



DEMYSTIFYING GREENER MECHANICAL SYSTEMS



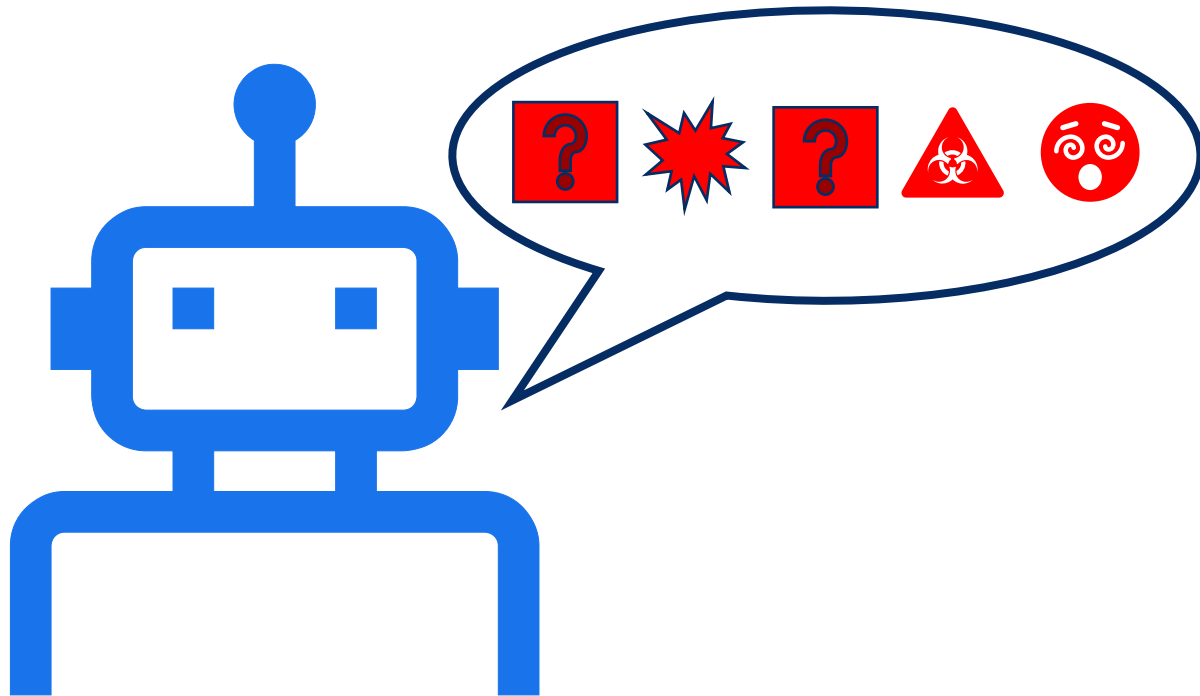
Today's Presenter



Trevor Rosmus is the Director of sales for western markets at GLP Canada. Trevor Joined the GLP Canada team in 2021.

Trevor is a red sealed journeyman in Refrigeration and Air conditioning with a certificate in PLC Programming and HMI development with over 20-years of experience.

Demystifying Greener Mechanical Systems



Furnaces – Mid-efficient to high-efficient

AC units and Heat Pumps

What is C.O.P.?

ERVs & HRVs

Breakdown of residential energy use



- NRCAN claims residential buildings use approximately 17% of the total energy consumed in Canada.

- The break down of residential energy use in Canadian homes

- Space heating: 63.6%

- Water heating: 17.2%

- Appliances 14.1%

- Lighting 3.5%

- Space cooling 1.6%

- Energy mix in Canadian homes

- Natural gas: 51.5%

- Electricity: 45.8%

- Heating oil: 2.7%

Heat and Cooling Sources

Traditional Furnaces

- Natural Gas
- Propane
- Heating Oil
- Electricity



Air Conditioners

- Single Stage
- Two Stage
- Inverter

Heat Pumps

- Single Stage
- Two Stage
- Inverter
- Cold Climate
- Air to Water
- Geothermal



Ventilation

ERVS & HRV'S

- Dedicated install
- Simplified Install
- Why you need one
- Heat Core VS Energy Core



What is AFUE?

AFUE or Annual Fuel Utilization Efficiency is an indicator of energy use efficiency. For example, a furnace with a 95% AFUE rating means that it converts 95% of the fuel's energy into heat for your home. The remaining 5% is lost, typically through the exhaust or flue.



Furnaces – What has changed over the years

- (pre-1990) 60% AFUE
- 80% AFUE to 90% AFUE January 1, 2010
- 90% AFUE to 95% AFUE July 3rd, 2019
- FER (Fan Energy Rating) is introduced on July 3rd, 2019



Good

Better

Best

Mid Efficient 80%AFUE

- Can only be used on relocatable modular.
- Less components and safeties.

Hi-efficient, Single Stage 95%AFUE

- Lower Fuel Usage than mids
- More heat removed from flue gasses
- Units heat cycle will cause condensation that is acidic.
- Exhaust pipe must be insulated in unconditioned spaces.

Hi-efficient, Dual Stage 96%AFUE

- Lower Fuel Usage than single stage hi efficient.
- More heat removed from flue gasses than single stage.
- More efficient Blower motors than single stage
- Units heat cycle will cause condensation that is acidic.
- Exhaust pipe must be insulated in unconditioned spaces.

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Air Conditioners

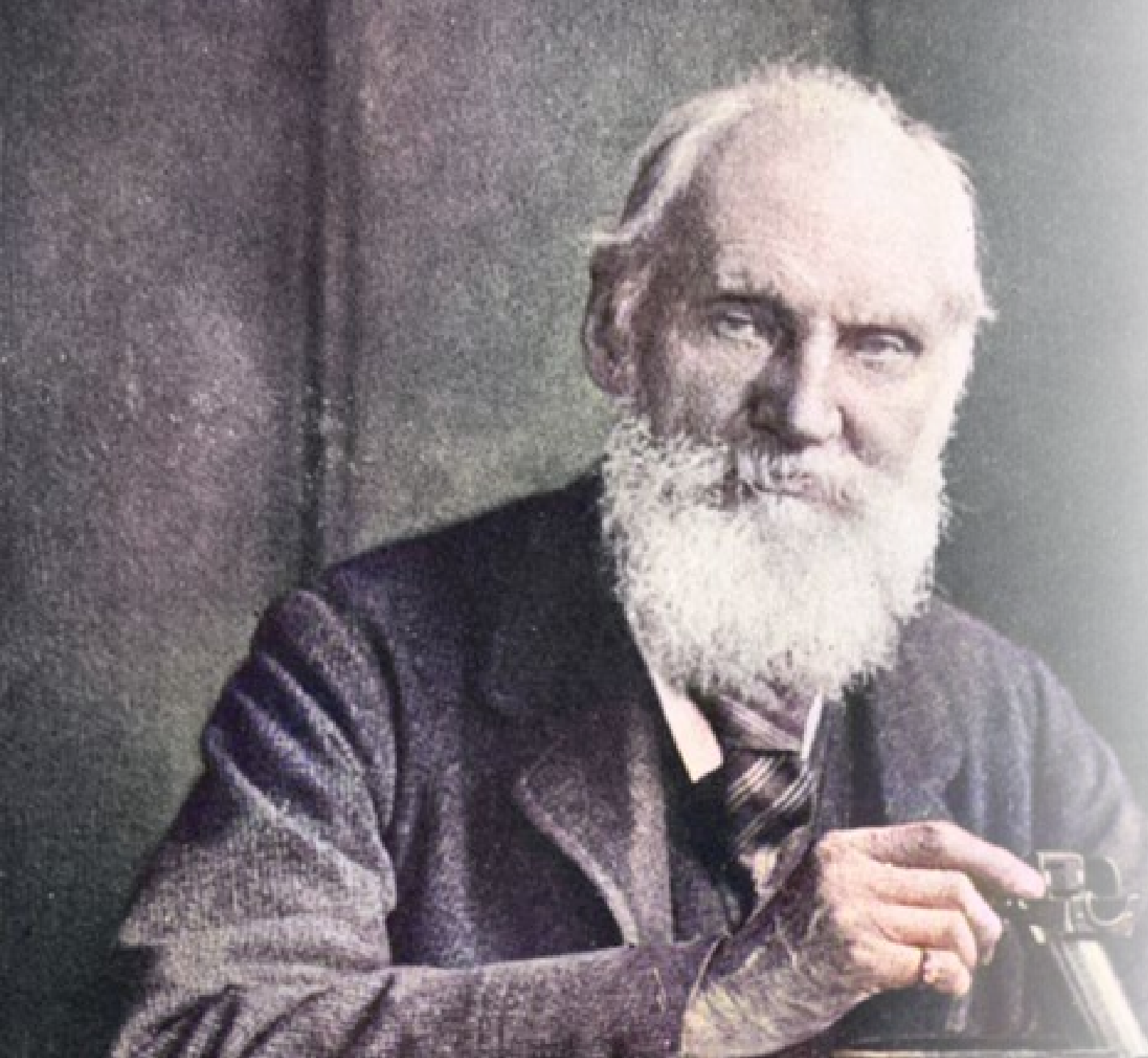
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Ventilation



What is a Heat Pump?

- 1852: Lord Kelvin described the fundamental theory behind how a heat pump works, explaining that heat could be moved from a colder to a hotter area with energy input.
- The first functioning heat pump was developed by Austrian engineer Peter von Rittinger between 1855 and 1857, initially for use in salt production to dry salt and evaporate brine.

Heat Pumps are more complex, but higher performance

Heat Pumps use refrigerant to move heat from indoors to the outdoors.
R12, R22, R407C, R410A, R454B/R32

Heat Pumps are all ELECTRIC

- In colder climates auxiliary heat sources are used.
- Special thermostat required to run auxiliary heat.

Performance is rated with C.O.P instead of AFUE



C.O.P – WHAT IS IT AND WHAT DOES IT MEAN???

Coefficient of Performance (COP) is a measure of a heating system's efficiency, calculated as the ratio of the heat output to the energy input. A higher COP indicates greater efficiency, meaning the system produces more heat for every unit of energy consumed.

96% AFUE Furnace = 0.96 C.O.P

Electric Furnace / Electric Baseboard = 1.0 C.O.P (100% of watt input is turned into heat)

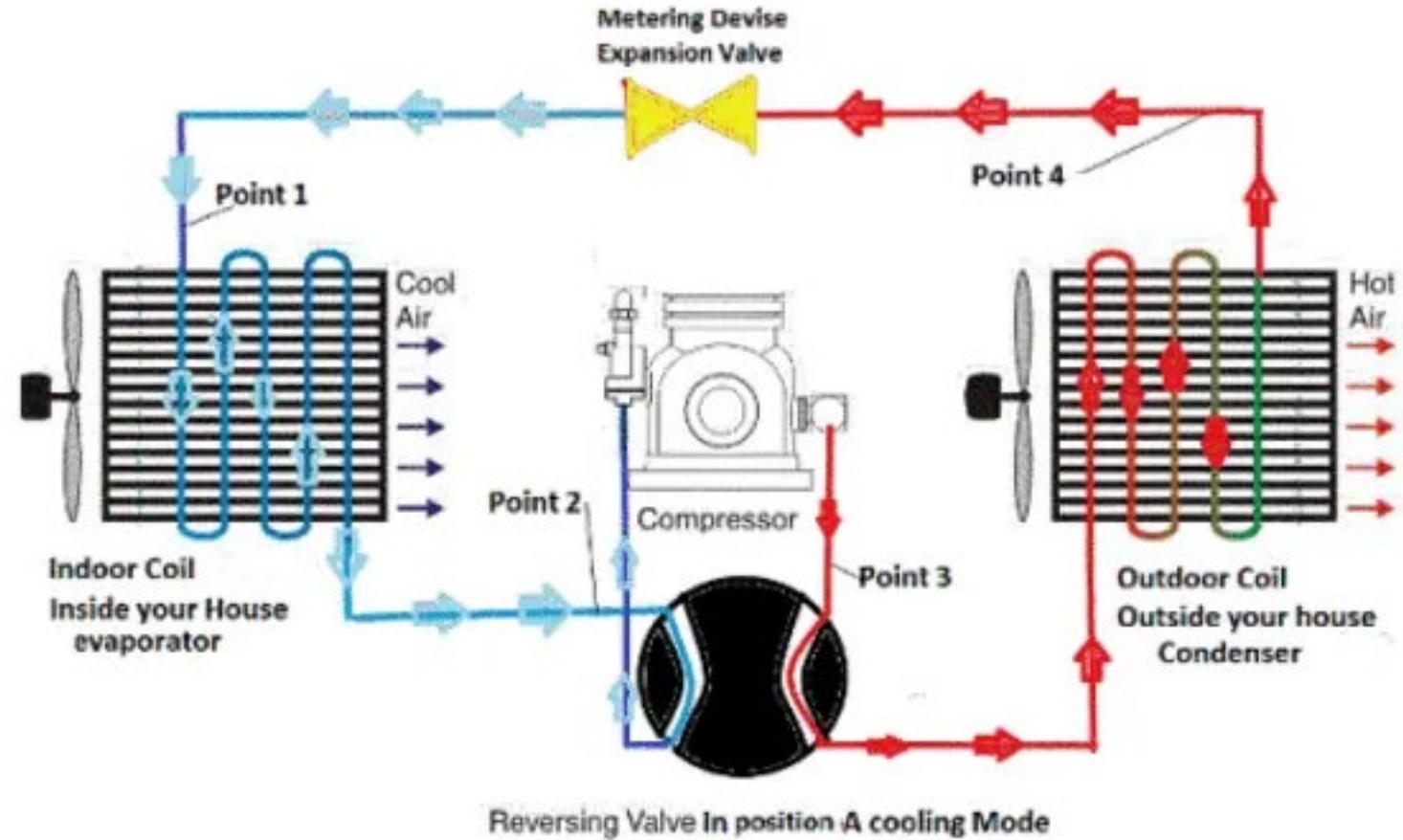
Cold Climate Heat Pump = equal to or greater than 1.75 C.O.P @ -15°C (175% Efficient)

How can a Heat Pump be 175% efficient?

Heat pumps don't create heat from electricity like a resistance heater. Instead, they use a small amount of energy to move existing heat from a source (like the outside air) into your home

How does a Heat Pump Work? In the Summer (Cooling Mode)

- Indoor Absorption
- Compression
- Heat Rejection
- Indoor Cooling



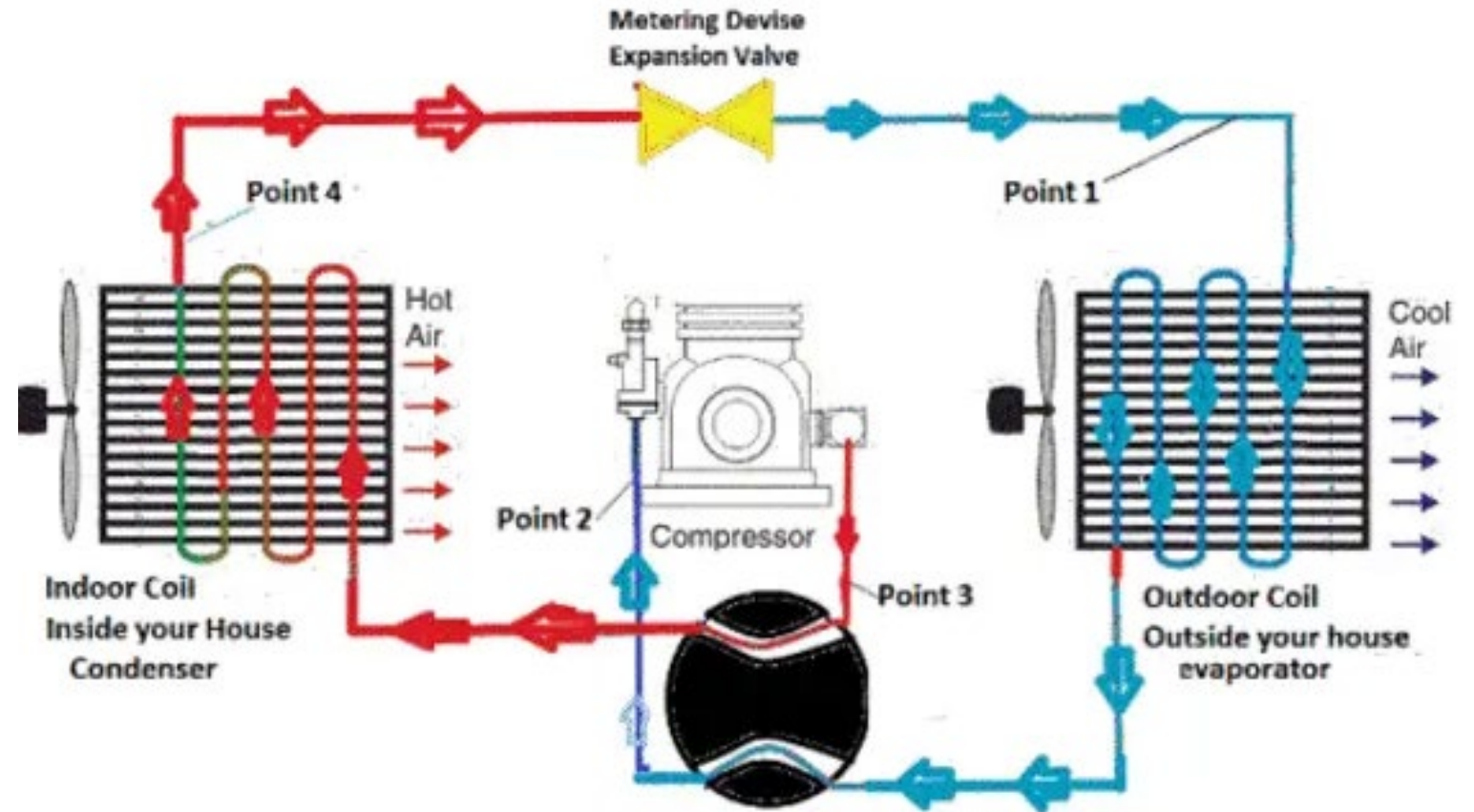
How does a Heat Pump Work? In Winter (Heating Mode)

-Absorption

-Phase Change

-Compression

-Heat Release



A photograph of a snow-capped mountain peak against a clear blue sky. The mountain is covered in snow and has a sharp, jagged peak. The sky is a clear, light blue.

Cold Climate Heat Pumps

- Cold climate heat pumps emerged through developments starting in the 1970s. The technology continued to evolve in the 2000s and 2010s with the advent of inverter technology, variable-capacity systems, and the development of prototypes for specific cold-weather performance.

- Today's cold-climate heat pumps are built to operate efficiently in temperatures as low as -30°C (-22°F) or even lower, a major improvement over conventional heat pumps that would struggle below -8°C (18°F)



SEER TO SEER2 (Seasonal Energy Efficiency Rating)

EER TO EER2 (Energy Efficiency Rating)

HSPF TO HSPF2 (Heating Seasonal Performance)

SEER 14 = SEER2 = 13.4

SCORE & SHORE Ratings to replace SEER2 & HSPF2

Good

Better

Best

Entry level

SEER2 14.3

- will not operate in low ambient conditions.
- Good for shoulder season.

Mid-efficient

SEER2 14-16

- will not operate in low ambient conditions.
- Good for shoulder season.
- Less energy than Entry

Cold Climate

SEER2 16-20

- will operate in low ambient conditions.
- Good for 90% of heating season.

Geothermal

up to 28 EER

- Operate year-round.
- requires a well or water source.
- Expensive install.

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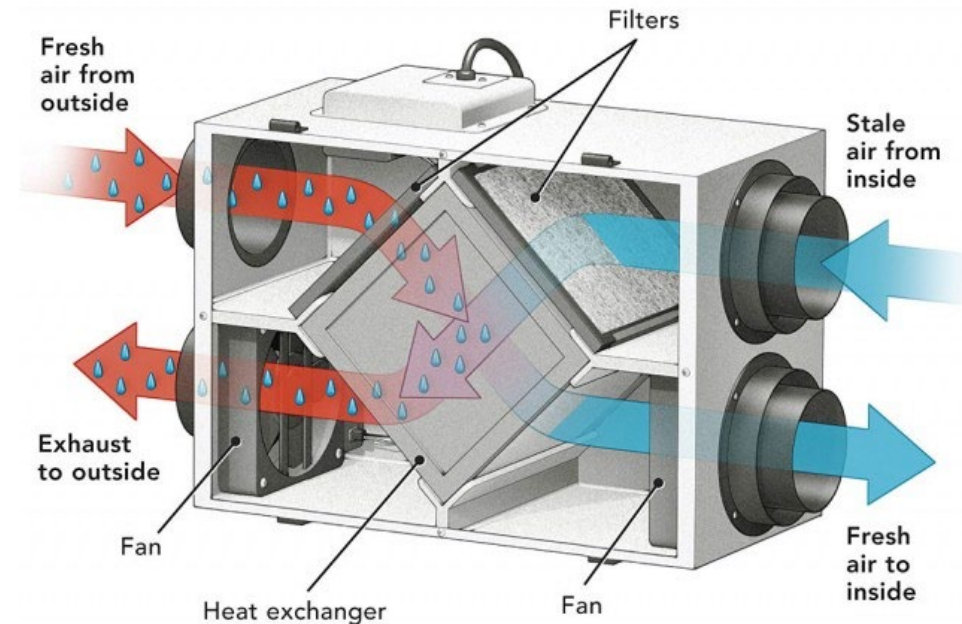


ERV/HRV'S – What are they and what do they do?

The primary purpose of a Heat Recovery Ventilator (HRV) and an Energy Recovery Ventilator (ERV) is to provide continuous, fresh air to a home while minimizing energy loss by transferring heat (and in the case of an ERV, moisture) from the outgoing stale air to the incoming fresh air.

Why You Need One

- Improved indoor air quality
- Energy Efficiency
- Humidity Control
- Comfort



HRV vs. ERV

HRV (Heat Recovery Ventilator):

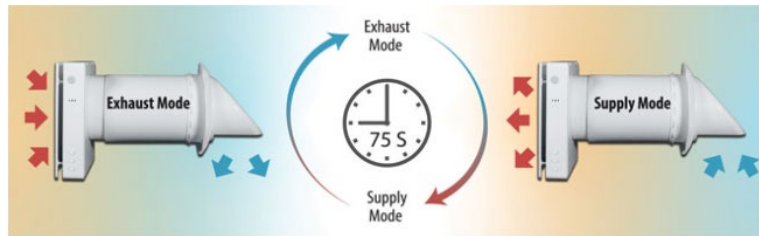
Transfers heat between air streams. It is ideal for climates where maintaining consistent humidity is not a major concern.

ERV (Energy Recovery Ventilator):

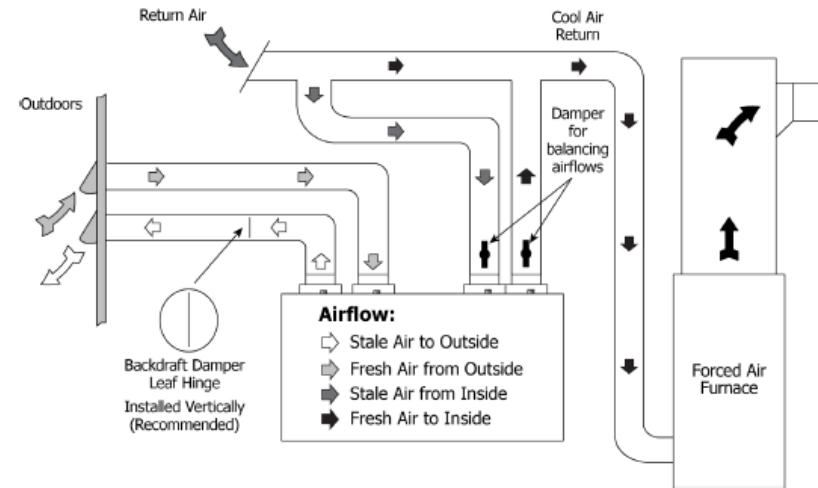
Transfers both heat and moisture. It is best suited for climates with significant temperature and humidity extremes.

Range of ERV's and HRV's

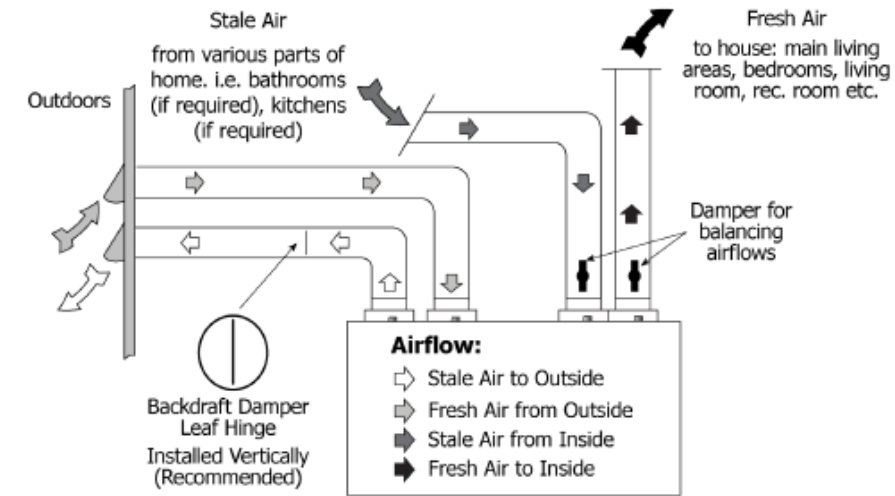
Single Room



Simplified Install



Dedicated Install



- What drives the Quality of an HRV and ERV's is the Core type and material.
- If looking for added efficiencies, select an ERV/HRV with ECM Motors
- If using in Low Ambient Locations Duct Heaters may be required.

Key takeaways



Single Stage, Hi Efficient
Furnace with low SEER AC,
ERV/HRV.

Two Stage, Hi Efficient
Furnace with Low SEER
Heat Pump, ERV/HRV

Two Stage, Hi Efficient
Furnace with Cold Climate
Heat Pump, ERV/HRV

Cold Climate Heat Pump,
Air Handler with Aux.
resistive heat, ERV/HRV

A few tips in designing your systems

- Perform a heat load calculation of the space to be heated or cooled
- Follow Manufacturers installation Manual
- Use the correct equipment for the application
- Use equipment for the application it is designed
- An ERV/HRV is not a make-up air
- Ensure start up and commissioning is completed by a licensed and qualified technician
- Perform regular preventative maintenance on the equipment

Thank you



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60 Years