



H O T E L



O F F I C E



R E S I D E N C E



CAHV-P500YA-HPB

# Mitsubishi Electric - Leading Manufacturer of Hot Water Heat Pump

Mitsubishi Electric has been designing and manufacturing commercial hot water heat pumps since 1970.

Mitsubishi Electric was one of the first manufacturers in Japan to utilize heat pump technology to provide hot water. We were also the first manufacturer to develop R407C products, which can supply hot water of up to 70°C, high enough to eliminate legionella bacteria.

We quickly rose to the forefront of hot water supply industry in Japan - a position we still enjoy today.

Our products are mainly used in commercial applications, such as hotels, hospitals, or nursing homes, which means our products are highly reliable. As a leading manufacturer of hot water supply industry, we proudly introduce our high efficient new Hot Water Heat Pump system.

## Case Study

Oil boiler had been previously installed for more than ten years, and had a frequent malfunction. When we built a new annex in 2005, we decided to renew the system. We first thought of the gas system; however, concerning safety and reliability, we decided to use the electric system. Up to today, we have been using Mitsubishi Electric's Hot Water Heat Pump for more than five years. No malfunction has occurred, and we are also satisfied with its safety.



- Application :** Nursing home
- Country :** Japan
- Work :** June, 2005
- Installation :** Hot water heat pump 20HP x 1  
\*Our previous model sold in Japan



**70°C**  
High temperature

**COP**  
Over 4\*

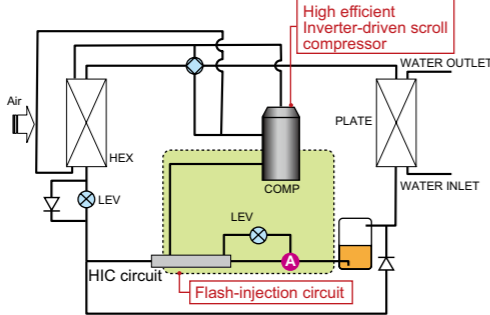
"Flash-injection Circuit", which is designed for our ZUBADAN CITY MULTI (air conditioning system for cold regions), is mounted in our new Hot Water Heat Pump. By utilizing our advanced "Flash-injection Circuit" and the latest high-efficient compressor, Hot Water Heat Pump is able to provide hot water of 70°C, and produces less capacity drop at low outdoor temperature.

\*COP 4.13  
Outdoor temp. 7°CDB/ 6°CWB  
Outlet water temp. 35°C

**Built-in Inverter-driven Scroll Compressor**



### Flash-injection Circuit



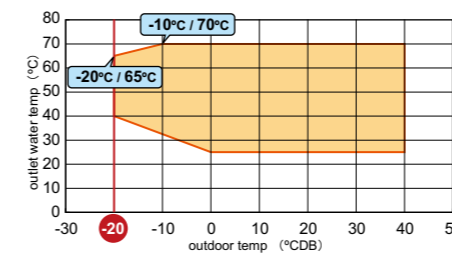
Two-phase refrigerant is separated into liquid refrigerant and gas refrigerant at the point of A. Liquid refrigerant, whose pressure is reduced by LEV (Linear Expansion Valve), exchanges heat in the HIC circuit and become gas-liquid two-phase refrigerant. The two-phase refrigerant flows into the injection port in the compressor for controlling the increase of the discharge temperature. Therefore the optimal amount of refrigerant can be provided to the system via the compressor, which makes it possible to provide hot water of 70 °C.

High performance even at low outdoor temp.

**Operable even at -20°C**

Hot Water Heat Pump can be operated between outdoor temp. of -20°C and 40°C. It delivers precise comfort even in the coldest days of the year down to -20°C.

### Range of operation temperature and outlet water temperature



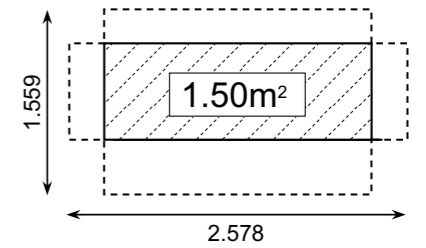
During defrost operation, two compressors, which are equipped within one unit, run alternatively resulting in less drop in outlet water temperature.

**Less Space**

Smaller footprint has been achieved by developing a high efficient new heat exchanger with low pressure loss.

Installation footprint 3.54m<sup>2</sup>\*

\*Installation footprint for one unit including service space



**Backup Function**

**Rotation Function**

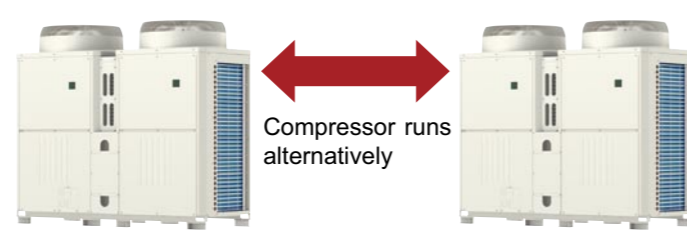
Hot Water Heat Pump ensures an exceptionally high level of reliability by utilizing "Backup Function\*". If either of the compressors malfunctions, the other compressor keeps operation to avoid a complete stop of the system. "Rotation Function" is also available. When two or more units are in the system, the unit runs alternatively ensuring an optimum product life cycle for both of its component units.

\*If the main circuit board is at fault, backup function and rotation function are not available.  
\*Capacity drops by 50%.

#### Backup Function



#### Rotation Function



Depending on the setting, "Rotation Function" is available within a unit.

**MAX. 70kW**  
Over\*

"Efficiency Priority Mode" and "Capacity Priority Mode" are selectable. With "Capacity Priority Mode", Hot Water Heat Pump can provide a maximum capacity of over 70kW. "Capacity Priority Mode" is more effective when used with a boiler because fuel cost for a boiler and CO<sub>2</sub> emission from a boiler can be reduced.

\*Outdoor temp. 20°CDB, Outlet water temp. 35°C  
\*Relative humidity 85%  
\*In Capacity Priority Mode

#### Efficiency Priority Mode

|                         |                   |      |      |      |      |      |
|-------------------------|-------------------|------|------|------|------|------|
| Outlet water temp. 35°C | Outdoor temp.°CDB | -20  | -10  | 0    | 7    | 20   |
|                         | Capacity kW       | 31.9 | 40.3 | 42.7 | 45.0 | 45.0 |

#### Capacity Priority Mode

|                         |                   |      |      |      |      |      |
|-------------------------|-------------------|------|------|------|------|------|
| Outlet water temp. 35°C | Outdoor temp.°CDB | -20  | -10  | 0    | 7    | 20   |
|                         | Capacity kW       | 31.9 | 40.3 | 42.7 | 63.4 | 73.9 |

**51dB(A)\***  
Low Sound Pressure Level

\*at 10m  
\*based on theoretical calculation

Lower sound pressure levels have been achieved by developing a new fan.

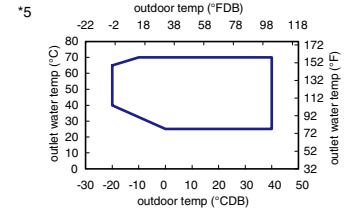
**Ozone Friendly**

Environmental friendly R407C refrigerant with ZERO ozone depleting potential is used in the product, which reduces CO<sub>2</sub> emissions compared to that of gas boilers.

# Specifications

|  |                          |   |  |
|--|--------------------------|---|--|
| Model  |                          | CAHV-P500YA-HPB (-BS)                                   |  |
| Power Source   |                          | 3-phase 4-wire 380-400-415V 50/60Hz                     |  |
| Capacity *1  |                          | kW  | 45                                       |
|  |                          | kcal/h  | 38,700                                   |
|  |                          | BTU/h   | 153,540                                  |
|  | Power input              | kW  | 12.9                                     |
|  | Current input            | A   | 21.78-20.69-19.94                        |
| COP (kW / kW)  |                          | 3.49  |  |
| Capacity *2  |                          | kW  | 45                                       |
|  |                          | kcal/h  | 38,700                                   |
|  |                          | BTU/h   | 153,540                                  |
|  | Power input              | kW  | 10.9                                     |
|  | Current input            | A   | 10.6 (400V)                              |
| COP (kW / kW)  |                          | 4.13  |  |
| Capacity *3  |                          | kW  | 45                                       |
|  |                          | kcal/h  | 38,700                                   |
|  |                          | BTU/h   | 153,540                                  |
|  | Power input              | kW  | 25.6                                     |
|  | Current input            | A   | 43.17-41.01-39.53                        |
| COP (kW / kW)  |                          | 1.76  |  |
| Maximum current input *4                                   |                          | A   | 57.77-54.88-52.90                        |
| Water pressure drop *1                                     |                          | 12.9kPa (1.87psi)                                       |  |
| Temp. range  | Outlet water temp *5     | 25~70°C<br>77~158°F                                     |  |
|  | Outdoor temp *5          | D.B   | -20~40°C<br>-4~104°F                     |
| Circulating water volume range                             |                          | 7.5 m³/h-15.0m³/h                                       |  |
| Sound Pressure level (measured in anechoic room) *1 at 1m  |                          | dB (A)  | 59                                       |
| Sound Pressure level (measured in anechoic room) *1 at 10m |                          | dB (A)  | 51                                       |
| Sound Pressure level (measured in anechoic room) *4        |                          | dB (A)  | 63                                       |
| Diameter of water pipe                                     | Inlet                    | mm (in)   | 38.1 (Rc 1 1/2") screw                   |
|  | Outlet                   | mm (in)   | 38.1 (Rc 1 1/2") screw                   |
| External finish  |                          | Acrylic painted steel plate <MUNSELL 5Y 8/1 or similar> |  |
| External dimension H x W x D                               |                          | mm  | 1,710 (without legs 1,650) x 1,978 x 759 |
|  |                          | in.   | 67.3 (without legs 65.0) x 77.9 x 29.9   |
| Net weight   |                          | kg (lb)   | 526 (1,160)                              |
| Accessories  |                          | Y strainer Rc 1 1/2                                     |  |
| Design Pressure  | R407C                    | MPa   | 3.85                                     |
|  | Water                    | MPa   | 1.0                                      |
| Drawing  | Wiring                   | KC94G268X01   |  |
|  | External                 | KC94G195X01   |  |
| Heat exchanger   | Water side               | stainless steel plate and copper brazing                |  |
|  | Air side                 | Plate fin and copper tube                               |  |
| Compressor   | Type                     | Inverter scroll hermetic compressor                     |  |
|  | Manufacture              | MITSUBISHI ELECTRIC CORPORATION                         |  |
|  | Starting method          | Inverter  |  |
|  | Motor output             | kW  | 7.5 x 2                                  |
|  | Case heater              | kW  | 0.045 x 2                                |
| Lubricant  | MEL32                    |   |  |
| FAN  | Air flow rate            | m³/min  | 185 x 2                                  |
|  |                          | L/s   | 3,083 x 2                                |
|  |                          | cfm   | 6,532 x 2                                |
|  | External static press.   | 0Pa (0mmH₂O)  |  |
|  | Type x Quantity          | Propeller fan x 2                                       |  |
| Control, Driving mechanism                                 |                          | Inverter-control, Direct-driven by motor                |  |
| Motor output   | kW                       | 0.46 x 2  |  |
| HIC circuit (HIC:Heat inter-Changer)                       |                          | Copper pipe   |  |
| Protection   | High pressure protection | High pres.Sensor & High pres.Switch at 3.85MPa (643psi) |  |
|  | Inverter circuit         | Over-heat protection, Over current protection           |  |
|  | Compressor               | Over-heat protection                                    |  |
|  | Fan motor                | Thermal switch  |  |
| Defrosting method  |                          | Auto-defrost mode (Reversed refrigerant circle)         |  |
| Refrigerant  | Type x original charge   | R407C x 5.5(kg) x 2                                     |  |
|  | Control                  | LEV and HIC circuit                                     |  |

- \*1 Under Normal heating conditions at outdoor temp. 7°CDB/6°CWB(44.6°FDB/42.8°FWB)/ outlet water temp 45°C(113°F), inlet water temp 40°C(104°F).
- \*2 Under Normal heating conditions at outdoor temp. 7°CDB/6°CWB(44.6°FDB/42.8°FWB)/ outlet water temp 35°C(95°F), inlet water temp 30°C(86°F).
- \*3 Under Heating conditions at outdoor temp. 7°CDB/6°CWB(44.6°FDB/42.8°FWB), outlet water temp 70°C (158°F).
- \*4 Under Heating conditions at outdoor temp. 7°CDB/6°CWB(44.6°FDB/42.8°FWB) when this unit is set to capacity priority mode by non-voltage B contact.
- \* Due to continuing improvement, the above specifications may be subject to change without notice.
- \* Please don't use the steel material for the water piping material.
- \* Please always make water circulate or pull out the circulation water completely when not using it.
- \* Please do not use groundwater and well water.
- \* Install the unit in an environment where the wet bulb Temp. will not exceed 32°C.
- \* The water circuit must use the closed circuit.



Outdoor temp -20°CDB/ Outlet water temp 40~65°C  
 (Outdoor temp -4°FDB/ Outlet water temp 104°F~149°F)  
 Outdoor temp -10°CDB/ Outlet water temp 33~70°C  
 (Outdoor temp 14°FDB/ Outlet water temp 91°F~158°F)  
 Outdoor temp 0°CDB/ Outlet water temp 25~70°C  
 (Outdoor temp 32°FDB/ Outlet water temp 77°F~158°F)

Unit converter

kcal =kW x 860  
 BTU/h =kW x 3,412  
 cfm =m³/min x 35.31  
 lb =kg/0.4536

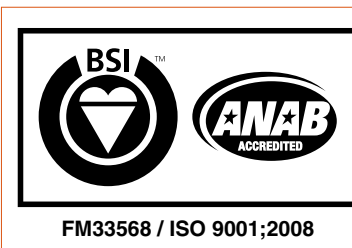
<PAR-W21MAA>



Up to 16 units can be controlled with one remote controller.

<External input/output from the unit>

\*The unit can be operated and the operation status can be monitored with external input/output terminals.



The Air Conditioning & Refrigeration Systems Works acquired ISO 9001 certification under Series 9000 of the International Standard Organization (ISO) based on a review of Quality management for the production of refrigeration and air conditioning equipment.

ISO Authorization System  
 The ISO 9000 series is a plant authorization system relating to quality management as stipulated by the ISO. ISO 9001 certifies quality management based on the "design, development, production, installation and auxiliary services" for products built at an authorized plant.



The Air Conditioning & Refrigeration Systems Works acquired environmental management system standard ISO 14001 certification.

The ISO 14000 series is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

**MITSUBISHI ELECTRIC CORPORATION**  
<http://Global.MitsubishiElectric.com>