MITSUBISHI ELECTRIC
HEATING & AIR CONDITIONING

ecodan®

A single-phase air-to-water heating and cooling solution by Mitsubishi Electric


Designed for life,
inside and out.

Leading all-electric HVAC innovation for more than 40 years.

Mitsubishi Electric offers innovative and evolving heating and cooling solutions for any application in any climate. Our ducted and ductless mini-split and Variable Refrigerant Flow (VRF) heat pump systems bring superior energy efficiency, comfort, and performance to any home or building. We are proud to provide not only cutting-edge products but also design and technical training and unmatched end-to-end support.

At Mitsubishi Electric, we strive to create better environments, inside and out. The adoption of all-electric heat pumps and sustainable building is more than a trend, it is the future. Discover the balance between enjoying the spaces where you live and work, while creating sustainability for the world around you.

Introducing ecodan®

ecodan by Mitsubishi Electric is a compact air-to-water (ATW) heat pump designed for hydronic heating and cooling, as well as domestic hot water (DHW). ecodan represents the next generation of comfort technology, designed for the growing demand of all-electric, environmentally friendly solutions.

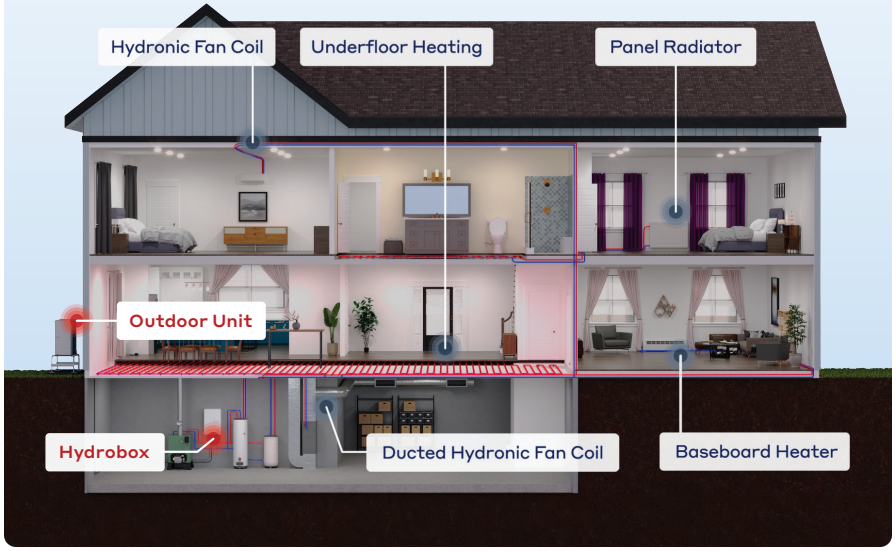
This system integrates inverter-driven heat pump technology with the quiet, clean, and versatile operation of a hydronic system. With ecodan, homeowners can take advantage of the efficiency of Mitsubishi Electric heat pumps and the comfort of hydronic space conditioning.

Unlike traditional air-to-air systems, hydronic systems capitalize on water's high heat absorption rate to evenly condition spaces and deliver comfort.

The ATW outdoor unit uses inverter-driven technology to extract heat from the outside air, even in temperatures as low as to -22° F. The outdoor unit then sends the refrigerant to the indoor unit where heat is transferred from the refrigerant to the water using a plate heat exchanger. The heated or cooled water is then distributed through pipes instead of air ducts for a quiet and comfortable experience. This same water loop can also connect to a domestic hot water tank, allowing the system to provide hot water for showers and taps.

ecodan® features an all-in-one indoor unit, Hydrobox, which has all of the key components built-in for streamlined installation and simple maintenance. The outdoor units have an elegant, compact design with a small footprint and low sound levels for maximum installation flexibility. ecodan is also capable of interlocking with a boiler, making it convenient for new construction and retrofit applications.

The system can provide cooling along with heating and domestic hot water, which saves space and reduces the number of systems that would require maintenance.

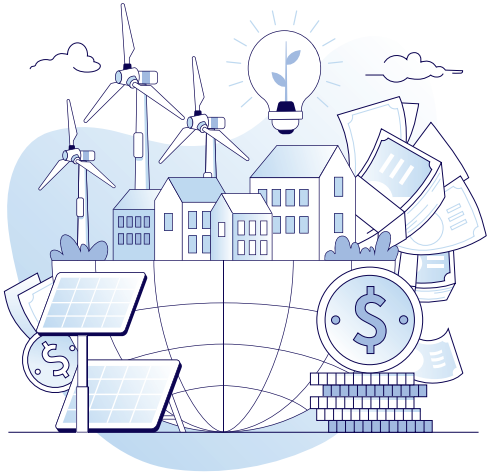


A sustainable solution

Mitsubishi ATW systems utilize all-electric heat pumps, making them a preferred choice for homes and buildings in regions that are implementing regulations to reduce fossil fuel usage.

All-electric, inverter-driven air-to-water heat pump systems like ecodan are an ideal choice for homeowners who want to invest in "net zero" homes[1]. ecodan's high efficiency performance is perfect for customers who are not only considering environmental sustainability, but also grid resiliency.

[1]"Net zero" homes are those which over the course of a year, generate energy onsite, using clean renewable resources, in a quantity equal to or greater than the total amount of energy consumed onsite. https://worldgbc.org/climate-action/what-is-a-net-zero-carbon-building/ , https://www.mass.gov/info-details/what-is-a-zero-net-energy-building



Conventional HVAC systems may become more inconvenient to maintain as states move away from reliance on fossil fuels.

Since ATW heat pumps and other all-electric systems do not burn any fossil fuels, local, state and utility rebates and tax credits may be available for homeowners[2]. These incentives differ depending on the city and state of residence and local utilities may have differing requirements for eligibility for such incentives*.

[2]Rebates and credits not available in all areas and may vary depending on location; please contact your city, state and utility to determine any incentives and eligibility.

The benefits of air-to-water systems

Air-to-water compared to boilers

Consistent comfort at all loads

Traditional boilers often struggle with oversizing and have limited modulation, causing temperature swings and short cycling. ATW heat pumps use inverter-driven compressors and variable-speed pumps to match demand, maintain steady comfort, and prevent inefficiencies.

Simplified operating and maintenance costs

Boilers require continuous fuel purchases along with delivery and service expenses. ATW heat pumps eliminate fuel delivery and infrastructure needs, beneficial for simplifying new construction and retrofit projects.

High-efficiency, all-electric advantage

Heat pumps generate more heat energy than the electricity they consume, outperforming fossil fuel systems.

Built-in cooling capability

Homes with boilers need a separate cooling system. ATW heat pumps provide both heating and cooling in one unit, reducing space, installation complexity, and long-term maintenance.

Year-round comfort with ecodan®

Reliable performance ensures comfort across seasons.

A versatile, low carbon solution

With no fossil fuel use, ATW heat pumps are well suited for both new builds and retrofit applications that aim to lower their carbon footprint.

Air-to-water compared to geothermal systems

Both geothermal and air-to-water heat pumps have their advantages. However, geothermal heat pumps may come with higher upfront costs for installation because the required horizontal or vertical ground loops require large areas of land. Air-to-water systems have a much smaller footprint and do not have any of the drilling costs that are required for geothermal loops.

Air-to-water compared to forced air

Forced air heating systems provide warm air that is distributed through ducts and grilles inside the home. Poorly designed ductwork and airflow distribution may result in air temperature stratification, meaning hot air remains concentrated in the upper portion of the room.

In contrast, air-to-water hydronic heating systems that utilize underfloor heating or radiator panels generate uniform radiant heat from the floor up, meaning no drafts, and less air stratification as well as quieter operation since no fans and motors are distributing the air. Hydronic systems are also less invasive, using smaller pipework rather than large ductwork. Hydronic heating doesn't move air so it eliminates any cross contamination, smells, or pollutants that may be contained in ductwork.

How ecodan® works

As part of the next generation of air-to-water heat pumps, ecodan is a refrigerant split system. In these types of systems, there is refrigerant piped between the outdoor unit and the indoor Hydrobox. The Hydrobox contains a refrigerant-to-water heat exchanger that is used to heat up the water that is pumped to the space emitters and DHW tank. Hydro-split and monobloc systems only use water which requires larger pipes and anti-freeze measures.

Benefits of a refrigerant split type system

The refrigerant heats the water in the hydronic distribution system through the plate heat exchanger. The water can then be circulated around the home.

No freeze risk

Uses refrigerant instead of water in piping between outdoor and indoor units.

No glycol or heat trace needed

Eliminates added materials, complexity, maintenance, and cost.

Fewer auxiliary components

Hydro-split and monobloc systems may require extra pumps for longer piping.

Long piping flexibility

Supports up to 164 ft.

Vertical install capability

Handles up to 100 ft. vertical piping; ideal for multi-family projects.

Smaller piping

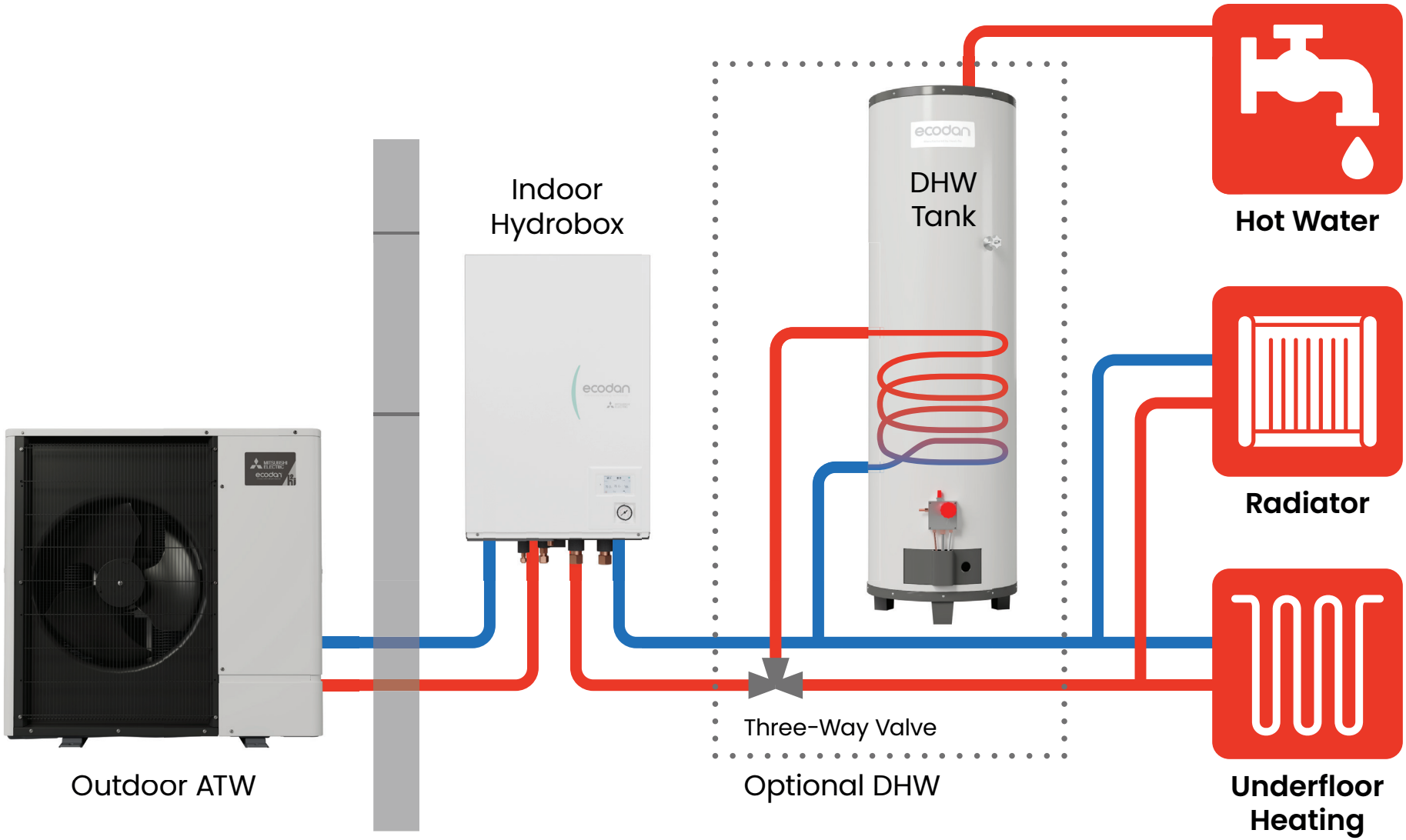
Less surface area allows for less heat loss

One key benefit of the system's configuration is that ecodan®'s Hydrobox is installed indoors, making it more convenient to service in a comfortable environment.

This is in stark contrast to monobloc systems, which requires service to be completed outdoors in potentially harsh, cold climate. ecodan serves as an all-in-one solution and includes key water circuit components in the Hydrobox, which eliminates the need for extra sourcing or install labor of critical components for hydronic systems.

While other systems may require additional pumps in order to extend piping, ecodan is capable of long piping lengths of up to 164 feet and a vertical piping height of up to 100 feet. The design and installation flexibility are ideal for multi-family applications or if you want to have the outdoor unit hidden from view.

System Layout



All-in-one Hydrobox

The heart of the ecodan® system, the all-in-one Hydrobox, includes the key water circuit components. The Hydrobox is easy to install as it comes with many of the necessary components built-in. It's developed for easy setup and maintenance. Designed with front-access serviceability, the Hydrobox includes a pump, expansion vessel, magnetic filter, booster heater, plate heat exchanger, flow temperature controller, and safety devices.

One of the key Hydrobox components is the magnetic filter. Providing system longevity and easier maintenance, the magnetic filter is specially designed to catch large debris, sediment, and iron particles before they can reach the plate heat exchanger, pump, or other associated components.

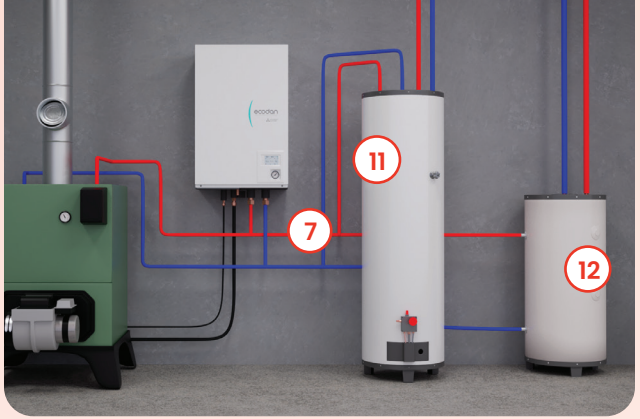
Flow Temperature Controller

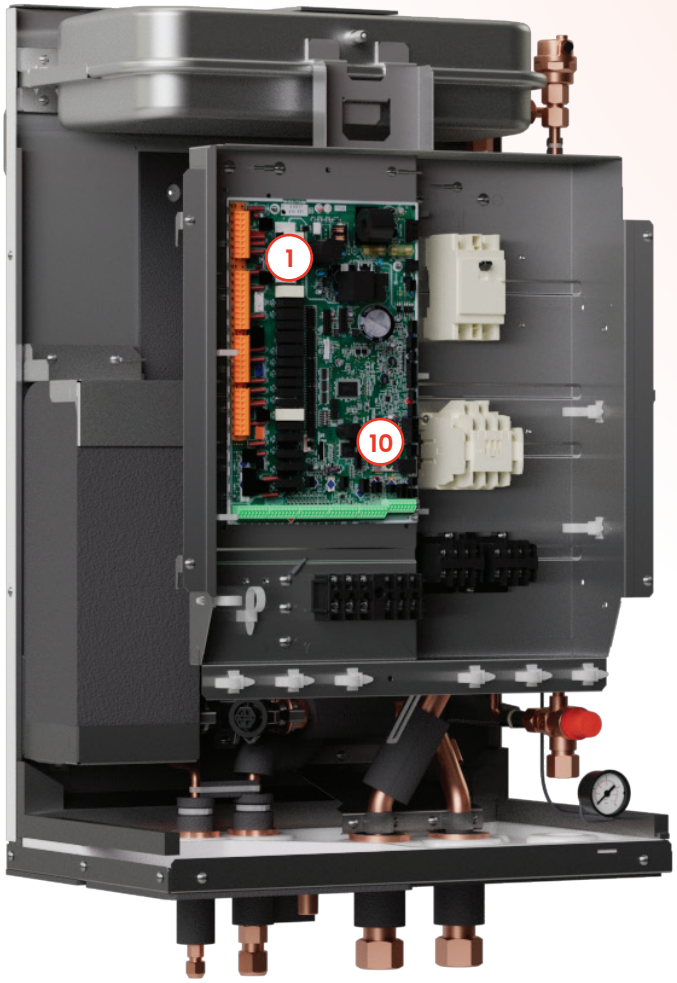
The Flow Temperature Controller (FTC) is the brain of the ecodan system.

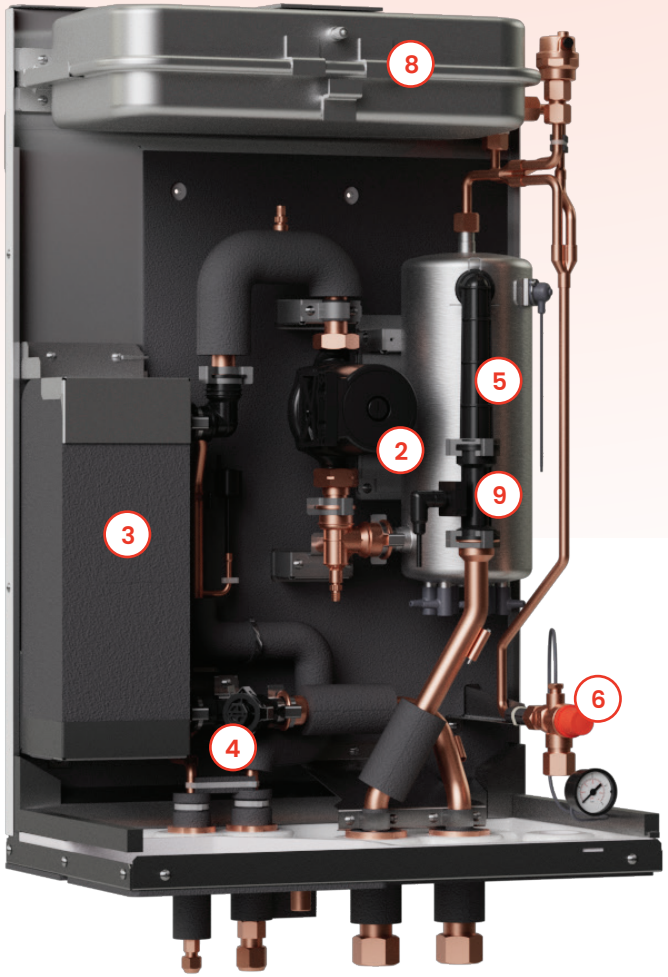
The FTC can manage the outdoor unit, indoor unit, and water circuit to maintain desired flow temperatures, integrate with various system components or interlock with an existing boiler, providing greater flexibility and adaptability for a wide range of applications.

Key components

Hydrobox indoor unit







1. **Flow Temperature Controller (FTC)** - The Flow Temperature Controller is the control board inside the Hydrobox. It manages the system, including the indoor and outdoor units and the water circuit based on ambient and flow temperatures. It can be integrated or interlocked with external controllers for greater application flexibility.

2. **Water pump/Circulator** - This component is built-in and equipped with sensors for energy efficient water circulation in a closed loop. The pump adjusts the speed of the water flow to maintain comfort.

3. **Plate heat exchanger** - The plate heat exchanger is designed and optimized for the efficient transfer of heat between the refrigerant and water.

4. **Magnetic filter** - The magnetic filter catches large debris, sediment, and iron particles before they can impact the plate heat exchanger, pump, or other piping, supporting system longevity and easier maintenance.

5. **Booster heater** - When the set point deviates beyond a selected temperature for a specified amount of time, the electric booster heater provides additional heating to raise the water temperature.

6. **Pressure relief valves** - The pressure relief valve is automatically activated when the water pressure is above 43.5 psi (3 bar).

7. **Three-way valve** - The three-way valve diverts water to switch between space conditioning and DHW.

8. **Expansion vessel** - The built-in expansion vessel absorbs the water volume expansion due to heating, protecting piping and its components.

9. **Flow sensor** - The flow sensor maintains water pressure by monitoring the flow rate and automatically adjusting the inverter output for maximum efficiency.

10. **MicroSD Card** - Installers can copy settings onto an included SD card to use for future installs. They can also easily save and refer to system operation data.

11. **Indirect tank** - This tank stores domestic hot water indirectly heated using hot water supplied by ecodan®. Available in 60 and 85-gallon capacities with and without an integrated heater.

12. **Buffer tank** - The optional buffer tank serves as a thermal energy battery, storing hot or cold water and reducing short cycling.


A heat pump


for any application

ecodan® benefits

ecodan is a modern hydronic system that can provide heating, cooling, and domestic hot water.

With hyper-heating outdoor units available in 2, 3, and 4 ton capacities, ecodan can serve as the primary system for single- and multi-family homes.

Indirect domestic hot water tanks that have been optimized for performance with ecodan are available in 60 and 85-gallon sizes with optional electric heaters built-in. ecodan can also be connected to any indirect field supplied tank to store and supply domestic hot water.

Domestic hot water

ecodan®'s DHW capabilities allow it to serve as the primary source of hot water for a home. The system can ramp up the heating of water based on usage and demand. The system controller further allows for the programming and scheduling of hot water from the dedicated tank whenever it's needed.

Cooling

When connected to hydronic air handlers and modern radiator panels, the ecodan system provides cooling as well as heating. It's an all-in-one solution for the home.

Heating

The system is compatible with a wide range of heat emitter types thanks to its ability to provide water flow temperature up to 158° F while maintaining high heating capacity output.

COP

A heat pump's Coefficient of Performance (COP) rating measures how efficiently the system moves heat relative to the electrical energy it consumes. COP directly reflects energy efficiency, so ecodan®'s high COP value of up to 4.74 means reduced energy consumption compared to other systems with lower COP values.

Low GWP refrigerant

ecodan uses R-32 refrigerant, which is environmentally-friendly with a low Global Warming Potential (GWP) of 675.

Flow temperature ranges

The wide flow temperature range allowed by ecodan® enables the system to work seamlessly with various heat emitter types, including underfloor radiant heating, panel radiators, baseboard heaters, and fan coils. This flexibility supports both retrofit and new installations, across diverse applications.

Heating flow temperature range:

68° F to 158° F

Cooling flow temperature range:

41° F to 77° F

ecodan® operating ranges

Hyper-heating:

100% heating capacity at 5° F, and guaranteed heating in temperatures as low as -22° F

Operating ranges:

Heating: as low as -22° F
Cooling: as high as 115° F
Domestic hot water: as low as -22° F

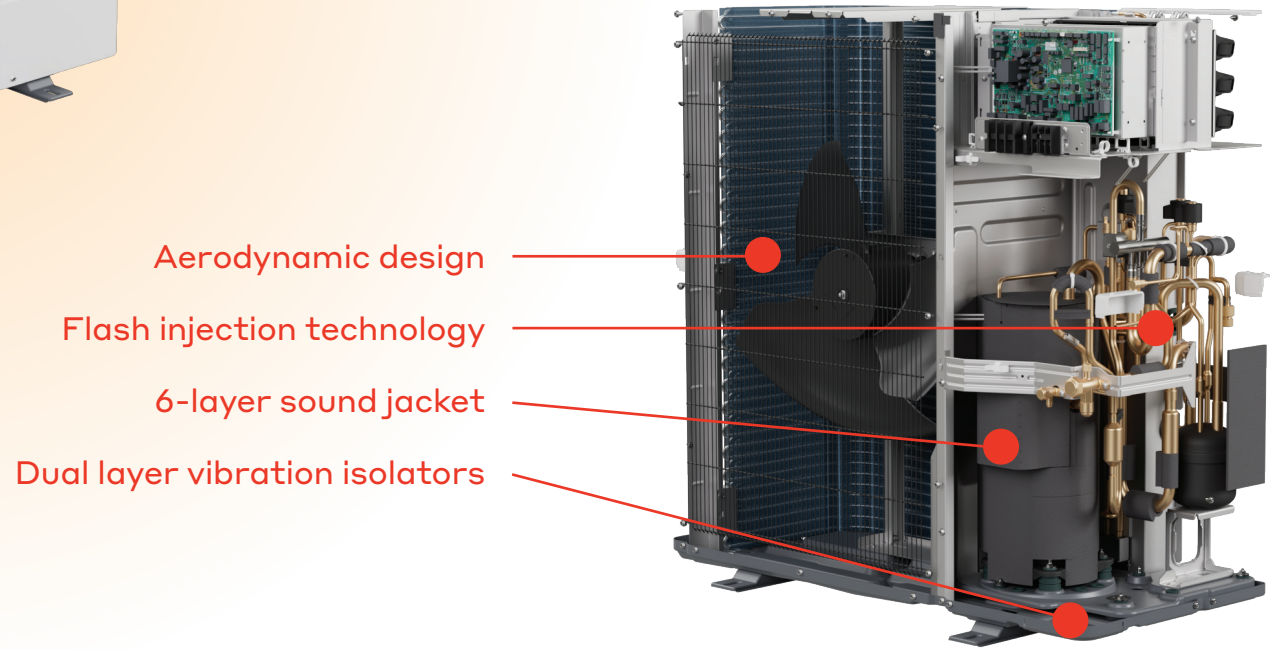
Design and sound

The ecodan® outdoor unit features an elegant design which seamlessly blends in with the design and functionality of any outdoor space. The outdoor unit's small size make them adaptable to many spaces. The compact, attractive design is further emphasized by the rounded edges of the unit, which creates a softer look and feel.

Designed for peace and quiet

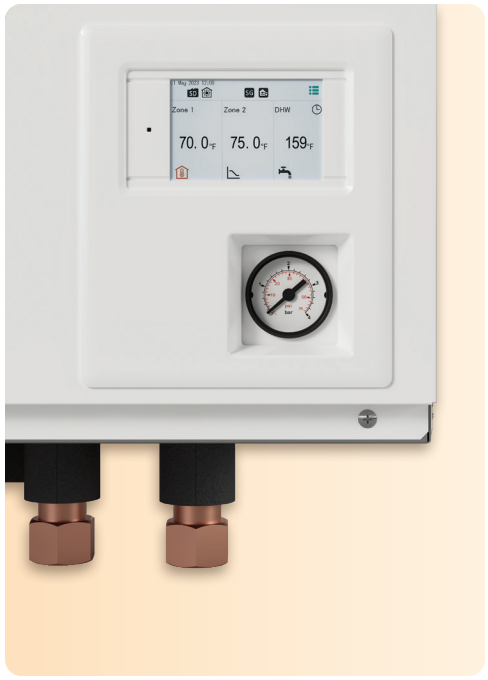
ecodan outdoor units feature a dual vibration isolator structure to reduce noise and vibrations, as well as a six-layer sound insulation jacket and an optimized low-speed fan. These designs are incorporated to reduce noise and achieve quiet operation without compromising performance.

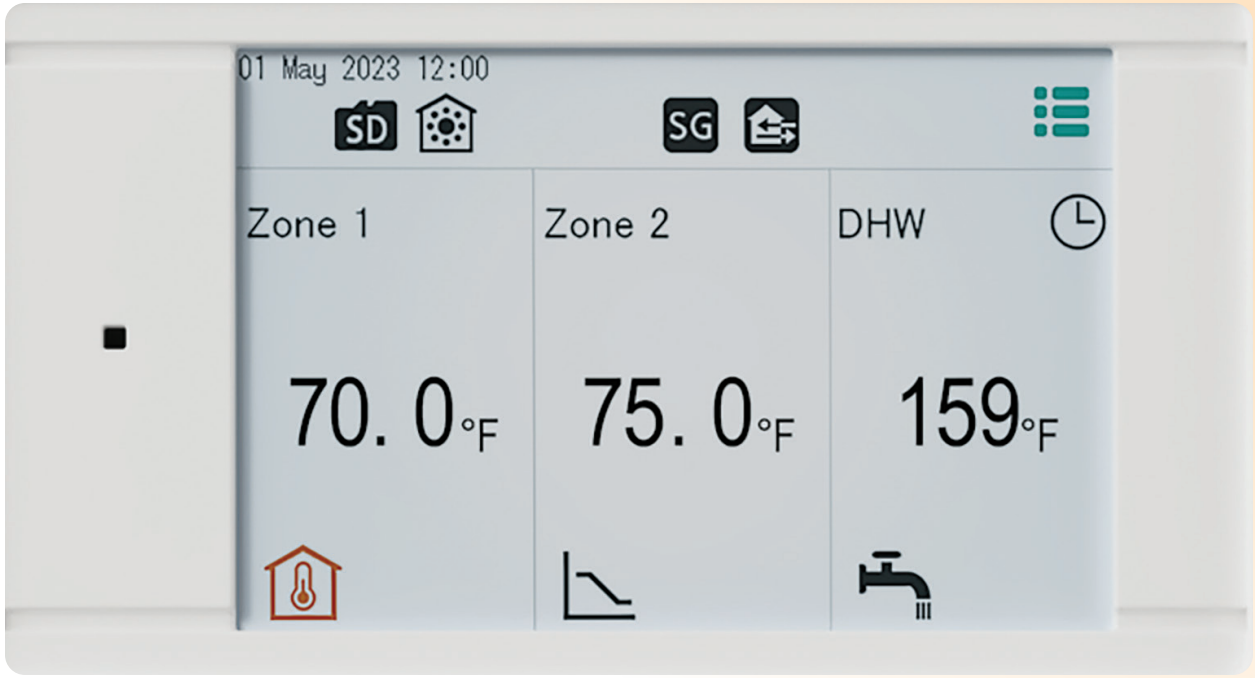
The outdoor unit features ultra-quiet operation as low as 41 - 45 db(A) thanks to its reduced-vibration design. The unit also offers a three-stage low-noise mode that can lower the compressor frequency and fan speed to reduce noise levels if desired while house occupants are sleeping or if needed to comply with noise ordinances.



Main controller

The ecodan® controller, located on the front panel of the Hydrobox, features a touch screen with a vibrant color display.





Users can navigate to settings that allow them to adjust heating and cooling for multiple zones, as well as set schedules. The DHW settings screen allows homeowners to choose to toggle Eco mode on or off, set water temperature, enable the boost function, and program the DHW prohibit schedule. The controller's expanded menu screen allows users to access even more features, including forced cooling mode, vacation mode, and detailed information on their system's energy consumption.

ecodan® features

Optimum water flow temperatures

ecodan is capable of delivering hot water up to 158° F outlet water even in low ambient temperatures. During cooling operation, ecodan can deliver a minimum water flow temperature of 41° F.

Hyper-heating

Hyper-Heating INVERTER® ecodan models provide heating at low ambient outdoor temperatures with 100% heating capacity down to 5° F and guaranteed operation as low as -22° F. These units offer year-round comfort even in extreme climates.

Flash injection

As temperatures drop outside, the compressor speeds up to maintain comfort inside. The flash injection process supplies a small amount of cooler refrigerant back to the compressor, reducing excess heat from increased speeds; allowing it to run faster and produce a high heating performance. This also enables the system to achieve set points faster, maintain efficiency, and recover quickly after a defrost cycle.

Quiet operation

The outdoor unit features ultra-quiet operation as low as 41 - 45 dB(A) due to an anti-vibration design and 6-layer insulation around the compressor. The unit also offers a three-stage low-noise operation mode.

All-in-one Hydrobox

Designed with a small footprint and front-access serviceability, the all-in-one Hydrobox incorporates all of the key water circuit components, including the pump, expansion vessel, magnetic filter, booster heater, and plate heat exchanger.

Boiler integration

Boiler Integration enables the system to automatically switch from heat pump to boiler operation based on ambient temperature and operating load readings. The Flow Temperature Controller (FTC) determines the best source of heating for consistent comfort and energy-efficient performance.

Multi-zone control

Connecting auxiliary valves and room thermostats to the Hydrobox enables dual-zone control, eliminating the need for additional zone controllers.

Auto changeover function

The unit will automatically change between heating and cooling modes when the ambient temperature deviates from the set temperature. This maintains comfort without the need for manual adjustment to the system settings. Installers can set custom temperature thresholds and delay periods to minimize unnecessary mode changes and promote year-round comfort.

Automatic air vent

Air builds up in a hydronic system over time and needs to be released to maintain optimal performance. The automatic air vent purges the excess air from the system piping, avoiding noise in the pump and providing steady circulation in the primary water circuit.

Eco mode

Eco mode allows the system to heat the water gradually to reduce power consumption.

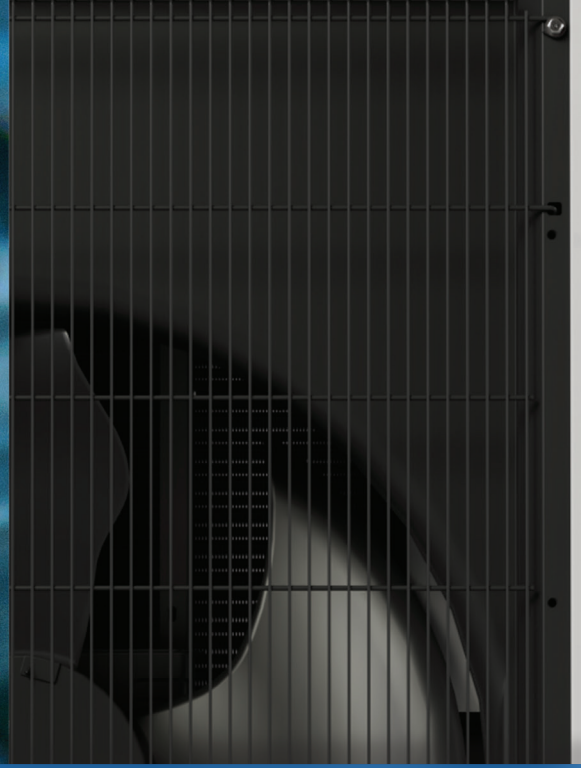
Energy monitoring

Homeowners can monitor monthly and yearly Domestic Hot Water (DHW) and space heating and cooling energy consumption from the Hydrobox controller. This information can help manage home energy use.

Quiet, efficient, and future-ready

ecodan® is a great solution for single- and multi-family homes that wish to upgrade from old boiler systems, and for new construction homes that wish to prioritize their heating and cooling system. The thoughtful design of the outdoor unit and the Hydrobox make ecodan an efficient and simple plug-and-play solution.

This next-generation ATW hydronic heating system provides consistent, even comfort without generating onsite greenhouse gas emissions that traditional fuel combustion heating and cooling systems can produce. ecodan provides heating and cooling, along with domestic hot water, all in one system. This whole-home solution stands out in the market by offering exceptional comfort and reliability.



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Together, we can create better environments inside, and out.

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