HEAT SIPHON® Owner

TO THE POOL OWNER

Since 1983, Heat Siphon® has stood alone as the most innovative and most reliable pool or spa heater made.

We have invented, designed and pioneered most of what has become the swimming pool heat pump of today, including the first electrically isolated heat exchangers, the low noise venturi fan mount and injection molded heat exchanger fittings and caps. Heat Siphon® was the first pool heater to use a titanium heat exchanger, the Copeland Scroll compressor and vacuum formed PVC cabinets. We are the only pool heater manufacturer to offer a lifetime corrosion warranty on the water side heat exchanger.

Over the years Heat Siphon®'s success and innovation has bred a few small competitors who have made look alike pool heaters. But unlike our competition, we aren't just an assembler of off the shelf parts. We are the manufacturer. We process raw material into finished product. We maximize in house manufacturing to control the quality and reliability of our components.

We completely fabricate our water side heat exchanger as well as all of our vacuum formed UV stabilized PVC cabinets from raw material. Sheets of plastic, lengths of titanium tubing etc. are all processed in house. Sophisticated computer controlled welding and vacuum forming machines, automated production testing as well as custom made manufacturing equipment and tooling all help our production personnel build what we consider the best pool heater made.

Those specialized high volume parts that we do purchase such as electrical controls are selected to maximize quality and minimize service, and if something does go wrong, we spend more per unit than any pool heater manufacturer to ensure your problems are quickly resolved.

You can rest assured that if there is a better way to build it, we will find it and if there is a better way to serve you we will do it.

Thank you for purchasing a Heat Siphon® Swimming Pool Heat Pump.

Sincerely,

President, United States ThermoAmp Inc.

Contents - Owner Section

1.0 Don't VOID Your Warranty!

This section is written specifically for you, the pool owner. It contains all the information you will need to ensure that your Heat Siphon® has been properly installed as well as owner maintenance and troubleshooting procedures.

IF YOUR INSTALLER IS NOT AN AUTHORIZED HEAT SIPHON® DEALER READ THIS SECTION BEFORE ALLOWING A NEW DEALER TO INSTALL YOUR UNIT.

Although your Heat Siphon® Swimming Pool Heat Pump has the strongest manufacturer's warranty of any pool heater made, there are things your installer could do incorrectly to cause you problems and expenses which will not be covered by the factory under this warranty. (See the Appendix for your Heat Siphon® Factory Warranty.)

As the owner you should be aware that the HEAT SIPHON INSTALLER IS TOTALLY RESPONSIBLE FOR PERFORMING THE FOLLOWING KEY INSTALLATION STEPS.

The Installer MUST:

1. Pick the Proper Size Heat Siphon® for Your Pool

2. Provide Proper Air / Service Clearance Around the Unit

3. ***Correctly Plumb for FULL PUMP FLOW - NO BYPASS***

FAILURE TO DO SO MAY VOID YOUR WARRANTY!!

1.1 Picking The Proper Size Heat Siphon®

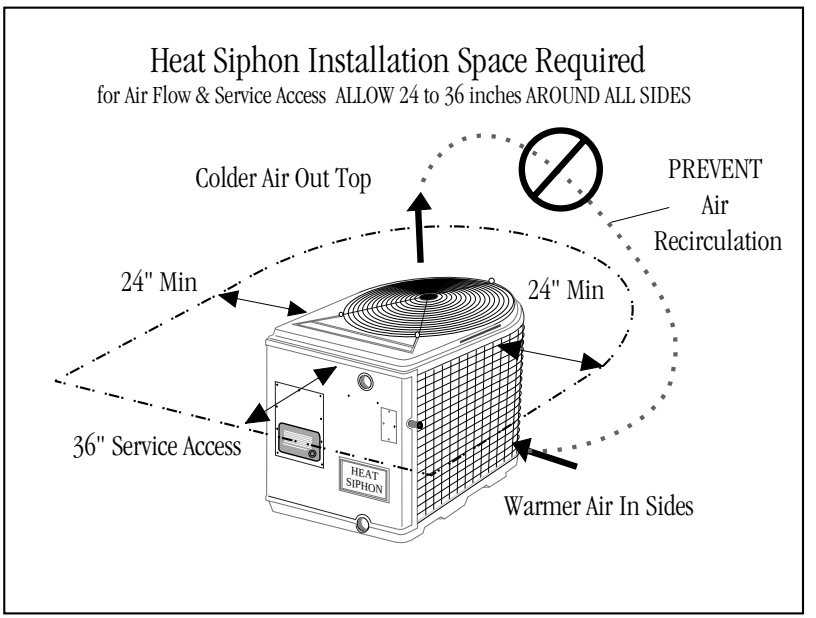
Your dealer should provide you with a Heat Siphon® that is large enough to heat your pool under normal conditions within 8-12 hours of run time each day. Under-sizing will result in long run times and possibly a pool which isn't always as warm as you want it to be.

Normally a 3.25HP Heat Siphon® will be more than adequate to heat most in ground residential pools to over 82° F. Most established Heat Siphon® dealers, can tell from experience what size will work on your pool. If there is a doubt about sizing, or if you have a larger pool , abnormal wind or shade or you wish to keep your pool uncovered 24 hours a day, then make sure your dealer has taken this into account.

TIP: Anyone can request our free factory computer pool heating analysis. It very accurately determines the proper size (and number) of Heat Siphon(s) for your pool as well as the expected heating cost. You specify your location (for climate data), the pool temperature you desire, the months it will be open, the hours per day covered, the wind condition, the pool pump hours and your local fuel costs. It will be FAXED back SAME DAY.

This four page printout also provides graphics showing pay back period, monthly operating cost and much more and it's FREE. *(See the sample in the Appendix to this book.*)

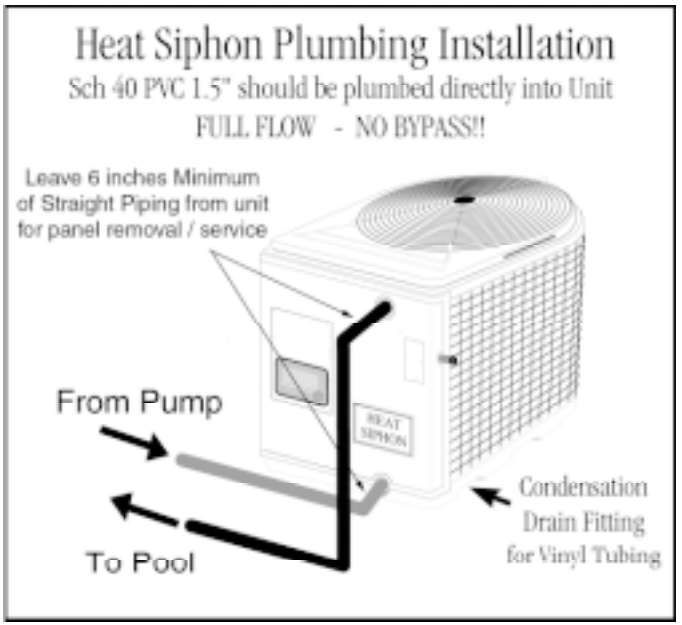
1.2 Provide Proper Clearance and Fresh Air



Heat Siphon® can not be installed where the cooler exhaust air (flowing straight up out of the unit) is recirculated back into the intake (sides) of the unit. This will reduce efficiency as well as heat output. At least two feet of clearance must be provided around the unit as well as unrestricted air flow overhead. Installing a Heat Siphon® under a deck or in a pool equipment shed or enclosed area or too close to shrubs will result in air recirculation, poor performance and short cycling which can shorten the unit's life and damage the compressor **AND WILL VOID THE WARRANTY.**

1.3 Provide Full Flow- No Bypass/ Pump Dead Heading

Heat Siphon® requires FULL PUMP FLOW with at least 25 to 30 GPM. DO NOT INSTALL A BYPASS. Heat Siphon®'s full flow heat exchanger will accept up to 80 GPM with very minimal pressure drop. Installing a bypass can reduce flow below the minimum required and overheat the condenser causing the unit to cycle on and off every 5 minutes. If allowed to continue, cycling can shorten the unit's life and damage the compressor which is not covered by the warranty.



Also, plumbing shut off valves downstream of the Heat Siphon® in a way that results in the pool pump pressurizing the Heat Siphon® with no water flow can also cause short cycling damage. This is known as dead heading the pool pump.

Any damage due to these incorrect plumbing installations is not covered by the warranty.

2.0 Installing Heat Siphon®

2.1 Location, Wind & Weather

As long as you provide plenty of fresh air and give it adequate clearance space all around (see section 1.0) , Heat Siphon can be installed virtually anywhere outdoors. Unlike gas heaters whose pilot lights can be blown out, Wind has no effect on Heat Siphon® other than possibly helping the fan and increasing the heat output.

It's all PVC cabinet , stainless steel hardware , vinyl coated fan guard and evaporator screen will remain unaffected by the elements. The plastic basepan has a drain fitting to carry rain water, as well as condensation, away from the unit. A 3/4" diameter clear vinyl tube will slip right over this barb type fitting to plumb the water away.

As far as direct sunlight is concerned, Heat Siphon's UV stabilized, flame retardant PVC plastic cabinet material is far superior to any type of galvanized or painted sheet metal cabinet. It won't rust, fade, chip or peel.

If the air temperature drops below about 42°F while the Heat Siphon® is running then any water in the air will begin to freeze and form frost or ice on Heat Siphon's large horseshoe shaped evaporator fins. This is because Heat Siphon®'s refrigerant must be colder than the air to remove heat from it and dips below freezing at about this air temperature.

Although this will cause no structural damage, it may take as much as 24 hours to melt and it will drastically reduce efficiency. Over a long period this can reduce the life of your compressor.

To prevent this icing your Heat Siphon® is equipped with a freeze protection switch that automatically turns the Heat Siphon® off if the refrigerant temperatures goes below freezing. It will automatically restart and continue heating the pool as soon as there is no icing danger at about 48°F.

2.2 Pool Pump Run Time

Just like other pool heaters, Heat Siphon® can add heat to the pool only when the filter pump is running. So the question is how many hours a day do you run your pool pump- 24, 16, 12 or 8 hours per day? There are several factors which you must take into consideration when deciding how long to run your pool pump each day:

First, you must run it long enough to filter out any dirt and debris.

Second, you must run the pool pump long enough to allow the heater to make up the heat loss your pool experiences.

Third, If you use a feeder, chlorinator, ionizer etc., the manufacturer's recommendations must be followed.

Picking too small of a pump will result in inadequate filtration time while too large a pump will increase both system back pressure and electric cost , since doubling the flow rate quadruples the power needed to pump water thru a given piping system.

The most efficient and lowest cost pool pump system is one where the pool pump has a flow rate in your pool plumbing system just large enough to pump (turn over) your entire pool volume through your filter in 8 to 12 hours. This means running the pump continuously to get the recommended 2 to 3 turnovers per day for proper filtration while pumping against the lowest back pressure possible.

2.2.1 Pool Heating Considerations

Heat Siphon® is equipped with a flow sensing switch which turns it on and off automatically when the pool pump is turned on or off. However, you must still run the pool pump long enough each day to allow Heat Siphon® to maintain the pool water temperature.

Make sure that your dealer provides you with a Heat Siphon® that is large enough to heat your pool under normal conditions with 8-12 hours of pump operation each day

If the pool pump is off during the night and the pool loses heat then it may take several hours or more in the morning to restore the pool to temperature. If your pool pump is sized to run 8 hours per day for filtration, during a cold spell or other high heat loss period such as when the pool is uncovered for an extended windy period, the Heat Siphon® may require longer pump operation to maintain temperature. This will not require excessive pool pump operation and will ensure a reserve heat output capacity to cover any temporary high heat loss conditions.

A properly sized Heat Siphon® and a smaller pool pump are the most cost effective combination to ensure proper pool heating and filtration. If in doubt about proper size Heat Siphon® call the factory and we will be glad to furnish a free computerized pool or spa heat loss analysis that will show recommended pump operating times and operating costs for each month Including extra pool pump electric costs if you do choose to oversize your pool pump. *(See the back of this manual for a sample print out.)*

2.2.2 Filtration Considerations

The number of bathers, amount of chemicals added as well as the temperature and weather all vary the actual filtration required to maintain a clear clean pool.

In most commercial pools, state laws usually require 3 turnovers per day with the pump running 24 hours per day (one turnover every 8 hours). Thus a 80,000 gallon pool would need a pump flow rate of 10,000 gallons per hour or 167 gallons per minute (GPM) to pump the entire volume through the filter in 8 hours.

POOL PUMP TURNOVER TIME IN HOURS =

POOL VOLUME (GALLONS) / (PUMP GPM X 60)

On residential pools 1.5 to 2 turnovers per day is usually considered the minimum. The size (horsepower) of your pool pump will determine the flow rate in your pool filter system and thus how many turnovers per day can be achieved.

Bigger pumps are not necessarily better. Some dealers put in a smaller pool pump sized to run 24 hours a day because the operating cost is much less per day than running a larger pump for 8-10 hours to get the same number of turnovers. Back pressure increases as the square of the flow rate. Thus, if you cut the flow rate in half in a given pool piping system, you decrease the back pressure that must be overcome to pump the pool water by 75%. In addition they claim 24 hour run time saves chemical costs by eliminating shock treatments and by keeping turbidity and suspended solids to an absolute minimum.

On the other hand are dealers who advocate using large 1. 5 or 2 horsepower filter pumps which turn over the entire pool volume in 4 to 6 hours and thus they claim need only be run 8-12 hours daily to achieve effective filtration. If you have different electric rates for day versus night usage, running your pool pump for a shorter time during "off peak" rates may actually save pump costs overall even though you use more electricity. Ask your dealer if in doubt or call your electric utility.

The pump flow rate requirements are also affected by the size and type of filter you use. Cartridge filters usually require 1 GPM (gallons per minute) per square foot while diatomaceous earth may require 2 GPM per square foot and sand 3 GPM / sq ft. or more. Thus a lower flow rate pump which runs longer can use a smaller but not undersized filter as long as it will not load up too quickly. If a large filter is used with the smaller pump, back pressure will also be reduced significantly thus further reducing pump electric costs.

In conclusion, in most cases using a longer run time with a smaller pump and a properly sized or even oversized filter clearly provides the best results from an economic as well as a filtration standpoint.

3.0 Owner Troubleshooting

The purpose of this section of the manual is to provide some GUIDANCE FOR HEAT SIPHON® OWNERS with little or no technical background who have a problem with their Heat Siphon®.

If our guidance here doesn't solve the problem CALL YOUR INSTALLER and refer him to the Installer Section of this manual. He will contact the factory service center for additional service if required.

When you apply power to your Heat Siphon® through the disconnect and circuit breaker, usually one of three things will happen

(A) IT DOES NOTHING

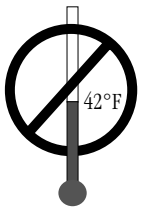
(B) IT TRIES TO START THEN SHUTS OFF

(C) IT STARTS & RUNS but doesn't heat

In any case you are probably reading this because your pool is not heating to the desired temperature, so follow the appropriate steps below BEFORE CALLING YOUR DEALER:

3.1 Unit Does Nothing

1. Is power on?
2. Thermostat set too low? (turn fully clockwise-unit should come on)
3. Pool pump on and valves properly set?
4. Water flow confirmed from pool through heater and back to pool?
5. Air too cold? -Air temperature below approx.. 42°F will shut unit off automatically to prevent icing. (Wait for air temperature to reach 45° F to 48° F - unit should automatically reset and turn itself on)
6. Time delay activated by brief power interruption? (Wait 5 minutes - unit should restart)



Heat Siphon Shuts Down Below 42°F to Prevent Evaporator Icing and Automatically Restarts at 48°F

7. Is breaker tripped? You may have a bad breaker or faulty wiring, loose wires or poor connection in the junction box . Have your installer check the wiring and breaker.

> *NOTE: Some brands of GFI type breakers are extremely sensitive and are susceptible to false tripping. Have your installer check all wiring between the unit and the breaker and make sure the breaker is wired right .*

8. Call your dealer. - His first step should be to check & adjust the water flow switch

3.2 Unit Tries to Start then Does Nothing

1. Time delay activated by brief power on/off? (Wait 5 minutes-unit should restart)

> ***NOTE. The combination of a cold pool (below about 50°F) and a low air temperature (below about 45°F) MAY cause temporary on off cycling of the Heat Siphon®. A pool cover and /or 50°F air temperature will eliminate this cycling and allow normal heating operation to resume.***

2. Is the air below 45°F to 48°F and the pool water cold? (Wait for air temperature and/ or pool to reach 50°F - unit should restart automatically and resume normal heating)
3. Is the pool filter clean and pool water flow stable? A clogged filter or air leak in the pool pump return line can cause erratic water flow and air in the lines which in turn can cause Heat Siphon® to cycle- restore the correct water flow.
4. Is the fan running when the unit is running? - (if not call dealer)

3.3 Unit Runs But Doesn't Heat

CHECK THESE BEFORE CALLING YOUR DEALER:

1. Air leaving colder? If not call dealer

> ***NOTE: If Heat Siphon®'s air outlet is noticeably (5 to 10°F) cooler than the inlet air, then the unit is providing heat to pool . The unit may not have been running long enough to heat the pool (see next step), or the unit may be undersized. (See proper sizing section above)***

2. Pool pump running long enough each day? Normally 12-14 hours/day is sufficient if Heat Siphon ® is sized properly (let pool pump run continuously for 24 hours to

find time required-if not heating call dealer)

3. Is there abnormally high heat loss? No cover on extremely windy day? (Cover pool and run pool pump 24 hours. If still not heating call dealer)

4.0 Maintenance & Winterizing

As well as being virtually corrosion-free, your Heat Siphon® has been designed and built using strictly high quality, proven reliable components. As a result, you can expect your Heat Siphon® to outlive other heaters and to require only minimal maintenance over its lifetime. No regular scheduled maintenance is required and only minimal cleaning and minor lubrication as noted below

4.1 Lubrication

Your Heat Siphon® has only two rotating parts subject to wear and thus requiring lubrication: the compressor and the fan motor.

Since the refrigeration system compressor is hermetically sealed which eliminates all air and water vapor contamination, it requires no lubrication or maintenance. The refrigerant inside is extremely stable, has a special lubricating oil added which lubricates the compressor bearing. The oil and refrigerant are so stable that under normal conditions they will easily last more than 10-20 years without breaking down.

The fan motor which is totally enclosed type motor (sealed from rain and dirt) is equipped with a rain slinger on its shaft to prevent rain water from washing the lubrication out of its sleeve bearings. This should also require no lubrication for years, however, after several years of service in a hotter climate or if the motor has set idle in a hot dry environment for many months, the lubrication may begin to dry out and may cause the fan motor bearing to make noise. If left uncorrected this will eventually slow down and freeze up the fan motor causing short cycling and may burn it out.

WARNING: Before removing the fan guard , TURN OFF ALL POWER TO THE UNIT. ACCIDENTAL STARTING OF THE FAN MOTOR WHILE THE GUARD IS OFF CAN RESULT IN SEVERE INJURY.

You can re-lubricate the bearings using the oil fittings on the side of the fan motor. Remove the two plastic seal plugs (one at the top and bottom of the motor housing) and squirt in light machine oil.

4.2 Cleaning

WARNING: Before cleaning TURN OFF ALL POWER TO THE UNIT. Although each unit is production tested for any ground faults and the electrical supply hookup is in a gasketed rain tight housing, a faulty field electrical

hookup or hidden damage to the unit CAN PRODUCE A FATAL SHOCK HAZARD. Don't take a chance- DISCONNECT AND LOCKOUT THE BREAKER BEFORE CLEANING

Caution - DO NOT SPRAY WATER DIRECTLY INTO THE HEAT SIPHON WITH A HOSE OR OTHER HIGH PRESSURE WATER. Although the Heat Siphon® Is Rain tight it is NOT WATERPROOF and high pressure water can be directed in a manner that could cause shorting and even ELECTRIC SHOCK HAZARD.

Heat Siphon's solid PVC cabinet may be cleaned using any of the automotive vinyl cleaners, or soap and water. An abrasive cleaner or bathtub porcelain cleanser will remove most stubborn stains. Dirt and leaves should be swept from the finned horse shoe shaped evaporator if build up occurs. Spraying water is not necessary to clean Heat Siphon® and normal dirt accumulation will not have any effect on the unit's performance.

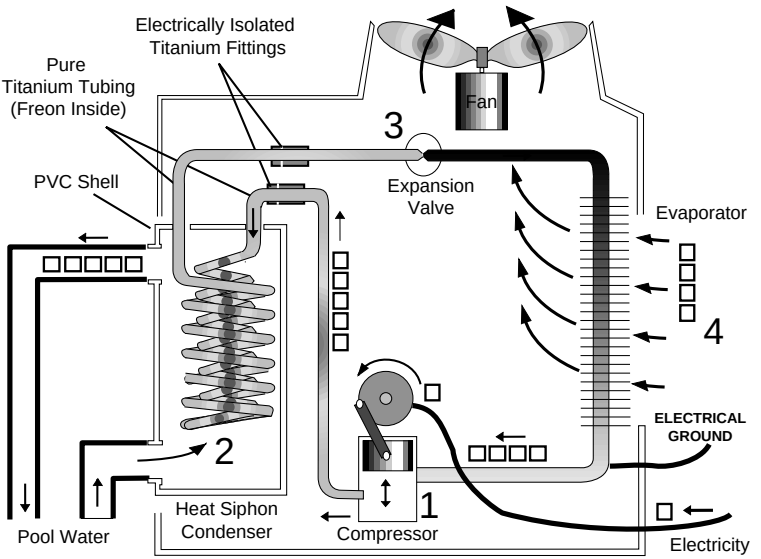
4.3 Winterizing

WARNING: IF POOL OR SPA WATER IS ALL0WED TO FREEZE IN THE HEAT EXCHANGER, IT WILL EXPAND AND MAY CRACK THE HEAT EXCHANGER HOUSING REQUIRING HEAT EXCHANGER REPLACEMENT WHICH IS NOT COVERED BY THE WARRANTY.

Your Heat Siphon can stand the coldest of winter weather with no problems. The only precaution necessary is to make sure that the heat exchanger is drained of all pool water. If in doubt add antifreeze to the outlet (top) until it comes out of the inlet (bottom) of the unit. In freezing weather the plastic cabinet material does become brittle and should be protected from any impact but can withstand normal moving and handling. It is totally unnecessary that your Heat Siphon be moved from its installed location for the winter, and in fact it is recommended that you leave it intact to avoid damage during moving.

5.0 How Heat Siphon® Works

Heat Siphon® is a heat pump designed specifically for recreational water heating (pools and spas). If you have an air conditioner, dehumidifier, water cooler or a refrigerator, you already own a heat pump. All these appliances use the same dependable technology to move heat from one place to another using electric power and a sealed refrigerant compression system. Just like a room air conditioner moves 2 to 3 units of heat from your home for every unit of electricity it consumes, Heat Siphon® uses 1 unit of electric energy to move 4 units of heat from the air and thus it provides 5 units of heat to your pool.



Referring to the diagram above - A unit of electrical energy (you pay for) goes into the compressor motor (1) . The compressor turns this into mechanical energy and sucks cool gas from a gas-liquid freon mixture in the evaporator tubes. As the freon evaporates it absorbs four units of "free" heat from the warmer air that the fan pulls over the outside of the evaporator tubes.

The compressor squeezes this gas causing its temperature to climb above 200° F and adds the electrical/mechanical energy as another unit of heat. This hot high pressure gas then enters the condenser coil (2) and heats the colder (80° F) pool water being circulated over the outside of the coils.

As it cools, the freon gas condenses back to a liquid at high pressure then rapidly expands thru a valve (3) back to the lower evaporating pressure. This rapid pressure drop super cools the liquid freon as it enters the evaporator (4) where it repeats the cycle. ***SO YOU PAY FOR ONE UNIT OF HEAT AND GET FOUR FREE!! . . . And with the Scroll models you get FIVE to SIX units FREE!!***

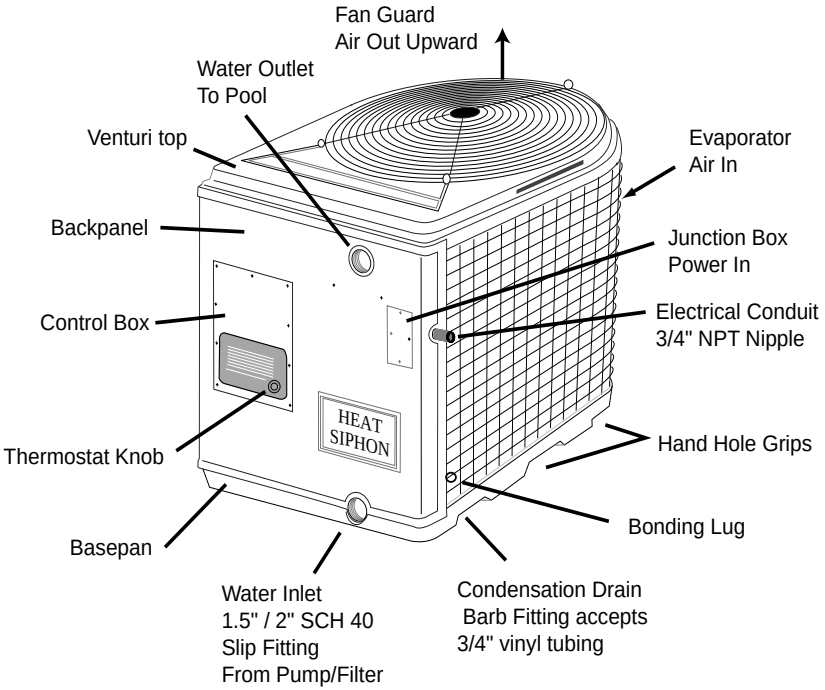


Figure 5.1 - Heat Siphon® Exterior Parts