



Heating and Cooling

# HYBRID

CITY MULTI

R2-Series R410A



Refrigerant  
and  
**Water**

Sustainable  
**Heat  
Pump**





# The industry's first and only Hybrid VRF technology

As a leading company in the industry, Mitsubishi Electric has developed the HYBRID VRF CITY MULTI as a top-of-the-line CITY MULTI system by using the industry's first and only hybrid VRF technology.

The HYBRID VRF CITY MULTI is the industry's first system to use refrigerant between the outdoor unit and the Hybrid Branch Circuit Controller (HBC controller) and water between the HBC controller and the indoor units. The HBC controller is the most unique part of this system that allows heat exchange between refrigerant and water.

The HYBRID VRF CITY MULTI System uses Mitsubishi Electric's original VRF technology and is suitable for a wide variety of installations by allowing centralized control, individual operation, and simultaneous heating and cooling with heat recovery.



**HYBRID**  
CITY MULTI

**R2-Series**



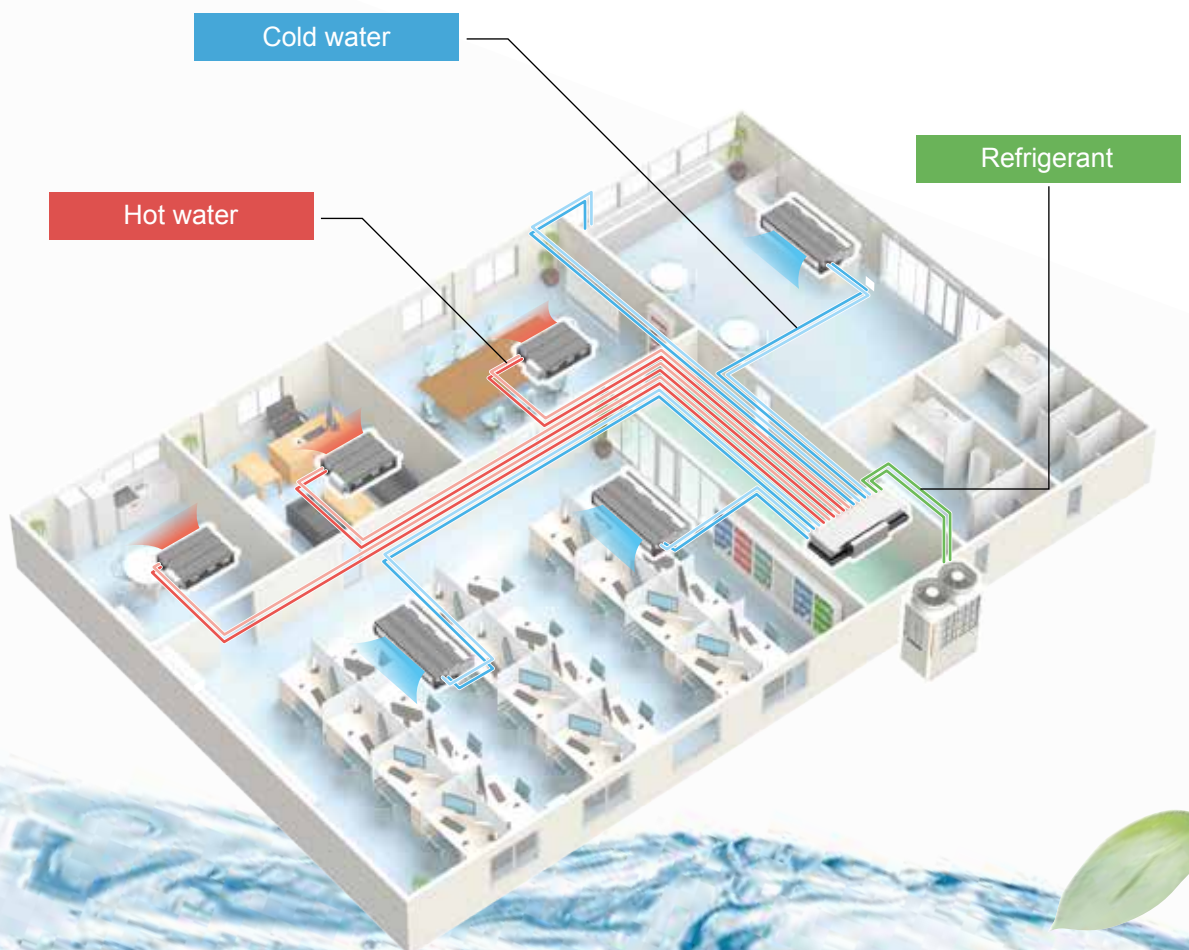
## Hybrid System using water and refrigerant

1. No refrigerant in occupied zones
2. Smaller system refrigerant volume



## Packaged System with Mitsubishi Electric products

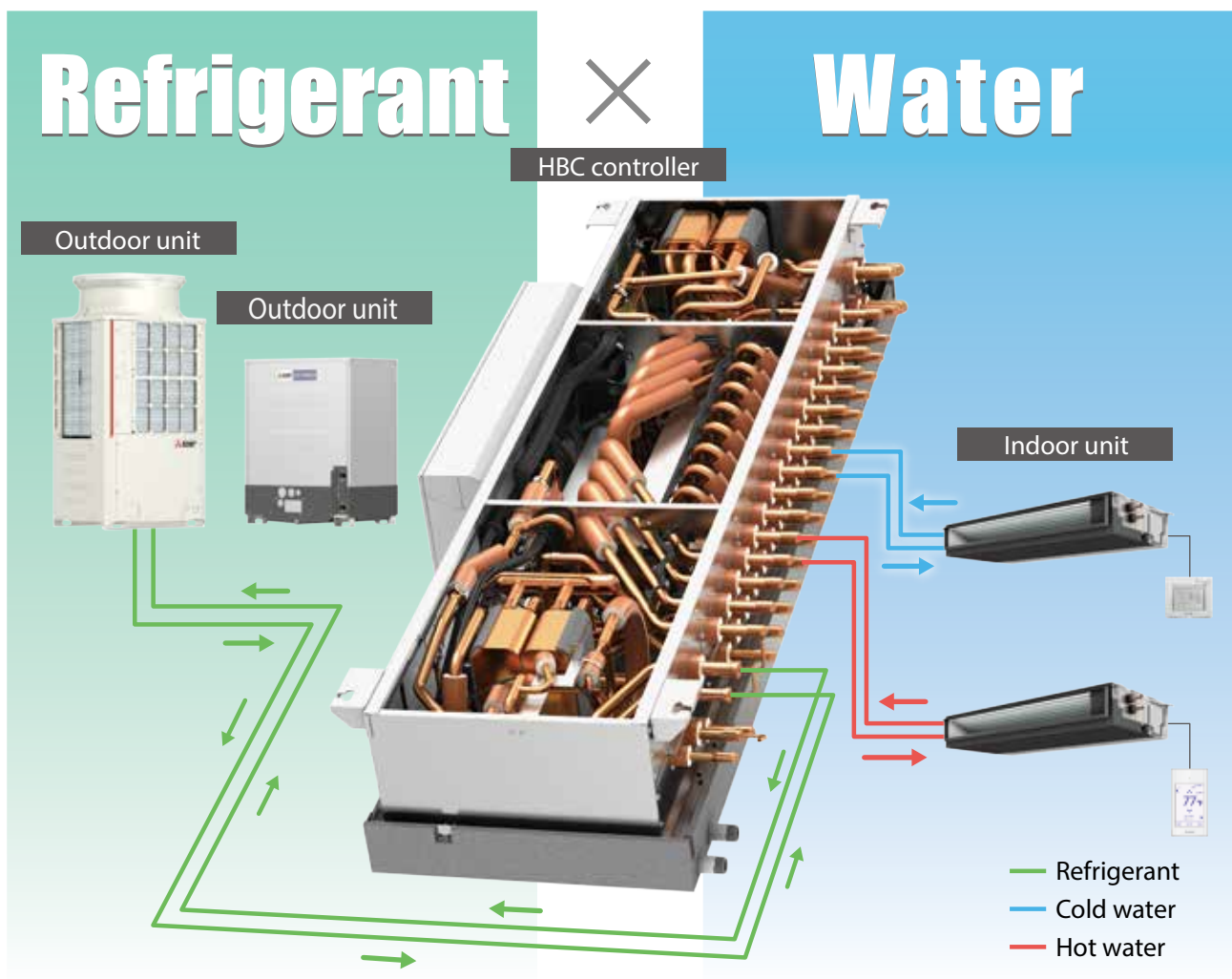
3. Simultaneous heating and cooling operation with a 2-pipe system
4. High energy efficiency through heat recovery
5. Easy control through M-NET





# HYBRID

## CITY MULTI R2-Series



### Outdoor Units

Two types of series, air cooled and water cooled, connectable line-up of 6 to 14 ton single module.



Air Source unit



Water Source unit

### HBC controller



The HBC Controller features 8 and 16 ports. The Sub HBC Controller connects with additional indoor units.

### Indoor unit

Indoor units fit the size of room and its usage.



Ceiling concealed

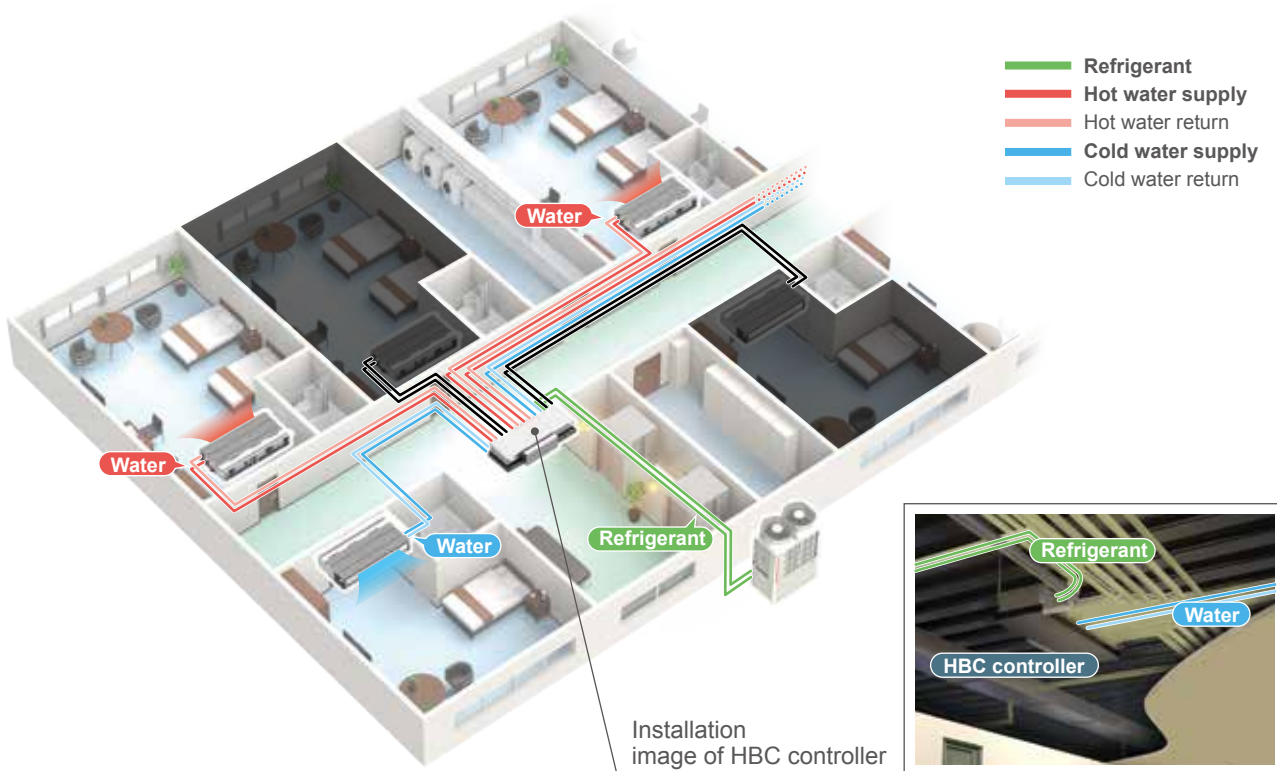
# Benefits of HVRF

## Hybrid system using water and refrigerant

### 1. Limits the area of the piping where refrigerant is used

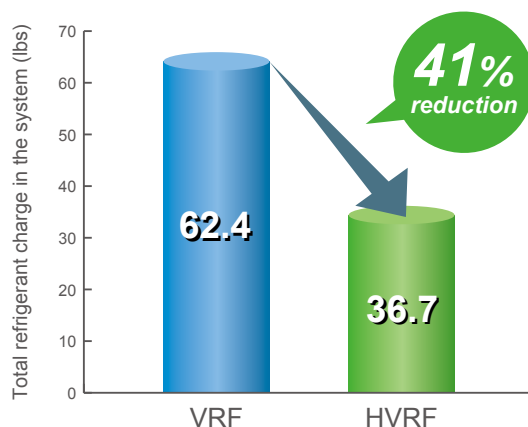
Since the refrigerant does not flow between the HBC controller and indoor units, it can limit the use of refrigerant to the outdoor side and keep the piping in the indoor space refrigerant-free.

\*Please refer to installation manual according to HBC controller installation.



### 2. Smaller system refrigerant volume

The hybrid system requires less refrigerant compared to the standard VRF system.



#### ► CASE STUDY

|  | VRF R410A<br><TNU> | HVRF R410A<br><TNU> |
|--|--------------------|---------------------|
| Total refrigerant piping length (feet) | 850                | 131                 |
| Refrigerant volume                     | 62.4               | 36.7                |

\*Simulation condition

Application image: Hotel (20 rooms/same size)

Outdoor unit: 10 ton x 1, Indoor unit: P08 (2.3 kW) x 20

VRF: BC controller 16 ports + 8 ports sub

HVRF: HBC controller 16 ports + 8 ports sub

Total refrigerant piping length: 850 ft (VRF), 131 ft (HVRF)

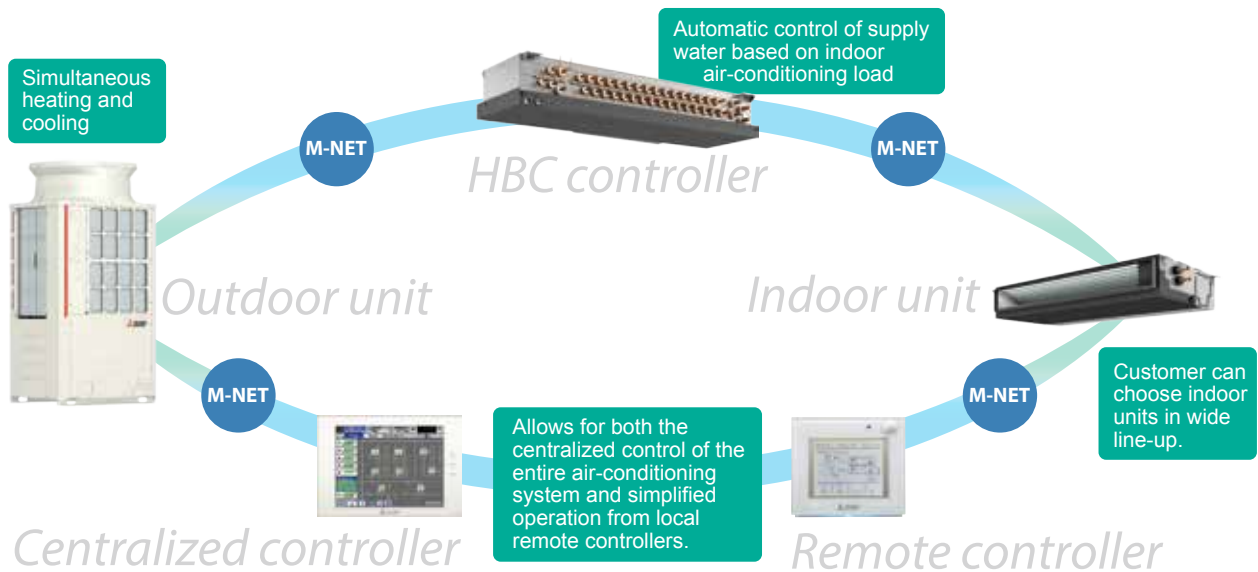
Piping length from outdoor unit to BC controller: 131 ft (VRF/HVRF)

41% reduction

# Benefits of HVRF

## Packaged system with Mitsubishi Electric products

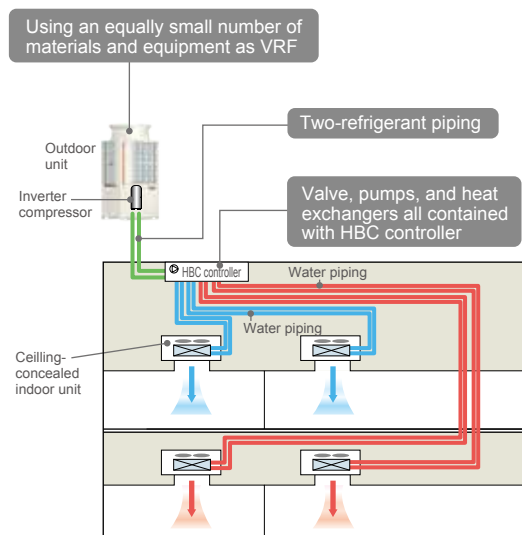
Outdoor units, HBC controller, indoor units, and remote controllers are offered as a package which facilitates design work. Furthermore, connecting M-NET wiring to each other allows optimum control of the whole system to satisfy the zones load precisely.



### 3. Simultaneous heating and cooling operation with a 2-pipe system

HVRF is a 2-pipe system requiring less piping compared to a 4-pipe system. It needs fewer key components to be installed because components such as the pumps, heat exchanger, and valves are incorporated into the HBC controller.

#### 2-pipe heat recovery system





#### 4. High energy efficiency through heat recovery

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The system efficiency is at peak when the ratio of heating and cooling is 50:50 because of dynamic heat recovery.

#### 5. Easy control through M-NET

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HVRF can provide individual control by indoor unit or by zone with the integration of Mitsubishi Electric's MELANS control system. Whether by local controller or centralized controller, heating and cooling can be monitored and operated remotely.

|   |  |
|---|--|
| <b>Individual control<br/>of indoor units</b>       | A suitable remote controller can be selected according to zone application.                            |
| <b>Centralized control<br/>of the entire system</b> | System controller can be connected to multiple indoor units for centralized monitoring and management. |

# Application example

Our unique HVRF system is compatible with a wide range of applications just like the standard VRF systems are. Since its release in European countries in 2012, it has received great reviews by many customers and has won several awards. The adoption of HVRF, which is packed with our unique technology, is increasing year by year.



## 01 Hotels & Residences

### COMFORT

In hotels, offering a comfortable environment throughout the building is imperative to the guests' hotel experience. The HYBRID VRF CITY MULTI system provides comfort with a gradual rate of change of temperature within the air conditioned space delivering a comfortable and stable environment. It also features individual control while delivering heating and cooling simultaneously.

### LESS REFRIGERANT

Whats more, with the HYBRID VRF CITY MULTI system, refrigerant is only used in the outdoor unit, and occupant spaces are free of refrigerant. This helps hotels comply with refrigerant regulations.



## 02 Offices

### COMFORT

Offices can be a comfortable place with independently controlled zones. The HYBRID VRF CITY MULTI system provides a gradual change of temperature for greater comfort, minimizes drafts and operates at a low sound level.

### EASE of INSTALLATION and MAINTENANCE

The HYBRID VRF CITY MULTI system installation is as easy as the standard VRF system, and adaptable with flexible layouts and system integration of the MELANS control. Compared to a conventional 4-pipe system, it requires less space, and maintenance is easier with less piping and fewer key components.





## 03 Education Facilities

### **COMFORT**

Having an optimal environment is mandatory for concentration and learning. The HYBRID VRF CITY MULTI system provides a gradual rate of change of temperature within the air conditioned space delivering a comfortable and stable environment for greater comfort with fewer drafts and a low sound level.

### **LESS REFRIGERANT**

Educational facilities contain many smaller spaces. HYBRID VRF CITY MULTI provides a solution that complies with refrigerant regulations by not using refrigerant in occupant spaces and eliminating the need for leak detection.



## 04 Hospital & Healthcare Facilities

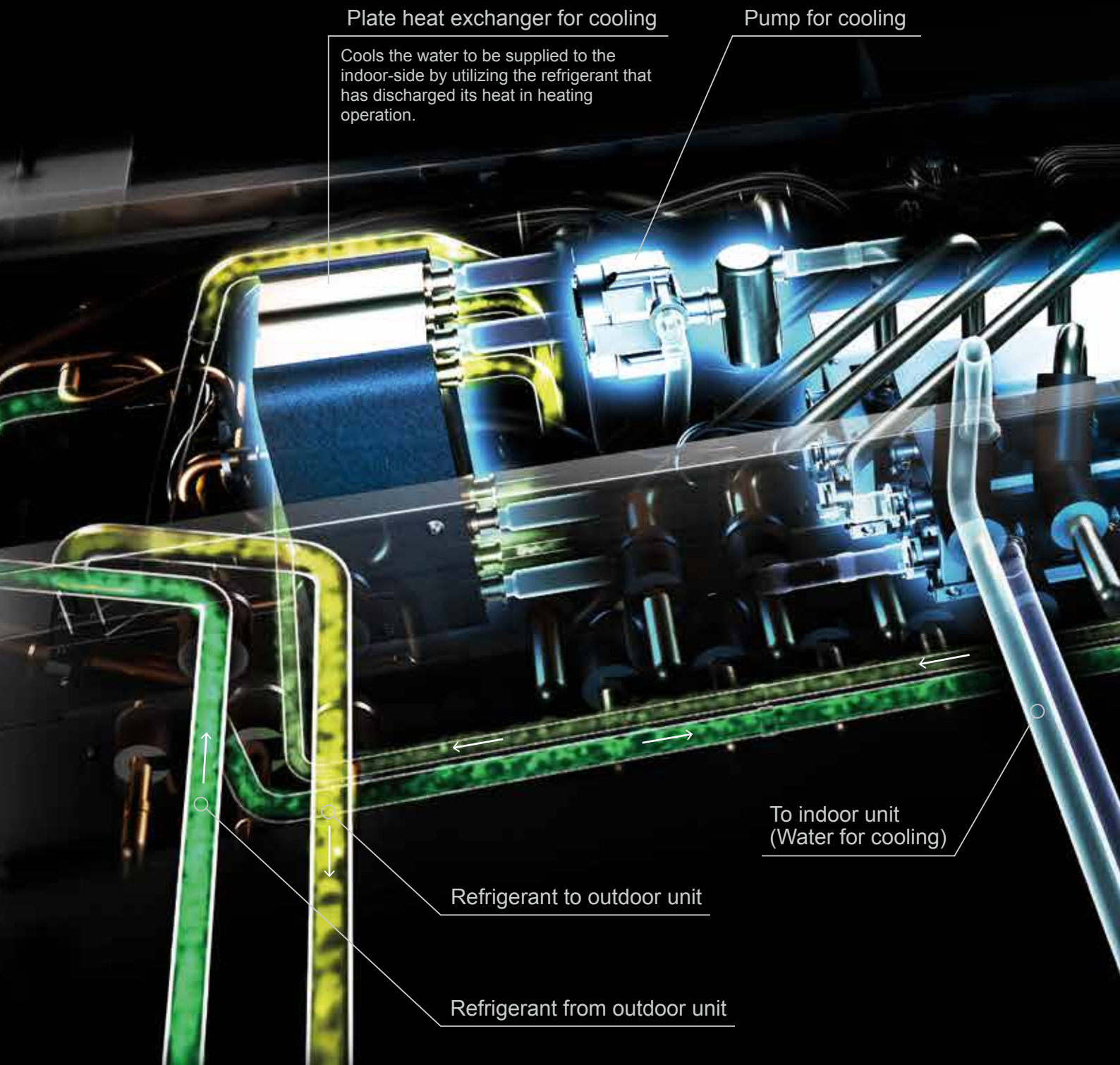
### **COMFORT**

Having individual comfort control is important in order for patients and residents in a hospital or healthcare facility to experience optimal comfort, whether over a short or long term period.

### **LESS REFRIGERANT**

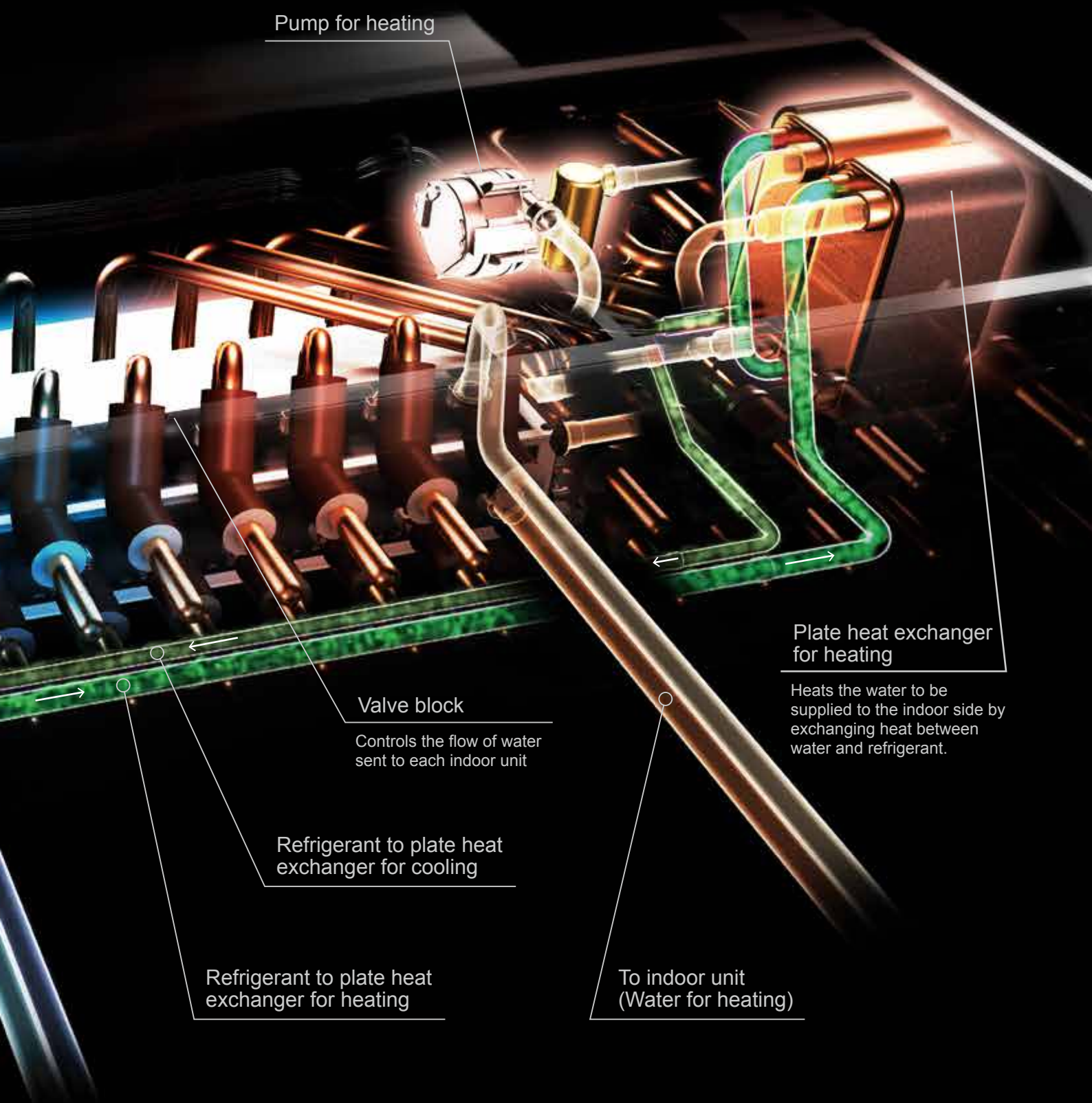
Consultation rooms are often small in size and airtight which require the use of door grilles or other means to mitigate the danger of a possible VRF refrigerant leak exposure. With the HYBRID VRF CITY MULTI system, refrigerant is not used in the occupied space. The concerns of refrigerant concentration are relieved and the need of a leak detection is negated.

## Hydro Branch Circuit Controller (During simultaneous heating and cooling operation)



**Our unique Hybrid VRF system with HBC controller that exchanges heat between water and refrigerant**





## Two series of outdoor units up to 14 ton



### Air Source Unit

PURY-(E)P-TYNU-A  
PURY-P-ZKMU-A  
(6-14 ton)



### Water Source Unit

PQRY-P-TYLMU-A1  
PQRY-P-ZLMU-A1  
(6-14 ton)

R410A-compatible outdoor units are available in two line-ups: The air-cooled PURY-Series and the water-cooled PQRY-Series. Each series has a line-up of between 6 and 14 ton.

# Revolutionary technology

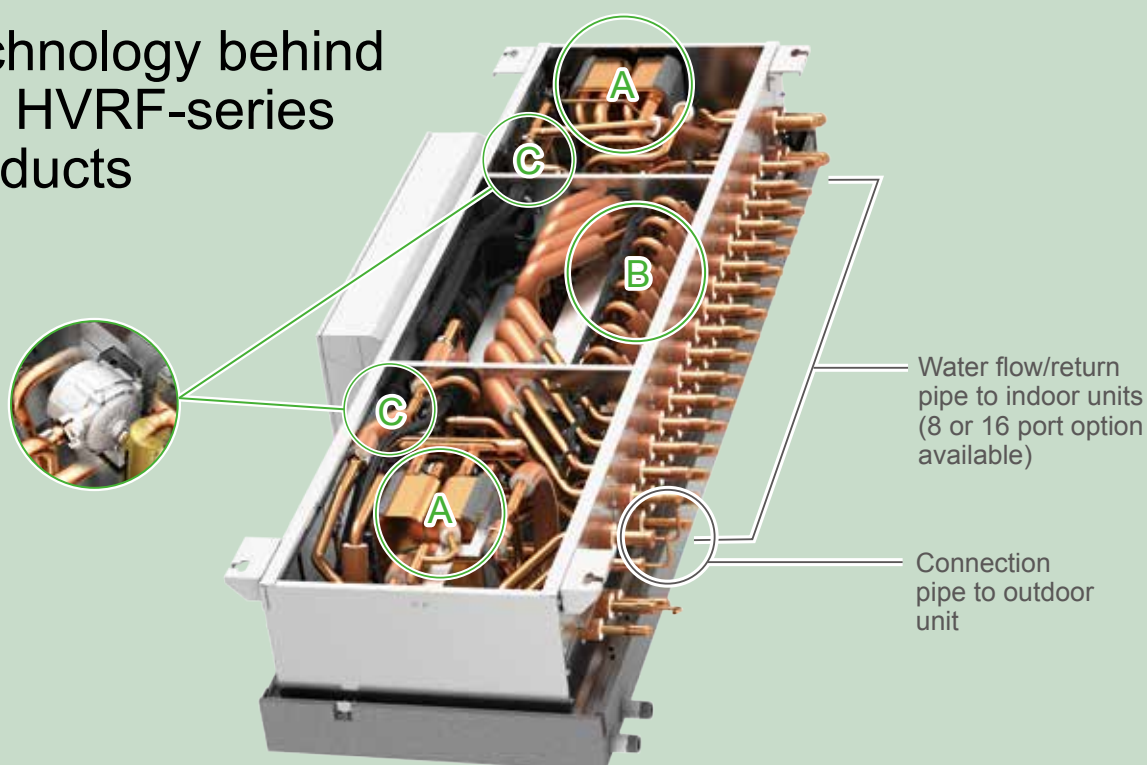
## The HBC Controller plays a key part in HVRF

The HBC controller plays a key role in heat exchange between water and refrigerant. We have a line-up of 8-branch and 16-branch HBC Controllers. By connecting the Sub HBC controller, the number of connectable indoor units can be increased.



HYBRID VRF CITY MULTI uses water in the indoor unit side. Refrigerant is circulated in the limited sections in the outdoor unit side.

### Technology behind our HVRF-series products



A

#### Plate Heat Exchanger

The HBC controller has two plate heat exchangers inside. The heat exchange is performed between the refrigerant from outdoor units and water from indoor units inside the HBC controller. During simultaneous heating/cooling, one is used for heating and the other is used for cooling.

B

#### Valve Block

A valve block serves as a pathway that connects indoor units and the HBC controller. It distributes water from the indoor unit side to the plate heat exchanger, and then leads the heat-exchanged water back to the indoor unit side. Two types of HBC controllers are available: One with 8 ports and the other with 16 ports to accommodate a different number of indoor units.

C

#### Pump

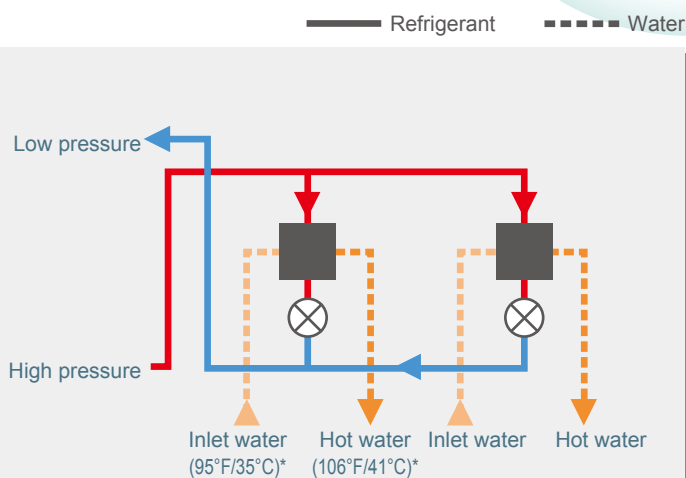
Each heat exchanger has a DC inverter-driven water pump, one of the crucial components for controlling water flow to the indoor units in the system.



## Heating operation

To produce hot water for heating operation, water from indoor unit is heated by heat exchange with high temperature, high-pressure refrigerant gas inside the plate heat exchanger.

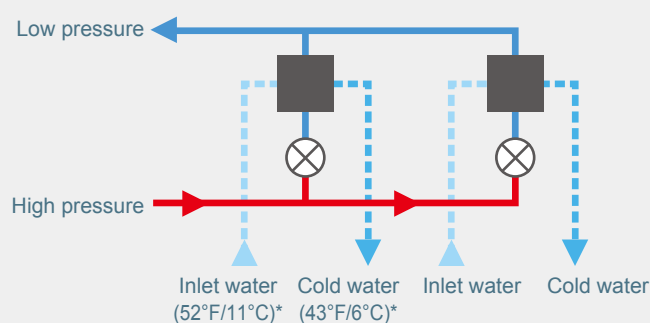
■ Plate heat exchanger    ⊗ Expansion valve



## Cooling operation

To produce cold water for cooling operation, water from the indoor unit is chilled by heat exchange with low-pressure refrigerant inside the plate heat exchanger.

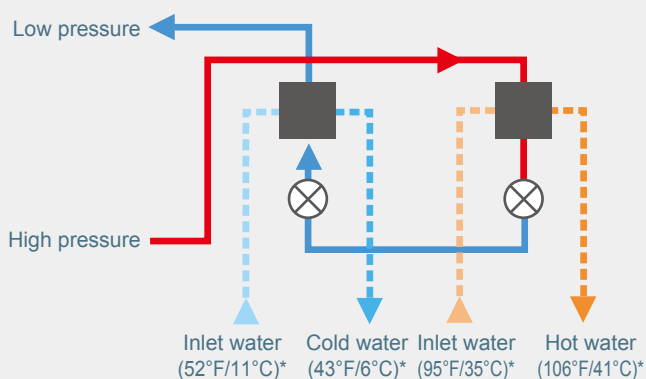
■ Plate heat exchanger    ⊗ Expansion valve



## Simultaneous heating and cooling operation

First, water from the indoor unit is heated by heat exchange with high-temperature, high-pressure refrigerant gas inside the plate heat exchanger for heating operation. Refrigerant gas is changed to low-pressure liquid refrigerant after passing through the expansion valve. Then, heat exchange is performed between the refrigerant and water from the indoor unit inside the other plate heat exchanger. Chilled water is used for cooling operation.

■ Plate heat exchanger    ⊗ Expansion valve



\*Water-temperatures provided are referential values. Water temperatures vary with operating conditions.

# Installation image

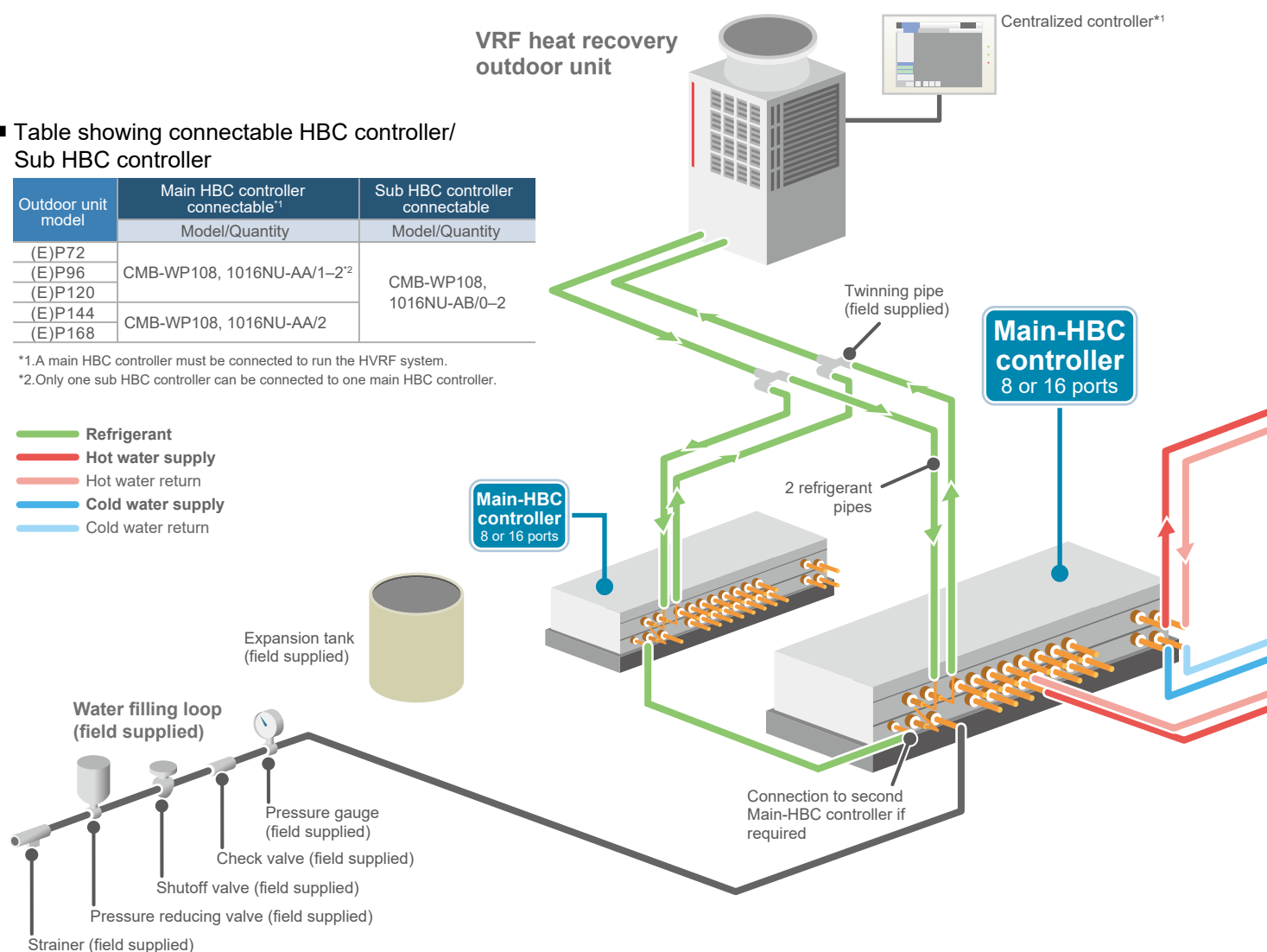
## ■ Table showing connectable HBC controller/ Sub HBC controller

| Outdoor unit model | Main HBC controller connectable <sup>*1</sup> | Sub HBC controller connectable |
|--------------------|---|--------------------------------|
|                    | Model/Quantity                                | Model/Quantity                 |
| (E)P72             | CMB-WP108, 1016NU-AA/1-2 <sup>*2</sup>        | CMB-WP108, 1016NU-AB/0-2       |
| (E)P96             |   |                                |
| (E)P120            |   |                                |
| (E)P144            |   |                                |
| (E)P168            | CMB-WP108, 1016NU-AA/2                        |                                |

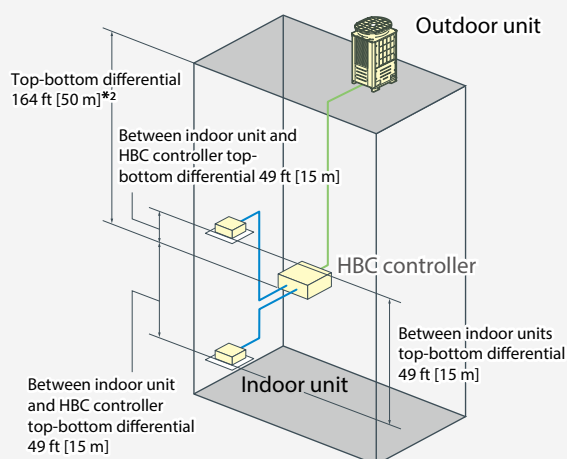
\*1. A main HBC controller must be connected to run the HVRF system.

\*2. Only one sub HBC controller can be connected to one main HBC controller.

- Refrigerant
- Hot water supply
- Hot water return
- Cold water supply
- Cold water return



## • Piping length



R : Refrigerant Pipe W : Water Pipe

### Refrigerant Piping Lengths Maximum feet [meters]

- R Distance between outdoor and HBC controller 360 [110]
- W Farthest indoor from HBC controller 196 [60]

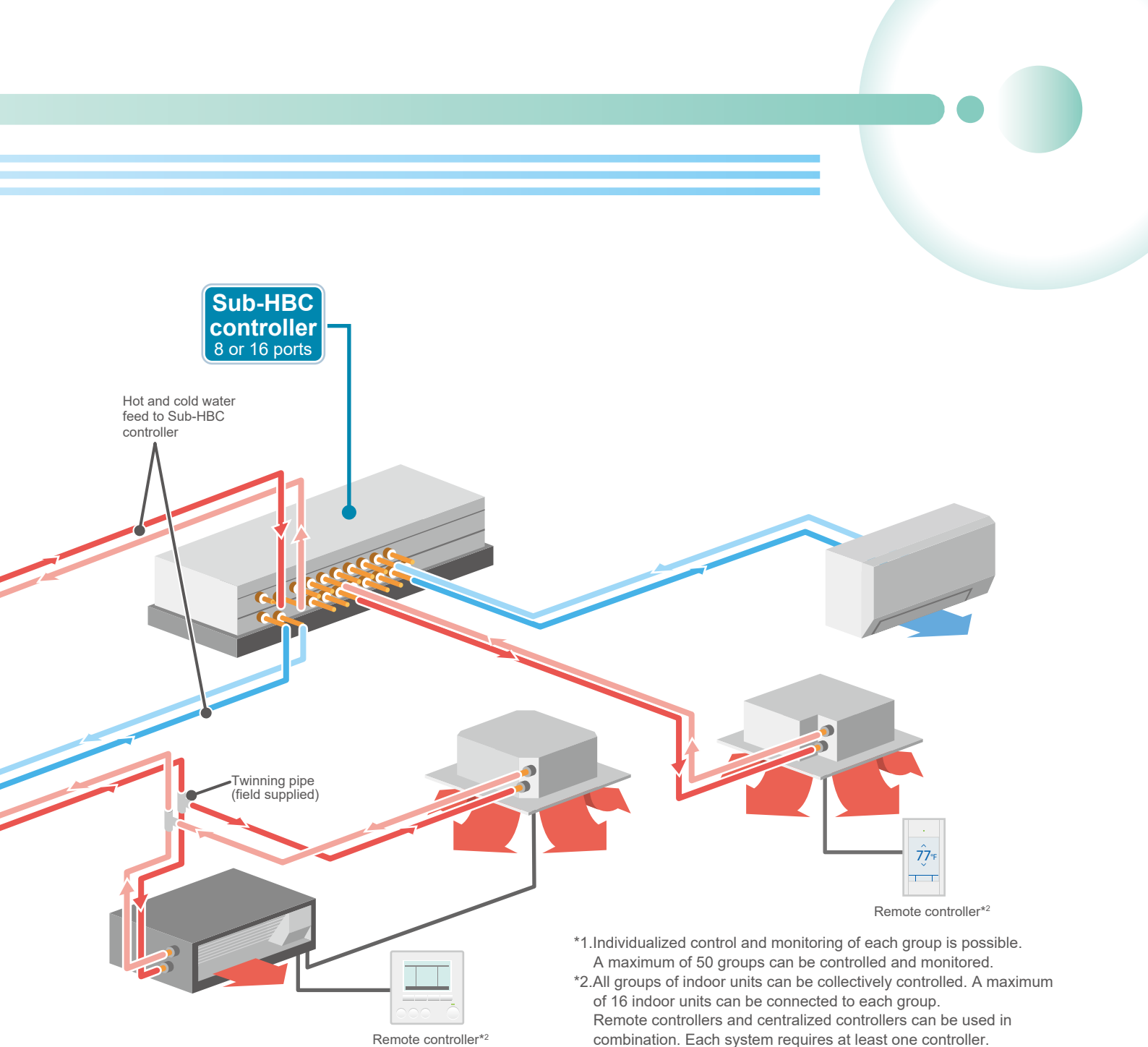
### Vertical differentials between units Maximum feet [meters]

- R HBC controller/outdoor (outdoor unit above HBC controller) 164 [50]\*2
- R HBC controller/outdoor (outdoor unit below HBC controller) 131 [40]\*3
- W Indoor/HBC controller 49 (32) [15 (10)]\*1
- W Indoor/indoor 49 (32) [15 (10)]\*1
- R HBC controller/HBC controller 49 (32) [15 (10)]\*1

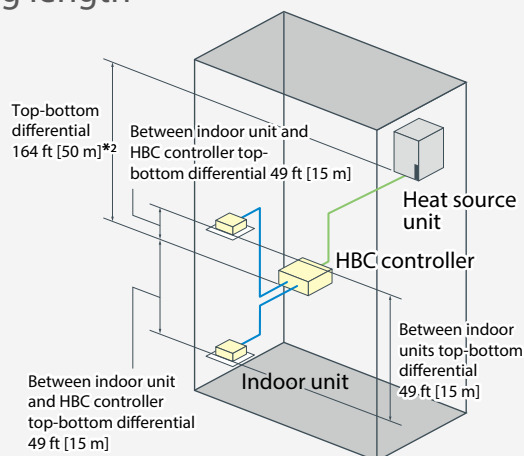
\*1. Values in ( ) are applied when indoor total capacity exceeds 130% of outdoor unit capacity.

\*2. 90 m is available depending on the model and installation conditions. For more detailed information, contact your local distributor.

\*3. 60 m is available depending on the model and installation conditions. For more detailed information, contact your local distributor.



## • Piping length



**R** : Refrigerant Pipe **W** : Water Pipe

### Refrigerant Piping Lengths Maximum feet [meters]

|  |           |
|--|-----------|
| <b>R</b> Distance between heat source and HBC controller | 360 [110] |
| <b>W</b> Farthest indoor from HBC controller             | 196 [60]  |

### Vertical differentials between units Maximum feet [meters]

|   |                     |
|---|---------------------|
| <b>R</b> HBC controller/heat source (heat source unit above HBC controller) | 164 [50]*2          |
| <b>R</b> HBC controller/heat source (heat source unit below HBC controller) | 131 [40]*3          |
| <b>W</b> Indoor/HBC controller  | 49 (32) [15 (10)]*1 |
| <b>W</b> Indoor/indoor  | 49 (32) [15 (10)]*1 |
| <b>R</b> HBC controller/HBC controller                                      | 49 (32) [15 (10)]*1 |

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# Line-up

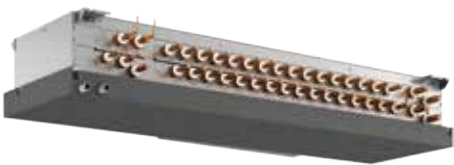


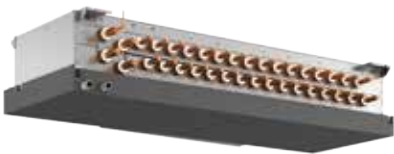


\*Please refer to the DATA BOOK for specifications.

## ■ Outdoor Units












| System       | Model Name      |                  | Model   | 6 ton | 8 ton | 10 ton | 12 ton | 14 ton |
|--------------|-----------------|------------------|---|-------|-------|--------|--------|--------|
|              |                 |                  |   | P72   | P96   | P120   | P144   | P168   |
| Air cooled   | Standard        | PURY-P T/YNU-A   |    <div>size S      size L      size XL</div>       | S     | L     | L      | L      | XL     |
|              |                 | PURY-P ZKMU-A    |    <div>size S      size L      size XL</div>    | S     | L     | XL     | XL     | —      |
|              | High Efficiency | PURY-EP T/YNU-A  |    <div>size S      size L      size XL</div> | S     | L     | L      | L      | XL     |
|              |                 |                  |   |       |       |        |        |        |
| Water cooled | Standard        | PQRY-P T/YLMU-A1 |   <div>size S      size L</div>   | S     | S     | S      | L      | L      |
|              |                 | PQRY-P ZLMU-A1   |   <div>size S      size L</div>   | S     | S     | S      | L      | L      |



## ■ HBC Controllers

|                     | Model Name                 | Model  | 8 ports   | 16 ports  |
|---------------------|----------------------------|--|---|---|
| Main-HBC controller | <b>CMB-WP108/1016NU-AA</b> |  |  |  |
| Sub-HBC controller  | <b>CMB-WP108/1016NU-AB</b> |  |  |  |

## ■ Indoor Units

| Type                                     | Model Name   | P06   | P08   | P12   | P15   | P18   | P24   | P27   | P30   | P36   | P48   |
|--|--|---|---|---|---|---|---|---|---|---|---|
| Ceiling concealed medium static pressure | <b>PEFY-WL NMAU-A</b><br> |  |  |  |  |  |  |  |  |  |  |

## A wide range of remote controller options for individual and centralized control

### • Centralized Remote Controller



AE-200A/AE-50A



EW-50A



TC-24B



PAC-YT40ANRA

### • Individual Remote Controller



PAR-U01MEDU



PAC-YT53CRAU



PAR-CT01MAU



PAR-40MAAU

Mitsubishi Electric also offers centralized controllers and individual remote controllers. Users can easily control units according to user needs. Depending on the heating and cooling need in the space, each indoor unit can be controlled individually, increasing efficiency of operation.

**⚠ Warning**

- Do not use refrigerant other than the type indicated in the manuals provided with the unit and on the nameplate.
  - Doing so may cause the unit or pipes to burst, or result in explosion or fire during use, repair, or at the time of disposal of the unit.
  - It may also be in violation of applicable laws.
  - MITSUBISHI ELECTRIC CORPORATION cannot be held responsible for malfunctions or accidents resulting from the use of the wrong type of refrigerant.
- Our air conditioning equipment and heat pumps contain a fluorinated greenhouse gas, R410A.

