



**Pentair**  
*Pool Products™*

**MiniMax® Plus HP**

*Because **reliability** matters most*

## **AIR SOURCE UNIT INSTALLATION MANUAL POOL/SPA HEATERS, CHILLERS, REVERSE CYCLE & COMMERCIAL MODELS**

### **WARNING**

#### **FOR YOUR SAFETY - READ BEFORE OPERATING**

**Warning:** If you do not follow these instructions exactly, a fire or explosion may result, causing property damage, personal injury or loss of life.

### **WARNING**

Improper installation, adjustment, alteration, service or maintenance may cause property damage, personal injury or death. Installation and service must be performed by a qualified technician or service agency.



#### **Models:**

**MiniMax Plus HP 400 (XLS400)**  
**MiniMax Plus HP 600 (XLS600)**  
**MiniMax Plus HP 800 (XLS800)**  
**MiniMax Plus HP 1000 (XLS1000)**  
**MiniMax Plus HP 230 (CP12)**

## **FOR QUALIFIED TECHNICIANS ONLY**

**Part # 471950 Revision #E**

**© HydroTemp Manufacturing Co., Inc.**

Note: Specifications may change without notice.

# **WARNING**

**FOR PROFESSIONAL USE ONLY**  
**Trained Technicians Only !**

## **WARNING**

The following installation manual is for FACTORY AUTHORIZED- licensed professional trade use only !  
The owner/user should review the following section for reference and knowledge needed to verify proper installation for warranty validation. The owner/user should not attempt to perform any internal adjustments, electrical, plumbing or any installation procedures in this manual. The owner/user should never open the access panel for any reason unless accompanied by a factory warranty representative.

**Owners/users/installers should contact the factory service department for advice at  
239-768-1555**

## **WARNING**

**Always review the wiring schematic located inside the heater,  
since it may have changed after this manual was printed !**

## **WARNING**



THE MISUSE OF THIS PRODUCT CAN RESULT IN SEVERE INJURY, DEATH, OR PROPERTY DAMAGE. BE ADVISED OF THE FOLLOWING CONDITIONS THAT MAY EXIST:

1. ELECTROCUTION AND/OR FIRE DUE TO IMPROPER WIRING.
2. HAND AND HAIR ENTRAPMENT MAY OCCUR NEAR THE FAN LOCATED ON THE TOP OF THIS UNIT.
3. LOSS OF POOL WATER AND/OR FLOODING AND/OR PROPERTY DAMAGE.
4. DAMAGE AND/OR MISUSE TO THE PRODUCT RESULTING IN FAILURE OR EXCESSIVE WEAR.
5. ALL ELECTRICAL WORK BY LICENSED PROFESSIONAL ONLY.
6. BACK OR BODY INJURY DUE TO MISHANDLING.

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**Manufactured for Pentair Pool Products by HydroTemp Mfg. Co., Inc.**

# SPECIAL FEATURES

**Separate Air Handling / Electric Compartment**  
An internal electrical compartment substantially reduces future service from moisture and salt laden air flow.

**Sturdy Rust Proof  
Fiberglass Top  
Non Fading**

**Quiet  
High Volume  
Fan With  
Vinyl Coated  
Guard**

**Large Aluminum & Copper  
Lanced Fin  
Evaporator Air Coil with  
Vinyl Coil Guard**

**Automatic Diagnostics With  
L.E.D. Display & Dual Pool/Spa  
Electronic Thermostat**

**Product  
Name Plate**

**Chemical  
Warning Label**

**Optional Pool/Spa Wiring  
Access Holes**

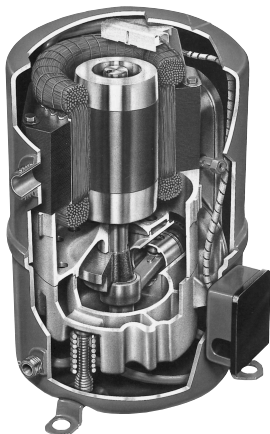
**Easy Connect  
2 Inch Plumbing With  
"Internal Automatic Bypass"  
Up To 90 GPM**

**Sturdy Elevated  
Fiberglass  
Rust Proof  
Bottom Provides  
Proper Drainage**

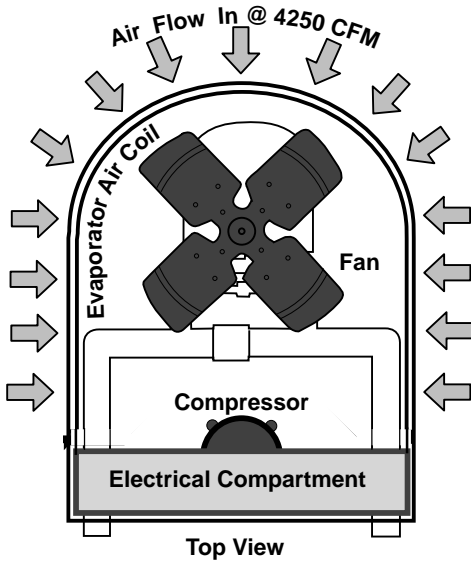
**TRANE®  
COMPRESSOR  
with 410-A, the safe  
and clean refrigerant.**

**And  
SCROLL  
COMPRESSOR**

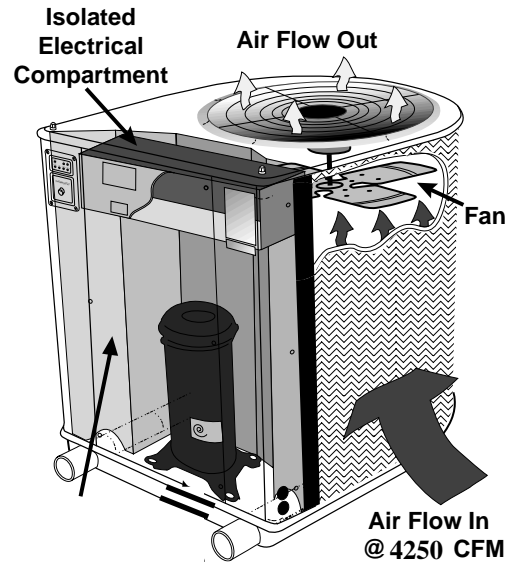
***Super Quiet & Highly Efficient Compressor Design***



# DESIGN ADVANTAGES

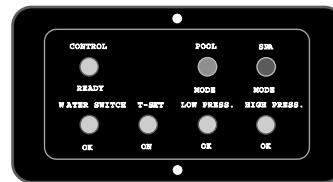
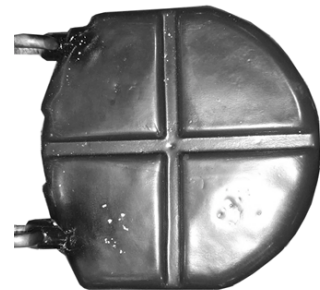
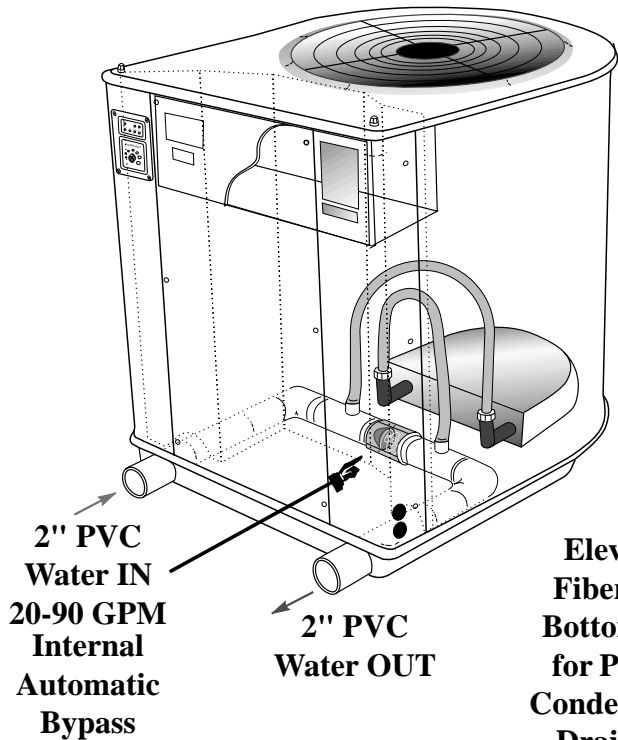


The electrical panel has an isolated compartment, located within the mechanical compartment to prevent corrosion. The heat from the compressor located just below the electrical compartment helps eliminate moisture as well. This exclusive design will substantially extend the life cycle of the heater. The fiberglass cabinets is corrosion proof and is much stronger than plastic cabinets.



**Internal Automatic Bypass**  
**Free Flow 2" Plumbing**  
 Automatically adjusts the water flow.  
 Lowest water flow restriction available.

**Heat Exchanger**  
**Special Cupronickel Alloy**  
 Encased In A Block of Foam  
 to Prevent Heat Loss & Corrosion



**L.E.D. Diagnostic Lights**

**Dual Thermostat**



See specification sheet to determine  
 electrical breaker requirement.

# INSTALLATION GUIDELINES

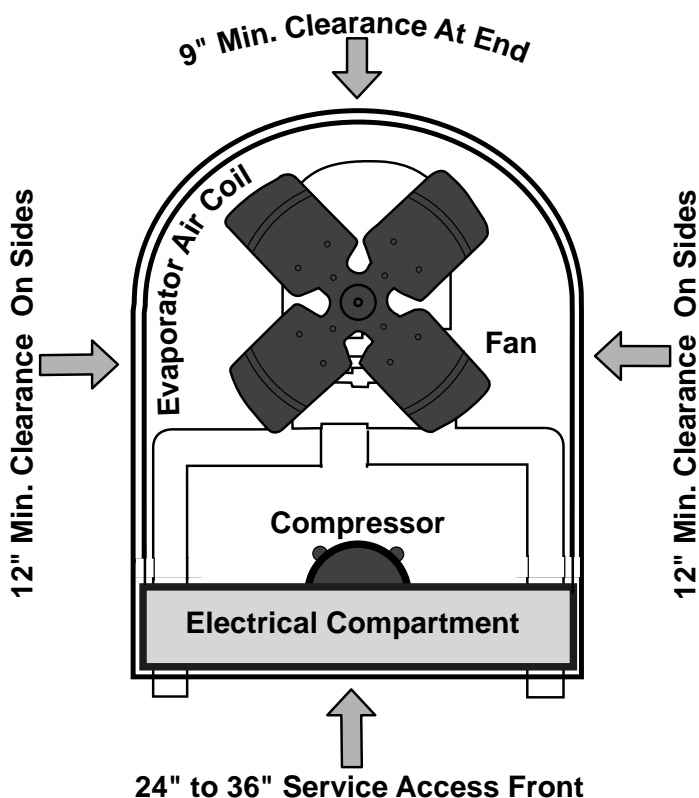
**IMPORTANT NOTICE:** The following are the installation requirements that must be followed in order to meet the general factory specifications. The installer may engineer other types of installation techniques that are suited for each particular installation, regarding placement and plumbing, but should still follow this basic format. The factory warranty will not warrant other field installed options unless factory parts are used according to this booklet. This information is intended for a licensed professional contractor only.

	 <b>WARNING</b>
	<p><b>The pool owner or operator should not attempt to perform or change any aspect of the installation, because serious bodily injury and or electrocution may result.</b></p>


## HEATER PLACEMENT & CLEARANCE

### CLEARANCE & AIR FLOW

Prepare a level area near the pool/spa filtering system. Remove any plants or equipment that do not meet the minimum clearance requirements for the side air inlets or the top air discharge, see diagram on next page.

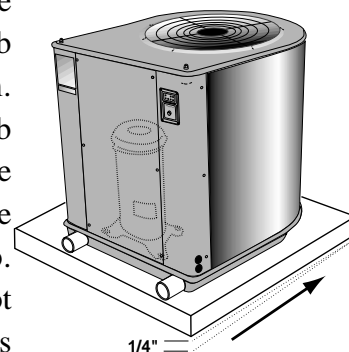


Make sure the air flow is not restricted in any way. Do not install the unit in an area where the cooler discharge air may accumulate and be drawn back into the unit. Provide ventilation through containment walls or fencing for the air intake if needed.

 <b>CAUTION</b>
<p><b>Do not install this unit indoors or in filtering system equipment rooms.</b></p>

### EQUIPMENT SLAB & PITCH

To support the heater, place a concrete or fabricated slab near the filtering system. Whenever possible, the slab should be placed at the same level or some what above the filtering system slab. Make sure the slab does not hold water and see that it is pitched no more than 1/4 inch away from the compressor end (front) of the heater. **Pitch slab from front to back 1/4" maximum and level from side to side.**

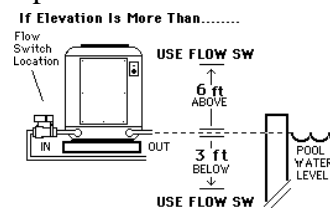


### CONDENSATION DRAINAGE

The heat pump will precipitate water that drains from the unit at a steady rate while it is running. This condensation is from the humidity in the outside air. The more humidity, the more condensation it will produce. There are several drain ports in the bottom of the unit, make sure they do not become clogged with debris.

### HEATER ELEVATION

If the heater is to be installed more than 6 feet above, or more that 3 feet below the pool water level, you may need to install an external flow switch as shown in the plumbing section of this manual. If a solar system or special equipment is in use, you may require either a special water pressure switch or the use of an external flow switch as shown in "Water Flow Switch Section",

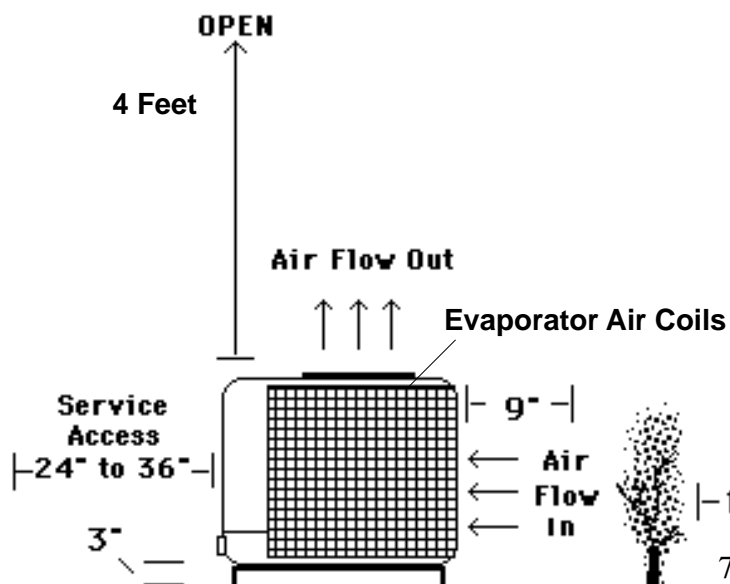


## SPRINKLER LOCATION

Relocate or remove any sprinkler heads that have the chance of spraying on or into the unit. Make sure there are absolutely no sprinkler heads near the heater that will in any way spray on or into the heater. **Sprinkler damage is not covered under the warranty agreement.** Make sure they are a sufficient distance away so normal wind currents will not carry the mist to the heater.



The heater is designed to handle the wettest weather conditions that are typical of rain and humidity, etc. However, sprinkler heads force high pressure water into the unit from the side at an odd angle. Most sprinkler systems are connected to a well system. Most well water is high in minerals, sulphur and other aggressive contaminants. These contaminants will leave a build up on the evaporator coils and electronics causing corrosion and hamper the efficiency. If you are located within 15 miles of the coast, salt may be in the well water also.



## CAUTION

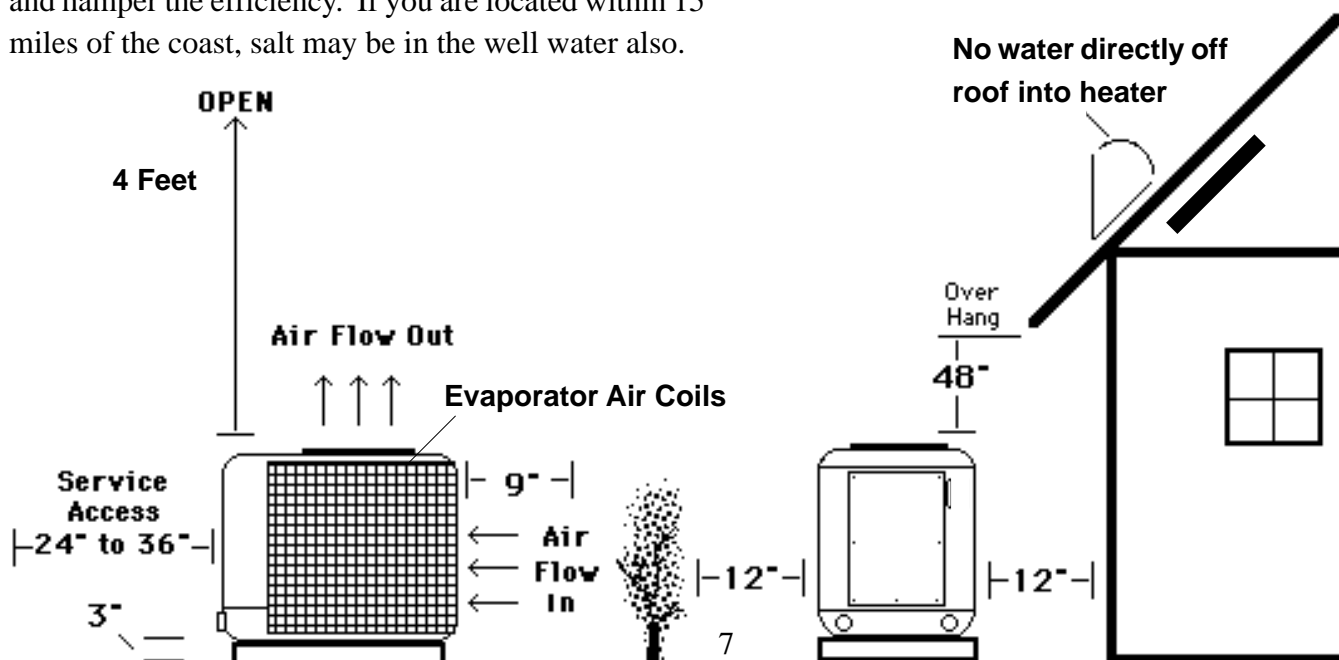
Chemicals should NOT be stored near the heater. The fan may draw corrosive chemical vapor through the unit causing damage. Do NOT store anything on top, underneath or around the heater. You will need access to the disconnect breakers in the event of an emergency.

## CLEANING

To clean the heater you should take a sponge and mild soapy water and wipe the surfaces clean. Do not use a pressurized garden hose to clean the heater. Never force water into the unit from any direction. You may use a garden hose at low pressure with no nozzle attachment to rinse the air coils. Pour a mild liquid soap into the water stream as you rinse the air coils. Clean the evaporator air coils at least 4 times a year. If you live near the sea coast, you will need to clean at least 6 times a year or more to remove salt and sand. Clogged evaporator coils will reduce the efficiency of the unit and cause corrosion. A professional should clean the coils periodically, every year or two.

## ROOF CLEARANCE & RUN OFF

Be aware of roof slope and overhang above the heater. Sharp sloping roofs without gutters will allow massive amounts of rain water, mixed with debris from the roof to be forced through the unit. Roof valleys that collect run off from two slopes are especially important to avoid. If space is limited, determine if a gutter or down spout is needed to protect the heater. Low roof overhangs may obstruct the air flow out of the unit and require 48 inches of clearance, See diagram below.





# PLUMBING & WATER FLOW

## PLUMBING CONNECTIONS

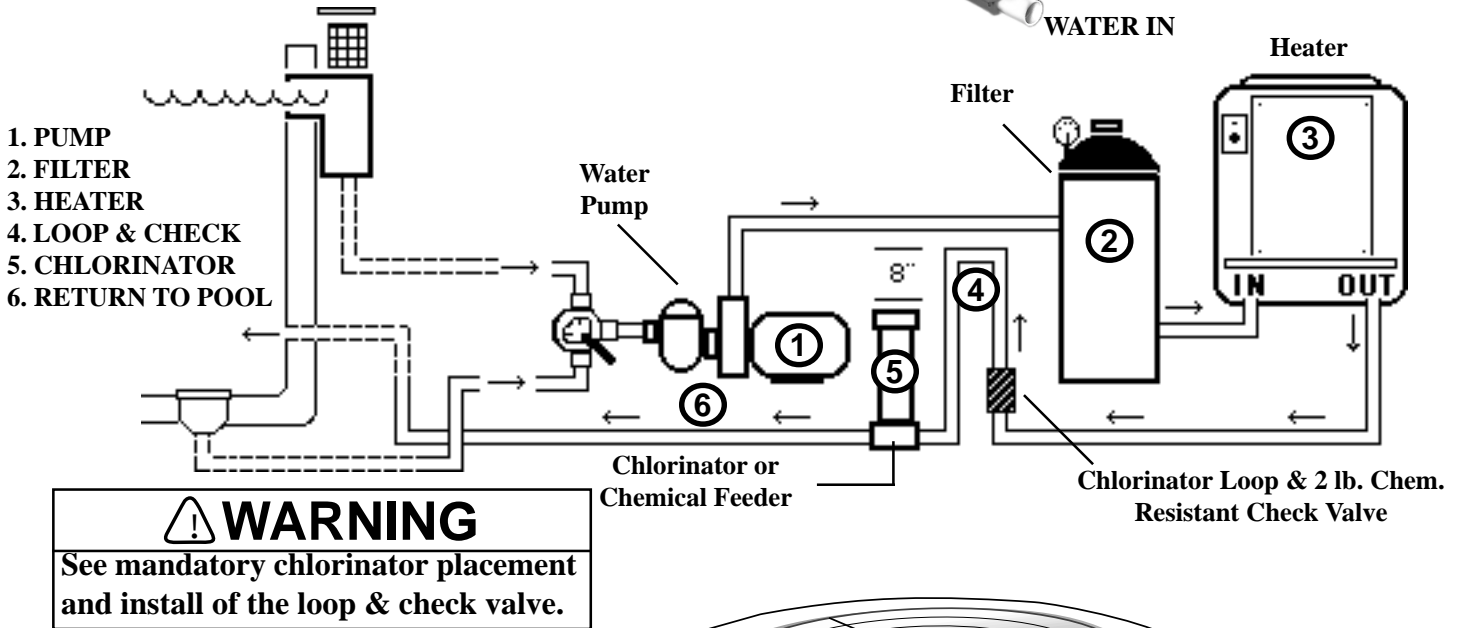
**Filtered Water "IN" on the LEFT front.**

**Heated Water "OUT" on the RIGHT front.**

The plumbing inlets are "slip" p.v.c. pipe that will accept a 2 inch p.v.c. glue fitting. The pipe is left plain so you can adapt to your needs. Use p.v.c. cleaner to prime the fitting and pipe. Use a quality medium body p.v.c. glue.

**FOR PUMPS UP TO 2 H.P. OR 90 G.P.M. MAX.**

**SEE NEXT PAGE FOR LARGER WATER PUMPS.**

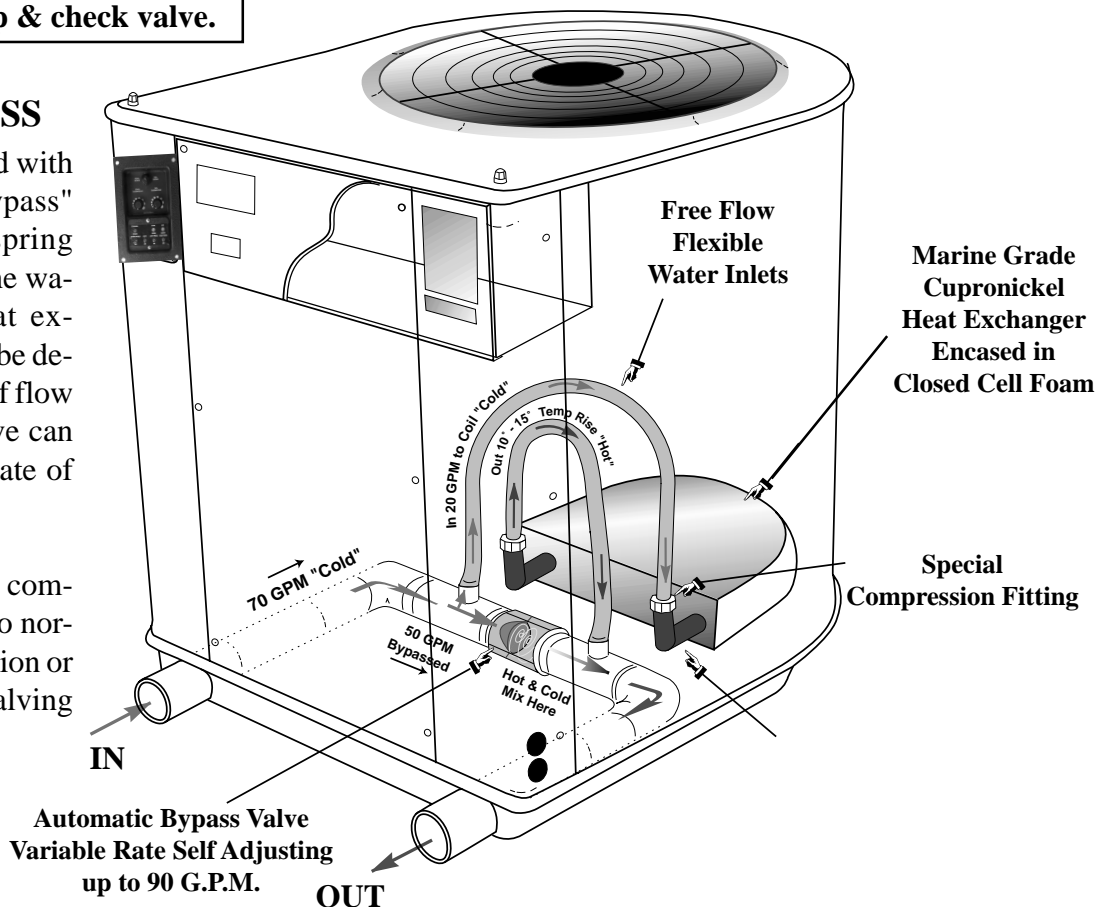


## INTERNAL AUTOMATIC BYPASS

The heat pump is equipped with an internal "Automatic Bypass" valve. A variable rate spring valve is used to regulate the water flow through the heat exchanger. Steady flow will be delivered over a wide range of flow rates. This automatic valve can handle a maximum flow rate of 90 gallons per minute.

The automatic valve will compensate for flow loss due to normal filter debris accumulation or changes in flow due to valving and other conditions.

**See chlorinator placement guidelines.**



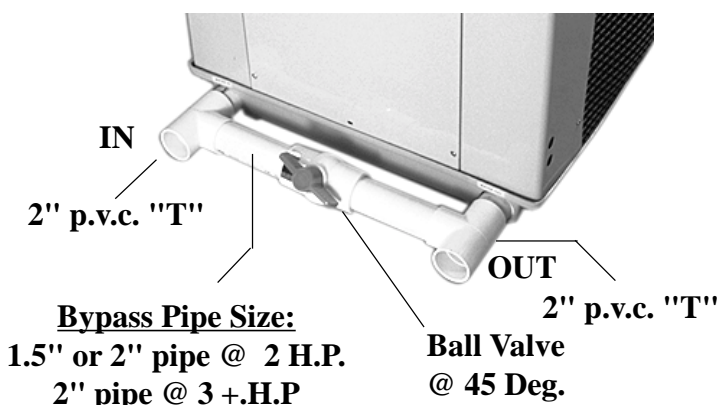


# HIGH RATE WATER PUMPS

## EXCESSIVE FLOW BYPASS MANIFOLD FOR LARGE 2 H.P. PUMPS OR OVER 90 G.P.M.

If the pool circulation pump is over 2 HP OR if the total flow exceeds 90 GPM you will have to add the "excessive flow valve" as shown here. Do not install a bypass valve that will completely shut off flow to the heater, see "Shut-down Procedures".

Some larger water pumps may be restricted if the pipe size is not adequate therefore reducing its overall flow rate. When determining if you need an excessive bypass valve, one has to consider the hydraulic restriction of the filter, valving, amount of 90° fittings and the distance of pipe to the pool in the existing filtering system. If you have a 2 HP water pump that does not exceed 90 G.P.M. considering the above, you may not need the excessive bypass. **Excessive water flow can damage the heat exchanger. SPECIAL NOTE: See chlorinator placement instructions (Pg. 10).**



● 2 H.P. Pumps  
Close Bypass 50%

● 3 H.P. Pumps  
Close Bypass 25%

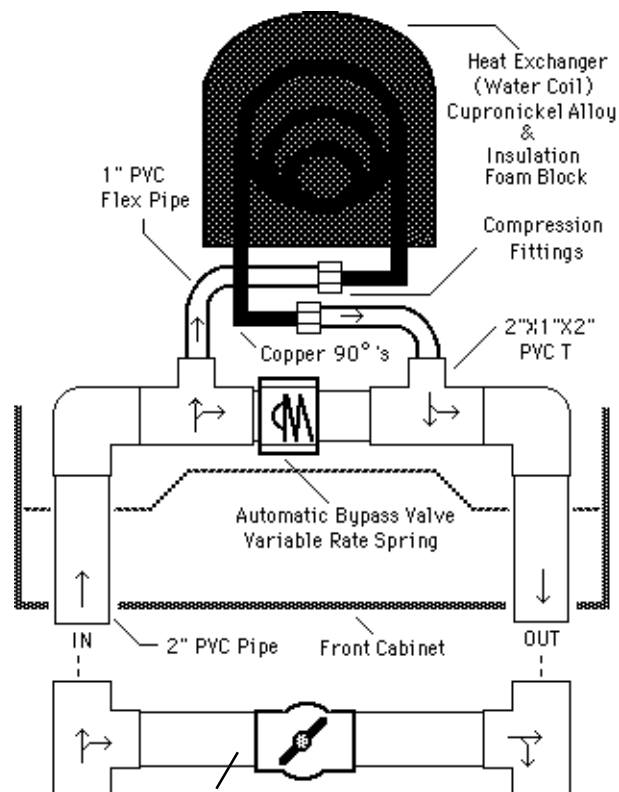
All others must be set by flow meter.  
See Commercial Plumbing Diagram

## ADVANCED HEAT EXCHANGER DESIGN

This diagram is a cross section of the heat exchanger. The seamless tube within another tube design transfers heat very efficiently.

The inner water tube is made of thicker resilient cupronickel metal alloy to help resist corrosive pool water. The outer heavy gauge Freon™ tube is dipped in a special weather proofing material.

Then, to insulate from heat loss and help prevent corrosion further, the heat exchanger is encased in a block of special "closed cell" sealing foam.



"Excessive Flow Valve Manifold"

Do not valve in a manner that will totally isolate heater from water flow.

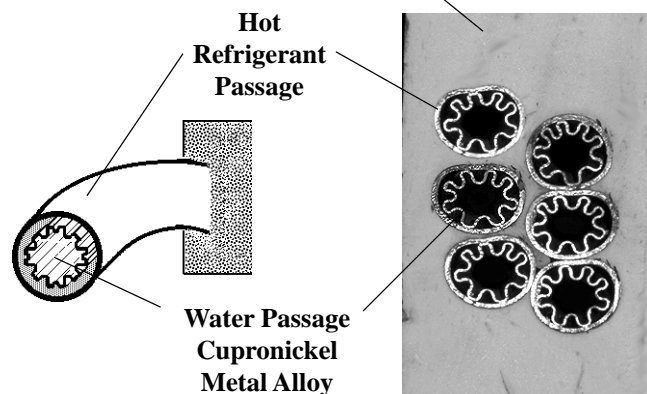
## ⚠ CAUTION

BE SURE THE BYPASS VALVE IS  
POSITIONED TO ALLOW REMOVAL OF  
THE FRONT ACCESS PANEL!

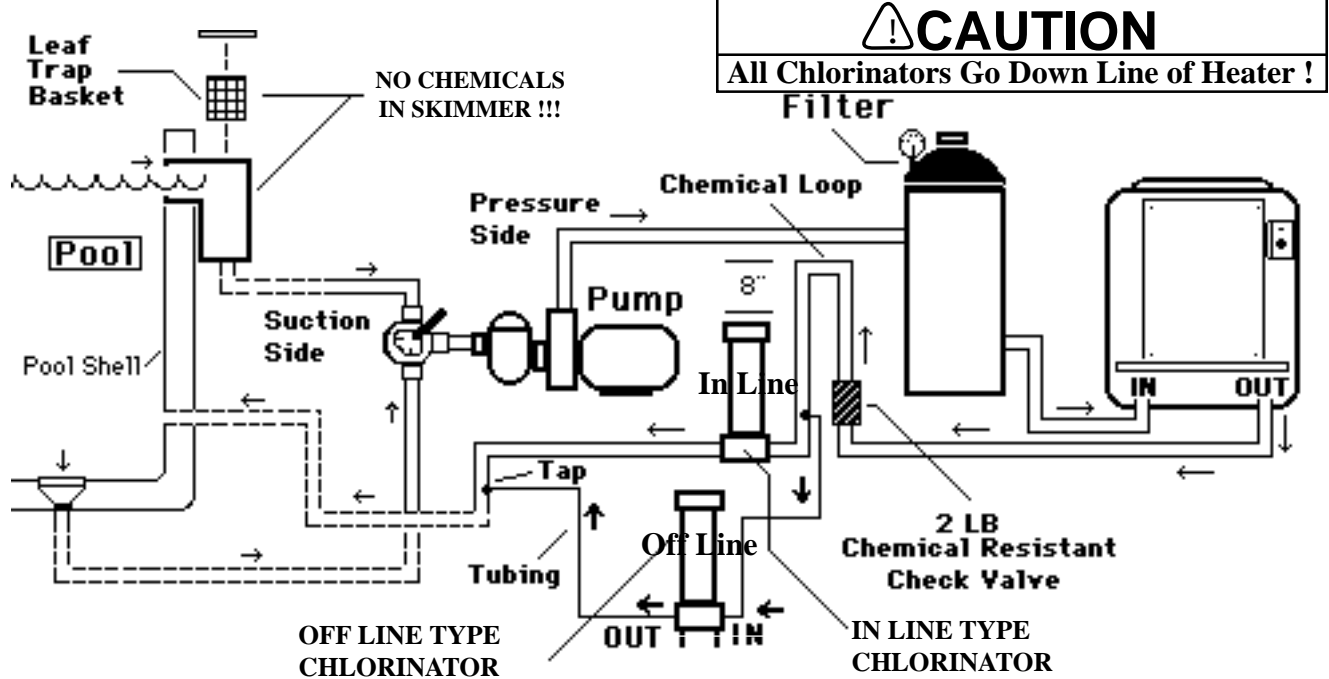
Position the valve so that the access panel can be easily removed, always check before final gluing. Angle the valve out 45° to provide adequate clearance. You may use a Compool 2-way valve or other type if desired. **"Do not" use a brass gate valve or a 3-way valve for bypass !**

## Heat Exchanger Cross Section

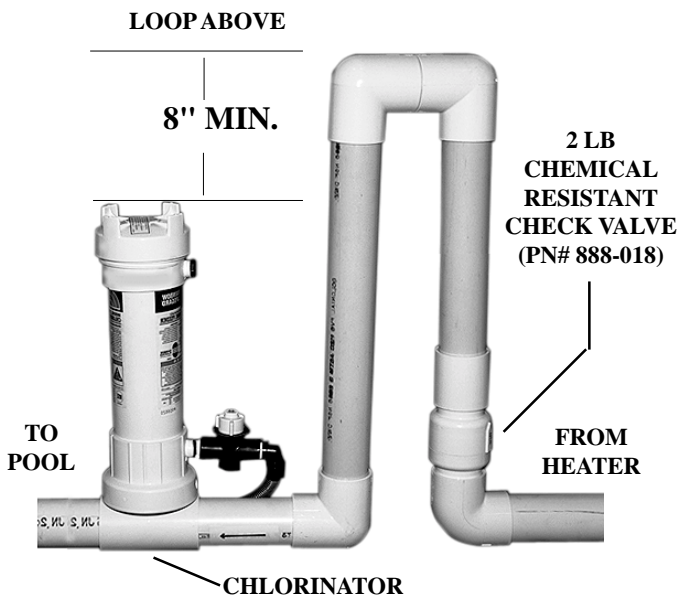
Closed Cell Insulation Foam



# CHEMICAL PROTECTION PRECAUTIONS

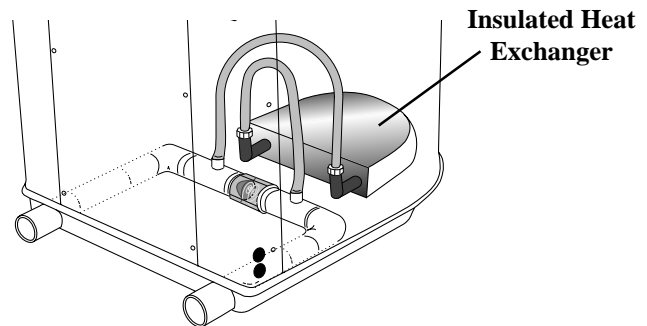


## MANDATORY CHECK VALVE & LOOP



The chemical resistant check valve and loop **MUST** be installed with all types of chlorinators to prevent chlorine migration to the heater. The loop should extend at least 8 inches above the chlorinator top. The chemical resistant check valve should be placed on the pipe leading "up" to the chlorinator. Therefore, the weight of the water above the check valve will hold it closed even if the spring is weak or damaged. Mount the check valve as low as possible. Be sure to keep the chlorinator, pump and filter lid o-rings lubricated with silicone grease to insure a good seal. If it loses its seal, it will allow the chlorine to migrate to the heater when the system shuts off. The loss of vacuum will allow reverse flow.

10



## CAUTION

Air leaks or suction leaks that allow air into the system will cause turbulence and damage to the sacrificial fittings. Correct immediately ! Do not add isolation valves unless required for seasonal shut down & freeze protection procedures. Stagnant water left in the heat exchanger can cause corrosion !

# CHLORINATOR PLACEMENT & CHEMICAL USE

Chlorinator placement, water balance and where chemicals are added are very important aspects of installation. The failure to protect the unit from chemical damage which is not covered under the warranty.

## PROTECT HEAT EXCHANGER

You want to prevent any chemicals from running through the piping and heat exchanger of the heater. Eliminate chlorinating devices which inject chlorine solution through the suction side of the filtering system, thus the chlorine passes through the heat exchanger at full strength before it has a chance to mix and dilute with the rest of the pool water. **Do not add isolation valves unless done for seasonal shut down & freeze protection procedures.** Stagnant water left in the heat exchanger can cause corrosion !

## CHLORINE MIGRATION

Some chlorinating devices will back siphon when the system is shut off, therefore allowing the chlorine solution from a chlorinator to flow through the heat exchanger causing damage. You have to make sure your filtering system does not have a vacuum leak that would allow the system to lose prime. When this happens, water will move backwards through the chlorinator thus moving the chlorine solution into the heat exchanger.

## CHLORINATOR PLACEMENT

**A) All chlorinators should have a chemical resistant "check valve and a loop" plumbed at least 8 inches above the chlorinator, between it and the heater, as far down line from the heater as possible.**

**B) Never plumb a chlorinator into the suction side of the circulation pump.**

**C) Do not use chemicals through the skimmer basket.**

**D) All automatic chemical feeders should be as far down line of the heaters water flow as possible.**

**E) Off line type chlorinators should be tapped into the plumbing only as shown on the diagram. See pool/spa combinations that require special placement.**

**F) Do not install a chlorinator in at a higher elevation than the heater itself even if a loop and check valve is used. This may allow chlorine to migrate to the heat exchanger. Chlorinator should be the lowest point in the system.**

## CAUTION

### ADDING CHEMICALS

**Do not place any chemicals in the skimmer throat.** Chlorine tablets placed in the skimmer will allow a concentrated solution of chlorine to pass through the heat exchanger. **Do not place any chemicals in the pump lint trap cavity or filter. Do not over load chlorinator feeder cavity.** Excessive amounts of chlorine tablets will increase the chance of migration of acidic and concentrated chlorine to the heat exchanger causing damage. 25% of maximum is suggested.

When adding any chlorine make sure that the pH does not drop below 7.4 and the alkalinity does not drop below 90 p.p.m. Fiberglass pools, spa & liner pools PH & chlorine levels are difficult to maintain. Please be advised heater damage may occur if minimum water balance levels are not maintained.

### COMMERCIAL FEEDERS

In a commercial pool situation where there is a vacuum type filter system is used in conjunction with a surge tank, there are exceptions to chemical injection. Some liquid chlorine (sodium hypochlorite) feeders and liquid muriatic acid feeders will inject their solutions into the surge tank on the suction side of the unit. As long as the liquid chlorine and, muriatic acid is diluted with 75% water in a supply tank and fed at a slow enough rate, you can allow this type of chemical injection to take place. As long as the water in the surge tank has not conflicted with the chemical values described in this booklet. You should test the surge tank while the feeders and circulation pumps are running, just as you would the pool water. Then adjust the solution or rate of feed accordingly.

## CAUTION

**Never place chlorine tablets in the surge tank. Never allow a tablet type chlorinator to inject solution into the surge tank under any circumstance.**

### MINIMUM WATER BALANCE

**PH.....7.4 to 7.8**

**Chlorine/Bromine.....1 to 5 ppm**

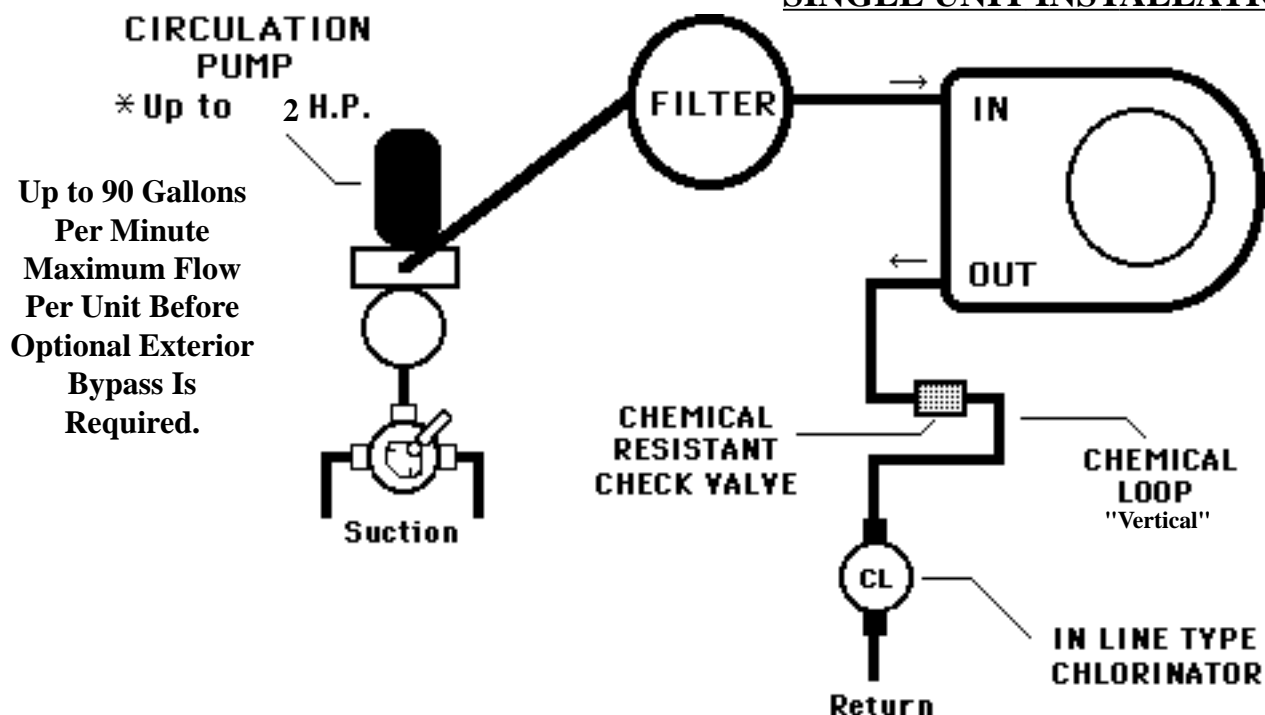
**Total Alkalinity.....90 to 120 ppm**

**Calcium Hardness.....250 to 400 ppm**

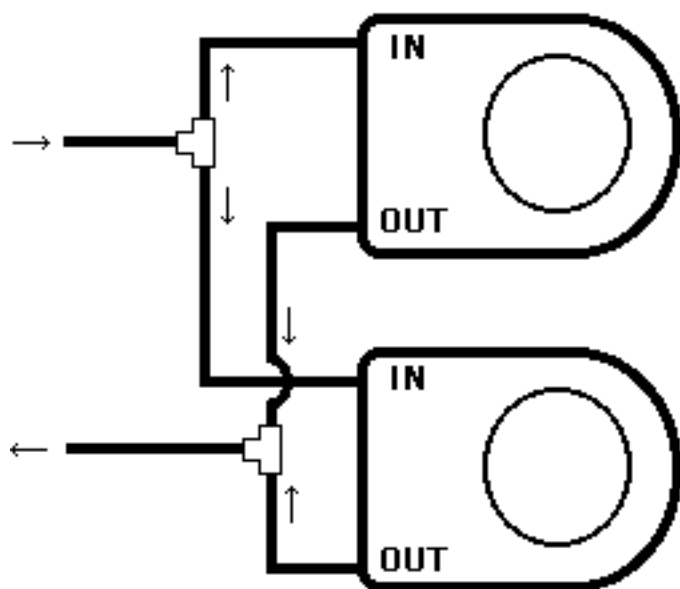
# STANDARD PLUMBING 1 OR 2 UNITS

The following diagram is for standard plumbing of either one or two units. Plumb the unit in "after" the filter and "before" the chlorinator. **SPECIAL NOTE: See chlorinator placement instructions in this manual (Pg. 10).** Be advised that if your circulation pump is over 2 HP **OR** if the total flow exceeds 90 GPM, you will have to add the "excessive flow valve" as shown below. Some larger water pumps may be restricted if the pipe size is not adequate therefore reducing its overall flow rate. When determining if you need an excessive bypass valve, one has to consider the hydraulic restriction of the filter, valving, amount of 90° fittings and the distance of pipe to the pool in the existing filtering system. If you have a 2 HP water pump that does not exceed 90 G.P.M., considering the above, you may not need the excessive bypass. See the diagram shown at the bottom of this page. Excessive water flow will damage the heat exchanger.

## SINGLE UNIT INSTALLATION

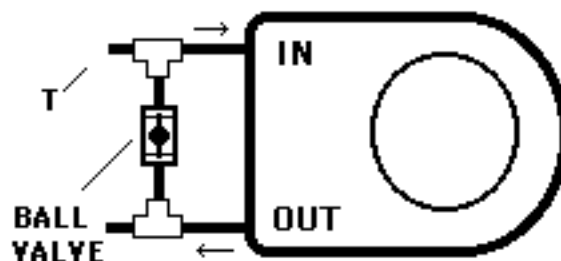


## TWO UNIT INSTALLATION



**\* NOTE: "EXCESSIVE WATER FLOW VALVE" PUMPS OVER 2 HP OR 90 GPM**

**\* NOTE: "MUST BE ADDED WHEN THE TOTAL FLOW IS OVER 90 GALLONS PER MINUTE \* USE IF WATER PUMP IS OVER 2 H.P.**

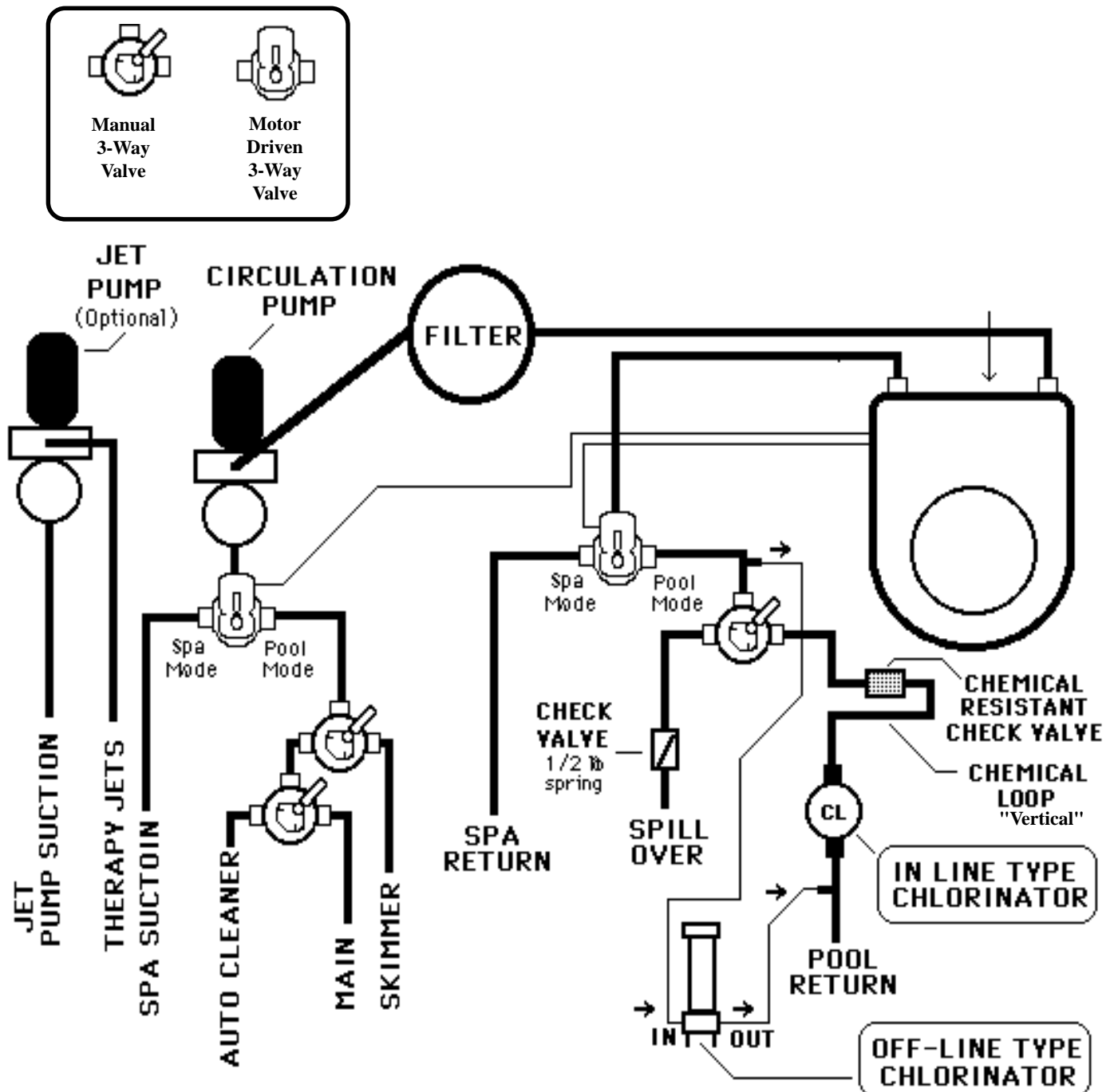


# POOL & SPA COMBO PLUMBING

**Heating a connected pool and spa spill over with one heater. For a single pump system.**

The following is a schematic of the suggested plumbing set up when using the standard dual thermostat kit. This design is used for pool/ spa combinations where the pool and spa are connected via a spill over, when one filtering pump is used to circulate the water to either the pool or spa. The motorized valves turn to isolate the pool or spa when the dual thermostat is activated by the user. The motorized valves shown, can be manual if automatic operation is not desired. See "Dual Thermostat Kit". Note the chlorinator placement to protect the heater. A separate hydrotherapy pump is suggested for newly constructed pools to eliminate restriction to the spa jets.

**Remember:** If the water pump is larger than 2 HP the excessive water flow valve may be needed.



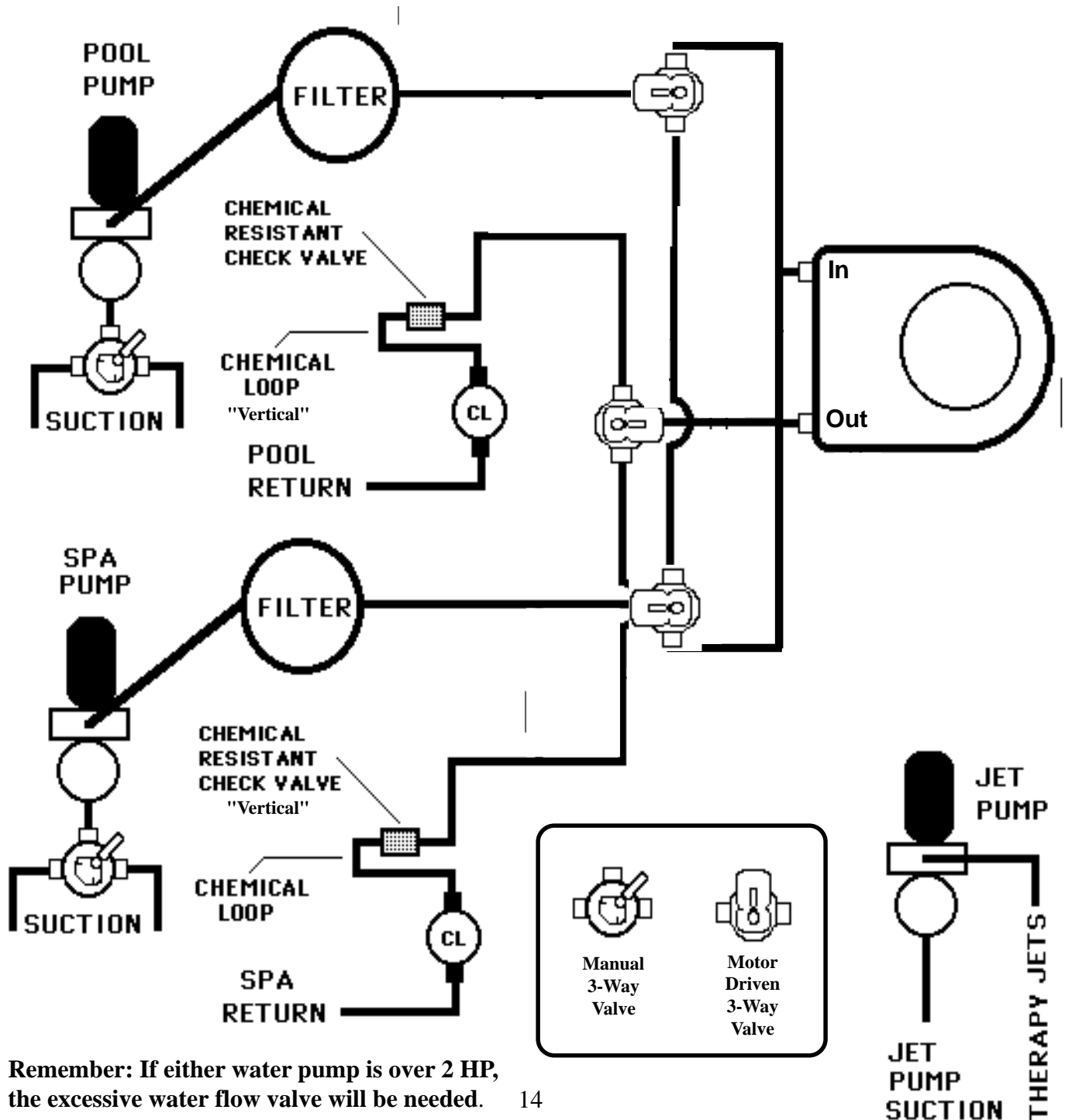
"Note Chlorinator Placement"

# SEPARATE POOL & SPA PLUMBING

**Heating a separate pool & spa, "without" a spill over, with one heater. Two pump system.**

The following schematic is the suggested plumbing set up when using the dual thermostat kit. This design is for "separate" pool and spa combinations, where the two are totally isolated from one another. The motorized valve turns so that the heater is isolated to either the pool or the spa when the dual thermostat is activated by the user. The motorized valves shown can be manual if automatic operation is not desired. Please note the 10 pound spring valve and ball valve used as a bypass when the valves are turning. This will eliminate the possibility of "dead heading" by the user.

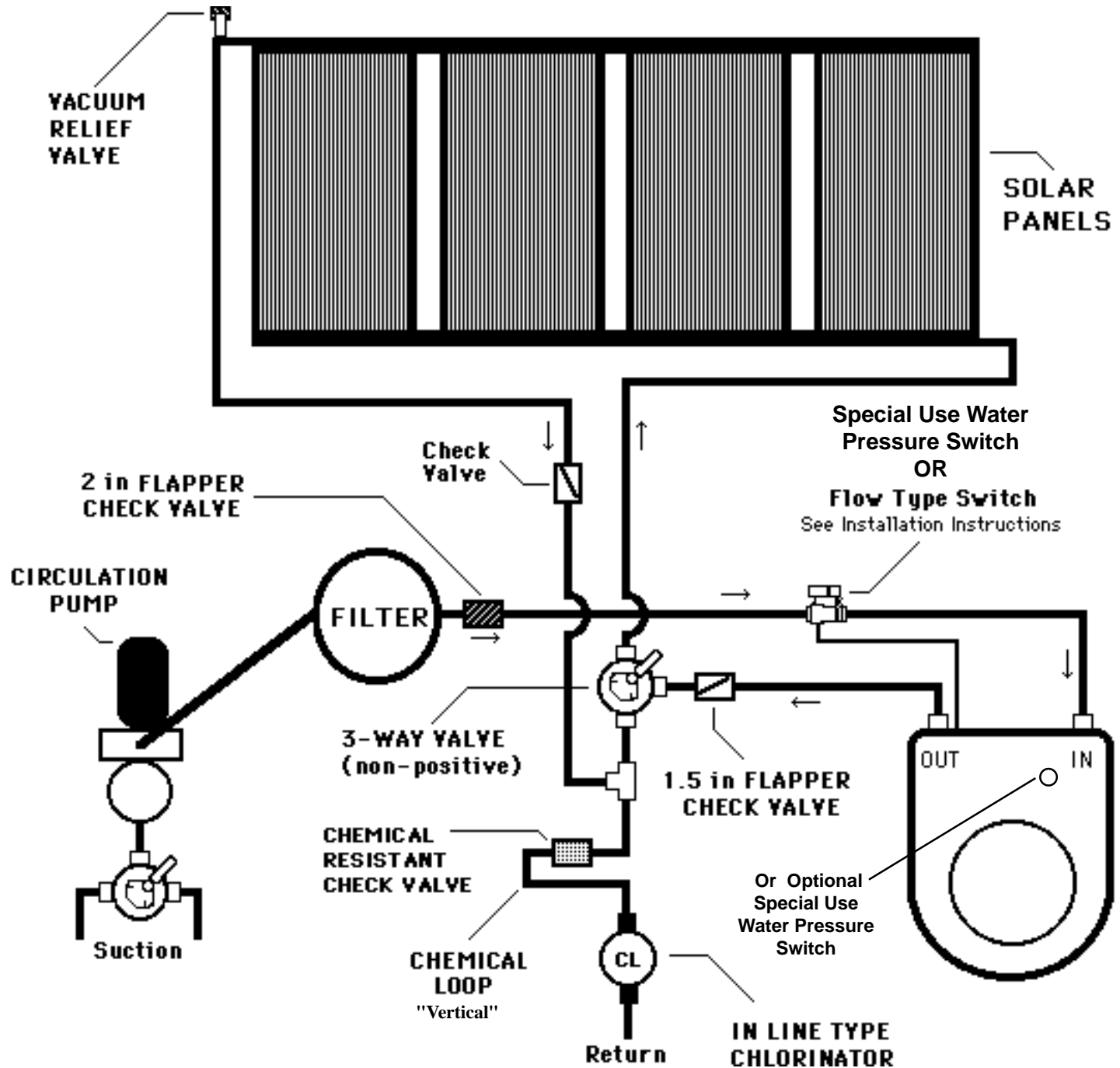
**NOTE:** An exchange of water between the pool & spa may occur. This will depend on pump size, pipe size and equipment distances. The possibility of the spa flooding over or draining should be considered. Most commercial pool/spa codes do not allow this type of plumbing set up.



Remember: If either water pump is over 2 HP, the excessive water flow valve will be needed. 14

# PLUMBING WITH SOLAR PANELS

Always plumb through the heat pump first before plumbing to solar. If the water flow is not adequate to provide proper flow for both, you will have to operate one or the other by adjusting the 3-way valve accordingly or increase your pumps size. Low water flow to the heat pump will cause the unit to cycle on & off. In some cases an external flow switch may have been installed in place of the existing pressure switch, if the draining of the solar panels effect the heater. A special use water pressure switch may be substituted for the factory water pressure switch in most cases, call the factory for advice. The static pressure created by the solar panels may allow the unit to operate without water flow.



**SPECIAL NOTE:** Do not run water through the solar panels at night or on very cloudy days. This will have a cooling effect and counteract the heat pumps heat input to the pool water. There should always be a vacuum relief valve on the solar panels to eliminate static pressure. **Do not run the solar and the heat pump when there is no available heat coming from the solar. The user must manually turn solar off & on if there is no automatic device installed by the solar contractor. These automatic solar switching devices are usually optional.**



# COMMERCIAL PLUMBING

When plumbing a heating system into a high rate commercial filtering system, you should be prepared to evaluate the entire system in order to accommodate the heaters. The control of the water flow is most critical. The more planning done prior to this type of installation will prevent service problems later.

## PLACEMENT AREA

Inspect the placement area and be sure that the piping does not obstruct any serviceable items such as electric or other utilities. When installing multiple units, be sure to allow enough spacing for proper air flow. You do not want the units competing for air flow.

## CHEMICAL FEEDERS

Inspect all chemical feeding devices and storage tanks. Follow the chemical feeder and chemical introduction guidelines described in this manual. The life of the unit depends on you following these suggestions to prevent chemical damage to the unit. Keep chemical storage tanks well away from the units so that the chemical vapor is not drawn into the unit.

## FLOW METERS

We strongly advise the use of flow meters when installing on a commercial application. The usually higher water flow must be controlled. When installing flow metering equipment to gauge water flow, be sure to follow the manufacturers directions to the letter. There are certain pipe length requirements, before and after the flow meters placement. An improperly placed or sized flow meter will give a false reading.

## INDEPENDENT BOOSTER PUMP

In some situations, it will be necessary to install a booster pump that will provide the water flow needed for the heaters. This pump will be independent of the circulation pump to prevent filtering restriction. They should be wired on a relay so they both run together. Call the factory for advice. Booster pumps should be used when the heaters are installed too far away from the filtering system or if the heaters are at a different elevation than the pool or if the filtering system is not capable of providing good flow at all times, to satisfy the health department.

## WATER FLOW SEQUENCE

Water is drawn into the filter surge tank from the pool. The circulation pump forces water to the diverting valve. The **diverting valve** is partially closed in order to force a certain amount of water through the heater **plumbing manifold**. The diverting valve is closed until the proper flow rate is indicated on the **flow meter**.

You should set the diverting valve so the flow meter reads approximately **35 to 40 G.P.M." per heater"**. More flow may be required depending upon hydraulic restriction and "feet of head" on the filtering system. Special considerations must be made to insure proper flow rate to the heater(s).

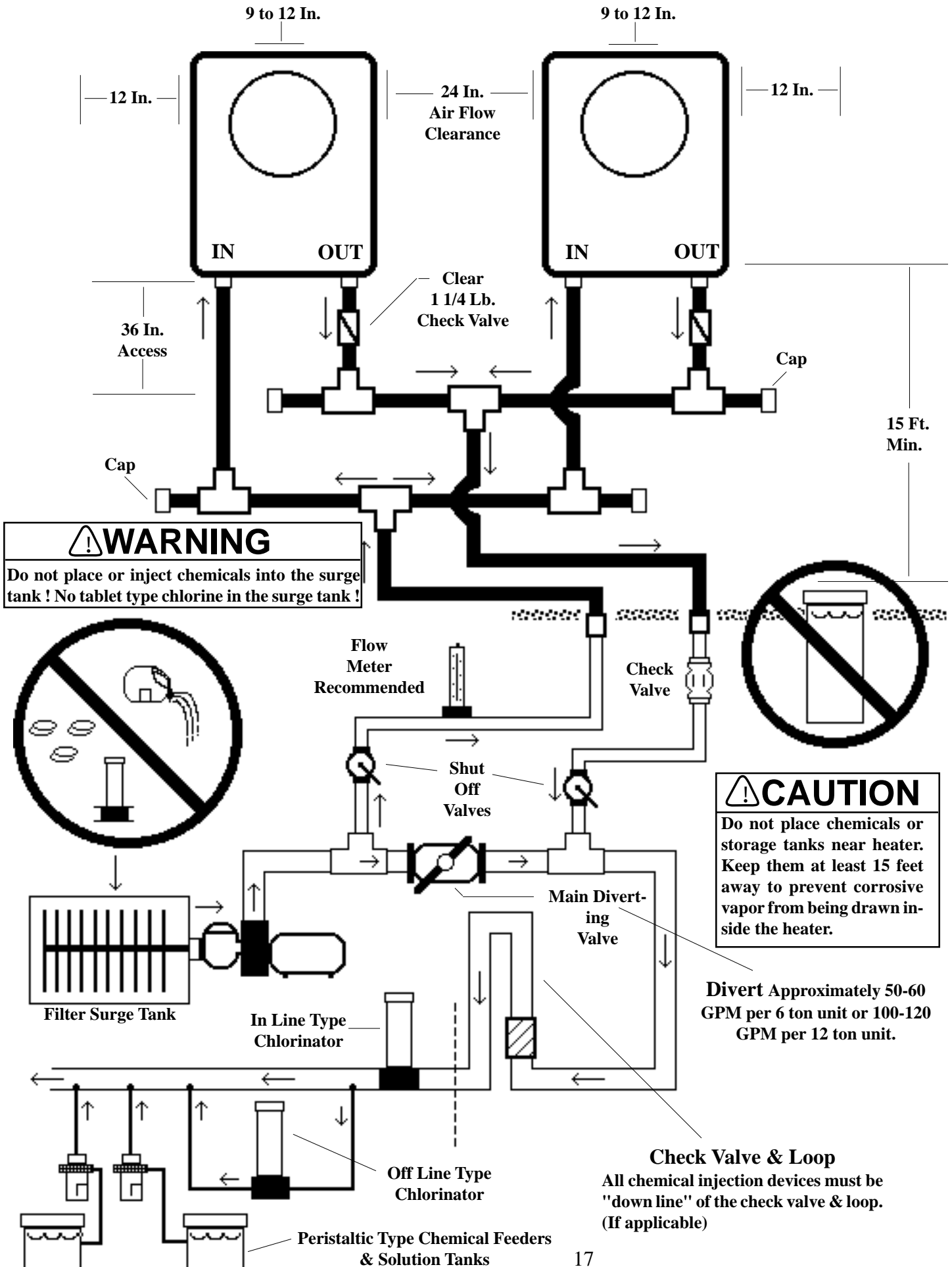
The water flow is diverted to the **heater's internal bypass** where it is automatically adjusted as long as the proper flow rate has been set at the main diverting valve. The internal bypass will regulate the water flow through the heat exchanger. This water is heated and returned to the main water flow. The balance of the water is "bypassed" and returned to the main water flow.

A **flapper check valve** is used to prevent the possibility of reverse flow. The **shut off valves** are used to isolate the heater from the water flow for servicing and may be required by local codes.

A **loop 8 inches above chlorinator** (or other chemical injectors) and the **2 to 5 lb. check valve** will prevent chemical damage to the heater. See page 10 and 11 for the required chemical damage protection precautions.

Keep all chemical and chlorine feeders as far down line from the heater as possible to prevent the possibility of corrosion to the heater.

# COMMERCIAL PLUMBING (Cont'd)



# OPTIONAL WATER "FLOW" SWITCH

Some installations require an external water "FLOW" switch in place of the water "PRESSURE" switch. This switch will keep the unit from running without water flow.

## BELOW WATER LEVEL

If the unit is installed three feet or more below water level, the pressure switch will be effected by static pressure. This static pressure may cause the "pressure" switch to stay activated thus allowing the unit to run when the water flow stops. You then may require the external flow switch or the special use water pressure switch.

## LONG RUNS & LOW FLOW

The "flow" switch or special water pressure switch may be needed on systems when the heater is installed more than 30 or 40 feet from the circulation pump. Weak or heavy load filtering systems will slow the water flow and cause the standard water pressure switch to cycle.

## SUCTION LEAKS

Be advised that suction leaks that allow air into the system will cause erratic operation of the water "pressure" switch and water "flow" switch. The air turbulence causes the switch to malfunction.

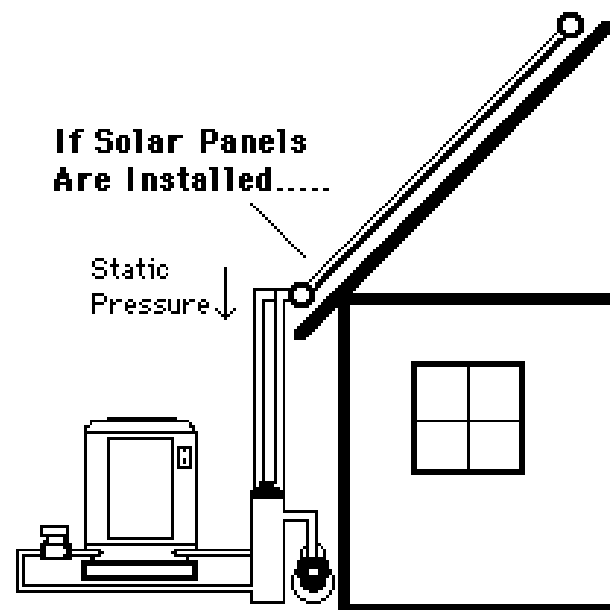
## SOLAR PANELS

If you have a solar system plumbed in the same system as the heat pump, you may experience static pressure on certain brands of solar panels. Often times the pressure switch will detect back pressure created from elevation of the solar panels.

Some solar systems may reverse flow (drain) when the circulation pump shuts off. This may cause problems with the internal "pressure" switch. In some cases you may have to add check valves to control the reverse flow. Check with the solar panel manufacturer or installer before using check valves. Make sure that your solar system is capable of draining into the pool, via a vacuum relief valve.

These and other conditions may require the use of this added type of flow switch or special use water pressure switch. Reverse flow and static pressure may allow the unit to run without water flow or cycle off and on, causing damage.

The added "flow" switch only detects water movement and will not be effected by static, low or high pressure, therefore, it is best suited in these situations.



# WATER FLOW SWITCH INSTALLATION

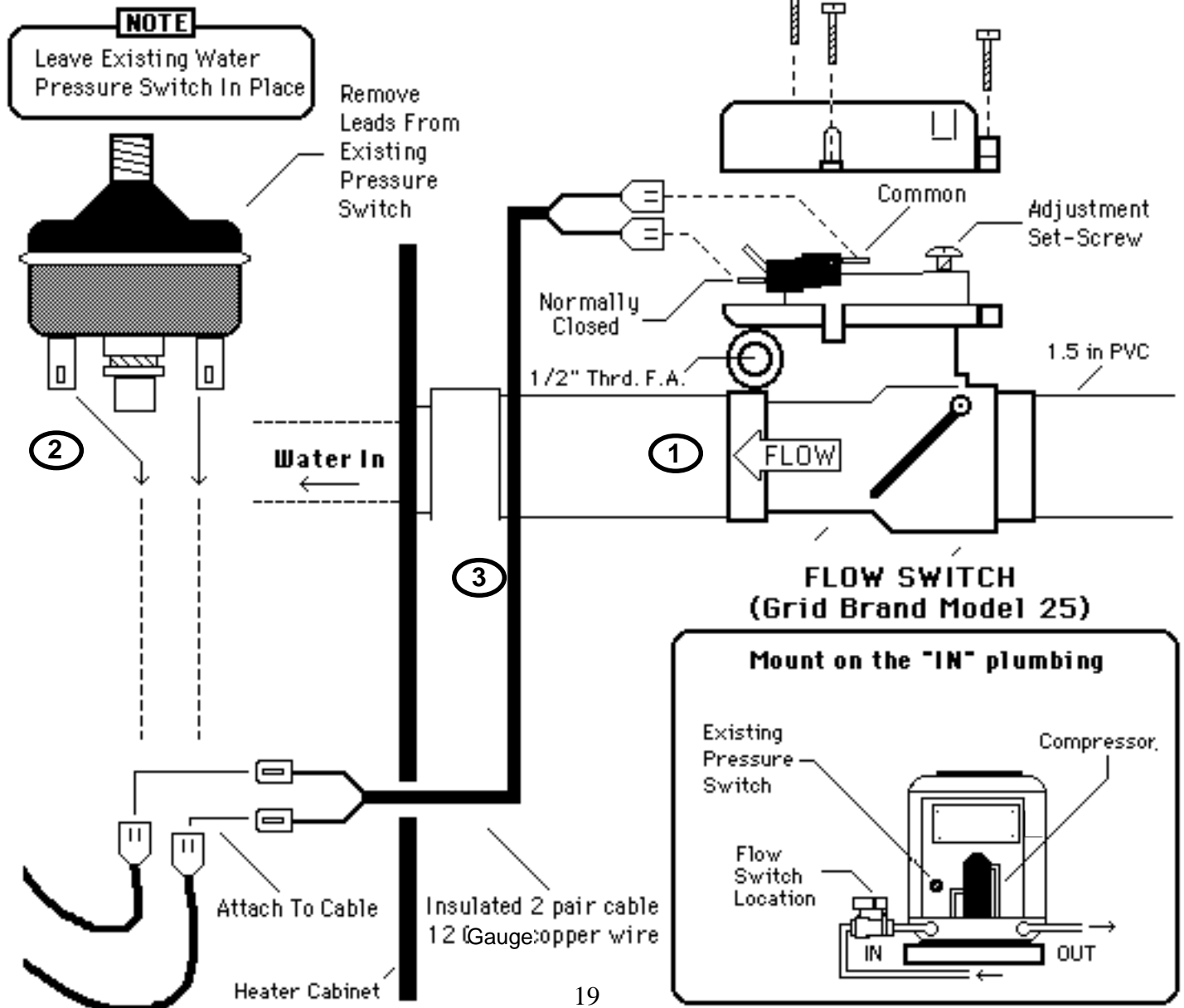
In most cases the existing water pressure switch located inside the access compartment can be changed to this special use water pressure switch. This water pressure switch can be set at a higher rating to offset the static pressure in some cases. The factory part number is #408. Install this switch in place of the existing water pressure switch when needed. If it does not solve the static pressure problem then use the optional Grid™ flow switch. The factory part number is #888-032.

See "Water Pressure Switch" for more information regarding the water pressure switch.

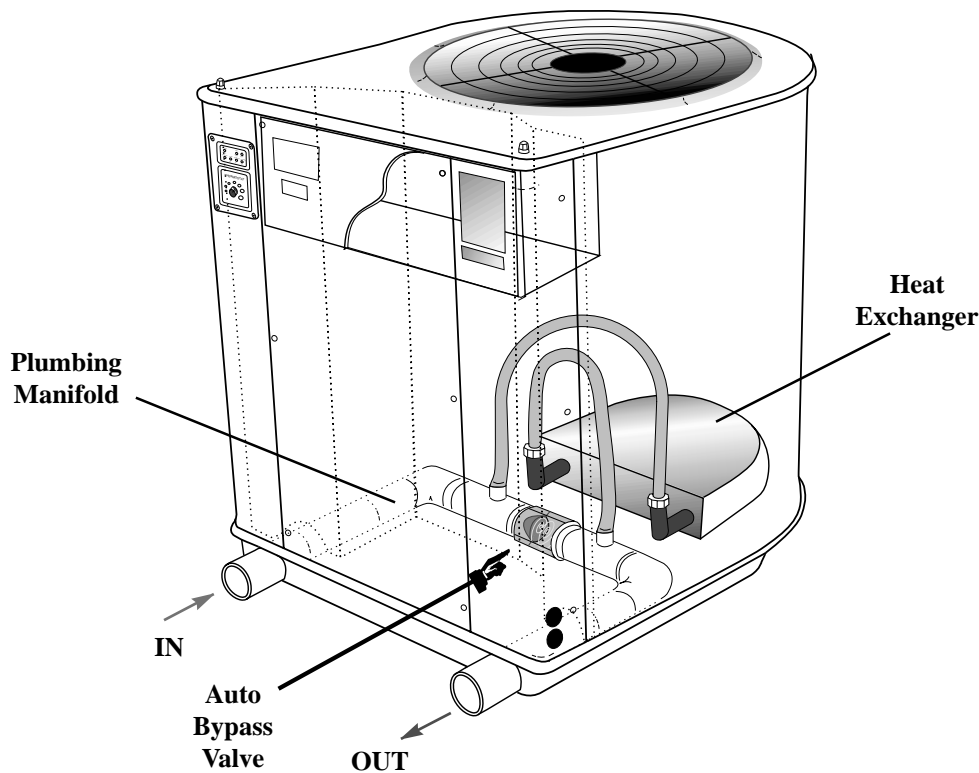
- ① Plumb the optional water FLOW switch externally on the water "in" piping. Position the flow switch on the water "in" line so it only detects the water flow through the unit itself.
- ② Remove the existing leads from the water PRESSURE switch. Then connect them to an insulated two pair cable with 14 to 12 gauge wire.
- ③ Run the cable from the flow switch to the inside of the units cabinet and wire accordingly. Make sure all connections are water tight. Use the proper slip connectors. Leave the existing water pressure switch in place or remove and replace with a 1/4 inch machine threaded "copper" or "p.v.c." plug. Use teflon tape and pipe sealer.

Start the circulation pump and heater. Adjust the set screw counter clockwise until the unit shuts off. Then turn the set screw clockwise until the unit starts, then add three more turns clockwise.

Test run all equipment that may slow the water flow and readjust as needed. Make sure the heater shuts off when the circulation pump does.



# PRE-START UP PROCEDURES



## NOTE: COMPRESSOR TIME DELAY

BE AWARE THERE IS A 5 TO 7 MINUTE TIME DELAY BEFORE THE COMPRESSOR WILL START ONCE THE UNIT IS TURNED ON OR WHENEVER IT RESTARTS.

## SET THE WATER PUMP TIMER

Set the circulation pump timer for 24 hours until the pool reaches temperature. Then it can be reset for 8 to 18 hours per day, depending on pool size and weather conditions, time of the year, some fall/winter conditions may require a 24 hour run time.

## CHECK FLOW AT AUTO BYPASS

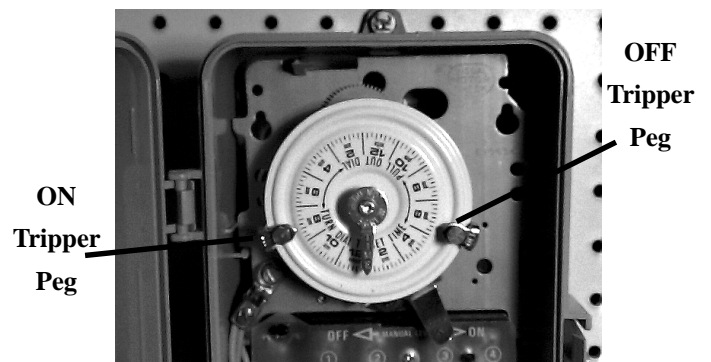
Make sure the pump is running with a full prime. Eliminate any suction leaks that allow air into the system.

Confirm that the internal automatic bypass valve is working properly. **Turn the power to the heater "OFF"**

Confirm there are no air leaks at the pump skimmer basket.

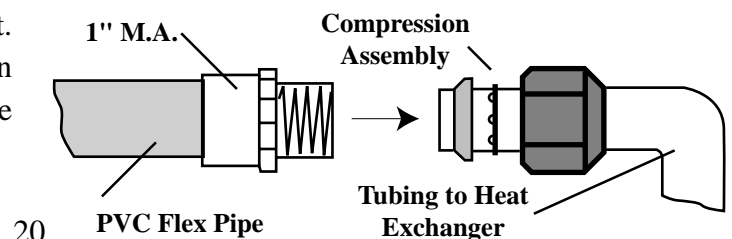
The auto valve should have no air passing through it. Air pumped through the heater due to a suction leak on the existing pool filtering system will cause turbulence and physical erosion to the heat exchanger.

## COMMON 24Hr. MECHANICAL TIMER



## PVC TO COPPER COMPRESSION FITTING

Once the water is flowing, examine the water tubing at the two p.v.c. to copper compression fittings. If you see a leak here call the factory warranty service department.

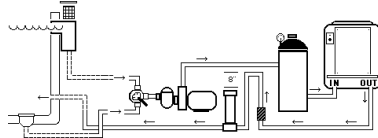


# OPERATIONAL SEQUENCE

## WATER FLOW & EXISTING WATER PUMP

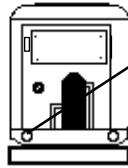
To filter the pool water each day, the water pump will come on & off according to the existing timer device. The heater will only heat if there is water running through it and it operates long enough.

pool  
or  
spa



## WATER PRESSURE SWITCH

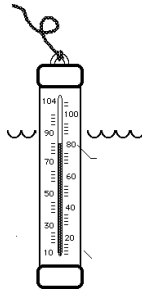
When water starts flowing through the unit the water pressure switch will activate and allow the unit to run. When the circulation pump timer stops the water flow, the water pressure switch will shut the unit off. When the pump restarts for the next day, the pressure switch will activate and allow the heater to run again.



Water  
Pressure  
Switch  
Location

## THERMOSTAT CONTROL & SETTINGS

Turning up the thermostat will start the unit. When the pool water has been heated to the thermostat setting, the unit will shut off. When the pool water temperature loses one to two degrees, the thermostat will activate the unit. There are no temperature graduate numbers printed on the thermostat face. To obtain an exact temperature for a pool, turn the t-stat 3/4's of the way up and then place a pool type thermometer in the pool water itself. Once the water has reached your target temperature on the thermometer, turn the thermostat knob backwards until the heater just shuts off. Therefore your thermostat will be set at the thermometer reading.



## THERMOSTAT CONTROL & SETTINGS FOR HEAT & COOL MODELS

For heating mode on these models, make sure toggle is selected to heat and follow the previous instructions above. For cooling mode, make sure toggle is selected to cool. Turning down the thermostat counter clockwise will start the unit running. When the pool water has been cooled to the thermostat setting, the unit will shut off. When the pool water temperature rises one to two degrees, the thermostat will activate the unit. There are no temperature graduate numbers printed on the thermostat face. To obtain an exact temperature, turn the t-stat all the way down and then place a pool type thermometer in the pool water itself. Once the water has reached your target temperature on the thermometer, turn the thermostat knob forwards until the heater just shuts off. Therefore your thermostat will be set at the thermometer reading.

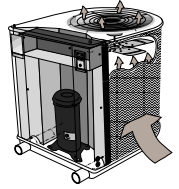


## FAN-AIR CIRCULATION

Once the t-stat is activated the fan will begin to turn. To collect the heat from the air, the fan circulates warmer air through the evaporator air coil at about 4200 cubic feet per minute. The fan runs independently from the compressor. The compressor will start within 5 to 7 minutes after the fan.

## EVAPORATOR AIR COIL

The fan circulates the warmer outside air through the evaporator air coil to collect any available heat. The cooler refrigerant absorbs this heat. This evaporates the refrigerant into a gas. Therefore the compressor can compress the gas to maximize the gained heat from the air.



## COMPRESSOR

Once the fan is running, the compressor will start 5 to 7 minutes later and is controlled by a time delay device. The compressor pumps and compresses refrigerant gas. When gas is compressed it gets very hot and intensifies the energy and then is released to the pool water. This compressed hot gas is pumped through the heat exchanger where it delivers heat to the pool water passing through the same heat exchanger.



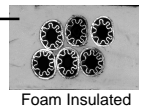
## WATER HEAT EXCHANGER



The compressed hot gas releases its heat to the pool water inside the heat exchanger. The exchanger is a tube within a tube construction, water passing through the inner tube, and the hot refrigerant passing through the outer tube.

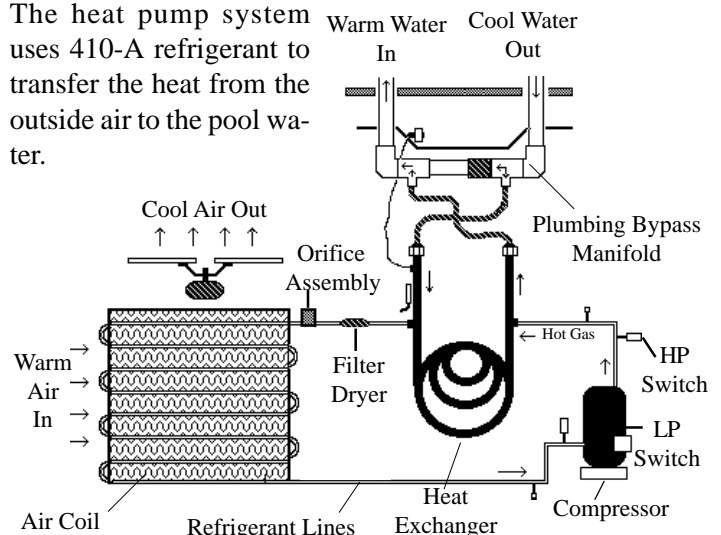
The refrigerant is transformed into a liquid (condensed) state as it releases its heat to the pool water. Therefore, it is also referred to as a condenser coil. The alloy exchanger is designed for maximum transfer surface area and strength.

Cross section



## SYSTEM OVERVIEW

The heat pump system uses 410-A refrigerant to transfer the heat from the outside air to the pool water.



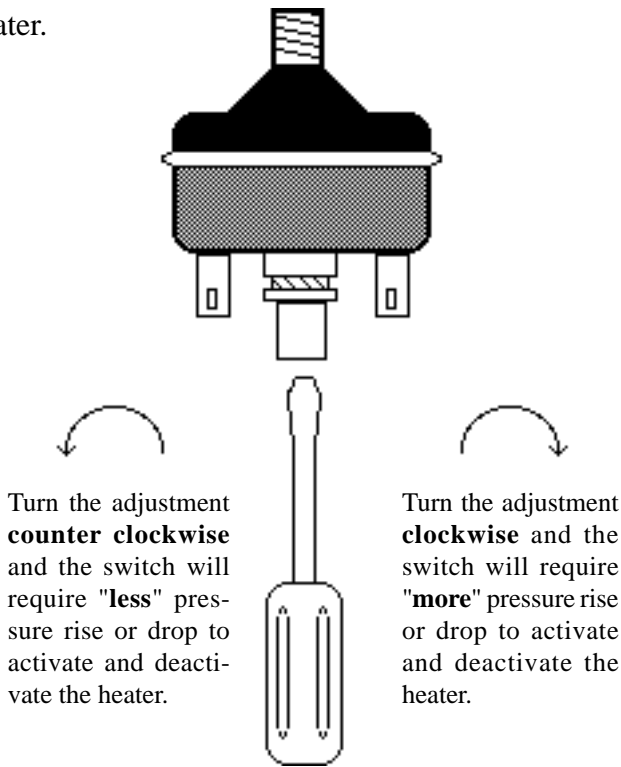
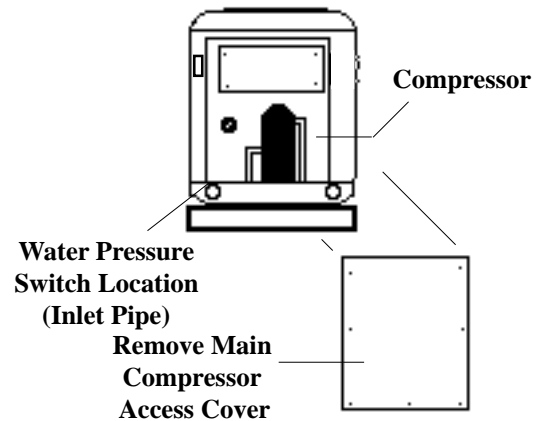
# WATER PRESSURE SWITCH CHECK

**The water pressure switch is preset at the factory and should only be adjusted "if needed".**


The water pressure switch is designed to shut the heater off when the water circulation pump shuts off. The water pressure switch will keep the unit from running when there is no water flow. The water pressure switch has a 1 to 5 psi pressure range on water pressure rise or fall.

After you have plumbed and wired the heater, you should check to see if the heater will shut off when the circulation pump shuts off. Also, test run other pool equipment (automatic pool vacuums, spas, solar panels, etc.), that may restrict the water flow. If the heater stops running when these items are operating, you may have to adjust the water pressure switch to compensate for flow restriction. The unit will suffer severe damage if it operates without enough water running through the heat exchanger. If the system will not work due to low or fluctuating water flow with the above mentioned items, you may require another optional, external water "FLOW" switch (part# 888-032) OR a special use pressure switch (part# 408). A "flow" type switch can be used in place of the existing water pressure switch inside the unit.

If the heater does not shut off when the circulation pump does, or the heater cycles off and on, there may be a problem in the filtering system or other equipment creating back pressure on the system. Items such as solar panels, units installed above or below water elevation or suction leaks causing water to back siphon through the unit, may keep the pressure switch engaged. Determine what can be done to improve water flow to accommodate the addition of the new heater.



**The water pressure switch is preset at the factory and should only be adjusted slightly by one to two turns maximum, in either direction. Adjust only when the heater does not shut off with the water circulation pump.**

 <b>CAUTION</b>
<b>NOTE: Be careful not to turn the adjustment knob too far counterclockwise or the adjustment knob and internal spring may come apart.</b>



# SHUT DOWN & FREEZE PROTECTION PROCEDURES

When shutting the unit down for the end of the swimming season, you must consider some items to protect the unit from inclement weather. It is best in most situations to shut the unit off by turning the thermostat all the way down, to the "left". **Leave power (circuit breaker), to the unit "on" unless the pool or spa water temperature drops below 50 degrees F.**

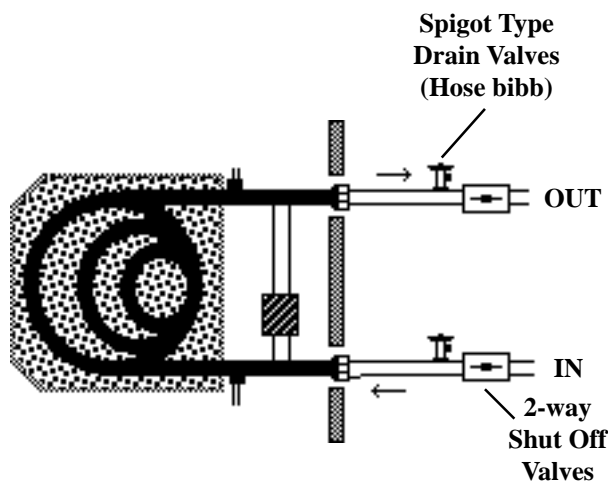
## SHORT TERM FREEZE PROTECTION PROCEDURES

**When the outside air temperature is forecast to drop below 32 degrees F for a short time:**

You should set the circulation pump timer to run 24 hours per day in order to circulate water through the unit and filtration system. Standing water inside the piping will freeze and damage the water heat exchanger and refrigerant system. Shut the heat pump off and do not try to heat the pool during freezing temperatures. If the unit is left running it may ice up and the compressor will stop running. The defrost control inside the unit will shut the compressor off, but allow the fan to run. The fan will circulate air through the unit to help defrost the evaporator air coil. If you know that the temperatures are going to be below 36 degrees F, you should eliminate the possibility of icing and just shut the unit off. Do not use the circuit breaker as the "on/off" switch, if you want to shut down for a long period of time use the disconnect. (See page 27)

## LONG TERM FREEZE PROTECTION / DRAIN VALVE INSTALLATION

**If you live in a climate that has a seasonal swim season due to winter, you should follow these long term freezing procedures.**



Shut the water pump off. Close both shut off valves. Open both drains and allow water to exit. Use pressurized air on the water in, one spigot only, to force the rest of the water out the other spigot.

If you live in an area that experiences freezing temperatures, the heat exchanger/water coil and bypass plumbing must have all water removed to prevent freeze and chemical damage to the heat pump system. This procedure should be done prior to the first freeze along with your other pool winterizing routine. When you drain the filter system and piping you should include the heat pump as well.

There should be two spigot type drains, (hose bibbs), plumbed into the heater's water in and water out piping. Place these valves as close to the heater and at the lowest point possible so as much water will drain as possible. Install two shut off valves on the water in and out lines as shown here. The rest of the water should be blown out with pressurized air to insure all water is removed. A antifreeze designed for pool equipment may be used, see a local pool professional.

### CAUTION

**Do not add isolation valves unless you intend to clear the heat exchanger of water with pressurized air! Stagnant water left in the heat exchanger can cause corrosion and will freeze causing damage!**

# ELECTRICAL WIRING GROUND & EQUIPMENT COMMON BONDING

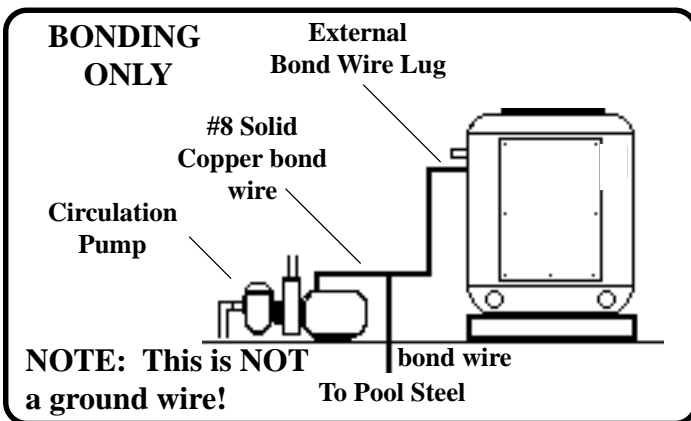
A certified electrician should prepare to wire the heater according to national, local codes and specifications from the factory in regards to supply voltage and amperes. Most codes require that a power disconnect be placed near the heater for emergency shut off.

## ⚠ WARNING

The heater must be electrically grounded and bonded in accordance with local codes, or in the absence of local codes, with the latest national electrical codes ANSI/NFPA No. 70. All wiring must comply with all local codes, or in the absence of local codes, with the latest national electrical codes ANSI/NFPA No. 70. For proper wire and/or breaker size, please refer to specification sheet and your local licensed electrician.

## REQUIRED BONDING TO POOL STEEL

Make sure that the unit cabinet is bonded to the pool steel. Most codes require that the circulation pump be bonded as well. You can connect at that point using at least a #8 gauge or larger **solid** copper bond wire. Use the external bond lug on the cabinet to insure a good bond.



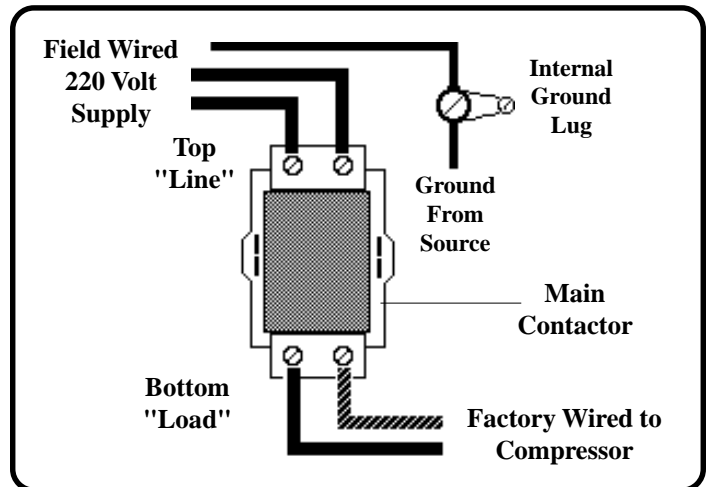
Bonding the unit to the pool steel will help reduce the chance of electrolysis, also known as electrical corrosion. A heater left un-bonded may experience corrosion to the metal water tubing inside the heater. Do not confuse with electrical ground.

## WIRE SIZE & GROUNDING

SEE SPECIFICATION SHEET TO DETERMINE REQUIRED BREAKER AND WIRE SIZE.

## ⚠ WARNING

Always review the wiring schematic located inside the heater, since it may have changed after this manual was printed !



## START CAPACITOR FOR 208 VOLTAGE

The compressor must be protected from low voltage situations to meet the warranty requirements. A unit drawing high amps due to low voltage, is not considered a proper installation. Contact the factory service for advice about low supply voltage. Many coastal communities have 208 volts. **208 volt supply requires changing transform leads to 208V from 240V, see wiring schematic.**

## TIME DELAY COMPRESSOR

**NOTE:** The compressor will attempt to start after a 5 to 7 minute time delay has passed from when the unit was activated. If the compressor starts then shuts right off, allow the 5 to 7 minute time delay to pass before expecting the compressor to start.

**Inform the owners not to use the circuit breaker as the on/off switch or the unit will not preheat as needed between cycles. Turn the thermostat all the**

**24 way down when you do not want the unit to heat.**



# Factory Specifications

## MiniMax® Plus HP

### Pool/Spa Heat Pumps

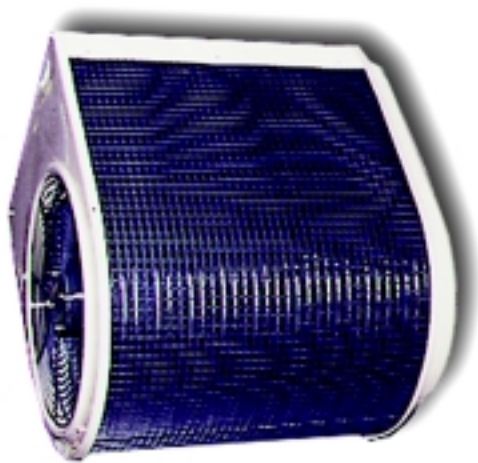
<b>Pentair</b> Model Order Number <u>Model Number</u> Min./Max. Air Inlet Temperature (°F) Air Temperature Relative humidity 50.0°F 63% 80.6°F 63% <b>Water Flow &amp; Plumbing Characteristics</b> Water Bypass Type (up to 1.5 HP pump) Water Bypass Type (2 HP pump or above) Min./Max. Water Flow Rate ( GPM ) Condenser Pressure Drop ( PSI ) Min./Max. Water Inlet Temperature ( °F ) Plumbing Connection Size ( In. Slip )	460512 <b>HP400A-1D</b> 40°-105° <b>BTUH/COP</b> 62,000/3.2 99,000/4.6	460513 <b>HP600A-1D</b> 40°-105° <b>BTUH/COP</b> 68,000/3.0 115,000/4.5	460514 <b>HP800A-1E</b> 40°-105° <b>BTUH/COP</b> 82,000/3.5 127,000/4.7	460515 <b>HP1000A-1E</b> 40°-105° <b>BTUH/COP</b> 95,000/3.4 145,000/4.5	460521 <b>HP1000A-3E</b> 40°-105° <b>BTUH/COP</b> 95,000/3.4 145,000/4.5	460526 <b>CP12A-3B</b> 40° / 105° <b>BTUH/COP</b> 160,300/4.7 230,500/6.5
	Auto/Internal Ext. Field Install 15-90 2.2@30GPM 60°-105°F 2"PVC	Auto/Internal Ext. Field Install 15-90 2.2@30GPM 60°-105°F 2"PVC	Auto/Internal Ext. Field Install 15-90 2.2@30GPM 60°-105°F 2"PVC	Auto/Internal Ext. Field Install 15-90 3.1@50GPM 60°-105°F 2"PVC	Auto/Internal Ext. Field Install 15-90 3.1@50GPM 60°-105°F 2"PVC	Auto/Internal Ext. Field Install 30-100 2.5 @ 60 GPM 60°-105°F 2"PVC
<b>Electrical Characteristics</b> 60 Htz Dual Rated Supply Voltage( VAC ) Supply Voltage Phase Min Sup. Wire Size Copper Strand(AWG) Min. HACR Breaker or Fuse(AMP) Evaporator Fan Motor ( HP ) Fan Full Load Amp (FLA) Air Flow (CFM) Fan Speed (RPM) Fan Diameter (Inches) Fan Discharge Compressor Rated Load Amps (RLA) Compressor Locked Rotor Amps (LRA)	208 or 230 1 Phase #8 50 1/3 1.9 4,250 1,075 22" Vertical 27.5 119	208 or 230 1 Phase #8 50 1/3 1.9 4,250 1,075 22" Vertical 29.2 145	208 or 230 1 Phase #6 60 1/3 1.9 4,250 1,075 22" Vertical 33.7 141	208 or 230 1 Phase #6 60 1/3 1.9 4,250 1,075 22" Vertical 34.5 142	208 or 230 3 Phase #10 40 1/3 1.9 4,250 1,075 22" Vertical 27.9 129	208 or 230 3 Phase #6 60-90 3/4 6.2 6,300 1,075 22" Vertical 39.7 254
	Refrigerant Type Refrigerant Charge (Lbs.) 3 Lbs. 2. Oz.	410A 3 Lbs. 2. Oz.	410A 3 Lbs. 8 Oz.	410A 3 Lbs. 8 Oz.	410A 3 Lbs. 8 Oz.	R-22 10
<b>Physical Characteristics</b> Cabinet Construction Separate Electric Compartment Weight (Lbs.) Dimensions (inches) See installation manual for other important details!	Composite Yes 270 27.25"H 31.5"W 36.75"L	Composite Yes 270 27.25"H 31.5"W 36.75"L	Composite Yes 298 35.5"H 31.5"W 36.75"L	Composite Yes 298 35.5"H 31.5"W 36.75"L	Composite Yes 298 35.5"H 31.5"W 36.75"L	Composite Yes 475 35.5"H 31.5"W 36.75"L

\* Standard for Heating and Cooling Equipment (UL 1995, 2<sup>nd</sup> Edition and CAN/CSA C22.2 No. 236, 2<sup>nd</sup> Ed.) 3 phase units performance not within scope of ETL testing procedure. Specifications may change without notice. The actual wire or breaker required may be larger and must be determined by local licenced electrician to meet United States local building safety codes. Minimum suggestion only. Products covered by Patent No.: US 6,227,003 B1, other patents pending.

## Factory Specifications MiniMax® Plus HP Pool/Spa Heat Pumps

<b>Pentair Model Order Number</b>  <b>CAPACITY HEATING MODE</b> <u>Air Temperature</u> 50.0°F <u>Relative humidity</u> 63°F 80°.6°F 63°F <b>CAPACITY COOLING MODE</b> <u>Water Temperature</u> 65% <u>Air Temperature</u> 85°F 105°F	460522	460523
	<b>HP1000R-1E</b> <b>BTUH/COP</b> 71,000/3.0 124,000/4.6	<b>HP1000R-3E</b> <b>BTUH/COP</b> 71,000/3.0 124,000/4.6
	<b>BTUH/EEER</b> 94,000/12.4	<b>BTUH/EEER</b> 94,000/12.4
	Unit Mounted	Unit Mounted
<b>Thermostat &amp; Heat/Cool Select Switch</b> <b>Water Flow &amp; Plumbing Characteristics</b> Water Bypass Type (up to 1.5 HP pump) Water Bypass Type (2 HP pump or above) Min./Max. Water Flow Rate ( GPM ) Condenser Pressure Drop ( PSI ) Min./Max. Water Inlet Temperature ( °F ) Plumbing Connection Size ( In. Slip )		
<b>Electrical Characteristics</b> 60 Htz. Dual Rated Supply Voltage ( VAC ) Supply Voltage Phase *Min Sup. Wire Size Copper Strand(AWG) *Min / Max HACR Breaker or Fuse(AMP) Evaporator Fan Motor ( HP ) Fan Full Load Amp (FLA) Air Flow (CFM) Fan Speed (RPM) Fan Discharge / Fan Diameter (Inches) Min./Max. Air Inlet Temperature (°F) Compressor Rated Load Amps (RLA) Compressor Locked Rotor Amps (LRA)		
<b>Refrigerant Characteristics</b> Refrigerant Type Initial Factory Refrigerant Charge (Lbs.)		
<b>Physical Characteristics</b> Cabinet Construction Separate Electric Compartment Weight (Lbs.) Dimensions (inches)		
R-410A 4.5 lbs. Composite Yes 298 35.5"H - 31.5"W - 36.75"L		

HEAT & COOL Specifications



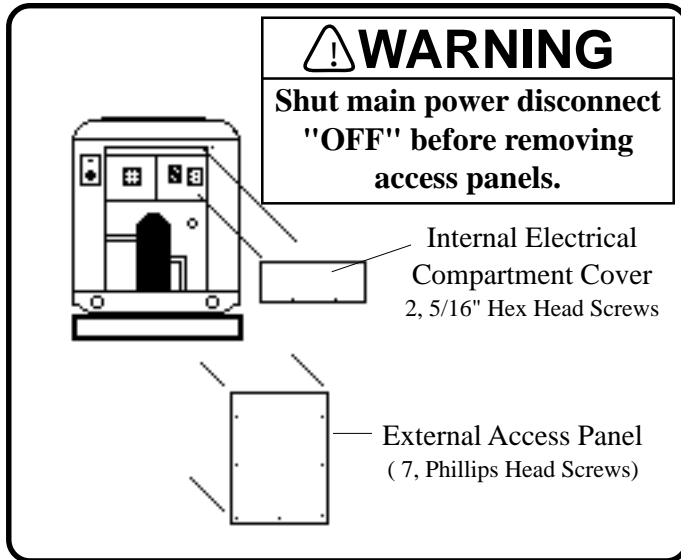
HEAT YOUR POOL IN THE WINTER...  
COOL IT IN THE SUMMER...  
THE ULTIMATE IN PERSONAL COMFORT.

- \* The actual wire or breaker required may be larger and must be determined by local licenced electrician to meet United States local building safety codes.  
Minimum suggestion only.
- \*Single phase only verified. Heat only tested. Specifications may change without notice. Tested to ANSI/ASHRAE 146-1998 standard. See installation manual for other important details! Products covered by Patent No.: US 6,227,003 B1, other patents pending.

# ELECTRICAL ACCESS & WIRING

## **WARNING**

The heater must be electrically grounded and bonded in accordance with local codes, or in the absence of local codes, with the latest national electrical codes ANSI/NFPA No. 70. All wiring must comply with all local codes, or in the absence of local codes, with the latest national electrical codes ANSI/NFPA No. 70. For proper wire and/or breaker size, please refer to specification sheet and your local licensed electrician.

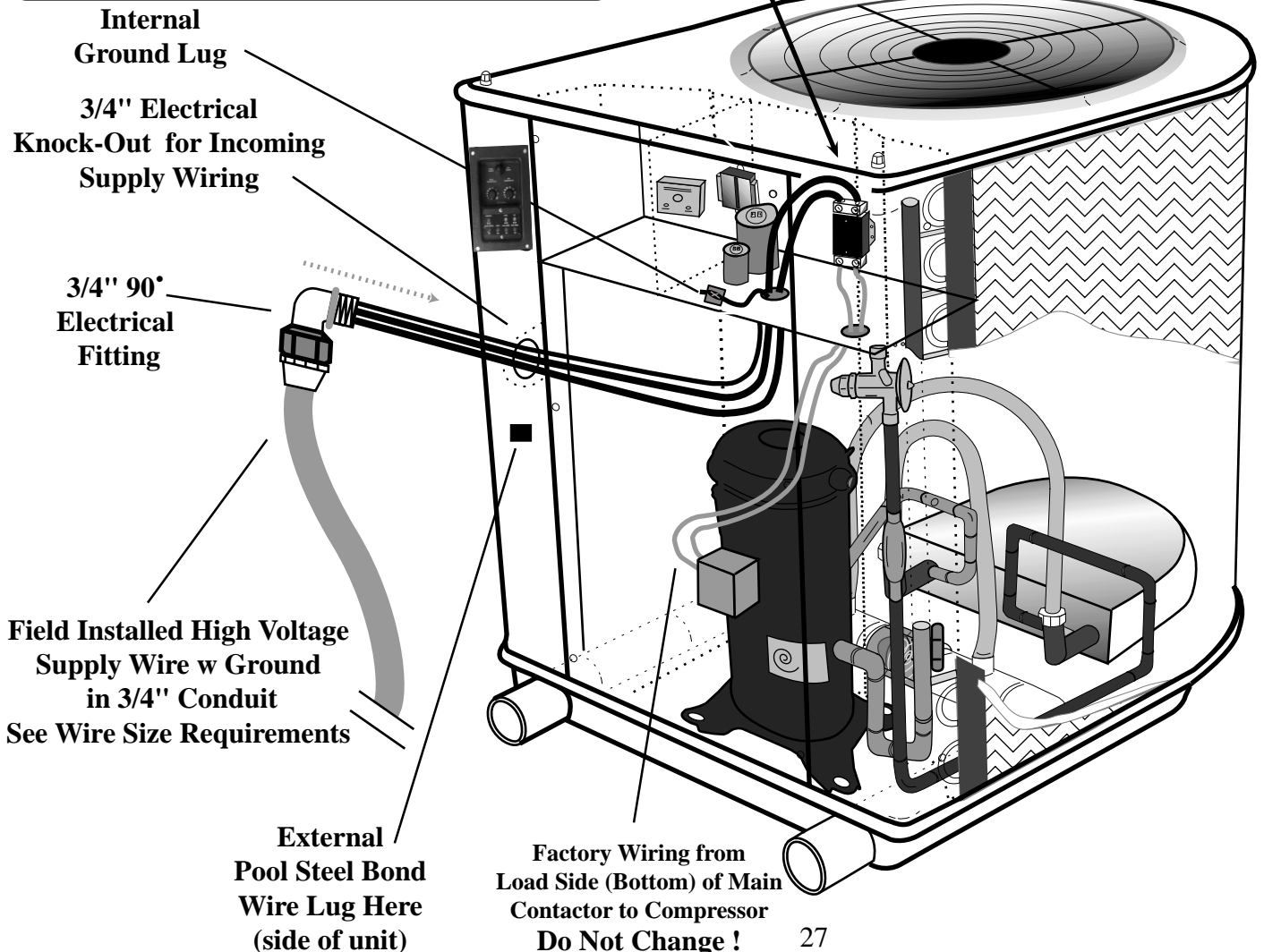


To run the main 240 volt supply wiring, remove the outer access panel and seven phillips head screws. Carefully slide the panel up and out.

The electrical compartment has a separate cover panel. Remove it by loosening the 5/16 inch, hex head screws on the bottom of the panel. Slide the panel down then guide one corner out from behind the body cabinet corner post.

Connect the proper conduit to the 3/4 inch electrical port shown below. Run wire of the proper size allowing enough slack to wire tie the supply line inside the cabinet. Run the wire up through the provided knock out on the bottom of the high voltage compartment. All conduit connections should be 3/4" and water tight.

**220V Field Connection Here  
at Line Side (Top) of "Main Contactor"**

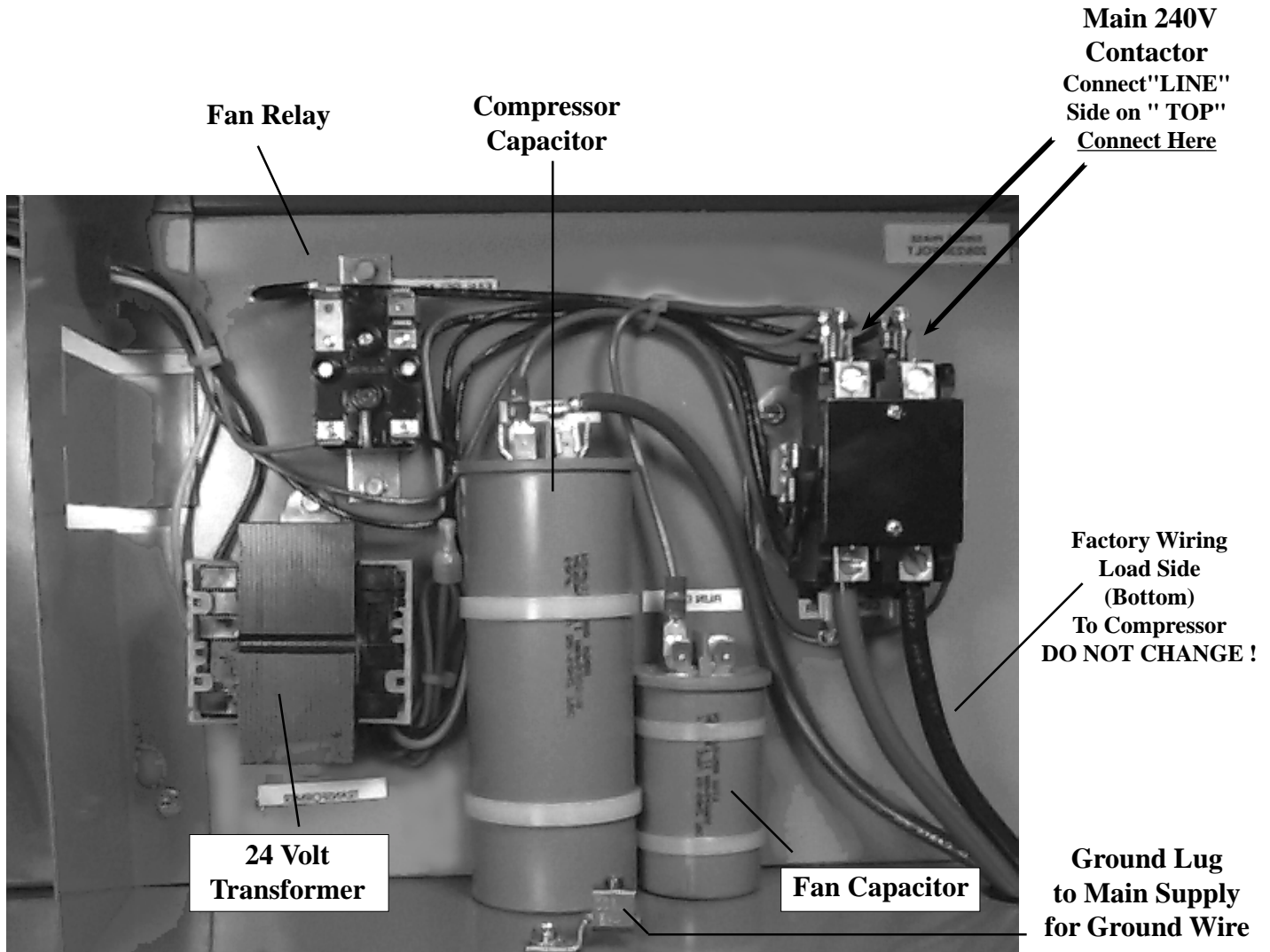




# HIGH VOLTAGE COMPARTMENT

## WARNING

Always review the wiring schematic shipped with the heater located inside the heaters electrical compartment, since it may have changed after this manual was printed ! Note 3 phase specifications available upon request @ 239-768-1555.



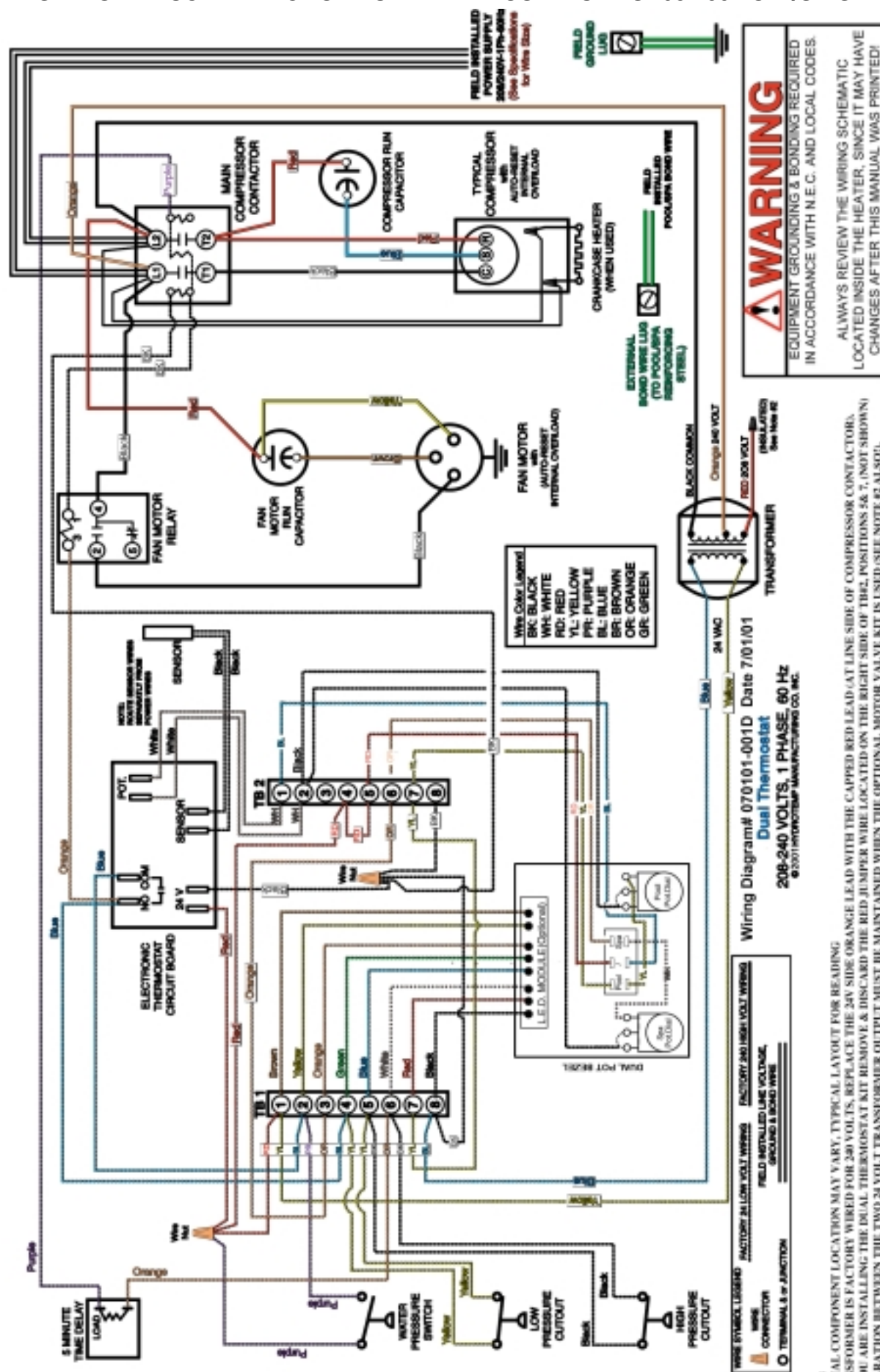
### Required Transformer Line Side Leg Change for 208 Voltage

The high voltage side of the 24 volt transformer must be rewired for 208 voltage. The orange 240 volt lead should be swapped with the unused red 208 volt lead connected to the **line side** of the main contactor. If the transformer is not rewired, the transformer will not produce an adequate amount of voltage to operate the contactor coils in the various relays of the heater. This can cause intermittent contact and damage to the compressor and contactors. Trace the orange wire to the terminal board, remove it and replace it with the red wire. Cap and secure the orange wire.

**NOTE:** If the unit has the factory optional dual thermostat kit and motorized plumbing valve kit, you must rewire the transformer on the motor valve kit as well. Damage due to improper low voltage installation is not covered under the warranty.

# WIRING DIAGRAM SCHEMATIC FOR DUAL THERMOSTAT UNITS 208-230 VOLT/SINGLE PHASE

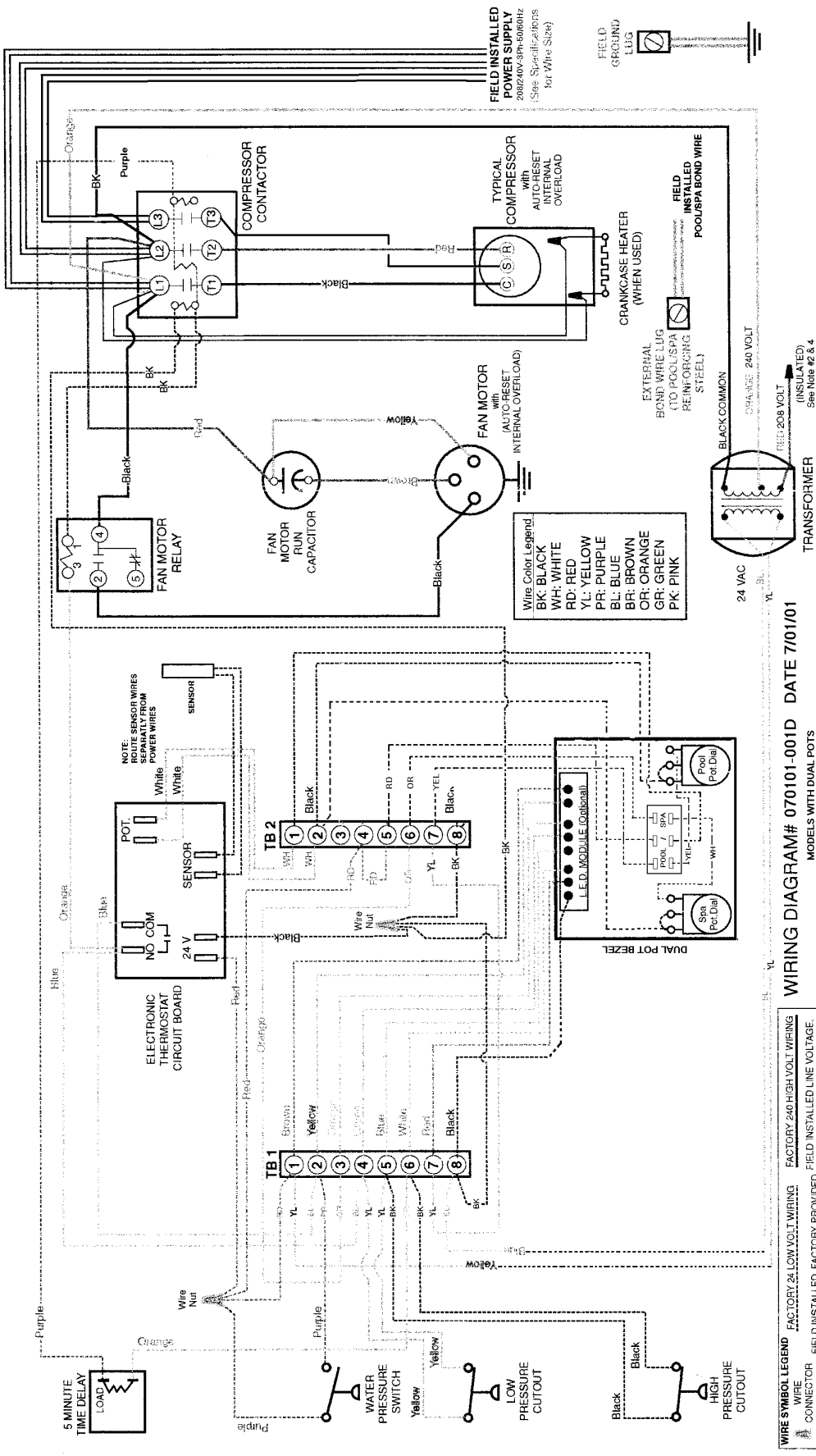
## WIRING DIAGRAM SCHEMATIC FOR DUAL THERMOSTAT UNITS 208-230 VOLT/SINGLE PHASE



MODELS: S300, S500, S700, S900, P4000, P5000, P6000, P7000, XL350, XL550, XL750, XL950, XLS400, XLS600, XLS800, XLS1000, SP3.5, SP5.5, SP6.5, SP7.5, SPS4, SPS6, SPS7, SPS8, HT75, HT95, HT115, HT135, HTS80, HTS100, HTS120, HTS140, 350HS, 550HS, 750HS, 950HS, 400HSS, 600HSS, 800HSS, 1000HSS, HP400, HP600, HP800, HP1000.



WIRING DIAGRAM SCHEMATIC FOR DUAL THERMOSTAT UNITS 208-230 VOLT/THREE PHASE



**WARNING**

EQUIPMENT GROUNDING & BONDING REQUIRED  
IN ACCORDANCE WITH N.E.C. AND LOCAL CODES.

ALWAYS REVIEW THE WIRING SCHEMATIC  
LOCATED INSIDE THE HEATER, SINCE IT MAY HAVE  
CHANGES AFTER THIS MANUAL WAS PRINTED!

NOTES:  
1. ACTUAL COMPONENT LOCATION MAY VARY. TYPICAL LAYOUT FOR READING.  
2. ALL TRANSFORMERS ARE FACTORY WIRING FOR 240 VOLTS. IF POWER SUPPLY IS 208 VOLTS, REPLACE THE 24V SIDE ORANGE LEAD WITH THE CAPPED RED LEAD (AT LINE SIDE OF COMPRESSOR CONTACTOR).  
3. IF YOU ARE INSTALLING THE OPTIONAL DUAL THERMOSTAT KIT REMOVE & DISCARD THE RED JUMPER WIRE LOCATED ON THE RIGHT SIDE OF TB2, POSITIONS 5 & 7, (NOT SHOWN).  
4. SEPARATION BETWEEN THE TWO 24 VOLT TRANSFORMER OUTPUT MUST BE MAINTAINED WHEN THE OPTIONAL MOTOR VALVE KIT IS USED (SEE NOTE #2 ALSO!).

WIRING DIAGRAM# 070101-001D DATE 7/01/01  
MODELS WITH DUAL POTS  
208-240 VOLTS AC, 3 PHASE, 50/60HZ  
© 2001 Hydrotech Manufacturing CO., Inc.

WIRE SYMBOL LEGEND	FACTORY 240 HIGH VOLT WIRING	FACTORY 240 LOW VOLT WIRING	FIELD INSTALLED 240 HIGH VOLT WIRING	FIELD INSTALLED 240 LOW VOLT WIRING
WIRE	---	---	---	---
CONNECTOR	---	---	---	---
TERMINAL	---	---	---	---
& or JUNCTION	---	---	---	---

Models: XLS1000, HP1000 & CP12.

**⚠ WARNING**

EQUIPMENT GROUNDING & BONDING REQUIRED  
IN ACCORDANCE WITH N.E.C. AND LOCAL CODES.

ALWAYS REVIEW THE WIRING SCHEMATIC  
LOCATED INSIDE THE HEATER, SINCE IT MAY HAVE  
CHANGED AFTER THIS MANUAL WAS PRINTED!



**O** or JUNCTION

24 LOW VOLT WIRING

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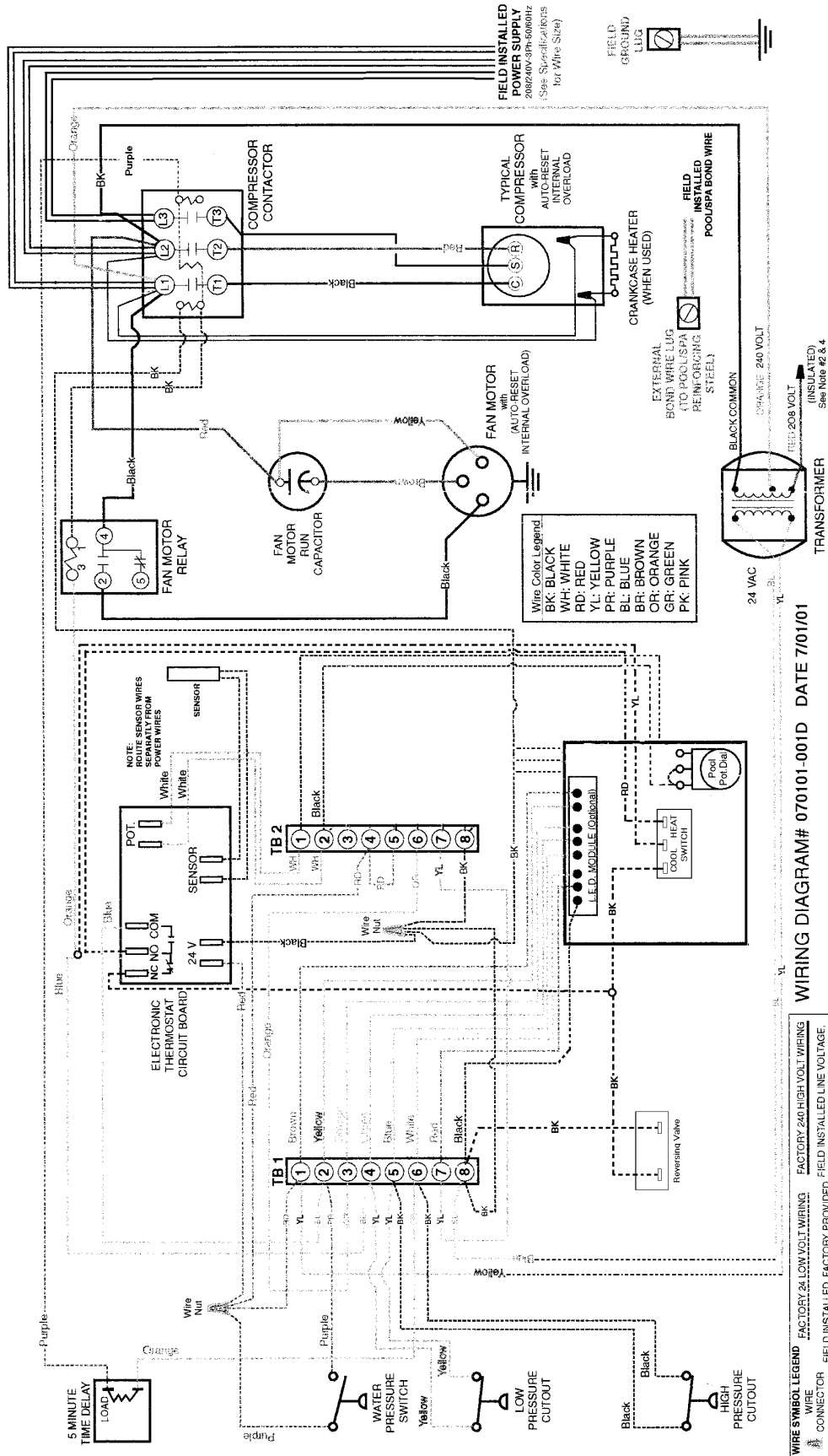
NOTES:

1. ACTUAL COMPONENT LOCATION MAY VARY. TYPICAL LAYOUT FOR READING  
2. ALL TRANSFORMERS ARE FACTORY WIRED FOR 240 VOLTS. IF POWER SUPPLY  
3. IF YOU ARE INSTALLING THE OPTIONAL DUAL THERMOSTAT KIT REMOVE & DISCARD THE RED JUMPER WIRE LOCATED ON THE RIGHT SIDE OF TB#2. POSITIONS 5 & 7, (NOT SHOWN).  
4. SEPARATION BETWEEN THE TWO 24V TRANSFORMER OUTPUT WHEN THE OPTIONAL MOTOR VALVE KIT IS USED (SEE NOTE #2 ALSO ).

208-240 VOLTS AC, 1 PHASE, 50/60HZ

© 2001 Hydrotech Manufacturing CO., Inc.

# WIRING DIAGRAM SCHEMATIC FOR SINGLE THERMOSTAT UNITS 208-230 VOLT/THREE PHASE REVERSE CYCLE



**WARNING**

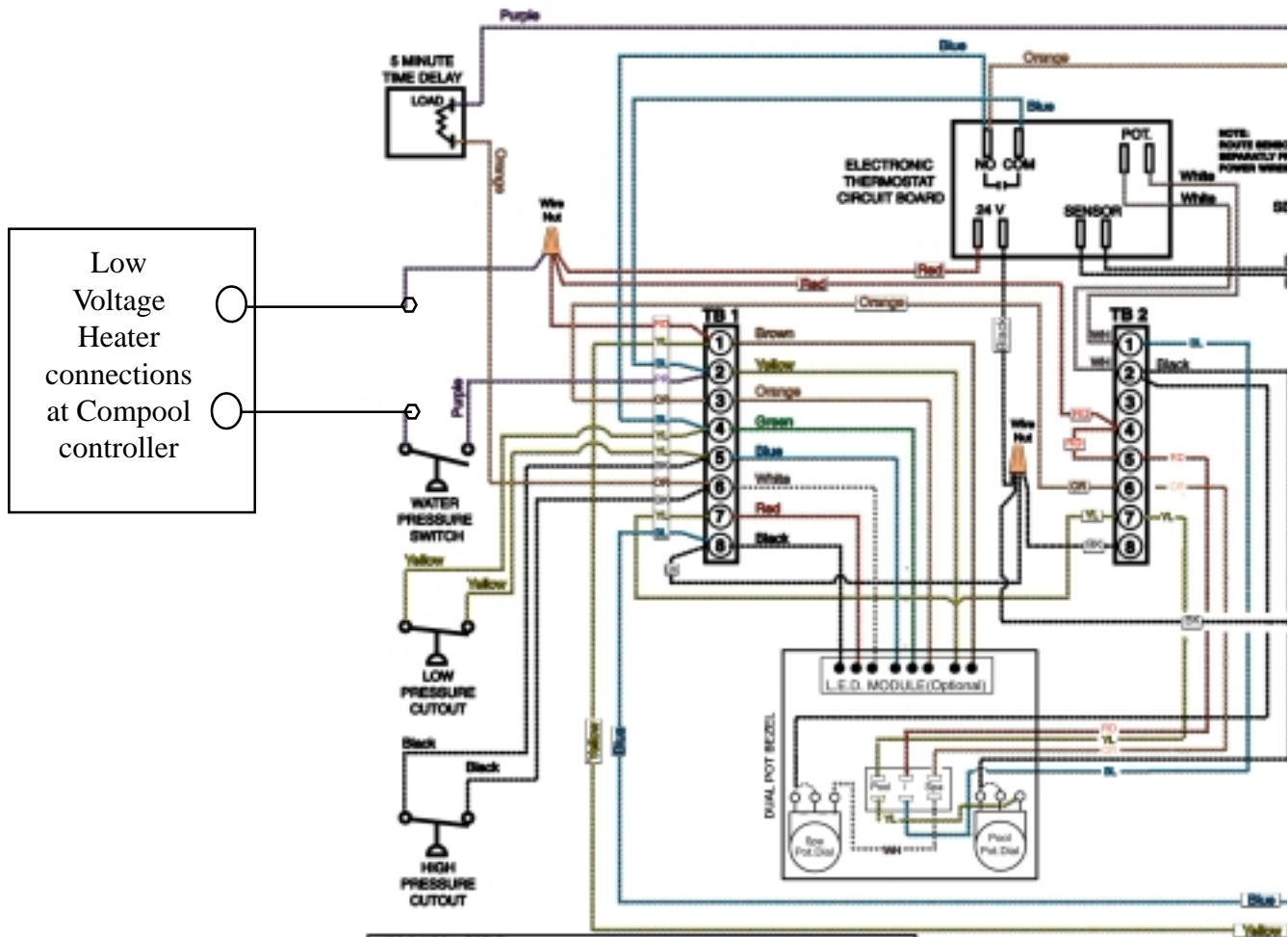
EQUIPMENT GROUNDING & BONDING REQUIRED  
IN ACCORDANCE WITH N.E.C. AND LOCAL CODES.

ALWAYS REVIEW THE WIRING SCHEMATIC  
LOCATED INSIDE THE HEATER, SINCE IT MAY HAVE  
CHANGES AFTER THIS MANUAL WAS PRINTED!

Models: XLS800R, XLS1000R, HP800R & HP1000R & CP12R

# How to hook up a heat pump to a Digital Compool for Models CP3800, CP3600, CP34000

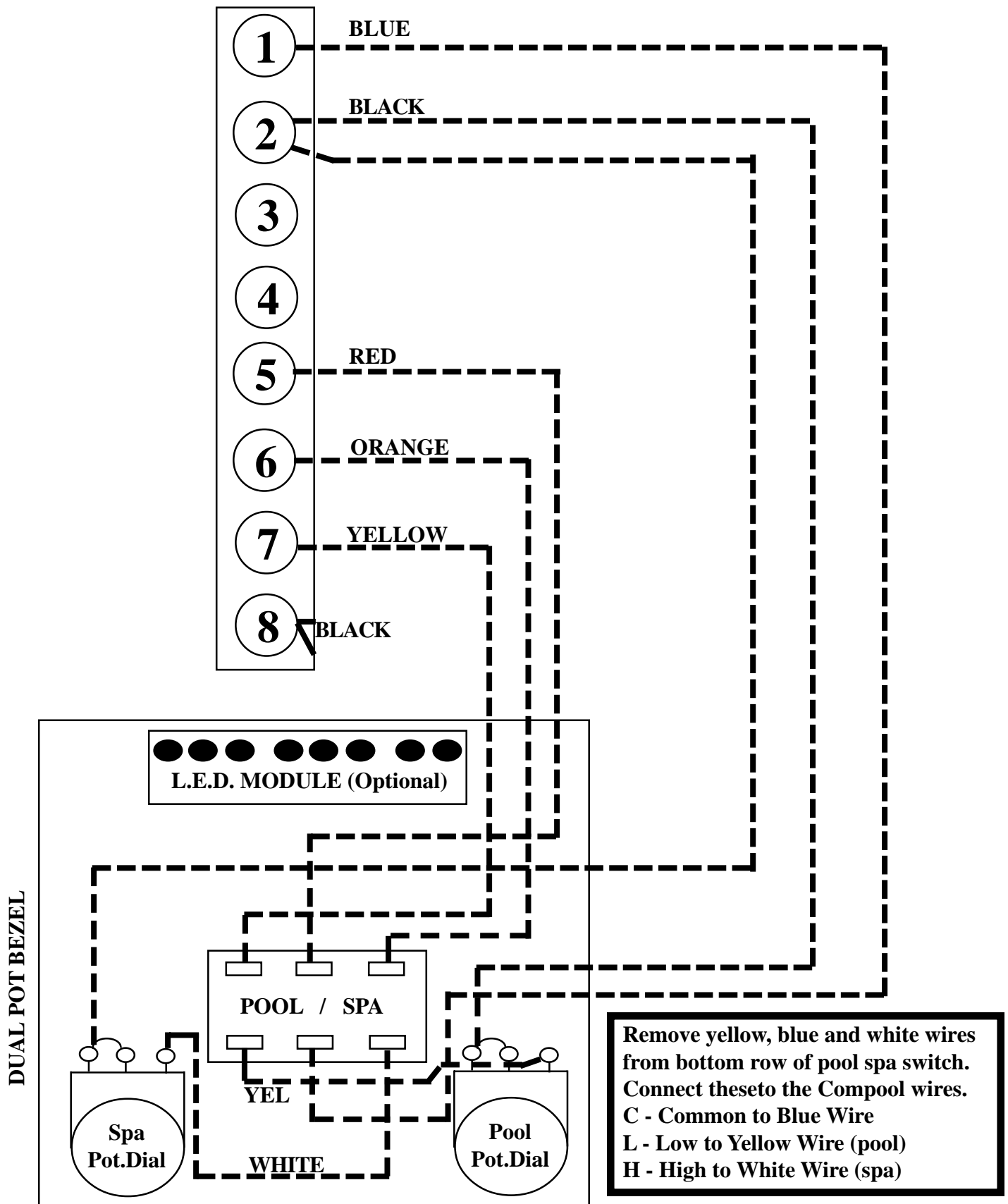
## 2 wire connections



- 1) Run two wires from Compool controller into unit.
  - 2) Cut one of the purple wires to water pressure switch.
  - 3) Splice one Compool wire to each purple wire.
- Leave unit thermostats on maximum.

# How to hook up a heat pump to a Non Digital Compool for Models CP100 & CP30

## TB2 3 wire connections



# OWNER TROUBLE SHOOTING GUIDE

## **WARNING**



### **Risk of electrical shock or electrocution.**

Improperly installation will create an electrical hazard which could result in death or serious injury to pool users, installers, or others due to electrical shock, and may also cause damage to property.

Do NOT attempt any internal adjustments inside the heater.

1. Keep your hands and hair clear of the fan blades to avoid injury.
2. If you are not familiar with your pool filtering system and heater:
  - a. Do not attempt to adjust or service without consulting your dealer, professional pool or air conditioning contractor.
  - b. Read the entire Owner and Installation Manual before attempting to use, service or adjust the heater or pool filtering system.

CONDITION	POSSIBLE CAUSE	POSSIBLE REMEDY
All control lights off. Unit will not start.	No power supply to heater. Tripped breaker or blown fuse. Control failure.	Reset breaker. Replace fuse. Call dealer for advice. Call factory for advice.
Control Ready light ON. Water Press. OK light OFF. T-Stat On light OFF. Low & High Press. lights OFF. Unit will not start.	Low water flow through heater. Dirty or worn filters or clogged lint traps. Clogged filter pump impeller. Improper plumbing valve settings. Suction leak allowing air into the water flow. Internal water pressure switch failure.	Clean entire filtering system and or replace filter element. Inspect & clean pump impeller. Adjust plumbing valves. Repair suction air leaks, grease pump lid o-ring. Replace filter. Replace water pressure switch.
Control Ready light ON. Water Press. OK light ON. T-Stat On light OFF. Low & High Press. lights OFF. Unit will not start.	Thermostat is not set higher than the pool/spa water temperature. The water temperature has reached the maximum setting. The thermostat is malfunctioning. Dual thermostat, the pool spa select switch is not in the correct mode.	Turn the thermostat up to the "right" more. Use a high quality thermometer to test the water temperature. Maximum water temperature is 104°F + or - 3°F. Call your dealer for advice. Call the factory for advice.
Control Ready light ON. Water Press. OK light ON. T-Stat On light ON. Low Press. light OFF. High Press. light OFF. Unit will not start.  OR Unit is forming ice or frost on the outer air coil, usually at the bottom.	Outside air temperature below operating range of 45°F., unit is in "defrost" mode. Discharge air flow is restricted. Discharge air is accumulating and being drawn back through the outer air coil. The fan is obstructed, low air flow. Large amounts of roof run off water restricting fan blade rotation. Sprinklers spraying on the outer air coil during cooler temperatures. Outer air coil clogged with debris. Plants too close to heater, blocking air flow. Low refrigerant pressure caused by a Freon™ leak. Possible malfunctioning of the internal low refrigerant pressure switch.	Do not try to operate the heater when the outside air temperature drops below 36°F and 45°F with very high humidity or high wind speed. Make sure heater is installed with the required placement clearances for air flow and roof clearance. Do not install indoors. Make sure that your sprinklers do not spray on the heater in any way what so ever. If ice forms on the outer coil, shut the heater off and allow ice to thaw. You may use water at low pressure to thaw ice build up on the outer coil, shut the heater off when doing so. Call the factory for advice.
Control Ready light ON. Water Press. OK light ON. T-Stat On light ON. Low Press. light ON. High Press. light OFF. Unit will not start.	Low or restricted water flow through heater. Dirty or worn filters or clogged lint traps. Clogged filter pump impeller. Improper plumbing valve settings. Suction leak allowing air into the water flow. Low water flow when switched to spa mode. Unit is plumbed backwards. Heat exchanger clogged with debris. Internal bypass valve damaged or clogged with debris. Water temperature exceeding 104°F maximum. Refrigerant system malfunction.	Clean entire filtering system and or replace filter element. Inspect & clean pump impeller. Adjust all plumbing valves. Repair suction air leaks, grease pump lid o-ring. Replace filter. Wrong filter pump pipe size. Automatic pool vacuum causing restriction. Thermostat not shutting unit off at 104°F. Call your dealer for advice. Call the factory for advice.
Control Ready light ON. Unit is cycling on & off.	Low or restricted water flow through heater. Dirty or worn filters or clogged lint traps. Clogged filter pump impeller. Improper plumbing valve settings. Suction leak allowing air into the water flow. Low water flow when switched to spa mode. Unit is plumbed backwards. Heat exchanger clogged with debris. Internal bypass valve damaged or clogged with debris.	Clean entire filtering system and or replace filter element. Inspect & clean pump impeller. Adjust all plumbing valves. Repair suction air leaks, grease pump lid o-ring. Replace filter. Wrong filter pump pipe size. Automatic pool vacuum causing restriction. Call your dealer for advice. Call the factory for advice.

Control Ready light ON. Water Press. OK light ON T-Stat On light ON Fan is not turning. Unit will not start.	Low water flow through heater. Dirty or worn filters or clogged lint traps. Clogged filter pump impeller. Improper plumbing valve settings.	Clean entire filtering system and or replace filter element. Inspect & clean pump impeller. Adjust plumbing valves. Call the factory for advice.
All control lights ON Fan is turning, no cool air discharging out the top of heater. Unit is not heating.	Compressor has not started yet. Low water flow through heater. Dirty or worn filters or clogged lint traps. Clogged filter pump impeller. Improper plumbing valve settings.	Wait for the 5 minute compressor time delay. Clean entire filtering system and or replace filter element. Inspect & clean pump impeller. Adjust plumbing valves. Call factory or dealer.
Spa will not heat to maximum temperature of 104°F + or - 3°. Thermostat is turned all the way up.  OR  Spa is heating very slowly.	Low or restricted water flow through heater. Dirty or worn filters or clogged lint traps. Clogged filter pump impeller. Improper plumbing valve settings. Suction leak allowing air into the water flow. Low water flow when switched to spa mode or the control is not in spa mode. Unit is plumbed backwards. Heat exchanger clogged with debris. Internal bypass valve damaged or clogged with debris. Your spa thermometer is not reading the correct temperature. Air blower is running. Venturi air inlets are open. It is very cold outside. Spa pump is not running.	Clean entire filtering system and or replace filter element. Inspect & clean pump impeller. Adjust all plumbing valves. Repair suction air leaks, grease pump lid o-ring. Shut off air blower and or Venturi inlets that allow air turbulence in the spa. Use a cover while heating the spa. Outside air temp. too cold. Set spa pump timer for longer time. Call your dealer for advice. Call the factory for advice.
Pool is heating very slowly. Pool is not getting up to temperature.	Low or restricted water flow through heater. Dirty or worn filters or clogged lint traps. Clogged filter pump impeller. Improper plumbing valve settings. Suction leak allowing air into the water flow. It is cold outside. Pool pump timer is not set for a long enough running period. Pool is not covered. High wind speed over pool. Shaded pool area.	Clean entire filtering system and or replace filter element. Inspect & clean pump impeller. Adjust all plumbing valves. Repair suction air leaks, grease pump lid o-ring. Use a pool cover. Place a wind break around pool. Set pool pump timer longer. Call your dealer for advice. Call the factory for advice.
For dual thermostat units: Unit is in pool mode but spa is on, or unit is in spa mode but pool is on.	The optional motorized plumbing valves are out of synchronization with the dual thermostat control. The motor valves are not turning. The manual pool/spa valves have not been turned correctly. A third party external control device is overriding the dual control. Motor valves have a tendency to rotate after a power outage and then they are out of sync.	Use the motor valve actuator switches so the valves go to the mode selected on the dual thermostat pool/spa select switch. Grease motor valves. Adjust manual valves correctly. Adjust third party control device. Possible defective motor valve. Call your installer for advice. Call the factory for advice.
Compressor will not start. Fan comes on, compressor time delay passes, compressor attempts to start but unit shuts all the way off ( and or circuit breaker trips).	Low or restricted water flow through heater. Dirty or worn filters or clogged lint traps. Clogged filter pump impeller. Improper plumbing valve settings. Suction leak allowing air into the water flow. Low water flow when switched to spa mode. Compressor was not preheated properly (reciprocating type R-series only). Scroll type (S-series) compressors "only" require several start cycles before it will start when new, during cold temperatures or if the unit has been idle for some time. Weak power supply voltage.	Clean entire filtering system and or replace filter element. Inspect & clean pump impeller. Adjust all plumbing valves. Repair suction air leaks, grease pump lid o-ring. Replace filter. Preheat reciprocating type (R-series) compressor for 8 hours. Allow Scroll type (S-series) compressors several start cycles. Have a licensed electrician check the power supply voltage and wire size. Call your installer for advice. Call the factory for advice.
Water running from the bottom of the heater when it is running.  OR  The heater seems to have a water leak.	The heater produces water condensation when it operates. The water will trickle from the drain holes designed in the bottom of the heater. The higher the humidity the more water condensation the heater will produce. This is similar to the effect that a glass of ice water has when it sweats. Corrosive pool water, chemical damage to water tubing inside heater. Chlorinator is not isolated from the heater, chlorine migration.	Shut the heater off for several hours but leave the pool water pump running. Allow enough time for all the normal condensation to evaporate. If the heater continues to trickle water after that time, when it is not running, you may have a pool water leak. You can test this water for chlorine to confirm. Make sure your chlorinator has a check valve and loop installed between the heater & chlorinator.



# WARRANTY & DEALER SERVICE

When requesting factory warranty service, please follow these guidelines to insure a smooth process.

## PROBLEM DESCRIPTION

Get a full description of the problem from the pool owner. The more details you obtain from the pool owner, the easier it is to satisfy their exact needs.

## VISIT THE SITE

Always visit the site and check the following non-warranty conditions:

Electrical breakers and switches.

Plumbing, valving water flow and clean filters.

Proper running time allowed for circulation pump.

Proper Installation, Plumbing & Electrical.

Chlorinator Placement and Water Quality.

## ELIMINATE USER ERROR

You must eliminate all user errors before calling for warranty service. The warranty covers factory defects only. The above mentioned conditions and others like them are not considered factory defects. All guidelines detailed in the owners and installation manual must be followed to receive warranty service. Damage due to improper installation or use is not covered under the warranty. If the warranty service crew arrives and finds there is a user or installer error, the service invoice is collected from the pool owner at the time of service.

## FACTORY SUPPORT

Our service department will call the pool owner directly and pre-qualify each service request to help you eliminate user errors before dispatching service. We take the time over the phone to assist the pool owner on checking their filtering system and associated equipment, if they are able. We always assume that the installation is to factory specifications. The warranty policy is explained to the pool owner directly so there is no misunderstanding. It is impossible to pre-qualify every service call over the phone, therefore, we must insist that you visit the site prior to warranty service.

## REQUIRED INFORMATION

Please have the following information ready when calling for warranty service:

### Required Information:

12 digits

**Heat Pump Service Department**

**12155 Metro Parkway**

**Ft. Myers, Florida 33912**

**239-768-1555**

**239-768-2856 Fax**

**www.warmpool.com**

**Serial #**

**Model #** \_\_\_\_\_,

**Install Date** \_\_\_\_ / \_\_\_\_ / \_\_\_\_

**Dealer Name** \_\_\_\_\_

The actual receipt or canceled check may be needed to verify installation date and proof of ownership.

# GLOSSARY OF TERMS

**A/C Contractor:** A company licensed by the state and local authorities to perform heating ventilation and air-conditioning installation or repair including pool heat pumps. Allow no others to repair this unit.

**Acidic:** Describing pool/spa water that is aggressive in nature with a Ph value below 7.6. Like acid, orange juice, vinegar etc.

**Accumulator:** a containment housing in the Freon circuit that collects liquid forms freon that does not evaporate after passing through the evaporator coil, thus protecting the compressor from damage.

**Air Blower:** An electronic device that forces air under pressure through the spa plumbing giving the spa a bubbling effect.

**Air Inlet:** Used to create bubbling effects for the spa jets. Water passing through a vortex draws air into the plumbing without the use of an electronic air blower. Usually controlled by some sort of knob or lever to shut it on or off.

**Alkaline:** Describing pool/spa water that is the opposite of acidic with a Ph value above 7.6. Base, like milk or chalk etc.

**Anti Short Cycle Time Delay Device:** Keeps the compressor from being damaged due to the freon gas not being allowed to settle between cycles, preventing liquid freon from entering the compressor. When the unit stops there will be a certain time delay before the compressor will start again.

**Automatic Chlorinator:** A device that feeds either tablet type or liquid type chlorine concentration into the plumbing piping and then delivered to the pool/spa water.

**Authorized Factory Service:** An A/C Contractor factory trained and under contract with the manufacturer to provide repair service.

**Back-Siphon:** In regards to pool filtering systems where the water flow reverses through the system when the circulation pump shuts off. This is usually caused by the vacuum created by the water in the filtering being above the pool level, or breach in the sealed water plumbing, allowing air into the system. This condition is sometimes referred to as a suction or vacuum leak.

**Back Pressure:** The pressure created by the circulation pump being restricted by plumbing, filters, solar panels and other related equipment. Usually due to a dirty filter, measured by the pressure gauge in the filter housing

**Blanket:** A plastic cover several mills thick with trapped air bubbles, cut to the same size as the pool and floats on top of the water to provide insulation and prevent heat loss. Some types collect small amounts of heat from the sun and transfer it to the pool water. Sometimes referred to as a solar blanket.

**BTU:** British Thermal Units. Measures heat output of a heat pump, in Btu's per hour.

**Broadcast Type Sprinklers:** Part of an irrigation system used to water plants or grass where the water is sprayed into the air and distributed directional.

**Bypass:** Used in the water piping to allow the control of water flow through the heater at a prescribed rate, thus the rest of the water flow not needed is diverted through the bypass

**Calcium Hardness:** The amount of calcium and magnesium content in pool/spa water calculated by using a test kit for such purposes.

**Calcium Hypochlorite:** A form of chlorine in a powder form and rarely in a tablet form used to sanitize pool/spa water. Calcium is a major component and by-product.

**Cartridge Filter:** A pool/ spa water filter that is made of pleated paper and nylon. Usually round with plastic base and top, placed into a tank that the water is pumped through trapping debris and dirt. Usually removed and cleaned with a high pressure garden hose.

**Check Valve:** A P.V.C. fitting used on the water piping to prevent reverse flow through the system and insure proper water direction. Sometimes used to create back pressure and slow the water velocity.

**Chemical Values:** The numerical reading you get by using a pool/spa water test kit to calculate levels of pool chemicals and minerals in the pool water at any given time.

**Chemical Damage:** Any damage or corrosion from pool chemicals or any other chemicals used around the heat pump or pool. Usually concentrated chlorine or acidic water corroding the copper piping or the heat exchanger or other equipment.

**Chemical Resistant Check Valve:** A check valve placed between the heater and a chlorinator to prevent the migration of concentrated chlorine into the heater.

**Chlorinator:** A device that is used to feed chlorine to the pool/spa through the filtering system. Water is pumped through a containment holding the chlorine. This makes a solution that is then fed to the pool or spa.

**Chlorinator Placement:** (Illustrated in this owners manual), showing the proper location and placement of chlorinating devices in order to prevent chemical damage to the heater.

**Chlorine:** A common pool/spa water sanitizer available in several different forms of powder, solid tablets, liquid or gas.

**Chlorine Tablets:** A common form of chlorine that is solid in nature used in a chlorinator that is eroded by water rushing over these tablets, making a solution to be slowly fed to the pool water.

**Circuit Breaker:** An automatic switch that will shut the power off to an electrical device (heater, circulation pump) when an overload or short occurs. Located in the electrical supply panel in your home or near the associated equipment.

**Circulation Pump:** An electric water pump that circulates water through the filter and other pool related equipment. Usually controlled by a timer.

**Condensation:** Water that accumulates inside the heater due to the humidity in the air coming in contact with the colder Freon™ piping in the evaporator coil. This water will trickle out of the drain ports on the bottom of the heater. Like sweat on a glass of ice water.

**Control Devices:** Electronic devices used to manipulate the pool/spa functions and equipment other than those manufactured into the heater itself. Sometimes by remote control, switches or sensors.

**Convection:** The transfer of heat from between two mediums, of different temperatures, in this case from hot to cold, from warm pool to cooler outside air

**Compressor:** A reciprocating piston in a cylinder, much like a car engine, that compresses freon gas in a chamber before it is released to the heat exchanger.

**Commercial Pool:** A pool for public use or for the use of community residents that are governed by state and local codes. Usually larger than a residential pool with a larger capacity filtering system, running at a high rate of water flow.

**Copper Piping:** The piping inside the unit as it was manufactured.

**Corrosion:** The dissolving of the metals in the heater due to chemical action.

**Cover:** Used to cover the pool surface and prevent heat loss, referred to as a blanket.

**Cupronickel Metal Alloy:** A special metal blend copper and nickel that is corrosion resistant.

**Cycle:** Referred to here as, on and off repeatedly, either the fan and or compressor.

**D.E. Filter:** A filter type that uses diatomaceous earth powder as a filter media. The D.E. is discharged with the debris via a valve that reverses flow through the filter. This is referred to as backwashing. The D.E. must then be replaced in the filter.

**Dealer:** As authorized by agreement, with the factory to sell and install this particular brand of heat pump.

**Defrost Control:** An internal device that will prevent the evapora-

tor coil from getting an ice build up when the outside air temperature drops below 36 degrees. It will shut the compressor off, but allow the fan to run until the air temperature increases.

**Down Line:** A reference that pertains to chlorinator placement and chemical application meaning, to introduce such, into the water flow piping, after it passes through the heater, as far away from the unit as possible.

**Drain Holes:** Located in the heater cabinet bottom, that allows the condensation water produced normally to drain out.

**Drain Plug:** A type of valve installed on the plumbing near the heater to allow the heat exchanger to be completely drained of pool water to prevent freeze damage in such climates.

**Dry Acid Powder:** A dry powder (sodium bisulfate) used to lower Ph in pool or especially spa water.

**Dual Thermostat:** A kit added to the unit to allow for two separate thermostats to be used for a pool and spa sharing the same heater. It is also capable of other functions such as motorized valve operation.

**Initial Heat Up Time:** The time required to heat the pool up to the desired temperature when you turn the unit on for the first time. When the pool water temperature is at its lowest temperature.

**Electrocution:** To be shocked by electrical current, to have electrical current pass through your body resulting in death or injury.

**Elevation:** The height of the installed unit, in comparison to the pool water level.

**Evaporation:** When referring to heat loss of the pool water, when the pool water changes from a liquid to a gas then dissipates into the air, taking heat away with it.

**Evaporator Coil:** The aluminum and copper air/freon manifold that is used to change the properties of the Freon as it passes through it. The warmer air is forced through the fins to produce the reaction due to dissimilar temperatures.

**Expansion Valve:** A control valve that regulates the Freon pressure to the evaporator coil.

**Fan:** Used to move air through the evaporator coil.

**Fan Blades:** The aluminum mechanism that moves the air through the unit. Located on top of the cabinet. Caution: fan blades can be sharp and cause injury.

**Filter:** Use to clean the pool water by pumping water through a media that collects debris and is cleaned later as part of regular pool maintenance.

**Filter System:** The equipment installed to circulate and clean the pool water usually consisting of an electric water pump on a timer, a filter containment, flow control valves, and other equipment needed for that particular pool and/or spa.

**Floating Chlorinator:** A device that floats on the pool waters surface that feeds chlorine to the water by eroding solid tablet type chlorine, inside its containment.

**Floating Thermometer:** A thermometer that floats on the water surface with the main sensing bulb in the water. Indicates the actual pool or spa temperature it's floating in. A tie on type will work the same.

**Flow Control Valve:** A valve or check valve that controls water flow either automatically or manually.

**Freon™:** Trade name for a type of refrigerant. The heat transfer medium used to transfer the generated heat to the pool water, in the vapor compression cycle of the heat pump system. Changing from a gas to a liquid state in cycles.

**Full Prime:** A reference used to describe a water pump running normally without air entering into the system, running at full capacity.

**Gas Chlorine:** Chlorine in a pure state, gas.

**G.P.M. :** Gallons per minute, used to measure flow rate

**Heat Exchanger:** A manifold where the compressed hot freon gas transfers its heat to the pool water. A tube within a tube. Hot freon gas passing through one tube and water passing through the other tube, bent in a coiled fashion. Made from a cupronickel metal alloy.

**Heat and Cool:** Reverse cycle unit capable of both heating and cooling the pool.

**Heat Loss:** The act of the pool losing heat due to certain conditions such as weather, wind, evaporation, radiance, convection etc.

**Heat Pump:** The unit, the heater, the appliance referenced in this manual.

**Hydro-Therapy Jets:** Used in spas to create high pressure water flow with air turbulence. Water is forced through a restriction that creates a vortex that draws air into the water flow thus increasing velocity. This air flow is usually regulated by a manual control.

**Icing Up:** Ice forming on the evaporator coil.

**In Line Type Chlorinator:** A chlorinating device that is mounted directly on the piping, that has an internal manifold within the plumbing, used to allow water flow through the containment, where a solid tablet type chlorine is held. This type requires no water tubing in and out of the containment.

**Injection:** In regard to feeding pool chemicals into the water flow in whatever fashion.

**Installer:** Same as dealer, person or company where the unit was purchased.

**Internal Adjustments:** Any part or component inside the cabinet of the unit.

**Lint Trap Basket:** A strainer type basket that collects debris and prevents such from being trapped in other equipment, including the heat exchanger.

**Liquid Chlorine:** Chlorine in a liquid form, (sodium hypochlorite).

**Long Term Freeze:** When the outside air temperature drops below 36 degrees as part of a seasonal weather change lasting for an extended period of time.

**Marcite:** A white plaster type pool wall and surface finishing material made of white Portland cement and marble dust.

**Migrate:** Referring to concentrated chlorine moving through the filter system plumbing with or without the water flowing.

**Motorized Plumbing Valves:** Valves' that are driven by low voltage motors mounted on top of such a valve. Usually used to change from pool to spa mode via a control switch or device without having to go to the filter system and turn these valves manually.

**Muriatic Acid:** A liquid acid that is used to lower the Ph of pool water. Handle with extreme caution. (Use a dry powder acid for spas.)

**Normal Operation:** When the heat pump is running as intended by the manufacturer.

**Nozzle Attachment:** A device attached to the end of a garden hose, that increases pressure and controls direction.

**On/Off Switch:** Located on the unit next to the thermostat dial use to shut the unit off and on, so you do not have to move the thermostat or shut off the circuit breaker to control the unit.

**O-Ring:** A round rubber gasket that is used for sealing removable access lids to pool filtering equipment and other related items.

**Ph:** A term used when determining the alkalinity or acidic nature of water.

**Pool/Spa Combination:** When you have a pool and spa together, where the two body's of water are connected by a spill-over or other plumbing means.

**PPM:** Parts per million. Use as a term to tell you how much of a certain chemical ratio is in the water.

**Pressure Switch:** A device inside the heater, that senses water pressure and keeps the unit from running when there is little or no water flow going through it.

**Radiant Heat Loss:** When the water loses heat through the walls and floor of the pool shell.

**Return:** The term used to indicate water flow direction back to the pool, after it passes through the filtering system. There are orifices in the pool called return outlets.

**Run Dry:** When any pool equipment is running without water, usually causing some sort of damage.

**Serial Number:** A twelve digit number on the identification sticker on the outside of the heater cabinet. Needed for all records, warranty request etc.

**Shadow-Box Fence:** A fence that is made to allow air to pass through it freely without restriction.

**Shock Treatment:** Adding a larger than normal dose of chlorine to the pool water to kill contaminants, algae and to remove combined chlorine.

**Short Cycle:** The act of the compressor going on and off without letting the refrigerant gas to settle.

**Short Term Freeze:** When the outside air temperature drops below 36 degrees for a short period of time, usually for only a few days or so, but not part of a normal seasonal change where lower temperatures are expected as a norm.

**Sodium Hypochlorite:** A liquid form of chlorine.

**Skimmer:** A housing mounted at the pool water level in the pool wall and deck, that is used to capture debris as water is drawn into it. The water is drawn in by the suction created by the circulation pump.

**Skimmer Basket:** The strainer type debris catch, inside the skimmer housing that keeps debris from clogging other related equipment.

**Skimmer Inlet:** The square opening right at the pool water level, flush with the pool wall.

**Skimmer Throat:** The main cavity of the skimmer where the skimmer basket is located.

**Solar Panels:** A manifold placed on a roof top, to collect heat from the sun and transfer it to the pool water being pumped through it.

**Spa:** a smaller body of water using hotter water temperature and high pressure water flow mixed with air to create a therapy effect.

**Sprinkler Heads:** Irrigation water distribution device, placed in areas of the yard that broadcast water to the surrounding area.

**Surge Tank:** Part of a filtering system that holds a specific amount of water to supply the circulation pump. Filter elements are sometimes placed in this tank so when the pump suctions water through them it cleans the water. This tank is fed pool water through plumbing piped from the pool by gravity.

**Temperature Rise/Difference:** A calculation used to determine how many degrees the water passing through the heat exchanger is increased in order to set it at a prescribed difference.

**Thermometer:** Used to determine the actual pool or spa water temperature. Sometimes a floating type or a tie on type.

**Thermostat:** Located on the unit itself, used to set the desired temperature you would like the actual pool or spa water to be.. The unit will activate if the water temperature is below the setting. The unit will shut off when the water temperature has reached that particular setting.

**Three-Way Valve:** A plumbing valve that controls water flow having three ports in which to connect plumbing to.

**Timer:** A timing device that activates the water circulation pump according to preset times.

**Time Delay:** A device inside the heater, that will delay the compressor from running until the refrigerant gas and crank case oil settle, before allowing the compressor to run, preventing damage to the compressor..

**Trickle Type Sprinkler:** An irrigation distributor that does not broadcast water into the air but slowly waters the surrounding ground directly.

**Vacuum Type Filter:** A filter on the suction side of the circulation pump usually mounted inside a surge tank. Water is drawn through the filter media trapping debris.

**Variable Rate Flow Control Valve:** The "internal" valve used to as a bypass for the heater water flow. This spring type valve will automatically adjust the water flow rate to the unit when the flow rate changes for what ever reason, (30 to 70 G.P.M. range).

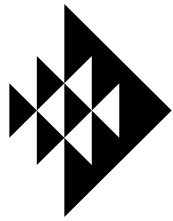
**Water Coil:** Same as heat exchanger.

**Water Chemical Balance:** The standard pool water test and chemical amounts and values, that the water needs to be considered balanced, according to standard practice.









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