

Engineering Data

M thermal Mono Series



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Part 1

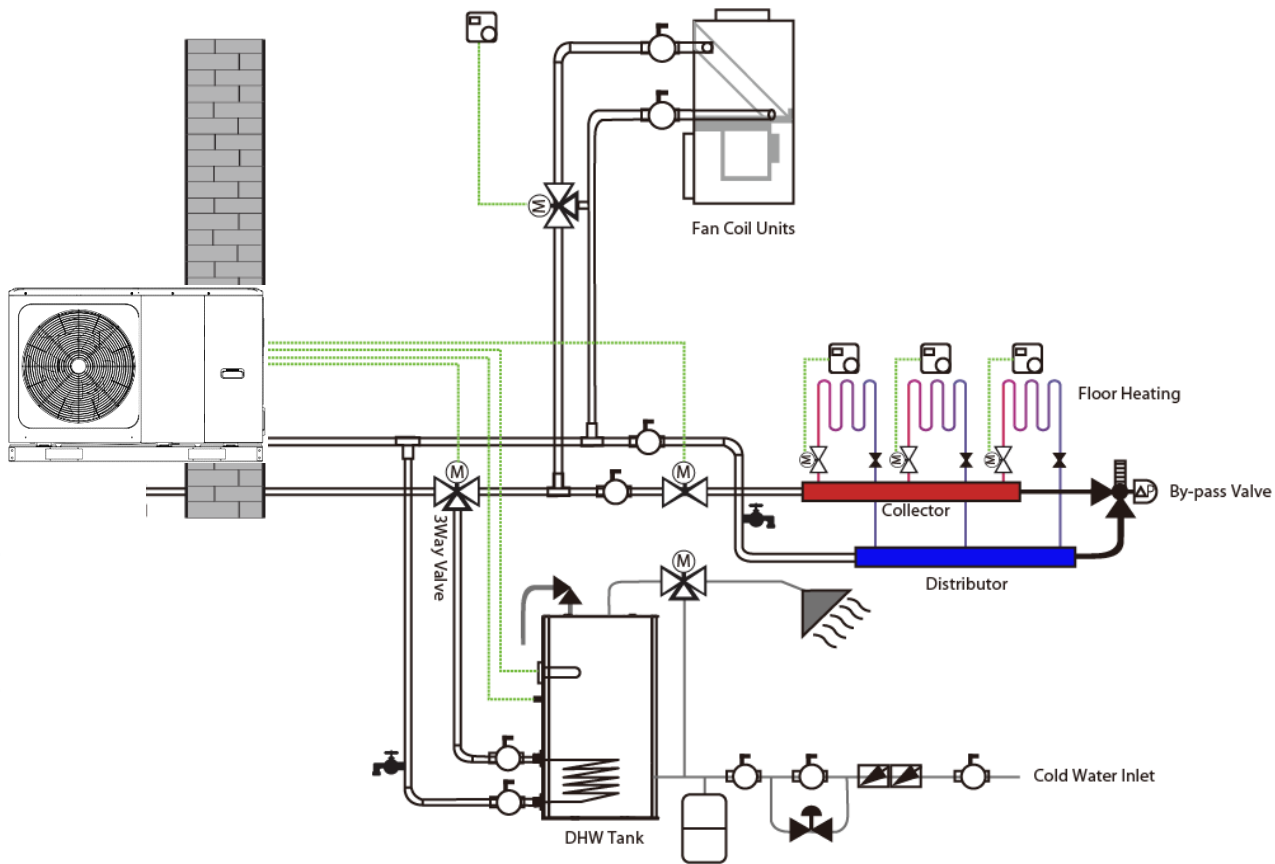
General Information

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1 M thermal Mono System

1.1 System Schematic

Figure 1-1.1: System schematic



M thermal is an integrated air to water heat pump system which is one-stop solution for space heating, space cooling and domestic hot water. The outdoor heat pump system extracts heat from the outdoor air and transfers this heat through refrigerant piping to the plate heat exchanger in the hydronic system. The heated water in the hydronic system circulates to low temperature heat emitters (floor heating loops or low temperature radiators) to provide space heating, and to the domestic hot water tank to provide domestic hot water. The 4-way valve in the outdoor unit can reverse the refrigerant cycle so that the hydronic system can provide chilled water for cooling using fan coil units.

The heating capacity of heat pumps decreases with ambient temperature dropping. M thermal Mono can be equipped with a backup electric heater to provide additional heating capacity for use during extremely cold weather when the heat pump capacity is insufficient. The backup electric heater also serves as a backup in case of heat pump malfunction and for anti-freeze protection of the outside water piping in winter.

1.2 System Configurations

M thermal Mono can be configured to run with the electric heater either enabled or disabled and can also be used in conjunction with an auxiliary heat source such as a boiler.

The chosen configuration affects the size of heat pump that is required. Three typical configurations are described below. Refer to Figure 1-1.2.

Configuration 1: Heat pump only

- The heat pump covers the required capacity and no extra heating capacity is necessary.
- Requires selection of larger capacity heat pump and implies higher initial investment.
- Ideal for new construction in projects where energy efficiency is paramount.

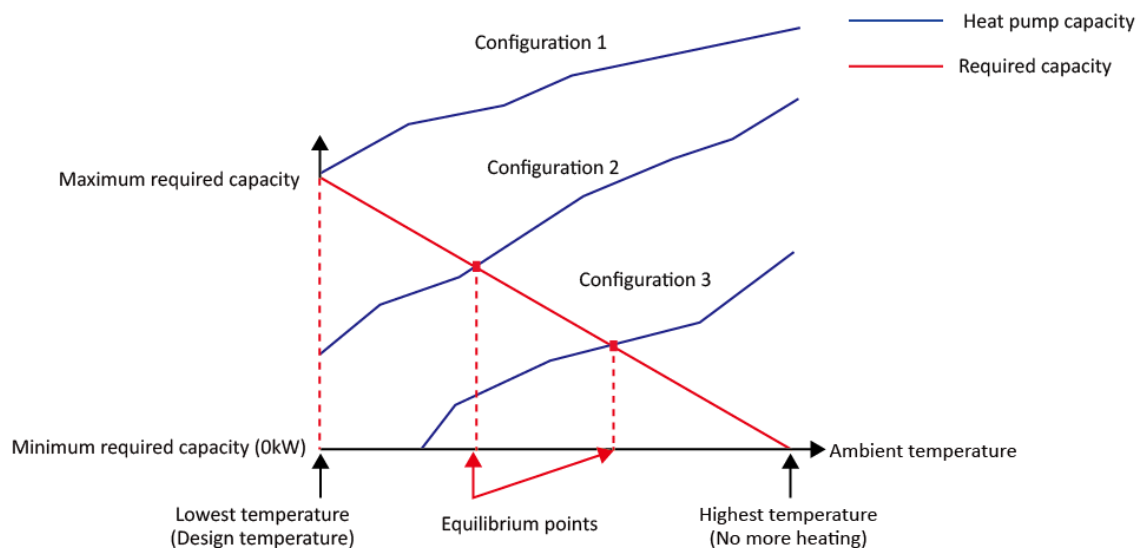
Configuration 2: Heat pump and backup electric heater

- Heat pump covers the required capacity until the ambient temperature drops below the point at which the heat pump is able to provide sufficient capacity. When the ambient temperature is below this equilibrium point (as shown in Figure 1-1.2), the backup electric heater supplies the required additional heating capacity.
- Best balance between initial investment and running costs, results in lowest lifecycle cost.
- Ideal for new construction.

Configuration 3: Heat pump with auxiliary heat source

- Heat pump covers the required capacity until the ambient temperature drops below the point at which the heat pump is able to provide sufficient capacity. When the ambient temperature is below this equilibrium point (as shown in Figure 1-1.2), depending on the system settings, either the auxiliary heat source supplies the required additional heating capacity or the heat pump does not run and the auxiliary heat source covers the required capacity.
- Enables selection of lower capacity heat pump.
- Ideal for refurbishments and upgrades.

Figure 1-1.2: System configurations



2 Unit Capacities

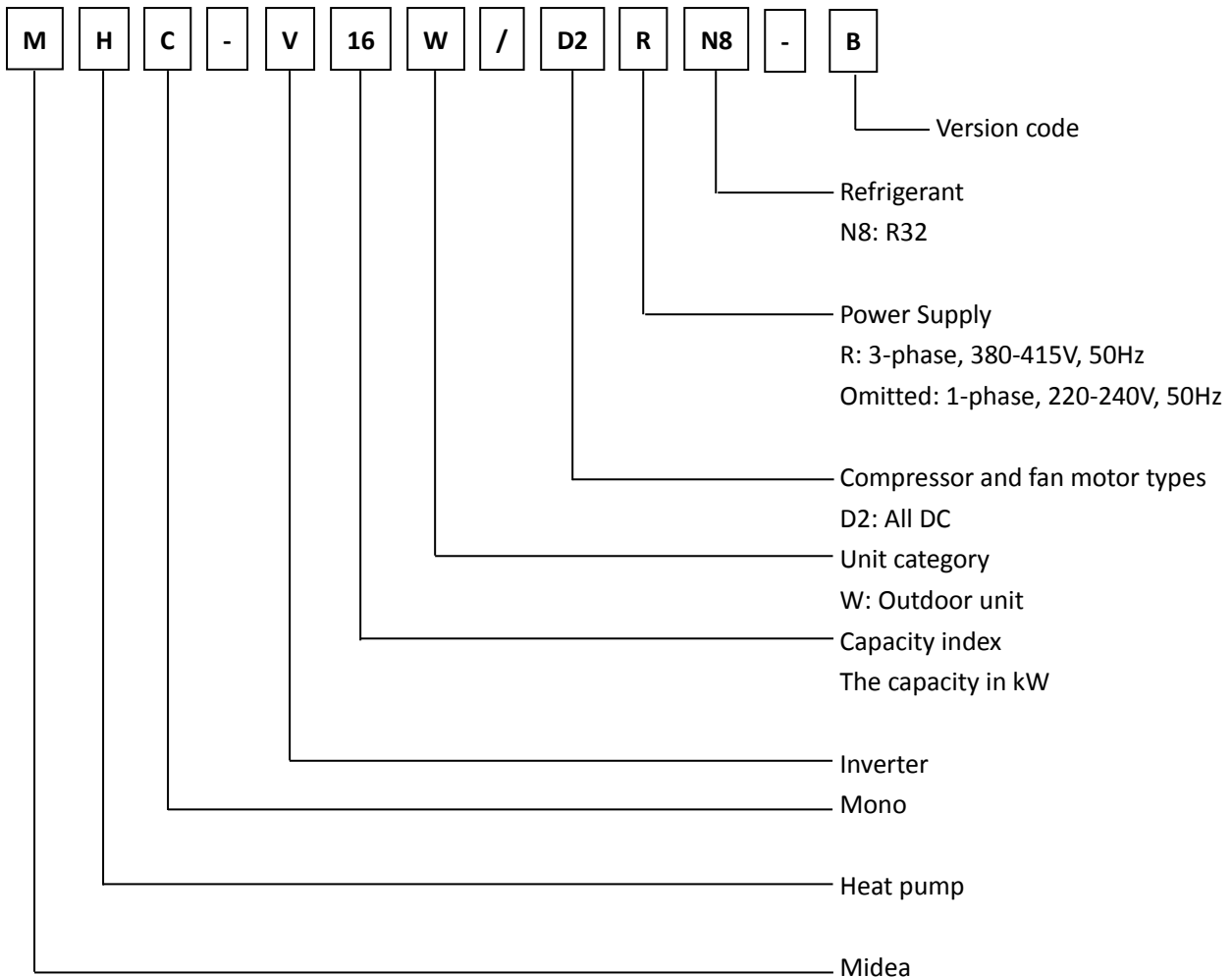
Table 1-2.1: M thermal Mono unit capacity range and unit appearances

Capacity	4kW	6kW	8kW	10kW	12kW	14kW	16kW
Model ¹ (MHC-)	V4W/D2N8-B	V6W/D2N8-B	V8W/D2N8-B	V10W/D2N8-B	V12W/D2N8-B V12W/D2RN8-B	V14W/D2N8-B V14W/D2RN8-B	V16W/D2N8-B V16W/D2RN8-B
Appearance							

Notes:

- The presence or omission of the letter R in the model names indicates the unit's power supply:
R: 3-phase, 380-415V, 50Hz; Omitted: 1-phase, 220-240V, 50Hz.

3 Nomenclature



4 System Design and Unit Selection

4.1 Selection Procedure

Step 1: Total heat load calculation

Calculate conditioned surface area
Select the heat emitters (type, quantity, water temperature and heat load)

Step 2: System configuration

Decide whether to include AHS and set AHS's switching temperature
Decide whether backup electric heater is enabled or disabled

Step 3: Selection of outdoor units

Determine required total heat load on outdoor units
Set capacity safety factor
Select power supply

Provisionally select M thermal Mono unit capacity based on nominal capacity

Correct capacity of the outdoor units for the following items:
Outdoor air temperature / Outdoor humidity / Water outlet temperature¹
/ Altitude / Anti-freeze fluid

Is corrected M thermal Mono unit capacity \geq Required total heat load on outdoor units²

Yes

M thermal Mono system selection is complete

No

Select a larger model or enable backup electric heater operation

Notes:

1. If the required water temperatures of the heat emitters are not all the same, the M thermal Mono's outlet water temperature setting should be set at the highest of the heat emitter required water temperatures. If the water outlet design temperature falls between two temperatures listed in the outdoor unit's capacity table, calculate the corrected capacity by interpolation.
2. If the outdoor unit selection is to be based on total heating load and total cooling load, select Mono units which satisfy not only the total heating load requirements but also the total cooling load requirements.

M thermal Mono

4.2 M thermal Leaving Water Temperature (LWT) Selection

The recommended design LWT ranges for different types of heat emitter are:

- For floor heating: 30 to 35°C
- For fan coil units: 30 to 45°C
- For low temperature radiators: 40 to 50°C

4.3 Optimizing System Design

To get the most comfort with the lowest energy consumption with M thermal, it is important to take account of the following considerations:

- Choose heat emitters that allow the heat pump system to operate at as low a hot water temperature as possible whilst still providing sufficient heating.
- Make sure the correct weather dependency curve is selected to match the installation environment (building structure, climate) as well as ender user's demands.
- Connecting room thermostats (field supplied) to the hydronic system helps prevent excessive space heating by stopping the outdoor unit and circulator pump when the room temperature is above the thermostat set point.

5 Typical Applications

5.1 Application 1

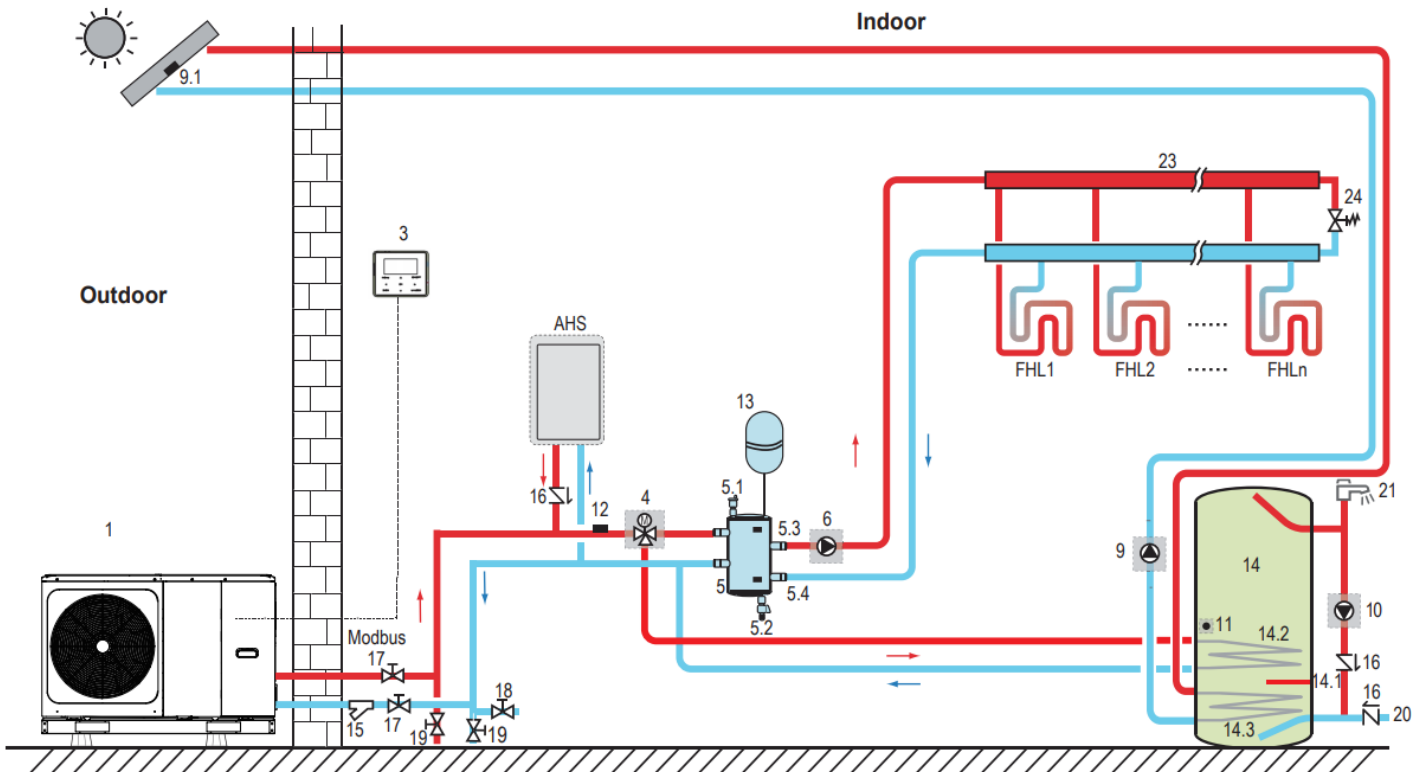


Figure 1-5.1: Application 1

Legend			
1	Outdoor unit	14	Domestic hot water tank (Field supply)
3	User interface	14.1	TBH: Domestic hot water tank booster heater (Field supply)
4	SV1:3-way valve (Field supply)	14.2	Coil 1, heat exchanger for heat pump
5	Balance tank (Field supply)	14.3	Coil 2, heat exchanger for Solar energy
5.1	Automatic bleed valve	15	Filter (Accessory)
5.2	Drainage valve	16	Check valve (Field supply)
5.3	Tbt1: Balance tank upper temperature sensor (Optional)	17	Shut-off valve (Field supply)
5.4	Tbt2: Balance tank lower temperature sensor (Optional)	18	Filling valve (Field supply)
6	P_o: Zone A circulation pump (Field supply)	19	Drainage valve (Field supply)
9	P_s: Solar pump (Field supply)	20	Tap water inlet pipe (Field supply)
9.1	Tsolar: Solar temperature sensor (Optional)	21	Hot water tap (Field supply)
9.2	Solar panel (Field supply)	23	Collector/distributor (Field supply)
10	P_d: DHW pipe pump (Field supply)	24	Bypass valve (Field supply)
11	T5: Domestic water tank temperature sensor (Accessory)	FHL1...n	Floor heating loop (Field supply)
12	T1: Water flow temperature sensor (Optional)	AHS	Auxiliary heat source (Field supply)
13	Expansion vessel (Field supply)		

Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

M thermal Mono

5.1.1 Space heating

The ON/OFF signal and operation mode and temperature setting are set on the user interface. P_o (6) keeps running as long as the unit is ON for space heating, SV1(4) keeps OFF.

5.1.2 Domestic water heating

The ON/OFF signal and target tank water temperature (T5S) are set on the user interface. P_o (6) stops running as long as the unit is ON for domestic water heating, SV1(4) keeps ON.

5.1.3 AHS (auxiliary heat source) control

The AHS function is set on the indoor unit

1) When the AHS is set to be valid only for heating mode, AHS can be turned on in the following ways:

- a. Turn on the AHS via BACKHEATER function on the user interface;
- b. AHS will be turned on automatically if initial water temperature is too low or target water temperature is too high at low ambient temperature.

P_o (6) keeps running as long as the AHS is ON, SV1(4) keeps OFF.

2) When the AHS is set to be valid for heating mode and DHW mode. In heating mode, AHS control is same as part 1); In DHW mode, AHS will be turned on automatically when the initial domestic water temperature T5 is too low or the target domestic water temperature is too high at low ambient temperature. P_o (6) stops running, SV1(4) keeps ON.

3) When the AHS is set to be valid, M1M2 can be set to be valid on the user interface. In heating mode, AHS will be turned on if M1M2 dry contact closes. This function is invalid in DHW mode.

5.1.4 TBH (tank booster heater) control

The TBH function is set on the user interface.

1) When the TBH is set to be valid, TBH can be turned on via TANKHEATER function on the user interface; In DHW mode, TBH will be turned on automatically when the initial domestic water temperature T5 is too low or the target domestic water temperature is too high at low ambient temperature.

2) When the TBH is set to be valid, M1M2 can be set to be valid on the user interface. TBH will be turned on if M1M2 dry contact closes.

5.1.5 Solar energy control

Hydraulic module recognizes solar energy signal by judging Tsolar or receiving SL1SL2 signal from user interface. The recognition method can be set via SOLAR INPUT on the user interface. Please refer to 8.8.5 "For solar energy input signal" for wiring.

1) When Tsolar is set to be valid, Solar energy turns ON when Tsolar is high enough, P_s(9) starts running; Solar energy turns OFF when Tsolar is low, P_s (9) stops running.

2) When SL1SL2 control is set to be valid, Solar energy turns ON after receiving Solar kit signal from user interface, P_s (9) starts running; Without solar kit signal. Solar energy turns OFF, P_s (9) stops running. The room thermostats are not connected to the Mono unit but to a motorized valve. Each room's temperature is regulated by the motorized valve on its water circuit. Domestic hot water is supplied from the domestic hot water tank connected to the Mono unit. A bypass valve is required.

5.2 Application 2

ROOM THERMOSTAT Control for Space heating or cooling need to be set on the user interface. It can be set in three ways: MODE SET/ONE ZONE/DOUBLE ZONE. The indoor unit can be connected to a high voltage room thermostat and a low voltage room thermostat. A hydraulic adapter box can also be connected. Another six thermostats can be connected to the hydraulic adapter box. Please refer to “ROOM THERMOSTAT in installation manual” for wiring.

5.2.1 One zone control

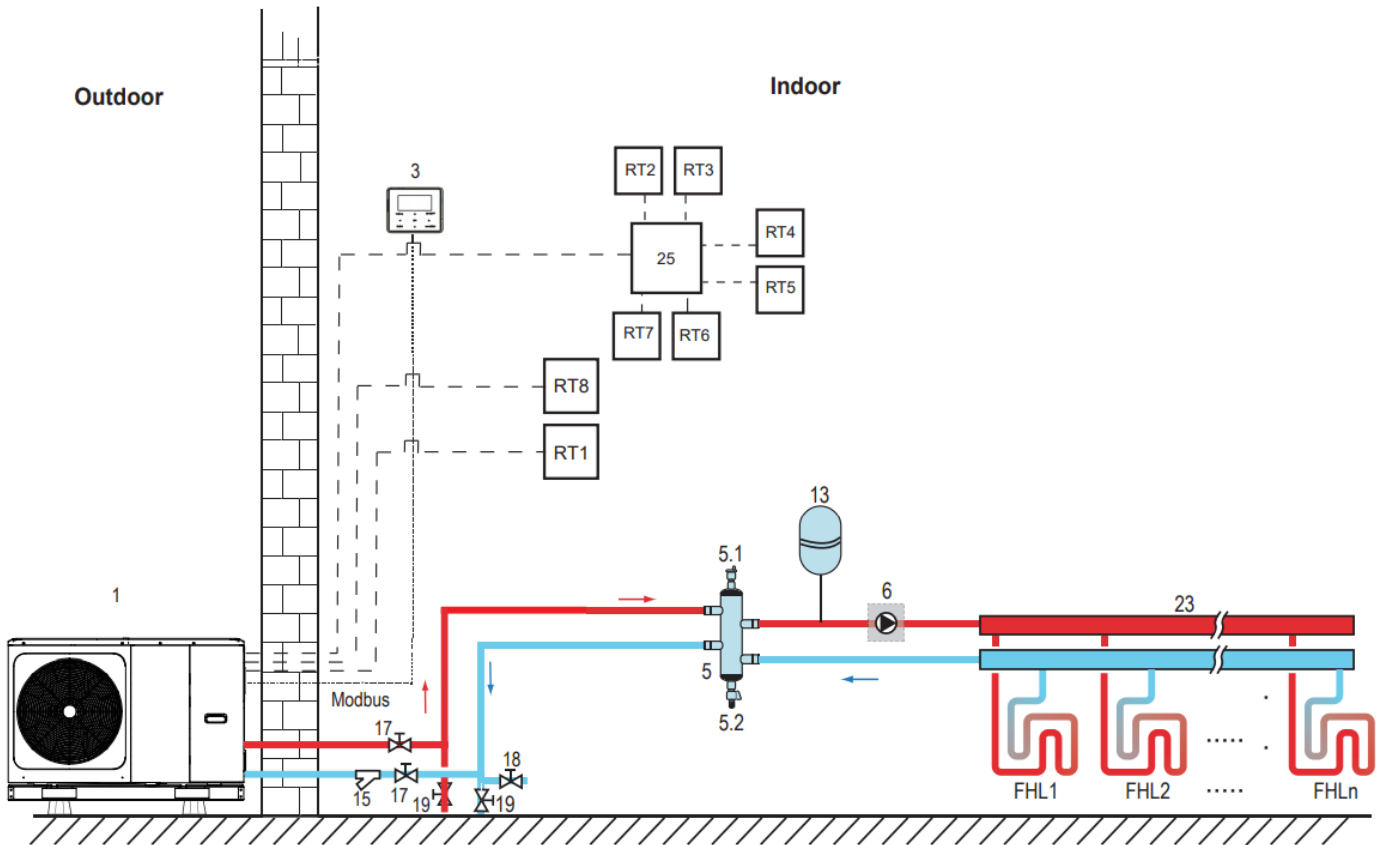


Figure 1-5.2: Application 2-One zone control

Legend			
1	Outdoor unit	17	Shut-off valve (Field supply)
3	User interface	18	Filling valve (Field supply)
5	Balance tank (Field supply)	19	Drainage valve (Field supply)
5.1	Automatic bleed valve	23	Collector/distributor (Field supply)
5.2	Drainage valve	25	Hydraulic adapter box (Optional)
6	P _o : Zone A circulation pump (Field supply)	RT 1...7	Low voltage room thermostat (Field supply)
13	Expansion vessel (Field supply)	RT8	High voltage room thermostat (Field supply)
15	Filter (Accessory)	FHL1...n	Floor heating loop (Field supply)

Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

Space heating

One zone control: the unit ON/OFF is controlled by the room thermostat, cooling or heating mode and outlet water temperature is set on the user interface. System is ON when any “HL” of all the thermostats closes. When all “HL” open, system turns OFF.

The circulation pumps operation

When the system is ON, which means any “HL” of all the thermostats closes, P_o(6) starts running; When the system is OFF, which means all “HL” close, P_o(6) stops running.

5.2.2 Mode set control

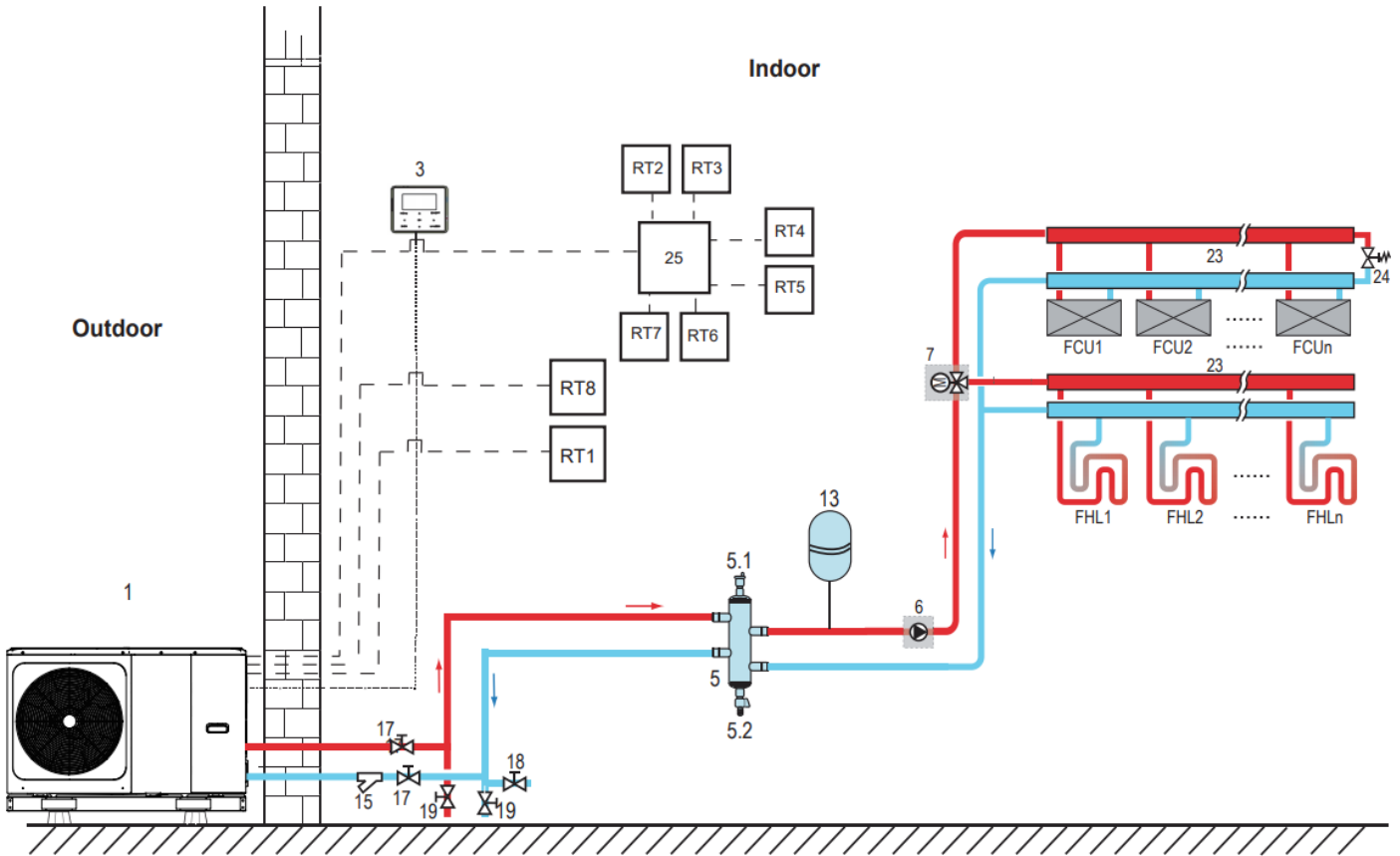


Figure 1-5.3: Application 2- Mode set control

Legend			
1	Outdoor unit	17	Shut-off valve (Field supply)
3	User interface	18	Filling valve (Field supply)
5	Balance tank (Field supply)	19	Drainage valve (Field supply)
5.1	Automatic bleed valve	23	Collector/distributor (Field supply)
5.2	Drainage valve	24	Bypass valve (Field supply)
6	P _o : Zone A circulation pump (Field supply)	25	Hydraulic adapter box (Optional)
7	SV2: 3-way valve (Field supply)	RT 1...7	Low voltage room thermostat (Field supply)
13	Expansion vessel (Field supply)	RT8	High voltage room thermostat (Field supply)
15	Filter (Accessory)	FHL1...n	Floor heating loop (Field supply)
		FCU1...n	Fan coil unit (Field supply)

Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

Space heating

Cooling or heating mode is set via the room thermostat, water temperature is set on the user interface. 1) When any “CL” of all the thermostats close, system will be set at cooling mode. 2) When any “HL” of all the thermostats close and all “CL” open, system will be set at heating mode.

The circulation pumps operation

- 1) When the system is in cooling mode, which means any “CL” of all the thermostats closes, SV2(7) keeps OFF, P_o(6) starts running;
- 2) When the system is in heating mode, which means one or more “HL” close and all “CL” open, SV2(7) keeps ON, P_o(6) starts running.

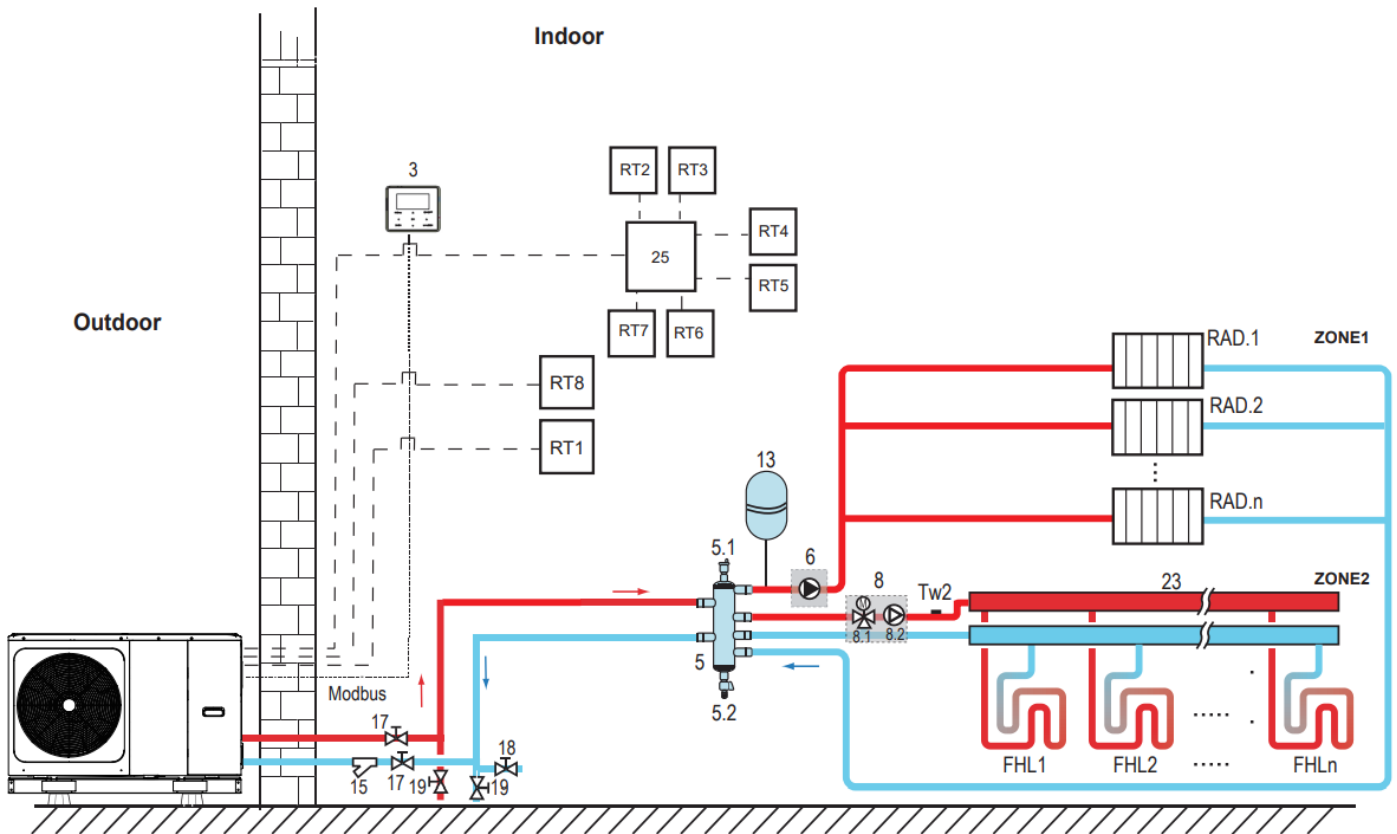
5.2.3 Double zone control


Figure 1-5.4: Application 2-Double zone control

Legend			
1	Outdoor unit	17	Shut-off valve (Field supply)
3	User interface	17	Shut-off valve (Field supply)
5	Balance tank (Field supply)	18	Filling valve (Field supply)
5.1	Automatic bleed valve	19	Drainage valve (Field supply)
5.2	Drainage valve	23	Collector/distributor (Field supply)
6	P _o : Zone A circulation pump (Field supply)	25	Hydraulic adapter box (Optional)
8	Mixing station (Field supply)	RT 1...7	Low voltage room thermostat (Field supply)
8.1	SV3: Mixing valve (Field supply)	RT8	High voltage room thermostat (Field supply)
8.2	P _c : zone 2 circulation	FHL1...n	Floor heating loop (Field supply)
13	Expansion vessel (Field supply)	Tw2	Zone 2 water flow temperature sensor (Optional)
15	Filter (Accessory)	RAD.1...n	Radiator (Field supply)

Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

Space heating

Zone1 can operate in cooling mode or heating mode, while zone2 can only operate in heating mode; While installation, for all thermostats in zone1, only “H、L” terminals need to be connected. For all thermostats in zone2, only “C、L” terminals need to be connected.

1) The ON/OFF of zone1 is controlled by the room thermostats in zone1. When any “HL” of all thermostats in zone1 closes, zone1 turns ON. When all “HL” turn OFF, zone1 turns OFF; Target temperature and operation mode are set on the user interface;

2) In heating mode, the ON/OFF of zone2 is controlled by the room thermostats in zone2. When any “CL” of all thermostats in zone2 closes, zone2 turns ON. When all “CL” open, zone2 turns OFF. Target temperature is set on the user interface; Zone 2 can only operate in heating mode. When cooling mode is set on the user interface, zone2 keeps in OFF status.

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The circulation pump operation

When zone 1 is ON, P_o(6) starts running; When zone 1 is OFF, P_o(6) stops running;

When zone 2 is ON, SV3(8.1) is ON, P_c(8.2) starts running; When zone 2 is OFF, SV3(8.1) is OFF, P_c(8.2) stops running .

The floor heating loops require a lower water temperature in heating mode compared to radiators. To achieve these two set points, a mixing station is used to adapt the water temperature according to requirements of the floor heating loops. The radiators are directly connected to the unit water circuit and the floor heating loops are after the mixing station. The mixing station is controlled by the unit.

Part 2

Engineering Data

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1 Specifications

MHC-V4W/D2N8-B / MHC-V6W/D2N8-B / MHC-V8W/D2N8-B/ MHC-V10W/D2N8-B/ MHC-V10W/D2N8-B

Table 2-1.1: MHC-V4(6, 8,10)W/D2N8-B specifications

Outdoor unit model name			MHC-V4W/D2N8-B	MHC-V6W/D2N8-B	MHC-V8W/D2N8-B	MHC-V10W/D2N8-B
			B	B	B	B
Power supply	V/Ph/Hz		220-240/1/50			
Heating A7W35	Capacity	kW	4.20	6.35	8.40	10.0
	Rated input	kW	0.82	1.28	1.63	2.02
	COP		5.10	4.95	5.15	4.95
Heating A7W45	Capacity	W	4.30	6.30	8.10	10.0
	Rated input	W	1.13	1.70	2.10	2.67
	COP		3.80	3.70	3.85	3.75
Heating A7W55	Capacity	W	4.40	6.00	7.50	9.50
	Rated input	W	1.49	2.03	2.36	3.06
	COP		2.95	2.95	3.18	3.10
Cooling A35W18	Capacity	W	4.50	6.50	8.30	9.90
	Rated input	W	0.82	1.35	1.64	2.18
	EER		5.50	4.80	5.05	4.55
Cooling A35W7	Capacity	W	4.70	7.00	7.45	8.20
	Rated input	W	1.36	2.33	2.22	2.52
	EER		3.45	3.00	3.35	3.25
SCOP	Water outlet at 35°C		A+++			
	Water outlet at 55°C		A++			
Sound power Level ³	Heating A7W35	dB	55	58	59	60
Compressor	Type		Twin rotary			
Outdoor fan	Motor type		DC fan		DC fan	
	Number of fans		1		1	
Air side heat exchanger			Finned tube			
Refrigerant			R32 1.4kg			
Unit dimension (W×H×D)		mm	1295×792×429		1385×945×526	
Packing dimension (W×H×D)		mm	1375×945×475		1465×1120×560	
Net/Gross weight		kg	98/121		121/148	
Outdoor air temperature range	Cooling	°C	-5 ~ 43			
	Heating	°C	-25 ~ 35			
	DHW	°C	-25 ~ 43			
Water side heat exchanger			Plate type			
Water outlet temperature range	Cooling	°C	5 ~ 30			
	Heating	°C	12 ~ 65			
	DHW (tank)	°C	10 ~ 60			

Abbreviations:

DHW: Domestic hot water

Notes:

1. Relevant EU standards and legislation: EN14511; EN14825; EN50564; EN12102; (EU) No 811/2013; (EU) No 813/2013; OJ 2014/C 207/02.
2. Seasonal space heating energy efficiency class tests in average climate conditions.
3. Sound power test condition: EN12102-1

MHC-V12W/D2N8-B / MHC-V14W/D2N8-B / MHC-V16W/D2N8-B

Table 2-1.1: MHC-V12(14, 16)W/D2N8-B specifications

Outdoor unit model name			MHC-V12W/D2N8-B	MHC-V14W/D2N8-B	MHC-V16W/D2N8-B
Power supply		V/Ph/Hz	220-240/1/50		
Heating A7W35	Capacity	kW	12.1	14.5	15.9
	Rated input	kW	2.44	3.15	3.53
	COP		4.95	4.60	4.50
Heating A7W45	Capacity	W	12.3	14.1	16.0
	Rated input	W	3.32	3.92	4.57
	COP		3.70	3.60	3.50
Heating A7W55	Capacity	W	11.9	13.8	16.0
	Rated input	W	3.90	4.68	5.61
	COP		3.05	2.95	2.85
Cooling A35W18	Capacity	W	12.00	13.50	14.90
	Rated input	W	3.04	3.75	4.38
	EER		3.95	3.60	3.40
Cooling A35W7	Capacity	W	11.5	12.4	14.0
	Rated input	W	4.18	4.96	5.60
	EER		2.75	2.50	2.50
SCOP	Water outlet at 35°C		A+++		
	Water outlet at 55°C		A++		
Sound power Level ³	Heating A7W35	dB	65	65	68
Compressor	Type		Twin rotary		
Outdoor fan	Motor type		DC fan		
	Number of fans		1		
Air side heat exchanger			Finned tube		
Refrigerant			R32 1.75kg		
Unit dimension (W×H×D)		mm	1385×945×526		
Packing dimension (W×H×D)		mm	1465×1120×560		
Net/Gross weight		kg	144/170		
Outdoor air temperature range	Cooling	°C	-5 ~ 43		
	Heating	°C	-25 ~ 35		
	DHW	°C	-25 ~ 43		
Water side heat exchanger			Plate type		
Water outlet temperature range	Cooling	°C	5 ~ 30		
	Heating	°C	12 ~ 65		
	DHW (tank)	°C	10 ~ 60		

 Abbreviations:
 DHW: Domestic hot water

Notes:

1. Relevant EU standards and legislation: EN14511; EN14825; EN50564; EN12102; (EU) No 811/2013; (EU) No 813/2013; OJ 2014/C 207/02.
2. Seasonal space heating energy efficiency class tests in average climate conditions.
3. Sound power test condition: EN12102-1

M thermal Mono



MHC-V12W/D2RN8-B / MHC-V14W/D2RN8-B / MHC-V16W/D2RN8-B

Table 2-1.3: MHC- V12(14, 16)W/D2RN8-B specifications

kW			12	14	16
Outdoor unit model name			MHC-V12W/D2RN8-B	MHC-V14W/D2RN8-B	MHC-V16W/D2RN8-B
Power supply		V/Ph/Hz	380-415/3/50		
Heating A7W35	Capacity	kW	12.1	14.5	15.9
	Rated input	kW	2.44	3.15	3.53
	COP			4.95	4.60
Heating A7W45	Capacity	W	12.3	14.1	16.0
	Rated input	W	3.32	3.92	4.57
	COP			3.70	3.60
Heating A7W55	Capacity	W	11.9	13.8	16.0
	Rated input	W	3.90	4.68	5.61
	COP			3.05	2.95
Cooling A35W18	Capacity	W	12.00	13.50	14.90
	Rated input	W	3.04	3.75	4.38
	EER			3.95	3.60
Cooling A35W7	Capacity	W	11.5	12.4	14.0
	Rated input	W	4.18	4.96	5.60
	EER			2.75	2.50
SCOP	Water outlet at 35°C		A+++		
	Water outlet at 55°C		A++		
Sound power Level ³	Heating A7W35	dB	65	65	68
Compressor	Type		Twin rotary		
Outdoor fan	Motor type		DC fan		
	Number of fans		1		
Air side heat exchanger			Finned tube		
Refrigerant			R32 1.75kg		
Unit dimension (W×H×D)		mm	1385×945×526		
Packing dimension (W×H×D)		mm	1465×1120×560		
Net/Gross weight		kg	160/188		
Outdoor air temperature range	Cooling	°C	-5 ~ 43		
	Heating	°C	-25 ~ 35		
	DHW	°C	-25 ~ 43		
Water side heat exchanger			Plate type		
Water outlet temperature range	Cooling	°C	5 ~ 30		
	Heating	°C	12 ~ 65		
	DHW (tank)	°C	10 ~ 60		

Abbreviations:

DHW: Domestic hot water

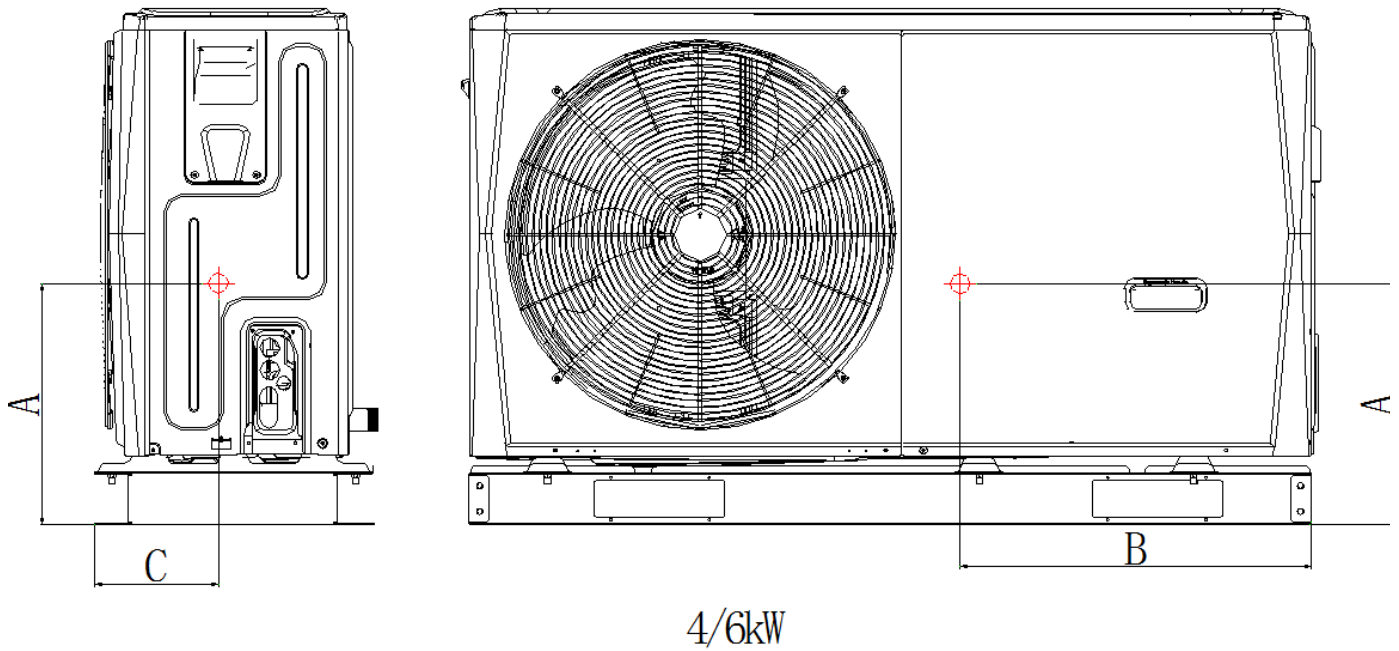
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2. Seasonal space heating energy efficiency class tests in average climate conditions.
3. Sound power test condition: EN12102-1

2 Dimensions and Center of Gravity

MHC-V4W/D2N8-B / MHC-V6W/D2N8-B / MHC-V8W/D2N8-B/ MHC-V10W/D2N8-B

Figure 2-2.1: MHC-V4(6, 8, 10)W/D2N8-B dimensions and center of gravity (unit: mm)



unit:
mm

Model	A	B	C
4/6kW	370	540	190

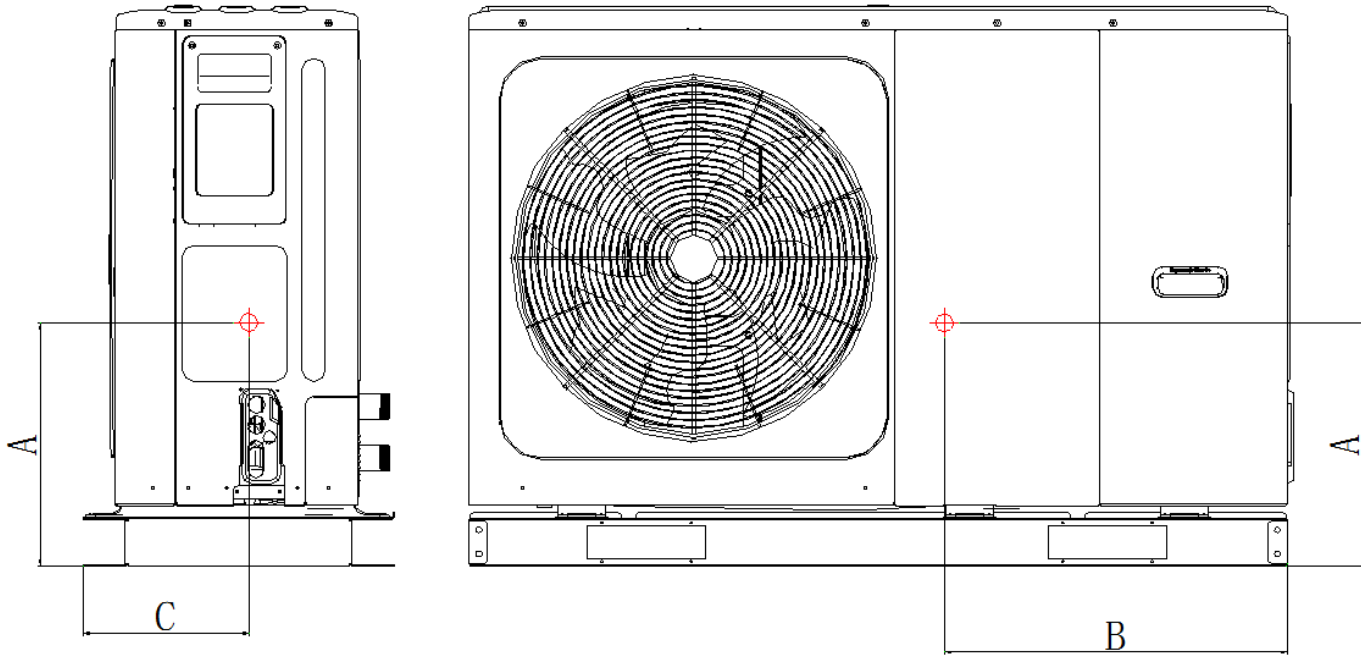
M thermal Mono



MHC-V12W/D2N8-B / MHC-V14W/D2N8-B / MHC-V16W/D2N8-B

MHC-V12W/D2RN8-B / MHC-V14W/D2RN8-B / MHC-V16W/D2RN8-B

Figure 2-2.2: MHC-V12(14,16)W/D2(R)N8 dimensions and center of gravity (unit: mm)



8-16kW

unit:
mm

Model	A	B	C
8/10kW	410	580	280
12-16kW 1Ph	370	605	605
12-16kW 3Ph	285	245	245

3 Piping Diagrams

MHC-V4(6,8,10,12,14,16)W/D2N8-B / MHC-V12(14,16)W/D2RN8-B

Figure 2-3.1: MHC-V4(6, 12,14,16)W/D2N8-B/ MHC-V12(14,16)W/D2RN8-B piping diagram

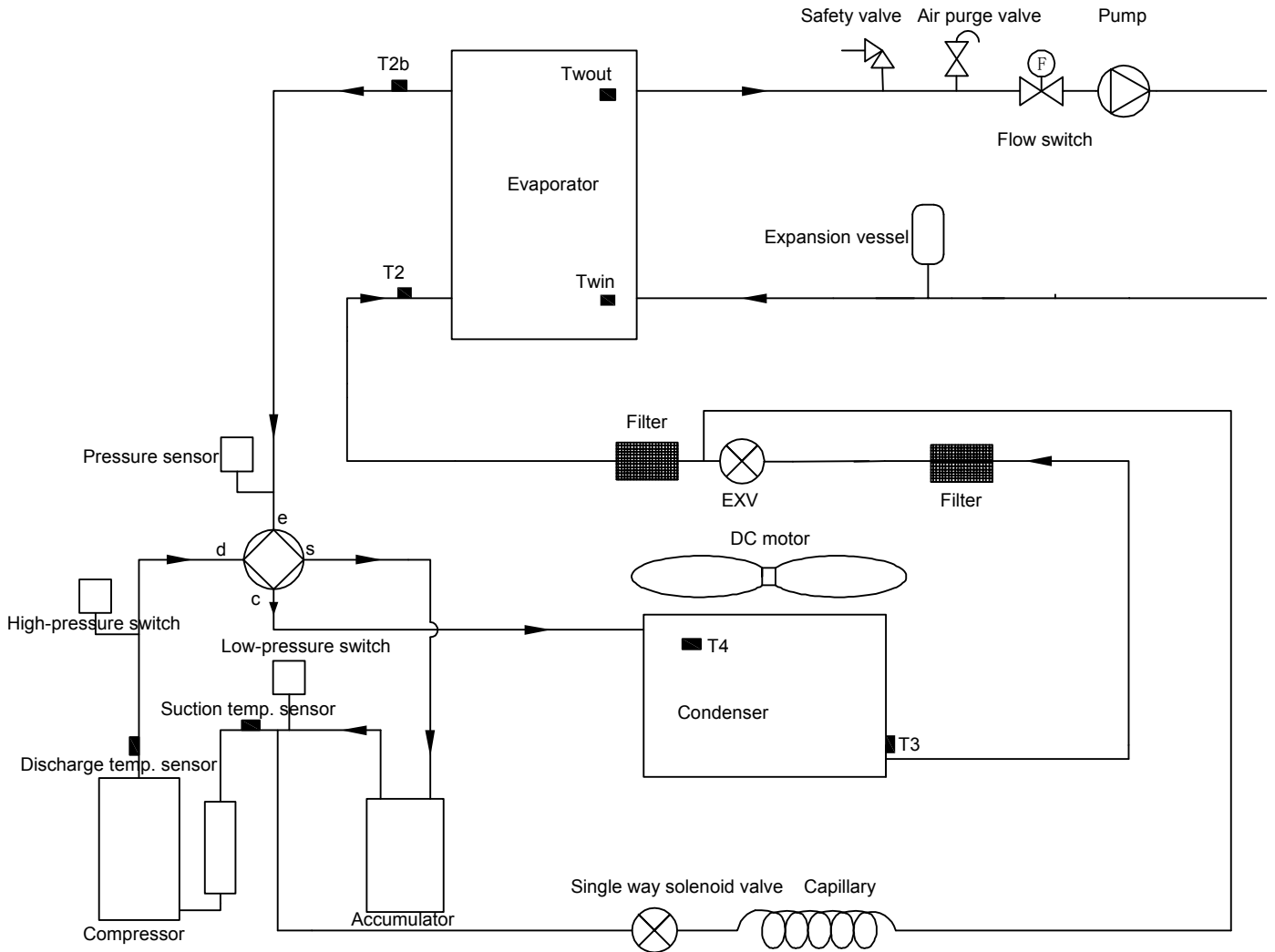
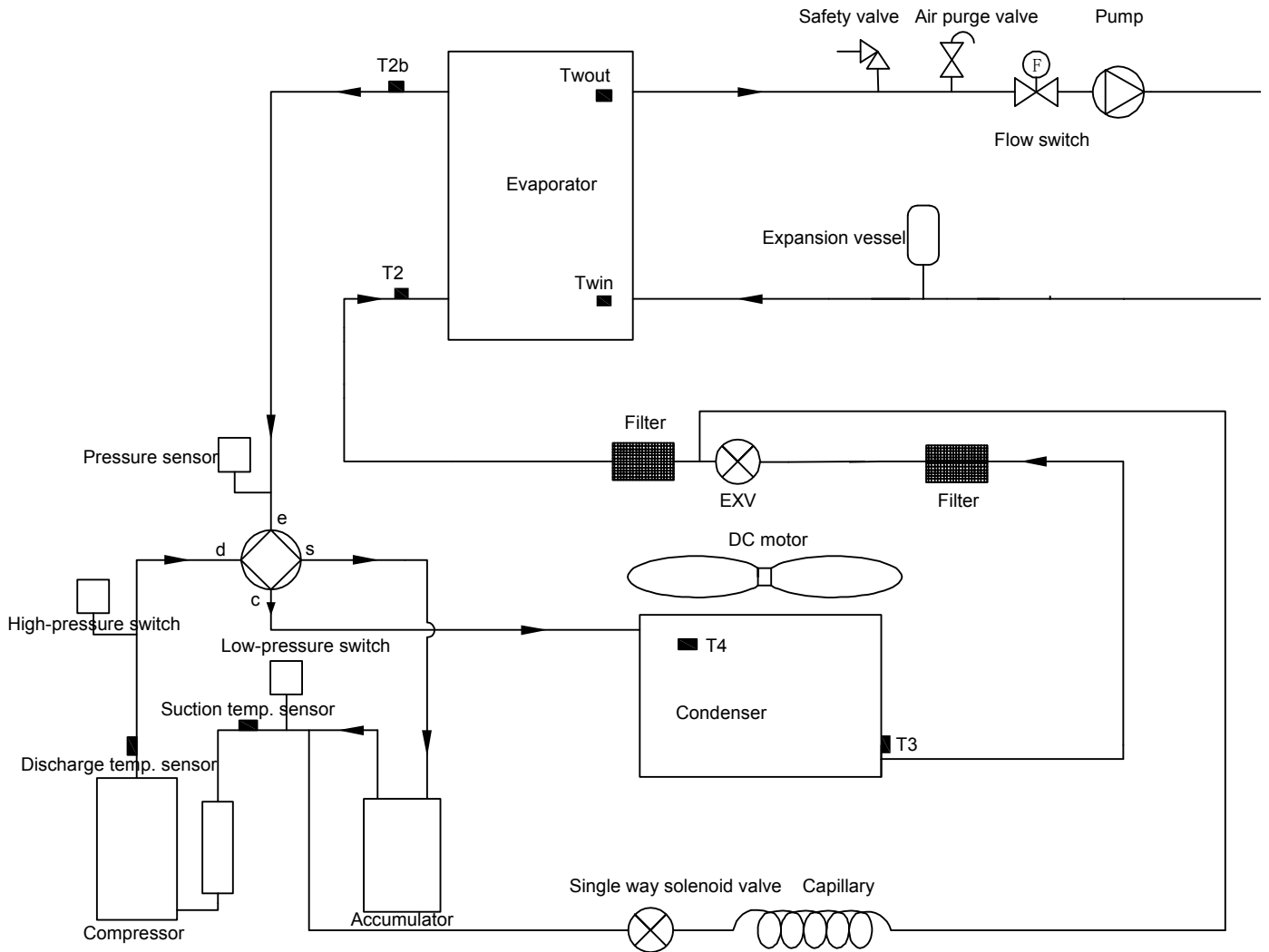


Figure 2-3.1: MHC-V8(10)W/D2N8-B0 piping diagram



4 Wiring Diagrams

MHC-V4W/D2N8-B / MHC-V6W/D2N8-B / MHC-V8W/D2N8-B/ MHC-V10W/D2N8-B

Figure 2-4.1: MHC-V4(6, 8, 10)W/D2N8-B wiring diagram

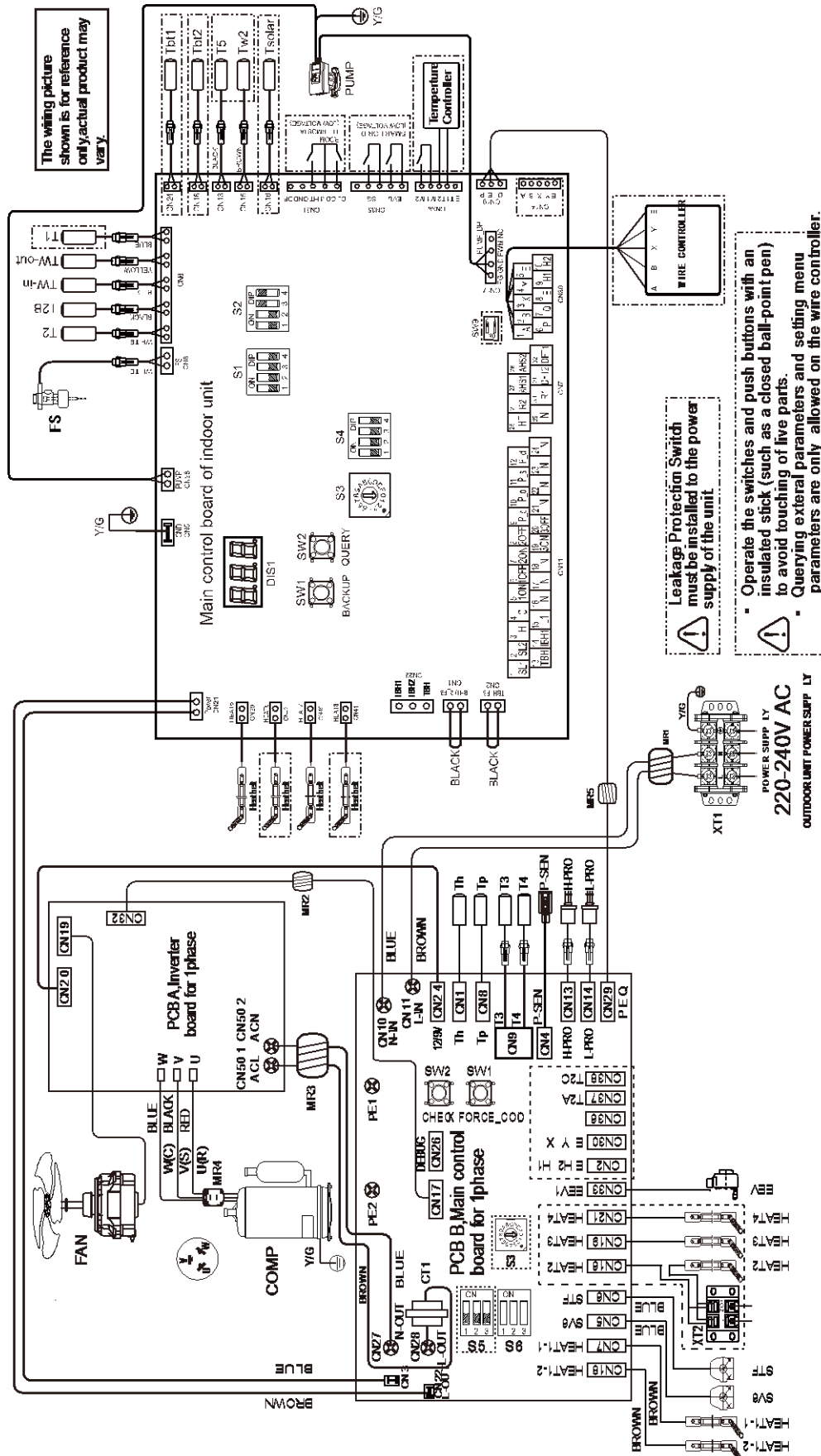
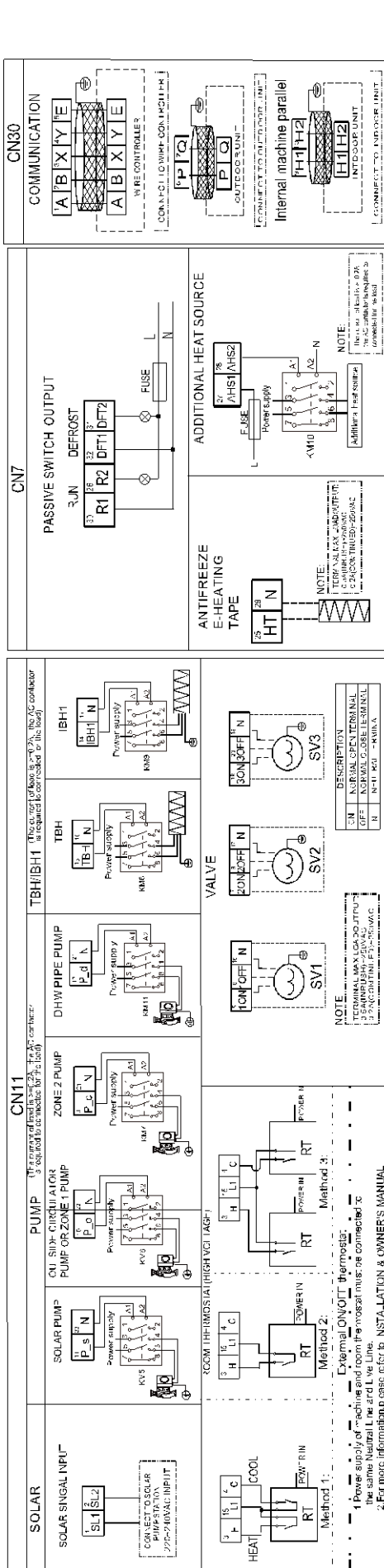


Figure continued on next page ...

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Figure 2-4.1: MHC-V4(6, 8, 10)W/D2N8-B wiring diagram (continued)



THE FAULT OR PROTECTION TABLE

Display	Fault or Protection
E0	Water flow fault(after 3 times E0)
E2	Communication fault between controller and indoor unit
H0	Communication fault between indoor unit and outdoor unit
E3	Final outlet water temp.sensor(T1) fault
E4	Water tank temp.sensor(T5) fault
E8	Water flow fault
Ed	Inlet water temp.sensor(Tw_in) fault
EE	Indoor unit EEPROM fault
H2	Refrigerant liquid temp.sensor(T2) fault
H3	Refrigerant gas temp.sensor(T2B) fault
HA	Outlet water temp.sensor(Tw_out) fault
Hb	Three times 'Pp' protection and Tw_out < 7°C
Eb	Solar panel temp.sensor(Tsolar) fault
H9	Outlet water for zone 2 temp.sensor(Tw2) fault
Pb	Anti-freeze mode
P5	Tw_out - Tw_in value too big protection
PP	Tw_out - Tw_in unusual protection
E7	Balanced water tank of up balanced temp.sensor(Tb1) fault
Ec	Balanced water tank of down balanced temp.sensor(Tb2) fault
H5	Temp.sensor(Ta) fault
Hd	Communication fault between indoor unit and temperature board
HE	

DIP switch	ON=1	OFF=0	Factory details
1	Reserved	Reserved	OFF
2	Reserved	Reserved	OFF
S1	0/0=Without IBH and AHS 0/1=With AHS for heat mode 1/0=With IBH 1/1=With AHS for heat mode and DHW mode	3:OFF 4:OFF	
1	Start pumpo after six hours will be valid	Start pumpo after six hours will be invalid	OFF
2	Without TBH	With TBH	OFF
S2	0/0=variable speed pump, Max head:8.5m(GRUNDFOSS) 0/1=constant speed pump(WILO) 1/0=variable speed pump, Max head: 10.5m(GRUNDFOSS) 1/1=variable speed pump,Max head: 9.0m(WILO)	3:ON 4:ON	
1/2	Reserved	Reserved	1:OFF 2:OFF
3/4	Reserved	Reserved	3:OFF 4:OFF

Additional heat source	DESCRIPTION
AHS	Domestic hot water
DHW	Heat mode/Cool mode(thermostat)
HT/CL	KN5-KM11 AC Contactor
SV1	Motorized 3-way valve (field supply)
SV2	Motorized 3-way valve (field supply)
SV3	Motorized 3-way valve (field supply)
PUMP	Variable speed pump
P_c	Zone 2 pump(field supply)
P_d	DHW pipe pump (field supply)
P_o	Outside circulator pump (field supply) or Zone 1 pump (field supply)
P_s	Solar pump
XT1	Terminal block
RT	Room thermostat
SG	Solar energy
EVU	Commercial power
M1 M2	Remote switch

Temp.sensor code	Property values
T2/T2B	$B_{25,50} = 4100K, R_{25} = 10k\Omega$
T1/TW_out	$B_{25,50} = 3970K, R_{25} = 17.6k\Omega$

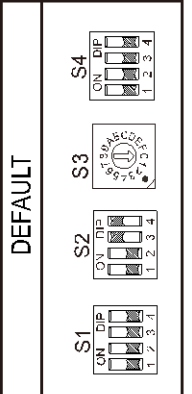
FACTORY SETTING	SS-1	SS-2	SS-3
4KW	0	0	0
6KW	1	0	0
8KW	0	1	0
10KW	1	1	0

Operating behavior	EVU	SG
Increased operation output	ON	ON
Normal operation	ON	OFF
Decreased operation output	OFF	ON
	OFF	OFF

THE FAULT OR PROTECTION TABLE

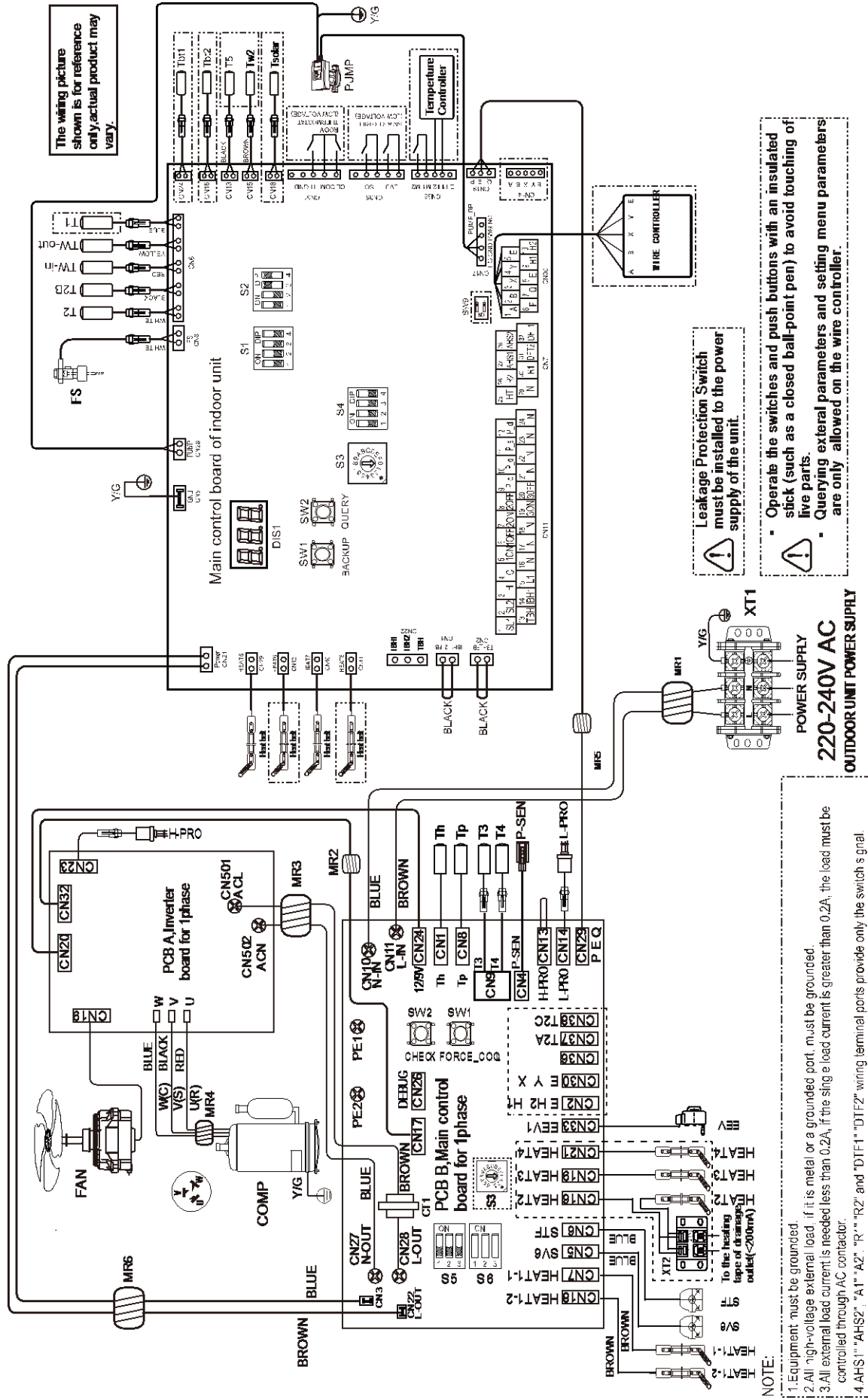
Display	Fault or protection
E5	Pressure sensor fault
HE	EEPROM fault
HI	10 times H6 in 120 minutes
HP	3 times low pressure protection in 1 hour in working mode
Hb	Heat pump system low pressure protection
H1	Heat pump system high pressure protection
H0	Compressor current protection
H1	Compressor discharge temperature too high protection
H1	Transducer module (IFM) protection
H4	Exchanger temperature (T3) too high protection
H6	DC fan motor fault
H7	DC bus voltage is too low protection
H8	Pressure sensor fault
H9	EEPROM fault
HI	10 times H6 in 120 minutes
HP	3 times low pressure protection in 1 hour in working mode
Hb	Heat pump system low pressure protection
H1	Heat pump system high pressure protection
H0	Compressor current protection
H1	Compressor discharge temperature too high protection
H1	Transducer module (IFM) protection
H4	Exchanger temperature (T3) too high protection
H6	DC fan motor fault
H7	DC bus voltage is too low protection

CODE	Part name
4-WAY	4-WAY valve
COMP.r	Compressor
CT1	AC current detector
EEV	Electric expansion valve
FAN	Outdoor fan motor
HEAT1-1	Comp. electrical heating tape1
HEAT1-2	Comp. electrical heating tape2
HEAT4	Chassis electrical heating tape
H-PRO	High pressure switch
L-PRO	Low pressure switch
MK1 MK2	Magnetic ring
H.SEN	Pressure sensor
T3	Condenser temp sensor
T4	Outdoor ambient temp sensor
TF	Radiator temp sensor
Th	Evaporator input temp sensor
TP	COMP. discharge temp sensor
XT1,2	Terminal blocks



MHC-V12W/D2N8-B / MHC-V14W/D2N8-B / MHC-V16W/D2N8-B

Figure 2-4.2: MHC-V12(14, 16)W/D2N8-B wiring diagram



The wiring picture shown is for reference only, actual product may vary.

Leakage Protection Switch must be installed to the power supply of the unit.

Operate the switches and push buttons with an insulated stick (such as a closed ball-point pen) to avoid touching of live parts. Querying external parameters and setting menu parameters are only allowed on the wire controller.

POWER SUPPLY
220-240V AC
OUTDOOR UNIT POWER SUPPLY

NOTE:

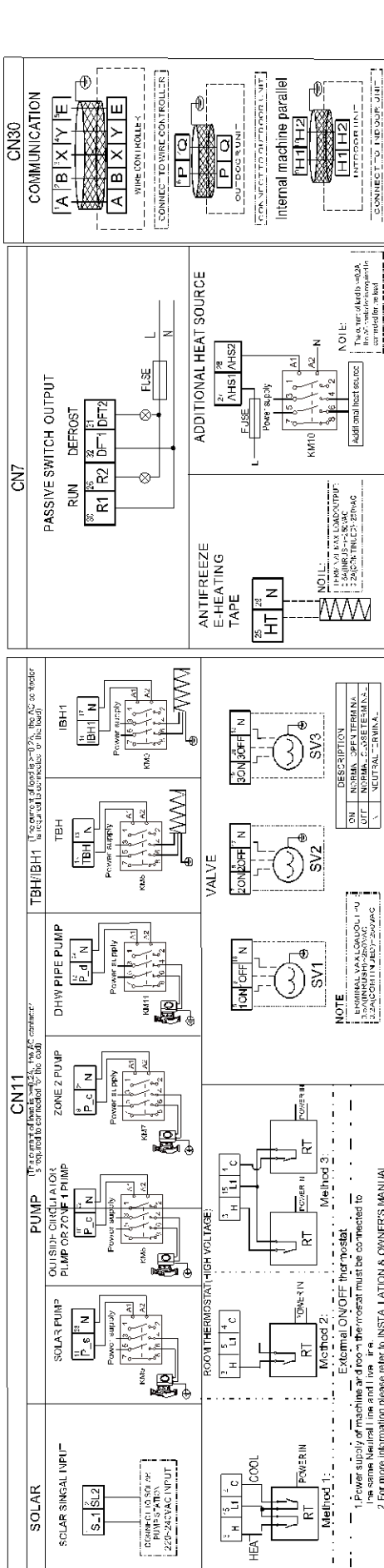
- Equipment must be grounded.
- All high-voltage external load, if it is metal or a grounded port, must be grounded.
- All external load current is needed less than 0.2A, if the single load current is greater than 0.2A, the load must be controlled through AC contactor.
- AHS1 "AHS2", "A1", "A2", "P1", "P2", "D1F1", "D1F2", "D1F3" wiring terminal ports provide only the switch signal.

Figure continued on next page ...

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Figure 2-4.2: MHC-V12(14, 16)W/D2N8-B wiring diagram (continued)



THE FAULT OR PROTECTION TABLE

Display	Fault or Protection
E0	Water flow fault (after 3 times E8)
E2	Communication fault between controller and indoor unit
H0	Communication fault between indoor unit and outdoor unit
E3	Final outlet water temp.sensor(T1) fault
E4	Water tank temp.sensor(T5) fault
E8	Water flow fault
E4	Inlet water temp.sensor(Tw_in) fault
EE	Indoor unit EEPROM fault
H2	Refrigerant liquid temp.sensor(T2) fault
H3	Refrigerant gas temp.sensor(T2B) fault
HA	Outlet water temp.sensor(Tw_out) fault
Hb	Three times "PP" protection and Tw_out < 7°C
Eb	Solar panel temp.sensor(Tsolar) fault
H9	Outlet water for zone 2 temp.sensor (Tw2) fault
Pb	Anti-freeze mode
P5	Tw_out - Tw_in value too big protection
PP	Tw_out - Tw_in unusual protection
E7	Balanced water tank of up balanced temp.sensor(Tbt1) fault
Ec	Balanced water tank of down balanced temp.sensor(Tbt2) fault
H5	Temp.sensor(Ta) fault
Hd	Communication fault between indoor unit parallel
HE	Communication fault between indoor unit and temperature board

DIP switch	ON=1	OFF=0	Factory defaults
1	Reserved	Reserved	OFF
2	Reserved	Reserved	OFF
S1	0/0=Without IBH and AHS 0/1=With AHS for heat mode 1/0=With IBH 1/1=With AHS for heat mode and DHW mode	3:OFF 4:OFF	3:OFF 4:OFF
1	Start pump after six hours will be valid	Start pump after six hours will be invalid	OFF
2	Without TBH	With TBH	OFF
3/4	0/0=variable speed pump.Max head:8.5m(GRUND-FOS) 0/1=constant speed pump(WILO) 1/0=variable speed pump.Max head:10.5m(GRUND-FOS) 1/1=variable speed pump.Max head:9.0m(WILO)	3:ON 4:ON	3:ON 4:ON
1/2	Reserved	Reserved	1:OFF 2:OFF
3/4	Reserved	Reserved	3:OFF 4:OFF

DEFAULT

S1: ON 1 2 3 4, OFF 1 2 3 4
S2: ON 1 2 3 4, OFF 1 2 3 4
S3: ON 1 2 3 4, OFF 1 2 3 4
S4: ON 1 2 3 4, OFF 1 2 3 4

Additional heat source

DESCRIPTION	ON	NORMAL	OPEN TERMINAL	OFF	NORMAL	CLOSE TERMINAL	OFF	NORMAL	CLOSE TERMINAL
AHS	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
DHW	10N	OFF	N	10N	OFF	N	10N	OFF	N
HT/CL	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
HT/CL	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
SV1	10N	OFF	N	10N	OFF	N	10N	OFF	N
SV2	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
SV3	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
PUMP	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
P_c	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
P_d	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
P_o	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
P_s	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
XT1	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
RT	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
SG	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
EVU	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N
M1/M2	3ON	OFF	N	3ON	OFF	N	3ON	OFF	N

Property values

Temp.sensor code	Property values
T2/T2B	$B_{T2,T2B} = 4100K, R_{T2,T2B} = 10k\Omega$
T1/TW out	$B_{T1,TW out} = 3970K, R_{T1,TW out} = 17.6k\Omega$

Property values

Temp.Sensor code	Property values
T3/T4/Th	$R_{T3,T4,Th} = 4100K, R_{T3,T4,Th} = 10k\Omega$
Tp	$R_{Tp} = 3950K, R_{Tp} = 5k\Omega$

Temp.Sensor code

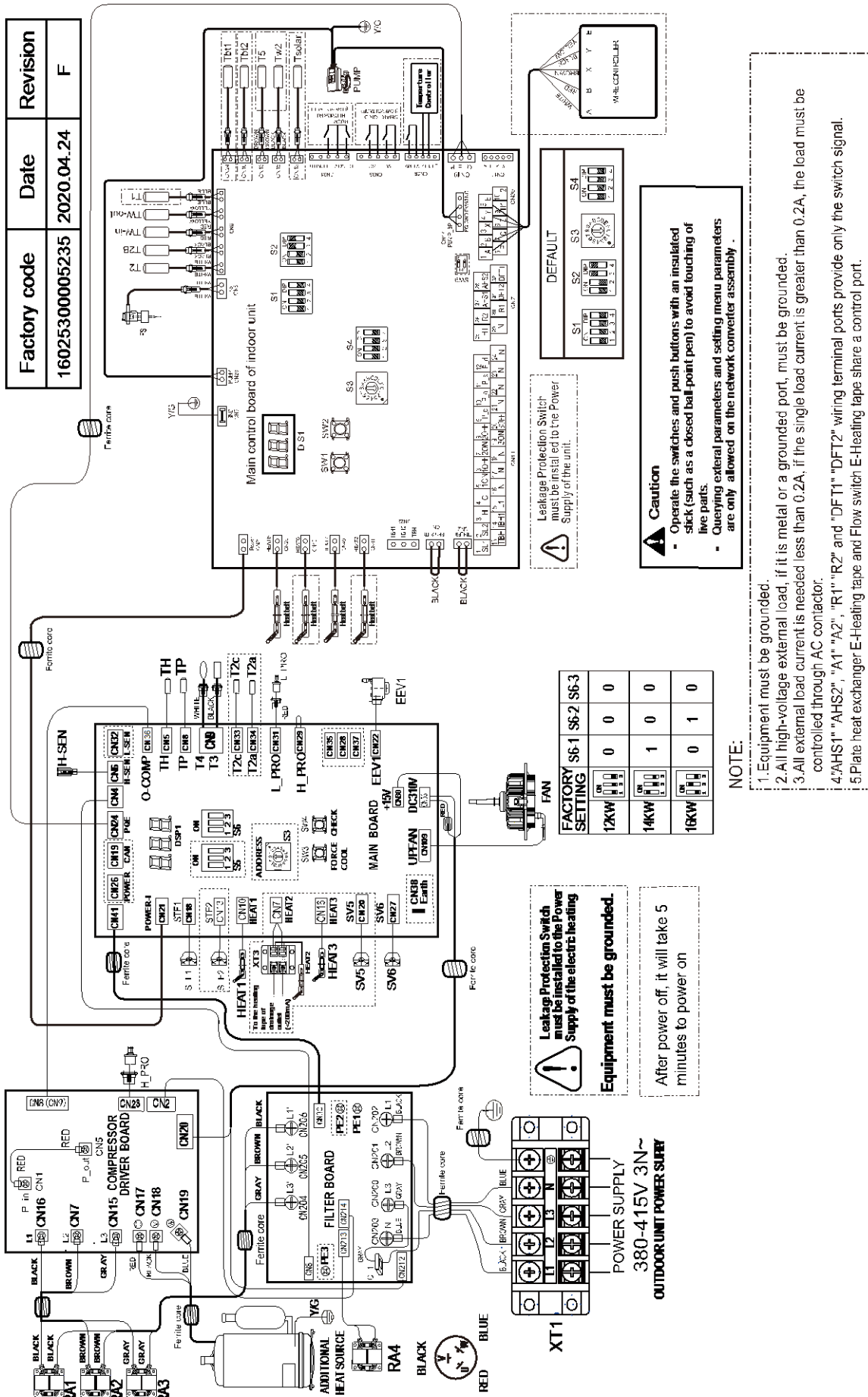
Temp.Sensor code	Property values
L0	Module protection
L1	DC generator low voltage protection
L2	DC generator high voltage protection
L4	MCE malfunction
P0	Zero speed protection
L5	Zero speed protection
L7	Phase sequence protection
L8	Speed difference >15% protection
L9	Speed difference >15% protection between the real and the setting speed

THE FAULT OR PROTECTION TABLE

Display	Fault or protection
E5	Condenser temp.sensor (T3) fault
E6	Outdoor ambient temp.sensor (T4) fault
E9	Suction temp.sensor (T6/T7) fault
EA	Compressor discharge temp.sensor (T5/Tp) fault
H0	Communication fault between indoor unit and outdoor unit
H1	Communication fault between inverter board and main control board in outdoor unit
H4	Three times P6 protection in 60 minutes
H6	DC fan motor fault
H7	Voltage protection
H8	Pressure sensor fault
HF	EEPROM fault
H1	10 times H6 in 120 minutes in 1 hour in cooling mode
HP	Heat pump system low pressure protection
P0	Heat pump system high pressure protection
P1	Compressor current protection
P3	Compressor discharge temperature too high protection
P4	Transducer module (IPM) protection
P6	Exchanger temperature (T3) too high protection
F1	DC bus voltage is too low protection

MHC-V12W/D2RN8-B / MHC-V14W/D2RN8-B / MHC-V16W/D2RN8-B

Figure 2-5.3 MHC-V12(14, 16)W/D2RN8-B wiring diagram



Factory code	Date	Revision
16025300005235	2020.04.24	F

FACTORY SETTING	S6-1	S6-2	S6-3
12KW	0	0	0
14KW	1	0	0
16KW	0	1	0

Caution

- Operate the switches and push buttons with an insulated stick (such as a closed ball-point pen) to avoid touching of live parts.
- Querying external parameters and setting menu parameters are only allowed on the network converter assembly.

- NOTE:**
- Equipment must be grounded.
 - All high-voltage external load, if it is metal or a grounded port, must be grounded.
 - All external load current is needed less than 0.2A, if the single load current is greater than 0.2A, the load must be controlled through AC contactor.
 - "AHS1" "AHS2", "A1" "A2", "R1" "R2" and "DFT1" "DFT2" wiring terminal ports provide only the switch signal.
 - Plate heat exchanger E-Heating tape and Flow switch E-Heating tape share a control port.

Figure continued on next page ...

M thermal Mono



Figure 2-4.3 MHC-V12(14, 16)W/D2RN8-B wiring diagram (continued)

THE FAULT OR PROTECTION TABLE

Display	Fault or Protection
E0	Water flow fault(after 3 times E8)
E2	Communication fault between controller and indoor unit
H0	Communication fault between indoor unit and outdoor unit
E3	Final outlet water temp.sensor(T1) fault
E4	Water tank temp.sensor(T5) fault
E8	Water flow fault
Ed	Inlet water temp.sensor(Tw_in) fault
EE	Indoor unit EEPROM fault
H2	Refrigerant liquid temp.sensor(T2) fault
H3	Refrigerant gas temp.sensor(T2B) fault
HA	Outlet water temp.sensor(Tw_out) fault
Hb	Three times "PP" protection and Tw_out<7°C
H5	Room temp.sensor(Ta) fault
H9	Outlet water for zone 2 temp.sensor(T1B) fault
Pb	Anti-freeze mode
P5	Tw_out - Tw_in] value too big protection
PP	Tw_out - Tw_in unusual protection
Hd	Communication fault between indoor unit parallel temperature board
HE	Communication fault between indoor unit and temperature board

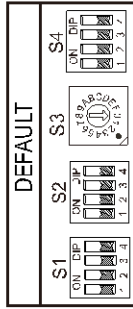
THE FAULT OR PROTECTION TABLE

Display	Melting or Protection	Melting or Protection
C7	Transducer module (FPM) temp. too high protection	Additional heat source
E1	Power fault	Domestic hot water
E5	Outdoor unit T3 temp.sensor malfunction	Heat mode/Cool mode(thermostat)
E6	Outdoor unit T4 temp.sensor malfunction	KM5-KM11 AC Contactor
E9	DC generator high voltage protection	Motorized 3-way valve (field supply)
EA	Outdoor unit T5(Tp) temp.sensor malfunction	Motorized 3-way valve (field supply)
F1	DC generator low voltage protection	Motorized 3-way valve (field supply)
H0	Communication malfunction between hydro-box and outdoor unit	Internal circulator pump
H1	Communication malfunction between outdoor and IR341	Zone 2 pump(field supply)
H4	These times P6 protection Head pump system high pressure protection	DHW pipe pump (field supply)
H6	DC fan motor fault	Outside circulator pump (field supply) or Zone 1 pump (field supply)
H7	Voltage protection	Solar pump
H8	Pressure sensor malfunction	Room thermostat
H9	Outdoor unit EEPROM fault	Solar energy
HF	10 times H6 in 120 minutes	Commercial power
HL	PFC module fault	
HP	3 times low pressure protection in 1 hour	
HL	Contact conglomeration or PED board protection	

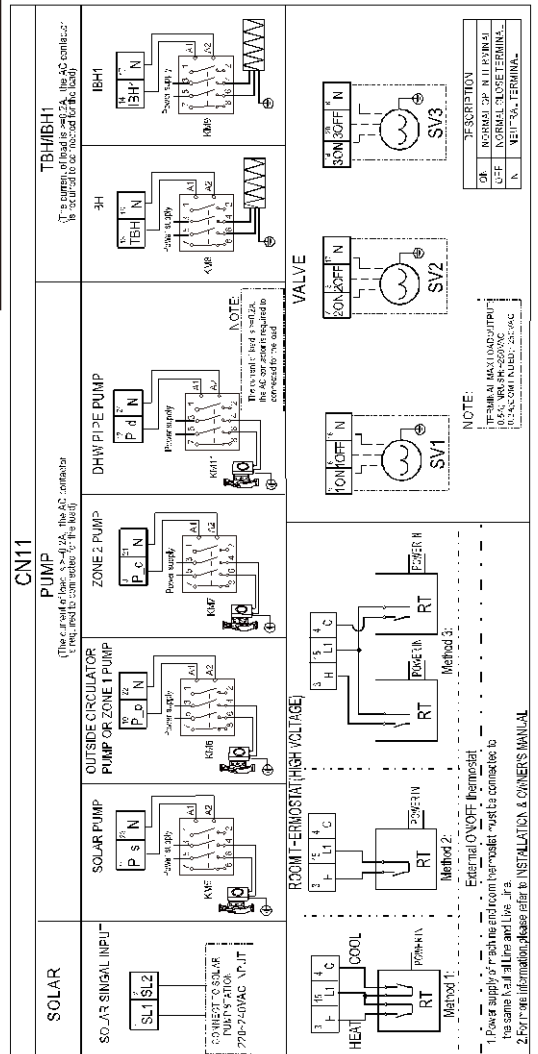
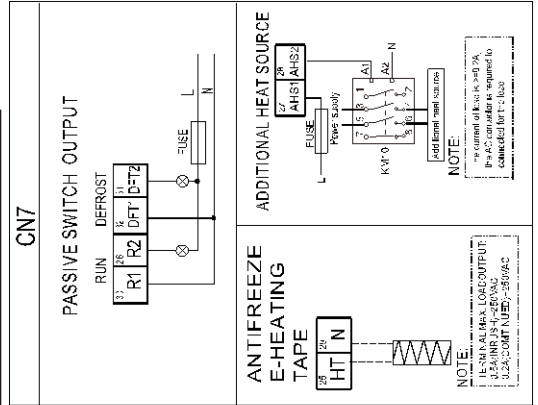
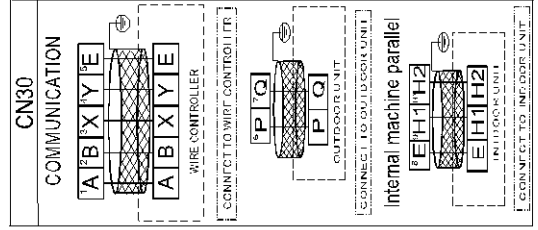
CODE	NAME
COMP	Inverter compressor
EEV1/2	Electric expansion valve
FAN_UP/DOWN	DC fan motor
HEAT+HEAT2	Crankcase heating
H PROCL PRO	High/Low pressure switch
H-SEN	High pressure sensor
XT1	Big 4-phase terminal
CT1	AC current transformer
RA	Reactor
STF1/STF2	4-way valve
SV5/SV6	Solenoid valve
T3/T3A	Piping temperature sensor
T4	Outdoor ambient temperature sensor
T5	Inverter compressor discharge temperature sensor
TP	Compressor exhaust temperature sensor
TH	Compressor return temperature sensor

Temp sensor code	Property values
T2/T2B	$B_{25\%} = 4100K, R_{35\%} = 10k\Omega$
T1/TW_out	$B_{010\%} = 3970K, R_{35\%} = 17.6k\Omega$

CN35-SMART GRID	
Operating behavior	EVU SG
Increased operation output	ON ON
Normal operation	ON OFF
Decreased operation output	OFF ON



DIP switch	Factory default	ON=1	OFF=0
S1	OFF	Reserved	Reserved
S2	OFF	100-variable speed pump, Max heat: 8.5m(GRUND)COS	10/1-constant speed pump, Max heat: 3.0m(GRUND)COS
S3	OFF	10-variable speed pump, Max heat: 10.5m(GRUND)COS	1/1-variable speed pump, Max heat: 9.0m(GRUND)COS
S4	OFF	Reserved	Reserved
S5	OFF	Reserved	Reserved
S6	OFF	Reserved	Reserved



5 Capacity Tables

5.1 Heating Capacity Tables

Table 2-5.1: MHC-V4W/D2N8-B heating capacity

LWT		30			35			40			45			
Outdoor air temperature [°C]		CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI
4kW-Maximum heating CAP	-25	max	1796	1.48	1215	1711	1.29	1323	1531	1.18	1296	1371	1.10	1245
		norm	1652	1.52	1085	1560	1.31	1189	1418	1.19	1196	1285	1.09	1176
		min	1115	1.55	722	1181	1.33	887	1087	1.20	904	864	1.10	787
	-20	max	2829	1.82	1558	2444	1.43	1704	2166	1.24	1744	1976	1.13	1747
		norm	2575	1.86	1382	2205	1.48	1492	1984	1.26	1569	1832	1.14	1608
		min	1528	1.90	804	1418	1.51	941	1386	1.29	1075	1225	1.15	1065
	-15	max	3407	2.78	1223	3253	2.39	1363	2934	1.97	1490	2505	1.56	1605
		norm	3066	2.88	1063	2901	2.48	1169	2658	2.02	1313	2222	1.59	1400
		min	1652	2.95	559	1548	2.54	609	1643	2.07	793	1603	1.61	995
	-10	max	4490	3.25	1381	4336	2.85	1521	4017	2.43	1651	3588	2.02	1773
		norm	3996	3.40	1175	3824	2.95	1296	3599	2.49	1446	3254	2.05	1589
		min	1751	3.50	501	1713	3.04	564	2089	2.56	815	2174	2.09	1041
	-7	max	5140	3.52	1461	4986	3.11	1601	4667	2.70	1731	4238	2.29	1853
		norm	4533	3.65	1241	4293	3.24	1324	4065	2.85	1425	3653	2.37	1539
		min	1182	3.76	315	1247	3.34	374	2063	2.93	703	2081	2.42	860
	-5	max	5177	3.72	1390	5018	3.27	1533	4738	2.82	1678	4467	2.45	1821
		norm	4618	3.86	1195	4371	3.41	1283	4174	2.99	1397	3895	2.55	1530
		min	1356	3.98	341	1415	3.51	404	2056	3.07	669	2157	2.60	831
	0	max	5269	4.34	1214	5098	3.74	1363	4916	3.18	1545	5039	2.89	1741
		norm	4800	4.46	1077	4603	3.85	1197	4533	3.23	1405	4460	3.00	1487
		min	1507	4.61	327	1422	3.98	358	2119	3.34	635	2222	3.07	724
	5	max	5746	4.85	1184	5677	4.33	1312	5588	3.77	1482	5501	3.27	1683
		norm	5188	5.03	1031	5080	4.49	1131	5107	3.86	1322	4824	3.42	1411
		min	1988	5.23	380	1924	4.66	413	2576	4.01	642	2591	3.52	737
7	max	6222	5.40	1153	6255	4.96	1261	6259	4.41	1418	5962	3.67	1625	
	norm	5556	5.65	983	5536	5.14	1077	5658	4.59	1234	5169	3.77	1371	
	min	2339	5.89	397	2308	5.39	428	2948	4.78	616	3219	3.91	823	
10	max	6033	5.16	1169	6067	4.82	1258	6312	4.63	1363	6051	3.86	1568	
	norm	5281	5.41	977	5355	4.97	1078	5641	4.83	1168	5477	3.91	1401	
	min	1768	5.67	312	1917	5.21	368	2841	5.06	561	3274	4.06	806	
15	max	5717	4.78	1196	5753	4.59	1254	6401	5.04	1270	6199	4.21	1474	
	norm	5062	5.13	987	5136	4.84	1061	5784	5.38	1076	5673	4.37	1300	
	min	2247	5.42	415	2249	5.12	440	2964	5.68	522	3434	4.58	751	
20	max	5743	5.75	998	5674	5.13	1105	6156	5.48	1123	6122	4.66	1313	
	norm	5113	6.22	822	5094	5.46	934	5593	5.89	950	5633	4.88	1155	
	min	2814	6.58	428	3007	5.78	521	3878	6.23	622	3796	5.12	741	
25	max	5768	7.21	800	5595	5.85	956	5910	6.06	976	6045	5.25	1151	
	norm	5237	7.85	667	5121	6.27	817	5473	6.55	835	5668	5.53	1024	

	25	min	3403	8.30	410	3525	6.63	531	4314	6.94	622	4352	5.81	749
	30	max	5836	7.48	780	5781	6.51	889	5886	6.39	921	6020	5.62	1071
		norm	5327	8.20	650	5319	7.01	758	5480	6.97	787	5674	5.97	951
		min	3589	8.68	414	3786	7.43	510	4032	7.37	547	4424	6.27	706
	35	max	5903	7.77	760	5966	7.27	821	5861	6.77	866	5994	6.05	990
		norm	5436	8.57	634	5538	7.89	702	5504	7.43	741	5698	6.47	881
		min	4014	9.08	442	3914	8.36	468	4044	7.87	514	4436	6.80	652
	40	max	6379	9.51	671	6359	8.57	742	6334	7.88	804	6377	6.86	930
		norm	5773	10.57	546	5731	9.37	612	5777	8.70	664	5890	7.38	798
		min	4274	11.19	382	4515	9.93	455	4560	9.22	495	4846	7.76	625
	43	max	6665	10.80	617	6594	9.50	694	6617	8.63	767	6606	7.39	894
		norm	6085	12.08	504	5996	10.46	573	6088	9.60	634	6154	8.01	769
		min	4532	12.80	354	4748	11.08	428	4830	10.17	475	5153	8.42	612

LWT		50			55			60			65			
Outdoor air temperature[°C]		CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI
4kW- Maximum heating CAP	-25	max	/	/	/	/	/	/	/	/	/	/	/	/
		norm	/	/	/	/	/	/	/	/	/	/	/	/
		min	/	/	/	/	/	/	/	/	/	/	/	/
	-20	max	1853	1.06	1748	1560	0.98	1592	/	/	/	/	/	/
		norm	1725	1.07	1608	1501	0.99	1523	/	/	/	/	/	/
		min	1279	1.08	1180	1139	1.00	1144	/	/	/	/	/	/
	-15	max	2197	1.31	1677	1835	1.18	1555	1728	1.03	1677	/	/	/
		norm	1957	1.34	1462	1692	1.20	1410	1608	1.03	1560	/	/	/
		min	1516	1.36	1116	1248	1.25	998	1227	1.05	1172	/	/	/
	-10	max	3280	1.81	1813	2629	1.56	1685	2811	1.56	1803	/	/	/
		norm	2988	1.84	1624	2398	1.58	1522	2589	1.55	1667	/	/	/
		min	2227	1.88	1187	1819	1.60	1135	2018	1.58	1274	/	/	/
	-7	max	3930	2.08	1893	3279	1.83	1794	3461	1.84	1883	/	/	/
		norm	3325	2.14	1553	2794	1.88	1487	3049	1.87	1628	/	/	/
		min	2051	2.18	940	1882	1.91	985	2222	1.91	1164	/	/	/
	-5	max	4065	2.16	1882	3522	1.95	1805	3728	1.92	1946	/	/	/
		norm	3480	2.23	1562	3036	2.01	1514	3322	1.95	1702	/	/	/
		min	2089	2.27	920	1993	2.04	977	2289	1.99	1150	/	/	/
	0	max	4402	2.38	1853	4129	2.13	1938	4397	2.09	2104	/	/	/
		norm	4010	2.42	1658	3683	2.17	1697	3874	2.09	1855	/	/	/
		min	2236	2.48	903	2213	2.21	1001	2607	2.14	1218	/	/	/
	5	max	4798	2.68	1790	4936	2.53	1954	4902	2.35	2090	4040	1.87	2163
		norm	4333	2.76	1572	4363	2.58	1688	4279	2.37	1808	3305	1.96	1683
		min	2581	2.84	910	2793	2.66	1050	3054	2.44	1253	2335	2.04	1145
7	max	5194	3.01	1726	5742	3.03	1895	5406	2.61	2075	4267	2.04	2092	
	norm	4638	3.12	1485	5019	3.07	1635	4665	2.65	1757	3337	2.16	1543	
	min	3220	3.23	997	3646	3.15	1158	3557	2.75	1295	2705	2.26	1195	
10	max	5297	3.23	1641	5699	3.16	1804	5267	2.69	1955	4494	2.22	2022	

	10	norm	4895	3.31	1478	4963	3.23	1539	4841	2.74	1764	3667	2.35	1558
		min	3194	3.44	928	3596	3.35	1073	3529	2.85	1237	2867	2.44	1174
	15	max	5469	3.65	1500	5628	3.41	1652	5036	2.87	1756	4873	2.56	1904
		norm	5109	3.83	1333	4957	3.53	1405	4679	2.97	1578	4025	2.77	1451
	20	min	3374	4.01	841	4052	3.70	1095	3676	3.00	1226	3070	2.90	1058
		max	5609	3.99	1405	5522	3.68	1499	4766	3.06	1559	/	/	/
	25	norm	5267	4.23	1246	4892	3.84	1273	4452	3.07	1451	/	/	/
		min	3646	4.44	822	3700	4.04	916	3193	3.23	989	/	/	/
	30	max	5749	4.39	1309	5416	4.02	1346	4495	3.30	1361	/	/	/
		norm	5500	4.68	1174	4893	4.23	1156	4278	3.34	1280	/	/	/
	35	min	4312	4.92	877	3889	4.44	875	3281	3.52	933	/	/	/
		max	5668	4.63	1225	5513	4.31	1281	4612	3.51	1315	/	/	/
	40	norm	5450	4.97	1096	5008	4.56	1098	4412	3.57	1235	/	/	/
		min	4392	5.22	841	4096	4.79	855	3482	3.76	925	/	/	/
	43	max	5586	4.90	1140	5610	4.62	1215	/	/	/	/	/	/
		norm	5416	5.30	1022	5141	4.92	1044	/	/	/	/	/	/
	46	min	4469	5.57	802	4376	5.18	845	/	/	/	/	/	/
		max	6001	5.20	1153	/	/	/	/	/	/	/	/	/
	49	norm	5657	5.67	998	/	/	/	/	/	/	/	/	/
		min	4861	5.96	816	/	/	/	/	/	/	/	/	/
	52	max	6250	5.38	1161	/	/	/	/	/	/	/	/	/
		norm	5941	5.90	1007	/	/	/	/	/	/	/	/	/
	55	min	5188	6.20	836	/	/	/	/	/	/	/	/	/
		max												

Abbreviations:

LWT: Leaving water temperature (°C)

CL: Capacity level

CAP: Total heating capacity (W)

PI: Power input (W)

Table 2-5.2: MHC-V6W/D2N8-B heating capacity

LWT		30			35			40			45			
Outdoor air temperature[°C]		CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI
6kW- heating CAP	-25	max	2245	1.46	1535	2139	1.28	1671	1914	1.17	1636	1714	1.09	1572
		norm	2065	1.51	1369	1951	1.30	1501	1772	1.17	1510	1606	1.08	1485
		min	1394	1.53	911	1476	1.32	1119	1359	1.19	1141	1080	1.09	993
	-20	max	3339	1.80	1857	2884	1.42	2031	2556	1.23	2078	2332	1.12	2082
		norm	3038	1.85	1647	2602	1.46	1779	2342	1.25	1870	2162	1.13	1917
		min	1803	1.88	958	1673	1.49	1122	1636	1.28	1281	1446	1.14	1269
	-15	max	4190	2.73	1535	4001	2.34	1710	3608	1.93	1870	3081	1.53	2014
		norm	3771	2.83	1333	3569	2.43	1466	3269	1.98	1648	2733	1.56	1756
		min	2032	2.90	702	1904	2.49	764	2021	2.03	994	1972	1.58	1249
	-10	max	5496	2.99	1840	5111	2.57	1988	4833	2.22	2176	4643	2.07	2240
		norm	4891	3.12	1566	4508	2.66	1694	4330	2.27	1906	4211	2.10	2008
		min	2143	3.21	667	2019	2.74	737	2513	2.34	1075	2814	2.14	1315
	-7	max	6296	3.28	1920	5911	2.86	2068	5633	2.50	2256	5443	2.35	2320
		norm	5553	3.40	1631	5089	2.98	1710	4906	2.64	1857	4692	2.44	1927
	-7	min	1448	3.50	413	1478	3.06	483	2490	2.72	917	2673	2.48	1077
	-5	max	6317	3.52	1793	6037	3.09	1957	5965	2.74	2179	5844	2.54	2300
		norm	5635	3.66	1541	5258	3.21	1637	5255	2.90	1814	5096	2.64	1932
		min	1655	3.76	440	1703	3.30	515	2589	2.98	869	2823	2.69	1050
	0	max	6371	4.31	1477	6353	3.79	1678	6795	3.42	1986	6848	3.04	2249
		norm	5804	4.43	1310	5737	3.89	1474	6265	3.47	1806	6060	3.15	1921
		min	1822	4.58	398	1772	4.02	440	2929	3.59	816	3020	3.23	935
	5	max	6713	4.48	1499	6881	4.25	1618	6962	3.69	1887	6991	3.29	2122
		norm	6062	4.64	1305	6158	4.42	1395	6363	3.78	1684	6131	3.45	1779
		min	2323	4.82	482	2333	4.59	509	3209	3.93	817	3293	3.54	929
	7	max	7055	4.81	1467	7409	4.76	1557	7128	3.99	1787	7134	3.58	1995
		norm	6300	5.03	1253	6557	4.99	1315	6444	4.14	1555	6185	3.76	1646
		min	2653	5.37	494	2734	5.32	526	3357	4.32	776	3852	3.88	992
	10	max	7108	5.24	1356	7354	5.02	1465	7371	4.21	1750	7318	3.78	1934
		norm	6222	5.49	1133	6491	5.17	1255	6587	4.39	1500	6624	3.83	1728
		min	2082	5.75	362	2324	5.42	429	3317	4.60	721	3959	3.99	993
15	max	7195	5.82	1236	7261	5.28	1375	7777	4.61	1687	7625	4.16	1831	
	norm	6370	6.24	1020	6482	5.57	1164	7027	4.92	1429	6978	4.32	1614	
	min	2828	6.59	429	2839	5.89	482	3601	5.20	693	4224	4.53	932	
20	max	6966	6.28	1109	6982	5.91	1181	7212	4.70	1535	7416	4.42	1677	
	norm	6202	6.79	914	6268	6.28	998	6552	5.05	1298	6824	4.62	1475	
	min	3413	7.18	475	3700	6.65	557	4543	5.34	851	4598	4.86	947	
25	max	6736	7.16	941	6702	6.31	1062	6646	5.11	1301	7207	4.74	1522	
	norm	6115	7.79	785	6134	6.75	908	6155	5.53	1113	6758	4.99	1355	
	min	3974	8.24	482	4222	7.15	590	4852	5.85	829	5189	5.24	990	
30	max	6832	8.02	852	6831	7.27	940	6556	6.01	1091	7049	5.05	1397	
	norm	6236	8.79	709	6286	7.84	802	6104	6.55	932	6645	5.35	1241	

	35	min	4201	9.30	452	4474	8.30	539	4491	6.94	647	5181	5.63	921	
		max	6927	9.43	735	6959	8.17	852	6465	6.87	941	6891	5.42	1272	
		norm	6379	10.41	613	6460	8.87	728	6071	7.54	805	6551	5.79	1132	
	40	min	4710	11.02	427	4565	9.40	486	4461	7.99	559	5099	6.09	838	
		max	7373	10.15	726	7285	9.02	808	7118	7.34	970	7337	6.12	1199	
		norm	6673	11.28	592	6565	9.86	666	6492	8.11	800	6777	6.59	1029	
	43	min	4940	11.94	414	5172	10.45	495	5125	8.59	596	5576	6.92	805	
		max	7641	10.94	698	7480	9.87	758	7509	8.27	908	7605	7.02	1083	
		norm	6976	12.24	570	6801	10.86	626	6909	9.20	751	7085	7.61	932	
			min	5196	12.96	401	5386	11.51	468	5482	9.75	562	5932	8.00	742

LWT		50			55			60			65			
Outdoor air temperature[°C]		CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI
6kW- heating CAP	-25	max	/	/	/	/	/	/	/	/	/	/	/	/
		norm	/	/	/	/	/	/	/	/	/	/	/	/
		min	/	/	/	/	/	/	/	/	/	/	/	/
	-20	max	2187	1.07	2042	1841	0.99	1860	/	/	/	/	/	/
		norm	2036	1.08	1879	1771	1.00	1779	/	/	/	/	/	/
		min	1509	1.09	1379	1344	1.01	1337	/	/	/	/	/	/
	-15	max	2702	1.34	2022	2257	1.20	1875	2125	1.05	2023	/	/	/
		norm	2407	1.37	1763	2081	1.22	1702	1978	1.05	1881	/	/	/
		min	1864	1.39	1345	1535	1.24	1237	1509	1.07	1413	/	/	/
	-10	max	4127	1.72	2405	3797	1.69	2243	3320	1.44	2300	/	/	/
		norm	3760	1.75	2149	3463	1.71	2027	3058	1.44	2127	/	/	/
		min	2802	1.78	1571	2628	1.74	1508	2384	1.47	1625	/	/	/
	-7	max	4927	2.01	2451	4597	1.91	2406	4173	1.75	2380	/	/	/
		norm	4168	2.07	2011	3917	1.97	1986	3676	1.79	2058	/	/	/
		min	2572	2.11	1217	2639	2.01	1313	2679	1.82	1471	/	/	/
	-5	max	5040	2.23	2256	4963	2.01	2467	4428	1.83	2425	/	/	/
		norm	4314	2.30	1873	4278	2.07	2062	3945	1.86	2121	/	/	/
		min	2590	2.35	1103	2809	2.11	1328	2719	1.90	1433	/	/	/
	0	max	5879	2.48	2367	5321	2.09	2546	5064	1.99	2539	/	/	/
		norm	5356	2.53	2118	4746	2.12	2242	4461	1.99	2239	/	/	/
		min	2987	2.59	1153	2852	2.17	1315	3003	2.04	1470	/	/	/
	5	max	6374	2.81	2266	6110	2.48	2460	5744	2.27	2530	4924	1.84	2682
		norm	5755	2.89	1990	5401	2.54	2125	5015	2.29	2189	4028	1.93	2087
		min	3429	2.98	1152	3458	2.62	1322	3579	2.36	1517	2846	2.01	1419
7	max	6868	3.17	2164	6899	2.91	2373	6424	2.55	2520	5245	2.02	2601	
	norm	6133	3.29	1862	6030	3.00	2008	5544	2.60	2134	4102	2.14	1919	
	min	4258	3.41	1250	4381	3.10	1411	4227	2.69	1573	3325	2.24	1486	
10	max	7006	3.35	2091	6931	3.04	2277	6270	2.60	2411	5566	2.21	2520	
	norm	6474	3.44	1883	6036	3.11	1942	5763	2.65	2175	4542	2.34	1942	
	min	4225	3.57	1183	4373	3.23	1354	4201	2.75	1525	3551	2.43	1463	
15	max	7236	3.67	1969	6984	3.30	2117	6013	2.70	2229	6101	2.56	2386	

M thermal Mono



		norm	6759	3.86	1750	6152	3.42	1800	5587	2.79	2003	5039	2.77	1818
		min	4465	4.05	1103	5028	3.58	1404	4389	2.82	1556	3844	2.90	1326
	20	max	7284	4.02	1813	6808	3.60	1889	5977	3.06	1952	/	/	/
		norm	6840	4.25	1608	6031	3.76	1603	5584	3.07	1817	/	/	/
		min	4735	4.46	1060	4561	3.95	1154	4005	3.23	1238	/	/	/
	25	max	7332	4.43	1656	6632	4.00	1660	5941	3.55	1674	/	/	/
		norm	7014	4.72	1485	5991	4.20	1426	5654	3.59	1575	/	/	/
		min	5499	4.96	1109	4762	4.41	1079	4337	3.78	1148	/	/	/
	30	max	6909	4.92	1404	6603	4.21	1569	6013	3.83	1568	/	/	/
		norm	6644	5.28	1257	5998	4.46	1345	5752	3.91	1472	/	/	/
		min	5354	5.55	965	4906	4.69	1047	4540	4.11	1103	/	/	/
	35	max	6486	5.21	1245	6574	4.45	1477	/	/	/	/	/	/
		norm	6289	5.63	1116	6024	4.75	1269	/	/	/	/	/	/
		min	5189	5.92	876	5128	4.99	1027	/	/	/	/	/	/
	40	max	6928	5.68	1220	/	/	/	/	/	/	/	/	/
		norm	6530	6.19	1056	/	/	/	/	/	/	/	/	/
		min	5612	6.50	863	/	/	/	/	/	/	/	/	/
	43	max	7193	5.96	1207	/	/	/	/	/	/	/	/	/
		norm	6838	6.54	1046	/	/	/	/	/	/	/	/	/
		min	5970	6.87	869	/	/	/	/	/	/	/	/	/

Abbreviations:

LWT: Leaving water temperature (°C)

CL: Capacity level

CAP: Total heating capacity (W)

PI: Power input (W)

Table 2-5.3: MHC-V8W/D2N8-B heating capacity

LWT			25			30			35			40		
Outdoor air temperature[°C]		CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI
8kW-Maximum heating CAP	-25	max	4446	2.25	1980	3999	1.96	2036	3590	1.64	2186	3344	1.55	2151
		norm	4113	2.29	1792	3679	2.03	1817	3274	1.67	1964	3097	1.56	1986
		min	2668	2.33	1146	2484	2.06	1209	2477	1.69	1464	2374	1.58	1501
	-20	max	5683	2.80	2032	5087	2.37	2146	4735	2.11	2244	4320	1.77	2445
		norm	5200	2.90	1793	4629	2.43	1904	4271	2.17	1965	3957	1.80	2200
		min	3182	2.96	1077	2747	2.48	1108	2746	2.22	1240	2765	1.83	1507
	-15	max	6899	3.34	2068	6443	2.87	2243	6105	2.43	2510	5566	2.26	2468
		norm	6244	3.49	1787	5799	2.98	1948	5446	2.53	2153	5043	2.32	2175
		min	3222	3.58	901	3125	3.05	1025	2906	2.59	1122	3117	2.37	1312
	-10	max	7446	3.68	2021	7280	3.33	2185	7084	3.15	2252	6872	2.62	2626
		norm	6664	3.89	1711	6479	3.49	1859	6248	3.26	1919	6157	2.68	2300
		min	2956	4.01	738	2839	3.59	792	2798	3.35	835	3573	2.76	1297
	-7	max	7637	3.76	2031	7467	3.40	2196	7266	3.21	2264	7048	2.67	2640
		norm	6805	3.97	1712	6586	3.53	1866	6256	3.34	1872	6139	2.82	2173
		min	1833	4.09	448	1717	3.63	473	1817	3.44	528	3115	2.90	1072
	-5	max	8047	4.02	2002	7966	3.69	2159	7685	3.22	2390	7451	2.90	2574
		norm	7250	4.25	1706	7105	3.83	1855	6694	3.35	2000	6564	3.06	2143
		min	2189	4.37	501	2087	3.94	530	2167	3.44	629	3234	3.15	1027
	0	max	8243	4.77	1730	8546	4.23	2023	8493	3.77	2253	8395	3.32	2529
		norm	7600	4.89	1554	7785	4.34	1794	7669	3.88	1979	7740	3.37	2299
		min	2209	5.06	437	2444	4.49	545	2370	4.01	591	3618	3.48	1039
	5	max	8856	5.95	1487	8952	4.94	1811	9033	4.56	1983	8781	3.84	2288
		norm	8095	6.17	1312	8083	5.13	1577	8084	4.73	1710	8026	3.93	2042
		min	2905	6.41	453	3097	5.32	582	3062	4.91	624	4048	4.08	991
	7	max	9508	6.54	1454	9199	5.32	1729	9105	5.07	1796	8852	4.18	2118
		norm	8595	6.84	1256	8215	5.57	1475	8058	5.31	1517	8002	4.34	1843
		min	3404	7.14	477	3459	5.81	595	3360	5.54	606	4169	4.53	920
	10	max	10064	7.44	1353	9278	5.84	1589	8942	5.42	1650	8700	4.30	2023
		norm	9046	7.93	1141	8122	6.12	1327	7893	5.58	1414	7774	4.48	1735
		min	3080	8.30	371	2718	6.41	424	2826	5.85	483	3915	4.70	834
15	max	9859	8.79	1122	9393	7.09	1326	9085	6.04	1505	9073	5.12	1774	
	norm	8959	9.59	934	8316	7.60	1094	8111	6.37	1274	8198	5.46	1502	
	min	3865	10.12	382	3691	8.03	460	3552	6.73	528	4201	5.76	729	
20	max	9653	10.14	952	9507	8.33	1141	9328	7.09	1316	9446	5.93	1593	
	norm	8821	11.14	792	8465	9.00	940	8374	7.53	1112	8583	6.37	1347	
	min	4344	11.77	369	4658	9.52	489	4944	7.98	620	5951	6.74	883	
25	max	9417	10.44	902	8998	8.75	1029	8751	7.64	1145	9148	6.34	1443	
	norm	8393	11.55	727	8169	9.52	858	8009	8.18	979	8472	6.86	1234	
	min	5179	12.21	424	5309	10.07	527	5513	8.66	637	6678	7.26	919	
30	max	9181	11.03	832	8489	9.16	927	8173	7.78	1051	8849	6.84	1294	
	norm	8229	12.29	670	7749	10.04	772	7521	8.39	897	8239	7.46	1105	

M thermal Mono



	35	min	5279	12.99	406	5221	10.63	491	5353	8.88	603	6062	7.89	768
		max	9548	11.31	844	8829	9.45	934	8500	8.05	1056	9203	7.05	1305
		norm	8635	12.68	681	8130	10.43	780	7890	8.74	903	8643	7.74	1117
	40	min	6397	13.42	477	6003	11.04	544	5576	9.26	602	6350	8.20	775
		max	10026	11.57	867	9270	10.02	925	8925	8.49	1051	9663	7.31	1322
		norm	9197	13.06	704	8389	11.13	754	8044	9.28	867	8814	8.08	1091
	43	min	6817	13.82	493	6211	11.79	527	6337	9.84	644	6957	8.56	813
		max	10326	12.25	843	9548	11.27	847	9193	9.11	1009	9953	7.86	1266
		norm	9555	13.92	686	8717	12.61	692	8358	10.03	834	9158	8.74	1047
		min	7125	14.73	484	6493	13.35	486	6619	10.63	623	7266	9.26	784

LWT		45			50			55			60			65			
Outdoor air temperature[°C]	CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	
8kW-Maximum heating CAP	-25	max	2815	1.30	2170	/	/	/	/	/	/	/	/	/	/	/	/
		norm	2638	1.29	2050	/	/	/	/	/	/	/	/	/	/	/	/
		min	1773	1.29	1371	/	/	/	/	/	/	/	/	/	/	/	/
	-20	max	3697	1.61	2291	3175	1.41	2258	2615	1.25	2097	/	/	/	/	/	/
		norm	3427	1.62	2109	2956	1.42	2078	2516	1.25	2005	/	/	/	/	/	/
		min	2292	1.64	1397	2191	1.44	1525	1909	1.27	1506	/	/	/	/	/	/
	-15	max	5288	2.00	2649	4669	1.73	2705	4937	1.69	2916	3994	1.41	2841	/	/	/
		norm	4690	2.03	2311	4160	1.76	2358	4552	1.72	2647	3718	1.41	2642	/	/	/
		min	3384	2.06	1643	3222	1.79	1800	3357	1.75	1924	2836	1.43	1985	/	/	/
	-10	max	6770	2.47	2741	6317	2.20	2878	6066	1.99	3049	5187	1.81	2861	/	/	/
		norm	6141	2.50	2457	5755	2.23	2578	5533	2.01	2751	4777	1.81	2646	/	/	/
		min	4103	2.55	1610	4289	2.28	1884	4198	2.05	2047	3724	1.84	2022	/	/	/
	-7	max	6944	2.52	2756	6479	2.24	2892	6222	2.03	3065	5320	1.85	2876	/	/	/
		norm	5986	2.62	2288	5481	2.31	2373	5301	2.09	2533	4687	1.89	2486	/	/	/
		min	3410	2.67	1279	3382	2.35	1437	3571	2.13	1674	3415	1.92	1777	/	/	/
	-5	max	7444	2.69	2772	7345	2.46	2986	6447	2.19	2944	6040	2.02	2997	/	/	/
		norm	6491	2.79	2329	6287	2.54	2479	5557	2.26	2461	5381	2.05	2621	/	/	/
		min	3595	2.84	1266	3775	2.59	1460	3649	2.30	1585	3708	2.09	1771	/	/	/
	0	max	8090	2.94	2752	8111	2.75	2955	7097	2.38	2988	6849	2.17	3156	/	/	/
		norm	7160	3.05	2351	7389	2.79	2644	6330	2.41	2631	6034	2.17	2783	/	/	/
		min	3568	3.12	1144	4120	2.86	1439	3804	2.47	1543	4061	2.22	1828	/	/	/
	5	max	8694	3.38	2569	8304	3.00	2764	7562	2.76	2740	7110	2.46	2885	3887	1.19	3266
		norm	7624	3.54	2154	7499	3.09	2428	6684	2.82	2367	6207	2.49	2496	3316	1.22	2721
		min	4095	3.64	1125	4468	3.18	1405	4280	2.91	1473	4430	2.56	1730	2468	1.24	1994
7	max	8979	3.82	2351	8433	3.17	2660	7802	3.12	2501	7241	2.72	2662	4082	1.36	3001	
	norm	7785	4.01	1939	7531	3.29	2289	6819	3.22	2116	6249	2.77	2255	3441	1.40	2457	
	min	4849	4.15	1169	5228	3.40	1537	4954	3.33	1487	4765	2.87	1662	2686	1.42	1890	
10	max	8735	3.90	2240	8280	3.42	2421	8198	3.31	2477	7499	2.76	2717	5591	2.11	2650	
	norm	7906	3.95	2001	7652	3.51	2181	7139	3.38	2113	6893	2.81	2451	4920	2.16	2275	
	min	4726	4.11	1151	4993	3.65	1370	5173	3.51	1473	5024	2.92	1719	3802	2.22	1716	
15	max	8909	4.38	2034	8406	3.77	2230	8316	3.55	2343	7678	3.09	2489	5708	2.39	2393	

		norm	8153	4.55	1793	7852	3.96	1982	7325	3.68	1992	7134	3.19	2236	5194	2.46	2110
		min	4936	4.77	1036	5187	4.15	1250	5988	3.86	1553	5605	3.23	1737	3824	2.52	1517
	20	max	9083	5.02	1809	8532	4.22	2022	8434	3.97	2124	7857	3.46	2271	/	/	/
		norm	8358	5.25	1592	8012	4.47	1794	7471	4.14	1803	7340	3.47	2114	/	/	/
		min	5631	5.51	1022	5546	4.69	1183	5651	4.35	1299	5264	3.65	1441	/	/	/
		max	9007	5.80	1553	8607	4.61	1869	8089	4.25	1903	7465	3.72	2007	/	/	/
	25	norm	8445	6.11	1382	8233	4.91	1676	7307	4.47	1635	7104	3.76	1888	/	/	/
		min	6485	6.42	1010	6455	5.16	1252	5808	4.69	1237	5449	3.96	1376	/	/	/
		max	8930	6.23	1433	8682	4.99	1740	7844	4.53	1732	7072	3.98	1775	/	/	/
		norm	8418	6.61	1273	8349	5.36	1558	7125	4.80	1485	6766	4.06	1668	/	/	/
	30	min	6564	6.95	945	6729	5.63	1195	5828	5.04	1156	5339	4.27	1250	/	/	/
		max	9287	6.34	1465	9029	5.21	1733	8158	4.72	1801	/	/	/	/	/	/
		norm	8829	6.77	1303	8755	5.63	1554	7476	5.03	1485	/	/	/	/	/	/
		min	6873	7.12	965	7223	5.92	1220	6363	5.29	1202	/	/	/	/	/	/
	35	max	9287	6.34	1465	9029	5.21	1733	8158	4.72	1801	/	/	/	/	/	/
		norm	8829	6.77	1303	8755	5.63	1554	7476	5.03	1485	/	/	/	/	/	/
		min	6873	7.12	965	7223	5.92	1220	6363	5.29	1202	/	/	/	/	/	/
		max	9752	6.46	1510	9481	5.46	1736	/	/	/	/	/	/	/	/	/
	40	norm	9007	6.95	1296	8937	5.95	1503	/	/	/	/	/	/	/	/	/
		min	7411	7.31	1014	7679	6.25	1229	/	/	/	/	/	/	/	/	/
	max	10044	6.83	1471	9765	6.08	1606	/	/	/	/	/	/	/	/	/	
	norm	9358	7.40	1264	9283	6.67	1392	/	/	/	/	/	/	/	/	/	
43	min	7834	7.78	1007	8105	7.01	1157	/	/	/	/	/	/	/	/	/	
	max	10044	6.83	1471	9765	6.08	1606	/	/	/	/	/	/	/	/	/	

Abbreviations:

LWT: Leaving water temperature (°C)

CL: Capacity level

CAP: Total heating capacity (W)

PI: Power input (W)

M thermal Mono



Table 2-5.4: MHC-V10W/D2N8-B heating capacity

LWT			30			35			40			45		
Outdoor air temperature[°C]		CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI
10kW-Maximum heating CAP	-25	max	4210	1.98	2121	3778	1.66	2278	3520	1.57	2242	2963	1.31	2262
		norm	3873	2.05	1893	3446	1.68	2046	3260	1.57	2070	2776	1.30	2136
		min	2614	2.08	1259	2607	1.71	1526	2499	1.60	1564	1867	1.31	1429
	-20	max	5354	2.39	2237	4985	2.13	2339	4548	1.79	2548	3892	1.63	2388
		norm	4873	2.46	1984	4496	2.20	2048	4166	1.82	2292	3608	1.64	2198
		min	2891	2.50	1155	2891	2.24	1292	2910	1.85	1571	2413	1.66	1456
	-15	max	6782	2.90	2337	6427	2.46	2616	5859	2.28	2572	5566	2.02	2761
		norm	6104	3.01	2030	5733	2.56	2243	5308	2.34	2267	4937	2.05	2408
		min	3289	3.08	1068	3059	2.62	1169	3281	2.40	1368	3562	2.08	1712
	-10	max	8144	3.22	2527	7885	2.98	2649	7638	2.67	2856	7376	2.38	3097
		norm	7248	3.37	2150	6955	3.08	2257	6843	2.74	2501	6690	2.41	2776
		min	3176	3.47	916	3115	3.17	982	3972	2.82	1410	4470	2.46	1819
	-7	max	8483	3.41	2488	8214	3.15	2608	7956	2.83	2811	7683	2.52	3049
		norm	7482	3.54	2114	7072	3.28	2157	6930	2.99	2314	6623	2.62	2532
		min	1951	3.64	536	2054	3.37	609	3517	3.08	1142	3772	2.67	1415
	-5	max	8862	3.60	2465	8799	3.33	2642	8460	2.88	2942	8181	2.65	3093
		norm	7905	3.73	2118	7664	3.47	2211	7453	3.04	2450	7133	2.75	2598
		min	2322	3.84	605	2481	3.57	696	3671	3.13	1174	3951	2.80	1412
	0	max	9357	4.05	2313	9563	3.76	2547	9254	3.16	2928	8889	2.87	3102
		norm	8524	4.15	2052	8635	3.86	2237	8532	3.20	2663	7866	2.97	2650
		min	2676	4.30	623	2668	3.99	668	3988	3.31	1203	3920	3.04	1290
	5	max	9972	4.81	2074	10132	4.51	2247	10096	3.83	2637	9786	3.40	2879
		norm	9005	4.99	1806	9068	4.68	1937	9228	3.92	2354	8582	3.55	2414
		min	3450	5.18	666	3435	4.86	707	4654	4.07	1143	4609	3.66	1260
	7	max	10275	5.21	1972	10322	4.93	2094	10448	4.18	2500	10279	3.77	2727
		norm	9176	5.45	1682	9135	5.17	1768	9445	4.34	2175	8912	3.96	2249
		min	3863	5.69	679	3809	5.39	707	4921	4.53	1086	5551	4.09	1356
	10	max	10414	5.64	1846	10031	5.13	1955	9935	4.17	2382	9873	3.67	2690
		norm	9116	5.91	1542	8855	5.28	1676	8878	4.35	2043	8937	3.72	2404
		min	3051	6.19	493	3170	5.54	572	4471	4.55	982	5341	3.86	1382
15	max	10622	6.49	1638	10232	5.90	1734	10134	4.80	2113	10070	4.22	2386	
	norm	9405	6.96	1351	9134	6.22	1468	9157	5.12	1790	9216	4.38	2104	
	min	4175	7.35	568	4001	6.58	608	4692	5.40	868	5579	4.59	1215	
20	max	10756	7.96	1351	10673	6.72	1588	10679	5.66	1887	10283	4.86	2116	
	norm	9577	8.60	1113	9582	7.14	1342	9703	6.08	1595	9462	5.08	1862	
	min	5270	9.10	579	5657	7.56	748	6728	6.44	1045	6375	5.34	1195	
25	max	9896	8.44	1173	9819	7.12	1378	9825	6.00	1638	9460	5.15	1836	
	norm	8984	9.18	978	8987	7.63	1179	9099	6.49	1401	8871	5.43	1634	
	min	5838	9.72	601	6186	8.07	766	7172	6.87	1044	6811	5.70	1195	
30	max	9073	8.79	1097	8895	7.95	1119	8852	6.72	1317	9923	6.15	1613	
	norm	8282	9.63	860	8186	8.57	955	8242	7.32	1125	9354	6.53	1434	

	35	min	5580	10.20	547	5826	9.08	642	6064	7.75	782	7293	6.86	1064	
		max	9436	9.15	1031	9251	8.30	1115	9206	6.97	1321	10320	6.40	1612	
		norm	8689	10.10	861	8587	9.01	953	8645	7.65	1130	9811	6.84	1435	
	40	min	6416	10.69	600	6069	9.55	636	6352	8.10	784	7637	7.19	1062	
		max	9908	9.81	1010	9713	8.47	1147	9666	7.34	1317	10836	6.79	1596	
		norm	8966	10.90	823	8754	9.26	946	8817	8.11	1087	10009	7.31	1370	
	43	min	6638	11.54	575	6896	9.81	703	6960	8.59	810	8235	7.68	1072	
		max	10205	10.61	962	10005	9.25	1082	9956	8.07	1234	11161	7.58	1472	
		norm	9317	11.87	785	9097	10.18	894	9161	8.98	1020	10398	8.21	1266	
			min	6939	12.57	552	7203	10.79	668	7268	9.51	764	8706	8.64	1008

LWT			50			55			60			65		
Outdoor air temperature[°C]		CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI
10kW-Maximum heating CAP	-25	max	/	/	/	/	/	/	/	/	/	/	/	/
		norm	/	/	/	/	/	/	/	/	/	/	/	/
	-20	min	/	/	/	/	/	/	/	/	/	/	/	/
		max	3342	1.42	2354	2753	1.26	2185	/	/	/	/	/	/
		norm	3111	1.44	2165	2648	1.27	2089	/	/	/	/	/	/
	-15	min	2306	1.45	1589	2010	1.28	1570	/	/	/	/	/	/
		max	4915	1.74	2818	5197	1.71	3039	4204	1.42	2961	/	/	/
		norm	4379	1.78	2457	4792	1.74	2758	3914	1.42	2754	/	/	/
	-10	min	3391	1.81	1875	3534	1.76	2005	2985	1.44	2069	/	/	/
		max	7033	2.13	3308	6670	1.86	3583	5385	1.71	3148	/	/	/
		norm	6407	2.16	2963	6083	1.88	3232	4959	1.70	2911	/	/	/
	-7	min	4775	2.20	2166	4616	1.92	2405	3866	1.74	2225	/	/	/
		max	7326	2.25	3256	6948	1.97	3527	5609	1.81	3099	/	/	/
		norm	6198	2.32	2672	5920	2.03	2915	4942	1.84	2679	/	/	/
	-5	min	3824	2.36	1617	3988	2.07	1926	3601	1.88	1915	/	/	/
		max	8039	2.46	3274	7528	2.27	3323	6131	1.98	3096	/	/	/
		norm	6881	2.53	2719	6489	2.34	2779	5463	2.02	2708	/	/	/
	0	min	4132	2.58	1601	4261	2.38	1790	3764	2.06	1830	/	/	/
		max	8817	2.70	3266	8179	2.51	3258	6989	2.12	3304	/	/	/
		norm	8032	2.75	2922	7295	2.54	2869	6157	2.11	2914	/	/	/
	5	min	4479	2.82	1591	4384	2.61	1683	4144	2.17	1913	/	/	/
		max	9452	3.01	3140	9075	2.78	3267	7853	2.45	3200	4523	1.37	3301
		norm	8535	3.09	2758	8023	2.84	2823	6856	2.48	2769	3858	1.40	2750
	7	min	5085	3.18	1597	5137	2.92	1756	4893	2.55	1919	2872	1.42	2016
max		9833	3.22	3054	9721	3.04	3198	8227	2.78	2959	4847	1.56	3107	
norm		8781	3.34	2627	8496	3.14	2706	7100	2.83	2506	4086	1.61	2543	
10	min	6096	3.46	1765	6173	3.25	1901	5413	2.93	1847	3189	1.63	1956	
	max	9588	3.30	2905	9573	3.08	3108	8268	2.72	3040	6436	2.11	3050	
	norm	8860	3.39	2617	8337	3.14	2651	7600	2.77	2742	5664	2.16	2619	
15	min	5782	3.52	1644	6041	3.27	1848	5540	2.88	1923	4376	2.22	1975	
	max	9780	3.80	2577	9764	3.54	2757	8433	3.13	2696	6565	2.43	2705	

		norm	9135	3.99	2290	8601	3.67	2344	7836	3.23	2423	5974	2.50	2386
		min	6034	4.18	1444	7030	3.85	1828	6156	3.27	1882	4398	2.56	1715
	20	max	10022	4.21	2381	9851	3.88	2539	8895	3.48	2556	/	/	/
		norm	9412	4.46	2112	8727	4.05	2155	8309	3.49	2379	/	/	/
		min	6514	4.68	1393	6600	4.25	1552	5960	3.67	1622	/	/	/
	25	max	9220	4.46	2066	9063	4.11	2204	8183	3.69	2218	/	/	/
		norm	8820	4.76	1853	8187	4.32	1893	7788	3.73	2087	/	/	/
		min	6915	5.00	1384	6507	4.54	1432	5974	3.93	1521	/	/	/
	30	max	9314	4.96	1878	9037	4.80	1883	7490	3.83	1956	/	/	/
		norm	8956	5.33	1681	8209	5.08	1615	7165	3.90	1836	/	/	/
		min	7218	5.59	1290	6714	5.34	1257	5655	4.11	1376	/	/	/
	35	max	9687	5.17	1874	9416	4.96	1898	/	/	/	/	/	/
		norm	9392	5.59	1680	8628	5.29	1631	/	/	/	/	/	/
		min	7749	5.88	1319	7345	5.56	1320	/	/	/	/	/	/
	40	max	10171	5.53	1839	/	/	/	/	/	/	/	/	/
		norm	9587	6.02	1592	/	/	/	/	/	/	/	/	/
		min	8238	6.33	1302	/	/	/	/	/	/	/	/	/
	43	max	10476	6.25	1676	/	/	/	/	/	/	/	/	/
		norm	9959	6.85	1453	/	/	/	/	/	/	/	/	/
		min	8695	7.20	1207	/	/	/	/	/	/	/	/	/

Abbreviations:

LWT: Leaving water temperature (°C)

CL: Capacity level

CAP: Total heating capacity (W)

PI: Power input (W)

Table 2-5.5: MHC-V12W/D2N8-B MHC-V12W/D2RN8-B heating capacity

LWT		30			35			40			45			
Outdoor air temperature[°C]		CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI
12kW-Maximum heating CAP	-25	max	6260	2.15	2912	5030	1.70	2959	4530	1.45	3120	4225	1.28	3293
		norm	5321	2.29	2322	4235	1.79	2373	3878	1.51	2573	3663	1.30	2821
		min	3718	2.35	1585	3274	1.81	1808	3080	1.53	2015	2831	1.30	2170
	-20	max	7688	2.50	3075	7213	2.16	3339	6383	1.87	3405	6051	1.72	3520
		norm	6727	2.70	2489	6254	2.30	2719	5623	1.97	2849	5307	1.77	3006
		min	4421	2.74	1613	4075	2.33	1747	3721	2.00	1859	3933	1.75	2250
	-15	max	8857	2.65	3342	8858	2.45	3616	7934	2.19	3623	7387	1.87	3950
		norm	7351	2.88	2554	7281	2.62	2778	6633	2.32	2863	6035	1.93	3127
		min	5004	2.94	1700	4916	2.68	1833	4546	2.37	1917	4728	1.93	2450
	-10	max	10076	2.74	3684	10022	2.54	3951	9685	2.23	4340	9323	2.05	4540
		norm	8263	2.92	2834	8138	2.66	3056	8000	2.32	3454	7803	2.11	3700
		min	4484	3.03	1482	4359	2.74	1592	4387	2.38	1841	4848	2.15	2255
	-7	max	10943	3.02	3624	11020	2.83	3894	10416	2.44	4269	10404	2.31	4504
		norm	8886	3.20	2781	8717	3.00	2903	8343	2.63	3172	8240	2.44	3372
		min	3852	3.36	1146	3967	3.14	1262	4198	2.74	1532	5410	2.52	2143
	-5	max	11212	3.15	3555	11298	2.92	3870	10940	2.57	4258	10943	2.37	4612
		norm	9217	3.38	2723	9049	3.13	2895	8872	2.78	3188	8777	2.52	3480
		min	4059	3.53	1151	4180	3.26	1283	4518	2.90	1559	5800	2.61	2226
	0	max	11886	3.80	3129	11992	3.48	3444	12249	3.04	4035	12292	2.81	4369
		norm	9354	4.09	2288	9186	3.74	2455	9505	3.30	2882	9428	3.00	3142
		min	4636	4.28	1083	4617	3.92	1179	5243	3.45	1520	6699	3.11	2152
	5	max	13510	4.55	2972	13616	4.15	3283	13783	3.73	3700	13618	3.26	4175
		norm	10768	4.94	2180	10566	4.50	2349	10833	4.08	2652	10582	3.51	3014
		min	5337	5.19	1028	5310	4.73	1123	5968	4.29	1391	7490	3.66	2048
	7	max	14260	5.04	2829	14571	4.69	3107	14796	4.14	3574	14508	3.63	3997
		norm	11265	5.50	2048	11205	5.11	2193	11526	4.56	2528	11171	3.93	2846
		min	5533	5.79	955	5581	5.38	1037	6303	4.80	1313	7878	4.10	1921
	10	max	14361	5.49	2616	14303	5.06	2827	14606	4.37	3342	14320	3.69	3885
		norm	11231	5.99	1874	10884	5.51	1974	11261	4.81	2339	10912	3.99	2737
		min	5716	6.31	906	5621	5.81	968	6368	5.07	1257	7919	4.16	1902
15	max	14697	6.65	2210	14364	5.43	2646	14955	4.72	3171	14605	4.14	3530	
	norm	11567	7.32	1579	11003	5.97	1843	11605	5.24	2214	11202	4.52	2481	
	min	5776	7.68	752	5616	6.26	898	6924	5.49	1261	8091	4.69	1724	
20	max	14319	7.60	1885	14223	6.47	2199	14835	5.39	2755	14750	4.69	3148	
	norm	11147	8.45	1320	10774	7.18	1501	11386	6.04	1885	11188	5.16	2168	
	min	5728	8.85	647	5661	7.52	753	6972	6.32	1102	8275	5.36	1543	
25	max	14279	8.23	1735	14182	7.35	1930	14715	6.26	2349	14695	5.39	2729	
	norm	11188	9.15	1223	10814	8.15	1326	11367	7.79	1459	11220	5.93	1891	
	min	5854	9.58	611	5786	8.54	677	7063	7.36	960	8391	6.16	1361	
30	max	14199	8.75	1623	14347	7.76	1849	14693	6.63	2217	14734	5.59	2634	
	norm	11231	9.66	1163	11047	8.55	1292	11461	8.15	1407	11360	5.88	1932	

M thermal Mono



	35	min	6958	10.11	688	7819	8.78	890	8228	7.52	1095	8523	6.18	1379	
		max	14857	9.29	1599	14712	8.16	1803	15088	6.95	2171	14572	5.83	2501	
		norm	11975	10.21	1173	11549	8.78	1316	11995	7.49	1602	11454	6.17	1857	
	40	min	7429	10.81	687	8165	9.31	877	8600	7.94	1083	8576	6.49	1322	
		max	15588	9.82	1587	15483	8.65	1790	15956	7.36	2168	15337	6.29	2438	
		norm	12876	10.86	1186	12464	9.37	1330	13004	7.99	1628	12362	6.71	1844	
	43	min	7950	11.50	691	8748	9.93	881	9095	8.47	1074	9049	7.05	1283	
		max	15950	10.61	1503	15889	9.18	1731	16483	7.82	2108	15985	6.81	2347	
		norm	13414	11.81	1135	13029	10.01	1301	13681	8.54	1601	13124	7.31	1795	
			min	8374	12.51	669	9216	10.62	868	9643	9.06	1064	9751	7.69	1268

LWT			50			55			60			65		
Outdoor air temperature[°C]		CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI
12kW-Maximum heating CAP	-25	max	/	/	/	/	/	/	/	/	/	/	/	/
		norm	/	/	/	/	/	/	/	/	/	/	/	/
		min	/	/	/	/	/	/	/	/	/	/	/	/
	-20	max	5362	1.51	3551	5075	1.40	3625	/	/	/	/	/	/
		norm	4724	1.56	3031	4628	1.40	3303	/	/	/	/	/	/
		min	3753	1.54	2432	3603	1.39	2584	/	/	/	/	/	/
	-15	max	6712	1.69	3972	6334	1.47	4309	5865	1.25	4692	/	/	/
		norm	5511	1.75	3144	5302	1.48	3585	4962	1.24	4005	/	/	/
		min	4631	1.75	2643	4434	1.49	2983	4223	1.25	3392	/	/	/
	-10	max	8964	1.94	4621	8602	1.79	4793	6695	1.30	5133	/	/	/
		norm	7539	2.00	3765	7243	1.85	3914	5697	1.33	4300	/	/	/
		min	5109	2.04	2504	5333	1.89	2827	4486	1.35	3320	/	/	/
	-7	max	10613	2.24	4743	10587	2.02	5249	8049	1.59	5061	/	/	/
		norm	8236	2.33	3536	8279	2.10	3943	6528	1.64	3989	/	/	/
		min	5731	2.37	2414	6035	2.16	2794	5232	1.68	3107	/	/	/
	-5	max	10773	2.27	4750	10555	2.05	5143	8213	1.60	5142	/	/	/
		norm	8468	2.36	3586	8359	2.14	3913	6743	1.64	4103	/	/	/
		min	5925	2.43	2439	6122	2.20	2785	5420	1.69	3205	/	/	/
	0	max	10824	2.27	4766	10474	2.15	4878	8522	1.69	5030	/	/	/
		norm	8129	2.37	3427	7929	2.24	3535	6698	1.75	3829	/	/	/
		min	6116	2.45	2494	6232	2.32	2689	5752	1.81	3180	/	/	/
	5	max	12813	2.88	4456	12819	2.73	4701	11570	2.29	5057	9921	1.92	5157
		norm	9750	3.03	3216	9832	2.88	3419	9210	2.38	3862	8195	2.02	4048
		min	7303	3.15	2321	8076	2.98	2706	7868	2.48	3177	6994	2.10	3328
7	max	13908	3.14	4428	13852	2.97	4664	12949	2.56	5068	11541	2.23	5168	
	norm	10487	3.31	3166	10528	3.13	3361	10217	2.66	3836	9452	2.35	4021	
	min	7830	3.46	2261	8630	3.27	2636	8715	2.79	3128	8056	2.46	3278	
10	max	13539	3.30	4107	13117	2.99	4384	12702	2.65	4788	11688	2.39	4888	
	norm	10100	3.44	2934	9864	3.13	3156	9920	2.74	3621	9479	2.49	3802	
	min	7758	3.63	2135	8303	3.27	2540	8676	2.87	3026	8275	2.61	3173	
15	max	13424	3.60	3733	12049	3.03	3974	12291	2.85	4320	11733	2.65	4420	

		norm	10081	3.79	2659	9121	3.20	2853	9661	2.97	3257	9574	2.82	3395
		min	8283	3.98	2080	7832	3.33	2354	8727	3.09	2826	8624	2.92	2952
	20	max	13661	4.06	3367	12023	3.39	3549	10762	2.90	3706	/	/	/
		norm	10143	4.32	2348	8999	3.61	2495	8367	3.06	2737	/	/	/
	25	min	8524	4.53	1880	7899	3.75	2105	7716	3.18	2425	/	/	/
		max	13898	4.63	3000	11997	3.84	3124	10033	2.99	3359	/	/	/
		norm	10389	4.93	2107	9040	4.09	2211	7851	3.14	2497	/	/	/
	30	min	8811	5.18	1702	8002	4.25	1881	7294	3.27	2229	/	/	/
		max	13946	4.95	2819	12641	4.30	2937	10342	3.04	3402	/	/	/
		norm	10529	5.24	2009	9620	4.49	2141	8170	3.17	2579	/	/	/
	35	min	8946	5.51	1624	8596	4.73	1819	7343	3.33	2204	/	/	/
		max	14225	5.24	2717	12893	4.62	2791	/	/	/	/	/	/
		norm	10953	5.58	1962	10005	4.86	2060	/	/	/	/	/	/
	40	min	9268	5.87	1578	8896	5.11	1740	/	/	/	/	/	/
		max	14511	5.40	2687	/	/	/	/	/	/	/	/	/
		norm	11464	5.80	1977	/	/	/	/	/	/	/	/	/
	43	min	9599	6.10	1574	/	/	/	/	/	/	/	/	/
		max	14782	5.75	2571	/	/	/	/	/	/	/	/	/
		norm	11900	6.22	1914	/	/	/	/	/	/	/	/	/
			min	10000	6.54	1529	/	/	/	/	/	/	/	/

Abbreviations:

LWT: Leaving water temperature (°C)

CL: Capacity level

CAP: Total heating capacity (W)

PI: Power input (W)

Table 2-5.6: MHC-V14W/D2N8-B MHC-V14W/D2RN8-B heating capacity

LWT			30			35			40			45		
Outdoor air temperature[°C]		CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI
14kW-Maximum heating CAP	-25	max	6761	2.11	3204	5432	1.71	3180	4892	1.46	3353	4474	1.29	3470
		norm	5747	2.25	2555	4574	1.79	2550	4188	1.51	2765	3879	1.30	2973
		min	4016	2.30	1745	3536	1.82	1943	3327	1.54	2165	2998	1.31	2286
	-20	max	8303	2.52	3298	7790	2.18	3581	6893	1.89	3652	6246	1.73	3608
		norm	7265	2.72	2670	6754	2.32	2916	6073	1.99	3056	5478	1.78	3081
		min	4774	2.76	1730	4401	2.35	1874	4019	2.02	1994	4060	1.76	2306
	-15	max	9566	2.62	3646	9567	2.43	3944	8569	2.17	3952	7632	1.85	4123
		norm	7939	2.85	2787	7864	2.60	3030	7163	2.29	3123	6235	1.91	3264
	-10	max	11420	2.73	4181	10949	2.47	4441	10601	2.26	4697	9638	2.04	4730
		norm	9364	2.91	3216	8890	2.59	3434	8756	2.34	3738	8067	2.09	3855
		min	5082	3.02	1682	4763	2.66	1789	4802	2.41	1992	5012	2.13	2349
	-7	max	12914	3.02	4282	12698	2.79	4553	12317	2.49	4939	11943	2.31	5170
		norm	10486	3.19	3286	10044	2.96	3394	9866	2.69	3670	9459	2.44	3870
		min	4546	3.36	1354	4571	3.10	1475	4964	2.80	1772	6210	2.52	2460
	-5	max	13191	3.41	3870	12464	2.99	4165	12560	2.73	4609	12071	2.42	4993
		norm	10843	3.66	2965	9984	3.21	3115	10186	2.95	3452	9681	2.57	3767
		min	4775	3.81	1253	4612	3.34	1381	5187	3.07	1688	6398	2.65	2410
	0	max	13681	3.87	3535	12432	3.26	3817	13006	3.01	4319	12694	2.62	4845
		norm	10767	4.17	2584	9523	3.50	2721	10093	3.27	3085	9736	2.79	3484
		min	5336	4.36	1224	4786	3.66	1307	5567	3.42	1627	6918	2.90	2386
	5	max	14908	4.51	3302	14316	3.94	3632	14275	3.61	3952	14290	3.11	4592
		norm	11882	4.90	2422	11109	4.27	2599	11220	3.96	2833	11103	3.35	3314
		min	5889	5.15	1143	5583	4.49	1243	6181	4.16	1486	7859	3.49	2252
	7	max	15551	4.94	3149	15457	4.59	3368	15596	4.04	3863	15649	3.60	4347
		norm	12285	5.39	2279	11886	5.00	2377	12149	4.45	2732	12050	3.89	3095
		min	6034	5.68	1063	5920	5.27	1124	6644	4.68	1419	8497	4.07	2090
	10	max	15519	5.36	2894	14863	4.79	3100	15266	4.24	3599	14974	3.67	4076
		norm	12136	5.85	2074	11310	5.22	2165	11770	4.67	2519	11410	3.97	2872
		min	6177	6.16	1002	5841	5.50	1062	6656	4.92	1353	8281	4.15	1996
	15	max	15180	5.79	2624	15165	5.16	2941	15833	4.45	3561	15503	3.89	3981
norm		11947	6.37	1875	11616	5.67	2049	12286	4.94	2486	11891	4.25	2797	
min		5966	6.68	893	5930	5.94	998	7331	5.18	1416	8589	4.42	1944	
20	max	14814	6.74	2199	14642	5.65	2590	15232	5.01	3042	15121	4.42	3418	
	norm	11533	7.49	1540	11091	6.27	1768	11690	5.62	2082	11469	4.87	2353	
	min	5926	7.85	755	5828	6.57	887	7159	5.88	1217	8483	5.06	1675	
25	max	14748	7.69	1918	14619	6.15	2377	14930	5.57	2681	14739	4.95	2975	
	norm	11555	8.55	1352	11147	6.82	1633	11533	6.93	1665	11253	5.46	2062	
	min	6047	8.95	675	5965	7.15	834	7166	6.54	1096	8416	5.67	1484	
30	max	14809	8.21	1803	14857	7.09	2096	15060	6.22	2423	14997	5.36	2797	
	norm	11714	9.07	1292	11440	7.81	1465	11747	7.64	1538	11562	5.63	2052	

	35	min	7256	9.49	765	8097	8.02	1009	8434	7.05	1196	8675	5.92	1465	
		max	15370	9.04	1701	14994	8.02	1869	15490	6.86	2257	15254	5.77	2645	
		norm	12388	9.93	1248	11770	8.63	1364	12315	7.39	1665	11990	6.10	1964	
	40	min	7685	10.52	731	8322	9.15	910	8829	7.84	1126	8977	6.42	1398	
		max	16406	10.29	1594	16213	8.57	1892	15963	7.26	2199	15751	6.08	2589	
		norm	13551	11.38	1191	13052	9.28	1406	13010	7.88	1652	12695	6.48	1958	
	43	min	8367	12.06	694	9160	9.84	931	9099	8.35	1089	9293	6.82	1362	
		max	16734	10.83	1545	16537	8.81	1877	16282	7.69	2118	16066	6.27	2564	
		norm	14074	12.06	1167	13561	9.61	1411	13514	8.40	1609	13190	6.73	1961	
			min	8785	12.78	688	9592	10.19	941	9525	8.90	1070	9238	7.08	1305

LWT			50			55			60			65		
Outdoor air temperature [°C]		CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI
14kW-Maximum heating CAP	-25	max	/	/	/	/	/	/	/	/	/	/	/	/
		norm	/	/	/	/	/	/	/	/	/	/	/	/
		min	/	/	/	/	/	/	/	/	/	/	/	/
	-20	max	5416	1.50	3606	5139	1.33	3867	/	/	/	/	/	/
		norm	4771	1.55	3078	4687	1.33	3523	/	/	/	/	/	/
		min	3791	1.54	2470	3649	1.32	2757	/	/	/	/	/	/
	-15	max	7010	1.62	4319	6463	1.41	4578	6012	1.19	5052	/	/	/
		norm	5755	1.68	3420	5410	1.42	3809	5086	1.18	4313	/	/	/
		min	4837	1.68	2874	4524	1.43	3170	4329	1.19	3652	/	/	/
	-10	max	9067	1.81	5009	8717	1.67	5213	6732	1.27	5301	/	/	/
		norm	7625	1.87	4082	7340	1.72	4257	5729	1.29	4440	/	/	/
		min	5168	1.90	2714	5405	1.76	3075	4510	1.32	3428	/	/	/
	-7	max	11035	2.07	5331	10968	2.01	5457	8024	1.51	5314	/	/	/
		norm	8563	2.15	3974	8577	2.09	4099	6507	1.55	4188	/	/	/
		min	5959	2.20	2713	6252	2.15	2904	5216	1.60	3262	/	/	/
	-5	max	11173	2.13	5243	11144	2.09	5324	8248	1.63	5059	/	/	/
		norm	8782	2.22	3959	8826	2.18	4051	6772	1.68	4037	/	/	/
		min	6145	2.28	2692	6463	2.24	2883	5444	1.73	3153	/	/	/
	0	max	11691	2.29	5099	11599	2.27	5099	9139	1.70	5366	/	/	/
		norm	8780	2.39	3666	8780	2.38	3695	7183	1.76	4085	/	/	/
		min	6605	2.48	2669	6901	2.46	2810	6169	1.82	3393	/	/	/
5	max	13798	2.77	4982	13779	2.66	5179	11696	2.17	5380	9762	1.83	5334	
	norm	10500	2.92	3595	10568	2.81	3767	9310	2.27	4108	8063	1.93	4186	
	min	7865	3.03	2595	8681	2.91	2981	7953	2.35	3380	6882	2.00	3442	
7	max	14971	3.11	4812	14526	2.95	4925	13202	2.54	5200	10385	2.10	4945	
	norm	11288	3.28	3441	11040	3.11	3549	10416	2.65	3936	8505	2.21	3848	
	min	8429	3.43	2457	9050	3.25	2783	8885	2.77	3209	7249	2.31	3136	
10	max	15308	3.31	4623	14150	3.08	4601	13200	2.69	4905	11235	2.26	4982	
	norm	11420	3.46	3302	10641	3.21	3312	10309	2.78	3711	9111	2.35	3876	
	min	8772	3.65	2403	8957	3.36	2666	9016	2.91	3101	7954	2.46	3235	
15	max	15342	3.51	4370	12994	3.24	4016	12737	2.84	4480	11862	2.41	4965	

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		norm	11522	3.70	3112	9836	3.41	2883	10011	2.96	3378	9679	2.56	3780
		min	9466	3.89	2435	8446	3.55	2378	9043	3.09	2930	8719	2.65	3287
	20	max	14992	3.90	3840	12732	3.52	3621	10985	2.92	3768	/	/	/
		norm	11131	4.16	2678	9530	3.74	2546	8541	3.07	2784	/	/	/
	25	min	9355	4.36	2144	8365	3.89	2148	7876	3.19	2466	/	/	/
		max	14721	4.30	3425	12469	3.80	3284	10156	2.99	3400	/	/	/
	30	norm	11004	4.58	2405	9395	4.04	2325	7947	3.14	2528	/	/	/
		min	9333	4.80	1943	8317	4.21	1978	7383	3.27	2256	/	/	/
	35	max	14610	4.65	3142	12795	4.37	2928	10342	3.04	3402	/	/	/
		norm	11030	4.92	2240	9737	4.56	2134	8170	3.17	2579	/	/	/
	35	min	9372	5.17	1811	8701	4.80	1813	7343	3.33	2204	/	/	/
		max	14778	5.00	2955	13007	4.69	2773	/	/	/	/	/	/
	40	norm	11379	5.33	2133	10093	4.93	2047	/	/	/	/	/	/
		min	9628	5.61	1717	8975	5.19	1729	/	/	/	/	/	/
	40	max	14953	5.38	2779	/	/	/	/	/	/	/	/	/
		norm	11813	5.78	2044	/	/	/	/	/	/	/	/	/
	43	min	9891	6.08	1628	/	/	/	/	/	/	/	/	/
		max	15152	5.54	2734	/	/	/	/	/	/	/	/	/
	43	norm	12197	5.99	2035	/	/	/	/	/	/	/	/	/
		min	10250	6.30	1626	/	/	/	/	/	/	/	/	/

Abbreviations:

LWT: Leaving water temperature (°C)

CL: Capacity level

CAP: Total heating capacity (W)

PI: Power input (W)

Table 2-5.7: MHC-V16W/D2N8-B MHC-V16W/D2RN8-B heating capacity

LWT			30			35			40			45		
Outdoor air temperature[°C]		CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI
16kW-Maximum heating CAP	-25	max	7986	1.93	4220	6610	1.65	4006	5892	1.33	4430	4963	1.18	4206
		norm	6788	2.06	3295	5566	1.73	3212	5044	1.38	3653	4303	1.19	3603
		min	4744	2.11	2250	4303	1.76	2448	4007	1.40	2861	3325	1.20	2771
	-20	max	9712	2.19	4433	8159	1.71	4770	7479	1.57	4763	6546	1.35	4849
		norm	8498	2.37	3588	7073	1.82	3883	6589	1.65	3985	5741	1.39	4141
		min	5584	2.40	2326	4610	1.85	2495	4360	1.68	2600	4255	1.37	3099
	-15	max	11268	2.45	4601	10707	2.17	4928	10065	1.92	5243	9029	1.68	5377
		norm	9352	2.66	3516	8801	2.32	3786	8414	2.03	4143	7377	1.73	4257
		min	6366	2.72	2340	5942	2.38	2498	5767	2.08	2774	5779	1.73	3335
	-10	max	13032	2.72	4780	12683	2.49	5091	12424	2.28	5432	11053	1.96	5615
		norm	10687	2.90	3685	10298	2.61	3947	10262	2.37	4337	9252	2.01	4593
		min	5799	3.01	1927	5517	2.68	2056	5628	2.43	2312	5748	2.05	2799
	-7	max	14091	2.88	4887	13868	2.67	5189	13839	2.50	5546	13128	2.18	6019
		norm	11442	3.05	3751	10970	2.84	3869	11085	2.69	4121	10397	2.31	4506
		min	4960	3.21	1546	4992	2.97	1681	5577	2.80	1990	6827	2.38	2864
	-5	max	14253	3.13	4607	13983	2.86	4927	13841	2.61	5333	13379	2.28	5879
		norm	11716	3.36	3487	11201	3.07	3653	11225	2.82	3976	10730	2.42	4435
		min	5160	3.50	1474	5174	3.20	1619	5716	2.94	1944	7091	2.50	2838
	0	max	14659	3.75	3906	14272	3.34	4273	13845	2.88	4799	14056	2.64	5329
		norm	11537	4.04	2856	10932	3.59	3046	10744	3.13	3428	10781	2.81	3832
		min	5717	4.23	1352	5495	3.76	1463	5926	3.28	1807	7661	2.92	2625
	5	max	14625	4.06	3610	16071	4.04	3997	15637	3.43	4570	15884	3.20	4964
		norm	11656	4.41	2642	12471	4.38	2846	12291	3.76	3265	12342	3.44	3583
		min	5777	4.64	1246	6268	4.60	1361	6771	3.95	1713	8736	3.59	2435
	7	max	14612	4.68	3122	16791	4.43	3790	16354	3.85	4248	16615	3.53	4707
		norm	11543	5.11	2260	12912	4.83	2675	12740	4.24	3004	12794	3.82	3351
		min	5669	5.38	1054	6431	5.08	1265	6967	4.46	1561	9022	3.99	2263
	10	max	16359	4.96	3338	17585	4.74	3735	17067	3.96	4327	17331	3.67	4719
		norm	12793	5.42	2362	13382	5.16	2593	13159	4.36	3015	13206	3.97	3325
	10	min	6511	5.70	1142	6911	5.44	1271	7441	4.59	1620	9584	4.15	2311
max		19271	6.26	3080	18907	5.43	3482	18255	4.48	4075	18525	4.09	4534	
norm		15166	6.89	2201	14483	5.97	2426	14166	4.98	2845	14209	4.46	3186	
15	min	7574	7.22	1048	7393	6.26	1181	8452	5.22	1620	10263	4.64	2214	
	max	16909	7.10	2381	16704	6.21	2692	17393	5.12	3395	16109	4.28	3768	
	norm	13164	7.89	1668	12653	6.88	1838	13349	5.75	2323	12219	4.71	2595	
20	min	6764	8.27	818	6648	7.21	922	8175	6.02	1359	9037	4.89	1847	
	max	16185	7.26	2231	16037	6.94	2309	16649	5.81	2867	15728	4.87	3231	
	norm	12681	8.06	1572	12228	7.71	1587	12861	7.22	1780	12008	5.36	2240	
25	min	6636	8.45	785	6543	8.07	810	7992	6.82	1172	8980	5.57	1612	
	max	15461	8.21	1883	15369	7.68	2000	15905	6.49	2450	15346	5.46	2811	
	norm	12230	9.06	1349	11834	8.47	1397	12406	7.98	1555	11832	5.74	2062	

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	35	min	7576	9.48	799	8376	8.70	963	8907	7.36	1210	8878	6.03	1472	
		max	16551	9.01	1837	16309	8.42	1937	16628	6.87	2421	15877	5.68	2794	
		norm	13340	9.90	1348	12802	9.06	1414	13219	7.40	1786	12479	6.02	2075	
	40	min	8276	10.48	789	9051	9.60	943	9478	7.85	1208	9343	6.33	1477	
		max	17641	10.06	1754	17248	9.15	1884	17351	7.24	2395	16407	5.91	2778	
		norm	14571	11.13	1310	13885	9.91	1400	14141	7.86	1799	13224	6.30	2100	
	43	min	8997	11.79	763	9745	10.51	927	9890	8.34	1187	9680	6.62	1461	
		max	17994	10.51	1711	17593	9.37	1878	17698	7.41	2388	16735	6.20	2699	
		norm	15133	11.71	1293	14426	10.21	1413	14689	8.10	1814	13740	6.66	2064	
			min	9447	12.40	762	10204	10.83	942	10353	8.59	1206	10208	7.00	1458

LWT		50			55			60			65			
Outdoor air temperature[°C]		CL	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI	CAP	COP	PI
16kW-Maximum heating CAP	-25	max	/	/	/	/	/	/	/	/	/	/	/	/
		norm	/	/	/	/	/	/	/	/	/	/	/	/
		min	/	/	/	/	/	/	/	/	/	/	/	/
	-20	max	5850	1.29	4543	5365	1.13	4748	/	/	/	/	/	/
		norm	5154	1.33	3878	4893	1.13	4326	/	/	/	/	/	/
		min	4095	1.32	3112	3809	1.13	3384	/	/	/	/	/	/
	-15	max	7532	1.42	5315	6823	1.29	5289	6423	1.15	5585	/	/	/
		norm	6184	1.47	4208	5711	1.30	4401	5434	1.14	4768	/	/	/
		min	5197	1.47	3536	4776	1.30	3662	4625	1.15	4038	/	/	/
	-10	max	9486	1.70	5560	8922	1.51	5878	7036	1.26	5589	/	/	/
		norm	7978	1.75	4551	7513	1.55	4833	5988	1.28	4686	/	/	/
		min	5407	1.79	3026	5532	1.58	3491	4714	1.30	3618	/	/	/
	-7	max	12859	2.07	6219	12482	2.03	6149	8249	1.33	6185	/	/	/
		norm	9979	2.15	4636	9761	2.11	4619	6690	1.37	4874	/	/	/
		min	6944	2.19	3165	7115	2.17	3272	5362	1.41	3796	/	/	/
	-5	max	12947	2.22	5824	12599	2.13	5915	8624	1.45	5967	/	/	/
		norm	10177	2.11	4832	9979	2.22	4500	7081	1.49	4761	/	/	/
		min	7121	2.17	3287	7308	2.28	3203	5692	1.53	3719	/	/	/
	0	max	13418	2.61	5138	12643	2.40	5278	9359	1.72	5428	/	/	/
		norm	10077	2.52	4001	9571	2.50	3825	7356	1.78	4132	/	/	/
		min	7581	2.60	2912	7523	2.59	2909	6317	1.84	3432	/	/	/
	5	max	15264	3.02	5052	14466	2.77	5213	12715	2.37	5363	10706	2.04	5242
		norm	11616	2.97	3905	11095	2.93	3792	10121	2.47	4089	8843	2.08	4245
		min	8701	3.09	2818	9113	3.04	3001	8646	2.57	3364	7548	2.15	3513
7	max	16003	3.17	5048	15995	2.89	5535	14057	2.63	5337	11277	2.20	5126	
	norm	12066	3.34	3610	12156	3.05	3989	11091	2.75	4039	9236	2.26	4094	
	min	9010	3.49	2578	9965	3.19	3127	9460	2.87	3294	7871	2.31	3407	
10	max	16686	3.26	5118	16045	3.11	5157	14315	2.79	5145	12229	2.46	4965	
	norm	12448	3.41	3656	12066	3.25	3713	11180	2.88	3878	9918	2.52	3934	
	min	9561	3.59	2660	10157	3.40	2988	9777	3.02	3241	8658	2.56	3380	
15	max	17825	3.72	4794	17462	3.42	5106	14745	3.06	4825	12474	2.60	4798	

		norm	13387	3.92	3414	13219	3.61	3665	11590	3.19	3638	10179	2.67	3810
		min	10998	4.12	2671	11350	3.75	3024	10469	3.32	3156	9168	2.72	3370
	20	max	14616	3.60	4055	14952	3.46	4324	13139	3.00	4385	/	/	/
		norm	10852	3.84	2828	11192	3.68	3040	10216	3.15	3239	/	/	/
		min	9120	4.03	2264	9823	3.83	2565	9421	3.28	2870	/	/	/
	25	max	14515	4.20	3459	14057	3.82	3680	12430	3.07	4049	/	/	/
		norm	10850	4.47	2429	10592	4.07	2605	9726	3.23	3010	/	/	/
		min	9203	4.69	1963	9376	4.23	2216	9037	3.36	2687	/	/	/
	30	max	14414	4.79	3011	13162	4.18	3147	12740	3.10	4110	/	/	/
		norm	10883	5.07	2147	10016	4.37	2294	10065	3.23	3116	/	/	/
		min	9247	5.33	1735	8950	4.59	1949	9045	3.40	2662	/	/	/
	35	max	14995	5.01	2996	13372	4.35	3074	/	/	/	/	/	/
		norm	11546	5.34	2163	10377	4.57	2269	/	/	/	/	/	/
		min	9769	5.61	1740	9227	4.81	1917	/	/	/	/	/	/
	40	max	15576	5.22	2982	/	/	/	/	/	/	/	/	/
		norm	12305	5.61	2193	/	/	/	/	/	/	/	/	/
		min	10304	5.90	1746	/	/	/	/	/	/	/	/	/
	43	max	15888	5.41	2937	/	/	/	/	/	/	/	/	/
		norm	12789	5.85	2186	/	/	/	/	/	/	/	/	/
		min	10748	6.15	1747	/	/	/	/	/	/	/	/	/

Abbreviations:

LWT: Leaving water temperature (°C)

CL: Capacity level

CAP: Total heating capacity (W)

PI: Power input (W)

5.2 Cooling Capacity Tables

Table 2-5.8: MHC-V4W/D2N8-B cooling capacity

LWT		5			10			15			20			25			
Outdoor air temperature[°C]		CL	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI
4kW-Maximum cooling CAP	-5	max	/	/	/	/	/	/	4759	10.30	462	5468	10.01	546	6094	12.66	481
		norm	/	/	/	/	/	/	3832	11.74	326	4450	11.92	373	4951	14.10	351
		min	/	/	/	/	/	/	2479	12.60	197	2871	12.38	232	3212	15.83	203
	0	max	/	/	/	/	/	/	4538	8.03	565	5247	8.08	649	5873	10.70	549
		norm	/	/	/	/	/	/	3660	9.35	392	4277	9.81	436	4779	13.31	359
		min	/	/	/	/	/	/	2375	9.92	239	2767	10.09	274	3109	13.40	232
	5	max	/	/	/	/	/	/	4038	6.07	665	4747	6.34	749	5373	8.28	649
		norm	/	/	/	/	/	/	3235	6.68	484	3809	7.29	523	4360	9.77	446
		min	/	/	/	/	/	/	1740	7.35	237	2065	7.76	266	2348	10.17	231
	10	max	/	/	/	/	/	/	6063	5.71	1062	6443	6.40	1007	7113	8.37	850
		norm	/	/	/	/	/	/	4872	6.29	774	5185	7.37	703	5789	9.89	585
		min	/	/	/	/	/	/	2701	6.99	387	2896	7.91	366	3212	10.39	309
	15	max	/	/	/	5049	5.91	855	8088	5.55	1458	8139	6.44	1264	8853	8.43	1050
		norm	/	/	/	3787	6.25	606	6794	5.89	1154	7000	7.06	992	7437	9.29	800
		min	/	/	/	2323	6.64	350	3640	6.29	579	3500	7.80	449	4249	10.32	412
	20	max	4715	4.53	1041	6009	4.47	1345	8159	5.47	1493	8331	6.42	1298	8984	8.15	1102
		norm	3676	4.76	772	4858	4.80	1013	6801	5.88	1157	7170	6.94	1034	7821	8.98	871
		min	1858	4.95	376	2127	5.00	425	3378	6.23	542	3949	7.32	540	4438	9.50	467
	25	max	5872	4.51	1301	6968	3.80	1835	8230	5.39	1527	8523	6.40	1332	9115	7.90	1154
		norm	4651	4.78	974	5721	4.09	1400	6963	5.74	1213	7441	6.98	1066	8049	8.85	910
		min	2231	4.89	456	2369	4.29	552	3292	6.04	545	3921	7.33	535	4375	9.28	471
	30	max	5836	3.78	1546	6803	3.67	1853	7771	4.72	1645	8195	5.63	1456	8773	6.75	1299
		norm	4693	4.02	1167	5669	3.92	1446	6669	5.06	1318	7255	6.05	1200	7854	7.44	1055
		min	2229	4.10	543	2327	4.11	566	3124	5.30	589	3786	6.38	593	4228	7.72	548
	35	max	5799	3.24	1790	6638	3.55	1870	7311	4.15	1763	7866	4.98	1579	8430	5.84	1444
		norm	4506	3.40	1323	5450	3.82	1426	6024	4.47	1349	6867	5.36	1282	7688	6.39	1203
		min	2053	3.50	587	2529	4.00	633	3012	4.79	629	3658	5.81	630	4232	6.84	618
40	max	3803	2.52	1509	5082	2.81	1806	5914	3.41	1733	6627	3.95	1676	7878	4.80	1640	
	norm	3105	2.70	1149	4296	3.03	1416	5147	3.68	1398	5947	4.34	1370	7147	5.41	1320	
	min	1402	2.69	521	2011	3.12	644	2523	3.82	661	3179	4.50	706	4070	5.51	739	
43	max	2582	2.24	1154	3800	2.51	1516	5075	3.26	1556	5884	3.74	1573	7546	4.73	1595	
	norm	2120	2.33	910	2987	2.59	1151	4040	3.43	1179	5037	4.04	1245	5969	5.18	1152	
	min	726	2.38	305	1429	2.68	534	2111	3.57	591	2565	4.17	616	3803	5.38	707	

Abbreviations:

LWT: Leaving water temperature (°C)

CL: Capacity level

CAP: Total heating capacity (W)

PI: Power input (W)

Table 2-5.9: MHC-V6W/D2N8-B cooling capacity

LWT		5			10			15			20			25			
Outdoor air temperature[°C]		CL	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI
6kW-cooling CAP	-5	max	/	/	/	/	/	/	5269	8.93	590	6378	11.53	553	6768	10.62	637
		norm	/	/	/	/	/	/	4243	10.18	417	5190	13.72	378	5498	12.96	424
		min	/	/	/	/	/	/	2745	10.92	251	3348	14.26	235	3567	13.17	271
	0	max	/	/	/	/	/	/	5048	7.28	693	6157	9.39	656	6547	8.85	740
		norm	/	/	/	/	/	/	4072	8.48	480	5019	11.39	440	5328	11.01	484
		min	/	/	/	/	/	/	2642	9.00	294	3247	11.72	277	3465	11.08	313
	5	max	/	/	/	/	/	/	4548	5.74	793	5657	7.48	756	6047	7.20	840
		norm	/	/	/	/	/	/	3643	6.31	578	4539	8.61	527	4907	8.49	578
		min	/	/	/	/	/	/	1960	6.95	282	2461	9.16	269	2643	8.84	299
	10	max	/	/	/	/	/	/	6318	5.61	1126	6898	6.83	1010	7450	7.88	945
		norm	/	/	/	/	/	/	5077	6.18	821	5551	7.86	706	6063	9.31	651
		min	/	/	/	/	/	/	2815	6.87	410	3101	8.44	367	3364	9.78	344
	15	max	/	/	/	5887	5.33	1104	8088	5.55	1458	8139	6.44	1264	8853	8.43	1050
		norm	/	/	/	4415	5.65	782	6794	5.89	1154	7000	7.06	992	7437	9.29	800
		min	/	/	/	2708	5.99	452	3640	6.29	579	3500	7.80	449	4249	10.32	412
	20	max	5411	3.93	1376	6626	4.62	1435	8159	5.47	1493	8331	6.42	1298	8984	8.15	1102
		norm	4218	4.14	1020	5358	4.96	1081	6801	5.88	1157	7170	6.94	1034	7821	8.98	871
		min	2132	4.30	496	2346	5.17	453	3378	6.23	542	3949	7.32	540	4438	9.50	467
	25	max	7164	3.98	1802	7365	4.17	1765	8230	5.39	1527	8523	6.40	1332	9115	7.90	1154
		norm	5674	4.21	1349	6047	4.49	1346	6963	5.74	1213	7441	6.98	1066	8049	8.85	910
		min	2722	4.31	632	2504	4.72	531	3292	6.04	545	3921	7.33	535	4375	9.28	471
	30	max	6502	3.51	1853	7292	3.84	1898	7771	4.72	1645	8195	5.63	1456	8773	6.75	1299
		norm	5229	3.74	1399	6076	4.10	1481	6669	5.06	1318	7255	6.05	1200	7854	7.44	1055
		min	2484	3.81	651	2494	4.30	580	3124	5.30	589	3786	6.38	593	4228	7.72	548
35	max	5839	3.07	1904	7219	3.55	2031	7311	4.15	1763	7866	4.98	1579	8430	5.84	1444	
	norm	4537	3.22	1408	5927	3.83	1548	6024	4.47	1349	6867	5.36	1282	7688	6.39	1203	
	min	2067	3.31	624	2750	4.00	687	3012	4.79	629	3658	5.81	630	4232	6.84	618	
40	max	3803	2.52	1509	5082	2.81	1806	5914	3.41	1733	6627	3.95	1676	7878	4.80	1640	
	norm	3105	2.70	1149	4296	3.03	1416	5147	3.68	1398	5947	4.34	1370	7147	5.41	1320	
	min	1402	2.69	521	2011	3.12	644	2523	3.82	661	3179	4.50	706	4070	5.51	739	
43	max	2582	2.24	1154	3800	2.51	1516	5075	3.26	1556	5884	3.74	1573	7546	4.73	1595	
	norm	2120	2.33	910	2987	2.59	1151	4040	3.43	1179	5037	4.04	1245	5969	5.18	1152	
	min	726	2.38	305	1429	2.68	534	2111	3.57	591	2565	4.17	616	3803	5.38	707	

Abbreviations:

LWT: Leaving water temperature (°C)

CL: Capacity level

CAP: Total heating capacity (W)

PI: Power input (W)

M thermal Mono



Table 2-5.10: MHC-V8W/D2N8-B cooling capacity

LWT		5			10			15			20			25			
Outdoor air temperature[°C]		CL	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI
8kW-Maximum cooling CAP	-5	max	/	/	/	/	/	/	6387	10.07	634	8213	10.82	759	8735	12.31	710
		norm	/	/	/	/	/	/	5143	11.38	452	6683	12.50	535	7096	14.03	506
		min	/	/	/	/	/	/	3328	11.86	281	4312	12.89	335	4603	14.71	313
	0	max	/	/	/	/	/	/	6173	8.69	711	7256	9.76	744	7756	11.05	702
		norm	/	/	/	/	/	/	4979	9.94	501	5914	11.31	523	6312	12.86	491
		min	/	/	/	/	/	/	3230	10.38	311	3826	11.79	325	4105	13.34	308
	5	max	/	/	/	/	/	/	5959	7.30	816	6298	8.69	725	6777	9.78	693
		norm	/	/	/	/	/	/	4774	7.96	600	5053	9.69	522	5499	10.76	511
		min	/	/	/	/	/	/	2568	8.55	300	2740	10.29	266	2962	11.57	256
	10	max	/	/	/	/	/	/	6288	8.54	736	7911	9.45	837	8300	10.53	788
		norm	/	/	/	/	/	/	5053	9.32	542	6367	10.55	603	6755	11.60	582
		min	/	/	/	/	/	/	2801	10.11	277	3556	11.31	315	3747	12.59	298
	15	max	/	/	/	5972	6.84	873	7334	7.38	994	9108	7.94	1147	9726	8.67	1122
		norm	/	/	/	4479	7.24	618	6161	7.83	787	7833	8.70	900	8169	9.55	855
		min	/	/	/	2747	7.69	357	3300	8.37	394	3916	9.62	407	4668	10.61	440
	20	max	5683	4.96	1146	7063	5.46	1294	8380	6.22	1347	10305	6.43	1603	11151	6.81	1637
		norm	4430	5.21	850	5711	5.86	974	6986	6.69	1044	8868	6.95	1276	9708	7.50	1294
		min	2239	5.42	413	2500	6.12	409	3469	7.09	489	4885	7.33	666	5509	7.93	694
	25	max	6474	4.36	1485	7817	4.81	1627	9263	5.52	1680	11253	5.92	1902	12757	6.33	2015
		norm	5128	4.61	1112	6417	5.17	1241	7836	5.87	1334	9823	6.46	1522	11264	7.09	1589
		min	2460	4.73	521	2658	5.43	489	3705	6.18	599	5176	6.78	764	6123	7.44	823
	30	max	7266	3.85	1885	8570	4.25	2015	10145	4.93	2058	12200	5.54	2204	14363	6.00	2395
		norm	5844	4.10	1424	7141	4.54	1572	8707	5.28	1649	10801	5.94	1817	12859	6.61	1946
		min	2775	4.19	663	2931	4.76	616	4078	5.53	737	5636	6.28	898	6923	6.86	1010
35	max	7395	3.28	2255	8769	3.80	2308	10214	4.43	2306	11740	4.89	2401	13586	5.42	2505	
	norm	5746	3.45	1667	7199	4.09	1759	8416	4.77	1764	10249	5.26	1950	12390	5.94	2086	
	min	2618	3.54	739	3341	4.28	781	4208	5.12	822	5459	5.70	957	6820	6.36	1073	
40	max	6609	2.62	2521	7421	3.14	2367	8883	3.51	2530	10234	4.07	2515	12275	4.34	2831	
	norm	5395	2.81	1919	6273	3.38	1855	7730	3.79	2042	9183	4.47	2056	11137	4.89	2278	
	min	2437	2.80	870	2936	3.48	844	3790	3.93	965	4909	4.64	1059	6342	4.97	1275	
43	max	5092	2.23	2283	5643	2.58	2187	6732	3.16	2129	8151	3.75	2171	10042	4.03	2494	
	norm	4181	2.32	1801	4436	2.67	1661	5359	3.32	1614	6977	4.06	1719	7943	4.41	1801	
	min	1431	2.37	604	2122	2.76	770	2801	3.46	809	3554	4.18	850	5061	4.58	1105	

Abbreviations:

LWT: Leaving water temperature (°C)

CL: Capacity level

CAP: Total heating capacity (W)

PI: Power input (W)

Table 2-5.11: MHC-V10W/D2N8-B cooling capacity

LWT		5			10			15			20			25			
Outdoor air temperature[°C]		CL	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI
10kW-Maximum cooling CAP	-5	max	/	/	/	/	/	/	6834	9.92	689	8788	10.66	825	9346	12.13	771
		norm	/	/	/	/	/	/	5503	11.21	491	7151	12.31	581	7593	13.82	549
		min	/	/	/	/	/	/	3561	11.68	305	4614	12.69	363	4926	14.49	340
	0	max	/	/	/	/	/	/	6605	8.56	772	7763	9.61	808	8299	10.88	763
		norm	/	/	/	/	/	/	5328	9.79	544	6328	11.14	568	6754	12.66	533
		min	/	/	/	/	/	/	3456	10.23	338	4094	11.61	353	4393	13.14	334
	5	max	/	/	/	/	/	/	6376	7.19	886	6739	8.56	787	7251	9.63	753
		norm	/	/	/	/	/	/	5108	7.84	651	5407	9.54	567	5884	10.60	555
		min	/	/	/	/	/	/	2748	8.42	326	2931	10.13	289	3169	11.40	278
	10	max	/	/	/	/	/	/	6545	8.73	750	8171	10.18	803	8796	10.22	861
		norm	/	/	/	/	/	/	5259	9.53	552	6576	11.37	579	7159	11.26	636
		min	/	/	/	/	/	/	2916	10.33	282	3673	12.18	302	3971	12.22	325
	15	max	/	/	/	6302	5.89	1070	7607	7.35	1035	9480	8.38	1132	10641	8.84	1204
		norm	/	/	/	4727	6.24	758	6389	7.80	819	8153	9.18	888	8938	9.74	918
		min	/	/	/	2899	6.62	438	3423	8.33	411	4076	10.14	402	5107	10.81	472
	20	max	6198	4.86	1275	7193	5.17	1391	8668	5.97	1452	10789	6.57	1642	12485	7.45	1676
		norm	4832	5.11	946	5816	5.55	1048	7226	6.42	1125	9285	7.10	1308	10869	8.21	1325
		min	2442	5.31	460	2546	5.79	440	3589	6.81	527	5114	7.49	683	6168	8.68	711
	25	max	7130	4.24	1682	8264	4.56	1812	9872	5.24	1884	11998	5.79	2072	13929	6.42	2171
		norm	5647	4.49	1259	6785	4.91	1383	8352	5.58	1497	10474	6.32	1658	12299	7.18	1712
		min	2709	4.60	589	2810	5.15	545	3949	5.88	672	5519	6.64	832	6686	7.54	887
	30	max	8062	3.71	2173	9335	4.05	2306	11076	4.62	2396	13206	5.14	2572	15372	5.51	2788
		norm	6484	3.95	1641	7779	4.32	1800	9507	4.95	1920	11691	5.51	2120	13763	6.08	2265
		min	3080	4.03	764	3193	4.53	705	4453	5.19	858	6101	5.82	1048	7409	6.30	1175
	35	max	8126	3.12	2476	9482	3.72	2432	11033	4.21	2623	12697	4.73	2684	14507	5.06	2866
		norm	6314	3.28	1926	7785	4.01	1943	9091	4.53	2007	11084	5.09	2180	13230	5.54	2387
		min	2877	3.37	854	3613	4.19	862	4546	4.86	936	5904	5.52	1071	7283	5.93	1228
40	max	6609	2.62	2521	7421	3.14	2367	8883	3.51	2530	10234	4.07	2515	12275	4.34	2831	
	norm	5395	2.81	1919	6273	3.38	1855	7730	3.79	2042	9183	4.47	2056	11137	4.89	2278	
	min	2437	2.80	870	2936	3.48	844	3790	3.93	965	4909	4.64	1059	6342	4.97	1275	
43	max	5092	2.23	2283	5643	2.58	2187	6732	3.16	2129	8151	3.75	2171	10042	4.03	2494	
	norm	4181	2.32	1801	4436	2.67	1661	5359	3.32	1614	6977	4.06	1719	7943	4.41	1801	
	min	1431	2.37	604	2122	2.76	770	2801	3.46	809	3554	4.18	850	5061	4.58	1105	

Abbreviations:
 LWT: Leaving water temperature (°C)
 CL: Capacity level
 CAP: Total heating capacity (W)
 PI: Power input (W)

M thermal Mono



Table 2-5.12: MHC-V12W/D2N8-B MHC-V12W/D2RN8-B cooling capacity

LWT		5			10			15			20			25			
Outdoor air temperature[°C]		CL	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI
12kW-Maximum cooling CAP	-5	max	/	/	/	/	/	/	9550	7.50	1274	10391	7.37	1410	11389	8.35	1364
		norm	/	/	/	/	/	/	7690	8.47	908	8456	8.51	993	9252	9.52	972
		min	/	/	/	/	/	/	4976	8.83	563	5455	8.78	622	6002	9.98	602
	0	max	/	/	/	/	/	/	9333	5.93	1575	10902	7.32	1490	11887	7.92	1501
		norm	/	/	/	/	/	/	7528	6.78	1110	8886	8.48	1048	9673	9.22	1049
		min	/	/	/	/	/	/	4884	7.09	689	5748	8.84	650	6292	9.56	658
	5	max	/	/	/	/	/	/	9115	5.32	1713	11412	7.27	1570	12384	7.57	1637
		norm	/	/	/	/	/	/	7302	5.80	1259	9156	8.10	1130	10048	8.32	1208
		min	/	/	/	/	/	/	3929	6.23	631	4964	8.61	577	5412	8.95	605
	10	max	/	/	/	/	/	/	10808	5.27	2051	13139	6.85	1918	14184	7.32	1937
		norm	/	/	/	/	/	/	8684	5.75	1510	10574	7.65	1382	11543	8.07	1431
		min	/	/	/	/	/	/	4815	6.24	772	5906	8.20	720	6404	8.75	732
	15	max	/	/	/	10509	4.53	2321	12500	5.36	2331	14865	6.56	2265	15983	7.14	2237
		norm	/	/	/	7882	4.86	1621	10500	5.82	1803	12784	7.36	1738	13426	8.05	1667
		min	/	/	/	4834	5.16	937	5625	6.22	905	6392	8.11	788	7672	8.92	860
	20	max	7784	3.83	2034	12153	4.10	2965	14162	4.54	3122	15933	5.08	3138	16527	5.82	2840
		norm	6068	4.02	1508	9827	4.46	2202	11805	4.99	2364	13712	5.61	2443	14388	6.56	2194
		min	3067	4.18	734	4302	4.65	925	5863	5.29	1109	7552	5.92	1277	8164	6.93	1179
	25	max	10101	3.37	2999	13797	3.82	3608	15824	4.04	3912	17001	4.24	4011	17071	4.96	3442
		norm	8000	3.56	2245	11327	4.17	2715	13387	4.41	3036	14842	4.73	3137	15074	5.68	2654
		min	3838	3.65	1051	4691	4.38	1071	6330	4.64	1365	7820	4.96	1576	8194	5.95	1377
	30	max	9994	2.79	3584	13431	3.25	4134	15177	3.64	4171	16170	3.90	4151	16113	4.31	3737
		norm	8038	2.97	2707	11192	3.52	3182	13026	3.99	3266	14315	4.28	3345	14426	4.86	2968
		min	3818	3.03	1260	4593	3.68	1247	6101	4.17	1461	7470	4.51	1655	7766	5.04	1542
35	max	9886	2.19	4523	13065	2.67	4902	14529	3.19	4558	15338	3.51	4375	15255	3.81	4001	
	norm	7681	2.30	3344	10726	2.91	3686	11972	3.51	3408	13390	3.86	3472	13913	4.27	3258	
	min	3500	2.36	1483	4978	3.04	1637	5986	3.76	1591	7132	4.18	1708	7658	4.56	1678	
40	max	8109	1.79	4531	9873	2.28	4334	10665	2.72	3921	12188	3.01	4053	13228	3.51	3767	
	norm	6620	1.92	3448	8346	2.49	3350	9282	3.00	3092	10936	3.38	3240	12002	4.05	2966	
	min	2990	1.91	1564	3907	2.56	1525	4551	3.11	1463	5847	3.50	1670	6835	4.12	1661	
43	max	5196	1.40	3718	6108	1.87	3259	7328	2.43	3017	8528	2.67	3191	10675	3.27	3263	
	norm	4266	1.45	2932	4800	1.97	2440	5833	2.61	2234	7300	2.96	2470	8444	3.66	2304	
	min	1460	1.48	984	2296	2.03	1132	3048	2.72	1121	3718	3.04	1221	5380	3.80	1415	

Abbreviations:
 LWT: Leaving water temperature (°C)
 CL: Capacity level
 CAP: Total heating capacity (W)
 PI: Power input (W)

Table 2-5.13: MHC-V14W/D2N8-B MHC-V14W/D2RN8-B cooling capacity

LWT		5			10			15			20			25			
Outdoor air temperature[°C]		CL	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI
14kW-Maximum cooling CAP	-5	max	/	/	/	/	/	/	10028	7.57	1324	10911	7.44	1466	11958	8.43	1418
		norm	/	/	/	/	/	/	8074	8.56	944	8878	8.60	1033	9715	9.61	1011
		min	/	/	/	/	/	/	5224	8.92	586	5728	8.86	646	6302	10.08	625
	0	max	/	/	/	/	/	/	9799	5.87	1670	11447	7.24	1580	12481	7.84	1591
		norm	/	/	/	/	/	/	7904	6.71	1177	9331	8.39	1111	10157	9.13	1113
		min	/	/	/	/	/	/	5128	7.01	731	6036	8.75	690	6606	9.47	698
	5	max	/	/	/	/	/	/	9571	5.44	1760	11983	7.43	1613	13003	7.73	1682
		norm	/	/	/	/	/	/	7667	5.93	1294	9614	8.28	1161	10551	8.50	1241
		min	/	/	/	/	/	/	4125	6.37	648	5212	8.80	593	5682	9.15	621
	10	max	/	/	/	/	/	/	11348	5.21	2178	13139	6.85	1918	14184	7.32	1937
		norm	/	/	/	/	/	/	9119	5.69	1604	10574	7.65	1382	11543	8.07	1431
		min	/	/	/	/	/	/	5055	6.16	820	5906	8.20	720	6404	8.75	732
	15	max	/	/	/	10982	4.60	2321	13063	5.45	2322	15534	6.67	2322	16383	7.26	2323
		norm	/	/	/	8236	4.94	1666	10973	5.92	1854	13359	7.48	1786	13761	8.19	1681
		min	/	/	/	5052	5.24	964	5878	6.32	930	6680	8.25	810	7864	9.07	867
	20	max	8173	3.77	2168	12761	4.04	3160	14870	4.47	3327	15933	5.08	3138	16527	5.82	2840
		norm	6372	3.96	1607	10318	4.40	2348	12396	4.92	2520	13712	5.61	2443	14388	6.56	2194
		min	3220	4.12	782	4517	4.58	986	6156	5.21	1182	7552	5.92	1277	8164	6.93	1179
	25	max	10606	3.32	3190	14487	3.77	3838	16615	3.99	4162	17001	4.24	4011	17071	4.96	3442
		norm	8400	3.52	2388	11894	4.12	2888	14056	4.35	3230	14842	4.73	3137	15074	5.68	2654
		min	4030	3.60	1118	4926	4.32	1140	6646	4.58	1452	7820	4.96	1576	8194	5.95	1377
	30	max	10493	2.65	3962	14103	3.11	4534	15935	3.49	4563	16170	3.87	4179	16113	4.31	3737
		norm	8440	2.82	2992	11752	3.37	3490	13677	3.83	3573	14315	4.25	3367	14426	4.86	2968
		min	4008	2.88	1392	4823	3.53	1368	6406	4.01	1599	7470	4.48	1666	7766	5.04	1542
	35	max	10380	2.16	4812	13718	2.58	5323	15255	3.13	4880	15338	3.45	4440	15255	3.71	4115
		norm	8065	2.27	3557	11263	2.81	4002	12570	3.45	3649	13390	3.80	3524	13913	4.15	3351
		min	3675	2.33	1578	5227	2.94	1778	6285	3.69	1704	7132	4.11	1734	7658	4.44	1726
	40	max	8109	1.79	4531	9873	2.28	4334	10665	2.72	3921	12188	3.01	4053	13228	3.51	3767
		norm	6620	1.92	3448	8346	2.49	3350	9282	3.00	3092	10936	3.38	3240	12002	4.05	2966
		min	2990	1.91	1564	3907	2.56	1525	4551	3.11	1463	5847	3.50	1670	6835	4.12	1661
43	max	5196	1.40	3718	6108	1.87	3259	7328	2.43	3017	8528	2.67	3191	10675	3.27	3263	
	norm	4266	1.45	2932	4800	1.97	2440	5833	2.61	2234	7300	2.96	2470	8444	3.66	2304	
	min	1460	1.48	984	2296	2.03	1132	3048	2.72	1121	3718	3.04	1221	5380	3.80	1415	

Abbreviations:
 LWT: Leaving water temperature (°C)
 CL: Capacity level
 CAP: Total heating capacity (W)
 PI: Power input (W)

M thermal Mono



Table 2-5.14: MHC-V16W/D2N8-B cooling capacity

LWT		5			10			15			20			25			
Outdoor air temperature[°C]		CL	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI	CAP	EER	PI
16kW-Maximum cooling CAP	-5	max	/	/	/	/	/	/	10028	7.57	1324	10911	7.44	1466	11958	8.43	1418
		norm	/	/	/	/	/	/	8074	8.56	944	8878	8.60	1033	9715	9.61	1011
		min	/	/	/	/	/	/	5224	8.92	586	5728	8.86	646	6302	10.08	625
	0	max	/	/	/	/	/	/	9799	5.87	1670	11447	7.24	1580	12481	7.84	1591
		norm	/	/	/	/	/	/	7904	6.71	1177	9331	8.39	1111	10157	9.13	1113
		min	/	/	/	/	/	/	5128	7.01	731	6036	8.75	690	6606	9.47	698
	5	max	/	/	/	/	/	/	9571	5.44	1760	11983	7.43	1613	13003	7.73	1682
		norm	/	/	/	/	/	/	7667	5.93	1294	9614	8.28	1161	10551	8.50	1241
		min	/	/	/	/	/	/	4125	6.37	648	5212	8.80	593	5682	9.15	621
	10	max	/	/	/	/	/	/	11348	5.21	2178	13139	6.85	1918	14184	7.32	1937
		norm	/	/	/	/	/	/	9119	5.69	1604	10574	7.65	1382	11543	8.07	1431
		min	/	/	/	/	/	/	5055	6.16	820	5906	8.20	720	6404	8.75	732
	15	max	/	/	/	11366	4.67	2433	13520	5.53	2444	16078	6.77	2374	16956	7.37	2300
		norm	/	/	/	8525	5.02	1699	11357	6.01	1890	13827	7.59	1822	14243	8.31	1714
		min	/	/	/	5228	5.32	983	6084	6.41	949	6913	8.37	826	8139	9.21	884
	20	max	8991	3.70	2433	14037	3.96	3547	15762	4.42	3563	16889	5.03	3360	17519	5.76	3040
		norm	7009	3.88	1804	11350	4.31	2635	13139	4.87	2699	14535	5.56	2616	15252	6.49	2350
		min	3542	4.04	878	4969	4.49	1106	6526	5.15	1266	8005	5.86	1367	8654	6.86	1262
	25	max	11667	3.25	3594	15936	3.69	4324	17446	3.90	4475	17851	4.14	4313	17925	4.84	3701
		norm	9240	3.43	2690	13083	4.02	3253	14759	4.25	3473	15584	4.62	3373	15827	5.55	2854
		min	4433	3.52	1260	5418	4.22	1284	6978	4.47	1561	8211	4.85	1694	8604	5.81	1480
	30	max	11542	2.59	4463	15513	3.04	5107	17210	3.41	5047	17140	3.68	4659	16919	4.21	4018
		norm	9284	2.75	3371	12927	3.29	3931	14771	3.74	3952	15174	4.04	3754	15147	4.75	3192
		min	4409	2.81	1568	5305	3.44	1541	6918	3.91	1768	7919	4.26	1857	8155	4.92	1658
	35	max	11418	2.11	5420	15090	2.52	5997	16476	2.94	5603	16258	3.27	4965	16170	3.62	4467
		norm	8872	2.21	4007	12389	2.75	4508	13576	3.24	4189	14193	3.60	3940	14747	4.05	3637
		min	4042	2.27	1778	5749	2.87	2002	6788	3.47	1956	7560	3.90	1938	8117	4.33	1873
40	max	8920	1.75	5111	10860	2.22	4889	11732	2.65	4423	13407	2.86	4692	14551	3.34	4362	
	norm	7282	1.87	3890	9180	2.43	3779	10210	2.93	3489	12030	3.21	3751	13202	3.84	3434	
	min	3289	1.86	1764	4297	2.50	1721	5006	3.03	1651	6431	3.33	1934	7518	3.91	1923	
43	max	5975	1.33	4500	7329	1.78	4117	9013	2.31	3907	10489	2.54	4131	11956	3.11	3847	
	norm	4906	1.38	3549	5761	1.87	3082	7174	2.48	2893	8978	2.81	3197	9457	3.48	2717	
	min	1679	1.41	1191	2756	1.93	1429	3749	2.58	1452	4573	2.89	1581	6026	3.61	1669	

Abbreviations:
 LWT: Leaving water temperature (°C)
 CL: Capacity level
 CAP: Total heating capacity (W)
 PI: Power input (W)

6 Operating Limits

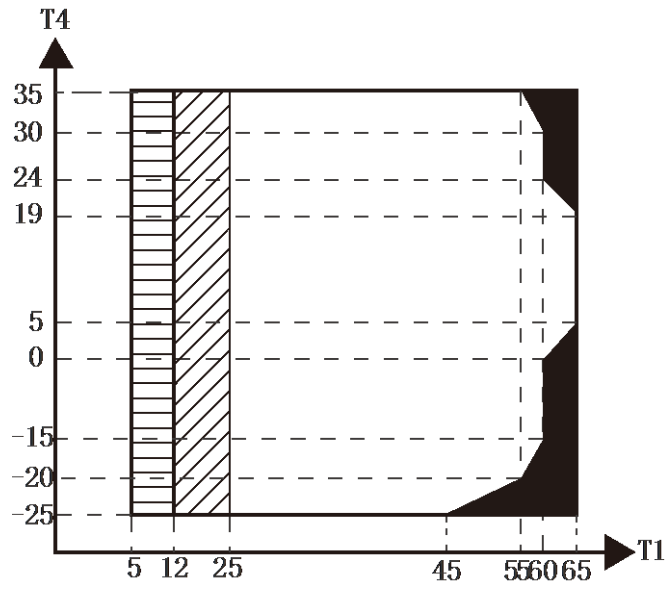


Figure 2-6.1: Heating operating limits¹

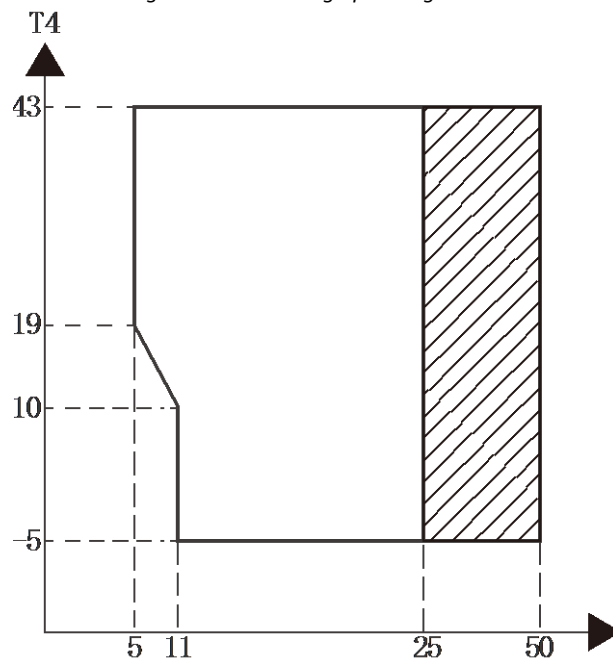


Figure 2-6.2: Cooling operating limits

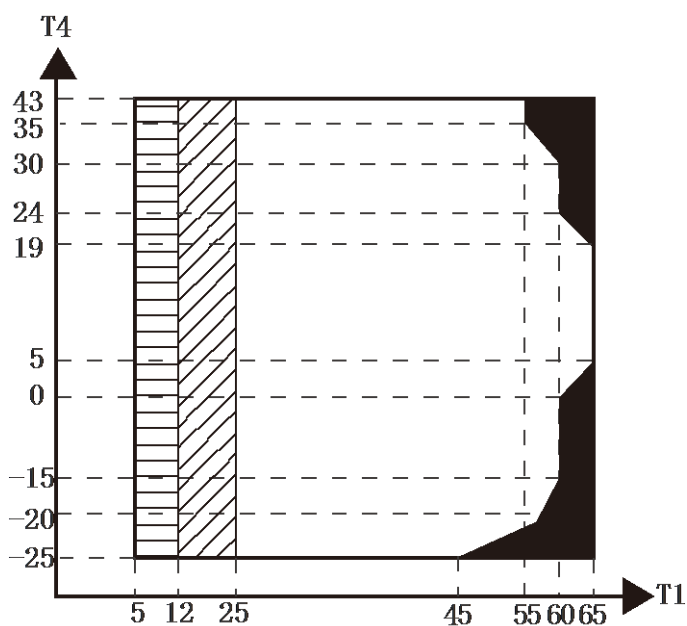


Figure 2-6.3: Domestic hot water operating limits¹

Abbreviations:

- T4: Outdoor temperature(°C)
- T1: Leaving water temperature (°C)
- IBH: Backup electric heater
- AHS: Additional heat source

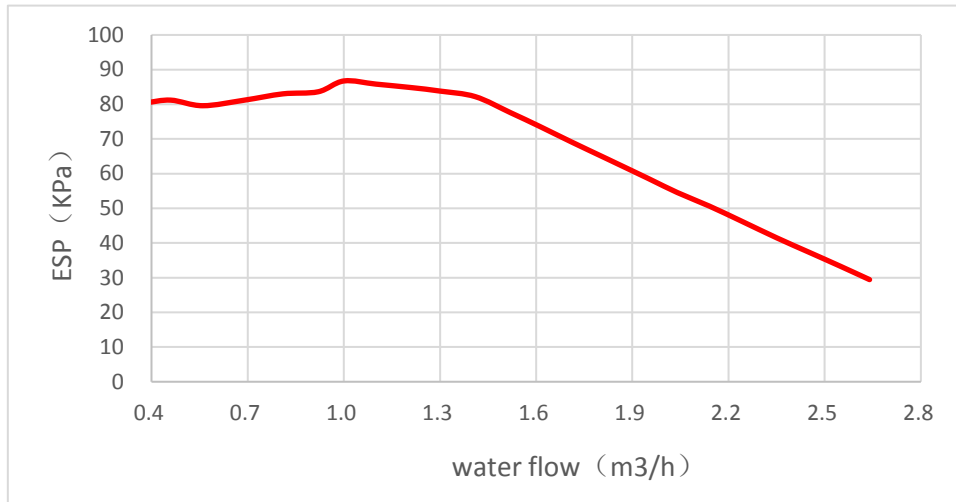
Notes:

1. IBH/AHS only
2. Water flow temperature drops or rises interval
3. If IBH/AHS setting is valid, only IBH/AHS turns on; If IBH/AHS setting is invalid, only heat pump turns on

7 Hydronic Performance

MHC-V4W/D2N8-B / MHC-V6W/D2N8-B / MHC-V8W/D2N8-B/ MHC-V10W/D2N8-B

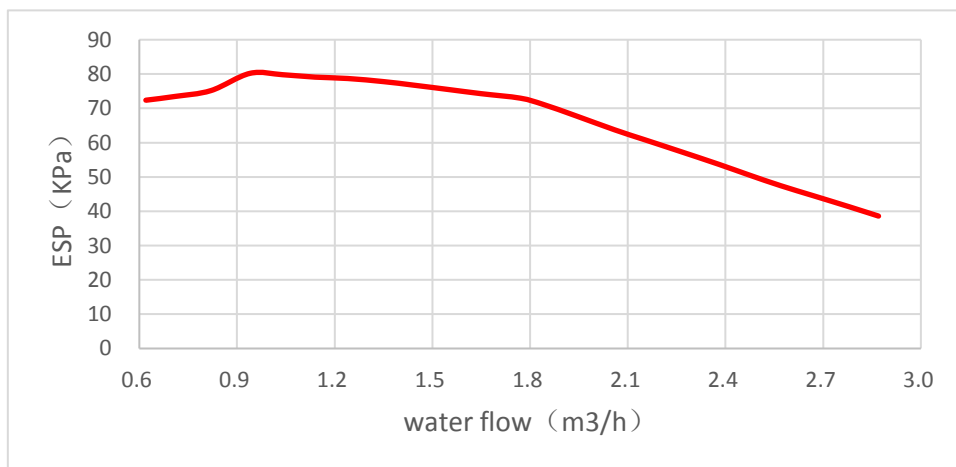
Figure 2-7.1: MHC-V4(6, 8, 10)W/D2N8-B hydronic performance¹



Abbreviations:
ESP: External static pressure

MHC-V12W/D2N8-B / MHC-V14W/D2N8-B / MHC-V16W/D2N8-B
MHC-V12W/D2RN8-B / MHC-V14W/D2RN8-B / MHC-V16W/D2RN8-B

Figure 2-7.2: MHC-V12(14,16)W/D2(R)N8 hydronic performance¹



Abbreviations:
ESP: External static pressure

8 Sound Levels

8.1 Overall

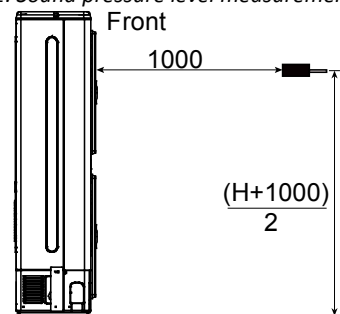
Table 2-8.1: Sound pressure levels¹

Model name	dB ²
MHC-V4W/D2N8-B	45.0
MHC-V6W/D2N8-B	47.5
MHC-V8W/D2N8-B	48.5
MHC-V10W/D2N8-B	50.5
MHC-V12W/D2N8-B	53.0
MHC-V14W/D2N8-B	53.5
MHC-V16W/D2N8-B	57.5
MHC-V12W/D2RN8-B	53.5
MHC-V14W/D2RN8-B	54.0
MHC-V16W/D2RN8-B	58.0

Notes:

1. Sound pressure level is measured at a position 1m in front of the unit and $(1+H)/2$ m (where H is the height of the unit) above the floor in a semi-anechoic chamber. During in-situ operation, sound pressure levels may be higher as a result of ambient noise.

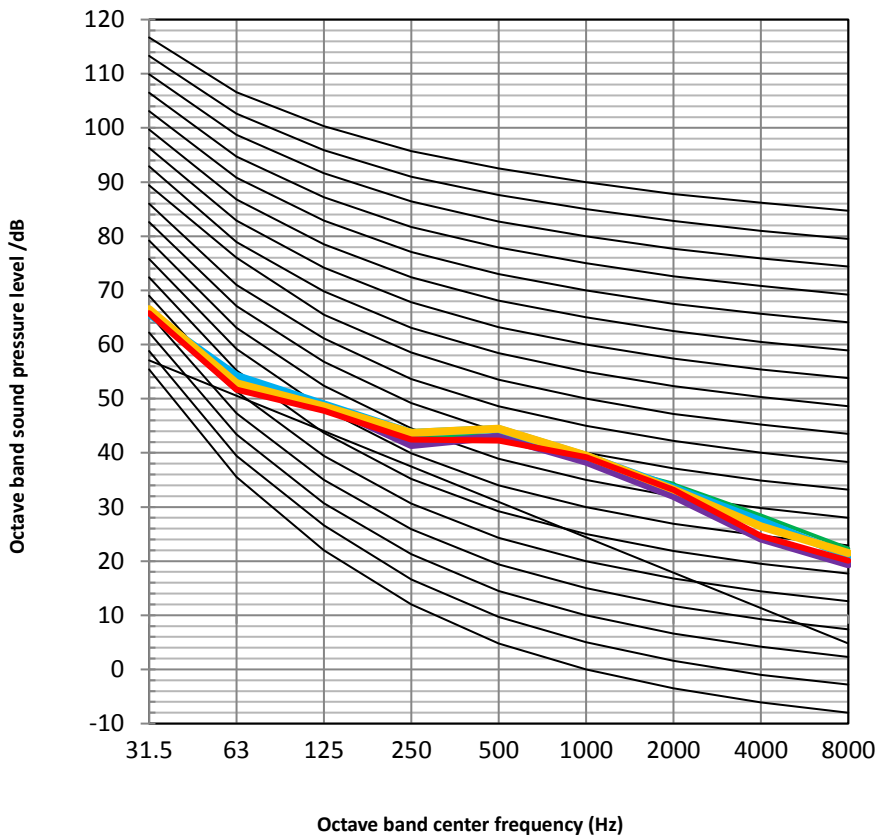
Figure 2-8.1: Sound pressure level measurement (unit: mm)



2. dB is the maximum value tested under the conditions below:
 Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C. Free compressor frequency.
 Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C. Free compressor frequency.

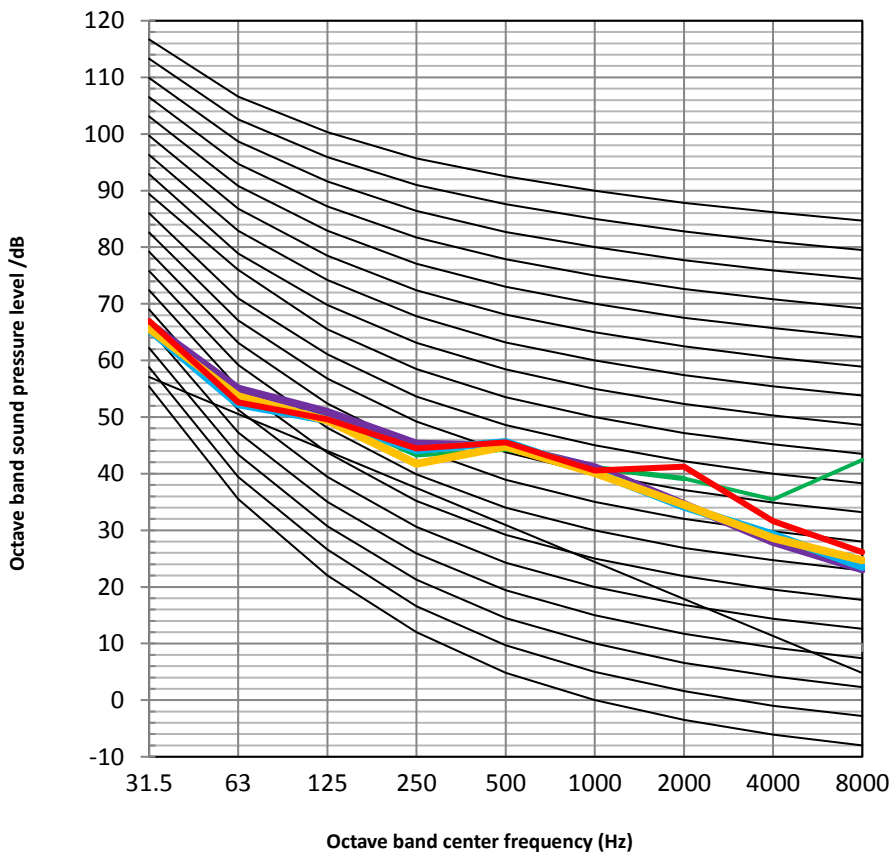
8.2 Octave Band Levels

Figure 2-8.2: MHC-V4W/D2N8-B octave band levels



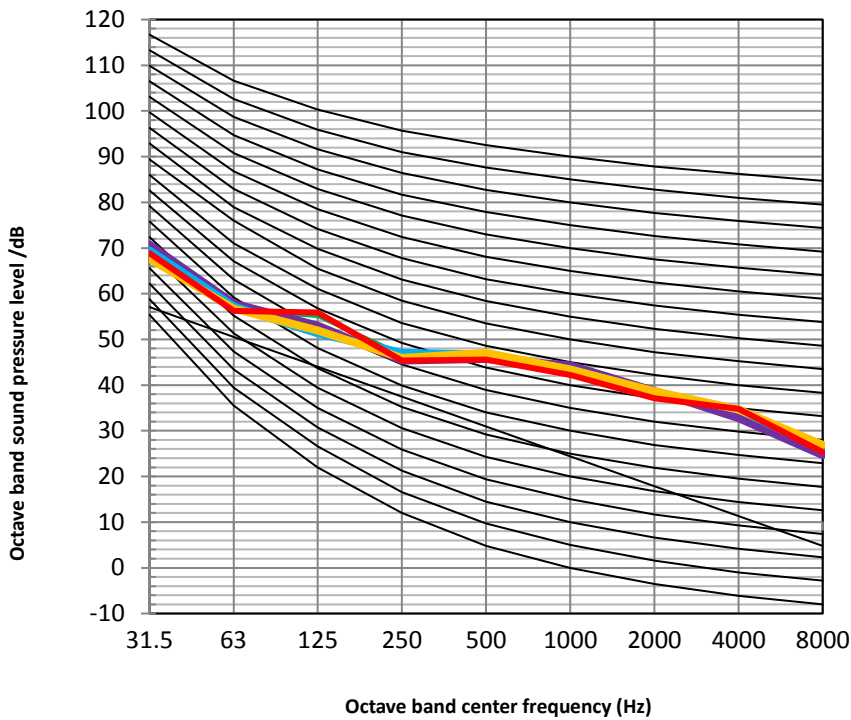
- Cooling in rated frequency
Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C
- Cooling in rated frequency
Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C
- Heating in rated frequency
Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C.
- Heating in rated frequency
Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C.
- Heating in rated frequency
Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.

Figure 2-8.3: MHC-V6W/D2N8-B octave band levels



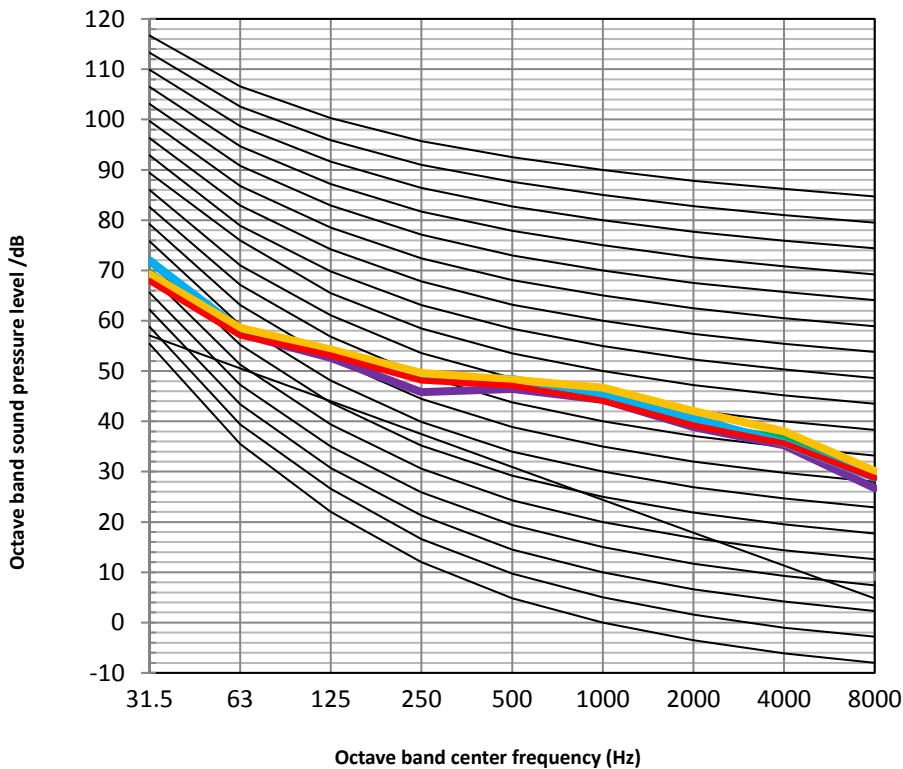
- Cooling in rated frequency
Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C
- Cooling in rated frequency
Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C
- Heating in rated frequency
Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C.
- Heating in rated frequency
Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C.
- Heating in rated frequency
Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.

Figure 2-8.4: MHC-V8W/D2N8-B octave band levels



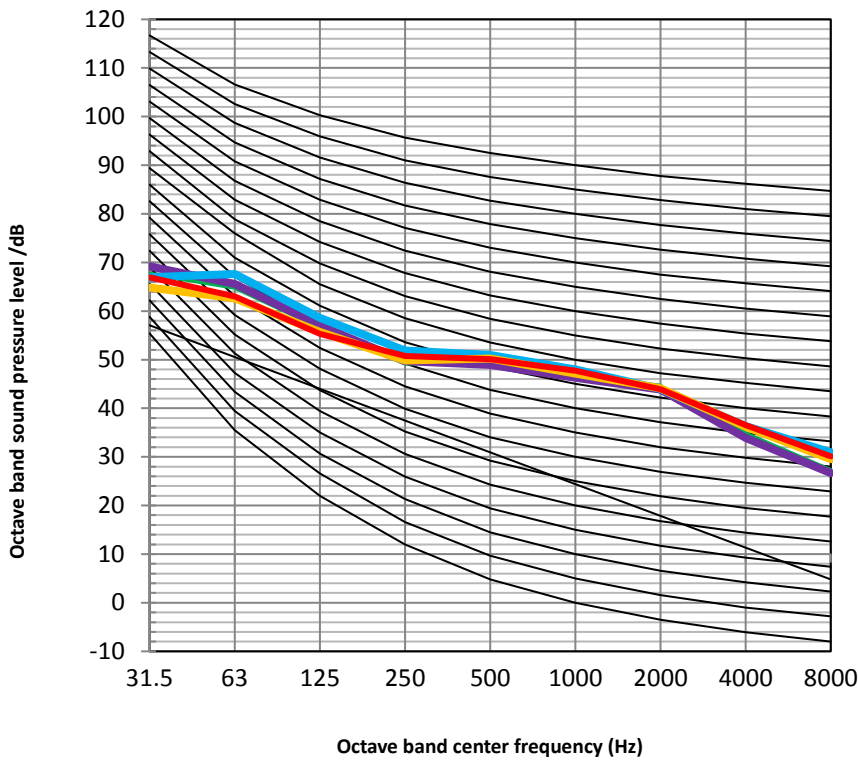
- Cooling in rated frequency
Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C
- NR-90 Cooling in rated frequency
- NR-80 Cooling in rated frequency
Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C
- NR-70
- NR-60 Heating in rated frequency
- NR-50 Heating in rated frequency
- NR-40 Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C.
- NR-30
- NR-20 Heating in rated frequency
- NR-10 Heating in rated frequency
Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C.
- NR-0 Heating in rated frequency
Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.

Figure 2-8.5: MHC-V10W/D2N8-B octave band levels



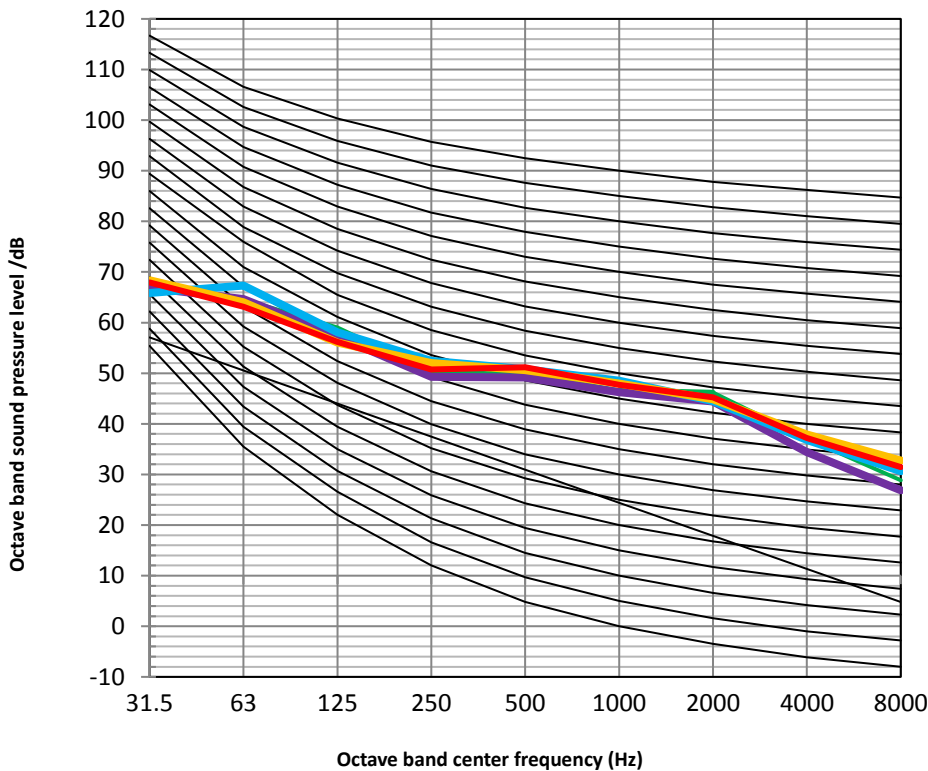
- Cooling in rated frequency
Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C
- NR-90 Cooling in rated frequency
- NR-80 Cooling in rated frequency
Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C
- NR-70
- NR-60 Heating in rated frequency
- NR-50 Heating in rated frequency
- NR-40 Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C.
- NR-30
- NR-20 Heating in rated frequency
- NR-10 Heating in rated frequency
Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C.
- NR-0 Heating in rated frequency
Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.

Figure 2-8.6: MHC-V12W/D2N8-B octave band levels



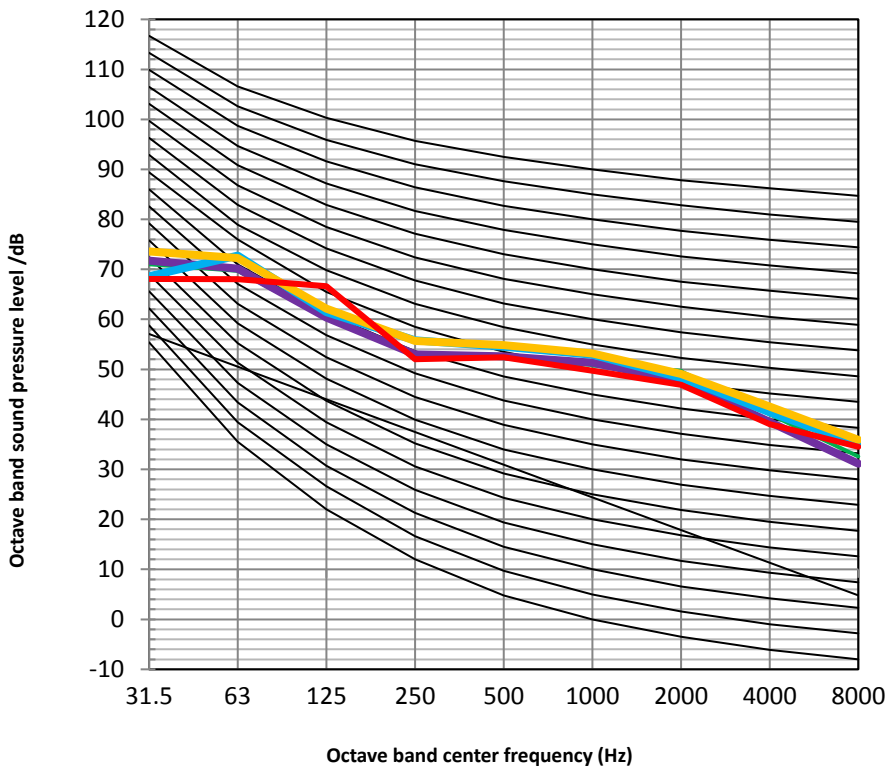
- Cooling in rated frequency
 Outdoor air temperature 35°C DB;
 EWT 12°C, LWT 7°C
- NR-90 — Cooling in rated frequency
- NR-80 — Outdoor air temperature 35°C DB;
- NR-70 — EWT 23°C, LWT 18°C
- NR-60 — Heating in rated frequency
- NR-50 — Outdoor air temperature 7°C DB,
- NR-40 — 85% R.H.; EWT 30°C, LWT 35°C.
- NR-30 — Heating in rated frequency
- NR-20 — Outdoor air temperature 7°C DB,
- NR-10 — 85% R.H.; EWT 40°C, LWT 45°C.
- NR-0 — Heating in rated frequency
- Outdoor air temperature 7°C DB,
 85% R.H.; EWT 47°C, LWT 55°C.

Figure 2-8.7: MHC-V14W/D2N8-B octave band levels



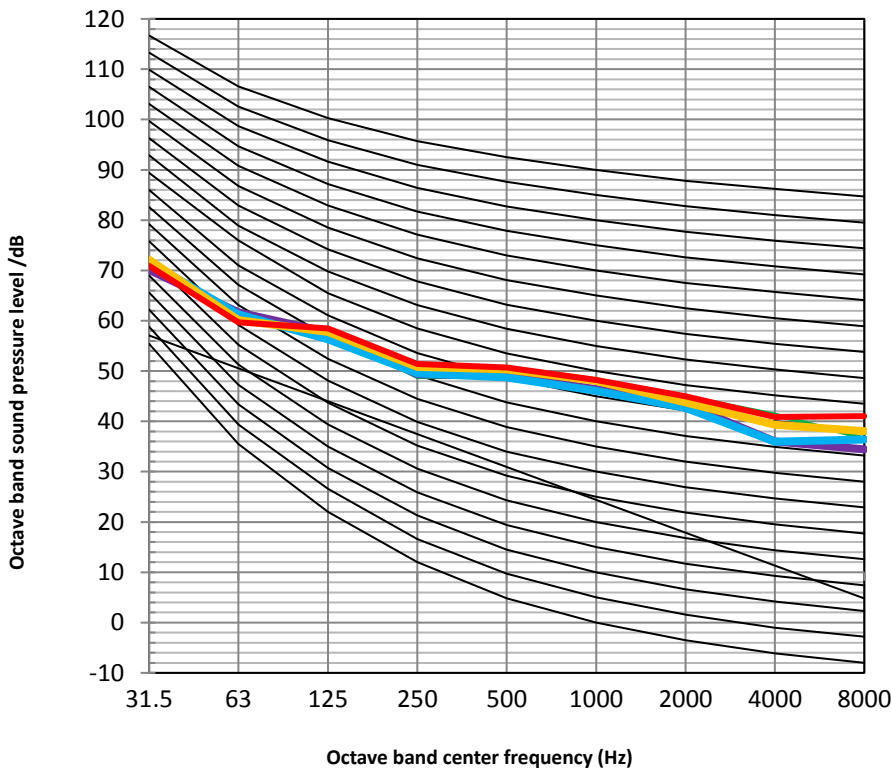
- Cooling in rated frequency
 Outdoor air temperature 35°C DB;
 EWT 12°C, LWT 7°C
- NR-90 — Cooling in rated frequency
- NR-80 — Outdoor air temperature 35°C DB;
- NR-70 — EWT 23°C, LWT 18°C
- NR-60 — Heating in rated frequency
- NR-50 — Outdoor air temperature 7°C DB,
- NR-40 — 85% R.H.; EWT 30°C, LWT 35°C.
- NR-30 — Heating in rated frequency
- NR-20 — Outdoor air temperature 7°C DB,
- NR-10 — 85% R.H.; EWT 40°C, LWT 45°C.
- NR-0 — Heating in rated frequency
- Outdoor air temperature 7°C DB,
 85% R.H.; EWT 47°C, LWT 55°C.

Figure 2-8.8: MHC-V16W/D2N8-B octave band levels



- Cooling in rated frequency
Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C
- NR-90 Cooling in rated frequency
- NR-80 Cooling in rated frequency
- NR-70 Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C
- NR-60 Heating in rated frequency
- NR-50 Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C.
- NR-30 Heating in rated frequency
- NR-20 Heating in rated frequency
- NR-10 Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C.
- NR-0 Heating in rated frequency
- Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.

Figure 2-8.9: MHC-V12W/D2RN8-B octave band levels



- Cooling in rated frequency
- Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C
- NR-90 Cooling in rated frequency
- NR-80 Cooling in rated frequency
- NR-70 Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C
- NR-60 Heating in rated frequency
- NR-50 Heating in rated frequency
- NR-40 Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C.
- NR-30 Heating in rated frequency
- NR-20 Heating in rated frequency
- NR-10 Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C.
- NR-0 Heating in rated frequency
- Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.

Figure 2-8.10: MHC-V14W/D2RN8-B octave band levels

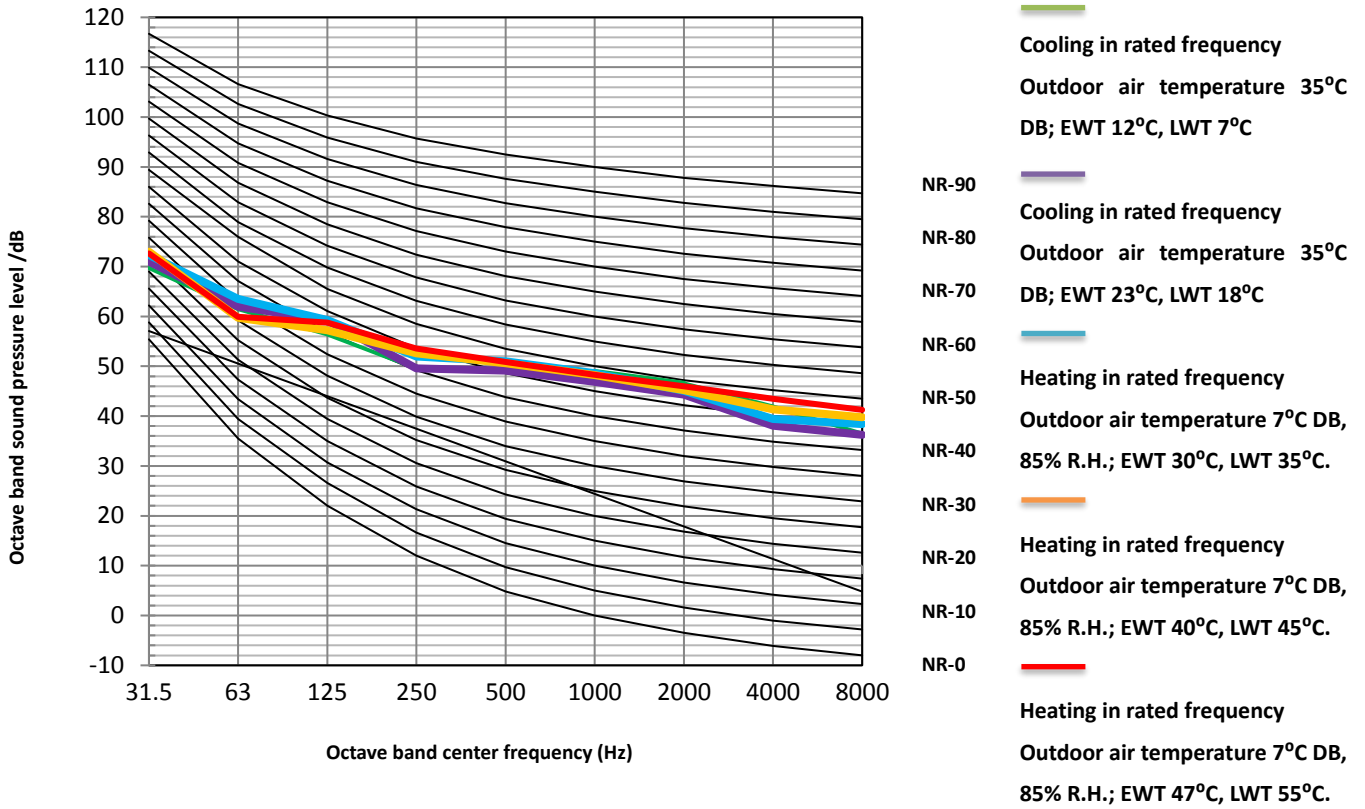
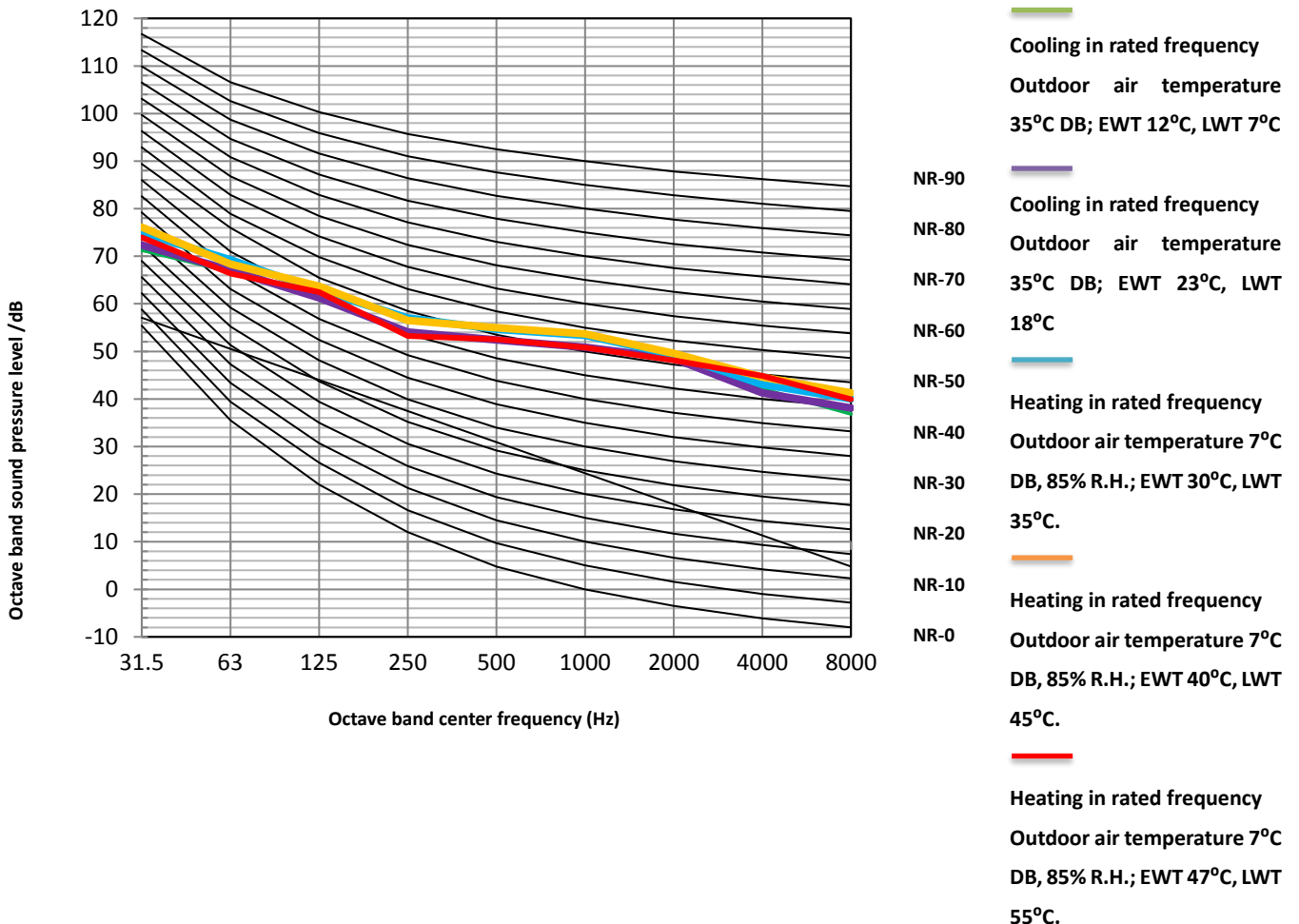


Figure 2-8.9: MHC-V12W/D2RN8-B octave band levels



9 Accessories

9.1 Standard accessories

Table 2-9.1: Standard accessories

Name	Shape	Quantity	
		MHC-V4W/D2N8-B MHC-V6W/D2N8-B MHC-V8W/D2N8-B MHC-V10W/D2N8-B	MHC-V12W/D2N8-B MHC-V14W/D2N8-B MHC-V16W/D2N8-B MHC-V12W/D2RN8-B MHC-V14W/D2RN8-B MHC-V16W/D2RN8-B
Outdoor unit installation and owner's manual		1	1
User interface owner's manual		1	1
Technical data manual		1	1
Y-shaped filter		1	1
Water outlet connection pipe assembly		2	1
Wired controller		1	1
Tighten belt for customer wiring use		0	2
		3	3
Thermistor for domestic hot water tank or additional heating source		1	1
Extension wire for T5		1	0

Part 3

Installation and Field Settings

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1 Preface to Part 3

1.1 Notes for Installers Boxes

The information contained in this Engineering Data Book may primarily be of use during the system design stage of a Midea M thermal Mono project. Additional important information which may primarily be of use during field installation has been placed in boxes, such as the example below, titled “Notes for installers”.

Notes for installers



- Notes for installers boxes contain important information which may primarily be of use during field installation, rather than during desk-based system design.

1.2 Definitions

In this Engineering Data Book, the term “applicable legislation” refers to all national, local and other laws, standards, codes, rules, regulations and other legislation that apply in a given situation.

1.3 Precautions

All system installation including installation of water piping and electrical works must only be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation.

2 Installation

2.1 Acceptance and Unpacking

Notes for installers



- When units are delivered check whether any damage occurred during shipment. If there is damage to the surface or outside of a unit, submit a written report to the shipping company.
- Check that the model, specifications and quantity of the units delivered are as ordered.
- Check that all accessories ordered have been included. Retain the Owner's Manual for future reference.

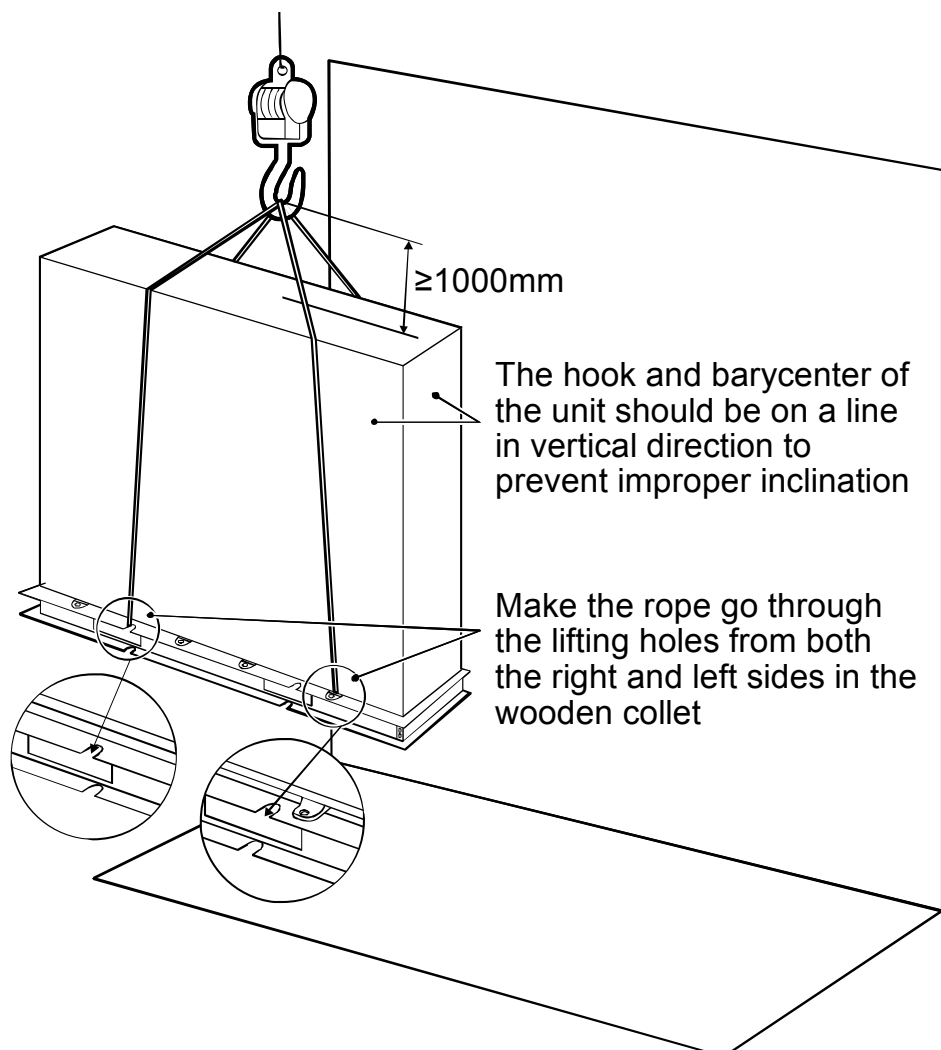
2.2 Hoisting

Notes for installers



- Do not remove any packaging before hoisting. If units are not packaged or if the packaging is damaged, use suitable boards or packing material to protect the units.
- Hoist one unit at a time, using two ropes to ensure stability.
- Keep units upright during hoisting, ensuring that the angle to the vertical does not exceed 30°.

Figure 3-2.1: Hoisting the unit



M thermal Mono

2.3 Placement Considerations

Placement of the outdoor unit should take account of the following considerations:

- Outdoor units should not be exposed to direct radiation from a high-temperature heat source.
- Outdoor units should not be installed in positions where dust or dirt may affect heat exchangers.
- Outdoor units should not be installed in locations where exposure to oil or to corrosive or harmful gases, such as acidic or alkaline gases, may occur.
- Outdoor units should not be installed in locations where exposure to salinity may occur.
- Outdoor units should be installed in well-drained, well-ventilated positions.
- Outdoor units should be installed in positions that are as close as possible to the heat emitters.
- Outdoor units should be installed in positions that are sufficiently close to the desired position of the wired controller that the controller's wiring length limitation will not be exceeded.
- In systems that are configured to heat domestic hot water and/or include an external backup electric heater, outdoor units should be installed in positions that are sufficiently close to the domestic hot water tank and/or backup electric heater that the temperature sensor wiring length limitations will not be exceeded.
- Outdoor units should be installed in locations where the noise from the unit will not disturb neighbors.

2.4 Strong Wind Installation

Wind of 5m/s or more blowing against an outdoor unit's air outlet blocks the flow of air through the unit, leading to deterioration in unit capacity, accelerated frost accumulation when in heating mode or domestic hot water mode, and potential disruption to operation due to increased pressure in the refrigerant circuit. Exposure to very strong wind can also cause the fan to rotate excessively fast, potentially leading to damage to the fan. In locations where exposure to high winds may occur should take account of the following considerations:

- For installation of the outdoor unit in a place where the wind direction can be foreseen, refer to Figure 3-2.3 and Table 3-2.1 for installation of the unit. Set the outlet side at a right angle to the direction of the wind, refer to Figure 3-2.2.
- If turn the air outlet side toward the building's wall, fence or screen. Make sure there is enough room to do the installation

Figure 3-2.2: Strong wind installation direction

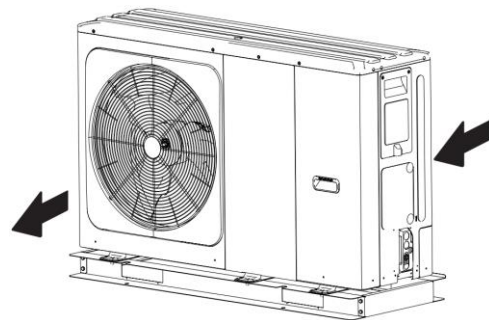


Figure 3-2.3: Installation room illustration

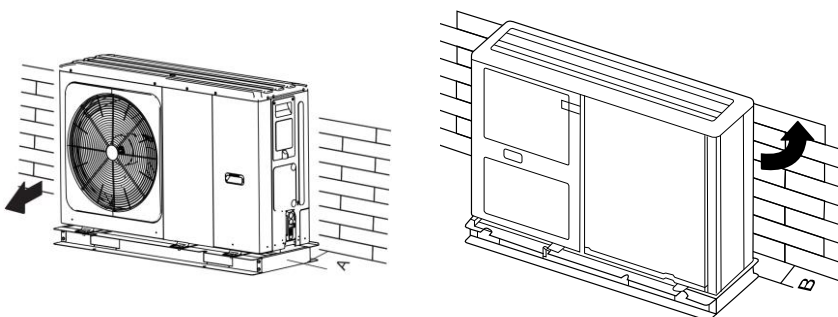


Table 3-2.1: Installation room requirement (Unit: mm)

Model	A(mm)
4-6KW	≥ 300
8-16KW	≥ 300

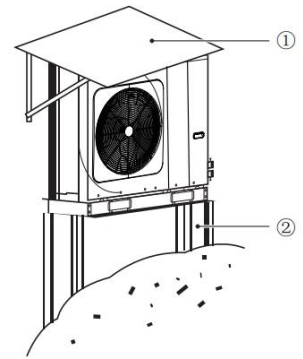
Model	B(mm)
4-6KW	≥ 1000
8-16KW	≥ 1500

2.5 Cold Climate Installation

In cold climate locations installation should take account of the following considerations:

- Never install the unit at a site where the suction side may be exposed directly to wind.
- To prevent exposure to wind, install a baffle plate on the air discharge side of the unit.
- To prevent exposure to wind, install the unit with its suction side facing the wall.
- In areas of heavy snowfall, a canopy should be installed to prevent snow entering the unit. Additionally, the height of the base structure should be increased so as to raise the unit further off the ground. Refer to Figure 3-2.4.

Figure 3-2.4: Snow shielding



2.6 Hot Climate Installation

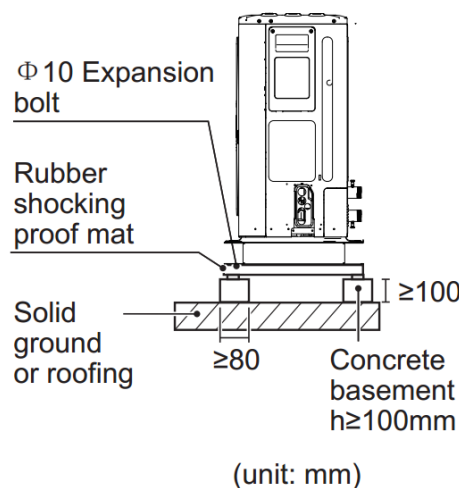
As the outdoor temperature is measured via the outdoor ambient temperature sensor, make sure to install the outdoor unit in the shade, or a canopy should be constructed to avoid direct sunlight. So that it is not influenced by the sun's heat, otherwise system protection may occur.

2.7 Base Structure

Outdoor unit base structure design should take account of the following considerations:

- A solid base prevents excess vibration and noise. Outdoor unit bases should be constructed on solid ground or on structures of sufficient strength to support the unit's weight.
- Bases should be at least 100mm high to provide sufficient drainage and to prevent water ingress into the base of the unit.
- Either steel or concrete bases may be suitable.
- Outdoor units should not be installed on supporting structures that could be damaged by water build-in in the event of a blocked drain.
- Fix the unit securely to foundation by means of the $\Phi 10$ expansion bolt. It is best to screw in the foundation bolts until their length is 20 mm from the foundation surface.

Figure 3-2.5: Outdoor unit typical concrete base structure design (unit: mm)



M thermal Mono

2.8 Drainage

Drainage ditch should be provided to allow drainage of condensate that may form on the air side heat exchanger when the unit is running in heating mode or domestic hot water mode. The drainage should ensure that condensate is directed away from roadways and footpaths, especially in locations where the climate is such that condensate may freeze.

Figure 3-2.6: 4/6kW models drainage hole

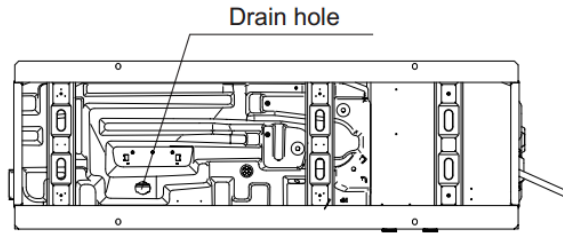
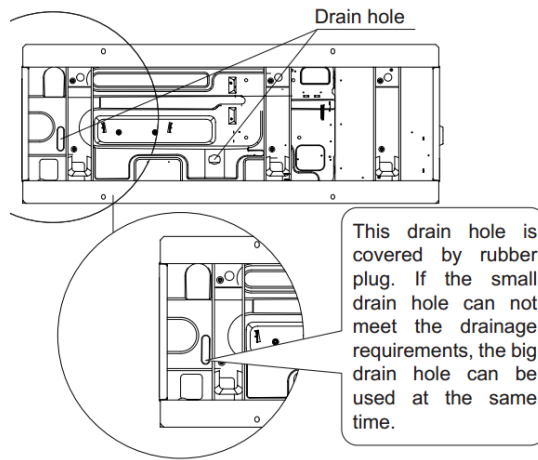


Figure 3-2.7: 8/10/12/14/16kW models drainage hole



2.9 Spacing

1.1.1 Stacked installation

Outdoor units must be spaced such that sufficient air may flow through each unit. Sufficient airflow across heat exchangers is essential for outdoor units to function properly. Figures 3-2.8 and 3-2.9 show the minimum spaces that must be allowed between units and the minimum distances from obstacles in front of and behind units.

Figure 3-2.8: Installation with obstacles in front of the unit

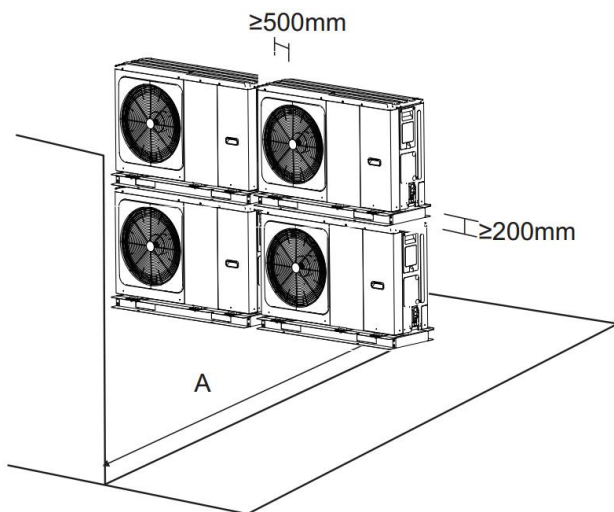
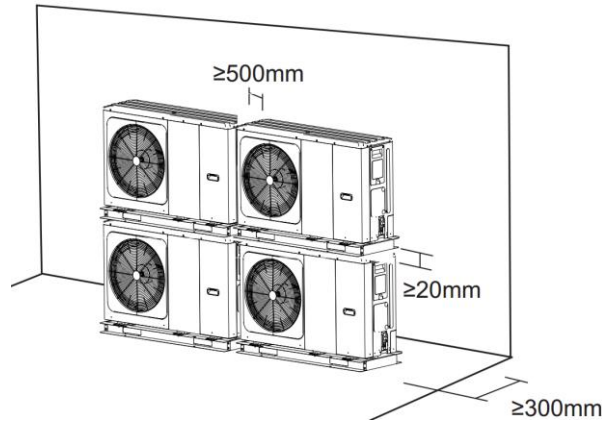


Table 3-2.2: Minimum spacing from obstacles in front of the unit

Model	A(mm)
4-6KW	≥1000
8-16KW	≥1500

Figure 3-2.9: Installation with obstacles behind the unit



1.1.2 Installation in Rows

Figure 3-2.10: Single row installation

Table 3-2.3: Single row installation spacing requirements

Model	A(mm)	B1(mm)	B2(mm)	C(mm)
4-6KW	≥1500	≥500	≥150	≥300
8-16KW	≥2000	≥1000	≥150	≥300

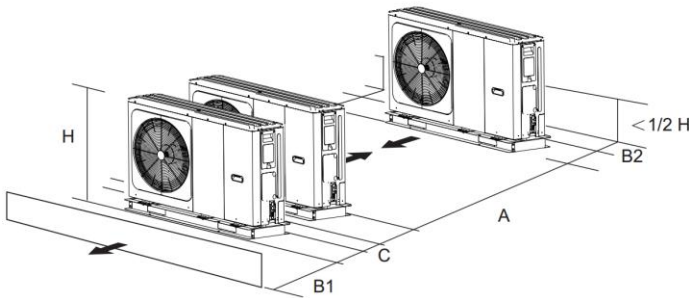


Figure 3-2.11: Multi-row installation

Table 3-2.4: Multiple row installation spacing requirements

Model	A(mm)	B1(mm)	B2(mm)	C(mm)
4-6KW	≥2500	≥1000	≥300	≥600
8-16KW	≥3000	≥1500	≥300	≥600

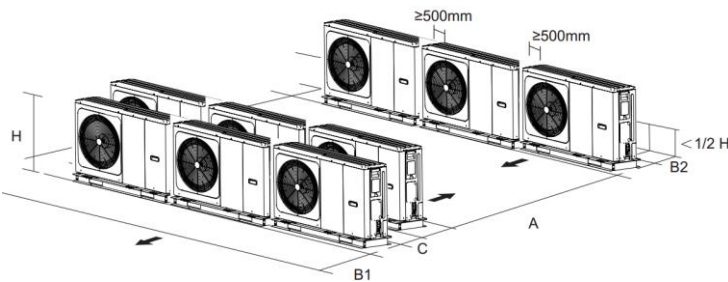
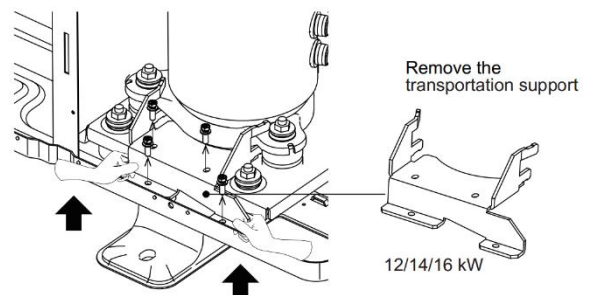


Figure 3-2.12: Remove the transportation support

2.10 Transportation support

For 12/14/16kW model, there is a transportation support which is used to protect tubes from breaking during transportation and this support should be taken off before turning on the heat pump.



3 Water Pipework

3.1 Water Circuit Checks

M thermal Mono units are equipped with a water inlet and outlet for connection to a water circuit. M thermal Mono units should only be connected to closed water circuits. Connection to an open water circuit would lead to excessive corrosion of the water piping. Only materials complying with all applicable legislation should be used.

Before continuing installation of the unit, check the following:

- The maximum water pressure ≤ 3 bar.
- The maximum water temperature $\leq 70^{\circ}\text{C}$ according to safety device setting.
- Always use materials that are compatible with the water used in the system and with the materials used in the unit.
- Ensure that components installed in the field piping can withstand the water pressure and temperature.
- Drain taps must be provided at all low points of the system to permit complete drainage of the circuit during maintenance.
- Air vents must be provided at all high points of the system. The vents should be located at points that are easily accessible for service. An automatic air purge is provided inside the unit. Check that this air purge valve is not tightened so that automatic release of air in the water circuit is possible.

3.2 Water Volume and Expansion Vessel Pre-pressure Checks

Outdoor units are equipped with an expansion vessel (8L) that has a default pre-pressure of 1.5 bar. To assure proper operation of the unit, the pre-pressure of the expansion vessel might need to be adjusted. Refer to Table 3-3.1. The total volume of water in the system must be at least 25L (for 4/6/8kW unit, the minimum volume is 15L) and should not exceed the limits specified in Figure 3-3.1.

Table 3-3.1: Expansion vessel pre-pressure adjustment

Installation height difference ¹	Water volume $\leq X L^2$	Water volume $> X L^2$
≤ 12 m	No pre-pressure adjustment required	Actions required: <ul style="list-style-type: none"> • Pre-pressure must be decreased, calculate according to "Calculating the pre-pressure of the expansion vessel"³ • Check if the water volume is lower than maximum allowed water volume (refer to Figure 3-3.1)
> 12 m	Actions required: <ul style="list-style-type: none"> • Pre-pressure must be increased, calculate according to "Calculating the pre-pressure of the expansion vessel"² • Check if the water volume is lower than maximum allowed water volume (refer to Figure 3-3.1) 	Expansion vessel in the outdoor unit too small for the system. An external expansion vessel (field supplied) is required.

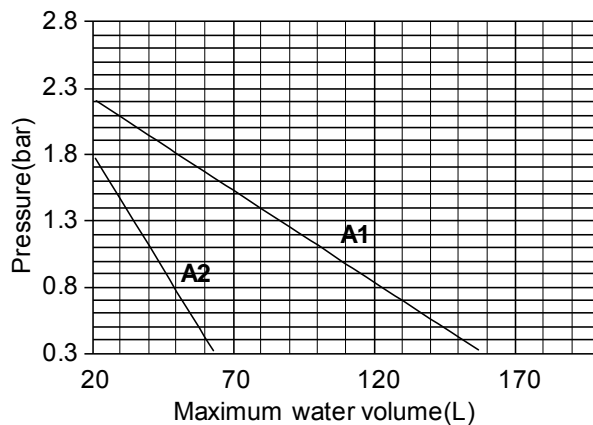
Notes:

1. Height difference is between the highest point of the water circuit and the outdoor unit's expansion tank. Unless the unit is located at the highest point of the system, in which case the installation height difference is considered to be zero.
2. For 1-phase 12~16kW and 3-phase 12~16kW units, this value is 72L, for 5~9kW units, this value is 30 L.
3. Calculating the pre-pressure of the expansion vessel:
The pre-pressure (Pg) to be set depends on the maximum installation height difference (H) and is calculated as $P_g(\text{bar}) = (H(\text{m})/10 + 0.3)$ bar

To determine the maximum allowed water volume in the entire circuit, proceed as follows:

- Determine the calculated pre-pressure (Pg) for the corresponding maximum water volume using the Figure 3-3.1.

Figure 3-3.1: Maximum water volume



A1: System without glycol for 1-phase 10~16kW and 3-phase 12~16kW unit

A2: System without glycol for the 4/6/8kW unit

- Check that the total water volume in the entire water circuit is lower than this value. If this is not the case, the expansion vessel inside the unit is too small for the installation.

Example

The unit(16kW) is installed at the highest point in the water circuit. The total water volume in the water circuit is 150L.

Since 150L is more than 72L, the pre-pressure must be decreased, refer to Table 3-3:1.

- The required pre-pressure is: $P_g(\text{bar}) = (H(\text{m})/10+0.3) \text{ bar} = (0/10+0.3) \text{ bar} = 0.3 \text{ bar}$
- The corresponding maximum water volume can be read from the Figure 3-1.7 is approximately 160L
- Since the total water volume (150L) is below the maximum water volume (160L), the expansion vessel suffices for the installation.

When it is required to change the default pre-pressure of the expansion vessel (1.5 bars), following guidelines:

- Use only dry nitrogen to set the expansion vessel pre-pressure.
- Inappropriate setting of the expansion vessel pre-pressure will lead to malfunctioning of the system. Pre-pressure should only be adjusted by a licensed installer.

If the expansion vessel of unit is too small for the installation, an additional expansion vessel is needed.

- Calculate the pre-pressure of the expansion vessel: $P_g(\text{bar}) = (H(\text{m})/10+0.3) \text{ bar}$
The expansion vessel equipped in the unit should adjust the pre-pressure also.
- Calculate the volume needed of the additional expansion vessel: $V_1=0.0693 \cdot V_{\text{water}}/(2.5-P_g)-V_0$
 V_{water} : the volume of water in the system
 V_0 : the volume of expansion vessel which the unit is equipped (For 5~9kW, $V_0=2\text{L}$; For 10~16kW, $V_0=5\text{L}$)

3.3 Water Circuit Connection

Water connections must be made correctly in accordance with the labels on the outdoor unit, with respect to the water inlet and water outlet. If air, moisture or dust gets in the water circuit, problems may occur. Therefore, always take into account the following when connecting the water circuit:

- Use clean pipes only.
- Hold the pipe end downwards when removing burrs
- Cover the pipe end when inserting it through a wall to prevent dust and dirt entering.
- Use a good thread sealant for sealing the connections. The sealing must be able to withstand the pressures and temperatures of the system.

- When using non-copper metallic piping, be sure to insulate the two kind of materials from each other to prevent galvanic corrosion.
- For copper is a soft material, use appropriate tools for connecting the water circuit. Inappropriate tools will cause damage to the pipes

3.4 Water Circuit Anti-freeze Protection

Ice formation can cause damage to the hydronic system. As the outdoor unit may be exposed to sub-zero temperatures, care must be taken to prevent freezing of the system. All internal hydronic parts are insulated to reduce heat loss. Insulation must also be added to the field piping.

- The software contains special functions using the heat pump to protect the entire system against freezing. When the temperature of the water flow in the system drops to a certain value, the unit will heat the water, either using the heat pump, the electric heating tap, or the backup heater. The freeze protection function will turn off only when the temperature increases to a certain value.
- In event of a power failure, the above features would not protect the unit from freezing. Since a power failure could happen when the unit is unattended, the supplier recommends use anti-freeze fluid to the water system.
- Depending on the expected lowest outdoor temperature, make sure the water system is filled with a concentration of glycol as mentioned in the table below. When glycol is added to the system, the performance of the unit will be affected. The correction factor of the unit capacity, flow rate and pressure drop of the system is listed in the table 3-3.2 and 3-3.3.

Table 3-3.2: Ethylene Glycol

Concentration of ethylene glycol (%)	Modification coefficient				Freezing point (°C)
	Cooling capacity	Power input	Water resistance	Water flow	
0	1.000	1.000	1.000	1.000	0
10	0.984	0.998	1.118	1.019	-4
20	0.973	0.995	1.268	1.051	-9
30	0.965	0.992	1.482	1.092	-16
40	0.960	0.989	1.791	1.145	-23
50	0.950	0.983	2.100	1.200	-37

Table 3-3.3: Propylene Glycol

Concentration of propylene glycol (%)	Modification coefficient				Freezing point (°C)
	Cooling capacity	Power input	Water resistance	Water flow	
0	1.000	1.000	1.000	1.000	0
10	0.976	0.996	1.071	1.000	-3
20	0.961	0.992	1.189	1.016	-7
30	0.948	0.988	1.380	1.034	-13
40	0.938	0.984	1.728	1.078	-22
50	0.925	0.975	2.150	1.125	-35

Uninhibited glycol will turn acidic under the influence of oxygen. This process is accelerated by presence of copper and at higher temperatures. The acidic uninhibited glycol attacks metal surfaces and forms galvanic corrosion cells that cause severe damage to the system. It is of extreme importance:

- That the water treatment is correctly executed by a qualified water specialist.
- That a glycol with corrosion inhibitors is selected to counteract acids formed by the oxidation of glycols.

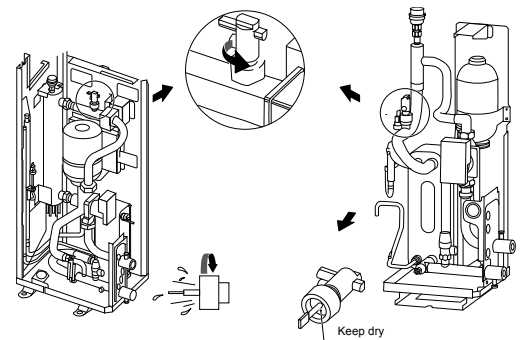
- That in case of an installation with a domestic hot water tank, only the use of propylene glycol is allowed. In other installations the use of ethylene glycol is fine.
- That no automotive glycol is used because their corrosion inhibitors have a limited lifetime and contain silicates that can foul or plug the system;
- That galvanized piping is not used in glycol systems since it may lead to the precipitation of certain elements in the glycol's corrosion inhibitor;
- To ensure that the glycol is compatible with the materials used in the system.

3.5 Water Flow Switch

Water may enter into the flow switch and cannot be drained out and may freeze when the temperature is low enough. The flow switch should be removed and dried, then can be reinstalled in the unit.

- Counterclockwise rotation, remove the water flow switch.
- Drying the water flow switch completely.

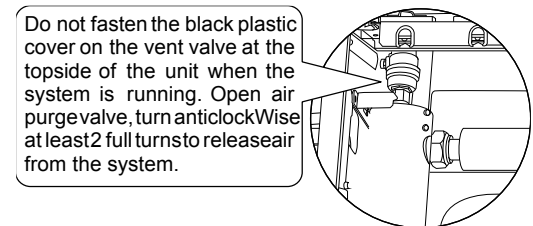
Figure 3-3.2: Water flow switch



3.6 Adding Water

- Connect the water supply to the fill valve and open the valve.
- Make sure the automatic air purge valve is open (at least 2 turns). Refer to Figure 3-3.3.
- Fill with water until the manometer indicates a pressure of approximately 2.0 bars. Remove air in the circuit as much as possible using the air purge valve. Air in the water circuit could lead to malfunction of the backup electric heater.

Figure 3-3.3: Air purge valve



3.7 Water Piping Insulation

The complete water circuit including all piping, water piping must be insulated to prevent condensation during cooling operation and reduction of the heating and cooling capacity as well as prevention of freezing of the outside water piping during winter. The insulation material should at least of B1 fire resistance rating and complies with all applicable legislation. The thickness of the sealing materials must be at least 13mm with thermal conductivity 0.039W/mK in order to prevent freezing on the outside water piping. If the outdoor ambient temperature is higher than 30°C and the humidity is higher than RH 80%, the thickness of the sealing materials should be at least 20mm in order to avoid condensation on the surface of the seal.

4 Electrical Wiring

4.1 General

Notes for installers



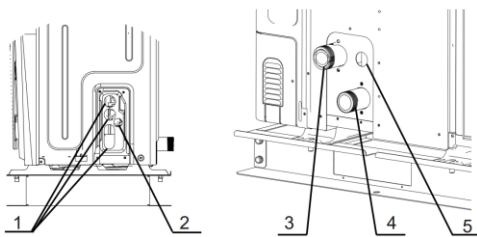
Caution

- All installation and wiring must be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation.
- Electrical systems should be grounded in accordance with all applicable legislation.
- Overcurrent circuit breakers and residual-current circuit breakers (ground fault circuit interrupters) should be used in accordance with all applicable legislation.
- Wiring patterns shown in this data book are general connection guides only and are not intended for, or to include all details for, any specific installation.
- The water piping, power wiring and communication wiring are typically run in parallel. However the communication wiring should not be bound together with power wiring. To prevent signal interference, the power wiring and communication wiring should not be run in the same conduit. If the power supply is less than 10A, a separation of at least 300mm between power wiring and communication wiring conduits should be maintained; if the power supply is in the range 10A to 50A then a separation of at least 500mm should be maintained.

4.2 Precautions

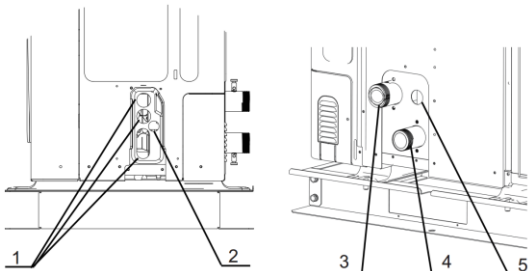
- Fix cables so that cables do not make contact with the pipes (especially on the high pressure side).
- Secure the electrical wiring with cable ties as shown in Figure 3-1.14 and Figure 3-1.15. So that it does not come in contact with the piping, particularly on the high-pressure side.

Figure 3-4.1: Wiring hole for 4/6kW models



Legend	
1	High voltage wire hole
2	Low voltage wire hole
3	Drainage pipe hole
4	Water inlet
5	Water outlet

Figure 3-4.2: Wiring holes for 8~16kW models



Legend	
1	High voltage wire hole
2	Low voltage wire hole
3	Drainage pipe hole
4	Water outlet
5	Water inlet

- Make sure no external pressure is applied to the terminal connectors.
- When installing the ground fault circuit interrupter make sure that it is compatible with the inverter (resistant to high frequency electrical noise) to avoid unnecessary opening of the ground fault circuit interrupter
- This unit is equipped with an inverter. Installing a phase advancing capacitor not only reduce the power factor improvement effect, but also may cause abnormal heating of the capacitor due to high frequency waves. Never install a phase advancing capacitor as it could lead to an accident.

4.3 Guidance

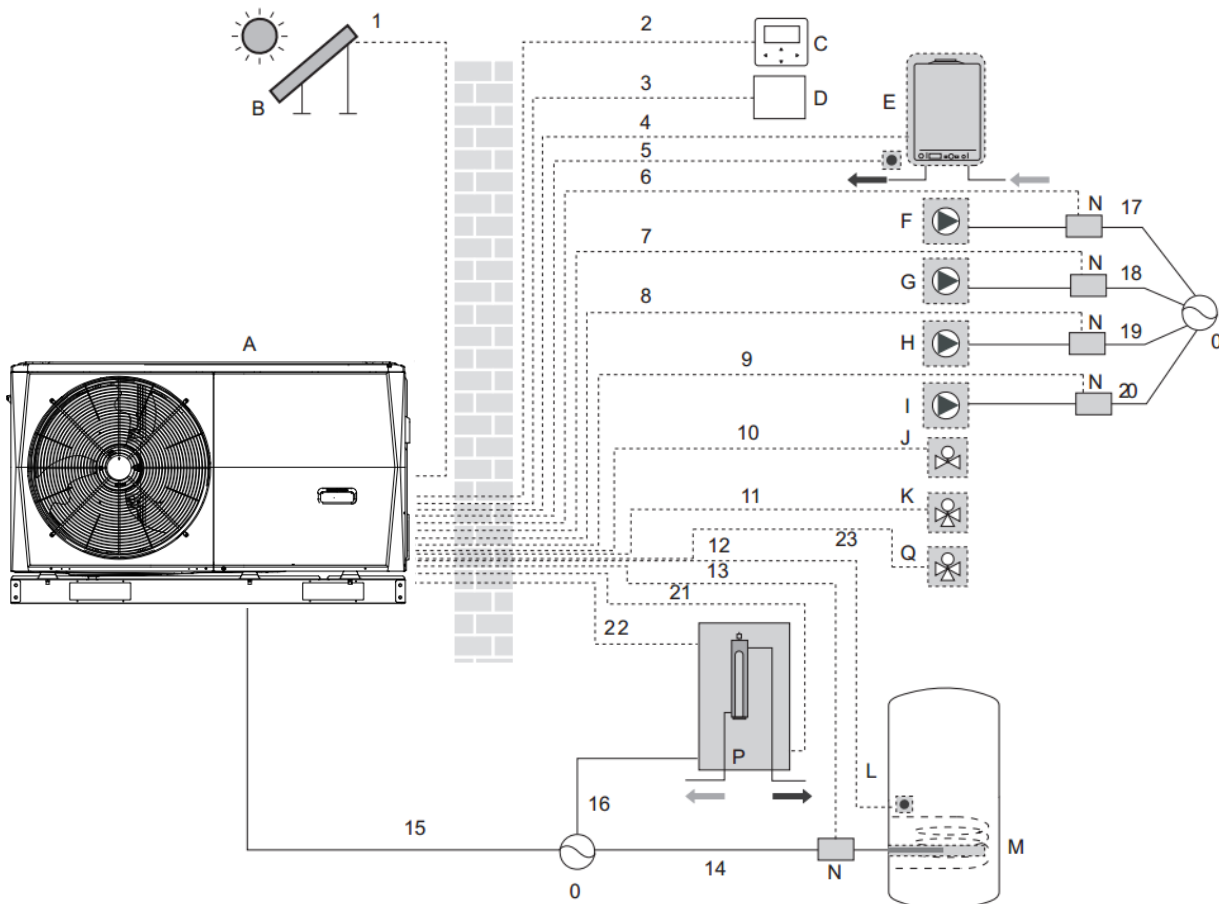
- Most field wiring on the unit is to be made on the terminal block inside the switch box. To gain access to the terminal block, remove the switch box service panel.
- Fix all cables using cable ties.
- A dedicated power circuit is required for the backup electric heater.
- Installation equipped with a domestic hot water tank (field supplied) requires a dedicated power circuit for the immersion heater.

Secure the wiring in the order shown below:

- Lay out the electrical wiring so that the front cover does not rise up when doing wiring work and attach the front cover securely.
- Follow the electric wiring diagrams for electrical wiring works. Refer to Figure 2-4.1, Figure 2-4.2 and Figure 2-4.3 in part 2, 4 “Wiring Diagram”.
- Install the wires and fix the cover firmly so that the cover may be fit in properly.

4.4 Wiring Overview

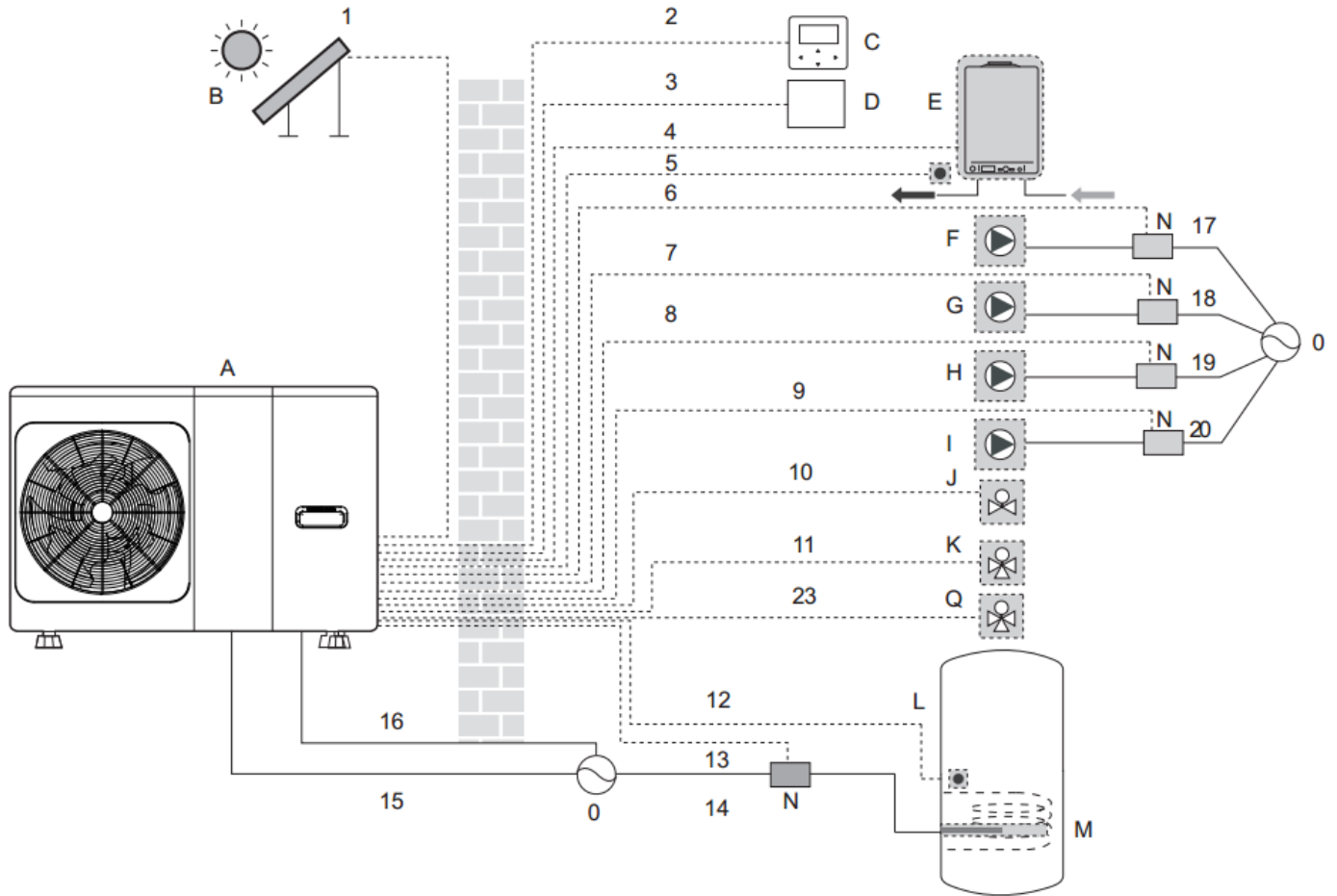
Figure 3-4.3: Wiring overview for 4/6kW models



M thermal Mono



Figure 3-4.4: Wiring overview for 8/10/12/14/16kW models



Item	Description	Item	Description
A	Outdoor unit	J	SV2: 3-way valve (field supply)
B	Solar energy kit (field supply)	K	SV1: 3-way valve for domestic hot water tank (field supply)
C	User interface	L	Domestic hot water tank
D	Room thermostat (field supply)	M	Booster heater
E	Boiler (field supply)	N	Contactator
F	P_s: Solar pump (field supply)	O	Power supply
G	P_c: Mixing pump (field supply)	P	Backup heater
H	P_o: Outside circulation pump (field supply)	Q	Zone2 SV3(3-way valve)
I	P_d: DHW pump (field supply)		

Table 3-4.1: Wiring requirements

Item	Description	AC/DC	Required number of conductors	Maximum running current
1	Solar energy kit signal cable	AC	2	200mA
2	User interface cable	AC	5	200mA
3	Room thermostat cable	AC	2 or 3	200mA(a)
4	Boiler control cable	/	2	200mA
5	Thermistor cable for T1B	DC	2	(b)
9	DHW pump control cable	AC	2	200mA(a)
10	3-way valve control cable	AC	2	200mA(a)
11	3-way valve control cable	AC	2 or 3	200mAC
12	Thermistor cable	DC	2	(b)
13	Booster heater control cable	AC	2	200mA(a)
15	Power supply cable for unit	AC	2+GND(1-Phase) 3+GND(3-Phase)	31A (1-Phase) 15A (3-Phase)
16	Power supply cable for backup heater	AC	2+GND(1-Phase) 3+GND(3-Phase)	14A (1-Phase) 6A (3-Phase)

5 DIP Switch Settings

DIP switches S1 and S2 on the hydronic system main PCB should be used to specify refrigerant piping length and to specify whether certain components have or have not been installed. Refer to Table 3-5.1 and to the M thermal Mono Service Manual, Part 4, 2.2 "Main PCB for Hydronic System".

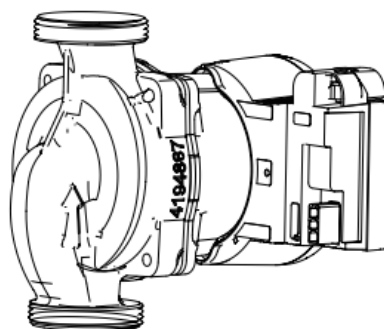
Table 3-5.1: DIP switch settings

Switch		ON=1	OFF=0	Default factory setting
<p>S1</p>	1	Reserved	Reserved	OFF
	2	Reserved	Reserved	OFF
	3/4	00=Without IBH and AHS 10=With IBH 01=With AHS for heating mode 11=With AHS for heating mode heating and DHW		OFF/OFF
<p>S2</p>	1	Start pumpo after six hours will be invalid	Start pumpo after six hours will be valid	OFF
	2	without TBH	with TBH	OFF
	3/4	00=variable speed pump (Max head:8.5m,Grundfos) 01=constant speed pump (WILO) 10= variable speed pump (Max head:10.5m,Grundfos) 11=variable speed pump (Max head:9.0m, WILO)		ON/ON
<p>S4</p>	1	Reserved	Reserved	OFF
	2	Reserved	Reserved	OFF
	3/4	Reserved		OFF/OFF

6 Internal Circulation Pump

The pump is controlled via a digital low-voltage pulse-width modulation signal which means that the speed of rotation depends on the input signal. The speed changes as a function of the input profile. The relationship between external static pressure and water flow rate is described in Part 2, 7 "Hydronic Performance".

Figure 3-6.1: Internal circulation pump



7 User Interface Field Settings

7.1 Introduction

During installation, the M thermal Mono’s settings and parameters should be configured by the installer to suit the installation configuration, climate conditions and end-user preferences. The relevant settings are accessible and programmable through the **FOR SERVICEMAN** menu on the M thermal Mono’s user interface. The user interface menus and settings can be navigated using the user interface’s touch-sensitive keys, as detailed in Table 3-7.1.

Figure 3-7.1: User interface

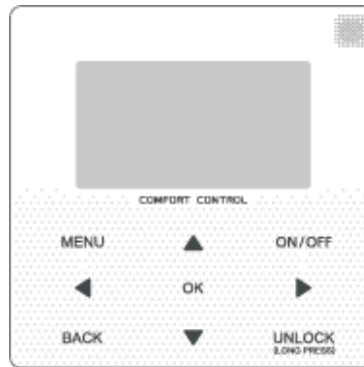
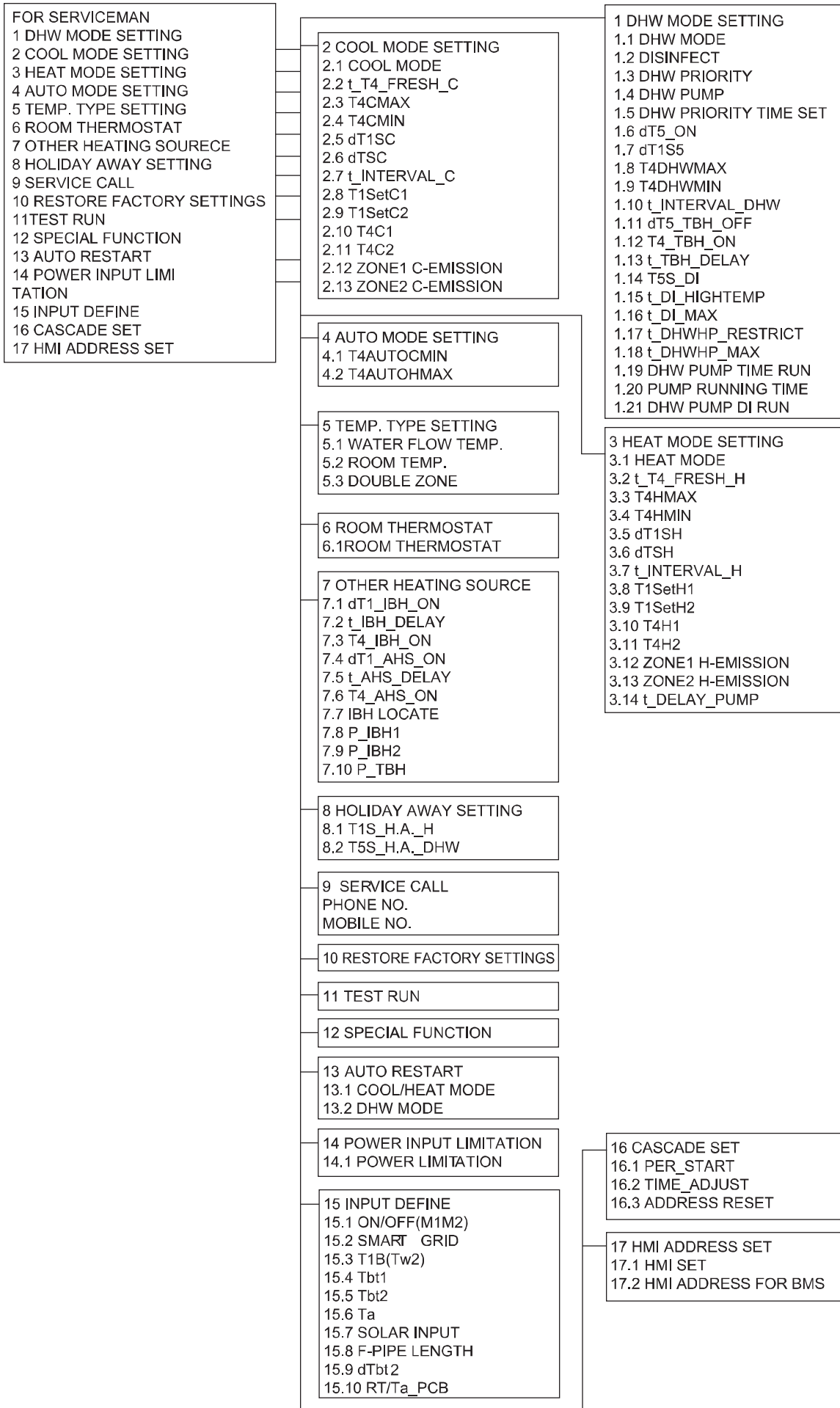


Table 3-7.1: User interface keys

Keys	Function
MENU	Go to the menu structure(on the home page)
◀▶ ▼ ▲	<ul style="list-style-type: none"> ▪ Navigate the cursor on the display ▪ Navigate in the menu structure ▪ Adjust settings
ON/OFF	<ul style="list-style-type: none"> ▪ Turn on/off the space heating/cooling operation or DHW mode ▪ Turn on/off functions in the menu structure
BACK	Come back to the up level
UNLOCK	<ul style="list-style-type: none"> ▪ Long press for unlock/lock the controller ▪ Unlock /lock some functions such as “DHW temperature adjusting”
OK	<ul style="list-style-type: none"> ▪ Go to the next step when programming a schedule in the menu structure and confirm a selection to enter in the submenu of the menu structure.

7.2 Menu Structure



7.3 FOR SERVICEMAN Menu

FOR SERVICEMAN allows installers to input the system configuration and set the system parameters. To enter **FOR SERVICEMAN**, go to **MENU > FOR SERVICEMAN**.

Enter the password, using ◀ ▶ to navigate between digits and using ▼ ▲ to adjust the numerical values, and then press **OK**. The password is 234. Refer to Figure 3-7.2

Then the following pages will be displayed after putting the password. Refer to Figure 3-7.3

Figure 3-7.2: FOR SERVICEMAN password screen

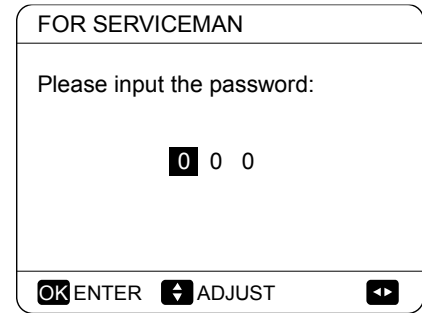


Figure 3-7.3: FOR SERVICEMAN menu

FOR SERVICEMAN 1/3	FOR SERVICEMAN 2/3	FOR SERVICEMAN 3/3
1. DHW MODE SETTING	7. OTHER HEATING SOURCE	13. AUTO RESTART
2. COOL MODE SETTING	8. HOLIDAY AWAY MODE SET	14. POWER INPUT LIMITATION
3. HEAT MODE SETTING	9. SERVICE CALL SETTING	15. INPUT DEFINE
4. AUTO MODE SETTING	10. RESTORE FACTORY SETTINGS	16. CASCADE SET
5. TEMP.TYPE SETTING	11. TEST RUN	17. HMI ADDRESS SET
6. ROOM THERMOSTAT	12. SPECIAL FUNCTION	
OK ENTER	OK ENTER	OK ENTER

7.4 DHW MODE SETTING Menu

7.4.1 DHW MODE SETTING menu overview

MENU > FOR SERVICEMAN > DHW MODE SETTING

Figure 3-7.4: DHW MODE SETTING menu

1 DHW MODE SETTING 1/5	1 DHW MODE SETTING 2/5	1 DHW MODE SETTING 3/5
1.1 DHW MODE YES	1.6 dT5_ON 5 °C	1.11 dT5_TBH_OFF 5 °C
1.2 DISINFECT YES	1.7 dT1S5 10 °C	1.12 T4_TBH_ON 5 °C
1.3 DHW PRIORITY YES	1.8 T4DHWMAX 43 °C	1.13 t_TBH_DELAY 30 MIN
1.4 DHW PUMP YES	1.9 T4DHWMIN -10 °C	1.14 T5S_DI 65 °C
1.5 DHW PRIORITY TIME SET NON	1.10 t_INTERVAL_DHW 5 MIN	1.15 t_DI HIGHTEMP. 15MIN
ADJUST	ADJUST	ADJUST
1 DHW MODE SETTING 4/5	1 DHW MODE SETTING 5/5	
1.16 t_DI_MAX 210 MIN	1.21 DHW PUMP DI RUN NON	
1.17 t_DHWHP_RESTRICT 30 MIN		
1.18 t_DHWHP_MAX 120 MIN		
1.19 DHWPUMP TIME RUN YES		
1.20 PUMP RUNNING TIME 5 MIN		
ADJUST	ADJUST	

In **DHW MODE SETTING** the following parameters should be set.

DHW MODE enables or disables DHW mode. For installations with DHW tanks, select **YES** to enable DHW mode. For installations without DHW tanks, select **NON** to disable DHW mode.

DISINFECT sets whether or not the disinfection operation is performed.

DHW PRIORITY sets whether domestic hot water heating or space heating/cooling takes priority. If **NON** is selected in the **DHW PRIORITY** mode, when it is available and the space heating/cooling is **OFF**, the heat pump will heat the water as required. If space heating/cooling is **ON**, the water will be heated as required when the immersion heater is unavailable.

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Only when the space heating/cooling is **OFF** will the heat pump operate to heat domestic water.

DHW PUMP sets whether or not the DHW pump is controlled by the M thermal Mono unit. If the DHW pump is to be controlled by the M thermal Mono, select **YES**. If the DHW pump is not to be controlled by the M thermal Mono unit, select **NON**.

DHW PUMP PRIORITY TIME SET set the operation time of DHW during **DHW PRIORITY** mode.

dT5_ON sets the temperature difference between the DHW set temperature (T5S) and the DHW tank water temperature (T5) above which the heat pump providing heated water to the DHW tank. When $T5S - T5 \geq dT5_ON$ the heat pump providing heated water to the DHW tank.

Note: When the heat pump's leaving water temperature is above the DHW mode leaving water temperature operating limit (T5stop), the heat pump does not provide heated water to the DHW tank. The DHW mode leaving water temperature operating limit is related to ambient temperature as shown in Figure 2-6.3 in Part 2, 6 "Operating Limits".

dT1S5 sets the heat pump's leaving water set temperature (T1S) relative to DHW tank water temperature (T5). For DHW mode, the user sets the DHW set temperature (T5S) on the main screen and cannot manually set T1S. T1S is set as $T1S = T5 + dT1S5$.

Figure 3-7.6 illustrates the operation of the heat pump and immersion heater(optional) in DHW mode. If the DHW tank water temperature (T5) is less than the minimum of the DHW set temperature (T5S) and the heat pump leaving water temperature operating limit (T5stop) (refer to Figure 2-6.3 in Part 2, 6 "Operating Limits") less **dT5_ON**, the heat pump starts providing heated water to the DHW tank. After **t_TBH_delay** minutes have elapsed, the immersion heater is turned on. If T5 reaches T5stop, the heat pump stops but the immersion heater continues running until T5 has reached $T5S + dT5_TBH_OFF$

Figure 3-7.5: dT5_ON

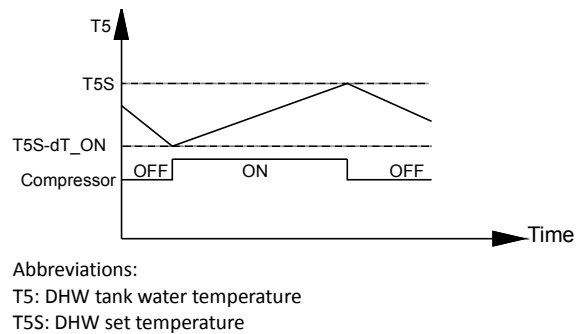


Figure 3-7.6: DHW mode operation

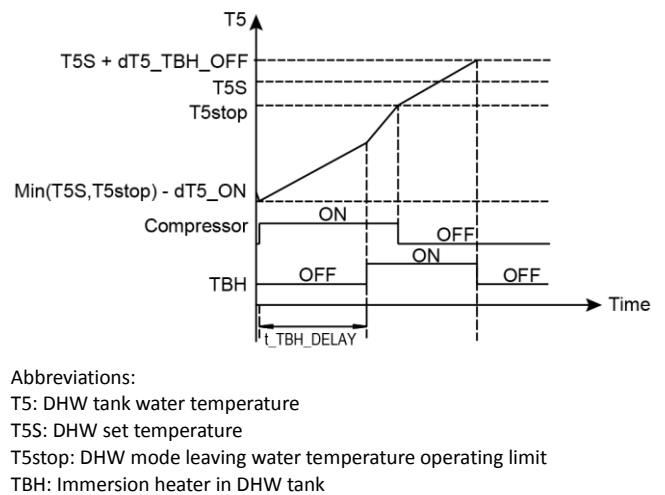


Figure 3-7.7: T4DHWMAX and T4DHWMIN



Abbreviations:
 HP: Heat pump
 TBH: DWH tank immersion heater
 AHS: Additional heating source

T4DHWMAX sets the ambient temperature above which the heat pump will not operate in DHW mode. The highest value that **T4DHWMAX** can take is 43°C, which is the DHW mode upper ambient temperature operating limit of the heat pump.

T4DHWMIN sets the ambient temperature below which the heat pump will not operate in DHW mode. The lowest value that **T4DHWMIN** can take is -25°C, which is the DHW mode lower ambient temperature operating limit of the heat pump.

t_INTERVAL_DHW sets the DHW mode compressor re-start delay. When the compressor stops running, it will not re-start

until at least **t_INTERVAL_DHW** minutes have elapsed.

dT5_TBH_OFF sets the temperature difference between the DHW set temperature (T5S) and the DHW tank water temperature (T5) below which the immersion is not used. When $T5 > \text{Min}(T5S + dT5_TBH_OFF, 65^\circ\text{C})$, the immersion heater is off.

T4_TBH_ON sets the ambient temperature above which the immersion heater will not be used.

t_TBH_DELAY sets the delay between the compressor starting and the immersion heater being turned on.

T5S_DI sets the DHW tank disinfection operation target temperature. Caution: during the disinfection operation (duration: **t_DI_MAX**) the domestic hot water temperature at the hot water taps will at times be equal to the value set for **T5S_DI**.

t_DI_HIGHTEMP sets that length of time that the DHW tank disinfection operation target temperature is maintained.

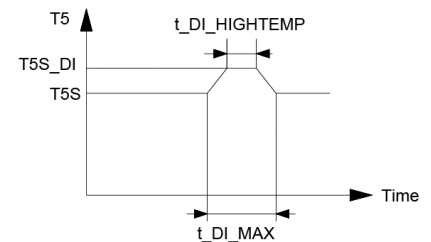
t_DI_MAX sets the total duration of the DHW tank disinfect operation.

t_DHWHP_RESTRICT sets the maximum length of time that the heat pump will run in space heating or space cooling modes before switching to DHW mode, if a requirement for DHW mode exists. When running in space heating mode or space cooling mode, the heat pump becomes available for DHW mode either as soon as the space heating/cooling set temperatures have been reached (refer to Part 3, 7.5 "COOL MODE SETTING Menu" and Part 3, 7.6 "HEAT MODE SETTING Menu") or after **t_DHWHP_MAX** minutes have elapsed.

t_DHWHP_MAX sets the maximum length of time that the heat pump will run in DWH mode before switching to space heating mode or space cooling mode if a requirement for space heating/cooling modes exists. When running in DHW mode, the heat pump becomes available for space heating/cooling either as soon as the DHW tank water temperature (T5) reaches the DHW set temperature (T5S) or after **t_DHWHP_MAX** minutes have elapsed.

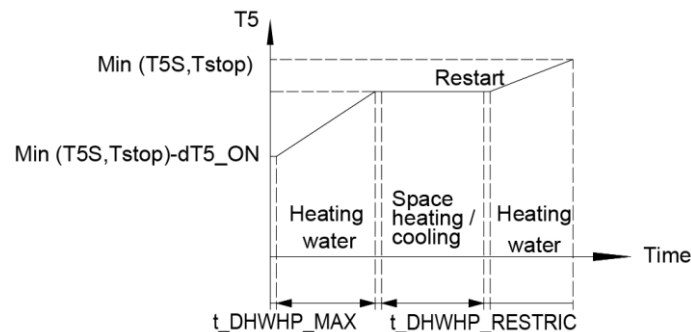
Figure 3-7.9 illustrates the effects of **t_DHWHP_MAX** and **t_DHWHP_RESTRICT** when **DHW PRIORITY** is enabled. The heat pump initially runs in DWH mode. After **t_DHWHP_MAX** minutes, T5 has not reached

Figure 3-7.8: DHW tank disinfection



Abbreviations:
 T5: DHW tank water temperature
 T5S: DHW set temperature

Figure 3-7.9: Operation in DHW PRIORITY



Abbreviations:
 T5: DHW tank water temperature
 T5S: DHW set temperature
 T5stop: DHW mode leaving water temperature operating limit

DHW PUMP TIME RUN sets whether or not the user is able to set the DHW pump (field supply) in DHW mode. For installations with a DHW pump, select ON so that the user is able to set pump start times.

PUMP RUNNING TIME sets the length of time the pump runs for at each of the user-specified start times on the **DHW**

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PUMP tab on the **DOMESTIC HOT WATER (DHW)** menu, if **TIMER RUNNING** is enabled.

DHW PUMP DI RUN sets whether or not the DHW pump (field supply) operates during the disinfection mode.

7.5 COOL MODE SETTING Menu

MENU > FOR SERVICEMAN > COOL MODE SETTING

Figure 3-7.10: COOL MODE SETTING menu

2 COOL MODE SETTING 1/3	2 COOL MODE SETTING 2/3	2 COOL MODE SETTING 3/3
2.1 COOL MODE YES	2.6 dTSC 2°C	2.11 T4C2 25°C
2.2 t_T4_FRESH_C 2.0HRS	2.7 t_INTERVAL_C 5MIN	2.12 ZONE1 C-EMISSION FCU
2.3 T4CMAX 43°C	2.8 T1SetC1 10°C	2.13 ZONE2 C-EMISSION FLH
2.4 T4CMIN 20°C	2.9 T1SetC2 16°C	
2.5 dT1SC 5°C	2.10 T4C1 35°C	
↔ ADJUST ↔	↔ ADJUST ↔	↔ ADJUST ↔

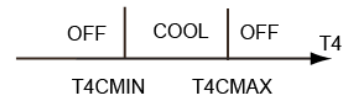
In **COOL MODE SETTING** the following parameters should be set.

COOL MODE enables or disables cooling mode. For installations with space cooling terminals, select **YES** to enable cooling mode. For installations without space cooling terminals, select **NON** to disable cooling mode.

t_T4_FRESH_C sets the refresh time of cooling model climate temperature curve.

T4CMAX sets the ambient temperature above which the heat pump will not operate in cooling mode. The highest value that **T4CMAX** can take is 46°C, which is the cooling mode upper ambient temperature operating limit of the heat pump. Refer to Figure 3-7.11.

Figure 3-7.11: T4CMAX, T4CMIN

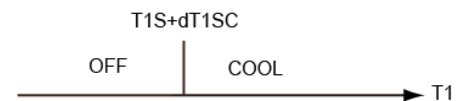


Abbreviations:
T4: Outdoor ambient temperature

T4CMIN sets the ambient temperature below which the heat pump will not operate in cooling mode. The lowest value that **T4CMIN** can take is -5°C, which is the cooling mode lower ambient temperature operating limit of the heat pump. Refer to Figure 3-7.11.

dT1SC sets the minimum temperature difference between the heat pump leaving water temperature (T1) and the heat pump leaving water set temperature (T1S) at which the heat pump provides chilled water to the space cooling terminals. When $T1 - T1S \geq dT1SC$ the heat pump provides chilled water to the space cooling terminals and when $T1 \leq T1S$ the heat pump does not provide chilled water to the space cooling terminals.

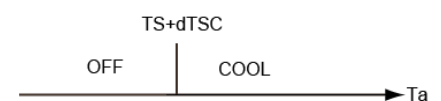
Figure 3-7.12: dT1SC



Abbreviations:
T1: Heat pump leaving water temperature
T1S: Heat pump leaving water set temperature

dTSC sets the temperature difference between the actual room temperature (Ta) and set room temperature (TS) above which the heat pump provides chilled water to the space cooling terminals. When $Ta - TS \geq dTSC$ the heat pump provides chilled water to the space cooling terminals and when $Ta \leq TS$ the heat pump does not provide chilled water to the space cooling terminals. Refer to Figure 3-7.13. **dTSC** is only applicable if **YES** is selected for **ROOM TEMP** in the **TEMP. TYPE SETTING** menu. Refer to Part 3, 7.8 "TEMP. TYPE SETTING Menu".

Figure 3-7.13: dTSC



t_INTERVAL_C sets the cooling mode compressor re-start delay. When the compressor stops running, it will not re-start until at least **t_INTERVAL_C** minutes have elapsed.

T1SetC1 sets the temperature 1 of automatic setting curve for cooling mode.

T1SetC2 sets the temperature 2 of automatic setting curve for cooling mode.

T4C1 sets the ambient temperature 1 of automatic setting curve for cooling mode.

T4C2 sets the ambient temperature 2 of automatic setting curve for cooling mode.

ZONE1 C-EMISSION sets the emission type of zone1 for cooling mode.

ZONE2 C-EMISSION sets the emission type of zone2 for cooling mode.

7.6 HEAT MODE SETTING Menu

MENU > FOR SERVICEMAN > HEAT MODE SETTING

Figure 3-7.14: HEAT MODE SETTING menu

3 HEAT MODE SETTING	1/3	3 HEAT MODE SETTING	2/3	3 HEAT MODE SETTING	3/3
3.1 HEAT MODE	YES	3.6 dTSH	2 °C	3.11 T4H2	7 °C
3.2 t_T4_FRESH_H	2.0HRS	3.7 t_INTERVAL_H	5MIN	3.12 ZONE1 H-EMISSION	RAD.
3.3 T4HMAX	16°C	3.8 T1SetH1	35°C	3.13 ZONE2 H-EMISSION	FLH
3.4 T4HMIN	-15°C	3.9 T1SetH2	28°C	3.14 t_DELAY_PUMP	2MIN
3.5 dT1SH	5°C	3.10 T4H1	-5°C		
↕ ADJUST	↔	↕ ADJUST	↔	↕ ADJUST	↔

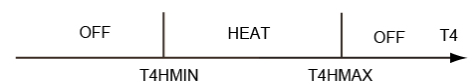
In **HEAT MODE SETTING** the following parameters should be set.

HEAT MODE enables or disables heating mode.

t_T4_FRESH_H sets the refresh time of heating model climate temperature curve.

T4HMAX sets the ambient temperature above which the heat pump will not operate in heating mode. The highest value that **T4HMAX** can take is 35°C, which is the heating mode upper ambient temperature operating limit of the heat pump. Refer to Figure 3-7.15.

Figure 3-7.15: T4HMAX, T4HMIN



Abbreviations:
T4: Outdoor ambient temperature

T4HMIN sets the ambient temperature below which the heat pump will not operate in heating mode. The lowest value that **T4HMIN** can take is -25°C, which is the heating mode lower ambient temperature operating limit of the heat pump. Refer to Figure 3-7.15.

dT1SH sets the temperature difference between the heat pump leaving water temperature (T1) and the heat pump leaving water set temperature (T1S) above which the heat pump provides heated water to the space heating terminals.

Figure 3-7.16: dTSH



Note:
Only when ROOM TEMP is enabled will this function be available

dTSH sets the temperature difference between the actual room temperature (Ta) and set room temperature (TS) above

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which the heat pump provides heated water to the space heating terminals. When $T_S - T_a \geq dT_{SH}$ the heat pump provides heated water to the space heating terminals and when $T_a \geq T_S$ the heat pump does not provide heated water to the space heating terminals. Refer to Figure 3-7.16. **dT_{SH}** is only relevant if **YES** is selected for **ROOM TEMP** in the **TEMP. TYPE SETTING** menu. Refer to Part 3, 7.8 “TEMP. TYPE SETTING Menu”.

t_{INTERVAL_H} sets the heating mode compressor re-start delay. When the compressor stops running, it will not re-start until at least **t_{INTERVAL_H}** minutes have elapsed.

T1SetH1 sets the temperature 1 of automatic setting curve for heating mode.

T1SetH2 sets the temperature 2 of automatic setting curve for heating mode.

T4H1 sets the ambient temperature 1 of automatic setting curve for heating mode.

T4H2 sets the ambient temperature 2 of automatic setting curve for heating mode.

ZONE1 H-EMISSION sets the emission type for heating mode.

ZONE2 H-EMISSION sets the emission type for heating mode.

7.7 AUTO MODE SETTING Menu

MENU > FOR SERVICEMAN > AUTO MODE SETTING

In **AUTO MODE SETTING** the following parameters should be set.

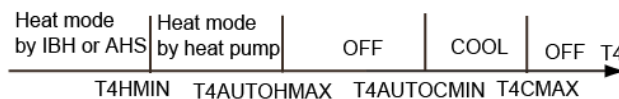
T4AUTOCMIN sets the ambient temperature below which the heat pump will not provide chilled water for space cooling in auto mode. Refer to Figure 3-7.18.

T4AUTOHMAX sets the ambient temperature above which the heat pump will not provide heated water for space heating in auto mode. Refer to Figure 3-7.18.

Figure 3-7.17: AUTO MODE SETTING menu

4 AUTO. MODE SETTING	
4.1 T4AUTOCMIN	25°C
4.2 T4AUTOHMAX	17°C
↕ ADJUST	⏪

Figure 3-7.18: T4AUTOCMAX, T4AUTOCMIN



- Abbreviations:
 HP: Heat pump
 AHS: Additional heating source
 IBH: Backup electric heater
 T4CMAX: The ambient temperature above which the heat pump will not operate in cooling mode.
 T4HMIN: The ambient temperature below which the heat pump will not operate in heating mode.

7.8 TEMP. TYPE SETTING Menu

MENU > FOR SERVICEMAN > TEMP. TYPE SETTING

The TEMP. TYPE SETTING is used for selecting whether the water flow temperature or room temperature is used to control the ON/OFF of the heat pump.

When ROOM TEMP. is enabled, the target water flow temperature will be calculated from climate-related curves (refer to “9 Climate related curves”).

For installations without room thermostats, space heating and cooling modes can be controlled in one of two different ways:

- according to the M thermal Mono’s leaving water temperature alone
- according to the room temperature detected by the M thermal Split user interface’s built-in temperature sensor alone

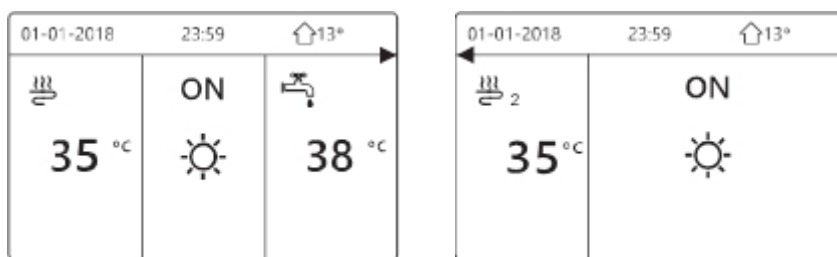
WATER FLOW TEMP. sets whether space heating/cooling modes are controlled according to the M thermal Mono’s leaving water temperature. If **YES** is selected, the user is able to set the M thermal Mono unit’s leaving water temperature set temperature on the user interface’s main screen.

ROOM TEMP. sets whether space heating/cooling modes are controlled according to the room temperature detected by the temperature sensor in the M thermal Mono user interface. If **YES** is selected, the user is able to set the room temperature set temperature on the user interface’s main screen, no matter what is the setting of **WATER FLOW TEMP.**

DOUBLE ZONE sets whether there are two zones.

If set WATER FLOW TEMP. and ROOM TEMP. to YES, meanwhile set DOUBLE ZONE to NON or YES, the following pages will be displayed. In this case, the setting value of zone 1 is T1S, the setting value of zone 2 is TS(The corresponding TIS2 is calculated according to the climate related curves.)

Figure 3-7.22: DOUBLE ZONE to NON or YES



Homepage (zone 1)

Addition page (zone 2)
(Double zone is effective)

If set DOUBLE ZONE to YES and set ROOM TEMP. to NON, meanwhile set WATER FLOW TEMP. to YES or NON, the following pages will be displayed. In this case, the setting value of zone 1 is T1S, the setting value of zone 2 is T1S2.

Figure 3-7.23: DOUBLE ZONE to YES and set ROOM TEMP. to NON meanwhile set WATER FLOW TEMP. to YES or NON

Figure 3-7.19: TEMP. TYPE SETTING menu

5 TEMP. TYPE SETTING	
5.1 WATER FLOW TEMP.	YES
5.2 ROOM TEMP.	NON
5.3 DOUBLE ZONE	NON
↔ ADJUST	▶

Figure 3-7.20: Only set WATER FLOW TEMP to YES

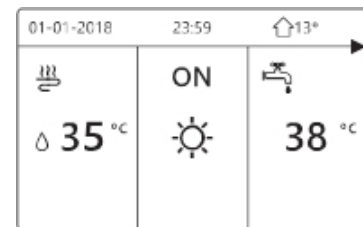
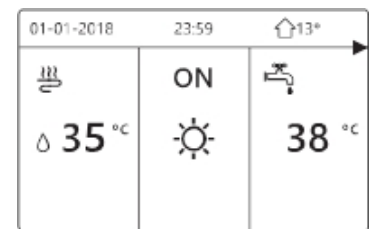
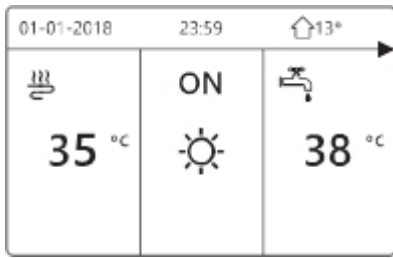
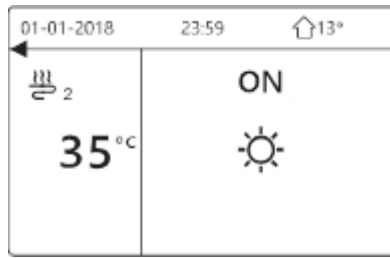


Figure 3-7.21: Only set ROOM TEMP to YES





Homepage (zone 1)



Addition page (zone 2)

If set DOUBLE ZONE and ROOM TEMP. to YES, meanwhile set WATER FLOW TEMP. to YES or NON, the following page will be displayed. In this case, the setting value of zone 1 is T1S, the setting value of zone 2 is TS (The corresponding TIS2 is calculated according to the climate related curves.)

Figure 3-7.24: DOUBLE ZONE and set ROOM TEMP. to YES meanwhile set WATER FLOW TEMP. to YES or NON



Homepage (zone 1)



Addition page (zone 2)
(Double zone is effective)

7.9 ROOM THERMOSTAT Menu

MENU > FOR SERVICEMAN > ROOM THERMOSTAT

As an alternative to controlling space heating/cooling modes according the M thermal Mono unit's leaving water temperature and/or the room temperature detected by the temperature sensor in the M thermal Mono user interface, separate room thermostat can be installed and used to control space heating/cooling modes.

Figure 3-7.25: ROOM THERMOSTAT menu

6 ROOM THERMOSTAT	
6.1 ROOM THERMOSTAT	NON
↕ ADJUST	

In ROOM THERMOSTAT the following parameters should be set.

ROOM THERMOSTAT sets whether or not room thermostats are installed. For installations with room thermostats, select **YES**. For installations without room thermostats, select **NON**.

ROOM THERMOSTAT = NON: No room thermostat.

ROOM THERMOSTAT = MODE SET: Room thermostat can control heating and cooling individually.

ROOM THERMOSTAT=ONE ZONE: Room thermostat provides the switch signal to unit.

ROOM THERMOSTAT=DOUBLE ZONE: Indoor unit is connected with two room thermostat.

7.10 OTHER HEATING SOURCE Menu
7.10.1 OTHER HEATING SOURCE menu overview
MENU > FOR SERVICEMAN > OTHER HEATING SOURCE
Figure 3-7.26: OTHER HEATING SOURCE menu

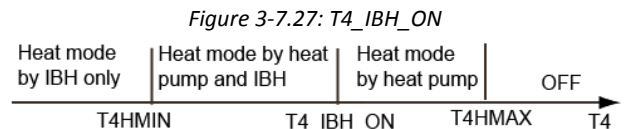
7 OTHER HEATING SOURCE 1/2		7 OTHER HEATING SOURCE 2/2	
7.1 dT1_IBH_ON	5°C	7.6 T4_AHS_ON	5°C
7.2 t_IBH_DELAY	30MIN	7.7 IBH LOCATE	PIPE LOOP
7.3 T4_IBH_ON	-5°C	7.8 P_IBH1	0.0kW
7.4 dT1_AHS_ON	5°C	7.9 P_IBH2	0.0kW
7.5 t_AHS_DELAY	30MIN	7.10 P_TBH	2.0kW
ADJUST		ADJUST	

In **OTHER HEATING SOURCE** the following parameters should be set. Backup electric heater is optional.

dT1_IBH_ON sets the temperature difference between the heat pump's leaving water set temperature (T1S) and the heat pump's leaving water temperature (T1) above which the backup electric heater heating element(s) are on. When $T1S - T1 \geq dT1_IBH_ON$ the backup electric heater is on (on models where the backup electric heater has a simple on/off control function).

t_IBH_DELAY sets the delay between the compressor starting and the backup electric heater being turned on.

T4_IBH_ON sets the ambient temperature below which the backup electric heater is used. If the ambient temperature is above **T4_IBH_ON**, the backup electric heater is not used. The relationship between operation of the backup heater and the ambient is shown in Figure 3-7.22.

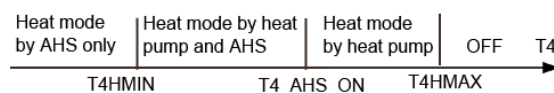


Abbreviations:
 T4: Outdoor ambient temperature
 IBH: Backup electric heater

dT1_ASH_ON sets the temperature difference between the heat pump's leaving water set temperature (T1S) and the heat pump's leaving water temperature (T1) above which the additional heating source is on. When $T1S - T1 \geq dT1_ASH_ON$ the additional heating source is on.

t_ASH_DELAY sets the delay between the compressor starting and the additional heating source being turned on.

T4_AHS_ON sets the ambient temperature below which the additional heating source is used. If the ambient temperature is above **T4_AHS_ON**, the additional heating source is not used. The relationship between operation of the additional heating source and the ambient is shown in the picture below.

Figure 3-7.28: T4_AHS_ON


Abbreviations:
 AHS: Additional heating source
 T4: Outdoor ambient temperature

IBH LOCATE means IBH is installed for pipe heating.

P_IBH1, P_IBH2 set heating capacity of IBH and P_TBH sets heating capacity of TBH, which are used for energy consumption statistics.

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7.11 HOLIDAY AWAY SETTING Menu

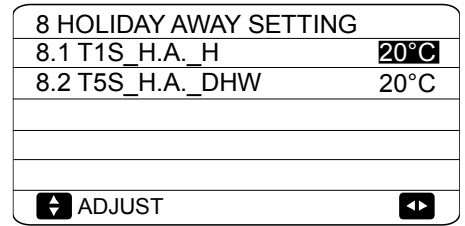
MENU > FOR SERVICEMAN > HOLIDAY AWAY SETTING

The **HOLIDAY AWAY SETTING** menu settings are used to set the outlet water temperature to prevent water pipes freezing when away from home in cold weather seasons. In **HOLIDAY AWAY SETTING** the following parameters should be set.

T1S_H.A._H sets the heat pump's leaving water set temperature for space heating mode when in holiday away mode.

T5S_H.M._DHW sets the heat pump's leaving water set temperature for DHW mode when in holiday away mode.

Figure 3-7.29: HOLIDAY AWAY SETTING menu



7.12 SERVICE CALL Menu

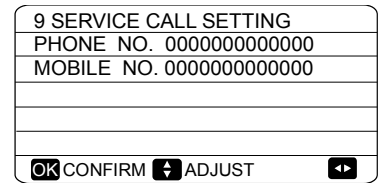
MENU > FOR SERVICEMAN > SERVICE CALL

In **SERVICE CALL** the following parameters can be set.

PHONE NO. and **MOBILE NO.** can be used to set after-sales service contact numbers. If set, these numbers are displayed to users in **MENU > FOR SERVICEMAN > SERVICE CALL**

Use ▼ ▲ to adjust the numerical values. The maximum length of the phone numbers is 14 digits.

Figure 3-7.30: SERVICE CALL menu



The black rectangle found between 0 and 9 when scrolling up and down using ▼ ▲ is converted to a blank space when the phone numbers are displayed to users in **MENU > FOR SERVICEMAN > SERVICE CALL** and can be used for phone numbers less than 14 digits in length.

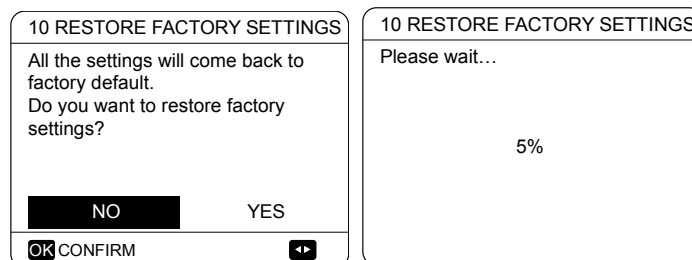
7.13 RESTORE FACTORY SETTINGS

MENU > FOR SERVICEMAN > RESTORE FACTORY SETTINGS

RESTORE FACTORY SETTINGS is used to restore all the parameters set in the user interface to their factory defaults.

On selecting **YES**, the process of restoring all settings to their factory defaults begins and progress is displayed as a percentage.

Figure 3-7.31: RESTORE FACTORY SETTINGS screens



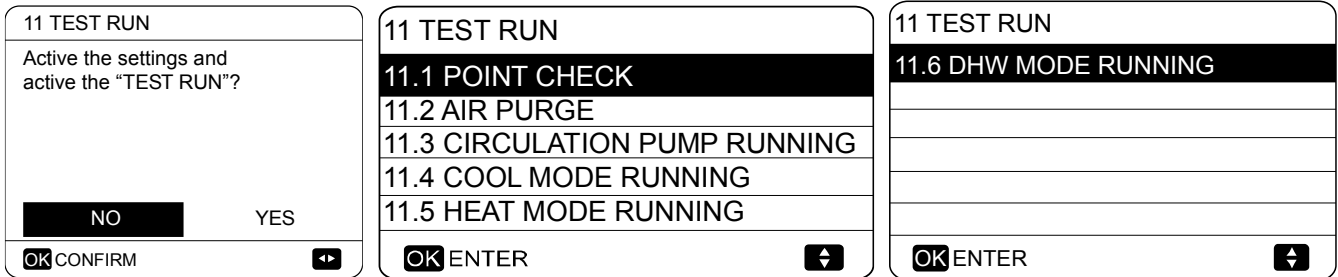
7.14 TEST RUN

7.14.1 TEST RUN Menu overview

MENU > FOR SERVICEMAN > TEST RUN

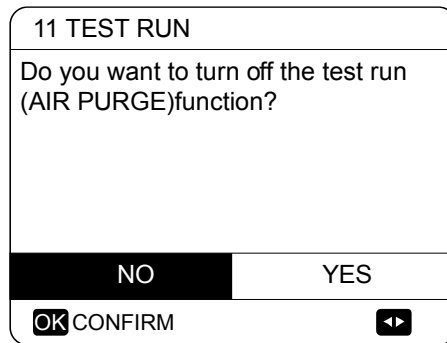
TEST RUN is used to check that the valves, air purge function, circulation pump, space cooling mode, space heating mode and DHW mode are all operating correctly.

Figure 3-7.32: TEST RUN start screen and TEST RUN menu



During test run, all buttons except OK are invalid. If you want to turn off the test run, please press OK. For example, when the unit is in air purge mode, after you press OK, the following page will be displayed:

Figure 3-7.33: Exit air purge screen

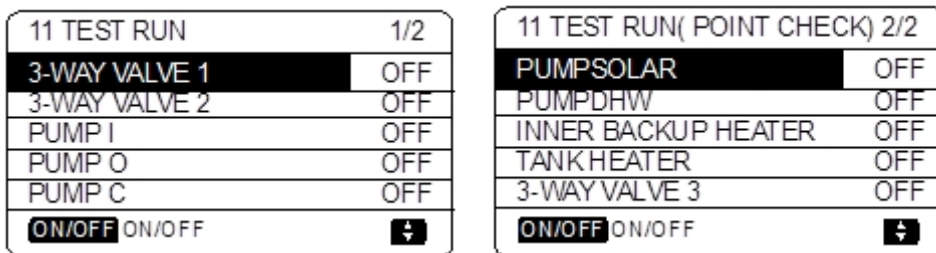


7.14.2 POINT CHECK menu

MENU > FOR SERVICEMAN > TEST RUN > POINT CHECK

The POINT CHECK menu is used to check the operation of individual components. Use ▼▲ to scroll to the components you want to check and press ON/OFF to toggle the on/off state of the component. If a valve does not turn on/off when its on/off state is toggled or if a pump/heater does not operate when turned on, check the component’s connection to the hydronic system main PCB.

Figure 3-7.34: POINT CHECK menu



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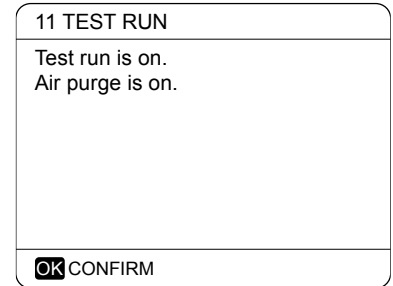
7.14.3 AIR PURGE operation

MENU > FOR SERVICEMAN > TEST RUN > AIR PURGE

Once installation is complete it is important to run the air purge function to remove any air which may be present in the water piping and which could cause malfunctions during operation.

The **AIR PURGE** operation is used to remove air from the water piping. Before running AIR PURGE mode, make sure that the air purge valve is open. When the air purge operation starts, SV1 valve opens and SV2 valve closes. 60 secs later the pump in the unit (PUMPI) operates for 10min during which the flow switch does not work. After the pump stops, SV1 valve closes and SV2 valve opens. 60 secs later both PUMPI and PUMPO operate until the next command is received. If any error code is displayed during the air purge operation, the cause should be investigated. Refer to Part 3, 10 "Error Code table".

Figure 3-7.35: AIR PURGE operation



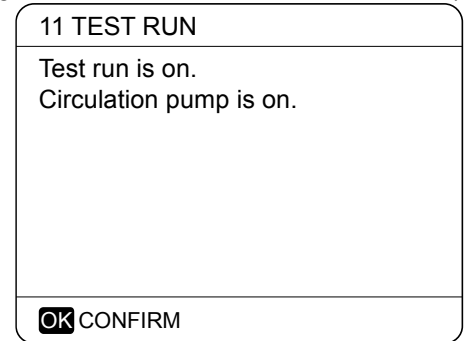
7.14.4 CIRCULATION PUMP RUNNING operation

MENU > FOR SERVICEMAN > TEST RUN > CIRCULATION PUMP RUNNING

The **CIRCULATION PUMP RUNNING** operation is used to check the operation of the circulation pump. When the circulation pump running operation starts, all running components stop. 60 secs later, the 3-way valve opens and the 3-way valve closes. After a further 60 secs PUMPI starts. 30 seconds later, if the flow switch detects that the water flow is normal, PUMPI operates for 3 mins. After the pump stops 60s, the 3-way valve closes and the 3-way valve opens. 60s later both PUMI and PUMPO

will operate. After a further 2 mins the flow switch start to check the water flow. If the water flow rate is sufficient, both PUMPI and PUMPO operate until the next command is received. If the water flow rate is insufficient over any 15-second period, PUMPI and PUMPO stop and error code E8 is displayed. Refer to Part 3, 10 "Error Code table".

Figure 3-7.36: CIRCULATION PUMP RUNNING display



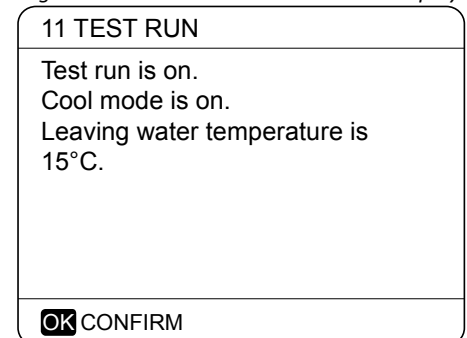
7.14.5 COOL MODE RUNNING operation

MENU > FOR SERVICEMAN > TEST RUN > COOL MODE RUNNING

The **COOL MODE RUNNING** operation is used to check the operation of the system in space cooling mode.

During the **COOL MODE RUNNING** operation, the M thermal Mono unit leaving water set temperature is 7°C. The current actual leaving water temperature is displayed on the user interface. The unit operates until the leaving water temperature drops to the set temperature or the next command is received.

Figure 3-7.37: COOL MODE RUNNING display



If any error code is displayed during the cool mode running operation, the cause should be investigated. Refer to Part 3, 10 "Error Code table".

7.14.6 HEAT MODE RUNNING operation

The **HEAT MODE RUNNING** operation is used to check the operation of the system in space heating mode.

During the **HEAT MODE RUNNING** operation the M thermal Split unit leaving water set temperature is 35°C. The current actual leaving water temperature is displayed on the user interface. When the **HEAT MODE RUNNING** operation starts, the heat pump first runs for 10 mins.

After 10 mins:

- On systems where an auxiliary heat source (AHS) is installed, the AHS starts and runs for 10 mins (whilst the heat pump continues running), after which the AHS stops and the heat pump continues to operate until the water temperature rises to the set temperature or the heat mode running operation is exited by pressing **OK**.
- On systems where a backup electric heater is being used, the backup heater turn on (on models where the backup heater has a simple on/off control function). 3 mins later the backup electric heater will turn off. The heat pump will then operate until the water temperature rises to the set temperature or the **next command is received**.
- On systems with no auxiliary heat source (AHS), the heat pump will then operate until the water temperature rises to the set temperature or the **next command is received**.

If any error code is displayed during the cool mode running operation, the cause should be investigated. Refer to Part 3, 8.2 "Error Code table".

7.14.7 DHW MODE RUNNING operation

The **DHW MODE RUNNING** operation is used to check the operation of the system in DHW mode.

During the **DHW MODE RUNNING** operation, the DHW set temperature is 55°C. On systems where a tank boost heater is installed, the tank boost heater will turn on once the heat pump has run for 10 mins. The tank boost heater will turn off 3 mins later and the heat pump will operate until the water temperature rises to the set temperature or the **next command is received**.

Figure 3-7.38: HEAT MODE RUNNING display

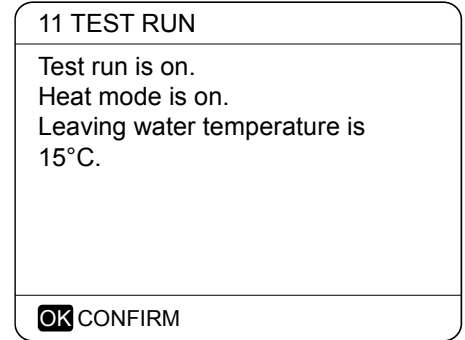
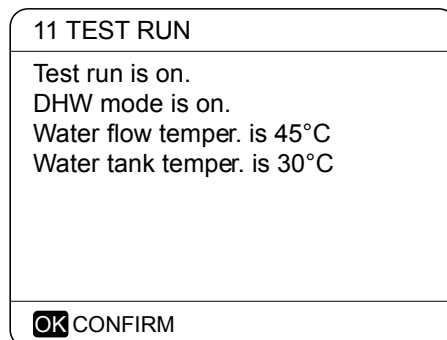


Figure 3-7.39: DHW MODE RUNNING display



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7.15 SPECIAL FUNCTION

7.15.1 SPECIAL FUNCTION menu overview

MENU > FOR SERVICEMAN > SPECIAL FUNCTION

SPECIAL FUNCTION is used to pre-heating floor and drying up floor once installation is complete or the first time start up the unit or restart the unit after a long time stop.

7.15.2 PREHEATING FOR FLOOR

MENU > FOR SERVICEMAN > SPECIAL FUNCTION > PREHEATING FOR FLOOR

Before floor heating, if a large amount of water remains on the floor, the floor may be warped or even rupture during floor heating operation, in order to protect the floor, floor drying is necessary, during which the temperature of the floor should be increased gradually.

During first operation of the unit, air may remain in the water system which can cause malfunctions during operation. It is necessary to run the air purge function to release the air (make sure the air purge valve is open).

T1S sets the heat pump's leaving water set temperature in preheating for floor mode.

t_fristFH sets the duration of preheating for floor mode.

The operation of the unit during preheating for floor mode is illustrated in Figure 3-7.37.

Figure 3-7.40: Special functions menu

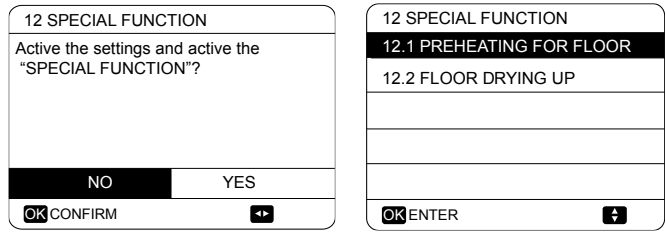


Figure 3-7.41: Preheating for floor menu

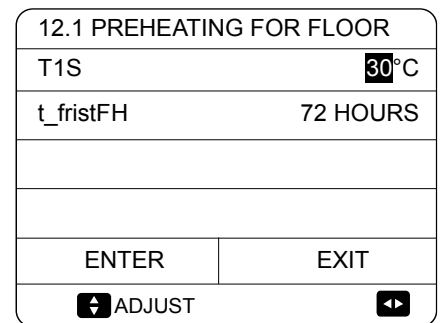
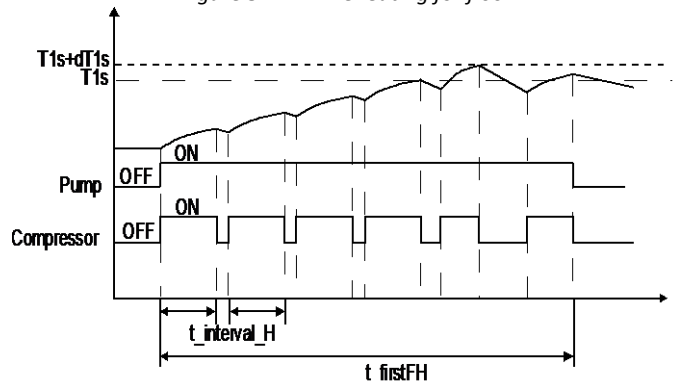


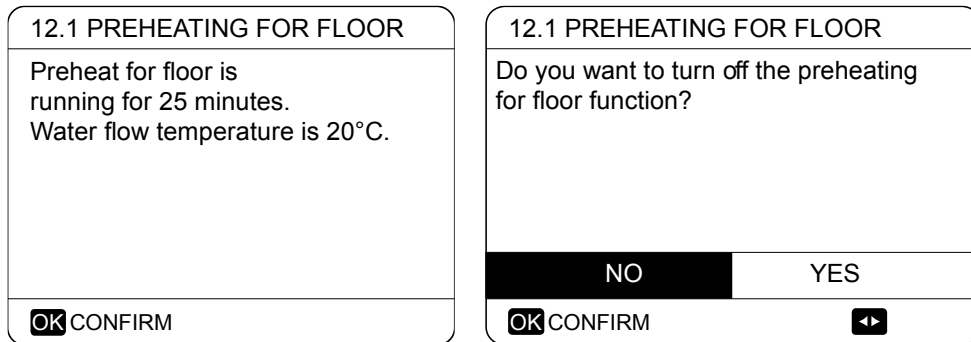
Figure 3-7.42: Preheating for floor



Abbreviations:
t_interval_H: Compressor re-start delay in space heating mode. (Refer to Part 3, 8.6 "HEAT MODE SETTING Menu").

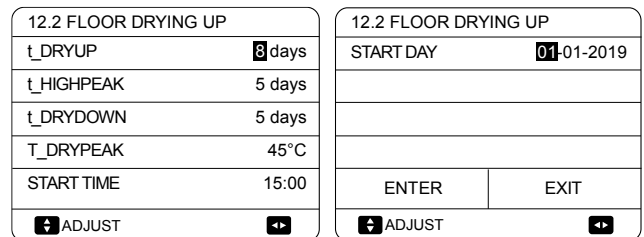
Whilst the preheating for floor operation is running, the number of minutes that it has been running for and the heat pump's leaving water temperature are displayed on the user interface. During the preheating for floor operation all buttons except **OK** are inactivated. To exit the preheating for floor operation, press **OK** and then select **YES** when prompted. Refer to Figure 3-7.38.

Figure 3-7.43: Preheating for floor screens


7.15.3 FLOOR DRYING UP
MENU > FOR SERVICEMAN > SPECIAL FUNCTION > FLOOR DRYING UP

For newly-installed under-floor heating systems, floor drying up mode can be used to remove moisture from the floor slab and subfloor to prevent warping or rupture of the floor during floor heating operation. There are three phases to the floor drying up operation:

Figure 3-7.44: FLOOR DRYING UP menu



- Phase 1: gradual temperature increase from a starting point of 25°C to the peak temperature
- Phase 2: maintain peak temperature
- Phase 3: gradual temperature decrease from the peak temperature to 45°C

t_DRYUP sets the duration of Phase 1.

t_HIGHPEAK sets the duration of Phase 2.

t_DRYDOWN is the duration of Phase 3.

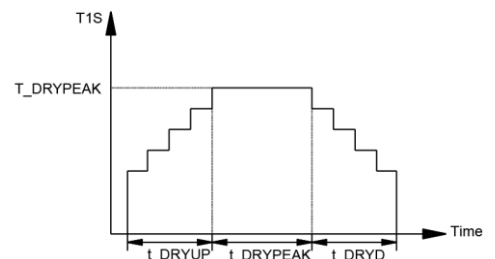
T_DRYPEAK sets the heat pump's leaving water set temperature for Phase 2.

START TIME sets the floor drying up operation start time.

START DATE sets the floor drying up operation start date.

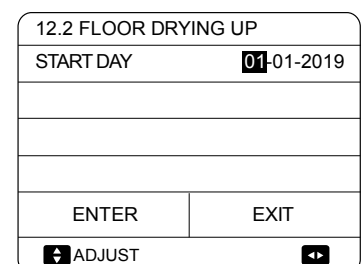
The heat pump's leaving water set temperature during the floor drying up operation is illustrated in Figure 3-7.40.

Figure 3-7.45: FLOOR DRYING UP settings



During the floor drying up operation all buttons except **OK** are inactivated. To exit the floor drying up operation, press **OK** and then select **YES** when prompted.

Figure 3-7.46: FLOOR DRYING UP screen



Note: In the event of a heat pump malfunction, floor drying up mode will continue if a backup electric heater and/or additional heating source is available and configured to support space heating mode.

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7.16 AUTO RESTART

MENU > FOR SERVICEMAN > AUTO RESTART

AUTO RESTART sets whether or not the unit re-applies the user interface settings when the power returns following a power failure. Select **YES** to enable auto restart or **NON** to disable auto restart.

If the auto restart function is enabled, when the power returns following a power failure, the unit re-applies the user interface settings from before the power failure. If the auto restart function is disabled, when the power returns after a power failure, the unit won't auto restart.

Figure 3-7.47: AUTO RESTART menu

13 AUTO RESTART	
13.1 COOL/HEAT MODE	YES
13.2 DHW MODE	NON
ADJUST	◀▶

7.17 POWER INPUT LIMITATION

MENU > FOR SERVICEMAN > POWER INPUT LIMITATION

POWER INPUT LIMITATION sets the type of power input limitation and the setting range is 0-8. If the unit will operate at larger power input, 0 should be selected. If the unit will operate at a lower power input, 1-8 should be selected and the power input and capacity will decrease.

Figure 3-7.48: POWER INPUT LIMITATION menu

14 POWER INPUT LIMITATION	
14.1 POWER INPUT LIMITATION	0
ADJUST	◀▶

7.18 INPUT DEFINE

MENU > FOR SERVICEMAN > INPUT DEFINE

INPUT DEFINE sets sensors and functions to fulfill with installation.

CN12 ON/OFF sets the control terminal type of CN12, 0: REMOTE ON/OFF, 1: TBH ON/OFF.

CN35 SMART GRID sets whether SMART GRID control signal is connected to hydronic PCB.

CN15 T1B sets whether T1B sensor exist in the installation.

Tbt1 Enable or disable the Tbt1.

Tbt2 Enable or disable the Tbt2.

SOLAR INPUT Choose the SOLAR INPUT.

F-PIPE LENGTH Choose the total length of the liquid pipe(F-PIPE LENGTH)

dTbt2 The temperature difference for starting the unit(Tbt2)

RT/Ta_PCB Enable or disable the RT/Ta_PCB

Ta PROBE sets the Ta sensor connection type, **HMI: Ta** on wired controller; **IDU: Ta** connected on hydronic PCB.

Figure 3-7.49: INPUT DEFINE menu

15 INPUT DEFINE	
15.1 ON/OFF(M1M2)	REMOTE
15.2 SMART GRID	NO
15.3 T1B(Tw2)	NO
15.4 Tbt1	NO
15.5 Tbt2	HMI
ADJUST	◀▶

15 INPUT DEFINE	
15.6 Ta	HMI
15.7 SOLAR INPUT	NON
15.8 F-PIPE LENGTH	< 10m
15.9 dTbt2	12°C
15.10 RT/Ta_PCB	NON
ADJUST	◀▶

8 Operation parameter

MENU > OPERATION PARAMETER

This menu is for installer or service engineer reviewing the operation parameters. There are nine pages for the operating parameter as following

Figure 3-9.1: Operation parameter

OPERATION PARAMETER #01	OPERATION PARAMETER #01	OPERATION PARAMETER #01
ONLINE UNITS NUMBER 1	PUMP-O OFF	GAS BOILER OFF
OPERATE MODE COOL	PUMP-C OFF	T1 LEAVING WATER TEMP. 35°C
SV1 STATE ON	PUMP-S OFF	WATER FLOW 1.72m ³ /h
SV2 STATE OFF	PUMP-D OFF	HEAT PUMP CAPACTIY 11.52kW
SV3 STATE OFF	PIPE BACKUP HEATER OFF	POWER CONSUM. 1000kWh
PUMP_I ON	TANK BACKUP HEATER ON	Ta ROOM TEMP 25°C
ADDRESS 1/9	ADDRESS 2/9	ADDRESS 3/9

OPERATION PARAMETER #01	OPERATION PARAMETER #01	OPERATION PARAMETER #01
T5 WATER TANK TEMP. 53°C	Tbt1 BUFFERTANK_UP TEMP. 35°C	ODU MODEL 6kW
Tw2 CIRCUIT2 WATER TEMP. 35°C	Tbt2 BUFFERTANK_LOW TEMP. 35°C	COMP.CURRENT 12A
TIS' C1 CLIMATE CURVE TEMP. 35°C	Tsolar 25°C	COMP.FREQUENCY 24Hz
TIS2' C2 CLIMATE CURVE TEMP. 35°C	IDU SOFTWARE 01-09-2019V01	COMP.RUN TIME 54 MIN
TW_O PLATE W-OUTLET TEMP. 35°C		COMP.TOTAL RUN TIME 1000Hrs
TW_I PLATE W-OUTLET TEMP. 30°C		EXPANSION VALVE 200P
ADDRESS 4/9	ADDRESS 5/9	ADDRESS 6/9

OPERATION PARAMETER #01	OPERATION PARAMETER #01	OPERATION PARAMETER #01
FAN SPEED 600R/MIN	TW_O PLATE W-OUTLET TEMP. 35°C	T3 OUTDOOR EXCHANGE TEMP. 5°C
IDU TARGET FREQUENCY 46Hz	TW_I PLATE W-INLET TEMP. 30°C	T4 OUTDOOR AIR TEMP. 5°C
FREQUENCY LIMITED TYPE 5	T2 PLATE F-OUT TEMP. 35°C	TF MODULE TEMP. 55°C
SUPPLY VOLTAGE 230V	T2B PLATE F-IN TEMP. 35°C	P1 COMP. PRESSURE 2300kPa
DC GENERATRIX VOLTAGE 420V	Th COMP. SUCTION TEMP. 5°C	ODU SOFTWARE 01-09-2018V01
DC GENERATRIX CURRENT 18A	Tp COMP. DISCHARGE TEMP. 75°C	HMI SOFTWARE 01-09-2018V01
ADDRESS 7/9	ADDRESS 8/9	ADDRESS 9/9

9 Network Configuration Guidelines

The wired controller realizes intelligent control with a built-in WIFI module, which receives control signal from the APP.

Before connecting the WLAN, please check for it if the router in your environment is active and make sure that the wired controller is well-connected to the wireless signal.

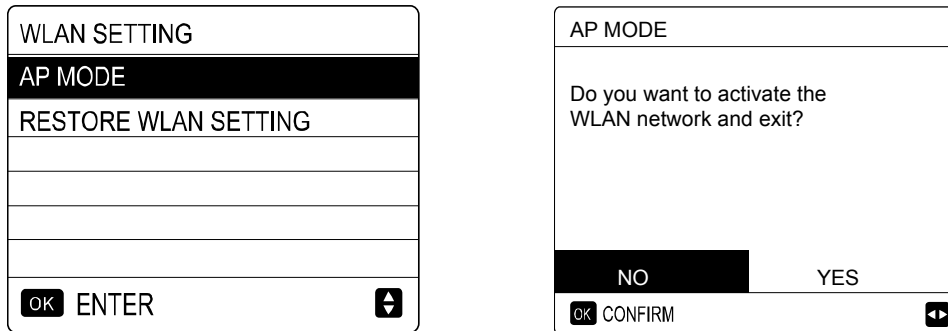
During the Wireless distribution process, the LCD icon “” flashes to indicate that the network is being deployed. After the process is completed, the icon “” will be constantly on.

9.1 Wired Controller Setting

The wired controller settings include **AP MODE** and **RESTORE WLAN SETTING**.

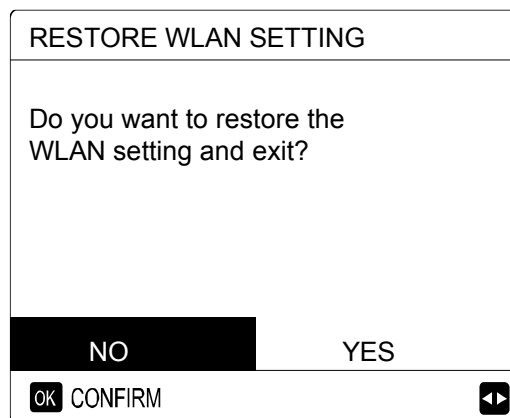
Go to "MENU"> "WLAN SETTING"> "AP MODE". Press "OK" to activate the WLAN, refer to Figure 3-8.1. Select **YES**, press **OK** to select AP mode. Select **AP Mode** correspondingly on the mobile device and continue the follow-up settings according to the APP prompts.

Figure 3-8.1: WLAN setting menu



Go to "MENU"> "WLAN SETTING"> "RESTORE WLAN SETTING", select **YES**, press **OK** and wireless configuration is reset.

Figure 3-8.2: RESTORE WLAN SETTING menu



9.2 Mobile Device Setting

9.2.1 Install APP

Scan the following QR code in Figure 3-8.3 or research "MSmartLife" in APP STORE or GOOGLE PLAY to install the APP.

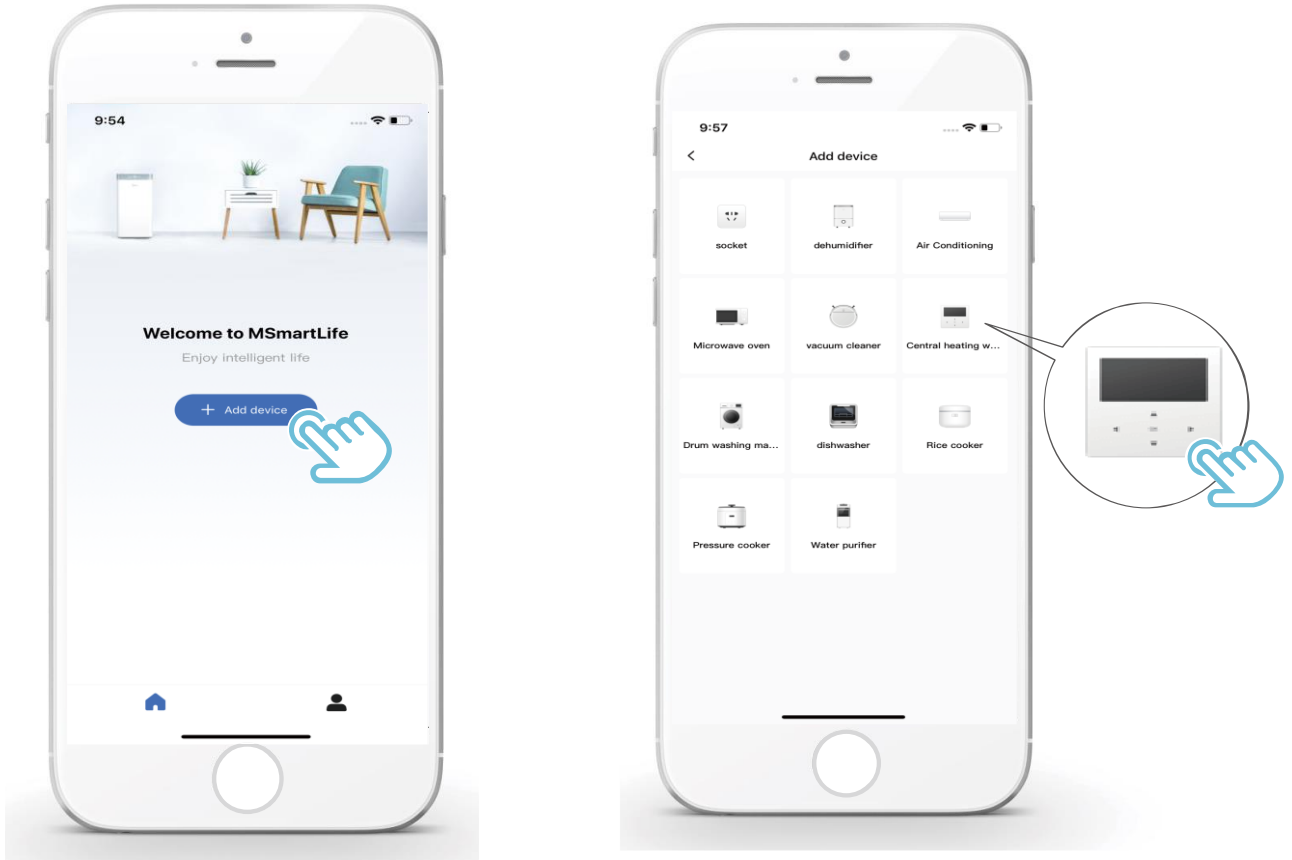
Figure 3-8.3: QR code for MSmartLifeAPP



9.2.2 Sign in

After installation, open the APP and click the "+" button to register account according to the guide.

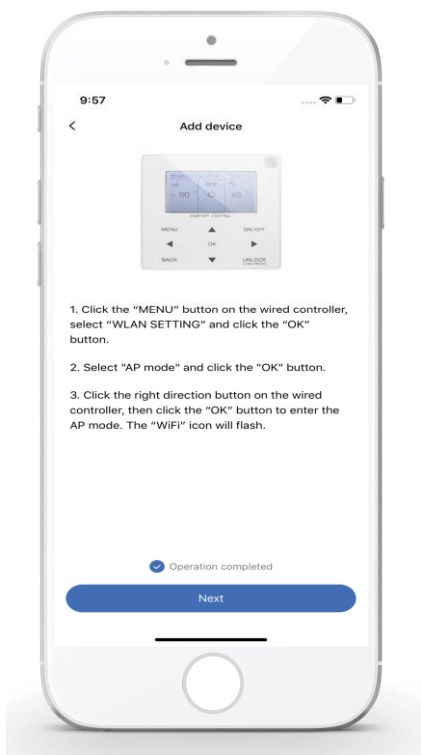
Figure 3-8.4: add device



9.2.3 Add Home Appliances

Choose the wired controller model, then go to add the device.

Figure 3-8.5: APP connection prompts



Operate the wired controller according to APP prompts.

Wait for the home appliance to connect, and click **"Finish"**.

After the appliance is successfully connected, the LCD icon “” of the wired controller is constantly on, and the unit can be controlled through the APP.

If the network distribution process fails, or the mobile connection demands reconnection and replacement, operate “**RESTORE WLAN SETTING**” on the wired controller, and then repeat the above process.

Figure 3-8.6: successful connection

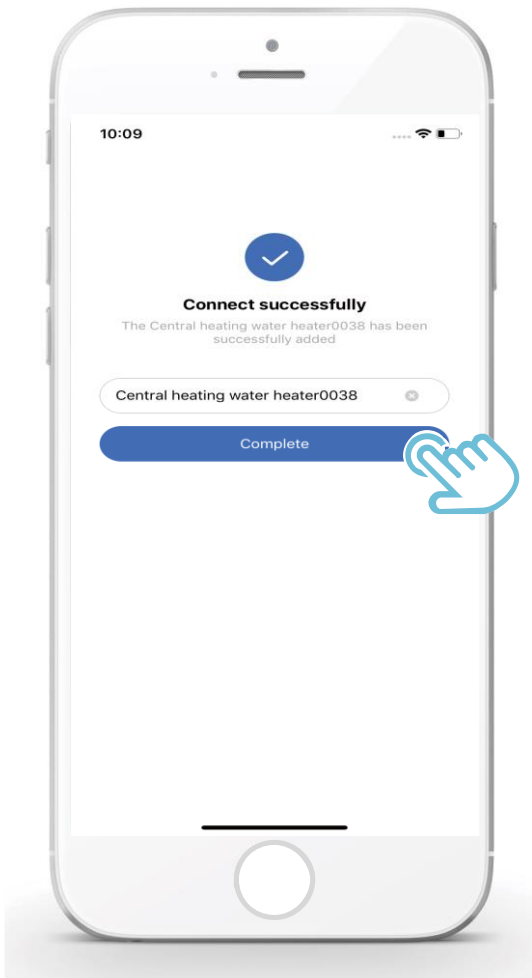
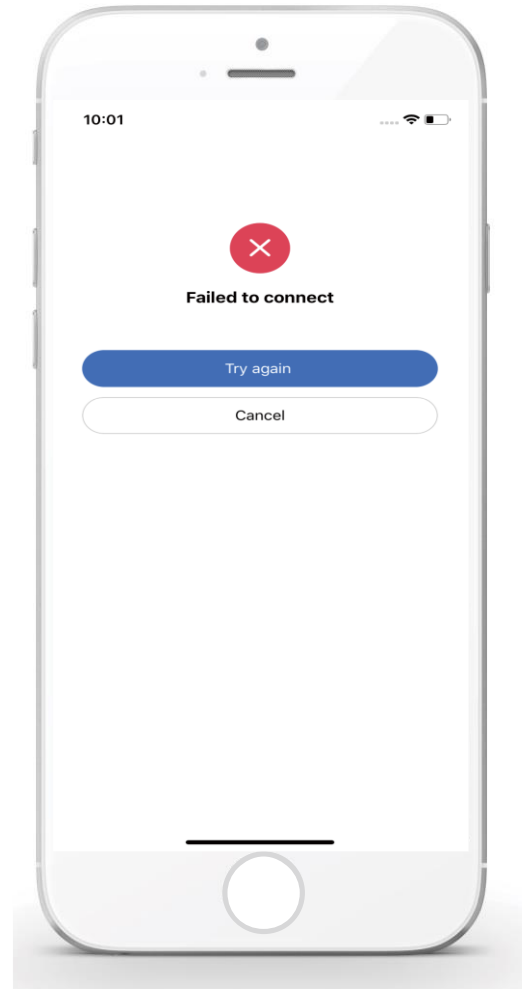


Figure 3-8.7: failed connection



10 Climate Related Curves

The climate related curves can be selected in the user interface, **MENU > PRESET TEMPERATURE > WEATHER TEMP. SET.**

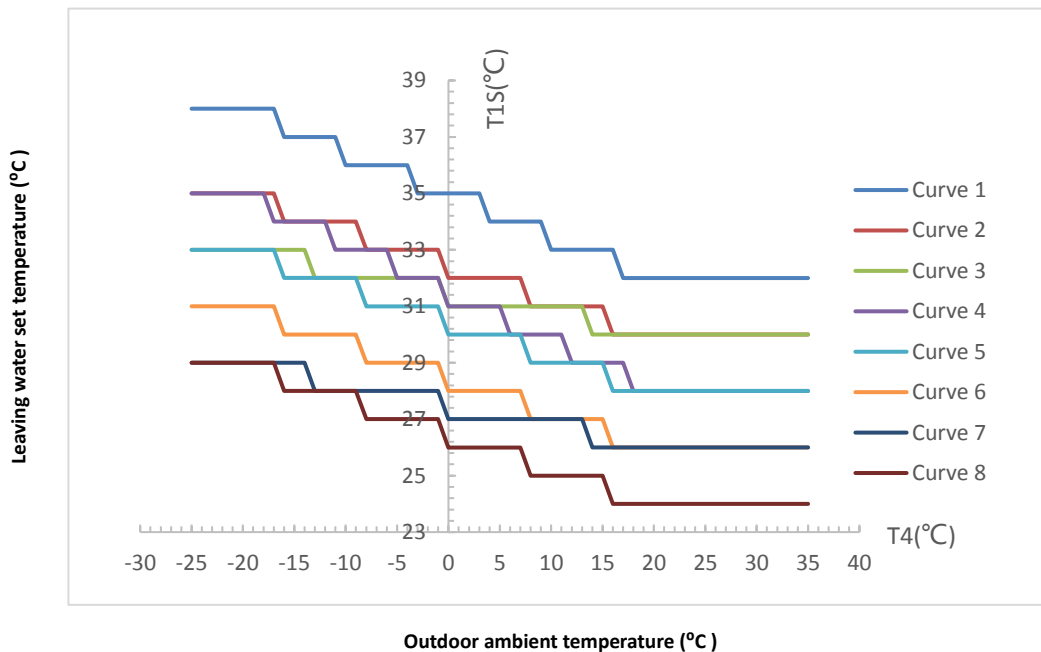
The curves for heating mode and ECO heating mode are the same but the default curve is curve 4 in heating mode, while in ECO mode, the default curve is curve 6. The default curves for cooling mode is curve 4. Once the curve is selected, the leaving water set temperature (T1s) is determined by the outdoor temperature. In each mode, each curve from the eight curves in the user interface can be selected. The relationship between outdoor ambient temperature (T4) and leaving water set temperature (T1s) is described as in Figure 3-9.2, Figure 3-9.3, Figure 3-9.4 and Figure 3-9.5.

Figure 3-9.1: WEATHER TEMP. SET menu

PRESET TEMPERATURE		
PRESET TEMP.	WEATHER TEMP.SET	ECO MODE
ZONE1 C-MODE LOW TEMP.		OFF
ZONE1 H-MODE LOW TEMP.		OFF
ZONE2 C-MODE LOW TEMP.		OFF
ZONE2 H-MODE LOW TEMP.		OFF
ON/OFF ON/OFF		

The automatic setting curves are the ninth curve for cooling and heating mode, the ninth curve can be set as in Figure 3-9.6 and Figure 3-9.7.

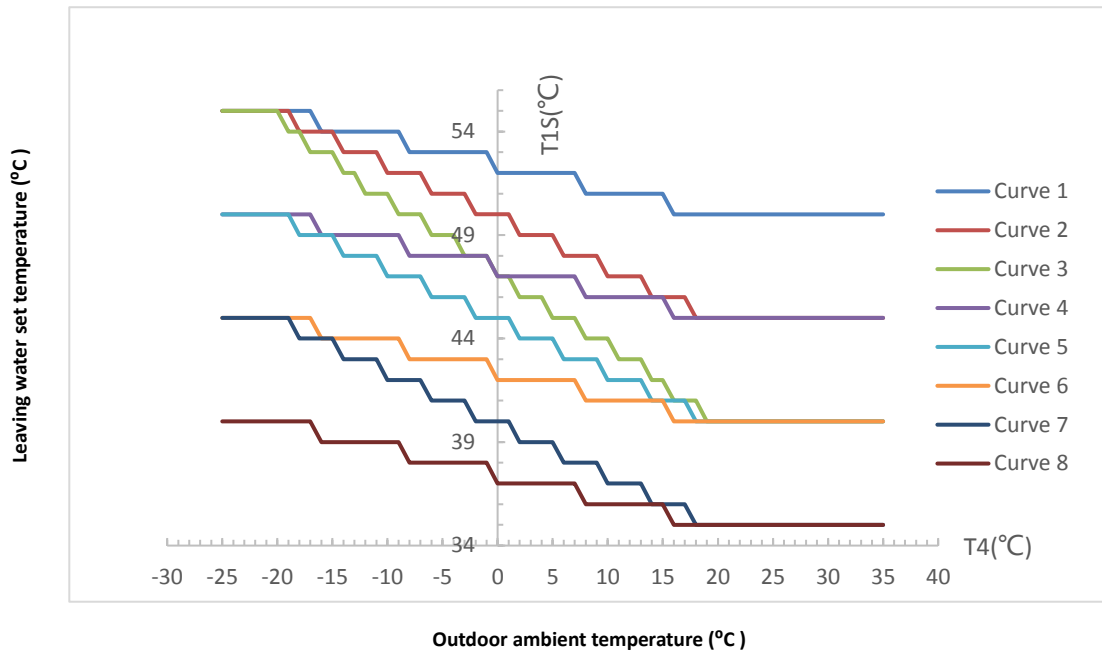
Figure 3-9.2: Low temperature curves for heating mode¹



Notes:

1. It only has the curves of the low temperature setting for heating, if the low temperature is set for heating.
2. Curve 4 is default in low temperature heating mode and curve 6 is default in ECO mode.

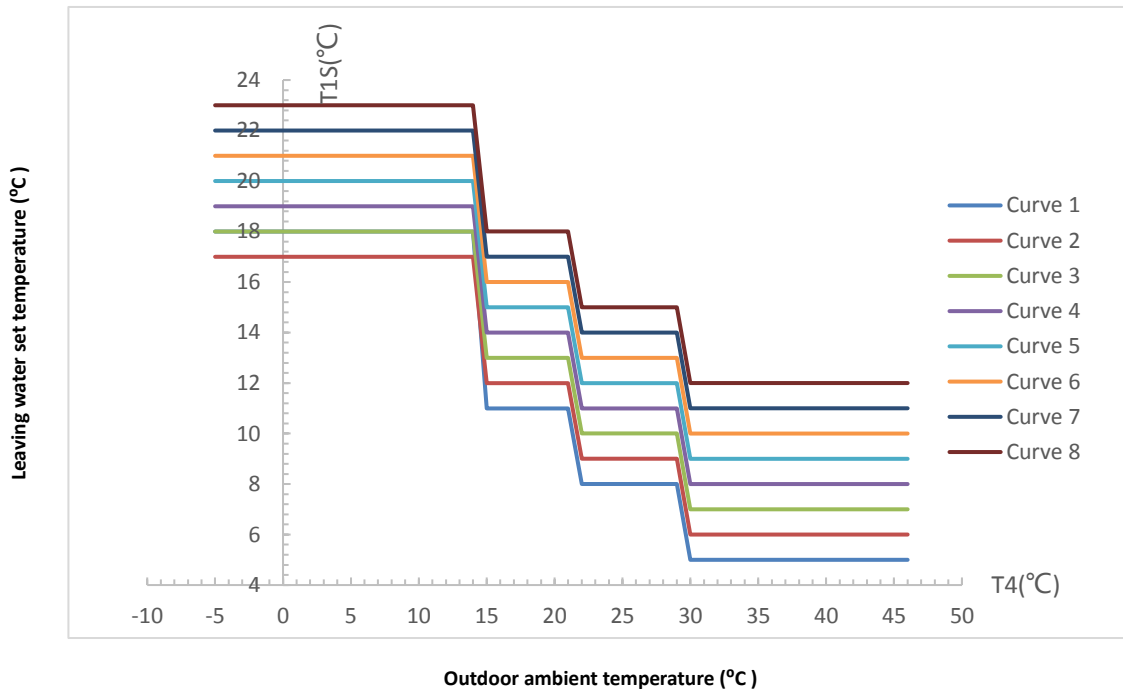
Figure 3-9.3: High temperature curves for heating mode¹



Notes:

1. It only has the curves of the high temperature setting for heating, if the high temperature is set for heating.
2. Curve 4 is default in high temperature heating mode and curve 6 is default in ECO mode.

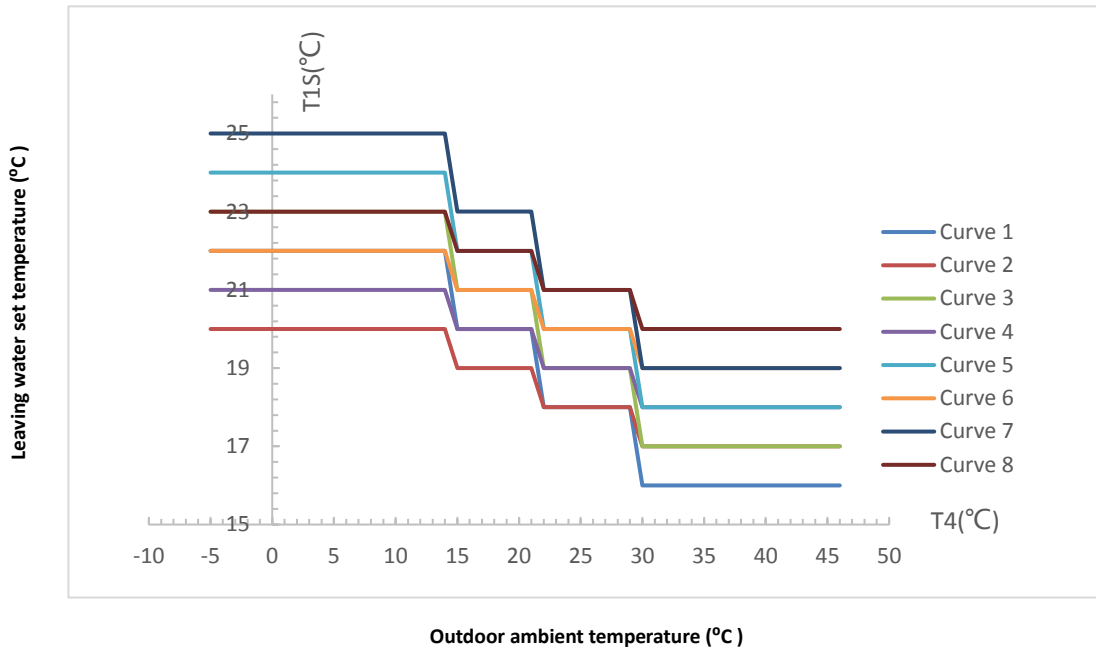
Figure 3-9.4: Low temperature curves for cooling mode¹



Notes:

1. It only has the curves of the low temperature setting for cooling, if the low temperature is set for cooling.
2. Curve 4 is default in low temperature cooling mode and curve 6 is default in ECO mode.

Figure 3-9.5: High temperature curves for cooling mode¹



Notes:

1. It only has the curves of the high temperature setting for cooling, if the high temperature is set for cooling.
2. Curve 4 is default in high temperature cooling mode and curve 6 is default in ECO mode.

Figure 3-9.6: Automatic setting curve for heating mode

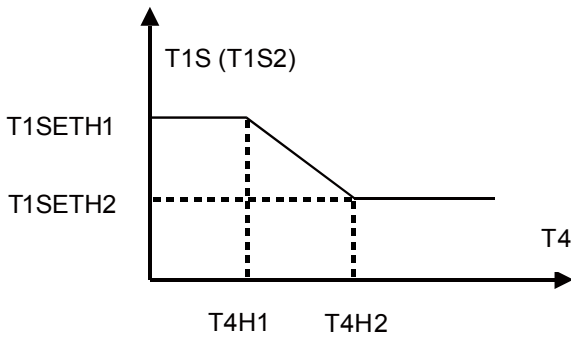
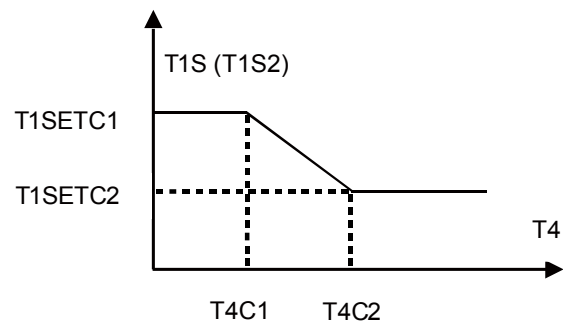


Figure 3-9.7: Automatic setting curve for cooling mode



The setting of T1SETH1, T1SETH2, T4H1, T4H2 refer to Part 3, 7.6" HEATING MODE SETTING Menu" and T1SETC1, T1SETC2, T4C1, T4C2 refer to Part 3, 7.5" COOLING MODE SETTING Menu".

11 Error Code Table

Table 3-10.1: Error code table

Error code	Content ²
C7	Transducer module temperature too high protect
E0	Water flow failure (E8 appears 3 times)
E1	Phase sequence error (for 3 phase models)
E2	Communication error between the main control board of hydraulic module and user interface
E3	Backup electric heater exchanger water outlet temperature sensor T1 error
E4	Domestic hot water tank temperature sensor T5 error
E5	Air side heat exchanger refrigerant outlet temperature sensor T3 error
E6	Outdoor ambient temperature sensor T4 error
E7	Balance tank sensor Tbt1 error
E8	Water flow failure within 3 times
E9	Suction pipe temperature sensor Th error
EA	Discharge pipe temperature sensor Tp error
Eb	Solar board sensor Tsolar error
Ec	Balance tank sensor Tbt2 error
Ed	Water side heat exchanger water inlet temperature sensor Twin error
EE.	Hydronic box EEPROM error
F1	DC generatrix voltage is too low
H0	Communication error between outdoor unit main control chip and hydronic box main control chip
H1	Communication error between outdoor unit main control chip and inverter driver chip
H2	Water side heat exchanger refrigerant outlet (liquid pipe) temperature sensor error
H3	Water side heat exchanger refrigerant inlet (gas pipe) temperature sensor error
H4	Inverter module protection (L0/L1 appear 3 times in one hour)
H5	Room temperature sensor Ta error
H6	DC fan error
H7	Abnormal main circuit voltage
H8	Pressure sensor error
H9	Zone 2 water outlet temperature sensor Tw2 error
HA	Water side heat exchanger water outlet temperature sensor error
Hb	PP protection three times in a row and Twout<7°C
H.F.	Refrigerant system EEPROM error
HH	H6 appears 10 times in 120min
HP	Low pressure protection (pressure < 0.6MPa for 3 times in one hour)
P0	Low pressure protection
P1	High pressure protection
P3	Compressor current protection
P4	Discharge temperature sensor Tp protection
P5	High temperature difference between water side heat exchanger water inlet and water outlet temperatures protection
P6	Inverter module protection
L0	Inverter module protection
L1	DC bus low voltage protection
L2	DC bus high voltage protection
L4	MCE error

M thermal Mono



L5	Zero speed protection
L7	Phase sequence error
L8	Compressor frequency variation greater than 15Hz within one second protection
L9	Actual compressor frequency differs from target frequency by more than 15Hz protection
Pb	Water side heat exchanger anti-freeze protection
Pd	High temperature protection of refrigerant outlet temperature of condenser in cooling mode
PP	Water side heat exchanger inlet temperature is higher than outlet temperature in heating/DHW mode
bH	PED board error

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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.

