Technical Service Manual

DC Inverter Air-Cooled Chiller

Aqua Tempo Super II Series

Model:

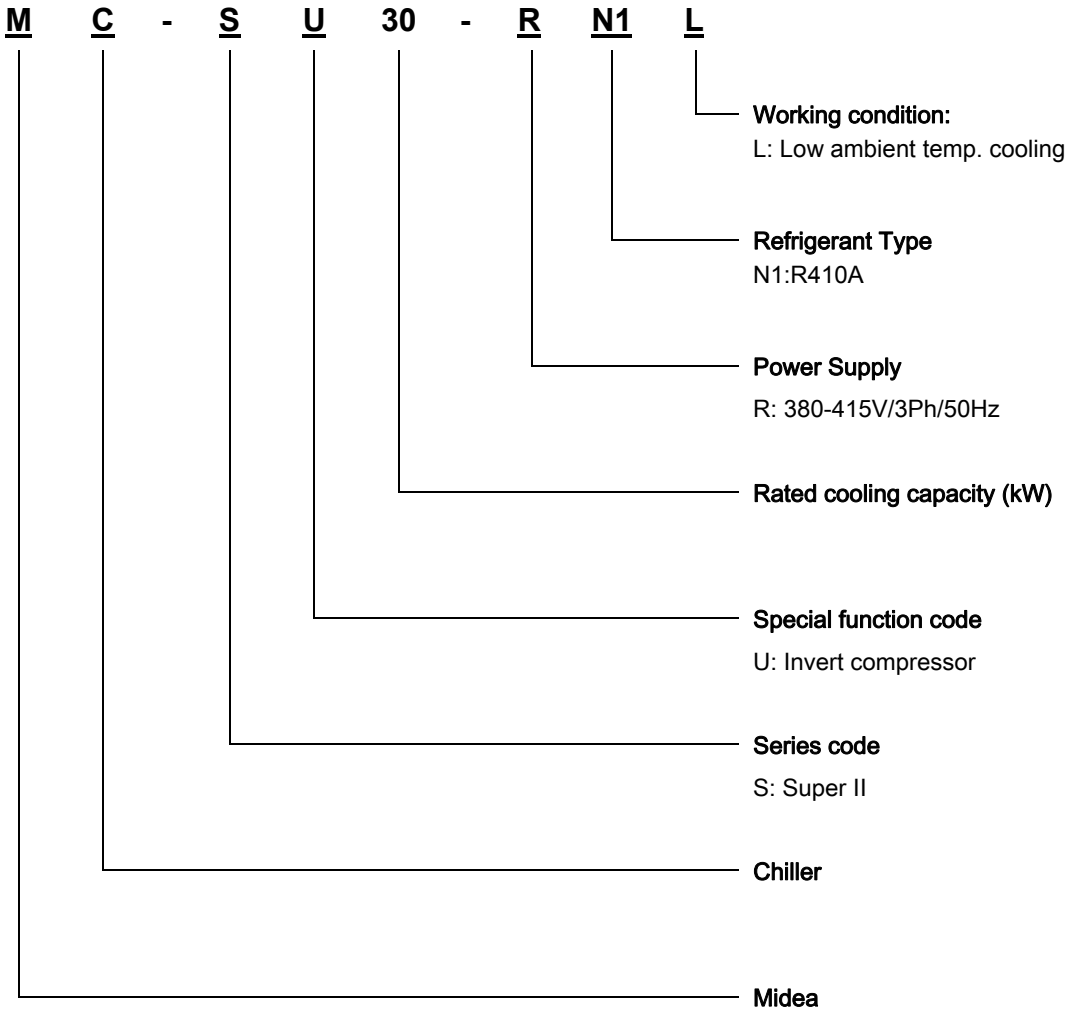
3 phase, 380-415V, 50Hz

MC-SU30-RN1L

MC-SU60-RN1L

Content

1. Nomenclature



2. Product Lineup

No	Model	Refrigerant	Net dimension	Net weight	Power supply
			W×H×D (mm)	(kg)	
1	MC-SU30-RN1L	R410A	1879×1175×1000	300	380-415V/3Ph/50Hz
2	MC-SU60-RN1L	R410A	2220×1325×1055	480	380-415V/3Ph/50Hz

3.External Appearance

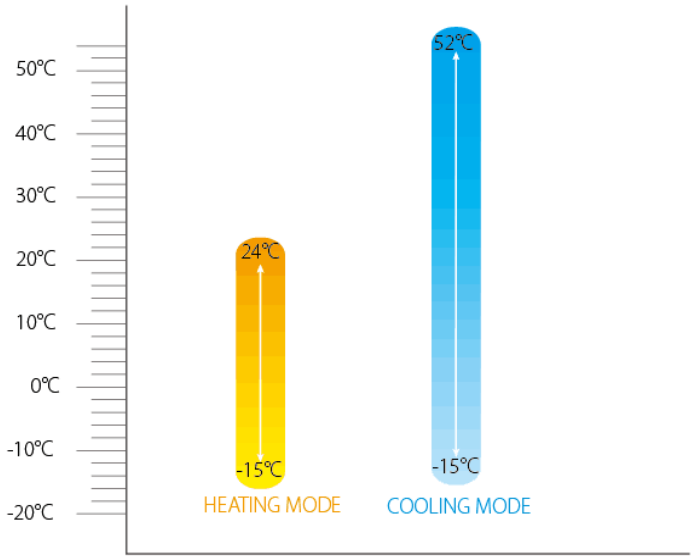
MC-SU30-RN1L

MC-SU60-RN1L

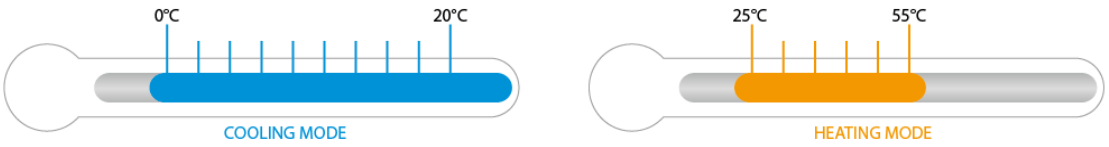
4. Features

4.1 Wide operating range

4.1.1 Ambient temperature



4.1.2 Outlet water temperature



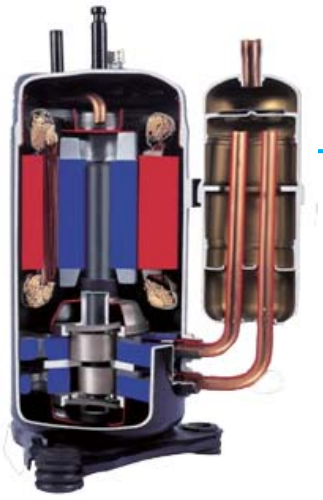
4.1.3 Flexibility

The unit adopts modular design, which can make more units to connect together. The maximum combination of the system consists of 1 main unit and 15 slave units. Cooling (heating) capacity range is from 30kW to 960kW, meanwhile every separate module can operate as main unit, also each module can be a slave unit with modules combination, more convenient for design and installation.

Freely combine with fan coil units and air handling units. Project owners may choose the best types according to their design taste (for interior) or functional needs.

4.2 Advanced technology

4.2.1 High efficient DC inverter compressor



Highly Efficient DC Motor:
- Creative motor core design
- High density neodymium magnet
- Concentrated type stator
-Wider operating frequency range

Better balance and Extremely Low Vibration:
- Twin eccentric cams
- 2 balance weights

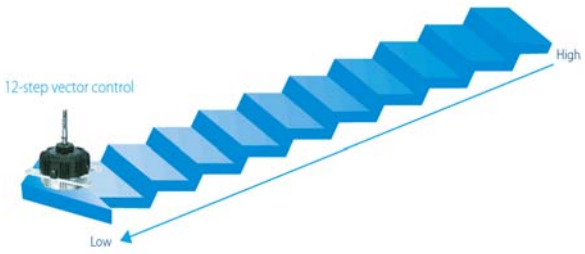
Highly Stable Moving Parts:
- Optimal material matching rollers and vanes
- Optimize compressor drive technology
- Highly robust bearings
-Compact structure

Mitsubishi Electric
Twin Rotary structure

4.2.2 All DC Fan Motors

Fan speed is controlled according to the system pressure and system load, minimizing energy consumption.

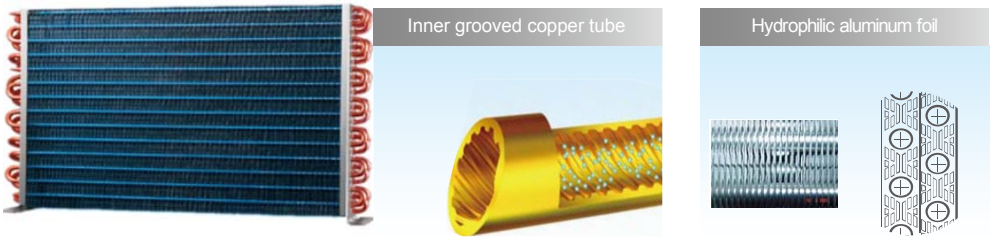
Brushless DC fan motor



12-step vector control

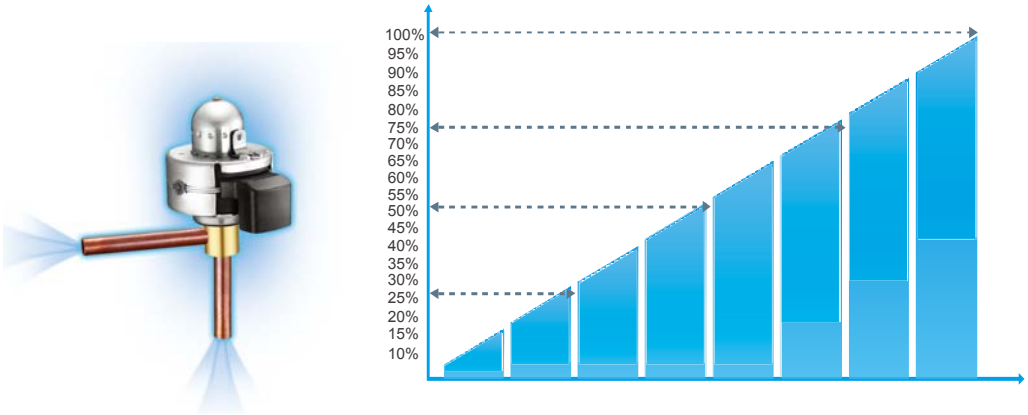
4.2.3 High efficiency heat exchange technology

The chiller adopts inner grooved copper tube and hydrophilic aluminum fins, greatly improve the heat exchange efficiency.



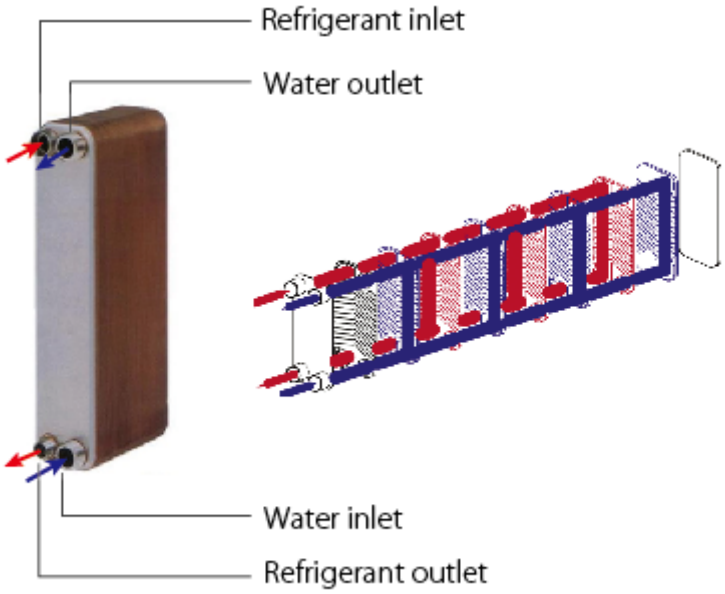
4.2.4 EXV more precisely flow control

Patented liquid distribution components to maximize performance and minimize defrost impact.500 steps EXV plus capillary for stable and accurate gas flow control.Fast respond resulting in higher efficiency and improved reliability.



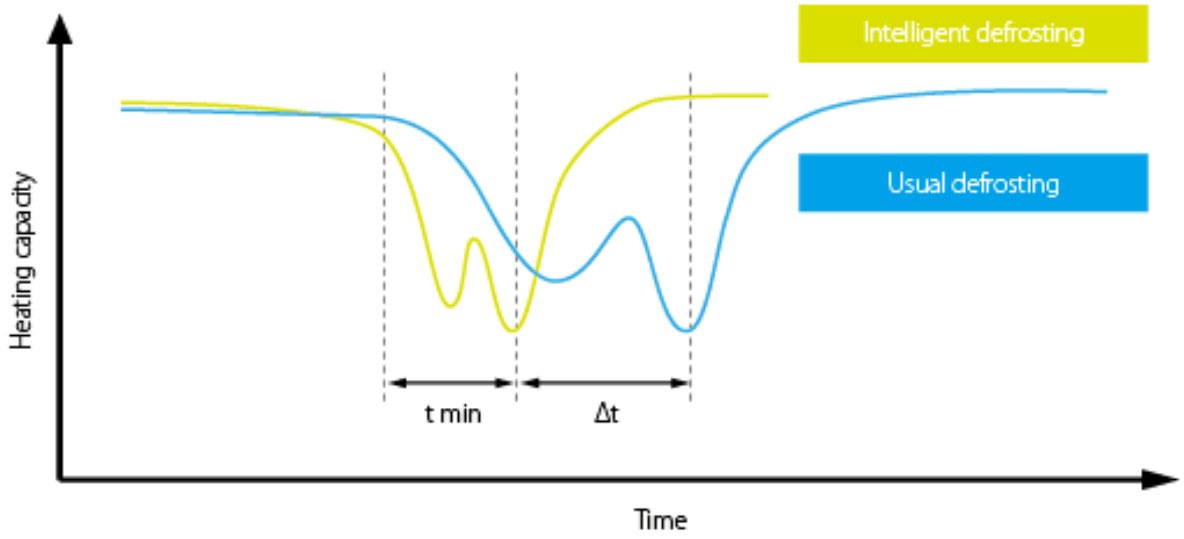
4.2.5 High efficiency plate heat exchanger

Late heat exchanger uses metal plates to transfer heat between refrigerant and water. The fluids are exposed to a much larger surface area because the fluids spread out over the plates, so both heat transfer efficiency and heat exchanger speed are greatly improved.



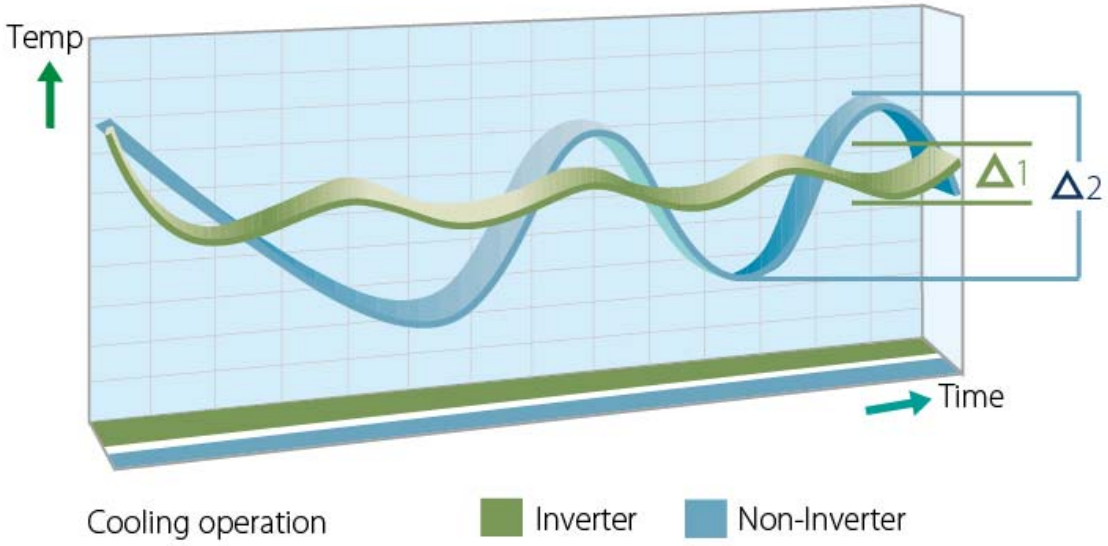
4.2.6 Intelligent defrosting technology

The intelligent defrosting program calculates the time required for defrosting according to the actual system status, eliminating heat losses from unnecessary defrosting. A specialized defrosting valve reduces time required for defrosting to as little at four minutes.



4.2.7 Rapid cooling or heating

The DC inverter compressor reaches full capacity rapidly, providing quicker cooling or heating with lower levels of temperature fluctuation during the cooling/heating operation.



4.3 High reliability

4.3.1 Alternative cycle duty operation

In one combination, all slave units operate as alternative in cycle duty to keep equal running time, realize higher stability, better reliability and longer lifespan.

(For example, five modules combination, no.1 is master unit, others are slave units.)

4.3.2 Backup functions

When unit is failed

- If master unit fails, all the units will stop.
- If one slave unit fails, this unit will stop but the others will keep running.
- When the master unit fails, any of the slave one can be set as the master unit by manual setting the address switch.

When unit is under protection

- If master unit's protection happens, this unit will stop but the others will keep running.
- If slave unit's protection happens, this unit will stop but the others will keep running.
- Except for some protections happen (detail protection please refer to protection codes)

4.4 Flexible installation

4.4.1 Built-in hydraulic module (customization option)

Built-in hydraulic module products can be customized. The modules are fully integrated and built-in expansion tank, plate heat exchanger, water circulating pump, etc. It saves you much installation space and cost.

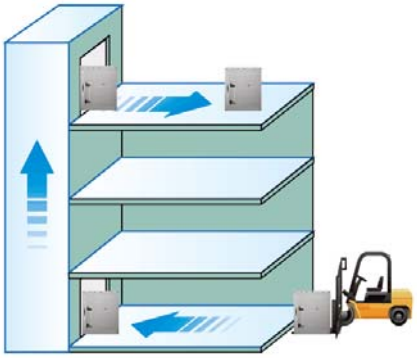
Option1: Built-in water circulating pump

Option2: Built-in water circulating pump and 100L expansion tank

Note:1. Option1 pump head 19m on MC-SU30-RN1L and 15m on MC-SU60-RN1L.
2. Option2 is only available on MC-SU30-RN1L.

4.4.2 Easy transportation and installation

The unit structure is compact, light weight, easy transportation and installation, no need cooling water tower, significant cost-savings.



Easy to transport

No need cooling water tower

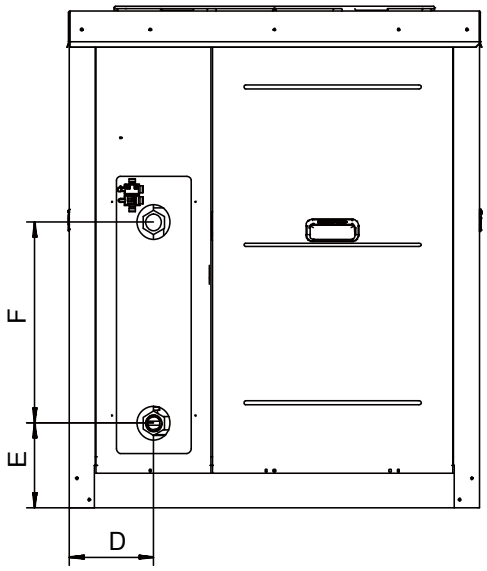
5.Specifications

Model			MC-SU30-RN1L	MC-SU60-RN1L
Cooling Capacity		kW	27	55
Heating Capacity		kW	31	61
Power input	Cooling	kW	10.8	22.0
	Cooling rated current	A	16.7	33.9
	Heating	kW	10.5	20.3
	Heating rated current	A	16.2	31.3
EER		kW / kW	2.5	2.5
SEER		kW / kW	4.41	4.2
COP		kW / kW	2.95	3.0
SCOP		kW / kW	4.01	3.85
Power supply		V/Ph/Hz	380-415/3/50	380-415/3/50
Power supply	Manual switch	A	50	100
	Fuse	A	36	70
Max. Input consumption		kW	11.67	23.86
Max current		A	18	36.8
Compressor	Type		Rotary	Rotary
	Brand		Mitsubishi Electric	Mitsubishi Electric
	Quantity	Piece	1	2
	Capacity	kW	20.1±5%	20.1±5%
	Input	kW	6.27±5%	6.27±5%
	Rate load Amps.(RLA)	A	17.7	17.7
	Demagnetizing current	A	68.9	68.9
	Refrigerant oil	ml	2300	2300x2
Refrigerant	Type		R410A	R410A
	Refrigerant control		EXV+ Capillary	EXV+ Capillary
	Weight	kg	10.5	17
Condenser (Air side)	Type		Finned tube	Finned tube
	Number of rows		2	3
	Quantity of fan motor	Pieces	1	2
	Air flow	$\times 10^3 m^3/h$	12.5	24
	Fan motor rated current	A	3.1	7.0
	Fan motor input	kW	0.45	1.2
Evaporator (Water side)	Type		Plate	Plate
	Water pressure drop	kPa	60	80
	Volume	L	2.44	5.17
	Water inlet/outlet pipeline inside normal diameter	mm	DN40	DN50
	Water flow	m^3/h	5	9.8
	Max. design pressure	MPa	1.0	1.0
	Water pipe connection type		Clasp connection	Clasp connection
Dimension	Net(W×H×D)	mm	1870×1175×1000	2220×1325×1055
	Packing size(W×H×D)	mm	1910×1225×1035	2250×1370×1090
Weight	Net weight	kg	300	480
	Operation weight	kg	310	490

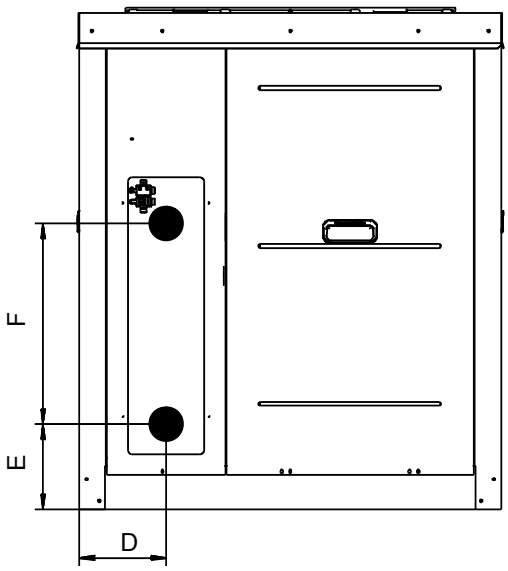
Connection wiring	Power wire	mm^2	16×4+16×1	25×4+16×1
	Signal wire	mm^2	0.75×3-core with shielding	0.75×3-core with shielding
Control type			Wired controller	Wired controller
Safety protection device			1) Protection for pressure. 2) Protection for over-low suction pressure. 3) Power supply phase sequence protection. 4) Anti-freezing protection in cooling mode. 5) Anti-freezing protection in Winter. 6) Protection for compressor over current. 7) Protection for compressor overload. 8) Outlet and inlet water temperature difference protection. 9) Protection for compressor over-high discharge temperature. 10) Water flow cut-off protection. 11) Sensor malfunction protection. 12) Low ambient temperature drive-up protection 13) Low temperature protection of plate heat exchanger.	
Sound pressure level		dB(A)	65.8	72.1
Operation water temp		℃	Cooling：0～20(Less than 5℃ must add antifreeze) Heating：25～55	
Ambient temp		℃	Cooling：-15～52 Heating：-15～24	

Note:
Specifications are based on the following conditions:
1. Cooling: chilled water inlet/outlet: 12˚C / 7˚C, and outdoor ambient temp. of 35˚C DB.
2. Heating: heat water inlet/outlet: 40˚C / 45˚C, and outdoor ambient temp. 7˚C DB/6˚C WB.
3. Water side fouling factor: 0.086m^2˚C /kW.
4. 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.

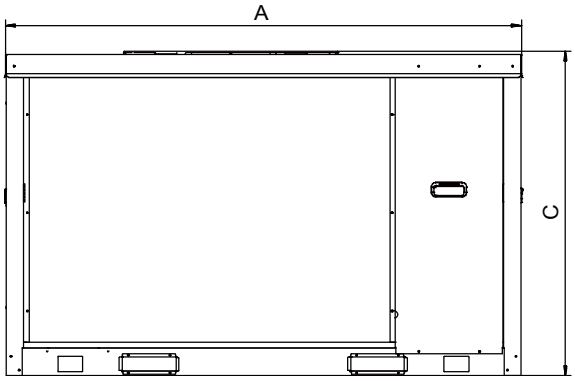
6.Dimensions



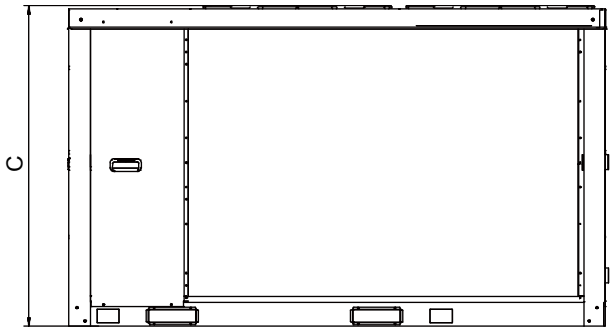
MC-SU30-RN1L



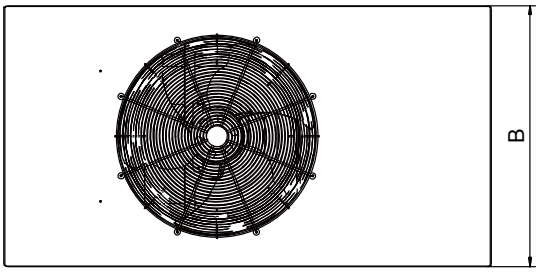
MC-SU60-RN1L



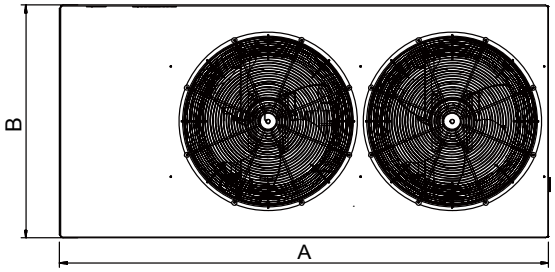
MC-SU30-RN1L



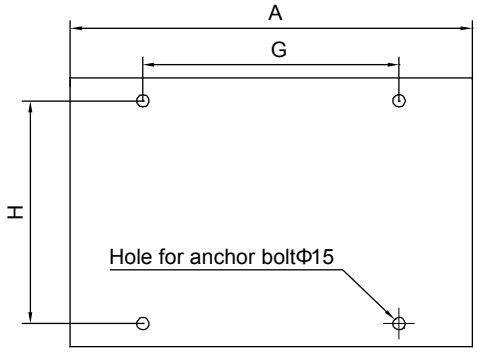
MC-SU60-RN1L



MC-SU30-RN1L



MC-SU60-RN1L



MC-SU30-RN1L and MC-SU60-RN1L

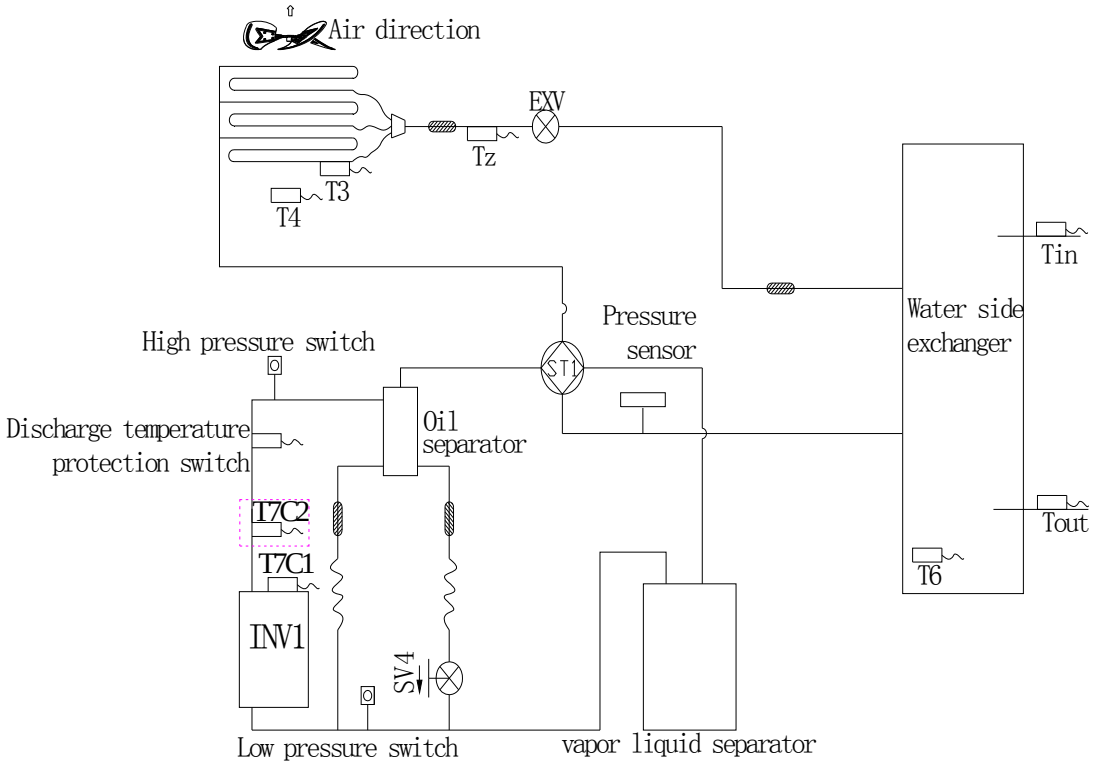
Unit: mm

Model	A	B	C	D	E	F	G	H
MC-SU30-RN1L	1870	1000	1175	204	200	470	788	880
MC-SU60-RN1L	2220	1055	1325	234	210	470	1105	958

7.Refrigeration System Sketch Drawing

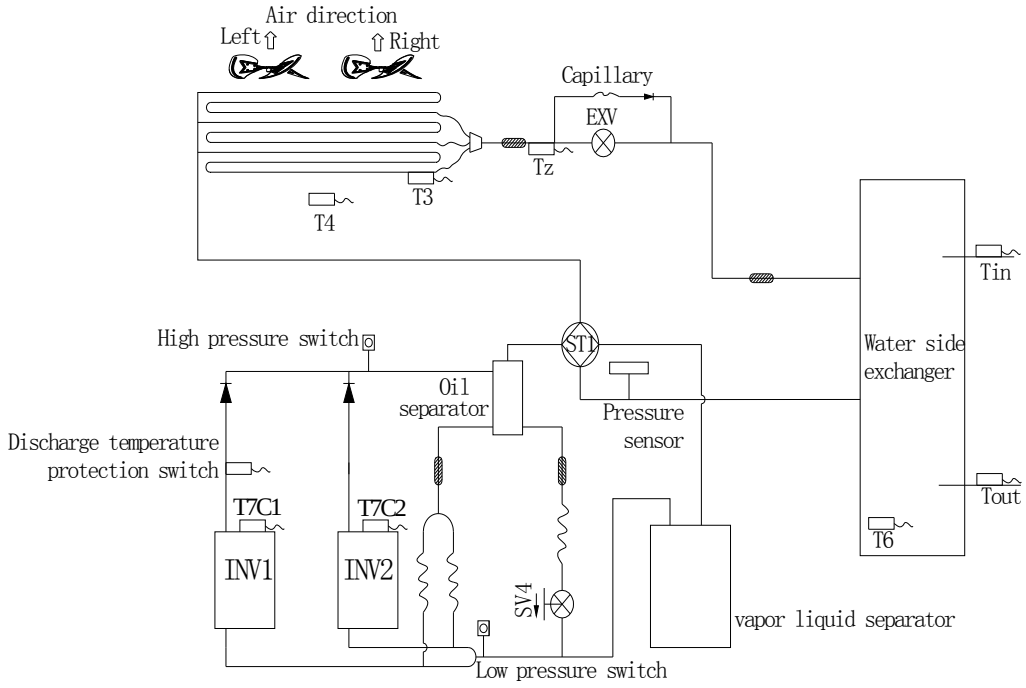
7.1 MC-SU30-RN1L refrigeration system sketch drawing

Each module has one compressor, one refrigerant system.



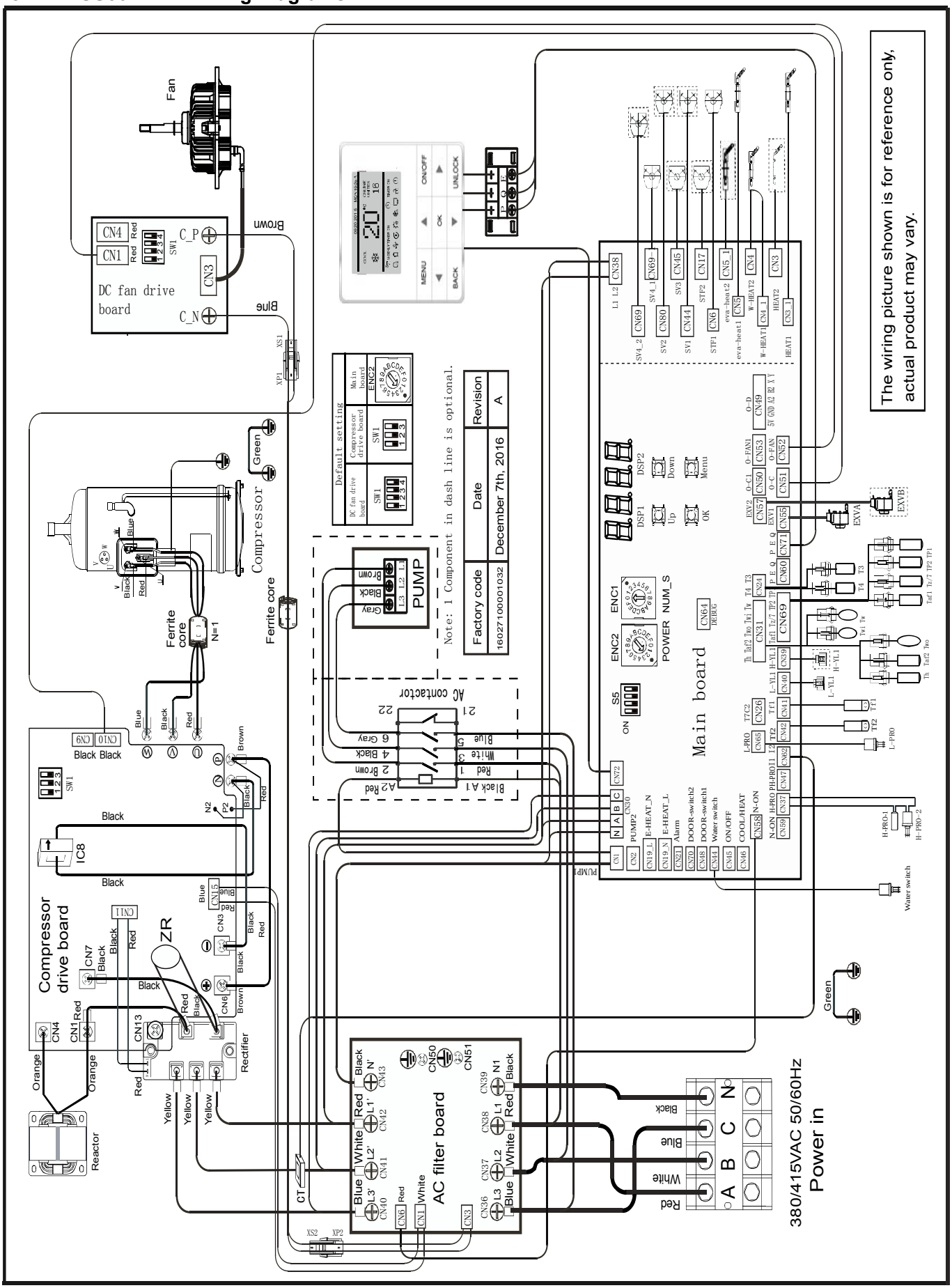
7.2 MC-SU60-RN1L refrigeration system sketch drawing

Each module has two compressors, one refrigerant system.

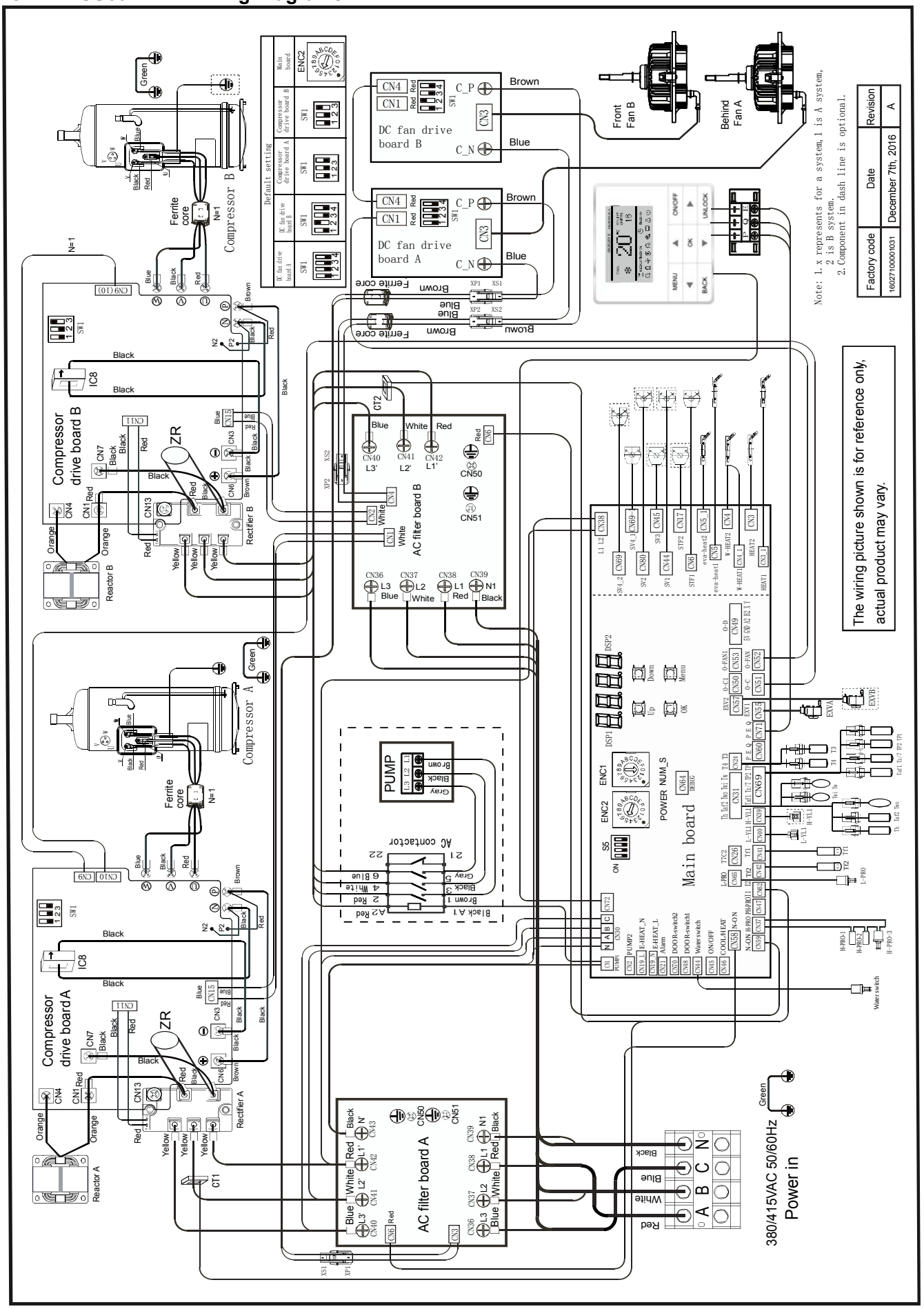


8.Wiring Diagrams

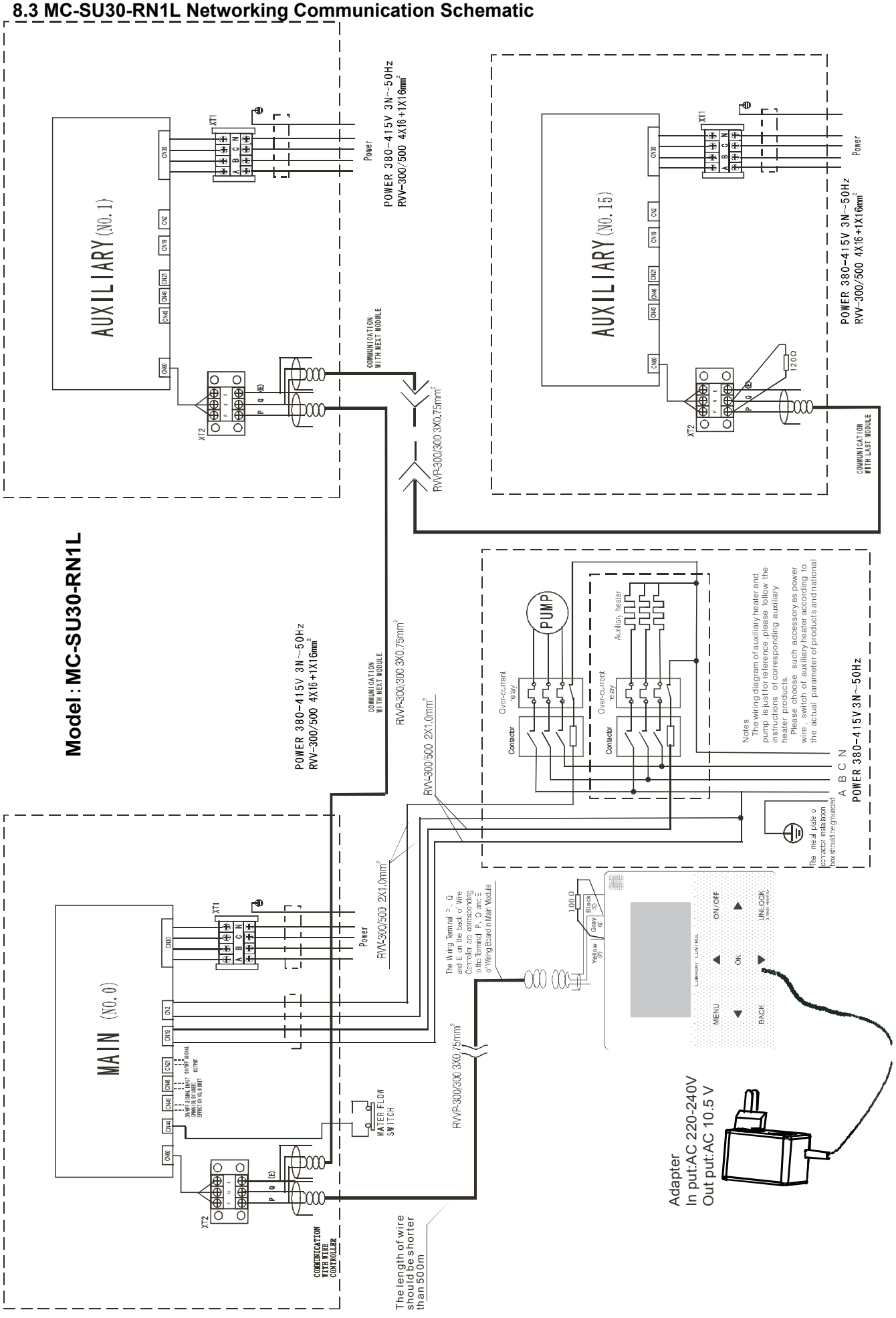
8.1 MC-SU30-RN1L Wiring Diagrams



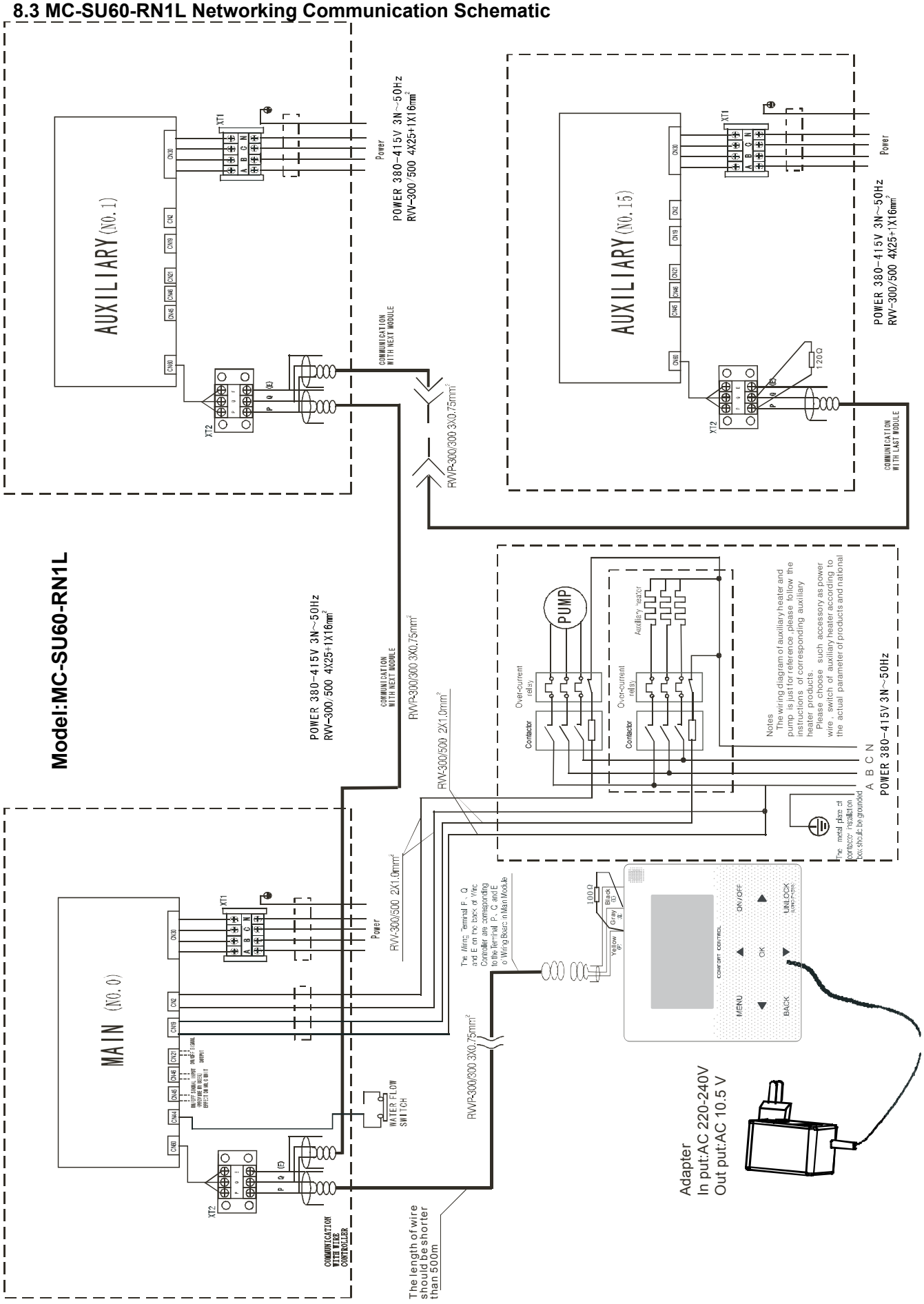
8.2 MC-SU60-RN1L Wiring Diagrams



8.3 MC-SU30-RN1L Networking Communication Schematic



8.3 MC-SU60-RN1L Networking Communication Schematic



9.Electric Characteristics

Model	Outdoor Unit				Power Supply		Compressor		OFM	
	Hz	Voltage	Min.	Max.	TOCA	MFA	LRA	RLA	kW	FLA
MC-SU30-RN1L	50	380-415	342	456	50	36	68.9	68.9	0.45	3.1
MC-SU60-RN1L	50	380-415	342	456	100	70	68.9	68.9	1.2	3.7

Remark:

TOCA: Total Over-current Amps. (A)
MFA: Max. Fuse Amps. (A)
LRA: Locked Rotor Amps. (A)
RLA: Rated Locked Amps. (A)
OFM: Outdoor Fan Motor.
FLA: Full Load Amps. (A)
kW: Rated Motor Input (kW)

10. Capacity Tables

10.1 Cooling

MC-SU30-RN1L

Ambient temp.	Chilled water outlet temperature(℃)									
	3.00		7.00		10.00		15.00		20．00	
	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power
℃	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
-15	22.98	6.08	26.20	5.93	28.64	6.54	29.65	6.80	32.12	7.11
-5	21.99	6.18	24.79	6.75	27.01	6.80	30.16	7.32	31.90	7.28
5.00	21.75	6.14	24.88	6.91	26.87	6.89	30.01	7.39	31.13	7.31
10.00	20.78	5.92	24.57	6.98	26.54	6.89	29.87	7.45	30.14	7.32
17.00	40.18	11.41	42.86	11.91	46.28	12.61	51.28	13.75	56.25	13.75
25.00	35.87	10.68	38.49	11.39	40.89	11.78	45.29	12.69	50.19	12.90
30.00	31.98	10.09	33.58	10.36	35.24	10.55	39.49	11.55	46.551	13.30
35.00	30.54	12.31	31.11	11.96	32.18	10.12	34.17	10.95	40.761	12.17
40.00	16.98	8.01	17.26	7.74	19.23	8.32	20.89	8.42	35.611	11.87
45.00	10.52	6.19	12.65	6.63	17.29	8.56	18.98	8.66	20.376	8.75

Note:
This table is measured in rated water flow.

MC-SU60-RN1L

Ambient temp.	Chilled water outlet temperature(℃)									
	3.00		7.00		10.00		15.00		20．00	
	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power
℃	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
-15	44.77	12.30	51.01	11.99	55.76	13.23	57.71	13.76	62.51	14.37
-5	42.84	12.50	48.27	13.66	52.60	13.76	58.69	14.80	62.08	14.73
5.00	42.39	12.44	48.46	13.98	52.32	13.94	58.41	14.95	60.58	14.78
10.00	40.50	11.98	47.86	14.12	51.68	13.94	58.14	15.06	58.66	14.79
17.00	78.14	23.06	83.34	24.04	89.97	25.47	99.67	27.76	109.32	27.77
25.00	69.78	21.57	74.86	23.00	79.52	23.80	88.05	25.62	97.56	26.05
30.00	62.23	20.38	65.34	20.94	68.56	21.31	76.79	23.32	90.50	26.85
35.00	59.44	24.86	60.54	24.16	62.62	20.45	66.47	22.12	79.27	24.57
40.00	33.13	16.20	33.67	15.65	37.49	16.83	40.72	17.03	69.28	23.97
45.00	20.60	12.55	24.74	13.42	33.73	17.31	37.01	17.50	39.72	17.63

Note:
This table is measured in rated water flow.

10.2 Heating

MC-SU30-RN1L

Ambient temp.	Chilled water outlet temperature(℃)											
	30.00		35.00		40.00		45.00		50.00		55.00	
	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power
-15.00	17.38	8.03	16.06	8.22	16.80	8.60	15.35	9.65	/	/	/	/
-7.00	25.44	8.85	24.41	9.46	24.32	9.90	23.33	11.11	20.23	11.21	/	/
2.00	25.67	8.04	25.05	8.51	24.23	8.90	23.94	9.99	20.76	10.08	/	/
7.00	31.84	8.17	33.80	8.95	32.95	9.36	32.31	10.51	28.01	10.60	22.19	9.20
15.00	34.27	5.35	32.23	5.77	27.58	5.86	24.21	6.64	23.54	7.93	21.97	8.70
20.00	33.69	4.51	30.77	4.67	25.45	4.63	21.57	5.10	20.87	6.08	19.43	6.73
25.00	33.75	4.18	31.22	4.34	26.34	4.31	22.82	4.78	22.62	5.77	21.61	6.38

Note:
This table is measured in rated water flow.

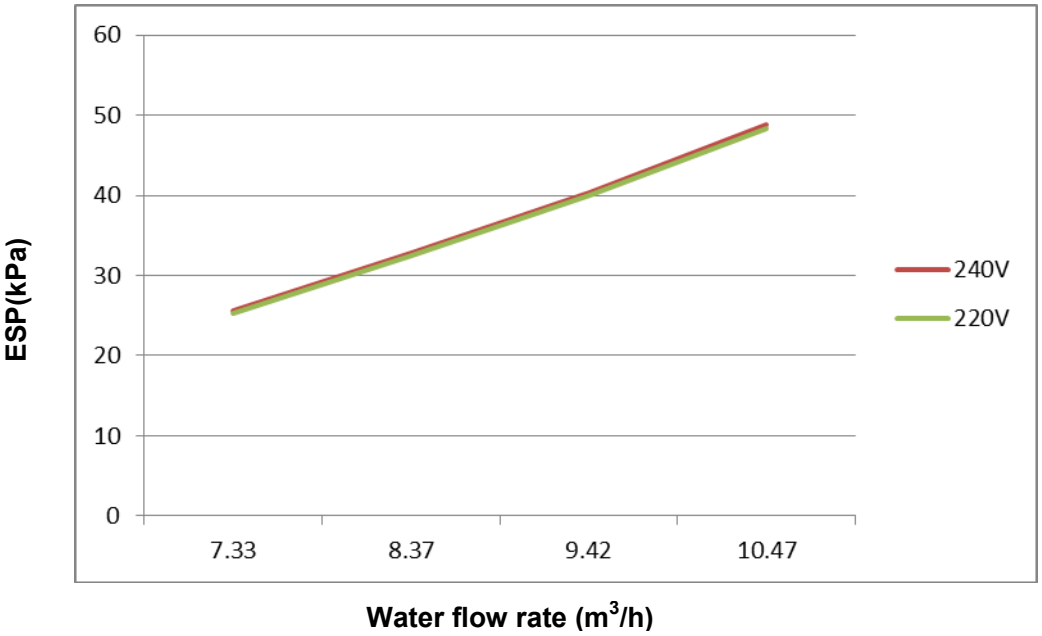
MC-SU60-RN1L

Ambient temp.	Chilled water outlet temperature(℃)											
	30.00		35.00		40.00		45.00		50.00		55.00	
	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power
-15.00	28.07	12.66	25.94	12.96	27.23	13.35	24.87	15.51	/	/	/	/
-7.00	51.23	16.95	49.16	18.12	49.13	18.66	47.13	21.67	40.86	21.87	/	/
2.00	45.39	14.12	44.28	14.96	42.96	15.40	42.45	17.89	36.81	18.05	/	/
7.00	61.57	16.10	65.37	17.64	63.91	18.16	62.67	21.09	54.34	21.28	43.04	18.47
15.00	66.27	10.54	62.32	11.37	53.50	11.38	46.97	13.33	45.67	15.93	42.61	17.46
20.00	65.14	8.90	59.50	9.21	49.37	8.97	41.84	10.24	40.49	12.21	37.69	13.52
25.00	65.26	8.23	60.37	8.54	51.09	8.36	44.26	9.60	43.87	11.59	41.91	12.81

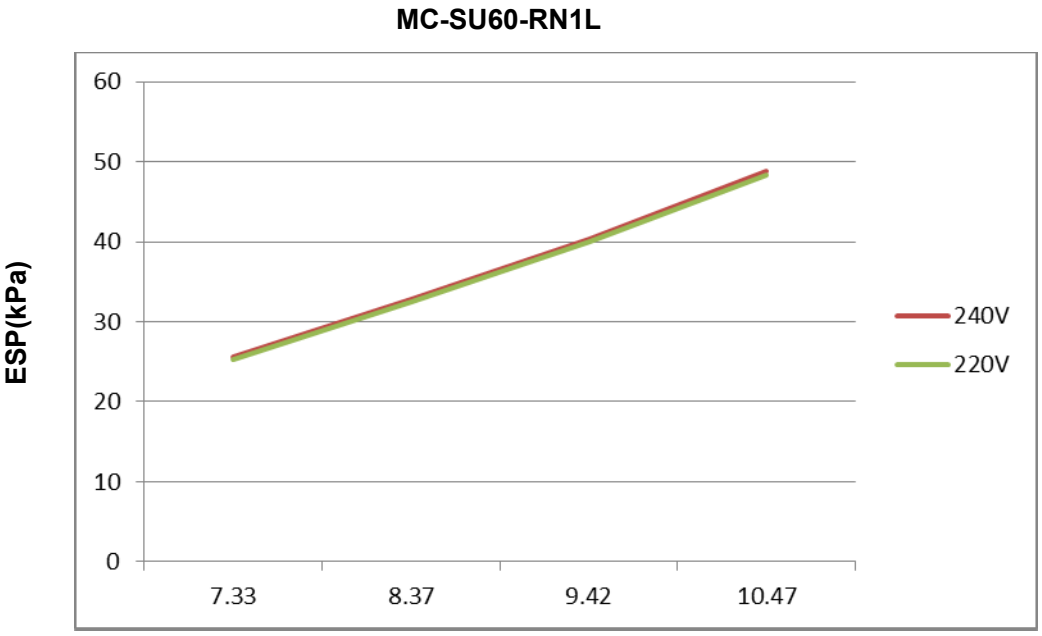
Note:
This table is measured in rated water flow.

11. Hydraulic Performance

MC-SU30-RN1L

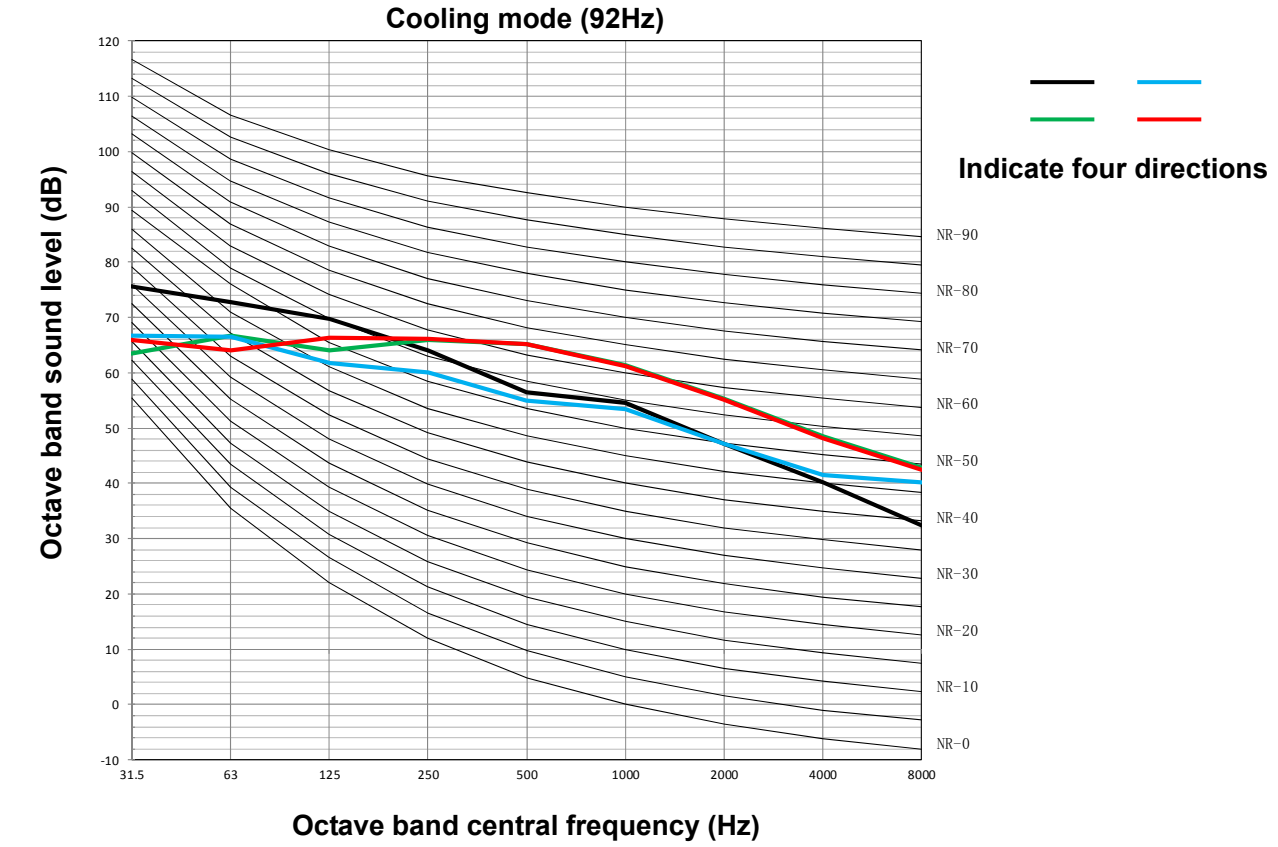


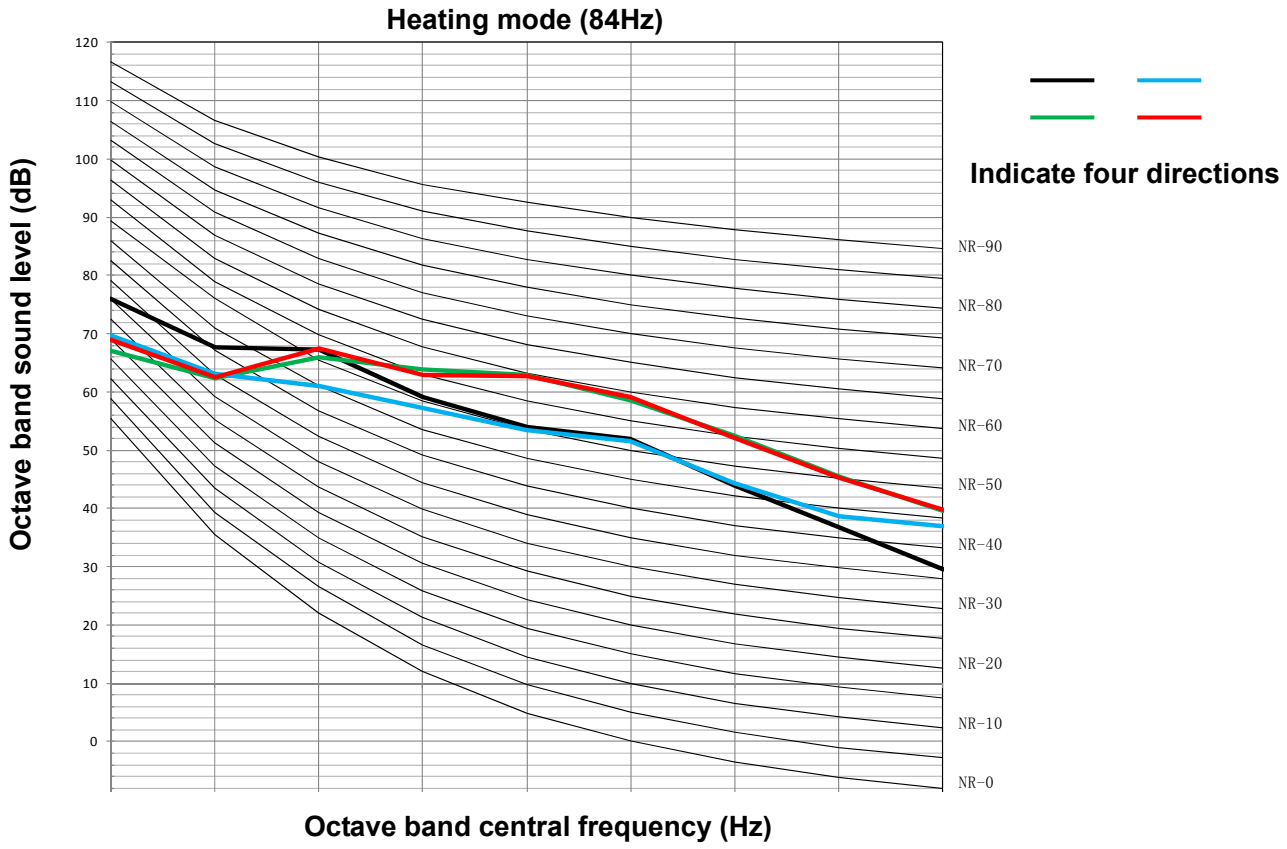
MC-SU60-RN1L



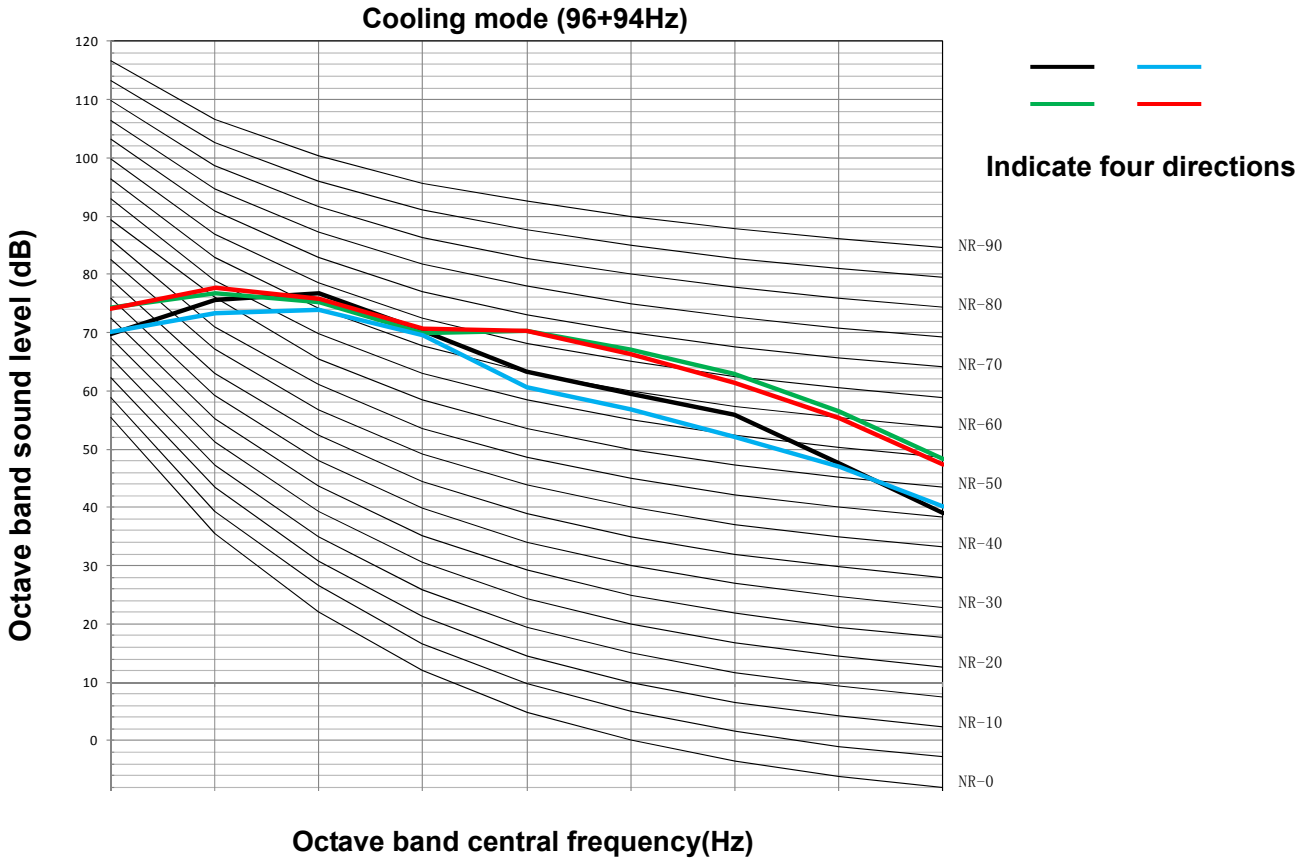
12. Octave Band Levels

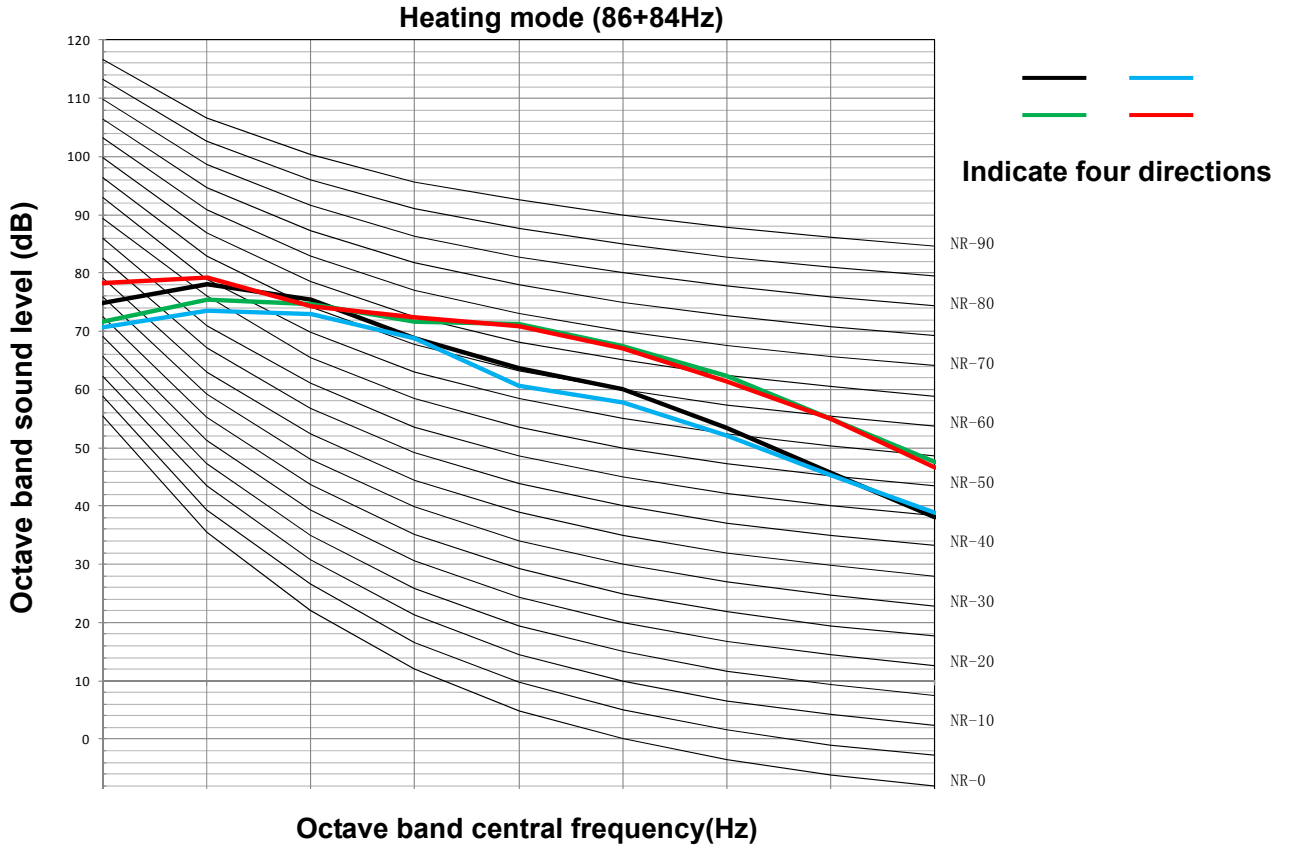
MC-SU30-RN1L





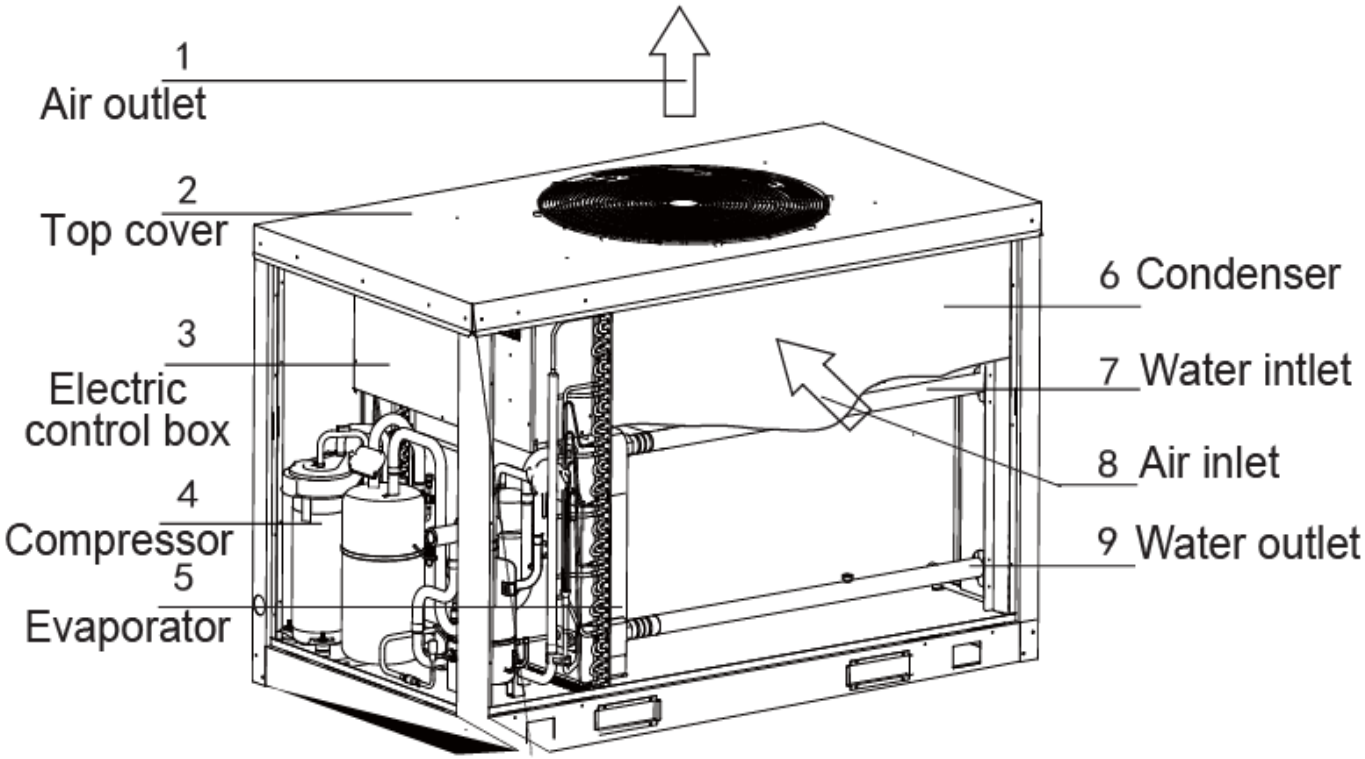
MC-SU60-RN1L

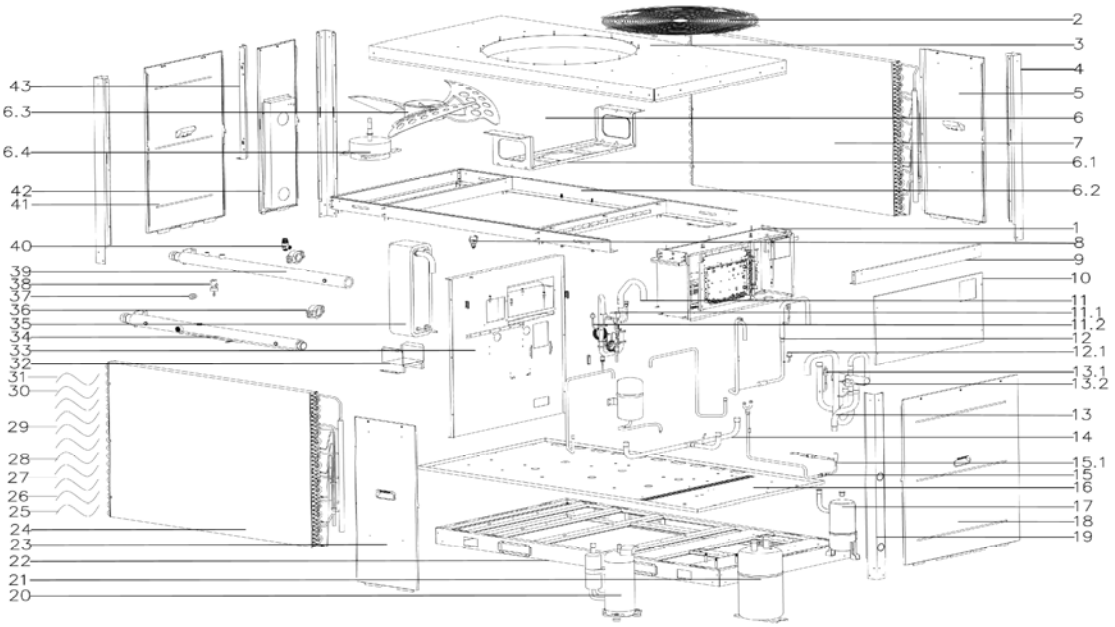

Cooling mode (96+94Hz)
Octave band sound level (dB)
120
110
100
90
80
70
60
50
40
30
20
10
0
NR-90
NR-80
NR-70
NR-60
NR-50
NR-40
NR-30
NR-20
NR-10
NR-0
Indicate four directions
Octave band central frequency(Hz)

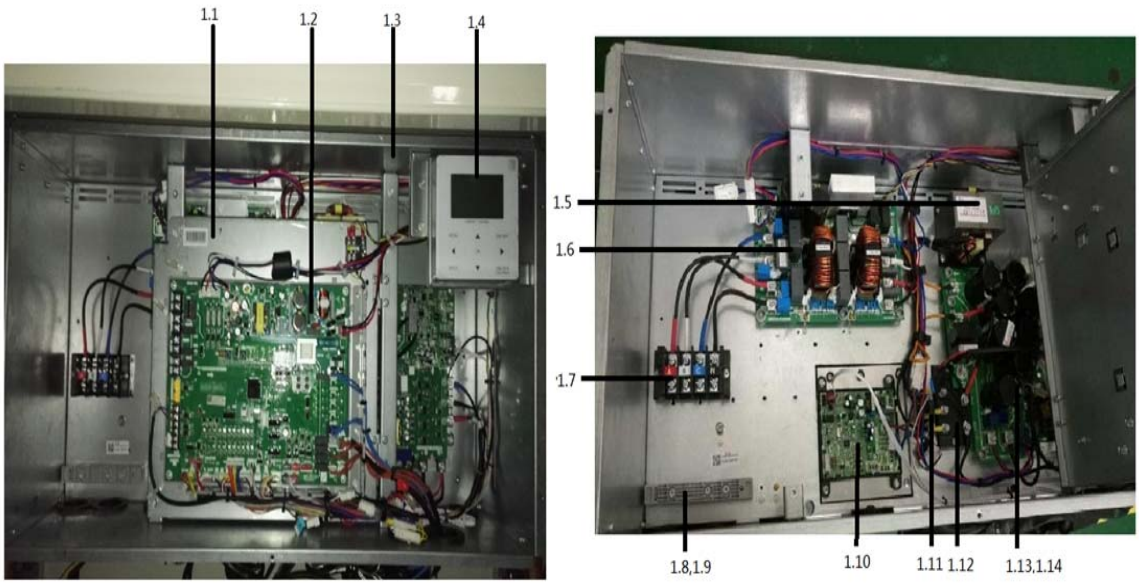

Heating mode (86+84Hz)
Octave band sound level (dB)
120
110
100
90
80
70
60
50
40
30
20
10
0
NR-90
NR-80
NR-70
NR-60
NR-50
NR-40
NR-30
NR-20
NR-10
NR-0
Indicate four directions
Octave band central frequency(Hz)

13. Exploded View

MC-SU30-RN1L



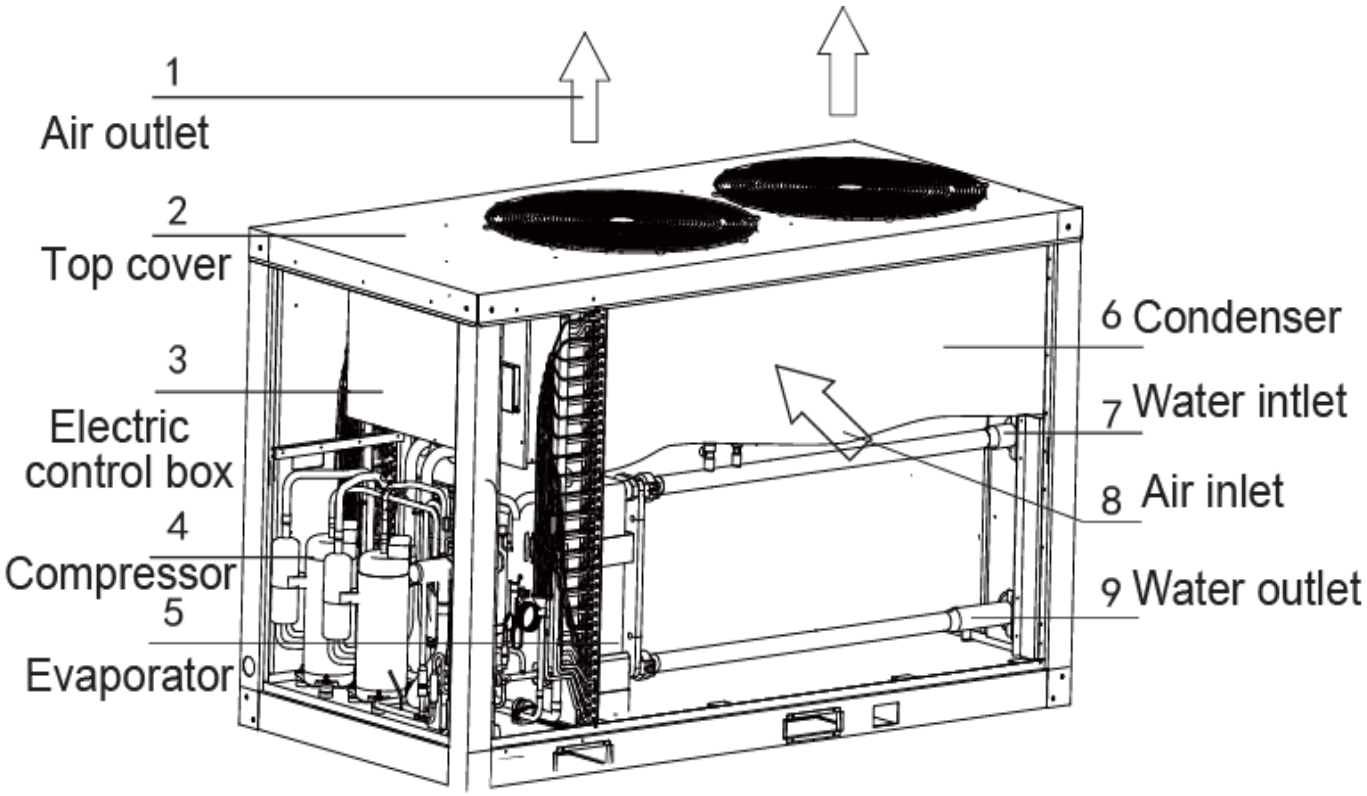


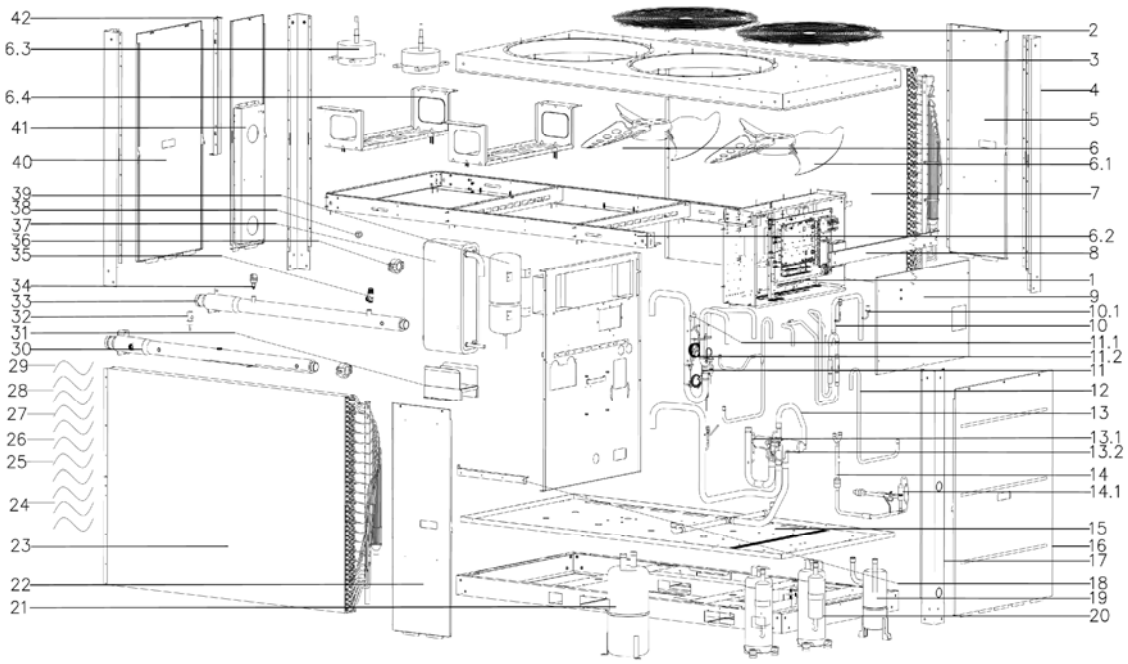


No.	Part Name	Qty	No.	Part Name	Qty
1	Electric control box assembly	1.0	13.1	Pressure sensor	1.0
1.1	Electric installation board assembly	1.0	13.2	Four-way valve ass’y	1.0
1.2	Tie-in assembly of Outdoor Main Control Board	1.0	14	Accessory-Connection pipe assembly	1.0
1.3	E-part box assembly	1.0	15	throttle ass’y	1.0
1.4	Wired controller	1.0	15.1	Electionic expansion valve	1.0
1.5	Reactance	1.0	16	Drainage pan	1.0
1.6	Filter board assembly	1.0	17	Oil separator	1.0
1.7	Wire joint, 4P	1.0	18	Coaming assembly	1.0
1.8	Clamp for wiring	1.0	19	Column	1.0
1.9	Clamp for wiring	1.0	20	DC Inverter Rotary Compressor	1.0
1.10	Module board assembly	1.0	21	Gas-liquid separator	1.0
1.11	Current detection board ass’y	1.0	22	Base assembly	1.0
1.12	Bridge Rectifier	1.0	23	Coaming assembly	1.0
1.13	Module board assembly	1.0	24	B unit condenser assembly	1.0
1.14	Radiator	1.0	25	Pipe temperature sensor assemblies	2.0
2	Wind nets	1.0	26	Temperature sensor	1.0
3	Top cover assembly	1.0	27	Discharge Temp. sensor ass’y	2.0
4	Column	3.0	28	Room Temperature Sensor	1.0
5	Coaming assembly	1.0	29	Pipe Temperature Sensor	4.0
6	Condenser assembly	1.0	30	Pipe Temperature Sensor	1.0
6.1	Bracket assembly	1.0	31	Pipe Temperature Sensor	1.0
6.2	Top frame	1.0	32	Fixing board assembly	1.0
6.3	Axial fan	1.0	33	Partition board assembly	1.0
6.4	Brushless DC Motor	1.0	34	Water Outlet pipe assembly	1.0
7	B unit condenser assembly	1.0	35	Heat-exchanger assembly	1.0
8	Exhaust valve	1.0	36	Holder ring	2.0
9	Vertical beam	1.0	37	Drainage plug assembly	1.0
10	E-part box door	1.0	38	Flow Switch	1.0
11	D unit suction pipe assembly	1.0	39	Water Inlet pipe assembly	1.0
11.1	throttle assembly	1.0	40	Safety valve	1.0

11.2	Pressure switch	1.0	41	Coaming assembly	1.0
12	Discharge pipe assembly B	1.0	42	Coaming assembly	1.0
12.1	Pressure switch	1.0	43	Bracket	1.0
13	Four-way valve assembly	1.0			

MC-SU60-RN1L


1
Air outlet
2
Top cover
3
Electric control box
4
Compressor
5
Evaporator
6 Condenser
7 Water intlet
8 Air inlet
9 Water outlet


42
6.3
6.4
41
40
39
38
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6.1
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6.2
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10.1
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11.1
11.2
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13.2
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14.1
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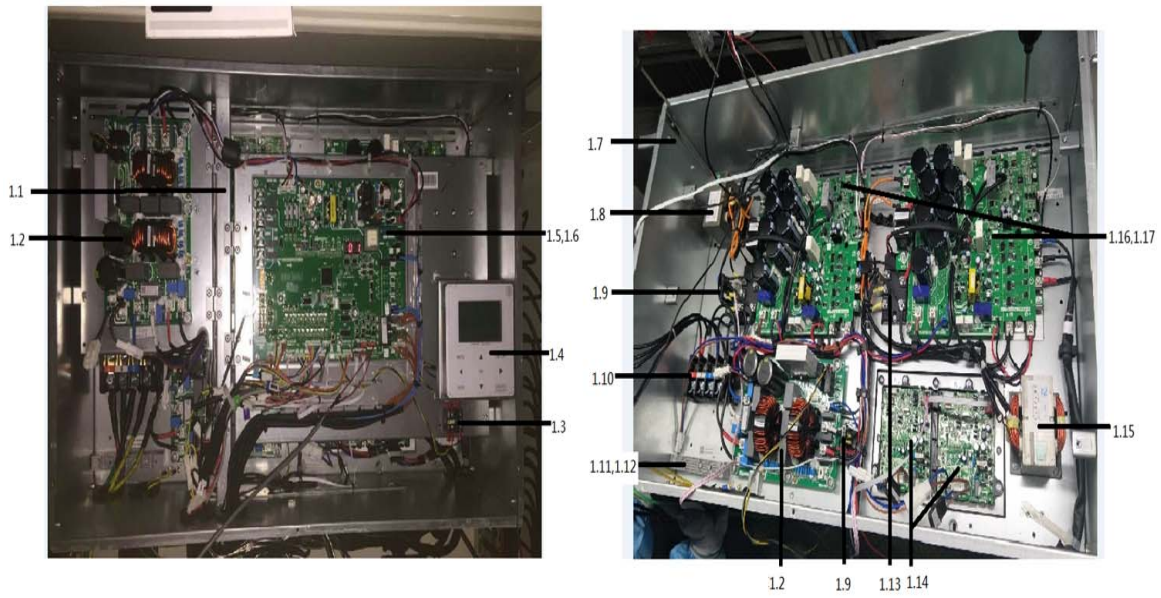


No.	Part Name	Qty	No.	Part Name	Qty
1	Electric control box assembly	1.0	12	Connecting pipe	2.0
1.1	Electric installation board assembly	1.0	13	Four-way valve assembly	1.0
1.2	Filter board assembly	2.0	13.1	Pressure sensor	1.0
1.3	Terminal bolck, 3P	1.0	13.2	Four-way valve kit	1.0
1.4	Wired controller	1.0	14	Throttle part	1.0
1.5	Outdoor main control board assembly	1.0	14.1	Electric expansive valve (EEV)	1.0
1.6	Main board bracket	1.0	15	Drainage pan	1.0
1.7	E-part box assembly	1.0	16	Coaming assembly	1.0
1.8	Reactance	1.0	17	Pole 5	1.0
1.9	Current detection board ass'y	2.0	18	Bracket	1.0
1.10	Terminal block, 4P	1.0	19	Oil separator	1.0
1.11	Clamp for wiring	1.0	20	DC Inverter Rotary Compressor	2.0
1.12	Clamp for wiring	1.0	21	Gas-liquid separator	1.0
1.13	Bridge Rectifier	2.0	22	Coaming assembly	1.0
1.14	Module board assembly	1.0	23	B unit condenser assembly	1.0
1.15	Reactance	1.0	24	Pipe Temperature Sensor	4.0
1.16	Module board assembly	2.0	25	Room Temperature Sensor	1.0
1.17	Radiator	2.0	26	Pipe temperature sensor assemblies	2.0
2	Wind nets	2.0	27	Pipe Temp. sensor ass'y	1.0
3	Top cover assembly	1.0	28	Discharge Temp. sensor ass'y	2.0
4	Pole 5	3.0	29	Pipe Temperature Sensor	1.0
5	Coaming assembly	1.0	30	Water Outlet pipe assembly	1.0
6	Air duct hoisting ass'y	1.0	31	Fixing board assembly	1.0
6.1	Axial fan	2.0	32	Flow Switch	1.0
6.2	Top frame	1.0	33	Water Inlet pipe assembly	1.0
6.3	Brushless DC Motor	2.0	34	Exhaust valve	1.0
6.4	Bracket assembly	2.0	35	Safety valve	1.0
7	B unit condenser assembly	1.0	36	Holder ring	2.0
8	Bracket assembly	1.0	37	Heat-exchanger assembly	1.0
9	E-part box door	1.0	38	Drainage plug assembly	1.0
10	Discharge pipe assembly B	1.0	39	Liquid accumulator	1.0
10.1	Pressure switch	1.0	40	Coaming assembly	1.0

11	D unit suction pipe assembly	1.0	41	Coaming assembly	1.0
11.1	Pressure switch	1.0	42	Bracket	1.0
11.2	throttle assembly	1.0			

14. Trouble Shooting

14.1 Failure &protection codes

No	Error code	Content
1	1E0	EEPROM error of main control board
	2E0	EEPROM error of inverter module A
	3E0	EEPROM error of inverter module B
2	E1	Power phase sequence error
3	E2	Communication error between main control board and wired controller
4	E3	Total water outlet temperature sensor(Tw) error(master only)
5	E4	Outlet water temperature sensor (Two)error
6	E5	Condenser tube temperature sensor (T3)error
7	E7	Outdoor ambient temperature sensor (T4)error
8	E9	Water flow detection error(protection occurs for 3 times in 60 minutes and the failure can be recovered by power disconnection only)
9	1Eb	Evaporator anti-freezing temperature sensor (Taf1)error
	1Eb	Evaporator anti-freezing temperature sensor (Taf2)error
10	EC	Wired controller detected that the units on-line reduction
11	1Ed	Compressor discharge temperature sensor(Tp1) error
	2Ed	Compressor discharge temperature sensor r(Tp2) error
12	EF	Inlet water temperature sensor(Twi) error
13	EH	System self- check error alarm
14	EP	Compressor discharge temperature sensor error alarm
15	EU	Total cooling outlet temperature sensor(Tz/7) error
16	P0	High pressure(>4.4Mpa) or compressor discharge temperature(>110˚C) protection(protection occurs for 5 times in 120 minutes and the failure can be recovered by power disconnection only)
17	P1	Low pressure(<0.14 Mpa) protection(protection occurs for 5 times in 120 minutes and the failure can be recovered by power disconnection only)
18	P4	System A Current（≥25A） protection(protection occurs for 5 times in 120 minutes and the failure can be recovered by power disconnection only)
19	P5	System B Current （≥25A）protection (protection occurs for 5 times in 120 minutes and the failure can be recovered by power disconnection only)
20	1P6	System A inverter module protection
	2P6	System A inverter module protection
21	P7	Condenser tube(T3>65˚C) and Total cooling outlet(Tz/7 >62˚C) high temperature protection
22	P9	Protection of outlet and inlet water temperature(≥12˚C) difference protection (protection occurs for 3 times in 60 minutes and the failure can be recovered by power disconnection only)
23	PA	Inlet water high temperature in cooling mode
24	Pb	System anti-freezing protection（≤4˚C in normal water outlet mode and ≤0˚C in low water outlet mode）
25	PC	Evaporator pressure low in cooling mode
26	PE	Low-temperature≤3˚C in normal water outlet mode and ≤0˚C in low water outlet mode) protection of evaporator (manual recovery)
27	PH	Ambient temperature(T4)high temperature protection in heating mode

28	PL	Module high temperature(Tf1 or Tf2>82°C) protection(Protection occurs for 3 times in 100 minutes and the failure can be recovered by power disconnection only)
29	1PU	DC fan 1 module protection
	2PU	DC fan 2 module protection
30	1H0	System A IPM module Communication error
	2H0	System B IPM module Communication error
31	H1	Under/Over voltage(V≥260V or V<165V) protection
32	1H4	Three times 1PP protection within one hour (power off recovery)
	2H4	Three times 2PP protection within one hour (power off recovery)
33	1H6	System 1 DC bus voltage error
	2H6	System 2 DC bus voltage error
34	Fb	Pressure sensor error
35	Fd	Air suction temperature(Th) protection error
36	1FF	DC fan 1 error
	2FF	DC fan 2 error
37	FP	DIP inconsistency of multiple water pumps(Power failure recovery required)
38	L0	Inverter module protection
39	L1	DC bus low voltage protection
40	L2	DC bus high voltage protection
41	L4	MCE error
42	L5	Zero speed protection
43	L7	Phase sequence error
44	L8	Compressor frequency variation greater than 15Hz within one second protection
45	L9	Actual compressor frequency differs from target frequency by more than 15Hz protection
46	dF	Defrosting prompt

14.2 System check table

Press SW3 and SW4 buttons simultaneously to enter into the system check function.

No	Parameters display on DSP2
0	Standby: ODU address (DSP1 display) + number of on-line units (DSP1 display) On: display frequency Defrosting: dF and operating frequency flash alternately at 1s intervals frequency In case of Pb protection, Pb and operating frequency flash alternately at 1s intervals
1	Outdoor unit address
2	Outdoor unit capacity
3	Number of outdoor units (main unit display)
4	Ambient temperature(T4) capacity revision
5	Operation modes (8: OFF; 0: Standby; 1: Cooling; 2: Heating)
6	Fan Speed 1 index
7	Fan Speed 2 index
8	Condenser tube temperature
9	Outdoor ambient temperature
10	Reserved
11	Evaporator anti-freezing temperature(Taf1)
12	Evaporator anti-freezing temperature(Taf2)
13	Total water outlet temperature(Tw)
14	Inlet water temperature(Twi, displays to decimal places)
15	Outlet water temperature(Two)
16	Total cooling outlet temperature(Tz/7)
17	Reserved
18	Compressor discharge temperature(Tp1)
19	Compressor discharge temperature(Tp2)
20	Compressor module temperature(Tf1)
21	Compressor module temperature(Tf2)
22	Air discharge superheat degree
23	Current of compressor 1
24	Current of compressor 2
25	Current of PUMP
26	EXV 1 position(step=value displayed *4)
27	EXV 2 position(step=value displayed *4)
28	High pressure
29	Low pressure (displays to decimal places)
30	Air suction superheat degree

31	Air suction temperature(Th)
32	Silent selection
33	Static pressure selection
34	DC bus low voltage 1 (reserved)
35	DC bus low voltage 2(reserved)
36	Last fault
37	Limit frequency No. (0: no limits; 1: ambient temperature(T4) limit frequency; 2: voltage limit frequency; 3: air discharge limit frequency; 4: low voltage ratio; 5: instant limit frequency; 6: current limit frequency; 7: voltage limit frequency; 8: pressure ratio and capacity demand adjusting; 9: cooling low pressure limit frequency)
38	Defrosting process status (the first digit: T4 selection solution; the second digit: scheme's range; the third and fourth digits as a whole indicates the defrosting time)
39	EEPROM failure: 1 indicates failure, and 0 indicates no failure
40	Defrosting scheme
41	Initial frequency
42	Saturation temperature (Tc, reserved)
43	Saturation temperature (Te, reserved)
44	----

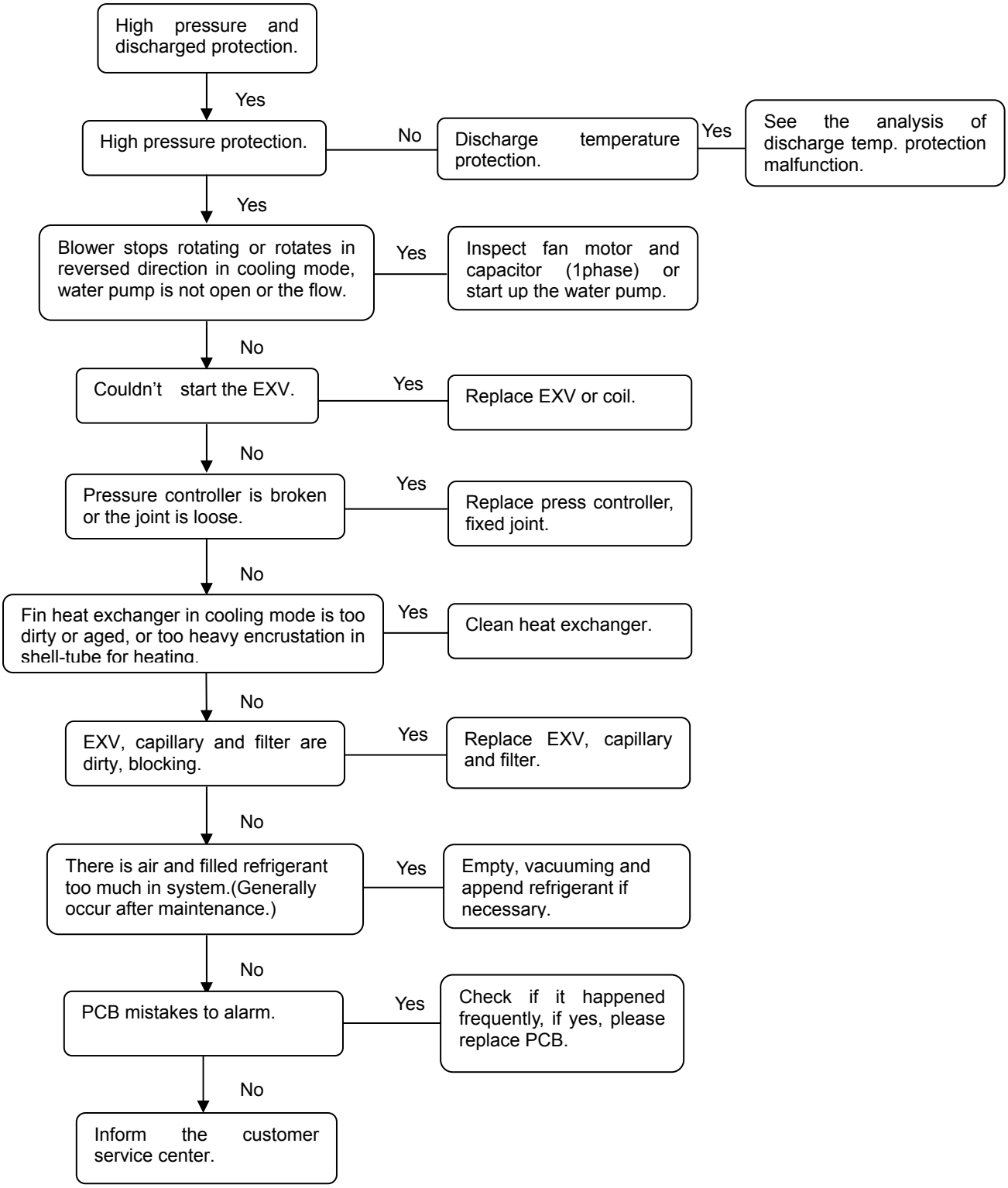
14.3 Troubles and Solutions

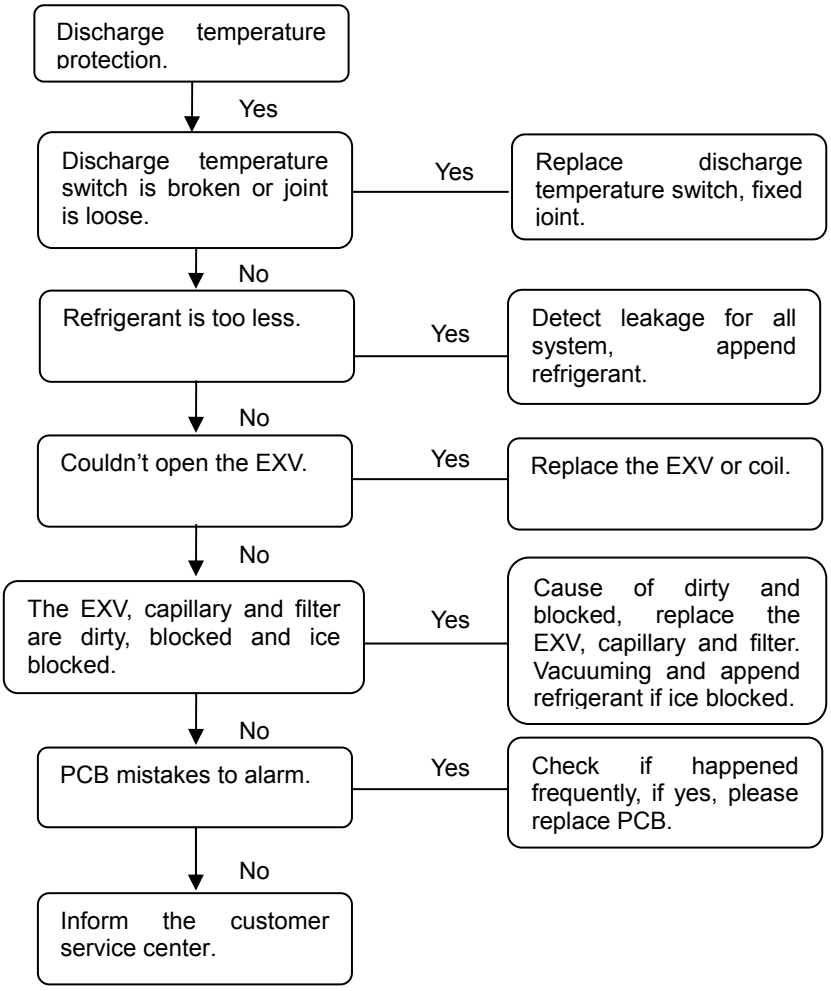
Troubles	Possible reasons	Solutions
Over high air discharge pressure (Cooling operation).	Air or other non-condensing gas still in the system.	Discharge gas from refrigerant charging inlet. Re-vacuum the system if necessary.
	Fins in the condenser are dirty or foreign substance blocking fins.	Clean condenser fins.
	Insufficient chilling air volume or condenser fan error.	Check and repair the condenser fan, recover the normal operation.
	Excessive high air suction pressure.	Clean the heat exchanger. Replace the EXV, capillary, filter.
	Excessive refrigerant charging volume.	Discharge the excessive refrigerant.
	Over high ambient temperature	Check ambient temperature
Over low air discharge pressure(Cooling operation).	Surrounding temperature is lower.	Measure the surrounding Temperature
	Refrigerant leak or insufficient.	Leak-hunting or recharging.
	Low suction pressure.	Refer to the “low suction pressure”
Over high air suction pressure (Cooling operation)	Refrigerant over-charged.	Discharge the additional refrigerant.
	High temperature of the inlet chilled-water.	Check the heat insulation of water pipeline.
Over low air suction pressure (Cooling operation).	Insufficient water flow.	Measure the temperature difference between inlet /outlet water, adjust the water flow.
	Low temperature of inlet chilled-water.	Check installation.
	Refrigerant leak or insufficient.	Leak-hunting or recharging.
	Scaling in the evaporator.	Descaling.
Over high air discharge pressure (Heating operation).	Insufficient water flow.	Check temperature difference between water inlet and outlet, and adjust the water flow volume.
	Air or other non-condensing gas still in the system.	Discharge gas from refrigerant charging inlet. Re-vacuum the system if necessary.
	Scaling in water side of heat exchanger.	Descaling.
	Over high temperature in chilling water inlet.	Check water temperature
Over low air discharge pressure (Heating operation).	Over low temperature of chilling water.	Check chilling water temperature
	Refrigerant leakage or insufficient refrigerant volume.	Test leakage or charge sufficient refrigerant to the system.
	Excessive low air suction pressure	Add refrigerant. Check the EXV, capillary, filter or pressure controller.
Over high air suction pressure (Heating operation)	Over heat air in the side of air heat exchanger	Check ambient temperature around it.
	Excessive refrigerant charging volume.	Discharge the excessive refrigerant.
Over low air suction pressure (Heating operation).	Insufficient refrigerant charging volume.	Charge sufficient refrigerant to the system
	Insufficient air flow volume.	Check fan rotating direction
	Air loop short circuit.	Reason about remove air short-circuit
	Insufficient frost-removal operation.	Error comes out from 4-way valve or thermal resistor. Replace a new one if necessary.
Compressor stops because of anti-freezing protection (Cooling operation).	Insufficient chilling water flow volume.	Error comes from pump or flow-type water volume control. Check and repair or replace a new one.
	Gas still in water loop.	Discharge air.
	Thermal resistor error.	Upon error have been confirmed, please replace a new one.
Compressor stops because of high pressure protection.	Over high air discharging pressure.	Discharge part of refrigerant. Clean the heat exchanger. Check the EXV,capillary, filter.
	High pressure switch error.	Upon error have been confirmed, please replace a new one.
Compressor stops because of motor overload.	Over high air discharging pressure and air suction pressure.	Clean the heat exchanger. Check the EXV,capillary, filter.
	High voltage or low voltage, signal phase or phase unbalance.	Confirm voltage not higher or lower than the rated voltage +/-10%.

	Short circuit comes out from motor or connecting interface.	Confirm resistors at motor are connected corresponding to terminals.
Compressor stops because of integrate temperature sensor or air discharge temperature protection.	Over high or over low voltage.	Confirm voltage not higher or lower than the rated voltage +/-10%.
	Over high air discharging pressure or excessive low air suction pressure.	Adjust refrigerant charge volume. Clean the heat exchanger. Check the EXV, capillary, filter.
	Component error.	Check the integrated temperature sensor after motor is cool down.
Compressor stops because of low pressure protection.	Filter of electronic expanding valve is blocked.	Replace a new filter.
	Low voltage switch error.	If the switch is defective, please replace a new one.
	Excessive low air suction pressure.	Add the refrigerant. Clean the heat exchanger. Check the EXV, capillary, filter.
Abnormal noise gives out form compressor.	Liquid refrigerant flows into compressor from evaporator result in liquid slugging.	Adjust refrigerant charge volume.
	Aging of compressor.	Replace a new compressor.
Compressor can't start.	Over current relay trip up, fuse burnt out.	Replace damaged assembly.
	Control circuit without power though.	Check the wring of control system.
	High voltage or low voltage protection.	Reference to mention in above the parts of air suction and discharge pressure error.
	Coils inside contactor are burnt out.	Replace damaged assembly.
	Wrong connection of phase sequence.	Re-connect and adjust the any 2 wires among 3 phases.
	Water system error and flow volume controller short connection.	Check water system.
	Error signal delivered from wired controller.	Find out the error type and carry out the corresponding measure to settle.
Air side heat exchanger excessive frost.	4-way valve or thermal resistor error.	Check the running state. Replace a new one if necessary.
	Air loop short circuit.	Settle the short circuit of air discharge.
With noise.	Fixing screws at panel are loosen.	Fix up all assemblies.

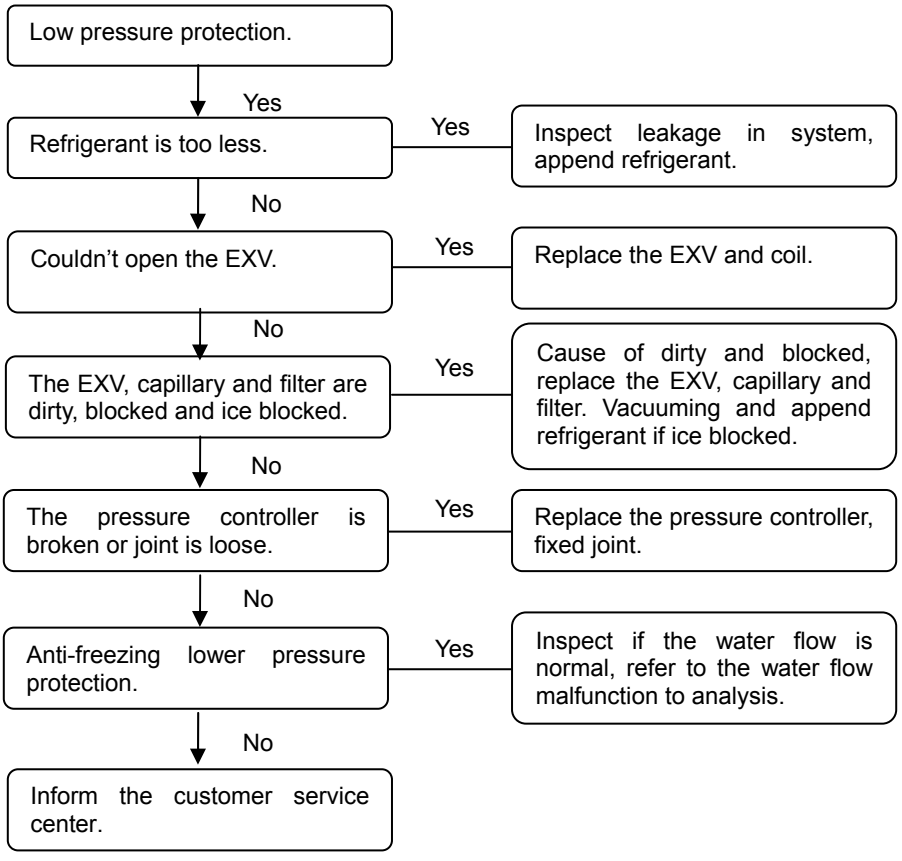
14.4 Typical malfunction solutions

1) High pressure and discharged temperature protection

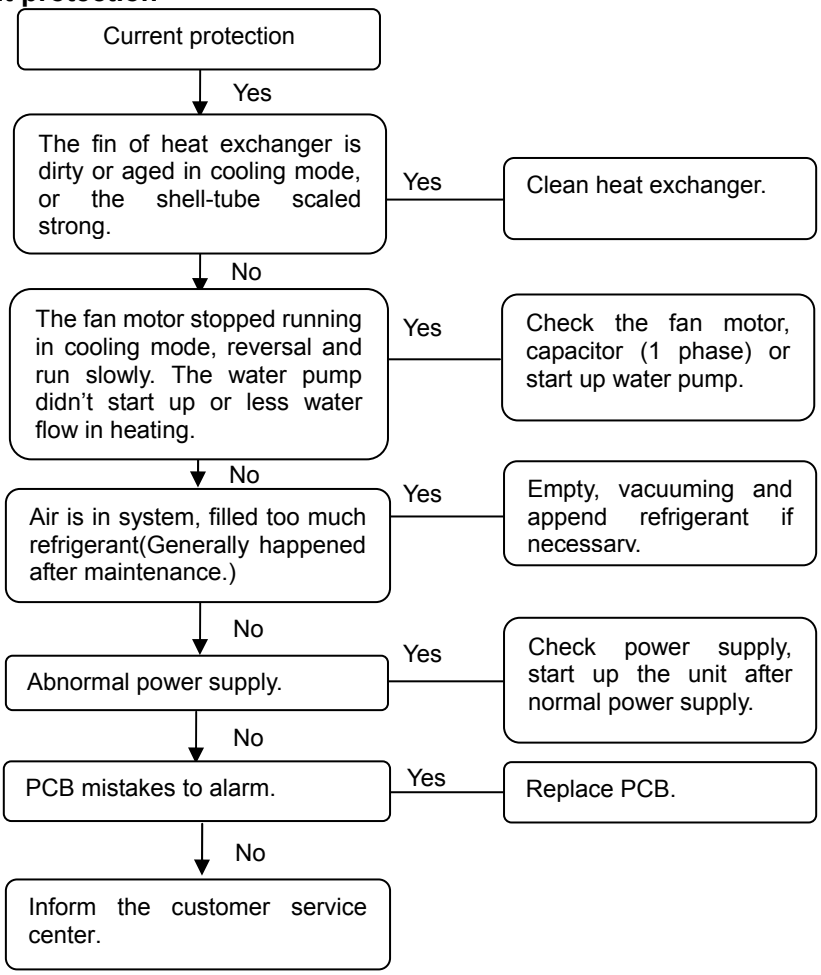




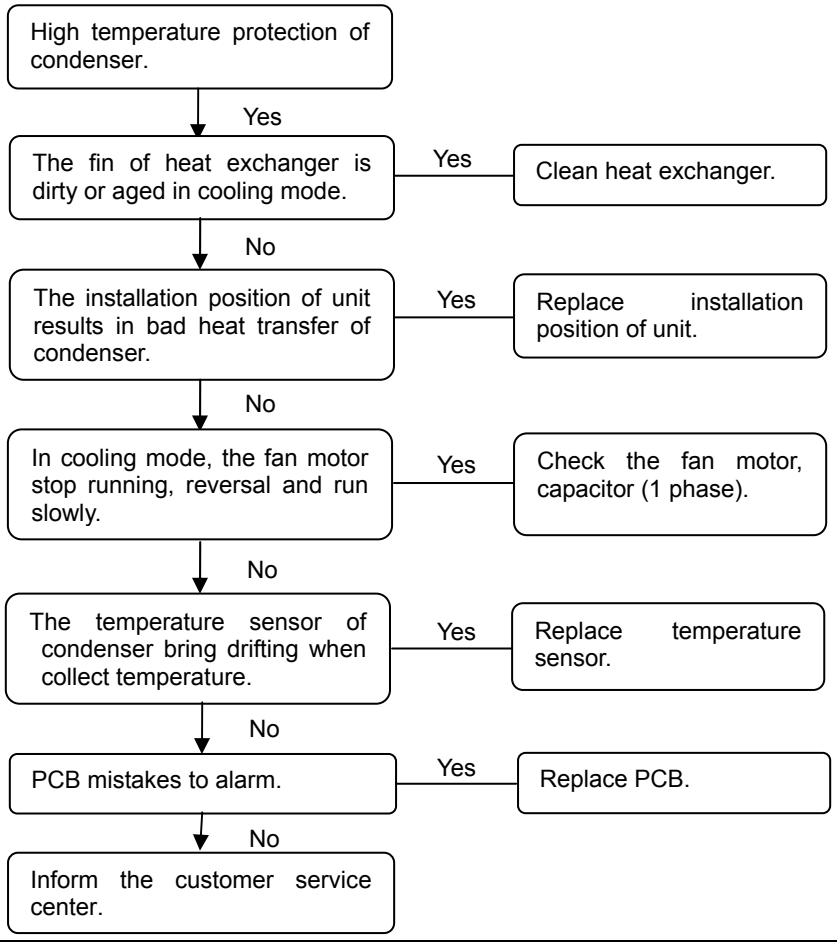
2) Low pressure protection



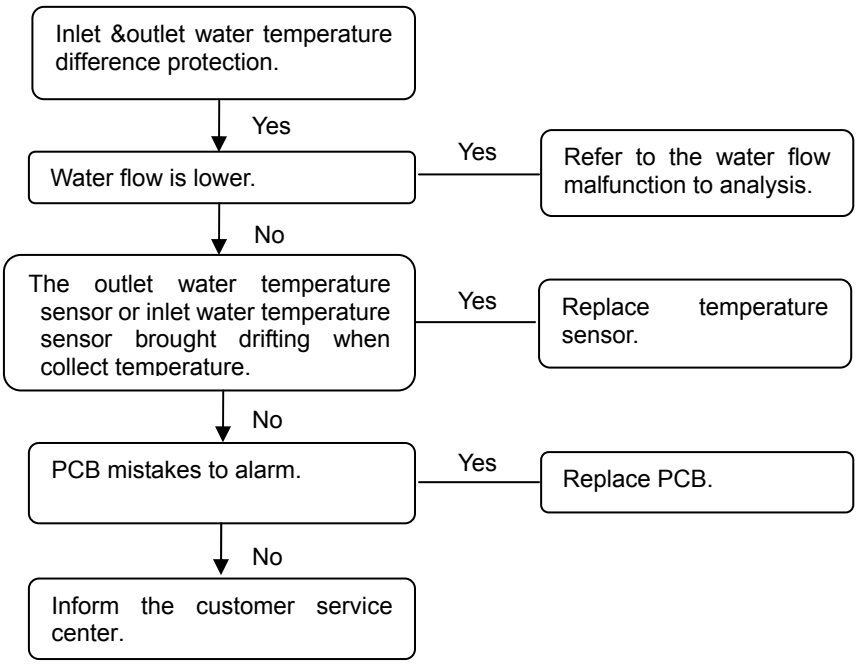
2) Current protection



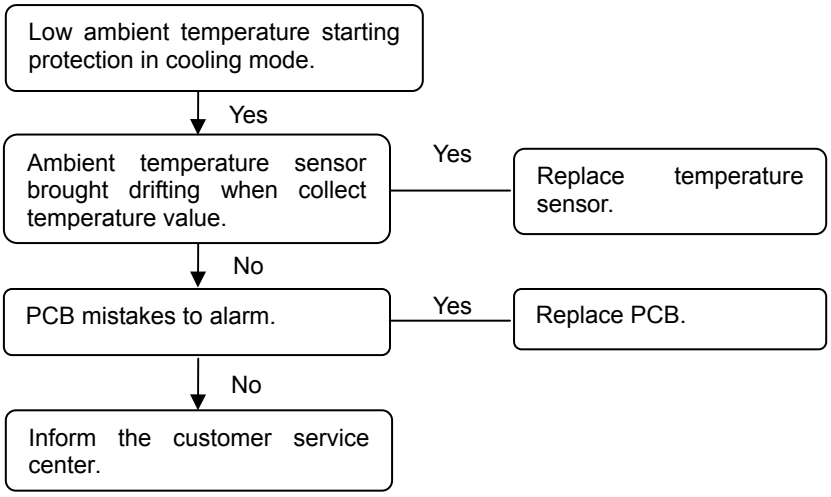
3) High temperature protection of condenser



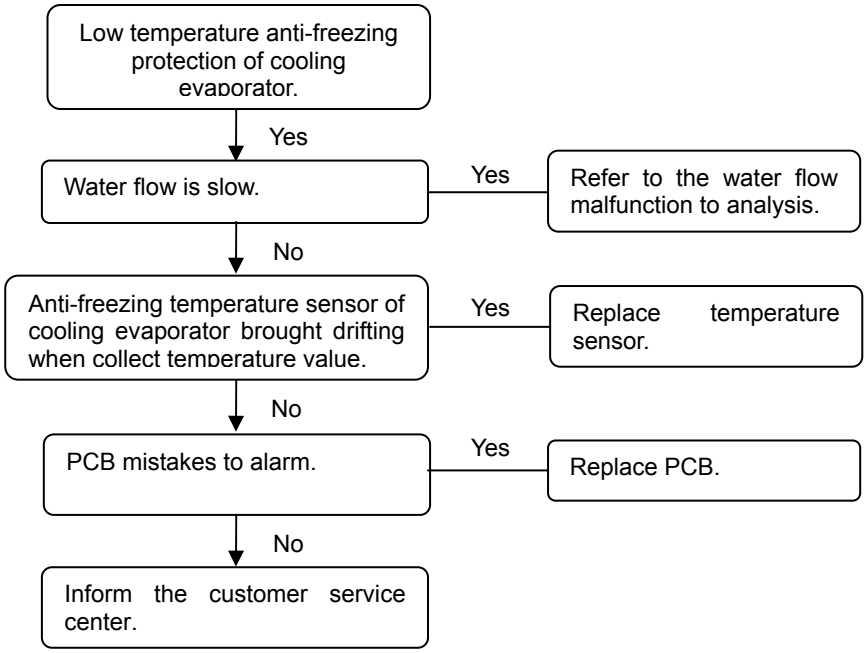
4) Inlet &outlet water temperature difference protection



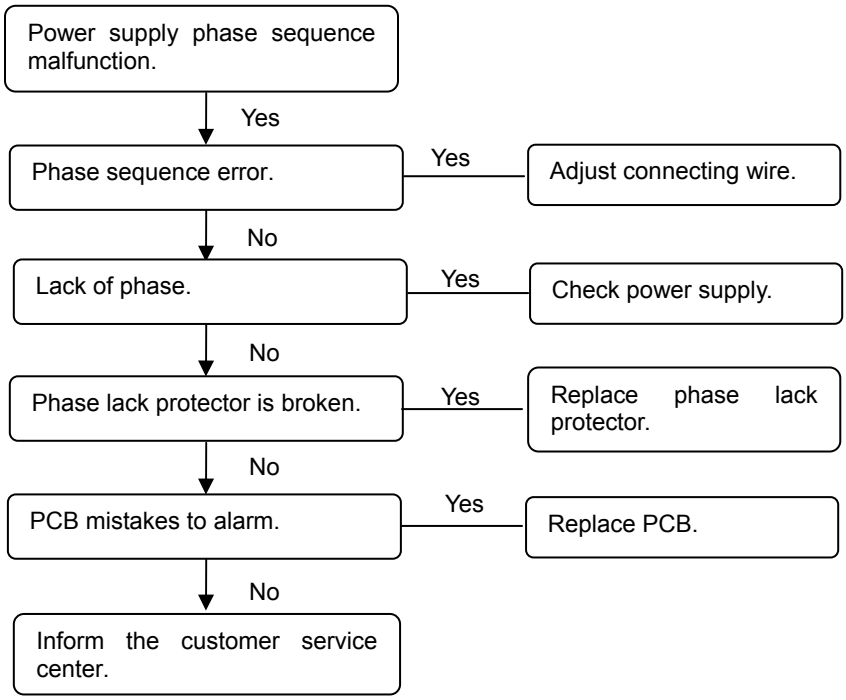
5) Low ambient temperature starting up protection



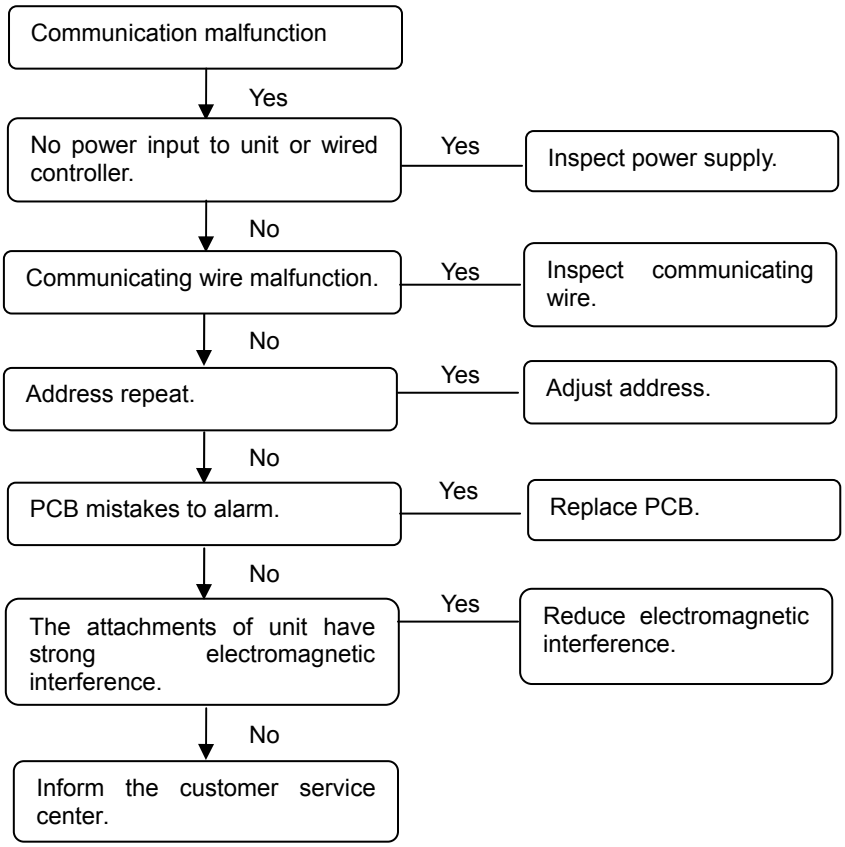
6) Low temperature anti-freezing protection of cooling evaporator



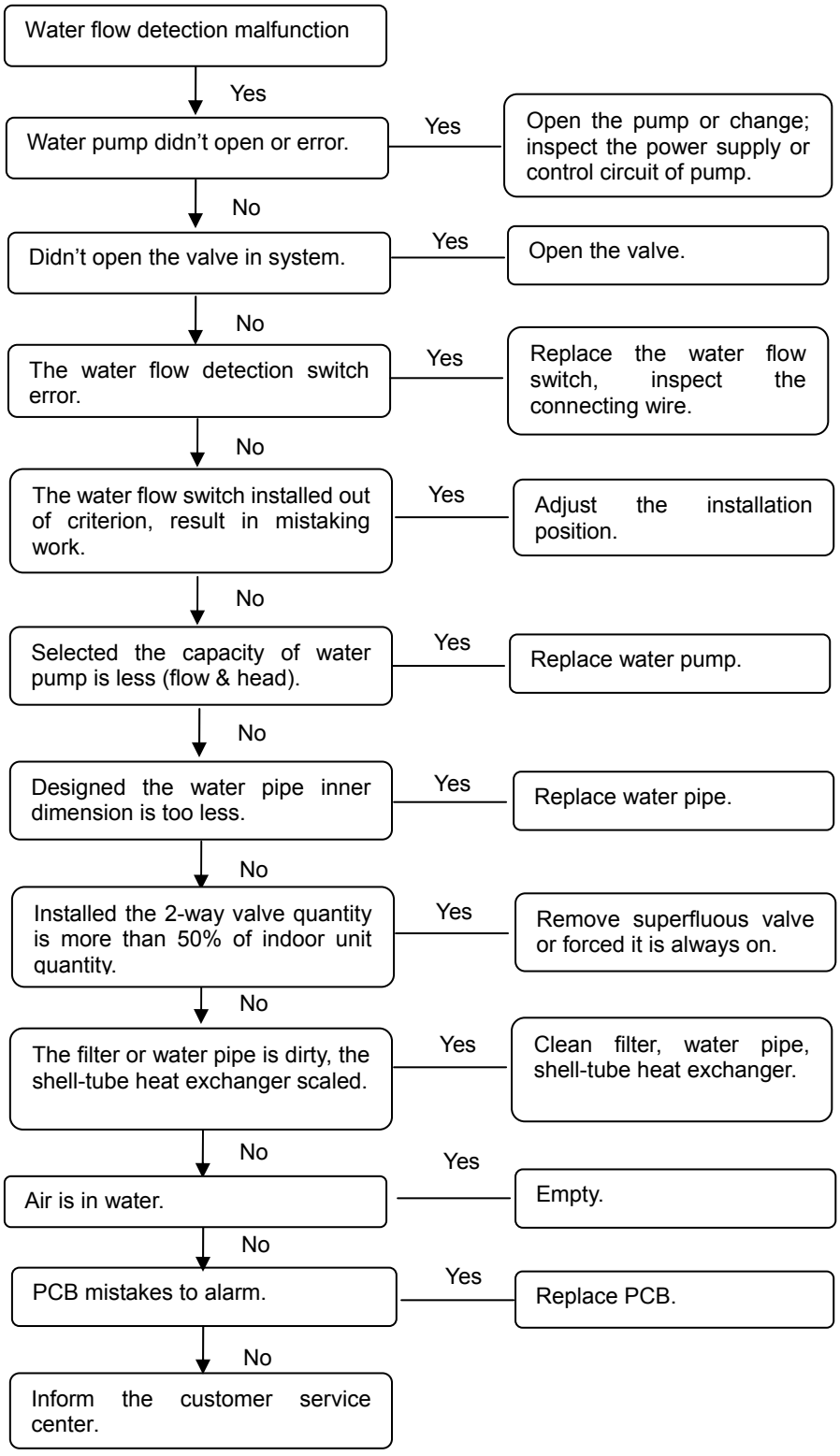
7) Power supply phase sequence malfunction



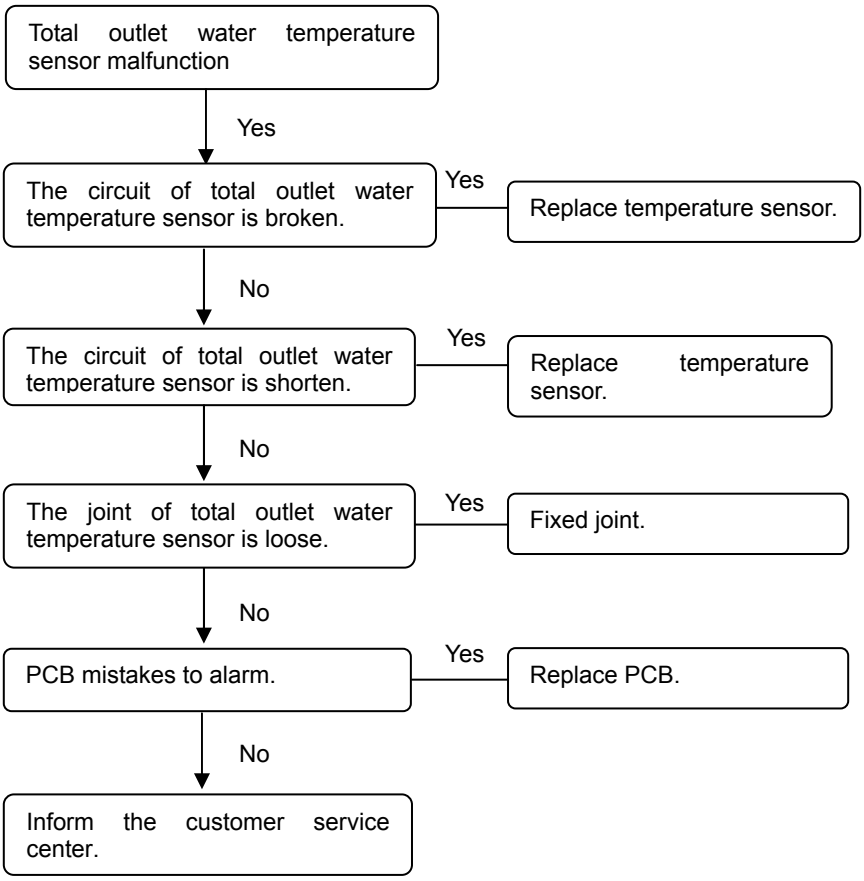
8) Communication malfunction



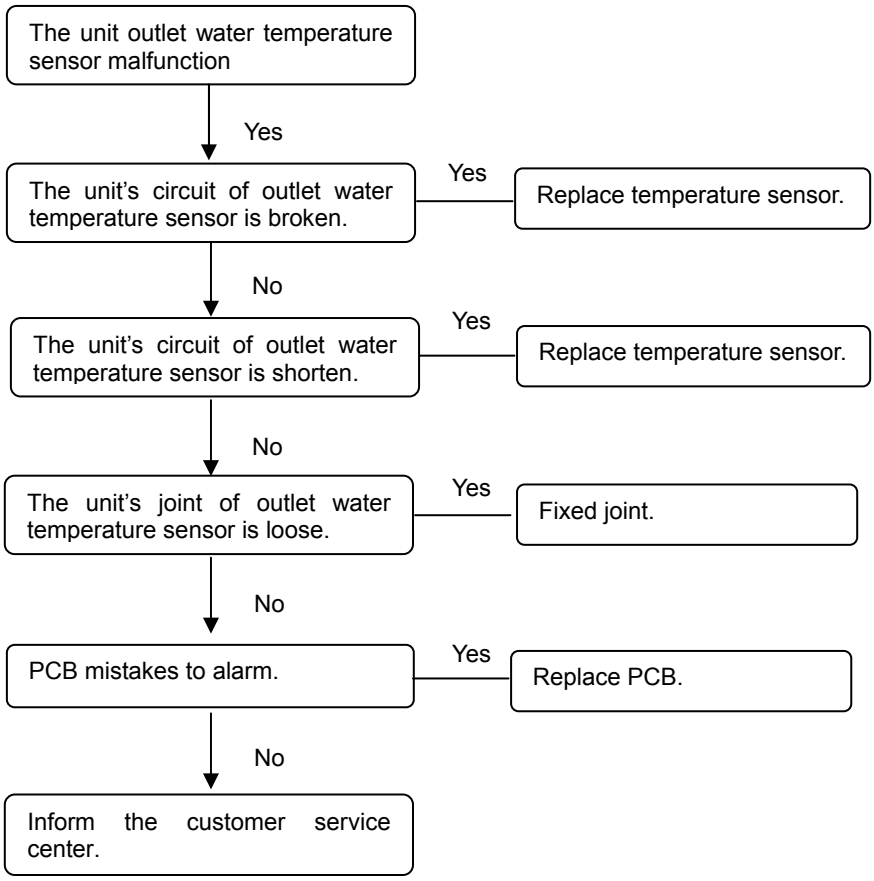
9) Water flow detection malfunction



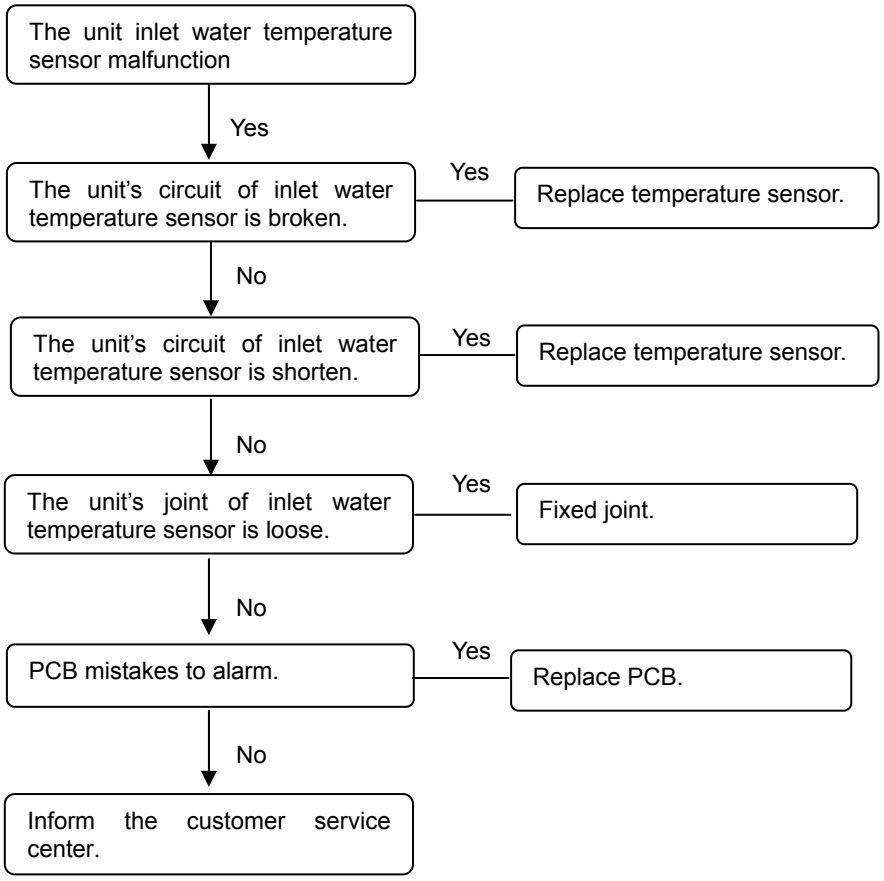
10) Total outlet water temperature sensor malfunction



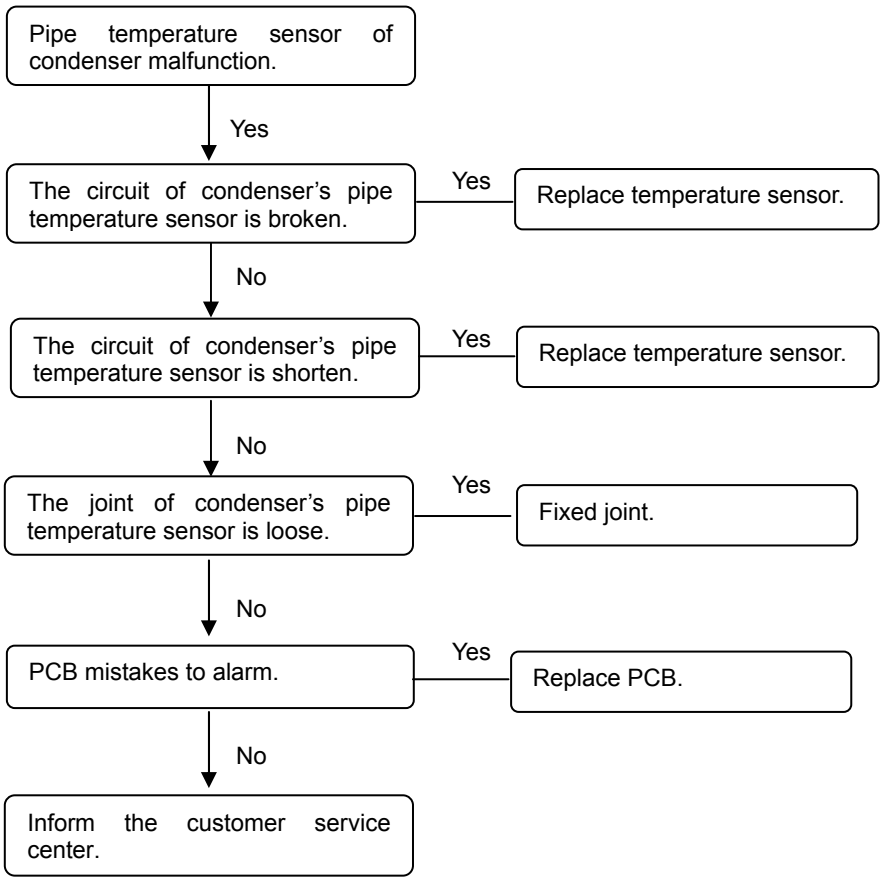
11) The unit outlet water temp. sensor malfunction



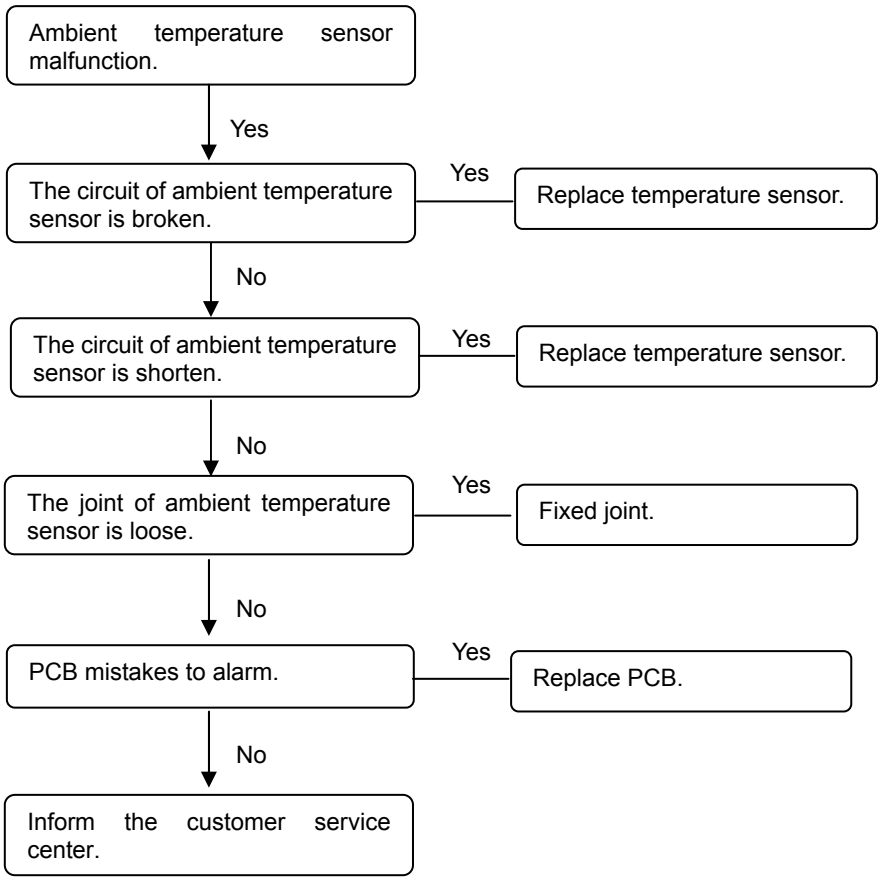
12) The unit inlet water temperature sensor malfunction



13) Pipe temp. sensor of condenser malfunction



14) Ambient temperature sensor malfunction



15. Installation

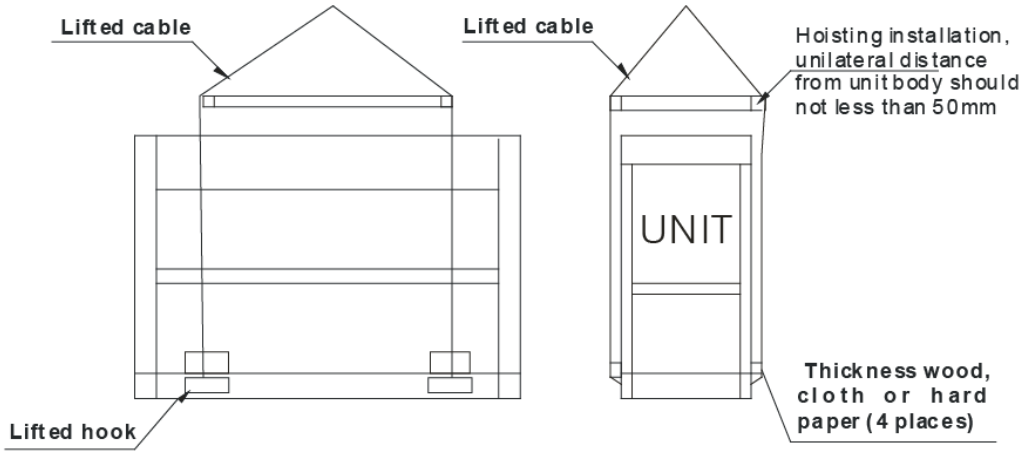
15.1 Unit Installation

15.1.1 Transportation

The angle of inclination should not be more than 15º when carrying the unit, to avoid overturn of the unit.

a. Rolling handling: 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.

b. Lifting: the strength lifting rope (belt) can bear should be 4 times the weight of the unit. Check the lifting hook and ensure that it is firmly attached to the unit, and the lifting angle should be more than 60º. To avoid damages to the unit, the contact position of the unit and lifting rope should be provided with an at least 50mm thick wood block, cloth or hard paper. Any person is not allowed to stand below the unit when lifting it.



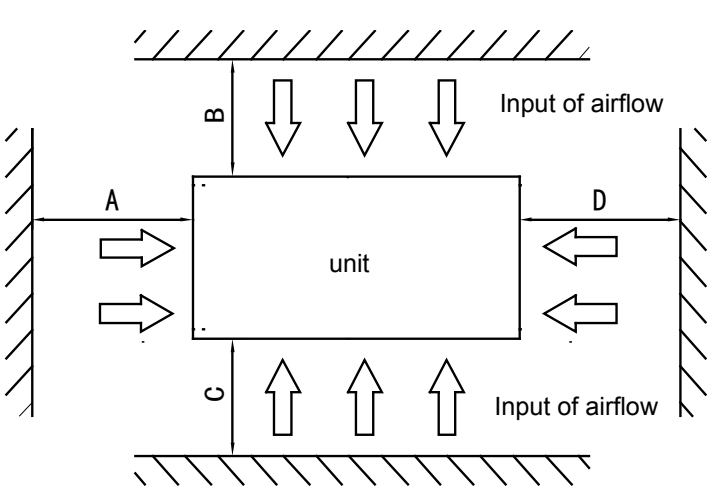
15.1.2 Installation space

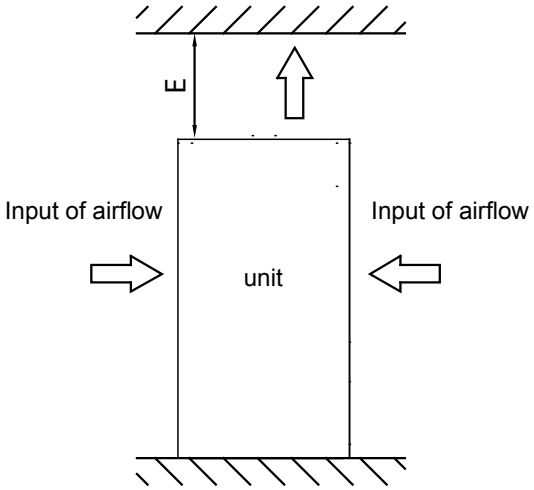
● **Requirements of arrangement space of the unit**

1) To ensure adequate airflow entering the condenser, the influence of descending airflow caused by the high-rise buildings around upon the unit should be taken into account when installing the unit.

2) If the unit is installed where the flowing speed of air is high, such as on the exposed roof, the measures including sunk fence and Persian blinds can be taken, to prevent the turbulent flow from disturbing the air entering the unit. If the unit needs to be provided with sunk fence, the height of the latter should not be more than that of the former; if Persian blinds are required, the total loss of static pressure should be less than the static pressure outside the fan. The space between the unit and sunk fence or Persian blinds should also meet the requirement of the minimum installation space of the unit.

3) If the unit needs to operate in winter, and the installation site may be covered by snow, the unit should be located higher than the snow surface, to ensure that air flows through the coils smoothly.





The recommend space parameter

Module	Installation space (mm)				
	A	B	C	D	E
MC-SU30-RN1L	≥800	≥2000	≥2000	≥800	≥6000
MC-SU60-RN1L					

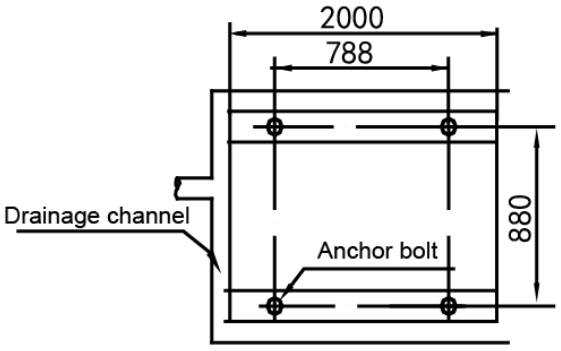
● Space requirements for parallel installation of multiple units

To avoid back flow of the air in the condenser and operational faults of the unit, the parallel installation of multiple units can follow the direction A and D as shown in the figure above, the spaces between the unit and the obstacle are given in the figure above, and the space between adjacent units should not be less than 300mm; the installation can also follow the direction B and C as shown in the figure above, the spaces between the unit and the obstacle are given in the figure above, and the space between adjacent units should not be less than 600mm; the installation can also follow the direction combination of A and D, and B and C, the spaces between the unit and the obstacle are given in the figure above, the space between adjacent units in the direction A and D should not be less than 300mm, and the space between adjacent units in the direction B and C should not be less than 600mm.
If the spaces mentioned above cannot be met, the air passing from the unit to the coils may be restricted, or back flow of air discharge may occur, and the performance of the unit may be affected, or the unit may fail to operate.

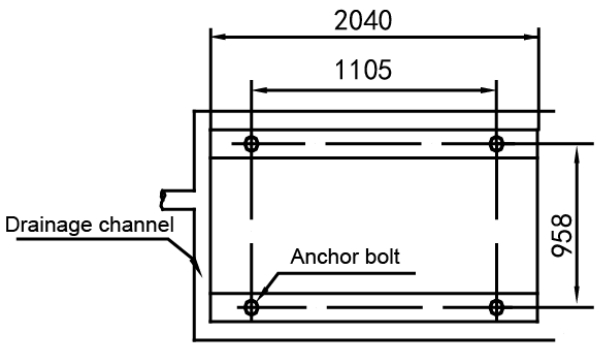
15.1.3 Installation foundation

- The unit should be located on the horizontal foundation, the ground floor or the roof which can bear operating weight of the unit and the weight of maintenance personnel. Refer to the operating weight parameters in specification table.
- If the unit is located so high that it is inconvenient for maintenance personnel to conduct maintenance, the suitable scaffold can be provided around the unit.
- The scaffold must be able to bear the weight of maintenance personnel and maintenance facilities.
- The bottom frame of the unit is not allowed to be embedded into the concrete of installation foundation.

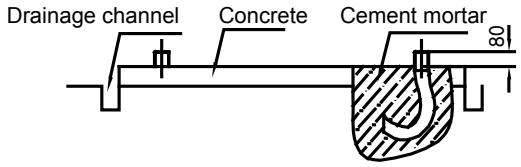
Location drawing of installation foundation of the unit (unit: mm)



30KW module



60KW module



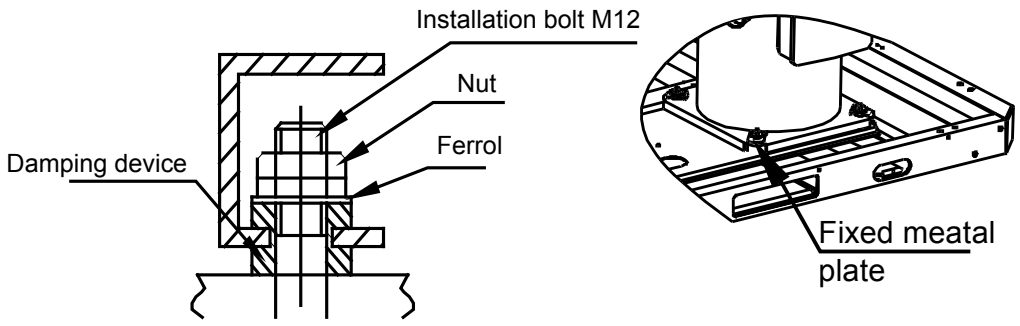
15.1.4 Installation of damping devices

※ Damping devices must be provided between the unit and its foundation.

By means of the Φ15mm diameter 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* (Schematic diagram of installation dimension of the unit) 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 relevant persons before selecting the damper.

※ **Installation steps of the damper**

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



15.2 Water System Installation

Notice:

- After the unit is in place, chilled water pipes can be laid.
- The relevant installation regulations should be abided with when conducting connection of water pipes.
- The pipelines should be free of any impurity, and all chilled water pipes must conform to local rules and regulations of pipeline engineering.

15.2.1 Connection requirements of chilled water pipes

a. 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.

b. Water must enter the heat exchanger through the inlet; otherwise the performance of the unit will decline.

c. The inlet pipe of the evaporator must be provided with a water flow switch, to realize flow-break protection for the unit. Both ends of the water flow switch must be supplied with horizontal straight pipe sections whose diameter is 5 times that of the inlet pipe. The water flow switch must be installed in strict accordance with “Installation & Regulation Guide for Water flow switch”. The wires of the water flow switch should be led to the electric cabinet through shielded cable. The working pressure of the water flow switch is 1.0MPa, and its interface is 1 inch in diameter. After the pipelines are installed, the water flow switch will be set properly according to the rated water flow of the unit.

d. 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.

e. The pipes and their ports must be independently supported but should not be supported on the unit.

f. 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.

g. 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.

h. The by-pass pipes and by-pass valves as shown in the figure of “Connection drawing of pipeline system” 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.

i. 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.

j. 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.

k. 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 discharging air from the pipeline. The discharge valves and drainage ports should not be under heat preservation, to facilitate maintenance.

l. All possible water pipes in the system to be chilled should be under heat preservation, including inlet pipes and flanges of the heat exchanger.

m. 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.

n. When the ambient temperature is lower than 2℃, 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.

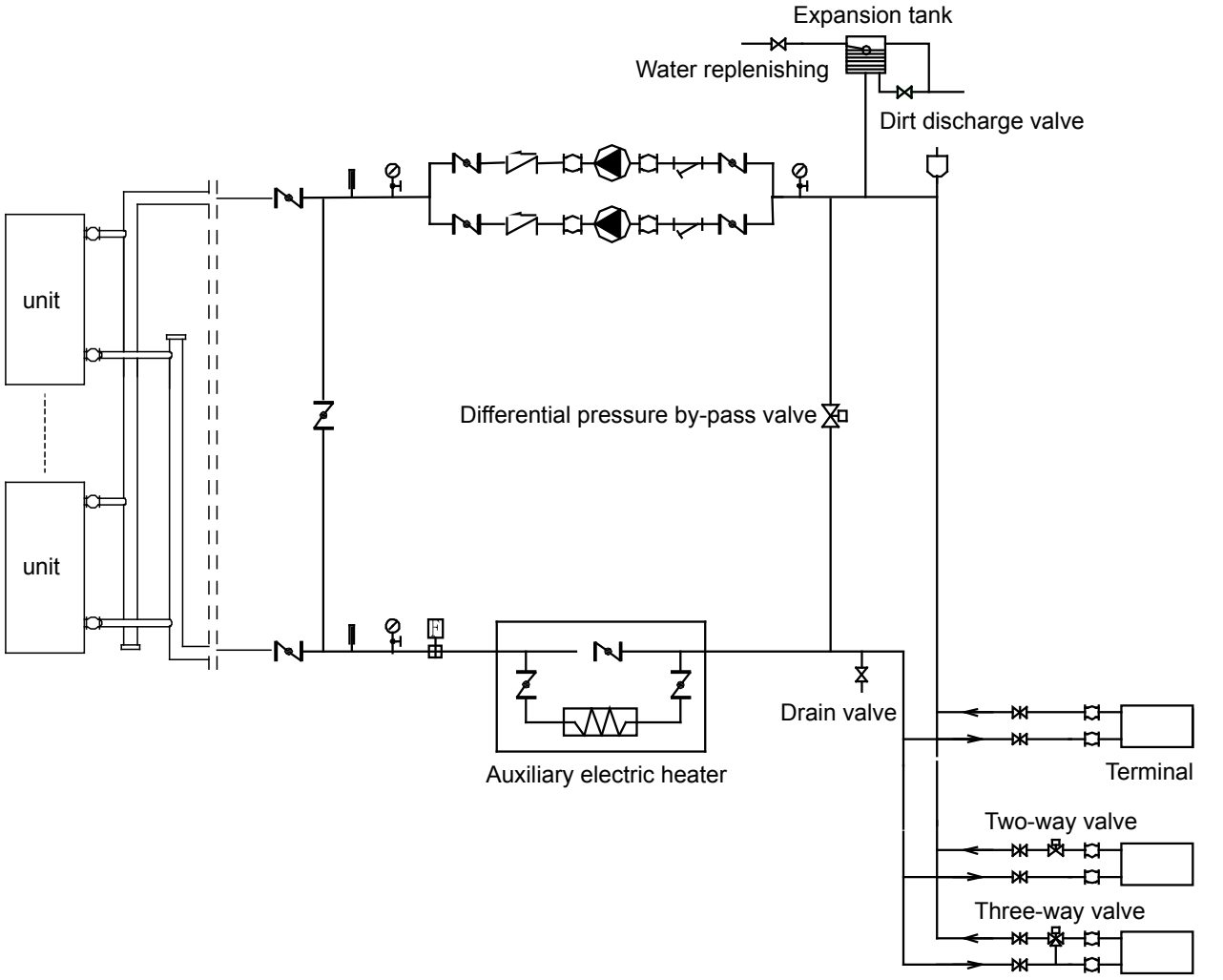
o. The common outlet pipelines of combined units should be provided with mixing water temperature sensor.

Warning:

● For the water pipeline network including filters and heat exchangers, dreg or dirt may seriously damages the heat exchangers and water pipes.

● The installation persons or the users must ensure the quality of chilled water, and de-icing salt mixtures and air should be excluded from the water system, since they may oxidize and corrode steel parts inside the heat exchanger.

15.2.2 Connection drawing of pipeline system



Symbol explanation				
Stop valve	Pressure gauge	Water flow switch	Gate valve	Flexible joint
Y-shaped filter	Thermometer	Circulating pump	Check valve	Automatic discharge valve

15.2.3 Water quality

※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.

※ Applicable standard of water quality for the unit

PH value	Total hardness	Conductivity	Sulfide ion	Chloride ion	Ammonia ion	Sulfate ion	Silicon	Iron content	Sodium ion	Calcium ion
7～8.5	<50ppm	<20μV/cm(25℃)	No	<50ppm	No	<50ppm	<30ppm	<0.3ppm	No requirement	<50ppm

15.2.4 Performance adjustment factors

The antifreeze must be required according to anyone condition as following:
1. The outlet water temperature is below 5℃;
2. The ambient temperature is below 0 ℃;
3. Don't start up the unit for a long time.
4. The power supply was cut off and needn't change the water in system.

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.

Ethylene Glycol

Quality of glycol（%）	modification coefficient				Freezing point ℃
	Cooling capacity modification	Power modification	Water resistance	Water flow modification	
0	1.000	1.000	1.000	1.000	0
10	0.984	0.998	1.118	1.019	-4.000
20	0.973	0.995	1.268	1.051	-9.000
30	0.965	0.992	1.482	1.092	-16.000
40	0.960	0.989	1.791	1.145	-23.000
50	0.950	0.983	2.100	1.200	-37.000

Propylene Glycol

Quality of glycol （%）	Modification coefficient				Freezing point ℃
	Cooling capacity modification	Power modification	Water resistance	Water flow modification	
0	1.000	1.000	1.000	1.000	0
10	0.976	0.996	1.071	1.000	-3.000
20	0.961	0.992	1.189	1.016	-7.000
30	0.948	0.988	1.380	1.034	-13.000
40	0.938	0.984	1.728	1.078	-22.000
50	0.925	0.975	2.150	1.125	-35.000

Units operating with glycol solutions are not included in the ARI Certification Program.

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. Maximum allowable altitude is 1800meters.

Evaporator temperature drop factors

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

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.

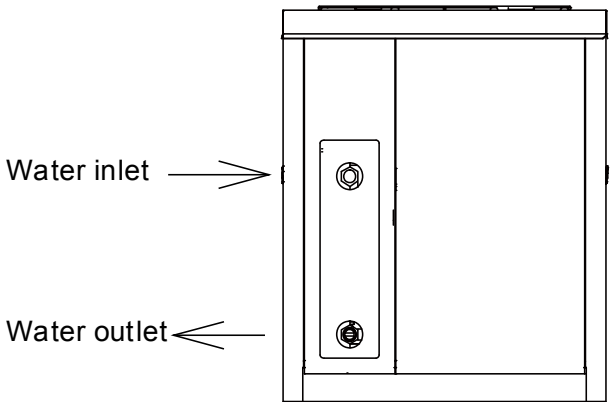
Fouling Factor

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

C--Cooling capacity
P--Power

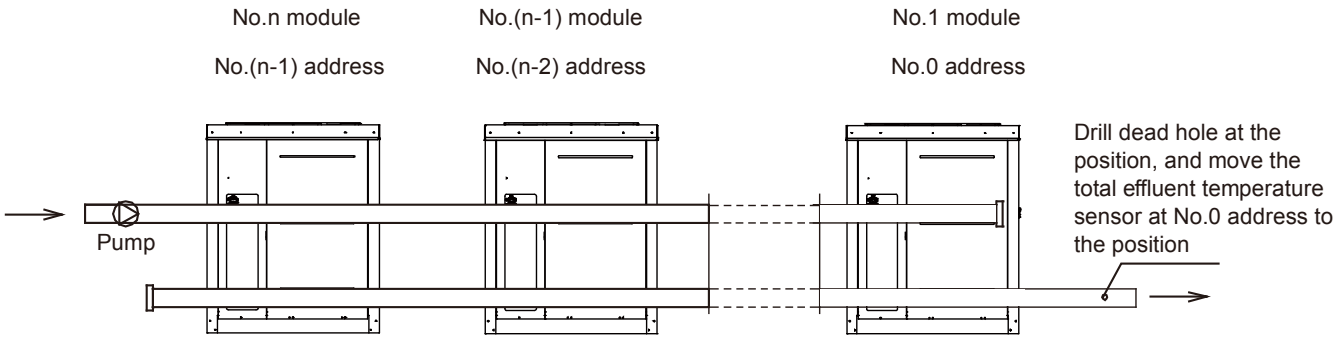
15.2.5 Installation of water system pipeline

Installation of single-module water system pipeline



Installation of multi-module water system pipeline

n :the module quantity, max 16



15.2.6 Diameter parameters of main inlet and outlet pipes

Cooling capacity	Total inlet and outlet water pipe inside nominal diameter
25≤Q≤50	DN40
50＜Q≤80	DN50
80＜Q≤130	DN65
135＜Q≤210	DN80
210＜Q≤325	DN100
325＜Q≤510	DN125
510＜Q≤740	DN150
740＜Q≤960	DN200

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, water flow switch and auxiliary electric heater are under control of the main module.

● One wired controller and one water flow switch are required and connected on 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.

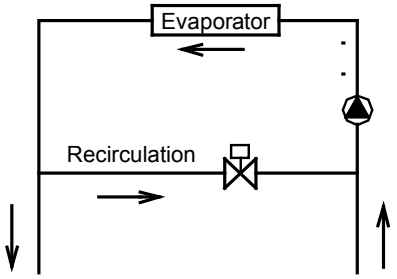
15.2.7 Chilled water flow

Minimum chilled water flow

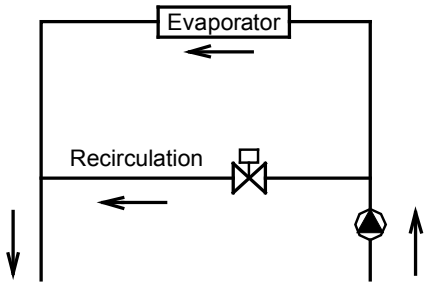
The minimum chilled water flow is shown in the below table.

If the system flow is less than the minimum unit flow rate, the evaporator flow can be recalculated, as shown in the diagram.

For minimum chilled water flow rate



For maximum chilled water flow rate



Maximum chilled water flow

The maximum chilled water flow is limited by the permitted pressure drop in the evaporator. It is provided in the below table.

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.

Minimum and Maximum water flow rates

Model	Water flow rate(m3/h)	
	Minimum	Maximum
MC-SU30-RN1L	3.8	6.4
MC-SU60-RN1L	8.0	13.0

15.2.8 Design of the store tank in the system

a. kW is the unit for cooling capacity, L is the unit for (G) minimum water flow volume in the formula.

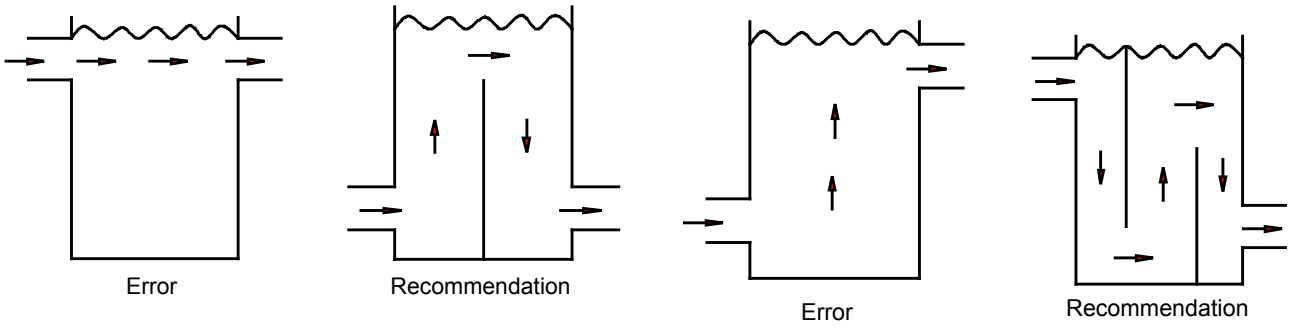
Comfortable type air conditioner

G= cooling capacity×2.6L

Process type cooling

G= cooling capacity×7.4L

b. In certain occasion (especially in manufacture cooling process), for conforming the system water content requirement, it's necessary to mount a tank equipping with a cut-off baffle at the system to avoid water short-circuit, Please see the following schemes:



15.2.9 Design of expansion tank

If a closed expansion tank with its filled volume of air is too small, the system pressure will easily exceed the maximum allowable pressure and cause water to discharge from the pressure relief valve, thus wasting water. If the closed tank is too large, when the water temperature drops, the system pressure may decrease to a level below the minimum allowable value and cause trouble in the air vent. Therefore, accurate sizing of a closed expansion tank is essential.

For diaphragm expansion tanks, the minimum volume of the water tank, Vt, gal(m3),can be calculated by the following formula, recommended by ASHRAE Handbook 1996, HVAC Systems and Equipment:

$$V_t=V_s\left\{\frac{v_2/v_1-1-3\,\alpha\,(T_2-T_1)}{1-p_1/p_2}\right\}$$

T_1=lower temperature,^oF (˚C)

T_2=higher temperature, ^oF (˚C)

V_s=volume of water in system, gal(m^3)

p_1=absolute pressure at lower temperature, psia(kPa abs.)

p_2=absolute pressure at higher temperature, paia(kPa abs.)

v_1,v_2=specific volume of water at lower and higher temperature, respectively, ft^3/lb(m^3/kg)

α =linear coefficient of thermal expansion; for steel, α =6.5x10^{-6}in./in・^oF(1.2x10^{-5}per ˚C); for copper,

α =9.5x10^{-6}in./in・^oF(1.7x10^{-5}per ˚C)

In a chilled water system, the higher temperature T2 is the highest anticipated ambient temperature when the chilled water system shuts down during summer. The lower temperature in a heating system is often the ambient temperature at fill conditions(for example, 50 ^oF or 10˚C).

15.2.10 Selection and installation of the pump

(1)Select the pump

a. Select the water-flow of the pump

The rated water-flow must no less than the unit rated water-flow; in terms of multi-connect the units, that water-flow must no less than total units' rated water-flow.

b. Select the left of the pump.

H=h1+h2+h3+h4

H: The lift of the pump.

h1: Main unit water resistance.

h2: Pump water resistance.

h3: Water resistance of the longest water-loop distance, includes: pipe resistance, different valve's resistance, flexible pipe resistance, pipe elbow and three-way resistance, two-way resistance or three-way resistance, as well as filter resistance.

H4: the longest terminal resistance.

(2) Installation the pump

a. The pump should be installed at the water inlet pipe, both of which sides must mount the soft connectors for vibration-proof.

b. The backup pump for the system (recommended).

c. Units must with a main unit controls (Please see "fielding wiring" for the controls diagram).

15.3 Wiring Installation

All wiring installation should be done by qualified person.

15.3.1 Precautions:

1. The air-conditioner should apply special power supply, whose voltage should conform to rated voltage.

2. Wiring construction must be conducted by the professional technicians according to the labeling on the circuit diagram.

3. 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.

4. The connected fixed wires must be equipped with full switching-off devices with at least 3mm contact separation.

5. Set leakage protective devices according to the requirements of national technical standard about electric equipment.

6. After completing all wiring construction, conduct careful check before connecting the power supply.

7. Please carefully read the labels on the electric cabinet.

8. 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.

15.3.2 Power supply specification

Model	Outdoor power supply			Wiring
	Power supply	Manual switch	Fuse	
MC-SU30-RN1L	380-415V 3Ph～50Hz	50A	36A	$16mm^2$ (<20m)
MC-SU60-RN1L	380-415V 3Ph～50Hz	100A	70A	$25mm^2$ (<20m)

15.3.3 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.

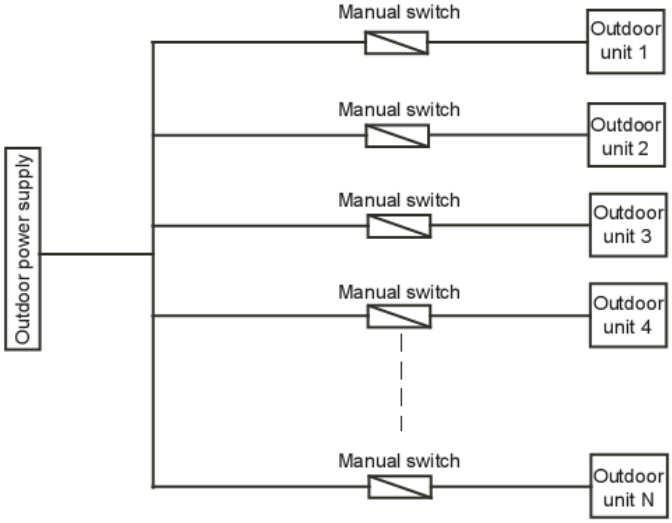
● The cables of correct specification must be used to supply power for the unit. The unit should use independent power supply, and the unit is not allowed to use the same power supply together with other electric devices, to avoid over-load danger. The fuse or manual switch of the power supply should 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 figure.

● 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.

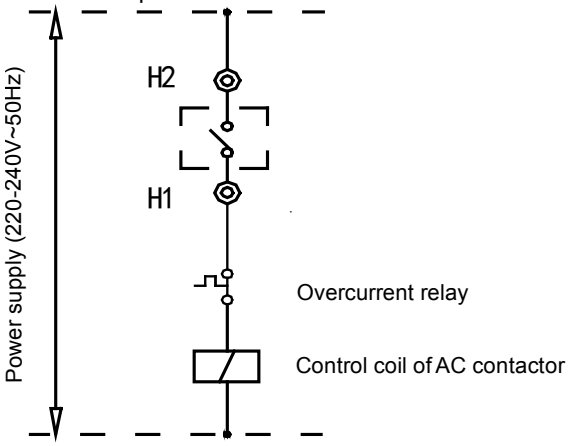
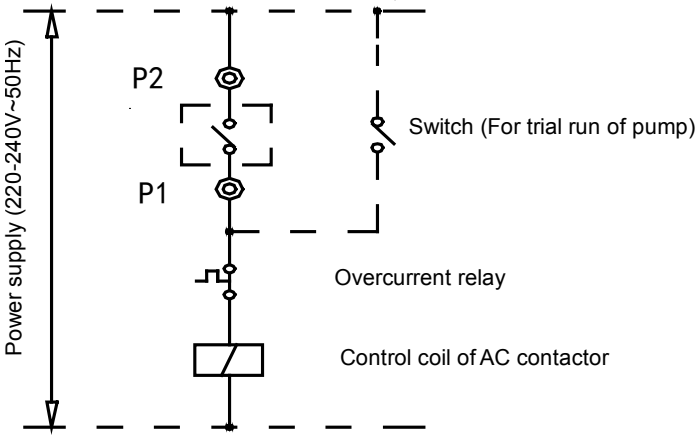
● All weak current wires led to the electric box must apply shielded wires, which must be provided with grounding wires. The shield wires and power supply wires should be laid separately, to avoid electromagnetic interference.

● 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.



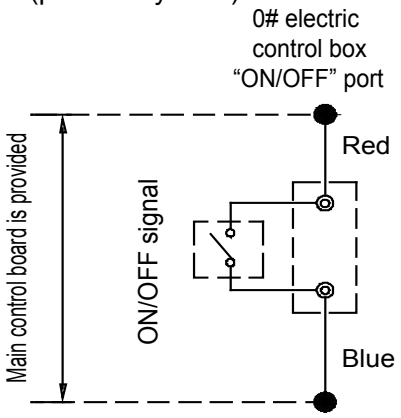
Note: only 16 units can be combined at most.

15.3.4 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	Connection of control wires of water flow switches: the wire leads (prepared by the user) of water flow switches are connected to the connection terminals W1 and W2 of the main unit.
10	Connection of control wires of auxiliary electric heaters: the control wires of AC contactor of the auxiliary electric heater must pass the connection terminals H1 and H2 of the main unit, as shown. 
11	Connection of control wires of pump: the control wires of AC contactor of the pump must pass the connection terminals P1 and P2 of the main unit, as shown. 
12	The connection way of the wired controller connects with every signal wires from package units: signal wires P, Q, E are connected in the same way of main wires connection method and accordingly connect to the terminals P, Q, E in the wired controller.

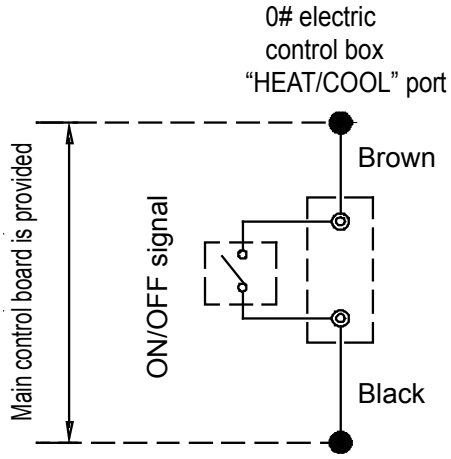
①.Wiring of “ON/OFF” weak electric port

Corresponding parallel connect the “ON/OFF”(dry contact input signal) port of the main unit’s electric control box, then, connect the “ON/OFF” signal (provide by user) to the “ON/OFF” port of main unit as follows.



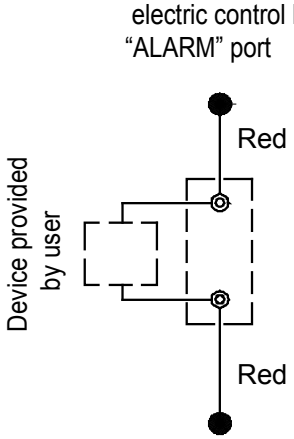
②.Remote mode selection: Wiring of “HEAT/COOL” weak electric port

Corresponding parallel connect the “HEAT/COOL” (dry contact input signal) port of the main unit’s electric control box, then, connect the “ON/OFF” signal (provide by user) to the “HEAT/COOL” port of main unit as follows.



③.Wiring of “ALARM” port

Connect the device provided by user to the “ALARM” (dry contact output signal) ports of the module units as follows.



If the unit is operating normally, the ALARM port is closed, otherwise, the ALARM port is not closed.

16. Commissioning

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.

2. Test run

6.3.1 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.

6.3.2 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.

6.3.3 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.

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.

17. Maintenance

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.

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.

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).

Replacing parts

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

First startup after shutdown

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

1) Thoroughly check and clean the unit.

2) Clean water pipe system.

3) Check pump, control valve and other equipment of water pipe system.

4) Fix connections of all wires.

5) It is a must to electrify the machine before startup.

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.

1) 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.

2) 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.

Disassembling compressor

Follow the following procedures if compressor needs to be disassembled:

1) Cut off the power supply of unit.

2) Remove power source connection wire of compressor.

3) Remove suction and discharge pipes of compressor.

4) Remove fastening screw of compressor.

5) Move the compressor.

Auxiliary electric heater

When the ambient temperature is lower than 2 ℃, 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℃ ~10℃, the user may consider to use auxiliary electric heater. Please refer to relevant professionals for the power of auxiliary electric heater.

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.

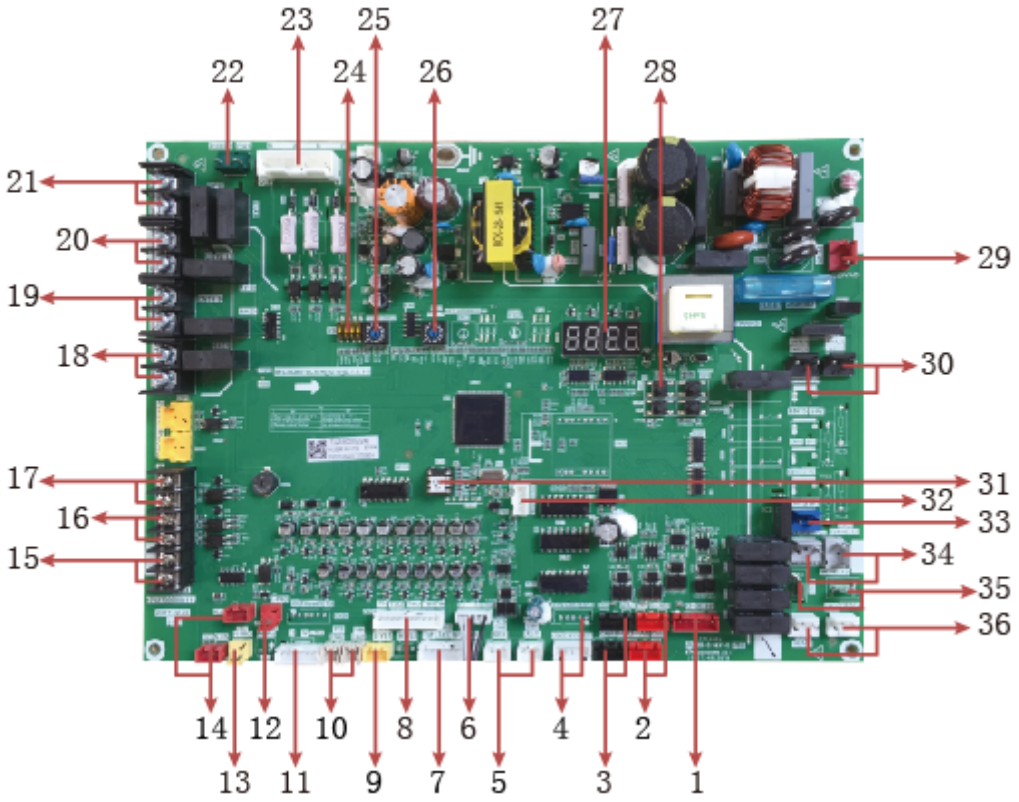
1) If the unit that is shut down for standby is placed in an environment where the outdoor temperature is lower than 0℃, the water in the water system should be drained.

2) 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.

3) 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 0.4Mpa. Therefore, the water in the heat exchanger must be kept flowing or be thoroughly discharged.

18. PCB Outline and Description

18.1 PCB, outlook view



18.2 Components description

No.	Detail information
1	Reserved port
2	Outdoor fan A and B communication port
3	Outdoor compressor A and B communication port
4	EXV A and B control port
5	Wired controller communication port
6	Detection of outdoor ambient temperature Detection of condenser tube temperature
7	Detection of evaporator anti-freezing temperature (Taf1) Detection of total cooling outlet temperature(TZ/7) Detection of compressor discharge temperature(Tp2) Detection of compressor discharge temperature(Tp2)
8	Detection of air suction temperature (Th) Detection of evaporator anti-freezing temperature (Taf2) Detection of water outlet temp (Two) Detection of water inlet temperature (Twi) Detection of total water outlet temperature (Tw)
9	Detection of high pressure
10	Detection of module temperature (Tf1) Detection of module temperature (Tf2)

11	Detection of current of the compressor A Detection of current of the compressor B
12	Port of low pressure
13	Port of high pressure
14	Filter board communication port
15	Remote Cool/Heat port
16	Remote ON/OFF port
17	Water flow detection port
18	The alarm signal output port (ON/OFF signal)
19	Auxiliary electric heater signal output port (ON/OFF signal)
20	Auxiliary electric heater signal output port (ON/OFF signal)
21	PUMP signal output port (ON/OFF signal)
22	PUMP signal output port (ON/OFF signal)
23	Power supply input port
24	S5-1: OFF: normal water outlet temperature ON: low water outlet temperature S5-2: OFF: ON/OFF is inactivated ON: ON/OFF is activated S5-3: OFF: one small pump per unit ON: one large pump controlled by master unit
25	ENC2: outdoor unit capacity 0: 30kW ; 3: 60kW module
26	ENC1: outdoor unit address 0:master unit 1,2,3……F: slave units
27	Digital display: display the status of the outdoor unit
28	Check button: the operating status of outdoor system can be observed through this check
29	Input port of transformer
30	Quick oil return valve
31	EEPROM
32	MCU flash port
33	Four-way valve control port
34	Evaporator anti-freezing crankcase heater control port
35	Target flow switch electric heating belt control port
36	Crankcase heater control port

CAUTION

1. Faults

When the main unit suffers faults, the main unit stops operating, and all other units also stop running;

When the slave unit suffers faults, only the unit stops operating, and other units are not affected.

2. Protection

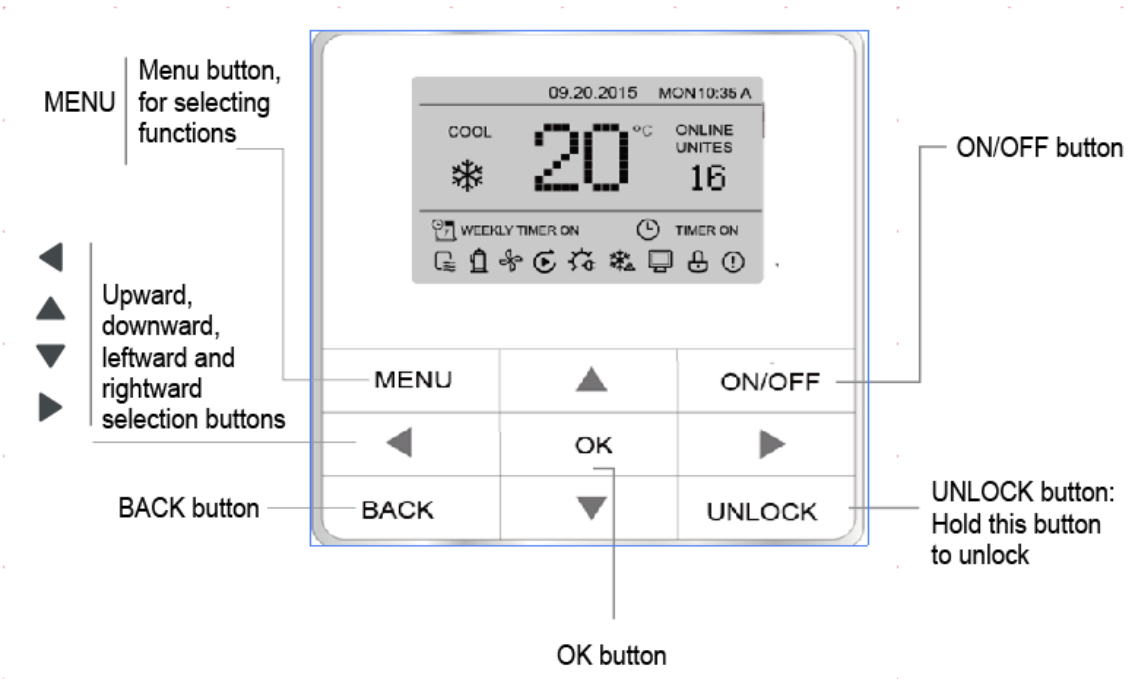
When the main unit is under protection, only the unit stops operating, and other units keep running;

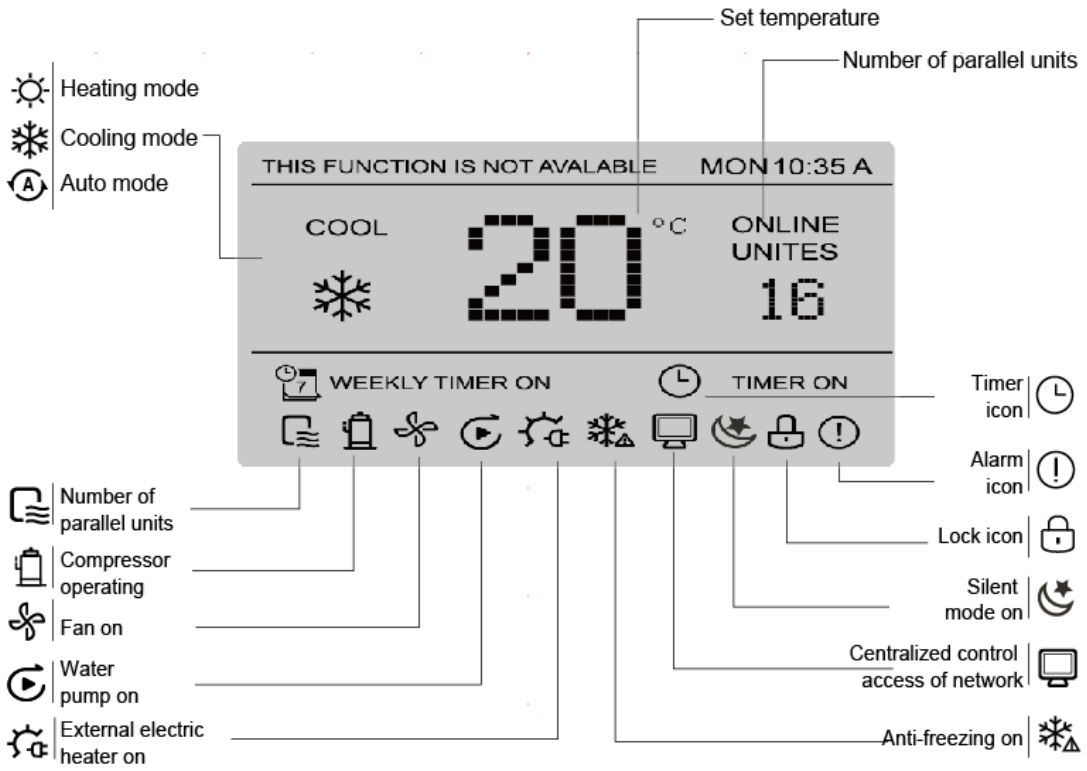
When the slave unit is under protection, only the unit stops operating, and other units are not affected.

19. Wired Controller KJRM-120H/BMWKO-E (Standard)

19.1 Appearance

19.2 Overview of Wired Controller





19.3 Wired controller specifications

Model	KJRM-120H/BMWKO-E
Power Supply Voltage	AC 10.5 V
Wiring size	0.75mm^2

Performance Features

1. Newly designed dot-matrix display.
2. Operating mode: cooling mode, heating mode, and water pump mode.
3. 3-level users: user, project and service
4. Auto-restart function
5. Address setting function
6. combination function

19.4 Menu Operations

19.4.1 Unlocking/Locking Operation

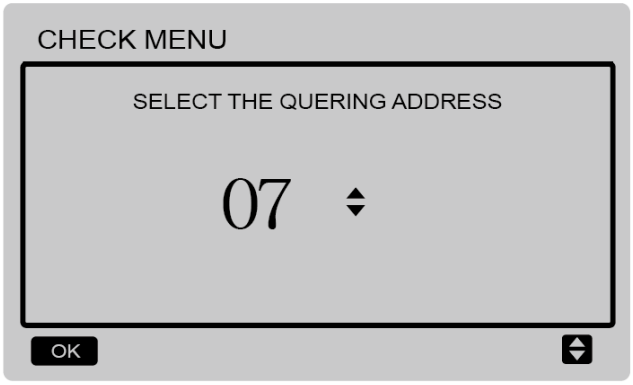
When the wired controller is locked, press and hold the "UNLOCK" button for 2s to unlock it, when "🔓" is not displayed; in the unlocked status, press and hold the "UNLOCK" button for 2s to lock it, when " 🔒 " is displayed and the wired controller cannot be operated; when there is no operation for continuous 60s on any page, the wired controller returns to the home page and is locked automatically, and the locking icon is displayed.

19.4.2 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.

19.4.3 Query Operation

Press the "MENU" button to enter the query interface below:



The user first uses the "▼" and "▲" buttons to select the address of module to view (the offline address is skipped automatically). Press the "OK" button to access the lower-layer submenu, or press "BACK" to go back to the previous interface. During operation on the menu page, press "BACK" to go back to the previous interface. After 0# main unit is selected, the system enters the main unit operating status: operation state, running mode, total outlet water temperature, outlet water temperature, inlet water temperature, anti-free temperature, ambient temperature, compressor current, EXV opening degree, error code. Press the "◄" and "►" buttons to switch the interface display.

19.4.4 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. The set address range is 0 to 15.

19.4.5 Power Failure Memory 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.

19.4.6 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.

19.4.7 Upper Computer Communication Function

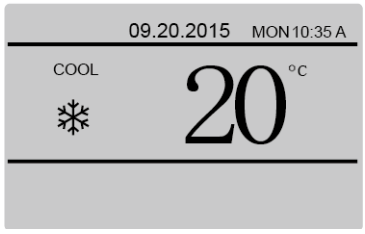
1) The home page displays the content below during communication with the upper computer: Communication between the wired controller and the upper computer.

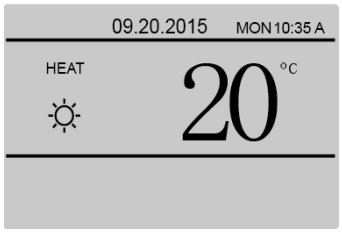
2) If the outdoor main control board is in the remote ON/OFF control mode and the wired controller sends an alarm, the current alarm page displays: Remote ON/OFF Control Mode. In this case, the network control of upper computer is invalid, and the wired controller can query the system status only and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

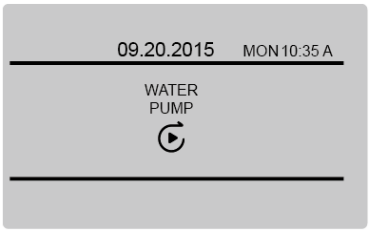
19.4.8 Setting Mode

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). As shown below: Three modes available.

a.Cooling mode b. Heating mode c. Water pump mode



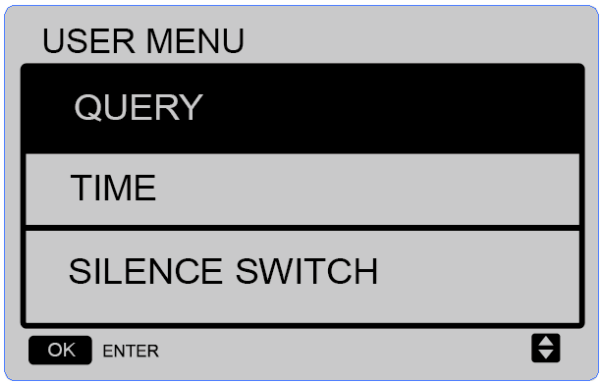




When the current mode button is selected (blinking), press "◄" and "►" to set a mode or temperature, and then press "▼" and "▲" to adjust the mode and set temperature value. After setting, press the "OK" button to save the setting and go back to the home page; or press the "BACK" button to go back to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

19.4.9 User Menu

Select "USER MENU" to enter the user menu. The interface is as follows:



◆ Main functions

Query: state query, temperature query, current error

Time: daily timer, weekly schedule, date and time

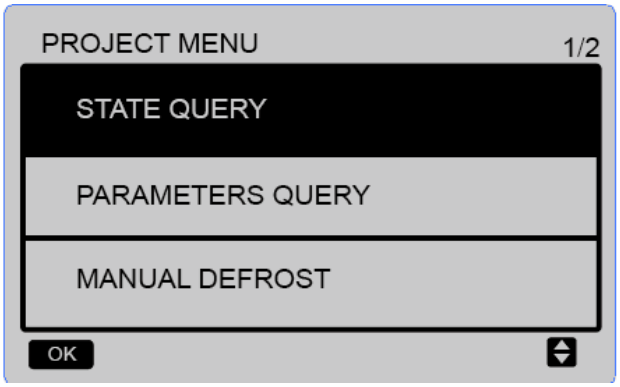
Silent switch

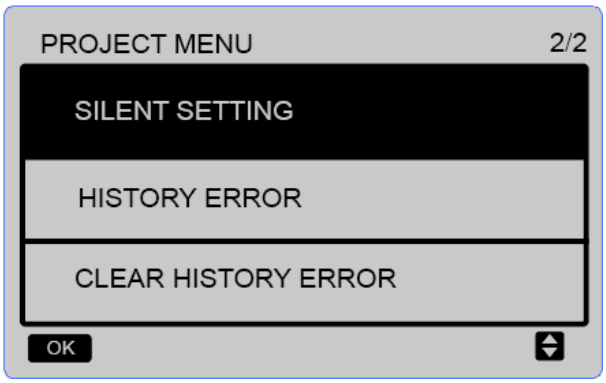
Press the "▼" and "▲" buttons to select the desired option, and press the "OK" button to access the interface.

19.4.10 PROJECT MENU

◆ Entering the password:

Select "PROJECT MENU", and press the "OK" button to enter the menu. The screen prompts the user to enter the password. 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 query interface as follows is displayed if the input is correct:





◆ Main functions:

a. State query: compressor state, fan state, 4-way valve state, pump state

b. Parameters query: EXV opening degree, compressor current, high pressure, low pressure, anti-freeze temperature, condenser pipe temperature, discharge temperature,

c. Manual defrost

d. Silent setting: standard mode, silent mode, night silent mode (factory default setting), super silent mode.

e. Querying history error: A maximum of 4 history errors can be displayed.

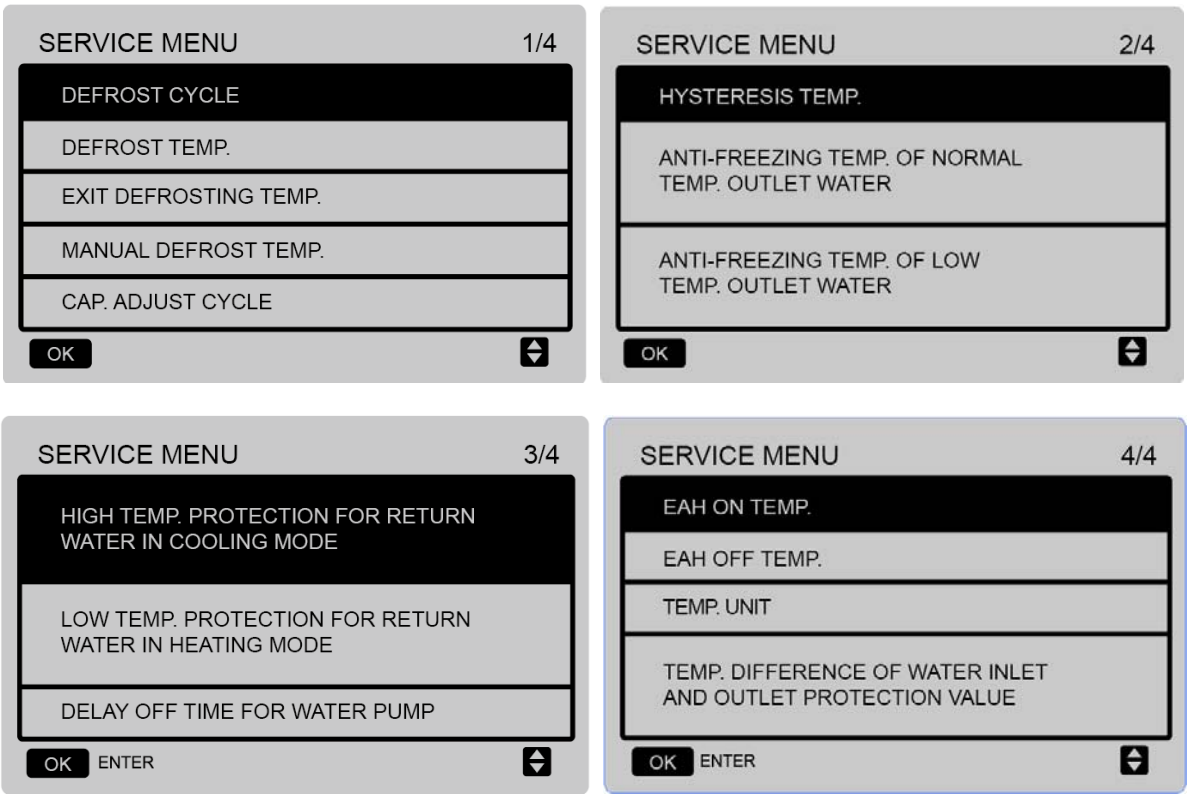
f. Clearing history error:

Press the "▼" and "▲" buttons to select the desired option, and press the "OK" button to access the interface.

19.4.11 SERVICE MENU

◆ Entering the password:

Select "SERVICE MENU", and press the "OK" button to enter the interface. The screen prompts the user to enter the password. The initial password is 9999 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 query interface as follows is displayed if the input is correct:



◆ Main functions

a. Defrost cycle

b. Defrost temperature

c. Exit defrost temperature

d. Manual defrost temperature

e. Capacity adjust cycle

f. Hysteresis temperature

g. Anti-freezing temperature of normal temperature outlet water

h. Anti-freezing temperature of low temperature outlet water

i. Setting the proportion for starting the unit for the first time for cooling

j. Setting the proportion for starting the unit for the first time for heating

k. Delay off time for water pump

l. Temperature of starting electric auxiliary heating

m. Temperature of stopping electric auxiliary heating

n. Selecting temperature unit (reserved):

o. Setting temperature difference protection of inlet and outlet water

Press the "▼" and "▲" buttons to select the desired option, and press the "OK" button to access the interface.

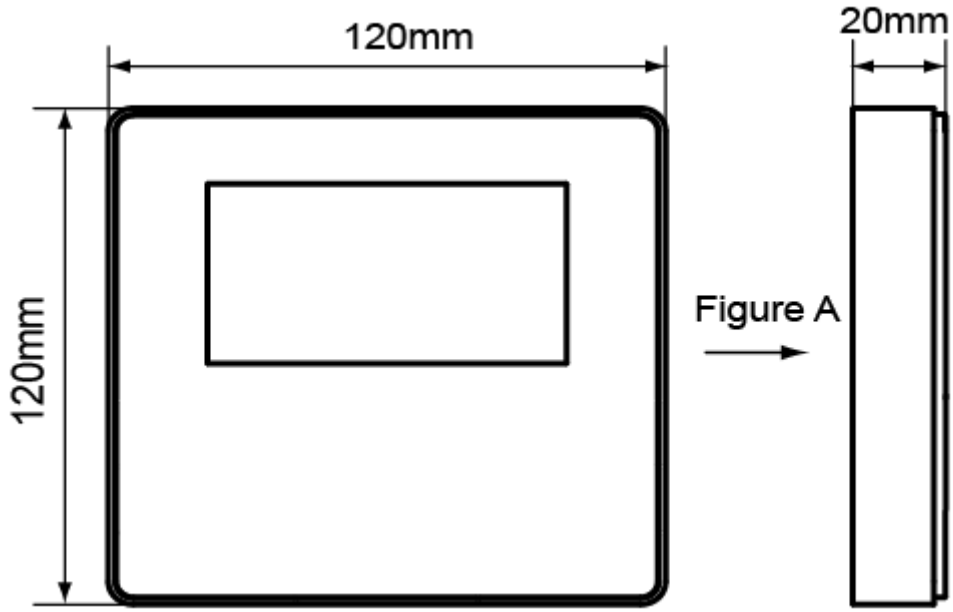
19.5 Installation

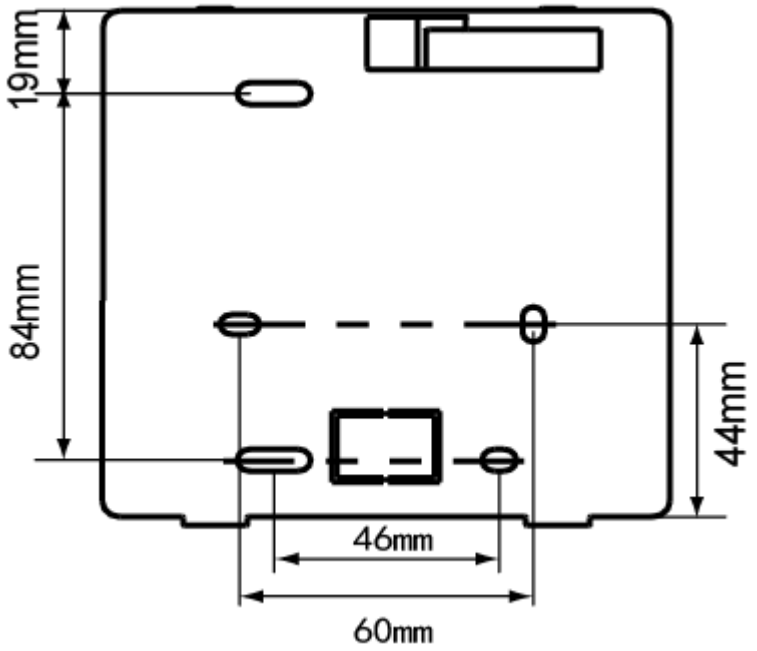
19.5.1 Preparation before installation

1) Check whether the following assemblies are complete.

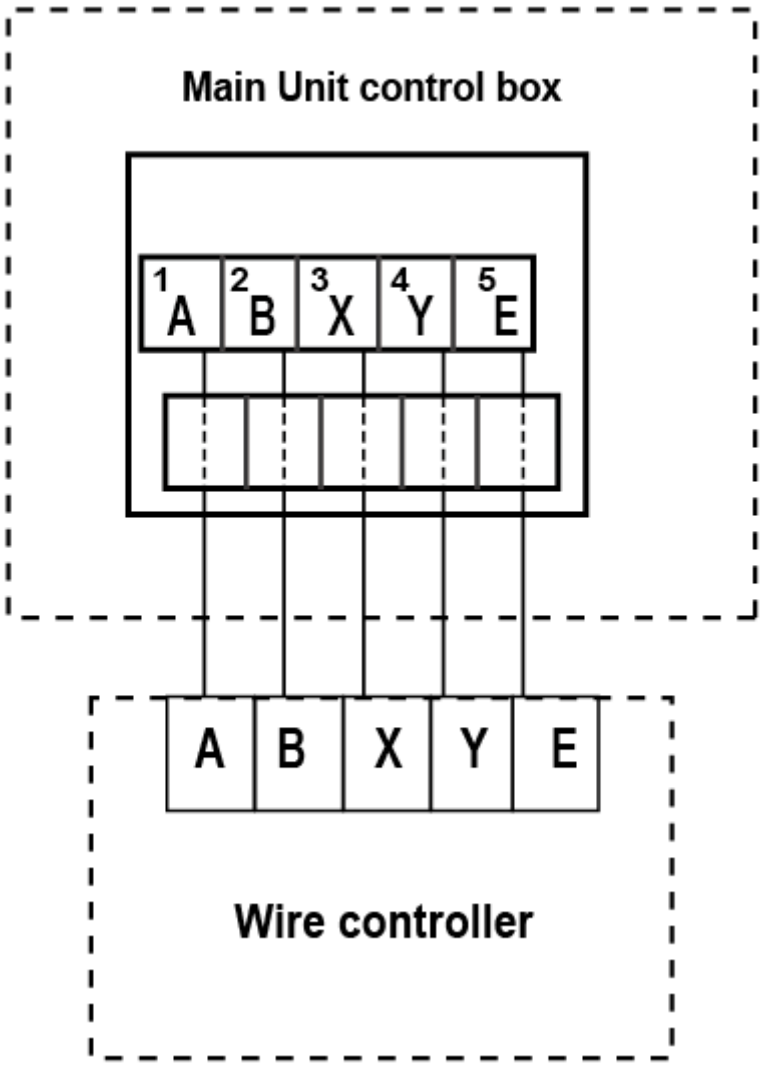
No.	Name	Qty.	Remarks
1	Wire controller	1	——
2	Cross round head wood mounting screw	3	GB950-86 M4X20 (For Mounting on the Wall)
3	Cross round head mounting screw	2	M4X25 GB823-88 (For Mounting on the Electrical Switch Box)
4	Installation & Owner's Manual	1	——
5	Plastic bolt	2	This accessory is used when install the centralized control inside the electric cabinet
6	Plastic expansion pipe	3	For Mounting on the Wall

19.5.2 Structure size figure





19.5.3 Wiring



19.5.4 Back cover installation

1) Use straight head screwdriver to insert into the buckling position in the bottom of wire controller, and spin the screwdriver to take down the back cover. (Pay attention to spinning direction, otherwise will damage the back cover!)

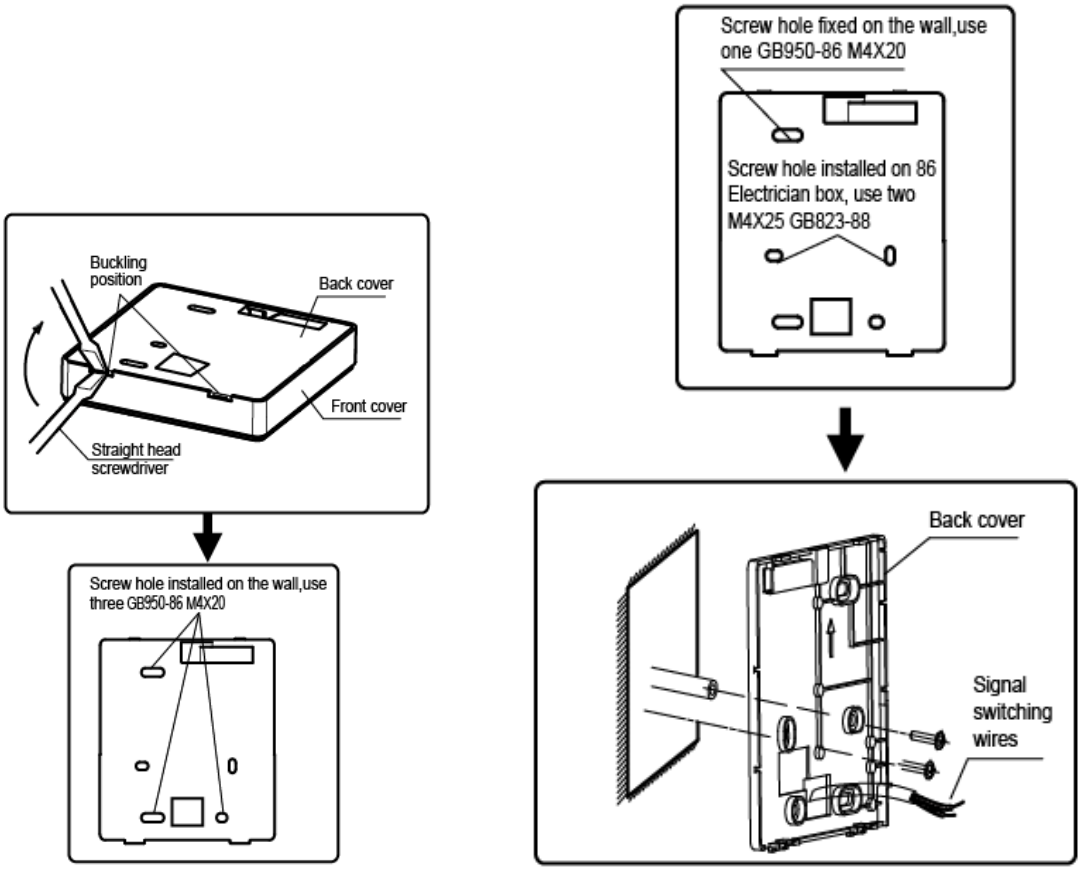
2) Use three GB950-86 M4X20 screws to directly install the back cover on the wall.

3) Use two M4X25 GB823-88screws to install the back cover on the 86 electrician box,and use one GB950-86 M4X20 screws for fixing on the wall.

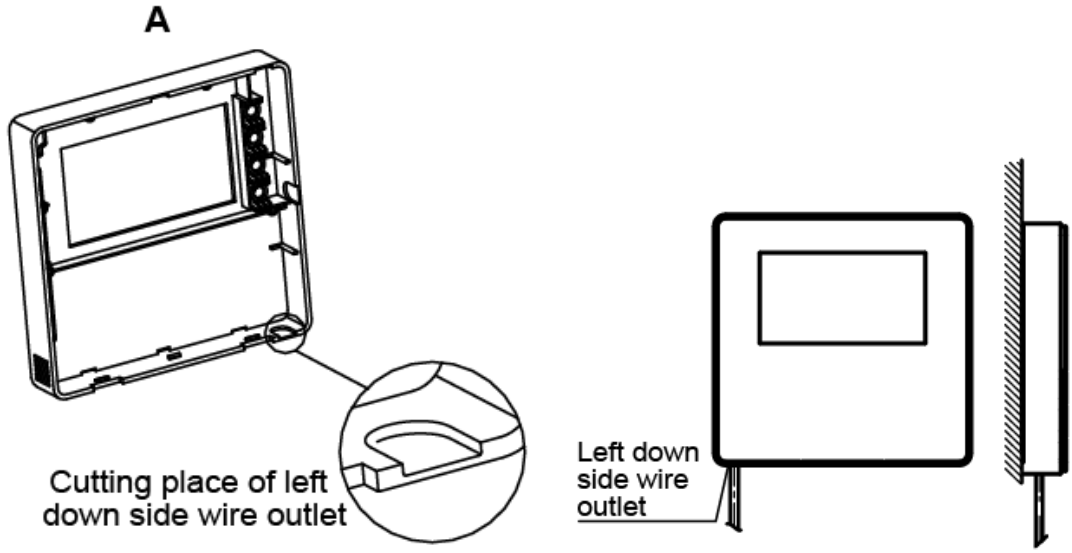
4) Adjust the length of two plastic screw bars in the accessory to be standard length from the electrical box screw bar to the wall. Make sure when install the screw bar to the wall, make it as flat as the wall.

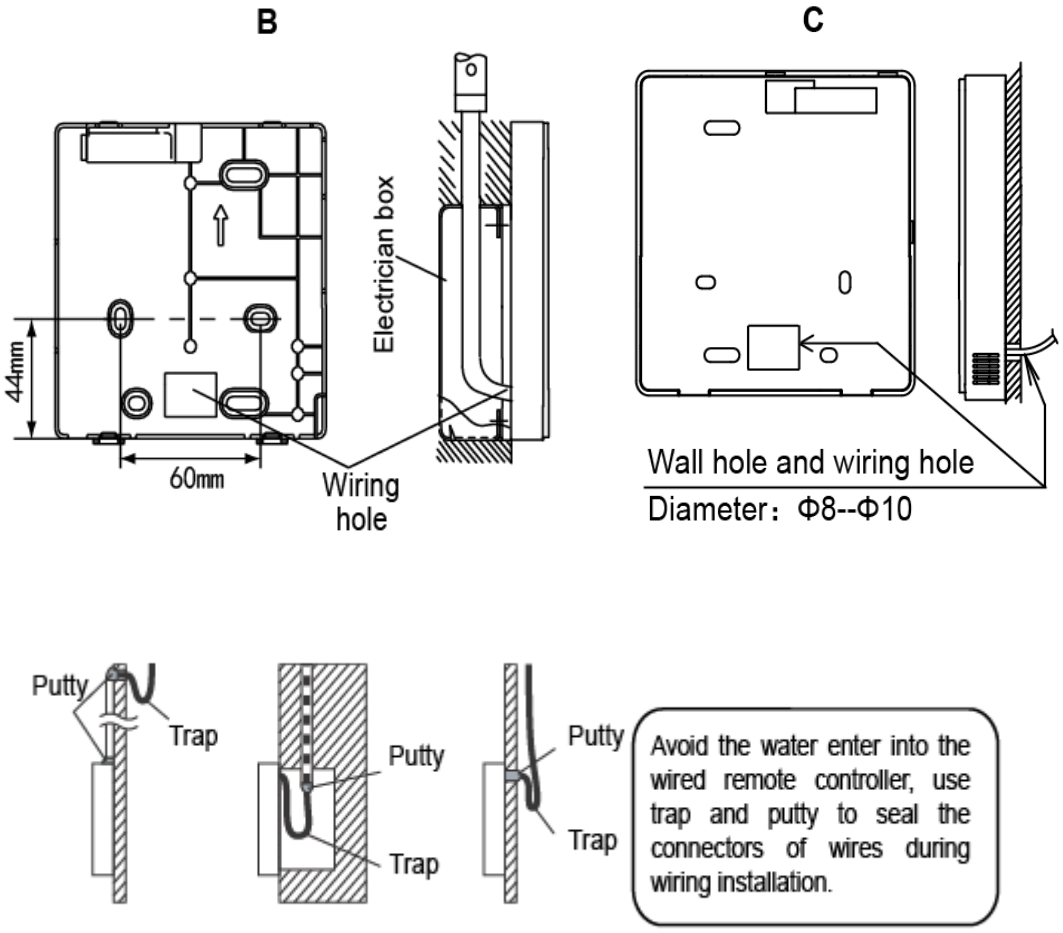
5) Use cross head screws to fix the wire controller bottom cover in the wall through the screw bar. Make sure the wire controller bottom cover is on the same level after installation, and then install the wire controller back to the bottom cover.

6) Over fasten the screw will lead to deformation of back cover.



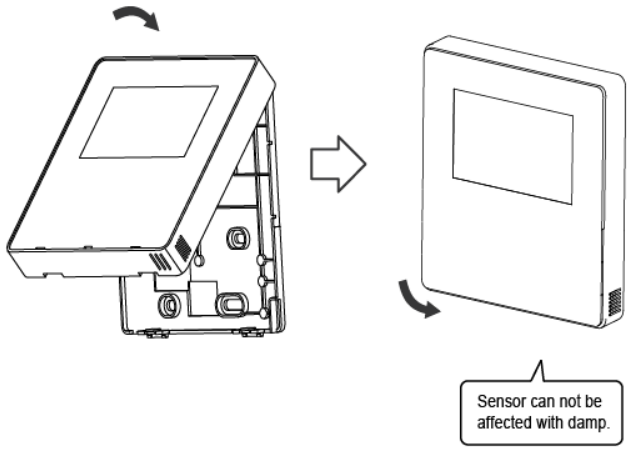
19.5.5 Wire outlet



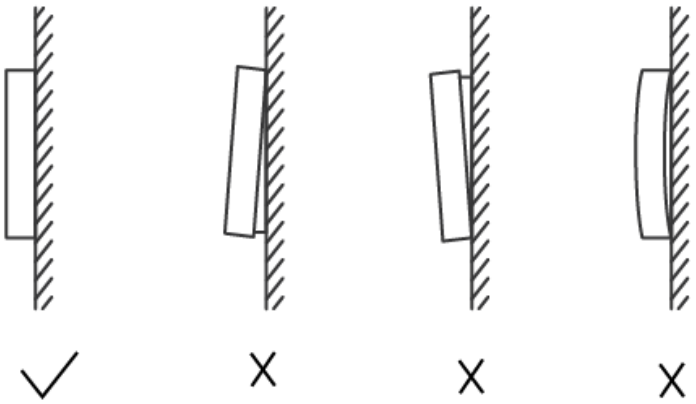


19.5.6 Front cover installation

After adjusting the front cover and then buckle the front cover; avoid clamping the communication switching wire during installation.



Correct install the back cover and firmly buckle the front cover and back cover, otherwise will make the front cover drop off.



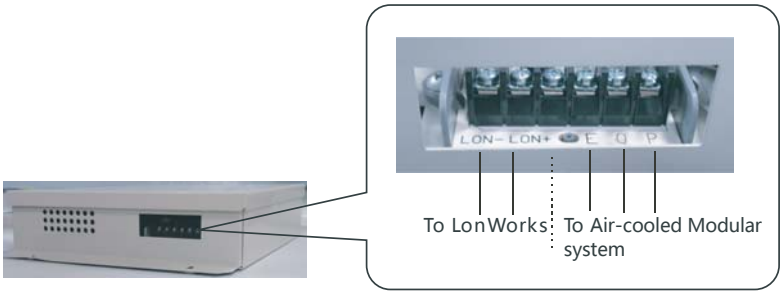
20. Modubus gateway (customization option)

The modbus gateway can be customized, the modbus protocol built in wired controller KJRM-120H/BMWKO-E, it realizes intelligent network control by X Y E ports. It can connect up to 16 wired controllers, each wired controller can control up to16 units.

21. Lonworks gateway (customization option)

21.1 Introduction

It is applied the central A/C system and the Building Management System (BMS) (namely Automated Building System) to realize the integration of A/C system and Building Management system.



21.2 Features

Insert the central A/C system to LonWorks network.

Comply with LonMark Standard, gateways is an intelligent node base on LonWorks technique.

The core control module of node apply. Flash Memory, which application program could be downloaded on line.

Connect to LonWorks network by twisted pair wire, and the communication mode is nonpolar.

Provide with a LonWorks control interface for BMS by network variables complying with LonMark standard.

LonWorks interoperability Guidelines Version 3.4 Compliance LonWorks gateway between LonMark /LonTalk protocol andMDPP (Private protocol).

The gateway can convert the LonTalk protocol to the MDPP protocol.

Connection to 16(MAX) units.

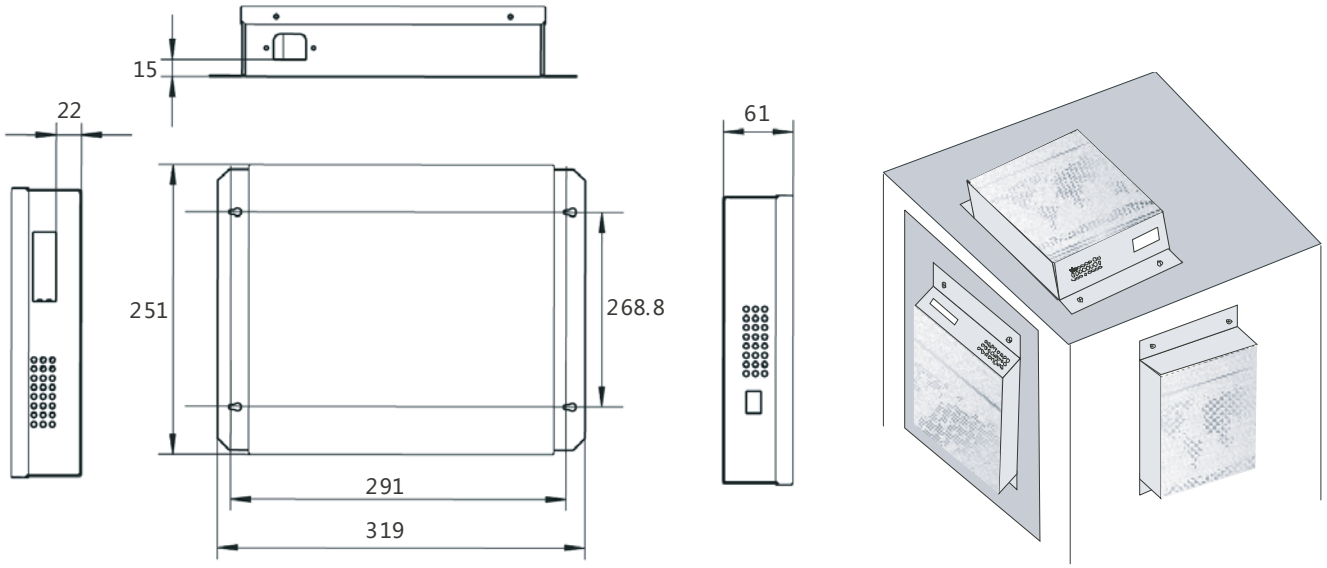
Valid address for each unit: 0x00~0x0F.

21.3 Specifications

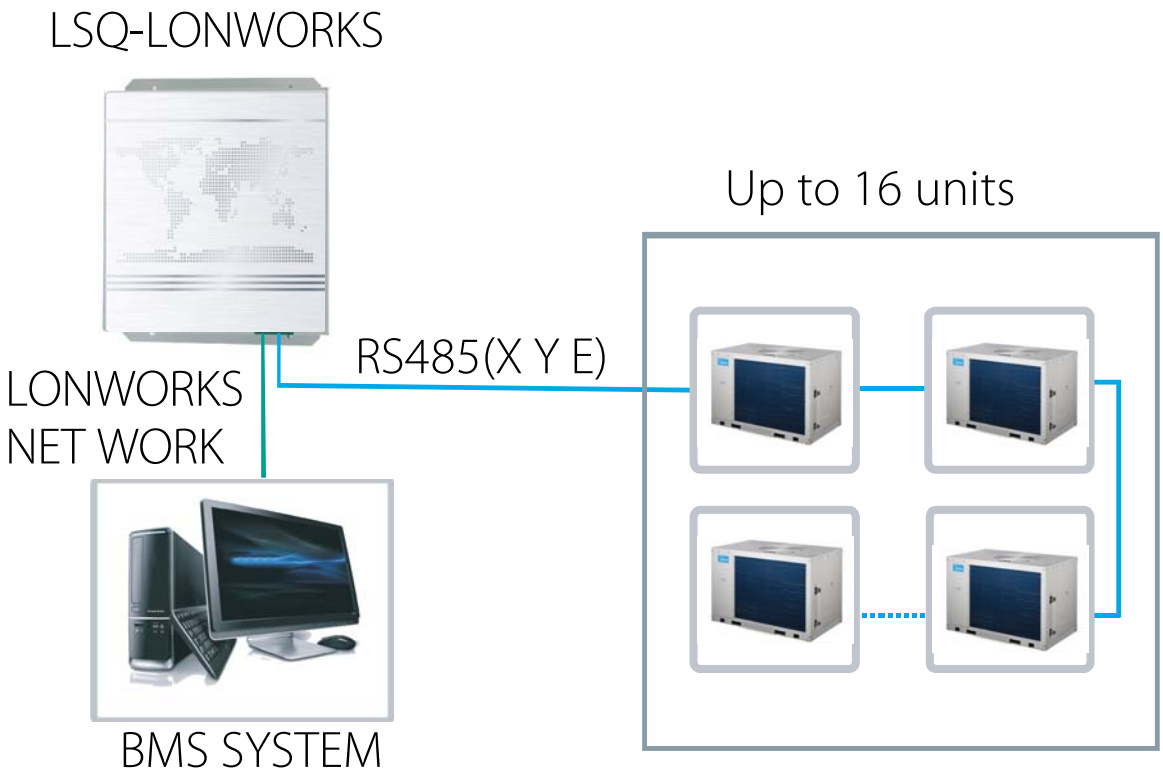
NO.	FUNCTION	DESCRIPTION
1	Processor memorizer	Neure chip, 10MHz, 64K Flash memorizer
2	Functions	● Hidden operation switch ● Operation LED (Red) ● Power LED(Green)
3	Transceiver	FTT-10A+isolating transformer
4	FTT-10A+isolating transformer	● Voltage range：177~254VAC ● MAX Current:2A
5	Operation ambient	● temperature:0～70℃ ● Relative humidity:25～90%
6	Software configuration	● LonMark standard allocative attribute ● Support Direct-Memory reading and writing by the LNS network management tool.
7	Communication port	Communication port
8	Size	31.9cm X 25.1cm X 6.1cm

21.4 External dimension

There are three installation methods as the following figure. Do not install the unit in any other orientation



21.5 Connection Method



Appendix

1.Temperature -Resistance characteristic sheet forT3,T4,Tz/7,Th,Taf1,Taf2,Twi,TwoTw.

Sensor characteristic sheet Unit：Temp:℃--K, Ratio:KΩ

Temp.	Ratio	Temp.	Ratio	Temp.	Ratio	Temp.	Ratio
-20	115.266	20	12.6431	60	2.35774	100	0.62973
-19	108.146	21	12.0561	61	2.27249	101	0.61148
-18	101.517	22	11.5	62	2.19073	102	0.59386
-17	96.3423	23	10.9731	63	2.11241	103	0.57683
-16	89.5865	24	10.4736	64	2.03732	104	0.56038
-15	84.219	25	10	65	1.96532	105	0.54448
-14	79.311	26	9.55074	66	1.89627	106	0.52912
-13	74.536	27	9.12445	67	1.83003	107	0.51426
-12	70.1698	28	8.71983	68	1.76647	108	0.49989
-11	66.0898	29	8.33566	69	1.70547	109	0.486
-10	62.2756	30	7.97078	70	1.64691	110	0.47256
-9	58.7079	31	7.62411	71	1.59068	111	0.45957
-8	56.3694	32	7.29464	72	1.53668	112	0.44699
-7	52.2438	33	6.98142	73	1.48481	113	0.43482
-6	49.3161	34	6.68355	74	1.43498	114	0.42304
-5	46.5725	35	6.40021	75	1.38703	115	0.41164
-4	44	36	6.13059	76	1.34105	116	0.4006
-3	41.5878	37	5.87359	77	1.29078	117	0.38991
-2	39.8239	38	5.62961	78	1.25423	118	0.37956
-1	37.1988	39	5.39689	79	1.2133	119	0.36954
0	35.2024	40	5.17519	80	1.17393	120	0.35982
1	33.3269	41	4.96392	81	1.13604	121	0.35042
2	31.5635	42	4.76253	82	1.09958	122	0.3413
3	29.9058	43	4.5705	83	1.06448	123	0.33246
4	28.3459	44	4.38736	84	1.03069	124	0.3239
5	26.8778	45	4.21263	85	0.99815	125	0.31559
6	25.4954	46	4.04589	86	0.96681	126	0.30754
7	24.1932	47	3.88673	87	0.93662	127	0.29974
8	22.5662	48	3.73476	88	0.90753	128	0.29216
9	21.8094	49	3.58962	89	0.8795	129	0.28482
10	20.7184	50	3.45097	90	0.85248	130	0.2777
11	19.6891	51	3.31847	91	0.82643	131	0.27078
12	18.7177	52	3.19183	92	0.80132	132	0.26408
13	17.8005	53	3.07075	93	0.77709	133	0.25757
14	16.9341	54	2.95896	94	0.75373	134	0.25125
15	16.1156	55	2.84421	95	0.73119	135	0.24512
16	15.3418	56	2.73823	96	0.70944	136	0.23916
17	14.6181	57	2.63682	97	0.68844	137	0.23338
18	13.918	58	2.53973	98	0.66818	138	0.22776
19	13.2631	59	2.44677	99	0.64862	139	0.22231

2.Temperature -Resistance characteristic sheet for Tp1 and Tp2

Sensor characteristic sheet Unit：temp:℃--K, Ratio:KΩ

Tem.	Ratio	Tem.	Ratio	Temp.	Ratio	Temp.	Ratio	Temp.	Ratio
-40	2889.60000	13	148.39300	66	17.29460	119	3.45032	172	0.97524
-39	2704.61400	14	141.59040	67	16.70980	120	3.35400	173	0.95632
-38	2532.87200	15	135.14040	68	16.13360	121	3.26198	174	0.93826
-37	2373.34200	16	129.00000	69	15.59180	122	3.17340	175	0.92020
-36	2225.07800	17	123.17780	70	15.06720	123	3.08740	176	0.90214
-35	2087.22000	18	117.65660	71	14.55980	124	3.00484	177	0.88494
-34	1957.44600	19	112.41060	72	14.07820	125	2.92400	178	0.86774
-33	1836.70200	20	107.43980	73	13.60520	126	2.85090	179	0.85054
-32	1724.38600	21	102.70120	74	13.15800	127	2.78038	180	0.83420
-31	1619.72400	22	98.19480	75	12.72800	128	2.71158	181	0.81614
-30	1522.20000	23	93.92060	76	12.30660	129	2.64450	182	0.79808
-29	1430.54120	24	89.86140	77	11.91100	130	2.58000	183	0.78088
-28	1345.07440	25	86.00000	78	11.52400	131	2.51636	184	0.76454
-27	1265.35240	26	82.31060	79	11.15420	132	2.45444	185	0.74820
-26	1190.94520	27	78.81040	80	10.79300	133	2.39424	186	0.73358
-25	1121.45720	28	75.47360	81	10.44900	134	2.33576	187	0.71982
-24	1056.14020	29	72.30020	82	10.12220	135	2.27900	188	0.70606
-23	995.10600	30	69.28160	83	9.80400	136	2.22396	189	0.69230
-22	938.04500	31	66.39200	84	9.49440	137	2.17150	190	0.67940
-21	884.66480	32	63.64860	85	9.20200	138	2.11990		
-20	834.71600	33	61.02560	86	8.91820	139	2.07002		
-19	787.65680	34	58.53160	87	8.64300	140	2.02100		
-18	743.58180	35	56.15800	88	8.37640	141	1.97370		
-17	702.29320	36	53.88760	89	8.11840	142	1.92812		
-16	663.59320	37	51.72040	90	7.86900	143	1.88340		
-15	627.28400	38	49.65640	91	7.64110	144	1.83954		
-14	593.03020	39	47.69560	92	7.40460	145	1.79740		
-13	560.88340	40	45.81220	93	7.18530	146	1.75354		
-12	530.71460	41	44.00620	94	6.97288	147	1.71140		
-11	502.36900	42	42.29480	95	6.76820	148	1.67012		
-10	475.74340	43	40.65220	96	6.57126	149	1.62970		
-9	450.57120	44	39.07840	97	6.38120	150	1.59100		
-8	426.90400	45	37.58200	98	6.19716	151	1.54886		
-7	404.64720	46	36.14580	99	6.02000	152	1.50844		
-6	383.70620	47	34.76120	100	5.84800	153	1.46888		
-5	363.98640	48	33.44540	101	5.68632	154	1.43018		
-4	345.31580	49	32.18980	102	5.52980	155	1.39320		
-3	327.73740	50	30.98580	103	5.37930	156	1.36224		
-2	311.16520	51	29.83340	104	5.23310	157	1.33214		
-1	295.55620	52	28.72400	105	5.09120	158	1.30290		
0	280.82440	53	27.66620	106	4.95360	159	1.27452		
1	266.85800	54	26.65140	107	4.82030	160	1.24700		
2	253.68280	55	25.67960	108	4.69216	161	1.21948		
3	241.24720	56	24.75080	109	4.56660	162	1.19368		
4	229.49960	57	23.85640	110	4.44620	163	1.16788		
5	218.40560	58	23.00500	111	4.32322	164	1.14208		
6	207.87060	59	22.17940	112	4.20454	165	1.11800		
7	197.91180	60	21.39680	113	4.08930	166	1.09650		
8	188.49480	61	20.64000	114	3.97750	167	1.07500		
9	179.59380	62	19.90900	115	3.87000	168	1.05436		
10	171.16580	63	19.22100	116	3.75992	169	1.03458		
11	163.15920	64	18.55020	117	3.65328	170	1.01480		
12	155.57400	65	17.91380	118	3.55008	171	0.99502		

3.Temperature-Resistance characteristic sheet for Tf1 and Tf2 .

Sensor characteristic sheet Unit：temp:℃--K, Ratio:KΩ

Tem.	Ratio	Tem.	Ratio	Temp.	Ratio
-30	88.360	23	56.636	76	7.43
-29	828.120	24	54.224	77	7.191
-28	779.364	25	51.929	78	6.957
-27	733.844	26	49.734	79	6.734
-26	691.320	27	47.65	80	6.515
-25	651.571	28	45.662	81	6.308
-24	614.174	29	43.77	82	6.11
-23	579.198	30	41.97	83	5.919
-22	546.469	31	40.245	84	5.731
-21	515.825	32	38.606	85	5.555
-20	487.126	33	37.039	86	5.384
-19	460.063	34	35.547	87	5.217
-18	434.695	35	34.127	88	5.056
-17	410.909	36	32.767	89	4.901
-16	388.596	37	31.469	90	4.75
-15	367.644	38	30.232	91	4.612
-14	347.861	39	29.055	92	4.47
-13	329.280	40	27.925	93	4.338
-12	311.827	41	26.84	94	4.209
-11	295.415	42	25.812	95	4.086
-10	279.987	43	24.824	96	3.967
-9	265.389	44	23.877	97	3.852
-8	251.652	45	22.976	98	3.741
-7	238.724	46	22.111	99	3.634
-6	226.550	47	21.277	100	3.53
-5	215.077	48	20.483	101	3.432
-4	204.206	49	19.725	102	3.338
-3	1 3.963	50	18.999	103	3.247
-2	184.298	51	18.302	104	3.16
-1	175.189	52	17.632	105	3.073
0	166.584	53	16.992	106	2.991
1	158.421	54	16.378	107	2.91
2	150.713	55	15.79	108	2.833
3	143.434	56	15.227	109	2.757
4	136.551	57	14.685	110	2.685
5	130.047	58	14.168	111	2.61
6	123.866	59	13.667	112	2.538
7	118.019	60	13.192	113	2.469
8	112.485	61	12.463	114	2.402
9	107.251	62	12.021	115	2.337
10	102.292	63	11.606	116	2.271
11	97.577	64	11.201	117	2.206
12	93.107	65	10.816	118	2.143
13	88.873	66	10.442	119	2.083
14	84.858	67	10.089	120	2.025
15	81.049	68	9.741	121	1.969
16	77.421	69	9.414	122	1.916
17	73.978	70	9.097	123	1.864
18	70.710	71	8.79	124	1.815
19	67.604	72	8.5	125	1.766
20	64.658	73	8.214		
21	61.848	74	7.944		
22	59.174	75	7.685		

Quality Assurance ISO 9001

Environmental Management ISO 14001

Occupational Health and Safety Assessment OHSAS 18001

Midea CAC After-service Application

iOS Version

Android Version

Midea CAC News Application

iOS Version

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