

Heat Pump Water Heater

**Fully integrated Heat Pump Water Heater (HPWH)
40-119 Gallon Capacity**

Features

■ Highest Efficiency

- ✓ Heat Pump transfers heat from surrounding air into the hot water tank
- ✓ Industry leading efficiency
- ✓ Insulated with 3" thick CFC free polyurethane foam insulation to minimize stand-by heat loss

■ Long Life

- ✓ Hydrastone Cement lining ensures long tank life
- ✓ Proven Heat Pump technology
- ✓ Incoloy Sheathed back-up electric heaters resist corrosion and mineral build up

■ Simple Operation

- ✓ Fully Integrated water heater easily replaces a standard electric water heater
- ✓ User friendly electronic controller simplifies operation, maintenance, and trouble shooting
- ✓ Low maintenance design
- ✓ Designed for simple installation and service by a professional plumber

APPLICATIONS

- Residential
- Restaurants
- Schools
- Office Buildings



A Long Lasting and Reliable Heat Pump Water Heater

The Hubbell Model PBX water heater incorporates a number of features not found in other conventional heaters which makes it better suited to resist the highly corrosive effects of hot water. The heart of a Hubbell water heater is a superior storage vessel which utilizes a specially formulated Hydrastone cement lining, solid copper-silicon

threaded tank openings and a built-in heat trap device, all of which ensure a longer lasting and energy efficient water heater.

When you specify and install a Hubbell Model PBX, you will have confidence in knowing that the owner will be provided with a long lasting, trouble-free water heater.

Cement Lined Tanks Provide Longer Service Life



What is the most common reason why a water heater fails?



Failure of a tank's protective lining allows water to come into direct contact with the steel tank causing it to corrode and leak.

Therefore, the type of protective lining is the single most important feature when determining the quality of any water heater. The ability of a lining to protect the steel tank is primarily based upon its thickness and complete coverage of all steel surfaces.

Two common internal tank linings are **Glass** & **Cement**.

Glass

Glass lining is approximately 5 mils (.005") thick & *does not cover* all internal surfaces.

To compensate, all glass lined tanks require a sacrificial anode rod which must be periodically inspected and replaced.

Cement

Hydrastone cement lining is a minimum of 1/2" thick (100 times thicker than glass lining) and is guaranteed to uniformly cover 100% of all internal tank surfaces. The result is a significantly longer lasting tank which does not require a sacrificial anode.

Threaded tapping material is critical for tank longevity.

Glass lined tanks are constructed with regular steel tappings which are continuously attacked by corrosive hot water due to the lack of glass lining on the internal threads. The Hubbell Model PBX water heater tank is constructed with *solid non-ferrous copper-silicon tank tappings* which are impervious to the corrosive effects of hot water.

The Hubbell Model PBX is a longer lasting water heater based upon the construction features found in the Hydrastone cement lined storage tank and the result is that when you specify and install a Hubbell Model PBX, you will have confidence in knowing that the owner will be provided with a trouble-free and long lasting water heater.

■ Thickness

Each Hubbell Model PBX storage tank is lined with a minimum of 1/2" thick Hydrastone cement to ensure protection of the steel tank.

■ Coverage

The Hydrastone cement lining covers a guaranteed 100% of all interior tank surfaces and is free from flaws or imperfections. Full coverage is achieved by injecting the precise amount of Hydrastone cement into each tank and then centrifugally spinning it at 250 RPM to ensure complete and uniform coverage of the lining on all interior surfaces.

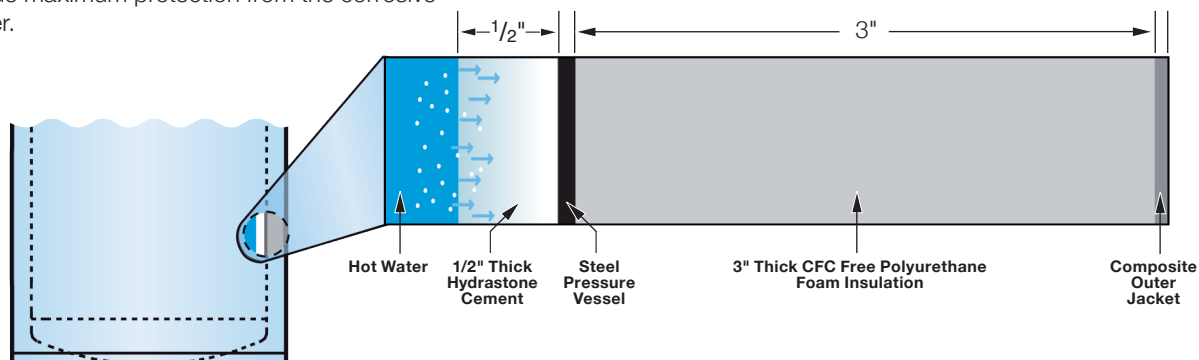
■ Corrosion Resistance

Hydrastone cement is a specifically formulated high density lining designed to provide maximum protection from the corrosive effects of hot water.

■ Reduced Operating Costs

The Hubbell Model PBX water heater significantly reduces the total ownership cost of a water heater due to the longer life and maintenance-free benefits derived from a Hydrastone cement lined tank. Longer tank life is directly attributable to the unmatched tank protection provided by the Hydrastone cement lining and copper-silicon tappings. Additionally, the Model PBX reduces operating expenses by eliminating the periodic inspection and replacement costs associated with maintaining a sacrificial anode in a glass lined tank.

Tank Cross Section (Actual Thickness Shown)



How the Hubbell Heat Pump Water Heater Works

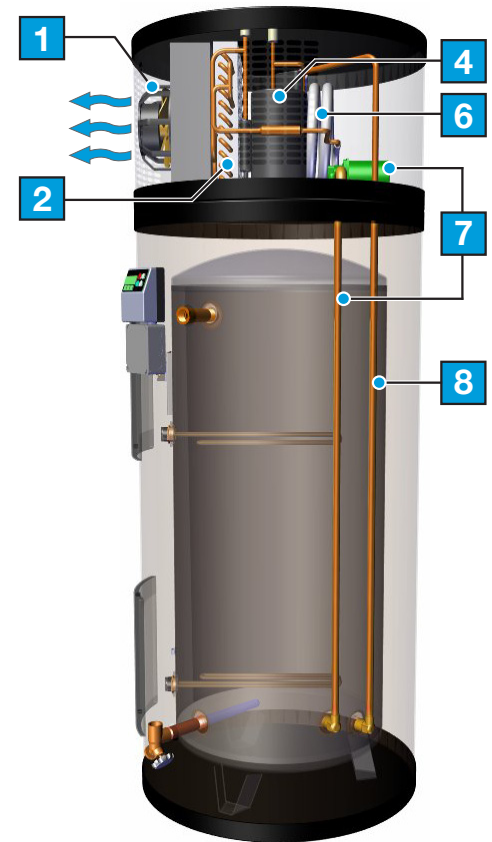
The Hubbell Model PBX Heat Pump Water Heater uses a small amount of electricity to transfer heat from the air to water. In comparison, traditional electric water heaters use resistive heating elements to directly heat water. The Hubbell Model PBX is significantly more energy efficient compared to a conventional electric water heater because less electricity is required for a heat pump water heater to produce the same amount of hot water as a traditional electric water heater.

Quite simply, a heat pumps works like a refrigerator in reverse. A refrigerator moves heat from inside the refrigerator (making things cold) and transfers that heat energy to the surrounding room. A heat pump water heater on the other hand pulls free and essentially unlimited heat from the surrounding air and transfers that heat to the hot water stored in the tank.

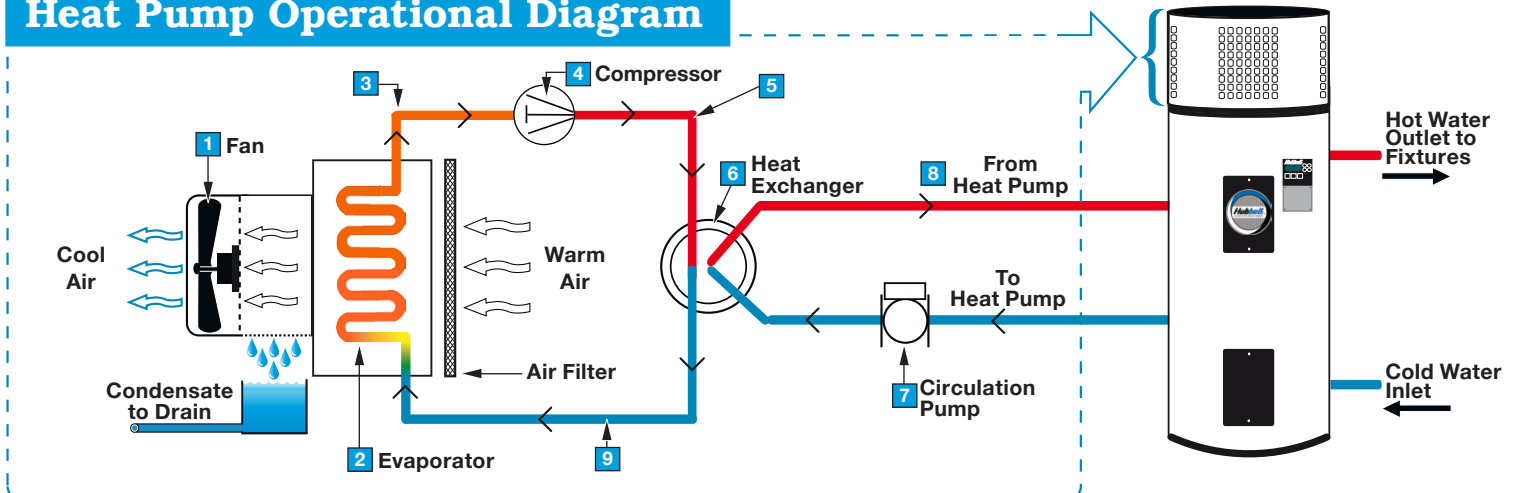
The Hubbell Model PBX Heat Pump Water Heater can pull heat out of air as cool as 40°F, and if it cannot provide enough heating capacity to meet demand, the water heater includes back-up resistive heating elements to ensure the unit provides sufficient hot water. The heat pump process of removing heat from the air and transferring it to the water results in the exhaust of cooler dryer air, with as much as 0.4 gallons per hour of “free” dehumidification provided by the heat pump when the unit is heating water.

Heat Pump Functions

- 1. The built in fan draws room air into the water heater heat pump compartment and across an evaporator coil, and exhausts cooler and slightly dryer (dehumidified) air.
- 2. The evaporator coil captures heat energy in the air and transfers that energy to a specially formulated CFC free refrigerant contained within the evaporator.
- 3. The refrigerant changes from a liquid to a gas as it gets warmer.
- 4. The refrigerant, now as a warm gas, exits the evaporator and passes into a compressor.
- 5. The warm gas is compressed, causing it to become a superheated hot gas and then flows to the heat exchanger.
- 6. The heat exchanger transfers heat energy from the superheated hot gas to the cold water from the tank.
- 7. The pump circulates cold water from the tank through the heat exchanger resulting in a continuous transfer of heat energy from the superheated gas to the water.
- 8. Hot water exits the heat exchanger and is stored in the tank.
- 9. The superheated gas condenses back to a liquid and awaits to repeat the process.



Heat Pump Operational Diagram



Model PBX Water Heater Specifications

Tank:	Hydrastone Cement Lined Steel	Hi-Limit:	190°F Manual Reset
Storage:	40, 50, 65, 80, 119 Gallons	Pressure Rating:	150 psi WP, 300 psi TP
Orientation:	Vertical	First Hour Rating: (Gallons)	
Voltages:	208-240 Volt	PBX40SL:	46
Phase:	1 Φ	PBX50SL:	61
Frequency:	60 Hz	PBX65SL:	70
Inlet Size:	3/4" Female NPT	PBX80SL:	82
Outlet Size:	3/4" Male NPT	PBX120SL:	120
Drain Size:	3/4" GHT	Standby Heat Loss: (°F/hr)	
Condensate Size:	1/4" Tube	PBX40SL:	0.45
Relief Valve Size:	3/4" Female NPT	PBX50SL:	0.36
Relief Valve Type:	T&P, 210°F, 150 psi	PBX65SL:	0.35
Heat Pump:		PBX80SL:	0.28
Refrigerant:	R426A (CFC Free)	PBX120SL:	0.28
ODP:	0	Energy Factor:	2.33
GWP:	1349	COP:	2.36
Over Pressure Safety:	Manual Reset	Average Power Consumption:	
Field Chargeable:	No	High Fan:	680 Watts
Ambient Air:		Low Fan:	614 Watts
Air Flow (High Fan):	450 CFM	Electric Elements:	Incoloy Sheathed 3800 W @ 240V
Air Flow (Low Fan):	250 CFM	Insulation:	3" Polyurethane Foam
Air Filtration:	Washable/Removable	Sound Level:	62db Average @ 3 Feet
Temperature Range:	40-110°F	Warranty:	
Thermostat Range:	50-160°F (°F or °C) \pm 3°F	Tank:	10 Years
Error Indication:	Visual and Audible	Parts:	6 Years
Demand Response Capable:	Yes	Approvals:	cULus
Child Lock Capable:	Yes	Jacket:	High Impact Colorized Composite
		Color:	White with Black Trim

Selectable Operating Modes

Economy

This mode controls the heater such that the heat pump provides essentially all of the heating capacity. This is typically the lowest operating cost mode.

Hybrid

This mode controls the heater in a way to optimize its efficiency and user experience and is the default setting. This mode operates the water heater such that the heat pump provides the vast majority of heating capacity and automatically switches to electric resistance heater mode only when necessary to meet high demand or to optimize efficiency.

Electric

This mode controls the heater such that it only heats using the electric resistance heaters and operates as a traditional electric water heater. The heat pump will not operate in this mode.

Super

This mode controls the heater such that both the heat pump and the electric resistance elements can operate simultaneously. This mode provides the fastest recovery option possible by providing heating capacity from both the heat pump and the electric resistance heaters at the same time.

Vacation

This mode prevents the heater from heating (regardless of what mode it is in) as a way to improve efficiency during long periods of no usage (i.e. vacation). In this mode the only time the heater will heat is if the unit is in danger of freezing. The user sets the number of days to be in vacation mode (adjustable from 2 to 99 days or Off), and the unit resumes its previous mode of operation at the end of this period.

Temporary Modes

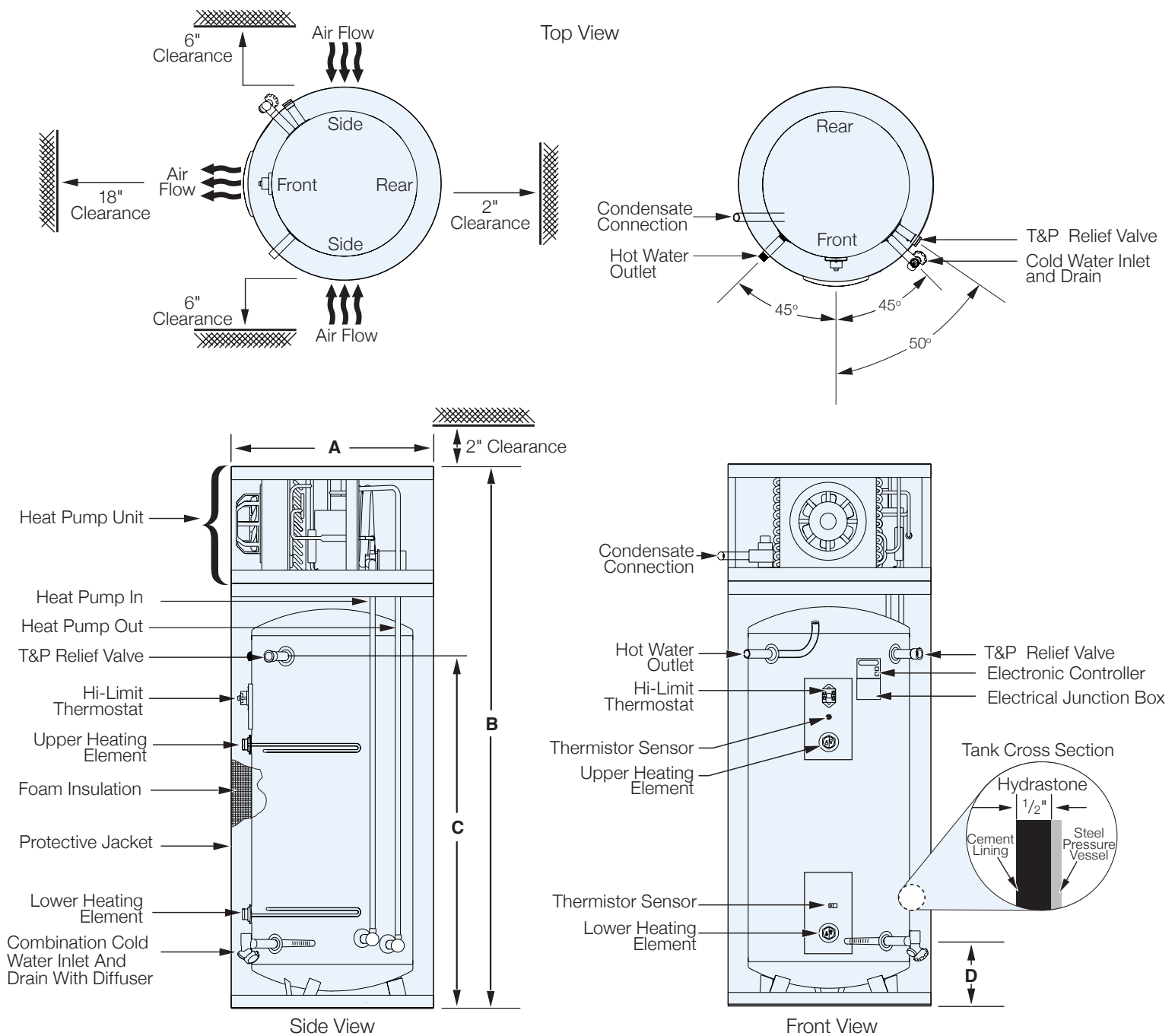
Max Heat

Simply pressing one button maximizes heating capacity by temporarily putting the heater into super mode.

Fan Off

Simply pressing one button temporarily lowers the fan speed which reduces the airflow and minimizes operating noise. Pressing the button twice turns the fan off for a user adjustable time period.

Outline Dimensions

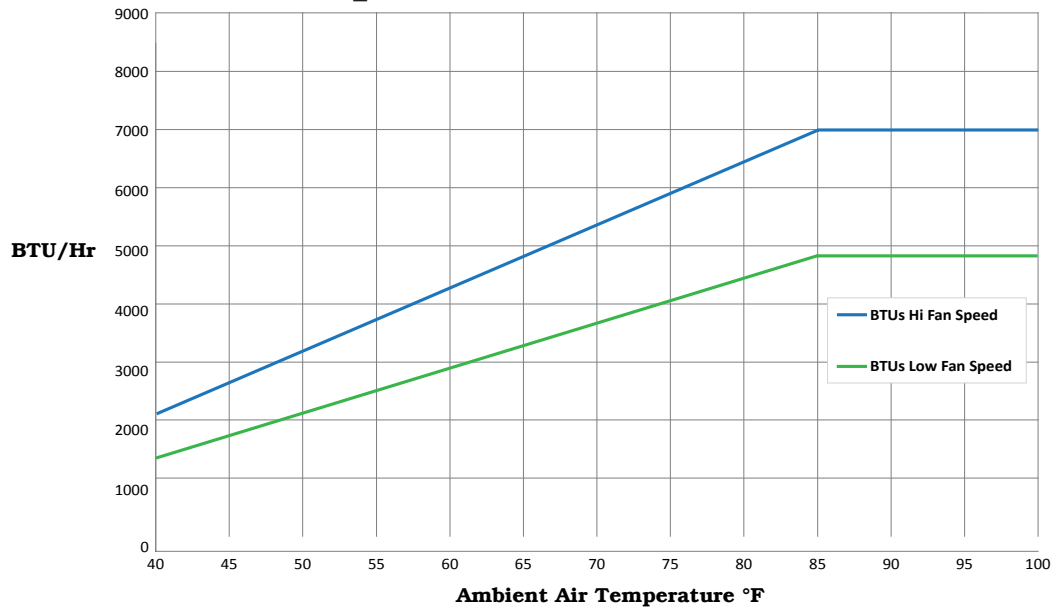


Dimensional Data

Storage Capacity (Gallons)	Base Model Number	Dimensions (Inches)				Shipping Weight (lbs.)
		Overall Diameter "A"	Overall Height "B"	Floor to T&P and HW Outlet "C"	Floor to CW Inlet "D"	
40	PBX40SL	28	49	26	9	270
50	PBX50SL	25	66	43	9	325
65	PBX65SL	28	63	40	9	365
80	PBX80SL	28	73.5	50	9	440
119	PBX120SL	30	84	61	9	525

Performance Chart

Hubbell Heat Pump Water Heater Performance



Energy Consumption Chart

Annual Energy Consumption (EST)

Ambient Air Temperature	Energy Factor (EF)	Coefficient of Performance (COP)	Annual Energy Consumption and Operating Cost in Various Operating Modes							
			Economy		Hybrid		Electric		Super	
			kW-Hrs	Operating Cost \$	kW-Hrs	Operating Cost \$	kW-Hrs	Operating Cost \$	kW-Hrs	Operating Cost \$
50°F	1.39	1.42	3159	\$336	3159	\$336	4671	\$497	4368	\$465
70°F	2.33	2.36	1884	\$201	1884	\$201	4671	\$497	3851	\$410
90°F	3.07	3.07	1430	\$152	1430	\$152	4671	\$497	3527	\$376

Energy Factor and Average Annual Operating Costs based on 2007 D.O.E. (Department of Energy) test procedures. D.O.E. national average fuel rate electricity 10.65¢/KWH. Energy Factor (EF) based upon heater operating in Hybrid mode.

Recovery Rating Chart

Continuous Recovery Rating (GPH)

Ambient Air Temp	Continuous Recovery Rating (GPH) in Various Operating Modes											
	Economy			Hybrid			Electric			Super		
	60°F ΔT	70°F ΔT	80°F ΔT	60°F ΔT	70°F ΔT	80°F ΔT	60°F ΔT	70°F ΔT	80°F ΔT	60°F ΔT	70°F ΔT	80°F ΔT
50°F	6.5	5.6	4.9	25.9	22.2	19.4	25.9	22.2	19.4	32.4	27.8	24.3
70°F	10.9	9.4	8.2	25.9	22.2	19.4	25.9	22.2	19.4	36.8	31.6	27.6
90°F	14.2	12.2	10.6	25.9	22.2	19.4	25.9	22.2	19.4	40.1	34.4	30.0

Continuous Recovery rating based upon 240V power supplied to heater and fan operating in high speed mode. ΔT represents the °F temperature rise for hot water.

Heating Chart

Heating Capacity Chart (BTU/Hr)

Ambient Air Temp	BTU/Hr Rating in Various Operating Modes			
	Economy	Hybrid	Electric	Super
50°F	3,240	12,965	12,965	16,205
70°F	5,400	12,965	12,965	18,365
90°F	7,020	12,965	12,965	19,985

Heating Capacity based on 240V power to heater and fan operating in high speed mode.

These units are designed to meet or exceed ANSI (American National Standards Institute) requirements and have been tested according to D.O.E. test procedures and meet or exceed the energy efficiency requirements of NAECA, ASHRAE standard 90, ICC Code and all state energy efficiency performance criteria for energy consuming appliances.

Amperage Chart

Amperage Rating Chart (Amps)				
Supply Voltage	Total Maximum AMP Draw in Various Operating Modes			
	Economy	Hybrid	Electric	Super
240V	2.6	15.8	15.8 (3800 Watts)	18.4
220V	2.8	14.5	14.5 (3200 Watts)	17.3
208V	3.0	13.7	13.7 (2850 Watts)	16.7

Over current circuit protection rated minimum 25 amp required, reference all local, state and national codes.

VARIABLES TO SOLVE FOR:

Solve for the unknown using the formulas stated below.

1. BTU/Hr Requirement:

$$\text{_____ GPH} \times \text{_____ } ^\circ\text{F } \Delta T \times 8.33 = \text{_____ BTU/Hr}$$

2. Temperature Rise:

$$\text{_____ BTU/Hr} \div 8.33 \div \text{_____ GPH} = \text{_____ } ^\circ\text{F } \Delta T$$

3. Flow Rate:

$$\text{_____ BTU/Hr} \div 8.33 \div \text{_____ } ^\circ\text{F } \Delta T = \text{_____ GPH}$$

ELECTRICAL

$$\frac{\text{Watts}}{\text{Volts}} = \text{Amps 1 } \Phi$$

$$\frac{\text{Watts}}{\text{Volts}} \div 1.73 = \text{Amps 3 } \Phi$$

Installation Requirements

Installed location must be at least a 10' x 10' x 7' room (700 cubic feet of air space). If smaller, there must be louver installed to provide sufficient airflow.

Installed room location must not be cooler than 40°F.

Installed locations with warmer ambient air temperature (i.e. furnace room) provides abundant “free” heat and is advantageous.

The heat pump dehumidifies the air and as a result produces condensate which must be piped to drain or outdoors.

The washable air filter requires periodic cleaning. Frequency depends upon environmental conditions.

OPTIONAL EQUIPMENT

- | | |
|--|--|
| <input type="checkbox"/> 1. 1 1/2" Male NPT inlet and outlet water connections | <input type="checkbox"/> 4. ASME tank construction |
| <input type="checkbox"/> 2. Solid (Copper-Alloy, Type 304L, Type 316L stainless steel) storage tank for maximum life | <input type="checkbox"/> 5. Alternate voltages (1 or 3 phase), alternate wattages or 50 Hz available. Please consult factory |
| <input type="checkbox"/> 3. Tank installed heat exchanger for use with solar or radiant heating systems | <input type="checkbox"/> 6. Condensate removal pump (120V plug-in) to remove and lift condensate to drain |

Metric Conversions

$$\text{Liters} \times 0.2641 = \text{Gallons}$$

$$\text{Gallons} \times 3.79 = \text{Liters}$$

$$\text{Gallons} \times 0.003785 = \text{m}^3$$

$$\text{m}^3 \times 264.2 = \text{Gallons}$$

$$1^\circ\text{C } \Delta T = 1.8^\circ\text{F } \Delta T$$

$$^\circ\text{F} = (^\circ\text{C} \times 1.8) + 32$$

$$^\circ\text{C} = (^\circ\text{F} - 32) \times 0.556$$

$$\text{psi} \times 0.06896 = \text{Bar}$$

$$\text{Bar} \times 14.5 = \text{psi}$$

$$\text{psi} \times 6.86 = \text{kPa}$$

$$\text{kPa} \times 0.1456 = \text{psi}$$

$$\text{Lbs} \times 0.4536 = \text{Kg}$$

$$\text{Kg} \times 2.2 = \text{Lbs}$$

$$\text{BTU/Hr} \div 3412 = \text{kW-Hr}$$

$$\text{kW-Hr} \times 3412 = \text{BTU/Hr}$$

Master Specification: Model PBX

JOB NAME _____

ENGINEER / ARCHITECT _____

REPRESENTATIVE _____

CONTRACTOR _____

GENERAL

Provide a quantity of _____ high efficiency heat pump electric water heater(s) Model No. _____ as manufactured by HUBBELL Electric Heater Co., Stratford, CT. The entire unit is to be complete with all operating controls and require only plumbing and electrical service connections. The tank shall be all welded steel commercial construction designed for 150 psi working pressure and contain (40, 50, 65, 80, 119) gallons of storage. The tank is to be lined with seamless Hydrastone cement to a minimum thickness of $\frac{1}{2}$ " on 100% of all interior tank surfaces and does not require any type of sacrificial anode. The tank shall be designed and fabricated with non-ferrous copper-silicon threaded tappings and non-ferrous inlet and outlet piping for maximum corrosion resistance. Steel tank tappings will not be acceptable. The entire tank is to be insulated with a minimum of 3" thick CFC free polyurethane foam insulation that exceeds the latest ASHRAE standard for stand-by heat loss. The complete heater shall be supplied with a high impact colorized composite protective jacket which cannot rust or corrode and does not require painting. The unit shall bear the cULus listing mark certifying the entire water heater.

The cold water inlet shall be $\frac{3}{4}$ " Female NPT (☐ **Optional Specification:** $\frac{1}{2}$ " Male NPT) and include a non-corrosive strata-flow diffuser which prevents incoming cold water from mixing too rapidly with hot water in the tank. A $\frac{3}{4}$ " hose connection drain is supplied. The hot water outlet shall be $\frac{3}{4}$ " Male NPT (☐ **Optional Specification:** $\frac{1}{2}$ " Male NPT) and shall include a factory installed built-in heat trap to prevent water from radiating through the piping during stand-by periods. A $\frac{1}{4}$ " tube condensate connection shall be provided for connection to suitable drain. A separate $\frac{3}{4}$ " Female NPT tapping is to be provided for relief valve installation. An ASME/CSA rated automatic reseating combination temperature and pressure safety relief valve set at 150 psi and 210°F shall be factory supplied.

HEATING CAPABILITY

The water heater shall be factory integrated with a built in air to water heat pump module rated to provide up to 7000 BTU/Hr heating capacity. The heat pump shall be capable of operating in ambient air temperature as low as 40°F and must be installed in a 10' x 10' x 7' room (700 Ft³), or if smaller, louvers shall be provided sufficiently sized to allow 450 CFM air flow. The fan shall be two speed type in order to optimize efficiency and minimize airflow when desired. The refrigerant shall be CFC free environmentally friendly R426A. The heat exchanger shall be non ferrous construction rated for 150psi WP. Two incoloy sheathed immersion electric resistance heating elements rated 3800 watts each at 240 volt 1 phase (☐ **Optional Specification:** _____ Watts, _____ Volts, _____ Phase, _____ Hz) shall be installed in the storage tank to provide back up heating capability. An integrated electronic controller with digital display shall provide the user interface and shall display operating and service information.

In addition, the water heater shall be supplied with the following optional features:

☐ **Option** _____

☐ **Option** _____

☐ **Option** _____

Hubbell shall warranty all electrical components against defects in workmanship and material for a period of one (1) year from date of start-up, all heat pump components for six (6) years and the pressure vessel for ten (10) years from date of start-up, provided that the unit is started within three (3) months of date of shipment and installed and operated within the scope of the tank design and operating capability. Each water heater shall be shipped with a complete set of installation and operating instructions including spare parts list and approved drawings.



The Electric Heater Company

ISO 9001:2008



Committed to continuous improvement...

Continuing research results in product improvement; therefore specifications are subject to change without notice. For the most updated information, consult the factory directly.

Made in the U.S.A.



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