Air-to-Water Heat Pumps

Air-to-water heat pumps offer another high efficiency solution for home comfort.

Air-to-water systems, often called hydronic systems, can be used for straight gas boiler replacements but also offer advantages that improve home comfort, more consistent temperatures, and cooling. Like all heat pumps, these systems operate at much higher efficiency than combustion technology which can translate to lower operating costs.

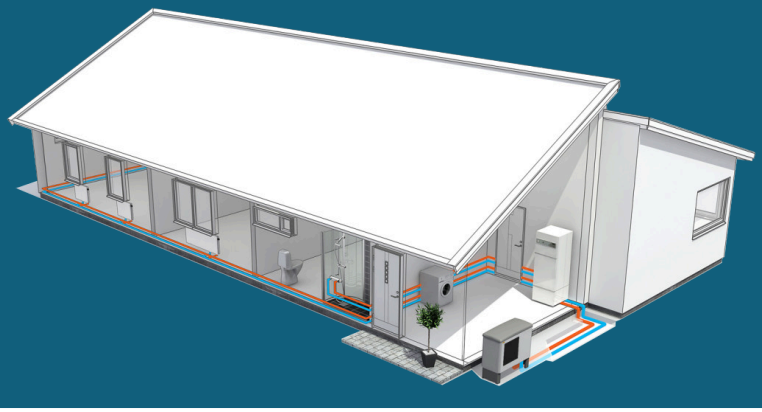
A single outdoor compressor unit can be configured with a variety of indoor emitter options depending on the needs of the home, including baseboard heaters, wall or ceiling panels, hydronic fan coils or radiant floor loops that can provide heating or cooling. They can also deliver domestic hot water heating to eliminate the need for stand-alone water heaters.

How do air-to-water heat pumps work?

Similar to standard air sourced heat pumps, a hydronic system has an external compressor unit which harvests heat or cooling from outdoor air even when temperatures are extreme. A heat exchanger then converts the energy in the refrigerant to water which is then circulated through the home for various heating and cooling end uses.

Space heating: A variety of "emitters", such as radiators, convectors, wall fans, floor loops and even central air handlers, can be combined to heat and cool the space depending on the needs of the home. In many cases, where existing gas boilers are replaced, existing radiators or underfloor heating loops can be re-used.

Water heating: The same system heats a water storage tank to provide domestic hot water. In some cases this water storage tank can be used as a thermal battery to efficiently store energy for later home heating use.



Simultaneous heating and cooling?

Because hydronic systems use just one heat pump for multiple purposes, they typically can not provide water heating and space cooling at exactly the same time. This may not be a problem, but be sure to discuss this with your installer to get the right solution for your home.

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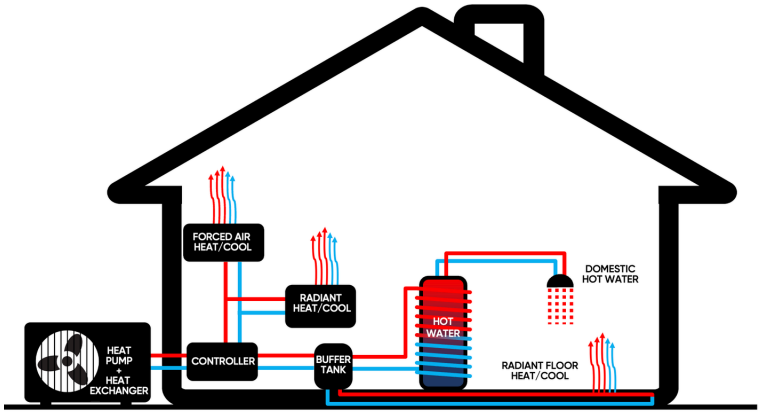
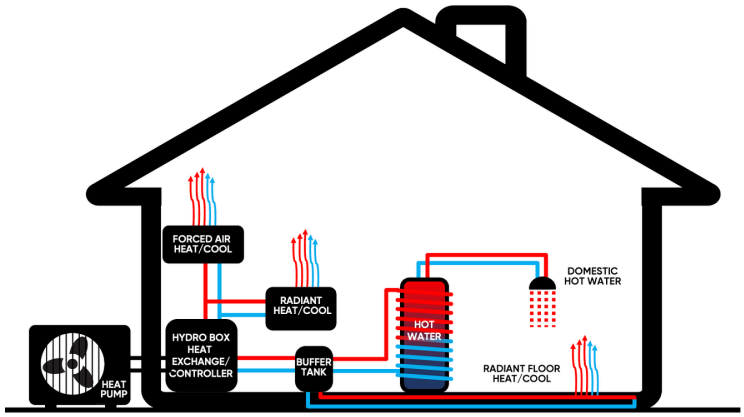
Types of air-to-water heat pumps

There are two types of heat pumps used in hydronic systems:



Air-to-Water Monobloc Systems: Monobloc heat pumps transfer heat from the refrigerant to water inside the outdoor unit then pump the water into the home through insulated water pipes using glycol to prevent freezing. As a result, these outdoor units are larger than conventional heat pumps, but this eliminates the complexity of running refrigerant lines into the building and reduces the volume of high global warming potential (GWP) refrigerants required.



Air-to-Water Split Systems: in this case, the external heat pump delivers hot or cold refrigerants to the indoor units, just like a conventional heat pump. The system is "split" because the refrigerant to water heat transfer occurs in a separate "hydro box" inside the building, either combined with the hot water storage tank or as a separate wall mounted unit. In some cases, split systems can also drive forced air heating and cooling units directly from the refrigerant lines.

Benefits of air-to-water heat pumps

- **One heat pump** to replace boilers and water heaters
- **Heating and Cooling:** hydronic systems can do both
- **More comfort than gas boilers:** better temperature control and consistency
- **High system flexibility:** multiple types of emitters, can use existing radiators
- **Super efficient water heating:** more flexible, faster recovery
- **Thermal battery:** a buffer tank can store energy when electricity rates are low
- **Lower emissions:** heat pumps reduce GHG compared to gas boilers in every state
- **Less refrigerant:** monobloc systems have no refrigerant lines

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