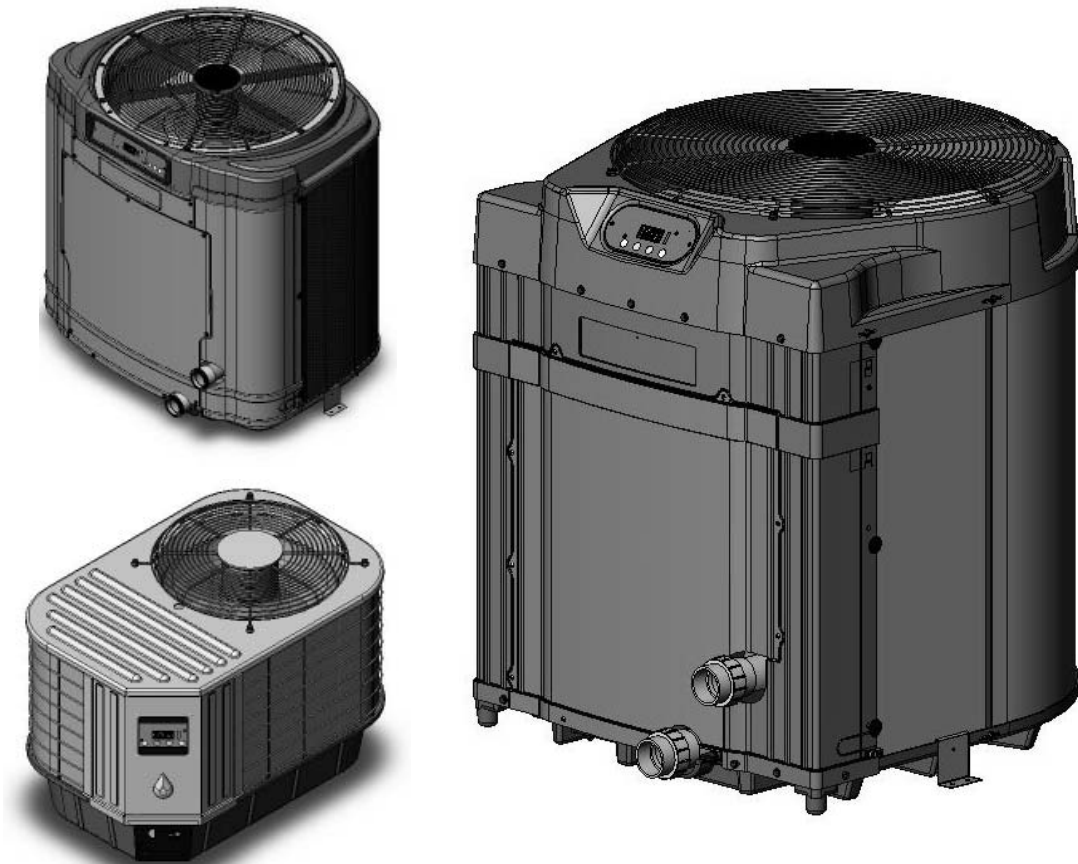


# AquaCal AutoPilot Pool & Spa Heat Pump

## Owner's Manual and Installation Guide

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MODEL / SERIAL NUMBER



Attention Installer: This manual is purchaser's property; leave with heat pump owner!





## TABLE OF CONTENTS

WELCOME TO THE TEAM -----	5
HEAT PUMP OPTIONS -----	6
HOW A HEAT PUMP WORKS -----	7
SAFETY INFORMATION -----	8
QUICK START & STOP -----	10
HEATER CONTROLS -----	12
Control Panel Layout -----	12
Buttons, Lights, and Display -----	12
Operational & Programming Codes -----	13
Owner-Level Programming (complete) -----	14
MAINTENANCE AND GENERAL OPERATION -----	18
General Maintenance -----	18
Safety During Cleaning Operations -----	18
Maintaining Proper Water Flow -----	19
Controlling Water Chemistry -----	19
Controlling Irrigation and Storm Water Run Off -----	20
Maintaining Clearances Around Heater -----	20

*(Continued on Next Page)*

# TABLE OF CONTENTS

(CONTINUED)

## MAINTENANCE AND GENERAL OPERATION...CONTINUED:

Heating Tips -----	21
Heating in Cooler Weather -----	21
Pool/Spa Blankets -----	21
Pool & Spa Combination Heating -----	21
Spa Set-Back Option -----	21
Calculating Initial Heating Time -----	22
Seasonal Use & Shut Down -----	23
(Use) During the Swim Season -----	23
Freeze Protection and Winterizing Requirements -----	23
Winterizing Procedure -----	24
AquaCal Preventive Maintenance Program -----	25
TROUBLESHOOTING (No Op, No heat, Water from Unit) -----	26
Troubleshooting Flowcharts -----	27
INSTALLER-SPECIFIC INFORMATION (Installation & Set Up) -----	30
Installer-Specific Table of Contents -----	31
CONTACTING THE FACTORY -----	58

# Welcome to the Team



## Dear Owner:

Congratulations on your wise decision to make an AquaCal heat pump part of your home. Since 1981, AquaCal has been recognized as the worldwide leader in the manufacture of swimming pool & spa heat pumps. Your new heat pump is not only a great investment, but also the most cost efficient method available for heating pools and spas. For example, your heat pump is up to 400% more efficient than gas, and, when compared to electric resistance heat, your heat pump is nearly 600% more effective. You can rest assured your new heat pump is of the highest quality and efficiency, and is designed and built to provide years of trouble-free operation.

Moreover, should you ever require help in using or maintaining your heat pump, you will find AquaCal's customer and technical support staff to be the largest, most qualified, and—of utmost importance—the *most easily accessed* customer service team in the pool & spa heat pump industry.

**“You can rest assured knowing your new heat pump is of the highest quality and efficiency, and is designed and built to provide years of trouble-free operation.”**

# Heat Pump Options



## ThermoLink® Heat Exchanger

The heart of your heat pump is the patented ThermoLink® heat exchanger. One of the primary causes of premature heat pump demise is the failure of the heat exchanger. Ordinary heat exchangers are made from a cupronickel alloy. This cupronickel material is susceptible to attack from the sanitizers used in pools and spas and from other related water chemistry conditions. Once the heat exchanger fails, the heat pump is ruined. The ThermoLink® heat exchanger tube is made from titanium, and is virtually impervious to water chemistry damage.

## Microprocessor Controller

Digitally-based microprocessor controls water temperature to within 1° Fahrenheit of set point. Controller also permits user to predefine different pool and spa water temperatures, and to prevent tampering by locking out controls via a pass code. The microprocessor controller also provides superior defrost control, and self diagnostics.

## Scroll Compressor

50% fewer moving parts than standard piston-type compressors. This equates to much improved reliability and improved efficiency. Scroll compressors are also much quieter in operation than their piston-type counterparts. And, while *all* AquaCal heat pumps are known for their low operating noise levels, it's very likely your heat pump will be quieter than any other item on the pool equipment pad.

## Corrosion-Proof Cabinet

The cabinet, being made from resilient, UV-Protected ABS material, has superior fade resistance and can never rust or corrode. You can expect the cabinet to retain a like-new appearance with only an occasional wash down and—if so desired—a quick waxing.

## Heat & Cool Capability\*

Puts you in full control, year round... Warms your pool or spa with the reliability and efficiency of our other heat pumps, but, with the flip of a switch, can also cool your pool or spa to refreshing temperatures during hot summer months. For cooler climates, Heat & Cool heat pumps offer unique advantages over passive defrost models. Please read more below...

## Hot Gas Defrost\*

Hot gas defrost heat pumps are uniquely equipped for an *active* defrost cycle. Active defrost involves directing hot refrigerant vapor to the heat collector, melting accumulated ice away in a matter of a few minutes... then right back to heating. Standard defrost heat pumps may remain "off in defrost" for extended periods during very cold weather. Because of their ability to continue to operate—even during freezing weather—hot gas defrost models extend the swimming season longer than *any* standard-defrost heat pump.

*\* These features available in Icebreaker® Models Only.*

PLEASE READ FURTHER TO BECOME FAMILIAR WITH ALL THE FEATURES, THE SAFE OPERATION, AND THE CARE OF YOUR NEW HEAT PUMP.

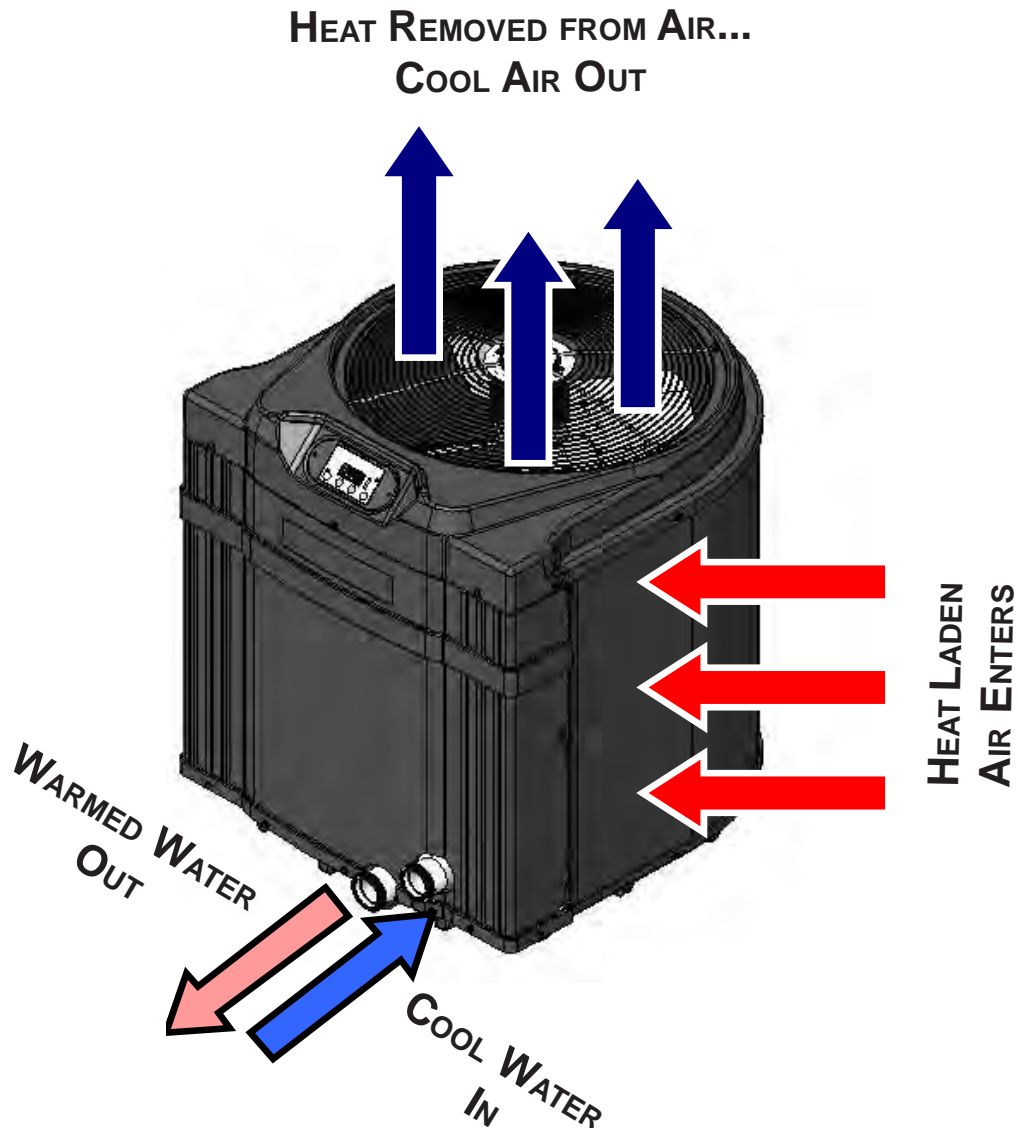
# HOW A HEAT PUMP WORKS

THE FOLLOWING EXPLANATION IS PROVIDED TO HELP YOU IN UNDERSTANDING WHAT TO EXPECT FROM YOUR HEAT PUMP...

## A Heat Pump Does Not Make Heat...

Heat pumps are so extraordinarily efficient because they do not need to *produce* heat in order to warm pool or spa water. Rather, heat pumps simply *transfer* heat from the outside air into the water.

If one considers Absolute Zero (*the point where all heat is absent*) occurs at  $-459^{\circ}$  Fahrenheit, it becomes evident outside air, even at the relative cool temperature of  $55^{\circ}$  Fahrenheit, still contains large amounts of heat energy. It is that abundant heat energy a heat pump captures and places into your pool or spa.



# SAFETY INFORMATION

Used and maintained properly, your heat pump will provide year-upon-year of safe and economical service. However, as with any mechanical or electrical device, to get the most from your heat pump—while insuring 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 heat pump must be performed only by experienced service personnel. Should you, the owner, suspect your heat pump is not performing properly, by referring to the section in this manual entitled: "Troubleshooting," you will be able to determine if a call for service is required. Your installer can be one source of service, or AquaCal Customer Support personnel stand ready to assist you at: (727) 823-5642. For questions concerning installation, modifications, operation, service and upkeep, please contact your installer or AquaCal Customer Support. Warranties may be voided if the heater has been used, maintained, or repaired improperly.

In addition to voiding the manufacturer's warranty... unapproved installation methods, nonstandard modifications, poor or incorrect maintenance, service by unqualified personnel, or improper use of the heater 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 heat pump and within this manual.

## Safety Signals

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

### **WARNING !**

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

"Warning" signal appears in this manual where special attention is required for personal safety. (*Specific instructions will appear in this box.*)

### **CAUTION !**

Failure to heed the following may result in equipment damage.

"Caution" signal appears in this manual where special care is required to avoid equipment damage. (*Specific instructions will appear in this box.*)



## Notice: Heater NOT Repairable by Owner

### **WARNING !**

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

Heat pumps contain no owner-repairable components. Repairs must not be attempted by untrained and/or unqualified individuals. If service is deemed necessary, contact installing dealer or AquaCal Customer Support at (727) 823-5642.

## Refrigerant Circuit Service Only by Qualified, EPA Certified Technician

### **WARNING !**

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

Heater contains refrigerant under pressure. Repairs to the refrigerant circuit must not be attempted by untrained and/or unqualified individuals. Service must be performed only by qualified HVAC technicians. Recover refrigerant before opening system.

## Water Temperature Safety

### **WARNING !**

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

Prolonged immersion in water warmer than normal body temperature may cause a condition known as HYPERTHERMIA. The symptoms of hyperthermia include: unawareness of impending hazard, failure to perceive heat, failure to recognize the need to exit the spa, and unconsciousness. The use of alcohol, drugs, or medication can greatly increase the risk of fatal hyperthermia. In addition, persons having an adverse medical history, or pregnant women, should consult a physician before using a hot tub or spa. Children and the extreme elderly should be supervised by a responsible adult.

## Water Chemistry Safety

### **WARNING !**

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

Improper water chemistry can present a serious health hazard. To avoid possible hazards, maintain Pool/Spa water per standards detailed later in this manual.

### **CAUTION !**

Failure to heed the following can result in damage to equipment.

While your heat pump's titanium-based heat exchanger provides nearly impervious protection against poor water chemistry, improper water chemistry may cause expensive damage to pump, filter, pool shell, etc. To avoid equipment damage, maintain Pool/Spa water per standards detailed later in this manual.

# Getting Started

## HEATING- QUICK START & STOP

This brief information is provided as an aid to installers, service personnel, and owners. The intent of this section is to provide rapid access to very basic operational information. Individuals who will be routinely using, installing, maintaining, and servicing this heat pump, are strongly encouraged to read this entire manual. Herein, the terms: *Heat Pump*, *Heater*, and *Unit* are used synonymously. **These instructions are intended for local control of a heat pump, independent of an external controller. Owners: if your installation includes an external controller, contact your installing dealer, or the external controller manufacturer, for external controller operating instructions.**

These instructions are for quick-starting in the HEATING mode... **Owners of Heat-Cool units**, in order to utilize all features of their heater, may want to also refer to: Owner Level Programming, beginning on page-14 of this manual.

### 1. Verify Electrical Power is Present at Heater:

- A. Ensure that the unit has electrical power connected; the heater controller display should be illuminated.
- B. If the display is blank, be certain the electrical breaker, and heater disconnect, are switched to "ON."
- C. For now, leave the water circulation pump OFF.

### 2. Set the Heater Controls (Refer to Control Panel Layout, Pg-12):

OWNER- If heater is connected to a Call-Flex controller, also see "Selecting Call-Flex Pump Options," located on page-17 of this manual.

INSTALLER- Is heater connected to an external controller? If so, see external controller information located on pages 41 and 44 of this manual.

- A. The user/owner settings can be made without water flowing. Once the heater has electrical power connected, with water *not* flowing, the display should read FLO.
- B. Press the MODE button until the HEAT (HEA) indication displays. This action will enable the remaining programming keys.
- C. Using the POOL / SPA selector key, select the POOL mode. An illuminated POOL indicator light, located on the left side of the display, will confirm the POOL control has been selected. If heating *only* a spa, using the DOWN arrow key, lower the POOL temperature until OFF is displayed; then proceed to Step-"E."
- D. Use the UP / DOWN arrow keys to set the desired water temperature for the POOL water.
- E. If the heat pump will be used to heat a spa, use the POOL/SPA selector key to select SPA, then use the UP / DOWN arrow keys to set the desired water temperature for the SPA. An illuminated SPA indicator light, located on the left side of the display, will confirm the SPA control has been selected. If heating *only* a POOL, using the DOWN arrow key, lower the SPA temperature until OFF is displayed.
- F. The heat pump controls are now set to maintain the desired water temperature for the POOL and/or SPA.

*(Quick-Start & Stop Continued Next Page)*

## **HEATING-QUICK START & STOP** (continued):

### **3. To Begin Heating:**

- A. Verify MODE is set to: HEAT (HEA); then, depending on which body of water is to be heated, use the POOL / SPA selector key to select POOL or SPA.
- B. Position water valves to flow water from the pool or spa, through the heater, and back to the pool or spa.
- C. Start the water pump; the fan will start, and after 4-minute time delay the unit will begin heating. The selected body of water will be brought to temperature and maintained per the setting determined previously in: "Set the Heater Controls."
- D. In operation, whenever the actual (displayed) water temperature falls below the desired set point, after an initial time delay of 4-minutes, the unit will begin heating.

NOTE: THE HEATER CONTROLLER INCORPORATES AN ANTI-SHORT CYCLE TIME DELAY. SHOULD OPERATION BE INTERRUPTED, COMPRESSOR RESTART WILL BE DELAYED BY APPROXIMATELY 4-MINUTES.

### **4. Program Filter Pump Run Time:**

Most pool/spa systems utilize a timer or multifunction controller to manage filter pump run times. If your system incorporates such a device, follow the instructions below:

- A. It will be necessary to allow the filter pump to run continuously until the water has reached the desired temperature. If a timer controls the pool filter pump, it will be necessary to override the timer to allow 24-hr. operation.
- B. Once the desired temperature has been obtained (1-4 days), reset the pump control device. Colder months require longer running times - generally eight to twelve hours/day.
- C. A heat pump can only operate when the filter pump is running. Therefore, it may be necessary—during cooler weather—to extend the water pump's hours of daily operation. The increased run time is necessary in order to keep up with increased, weather-related heat losses.

### **5. Continuous Usage and Water Around Heater:**

Condensation... After the heat pump has been operating for some time, water may be observed surrounding the heater. The moisture seen is condensation produced as a normal by-product of transferring heat from the air into the pool or spa water. Quantities of 6-8 gallons of water produced per hour are common if the air humidity is high. Conversely, a low humidity condition may result in no condensation being produced. (If water around unit seems excessive, to troubleshoot, see page-26, "Water Coming from the Heat Pump.")

### **6. To Stop the Heat Pump:**

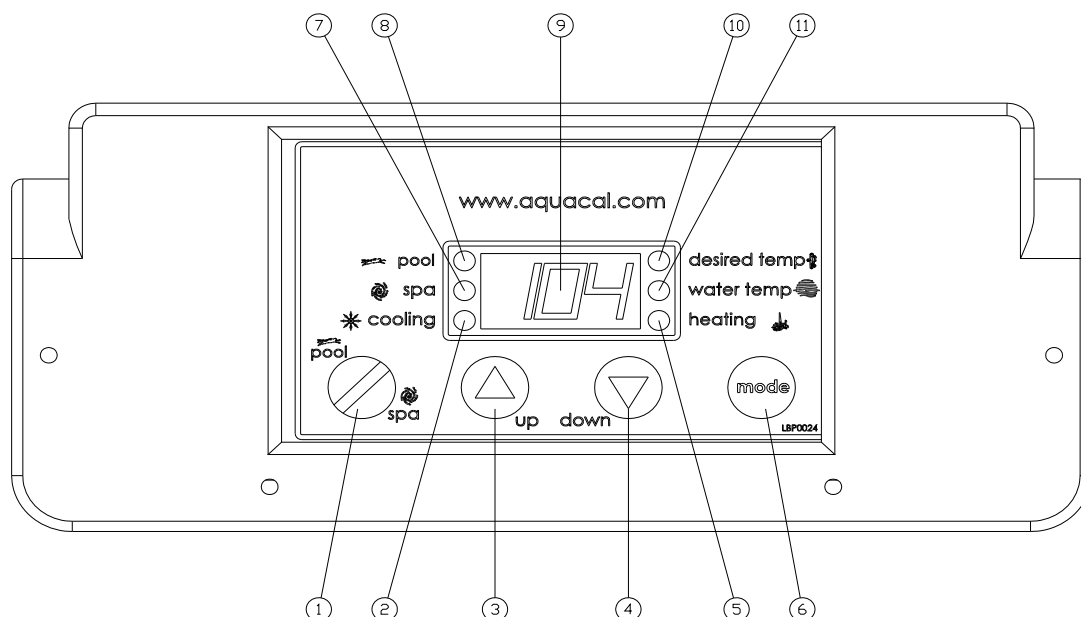
- A. Select: OFF via the MODE selector. This method of shut down preserves the controller settings;
- B. An interruption of water flow—such as when a pump timer is in control—will also halt heat pump operation.

*(End... Quick-Start & Stop)*

# HEATER CONTROLS

## Control Panel Layout

(APPEARANCE VARIES BY MODEL)



## Control Buttons, Indicator Lights, & Display

(AS INDICATED BY CIRCLED NUMBERS)

- 1) **POOL / SPA SELECTOR** – Selects either pool or spa thermostat.
- 2) **COOLING INDICATOR LIGHT** – Indicates unit is cooling. (Note: this light nonfunctional with heat-only models.)
- 3) **UP ARROW** – Increases temperature setting. (Maximum setting is 104 °F)
- 4) **DOWN ARROW** – Decreases temperature setting. (Minimum setting is 45 °F)
- 5) **HEATING INDICATOR LIGHT** – Indicates unit is heating.
- 6) **MODE SELECTOR** – Used to select between the Heating, Cooling, Auto-Changeover, and Off for Heat & Cool models. Used to select between Heating and Off for heat-only models.
- 7) **SPA INDICATOR LIGHT** – Indicates heater is referencing spa thermostat.
- 8) **POOL INDICATOR LIGHT** – Indicates heater is referencing pool thermostat.
- 9) **LED DISPLAY** – Displays water temperature when no keys are being pressed. Displays desired temperature when UP ARROW or DOWN ARROW is pressed. Also displays operational, programming, and fault codes as applicable.
- 10) **DESIRED TEMPERATURE LIGHT** – Indicates temperature set point is being displayed. Indicates temperature set point is being changed due to the UP ARROW or DOWN ARROW being pressed.
- 11) **WATER TEMPERATURE LIGHT** – Indicates current water temperature is being displayed.

# HEATER CONTROLS...continued

## Operational & Programming Codes

THE FOLLOWING CODES WILL BE DISPLAYED AS PART  
OF THE NORMAL OPERATION OR PROGRAMMING OF THE HEATER:

- FLO.....** No Water Flow Detected. This code appears whenever the circulating pump is off, or when the heater is not receiving correct water flow.
- OFF.....** System is Off. This code appears whenever heater has been turned off via the mode selector button, or when the temperature set point has been lowered below 45 °F.
- CFI.....** Celsius/Fahrenheit Selection. This is a programming entry point to select in which format the water temperature will be displayed.
- ULC.....** User Lock Code. This is a programming entry point; when activated, steps to the next menu level: ELC.
- ELC.....** Enter Lock Code. This a programming entry point; permits end user to select a secret code, thereby limiting access to the owner settings.
- CFO.....** Call Flex Options. This is a programming entry point; when used in conjunction with an AquaCal Call/Flex option kit, permits the use of CALL or FLEX options.
- FS.....** Heater in Defrost Mode (Applicable to Heat-Only Units, only). This code appears as a normal display during periods of lower air temperatures. Sequence follows:  
Heat-Only Defrost Sequence: Fan continues to run and compressor is off. Compressor will restart when air coil temperature rises to approximately 38°F.
- LOC.....** This is a Service Entry Point (not intended for use by the owner). The[LOC] code permits service personal to enter a factory code for access to adjustable calibration and site-dependant setup parameters. Service adjustments are available to authorized installation and service personnel, only.

### **CAUTION !**

Failure to heed the following may result in equipment damage and voiding of manufacturer's warranty.

Heat pumps contain no owner-serviceable components. Owner-initiated adjustments, beyond the controller "LOC" code, must not be attempted. If adjustments are deemed necessary, the owner should contact installing dealer or AquaCal Customer Support at (727-823-5642).

# HEATER CONTROLS...continued

## Start Up & Setting Operating Controls Owner-Level Programming Instructions

This section covers features and settings typically accessed first by the installer, and also accessible to the owner/operator. These features reside at the Level-1 access point within the microprocessor. Note: if preferred, all programming may be performed without water flow, waiting to start the water pump as the last step in the set up and run process.

### 1. Applying Power to The Controller:

- A. When power is first applied, the controller performs a lamp test and the display will read [888]. Following [888] the software version will display briefly.
- B. The control will then display the actual water temperature, provided the circulating pump is operating, and adequate water is flowing through the heater.
- C. If the pool-circulating pump is off, the control will display: [FLO]. This code message indicates no (or insufficient) water is being circulated through the heat pump.

### 2. MODE Controls Explained, and Starting the Heat Pump

Once electrical power is supplied to the heat pump, sufficient water is circulating, and the heater controller has successfully completed its self-test, the heater is ready to operate. The heat pump has four controller operating "Modes"; OFF, HEAT, COOL\*, and ACH\* (Auto-Change Over).

OFF - The heat pump is shipped in the OFF mode. When the heat pump MODE is set to OFF, the current water temperature will be displayed and no functions, values, or programming will be available for adjustment. If there is insufficient water flow, the unit will display FLO.

HEAT - To turn the unit on in heat only mode, press the mode button to HEAT. The display will show the actual water temperature. Press the UP ARROW key to set the desired temperature. After the desired temperature is set, the unit will again display the actual water temperature. If the set temperature is above the actual water temperature, the heat pump will start and continue to heat until the desired temperature is reached. The heat pump will periodically turn on, calling for heat as needed in order to maintain the set temperature until the mode is changed back to OFF. PLEASE NOTE - both the compressor and the fan must be operating before the "Heating" LED will illuminate.

COOL\* - To turn the unit on in cooling mode, press the mode button to COOL. The display will show the actual water temperature. Press the UP ARROW key to set the desired temperature. After the desired temperature is set, the unit will again display the actual water temperature. If the set temperature is below the actual water temperature, the heat pump will start and continue to cool the water until the desired temperature is reached. The heat pump will periodically turn on to cool the water as needed until the mode is changed back to OFF.

ACH\* - To have the heat pump maintain a particular temperature, regardless of the temperature of the water, press the mode button to ACH. The heat pump will turn on in either heat or cooling mode to maintain that temperature as needed until the heat pump mode is changed to OFF.

### 3. Turning The Heat Pump Off:

- A. Method 1: using the [MODE] key, press the key until the display reads "OFF" The heater will shut off and remain off until the [MODE] key is used to select an operational mode. **This is the preferred method for shutting off the heat pump.**

\* *These features available in Icebreaker® Models Only.* (Continued on Next Page)

# **HEATER CONTROLS...continued**

## **Start Up & Setting Operating Controls Owner-Level Programming Instructions... continued:**

### **3. Turning The Heat Pump Off... continued:**

- B. Method 2: using the DOWN key, press the key until the desired water temperature reaches 45°F (minimum setting); then, press the DOWN key one more time, causing the display to read "OFF".

### **4. Selecting Pool/Spa Thermostat Settings:**

- A. Press the [POOL/SPA] key to toggle between the pool and the spa temperature set points.
- B. The pool/spa LED indicator lights, located to the left of the temperature display, will confirm the selected set point.

### **5. Changing The Pool Temperature Set Point:**

- A. Using the [POOL/SPA] key, select the POOL temperature set point. The pool set point indicator light will confirm the selection.
- B. The pool temperature set point is adjustable from a minimum of 45°F to a maximum of 104°F. Pressing the [UP ARROW] key will raise the set point 1-degree for every push of the button. Pressing the [DOWN ARROW] key will lower the set point 1-degree for every push of the button.

### **6. Changing The Spa Temperature Set Point:**

- A. Using the [POOL/SPA] key, select the SPA temperature set point. The spa set point indicator light will confirm the selection.
- B. The spa temperature set point is adjustable from a minimum of 45°F to a maximum of 104°F. Pressing the [UP ARROW] key will raise the set point 1-degree for every push of the button. Pressing the [DOWN ARROW] key will lower the set point 1-degree for every push of the button.

### **7. Selecting Between °F and °C:**

- A. Simultaneously press and hold both the [UP ARROW] and [DOWN ARROW] keys until [CF1] (Celsius / Fahrenheit) code appears.
- B. With the [CF1] code displayed, pressing the [UP ARROW] or [DOWN ARROW] keys will change the selection code to either "0" or "1". Select "1" for Fahrenheit temperature display, or "0" for Celsius temperature display. Once the desired temperature display mode has been selected, not pressing any buttons for 15-seconds will allow the controller to save the selection and return to the normal operating mode. Pressing the [POOL/SPA] key will also save the selection and step to the next menu parameter: [ULC] (User Lock Code).

### **8. User Lock Code Option [ULC]:**

#### This Option Explained:

Heat pumps are shipped from the factory with the [ULC] option disabled. Enabling the [ULC] function permits the heat pump owner to restrict access to the unit's controls. With the [ULC] function enabled, unless the correct ULC code number is entered, changes to Level-1 programming are not possible. (I.e.: Altering temperature set points, Pool/Spa selection, C/F display changes, etc., will not be possible). The [ULC] option can be thought of as an electronic lockable cover for the controls.

*(Continued on Next Page)*

# HEATER CONTROLS...continued

## Start Up & Setting Operating Controls

### Owner-Level Programming Instructions... continued:

#### 8. User Lock Code Option [ULC]...continued:

##### A. Selecting ULC Option:

- 1) Press either the UP or DOWN ARROW keys; if “LOC” is momentarily displayed followed by “0”, the ULC feature is enabled. If “0” displays proceed to “6)” of this section; otherwise, see number “2,” below.
- 2) Simultaneously press and hold both the [UP ARROW] and [DOWN ARROW] keys until [CF1] (Celsius / Fahrenheit) code appears.
- 3) Press the [POOL/SPA] key once to display [ULC].
- 4) With [ULC] displayed, pressing either the Up or Down Arrow key will display either “1” or “0”. Selecting “0” will allow the keypad to remain unlocked. Selecting “1” will enable the User Lock Code option. Then, to enter a lock code number, press the [POOL/SPA] key once to display [ELC] (Enter Lock Code).
- 5) With [ELC] displayed, use the Up or Down arrow keys to select a lock code. The code can be any number from “00” to “99”. The factory set lock code is “0”. Not pressing any buttons for 15-seconds will allow the controller to save the selection and return to the normal operating mode. Pressing the {POOL/SPA} key will also save the selection, and will step the controller to the next menu parameter: [CFO] (Call Flex Options).
- 6) Once the ULC option has been enabled, pressing any key will momentarily display “LOC” followed by “0” (prompting the entry of the correct lock code number). To gain access to the controller:
  - a. Using the [UP ARROW] key, scroll to the correct lock code number, then;
  - b. Press the [POOL/SPA] key... Current water temperature will be displayed... Control setting can now be viewed or changed as desired.
  - c. After a period of approximately four (4) minutes, during which time no buttons have been pressed, the controller will automatically return to the locked mode. Provided ULC selection is set to “1,” the controller will always fail-safe in the locked mode.
  - d. Without knowledge of the correct lock code, and with the ULC enabled, control adjustments will not be possible. **Be certain to record your lock code in a safe place.** The lock code may be changed any number of times by following the instructions detailed in this section.

##### B. De-Activating the User Lock Code [ULC] function:

- 1) Following the instructions detailed previously at: “8, 6)”, press any key and enter the user lock code number; then press the [POOL/SPA] key.
- 2) Immediately following the entry of the user lock code, simultaneously press and hold the [UP ARROW] and [DOWN ARROW] keys until the code [CF1] appears on the display.
- 3) Then, use the [POOL/SPA] key to scroll to the [ULC] message; press the [DOWN ARROW] key to change the display to “0”. This will disable the User lock function.

*(ULC Continued on Next Page)*



# HEATER CONTROLS...continued

## Start Up & Setting Operating Controls

### Owner-Level Programming Instructions... continued:

#### C. User Lock Code is Activated, but Pass Number is Not Known (“Back Door Entry”):

Note: Should the ULC option be enabled, and a lock code number other than the factory default (0) be installed but is unknown, the following procedure may be followed to regain controller programming access:

- 1) Simultaneously press and hold the [POOL/SPA] and [UP ARROW] keys until the display shows “888”. This operation will reset the controller to the factory default settings.
- 2) When reset to the factory default settings the user lock code [ULC] is deactivated and the user lock code number [ELC] is reset to “0.”
- 3) In addition, **all other settings are returned to the factory defaults**. If an external controller is in use, contact AquaCal Technical Support Group (727-823-5642); ask for assistance with re-configuring the controller for use with an external controller.

#### 9. **Selecting Call-Flex Pump Options [CFO]:**

##### General Information:

The Call-Flex option automatically extends or overrides the run time of the water circulator pump, and heater, based upon changing weather conditions. Without Call-Flex, as weather conditions grow progressively cooler during winter months, or when unusually cold weather occurs, the run duration of the circulator pump may require manual adjustments to permit the heater to maintain or regain desired water temperature (the water pump must be running in order for the heater to operate). Likewise, without Call-Flex, one must remember to reset the pump run controls following the cold weather event. The Call-Flex option greatly reduces the need for seasonal, manually made, pump run time adjustments. **Call-Flex is a dealer-installed option that does not come with every heater**; if unsure, check with the installing dealer to determine if a call-flex kit was part of the original installation. If Call-Flex was not part of the installation, and you would like to have Call-Flex added, your dealer can do so...contact the installing dealer.

If the installation is equipped with the Call-Flex option, the following steps are used to control the Call-Flex features:

- A. Simultaneously press and hold the [UP ARROW] and [DOWN ARROW] keys until the display shows “CF1”. Press the [POOL/SPA] key three times to scroll the display to [CFO].
- B. With the [CFO] (Call-Flex Options) code displayed, use the Up or Down keys to select “0” to disable the Call Flex Options, “1” to enable the Call Option, or “2” to enable the Flex Option. Not pressing any buttons for 15-seconds will allow the controller to save the selection and return to the normal operating mode. Pressing the {POOL/SPA} key will also save the selection, and will step the controller to the next menu parameter: [LOC] (Service Lock Code).
- C. For further information, please refer to Call-Flex installation instructions, shipped with the Call-Flex kit. For additional copies of these instructions, contact the AquaCal Customer Support (727-823-5642).

*(End... Owner-Level Programming Instructions)*

# MAINTENANCE & OPERATIONAL RECOMMENDATIONS

The information in this section is written primarily for the Home Owner, but may also apply to servicing dealers or HVAC service centers. This section contains information concerning planned maintenance, proper water flow, maintaining proper clearances, as well as other vital information. Please read this section now, and before calling AquaCal Customer Support (727-823-5642).

## **General Maintenance**

Heat pumps should be inspected and maintained on an annual basis by a qualified swimming pool heat pump specialist. Additionally, if the heat pump is located near the beach or coastal area, where salt spray and sand can become detrimental factors, more frequent service may be necessary. For service plan information, please see: Planned Maintenance Program, later in this section, and then contact AquaCal Customer Support at: 727-823-5642.

While annual maintenance is recommended to maintain your warranty, if you choose not to participate in the Planned Maintenance Program, rinsing the air coil regularly, and keeping the base of the unit clear of leaves and debris is a necessity.

Should you as the owner desire to perform the coil rinsing and other cosmetic care of the heat pump, please contact AquaCal Customer Support: 1-727-823-5642; request the document titled: "Appearance Care for Air-Source Heat Pumps: Approved Method for Home Owners."

## **Safety During Cleaning Operations**

### **WARNING !**

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

POSSIBLE ELECTRIC SHOCK HAZARD . . . Should you decide to wash the heat pump via water hose, disconnect all power to the pool equipment pad- including, but not limited to: The heat pump, water pump, and any and all other electrical equipment. Do NOT spray water directly into electrical components. Do NOT restore electrical power until such time as all water has dried completely.

### **CAUTION !**

Failure to heed the following may result in damage to equipment.

Do not use a pressure cleaner to wash heat pump . . . . Damage to evaporator fins, as well as other components, will result.

# MAINTENANCE & OPERATION (continued)

## Maintain Proper Water Flow

- It is important to operate and maintain the filter according to the manufacturer's specifications. As a filter gets dirty, the water flow to the heat pump is reduced. The higher the pressure on the filter gauge, the lower the flow rate.
- Similar to a dirty filter, large amounts of debris in the pump and skimmer baskets can reduce water flow. Keep baskets free of debris.
- Check for improper valve settings. A partially closed valve after the filter, or a full-open bypass around the heater, will cause insufficient water flow through heater.
- If the conditions listed above remain unresolved, the water flow through the heater may be reduced to a point where internal safety devices (i.e.: "HP" or "HP5") shut the heater off.
- Before calling for service, always check the filter, the pump basket, and water valve positions. If the problem persists, please call AquaCal Customer Support at: (727) 823-5642.

## Control Water Chemistry

- **IMPORTANT!** Your heat pump is engineered for exceptional durability and reliability. And, *this* unit's heat exchanger—being equipped with titanium tubing—will be nearly impervious to water chemistry damage. However, other components of the heater, and the remainder of the pool/spa equipment in general, may be susceptible to damage from prolonged exposure to unbalanced water chemistry. Likewise, bathers may be exposed to health risks if water chemistry is not properly maintained.
- For the longevity of the entire pool/spa installation, and for the safety of bathers, it is strongly recommended that the water chemistry be checked regularly and maintained within proper norms. Please see the table, below, for a complete listing of recommended water chemistry levels.

### RECOMMENDED WATER CHEMISTRY STANDARDS\*

Chlorine . . . . .	: 1.0 – 3.0 ppm in pools, 1.5 – 3.0 ppm in spas
Bromine . . . . .	: 2.0 – 4.0 ppm in pools, 3.0 – 5.0 ppm in spas
pH . . . . .	: 7.4 – 7.6 ppm in pools, 7.2 – 7.8 ppm in spas
Total Alkalinity . . . . .	: 80 – 140 ppm in pools, 80 – 120 ppm in spas
Calcium Hardness . . . . .	: 200 – 400 ppm in pools and spas
Total Dissolved Solids . . . . .	: 1,000 – 2,000 ppm in pools, 1,500 ppm above start-up TDS in spas

\* STANDARDS FOR COMMERCIAL APPLICATIONS MAY VARY LOCAL-TO-LOCAL...  
ALWAYS MAINTAIN WITHIN LIMITS ESTABLISHED BY AUTHORITY HAVING JURISDICTION.

### CAUTION- Pool/Spa Refinishing Operations

During pool refinishing or acid cleaning, the water flow through the heater must be shut off. Water flow to the heater must remain off until water chemistry is once again in balance and the water is clear in appearance. Failure to follow these instructions may void heater warranty.

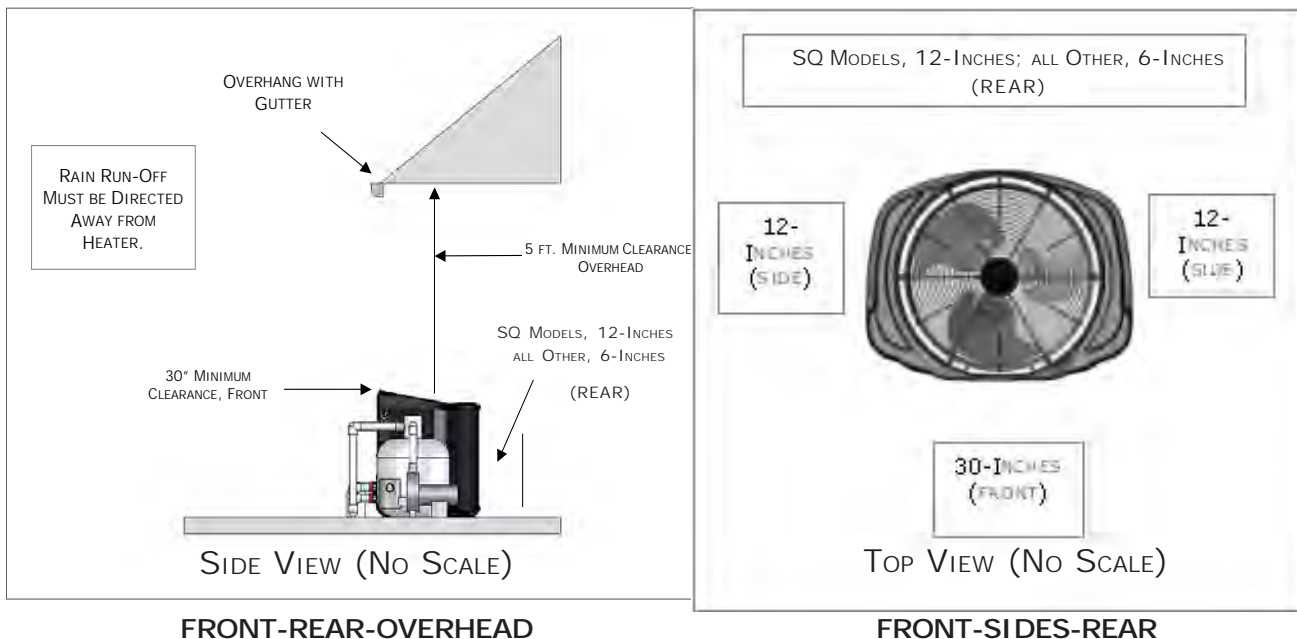
# MAINTENANCE & OPERATION (continued)

## Control Irrigation and Storm Run Off

- Control Irrigation: Irrigation water spray can damage heater components. Regardless of water quality, it is important that irrigation be directed away from the heat pump.
- Prevent rain water runoff from pouring directly into the heater. The heater is designed to withstand normal rainfall, but solid streams of water from roof drip-lines may eventually damage heat pump components.
- If the heat pump resides beneath a roof edge, to promote heat pump longevity, a rain leader (gutter), or rain shield, will be necessary.

## Maintain Proper Clearances Around Heater

- For maximum efficiency, proper air flow clearances around heater must be maintained.
- It is important to keep the area immediately adjacent to the heat pump clear of items such as shrubs and bushes, lawn furniture, chemicals containers, etc. These items can prevent air from circulating fully through the heater, and will result in inefficient operation or damage to the heat pump.
- In addition, do not place objects on top of the heat pump; doing so will block the air from exiting the heater, and will result in damage to the compressor and fan motor.
- Proper clearances are also necessary in order to access the working parts of your heater. A heater that is easy to "get to," will be a heater that is easy to maintain; service and maintenance personnel will thank you for keeping the area around your heater unobstructed.
- Please see diagrams, below, for specific clearance requirements.



# MAINTENANCE & OPERATION (continued)

## Heating Tips

### Heating in Cooler Weather...

Late night and early morning, generally being the coolest times of the day, are least efficient for heating. For most efficient heating operation, heat pumps should be timed to operate during the warmest, daylight portions of the day. Conversely, if cooling a pool, it is best to run the equipment at night. Please set water pump and heat pump controls accordingly.

### Pool/Spa Blankets...

A “solar” blanket will significantly reduce your heating bills. Check with the installing dealer to see if your heat pump was sized to be used in conjunction with a blanket. Blanketed pools will typically lose only 3 - 4° of heat per night versus 8 - 10° overnight with an un-blanketed pool. Reductions of 40-60% on heating bills can be achieved by using blankets. (Idea...Contact AquaCal Customer Support (727-823-5642) to learn about Liquid Blanket innovations.)

## **WARNING !**

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

Improperly used, Pool-Spa blankets can become a drowning risk to people and pets. Blankets are not safety covers. They are not designed to support the weight of a person or pet. Never enter a pool until the blanket is completely removed (under no circumstances should anyone swim under the blanket). Follow all safety recommendations of the blanket manufacturer.

### Pool and Spa Combination Heating...

Everything stated for heating a pool applies for heating a spa—only the volume of water being heated is different. Your heat pump comes equipped with two thermostats. One thermostat is for the pool and the other is for the spa. Simply position the pool and spa isolation valves as directed by your installer; select the appropriate thermostat (pool or spa), whichever you are heating, and with electrical power and water flow supplied to the heater, the water will be maintained at set point.

Your system can be automated with the addition of an optional External Flow Switch Kit (P.N. 0040S). Using this option will save you from having to change the thermostat selector switch each time you change from pool-to-spa and back again. Or, add a Universal Heater Controller (P.N. 0097TS) and gain not only automatic thermostat switching, but also automated spa/pool water valve operation. For details, contact the installer, the distributing dealer, or AquaCal Customer Support (727-823-5642).

### Spa Heating & Spa Setback Option...

Air blowing into your spa, while it is being brought to temperature, will very often neutralize or partially counteract the heat being put into the spa by the heater; this added heat loss equates to increased time to bring your spa to desired temperature. When heating a spa, be sure to turn off the air blower. Air induced through the spa jets should also be eliminated, during warm-up, whenever possible.

If your heater is being used to *only* heat a spa, the POOL thermostat can be used as a setback control: simply set the pool control at a point 10-15° F below desired spa heat temperature and select the pool thermostat. This method allows the spa—when not in use—to be held at a heated temperature, but somewhat lower than normal spa-use temperature. One would want to blanket the spa if using this setback method. Using spa setback will result in reduced warm up periods over full, cold starts.

# MAINTENANCE & OPERATION (continued)

## Calculating Initial Heating Time

The time it takes to initially warm your pool or spa depends on several factors.

First, determine how many gallons of water are to be heated. Knowing this, you can then compute the equivalent pounds of water involved, and the BTU's necessary to heat the volume of water to the desired temperature.

Next, find the approximate BTU output of your heat pump at the current ambient air temperature; see product literature at: [www.aquacal.com](http://www.aquacal.com), or contact AquaCal Customer Support (727-823-5642).

Finally, decide upon the temperature at which you plan to maintain your pool or spa.

The following work sheet can be used to calculate approximately how long it will take your heater to bring your pool or spa up to temperature. Keep in mind heating times will vary somewhat due to weather conditions during the period that the heater is in use; use of a pool blanket can dramatically improve heat up and heat maintenance performance.

---

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Pool Volume (Length X Width X Average Depth) = \_\_\_\_\_ Pool Cubic Feet

X Gallons per cubic ft.(7.5) = \_\_\_\_\_ Pool Gallonage

X Pounds per Gallon (8.3) = \_\_\_\_\_ Pounds of Water

How many degrees do you want to raise the temperature of the pool?

# of Degrees \_\_\_\_\_ X Pounds of Water (per above) = \_\_\_\_\_ BTU's Required

BTU's Required (per above) \_\_\_\_\_ ÷ BTU Output of Heater = \_\_\_\_\_ Hrs. of Operation

Optional Cold Weather Adjustment Factor:

Hrs. of Operation (per above) \_\_\_\_\_ X 1.25 (60° F outside air (O.A.) Temperature Factor) =

\_\_\_\_\_ Hrs. of Operation at 60° F O.A.

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## At Start Up: Continuous Circulation Pump Operation Required

When starting a heat pump for the first time, it must be permitted to operate, continuously, until the desired water temperature is attained. This may take several hours, to several days, depending upon the size of the pool or spa and weather conditions.

If a time clock or similar device controls the operating times of the water circulation pump, temporarily override the water pump controller, allowing for 24-hour, continuous water pump operation.

Once the body of water has reached the desired temperature, the water pump controller can be reset.

# MAINTENANCE & OPERATION (continued)

## Seasonal Use & Shut Down

### During the Swim Season:

- During the swim season, even if the pool or spa is not in use, allow water to flow through the heater. Doing so eliminates the need to reposition valves when you do wish to heat the pool or spa.
- During periods when heating or cooling is not desired, leave heater controls in the OFF position.

# Important !!!

## Information Critical to the Survival of Your Heater Follows...

### Freeze Protection & Extended Shut Down:

In areas where freezing conditions are a rare occurrence, allow the filtration system to run continuously throughout the freeze period. Typically, during light freeze conditions, circulating (moving) water will not freeze.

In areas where freezing conditions are prevalent and sustained, the heat pump MUST be winterized; please refer to winterizing instructions, below, and on the following pages.

### Winterizing for Hard Freeze Conditions:

## CAUTION !

Failure to heed the following can result in damage to equipment and/or property.

Failure to properly winterize heat pump may result in serious equipment damage. Freeze damage is not covered under the heat pump warranty.

## CAUTION !

Failure to heed the following can result in damage to equipment and/or property.

While the plumbing connections are in the winterized condition (not fully tightened), it is imperative pool/spa water not be circulated through the heat pump. Loss of water through loose plumbing connections may result in damage to circulating pump, pool/spa structure, and/or other equipment.

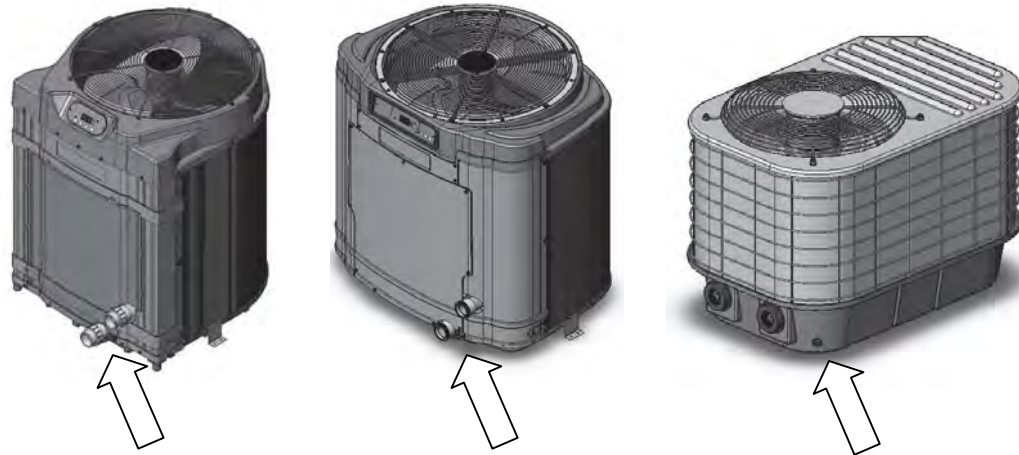
*(Winterizing continued on page following)*

## **MAINTENANCE & OPERATION** (continued)

### **Winterizing Procedure Continued:**

1. Disconnect all electrical power to the heater; turn OFF circulating pump.
2. At the two (2) connection unions, disconnect the plumbing to the heater (removal is counter-clockwise).
3. If your unit has an external drain plug, remove plug. This plug would be located at lower, front corner of heater. (position may vary between models). Allow water to drain out of the condensor. **DO NOT** replace plug until final winterizing step.

#### **Location of External Drain Plug will vary by model**



4. If no external drain plug is found, it will be necessary to open access panel and see if heat exchanger has an internal drain plug. If so, remove plug, and allow water to drain out of the condensor.

#### **Water Heat Exchangers**



**PLEASE NOTE** - If your heat pump contains an exchanger other than what is shown above, call AquaCal AutoPilot for alternate winterizing instructions.

5. Replace the winterizing plug; thread the plug in clockwise until just snug, then apply an additional 1/8 turn. To prevent insects and vermin from entering the plumbing during the winterized period, partially reconnect the two (2) plumbing connection unions: couple each union one or two threads; this will permit condensation to drain, but will prevent most insects and animals from entering the plumbing circuit.
- 6.. Next Season: To ready the heat pump for use, simply retighten plumbing connection unions. Hand-tight is generally sufficient.



## **MAINTENANCE & OPERATION** (continued)

### **Planned Maintenance Program**

Just as you would have yearly service performed on your air-conditioning system, regular inspection and maintenance of your AquaCal heat pump will insure highest operating efficiencies. A regularly maintained heater will protect your investment, and will potentially extend the useful life of your heat pump far beyond the warranty period. Our expertly trained factory service technicians offer comprehensive maintenance procedures designed to insure your heat pump—over the coming years—will continue to operate efficiently and reliably.\*

#### **The 20-Point Planned Maintenance Service Includes the Following:**

- > Check Water Flow
- > Clean Evaporator Coil
- > Check Relay Contacts
- > Check Capacitor Values
- > Check Refrigerant Levels
- > Clean Heat Pump Cabinet
- > Check Fan Blade Clearances
- > Check Flow/Pressure Switch
- > Check Electrical Connections
- > Check Proper Voltage To Unit
- > Oil Fan Motor (As Applicable)
- > Check Fan Motor Amperage Draw
- > Check Pool & Spa Water Chemistry
- > Check and Clean Condensate Drains
- > Check Compressor Amperage Draw
- > Check Water Pump Amperage Draw
- > Acid Wash Source Coil (As Applicable)
- > Check Air Temperature Change Through Evaporator
- > Check Operating Controls and Temperature Sensors
- > Check Water Temperature Change Through Condenser

We recommend Preventive Maintenance be performed starting one (1) year after the installation of the heater.

\* FACTORY PM SERVICE NOT AVAILABLE IN ALL REGIONS; PLEASE CONTACT AQUACAL CUSTOMER SUPPORT FOR ADDITIONAL INFORMATION (727) 823-5642.

# TROUBLESHOOTING

Also see page 51...  
"Error Codes"

## Heat Pump Fails to Operate...

### *Is the display illuminated?*

If not, ensure the main breaker (located at the power supply panel) and the disconnect switch (located near the heat pump) are both turned ON.

### *Is the code "FLO" displayed?*

If so, check to be sure that the circulating pump is operating and the filter is clean. There may also be a valve positioned incorrectly allowing water to bypass the heat pump. Be sure water is flowing through the heater.

### *Is the Pool or Spa thermostat selected for the correct body of water to be heated, have you tried selecting a higher temperature setting, and have you chosen the correct "Mode" of operation? (For icebreaker or Heat and Cool Models only) ?*

If not, the actual water temperature may be above that of the selected thermostat. Raise the desired water temperature above the actual water temperature; the fan should start, and after approximately four (4) minutes, the "Heating" light should illuminate. If the heat pump still fails to start, and the unit is not in defrost (heat-only unit defrost display code is: "FS"), contact AquaCal Customer Support: 727-823-5642.

## Heat Pump Running... but is it Heating?

### *Is the air blowing out of the top of the unit noticeably cooler than the surrounding air?*

(With heating indicator light illuminated, a 9°F to 12°F difference is typical.) If not, contact AquaCal for service at: 727-823-5642. But first, be sure all air coil surfaces are free from obstructions—low roof overhangs, landscaping, walls, fences, etc., can restrict air flow. The heat pump needs good airflow to operate at peak efficiency.

### *How many hours/day does the circulating pump operate?*

Cooler weather conditions, or heating to a higher than normal temperature, may necessitate running the heat pump for a longer period of time. Was the heater sized considering the use of a pool blanket (check with installing dealer)? A blanket can be useful in permitting shorter run times, in turn leading to substantial energy cost savings.

### *What is the outside air temperature?*

The heat pump may be in the defrost mode if air temperatures are below 50°F. With Heat-Only models, if the heater is in defrost, the code: "FS" will be displayed. If air temperatures are not cold, but the heater remains in defrost, contact AquaCal Customer Support at: 727-823-5642.

## Water Coming from the Heat Pump...

### *Is it a leak or just condensation from normal operation? Here's how to find out.*

Test the water draining out the heater base for the presence of the sanitizer being used in the pool or spa. Using a water test kit, or a test strip, check a sample of the water for chlorine or bromine. If the sample tests positive for sanitizer, call AquaCal for service at: 727-823-5642. If the test is negative, the water is probably harmless condensate.

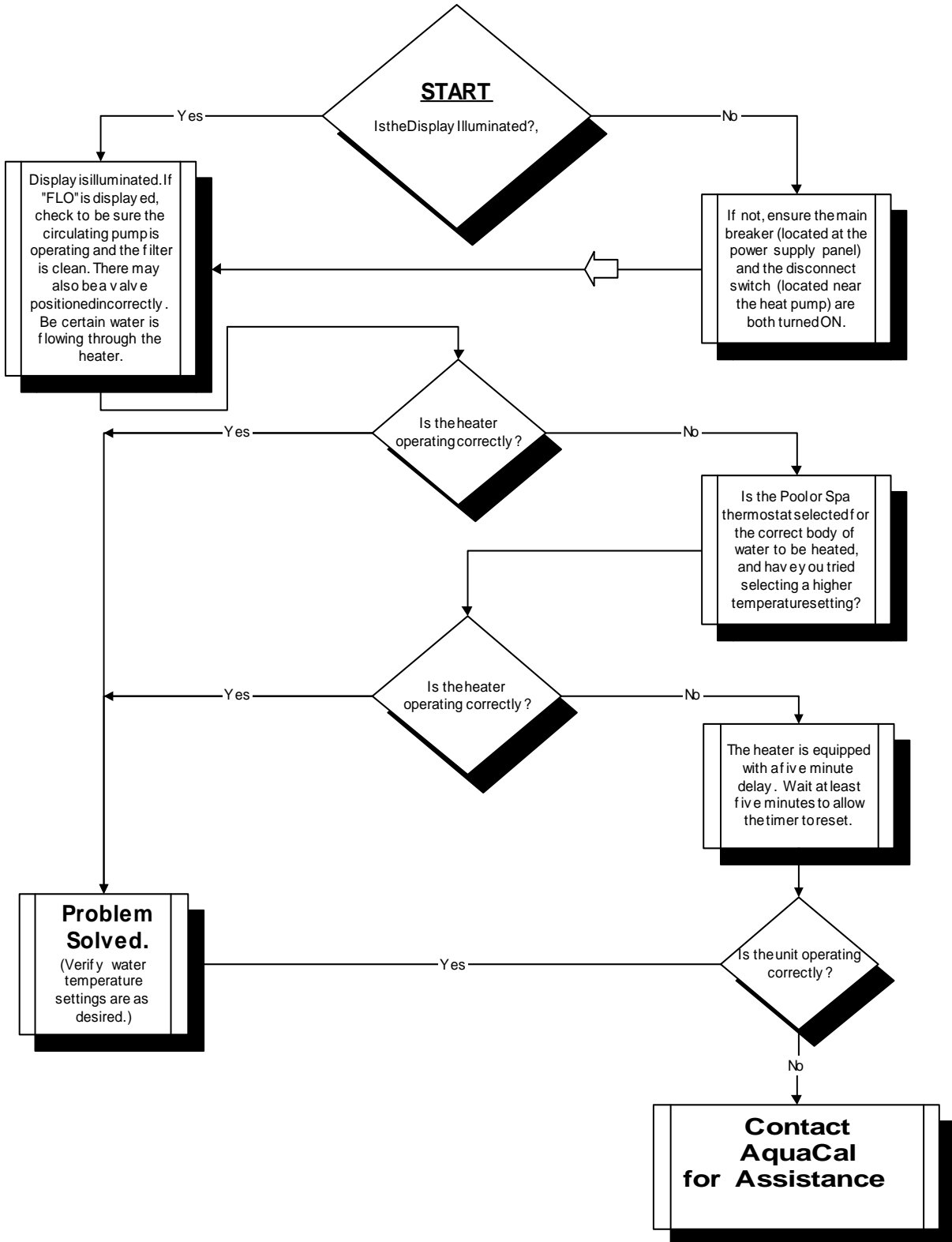
Or, as an alternate method, shut the heat pump off, leaving the circulation pump running. Within a few hours, there should be a marked reduction in the amount of water seen around the bottom of the heat pump. If the water appears to be drying up, the water is probably harmless condensate, indicative of normal operation.

**NOTE:** The water test method will not be effective if an ionizer or ozone generator is being used to produce the sanitizing agent.

**CAUTION!** If after testing, a water leak is suspected, immediately shut OFF the water pump and contact AquaCal Customer Support: 727-823-5642.

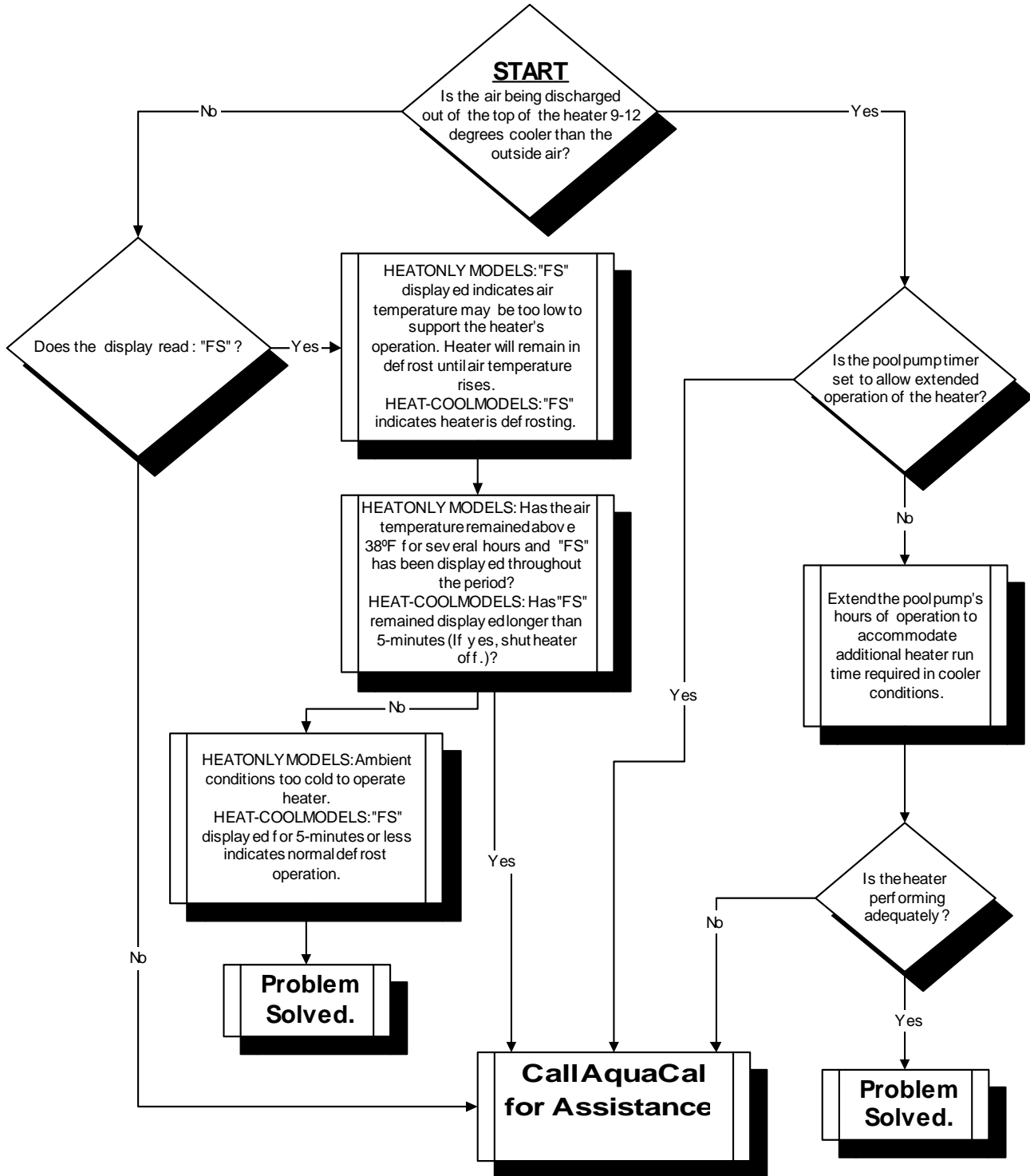
# TROUBLESHOOTING FLOWCHART

## Heat Pump Fails to Operate



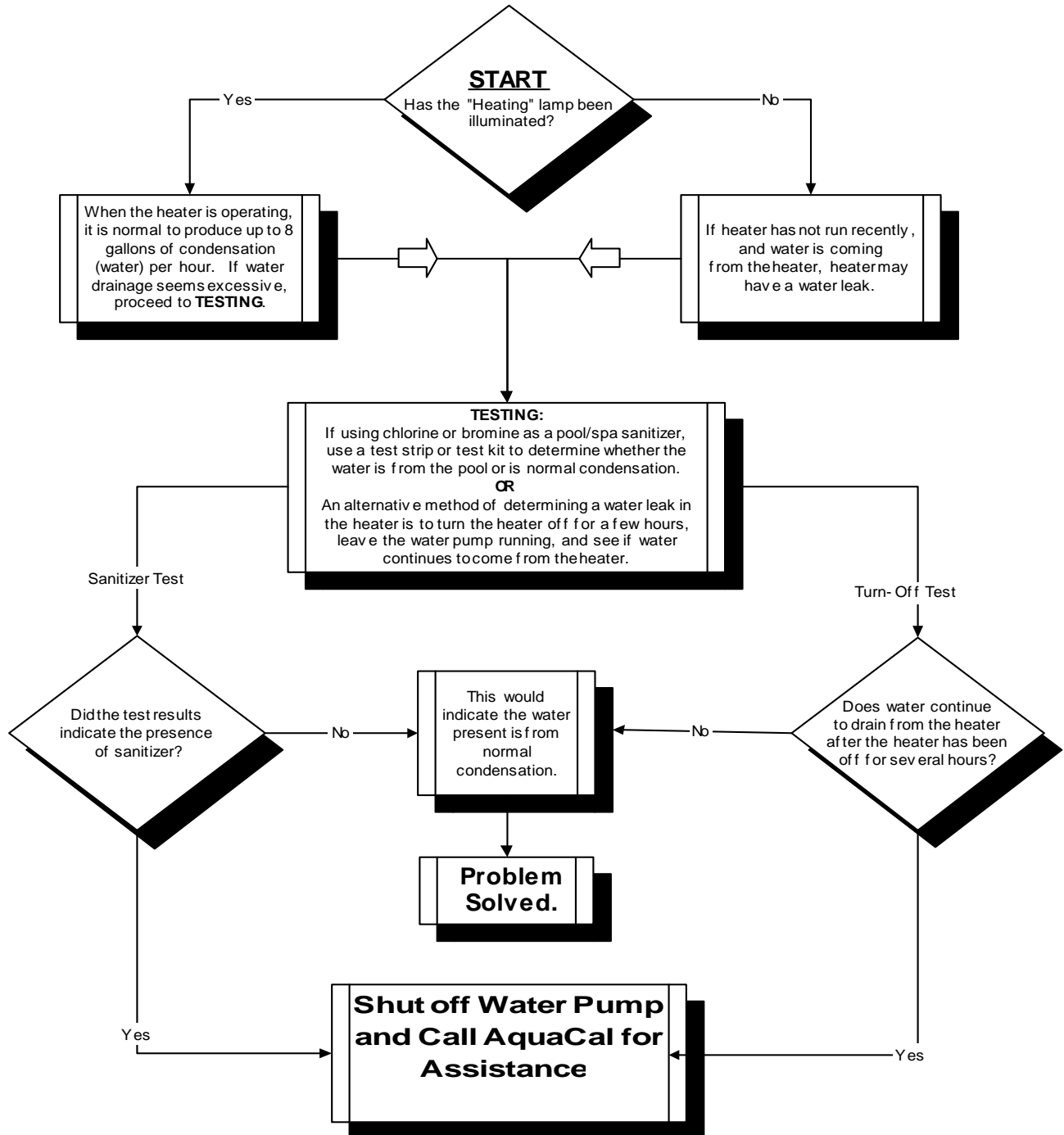
# TROUBLESHOOTING FLOWCHART

## Heat Pump Running... but is it Heating? (Assumes Heating Indicator Light is Illuminated)



# TROUBLESHOOTING FLOWCHART

## Water Coming from Heat Pump



# **AquaCal AutoPilot Pool & Spa Heat Pump**

Installation Specifications  
&  
Controls Configuration

**INSTALLER-SPECIFIC  
INFORMATION  
FOLLOWS**

# INSTALLER-SPECIFIC TABLE of CONTENTS

GENERAL SAFETY INFORMATION .....	33
DATA PLATE NOMENCLATURE .....	33
HEATER SPECIFICATIONS .....	34
Physical Characteristics (dimensional drawings) .....	34
INSTALLATION INSTRUCTIONS .....	39
Placement of Heater .....	39
Indoor Installations .....	39
Outdoor Installations .....	39
Required Clearances .....	39
Irrigation, Rain Runoff, and Landscape Factors .....	40
Equipment Mounting Pad Requirements .....	40
Anchoring heater to Pad .....	40
Plumbing Requirements .....	41
Overview .....	41
Approved Parts and Materials .....	41
In-Line Chlorinators (use and placement of) .....	41
Maintaining Ability to Winterize .....	41
Maximum Operating Pressure .....	41
Minimum-Maximum Water Flow Rates .....	41
In-Floor Cleaning Systems (special considerations) .....	42
Plumbing Schematics (layout drawings) .....	42

# INSTALLER-SPECIFIC TABLE of CONTENTS

(CONTINUED)

## INSTALLATION INSTRUCTIONS (continued):

Electrical Requirements .....	44
General Requirements .....	44
Code-Specific Requirements .....	44
Connecting External Controllers .....	44
Sizing the Electrical Service .....	45
Ground Fault Protection (not recommended) .....	45

## CONTROLS CONFIGURATION & ADJUSTMENTS .....

46

Level-2 (dealer-service) Programming .....	46
1. Entering Service Menu .....	46
2. Time Delay .....	47
3. Configuring for External Controllers .....	47
4. Water Sensor Calibration .....	47
5. Defrost Sensor Calibration .....	48
6. Spa Dead Band Differential (and adjustment) .....	49
7. Pool Dead Band Differential (and adjustment) .....	49
8. Changing Service Lock Code & "Back Door" Entry .....	50

Level-2 Set Up & Calibration Codes .....	51
--	----

Factory Default Settings .....	51
--------------------------------	----

Troubleshooting Using Displayed Codes .....	52
---	----

Mode Jumper and Positioning .....	53
-----------------------------------	----

Defrost Systems (described and explained) .....	55
---	----

Water Flow Pressure Switch Adjustment .....	56
---	----

## CONTACTING THE FACTORY .....

58



# SAFETY INFORMATION

## Notice: Heater NOT Repairable by Owner

### WARNING !

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

Heat pumps contain no owner-repairable components. Repairs must not be attempted by untrained and/or unqualified individuals. If service is deemed necessary, contact installing dealer or AquaCal Customer Support at (727) 823-5642.

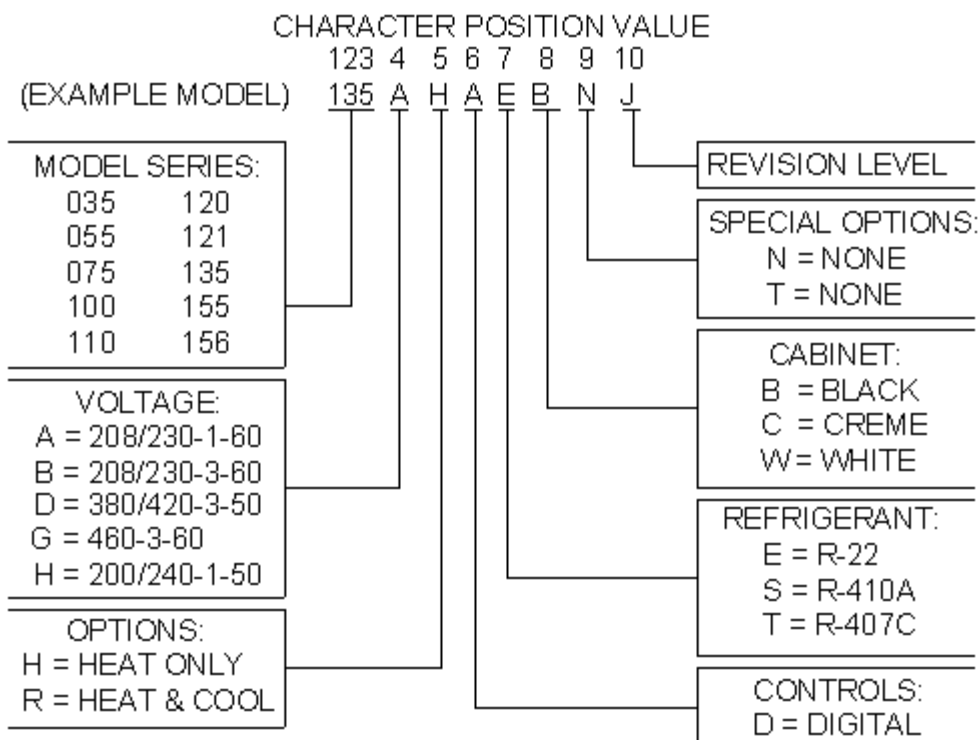
## Refrigerant Circuit Service Only by Qualified, EPA Certified Technician

### WARNING !

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

Heater contains refrigerant under high pressure. Repairs to the refrigerant circuit must not be attempted by untrained or unqualified individuals. Service must be performed only by qualified HVAC technicians. Recover refrigerant before opening system.

## DATA PLATE NOMENCLATURE

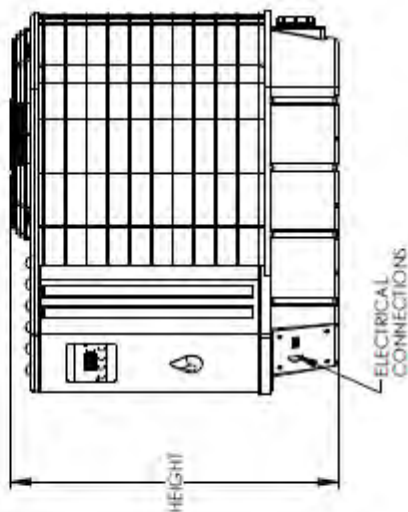
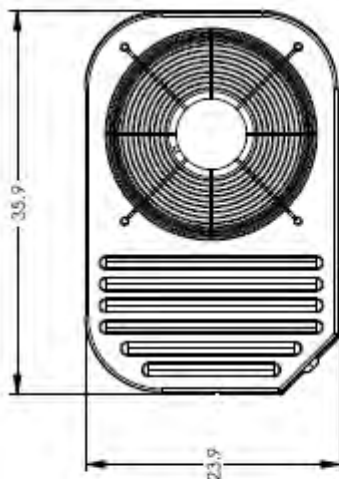


# SPECIFICATIONS

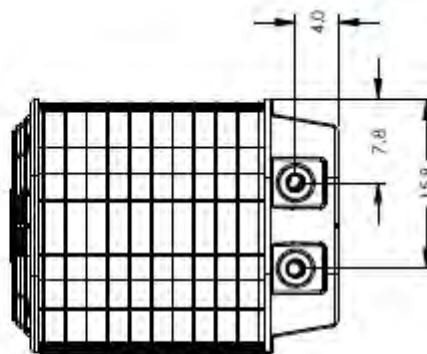
## Physical Characteristics

REVISION TABLE			
REV	DESCRIPTION	CHANGED BY	DATE
001	INITIAL RELEASE	MURDO	04/11/09

### APPLICABLE MODEL NUMBERS 035, 055, & 075



MODEL #:	HEIGHT:
T035AHD5WNA	24.7"
T055AHD5WNA	24.7"
T075AHD5WNA	30.7"



**Aquacal**  
The International Aquaculture  
Association  
20100 Highway 11, Suite 200  
Dallas, TX 75242-1100  
Phone: 972-342-6100  
Fax: 972-342-6101  
www.aquacal.com

**AUTOPILOT SYSTEMS**

T035,055,075 UNIT - OVERALL DIMENSIONS

DATE: 04/11/09	REVISED: 04/11/09	BY: MURDO	DATE: 04/11/09
SCALE: 1:1.0	UNIT: INCHES	PROJECT: LHM0178	
DRAWN BY: MURDO		CHECKED BY: MURDO	
APPROVED BY: MURDO		DATE: 04/11/09	
PROJECT: LHM0178		SHEET NO: 01	

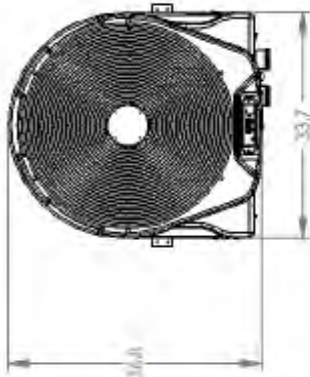
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DO NOT MANUALLY CHANGE  
DO NOT SCALE DIMENSIONS

# SPECIFICATIONS

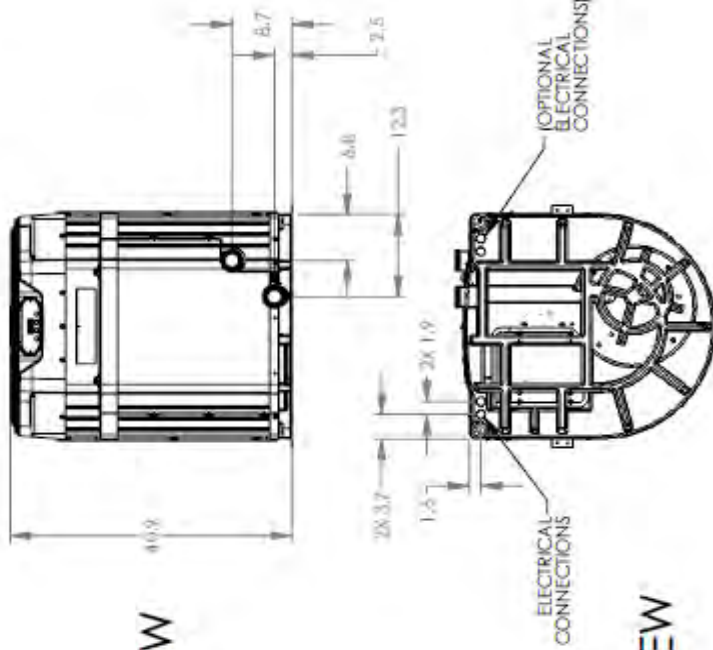
## Physical Characteristics

REVISION TABLE		
REV.	PCA NUMBER/DESCRIPTION	CHANGED BY
REV. A	INITIAL RELEASE	R/NEEC
		DATE
		1/13/2009

APPLICABLE MODEL NUMBERS  
110 & 120



TOP VIEW



FRONT VIEW

BOTTOM VIEW

**AquaCal**  
WATER CONDITIONING SYSTEMS  
10000 S. 100th Ave. #100  
Denver, CO 80231  
Tel: 303.440.1000  
Fax: 303.440.1001  
www.aquacal.com

**AUTOPILOT SYSTEMS**  
SALT-BELIEF GENERATOR

SQ110, 120 UNIT OVERALL DIMENSIONS

APPROVED FOR	DATE	BY	REVISION

**LTM0170**

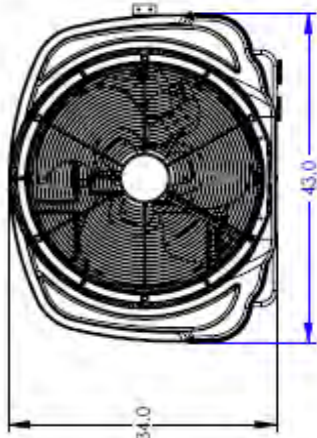
REVISED

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DATE  
1/13/09

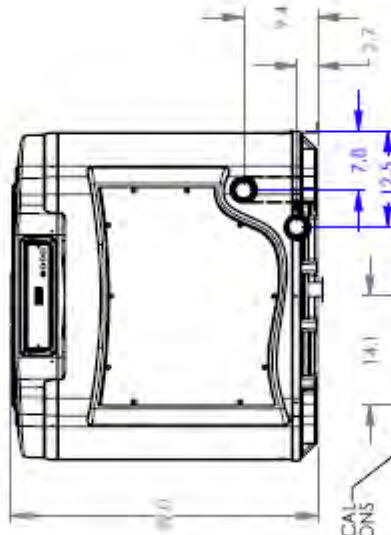
# SPECIFICATIONS

## Physical Characteristics

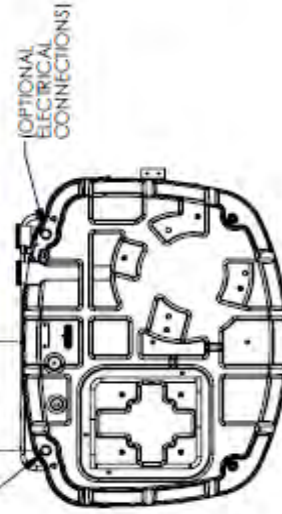
REVISION TABLE		
REV.	PCA NUMBER/DESCRIPTION	CHANGED BY
01		R/HEC
DATE		
10/2/2007		



TOP VIEW



FRONT VIEW



BOTTOM VIEW

APPLICABLE MODEL NUMBERS:  
SQ121

**AquaCal**  
The Finest in the Industry  
Pool & Spa Water  
Conditioning Systems

3702 13th St. N. #100  
Palm Bay, FL 32909  
Tel: 321.321.3373

**AUTOPILOT SYSTEMS**  
SALT-BALANCE GENERATORS

DESCRIPTION

**SQ121 UNIT OVERALL DIMENSIONS**

ACQUACAL REC.	DESIGNER'S REC.	DATE	DATE	DATE	DATE
		02/27/07	02/27/07	02/27/07	02/27/07
REVISED BY	DESIGNER'S NAME	DATE	DATE	DATE	DATE
<b>LTM0129</b>					
X 1/4" = 1" (1:4)					
3/4" = 1" (1:3)					
1/2" = 1" (1:2)					
1/8" = 1" (1:8)					

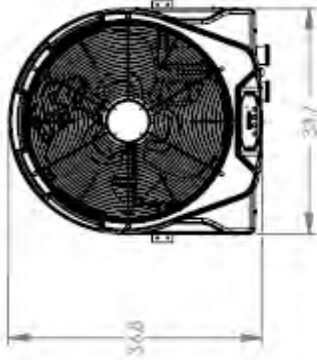
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DRAWN: [blank] CHECKED: [blank] DATE: [blank]

# SPECIFICATIONS

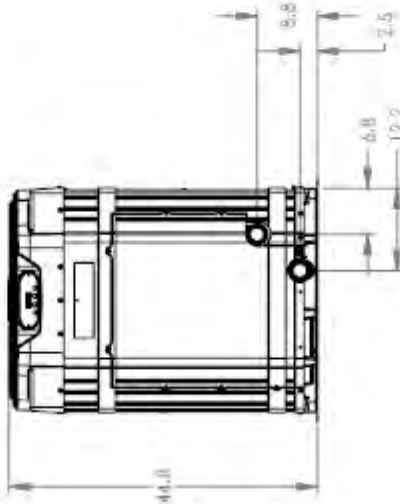
## Physical Characteristics

NOTES UNLESS OTHERWISE SPECIFIED:  
1.

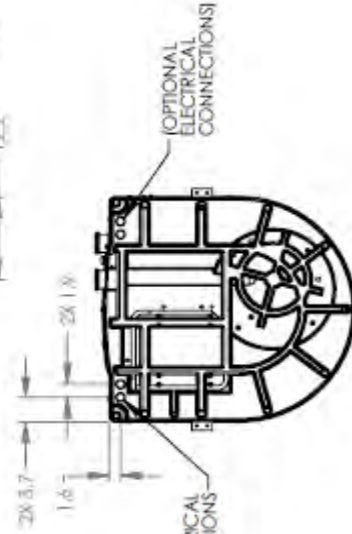
REVISION TABLE		
REV.	PCA NUMBER/DESCRIPTION	CHANGED BY
REV. A	INITIAL RELEASE	RENEC
		DATE
		1/31/2009



TOP VIEW



FRONT VIEW



BOTTOM VIEW

APPLICABLE MODEL NUMBERS  
135, 155, & 175

**AquaCal**  
The Aquacal® Generator is  
Part of the AquaCal®  
Conditioning Equipment  
2737 24th St. No.  
St. Petersburg, FL 33713 SALT BRINE GENERATORS

**UNIT OVERALL DIMENSIONS**

LEGEND: A-D	REVISIONS	REWORKING DES.	CHK BY	DES.
REV. D	REV. C	REV. B	REV. A	

REVISIONS TO BE MADE BY: **LTMO169**

DATE: 08/07/08

BY: **LTMO169**

CHK: **LTMO169**

DES: **LTMO169**

DO NOT SCALE DRAWING  
CAD GENERATED DRAWING  
DO NOT MANUALLY CHANGE  
DIMENSIONS  
DIMENSIONS IN PARENT  
DIMENSIONS IN CHILD  
DIMENSIONS IN GRANDCHILD  
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# INSTALLATION

## Placement of Heater

### -Indoor Installation-

Indoor installations can be problematic, and for that reason are discouraged. However, if no viable alternative exists, indoor installations may be successfully accomplished provided very exacting criteria is addressed. Every indoor installation is unique; therefore, there are no specific guidelines for this type of installation. If considering an indoor installation, you are strongly urged to contact the AquaCal Engineering department (727) 823-5642 for assistance prior to proceeding.

### -Outdoor Installation-

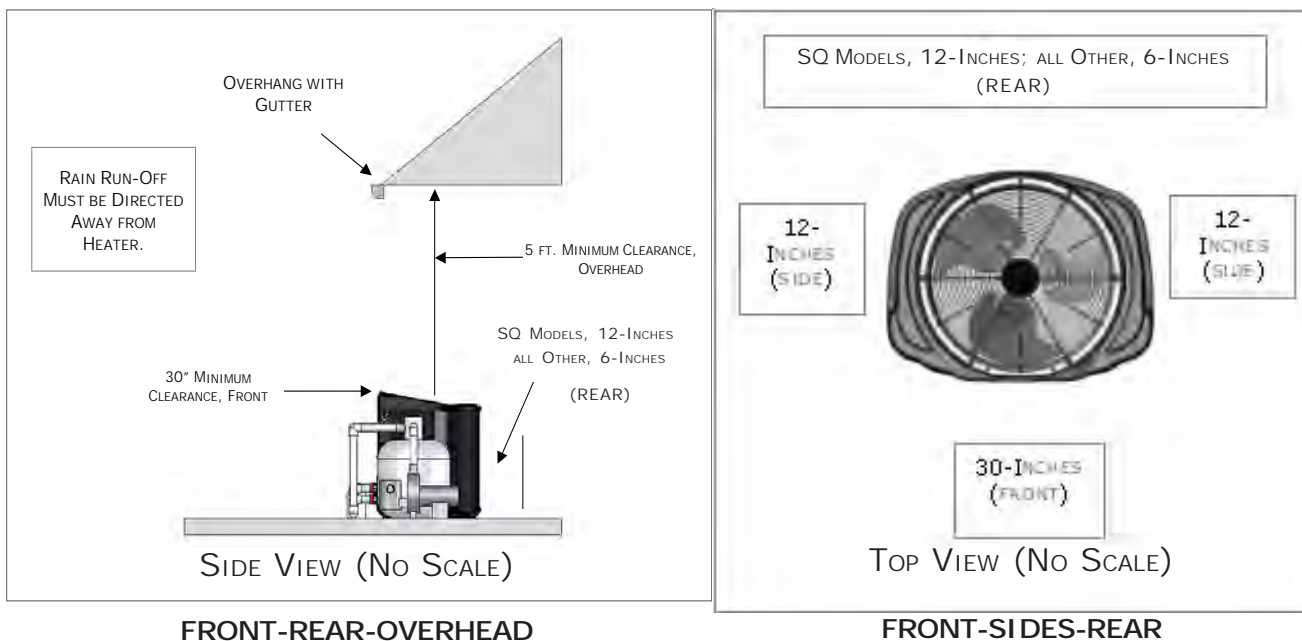
#### Service and Operational Clearances:

- To operate correctly, heat pumps require large volumes of air moving over the heat collector. allow adequate clearance between the heat pump and walls, fences, shrubs, or other objects. Refer to required clearance drawings below.
- Allow five (5) feet of vertical clearance between the top of the heat pump and any roof overhang or other obstruction. This clearance prevents cold discharge air from recirculating back into the heat pump (recirculation will reduce the overall performance of the heat pump).
- The access panel requires removal during installation and service. Do not place plumbing, or other items, closer than 30" from the front of the heater.

#### Code Required Clearances:

In addition to the previously stated clearance requirements, follow all applicable local, state, and national requirements relative to spacing from other objects or equipment.

### Required Installation Clearances



# **INSTALLATION - PLACEMENT OF HEATER**

(continued)

## **Irrigation, Rainwater Runoff, and Landscape Features**

- Place the heat pump away from direct rain runoff from roofs. If roof slope directs runoff into the heater, a gutter or rain shield will be required on the roof edge above the heat pump.
- Relocate or adjust irrigation to avoid water spray onto the heat pump.
- Do not locate the heat pump directly adjacent to plants, shrubs, or bushes. Doing so will prevent proper air circulation into the unit, and may inhibit access to the heater when service is needed.
- Consult drawings on previous page (Required Installation Clearances) for proper spacing to other objects.

## **Equipment Mounting Pad Requirements**

- The equipment pad shall be constructed of concrete, pressure treated wood, or other code-approved materials.
- The equipment pad shall meet all requirements of authorities having code-related jurisdiction.
- The pad shall be elevated and placed to provide adequate drainage and support to the base of the heat pump. The pad should be essentially level with just enough pitch to drain condensate and any other water away from the heater.
- The pad shall extend—in all directions—at least 3" beyond the base of the heat pump.
- Under no circumstances shall the heater be installed directly onto the earth.

## **Anchoring Heater to Pad**

- Follow all relevant local, state, or national requirements regarding wind load anchoring.
- When anchoring is required, use AquaCal optional Hurricane Anchoring Kits.
  - AquaCal anchoring kits satisfy, completely, the very stringent Florida Building Code Section 301.13: Wind Anchoring Requirements.
  - Contact AquaCal Parts Group (727-823-5642) to obtain the correct anchoring kit for the heater being installed.
  - Please have the heater model number ready when contacting AquaCal Parts Group.
- As necessary, contact the AquaCal Technical Support Group (727-823-5642) for assistance in determining best method of compliance.

## **WARNING!**

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

Installation made by unqualified persons can result in hazards to the installer and others. The information contained throughout the "Installation" section is intended for use by qualified heat pump installation technicians, familiar with the swimming pool/spa service industry safety standards and methods. Installation to be performed by qualified individuals only.



# **INSTALLATION**

## **Plumbing Requirements**

### **Overview**

When planning plumbing system layout, reference the plumbing schematics within this section as a guide to the sequence of equipment, valves, fittings, etc. The plumbing configurations for typical installations are diagrammed. In operation, it is imperative the heat pump receive water flow within the minimum-maximum ranges specified for the particular heat pump. Should the system installation under consideration not closely match any of the schematics, contact AquaCal Technical Support Group for advice and guidance: (727-823-5642).

### **Approved Parts and Materials**

Industry technology changes much too rapidly for AquaCal to specify, with exactness, any items outside and beyond the heat pump. What is specified is that the heater must be installed in accordance with all applicable local, state, or national codes & standards.

### **In-Line Chlorine Feeders**

The titanium heat exchanger tube is nearly impervious to chemical damage; however, other parts of the heater may be damaged by concentrated chlorine. Caution: Per chlorinator manufacturers' recommendations, always place in-line chlorinators as low, and as far downstream from the heater as possible. And if an erosion type feeder is used always install/use a Hartford Loop to protect internal heat pump components.

### **Maintain Ability to Winterize**

In regions where hard freeze conditions are typical, the unions mentioned below allow for easy disconnection and re-connection of the heater from/to the plumbing system. Caution: Do not defeat the function of the unions—use no glue on the threaded portion of the unions.

### **Water Connections to Heat Pump**

All AquaCal heat pumps are supplied with 2" PVC plumbing unions. Connection to site plumbing is made via PVC solvent cement to the female slip socket of the plumbing unions.

### **Maximum Static or Operating Pressure: 50-PSI**

### **Minimum - Maximum Water Flow Rates**

- All AquaCal heaters represented within this manual are designed to operate successfully at flow rates of 30-to-70 gallons-per-minute (GPM).
- Design the plumbing system to maintain at least 50-GPM flow through the heater under worst case conditions (i.e.: filter fouled to 10 psi rise); the heat pump will not operate correctly, nor reliably, with less than 50-GPM of water flow supplied. These specifications relate to heater only; code-specified whole system turnover rates must be satisfied.
- If water flow rates through the heater will exceed 70-GPM, a spring-check bypass valve will be required. Install AquaCal P.N.: 2556 5-LB bypass check valve, or bypass check valve equal to Del Industries PN: CO-0103. See drawing, top of next page, for install location in site plumbing.

### **CAUTION !!! Installations with In-floor Cleaning Systems**

In-floor cleaning systems, dependent upon varying site circumstances, may create water hammer conditions throughout the water circulation system. Water hammer is very damaging to the plumbing system and connected devices. Where an in-floor cleaning system is (or will be) installed, AquaCal strongly recommends a water hammer suppression stand pipe assembly within the plumbing circuit. For additional information, please contact AquaCal Customer Support (727-823-5642) and request Technical Service Bulletin: AQ P-1031, *Water Hammer Abatement with In-Floor Cleaning Systems*.

# INSTALLATION

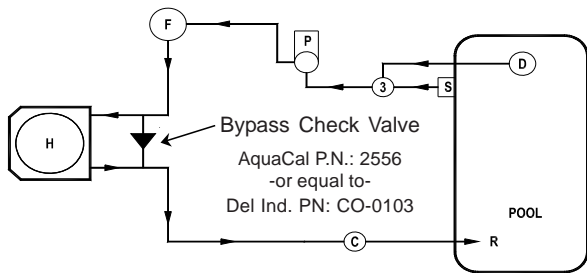
## Plumbing Requirements (continued)

### **CAUTION!**

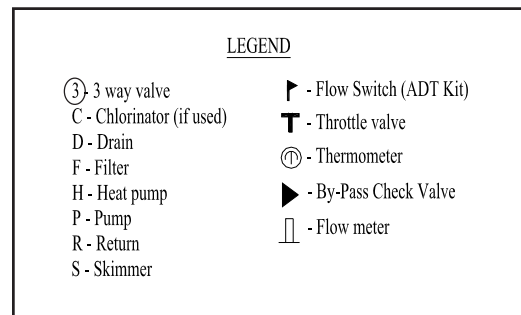
Failure to heed the following may result in damage to equipment.

Water flow exceeding 70-GPM may damage titanium condenser; such damage will NOT be covered under the equipment warranty. Install a bypass check valve (AquaCal P.N.: 2556, or equal to Del Industries P.N.: CO-0103) whenever water flow rate may exceed 70-GPM. Contact AquaCal Technical Support (727-823-5642) for guidance regarding testing for water flow rate.

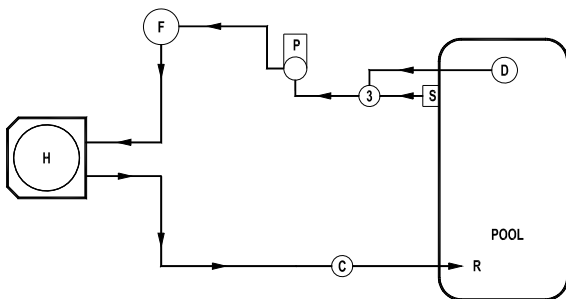
### General Plumbing Schematic—Flow Exceeding 70-GPM



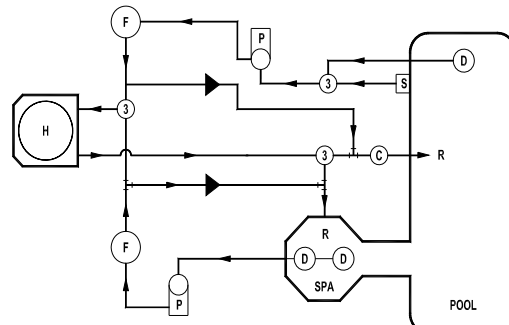
TYPICAL POOL - FLOW GREATER THAN 70-GPM



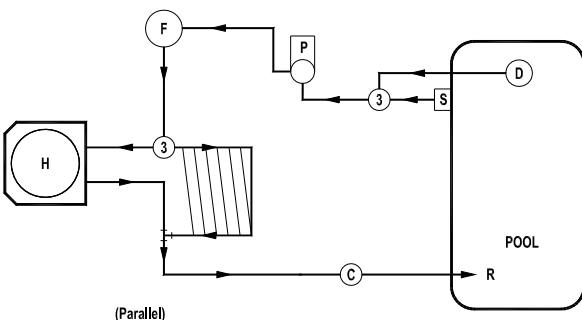
### General Plumbing Schematics – Flow 30 to 70-GPM



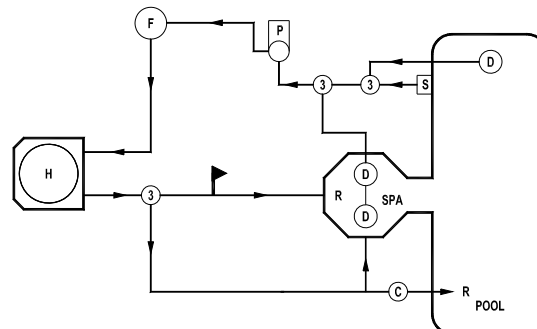
TYPICAL POOL - FLOW LESS THAN 70-GPM



POOL/SPILL OVER SPA - TWO PUMP SYSTEM



HEAT PUMP WITH SOLAR PANELS



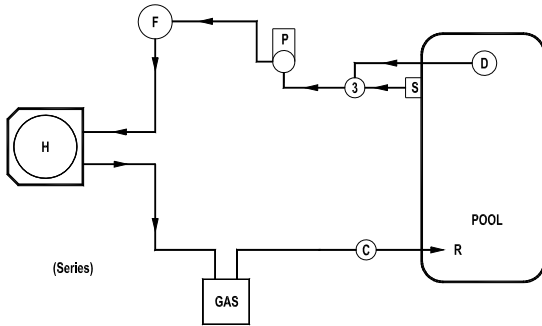
POOL/SPILL OVER SPA - ONE PUMP SYSTEM

# INSTALLATION

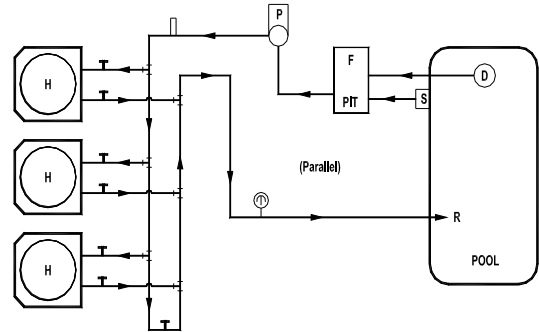
## Plumbing Requirements

### General Plumbing Schematics – Flow 30 to 70-GPM

*(continued)*



HEAT PUMP WITH GAS HEATER BACK UP

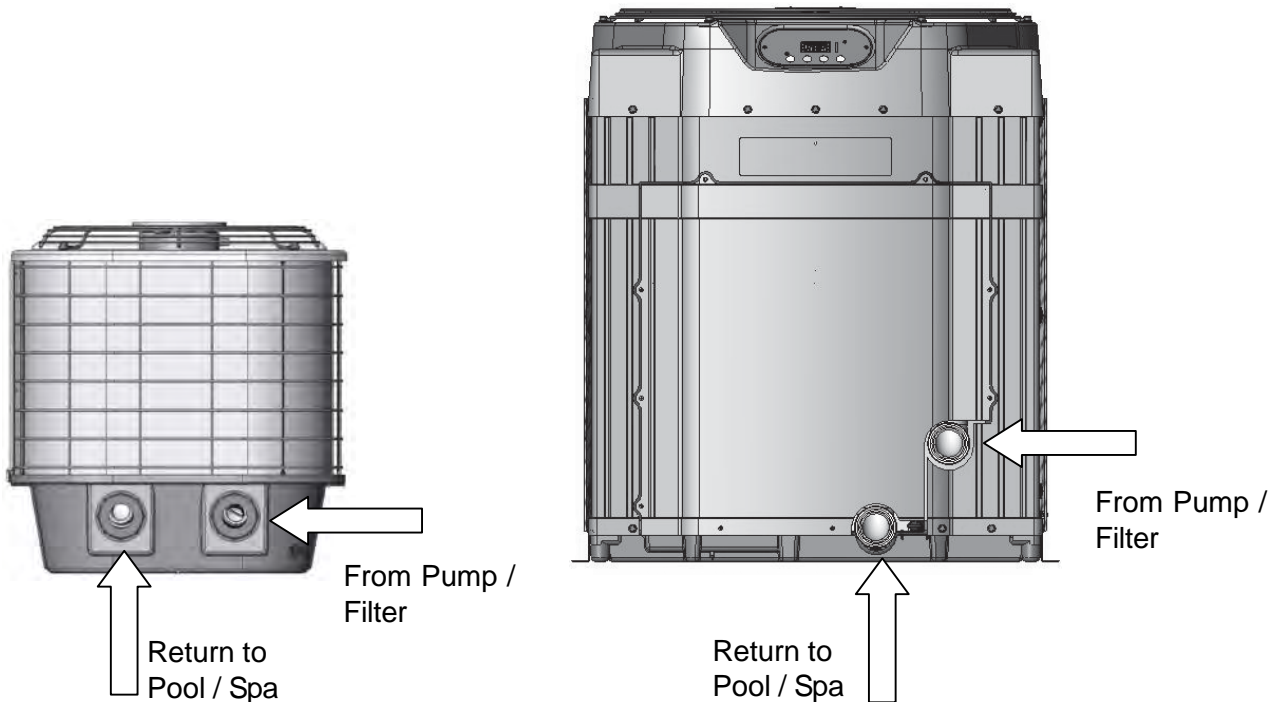


MULTIPLE HEAT PUMP INSTALLATION  
MINIMUM 30 GPM TO EACH HEATER  
MINIMUM SPACING 24-INCHES

### **Water IN & OUT Connections- Typical**

*(exact location varies by model)*

For proper operation, piping coming from the pump and filter MUST be connected to the "IN" port of the heater. Likewise, connect piping returning to the pool/spa to the "OUT" port of the heater. See drawing below.



# INSTALLATION

## Electrical Requirements

### **WARNING!**

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

Installation made by unqualified persons can result in hazards to the installer and others. The information contained in this Electrical Installation section is intended for use by qualified electrical installation technicians, familiar with electrical service industry safety standards and methods. Electrical installation to be performed by qualified individuals only.

### General Requirements

- Locate the equipment disconnect means within 3-feet of the heater's electrical enclosure, or as close to the heater as possible. Always satisfy applicable codes and standards.
- AquaCal heat pumps are designed for copper conductors, only. Never mount disconnect directly to heat pump.
- In sizing power wiring, be especially aware of up-sizing requirements necessary due to wiring distances. Always satisfy applicable codes and standards.
- Multiple heaters installed at same site generally require special sequencing controls (an "ASC" controller will be required). If yours is a multi-heater installation, contact AquaCal Technical Support Group (727-823-5642) for application assistance.
- Electrical installation should be by *licensed electrician only*.

### Code-Specific Requirements

- The electrical installation must conform to the most current version of the National Electrical Code, NFPA No.70, and all applicable local and state codes.
- National Electrical Code, Article 680; Swimming Pools, Fountains, and Similar Installations, shall apply.
- National Electrical Code, Article 440, Air-Conditioning and Refrigeration Equipment, shall apply.

### Connecting External Controllers

- See document entitled: "Connecting External Controllers to AquaCal Heat Pumps"; this document is shipped with every AquaCal heater. For extra copies, contact AquaCal Customer Support (727-823-5642); request literature piece: "LTP0050."
- For Call-Flex option, reference instructions received with the Call-Flex kit.
- Please contact the AquaCal Technical Support Group (727-823-5642) concerning the application of any external controller, Call-Flex, sequencing control, etc.

# INSTALLATION

## Electrical Requirements (continued):

### Sizing the Electrical Service... Reference the Equipment Data Plate

- All AquaCal heat pumps have two (2) identical data plates affixed: one can be found outside the unit, on right front corner; the second data plate is located behind the front access panel, on the electrical enclosure cover.
- Refer to either equipment data plate for unit-specific electrical power supply requirements.
- Based on data plate information, size wiring, wiring devices, and over-current protection per applicable codes and standards.
- Refer to drawing below for data plate items specific to electrical installation requirements. On the installed heater data plate, the areas depicted below, numbered 1-11, will contain the information required to size the electrical service and over-current protection.

#### ELECTRICAL PORTION of DATA PLATE

MINIMUM CIRCUIT AMPACITY:	<input type="text" value="#1"/>	SUITABLE FOR OUTSIDE USE	IPX4		
ELEC. SERVICE: VOLTS	<input type="text" value="#2"/>	PH	<input type="text" value="#3"/>	HZ	<input type="text" value="#4"/>
MAXIMUM TIME DELAY FUSE OR HACR BREAKER:	<input type="text" value="#5"/>				
COMPRESSOR: VOLTS	<input type="text" value="#6"/>	RLA	<input type="text" value="#7"/>	LRA	<input type="text" value="#8"/>
FAN MOTOR: VOLTS	<input type="text" value="#9"/>	HP	<input type="text" value="#10"/>	FLA	<input type="text" value="#11"/>
REFRIGERANT: Factory charged	<input type="text"/>	ONLY	oz/Kg	<input type="text"/>	
Tested to	<input type="text"/>	High side /	<input type="text"/>	Low side	<b>MADE IN THE U.S.A.</b>

### A Word Concerning Ground-Fault Protection

- The National Electrical Code (NEC) contains no standards requiring Ground-Fault Interruption protection (via GFI Circuit Breaker or otherwise) of “Fixed” or “Stationary” equipment, under article 680: *Swimming Pools, Fountain, & Similar Installations*, or Article 440: *Air-Conditioning & Refrigeration Equipment*.
- The preceding standards govern the installation of AquaCal (and other manufacturers’) heat pumps. AquaCal heat pumps are designed, and safety tested by a certified laboratory, to be installed under applicable standards detailed within the NEC.
- AquaCal does not recommend the use of ground fault protective devices in conjunction with heat pumps. **Service calls, found to be due to “nuisance” tripping of ground fault devices, are not covered under the AquaCal factory warranty.**

# Controls Configuration & Adjustments

## Level-2 (Dealer-Service) Microprocessor Programming

(Includes Configuration for External Controllers)

Level-2 programming involves configuring the heat pump microprocessor for specific site characteristics. To explain: this programming is where the heat pump microprocessor is set to operate with, or without, an external “pool equipment” controller; where sensor calibrations are performed; and where changes to other factory default parameters are made.

Before transferring use of the heater to the owner, the installer must insure the controller programming is compatible with any site-installed external controllers, and that the heater starts and operates per the manufacturer’s specifications.

Generally speaking, the installer’s main focus within Level-2 programming will be in configuring for external controller compatibility. And, **unless instructed to do otherwise by the AquaCal Technical Support Group, the installer should not adjust sensor calibration or dead-band values.**

### CAUTION!

Failure to heed the following may result in equipment damage and voiding of manufacturer’s warranty.

Heat pumps contain no owner-serviceable components. Owner-initiated adjustments, beyond the controller “LOC” code, must not be attempted. If adjustments are deemed necessary, the owner should contact installing dealer or AquaCal Customer Support at (727-823-5642).

#### 1. Entering Service Menu:

- A. To enter the service menu, Simultaneously press and hold both the [UP ARROW] and [DOWN ARROW] keys until [CF1] (Celsius / Fahrenheit) code appears. (Note: if “000” displays, the User Lock Code is enabled, and the ULC pass code must be entered before proceeding. See Owner-Level Operating Instructions, page-15: “User Lock Code Option [ULC].” If the owner’s ULC pass code is unknown, the factory default code “17” may be used to access controller programming.) Press the [POOL/SPA] key four times to display [LOC], which is the entrance point for the Service Menu.
- B. The [LOC] code function allows service personnel to use an access code to enter the service menu. This section of the programming is intended for authorized factory service personnel, only.
- C. Using the [UP] and [DOWN] arrow keys, scroll the displayed number to “50.” (“50” is the default service entry pass code.)
- D. Once the correct service code is displayed, pressing the [POOL/SPA] key—once again—will allow access to the service menu.
- E. The first service parameter displayed will be [dEL] (4 -minute time delay on make).

**NOTE:** Pressing the [POOL/SPA] key will save the displayed value in any menu parameter, and will advance to the next service menu juncture.

*(Continued on Next Page)*

# Controls Configuration & Adjustments...

## Level-2 Microprocessor Programming... continued:

### 2. Time Delay [dEL]:

- A. With the [dEL] (4 minute time delay) code message displayed use the [UP] or [DOWN] arrow key to select either "1" to allow the time delay to remain active or "0" to deactivate the time delay. Not pressing any buttons for 15 seconds will allow the controller to save the selection and return to the normal operating mode. Pressing the {POOL/SPA} key will also save the selection and step to the next menu parameter: [JAO] (External Controller Interface).
- B. **CAUTION!!!:** The time delay should only be deactivated for service convenience and must be reactivated prior to placing the heat pump back in service. Failure to reset the time delay feature could result in permanent damage to the heat pump compressor.

### 3. Configuring for External Controllers [JAO] or [FS2]:

NOTE: FOR WIRING TO AN EXTERNAL CONTROLLER, REFERENCE DOCUMENT LTP0050 SHIPPED WITH HEATER.

- A. Configuring for External Controllers Using [JAO] Selection:
  - 1) Follow the steps **1, A** through **1, D** to enter the service menu. Once [dEL] is displayed, press the [POOL/SPA] key until the display shows [JAO].
  - 2) With the [JAO] (External Controller Interface) code message displayed, use the [UP] or [DOWN] arrow keys to select either "0" to disable the External Controller Interface, "2" to connect a thermostat type controller (2-wire connection). Apply [FS2] configuration to connect a thermostat selector type controller (3-wire connection); see "3. B," below. Do NOT use [JAO] "3."
- B. Configuring Remote Flow Switch / Automatic Thermostat Switching Using [FS2] Selection:
  - 1) Follow the steps **1, A** through **1, D** to enter the service menu. Once [dEL] is displayed, press the [POOL/SPA] key until the display shows [FS2].
  - 2) With the [FS2] (Remote Flow Switch / Automatic Thermostat Switching) code message displayed, use the [UP] or [DOWN] arrows to select either "0" to disable Remote Flow Switch / Automatic Thermostat Switching, "1" to enable Remote Flow Switch / Automatic Thermostat Switching.

**NOTE:** ALL FLOW SWITCH KITS PRODUCED BY AQUACAL ARE SHIPPED WITH FULL INSTALLATION AND PROGRAMMING INSTRUCTIONS. PLEASE CONTACT AQUACAL CUSTOMER SUPPORT (727-823-5642) IF ADDITIONAL COPIES OF THESE INSTRUCTIONS ARE NEEDED.

### 4. Water Sensor Calibration [tSC]:

If it is believed the displayed pool or spa water temperature does not match the actual temperature, follow the steps below to verify and adjust the controller as necessary. Be certain to use an accurate thermometer:

- A. With the circulating pump in operation, and water moving through the heater, use a reliable thermometer to measure the temperature of the pool or spa water. Be sure to measure the water temperature away from returns. The object is to accurately determine the temperature of the water entering the heater.
- B. Once you have measured the water temperature, compare the result to the heater's displayed water temperature. If the water temperatures are the same or within 1°F, no calibration is necessary. If the temperatures differ by 2 to 3°F, calibration is necessary. Perform calibration procedure as follows:

*(Continued on Next Page)*

# Controls Configuration & Adjustments...

## Level-2 Microprocessor Programming... continued:

### 4. Water Sensor Calibration... continued:

- C. Follow the steps **1, A** through **1, D** to enter the service menu. Once [dEL] is displayed, press the [POOL/SPA] key until the display shows [tSC] (Water Temperature Calibration). Using either the [UP] or [DOWN] arrow keys, calibrate the water temperature sensor by increasing or decreasing the numeric value displayed to match the measured water temperature. The controller can be adjusted to +10°F to -10°F from the nominal displayed temperature. However, offset calibrations greater than 3°F should be avoided... Such large offsets generally indicate problems with the method of water temperature measurement, a water sensor not properly inserted into the well, or other equipment issues. Do NOT attempt to mask such issues through offset calibration.
- D. Once the corrected temperature is displayed, Not pressing any buttons for 15 seconds will allow the controller to save the selection and return to the normal operating mode. Pressing the {POOL/SPA} key will also save the selection and step to the next menu parameter: [dSC] (Defrost Sensor Calibration).

### 5. Defrost Sensor Calibration [dSC] (Checking-Adjusting):

In the event it is suspected the defrost Sensor requires calibration, the following steps must be followed closely to ensure correct defrost operation:

- A. At the heater control panel "Mode" button, set the system to OFF.
- B. Remove the heater front panel to gain access to the defrost sensor location. The defrost sensor will be found strapped to the suction line in combination with the TXV bulb, or strapped and separately insulated nearby the TXV bulb. Note: if unsure of sensor location, follow-to termination-the pair of wires leading from the "FS" terminals on the controller PC board.
- C. Position a clamp-on, thermocouple-type temperature sensor onto the suction line; position the clamp immediately adjacent to the defrost sensor. Connect the clamp-on thermocouple to a multimeter designed to accept the input of the clamp-on device.
- D. Once the heater has remained OFF for a minimum of 10-minutes, procede to step "E," below.
- E. Follow steps **1, A** through **1, D** to enter the service menu. Once [dEL] is displayed, press the [POOL/SPA] key until the display shows [dSC] (Defrost Sensor Calibration). With [dSC] displayed, pressing either the [UP] or [DOWN] arrow key, once, will display the current temperature value of the defrost sensor.
- F. Compare the controller's displayed defrost sensor temperature against the reading obtained by the clamp-on device. If the temperatures are the same, or within 1°F, calibration is NOT necessary. If the temperatures differ by 2 to 3°F, calibration is necessary. The controller can be adjusted to +10°F to -10°F from the nominal displayed temperature. However, offset calibrations greater than 3°F should be avoided. Such large offsets generally indicate problems with the method of suction line temperature measurement, a defrost sensor not properly attached to the suction line, or other equipment issues. Do NOT attempt to mask such issues through offset calibration.



# Controls Configuration & Adjustments...

## Level-2 Microprocessor Programming... continued:

### 5. Defrost Sensor Calibration... continued:

G. Once the correct temperature value has been selected, *not* pressing any buttons for 15-seconds will allow the controller to save the selection and return to the normal operating mode. Pressing the [POOL/SPA] key will also save the selection and step to the next menu parameter: [dBS] (Dead Band for Spa).

H. Return system controls to desired mode of operation.

### 6. Spa Dead Band Differential [dBS]:

In the heating mode, the dead band differential determines the number of degrees the water temperature must *fall* below the set point before the thermostat closes. In the cooling mode, the dead band differential determines the number of degrees the water temperature must *rise* above the set point before the thermostat closes. When in the auto-changeover mode, the dead band differential operates in the same manner as described above for the heating and the cooling modes. However, in all modes, the thermostat will open when the set point is reached independent of the direction the water temperature is changing. The factory spa dead band differential is set to 1°F. It is strongly recommended the factory default of 1°F remain; however, if for some reason the dead band requires adjustment, follow the steps outlined below:

A. Follow the steps **1, A** through **1, D** to enter the service menu. Once [dEL] is displayed, press the [POOL/SPA] key until the display shows [dBS] (Spa Dead Band Differential).

B. With the service menu parameter [dBS] displayed, pressing either the [UP] or [DOWN] arrow keys, once, will display the current setting. Using the [UP] or [DOWN] arrows keys will increase or decrease the value respectively. The differential is adjustable in 1° increments from 1 to 5-degrees.

C. Once the desired dead band value has been selected, *not* pressing any buttons for 15-seconds will allow the controller to save the selection and return to the normal operating mode. Pressing the [POOL/SPA] key will also save the selection and step to the next menu parameter: [dBP] (Dead Band Pool).

### 7. Pool Dead Band Differential [dBP]:

In the heating mode, the dead band differential determines the number of degrees the water temperature must *fall* below the set point before the thermostat closes. In the cooling mode, the dead band differential determines the number of degrees the water temperature must *rise* above the set point before the thermostat closes. When in the auto-changeover mode, the dead band differential operates in the same manner as described above for the heating and the cooling modes. However, in all modes, the thermostat will open when the set point is reached independent of the direction the water temperature is changing. The factory pool dead band differential is set to 1°F. It is strongly recommended the factory default of 1°F remain; however, if for some reason the dead band requires adjustment, follow the steps outlined below:

A. Follow the steps **1, A** through **1, D** to enter the service menu. Once [dEL] is displayed, press the [POOL/SPA] key until the display shows [dBP] (Pool Dead Band Differential).

B. With the service menu parameter [dBP] displayed, pressing either the [UP] or [DOWN] arrow keys, once, will display the current setting. Using the [UP] or [DOWN] arrows keys will increase or decrease the value respectively. The differential is adjustable in 1° increments from 1 to 5-degrees.

*(Continued on Next Page)*

# Controls Configuration & Adjustments...

## Level-2 Microprocessor Programming... continued:

### 7. Pool Dead Band Differential... continued:

- C. Once the desired dead band value has been selected, not pressing any buttons for 15-seconds will allow the controller to save the selection and return to the normal operating mode. Pressing the {POOL/SPA} key will also save the selection and step to the next menu parameter: [LOC] (LOCK CODE).

### 8. Changing the Service Lock Code and “Back Door” Entry:

#### A. Changing the Code...

The factory default Service Lock Code is “50”. Service personnel are strongly advised to retain the factory default setting. However, should unauthorized access to Level-2 (Service) menu be suspected, it may be necessary to select a code other than “50”. To change the Service Lock Code:

- 1) Follow the steps **1 A** through **1 D** to enter the service menu. Once [dEL] is displayed, press the [POOL/SPA] key until the display shows [LOC] (LOCK CODE).
- 2) Press the [UP] arrow key to display the current service lock code value. With the current value displayed the [UP] arrow key will increase the value while the [DOWN] arrow key will decrease the value. When the desired value is displayed not pressing depressing any buttons for 15-seconds will allow the controller to save the selection and return to the normal operating mode. Pressing the {POOL/SPA} key will also save the selection and step to the next menu parameter. **It is recommended, however, unless attempting to prevent tampering, that the factory setting of: “50” remain in use.**

#### B. Back-door Access (For use when correct Service Lock Code is unknown):

- 1) Simultaneously press and hold the [POOL/SPA] and [UP ARROW] keys until the display shows “888”. This operation will reset the controller to the factory default settings.
- 2) The factory reset will change the service lock code back to the factory setting “50”. In addition, **all other settings (including external controller configuration) are returned to the factory defaults.** See section in this manual entitled: “Factory Default Settings” for a complete list of factory default parameters.

*(End... Level-2 Microprocessor Programming)*

# Controls Configuration & Adjustments...

## Microprocessor Level-2 Set Up & Calibration Codes

### Service Adjustable Parameters

Code	Description	Factory Setting	Range
[LOC]	Service Lock Code	50	00-99
[dEL]	4-minute Delay on Make	1	0 / 1
[JAO]	External Controller Interface	0	0 / 2 / 3
[FS2]	Flow Switch/Auto T-Stat Switching	0	0 / 1
[tSC]	Water Sensor Calibration	Factory Calibrated	+10° to -10° of display
[dSC]	Defrost Sensor Calibration	Factory Calibrated	+10° to -10° of display
[dBS]	Spa Dead Band Differential	1°	1° to 5°
[dBP]	Pool Dead Band Differential	1°	1° to 5°

## Microprocessor Factory Default Settings

### Level -1 and Level-2 Default Settings

Menu	Code	Description	Default Value	Range
Level-1	[CF1]	Celsius/Fahrenheit	1	0 / 1
Level-1	[ULC]	User Lock Code	0	0 / 1
Level-1	[ELC]	Enter Lock Code	0	00-99
Level-1	[CFO]	Call / Flex	0	0 / 1 / 2
Level-1	[LOC]	Service Lock Code	50	00-99
Mode	Key Pad	Operating Mode	OFF	For Heat Only: OFF/HEAT For Heat & Cool: OFF, HEA, COO, ACH
Thermostat	Key Pad	Thermostat Settings Pool & Spa	OFF	45°F – 104°F
Level-2	[dEL]	Anti-Short Cycle, 4-minute Delay on Make	1	0 / 1
Level-2	[JAO]	External Controller Interface	0	0 / 2 / 3
Level-2	[FS2]	Flow Switch / Automatic Thermostat Switching	0	0 / 1
Level-2	[tSC]	Water Sensor Calibration	Factory Calibrated	+10° to -10° of displayed value
Level-2	[dSC]	Defrost Sensor Calibration	Factory Calibrated	+10° to -10° of displayed value
Level-2	[dBS]	Spa Dead Band Differential	1°	1° to 5°
Level-2	[dBP]	Pool Dead Band Differential	1°	1° to 5°

# Controls Configuration & Adjustments...

## Troubleshooting Using Displayed Codes

### Interpreting Error Codes

The HP7R heat pump microprocessor controller is designed to be self-diagnostic through the display of various fault codes.

Owners & Operators: If you believe you are experiencing a problem with the heater, and feel a need to call the factory for assistance, it will be beneficial to let the factory Service Representative know if any code is being displayed. Having this information at hand will permit the Service Representative to work through—with you—any site related issues causing or contributing to the problem. Then, if after working through site-related issues the heater is still not functioning correctly, the Service Representative will offer to set up a service visit. As necessary, please Contact AquaCal Customer Support Group (727-823-5642).

Dealers and Service Centers: For troubleshooting use, listed below are all possible fault messages output by the microprocessor, what the codes mean, and possible causes with solutions for the indicated problem. Please contact AquaCal Technical Support Group, as necessary (727-823-5642).

## WARNING !

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

Heat pumps contain no owner or operator repairable components. Repairs must not be attempted by untrained and/or unqualified individuals. If service is deemed necessary, contact installing dealer or AquaCal Customer Support at (727) 823-5642

Message	Error Description	Possible Cause
[dPO]	Defrost Sensor Open	Cut or loose defrost sensor wiring.
[PO]	Water Temperature Sensor Open	Cut or loose temperature sensor wiring.
[dPC]	Defrost Sensor Shorted	Short circuit in defrost sensor wiring or defective defrost sensor.
[PC]	Water Temperature Sensor Shorted	Short circuit in water temperature sensor or defective sensor.
[LP]	Refrigerant System Low Pressure Switch Open	System refrigerant charge low, defective low pressure switch, clogged evaporator coil, or defective wiring.
[HP]	Refrigerant System High Pressure Switch Open	Low water flow, defective high pressure switch, or defective wiring.
[HP5]	5 High Pressure Faults Within One (1) Call for Heating or Cooling (Lock Out Condition)	See causes for [HP]
[LP5]	5 Low Pressure Faults Within One (1) Call for Heating or Cooling (Lock Out Condition)	See causes for [LP]
[OTA]	Over Temperature Alarm < Temperature over 110 F (Unit Locked)	Defective compressor contactor, defective controller, or defective water temperature sensor.
[FLO]	Low or No Water Flow Detected	Circulating pump off, water filter dirty, isolation valves set improperly, or defective pressure switch.
[FS]	Heater in Defrost Mode (Heat-Only Units)	Normal function in lower air temperatures. Fan continues to run and compressor is off. Compressor will restart when air-coil temperature reaches 38 F or above.
[CSE]	Control System Error	Controller may need to be reset. Disconnect then reconnect power to controller. If error continues, replace control board, display board, or both.
[CEr]	Communication Fault	Loss of communication between main board and display board. Reset controller or replace communication cable.

# Controls Configuration & Adjustments...

## Microprocessor Mode Jumper Positioning

### Mode Jumper Explained

The HP7R microprocessor is designed to operate as a Heat-Only or a Heating & Cooling controller.

The selection between the two choices is made through the positioning of a mode jumper contained on the microprocessor board. The position of the jumper is set at the factory, and is dependant upon the design of the heater being controlled. Heaters designed to heat only, have the microprocessor mode jumper set in the heat-only mode; heaters capable of both heating and cooling (reversing), have their microprocessor mode jumper set to permit control of both heating and cooling.

**Important:** The position of the mode jumper must match the capabilities of the heat pump. Simply placing the mode jumper to the heating and cooling position, with a heater designed to heat only, will not make a heat-only heater heat & cool. In fact, a mis-positioned mode jumper will cause heater control difficulties.

### Verifying the Mode Jumper Position is Correct

1. Apply electrical power to the heater.
2. Review the available modes by repeatedly pressing the [MODE] key:
  - A. Heat-Only Models: the [MODE] key functions should appear as: [OFF] and [HEA].
  - B. Heat-Cool Models (Icebreakers): the [MODE] key functions should appear as: [OFF], [HEA], [COO], and [AHC].
3. If the modes do not display correctly for the heater being serviced, the mode selector jumper, located on the microprocessor PC board, is likely placed in the wrong position. To correct this condition, the jumper will need to be repositioned. See repositioning instructions, below.

### Repositioning the Mode Jumper

Use this procedure if [MODE] key functions indicate jumper positioning is incorrect. The mode jumper is located on the microprocessor controller board, within the heater's electrical enclosure.

## WARNING !

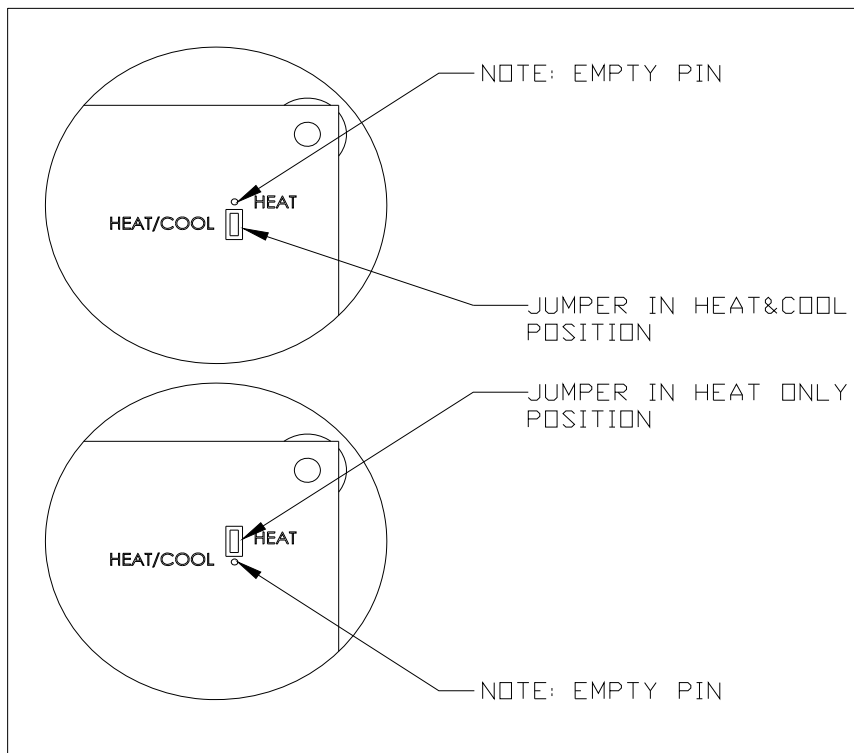
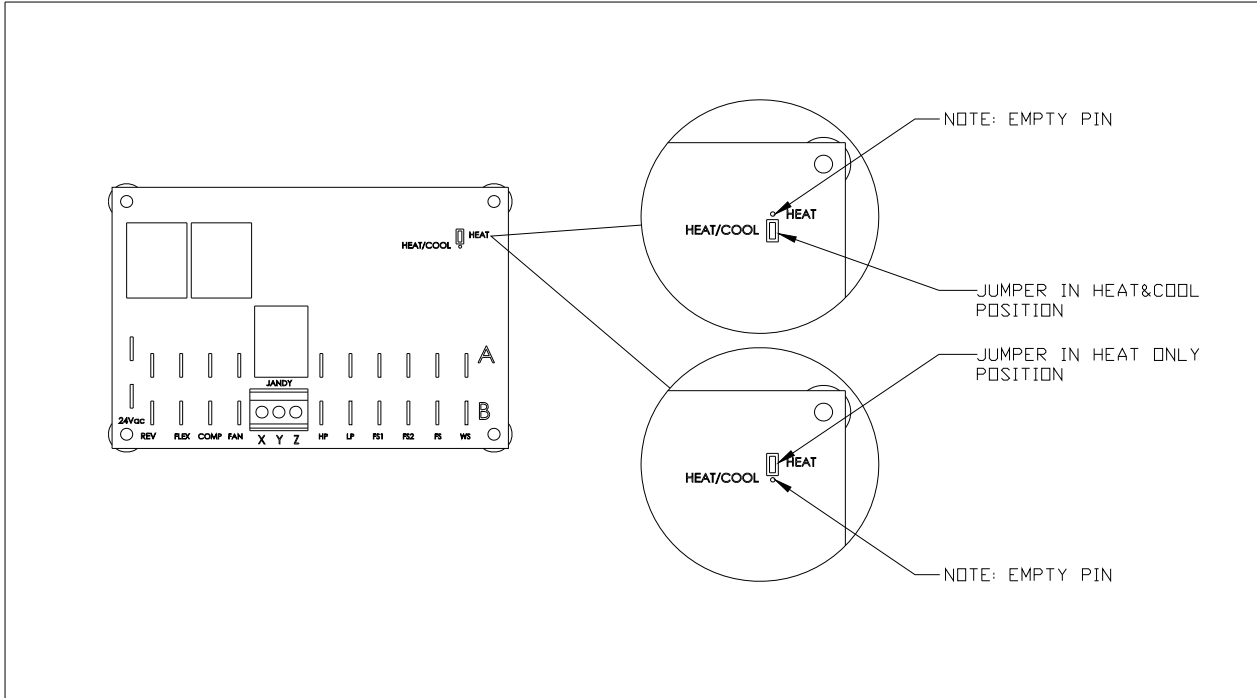
Failure to heed the following may result in permanent injury or death.

This is NOT an owner or operator procedure. Repairs must not be attempted by untrained and/or unqualified individuals. Risk of Electrical Shock... **Ensure all electrical power to the heater has been disconnected** prior to removing the heater front access panel. **Leave electrical power disconnected** throughout the following jumper repositioning procedure.

1. To access the jumper, disconnect electrical power and remove the heater front entry panel; then, remove the metal cover from heater electrical enclosure. For layout details of the PC control board, see figures on next page.
2. Locate the mode jumper in the upper right hand corner of the PC control board; per the figures on the following page, identify the correct location for the jumper. If the jumper is found to be incorrectly positioned, gently disengage the jumper by pulling it directly away from the control board.
3. Correctly reposition the jumper, leaving one pin uncovered. **Note:** The jumper should cover two (2) pins: one always being the middle pin, and the other the correct pin for the features of the heat pump.

# Controls Configuration & Adjustments...

## Microprocessor Mode Jumper Positioning... continued:



# Controls Configuration & Adjustments...

## Defrost Systems- Described

### DEFROST CYCLE (HEAT ONLY UNITS):

The microprocessor controller monitors the heater's air-coil temperature, minimizing air-coil freeze-up during cooler weather conditions. If the controller senses air-coil temperatures conducive to making ice, the heater's compressor operation is interrupted while the fan is allowed to continue in operation.

With the compressor off, the air-coil begins to warm to the surrounding air temperature. When air-coil temperatures rise above approximately 38°F, the compressor is restarted and heating resumes.

In the event air temperatures remain below approximately 38°F, the compressor will remain off until the air temperature rises above 38°F. The unit will not heat the water as long as the compressor remains off.

During defrost cycles, when the controller has stopped compressor operation, the display will read: [FS].

### DEFROST CYCLE (HEAT & COOL UNITS):

The microprocessor controller, in conjunction with the defrost sensor, constantly monitors the heater's evaporator (air-coil) temperature. Should the controller sense ice or frost has formed on the evaporator, sufficient in amount as to affect the heater's performance, an active defrost cycle (more below) is initiated. Before initiating a defrost command, the controller defrost logic looks at both the air-coil temperature, and the length of time the coil has remained at an ice-making temperature.

Active defrost involves using hot refrigerant gas, from the compressor, to rapidly remove ice or frost from the evaporator coil. In practice, during a hot gas defrost cycle, valving, internal within the refrigerant system, reverses the flow of the refrigerant; this reversal of flow temporarily makes the air-coil the condenser. During hot gas defrost, the air-coil warms very quickly, and accumulated ice and frost is rapidly melted. Under most conditions the evaporator will be completely cleared in under 5-minutes.

### HEAT & COOL DEFROST SEQUENCE DETAILS:

- When the controller senses air-coil temperatures conducive to making ice, the unit will enter a 50-minute defrost delay (counting) period.
- During the counting period, the fan and compressor will continue to operate, and the water will continue to be heated. During the counting period it is normal to see a moderate amount of frost and ice formation on the air coil.
- If, after the 50-minute counting period, the controller senses a need to defrost:
  1. The refrigerant circuit reversing valve will be activated, changing the flow of hot refrigerant gas from the pool water heat exchanger to the air-coil.
  2. Fan operation will be suspended, permitting maximum heating of the air-coil.
  3. The reverse cycle will continue until either:
    - A. The air-coil attains a predetermined temperature (indicative of total defrost), or;
    - B. Until 10-minutes have elapsed (regardless of total defrost having occurred).
- During hot gas defrost cycles, the compressor will not deactivate; rather, the compressor will continue operation throughout the sequence. Upon completion of the defrost cycle (as terminated per "A" or "B," above), the reversing valve will be deactivated, fan operation will recommence, and water heating will resume.

# Controls Configuration & Adjustments...

## Water Flow (Pressure) Switch Adjustment

Occasionally, plumbing system design features will create a situation whereas the heater will abnormally cycle on the water flow circuit. This situation will be evident if the circulator pump is operating, the filter is clean, and all water valves are set to flow water through the heater— but the error code: “FLO” remains displayed (or displays intermittently). In these rare instances where the factory water pressure switch (WPS) setting will not satisfy site conditions, a WPS adjustment, to enable normal heater operation, is possible.

### **WARNING !**

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

WPS adjustment procedure to be performed by experienced service personnel only; procedure is NOT a homeowner-based task, and must not be attempted by individuals lacking adequate electrical and mechanical experience. BEWARE: ROTATING FAN PROP HAZARD: fan may start during water switch adjustment. Keep hands clear of fan blade at all times.

### **Locate Water Pressure Switch and Identify Type:**

1. Before proceeding with switch adjustment, be absolutely certain the heater is receiving correct water flow. Leave circulation pump operating during water pressure switch (WPS) adjustment process.
2. Remove heater front cover and locate the water pressure switch. The switch will be found attached outside of the electrical enclosure, at lower edge; exact location will vary by heater model (see photo P-1, on following page).
3. AquaCal heat pumps may come equipped with either of two (2) water pressure switches: “Len Gordon” or “TecMark” brand (see photos P-2 and P-3, on following page, to determine which brand pressure switch is installed). The adjustment procedures differ slightly between the two brands.

### **To Adjust a “Len Gordon” Switch:**

1. Locate the black, rectangular plastic tab, located on the forward-facing side of the switch (reference P-2 on page following). The black rectangle is a wheel lock tab; slide the tab fully LEFT to unlock the adjustment wheel.
2. With water pump operating, and electrical power supplied to the heater, slowly rotate the top of the adjustment wheel TOWARDS you until the FLO code (just) disappears. WARNING: watch for rotating fan blade; depending upon the state of the control circuit time delay, the heater may start simultaneous with the WPS adjustment.
3. Once the adjustment has been completed, slide the wheel locking tab fully back to the right-hand, locked position.

### **To Adjust a “TecMark” Switch:**

1. (Reference photo P-3 on page following.) TecMark switches do not have an adjustment wheel lock.
2. With water pump operating, and electrical power supplied to the heater, slowly rotate the top of the adjustment wheel AWAY from you until the FLO code (just) disappears. WARNING: watch for rotating fan blade; depending upon the state of the control circuit time delay, the heater may start simultaneous with the WPS adjustment.



# Controls Configuration & Adjustments...

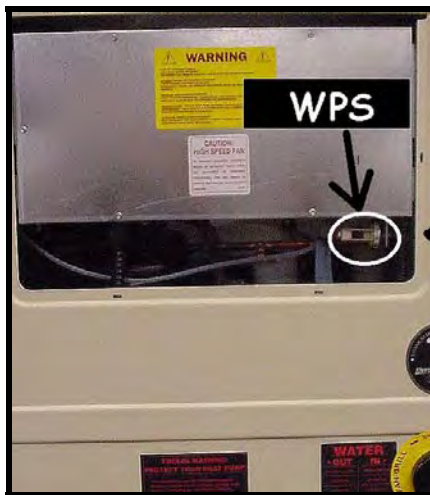
## Water Flow (Pressure) Switch Adjustment... continued:

### **To Complete the Adjustment Procedure– Either Brand Switch:**

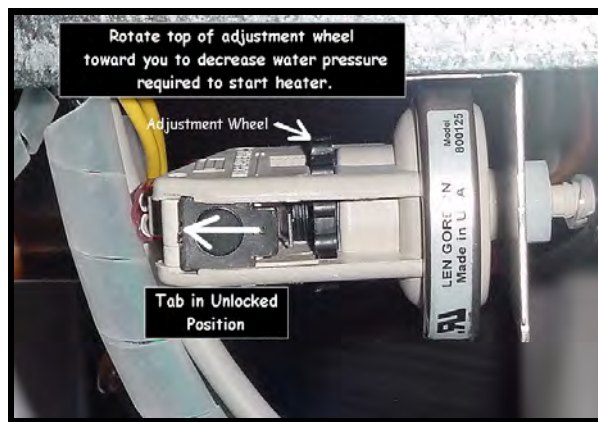
1. With electrical power remaining ON to the heater and heater operating, shut off the power to the circulating pump. If the switch has been correctly adjusted, when the water pump stops, the heater will shut off and the “FLO” code will display.

**CAUTION:** If the heater continues to operate with water pump off, readjust water pressure switch to **ensure heater will not run without water flow.**

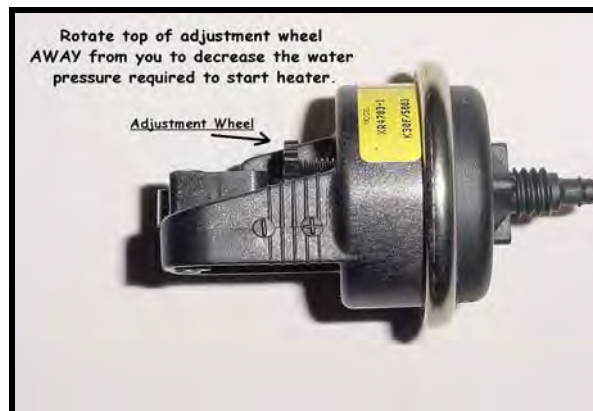
2. Reinstall heater front cover.



P-1, WPS Location



P-2, Len Gordon Style Switch



P-3, TecMark Style Switch

SHOULD ADJUSTMENT OF THE WATER PRESSURE SWITCH PROVE UNSUCCESSFUL, CONTACT AQUACAL TECHNICAL SUPPORT (727-823-5642); SITE-SPECIFIC FACTORS MAY REQUIRE THE INSTALLATION OF AN EXTERNAL FLOW SWITCH.

# CONTACTING THE FACTORY

## What We Need to Know When You Call Us

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

Model: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Installation Date: \_\_\_\_\_

} Look for this information on sticker located at top of front cover of this manual; otherwise, see data plate on side of heater.

} Refer to installer's invoice for this information.

Having the above information ready will speed the service process and allow us to respond more quickly. A brief but concise description of what the unit is, or is not doing, will also help us to help you.

Please call toll-free at: (727) 823-5642. We are here to serve you from 8 a.m. to 5 p.m. EST, Monday through Friday. If calling after hours, our voice mail system will handle your call. Be sure to leave your name, complete address, and telephone number.

If you prefer, you may FAX the information to: (727) 824-0847.

(Be certain to provide your full address and a daytime telephone number.)

## Thank You !







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