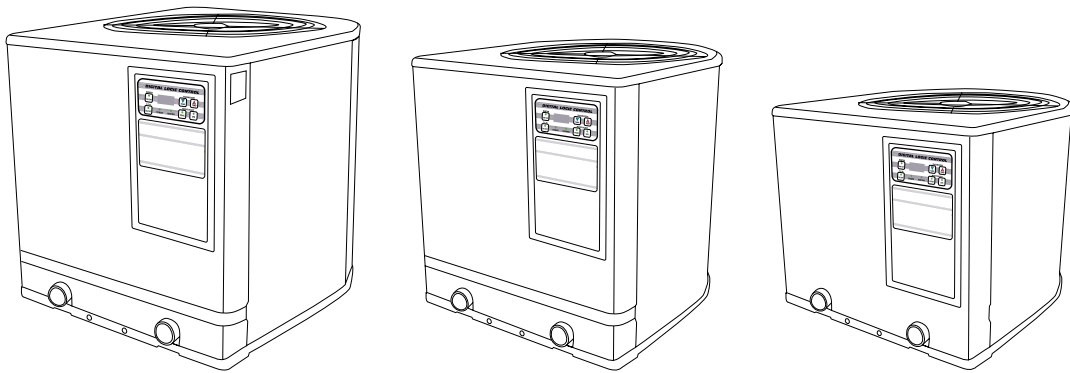
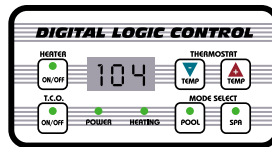


SWIMMING POOL & SPA HEAT PUMPS

OWNERS OPERATIONAL MANUAL



DIGITAL LOGIC™



Model AT800 AT600 & AT400

“BLACK CABINET” with DIGITAL CONTROLS ONLY

NOTE: Installers should see separate installation manual !



WARNING: Specifications may change without notice.

V2.3-AT © 2001 Calorex U.S.A. LLC

Table of Contents

NOTICE

Technicians See Separate "Installation Manual". Specifications may change without notice.

A. Introduction	Pages 2 - 3
1. Unit Exterior Description	
2. How Does A Heat Pump Work	
B. Heat Pump Description	Pages 4 - 5
1. Control Panel Description	
2. Optional Time Clcok Override Description	
3. LED Display & Status Light Descriptions	
C. Operational Instructions	Pages 6 - 7
1. Water Flow & Water Pump Timer Setting	
2. Thermostat Setting	
3. Optional Time Clock Override Setting	
4. Time Delay Modes	
5. Normal Operation Indicators	
6. Pool/Spa Covers (Blanket) Use	
7. Spa Heating Suggestions	
8. Defrost Mode Control	
D. Owner Required Maintenance & Precautions	Page 8 - 12
1. Air Flow & Service Clearances	
2. Chemicals, Feeders & Water Balance	
3. Owner Cleaning & Maintenance	
4. Professional Service Requirements	
5. Warranty Service Requirements & Notes	
6. Operational Sequence & Troubleshooting Flow Chart	

Introduction

Congratulations on the purchase of your new pool/spa heat pump. A Heat Pump is one of the most efficient ways to heat your pool or spa. Your heat pump was manufactured by Calorex USA, the very first company to produce swimming pool heat pumps. Since making the very first pool heat pump some 24 years ago, Calorex has become the industry leader in reliability and efficiency.

You can expect to get more use from your pool or spa investment with your new heat pump. The heat pump will extend your swimming season at very affordable operational cost. When compared to propane gas pool/spa heaters, the heat pump is 5 times more efficient. The heat pump is pollution free & environmentally friendly.

Please review this owners manual so you can better understand the use and operation of your new heat pump. Be advised there is a separate installation manual shipped with each heat pump.

Important Information to Record

Installer Name _____

Installer Phone _____ Install Date _____

Model Number _____ Serial Number _____

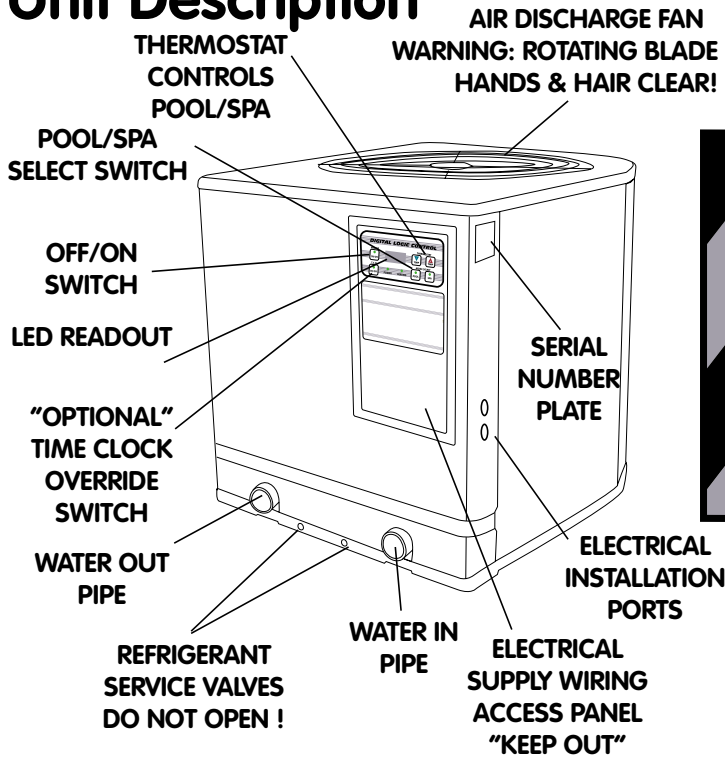


5826 Corporation Circle Ft. Myers Florida 33905

888-297-3826 • www.calorexusa.com • calorexusa@earthlink.net

Written & Illustrated by Michael Glore

Unit Description



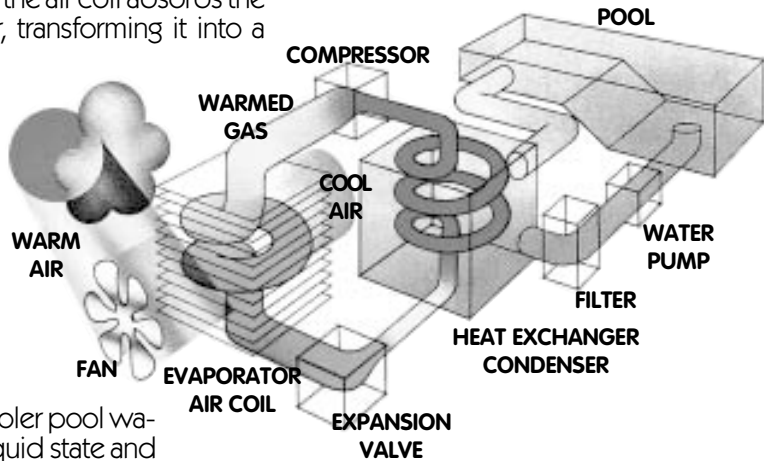
WARNING

DANGER FROM ELECTRICAL SHOCK & ROTATING FAN !
 SHUT OFF ALL POWER BEFORE SERVICING !
 CAUTION: MORE THAN ONE DISCONNECTION MAY BE REQUIRED TO ELIMINATE ALL POWER TO THIS UNIT INCLUDING POWER TO THE OPTIONAL TIME CLOCK OVERRIDE !

How Does A Heat Pump Warm My Pool ?

A swimming pool & spa pump utilizes proven refrigerant technology to capture the heat in the outside air and transfers it to the pool water. Refrigerant is used because of its ability to absorb and transfer heat energy. The fan circulates air through the outer **evaporator air coil** that acts as a heat collector. The liquid refrigerant in the air coil absorbs the available heat in the ambient air, transforming it into a gas. The refrigerant gas is then pumped into the **compressor**. When this warmed gas is compressed, it intensifies or concentrates the heat, like a magnifying glass in the sun.

This intensely hot gas is then pumped into the **heat exchanger condenser**, where the actual heat transfer takes place. As the pool water passes through the heat exchanger, the hot gas gives up its heat to the cooler pool water. The refrigerant returns to a liquid state and is pumped through the **expansion valve** then into the evaporator air coil to start the process all over again.

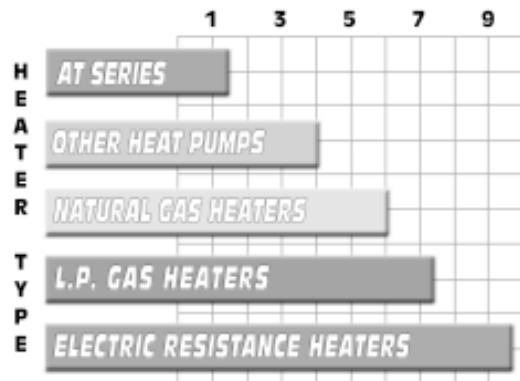


How Efficient Is It ?

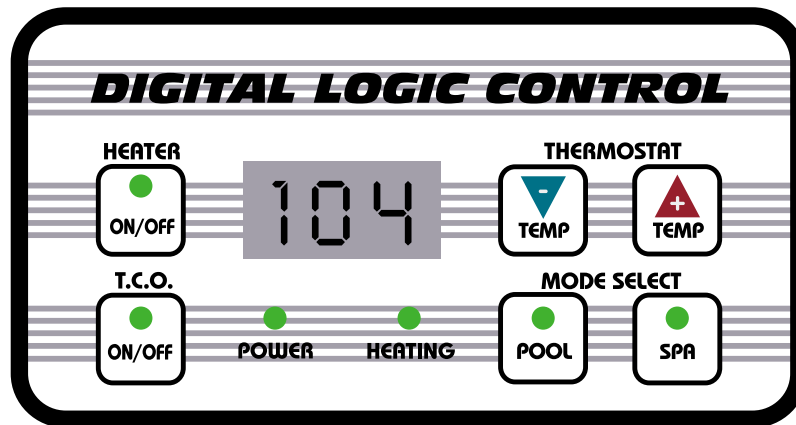
This graph is a operational cost comparison for equal amounts of pool heat. As you can see heat pump is the most efficient way to heat your pool.

Compared to L.P. gas heaters, a heat pump produces 5 to 6 times more heat for every \$1.00 you spend on operation.

RELATIVE POOL HEATING COST COMPARISON



“Digital Logic” Digital Control Panel Information



HEATER ON/OFF:

To start the heater press this button and its green light will come on. To disable the heater press this button and its green light will go off.

THERMOSTAT BUTTONS:

Pressing the + button will raise the set temperature. Pressing the - button will lower the set temperature. When either button is pressed the LED display will begin to flash. The flashing numbers indicate the thermostat setting.

MODE SELECT BUTTONS-POOL or SPA: The heater has two thermostat modes for two different desired temperature settings, one for pool mode and one for spa mode. If you do not have a spa use the pool mode only. If you do have a spa, you can connect two Jandy™ motorized plumbing valves. Therefore, when you select either mode the motorized valves will turn to isolate the heater to either the pool or spa. NOTE: There is a 30 second compressor when switching pool/spa modes.

“OPTIONAL” WATER PUMP TIME CLOCK OVERRIDE OPERATION When the T.C.O. button is set to the ON mode, the Time Clock Override feature is designed to start the water pump whenever the pool requires heat. Once the pool is up to the set temperature the heater will stop and then 5 minutes later the water pump will stop. When this button is set to the OFF mode, the heater will operate only when the water pump is running during the timed period set on the water pumps time clock.

NOTE: The time clock override works best if used during cooler weather conditions where the pool is losing more than 8 to 10 degrees over night or when the pool is being heated from “dead cold”.

NOTE: If the time clock override starts the water pump and the thermostat does not continue to call for heat for at least 5 minutes, the control will shut the water pump and heater off. Thereafter, it will not re-attempt to start the water pump for 4 hours. This 4 hour delay can be bypassed by pressing the T.C.O. button off then back on.

NOTE: When the T.C.O. button is activated while in “spa mode” the water pump will run the entire time you are in spa mode. When you switch back to pool mode there will be a 5 minute delay before the water pump shuts off. The T.C.O. option is built into the heater at the factory and can not be added later.

GREEN POWER LIGHT: This light indicates that the heater has control power.

WARNING: This is not a supply line power indicator and caution should be used since more than one power disconnection may be required to isolate the heater electrically.

WARNING: If the optional Time Clock Override is installed, you must shut off the water pumps main power disconnect as well to eliminate all power to the heater.

GREEN HEATING LIGHT: This light indicates that the unit is heating and the compressor is running. The compressor starts after a 3 to 5 minute time delay. NOTE: The water pump must be running at the same time in order for the heater to run.

LED READOUTS:

When the unit has power, the LED will display the current water temperature. When pressing the thermostat buttons the flashing readout will indicate the set temperature. The following are LED code readouts for the internal safety controls that regulate the unit for various reasons.

LF = LOW WATER FLOW

This light indicates there is no water flow through the heater. The heater is designed to shut off whenever the water pump is not pumping water through the heater. If **LF** is on while the water pump is running, the water pump may not be supplying enough flow for the heater to operate properly. During normal operation the heater turns off and on with the water pump.

bF = DEFROST MODE

This readout indicates that the internal defrost safety control has disabled the heater. During cold weather where the air temperature drops below approximately 45 to 50 degrees (depending on humidity), the low refrigerant pressure switch (or defrost control) is designed to disable the compressor only. Once the unit is in defrost mode the compressor will shut off for 1 hour while the fan continues to help deice and warm the air coil. After 1 hour the unit will attempt to restart. If the air temperature has increased to the operational range the compressor will continue to run, otherwise the compressor will return to the defrost mode for another 1 hour delay cycle.

HP = HIGH REFRIGERANT PRESSURE SHUT OFF

This readout out indicates high refrigerant pressure. The high refrigerant pressure switch is designed to shut the compressor and fan off if a heat buildup occurs for whatever reason. Typically, the high refrigerant pressure switch will trip if the water flow through the heater is restricted. It may also trip if the air flow is restricted through the heater.

TIME DELAYS:

30 second compressor delay when switching pool/spa modes.

5 minute compressor delay when T.C.O. enables in pool mode.

5 minute T.C.O. off delay when: switching from spa to pool mode, when temperature is reached in pool mode, or if LF (low water flow) is displayed on LED.

If water pump loses prime there will be a 3 minute compressor delay.

Operational Instructions

When heating the pool or spa you should check the following items as they are all critical to the proper operation of the heater.

1. WATER FLOW

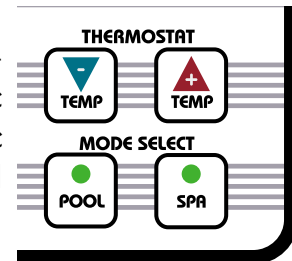
Make sure all pool filters and traps are clean since the unit requires a minimum water flow in order to operate properly. The heater should and will not run unless the water pump is running. There is an internal water pressure switch that disables the heater whenever the water pump is not supplying water flow.

2. WATER PUMP TIMER SETTING

Since the heat pump collects heat from the outside air, you want to set the water pump timer to run during the hottest part of the day. If you are heating the pool from “dead cold” you may need to set the water pump timer to run 24 hours until the pool reaches temperature, then reset the timer for a normal run time. Run times are determined by pool size, set pool/spa temperature and weather conditions.

3. THERMOSTAT SETTING & MODE SELECT BUTTONS

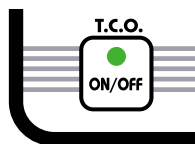
The LED display will show a constant readout of the actual current water temperature. To set the desired water temperature press either the + or - thermostat buttons. While adjusting the set temperature, the LED will flash. The flashing numbers will indicate the thermostat setting.



If you have a spa you can press the spa mode button and set the desired spa temperature. If you do not have a spa use the pool mode only.

4. OPTIONAL TIME CLOCK OVERRIDE SWITCH

The optional “Time Clock Override” control you can set the switch turn this switch ON and the heater will start the water filter pump automatically whenever the water temperature drops below the thermostat setting.



This option is best used when heating the pool from “dead cold” and for maintaining water temperatures during non timed periods where the pool is losing 8 to 10 degrees or more overnight. The heating mode select switch is best left in the OFF position during the warmer parts of the swimming season. The optional time clock override feature is built into the heater at the factory and can not be added later. See the bottom of page 4 also.

5. TIME DELAY MODE

This heater is equipped with an internal compressor time delay to allow the refrigerant to settle during start-up or restart cycles. When the heater is started the fan will run but the compressor will not start until the 3 to 5 minute delay has passed. The green heating light will be on when the compressor is running. In some cases (when the heater is new or during cold weather), it may be necessary to allow the unit to go through the time delay several times before the unit will start. The unit will delay for other reasons noted below:

TIME DELAYS:

30 second compressor delay when switching pool/spa modes.

3 to 5 minute compressor delay when T.C.O. enables in pool mode.

5 minute T.C.O. off delay when: switching from spa to pool mode, when temperature is reached in pool mode, or if LF (low water flow) is displayed on LED.

If water pump loses prime there will be a 3-5 minute compressor delay.

6. NORMAL OPERATION INDICATORS

When the fan and compressor are running, the unit will discharge cool air from the top. The heater will produce condensation while running and is considered normal. It will produce more condensation the more humid the ambient air is. The condensation will exit the heater through the bottom drain ports.

7. POOL/SPA COVER USE

You can substantially reduce the heat loss and electrical consumption by utilizing a pool cover (or pool blanket). You can get higher water temperatures in less operational time using a cover. If you keep the pool or spa covered whenever you are not swimming you can typically reduce heat loss by as much as 80% and reduce heating costs as much as 50%. Using a cover during the initial heat up period will greatly reduce the operational time needed.

8. SPA HEATING

When heating a spa it is advisable to not run the air blower or air inlet venturis during the initial heat up time. Air blowers and venturis inject air into the water to create the spa therapy action. During colder weather the air blower or inlet venturis will inject cold air into the spa thus increasing heat demand. Leaving these items off until the spa reaches the set temperature will reduce the heat up time. A cover is highly suggested for spa heating.

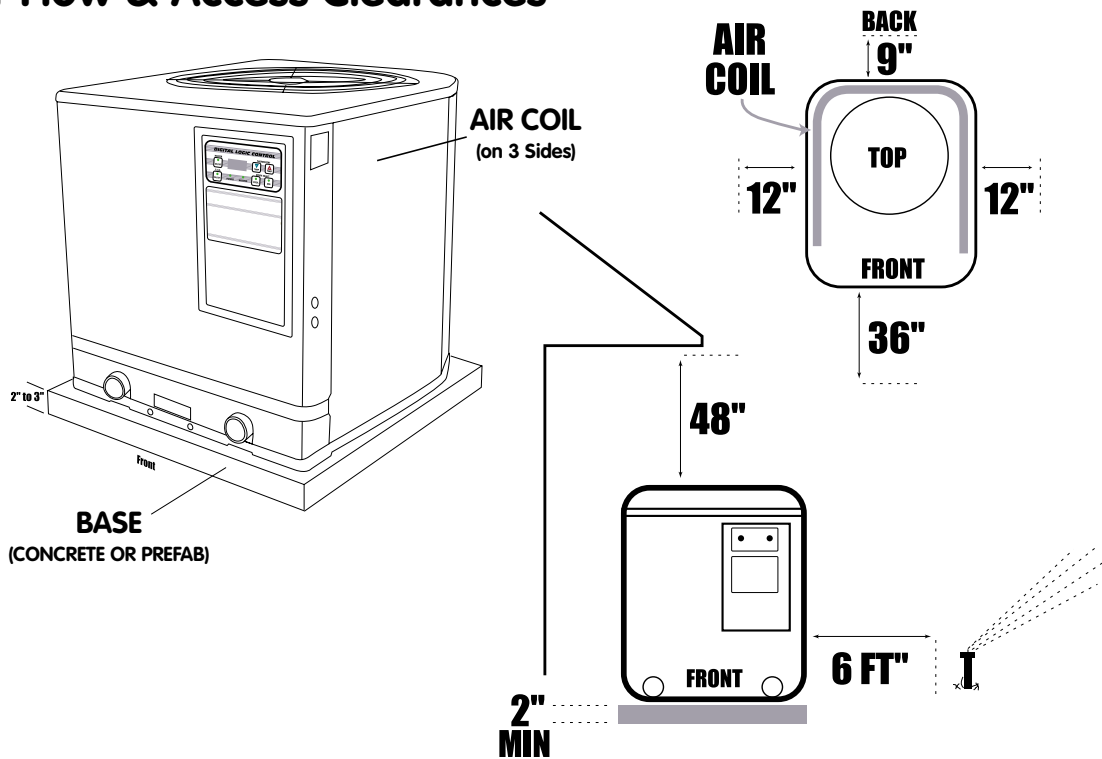
9. DEFROST CONTROL IN COLD WEATHER

bF This readout indicates that the internal defrost safety control has disabled the heater. During cold weather where the air temperature drops below approximately 45 to 50 degrees (depending on humidity), the low refrigerant pressure switch (or defrost control) is designed to disable the compressor only. Once the unit is in defrost mode the compressor will shut off for 1 hour while the fan continues to help deice and warm the air coil. After 1 hour the unit will attempt to restart. If the air temperature has increased to the operational range the compressor will continue to run, otherwise the compressor will return to the defrost mode for another 1 hour delay cycle.

You may experience some frost or icing on the outer air coil in cold weather temperatures and is considered normal. If the air coil ices up, shut the heater off, allow it to defrost and wait for warmer weather to restart the heater. If you live in an area where the weather is expected to drop below 45°F to 50°F for an extended period you should disable the heater during those times.

Heat Pump Maintenance & Precautions

Air Flow & Access Clearances



1. Make sure the unit has a firm base. The heat pump will produce condensation (water) while in operation. You will notice water coming from the bottom drain ports when the unit is running. The condensation will increase as the outdoor air humidity level increases.

Make sure the bottom drain ports do not become clogged with debris. Make sure the run off water does not puddle inside the heater and does not undermine the equipment base.

2. Keep the top air flow discharge & air flow intake area clear as shown here so the air flow through the heater is not restricted. Make sure the unit can "breathe" well. The cooler discharge air from the top should not accumulate and be drawn into the side air intake coils. Keep all plants and shrubs trimmed away from the heater. Make sure the front is accessible for future service.

3. Do not allow lawn sprinklers to spray on the heater in any way. Keep sprinkler heads away from the heat pump to prevent corrosion and damage. Use a deflector if needed.

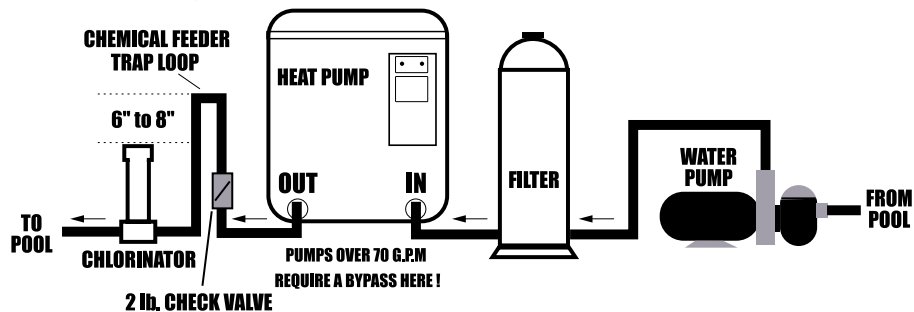
4. If the unit is installed under a very sharp roof pitch or under a roof valley that has no gutter, a gutter or diverter should be fitted to prevent excessive water from pouring through the unit.

Feeders, Chemicals & Water Balance

This heat pump is equipped with the highest marine grade cupronickel alloy heat exchanger that is designed to resist corrosion from normal pool water. The life and condition of the heat exchanger is directly related to the pool water chemical balance and chemical usage techniques. The following precautions are required to help prevent the possibility of corrosion damage to the heat exchanger. Chemical damage is not covered and may void the warranty.

CHEMICAL FEEDERS & USAGE

1. All Chemical feeders must be installed as far “down-line” of the heater as possible.
2. A check valve and chemical trap loop must be installed between the heater and any chemical feeders as shown here (and in the installation manual). The loop will help prevent chemical backup into the heater.



3. All feeders should be installed at the same or below the heater piping elevation to prevent chemical back up into the heater.
4. Do not install a chemical feeder on the suction side of the filter system. Feeders and chlorinators installed on the suction side will discharge concentrated chemical or chlorine into the heat exchanger before it is diluted with the rest of the pool water.
5. **NEVER PLACE CHEMICALS IN THE POOL or SPA SKIMMER !**

Chemicals placed in the skimmer will feed concentrated chemical or chlorine into the heat exchanger before it is diluted with the rest of the pool water. Chemicals or chlorine placed in the skimmer will dissolve and concentrate in the skimmer when the water pump is off and then send a super concentrated chemical solution through the heater every time the water pump restarts.

6. **DO NOT STORE CHEMICALS NEAR THE HEATER !**

POOL WATER BALANCE

The following standardized water balance values should be maintained to reduce the risk of corrosion and/or mineral buildup in the heat exchanger.

MINIMUM WATER BALANCE REQUIREMENTS

pH - 7.4 to 7.6
Chlorine - 1.0 to 5.0 p.p.m.
Alkalinity - 90 to 120 p.p.m.
Calcium - 200 to 350 p.p.m.

POOL WATER PUMP REQUIREMENTS

The water pump creates a vacuum on the skimmer line and the bottom floor suction drain in the pool. If there is an imperfection in the filter system or plumbing, the pump will draw air into the piping. This air will cause turbulence in the heat exchanger decreasing heat transfer and possibly causing physical erosion.

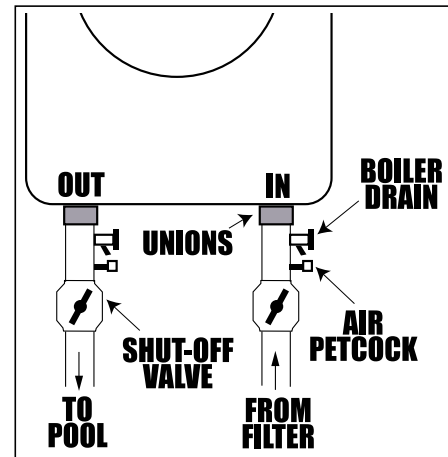
NOTE: Be advised that water pumps rated over 1.5 H.P. or over 70 gallons per minute must have a plumbing bypass added to the exterior heater piping as shown in the technicians installation manual. Be aware of this when upgrading your existing water pump.

Freezing Condition Precautions

In areas where extended freezing conditions exist, the heater must be plumbed as shown here (and the installation manual), so it can be winterized. Water left inside the heater will freeze and cause damage.

This plumbing setup will allow the use of pressurized air to clear the heat exchanger of water in preparation for an extended freeze. This should be done as part of your end of swimming season winterizing.

In warmer southern climates where freezing conditions are temporary, you should run the water pump 24 hours a day to prevent the water from freezing inside the heater. Freeze damage is not covered and may void the warranty.



Owner Maintenance & Cleaning

1. The heat pump will produce condensation water run off while in operation. Make sure the condensation drains in the bottom of the heater cabinet do not become blocked with debris. The condensation run off may attract increased plant growth and insects in the heat pump area, be sure to keep all plants trimmed back and treat for insects as needed.
2. The outer air coil (located on three sides of the heater), should be kept free of debris and buildup. A minimal air coil cleaning should be done as needed and at least two times per year. If the heater is installed in a sandy or salty condition, the air coil should be cleaned more frequently.
3. To clean the air coil SHUT OFF ALL POWER, then use a garden hose at low pressure, (without a pressure nozzle) to lightly rinse the air coil in an up and down motion. You can use a mild soap while rinsing to help neutralize and clean. DO NOT spray water directly in heater at high pressure.
4. Cabinet surfaces can be wiped clean with a towel and mild cleaner.

Professional Maintenance

The heater should be serviced regularly like any other machine. A factory authorized, licensed air conditioning or mechanical contractor should perform the following maintenance procedures periodically.

1. Oil the fan motor.
2. Check the refrigerant charge.
3. Check the amp. draw.
4. Check all electrical supply connections & breakers.
5. Clean the air coil with approved solution.
6. Clean the interior cabinet bottom of debris.
7. Spray internal components with lubricant.
8. Inspect the installation including chemical feeder placement.
9. Inspect sprinklers to be sure the heater is not being sprayed.
10. Inspect for insect nests in and around the heat pump and treat.

You can contact the factory @ 888-297-3826 for a list of factory authorized service centers in your area.

Warranty Service

Before calling for warranty service you should check the following first:

1. Clean all filters and traps in the pool circulation system. Low water flow will cause the unit to shut down or cycle.
2. Check and adjust all water flow valves and adjust to the proper positions to insure proper water flow through the heater.
3. Check the water pump timer setting to insure there is enough time allotted for a proper heating cycle.
4. Check all circuit breakers and disconnects. Note: More than one disconnect may be required to shut off or turn on power to the heater.
5. Confirm that all heater controls, thermostat, thermostat selector switch, reset tripper, and optional auto heat switch (if so equipped), are in the correct position.
6. If any 3rd party control devices are installed on the pool/spa system make sure they are functioning properly. Factory service technicians will not diagnose 3rd party external control devices. All external controls are disconnected during warranty service and the heater is diagnosed as manufactured then reconnected.

7. The limited factory warranty does not cover damage or conditions caused by but not limited to the following:

Improper installation.

Improper use.

Inadequate run time on the water pump timer.

Improper water flow to the heater.

Conditions caused or associated with 3rd party external controls.

Chemical damage or improper water balance.

Sprinkler damage.

Roof run off damage.

Freeze damage or operation damage during freezing conditions.

Salt and/or sand/debris damage.

Lack of maintenance and/or cleaning.

Unauthorized servicing of the heater during the warranty period.

Normal rusting and oxidation of metal components.

Non warranty service calls such as inspections, maintenance, or problems unrelated to the heater as it was manufactured are not covered under the warranty.

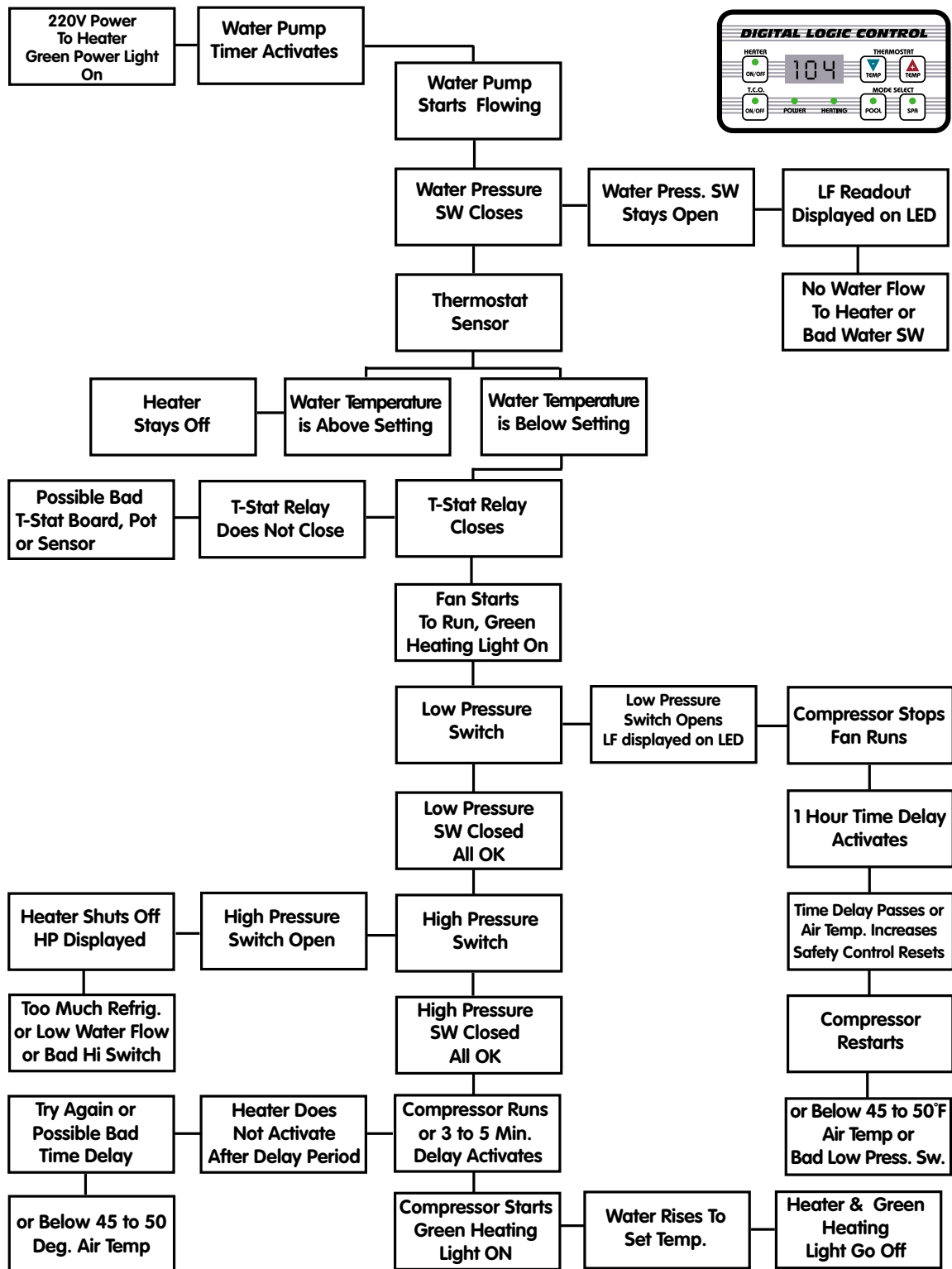
8. You can contact the factory @ 888-297-3826 to be pre-qualified and scheduled with a factory authorized service center in your area. Have your model number, serial number and installation date ready.

Important Notes:

The heater will not heat faster if you turn the thermostat all the way up. The heater will never run without water running through it from the pool/spa filter pump. When the heater is started the fan will run right away. The compressor will start after a 5 to 7 minute delay. The heating light will come on only when the compressor is running.

The heater will produce condensation at a steady rate. The condensation exits the heater from the bottom drains. The more humidity the more condensation. The thermostat is accurate within three degrees and may not always match exactly to the degree numbers printed on the control panel as it is effected by the humidity and other factors. The heater is designed to shut off in defrost mode when the air temperature drop below 45°F to 50°F.

Operational Sequence & Troubleshooting Flow Chart for "Digital Logic" Digital Control Models



TIME DELAYS

30 second compressor delay when switching pool/spa modes.

5 minute compressor delay when T.C.O. enables in pool mode.

5 minute T.C.O. off delay when: switching from spa to pool mode, when temperature is reached in pool mode, or if LF (low water flow) is displayed on LED.

If water pump loses prime there will be a 3 minute compressor delay.

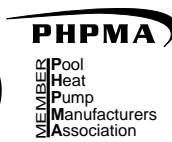
calorex U.S.A. L.L.C.

5826 Corporation Circle
Ft. Myers Florida 33905

888-297-3826

www.calorexusa.com

calorexusa@earthlink.net



Specifications may change without notice.

© 2000 Calorex U.S.A. LLC