

# AquaCal<sup>®</sup> Operation Manual

## **WATER SOURCE**

SWIMMING POOL AND SPA HEAT PUMPS AND

## **SUNPOWER**



### Important

Read this document before operating / installing this product

For additional product manuals and operation / installation procedures, please visit [www.AquaCal.com](http://www.AquaCal.com)

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MODEL / SERIAL NUMBER

# Table of Contents

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## **Section 1 - Contacting AquaCal AutoPilot, Inc.**

## **Section 2 - Safety**

## **Section 3 - Operation**

3.1 Energizing Heat Pump .....	2
3.2 Display Lock .....	2
3.3 Control Panel .....	2
3.4 Buttons .....	2
3.5 Indicator Lights .....	3
3.6 Display .....	3
3.7 Factory Defaults .....	3
3.8 Setting Operating Mode .....	4
3.9 Setting Thermostats .....	5
3.10 Selecting Celsius or Fahrenheit .....	5
3.11 User Lock Option (Enable) .....	5
3.12 User Lock Option (Entering Pass Code) .....	6
3.13 User Lock Option (Disable) .....	7
3.14 Operating Heat Pump (With an External Controller) .....	7

## **Section 4 - Maintenance**

4.1 Monitoring Conditions .....	8
4.1.a Water Chemistry .....	8
4.1.b Water Flow Rates .....	9
4.1.c Adjusting Water Flow Using $\Delta T$ (Delta-T) .....	10
4.1.d Irrigation and Storm Run-Off .....	11
4.1.e Clearances .....	11
4.2 Cleaning Equipment .....	12
4.3 Planned Maintenance .....	13
4.4 Winterizing .....	13

## **Section 5 - Troubleshooting**

5.1 Fault Codes .....	15
5.2 Issues and Resolutions .....	18

## **Section 6 - Appendix**

6.1 Identifying Model Specifications .....	20
6.2 Initial Heating Recommendations .....	21
6.3 Initial Cooling Recommendations .....	21
6.4 Available Accessories .....	21

## SECTION 1 - CONTACTING AQUACAL AUTOPILOT, INC.

For further assistance, please contact the installing dealer or contact AquaCal AutoPilot, Inc. for a service partner in your area. To better assist you, please have the heat pump model and serial number available. See "Identifying Model Specifications" on page 20.

<b>Website</b>	www.AquaCal.com
<b>Request Service Online</b>	<a href="http://www.AquaCal.com/request-heat-pump-service/">www.AquaCal.com/request-heat-pump-service/</a>
<b>Phone</b>	(1) 727-823-5642
<b>Hours</b>	8-5 pm, Eastern M-F

## SECTION 2 - SAFETY

- For personal safety, and to avoid damage to equipment, follow all safety instructions displayed on the equipment and within this manual. Repair and service of heat pump must be performed by an authorized service center.
- Warranties may be voided if the equipment has been improperly installed, maintained or serviced.
- If service is deemed necessary, please contact the installing dealer. Or contact AquaCal® for a service partner in your area. See "Contacting AquaCal AutoPilot, Inc." on page 1.

### **SAFETY SIGNALS**

*Throughout this document, safety signals have been placed where particular attention is required.*



**WARNING** - signals relate to personal safety.



**CAUTION** - signals promote avoiding damage to the equipment.

When installing and using your heat pump basic safety precautions must always be followed, including the following:



**WARNING** - Failure to heed the following may result in injury or death.

- Installation and repairs must be performed by a qualified technician.
- The heat pump 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 the system.
- The heat pump utilizes high voltage. Use caution when servicing.
- Electrical installation and service should be performed by a Licensed Electrician only.
- Improper water chemistry can present a serious health hazard. To avoid possible hazards, maintain pool / spa water per standards detailed in this document.
- 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.
- Prolonged immersion in water colder than normal body temperature may cause a condition known as Hypothermia. The symptoms of Hypothermia include shivering (although as hypothermia worsens, shivering stops), clumsiness or lack of coordination, slurred speech or mumbling, confusion and poor decision-making, drowsiness or low energy, lack of concern about personal welfare, progressive loss of consciousness, weak pulse and slow or shallow breathing. In addition, persons having an adverse medical history, or pregnant women, should consult a physician before immersing in a cold body of water. Children and the extreme elderly should be supervised by a responsible adult.

**⚠ CAUTION** - Failure to heed the following may result in equipment damage.

- Maintain proper water chemistry in order to avoid damage to pump, filter, pool shell, etc.
- Water flow exceeding maximum flow rate requires a bypass. Damage due to excessive water flow will void warranty.

## SAVE THESE INSTRUCTIONS

### SECTION 3 - OPERATION

#### 3.1 Energizing Heat Pump

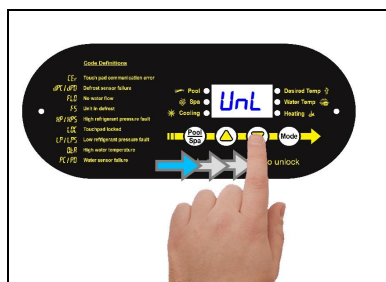
Turn power on at external fuse box or breaker disconnect.

- Controller performs a lamp test.
- The display reads **BBB**.
- Controller then displays as normal. See "Display" on page 3.

#### 3.2 Display Lock

The heat pump has a display lock to protect against inadvertent setting changes. To activate display and controls, slide finger across the controls as shown from left to right.

- The code **UnL** will briefly appear, then the set temperature or mode will display.
- This is different than a user-lock which requires a pass code. See "User Lock Option (Enable)" on page 5.

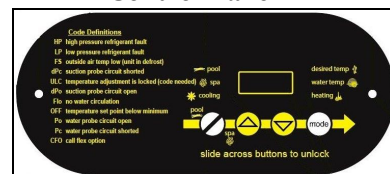


#### 3.3 Control Panel

The following information outlines the operation for a standard installation.

- Control Buttons will operate differently for custom installations; such as a heat pump connected to an external controller. See "Operating Heat Pump (With an External Controller)" on page 7.

**Control Panel**



#### 3.4 Buttons

Buttons	Description
<b>Display Lock</b>	Sliding your finger across the buttons from left to right will temporarily disable the display lock.
<b>Pool / Spa</b>	Select either the pool or the spa thermostat.
<b>Up Arrow</b>	Used to increase temperature set point and navigate through menu options.
<b>Down Arrow</b>	Used to decrease temperature set point and navigate through menu options.
<b>Mode</b>	Select heat pump's operating mode.

### 3.5 Indicator Lights

Indicators	Description
<b>Pool</b>	The Heat Pump is referencing the pool thermostat.
<b>Spa</b>	The Heat Pump is referencing the spa thermostat.
<b>Heating</b>	Indicates the unit is heating the water. Please note - the compressor must be operating before this light will illuminate.
<b>Cooling</b>	Indicates the unit is cooling the water. Please note - the compressor must be operating before this light will illuminate.
<b>Water Temp</b>	Indicates current water temperature.
<b>Desired Temp</b>	Indicates temperature set point is displayed. This is displayed when "UP" or "DOWN" is selected.

### 3.6 Display

Display	Description
<b>75</b>	The heat pump is on and displaying the current water temperature. In this example 75° F is displayed.
<b>FLO</b>	No water flow is detected. The filter pump is off or heat pump is not receiving correct water flow.
<b>OFF</b>	The heat pump has been turned off via the mode selector button or the temperature set point has been lowered below 45° F.
<b>BBB</b>	The control program is initializing. This displays only as power is applied to the heat pump. The program version number will then be displayed.
<b>CF 1</b>	Select water temperature format (in either Celsius or Fahrenheit).
<b>ULC</b>	Enable heat pump lockout feature.
<b>ELC</b>	Select passcode to lock the keyboard.
<b>LDC</b>	This is a Service Entry Point (not intended for use by the owner). The <b>LDC</b> code permits service personnel to enter a factory passcode to access adjustable calibration and site dependent setup parameters. Service adjustments are available to authorized installation and service personnel, only.

### 3.7 Factory Defaults

Certain programming options have been preset at the factory. These options can be overwritten for site-specific conditions.



**CAUTION** - Failure to heed the following may result in equipment damage.

- Service Level Programming must only be attempted by authorized service centers.
- Unauthorized adjustments in the Service Menu (beyond the **LDC** menu) may void heat pump's warranty.
- If the issue reoccurs, please contact the installing dealer. Or contact AquaCal® for a service partner in your area. See "Contacting AquaCal AutoPilot, Inc." on page 1.

Table 1 - Factory Defaults

CODE	DESCRIPTION	DEFAULT VALUE	RANGE
<i>OFF</i>	Heat Pump is deactivated.	<i>OFF</i>	
<i>HEA</i>	Set to heat water to point set on thermostat.		
<i>COO</i>	Set to cool water to point set on thermostat.		
<i>ACH</i>	Set to maintain a water temperature set on the thermostat.		
<i>CF 1</i>	Celsius / Fahrenheit Selection	1	0 = Celsius 1 = Fahrenheit
<i>ELC</i>	Enter Lock Code	0	0 - 99
<i>ULC</i>	User Lock Code	0	0 = "User Lock Disabled" 1 = "User Lock Enabled"

**3.8 Setting Operating Mode**

**Heat Mode**



**Cool Mode**



**Automatic Heat / Cool Mode**

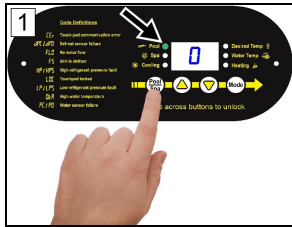


**Deactivate Heat Pump**

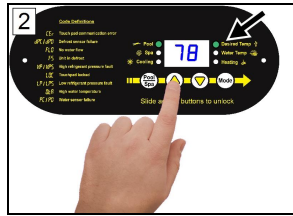


Heating / Cooling modes only available on select equipment. Confirm heat pump features before setting a mode.

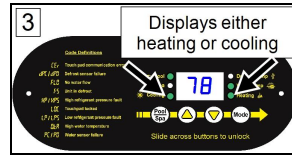
### 3.9 Setting Thermostats



Select "POOL" or "SPA"



Press "UP" or "DOWN" to the desired temperature.

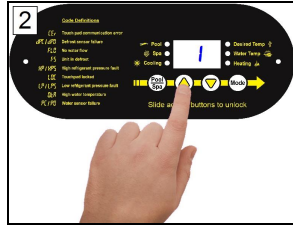


- The heating indicator will illuminate when heating the water.
- The cooling indicator will illuminate when cooling the water.

### 3.10 Selecting Celsius or Fahrenheit



Hold "UP" and "DOWN" until "CF" displays.



"0" - Celsius  
"1" - Fahrenheit

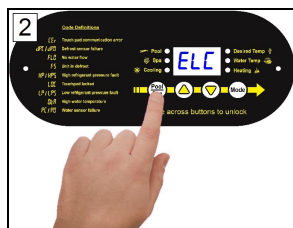
### 3.11 User Lock Option (Enable)

The user-lock feature allows the heat pump control panel to be "locked"; preventing unauthorized temperature adjustments.

- Do not confuse a user-lock with the display lock. See "Display Lock" on page 2.
- If **LOC** is briefly displayed, followed by a "0", the heat pump is already locked.



Hold "UP" and "DOWN" until "CF" displays.



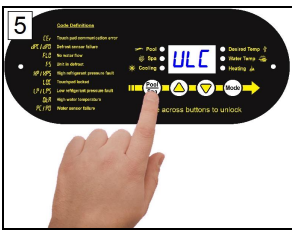
Press "POOL / SPA" button until "ELC" is displayed.



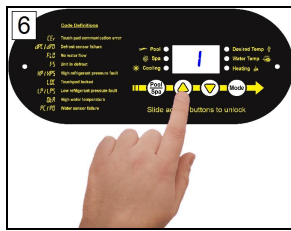
Press "UP or "DOWN" button to change or add a numerical password



Press "POOL / SPA" button to lock in the password.



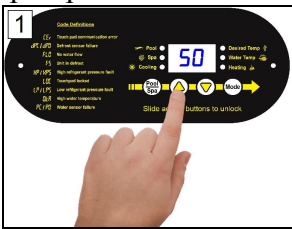
Press "POOL / SPA" button until **ULC** is displayed.



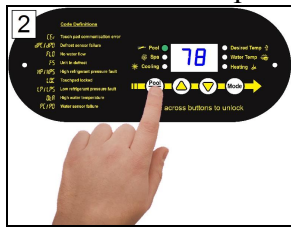
Press "Up" button till "1" is displayed to enable.

### 3.12 User Lock Option (Entering Pass Code)

If **LOC** is briefly displayed when attempting to change a heat pump's settings followed by a "0", the heat pump is in a user-lock mode. A numerical passcode is required to proceed.



Press "UP" or "DOWN" arrow to enter user lock code.



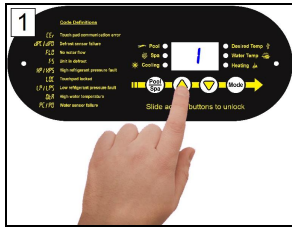
Press "POOL / SPA" button again to unlock.

#### **NOTE -**

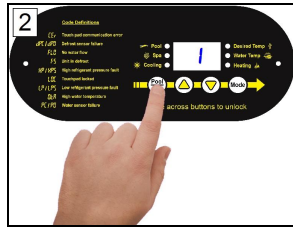
- After three seconds of inactivity, the heat pump's slide lock will activate.
- If the user-lock code has been misplaced, the heat pump must be reset to default factory settings. See "Reset to Factory Defaults Settings" on page 1.



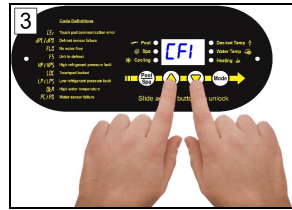
### 3.13 User Lock Option (Disable)



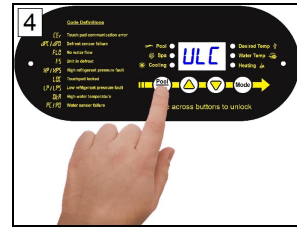
Use "UP" button to enter existing password.



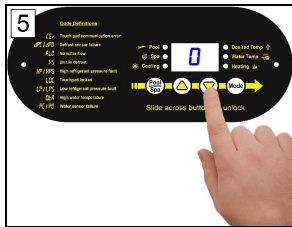
Press "Pool / Spa" button to unlock.



Hold "UP" and "DOWN" buttons until **CF 1** is displayed.



Press "POOL / SPA" button until **ULL** is displayed



Press "DOWN" button until "0" is displayed.

### 3.14 Operating Heat Pump (With an External Controller)

#### Controller with an internal thermostat control

##### Activating Heat Pump

1. Set the desired temperature at the external controller.
2. Use the external controller to select either the "Pool" or "Spa" to heat.

##### Deactivating Heat Pump

- Set the external controller to "OFF".

Please note - If equipped, the heat pump's cooling function **will be disabled** when using this type of controller.

If the cooling function is needed, the heat pump must be temporarily re-programmed for local control. Check with controller installer if heat pump needs to be re-programmed.

## Controller with 2 positions - ("Pool" and "Spa" - no internal thermostat control)

### Activating Heat Pump

1. Set the desired temperatures on the heat pump thermostats. See "Setting Thermostats" on page 5.
2. Use the external controller to select either the "Pool" or "Spa" to heat.
  - *Rapid movement between thermostats without a "rest" between each change can cause a missed signal by the heat pump.*

### Deactivating Heat Pump

- Go to the heat pump and set the mode to "OFF". See "Setting Operating Mode" on page 4.

Please note - If equipped, the heat pump's cooling function **will be disabled** when using this type of controller.

If the cooling function is needed, the heat pump must be temporarily re-programmed for local control. Check with controller installer if heat pump needs to be re-programmed.

## Controller with 3 positions - ("High", "Low", and "Off" - no internal thermostat control):

### Activating Heat Pump

1. Set the desired temperatures on the heat pump thermostats. See "Setting Thermostats" on page 5.
2. Use the external controller to select either "High" or "Low" to heat.
  - *When changing between thermostats, select "Off" first. Then select desired thermostat.*
  - *Rapid movement between thermostats without a "rest" between each change can cause a missed signal by the heat pump.*

### Deactivating Heat Pump

- Set the external controller to "OFF".

## SECTION 4 - MAINTENANCE

### 4.1 Monitoring Conditions

#### 4.1.a Water Chemistry

Check water chemistry regularly and maintain within recommended levels. Standards for commercial applications vary in different areas. Follow all local applicable codes.

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

- Do not allow water to flow through heat pump when refinishing or acid washing a pool. Either use an installed bypass to route water away from heat pump or deactivate filter pump.
- To avoid damage to equipment, monitor and maintain chemistry within recommended levels.

CHEMISTRY LEVEL CHART (RESIDENTIAL)		
CHEMICAL	POOLS	SPAS
Chlorine	1.0 – 3.0 ppm	3.0 – 5.0 ppm
Bromine	2.0 – 6.0 ppm	2.0 – 6.0 ppm
Cyanuric Acid	30 - 50 ppm	30 - 50 ppm
pH	7.4 – 7.6 ppm	7.4 – 7.6 ppm

<b>CHEMISTRY LEVEL CHART (RESIDENTIAL)</b>		
<b>CHEMICAL</b>	<b>POOLS</b>	<b>SPAS</b>
<b>Total Alkalinity</b>	80 – 120 ppm	80 – 120 ppm
<b>Calcium Hardness</b>	200 – 400 ppm	150 – 250 ppm
<b>Total Dissolved Solids*</b>	0 – 1,500 ppm	1,500 ppm above start-up total dissolved solids in spas

\* Salt from a chlorine generator is not included in Total Dissolved Solids.

#### 4.1.b Water Flow Rates

Maintain water flow rates as indicated. Please note, these specifications relate to the heat pump only. Code-specified whole system turnover rates must be satisfied.

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

- Water flow exceeding maximum flow rate may damage heat exchanger; such damage will not be covered under the equipment warranty

#### Water Source

<b>MODEL</b>	<b>SOURCE</b>	<b>HEAT EXCHANGER TYPE</b>	<b>FLOW RATES</b>	
			<b>MINIMUM</b>	<b>MAXIMUM</b>
<b>WS03</b>	Source-Side	Titanium ThermoLink®	20 GPM	70 GPM
		Cupronickel	10 GPM	14 GPM
	Pool / Spa	Titanium ThermoLink®	30 GPM	70 GPM
		Cupronickel	N/A	N/A
<b>WS05</b>	Source-Side	Titanium ThermoLink®	20 GPM	70 GPM
		Cupronickel	10 GPM	18 GPM
	Pool / Spa	Titanium ThermoLink®	30 GPM	70 GPM
		Cupronickel	N/A	N/A
<b>WS10</b>	Source-Side	Titanium ThermoLink®	30 GPM	70 GPM
		Cupronickel	30 GPM	54 GPM
	Pool / Spa	Titanium ThermoLink®	30 GPM	70 GPM
		Cupronickel	N/A	N/A

**SunPower**

MODEL	SOURCE	HEAT EXCHANGER TYPE	FLOW RATES	
			MINIMUM	MAXIMUM
SP05	Spa-Side	Titanium ThermoLink®	20 GPM	45 GPM
	Pool-Side	Titanium ThermoLink®	30 GPM	70 GPM

If water flow through the heat pump is reduced, performance will suffer and internal safety devices may deactivate the heat pump with error codes **HP**, **HPS**, **LP** or **LPS**.

- Operate water filtration devices per manufacturer's specifications. Dirty filters can cause reduced water flow to the heat pump. An increase of 7-10 psi higher than the clean filter pressure typically reduces flow rates. This requires the filter to be cleaned or back-washed
- Keep baskets free of debris. Similar to a dirty filter, large volumes of debris in the pump and skimmer baskets can reduce water flow.
- Check for improper valve settings. A partially closed valve after the filter, or a full-open bypass around the heat pump, will cause insufficient water flow through the heat pump.
- The maximum static (or operating pressure) is 50 pounds-per-square-inch (PSI) unless a special "high-pressure" unit has been ordered. These specifications relate to the heat pump only. Code-specified whole system turnover rates must be satisfied.

**4.1.c Adjusting Water Flow Using ΔT (Delta-T)**

The Delta-T is the temperature difference between the water temperatures entering and leaving the heat pump. The equipment can be fine-tuned for maximum performance by balancing water flow rates to maintain an ideal ΔT.

- Installed Temperature / Pressure probes and ports are required to perform the following procedures.
- **This adjustment procedure is to be completed with the unit in HEA mode only; RCH and COO discharge temperatures are not shown.**

***PLEASE NOTE -***

*Temperature / Pressure ports are required for all Water Source and SunPower installations on both inlet and outlet piping.*

1. Adjust heat pump thermostat to its lowest setting while in **HEA** mode.
2. Deactivate the water filtration pump.
3. Adjust valves to a halfway open position leading to the heat pump.
4. Adjust valves to a fully open position leading away from the heat pump.
5. Activate the pool water filtration pump.
6. Slowly turn the thermostat up until the heat pump activates.
  - The source water filtration pump will cycle on first.
  - After a four-minute delay, the heat pump compressor will start.
7. With the heat pump running, confirm the source-side water filtration pump is operating properly with adequate flow and no short cycling. If needed, clean filters leading to the heat pump.
8. Wait for water and refrigerant pressure to stabilize (approximately 5 minutes).

**Temperature / Pressure Port  
(Shown with Probe)**



9. Adjust valves in the following order:
  - A. Adjust source-side valve leading away from the heat pump to correct temperature measured with a temperature pressure probe.
  - B. Adjust pool-side valve leading away from the heat pump to correct temperatures measured with a temperature pressure probe.
  - C. Allow pressure to stabilize. Then check source-side temperature again. Re-adjust valve leading away from the heat pump as needed.
  - D. Allow pressure to stabilize . Then check pool-side temperature again. Re-adjust valve leading away from the heat pump as needed.
10. Mark valves at these positions for future reference.

Temperature differences are based on pool and source water temperatures of 72° (+ or – 3° F). For water temperatures outside this range, contact AquaCal® Technical Support.

<b>HEAT EXCHANGER TYPE*</b>	<b>MODEL</b>	<b>POOL-SIDE</b>	<b>SOURCE-SIDE</b>
<b>Titanium pool-side and source-side exchangers</b>	WS03	2° to 4° F	1° to 5° F
	WS05	3° to 6° F	2° to 8° F
	WS10	6° to 14° F	5° to 12° F
<b>Titanium pool-side exchanger and cupronickel source-side exchanger</b>	WS03	1° to 3° F	6° to 8° F
	WS05	2° to 6° F	7° to 13° F
	WS10	6° to 14° F	6° to 11° F
<b>Titanium ThermoLink®</b>	SP05	3° to 6° F	2° to 8° F

Table 2 - Temperature Chart

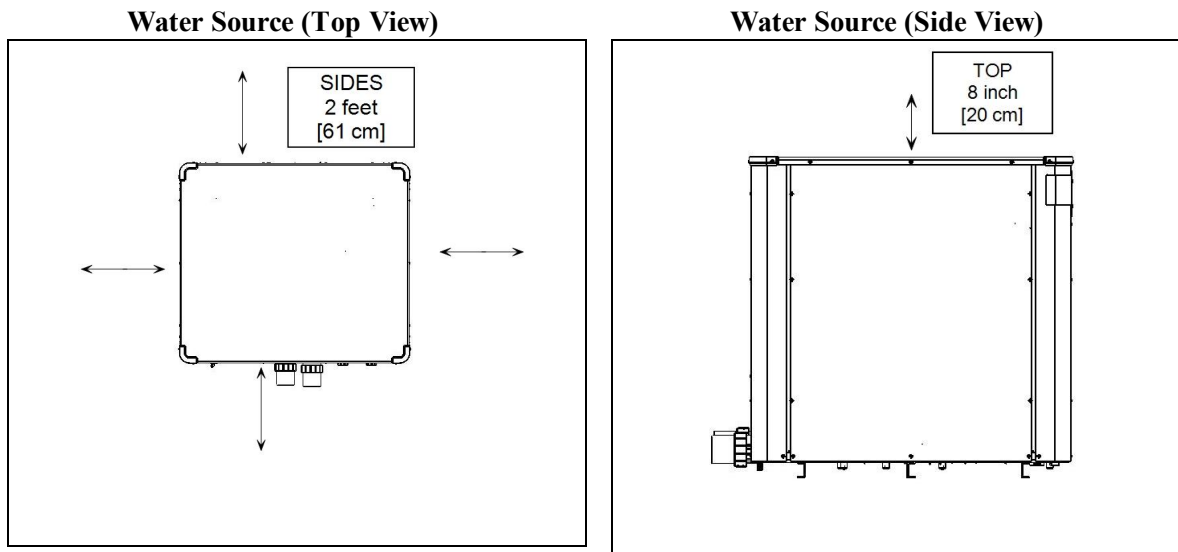
\* If unsure what heat exchanger is in equipment, check wintering section for pictures. See "Winterizing" on page 13.

**4.1.d Irrigation and Storm Run-Off**

- Corrosive irrigation water may damage heat pump components. Have irrigation water directed away from the heat pump.
- The heat pump will withstand normal rainfall. Do not allow a roof slope to direct rainwater onto the heat pump. Have a gutter installed on the roof edge to direct this water away from the heat pump. Or install the heat pump in another location.

**4.1.e Clearances**

- Locate the heat pump at least 24 inches away from the wall. And provide a minimum 24 inches between heat pumps. This will allow for rear plumbing access and electrical connections.
- Do not stack heat pumps on top of each other. Use approved racks when stacking equipment.
- Only rack equipment two units high.
- Equipment rack must meet all requirements of authorities having code-related jurisdiction.
- Avoid storing chemical containers near the heat pump. The chemicals can cause equipment damage.



## 4.2 Cleaning Equipment

Cleaning and polishing your heat pump regularly can protect its appearance longevity. More frequent servicing may be required for heat pumps located in sandy or coastal areas where sand and salt spray can become detrimental factors to equipment.

**⚠ WARNING** - Failure to heed the following may result in injury or death.

- Possible electric shock hazard - Deactivate power to all electrical devices on the pad when washing heat pump. Do not restore electrical power until equipment is completely dry.

**⚠ CAUTION** - Failure to heed the following may result in equipment damage.

- Do not use a pressure cleaner to wash heat pump. Damage to heat pump components may result. If using a hose-end spray nozzle adjust spray pattern to low strength only.
- Do not spray water directly into the interior of the heat pump; damage to components may result.
- Do not use chemicals on the control panel.

### Cleaning

1. Wash outside cabinet using a low-pressure water hose
2. While the heat pump is still wet, use an approved cleaning agent to clean the exterior of the heat pump. **Do not use chemicals on the control panel.**
3. Use a detergent-dampened cloth to wipe the heat pump's exterior cabinet.
4. Flush all exterior with fresh water using a low-pressure water hose.
5. Dry the exterior cabinet using a soft cloth.

<b>APPROVED CLEANING AGENTS*</b>
Fantastic <sup>®</sup>
Formula 409 <sup>®</sup>
Cascade <sup>®</sup>
All Power Plain Detergent (3% Solution)

Table 3 - Cleaning Agents

### Polishing

1. Polish the heat pump's cabinet panels using an approved polishing agent and following the manufacturer's instructions. Do not use chemicals on the control panel.
2. Rinse the heat pump panels with fresh water, wipe, and buff panels using a dry soft cloth.
3. Allow heat pump interior and surrounding equipment to "air-dry" for several hours prior to restoring electrical power.

<b>APPROVED POLISHING AGENTS*</b>
Simoniz <sup>®</sup> Wax
AeroWax <sup>®</sup>
Glo-Coat <sup>®</sup>

Table 4 - Polishing Agents

- \* The trademarks used in approved cleaning and polishing agents are property of their owners and are not related to AquaCal<sup>®</sup>.

### 4.3 Planned Maintenance

An annual inspection and maintenance program is strongly recommended starting no longer than one year after installation of the heat pump. See recommended annual inspection checklist.

AquaCal<sup>®</sup> can perform this service in limited areas. Contact Customer Support for more information.

**⚠ WARNING** - Failure to heed the following may result in injury or death.

- Annual inspection and service must be performed by a qualified heat pump specialist in order to prevent physical injury or damage to equipment.

#### **RECOMMENDED INSPECTION CHECKLIST:**

- Wash Source Coil (As Applicable)
- Check Water Temperature through Evaporator
- Check Capacitor Value
- Check Compressor Amperage Draw
- Check Electrical Connections
- Check Flow / Pressure Switch
- Check Operating Controls and Temperature Sensors
- Check Water Chemistry
- Check Proper Voltage to Unit
- Check Refrigerant Levels
- Check Relay Contacts
- Check Water Flow
- Check filter pump Amperage Draw
- Check Water Temperature Change through Heat Exchanger
- Clean Evaporator's Coil
- Clean Heat Pump's Cabinet

### 4.4 Winterizing

**⚠ WARNING** - Failure to heed the following may result in injury or death.

- Deactivate all electrical power to heat pump before performing hard freeze procedures.

**⚠ CAUTION** - Failure to heed the following may result in equipment damage.

- Failure to winterize heat pump may result in serious equipment damage. Freeze damage is not covered under the heat pump warranty.
- While the plumbing connections are in the winterized condition (not fully tightened), it is imperative the pool and spa water not be circulated through the heat pump. Loss of water through loose plumbing connections may result in damage to circulating pump, pool and spa structures, and other equipment.

#### **Light Freeze Conditions**

There are two freeze conditions requiring heat pump attention. A light freeze is when the ambient air temperature falls below 32 degrees Fahrenheit for less than 8 hours. Typically during light freeze conditions circulating (moving) water will not freeze. Override time clocks and allow filtration system to run continuously during light freeze conditions.

## Hard Freeze Conditions

A hard freeze is when the ambient air temperature falls below 32 degrees Fahrenheit for more than 8 hours. In areas where this condition is prevalent and sustained, the heat pump **MUST** be winterized for hard freeze conditions. Follow the correct procedure depending on the type of heat exchanger found in the heat pump.

### ***PLEASE NOTE - WHEN WINTERIZING WATER SOURCE UNITS***

*For Water Source units both the pool and the source sides must be winterized. Your Water Source unit may have two different heat exchanger types on pool and source sides. Be sure to properly identify and follow the correct procedure for both heat exchanger types in your unit.*

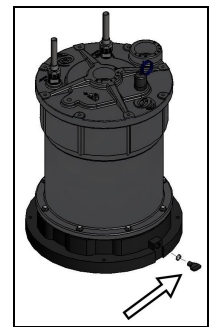
## Identify Exchanger:

1. Deactivate all electrical power to heat pump.
2. Deactivate filter pump.
3. Remove front access panel.
4. Identify heat pump exchanger from illustrations in this section. Then follow procedure for that heat pump's exchanger.

### **Titanium ThermoLink® Exchanger (with Internal Drain)**

1. Disconnect the plumbing to the heat pump at connection unions (removal is counter-clockwise).
2. Remove internal drain plug.
3. Allow water to drain completely from the heat pump. Expect to see a lot of water drain out at first, and then a small amount to continue to drain out over a long period.
4. After heat pump is fully drained, re-connect internal drain plug and reinstall front access panel.
5. Partially reconnect plumbing connection unions.
6. Winterizing is complete.
7. When ready to use heat pump again, hand-tighten connection unions. Reconnect electrical power, and set the operating mode on the heat pump. Activate filter pump.

**Internal  
Drain**



### **Titanium ThermoLink® Exchanger (with no Drain)**

1. Reinstall front access panel.
2. Disconnect the plumbing to the heat pump at connection unions (removal is counter-clockwise).
3. Allow water to drain completely from the heat pump. Expect to see a lot of water drain out at first, and then a small amount to continue to drain out over a long period.
4. After heat pump is fully drained, reinstall front access panel.
5. Partially reconnect plumbing connection unions.
6. Winterizing is complete.
7. When ready to use heat pump again, hand-tighten connection unions. Reconnect electrical power, and set the operating mode on the heat pump. Activate filter pump.

**No Drain**

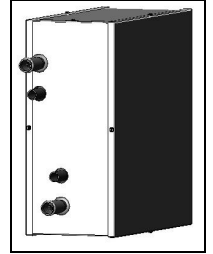




## Cupronickel Tube in Tube Exchanger

1. Reinstall front access panel.
2. Disconnect the plumbing to the heat pump at connection unions (removal is counter-clockwise).
3. Place a garden hose into the inlet side of the heat pump; wrap a clean rag around the hose to form a temporary seal.
4. Turn on the garden hose water supply.
5. Allow water to run through the heat exchanger for 2-3 minutes; fresh water should be seen exiting the pool's out-port.
6. Place a garden hose into the outlet side inlet of the heat pump; wrap a clean rag around the hose to form a temporary seal.
7. Turn on the garden hose water supply.
8. Allow water to run through the heat exchanger for 2-3 minutes; fresh water should be seen exiting the pool's in-port.
9. Place an air hose into the pool inlet of the heat pump; wrap a clean rag around the hose to form a temporary seal.
10. Push all water from the water circuit using compressed air at approximately 50 psig. The residual water should be forced out of the heat pump pool outlet.
11. Allow compressed air to blow into the heat pump inlet for at least 15-20 seconds after the water stops coming out.
12. Repeat process on the outlet side.
13. Partially reconnect plumbing connection unions.
14. Winterizing is complete.
15. When ready to use heat pump again, hand-tighten connection unions. Reconnect electrical power, and set the operating mode on the heat pump. Activate filter pump.

**Cupronickel  
(Orientation  
depends  
on model)**



## SECTION 5 - TROUBLESHOOTING

### 5.1 Fault Codes

A fault code indicates a specific issue or condition that will require action before the equipment can resume operating.

Please perform the following troubleshooting.

If the issue reoccurs, please contact the installing dealer. Or contact AquaCal® for a service partner in your area. See "Contacting AquaCal AutoPilot, Inc." on page 1.

**⚠ WARNING** - Failure to heed the following may result in injury or death.

- Repairs must not be attempted by untrained or unqualified individuals.
- The heat pump 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 the system.

**⚠ CAUTION** - Failure to heed the following may result in equipment damage.

- Service by unauthorized personnel will void the heat pump warranty.

## **FLO Indicator**

### **ISSUE**

Low or no water detected.

### **RESOLUTION**

1. Confirm the filter pump is on.
2. If a multiple-speed filter pump is being used, run at a higher speed to determine if the error persists. Do not exceed maximum flow rate for your model.
3. Confirm water is not being diverted away from the heat pump.
  - See "Water Flow Rates" on page 9.
  - See "Adjusting Water Flow Using  $\Delta T$  (Delta-T)" on page 10.

## **CEr Indicator**

### **ISSUE**

This can indicate a loose or damaged communication cable.

### **RESOLUTION**

A qualified technician should check the cable from control board to display assembly for a loose connection or visible damage.

## **CSE Indicator**

### **ISSUE**

This is a control system error.

### **RESOLUTION**

1. Deactivate then reactivate power to reset controls.
2. If the issue reoccurs, please contact the installing dealer. Or contact AquaCal<sup>®</sup> for a service partner in your area. See "Contacting AquaCal AutoPilot, Inc." on page 1.

## **dPC or dPD Indicator**

### **ISSUE**

Shorted or open defrost sensor.

### **RESOLUTION**

A qualified technician should replace the defrost sensor.

## **PC or PD Indicator**

### **ISSUE**

Shorted or open water sensor.

### **RESOLUTION**

A qualified technician should replace the defrost sensor.

## **HP Indicator**

### **ISSUE**

The refrigerant system's high-pressure switch is showing as open.

### **RESOLUTION**

1. Determine if an insufficient amount of water is being supplied to the equipment.
  - a. Confirm the filter pump is on.
  - b. If a multiple-speed filter pump is being used, run filter pump at a higher speed. Do not exceed maximum flow rate for your model.
  - c. Confirm water is not being diverted away from the heat pump.
    - See "Water Flow Rates" on page 9.
    - See "Adjusting Water Flow Using  $\Delta T$  (Delta-T)" on page 10.
2. If the issue reoccurs, please contact the installing dealer. Or contact AquaCal® for a service partner in your area. See "Contacting AquaCal AutoPilot, Inc." on page 1.

## **HPS Indicator**

### **ISSUE**

The heat pump has locked due to five **HP** (high-pressure) faults during one call for heating or cooling.

### **RESOLUTION**

1. Deactivate then reactivate power to the heat pump to clear error.
2. Troubleshoot the high-pressure issue causing the error. See "HP Indicator" on page 17.
3. If the issue reoccurs, please contact the installing dealer. Or contact AquaCal® for a service partner in your area. See "Contacting AquaCal AutoPilot, Inc." on page 1.

## **LP Indicator**

### **ISSUE**

The refrigerant system's low-pressure switch is showing as open.

### **RESOLUTION**

If the heat pump is a reversing unit, place it in **HEA** mode and perform the following troubleshooting.

1. For further assistance, please contact the installing dealer. Or contact AquaCal® for a service partner in your area. See "Contacting AquaCal AutoPilot, Inc." on page 1.

## **LPS Indicator**

### **ISSUE**

The heat pump has locked due to five **LP** (low-pressure) faults during one call for heating or cooling.

### **RESOLUTION**

1. Deactivate then reactivate power to the heat pump to clear error.
2. Troubleshoot the low-pressure issue causing the error. See "LP Indicator" on page 17.

## **OEI Indicator**

### **ISSUE**

Incoming water temperature exceeded 110° F and the unit is locked with an **OEI** over temperature alarm. The heat pump will not operate until incoming water temperature drops to 100° F or lower.

### **RESOLUTION**

1. Determine if another heat source (gas heater, solar heater, etc.) is heating water being sent directly to the heat pump with the **OEI** indicator. This situation will need to be corrected before continuing.
2. Rule out an incorrect reading from the water temperature sensor. Verify existing water temperature with an accurate thermometer. If heat pump's sensor is inaccurate, the water temperature sensor may require replacement.

## **5.2 Issues and Resolutions**

**⚠ WARNING** - Failure to heed the following may result in injury or death.

- Repairs must not be attempted by untrained or unqualified individuals.
- The heat pump contains refrigerant under 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 the system.

**⚠ CAUTION** - Failure to heed the following may result in equipment damage.

- Service by unauthorized personnel will void the factory warranty.

Please perform the following troubleshooting.

For further assistance, please contact the installing dealer. Or contact AquaCal® for a service partner in your area. See "Contacting AquaCal AutoPilot, Inc." on page 1.

## **Control Panel Not Responding**

1. If the heat pump is controlled by an external controller, confirm the external controller settings. See "Operating Heat Pump (With an External Controller)" on page 1.
2. If the issue is still occurring, contact the manufacturer of the external control device.
3. For further assistance, please contact the installing dealer. Or contact AquaCal® for a service partner in your area. See "Contacting AquaCal AutoPilot, Inc." on page 1.

## **Heat Pumps Not Running**

1. Confirm equipment is receiving power. Is the heat pump display illuminated?
  - If not, confirm the main breaker (located at the power supply panel) and the disconnect switch (located near the heat pump) are both turned on.
  - If the display still does not illuminate, it is recommended that the heat pump installer or electrician confirms heat pump is receiving power.
2. Confirm correct mode is selected. See "Setting Operating Mode" on page 4.
3. Confirm thermostat is set correctly. See "Setting Thermostats" on page 5.
  - If heating the water, the thermostat should be set above the current water temperature.
  - If cooling the water, the thermostat should be set below the current water temperature.
4. If an error code is displayed, diagnose and correct the cause of the code. See "Fault Codes" on page 15.
5. If the heat pump is using an external controller, the heat pump may not be set correctly to accept the controller's signal.
  - See "Operating Heat Pump (With an External Controller)" on page 7.
6. For further assistance, please contact the installing dealer. Or contact AquaCal® for a service partner in your area. See "Contacting AquaCal AutoPilot, Inc." on page 1.

## **Heat Pumps Tripping Breaker**

1. Have an electrician confirm breakers are in good condition and properly sized for the heat pump.

2. Multiple heat pumps installed at the same site may benefit from special automatic sequencing controllers to avoid excessive power drops at start-up. See "Automatic Sequencing Controller" on page 21.
3. If a fault occurs immediately when the compressor starts, a qualified technician should evaluate the system.

### **Heat Pump Won't Shut Off**

1. If the heat pump is using an external controller, it may not be set correctly to accept the controller's signal.

### **Heat Pump Is Running, Not Heating**

1. Confirm heat pump mode is set to either *HEA* or *ACH*.
2. Confirm heat pump is on and transferring heat into the water.
  - Measure the pool-side and source-side discharge water coming out of the heat pump. See "Adjusting Water Flow Using  $\Delta T$  (Delta-T)" on page 10.
3. Confirm thermostat is set to the desired water temperature.
4. If the heat pump is using an external controller, confirm it is set correctly to accept the controller's signal.
  - If the heat pump is still not running correctly with this device, contact the installer of the external controller device or the device's manufacturer for further assistance.
5. If an error code is displayed, diagnose and correct cause of code. See "Fault Codes" on page 15.
6. Confirm valves are correctly positioned to heat the correct body of water (either the pool or the spa). If heating a spa that overflows into a pool, confirm the spa is isolated when being heated (not flowing into the pool).
7. Confirm that filter pump has a sufficient run-time. The heat pump will not run (or heat the water) without water flow. Water Source equipment will generally be set to run 24 hours a day in commercial applications. See "Initial Heating Recommendations" on page 21.
8. If heating a spa, deactivate air blower or venturi (if equipped) to allow for quicker heating times. For pools, deactivate water features, such as slides, waterfalls, or fountains to allow water to retain heat. Use of a liquid pool blanket product, such as an Aqua Blanket™, can also compensate for excessive heat loss.

### **Heat Pump Is Running, Not Cooling (Reversing Models)**

1. Confirm the heat pump mode is set to either *COO* or *ACH* operating mode.
2. Confirm the thermostat is set below the current water temperature.
3. Confirm heat pump is transferring heat out of the water.
  - Measure the temperature of source-side and pool-side discharge water coming out of heat pump. See "Adjusting Water Flow Using  $\Delta T$  (Delta-T)" on page 10.
4. If an error code is displayed, determine and correct the condition causing the code. See "Fault Codes" on page 15.
5. Confirm valves are correctly positioned to cool the correct body of water (either the pool or the spa). If cooling a spa that overflows into a pool, confirm the spa is isolated when being cooled (not flowing into the pool).
6. Confirm that filter pump has a sufficient run-time. The heat pump will not run (or cool the water) without water flow. Water Source equipment will generally be set to run 24 hours a day in commercial applications. See "Initial Cooling Recommendations" on page 21.

# SECTION 6 - APPENDIX

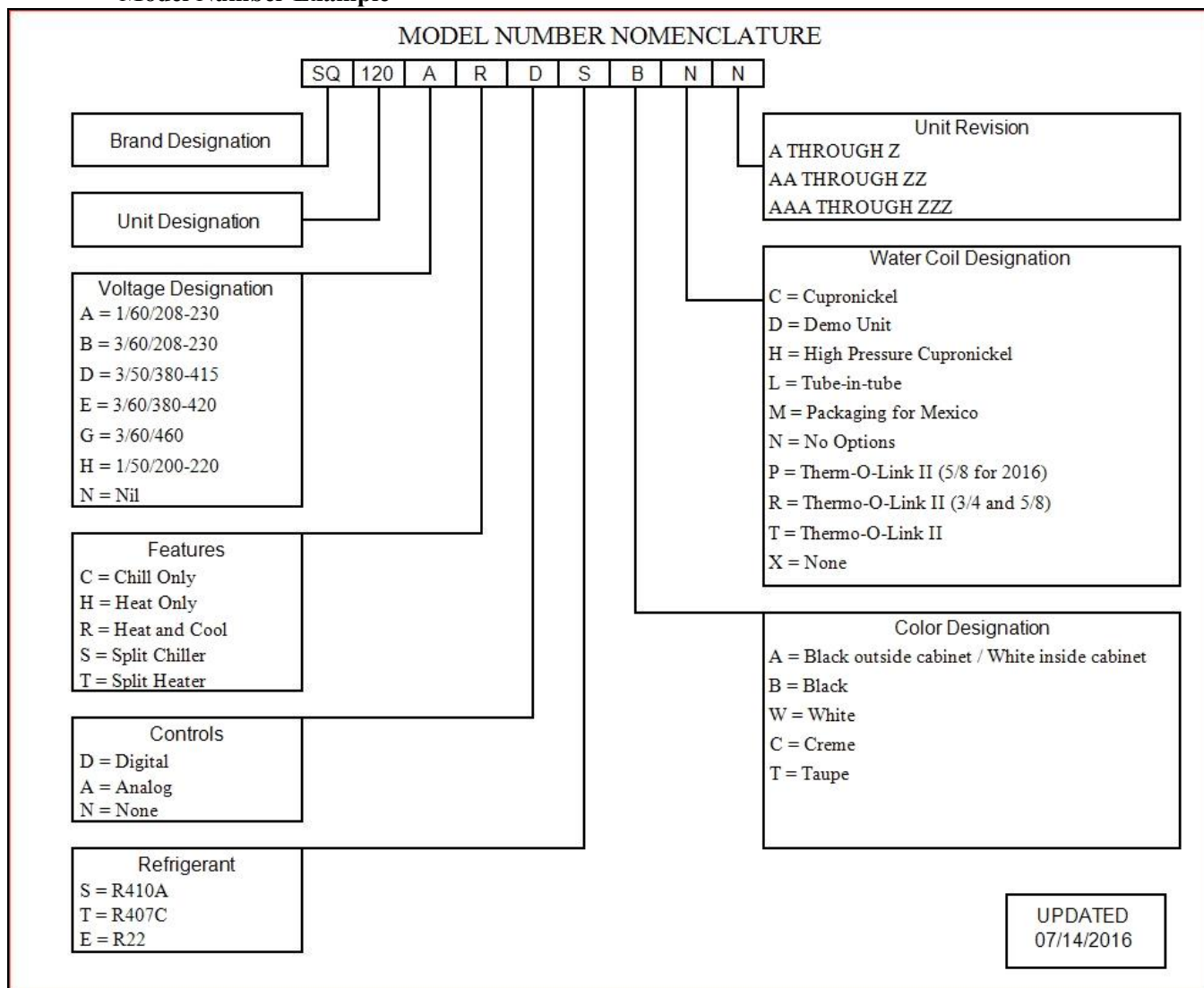
## 6.1 Identifying Model Specifications

1. Find Data Plate - The data plate is usually posted on the side of the equipment or on the control panel access plate.
2. Find the model number on the data plate. The first letters and numbers indicate the model type.
3. The complete model number identifies the equipment's specifications.

### Data Plate Example

MINIMUM CIRCUIT AMPACITY	<input type="text"/>	MADE IN THE USA
ELEC. SERVICE: VOLTS	<input type="text"/>	PH <input type="text"/> HZ <input type="text"/>
MAXIMUM TIME DELAY FUSE OR HACR BREAKER	<input type="text"/> 5	
COMPRESSOR VOLTS	R.L.A. <input type="text"/>	L.R.A. <input type="text"/>
FAN MOTOR VOLTS	H.P. <input type="text"/>	F.L.A. <input type="text"/>
REFRIGERANT: Circuit - Factory charged	<input type="checkbox"/>	Only oz/Kg <input type="text"/>
Tested to	<input type="checkbox"/> psig High side /	<input type="checkbox"/> psig Low side
OUTDOOR USE		
AQUA CAL, INC A TEAM HORNER COMPANY 2737 24 <sup>TH</sup> STREET NORTH ST. PETERSBURG, FL 33713 FACTORY SERVICE 727-523-5642		MODEL NUMBER <input type="text"/> <b>IIIBAR CODEIII</b> SERIAL NUMBER <input type="text"/> <b>IIIBAR CODEIII</b>

### Model Number Example



## 6.2 Initial Heating Recommendations

The following recommendations will reduce the amount of time required to heat a pool. **If unsure of equipment heating capability, review equipment data plate.** See "Identifying Model Specifications" on page 20.

1. Confirm heat pump mode has been set to **HEA**.
2. Set thermostat to desired water temperature.
3. Temporarily override the filter pump's time-clock for continuous operation.
  - This will allow the Heat Pump the time required to heat the water at start-up.
  - After the water has reached the desired temperature, the time-clock can be reset to normal operating time-frames.

## 6.3 Initial Cooling Recommendations

The following recommendations will reduce the amount of time required to cool a pool or cold plunge application. **If unsure of equipment cooling capability, review equipment data plate.** See "Identifying Model Specifications" on page 20.

1. Confirm heat pump mode has been set to **COO**.
2. Set thermostat to desired water temperature.
3. Temporarily override the filter pump's time-clock for continuous operation.
  - This will allow the Heat Pump the time required to cool the water at start-up.
  - After the water has reached the desired temperature, the time-clock can be reset to normal operating time-frames.

## 6.4 Available Accessories

### Automatic Sequencing Controller

- An Automatic Sequencing Controller (ASC) provides easy control of all units from one lead unit and prevents the simultaneous start-up of multiple heat pumps.
- Site voltage drop is minimized and utilities are not subjected to large in-rush demands of electrical current.
- Part number is based on number of heat pump's to be controlled. Call AquaCal® Customer Support for assistance with correct configuration.

### External Flow Relay (Grid Flow) Switch Kit (0040s)

- Used when the pool / spa elevation is higher than the heat pump.
- Used when a variable two-speed filter pump set on low-speed mode does not provide enough water pressure to activate a heat pump's water pressure switch.
- Also used for automatic pool / spa thermostat switching.

### Remote Control Kit (STK0070)

- A remote (wired) control kit allows for full control of the heat pump from up to 100 feet from the equipment.

### Plumbing Unions:

SIZE	PART NUMBER
1 INCH	PLP0059
2 INCH	2627