

## Commercial Air Conditioners 2017



## M-Thermal Heat Pumps Mono/Split





# Midea CAC

Midea CAC is a key division of the Midea Group, a leading producer of consumer appliances and provider of heating, ventilation and air conditioning solutions. Midea CAC has continued with the tradition of innovation upon which it was founded, and emerged as a global leader in the HVAC industry. A strong drive for advancement has created a groundbreaking R&D department that has placed Midea CAC at the forefront of a competitive field. Through these independent efforts and joint cooperation with other global enterprises, Midea has supplied thousands of innovative solutions to customers worldwide.

There are three production bases: Shunde, Chongqing and Hefei.

MCAC Shunde: 38 product lines focusing on VRF, Split Products, Heat Pump Water Heaters, and AHU/FCU.

MCAC Chongqing: 14 product lines focusing on Water Cooled Centrifugal/Screw/Scroll Chillers, Air Cooled Screw/Scroll Chillers, and AHU/FCU.

MCAC Hefei: 11 product lines focusing on VRF, Chillers, and Heat Pump Water Heaters.



- 2016 >> Launched the new generation of M-Thermal products, including Mono and Split type.
- 2015 >> JV with Carrier in China in chiller field, BOSCH in VRF production and Siix in smart control.
- 2013 >> Launched combo type 300L products with enamel water tank.
- 2012 >> Introduced the professional production line EISENMAN from German.
- 2011 >> Launched the first generation of M-thermal products.
- 2010 >> Built the 3rd manufacturing base in Hefei.
- 2008 >> Launch the first generation of combo type products.
- 2007 >> Cooperated with GE to develop combo type air source heat pump.
- 2004 >> Launch the first generation of direct heating products.
- 2003 >> Entered the air source heat pump field and launched the first generation cycle heating products.
- 1999 >> Entered the CAC field.

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Introduction



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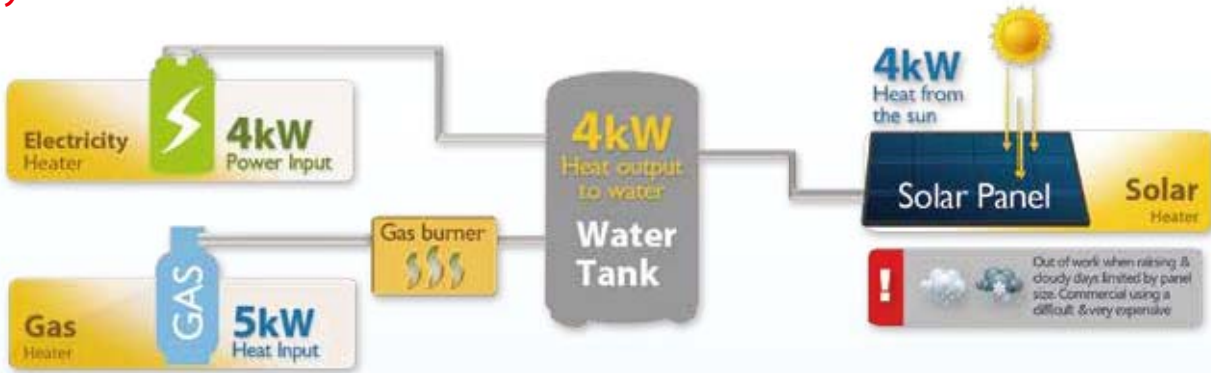
# Renewable

Heat pump is renewable and energy saving



Heat pumps use electrical energy to capture renewable heat from the air. Typically you can capture 3kW of energy for every 1kW of electrical energy. This means you get 4 kW of heat for only 1kW of electrical input making the unit 400% efficient.

## Why select HPWH?



Comparison of the power needed to heat 1 ton water from 15°C to 55°C

	Midea HPWH	Gas Water Heater	Electric Water Heater	Boiler	Solar Water Heater*
Energy Resource	Air,electricity	Gas	Electricity	Diesel oil	Solar,electricity
Calorific Value	860kcal/kW.h	24000kcal/m3	860kcal/kW.h	10200kcal/kg	860kcal/kW.h
Average Efficiency	4.6	0.8	0.95	0.7	2.7(1/3 weather need Auxiliary Heater)
Consumption	10kW.h	2.08m3	48.9kW.h	5.6kg	17.22kW.h
Running Cost(USD)	0.9	5.9	4.3	6.5	1.5
Merit/Demerit	Green,safe,energy saving,friendly for environment and easy for installation.	Risk of fire and explosion, emits CO2.	Risk of electric shocks.	Risk of fire and explosion, emits CO2.	Difficult to install, takes up a lot of space, water tank capacity is limited.

The comparison is under the same condition.

- 1.\* It needs auxiliary heater during rainy/snowy and cloudy days of one year.
- 2. Data tested in Midea lab and according to local price in China.

# Contents

- ❖ 05 Introduction
- ❖ 07 DC Inverter Technology
- ❖ 09 The Basics
- ❖ 13 Features & Technologies
- ❖ 21 Typical Applications
- ❖ 31 Specifications





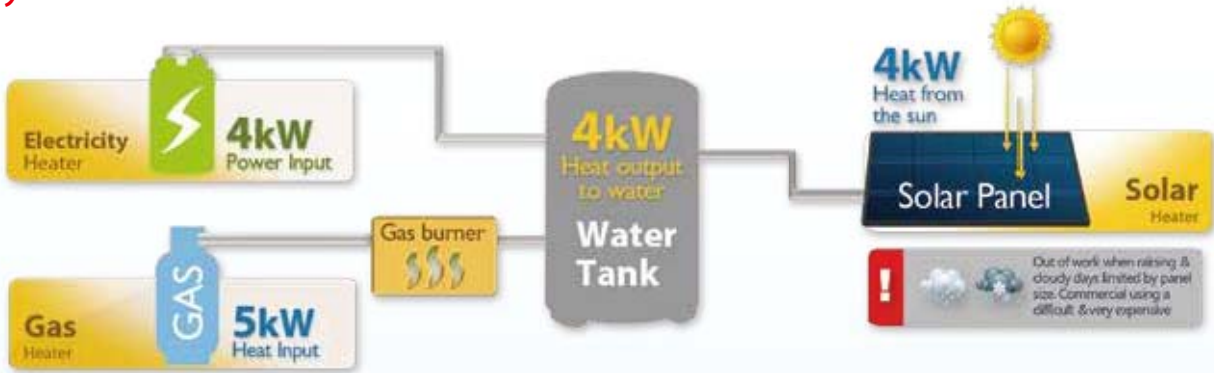
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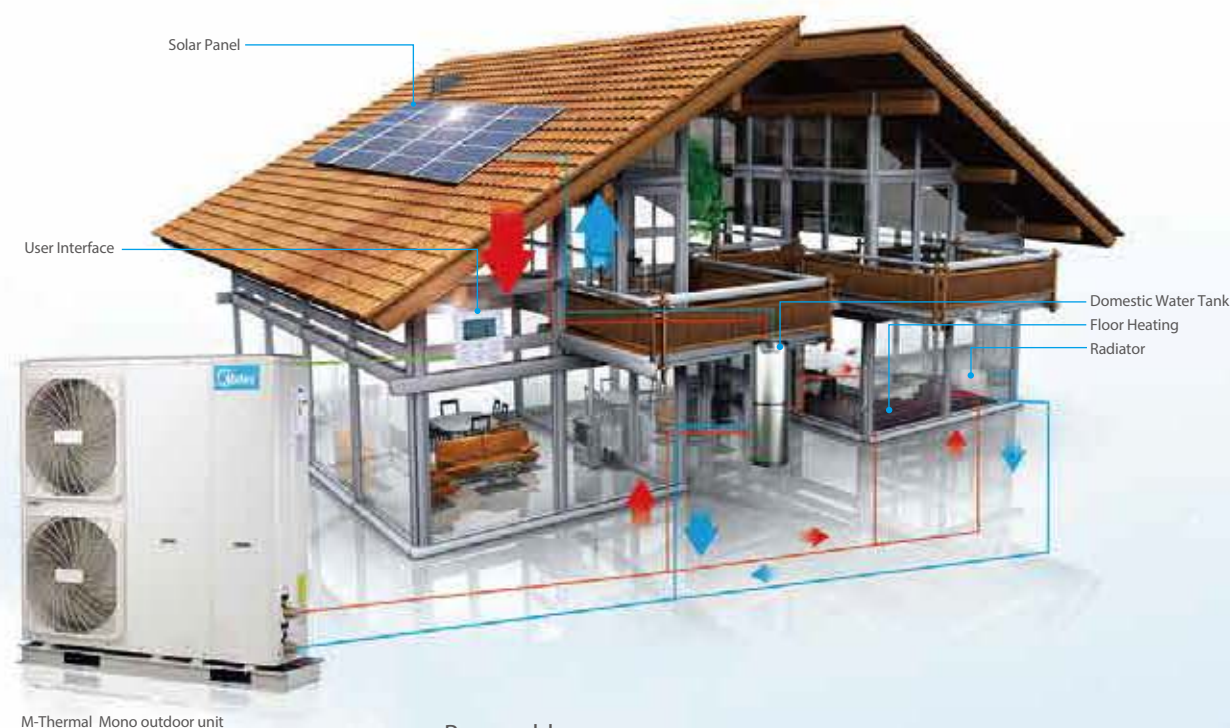




# Introduction

## Total heat solution-Heating, cooling, domestic hot water in one system

M-Thermal is an integrated system that heats and cools space, as well as produces domestic hot water. It offers total heat solution all year round. This system can complete instead of the tradition gas or fuel boilers, also can work together with them.



- ❖ Renewable energy source
- ❖ R410A, low CO2 emissions, environmentally friendly
- ❖ DC inverter technology, high energy efficiency
- ❖ Sufficient heating capacity at low ambient temperature (even at -20°C)
- ❖ Provide space heating, cooling & domestic hot water, total heat solution
- ❖ Compatible with other heat source such as solar energy and boiler

## How air source heat pump works

A heat pump is an energy efficient system that absorbs heat from the ambient air for heating and hot water. By using the ambient air and transferring this heat into the house through a hydronic system, such as floor heating, fan coil units and radiators.



### 1 Stage One

The heat transfer medium (the refrigerant) is colder than the heat source (the outside air). As the outside air passes across the first heat exchanger (the evaporator) the liquid refrigerant absorbs the heat and evaporates.

### 2 Stage Two

The vapor passes to the compressor and is compressed. When compressed the pressure is increased and the temperature of the vapor rises, effectively concentrating the heat.

### 3 Stage Three

The hot vapor passes to the second heat exchanger (the condenser) where the heat is released to the water and the vapor condenses back into a liquid. The water heated in by the M-Thermal system is circuit to the indoors for central heating and domestic hot water heating.

### 4 Stage Four

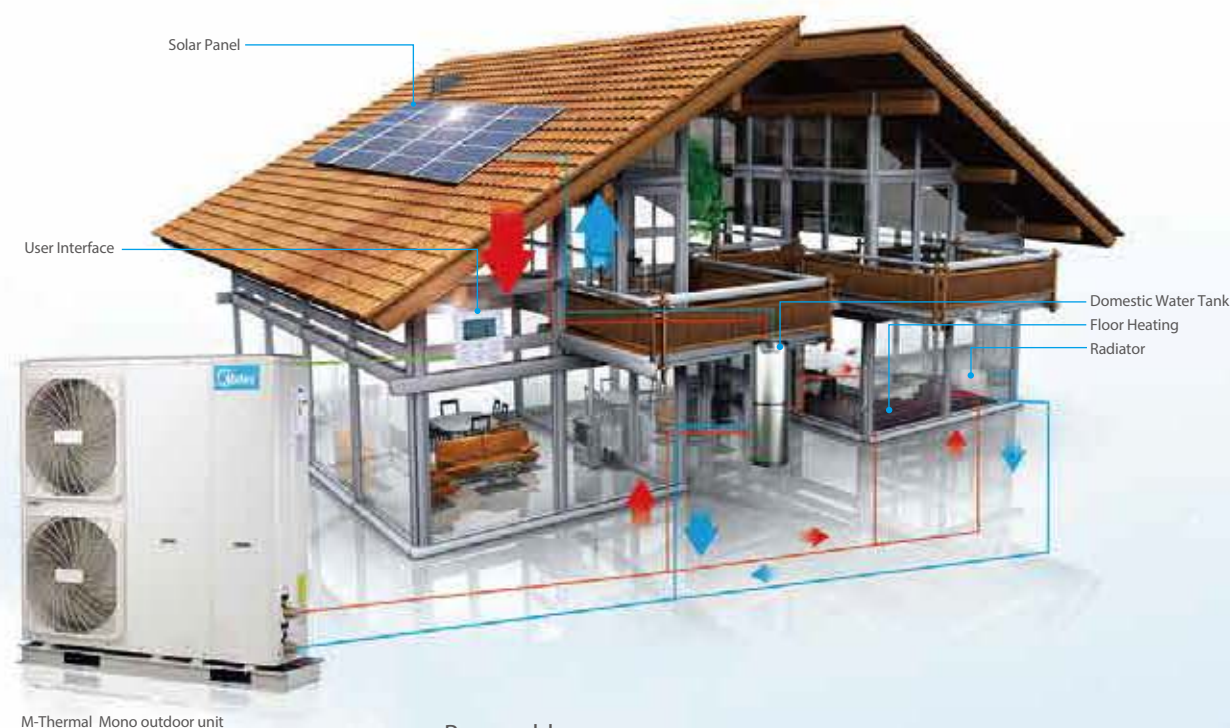
The liquid refrigerant passes through an expansion valve, reducing its pressure and temperature, ready to start the next circuit.



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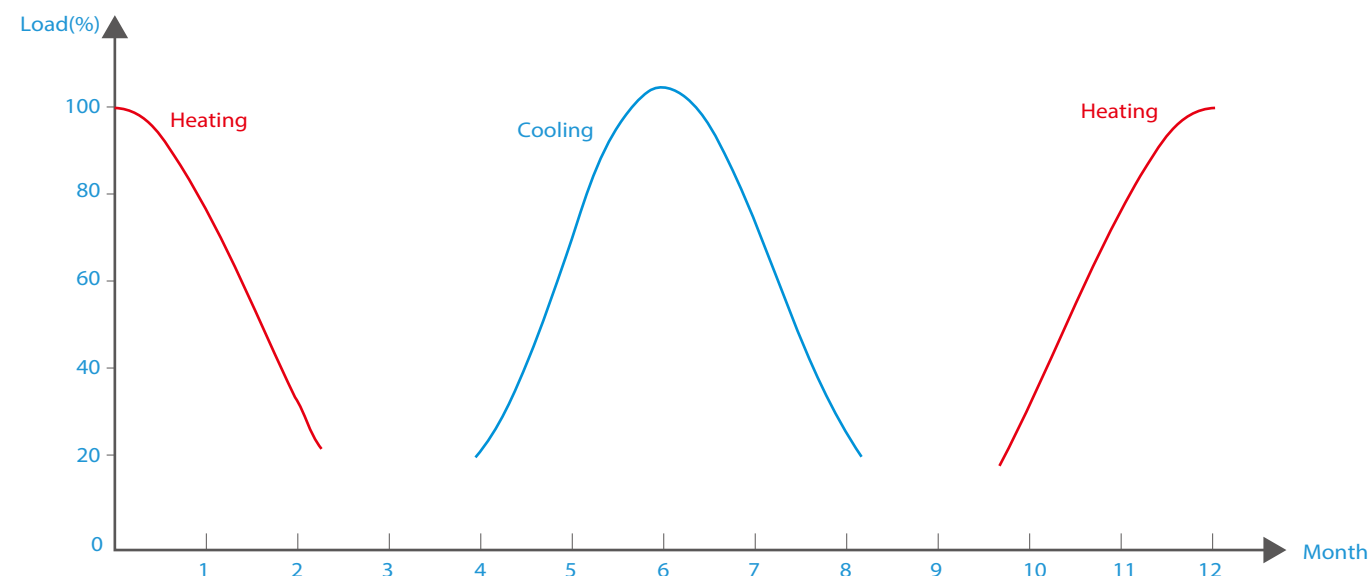
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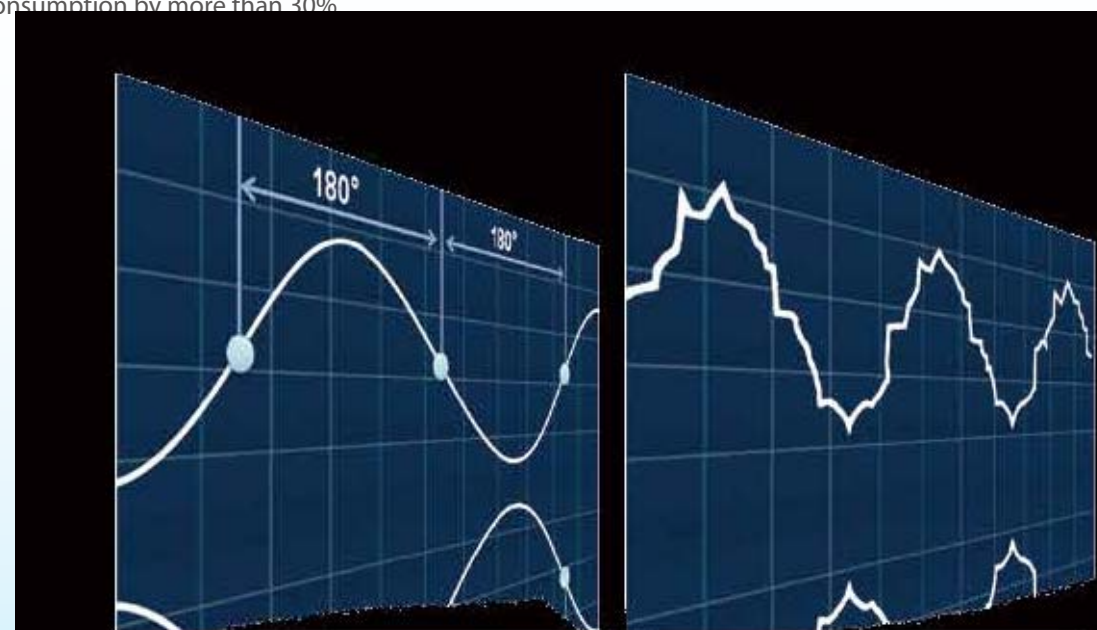
# DC Inverter Technology

Traditional motors used in heat pump run at full load even in part load operations, resulting in energy waste. Midea's M-Thermal products use DC inverter technology, which allows the use of only the power necessary to perfectly match the real load. Therefore, only actual energy demand needs payment.



## High energy efficiency

The upgraded DC driven system of inverter model forms a full DC frequency conversion system and dramatically reduces power consumption by more than 30%.

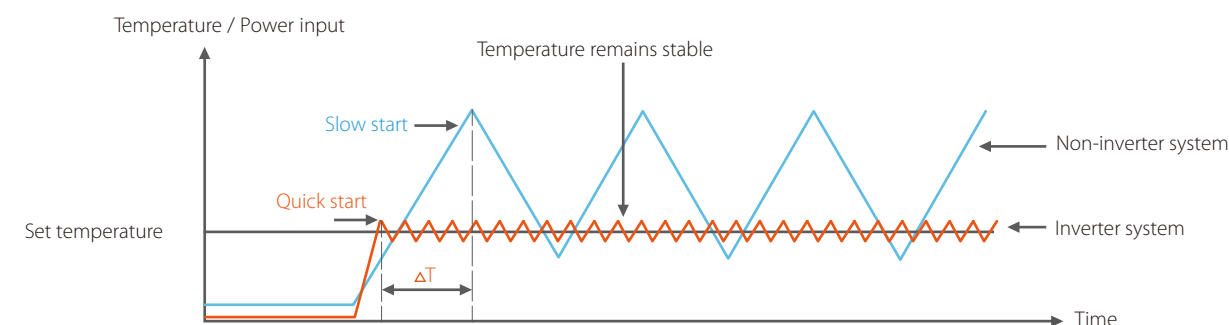


Smooth 180° sine wave, operation efficiency is improved around 30%

Conventional saw tooth wave, low operation efficiency

## Constant level of water temperature, more comfort

Thanks to the DC inverter technology, the rotary speed of compressor is precisely controlled according to the energy demand. The set temperature remains stable and that provides the user with more comfort.



## Quick start-up

Inverter system output power according to the energy demand by adjusting motor rotary frequency, so it possible to achieve comfort conditions in less time than system without inverter, start-up time reduced.

## Less frequent start/stop

The inverter technology ensures fewer start/stop cycles. This obviously expands compressor's lifespan and reduces sharp noise.

## Quiet operation

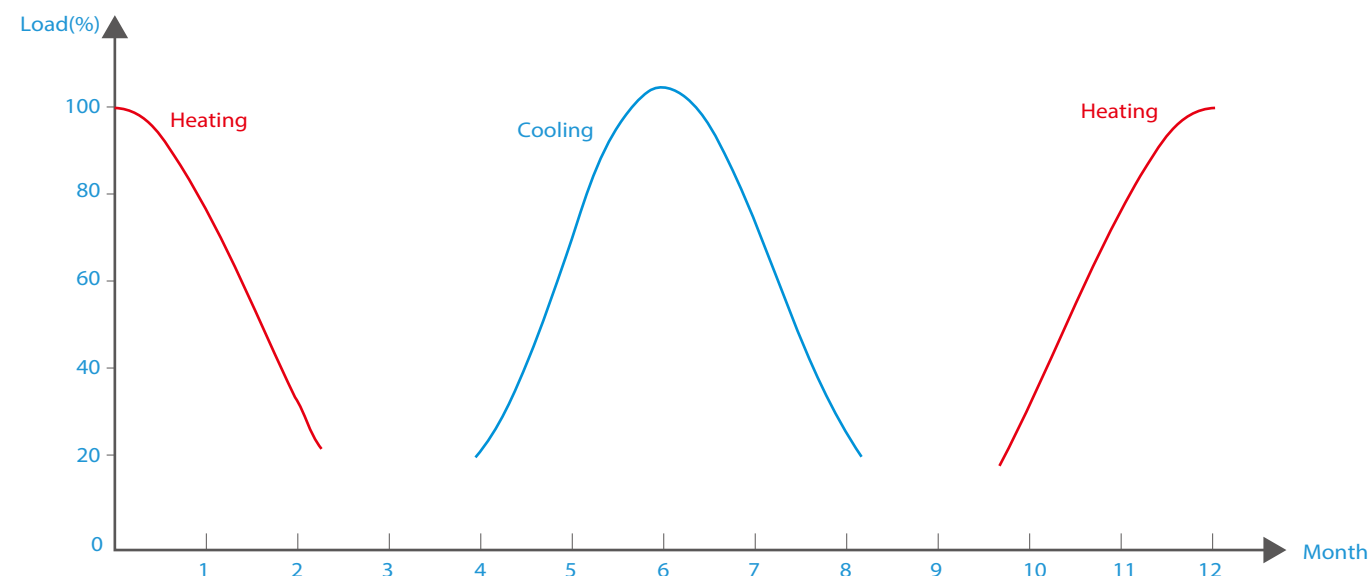
During most of the operating time, the capacity required in a building is lower than the peak load conditions, so the products work in partial load in most of time. Low sound levels in partial load conditions are achieved by the adjustable compressor frequency, thus realize quiet operation.





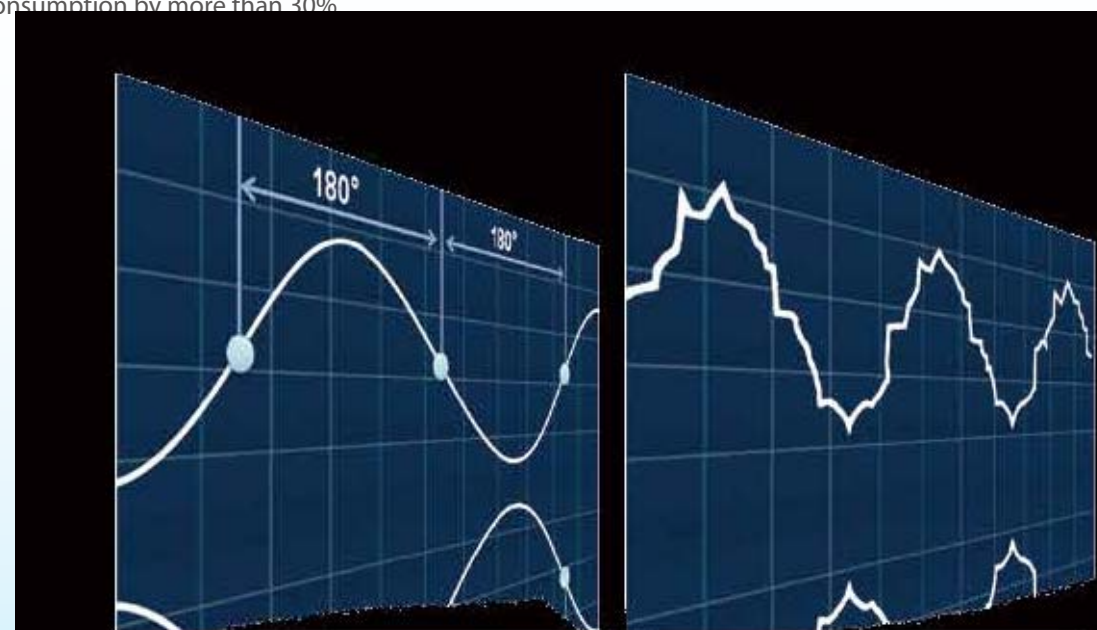
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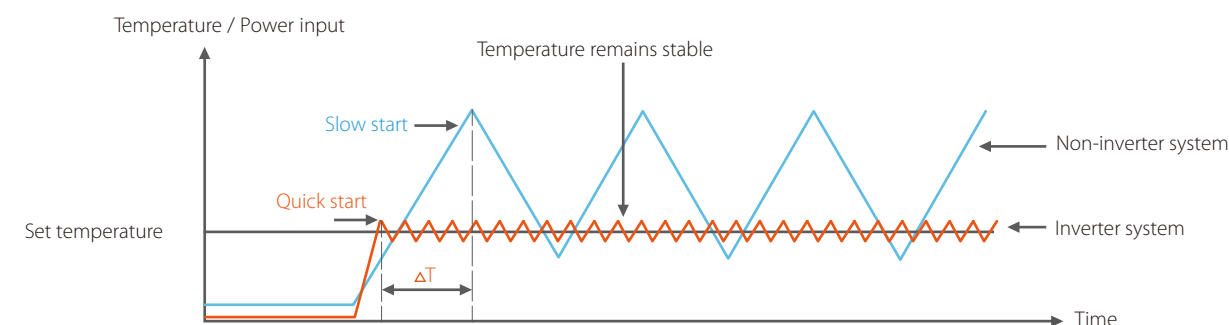


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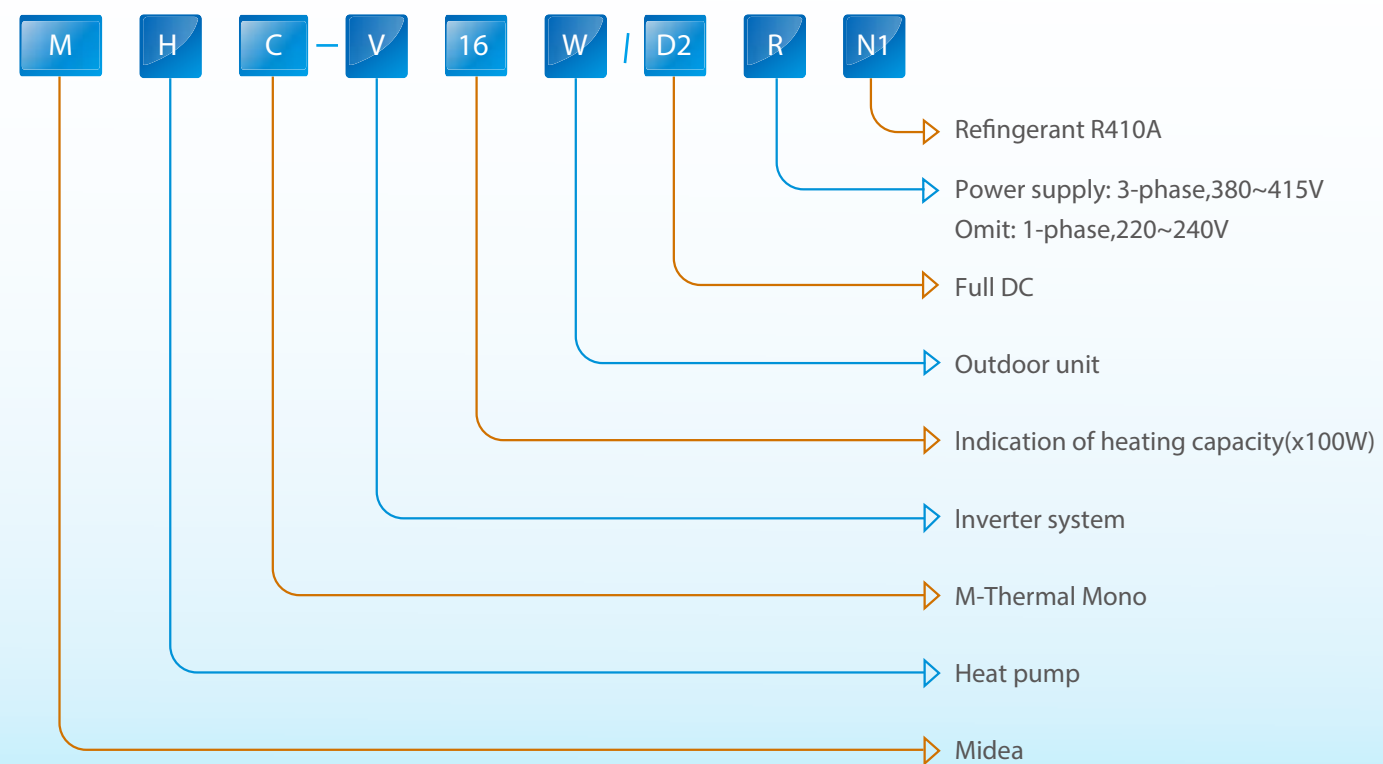
# The Basics

M-Thermal offers Mono and Split type products. Mono's hydronic components are located within the outdoor unit for easy installation. Split type has separate outdoor unit and hydronic box for more flexibility. Both Mono and Split type products achieve Erp A++ rate energy efficiency grade. So they make significant contribution to the limiting the impact on the environment.

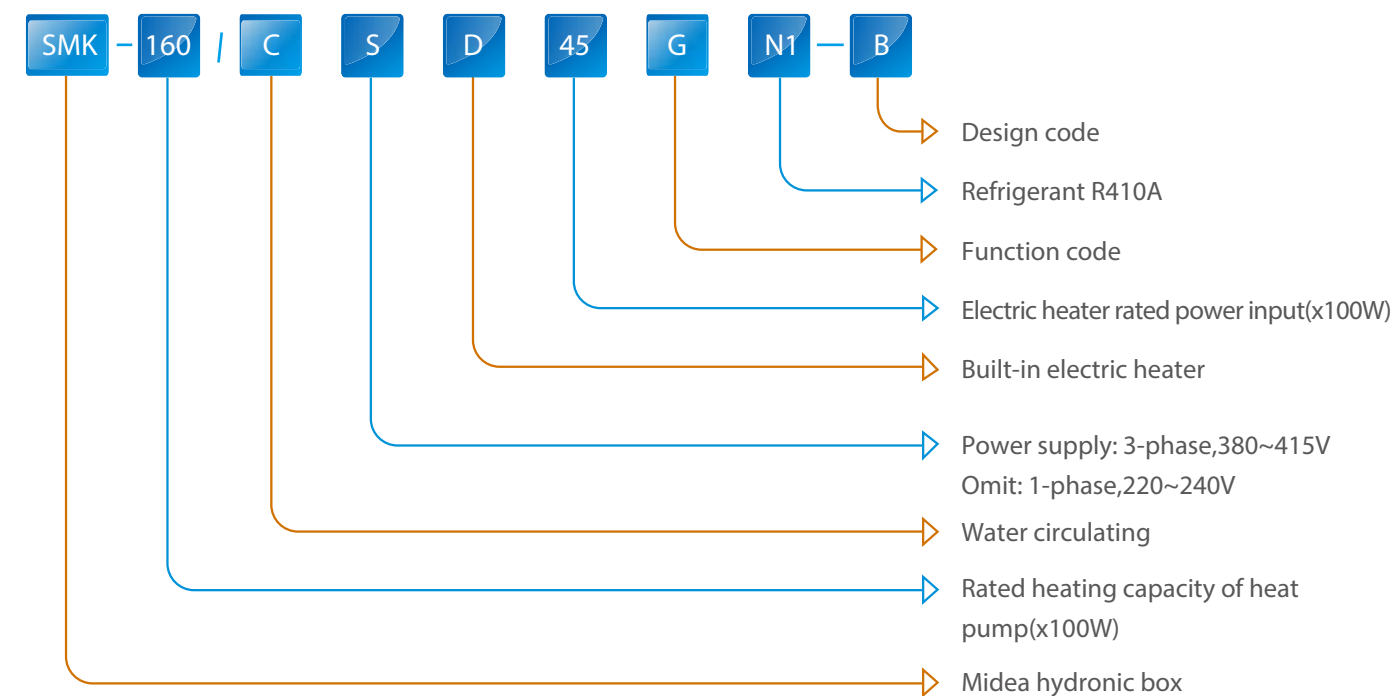


## Nomenclature

Outdoor units



Hydronic box



## Product lineup

M-Thermal Mono

Capacity(kW)	5	7	10	12	14	16
Appearance						
220~240V-1Ph	●	●	●	●	●	●
380~415V-3Ph				●	●	●

M-Thermal Split

Capacity(kW)	4	6	8	10	12	14	16
Appearance							
220~240V-1Ph	● ●	● ●	● ●	● ●	● ●	● ●	● ●
380~415V-3Ph					● ●	● ●	● ●

● Outdoor unit

● Hydronic box(4-8kW)

● Hydronic box(1Ph,10-16kW)

● Hydronic box(3Ph,12-16kW)



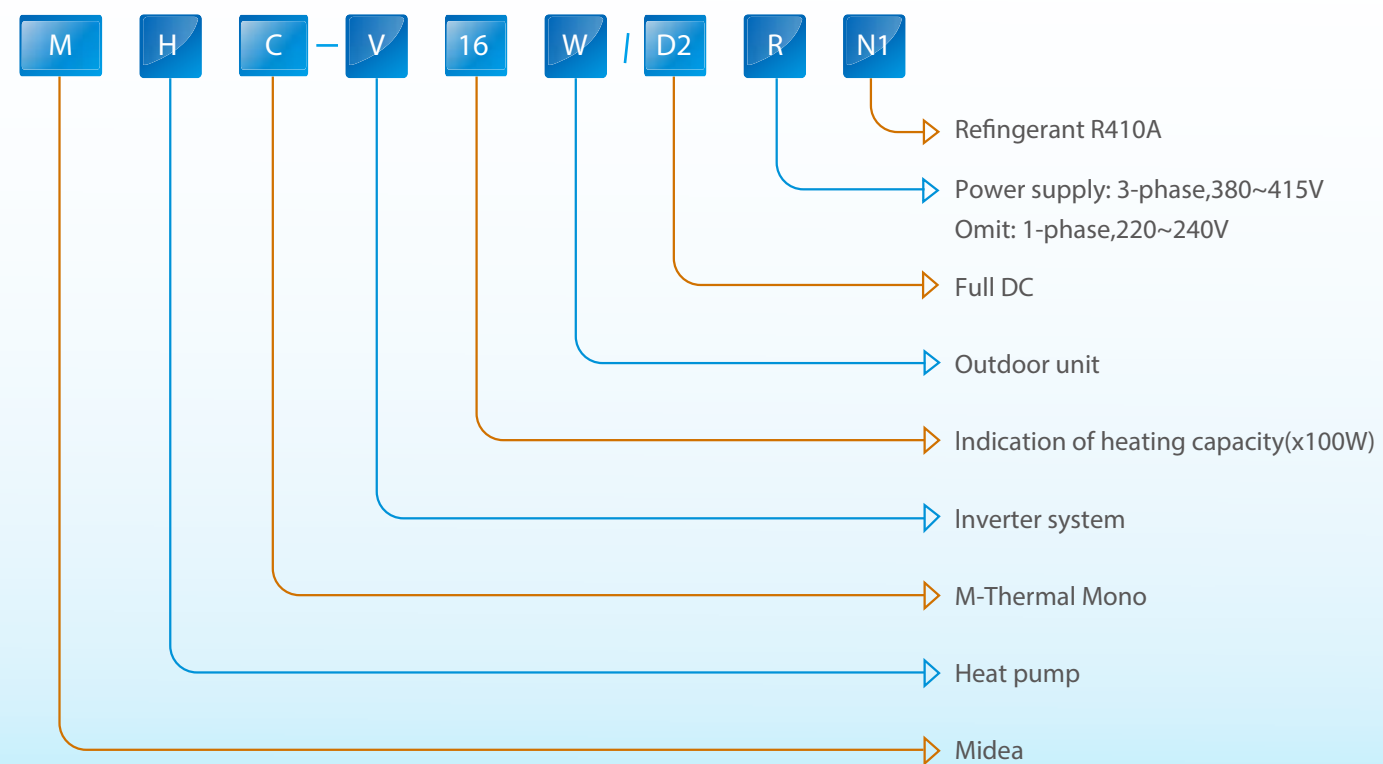
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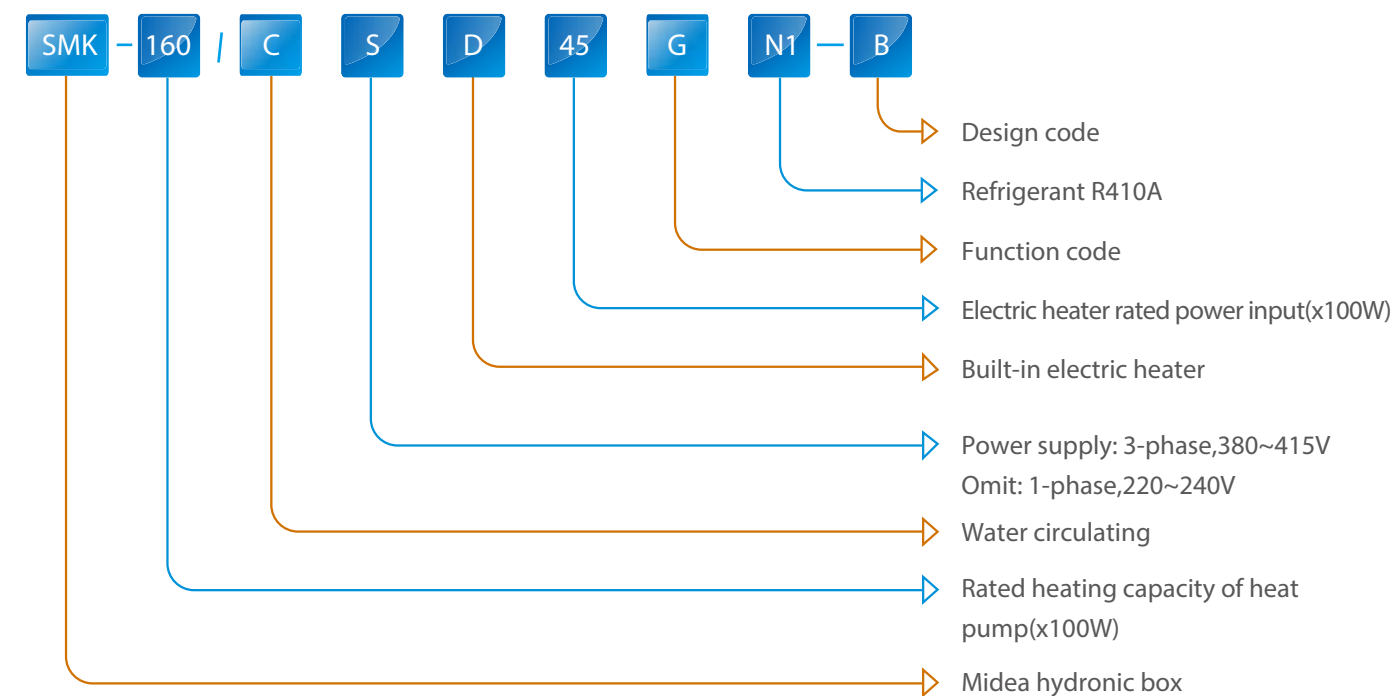


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## The Basics

M-Thermal Mono System	 <p>Solar panel</p> <p>User interface</p> <p>Low temperature radiator</p> <p>Floor heating</p> <p>Mono outdoor unit</p> <p>Domestic water tank</p>
Application	Heating + Cooling + Domestic hot water
Heat pump type	Outdoor unit only (Compressor part and hydronic box are integrated)
Refrigerant piping	Inside outdoor unit
Water piping	Between outdoor unit and indoor heating appliances
Installation	Only need to install water piping
Combinational parts (field supply)	Floor heating coils Fan coil units Low temperature radiators Domestic hot water tank Auxiliary heat sources (such as solar collector, boiler and gas furnace)

## Mono outdoor unit

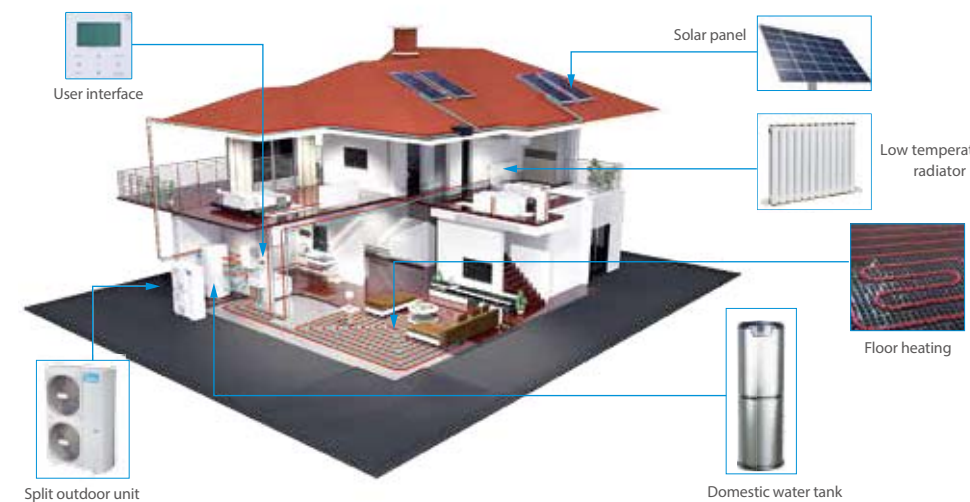
Mono outdoor unit absorbs heat from the outside air and transfers it to the water in the hydronic modular, through water to supply heat to indoor side.

## Domestic water tank (field supplied)

Domestic water tank is used to supply sanitary hot water. The hot water from the Mono unit release heat to water in the tank through the inner coil, and cold water in the tank is heated. Usually there is an addition electric heater in the domestic water tank.

## User interface

User interface is connecting to the Mono unit through signal wire; it mainly uses for ON/OFF the unit, mode setting, temperature adjusting and timer setting.

M-Thermal Split System	 <p>Solar panel</p> <p>User interface</p> <p>Low temperature radiator</p> <p>Floor heating</p> <p>Split outdoor unit</p> <p>Domestic water tank</p>
Application	Heating + Cooling + Domestic hot water
Heat pump type	Outdoor unit (Compressor part) + Indoor unit (Hydronic box)
Refrigerant piping	Between outdoor unit and indoor unit
Water piping	Between indoor unit and indoor heating appliances
Installation	Refrigerant piping & Water piping
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## Split type outdoor unit

The outdoor unit absorbs heat from the outside air and transfers it inside through refrigerant piping.

## Hydronic box

The hydronic box heats the water by refrigerant from outdoor unit. The heated water circulates through heating apparatus such as floor heating, radiators, fan coil units as well as inner coil of domestic hot water tank.

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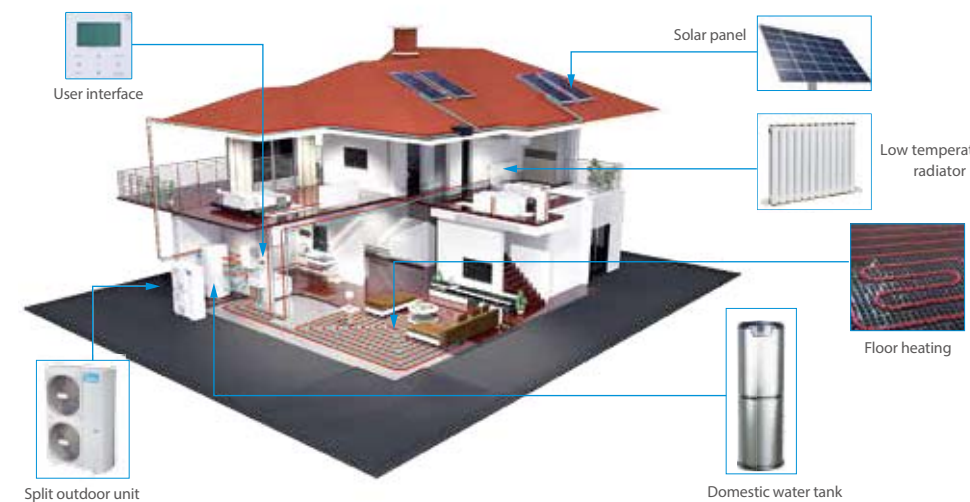
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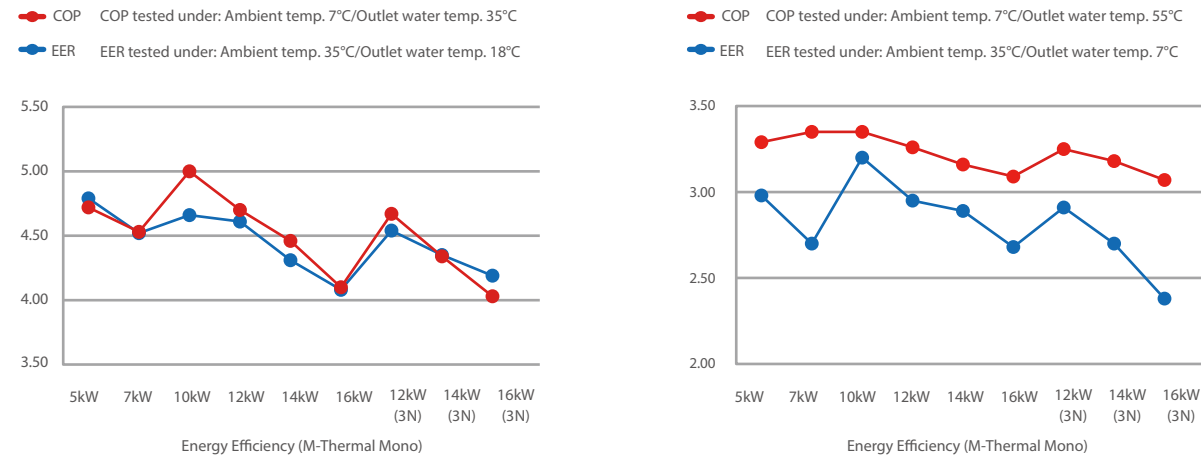


# Features & Technologies

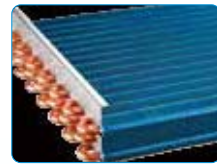
## M-Thermal Mono

### High efficiency & Total heat solution

❖ DC inverter technology to guarantee optimal operational reliability and efficiency.



❖ Offers heating capacity of 80% at -7°C thanks to the large heat exchanger and large compressor.



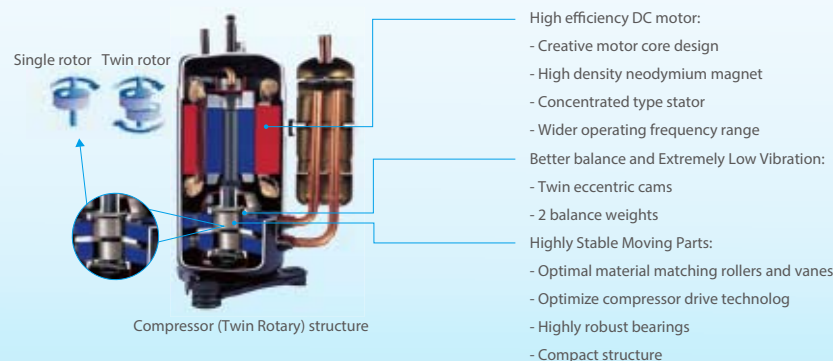
**Fin-coil heat exchanger**  
 Ø9.5 inner-threaded copper pipes optimize heat exchange efficiency.  
 Window fins enlarge the heat-exchanging area and decrease the air resistance.  
 Blue coating increases the resistance against corrosive agents, enhance durability.



**Brushless DC fan motor**  
 BLDC fan motor with stepless control helps to meet heating and cooling demands with low noise fan, super quiet operation, as well low power consumption.

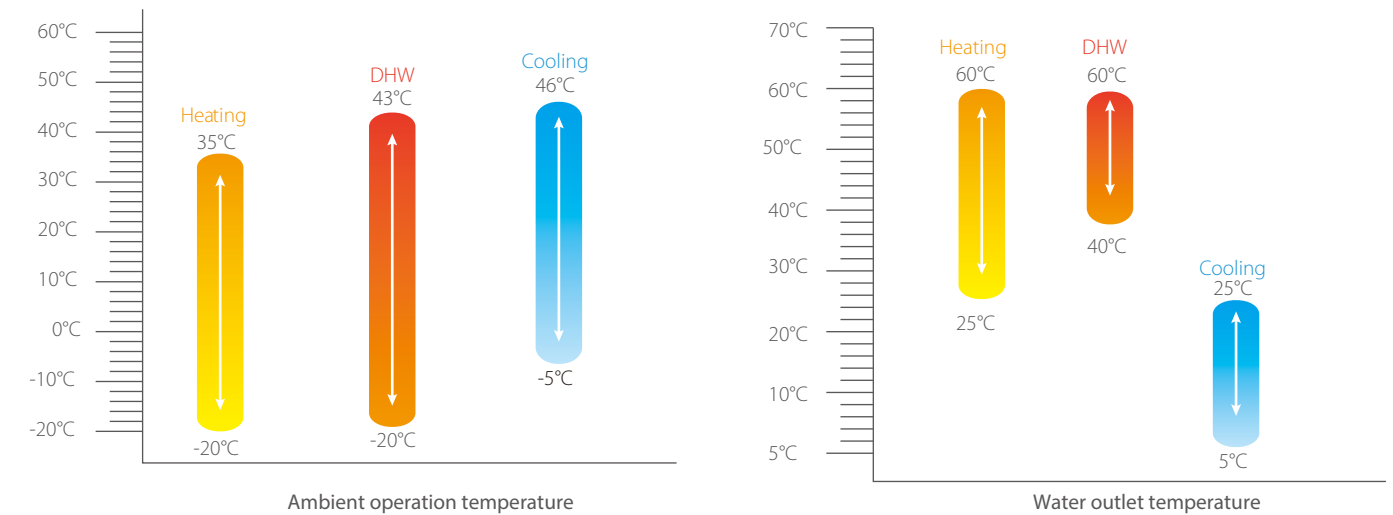
#### DC inverter compressor

The newly designed twin rotary DC inverter compressor with permanent magnet brings low working sound, wide working frequency and precession control. The upgraded DC motor power system of inverter model forms a full DC frequency conversion system and dramatically reduces power consumption by more than 30%.



**Hydronic modular**  
 Intergrated hydronic modular with DC water pump and backup electric heater.

- ❖ Built-in backup electric heater for additional heating during extremely cold outdoor temperatures. The capacity of electric heater is adjustable.
- ❖ Heating, cooling & domestic hot water, total heat solution.
- ❖ Wide operation temperature range & Wide water outlet temperature range.



❖ Compatible with additional heat sources (AHS), including solar energy, fuel boiler, gas boiler and so on. AHS can work together with heat pump or alternative for space heating and domestic hot water dependent on the system control.

### Easy installation & Easy maintenance

- ❖ All hydronic components are located within the outdoor unit.
- ❖ Water pipes run indoors from the outdoor unit, only need to connect water piping.
- ❖ Compact structure, easy for transportation and installation.
- ❖ Two doors design for easy access to inner parts for easy maintenance.



Door 1: Access to hydronic compartments and electrical parts



Door 2: Access to refrigerant compartments and electrical parts.

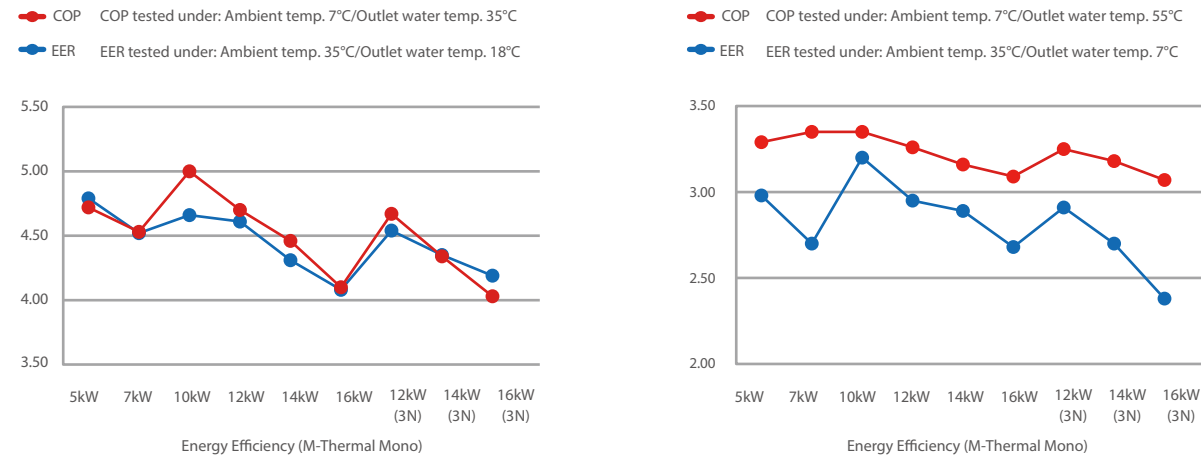


# Features & Technologies

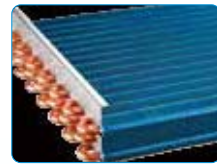
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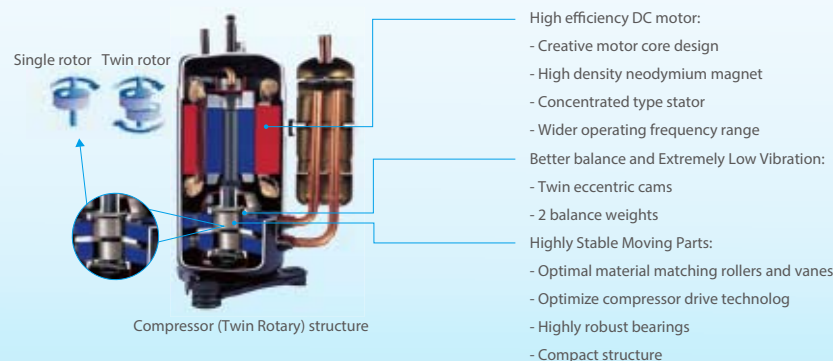
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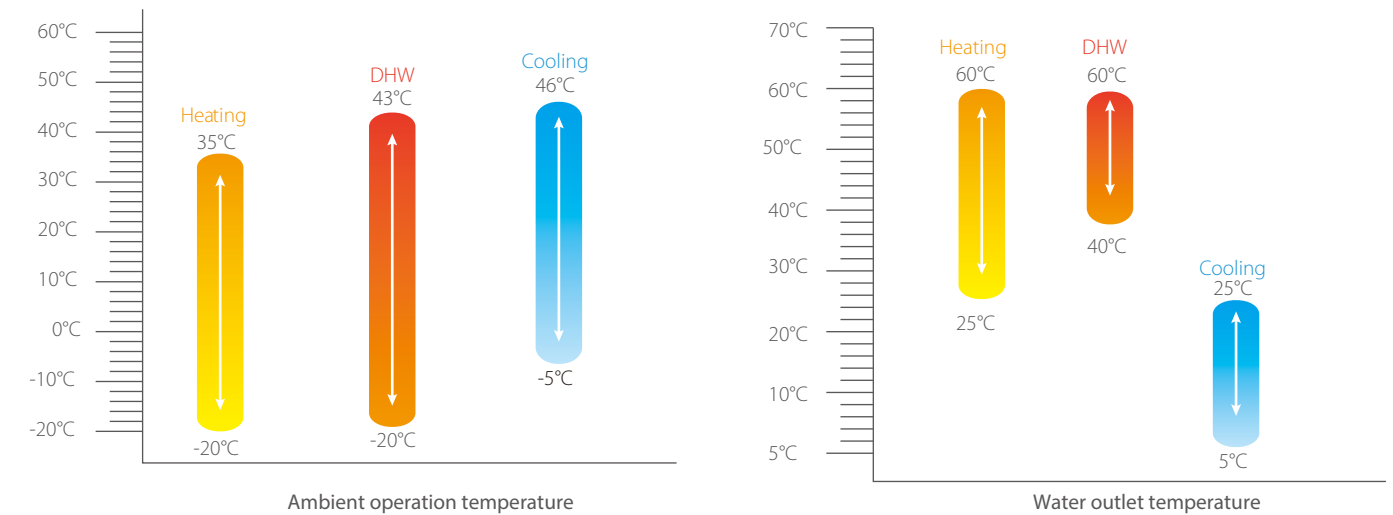
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- ❖ Heating, cooling & domestic hot water, total heat solution.
- ❖ Wide operation temperature range & Wide water outlet temperature range.



- ❖ Compatible with additional heat sources (AHS), including solar energy, fuel boiler, gas boiler and so on. AHS can work together with heat pump or alternative for space heating and domestic hot water dependent on the system control.

### Easy installation & Easy maintenance

- ❖ All hydronic components are located within the outdoor unit.
- ❖ Water pipes run indoors from the outdoor unit, only need to connect water piping.
- ❖ Compact structure, easy for transportation and installation.
- ❖ Two doors design for easy access to inner parts for easy maintenance.



Door 1: Access to hydronic compartments and electrical parts

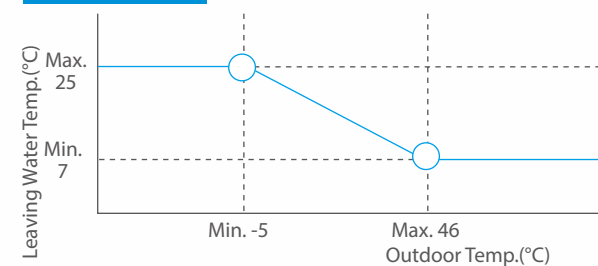


Door 2: Access to refrigerant compartments and electrical parts.

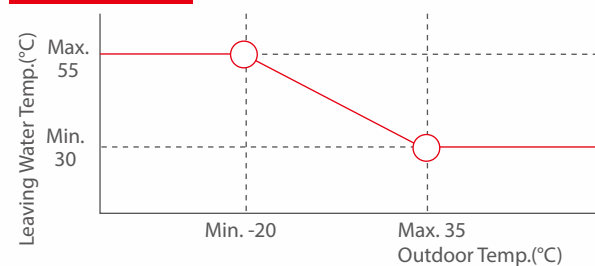
## Flexible operation & More comfort

- ❖ Weather dependent operation with climate correlation to ensure absolute comfort climate correlation curve curves for choice. Once the curve is selected, the unit set the outlet water temperature automatically according to the outdoor ambient temperature.

Cooling operation



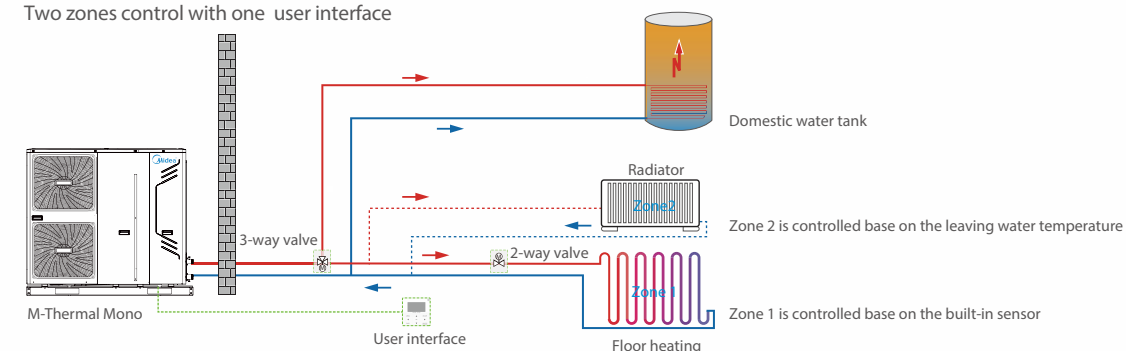
Heating operation



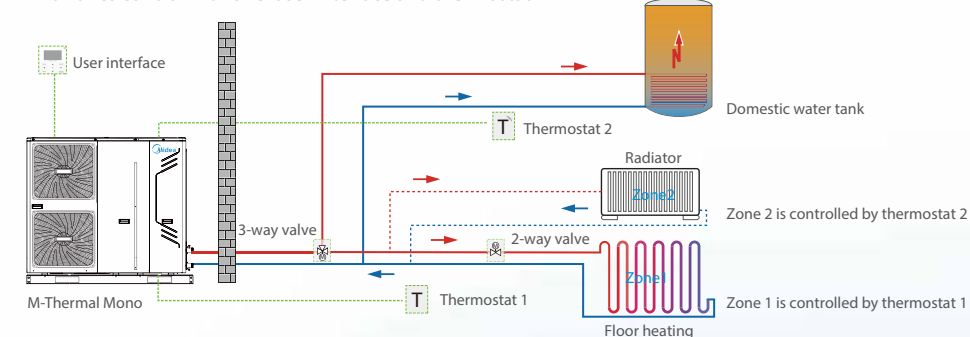
- ❖ Two zones control mre flexibility

Temperature of each zone is separately controlled. Two zones control reduces water pump cycle time and save energy.

Two zones control with one user interface



Two zones control with one user interface and thermostat



- ❖ Priority setting function and multi modes choice



- ❖ Special functions such as air purge, preheating for floor and floor drying up for choice

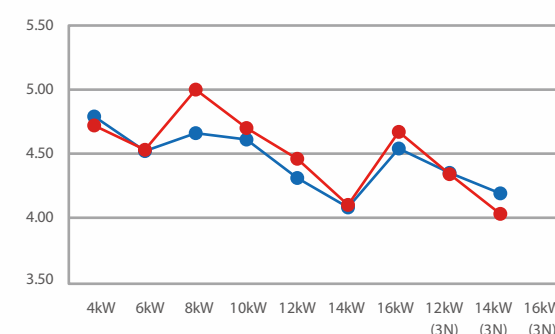
## M-Thermal Split

### High efficiency & Total heat solution

- ❖ Twin rotary DC inverter compressor to guarantee optimal operational reliability and efficiency.

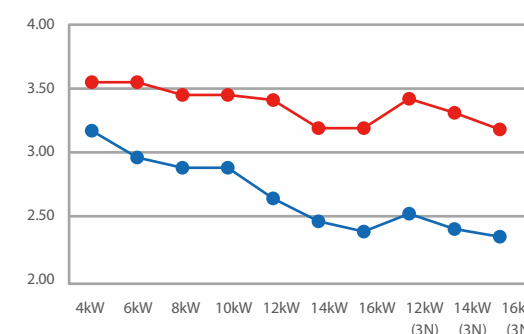
COP COP tested under: Ambient temp. 7°C/Outlet water temp. 35°C

EER EER tested under: Ambient temp. 35°C/Outlet water temp. 18°C

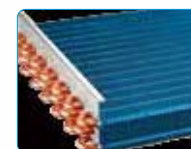


COP COP tested under: Ambient temp. 7°C/Outlet water temp. 55°C

EER EER tested under: Ambient temp. 35°C/Outlet water temp. 7°C



- ❖ Offers heating capacity of 80% at -7°C thanks to the large heat exchanger and large compressor.



Fin-coil heat exchanger

Φ9.5 inner-threaded copper pipes optimize heat exchange efficiency. Window fins enlarge the heat-exchanging area and decrease the air resistance. Blue coating increases the resistance against corrosive agents, enhance durability.

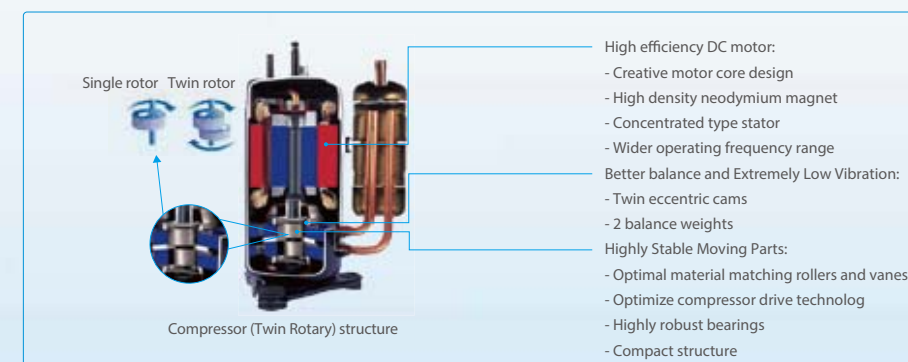


Brushless DC fan motor

BLDC fan motor with stepless control helps to meet heating and cooling demands with low noise fan, super quiet operation, as well low power consumption.

DC inverter compressor

The newly designed twin rotary DC inverter compressor with permanent magnet brings low working sound, wide working frequency and precession control. The upgraded DC motor power system of inverter model forms a full DC frequency conversion system and dramatically reduces power consumption by more than 30%.



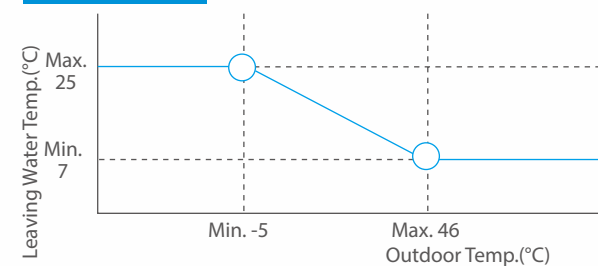
- High efficiency DC motor:
  - Creative motor core design
  - High density neodymium magnet
  - Concentrated type stator
  - Wider operating frequency range
- Better balance and Extremely Low Vibration:
  - Twin eccentric cams
  - 2 balance weights
- Highly Stable Moving Parts:
  - Optimal material matching rollers and vanes
  - Optimize compressor drive technology
  - Highly robust bearings
  - Compact structure



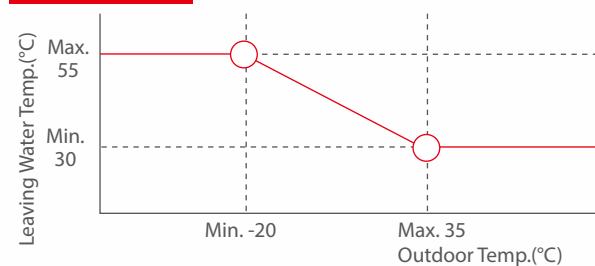
## Flexible operation & More comfort

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Cooling operation



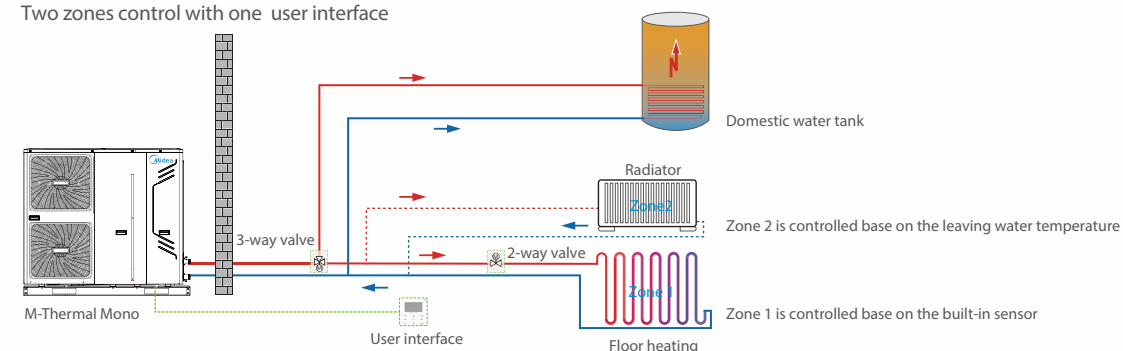
Heating operation



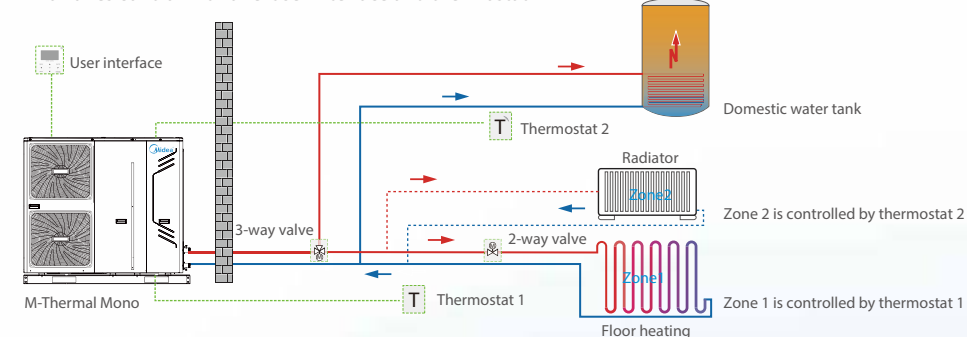
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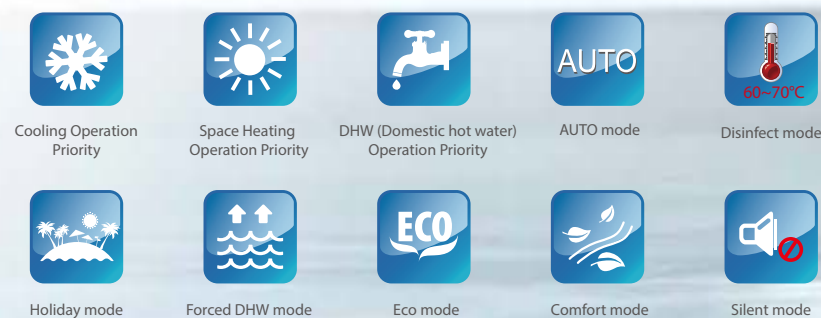
Two zones control with one user interface



Two zones control with one user interface and thermostat



- ❖ Priority setting function and multi modes choice



- ❖ Special functions such as air purge, preheating for floor and floor drying up for choice

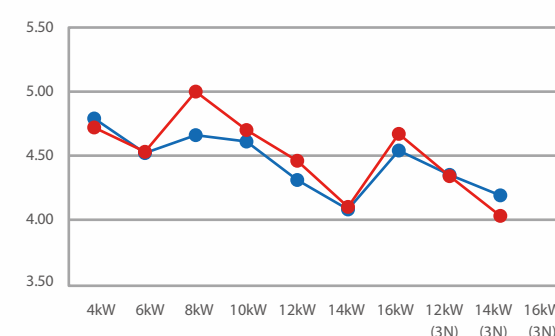
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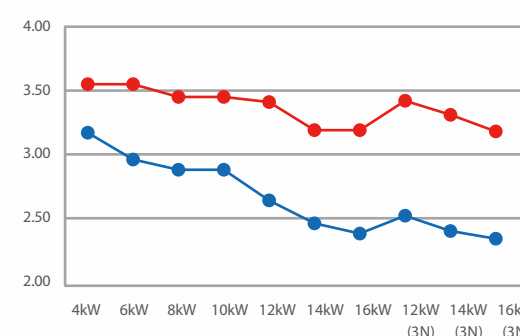
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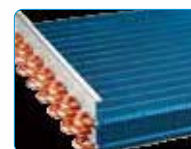


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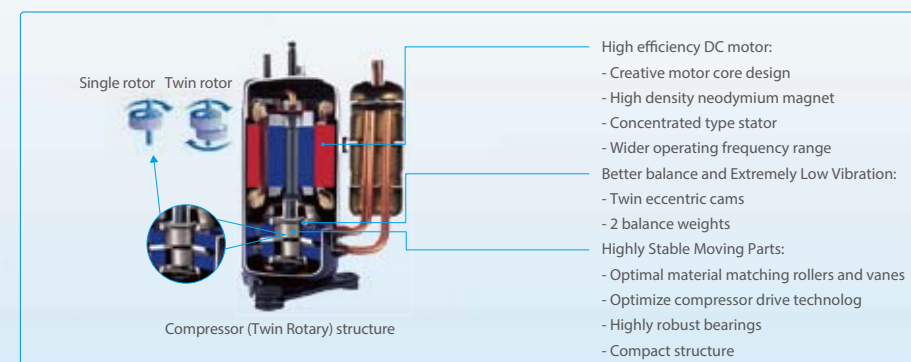


Brushless DC fan motor

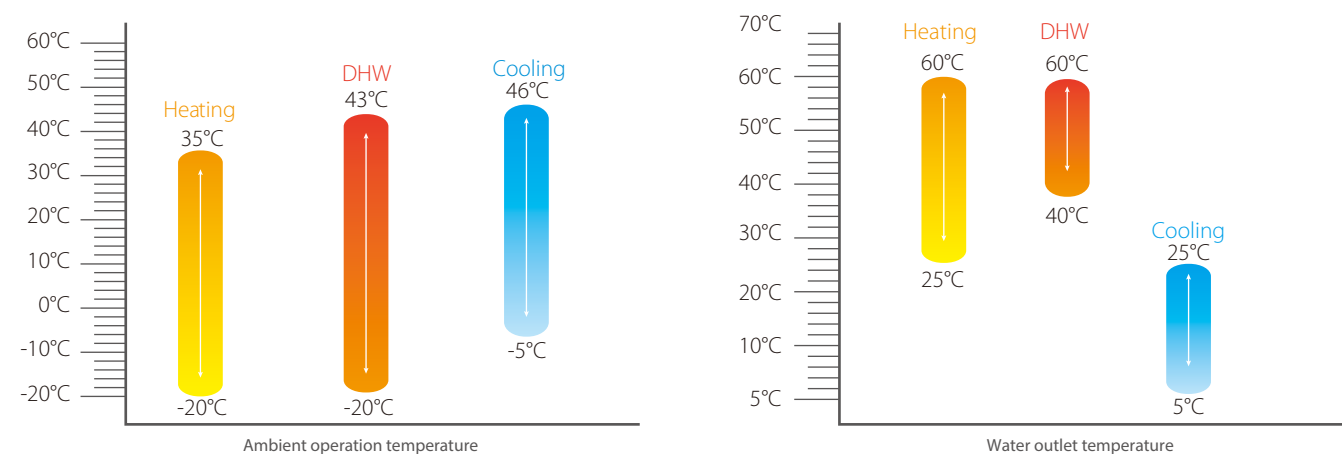
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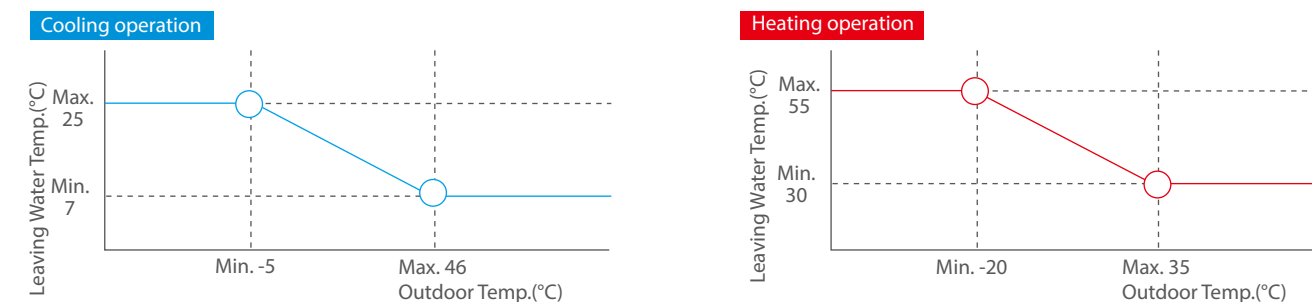
## Flexible installation & Easy maintenance

- ❖ Compact structure, independent hydronic box, flexible installation.
- ❖ Refrigerant pipes run indoors from the outdoor unit, no need extra insulation of water piping to protect from freezing up.
- ❖ No need extra refrigerant within 10m refrigerant pipe length.



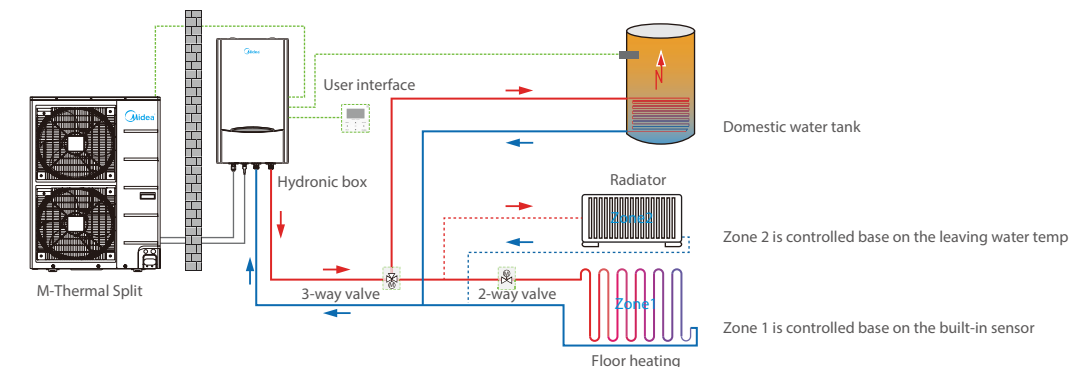
## Flexible operation & More comfort

- ❖ Weather dependent operation with climate correlation to ensure absolute comfort climate correlation curve curves for choice. Once the curve is selected, the unit set the outlet water temperature automatically according to the outdoor ambient temperature.

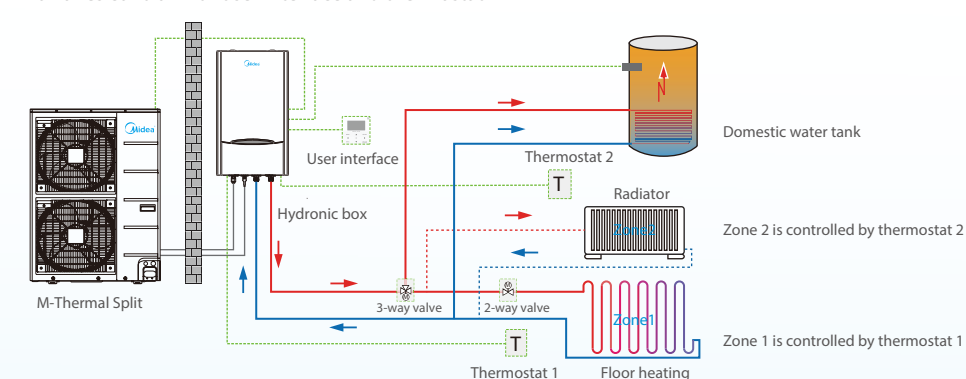


- ❖ Two zones control for more flexibility  
Temperature of each zone is separately controlled. Two zones control reduces water pump cycle time and save energy.

Two zones control with one user interface



Two zones control with user interface and thermostat



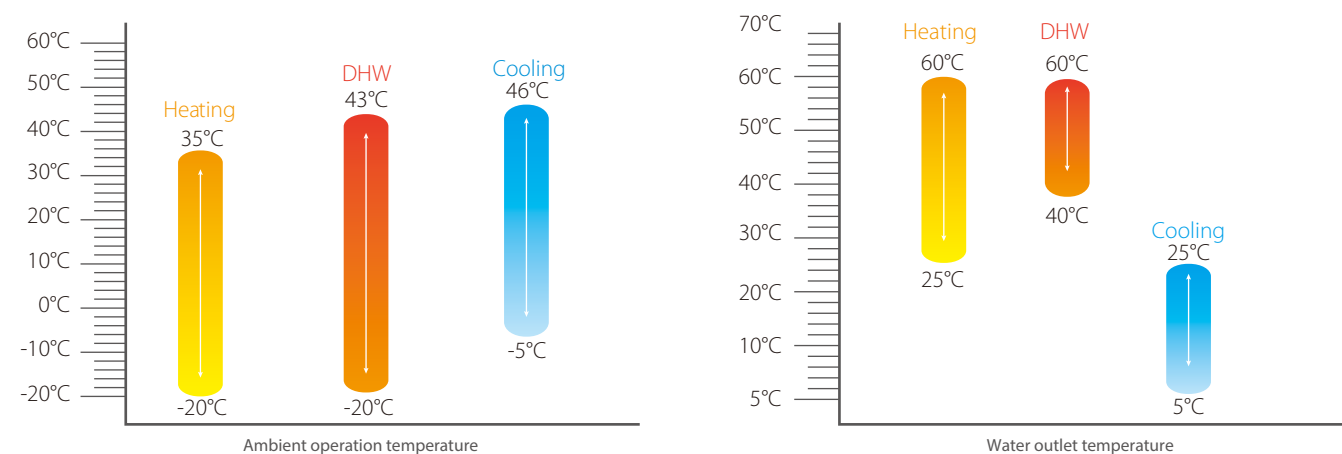
- ❖ Priority setting function and multi modes choice



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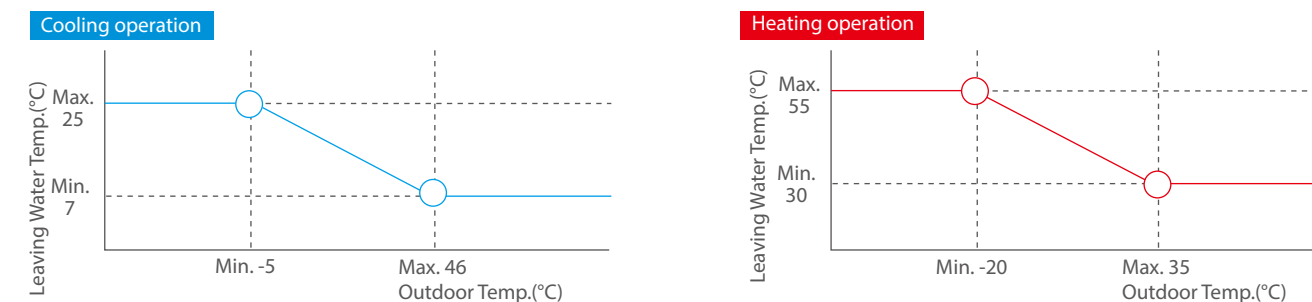
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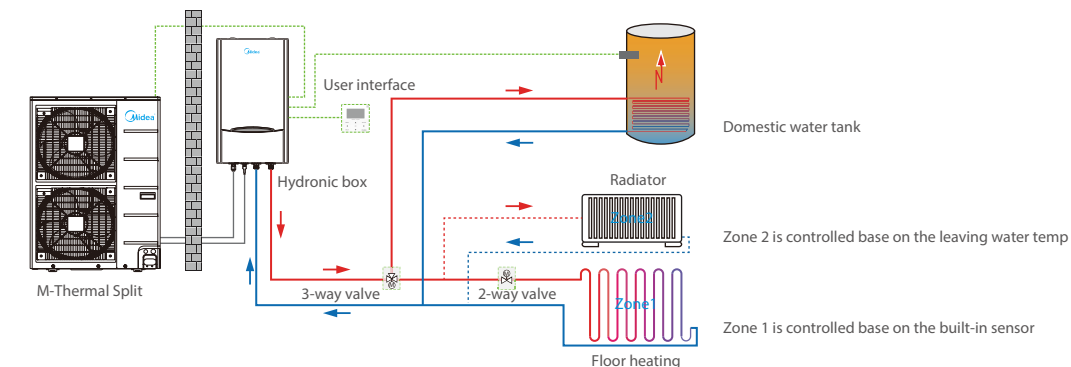
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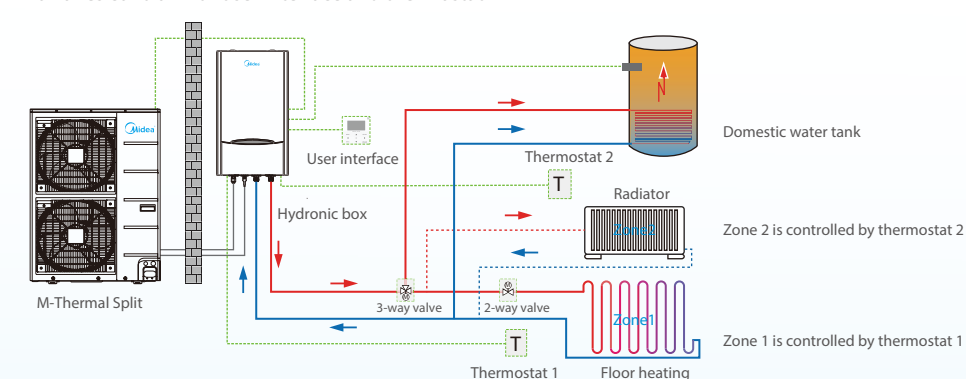


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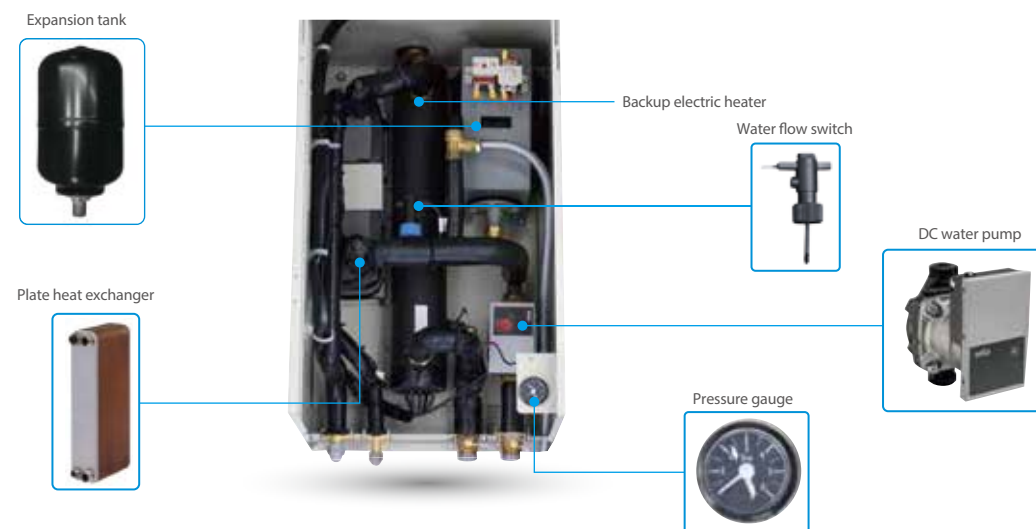
- ❖ Priority setting function and multi modes choice



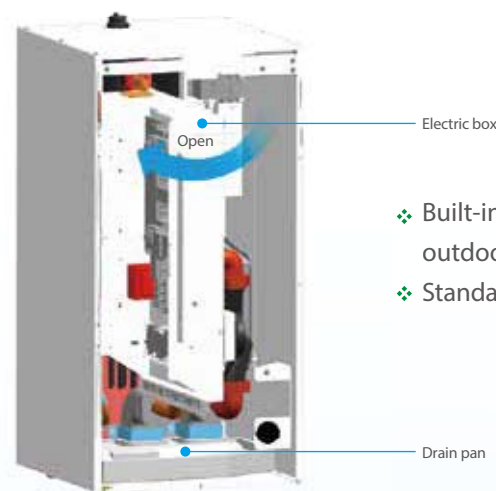
- ❖ Special functions such as air purge, preheating for floor and floor drying up for choice

## Hydronic box

- ❖ All hydronic components are pre-assembled, easy for installation.



- ❖ All parts are easy to reach for maintenance thanks to the rotatory electric box design.



- ❖ Built-in backup electric heater for additional heating during extremely cold outdoor temperatures. The capacity of electric heater is adjustable.
- ❖ Standard drain pan in the hydronic box, no worry about condensate water.

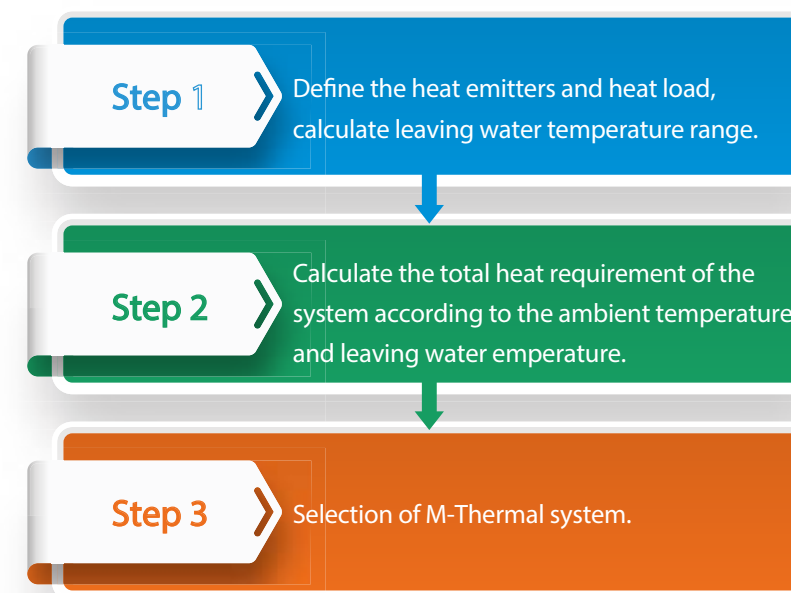
## User interface



- ❖ Newly designed dot-matrix wired controller.
- ❖ 150m signal wire permitted.
- ❖ Built-in temperature sensor to realize follow me function.
- ❖ Modbus protocol.
- ❖ Separated power adaptor.

## Typical Applications

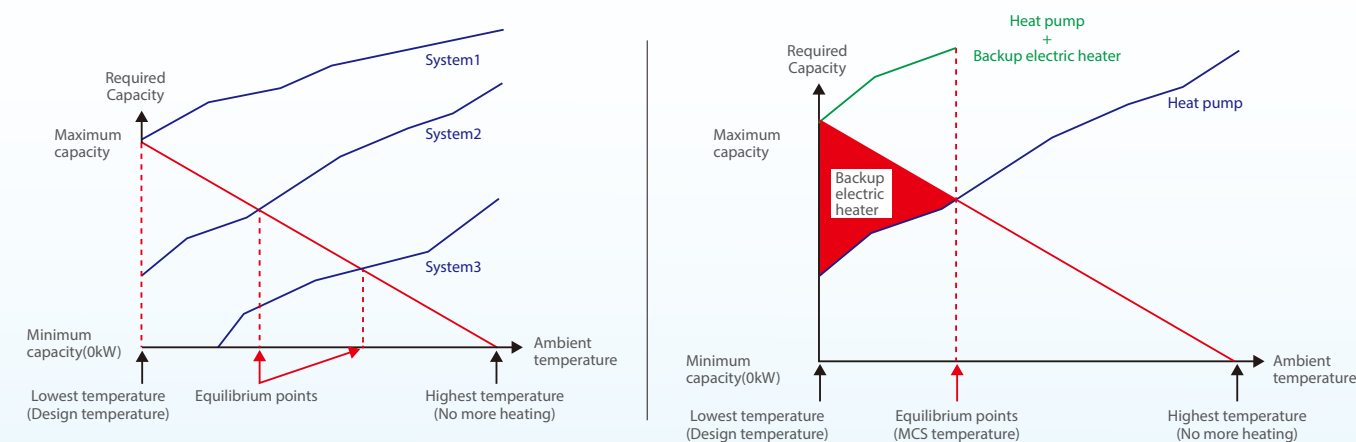
### Selection Procedure



### M-thermal system configurations

M-thermal system consists of a heat pump and a backup electric heater in the hydronic modular.

Heat pump's capacity decreases with the ambient temperature, electric heater is used to provide the insufficient heat requirement. Below an extreme ambient temperature, the heat pump can't provide capacity any more for the system's safety as well as energy efficiency. Typically there are three different systems for selection under certain situation:

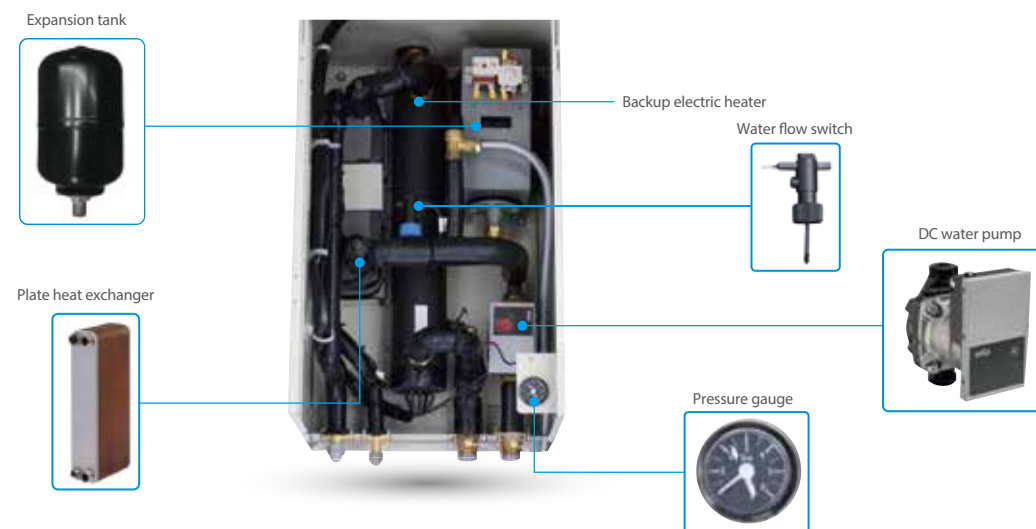


- ❖ System 1: Heat pump covers the required capacity and no extra heating capacity is necessary.
  - ❖ System 2: Heat pump covers the required capacity up the equilibrium point. When the ambient temperature is below the equilibrium point, the backup electric heater supplies the insufficient heat requirement.
  - ❖ System 3: The heat pump of system cannot cover the required capacities. When the ambient temperature is out of range for heat pump, there system must have an auxiliary heat source (AHS) capable of providing all required capacity.
- In System 1, heat pump covers the required capacity at all times, but the solution may be expensive due to the large heat pump selection. As M-thermal system consists of a heat pump and a backup electric heater in the hydronic modular, System 2 may be a cheaper solution. The backup electric heater is not used too frequently during the year and supplies the insufficient heat necessary at low ambient temperature.

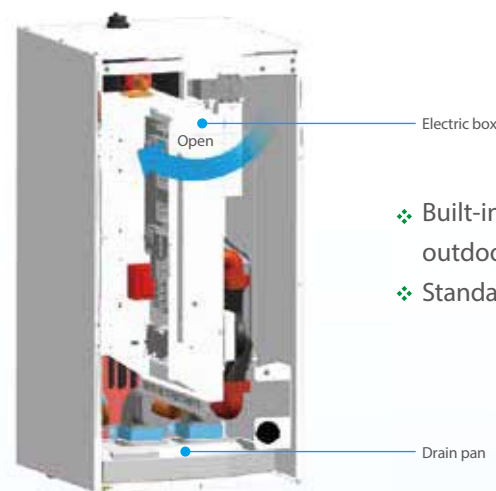


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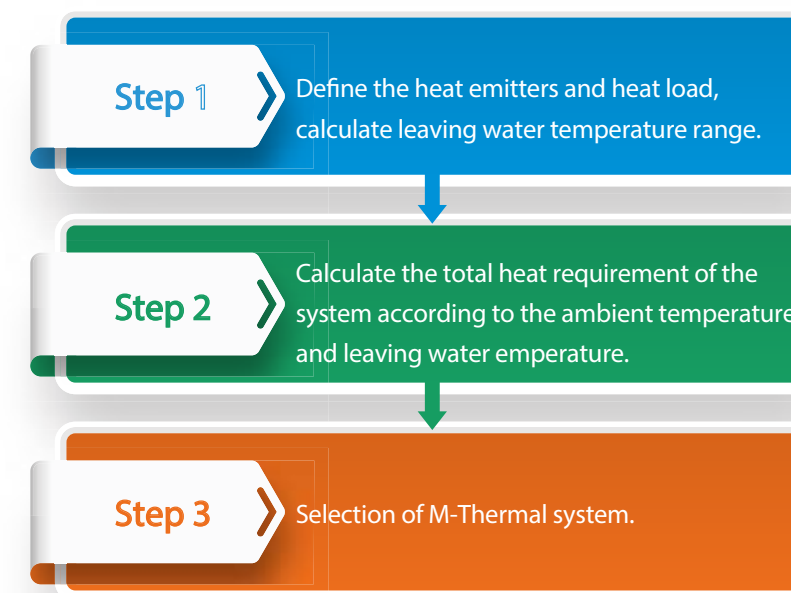
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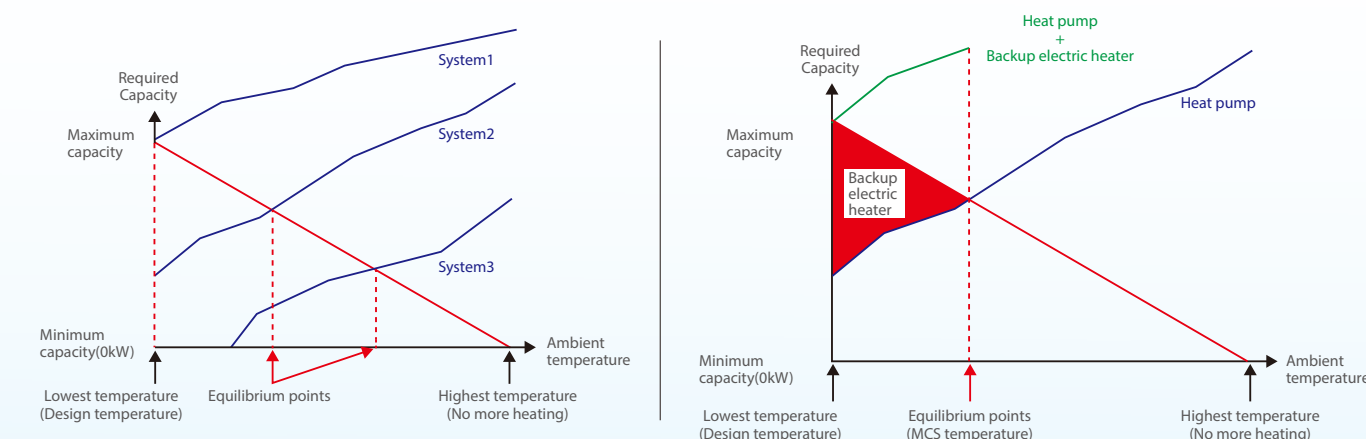
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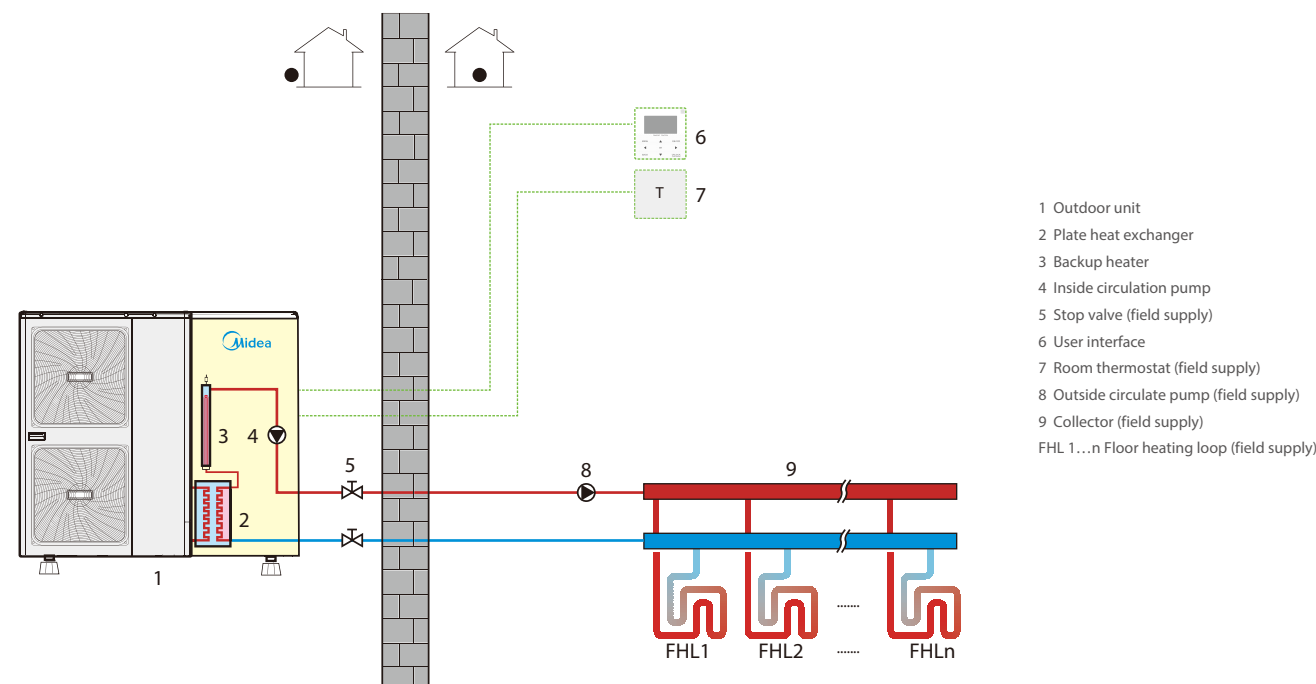


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## M-Thermal Mono applications

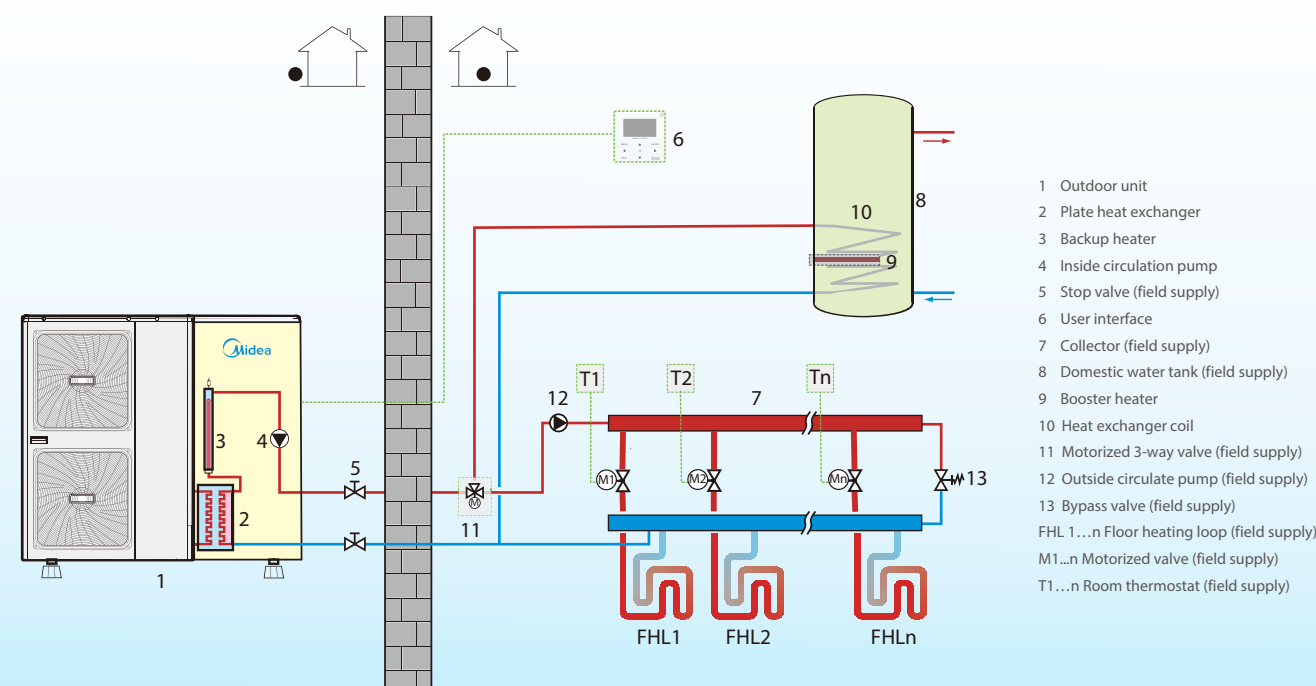
### ❖ Application 1: M-Thermal Mono for space heating only

The room thermostat is used as a switch. When there is a heating request from the room thermostat, the Mono unit operates to achieve the target water temperature that set on the user interface. When the room temperature achieves the thermostat's set point, Mono unit stops operation.



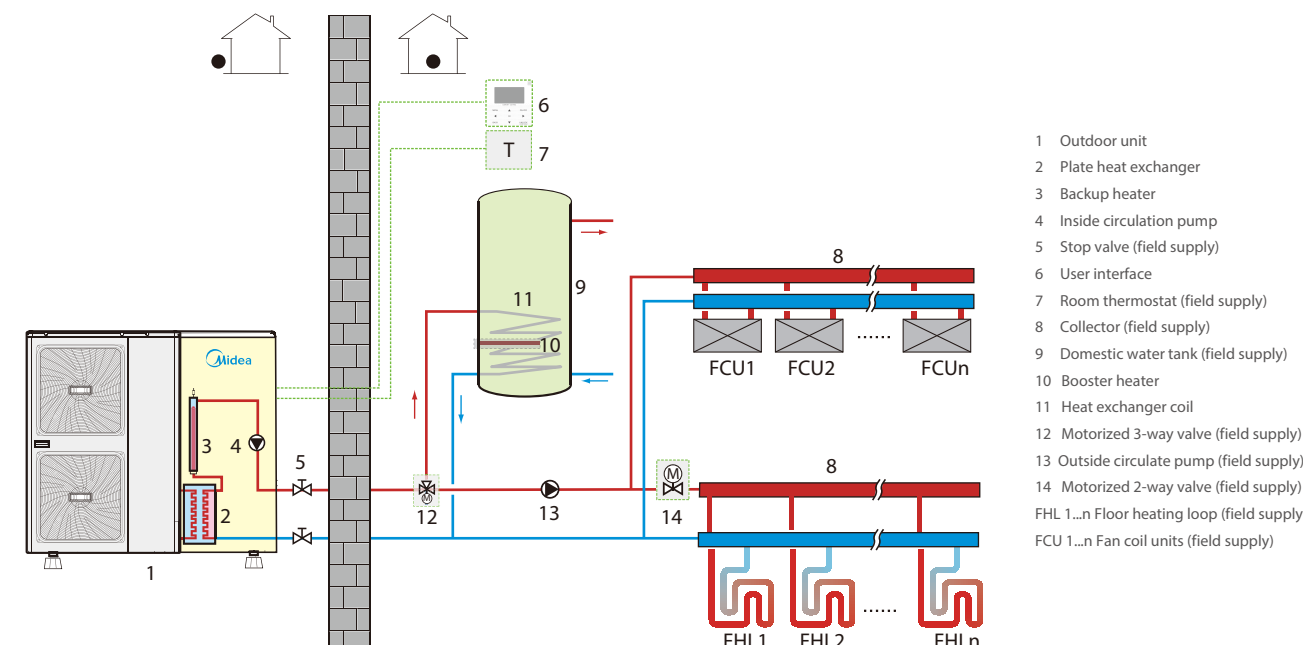
### ❖ Application 2: M-Thermal Mono for space heating and domestic hot water

Room thermostat is not connected to the Mono unit but to motorized valve. Each room's temperature is regulated by the motorized valve on every water circuit. Sanitary hot water is delivered by the domestic hot water tank connected to the Mono unit. In this situation, bypass valve is necessary.



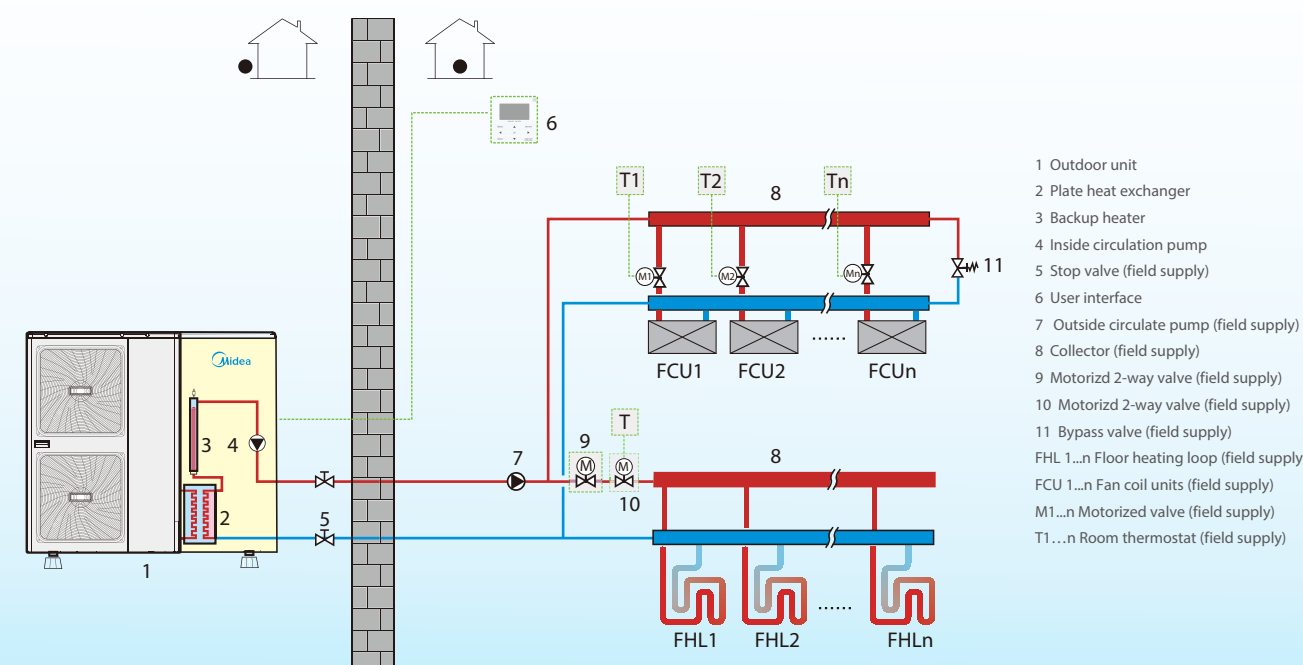
### ❖ Application 3: M-Thermal Mono for space heating, space cooling and domestic hot water

Floor heating coils and fan coil units are for space heating. Fan coil units used for space cooling. Sanitary hot water is delivered by the domestic hot water tank connected to the Mono unit. The unit will switch to heating or cooling mode according to the temperature detected by the room thermostat. In space Cooling mode, the 2-way valve closes to prevent cold water entering to the floor heating loops.



### ❖ Application 4: M-Thermal Mono for space heating and space cooling

Space cooling and heating application without a room thermostat connected to the unit, but with a heating only room thermostat controlling the floor heating and a heating/cooling thermostat controlling the fan coil units. Heating is provided through floor heating loops and fan coil units. Cooling is provided through the fan coil units only.

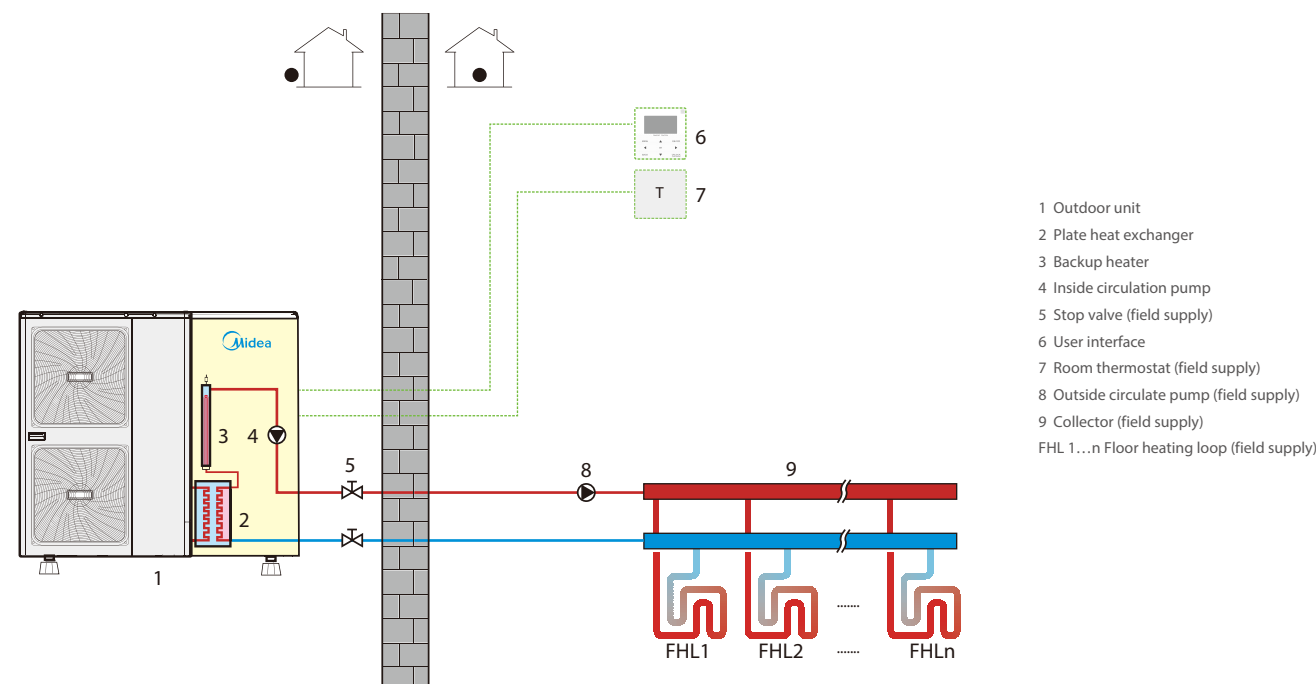




## M-Thermal Mono applications

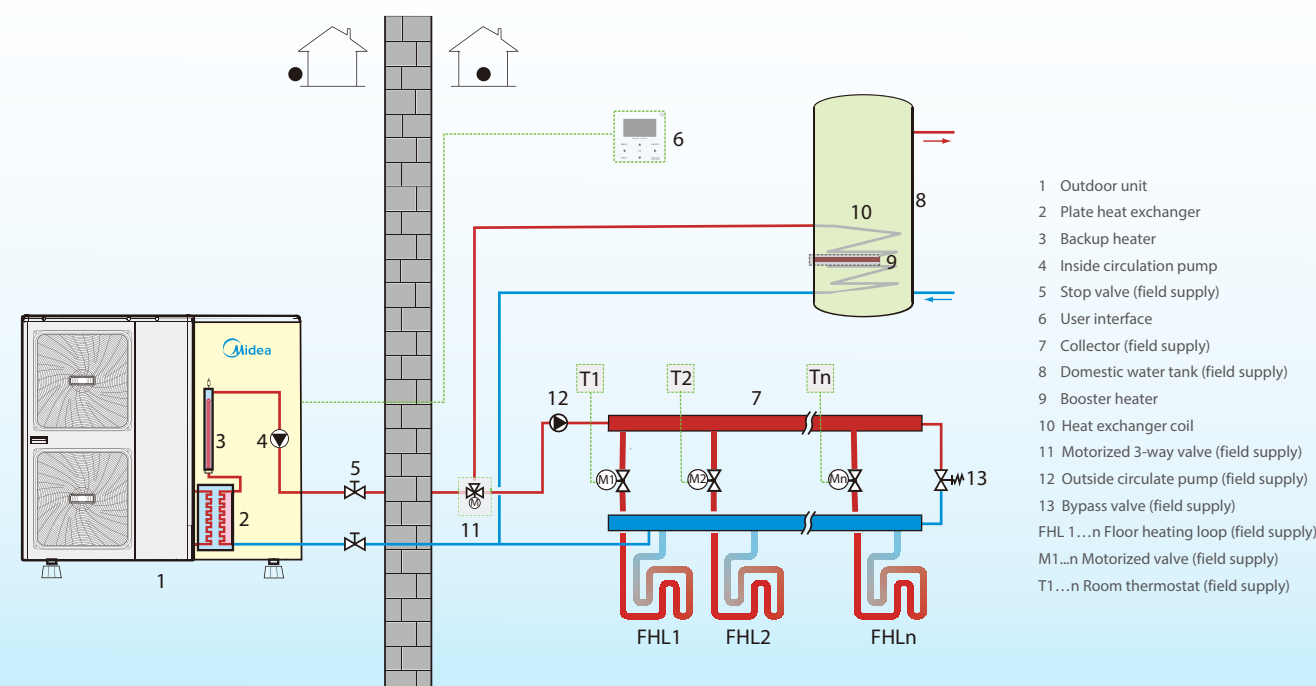
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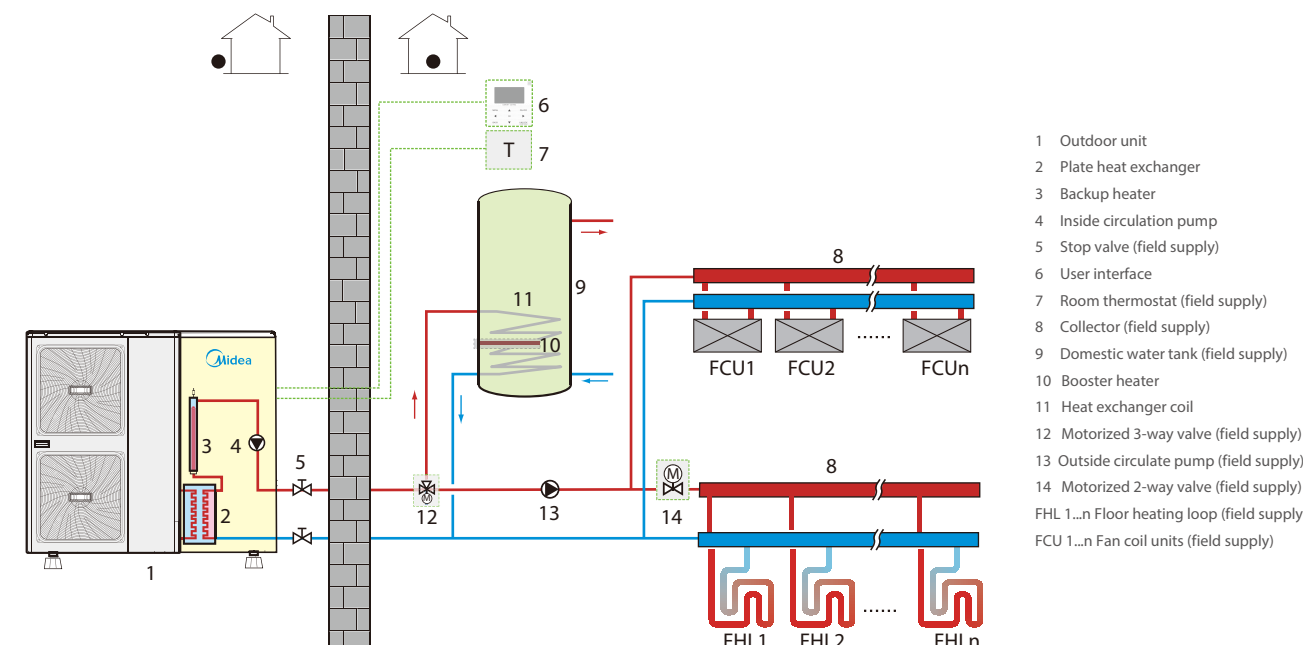
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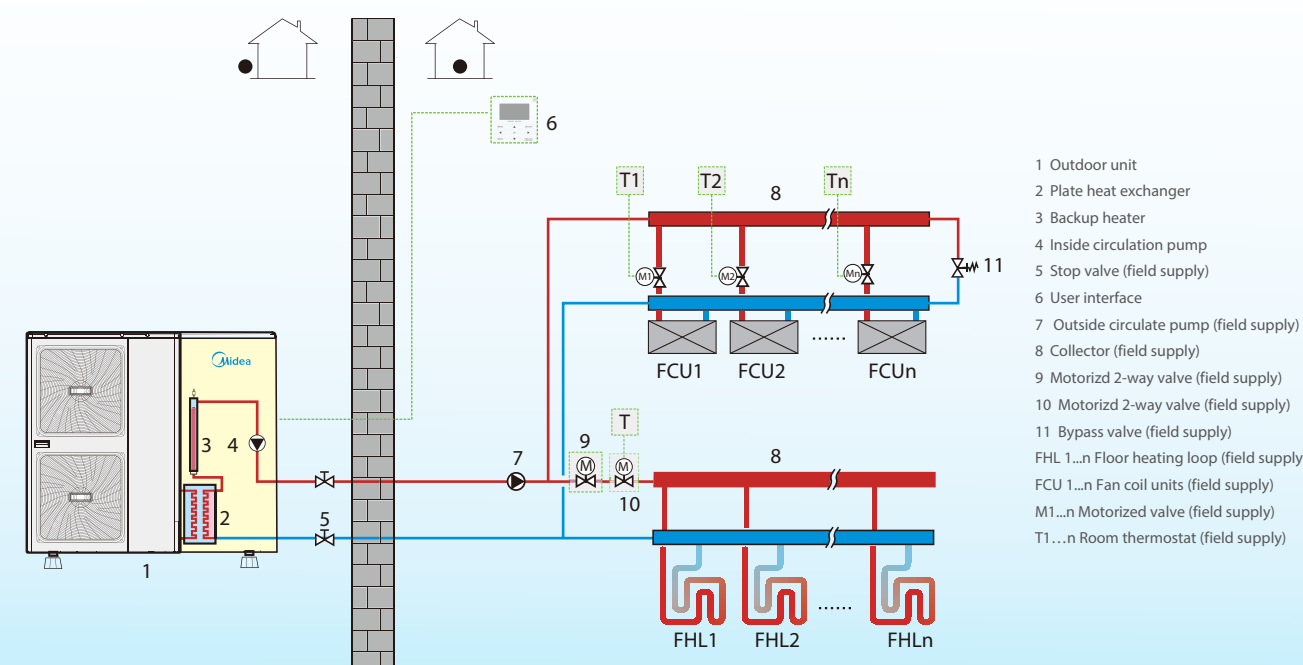
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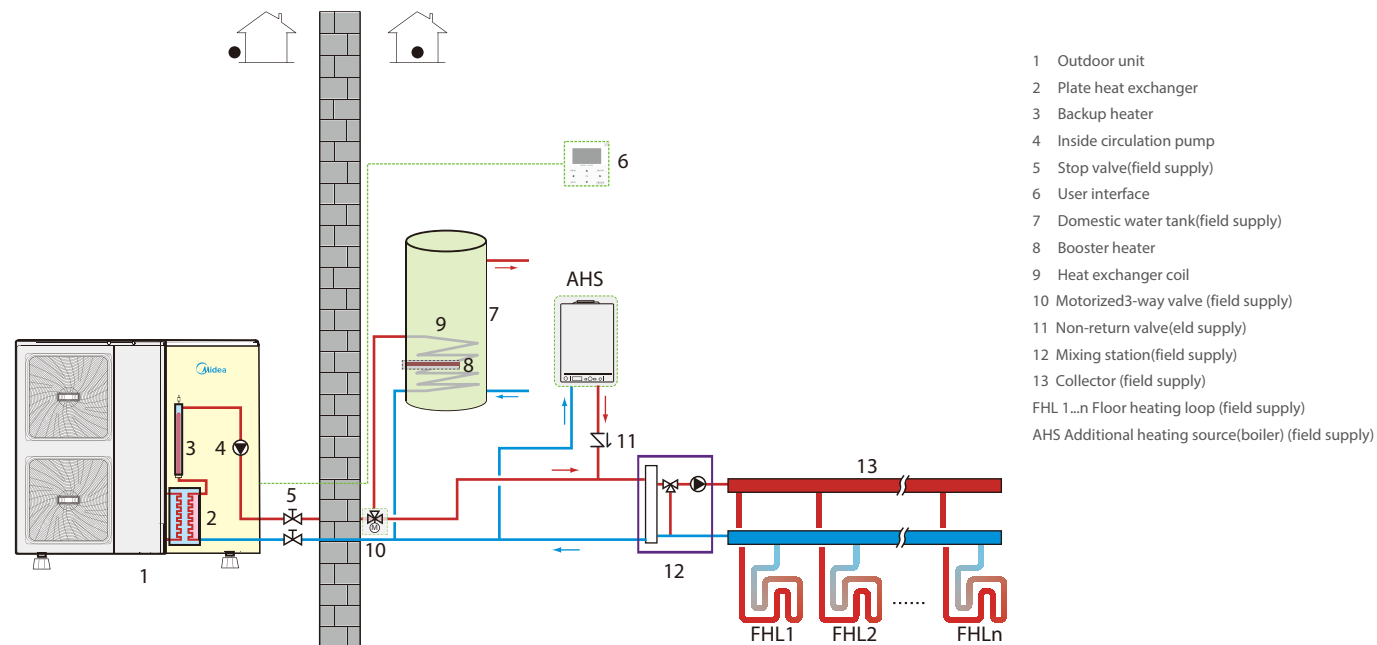
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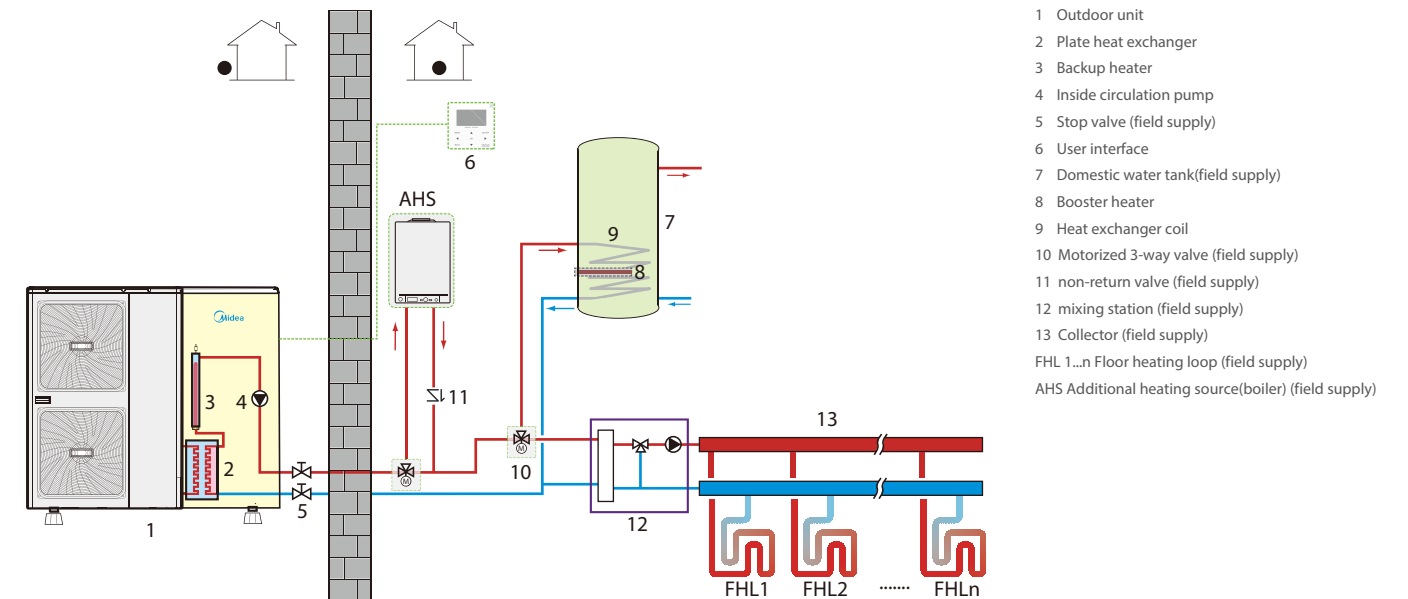
## ❖ Application 5: Bivalent application, M-Thermal Mono and auxiliary boiler for space heating and domestic hot water.

Typically there are 3 application situations

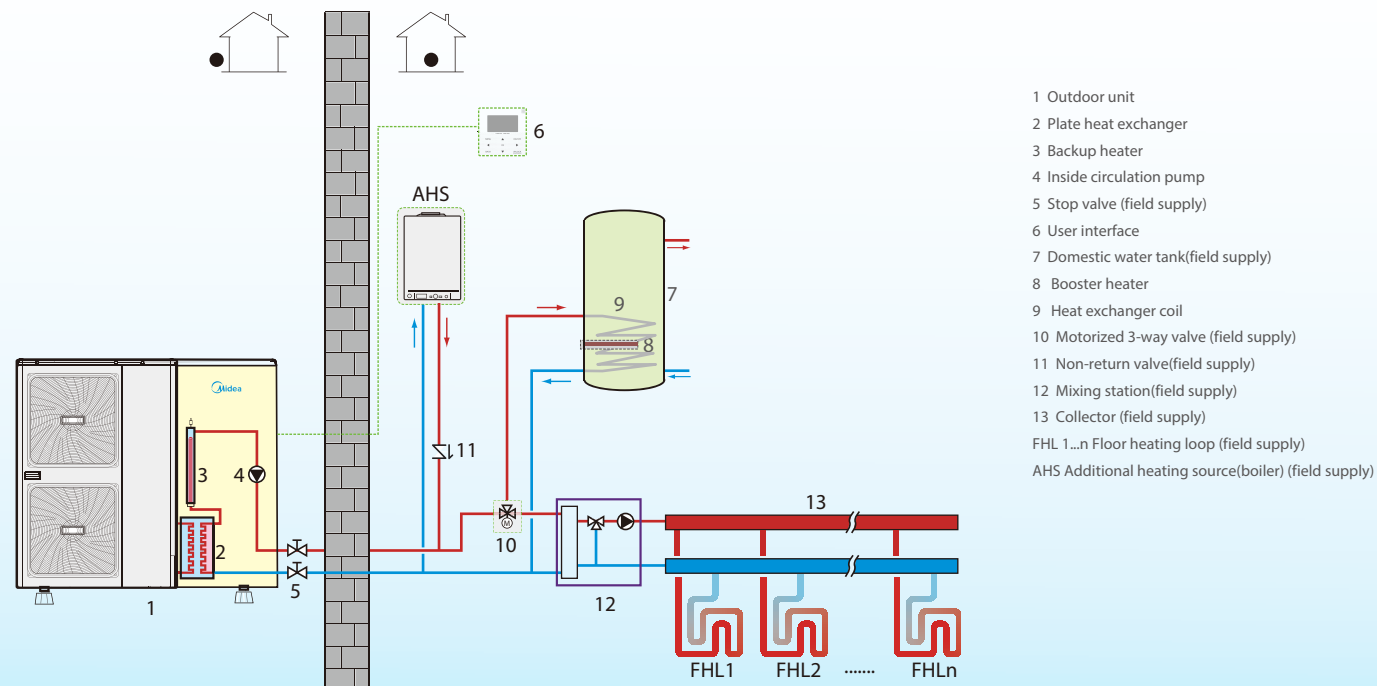
## 5-1 Auxiliary boiler only provide heating for space heating



## 5-3 Auxiliary boiler reheats the water from the outdoor unit. An additional 3-way valve should be installed, when the water temperature from Mono unit is not high enough, the 3-way valve opens and the water flow through the boiler and be reheated.

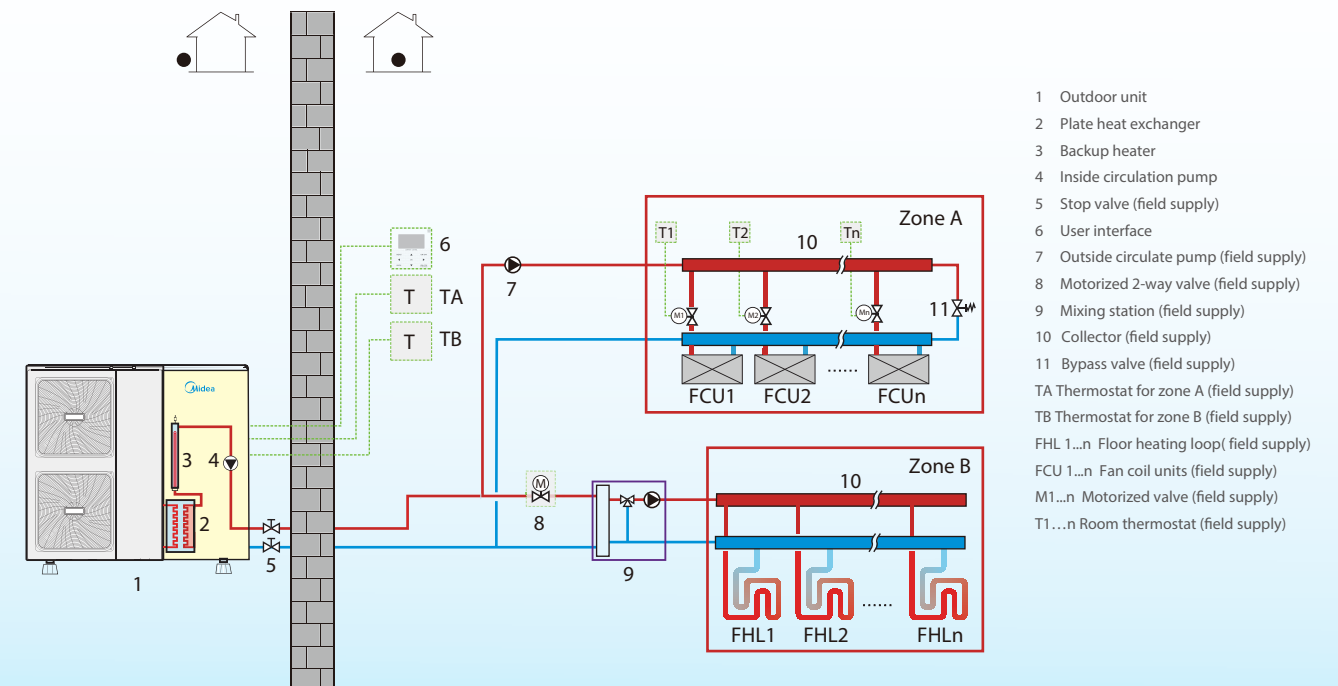


## 5-2 Auxiliary boiler provide heating for space heating and domestic hot water



## ❖ Application 6: M-Thermal Mono application for space heating through floor heating loops and fan coil units. The floor heating loops and fan coil units require different operating water temperatures.

To achieve these two set points, a mixing station is needed. Room thermostats for each zone are optional.

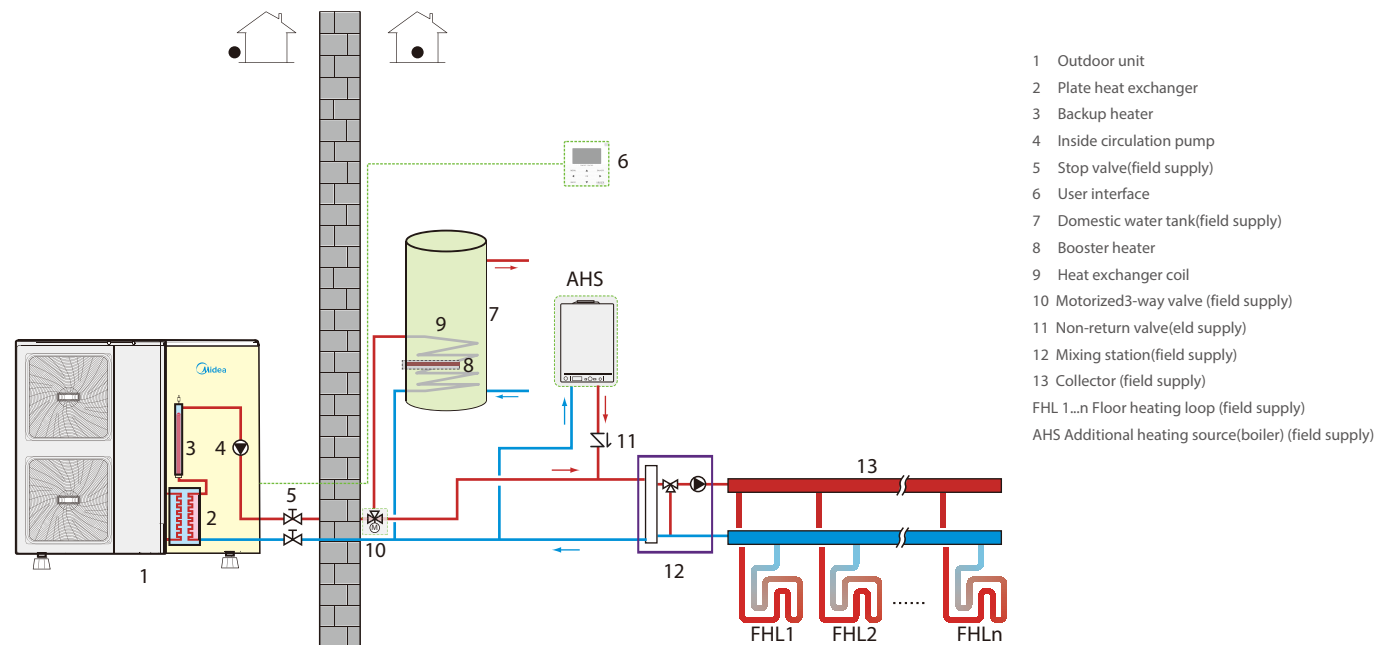




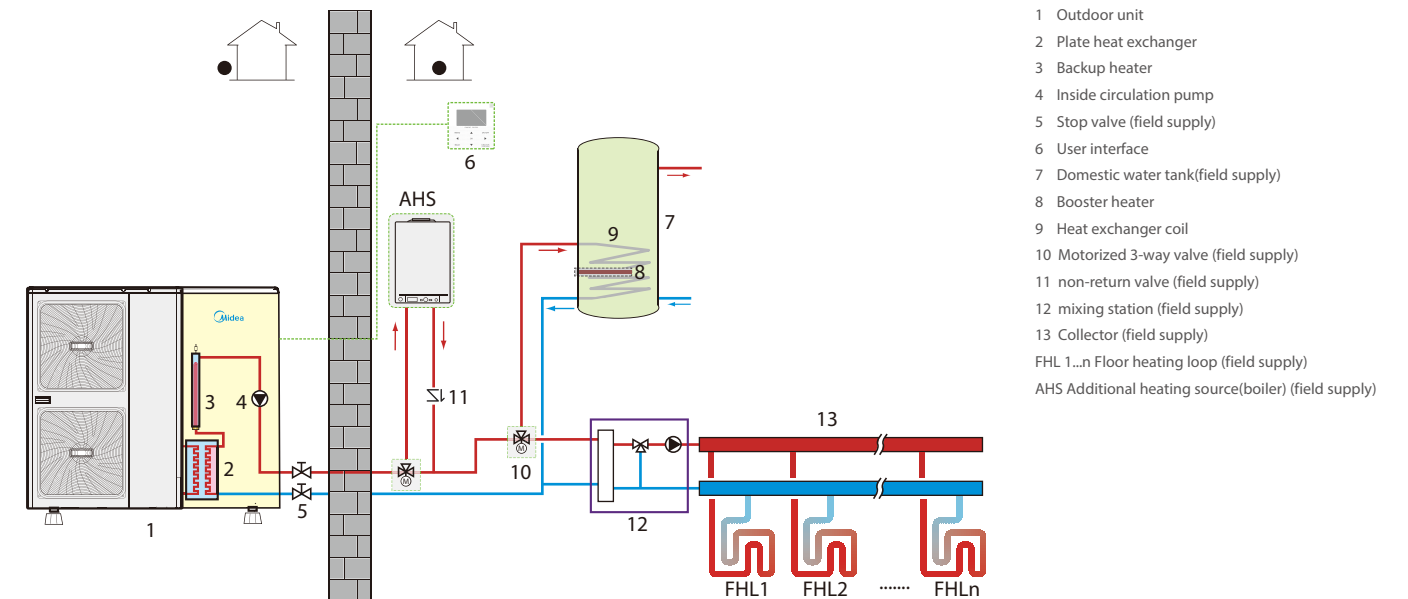
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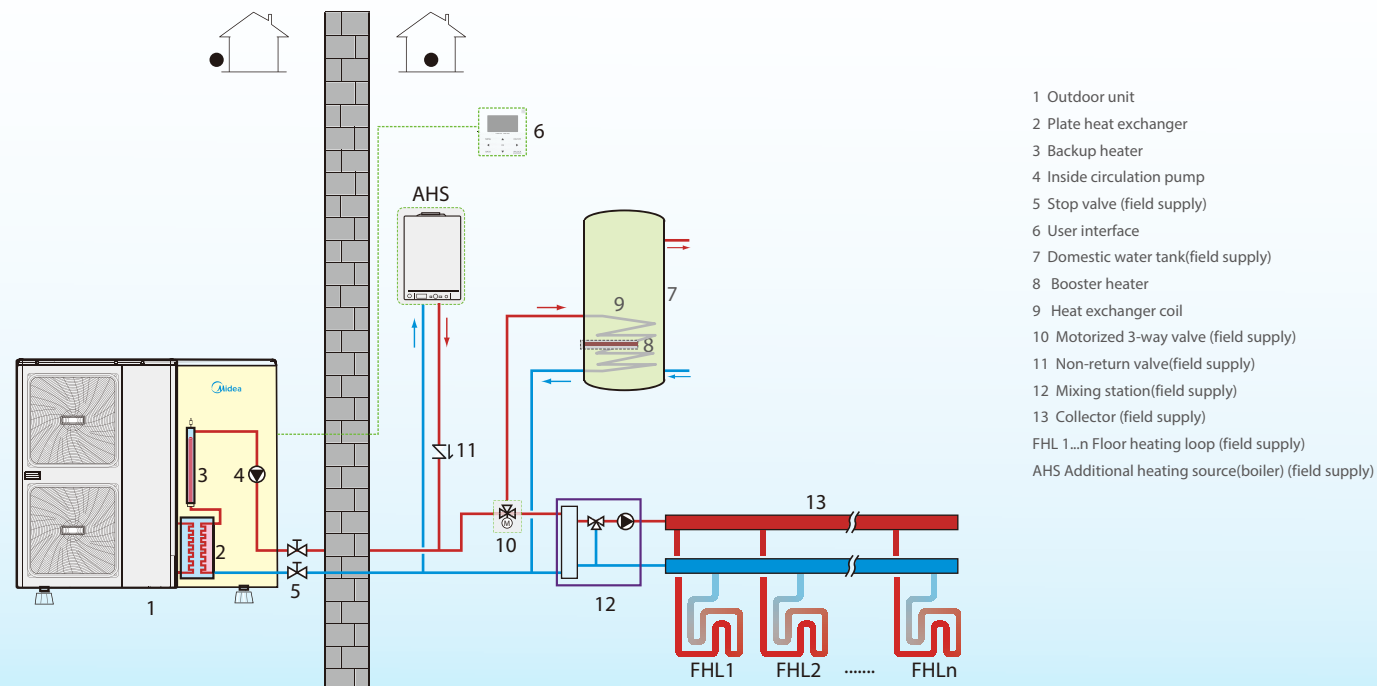
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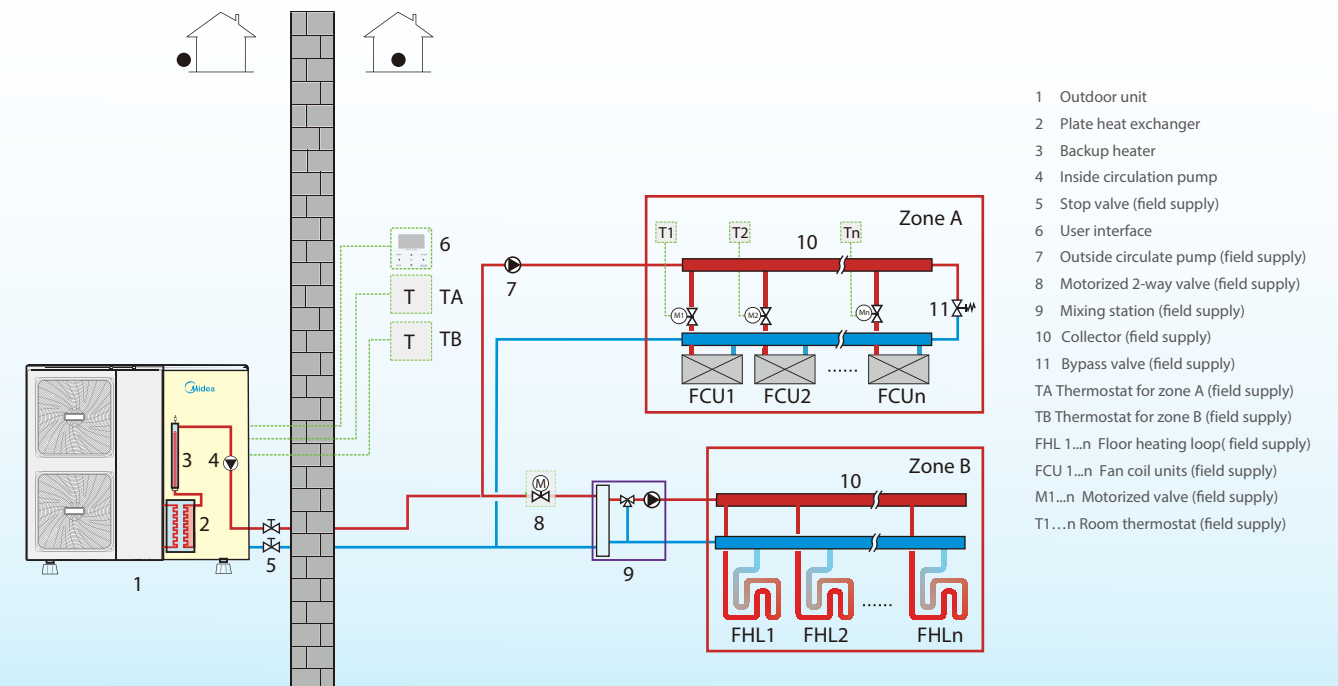


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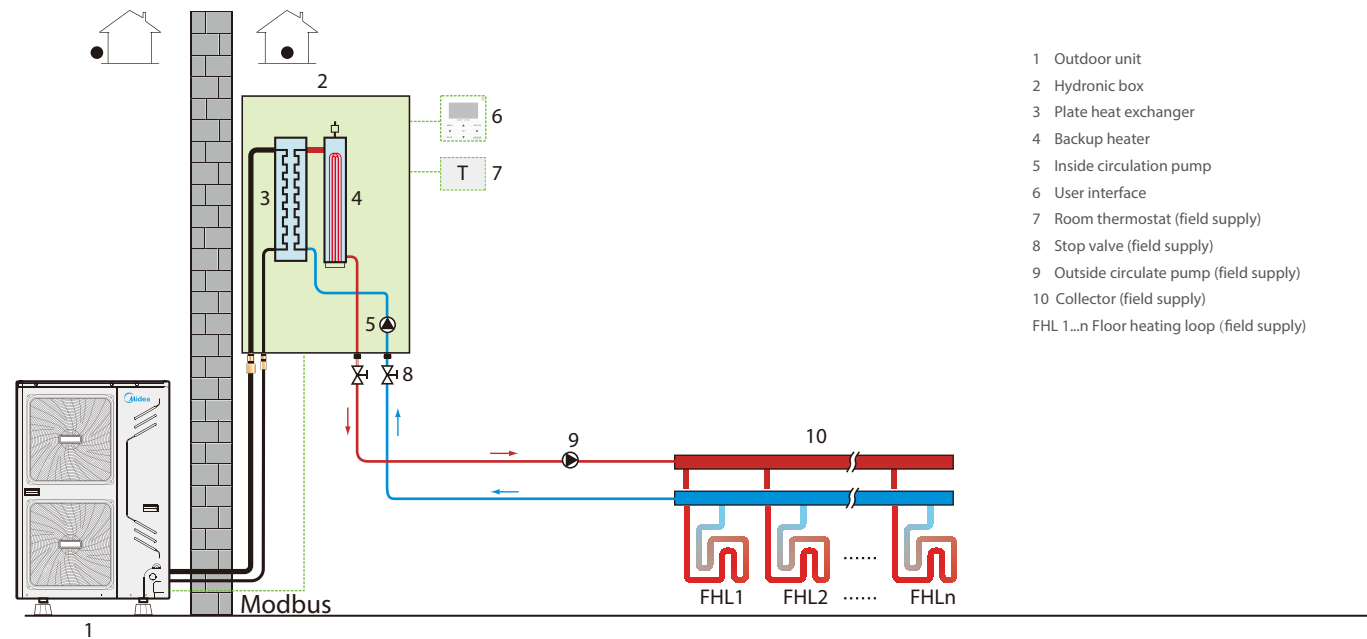
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## M-Thermal Split applications

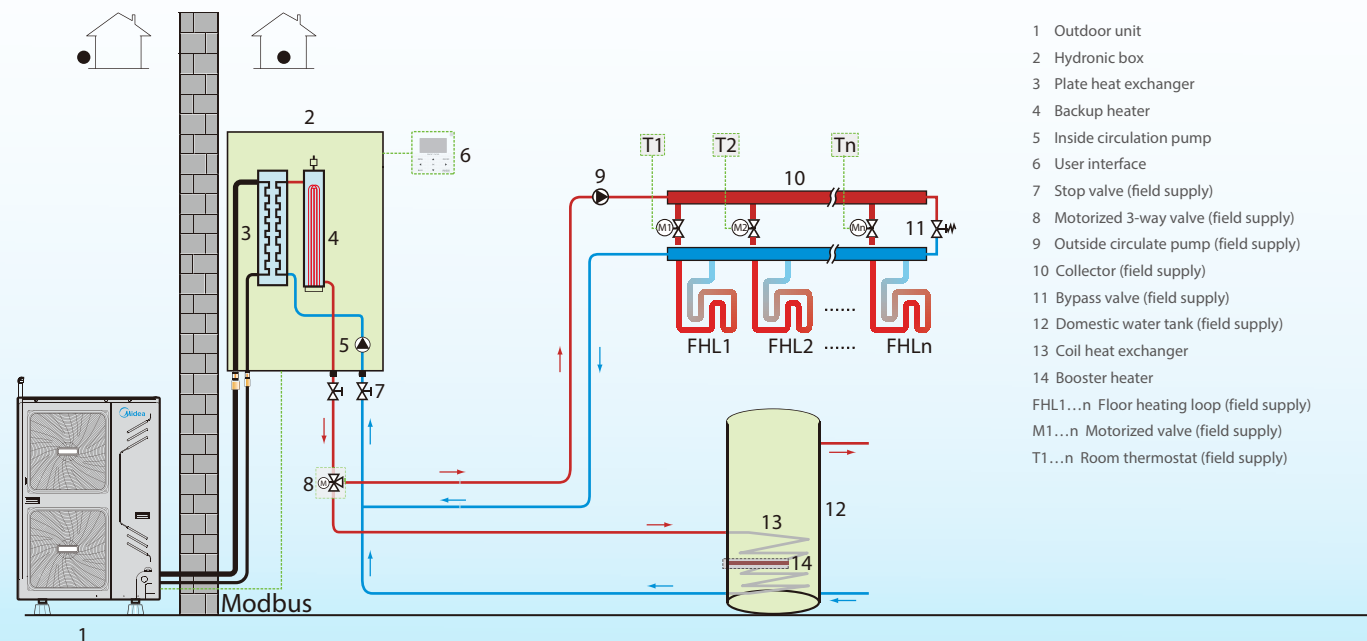
### ❖ Application 1: M-Thermal Split unit for space heating only

The room thermostat is used as a switch. When there is a heating request from the room thermostat, the Split unit operates to achieve the target water temperature that set on the user interface. When the room temperature achieves the thermostat's set point, unit stops operation.



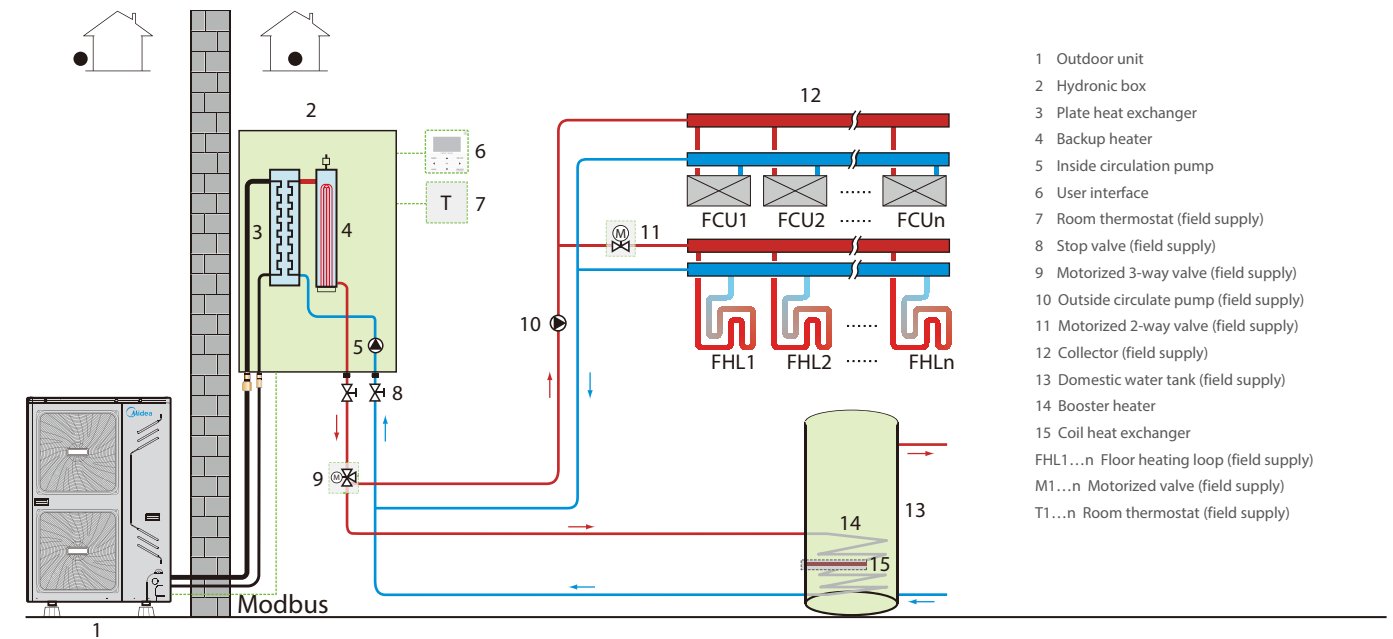
### ❖ Application 2: M-Thermal Split type unit for space heating and domestic hot water

Room thermostat is not connected to the indoor hydronic box but to motorized valve. Each room's temperature is regulated by the motorized valve on every water circuit. Sanitary hot water is delivered by the domestic hot water tank connected to the split indoor unit. In this situation, bypass valve is necessary.



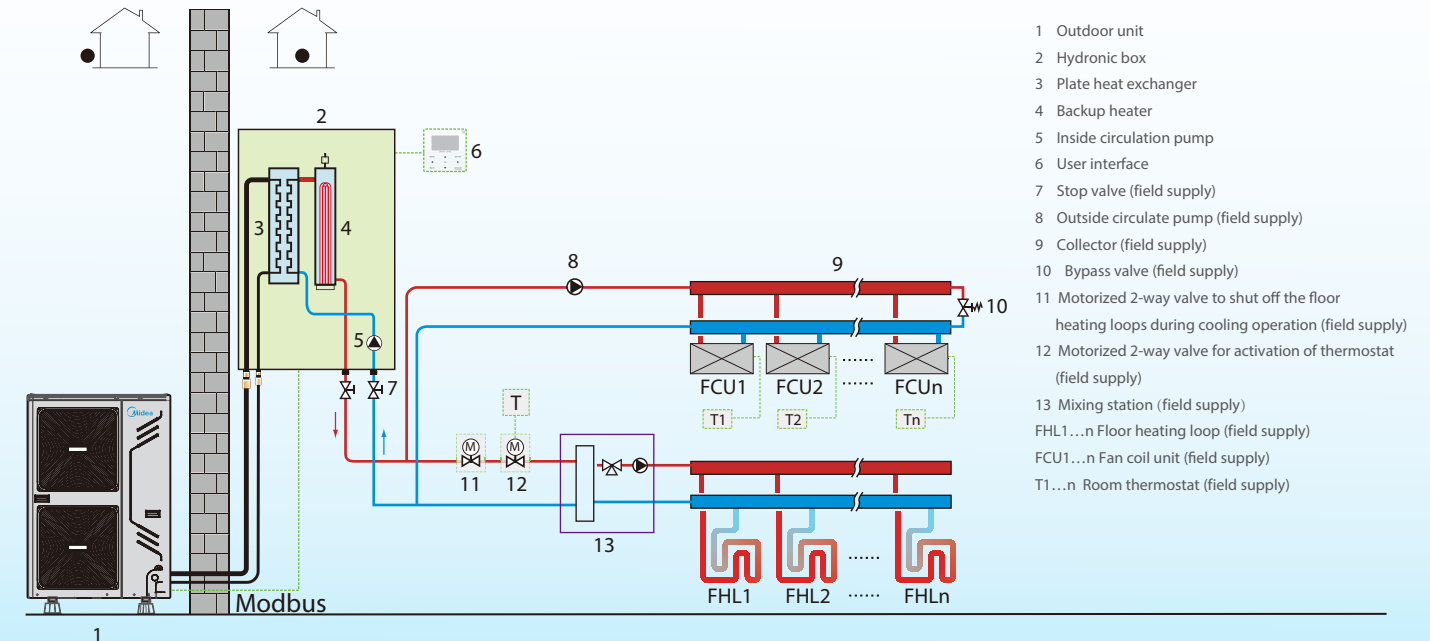
### ❖ Application 3: M-Thermal Split type unit for space heating, space cooling and domestic hot water

Floor heating coils and fan coil units are for space heating. Fan coil units used for space cooling. Sanitary hot water is delivered by the domestic hot water tank connected to the indoor hydronic box. The outdoor unit will switch to heating or cooling mode according to the temperature detected by the room thermostat. In space Cooling mode, the 2-way valve closes to prevent cold water entering to the floor heating loops.



### ❖ Application 4: M-Thermal Split type unit for space heating and space cooling

Space cooling and heating application without a room thermostat connected to the indoor hydronic box, but with a heating only room thermostat controlling the floor heating and a heating/cooling thermostat controlling the fan coil units. Heating is provided through floor heating loops and fan coil units. Cooling is provided through the fan coil units only.

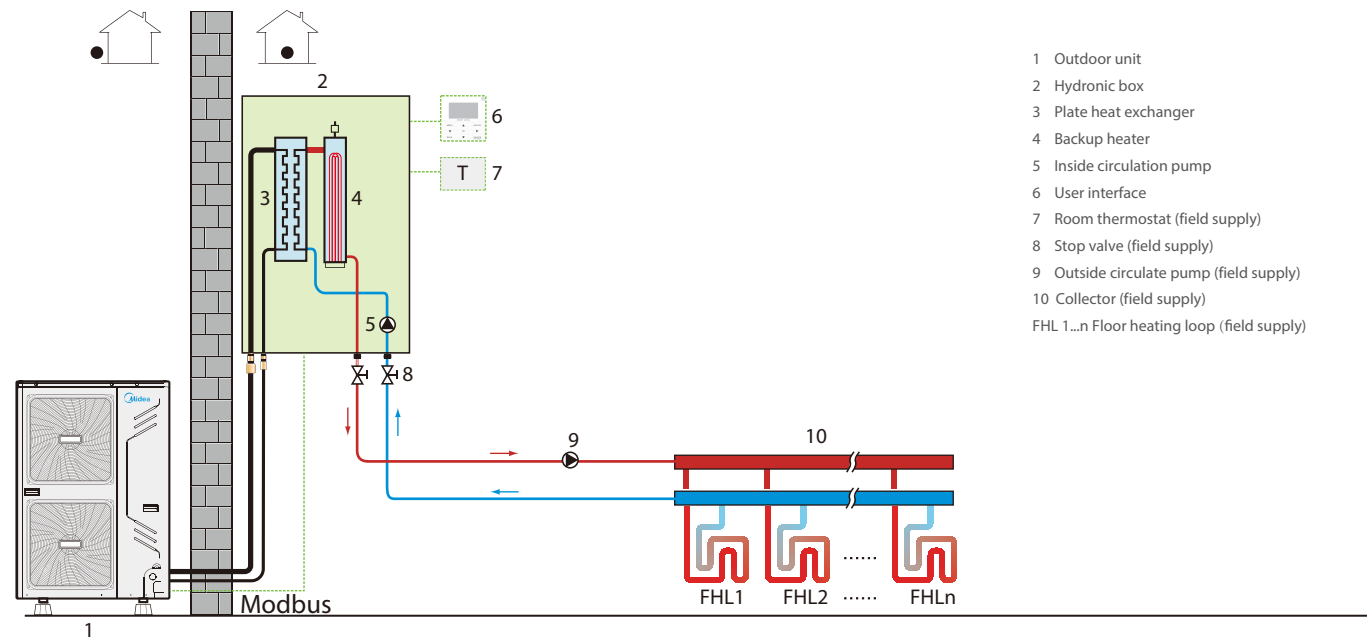




## M-Thermal Split applications

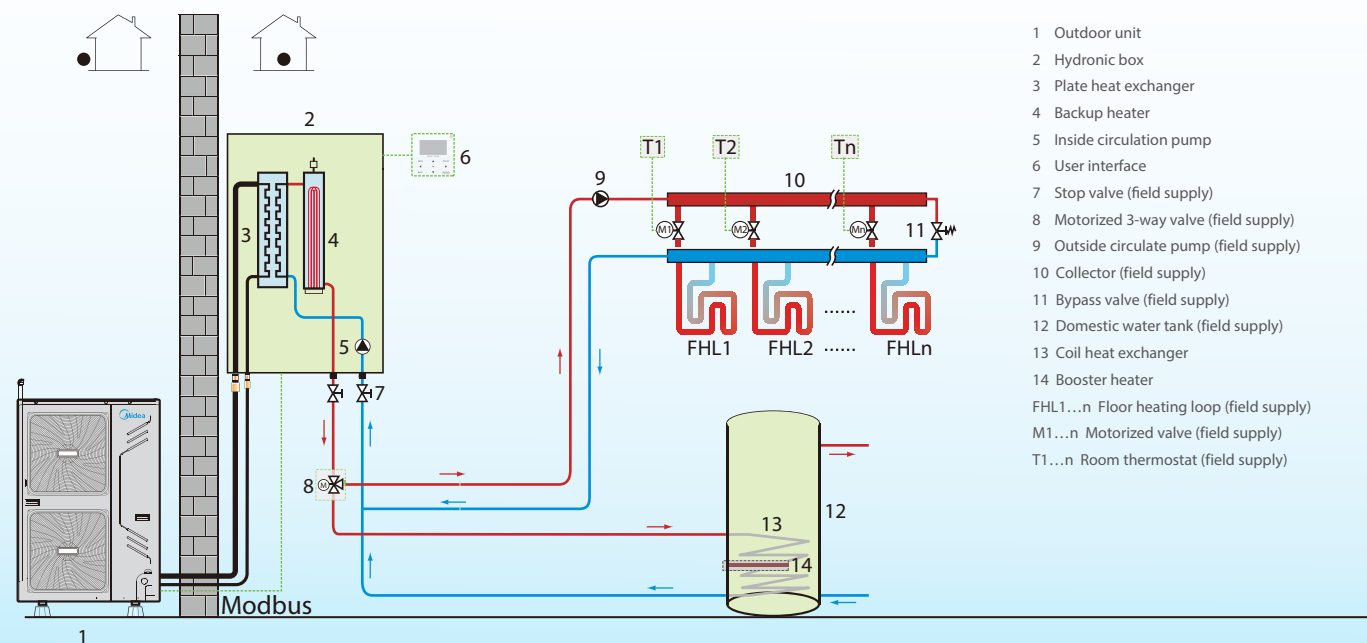
### ❖ Application 1: M-Thermal Split unit for space heating only

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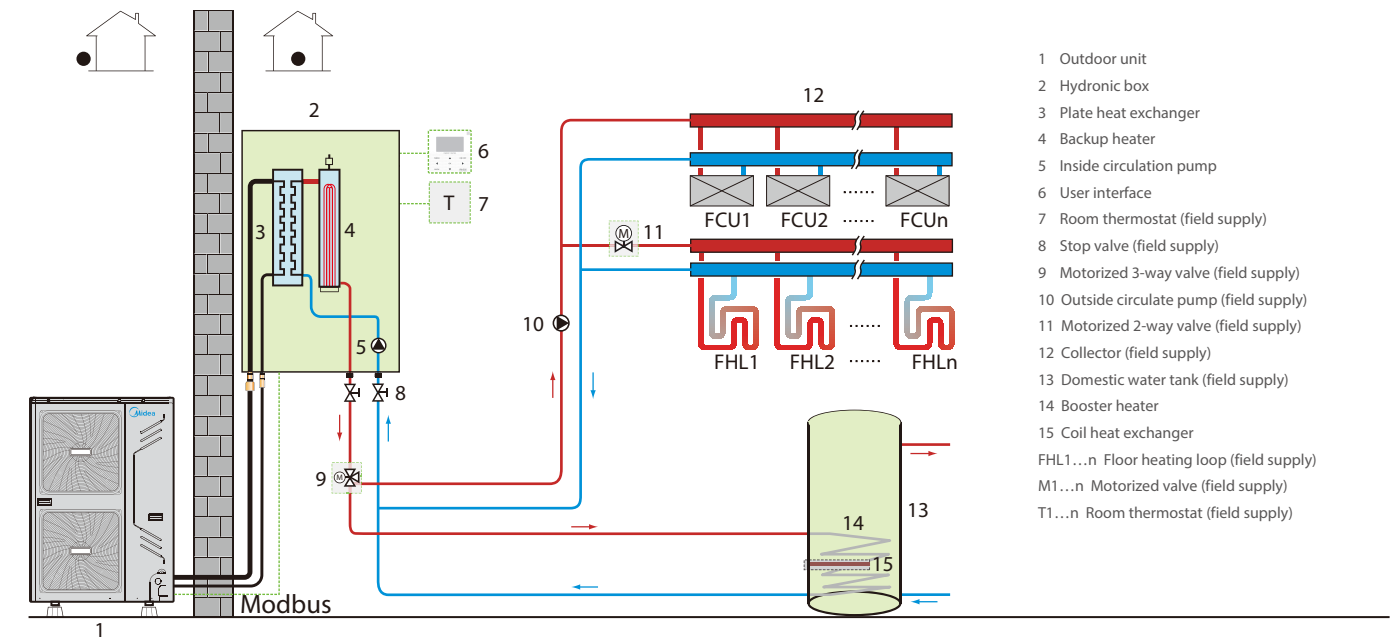
### ❖ Application 2: M-Thermal Split type unit for space heating and domestic hot water

Room thermostat is not connected to the indoor hydronic box but to motorized valve. Each room's temperature is regulated by the motorized valve on every water circuit. Sanitary hot water is delivered by the domestic hot water tank connected to the split indoor unit. In this situation, bypass valve is necessary.



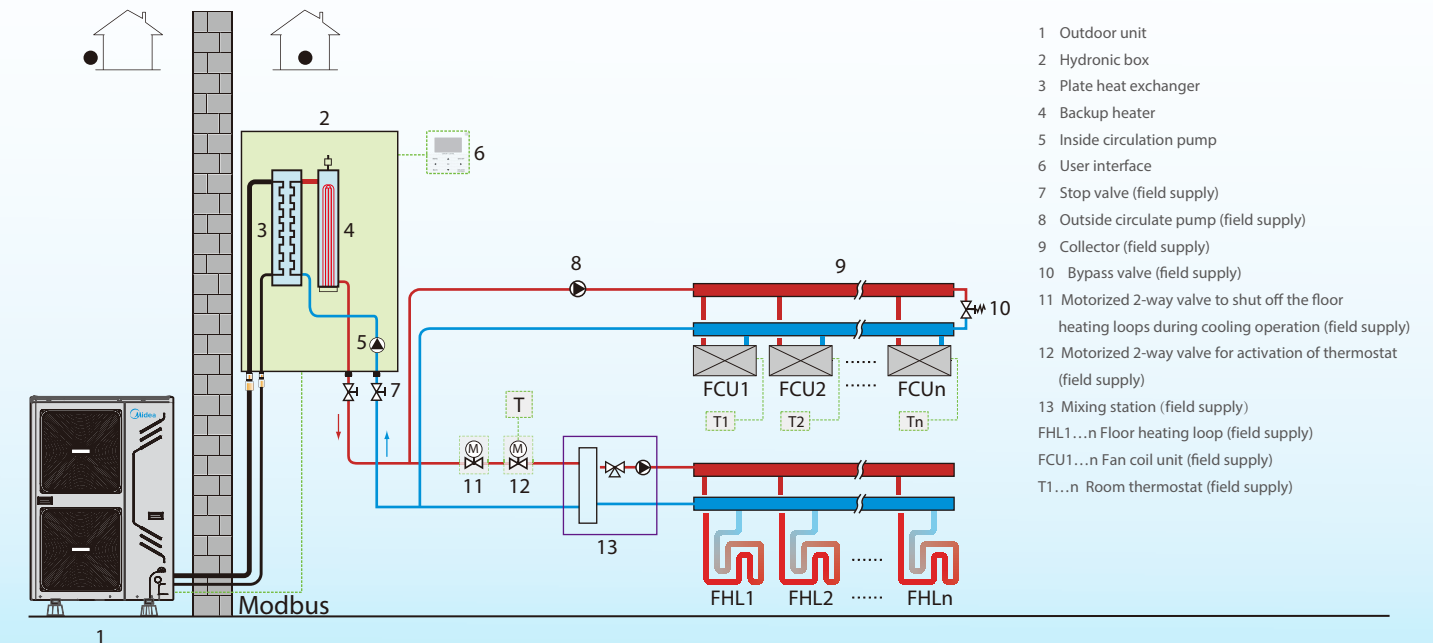
### ❖ Application 3: M-Thermal Split type unit for space heating, space cooling and domestic hot water

Floor heating coils and fan coil units are for space heating. Fan coil units used for space cooling. Sanitary hot water is delivered by the domestic hot water tank connected to the indoor hydronic box. The outdoor unit will switch to heating or cooling mode according to the temperature detected by the room thermostat. In space Cooling mode, the 2-way valve closes to prevent cold water entering to the floor heating loops.



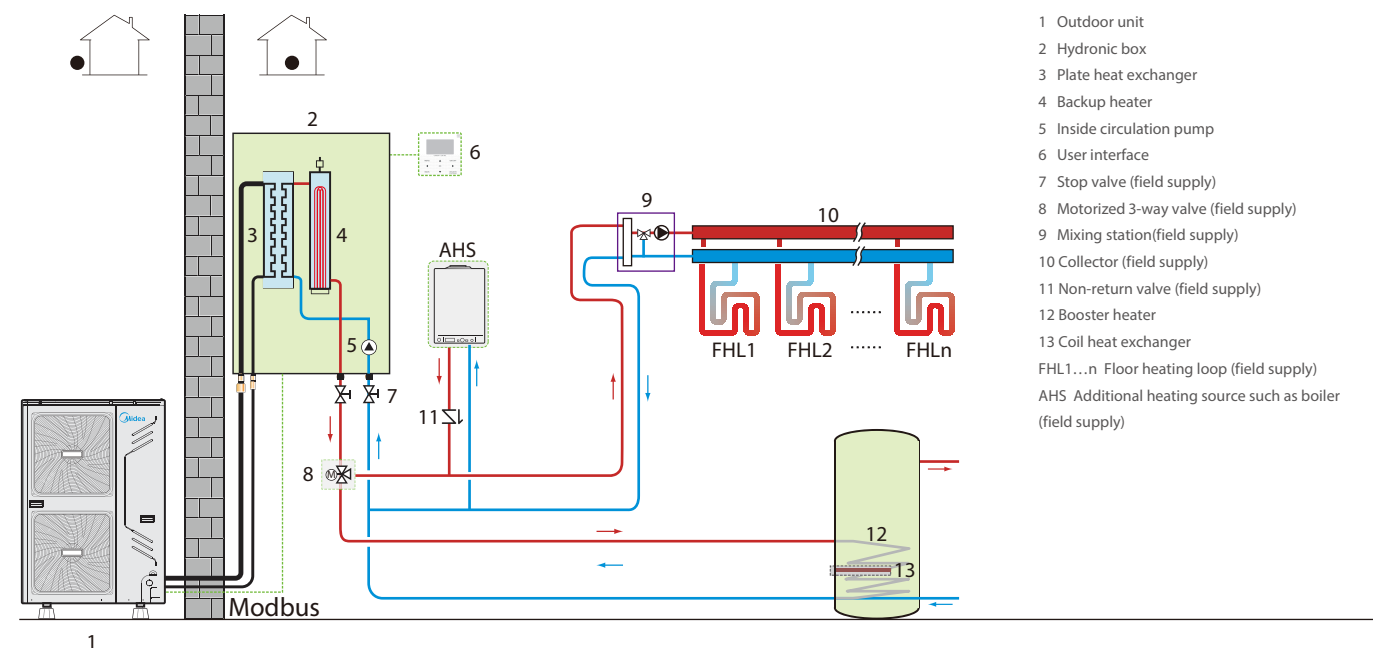
### ❖ Application 4: M-Thermal Split type unit for space heating and space cooling

Space cooling and heating application without a room thermostat connected to the indoor hydronic box, but with a heating only room thermostat controlling the floor heating and a heating/cooling thermostat controlling the fan coil units. Heating is provided through floor heating loops and fan coil units. Cooling is provided through the fan coil units only.

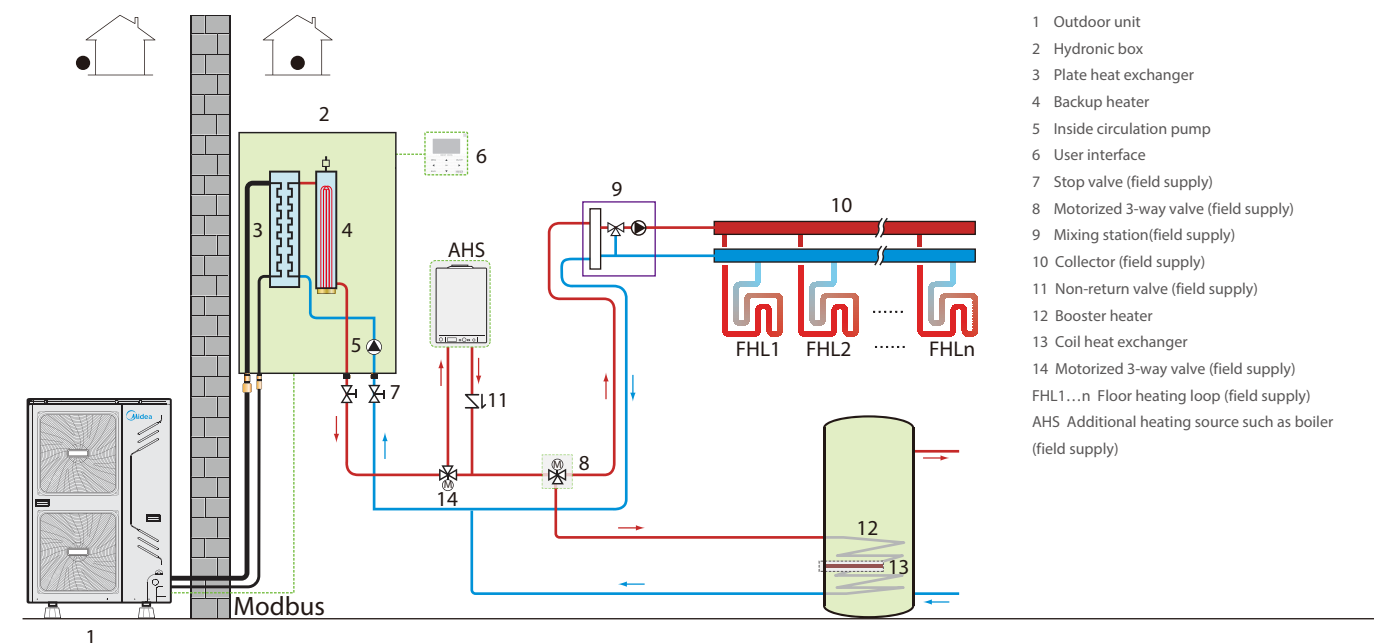


❖ Application 5: Bivalent application, M-Thermal Split type unit and auxiliary boiler for space heating and domestic hot water.  
Typically there are 3 application situations:

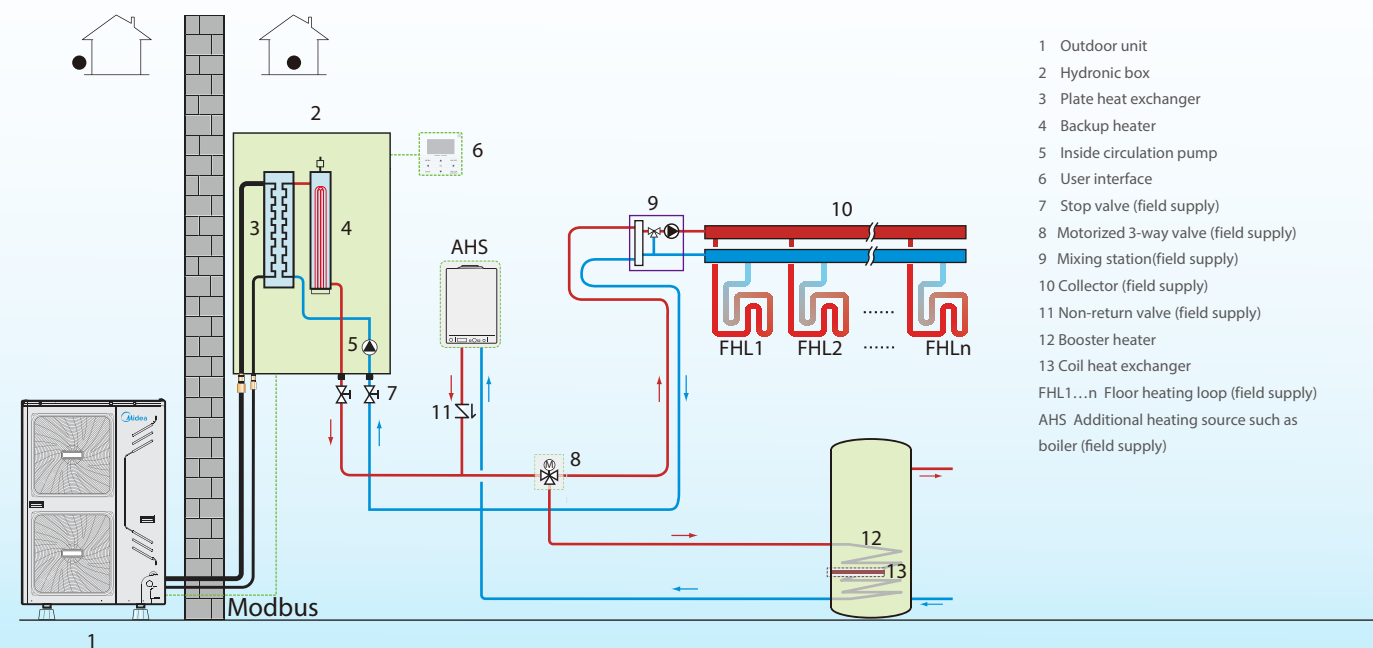
5-1 Auxiliary boiler only provide heating for space heating



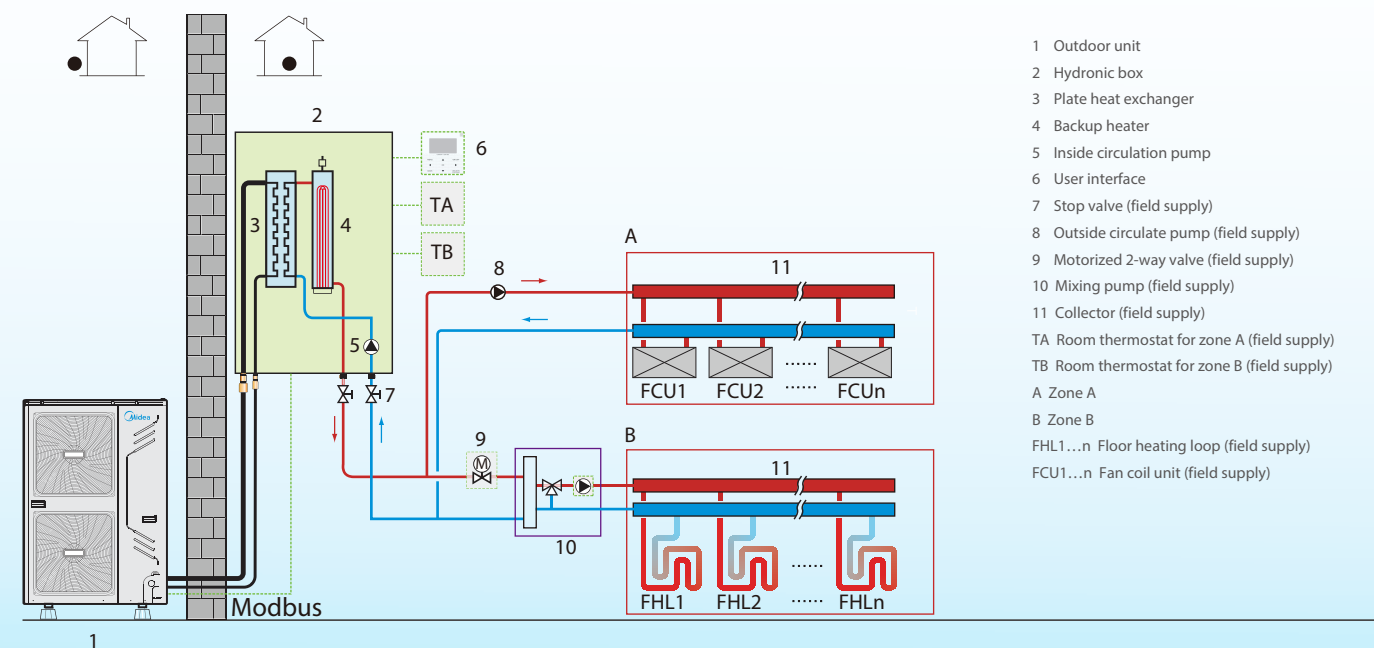
5-3 Auxiliary boiler reheats the water from the outdoor unit. An additional 3-way valve should be installed, when the water temperature from Mono unit is not high enough, the 3-way valve opens and the water flow through the boiler and be reheated.



5-2 Auxiliary boiler provide heating for space heating and domestic hot water



❖ Application 6: M-Thermal Split type unit for space heating through floor heating loops and fan coil units.

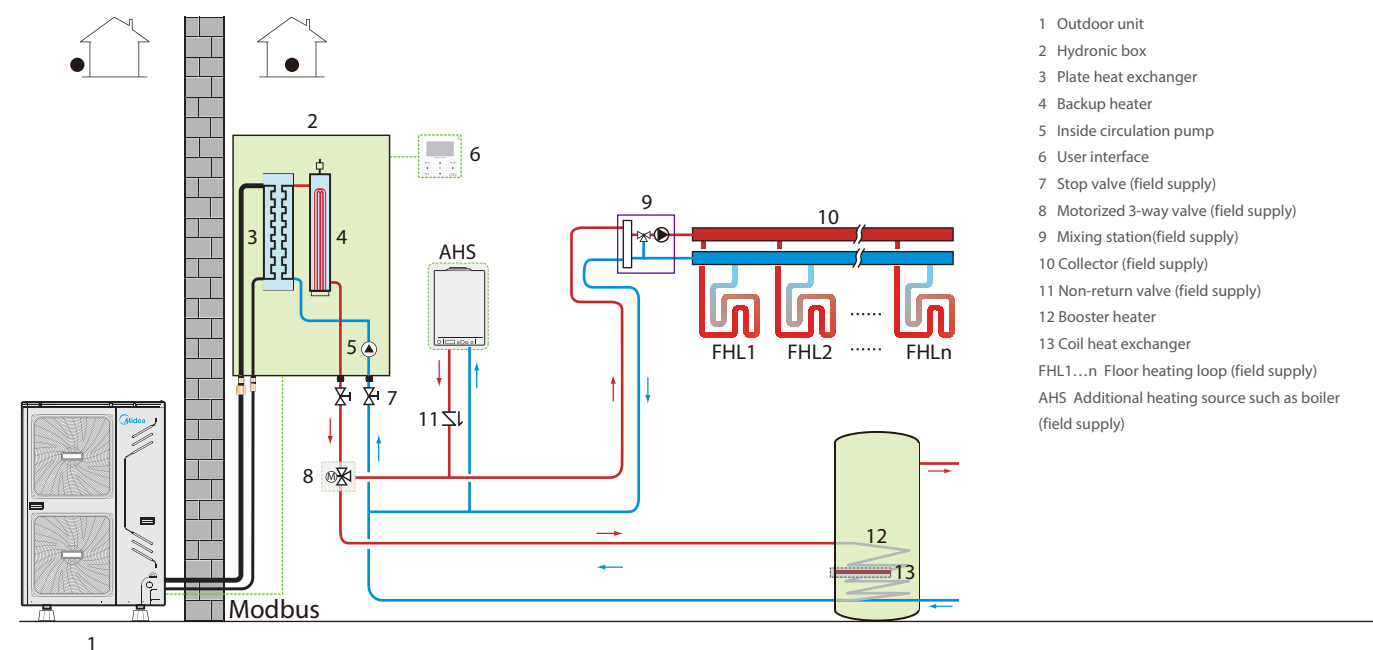




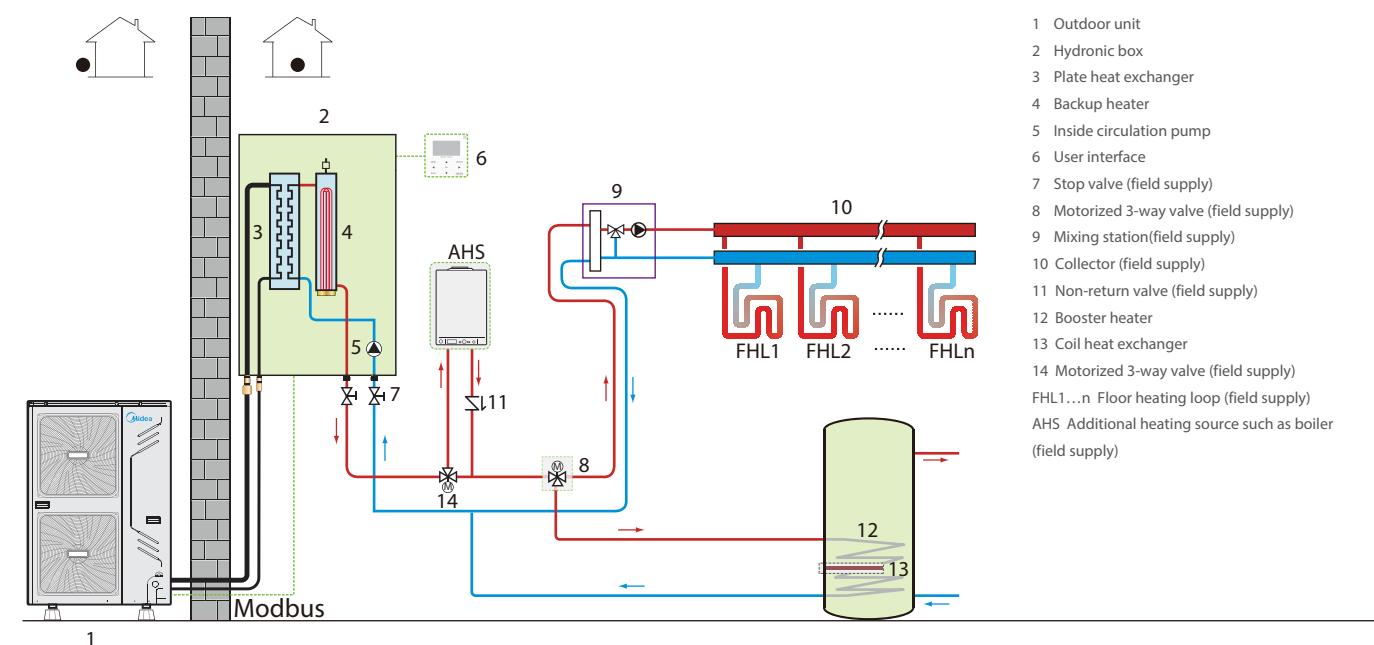
## ❖ Application 5: Bivalent application, M-Thermal Split type unit and auxiliary boiler for space heating and domestic hot water.

Typically there are 3 application situations:

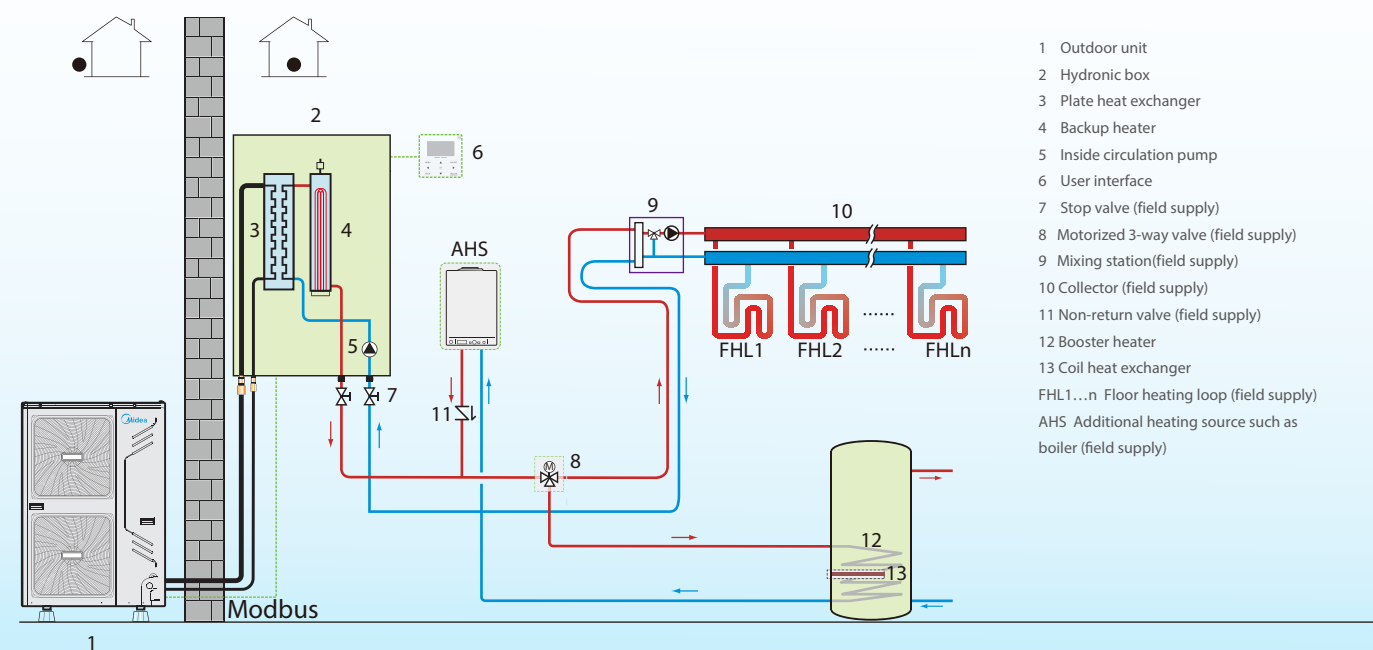
## 5-1 Auxiliary boiler only provide heating for space heating



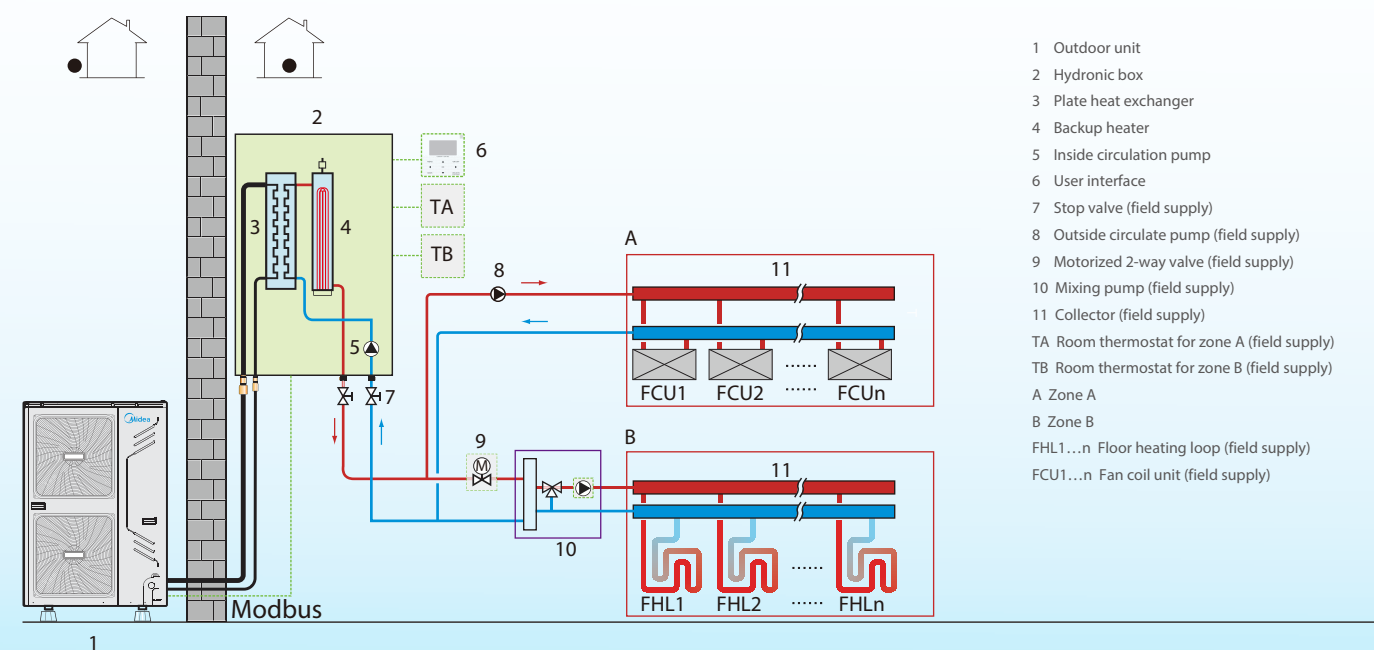
5-3 Auxiliary boiler reheats the water from the outdoor unit. An additional 3-way valve should be installed, when the water temperature from Mono unit is not high enough, the 3-way valve opens and the water flow through the boiler and be reheated.



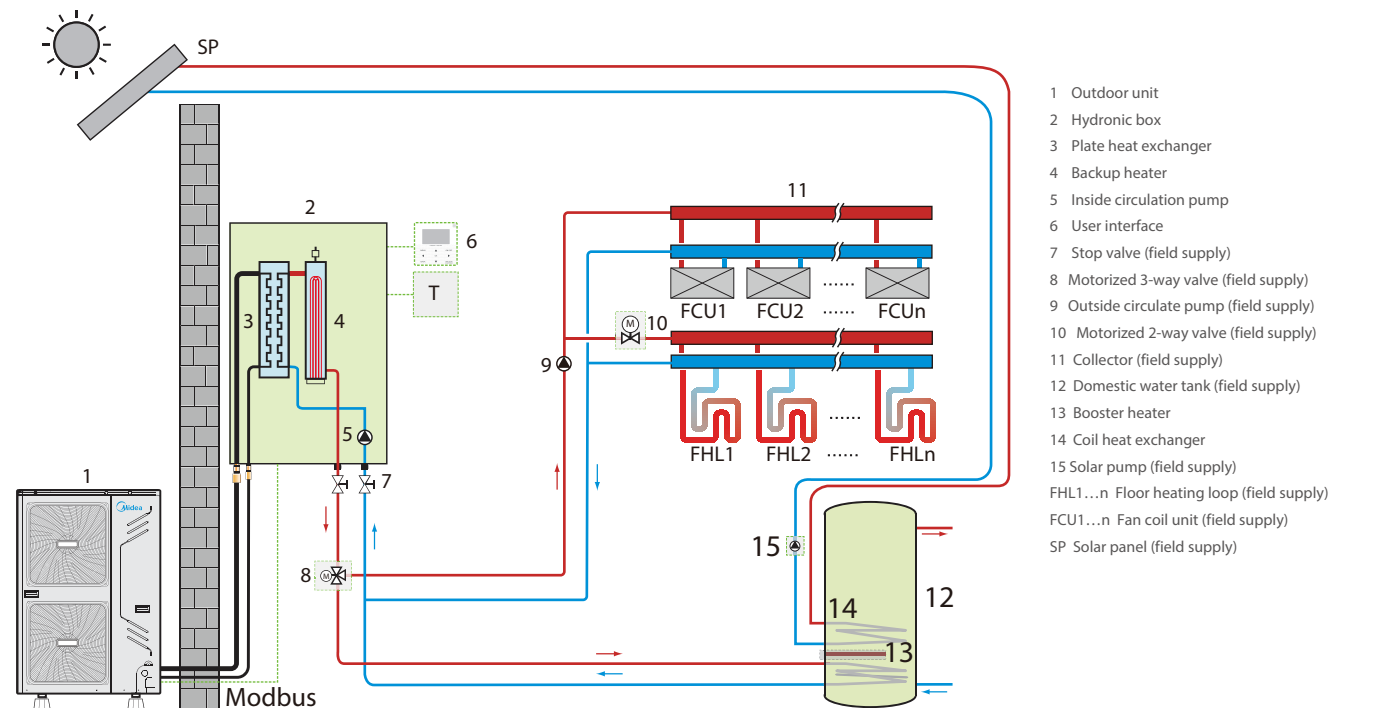
## 5-2 Auxiliary boiler provide heating for space heating and domestic hot water



## ❖ Application 6: M-Thermal Split type unit for space heating through floor heating loops and fan coil units.



### ❖ Application 7: M-Thermal Split type unit for space heating and space cooling, Split type unit and solar pane both for domestic hot water



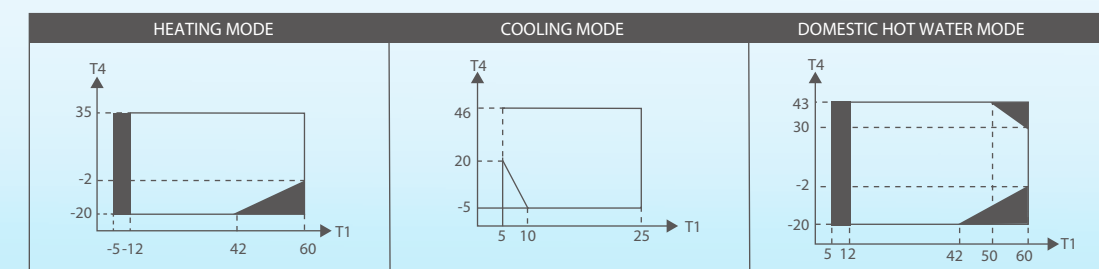
## Specifications

### Mono type

Outdoor Mono type MHC-			V5W/D2N1	V7W/D2N1	V10W/D2N1	V12W/D2N1	V14W/D2N1	V16W/D2N1	V12W/D2RN1	V14W/D2RN1	V16W/D2RN1	
Heating <sup>1</sup>	Capacity	kW	4.64	6.55	10.40	12.13	14.75	16.38	12.33	14.08	16.30	
	Rated Input	kW	0.97	1.45	2.23	2.63	3.42	4.02	2.72	3.24	3.89	
	COP		4.79	4.52	4.66	4.61	4.31	4.08	4.54	4.35	4.19	
Heating <sup>2</sup>	Capacity	kW	4.72	6.72	10.20	12.57	14.06	16.13	11.97	14.09	16.08	
	Rated Input	kW	1.44	2.01	3.05	3.86	4.45	5.22	3.67	4.43	5.24	
	COP		3.29	3.35	3.35	3.26	3.16	3.09	3.25	3.18	3.07	
Cooling <sup>3</sup>	Capacity	kW	4.77	6.63	10.40	12.23	14.17	14.93	12.68	14.05	15.13	
	Rated Input	kW	1.01	1.46	2.08	2.60	3.18	3.64	2.72	3.24	3.75	
	COP		4.72	4.53	5.00	4.70	4.46	4.10	4.67	4.34	4.03	
Cooling <sup>4</sup>	Capacity	kW	4.65	6.69	9.90	12.21	12.99	13.75	12.27	13.83	15.27	
	Rated Input	kW	1.56	2.48	3.09	4.14	4.50	5.13	4.22	5.12	6.42	
	COP		2.98	2.70	3.20	2.95	2.89	2.68	2.91	2.70	2.38	
Seasonal space heating energy eff. Class (average climate general)	Water outlet @ 35°C		A++	A++	A++	A++	A++	A++	A++	A++	A++	
	Water outlet @ 55°C		A+	A+	A+	A+	A++	A+	A+	A++	A++	
Power supply		V/Ph/Hz	220-240/1/50						380-415/3/50			
Compressor	Type		Twin-rotary inverter									
Outdoor fan	Motor type		Brushless DC motor									
	Air flow	m³/h	3050			6150			6150			
Air side heat exchanger			Fin-coil		Fin-coil				Fin-coil			
Water side heat exchanger			Plate type heat exchanger									
Water pump head		m	6		7.5				7.5			
Expansion tank volume		L	2		5				5			
Refrigerant	Type		R410A			R410A			R410A			
	Charged volume	kg	2.4			3.6			3.6			
Throttle type			Electronic expansion valve									
Backup electric heater	Standard mounted	kW	/		3				4.5			
	Optional	kW	3		4.5				/			
	Capacity steps		1		2				1			
	Power supply	V/Ph/Hz	220-240/1/50			220-240/1/50				380-415/3/50		
Sound pressure	Heating	dB(A)	52	62	65	67	71	72	67	71	72	
	Cooling	dB(A)	63	63	64	66	70	71	66	70	71	
Unit net dimension(WxHxD)		mm	1210x945x402			1404x1414x405				1404x1414x405		
Unit packing dimension(WxHxD)		mm	1500x1140x450			1475x1580x440				1475x1580x440		
Net/Gross weight		kg	99/177			162/183				177/198		
Water piping connections Dia.		inch	1″ Femal BSP			1-1/4″ Femal BSP				1-1/4″ Femal BSP		
Safety valve		MPa	0.3			0.3				0.3		
Total water volume		L	2			5.5				5.5		
Ambient temperature range (Heat pump)	Cooling	°C	-5~46									
	Heating	°C	-20-35									
	Domestic hot water	°C	-20-43									
Water outlet temperature range	Cooling	°C	5~25									
	Heating	°C	25~60									
	Domestic hot water	°C	40~60									

Nominal capacity is based on the following conditions:

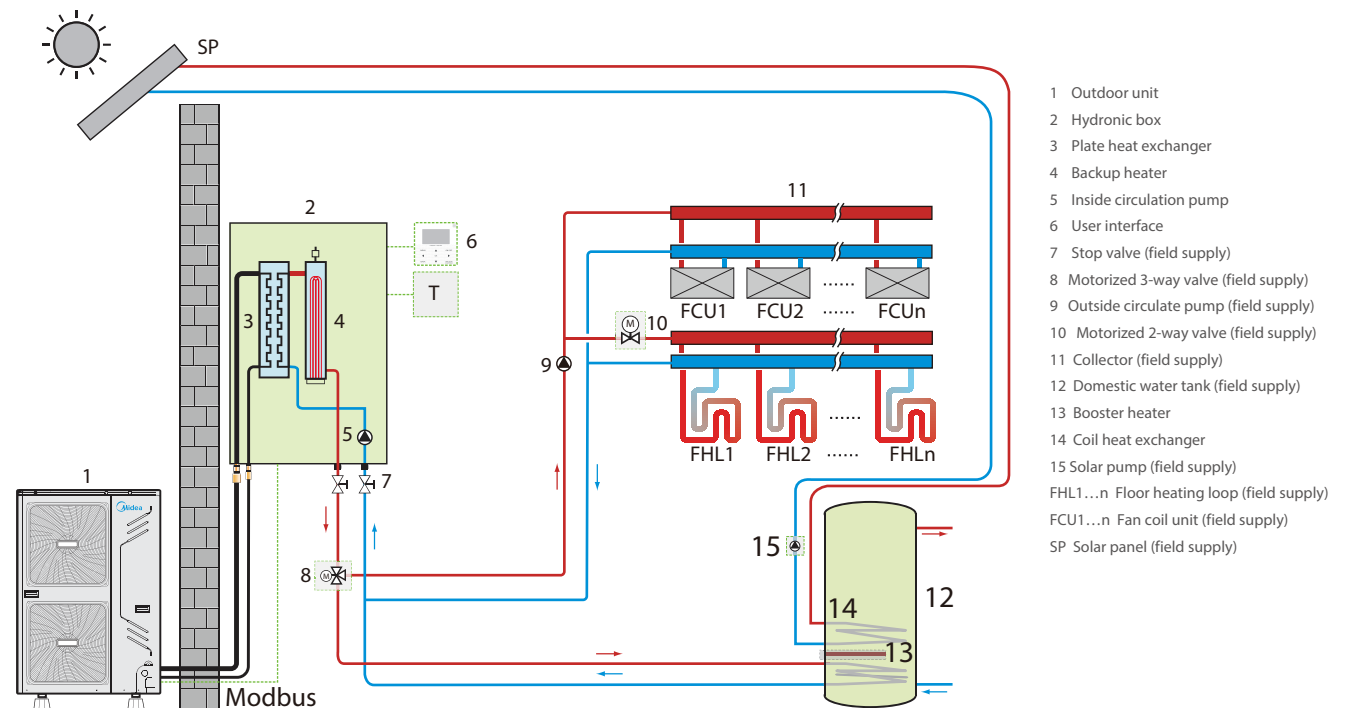
1. Evaporator air in 7°C °C85% R.H., Condenser water in/out 30/35°C
2. Evaporator air in 7°C °C85% R.H., Condenser water in/out 40/45°C
3. Condenser air in 35°C. Evaporator water in/out 23/18°C
4. Condenser air in 35°C. Evaporator water in/out 12/7°C
5. At 1m in open field fan side (sound pressure)
6. The above data test reference standard EN14511:2013; EN14825:2013; EN50564:2011; EN12102:2011; (EU)No:811:2013; (EU)No:813:2013; OJ 2014/C 207/02:2014



T4 Ambient temperature(°C)  
T1 Water flow temperature(°C)  
■ No heat pump operation, backup electric heater or boiler only.



- ❖ Application 7: M-Thermal Split type unit for space heating and space cooling, Split type unit and solar pane both for domestic hot water



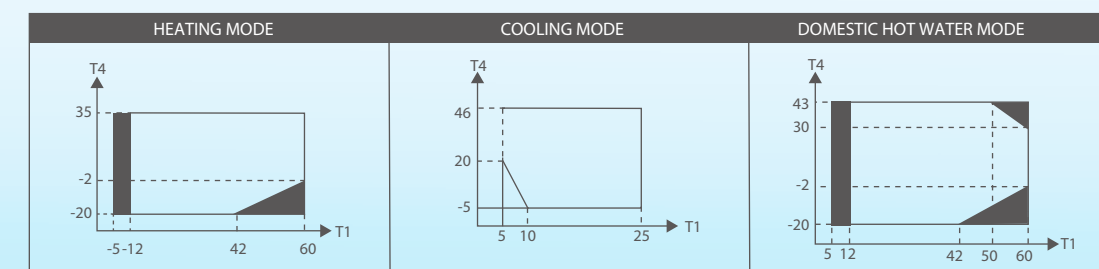
## Specifications

### Mono type

Outdoor Mono type MHC-			V5W/D2N1	V7W/D2N1	V10W/D2N1	V12W/D2N1	V14W/D2N1	V16W/D2N1	V12W/D2RN1	V14W/D2RN1	V16W/D2RN1
Heating <sup>1</sup>	Capacity	kW	4.64	6.55	10.40	12.13	14.75	16.38	12.33	14.08	16.30
	Rated Input	kW	0.97	1.45	2.23	2.63	3.42	4.02	2.72	3.24	3.89
	COP		4.79	4.52	4.66	4.61	4.31	4.08	4.54	4.35	4.19
Heating <sup>2</sup>	Capacity	kW	4.72	6.72	10.20	12.57	14.06	16.13	11.97	14.09	16.08
	Rated Input	kW	1.44	2.01	3.05	3.86	4.45	5.22	3.67	4.43	5.24
	COP		3.29	3.35	3.35	3.26	3.16	3.09	3.25	3.18	3.07
Cooling <sup>3</sup>	Capacity	kW	4.77	6.63	10.40	12.23	14.17	14.93	12.68	14.05	15.13
	Rated Input	kW	1.01	1.46	2.08	2.60	3.18	3.64	2.72	3.24	3.75
	COP		4.72	4.53	5.00	4.70	4.46	4.10	4.67	4.34	4.03
Cooling <sup>4</sup>	Capacity	kW	4.65	6.69	9.90	12.21	12.99	13.75	12.27	13.83	15.27
	Rated Input	kW	1.56	2.48	3.09	4.14	4.50	5.13	4.22	5.12	6.42
	COP		2.98	2.70	3.20	2.95	2.89	2.68	2.91	2.70	2.38
Seasonal space heating energy eff. Class (average climate general)	Water outlet @ 35°C		A++	A++	A++	A++	A++	A++	A++	A++	A++
	Water outlet @ 55°C		A+	A+	A+	A+	A++	A+	A+	A++	A++
Power supply		V/Ph/Hz	220-240/1/50						380-415/3/50		
Compressor	Type		Twin-rotary inverter								
Outdoor fan	Motor type		Brushless DC motor								
	Air flow	m³/h	3050			6150			6150		
Air side heat exchanger			Fin-coil		Fin-coil				Fin-coil		
Water side heat exchanger			Plate type heat exchanger								
Water pump head		m	6		7.5				7.5		
Expansion tank volume		L	2		5				5		
Refrigerant	Type		R410A		R410A				R410A		
	Charged volume	kg	2.4		3.6				3.6		
Throttle type			Electronic expansion valve								
Backup electric heater	Standard mounted	kW	/		3				4.5		
	Optional	kW	3		4.5				/		
	Capacity steps		1		2				1		
	Power supply	V/Ph/Hz	220-240/1/50		220-240/1/50				380-415/3/50		
Sound pressure	Heating	dB(A)	52	62	65	67	71	72	67	71	72
	Cooling	dB(A)	63	63	64	66	70	71	66	70	71
Unit net dimension(WxHxD)		mm	1210x945x402			1404x1414x405			1404x1414x405		
Unit packing dimension(WxHxD)		mm	1500x1140x450			1475x1580x440			1475x1580x440		
Net/Gross weight		kg	99/177			162/183			177/198		
Water piping connections Dia.		inch	1″ Femal BSP			1-1/4″ Femal BSP			1-1/4″ Femal BSP		
Safety valve		MPa	0.3			0.3			0.3		
Total water volume		L	2			5.5			5.5		
Ambient temperature range (Heat pump)	Cooling	°C	-5~46								
	Heating	°C	-20-35								
	Domestic hot water	°C	-20-43								
Water outlet temperature range	Cooling	°C	5~25								
	Heating	°C	25~60								
	Domestic hot water	°C	40~60								

Nominal capacity is based on the following conditions:

1. Evaporator air in 7°C °C85% R.H., Condenser water in/out 30/35°C
2. Evaporator air in 7°C °C85% R.H., Condenser water in/out 40/45°C
3. Condenser air in 35°C. Evaporator water in/out 23/18°C
4. Condenser air in 35°C. Evaporator water in/out 12/7°C
5. At 1m in open field fan side (sound pressure)
6. The above data test reference standard EN14511:2013; EN14825:2013; EN50564:2011; EN12102:2011; (EU)No:811:2013; (EU)No:813:2013; OJ 2014/C 207/02:2014



T4 Ambient temperature(°C)  
T1 Water flow temperature(°C)  
■ No heat pump operation, backup electric heater or boiler only.

## Split type

Outdoor Split type MHA-				V4W/D2N1	V6W/D2N1	V8W/D2N1	V10W/D2N1	V12W/D2N1	V14W/D2N1	V16W/D2N1	V12W/D2RN1	V14W/D2RN1	V16W/D2RN1	
Heating <sup>1</sup>	Capacity		kW	4.10	6.10	8.00	10.00	12.10	14.00	15.50	12.10	14.00	15.50	
	Rated input		kW	0.82	1.29	1.73	2.17	2.74	3.39	3.82	2.68	3.26	3.79	
	COP			5.00	4.73	4.62	4.61	4.42	4.13	4.06	4.51	4.29	4.09	
Heating <sup>2</sup>	Capacity		kW	4.01	5.96	7.34	10.12	11.85	14.05	16.05	11.97	13.93	15.48	
	Rated input		kW	1.13	1.68	2.13	2.93	3.48	4.41	5.03	3.50	4.21	4.87	
	COP			3.55	3.55	3.45	3.45	3.41	3.19	3.19	3.42	3.31	3.18	
Cooling <sup>1</sup>	Capacity		kW	4.10	6.10	8.00	10.00	11.80	13.00	14.00	12.10	13.00	14.00	
	Rated input		kW	0.79	1.31	1.78	2.07	2.65	3.23	3.62	2.82	3.21	3.68	
	EER			5.19	4.66	4.49	4.83	4.45	4.02	3.87	4.29	4.05	3.80	
Cooling <sup>2</sup>	Capacity		kW	4.12	6.15	6.44	9.39	11.02	12.49	12.85	11.70	12.53	12.91	
	Rated input		kW	1.30	2.08	2.24	3.26	4.17	5.07	5.39	4.65	5.21	5.52	
	EER			3.17	2.96	2.88	2.88	2.64	2.46	2.38	2.52	2.40	2.34	
Seasonal space heating energy eff. Class (average climate general)	Water outlet @ 35°C			A++										
	Water outlet @ 55°C			A+										
Power supply			V/Ph/Hz	220-240/1/50						380-415/3/50				
Dimension (WxHxD)Z			mm	975x862x355		1074x964x396		900x1327x320			900x1327x320			
Packing (WxHxD)			mm	1020x915x410		1120x1015x435		1016x1377x435			1016x1377x435			
Net/gross weight			kg	56.8/64		73.8/85		109/121			109/121			
Sound pressure level <sup>3</sup>	Cooling	dB(A)		62		64		65	66	69	71	66	69	71
	Cooling	dB(A)		62		64		65	66	69	71	66	69	71
Compressor			Type		Twin-rotary inverter									
Outdoor fan	Type		Brushless DC motor											
	Air flow		m³/h	3180		5120		6500						
Air side heat exchanger				Fin-coil			6500							
Piping connections	Liquid	Type		Flaring										
		Dia.(OD)		mm		Φ9.5								
	Gas	Type		Flaring										
		Dia.(OD)		mm		Φ15.9								
	Piping length	Min.		m		2								
		Max.		m		20		30		50			50	
	Installtion height dfference	outdoor unit upside		m		10		20		30			30	
		outdoor unit downside		m		8		15		25			25	
Refrigerant	Type			R410A										
	Charged volume		kg	2.5		2.8		3.9			4.2			
Throttle type				Electric expansion valve										
Ambient temperature range	Cooling		°C	-5~46										
	Heating		°C	-20~35										
	Sanitary hot water		°C	-20~43										

Nominal capacity is based on the following conditions:

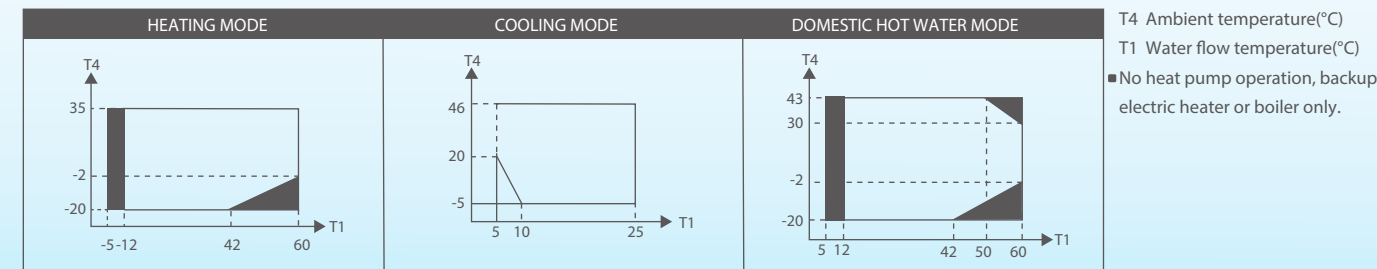
1. Evaporator air in 7°C °C85% R.H., Condenser water in/out 30/35°C
2. Evaporator air in 7°C °C85% R.H., Condenser water in/out 40/45°C
3. Condenser air in 35°C. Evaporator water in/out 23/18°C
4. Condenser air in 35°C. Evaporator water in/out 12/7°C
5. At 1m in open field fan side (sound pressure)
6. The above data test reference standard EN14511:2013; EN14825:2013; EN50564:2011; EN12102:2011; (EU)No:811:2013; (EU)No:813:2013; OJ 2014/C 207/02:2014

## Hydronic box

Hydronic box				SMK-80/CD30GN1 (For use with MHA-V4/6/8W/D2N1)	SMK-160/CD30GN1-B (For use with MHA-V10/12/14/16W/D2N1)	SMK-160/CSD45GN1-B (For use with MHA-V12/14/16W/D2RN1)
Type				Heating&Cooling		
Leaving water tem perature range	Space heating	Low	℃	25~55, default 35		
		High	℃	35~60, default 45		
	Space cooling	Low	℃	7~25, default 7		
		High	℃	18~25, default 18		
	Sanitary hot water		℃	40~60, default 45		
Power supply			V/Ph/Hz	220-240/1/50	220-240/1/50	380-415/3/50
Dimension (WxHxD)			mm	400×865×427	400×865×427	400×865×427
Packing (WxHxD)			mm	495×1040×495	495×1040×495	495×1040×495
Net/gross weight			kg	43/51	54/62	54/62
Water circuit	Piping connections Dia.		mm	DN25	DN25	DN25
	Safety valve		kPa	300	300	300
	Total water volume		L	4.7	5.0	5.0
	Drainage pipe		mm	Φ16	Φ16	Φ16
	Expansion tank	Volume	L	3	3	3
		Max. water pressure	kPa	800	800	800
		Pre pressure	kPa	150	150	150
	Water side heat exchanger	Type		Plate type heat exchanger	Plate type heat exchanger	Plate type heat exchanger
		Volume	L	0.7	1.0	1.0
	Water pump head		m	6	7.5	7.5
Refrigerant circuit	Liquid side Dia.		mm	Φ9.5	Φ9.5	Φ9.5
	Gas side Dia.		mm	Φ15.9	Φ15.9	Φ15.9
Mounted Back-up electric heater	Size		kW	3.0	3.0	4.5
	Step			2	2	2
	Power supply			220-240/1/50	220-240/1/50	380-415/3/50

Nominal capacity is based on the following conditions:

1. Condition 1: Heating mode air inlet at 7°C and water outlet at 35°C with ΔT at 5°C, Cooling mode air inlet at 35°C and water outlet at 18°C with ΔT at 5°C
2. Condition 2: Heating mode air inlet at 7°C and water outlet at 45°C with ΔT at 5°C, Cooling mode air inlet at 35°C and water outlet at 7°C with ΔT at 5°C
3. Noise level is test at 1m in open field fan side, in heating mode with air inlet at 7°C and water outlet at 35°C with ΔT at 5°C.
4. The above data test reference standard EN14511





## Split type

Outdoor Split type MHA-				V4W/D2N1	V6W/D2N1	V8W/D2N1	V10W/D2N1	V12W/D2N1	V14W/D2N1	V16W/D2N1	V12W/D2RN1	V14W/D2RN1	V16W/D2RN1		
Heating <sup>1</sup>	Capacity		kW	4.10	6.10	8.00	10.00	12.10	14.00	15.50	12.10	14.00	15.50		
	Rated input		kW	0.82	1.29	1.73	2.17	2.74	3.39	3.82	2.68	3.26	3.79		
	COP			5.00	4.73	4.62	4.61	4.42	4.13	4.06	4.51	4.29	4.09		
Heating <sup>2</sup>	Capacity		kW	4.01	5.96	7.34	10.12	11.85	14.05	16.05	11.97	13.93	15.48		
	Rated input		kW	1.13	1.68	2.13	2.93	3.48	4.41	5.03	3.50	4.21	4.87		
	COP			3.55	3.55	3.45	3.45	3.41	3.19	3.19	3.42	3.31	3.18		
Cooling <sup>1</sup>	Capacity		kW	4.10	6.10	8.00	10.00	11.80	13.00	14.00	12.10	13.00	14.00		
	Rated input		kW	0.79	1.31	1.78	2.07	2.65	3.23	3.62	2.82	3.21	3.68		
	EER			5.19	4.66	4.49	4.83	4.45	4.02	3.87	4.29	4.05	3.80		
Cooling <sup>2</sup>	Capacity		kW	4.12	6.15	6.44	9.39	11.02	12.49	12.85	11.70	12.53	12.91		
	Rated input		kW	1.30	2.08	2.24	3.26	4.17	5.07	5.39	4.65	5.21	5.52		
	EER			3.17	2.96	2.88	2.88	2.64	2.46	2.38	2.52	2.40	2.34		
Seasonal space heating energy eff. Class (average climate general)	Water outlet @ 35°C			A++											
	Water outlet @ 55°C			A+											
Power supply			V/Ph/Hz	220-240/1/50						380-415/3/50					
Dimension (WxHxD)Z			mm	975x862x355		1074x964x396		900x1327x320			900x1327x320				
Packing (WxHxD)			mm	1020x915x410		1120x1015x435		1016x1377x435			1016x1377x435				
Net/gross weight			kg	56.8/64		73.8/85		109/121			109/121				
Sound pressure level <sup>3</sup>	Cooling	dB(A)		62		64		65	66	69	71	66	69	71	
	Cooling	dB(A)		62		64		65	66	69	71	66	69	71	
Compressor			Type		Twin-rotary inverter										
Outdoor fan	Type		Brushless DC motor												
	Air flow		m <sup>3</sup> /h	3180		5120		6500							
Air side heat exchanger				Fin-coil			6500								
Piping connections	Liquid	Type		Flaring											
		Dia.(OD)		mm		Φ9.5									
	Gas	Type		Flaring											
		Dia.(OD)		mm		Φ15.9									
	Piping length	Min.		m		2									
		Max.		m		20		30		50			50		
	Installtion height dfference	outdoor unit upside		m		10		20		30			30		
		outdoor unit downside		m		8		15		25			25		
Refrigerant	Type			R410A											
	Charged volume		kg	2.5		2.8		3.9			4.2				
Throttle type				Electric expansion valve											
Ambient temperature range	Cooling		°C	-5~46											
	Heating		°C	-20~35											
	Sanitary hot water		°C	-20~43											

Nominal capacity is based on the following conditions:

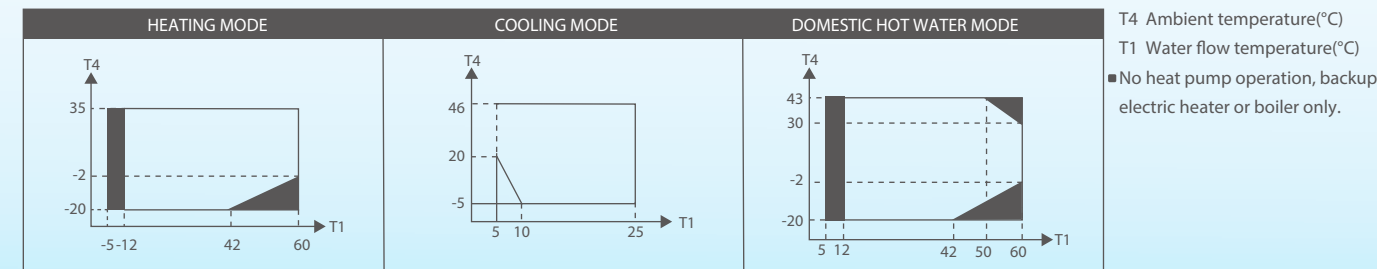
1. Evaporator air in 7°C °C85% R.H., Condenser water in/out 30/35°C
2. Evaporator air in 7°C °C85% R.H., Condenser water in/out 40/45°C
3. Condenser air in 35°C. Evaporator water in/out 23/18°C
4. Condenser air in 35°C. Evaporator water in/out 12/7°C
5. At 1m in open field fan side (sound pressure)
6. The above data test reference standard EN14511:2013; EN14825:2013; EN50564:2011; EN12102:2011; (EU)No:811:2013; (EU)No:813:2013; OJ 2014/C 207/02:2014

## Hydronic box

Hydronic box				SMK-80/CD30GN1 (For use with MHA-V4/6/8W/D2N1)	SMK-160/CD30GN1-B (For use with MHA-V10/12/14/16W/D2N1)	SMK-160/CSD45GN1-B (For use with MHA-V12/14/16W/D2RN1)
Type				Heating&Cooling		
Leaving water temperature range	Space heating	Low	℃	25~55, default 35		
		High	℃	35~60, default 45		
	Space cooling	Low	℃	7~25, default 7		
		High	℃	18~25, default 18		
	Sanitary hot water		℃	40~60, default 45		
Power supply			V/Ph/Hz	220-240/1/50	220-240/1/50	380-415/3/50
Dimension (WxHxD)			mm	400×865×427	400×865×427	400×865×427
Packing (WxHxD)			mm	495×1040×495	495×1040×495	495×1040×495
Net/gross weight			kg	43/51	54/62	54/62
Water circuit	Piping connections Dia.		mm	DN25	DN25	DN25
	Safety valve		kPa	300	300	300
	Total water volume		L	4.7	5.0	5.0
	Drainage pipe		mm	Φ16	Φ16	Φ16
	Expansion tank	Volume	L	3	3	3
		Max. water pressure	kPa	800	800	800
		Pre pressure	kPa	150	150	150
	Water side heat exchanger	Type		Plate type heat exchanger	Plate type heat exchanger	Plate type heat exchanger
		Volume	L	0.7	1.0	1.0
	Water pump head		m	6	7.5	7.5
Refrigerant circuit	Liquid side Dia.		mm	Φ9.5	Φ9.5	Φ9.5
	Gas side Dia.		mm	Φ15.9	Φ15.9	Φ15.9
Mounted Back-up electric heater	Size		kW	3.0	3.0	4.5
	Step			2	2	2
	Power supply			220-240/1/50	220-240/1/50	380-415/3/50


Nominal capacity is based on the following conditions:

1. Condition 1: Heating mode air inlet at 7°C and water outlet at 35°C with ΔT at 5°C, Cooling mode air inlet at 35°C and water outlet at 18°C with ΔT at 5°C
2. Condition 2: Heating mode air inlet at 7°C and water outlet at 45°C with ΔT at 5°C, Cooling mode air inlet at 35°C and water outlet at 7°C with ΔT at 5°C
3. Noise level is test at 1m in open field fan side, in heating mode with air inlet at 7°C and water outlet at 35°C with ΔT at 5°C.
4. The above data test reference standard EN14511




Commercial Air Conditioners 2017



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Certificate No. 15912S20006R0L-1.

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Note: Product specifications change from time to time as product improvements and  
developments are released and may vary from those in this document.

**M-Thermal Heat Pumps**  
**Mono/Split**

