**HEAT PUMP WATER HEATER AND RECOMMENDATIONS**

[**Review of 120 volt plug-in water heaters**](https://www.greenbuildingadvisor.com/article/introducing-the-120-volt-plug-in-heat-pump-water-heater) **(This article has several current references for more information; four 120volt models available)**

**[Current -50-gal-equiv-water-heaters.jpg](https://climate.smiller.org/REF/HPWaterHeaters/current-50gal-equiv-water-heaters.jpg)**

 Side-by side comparisons: purchase price, efficiencies, operating cost of electric tank; electric tankless; gas tank, gas tankless, and electric heat pump

[**Current -50-gal-equiv-water-heaters-GHG-emissions.jpg**](https://climate.smiller.org/REF/HPWaterHeaters/fitting.jpg)

 Side-by-side comparisons: tons of CO2 (equiv) emissions per year

[**Latest-hp-water-heaters.jpg**](https://climate.smiller.org/REF/HPWaterHeaters/latest-hp-water-heaters.jpg) (AO Smith Voltex AL; Rheem Proterra Plub-in; Rheem Proterra Plug IN w/hydroboost)

I HAVE RECENT EXPERIENCE WITH HEAT PUMP VERSIONS OF RHEEM 60 GALLON AND AOSMITH 50 GALLON.

ADVANTAGES OF AO Smith Voltext AL (current model HPS10-50H45DV200 ):

* duplicate side and top hot/cold water connections
* Side connections are typical electric water heaters
* Top connections are typical gas water heaters (easier to connect to existing house pipes)
* 45 dBA is low sound emissions from the heat pump

Rheem Proterra Plug-In –

* requires a DEDICATED 15 amp circuit

Rheem Proterra Plug In w/”Hydroboost”-

* share a 15 amp (share an electrical circuit and outlets)
* This is a VERY new breed- good for older houses with lower amp panels and wiring difficult to upgrade. Competitors likely to quickly follow.
* Stores water at HIGHER stored internal temp: then mixes with cold water to lower hot water to 120 degrees.
Allows a smaller tank to have same immediate water capacity as a larger sized tank
* Check for reviews before buying

[**Required-size-of-room.pdf**](https://climate.smiller.org/REF/HPWaterHeaters/required-size-of-room.pdf)  Ventilation requirements of various sized rooms

* >700 cubic foot room: no ventilation required
* <700 cubic foot room: need louvered door

[**Rheem-performance-platinum.pdf**](https://climate.smiller.org/REF/HPWaterHeaters/rheem-performance-platinum.pdf) specifications and dimensions of available models

 1st page: highlights; 2nd page: specs- including dimensions of Rheem heat pump water heaters

 These comments based upon experience with 65 gallon model XE65T10H45UO $2163 (10/2022) from Home Depot (not in stock- ordered on-line)

NOTES: Include a drain pan installed under the hot water tank. (All tanks eventually leak; all my tank leaks have been relatively slow drips, and must be either self-draining, or alerting) For insurance, run a pan drain line - add a small diameter drain hose to outdoors. An optional version of Rheem and the standard AO Smith heat pump water tanks have a built-in leak detector**-** it will send your cell phone an alert if it detects water in the pan. The latest AOSmith has an auto-shutoff valve on the cold water line. (If the valve auto-closes, it can be easily manually overridden to keep water flowing until tank is repaired/replaced).

The heat pump behaves like a dehumidifier, so a drain is required for heat pump water heater condensate . Condensate drains from an opening ~4.5 feet high. Run a pipe to any convenient drain, such as a nearby clothes washer sewer drain.

**REBATES**: $750 rebate from JCP&L. <https://residential.energysavenj.com/jersey-central/products/>; $1000 rebate from PSEG

**TAX CREDITS: (effective now)**

+ IRA 30% Tax credit heat pump water heater under section 25C

See <https://www.rewiringamerica.org/app/ira-calculator/information/heat-pump-water-heater>

+ IRA 30% TAX Credit for electrical panel update (credit capped at $600)

Your personal IRA calculator is at: <https://www.rewiringamerica.org/app/ira-calculator>

**IRA REBATES** (Available likely in 2025. LMI families will receive HIGH rebates. Higher income families receive limited or NO rebates. Use above “IRA-Calculator” to determine your family rebates.

**RECOMMENDATIONS**: For the latest model appliance like heat pump water heater (or heat pump clothes dryer), I recommend using Lowes or Home Depot. Shop on-line to see all models (on-line will show local store inventory – BUT local store might have NO sample for display and the water heater or dryer would be shipped from a regional warehouse). Choose based on ratings and evaluations. You can have Lowes or Home depot use their own contactors to install. With your own contractor (or yourself), Lowes or Home Depot will deliver to your house (free or $50) but they dont haul away the old water heater. AO Smith and Rheem heat pump water heaters are very similar. If you need LOW noise (water heater is near living quarters on main floor of your house) , then specify the newest AO Smith Signature 900 “HPS” (also called Voltex HPTS, or Voltex 130 Series Proline XE Voltex). These come in various gallon capacity- and have a (low) 45dBA noise spec. BEWARE: this early model AOSmith heat pump water heater suffered SEVERAL early failures of internal hard-to-replace sensors.

**FURTHER INFO ON HEAT PUMP WATER HEATERS:**

* 2023-7-12 "[Plug-In Heat Pump Water Heater Field Study Findings & Market Commercialization Recommendations](https://newbuildings.org/resource/plug-in-heat-pump-water-heater-field-study-findings-market-commercialization-recommendations)", NBI, 120volt water heaters lessons learned.
* 2022-11-10-[Heat pump water heaters can replace gas water heaters](https://nj.pseg.com/worryfree/learnaboutyourheating/waterheaters)
* 2022-7-12 Heat Pump Water Heater Reviews by electrifynow.net; [video clip](https://youtu.be/4O77e8fgJX8) (beginning ~22min- installations to avoid; last 3 minutes: heat pump water heater has small effect on overall building heating/cooling performance; [slides](https://climate.smiller.org/50x30/building-electrification/2022-7-12-heat-pump-water-heater/july12-slides.docx)

**MY EXPERIENCE WITH RHEEM AND AO SMITH HEAT PUMP WATER HEATERS**

**RECENT EXPERIENCE** with Rheem 65 gallon and AOSmith 50 gallon heat pump water heaters installed professionally in two different houses. Both require a 30 amp 240 circuit. Designs are very similar. Both have a display panel, and have Wifi-connected App to cell phone for control and display of any errors.

**AO SMITH EXPERIENCE** AOSmith tank was DOA upon installation, Oct, 2023. Factory support said the symptoms indicated the tank (in its shipping box) was likely on its side for part of the shipment (contrary to written directions on outside of box). This caused the freon to “pool”. The tank had to be returned for factory repair. A 2nd identical tank was shipped and installed 2 days later. It worked well for a few days. However, the tank began reporting repeated failure of control assembly “internal error” every 4 or 5 days, (reset by turning off beaker, a short wait, and then back “on”). Then 2-3 weeks later the control assembly also reported an external thermistor fault. The factory shipped free replacements. In the meantime, I was able to set the controller to use only the electric heating rods and bypass the heat pump. When the parts arrived, I installed them -design is modular (2 hours of my time), and the tank then worked for 2 months, until it stopped working when the controller identified failure of the “heat pump coil temperature sensor”, again shipped free from AOSmith Tech Support for homeowner to arrange installation. I arranged for the tank supplier to replace the complete wiring harness containing the “Heat pump coil temperature sensor” and other sensors on that harness. However, upon tank turn-on the control assembly indicated an internal component failure. However, neither the heat pump nor the electric heating rods would operate. The tank supplier threw in the towel on this lemon, and ordered another tank replacement, which occurred two days later. (During the ensuing 2 days, the home had NO hot water). The third tank has now been operating normally (as of 3/7/2024) for 3 weeks. The good news is the low noise level (45 dbA) which makes this suitable for installation in a small furnace room off a center hallway in this single story house on a slab. Existing louvered doors provide sufficient ventilation. RECOMMENDATION: hold off AO Smith purchase for a year or two to allow bugs to be worked out of this otherwise feature-rich heat pump water heater.

**RHEEM EXPERIENCE:** tank installed Nov, 2022 in my unheated basement (lowest temp is ~54 degrees). Initially installed without ducting, and it worked fine.  The little basement alcove -with one open wall- was definitely colder (maybe 10 degrees) when the heat pump operated (but quickly warmed to basement temps when the heat pump was not working). Later, I improved the efficiency a little by ducting the cold exhaust air into the open basement.  [Photo shows](https://climate.smiller.org/REF/HPWaterHeaters/20230206_085305.jpg) the 90 degree elbow, and the 8 inch dia. flexible ducting extending the cold air exhaust about 30 feet.  The temperature change, within a larger area of unfinished unheated basement,  is not noticeable. It has worked great with no problems.  In the summer, the heat pump water heater is like a small air conditioner that intermittently cools and dehumidifies the air.

Instructions for locating heat pump water heater in a small area/laundry room: orient the water tank so the heater exhaust (the side vent) should be close to door louvers  (a couple of feet?) and preferably aimed directly at the louvers in the entrance door.  An adapter for Rheem tanks (~$130 from a supply house) and an adjustable 8 inch (diameter)  elbow (plus desired length 8 inch flex duct) will direct the exhaust air in any direction. See photo of adapter, elbow, and flex duct.  My hot water tank is in a small alcove in my basement and condensation drains into a utility sink, and find it is a great basement dehumidifier.

HVAC contractors, during webinars, have said customers have not noticed any larger area cooling effect from the heat pump in the laundry room. Addition of exhaust ducting to the outdoors (or into garage) is unlikely to make a noticeable difference in house temperature, but WOULD create a net loss of conditioned air.  To replace that air volume (maybe a few cubic feet per second?), the owner would need an intake opening or duct for an equal air flow into the house; that incoming air then requires energy to be heated or cooled and dehumidified, (depending on season).

My biggest concern is noise level. Location of the Rheem heat pump water heater in a basement is unlikely to be a noise concern. Location in a laundry room depends upon location of the laundry room relative to livings/sleeping quarters.  My Rheem heat pump noise emission is both a steady-state low-frequency drone, plus a higher frequency “whine”. (I estimate the Rheem total sound intensity is somewhat less than a clothes washer on spin portion of the wash cycle).

If noise is an issue because the heat pump location is near living or bedroom areas, then IN THE FUTURE I recommend the AO Smith Voltex AL (noise level is 45dBA , which is quite low- about the noise of the flames of a gas burning furnace and/or lower level noise than the associated room air blower.).  It is likely the same venting and cooling issues apply equally to AO Smith and Rheem heat pump water heaters.

CREDITS: WATER HEATER PHOTOS are from 2023-1-18 “Tankless Gas Water Heaters The Infamous Methane Puff” by ElectrifyNow slides [**here**](https://clicks.eventbrite.com/f/a/NBWwV0AWDRM4Y0NTUvBYQA~~/AAQxAQA~/RgRlqpS4P0RUaHR0cHM6Ly9kcml2ZS5nb29nbGUuY29tL2RyaXZlL2ZvbGRlcnMvMU9nQkpVOWpNTncwOHkzbTA0dEtINUpxWlMzWnVQX0pMP3VzcD1zaGFyaW5nVwNzcGNCCmPJOGHJY1CacnhSF3N0ZXZlbWlsbGVyQGNvbWNhc3QubmV0WAQAAAAA); recording [**here**](https://clicks.eventbrite.com/f/a/5M34RFzXOpfD2xbByobLDg~~/AAQxAQA~/RgRlqpS4P0QcaHR0cHM6Ly95b3V0dS5iZS9tRkZNQ0NjMzN4b1cDc3BjQgpjyThhyWNQmnJ4UhdzdGV2ZW1pbGxlckBjb21jYXN0Lm5ldFgEAAAAAA~~)**.**

**ELECTRICAL PANEL/HOUSE PANEL RECOMMENDATIONS**: Newest (120 volt low power) models are becoming available. Some models can be plugged into any shared outlet. Other models require a dedicated 15 amp outlet. The “hybrid” heat pump high powered water tanks requires a dedicated 30 amp circuit to power the electric heating rods. A plan should be created to ensure electrical panel capacity needed in the next 10 years, after full electrification of a house using IRA benefits. If the panel is rated at 100 amps, the 120 volt low power heat pump water tank might be considered. Electrification might include a heat pump furnace (my A/C replacement furnace heat pump draws about 8 amps at 240 volts, but requires a 30 amp breaker). AND a heat pump clothes dryer using maybe 1/3 the electric usage of an electric clothes dryer; an induction stove; AND one or two EVs. There are now many add-on solutions that allow sharing of circuits, for older houses that are difficult to upgrade the amperage from pole to the house. My recommendation (to avoid a several $thousand panel upgrade) is to first follow the advice given in “The Watt Diet” beginning page 18, of <https://www.redwoodenergy.net/research/a-pocket-guide-to-all-electric-retrofits-of-single-family-home>

**WHAT I DID**: My existing 200 amp panel was completely filled with 15 and 20 amp breakers, and all possible dual/miniature breakers had been changed-out. My electrician installed an overflow 125 amp (max) panel slaved from a new 100amp breaker inserted into my existing 200 amp panel. The new panel is mostly dedicated to 240 volt appliances (heat pump water heater; heat pump pool heater, one heat pump furnace; room for future 2nd heat pump heat pump furnace; future heat pump clothes dryer, future induction stove, and future 240 volt plug-in EV chargers. Tesla 240 volt chargers currently have a 32 amp load (provided by 40 amp (minimum) breaker. To future-proof EV charging, the wire could be up-sized to handle 50 or 60 amps, but for now remain behind a 30 amp breaker.

Updated 3/7/2024