INSTALLATION & OPERATION MANUAL

Heat Pump Pool & Spa Heater

MODELS: TWPH-6560 & 6560EHC

NOTICE
SCAN WITH QR EQUIPPED SMART DEVICE FOR ONLINE MANUAL.

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FOR YOUR SAFETY: Do not store or use gasoline or other flammable vapors and liquids or other combustible materials in the vicinity of this or any other appliance. To do so may result in an explosion or fire.

NOTE: The instructions in this manual are for the use of qualified individuals specially trained and experienced in the installation and maintenance of this type of equipment and related system components. Installation and service personnel are required by some states to be licensed. Persons not qualified shall not attempt to install, service, or maintain this equipment.

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

WEATHER KING®

QUICK START GUIDE

Revision 02 reflects the following changes:

Added items 9-M & 10-M to the IPL.

TABLE OF CONTENTS

1. WARNINGS

Pay Attention to these Terms

⚠ **DANGER**	Indicates the presence of immediate hazards which will cause severe personal injury, death or substantial property damage if ignored.
⚠ **WARNING**	Indicates the presence of hazards or unsafe practices which could cause severe personal injury, death or substantial property damage if ignored.
⚠ **CAUTION**	Indicates the presence of hazards or unsafe practices which could cause minor personal injury or product or property damage if ignored.
CAUTION	CAUTION used without the warning alert symbol indicates a potentially hazardous condition which could cause minor personal injury or product or property damage if ignored.
NOTE	Indicates special instructions on installation, operation, or maintenance which are important but not related to personal injury hazards.

This manual, as well as the pool heater itself, contains ANSI-approved product safety signs and labels. Please read these signs and labels, as they convey important safety information about hazards that may be potentially present in and around the heater.

⚠ **CAUTION:** Elevated water temperature can be hazardous. The U.S. Consumer Product Safety Commission has these guidelines:

1. Spa water temperatures should never exceed 104°F (40°C). A temperature of 100°F (38°C) is considered safe for a healthy adult. Special caution is suggested for young children.

2. Drinking of alcoholic beverages before or during spa or hot tub use can cause drowsiness which could lead to unconsciousness and subsequently result in drowning.

3. Pregnant Women Beware! Soaking in water over 102°F (39°C) can cause fetal damage during the first three months of pregnancy resulting in the birth of a brain-damaged or deformed child. Pregnant women should stick to the 100°F (38°C) maximum rule.

4. Before entering the spa or hot tub, users should check the water temperature with an accurate thermometer; spa or hot tub thermostats may err in regulating water temperatures by as much as 4°F (2.2°C).

5. Persons with a medical history of heart disease, circulatory problems, diabetes, or blood pressure problems should obtain a physician's advice before using pools or hot tubs.

6. Persons taking medications which induce drowsiness, such as tranquilizers, antihistamines, or anticoagulants, should not use spas or hot tubs.

CAUTION: Improper chemical content in a swimming pool or spa can damage the heater. DO NOT add pool/spa chemicals to the pool/spa via the skimmer or any other apparatus (feeder, chlorinator, etc.), that is on the influent side (i.e. before) of the heater. This will damage the heater and could void the heater warranty. ALWAYS follow the product manufacturer's directions when adding any chemicals to your pool.

⚠ **WARNING:** These heat pump pool heaters are charged with R-410A refrigerant. Ensure that all service work is done with gauges and equipment suitable for R-410A.

EFFICIENCY TESTING NOTICE: For purposes of verifying or testing efficiency ratings, the test procedure in Title 10 APPENDIX P to Subpart B of Part 430 (Uniform Test Method for Measuring the Energy Consumption of Pool Heaters) and the clarifying provisions provided in the AHRI Operations Manual 1160 that were applicable at the date of manufacture should be used for test set up and performance. Charging Charts are available at https://www.raypak.com/customer-support/heat-pump-charging-charts. These should only be used by certified HVAC technicians to check or adjust refrigerant charge for proper operation.

CAUTION: The appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction. Do not allow children to play near or with appliance, severe damage can occur from moving parts.

2. INTRODUCTION

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

This manual contains important information on the use, maintenance and troubleshooting of your new heat pump pool heater. This unit must be properly installed, maintained and operated for optimal performance.

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

All heat pump pool heaters have a lower BTU/hr heating capacity than a gas-fired or oil-fired heater for the same pool and will have to operate more hours per day to keep the pool at setpoint. It may operate up to 24-hours a day at certain times. It is designed to do so. Even with long runtime hours, it will heat the pool at less cost than other heaters using fossil fuel.

Since evaporation is the main cause of heat loss from a pool, keeping the pool covered whenever it is not in use will greatly reduce the cost of keeping the pool heated. Even during warmer weather, Raypak recommends keeping the pool covered at night.

> **NOTE:** **4x Hurricane tie-down brackets, 16x tie-down screws, 2x union halves, the printed warranty, optional harnesses and the I&O manual are located in an accessory bag mounted on the front of the heater inside the packaging. For Heat/Cool models, a bypass assembly is provided. Please DO NOT throw away the packaging before removing all of their contents.**

ATTENTION: Please Take This Opportunity to Quickly Register Your Unit!!

While your unit is being installed by your professional and licensed installer of choice, Please Take This Opportunity to Quickly Register Your Unit!! With the necessary information in hand, Registering your new heater only takes a few moments and is the only way to assure any verifiable warranty procedures during the span of your unit's period of protection.

Using Figure 1, please locate and record your model and serial number. Once you have done this, please make sure you also have the following information on hand:

- Name, phone number, and email address of homeowner
- Physical address of where the unit is installed; please include any 'subdivision' or similar information
- Any service challenges present at the house/ neighborhood: gated community, locked access at house, guard dog, etc.
- Date of installation of the new unit
- Name and phone number of the professional and licensed entity that performed the installation for you

With all of the above information in hand, please contact Raypak and ask to register your brand new heat pump or Online at:

https://www.raypak.com/support/registration_warranty/

You will be given a Warranty Registration Confirmation number which you should notate and keep in one location along with your Installation & Owner's Manual, a copy of your warranty (provided with your manual) and the above information.

This unit is equipped with a QR Code on the rating plate, as shown in Figure 1, which will take you to the www.raypak.com website where the Installation & Owner's manual and other documents can be easily accessed.

This would also be a good time to review both the manual and the warranty so that you are aware of how to correctly operate your new equipment as well as how to keep from voiding any aspects of your warranty. During the life of your unit, please feel free to use the phone number conveniently located right on the unit, to contact us with any questions you may have about operation, warranty, and/or service.

Thank you very much choosing Raypak to satisfy your pool heating needs!!
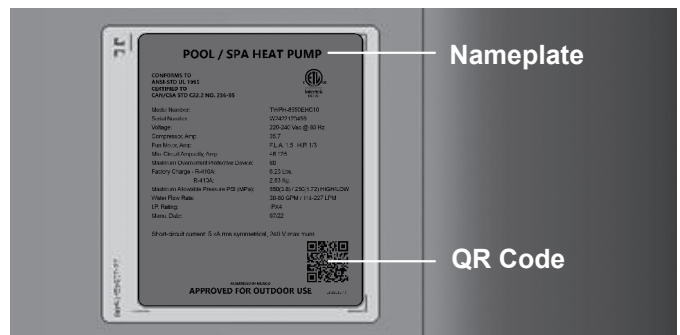

Figure 1.   Model and Serial Number Location

Warranty Registration Confirmation #:

Scan this QR with your smart device to register or verify your new Raypak heater.

3. WATER CHEMISTRY

IMPORTANT: Damage from corrosive water is not covered under warranty.

For your health and the protection of your pool equipment, it is essential that your water be chemically balanced. The following levels in Table A must be used as a guide for balanced water.

- Occasional chemical shock dosing of the pool or spa water should not damage the heater providing the water is balanced. However, it is highly recommended that the heater is isolated via shutoff valves before any aggressive chemical treatment.

- Automatic chemical dosing devices and salt chlorinators are usually more efficient in heated water. Unless controlled, they can lead to excessive chlorine level which can damage your heater.

- Further advice should be obtained from your pool or spa builder, accredited pool shop, or chemical supplier for the correct levels for your water.

4. INSTALLATION CONSIDERATIONS

⚠ **WARNING**: Do not install the unit within 3 ft (0.9 m) of fossil-fuel-burning heaters. Air intake along the sides of this heat pump pool heater could disturb the combustion process of the gas-fired unit, and could cause damage or personal injury.

● **Mount the unit on a level, sturdy base, preferably a concrete slab. The size of the base should be at least 3 ft by 3 ft (0.9 m x 0.9 m) - slightly larger if hurricane tie-down brackets are installed. See Figure 5 for more details.**

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

IN REVIEW

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

- For unrestricted air intake and service access, position each side of the unit at least 1 ft (30 cm) from walls, pipes and other obstructions.

⚠ **WARNING:** This unit is designed for outdoor installation. It is NOT certified for indoor installation. DO NOT install it in an enclosed area such as a shed or garage, or under a porch or deck.

- This unit features an 'up-flow' discharge for quiet operation. Air is pulled up through the evaporator coil and discharged through the top grill. Allow at least 5 ft (1.5 m) clearance above the unit for unrestricted air discharge. Do NOT install the unit under a porch or deck. Refer to Figure 2 for installation clearances. Allowing cold discharge air to recirculate back into the evaporator coil will greatly reduce the unit's heating capacity and efficiency. To minimize water piping, locate the unit as close as possible to the existing pool pump and filter.

- Irrigation water should be directed away from the heater - irrigation water spray can damage the heater.

- Rain water runoffs - the unit is designed to operate outdoors and can be exposed to rain. However, rain water runoff falling directly onto the unit can cause damage and/or shorten the life of your unit. Such damage is NOT covered under warranty. Install rain gutters or rain diverters on your roof if the unit is installed in a position where contact with rain runoff may occur.

- It is important to keep the area next to the heater clear of shrubs, bushes and chemicals containers. They could prevent air from circulating fully through the heater, and will affect the operation of the heater or damage the unit.

- When installed in areas where freezing temperatures

Recommended Level(s)	Fiberglass Pools	Fiberglass Spas	Other Pool & Spa Types
Water Temp.	68 °F to 88 °F (20°C to 31°C)	89 °F to 104 °F (32°C to 40°C)	68 °F to 104 °F (20°C to 40°C)
pH	7.3 to 7.4	7.3 to 7.4	7.6 to 7.8
Total Alkalinity (PPM)	120 to 150	120 to 150	80 to 120
Calcium Hardness (PPM)	200 to 300	150 to 200	200 to 400
Salt (PPM)	4500 MAXIMUM	4500 MAXIMUM	4500 MAXIMUM
Free Chlorine (PPM)*	2 to 3	2 to 3	2 to 3
Total Dissolved Solids (PPM)	3000 MAXIMUM**	3000 MAXIMUM**	3000 MAXIMUM**
Water Pressure (psi/kPa)	5 MIN. - 70 MAX. (35 MIN. - 483 MAX.)	5 MIN. - 70 MAX. (35 MIN. - 483 MAX.)	5 MIN. - 70 MAX. (35 MIN. - 483 MAX.)

***Free Chlorine MUST NOT EXCEED 5 PPM!**

** In salt water chlorinated pools, the total TDS can be as high as 6000 ppm.
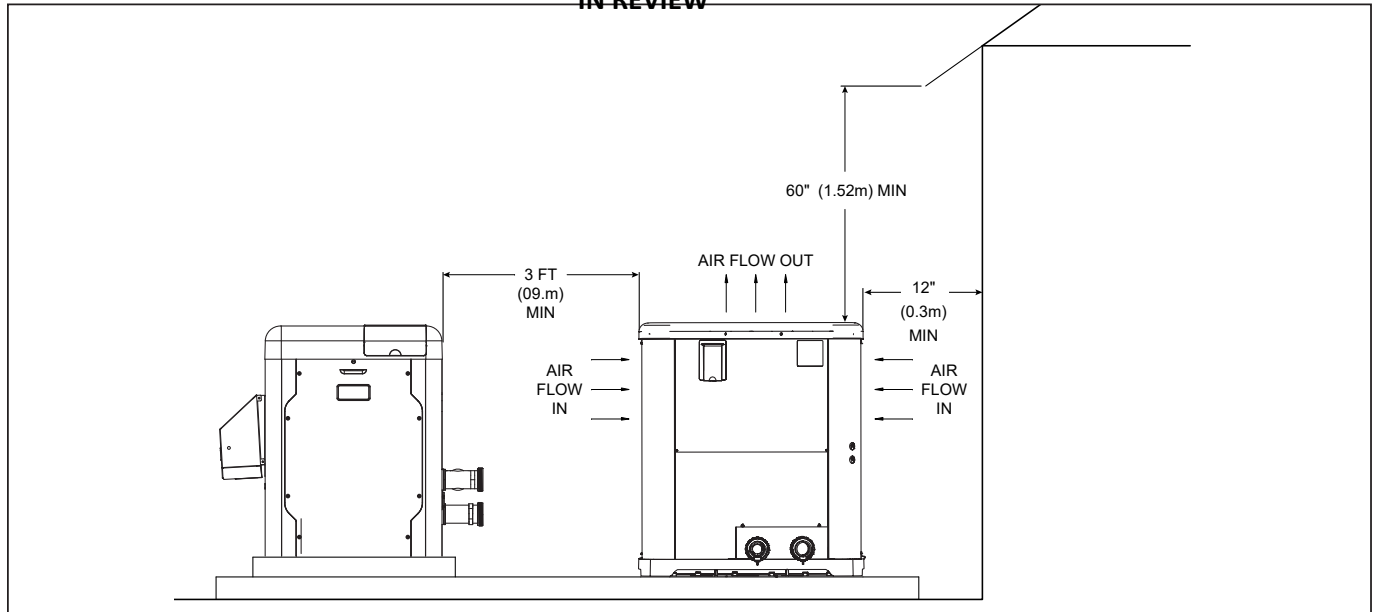
Table A. Water Chemistry

Figure 2.   Installation Clearances

can be encountered, drain the water circuit to prevent possible freeze-up damage. Refer to "Freeze Protection" on page 27 for proper procedures.

• When the heater is located below the water line of the pool or spa, it may be necessary to adjust the Water Pressure Switch (WPS) to compensate for the no-flow static head (see Figure 4). If after adjusting the WPS to its maximum setting without resolution, an external Water Flow Switch (WFS) must be installed. See "Water Flow Switch" section below for further installation instructions.

• For high-wind installation requirements, refer to Figure 5 – depending on the model size.

> NOTE: **The base is designed with recessed areas to allow the use of hand trucks or lifting without the possibility of pinching fingers as shown in Figure 3.**
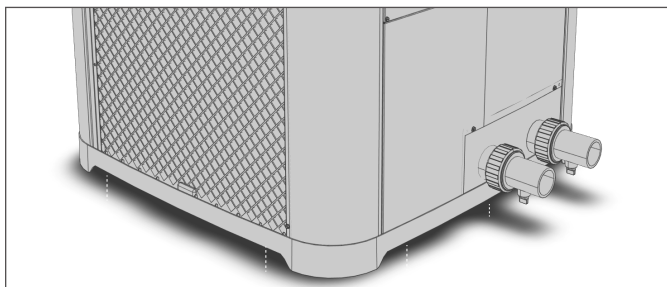
Figure 3.   Base Design - Handling

Water Flow Switch

If the heater is located below the water line of the pool, an external Water Flow Switch (WFS) must be installed. The WFS is provided with the heater and must be installed as per the following instructions to prevent nuisance heater tripping (for example: high-pressure switch fault) and to ensure proper operation.

1. Install the WFS onto the water inlet piping as shown in Figure 47.

2. The WFS must be installed before any bypass or check valve assembly.

3. The WFS must be installed within a straight, horizontal piece of inlet piping of at least 5" in length. The WFS sensor is sized for 1.5" pipe, but can be converted to 2" if required.

4. The WFS must be installed in close proximity to the heater, Raypak recommends it be installed no further than 2 ft. away, per Figure 47.
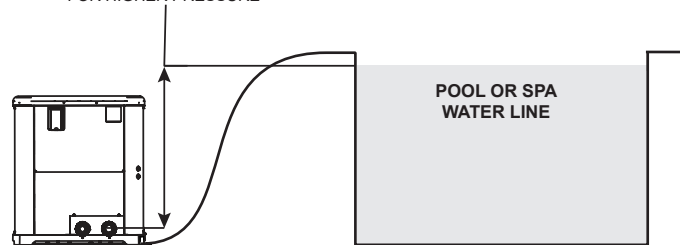
Figure 4.   Water Pressure Switch Adjustment
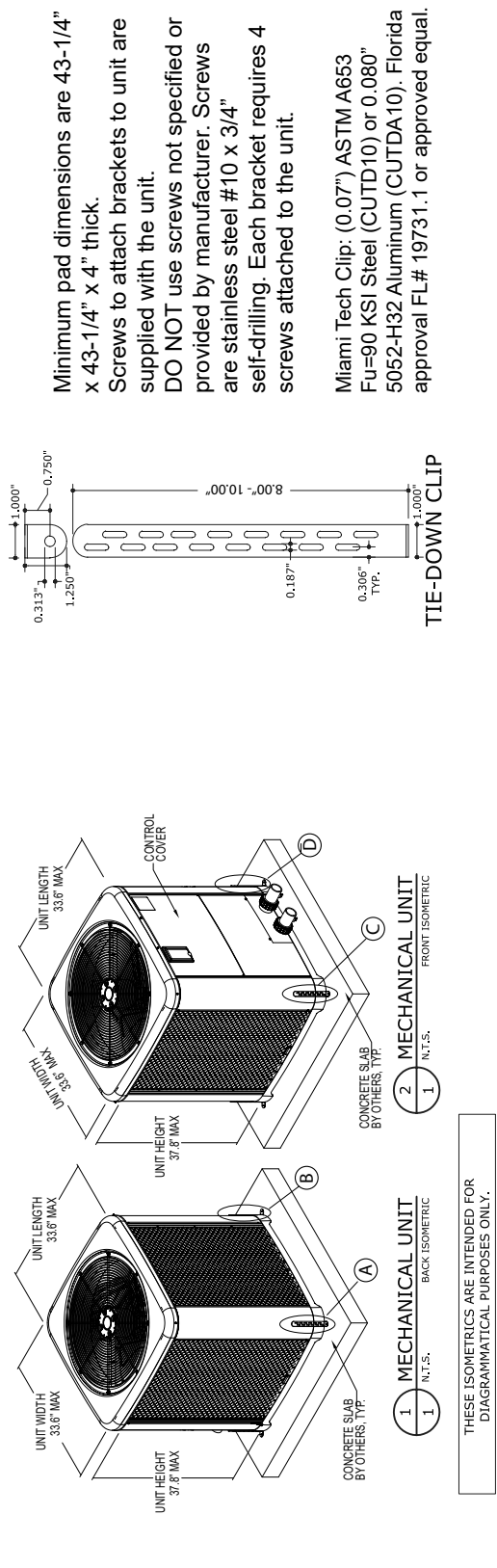
Minimum pad dimensions are 43-1/4" x 43-1/4" x 4" thick.
Screws to attach brackets to unit are supplied with the unit.
DO NOT use screws not specified or provided by manufacturer. Screws are stainless steel #10 x 3/4" self-drilling. Each bracket requires 4 screws attached to the unit.

Miami Tech Clip: (0.07") ASTM A653 Fu=90 KSI Steel (CUTD10) or 0.080" 5052-H32 Aluminum (CUTDA10). Florida approval FL# 19731.1 or approved equal.
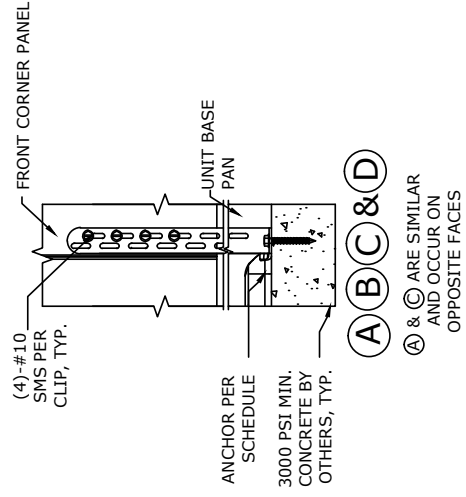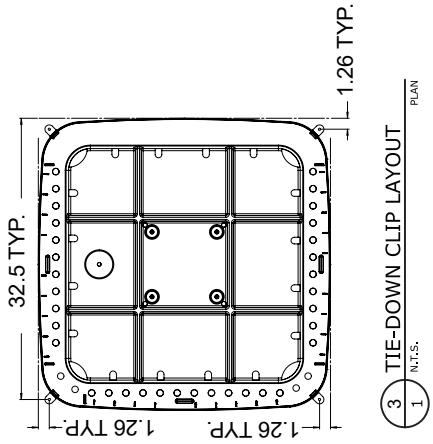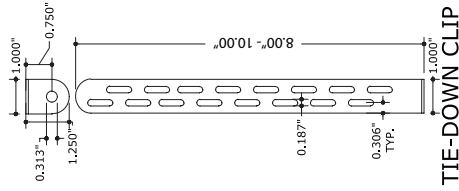
TIE-DOWN CLIP

TIE-DOWN SCHEDULE

Installation Condition	Max. ASD Wind Pressures Lateral (Uplift)	# of Tie-Down Clips
At-Grade	± 54 psf (0 psf)	4
At-Grade / Rooftop	± 140 psf (111 psf)	8

Maximum Rated Wind Pressures:
± 140 psf Lateral, 111 psf Uplift

CONTROL COVER

UNIT LENGTH 33.6" MAX

UNIT WIDTH 33.6" MAX

UNIT HEIGHT 37.8" MAX

CONCRETE SLAB BY OTHERS, TYP.

$\frac{2}{1}$ MECHANICAL UNIT   N.T.S.   FRONT ISOMETRIC

UNIT LENGTH 33.6" MAX

UNIT WIDTH 33.6" MAX

UNIT HEIGHT 37.8" MAX

CONCRETE SLAB BY OTHERS, TYP.

$\frac{1}{1}$ MECHANICAL UNIT   N.T.S.   BACK ISOMETRIC

THESE ISOMETRICS ARE INTENDED FOR DIAGRAMMATICAL PURPOSES ONLY.

FRONT CORNER PANEL

UNIT BASE PAN

(4)-#10 SMS PER CLIP, TYP.

ANCHOR PER SCHEDULE

3000 PSI MIN. CONCRETE BY OTHERS, TYP.

A B C & D

A & C ARE SIMILAR AND OCCUR ON OPPOSITE FACES

1.26 TYP.

32.5 TYP.

1.26 TYP.

1.26 TYP.

$\frac{3}{1}$ TIE-DOWN CLIP LAYOUT   N.T.S.   PLAN

Hurricane tie-downs are a structural component designed to prevent wind uplift during severe weather, such as hurricanes or severe storms. For further information on tie-downs, and technical support, contact Raypak at **www.raypak.com** or call **805-278-5300.**

Figure 5.   Hurricane Tie Down Instructions

5. WATER CONNECTIONS

CAUTION: The heater inlet and outlet are NOT interchangeable. They must be connected as instructed below.

⚠ WARNING: Improper installation of any type of automatic chemical feeders can result in serious damage to, or premature failure of, the heater and such damage will not be covered under warranty. Install a check valve and/or a Hartford loop AFTER the heater and BEFORE any chlorinating devices. Install any automatic chemical feeders AFTER the heater.

1. Connect the heater in the return water line between the filter and the pool/spa. See plumbing diagrams on page 31 (without bypass) and page 32 (with bypass).

2. Connect the filter outlet to the fitting marked INLET at the bottom front of the unit.

3. Connect the fitting marked OUTLET to the return piping to the pool/spa. Unit inlet/outlet connection fittings are 2-inch PVC unions.

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

- If the water flow through the unit will exceed 50 GPM, (189 LPM) a piped bypass is required. See Figure 46 for bypass instructions.

- To protect (completely bypass) the unit from any harmful chemical treatments (i.e. Acid wash, back-to-back super chlorinators, stain treatments, etc.); or to be able to isolate the unit for service/repair or freeze preparation and still allow pool/spa circulation to continue.

Please refer to the plumbing on page 32 for further instruction.

Please note that some municipalities do not allow the use of a shutoff valve on the effluent/outlet side of any heating equipment, especially when there is one on the inlet side. These entities typically instead allow a PVC tee and spring check valve on the effluent/outlet side. This is allowed by Raypak and can also double as your protection from chemical feeders and chlorinators that are downstream of the unit.

4. Operate the pump and check the system for leaks.

5. Drain plugs are located on each union fitting as shown in Figure 6 for draining the system during winterizing.

NOTE: While it is possible to mount the upper union with the drain plug vertically, the manufacturer has determined that installing both unions with the drain plugs facing down, as shown in Figure 6, provides for the best draining of the system.
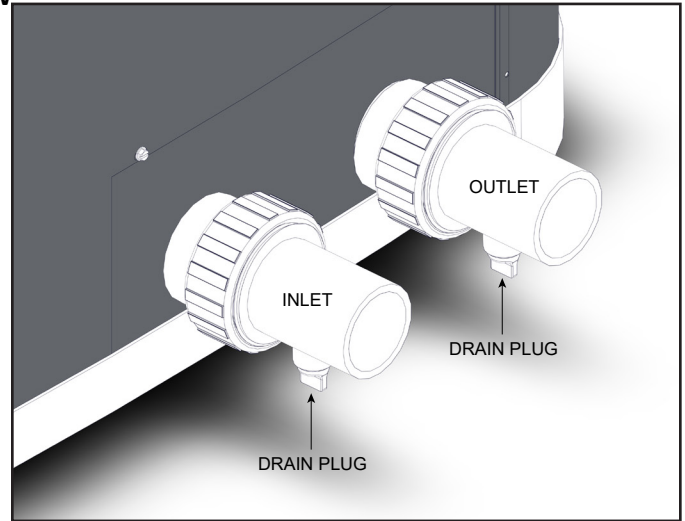
Figure 6.   Water Connections/Drain Plugs

CAUTION: When the drain plugs are removed for draining the system, ensure that they are stored in a safe place for re-installation when needed to restart the system.

6. FLOW RATE & PRESSURE DROP

Flow Rate GPM (LPM)	Heater Pressure Drop
30 (113)	6 PSI
40 (151)	9 PSI
50 (189)	10 PSI
60 (227)	11 PSI
70 (265)	12 PSI
80 (303) max.	13 PSI

Note: Minimum recommended flow is 20 GPM. Multiply the pressure drop in psi by 2.3067 to yield the pressure drop in Ft. H_2O Head (Total Dynamic Head TDH).

Table B.   Flow Rate & Pressure Drop Across the Heater

7. ELECTRICAL CONNECTIONS

Refer to the unit rating plate below the control panel for precise power requirements for your unit, and for ampacity and over-current protection requirements.

All wiring must be in accordance with the National Electrical Code, NFPA No. 70, latest edition, and all applicable state and local codes. See wiring diagram on page 11.

⚠ **WARNING: This unit MUST be installed using flexible conduit for supply wiring to the unit. This will allow movement of the conduit whenever the junction box is removed for service - see "Service Access to Heaters" on page 30.**

- Locate the equipment disconnect means within 3 feet (0.9 m) of the heater's electrical enclosure, or as close to the heater as possible. Always satisfy applicable codes and standards.

- A means to fully disconnect the unit from the main power supply must be incorporated in the wiring of the unit.

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

- In sizing power wiring, be especially aware of up-sizing requirements necessary due to wiring distances. Always satisfy applicable codes and standards.

- Connect electrical Line 1 (L1) and Line 2 (L2) to the terminals indicated in Figure 7 for proper wiring. Electrical installation should be performed by a licensed electrician only.

This unit is compatible with external control systems, (use the harness provided with the unit, see the **NOTE** on page 5), heat-on-demand options and other external time clock overrides. Refer to the external control system's instructions, and "Remote Mode Selector", on page 24 of this manual, for installation information.

An earth ground lug is located to the right-side of the water connections.

L2

L1 GND

For 208V operation, be sure to change the transformer to the 208 and C terminals.
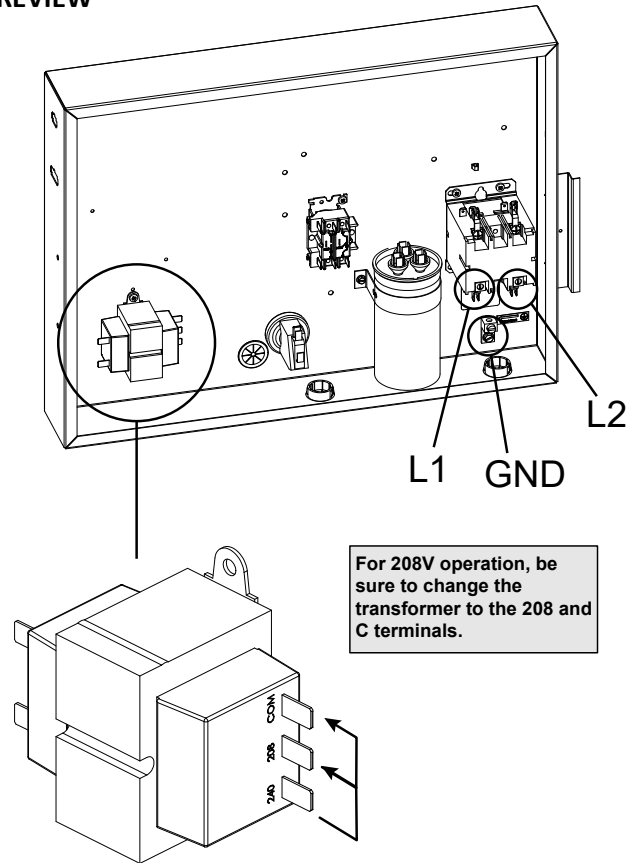
Figure 7.   Terminals L1 and L2

Power	Min. Circuit Ampacity	Breaker Size (AMP)	Recommended Wire Length from Breaker to Heater*, ft. (m)				
		MAX.	12 AWG	10 AWG	8 AWG	6 AWG	4 AWG
208/230V - Single Phase - 60Hz	46	70	NR**	97 (29.6)	156 (47.5)	247 (75.3)	396 (120.7)

* Reference only - see National Electrical Code or local codes for wire gauge length limits.

** NR= Not Recommended

Table C.   Typical System Electrical Power Requirements

8. WIRING DIAGRAM

208V/230V Single-Phase

Figure 8. Wiring Diagram
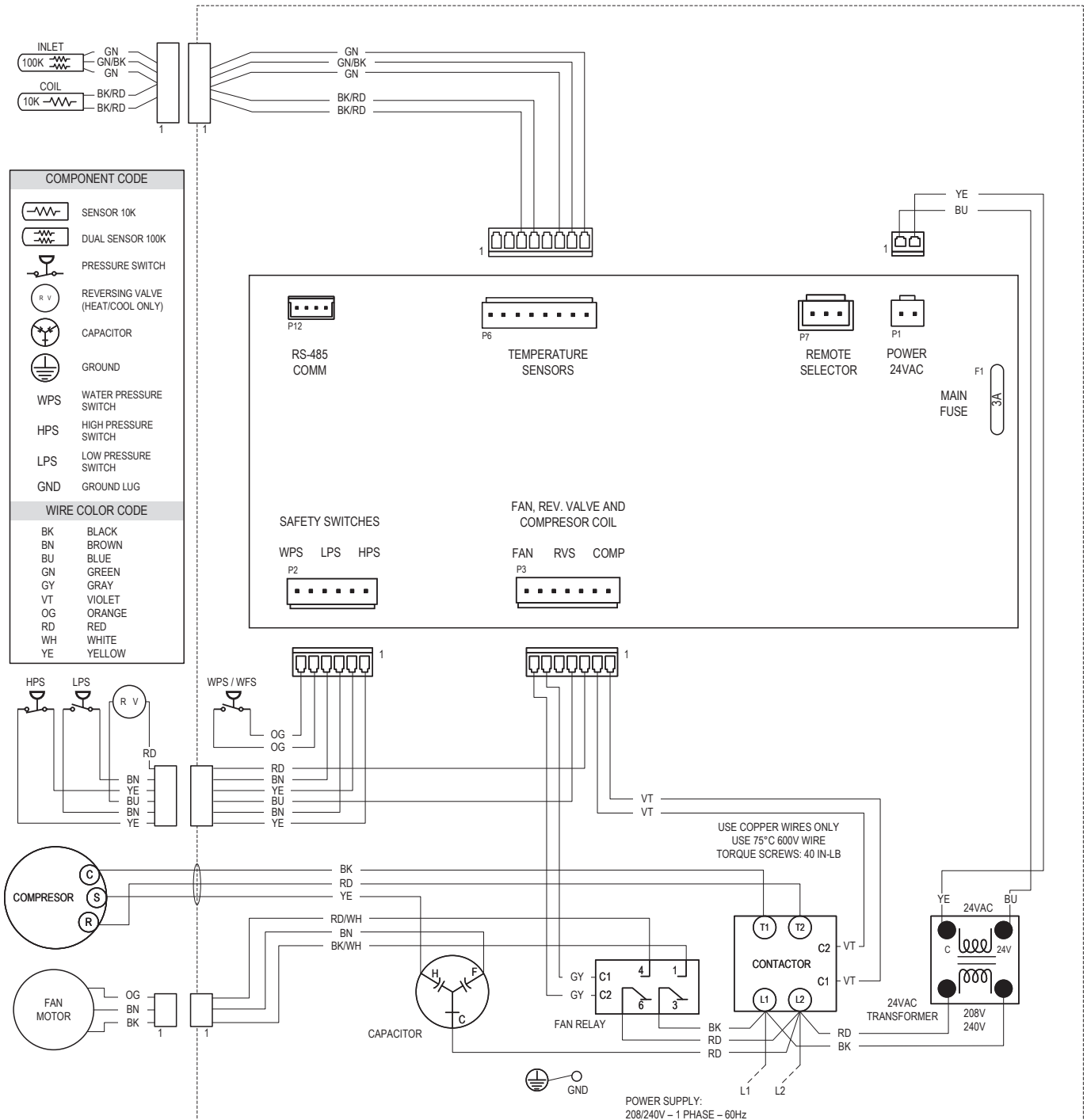
9. HEATER CONTROL DISPLAY

The heater display is located in the front panel of the heat pump, covered with a door. All operation and settings of the heater control are accomplished through the use of the three (3) buttons on the user interface. These keypad is displayed in Figure 9.

MENU / SET Button ◉

The MENU/SET button is used to select POOL or SPA operation. It also allows the user to select the OFF mode, during which the LCD displays OFF and continues to show the water temperature. Refer to section 10, "Operation Modes" for details.

UP and DOWN Buttons ∧ ∨

If the heater is in POOL or SPA mode, the desired water temperature setpoint can be adjusted using the UP or DOWN buttons.

UP BUTTON → ∧   DOWN BUTTON ← ∨

MENU/SET

MENU/SET BUTTON
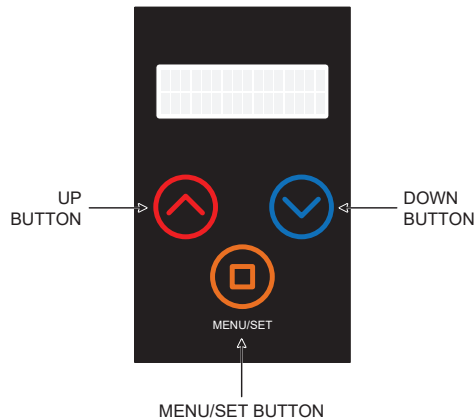
Figure 9.   Heater Control Display

The display shows information on a 2 row, 16-character back-lit Liquid Crystal Display (LCD). The back-light is normally off, but it turns on for 5-minutes after power-up and for 5-minutes after any button press. Use the LCD to set up and monitor the operation of your heater.

If the control buttons remains inactive for 5-minutes, the screen will turn off the back light.

On a normal power-up, the control displays the current software revision and unit type ("Heat only" or "Heat/Cool") on the LCD for 2-seconds and then resumes the user-selected mode it was in before power was interrupted.

If unit type has not been set (like during the replacement of the control board), the control prompts the user to set the unit type (Heat Only or Heat/Cool) before any device operation is enabled.

Upon initial installation, there are several items that can be defined and programmed depending on the heater configuration. Refer to the "Installer Menu" section on page 17 for details.

10. OPERATION MODES ◉

The user may select one of several operating modes. Each mode is selected by pressing the MENU button to cycle between the modes. Each press of the MENU button selects the next mode.

On **Heat Only** models, the options available by pressing the MENU button are POOL, SPA, TIMED SPA and OFF.

On **Heat/Cool** models, the options available by pressing the MENU button are POOL COOL, POOL HEAT, POOL AUTO, SPA, TIMED SPA and OFF.

OFF	
Water Temp	68F

OFF	
No Demand	
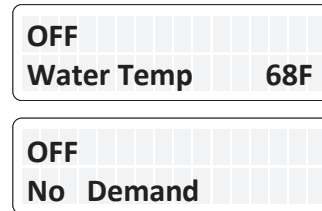
Figure 10.   Alternating Display

Pool [Heat] and Spa Modes

The control is equipped with POOL (heat) and SPA modes which will automatically heat the pool to the heating setpoint established in the selected mode.

The top row of the LCD displays the operation mode and temperature setpoint. When POOL (heat) or SPA mode is selected, each press of the UP or DOWN button will increase / decrease the water heating setpoint temperature. Holding the UP or DOWN buttons down will change the speed at which the temperature values change.

In these modes, the heater is set to heat when the water temperature is 1°F (0.5°C) degree below the selected temperature (setpoint). Heating is terminated when setpoint is reached.

When the water temperature is above the setpoint, the LCD will alternate "Water Temp" with "No Demand." When the water temperature is below the setpoint and the unit is heating, the LCD will alternate "Water Temp" with "Heating".

In POOL mode, default temperature setpoint is 80°F (27°C) with a maximum temperature limit of 95°F (35°C). In SPA mode, the default temperature setpoint is 100°F (38°C). with a maximum temperature limit of 104°F (40°C). Refer to "Program Menu", on page 17, to adjust the pool or spa maximum temperature limits.

Pool set	85F		Spa set	100F
Water Temp	68F		Water Temp	68F

Pool set	85F		Spa set	100F
Heating			Heating	

Figure 11.   Pool Heat and Spa Modes

Timed Spa Mode

The control is equipped with a mode which will heat the spa to the Spa setpoint temperature for a specified period of time selected in the TIMED SPA mode setup.

⚠️ **WARNING: If an external controller controls the spa heating in a pool/spa system, manual adjustment of the 3-way valves may be necessary to use the TIMED SPA feature of this heat pump. Failure to adjust the 3-way valves properly may result in pool water overheating or other undesirable results.**

To activate the timed spa feature, press the MENU button until "TIMED SPA" is displayed on the top line of the display. The display will read "Up or Dn to Set". This tells the user to press the UP or DOWN buttons to set the desired length of time for the timed spa heating operation.

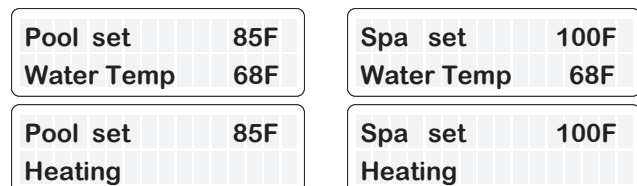Press the UP or DOWN buttons to select the desired duration of spa heating, up to a maximum duration of 6-hours in 15-minute increments. After selection of time is completed press MENU button to start heater operation.

The timer will start to count down from the selected period and the unit will operate to heat the water based on the previously selected spa setpoint temperature setting.

Once the unit turns on, the display will toggle between the current spa water temperature and the current operating state "Heating" and the timer.

The top row of the LCD displays the operation mode and temperature setpoint. Timed Spa temperature setpoint can be adjusted using the UP and DOWN buttons while the screen is displaying the Water Temperature and "Heating" status.

To adjust the timer, press MENU button, then use the UP and DOWN buttons to increase or decrease the timer. To terminate the timer, use DOWN button to set timer to 00:00:00.

When the TIMED SPA timer has expired, the control will be set to OFF.

```
┌─────────────────────────┐
│ Timed Spa      100F      │
│ Up  or  Dn  to  Set      │
└─────────────────────────┘

┌─────────────────────────┐
│ Timed Spa      100F      │
│  Heating       2:30:00   │
└─────────────────────────┘

┌─────────────────────────┐
│ Timed Spa      100F      │
│ Water Temp      68F      │
└─────────────────────────┘
```

Figure 12.   Timed Spa Mode

Pool Cool Mode - Heat/Cool Models Only

In heat/cool models, the control is equipped with a "Pool Cool Mode" which will automatically cool the pool to the cooling setpoint established in this mode.

The top row of the LCD displays the operation mode and temperature setpoint. In POOL COOL mode, each press of the UP or DOWN button will increase / decrease the water cooling setpoint temperature. Holding the UP or DOWN buttons down will change the speed at which the temperature values change.

In this mode, the heater is set to cool when the water temperature is 1°F (0.5°C) degree above the selected temperature (setpoint). Cooling is terminated when setpoint is reached.

When the water temperature is below the setpoint, the LCD will alternate "Water Temp" with "No Demand." When the water temperature is above the setpoint and the unit is cooling, the display will alternate "Water Temp" with "Cooling".

In pool cool mode, default temperature setpoint is 80°F (27°C) with a minimum temperature of 44°F (7°C) and maximum temperature limit of 95°F (35°C). Refer to "Program Menu", on page 18, to adjust pool maximum temperature limits.

```
┌─────────────────────────┐
│ Pool  Cool       85F     │
│ Water  Temp      95F     │
└─────────────────────────┘

┌─────────────────────────┐
│ Pool  Cool       85F     │
│ Cooling                  │
└─────────────────────────┘
```

Figure 13.   Pool Cool Mode

Pool Auto Mode - Heat/Cool Models Only

The control is equipped with a mode which will automatically heat and cool the pool within the range of the heating setpoint and the cooling deadband.

The top row of the LCD displays the operation mode and temperature setpoint. In POOL AUTO mode, each press of the UP or DOWN button will increase / decrease the water setpoint temperature. Holding the UP or DOWN buttons down will change the speed at which the temperature values change.

In these modes, the heater is set to heat when the water temperature is 1°F (0.5°C) degree below the selected temperature (setpoint). Heating is terminated when setpoint is reached. The heater is set to cool when the water temperature is above the selected temperature (setpoint) plus the specified cooling deadband. Cooling is terminated when setpoint plus the cooling deadband is reached.

Example: When the POOL AUTO setpoint is set at 80°F (27°C) and the cooling deadband set at 6°F (3.5°C), the unit will automatically heat the pool if the temperature drops below 80°F (27°C), and will automatically cool the pool if the temperature is above 86°F (30.5°C).

In pool auto mode, default temperature setpoint is 80°F (27°C) with a minimum temperature of 44°F (7°C) and maximum temperature limit of 95°F (35°C). Cooling deadband default is 6°F (3.5°C), adjustable from 2 to 10°F (1 to 5.5°C) degrees. Refer to "Program Menu", on page 18, to adjust pool maximum temperature limits and cooling deadband.

| Pool Auto | 85F |
| Water Temp | 83F |

| Pool Auto | 85F |
| Heating | |

| Pool Auto | 85F |
| Water Temp | 92F |

| Pool Auto | 85F |
| Cooling | |

Figure 14. Pool Auto Mode

Control Lockout Mode

Prevent unauthorized access to the heater's control settings with the "Control Lockout" feature. To activate the lockout, press and hold the MENU and DOWN buttons simultaneously for 5-seconds. Select a three-digit PIN by using the UP and DOWN buttons to select each digit and the MENU button to lock in the selection. Confirm your selection and make a record of your PIN for future reference.

| Control   Lockout | |
| Enter PIN | 000 |

| Confirm   Lockout | |
| Yes | |

Figure 15. Control Lockout

> **NOTE:** Record this lockout code for future reference.

To unlock the controls, select the ENTER PIN menu by pressing the MENU button followed by the UP or DOWN button. Enter the three-digit PIN that was previously used to lock the control. Please note that power cycling will not clear the lockout. A successful PIN entry will display "LOCKBOX CLEARED," whereas an incorrect PIN will result in "INVALID PIN" being displayed.

If the user-selected PIN is lost or does not clear the Control Lockout, enter **Code 101** to temporarily override the lock box and then the Program Menu to SET FACTORY DEFAULTS. This will remove the PIN and allow normal operation, including the selection of a new PIN if desired. Refer to the "Program Menu" section on page 16 for detailed instructions.

> **NOTE:** If you choose to set FACTORY DEFAULTS, the pool and spa setpoints will return to their default values of 85°F (29°C) and 100°F (38°C), respectively, and the maximum temperature settings for pool and spa will be reset to 95°F (35°C) and 104°F (40°C). It will be necessary to readjust these setpoints to your preferred settings. Additionally, other default configurations will be restored.

11. SERVICE MENU

To access the "Service Menu" and fault history, press and hold the MENU button for 5-seconds. The heater will continue to operate while in the service menu.

In the SERVICE menu, pressing the MENU button will move forward through the various information reported. The "Fault History" screen has multiple values. Press the UP or DOWN buttons to scroll through the additional registers of fault history. The SERVICE menu may be exited to return to the previous display by pressing and holding the MENU button for 5-seconds. It will automatically be exited if no button is pressed within 1-minute.

Supply Voltage

The first screen displayed is the "Supply Voltage" indicator, which indicates the voltage supplied to the control board. Normal readings range from 24 to 30 volts.

| Supply Voltage | |
| | 24V |

Figure 16. Supply Voltage Indicator

Run Time Hours and Cycles

Press the MENU button. The "Hours" run time indicates the total hours of operation for the pool heater, as measured by the amount of time that the compressor has been energized. The "Cycles" count indicates the number of on/off cycles of the heater, as measured by the number of times the compressor has been energized.

| Hours | 451 |
| Cycles | 89 |

Figure 17. Run Time/Cycles

Heat Pump Temperatures

Press the MENU button again. The "HPPH Temp" screen indicates the water temperature sensed in the water inlet and at the heat pump coil of the heater. When the compressor is not running, the coil temp sensor reports ambient temperature.

Water Temp	68F
Coil Temp	78F

Figure 18. Water and Coil Temperature

Faults History

Press the MENU button again to show "Fault History". To skip the faults history, press MENU button or press DOWN button to navigate through the faults recorded in memory. The "Fault History" displays up to ten faults in memory. The order of the faults begins with "Last Err", which is the most recent fault, and proceeds through the ten most recent messages in reverse chronological order.

Run time hours at the moment of the fault are displayed at the end of the first line. The second line of the display shows the "Fault" message. If there are no faults in the history buffer, the second line reads "All Faults Clear."

Last Err	450
Inlet Temp Fail	

Fault 9	241
Brownout	

or

Last Err	0
All Faults Clear	

Figure 19. Fault History

Installer Menu

Press the MENU button again. The "INSTALLER Menu" option is displayed. Press the UP or DOWN button to select "YES" and enter to the INSTALLER Menu or select "No" to continue in Service menu.

INSTALLER MENU
No

Figure 20. INSTALLER menu

Operations and Service Menu

OPERATION MODES

OFF mode

OFF
No Demand

OFF
Water Temp 68F

❄ POOL Cool mode

Pool Cool 80F
Cooling

Adjust Temperature

POOL [Heat] mode

Pool Heat 80F
Heating

Adjust Temperature

❄ POOL Auto mode

Pool Auto 80F
Cooling

Pool Auto 80F
Heating

Adjust Temperature

SPA mode

Spa set 100F
Heating

Adjust Temperature

Timed SPA mode

Timed Spa 100F
Up or Dn to Set

Timed Spa 100F
Heating 2:30:00

Adjust Duration to start Timer

❄ Options available only in Heat/Cool models

MENU/SET

SERVICE MENU

Press and hold MENU button for 5 seconds

Supply Voltage

Supply Voltage
26V

Run Counters

Hours 451
Cycles 89

Water & Coil Temperatures

Water Temp 70F
Coil Temp 75F

Faults History

Last Err 450
Inlet Temp Fail

Fault 9 241
Brownout

or

Last Err 0
All Faults Clear

Installer Menu

INSTALLER Menu
No

Select "Yes" to enter INSTALLER MENU

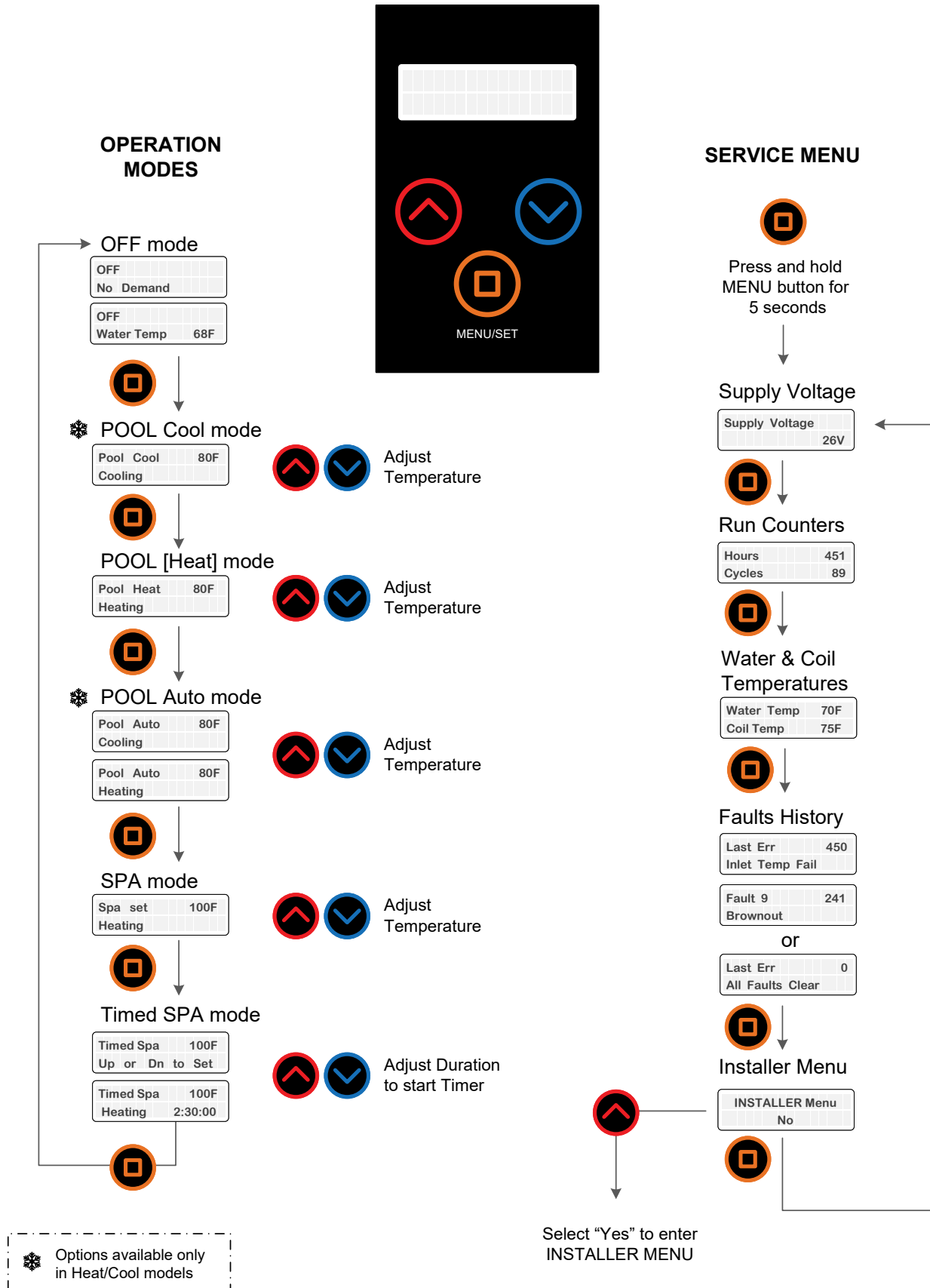**Figure 21. Operation and Service Screen**

12. INSTALLER MENU

The INSTALLER menu is available through the Service Menu. Open the service menu, then press the MENU button until you reach the "Installer menu" option. Press the UP or DOWN button to select "Yes" and enter the INSTALLER menu. When entering to Installer menu, "Language" screen appears on the display.

The screens in the INSTALLER menus allows the user to change the current programming, or to reset the unit to the factory default settings. There are different features and settings required for different model types. This section outlines the items noted on the display in Heat Only and Heat/Cool configurations, the default values and range of adjustable values and a description of the feature.

> **NOTE:** Any changes to values are stored into the non-volatile memory after selection is made using the UP or DOWN buttons. Pressing MENU button toggles to the next setting. Failure to press any button for 1-minute will cause the screen to return to Operation mode screen. The INSTALLER mode can also be exited by the "Exit INSTALLER" screen. In this screen select "Yes" and press MENU to exit.

> **CAUTION**: Changes to default program configurations could affect normal functionality of the heater.

Language Selection

The initial screen in INSTALLER Menus is "Language" selection.

Use the UP and DOWN buttons to toggle between English, Spanish or French language for all menus and Display messages.

Language	Lenguaje	Langue
English	Español	Français

Figure 22.   Language Selection Mode

Set Factory Defaults

Press the MENU button again. "Set Defaults" option is displayed. To set factory defaults, press and hold the UP and DOWN buttons simultaneously for 5-seconds until "Defaults Set" appears. This operation resets the operating program to its factory default values.

The pool setpoint is configured to 80°F (27°C), and the SPA setpoints will default to 100°F (38°C). The maximum temperature setting for pool and spa is limited to 95°F (35°C) and 104°F (40°C), respectively. The language is set to English, and the temperature display is set to Fahrenheit. The cooling deadband is set to 6°F (3.5°C), defrost temperature to 24°F (-4°C), defrost deadband to 10°F (5.5°C) and outside lockout to 45°F (7°C), respectively. The brownout is set to 230V, and the remote pool mode is set to Heat. Note that cooling deadband and remote pool mode settings are only available in Heat/Cool models.

The "Control Lockout PIN" will be cleared, and the control will resume normal operation. See the "Control Lockout" section on page 14.
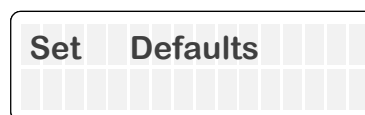
Set   Defaults

Figure 23.   Set Defaults Option

Reset Faults

Press the MENU button again. "Reset Faults" appears on the digital display. To clear the faults history, press and hold the UP and DOWN buttons simultaneously for 5-seconds until "Faults Cleared" appears.

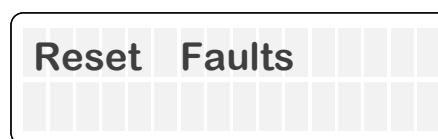This function clears the historical fault available in SERVICE menu.

Reset   Faults

Figure 24.   Reset Faults Option

Temperature Display

Press the MENU button again "Temp Display" appears on the digital display. The UP or DOWN buttons will select "Fahrenheit" or "Celsius" on the temperature display. Choose the desired temperature scale. After making the selection, all temperature screens will be updated to display degrees in either Fahrenheit or Celsius.

Temp Display	Temp Display
Fahrenheit	Celsius

Figure 25.   Temperature Display Option

Spa Setpoint Maximum Adjustment

Press the MENU button again. "Spa Max Temp" appears on the digital display. Using the UP and DOWN buttons will change the maximum temperature setting to your desired value. The control can be set to limit the maximum setpoint in the range of 65°F to 104°F (18°C to 40°C). The default value is 104°F (40°C).
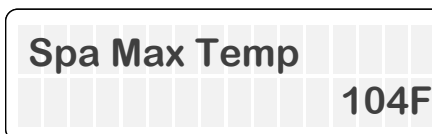
Spa Max Temp
104F

Figure 26.   Spa Setpoint Maximum Adjustment Option

Pool Setpoint Maximum Adjustment

Press the MENU button again. "Pool Max Temp" appears on the digital display. Using the UP and DOWN buttons will change the maximum temperature setting to your desired value. The control can be set to limit the maximum setpoint in the range of 65°F to 95°F (18°C to 35°C). The default value is 95°F (35°C).
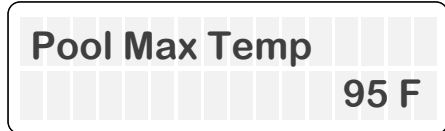
Pool Max Temp

95 F

Figure 27.   Pool Setpoint Maximum Adjustment Option

Cooling Deadband Adjustment - (Heat/Cool Models Only)

Press the MENU button again. "Cooling Deadband" appears on the digital display. Using the UP and DOWN buttons will change the cooling deadband setting. In POOL AUTO mode, the cooling setpoint is the heating setpoint minus this cooling deadband value. This setting can be set in the range of 2°F to 10°F degrees (1°C to 5.5°C). The default value is 6°F (3.5°C).
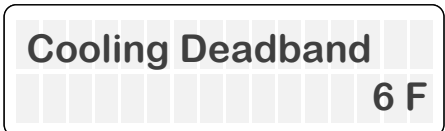
Cooling Deadband

6 F

Figure 28.   Cooling Deadband Adjustment Option

Remote Pool Mode - (Heat / Cool Models Only)

Press the MENU button again. "Remote Pool Mode" appears on the digital display.

When Remote mode (3-wire selector) is enabled, and the unit is a Heat/Cool model, this setting can be used to define the operation mode of the "Pool" wire selector. Use UP and DOWN buttons to set Remote pool mode to Pool Heat, Pool Cool or Pool Auto. The default value for remote pool mode is "Heat".
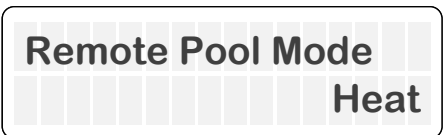
Remote Pool Mode

Heat

Figure 29.   Remote Pool Mode Option

Defrost Temperature Adjustment

To adjust the defrost temperature, press the MENU button and select "Defrost Temp" on the digital display. Use the UP and DOWN buttons to adjust the temperature setting, which is measured on the coil during defrost mode. The range of available settings is 20°F to 35°F (-6.5°C to 1.5°C), with a default value of 24°F (-4°C).

Defrost Temp

24F
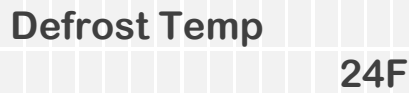
Figure 30.   Defrost Temperature Adjustment Option

Defrost Deadband Adjustment

To adjust the defrost deadband, press the MENU button and select "Defrost Deadband" on the digital display. Use the UP and DOWN buttons to adjust the deadband setting, which determines when defrost mode ends based on the coil temperature. The defrost cycle ends when the coil temperature is higher than the Defrost Temperature plus the Defrost Deadband. You can set this value in the range of 5°F to 20°F (2.5°C to 11°C), with a default value of 10°F (5.5°C).

Defrost Deadband

10F
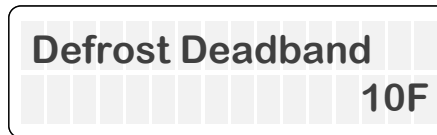
Figure 31.   Defrost Deadband Adjustment Option

Outside Lockout Temperature Adjustment

To adjust the outside lockout temperature limit, press the MENU button and select "Outside Lockout" on the digital display. Use the UP and DOWN buttons to set the ambient temperature at which the unit will be locked out of operation. This setting can be adjusted in the range of 30°F to 50°F (-1°C to 10°C), with a default value of 45°F (7°C).

Outside Lockout

45F

Figure 32.   Outside Lockout Temperature Adjustment

Brownout Detection Mode

To adjust the brownout detection mode, press the MENU button and navigate to "Brownout Detect" on the digital display. You can then use the UP and DOWN buttons to choose from three options: 230V, 208V, or Disabled. Enabling brownout detection will cause the unit to shut down automatically if the Transformer's 24VAC signal drops below a certain threshold, specifical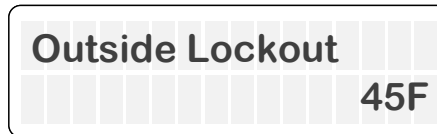ly below 21VAC for 230V or below 24VAC for 208V. This function is intended to protect the unit from low-voltage situations. If you prefer not to use this feature, simply select "Disabled". The default setting for brownout detection is 230V.

```
 Brownout Detect.
                230V
```
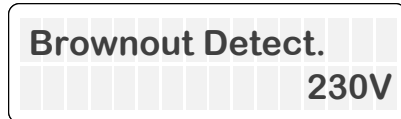
Figure 33. Brownout Detection Mode Option

NOTE: Disabling "Brownout Detection" limits the ability of the heater to protect the compressor.

Exit Installer Menu

This screen allows the user to exit the Installer menu. Use the UP or DOWN buttons to select "Yes", then press the MENU button to exit. By exiting the Installer menu, all changes made to settings are stored in non-volatile memory. The display returns to operation screen.

```
 EXIT INSTALLER
             No
```
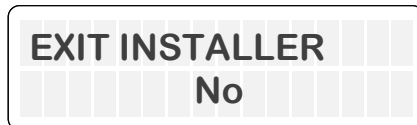
Figure 34. Exit Installer Menu

Unit Type

NOTE: "Unit Type" setting shall be used only by servicer when the control boards has been replaced and unit type needs to be set. The "Unit type" setting refers to Heat-only or Heat/Cool HPPH. Selecting the wrong configuration may result in malfunctioning of the heater.

Pressing the MENU button again shows the "Unit Type" screen. This screen allows the user to change the control to operate as Heat-Only or Heat/Cool. The proper operation modes are defined by the model of the unit. Do not change Unit type if this is not required.

Use the UP or DOWN button to change unit type. To save the change to non-volatile memory, press and hold the UP and DOWN keys for 5-seconds until the display shows "Unit Type".

Installer Menu Diagram

From Service menu:

```
INSTALLER MENU
          Yes
```

Use UP or DOWN
buttons to select "Yes"
to enter INSTALLER
Menu

INSTALLER MENU

Language

```
Language
English
```
```
Lenguaje        Langue
Español         Français
```
Select
Display
Language

Set Defaults

```
Set    Defaults
```
```
Defaults   Set
```
+ 5 sec

Set Factory
Defaults

Reset Faults

```
Reset   Faults
```
```
Faults   Cleared
```
+ 5 sec

Reset Fault
History

Temperature Display

```
Temp  Display
Fahrenheit
```
```
Temp  Display
Celsius
```
Select
Temperature
Scale

Max Spa Setpoint

```
Spa Max Temp
          104 F
```
Adjust Spa
Temperature
Limit

65°F - 104°F

Max Pool Setpoint

```
Pool  Max  Temp
           95 F
```
Adjust Spa
Temperature
Limit

65°F - 95°F

❄ Cooling Deadband

```
Cooling  Deadband
              6 F
```
Adjust
Cooling
Deadband

2°F - 10°F

❄ Remote Pool Mode

```
Remote  Pool  Mode
              Heat
```
Select
Remote Pool
Operation

**Heat, Cool
or Auto**

Defrost Temperature

```
Defrost  Temp
           24 F
```
Adjust
Defrost
Temperature

20°F - 35°F

Defrost Deadband

```
Defrost  Deadband
            10 F
```
Adjust
Defrost
Deadband

5°F - 20°F

Outside Lockout

```
Outside Lockout
           45 F
```
Adjust Outside
Lockout Temp.

30°F - 50°F

Brownout Detection

```
Brownout  Detect.
           230V
```
Select
Brownout
voltage option

**230v, 208v
or Disabled**

Exit Installer menu

```
Exit INSTALLER
            No
```
Select **Yes** to Exit the
INSTALLER MENU or
No to continue

Unit Type

```
Unit Type
        Heat  Only
```
Change unit
type

**Heat Only or
Heat/Cool**

Set Unit Type
selection

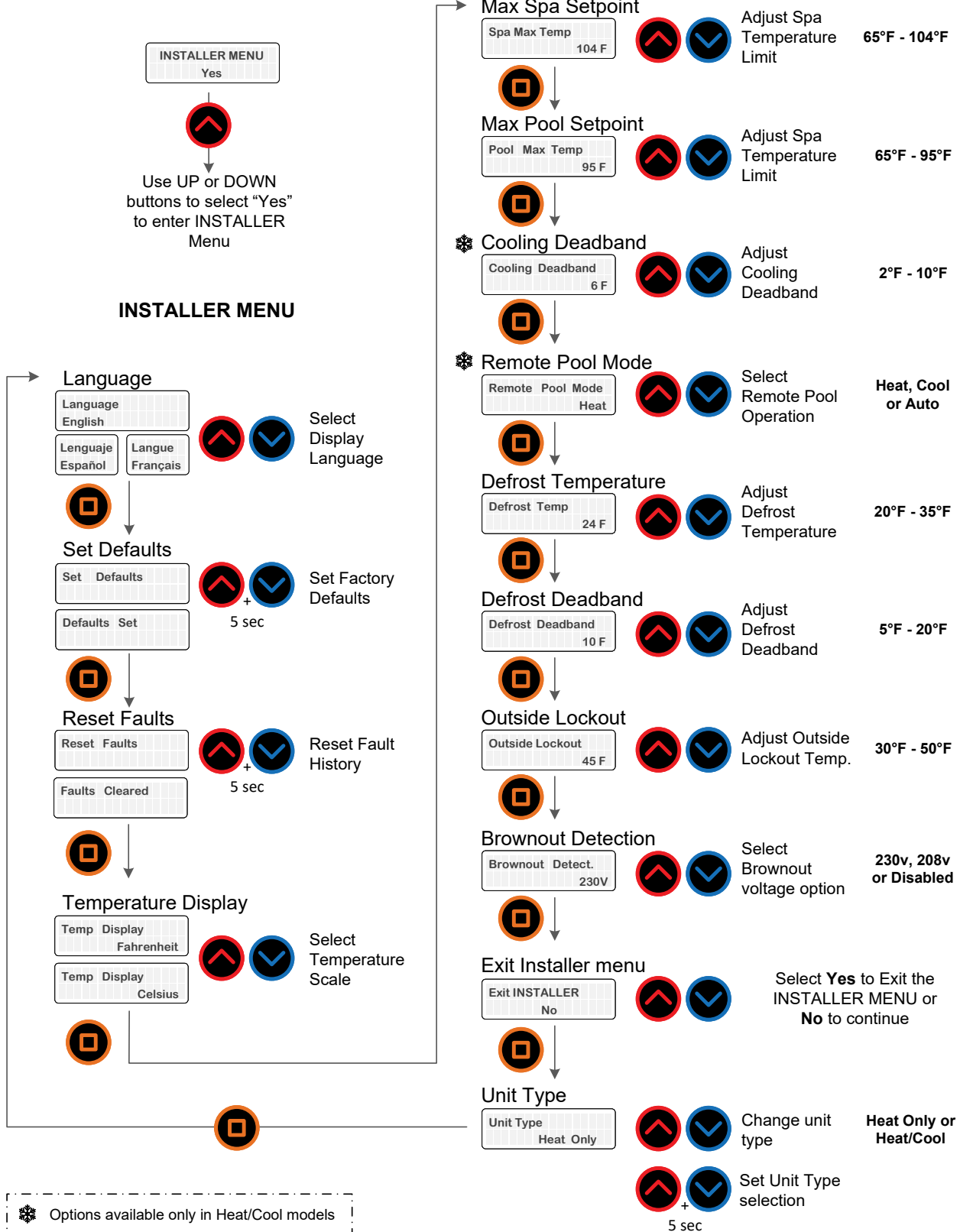+ 5 sec

---

❄ Options available only in Heat/Cool models

Figure 35.   Installer Menu

13. DIGITAL CONTROLS OPERATION

This heater incorporates digital safety controls and indicators to ensure safe and reliable operation. The pool water temperature is controlled by the heater's digital control system, which provides multiple operation modes as described in section 10, "Operation Modes," on page 12.

The unit is compatible with most "2-wire" and "3-wire" control/automation systems. For more information about 2 and 3-wire control, refer to Section 16, "Remote Mode Selector", on page 24.

This section explains the general control sequence of operation, as well as the protections provided by the heater to ensure safe and dependable operation.

Sequence of Operation

1. Upon the initial application of power, the heater control briefly illuminates all segments on the LCD at power-up.

2. The control displays the current software version on the LCD for 2-seconds, then resumes the user-selected mode it was in before power was interrupted.

3. For service replacement of control boards, if the unit type has not been set, the control prompts the user to set the model type before enabling any device operation.

NOTE: **The model type is set from the factory. If this value needs to be updated due to a board replacement, use the special menu "Unit Type", available in the Installer menu. The Installer menu can be accessed from the Service menu. Refer to section 12, "Installer Menu", on page 17 for more information.**

4. The user can select one of several operating modes depending on the unit type. To cycle between the modes, simply press the MENU button. Each press of the MENU button selects the next mode.

• For Heat Only models, the available mode selections are OFF, POOL, SPA, and TIMED SPA.

• For Heat/Cool models, the available mode selections are OFF, POOL COOL, POOL HEAT, POOL AUTO, SPA, and TIMED SPA.

For more information, refer to section 10, "Operation Modes", on page 12. For information about the remote mode, please refer to section 16, "Remote Mode Selector", on page 24.

5. During operation, the unit will run until the water temperature reaches 0.5°F (0.3°C) above the setpoint for heating (or below for cooling), or until the unit is manually turned off.

6. The unit will enter standby mode and wait for the next demand to start heating or cooling the water.

System Start-Up

1. Ensure that the Digital Board is displaying the correct temperature and that the pool pump is running, and water is circulating properly.

2. Confirm that the Board is programmed with the desired temperature setpoint for the pool and/or spa.

3. Allow the heater to operate for a few minutes to stabilize the operating pressures and allow various component temperatures to normalize.

4. After the unit has been operating in heating mode for a few minutes, check that the discharge air temperature is approximately 8°F-10°F (4.4°C-5.5°C) cooler than the air entering the unit.

5. In Heat/Cool models, after the unit has been operating in cooling mode for a few minutes, the discharge air temperature should be 8°F-10°F (4.4°C-5.5°C) warmer than the air entering the unit.

NOTE: **Heating is more efficient during warmer daylight hours, while cooling is more efficient during cooler nighttime hours. To speed up the cooling process, turn off the pool/spa blanket and turn on any fountains, sprays, or other water features at nighttime.**

Operational Status Messages

The LCD screen displays a range of status and diagnostic messages, depending on the operating conditions. The following status messages, will be shown in pool, spa, and remote modes when no active fault conditions are present.

Display	Condition
No Demand	Demand has been satisfied and the unit is in standby.
Heating	Unit is operating and running a heating cycle.
Cooling	Unit is operating and running a cooling cycle.
Defrost	Unit is performing a defrost cycle. Coil temperature is below defrost temperature limit. Verify defrost temperature and defrost deadband settings.
Comp Start Delay	Notification that the compressor is under a 3-minute delay before turning on.
Outside Lockout	The compressor is not running because the ambient temperature is too cold as measured by the ambient sensor. Verify outside lockout temperature setting.

Table D.   Operational Status Messages

Error Messages

The following error messages are displayed in pool, spa, and remote modes. Consecutive identical faults are only stored once in the "Fault History".

⚠**WARNING:** Performing service on this equipment requires specialized expertise, mechanical skills, tools, and equipment. If you do not possess these, it is not recommended to attempt any service on this equipment unless following the procedures outlined in this manual.

Display	Troubleshooting
In Sensor Fault	Inlet sensor fault - Check for low water flow conditions. Check pump speed. Check inlet sensor.
In Sensor Open	Inlet sensor fault - Sensor open. Check sensor wires and harness terminals.
In Sensor Short	Inlet sensor fault - Sensor short. Check sensor wires and terminals.
Coil Sensor Open	Coil sensor open - Check sensor wires and terminals.
Coil Sensor Short	Coil sensor short - Check sensor wires and terminals.
Internal Fault	Controller faulted - Memory corrupted. Power cycle unit. Replace main board.
Low Temp Lockout	Temperature lockout - Water temperature below is 36°F (2°C). Check water temperature. Check inlet sensor.
Hi Press Trip	High-pressure switch tripped - Check water flow, check refrigerant load
Lo Press Trip	Low-pressure switch tripped - Check refrigerant load
Hi Press Lockout	High-pressure lockout - Multiple pressure trips detected. Check refrigerant load
Lo Press Lockout	Low-pressure lockout - Multiple pressure trips detected. Check refrigerant load
Brownout	Low voltage in 24V transformer - Check voltage input 230v /208v
Hi Water Trip	High-temperature water trip - Inlet water is higher than 106°F (41°C).
Hi Water Lockout	High-temperature water lockout - Inlet water is higher than 108°F (42°C).
Remote Error	Remote 3-wire selector fault - Pool and spa inputs are energized. Check 3-wire remote control terminals.
Water PS Open	Water pressure switch open - Check pump operation. Check water flow.
Outside Lockout	Outside lockout - Compressor not running because ambient too cold.
Defrost Lockout	Defrost operation not effective. Confirm ambient conditions.

Table E.   Error Messages

Minimum Run Time

To ensure the compressor operates efficiently and has a longer lifespan, the control has set a minimum run time of 3-minutes. If the setpoint temperature is reached within 3-minutes, the compressor will continue to run for the remaining time, unless one of the following conditions occur: (1) the high-pressure switch is tripped, (2) the water-pressure switch is tripped, (3) the high-temperature limit is reached, or (4) the user selects the "OFF" mode.

Compressor Start Delay

To prevent the compressor from short cycling, the control is programmed with a compressor start delay. The compressor will not be energized unless it has been off for at least 3-minutes. During this delay, the display will show "Comp Start Delay", until the 3-minute wait time is completed and the compressor starts.

Water Pressure Switch

The control system includes a water pressure switch (or flow switch, if available) that is constantly monitored. If the compressor is required and the water pressure switch is open, the control system will prevent the compressor from starting and display the message "Water PS Open" on the screen.

Defrost Operation

The control's defrost temperature limits vary depending on the unit's configuration, whether it is a Heat Only or a Heat/Cool unit.

The control initiates a defrost cycle when the coil temperature falls to the "Defrost Temp" limit established in the Program menu, which is 24°F (-4°C) by default. For Heat Only models, during the defrost cycle, the compressor will shut off, while the fan will continue to operate to pull warmer air across the coil for defrosting.

For Heat/Cool models, during the defrost cycle, the control shuts off the fan and activates the reversing valve, while the compressor remains running. This action directs the hot refrigerant gas to the coil for defrosting.

Once the control sees a rise in the coil sensor temperature equal to "Defrost Temp" + "Defrost Deadband", which is 10°F (-12°C) by default, or after 15-minutes have passed, the unit exits the defrost cycle and returns to normal heating operation based on the current water temperature and setpoint temperature.

Low Ambient Temperature - Outside Lockout

The control features a Low Ambient Temperature Lockout function that prevents operation when the ambient temperature falls below the "Outside Lockout" temperature limit. You can access this setting through the Program menu, and the default value is 45°F (7°C). However, the temperature limit is adjustable, from 30°F (-1°C) to 50°F (10°C).

High Water Temperature Limit

If the compressor is demanded and the inlet water temperature is 106°F (41°C) or higher, the control will prevent compressor start, allow the pump to run, and show "Hi Water Trip" on the second line of the LCD. The fault is removed only when the water temperature drops below 106°F (41°C).

In the event that the inlet water temperature sensor reads at or above 108°F (42°C) while the compressor is running, the control will shut down the compressors and display "Hi Water Lockout" on the second line of the LCD. The compressors will remain locked out until the inlet sensor reading falls below 103°F (39°C).

This high-temperature limit is active in all modes of operation, including cooling operation (heat/cool models), in case of a reversing valve failure. High water temperature is ignored if there is no demand for the compressor.

High-Pressure Switch Lockout

In the event that the high-pressure switch opens, the control turns off the compressor output, and the fan will continue to operate for 15-minutes after the High-Pressure Switch (HPS) opens. Additionally, the display will show "Hi Press Trip."

If the high-pressure switch trips 7-times within a single cycle, the display will show "Hi Press Lockout," and the unit will be disabled for 4-hours. The unit will automatically reset after 4-hours, or the lockout can be manually reset by pressing the MODE button or by power cycling. It is important to note that the high-pressure switch must remain closed for a minimum of 3-seconds for the control to recognize that it has closed.

Low-Pressure Switch Lockout

The control has a 30-second grace period after the compressor is energized during which it will ignore an open low-pressure switch. However, if the low-pressure switch remains open for 3 or more seconds after this period, the compressor will shut down and the display will show "Lo Press Trip".

In the event that the low-pressure switch trips 6-times within a single cycle, the control will display "Lo Press Lockout" and the unit will be disabled for 4-hours. After the 4-hour period has elapsed, the unit will automatically reset. Alternatively, the lockout can be manually reset by power cycling the unit. It's important to note that the low-pressure switch must be closed for at least 3-seconds in order for the control to recognize it as closed.

14. REMOTE MODE SELECTOR

⚠ WARNING **The ability to properly perform service on this equipment requires a certain level of expertise, mechanical skills, and access to the necessary tools and equipment. If you do not possess these, do not attempt to perform any service on this equipment other than those procedures recommended in this manual.**

The heater controller is remote-ready. The digital display shows the actual pool temperature, operating status, and service messages. The touch buttons on the control panel allow you to select the desired pool or spa temperature before the remote mode is enabled. The LCD indicates when a remote system is controlling the heater by displaying "Remote" on the display. When connecting the heater to a remote system, identify whether it is a two- or three-wire remote system.

- REMOTE mode is accessed by pressing and holding the UP and DOWN buttons simultaneously for 5-seconds.

- If the UP, DOWN, or MENU buttons are pressed while in REMOTE mode, the display will read "Exit Remote Mode to Adjust Temp". The mode and temperature set points are not changed.

- Press and hold the UP and DOWN buttons for 5-seconds to exit REMOTE mode. When exiting REMOTE mode, the control always selects the OFF mode.

Select the appropriate instruction listed in the following paragraphs to properly install the remote to the heater.

Remote Wiring Connector

The heaters are equipped with the ability to work with external remote controls and automation systems. The supplied 3-pin remote wiring located in the packaging installed on connector "P7" supplies power out to either a toggle switch or the switch contacts of a third-party automation controller. The remote works by either making or breaking the circuit created by the remote wiring.
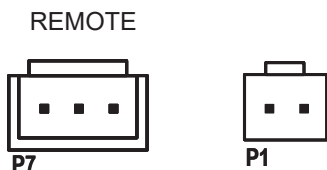
REMOTE

Figure 36. Remote Wiring Connector

NOTE: **Typically, a remote automation controller does not supply power to the heater, it only provides a switching function to turn the heater On or Off. If your remote controller is supplying its own voltage to the heater, it will not work with this heater and may damage the digital circuit board.**

Activating the Remote Mode

To activate or deactivate the remote mode, press and hold the UP and DOWN arrow buttons simultaneously for 5-seconds.

The first line in the LCD displays "Remote" and "Off", "Pool" or "Spa" and the temperature setpoint. The second line of the LCD displays "Water Temp" and water temperature alternating with heater status message. See Figure 37.
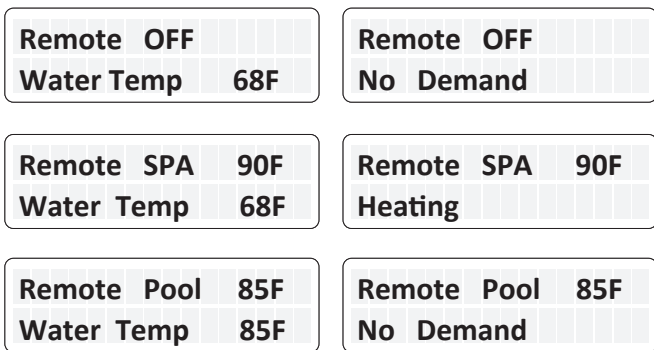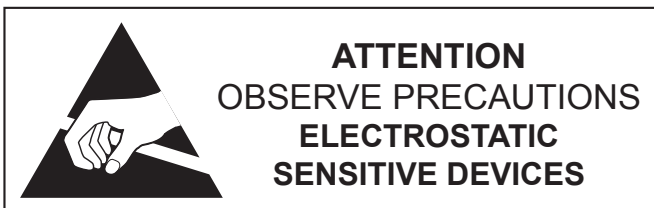
REMOTE MODE ENABLED

Remote OFF		Remote OFF	
Water Temp	68F	No Demand	

Remote SPA	90F	Remote SPA	90F
Water Temp	68F	Heating	

Remote Pool	85F	Remote Pool	85F
Water Temp	85F	No Demand	

Figure 37. Remote Operation Modes

Remote Control Wiring

ATTENTION
OBSERVE PRECAUTIONS
**ELECTROSTATIC
SENSITIVE DEVICES**

⚠ CAUTION: **Electrostatic Discharge (ESD) damage can be caused by direct or indirect contact with the wiring or circuit board. When one walks to the heater area, an electrostatic charge accumulates on the body. Contact of a finger allows the body to discharge, possibly causing device damage. This damage can be limited if the service person discharges himself, following ESD preventive/removal practices, and holds on to the heater enclosure for 5-seconds before proceeding.**

Important Installation Notes for Remote or External Wiring Configuration:

- Remote wiring must be run in a separate conduit.

- Remote wiring must not be run parallel to high voltage lines.

- For runs of under 30' (9 m), remote wiring should have stranded conductors with a minimum of 22 AWG, 600V, cable twisting 1.5" to 2.5" (3.8 to 6.4 cm) lay and jacketed.

- For runs over 30 feet (9 m), the conductors should be a minimum of 20 AWG, 600V, cable twisting 1.5" to 2.5" (3.8 to 6.4 cm) lay that is shielded and jacketed.

- Maximum cable length recommended is 200' (61 m).

- For both two- and three-wire remote systems, the provided 3-pin REMOTE connector "P7" must be utilized.

NOTE: **The remote wires must be connected to the 3-wire remote interface harness before the connector is plugged into the board.**
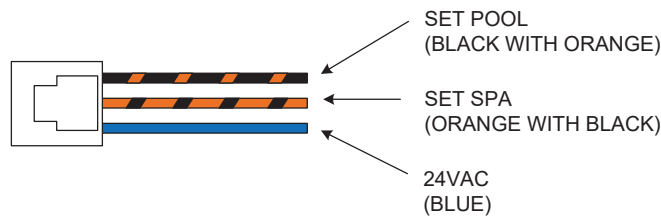

Figure 38. 3-Wire Remote Harness

SET POOL (BLACK WITH ORANGE)
SET SPA (ORANGE WITH BLACK)
24VAC (BLUE)

2-Wire Remote Control (On-Off)

This application assumes that only one heating function (pool or spa) is required.

1. Turn on power to the heater.

2. For a remote controller without its own thermostat, push the MENU button to the "POOL" or "SPA" mode and set the desired setpoint (e.g.102°F (39°C) for spa).

3. For a remote controller with its own thermostat, push the MENU button to select "POOL" or "SPA" mode and set the temperature to the highest setting available on the control. The actual setpoint will be controlled by the remote controller.

4. Use the MENU button to set operation mode to "OFF" and remove power from the heater.

5. On the 3-wire remote harness, connect the BLUE wire to one side of the remote automation controller and connect the other side to either the ORANGE/BLACK wire for "SPA" operation or the BLACK/ORANGE wire for "POOL" operation. See Figure 39.

6. Attach wire nut on the unused wire of the harness.

7. Install the "3-wire Remote Harness" to the "P7" connector and turn power "ON" to the heater. See Figure 39.

8. Activate remote mode in the heater. Press and hold the UP and DOWN arrow buttons simultaneously for 5-seconds.
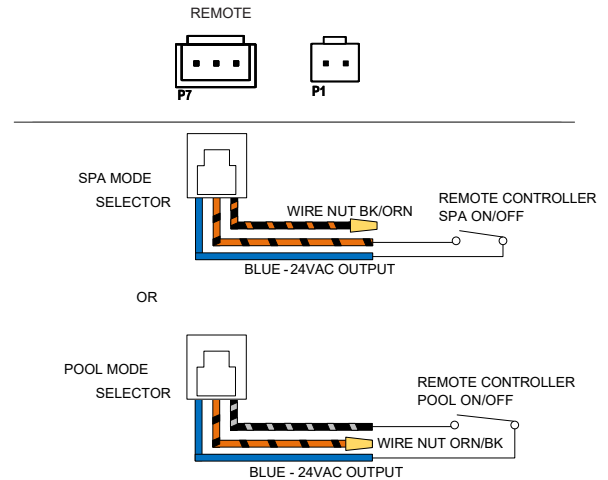
Figure 39. 2-Wire Remote Harness Installation

3-Wire Remote Control Using Three-Position Selector (Pool-Off-Spa, or Low-Off-High)

This application assumes that both heating functions (pool and spa) are required.

1. Turn on power to the heater.

2. For remote controllers without its own thermostat, push the MENU button to the "POOL" or "SPA" mode and set the desired temperature for each, e.g. 80°F (27°C) for Pool and 102°F (39°C) for spa.

3. For remote controller with its own thermostat , push the MENU button to select "POOL" or "SPA" mode and set both temperature setpoints to the highest setting available on the heater. The actual setpoint will be controlled by the remote controller.

4. Turn the MENU button to "OFF" and remove power from the heater.

5. On the 3-wire remote interface harness, connect the BLUE wire to one side of the remote automation controller and connect the ORANGE/BLACK wire for "SPA" operation and the BLACK/ORANGE wire for the "POOL" operation. See Figure 40.

6. Install the 3-wire remote interface harness to the "P7" connector and turn power ON to the heater. See Figure 40.

7. Activate remote mode in the heater. Press and hold the UP and DOWN arrow buttons simultaneously for 5-seconds.
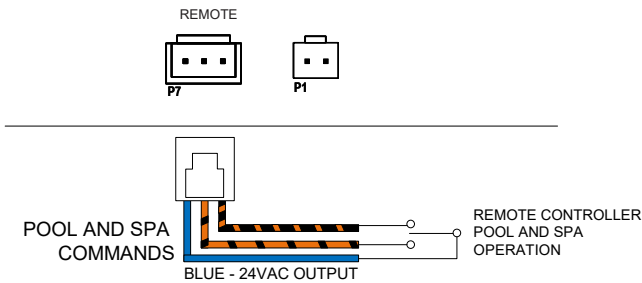

Figure 40. 3-Wire Remote Harness Installation

Remote Control Options for Heat/Cool Models

In Heat/Cool models, the 3-wire remote "Pool" terminal can be configured to operate as "Pool Heat", "Pool Cool" or "Pool Auto". The default mode for remote pool is "Pool Heat".

1. To change this setting enter "Installer Menu". Begin by entering to SERVICE menu by pressing and holding MENU button for 5-seconds. The "Language" screen is displayed.

2. Press MENU button until "INSTALLER" screen is displayed. Now press UP button to access the INSTALLER menu.

3. Press MENU button until "Remote Pool Mode" is displayed.

4. Use the UP or DOWN buttons to select "Pool Cool", "Pool Auto" or "Pool Heat".

5. After selection is completed, press MENU button until "Exit INSTALLER" screen is displayed. Use UP or DOWN button to select "YES", then press MENU to exit.

6. For remote controllers without its own thermostat, use the MENU button to select the pool mode (pool heat, pool cool or pool auto). Then use the UP/DOWN buttons to adjust the temperature setpoint to be used in remote mode.

7. For remote controller with its own thermostat, push the MENU button to select the pool mode (pool heat, pool cool or pool auto) and set the temperature setpoints to the highest/lowest setting available on the heater. The actual setpoint will be controlled by the remote controller.

8. Turn "OFF" with MENU button and remove power from the heater.

9. For a 2-Wire remote control, connect the BLUE wire to one side of the remote controller and connect the other side to the BLACK/ORANGE wire for "POOL" operation.

10. Attach wire nut on the ORANGE/BLACK wire of the 3-wire remote harness. See Figure 41.
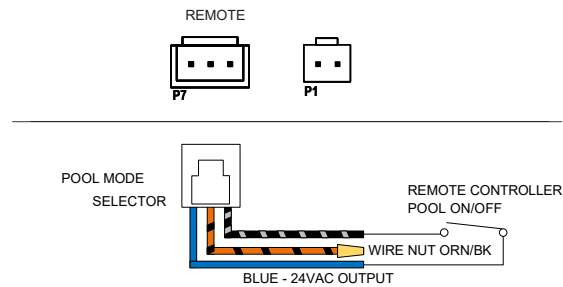
Figure 41. 2-Wire Remote Harness Installation

11. For 3-wire control, connect the BLUE wire to one side of the remote controller and connect the ORANGE/BLACK wire for "SPA" operation and the BLACK/ORANGE wire for the "POOL" operation. See Figure 40.

12. Install the 3-wire remote harness to the "P7" connector and turn power ON to the heater.

13. Activate remote mode in the heater. Press and hold the UP and DOWN buttons simultaneously for 5-seconds.

15. SEASONAL START-UP OR ANNUAL CHECK

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

1. Remove leaves, pine needles, etc., from the evaporator coil. Clean the coil by gently applying a mild solution of household liquid soap and water.

2. Remove the side louvered panel by removing the single screw at the top and the two (2) screws on the middle part of the panel. Lift and pull the bottom out. The panel will easily come away from the cabinet giving access to the coil for cleaning.

3. Gently rinse the coil with water; DO NOT use high pressure.

4. Re-install the side panels and secure each with the screws removed in Step 2.

5. Backwash or otherwise clean the pool filter. If necessary, clean the skimmer basket and pump strainer.

6. Set the valves to ensure proper water flow through the unit.

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

16. SUMMER SHUTDOWN

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

1. Turn the unit circuit breaker or disconnect switch to OFF.

2. Leave the valves set the way they are unless additional circulation is required. DO NOT stop all flow through the heater.

3. **IMPORTANT:** Remember to reset the valves before the next heating season, or the unit will not operate properly.

17. FREEZE PROTECTION

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

System Drain-Down

1. Turn the unit circuit breaker or disconnect switch to OFF.

2. With the pool pump OFF, close the external shut-off valves and remove the drain plugs located in the inlet and outlet water unions to allow water to drain. See Figure 42.
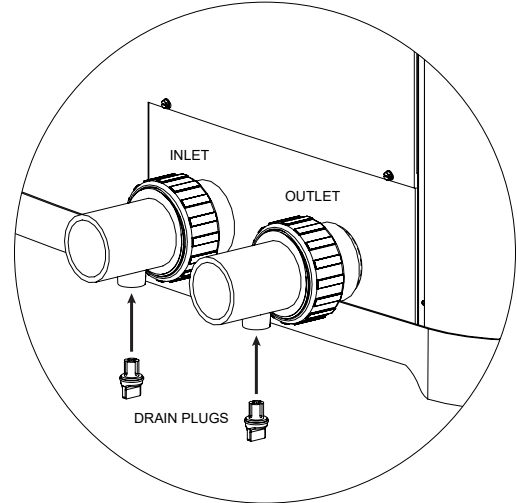

Figure 42. Drain Plug Locations

3. Use a wet/dry vacuum or air pressure to remove excess water, as necessary.

4. Once the water is drained, reinstall the drain plugs.

5. Cover the unit with a waterproof cover.

Continuous Pump Operation

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

NOTE: **The heater manufacturer is not responsible for maintenance adjustments.**

18. MAINTENANCE

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

CAUTION: **To clean the fins, remove the side louvered panels and spray gently with a garden hose. DO NOT pressure wash. Doing so will bend the fins and any such damage will not be covered under the warranty.**

Air Coil Cleaning

Efficient operation depends on free circulation of air through the thin and tightly-spaced fins of the evaporator coil(s). The evaporator must be cleaned whenever it has a buildup of dirt or debris.

Cabinet Care (optional)

⚠ **WARNING: Shut OFF electricity to the unit before cleaning.**

The powder-coated cabinet is designed for outdoor use and requires little care. However, you can clean it if you wish. Wash the cabinet with soap and water.

Unplug Condensation Drain Holes

The unit extracts humidity from the air as it passes through the coil, similar to the way a cold drink outside "sweats" on a hot day. This condensation drains from the bottom of the unit.

1. Routinely check to be sure the condensation drain holes in the base of the unit are not plugged with dirt or debris. See Figure 43 for condensate drain hole locations.

2. If condensation becomes a problem, optional drain pans may be available from your heater distributor or pool dealer.
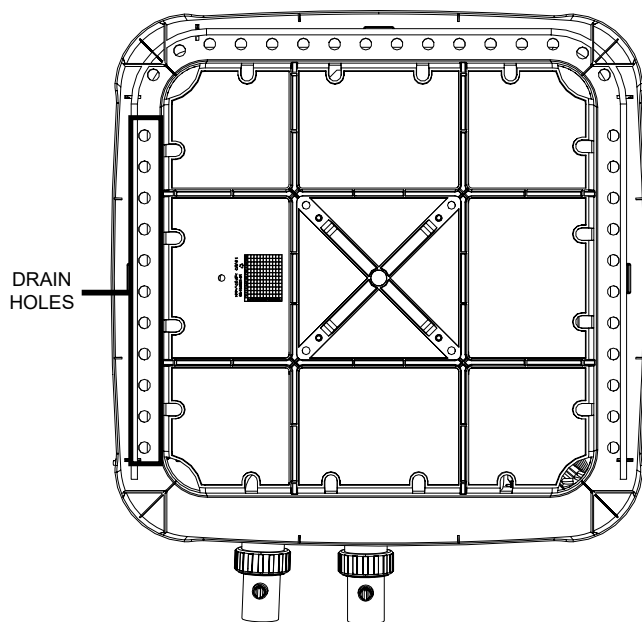
UNIT'S BOTTOM VIEW

DRAIN HOLES

Figure 43. Condensate Drain Hole Locations

19. TROUBLESHOOTING

Before troubleshooting the system, ensure that:

- All mechanical and electrical connections are secure and tight

- All system wiring is correct

- Fuse is not blown (3A Automotive "ATO" type fuse for 24VAC)

- That a system ground is properly connected to the heater. Nuisance shutdowns are often caused by a poor or erratic ground.

The service display can be accessed by pressing and holding the MENU button for 5-seconds.

The service display does not affect operation of the unit, which continues to operate in the background. When in this menu, the MENU buttons will move forward through the various information reported. For more details about Service menu, refer to Section 11 "Service Menu", on page 14.

If your unit does not operate, or simply does not heat your pool water, fault messages on the front control panel can provide valuable clues as to what is wrong, and may even indicate precisely what the problem is. Always observe these messages before calling a service representative. By reporting on the telephone the fault messages that are showing, the service representative may be able to solve the problem without the expense of a service call.

A. Unit Is Running, But Not Heating

- Is water flow through the unit adequate? Check the unit for obstructions, such as a clogged filter pump strainer, a dirty filter, or valves not positioned correctly.

- Is the ejected air from the unit 8°–10°F (4.4°C–5.5°C) cooler than incoming air? If so, the unit is extracting heat from the air and transferring it to the pool.

- Is water condensing on the evaporator and internal copper pipes? This is also evidence of heat removal from the air. When the air is cool with low humidity, condensation may not be evident.

- How long has the unit been operating? During initial pool heating in cold weather, it may require a week to elevate the water temperature to a comfortable level. Normally, it takes about 4-days.

- How many hours per day is the unit operating? **Remember that the heater only operates while the pool pump is running**. Set the time clock to permit 24-hour per day operation. After the desired temperature is reached, return the unit to normal operation of 8–10 hours per day.

- Is airflow through the unit being obstructed? Restrictions such as shrubbery, tall grass, dirty coils, or any other obstruction to airflow will reduce performance.

- Is the pool blanket/cover being used? Uncovered pools can lose up to 10°F (5.5°C) per night compared to 4°F (2.2°C) or fewer when a blanket is used. Without a blanket, the total heat gained during the day can be lost overnight.

- Are rapid heat losses occurring in some other way, such as high-wind, spillage, rainfall, flow through solar panels at night, or a high water table?

> **NOTE:** If the heater shuts off before the water temperature is raised to the desired level, you must increase the running time. To do this, reset the time clock dial for a longer running time or manually operate the pump with the timer override switch. Since the unit capacity and efficiency are greater at higher ambient air temperatures, the run time should be set to take advantage of all daylight hours when the air is generally warmer.

B. Unit Is Not Running

- Is the temperature display ON? If not, the circuit breaker may be shut OFF or tripped. Reset the breaker by switching it OFF, and then back ON. Verify that the breaker is set and operating properly before calling for service.

- Are the Pool/Spa settings correct? Verify that the temperature has been properly set on the thermostat, and that it is higher than the current water temperature.

- Have you waited approximately 3-minutes for the time delay? After the unit has been running and then shut OFF for any reason, there is a delay before operation can begin again. The display will read "Comp Start Delay" when this 3-minute delay is active.

> **NOTE:** The heater will not run when the Remote position is selected on the pool/spa control and there is no remote control system attached.

C. Condensation Seems Excessive

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

- Shut the unit OFF and leave the filter pump running to see if the water stops dripping. If the water stops dripping, the unit is not leaking.

> **NOTE:** Use a pool chemistry test kit to confirm there is no chlorine in the water.

20. SERVICE CALL VERIFICATION

> **NOTE:** The Service number is located on the front of the heater at the brand label.

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

- Warranty Service - must have model number, serial number and date of installation or Warranty Registration confirmation number.

- Unit operation (power supply, water flow, or time clock adjustment).

> **NOTE:** The manufacturer is not responsible for these adjustments.

Power Supply

- Verify that all circuit breakers are reset and working properly.

- If the temperature display on the control panel still does not light, contact the installing dealer, since it may be a power problem requiring an electrician.

Water Flow

- Verify that the pool filter is clean to provide good flow.

- Verify that valves are properly positioned to allow adequate water flow through the unit.

Time Clock Adjustment

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

Set Factory Defaults

If programming is disarranged and no operation can reliably be made, the control board can be reset to Factory Default values. This operation changes all adjustable settings to factory default settings.

> **NOTE:** Previous settings will be erased and are no longer recoverable. All changes from default values will have to be re-entered by hand to re-establish desired operation.

After setting the factory defaults, check the Installer menu as necessary to configure the desired operation settings.

Service Access to Heaters

If service access to the heater is required, it is accomplished by removing the control cover panel and service access panel (Figure 44) to provide a wide access to get to (1) compressor, (2) heat exchanger, (3) thermal expansion valve (TXV), (4) reversing valve/solenoid valve (if equipped), (5) flow switch (if equipped), and (6) sensors (water, ambient and coil). To gain access, follow the steps below:

1. Shut off all power to the unit to avoid any possibility of electrical shock or damage to components.

2. Remove the heater's front control cover panel by unscrewing the six (6) screws using a 1/4" hex head screwdriver. See Figure 44.
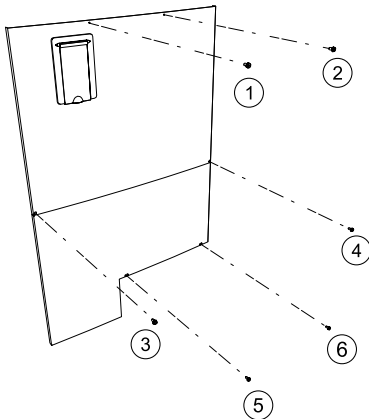
Figure 44. Sheet Metal Screws to Remove Control Panel

3. Pull the front panel's bottom down and outward. Disconnect the wire attached to the rear of the user interface. The panel is now free for removal.

4. Set the control panel cover aside to reinstall when service is completed.

5. Install service access panel and slide control cover panel up to its place and secure with screws removed in Step 2.

6. Turn ON power and start operation as needed.

21. PLUMBING DIAGRAMS

NOTE: For systems with pumps less than 2 HP (under 50 GPM / 189 LPM). No external bypass required.

WATER OUT
(TO POOL
OR SPA)

CHEMICAL
INTRODUCTION

CHECK
VALVE

FILTER

PUMP

WATER IN
(TO POOL
OR SPA)
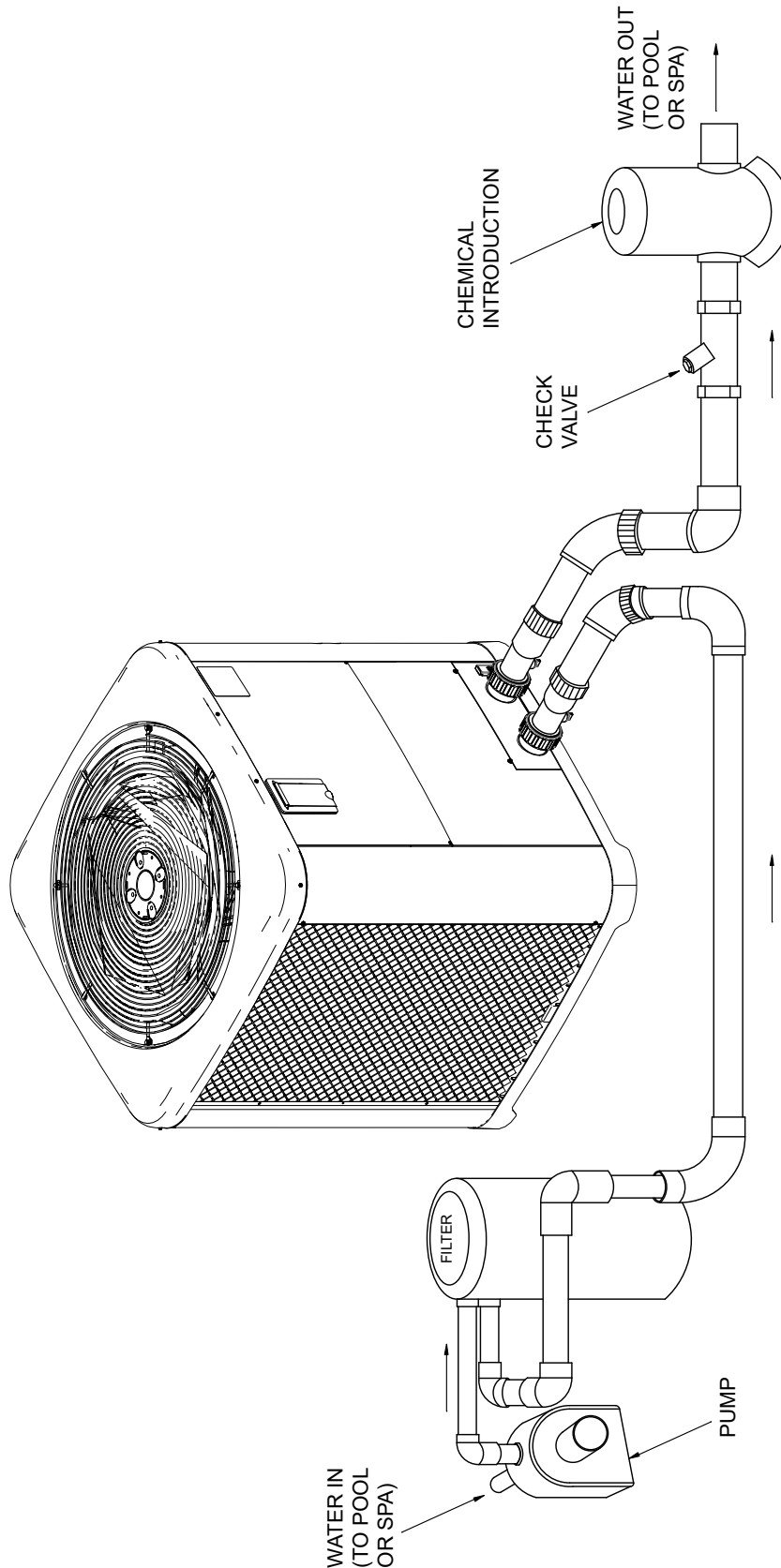
Figure 45.   Plumbing Schematic – No External Bypass (Plumb the heater AFTER the filter and before any chlorinators.)

NOTE: For systems with pumps of 2 HP or greater (over 50 GPM / 189 LPM) External bypass required.

EXTERNAL BYPASS

CHEMICAL INTRODUCTION

WATER OUT
(TO POOL
OR SPA)

CHECK VALVE

FILTER

WATER IN
(TO POOL
OR SPA)

PUMP

Figure 46. Plumbing Schematic – External Bypass (Plumb the heater AFTER the filter and before any chlorinators.)
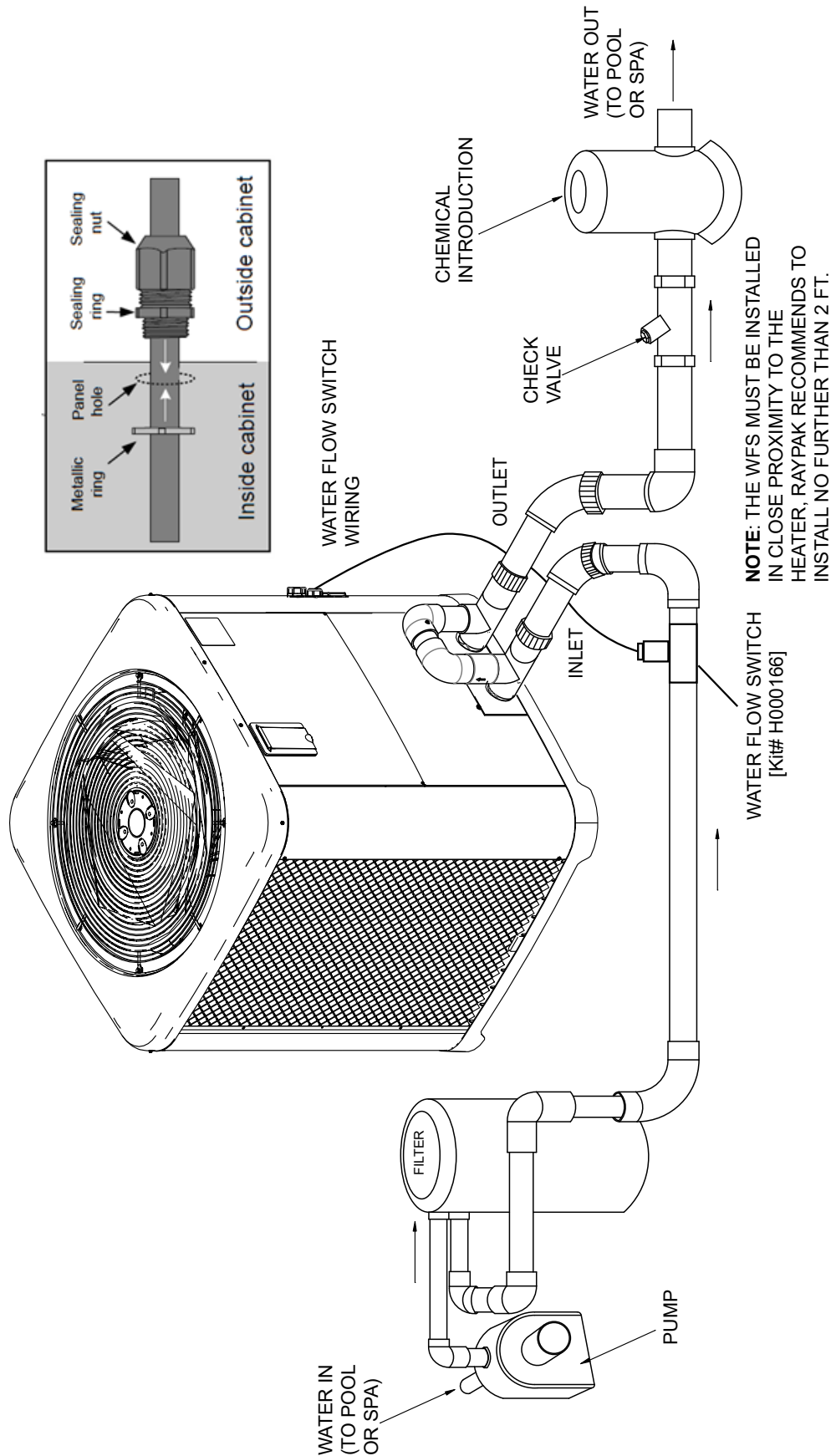
Figure 47. Plumbing Schematic – Above Ground Pool Water Flow Switch Installation

KEY

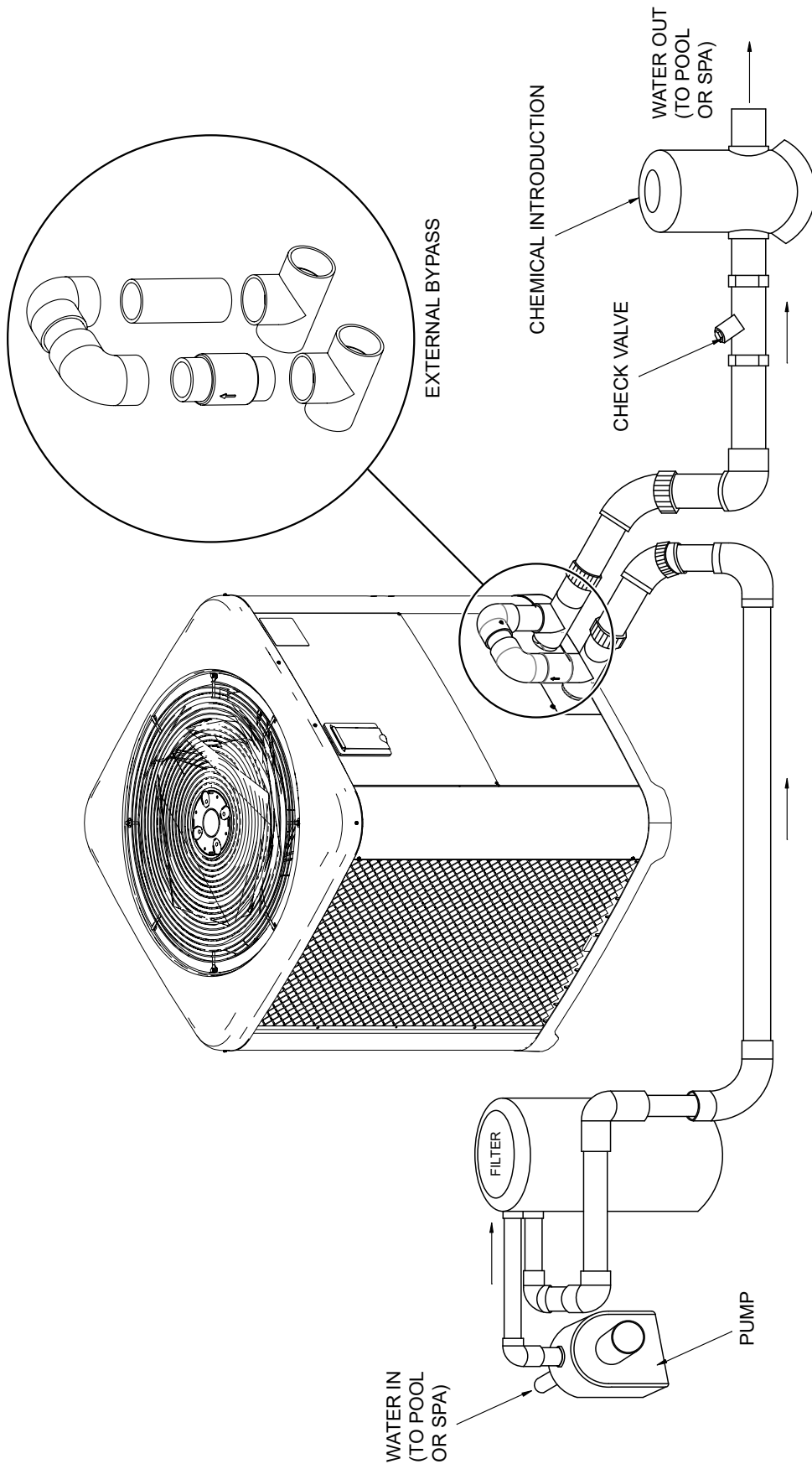| | PRESSURE RELIEF VALVE |
	PUMP
	UNION
	CHECK VALVE
	BALL VALVE
	THERMOMETER

THIS PIPING DIAGRAM IS RAYPAK'S RECOMMENDATION AND IS NOT INTENDED TO REPLACE AN ENGINEERED PIPING SYSTEM DESIGNED BY A PROFESSIONAL ENGINEER.

MINIMUM PIPE SIZES

BRANCH	MAIN
1-1/2"	2"
1-1/2"	2"

Optional

SOLAR HEATING SYSTEM

Temperature sensor

HEAT PUMP

INTERNAL SENSOR

Optional

GAS HEATER OR ELECTRIC HEATER AS BACKUP

INTERNAL SENSOR

INTERNAL BYPASS SYSTEM

ISOLATION VALVES (TYP.)

BALANCING VALVE (TYP.)

FROM PUMP & FILTER SYSTEM

PIPE DIAS MAX.

TO POOL

PRIMARY LOOP

HEATERS SHOWN REPRESENT VARIOUS MODELS. BECAUSE INDIVIDUAL MODELS WILL VARY IN DESIGN AND SIZING, SEE EACH SPECIFIC HEATER TYPE FOR DETAILS.
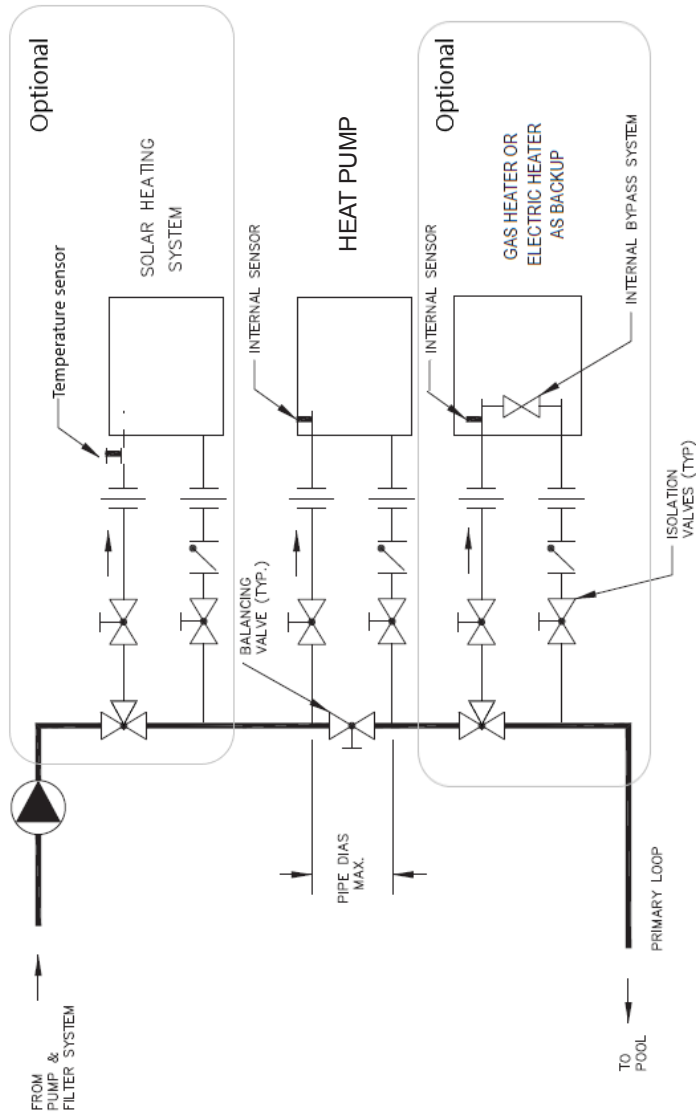
NOTES:

1. PLUMB SWING CHECK VALVE IN GRAVITY-CLOSED POSITION.

2. PIPE ALL RELIEF VALVES TO DRAIN, OR AS LOCAL CODES REQUIRE.

3. MINIMUM PIPE SIZE MUST BE EQUAL TO THE HEATER INLET/ OUTLET SIZE. SEE "MINIMUM PIPE SIZES" CHART ABOVE.

4. SOLAR SYSTEM MUST BE INSTALLED IN ACCORDANCE WITH SOLAR SUPPLIER'S INSTRUCTIONS INCLUDING, BUT NOT LIMITED TO, PROTECTION AGAINST OVERHEATING AND/OR FREEZE-UPS.

5. HEAT PUMP MUST BE INSTALLED IN ACCORDANCE WITH SUPPLIER'S INSTRUCTIONS INCLUDING, BUT NOT LIMITED TO, PROTECTION AGAINST OVERHEATING AND/OR FREEZE-UPS.

Figure 48. Piping

THIS PIPING DIAGRAM IS RAYPAK'S RECOMMENDATION AND IS NOT INTENDED TO REPLACE AN ENGINEERED PIPING SYSTEM DESIGNED BY A PROFESSIONAL ENGINEER.

MINIMUM PIPE SIZES

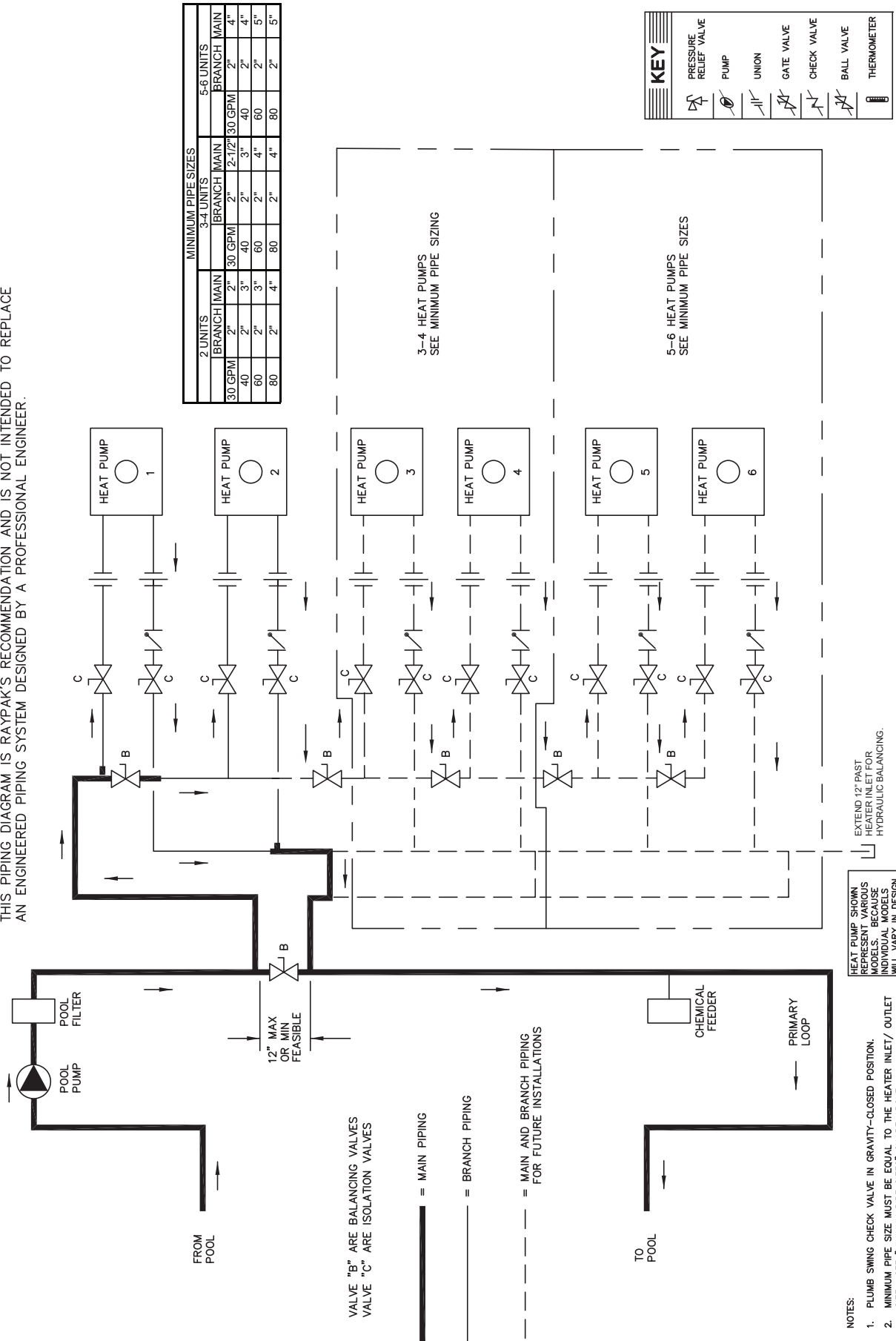|	2 UNITS		3-4 UNITS		5-6 UNITS	
	BRANCH	MAIN	BRANCH	MAIN	BRANCH	MAIN
30 GPM	2"	2"	2"	2-1/2"	2"	4"
40	2"	3"	2"	3"	2"	4"
60	2"	3"	2"	4"	2"	5"
80	2"	4"	2"	4"	2"	5"

KEY

PRESSURE RELIEF VALVE	
PUMP	
UNION	
GATE VALVE	
CHECK VALVE	
BALL VALVE	
THERMOMETER	

3-4 HEAT PUMPS
SEE MINIMUM PIPE SIZING

5-6 HEAT PUMPS
SEE MINIMUM PIPE SIZES

HEAT PUMP 1
HEAT PUMP 2
HEAT PUMP 3
HEAT PUMP 4
HEAT PUMP 5
HEAT PUMP 6

EXTEND 12" PAST HEATER INLET FOR HYDRAULIC BALANCING.

HEAT PUMP SHOWN REPRESENT VARIOUS MODELS. BECAUSE INDIVIDUAL MODELS WILL VARY IN DESIGN AND SIZING, SEE EACH SPECIFIC HEAT PUMPS TYPE FOR DETAILS.

POOL FILTER

POOL PUMP

12" MAX OR MIN FEASIBLE

CHEMICAL FEEDER

PRIMARY LOOP

FROM POOL

TO POOL

VALVE "B" ARE BALANCING VALVES
VALVE "C" ARE ISOLATION VALVES

= MAIN PIPING

= BRANCH PIPING

= MAIN AND BRANCH PIPING FOR FUTURE INSTALLATIONS

NOTES:

1. PLUMB SWING CHECK VALVE IN GRAVITY-CLOSED POSITION.

2. MINIMUM PIPE SIZE MUST BE EQUAL TO THE HEATER INLET/ OUTLET SIZE. SEE "MINIMUM PIPE SIZES" CHART ABOVE.

Figure 49. Piping for Multiple Heaters, Primary/Secondary

22. RESISTANCE SENSOR VALUES

Inlet Water Sensor
100K Sensor Resistance Values

Temperature ºF (ºC)	Resistance (Ω)
32 (0)	325500
41 (5)	253950
50 (10)	199040
59 (15)	157150
68 (20)	129440
77 (25)	100000
86 (30)	80570
95 (35)	65310
104 (40)	53260
113 (45)	43680
122 (50)	36020

Water Outlet, Ambient, Coil and solar sensors
10K Sensor Resistance Values

Temperature ºF (ºC)	Resistance (Ω)
32 (0)	32550
41 (5)	25340
50 (10)	19870
59 (15)	15700
68 (20)	12490
77 (25)	10000
86 (30)	8059
95 (35)	6535
104 (40)	5330
113 (45)	4372
122 (50)	3605

Table F.   Temperature-Resistance Sensor Values

100KOhm thermistors are used for water temperature measurement. These sensors are dual thermistors in a single sensor housing. The control uses both sensor readings in operating the unit. If the control measures temperatures on these thermistors which are approximately 3°F (1.6°C) apart, the control will shut off the compressor and show "In Sensor Fault".

The message will be cleared and operation resume when thermistors are within 2°F (1.1°C) of each other. The sensor has a measurement error of less than +/- 0.5°F (0.3°C) between 36°F and 110°F (2.2°C and 43°C) temperatures. The control displays 100K sensor temperatures to 0.1°F or 0.1°C resolution. The water temperature used for thermostat decisions is the average of the 2 thermistors.

The Coil Temperature sensor is a 10KOhm thermistor. The sensor has a measurement error of less than +/- 0.5°F (0.3°C) between 36°F and 110°F (2.2°C and 43°C) temperatures. The control displays 10K sensor temperatures to 0.1°F or 0.1°C resolution.

23. REPLACEMENT PARTS

> **NOTE:** To supply you with the correct part, it is important that you supply the heater model and serial number.

Any part returned for replacement under standard company warranties must be properly tagged with a return parts tag, completely filled in with the heater serial number, model number, etc., and shipped to the Company freight prepaid.
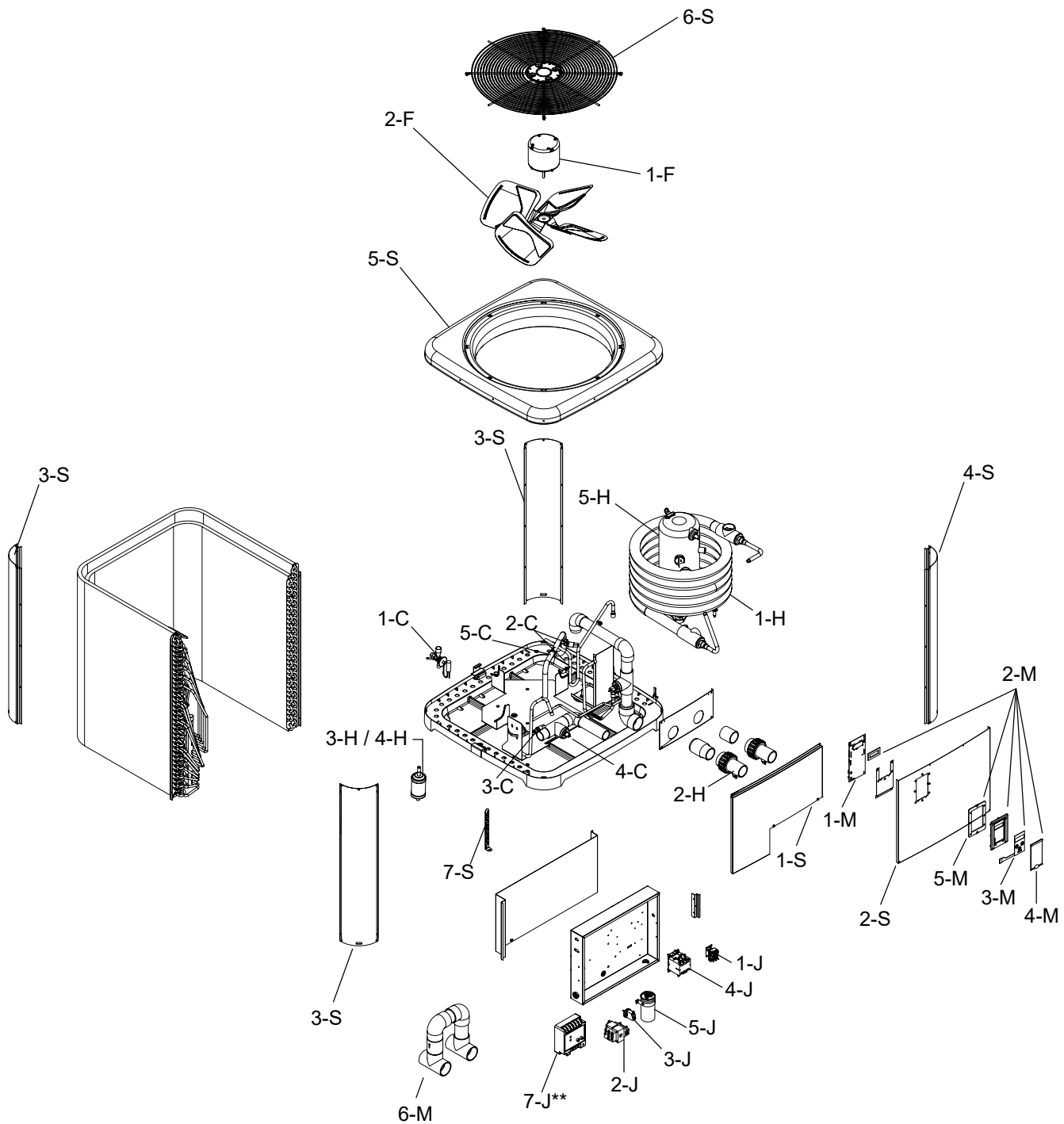
If determined defective by the Company and within warranty, a like part or equal substitution will be returned, freight collect. Credit will not be issued.

MANUFACTURER:

Av. New York 207, Parque Industrial Oradel, C.P. 88285 Nuevo Laredo Tamps. Mexico

24. ILLUSTRATED PARTS LIST

6-S

2-F

1-F

5-S

3-S

3-S

5-H

4-S

1-H

1-C

5-C

2-C

2-M

3-H / 4-H

4-C

3-C

2-H

1-M

7-S

1-S

5-M

2-S

3-M

4-M

1-J

4-J

5-J

3-S

3-J

6-M

7-J**

2-J

CALL OUT	DESCRIPTION	Part Number
C	**CONTROLS**	
1-C	TX Valve	100-10000386
2-C	Low Pressure Switch	100-10000633
3-C	High Pressure Switch	100-10000634
4-C	Inlet Temp Sensor 100K	100-10000635
5-C	Coil Defrost Sensor	100-10000643
6-C	Harness Assy J-Box (Not Shown)	100-10004116
7-C	Harness Assy/Fan* (Not Shown)	100-10000396
8-C	Harness Assy Contactor (Not Shown)	100-10000397
9-C	Harness Assy Rev Valve/Press Switches (Not Shown)	100-10000398
10-C	Harness Assy-Temp Sensor (Not Shown)	100-10004117
11-C	Harness Reversing Valve Connector* (Not Shown)	100-10000644
12-C	3-wire Remote Harness Adapter (Not Shown)	100-10001036
H	**HEAT TRANSFER**	
1-H	Heat Exchanger	H000368
2-H	PVC Union	H000317
3-H	Liquid Line Drier	H000011
4-H	Liquid Line Drier (EHC models)*	H000004
5-H	Compressor R-410A 208/230V 1PH 60Hz	H000012
6-H	Compressor Power Plug (Not Shown)	H000271
7-H	Reversing Valve * (Not Shown)	H000136
F	**FAN**	
1-F	Fan Motor	100-10000638
2-F	Fan Blade	100-10000639
J	**CONTROL BOX**	
1-J	Fan Relay	H000299
2-J	Transformer	H000331
3-J	Water Pressure Switch	H000025
4-J	Contactor	H000043
5-J	Capacitor	H000051
6-J	Fuse (Not Shown)	H000370
7-J	Voltage Monitor**	H000291
M	**MISCELLANEOUS**	
1-M	Control Board	100-10004118
2-M	Control Bezel Digital (Includes Switch Decal)	H000325
3-M	Switch/Decal Membrane	H000326
4-M	Cover Control Bezel	H000327
5-M	Bezel Seal Gasket	H000344
6-M	Water Bypass	100-10000816
7-M	Water Flow Switch (Not Shown)	H000166
8-M	Touch-up Paint (Not Shown)	100-10000661
9-M	Drain Plug 1/4" NPT (Not Shown)	100-10004354
10-M	Kit Accessories Bag (Not Shown)	100-10004855
S	**SHEET METAL**	
1-S	Access Panel	100-10004119
2-S	Front Panel	100-10004123
3-S	Corner Panel, Solid	100-10004121
4-S	Corner Panel, Plugged Holes	100-10004122
5-S	Jacket Top	H000396
6-S	Grille Fan Guard	100-10000641
7-S	Hurricane Bracket HT Pump SS	H000357

*EHC models only.

**7-J Voltage Monitor is an optional field-installed component. Use for protection of compressor installations with known variation in voltage lines.

NOTE: Items 6-C through 12-C are not shown in the IPL illustration because they are part of the unit's wiring.