MUNDOCLIMA®

MODULAR CHILLER

MUENR-H9T & MUENR-H9T(K)

Data Book

www.mundoclima.com

CL25635 to CL25638

CONTENTS

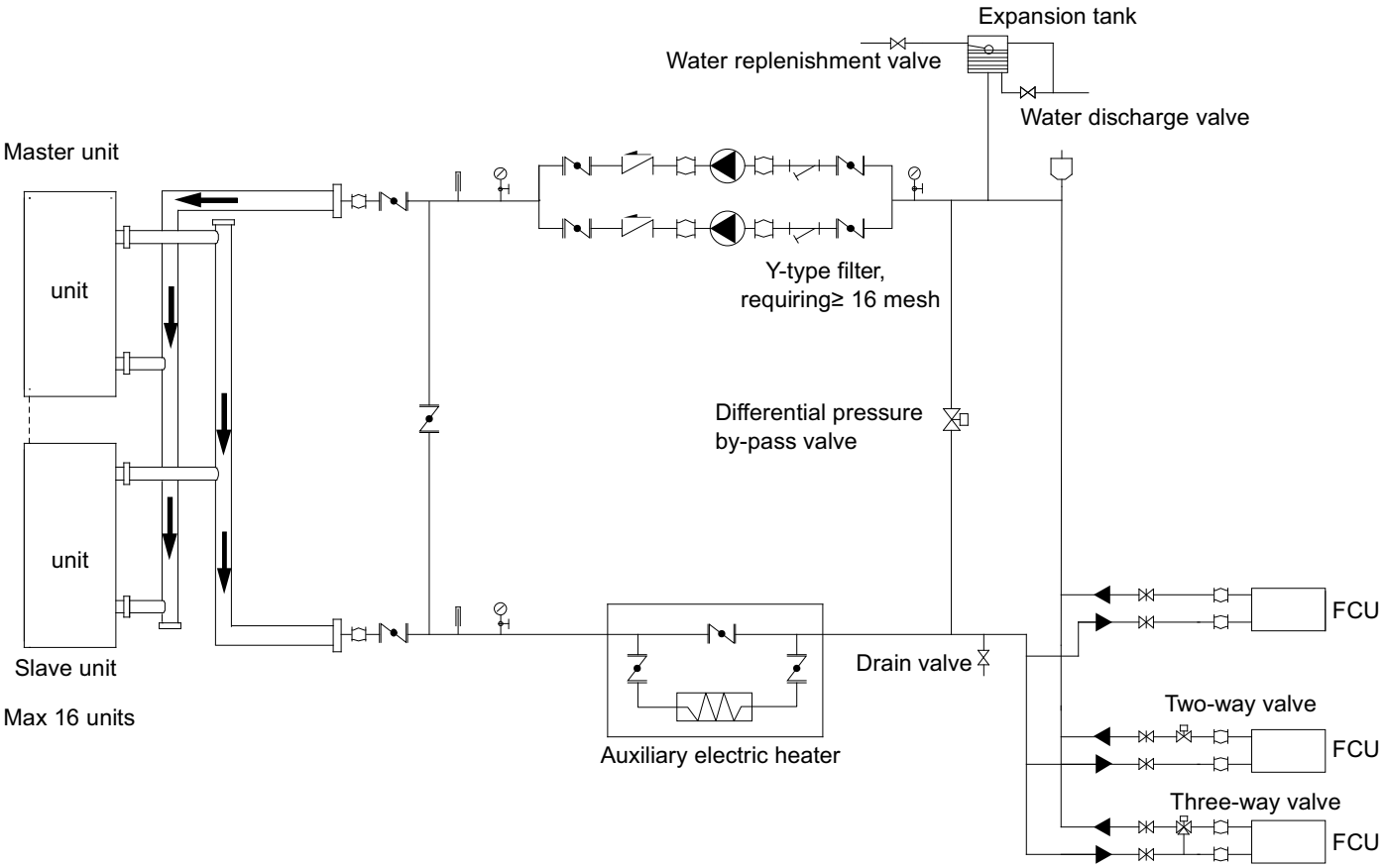
Part 1

General Information

1 R32 DC Modular Chiller H9T

1.1 System Schematic

Figure 1-1.1: System schematic



Legend				
Stop valve	Pressure gauge	Flexible joint	Gate valve	Automatic discharge valve
Y-shaped filter	Thermometer	Circulating pump	Check valve	

DC Modular Chiller H9T 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.

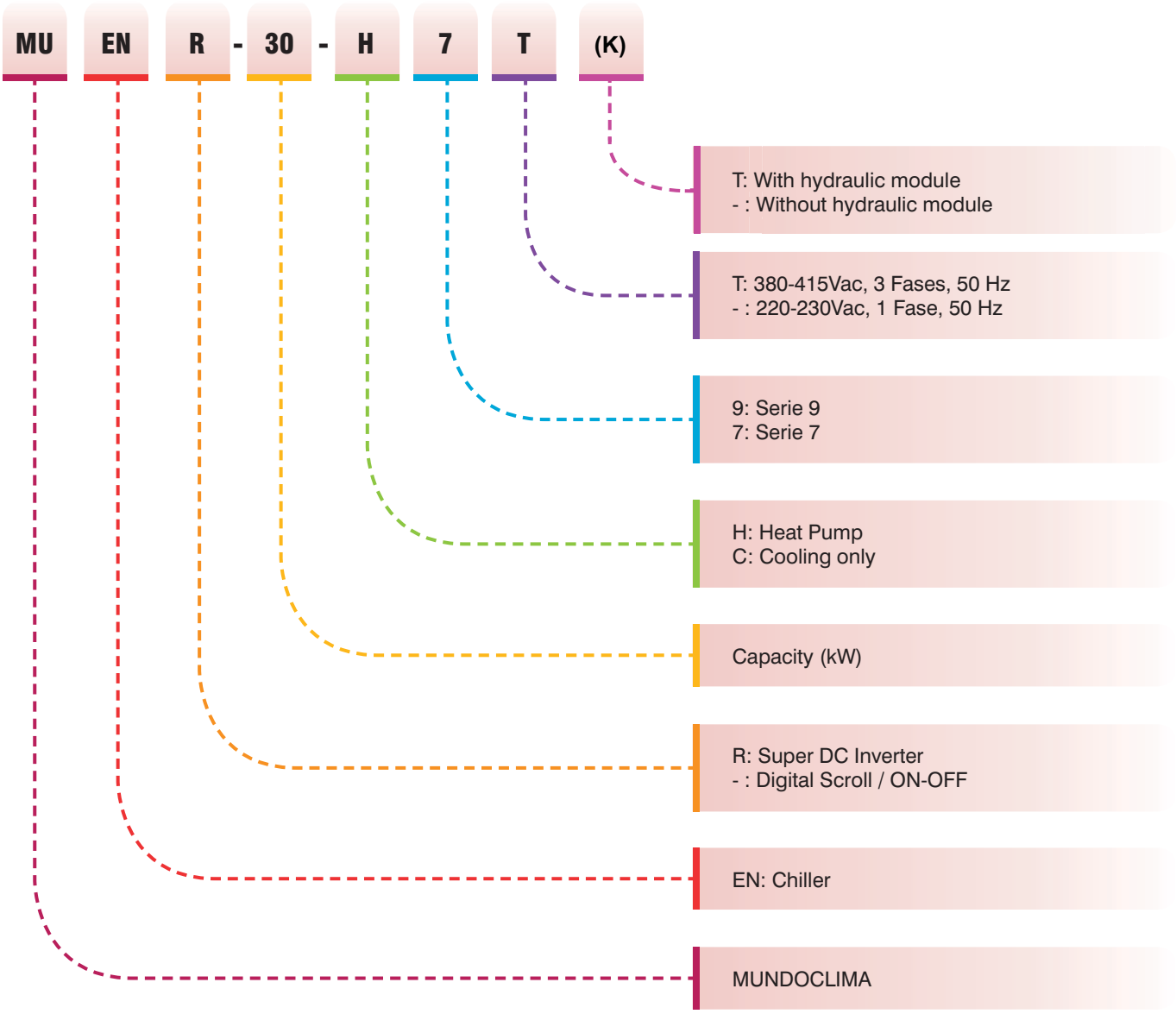
The heating capacity of heat pumps decreases with ambient temperature. DC Modular Chiller H9T is reserved an auxiliary electric heater control port to provide additional heating capacity for use during extremely cold weather when the heat pump capacity is insufficient. The auxiliary electric heater also serves as a backup in case of heat pump malfunction and for anti-freeze protection of the outside water piping in winter.

2 Unit Capacities

Table 1-2.1: Unit capacity range and unit appearances

Capacity	30kW	60kW
Model	MUENR-30-H9T / MUENR-30-H9T(K)	MUENR-60-H9T / MUENR-60-H9T(K)
Appearance		
Power supply	380-415V/3Ph/50Hz	

3 Nomenclature



4 Unit Combinations

Table 1-4.1: Unit Combinations

System Capacity (kW)	Numbers of units	Modules	
		30kW	60kW
30	1	●	
60	1		●
90	2	●	●
120	2		●●
150	3	●	●●
180	3		●●●
210	4	●	●●●
240	4		●●●●
270	4	●	●●●●
300	5		●●●● ●
330	6	●	●●●● ●
360	6		●●●● ●●
390	7	●	●●●● ●●
420	7		●●●● ●●●
450	7	●	●●●● ●●
480	8		●●●● ●●●●
510	9	●	●●●● ●●●●
540	9		●●●● ●●●● ●
570	10	●	●●●● ●●●● ●
600	10		●●●● ●●●● ●●
630	11	●	●●●● ●●●● ●●
660	11		●●●● ●●●● ●●●

Table continued on next page ...

Table 1-4.1: Unit Combinations(continued)

690	12	●	●●● ●●● ●●●
720	12		●●● ●●● ●●●
750	13	●	●●● ●●● ●●●
780	13		●●● ●●● ●●● ●
810	14	●	●●● ●●● ●●● ●
840	14		●●● ●●● ●●● ●●
870	15	●	●●● ●●● ●●● ●●
900	15		●●● ●●● ●●● ●●●
930	16	●	●●● ●●● ●●● ●●●
960	16		●●● ●●● ●●● ●●●

5 System and Design Unit Selection

5.1 Selection Procedure

Step 1: Total heat load calculation

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

Step 2: System configuration

Decide whether to enable or disable auxiliary electric heater

Step 3: Selection of outdoor units

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

Provisionally select DC Modular Chiller unit H9T capacity[1] based on nominal capacity

Correct capacity of the outdoor units for the following items:
Outdoor air temperature / Outdoor humidity / Water outlet temperature[2] / Altitude / Anti-freeze type

Is corrected DC Modular Chiller H9T unit capacity[1] Required total heat load on outdoor units[3]

Yes

R32 DC Modular Chiller H9T system selection is complete

No

Select a larger model or enable auxiliary electric heater operation

Notes:

1. Up to 16 units can be connected together, giving a system cooling/heating capacity range from 30kW to 960kW.
2. If the required water temperatures of the heat emitters are not all the same, the DC Modular Chiller H9T 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.
3. If the outdoor unit selection is to be based on total heating load and total cooling load, select DC Modular Chiller H9T units which satisfy not only the total heating load requirements but also the total cooling load requirements.

5.2 DC Modular Chiller H9T Leaving Water Temperature (LWT) Selection

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

- For floor heating: 30 to 35^{o}C
- For fan coil units: 30 to 45^{o}C
- For low temperature radiators: 40 to 50^{o}C

5.3 Optimizing System Design

To get the most comfort with the lowest energy consumption with R32 DC Modular Chiller H9T, it is important to take account of the following considerations:

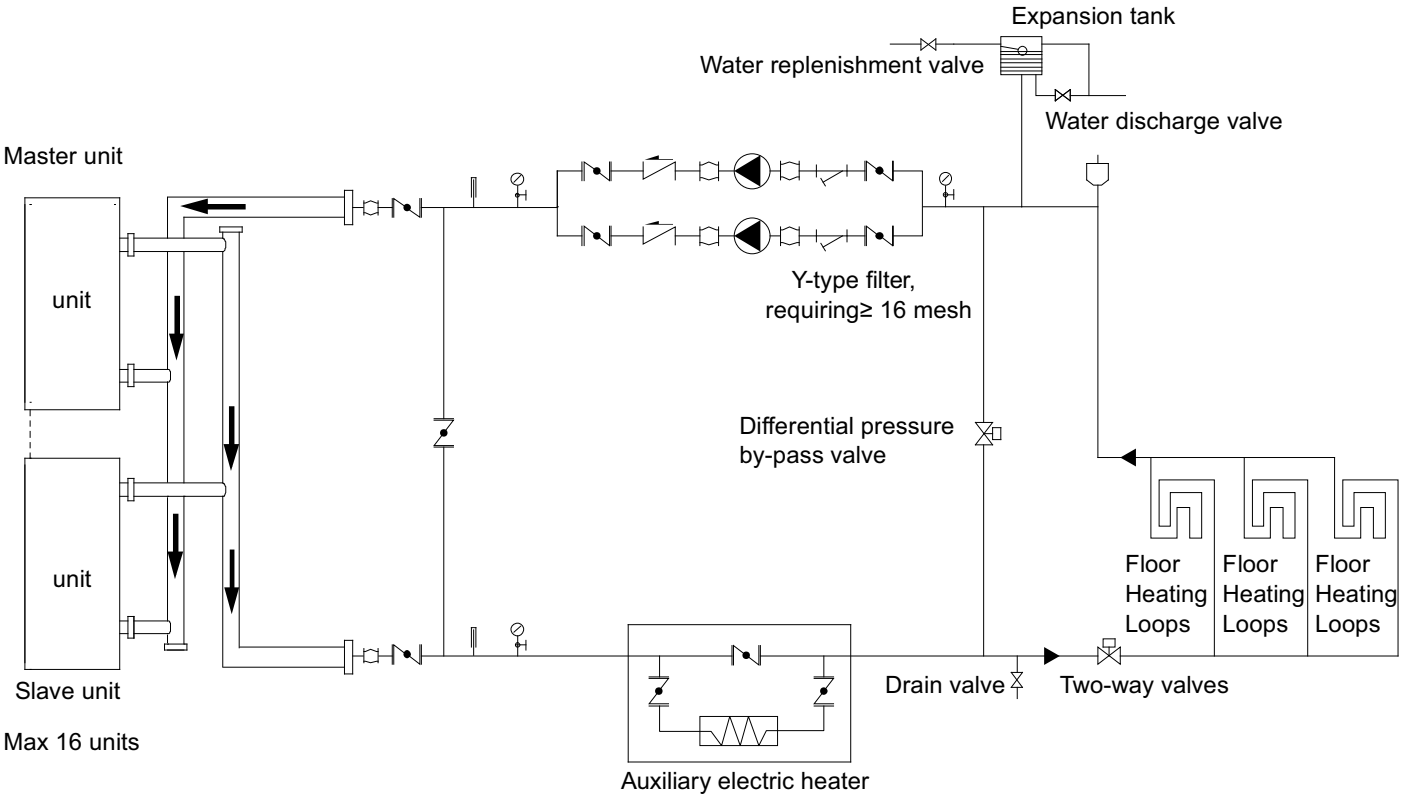
- Choose heat emitters that allow the heat pump system to operate at as low a hot water temperature as possible whilst still providing sufficient heating.

6 Typical Applications

6.1 Space Heating Through Floor Heating Loops

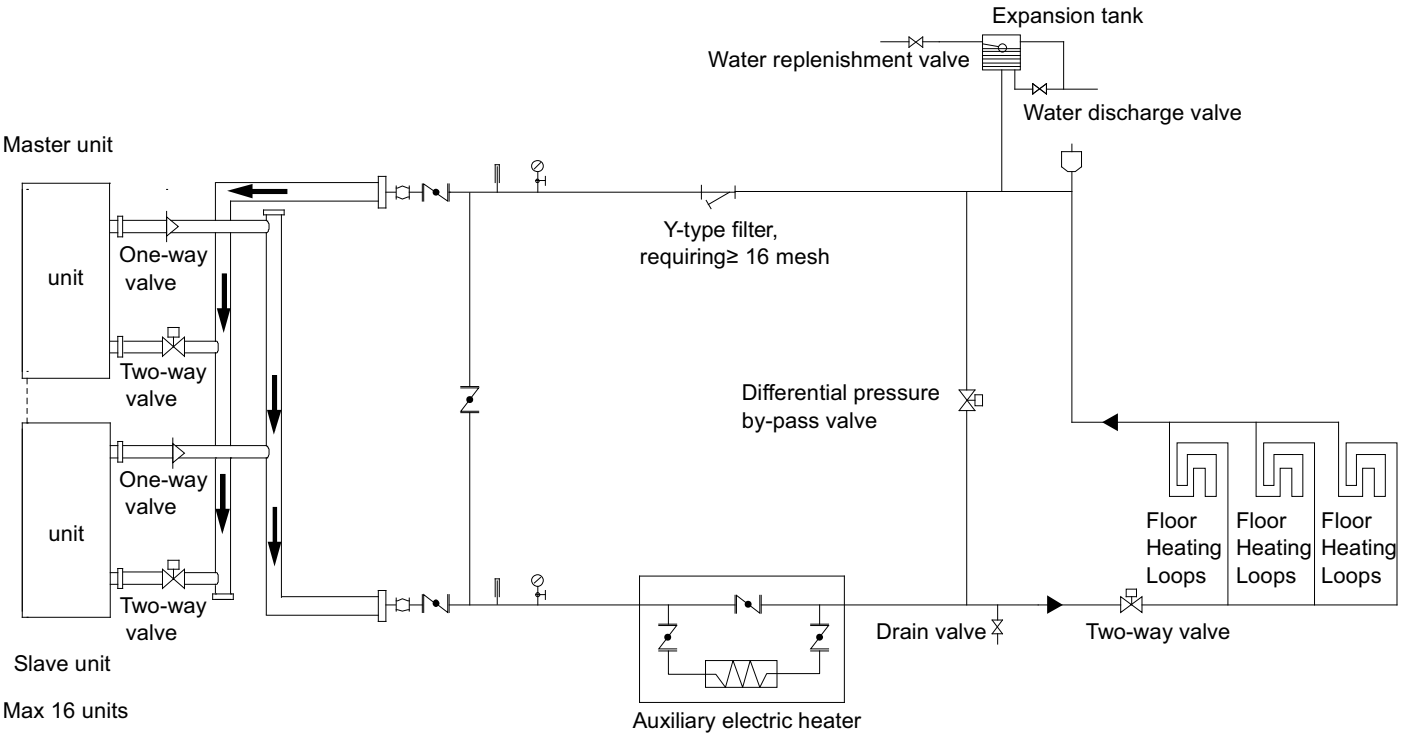
Floor heating Loops are used for spaces heating.

Figure 1-6.1: Space heating through floor heating loops (standard unit without hydronic module)



Legend				
Stop valve	Pressure gauge	Flexible joint	Gate valve	Automatic discharge valve
Y-shaped filter	Thermometer	Circulating pump	Check valve	

Figure 1-6.2: Space heating through floor heating loops (customized unit with built-in hydronic module)

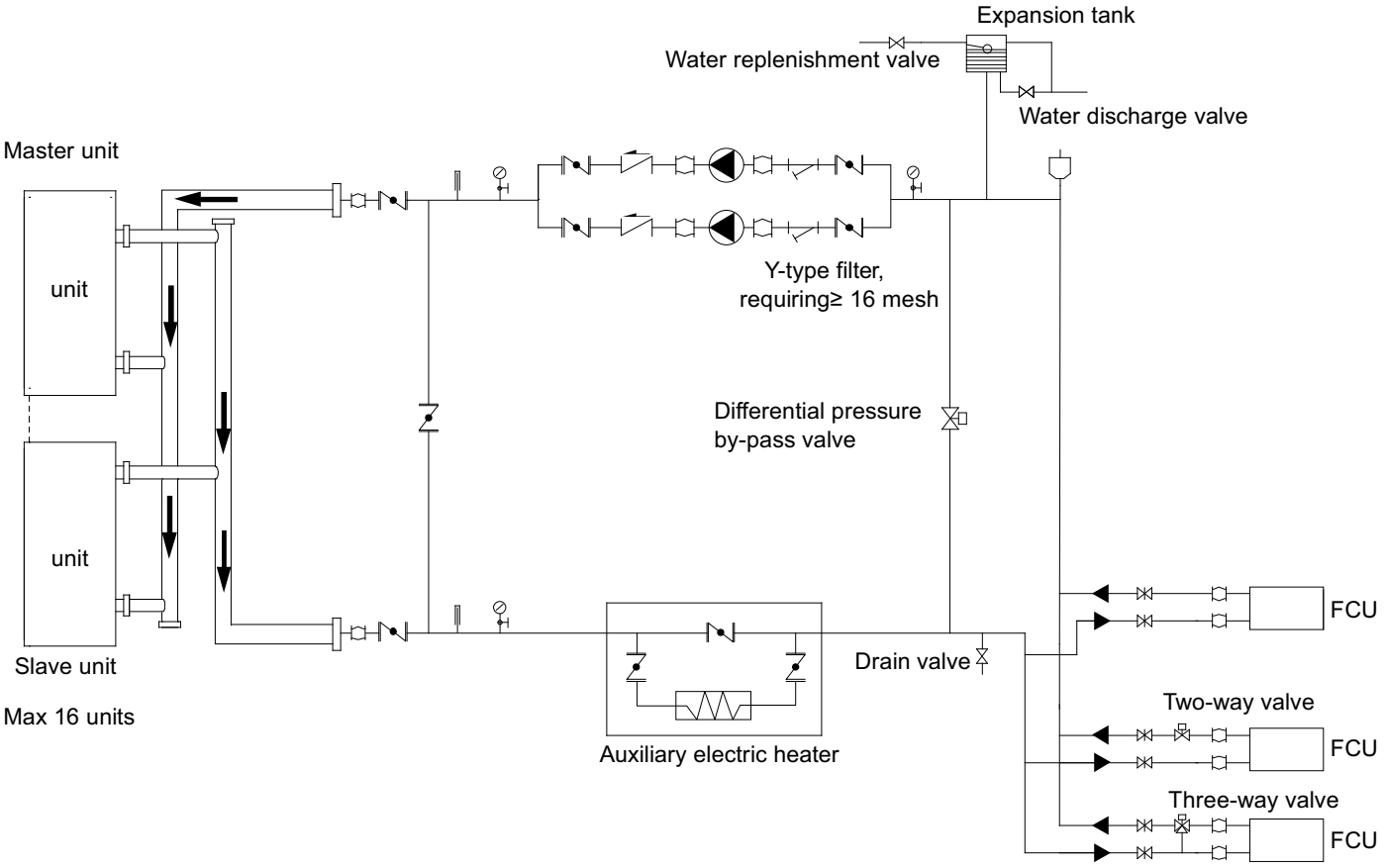


Legend				
Stop valve	Pressure gauge	Flexible joint	Gate valve	Automatic discharge valve
Y-shaped filter	Thermometer	Circulating pump	Check valve	

6.2 Space Heating and Space Cooling Through Fan Coil Unit

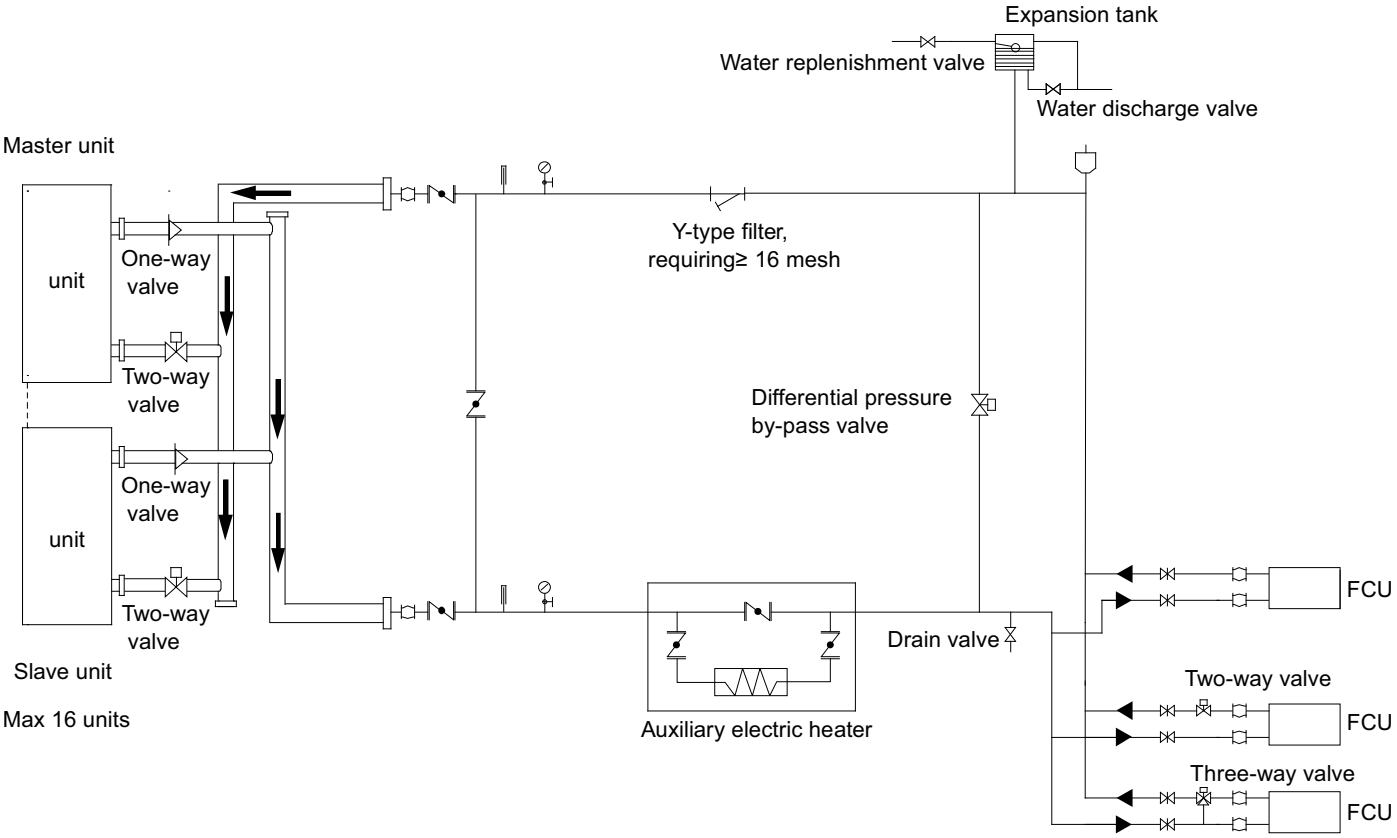
Fan coil units are used for space heating and cooling.

Figure 1-6.3: Space heating and space cooling through fan coil unit (standard unit without hydronic module)



Legend				
Stop valve	Pressure gauge	Flexible joint	Gate valve	Automatic discharge valve
Y-shaped filter	Thermometer	Circulating pump	Check valve	

Figure 1-6.4: Space heating and space cooling through fan coil unit (customized unit with built-in hydronic module)

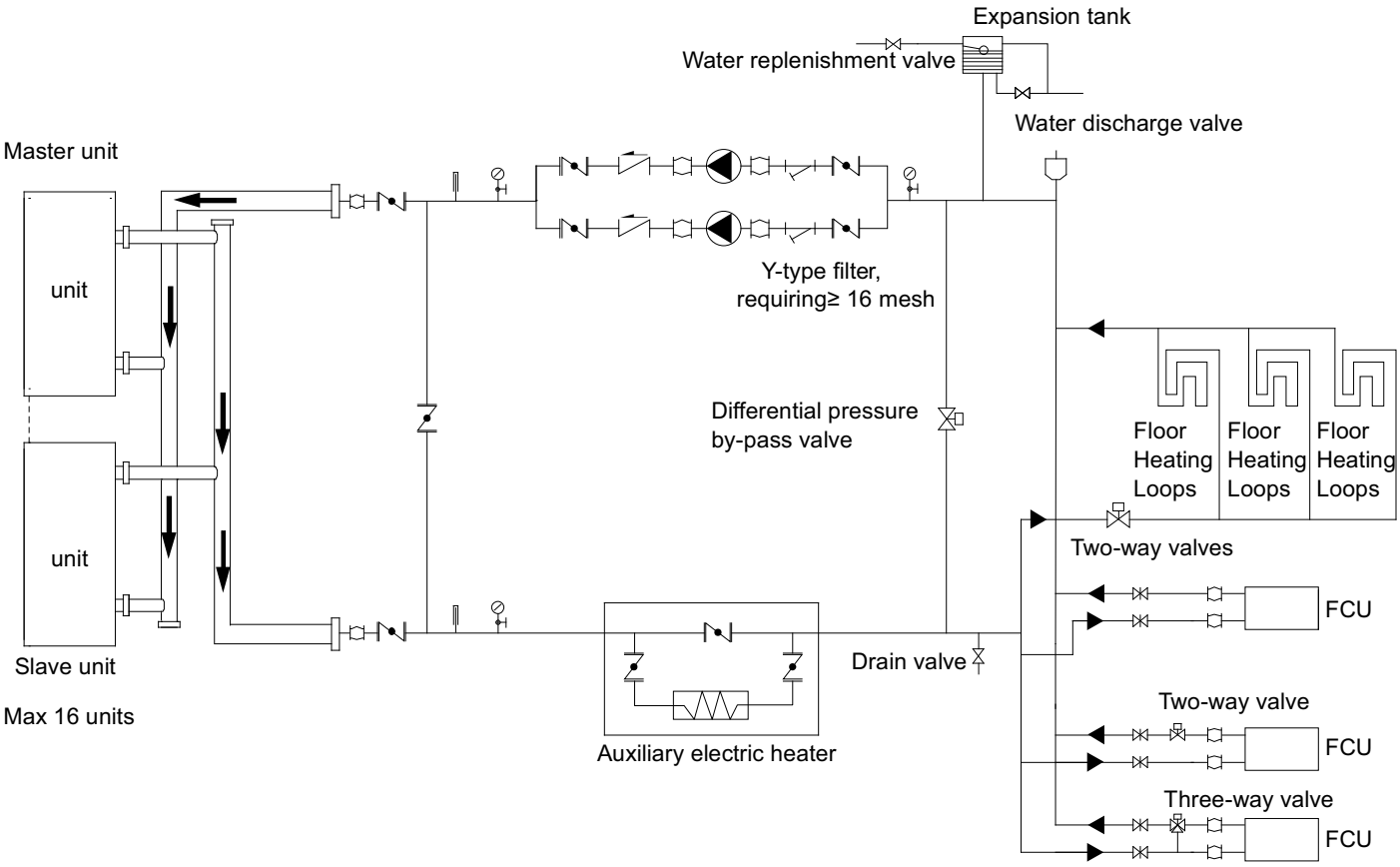


Legend				
Stop valve	Pressure gauge	Flexible joint	Gate valve	Automatic discharge valve
Y-shaped filter	Thermometer	Circulating pump	Check valve	

6.3 Space Heating Through Floor Heating Loops And Space Cooling Through Fan Coil Unit

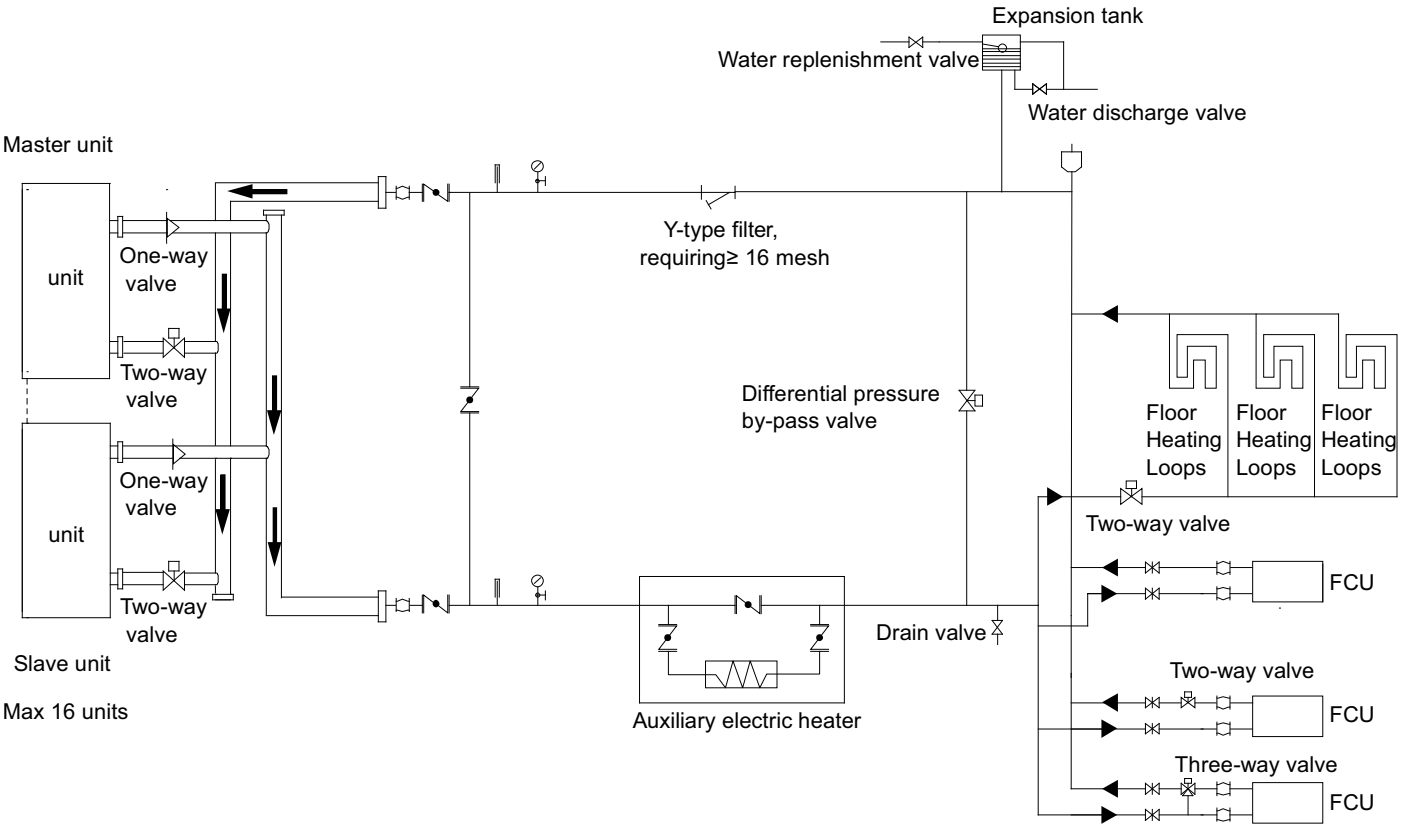
Floor heating loops and fan coil units are used for space heating and fan coil units are used for space cooling. In space cooling mode, the 2-way valve is closed to prevent cold water entering the floor heating loops.

Figure 1-6.5: Space heating through floor heating loops and space cooling through fan coil unit (standard unit without hydronic module)



Legend				
Stop valve	Pressure gauge	Flexible joint	Gate valve	Automatic discharge valve
Y-shaped filter	Thermometer	Circulating pump	Check valve	

Figure 1-6.6: Space heating through floor heating loops and space cooling through fan coil unit (customized unit with built-in hydronic module)



Legend				
Stop valve	Pressure gauge	Flexible joint	Gate valve	Automatic discharge valve
Y-shaped filter	Thermometer	Circulating pump	Check valve	

Part 2

Engineering Data

1 Specifications

Table 2-1.1: Specifications

kW			30	60
Model name			MUENR-30-H9T	MUENR-60-H9T
Power supply		V/Ph/Hz	380-415/3/50	
Cooling [1]	Capacity	kW	27.5	55
	Rated input	kW	10.3	21.5
	EER		2.67	2.55
	SEER		4.62	4
Heating[2]	Capacity	kW	32	62
	Rated input	kW	10	20
	COP		3.2	3.1
	SCOP		4.24	3.86
Seasonal space heating energy efficiency class			A++	A++
Max. running current	A		20	40.5
Air side heat exchanger	Type		Finned tube	Finned tube
	Fan motor type		DC motor	DC motor
	Fan motor rated input	W	750	750
	Fan motor quantity		1	2
	Air flow rate	m^3/h	12,500	24,000
Water side heat exchanger	Type		Plate	Plate
	Volume	L	2.44	5.17
	Rated water flow	m^3/h	5	9.8
	Water flow range	m^3/h	4.0 to 6.0	7.8 to 11.8
	Water pressure drop	kPa	55	61
Refrigerant system	Refrigerant type		R32	R32
	Refrigerant charge	kg	7.9	14
	Throttle type		EXV	EXV + Capillary
Sound power level	dB(A)		78	86
Sound pressure level[3]	dB(A)		64.8	71.3
Net dimensions (W×H×D)	mm		1870×1175×1000	2220×1325×1055
Packed dimensions (W×H×D)	mm		1910×1225×1035	2250×1370×1090
Net/Gross weight	kg		300/310	480/490
Pipe connections	Water inlet/outlet	mm	DN40	DN50
Water pressure range	MPa		0.05 to 1.0	0.05 to 1.0
Water flow switch	Action flow	m^3/h	3.6± 10%	7± 10%
Vent Valve	Max working pressure	Mpa	1.0	1.0
Safety valve	Action pressure	Mpa	0.6 ± 10%	0.6 ± 10%
Controller			RM-120H/BMW O3-E	RM-120H/BMW O3-E
Operating temperature range	Cooling	C	-10 to 43	-10 to 43
	Heating	C	-14 to 30	-14 to 30
Water outlet temperature range	Cooling[4]	C	5 to 20	5 to 20
	Heating	C	25 to 54	25 to 54

Notes

1. Cooling Chilled water inlet/outlet temp.12/7 C outdoor ambient temp. 35 C DB.
2. Heating Warm water inlet/outlet temp. 40/45 C outdoor ambient temp. 7 C DB/6 C WB.
3. Sound pressure level is measured at a position 1m in front of the unit and 1.1m above the floor in a semi-anechoic chamber.
4. Capacity and efficiency data calculated in accordance with EN14511, EN 14825.

Table 2-1.2: Specifications

kW			30	60
Model name			MUENR-30-H9T(K)	MUENR-60-H9T(K)
Power supply		V/Ph/Hz	380-415/3/50	
Cooling [1]	Capacity	kW	27.5	55
	Rated input	kW	11	23
	EER		2.5	2.39
	SEER		4.25	4.03
Heating [2]	Capacity	kW	32	62
	Rated input	kW	10.7	21.5
	COP		2.99	2.88
	SCOP		3.99	3.72
Seasonal space heating energy efficiency class			A++	A+
Max. running current	A		21,5	43.5
Air side heat exchanger	Type		Finned tube	Finned tube
	Fan motor type		DC motor	DC motor
	Fan motor rated input	W	750	750
	Fan motor quantity		1	2
	Air flow rate		12,500	24,000
Water side heat exchanger	Type		Plate	Plate
	Volume	L	2.44	5.17
	Rated water flow	m^3/h	5	9.8
	Water flow range	m^3/h	4.0 to 6.0	7.8 to 11.8
	Pump head	m	15	15
	Water pressure drop	kPa	130	200
Refrigerant system	Refrigerant type		R32	R32
	Refrigerant charge	kg	7.9	14
	Throttle type		EXV	EXV + Capillary
Sound power level	dB(A)		78	86
Sound pressure level [3]	dB(A)		65.1	71.4
Net dimensions (W×H×D)	mm		1870×1175×1000	2220×1325×1055
Packed dimensions (W×H×D)	mm		1910×1225×1035	2250×1370×1090
Net/Gross weight	kg		315/325	515/525
Pipe connections	Water inlet/outlet	mm	DN40	DN50
Water pressure range	MPa		0.05 to 1.0	0.05 to 1.0
Water pump	Pump model name		KB-650-2-1	KB-1500-2-1
	Power supply		380-415 V/3Ph/50Hz	380-415 V/3Ph/50Hz
	Rated power	KW	0.65	1.5
	Rated current	A	1.6-1.8	3.15
	Rated water flow	m^3/h	4.7	10
	Rated pump head	m	22.8	27.1
	Rated speed	r/min	2770-2820 r/min	2840-2870 r/min
	Max operating temperature	°C	55	55
	Max operating pressure	MPa	1.0	1.0
	Power factor		0.82-0.72	0.87-0.82
	Efficiency		72.9%-73.9%	84.2%-84.9%
	Resistance class		P55	P55
	nsulation class		F	F
	Net/Gross weight	kg	11.9 /14.4	32.6 /35.1

Table continued on next page ...

Table 2-1.2: Specifications(continued)

Expansion tank	Volume	L	4.2	12
	Precharge pressure	Mpa	0.15	0.15
	Test pressure	Mpa	1.0	1.0
Water flow switch	Action flow	m^3/h	3.6± 10%	7± 10%
Vent Valve	Max working pressure	Mpa	1.0	1.0
Safety valve	Action pressure	Mpa	0.6 ± 10%	0.6 ± 10%
Controller			KJRM-120H/BMWKO3-E	KJRM-120H/BMWKO3-E
Operating temperature range	Cooling	°C	-10 to 43	-10 to 43
	Heating	°C	-14 to 30	-14 to 30
Water outlet temperature range	Cooling[4]	°C	5 to 20	5 to 20
	Heating	°C	25 to 54	25 to 54

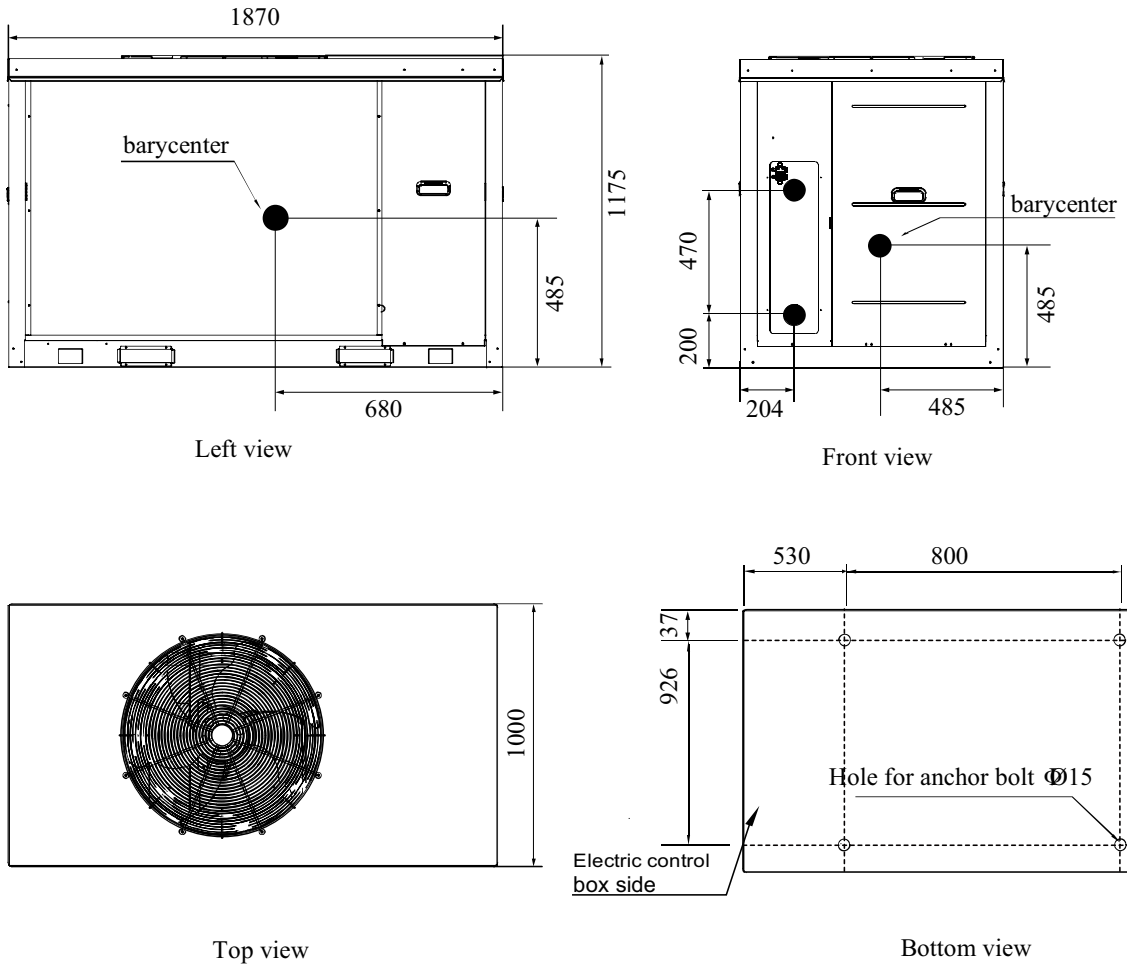
Notes:

1. Cooling: Chilled water inlet/outlet temp.12/7°C; outdoor ambient temp. 35°C DB.
2. Heating: Warm water inlet/outlet temp. 40/45°C; outdoor ambient temp. 7°C DB/6°C WB.
3. Sound pressure level is measured at a position 1m in front of the unit and 1.1m above the floor in a semi-anechoic chamber.
4. Capacity and efficiency data calculated in accordance with EN14511, EN14825

2 Dimensions and Center of Gravity

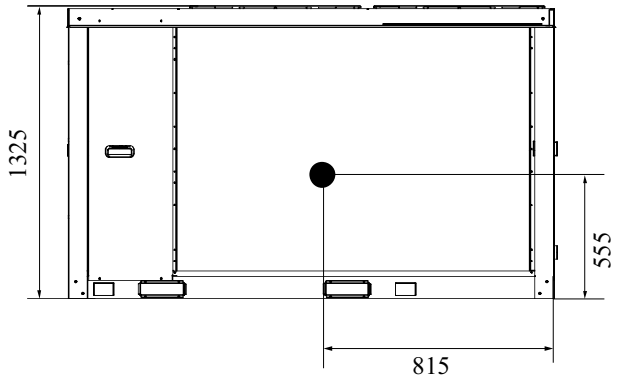
MUENR-30-H9T / MUENR-30-H9T(K)

Figure 2-2.1: dimensions and center of gravity (unit: mm)

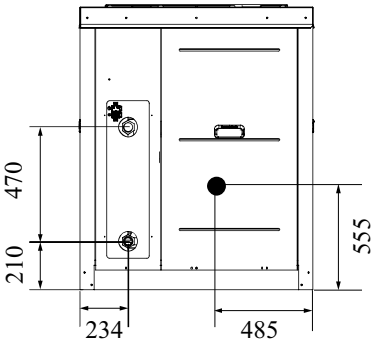


MUENR-60-H9T / MUENR-60-H9T(K)

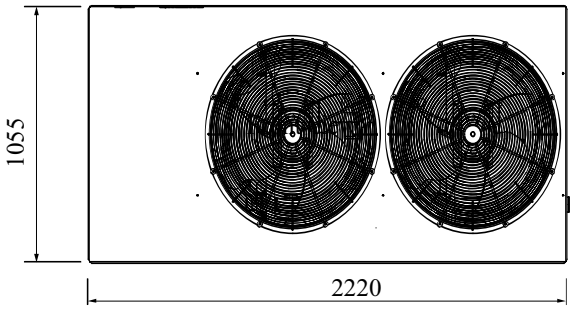
Figure 2-2.2: dimensions and center of gravity (unit: mm)



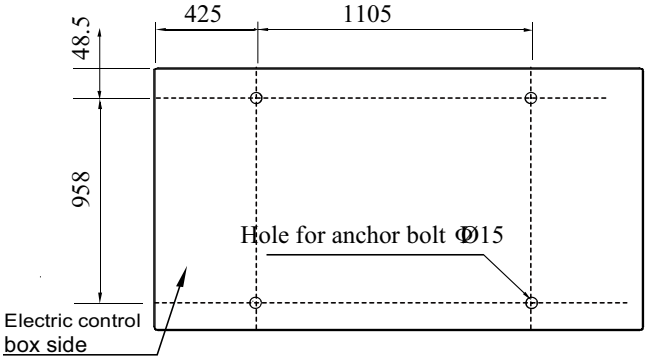
Left view



Front view



Top view

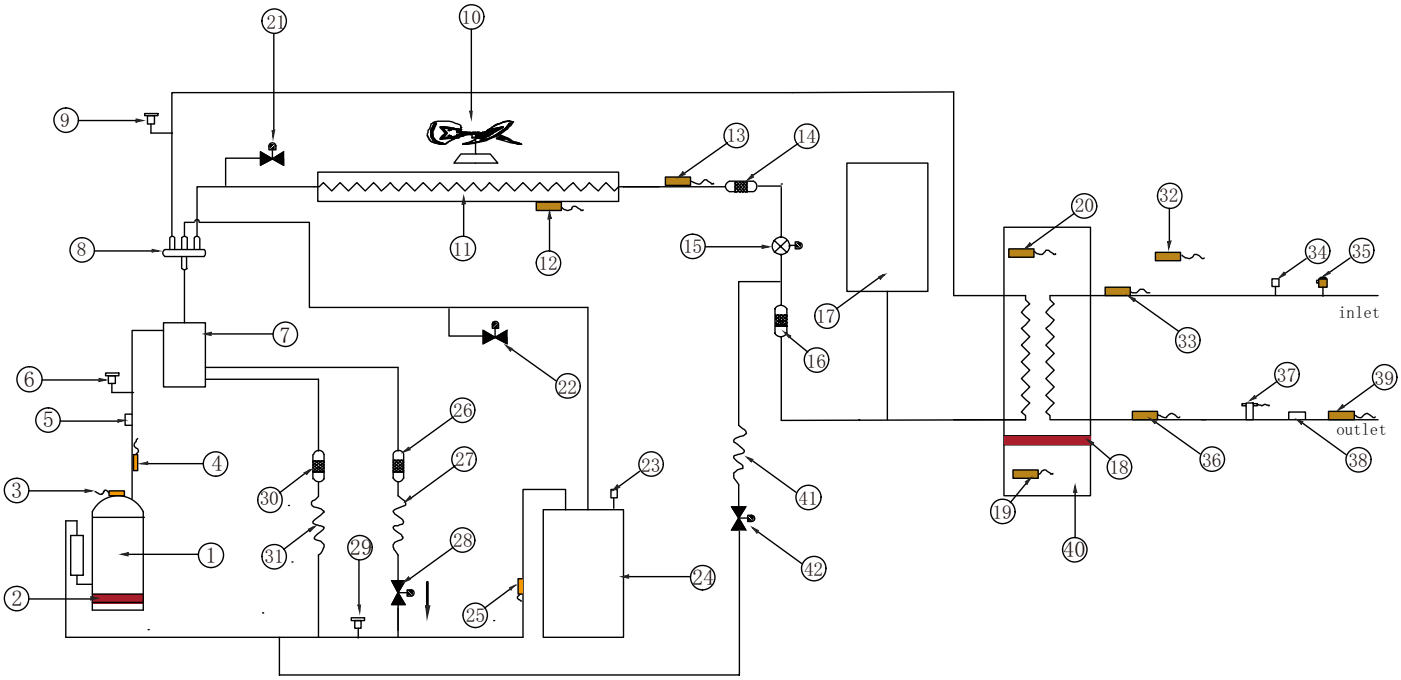


Bottom view

3 Piping Diagrams

MUENR-30-H9T

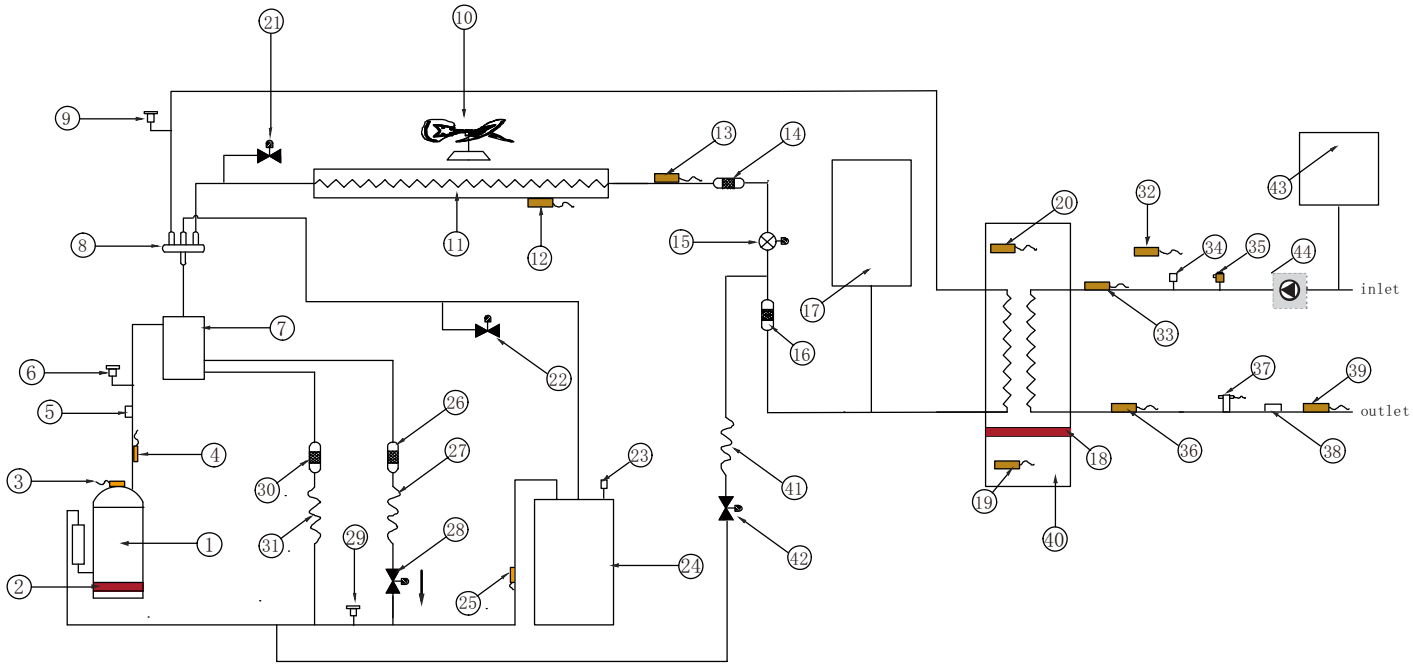
Figure 2-3.1: piping diagram



Legend			
1	DC inverter compressor	22	Stop valve
2	Crankcase heater	23	Safety valve
3	DC inverter compressor discharge temperature sensor 1	24	Vapor-liquid separator
4	DC inverter compressor discharge temperature sensor 2	25	Suction temperature sensor
5	Discharge temperature control switch	26	Filter
6	High pressure switch	27	Capillary
7	Oil separator	28	Fast oil return solenoid valve
8	4-way-valve	29	Low pressure switch
9	System pressure sensor	30	Filter
10	DC fan	31	Capillary
11	Condenser	32	Outdoor ambient temperature sensor
12	Coil outlet temperature sensor	33	Unit water inlet temperature sensor
13	Coil final outlet temperature sensor	34	Safety valve
14	Filter	35	Air purge valve
15	Electronic expansion valve	36	Unit water outlet temperature sensor
16	Filter	37	Water flow switch
17	High pressure tank	38	Manual water drain valve
18	Antifreeze heater of plater heat exchanger	39	Total outlet water temperature sensor
19	Water side antifreeze temperature sensor 2	40	Plate heat exchanger
20	Water side antifreeze temperature sensor 1	41	Capillary
21	Stop valve	42	Liquid in ection solenoid valve

MUENR-30-H9T(K)

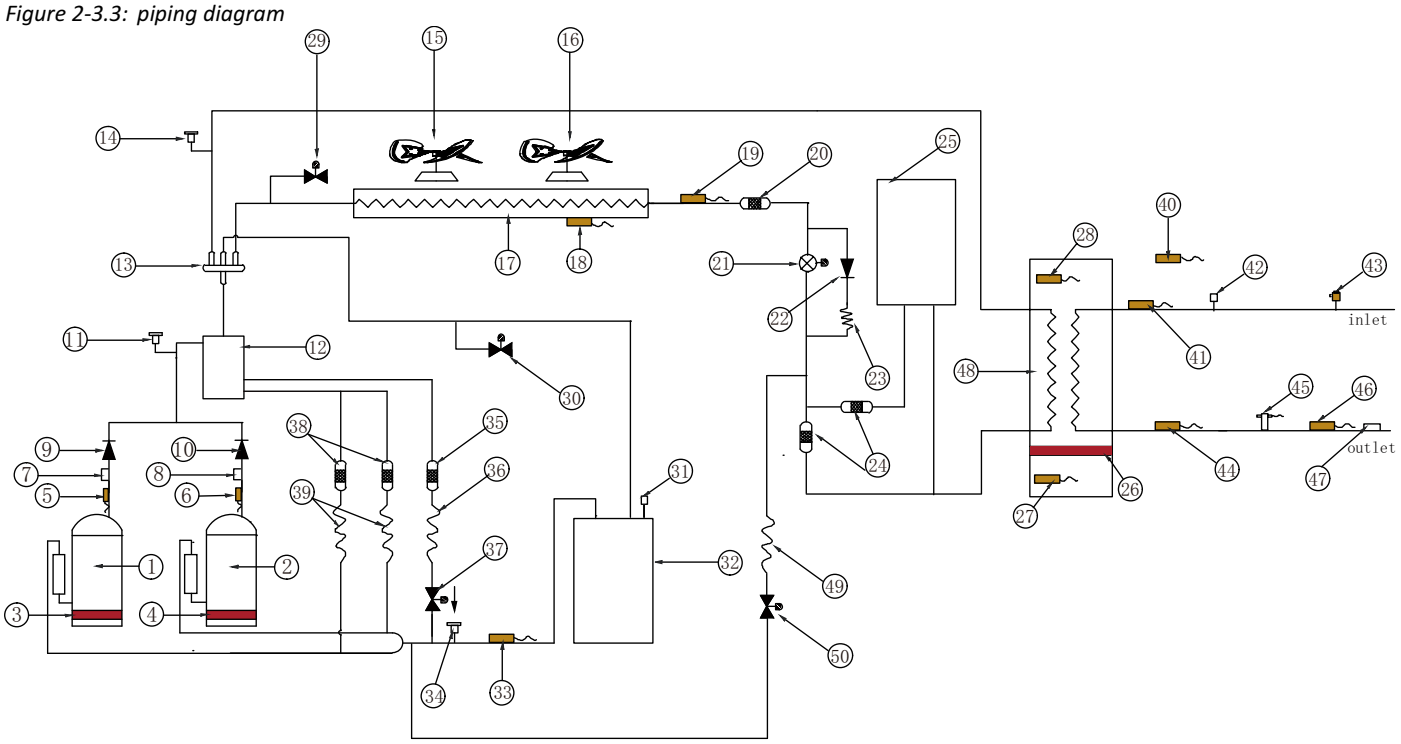
Figure 2-3.2: piping diagram



Legend			
1	DC inverter compressor	23	Safety valve
2	Crankcase heater	24	Vapor-liquid separator
3	DC inverter compressor discharge temperature sensor 1	25	Suction temperature sensor
4	DC inverter compressor discharge temperature sensor 2	26	Filter
5	Discharge temperature control switch	27	Capillary
6	High pressure switch	28	Fast oil return solenoid valve
7	Oil separator	29	Low pressure switch
8	4-way-valve	30	Filter
9	System pressure sensor	31	Capillary
10	DC fan	32	Outdoor ambient temperature sensor
11	Condenser	33	Unit water inlet temperature sensor
12	Coil outlet temperature sensor	34	Safety valve
13	Coil final outlet temperature sensor	35	Air purge valve
14	Filter	36	Unit water outlet temperature sensor
15	Electronic expansion valve	37	Water flow switch
16	Filter	38	Manual water drain valve
17	High pressure tank	39	Total outlet water temperature sensor
18	Antifreeze heater of plater heat exchanger	40	Plate heat exchanger
19	Water side antifreeze temperature sensor 2	41	Capillary
20	Water side antifreeze temperature sensor 1	42	Liquid in ection solenoid valve
21	Stop valve	43	Expansion tank
22	Stop valve	44	Pump

MUENR-60-H9T

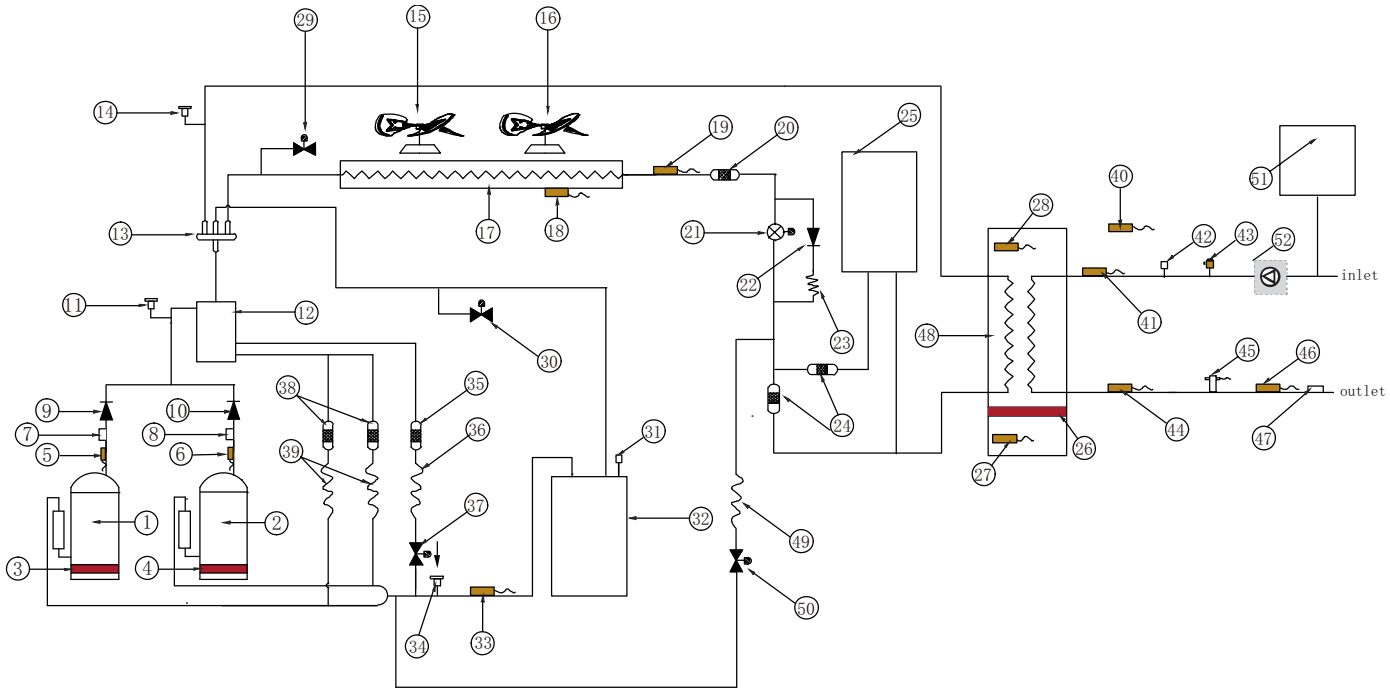
Figure 2-3.3: piping diagram



Legend			
1	DC inverter compressor 1	26	Antifreeze heater of plate heat exchanger
2	DC inverter compressor 2	27	Water side antifreeze temperature sensor 2
3	Crankcase heater 1	28	Water side antifreeze temperature sensor 1
4	Crankcase heater 2	29	Stop valve
5	DC inverter compressor discharge temperature sensor 1	30	Stop valve
6	DC inverter compressor discharge temperature sensor 2	31	Safety valve
7	Discharge temperature control switch 1	32	Vapor-liquid separator
8	Discharge temperature control switch 2	33	Suction temperature sensor
9	One-way valve 1	34	Low pressure switch
10	One-way valve 2	35	Filter
11	High pressure switch	36	Capillary
12	Oil separator	37	Fast oil return solenoid valve
13	4-way valve	38	Filter
14	System pressure sensor	39	Capillary
15	DC fan 1	40	Outdoor ambient temperature sensor
16	DC fan 2	41	Unit water inlet temperature sensor
17	Condenser	42	Safety valve
18	Coil outlet temperature sensor	43	Air purge valve
19	Coil final outlet temperature sensor	44	Unit water outlet temperature sensor
20	Filter	45	Water flow switch
21	Electronic expansion valve	46	Total outlet water temperature sensor
22	One-way valve 3	47	Manual water drain valve
23	Capillary	48	Plater exchanger
24	Filter	49	Capillary
25	High pressure tank	50	Liquid in ection solenoid valve

MUENR-60-H9T(K)

Figure 2-3.4: piping diagram

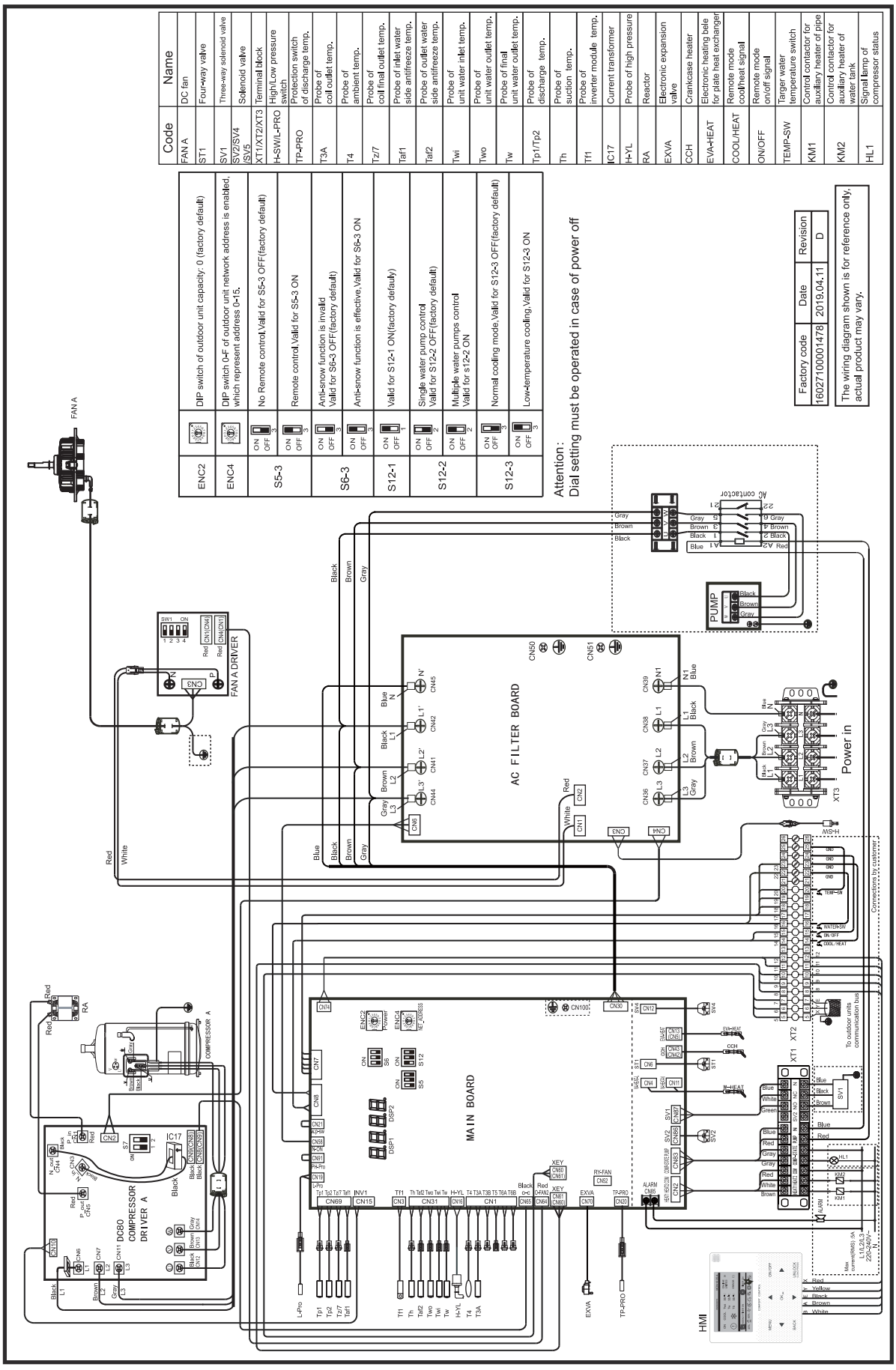


Legend			
1	DC inverter compressor 1	27	Water side antifreeze temperature sensor 2
2	DC inverter compressor 2	28	Water side antifreeze temperature sensor 1
3	Crankcase heater 1	29	Stop valve
4	Crankcase heater 2	30	Stop valve
5	DC inverter compressor discharge temperature sensor 1	31	Safety valve
6	DC inverter compressor discharge temperature sensor 2	32	Vapor-liquid separator
7	Discharge temperature control switch 1	33	Suction temperature sensor
8	Discharge temperature control switch 2	34	Low pressure switch
9	One-way valve 1	35	Filter
10	One-way valve 2	36	Capillary
11	High pressure switch	37	Fast oil return solenoid valve
12	Oil separator	38	Filter
13	4-way valve	39	Capillary
14	System pressure sensor	40	Outdoor ambient temperature sensor
15	DC fan 1	41	Unit water inlet temperature sensor
16	DC fan 2	42	Safety valve
17	Condenser	43	Air purge valve
18	Coil outlet temperature sensor	44	Unit water outlet temperature sensor
19	Coil final outlet temperature sensor	45	Water flow switch
20	Filter	46	Total outlet water temperature sensor
21	Electronic expansion valve	47	Manual water drain valve
22	One-way valve 3	48	Plater exchanger
23	Capillary	49	Capillary
24	Filter	50	Liquid in ection solenoid valve
25	High pressure tank	51	Expansion tank
26	Antifreeze heater of plate heat exchanger	52	Pump

4 Wiring Diagrams

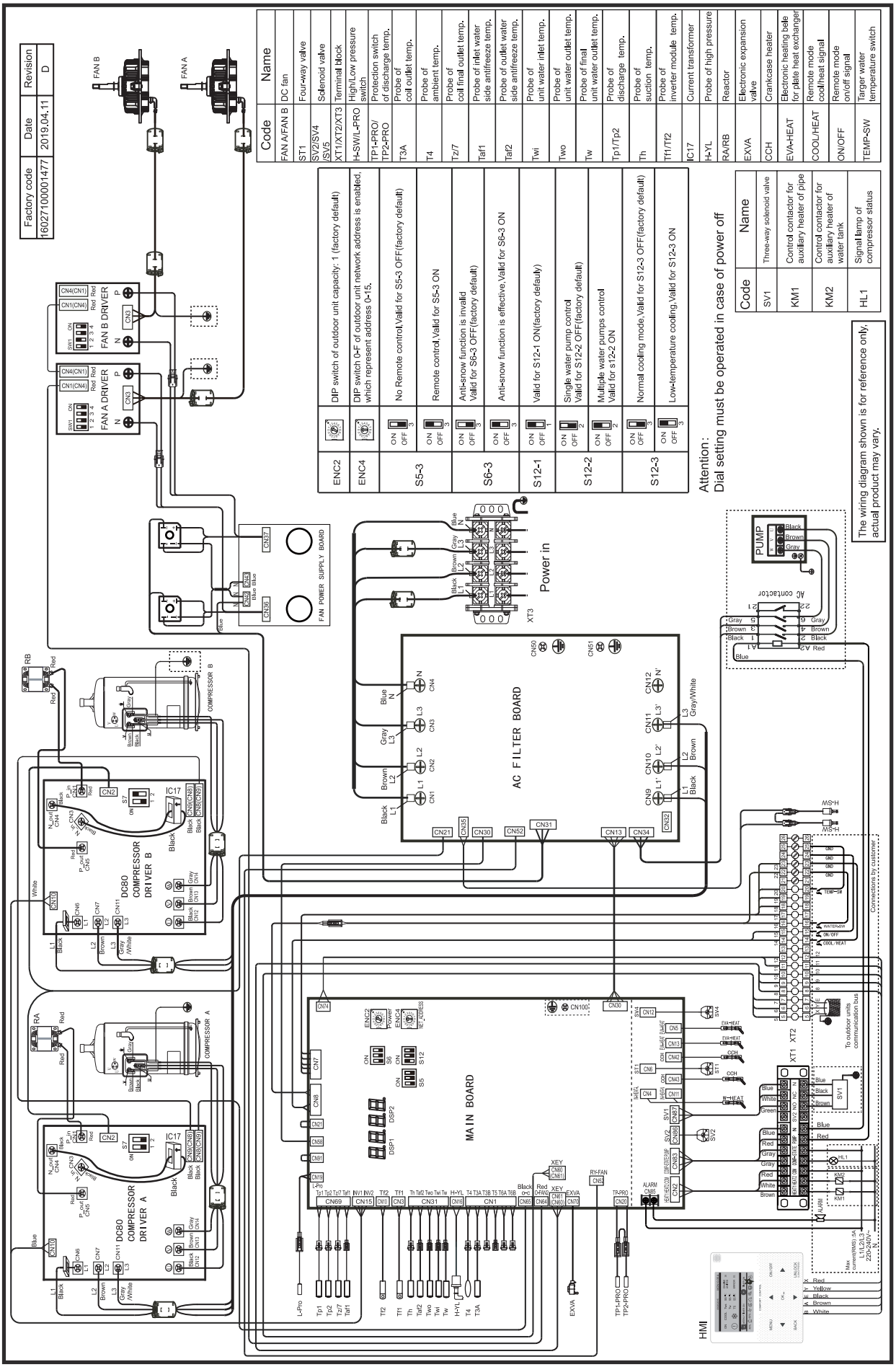
MUENR-30-H9T / MUENR-30-H9T(K)

Figure 2-4.1: wiring diagram



MUENR-60-H9T / MUENR-60-H9T(K)

Figure 2-4.2: wiring diagram



5 Capacity Tables

5.1 Heating Capacity Tables

Table 2-5.1: Model 30 heating capacity

Ambient temp (°C)	Chilled water outlet temperature (°C)											
	30.00		35.00		40.00		45.00		50.00		54.00	
	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
-14.00	21.56	7.94	20.96	8.45	20.73	9.99	19.69	10.50	-	-	-	-
-7.00	28.78	8.56	27.82	9.32	27.43	10.32	27.42	11.24	24.07	7.81	-	-
2.00	29.12	7.17	28.45	7.83	27.91	3.17	27.64	10.40	24.21	10.04	19.13	7.86
7.00	37.60	8.80	35.65	8.88	35.25	9.69	35.07	10.84	28.39	10.22	19.01	7.92
15.00	41.43	9.04	41.46	9.78	38.42	9.30	36.90	10.50	32.39	10.11	20.12	7.56
20.00	48.28	9.57	47.58	9.93	44.67	10.03	42.97	10.52	26.07	7.74	18.14	6.25
25.00	47.04	8.15	46.70	8.51	41.75	6.59	41.13	9.32	27.95	7.82	21.25	6.33
30.00	39.66	6.28	31.77	5.72	27.50	5.11	27.13	5.77	26.75	6.21	23.42	6.29

Abbreviations:
TC: Total capacity (kW)
PI: Power input (kW)

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

Table 2-5.2: Model 60 heating capacity

Ambient temp.(°C)	Chilled water outlet temperature (°C)											
	30.00		35.00		40.00		45.00		50.00		54.00	
	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
-14.00	44.12	18.60	43.83	19.72	41.46	20.89	40.69	21.76	-	-	-	-
-7.00	53.27	19.16	52.61	20.15	50.21	22.89	49.95	23.32	44.34	24.13	-	-
2.00	47.34	16.03	46.72	16.45	44.14	17.53	43.80	19.68	37.47	20.11	44.89	17.87
7.00	72.68	16.32	70.68	17.75	68.56	18.29	67.97	21.05	56.34	20.46	44.97	17.90
15.00	76.31	12.48	72.30	13.52	63.53	13.41	56.64	15.38	55.72	17.42	52.73	19.35
20.00	75.20	10.82	69.52	11.40	59.42	10.96	51.84	12.37	50.00	14.32	47.86	15.49
25.00	75.34	10.22	70.36	10.53	61.12	10.39	54.20	11.65	53.17	13.44	51.26	14.57
30.00	76.25	10.57	77.20	10.76	64.31	10.96	57.97	11.98	55.12	12.86	53.45	14.64

Abbreviations:
TC: Total capacity (kW)
PI: Power input (kW)

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

5.2 Cooling Capacity Tables

Table 2-5.3: Model 30 cooling capacity

Ambient temp. (°C)	Chilled water outlet temperature (℃)											
	5.00		7.00		10.00		13.00		15.00		20.00	
	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power
	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
-10.00	-	-	-	-	30.19	7.33	31.88	7.79	32.86	8.33	35.08	8.09
-5.00	-	-	-	-	29.06	7.29	30.89	7.69	31.52	8.12	34.65	8.11
5.00	-	-	-	-	28.69	7.31	31.06	7.84	31.25	8.06	34.50	8.21
10.00	-	-	-	-	28.55	7.05	30.55	7.66	31.05	7.96	33.60	8.05
17.00	44.43	12.41	46.52	13.02	48.68	13.69	51.73	13.13	54.55	13.85	58.35	14.20
25.00	39.98	11.50	42.51	12.28	42.73	12.07	46.58	12.04	46.66	11.80	55.15	12.80
30.00	34.45	11.27	37.61	12.16	38.16	11.41	39.98	11.08	40.05	10.80	48.49	13.92
35.00	29.66	11.18	32.51	12.05	31.98	10.71	33.64	10.25	36.06	10.46	40.87	11.59
40.00	22.15	10.21	25.45	10.61	28.27	10.92	31.57	11.27	28.93	9.72	34.45	9.96
43.00	19.03	8.45	20.30	7.79	22.81	7.96	24.17	8.12	28.03	9.23	32.29	9.44

Abbreviations:
TC: Total capacity (kW)
PI: Power input (kW)

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

Table 2-5.4: Model 60 cooling capacity

Ambient temp. (°C)	Chilled water outlet temperature (℃)											
	5.00		7.00		10.00		13.00		15.00		20.00	
	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power
	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
-10.00	-	-	-	-	54.67	11.98	62.73	12.86	63.47	14.37	64.97	14.41
-5.00	-	-	-	-	53.81	12.71	57.12	13.42	59.21	13.83	63.23	13.63
5.00	-	-	-	-	53.41	12.91	57.61	13.49	60.17	13.97	62.42	13.86
10.00	-	-	-	-	52.87	12.86	56.67	13.45	59.64	14.15	59.97	13.76
17.00	82.69	22.76	84.12	24.97	90.12	26.12	93.64	27.21	100.21	28.12	110.54	28.19
25.00	73.23	22.26	75.76	23.26	80.87	24.01	86.23	24.98	89.19	25.94	98.56	26.87
30.00	64.91	19.91	66.46	20.15	69.51	21.24	68.22	22.10	77.80	23.10	91.10	25.96
35.00	59.71	22.98	61.12	23.67	63.72	20.13	65.70	21.65	67.87	22.46	80.73	23.98
40.00	47.61	22.21	49.34	23.27	53.89	23.91	57.56	25.16	59.76	25.54	65.25	26.21
43.00	43.98	20.65	45.10	21.87	47.53	23.74	50.24	24.56	59.42	25.15	63.63	26.23

Abbreviations:
TC: Total capacity (kW)
PI: Power input (kW)

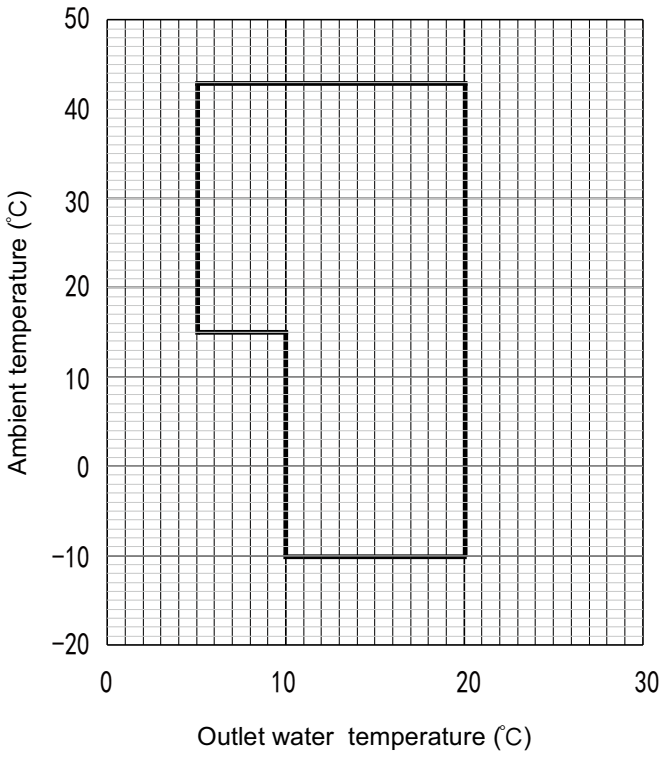
Notes:

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

6 Operating Limits

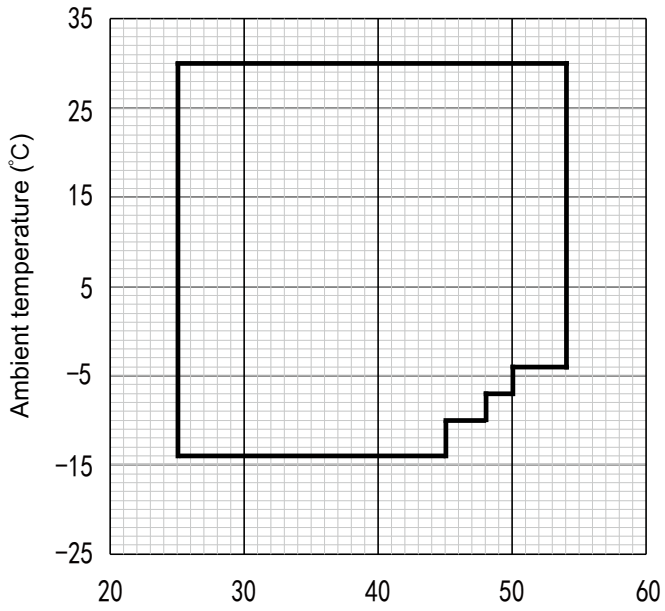
6.1 Cooling operating range

Figure 2-6.1: Cooling operating range



6.2 Heating operating range

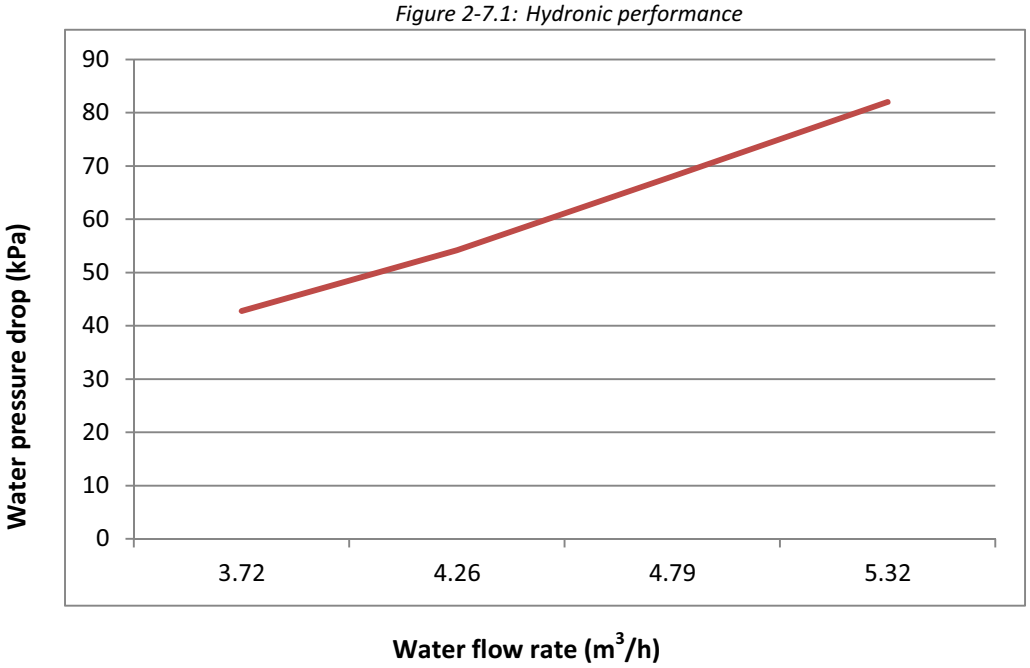
Figure 2-6.2: Heating operating range



7 Hydronic Performance

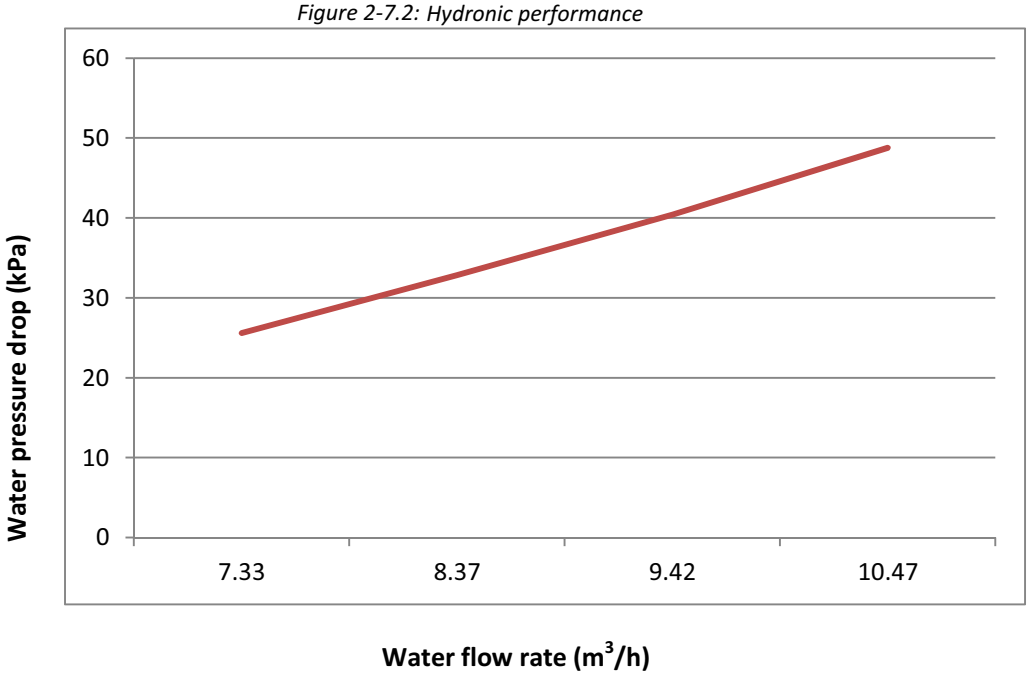
MUENR-30-H9T / MUENR-30-H9T(K)

Figure 2-7.1: Hydronic performance



MUENR-60-H9T / MUENR-60-H9T(K)

Figure 2-7.2: Hydronic performance



Pump head curve

Figure 2-7.3: YKB-650-2-1 Hydronic performance of MUENR-30-H9T(K)

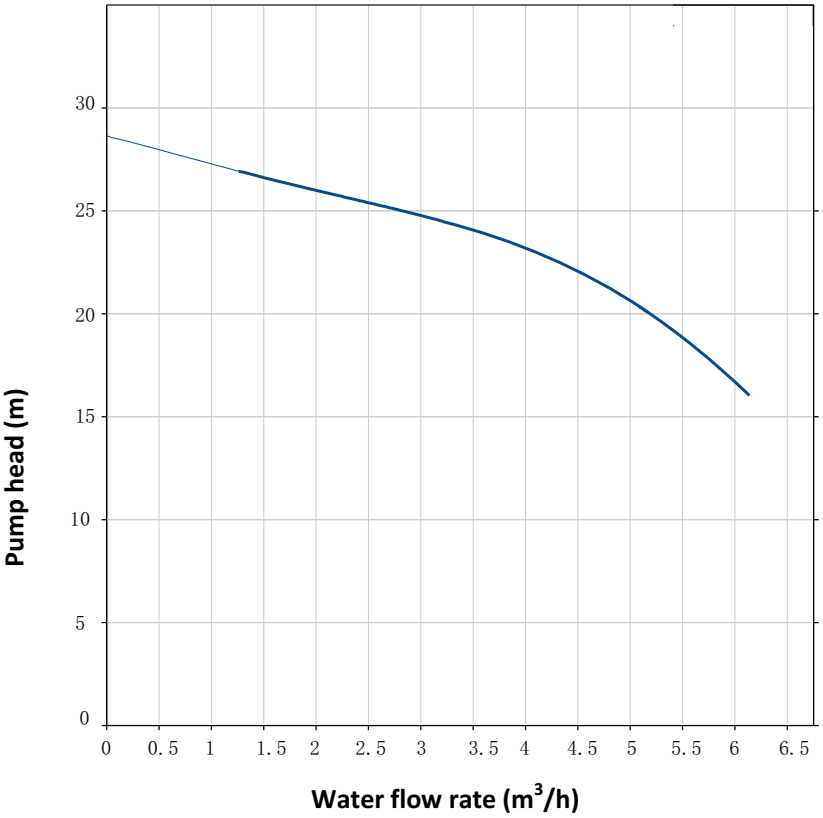
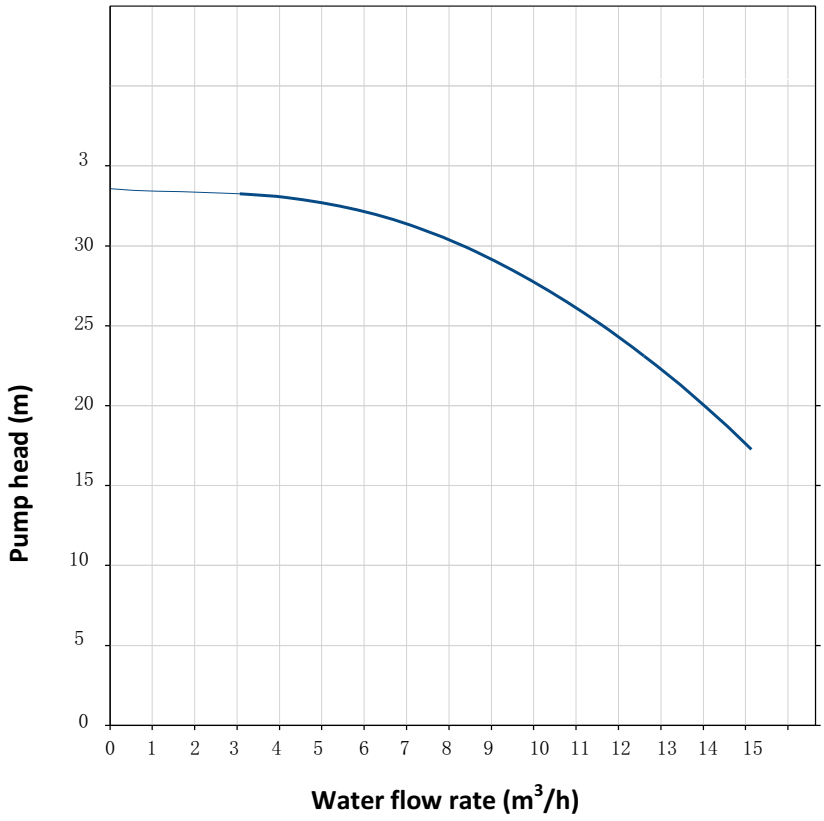


Figure 2-7.4: YKB-1500-2-1 Hydronic performance of MUENR-60-H9T(K)



8 Sound Levels

8.1 Overall

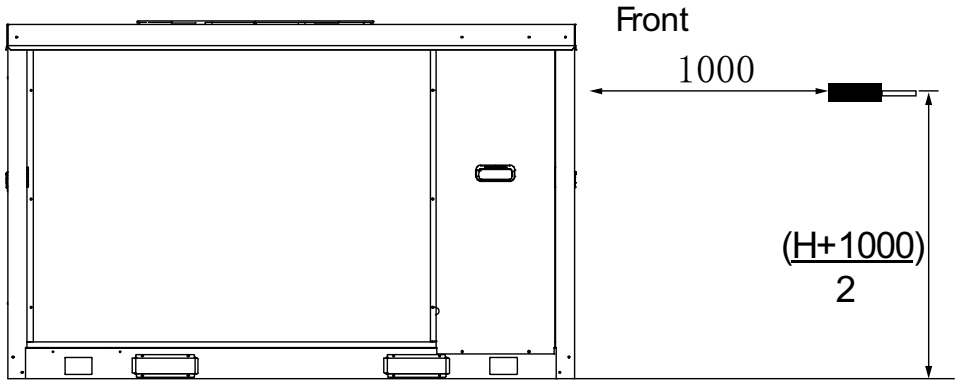
Table 2-8.1: Sound pressure levels

Model name	dB(A)
MUENR-30-H9T	64.8
MUENR-30-H9T(K)	65.1
MUENR-60-H9T	71.3
MUENR-60-H9T(K)	71.4

Notes:

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

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



8.2 Octave Band Levels

Figure 2-8.2: MUENR-30-H9T *octave band level (in cooling mode at rated compressor frequency)*

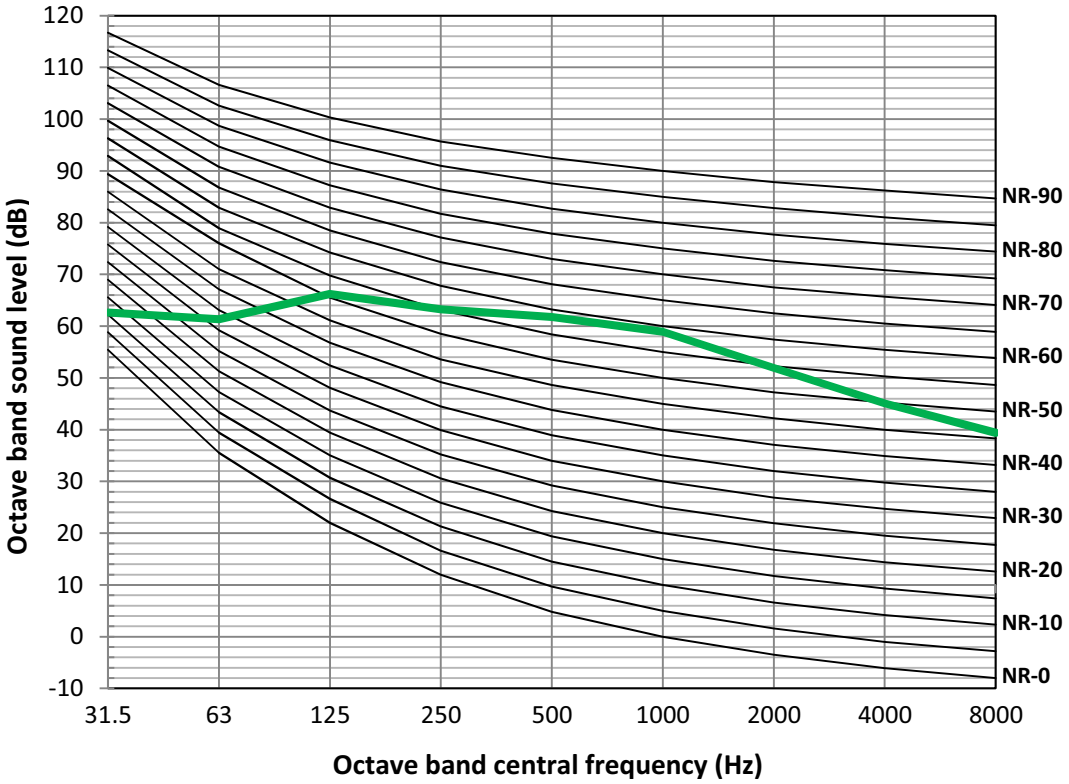


Figure 2-8.3: MUENR-30-H9T(K) *octave band level (in cooling mode at rated compressor frequency)*

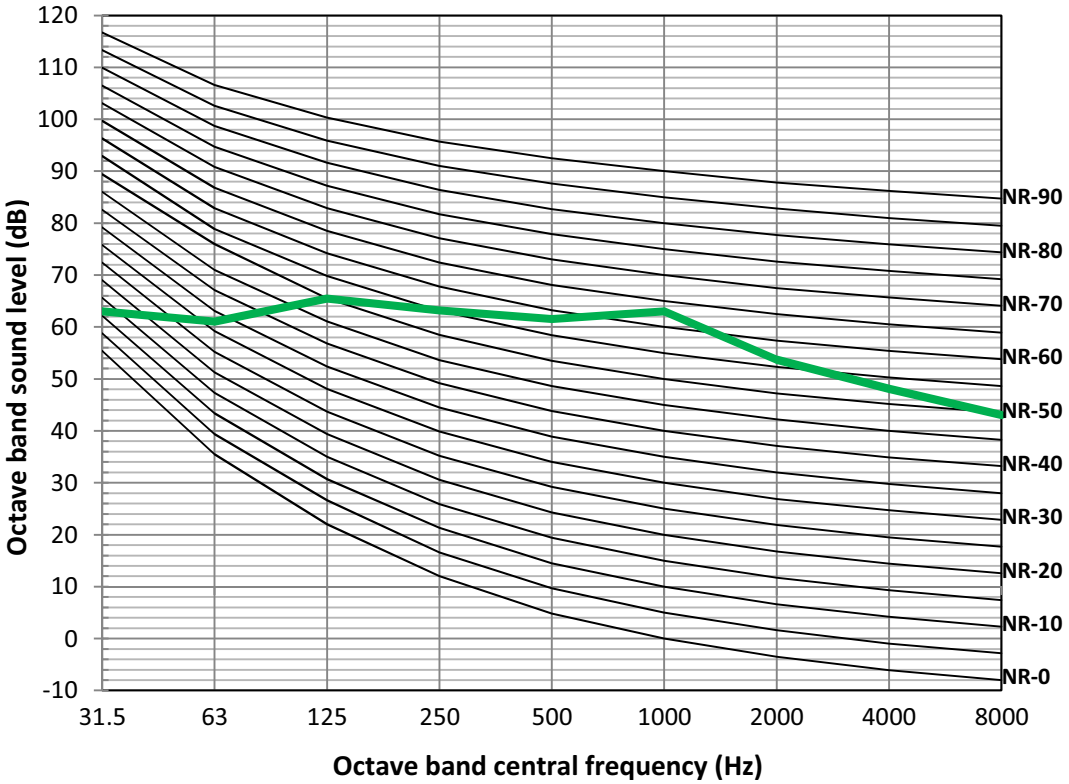


Figure 2-8.4: MUENR-60-H9T *octave band level (in cooling mode at rated compressor frequency)*

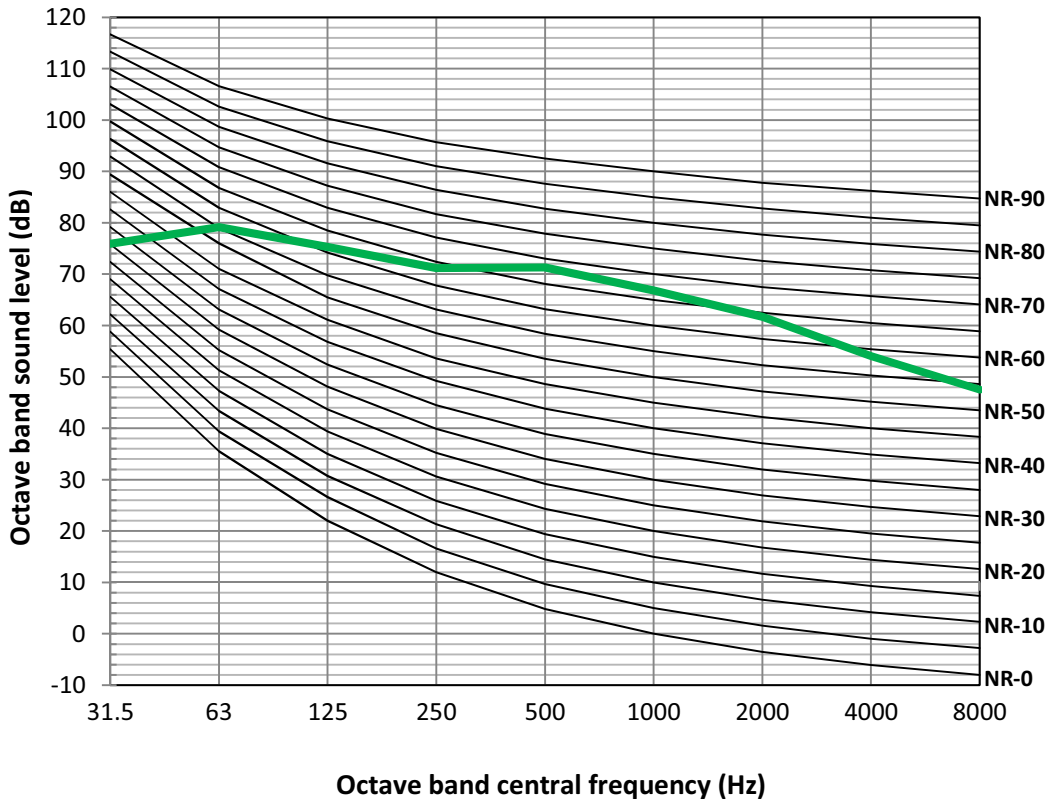


Figure 2-8.5: MUENR-60-H9T(K) *octave band level (in cooling mode at rated compressor frequency)*

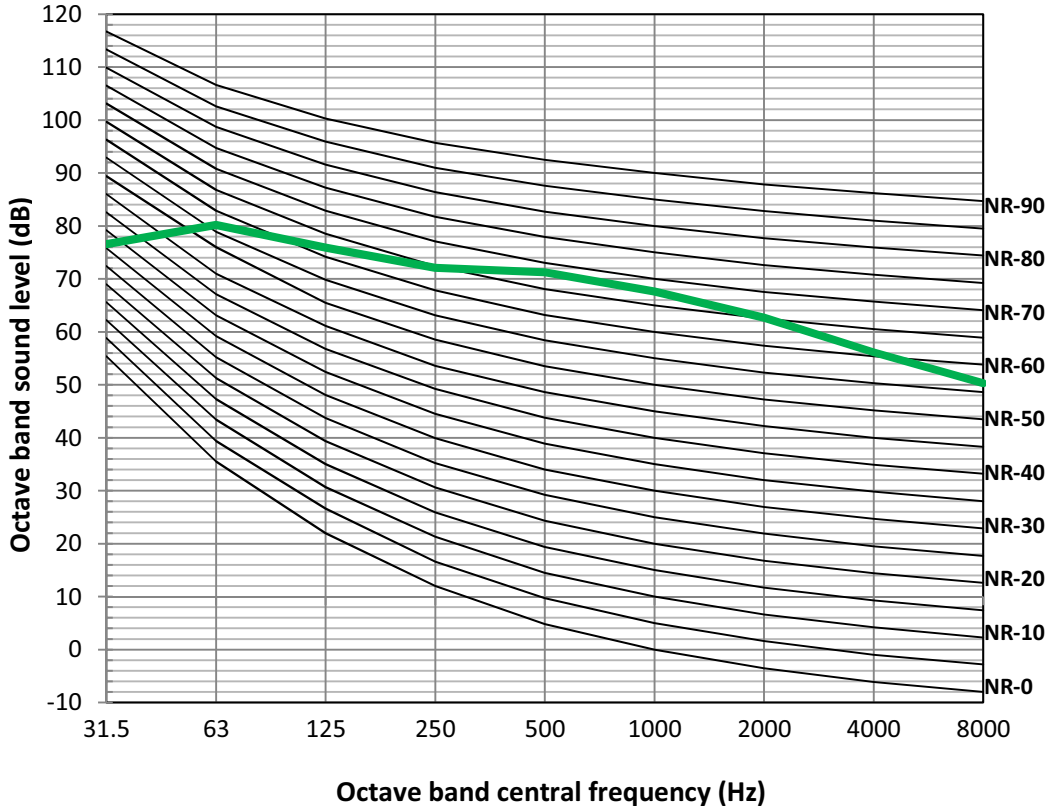


Figure 2-8.6: MUENR-30-H9T *octave band level (in heating mode at rated compressor frequency)*

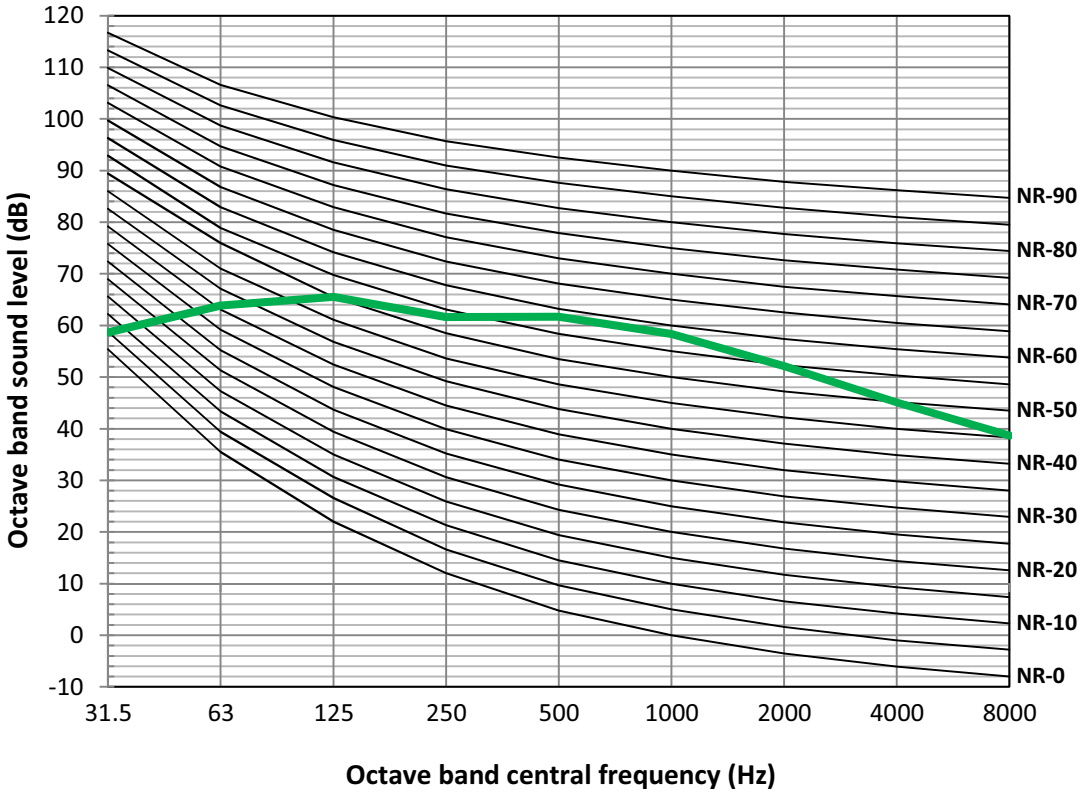


Figure 2-8.7: MUENR-30-H9T(K) *octave band level (in heating mode at rated compressor frequency)*

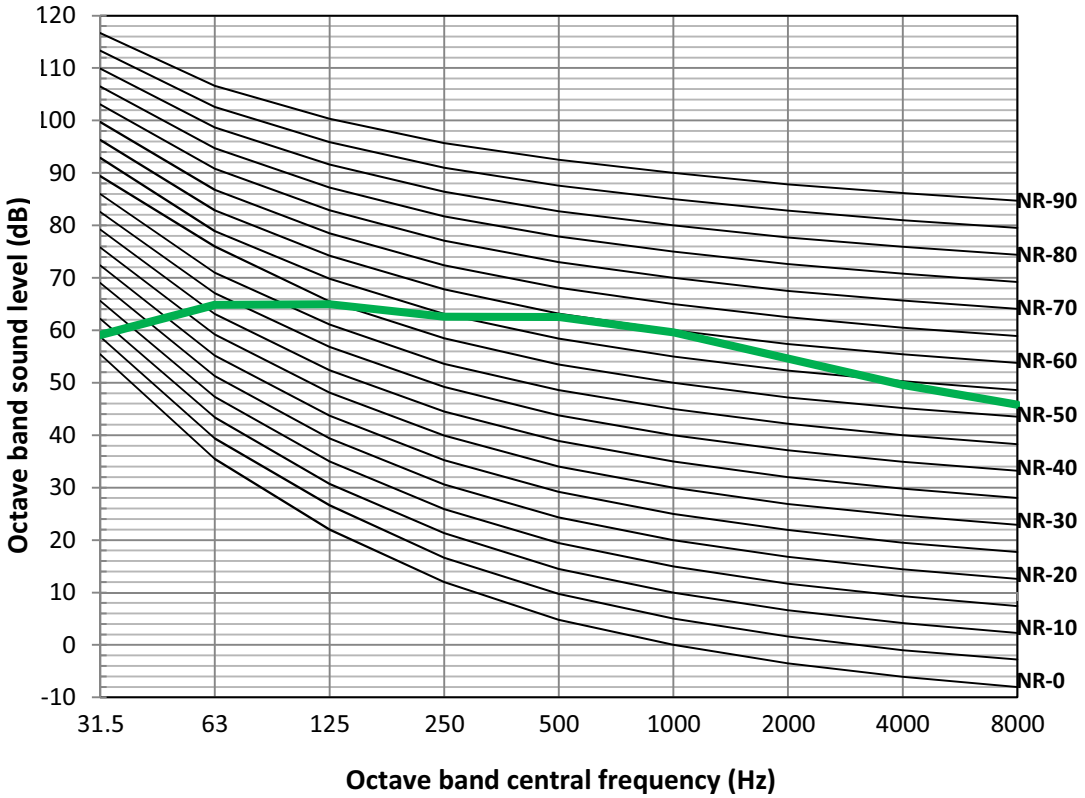


Figure 2-8.8: MUENR-60-H9T *octave band level (in heating mode at rated compressor frequency)*

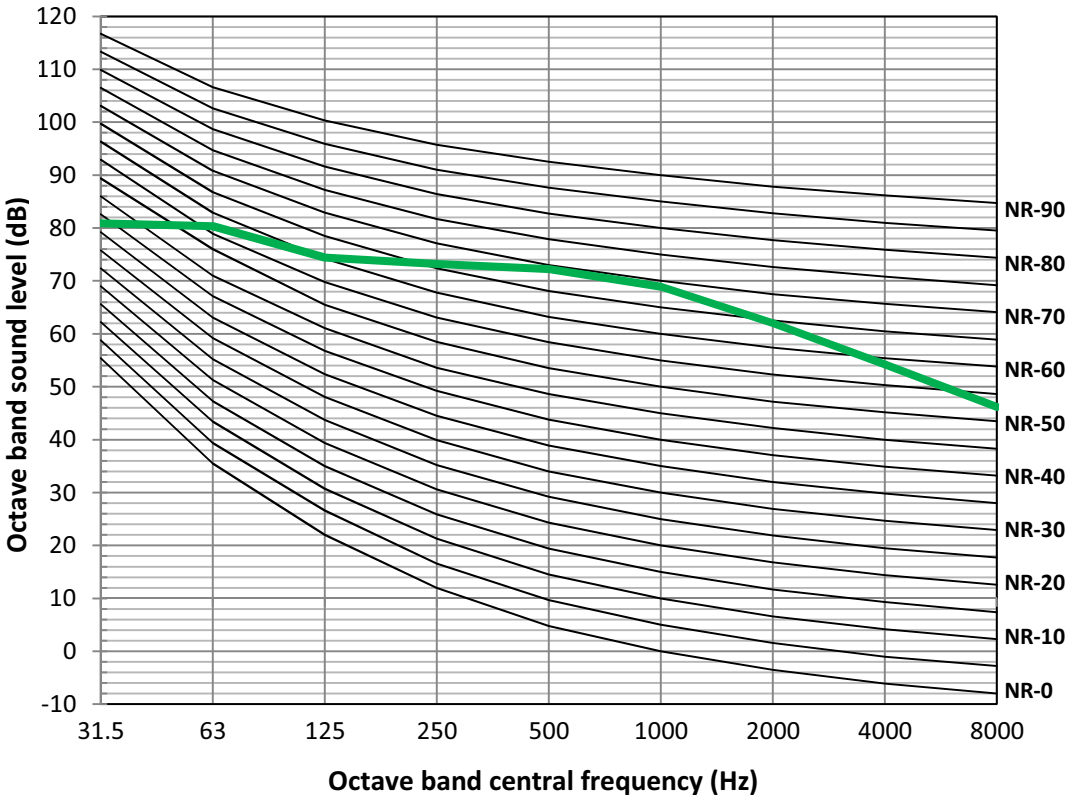
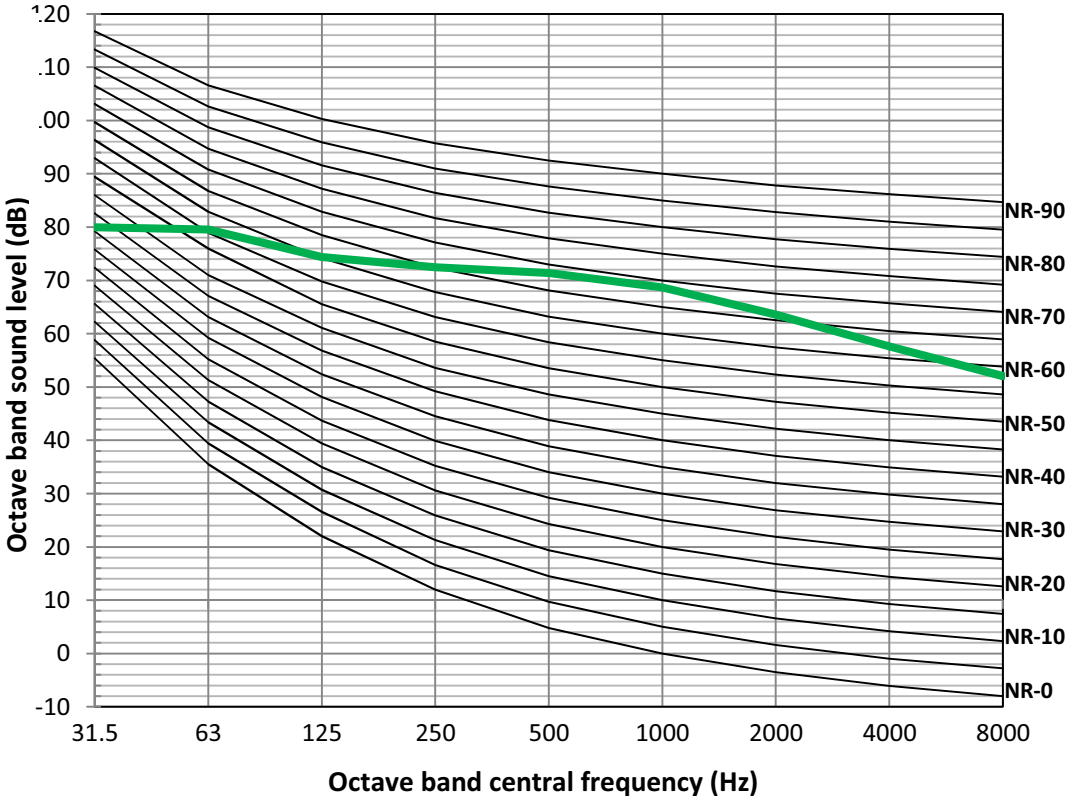


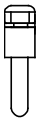
Figure 2-8.9: MUENR-60-H9T(K) *octave band level (in heating mode at rated compressor frequency)*



9 Accessories

9.1 Standard accessories

Table 2-9.1: Standard accessories

Name	*Shape*	*Quantity*
Installation & Operation Manual		*1*
Temperature testing components for total water outlet		*1*
Wired controller power adapter		*1*
Wired controller installation manual		*1*

Part 3 Installation and Field Settings

1 Preface to Part 3

1.1 Notes for Installers Boxes

The information contained in this Engineering Data Book may primarily be of use during the system design stage of a R32 DC Modular Chiller H9T project. Additional important information which may primarily be of use during field installation has been placed in boxes, such as the example below, titled “Notes for installers”.

Notes for installers

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

1.2 Definitions

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

1.3 Precautions

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

2 Unit Placement and Installation

2.1 Acceptance and Unpacking

Notes for installers

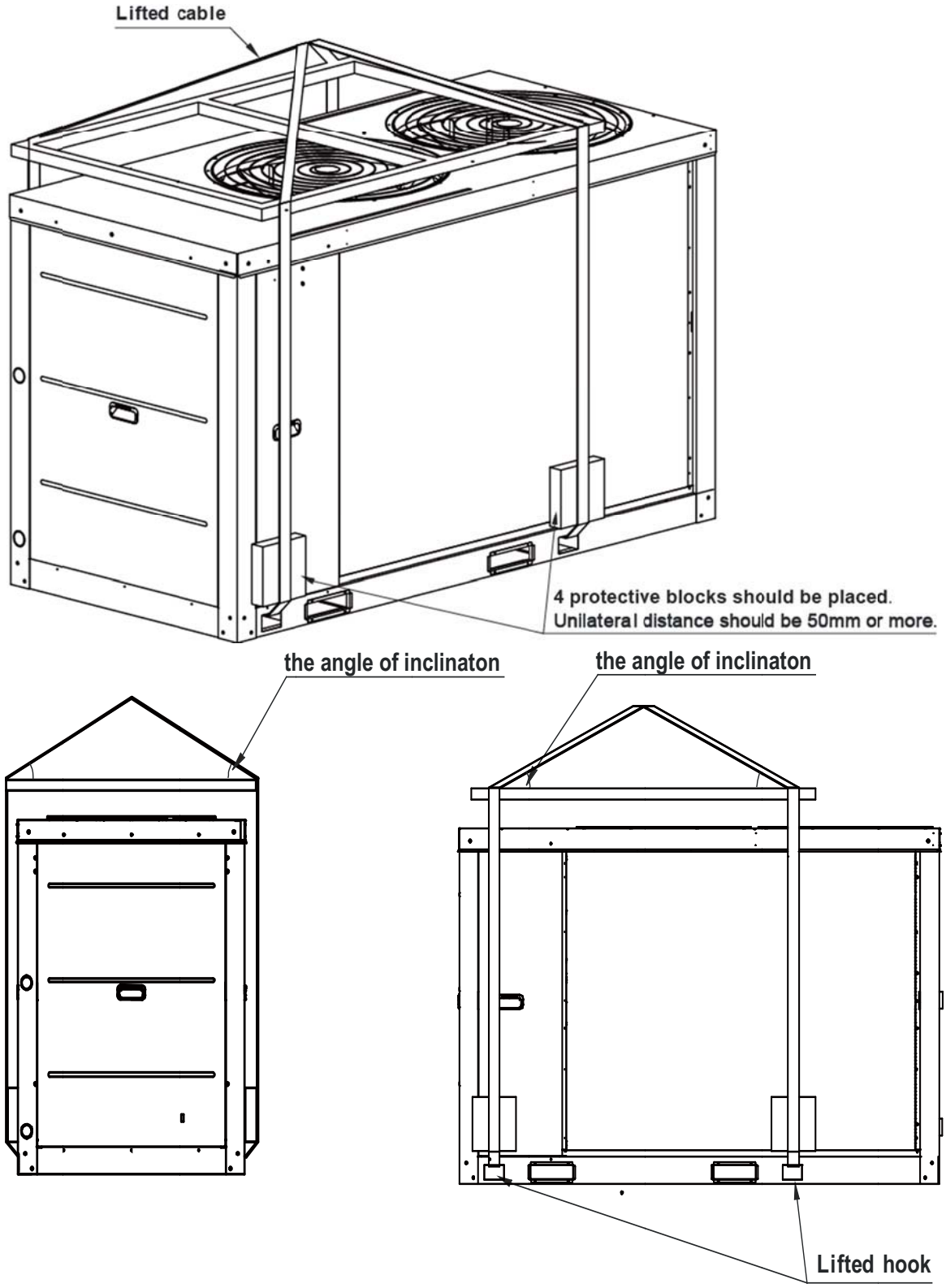
- When units are delivered check whether any damage occurred during shipment. If there is damage to the surface or outside of a unit, submit a written report to the shipping company.
- Check that the model, specifications and quantity of the units delivered are as ordered.
- Check that all accessories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

2.2 Hoisting

Notes for installers

- If units are not packaged or if the packaging is damaged, use suitable boards or packing material to protect the units.
- Hoist one unit at a time, using two ropes to ensure stability.
- The angle of inclination should not be more than 15° when carrying the unit in case of overturn of the unit.
- Several rolling rods of the same size are placed under the base of the unit, and the length of each rod must be more than the outer frame of the base and suitable for balancing of the unit.
- Each lifting rope (belt) should be able to bear 4 times the weight of the unit. Check the lifting hook and ensure that it is firmly attached to the unit. To avoid damages to the unit, a protective block made of wood, cloth or hard paper should be placed between the unit and rope when lifting, and its thickness should be 50mm or

Figure 3-2.1: Hoisting the unit



2.3 Placement Considerations

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

- Outdoor units should not be exposed to direct radiation from a high-temperature heat source.
- Outdoor units should not be installed in positions where dust or dirt may affect heat exchangers.
- Outdoor units should not be installed in locations where exposure to oil or to corrosive or harmful gases, such as acidic or alkaline gases, may occur.
- Outdoor units should not be installed in locations where exposure to salinity may occur.
- Outdoor units should be installed in well-drained, well-ventilated positions that are as close as possible to the indoor units.

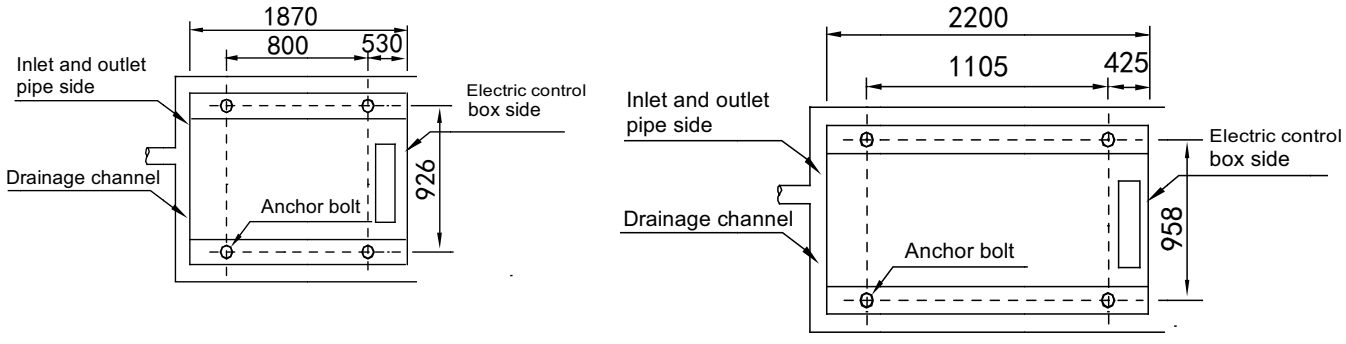
- Outdoor units can be installed on the ground or on a roof structure that is strong enough to bear the unit's weight. When installed in a position that is not easily accessible, a method of safe access for installation/maintenance should be provided.
- Outdoor units should not be installed in locations which have stringent low-noise or low-vibration requirements.
- Outdoor units should not be installed adjacent to boiler flues and should be sheltered from direct sunlight as much as possible.
- For the safety of persons which may be in the vicinity of an outdoor unit and to protect the unit from accidental damage, guard rails/meshes should be installed to prevent unauthorized persons from opening unit casings.

2.4 Base Structure

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

- A solid base prevents excess vibration and noise. Outdoor unit bases should be constructed on solid ground or on structures of sufficient strength to support the units' weight and that of installation/maintenance personnel.
- Bases should be at least 200mm high to provide sufficient access for installation of piping.
- Either steel or concrete bases may be suitable.
- To ensure that all contact points are equally secure, bases should be completely level. Base design should ensure that the points on the units' bases designed for weight-bearing support are fully supported.
- A drainage ditch should be provided to allow drainage of condensate that may form on the heat exchangers when the units are running in heating mode. The drainage should ensure that condensate is directed away from roadways and footpaths, especially in locations where the climate is such that condensate may freeze.
- The unit casing should not be embedded into a concrete foundation.
- When installed on the ground, the unit's foundations should be a separate structure from the building foundations, to prevent transfer of noise and vibrations.
- When installed on a roof, if a steel frame is used, the steel should be sufficiently wide that the dampers can be installed.
- In areas of high snowfall, the height of the base structures should be increased so as to raise the units further off the ground.

Figure 3-2.2: Outdoor unit typical concrete base structure design (unit: mm)



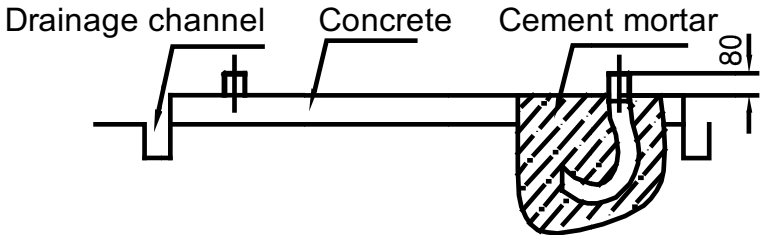
MC-SU30-RN8L, MC-SU30M-RN8L

MC-SU60-RN8L, MC-SU60M-RN8L

2.5 Drainage

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

Figure 3-2.3: Drainage hole



2.6 Spacing

Outdoor units must be spaced such that sufficient air may flow through each unit. Sufficient airflow across heat exchangers is essential for outdoor units to function properly. The influence of adjacent structures on the airflow around the unit should also be taken into consideration. For units installed in locations that may be experience high wind speeds, measures such as installing fences should be taken to protect the units from turbulent flows that may disturb the air entering/leaving the units. When fencing or other forms of wind protection are installed, the minimum spacing requirements detailed in Figure 3-2.4 should still be observed.

Figure 3-2.4: Installation with obstacles

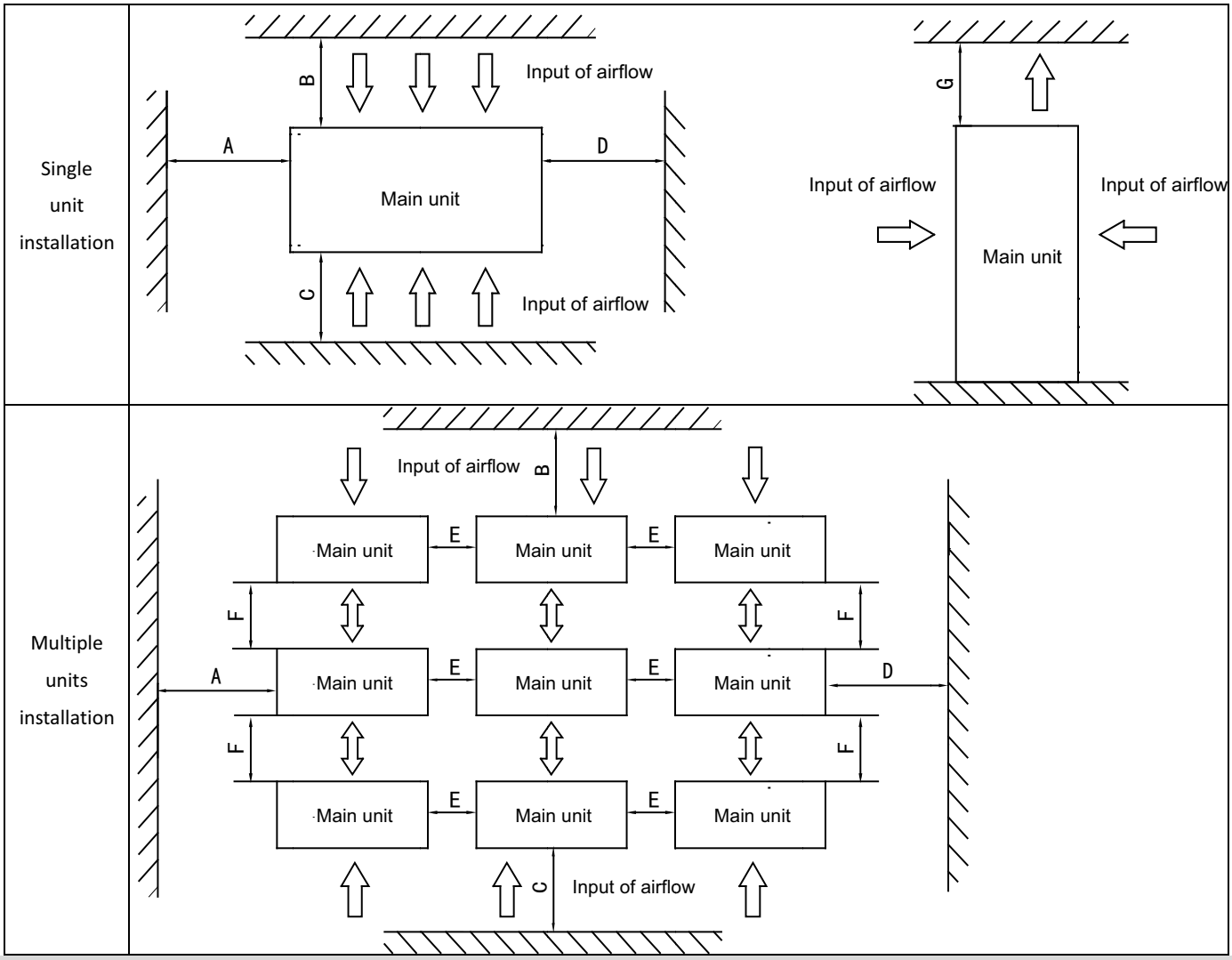


Table 3-2.1: Recommend minimum spacing

Module	Installation space (mm)						
	A	B	C	D	E	F	G
30	≥800	≥2000	≥2000	≥800	≥800	≥1100	≥6000
60							

2.7 Installation of Damping Devices

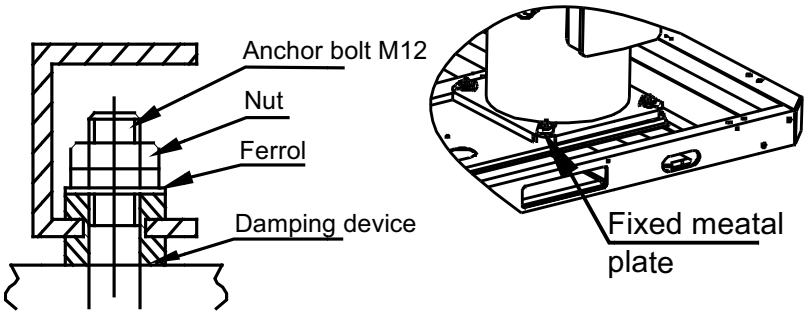
2.7.1 Damping devices must be provided between the unit and its foundation

By means of the installation holes on the steel frame of the unit base, the unit can be fastened on the foundation through the spring damper. See figure above (Figure 3-2.2) for details about center distance of the installation holes. The damper does not go with the unit, and the user can select the damper according to the relevant requirements. When the unit is installed on the high roof or the area sensitive to vibration, please consult the technical engineers before selecting the damper.

2.7.2 Installation steps of the damper

- Step 1. Make sure that the flatness of the concrete foundation is within ±3mm, and then place the unit on the cushion block.
- Step 2. Raise the unit to the height suitable for installation of the damping device. Remove the clamp nuts of the damper.
- Step 3. Place the unit on the damper, and align the fixing bolt holes of the damper with the fixing holes on the unit base.
- Step 4. Return the clamp nuts of the damper to the fixing holes on the unit base, and tighten them into the damper.
- Step 5. Adjust the operational height of the damper base, and screw down the leveling bolts. Tighten the bolts by one circle to ensure equal height adjustment variance of the damper.
- Step 6. The lock bolts can be tightened after the correct operational height is reached.

Figure 3-2.5: Installation of the damper



3 Water System Design and Installation

3.1 Water Circuit Checks

DC Modular Chiller H9T units are equipped with a water inlet and outlet for connection to a water circuit. The Chiller H9T units should only be connected to closed water circuits. Connection to an open water circuit would lead to excessive corrosion of the water piping. Only materials complying with all applicable legislation should be used.

Before continuing installation of the unit, check the following:

- All chilled water pipelines should be thoroughly flushed, to be free of any impurity, before the unit is operated. Any impurity should not be flushed to or into the heat exchanger.
- Water must enter the heat exchanger through the inlet; otherwise the performance of the unit will decline.
- The pump installed in the water pipeline system should be equipped with starter. The pump will directly press water into the heat exchanger of the water system.
- The pipes and their ports must be independently supported but should not be supported on the unit.
- The pipes and their ports of the heat exchanger should be easy to disassemble for operation and cleaning, as well as inspection of port pipes of the evaporator.
- The evaporator should be provided with a filter with more than 40 meshes per inch at site. The filter should be installed near to the inlet port as much as possible, and be under heat preservation.
- The by-pass pipes and by-pass valves as shown in Figure 1-1.1: System schematic must be mounted for the heat exchanger, to facilitate cleaning of the outside system of water passage before the unit is adjusted. During maintenance, the water passage of the heat exchanger can be cut off without disturbing other heat exchangers.
- The flexible ports should be adopted between the interface of the heat exchanger and on-site pipeline, to reduce transfer of vibration to the building.
- To facilitate maintenance, the inlet and outlet pipes should be provided with thermometer or manometer. The unit is not equipped with pressure and temperature instruments, so they need to be purchased by the user.
- All low positions of the water system should be provided with drainage ports, to drain water in the evaporator and the system completely; and all high positions should be supplied with discharge valves, to facilitate expelling air from the pipeline. The discharge valves and drainage ports should not be under heat preservation, to facilitate maintenance.
- All possible water pipes in the system to be chilled should be under heat preservation, including inlet pipes and flanges of the heat exchanger.
- The outdoor chilled water pipelines should be wrapped with an auxiliary heating belt for heat preservation, and the material of the auxiliary heat belt should be PE, EDPM, etc., with thickness of 20mm, to prevent the pipelines from freezing and thus cracking under low temperature. The power supply of the heating belt should be equipped with an independent fuse.
- When the ambient temperature is lower than 2^{o}C, and the unit will be not used for a long time, water inside the unit should be drained. If the unit is not drained in winter, its power supply should not be cut off, and the fan coils in the water system must be provided with three-way valves, to ensure smooth circulation of the water system when the anti-freezing pump is started up in winter.
- The common outlet pipelines of combined units should be provided with mixing water temperature sensor.

3.2 Water Quality Control

When industrial water is used as chilled water, little furring may occur; however, well water or river water, used as chilled water, may cause much sediment, such as furring, sand, and so on. Therefore, well water or river water must be filtered and softened in softening water equipment before flowing into chilled water system. If sand and clay settle in the evaporator, circulation of chilled water may be blocked, and thus leading to freezing accidents; if hardness of chilled water is too high, furring may occur easily, and the devices may be corroded. Therefore, the quality of chilled water should be analyzed before being used, such as PH value, conductivity, concentration of chloride ion, concentration of sulfide ion, and so on.

Table 3-3.1: Applicable standard of water quality for the unit

pH value	Total hardness	Conductivity	Sulfide ions	Chloride ions	Ammonia ions	Sulfate ions	Silicon	Iron	Sodium ions	Calcium ions
6.8-8.0	< 70ppm	< 200μV/cm (25°C)	No requirement	< 50ppm	No requirement	< 50ppm	< 30ppm	< 0.3ppm	No requirement	< 50ppm

3.2.1 Performance adjustment factors

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

- The ambient temperature is below 0 °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.

3.2.2 Ethylene and Propylene Glycol factors

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.

Table 3-3.2: Ethylene glycol

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

Table 3-3.3: Propylene glycol

Concentration of propylene glycol (%)	Modification coefficient				Freezing point (°C)
	Cooling capacity	Power input	Water resistance	Water flow	
0	1.000	1.000	1.000	1.000	0
10	0.976	0.996	1.071	1.00	-3
20	0.961	0.992	1.189	1.016	-7
30	0.948	0.988	1.380	1.034	-13
40	0.938	0.984	1.728	1.078	-22
50	0.925	0.975	2.150	1.125	-35

3.2.3 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. For performance at elevations other than sea level refer to Table 3-3.4. Maximum allowable altitude is 1800meters.

3.2.4 Evaporator temperature drop factors

Performance tables are based on a 5°C temperature drop through the evaporator. Adjustment factors for applications with temperature ranges from 3°C to 6°C in follow table. Temperature drops outside this range can affect the control system's capability to maintain acceptable control and are not recommended.

3.2.5 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, 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.

Table 3-3.4: Fouling factor

ALTITUDE (m)	Difference of water inlet and outlet temp. (°C)	Fouling Factor							
		0.018 m2. °C /kW		0.044 m2. °C /kW		0.086 m2. °C /kW		0.172 m2. °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

3.3 Installation of Water System Pipeline

3.3.1 Installation of single-module water system pipeline

Figure 3-3.1: Installation of single-module water system pipeline

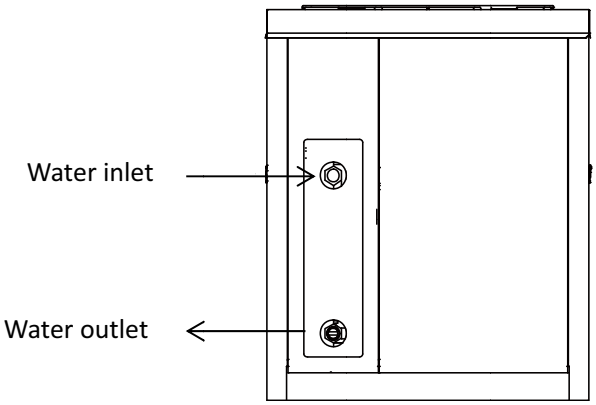


Figure 3-3.2: connection method of model30

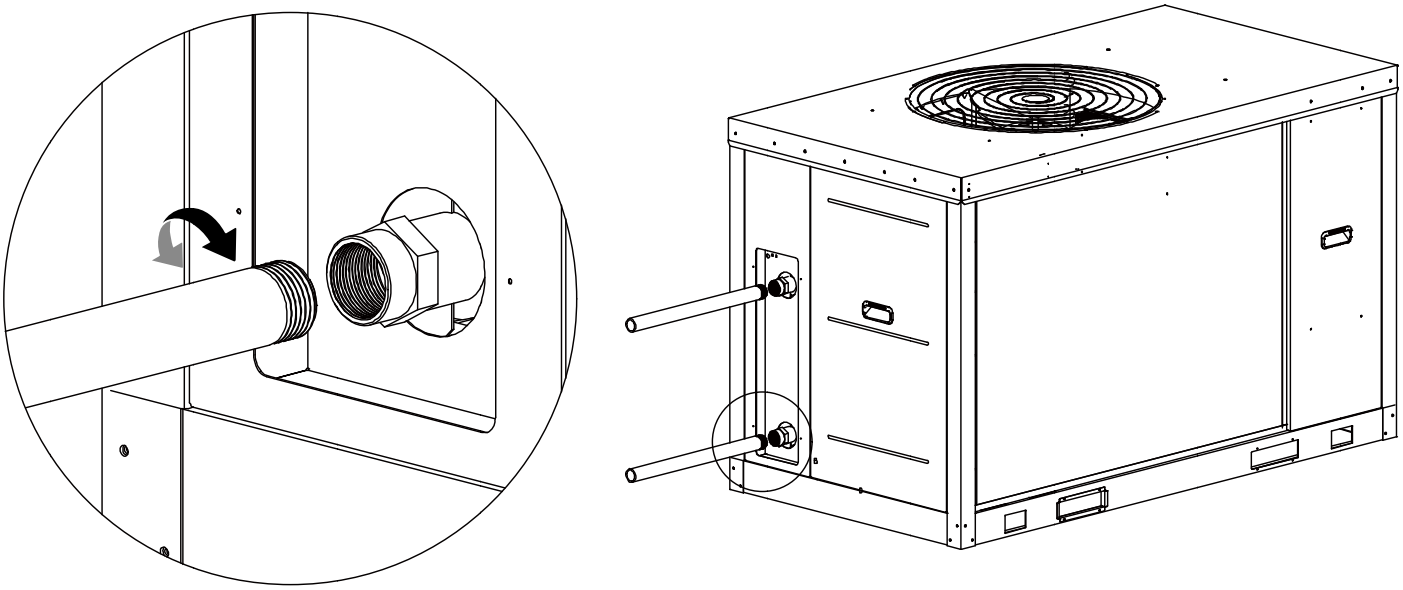
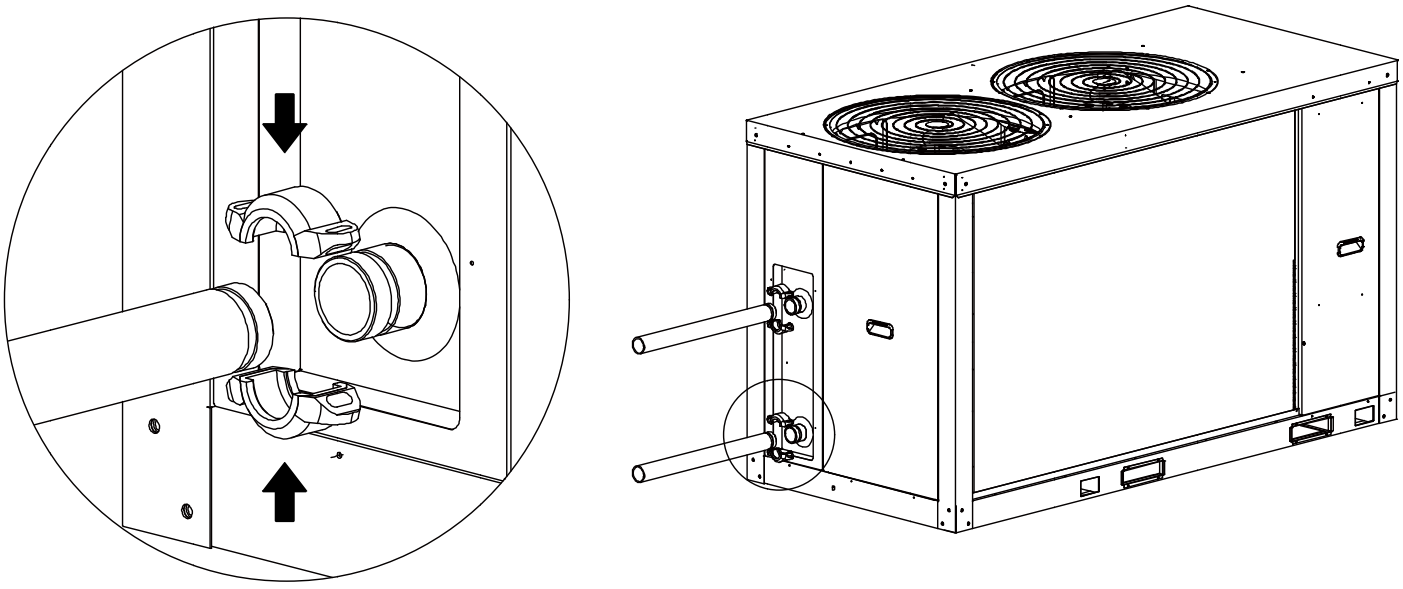
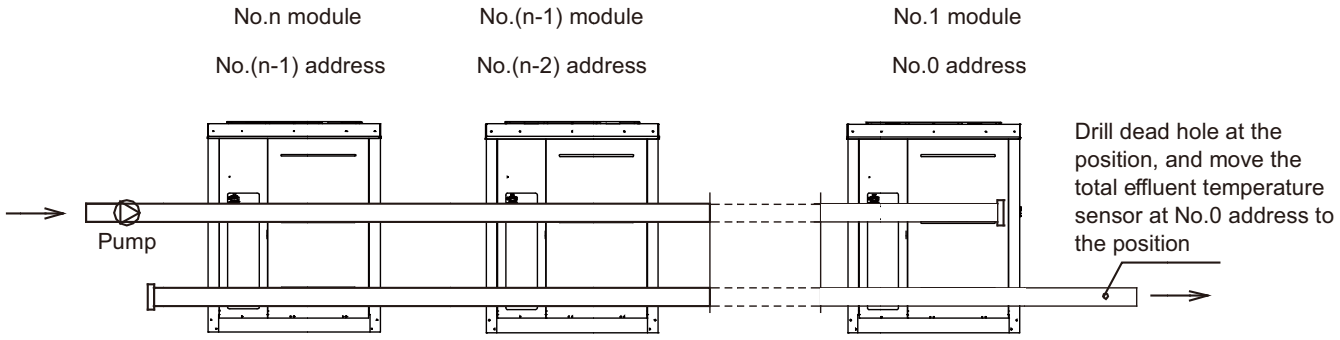


Figure 3-3.3: connection method of model60



3.3.2 Installation of multi-module water system pipeline

Figure 3-3.4: Installation of multi-module water system pipeline



Note: n: the module quantity, max 16

3.3.3 Diameter parameters of main inlet and outlet pipes

Table 3-3.5: Fouling factor

Cooling capacity	Total inlet and outlet water pipe inside nominal diameter
15≤ Q≤ 30	DN40
30< Q≤ 90	DN50
90<Q≤ 130	DN65
130< Q≤ 210	DN80
210< Q≤ 325	DN100
325< Q≤ 510	DN125
510< Q≤ 740	DN150
740< Q≤ 1300	DN200
740< Q≤ 2080	DN250

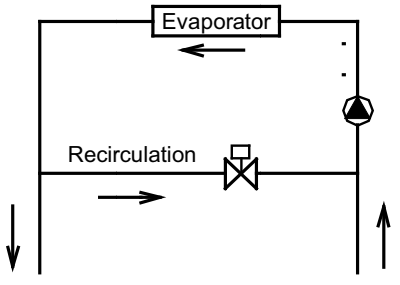
Please pay attention to the following items when installing multiple modules:

- Each module corresponds to an address code which cannot be repeated.
- Main water outlet temperature sensing bulb and auxiliary electric heater are under control of the main module.
- The unit can be started up through the wired controller only after all addresses are set and the aforementioned items are determined. The wired controller is ≤500m away from the outdoor unit.

3.3.4 Chiller water flow

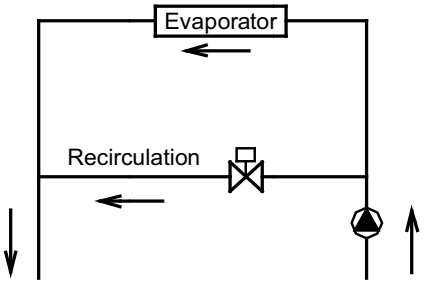
Minimum chilled water flow: if the system flow is less than the minimum unit flow rate, the evaporator flow can be recirculated, as shown in the diagram below.

Figure 3-3.5: Diagram for minimum chilled water flow



Maximum chilled water flow: the maximum chilled water flow is limited by the permitted pressure drop in the evaporator. If the system flow is more than the maximum unit flow rate, bypass the evaporator as shown in the diagram to obtain a lower evaporator flow rate.

Figure 3-3.6: Diagram for maximum chilled water flow



Minimum and Maximum water flow rates:

Table 3-3.6: Minimum and Maximum water flow rates

Model	Water flow rate(m3/h)	
	Minimum	Maximum
30	3.8	6.4
60	8.0	13.0

3.3.5 Water circuit connection

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

- Use clean pipes only.
- Hold the pipe end downwards when removing burrs
- Cover the pipe end when inserting it through a wall to prevent dust and dirt entering.
- Use a good thread sealant for sealing the connections. The sealing must be able to withstand the pressures and temperatures of the system.
- When using non-copper metallic piping, be sure to insulate the two kind of materials from each other to prevent galvanic corrosion.
- For copper is a soft material, use appropriate tools for connecting the water circuit. Inappropriate tools will cause damage to the pipes

3.3.6 Water piping insulation

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

4 Electrical Wiring

4.1 General

Notes for installers

Caution

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

4.2 Precautions

- The chiller should apply special power supply, whose voltage should conform to rated voltage.
- Wiring construction must be conducted by the professional technicians according to the labeling on the circuit diagram.
- Only use the electric components specified by our company, and require installation and technical services from the manufacturer or authorized dealer. If wiring connection fails to conform to electric installation norm, failure of the controller, electronic shock, and so on may be caused.
- The connected fixed wires must be equipped with full switching-off devices with at least 3mm contact separation.
- Set leakage protective devices according to the requirements of national technical standard about electric equipment.
- After completing all wiring construction, conduct careful check before connecting the power supply.
- Please carefully read the labels on the electric cabinet.
- The user's attempt to repair the controller is prohibited, since improper repair may cause electric shock, damages to the controller, and so on. If the user has any requirement of repair, please contact the maintenance center.

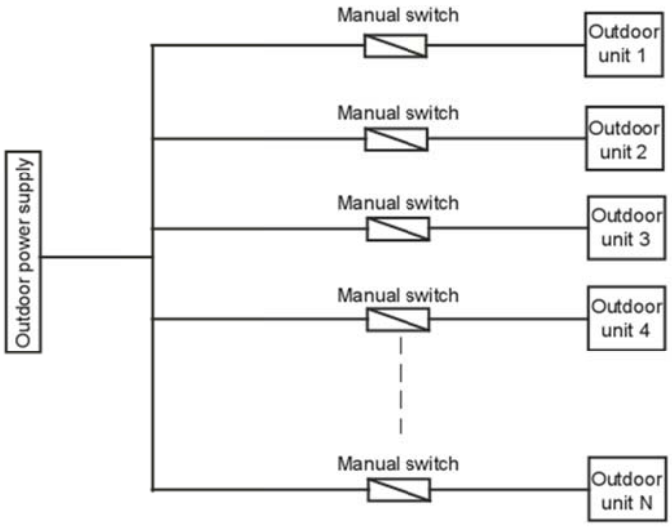
4.3 Requirements of Wiring Connection

No additional control components are required in the electric cabinet (such as relay, and so on), and the power supply and control wires not connected with the electric cabinet are not allowed to go through the electric box. Otherwise, electromagnetic interference may cause failure of the unit and control components and even damages to them, which thus lead to protective failure.

- All cables led to the electric box should be supported independently but by the electric box.
- The strong current wires generally pass the electric box, and 220V alternating current may also pass the control board, so wiring connection should conform to the principle of separation of strong current and weak current, and the wires of power supply should be kept more than 100 mm away from the control wires.
- Only use 380-415V 3Ph~ 50Hz rated power supply for the unit, and the maximum allowable range of voltage is 342V-418V.

- All electric wires must conform to local wiring connection norm. The suitable cables should be connected to power supply terminal through wiring connection holes at the bottom of the electric cabinet. According to Chinese standard, the user is responsible for providing voltage and current protection for the input power supply of the unit.
- All power supplies connected to the unit must pass one manual switch, to ensure that the voltages on all nodes of electric circuit of the unit are released when the switch is cut off.
- The cables of correct specification must be used to supply power for the unit. The unit should use independent power supply, and the unit is not allowed to use the same power supply together with other electric devices, to avoid over-load danger. The fuse or manual switch of the power supply should be compatible with working voltage and current of the unit. In case of parallel connection of multiple modules, the requirements of wiring connection mode and configuration parameters for the unit are shown in the following Table 3-4.1.
- Some connection ports in the electric box are switch signals, for which the user needs to provide power, and the rate voltage of the power should be 220-230V AC. The user must be aware that all power supplies they provided should be obtained through power circuit breakers (provided by the user), to ensure that all voltages on the nodes of the provided power supply circuit are released when the circuit breakers are cut off.
- All inductive components provided by the user (such as coils of contactor, relay, and so on) must be suppressed with standard resistance-capacitance suppressors, to avoid electromagnetic interference, thus leading to failure of the unit and its controller and even damages to them.
- All weak current wires led to the electric box must apply shielded wires, which must be provided with grounding wires. The shield wires and power supply wires should be laid separately, to avoid electromagnetic interference.
- The unit must be provided with grounding wires, which are not allowed to be connected with the grounding wires of gas fuel pipelines, water pipelines, lightning conductors or telephones. Improper earth connection may cause electric shock, so please check whether earth connection of the unit is firm or not frequently.

Figure 3-4.1: Diagram of manual switch for the system



Note: up to 16 units can be combined at most.

Table 3-4.1: Power supply specifications

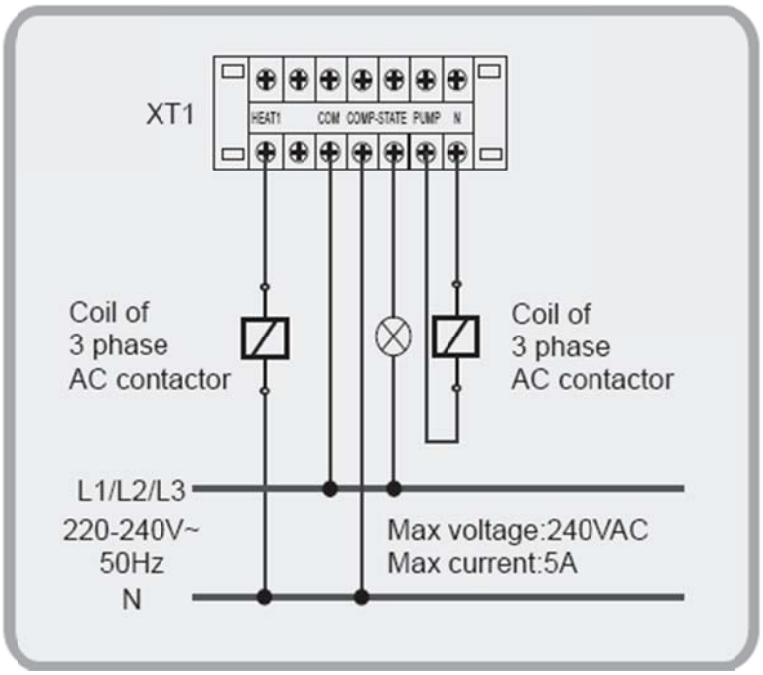
Model	Outdoor power supply			Wiring
	Power supply	Manual switch	Fuse	
30	380-415V 3Ph～50Hz	50A	36A	$10mm^2$ X5(<20m)
60	380-415V 3Ph～50Hzo	100A	70A	$16mm^2$ X5(<20m)

4.4 Wiring Steps

Table 3-4.2: Wiring steps

Step	Content
1	Check the unit and ensure that it is connected with grounding wires correctly, to avoid leakage, and the grounding devices should be mounted in strict accordance with the requirements of electrical engineering rules. The grounding wires can prevent electric shock.
2	The control box of the main power switch must be mounted in a proper position.
3	Wiring connection holes of the main power should be provided with glue cushion.
4	The main power and neutral wires and grounding wires of power supply are led into the electric box of the unit.
5	The wires of the main power must pass the bonding clamp.
6	Wires should be connected firmly to the connection terminals A,B,C, N.
7	Phase sequences must be consistent when the wires of the main power.
8	The main power should be located out of easy reach of non-professional maintenance personnel, to avoid mal-operation and improve safety.
9	MC-SU30-RN8L and MC-SU60-RN8L connection of control wires of auxiliary electric heaters: the control wires of AC contactor of the auxiliary electric heater must pass the connection terminals HEAT1 and COM of terminal XT1 of the main unit, as shown in Fig.3-4.2
10	MC-SU30-RN8L and MC-SU60-RN8L connection of control wires of pump: the control wires of AC contactor of pump must pass the connection terminas PUMP and N of terminal XT1 of the main unit, as shown in Fig. 3-4.4
11	Connection of the wired controller to P, Q, E terminal in the electric control box. The wired controller is built-in the electric control box as standard.

Figure 3-4.2: wire connection of auxiliary electric heaters



4.5 Wiring Overview

Figure 3-4.3: diagram combination system of MUENR-30-H9T and MUENR-60-H9T

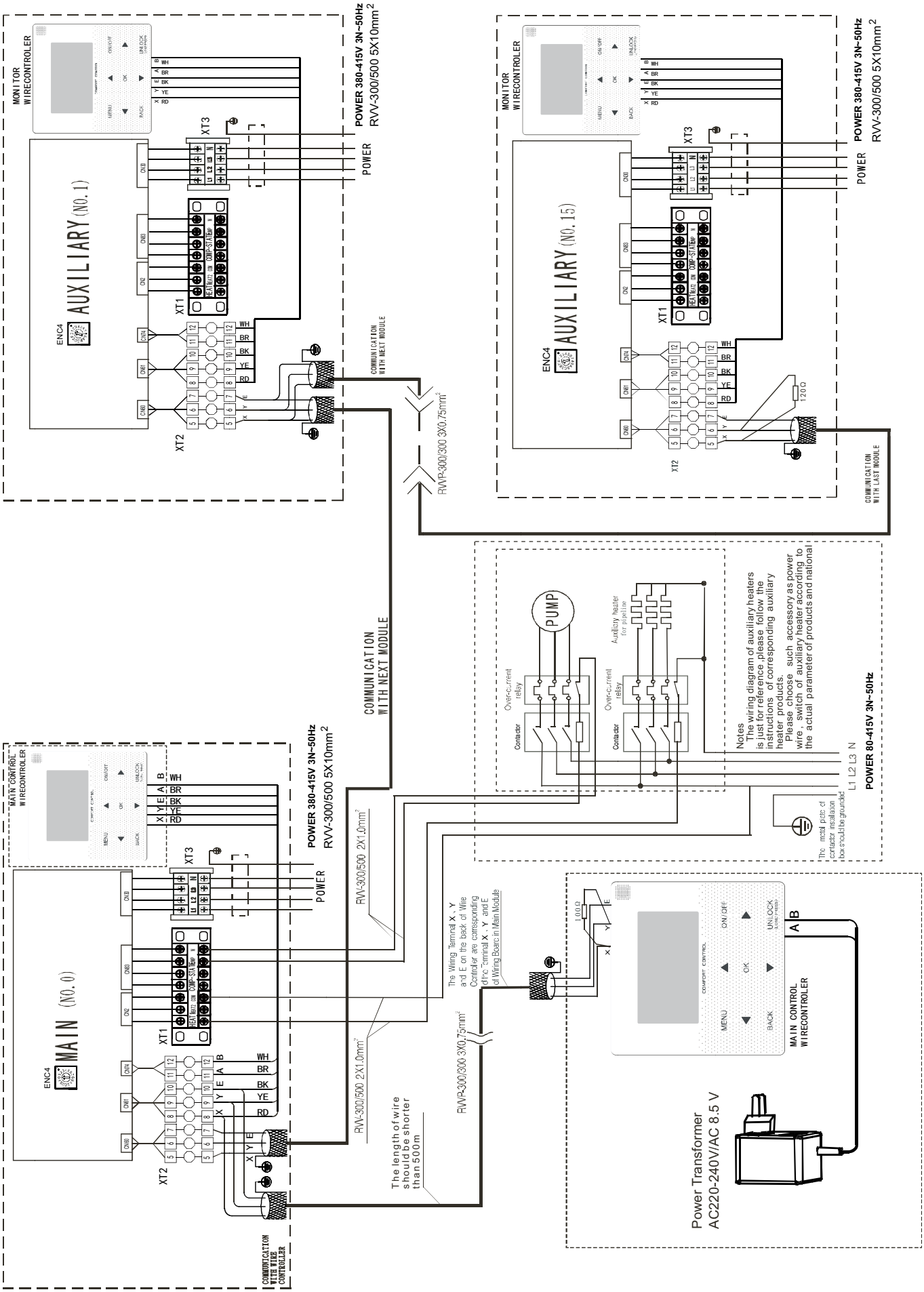


Figure 3-4.4: diagram combination system of MUENR-30-H9T(K) and MUENR-60-H9T(K)

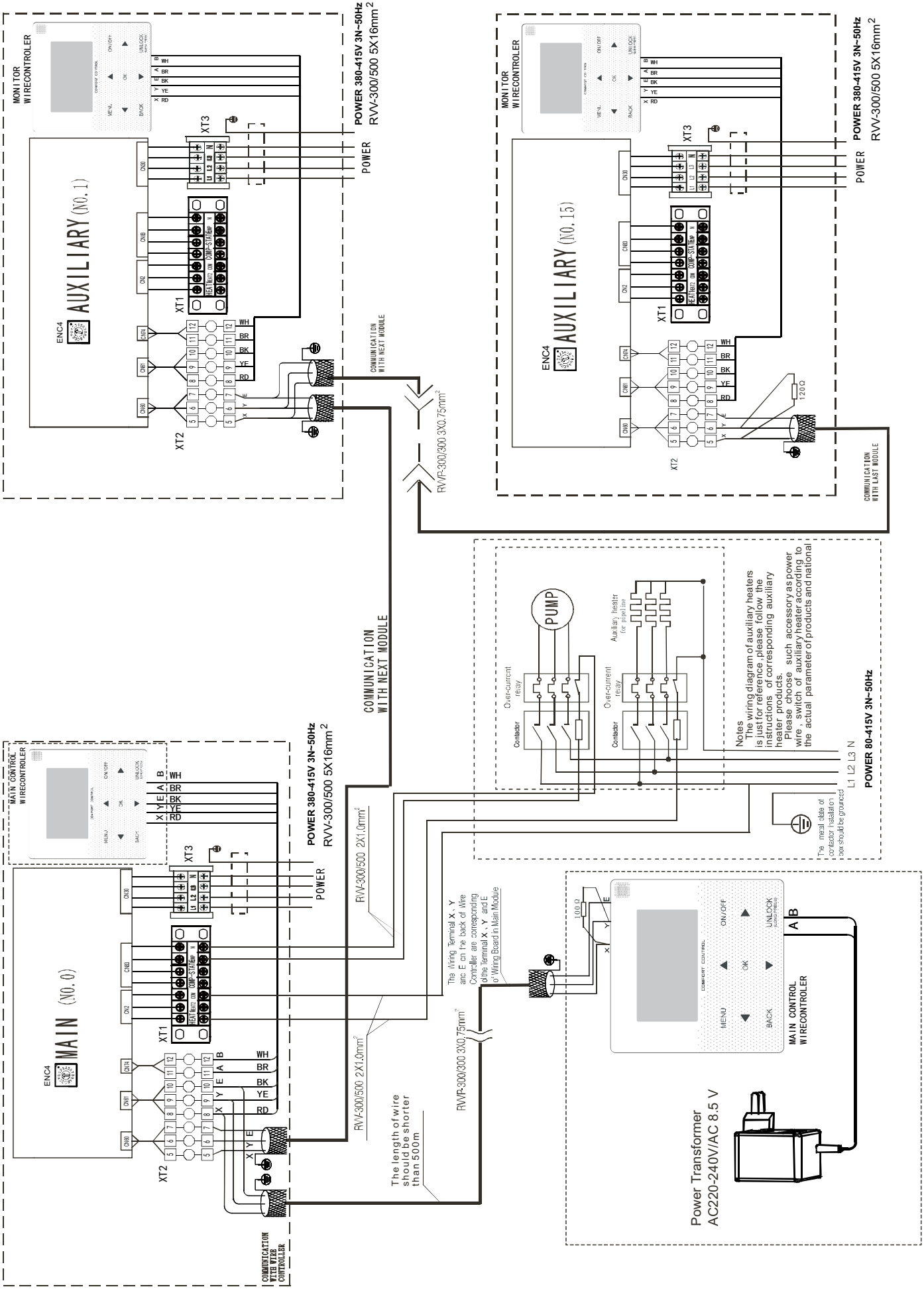


Table 3-4.3: Wiring requirements

Item	Description	Current	Required number of conductors	Maximum running current	Minimum wiring size
1	User interface wire[1]	AC	5	200mA	0.75-1.25mm
2	Auxiliary heater control wire	AC	2	200mA	1mm^2
3	Pump control wire	AC	2	200mA	1mm^2
4	ON/OFF signal wire	DC	2	-	0.75mm^2
5	Cool/Heat signal wire	DC	2	-	0.75mm^2
6	Alarm signal wire	AC	2	200mA	0.75mm^2
7	Water flow switch signal wire	DC	2	-	0.75mm^2
8	Compressor state signal wire[2]	AC	2	200mA	0.75mm^2
9	Water pressure switch wire[2]	DC	2	-	0.75mm^2
10	Inverter Pump control wire[2]	DC	2	-	0.75mm^2
11	Dual temperature set points switch[2]	DC	2	-	0.75mm^2

Notes:

1. 5-core shielded wire is required; the standard maximum wire length is 50m.

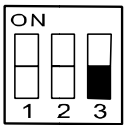
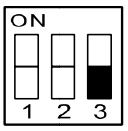
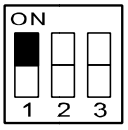
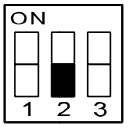
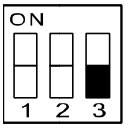
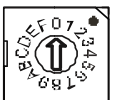
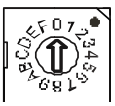
4.5 Modbus Gateway

Up to 16 wired controllers can be connected together, with each controller controlling up to 16 units.

Figure 3-4.5: Modbus Gateway wiring connection

5 Field Settings

Table 3-5.1: Field Setting

Switch		Description	Default factory setting
S5-3		Normal control	OFF
		Remote control	-
S6-3		Anti-snow function is invalid	OFF
		Anti-snow function is effective	-
S12-1		Represent MUNDOCLIMA product	ON
S12-2		Single water pump control	OFF
		Multiple water pumps control	-
S12-3		Normal cooling mode	OFF
		Low-temperature cooling mode	-
ENC2		DIP switch of outdoor unit capacity	0: Model 30 1: Model 60
ENC4		DIP switch of outdoor unit network address 0: master unit 1,2,3…F: slave units	0

6 Commissioning and Maintenance

6.1 Commissioning

6.1.1 Preparation

- After the water system pipeline is flushed several times, please make sure that the purity of water meets the requirements; the system is re-filled with water and drained, and the pump is started up, then make sure that water flow and the pressure at the outlet meet the requirements.
- The unit is connected to the main power 12 hours before being started up, to supply power to the heating belt and pre-heat the compressor. Inadequate pre-heating may cause damages to the compressor.
- Setting of the wired controller. See details of the manual concerning setting contents of the controller, including such basic settings as refrigerating and heating mode, manual adjustment and automatic adjustment mode and pump mode. Under normal circumstances, the parameters are set around standard operating conditions for trial run, and extreme working conditions should be prevented as much as possible.
- Carefully adjust the water flow switch on the water system or the inlet stop valve of the unit, to make the water flow of the system accord with the water flow in specification table.

6.1.2 Test run

- Start up the controller and check whether the unit displays a fault code. If a fault occurs, remove the fault first, and start the unit according to the operating method in the “unit control instruction”, after determining that there is no fault existing in the unit.
- Conduct trial run for 30 min. When the influent and effluent temperature becomes stabilized, adjust the water flow to nominal value, to ensure normal operation of the unit.
- After the unit is shut down, it should be put into operation 10 min later, to avoid frequent start-up of the unit. In the end, check whether the unit meets the requirements in specification table.

6.1.3 Notices

- The unit can control start-up and shut-down of the unit, so when the water system is flushed, the operation of the pump should not be controlled by the unit.
- Do not start up the unit before draining the water system completely.
- The water flow switch must be installed correctly. The wires of the water flow switch must be connected according to electric control schematic diagram, or the faults caused by water breaking while the unit is in operation should be the user’s responsibility.
- Do not re-start the unit within 10 min after the unit is shut down during trial run.
- When the unit is used frequently, do not cut off the power supply after the unit is shut down; otherwise the compressor cannot be heated, thus leading to its damages.
- If the unit is not in service for a long time, and the power supply needs to be cut off, the unit should be connected to the power supply 12 hours prior to re-starting of the unit, to pre-heat the compressor.

6.2 Maintenance

6.2.1 Maintenance for main components

- Close attention should be paid to the discharge and suction pressure during the running process. Find out reasons and eliminate the failure if abnormality is found.
- Control and protect the equipment. See to it that no random adjustment be made on the set points on site.
- Regularly check whether the electric connection is loose, and whether there is bad contact at the contact point caused by oxidation and debris etc., and take timely measures if necessary. Frequently check the work voltage, current and phase balance.
- Check the reliability of the electric elements in time. Ineffective and unreliable elements should be replaced in time.

6.2.2 Removing scale

After long-time operation, calcium oxide or other minerals will be settled in the heat transfer surface of the water-side heat exchanger. These substances will affect the heat transfer performance when there is too much scale in the heat transfer surface and sequentially cause that electricity consumption increases and the discharge pressure is too high (or suction pressure too low). Organic acids such as formic acid, citric acid and acetic acid may be used to clean the scale. But in no way should cleaning agent containing chlorine acid or fluoride should be used as the water-side heat exchange is made from stainless steel and is easy to be eroded to cause refrigerant leakage. Pay attention to the following aspects during the cleaning and scale-removing process:

- Water-side heat exchanger should be done be professionals.
- Clean the pipe and heat exchanger with clean water after cleaning agent is used. Conduct water treatment to prevent water system from being eroded or re-absorption of scale.
- In case of using cleaning agent, adjust the density of the agent, cleaning time and temperature according to the scale settlement condition.
- After pickling is completed, neutralization treatment needs to be done on the waste liquid. Contact relevant company for treating the treated waste liquid.
- Protection equipment (such as goggles, gloves, mask and shoes) must be used during the cleaning process to avoid breathing in or contacting the agent as the cleaning agent and neutralization agent is corrosive to eyes, skins and nasal mucosa.

6.2.3 Winter shutdown

- For shutdown in winter, the surface of the unit outside and inside should be cleaned and dried. Cover the unit to prevent dust. Open discharge water valve to discharge the stored water in the clean water system to prevent freezing accident (it is preferable to inject antifreeze in the pipe).

6.2.4 Replacing parts

Parts to be replaced should be the ones provided by our company. Never replace any part with different part.

6.2.5 First startup after shutdown

The following preparations should be made for re-startup of unit after long-time shutdown:

- Thoroughly check and clean the unit.
- Clean water pipe system.
- Check pump, control valve and other equipment of water pipe system.
- Fix connections of all wires.
- It is a must to electrify the machine before startup.

6.2.6 Refrigeration system

Determine whether refrigerant is needed by checking the value of suction and discharge pressure and check whether there is a leakage. Air tight test must be made if there is a leakage or part of refrigerant system is to be replaced. Take different measures in the following two different conditions from refrigerant injection.

Total leakage of refrigerant. In case of such situation, leakage detection must be made on the pressurized nitrogen used for the system. If repair welding is needed, welding cannot be made until all the gas in the system is discharged. Before injecting refrigerant, the whole refrigeration system must be completely dry and of vacuum pumping.

- Connect vacuum pumping pipe at the fluoride nozzle at low-pressure side.
- Remove air from the system pipe with vacuum pump. The vacuum pumping lasts for above 3 hours. Confirm that the indication pressure in dial gauge is within the specified scope.
- When the degree of vacuum is reached, inject refrigerant into the refrigeration system with refrigerant bottle. Appropriate amount of refrigerant for injection has been indicated on the nameplate and the table of main technical

parameters. Refrigerant must be injected from the low pressure side of system.

- The injection amount of refrigerant will be affected by the ambient temperature. If the required amount has not been reached but no more injection can be done, make the chilled water circulate and start up the unit for injection. Make the low pressure switch temporarily short circuit if necessary.

Refrigerant supplement:

- Connect refrigerant injection bottle on the fluoride nozzle at low-pressure side and connect pressure gauge at low pressure side.
- Make chilled water circulate and start up unit, and make the low pressure control switch short circuit if necessary.
- Slowly inject refrigerant into the system and check suction and discharge pressure.

6.2.7 Disassembling compressor

Follow the following procedures if compressor needs to be disassembled:

- Cut off the power supply of unit.
- Remove power source connection wire of compressor.
- Remove suction and discharge pipes of compressor.
- Remove fastening screw of compressor.
- Move the compressor.

6.2.8 Auxiliary electric heater

When the ambient temperature is lower than 2^{o}C, the heating efficiency decreases with the decline of the outdoor temperature. In order to make the unit stably run in a relatively cold region and supplement some heat lost due to de-frosting. When the lowest ambient temperature in the user's region in winter is within 0^{o}C -10^{o}C, the user may consider to use auxiliary electric heater. Please refer to relevant professionals for the power of auxiliary electric heater.

6.2.9 System anti-freezing

- In case of freezing at the water-side heat exchanger interval channel, severe damage may be caused, i.e. heat exchange may be broken and appears leakage. This damage of frost crack is not within the warranty scope, so attention must be paid to anti-freezing.
- If the unit that is shut down for standby is placed in an environment where the outdoor temperature is lower than 0℃, the water in the water system should be drained.
- Water pipe may be frozen when the chilled water flow switch and anti-freezing temperature senor become ineffective at running, therefore, the water flow switch must be connected in accordance with the connection diagram.
- Frost crack may happen to water-side heat exchanger at maintenance when refrigerant is injected to the unit or is discharged for repair. Pipe freezing is likely to happen any time when the pressure of refrigerant is below 0.6Mpa. Therefore, the water in the heat exchanger must be kept flowing or be thoroughly discharged.

7 User Interface Field Settings for KJRM-120H/BMWKO3-E

7.1 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 PROJECT menu on the wired controller's user interface. The user interface menus and settings can be navigated using the user interface's touch-sensitive keys, as detailed in Table 3-7.1.

Figure 3-7.1: User interface

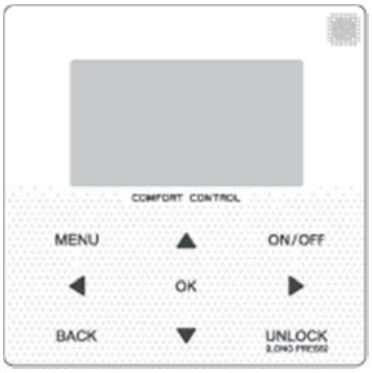


Table 3-7.1: User interface keys

Keys	Function
MENU	Display the main menu
◄► ▼ ▲	▪ Navigate the menu structure ▪ Adjust setting values
ON/OFF	▪ Turn space heating/cooling on/off
BACK	Exit a sub-menu (move up one level in the menu structure)
UNLOCK	Press for 3 seconds to unlock/lock the user interface
OK	▪ Enter a sub-menu ▪ Confirm entered values

7.2 Menu operation

7.2.1 Unlocking/Locking operation

When the wired controller is locked, press and hold the "UNLOCK" button for 3s to unlock it; when " " is not displayed in the locked status, press and hold the "UNLOCK" button for 3s to lock it. When " " is displayed the wired controller cannot be operated. When there is no operation for 60 continuous seconds on any page, the wired controller returns to the home page and is locked automatically, and the lock icon is displayed.

7.2.2 Power-on/off

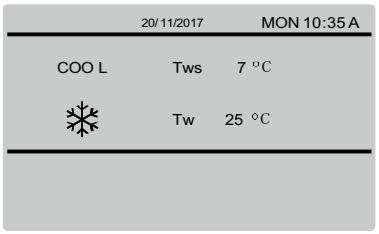
When the wired controller is unlocked and the unit is on, "ON/OFF" can be pressed to power off the unit under the home page only; when the unit is off, press "ON/OFF" to power on the unit. The mode can be switched under the power-off mode only.

7.2.3 Setting mode

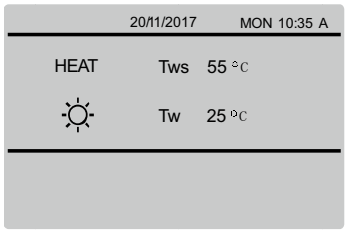
In Unlock mode, press the "MENU" button to enter the menu setting interface, press the "▼" and "▲" buttons to select "MODE" and set a mode, and press the "OK" button as shown in the above figure to access the submenu (mode setting). The interfaces are shown as the following figure.

Figure 3-7.2: Different mode interfaces

Cooling mode



Heating mode

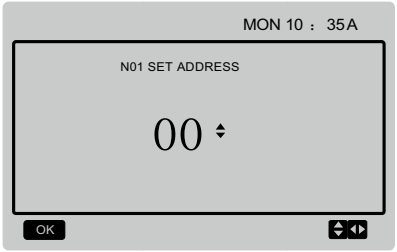


When the current mode button is selected (blinking), press "◄" and "►" to set a mode or temperature, and then press "▼" and "▲" to adjust the mode and set temperature value. After setting, press the "OK" button to save the setting and go back to the home page; or press the "BACK" button to go back to the previous interface; if there is no subsequent operation in 60s, the setting is saved automatically, and the system returns to the home page.

7.2.4 Setting wired controller address

Press the "MENU" and " " buttons for 3s at the same time to access wired controller address selection, and press the "▲" and "▼" buttons to select the desired values. If there is no subsequent operation in 60s, the setting is saved automatically, and the system returns to the home page. Press the "BACK" button to cancel the setting and return to the previous interface. The set address range is 00 to 15.

Figure 3-7.3: Setting wired controller address



7.2.5 Auto-restart function

The power supply to the system fails unexpectedly during operation. When the system is powered on again, the wired controller continues to operate according to the status before the last power failure, including the power-on/off status, mode, set temperature, failure, protection, wired controller address, timer, hysteresis, etc. However, the memorized content must be the content set at least 7s before the power failure.

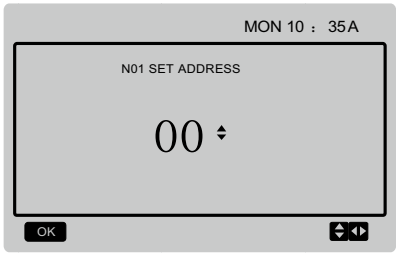
7.2.6 Combination function of wired controller

1) A maximum of 16 wired controllers can be connected in parallel, and the address can be set in the range of 0 to 15.
2) After wired controllers are connected in parallel, wired controllers with the same address are not allowed on the bus; otherwise a communication failure will occur.
3) After multiple wired controllers are connected in parallel, data is shared among them, e.g., the power-on/off function, data settings (such as the water temperature and hysteresis) and other parameters will be kept consistent (note: The mode, temperature, and hysteresis settings can be shared only when the system is powered on)
4) Start point of data sharing: After the power-on/off button is pressed, data can be shared during parameter adjustment. The "OK" button must be pressed after parameters are adjusted, and the finally adjusted values will be shared.
5) Since the bus is processed in the polling mode, the data of the wired controller with the minimum number is valid if multiple wired controllers are operated at the same time in the same bus cycle (4s). Avoid the above situation during operation.
6) After any of parallel wired controllers has been reset, the address of this wired controller is 0 by default.

7.2.7 Monitoring setting of wired controller

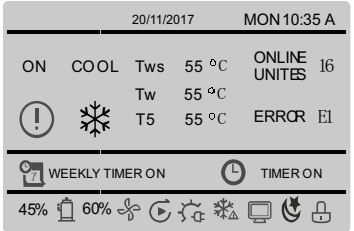
Press the "MENU" and " " buttons for 3s at the same time to access “SET ADDRESS” interface, The interface display is as follows.

Figure 3-7.4: Setting Monitoring wired controller



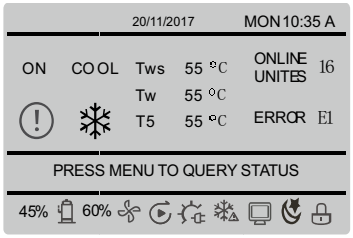
Press the "▲" and "▼" buttons to select the desired values. If there is no subsequent operation in 60s, or press “OK” button the setting is saved automatically, and the system returns to the home page. Press the "BACK" button to cancel the setting and return to the previous interface. The units only have one main control wired controller (the default address 00),and other address(address 01-15)must be set as monitor wired controller. When set address “00” and press “OK” button, the wired controller will enter the interface as follows.

Figure 3-7.5: Main page for main wired controller



When set address “01-15” and press “OK” button, the wired controller will enter the interface as follows.

Figure 3-7.6: Main page for slave wired controller



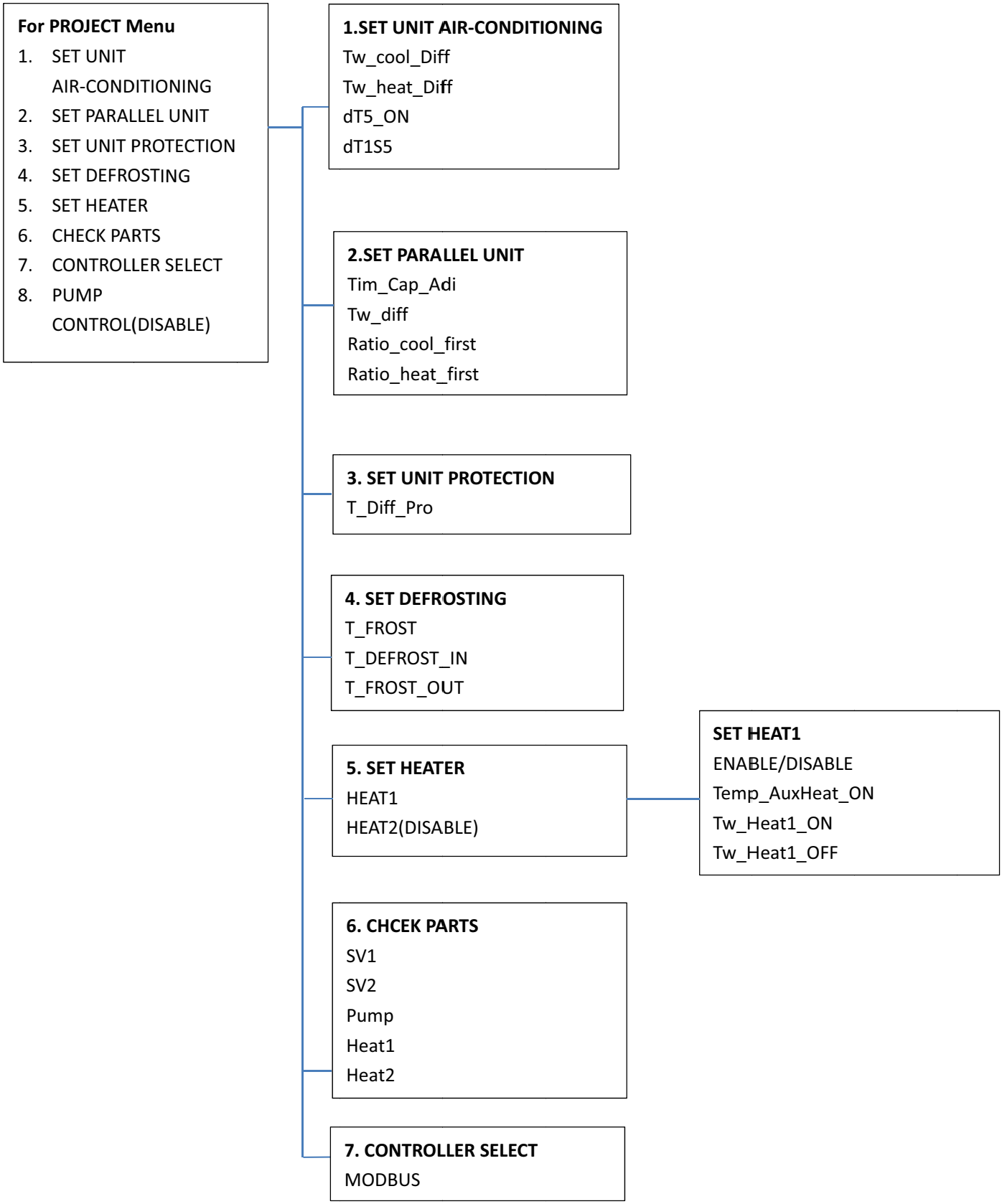
7.2.8 Upper Computer Communication Function

1) The home page displays the content below during communication with the upper computer: Communication between the wired controller and the upper computer.

2) If the outdoor main control board is in the remote ON/OFF control mode and the wired controller sends an alarm, the current alarm page displays: Remote ON/OFF Control Mode. In this case, the network control of upper computer is invalid, and the wired controller can query the system status only and cannot send out control information.

7.3 Setting PROJECT MENU

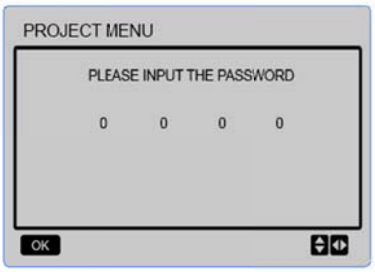
7.3.1 PROJECT menu structure



7.3.2 Entering the password

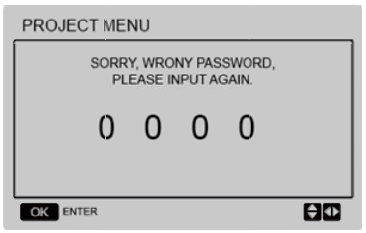
Select "PROJECT MENU", and press the "OK" button to enter the menu. The screen prompts the user to enter the password is shown as below.

Figure 3-7.7: PROJRCT password screen



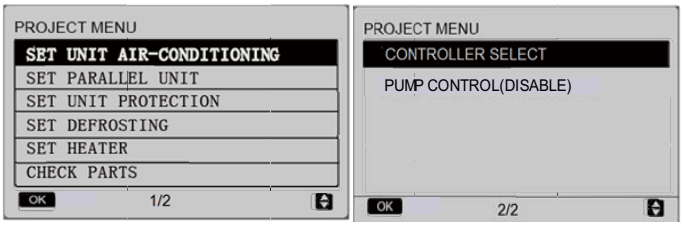
The initial password is 6666 and cannot be changed. Press the "▲" and "▼" buttons to change the number to enter, and press the "◄" and "►" buttons to change the bit code to enter. After the number is entered, the display is not changed. After entering the password, press the "OK" button to enter the interface; press the "BACK" button to go back to the previous interface; the display is as follows if the input is incorrect

Figure 3-7.8: PROJRCT password incorrect screen



The query interface as follows is displayed if the input is correct.

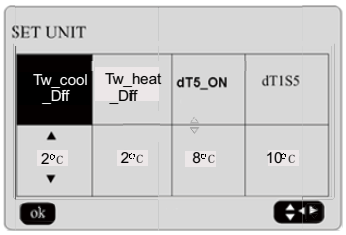
Figure 3-7.9: PROJECT menu



a. Set unit air-conditioning

Select "SET UNIT AIR-CONDITIONING", and press the "OK" button to enter the interface. The interface display is as follows.

Figure 3-7.10: Set unit air-conditioning interface

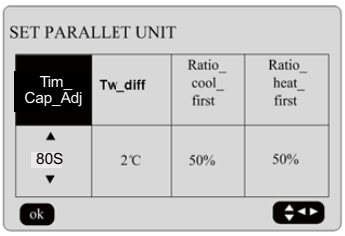


Press the"◄" and "►" buttons to select the desired option, and press "▲" and "▼" buttons to set the temperature and press the "OK" button to save the setting and return to the previous interface, or press the "BACK" button to cancel the setting and return to the previous interface. If there is no operation in 60 seconds, the wired controller will return to the home page.

b. Set parallel unit

Select "SET PARALLEL UNIT", and press the "OK" button to enter the interface, The interface display is as follows.

Figure 3-7.11: Set parallel unit interface

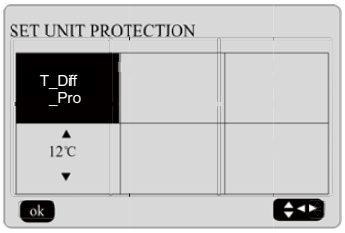


Press the"◄" and "►" buttons to select the desired option, and press "▲" and "▼" buttons to set the temperature and press the "OK" button to save the setting and return to the previous interface, or press the "BACK" button to cancel the setting and return to the previous interface. If there is no operation in 60 seconds, the wired controller will return to the home page.

c. Set unit protection

Select "SET UNIT PROTECTION", and press the "OK" button to enter the interface. The interface display is as follows.

Figure 3-7.12: Set unit protection interface

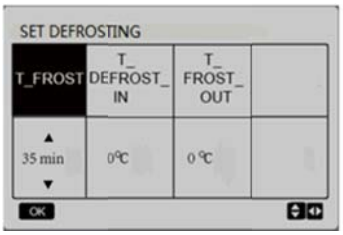


Press the “▲” and “▼” buttons to set the values and press “OK” button to save the setting and return to the previous interface, or press the "BACK" button to cancel the setting and return to the previous interface. If there is no operation in 60 seconds, the wired controller will return to the home page.

d. Set defrosting

Select “SET DEFROSTING”, and press the “OK” button to enter the interface, The interface display is as follows.

Figure 3-7.13: Set defrosting interface

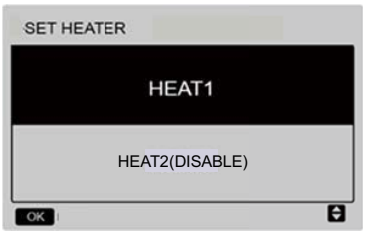


Press the“◄” and “►” buttons to select the desired option, and press “▲” and “▼” buttons to set the temperature and press the "OK" button to save the setting and return to the previous interface, or press the "BACK" button to cancel the setting and return to the previous interface. If there is no operation in 60 seconds, the wired controller will return to the home page.

e. Set heater

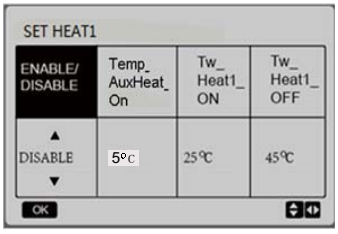
Select “SET HEATER”, and press the “OK” button to enter the interface, If it is controlled by single water pump. The interface display is as follows.

Figure 3-7.14: Set heater interface



Press the "▲" and "▼" buttons to select the desired option, and press “OK” button to access the interface. When select the“HEAT1”, and press the “OK” button to access the interface, The interface display is as follows.

Figure 3-7.15: Set Heat1 interface



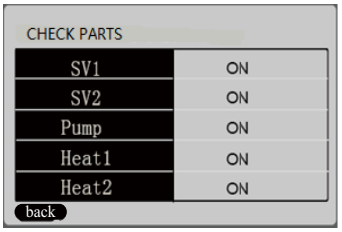
Notes:

1. The value of “Tw_Heat1_OFF” is bigger than “Tw_Heat1_ON”.
2. HEAT2 function is disabled, so user cannot enter the HEAT2 interface.

f. Check parts

Select "CHECK PARTS", and press the "OK" button to enter the interface. The interface display is as follows.

Figure 3-7.16: Check parts interface

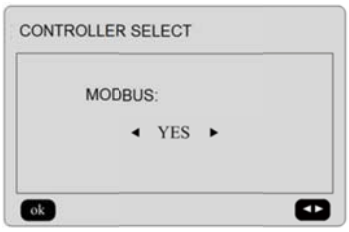


The screen displays conditions of all parts; users can press “BACK” button to exit after confirming.

g. Controller select

Select "CONTROLLER SELECT", and press the "OK" button to enter the interface. The interface display is as follows.

Figure 3-7.17: Controller select interface



Operation instructions:

When select modbus “YES”, and press “OK” button to acess the function. User can use a host computer to communicate with the wried controller by modbus protocol and these operations on the wired controller as “Power-ON/OFF”, “Setting Mode”, “Timer” and “Setting temperature” are invalid.

7.3.3 Parameters setting

Table 3-7.2: Parameters setting

parameters	Setting range	Default value	Adjustment range
Defrosting cycle	20 min to 120 min	35 min	5min
Defrost enter temperature	-5°C to 5°C	0°C	1°C
Defrost exit temperature	-10°C to +10°C	0°C	1°C
Capacity adjustment period	60s to 360s	80s	20S
Hysteresis temperature setting	1°C to 5°C	2°C	1°C
Delay closing time of water pump	2min to 5min	2min	1min
Auxiliary electric heater opens water temperature	0°C to 50°C	25°C	1°C
Auxiliary electric heater close water temperature	0°C to 50°C	45°C	1°C
Water inlet and outlet temperature difference protection	8°C to 15°C	12°C	1°C
Initial cooling ratio	0 to 100%	50%	5%
Initial heating ratio	0 to 100%	50%	5%

8 Appendix

8.1 Error Code Table

Table 3-8.1: Error code table

Error code	Content
E0	Main control parameter memory EEPROM failure
E1	Phase sequence failure of main control board check
E2	Communication failure between master and the HMI
	Communication failure between master and the slave
E3	Total water outlet temperature sensor (Tw) failure (displayed on master unit only)
E4	Unit water outlet temperature sensor (Two) failure
E5	1E5 condenser tube temperature sensor T3A failure
	2E5 condenser tube temperature sensor T3B failure
E7	Ambient temperature sensor (T4) failure
E8	Power supply phase sequence protector output error
E9	Water flow detection failure
Eb	1Eb --> Taf1 cooling evaporator low-temperature anti-freeze protection sensor failure
	2Eb --> Taf2 cooling evaporator low-temperature anti-freeze protection sensor failure
EC	Slave unit module reduction
Ed	1Ed --> A system discharge temperature sensor failure
	2Ed --> B system discharge temperature sensor failure
EF	Unit water return temperature sensor (Twi) failure
EH	System self-check failure alarm
EP	Discharge temperature sensor failure alarm
EU	Tz/7 Coil final outlet temperature sensor error
P0	System high-pressure protection or discharge temperature protection
P1	System low pressure protection
P2	Tz/7 Coil final outlet temperature too high
P3	T4 ambient temperature too high in cooling mode
P4	System A current protection
P5	System B current protection
P6	Inverter module failure
P7	High temperature protection of system condenser
P9	Water inlet and outlet temperature difference protection
Pb	Antifreeze protection in winter
PC	Evaporator pressure too low in cooling
PE	Cooling evaporator low temperature antifreeze protection
PH	T4 ambient temperature too high in heatling mode
PL	Inverter module temperature Tfin too high temperature protection
xPU	DC fan module protection
H5	Voltage too high or too low
xH9	Compressor inverter module is not matched
xHE	Not insert electronic expansion valve error

Table continued on next page ...

Table 3-8.1: Error code table

(continued)

xF0	IPM module communication failure
F2	Superheat insufficient
xF4	L0 or L1 protection occurs 3 times in 60 minutes
xF6	DC bus voltage error (PTC)
F7	Not insert electronic expansion valve
xF9	Inverter module temperature sensor error
Fb	Pressure sensor error
Fd	Suction temperatrue sensor error
xFF	DC fan failure
FP	DIP inconsistency of multiple water pumps
C7	If PL occurs 3 times,the system reports the C7 failure
L0	Compressor inverter module protection
L1	DC bus low voltage protection
L2	DC bus high voltage protection
L4	MCE error
L5	Zero speed protection
L7	Phase sequence lost protection
L8	Compressor frequency change over 15Hz
L9	Compressor frequency difference 15Hz
dF	Defrosting prompt

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