

*Rheem - Raypak®  
Swimming Pool and  
Spa Heat Pump*

**OWNER and  
INSTALLATION MANUAL**

Heat/Cool Models



This manual should be maintained in legible condition and kept adjacent to the heat pump or in a safe place for future use.

For additional information call: **(800) 260-2758**



The instructions in this manual are for the use of qualified individuals specially trained and experienced in the installation and maintenance of this type of equipment and related system components. Installation and service personnel are required by some states to be licensed.

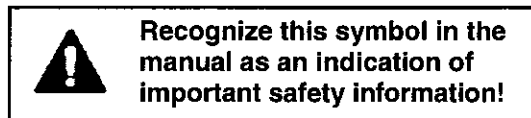
Persons not qualified shall not attempt to install, service, or maintain this equipment.



Manual Effective Date: 1/1/2008

Replaces: All Previous Versions

## PRODUCT SAFETY SIGNS AND LABELS



This manual, as well as the pool/spa heat pump itself, contains ANSI-approved product safety signs and labels. Please read these signs and labels, as they convey important safety information about hazards that may be potentially present in and around the heat pump. They are classified according to relative seriousness of the hazard potential, from DANGER as the most serious, to WARNING, to CAUTION as the least serious.



**Improper chemical content in a swimming pool or spa can damage the heat pump. DO NOT add pool chemicals to the skimmer. This will damage the heat pump and could void the heat pump warranty. ALWAYS follow the product manufacturer's directions when adding any chemicals to your pool.**

### AUDIENCE

The audience for this manual is twofold:

1. For the installing contractor, to provide information for the proper installation and adjustment of the heat pump;
2. For the owner-operator, to explain the features, operation, safety precautions, and service/maintenance of the heat pump. The manual also includes system drawings and illustrated replacement parts lists.

### WARRANTY CLAIMS

For the Warranty to apply, proper authorization **MUST** be obtained **PRIOR** to making any repairs. This Warranty is **VOID** if the product is repaired or altered in any way by **ANY** persons or agencies other than those authorized by Raypak, Inc.

The toll-free warranty and service number is (800) 260-2758.



*Swimming Pool and Spa Heat Pump*

**RHP 115HC OWNER and INSTALLATION MANUAL**

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## Introduction



**This pool/spa heat pump is an electromechanical machine that incorporates a pressurized refrigerant gas in a sealed system. ONLY trained and qualified service personnel should attempt to install or service this equipment. Without proper training and knowledge of such equipment, any attempt to install or service the unit could result in serious injury or even death.**

This manual contains important information on the use, maintenance, chemistry requirements and installation of your new heat pump. Proper installation and operation of the unit will increase the benefits you receive from the unit.

This heat pump is an extremely efficient, economical machine designed specifically for pool and spa heating. It is similar in design and operation to a typical residential air conditioning system. The heat pump employs a hermetic motor/compressor operating in a refrigeration cycle to extract heat from ambient air and deliver it to the circulating pool/spa water.

As with all pool/spa heat pumps, compared to other types of heaters such as gas- or oil-fired, this heat pump has lower heating capacity on a BTU/hr basis. As a result, it will be required to operate longer to accomplish the desired results. It may, at certain times, operate as much as 24 hours per day. However, this should not be of concern to the owner, because the unit is designed to operate continuously. Even though it may operate continuously for many hours, it will still heat the pool/spa with greater economy than other types of fossil fuel heaters.

You are advised to put a cover or blanket over the pool/spa at night and other non-use periods. This will keep evaporation, the cause of the greatest heat loss, to a minimum, and so greatly reduce pool/spa heating costs. During warmer weather, the cover may be required only at night.

## I. Installation

- The placement of the pool/spa heat pump is very important to minimize installation costs while providing maximum efficiency of operation, and to allow adequate service access.
- The unit is designed for outdoor installation and must *not* be installed in a totally enclosed area such as a shed or garage, unless ventilation is provided to ensure adequate air exchange for proper operation. Recirculation of cold discharge air back into the evaporator coil will greatly reduce the unit's heating capacity and efficiency.
- When installed in a geographical location where freezing temperatures can be encountered, the water circuit should be drained to prevent possible freeze-up damage. See Section IX, Freeze Protection.
- The unit should be located as close as possible to the existing pool/spa pump and filter to minimize water piping.
- All models feature an "up-flow" discharge for quiet operation. Air is pulled up through the evaporator coil and discharged through the top grill. Allow at least 8 ft clearance above the unit for unrestricted air discharge. Do NOT install the unit under a porch or deck.

- Each side of the unit must be located at least 1 ft from walls, pipes, or other obstructions for unrestricted air intake and service access.



**Do not install the unit within 3 ft of fossil fuel burning heaters. Air intake along the sides of this heat pump could disturb the combustion process of the unit, and could cause damage or personal injury.**

- Mount the unit on a level, sturdy base, preferably a concrete slab or blocks. The size of the base should be not less than 3 ft by 3 ft.
- Completely isolate the base from the building foundation or wall to prevent sound or vibration transmission into the building. **For this purpose, 4 black rubber sound isolation pads are included with the unit. These pads must be installed under the corners of the unit to reduce vibration and sound transmission to the base.**
- If the unit is installed in an area known for water accumulation during periods of heavy rainfall, its supporting base must be high enough to keep it completely free of standing water at all times.

## II. Electrical Connections

Refer to the unit rating plate below the control panel for precise power requirement for each unit, and for ampacity and over-current protection requirements. All wiring must be in accordance with the National Electrical Code, NFPA No. 70, latest edition, and all applicable state and local codes.

**NOTE: Refer to the National Electrical Code, Article 680, for general requirements for swimming pools and equipment, and to Article 440 for special considerations necessary for circuits supplying hermetic refrigeration motor/compressors.**

The power supply connections to the unit are located behind the control panel. Remove the control panel to expose the electrical controls. Line voltage connections are made at the line voltage terminals of the compressor contactor.

Conduit entrance to the unit is through a hole below the control panel.

**NOTE: Make certain all electrical connections to unit terminals are secure.**

### III. Water Connections



**The heat pump inlet and outlet connections are NOT interchangeable. They must be connected as instructed below.**

1. Connect the heat pump in the return water line between the filter and the pool/spa. See page 11, Plumbing Diagrams.
2. Connect the filter outlet to the fitting marked **WATER IN** at the bottom front of the unit.
3. Connect the fitting marked **WATER OUT** to the return piping to the pool/spa. Unit inlet/outlet connection fittings are 2-inch PVC unions.

Water connections from the heat pump to the main return line can be PVC pipe or flexible pipe approved for the purpose and, in either case, should be at least equal in size to the main pool/spa circulation piping.

4. In cold weather (freeze zone) areas, shutoff valves (ball or gate type) must be installed at the heat pump inlet and outlet to facilitate service and cold weather drain-down.
5. When the water connections are complete, operate the pump and check the system for leaks.

Automatic chemical feeders should not be installed upstream of the heat pump. Improper installation of erosion-type automatic chemical feeders can result in serious damage to, or premature failure of, the heat pump. A flow check valve and/or a Hartford loop will be required.

### IV. Controls and Indicator Lamps

Your heat pump incorporates safety controls and indicators to ensure its safe, reliable operation.

**Water Pressure Switch:** Prevents operation when the pump is OFF. The unit requires 5 psi minimum pressure.

**Water Temperature Control:** Pool/spa water temperature is controlled by the heat pump thermostat on the unit control panel cover, which contains a switch and 2 thermostats, one for setting a heat spa temperature and the other for a swimming pool temperature. The switch can operate an optional external control system, or can switch between thermostats for pool or spa.

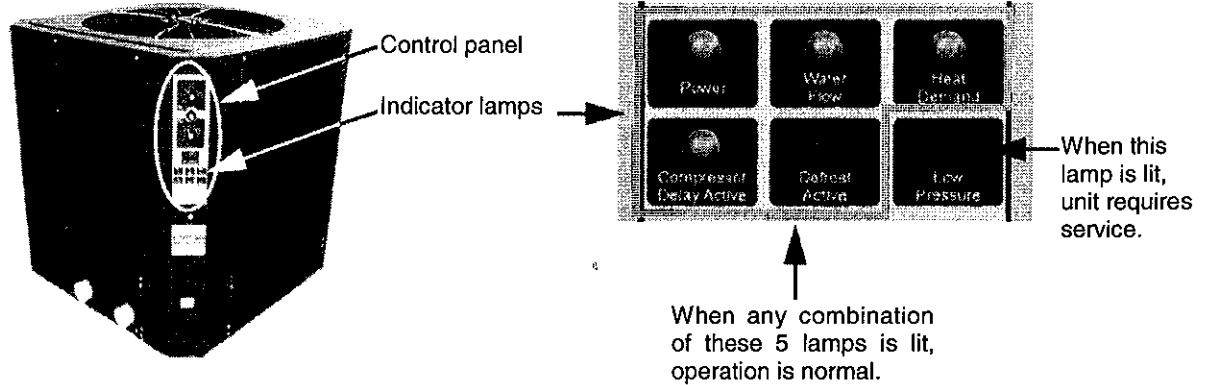
**NOTE: The heat pump will not run when the Remote position is selected and there is no remote control system attached.**

**Defrost Switch:** Prevents heat pump operation if ambient air temperature falls below a predetermined safe minimum (approximately 42° F).

**Delay Timer:** Prevents compressor from short cycling, which could damage or destroy the hermetic motor/compressor. Upon water temperature control satisfaction, or other control circuit interruption, this solid state device will prevent compressor restart for approximately 5 minutes. Upon power failure or interruption, a 6 to 8 minute delay will also be initiated.

**Refrigerant Low Pressure Control:** Stops the compressor if refrigerant suction (low side) pressure falls too low as a result of a malfunction or loss of charge.

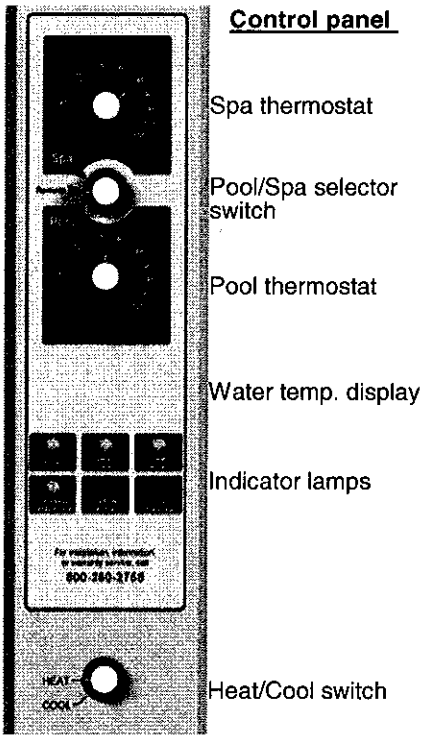
**Indicator Lamps:** There are 6 indicator lamps located on the unit control panel:



- **Power** (amber lamp): When lit, indicates power is applied to the unit.

**NOTE: The heat pump will not run when the Remote position is selected and there is no remote control system attached.**

- **Water Flow** (green lamp): When lit, indicates normal water flow.
- **Heat Demand** (green lamp): When lit, indicates the actual water temperature is below the target water temperature.
- **Compressor Delay Active** (amber lamp): *Under normal operation*, when lit, indicates compressor anti-short cycle timer is active. The fan will run but the compressor will be OFF for 6 to 8 minutes.
- **Defrost Active** (red lamp): When lit, indicates unit is in defrost mode. Defrost mode occurs when ice starts to form on the outside coil. The fan will continue to run but the compressor will stay OFF (not heating) until weather conditions improve.
- **Low Pressure** (red lamp): When lit, indicates failure in the refrigeration circuit. When this lamp is **ON**, service is required. Call the number shown on the cover of this manual.



## V. Initial Start-Up and Check

1. Verify that the **Power** lamp is ON and that the pool/spa pump is running and circulating properly.
2. Verify that the control panel **Spa-Remote-Pool** switch is in the **Remote** (OFF) position; see the figure.
3. Turn the control switch to either **Pool** or **Spa** to turn the system ON and raise the thermostat setting above the current water temperature. At this time the 2 green lamps should illuminate. The fan and compressor should start up and run simultaneously.

**NOTE: The heat pump will be OFF when the Remote position is selected on the Pool/Spa selector switch and there is no remote control system attached.**

4. Allow the heat pump to operate for a few minutes to stabilize operating pressures and to allow various component temperatures to normalize.
5. Verify that the discharge air temperature is approximately 8° - 10° cooler than the air entering the unit.

### A. Heating Mode

Whether heating or cooling, the unit is designed to operate up to 24 hours a day.

1. Set the **Heat/Cool** switch on the control panel to **Heat** mode (see figure).
2. Rotate the thermostat control knob to the desired pool or spa water temperature setpoint to set the Pool/Spa thermostat. Whenever the setting on the thermostat control knob is above the actual water temperature, the **Heat Demand** lamp will be ON and the unit fan will run. If the **Heat Demand** and **Water Flow** lamps are ON and the **Defrost Active** and **Compressor Delay Active** lamps are OFF, the unit fan and compressor should be running.

**NOTE: Whenever the unit is turned OFF, the compressor will not restart for 6 minutes. This delay protects the compressor.**

**Heating Confirmation** - After a few minutes of operation, the **Compressor Delay Active** lamp will turn OFF and the unit will begin heating. Again, discharge air temperature should be 8° - 10° cooler than the air entering the unit.

**Initial Heating** - Check the water temperature and note the time. A heat pumps warms slower but more economically than other heaters. The rate of heating depends on 3 factors:

- How many pounds of water to be heated (10,000 gallons = 83,300 pounds of water).
- How many degrees the water needs to be heated. It takes 1 BTU to heat 1 pound of water 1°.
- How many BTUs the water loses. The warmer the air, the less time it takes to heat the water.

**NOTE: Use a pool cover or blanket to reduce BTU loss. Also turn off all fountains, sprays and other water features.**

Initial heating time (operating 24 hours per day) may vary from 2 days to 1 week. After initial heating, operating time is reduced to match heat loss.



## B. Cooling Mode

Utilizing proven heat pump technology, your unit takes heat from the water and transfers it to the air the same way your home air conditioner does. In cooling mode, running the unit during the night, when air temperature is the lowest, will give you the highest efficiency.

1. Set the **Heat/Cool** switch on the control panel to **Cool** mode.
2. Rotate the thermostat control knob to the desired pool or spa water temperature setpoint to set the thermostat selected by the Pool/Spa switch. Whenever the setting on the thermostat control knob is below the actual water temperature, the **Heat Demand** lamp will be ON and the unit fan will run. If the **Heat Demand** and **Water Flow** lamps are ON and the **Defrost Active** and **Compressor Delay Active** lamps are OFF, the unit fan and compressor should be running.

**NOTE: Whenever the unit is turned OFF, the compressor will not restart for 6 minutes. This delay protects the compressor.**

**Cooling Confirmation** - After a few minutes of operation, the **Compressor Delay Active** lamp will turn OFF and the unit will begin cooling. Discharge air temperature should be 8° - 10° warmer than the air entering the unit.

**Initial Cooling** - Check the water temperature and note the time. The rate of cooling depends on 3 factors:

- How many pounds of water to be cooled (10,000 gallons = 83,300 pounds of water).
- How many degrees the water needs to be cooled. It takes 1 BTU to cool 1 pound of water 1°.
- How many BTUs the unit transfers to the pool/spa. The cooler the air, the less time it takes to cool the water.

**NOTE: Remove the pool/spa cover to speed cooling. Also, turn ON fountains, sprays and other water features.**

Initial cooling time (operating 24 hours per day) may vary from 2 days to 1 week. After initial cooling, operating time is reduced to match heat gain.

### Daily Heating Cycle

Most heat pumps are sized to operate during the pool/spa filtering cycle time of 8 - 10 hours daily to provide an even, steady flow of warm water over a long period of time. On warmer days, the unit will run less, on cooler days, longer. To accomplish this, set the time clock for longer run times.

**Hint: Remember, heating is more efficient during the warmer daylight hours.**

Every pool/spa environment is unique in terms of location, use, swimming hours, solar exposure, shade, wind, etc. Therefore, heat pump operating time will differ between pools/spas.

### Daily Cooling Cycle

Most heat pumps are sized to operate during the filtering cycle time of 8 - 10 hours daily to provide an even, steady flow of cool water over a long period of time. On warmer days, the unit will run longer, on cooler days, less. To accomplish this, set the time clock for longer run times.

**Hint: Remember, cooling is more efficient during the cooler nighttime hours.**

## VI. Seasonal Start-Up or Annual Check

1. Remove leaves, pine needles, etc. from the evaporator coil. Clean the coil by spraying it with a mild solution of household liquid soap and water.
2. Flush the coil with a garden hose; DO NOT use a high-pressure sprayer.
3. Backwash or otherwise clean the pool/spa filter. If necessary, clean the skimmer basket and pump strainer.
4. Set the valves to assure proper water flow through the unit.
5. Set the water temperature control to the desired temperature range for either pool or spa.
6. Set the **Heat/Cool** switch on the control panel to either **Heat** or **Cool** mode.
7. Turn the control switch to either **Pool** or **Spa**. If the pool pump is running and the water is colder than the setting of the temperature control, the heat pump will start up and run. It will run until the desired water temperature is reached, or until the pool pump shuts OFF.

**NOTE: If the pool pump and heat pump shut OFF before the water temperature is raised to the desired level, you must lengthen the running time of both. To do this, reset the time clock dial for the longer running time, or manually operate the pump with the timer override switch. In Heat mode, the pool heat pump capacity and efficiency are both greater at higher ambient air temperatures. Run time should be set to take advantage of all daylight hours, when the air is generally warmer. In Cool mode, conversely, the system performs best during nighttime hours, when the air is generally cooler.**

## VII. Heat Pump Running Time

1. Determine the length of pump and heat pump operating time necessary for your particular requirements. Minimum run time should be the required hours to attain proper water filtration. Maximum run time obviously is 24 hours per day, or as required to reach desired water temperature, and depends on such things as weather, pool/spa size, covering, shading, etc.
2. If cooler or warmer water is desired, simply adjust the water temperature control and/or the pump and heat pump operating time until the desired water temperature is reached.

**NOTE: At the beginning of the heating season, or whenever the pool/spa water temperature is to be raised several degrees, the pool/spa pump and heat pump may need to operate continuously for several days. During summer months, only a few hours per day may be necessary, or none at all.**

## VIII. Summer Shutdown

If you do not plan to use the heat pump during the summer months, secure and protect it as follows:

1. From the control panel, turn the control switch to **Remote** (OFF).
2. Turn the heat pump circuit breaker or disconnect switch to OFF.
3. Leave the valves set the way they are unless additional circulation is required. DO NOT stop all flow through the heat pump.
4. **IMPORTANT:** Remember to reset the valves before the next heating season, or the heat pump will not operate properly.

## IX. Freeze Protection

If the heat pump is installed in a location subject to freezing conditions, it is important to protect the water circuit from freezing, just as should be done for the pump and filter.

### System Drain-Down

1. Turn the heat pump circuit breaker or disconnect switch to OFF.
2. From the control panel, turn the control switch to **Remote** (OFF).
3. With the pool pump OFF, close the external shutoff valves and loosen the inlet and outlet water unions and allow water to drain.
4. Leave the drains open until the unit is started in the spring.
5. Cover the heat pump with a waterproof cover.



### Continuous Pump Operation

It is also possible in some areas to prevent heat pump freeze damage by operating the pump continuously during freezing weather. However, this results in significantly higher pump operating cost. Further, if a sustained power failure occurs, the heat pump would have to be drained anyway, or freeze damage could result.


## X. Maintenance

The following maintenance procedures are designed to keep your heat pump operating at a high level of reliability. Maintenance should be performed on a periodic basis to prevent system failures and performance degradation.

**A. Air Coil Cleaning** - Efficient system operation depends on free circulation of air through the thin and tightly-spaced fins of the evaporator coils. The evaporator should be cleaned whenever it has a buildup of dirt or debris.

1.  **WARNING** Shut OFF electricity to the heat pump.
2.  **CAUTION** To clean the fins, spray with a garden hose. But avoid high water pressure, which will bend and damage the fins.

**B. Cabinet Care (optional)** - The cabinet is designed for outdoor use and requires little care. However, you can clean it if you wish.

1.  **WARNING** Shut OFF electricity to the heat pump.
2. Wash the cabinet with soap and water.

**C. Condensate Drainage** - The heat pump extracts humidity from the air as it passes through the coil, similar to the way a cold drink outside “sweats” on a hot day. This condensate drains from the bottom of the unit.

1. Routinely check to be sure the condensate drain holes in the base of the unit are not plugged with dirt or debris.

**NOTE: Owners often suspect that the heat pump is leaking when in fact it is condensate that is draining. To check that the liquid is condensate and not leakage from the heat pump, either:**

- a. Use the pool chemistry test kit to confirm there is no chlorine in the condensate. *Or,*
  - b. Shut the heat pump OFF and leave the filter pump running to see if the water disappears. If the water disappears, it would confirm the water to be condensate.
2. If the condensate flow becomes a problem, optional drain pans are available from the factory.

## **XI. Troubleshooting**

If your heat pump does not operate, or simply does not heat your pool/spa water, the indicator lamps on the front control panel (see page 4) can provide valuable clues as to what is wrong, and may even indicate precisely what the problem is. Always observe these lamps before calling a service representative. By reporting on the telephone which lamps are ON and OFF, the service rep may be able to solve the problem without the expense of a service call.

### **A. UNIT IS RUNNING, BUT NOT HEATING OR COOLING**

- Is the ejected air from the unit 8-10° warmer/cooler than incoming air? If so, the unit is extracting heat from the air or pool/spa and transferring it.
- Is water condensing on the evaporator and internal copper pipes? This is also evidence of heat removal from the air. When the air is cool with low humidity, condensation may not be evident.
- How long has the heater been operating? During initial pool/spa heating in cold weather, it may require a week to elevate the water temperature to a comfortable level. Normally, it takes about 4 days.
- How many hours per day is the unit operating? **Remember that the heat pump only operates while the pool pump is running.** Set the time clock to permit 24 hour per day operation. After the desired temperature is reached, return the system to normal operation of 8-10 hours per day.
- Is airflow through the unit being obstructed? Restrictions such as shrubbery, tall grass, dirty coils, or any other obstruction to airflow will reduce performance.
- Is the pool blanket/cover being used? Unblanketed pools can lose up to 10 degrees per night compared to 4 degrees or fewer when a blanket is used. Without a blanket, the total heat gained during the day can be lost overnight.
- Are rapid heat losses occurring in some other way, such as high wind, waterfalls, spa spillage, bubblers, rainfall, flow through solar panels at nights, or a high water table?
- Is water flow through the unit adequate? Check the system for obstructions, such as a clogged filter pump strainer or a dirty filter.

## B. UNIT IS NOT RUNNING

- Is the control panel **Power** lamp ON? If not, the circuit breaker may be shut OFF or tripped. Reset the breaker by switching it OFF, then back ON. *Verify that the breaker is set and operating properly before calling for service.*
- Is the thermostat setting correct? Verify that the temperature has been properly set on the thermostat, and that it is *higher* than the current water temperature.
- Have you waited 6 minutes for the time delay? After the unit has been running and then shut OFF for any reason, there is a 6-minutes timed cycle before operation can begin again.
- Is the **Water Flow** lamp OFF? This lamp will turn OFF if not enough water is flowing through the heater. Improperly positioned valves or a dirty filter could decrease the flow of water required for efficient operation. When the **Water Flow** lamp is ON, proper flow is present. If this lamp is OFF, but you can feel normal flow at the pool/spa returns, check the water valves or settings.
- Is the **Defrost Active** lamp OFF? If this lamp is ON, the fan will be running but not the compressor. The unit is waiting for the frost to melt or the air temperature to rise before heating is resumed.
- Is the **Heat Demand** lamp ON? If not, then the thermostat setting is not higher than the temperature of the water. Raise the thermostat setting.
- Is the **Low Pressure** lamp ON? If this lamp is ON, there is a problem with the unit that will require service. Turn the unit OFF and call the number shown on the cover of this manual.

## SERVICE CALL REQUESTS

Determine if the problem is:

- Warranty Service
- Non Warranty Service
- Maintenance-related (power supply, water flow, or time clock adjustment)

**NOTE: The MANUFACTURER IS NOT RESPONSIBLE for maintenance adjustments.**

## POWER SUPPLY

- Verify that all circuit breakers are reset and working properly.
- If the **Power** lamp on the control panel still does not light, contact the installing dealer, since it may be a power problem requiring an electrician.

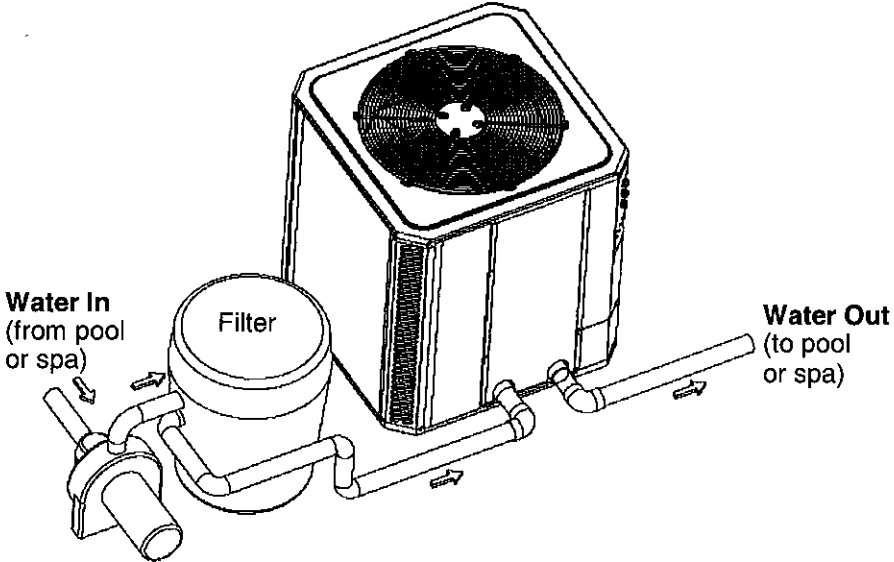
## WATER FLOW

- Verify that the filter is clean to provide good flow.
- Verify that the valves are properly positioned.
- If the **Water Flow** lamp on the control panel still does not light, and water is circulating in the pool or spa, contact the installing dealer to adjust the valves.

## TIME CLOCK ADJUSTMENT

Verify that the time clock is set to permit the heater to run long enough to heat properly.

# Plumbing Diagrams



For systems with pumps of less than 2 HP (under 80 gpm), no external bypass is required. Connections are 2-inch unions. Plumb the heat pump **after** the filter and **before** any chlorinators.

For systems with pumps of 2 HP or greater (over 80 gpm), an external bypass is required. Adjust the bypass valve to divert a minimum of 40 gpm through the heat pump. Connections are 2-inch unions. Plumb the heat pump **after** the filter and **before** any chlorinators.

