



HVRF

The world's first hydronic VRF system



Scan to learn
about HVRF

Contents

1. Introducing HVRF
2. The heart of HVRF
3. Inside the HBC Controller
4. Simultaneous hydronic heating and cooling
6. Applications
7. Scalable, affordable installation
8. Piping allowances

Designed for life,

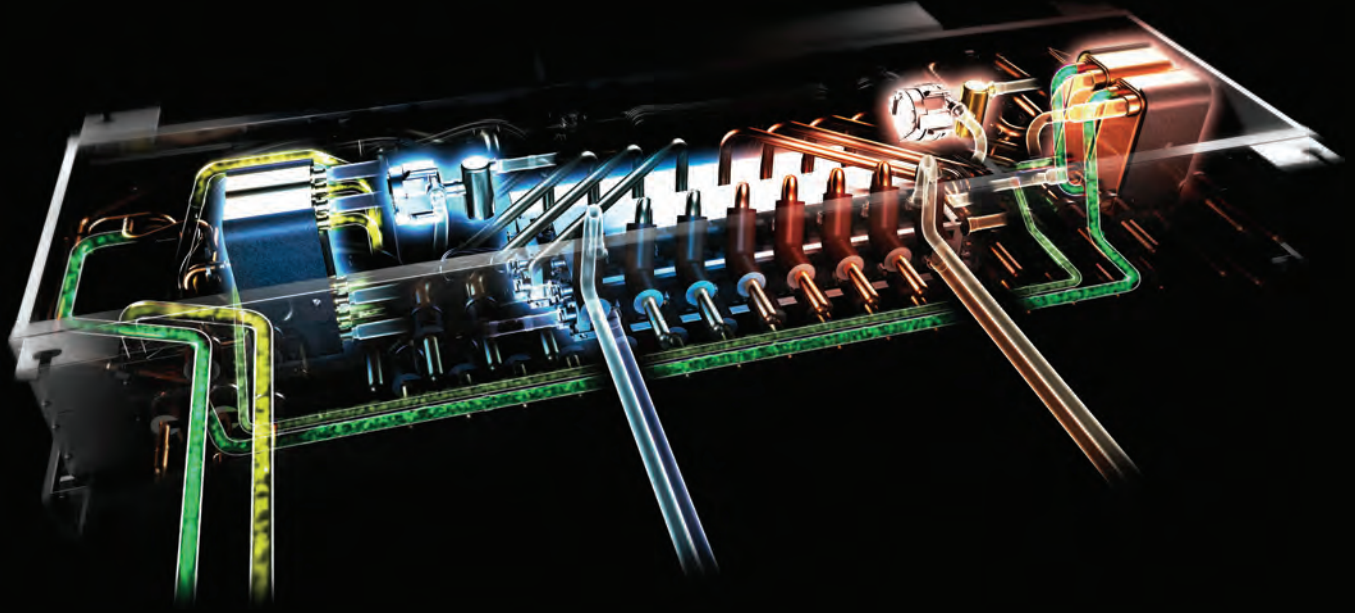


inside and out.

Introducing Trane®/ Mitsubishi Electric HVRF

The world's first Hybrid Variable Refrigerant Flow (HVRF) system heats and cools simultaneously without the need for refrigerant in indoor spaces, instead replacing it with water between the Hybrid Branch Circuit (HBC) Controller and indoor units. HVRF is a truly integrated modern heating and cooling solution for multi-zone commercial spaces. The system is specifically designed to provide quiet, energy-efficient, simultaneous heating and cooling in occupied spaces.

HVRF is quick, easy, and flexible to design and install using the same outdoor equipment and control solutions as other CITY MULTI® VRF systems. Furthermore, HVRF's system architecture makes phased installation and expansion possible, while maintaining the high levels of seasonal efficiency expected with VRF technology.



The heart of Trane®/ Mitsubishi Electric HVRF

The key to the HVRF system is the Hybrid Branch Circuit (HBC) Controller.

The HVRF exchanges heat between refrigerant and water using our unique HBC Controller, reducing the overall refrigerant charge in the system, and keeping the piping in the indoor space refrigerant-free. Air-source or water-source heat pump heat recovery units connect to the HBC Controller by a two-pipe refrigerant system, allowing for simultaneous heating and cooling in the same way as it does with a VRF system.

The Main HBC Controller supplies both cold water and hot water to the refrigerant-free Sub-HBC Controller, which then feeds the water to up to 16 connected zones, making HVRF a perfect solution for any size building.

Every Main HBC Controller can accommodate up to 10 tons of nominal system capacity. Sub-HBC Controllers can be added to each Main HBC Controller when additional zoning is required.

Inside the HBC Controller

Standard packaged controls contained within the HBC Controller provide the ability to actively reset cold water and hot water temperatures at each indoor unit. This allows for milder off-coil temperatures in shoulder seasons, which helps prevent an uncomfortable “cold blow” experience. Using hydronic indoor units can reduce noise during transitions and reduce defrost time by up to 50% through the use of heat recovered from the hydronic loop.

Each heat exchanger has two **DC inverter-driven water pumps**, used to control water flow and temperature to each indoor unit in conjunction with a modulating flow control valve per branch port.

The **control panel** controls all internal devices within each HBC and communicates with outdoor and indoor units.

The **air purge valves** are utilized during the commissioning procedure to remove air from the system.

The **reversing valves** in the HBC Controller allow the system to operate in heating, cooling, and mixed modes, providing the ability for heat recovery within the system.

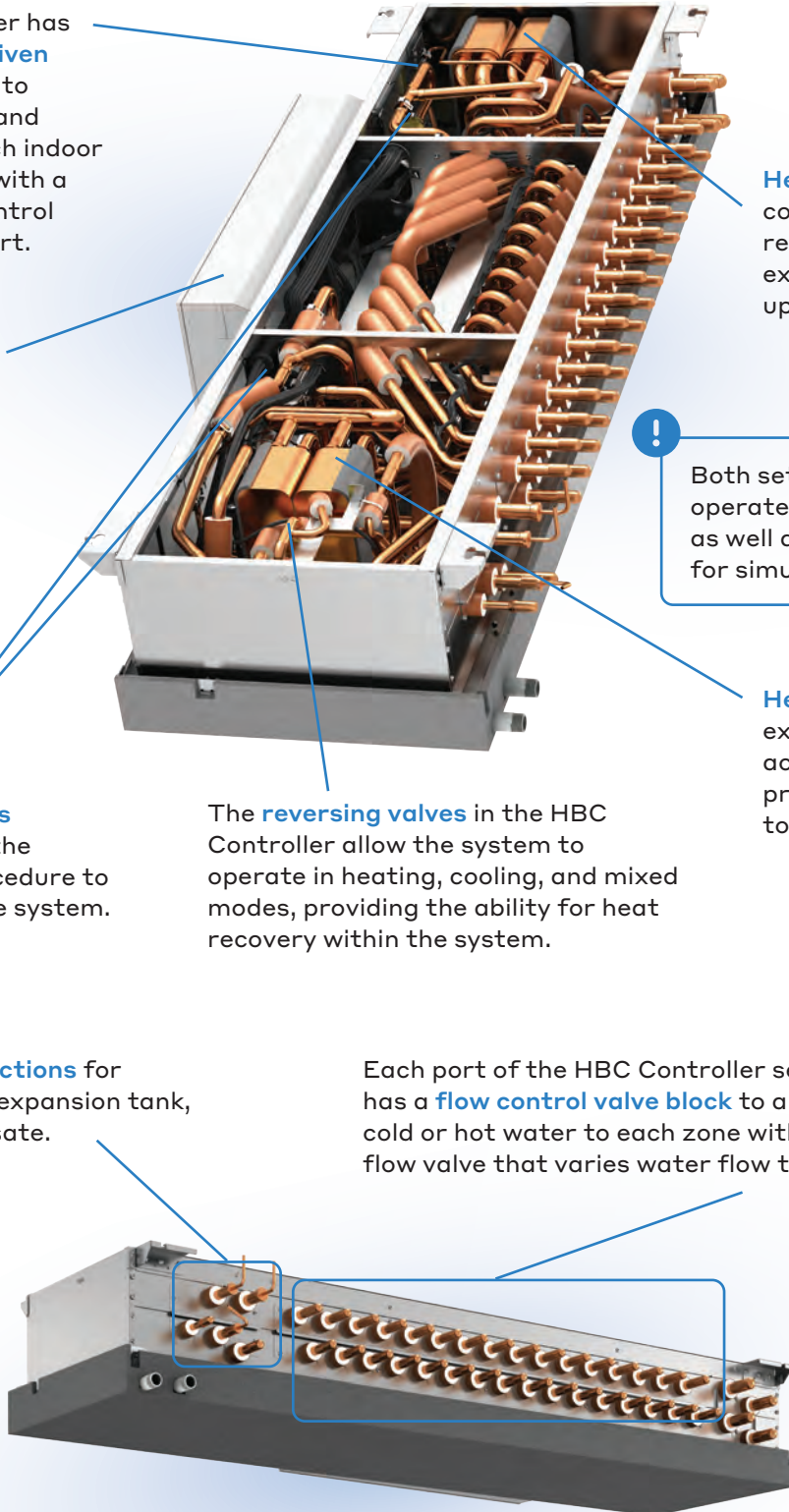
Hex-heating heats water by condensing a hot gas-state refrigerant across the heat exchanger to provide water up to 140°F to indoor units.

Both sets of heat exchangers can operate in cooling or heating modes, as well as a mixed mode which allows for simultaneous operation.

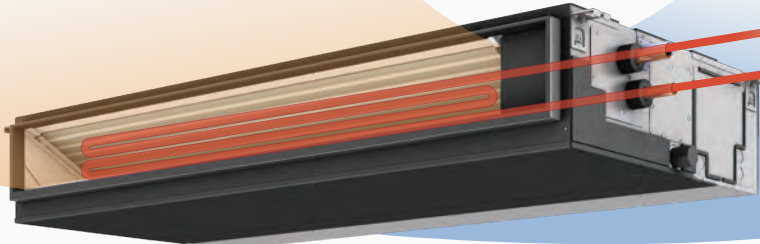
Hex-cooling cools water by expanding a liquid refrigerant across the heat exchanger to provide water as low as 41°F to indoor units.

Easy-access connections for refrigerant piping, expansion tank, fill line and condensate.

Each port of the HBC Controller serving an individual zone has a **flow control valve block** to allow it to send and return cold or hot water to each zone with an integrated modulating flow valve that varies water flow to each indoor zone.



Simultaneous hydronic heating and cooling



HVRF creates a refrigerant-free closed loop to heat and cool occupied spaces.

Modulating hot or chilled water flow from an HBC Controller to indoor units heats or cools every space to maintain exceptional comfort.

Heated or chilled water flows from the heat exchangers through a 3-way valve block to allow for use in any zone. The system is designed for a low delta-T water design with active water temperature reset for effective seasonal comfort.

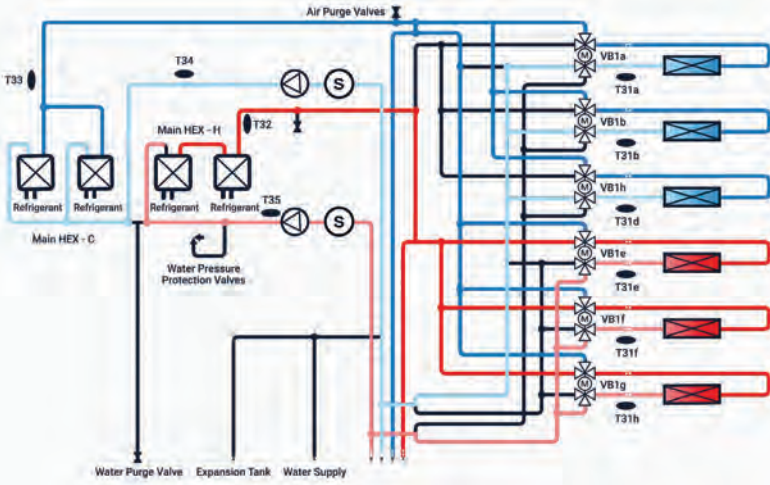


Illustration represents six indoor units. HBCs can support up to 16 independent zones.

CITY MULTI® VRF technology

CITY MULTI VRF heat pumps are designed with advanced components that work together to optimize performance and efficiency in any climate.



The **INVERTER compressor** varies the amount of circulating refrigerant by constantly adjusting the operating frequency based on the system's loading.



Reversing valves allow the system to reverse the refrigerant flow and use indoor heat exchangers to discharge heat while the outdoor heat exchanger absorbs heat from ambient air.



The **variable speed fan** operates at the exact speed required to achieve the best possible balance of heat exchange and efficiency.



Outdoor units

HVRF uses N-Generation high efficiency R2 air-cooled 6–14-ton units and L-Generation WR2 water-cooled 6–14-ton units.

The N-Generation high efficiency models use our unique all-aluminum HexiCoil design to reduce refrigerant charge in the outdoor condensing unit, making them the perfect fit for HVRF systems.

Indoor units

HVRF technology is currently available with our new hydronic medium static ducted, ceiling cassettes, and wall-mounted indoor unit options.

Each indoor unit can be controlled centrally or individually.



Scan here to see all compatible indoor and outdoor units and accessories.

Applications

HVRF systems allow for a flexible layout, making installation simple. With centralized controls, HVRF can be utilized in a wide variety of applications that require individual space comfort settings. Electrification of these spaces is valuable for the future of sustainable heating and cooling.



Multifamily

HVRF provides a quiet and efficient system option for multifamily buildings and allows for easier compliance with ASHRAE Standard 15 / 34 refrigerant codes, as there is no refrigerant in the occupied indoor spaces.

Mixed-use and office space

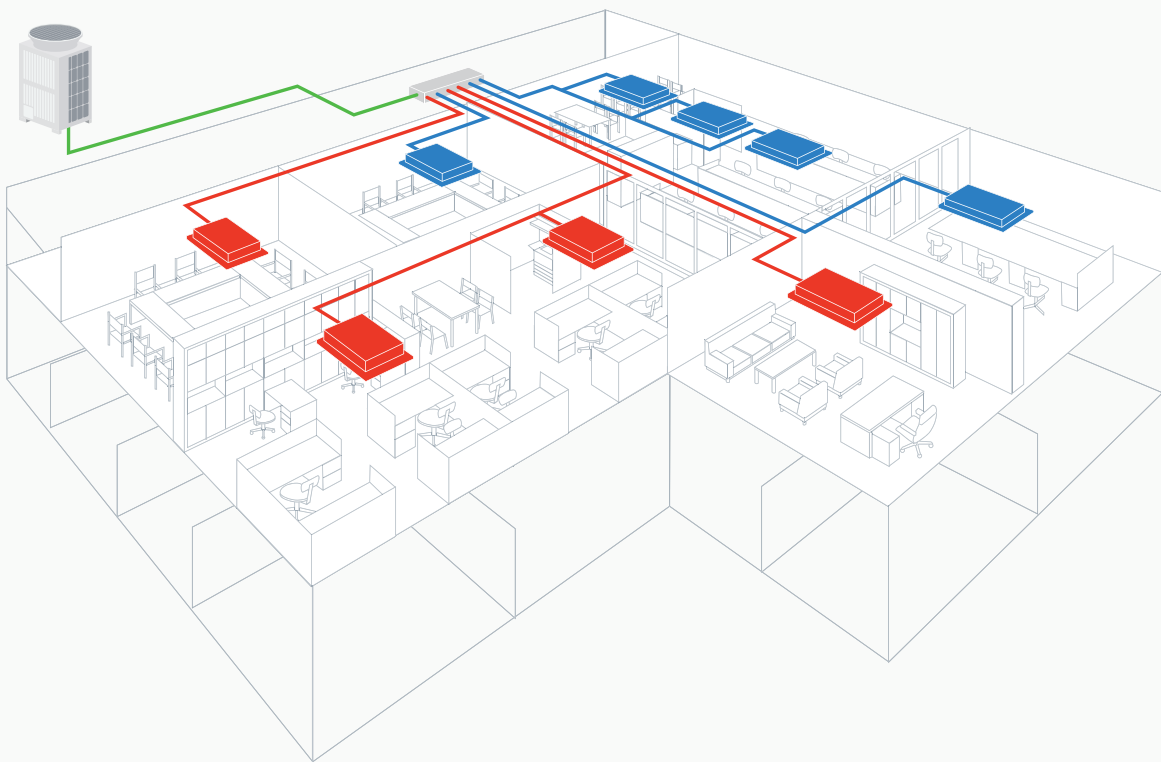
As we look for ways to reduce greenhouse gas production in crowded city centers, more mixed-use properties are being developed with sustainability in mind. HVRF provides a fully adaptable solution for optimum performance and a reduced carbon footprint.

Hospitality

Modern commercial hotel buildings need heating and air-conditioning systems that provide the highest levels of comfort, air quality, and energy efficiency. Individual control zones give your guests full comfort control.

Scalable design, affordable installation

A small footprint and modular design means building owners can take advantage of a manageable phased installation.



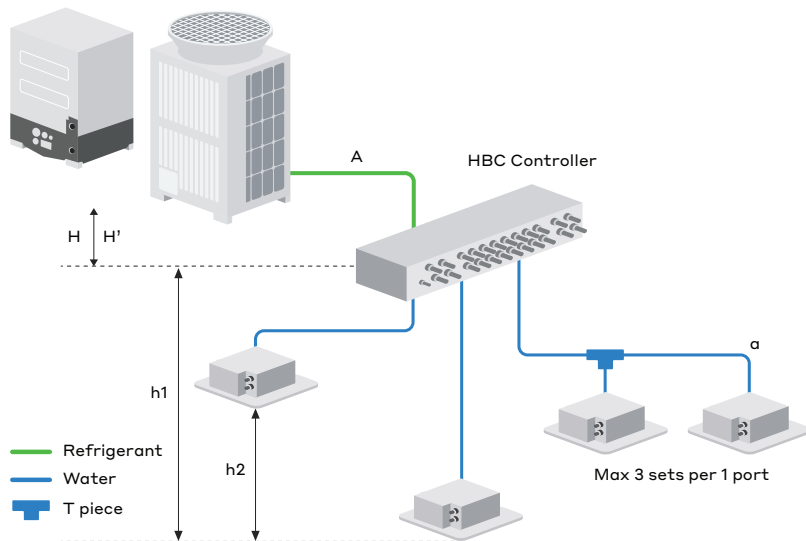
Reduced refrigerant and materials equals reduced cost.

Save on installation cost and labor by eliminating refrigeration work between the HBC Controller and HVRF indoor units. HVRF allows for traditional copper water piping or Multi-layer composite piping to be used between the HBC Controller and HVRF indoor units.

Our unique 2-pipe heat recovery system requires less piping than a 4-pipe chiller system. In addition, the system does not require an external pump, valves, sensors, actuators, or other ancillary controls associated with conventional 4-pipe chiller systems.

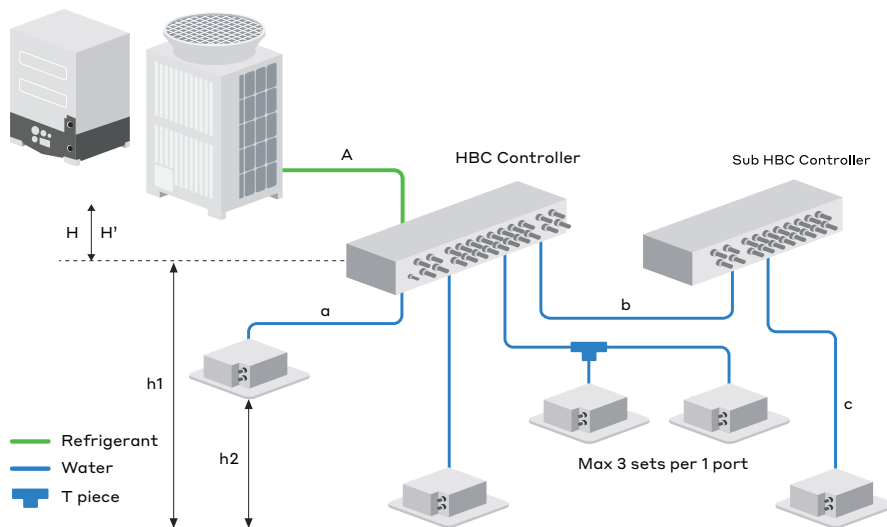
Piping allowances

1 Main HBC Controller



- A** Between OU and main HBC: 370ft. max length
- a** Length between furthest IU and main HBC: 196ft. max length
- H** Height between OU and main HBC (OU above main HBC): 370ft. max elevation difference
- H'** Height between OU and main HBC (OU below main HBC): 196ft. max elevation difference
- h1** Height between IU and main HBC: 49ft. max length
- h2** Height between IU and IU: 49ft. max length

1 Main HBC Controller and 1 Sub HBC Controller



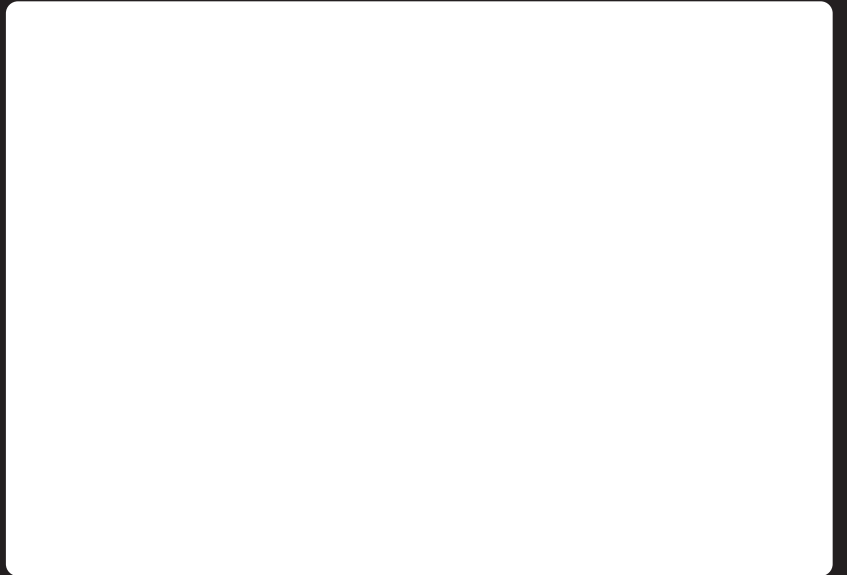
- A** Between OU and main HBC: 370ft. max length
- a** Length between furthest IU and main HBC: 196ft. max length
- b** Length between Sub HBC Controller and main HBC: 196ft. max length
- c** Length between furthest IU and Sub HBC Controller: 196ft. max length
- H** Height between OU and main HBC (OU above main HBC): 370ft. max elevation difference
- H'** Height between OU and main HBC (OU below main HBC): 196ft. max elevation difference
- h1** Height between IU and main HBC: 49ft. max length
- h2** Height between IU and IU: 49ft. max length



Designed for life,
inside and out.



Scan to learn
about HVRF



**MITSUBISHI ELECTRIC
TRANE HVAC US**

©2024 Mitsubishi Electric Trane HVAC US LLC. All rights reserved.

Mitsubishi Electric, Lossnay, and the three-diamond logo are trademarks of Mitsubishi Electric Corporation. CITY MULTI and HVRF are registered trademarks of Mitsubishi Electric US, Inc. All other product names mentioned herein are trademarks or registered trademarks of their respective owners.

Specifications shown in this brochure are subject to change without notice. See complete warranty for terms, conditions and limitations. A copy is available from Mitsubishi Electric Trane HVAC US LLC.

Printed in the USA

VRF-SLB046-EN
05/13/2024