



Engineering Data

Aqua thermal Super



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Part 1

General Information

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1 System introduction

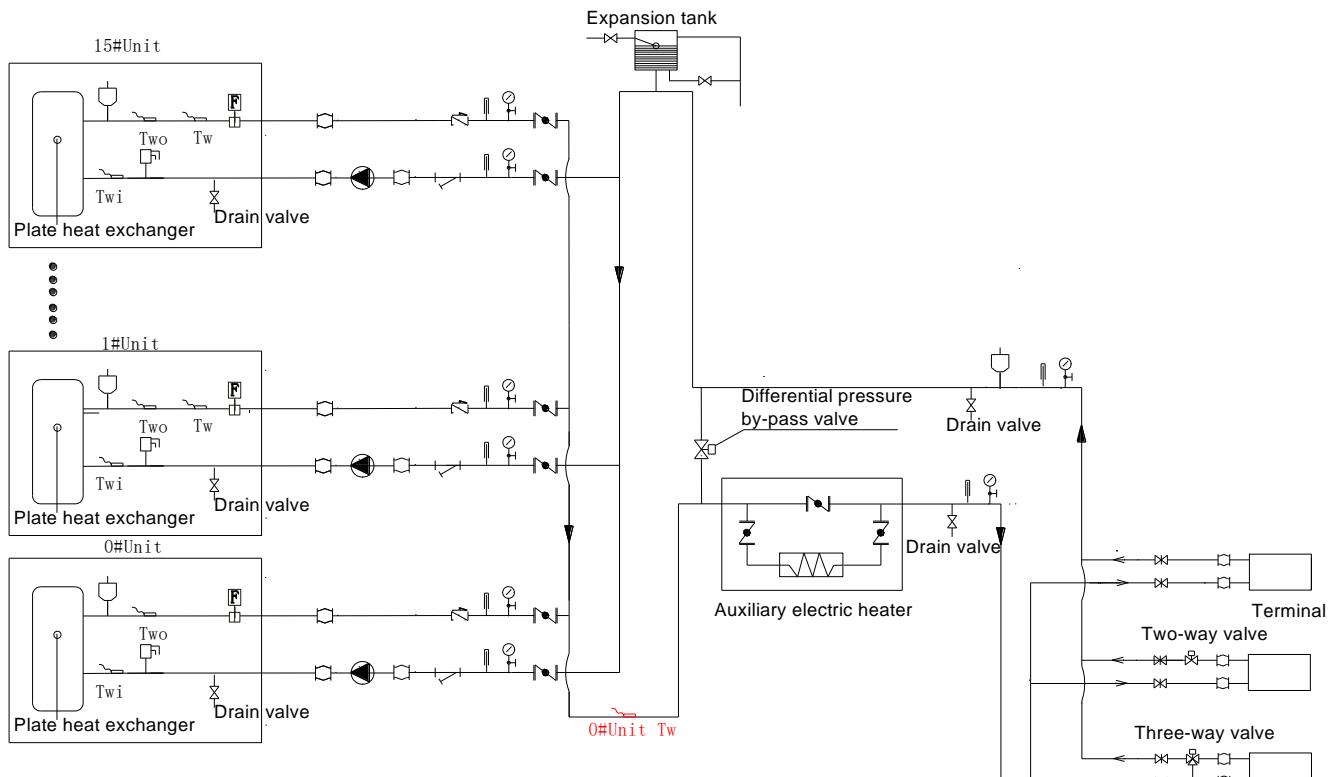
1.1 System Schematic

Aqua thermal Super is an integrated air-to-water space heating and space cooling heat pump system. 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. 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 the decrease of ambient temperature. Aqua thermal Super is reserved an auxiliary electric heater control port to provide additional heating capacity for use during extremely cold weather when the heat pump capacity is insufficient. The auxiliary 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 Typical Applications

1.2.1 Air Conditioning mode



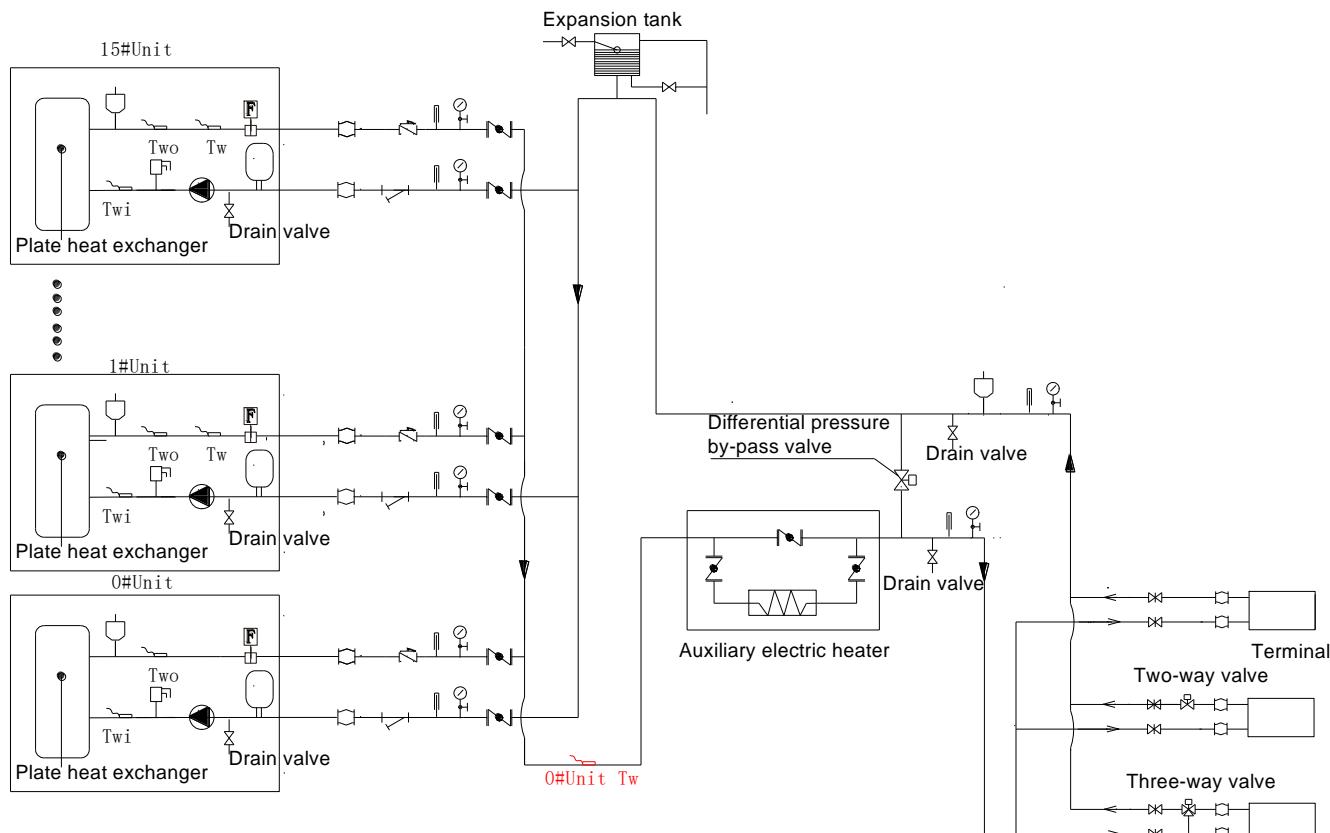
Symbol explanation

Drain valve	Water pressure instrument	Water flow switch	Gate valve	Differential pressure by-pass valve
Y-filter	Thermometer	Pump	Check valve	Atmospheric exhaust valve
Expansion tank	Safety valve	Soft joint	Solenoid three-way valve	

Note:

1. The ratio of the two - way valves on the terminal shall not exceed 50 percent.
2. The main outlet water temperature sensing (Tw) head of the unit at address 0 needs to be placed on the main outlet pipe.
3. The hot water tank and the hot water exchange pump of the unit use the CN125(220V)port control switch on the slave board of the 0 # unit, pump output is controlled through CN108 (0-10V). (CN125 is a three-way valve control port for switching between hot water mode and air conditioning mode)

1.2.2 Air Conditioning mode (unit with variable frequency pump)



Symbol explanation

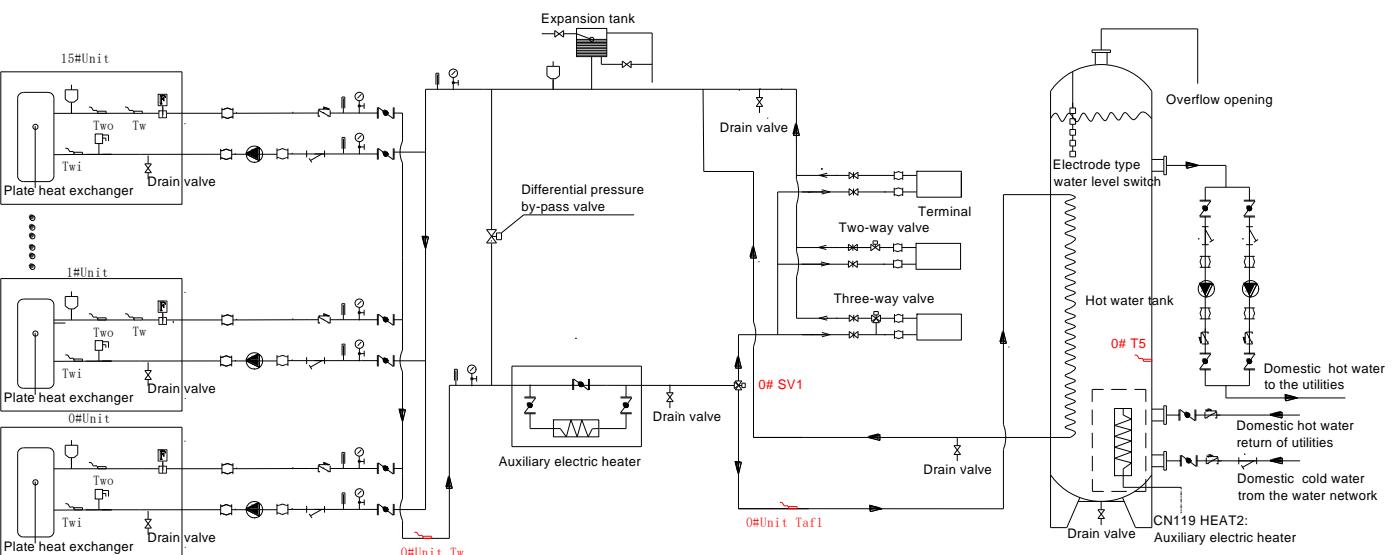
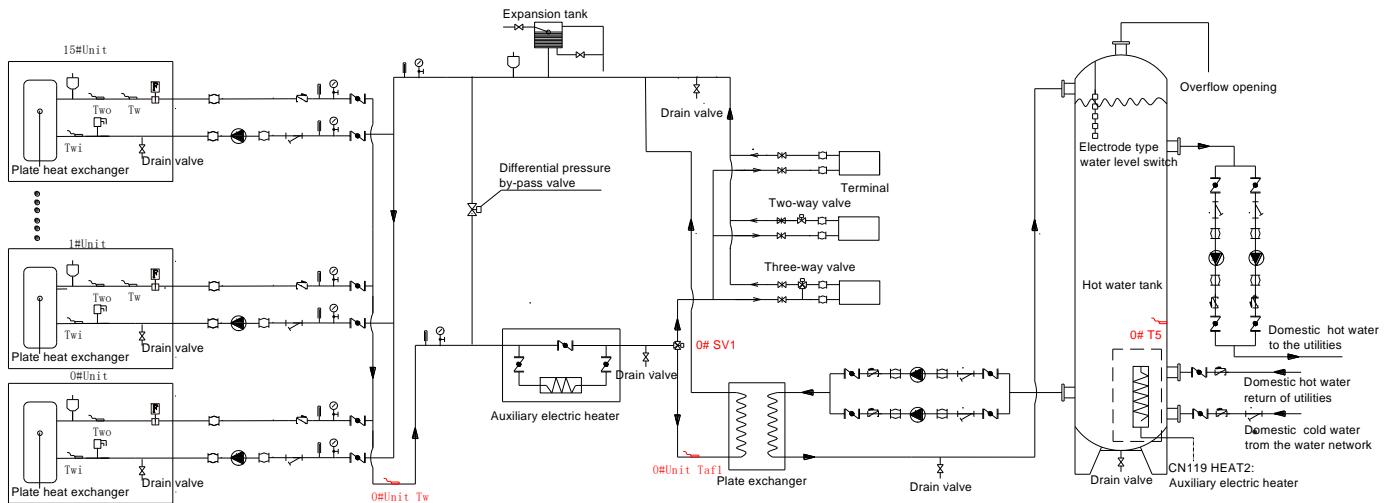
Drain valve	Water pressure instrument	Water flow switch	Gate valve	Differential pressure by-pass valve
Y-filter	Thermometer	Pump	Check valve	Atmospheric exhaust valve
Expansion tank	Safety valve	Soft joint	Solenoid three-way valve	

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1.2.3 Air conditioning and hot water mode



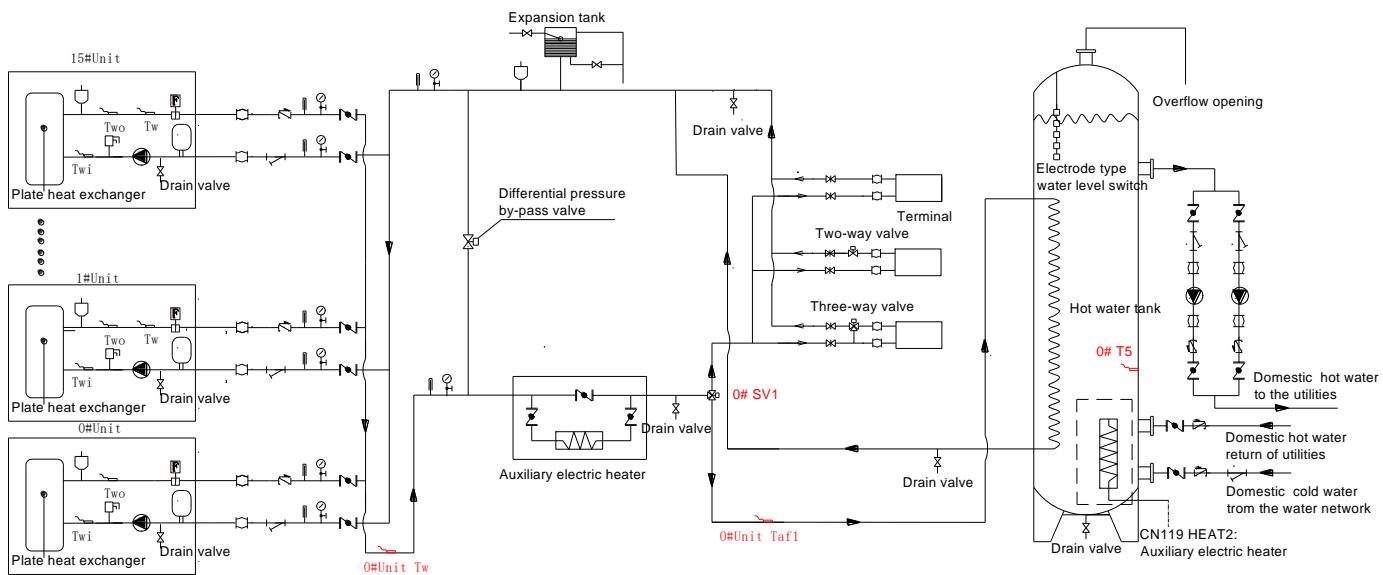
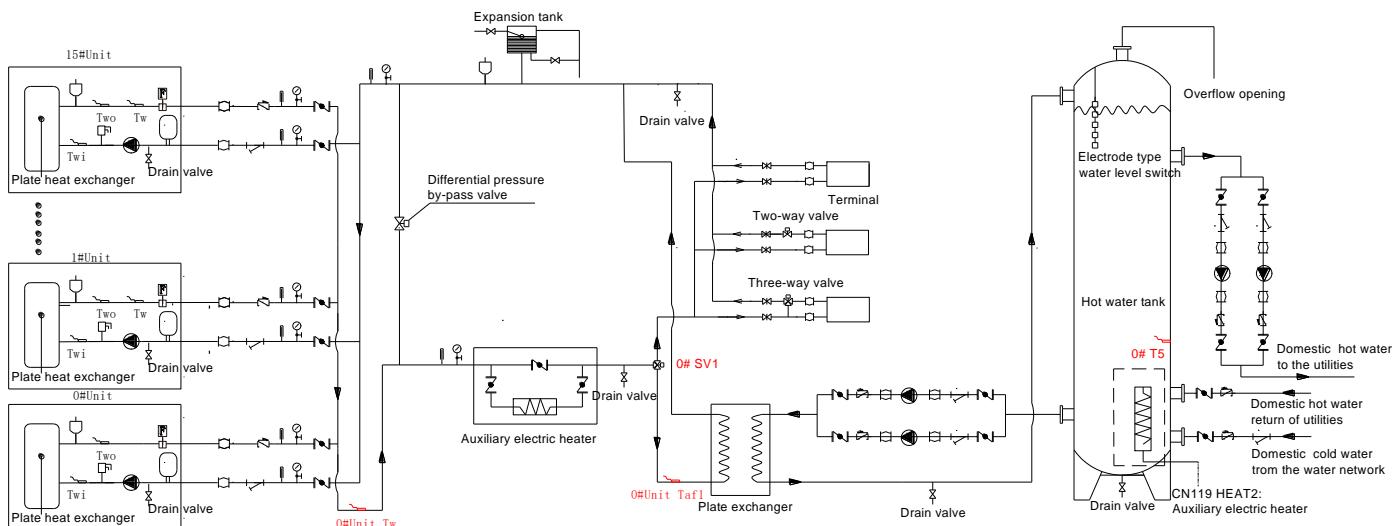
Symbol explanation

Drain valve	Water pressure instrument	Water flow switch	Gate valve	Differential pressure by-pass valve
Y-filter	Thermometer	Pump	Check valve	Atmospheric exhaust valve
Expansion tank	Safety valve	Soft joint	Solenoid three-way valve	

Note:

1. The ratio of the two - way valves on the terminal shall not exceed 50 percent.
2. The main outlet water temperature sensing (Tw) head of the unit at address 0 needs to be placed on the main outlet pipe.
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1.2.4 Air conditioning and hot water mode (unit with variable frequency pump)



Symbol explanation

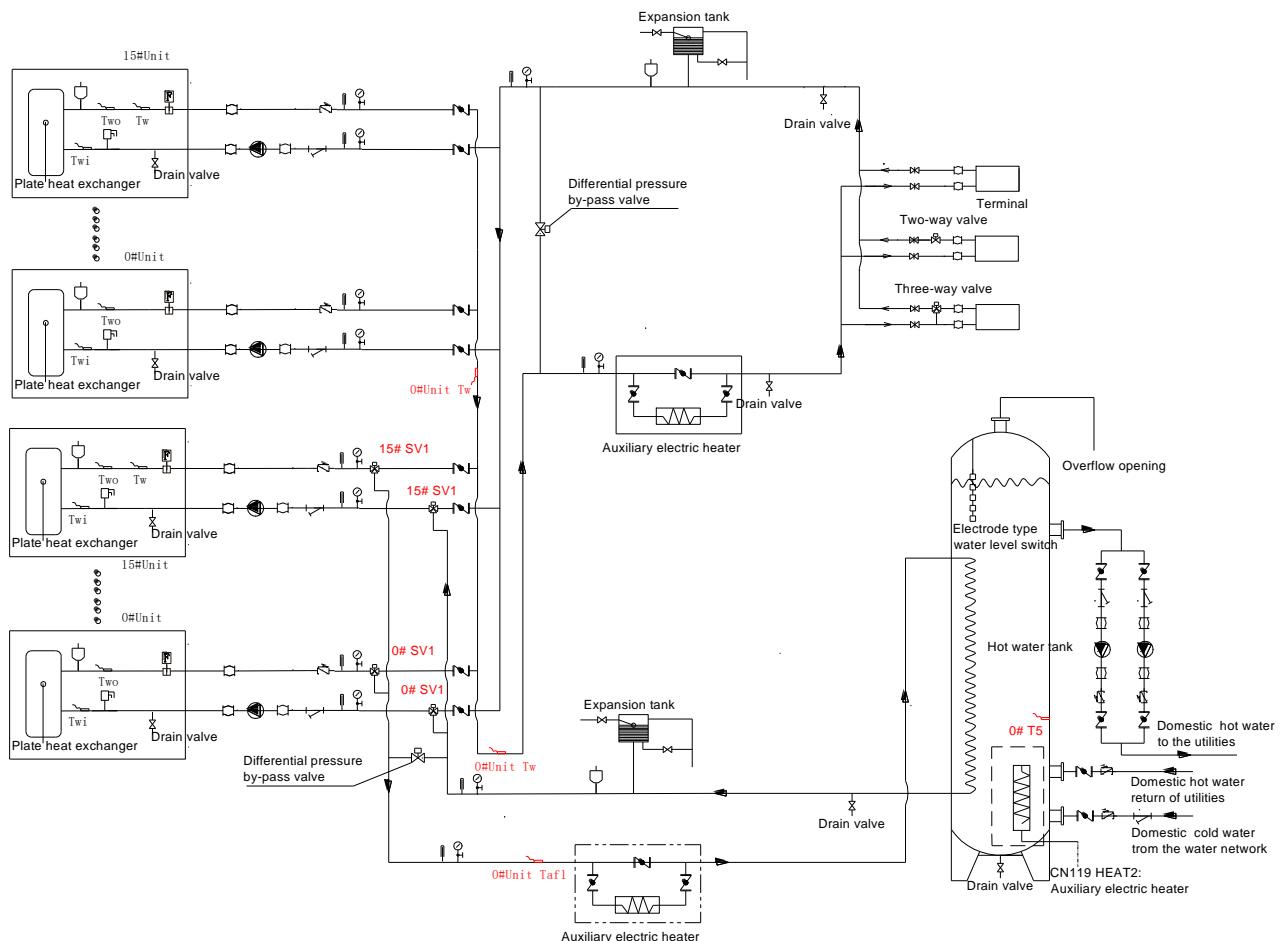
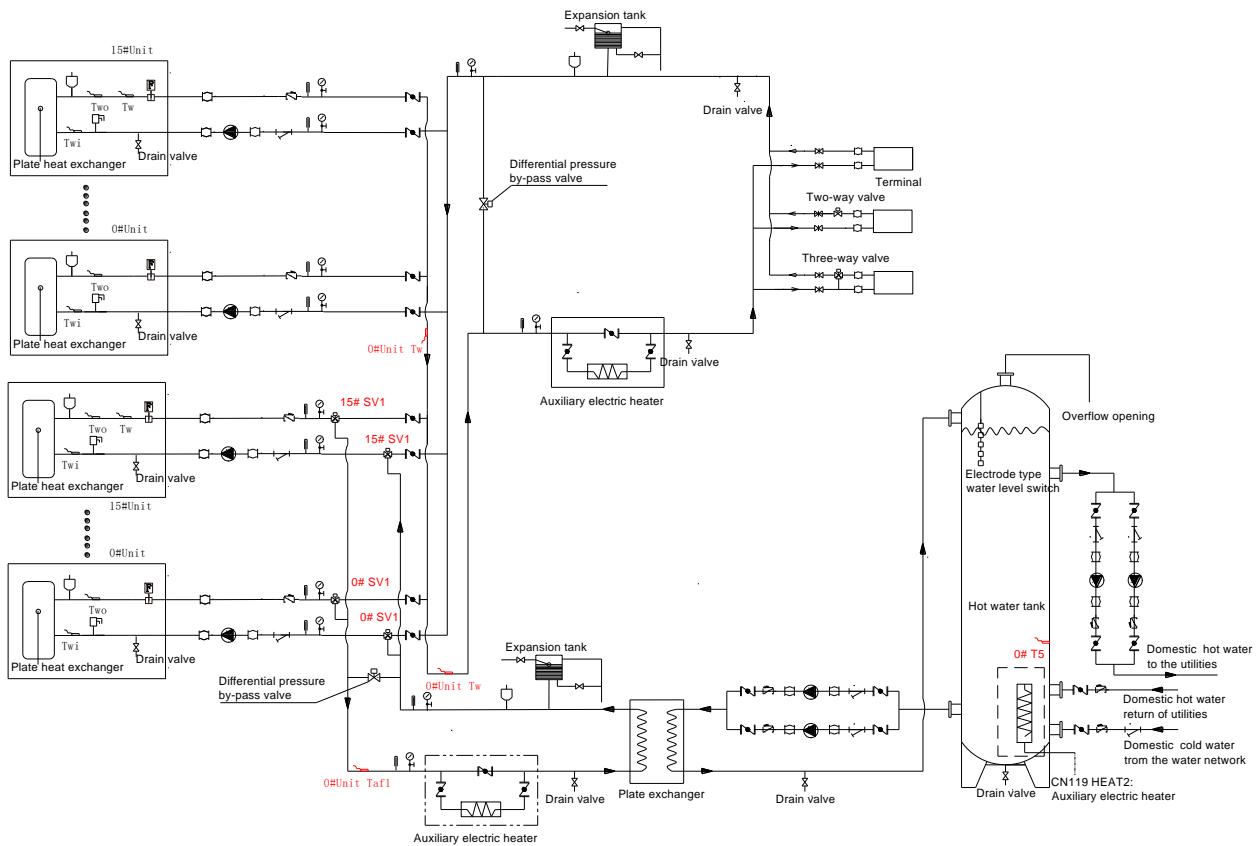
Drain valve	Water pressure instrument	Water flow switch	Gate valve	Differential pressure by-pass valve
Y-filter	Thermometer	Pump	Check valve	Atmospheric exhaust valve
Expansion tank	Safety valve	Soft joint	Solenoid three-way valve	

Note:

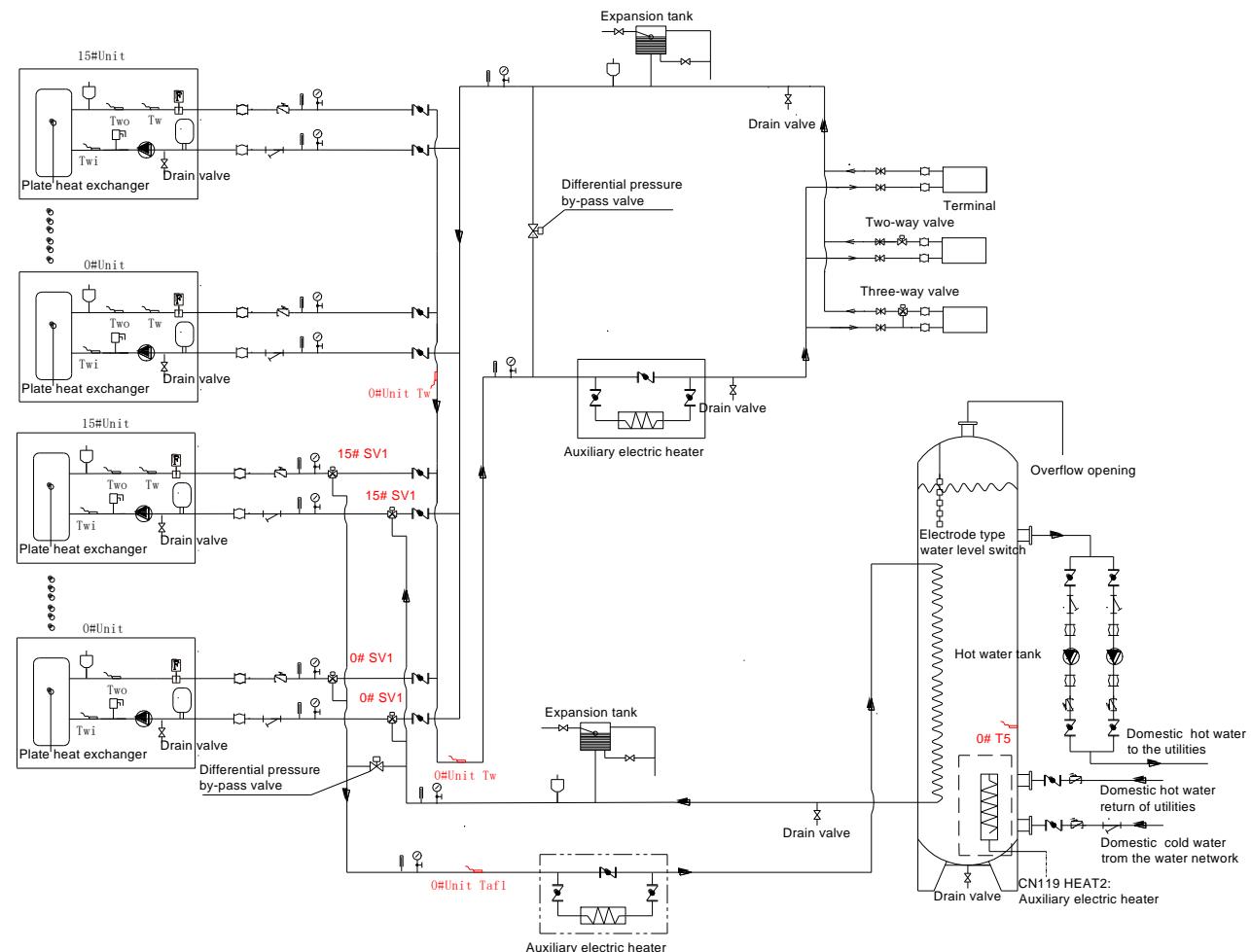
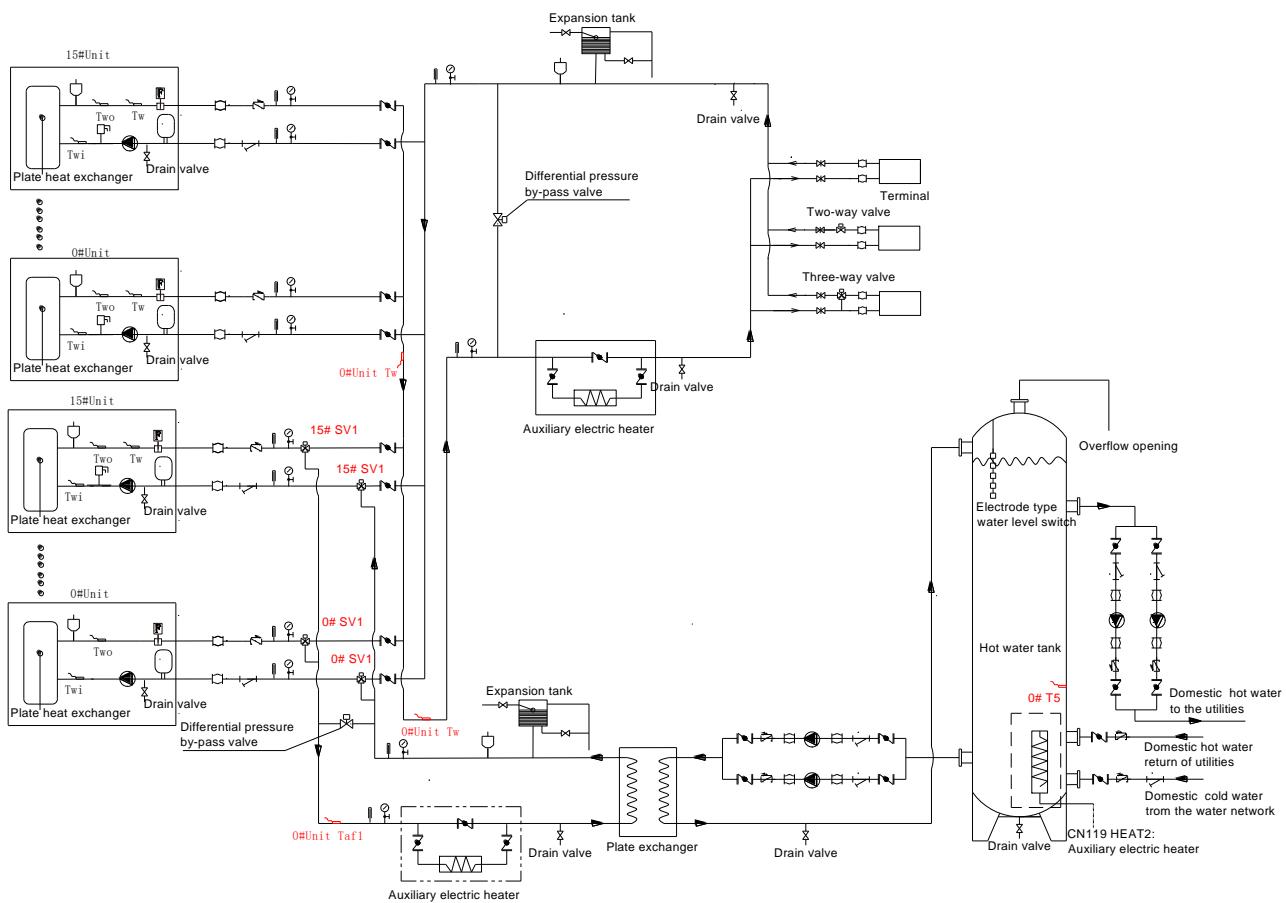
1. The ratio of the two - way valves on the terminal shall not exceed 50 percent.
2. The main outlet water temperature sensing (Tw) head of the unit at address 0 needs to be placed on the main outlet pipe.
3. The hot water tank and the hot water exchange pump of the unit use the CN125 (220V) port control switch on the slave board of the 0 # unit, pump output is controlled through CN108 (0-10V). (CN125 is a three-way valve control port for switching between hot water mode and air conditioning mode)

Aqua thermal Super

1.2.5 Cooling and hot water mode are operated simultaneously



1.2.6 Cooling and hot water mode are operated simultaneously (unit with variable frequency pump)



2 Product lineup

Model	MDVM-V50D2BR8-AS MDVM-V50MD2BR8-AS MDVM-V65D2BR8-AS MDVM-V65MD2BR8-AS MDVM-V75D2BR8-AS MDVM-V75MD2BR8-AS	MDVM-V110D2BR8-AS MDVM-V110MD2BR8-AS MDVM-V140D2BR8-AS MDVM-V140MD2BR8-AS
Power supply	380-415V/3Ph/50Hz	380-415V/3Ph/50Hz
Appearance		

3 Nomenclature

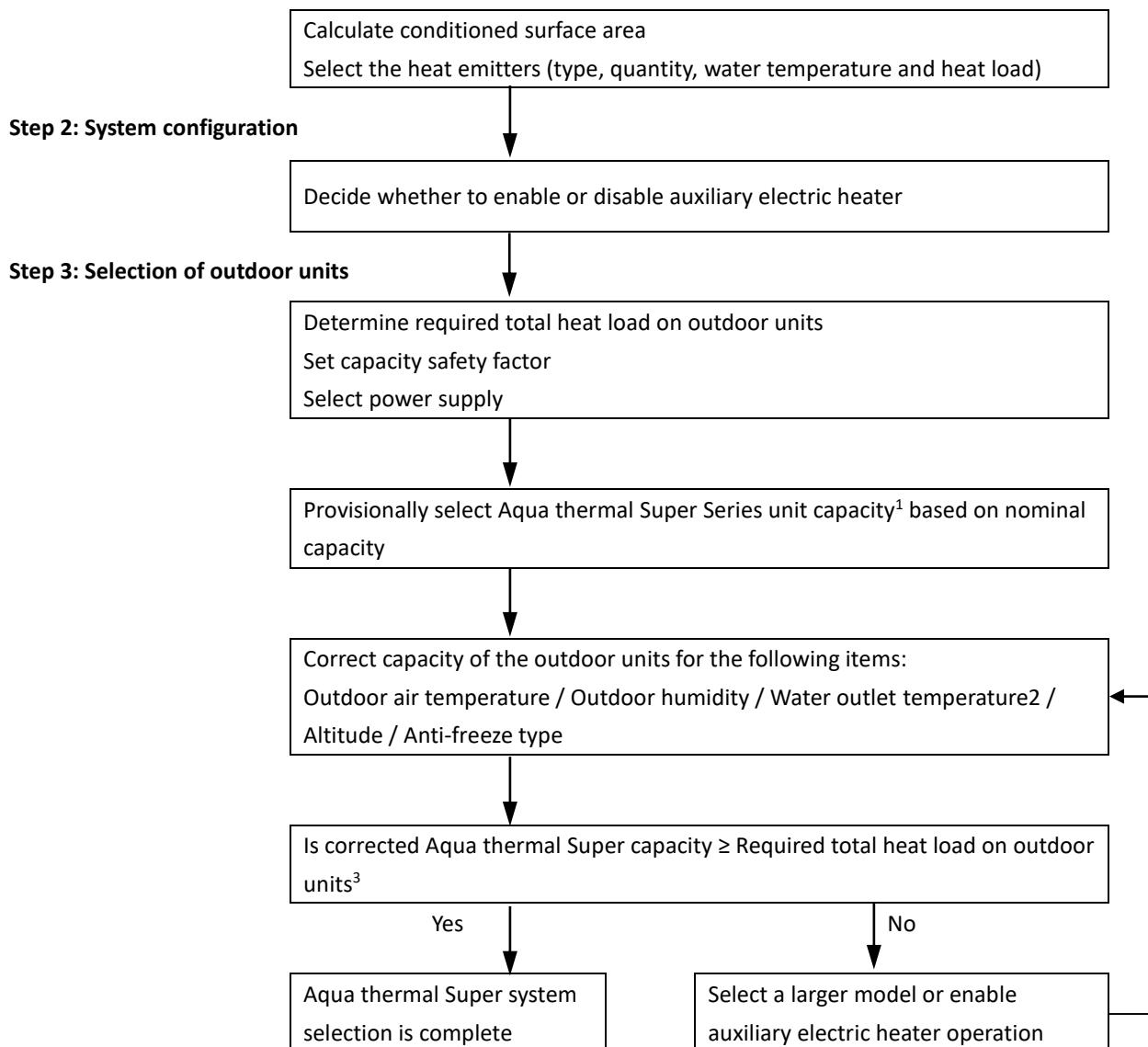
MDV	M	-	V	65	M	D2	B	R8	-	AS
1	2		3	4	5	6	7	8		9

Legend		
No.	Code	Remarks
1	MDV	Brand: MDV
2	M	M: Modular chiller
3	V	Inverter
4	65	Rated heating capacity (kW) 65: 65 kW/h; 110: 110 kW/h;
5	D2	Compressor and fan motor types D2: All DC
6	B	Power supply: B:380-415V/3Ph/50Hz
7	M	M: With hydronic module Omitted: Without hydronic module
8	R8	Refrigerant type R8: R32
9	AS	Version code: AS: Aqua thermal Super

4 System Design and Unit Selection

4.1 Selection Procedure

Step 1: Total heat load calculation



Notes:

- Up to 16 units can be connected together, giving a system cooling/heating capacity range from 65kW to 2240kW.
- If the required water temperatures of the heat emitters are not all the same, the Aqua thermal Super'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.
- Select Aqua thermal Super which satisfies both total heating and cooling load requirements.

4.2 Modular Chiller Leaving Water Temperature (LWT) Selection

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

- For floor heating: 35 to 45°C
- For fan coil units: 40 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 Aqua thermal Super, 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.

4.4 Design of the buffer tank in the system

4.4.1 Selection of buffer tank

The role of the buffer water tank:

In cooling mode, it prevents frequent opening and stopping of the equipment, thus protecting it.

The buffer water tank serves different purposes depending on whether the system is in cooling or heating mode. In heating mode, it ensures system stability during defrosting and reduces the need for frequent start-stop of the unit under small load conditions.

Design calculation method:

a) Calculation of defrosting time under heating conditions

The most significant factor affecting the air source heat pump heating system is the defrosting of the winter unit. To ensure thermal stability, the main engine's defrosting time should be limited to 4 minutes during winter operation. Additionally, the water temperature before and after defrosting should not decrease by more than 3°C. The buffer tank's volume should be calculated based on the above data.

Heating conditions, minimum effective water capacity calculation:

$$M_H = [Q_h \times H_{min} \times T_H / (C \times \Delta T_H)] / \rho$$

Where:

M_H : minimum water capacity of the system, m³;

Q_h : rated heat production of the main engine, kW;

H_{min} : coefficient of defrosting ability, %; generally take: 50%;

ΔT_H : Water temperature drop before and after defrosting, °C; Conventional units generally take 3°C;

C: specific heat gain of water 4.18 kJ/(kg·°C);

ρ : Density of water, 1000 kg/m³;

T_H : defrosting time, S; generally take 240S

b) Cooling running time calculation method

During the cooling process, avoid frequently opening and stopping the equipment to protect it. Ensure that there is enough water to allow the equipment to run continuously for at least 5 minutes.

Refrigeration conditions, the minimum effective water capacity calculation:

$$M_C = [Q_c \times C_A \times C_{min} \times T_C / (C \times \Delta T_C)] / \rho$$

Where:

M_C : minimum system water capacity, m³;

Q_c : cooling rated capacity, kW;

C_A : Capacity coefficient of small load condition: generally: 1.6.

C_{min} : the minimum operating capacity ratio of the unit, %; Fixed frequency according to 100%; Frequency conversion unit according to 30%;

△TC: Control temperature range, °C; Factory default 4°C;

C: specific heat gain of water 4.18 kJ/(kg·°C);

ρ : Density of water, 1000 kg/m³;

Tc: cooling operation time, S, generally 300S;

C) Calculate the system capacity according to the cooling and heating conditions, and take the maximum value;

M=MAX (M_H,M_c)

Single cooling unit takes M_c, single heating unit takes M_H;

d) The effective water capacity of a water system refers to its total capacity, including the main pipeline, water storage tank, and the normally open end of the two-way valve involved in circulation during operation.

M₂ =V× L

Where: M₂: effective water capacity of water system, m³;

L: Total length of system pipeline, m;

V: Water capacity m³/m per meter pipe length of each model system pipeline.

e) Buffer tank volume refers to the minimum water capacity required to meet the normal operation of the unit:

V_{min} = M – M₂

V_{min} - Minimum volume of buffer tank, m³.

4.4.2 Empirical Estimation Method

For renovation projects where the system water capacity cannot be estimated, the volume of the buffer tank can be estimated empirically using the following formula:

V_{min} = Q × K. Here, V_{min} represents the minimum volume of the buffer tank in litres.

The comfort air conditioning requires 10 L/kW and the process air conditioning requires 15. The stability of the system water temperature increases with a higher K value.

The main mechanism for heat is measured in kW.

(3) Precautions for buffer tank selection:

a) The configuration of the buffer tank depends on the specific project instance. If the water system capacity is large or the end form is in the form of floor heating, the buffer tank should not be added. However, increasing the size of the buffer water tank has several advantages for the system's operation. It helps to avoid frequent opening and stopping of the main engine under small load conditions, prevents defrosting of the main engine, and ensures that there is enough water in the system to meet the unit defrosting requirements. This improves the comfort of the unit. Therefore, it is necessary to comprehensively consider various factors on the site from an investment perspective.

b) There are two methods to calculate the volume of the buffer tank. The results differ, with method 1 being more accurate as it is based on actual operation data analysis. Therefore, it is recommended to use method 1 for actual design and selection. Method 2 is an empirical estimate.

C) When using multiple units in parallel, it is recommended to base the calculation on the maximum capacity of the parallel unit.

Part 2

Engineering Data

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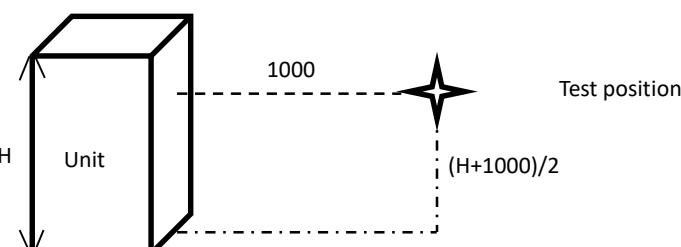
1 Specifications

Model			MDVM-V50D2 BR8-AS	MDVM-V65D2 BR8-AS	MDVM-V75D2 BR8-AS	MDVM-V110D2 BR8-AS	MDVM-V140D2 BR8-AS		
Power supply		V/Ph/ Hz	380~415/3/50	380~415/3/50	380~415/3/50	380~415/3/50	380~415/3/50		
Cooling(A35 W7)	Capacity	kW	50.25	57	70	100	130		
	Input	kW	14.45	19.00	26.80	32.78	50.00		
	EER		3.48	3.00	2.61	3.05	2.60		
Cooling(A35 W18)	Capacity	kW	50.40	76	86	128	138		
	Input	kW	9.55	20.27	23.12	33.70	36.32		
	EER		5.28	3.75	3.72	3.80	3.80		
SEER			5.00	5.00	5.00	4.80	4.80		
Heating(A7 W65)	Capacity	kW	49.90	60	61	100	110		
	Input	kW	19.88	26.10	26.75	42.90	50.00		
	COP		2.51	2.30	2.28	2.33	2.20		
Heating(A7 W55)	Capacity	kW	49.80	64	66	106	126		
	Input	kW	15.57	21.33	22.15	35.30	49.22		
	COP		3.20	3.00	2.98	3.00	2.56		
Heating(A7 W45)	Capacity	kW	49.60	65	75	110	140		
	Input	kW	12.26	18.30	22.06	29.90	44.73		
	COP		4.05	3.55	3.40	3.68	3.13		
Heating(A7 W35)	Capacity	kW	49.50	64	77	112	142		
	Input	kW	10.46	15.24	19.74	27.00	38.17		
	COP		4.73	4.20	3.90	4.15	3.72		
SCOP(55)average			3.40	3.40	3.40	3.25	3.25		
SCOP(35)average			4.50	4.50	4.50	4.25	4.25		
Fan	Type	DC motor							
	Quantity	2	2	2	2	2	2		
	Air flow rate	m³/h	22000	22000	28500	32500	50000		
Air side heat exchanger	Type	Fin coil mode							
	Row	2	2	2	2	2	2		
	thickness	mm	0.095	0.095	0.095	0.095	0.095		
	pipe diameter	mm	7	7	7	7	7		
Water side heat exchanger	Type	Plate heat exchanger							
	Water pressure drop	kPa	34	44	65	39	65		
	Volume	L	5.17	5.17	5.17	11.1	11.1		
	Rated water flow(cool ing)	m³/h	8.60	9.8	12.04	17.2	22.36		
	Rated	m³/h	8.60	11.2	12.9	18.9	24.08		

	water flow(heating)						
	Water flow range	m ³ /h	3~14	3~14	3~14	5~26	5~26
Refrigerant system	Type	R32	R32	R32	R32	R32	R32
	Charge kg	9	9	9	15.5	15.5	
	Throttle type	EXV	EXV	EXV	EXV	EXV	EXV
Sound power level (A7W45)	dB(A)	80	80	86	80	92	
Sound pressure level(1m) ¹ (A7W45)	dB(A)	64	64	69	64	73	
Silent mode sound power level(A7W45)	dB(A)	77	77	82	75	88	
Super Silent mode sound power level(A7W45)	dB(A)	74	74	78	72	85	
Net dimensions(W×H×D)	mm	2000×1770×960	2000×1770×960	2000×1770×960	2220×2300×1135	2220×2300×1135	
Packed dimensions (W×H×D)	mm	2085×1890×1030	2085×1890×1030	2085×1890×1030	2250×2445×1180	2250×2445×1180	
Net / Gross weight	kg	440 / 455	440 / 455	440 / 455	670 / 690	670 / 690	
Water pipe connection	mm	DN50	DN50	DN50	DN65	DN65	
Ambient temperature range	Cooling	°C	-15 to 48	-15 to 48	-15 to 48	-15 to 48	-15 to 48
	Heating	°C	-25 to 43	-25 to 43	-25 to 43	-25 to 43	-25 to 43
	DHW	°C	-20 to 43	-20 to 43	-20 to 43	-20 to 43	-20 to 43
Water outlet temperature range	Cooling ²	°C	0 to 20	0 to 20	0 to 20	0 to 20	0 to 20
	Heating	°C	25 to 65	25 to 65	25 to 65	25 to 65	25 to 65
	DHW(Heat at pump)	°C	30 to 62	30 to 62	30 to 62	30 to 62	30 to 62
	DHW ³	°C	30 to 70	30 to 70	30 to 70	30 to 70	30 to 70

Notes:

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



2. Antifreeze fluid is need when water temperature is less than 5 °C.
3. Heat pump + Electric heater, Electric heater installed in the tank is field supplied.



Model		MDVM-V50MD 2BR8-AS	MDVM-V65MD 2BR8-AS	MDVM-V75MD 2BR8-AS	MDVM-V110MD 2BR8-AS	MDVM-V140MD 2BR8-AS
Power supply	V/Ph /Hz	380~415/3/50	380~415/3/50	380~415/3/50	380~415/3/50	380~415/3/50
Cooling(A3 5W7)	Capacity	kW	50.00	56.68	69.29	99.33
	Input	kW	15.15	19.79	28.26	34.09
	EER		3.30	2.86	2.45	2.91
Cooling(A3 5W18)	Capacity	kW	50.00	75.30	85.07	127.26
	Input	kW	10.20	22.14	25.06	35.50
	EER		4.90	4.90	3.39	3.58
SEER			4.92	4.92	4.85	4.78
Heating(A7 W65)	Capacity	kW	50.00	60.10	61.10	100.12
	Input	kW	20.00	26.24	26.89	43.27
	COP		2.50	2.29	2.27	2.31
Heating(A7 W55)	Capacity	kW	50.00	64.15	66.15	106.32
	Input	kW	15.87	21.68	22.50	35.85
	COP		3.15	2.96	2.94	2.97
Heating(A7 W45)	Capacity	kW	50.00	65.65	75.71	110.67
	Input	kW	13.16	19.43	23.51	31.21
	COP		3.80	3.38	3.22	3.55
Heating(A7 W35)	Capacity	kW	50.00	64.65	77.70	113.14
	Input	kW	11.36	16.37	21.61	28.52
	COP		4.40	3.95	3.59	3.97
SCOP(55)average			3.36	3.36	3.36	3.23
SCOP(35)average			4.47	4.47	4.47	4.23
Fan	Type		DC motor	DC motor	DC motor	DC motor
	Quantity		2	2	2	2
	Air flow rate	m³/h	22000	22000	28500	32500
Air side heat exchanger	Type		Fin coil mode	Fin coil mode	Fin coil mode	Fin coil mode
	Row		2	2	2	2
	thickness	mm	0.095	0.095	0.095	0.095
	pipe diameter	mm	7	7	7	7
Water side heat exchanger	Type		Plate heat exchanger	Plate heat exchanger	Plate heat exchanger	Plate heat exchanger
	head of delivery	m	25.8	23.0	17.3	18.0
	Volume	L	5.17	5.17	5.17	11.1
	Rated water flow(coo ling)	m³/h	8.60	9.80	12.04	17.2
	Rated water flow(hea	m³/h	8.60	11.2	12.9	18.9

Aqua thermal Super

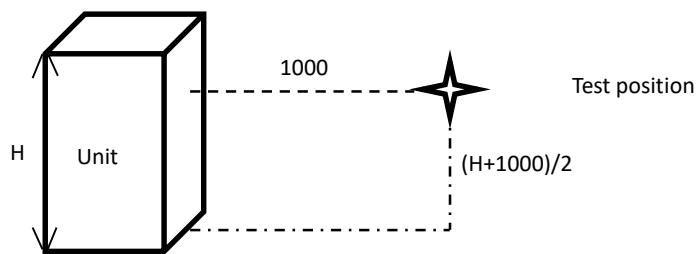


	ting)						
	Water flow range	m ³ /h	3~14	3~14	3~14	5~26	5~26
Refrigerant system	Type		R32	R32	R32	R32	R32
	Charge kg		9	9	9	15.5	15.5
	Throttle type		EXV	EXV	EXV	EXV	EXV
Water pump	Pump model	MHIE802-1/10 /E/3-380-60-2		MHIE802-1/10/E/3-380-60-2		MHIE802-1/10/E/3-380-60-2 + MHI802-1/10/E/3-380-50-2	
Expansion tank	Volume L	12	12	12	22	22	
	Precharge pressure Mpa	0.15	0.15	0.15	0.15	0.15	
	Test pressure Mpa	1	1	1	1	1	
Sound power level (A7W45)	dB(A)	83	83	89	83	93	
Sound pressure level(1m) ¹ (A7W45)	dB(A)	64	64	69	64	73	
Silent mode sound power level(A7W45)	dB(A)	/	/	65	/	69	
Super Silent mode sound power level(A7W45)	dB(A)	/	/	61	/	66	
Net dimensions(W×H×D)	mm	2000X1770X960	2000X1770X960	2000X1770X960	2220×2300×1135	2220×2300×1135	
Packed dimensions (W×H×D)	mm	2085X1890X1030	2085X1890X1030	2085X1890X1030	2250×2445×1180	2250×2445×1180	
Net / Gross weight	kg	475 / 490	475 / 490	475 / 490	746 / 767	746 / 767	
Water pipe connection	mm	DN50	DN50	DN50	DN65	DN65	
Ambient temperature range	Cooling	°C	-15 to 48	-15 to 48	-15 to 48	-15 to 48	-15 to 48
	Heating	°C	-25 to 43	-25 to 43	-25 to 43	-25 to 43	-25 to 43
	DHW	°C	-20 to 43	-20 to 43	-20 to 43	-20 to 43	-20 to 43
Water outlet temperature range	Cooling ²	°C	0 to 20	0 to 20	0 to 20	0 to 20	0 to 20
	Heating	°C	25 to 65	25 to 65	25 to 65	25 to 65	25 to 65
	DHW(Heat at pump)	°C	30 to 62	30 to 62	30 to 62	30 to 62	30 to 62
	DHW ³	°C	30 to 70	30 to 70	30 to 70	30 to 70	30 to 70

Water pump	Pump model		MHIE802-1/10/E/3-380-60-2	MHI802-1/10/E/3-380-50-2
	Power supply	V/Ph/Hz	380V ±10% 3P 50/60Hz	380V ±10% 3P 50Hz
	Rated power	KW	1.78	0.93
	Rated current	A	3.25	1.83
	Rated pump head	m	27.1	15.0
	Rated speed	r/min	3480	2825

Notes:

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



2. Antifreeze fluid is need when water temperature is less than 5 °C.
3. Heat pump + Electric heater, Electric heater installed in the tank is field supplied.

2 Electrical Characteristics

System	Outdoor unit				Power current		Compressor		Fan	
	Voltage	Hz	Min.	Max.	MCA	MOP	MSC	RLA	kW	FLA
	(V)		(V)	(V)	(A)	(A)	(A)	(A)		(A)
MDVM-V50D2BR8-AS MDVM-V50MD2BR8-AS	380-415	50	342	456	46	54	-	34.09	0.30	1.1
MDVM-V65D2BR8-AS MDVM-V65MD2BR8-AS	380-415	50	342	456	46	54	-	34.09	0.39	1.4
MDVM-V75D2BR8-AS MDVM-V75MD2BR8-AS	380-415	50	342	456	46	54	-	34.09	0.72	2.5
MDVM-V110D2BR8-AS MDVM-V110MD2BR8-AS	380-415	50	342	456	90	106	-	34.09	0.68	1.7
MDVM-V140D2BR8-AS MDVM-V140MD2BR8-AS	380-415	50	342	456	90	106	-	34.09	1.60	4.0

Note:

MCA: Min. Circuit Amps. (For wire diameter selection)

MOP: Maximum overcurrent protector

MSC : Max. Starting Amps.

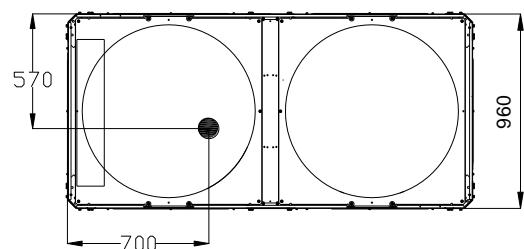
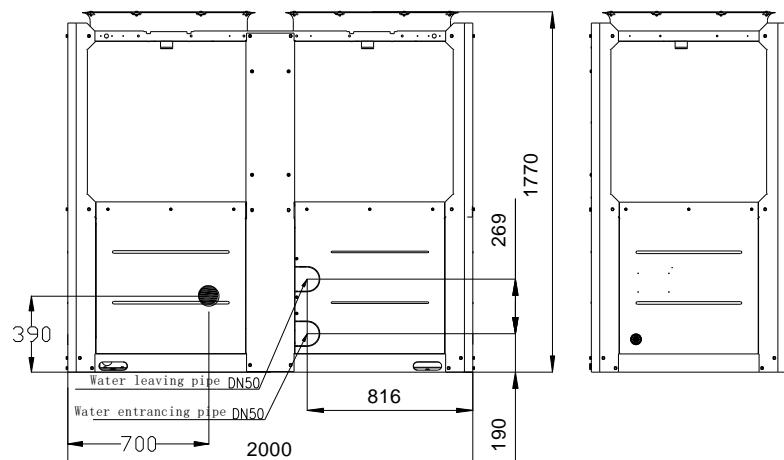
FLA: Full Load Amps.

KW: Rated Motor Output

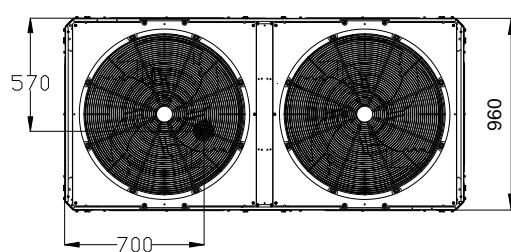
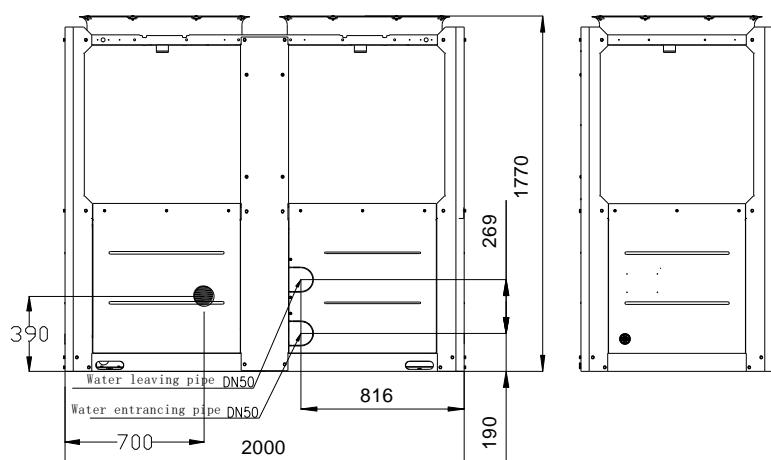
RLA: In nominal cooling or heating test condition, the input Amps of compressor where MAX. Hz can operate Rated Load Amps.

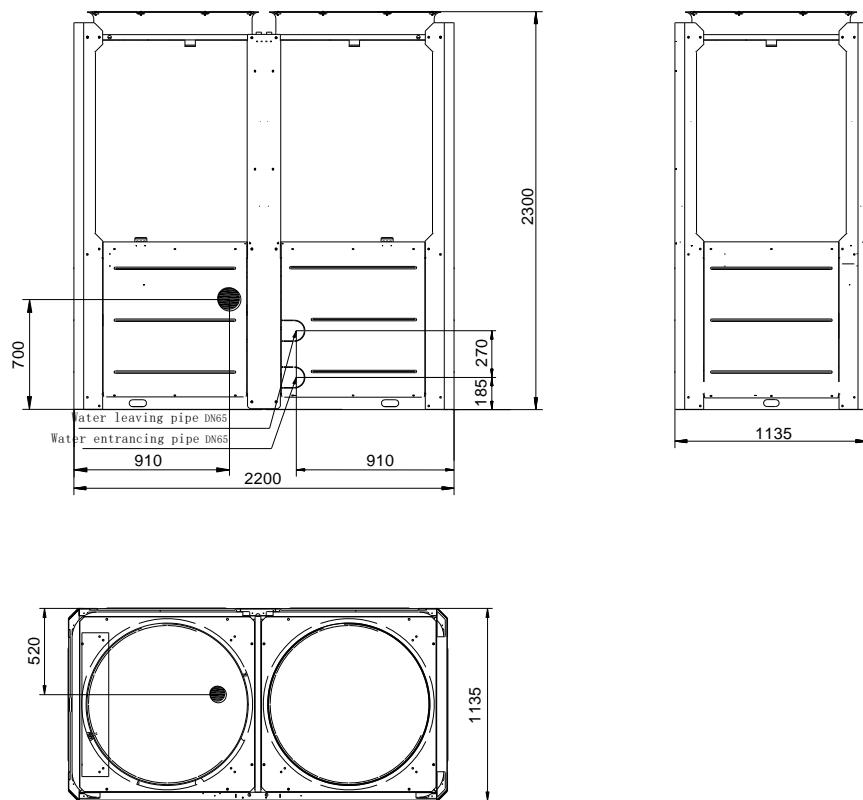
3 Dimensions and Center of Gravity

MDVM-V50D2BR8-AS / MDVM-V65D2BR8-AS / MDVM-V75D2BR8-AS

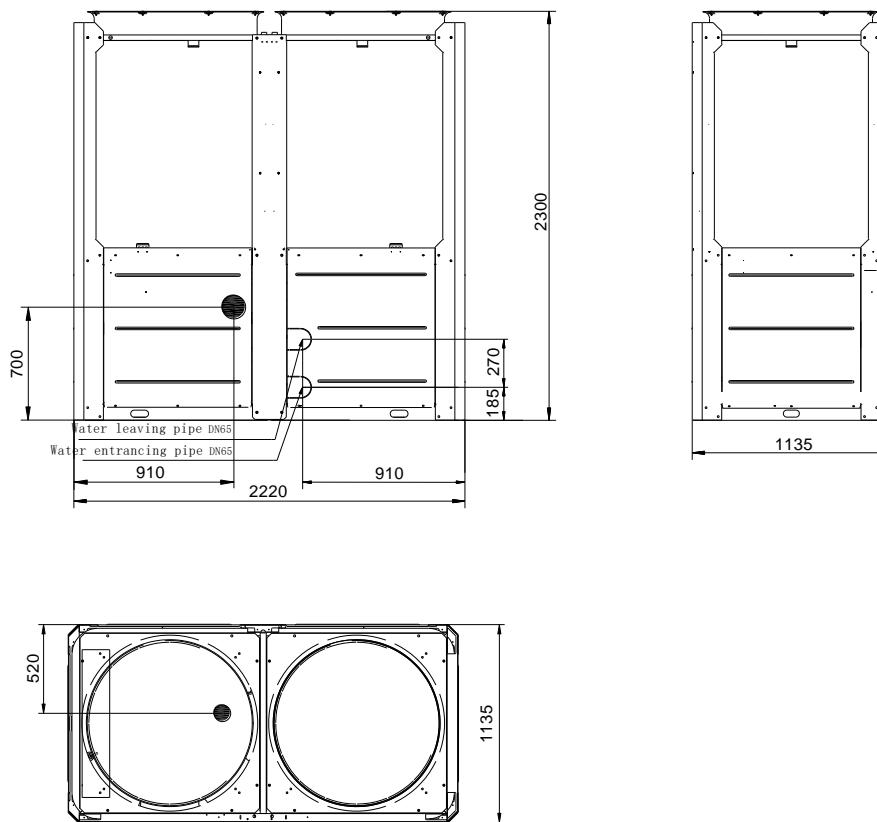


MDVM-V50MD2BR8-AS / MDVM-V65MD2BR8-AS / MDVM-V75MD2BR8-AS





MDVM-V110MD2BR8-AS / MDVM-V140MD2BR8-AS



4 Capacity Tables

4.1 Heating Capacity Tables

MDVM-V50D2BR8-AS

LWT	DB																	
	-25			-20			-18			-15			-10			-5		
	HC	PI	COP															
25	26.52	11.03	2.41	30.97	10.80	2.87	33.57	10.35	3.24	35.78	10.31	3.47	38.00	10.68	3.56	42.75	11.61	3.68
30	25.64	12.14	2.11	30.15	11.97	2.52	32.57	10.58	3.08	34.72	10.46	3.32	36.87	10.75	3.43	41.23	11.67	3.53
35	25.07	13.07	1.92	29.24	12.78	2.29	31.09	11.43	2.72	33.06	11.27	2.93	35.24	11.91	2.96	39.30	12.57	3.13
40	23.25	13.46	1.73	26.99	13.13	2.06	31.13	14.07	2.21	33.11	13.74	2.41	35.29	14.37	2.46	39.81	14.57	2.73
45				27.14	15.39	1.76	30.40	15.36	1.98	32.53	14.60	2.23	34.54	15.03	2.30	39.70	15.80	2.51
48				25.99	18.78	1.38	29.81	19.18	1.55	31.70	17.31	1.83	33.71	16.83	2.00	39.10	17.42	2.24
50							27.91	18.14	1.54	29.82	16.41	1.82	31.71	16.55	1.92	37.52	17.82	2.11
55										28.82	16.59	1.74	30.66	16.62	1.84	36.75	18.30	2.01
60													29.68	17.78	1.67	35.23	19.39	1.82
65													28.00	18.88	1.48	33.76	20.89	1.62
LWT	DB																	
	0			5			7			10			15			20		
	HC	PI	COP															
25	47.51	11.89	4.00	50.45	12.03	4.19	53.64	10.96	4.90	56.34	10.81	5.21	65.65	11.51	5.70	67.60	11.41	5.92
30	45.52	12.20	3.73	48.28	11.96	4.03	51.63	10.59	4.87	55.36	11.27	4.91	62.00	11.35	5.46	65.26	11.49	5.68
35	43.57	12.52	3.48	46.13	11.99	3.85	49.50	10.46	4.73	51.55	10.50	4.91	59.68	11.30	5.28	63.20	11.63	5.43
40	44.45	13.98	3.18	47.46	13.07	3.63	49.76	12.17	4.09	52.16	11.89	4.39	57.90	11.94	4.85	59.01	11.45	5.15
45	45.06	14.55	3.10	48.29	12.82	3.77	49.60	12.26	4.05	51.28	11.09	4.62	53.34	10.62	5.02	57.35	10.89	5.27
48	44.53	16.63	2.68	47.81	14.24	3.36	49.70	12.95	3.84	51.17	12.58	4.07	53.28	12.13	4.39	57.43	12.31	4.67
50	43.38	17.58	2.47	47.47	14.49	3.28	49.75	13.48	3.69	50.78	12.75	3.98	52.87	12.29	4.30	56.99	12.48	4.57
55	42.83	18.19	2.35	46.78	15.11	3.10	49.80	15.57	3.20	49.41	14.34	3.45	51.41	13.80	3.73	55.30	14.10	3.92
60	40.78	19.14	2.13	45.21	16.14	2.80	49.85	16.52	3.02	49.85	15.24	3.27	47.67	14.58	3.27	46.10	13.51	3.41
65	39.54	20.86	1.90	43.82	17.59	2.49	49.90	19.88	2.51	49.98	16.01	3.12	44.10	15.65	2.82	33.52	11.52	2.91
LWT	DB																	
	25			30			35			40			43					
	HC	PI	COP															
25	71.52	11.43	6.26	76.11	10.74	7.08	76.78	9.52	8.06	77.61	8.95	8.67	76.73	8.50	9.03			
30	70.49	11.40	6.18	77.31	11.45	6.75	79.57	10.04	7.92	82.52	10.06	8.21	78.60	9.33	8.42			
35	69.07	11.44	6.04	76.47	11.84	6.46	81.52	10.97	7.43	84.47	11.24	7.51	79.61	10.07	7.91			
40	65.00	11.40	5.70	70.88	12.10	5.86	75.57	11.14	6.78	78.98	11.30	6.99	74.06	10.14	7.31			
45	62.81	11.15	5.63	63.84	10.77	5.93	68.90	10.21	6.75	70.45	10.34	6.81	66.53	9.17	7.25			
48	63.19	12.49	5.06	64.20	11.91	5.39	69.08	11.16	6.19	70.65	11.28	6.26	66.89	10.28	6.51			
50	62.71	12.66	4.95	63.55	12.08	5.26	68.54	11.32	6.05	70.05	11.29	6.21	66.37	10.42	6.37			
55	60.68	14.47	4.19	61.68	14.02	4.40	66.55	13.17	5.05	68.05	13.31	5.11	64.24	11.96	5.37			
60	50.43	14.08	3.58	48.32	13.27	3.64	52.14	12.52	4.16	53.32	12.66	4.21	50.34	11.39	4.42			
65	36.74	11.77	3.12	37.35	11.40	3.28	40.35	10.65	3.79	27.69	6.86	4.04						

Abbreviations:

HC: Total heating capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Performance specifications measured with water pump operating at rated water flow rate.

LWT	DB																	
	-25			-20			-18			-15			-10			-5		
	HC	PI	COP															
25	26.59	11.17	2.38	31.07	10.94	2.84	33.67	10.49	3.21	35.88	10.45	3.43	38.15	11.03	3.46	42.90	11.96	3.59
30	25.71	12.28	2.09	30.25	12.11	2.50	32.67	10.72	3.05	34.82	10.60	3.29	37.02	11.10	3.34	41.38	12.02	3.44
35	25.11	13.19	1.90	29.34	12.92	2.27	31.19	11.57	2.70	33.16	11.41	2.91	35.34	12.05	2.93	39.45	12.92	3.05
40	23.29	13.58	1.71	27.06	13.27	2.04	31.23	14.21	2.20	33.21	13.88	2.39	35.39	14.51	2.44	39.96	14.92	2.68
45				27.37	15.84	1.73	30.72	15.91	1.93	32.82	15.37	2.14	35.01	15.97	2.19	40.38	17.09	2.36
48				26.06	18.92	1.38	29.91	19.32	1.55	31.80	17.45	1.82	33.81	16.97	1.99	39.25	17.77	2.21
50							27.98	18.28	1.53	29.92	16.55	1.81	31.81	16.69	1.91	37.67	18.17	2.07
55										28.86	16.71	1.73	30.70	16.74	1.83	36.79	18.42	2.00
60													29.72	17.90	1.66	35.27	19.51	1.81
65													28.04	19.00	1.48	33.80	21.01	1.61
LWT	DB																	
	0			5			7			10			15			20		
	HC	PI	COP															
25	47.74	12.34	3.87	50.68	12.48	4.06	53.96	11.51	4.69	56.64	11.47	4.94	66.12	12.46	5.31	68.25	12.54	5.44
30	45.75	12.65	3.62	48.51	12.41	3.91	51.95	11.14	4.66	55.68	11.82	4.71	62.29	12.12	5.14	65.73	12.44	5.28
35	43.72	12.87	3.40	46.37	12.44	3.73	50.00	11.36	4.40	51.87	11.05	4.69	59.97	12.07	4.97	63.49	12.40	5.12
40	44.68	14.43	3.10	47.70	13.52	3.53	49.99	12.62	3.96	52.48	12.44	4.22	58.21	12.60	4.62	59.32	12.11	4.90
45	45.76	16.21	2.82	48.99	14.69	3.33	50.00	13.15	3.80	52.20	13.03	4.01	54.26	12.56	4.32	58.27	12.83	4.54
48	44.76	17.08	2.62	48.05	14.69	3.27	50.64	14.22	3.56	51.41	13.03	3.94	53.60	12.68	4.23	57.74	12.97	4.45
50	43.53	17.93	2.43	47.71	14.94	3.19	49.96	13.93	3.59	51.01	13.20	3.86	53.19	12.84	4.14	57.29	13.14	4.36
55	42.87	18.31	2.34	46.85	15.25	3.07	50.00	15.87	3.15	49.51	14.48	3.42	51.51	13.94	3.70	55.40	14.24	3.89
60	40.82	19.26	2.12	45.28	16.28	2.78	49.25	16.05	3.07	49.55	15.88	3.12	47.74	14.72	3.24	46.17	13.65	3.38
65	39.58	20.98	1.89	43.86	18.43	2.38	50.00	20.00	2.50	50.26	16.56	3.04	44.14	15.77	2.80	33.56	11.64	2.88
LWT	DB																	
	25			30			35			40			43					
	HC	PI	COP															
25	72.20	12.72	5.68	76.82	12.20	6.30	77.49	10.98	7.06	78.32	10.62	7.38	77.44	9.95	7.78			
30	71.18	12.69	5.61	78.02	12.90	6.05	80.28	11.70	6.86	83.22	11.93	6.98	79.31	11.00	7.21			
35	69.72	12.56	5.55	77.18	13.30	5.81	82.22	12.84	6.40	85.17	13.11	6.49	80.32	11.73	6.85			
40	65.47	12.35	5.30	71.56	13.39	5.34	76.28	12.59	6.06	79.69	12.97	6.15	74.77	11.59	6.45			
45	63.73	13.09	4.87	64.76	12.71	5.10	69.82	12.15	5.75	71.37	12.28	5.81	67.45	11.11	6.07			
48	63.48	13.26	4.79	64.67	12.86	5.03	69.73	12.29	5.67	71.33	12.57	5.67	67.36	11.22	6.00			
50	63.00	13.43	4.69	64.02	13.03	4.91	69.19	12.45	5.56	70.73	12.58	5.62	66.84	11.37	5.88			
55	60.78	14.61	4.16	61.78	14.16	4.36	66.70	13.52	4.93	68.20	13.66	4.99	64.39	12.31	5.23			
60	50.53	14.22	3.55	48.39	13.41	3.61	52.24	12.66	4.13	53.42	12.80	4.17	50.44	11.53	4.38			
65	36.78	11.89	3.09	37.39	11.52	3.25	40.39	10.77	3.75	27.73	6.98	3.97						

Abbreviations:

HC: Total heating capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Performance specifications measured with water pump operating at rated water flow rate.



MDVM-V65D2BR8-AS

Aqua thermal Super

LWT	DB																	
	-25			-20			-18			-15			-10			-5		
	HC	PI	COP															
25	34.40	16.05	2.14	40.00	15.68	2.55	43.38	15.02	2.89	46.15	14.89	3.10	49.10	15.72	3.12	55.17	16.98	3.25
30	32.03	17.02	1.88	37.25	16.62	2.24	42.08	15.36	2.74	44.77	15.10	2.97	47.62	15.82	3.01	53.19	17.07	3.12
35	32.47	18.98	1.71	37.76	18.53	2.04	40.15	16.59	2.42	42.71	16.36	2.61	45.44	17.19	2.64	50.78	18.46	2.75
40	30.11	19.55	1.54	35.01	19.10	1.83	40.21	20.40	1.97	42.78	19.93	2.15	45.51	20.75	2.19	51.44	21.35	2.41
45				35.10	22.68	1.55	39.34	22.70	1.73	41.85	21.94	1.91	44.53	22.64	1.97	51.15	24.05	2.13
48				33.71	27.27	1.24	38.49	27.80	1.38	40.95	25.10	1.63	43.56	24.40	1.79	50.52	25.47	1.98
50							36.20	26.35	1.37	38.51	23.79	1.62	40.97	24.00	1.71	48.47	26.05	1.86
55										37.36	24.14	1.55	39.74	24.17	1.64	47.64	26.58	1.79
60													38.47	25.86	1.49	45.67	28.15	1.62
65													36.30	27.44	1.32	43.78	30.36	1.44
LWT	DB																	
	0			5			7			10			15			20		
	HC	PI	COP															
25	61.23	17.56	3.49	64.88	17.59	3.69	68.96	16.00	4.31	72.27	15.92	4.54	84.00	17.32	4.85	86.77	17.44	4.98
30	58.76	17.99	3.27	62.23	17.67	3.52	66.51	15.65	4.25	71.02	16.42	4.33	79.24	16.82	4.71	83.50	17.30	4.83
35	56.13	18.31	3.06	59.56	17.69	3.37	64.00	15.24	4.20	66.41	15.52	4.28	76.43	16.75	4.56	80.79	17.24	4.69
40	57.37	20.57	2.79	61.17	19.27	3.18	64.83	18.03	3.60	67.21	17.53	3.83	74.30	17.55	4.23	75.58	16.80	4.50
45	57.77	22.75	2.54	61.75	20.56	3.00	65.00	18.31	3.55	65.85	17.93	3.67	68.53	17.26	3.97	73.73	17.64	4.18
48	57.47	24.40	2.36	61.63	20.96	2.94	64.83	20.10	3.23	65.82	18.38	3.58	68.49	17.69	3.87	73.69	18.08	4.08
50	55.98	25.62	2.18	61.19	21.32	2.87	64.51	20.50	3.15	65.30	18.63	3.51	67.96	17.93	3.79	73.12	18.32	3.99
55	55.53	26.39	2.10	60.70	21.96	2.76	64.00	21.30	3.00	63.95	20.79	3.08	66.55	20.01	3.33	71.60	20.45	3.50
60	52.87	27.76	1.90	58.67	23.45	2.50	61.95	22.82	2.72	59.45	21.61	2.75	61.86	21.19	2.92	59.82	19.65	3.04
65	51.26	30.28	1.69	56.82	25.55	2.22	60.00	25.00	2.40	54.95	22.71	2.42	57.18	22.75	2.51	43.47	16.79	2.59
LWT	DB																	
	25			30			35			40			43					
	HC	PI	COP															
25	91.83	17.48	5.25	97.83	16.73	5.85	98.70	14.96	6.60	99.77	14.44	6.91	98.63	13.48	7.32			
30	90.57	17.67	5.13	99.39	17.75	5.60	102.3	16.01	6.39	106.1	16.33	6.50	101.1	14.99	6.74			
35	88.67	17.47	5.07	98.30	18.32	5.37	104.6	17.66	5.94	108.7	18.05	6.02	102.4	16.05	6.38			
40	83.15	17.17	4.84	90.99	18.46	4.93	97.13	17.30	5.61	101.6	17.84	5.69	95.17	15.85	6.00			
45	80.83	18.02	4.49	82.17	17.46	4.71	88.73	16.66	5.33	90.75	16.84	5.39	85.65	15.16	5.65			
48	80.78	18.48	4.37	82.12	17.90	4.59	88.69	17.08	5.19	90.70	17.27	5.25	85.61	15.54	5.51			
50	80.15	18.72	4.28	81.48	18.14	4.49	87.99	17.31	5.08	89.99	17.50	5.14	84.94	15.75	5.39			
55	78.49	20.90	3.76	79.79	20.25	3.94	86.17	19.32	4.46	88.13	19.53	4.51	83.18	17.58	4.73			
60	65.27	20.42	3.20	62.50	19.26	3.25	67.49	18.17	3.72	69.03	18.37	3.76	65.15	16.53	3.94			
65	47.65	17.16	2.78	48.44	16.63	2.91	52.31	15.51	3.37	35.89	10.05	3.57						

Abbreviations:

HC: Total heating capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Performance specifications measured with water pump operating at rated water flow rate.

Aqua thermal Super



MDVM-V65MD2BR8-AS

LWT	DB																	
	-25			-20			-18			-15			-10			-5		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
25	34.54	16.15	2.14	40.35	15.83	2.55	43.73	15.17	2.88	46.60	15.12	3.08	49.55	15.96	3.11	55.72	17.30	3.22
30	32.17	17.12	1.88	37.60	16.77	2.24	42.43	15.51	2.74	45.22	15.33	2.95	48.07	16.06	2.99	53.74	17.39	3.09
35	32.61	19.08	1.71	38.11	18.68	2.04	40.50	16.74	2.42	43.06	16.51	2.61	45.89	17.43	2.63	51.23	18.69	2.74
40	30.25	19.65	1.54	35.15	19.20	1.83	40.56	20.55	1.97	43.13	20.08	2.15	45.96	20.99	2.19	51.89	21.59	2.40
45				35.55	22.91	1.55	39.89	23.02	1.73	42.62	22.23	1.92	45.47	23.11	1.97	52.44	24.73	2.12
48				33.85	27.37	1.24	38.84	27.95	1.39	41.30	25.25	1.64	43.91	24.55	1.79	50.97	25.70	1.98
50						36.34	26.45	1.37	38.86	23.94	1.62	41.32	24.15	1.71	48.92	26.28	1.86	
55									37.48	24.18	1.55	39.86	24.21	1.65	47.78	26.65	1.79	
60												38.59	25.90	1.49	45.81	28.22	1.62	
65												36.42	27.48	1.33	43.90	30.40	1.44	
LWT	DB																	
	0			5			7			10			15			20		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
25	62.00	17.85	3.47	65.82	18.06	3.64	70.08	16.65	4.21	73.56	16.60	4.43	85.87	18.02	4.76	88.64	18.14	4.89
30	59.42	18.29	3.25	63.00	17.96	3.51	67.46	16.12	4.18	72.31	17.10	4.23	80.90	17.53	4.61	85.37	18.00	4.74
35	56.79	18.62	3.05	60.22	18.00	3.35	64.65	16.37	3.95	67.36	15.99	4.21	77.89	17.46	4.46	82.45	17.94	4.60
40	58.03	20.88	2.78	61.94	19.56	3.17	65.78	18.50	3.56	68.16	18.00	3.79	75.59	18.23	4.15	77.03	17.52	4.40
45	59.43	23.46	2.53	63.62	21.26	2.99	65.65	19.42	3.38	67.79	18.85	3.60	70.47	18.18	3.88	75.67	18.56	4.08
48	58.13	24.71	2.35	62.40	21.25	2.94	65.77	20.57	3.20	66.76	18.85	3.54	69.62	18.34	3.80	74.98	18.76	4.00
50	56.53	25.94	2.18	61.96	21.61	2.87	65.46	20.97	3.12	66.25	19.10	3.47	69.08	18.58	3.72	74.41	19.00	3.92
55	55.67	26.49	2.10	60.84	22.06	2.76	64.15	21.67	2.96	64.30	20.94	3.07	66.90	20.16	3.32	71.95	20.60	3.49
60	53.01	27.86	1.90	58.81	23.55	2.50	62.09	22.92	2.71	59.59	21.71	2.74	62.00	21.29	2.91	59.96	19.75	3.04
65	51.40	30.35	1.69	56.96	25.62	2.22	60.10	26.24	2.29	55.09	22.78	2.42	57.32	22.82	2.51	43.59	16.83	2.59
LWT	DB																	
	25			30			35			40			43					
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP			
25	93.77	18.40	5.10	99.77	17.65	5.65	100.6	15.88	6.34	101.7	15.36	6.62	100.6	14.40	6.98			
30	92.44	18.37	5.03	101.3	18.67	5.43	104.3	16.93	6.16	108.1	17.25	6.26	103.0	15.91	6.47			
35	90.54	18.17	4.98	100.2	19.24	5.21	106.8	18.58	5.75	110.6	18.97	5.83	104.3	16.97	6.15			
40	85.02	17.87	4.76	92.93	19.38	4.80	99.07	18.22	5.44	103.5	18.76	5.52	97.11	16.77	5.79			
45	82.77	18.94	4.37	84.11	18.38	4.58	90.67	17.58	5.16	92.69	17.76	5.22	87.59	16.08	5.45			
48	82.45	19.18	4.30	83.99	18.60	4.51	90.56	17.78	5.09	92.64	18.19	5.09	87.48	16.24	5.39			
50	81.81	19.43	4.21	83.14	18.85	4.41	89.86	18.01	4.99	91.86	18.20	5.05	86.81	16.45	5.28			
55	78.94	21.13	3.74	80.24	20.49	3.92	86.62	19.55	4.43	88.58	19.77	4.48	83.63	17.81	4.70			
60	65.62	20.57	3.19	62.85	19.41	3.24	67.84	18.32	3.70	69.38	18.52	3.75	65.50	16.68	3.93			
65	47.77	17.20	2.78	48.56	16.67	2.91	52.45	15.58	3.37	36.01	10.09	3.57						

Abbreviations:

HC: Total heating capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Performance specifications measured with water pump operating at rated water flow rate.



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Aqua thermal Super

LWT	DB																	
	-25			-20			-18			-15			-10			-5		
	HC	PI	COP															
25	39.56	20.16	1.96	46.22	19.75	2.34	50.13	18.58	2.70	53.33	19.44	2.74	56.74	20.35	2.79	63.75	21.68	2.94
30	37.52	21.77	1.72	43.84	21.33	2.06	49.53	19.34	2.56	52.69	20.08	2.62	56.06	20.86	2.69	62.61	22.20	2.82
35	36.57	23.34	1.57	42.73	22.86	1.87	45.43	20.09	2.26	48.33	20.92	2.31	51.42	21.79	2.36	57.46	23.08	2.49
40	33.74	23.87	1.41	39.21	23.32	1.68	45.04	24.45	1.84	47.92	25.22	1.90	50.98	26.04	1.96	57.62	26.43	2.18
45				38.73	27.27	1.42	42.27	26.09	1.62	46.84	27.75	1.69	49.83	28.38	1.76	57.25	29.74	1.93
48				36.28	29.98	1.21	39.60	29.33	1.35	43.88	28.32	1.55	46.68	28.96	1.61	53.63	30.35	1.77
50							38.66	29.29	1.32	42.85	28.19	1.52	45.58	28.83	1.58	52.36	30.21	1.73
55										41.22	27.86	1.48	43.85	28.49	1.54	50.38	29.86	1.69
60													42.03	30.70	1.37	48.28	32.17	1.50
65													40.53	34.42	1.18	46.56	36.07	1.29
LWT	DB																	
	0			5			7			10			15			20		
	HC	PI	COP															
25	70.76	22.54	3.14	74.97	22.72	3.30	83.52	20.12	4.15	83.65	20.82	4.02	96.89	23.18	4.18	100.3	22.78	4.40
30	69.17	23.53	2.94	73.25	23.25	3.15	80.71	20.03	4.03	82.20	21.48	3.83	91.39	22.51	4.06	96.53	22.60	4.27
35	63.51	23.02	2.76	67.39	22.38	3.01	77.00	19.74	3.90	76.86	20.98	3.66	88.16	22.41	3.93	93.40	22.52	4.15
40	64.26	25.60	2.51	68.52	24.13	2.84	75.60	20.54	3.68	77.79	22.93	3.39	85.70	23.48	3.65	87.38	21.95	3.98
45	64.66	28.29	2.29	69.12	25.73	2.69	75.00	22.06	3.40	76.22	23.45	3.25	79.04	23.09	3.42	85.24	23.04	3.70
48	60.57	28.87	2.10	64.75	26.25	2.47	70.26	22.51	3.12	71.40	23.93	2.98	74.04	23.56	3.14	79.85	23.51	3.40
50	59.14	28.74	2.06	63.22	26.14	2.42	68.60	22.41	3.06	69.71	23.83	2.93	72.29	23.46	3.08	77.97	23.41	3.33
55	56.90	28.40	2.00	60.82	25.83	2.35	66.00	22.15	2.98	67.07	23.55	2.85	69.56	23.18	3.00	75.01	23.13	3.24
60	54.53	30.60	1.78	58.29	27.83	2.09	63.25	23.86	2.65	64.28	25.37	2.53	66.66	24.98	2.67	64.70	22.43	2.88
65	52.59	34.31	1.53	56.22	31.20	1.80	61.00	26.75	2.28	55.79	25.60	2.18	57.86	25.21	2.30	47.14	19.00	2.48
LWT	DB																	
	25			30			35			40			43					
	HC	PI	COP															
25	106.2	22.83	4.65	113.6	21.65	5.25	114.4	19.41	5.89	115.9	18.61	6.23	114.3	17.65	6.32			
30	104.7	23.08	4.54	115.4	22.97	5.03	118.6	20.78	5.70	123.3	21.06	5.85	117.1	19.63	5.97			
35	102.5	22.83	4.49	114.2	23.70	4.82	121.5	22.91	5.30	126.2	23.27	5.42	118.6	21.01	5.65			
40	96.13	22.43	4.29	105.7	23.88	4.43	112.5	22.45	5.01	117.9	23.00	5.13	110.3	20.76	5.31			
45	93.44	23.54	3.97	95.43	22.59	4.22	102.8	21.62	4.76	105.4	21.71	4.85	99.25	19.84	5.00			
48	87.53	24.02	3.64	89.40	23.06	3.88	96.32	22.06	4.37	98.74	22.16	4.46	92.98	20.25	4.59			
50	85.47	23.92	3.57	87.28	22.95	3.80	94.04	21.96	4.28	96.40	22.06	4.37	90.78	20.16	4.50			
55	82.23	23.64	3.48	83.98	22.69	3.70	90.48	21.71	4.17	92.75	21.80	4.25	87.34	19.92	4.38			
60	70.93	22.92	3.09	63.58	19.31	3.29	68.51	18.47	3.71	70.23	18.56	3.78	66.13	16.96	3.90			
65	51.68	19.42	2.66	52.78	18.63	2.83	56.87	17.83	3.19	38.58	11.85	3.26						

Abbreviations:

HC: Total heating capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Performance specifications measured with water pump operating at rated water flow rate.

Aqua thermal Super

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LWT	DB																	
	-25			-20			-18			-15			-10			-5		
	HC	PI	COP															
25	39.91	20.31	1.97	46.67	19.99	2.34	50.58	18.81	2.69	53.88	19.76	2.73	57.40	20.65	2.78	64.52	21.97	2.94
30	37.87	21.92	1.73	44.19	21.48	2.06	49.98	19.58	2.55	53.24	20.40	2.61	56.61	21.18	2.67	63.38	22.49	2.82
35	36.71	23.44	1.57	43.08	23.01	1.87	45.88	20.32	2.26	48.78	21.15	2.31	51.87	22.02	2.36	58.12	23.38	2.49
40	33.88	23.97	1.41	39.56	23.47	1.69	45.49	24.69	1.84	48.37	25.45	1.90	51.43	26.27	1.96	58.28	26.73	2.18
45				39.18	27.51	1.42	42.82	26.41	1.62	47.61	28.04	1.70	50.78	28.85	1.76	58.54	30.42	1.92
48				36.42	30.08	1.21	39.95	29.48	1.36	44.23	28.47	1.55	47.13	29.20	1.61	54.18	30.67	1.77
50							39.01	29.44	1.33	43.20	28.34	1.52	46.03	29.07	1.58	52.91	30.53	1.73
55										41.34	27.90	1.48	43.99	28.56	1.54	50.52	29.96	1.69
60													42.15	30.74	1.37	48.42	32.24	1.50
65													40.65	34.46	1.18	46.68	36.11	1.29
LWT	DB																	
	0			5			7			10			15			20		
	HC	PI	COP															
25	72.05	23.23	3.10	76.43	23.44	3.26	85.39	20.82	4.10	85.52	21.52	3.97	98.83	24.10	4.10	102.3	23.70	4.31
30	70.29	24.18	2.91	74.54	23.94	3.11	82.38	20.74	3.97	84.07	22.18	3.79	93.33	23.43	3.98	98.47	23.52	4.19
35	64.28	23.31	2.76	68.34	22.85	2.99	78.46	20.46	3.84	78.32	21.70	3.61	90.03	23.11	3.90	95.34	23.44	4.07
40	65.21	26.07	2.50	69.64	24.78	2.81	77.06	21.26	3.62	79.24	23.65	3.35	87.57	24.18	3.62	89.25	22.65	3.94
45	66.32	28.99	2.29	70.99	26.43	2.69	76.94	22.98	3.35	78.16	24.37	3.21	80.98	24.01	3.37	87.18	23.96	3.64
48	61.34	29.16	2.10	65.69	26.72	2.46	71.38	23.16	3.08	72.69	24.61	2.95	75.33	24.25	3.11	81.51	24.22	3.37
50	59.80	29.04	2.06	63.99	26.43	2.42	69.72	23.06	3.02	70.84	24.48	2.89	73.58	24.14	3.05	79.42	24.12	3.29
55	57.04	28.50	2.00	60.96	25.93	2.35	66.35	22.30	2.98	67.42	23.70	2.85	69.91	23.33	3.00	75.46	23.37	3.23
60	54.67	30.70	1.78	58.43	27.93	2.09	63.60	24.01	2.65	64.63	25.52	2.53	67.01	25.13	2.67	65.05	22.58	2.88
65	52.73	34.38	1.53	56.36	31.27	1.80	61.14	26.85	2.28	55.93	25.67	2.18	58.00	25.28	2.29	47.26	19.04	2.48
LWT	DB																	
	25			30			35			40			43					
	HC	PI	COP															
25	108.1	23.75	4.55	115.6	22.57	5.12	116.3	20.33	5.72	117.8	19.53	6.03	116.2	18.57	6.26			
30	106.6	24.00	4.44	117.4	23.89	4.91	120.5	21.70	5.55	125.2	21.98	5.70	119.0	20.55	5.79			
35	104.5	23.75	4.40	116.1	24.62	4.72	123.4	23.83	5.18	128.2	24.19	5.30	120.6	21.93	5.50			
40	98.07	23.35	4.20	107.6	24.80	4.34	114.5	23.37	4.90	119.9	23.92	5.01	112.2	21.68	5.18			
45	95.38	24.46	3.90	97.37	23.51	4.14	104.8	22.54	4.65	107.3	22.63	4.74	101.2	20.76	4.87			
48	89.40	24.72	3.62	91.27	23.76	3.84	98.26	22.98	4.28	100.7	23.08	4.36	94.92	21.17	4.48			
50	87.34	24.62	3.55	89.15	23.65	3.77	95.98	22.88	4.19	98.34	22.98	4.28	92.72	21.08	4.40			
55	82.68	23.87	3.46	84.43	22.92	3.68	91.03	22.03	4.13	93.30	22.12	4.22	87.79	20.16	4.35			
60	71.28	23.07	3.09	63.93	19.46	3.29	68.86	18.62	3.70	70.58	18.71	3.77	66.48	17.11	3.89			
65	51.82	19.49	2.66	52.92	18.70	2.83	57.01	17.90	3.18	38.70	11.89	3.25						

Abbreviations:

HC: Total heating capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Performance specifications measured with water pump operating at rated water flow rate.



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Aqua thermal Super

LWT	DB																	
	-25			-20			-18			-15			-10			-5		
	HC	PI	COP															
25	64.57	28.55	2.26	75.08	27.89	2.69	82.07	27.51	2.98	87.56	28.72	3.05	91.93	28.07	3.27	104.0	31.15	3.34
30	59.04	27.15	2.18	68.65	26.51	2.59	78.05	26.98	2.89	82.39	28.78	2.86	88.07	28.64	3.08	98.71	31.26	3.16
35	59.70	28.93	2.06	69.42	28.25	2.46	74.53	27.01	2.76	78.76	28.45	2.77	83.55	28.10	2.97	94.05	31.07	3.03
40	52.49	30.03	1.75	61.03	29.33	2.08	69.56	28.59	2.43	74.43	28.71	2.59	78.49	28.18	2.79	89.11	31.02	2.87
45				50.54	32.82	1.54	67.03	34.63	1.94	71.31	32.28	2.21	75.37	31.76	2.37	87.00	35.83	2.43
48				40.52	28.34	1.43	64.57	34.72	1.86	69.05	32.52	2.12	73.03	32.02	2.28	84.96	36.41	2.33
50							60.18	33.56	1.79	64.13	31.33	2.05	68.44	31.13	2.20	80.67	35.86	2.25
55										62.50	34.27	1.82	66.56	33.98	1.96	79.73	39.77	2.00
60													64.56	38.32	1.68	77.03	44.68	1.72
65													61.18	40.67	1.50	72.99	47.41	1.54
LWT	DB																	
	0			5			7			10			15			20		
	HC	PI	COP															
25	114.7	32.43	3.54	122.5	29.93	4.09	129.0	28.48	4.53	137.8	29.46	4.68	146.2	30.29	4.83	159.8	32.30	4.95
30	108.1	32.73	3.30	115.1	30.18	3.81	122.3	29.08	4.20	134.9	30.74	4.39	144.8	31.66	4.57	153.0	32.85	4.66
35	103.7	32.44	3.20	109.7	31.01	3.54	112.0	27.0	4.15	126.5	29.77	4.25	139.3	31.17	4.47	146.4	32.17	4.55
40	99.45	33.62	2.96	106.1	32.23	3.29	111.7	28.55	3.91	119.5	29.66	4.03	133.6	31.74	4.21	136.2	30.46	4.47
45	97.85	38.43	2.55	105.1	35.08	3.00	110.0	29.9	3.68	113.5	30.45	3.73	119.1	31.53	3.78	124.8	30.39	4.11
48	97.15	39.70	2.45	103.1	35.80	2.88	108.4	30.64	3.54	110.8	30.93	3.58	117.3	32.32	3.63	122.9	31.14	3.95
50	93.53	39.64	2.36	101.9	36.70	2.78	106.6	31.27	3.41	109.6	31.74	3.45	115.4	32.99	3.50	120.9	31.79	3.80
55	92.66	44.08	2.10	100.6	40.66	2.47	106.0	35.3	3.00	107.4	35.11	3.06	114.1	36.62	3.12	119.6	35.28	3.39
60	88.41	48.91	1.81	98.41	46.26	2.13	103.4	40.06	2.58	105.9	40.26	2.63	111.3	41.51	2.68	116.6	40.00	2.92
65	86.26	53.44	1.61	95.37	50.20	1.90	100.0	42.92	2.33	102.5	42.02	2.44	92.36	36.27	2.55	96.79	34.95	2.77
LWT	DB																	
	25			30			35			40			43					
	HC	PI	COP															
25	173.4	34.54	5.02	178.8	34.94	5.12	184.3	34.07	5.41	175.9	27.97	6.29	171.7	26.81	6.40			
30	161.2	34.16	4.72	165.8	32.55	5.09	170.4	31.86	5.35	160.8	26.60	6.04	156.0	25.51	6.12			
35	150.8	32.86	4.59	154.7	30.57	5.06	160.5	30.89	5.20	148.8	26.27	5.66	144.6	25.22	5.73			
40	139.3	30.28	4.60	135.8	27.67	4.91	142.6	28.14	5.07	131.7	25.43	5.18	126.2	23.99	5.26			
45	126.7	29.82	4.25	120.2	27.16	4.43	126.9	28.16	4.51	115.3	24.58	4.69	109.4	23.10	4.74			
48	124.8	30.56	4.08	118.4	27.84	4.25	125.0	28.86	4.33	113.5	26.02	4.36	107.8	24.30	4.43			
50	122.8	31.19	3.94	116.5	28.42	4.10	123.0	29.46	4.18	111.7	26.08	4.28	106.0	24.53	4.32			
55	121.4	34.62	3.51	115.2	31.54	3.65	121.7	32.70	3.72	110.5	29.28	3.77	104.9	27.23	3.85			
60	118.4	39.25	3.02	102.5	31.54	3.25	108.3	32.70	3.31	98.33	28.63	3.43	93.34	26.06	3.58			
65	98.25	34.29	2.87	53.32	17.26	3.09	56.31	17.90	3.15	51.13	15.67	3.26						

Abbreviations:

HC: Total heating capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Performance specifications measured with water pump operating at rated water flow rate.

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LWT	DB																	
	-25			-20			-18			-15			-10			-5		
	HC	PI	COP															
25	64.68	28.92	2.24	75.40	28.44	2.65	82.50	28.30	2.92	87.93	29.78	2.95	92.30	29.13	3.17	104.7	32.31	3.24
30	59.15	27.52	2.15	68.97	27.06	2.55	78.48	27.77	2.83	82.82	29.57	2.80	88.44	29.70	2.98	99.38	32.42	3.07
35	59.81	29.30	2.04	69.74	28.80	2.42	74.85	27.56	2.72	79.19	29.24	2.71	83.92	29.16	2.88	94.42	32.13	2.94
40	52.62	30.27	1.74	61.14	29.70	2.06	69.88	29.14	2.40	74.75	29.26	2.56	78.92	28.97	2.72	89.48	32.08	2.79
45				50.67	33.06	1.53	67.14	35.00	1.92	71.63	32.83	2.18	75.69	32.31	2.34	87.37	36.89	2.37
48				40.75	28.49	1.43	64.68	35.09	1.84	69.37	33.07	2.10	73.35	32.57	2.25	85.33	37.47	2.28
50							60.29	33.93	1.78	64.24	31.70	2.03	68.76	31.68	2.17	81.10	36.65	2.21
55										62.74	34.42	1.82	66.79	34.13	1.96	79.96	39.92	2.00
60													64.80	38.47	1.68	77.26	44.83	1.72
65													61.42	40.82	1.50	73.23	47.56	1.54
LWT	DB																	
	0			5			7			10			15			20		
	HC	PI	COP															
25	115.4	33.77	3.42	123.2	31.45	3.92	129.7	30.28	4.28	138.5	31.47	4.40	147.3	32.91	4.48	161.0	35.17	4.58
30	108.8	34.07	3.19	115.8	31.52	3.67	123.0	30.60	4.02	135.6	32.75	4.14	145.8	34.03	4.28	154.2	35.72	4.32
35	104.4	33.60	3.11	110.4	32.35	3.41	113.1	28.52	3.97	127.3	31.43	4.05	140.2	33.36	4.20	147.4	34.79	4.24
40	100.1	34.78	2.88	106.7	33.39	3.20	112.4	29.89	3.76	120.2	31.18	3.86	134.3	33.64	3.99	136.9	32.47	4.22
45	98.5	39.59	2.49	105.8	36.24	2.92	110.7	31.2	3.55	114.2	31.79	3.59	119.8	33.05	3.62	125.5	32.05	3.92
48	97.8	40.86	2.39	103.7	36.96	2.81	109.0	31.98	3.41	111.5	32.27	3.46	118.0	33.66	3.50	123.6	32.80	3.77
50	93.9	40.70	2.31	102.6	37.86	2.71	107.3	32.43	3.31	110.3	33.08	3.33	116.1	34.33	3.38	121.6	33.31	3.65
55	92.8	44.32	2.09	100.7	41.03	2.45	106.3	35.85	2.97	107.5	35.48	3.03	114.2	36.99	3.09	119.9	35.83	3.35
60	88.5	49.15	1.80	98.54	46.50	2.12	103.5	40.43	2.56	106.0	40.63	2.61	111.4	41.88	2.66	116.9	40.55	2.88
65	86.5	53.59	1.61	95.60	50.35	1.90	100.1	43.27	2.31	102.6	42.26	2.43	92.59	36.42	2.54	97.02	35.10	2.76
LWT	DB																	
	25			30			35			40			43					
	HC	PI	COP															
25	174.6	37.41	4.67	180.1	37.81	4.76	185.5	36.94	5.02	177.1	30.84	5.74	172.9	29.68	5.82			
30	162.4	37.03	4.39	167.0	35.42	4.72	171.6	34.73	4.94	162.0	29.47	5.50	157.2	28.38	5.54			
35	152.0	35.73	4.26	155.9	33.44	4.66	161.7	33.76	4.79	150.0	29.14	5.15	145.5	27.59	5.27			
40	140.1	32.47	4.31	136.5	29.68	4.60	143.5	30.51	4.70	132.4	27.34	4.84	126.9	25.65	4.95			
45	127.4	31.48	4.05	120.9	28.68	4.21	127.7	29.96	4.26	115.9	25.92	4.47	110.1	24.44	4.50			
48	125.5	32.22	3.89	119.1	29.36	4.06	125.7	30.52	4.12	114.2	27.36	4.18	108.4	25.46	4.26			
50	123.5	32.85	3.76	117.2	29.76	3.94	123.7	31.12	3.98	112.4	27.42	4.10	106.7	25.69	4.15			
55	121.7	35.17	3.46	115.3	31.91	3.61	122.0	33.25	3.67	110.6	29.65	3.73	105.0	27.60	3.80			
60	118.7	39.80	2.98	102.7	31.91	3.22	108.4	33.07	3.28	98.46	28.87	3.41	93.47	26.30	3.55			
65	98.38	34.53	2.85	53.56	17.41	3.08	56.55	18.05	3.13	51.37	15.82	3.25						

Abbreviations:

HC: Total heating capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Performance specifications measured with water pump operating at rated water flow rate.



MDVM-V140D2BR8-AS

Aqua thermal Super

LWT	DB																	
	-25			-20			-18			-15			-10			-5		
	HC	PI	COP															
25	77.13	41.27	1.87	89.69	40.31	2.22	98.04	39.76	2.47	104.6	41.51	2.52	109.8	40.57	2.71	124.3	45.02	2.76
30	70.53	39.24	1.80	82.01	38.32	2.14	93.24	39.00	2.39	98.42	40.14	2.45	105.2	41.39	2.54	117.9	45.18	2.61
35	65.45	39.96	1.64	78.53	40.27	1.95	89.37	40.80	2.19	94.44	41.90	2.25	100.2	42.45	2.36	112.8	46.94	2.40
40	56.92	41.03	1.39	66.18	40.07	1.65	77.11	39.94	1.93	89.69	43.58	2.06	94.57	42.79	2.21	107.4	47.10	2.28
45				67.08	47.20	1.42	75.86	46.25	1.64	86.78	46.35	1.87	91.72	45.61	2.01	105.9	51.45	2.06
48				65.81	48.42	1.36	74.42	48.11	1.55	85.14	48.22	1.77	89.99	47.44	1.90	103.9	53.52	1.94
50							71.81	49.56	1.45	82.15	49.67	1.65	86.82	48.87	1.78	100.2	55.13	1.82
55										78.10	51.00	1.53	82.55	50.19	1.64	95.28	56.61	1.68
60													77.60	49.12	1.58	89.57	55.40	1.62
65													72.07	50.98	1.41	83.18	57.51	1.45
LWT	DB																	
	0			5			7			10			15			20		
	HC	PI	COP															
25	137.0	46.87	2.92	146.4	43.27	3.38	158.9	38.26	4.15	169.7	40.46	4.20	180.1	41.91	4.30	185.2	42.58	4.35
30	129.1	47.30	2.73	137.5	43.62	3.15	150.6	38.08	3.95	166.2	41.44	4.01	178.3	43.48	4.10	181.6	43.25	4.20
35	124.4	49.01	2.54	131.5	43.69	3.01	142.0	38.17	3.72	161.7	42.28	3.83	172.0	43.87	3.92	178.5	43.99	4.06
40	119.8	51.04	2.35	127.8	46.27	2.76	141.3	40.08	3.52	158.9	43.84	3.62	166.0	43.56	3.81	168.5	42.65	3.95
45	119.1	55.18	2.16	127.9	50.38	2.54	140.0	44.73	3.13	154.4	47.48	3.25	160.6	45.33	3.54	162.5	44.48	3.65
48	116.8	57.40	2.04	125.5	52.41	2.39	137.4	46.53	2.95	152.4	49.71	3.07	156.1	46.74	3.34	159.5	46.27	3.45
50	112.7	59.13	1.91	121.1	53.98	2.24	132.5	47.93	2.77	146.1	50.88	2.87	152.4	48.69	3.13	153.9	47.67	3.23
55	107.2	60.72	1.76	115.1	55.44	2.08	126.0	49.22	2.56	138.9	52.24	2.66	144.5	49.89	2.90	146.3	48.95	2.99
60	100.8	59.43	1.70	108.2	54.26	1.99	118.5	48.17	2.46	130.6	51.13	2.55	135.7	48.75	2.78	137.5	47.91	2.87
65	93.56	61.69	1.52	100.5	56.32	1.78	110.0	50.00	2.20	109.1	47.77	2.29	112.8	45.32	2.49	114.9	44.75	2.57
LWT	DB																	
	25			30			35			40			43					
	HC	PI	COP															
25	188.6	42.81	4.41	190.3	42.67	4.46	192.5	42.59	4.52	195.5	42.13	4.64	191.5	40.53	4.73			
30	185.7	43.23	4.30	188.6	43.35	4.35	190.3	43.04	4.42	192.5	42.69	4.51	187.7	41.02	4.58			
35	182.7	43.86	4.17	185.6	43.67	4.25	188.0	43.19	4.35	188.5	42.65	4.42	180.5	40.68	4.44			
40	171.6	42.92	4.00	173.7	42.10	4.13	176.0	41.34	4.26	176.6	40.93	4.32	169.5	38.97	4.35			
45	165.6	44.70	3.71	169.0	44.99	3.76	170.7	44.68	3.82	172.7	44.39	3.89	159.6	40.49	3.94			
48	162.5	46.50	3.49	165.8	46.80	3.54	167.5	46.48	3.60	169.4	46.18	3.67	156.6	42.12	3.72			
50	156.8	47.90	3.27	159.9	48.21	3.32	161.6	47.88	3.37	163.5	47.57	3.44	151.1	43.39	3.48			
55	149.1	49.19	3.03	152.1	49.50	3.07	153.6	49.17	3.12	155.4	48.85	3.18	143.6	44.56	3.22			
60	140.1	48.14	2.91	112.9	38.27	2.95	114.1	38.02	3.00	115.4	37.77	3.06	106.7	34.45	3.10			
65	93.70	35.98	2.60	90.28	34.20	2.64	91.20	33.97	2.68	61.06	22.33	2.73						

Abbreviations:

HC: Total heating capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Performance specifications measured with water pump operating at rated water flow rate.

LWT	DB																	
	-25			-20			-18			-15			-10			-5		
	HC	PI	COP															
25	77.45	41.82	1.85	90.06	41.37	2.18	98.71	40.92	2.41	105.3	42.67	2.47	110.5	41.91	2.64	125.0	46.68	2.68
30	70.85	39.79	1.78	82.44	39.11	2.11	93.61	40.06	2.34	99.09	41.30	2.40	105.9	42.55	2.49	118.6	46.52	2.55
35	65.56	40.33	1.63	78.96	41.06	1.92	89.74	41.86	2.14	94.81	42.96	2.21	100.9	43.61	2.31	113.5	48.28	2.35
40	57.05	41.27	1.38	66.29	40.44	1.64	77.43	40.49	1.91	90.06	44.64	2.02	94.94	43.85	2.17	108.1	48.26	2.24
45				67.19	47.57	1.41	76.18	46.80	1.63	87.15	47.41	1.84	92.09	46.67	1.97	106.5	52.61	2.03
48				65.92	48.79	1.35	74.74	48.66	1.54	85.51	49.28	1.74	90.36	48.50	1.86	104.5	54.68	1.91
50							72.13	50.11	1.44	82.58	50.46	1.64	87.19	49.93	1.75	100.9	56.29	1.79
55										78.33	51.15	1.53	82.78	50.34	1.64	95.41	56.85	1.68
60													77.83	49.27	1.58	89.70	55.64	1.61
65													72.31	51.13	1.41	83.41	57.66	1.45
LWT	DB																	
	0			5			7			10			15			20		
	HC	PI	COP															
25	137.7	48.88	2.82	147.4	45.89	3.21	160.1	41.13	3.89	170.9	43.33	3.95	181.3	44.78	4.05	186.5	45.45	4.10
30	129.9	49.10	2.64	138.2	45.63	3.03	151.8	40.95	3.71	167.4	44.31	3.78	179.6	46.35	3.87	182.8	46.12	3.96
35	125.1	50.67	2.47	132.2	45.60	2.90	142.9	40.54	3.53	162.9	45.15	3.61	173.2	46.74	3.71	179.8	46.86	3.84
40	120.5	52.56	2.29	128.5	48.07	2.67	142.1	42.27	3.36	160.1	46.71	3.43	167.2	46.43	3.60	169.8	45.52	3.73
45	119.8	56.70	2.11	128.7	52.18	2.47	140.8	46.92	3.00	155.6	50.35	3.09	161.8	48.20	3.36	163.8	47.35	3.46
48	117.5	58.74	2.00	126.2	54.07	2.33	138.1	48.54	2.84	153.6	52.58	2.92	157.3	49.61	3.17	160.7	49.14	3.27
50	113.4	60.47	1.88	121.8	55.50	2.19	133.2	49.83	2.67	147.2	53.50	2.75	153.6	51.56	2.98	155.1	50.54	3.07
55	107.3	61.09	1.76	115.2	55.81	2.07	126.3	49.77	2.54	139.3	53.03	2.63	144.9	50.95	2.84	146.7	50.01	2.93
60	100.9	59.80	1.69	108.3	54.63	1.98	118.8	48.72	2.44	130.9	51.68	2.53	136.1	49.54	2.75	138.0	48.70	2.83
65	93.79	61.84	1.52	100.6	56.56	1.78	110.1	50.24	2.19	109.3	48.01	2.28	112.9	45.56	2.48	115.1	44.99	2.56
LWT	DB																	
	25			30			35			40			43					
	HC	PI	COP															
25	189.8	45.68	4.15	191.5	45.54	4.20	193.8	45.46	4.26	196.7	45.00	4.37	192.7	43.40	4.44			
30	186.9	46.10	4.05	189.8	46.22	4.11	191.5	45.91	4.17	193.7	45.56	4.25	188.9	43.89	4.30			
35	183.9	46.73	3.94	186.9	46.54	4.01	189.2	46.06	4.11	189.8	45.52	4.17	181.7	43.55	4.17			
40	172.8	45.79	3.77	174.9	44.97	3.89	177.2	44.21	4.01	177.8	43.80	4.06	170.8	41.84	4.08			
45	166.8	47.57	3.51	170.2	47.86	3.56	171.9	47.55	3.61	173.9	47.26	3.68	160.8	43.36	3.71			
48	163.7	49.37	3.32	167.0	49.67	3.36	168.7	49.35	3.42	170.6	49.05	3.48	157.8	44.99	3.51			
50	158.0	50.77	3.11	161.2	51.08	3.16	162.8	50.75	3.21	164.7	50.44	3.26	152.3	46.26	3.29			
55	149.4	50.25	2.97	152.4	50.56	3.01	154.0	50.23	3.07	155.8	49.91	3.12	144.0	45.62	3.16			
60	140.5	49.20	2.86	113.0	38.64	2.93	114.2	38.39	2.98	115.5	38.14	3.03	106.8	34.82	3.07			
65	93.93	36.13	2.60	90.51	34.35	2.64	91.43	34.12	2.68	61.30	22.48	2.73						

Abbreviations:

HC: Total heating capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Performance specifications measured with water pump operating at rated water flow rate.



4.2 Cooling Capacity Tables

MDVM-V50D2BR8-AS

LWT	DB																	
	-15			-10			-5			0			5			10		
	CC	PI	EER															
0	31.88	4.49	7.11	31.35	4.64	6.75	30.42	4.87	6.24	28.57	5.36	5.33	27.33	5.66	4.83	39.97	7.99	5.00
5	39.09	5.04	7.75	38.61	5.20	7.43	37.91	5.44	6.97	36.38	6.11	5.96	34.90	6.32	5.52	44.17	8.37	5.28
7	41.30	5.24	7.88	40.71	5.41	7.53	39.87	5.66	7.05	38.65	6.13	6.31	37.52	6.50	5.77	46.97	8.87	5.30
10	44.33	5.46	8.12	43.80	5.56	7.88	43.35	6.02	7.20	41.87	6.45	6.49	40.64	6.84	5.94	49.88	9.03	5.52
15	50.78	5.60	9.06	50.18	5.70	8.80	49.47	6.35	7.79	47.22	6.26	7.55	46.38	6.26	7.41	54.11	7.57	7.15
20	56.19	6.13	9.16	55.51	6.25	8.88	55.01	6.66	8.26	54.14	6.71	8.07	52.63	6.61	7.96	62.68	7.98	7.85

LWT	DB																	
	15			20			25			30			35			40		
	CC	PI	EER															
0	44.08	9.62	4.58	43.53	9.94	4.38	42.94	10.27	4.18	42.30	12.25	3.45	40.86	13.44	3.04	37.52	13.33	2.81
5	51.29	10.44	4.91	50.31	10.68	4.71	48.45	10.94	4.43	47.24	13.06	3.62	46.10	14.33	3.22	42.43	14.32	2.96
7	54.96	11.17	4.92	54.18	11.31	4.79	53.12	11.81	4.50	51.40	13.35	3.85	50.25	14.45	3.48	45.69	14.69	3.11
10	58.33	11.47	5.08	57.64	11.72	4.92	56.89	11.80	4.82	55.02	13.71	4.01	53.61	15.03	3.57	47.82	14.34	3.34
15	64.21	10.17	6.31	63.51	10.79	5.89	62.10	11.42	5.44	59.87	12.71	4.71	56.50	13.52	4.18	51.28	13.18	3.89
20	74.48	10.91	6.82	73.79	11.74	6.29	72.53	12.85	5.65	71.75	13.93	5.15	68.86	14.04	4.90	60.09	12.97	4.63

LWT	DB									
	43			45			48			
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC
0	35.53	14.24	2.50	32.68	13.68	2.39	24.10	13.42	1.80	
5	40.59	15.24	2.66	36.42	14.42	2.53	25.35	12.91	1.96	
7	43.19	14.88	2.90	38.61	14.13	2.73	26.60	11.94	2.23	
10	45.06	14.58	3.09	40.85	14.04	2.91	27.39	10.55	2.60	
15	42.94	11.87	3.62	36.69	10.65	3.44	27.69	8.53	3.25	
20	50.41	12.10	4.17	44.12	11.58	3.81	31.77	9.15	3.47	

Abbreviations:

CC: Total cooling capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Notes: Performance specifications measured with water pump operating at rated water flow rate.

Aqua thermal Super



MDVM-V50MD2BR8-AS

LWT	DB																	
	-15			-10			-5			0			5			10		
	CC	PI	EER															
0	31.98	4.63	6.91	31.45	4.78	6.58	30.52	5.01	6.09	28.64	5.50	5.21	27.40	5.80	4.72	40.12	8.34	4.81
5	39.24	5.39	7.27	38.76	5.55	6.99	38.06	5.79	6.58	36.48	6.25	5.84	35.00	6.46	5.42	44.40	8.82	5.04
7	41.45	5.59	7.41	40.86	5.76	7.10	40.02	6.01	6.66	38.80	6.48	5.99	37.67	6.85	5.50	47.21	9.32	5.06
10	44.57	5.91	7.54	44.04	6.01	7.33	43.50	6.37	6.82	42.02	6.80	6.18	40.79	7.19	5.67	50.12	9.48	5.29
15	50.93	5.95	8.55	50.33	6.05	8.31	49.62	6.70	7.40	47.37	6.61	7.17	46.53	6.61	7.04	54.35	8.02	6.78
20	56.49	6.57	8.60	55.83	6.62	8.43	55.33	7.03	7.87	54.46	7.08	7.69	52.95	6.98	7.59	62.97	8.50	7.41

LWT	DB																	
	15			20			25			30			35			40		
	CC	PI	EER															
0	44.32	10.07	4.40	43.68	10.29	4.24	43.09	10.62	4.06	42.45	12.60	3.37	41.01	13.79	2.97	37.67	13.68	2.75
5	51.52	10.89	4.73	50.55	11.13	4.54	48.68	11.39	4.27	47.47	13.51	3.51	46.34	14.78	3.14	42.58	14.67	2.90
7	55.28	11.72	4.72	54.50	11.86	4.59	53.44	12.36	4.32	51.64	13.80	3.74	50.00	15.15	3.30	45.93	15.14	3.03
10	58.63	12.13	4.83	57.94	12.38	4.68	57.20	12.46	4.59	55.34	14.26	3.88	53.93	15.58	3.46	48.06	14.79	3.25
15	64.53	10.72	6.02	63.83	11.34	5.63	62.42	11.97	5.21	60.10	13.16	4.57	56.74	13.97	4.06	51.43	13.53	3.80
20	75.19	11.88	6.33	74.50	12.71	5.86	73.21	13.71	5.34	72.43	14.79	4.90	69.51	14.79	4.70	60.38	13.48	4.48

LWT	DB									
	43			45			48			
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC
0	35.63	14.38	2.48	32.78	13.82	2.37	24.14	13.54	1.78	
5	40.74	15.59	2.61	36.52	14.56	2.51	25.39	13.03	1.95	
7	43.34	15.23	2.85	38.76	14.48	2.68	26.67	12.08	2.21	
10	45.30	15.03	3.01	41.00	14.39	2.85	27.46	10.69	2.57	
15	43.04	12.01	3.58	36.79	10.79	3.41	27.73	8.65	3.21	
20	50.65	12.40	4.08	44.35	11.88	3.73	31.87	9.29	3.43	

Abbreviations:

CC: Total cooling capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Notes: Performance specifications measured with water pump operating at rated water flow rate.



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LWT	DB																	
	-15			-10			-5			0			5			10		
	CC	PI	EER	CC	PI	EER												
0																45.35	10.26	4.42
5																50.22	10.87	4.62
7																53.33	11.42	4.67
10	50.41	7.14	7.06	49.81	7.27	6.85	49.20	7.74	6.36	47.51	8.28	5.74	46.12	8.78	5.25	56.65	11.51	4.92
15	57.64	7.20	8.01	56.96	7.32	7.78	56.15	8.16	6.88	53.59	8.03	6.67	52.72	8.14	6.48	61.52	9.84	6.25
20	63.88	7.89	8.10	63.12	7.95	7.94	62.55	8.48	7.38	61.65	8.64	7.14	59.94	8.51	7.05	71.25	10.25	6.95

LWT	DB																	
	15			20			25			30			35			40		
	CC	PI	EER															
0	50.13	12.47	4.02	49.40	12.77	3.87	48.73	13.18	3.70	48.00	15.73	3.05	46.37	17.25	2.69	42.66	17.22	2.48
5	58.24	13.32	4.37	57.13	13.63	4.19	55.00	14.08	3.91	53.62	16.80	3.19	52.34	18.43	2.84	48.15	18.39	2.62
7	62.53	14.27	4.38	61.65	14.46	4.26	60.43	15.11	4.00	58.38	17.06	3.42	57.00	19.00	3.00	51.87	18.89	2.75
10	66.16	14.63	4.52	65.37	14.95	4.37	64.53	15.06	4.29	62.60	17.55	3.57	61.00	19.24	3.17	54.29	18.44	2.94
15	73.04	12.99	5.62	72.24	13.79	5.24	70.63	14.71	4.80	67.99	16.24	4.19	64.16	17.39	3.69	58.21	16.92	3.44
20	84.80	14.13	6.00	84.01	15.19	5.53	82.54	16.48	5.01	81.66	17.87	4.57	78.52	18.05	4.35	68.31	16.65	4.10

LWT	DB									
	43			45			48			
	CC	PI	EER	CC	PI	EER	CC	PI	EER	
0	40.34	18.11	2.23	37.10	17.40	2.13	27.36	17.24	1.59	
5	46.06	19.57	2.35	41.35	18.35	2.25	28.79	16.60	1.73	
7	49.02	19.11	2.57	43.89	18.25	2.40	30.21	15.37	1.97	
10	51.24	18.85	2.72	46.36	18.03	2.57	31.11	13.59	2.29	
15	48.76	15.07	3.23	41.70	13.72	3.04	31.44	10.96	2.87	
20	57.32	15.47	3.70	50.25	14.91	3.37	36.12	11.79	3.06	

Abbreviations:

CC: Total cooling capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Notes: Performance specifications measured with water pump operating at rated water flow rate.

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LWT	DB																	
	-15			-10			-5			0			5			10		
	CC	PI	EER	CC	PI	EER												
0																45.59	10.71	4.26
5																50.46	11.32	4.46
7																53.65	11.97	4.48
10	50.64	7.59	6.67	50.04	7.72	6.48	49.43	8.19	6.04	47.75	8.73	5.47	46.35	9.23	5.02	56.95	12.17	4.68
15	57.87	7.65	7.57	57.19	7.77	7.36	56.39	8.61	6.55	53.83	8.48	6.34	52.87	8.49	6.23	61.76	10.29	6.00
20	64.20	8.44	7.61	63.44	8.50	7.46	62.87	9.03	6.97	61.88	9.09	6.81	60.17	8.96	6.72	71.56	10.91	6.56

LWT	DB																	
	15			20			25			30			35			40		
	CC	PI	EER															
0	50.36	12.92	3.90	49.64	13.22	3.76	48.97	13.63	3.59	48.24	16.18	2.98	46.61	17.70	2.63	42.81	17.57	2.44
5	58.55	13.98	4.19	57.44	14.29	4.02	55.32	14.63	3.78	53.94	17.35	3.11	52.66	18.98	2.77	48.39	18.84	2.57
7	62.82	15.04	4.18	61.94	15.23	4.07	60.72	15.88	3.82	58.68	17.72	3.31	56.68	19.82	2.86	52.19	19.44	2.68
10	66.63	15.58	4.28	65.84	15.90	4.14	65.00	16.00	4.06	62.89	18.32	3.43	61.29	20.01	3.06	54.61	18.99	2.88
15	73.33	13.76	5.33	72.53	14.56	4.98	70.93	15.37	4.61	68.30	16.90	4.04	64.48	17.94	3.59	58.45	17.37	3.36
20	85.45	15.26	5.60	84.66	16.32	5.19	83.19	17.60	4.73	82.31	18.99	4.33	78.99	19.00	4.16	68.61	17.31	3.96

LWT	DB									
	43			45			48			
	CC	PI	EER	CC	PI	EER	CC	PI	EER	
0	40.49	18.46	2.19	37.25	17.75	2.10	27.43	17.38	1.58	
5	46.29	20.02	2.31	41.50	18.70	2.22	28.86	16.74	1.72	
7	49.26	19.56	2.52	44.04	18.60	2.37	30.31	15.51	1.95	
10	51.47	19.30	2.67	46.59	18.48	2.52	31.21	13.73	2.27	
15	48.91	15.42	3.17	41.80	13.86	3.02	31.51	11.10	2.84	
20	57.55	15.92	3.61	50.40	15.26	3.30	36.22	11.93	3.04	

Abbreviations:

CC: Total cooling capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Notes: Performance specifications measured with water pump operating at rated water flow rate.



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LWT	DB																	
	-15			-10			-5			0			5			10		
	CC	PI	EER															
0																52.04	14.50	3.59
5																60.51	15.88	3.81
7																64.30	16.33	3.94
10	62.61	10.17	6.16	61.88	10.34	5.98	60.97	10.96	5.56	58.95	11.74	5.02	57.22	12.47	4.59	68.25	15.84	4.31
15	71.60	10.25	6.99	70.75	10.42	6.79	69.58	11.56	6.02	66.49	11.40	5.83	65.41	11.56	5.66	75.21	13.85	5.43
20	79.35	11.23	7.07	78.41	11.31	6.93	77.52	12.01	6.46	76.49	12.25	6.24	74.37	12.08	6.15	82.54	13.92	5.93

LWT	DB																	
	15			20			25			30			35			40		
	CC	PI	EER															
0	61.13	18.90	3.23	60.47	19.26	3.14	59.87	19.97	3.00	59.37	23.80	2.49	56.90	25.99	2.19	45.05	18.83	2.39
5	68.99	18.90	3.65	68.25	19.26	3.54	67.57	19.97	3.38	67.01	23.80	2.82	64.22	25.99	2.47	51.09	20.34	2.51
7	75.51	20.25	3.73	75.08	20.43	3.68	74.24	21.43	3.47	70.76	24.16	2.93	70.00	26.82	2.61	54.77	21.16	2.59
10	82.29	20.75	3.97	81.21	21.11	3.85	79.27	21.36	3.71	77.42	24.85	3.12	74.84	27.14	2.76	57.76	20.98	2.75
15	90.84	18.43	4.93	87.99	19.48	4.52	86.77	20.87	4.16	82.41	23.00	3.58	78.72	24.53	3.21	61.94	19.19	3.23
20	95.92	18.60	5.16	94.49	19.62	4.82	93.54	21.34	4.38	91.62	22.95	3.99	87.45	23.23	3.77	72.34	18.92	3.82

LWT	DB									
	43			45			48			
	CC	PI	EER	CC	PI	EER	CC	PI	EER	
0	42.36	19.57	2.16	38.95	18.80	2.07	28.73	18.62	1.54	
5	47.90	20.96	2.29	43.00	19.65	2.19	29.94	17.78	1.68	
7	50.74	20.28	2.50	45.43	19.37	2.34	31.27	16.31	1.92	
10	52.78	19.85	2.66	47.75	18.99	2.51	32.04	14.31	2.24	
15	49.98	15.78	3.17	42.74	14.37	2.98	32.22	11.48	2.81	
20	57.37	15.84	3.62	50.30	15.26	3.30	36.15	12.07	3.00	

Abbreviations:

CC: Total cooling capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Notes: Performance specifications measured with water pump operating at rated water flow rate.

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LWT	DB																	
	-15			-10			-5			0			5			10		
	CC	PI	EER															
0																52.36	15.05	3.48
5																60.80	16.65	3.65
7																64.77	17.28	3.75
10	62.90	10.94	5.75	62.17	11.11	5.60	61.26	11.73	5.22	59.25	12.40	4.78	57.52	13.13	4.38	68.90	16.96	4.06
15	71.89	11.02	6.53	71.06	11.08	6.41	69.89	12.22	5.72	66.81	11.95	5.59	65.73	12.11	5.43	75.50	14.62	5.16
20	79.82	12.17	6.56	78.88	12.26	6.44	77.99	12.95	6.02	76.78	13.02	5.89	74.66	12.85	5.81	83.19	15.05	5.53

LWT	DB																	
	15			20			25			30			35			40		
	CC	PI	EER															
0	61.42	19.67	3.12	60.76	20.03	3.03	60.16	20.74	2.90	59.68	24.46	2.44	57.20	26.65	2.15	45.29	19.28	2.35
5	69.64	20.02	3.48	68.90	20.38	3.38	68.22	21.09	3.23	67.48	24.74	2.73	64.69	26.94	2.40	51.32	20.79	2.47
7	76.22	21.70	3.51	75.79	21.88	3.46	74.93	22.72	3.30	71.44	25.45	2.81	70.65	27.94	2.53	55.09	21.71	2.54
10	82.99	22.62	3.67	81.91	22.78	3.60	79.98	23.02	3.47	78.14	26.31	2.97	75.56	28.60	2.64	58.07	21.64	2.68
15	91.56	19.88	4.60	88.67	20.77	4.27	87.45	22.16	3.95	83.06	24.12	3.44	79.19	25.48	3.11	62.17	19.64	3.17
20	96.63	20.26	4.77	95.20	21.29	4.47	94.26	22.80	4.13	92.33	24.41	3.78	88.13	24.52	3.59	72.63	19.69	3.69

LWT	DB									
	43			45			48			
	CC	PI	EER	CC	PI	EER	CC	PI	EER	
0	42.51	19.92	2.13	39.10	19.15	2.04	28.80	18.76	1.53	
5	48.13	21.41	2.25	43.15	20.00	2.16	30.04	17.92	1.68	
7	50.97	20.73	2.46	45.66	19.82	2.30	31.37	16.45	1.91	
10	53.10	20.40	2.60	47.98	19.44	2.47	32.14	14.45	2.22	
15	50.13	16.13	3.11	42.84	14.51	2.95	32.29	11.62	2.78	
20	57.61	16.29	3.54	50.45	15.61	3.23	36.25	12.21	2.97	

Abbreviations:

CC: Total cooling capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Notes: Performance specifications measured with water pump operating at rated water flow rate.



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LWT	DB																	
	-15			-10			-5			0			5			10		
	CC	PI	EER															
0																77.82	18.98	4.10
5																90.04	20.84	4.32
7																94.88	21.42	4.43
10	88.94	16.30	5.46	88.06	16.63	5.30	86.83	16.70	5.20	85.66	16.93	5.06	84.50	17.18	4.92	97.30	20.61	4.72
15	114.8	18.49	6.21	113.7	18.86	6.03	112.0	18.81	5.95	110.9	18.96	5.85	109.9	19.11	5.75	109.2	19.36	5.64
20	124.2	17.55	7.08	123.0	17.90	6.87	121.6	18.25	6.66	120.3	18.40	6.54	119.1	18.56	6.42	118.7	18.78	6.32

LWT	DB																	
	15			20			25			30			35			40		
	CC	PI	EER															
0	89.20	24.70	3.61	88.12	26.17	3.37	87.00	26.64	3.27	82.39	28.91	2.85	80.94	32.37	2.50	70.92	30.60	2.32
5	104.1	26.23	3.97	100.1	27.08	3.70	99.20	27.35	3.63	95.84	30.38	3.15	93.72	34.38	2.73	80.59	32.59	2.47
7	109.5	26.78	4.09	106.8	27.36	3.90	105.5	27.50	3.84	101.7	31.11	3.27	100.0	32.78	3.05	85.94	32.34	2.66
10	110.3	26.43	4.17	108.1	27.07	3.99	107.1	27.79	3.85	105.0	30.90	3.40	103.0	33.11	3.11	92.61	32.57	2.84
15	126.8	26.58	4.77	124.3	27.73	4.48	123.1	28.27	4.36	120.8	32.31	3.74	118.4	32.98	3.59	108.5	34.75	3.12
20	89.20	24.70	3.61	88.12	26.17	3.37	87.00	26.64	3.27	82.39	28.91	2.85	80.94	32.37	2.50	70.92	30.60	2.32

LWT	DB									
	43			45			48			
	CC	PI	EER	CC	PI	EER	CC	PI	EER	
0	67.47	31.76	2.12	59.26	29.56	2.00	45.23	26.64	1.70	
5	77.46	33.93	2.28	67.34	31.31	2.15	51.63	27.18	1.90	
7	82.97	34.50	2.41	71.73	31.34	2.29	52.71	23.93	2.20	
10	88.76	34.31	2.59	76.87	30.55	2.52	57.47	24.15	2.38	
15	92.62	30.78	3.01	78.88	26.98	2.92	58.57	21.58	2.71	
20	67.47	31.76	2.12	59.26	29.56	2.00	45.23	26.64	1.70	

Abbreviations:

CC: Total cooling capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Notes: Performance specifications measured with water pump operating at rated water flow rate.

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LWT	DB																	
	-15			-10			-5			0			5			10		
	CC	PI	EER															
0																78.25	19.77	3.96
5																90.41	21.90	4.13
7																95.25	22.48	4.24
10	89.31	17.36	5.14	88.43	17.69	5.00	87.20	17.76	4.91	86.03	17.99	4.78	84.87	18.24	4.65	97.97	21.77	4.50
15	115.2	19.55	5.89	114.0	19.92	5.73	112.4	19.87	5.65	111.3	20.02	5.56	110.2	20.17	5.46	109.6	20.42	5.37
20	124.9	18.71	6.68	123.7	19.06	6.49	122.3	19.41	6.30	121.0	19.56	6.19	119.7	19.72	6.07	119.4	19.94	5.99

LWT	DB																	
	15			20			25			30			35			40		
	CC	PI	EER															
0	89.57	25.76	3.48	88.49	27.23	3.25	87.37	27.70	3.15	82.82	29.70	2.79	81.37	33.16	2.45	71.24	31.15	2.29
5	104.8	27.39	3.83	100.8	28.24	3.57	99.87	28.51	3.50	96.21	31.44	3.06	94.09	35.44	2.65	81.02	33.38	2.43
7	110.2	28.12	3.92	107.4	28.52	3.77	106.1	28.66	3.70	99.33	34.09	2.91	56.68	19.79	2.86	86.31	33.40	2.58
10	111.0	27.77	4.00	108.8	28.41	3.83	107.7	28.95	3.72	105.7	32.06	3.30	103.6	34.27	3.02	92.98	33.63	2.76
15	127.5	27.74	4.59	125.0	28.89	4.33	123.8	29.43	4.21	121.4	34.79	3.49	119.1	19.25	6.18	108.9	35.81	3.04
20	141.4	29.54	4.79	138.6	30.35	4.57	137.3	30.99	4.43	134.7	35.07	3.84	132.0	19.75	6.69	113.1	33.50	3.38

LWT	DB									
	43			45			48			
	CC	PI	EER	CC	PI	EER	CC	PI	EER	
0	67.58	32.13	2.10	59.37	29.93	1.98	45.46	26.79	1.70	
5	77.78	34.48	2.26	67.45	31.68	2.13	51.76	27.42	1.89	
7	83.34	35.56	2.34	72.05	31.89	2.26	52.84	24.17	2.19	
10	89.13	35.37	2.52	77.19	31.10	2.48	57.60	24.39	2.36	
15	92.94	31.33	2.97	78.99	27.35	2.89	58.70	21.82	2.69	
20	92.25	28.25	3.27	80.91	25.90	3.12	52.24	17.85	2.93	

Abbreviations:

CC: Total cooling capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Notes: Performance specifications measured with water pump operating at rated water flow rate.



MDVM-V140D2BR8-AS

Aqua thermal Super

LWT	DB																	
	-15			-10			-5			0			5			10		
	CC	PI	EER															
0																105.2	31.59	3.33
5																120.0	33.68	3.56
7																128.2	34.33	3.73
10	115.5	25.09	4.60	114.4	25.59	4.47	112.8	25.71	4.39	111.3	26.06	4.27	109.7	26.44	4.15	133.3	33.59	3.97
15	135.1	25.78	5.24	133.7	26.29	5.09	131.8	26.23	5.02	130.5	26.43	4.94	129.2	26.65	4.85	138.2	29.10	4.75
20	146.2	24.47	5.97	144.7	24.96	5.80	143.1	25.44	5.62	141.6	25.65	5.52	140.1	25.87	5.41	146.6	27.90	5.25

LWT	DB																	
	15			20			25			30			35			40		
	CC	PI	EER															
0	117.4	38.02	3.09	111.5	38.75	2.88	110.1	40.47	2.72	108.4	44.51	2.44	106.5	47.14	2.26	74.89	33.46	2.24
5	135.2	40.36	3.35	128.4	41.14	3.12	125.6	43.28	2.90	124.5	46.75	2.66	121.7	49.48	2.46	85.51	36.05	2.37
7	142.2	41.22	3.45	136.9	41.56	3.29	133.5	45.26	2.95	132.1	47.87	2.76	130.0	50.00	2.60	90.76	36.22	2.51
10	146.5	41.62	3.52	144.0	42.74	3.37	142.1	44.20	3.22	138.8	44.40	3.13	135.6	45.06	3.01	98.53	37.06	2.66
15	155.0	37.58	4.13	151.0	39.47	3.83	148.3	40.58	3.65	144.6	40.56	3.56	137.5	39.84	3.45	115.5	39.42	2.93
20	156.3	35.10	4.45	152.9	37.02	4.13	150.2	37.08	4.05	146.6	36.77	3.99	145.6	37.24	3.91	119.4	36.86	3.24

LWT	DB									
	43			45			48			
	CC	PI	EER	CC	PI	EER	CC	PI	EER	
0	71.25	34.73	2.05	62.58	32.32	1.94	47.76	29.13	1.64	
5	82.19	37.54	2.19	71.45	34.64	2.06	54.78	30.07	1.82	
7	87.62	38.63	2.27	75.74	35.10	2.16	55.66	26.80	2.08	
10	94.44	39.04	2.42	81.79	34.77	2.35	61.15	27.48	2.23	
15	98.55	34.91	2.82	83.93	30.61	2.74	62.32	24.48	2.55	
20	97.35	31.47	3.09	85.56	29.00	2.95	55.08	20.12	2.74	

Abbreviations:

CC: Total cooling capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Notes: Performance specifications measured with water pump operating at rated water flow rate.

Aqua thermal Super



MDVM-V140MD2BR8-AS

LWT	DB																	
	-15			-10			-5			0			5			10		
	CC	PI	EER															
0																105.8	32.75	3.23
5																120.7	35.20	3.43
7																129.0	36.13	3.57
10	116.2	26.43	4.40	115.1	26.93	4.27	113.5	27.05	4.19	111.9	27.40	4.08	110.4	27.78	3.97	134.0	35.49	3.78
15	135.7	27.12	5.01	134.4	27.63	4.86	132.4	27.57	4.80	131.2	27.77	4.72	129.9	27.81	4.67	138.9	30.44	4.56
20	146.9	25.99	5.65	145.4	26.48	5.49	143.8	26.96	5.33	142.3	26.99	5.27	140.8	27.21	5.17	147.3	29.42	5.01

LWT	DB																	
	15			20			25			30			35			40		
	CC	PI	EER															
0	118.0	39.36	3.00	112.2	40.09	2.80	110.8	41.81	2.65	109.1	45.85	2.38	107.2	48.30	2.22	75.21	34.01	2.21
5	135.9	42.37	3.21	129.1	42.94	3.01	126.3	44.94	2.81	125.2	48.41	2.59	122.4	51.00	2.40	85.88	37.11	2.31
7	143.1	43.59	3.28	137.6	43.57	3.16	134.2	47.16	2.85	132.9	49.78	2.67	130.7	51.80	2.52	91.13	37.28	2.44
10	147.6	44.24	3.34	145.0	45.11	3.21	143.0	46.57	3.07	139.6	46.59	3.00	136.3	47.07	2.90	99.20	38.22	2.60
15	155.7	39.38	3.96	151.7	41.13	3.69	149.0	42.24	3.53	145.3	42.08	3.45	138.2	41.18	3.36	116.2	40.58	2.86
20	157.0	36.90	4.25	153.6	38.82	3.96	151.0	38.74	3.90	147.3	38.29	3.85	146.3	38.76	3.77	120.0	38.02	3.16

LWT	DB									
	43			45			48			
	CC	PI	EER	CC	PI	EER	CC	PI	EER	
0	71.57	35.28	2.03	62.69	32.69	1.92	47.99	29.28	1.64	
5	82.62	38.33	2.16	71.77	35.19	2.04	54.91	30.31	1.81	
7	87.99	39.69	2.22	76.06	35.65	2.13	55.79	27.04	2.06	
10	94.81	40.10	2.36	82.22	35.56	2.31	61.26	27.85	2.20	
15	98.98	35.70	2.77	84.25	31.16	2.70	62.45	24.72	2.53	
20	97.78	32.26	3.03	85.88	29.55	2.91	55.31	20.27	2.73	

Abbreviations:

CC: Total cooling capacity (kW)

PI: Power input (kW)

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for outdoor air temperature (°C)

Notes: Performance specifications measured with water pump operating at rated water flow rate.

5 Performance Adjustment Factors

5.1 Ethylene and Propylene Glycol factors

The antifreeze must be required according to anyone condition as following:

- The ambient temperature is below 0 °C,
- The outlet water temperature is lower than 5 °C,
- Don't start up the unit for a long time,
- The power supply was cut off and needn't change the water in system.

A glycol solution is required when the unit with condition as mentioned. The use of glycol will reduce the performance of the unit depending on concentration.

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	0.993	0.997	1.013	1.034	-3
20	0.984	0.994	1.149	1.051	-8
30	0.975	0.989	1.343	1.075	-14.1
40	0.969	0.984	1.623	1.110	-23.3
50	0.961	0.978	2.026	1.150	-33.8

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	0.987	0.992	1.071	1.007	-3
20	0.975	0.985	1.215	1.010	-7
30	0.962	0.978	1.420	1.021	-13
40	0.946	0.971	1.716	1.036	-21
50	0.929	0.965	2.228	1.061	-33

5.2 Evaporator temperature drop factors

Performance tables are based on a 5°C temperature drop through the evaporator. Temperature drops outside this range can affect the control system's capability to maintain acceptable control and are not recommended.

5.3 Altitude correction factors

Performance tables are based at sea level. Elevations other than sea level affect the performance of the unit. The decreased air density will reduce condenser capacity and reduce the unit's performance. Maximum allowable altitude is 1800meters.

5.4 Fouling factor

Fouling refers to the accumulation of unwanted material on solid surfaces, most often in an aquatic environment. The fouling material can consist of either living organisms (biofouling) or a non-living substance (inorganic or organic). Fouling is usually distinguished from other surface-growth phenomena in that it occurs on a surface of a component, system or plant performing a defined and useful function, and that the fouling process impedes or interferes with this function.

Other terms used in the literature to describe fouling include: deposit formation, encrustation, crudding, deposition, scaling,

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scale formation, slagging, and sludge formation. The last six terms have a more narrow meaning than fouling within the scope of the fouling science and technology, and they also have meanings outside of this scope; therefore, they should be used with caution.

Fouling phenomena are common and diverse, ranging from fouling of ship hulls, natural surfaces in the marine environment (marine fouling), fouling of heat-transfer components through ingredients contained in the cooling water or gases, and even the development of plaque or calculus on teeth, or deposits on solar panels on Mars, among other examples.

Foreign matter in the chilled water system will adversely affect the heat transfer capability of the evaporator, and could increase the pressure drop and reduce the water flow. To provide optimum unit operation, proper water treatment must be maintained. Refer to the able as following.

ALTITUDE (m)	Difference of water inlet and outlet temp. (°C)	Fouling Factor							
		0.018 m ² . °C /kW		0.044 m ² . °C /kW		0.086 m ² . °C /kW		0.172 m ² . °C /kW	
		C	P	C	P	C	P	C	P
Sea level	3	1.036	1.077	1.019	1.076	0.991	0.975	0.963	0.983
	4	1.039	1.101	1.022	1.080	0.994	0.996	0.971	0.984
	5	1.045	1.105	1.028	1.086	1.000	1.000	0.977	0.989
	6	1.051	1.109	1.034	1.093	1.006	1.004	0.983	0.994
600	3	1.024	1.087	1.008	1.064	0.980	0.984	0.951	0.991
	4	1.027	1.111	1.011	1.068	0.983	1.005	0.959	0.992
	5	1.034	1.115	1.017	1.074	0.989	1.009	0.965	0.997
	6	1.043	1.115	1.026	1.084	0.998	1.009	0.973	0.999
1200	3	1.013	1.117	0.996	1.052	0.969	1.011	0.942	1.002
	4	1.015	1.118	0.998	1.055	0.971	1.012	0.948	1.003
	5	1.023	1.122	1.006	1.063	0.979	1.015	0.955	1.005
	6	1.031	1.125	1.015	1.072	0.987	1.018	0.962	1.007
1800	3	1.002	1.128	0.986	1.042	0.959	1.021	0.935	1.007
	4	1.005	1.129	0.989	1.045	0.962	1.022	0.941	1.010
	5	1.012	1.132	0.995	1.051	0.968	1.024	0.945	1.012
	6	1.018	1.134	1.001	1.058	0.974	1.026	0.949	1.014

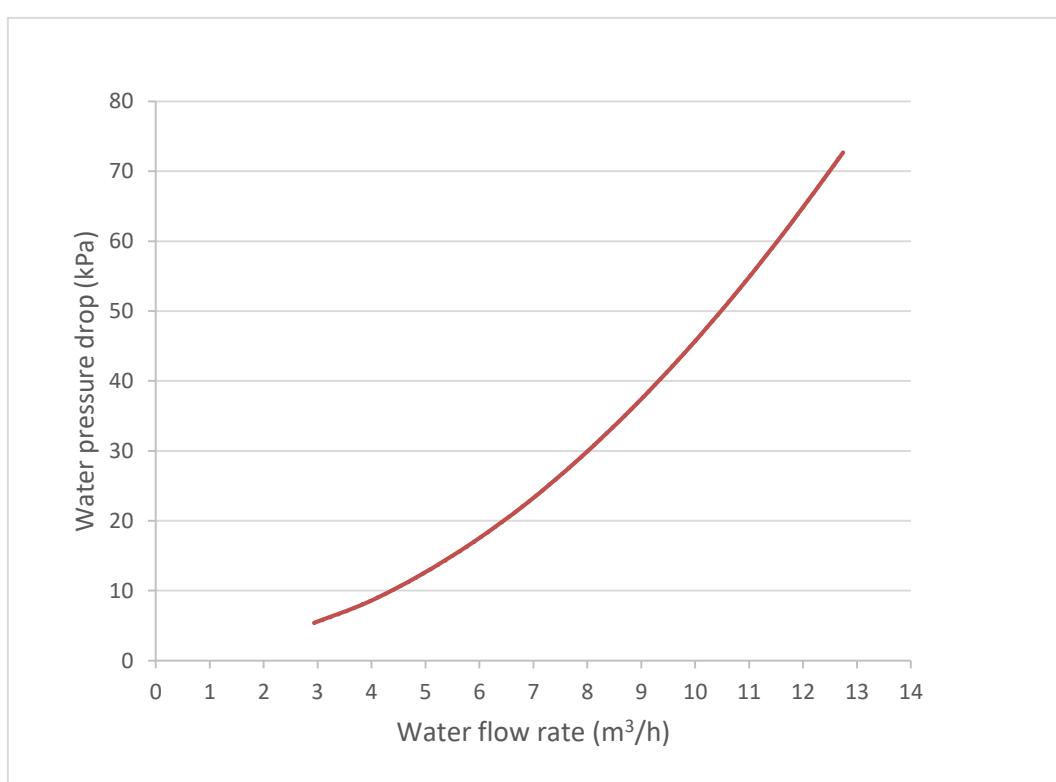
Abbreviations:

C: Cooling capacity

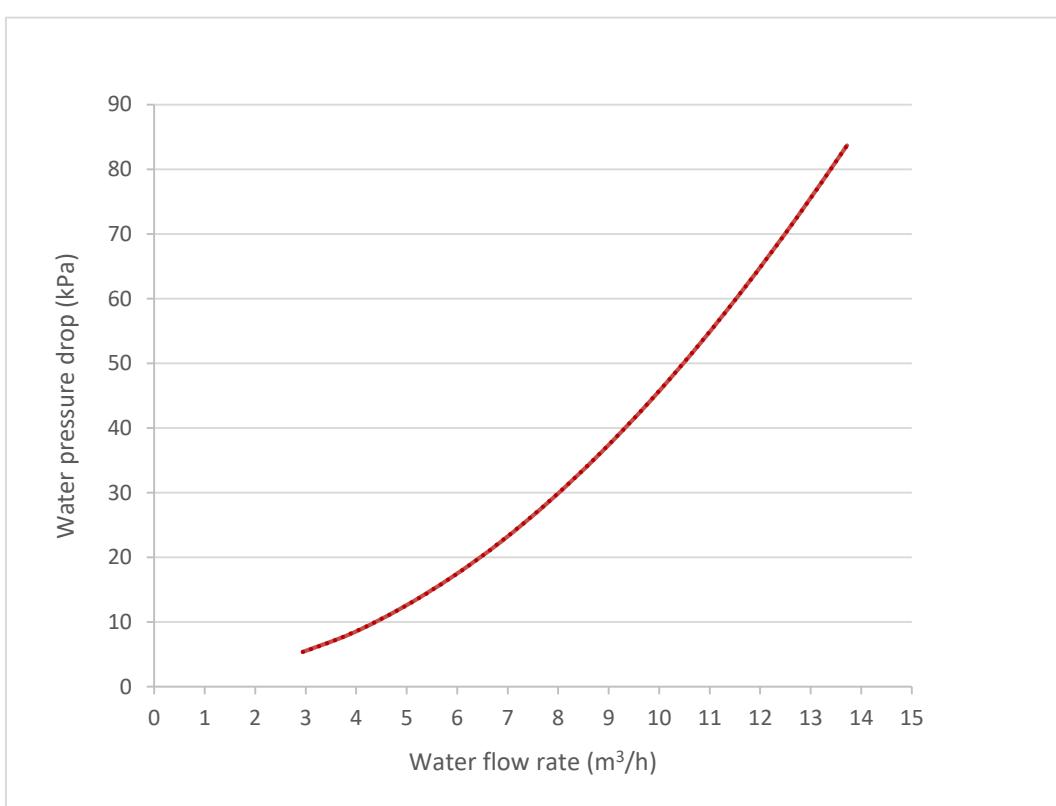
P: Power input

6 Hydronic Performance

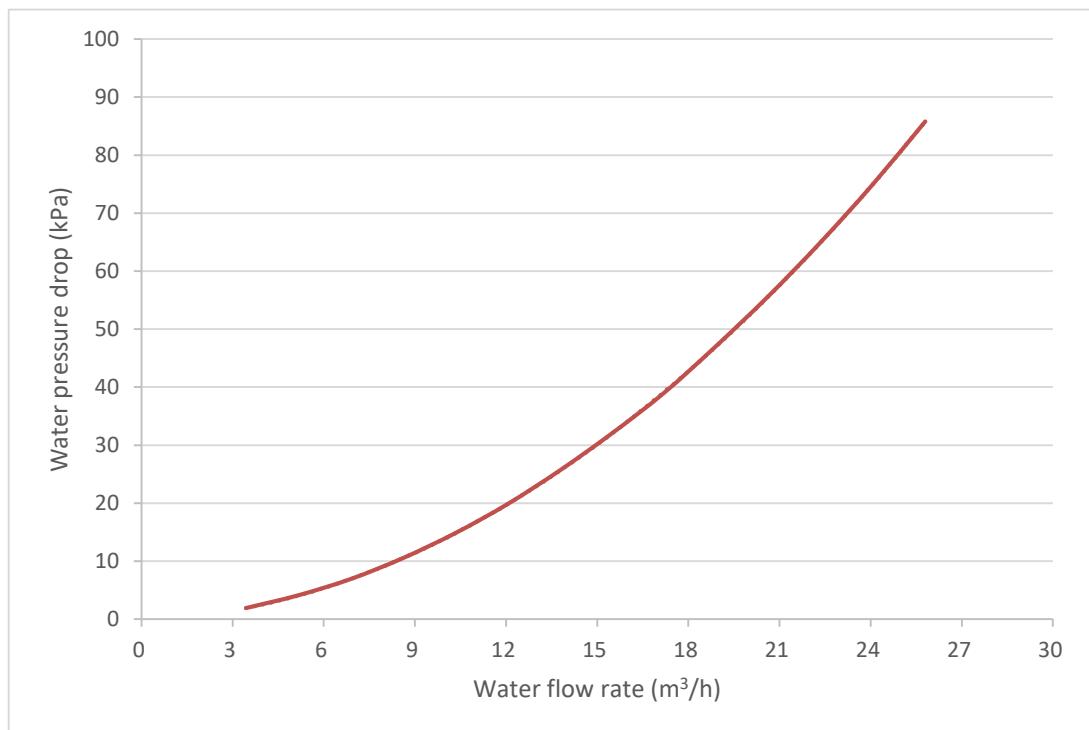
MH-SU50-RN8L



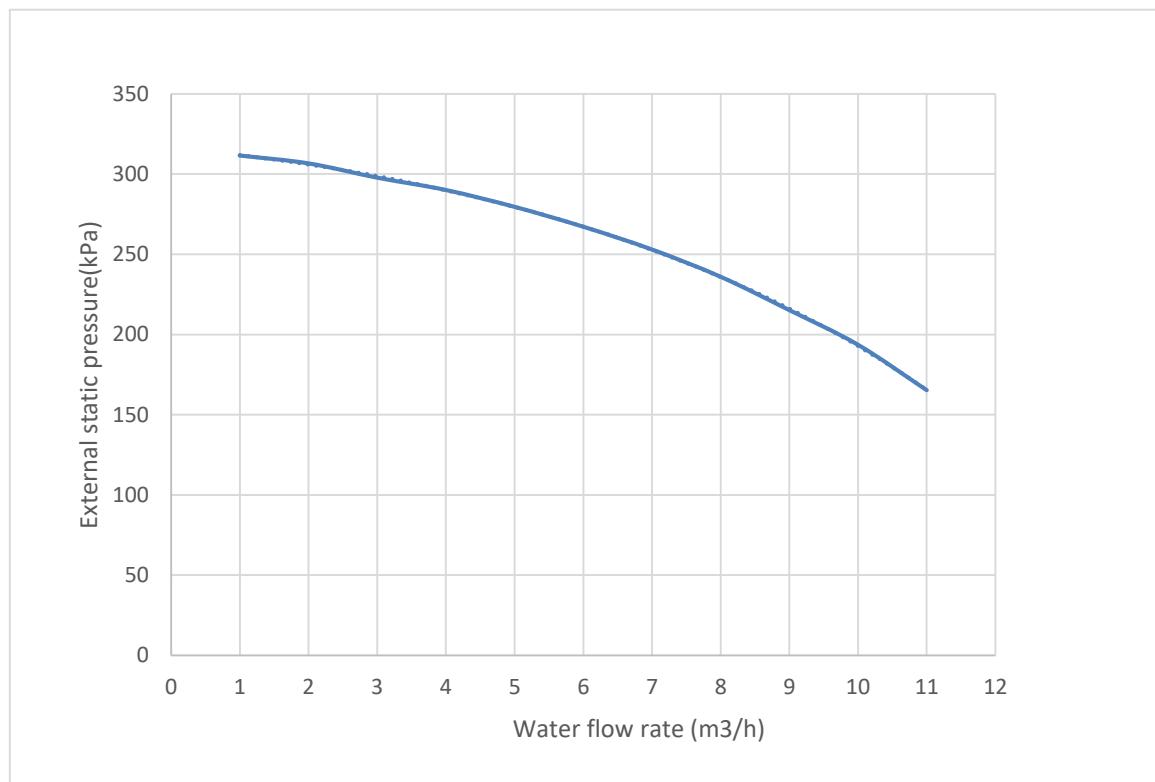
MDVM-V65D2BR8-AS / MDVM-V75D2BR8-AS



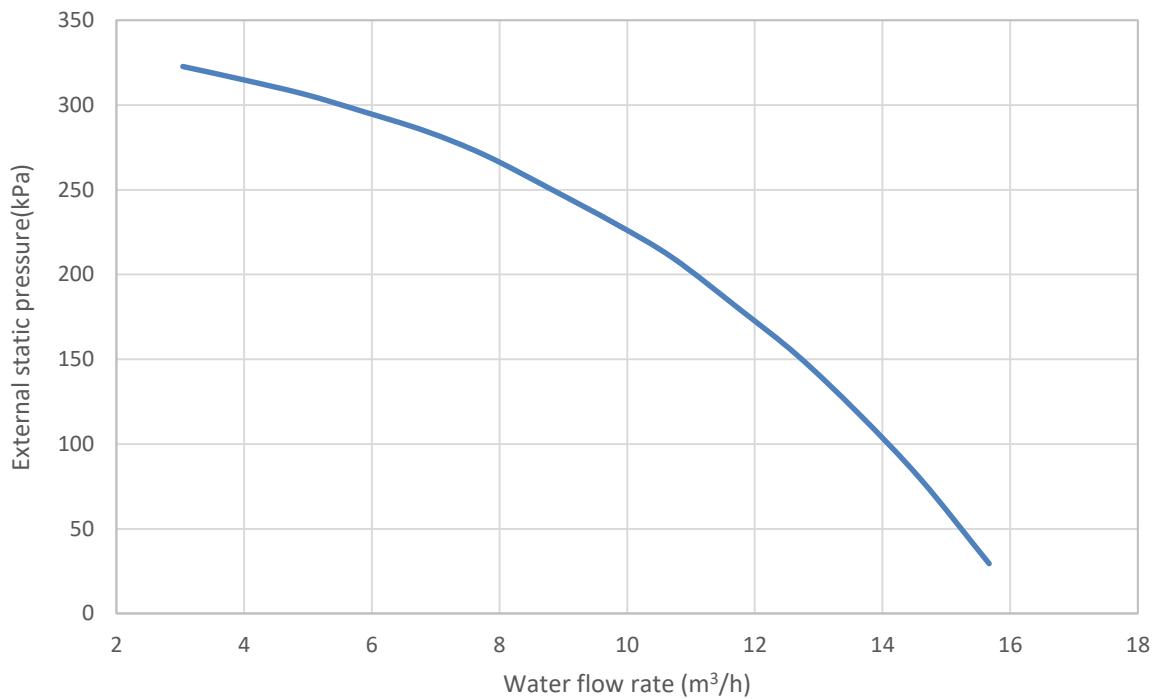
MDVM-V110D2BR8-AS / MDVM-V140D2BR8-AS



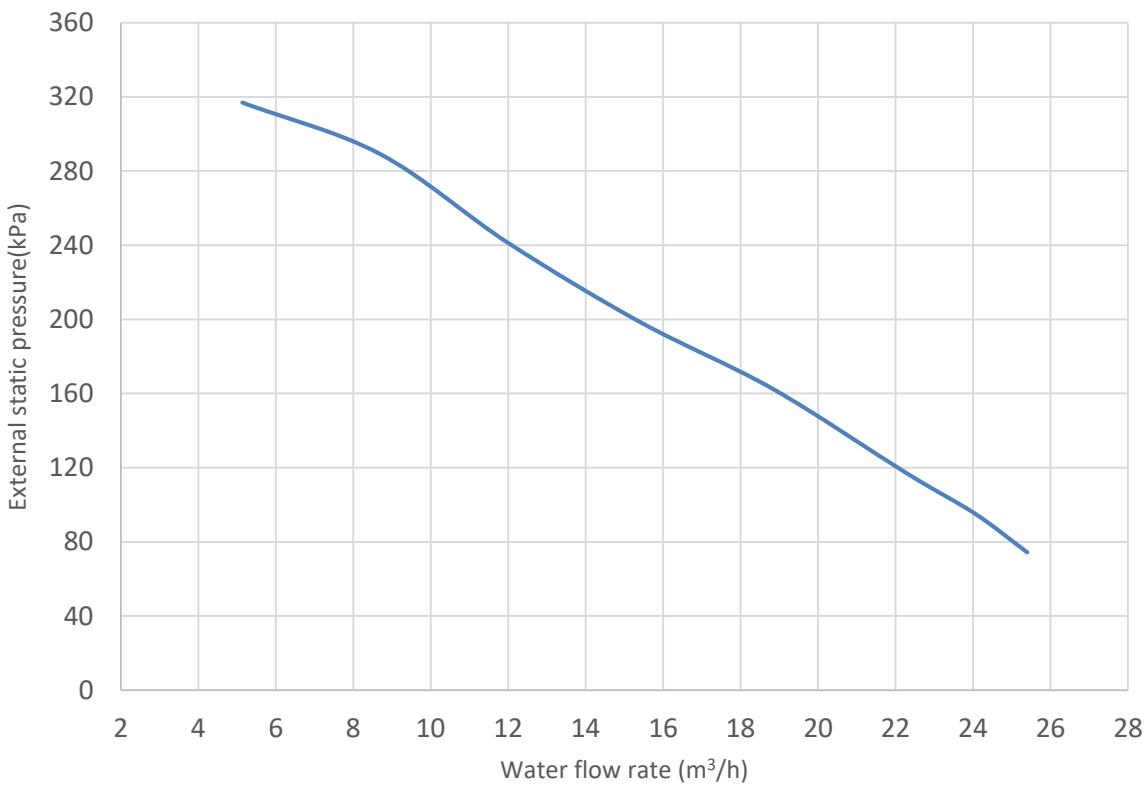
MH-SU50M-RN8L



MDVM-V65MD2BR8-AS / MDVM-V75MD2BR8-AS

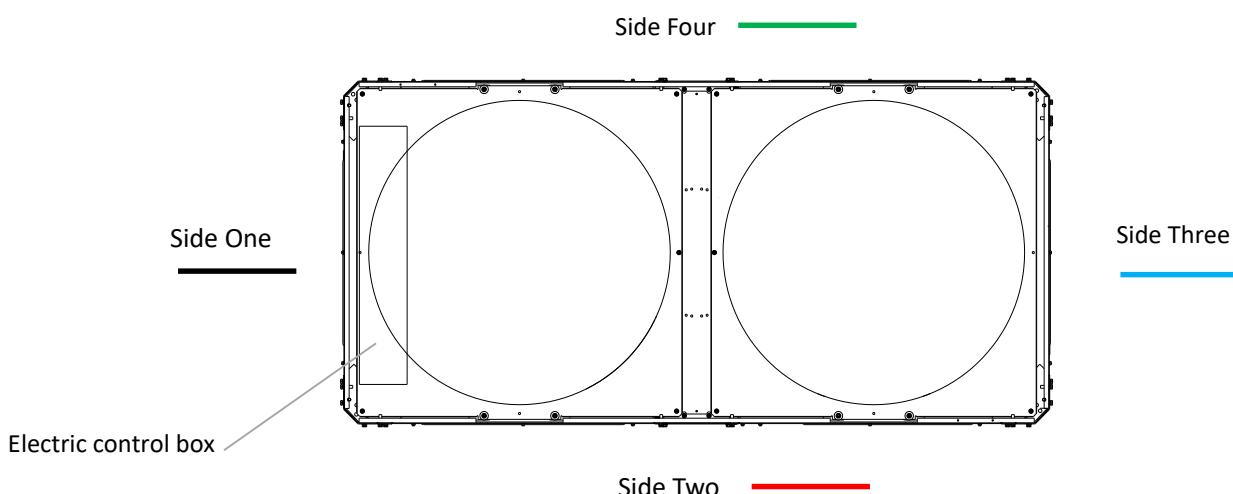


MDVM-V110MD2BR8-AS / MDVM-V140MD2BR8-AS

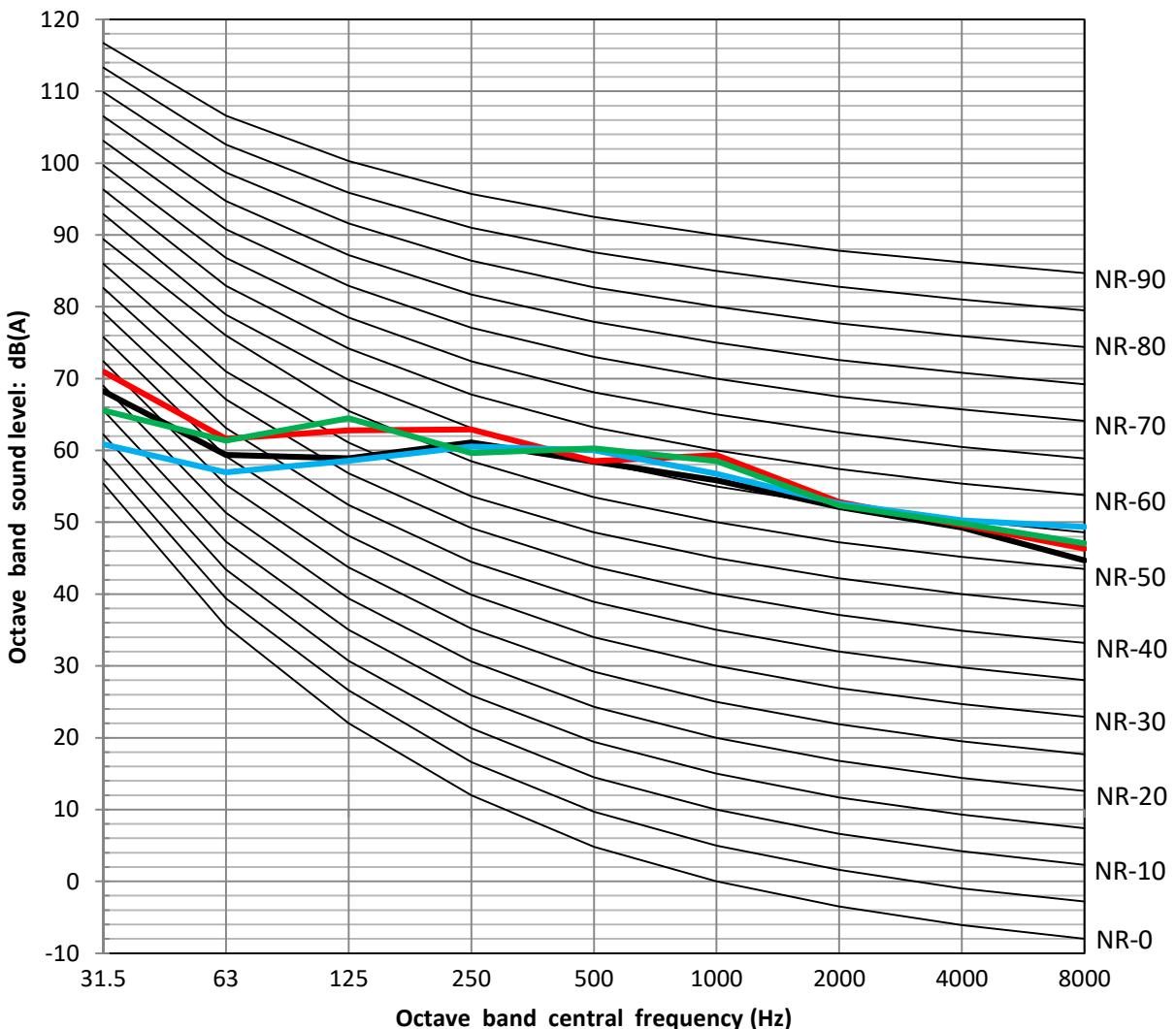


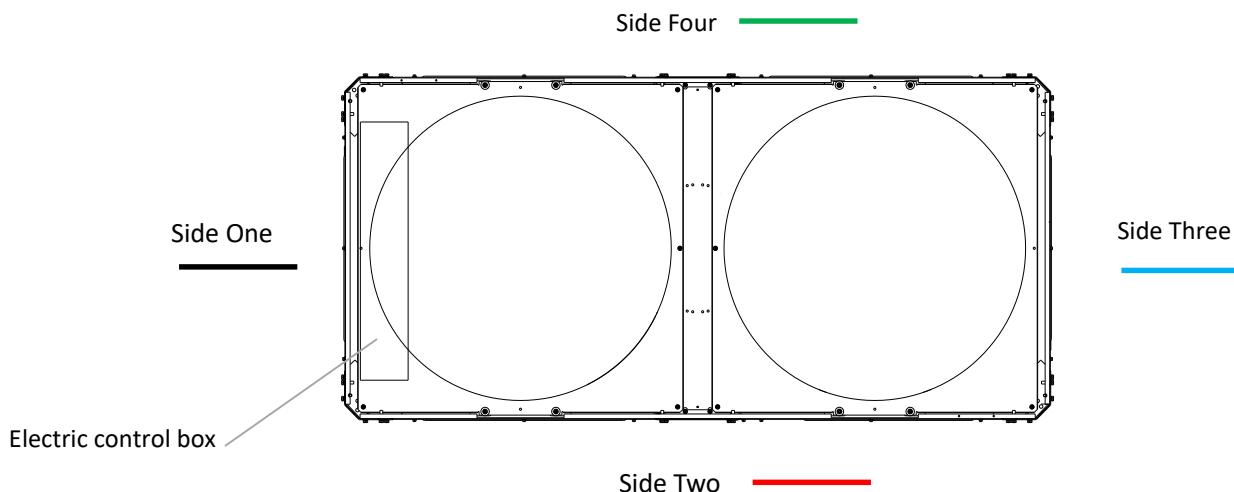
7 Octave Band Levels

For 50/65/75kW

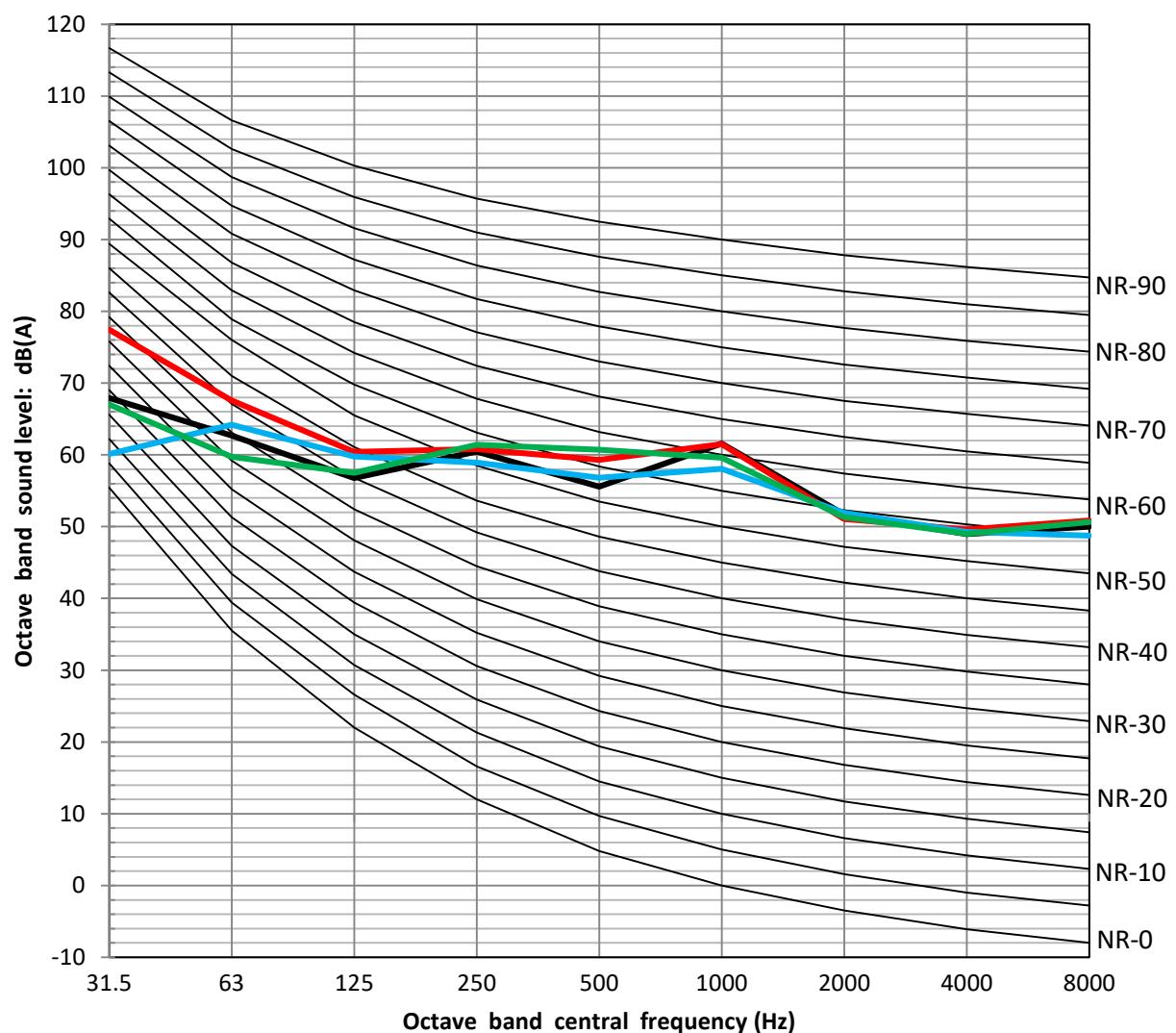


Test condition: Outdoor ambient temperature 35°C DB, EWT 12°C, LWT 7°C





Test condition: Outdoor ambient temperature 35°C DB. EWT 12°C, LWT 7°C



Part 3

User Interface

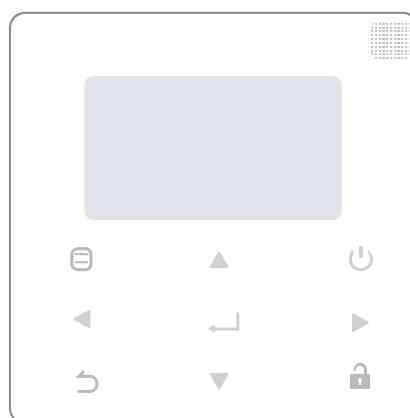
Field Settings

1 Introduction	51
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1 Introduction

During installation, the unit'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 SERVICE and PROJECT menu on the wired controller's user interface.

KJRM-120H2/BMWKO-E



Icon	Function
☰	Enter the menu structure from the home page
◀ ▲ ▶ ▼	Navigate the cursor on the display/navigate in the menu structure/ adjust the settings
⌚	Turn on or off the space operation mode
↶	Come back to the up level
🔒	Long press for unlocking /locking the controller
↷	Go to the next step when programming a schedule in the menu structure / confirm a selection/enter a submenu in the menu structure

2 Service menu

2.1 Structure

For SERVICE Menu

- 1. STATE QUERY
- 2. CLEAR HSITORY ERRORS
- 3. SETTING ADDRESS
- 4. HEAT CONTROL
- 5. TEMPERATURE COMPENSATION
- 6. PUMP CONTROL
- 7. MANUAL DEFROST
- 8. LOW OUTLET WATER CONTROL
- 9. VACUMM SWITCH
- 10. ENERGY SAVING SWITCH
- 11. DHW ENABLE
- 12. FACTORY DATA RESET

1. STATE QUERY

2. CLEAR HISTORY ERRORS

- CLEAR UNIT HISTORY ERRORS
- CLEAR ALL HISTORY ERRORS
- CLEAR LOCK ERRORR
- CLEAR RUN TIME

3. SETTING ADDRESS

- CONTROLLER ADDRESS
- CONTROL ENABEL
- MODBUS ENABLE
- MODBUS ADDRESS

4. HEAT CONTROL

- HEAT1
- HEAT2
- FORCED HEAT2 OPEN

5. TEMPERATURE COMPENSATION

- COOL MODE ENABLE
- T4_COOL_1
- T4_COOL_2
- OFFSET-C
- HEAT MODE ENABLE
- T4_HEAT_1
- T4_HEAT_2

6. PUMP CONTROL

- FORCED PUMP OPEN
- INV PUMP SETTING
- PUMP ON/OFF TIME

7. MANUAL DEFROST

8. LOW OUTLETWATER CONTROL

9. VACUUM SWITCH

10. ENERGY SAVING SWITCH

11. DHW ENABLE

12. FACTORY DATA RESET

2.2 Service Menu

MENU > Service Menu

Service Menu allows installers to input the system configuration and set the system parameters. Enter the password, using **◀ ▶** to navigate between digits and using **▼ ▲** to adjust the numerical values, and then press **OK**. The password is 234.

SERVICE MENU		
PLEASE INPUT THE PASSWORD		
0 0 0		
OK	◀	▶

The following pages will be displayed after putting the password.

SERVICE MENU		
STATE QUERY		
CLEAR HISTORY ERRORS		
SETTING ADDRESS		
HEAT CONTROL		
OK	1/3	◀

SERVICE MENU		
TMEPERATURE COMPENSATION		
PUMP CONTROL		
MANUAL DEFROST		
LOW OUTLET WATER CONTROL		
OK	2/3	◀

SERVICE MENU		
VACUUM SWITCH		
ENERGY SAVING SWITCH		
DHW ENABLE		
FACTORY DATA RESET		
OK	3/3	◀

2.3 State query

MENU > Service Menu > State query

SERVICE MENU		
STATE QUERY		
CLEAR HISTORY ERRORS		
SETTING ADDRESS		
HEAT CONTROL		
OK	1/3	◀

STATE QUERY allows installers to check the operation parameters. Press **◀ ▶** to select the address of units.

STATE QUERY		
SELECT ADDRESS	• 07 • #	
ODU MODEL	130 kW	
COMP FREQUENCE	50 Hz	
COMP1 CURRENT	20 A	
COMP2 CURRENT	20 A	
BACK	◀	▶

STATE QUERY		
H-P PRESSURE	3.83 MPa	
L-P PRESSURE	1.00 MPa	
TP1 DISCHARGE TEMP	30 °C	
TP2 DISCHARGE TEMP	30 °C	
TH SUCTION TEMP	-20 °C	
OK	2/9	◀

STATE QUERY		
TZ TEMP	-20°C	
T3 TEMP	-20°C	
T4 TEMP	-20°C	
T6A TEMP	40°C	
T6B TEMP	40°C	
BACK	3/9	◀

STATE QUERY		
TFIN1 TEMP	60 °C	
TFIN2 TEMP	60 °C	
TDSH	30 °C	
TSSH	15 °C	
TCSH	15 °C	
BACK	4/9	◀

STATE QUERY		
FAN1 SPEED	850 RPM	
FAN2 SPEED	850 RPM	
FAN3 SPEED	850 RPM	
EXV A	1800 P	
EXV B	1800 P	
BACK	5/9	◀

STATE QUERY		
EXV C	1800P	
Twi TEMP	30°C	
Two TEMP	30°C	
Tw TEMP	30°C	
TAF1 TEMP	30°C	
BACK	6/9	◀

STATE QUERY	
TAF2 TEMP	30 °C
T5 TEMP	30 °C
COMP TIME1	120 MIN
COMP TIME2	120 MIN
COMP TIME3	120 MIN
BACK	7/9 □ ▶

STATE QUERY	
COMP TIME	65535 H
FIX PUMP TIME	65535 H
INV PUMP TIME	65535 H
ODU SOFTWARE	V45
HMI SOFTWARE	V45
BACK	8/9 □ ▶

STATE QUERY	
DEFROSTING STATE	
00	01
08	09
10	11
12	13
13	14
14	15
E2 SOFTWARE V45	
END	
OK	9/9 □ ▶

Note:

1. Tz plate heat exchanger outlet temperature

T3 lowest temperature of condenser tube

T4 ambient temperature

T6A, T6B EVI plate heat exchanger refrigerant temperature

Tfin1, Tfin2 inverter module temperature

TDSH Discharge superheat temperature

TSSH Suction superheat temperature

TCSH Injection superheat temperature

Twi Unit water inlet temperature

Two Unit water outlet temperature

Tw Total water outlet temperature

Taf1 DHW water pipe antifreeze temperature

Taf2 Water side antifreeze temperature

T5 Water tank temperature

2. For ODU SOFTWARE and HMI SOFTWARE, the version number will vary with product iterations.

2.4 Clear history errors

MENU > Service Menu > Clear history errors

SERVICE MENU	
STATE QUERY	
CLEAR HISTORY ERROR	▼
SETTING ADDRESS	
HEAT CONTROL	
OK	1/3 □ ▶

CLEAR HISTORY ERRORS	
CLEAR UNIT HISTORY ERRORS	
CLEAR ALL HISTORY ERRORS	
CLEAR LOCK ERROR	
CLEAR RUN TIME	
OK	□ ▶

CLEAR HISTORY ERRORS is used to clear the history error codes and component operation time.

CLEAR UNIT HIS ERRS	
SELECT ADDRESS	◀ 07 ▶
DO YOU WANT TO CLEAR?	◀ YES ▶
OK	◀ ▶

CLEAR ALL HIS ERRS	
DO YOU WANT TO CLEAR?	◀ YES ▶
OK	◀ ▶

CLEAR LOCK ERR	
DO YOU WANT TO CLEAR?	◀ YES ▶
OK	◀ ▶

CLEAR RUN TIME	
SELECT ADDRESS	◀ 07 ▶
CLEAR COMP TIME?	◀ NO ▶
CLEAR FIX PUMP TIME?	◀ NO ▶
CLEAR INV PUMP TIME?	◀ NO ▶
OK	◀ ▶

2.5 Setting address

MENU > Service Menu > Setting address

SERVICE MENU
STATE QUERY
CLEAR HISTORY ERROR
SETTING ADDRESS
HEAT CONTROL
OK
1/3
◀ ▶

SETTING ADDRESS is used to set whether the unit can be controlled by wired controller and through MDOBUS. **SETTING ADDRESS** can also enter by combining buttons pressing **◀**, **▶** for 3s.

CONTROLLER ADDRESS	◀ 10 ▶ #
CONTROL ENABEL	◀ NO ▶
MODBUS ENABLE	◀ NO ▶
MODBUS ADDRESS	◀ 10 ▶ #
OK	◀ ▶

CONTROLLER ADDRESS selects the unit address then we can check the parameters about this unit.

If **CONTROL ENABEL** sets as YES, it means the controller can set all the parameters; if **CONTROL ENABEL** sets as NO, it means the controller can only display the parameters.

If the chiller system access to MODBUS system, **MODBUS ENABLE** should be set as YES. Please note that in this case, **COMTROL ENABLE** should be also set as YES, otherwise the units cannot be controlled.

MODBUS ADDRESS set the controller address if the Modbus system is available.

2.6 Heat control

MENU > Service Menu > Heat control

SERVICE MENU
STATE QUERY
CLEAR HISTORY ERROR
SETTING ADDRESS
HEAT CONTROL
OK
1/3
◀ ▶

HEAT CONTROL
HEAT1
HEAT2
FORCED HEAT2 OPEN
OK
◀

HEAT1 means pipe electric heating in cooling/heating mode.

HEAT2 means tank electric heating in DHW mode.

HEAT1	
HEAT1 ENABLE	◀ NO ▶
TEMP-	◀ 07 ▶ °C
AUXHEAT1-ON	
TW. HEAT1-ON	◀ 25 ▶ °C
TW. HEAT1-OFF	◀ 45 ▶ °C
OK	
1/2	
◀ ▶	

HEAT2	
ALL HEAT2 DISABLE	◀ YES ▶
SELECT ADDRESS	◀ 10 ▶ #
HEAT2-ENABLE	◀ NO ▶
T-HEAT2-DELAY	◀ 190 ▶ MIN
DT5-HEAT2-OFF	◀ 10 ▶ °C
OK	
1/2	
◀ ▶	

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HEAT2	
T4-HEAT2-ON	◀ 10 ▶ °C
00 01 02 03 04 05 06 07	
08 09 10 11 12 13 14 15	
OK 2/2 ⌂ ⌃	

FORCED HEAT2 OPEN	
SELECTED ADDRESS	◀ 10 ▶ #
FORCED HEAT2 OPEN	◀ NO ▶
00 01 02 03 04 05 06 07	
08 09 10 11 12 13 14 15	
OK ⌂ ⌃	

TEMP-AUXHEAT1-ON sets the ambient temperature below which the pipe heater (field supplied) turns on.

When the leaving water temperature reaches TW. HEAT1-ON, the pipe electric heater (field supplied) turns on automatically.

When the leaving water temperature reaches TW. HEAT1-OFF, the pipe electric heater (field supplied) turns off automatically.

If the system is installed with tank booster heater, ALL HEAT2 DISABLE should be set as YES.

HEAT2-ENABLE sets the state of tank booster heater of SELECT ADDRESS.

T-HEAT2-DELAY sets the delay time for tank booster heater to turn on after the compressor starts.

DT5-HEAT2-OFF sets the temperature difference between the actual water temperature and setting temperature above which the tank booster heater turns off.

T4_HEAT2_ON sets the ambient temperature that tank booster heater turns on. (00~15 means unit address)

If **FORCED HEAT2 OPEN** is set as YES, when $T5 < T5S-1$, then tank electric heater turns on; when $T5 \geq T5S$, then tank electric heater off. (00~15 means unit address)

2.7 Temperature Compensation

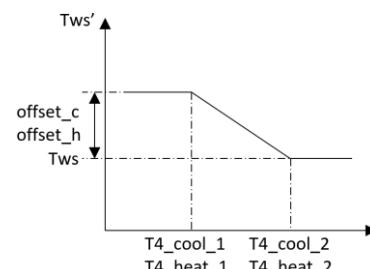
MENU > Service Menu > Temperature Compensation

SERVICE MENU
TEMPERATURE COMPENSATION
PUMP CONTROL
MANUAL DEFROST
LOW OUTLET WATER CONTROL
OK 2/3 ⌂ ⌃

With the help of **TEMPERATURE COMPENSATION**, water temperature will automatically change as outside air temperature changes. When outdoor air temperature increases/decreases, the heating load will decrease/increase and water temperature will decrease/increase automatically. When outdoor air temperature decreases/increases, the cooling load will decrease/increase and water temperature will increase/decrease automatically.

TEMP COMPENSATION	
COOL MODE ENABLE	◀ YES ▶ °C
T4 COOL-1	◀ 15 ▶ °C
T4 COOL-2	◀ 08 ▶ °C
OFFSET-C	◀ 10 ▶ °C
OK 1/2 ⌂ ⌃	

TEMP COMPENSATION	
HEAT MODE ENABLE	◀ YES ▶ °C
T4 HEAT-1	◀ 15 ▶ °C
T4 HEAT-2	◀ 08 ▶ °C
OFFSET-H	◀ 10 ▶ °C
OK 2/2 ⌂ ⌃	



T4 COOL-1, T4 COOL-2 set the ambient temperature for cooling mode.

T4 HEAT-1, T4 HEAT-2 set the ambient temperature for heating mode.

Offset_c, Offset_h is the temperature difference between current water temperature and T4_cool_1, T4_heat_1 corresponding water temperature.

2.8 Pump Control

MENU > Service Menu > Pump Control

SERVICE MENU
TMEPERATURE COMPENSATION
PUMP CONTROL
MANUAL DEFROST
LOW OUTLET WATER CONTROL
OK
2/3

PUMP CONTROL
FORCED PUMP OPEN
INV PUMP SETTING
PUMP ON/OFF TIME
OK

FOECD PUMP OPEN
SELECT ADDRESS ▶ 0 ▷ #
FORCED PUMP OPEN ▶ NO ▷
OK
◀ ▶ ▷

INV PUMP SETTING
SELECT ADDRESS ▶ 07 ▷ #
SWITCH ON THE ▶ NO ▷ PUMP
RATIO PUMP ▶ 100 ▷ #
OK
◀ ▶ ▷

PUMP ON/OFF TIME
PUMP ON TIME ▶ 05 ▷ MIN
PUMP OFF TIME ▶ 05 ▷ MIN
OK
◀ ▶ ▷

FORCED PUMP OPEN is used to control the fixed frequency pump (field supplied) operation.

INV PUMP SETTING is used to control the inverter water pump (field supplied) operation, the setting range of RATIO-PUMP is 30%-100%. It should ensure its flow meet the requirement of whole unit, otherwise the unit may be damaged.

PUMP ON TIME sets the pump operation time after the unit stops.

If PUMP OFF TIME sets as 0, the pump will run all the time. Otherwise, the pump will operate intermittently according to the PUMP ON TIME and PUMP OFF TIME setting.

	Set range	Default value	Adjustment range
PUMP ON TIME	5~60min	5	5
PUMP OFF TIME	0~60min	0	5

2.9 Manual Defrost

MENU > Service Menu > Manual Defrost

SERVICE MENU
TMEPERATURE COMPENSATION
PUMP CONTROL
MANUAL DEFROST
LOW OUTLET WATER CONTROL
OK
2/3

MANUAL DEFROST
SELECT ADDRESS ▶ 07 ▷ #
MANUAL DEFRIOST ▶ NO ▷
OK
◀ ▶ ▷

MANUAL DEFROST can force the unit to enter the defrost mode manually.

If the external unit successfully enters the defrost mode after the “MANUAL DEFROST” is turned on, the defrost icon  will be displayed at homepage of the wired controller.

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2.10 Low outlet water temperature control

MENU > Service Menu > Low outlet water temperature control

SERVICE MENU	
TMEPERATURE COMPENSATION	
PUMP CONTROL	
MANUAL DEFROST	
LOW OUTLET WATER CONTROL	
OK	2/3

At this page, the historical minimum water outlet temperature setting (setting range 0-20°C) can be viewed.

LOW OUTLET WATER CTRL	
MIN TEMP FOR COOL	◀ 50°C ▶
HISTORICAL SETTING	
04/06/2020 11:30A	5°C
04/06/2020 11:30A	5°C
04/06/2020 11:30A	5°C
OK	◀ ▶

MIN TEMP FOR COOL sets the lowest water temperature for cooling mode. Please notice that When the setting temperature is less than 5 °C, antifreeze liquid should be added in the water system.

LOW OUTLET WATRER CONTROL	
The setting temp is below 5 degree please confirm whether it is an antifreeze system?	
OK	◀ ▶

2.11 Vacuum switch

MENU > Service Menu > Vacuum switch

SERVICE MENU	
VACUUM SWITCH	
ENERGY SAVING SWITCH	
DHW ENABLE	
FACTORY DATA RESET	
OK	3/3

VACUUM SWITCH	
VACUUM SWITCH	◀ NO ▶
OK	◀ ▶

VACUUM SWITCH is used for vacuuming.

2.12 Energy saving mode

MENU > Service Menu > Energy saving mode

SERVICE MENU
VACUUM SWITCH
ENERGY SAVING SWITCH
DHW ENABLE
FACTORY DATA RESET
OK
3/3
◀ ▶

ENERGY SAVING SWITCH	
SAVING SWITCH	◀ 80% ▶
HISTORICAL SETTING	
04/06/2020 11:30A	80%
04/06/2020 11:30A	80%
04/06/2020 11:30A	80%
OK	◀ ▶

For projects with temporary electricity supply restrictions, the outdoor unit supports 7 levels of energy management which can be set to output 40-100% capacity. It prevents tripping during electricity supply restriction conditions and remains system continue to operate. The historical energy saving switch setting can be viewed.

2.13 DHW ENABLE

MENU > Service Menu > DHW ENABLE

Domestic hot water function can be customized.

DHW ENABLE	
DHW ENABLE	◀ NO ▶
OK	◀ ▶

2.14 Factory data reset

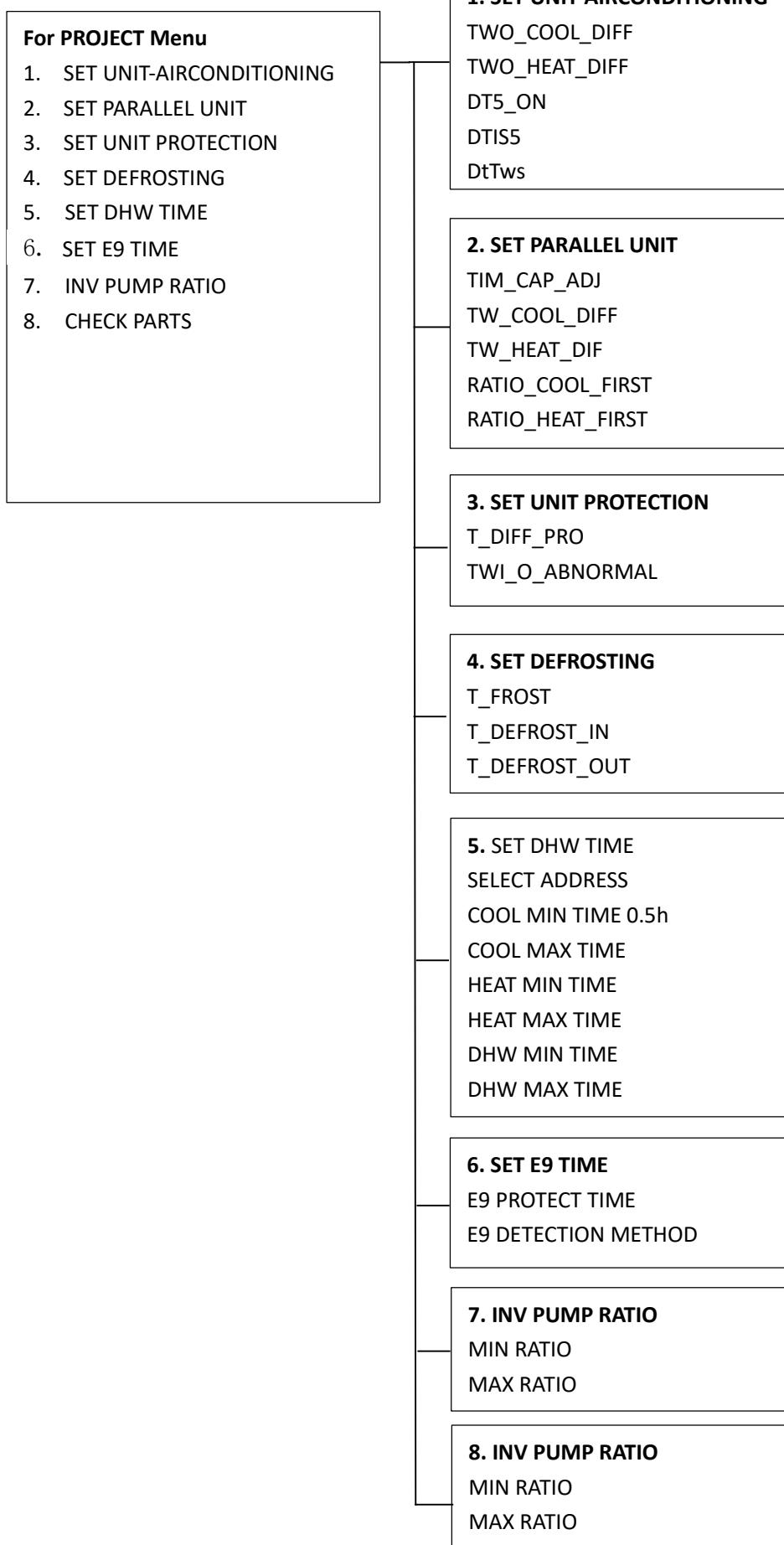
MENU > Service Menu > Factory data reset

Factory data reset is used to reset all the data to the factory default setting.

FACTORY DATA RESET	
DO YOU WANT TO RESET?	◀ YES ▶
OK	◀ ▶

3 Project menu

3.1 Structure



3.2 Project Menu

MENU > Project Menu

Project Menu allows installers to input the system configuration and set the system parameters. Enter the password, using **<>** to navigate between digits and using **▼ ▲** to adjust the numerical values, and then press **OK**. The password is 9877.

PROJECT MENU	
PLEASE INPUT THE PASSWORD	
0 0 0 0	
OK	

The following pages will be displayed after putting the password.

PROJECT MENU	
SET UNIT AIRCONDITIONING	
SET PARALLEL UNIT	
SET UNIT PROTECTION	
SET DEFROSTING	
OK	1/2

PROJECT MENU	
SET DHW TIME	
SET E9 TIME	
INV PUMP RATIO	
CHECK PARTS	
OK	2/2

3.3 SET UNIT-AIRCONDITIONING

MENU > Project Menu > SET UNIT-AIRCONDITIONING

SET UNIT	
TWO_COOL_DIFF	2 °C
TWO_HEAT_DIFF	2 °C
DT5_ON	8 °C
DTIS5	10 °C
DtTws	1 °C
OK	

TWO_COOL_DIFF sets the minimum temperature difference between the leaving water temperature (Two) and the leaving water set temperature (TwoS) above which the unit will start for cooling mode. When Two - TwoS \geq TWO_COOL_DIFF, unit starts. When TwoS - Two \geq 2 lasts for 5s, unit stops.

TWO_HEAT_DIFF sets the minimum temperature difference between the leaving water temperature (Two) and the leaving water set temperature (TwoS) above which the unit will start for heating mode. When TwoS - Two \geq TWO_HEAT_DIFF, unit starts. When Two - TwoS \geq 2 lasts for 5s, unit stops.

If unit is customized with the DHW function, when $\text{TempW_heat_Min_n} \leq T5 < \text{Min}(T5S, \text{TempW_heat_Max_n}) - dT5_ON$ and $\text{Two} < \text{Min}(T5S, \text{TempW_heat_Max_n}) - 2$, then DHW mode is on.

Note:

The value of TempW_heat_Min_n, T5S, TempW_heat_Max_n are related to the ambient temperature, which are already fixed in the program.

T5 means the water tank temperature

T5S means the setting temperature of DHW mode

The target leaving water temperature of DHW mode is Twos=T5S+DT1S5. If Two>TempW_heat_Max_n, then DHW mode is off.

DtTws is reserved.

3.4 SET PARALLEL UNIT

MENU > Project Menu > SET PARALLEL UNIT

SET PAPALLE UNIT	
TIM_CAP_ADJ	◀ 180 ▶ S
TW_COOL_DIFF	◀ 2 ▶ °C
TW_HEAT_DIFF	◀ 2 ▶ °C
RATIO_COOL_FIRST	◀ 0 ▶ %
RATIO_HEAT_FIRST	◀ 50 ▶ %
OK	◀ ▶

TIM_CAP_ADJ sets the period of capacity adjustment

TW_COOL_DIFF sets the minimum temperature difference between the total leaving water temperature (Tw) and the total leaving water set temperature (TwS) above which the unit will start for cooling mode. When $Tw - TwS \geq TW_COOL_DIFF + 1$, unit starts. When $TwS - Tw \geq 2$ lasts for 5s, unit stops.

TW_HEAT_DIFF sets the minimum temperature difference between the total leaving water temperature (Tw) and the total leaving water set temperature (TwS) above which the unit will start for heating mode. When $TwS - Tw \geq TW_HEAT_DIFF + 1$, unit starts. When $Tw - TwS \geq 1$ lasts for 5s, unit stops.

RATIO_COOL_FIRST sets the number of initial startup units for cooling mode.

RATIO_HEAT_FIRST sets the number of initial startup units for heating mode.

3.5 SET UNIT PROTECTION

MENU > Project Menu > SET UNIT PROTECTION

SET UNIT PROTECTION	
T_DIFF_PRO	◀ 12 ▶ °C
TWI_O_ANORMAL	◀ 2 ▶ °C
OK	◀ ▶

T_DIFF_PRO set the absolute difference between entering water temperature (Twi) and leaving water temperature (Two). If $|Twi - Two| \geq T_DIFF_PRO$, unit stops and error code P9 appears. Normal heat pumps when $|Twi - Two| \geq 10^\circ C [T_DIFF_PRO]$, or high temperature heat pumps $|Twi - Two| \geq 15^\circ C$, error code disappears.

TWI_O_ANORMAL sets the difference between Inlet water temperature (Twi) and Outlet water temperature (Two). For cooling mode, if $Two - Twi \geq TWI_O_ANORMAL$ and lasts for 20min, unit stops and error code PA appears. If $Two - Twi \leq TWI_O_ANORMAL - 1$, error code disappears. For heating mode, if $Twi - Two \geq TWI_O_ANORMAL$ and lasts for 20min, unit stops and error code PA appears. If $Twi - Two \leq TWI_O_ANORMAL - 1$, error code disappears.

3.6 SET DEFROSTING

MENU > Project Menu > SET DEFROSTING

SET DEFROSTING		
T_FROST	<input type="button" value="◀"/> 35 <input type="button" value="▶"/>	min
T_DEFROST_IN	<input type="button" value="◀"/> 0 <input type="button" value="▶"/>	°C
T_FROST_OUT	<input type="button" value="◀"/> 0 <input type="button" value="▶"/>	°C
OK	<input type="button" value="◀"/> <input type="button" value="▶"/>	

T_FROST sets the time between the end of the last defrost mode and the beginning of the next defrost mode.

T_DEFROST_IN sets the temperature for T3 of entering defrosting mode. When T3 reaches T_DEFROST_IN, unit enters defrosting mode.

T_FROST_OUT sets the temperature for T3 of exiting defrosting mode. When T3 reaches T_DEFROST_OUT, unit exits defrosting mode.

3.7 DHW time setting (Customized)

MENU > Project Menu > SET DHW TIME

SET DHW TIME		
SELECT ADDRESS	<input type="button" value="◀"/> 07 <input type="button" value="▶"/>	#
COOL MAX TIME	<input type="button" value="◀"/> 08 <input type="button" value="▶"/>	h
COOL MIN TIME	<input type="button" value="◀"/> 0.5 <input type="button" value="▶"/>	h
HEAT MAX TIME	<input type="button" value="◀"/> 08 <input type="button" value="▶"/>	h
HEAT MIN TIME	<input type="button" value="◀"/> 0.5 <input type="button" value="▶"/>	h
OK	1/2 <input type="button" value="◀"/> <input type="button" value="▶"/>	

SET DHW TIME		
DHW MIN TIME	<input type="button" value="◀"/> 0.5 <input type="button" value="▶"/>	h
DHW MAX TIME	<input type="button" value="◀"/> 08 <input type="button" value="▶"/>	h
OK	2/2 <input type="button" value="◀"/> <input type="button" value="▶"/>	

COOL MAX TIME sets the maximum operation time for cooling mode when DHW requirement exists.

COOL MIN TIME sets the minimum operation time for cooling mode when DHW requirement exists.

HEAT MAX TIME sets the maximum operation time for heating mode when DHW requirement exists.

HEAT MIN TIME sets the minimum operation time for heating mode when DHW requirement exists.

DHW MIN TIME sets the minimum operation time for DHW mode.

DHW MAX TIME sets the maximum operation time for DHW mode.

3.8 SET E9 TIME

MENU > Project Menu > SET E9 TIME

SET E9 TIME		
E9 PROTECT TIME	<input type="button" value="◀"/> 10 <input type="button" value="▶"/>	s
E9 DETECTION METHOD	<input type="button" value="◀"/> 1 <input type="button" value="▶"/>	#
OK	<input type="button" value="◀"/> <input type="button" value="▶"/>	

E9 PROTECT TIME sets the delay time of water flow detection. When unit starts, water flow will not be detected until at least (2+
E9 PROTECT TIME/60) minutes have elapsed.

E9 DETECTION METHOD sets the method of water flow detection. If “1” is selected, the water flow switch is detected after water pump starts. If “2” is selected, the water flow switch is both detected before and after the water pump starts.

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3.9 INV PUMP RATIO

MENU > Project Menu > INV PUMP RATIO

INV PUMP RATIO		
MIN RATIO	◀ 70 ▶ %	
MAX RATIO	◀ 100 ▶ %	
OK	◀ ▶	

MIN RATIO sets the minimum output ratio of inverter pump which is installed in the main water pipe.

MAX RATIO sets the maximum output ratio of inverter pump which is installed in the main water pipe.

3.10 CHECK PARTS

MENU > Project Menu > CHECK PARTS

State of different parts can be checked in this menu.

CHECK PARTS		
SELECT ADDRESS	◀ 07 ▶ #	
FIX PUMP STATE	OFF	
INV PUMP STATE	80%	
FOUR-WAY VALVE	OFF	
SV1 STATE	OFF	
BACK	1/3	◀ ▶

CHECK PARTS		
SV2 STATE	OFF	
SV4 STATE	OFF	
SV5 STATE	OFF	
SV6 STATE	OFF	
SV8A STATE	OFF	
BACK	2/3	◀ ▶

CHECK PARTS		
SV8B STATE	OFF	
HEAT1 STATE	OFF	
HEAT2 STATE	OFF	
COIL VALVE	OFF	
BACK	3/3	◀ ▶

4 Parameters setting

Menu	Parameters	Setting range	Default value	Adjustment range
Service menu	TEMP_AUXHEAT_ON	0~10°C	5°C	1°C
	TW_HEAT1_ON	0~50°C	25°C	1°C
	TW_HEAT1_OFF	0~60°C	45°C	1°C
	T_HEAT2_DELAY	60~240min	90min	5min
	DT5_HEAT2_OFF	2~10°C	5°C	1°C
	T4_HEAT2_ON	-5~20°C	5°C	1°C
	T4_COOL_1	15~30°C	25°C	1°C
	T4_COOL_2	35~45°C	40°C	1°C
	OFFSET_C	0~15°C	10°C	1°C
	T4_HEAT_1	-10~10°C	2°C	1°C
	T4_HEAT_2	15~30°C	15°C	1°C
	OFFSET_H	0~30°C	10°C	1°C
	RATIO_PUMP	30%~100%	100%	5%
	PUMP ON TIME	5~60min	5min	5min
	PUMP OFF TIME	0~60min	0min	5min
	MIN TEMP FOR COOL	0~20°C	7°C	1°C
	ENERGY SAVING SWITCH	40~100%	100%	10%

Menu	Parameters	Setting range	Default value	Adjustment range
Project menu	TWO_COOL_DIFF	1°C~5°C	2°C	1°C
	TWO_HEAT_DIFF	1°C~5°C	2°C	1°C
	TIM_CAP_ADJ	60~360s	80s	20s
	TW_COOL_DIFF	1°C~5°C	2°C	1°C
	TW_HEAT_DIFF	1°C~5°C	2°C	1°C
	RATIO_COOL_FIRST	0~100%	50%	5%
	RATIO_HEAT_FIRST	0~100%	50%	5%
	T_DIFF_PRO	Normal: 8~15°C	Normal : 10°C	1°C
		Hot: 8~20°C	Hot: 15°C	
	TWI_O_ABNORMAL	1~5°C	2°C	1°C
	T_FROST	20~120 min	35 min	5min
	T_DEFROST_IN	-5~5°C	0°C	1°C
	T_FROST_OUT	-10~+10°C	0°C	1°C
	E9 PROTECT TIME	2~20s	5s	1
	E9 DETECTION METHOD	1~2	1	1
	MIN RATIO	Normal: 40~100%	75%	5%
		Hot: 25~100%	25%	5%
	MAX RATIO	70~100%	100%	5%
Project menu (customized with DHW)	dT5_ON	2~10°C	8°C	1°C
	dT1S5	5~20°C	10°C	1°C
	COOL MIN TIME	0.5~24h	0.5h	0.5h
	COOL MAX TIME	0.5~24h	8h	0.5h
	HEAT MIN TIME	0.5~24h	0.5h	0.5h
	HEAT MAX TIME	0.5~24h	8h	0.5h
	DHW MIN TIME	0.5~24h	0.5h	0.5h
	DHW MAX TIME	0.5~24h	8h	8h

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