# OWNERS GUIDE AND INSTALLATION INSTRUCTIONS

# COMMERCIAL AIR TO WATER

## HEAT PUMP WATER HEATER

CLASSIFIED UL WATER QUALITY ANSI/NSF-5

*This water heater must be installed and serviced by a qualified person.*

*Please leave this guide with a qualified professional.*

# CONTENTS



**TECHNICAL SUPPORT LINE**
Rheem: 800-432-8373
Raypak: 805-278-5300

**ORDER CENTER**
Rheem: 1-800-621-5622
Raypak: 805-278-5300

**RHEEM WATER HEATERS**
800 Interstate Park Dr.
Montgomery, AL 36109
Website: www.Rheem.com
e-mail: Techserv@Rheem.com

# INTRODUCTION

Only a licensed person will give you a Compliance Certificate, showing that the work complies with all the relevant standards.

**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 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 equipment.

# SAFETY

Your safety and the safety of others are very important. There are many important safety messages in this manual and on your appliance. Always read and obey all safety messages.

**This is the safety alert symbol. Recognize this symbol as an indication of important Safety Information!**

**This symbol alerts you to potential hazards that can kill or hurt you and others.**

### ⚠ DANGER

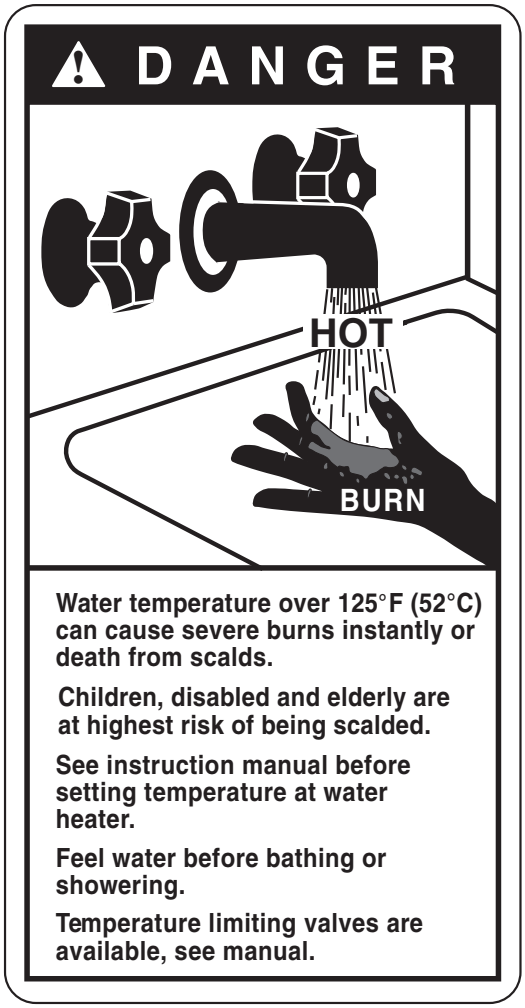
### WATER TEMPERATURE SETTING

Safety and energy conservation are factors to be considered when selecting the water temperature setting of the water heater. Water temperatures above 125°F (52°C) can cause severe burns or death from scalding.

| Temperature | Time To Produce a Serious Burn |
|---|---|
| 120°F (49°C) | More than 5 minutes |
| 125°F (52°C) | 1½ to 2 minutes |
| 130°F (54°C) | About 30 seconds |
| 135°F (57°C) | About 10 seconds |
| 140°F (60°C) | Less than 5 seconds |
| 145°F (63°C) | Less than 3 seconds |
| 150°F (65°C) | About 1½ seconds |
| 155°F (68°C) | About 1 second |

*Table courtesy of Shriners Burn Institute*

**⚠DANGER: Occupied Spaces with small children, disabled, or elderly persons may require a 120°F (49°C) or lower thermostat setting to prevent contact with "HOT" water.**



# ABOUT YOUR WATER HEATER

## WATER HEATER APPLICATION

This water heater is designed for the purpose of heating potable water. Its use in an application other than this may shorten its life.

## HOW HOT SHOULD THE WATER BE?

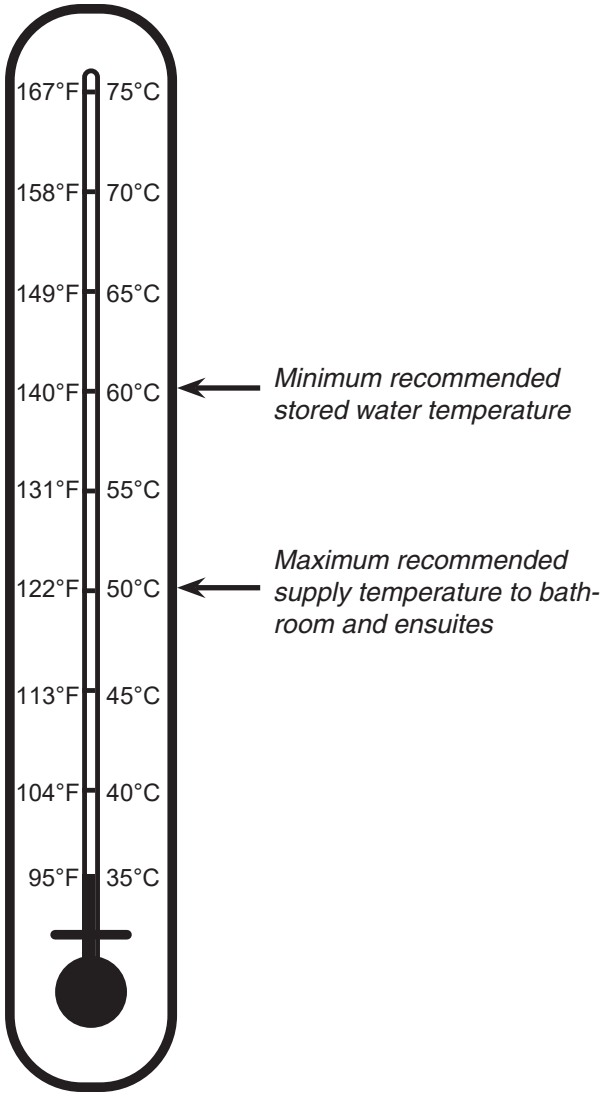
The heat pump (compressor, evaporator and condenser) will operate until a water temperature of up to setpoint is reached.

The factory setting is 142°F (61°C). The setpoint can be adjusted up to 149°F (65°C) depending on site suitability after consulting with the manufacturer.

## HOTTER WATER INCREASES THE RISK OF SCALD INJURY

This water heater can deliver water at temperatures which can cause scalding. Check the water temperature before use, such as when entering a shower or filling a bath or basin, to ensure it is suitable for the application and will not cause scald injury.

We recommend and it may also be required by applicable state or local regulations that an approved temperature limiting device be fitted into the hot water pipe work to the bathroom and ensuite when this water heater is installed. This will keep the water temperature below 122°F (50°C) at the bathroom and ensuite. The risk of scald injury will be reduced and still allow hotter water to the kitchen and laundry.




## TEMPERATURE ADJUSTMENT

### Setpoint Quick Setting

Press ‘prg’ from the main display screen and the Setpoint page will appear. Cursor will be on the set temperature. Pressing the up and down keys will adjust the setting in 0.1 increments. Hold down for rapid change. Press ’Enter’ to confirm change. Press ‘esc’ to return to the main display screen.

**NOTE:** Mixing valves are required if adjusted above 120°F (49°C) for reducing point of use water temperature by mixing hot and cold water in branch water lines. It is recommended that a mixing valve complying with the Standard for Temperature Actuated Mixing Valves for Hot Water Distribution Systems, ASSE 1017 be installed. See pages 15 & 17 for more details and contact a licensed plumber or the local plumbing authority for further information.

# ABOUT YOUR WATER HEATER

**⚠WARNING: This water heater is only intended to be operated by persons who have the experience or the knowledge and the capabilities to do so. This water heater is not intended to be operated by persons with reduced physical, sensory or mental capabilities i.e. the infirm, or by children. Children should be supervised to ensure they do not interfere with the water heater.**

This water heater uses 208-240 or 480 VAC electrical power for operation of the control systems and other electrically operated components. The removal of the access cover(s) will expose 208-240 or 480 VAC wiring. They must only be removed by a qualified person.

- **DO NOT** use aerosols, stain removers and chemicals near the water heater. Gases from some aerosol sprays, stain removers and chemicals are corrosive to the materials used in the heat pump system.
- **DO NOT** store swimming pool chemicals, household or industrial cleaners, etc., near the water heater.
- Ensure the air inlet and outlet ports and air flow are not obstructed in any way at any time.

## SAFETY

This water heater is supplied with built in Controller which controls low and high pressure switches, low temperature cut off, temperature safety switch and flow switch.

Additionally, the compressor is fitted with thermal overload protection, the condenser heat exchanger is fitted with a pressure relief valve, the heat pump is supplied with a built in ambient temperature sensor. These devices must not be tampered with or removed. The water heater must not be operated unless each of these devices is fitted and is in working order.

If the electrical supply conduit to the water heater is damaged, it must be replaced by a qualified person in order to avoid a hazard. Contact your local service contractor to arrange for an inspection.

**⚠WARNING: For continued safety of this water heater it must be installed, operated and maintained in accordance with the Owner's Guide and Installation Instructions.**

**⚠WARNING! FLAMMABLE CONTENTS UNDER PRESSURE.. The compressor wiring terminals may arc allowing pressurized refrigerant and oil to escape, ignite and cause serious bodily injury, severe burns or death.**

**The warranty may not cover faults if relief valves or other safety devices are tampered with or if the installation is not in accordance with these instructions.**

## TO TURN OFF THE WATER HEATER

- Switch off the electrical supply at the circuit breaker to the water heater.
- Close the isolation valves at the inlet and outlet of the water heater.

## TO TURN ON THE WATER HEATER

- First, ensure the water is connected to storage tanks, the system is filled with water and all valves between the tanks and the water heater are open.
- Switch on the electrical supply at the circuit breaker to the water heater.

**NOTE:** The water heater may not turn on immediately when it is first switched on, if it is switched on within 20 minutes to 2 hours of it having been switched off at the circuit breaker, or the heat pump has just completed a heating cycle. The water heater will wait until the conditions for start-up are favorable in order to protect the compressor from damage. This may take up to 20 minutes to 2 hours.

## HOW DO I KNOW IF THE WATER HEATER IS INSTALLED CORRECTLY?

Installation requirements are shown on the "Installation" section. The water heater must be installed:

- by a qualified person, and
- in accordance with the installation instructions, and
- in compliance with Standards UL 1995, NSF/ANSI/CAN 61 and all local codes and regulatory authority requirements.

# ABOUT YOUR WATER HEATER

## DOES THE WATER CHEMISTRY AFFECT THE WATER HEATER?

The water heater is suitable for most public water supplies, however some water chemistries may have detrimental effects on the water heater, its components and fittings. Refer to “Water Supplies” section. If you are not sure, have your water chemistry checked against the conditions described on the "Chloride and PH" and "Summary of Water Chemistry Advice Affecting the Warranty" sections.

## CAUTIONS

Where damage to property can occur in the event of the water heater leaking, the water heater must be installed in a safe tray or be suitably bounded.

The water heater must be maintained in accordance with the Owner’s Guide and Installation Instructions. Refer to “Regular Care” section.

If this water heater is to be used where an uninterrupted hot water supply is necessary for your application, or business you should ensure that you have back up redundancy within the hot water system design. This should ensure the continuity of hot water supply in the event that this water heater were to become inoperable for any reason. We recommend you seek advice from your plumber, specifier or Rheem Application Engineer about your needs and building back up redundancy into your hot water supply system.

## ENVIRONMENT

At the end of the service life of the water heater and prior to the water heater being disposed of, a person qualified to work with refrigerants must recover the refrigerant from within the sealed system. The refrigerant must not be vented to atmosphere. Contact your local service contractor to arrange for an inspection.

# HOW YOUR WATER HEATER WORKS

The commercial heat pump is an instantaneous type and does not have an integral storage tank. The unit is designed to be installed indoors or outdoors, model dependent. The water heater's evaporator absorbs heat from the surrounding air and transfers this heat into the water. A circulator transfers the heated water to a bank of storage tanks. The heat pump produces a sound level of up to 69 dBA (measured at 9.8 ft) when it is operating. The principle of operation and sound level are similar to that of an air conditioner.

When hot water is drawn off and cold water enters the storage tanks, a remote thermostat activates the fan, compressor and circulating pump of the water heater. Air is drawn in through the inlet louvers on the side of the water heater and then past the evaporator, where heat is transferred from the air to a refrigerant fluid. The fluid is compressed and passes to the condenser (heat exchanger) where heat is transferred into the water. The pump circulates water from the bottom of the storage tanks through the heat exchanger and the heated water is circulated back into the storage tanks. The fan discharges the cooled air through the fan grilles on the top of the water heater. This process continues until the water in the storage tanks reaches the set temperature.

Even on cold days, heat is drawn from the surrounding air. The heat pump will operate most efficiently at temperatures between a minimum of 41°F (5°C) and maximum of 113°F (45°C). The efficiency of the water heater is relative to the surrounding air temperature and the incoming water temperature.

Automatic safety controls are fitted to the water heater to provide safe and efficient operation.

## AUXILIARY BOOST OPERATION

The water heater can control an auxiliary heating source if the ambient temperature falls below 41°F (5°C) or if 50% or more of the water heaters are in fault mode.

## OPERATION AT LOW AMBIENT TEMPERATURE

Ice may begin to form on the evaporator when the ambient air temperature falls below 45°F (7°C), and this will reduce the heat pump efficiency. In this case, the heat pump will use hot gas bypass to de-ice the evaporator coil. Should the ambient temperature continue to fall below 41°F (5°C), the heat pump will enter Low Ambient mode. The water heating system can be designed to operate in one of two scenarios when ambient temperature falls below 41°F (5°C).

When auxiliary heating mode is OFF, the heat pump will use hot gas bypass to melt any ice that may form on the evaporator coil when operating at air temperatures below 41°F (5°C) and there will be no auxiliary boost.

When auxiliary heating mode is ON, the heat pump will use hot gas bypass to melt any ice that may form on the evaporator coil when operating at air temperatures below 41°F (5°C) and auxiliary gas or electric water heater will be activated. Auxiliary heater will remain active until the air temperature reaches 45°F (7°C).

## OPERATION IN FAULT MODE

If fitted, the auxiliary booster will operate instead of the heat pump if the heat pump is in fault.

For multiple heat pump (Primary/Secondary) configuration, the auxiliary booster will operate instead of the heat pumps if fifty percent (50%) or more heat pumps are in fault.

The auxiliary boost will operate until the set temperature is reached. The auxiliary boost should be set to 140°F (60°C).

The auxiliary boost will remain active until the water heater fault is cleared.

**⚠ WARNING: Rheem nor its subsidiaries will not be responsible for higher utility bills due to excessive use of auxiliary boost heater. It is the customers' responsibly to monitor the system regularly for its correct operation. We recommend monitoring via BMS (modules supplied separately).**

## MAINS PRESSURE

The water heater is designed to operate at mains pressure by connecting directly to the mains water supply. If the mains supply pressure in your area exceeds, a pressure limiting valve must be fitted.

# HOW YOUR WATER HEATER WORKS

## THERMAL CUTOUT

The refrigeration circuit is protected by thermal sensors. These will activate a thermal cut out in the event of excessive heat in the refrigeration system.

If the thermal cut out has activated, the heat pump will not operate for a period of 20 minutes to 2 hours. The water heater will make two more attempts to start up. If the thermal cut out is tripped again after the third attempt, the system will enter lock out and the alarm contacts will close. If connected to a BMS, this will alert the user that the unit is not operating.

The lockout condition can be manually reset by switching the power to the water heater off and then on.

## CONTROL FUNCTIONALITY

A timer can be set through the heat pump control panel to limit the hours of operation of the water heater (e.g. to reduce noise at night).

The operation of the heat pump can also be controlled by setting up tariff option on the control panel to manage operating costs.

**NOTE: depending on the booster configuration there may be insufficient stored energy available for the next peak period if the system is not up to temperature.**

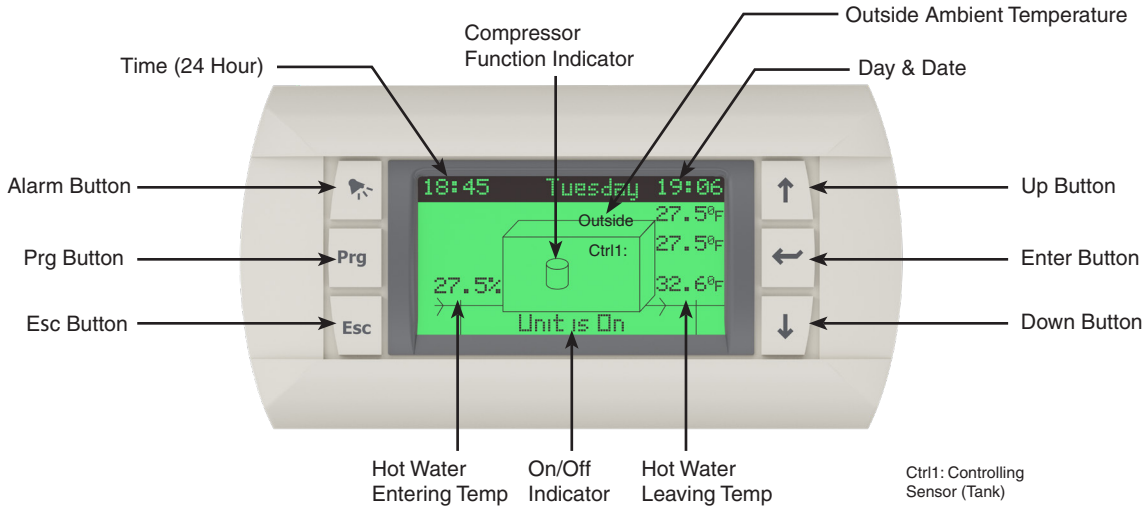
Remember, even on cloudy and cold days your heat pump water heater will heat your stored water.

## SUPERIOR MONITORING

The Heat Pump System is supplied with 9 sensors:

1. Tank temperature sensor
2. Building flow temperature sensor
3. Water inlet temperature sensor
4. Water outlet temperature sensor
5. Refrigerant suction side temperature (superheat)
6. Suction pressure transducer
7. Discharge pressure transducer
8. Ambient air temperature sensor
9. Evaporator coil sensor

The output of these sensors are displayed on the user friendly control panel to ensure correct system operation.




*The system can be connected to BMS via interface cards (Modbus RS485 or BACnet MS-TP or BACnet TCP/IP Ethernet) supplied. Contact us for further information on BMS.*

# REGULAR CARE

It is suggested that the commercial heat pump be serviced annually, to retain optimum performance. Servicing must be performed by a suitably qualified person.

## ANNUAL SERVICE

1. Check the sensors are fully installed into thermal wells.
2. Check for leaks at all fittings.
3. Check for signs of excessive corrosion on storage tank(s) jacket(s) and heat pump casing.
4. Check for sludge build up and if necessary drain and flush storage tank(s).
5. Clear hot water pump impeller and ensure free rotation.
6. Check condensate drain for blockages – clear if necessary.
7. Clean blockages and debris from evaporator fins, fan blades and grilles.
8. Isolate power to heat pump and check all electrical connections for signs of overheating due to poor connection.
9. Check for vibration or excessive noise from compressor, fans and hot water pump.
10. Check refrigerant pressures and adjust refrigerant charge if required.
11. Visually check system for any potential problems.
12. Confirm correct system operation.
13. Operate temperature and pressure relief valve and expansion control valve. Refer to next page.

## FIVE YEAR SERVICE

1. As per annual service.
2. Inspect and if required, replace storage tank(s) anode(s). If the anode is not replaced, it should be replaced within three years of this service.
3. Check operation of defrost solenoid valve by manually operating the valve.
4. Replace temperature and pressure relief valve or expansion control valve.

Refer to Service manual for more information.

# REGULAR CARE

## TEMPERATURE AND PRESSURE RELIEF VALVE EXPANSION CONTROL VALVE AND EXPANSION TANK

A temperature and pressure relief valve should be used with the storage tanks. In many areas, an expansion control valve or expansion control tank is also fitted to the cold water line to the water heater system. The expansion control valve may discharge a small quantity of water from its drain line during the heating period instead of the temperature pressure relief valve on the storage tanks.

Operate the easing lever on the temperature and pressure relief valve and expansion control valve. It is very important you raise and lower the lever gently.

**⚠WARNING: Exercise care to avoid any splashing of water, as water discharged from the drain line will be hot. Stand clear of the drain line's point of discharge when operating the valve's lever.**

If water does not flow freely from the drain line when the lever is lifted, then the water heater must be checked contact a local service technician to arrange for an inspection.

The temperature and pressure relief and expansion control valve or expansion control tank should be replaced at intervals not exceeding 5 years, or more frequently in areas where there is a high incidence of water deposits (refer to "Water Supplies" section).

# WATER SUPPLIES

**This water heater must be installed in accordance with this advice to be covered by the warranty.**

This water heater is manufactured to suit the water conditions of most public reticulated water supplies. However, there are some known water chemistries which can have detrimental effects on the water heater and its operation and / or life expectancy. If you are unsure of your water chemistry, you may be able to obtain information from your local water supply authority. This water heater should only be connected to a water supply which complies with these guidelines for the Rheem's warranty to apply.

## CHANGE OF WATER SUPPLY

The changing or alternating from one water supply to another can have a detrimental effect on the operation and / or life expectation of a number of components in this water heater.

Where there is a changeover from one water supply to another, e.g. a rainwater tank supply, bore water supply, desalinated water supply, public reticulated water supply or water brought in from another supply, then water chemistry information should be sought from the supplier or it should be tested to ensure the water supply meets the requirements given in these guidelines for the warranty to apply.

## SATURATION INDEX

The saturation index (SI) is used as a measure of the water's corrosive or scaling properties.

Where the saturation index is less than –1.0, the water is very corrosive and the warranty does not apply to the water heater. In a corrosive water supply, the water can attack copper parts and cause them to fail.

Where the saturation index exceeds +0.40, the water is very scaling and an expansion control valve* must be fitted on the cold water line after the non-return valve. The warranty does not apply to the water heater.

Water which is scaling may be treated with a water softening device to reduce the saturation index of the water.

## CHLORIDE AND PH

Where the chloride level exceeds 250 ppm the warranty does not apply to the water heater. In a high chloride water supply, the water can corrode stainless steel parts and cause them to fail.

Where the pH is less than 6.0 the warranty does not apply to the water heater. pH is a measure of whether the water is alkaline or acid. In an acidic water supply, the water can attack stainless steel parts and cause them to fail.

Water with a pH less than 6.0 may be treated to raise the pH. The water supply from a rainwater tank in a metropolitan area is likely to be corrosive due to the dissolution of atmospheric contaminants.

## SUMMARY OF WATER CHEMISTRY ADVICE AFFECTING THE WARRANTY

The water heater is not suitable for certain water chemistries. Those chemistries are listed below. If the water heater is connected at any time to a water supply with the following water chemistry, Rheem's warranty will not cover any resultant

| **Water Chemistry** | **Component** |
|---|---|
| Saturation Index (SI) < -1.0 | Water Heater |
| Saturation Index (SI) > +0.4 | Water Heater |
| Chloride > 250 ppm | Water Heater |
| pH < 6.0 | Water Heater |

# SAVE A SERVICE CALL

Check the items below before making a service call. You will be charged for attending to any condition or fault that is not related to manufacture or failure of a part.

## NOT ENOUGH HOT WATER (OR NO HOT WATER)

- **Is the electricity switched on?**

  Inspect the circuit breaker marked “HOT WATER” or “WATER HEATER” at the electrical service panel and the isolating switch at the water heater and ensure they are turned on.

  Check the circuit breaker marked “HOT WATER” or “WATER HEATER” at the electrical service panel.

- **Is the alarm light flashing RED on heat pump controller?**


  If the alarm light is flashing RED, check the alarm by pressing the alarm button. Contact your nearest Service Department to inform about the alarm.

- **Is the timer set?**

  If the timer has been set, ensure sufficient time has been allowed to reheat the storage tanks.

- **Are you using more hot water than you think?**

  Are outlets (especially the showers) using more hot water than you think? Very often it is not realised the amount of hot water used, particularly when showering. Carefully review the hot water usage. Have your plumber install a flow control valve to each shower outlet to reduce water usage.

- **Heat pump circulator has failed?**

  The heat pump will not operate if the heat pump circulator has failed. Refer to “Heat Pump Is Not Operating” section . Phone your nearest Service Department or Accredited Service Agent to arrange for an inspection.

- **Water heater size**

  Do you have the correct size water heater for your requirements? Contact Rheem Application Engineering for guidance.

- **Air temperature is cold – defrost mode**

  If this method of low ambient temperature operation is used, the heat pump will enter a defrost mode when ice is sensed on the evaporator coil. The recovery rate of the heat pump is reduced in this mode due to the lower operating air temperature and heating of water is reduced during the defrost cycle.

## WATER TOO HOT

The water heater, during both normal heat pump operation and auxiliary booster operation (activated during periods of ambient temperatures below 41°F (5°C) or heat pump fault), will heat the water to a temperature of 140°F (60°C) to 149°F (65°C). It is recommended to set the auxiliary booster thermostat setting to 140°F (60°C).

## WATER NOT HOT ENOUGH

You may find that due to heavy hot water usage the water temperature may be lower than normally expected, due to insufficient heating time being allowed. Additional storage or an in series booster may be required to be installed under these circumstances.

# SAVE A SERVICE CALL

## HEAT PUMP IS NOT OPERATING

- **Ambient temperature is cold– auxiliary boost mode**

  If this method of low ambient temperature operation is used the heat pump may not operate when the ambient temperature is below 41°F (5°C) and the auxiliary water heater, if installed, will operate instead. The total storage tank capacity will be heated to 140°F (60°C) during these periods. Auxiliary boost will turn OFF and heat pump will start operating as normal when air temperature increases to 45°F (7°C) or higher.

- **Thermal cut out activated**

  Has the thermal cut out for the heat pump compressor activated?

  If the thermal cut out has activated, the heat pump will not operate for a period of 20 minutes to 2 hours and display alarm on the control panel. The water heater will make two more attempts to start. If the thermal cut out is tripped again after the third attempt, the system will enter lock out. If connected to a BMS, this will alert the user that the unit is not operating.

  To check whether there may be a problem, switch the power to the water heater off and on again at the circuit breaker to the water heater, then open a hot tap and allow to run for ten to fifteen minutes. The heat pump, if working properly, will activate and continue operating to heat the water. Close the hot tap when the heat pump begins to operate.

  However, if the heat pump deactivates within five minutes, there may be a problem. Contact your nearest service technician.

- **Incorrect Phase Rotation**

  The phase fail relay will open circuit if the heat pump has been wired with incorrect phase rotation or if a phase has failed. Both green and yellow LEDs on the relay will be illuminated if all phases are available and phase rotation is correct.

- **Heat pump circulator has failed**

  If the heat pump circulator has failed, the heat pump will not operate and may trip on a fault. Contact your local service technician to arrange for an inspection.

## HIGH ELECTRICITY BILLS

With the installation of your new air sourced heat pump water heater, maximum electrical energy savings can be achieved. Should you at any time, feel your energy account is too high, we suggest you check the following points:

Is the relief valve in the storage tanks running excessively?

- Are outlets (especially the showers) using more hot water than you think? (Refer to “Not Enough Hot Water” on previous page).
- Is there a leaking hot water pipe, dripping hot water tap, etc? Even a small leak will waste a surprising quantity of hot water and energy. Replace faulty tap washers, and have your plumber rectify any leaking pipe work.
- Consider recent changes to your hot water usage pattern and check if there has been any increase in tariffs since your previous account.
- The heat pump water heater operates at its most efficient at higher air temperatures. Prolonged periods of low ambient temperature will decrease the efficiency of the system and increase running costs.

**IF YOU HAVE CHECKED ALL THE FOREGOING AND STILL BELIEVE YOU NEED ASSISTANCE, CONTACT YOUR LOCAL SERVICE TECHNICIAN.**

# INSTALLATION

**THIS WATER HEATER IS FOR INDOOR OR OUTDOOR INSTALLATION, MODEL DEPENDENT. THIS WATER HEATER IS NOT SUITABLE FOR POOL HEATING.**

## INSTALLATION STANDARDS

The water heater must be installed:

- by a qualified person, and
- in accordance with the installation instructions, and
- in compliance with Standards UL 1995, NSF/ANSI/CAN 61 and all local codes and regulatory authority requirements.

## WATER HEATER APPLICATION

This water heater is designed for the purpose of heating potable water. Its use in an application other than this may shorten its life

If this water heater is to be used where an uninterrupted hot water supply is necessary for the application or business, then there should be redundancy within the hot water system design. This should ensure the continuity of hot water supply in the event that this water heater was to become inoperable for any reason. We recommend you provide advice to the system owner about their needs and building backup redundancy into the hot water supply system.

## COMPONENTS

The heat pump water heater system is modular and comprises three main components: the heat pump water heater, storage tanks and primary circulator. An auxiliary booster and/or circulator may also be employed as part of the system. The water heater must not be operated until all components are assembled.

**DO NOT tilt the heat pump more than 45° from the vertical.** This will unsettle the refrigerant gas and compressor lubricating oil. If the heat pump has been tilted more than 45° from the vertical during handling, it will need one hour to settle before the power to the water heater can be switched on, otherwise damage to the compressor may result.

## INDOOR INSTALLATION

To comply with UL 1995, the minimum room size permissible in relation to the quantity of refrigerant in the water heater, is 264.86ft$^3$ per 60k BTUh heat pump and 626.12ft$^3$ per 135k BTUh heat pump. A larger room size is recommended for efficient heat pump operation.

## WATER HEATER LOCATION

Non ducted vertical and horizontal models are designed to be installed outdoors or indoors, if a sufficient supply of heat energy is available and the room meets the volume requirements stated above. Good performance is obtained when the heat pump is supplied with a constant supply of fresh air. Failure to observe the above recommendations may lead to lower than expected performance or problematic operation of the heat pump.

Vertical and horizontal models can be converted with a kit, models are designed for ducting of discharge air in indoor installations.

The water heater should be installed close to the storage tanks and its position chosen with noise, safety and service in mind. Make sure the air inlet and outlet grilles are clear of obstructions and shrubbery and they are unlikely to be touched by people (especially children).

It is advisable to install the water heater away from bedroom or living room windows as the system can generate a noise of 69dBA (at 10ft from the water heater) whilst operating.

It is recommended the water heater be installed at ground or floor level. Stacked units with base unit at ground or floor level is acceptable from a servicing perspective.

The water heater must stand vertically upright.

**NOTE: to assist with condensate drainage, the heat pump has a 2.5 degrees slope towards the drains. Do not level the product.**

Clearance must be allowed for servicing of the water heater. The water heater must be accessible without the use of a ladder or scaffold.

You must be able to read the information on the rating plate. Remember you may have to remove the entire water heater later for servicing.

The water heater must not be installed in an area with a corrosive atmosphere where chemicals are stored or where aerosol propellants are released. Remember the air may be safe to breathe, but the chemicals may attack the materials used in the heat pump system.

# INSTALLATION

## SAFE TRAY

Where damage to property can occur in the event of the water heater leaking or condensate forming under the drain tray, the water heater must be installed in a safe tray or be suitably bounded. Construction, installation and draining of a safe tray must comply with all local codes and regulatory authority requirements.

## MAINS WATER SUPPLY

Where the mains water supply pressure exceeds that shown in the table below, an approved pressure limiting valve is required and should be fitted as shown in the installation diagram.

## TANK WATER SUPPLY

If the storage tank is supplied with water from a tank supply and a pressure pump system is not installed, then the bottom of the supply tank must be at least 3.2 ft above the highest point of the hot water plumbing system, including the storage tank. Care must be taken to avoid air locks. The cold water line to the storage tank should be adequately sized and fitted with a full flow gate valve or ball valve.

## HOT WATER DELIVERY

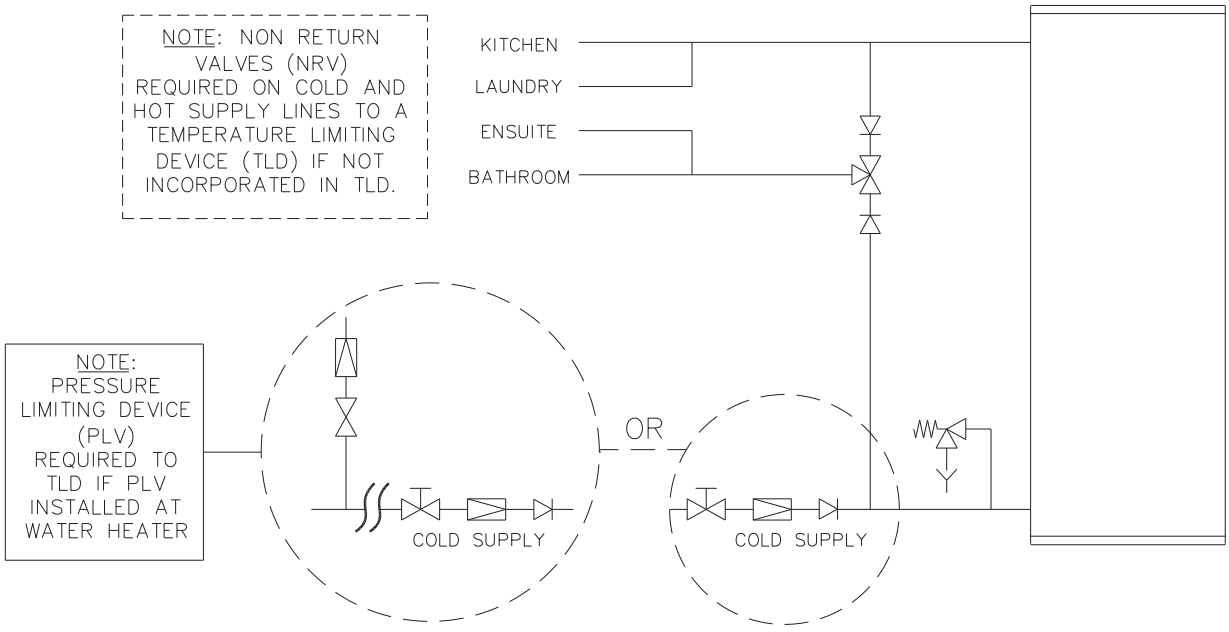
This water heater can deliver water at temperatures which can cause scalding.

It is necessary and we recommend that a temperature limiting device be fitted between the storage tanks and the hot water outlets in any ablution area such as a bathroom or ensuite, to reduce the risk of scalding. The installing plumber may have a legal obligation to ensure the installation of this water heater system meets the delivery water temperature requirements of UL 1995 so that scalding water temperatures are not delivered to a bathroom, ensuite or other ablution area.

Where a temperature limiting device is installed adjacent to the storage tanks, the cold water line to the temperature limiting device can be branched off the cold water line either before or after the ball valve, pressure limiting valve and non return valve to the water heater system. If an expansion control valve is required, it must always be installed after the non return valve and be the last valve prior to the storage tanks.

If a pressure limiting valve is installed on the cold water line to the water heater system and the cold water line to a temperature limiting device branches off before this valve or from another cold water line in the premises, then a pressure limiting valve of an equal pressure setting may be required prior to the temperature limiting device.

**Two Temperature Zones Using a Temperature Limiting Device**



# INSTALLATION

## CIRCULATED HOT WATER FLOW AND RETURN SYSTEM

This heat pump water heater may be installed as part of a circulated hot water flow and return system in a building as long as a temperature boosting water heater is not installed downstream of the heat pump.

If a temperature boosting water heater is installed the circulated hot water flow and return system must return to the inlet of the temperature boosting water heater, and not the heat pump, to avoid potential nuisance tripping. Refer to the diagram on page 18.

### Temperature Limiting Device

A temperature limiting device cannot be installed in circulated hot water flow and return pipe work unless the device is designed for this application. The tempered water from a temperature limiting device cannot be circulated. Where a circulated hot water flow and return system is required in a building, a temperature limiting device can only be installed on a dead leg, branching off the circulated hot water flow and return pipe.

If circulated tempered water were to be returned back to the water heater, depending on the location of the return line connection on the water supply line to the water heater, then either:

- water will be supplied to the cold water inlet of the temperature limiting device at a temperature exceeding the maximum recommended water supply temperature, or
- when the hot taps are closed no water will be supplied to the cold water inlet of the temperature limiting device whilst hot water will continue to be supplied to the hot water inlet of the temperature limiting device.

These conditions may result in either water at a temperature exceeding the requirements of UL 1995 being delivered to the hot water outlets in the ablution areas, or the device closing completely and not delivering water at all, or the device failing. Under either condition, the operation and performance of the device cannot be guaranteed.

## INSULATION

To minimise heat loss and provide protection from freezing, the cold water line to and the hot water line from the heat pump water heater must be insulated in accordance with the requirements of UL 1995. The insulation must be weatherproof and UV resistant if exposed.

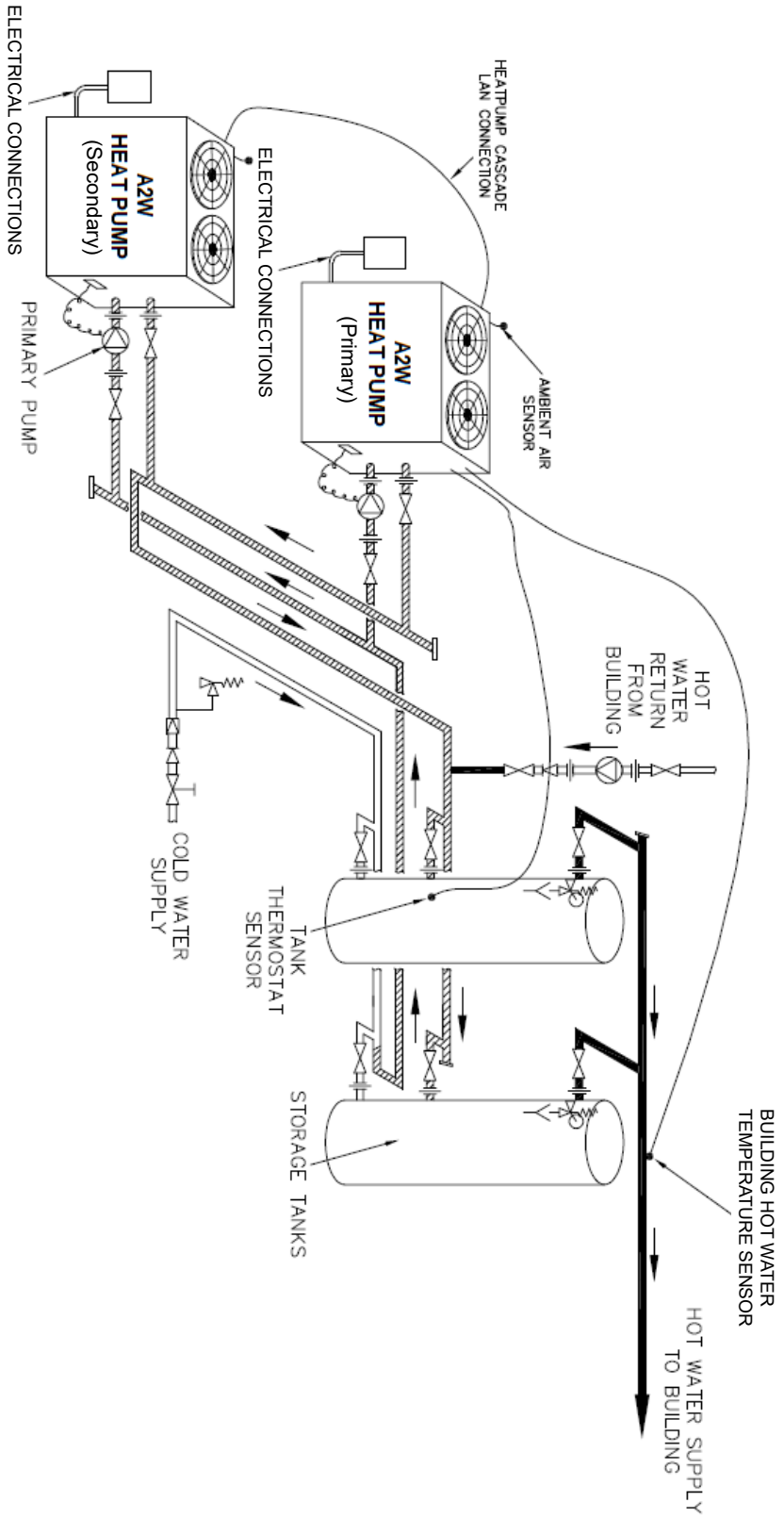
## SADDLING - PIPE WORK

To prevent damage to the heat pump and storage tanks when attaching pipe clips or saddles to the water heater jacket, we recommend the use of self-drilling screws with a maximum length of 0.5 in (12 mm). Should pre drilling be required, extreme caution must be observed when penetrating the jacket of the water heater.

**Avoid drilling or saddling in the vicinity of the evaporator coil. The coil and refrigerant circuit are in close proximity to the jacket and rupturing of the refrigerant circuit may occur.**

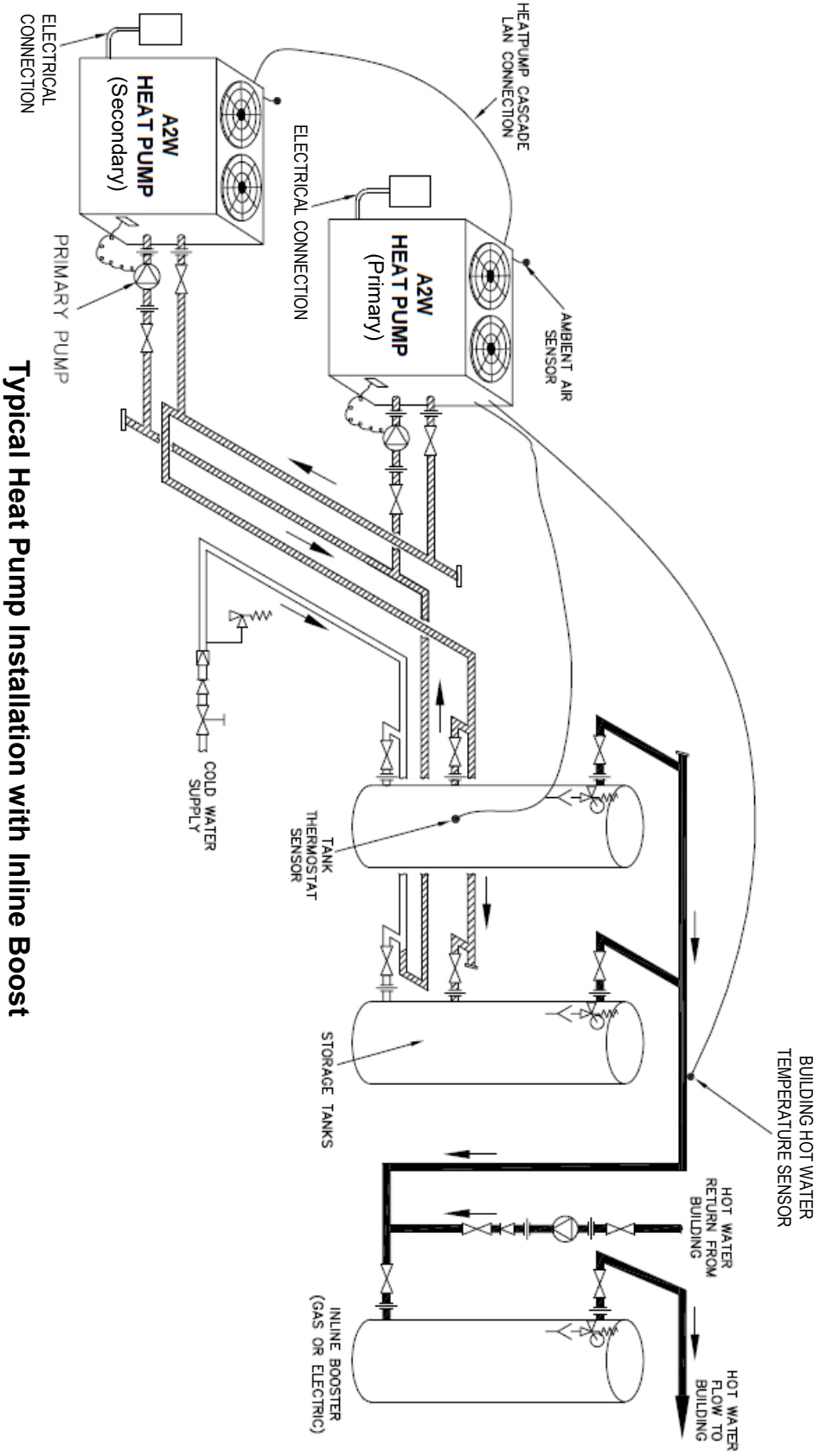
**Note: If the heat pump is damaged as a result of attaching pipe clips or saddling to the jacket, any resultant faults will not be covered by the warranty.**

# INSTALLATION



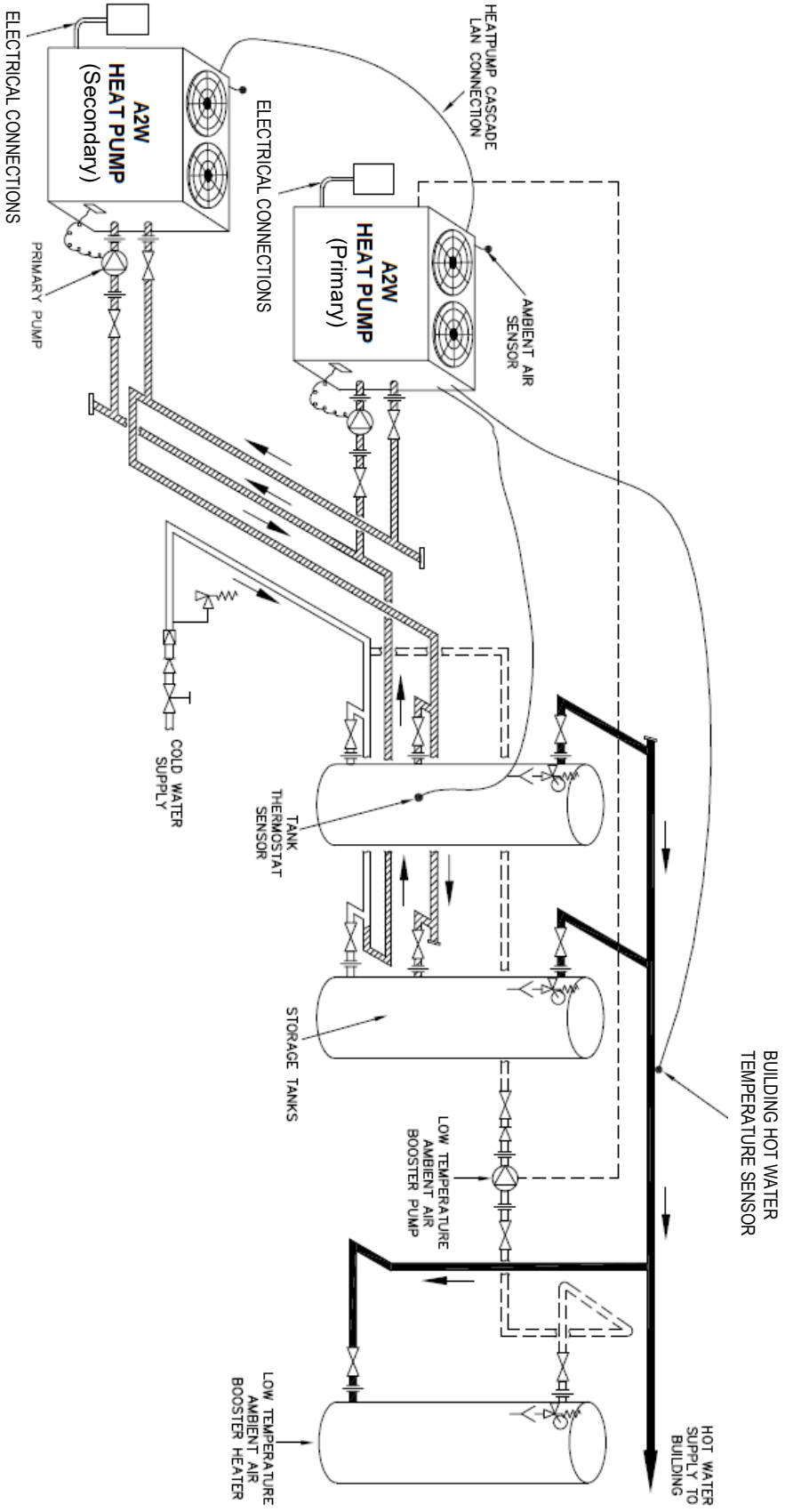

**Typical Heat Pump Installation with Recirculation**

# INSTALLATION




**Typical Heat Pump Installation with Inline Boost**

# INSTALLATION

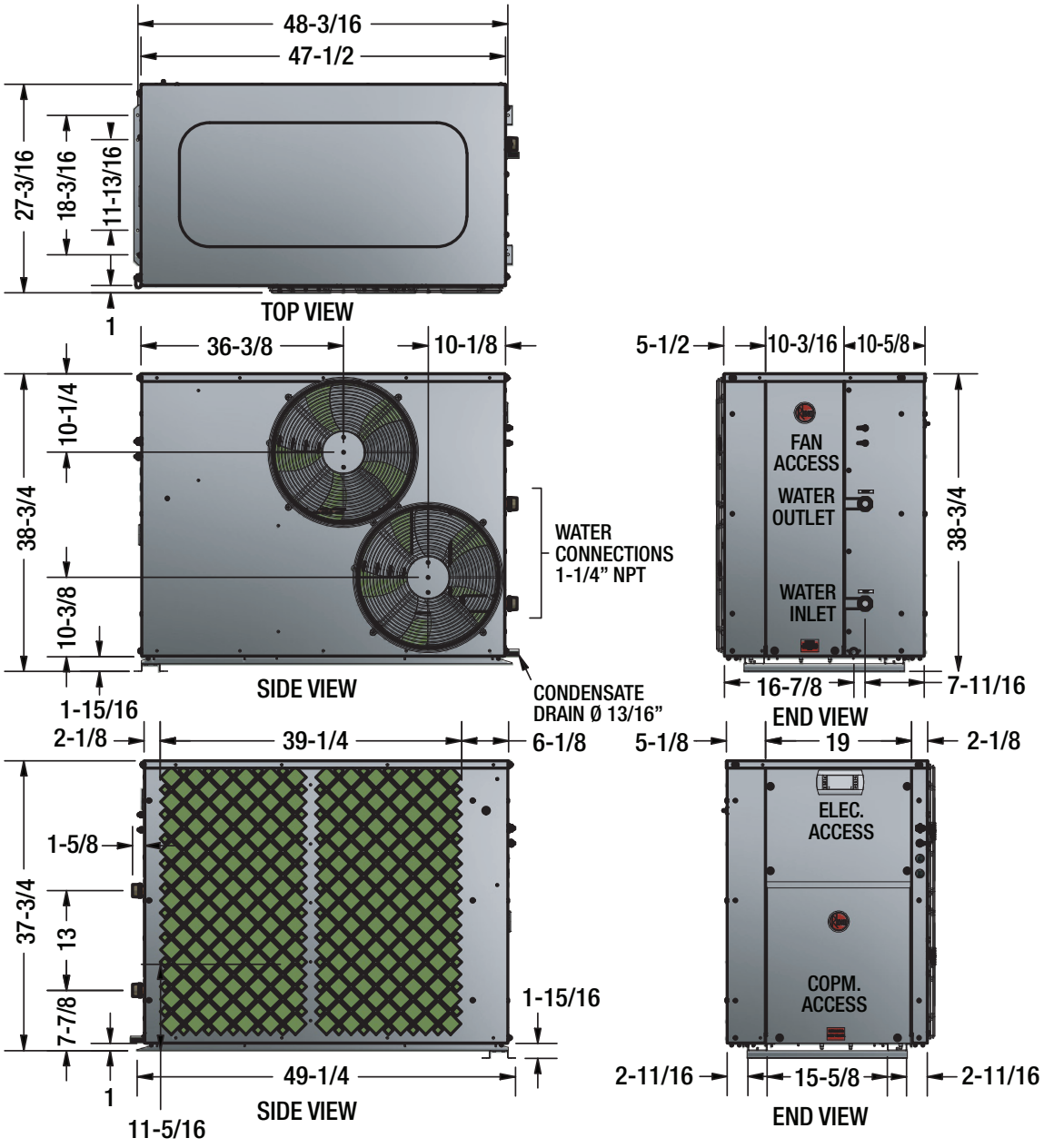



**Typical Heat Pump Installation with Low Ambient Air Boost- Dead Leg System**

# INSTALLATION

## DIMENSIONS AND TECHNICAL DATA- 60K BTU MODELS

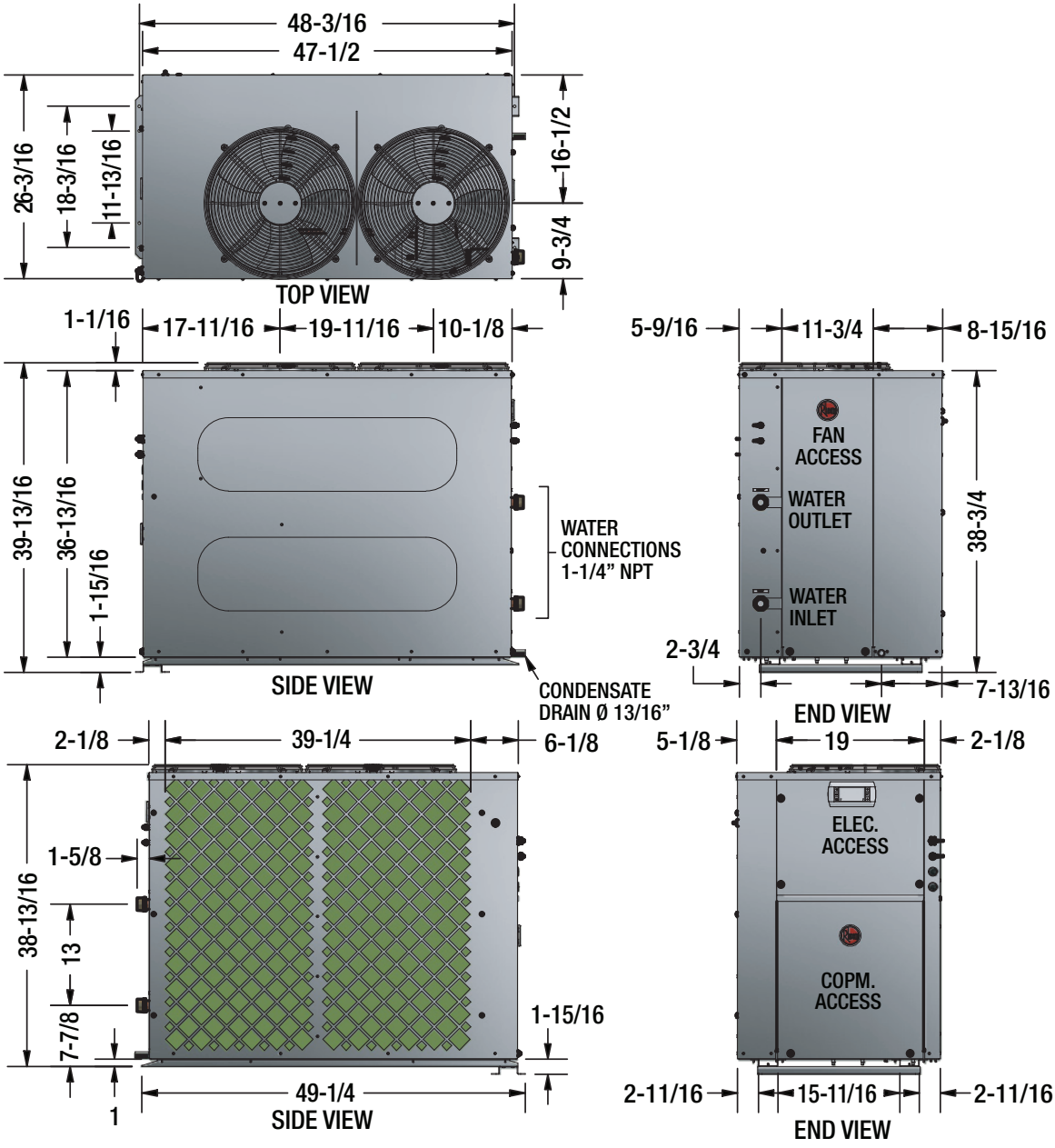
**A2W 60k BTU- Ducted Horizontal Discharge HPHD-60HNU-201**



# INSTALLATION

## DIMENSIONS AND TECHNICAL DATA- 60K BTU MODELS

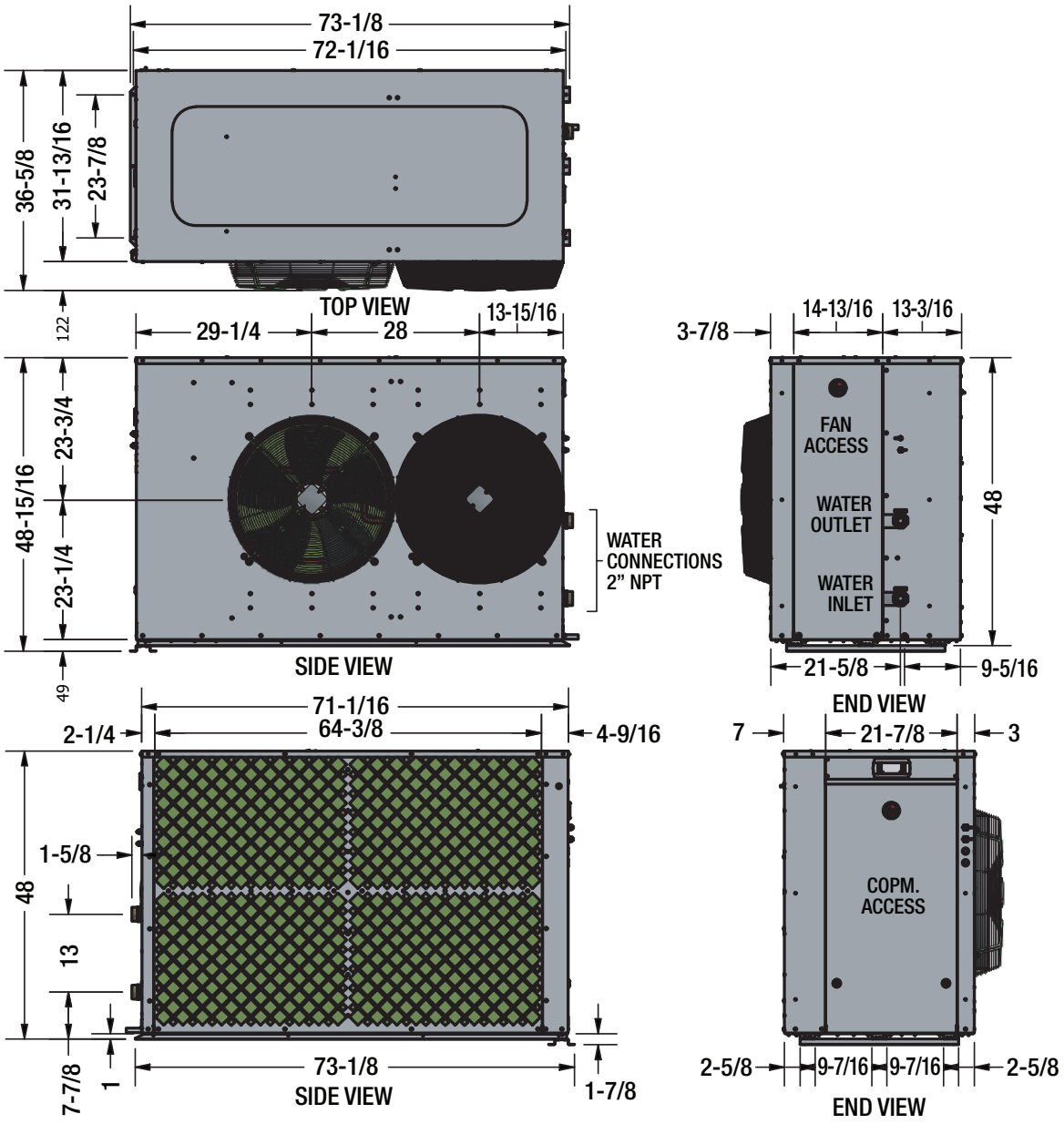
**A2W 60k BTU - Vertical Discharge HPHD-60VNU-201**



# INSTALLATION

## DIMENSIONS AND TECHNICAL DATA- 135K BTU MODELS

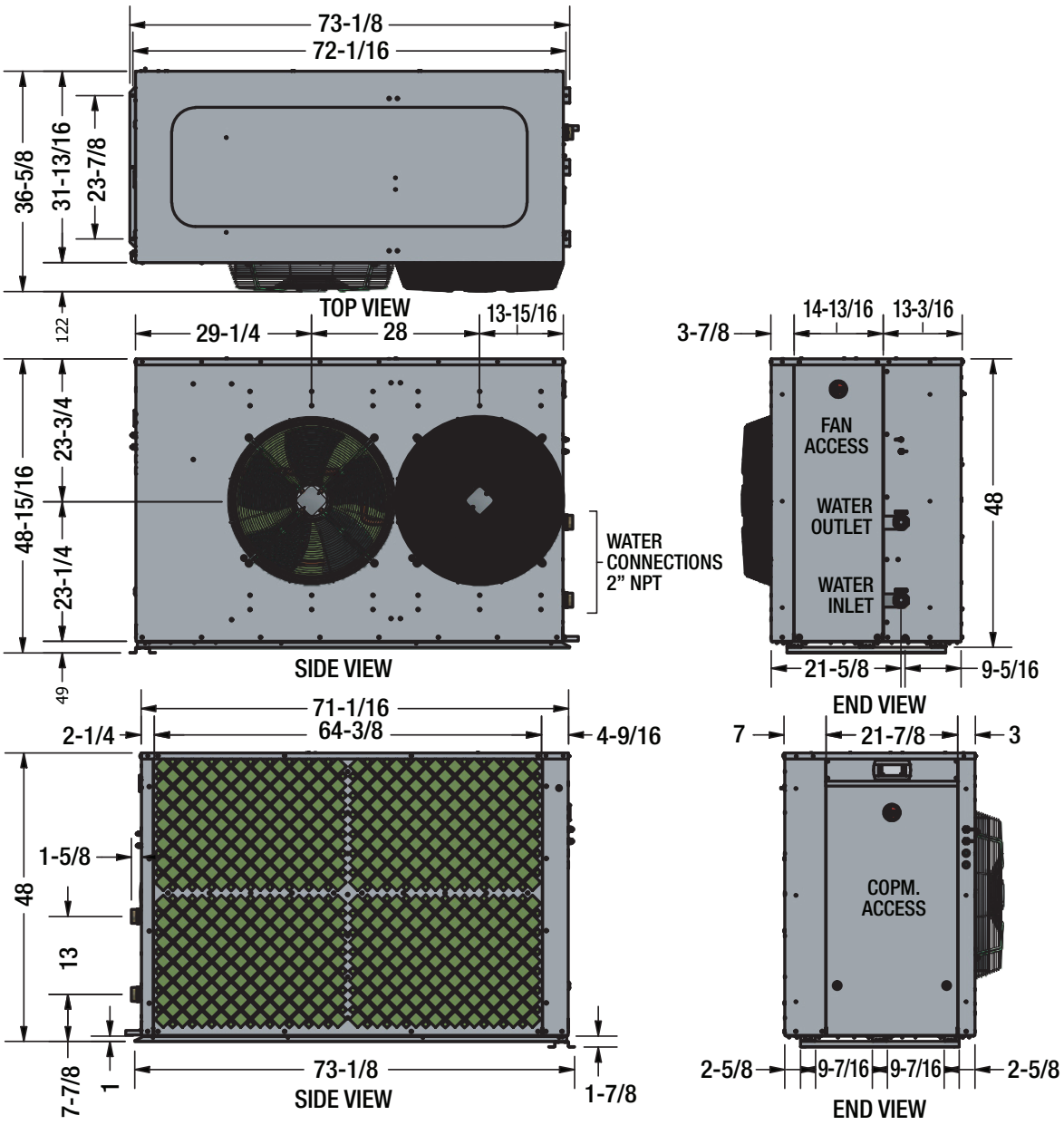
**RHEEM A2W 135 K BTU - Horizontal Discharge HPHD-135HNU-483**



# INSTALLATION

## DIMENSIONS AND TECHNICAL DATA- 135K BTU MODELS

**RHEEM A2W 135 K BTU - HPHD-135VNU-483**



# INSTALLATION

## CLEARANCES- AIR TO WATER HEAT PUMP MODELS

| SIDES | 60K BTU MODELS | 135K BTU MODELS |
|---|---|---|
| Evap Coil Side | 20 in (500 mm) | 40 in (1000 mm) |
| Back (vertical discharge models) | Nil | Nil |
| Back (horizontal discharge models) | 47 in (1200 mm) | 78 in (2000 mm) |
| Display Side | 34 in (850 mm) | 34 in (850 mm) |
| Water Connections Side | 20 in (500 mm) | 24 in (600 mm) |
| Top (vertical discharge models) | 47 in (1200 mm) | 79 in (2000 mm) |
| Top (horizontal discharge option) | Clearance above unit required for service personnel to stand. | |

# HEAT PUMP AND TANK ASSEMBLY

## HEAT PUMP AND STORAGE TANKS

The heat pump water heater system is modular and comprises three main components: the heat pump water heater, storage tanks and primary circulator. An auxiliary booster and/or circulator may also be employed as part of the system. The water heater must not be operated until all components are assembled.

## HEAT PUMP

Locate the heat pump(s) in the appropriate position observing the required clearances for operation and servicing. Refer to previous page.

### Indoor Installations

To comply with UL 1995, the minimum room size permissible in relation to the quantity of refrigerant in the water heater, is 264.9 $ft^3$ per HPHD-60, 60k Btuh heat pump and 626.1 $ft^3$ per HPHD-135, 135k Btuh heat pump. A larger room size is recommended for efficient heat pump operation.

Ducted models with duct kit are designed to be connected to ducting to convey cold discharge air away from the heat pump air inlet. Non ducted models may be installed indoors, without ducting, if a sufficient supply of heat energy is available and the room meets the volume requirements stated above. Good performance is obtained when the heat pump is supplied with a constant supply of fresh air. Failure to observe the above recommendations may lead to lower than expected performance or problematic operation of the heat pump.

### Ventilation

The heat pump draws fresh air at a rate of 56.5 $ft^3/s$ for HPHD-60, 60k Btuh heat pump and 204.8 $ft^3/s$ for HPHD-135, 135k Btuh heat pump. Minimum recommended free air inlet ventilation opening is 10.8 $ft^2$ per HPHD-60, 60k Btuh heat pump and 20.8 $ft^2$ per HPHD-135, 135k Btuh heat pump.

### Ducted Models with Kit

The exhaust air duct must be constructed so that it covers both fans. A spigot is provided on ducted models to facilitate ductwork connection. The maximum static pressure in the ductwork must not exceed the values stated in the table below.

| MAXIMUM STATIC PRESSURE | | | |
|---|---|---|---|
| **60k BTU Heat Pump** | | **135k BTU Heat Pump** | |
| Ducted | Non ducted | Ducted | Non ducted |
| 11.6 psi | 2.9 psi | 14.5 psi | 2.9 psi |

### Horizontal Ducting

If ducting horizontally, the vertical dimension of the duct must be at least 31.5 in high. It is recommended to terminate the ducting with bird mesh as this provides the least pressure resistance to the fans against air flow. If louvres are to be used, the duct size must be increased. The duct should have a slight fall away from the heat pump and the terminal face be tapered downwards to prevent water ingress.

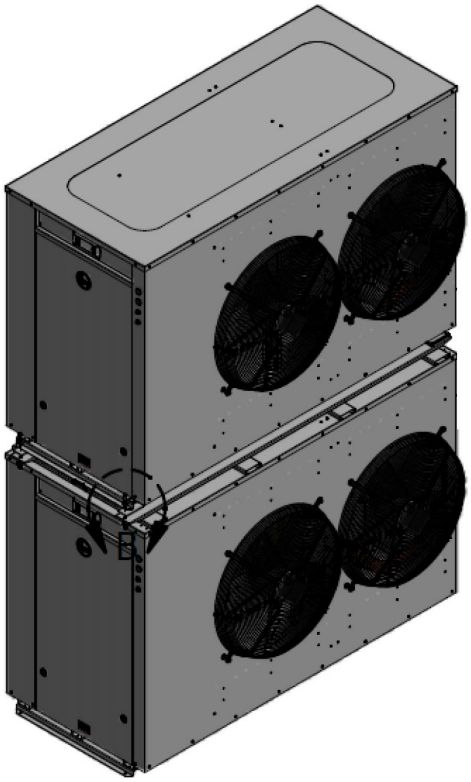
### Vertical Ducting

If ducting vertically, the duct must terminate 19.68 in above the roof level and have a free ventilation outlet area equivalent to 10.76 $ft^2$ per heat pump 60k BTU models and 20.77$ft^2$ per 135k BTU heat pump models. It is recommended to terminate the duct with bird mesh as this provides the least pressure resistance to the fans against air flow. Adequate weather protection must be provided to prevent water ingress.

### Horizontal Fan Option

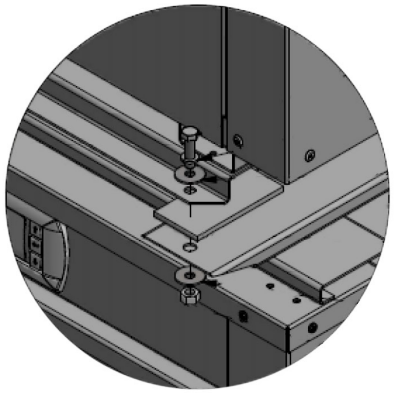
If a horizontal discharge fan option has been selected, the same rules apply to location of installation. If installed indoors, observe the same requirements as shown in indoor installations on page 14.

# HEAT PUMP AND TANK ASSEMBLY



**Staking kits available for horizontally vented heaters. See Kit Instillation Instructions for proper stacking**

| PART NUMBER | DESCRIPTION |
|---|---|
| 45263 | HPHD-60 Horizontal Stacking Kit |
| 45264 | HPHD-135 Horizontal Stacking Kit |



DETAIL B

**Note: Top unit can be 9530XXH0 or 9520XXH0.**

## STORAGE TANKS

Commercial storage tanks are employed to store the hot water generated by the heat pump. The tanks must be manifolded to ensure even distribution of the stored energy. More than one bank can be used. Follow the Manifold Arrangement diagram in this Manual when manifolding the tanks.

Refer to the installation instructions supplied with the storage tanks for specific information relating to the installation of the storage tanks.

## PRIMARY CIRCULATOR

Each heat pump requires a primary circulator to ensure the correct flow rate and temperature rise is achieved. Where more than one heat pump is installed the common manifold system must be sized to accommodate the total flow of all the primary pumps running simultaneously.

# HEAT PUMP AND TANK ASSEMBLY

Refer to table below for minimum (ID) pipe sizing.

The designed primary pump per 60k Btuh model is Grundfos model CM3-2 and per 135k Btuh model is CM10-1. Refer to installation manuals supplied with pumps. If another pump has been supplied, consult Rheem before continuing with the installation.

| 60K BTUH | | | | |
|---|---|---|---|---|
| No. of Heat Pumps in Parallel | 1 | 2 | 3 | 4 |
| Pump | Grundfos CM3-2 (Rheem AP22760A) | | | |
| Branch Size (in) | 1.5" | | | |
| Header Size (in) | 1.5" | 2" | 2.5" | 3" |

| 135K BTUH | | | | |
|---|---|---|---|---|
| No. of Heat Pumps in Parallel | 1 | 2 | 3 | 4 |
| Pump | Grundfos CM10-1 (Rheem AP22760B) | | | |
| Branch Size (in) | 2" | | | |
| Header Size (in) | 2" | 3" | 4" | 4" |

Header pipe sizing is based on one pump per heat pump with a total length of 65 ft of primary flow and return piping and 20 x 90° bends, excluding manifolds on storage tanks and heat pumps, at 3.9 ft/sec velocity. If this specification is exceeded consult Rheem before continuing with the installation.

Multiple heat pumps MUST be installed to ensure equal demand on each heat pump (or storage tank) in the bank is the same as any other. To achieve this, the following is necessary:

1. The inlet manifolds must be designed to balance the flow to each heat pump i.e. each branch line must be the same diameter and length.
2. The outlet manifold must be designed to balance the flow from each heat pump i.e. each branch line must be the same diameter and length.
3. The first heat pump in must be the last heat pump out.

**NOTE:** Inlet and outlet water isolation valves MUST be installed at each heat pump to enable each heat pump to be individually isolated for servicing. The inlet isolation valve MUST be installed before the pump to also enable the pump to be isolated for servicing.

## AUXILIARY WATER HEATER

It may be necessary to install an auxiliary water heater under the following conditions:

- If the ambient temperature is likely to drop below 41°F (5°C) during periods when heating may be required.
- To ensure sufficient hot water is available for higher than expected peak conditions.
- If higher temperature water is required for certain applications, e.g. commercial laundry or kitchen.

# HEAT PUMP AND TANK ASSEMBLY

The configuration of the auxiliary water heating plant can vary depending on the requirements of the individual installation.

**Low Ambient Temperature Heating Only** - Where the auxiliary water heater is required to be activated if the heat pump cannot operate due to low ambient conditions, the heat pump can activate the auxiliary heater or pump. There are many configurations depending on system design. Refer to Application Guide for details on the auxiliary boost function designed for this system.

**In Line Boosting Only -** Where the auxiliary water heater is required to ensure sufficient hot water is available for periods after the main peak or to boost the temperature of the water produced by the heat pump for other purposes (eg high temperature for kitchen and laundry use), an auxiliary water heater must be installed in series with the storage tanks. ie, the hot water outlet from the storage tanks must feed into the inlet of the auxiliary water heater(s).

**NOTE:** Where storage tanks are used, boosting in the top portion of the storage tank is equivalent to boosting in series.

Where multiple auxiliary water heaters are required to be manifolded together, these must be manifolded. Refer to next page.

This arrangement can also be adapted to include recirculation heat loss make up and / or low ambient temperature activation heating. Refer to Application Guide for options.

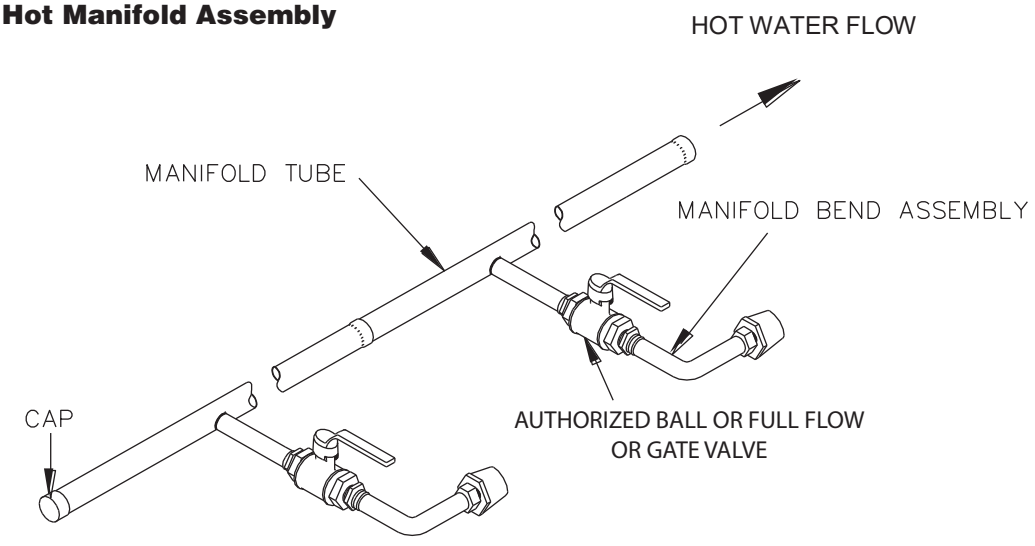
# MANIFOLD INSTALLATIONS

The commercial heat pump water heater is designed to be installed with storage tanks on a single manifold or multiple manifolds if required. The cold water, primary flow and hot water manifolds must be designed to balance the flow from each water heater and storage tank. To achieve this, there are basic installation requirements and principles which must be followed:

1. The maximum number of storage tanks in a bank should be 10, however several banks of storage tanks can be installed.
2. The hot water line from the manifold must leave from the opposite end to which the cold water line enters the manifold.
3. The storage tanks must be of the same model.
4. The cold water line, cold and hot headers and hot water line must be sized to meet the requirements of both AS/NZS 3500.4 and the application.
5. A non-return valve, isolation valve and if required a pressure limiting valve and expansion control valve, must be installed on the cold water line to the system.
6. A full flow gate valve or ball valve (not a stop tap, as used on a single water heater installation) must be installed on both the cold water branch and hot water branch of each water heater and storage tank.
7. Non return valves or pressure limiting valves MUST NOT be installed on the branch lines to the water heaters or storage tanks.
8. All fittings, valves and branch lines must be matched sets all the way along the manifold.
9. Sufficient space must be left to enable access, servicing or removal of any water heater or storage tank.
10. The temperature pressure relief valve drain line from each storage tank can terminate at a common tundish (funnel) with a visible air break at each drain discharge point.

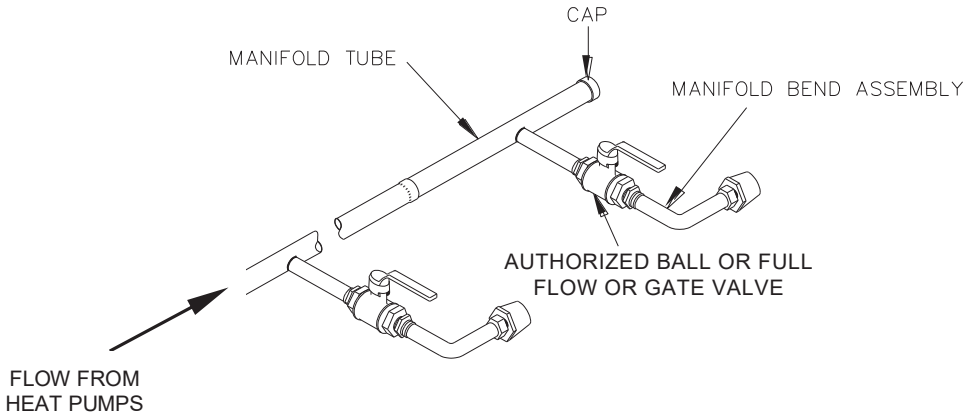
## MANIFOLD ARRANGEMENT

**Hot Manifold Assembly**

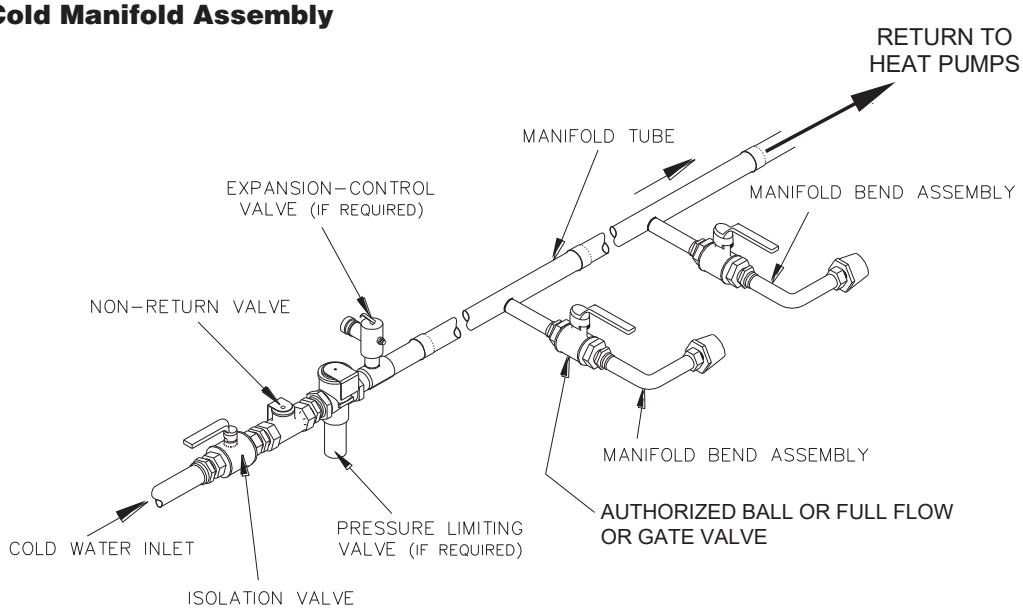


# MANIFOLD INSTALLATIONS

**Primary Hot Water Flow Manifold Assembly**

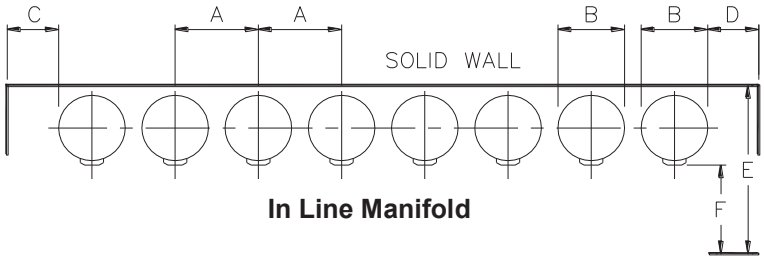



**Cold Manifold Assembly**

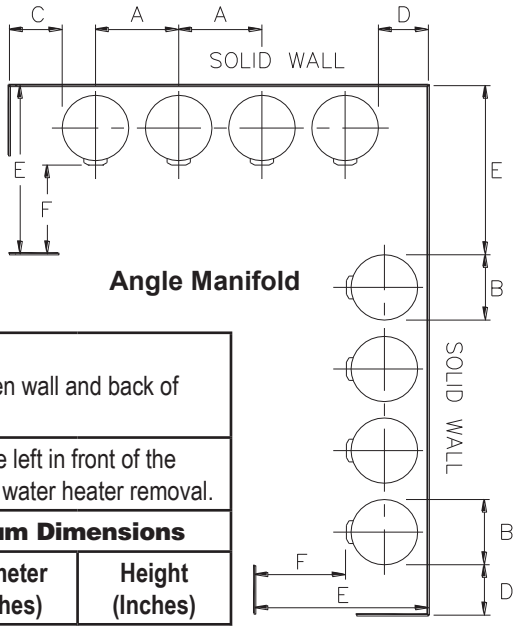


# MANIFOLD INSTALLATIONS

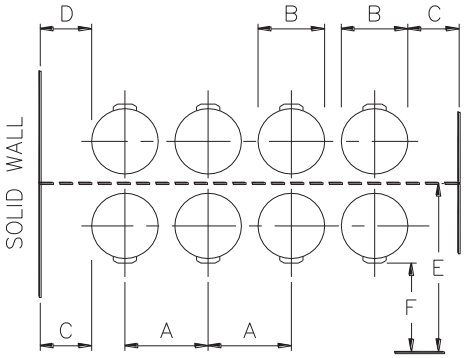
## INSTALLATION DIMENSIONS - MULTIPLE STORAGE TANKS




**In Line Manifold**




**Angle Manifold**




**Back to Back Manifold**

NOTES:
Minimum recommended space between wall and back of water heater is 4 in.

A minimum of 36 in (E* & F*) should be left in front of the water heater for access, servicing and water heater removal.

**Installation Layout Minimum Dimensions**

| Model | Volume (Gallons) | Diameter (Inches) | Height (Inches) |
|---|---|---|---|
| ST80 | 80 | 24-7/16 | 58-5/18 |
| ST120 | 120 | 28-1/4 | 59-1/4 |
| ST175 | 175 | 32-1/4 | 67-1/4 |
| ST200A | 200 | 34 | 77-1/2 |
| ST260A | 257 | 34 | 95-1/2 |
| ST320A | 318 | 40 | 84-1/2 |
| ST320A | 318 | 40 | 84-1/2 |
| ST430A | 432 | 46 | 84-1/2 |
| ST500A | 504 | 46 | 94-1/2 |
| ST750A | 752 | 54 | 107-1/2 |
| ST950A | 940 | 54 | 131-1/2 |

# CONNECTIONS - PLUMBING

## CONNECTION SIZES

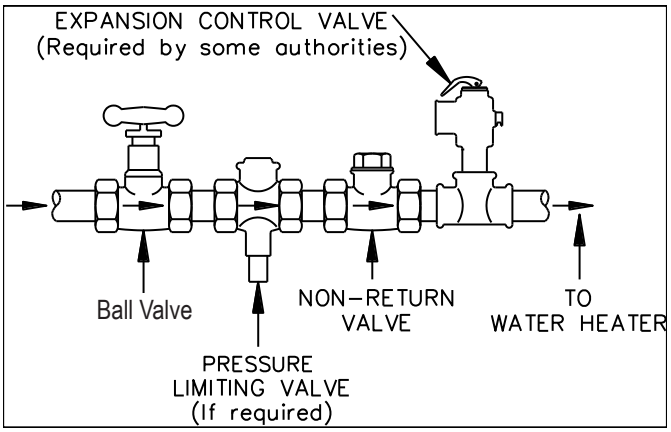
| Model | 60k BTU | 135k BTU |
|---|---|---|
| Heat pump water heater inlet connection | 1¼" NPT | 2" NPT |
| Heat pump water heater outlet connection | 1¼ NPT | 2" NPT |
| Condensate drain connection | 13/16" | |

All plumbing work must be carried out by a qualified person and in accordance with the UL 1995.

## WATER INLET AND OUTLET

The pipe work must be cleared of foreign matter before connection and purged before attempting to operate the water heater. All olive compression fittings must use brass. Use thread sealing tape or approved thread sealant on all screwed fittings.

An isolation valve and non-return valve must be installed on the cold water line to the water heater system. An acceptable arrangement is shown in the diagram. Refer also to “Hot Water Delivery” and to “Mains Water Supply” sections in this Manual.




Disconnection unions are provided at the cold water inlet and hot water outlet on the water heater to allow for disconnection of the water heater.

## PIPE SIZES

To achieve true mains pressure operation, the cold water line to the storage tanks should be the same size or bigger than the hot water line from the storage tanks.

The pipe sizing for hot water supply systems should be carried out by persons competent to do so, choosing the most suitable pipe size for each individual application. Reference to the technical specifications of the water heater and local regulatory authority requirements must be made.

Refer to the table on the left for correct primary flow and return pipe sizing.

## RELIEF VALVE

The heat pump is supplied with an integral pressure relief valve located on the inside of the heat pump cabinet and will discharge into the tray of the heat pump. Refer to Condensate Drain on next page for drainage instructions.

## EXPANSION CONTROL VALVE

Local regulations may make it mandatory to install an expansion control valve (ECV) in the cold water line to the water heater system. In other areas, an ECV is not required unless the saturation index is greater than +0.4 (refer to “Water Supplies” on page 11). However, an ECV may be needed in a corrosive water area where there are sufficient quantities of silica dissolved in the water.

The expansion control valve must always be installed after the non return valve and be the last valve installed prior to the water heater system (refer to diagram on page 38).

# CONNECTIONS - PLUMBING

## EXPANSION CONTROL VALVE DRAIN

A copper drain line must be fitted to the relief valve to carry the discharge clear of the water heater. Connect the drain line to the relief valve using a disconnection union. The pipe work from the relief valve to the drain should be as short as possible and fall all the way from the water heater with no restrictions. It should have no more than three right angle bends in it. Use NPT 1/2 pipe.

The outlet of the drain line must be in such a position that flow out of the pipe can be easily seen (refer to UL 1995) - but arranged so hot water discharge will not cause injury, damage or nuisance. The drain line must discharge at an outlet or air break not more than 19.52 ft from the relief valve.

In locations where water pipes are prone to freezing, the drain line must be insulated and not exceed 12" in length. The drain line must be installed in accordance with local codes.

## CONDENSATE DRAIN

A drain line must be fitted to the condensate drains to carry the discharge clear of the water heater. The drain line can be extended using 13/16 in O.D. rigid hose or conduit. Where installed externally, the drain line pipe work must be UV resistant or protected from sunlight. The outlet of the drain line must be in such a position that flow out of the pipe can be easily seen - but arranged so water discharge will not cause damage or nuisance. The water heater is supplied with fall and t is recommended to install the water heater with a slight fall towards the condensate drain.

The condensate drain must not be connected to the pressure relief or expansion control valve drain line but may discharge at the same point.

# CONNECTIONS - ELECTRICAL

The power supply to the water heater must not be switched on until the water heater is filled with water and a satisfactory megger reading is obtained.

## MEGGER READING

When a megger test is conducted on this water heater, then the following should be noted.

**⚠WARNING: This water heater contains electronic equipment and 500 V insulation tests must only be conducted between actives and earth and between neutral and earth. An active to neutral test WILL damage the electronics.**

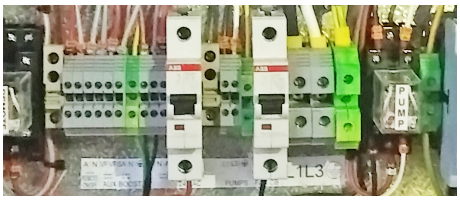
An insulation test result of above 1 MΩ should be obtained for this water heater.

## ELECTRICAL CONNECTION

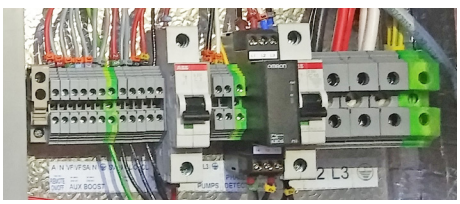
All electrical work and permanent wiring must be carried out by a qualified person and in accordance with UL 1995.

## HEAT PUMP

The heat pump water heater must be directly connected to the proper mains power supply (HPHD-60 at 208-240V single phase, HPHD135 at 480V 3 phase). The heat pump must be on its own circuit with an circuit breaker installed at the switchboard. A secondary isolating switch must be installed within reach of the water heater.



*HPHD-60*



*HPHD135*

A conduit is required for the electrical cable to the heat pump water heater. The conduit is to be connected to the unit with a 20mm terminator. Holes are provided on the electrical panel for cabling. Connect the power supply and earth wires directly to the terminal block, ensuring there are no excess wire loops inside the electrical enclosure. Correct phase connection is required.

| ELECTRICAL DATA TABLE | | |
|---|---|---|
| **Model** | **60k Btu** | **135k Btu** |
| Electrical Connection | 208-240V single phase | 480V (3 phase) |
| MCA | 40 A | 35A |
| Minimum Circuit Size (per phase) | 60A | 50A |

## PRIMARY PUMP

The power to the primary pump for each heat pump is supplied from the water heater. Connect the active, neutral and earth wire to the pump terminals as shown in the photo inside the pump cover and to the terminals located within the heat pump electrical enclosure.

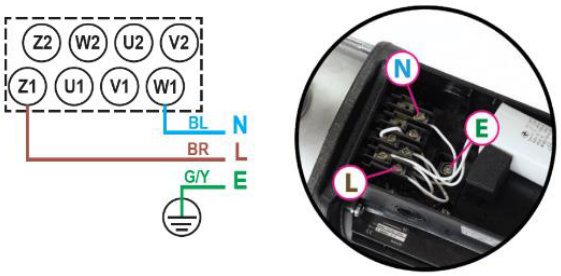
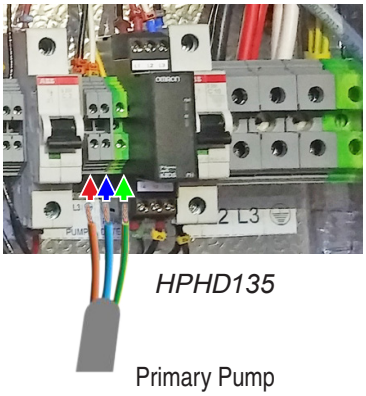



*Photo inside the pump cover.*

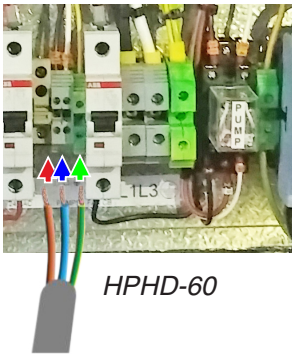
A 20 mm conduit is required for the electrical cable between the water heater and pump. The conduit is to be connected to the water heater with a 20 mm terminator.

Holes are provided on the electrical panel for cabling.



*HPHD135*

Primary Pump



*HPHD-60*

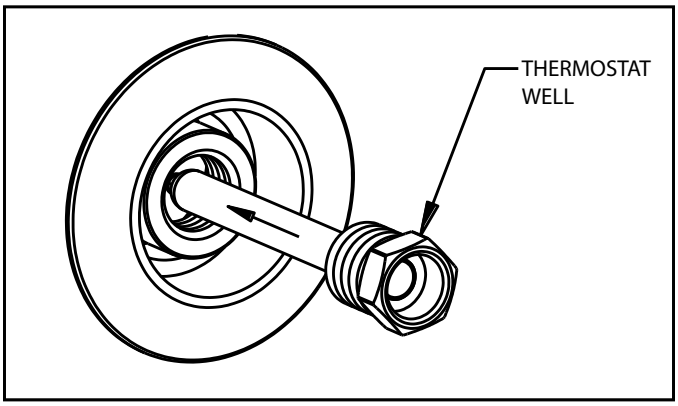
Primary Pump

# CONNECTIONS - ELECTRICAL

## TANK SENSOR INSTALLATION

Connect one of the supplied temperature sensors to the connection terminal on the heat pump marked “Tank Sensor”.

- Run out the sensor to the nearest storage tank.




- Insert a Thermostat Well (not supplied) into the tank.
- Insert the sensor all the way into the thermostat well and secure it to the storage tank to prevent the sensor dislodging from the well.
- Cable tie the sensor lead, curling up and tying off any excess lead.

## BUILDING FLOW TEMPERATURE SENSOR INSTALLATION

- Connect the 2nd temperature sensor to the connection terminal on the heat pump marked “Building Flow Sensor”.
- Run out the sensor to the building flow pipe.
- Fit a thermostat well (not supplied) in the pipe ensuring the end of the sensor is in the flow of water. To prevent the sensor dislodging from the well, secure the sensor to the insulation using a cable tie. Alternatively, clamp the sensor to the outside of the pipe using a pipe clamp prior to the insulation being fitted.

**NOTE:** For multiple heat pump installation, the preferred method is to interconnect the heat pumps (up to 4 maximum) via LAN cables, available as an accessory (part number: 17534).

In this case, only one tank sensor and building flow temperature sensor is required, which are connected to the heat pump designated as the Primary.

Alternatively, each heat pump can operate independently in which case each tank sensor and building flow temperature sensor must be connected and fitted as described above.

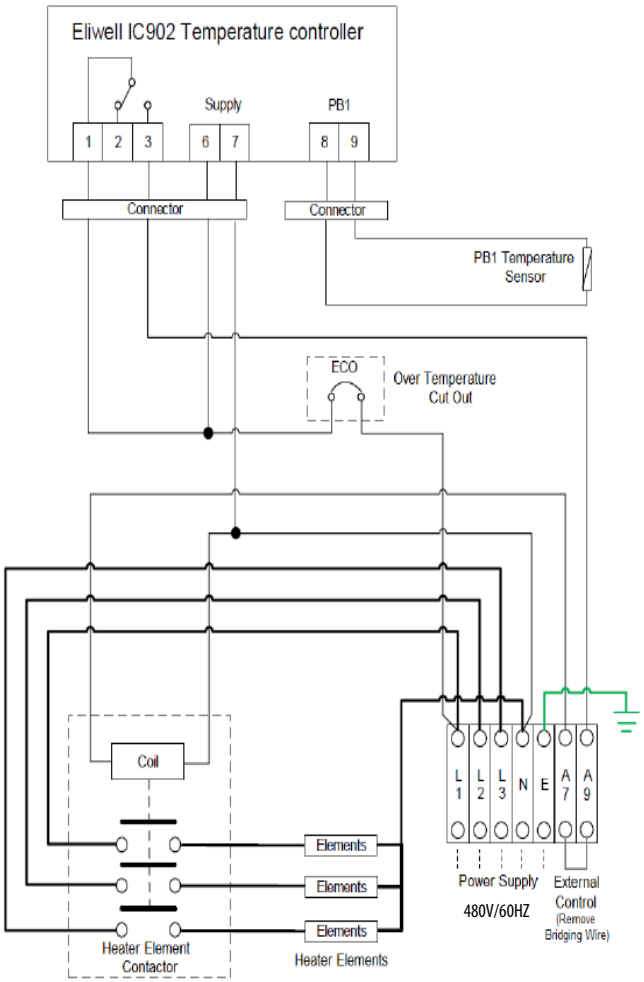
## LOW AMBIENT BOOST

If auxiliary boosting is required for low ambient operation, the booster should be interlocked with the heat pump to only operate under low ambient or fault conditions.

# CONNECTIONS - ELECTRICAL

## AUXILIARY BOOST ELEMENT

If a single auxiliary boost element is supplied by Rheem, remove bridging wire at the terminals marked 'A7 and A9' behind the element controller cover and connect the terminal A7 and A9 to the voltage free terminal marked 'VF' in the heat pump enclosure to control the operation of the boost element.




*Electric Heating Unit - Wiring Diagram.*

*Picture of heat pump terminal strip.*

Where multiple auxiliary boost elements are required, and the number of auxiliary boost elements matches the number of heat pumps, each element may be interlocked with an individual heat pump directly using the method described above. In this case, the heat pumps should operate independently and each have their own tank and building flow temperature sensor connected.

Where the number of auxiliary boost does not match the number of heat pumps or the heat pumps are connected in a Primary/Secondary arrangement using LAN cables (refer to next page), then the heat pumps must be connected via LAN cables and control of the auxiliary boost elements will be via the Primary heat pump using an intermediary relay arrangement. Refer to Application Guide for more detail.

## AUXILIARY BOOST HEATER (EXTERNAL TO STORAGE TANK)

Depending on the installation, an auxiliary heater and/or boost pump may be supplied. Refer to Application Guide for auxiliary boost options.

In the heat pump enclosure, terminals marked "SA", "N" and "GND" provide 24V to control the auxiliary heater and/or auxiliary pump or multiple boost elements depending on the system design. Maximum current is 1A. Refer to Application Guide for further information to connect auxiliary boost heater.

**NOTE:** Where multiple heat pumps are required, the heat pumps must be connected in a Primary/Secondary arrangement using LAN cables (refer to page 53), and control of the auxiliary boost heaters will be via the Primary heat pump. Refer to Application Guide for more details.

# CONNECTIONS - ELECTRICAL

## MULTIPLE HEAT PUMP INSTALLATION

Up to four heat pumps can be interconnected by daisy chaining the LAN cables for operation as shown below. LAN cable is available as an accessory (part number: 17534).

**Step 1:**

*1st Heat Pump / Primary* *2nd Heat Pump* *3rd Heat Pump* *4th Heat Pump*

Interconnect the heat pumps as shown above by using the LAN cables. Determine the 1st heat pump as Primary. Route the cables neatly to prevent damage and trip hazards. Do not route across access panels.

Note: Any of the two LAN connections will be acceptable.

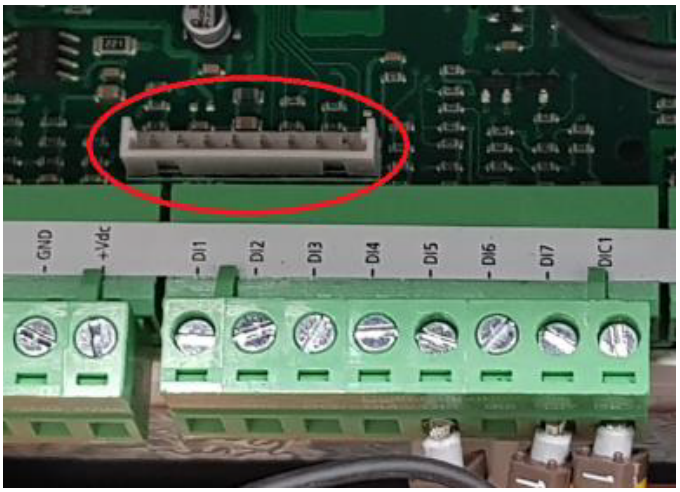
**Note**

1. Tank temperature sensor for the Primary heat pump must be connected, otherwise the heat pumps will not operate due to fault. There is no need to connect tank temperature sensors for Secondary heat pumps.
2. Building temperature sensor for the Primary heat pump must be connected. There is no need to connect building temperature sensors for Secondary heat pumps.
3. Ignore the values for tank and building temperature sensors on the display of Secondary heat pumps as these are not connected.

## BUILDING MANAGEMENT SYSTEMS (BMS/BAS)

Each water heater can be connected to a BMS or BAS system via interface cards (Modbus RS485 or BACnet MS-TP or BACnet TCP/IP Ethernet), available as an accessory.

Based on site requirement, a suitable interface card needs to be connected to the control panel as shown in the diagram below.




- If the system is comprised of single or multiple standalone heat pumps, each heat pump will have its own BMS card.

Insert the BMS card into the connector for each heat pump, taking care that the card is firmly placed as shown in red circle.

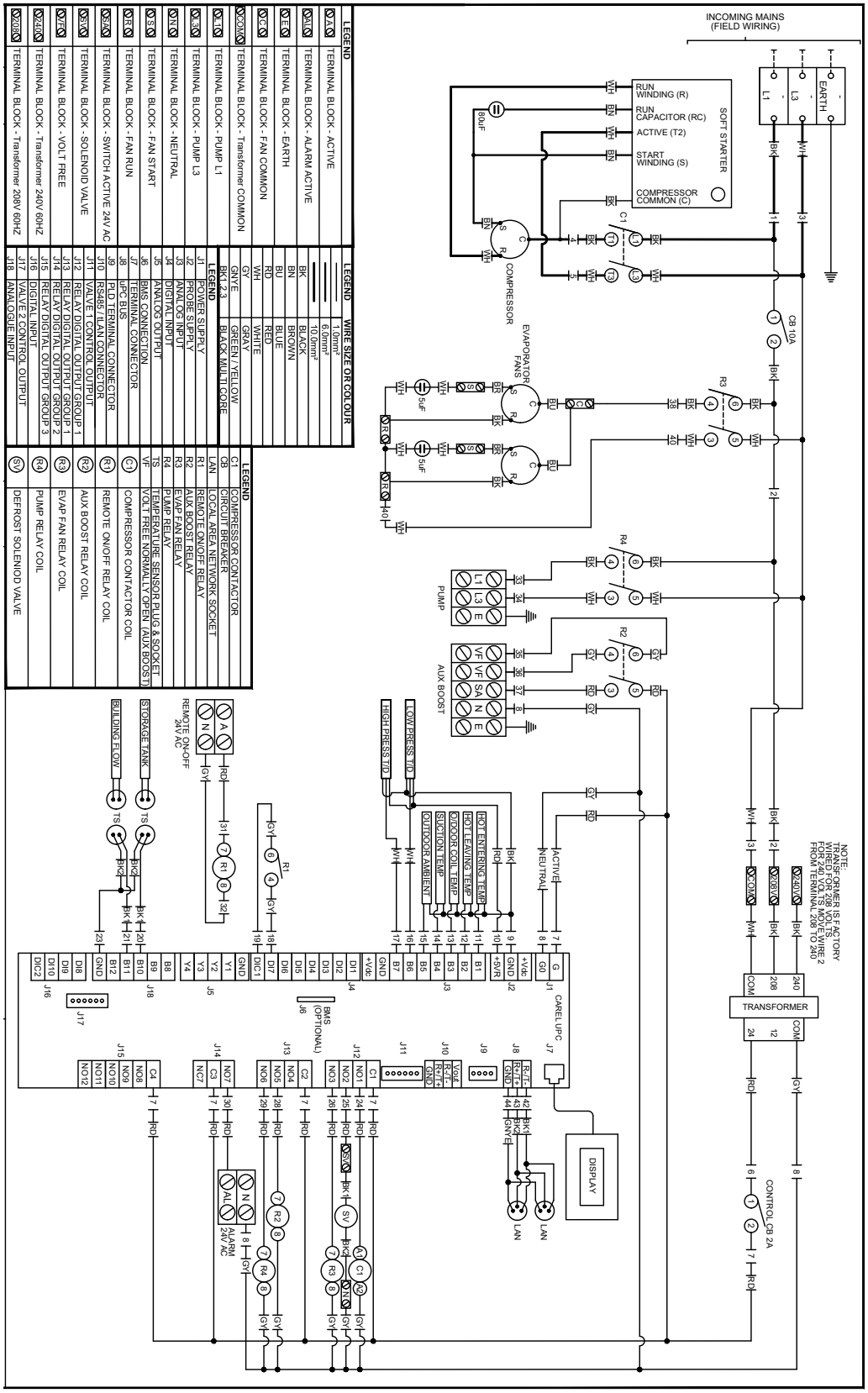
- If the system is comprised of multiple heat pumps for Primary/Secondary operation, only primary heat pump will have a BMS card and the secondary heat pumps will be connected via LAN cables.

Follow the instruction on previous page for Interconnecting Multiple Heat Pumps from step 1 to step 2.

Insert the BMS card into the connector for primary heat pump, taking care that the card is firmly placed as shown in red circle.

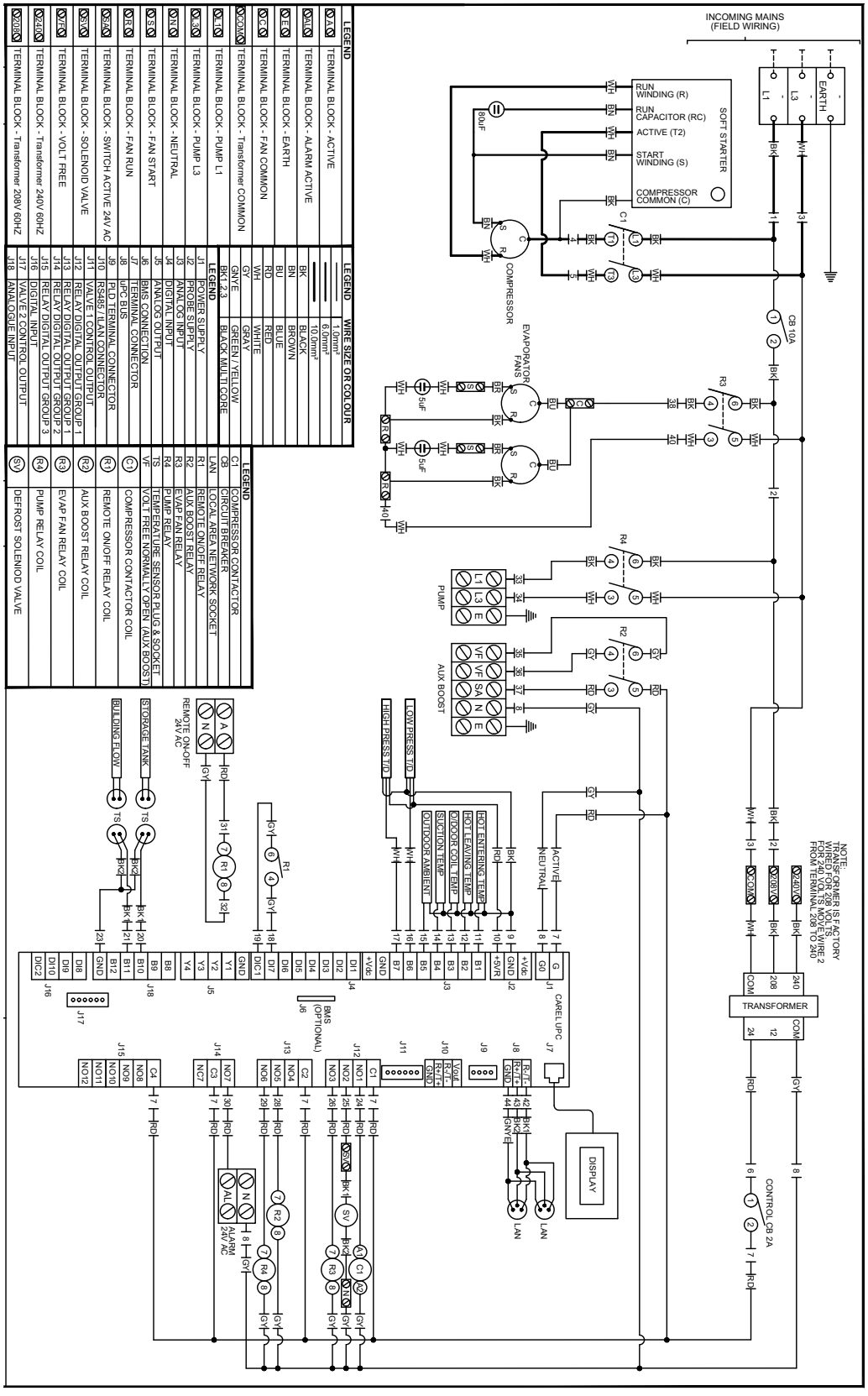
# CONNECTIONS - ELECTRICAL

## HPHD-60VN



# CONNECTIONS - ELECTRICAL

## HPHD-60HN




| LEGEND | | |
|---|---|---|
| XA.S | TERMINAL BLOCK - ACTIVE | |
| XA1.S | TERMINAL BLOCK - ALARM ACTIVE | |
| XE.S | TERMINAL BLOCK - EARTH | |
| XF.S | TERMINAL BLOCK - FAN COMMON | |
| XN.S | TERMINAL BLOCK - NEUTRAL | |
| XS.S | TERMINAL BLOCK - FAN START | |
| XR.S | TERMINAL BLOCK - FAN RUN | |
| XSA.S | TERMINAL BLOCK - SWITCH ACTIVE 24V AC | |
| XSV.S | TERMINAL BLOCK - SOLENOID VALVE | |
| XVF.S | TERMINAL BLOCK - VOLT FREE | |
| XT240.S | TERMINAL BLOCK - Transformer 240V 60HZ | |
| XT208.S | TERMINAL BLOCK - Transformer 208V 60HZ | |

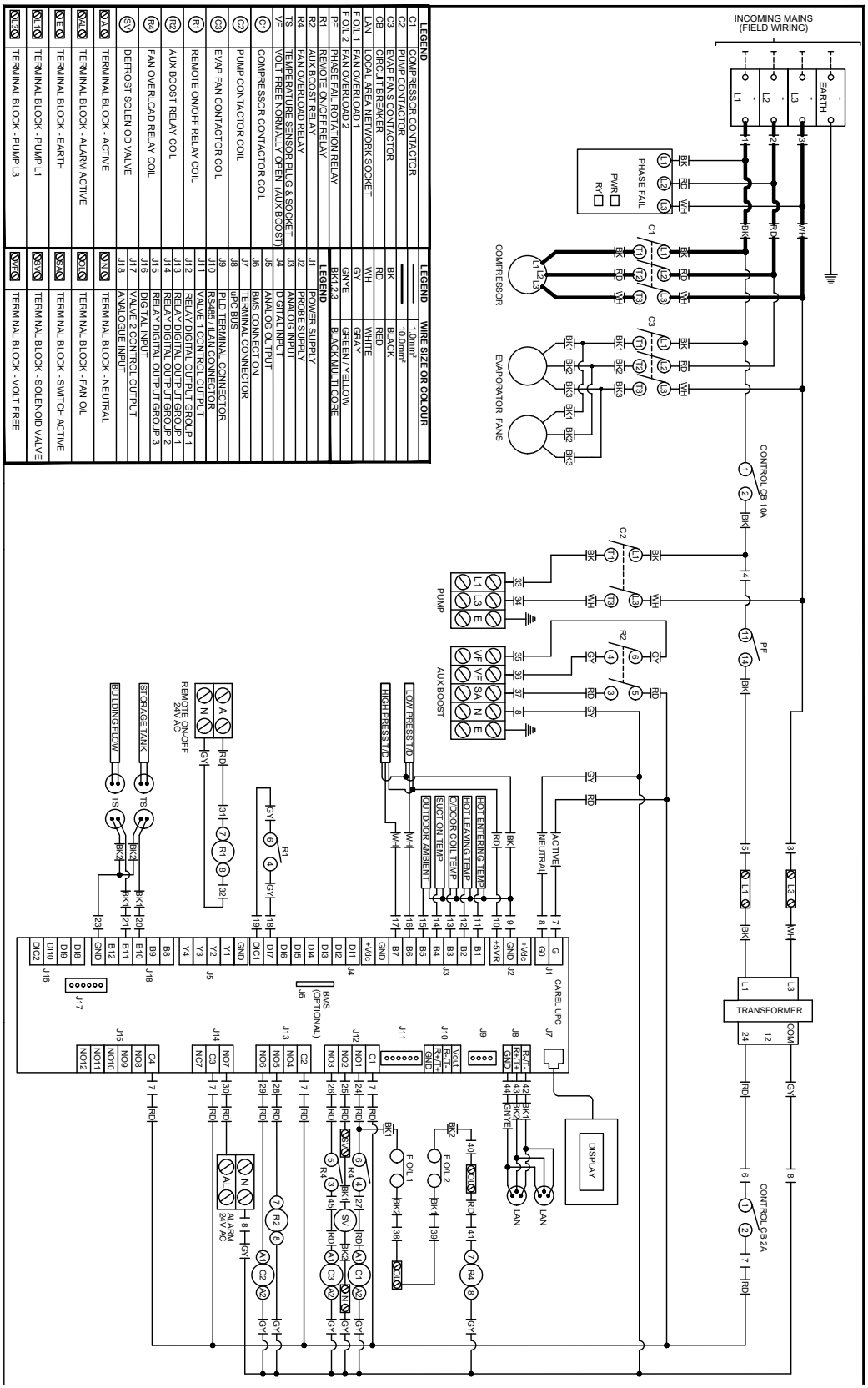
| LEGEND | WIRE SIZE OR COLOUR |
|---|---|
| | 1.0mm² |
| | 6.0mm² |
| BK | BLACK |
| BN | BROWN |
| BU | BLUE |
| RD | RED |
| WH | WHITE |
| GY | GRAY |
| GN/YE | GREEN / YELLOW |
| BK1,2,3 | BLACK MULTI CORE |

| LEGEND | |
|---|---|
| J1 | POWER SUPPLY |
| J2 | PROBE SUPPLY |
| J3 | ANALOG INPUT |
| J4 | DIGITAL INPUT |
| J5 | ANALOG OUTPUT |
| J6 | BMS CONNECTION |
| J7 | TERMINAL CONNECTOR |
| J8 | uPC BUS |
| J9 | PLD TERMINAL CONNECTOR |
| J10 | RS485 / LAN CONNECTOR |
| J11 | VALVE 1 CONTROL OUTPUT |
| J12 | RELAY DIGITAL OUTPUT GROUP 1 |
| J13 | RELAY DIGITAL OUTPUT GROUP 2 |
| J14 | RELAY DIGITAL OUTPUT GROUP 3 |
| J15 | RELAY DIGITAL OUTPUT GROUP 3 |
| J16 | DIGITAL INPUT |
| J17 | VALVE 2 CONTROL OUTPUT |
| J18 | ANALOGUE INPUT |

| LEGEND | |
|---|---|
| C1 | COMPRESSOR CONTACTOR |
| CB | CIRCUIT BREAKER |
| LAN | LOCAL AREA NETWORK SOCKET |
| R1 | REMOTE ON/OFF RELAY |
| R2 | AUX BOOST RELAY |
| R3 | EVAP FAN RELAY |
| R4 | PUMP RELAY |
| TS | TEMPERATURE SENSOR PLUG & SOCKET |
| VF | VOLT FREE NORMALLY OPEN (AUX BOOST) |
| (C1) | COMPRESSOR CONTACTOR COIL |
| (R1) | REMOTE ON/OFF RELAY COIL |
| (R2) | AUX BOOST RELAY COIL |
| (R3) | EVAP FAN RELAY COIL |
| (R4) | PUMP RELAY COIL |
| (SV) | DEFROST SOLENIOD VALVE |

# CONNECTIONS - ELECTRICAL

## HPHD-135



# CONTROLLER AND DISPLAY INFORMATION

## UPC Parameter Hierarchy

**START** Press and release *Esc* to enter main menu (greyed)

**A. On/Off Unit**
- **01** On/Off control
- **02** Type of pump control

**B. Setpoint**
- **01** Setpoint adjust

**C. Clock/Scheduler**
- **01** Set day/date/hour<br>enable scheduler<br>enable tariff<br>enable D.L. save
- **03** Enable special event<br>Start & end date<br>Setpoint<br>Differential

**D. Input/Output**
- **01** Hot enter temp<br>Hot leave temp
- **02** (compressor 1 info)<br>Low pressure<br>Sat suction temp<br>Suction temp<br>High pressure<br>Sat condenser temp<br>Outdoor coil temp
- **03** LP1 switch state<br>HP1 switch state
- **04** Flow switch state<br>Comp O/load state<br>Remote on/off state
- **05** Compressor 1 state<br>HG valve state<br>Fan state<br>Circ pump state
- **10** Outside temp<br>Tank temp<br>Bld flow temp
- **11** (Input/output info)<br>Digital inputs (1~10)<br>Relay outputs (1~12)

**E. Alarm History**
- Displays the last 150 alarms (1 screen for each alarm) and the following information at time of alarm:<br>Alarm description<br>Entering water temp<br>Leaving water temp<br>Coil temp

**F. Board Switch**
- Not used for A2WHH

**G. Service** (password 0022)
- **a. Change Display** (must be set to pGD)
- **b. Information** (Firmware / Software)
- **c. Summer/Winter** (Cannot access)
- **d. Working Hours**<br>Circ pump hrs<br>Compressor 1 hrs<br>Outdoor fan 1 hrs
- **e. BMS Config**<br>Address<br>Protocol (Modbus)<br>Speed (19200)
- **f. Service Settings**
- **g. Manual Manage**

Go to 'Service Settings Screen Parameter Settings' table in this section

**H. Manufacturer** (password protected)
- **a. Configuration** (config parameters)
- **b. I/O Configuration** (I/O config parameters)
- **c. Factory Settings**<br>(Enable unit on/off)<br>By digital input (yes/**no**)<br>By supervisor (yes/**no**)<br>By flow switch (not avail)<br>Enable tariff time zone management (yes/**no**)
- **d. Initialization** (I/O config parameters)
- **e. Input/output Test** (for future use)
- **01**<br>Circ pump (**Auto**/off/on)<br>Comp 1 (**Auto**/off/on)<br>Comp enabled (**yes**/no)<br>Reverse Vlv (**Auto**/off/on)<br>Cond fan 1 (**Auto**/off/on)
- **01b** Electric Heat (**Auto**/off/on)
- **03** Reset off/on/auto over rides (**no**/yes)
- **04** Speed up timers (**no**/yes)

Go to 'Manufacturer Screen Parameter Settings' table In this section

**Default Installation**<br>Erase user settings & reinstall global default value table (yes/**no**)

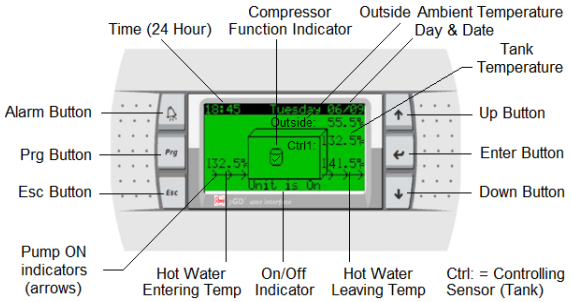
Reset manufacturer password PW2

Default manufacturer settings shown in brackets in bold

Alternative setpoint quick view or adjustment

Press and release *Prog* to view or change setpoint

**01** Setpoint adjust




### Control Panel Operation Quick Guide

Press and release **Esc** to enter main menu (from home screen)
Press and release ↑ or ↓ to highlight desired main menu screen
Press and release ↵ to enter highlighted main menu screen
Press and release ↑ or ↓ to navigate to desired parameter screen
Press and release ↵ to move curser to desired parameter
Press and release ↑ or ↓ to change parameter
Press and release ↵ to accept new parameter setting
Press and release **Esc** to navigate back one screen
Repeatedly press and release **Esc** to navigate back to home screen

# CONNECTIONS - ELECTRICAL

**NOTE:** If no keys are pressed for 60 seconds, screen reverts to main display screen and any changes made and not confirmed will be lost.

### SETPOINT QUICK SETTING

Press 'prg' from the main display screen and the Setpoint page will appear. Cursor will be on the set temperature. Pressing the up and down keys will adjust the setting in 0.1 increments. Hold down for rapid change. Press 'Enter' to confirm change. Press 'esc' to return to the main display screen. The factory setting is 141.8°F (61°C). The setpoint can be adjusted up to 149°F (65°C) depending on site suitability after consulting with Rheem.

### MENU ITEM

A. On/Off – Press 'enter' to access change. Press 'up' or 'down' to turn unit on or off. Press 'enter' to confirm.

Press 'down' key to display type of circulating pump control.

Default: AUTOMATIC ON TEMP

Press 'esc' to return to Menu Primary.

B. Setpoint - displays the tank maximum setpoint at which the compressor will be deactivated. Cursor will be on the set temperature. Pressing the 'up' and 'down' keys will adjust the setting in 0.1 increments. Hold down for rapid change. Press 'enter' to confirm change. Press 'esc' to return to the Menu Primary.

C. Clock / Scheduler – time and date are set here. Other adjustments include:

i. Enable Scheduler: No (controls heat pump operating time based on programmed time period)

ii. Enable Tariff: No (controls heat pump operating time based on tariffs)

iii. Enable D.L. Save: No (shifts time based on seasons)

i. Enabling Scheduler to 'Yes' will open a 2nd page which will allow the user to program specified operating times on a 7-day basis. E.g.:

Clock Schedule

Mon 00:00 to 00:00

Tue 00:00 to 00:00

Pressing the 'down' key will reveal a 2nd page in the Clock Scheduler:

– Do you want to enable Special Event: No (programs the temperature to be maintained during a specified date range)

Enabling the Special Event to 'Yes' allows user to program in the desired date range, setpoint and differential to be maintained during the Special Event period.

ii. Enabling Tariff to Yes will open the Tariff Time Band pages which allows the user to program which hours are off peak, shoulder and peak in 12 hour blocks as Weekday AM, Weekday PM, Weekend AM, Weekend PM.

Press 'esc' until page returns to the Menu Primary.

# CONNECTIONS - ELECTRICAL

D. Input/output View – Displays the actual readings as follows:

| | |
|---|---|
| Hot Enter Temp: | Potable water temperature entering and leaving the condenser heat exchanger |
| Hot Leave Temp: | |
| Cold enter Temp: | Non-potable/chilled water temperature entering and leaving the evaporator heat exchanger |
| Cold Leave Temp: | |
| Compressor 1 – | Compressor temperature and pressure readings |
| Low Press: | |
| sat. suction: | |
| Suction: | |
| High Press: | |
| sat. condenser: | |
| out. coil Temp: | Evaporator coil temperature |
| LP1 switch: OK | Hi and Lo pressure switches closed or open circuit |
| HP1 switch: OK | |
| Flow switch: On/Off | Flow switch in non-potable/chilled water circuit activated |
| Comp O/Load: On/Off | Compressor overload activated |
| Remote: On/Off | Remote control of heat pump activated |
| Compressor 1: On/Off | Compressor status |
| Rev. valve: On/Off | Reversing valve status (NA) |
| Fan: On/Off | Fan status |
| Circ. Pump: On/Off | Primary pump/s status (NB: both non-potable/chilled and potable water pumps are activated by same relay) |
| Outside Temp: | Ambient air sensor temperature |
| Tank Temp: | Temperature at near bottom of tank |
| Building Flow Temp: | Temperature being delivered to building flow |
| Digital Inputs: | Displays the number of inputs and outputs |
| Relay Outputs: | |

E. Alarm History – will display up to 150 alarm events and then will overwrite oldest event. Alarms can be cleared by pressing the 'Alarm Bell' key.

F. Service – password: 0022

a. Change display (do not use)

b. Information – software version information

c. Summer/Winter (not applicable to this product)

d. Working Hours:

i. Circ. Pump / reset counter

ii. Compressor 1 / reset counter

iii. Outdoor Fan 1 / reset counter

e. BMS configuration (will time out after 5 minutes if no buttons pressed)

Address: 1 (if BMS Interface Card Modbus on RS485 is used, change the address value based on the unique address set by the customer's network. For all other BMS interface cards, ignore this value).

Protocol: CAREL/Modbus (choose Modbus only for BMS Interface Card Modbus on RS485. For all other BMS interface cards, choose CAREL).

Speed: 19200 (if BMS Interface Card Modbus on RS485 is used, change the speed value based on the customer's network. For all other BMS interface cards, use 19200 as speed).

f. Service Settings

a. Working Hour Set

b. Prove Adjustment

c. Thermoregulation (for multiple heat pump installation, change the no. of compressor and other settings from the table on the next page.)

d. User DEV/Change PW1

For more information, please refer to the service manual for heat pumps.

# CONNECTIONS - ELECTRICAL

| | Parameter | Sub Parameter | Primary | Secondary |
|---|---|---|---|---|
| **Thermoregulation** | Thermoregulation 01 | Setpoint | 140°F (60.0°C) | Screen N/A |
| | | Differential | 37°F (3.0°C) | Screen N/A |
| | | Dead band | 33°F (0.5°C) | Screen N/A |
| | Thermoregulation 02 (De-ice temperature) | Initiate | 25°F (-4°C) | 25°F (-4°C) |
| | | Terminate | 50°F (10.0°C) | 50°F (10.0°C) |
| | Thermoregulation 03 (De-ice timers) | Delay to start | 5m | 5m |
| | | Max duration | 10m | 10m |
| | | Min between | 30m | 30m |
| | | Coil de-water | 30s | 30s |
| | Thermoregulation 04 (Pump settings) | Flow proof delay | 3s | Screen N/A |
| | | Pump min run | 5m | Screen N/A |
| | | Pump run on time | 1m | Screen N/A |
| | | Temp. test cycle | Not avail | Screen N/A |
| | | Flow switch fitted | No | Screen N/A |
| | Thermoregulation 04s | Flow switch fitted | Screen N/A | No |
| | Thermoregulation 05 | Blackout delay | 10s | Screen N/A |
| | | No of compressors (number of heat pumps) | Set as required (default 1) | Screen N/A |
| | | Compressor staging | Simultaneous | Screen N/A |
| | | Controlling sensor | Tank | Screen N/A |
| | I/O Config 05 | Out air sensor | Yes | No |
| | | Sensor type | Carel NTC | Carel NTC |
| | Thermoregulation 06 (Enable unit On/Off) | By digital input | No | Screen N/A |
| | | By supervisor | No | Screen N/A |
| | | By flow switch | Not avail | Screen N/A |
| | | Dig input 6 is for: | Comp O/Load | Screen N/A |
| | I/O Config 06b | Storage tank temp | Yes | No |
| | | Sensor type | Carel NTC | Carel NTC |
| | | Building flow temp | Yes | No |
| | | Sensor type | Carel NTC | Carel NTC |
| | Thermoregulation 07 (HP/LP Safety) | LP trip set | 0.4 Bar | 0.4 Bar |
| | | HP trip set | 27.5 Bar | 27.5 Bar |
| | Thermoregulation 08 (Anti-freeze safety for PHE evaporator (leave)) | Low limit set | 32°F (0.0ºC) | Screen N/A |
| | Thermoregulation 09 | Aux. Boost Fitted | Yes | Screen N/A |
| | | % compressor in alarm to activate boost | 50% | Screen N/A |
| | | Boost act. Delay | 5m | Screen N/A |
| | Thermoregulation 10 (Low outside air temp i.e low ambient aux boost) | Cut over point | 41°F (5.0ºC) | Screen N/A |
| | | Differential | 36°F (2.0ºC) | Screen N/A |
| | | Comp stop in low outside air temp: | Yes | Screen N/A |

# COMMISSIONING

## TO FILL AND TURN ON THE WATER HEATER

**The power supply to the water heater and controller must not be switched on until the water heater is filled with water and a satisfactory megger reading is obtained.**

**⚠WARNING: This water heater contains electronic equipment and 500 V insulation tests must only be conducted between actives and earth and between neutral and earth. An active to neutral test WILL damage the electronics.**

## COMMISSIONING PROCEDURE – STANDALONE HEAT PUMP CONFIGURATION

- Perform this procedure to commission a single (standalone) heat pump.
- If the system is comprised of multiple standalone heat pumps, perform this procedure for each heat pump.

- Open all of the hot water taps in the building (don't forget the showers) and supply valves in the system.
- Open the valves fully on the cold, return and hot water branches to the storage tanks.
- Open the main cold water valve.
- Air will be forced out of the taps.
- Close each tap as water flows freely from it.
- Check the pipe work for leaks.
- Switch on the electrical supply at the isolating switch to the water heater.
- Set time/tariff control if required.
- Reset alarms. Skip this step if there are no alarms.

If the water heater is full of cold water, the fan will activate and heating will commence unless the ambient air temperature is below the ambient sensor setpoint, in which case the auxiliary boost will operate, if installed.

It is important to wait for five minutes after the heat pump has activated to ensure it continues to operate and is functioning correctly.

**NOTE**: The water heater may not turn on immediately when it is first switched on, if it is switched on within 20 minutes to 2 hours of it having been switched off at the isolating switch, or the heat pump has just completed a heating cycle. The water heater will wait until the conditions for start-up are favorable in order to protect the compressor from damage. This may take up to 20 minutes to 2 hours. The auxiliary booster (if installed) will operate instead of the heat pump if the ambient air temperature is less than the ambient sensor setpoint.

Explain to a qualified technician the functions and operation of the heat pump water heater. Upon completion of the installation and commissioning of the water heating system, leave this guide with the qualified technician.

## COMMISSIONING PROCEDURE – MULTIPLE HEAT PUMP (PRIMARY/SECONDARY) CONFIGURATION

Perform this procedure if the system is comprised of multiple heat pumps to be configured for Primary/Secondary operation.

- Open all of the hot water taps in the building (don't forget the showers) and supply cocks and valves in the system.
- Open the isolation valves fully on the cold, return and hot water branches to the storage tanks.
- Open the main cold water valve on the cold water line to the storage tanks.

Air will be forced out of the taps.

- Close each tap as water flows freely from it.
- Check the pipe work for leaks.

Before commencing the Primary/Secondary commissioning procedure, ensure the 'Multiple Heat Pump Installation

- step 1 and step 2 have been completed as stated on page 45.

# COMMISSIONING

The commissioning procedure MUST be performed in the order shown.

*1st Heat Pump / Primary* | *2nd Heat Pump Secondary 1* | *3rd Heat Pump Secondary 2* | *4th Heat Pump Secondary 3*

1. Ensure all heat pumps are turned OFF at the isolating switch.
2. Turn ON secondary 1 heat pump (2nd heat pump).
3. Configure heat pump address.
   - While in the home screen on control panel, simultaneously press and hold Up ↑, Down↓and Enter↵ for 5 seconds to enter the setup menu.
   - Use Up ↑ or Down↓buttons to set values.
   - Press and release Enter↵to move curser to next line.
   - Change the following values as shown in the table at the bottom on this page.
   - Press “Enter” to confirm settings. The screen will change to the home screen and settings will be saved.

Note that the secondary's pump will start and an alarm may occur – ignore at this stage.

| Menu | Secondary 1 | Secondary 2 | Secondary 3 | Primary | Example Screen Image of Secondary 1 |
|---|---|---|---|---|---|
| Display address setting | 17 | 18 | 19 | 16 |  |
| I/O board address | 02 | 03 | 04 | 01 | |
| trm1 | 32 | 32 | 32 | 32 |  |
| trm2 | 17 | 18 | 19 | 16 | |
| trm3 None – Ok? | Yes | Yes | Yes | Yes | |

# COMMISSIONING

4. Change secondary heat pump 'Out air sensor', 'Storage tank temp' sensor and 'Building flow temp' sensor parameters to 'No'.

    - Go to the Service menu (Service>Service Settings- password 0022>Thermoregulation). Refer to page 50 to see the chart for navigating Service menu and page 53 for Thermoregulation section or see the table below.

| Parameter | Sub Parameter | Primary | Secondary |
|---|---|---|---|
| Thermoregulation 05 | Blackout delay | 10s | Screen N/A |
| | No of compressors | Set as required (default 1) | Screen N/A |
| | Compressor staging | Simultaneous | Screen N/A |
| | Controlling sensor | Tank | Screen N/A |
| I/O Config 05 | Out air sensor | Yes | No |
| | Sensor type | Carel NTC | Carel NTC |
| Thermoregulation 06 (Enable unit On/Off) | By digital input | No | Screen N/A |
| | By supervisor | No | Screen N/A |
| | By flow switch | Not avail | Screen N/A |
| | Dig input 6 is for: | Comp O/Load | Screen N/A |
| I/O Config 06b | Storage tank temp | Yes | No |
| | Sensor type | Carel NTC | Carel NTC |
| | Building flow temp | Yes | No |

5. Turn OFF the Secondary heat pump.

    - If there is only 1 secondary proceed directly to step 6.

    - If there are 2 or 3 Secondary heat pumps repeat step 3 to step 5 for Secondary 2 and Secondary 3 respectively using the values for respective Secondary heat pumps.

6. Turn ON Primary heat pump and set the primary address as stated in step 3.

7. After commissioning the Primary heat pump, go to the Service menu (Service>Service Settings- password 0022>Thermoregulation>no. of compressor) on the Primary heat pump and change the number of compressors according to the number of heat pumps interconnected together.


Refer to page 50 to see the chart for navigating Service menu and page 53 for Thermoregulation section or see the table below.

| Parameter | Sub Parameter | Primary |
|---|---|---|
| Thermoregulation 05 | Blackout delay | 10s |
| | No of compressors (Number of heat pumps) | Set as required (default 1) |
| | Compressor staging | Simultaneous |
| | Controlling sensor | Tank |

8. Turn on all the heat pumps.

9. Reset alarms on each heat pump. Skip this step if there are no alarms.

10. Set time/tariff control on Primary heat pump if required. Refer to page 50 to see the chart for navigating the control panel display.

If the water heaters are full of cold water, the fan will activate on each water heater and heating will commence unless the ambient air temperature is below the ambient sensor setpoint, in which case the auxiliary boost will operate, if installed.

It is important to wait for five minutes after each heat pump has activated to ensure it continues to operate and is functioning correctly.

**NOTE:** The heat pump may not turn on immediately when it is first switched on, if it is switched on within 20 minutes to 2 hours of it having been switched off at the isolating switch, or the heat pump has just completed a heating cycle. The heat pump will wait until the conditions for start-up are favorable in order to protect the compressor from damage. This may take up to 20 minutes to 2 hours. The auxiliary booster (if installed) will operate instead of the heat pump if the ambient air temperature is less than the ambient sensor setpoint.

Explain to a responsible officer the functions and operation of the heat pumps. Upon completion of the installation and commissioning of the water heating system, leave this guide with the responsible officer.

# COMMISSIONING

## COMMISSIONING PROCEDURE-BMS CONFIGURATION

Before commencing the commissioning procedure, ensure the 'Building Management Systems (BMS/BAS)' installation procedure has been completed as stated on page 46.

- If the system is comprised of single or multiple standalone heat pumps, perform this procedure for each heat pump. Each heat pump will have its own BMS card.
- If the system is comprised of multiple heat pumps for primary/secondary operation, perform this procedure for only master heat pump. Only primary heat pump will have a BMS card and the secondary heat pumps will be connected via LAN cable.

Configure BMS settings from the display of the heat pump.

After commissioning the primary heat pump, go to the Service menu

(Service- password 0022>BMS config). Refer to page 50 to see the chart for navigating Service menu.

### Configuration: BMS Interface Card Modbus on RS485

1. Go to BMS configuration (will time out after 5 minutes if no buttons pressed)

   Change the settings for BMS configuration from the display menu as mentioned below.

   **Address:** Change the address value based on the unique address set by the customer's network.

   **Protocol:** Choose option 'Modbus'

   **Speed:** Change the speed value based on the customer's network.

2. Parameter table is provide for customers to follow for further configuration to customer's network on page 59.

### Configuration: BMS Interface card BACnet MS-TP

1. Go to BMS configuration (will time out after 5 minutes if no buttons pressed)

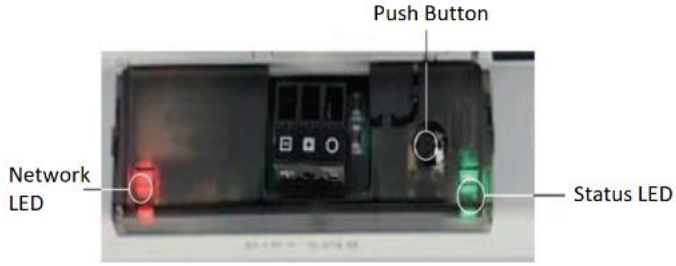
   Change the settings for BMS configuration from the display menu as mentioned below.

   **Address:** No change required (address is irrelevant for this card).

   **Protocol:** CAREL

   **Speed:** 19200 (this value is set from factory to communicate between heat pump and BMS card)

2. Open the heat pump enclosure and check the BMS card.




*The BACnet MS-TP card features a button (PUSHBUTTON) and two indicator lights (STATUS LED and NETWORK LED).*

Functions of the button: When starting up the BACnet MS-TP, this is used to select, for network communication, whether to use the factory parameters or the user parameters

In normal operation, reboots BACnet MS-TP without needing to disconnect the power supply

Status LED: indicates the status of communication with the heat pump and the card. Once the starting sequence has been completed, the Status LED flashes to indicate the quality of communication.

a. If Status LED flashes green, then communication with the BACnet MS-TP is OK.

b. If LED is red or green-red-green, then the communication is not established. In that case, check the BMS configuration.

Network LED: The Network LED (right) indicates the status of communication with customer's network. Once the starting sequence has been completed, the Network LED flashes to indicate the quality of communication with customer's network.

# COMMISSIONING

a. If Network LED flashes green with occasional red flashes then communication is OK.

b. If Network LED flashes green and red ON together (BACnet MS/TP meaning: continuous Poll-For-Master): communication not established (connection problems, or no network device found); this may depend on electrical connection difficulties or communication settings that are not compatible with the other network devices connected.

3. For further configuration of BACnet MS-TP card, please follow the "BACnet MS-TP Configuration Guide".

4. Parameter table is provided for customers to follow for further configuration to customer's network on page 59.

### Configuration: BMS Interface card BACnet TCP/IP Ethernet

1. Go to BMS configuration (will time out after 5 minutes if no buttons pressed)

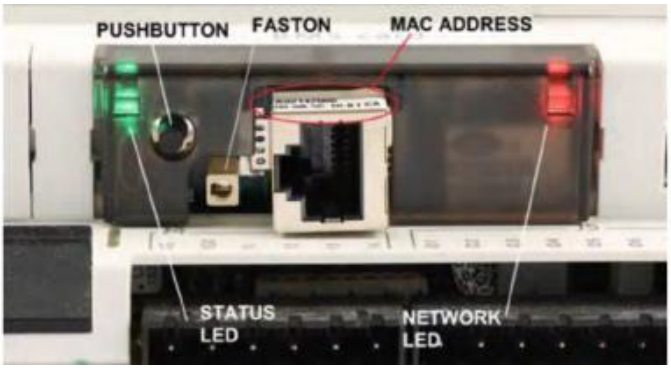
   Change the settings for BMS configuration from the display menu as mentioned below.

   **Address:** No change required (address is irrelevant for this card).

   **Protocol:** CAREL

   **Speed:** 19200 (this value is set from factory to communicate between heat pump and BMS card)

2. Open the heat pump enclosure and check the BMS card.




*The BACnet TCP/IP Ethernet card features a button (PUSHBUTTON) and two indicator lights (STATUS LED and NETWORK LED).*

Functions of the button: When starting up the TCP/IP Ethernet card, this is used to select, for network communication, whether to use the factory parameters or the user parameters. In normal operation, reboots TCP/IP Ethernet card without needing to disconnect the power supply.

Status LED: indicates the status of communication with the heat pump and the card. Once the starting sequence has been completed, the Status LED flashes to indicate the quality of communication.

a. If Status LED flashes green or green steady, then communication with the BACnet TCP/IP Ethernet card is OK.

b. If LED is red or green-red-green, then the communication is not established. In that case, check the BMS configuration.

Network LED: Displays the status of the physical network connection (Ethernet connection signals), regardless of whether the network parameters are correct; usually this must be green and flash when data is transmitted/received.

3. For further configuration of BACnet TCP/IP Ethernet card, please follow the "BACnet TCP/IP Ethernet Configuration Guide".

4. Parameter table is provided for customers to follow for further configuration to customer's network on page 59.

# COMMISSIONING

**Refer to the parameter tables below for BMS:**

## ANALOG VARIABLES

| BMS Address | Description | Default | Category | UOM | Min | Max | Read/ Write | Variable name |
|---|---|---|---|---|---|---|---|---|
| 1 | reading from input 1<br>Hot Entering water Sensor | 0 | Default | --- | -3276.8 | 3276.7 | R | Probe_Value_1 |
| 2 | reading from input 2<br>Hot Leaving water Sensor | 0 | Default | --- | -3276.8 | 3276.7 | R | Probe_Value_2 |
| 3 | reading from input 3 Out. coil sensor | 0 | Default | --- | -3276.8 | 3276.7 | R | Probe_Value_3 |
| 4 | reading from input 4<br>Suction Temperature sensor | 0 | Default | --- | -3276.8 | 3276.7 | R | Probe_Value_4 |
| 5 | reading from input 5 Out Air sensor | 0 | Default | --- | -3276.8 | 3276.7 | R | Probe_Value_5 |
| 6 | reading from input 6<br>LP Pressure sensor fitted | 0 | Default | --- | -3276.8 | 3276.7 | R | Probe_Value_6 |
| 7 | reading from input 7<br>HP Pressure sensor fitted | 0 | Default | --- | -3276.8 | 3276.7 | R | Probe_Value_7 |
| 8 | reading from input 8 Cold Enter water | 0 | Default | --- | -3276.8 | 3276.7 | R | Probe_Value_8 |
| 9 | reading from input 9 Cold Leave water | 0 | Default | --- | -3276.8 | 3276.7 | R | Probe_Value_9 |
| 10 | reading from input 10<br>Hot Entering water Sensor | 0 | Default | --- | -3276.8 | 3276.7 | R | Probe_Value_10 |
| 11 | reading from input 11<br>Hot Leaving water Sensor | 0 | Default | --- | -3276.8 | 3276.7 | R | Probe_Value_11 |
| 12 | reading from input 12 Out. coil sensor | 0 | Default | --- | -3276.8 | 3276.7 | R | Probe_Value_12 |
| 13 | Virtual Analoge Output 1 | 0 | Default | --- | 0 | 3276.7 | R | VAOut_1 |
| 14 | Virtual Analoge Output 2 | 0 | Default | --- | 0 | 3276.7 | R | VAOut_2 |
| 15 | Virtual Analoge Output 3 | 0 | Default | --- | 0 | 3276.7 | R | VAOut_3 |
| 16 | Virtual Analoge Output 4 | 0 | Default | --- | 0 | 3276.7 | R | VAOut_4 |
| 17 | Virtual Analoge Output 5 | 0 | Default | --- | 0 | 3276.7 | R | VAOut_5 |
| 18 | Virtual Analoge Output 6 | 0 | Default | --- | 0 | 3276.7 | R | VAOut_6 |
| 19 | Superheat valve Comp 1 | 0 | Default | --- | -72.0 | 324.0 | R | Superheat_C1 |
| 20 | Superheat valve Comp 2 | 0 | Default | --- | -72.0 | 324.0 | R | Superheat_C2 |
| 21 | Superheat valve Comp 3 | 0 | Default | --- | -72.0 | 324.0 | R | Superheat_C3 |
| 22 | Superheat valve Comp 4 | 0 | Default | --- | -72.0 | 324.0 | R | Superheat_C4 |
| 23 | Control Temperature | 0 | Default | °F | -146.2 | 211.82 | R | Ctrl_temp |
| 24 | Outside Air Temperature | 0 | Default | BAR | -146.2 | 211.82 | R | OAT |
| 25 | Entering water temperature | 0 | Default | °F | -146.2 | 211.82 | R | EW_temp |
| 26 | Leaving water temperature | 0 | Default | °F | -146.2 | 211.82 | R | LW_temp |
| 27 | Condenser temperature<br>(either from NTC or P-T) | 0 | Default | --- | -99.9 | 211.82 | R | Cond_temp |
| 28 | Current entering water Setpoint | 22.0 | Default | °F | 32 | 113 | R | Active_Setpoint |
| 29 | Active Proportional Band for compressor | 1.5 | Default | °F | 32 | 50 | R | Active_Pro_band |
| 30 | Water Setpoint | 22.0 | Default | °F | 41 | 113 | R/W | Setpoint |
| 31 | Dead band | 1.0 | Default | °F | 32 | 50 | R/W | D_Band |
| 32 | Proportional Band for compressor | 1.5 | Default | °F | 32 | 77 | R/W | Pro_band |
| 33 | Entering water temperature 2 | 0 | Default | °F | -146.2 | 211.82 | R | EW_temp2 |
| 34 | Leaving water temperature 2 | 0 | Default | °F | -146.2 | 211.82 | R | LW_temp2 |
| 35 | Storage tank water temperature | 0 | Default | °F | -146.2 | 211.82 | R | Tank_temp |
| 36 | Building Supply water temperature (Flow) | 0 | Default | °F | -146.2 | 211.82 | R | Bld_Supply_temp |

# COMMISSIONING

## INTEGER VARIABLES

| BMS Address | Description | Default | Category | UOM | Min | Max | Read/ Write | Variable name |
|---|---|---|---|---|---|---|---|---|
| 21 | type of tariff - timeband 0 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_0 |
| 22 | type of tariff - timeband 1 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_1 |
| 23 | type of tariff - timeband 2 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_2 |
| 24 | type of tariff - timeband 3 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_3 |
| 25 | type of tariff - timeband 4 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_4 |
| 26 | type of tariff - timeband 5 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_5 |
| 27 | type of tariff - timeband 6 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_6 |
| 28 | type of tariff - timeband 7 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_7 |
| 29 | type of tariff - timeband 8 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_8 |
| 30 | type of tariff - timeband 9 | 0 | Default | --- | 0 | 2 | R/W | trfw_9 |
| 31 | type of tariff - timeband 10 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_10 |
| 32 | type of tariff - timeband 11 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_11 |
| 33 | type of tariff - timeband 12 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_12 |
| 34 | type of tariff - timeband 13 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_13 |
| 35 | type of tariff - timeband 14 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_14 |
| 36 | type of tariff - timeband 15 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_15 |
| 37 | type of tariff - timeband 16 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_16 |
| 38 | type of tariff - timeband 17 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_17 |
| 39 | type of tariff - timeband 18 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_18 |
| 40 | type of tariff - timeband 19 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_19 |
| 41 | type of tariff - timeband 20 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_20 |
| 42 | type of tariff - timeband 21 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_21 |
| 43 | type of tariff - timeband 22 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_22 |
| 44 | type of tariff - timeband 23 week end | 0 | Default | --- | 0 | 2 | R/W | trfw_23 |
| 49 | State of unit. | 0 | Default | --- | 0 | 13 | R | Unit_Status |
| 70 | Compressor 1 Hour run counter (low) | 0 | Default | --- | 0 | 999 | R | Comp_T_Hours_L_1 |
| 71 | Compressor 1 Hour run counter (high) | 0 | Default | --- | 0 | 999 | R | Comp_T_Hours_H_1 |
| 72 | Compressor 2 Hour run counter (low) | 0 | Default | --- | 0 | 999 | R | Comp_T_Hours_L_2 |
| 73 | Compressor 2 Hour run counter (high) | 0 | Default | --- | 0 | 999 | R | Comp_T_Hours_H_2 |
| 74 | Compressor 3 Hour run counter (low) | 0 | Default | --- | 0 | 999 | R | Comp_T_Hours_L_3 |
| 75 | Compressor 3 Hour run counter (high) | 0 | Default | --- | 0 | 999 | R | Comp_T_Hours_H_3 |
| 76 | Compressor 4 Hour run counter (low) | 0 | Default | --- | 0 | 999 | R | Comp_T_Hours_L_4 |
| 77 | Compressor 4 Hour run counter (high) | 0 | Default | --- | 0 | 999 | R | Comp_T_Hours_H_4 |
| 78 | Pump Hour run counter (low) | 0 | Default | --- | 0 | 999 | R | Pump_T_Hours_L |
| 79 | Pump Hour run counter (high) | 0 | Default | --- | 0 | 999 | R | Pump_T_Hours_H |
| 86 | Outdoor Fan 1 Hour run counter (low) | 0 | Default | --- | 0 | 999 | R | OutFan_T_Hours_L_1 |
| 87 | Outdoor fan 1 Hour run counter (high) | 0 | Default | --- | 0 | 999 | R | OutFan_T_Hours_H_1 |
| 88 | Outdoor Fan 2 Hour run counter (low) | 0 | Default | --- | 0 | 999 | R | OutFan_T_Hours_L_2 |
| 89 | Outdoor fan 2 Hour run counter (high) | 0 | Default | --- | 0 | 999 | R | OutFan_T_Hours_H_2 |
| 90 | Outdoor Fan 3 Hour run counter (low) | 0 | Default | --- | 0 | 999 | R | OutFan_T_Hours_L_3 |
| 91 | Outdoor fan 3 Hour run counter (high) | 0 | Default | --- | 0 | 999 | R | OutFan_T_Hours_H_3 |
| 92 | Outdoor Fan 4 Hour run counter (low) | 0 | Default | --- | 0 | 999 | R | OutFan_T_Hours_L_4 |
| 93 | Outdoor fan 4 Hour run counter (high) | 0 | Default | --- | 0 | 999 | R | OutFan_T_Hours_H_4 |

# COMMISSIONING

## INTEGER VARIABLES

| BMS Address | Description | Default | Category | UOM | Min | Max | Read/ Write | Variable name |
|---|---|---|---|---|---|---|---|---|
| 100 | | 15018 | Default | --- | 0 | 32767 | R | BMS_Sw_Ver |
| 101 | | 15018 | Default | --- | 0 | 32767 | R | BMS_Sw_Date |
| 102 | | 0 | Default | --- | 0 | 9999 | R | Manuf_Password |
| 103 | Current year | 0 | Clock / TimeDate | --- | 0 | 99 | R | CURRENT_YEAR |
| 104 | Current month | 1 | Clock / TimeDate | --- | 1 | 12 | R | CURRENT_MONTH |
| 105 | Current day | 1 | Clock / TimeDate | --- | 1 | 31 | R | CURRENT_DAY |
| 106 | Current hour | 0 | Clock / TimeDate | h | 0 | 23 | R | CURRENT_HOUR |
| 107 | Current minute | 0 | Clock / TimeDate | --- | 0 | 59 | R | CURRENT_MINUTE |

# COMMISSIONING

## DIGITAL VARIABLES

| BMS Address | Description | Default | Category | UOM | Min | Max | Read/ Write | Variable name |
|---|---|---|---|---|---|---|---|---|
| 1 | Digital Input 1 | 0 | Default | --- | 0 | 1 | R | Din_1 |
| 2 | Digital Input 2 | 0 | Default | --- | 0 | 1 | R | Din_2 |
| 3 | Digital Input 3 | 0 | Default | --- | 0 | 1 | R | Din_3 |
| 4 | Digital Input 4 | 0 | Default | --- | 0 | 1 | R | Din_4 |
| 5 | Digital Input 5 | 0 | Default | --- | 0 | 1 | R | Din_5 |
| 6 | Digital Input 6 | 0 | Default | --- | 0 | 1 | R | Din_6 |
| 7 | Digital Input 7 | 0 | Default | --- | 0 | 1 | R | Din_7 |
| 8 | Digital Input 8 | 0 | Default | --- | 0 | 1 | R | Din_8 |
| 9 | Digital Input 9 | 0 | Default | --- | 0 | 1 | R | Din_9 |
| 10 | Digital Input 10 | 0 | Default | --- | 0 | 1 | R | Din_10 |
| 11 | Digital Input 11 | 0 | Default | --- | 0 | 1 | R | Din_11 |
| 12 | Digital Input 12 | 0 | Default | --- | 0 | 1 | R | Din_12 |
| 13 | Digital Input 13 | 0 | Default | --- | 0 | 1 | R | Din_13 |
| 14 | Digital Input 14 | 0 | Default | --- | 0 | 1 | R | Din_14 |
| 15 | Digital Input 15 | 0 | Default | --- | 0 | 1 | R | Din_15 |
| 16 | Digital Input 16 | 0 | Default | --- | 0 | 1 | R | Din_16 |
| 17 | Digital Input 17 | 0 | Default | --- | 0 | 1 | R | Din_17 |
| 18 | Digital Input 18 | 0 | Default | --- | 0 | 1 | R | Din_18 |
| 19 | Virtual Digital Output 1 | 0 | Default | --- | 0 | 1 | R | VDOut_1 |
| 20 | Virtual Digital Output 2 | 0 | Default | --- | 0 | 1 | R | VDOut_2 |
| 21 | Virtual Digital Output 3 | 0 | Default | --- | 0 | 1 | R | VDOut_3 |
| 22 | Virtual Digital Output 4 | 0 | Default | --- | 0 | 1 | R | VDOut_4 |
| 23 | Virtual Digital Output 5 | 0 | Default | --- | 0 | 1 | R | VDOut_5 |
| 24 | Virtual Digital Output 6 | 0 | Default | --- | 0 | 1 | R | VDOut_6 |
| 25 | Virtual Digital Output 7 | 0 | Default | --- | 0 | 1 | R | VDOut_7 |
| 26 | Virtual Digital Output 8 | 0 | Default | --- | 0 | 1 | R | VDOut_8 |
| 27 | Virtual Digital Output 9 | 0 | Default | --- | 0 | 1 | R | VDOut_9 |
| 28 | Virtual Digital Output 10 | 0 | Default | --- | 0 | 1 | R | VDOut_10 |
| 29 | Virtual Digital Output 11 | 0 | Default | --- | 0 | 1 | R | VDOut_11 |
| 30 | Virtual Digital Output 12 | 0 | Default | --- | 0 | 1 | R | VDOut_12 |
| 31 | Virtual Digital Output 13 | 0 | Default | --- | 0 | 1 | R | VDOut_13 |
| 32 | Select if din 6 is Compressor Overload or DRED | 0 | Default | --- | 0 | 1 | R/W | Sel_dred_ol |
| 35 | remote / maintenance enable of compressor 1 | 1 | Default | --- | 0 | 1 | R/W | Comp1_En |
| 36 | remote / maintenance enable of compressor 2 | 1 | Default | --- | 0 | 1 | R/W | Comp2_En |
| 37 | remote / maintenance enable of compressor 3 | 1 | Default | --- | 0 | 1 | R/W | Comp3_En |
| 38 | remote / maintenance enable of compressor 4 | 1 | Default | --- | 0 | 1 | R/W | Comp4_En |
| 41 | Actual status of compressor 1 | 0 | Default | --- | 0 | 1 | R | Device_Status_Comp_1 |
| 42 | Actual status of compressor 2 | 0 | Default | --- | 0 | 1 | R | Device_Status_Comp_2 |
| 43 | Actual status of compressor 3 | 0 | Default | --- | 0 | 1 | R | Device_Status_Comp_3 |

# COMMISSIONING

## DIGITAL VARIABLES

| BMS Address | Description | Default | Category | UOM | Min | Max | Read/ Write | Variable name |
|---|---|---|---|---|---|---|---|---|
| 44 | Actual status of compressor 4 | 0 | Default | --- | 0 | 1 | R | Device_Status_Comp_4 |
| 45 | Actual status of reverse valve | 0 | Default | --- | 0 | 1 | R | Device_Status_rev_vlv1 |
| 46 | Actual status of reverse valve 2 | 0 | Default | --- | 0 | 1 | R | Device_Status_rev_vlv2 |
| 47 | Actual status of reverse valve 3 | 0 | Default | --- | 0 | 1 | R | Device_Status_rev_vlv3 |
| 48 | Actual status of reverse valve | 0 | Default | --- | 0 | 1 | R | Device_Status_rev_vlv4 |
| 49 | On-Off unit state (0: Off; 1: On) | 0 | Default | --- | 0 | 1 | R | Sys_On |
| 50 | Supervisor (BMS) On-Off. Show the state OFF by BMS in main mask (0: Off; 1: On) | 0 | Default | --- | 0 | 1 | RW | Superv_OnOff |
| 51 | Alarm reset from supervisory | 1 | Default | --- | 0 | 1 | R/W | RST_Alarms |
| 52 | Enable tariff time zone management | 0 | Default | --- | 0 | 1 | R/W | Trf_en |
| 120 | Alarm relay | 0 | Default | --- | 0 | 1 | R | Alarm |
| 121 | Alarm from probe on input 1 | 0 | Alarms | --- | 0 | 1 | R | Al_probe_1 |
| 122 | Alarm from probe on input 2 | 0 | Alarms | --- | 0 | 1 | R | Al_probe_2 |
| 123 | Alarm from probe on input 3 | 0 | Alarms | --- | 0 | 1 | R | Al_probe_3 |
| 124 | Alarm from probe on input 4 | 0 | Alarms | --- | 0 | 1 | R | Al_probe_4 |
| 125 | Alarm from probe on input 5 | 0 | Alarms | --- | 0 | 1 | R | Al_probe_5 |
| 126 | Alarm from probe on input 6 | 0 | Alarms | --- | 0 | 1 | R | Al_probe_6 |
| 127 | Alarm from probe on input 7 | 0 | Alarms | --- | 0 | 1 | R | Al_probe_7 |
| 128 | Alarm from probe on input 8 | 0 | Alarms | --- | 0 | 1 | R | Al_probe_8 |
| 129 | Alarm from probe on input 9 | 0 | Alarms | --- | 0 | 1 | R | Al_probe_9 |
| 130 | Alarm from probe on input 10 | 0 | Alarms | --- | 0 | 1 | R | Al_probe_10 |
| 131 | Alarm from probe on input 11 | 0 | Alarms | --- | 0 | 1 | R | Al_probe_11 |
| 132 | Alarm from probe on input 12 | 0 | Alarms | --- | 0 | 1 | R | Al_probe_12 |
| 133 | Alarm_comp1 | 0 | Default | --- | 0 | 1 | R | Device_Alarm_comp1 |
| 134 | Alarm_comp2 | 0 | Default | --- | 0 | 1 | R | Device_Alarm_comp2 |
| 135 | Alarm_comp3 | 0 | Default | --- | 0 | 1 | R | Device_Alarm_comp3 |
| 136 | Alarm_comp4 | 0 | Default | --- | 0 | 1 | R | Device_Alarm_comp4 |
| 137 | Compressor Overload 1 | 0 | Default | --- | 0 | 1 | R | Comp_OL1 |
| 138 | Compressor Overload 2 | 0 | Default | --- | 0 | 1 | R | Comp_OL2 |
| 139 | Compressor Overload 3 | 0 | Default | --- | 0 | 1 | R | Comp_OL3 |
| 140 | Compressor Overload 4 | 0 | Default | --- | 0 | 1 | R | Comp_OL4 |

# COMMISSIONING

### To Turn Off The Water Heater

If it is necessary to turn off the water heater on completion of the installation, such as on a building site or where the premises are vacant, then:

- Switch off the electrical supply at the isolating switch to the water heater.
- Close the cold water isolation valve at the inlet to the system.

# DRAINING THE WATER HEATER

To drain the water heater:

- Turn off the water heater (refer to “To Turn Off The Water Heater” on page 56.
- Close all hot water taps.
- Operate the relief valve release lever on one of the storage tanks - do not let the lever snap back or you will damage the valve seat.
- Operating the lever will release the pressure in the water heater.
- Close the isolation valves at the inlet and outlet of the water heater and place a bucket under the cold water inlet.
- Undo the unions at the inlet and outlet of the water heater. The heat pump heat exchanger holds 1.3 to 2.6 gallons of water (model dependent) and will drain into the bucket.

# TROUBLE SHOOTING

### Heat Pump Won't Start

A delay of up to 20 minutes to 2 hours can be experienced before heat pump starts operating

### Incorrect Phase Rotation


The phase detect relay will open circuit if the heat pump has been wired with incorrect phase rotation or if a phase has failed. Both green and yellow LEDs on the relay will be illuminated if phase rotation is correct.

### Alarm light on heat pump controller


If the alarm light is flashing RED, check the alarm by pressing the alarm button. Phone your nearest Rheem Service Department to inform about the alarm.

### Low Ambient Temperature

If the ambient air temperature is below setpoint, the heat pump may not start. Check the control panel of the heat pump. Check outside ambient temperature that shows on the display.

### Heat pump starts then turns off soon after

This could be caused by:

a. Insufficient water flow rate through heat exchanger. Check pipe sizing per chart, check obstructions, check lines and pump are bled, check pump is operating, check temperature rise across inlet and outlet.

**NOTE**: Tanks and heat pumps are to be manifolded in Equa-Flow. It is important that the branches to each storage tank ONLY contain a gate or ball valve and union. Fitting of loose jumper valves, non-return valves or pressure limiting valves in the branches or primary flow and return lines between the heat pump and tanks WILL affect performance of the heat pump.

b. Refrigerant charge too high? Refer to Alarm.

c. Refrigerant charge too low? Refer to Alarm.

Turn heat pump off then on again at isolating switch to reset system.

### Heat pump compressor excessively noisy

Check for correct phase rotation.

# AUTOMATIC DEFROST

The Rheem Commercial Heat Pump installation can be configured in a number of ways depending on the requirements of the individual installation.

Ice may begin to form on the evaporator when the air temperature falls below 45°F (7°C), and this will reduce the heat pump efficiency. The water heating system can be designed to operate in one of two scenarios in low ambient temperature conditions.

When auxiliary heating mode is OFF, the heat pump will use hot gas bypass to melt any ice that may form on the evaporator coil when operating at air temperatures below 41°F (5°C) and there will be no auxiliary boost.

When auxiliary heating mode is ON, the heat pump will use hot gas bypass to melt any ice that may form on the evaporator coil when operating at air temperatures below 41°F (5°C) and auxiliary gas or electric water heater will be activated. A pump circulates water from the storage tanks through the auxiliary water heater until the set temperature is reached.

The auxiliary heater should be set to 140°F (60°C).

For most applications, automatic defrost should be satisfactory to meet the water heating demands.

The water heater can control an auxiliary heating source if the ambient temperature falls below 41°F (5°C) or if 50% or more of the water heaters are in fault mode.

# ACCESSORIES

| BMS Address | Description |
|---|---|
| 16292 | DTGB165s 5/8" Liquid Line Drier |
| 16293 | DTGB164s 1/2" Liquid Line Drier 1 |
| 16490 | CAPILLARY HOSE 2MM 078C500STEL |
| 16818 | E7-4103 HW65 LH 46THx1650mm 3R12FPI |
| 16834 | Pressure Relief Valve 04-38888-00 |
| 16835 | B16HDWx52/1P-SC-M Heat Exchang |
| 16907 | Solenoid Valve 10t 5/8" MDF-A03-10H003 |
| 16908 | Solenoid Valve 10t 1/2" 1 |
| 16916 | 3.6RT 1/2"x7/8"x1/4" TX Valve 1 |
| 16926 | E7-3493 Evap AC18 LH 2R 1050FL |
| 16934 | B16DWHx96/1P-SC-M |
| 16946 | TX Valve TGEN20 12tn 067N5163 |
| 17107 | RUN CAPACITOR - 80MFD |
| 17127 | OMRON Relay Base - PTFO8A-E |
| 17160 | RUN CAPACITOR - 5MFD |
| 17200 | OMRON Relay - LY2N 24VAC |
| 17294 | Panel mount LCD terminal PGD1000F00 |
| 17313 | 0.8m cable for PGD S90CONN002 |
| 17435 | PHASE LOSS RELAY K8DS-PH1 |
| 17449 | uPC medium connector kit UPCCONN0M0 |
| 17509 | Thread 0 - 17.3 bar, Lead wire Transduce |
| 17510 | Thread 0 - 34.5 bar, Lead wire Transduce |
| 17511 | Mini series 2pin front panel mount with pin(lock bayonet) |
| 17512 | Mini series 2pin male plug with socket field installable 180°(lock bayonet) |
| 17513 | Waterproof cap for mini series panel mount(lock bayonet) |
| 17533 | Waterproof cap for Std series panel mount(lock bayonet) 3 Pin |

| BMS Address | Description |
|---|---|
| 17535 | TEMP. SENSOR (3435 10k 1%)TPE WIRE 1.5M |
| 17536 | TEMP. SENSOR (3435 10k 1%)TPE WIRE 3M |
| 17537 | NTC Sensor with 10m Double insulate Cable |
| 17550 | 1Phase Softstarter #SS1B16-32SN |
| 17551 | 24V Solenoid valve coil MQ-A03024-000018 |
| 17552 | CWB9-11-30D02 Contactor 9A 24V 50/60Hz |
| 17553 | CWB32-11-30D02 Contactor 32A 24V |
| 17554 | Contactor 40A 24V 50/60Hz |
| 17557 | UPCB001BM1 MEDIUM BOARD |
| 17591 | Mini series 3pin front panel mount with pin(lock bayonet) |
| 17592 | Mini series 3pin male plug with socket field installable 180°(lock bayonet) |
| 17593 | Hi-Temp Sensor (50k 1%)TPE WIRE 2M |
| 17596 | MCB 1P 10A 6kA C Curve S201C10 |
| 17597 | MCB 1P 2A 6kA C Curve S201C2 |
| 20129 | ZR68KCE-PFV-522 1P R134a/R407c 60Hz Compressor |
| 20133 | ZR160KCE-TFD-522 3Phase R22/R407c |
| 21146 | A6E450AU0406 450mm flat fan no guard |
| 21148 | 630mm Fan |
| 21149 | Fan Guard 450mm 60HZ #Painted |
| 26829 | SCHRADER UNION 1/4SCHR x 3 Stp |
| 26862 | 32mm Male BSPT x 32C Bush 2 |
| 26889 | 1"1/4 Male NPT x 32C Bush 2 |
| 26890 | 2" Male NPT x 50.8 Tube Bush Brass |
| 26902 | 32mm Male BSPTx50C Bush Brass |

# CERTIFICATE OF LIMIT WARRANTY

## COMMERCIAL AIR TO WATER HEAT PUMP WATER HEATER

**For the Rheem, Ruud, Richmond, or Raypak Models listed in this Manual.**

### GENERAL

This Limited Warranty is only available to the original owner of this water heater. It is not transferable.

Rheem Manufacturing Company (Rheem®) warrants this Rheem/Ruud/Richmond/Raypak water heater, and its component parts, to be free from defects in materials and workmanship, under normal use and service, for the Applicable Warranty Period. At its option, Rheem will repair or replace the defective water heater, or defective component part(s), in accordance with the terms of this Limited Warranty, if it fails in normal use and service during the Applicable Warranty Period. The replacement water heater must be manufactured by Rheem. The replacement component part(s) must be Rheem authorized component part(s). The replacement unit will be warranted only for the unexpired portion of the original unit's Applicable Warranty Period.

### EFFECTIVE DATE

The Effective Date of warranty coverage (or the beginning of the Applicable Warranty Periods) is the date of installation of the water heater, if properly documented. Otherwise, it is the date of manufacture of the water heater plus ninety (90) days.

### APPLICABLE WARRANTY PERIODS

The Applicable Warranty Periods are one (1) year from the Effective Date for the tank and the component parts.

### WARRANTY EXCLUSIONS

This Limited Warranty will not cover:

a) Service trips to your facility to teach you how to install, use, or maintain this water heater or to bring the water heater installation into compliance with local building codes and regulations.

b) Damages, malfunctions or failures resulting from failure to install the water heater in accordance with applicable building codes/ordinances or good plumbing and electrical trade practices.

c) Damages, malfunctions, or failures resulting from improper installation or failure to operate and maintain the water heater in accordance with the manufacturer's instructions provided.

d) Performance problems caused by improper sizing of the water heater or (pertaining to electric models) electric service voltage, wiring, or fusing.

e) Damages, malfunctions, or failures caused by abuse, accident, fire, flood, freeze, lightning, acts of God, and the like.

f) Coil failures (leaks) caused by operating the water heater in a corrosive or contaminated atmosphere.

g) Damages, malfunctions, or failures caused by operating the water pump without any supply of water.

h) Damages, malfunctions, or failures caused by operating the unit at water temperatures exceeding the maximum setting of the operating, or high limit, control.

i) Coil failures caused by operating the water heater when it is not supplied with potable water, free to circulate at all times.

j) Damages, malfunctions or failures caused by subjecting the heater to pressures, or electrical characteristics, greater than those shown on the rating label.

k) Damages, malfunctions or failures resulting from the use of any attachment, including any energy saving device, not authorized by Rheem.

l) Units installed outside the fifty states (and the District of Columbia) of the United States of America.

m) Units removed from the original installation location.

n) Units that have had their rating labels removed. A water heater should not be operated if the rating label is removed

o) Parts installed with or used in connection with normal maintenance, such as cleaning or replacing refrigerant, or refrigerant drier.

# CERTIFICATE OF LIMIT WARRANTY

## LABOR, SHIPPING, AND PROCESSING COSTS (After 1 Year)

This Limited Warranty does not cover any labor expenses for service, repairs, reinstallation, permits, or removal and disposal of the failed water heater, or defective component part(s). All such expenses are your responsibility.

Rheem will pay the transportation costs for an "in-warranty" replacement water heater, or "in-warranty" replacement component part(s), to a convenient delivery point (selected by Rheem) near the place the original water heater, or original component part(s), is located: such as a local Rheem/Ruud/Raypak/Richmond water heater distributor. You must pay any local freight charges, including the cost of returning the failed water heater, or defective component part(s) to a convenient shipping location (selected by Rheem): such as a local Rheem/Ruud/Raypak/Richmond water heater distributor.

Rheem does not authorize, recommend, or receive any benefit from any claims processing or similar fees charged by others to process warranty claims for any Rheem water heater or component part(s). Rheem will not reimburse any party for these, or any other, fees not specifically covered in this Limited Warranty document.

## HOW TO OBTAIN WARRANTY CLAIM ASSISTANCE

Any claim for warranty assistance must be made promptly. First, determine if your water heater is "in-warranty" (that is, within the Applicable Warranty Period). You can determine your unit's warranty status by obtaining the complete model number, the complete serial number, and the date of installation of your water heater and then accessing the "Warranty Verification" information on the Rheem Water Heater Division's Internet web site (www.rheem.com) or contacting Rheem Water Heaters' Claims Department (telephone (800) 621-5622) during normal business hours to determine if the Applicable Warranty Period has expired.

If your water heater is "in-warranty", contact the plumber, or mechanical contractor, that installed it for assistance with the warranty repairs, or replacement, required. You may also select a plumber, or mechanical contractor, from your local Yellow Pages to assist you. Technical Service personnel are available to assist you – by telephone (800) 432-8373 or via our web site (www.rheem.com) – in obtaining "in-warranty" service or to answer your questions about the operation or repair of your water heater during normal business hours. Be prepared to provide the plumber, mechanical contractor, or Technical Service person you contact with the complete model number, the complete serial number, and the date of installation of your water heater in addition to an explanation of your water heater problem.

If an exact replacement is not available, Rheem will provide you with the current model of your water heater, or component part(s), or a replacement unit with comparable operating features. If government regulations or industry certification or similar standards require the replacement water heater, or replacement component part(s), to have features not found in the defective water heater, or the defective component part(s), you will be charged for the difference in price represented by those required features. If you pay the price difference for those required features and/or to upgrade the size and/or other features available on a replacement new water heater, you will also receive a complete new Limited Warranty (with the full Applicable Warranty Period) for the replacement new water heater.

Rheem reserves the right to inspect, or require the return of, the failed water heater or the defective component part(s). Each "in-warranty" failure water heater must be made available to Rheem (with the rating label and all the component parts intact) in exchange for the replacement water heater. Each defective "in-warranty" component part to be replaced must be returned to Rheem in exchange for the replacement component part.

Warranty compensation is subject to validation of "in-warranty" coverage by Rheem Claims Department personnel.

- To obtain warranty compensation for an "in-warranty" water heater failure, you must provide Rheem with: (at Rheem's option) either the failed water heater (with the rating label and all the component parts intact) or the complete original rating label (photocopies are not acceptable) removed from the failed water heater; the complete model number and the complete serial number of the Rheem/Ruud/Richmond/Raypak water heater that replaced the failed unit; and the date the original water heater failed. You may also be required to provide documentary proof of the failed water heater's date of installation to establish its "in-warranty" status.

- To receive warranty compensation for an "in-warranty" defective component part, you must provide Rheem with: the defective component part; the complete model number and the complete serial number of the Rheem/Ruud/Richmond/Raypak water heater from which the defective component part was removed; and the date the defective component part failed. You may also be required to provide documentary proof of the date of installation of the Rheem/Ruud/Richmond/Raypak water heater from which the defective part was removed – or the date of purchase of the part (if it was purchased separately) - to establish the "in-warranty" status of the defective component part.

# CERTIFICATE OF LIMIT WARRANTY

Warranty claim documentation should be mailed promptly to Rheem Water Heaters, Warranty Department, 800 Interstate Park Drive, Montgomery, Alabama 36109, USA.

**EXCLUSIVE WARRANTY – LIMITATION OF LIABILITY**

This Limited Warranty is the only Warranty for this unit given by the Water Heater Division of Rheem Manufacturing Company. No one is authorized to make any other warranties on behalf of Rheem. ANY IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE, SHALL NOT EXTEND BEYOND THE APPLICABLE WARRANTY PERIODS SPECIFIED PREVIOUSLY. RHEEM'S SOLE LIABILITY, WITH RESPECT TO ANY DEFECT, SHALL BE AS SET FORTH IN THIS LIMITED WARRANTY, AND ANY CLAIMS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING DAMAGE FROM WATER LEAKAGE) ARE EXCLUDED. Some states do not allow limitations on how long an implied warranty lasts, or for the exclusion of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

This Limited Warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

We suggest you immediately complete the information below and retain this Certificate of Limited Warranty in the event warranty service is needed. Reasonable proof of the date of installation of your water heater may be required to establish its "in-warranty" status. Otherwise, the Effective Date of this Limited Warranty will be the date of manufacture of the water heater plus ninety (90) days.

**DO NOT RETURN THIS DOCUMENT TO RHEEM.**

**KEEP IT WITH YOUR WATER HEATER OR BUSINESS RECORDS.**

Name of Owner:

_____

Owner's Address:

_____

_____

Name of Plumber / Mechanical Contractor - Installer:

_____

Address of Plumber / Mechanical Contractor - Installer:

_____

_____

Telephone Number of Plumber / Mechanical Contractor - Installer:

_____

Date of Water Heater Installation:

_____

Model Number of Your Water Heater:

_____

Serial Number of Your Water Heater:

_____

# NOTES

# NOTES


**TECHNICAL SUPPORT LINE**
Rheem: 800-432-8373
Raypak: 805-278-5300

**ORDER CENTER**
Rheem: 1-800-621-5622
Raypak: 805-278-5300

**RHEEM WATER HEATERS**
800 Interstate Park Dr.
Montgomery, AL 36109
Website: www.Rheem.com
e-mail: Techserv@Rheem.com