



Raypak® Swimming Pool Heat Pump

OWNER'S MANUAL

Models

5100

6100



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: 11/15/2004

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.

An example of a heat pump safety label follows.



**Excessive chemical content in a swimming pool or spa can damage the heat pump.
DO NOT skimmer feed - Avoid adding chemicals in this manner.**

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.

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



Swimming Pool Heat Pump
OWNER'S MANUAL - Models 5100 and 6100

CONTENTS

Introduction	1
I. Installation Considerations	1
II. Electrical Connections	2
III. Water Connections	3
IV. Controls and Indicator Lamps	3
V. System Start-Up	4
VI. Summer Shutdown	5
VII. Freeze Protection	6
VIII. Maintenance	6
IX. Troubleshooting	7
X. Service Call Verification	8
Plumbing Diagrams	9

Introduction



This pool heat pump is an electromechanical machine that incorporates a pressurized refrigerant gas in a sealed system. ONLY trained and qualified service personnel are authorized 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 and troubleshooting of your new heat pump. This unit must be properly installed, maintained and operated for optimal performance. This heat pump is an extremely efficient, economical machine designed specifically for swimming pool 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 water.

As with all pool heat pumps, compared to other types of heat pumps 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 with greater economy than other types of fossil fuel heaters.

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

I. Installation Considerations



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 at least 3 ft by 3 ft.
- **You must install the 4 black rubber sound isolation pads that ship with the unit. Install under the corners of the unit to reduce vibration and sound transmission to the base.**



The unit's supporting base must be high enough to keep it completely free of standing water at all times.

Situate the pool heat pump carefully to minimize installation costs while providing maximum efficiency of operation, and to allow adequate service access, as follows:

- For unrestricted air intake and service access, position each side of the unit at least 1 ft from walls, pipes and other obstructions.
- The unit is designed for outdoor installation; do NOT install it in an 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.
- This unit 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.
- To minimize water piping, locate the unit as close as possible to the existing pool pump and filter.
- When installed in areas where freezing temperatures can be encountered, drain the water circuit to prevent possible freeze-up damage. See Section VII, Freeze Protection.

II. Electrical Connections

Refer to the unit rating plate below the control panel for precise power requirement for your 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.

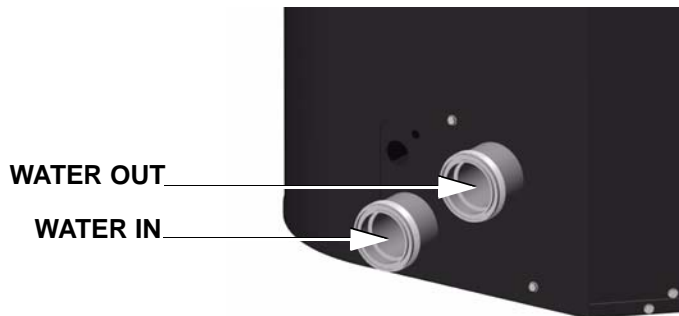
This unit is pre-wired to work with external control systems, heat-on-demand options and other external time clock overrides. Refer to the external control system's instructions for installation information.

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. See page 10, Plumbing Diagrams.
2. Connect the filter outlet to the fitting marked **WATER IN** at the bottom side of the unit. Unit inlet/outlet connection fittings are 2-inch PVC unions.



3. Connect the fitting marked **WATER OUT** to the return piping to the pool.

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, must be at least equal in size to the main pool circulation piping.

4. Operate the pump and check the unit for water leaks.



Install a check valve and/or a Hartford loop AFTER the heat pump and BEFORE any chlorinating devices. Install any automatic chemical feeders AFTER the heat pump. Improper installation of erosion-type automatic chemical feeders can result in serious damage to, or premature failure of, the heat pump and will void the heat pump warranty.

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 water temperature is controlled by the heat pump thermostat on the unit control panel, 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.

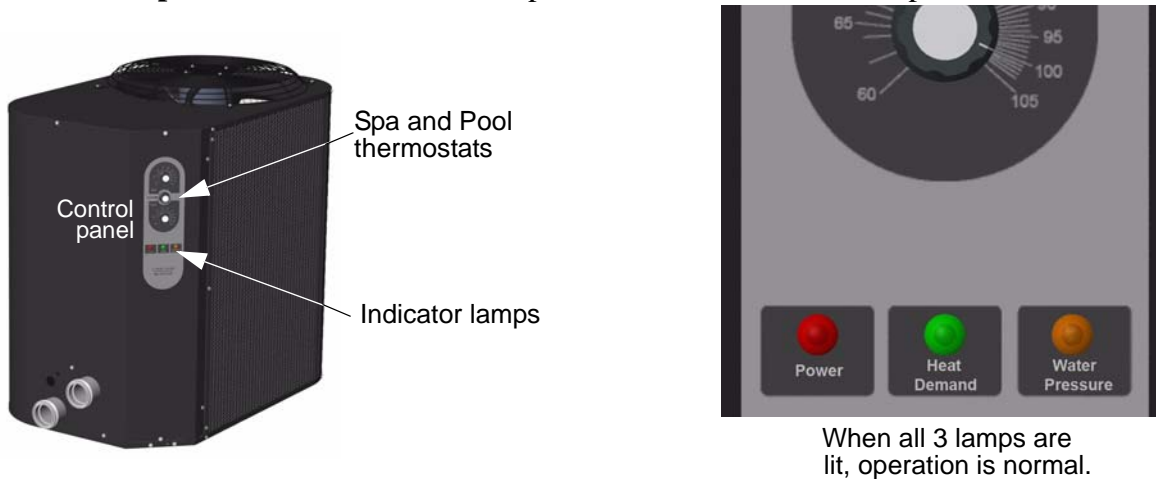
NOTE: The heat pump will not run when the Remote position is selected and there is no remote control system attached.

Defrost Switch: Prevents heat pump operation if ambient air temperature falls below a predetermined safe minimum (approximately 42-48° F, based on humidity). The compressor will shut OFF but the fan will continue to run.

Delay Timer: Prevents compressor from short cycling, which could damage or destroy the hermetic motor/compressor. Upon water temperature control satisfaction, or other circuit interruptions, this solid state device will prevent compressor restart for approximately 5 minutes.

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

Indicator Lamps: There are 3 indicator lamps located on the unit control panel:



- **Power** (red 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.

- **Heat Demand** (green lamp): When lit, indicates the actual water temperature is below the target water temperature.
- **Water Pressure** (orange lamp): When lit, indicates normal water flow.

V. System Start-Up

1. Verify that the **Power** lamp is ON, the pool pump is running and water is circulating properly.
2. Verify that the control panel **Spa-Remote-Pool** switch is in the **Remote** (OFF) position; see the figure below.
3. Turn the selector switch to **Pool** to turn the unit ON and raise the thermostat setting above the current water temperature. At this time all three lamps should illuminate and the fan should start to run.



Spa thermostat

Pool/Spa selector switch

Pool thermostat

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. If not, see Section IX, Troubleshooting.

Seasonal Start-Up or Annual Check

NOTE: At the beginning of the heating season, or whenever the pool water temperature is to be raised several degrees, the pool 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.

1. Remove leaves, pine needles, etc. from the evaporator coil. Clean the coil by gently applying a mild solution of household liquid soap and water.
2. Gently rinse the coil with water; do NOT use high pressure.
3. Backwash or otherwise clean the pool filter. If necessary, clean the skimmer basket and pump strainer.
4. Set the valves to assure proper water flow through the unit.

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. Since the 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.

VI. 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.

VII. 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 to allow water to drain. Use a Shop Vac or air pressure to remove excess water.
4. Re-attach the unions.
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 **MUST** be drained anyway, or freeze damage could result.


VIII. Maintenance


NOTE: The heat pump MANUFACTURER IS NOT RESPONSIBLE for maintenance adjustments.

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

A. Air Coil Cleaning - Efficient operation depends on free circulation of air through the thin and tightly-spaced fins of the evaporator coils. The evaporator *must* 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 gently with a garden hose. DO NOT pressure wash, which will bend the fins and can void the warranty.
--	--

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. Unplug Condensation Drain Holes - 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 condensation drains from the bottom of the unit.

1. Routinely check to be sure the condensation drain holes in the base of the unit are not plugged with dirt or debris.
2. If condensation becomes a problem, optional drain pans are available from your heat pump distributor or pool dealer.

IX. Troubleshooting

If your heat pump does not operate, or simply does not heat your pool water, the indicator lamps on the front control panel (see Section IV) 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

- Is water flow through the unit adequate? Check the unit for obstructions, such as a clogged filter pump strainer, a dirty filter, or valves not positioned correctly.
- Is the ejected air from the unit 8-10° cooler than incoming air? If so, the unit is extracting heat from the air and transferring it to the pool.
- 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 unit been operating? During initial pool 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 unit to normal operation of 8-10 hours per day.

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. Since the 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.

- 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, spillage, rainfall, flow through solar panels at nights, or a high water table?

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.*
- Are the thermostat setting and the Pool/Spa setting correct? Verify that the temperature has been properly set on the thermostat, and that it is *higher* than the current water temperature. *At this time all three lamps should illuminate and the fan should start to run.*
- Is the **Water Flow** lamp ON? This lamp will turn OFF if not enough water is flowing through the unit. Improperly positioned valves or a dirty filter could decrease the flow of water required for efficient operation. If this lamp is OFF, but you can feel normal flow at the pool returns, check the water valves or settings.
- Have you waited approximately 5 minutes for the time delay? After the unit has been running and then shut OFF for any reason, there is a delay before operation can begin again.
- 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.

C. CONDENSATION SEEMS EXCESSIVE

Heat pumps can produce a large amount of condensation (water) during operation. If you suspect that the heat pump is leaking:

- a. Use a pool chemistry test kit to confirm there is no chlorine in the condensation. **Or,**
- b. Shut the heat pump OFF and leave the filter pump running to see if the water stops dripping. If the water stops dripping, the heat pump is *not* leaking.

X. Service Call Verification

Before you make a service call, *first* determine if the problem is:

- Warranty Service
- Heat pump operation (power supply, water flow, or time clock adjustment)

NOTE: The MANUFACTURER IS NOT RESPONSIBLE for these 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.

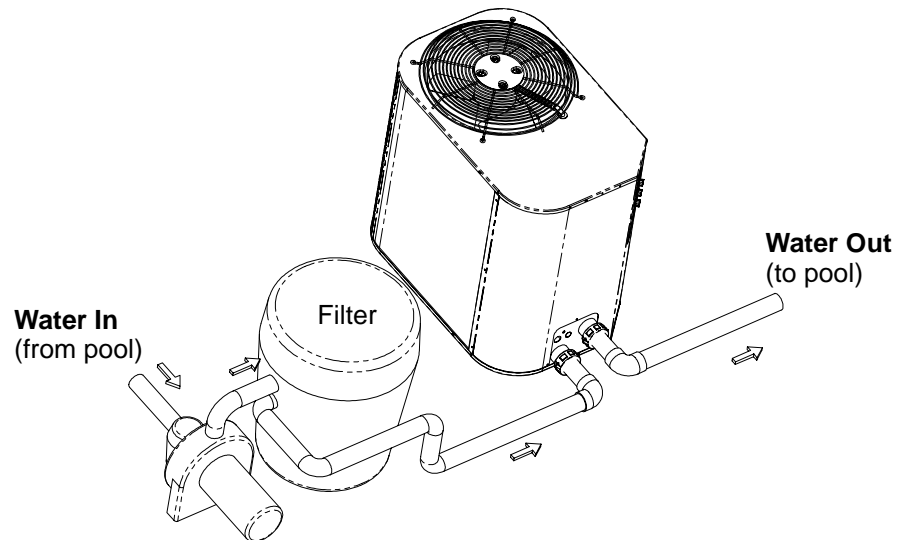
WATER FLOW

- Verify that the pool filter is clean to provide good flow.
- Verify that valves are properly positioned to allow adequate water flow through the heat pump.
- If the **Water Flow** lamp on the control panel still does not light, and water is circulating in the pool, verify that all valves are positioned correctly.

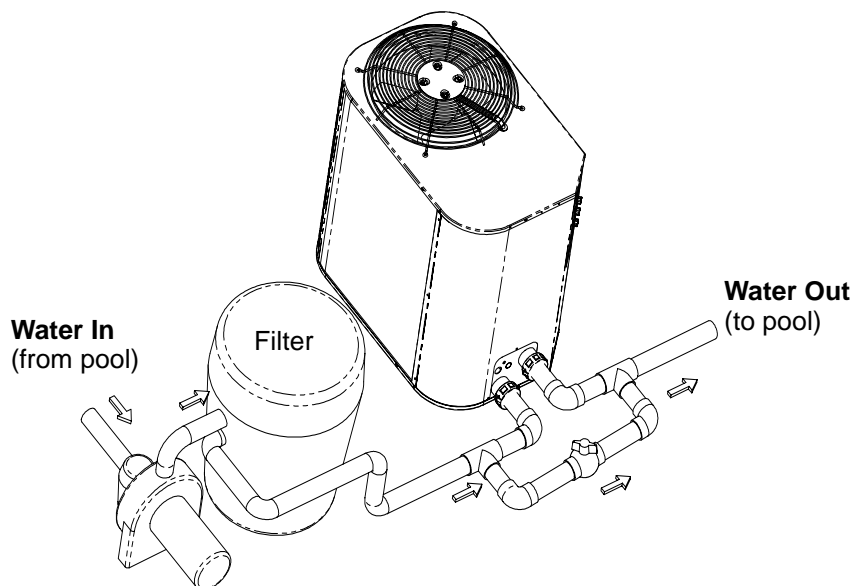
TIME CLOCK ADJUSTMENT

Verify that the time clock is set to permit the unit 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 must be installed. Adjust the bypass valve to divert most of the water through the heat pump. Connections are 2-inch unions. Plumb the heat pump **after** the filter and **before** any chlorinators.

