

# OWNER'S & INSTALLATION MANUAL

## *DC Inverter Air-cooled Modular Chiller*

Applicable models: MC-SU30-RN1L  
MC-SU60-RN1L  
MC-SU90-RN1L

Original instructions  
Thank you very much for purchasing our air conditioner,  
Before using your air conditioner, please read this manual carefully and keep it for future reference.







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**ACCESSORIES**

Unit	Installation & Operation Manual	Temperature testing components of total water outlet	Transformer	Installation manual of wired controller
Qty.	1	1	1	1
Shape				
Purpose	_____	Use for installation (only need for setting the main module)		

# 1. INTRODUCTION

## 1.1 Main characteristics

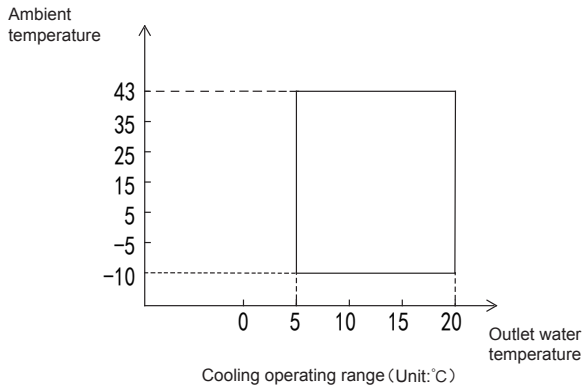
Air-cooled heat pump unit consists of one or more modules. Each module has an independent electronic control unit. In addition, there is also a network in the unit enabling communications among modules. Compact and easy to transport and install, the air-cooled heat pump unit requires less auxiliary facilities, such as cooling tower and cooling pump, and therefore costs less for consumers. The unit is provided together with central air conditioning equipment or cold, hot water terminal equipment. As a completely independent model, the unit is able to be installed outdoors, such as on the ground and on the roof. The unit's each module features efficient, low-noise and modular compressor, air-cooled condenser, plate evaporator and microcomputer control centre and so on, all of which are installed on a steel structure reliably. The unit's microcomputer control system is able to adjust energy input according to the load, to most closely match the conditions and reduce energy losses. 16 Modular units can be combined in parallel at most, with the number of units at the discretion of the user depending on the actual situation. The product can be widely applied to air conditioning schemes in new and reconstructed buildings for industrial and civil use, for example, restaurants, hotels, apartments, office buildings, hospitals, and industrial parks. For scenarios requiring silence and with higher requirements for the surroundings and water supply, the air-cooled heat pump modular unit is definitely the best choice.

## 1.2 Use conditions of the unit

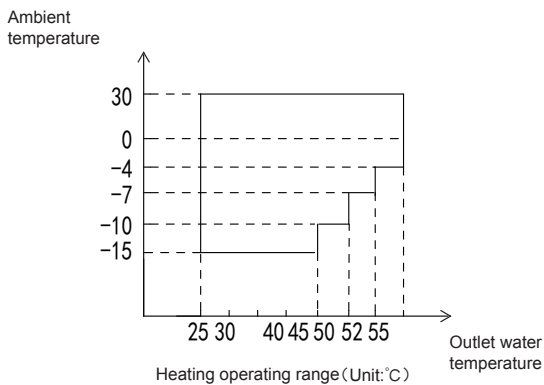
a. The standard voltage of power supply is 380-415V 3N~50Hz, the minimum allowable voltage is 342V, and the maximum voltage is 456V.

b. To maintain better performance, please operate the unit under the following outdoor temperature:

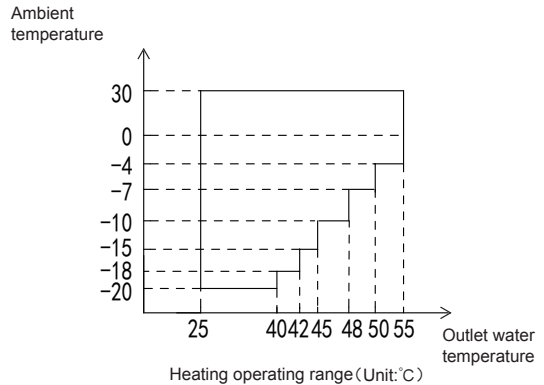
**MC-SU30-RN1L**  
**MC-SU60-RN1L**  
**MC-SU90-RN1L**



**MC-SU30-RN1L**  
**MC-SU60-RN1L**



**MC-SU90-RN1L**



## 2. SAFETY CONSIDERATION

To prevent injuries or property losses, make sure to observe the following instructions. Failure to do so may cause injuries or losses.

There are two types of safety instructions: warning and caution. Whichever type it is, you must read the information listed under it carefully.



### WARNING

Failure to observe a warning may result in death.



### CAUTION

Failure to observe a caution may result injury or damage to the equipment.



### WARNING

- Get your distributor or a professional to install the product. The installation personnel must be equipped with the professional knowledge. When you install on your own, any mistake you made during the operations may lead to a fire, electric shock, injury or water leakage.
- When purchasing items locally, purchase those designated by our company.
- Failure to do so may result in a fire, electric shock, or water leakage. Note to entrust a professional to install those items.
- When powering the unit, follow the regulations of the local electric company.
- Make sure the unit is grounded reliably in accordance with the laws. Otherwise, it may cause electric shock. When moving or reinstalling the modular unit, get your distributor or a professional to do so.
- If installed improperly, a fire, electric shock, injury or water leakage may occur. Never modify or repair the unit on your own.
- Otherwise, a fire, electric shock, injury or water leakage may occur. Get your distributor or a professional to do so.



### CAUTION

- Ensure that the residual current device (RCD) is installed. The RCD must be installed. Failure to install it may result in electric shock.
- Connect the cable properly. Otherwise, it may cause damage to electrical parts.
- Do not operate the unit near flammables (paint, coating, gasoline and chemical reagents) lest fire or explosion may occur. In the unlikely event of a fire, please turn off the main power immediately and put out the fire using an extinguisher.
- Do not touch refrigerant discharge parts to prevent being burnt.
- Service the unit regularly according to the manual, to ensure that the unit is in good condition. When the unit stops due to a fault, refer to the Fault Analysis and Troubleshooting in this manual, or contact the local customer service centre of Midea. Do not start the unit until the fault is eliminated.
- When finding refrigerant or chilled water (cooling water) leaks, turn off all the switches immediately. If you cannot do so through operating the controller, do not restart the unit unless the fault is located and eliminated.
- Use fuses with designated capacity. Do not use iron wires or copper wires, as doing so may result in serious damages to the unit or a fire.

### 3. BEFORE INSTALLATION

#### 3.1 Handling of the unit

The angle of inclination should not be more than 15° when carrying the unit in case of 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: each lifting rope (belt) should be able to bear 4 times the weight of the unit. Check the lifting hook and ensure that it is firmly attached to the unit. To avoid damages to the unit, a protective block made of wood, cloth or hard paper should be placed between the unit and rope when lifting, and its thickness should be 50mm or more. It is strictly forbidden to stand under the machine when it is hoisted.

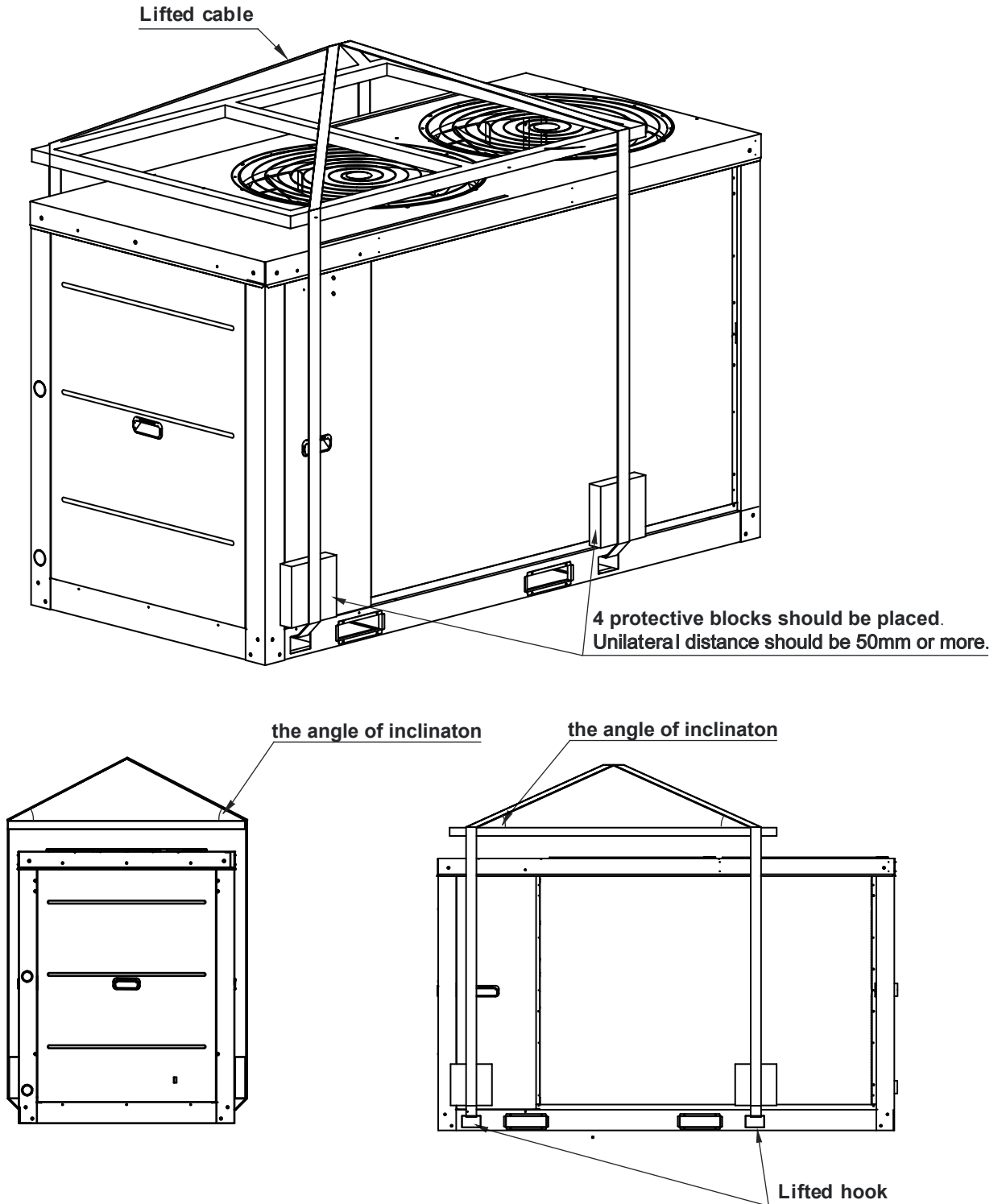


Fig. 3-1 lifting of the unit

## 4. IMPORTANT INFORMATION ON REFRIGERANT

This product contains fluorinated greenhouse gases covered by the Kyoto Protocol. Do not vent gases into the atmosphere.

Refrigerant type: R410A

GWP(1) value: 2088

(1) GWP = global warming potential

The refrigerant quantity is indicated on the unit name plate

- Add the refrigerant

Amount of factory -charged refrigerant is

MC-SU30-RN1L	10.5kg
MC-SU60-RN1L	17kg
MC-SU90-RN1L	27kg

## 5. SELECTION OF INSTALLATION SITE

5.1 Units can be installed on the ground or proper place on a roof, provided that sufficient ventilation can be guaranteed.

5.2 Do not install the unit in a scenario with requirements on noise and vibration.

5.3 When installing the unit, take measures to avoid exposure to direct sunlight, and keep the unit away from boiler pipeline and surroundings which might corrode the condenser coil and copper pipes.

5.4 If the unit is within the reach of unauthorized personnel, take protective measures for safety considerations, such as installing a fence. These measures can prevent man-caused or accidental injuries, and can also prevent the electrical parts in operation from being exposed when the main control box is opened.

5.5 Install the unit on a foundation at least 300 mm high above the ground, where the floor drain is provided, to ensure that water does not accumulate.

5.6 If installing the unit on the ground, put the steel base of the unit on the concrete foundation, which must be as deep as into the frozen soil layer. Ensure the installation foundation is separated from buildings, as the noises and vibration of the unit may adversely affect the latter. By means of the installation holes on the unit base, the unit can be fastened on the foundation reliably.

5.7 If the unit is installed on a roof, the roof must be strong enough to bear the weight of the unit and the weight of maintenance personnel. The unit can be placed on the concrete and groove-shaped steel frame, similar to the case when the unit is installed on the ground. The weight-bearing groove-shaped steel must match the installation holes of the shock absorber and is wide enough to accommodate the shock absorber.

5.8 For other special requirements for installation, please consult the building contractor, architectural designer or other professionals.



### NOTE

The selected installation site of the unit should facilitate connection of water pipes and wires, and be free from water inlet of oil fume, steam or other heat sources. Besides, the noise of the unit and cold and hot air should not influence the surrounding environment.

## 6. PRECAUTIONS ON INSTALLATION

### 6.1 Outline dimensional drawing

#### 6.1.1 MC-SU30/RN1L

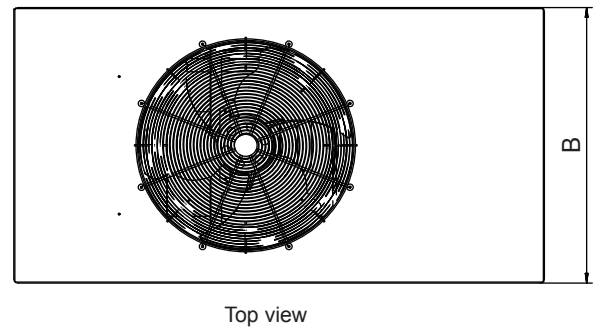
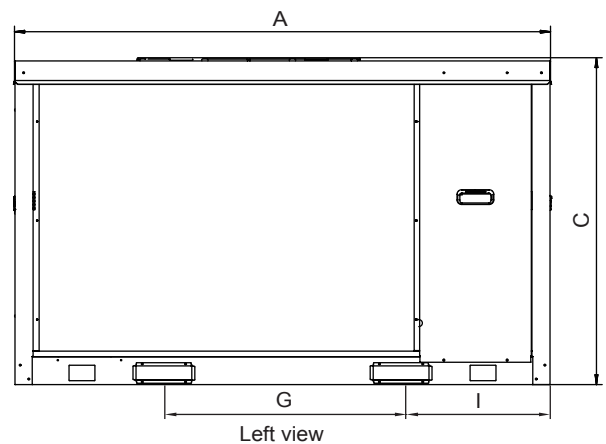
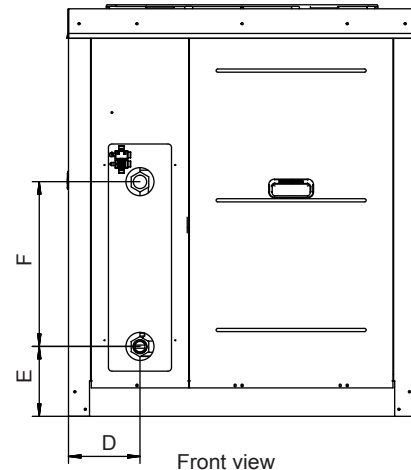
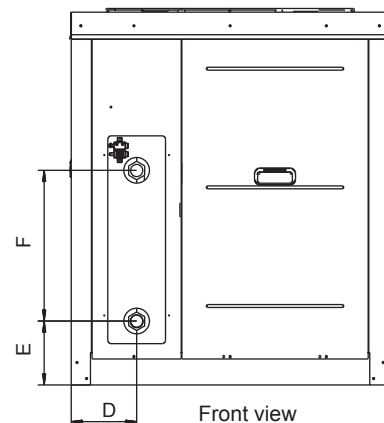


Fig. 6-1 outline dimensional of MC-SU30-RN1L

#### 6.1.2 MC-SU60-RN1L



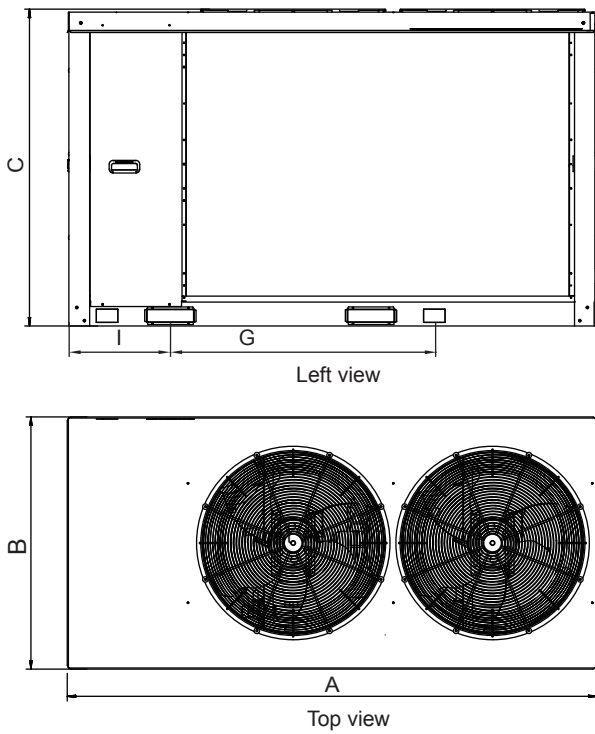


Fig. 6-2 outline dimensional of MC-SU60-RN1L

### 6.1.3 MC-SU90-RN1L

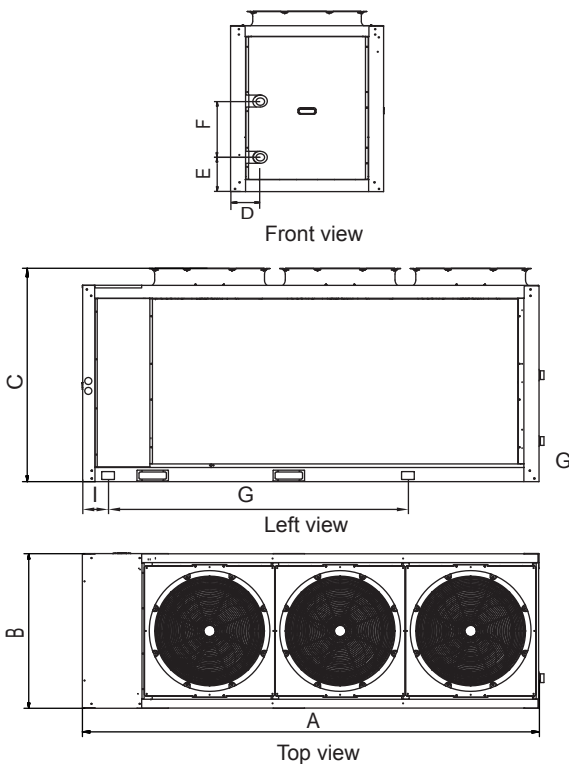


Fig. 6-3 outline dimensional of MC-SU90-RN1L

Table 6-1

Model	MC-SU30-RN1L	MC-SU60-RN1L	MC-SU90-RN1L
A	1870	2220	3220
B	1000	1055	1095
C	1175	1325	1513
D	204	234	286
E	200	210	210
F	470	470	470
G	788	1105	2116
H	880	958	1008
I	530	425	180



### NOTE

- After installing the spring damper, the total height of the unit will increase by 135mm or so.

## 6.2 Requirements of arrangement space of the unit

- 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.
- 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.
- If the unit needs to operate in winter, and the installation site may be covered by snow, the unit should

Table 6-2

Installation space (mm)	
A	$\geq 800$
B	$\geq 2000$
C	$\geq 2000$
D	$\geq 800$
E	$\geq 300$
F	$\geq 600$
G	$\geq 6000$



### 6.3 Space requirements for parallel installation of multiple Modular units

To avoid back flow of the air in the condenser and operational faults of the unit, the parallel installation of multiple Modular units can follow the direction A and D as shown in Fig. 6-5, the spaces between the unit and the obstacle are given in Table 6-2, and the space between adjacent Modular units should not be less than 300mm; the installation can also follow the direction B and C as shown in Fig. 6-5, the spaces between the unit and the obstacle are given in Table 6-2, and the space between adjacent Modular 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 Table 6-2, the space between adjacent Modular units in the direction A and D should not be less than 300mm, and the space between adjacent Modular 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.

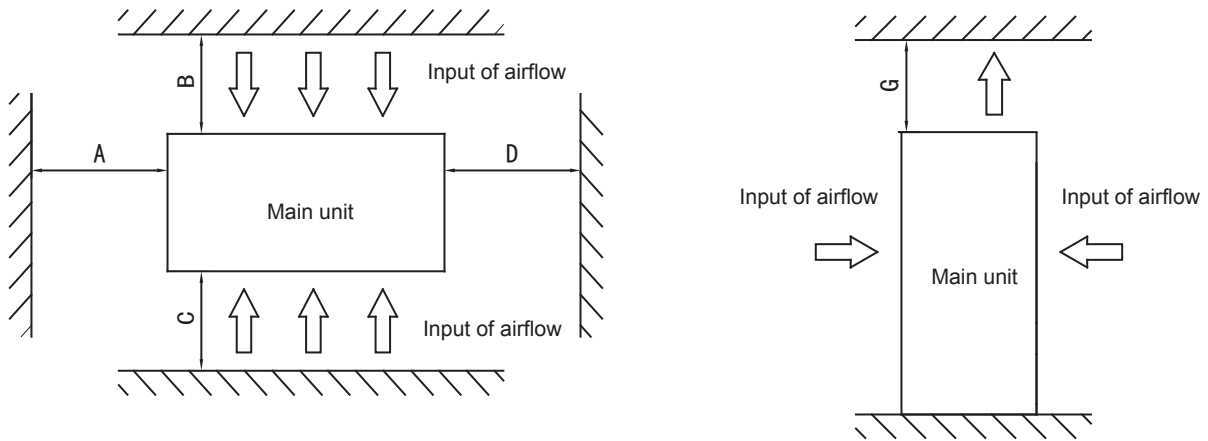


Fig. 6-4 single unit installation

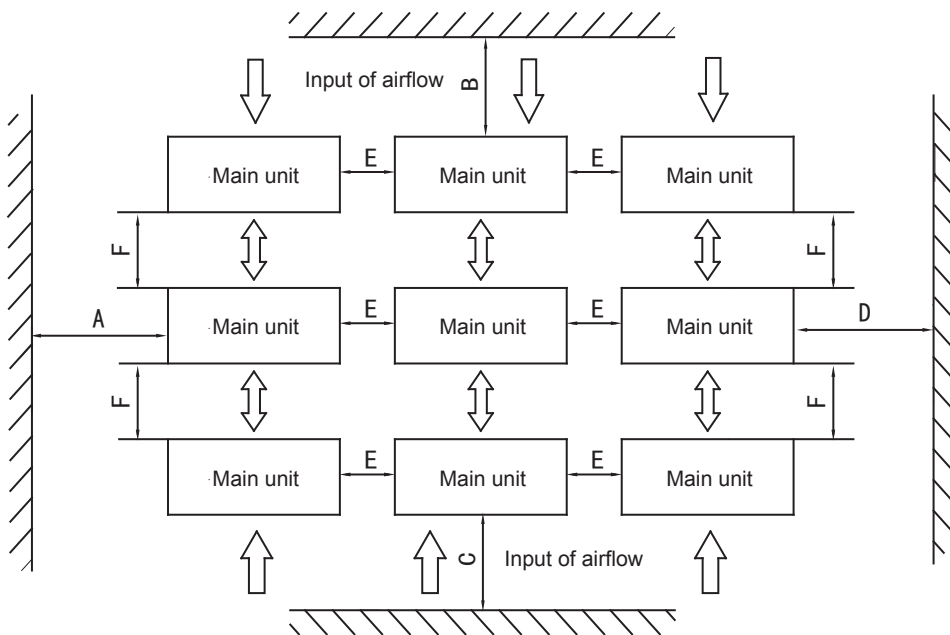


Fig. 6-5 multiple units installation

## 6.4 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 Table 12-1 (Table of applicable models and parameters) for operating weight.
- 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.

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

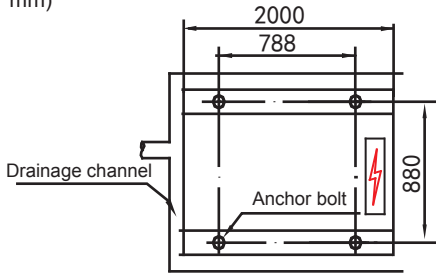


Fig. 6-6 Schematic diagram of installation dimension of MC-SU30M/RN1L

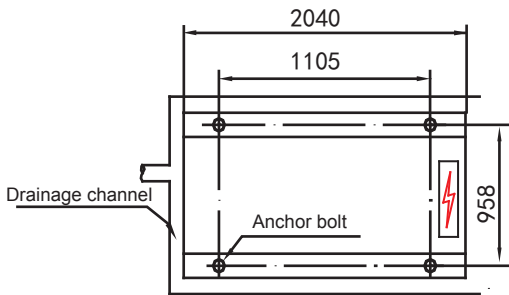


Fig. 6-7 Schematic diagram of installation dimension of MC-SU60M/RN1L

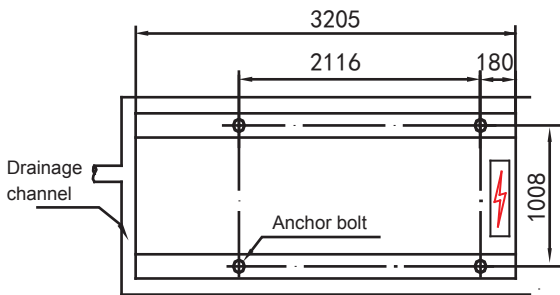


Fig. 6-8 Schematic diagram of installation dimension of MC-SU90M/RN1L

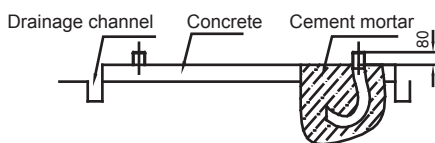


Fig. 6-9 diagram of installation foundation

## 6.5 Installation of damping devices

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

By means of the  $\Phi 15$ mm diameter installation holes on the steel frame of the unit base, the unit can be fastened on the foundation through the spring damper. See Fig.6-6, 6-7,6-8(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.

### 6.5.2 Installation steps of the damper

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



### NOTE

It is recommended that the damper should be fastened on the foundation with the provided holes. After the unit is placed on the foundation, the damper connected with the unit should not be moved, and the central clamp nut is not allowed to be tightened before the damper sustains load.

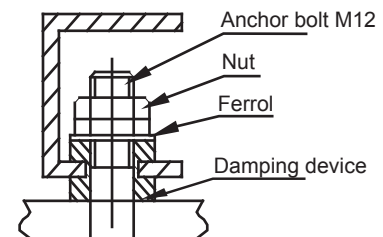


Fig. 6-10 installation of the damper

## 7. TYPICAL APPLICATION EXAMPLES

### 7.1 Application 1

Space heating only application without room thermostat connected to the unit. The temperature in each room is controlled by a valve on each water circuit. Heating is provided through floor heating loops.

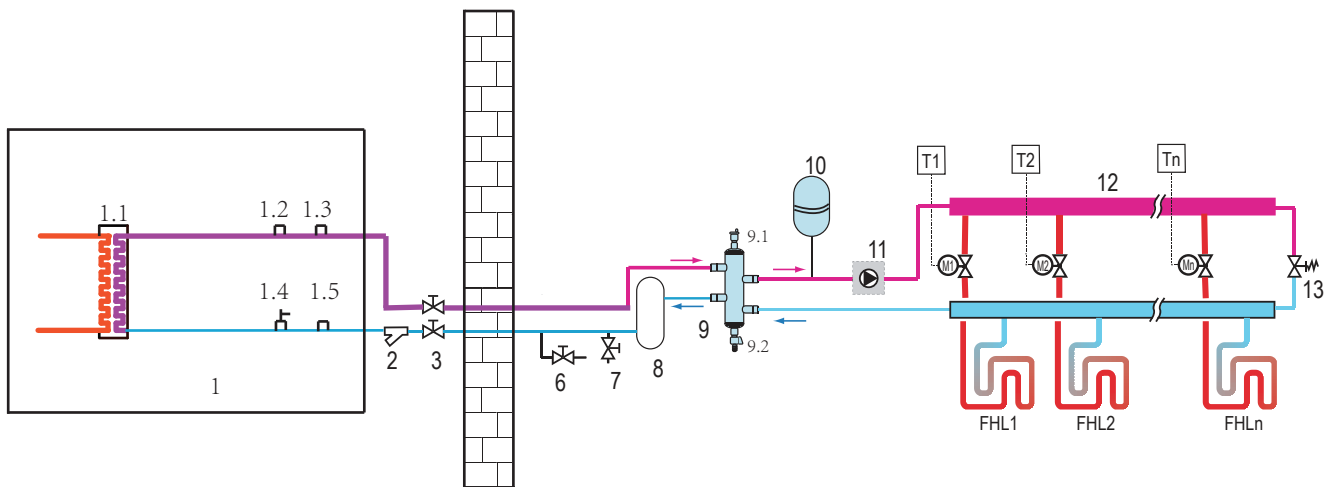


Fig.7-1 diagram of application 1

Table 7-1

No.	component	No.	component	No.	component
1	main unit	3	stop valve (field supply)	10	expansion vessel (field supply)
1.1	water side heat exchanger	6	drain valve (field supply)	11	P_o:outside circulation pump (field supply)
1.2	safety valve	7	fill valve (field supply)	12	collector (field supply)
1.3	manual air purge valve	8	buffer tank (field supply)	13	bypass valve (field supply)
1.4	water flow switch	9	balance tank (field supply)		FHL 1...n floor heating loop
1.5	manual water drain valve	9.1	air purge valve		M1...n motorized valve (field supply)
2	y-shape filter	9.2	drain valve		T1...n room thermostat (field supply)

## 7.2 Application 2

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

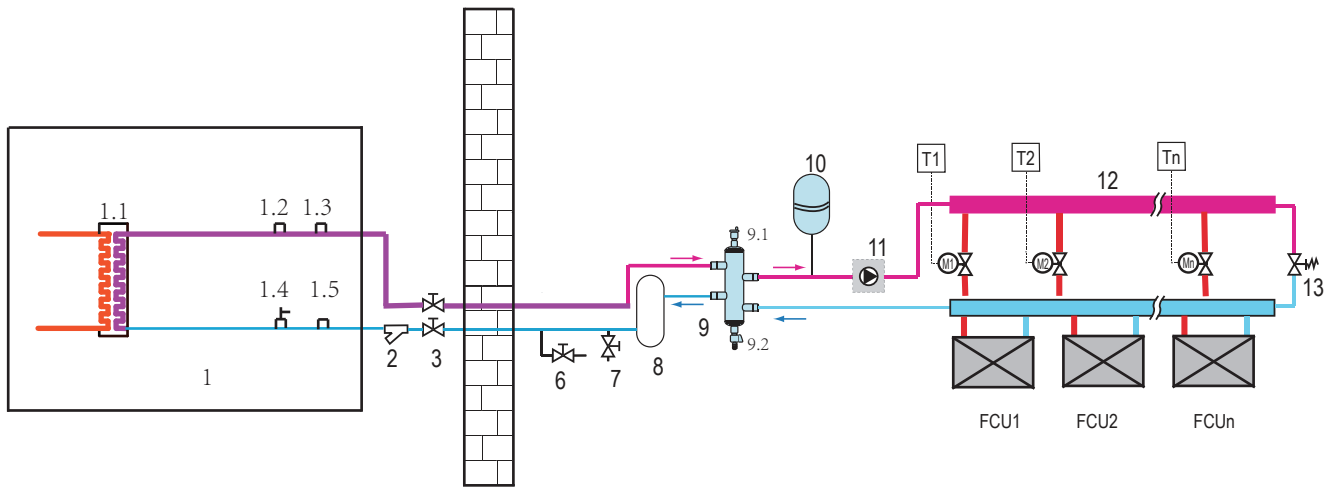


Fig.7-2 diagram of application 2

Table 7-2

No.	component	No.	component	No.	component
1	main unit	3	stop valve (field supply)	10	expansion vessel (field supply)
1.1	water side heat exchanger	6	drain valve (field supply)	11	P_o:outside circulation pump (field supply)
1.2	safety valve	7	fill valve (field supply)	12	collector (field supply)
1.3	manual air purge valve	8	buffer tank (field supply)	13	bypass valve (field supply)
1.4	water flow switch	9	balance tank (field supply)		FCU 1...n fan coil units
1.5	manual water drain valve	9.1	air purge valve		M1...n motorized valve (field supply)
2	y-shape filter	9.2	drain valve		T1...n room thermostat (field supply)

### 7.3 Application 3

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

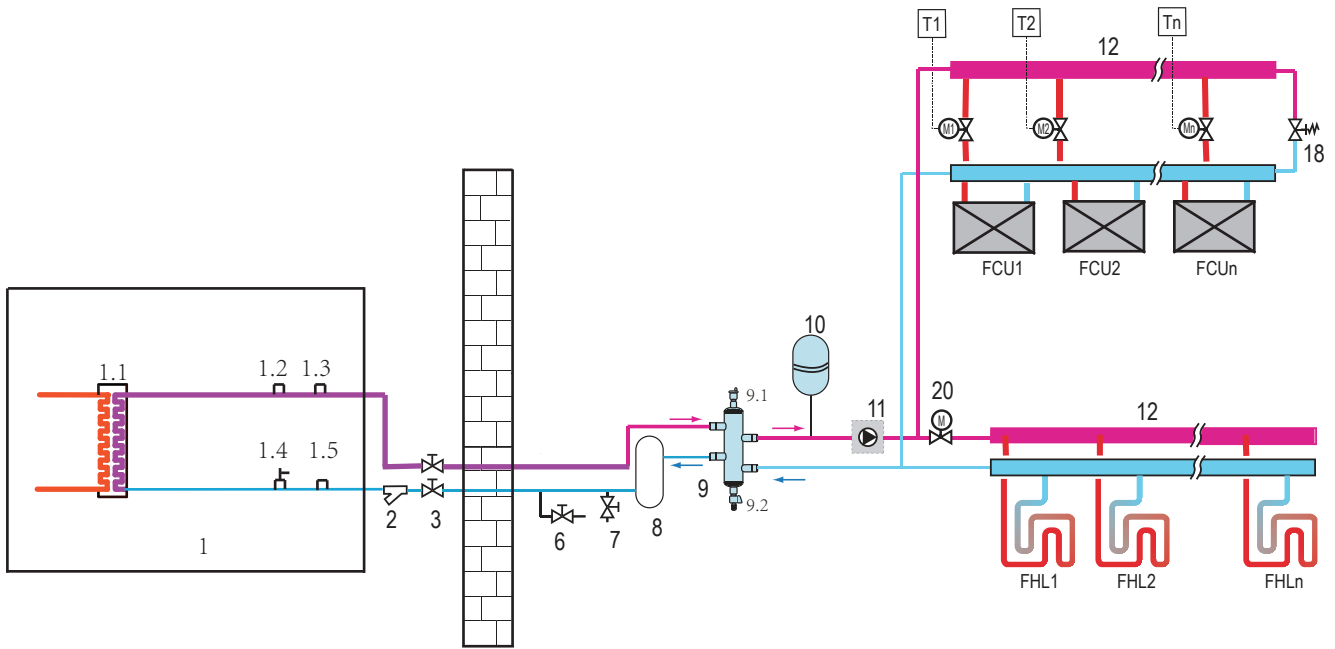


Fig.7-3 diagram of application 3

Table 7-3

NO.	component	NO.	component	NO.	component
1	main unit	7	fill valve (field supply)		FHL 1...n floor heating loop
1. 1	water side heat exchanger	8	buffer tank (field supply)		FCU 1...n fan coil units
1. 2	safety valve	9	balance tank (field supply)		M 1...n motorized valve (field supply)
1. 3	manual air purge valve	9. 1	air purge valve		
1. 4	water flow switch	9. 2	drain valve		
1. 5	manual water drain valve	10	expansion vessel (field supply)		
2	y-shape filter	11	P_o:outside circulation pump (field supply)		
3	stop valve (field supply)	12	collector (field supply)		
6	drain valve (field supply)	18	bypass valve (field supply)		
	T1...n room thermostat (field supply)	20	SV2: 2-way valve (field supply)		

## 8. OVERVIEW OF THE UNIT

### 8.1 Main parts of the unit

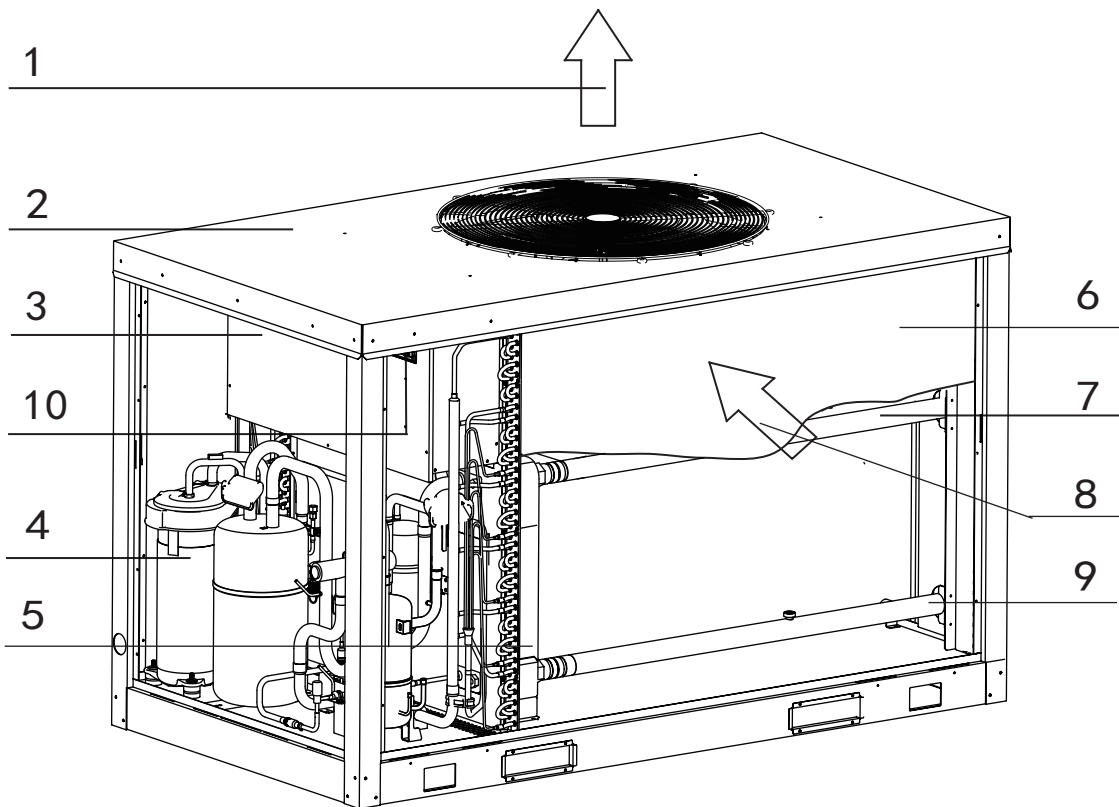


Fig. 8-1 main parts of MC-SU30-RN1L

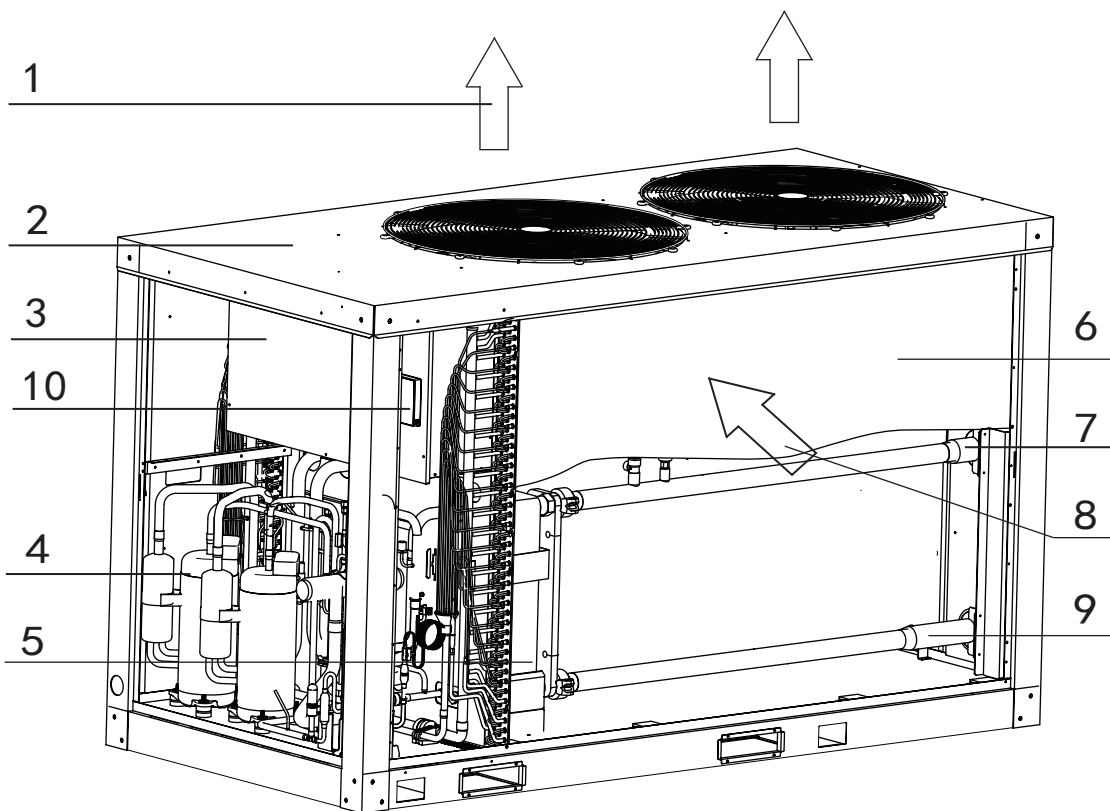


Fig. 8-2 main parts of MC-SU60-RN1L

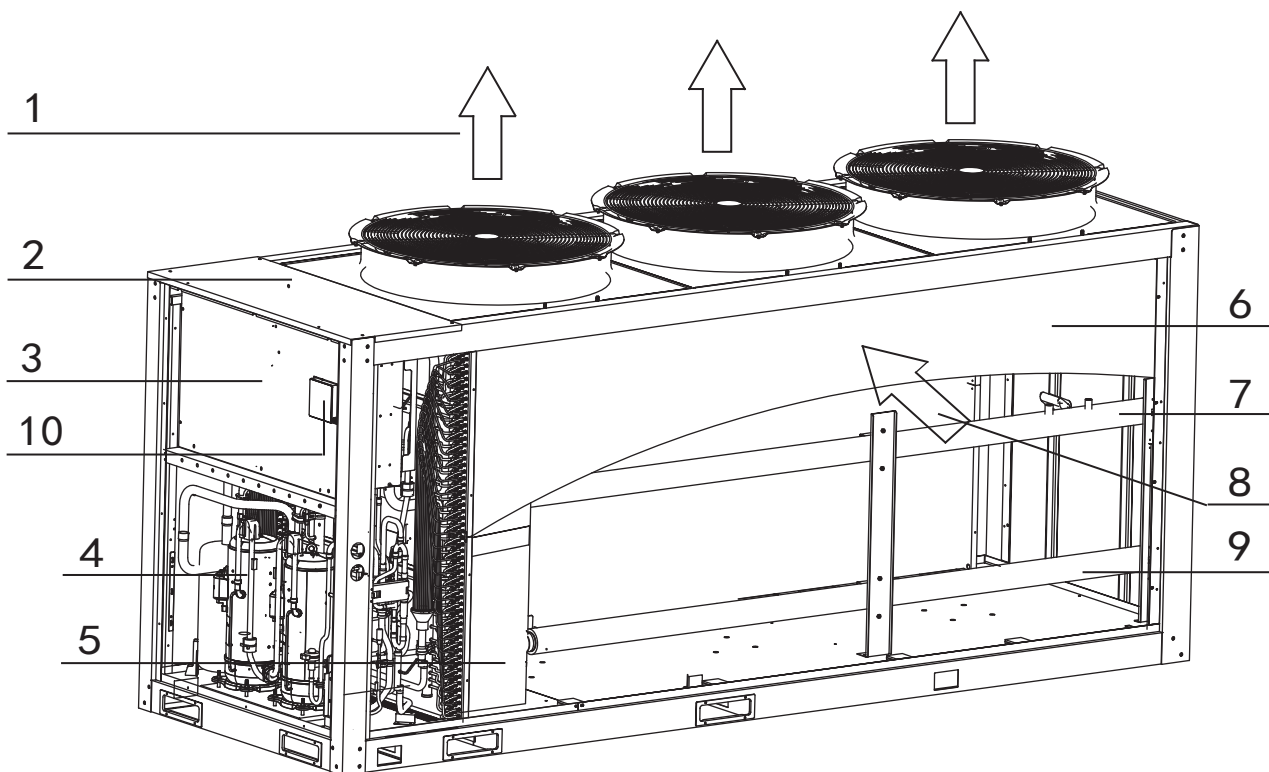
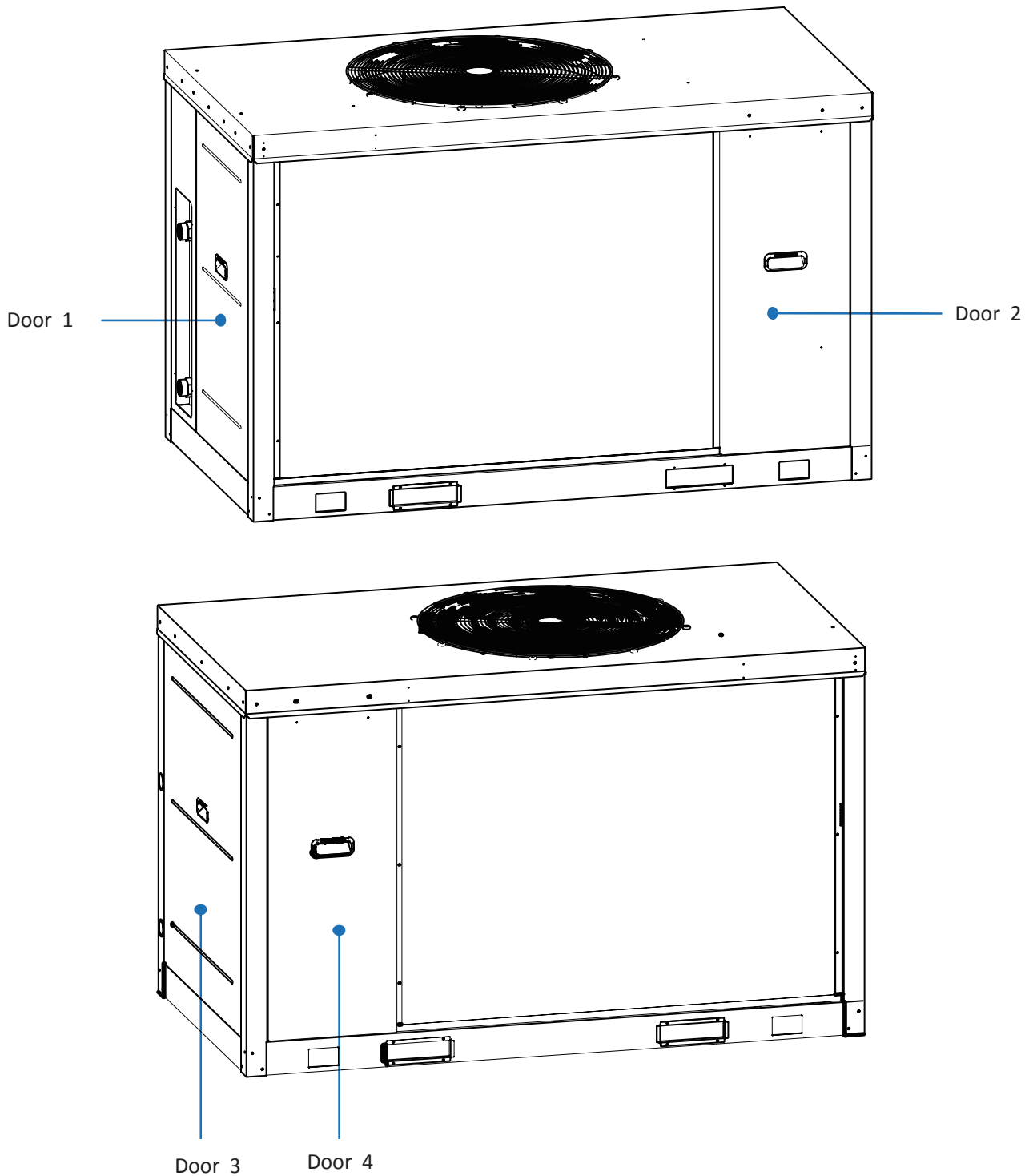


Fig. 8-3 main parts of MC-SU90-RN1L

NO.	1	2	3	4	5	6	7
NAME	Air outlet	Top cover	Electric control box	Compressor	Evaporator	Condenser	Water inlet
NO.	8	9	10				
NAME	Air inlet	Water outlet	wire controller (It can be placed indoors)				

## 8.2 Opening the unit

By means of a detachable service panel, the maintenance personnel can easily access the interior components of the unit.

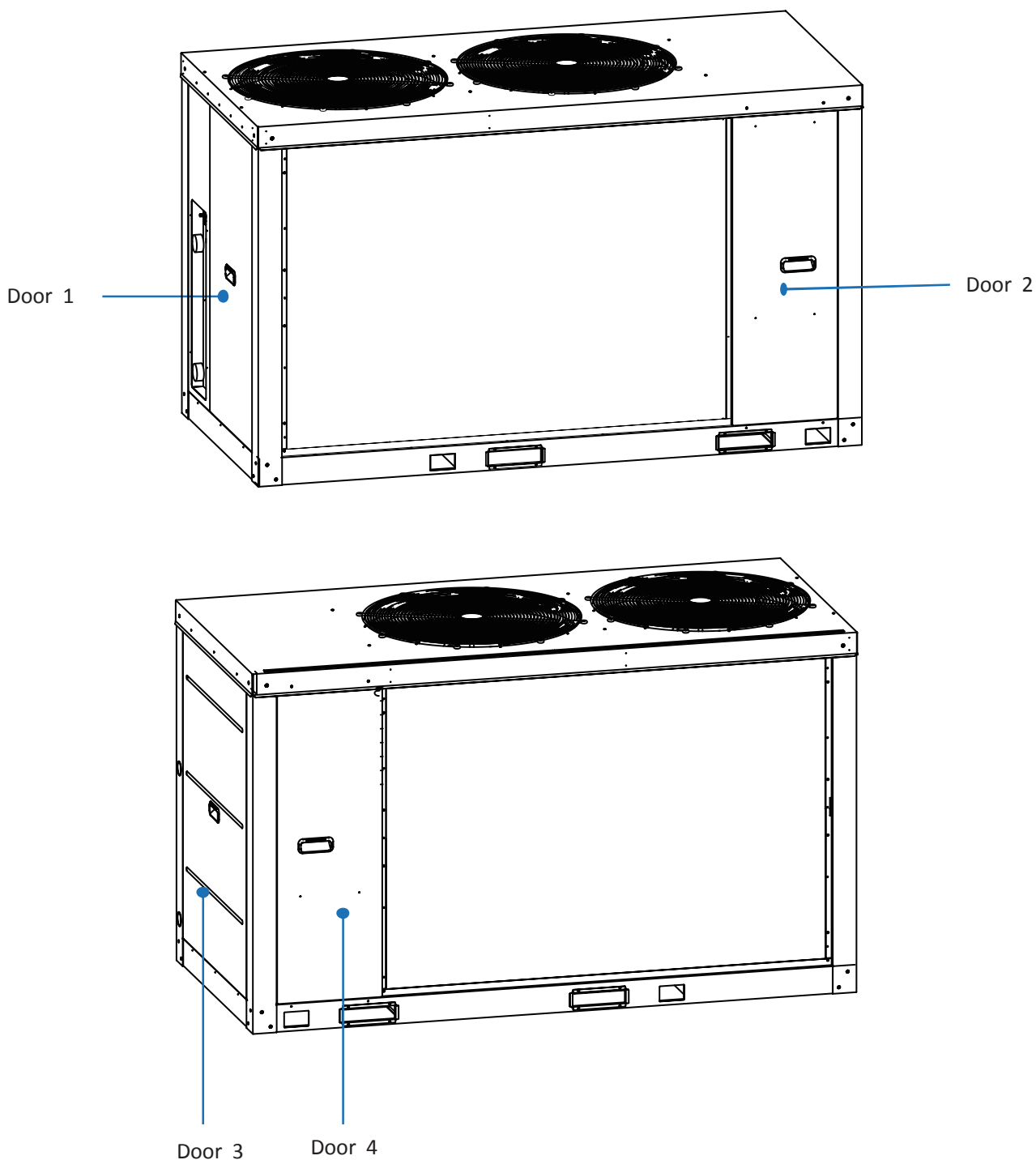


*Fig. 8-4 doors of MC-SU30-RN1L*

Door 1 give access to the compartment of water pipes and water side heat exchanger.

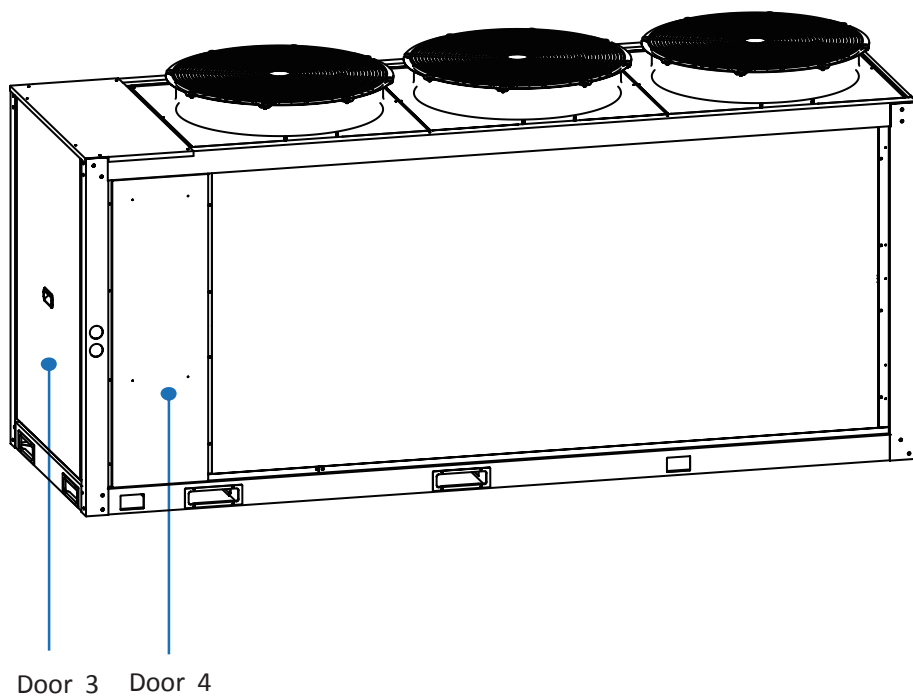
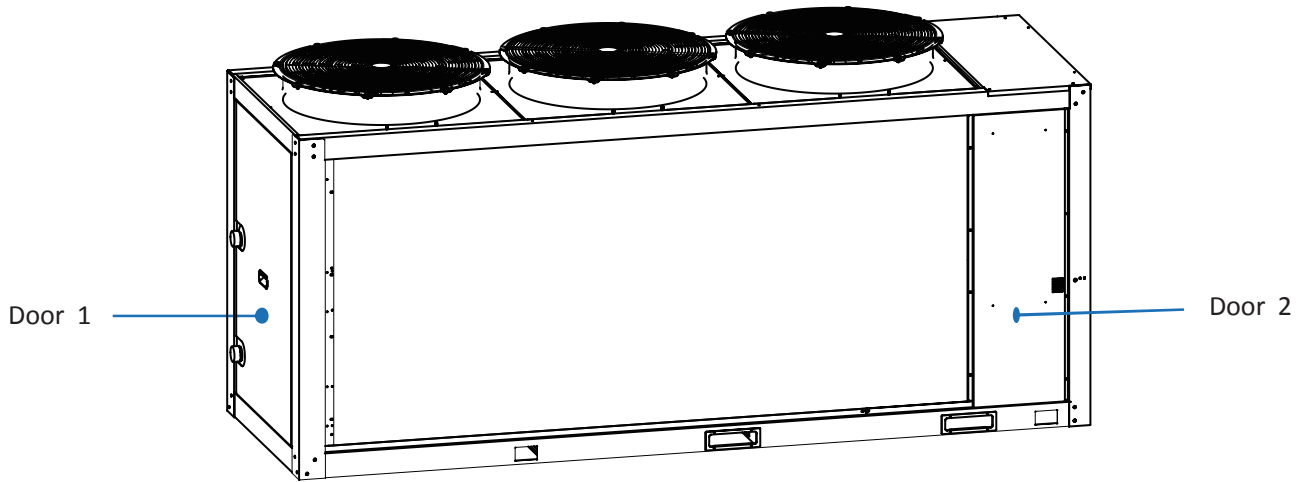
Door 2/3/4 give access to the hydraulic compartment and electrical parts.





*Fig. 8-5 doors of MC-SU60-RN1L*

Door 1 give access to the compartment of water pipes ,water side heat exchanger,acculator and liquid-vapor separator.  
 Door 2/3/4 give access to the hydraulic compartment and electrical parts.



*Fig. 8-6 doors of MC-SU60-RN1L*

Door 1 give access to the compartment of water pipes ,water side heat exchanger,acculator and liquid-vapor separator.  
 Door 2/3/4 give access to the hydraulic compartment and electrical parts.

### 8.3 main components

#### 8.3.1 main components of MC-SU30-RN1L

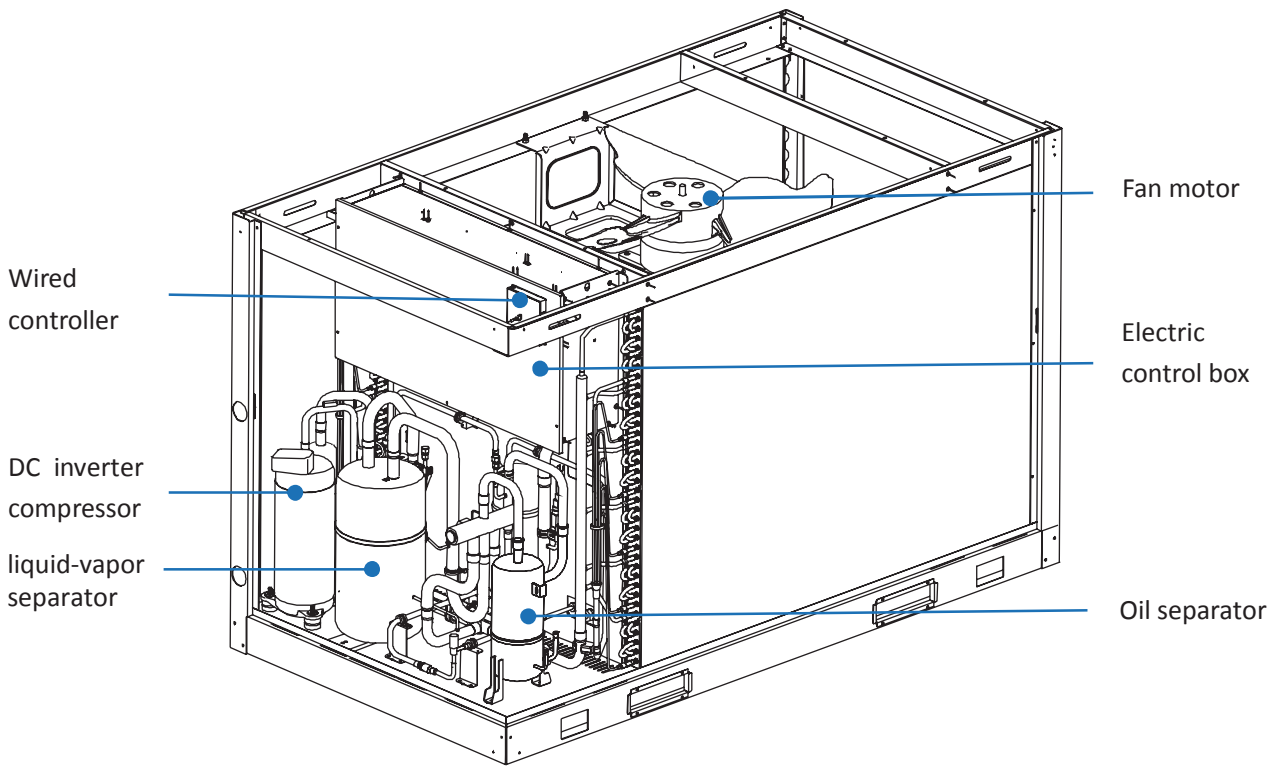


Fig. 8-7 MC-SU30-RN1L rear view

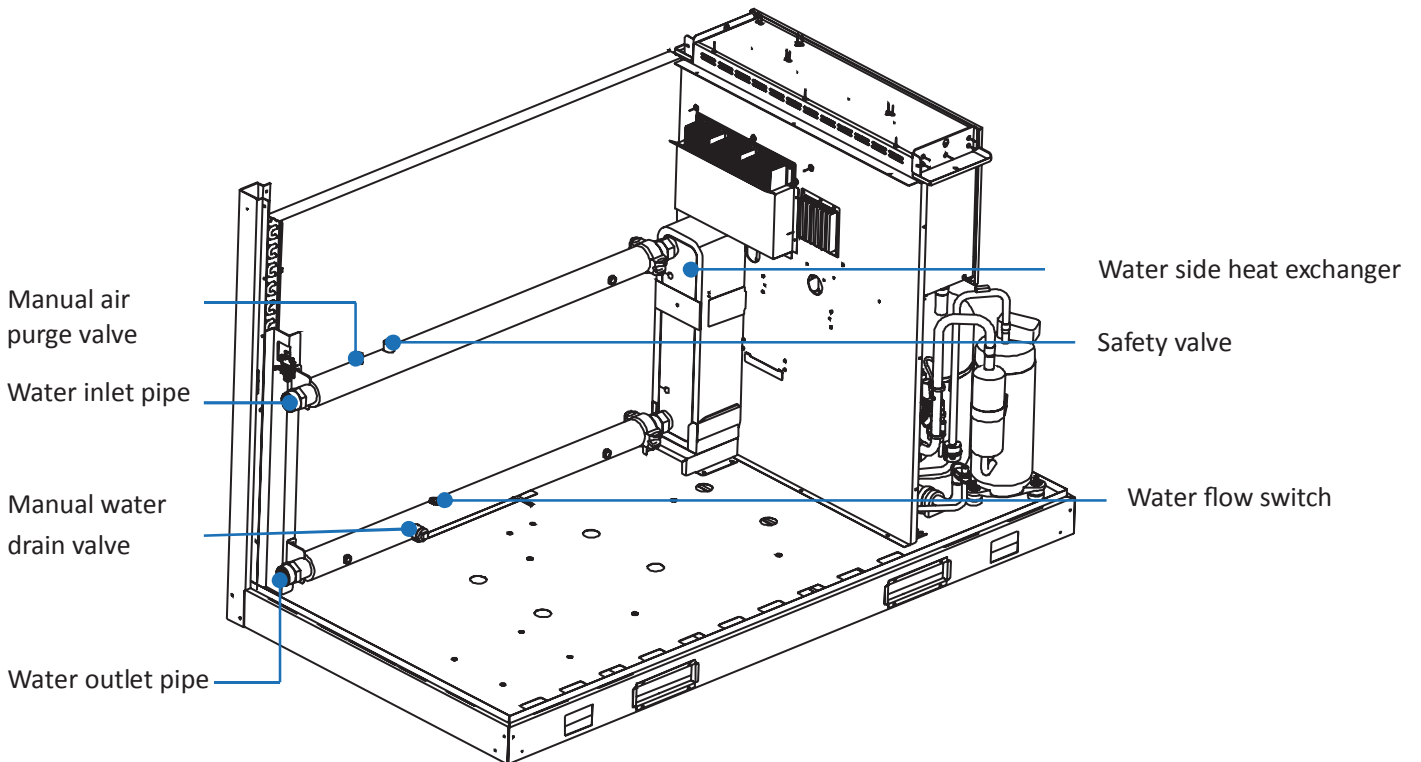


Fig. 8-8 MC-SU30-RN1L front view

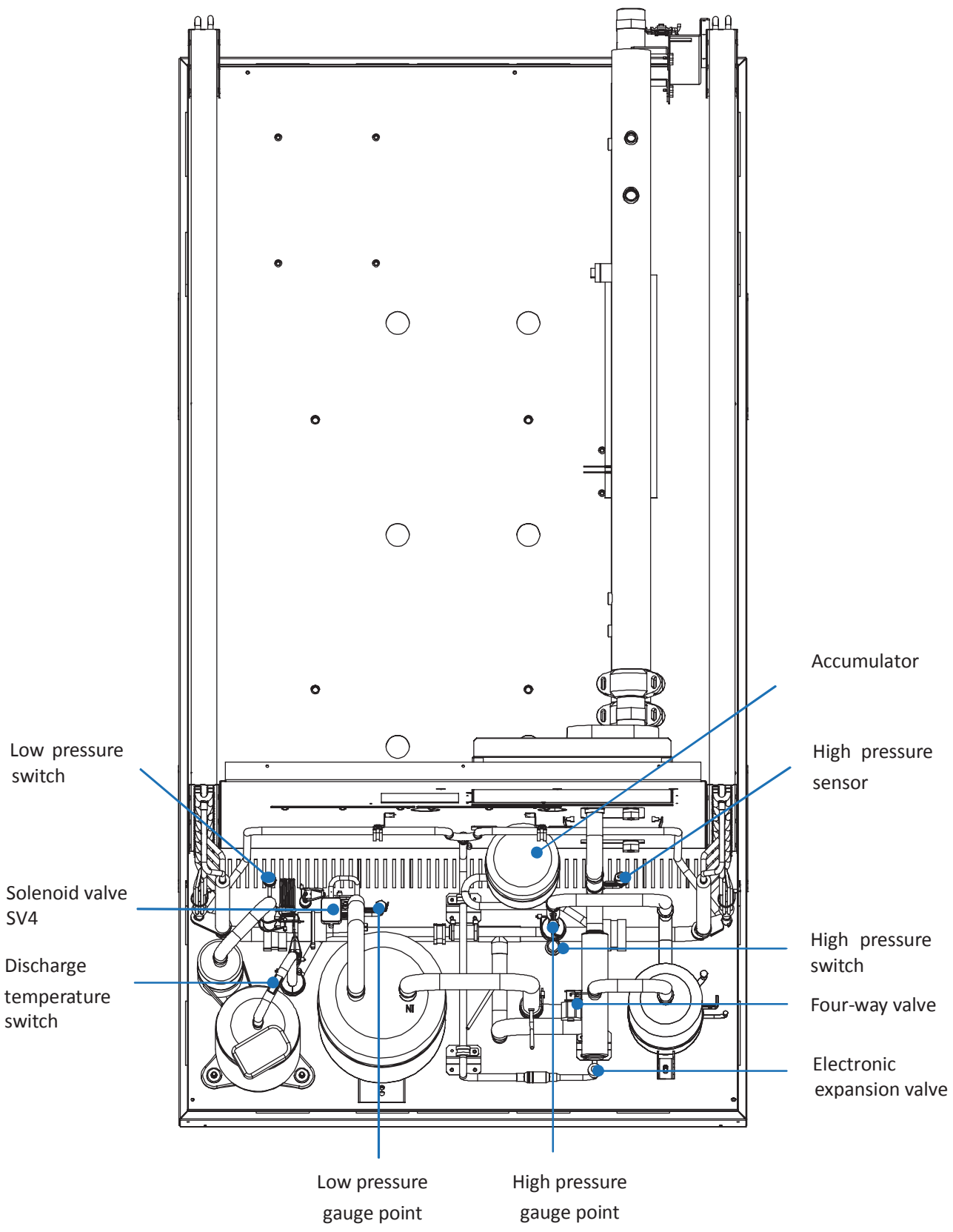


Fig.8-9 MC-SU30-RN1L top view

### 8.3.2 main components of MC-SU60-RN1L

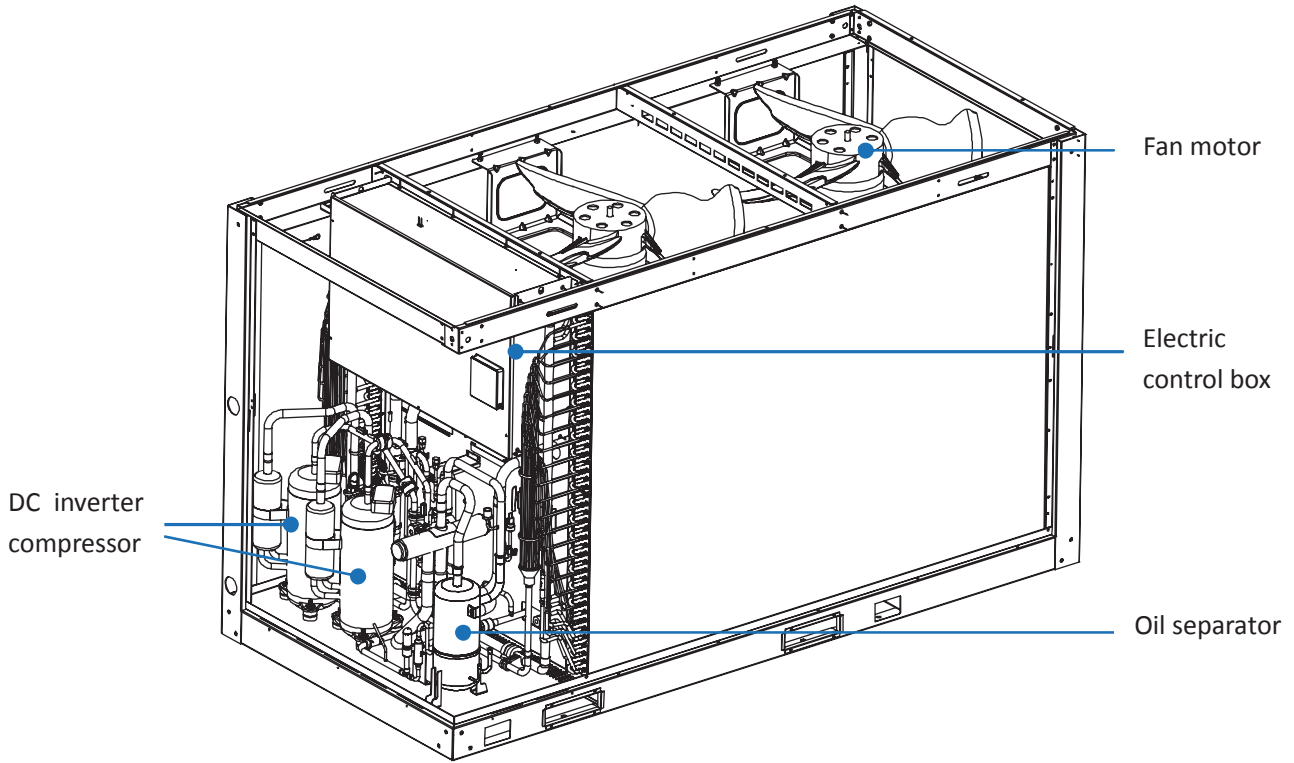


Fig.8-10 MC-SU60-RN1L rear view

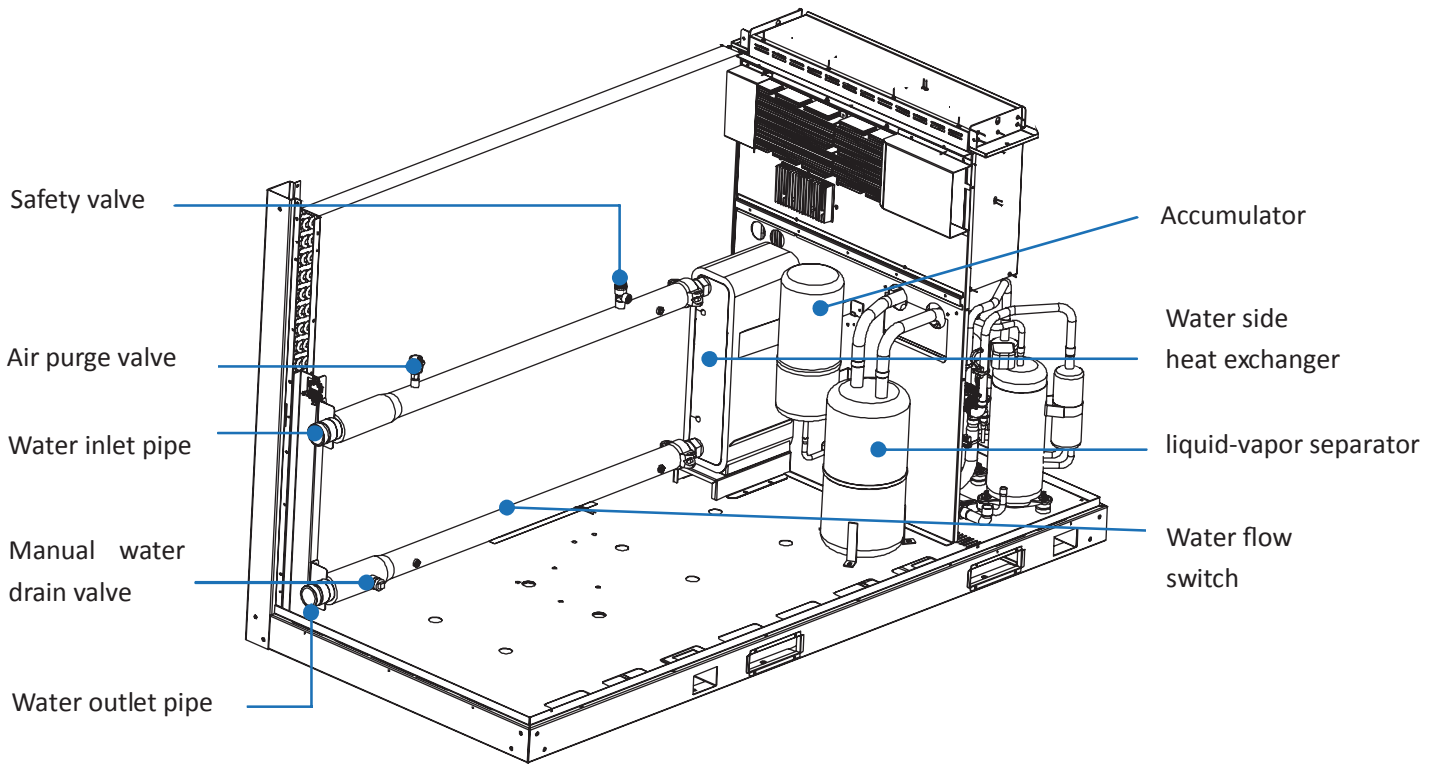


Fig.8-11 MC-SU60-RN1L front view

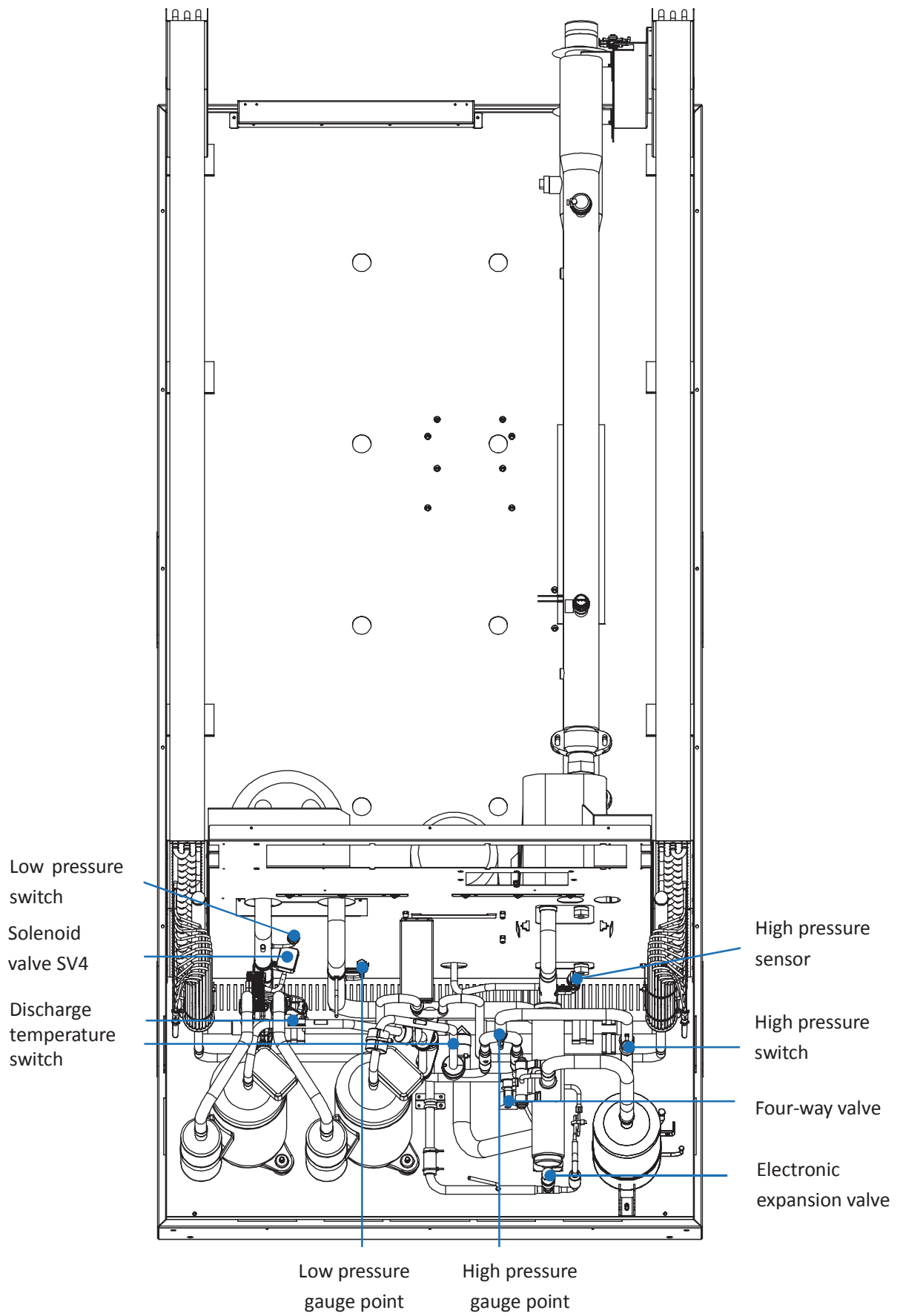


Fig.8-12 MC-SU60-RN1L top view

### 8.3.3 main components of MC-SU90-RN1L

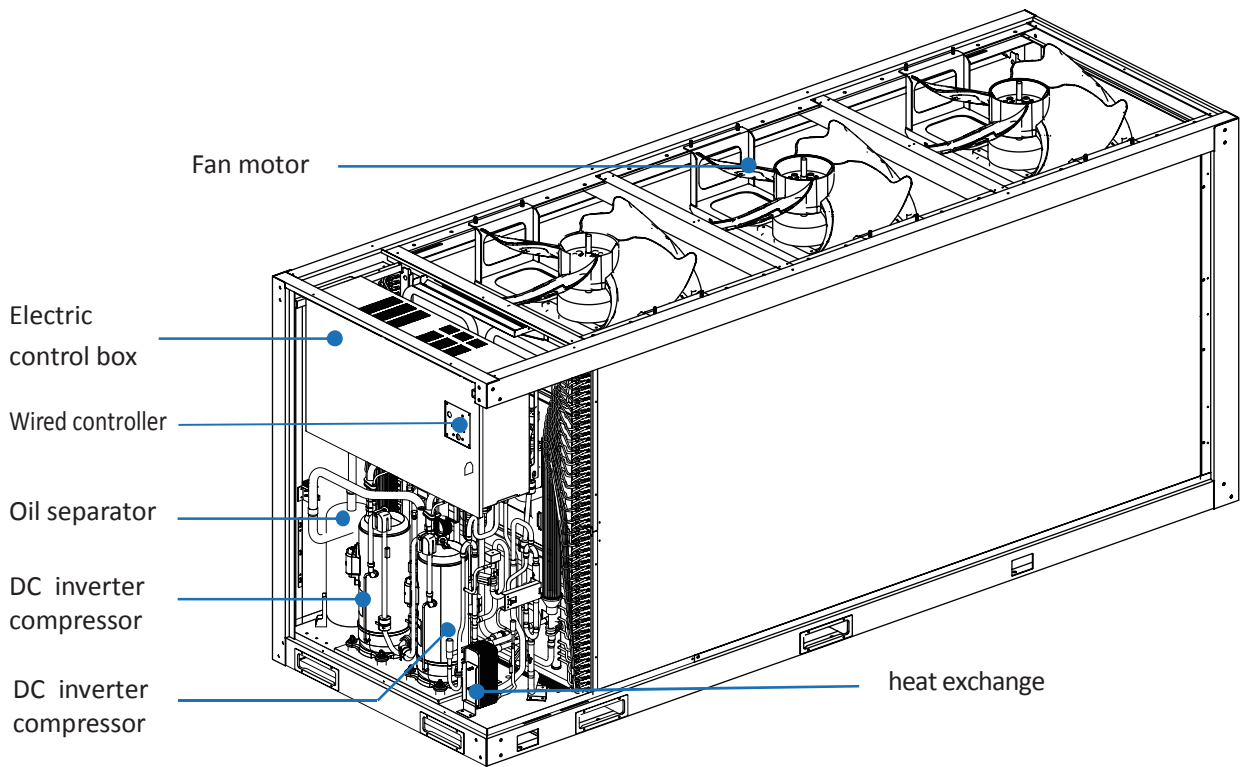


Fig.8-13 MC-SU90-RN1L rear view

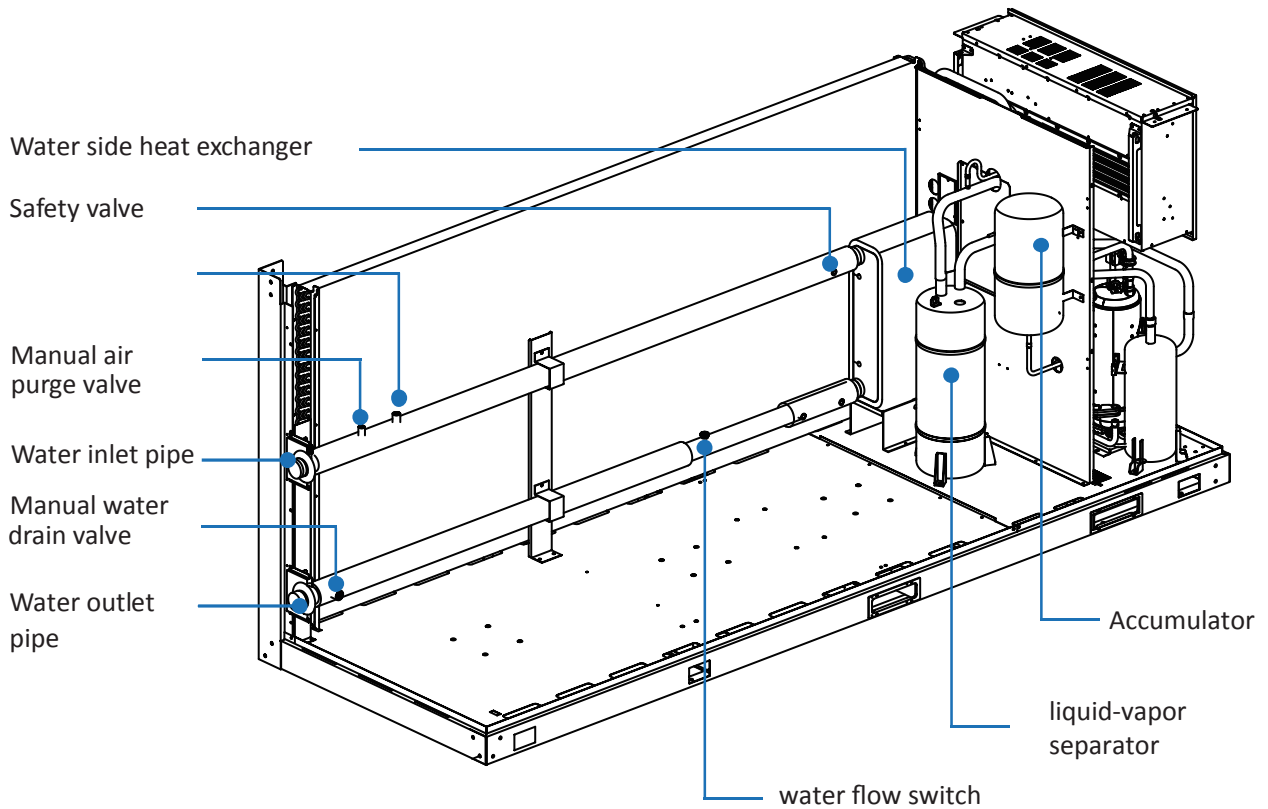


Fig.8-14 MC-SU90-RN1L front view

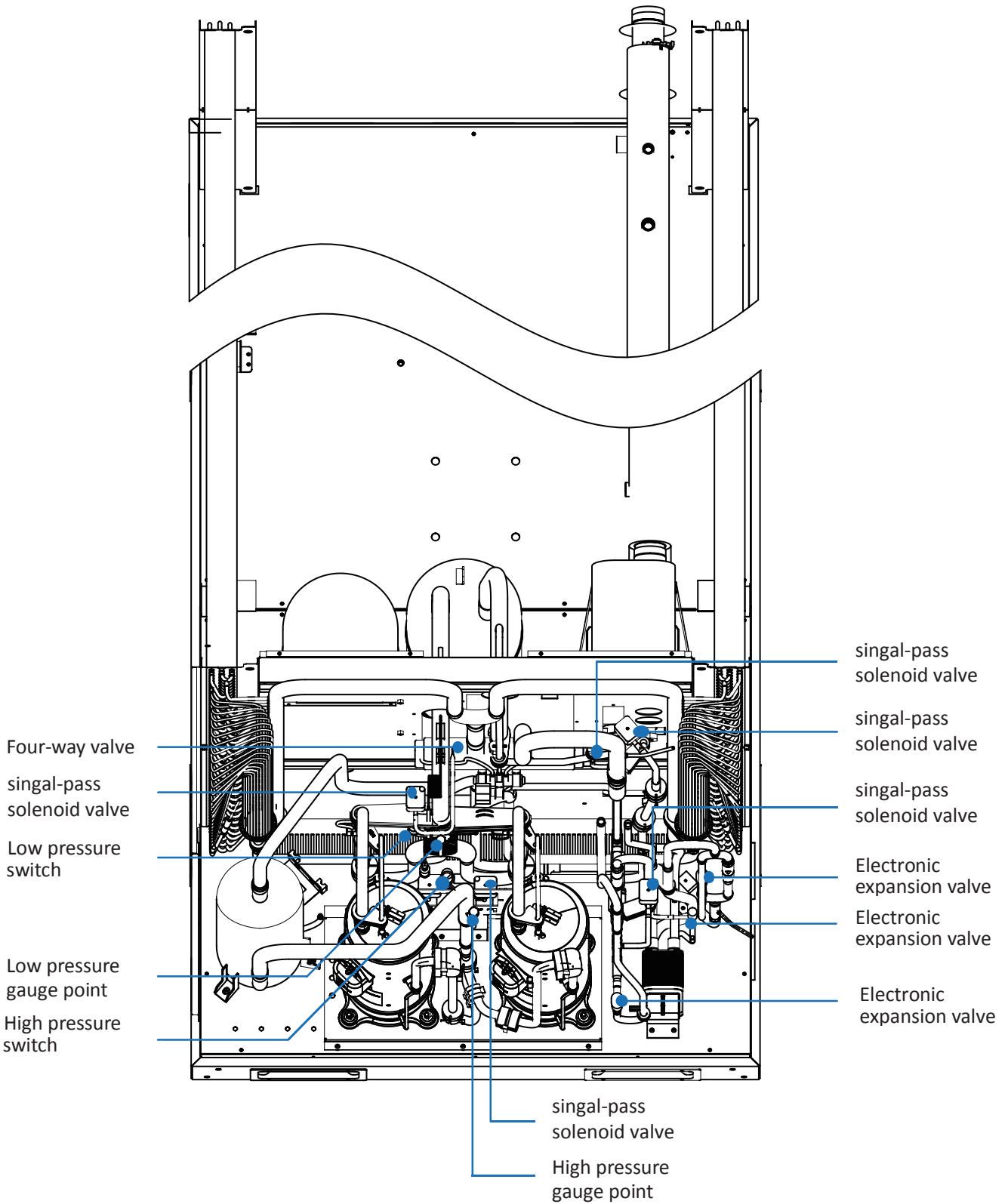


Fig.8-15 MC-SU30-RN1L top view



## 8.4 System diagram

### 8.4.1 diagram of MC-SU30-RN1L

Fig.8-16, 8-17,8-18 are the function diagrams of the 30、60、90 kW Full-DC Inverter Modular Air-cooled Heat Pump Unit and it shows the internal system structure to users, which is made up of main components (such as compressors, electronic expansion valves, Condenser, plate heat exchanger and so on)、 pipeline and sensors. The unit is equipped with cooling and heating mode with full-DC inverter technology, and the two mode can switch each other by component 7、11(4-way-valve).The system has two electronic expansion valve EXVA and EXVB. The EXVA is mainly used in heating mode, by which is controlled superheat, and in cooling mode it is at maximum opening. The EXVB is used in cooling mode and it is also controlled by the superheat.

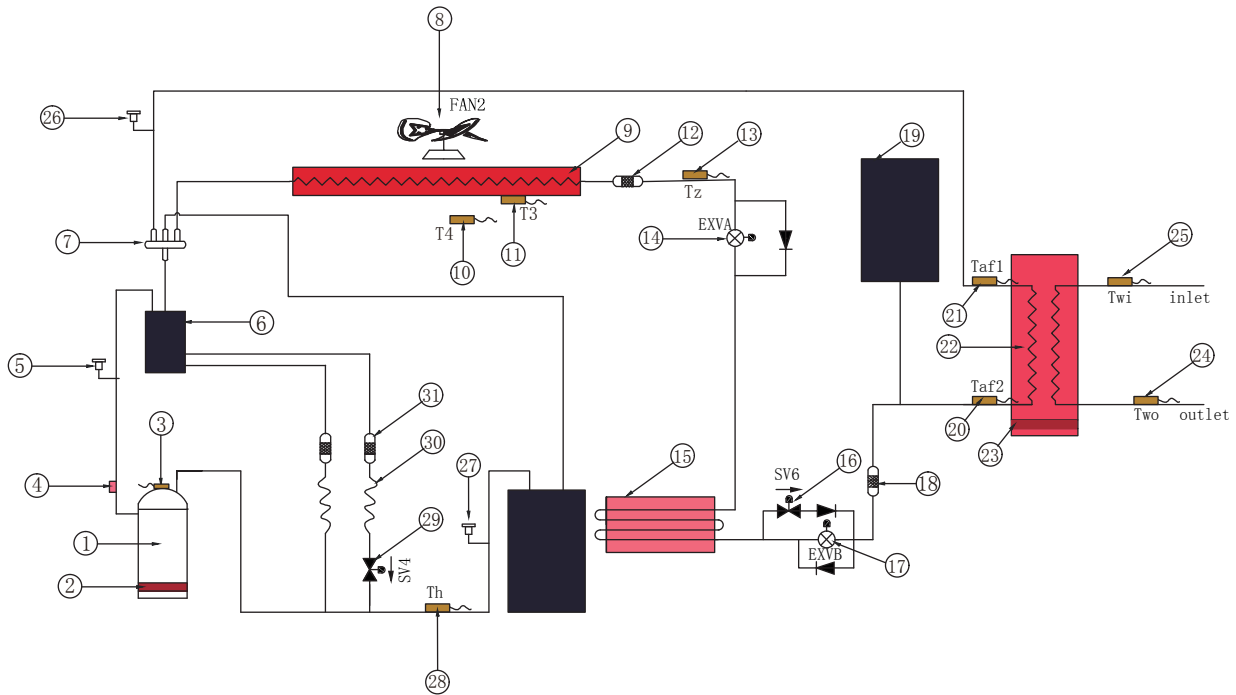


Fig.8-16 MC-SU30-RN1L piping diagram

Table 8-1

Legend			
1	Compressor	2	CCH (Crankcase heater )
3	Tp (DC inverter compressor discharge temperature)	4	Switch_Tp(Discharge temperature control switch )
5	PRO-H (High pressure switch)	6	Oil seperator
7	4-way-valve	8	FAN
9	Condenser	10	T4 (Outdoor ambient temperature)
11	T3 (coiloutlet temperature)	12	Filter
13	TZ (coil final outlet temperature)	14	EXVA (System electronic expansion valve 1)
15	Unit for cooling electronic control board	16	SV6 (Liquid side bypass solenoid valve)
17	EXVB (System electronic expansion valve 2)	18	Filter
19	High pressure tank	20	Taf2 (Water side antifreeze temperature)
21	Taf1 (Water side antifreeze temperature)	22	Plate heat exchanger
23	Antifreeze heater of plate heat exchanger	24	Two (Unit water outlet temperature)
25	Twi (Unit water inlet temperature)	26	System pressure sensor
27	PRO-L (Low pressure switch)	28	Th (System suction temperature)
29	SV4 (Fast oil return solenoid valve)	30	Capillary
31	Filter		

### 8.4.2 diagram of MC-SU60-RN1L

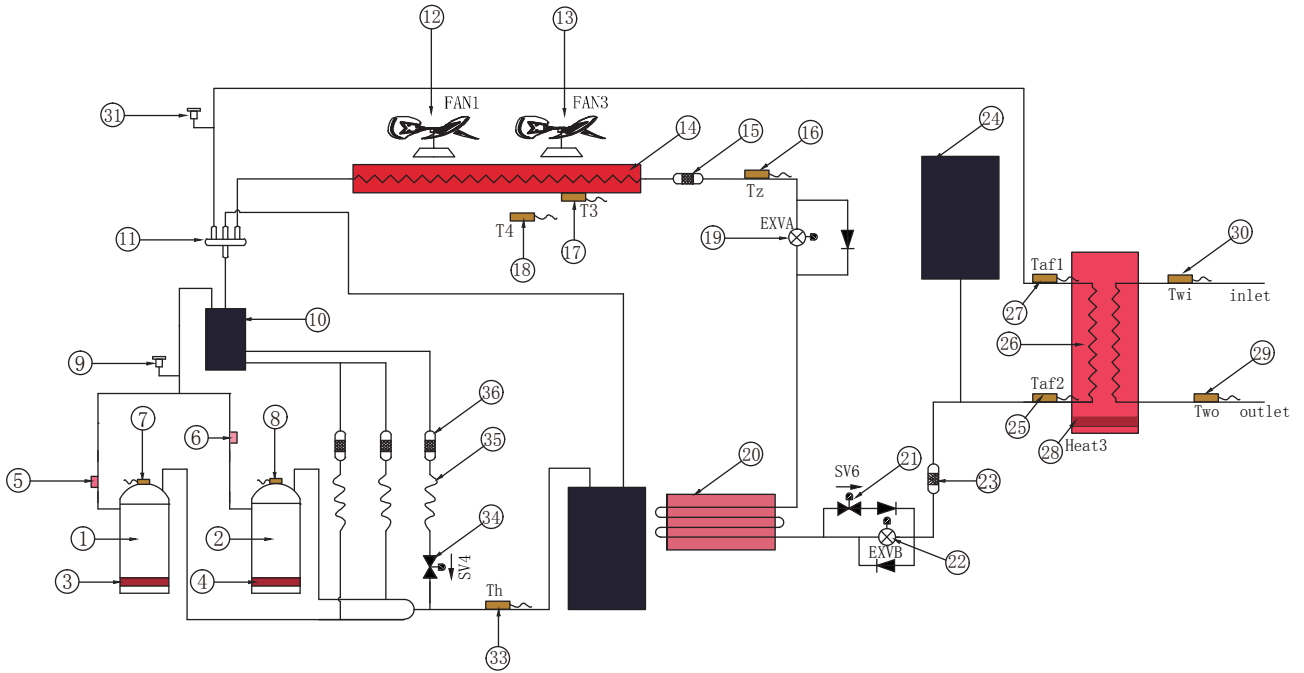


Fig.8-17 MC-SU60-RN1L piping diagram

Table 8-2

Legend			
1	Compressor1	2	Compressor2
3	CCHA (Crankcase heater A)	4	CCHB (Crankcase heater B)
5	Switch_TpA (Discharge temperature control switch A)	6	Switch_TpB ( Discharge temperature control switch B)
7	Tp1 (DC inverter compressor 1 discharge temperature)	8	Tp2 (DC inverter compressor 2 discharge temperature)
9	PRO-H (High pressure switch)	10	Oil seperator
11	4-way-valve	12	FAN1
13	FAN2	14	Condenser
15	Filter	16	TZ (coil final outlet temperature)
17	T3 (coiloutlet temperature)	18	T4 (Outdoor ambient temperature)
19	EXVA (System electronic expansion valve 1)	20	Unit for cooling electronic control board
21	SV6 (Liquid side bypass solenoid valve)	22	EXVB (System electronic expansion valve 2)
23	Filter	24	High pressure tank
25	Taf2 (Water side antifreeze temperature)	26	Plate heat exchanger
27	Taf1 (Water side antifreeze temperature)	28	Antifreeze heater of plate heat exchanger
29	Ttwo (Unit water outlet temperature)	30	Twi (Unit water inlet temperature)
31	System pressure sensor	32	PRO-L (Low pressure switch)
33	Th (System suction temperature)	34	SV4 (Fast oil return solenoid valve)
35	Capillary	36	Filter

### 8.4.3 diagram of MC-SU90-RN1L

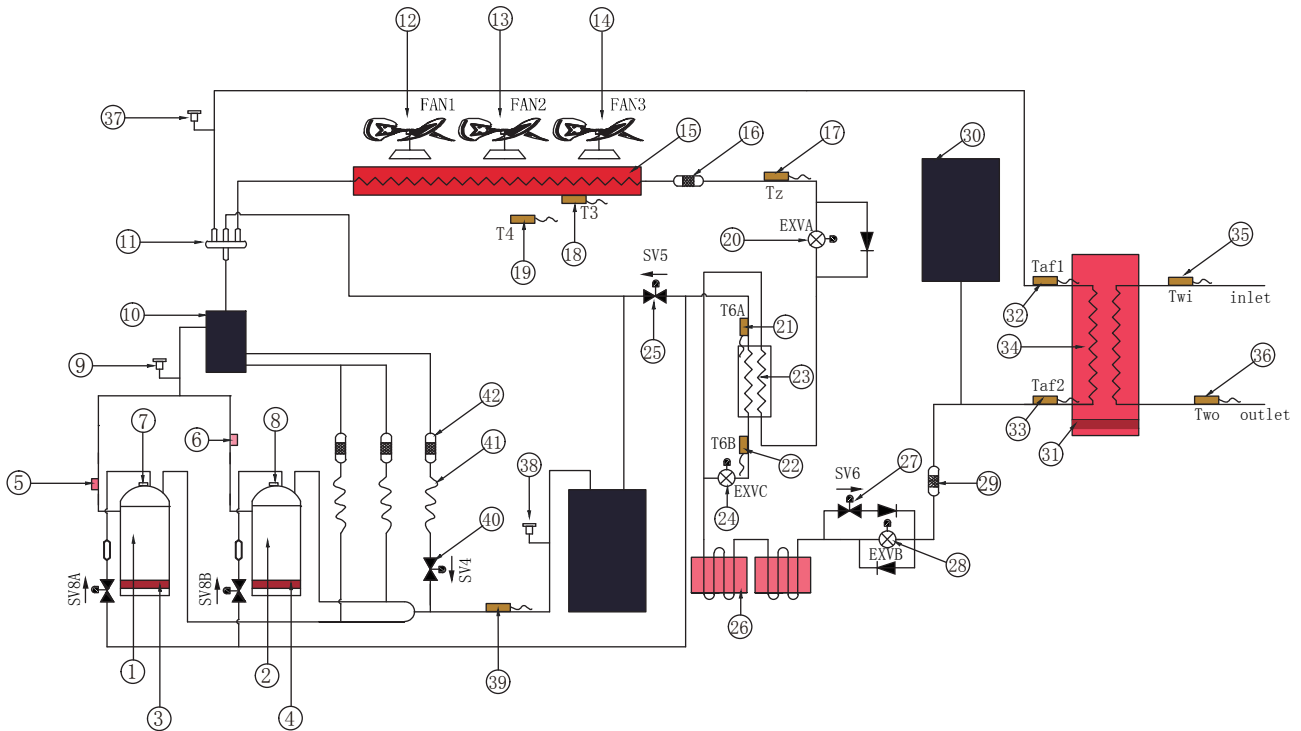


Fig.8-18 MC-SU90-RN1L piping diagram

Table 8-3

Legend			
1	Compressor1	2	Compressor2
3	CCHA (Crankcase heater A)	4	CCHB (Crankcase heater B)
5	Switch_TpA (Discharge temperature control switch A)	6	Switch_TpB (Discharge temperature control switch B)
7	Tp1 (DC inverter compressor 1 discharge temperature)	8	Tp2 (DC inverter compressor 2 discharge temperature)
9	PRO-H (High pressure switch)	10	Oil separator
11	4-way-valve	12	FAN1
13	FAN2	14	FAN3
15	Condenser	16	Filter
17	TZ (coil final outlet temperature)	18	T3 (coiloutlet temperature)
19	T4 (Outdoor ambient temperature)	20	EXVA (System electronic expansion valve 1)
21	T6B (Refrigerant outlet temperature ofEVI plate heat exchanger)	22	T6A (Refrigerant inlet temperature ofEVI plate heat exchanger)
23	economizer	24	EXVC (EVI electronic expansion valve)
25	SV5 (Multifunctional solenoid valve)	26	Unit for cooling electronic control board
27	SV6 (Liquid side bypass solenoid valve)	28	EXVB (System electronic expansion valve 2)
29	Filter	30	High pressure tank
31	Antifreeze heater of plate heat exchanger	32	Taf1 (Water side antifreeze temperature)
33	Taf2 (Water side antifreeze temperature)	34	Plate heat exchanger
35	Two (Unit water outlet temperature)	36	Twi (Unit water inlet temperature)
37	System pressure sensor	38	PRO-L (Low pressure switch)
39	Th (System suction temperature)	40	SV4 (Fast oil return solenoid valve)
41	Capillary	42	Filter

## 8.5 Outdoor unit PCBs

### 8.5.1 MAIN PCB

Label descriptions are given in Table 8-4

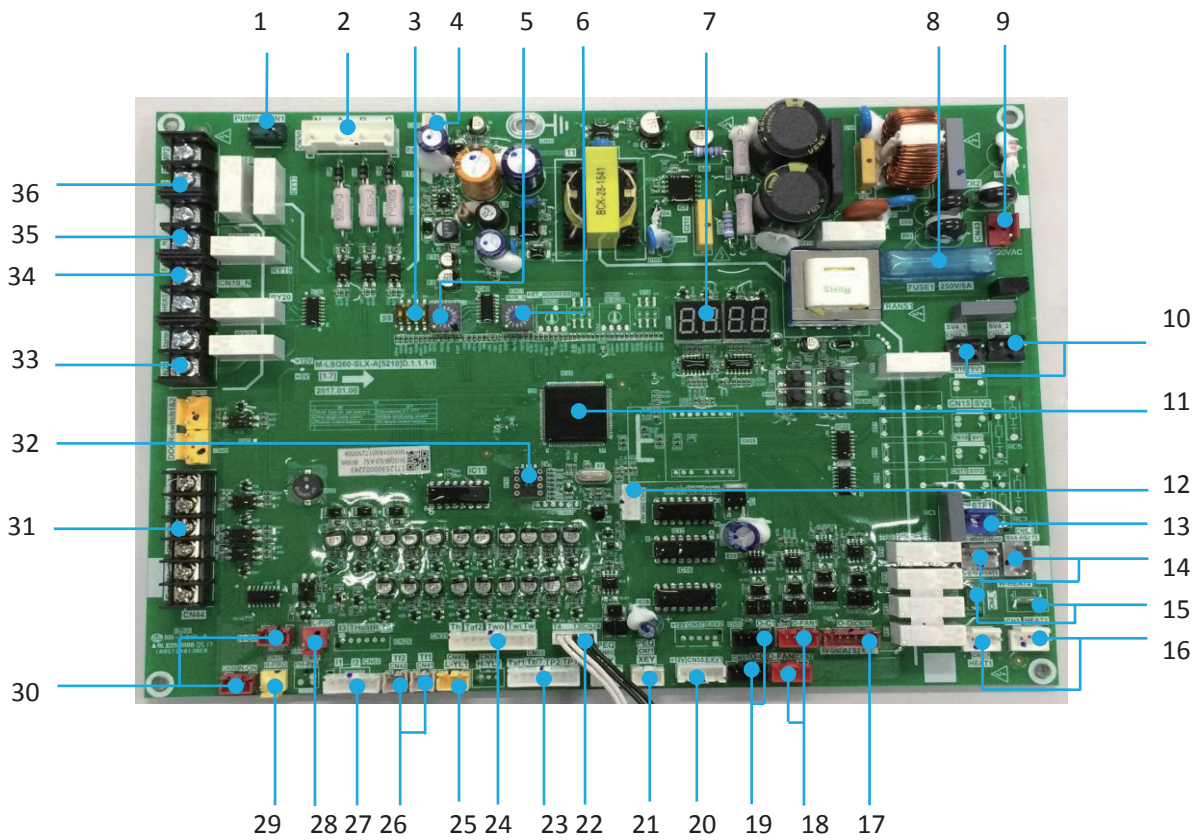


Figure 8-19 Main PCB of MC-SU30-RN1L and MC-SU60-RN1L

Table 8-4

No.	Content
1	CN1: Pump 1 connection
2	CN30: Power sequence detection connection
3	S5: DIP switches
4	CN72: Power supply to user interface
5	ENC1: Unit capacity dial switch

6	ENC3: Address dial switch
7	DSP1: Digital display
8	FUS1:Fuse
9	CN43: Power input
10	CN12_1,CN12_2: Solenoid valve (SV4) drive ports
11	IC25: Main control chip
12	CN64: Debug port
13	CN16: Four-way valve drive port
14	CN5,CN5_1: Water side heat exchanger heaters connection
15	CN4,CN4_1: Water flow switch heater connection
16	CN3,CN3_1: Compressor crankcase heater connections
17	CN49: Reserved communication port
18	CN52,CN53: Fan inverter module communication ports
19	CN50,CN51: Compressor inverter module communication ports
20	CN55: EXV drive port
21	CN60,CN71: Wired controller communication ports
22	CN24: Outdoor ambient temperature sensor and air side heat exchanger refrigerant outlet temperature sensor connections
23	CN69: Water side heat exchanger anti-freezing temperature sensor1, air side heat exchanger refrigerant total outlet temperature sensor, discharge temperature sensor 2 and discharge temperature sensor 1 connections
24	CN31: Air suction temperature sensor , water side heat exchanger anti-freezing temperature sensor 2, water side heat exchanger water outlet temperature sensor, water side heat exchanger water inlet temperature sensor and combined water outlet temperature sensor connections
25	CN40: Pressure sensor connection
26	CN41,CN42: Inverter module temperature sensor 1 and Inverter module temperature sensor 2 connections
27	CN62: AC indicator A and AC indicator B connections
28	CN65:Low pressure switch connection
29	CN47:High pressure switch and discharge temperature switch (es) connections
30	CN58,CN59: AC filter board communication ports
31	CN44:Water flow switch, additional control and Cool/heat connections.
32	IC10: EEPROM
33	CN21: Remote alarm connection
34	CN19_N: Electric auxiliary heater N line connection
35	CN19_L: Electric auxiliary heater N line connection
36	CN2: Pump 2 connection

Label descriptions are given in Table 8-5

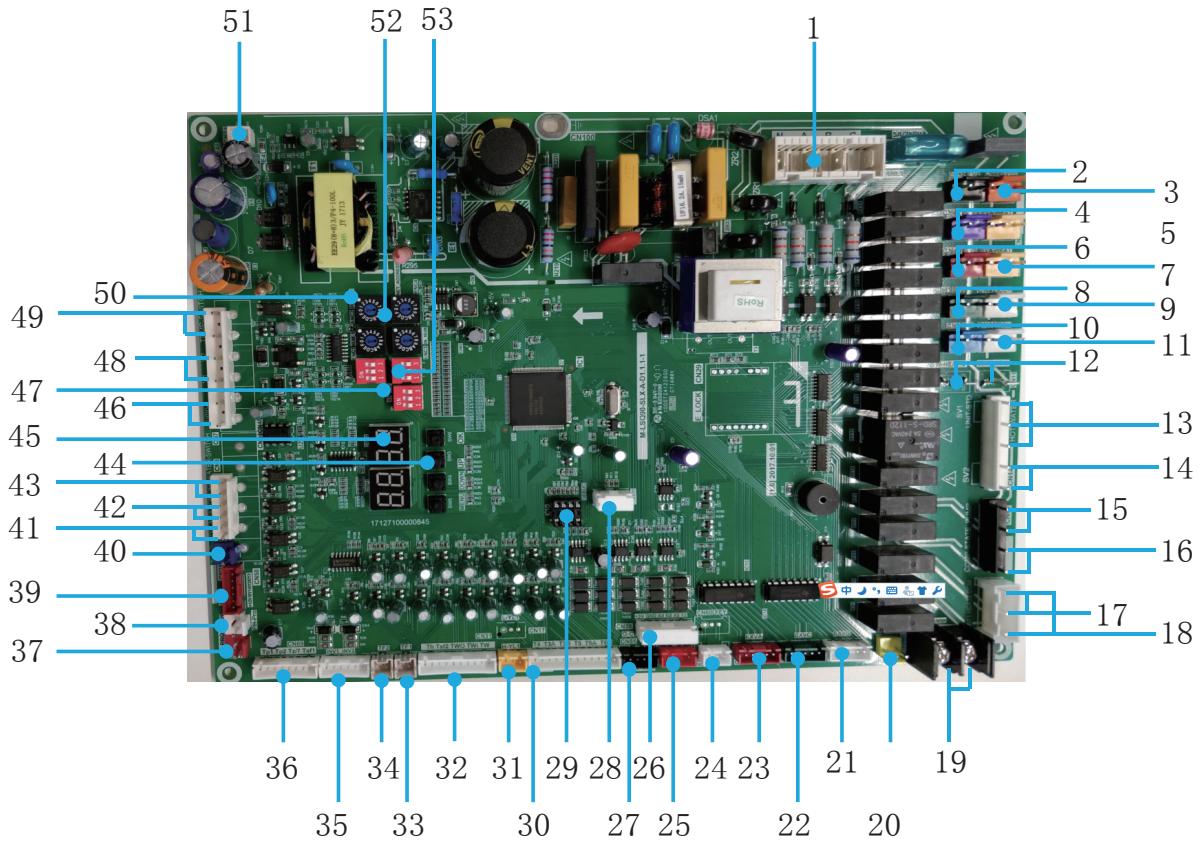


Figure 8-20 Main PCB of MC-SU90-RN1L

Table 8-5

No.	Detail information
1	CN30: Input of three-phase four-wire power supply (fault code E1) Input of transformer, 220-240V AC current. (only valid for the main unit) Three phases A, B and C of power supply should exist simultaneously, and the difference of phase angle should be 120° among them. If the conditions are not met, fault of phase sequence or phase lack may occur, and fault code will be displayed. When the power supply returns to normal condition, fault is removed. Attention: phase lase and phase dislocation of power supply are detected only in the early period after the power supply is connected, and they are not detected while the unit is in operation.
2	CN12:Quick return oil solenoid valve
3	CN80:Injection solenoid valve of compressor system B
4	CN47:Injection solenoid valve of compressor system A
5	CN5:Electric heating belt for plate heat exchanger
6	CN40:Multi-function solenoid valve
7	CN13:Electric heating belt for plate heat exchanger
8	CN41:Liquid bypass solenoid valve
9	CN42:Crankcase heater
10	CN6:Four-way valve
11	CN43:Crankcase heater
12	CN4/CN11:Electric heater of water flow switch
13	CN14:Three-way valve(hot-water valve)
14	CN14:Two-way valve(not used)
15	CN83:Pump 1) After receiving start-up instruction, the pump will be started up instantly, and will maintain start-up state always in the process of operation. 2) In case of refrigerating or heating shutdown, the pump will be shut down 2 minutes after all modules stop operating. 3) In case of shutdown under the pump mode, the pump can be directly shut down.
16	CN83:COMP-STATE,connect with an ac light to indicate the state of the compressor Attention: the control port value of the pump actually detected is ON/OFF but not 220-230V control power supply, so special attention should be paid when installing the light.

No.	Detail information
17	CN2:HEAT2.Water Tank Auxiliary Heater Attention: the control port value of the pump actually detected is ON/OFF but not 220-230V control power supply, so special attention should be paid when installing the water tank auxiliary heater.
18	CN2:HEAT1.Pipeline Auxiliary Heater Attention: the control port value of the pump actually detected is ON/OFF but not 220-230V control power supply, so special attention should be paid when installing the pipeline auxiliary heater.
19	CN85: The alarm signal output of the unit(ON/OFF signal) Attention: the control port value of the pump actually detected is ON/OFF but not 220-230V control power supply, so special attention should be paid when installing the alarm signal output.
20	discharge temperature switch protection (protection code P0,provent the compressor from over temperature 115 C )
21	CN71:System electronic expansion valve2.Used for cooling.
22	CN72:EVI electronic expansion valve.Used for EVI.
23	CN70:System electronic expansion valve1.Used for heating.
24	CN61:signal communication port (fault code E2)
25	CN64:Outdoor fan , controlled by T4.Fan system drive boards communication port. Fault code 1PP:Fan system A IPM module communication failure. Fault code 2PP:Fan system B IPM module communication failure. Fault code 3PP:Fan system C IPM mokule communication failure.
26	CN28:Modelbus communication port
27	CN64:Compressor system drive boards communication port. Fault code 1F0:Compressor system A IPM module communication failure. Fault code 2F0:Compressor system B IPM module communication failure.
28	CN300:Program burn in port(WizPro200RS programming device).
29	IC10: Parameter chip
30	CN1:temperature sensors input port. T4: outdoor ambient temperature sensor (10kΩ corresponds to 25°C, B=4100) T3A/T3B:pipe temperature sensor of the condenser (10kΩ corresponds to 25°C, B=4100) T5:wwater tank temperature sensor (17kΩ corresponds to 50°C) T6A:Refrigerant inlet temperature of EVI plate heat exchanger(10kΩ corresponds to 25°C, B=4100) T6B:Refrigerant inlet temperature of EVI plate heat exchanger(10kΩ corresponds to 25°C, B=4100)
31	CN1:System pressure sensor(fault code Fb)



No.	Detail information
32	<p>CN31:Temperature sensors input port  Th:System suction temperature sensor(10kΩ corresponds to 25°C, B=4100).  Taf2:Water side antifreeze temperature sensor(10kΩ corresponds to 25°C, B=4100).  Two:Unit water outlet temperature sensor(10kΩ corresponds to 25°C, B=4100).  Twi:Unit water inlet temperature sensor(10kΩ corresponds to 25°C, B=4100).  Tw:Total water outlet temperature sensor when several units are connected in parallel(10kΩ corresponds to 25°C, B=4100).</p>
33	CN3:Module 1 temperature sensor(10kΩ corresponds to 25°C, B=4100).
34	CN10:Module 2 temperature sensor(10kΩ corresponds to 25°C, B=4100).
35	<p>CN15:Detection of current of the compressor system input port  INV1 : Detection of current of the compressor A (protection code P4)  INV2 : Detection of current of the compressor B (protection code P5)</p>
36	<p>CN69:Temperature sensors input port  Tp1:DC inverter compressor 1 discharge temperature sensor.(5kΩ corresponds to 90°C, B=3950)  Tp2:DC inverter compressor 2 discharge temperature sensor.(5kΩ corresponds to 90°C, B=3950)  Tz/7:coil final outlet temperature sensor.(10kΩ corresponds to 25°C, B=4100)  Taf1:Water side antifreeze temperature.(10kΩ corresponds to 25°C, B=4100)</p>
37	CN19:Low voltage protection switch.(Protection code P1)
38	CN91:Three-phase protector output switch.(Protection code E8)
39	CN58:Fan really driver port.
40	CN21:The thermostat switch.(not used)
41	CN8:Remote mode signal
42	CN8:Remote stop signal
43	CN8:Water flow switch signal
44	<p>SW3:Up button  a) Select different menus when enter menu selection.  b) For sopt inspection in conditions.  SW4:Down button  a) Select different menus when enter menu selection.  b) For sopt inspection in conditions.  SW5:Menu button  Press to enter menu selection, short press to return to the previous menu.  SW6:OK button  Enter the submenu or confirm the function selected by short pressing.</p>
45	<p>Numerical code tube  1) In case of stand-by, the address of the module is displayed;  2) In case of normal operation, 10. is displayed (10 is followed by dot).  3) In case of fault or protection, fault code or protection code is displayed.</p>
46	CN7:Inverter water pump signal.(0-10VDC output)
47	<p>S5:Dip switch  S5-1/S5-2:Low static pressure mode, OFF of S5-1 and S5-2 are enabled(factory default).  Middle static pressure mode, OFF of S5-1 and ON of S5-2 are enabled.  High static pressure mode, ON of S5-1 and either of S5-2 are enabled.  S5-3: No remote controll, OFF of S5-3 is enabled(factory default).  Remote controll, ON of S5-3 is enabled</p>
48	CN7:Demand restricted port.(0-10VDC input)

No.	Detail information
49	CN7:Target water temperature switching port.
50	ENC2:POWER DIP switch of outdoor unit capacity: 1, 60KW; 2, 90KW
51	CN74:The power supply port of the wired controller .(DC9V)
52	ENC4:NET_ADDRESS DIP switch 0-F of outdoor unit network address is enabled, which represent address 0-15
53	S12:Dip switch S12-1:ON of S12-1 is enable(factory default) S12-2:Single water pump controll, OFF of S12-2 is enabled(factory default) Multiple water pumps controll, ON of S12-2 is enabled S12-3:Outlet water temp. in normal cooling, OFF of S12-3 is enabled(factory default) Outlet water temp. in low temperature cooling, ON of S12-3 is enabled



**CAUTION**

1. Faults

When the main unit suffers faults, the main unit stops operating, and all other units also stop running;  
When the subordinate 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 subordinate unit is under protection, only the unit stops operating, and other units are not affected.

## 8.6 Electric wiring

### 8.6.1 Electric wiring



#### CAUTION

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. The power wire and the grounding wire must be connected the suitable terminals.
4. The power wire and the grounding wire must be fasten up by suitable tools.
5. The terminals connected the power wire and the grounding wire must be fully fastened and regularly checked, in case to become flexible.
6. 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.
7. The connected fixed wires must be equipped with full switching-off devices with at least 3mm contact separation.
8. Set leakage protective devices according to the requirements of national technical standard about electric equipment.
9. After completing all wiring construction, conduct careful check before connecting the power supply.
10. Please carefully read the labels on the electric cabinet.
11. 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.
12. The power cord type designation is H07RN-F.

### 8.6.2 Power supply specification

Table 8-6

Model	Item	Outdoor power supply			
		Power supply	Manual switch	Fuse	Wiring
MC-SU30-RN1L		380-415V 3N~50Hz	50A	36A	10mm <sup>2</sup> (<20m)
MC-SU60-RN1L		380-415V 3N~50Hz	100A	70A	25mm <sup>2</sup> (<20m)
MC-SU90-RN1L		380-415V 3N~50Hz	125A	100A	25mm <sup>2</sup> (<20m)

### 8.6.3 Requirements of wiring connection

1. 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
2. All cables led to the electric box should be supported independently but by the electric box.
3. The strong current wires generally pass the electric box, and 220-230V 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.
4. 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.

5. 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.
6. 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.
7. Some connection ports in the electric box are switch signals, for which the user needs to provide power, and the rated voltage of the power should be 220-230VAC. 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.
8. 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.
9. 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.
10. The unit must be provided with grounding wires, which are not allowed to be connected with the grounding wires of gas fuel pipelines, water pipelines, lightning conductors or telephones. Improper earth connection may cause electric shock, so please check whether earth connection of the unit is firm or not frequently.

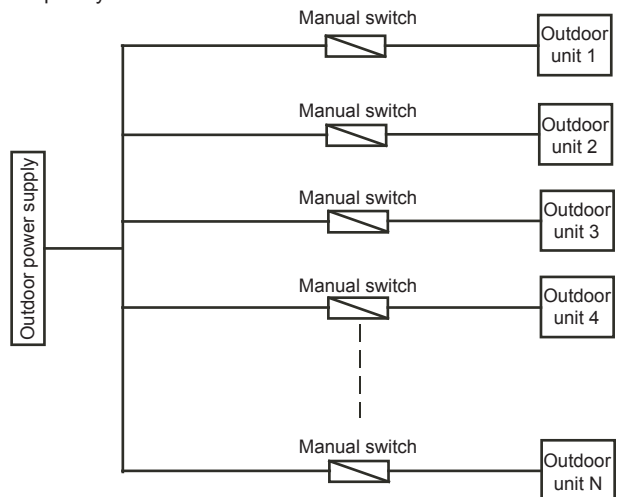


Figure 8-21



#### NOTE

Only 16 Modular units can be combined at most.

### 8.4 Wiring steps

- Step 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.
- Step 2. The control box of the main power switch must be mounted in a proper position.
- Step 3. Wiring connection holes of the main power should be provided with glue cushion.
- Step 4. The main power and neutral wires and grounding wires of power supply are led into the electric box of the unit.

- Step 5. The wires of the main power must pass the bonding clamp.
- Step 6. Wires should be connected firmly to the connection terminals L1, L2, L3 and N.
- Step 7. Phase sequences must be consistent when the wires of the main power.
- Step 8. The main power should be located out of easy reach of non-professional maintenance personnel, to avoid mal-operation and improve safety.
- Step 9. MC-SU30-RN1L and MC-SU60-RN1L connection of control wires of auxiliary electric heaters: the control wires of AC contactor of the auxiliary electric heater must pass the connection terminals CN19\_L and CN19\_N of the main unit, as shown in Fig. 8-22-1.
- Step 10. MC-SU90-RN1L connection of control wires of pipeline auxiliary electric heaters: the control wires of AC contactor of the pipeline auxiliary electric heater must pass the connection terminals HEAT1 and COM of the connector XT1 in the electric box of the unit, as shown in Fig. 8-22-2.
- Step 11. MC-SU30-RN1L and MC-SU60-RN1L Connection of control wires of pump: the control wires of AC contactor of pump must pass the connection terminals CN1 or CN2 of the main unit, as shown in Fig. 8-22-3.
- Step 12. MC-SU90-RN1L Connection of control wires of pump: the control wires of AC contactor of pump must pass the connection terminals PUMP and N of the connector XT1 in the electric box of the unit, as shown in Fig. 8-22-4.
- Step 13. The connection way of the wire 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 wire controller.

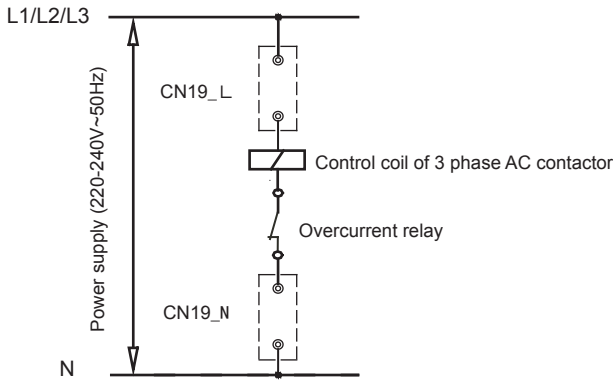


Fig. 8-22-1

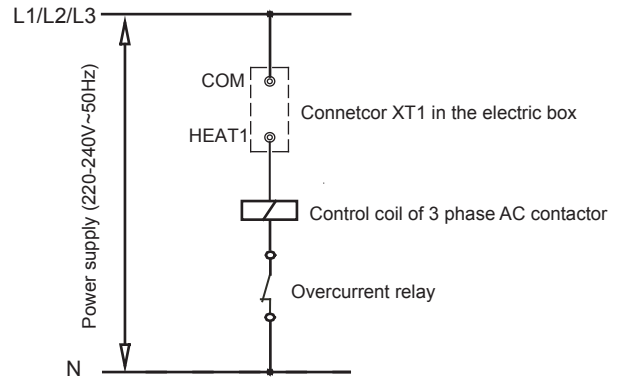


Fig. 8-22-2

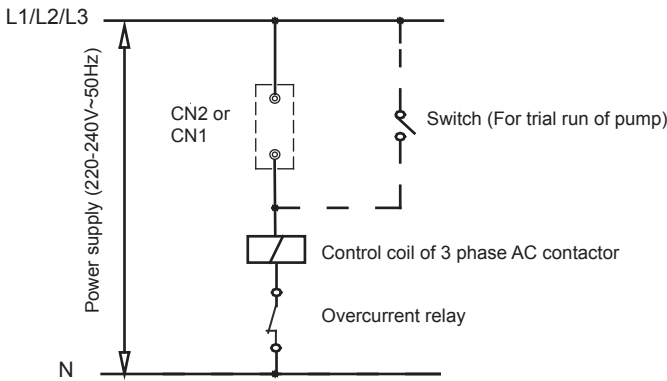


Fig. 8-22-3

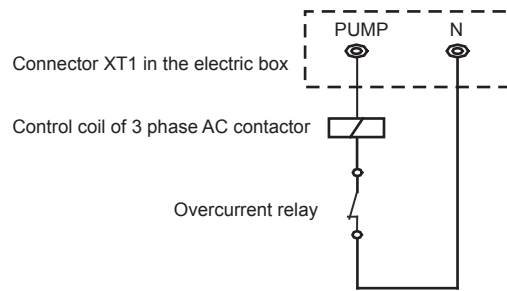


Fig. 8-22-4



### CAUTION

The connection of control of pump of MC-SU90-RN1L is different with MC-SU30-RN1L and MC-SU60-RN1L. An all-pole disconnection device which has at least 3mm separation distance in all pole and a residual current device(RCD)with the rating of above 10 mA shall be incorporated in the fixed wiring according to the national rule. The appliance shall be installed in accordance with national wiring regulations.

## 8.7 Water system installation

### 8.7.1 Basic requirements of connection of chilled water pipes



#### CAUTION

---

- 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.

- 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 target flow controller, to realize flow-break protection for the unit. Both ends of the target flow controller must be supplied with horizontal straight pipe sections whose diameter is 5 times that of the inlet pipe. The target flow controller must be installed in strict accordance with "Installation & Regulation Guide for Target Flow Controller" (Fig.8-28,8-29). The wires of the target flow controller should be led to the electric cabinet through shielded cable (see Electric Controlling Schematic Diagram for details). The working pressure of the target flow controller is 1.0MPa, and its interface is 1 inch in diameter. After the pipelines are installed, the target flow controller 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 Fig. 8-23 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 expelling 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°C, and the unit will be not used for a long time, water inside the unit should be drained. If the unit is not drained in winter, its power supply should not be cut off, and the fan coils in the water system must be provided with three-way valves, to ensure smooth circulation of the water system when the anti-freezing pump is started up in winter.

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

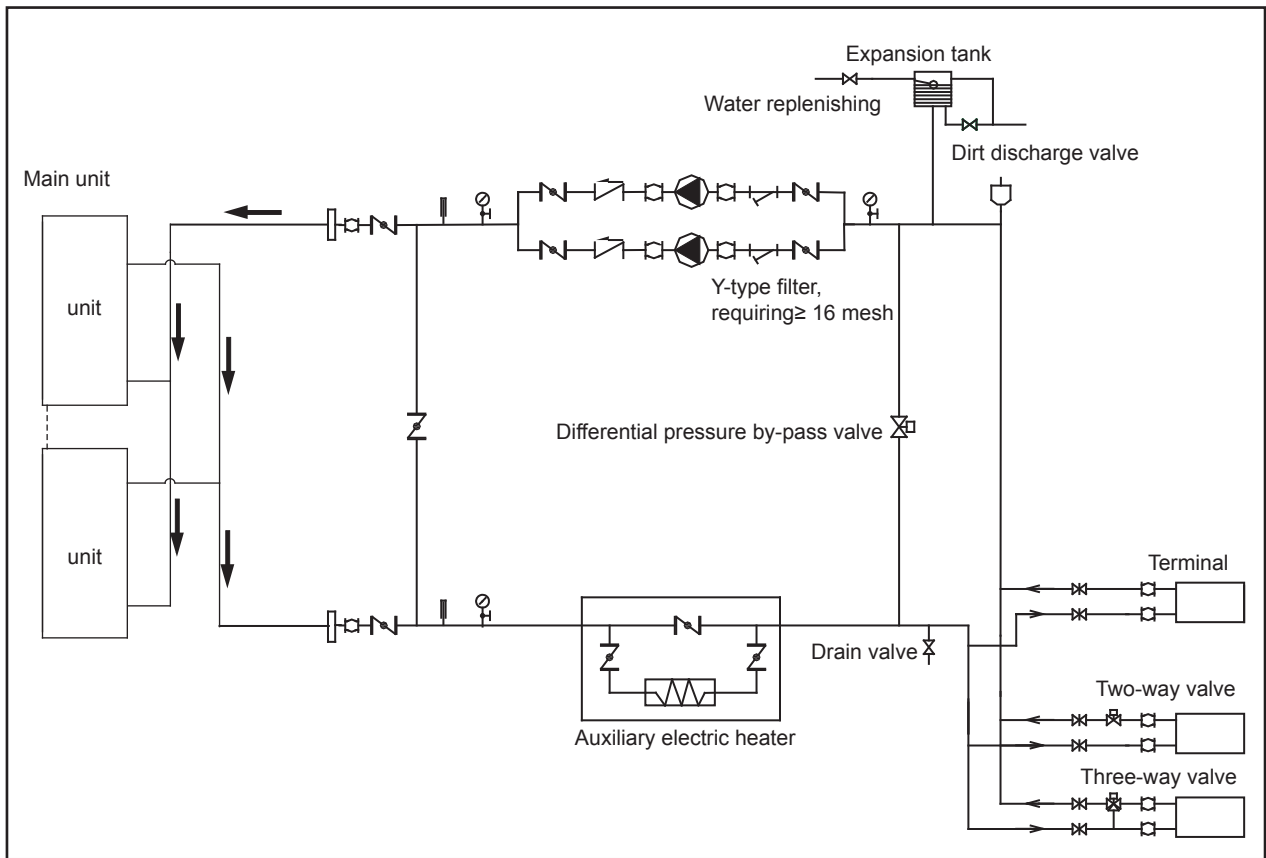


#### WARNING

---

- 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.
-

### 8.7.2 Connection drawing of pipeline



This is the water system of standard module, which pump is not provided.

Symbol explanation				

Fig.8-23 connection drawing of pipeline system

### 8.7.3 Connection mode of pipe

The water inlet and outlet pipes are installed and connected as shown in the following figures. MC-SU30-RN1L model uses screwed connection, while the MC-SU60-RN1L and MC-SU90-RN1L models use hoop connection. For the specifications of the water pipes and screw thread, see the Table 8-7 below.

Table 8-7

Model	Pipe connection methods	Specifications of water pipe	Specifications of screw thread
MC-SU30-RN1L	Screwed connection	DN40	Rc 1 1/4
MC-SU60-RN1L	Hoop connection	DN50	/
MC-SU90-RN1L	Hoop connection	DN50	/

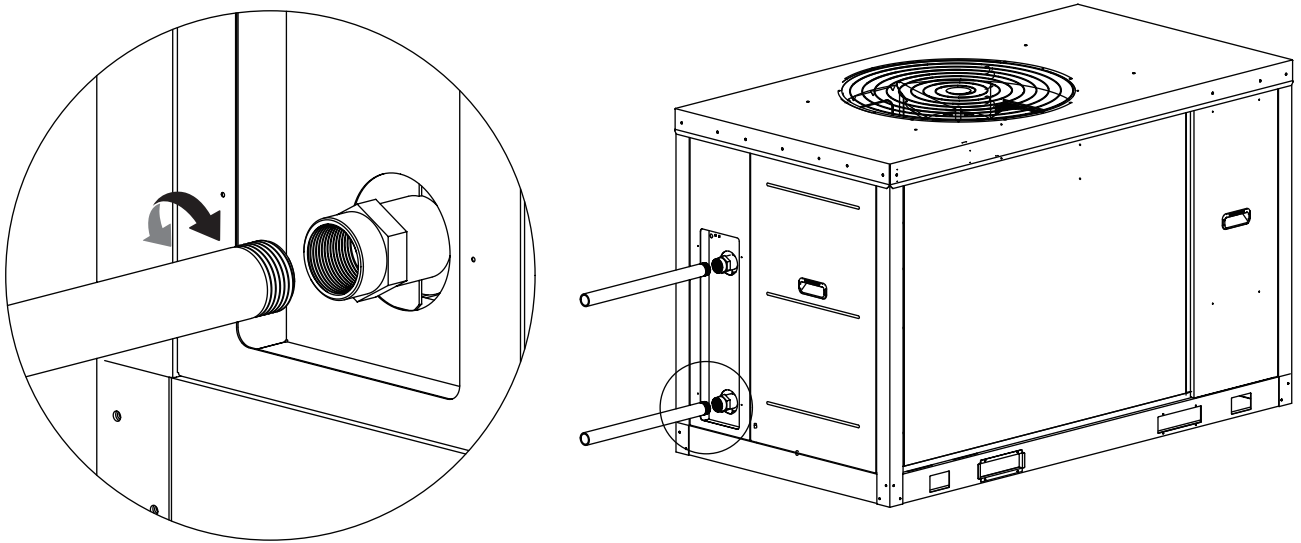


Fig.8-24 connection mode of MC-SU30-RN1L pipe

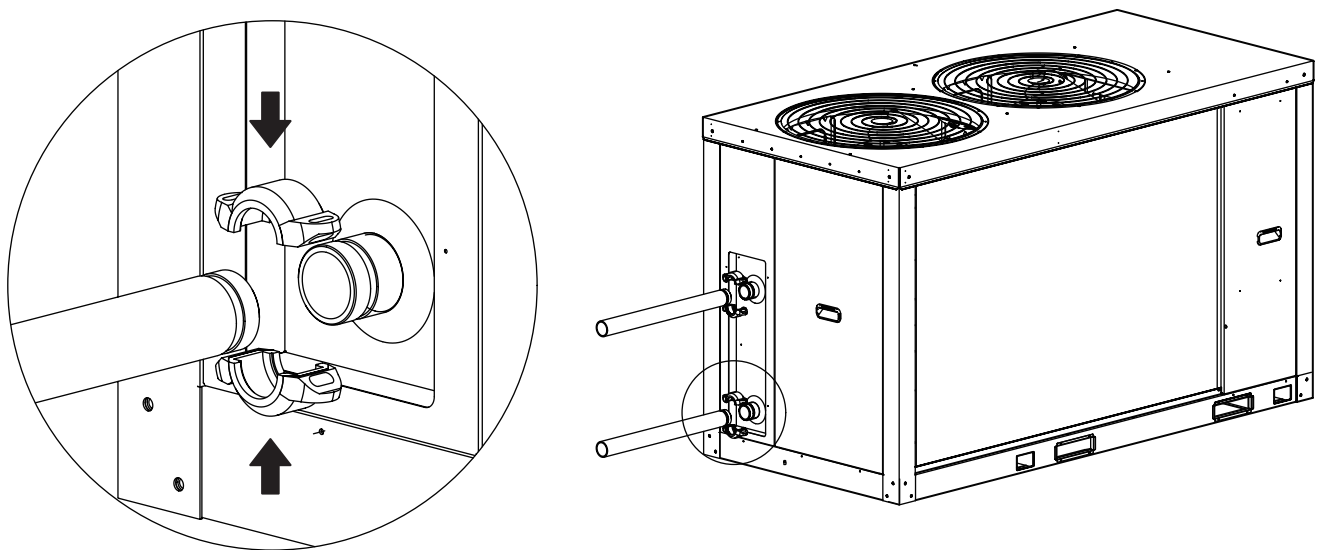


Fig.8-25 connection mode of MC-SU60-RN1L pipe

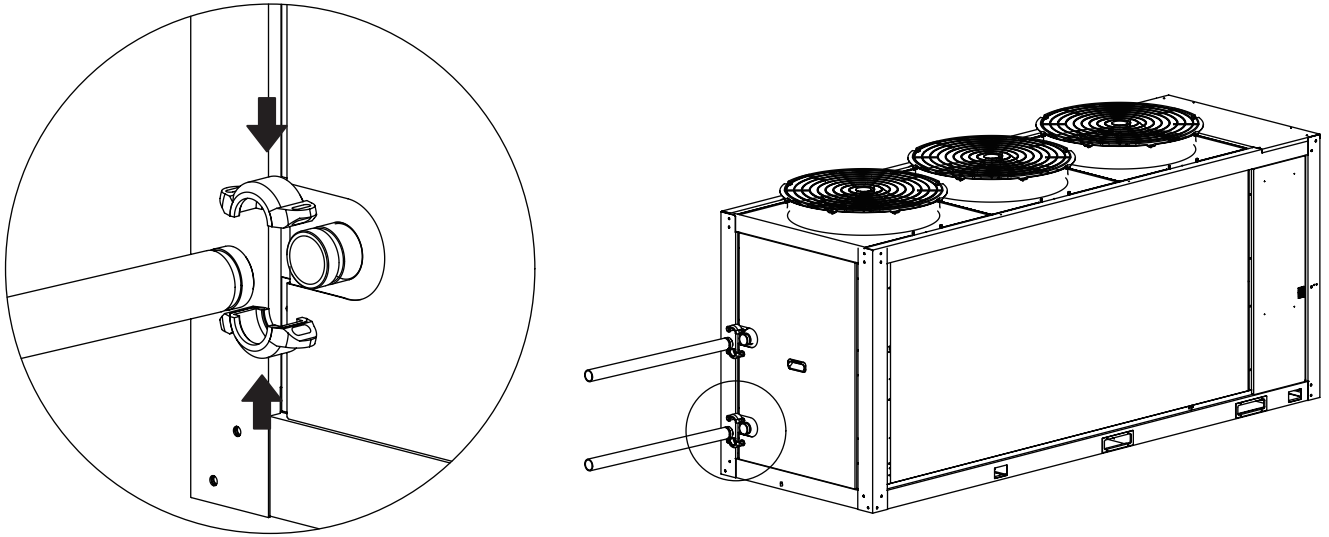


Fig.8-26 connection mode of MC-SU90-RN1L pipe

#### 8.7.4 Design of the store tank in the system

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 following schemes:

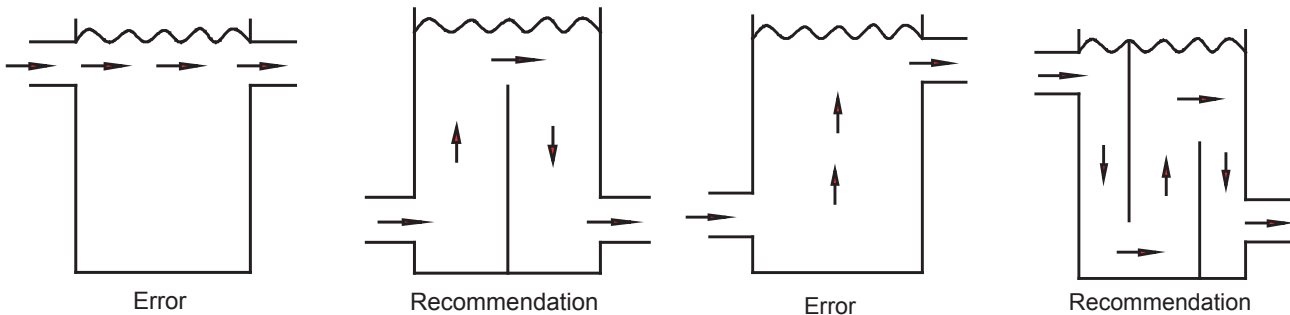


Fig.8-27 design of the store tank

Chilled water system minimum water volume

Chilled water system water volume can be calculated as:

$$\begin{aligned}
 \text{Chilled water system water volume} &= \text{Water pipework volume} \\
 &+ \text{Chiller heat exchanger volume} \\
 &+ \text{Water tank volume} \\
 &+ \text{FCU heat exchanger volume}
 \end{aligned}
 \tag{Equation 1}$$

From the above it can be seen that the system water volume can be adjusted by adjusting the water pipe and/or water tank dimensions. For replacement projects (where the pipework is already installed) the water system water volume can only be adjusted by adjusting the water tank dimensions. If the minimum water volume requirements (as per the calculations below) indicate that the water requirement is met by the pipework and heat exchanger volumes, a water tank is not required.



From equation 1:

$$\begin{aligned} \text{Water tank design volume} &= \text{Chilled water system minimum water volume} \\ &- \text{Water pipework volume} \\ &- \text{Chiller heat exchanger volume} \\ &- \text{FCU heat exchanger volume} \end{aligned}$$

Two factors place lower limits on the chilled water system required water volume:

1. Cooling mode limit: To ensure reliable system operation, the chilled water system water volume should be sufficient to prevent frequent system start/shutdown when operating in cooling mode under relatively low ambient temperatures. Typically systems should be designed such that the system runs for a minimum of 5 minutes following each system start up in cooling mode.
2. Heating mode limit: To ensure occupant comfort during the defrosting operation, the water system water volume should be sufficient to ensure that the leaving water temperature at the end of the defrosting operation has not fallen so low that occupants could experience cold drafts.

Cooling mode limit on chilled water system water volume

The cooling mode lower limit for the chilled water system water volume is given by:

$$W_c = Q_{c5} / (\Delta T_s - (Q_{cmin} / (G \times 1000))) \quad \text{Equation 2}$$

Where:

- $W_c$  is the required water volume (in liters)
- $Q_{c5}$  is the unit's cumulative cooling output (in kcal) when running at the unit's lowest operating speed for 5 minutes less the cumulative cooling output required to maintain the conditioned spaces at their set temperatures during that time, which can be obtained from:
  - $Q_{c5} = Q_c \times 860 \times (C_{min} - R_{min}) \times (5/60)$  Equation 3
  - Where:
    - $Q_c$  is the unit's cooling capacity (in kW) corrected for ambient temperature (using the lowest expected cooling mode ambient temperature) and leaving water temperature
    - $C_{min}$  is the ratio of unit output at its lowest operating speed to its output at maximum operating speed
    - $R_{min}$  is the cooling output required to maintain the conditioned spaces at their set temperatures, as a proportion of  $Q_c$
- $\Delta T_s$  is the unit's deadband temperature range (in °C).
- $Q_{cmin}$  is the unit's output (in kcal/h) when operating at its lowest speed and corrected for ambient temperature and leaving water temperature, which can be obtained from:
  - $Q_{cmin} = Q_c \times 860 \times C_{min}$  Equation 4
  - $G$  is the unit's minimum chilled water flow rate (in m<sup>3</sup>/h)

Heating mode limit on chilled water system water volume

To prevent occupants experiencing cold drafts during defrosting, system design should ensure that the leaving water temperature at the end of the defrosting operation does not fall below 15°C (when the ambient temperature is 1°C and the leaving water temperature before starting defrosting is 30°C) or does not fall below 20°C (when the ambient -7°C and the leaving water temperature before starting defrosting is 35°C).

Defining  $Q_h$  as the unit heating capacity (in kW) adjusted for ambient temperature and leaving water temperature, the required minimum water volume is given by:

$$W_{ct} = (Q_d + Q_s) / \Delta T_t \quad \text{Equation 5}$$

Where:

- $W_{ct}$  is the required water volume in liters
- $Q_d$  is the heat energy (in kcal) required for defrosting, which may be taken to be 12% of hourly unit output, such that:
  - $Q_d = Q_h \times 860 \times 0.12$  Equation 6

- $Q_s$  is the heat energy (in kcal) required for room heating during the defrosting operation, which may be obtained from:
  - $Q_s = Q_h \times 860 \times (t_f / 60)$  Equation 7
  - Where:
    - $t_f$  is the duration of defrosting operation (in mins)
- $\Delta T_t$  is the permitted water system temperature drop during defrosting operation (in °C)

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,  $V_t, gal (m^3)$ , can be calculated by the following formula, recommended by ASHRAE Handbook 1996, HVAC Systems and Equipment:

$$V_t = V_s \left( \frac{\frac{V_2}{V_1} - 1 - 3\alpha(T_2 - T_1)}{1 - \frac{P_1}{P_2}} \right)$$

$T_1$  = lower temperature, °F (°C)

$T_2$  = higher temperature, °F (°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, psia(kPa abs.)

$V_1, V_2$  = specific volume of water at lower and higher temperature, respectively, ft<sup>3</sup>/lb( $m^3$ /kg)

$\alpha$  = linear coefficient of thermal expansion: for steel,  $\alpha = 6.5 \times 10^{-6} \text{ in./in.} \cdot ^\circ\text{F}$  ( $1.2 \times 10^{-5}$  per °C);

for copper,  $\alpha = 9.5 \times 10^{-6} \text{ in./in.} \cdot ^\circ\text{F}$  ( $1.7 \times 10^{-5}$  per °C)

In a chilled water system, the higher temperature  $T_2$  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°F or 10 °C).

### 8.7.5 Minimum chilled water flow

The minimum chilled water flow is shown in the table 8-8

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

For minimum chilled water flow rate

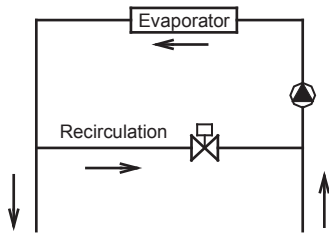


Fig. 8-28

### 8.7.6 Maximum chilled water flow

The maximum chilled water flow is limited by the permitted pressure drop in the evaporator. It is provided in the table 8-8

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.

For maximum chilled water flow rate

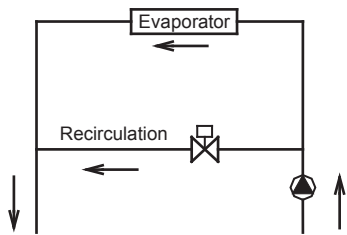


Fig. 8-29

### 8.7.7 Minimum and Maximum water flow

Table 8-8

Model	Item	Waterflow rate(m <sup>3</sup> /h)	
		Minimum	Maximum
MC-SU30-RN1L		3.8	6.4
MC-SU60-RN1L		8.0	13.0
MC-SU90-RN1L		13.5	16.5

### 8.7.8 Selection and installation of the pump

#### 8.7.8.1 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.

$$H=h_1+h_2+h_3+h_4$$

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.

#### 8.7.8.2 Installation the pump

- The pump should be installed at the water inlet pipe, both of which sides must mount the soft connectors for vibration-proof.
- The backup pump for the system (recommended).
- Units must with a main unit controls (Please see Fig. 8-22 for the controls wiring diagram).

### 8.7.9 Water quality

#### 8.7.9.1 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.

#### 8.7.9.2 Applicable standard of water quality for the unit

Table 8-9

PH value	7.5~9
Total hardness	<50ppm
Conductivity	<200μV/cm (25°C)
Sulfide ion	No
Chloride ion	<50ppm
Ammonia ion	No
Sulfate	<50ppm
Silicon	<30ppm
Iron content	<0.3ppm
Sodium ion	No requirement
Calcium ion	<50ppm

### 8.7.10 Installation of single-module water system pipeline

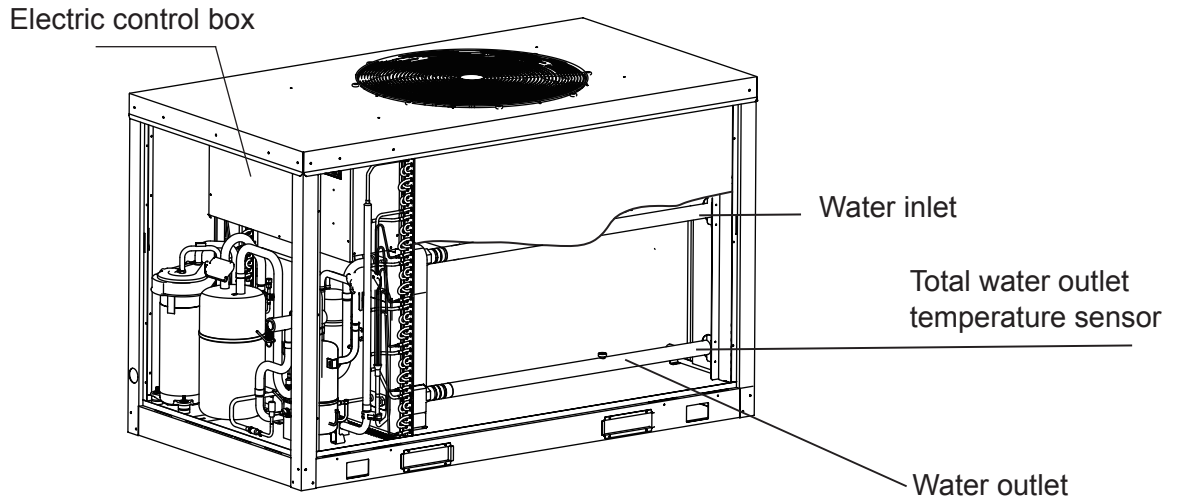


Fig.8-30 MC-SU30-RN1

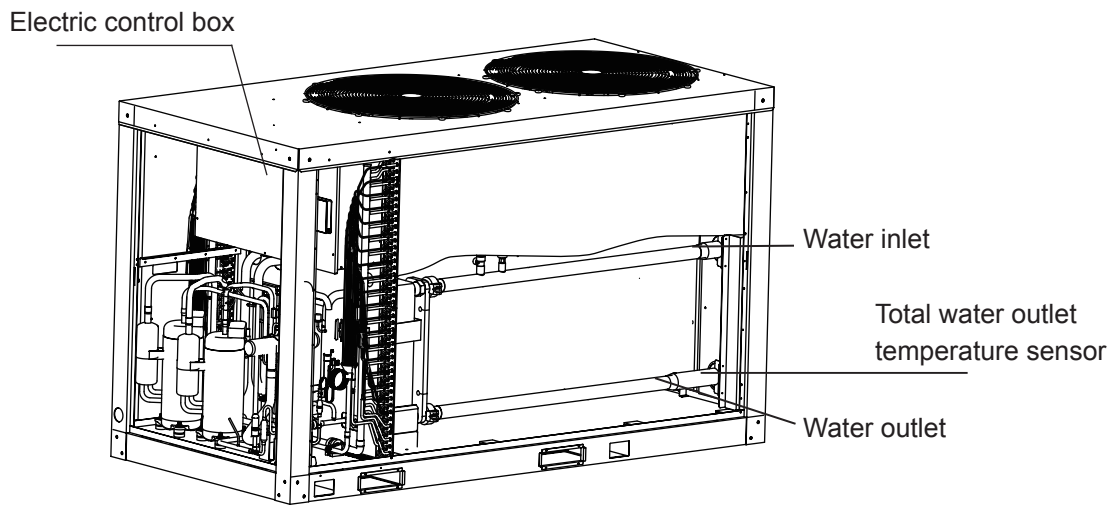


Fig.8-31 MC-SU60-RN1L

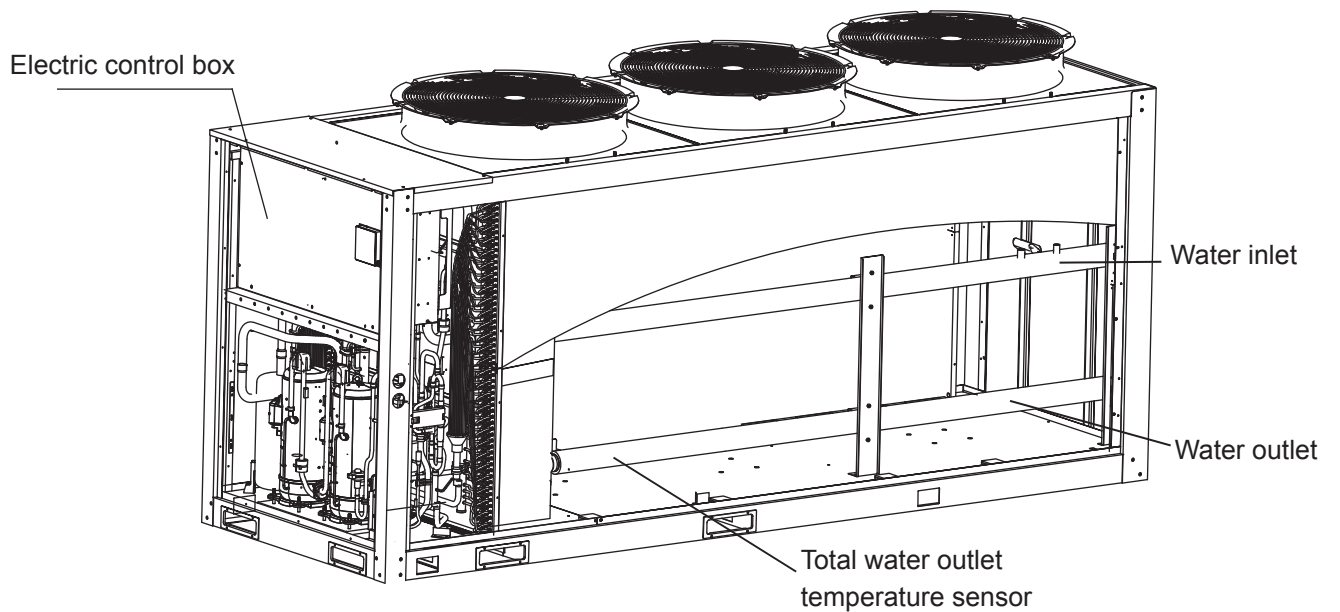


Fig.8-32 MC-SU90-RN1L

### 8.7.11 Installation of multi-module water system pipeline

Multi-module combination installation involves special design of the unit, so relevant explanation is given as follows.

#### 8.7.11.1 Installation mode of multi-module combination water system pipeline

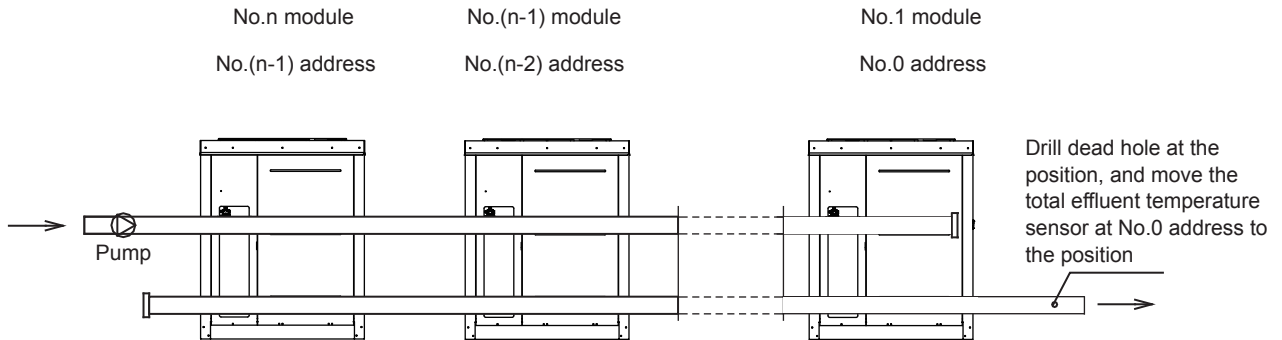


Fig.8-33 installation of multi-module (less than 16 modules)

#### 8.7.11.2 Table of diameter parameters of main inlet and outlet pipes

Table 8-10

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



### CAUTION

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, target flow controller and auxiliary electric heater are under control of the main module.
- One wired controller and one target flow controller 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  $\leq 500\text{m}$  away from the outdoor unit.

# 9. STRAT-UP AND CONFIGURATION

## 9.1 Initial start-up at low outdoor ambient temperatures

During initial start-up and when water temperature is low, it is important that the water is heated gradually. Failure to do so may result in concrete floors cracking due to rapid temperature change. Please contact the responsible cast concrete building contractor for further details.

To do so, the lowest water flow set temperature can be decreased to a value between 25°C and 35°C by adjusting the FOR SERVICEMAN. Refer to "FOR SERVICEMAN/special function/preheating for floor"

## 9.2 Points for attention prior to trial run

9.3.1 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.

9.3.2 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.

9.3.3 Setting of the wired controller. See details of the manual concerning setting contents of the controller, including such basic Zsettings 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.

9.3.4 Carefully adjust the target flow controller on the water system or the inlet stop valve of the unit, to make the water flow of the system be 90% of the water flow specified in troubleshooting table.

## 9.3 Overview of Wired Controller

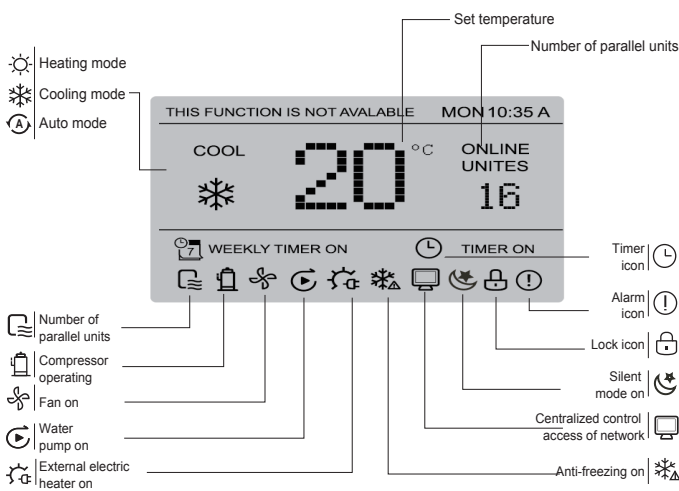


Fig.9-1 MC-SU30-RN1L and MC-SU60-RN1L

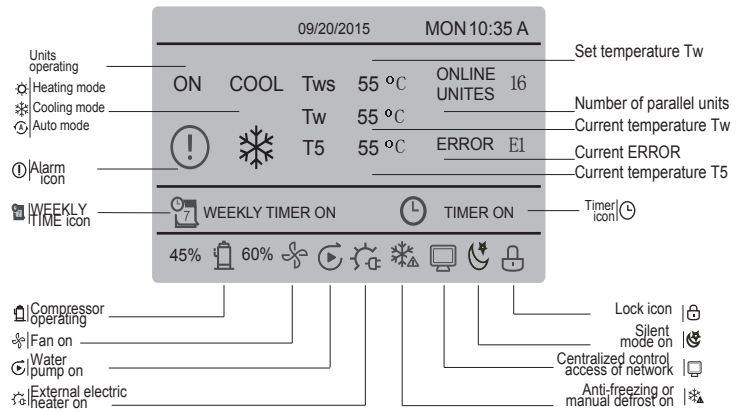
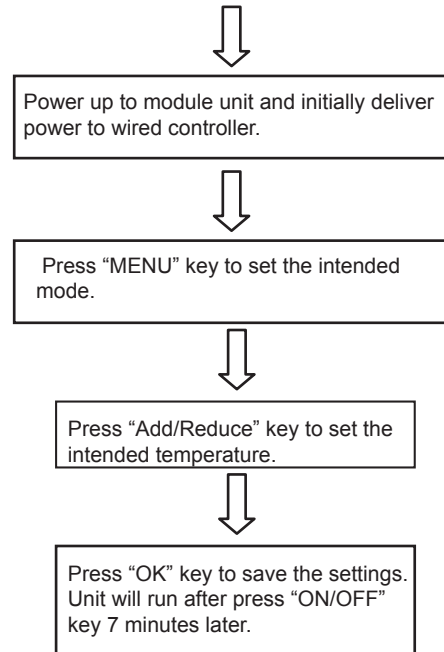


Fig.9-2 MC-SU90-RN1L

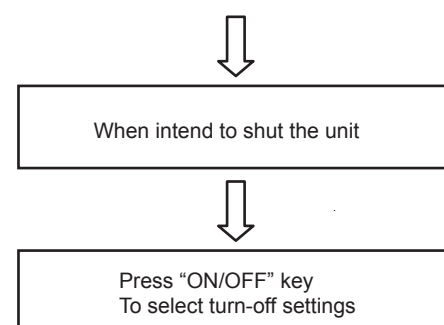
## 9.4 ON/OFF

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.

### Turn on the unit



### Turn off the unit



## 10. TEST RUN AND FINAL CHECK

### 10.1 Check item table after installation

Table 10-1

Checking item	Description	Yes	No
Whether installing site is meet for requirements	Units are fixed mounting on level base.		
	Ventilating space for heat exchanger at the air side is meeting for requirement		
	Maintenance space is meeting for requirement.		
	Noise and vibration is meeting for requirement.		
	Sun radiation and rain or snow proof measures are meeting for requirements.		
	External physical is meeting for requirement.		
Whether water system is meeting for requirements	Pipe diameter is meeting for requirement		
	The length of system is meeting for requirement		
	Water discharge is meeting for requirement		
	Water quality control is meeting for requirement		
	Flexible tube's interface is meeting for requirement		
	Pressure control is meeting for requirement		
	Thermal insulation is meeting for requirement		
	Wire capacity is meeting for requirement		
	Switch capacity is meeting for requirement		
	Fuse capacity is meeting for requirement		
	Voltage and frequency are meeting for requirement		
Whether electric wiring system is meeting for requirements	Connecting tightly between wires		
	Operation control device is meeting for requirement		
	Safety device is meeting for requirement		
	Chained control is meeting for requirement		
	Phase sequence of power supply is meeting for requirement		

## 10.2 Trial run

10.2.1 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.

10.2.2 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.

10.2.3 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 according to the contents in Table 11-1,11-2.



### CAUTION

- 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 target flow controller must be installed correctly. The wires of the target flow controller 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, the pump, the plate heat exchanger and the differential pressure value.
-



# 11. MAINTENANCE AND UPKEEP

## 11.1 Failure information and code

In case the unit runs under abnormal condition, failure protection code will display on both control panel and wired controller, and the indicator on the wired controller will flash with 1Hz. The display codes are shown in the following table:

Table11-1 MC-SU30-RN1L and MC-SU60-RN1L

No.	Code	reason	note
1	E0	Main control parameter memory EPROM failure or inverter module A, B-- Parameter memory EPROM failure	Recovered upon failure recovery
		1E0--> Main control parameter memory EPROM failure	Recovered upon failure recovery, spot check query
		2E0-->Inverter module A--Parameter memory EPROM failure	Recovered upon failure recovery
		3E0-->Inverter module B--Parameter memory EPROM failure	Recovered upon failure recovery
2	E1	Phase sequence failure of main control board check	Recovered upon failure recovery
3	E2	Main control and wired control communication failure	Recovered upon failure recovery
4	E3	Total water outlet temperature sensor failure (main unit valid)	Recovered upon failure recovery
5	E4	Unit water outlet temperature sensor failure	Recovered upon failure recovery
6	E5	Condenser tube temperature sensor failure	Recovered upon failure recovery
7	E7	Ambient temperature sensor failure	Recovered upon failure recovery
8	E8	Power supply phase sequence protector output failure	Recovered upon failure recovery
9	E9	Water flow detection failure (recovered through button)	Protection occurs 3 times in 60 minutes and the failure can be recovered by power disconnection only.
11	Eb	1Eb-->Taf1 cooling evaporator low-temperature antifreeze protection sensor failure	Recovered upon failure recovery
		2Eb-->Taf2 cooling evaporator low-temperature antifreeze protection sensor failure	Recovered upon failure recovery
12	EC	Slave unit module reduction (displayed by wired controller)	/
13	Ed	1Ed-->A system discharge temperature sensor failure	Recovered upon failure recovery
		2Ed-->B system discharge temperature sensor failure	Recovered upon failure recovery
14	EF	Unit water return temperature sensor failure	Recovered upon failure recovery
15	EH	System self-check failure alarm	Recovered upon failure recovery
16	EL	Electronic lock failure	Recovered upon failure recovery
17	EP	Discharge sensor failure alarm	Recovered upon failure recovery
18	EU	Tz general cold water outlet sensor failure	Recovered upon failure recovery
19	P0	System high-pressure protection or discharge temperature protection	Protection occurs 5 times in 120 minutes and the failure can be recovered by power disconnection only.
20	P1	System low pressure protection	Protection occurs 5 times in 120 minutes and the failure can be recovered by power disconnection only.
21	P4	System A current protection	Protection occurs 5 times in 120 minutes and the failure can be recovered by power disconnection only.
22	P5	System B current protection	Protection occurs 5 times in 120 minutes and the failure can be recovered by power disconnection only.
23	P6	1P6-->IPM module failure, system A protection	Protection occurs 10 times in 150 minutes and the failure can be recovered by power disconnection only.
		2P6-->IPM module failure, system B protection	
24	P7	High temperature protection of system condenser and total cold water outlet temperature Tz	Protection occurs 10 times in 180 minutes, the failure can be recovered by power disconnection only.
25	P9	Water inlet and outlet temperature difference protection	Protection occurs 3 times in 60 minutes and the failure can be recovered by power disconnection only.




26	PA	Cooling return water temperature too high	Recovered upon failure recovery
27	Pb	Winter antifreeze protection	Recovered upon failure recovery
28	PC	Evaporator pressure low in cooling	Occurs 10 times in 150 minutes. The failure needs to be recovered manually or power disconnection.
29	PE	Cooling evaporator low-temperature antifreeze protection (recovered through button)	Protection occurs 3 times in 60 minutes and the failure can be recovered by power disconnection.
30	PF	Electronic lock not unlocked (main board); electronic lock failure or not unlocked (wired controller)	/
31	PH	Heating T4 too high temperature protection	Recovered upon failure recovery
32	PL	Tfin module too high temperature protection	Protection occurs 3 times in 100 minutes and the failure can be recovered by power disconnection only.
33	PU	1PU-->DC fan A module protection	Recovered upon failure recovery
		2PU-->DC fan B module protection	Recovered upon failure recovery
34	H0	1H0: IPM module communication failure	Recovered upon failure recovery
		2H0: IPM module communication fault	Recovered upon failure recovery
35	H1	Over/under-voltage protection	Recovered upon failure recovery
36	H4	1H4: PP protection occurs 3 times in 60 minutes (power failure recovery)	Reserved
		2H4: PP protection occurs 3 times in 60 minutes (power failure recovery)	Reserved
37	H6	1H6: A system bus voltage failure (PTC)	Recovered upon failure recovery
		2H6: B system bus voltage failure (PTC)	Recovered upon failure recovery
38	Fb	Pressure sensor failure	Recovered upon failure recovery
39	Fd	Air return temperature sensor failure	Recovered upon failure recovery
40	FE	Heat recovery temperature sensor failure	Recovered upon failure recovery
41	FF	1FF DC fan A failure	Protection occurs 3 times in 20 minutes and the failure can be recovered by power disconnection only.
		2FF DC fan B failure	Protection occurs 3 times in 20 minutes and the failure can be recovered by power disconnection only.
42	FP	DIP inconsistency of multiple water pumps	Power failure recovery required
43	L0	L0 module protection	Recovered upon failure recovery
44	L1	L1 low voltage protection	Recovered upon failure recovery
45	L2	L2 high voltage protection	Recovered upon failure recovery
46	L4	L4MCE failure	Recovered upon failure recovery
47	L5	L5 zero speed protection	Recovered upon failure recovery
48	L7	L7 phase loss	Recovered upon failure recovery
49	L8	L8 frequency change over 15Hz	Recovered upon failure recovery
50	L9	L9 frequency phase difference 15Hz	Recovered upon failure recovery
51	dF	Defrosting prompt	Recovered upon failure recovery

Table 11-2 MC-SU90-RN1L

No.	Code	reason	note
1	E0	Main control parameter memory EPROM failure	Recovered upon failure recovery
2	E1	Phase sequence failure of main control board check	Recovered upon failure recovery
3	E2	Main control and wired control communication failure	Recovered upon failure recovery
4	E3	Total water outlet temperature sensor failure (main unit valid)	Recovered upon failure recovery
5	E4	Unit water outlet temperature sensor failure	Recovered upon failure recovery
6	E5	1E5 condenser tube temperature sensor T3A failure	Recovered upon failure recovery
		2E5 condenser tube temperature sensor T3B failure	Recovered upon failure recovery
7	E6	Water tank temperature sensor T5 failure	Recovered upon failure recovery
8	E7	Ambient temperature sensor failure	Recovered upon failure recovery
9	E8	Power supply phase sequence protector output failure	Recovered upon failure recovery
10	E9	Water flow detection failure (recovered through button)	Protection occurs 3 times in 60 minutes and the failure can be recovered by power disconnection only.
	xE9	Drive model not matched	x indicates the compressor: 1 indicates compressor A, and 2 indicates compressor B.
12	Eb	1Eb-->Taf1 cooling evaporator low-temperature antifreeze protection sensor failure	Recovered upon failure recovery
		2Eb-->Taf2 cooling evaporator low-temperature antifreeze protection sensor failure	Recovered upon failure recovery
13	EC	Slave unit module reduction	Recovered upon failure recovery
14	Ed	1Ed-->A system discharge temperature sensor failure	Recovered upon failure recovery
		2Ed-->B system discharge temperature sensor failure	Recovered upon failure recovery
15	EE	1EE EVI plate heat exchanger refrigerant temperature T6A sensor failure	Recovered upon failure recovery
		2EE EVI plate heat exchanger refrigerant temperature T6B sensor failure	
16	EF	Unit water return temperature sensor failure	Recovered upon failure recovery
17	EH	System self-check failure alarm	Recovered upon failure recovery
18	EP	Discharge sensor failure alarm	Recovered upon failure recovery
19	EU	Tz sensor error	Recovered upon failure recovery
20	P0	System high-pressure protection or discharge temperature protection	Protection occurs 10 times in 150 minutes and the failure can be recovered by power disconnection only.
21	P1	System low pressure protection	Protection occurs 10 times in 150 minutes and the failure can be recovered by power disconnection only.
22	P2	Tz total cold outlet temperature too high	Recovered upon failure recovery
23	P4	System A current protection	Protection occurs 10 times in 150 minutes and the failure can be recovered by power disconnection only.
24	P5	System B current protection	Protection occurs 10 times in 150 minutes and the failure can be recovered by power disconnection only.
25	P6	Module failure	Protection occurs 10 times in 150 minutes and the failure can be recovered by power disconnection only.
26	P7	High temperature protection of system condenser	Protection occurs 10 times in 180 minutes and the failure can be recovered by power disconnection only.
27	P9	Water inlet and outlet temperature difference protection	Protection occurs 3 times in 60 minutes and the failure can be recovered by power disconnection only.
28	Pb	Winter antifreeze protection	Recovered upon failure recovery
29	PC	Evaporator pressure low in cooling	Occurs 10 times in 150 minutes. The failure needs to be recovered manually or through power disconnection.
30	PE	Cooling evaporator low temperature antifreeze protection	Protection occurs 3 times in 60 minutes and the failure can be recovered by power disconnection only.
31	PH	Heating T4 too high temperature protection	Valid for heating
32	PL	Tfin module too high temperature protection	Protection occurs 3 times in 100 minutes and the failure can be recovered by power disconnection only.
33	PU	1PU-->DC fan A module protection	Recovered upon failure recovery
		2PU-->DC fan B module protection	Recovered upon failure recovery
		3PU-->DC fan C module protection	Recovered upon failure recovery
34	H5	Voltage too high or low	Recovered by power disconnection
35	xH9	Drive model not matched	x indicates the compressor: 1 indicates compressor A, and 2 indicates compressor B.

36	HE	A valve not inserted fault 1HE	Recovered upon failure recovery
		B valve not inserted fault 2HE	Recovered upon failure recovery
		C valve not inserted fault 3HE	Recovered upon failure recovery
37	F0	1F0: IPM module communication failure	Recovered upon failure recovery
		2F0: IPM module communication failure	Recovered upon failure recovery
38	F2	Superheat insufficient	Protection occurs 3 times in 240 minutes and the failure can be recovered by power disconnection only.
39	F3 (reserved)	Fan 1 communication failure 1F3	Recovered upon failure recovery
		Fan 2 communication failure 2F3	Recovered upon failure recovery
		Fan 3 communication failure 3F3	Recovered upon failure recovery
40	F4	1F4: L0 or L1 protection occurs 3 times in 60 minutes (power failure recovery)	Recovered upon failure recovery
		2F4: L0 or L1 protection occurs 3 times in 60 minutes (power failure recovery)	Recovered upon failure recovery
41	F6	1F6: A system bus voltage fault (PTC)	Recovered upon failure recovery
		2F6: B system bus voltage fault (PTC)	Recovered upon failure recovery
42	F9	Tfin1 radiator temperature sensor failure 1 F9	Recovered upon failure recovery
		Tfin2 radiator temperature sensor failure 2 F9	Recovered upon failure recovery
43	Fb	Pressure sensor failure	Recovered upon failure recovery
44	Fd	Air return temperature sensor failure	Recovered upon failure recovery
45	FF	1FF DC fan A failure	Failure can only be recovered by disconnecting the power
		2FF DC fan B failure	Failure can only be recovered by disconnecting the power
		3FF DC fan C failure	Failure can only be recovered by disconnecting the power
46	FP	DIP inconsistency of multiple water pumps	Power failure recovery required
47	C7	If PL occurs 3 times, the system reports the C7 failure	Power failure recovery required
48	L0	L0 module protection	Recovered upon failure recovery
49	L1	L1 low voltage protection	Recovered upon failure recovery
50	L2	L2 high voltage protection	Recovered upon failure recovery
51	L4	L4MCE failure	Recovered upon failure recovery
52	L5	L5 zero speed protection	Recovered upon failure recovery
53	L7	L7 phase loss	Recovered upon failure recovery
54	L8	L8 frequency change over 15Hz	Recovered upon failure recovery
55	L9	L9 frequency phase difference 15Hz	Recovered upon failure recovery
56	dF	Defrosting prompt	Recovered upon failure recovery

## 11.2 Data display of wired controller

- Ordinary displayed data are displayed in all display pages.
- If the unit system is under running state, i.e. one or more than one Modular unit is under running operation, there will be a dynamic display of . If the system is under OFF state, there is no display.
- If the communication with the main unit Modular unit is fail, it displays E2
- If it is under the host computer network control,  displays, otherwise there is no display.
- If it is under wired controller locked or button locked state, it displays  the lock mark. There will be no display after the lock is unlocked.

## 11.3 Digital display of main board

The data display area is divided into Up area and Down area, with two groups of two-digit half 7-segment digital display, respectively.

### a. Temperature display

Temperature display is used for displaying the total outlet water temperature of unit system, outlet water temperature, condenser pipe temperature T3A of system A, condenser pipe temperature T3B of system B, outdoor environmental temperature T4, anti-freezing temperature T6 and setting temperature Ts, with allowable data display scope -15°C~70°C. If the temperature is higher than 70°C, it is displayed as 70°C. If there is no effective date, it displays “— —” and indication point °C is on.

### b. Current display

Current display is used for displaying Modular unit system A compressor current IA or system B compressor current IB, with allowable display scope 0A~99A. If it is higher than 99A, it is displayed as 99A. If there is no effective date, it displays “— —” and indication point A is on.

### c. Failure display

It is used for displaying the total failure warning date of unit or that of Modular unit, with failure display scope E0~EF, E indicating failure, 0~F indicating failure code. “E-” is displayed when there is no failure and indication point # is on at the same time.

### d. Protection display

It is used for displaying the total system protection data of unit or the system protection data of Modular unit, with protection display scope P0~PF, P indicating system protection, 0~F indicating protection code. “P-” is displayed when there is no failure.

### e. Unit number display

It is used for displaying the address number of the currently selected Modular unit, with display scope 0~15 and indication point # is on at the same time.

### f. Display of online unit number and startup unit number

They are used for displaying the total online Modular units of the whole unit system and the number of the Modular unit under running state, respectively, with display scope 0~16.

Any time when the spot check page is entered to display or change Modular unit, it is needed to wait for the up-to-date data of the Modular unit received and selected by wired controller. Before receiving the data, the wired controller only displays “— —” on the data display Down area, and the Up area displays the address number of the Modular unit. No page can be turned, which continues until the wired controller receives the communication data of this Modular unit.

## 11.4 Query display

Press the “▲” or “▼” key of wire controller to adjust the main unit serial number can query 16 sets main units' status information from #0~#15. Press “◀” or “▶” to adjust the spot check sequence number of one main unit then can query all the status information of this unit.

Spot check content according to the main unit model wired controller:

Table 11-3 MC-SU30-RN1L and MC-SU60-RN1L

No.		Spot inspection item
0		Standby: ODU address (L88) + number of on-line units (R88), On: display frequency Defrosting: dF and operating frequency flash alternately at 1s intervals In case of Pb protection, Pb and operating frequency flash alternately at 1s intervals
1	0.xx	ODU address
2	1.xx	ODU Hp
3	2.xx	Number of ODUs (Main unit included)
4	3.xx	T4 capacity revision
5	4.xx	Operation modes (8 OFF, 0 Standby, 1 Cooling, and 2 Heating)
6	5.xx	Fan Speed 1
7	6.xx	Fan Speed 2
8	7.xx	T3
9	8.xx	T4
10	9.xx	T5
11	10.xx	Taf1
12	11.xx	Taf2
13	12.xx	Tw
14	t.xx	Two unit water inlet (displays to decimal places)
15	14.xx	Two unit water outlet
16	15.xx	Tz general cold water leaving temperature
17	16.xx	THeatR heat recovery sensor temperature
18	17.xx	Air discharge 1
19	18.xx	Air discharge 2
20	19.xx	Heat sink temperature 1
21	20.xx	Heat sink temperature 2
22	21.xx	Air discharge superheat degree DSH
23	22.xx	Current of compressor A
24	23.xx	Current of Compressor B
25	24.xx	Water pump current
26	25.xx	Electronic expansion valve 1 opening (/4)
27	26.xx	Electronic expansion valve 2 opening (/4)
28	27.xx	High pressure
29	L.xx	Low pressure (displays to decimal places)
30	29.xx	Air return superheat degree
31	30.xx	Air return temperature
32	31.xx	Mute selection
33	32.xx	Static pressure selection
34	33.xx	DC voltage A (reserved)
35	34.xx	DC voltage B (reserved)
36	35.xx	Last fault
37	36.xx	Limit frequency No. (0: no limits; 1: 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	37.xx	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	38.xx	E-direction failure: 1 indicates failure, and 0 indicates no failure
40	39.xx	Defrosting scheme
41	40.xx	Initial frequency
42	41.xx	Tc
43	42.xx	Te
44	43.xx	----

Table 11-4 MC-SU90-RN1L

No.		Sport Check Item
0		Standby: main unit address (88 on the left) + number of online sets (88 on the right) On: display frequency Defrosting: dFdF
1	0.xx	Main unit address
2	1.xx	Main unit HP (90kw displays 90)
3	2.xx	Number of online sets (main unit valid)
4	3.xx	T4 capacity correction (1 displayed)
5	4.xx	Operation mode (8 - Off, 1 - Cool, 2 - Heat, 4 - Water heating)
6	5.xx	Fan speed (0 - 35)
7	6.xx	Fan speed (0 displayed)
8	7.xx	T3 (Min. value)
9	8.xx	T4
10	9.xx	T5 Water outlet temperature of water tank
11	10.xx	Taf1
12	11.xx	Taf2
13	12.xx	Tw Total water outlet temperature of air conditioner
14	13.xx	Twi Unit water inlet temperature
15	14.xx	Two Unit water outlet temperature
16	15.xx	Tz total cold outlet temperature
17	16.xx	THeatR heat recovery sensor temperature (-- displayed)
18	17.xx	Discharge temperature 1
19	18.xx	Discharge temperature 2
20	19.xx	Radiation fin temperature 1
21	20.xx	Radiation fin temperature 2
22	21.xx	Discharge superheat TDSH
23	22.xx	Compressor A current
24	23.xx	Compressor B current
25	24.xx	--
26	25.xx	Opening of electronic expansion valve A (/20)
27	26.xx	Opening of electronic expansion valve B (/20)
28	27.xx	Opening of electronic expansion valve C (/4)
29	28.xx	High pressure (Heating mode)
30	L.xx	Low pressure (with decimal display -- displayed during cooling or standby)
31	30.xx	Cooling return air superheat TSSH
32	31.xx	Th return air temperature
33	32.xx	The first nixie tube from the right: Silence selection: 0 - Night silent; 1 - Silent; 2 - Super silent; 3 - No silence (by default) The second nixie tube from the right: Silence time selection (0-3) values depend on the parameters of the wired controller

34	33.xx	Static pressure selection (0 static pressure by default)
35	34.xx	DC voltage A (reserved)
36	35.xx	DC voltage B (reserved)
37	36.xx	Frequency limiting No. (0: No frequency limiting; 1: T4 Frequency limiting; 2: Discharge frequency limiting; 3: Frequency limiting of Tz total cold outlet; 4: Frequency limiting of module temperature; 5: Pressure frequency limiting; 6: Current frequency limiting; 7: Voltage frequency limiting)
38	37.xx	Defrosting process state (the first digit: T4 selection solution; the second digit: interval in the solution; the third digit and fourth digit determine the defrosting timer time)
39	38.xx	Parameter memory EPROM failure: 1: Failure exits; 0: No failure
40	39.xx	Defrosting solution
41	40.xx	Initial frequency
42	41.xx	Tc (Saturation temperature corresponding to the high pressure in heating mode)
43	42.xx	Te (Saturation temperature corresponding to the low pressure in cooling mode)
44	43.xx	T6a
45	44.xx	T6b
46	45.xx	Software version No.
47	46.xx	Last malfunction
48	47.xx	---

## 11.5 Care and maintenance

### Maintenance period

It's recommended that before cooling in summer and heating in winter every year, consult local air conditioner customer service center to check and maintain the unit, to prevent air conditioner errors which bring inconvenience to your life and work.

### Maintenance of main parts

- 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.

## 11.6 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 fluoroacetic 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 by professionals. Please contact the local air-conditioner customer service center.
- 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 equipments (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.

## 11.7 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 antifreezer in the pipe).

## 11.8 Replacing parts

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

## 11.9 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 equipments of water pipe system.
- 4) Fix connections of all wires.
- 5) It is a must to electrify the machine 12 hours before startup.

## 11.10 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 parts of refrigerating 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.



### CAUTION

- Connection must be renewed after injection is completed.
  - Never inject oxygen, acetylene or other flammable or poisonous gas to the refrigeration system at leakage detection and air tight test. Only pressurized nitrogen or refrigerant can be used.
- 

## 11.11 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.

## 11.12 Auxiliary electric heater

When the ambient temperature is lower than 2°C, the heating efficiency decreases with the decline of the outdoor temperature. In order to make the air-cooled heat pump 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°C~10°C, the user may consider to use auxiliary electric heater. Please refer to relevant professionals for the power of auxiliary electric heater.

### 11.13 System antifreezing

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 antifreezing.

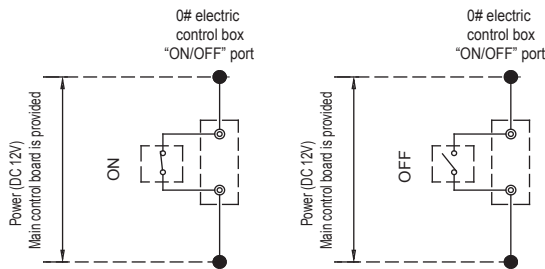
1) If the unit that is shutdown for standby is placed in an environment where the outdoor temperature is lower than 0℃, the water in the water system should be drained.


2) Water pipe may be frozen when the chilled water target flow controller and anti-freezing temperature sensor become ineffective at running, therefore, the target flow controller 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.

### 11.14 Wiring of “ON/OFF” weak electric port

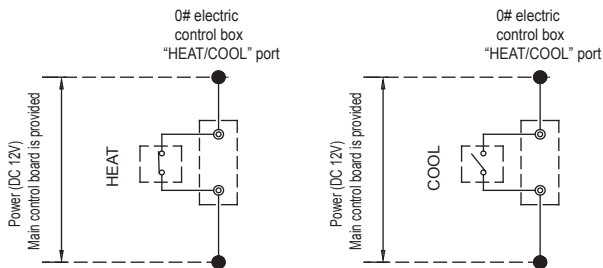
First, corresponding parallel connect the “ON/OFF” port of the main unit’s electric control box,then, connect the “ON/OFF” signal (provide by user) to the “ON/OFF” port of main unit as follows.



If the “ON/OFF” port is effective ,the “” icon of the wire controller will be flashing.

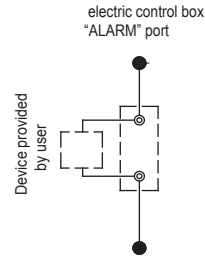
### 11.15 Wiring of “HEAT/COOL” weak electric port

First, corresponding parallel connect the “HEAT/COOL” 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.



### 11.16 Wiring of “ALARM” port

Connect the device provided by user to the “ALARM” ports of the module units as follows.



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

### 11.17 Important information for the used refrigerant

This product has the fluorinated gas, it is forbidden to release to air. Refrigerant type: R410A; Volume of GWP: 2088; GWP=Global Warming Potential

Model	Factory charge	
	Refrigerant/kg	tonnes CO <sub>2</sub> equivalent
MC-SU30-RN1L	10.50	21.94
MC-SU60-RN1L	17.00	35.50
MC-SU90-RN1L	27.00	56.36

#### Attention:

#### Frequency of Refrigerant Leak Checks

- 1) For equipment that contains fluorinated greenhouse gases in quantities of 5 tonnes of CO<sub>2</sub> equivalent or more, but of less than 50 tonnes of CO<sub>2</sub> equipment, at least every 12 months, or where a leakage detection system is installed, at least every 24 months.
- 2) For equipment that contains fluorinated greenhouse gases in quantities of 50 tonnes of CO<sub>2</sub> equivalent or more, but of less than 500 tonnes of CO<sub>2</sub> equipment, at least every six months, or where a leakage detection system is installed, at least every 12 months.
- 3) For equipment that contains fluorinated greenhouse gases in quantities of 500 tonnes of CO<sub>2</sub> equivalent or more, at least every three months, or where a leakage detection system is installed, at least every six months.
- 4) Non-hermetically sealed equipment charged with fluorinated greenhouse gases shall only be sold to the end user where evidence is provide that the installation is to be carried out by an undertaking certified person.
- 5) Only certificated person is allowed to do installation, operation and maintenance.



## 11.18 Replacement of safety valve

Replace the safety valve as follows:

- 1) Reclaim the refrigerant completely in the system. Doing so requires professional staff and equipment;
- 2) Note to protect the tank coating. Avoid damage to coating from external force or high temperature when removing and installing the safety valve;
- 3) Heat the sealant to screw off the safety valve. Note to protect the area where the screwing tool meets the tank body and avoid damages to the tank coating;
- 4) If tank coating is damaged, repaint the damaged area.

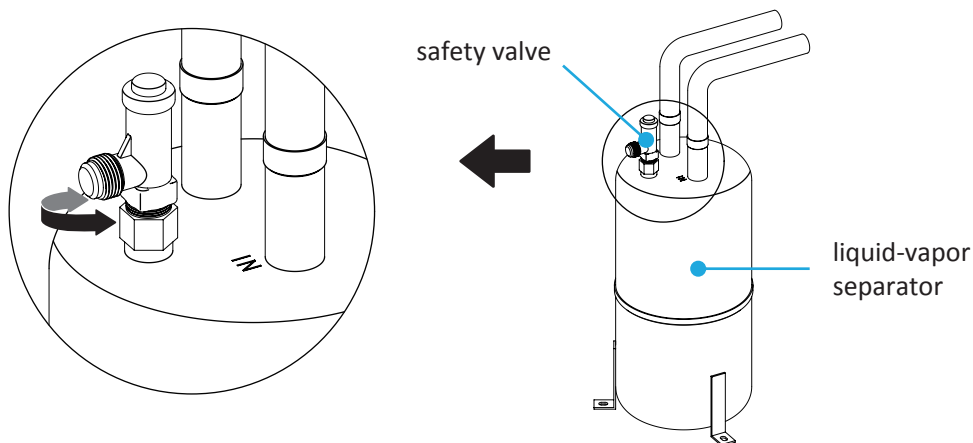


Fig.11-1 Replacement of safety valve



**WARNING: Safety valve warranty period is 24 months. Under the specified conditions, if flexible sealing parts is used, the safety valve life expectancy is 24 to 36 months, if metal or PIFE sealing components is used, the average life expectancy is 36 to 48 months. Visual inspection is needed after that period, maintenance people should check the appearance of the valve body and the operating environment. If the valve body is not obvious corrosion, cracks, dirt, damage, then the valve can be used continually. Otherwise, please contact your supplier for spare part.**

## RECORD TABLE OF TEST RUN AND MAINTENANCE

Table 11-5

Model:	Code labeled on the unit:
Customer name and address:	Date:
<p>1. Whether there is sufficient water flow passing waterside heat exchanger? (    )</p> <p>2. Whether leakage detection has been made on all the water pipe?    (    )</p> <p>3. Whether pump, fan and motor are lubricated?                            (    )</p> <p>4. Whether unit has been through 30-minute operation?                    (    )</p> <p>5. Check temperature of chilled water or hot water              Inlet (    )                            Outlet (    )</p> <p>6. check air temperature of air-side heat exchanger:              Inlet (    )                            Outlet (    )</p> <p>7. Check refrigerant suction temperature and superheating temperature:              Refrigerant suction temperature: (    )(    )(    )(    )(    )              Superheating temperature:    (    )(    )(    )(    )(    )</p> <p>8. Check pressure:              Discharge pressure: (    )(    )(    )(    )(    )              Suction pressure: (    )(    )(    )(    )(    )</p> <p>9. Check running current: (    )(    )(    )(    )(    )</p> <p>10. Whether unit has been through refrigerant leakage test?    (    )</p> <p>11. Whether unit inside and outside is cleared?                    (    )</p> <p>12. Whether there is noise on all the panels of unit?                (    )</p> <p>13. Check whether the main power source connection is correct.    (    )</p>	



## 12. APPLICABLE MODELS AND MAIN PARAMETERS

Table 12-1

Model		MC-SU30-RN1L	MC-SU60-RN1L	MC-SU90-RN1L
Cooling capacity	kW	27	55	82
Heating capacity	kW	31	61	92
Standard cooling input	kW	10.8	22	36.8
Cooling rated current	A	16.7	33.9	60
Standard heating input	kW	10.5	20.3	32.8
Heating rated current	A	16.2	31.3	42
Power supply		380-415V 3N~ 50Hz		
Operation control		Control of wired controller, auto startup, running state display, failure alert etc.		
Safety device		High or low pressure switch, freeze-proof device, water flow volume controller, Overcurrent device, power phase sequence device etc.		
Refrigerant	Type	R410A		
	Chargeing volume kg	10.5	17.0	27.0
Water pipe system	Waterflow volume m <sup>3</sup> /h	5.0	9.8	15
	Hydraulic resistance lose kPa	80	50	75
	Water side heat exchanger	Plate heat exchanger		
	Max. pressure MPa	1.0		
	Min. pressure MPa	0.05		
	Inlet and outlet pipe dia.	DN40	DN50	
Air side heat exchanger	Type	Fin coil model		
	Air flow volume m <sup>3</sup> /h	12500	24000	38000
Outline dimension N.W. of the unit	L mm	1870	2220	3220
	W mm	1000	1055	1095
	H mm	1175	1325	1513
Net Weight	kg	300	480	710
Operation Weight	kg	310	490	739
Packing dimension	L×W×H mm	1910×1035×1225	2250×1090×1370	3275×1130×1540
<p>Notes: the above data is measured base on the following working condition.            Refrigeration mode under nominal working condition: water flow 0.172m<sup>3</sup>/(h·kW), outlet water temperature of chilled water 7℃, air inlet temperature of condenser 35℃.            Heating mode under nominal working condition: water flow 0.172m<sup>3</sup>/(h·kW), outlet water temperature of hot water 45℃, air inlet temperature of condenser DB/WB 7/6℃.</p>				

### 13. INFORMATION REQUIREMENTS

Table 13-1

Information requirements for comfort chillers							
Model(s):	MC-SU30-RN1L						
Outdoor side heat exchanger of chiller:	Air to water						
Indoor side heat exchanger chiller:	Water						
Type:	Compressor driven vapour compression						
Driver of compressor:	Electric motor						
Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
Rated cooling capacity	$P_{rated,c}$	27.58	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	150	%
Declared cooling capacity for part load at given outdoor temperature $T_j$				Declared energy efficiency ratio for part load at given outdoor temperature $T_j$			
$T_j = + 35 \text{ }^\circ\text{C}$	$P_{dc}$	27.58	kW	$T_j = + 35 \text{ }^\circ\text{C}$	$EER_d$	2.52	--
$T_j = + 30 \text{ }^\circ\text{C}$	$P_{dc}$	22.00	kW	$T_j = + 30 \text{ }^\circ\text{C}$	$EER_d$	3.64	--
$T_j = + 25 \text{ }^\circ\text{C}$	$P_{dc}$	14.96	kW	$T_j = + 25 \text{ }^\circ\text{C}$	$EER_d$	5.15	--
$T_j = + 20 \text{ }^\circ\text{C}$	$P_{dc}$	8.12	kW	$T_j = + 20 \text{ }^\circ\text{C}$	$EER_d$	6.49	--
Degradation co-efficient for chillers (*)	$C_{dc}$	0.9	--				
Power consumption in modes other than 'active mode'							
Off mode	$P_{OFF}$	0.075	kW	Crankcase heater mode	$P_{CK}$	0.075	kW
Thermostat-off mode	$P_{TO}$	0.206	kW	Standby mode	$P_{SB}$	0.075	kW
Other items							
Capacity control	variable			For air-to-water comfort chillers: air flow rate, outdoor measured	--	12500	$\text{m}^3/\text{h}$
Sound power level, indoors / outdoors	$L_{WA}$	-/78	dB	For water / brine-to-water chillers: Rated brine or water flow rate, outdoor side heat exchanger	--	--	$\text{m}^3/\text{h}$
Emissions of nitrogen oxides (if applicable)	$\text{NO}_x$ (**)	--	mg/kWh input GCV				
GWP of the refrigerant	--	2088	kg $\text{CO}_2$ eq (100 years)				
Standard rating conditions used:	Low temperature application						
Contact details	GD Midea Heating & Ventilating Equipment Co. , Ltd. Penglai industry Road, Beijiao, Shunde, Foshan, Guangdong, 528311 P.R. China.						
(*) If $C_{dc}$ is not determined by measurement then the default degradation coefficient of chillers shall be 0,9.							
(**) From 26 September 2018.							

Table 13-2

Information requirements for comfort chillers								
Model(s):	MC-SU60-RN1L							
Outdoor side heat exchanger of chiller:	Air to water							
Indoor side heat exchanger chiller:	Water							
Type:	Compressor driven vapour compression							
Driver of compressor:	Electric motor							
Item	Symbol	Value	Unit		Item	Symbol	Value	Unit
Rated cooling capacity	$P_{rated,c}$	55.5	kW		Seasonal space cooling energy efficiency	$\eta_{s,c}$	151	%
Declared cooling capacity for part load at given outdoor temperature $T_j$					Declared energy efficiency ratio for part load at given outdoor temperature $T_j$			
$T_j = + 35 \text{ }^\circ\text{C}$	$P_{dc}$	55.5	kW		$T_j = + 35 \text{ }^\circ\text{C}$	$EER_d$	2.43	--
$T_j = + 30 \text{ }^\circ\text{C}$	$P_{dc}$	41.84	kW		$T_j = + 30 \text{ }^\circ\text{C}$	$EER_d$	3.44	--
$T_j = + 25 \text{ }^\circ\text{C}$	$P_{dc}$	25.89	kW		$T_j = + 25 \text{ }^\circ\text{C}$	$EER_d$	4.82	--
$T_j = + 20 \text{ }^\circ\text{C}$	$P_{dc}$	11.93	kW		$T_j = + 20 \text{ }^\circ\text{C}$	$EER_d$	4.89	--
Degradation co-efficient for chillers (*)	$C_{dc}$	0.9	--					
Power consumption in modes other than 'active mode'								
Off mode	$P_{OFF}$	0.064	kW		Crankcase heater mode	$P_{CK}$	0.064	kW
Thermostat-off mode	$P_{TO}$	0.398	kW		Standby mode	$P_{SB}$	0.064	kW
Other items								
Capacity control	variable				For air-to-water comfort chillers: air flow rate, outdoor measured	--	24000	$\text{m}^3/\text{h}$
Sound power level, indoors / outdoors	$L_{WA}$	-85.3	dB		For water / brine-to-water chillers: Rated brine or water flow rate, outdoor side heat exchanger	--	--	$\text{m}^3/\text{h}$
Emissions of nitrogen oxides (if applicable)	$NO_x (**)$	--	mg/kWh input GCV					
GWP of the refrigerant	--	2088	kg $CO_2$ eq (100 years)					
Standard rating conditions used:	Low temperature application							
Contact details	GD Midea Heating & Ventilating Equipment Co. , Ltd. Penglai industry Road, Beijiao, Shunde, Foshan, Guangdong, 528311 P.R. China.							
(*) If $C_{dc}$ is not determined by measurement then the default degradation coefficient of chillers shall be 0,9.								
(**) From 26 September 2018.								

Table 13-3

Information requirements for comfort chillers							
Model(s):	MC-SU90-RN1L						
Outdoor side heat exchanger of chiller:	Air to water						
Indoor side heat exchanger chiller:	Water						
Type:	Compressor driven vapour compression						
Driver of compressor:	Electric motor						
Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
Rated cooling capacity	$P_{rated,c}$	82	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	--	%
Declared cooling capacity for part load at given outdoor temperature $T_j$				Declared energy efficiency ratio for part load at given outdoor temperature $T_j$			
$T_j = + 35 \text{ }^\circ\text{C}$	$P_{dc}$	82	kW	$T_j = + 35 \text{ }^\circ\text{C}$	$EER_d$	2.3	--
$T_j = + 30 \text{ }^\circ\text{C}$	$P_{dc}$	64.90	kW	$T_j = + 30 \text{ }^\circ\text{C}$	$EER_d$	3.74	--
$T_j = + 25 \text{ }^\circ\text{C}$	$P_{dc}$	41.38	kW	$T_j = + 25 \text{ }^\circ\text{C}$	$EER_d$	4.60	--
$T_j = + 20 \text{ }^\circ\text{C}$	$P_{dc}$	30.88	kW	$T_j = + 20 \text{ }^\circ\text{C}$	$EER_d$	6.40	--
Degradation co-efficient for chillers (*)	$C_{dc}$	0.9	--				
Power consumption in modes other than 'active mode'							
Off mode	$P_{OFF}$	0.038	kW	Crankcase heater mode	$P_{CK}$	0.038	kW
Thermostat-off mode	$P_{TO}$	0.107	kW	Standby mode	$P_{SB}$	0.038	kW
Other items							
Capacity control	variable			For air-to-water comfort chillers: air flow rate, outdoor measured	--	38000	$\text{m}^3/\text{h}$
Sound power level, indoors / outdoors	$L_{WA}$	-/80.1	dB	For water / brine-to-water chillers: Rated brine or water flow rate, outdoor side heat exchanger	--	--	$\text{m}^3/\text{h}$
Emissions of nitrogen oxides (if applicable)	$NO_x$ (**)	--	mg/kWh input GCV				
GWP of the refrigerant	--	2088	kg $CO_2$ eq (100 years)				
Standard rating conditions used:	Low temperature application						
Contact details	GD Midea Heating & Ventilating Equipment Co. , Ltd. Penglai industry Road, Beijiao, Shunde, Foshan, Guangdong, 528311 P.R. China.						
(*) If $C_{dc}$ is not determined by measurement then the default degradation coefficient of chillers shall be 0,9.							
(**) From 26 September 2018.							

Table 13-4

Information requirements for heat pump space heaters and heat pump combination heaters							
Model(s):	MC-SU30-RN1L						
Air-to-water heat pump:							[yes]
Water-to-water heat pump:							[yes/no]
Brine-to-water heat pump:							[yes/no]
Low-temperature heat pump:							[yes/no]
For low-temperature heat pumps, parameters shall be declared for low-temperature application. Otherwise, parameters shall be declared for medium-temperature application.							
Parameters shall be declared for average climate conditions.							
Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
Rated heat output <sup>(3)</sup> at T <sub>designh</sub> = -10 (-11) °C	Prated = P <sub>designh</sub>	21	kW	Seasonal space heating energy efficiency	η <sub>s</sub>	157	%
Seasonal coefficient of performance	SCOP	4.01	–	Active mode coef. of performance	SCOP <sub>on</sub>	x.xx	–
				Net seasonal coef. of performance	SCOP <sub>net</sub>		–
T <sub>j</sub> = -7 °C	P <sub>dH</sub>	19.2	kW	T <sub>j</sub> = -7 °C	COP <sub>d</sub>	2.59	–
T <sub>j</sub> = +2 °C	P <sub>dH</sub>	10.9	kW	T <sub>j</sub> = +2 °C	COP <sub>d</sub>	3.84	–
T <sub>j</sub> = +7 °C	P <sub>dH</sub>	7.2	kW	T <sub>j</sub> = +7 °C	COP <sub>d</sub>	5.21	–
T <sub>j</sub> = +12 °C	P <sub>dH</sub>	8.7	kW	T <sub>j</sub> = +12 °C	COP <sub>d</sub>	7.1	–
T <sub>j</sub> = bivalent temperature	P <sub>dH</sub>	22.2	kW	T <sub>j</sub> = bivalent temperature	COP <sub>d</sub>	2.34	–
T <sub>j</sub> = operation limit temperature	P <sub>dH</sub>	22.2	kW	T <sub>j</sub> = operation limit temperature	COP <sub>d</sub>	2.34	–
For air-to-water heat pumps: T <sub>j</sub> = -15 °C (if TOL < -20 °C)	P <sub>dH</sub>	x,x	kW	For air-to-water heat pumps: T <sub>j</sub> = -15 °C (if TOL < -20 °C)	COP <sub>d</sub>	x,xx	–
Bivalent temperature (maximum +2°C)	T <sub>biv</sub>	-10	°C	For air-to-water HP : Operation limit temperature (maximum -7°C)	TOL	-10	°C
Cycling interval capacity for heating at T <sub>j</sub> = -7°C	P <sub>cyCh</sub>	x,x	kW	Heating water operating limit temperature	WTOL	x	°C
Degradation coefficient <sup>(4)</sup> at T = -7°C	C <sub>dH</sub>	x,xx	–	Cycling interval efficiency at T <sub>j</sub> = +7°C	COP <sub>cyCh</sub>	x,xx	–
Cycling interval capacity for heating at T <sub>j</sub> = +2°C	P <sub>cyCh</sub>	x,x	kW	Cycling interval efficiency at T <sub>j</sub> = +12°C	COP <sub>cyCh</sub>	x,xx	–
Degradation coefficient <sup>(4)</sup> at T = +2°C	C <sub>dH</sub>	x,xx	–	Cycling interval efficiency at T <sub>j</sub> = +7°C	COP <sub>cyCh</sub>	x,xx	–
Cycling interval capacity for heating at T <sub>j</sub> = +7°C	P <sub>cyCh</sub>	x,x	kW	Cycling interval efficiency at T <sub>j</sub> = +12°C	COP <sub>cyCh</sub>	x,xx	–
Degradation coefficient <sup>(4)</sup> at T <sub>j</sub> = +7°C	C <sub>dH</sub>	x,xx	–				
Cycling interval capacity for heating at T <sub>j</sub> = +12°C	P <sub>cyCh</sub>	x,x	kW				
Degradation coefficient <sup>(4)</sup> at T <sub>j</sub> = +12°C	C <sub>dH</sub>	x,xx	–				
Power consumption in modes other than active mode				Supplementary heater (to be declared even if not provided in the unit)			
Off mode	P <sub>OFF</sub>	0.08	kW	Rated heat output (3)	P <sub>sup = sup(T<sub>j</sub>)</sub>	x,x	kW
Thermostat-off mode	P <sub>TO</sub>	0.21	kW	Type of energy input			
Standby mode	P <sub>SB</sub>	0.08	kW				
Crankcase heater mode	P <sub>CK</sub>	0.08	kW				
Other items				Outdoor heat exchanger			
Capacity control	fixed/variable	variable		For air-to-water HP: Rated air flow rate	Q <sub>airsource</sub>	12500	m <sup>3</sup> /h
Sound power level, indoors	L <sub>WA</sub>	x	dB(A)	For water-to-water: Rated water flow rate	Q <sub>watersource</sub>	x	m <sup>3</sup> /h
Sound power level, outdoors	L <sub>WA</sub>	78	dB(A)	For brine-to-water: Rated brine flow rate	Q <sub>brinesource</sub>	x	m <sup>3</sup> /h
Contact details	Name and address of the manufacturer or its authorised representative.						
(1) For heat pump space heaters and heat pump combination heaters, the rated heat output Prated is equal to the design load for heating Pdesignh, and the rated heat output of a supplementary heater Psup is equal to the supplementary capacity for heating sup(Tj).							
(2) If Cdh is not determined by measurement then the default degradation coefficient is Cdh = 0,9.							



Table 13-5

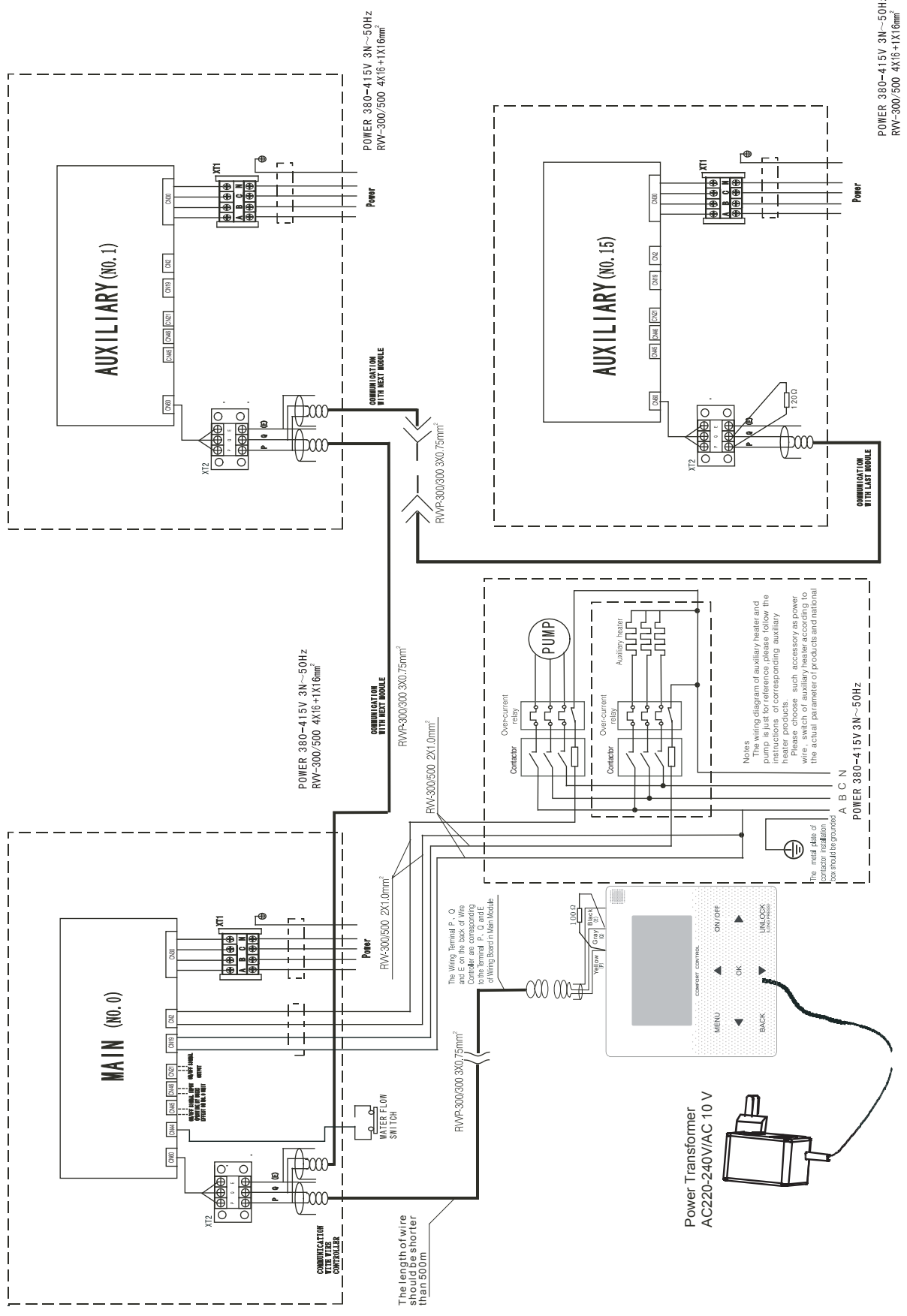
Information requirements for heat pump space heaters and heat pump combination heaters							
Model(s):		MC-SU60-RN1L					
Air-to-water heat pump:							[yes]
Water-to-water heat pump:							[yes/no]
Brine-to-water heat pump:							[yes/no]
Low-temperature heat pump:							[yes/no]
Equipped with a supplementary heater:							[yes/no]
Heat pump combination heater:							[yes/no]
For low-temperature heat pumps, parameters shall be declared for low-temperature application. Otherwise, parameters shall be declared for medium-temperature application.							
Parameters shall be declared for average climate conditions.							
Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
Rated heat output <sup>(3)</sup> at T <sub>designh</sub> = -10 (-11) °C	Prated = P <sub>designh</sub>	31	kW	Seasonal space heating energy efficiency	η <sub>s</sub>	152	%
Seasonal coefficient of performance	SCOP	3.85	—	Active mode coef. of performance	SCOP <sub>on</sub>	X.XX	—
				Net seasonal coef. of performance	SCOP <sub>net</sub>	X.XX	—
T <sub>j</sub> = -7 °C	P <sub>dh</sub>	27.3	kW	T <sub>j</sub> = -7 °C	COP <sub>d</sub>	2.84	—
T <sub>j</sub> = +2 °C	P <sub>dh</sub>	17.1	kW	T <sub>j</sub> = +2 °C	COP <sub>d</sub>	3.60	—
T <sub>j</sub> = +7 °C	P <sub>dh</sub>	15.4	kW	T <sub>j</sub> = +7 °C	COP <sub>d</sub>	5.24	—
T <sub>j</sub> = +12 °C	P <sub>dh</sub>	12.5	kW	T <sub>j</sub> = +12 °C	COP <sub>d</sub>	6.43	—
T <sub>j</sub> = bivalent temperature	P <sub>dh</sub>	27.3	kW	T <sub>j</sub> = bivalent temperature	COP <sub>d</sub>	2.84	—
T <sub>j</sub> = operation limit temperature	P <sub>dh</sub>	31.5	kW	T <sub>j</sub> = operation limit temperature	COP <sub>d</sub>	2.40	—
For air-to-water heat pumps: T <sub>j</sub> = -15 °C (if TOL < -20 °C)	P <sub>dh</sub>	x,x	kW	For air-to-water heat pumps: T <sub>j</sub> = -15 °C (if TOL < -20 °C)	COP <sub>d</sub>	x,xx	—
Bivalent temperature (maximum +2°C)	T <sub>biv</sub>	-7	°C	For air-to-water HP : Operation limit temperature (maximum -7°C)	TOL	-10	°C
Cycling interval capacity for heating at T <sub>j</sub> = -7°C	P <sub>cyh</sub>	x,x	kW	Heating water operating limit temperature	WTOL	x	°C
Degradation coefficient <sup>(4)</sup> at T <sub>j</sub> = -7°C	C <sub>dh</sub>	x,xx	—	Cycling interval efficiency at T <sub>j</sub> = +7°C	COP <sub>cyh</sub>	x,xx	—
Cycling interval capacity for heating at T <sub>j</sub> = +2°C	P <sub>cyh</sub>	x,x	kW	Cycling interval efficiency at T <sub>j</sub> = +12°C	COP <sub>cyh</sub>	x,xx	—
Degradation coefficient <sup>(4)</sup> at T <sub>j</sub> = +2°C	C <sub>dh</sub>	x,xx	—	Cycling interval efficiency at T <sub>j</sub> = +7°C	COP <sub>cyh</sub>	x,xx	—
Cycling interval capacity for heating at T <sub>j</sub> = +7°C	P <sub>cyh</sub>	x,x	kW	Cycling interval efficiency at T <sub>j</sub> = +12°C	COP <sub>cyh</sub>	x,xx	—
Degradation coefficient <sup>(4)</sup> at T <sub>j</sub> = +7°C	C <sub>dh</sub>	x,xx	—				
Cycling interval capacity for heating at T <sub>j</sub> = +12°C	P <sub>cyh</sub>	x,x	kW				
Degradation coefficient <sup>(4)</sup> at T <sub>j</sub> = +12°C	C <sub>dh</sub>	x,xx	—				
Power consumption in modes other than active mode				Supplementary heater (to be declared even if not provided in the unit)			
Off mode	P <sub>OFF</sub>	0.08	kW	Rated heat output (3)	P <sub>sup</sub> = sup(T <sub>j</sub> )	x,x	kW
Thermostat-off mode	P <sub>TO</sub>	0.40	kW	Type of energy input			
Standby mode	P <sub>SB</sub>	0.08	kW				
Crankcase heater mode	P <sub>CK</sub>	0.08	kW				
Other items				Outdoor heat exchanger			
Capacity control	fixed/variable	variable		For air-to-water HP: Rated air flow rate	Q <sub>airsource</sub>	24000	m <sup>3</sup> /h
Sound power level, indoors	L <sub>WA</sub>	x	dB(A)	For water-to-water: Rated water flow rate	Q <sub>watersource</sub>	x	m <sup>3</sup> /h
Sound power level, outdoors	L <sub>WA</sub>	84	dB(A)	For brine-to-water: Rated brine flow rate	Q <sub>brinesource</sub>	x	m <sup>3</sup> /h
Contact details	Name and address of the manufacturer or its authorised representative.						
(1) For heat pump space heaters and heat pump combination heaters, the rated heat output Prated is equal to the design load for heating Pdesignh, and the rated heat output of a supplementary heater Psup is equal to the supplementary capacity for heating sup(Tj).							
(2) If Cdh is not determined by measurement then the default degradation coefficient is Cdh = 0,9.							

Table 13-6

Information requirements for heat pump space heaters and heat pump combination heaters							
Model(s):		MC-SU90-RN1L					
Air-to-water heat pump:							[yes]
Water-to-water heat pump:							[yes/no]
Brine-to-water heat pump:							[yes/no]
Low-temperature heat pump:							[yes/no]
Equipped with a supplementary heater:							[yes/no]
Heat pump combination heater:							[yes/no]
For low-temperature heat pumps, parameters shall be declared for low-temperature application. Otherwise, parameters shall be declared for medium-temperature application.							
Parameters shall be declared for average climate conditions.							
Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
Rated heat output <sup>(3)</sup> at T <sub>designh</sub> = -10 (-11) °C	Prated = P <sub>designh</sub>	66	kW	Seasonal space heating energy efficiency	η <sub>s</sub>	156.6	%
Seasonal coefficient of performance	SCOP	3.99	—	Active mode coef. of performance	SCOP <sub>on</sub>	X.XX	—
				Net seasonal coef. of performance	SCOP <sub>net</sub>	X.XX	—
T <sub>j</sub> = -7 °C	P <sub>dh</sub>	58.67	kW	T <sub>j</sub> = -7 °C	COP <sub>d</sub>	2.49	—
T <sub>j</sub> = +2 °C	P <sub>dh</sub>	35.93	kW	T <sub>j</sub> = +2 °C	COP <sub>d</sub>	3.78	—
T <sub>j</sub> = +7 °C	P <sub>dh</sub>	28.16	kW	T <sub>j</sub> = +7 °C	COP <sub>d</sub>	5.43	—
T <sub>j</sub> = +12 °C	P <sub>dh</sub>	32.98	kW	T <sub>j</sub> = +12 °C	COP <sub>d</sub>	6.68	—
T <sub>j</sub> = bivalent temperature	P <sub>dh</sub>	58.67	kW	T <sub>j</sub> = bivalent temperature	COP <sub>d</sub>	2.49	—
T <sub>j</sub> = operation limit temperature	P <sub>dh</sub>	65.18	kW	T <sub>j</sub> = operation limit temperature	COP <sub>d</sub>	2.13	—
For air-to-water heat pumps: T <sub>j</sub> = -15 °C (if TOL < -20 °C)	P <sub>dh</sub>	x,x	kW	For air-to-water heat pumps: T <sub>j</sub> = -15 °C (if TOL < -20 °C)	COP <sub>d</sub>	x,xx	—
Bivalent temperature (maximum +2°C)	T <sub>biv</sub>	-7	°C	For air-to-water HP : Operation limit temperature (maximum -7°C)	TOL	-10	°C
Cycling interval capacity for heating at T <sub>j</sub> = -7°C	P <sub>cyh</sub>	x,x	kW	Heating water operating limit temperature	WTOL	x	°C
Degradation coefficient <sup>(4)</sup> at T <sub>j</sub> = -7°C	C <sub>dh</sub>	x,xx	—	Cycling interval efficiency at T <sub>j</sub> = +7°C	COP <sub>cyh</sub>	x,xx	—
Cycling interval capacity for heating at T <sub>j</sub> = +2°C	P <sub>cyh</sub>	x,x	kW	Cycling interval efficiency at T <sub>j</sub> = +12°C	COP <sub>cyh</sub>	x,xx	—
Degradation coefficient <sup>(4)</sup> at T <sub>j</sub> = +2°C	C <sub>dh</sub>	x,xx	—	Cycling interval efficiency at T <sub>j</sub> = +7°C	COP <sub>cyh</sub>	x,xx	—
Cycling interval capacity for heating at T <sub>j</sub> = +7°C	P <sub>cyh</sub>	x,x	kW	Cycling interval efficiency at T <sub>j</sub> = +12°C	COP <sub>cyh</sub>	x,xx	—
Degradation coefficient <sup>(4)</sup> at T <sub>j</sub> = +7°C	C <sub>dh</sub>	x,xx	—				
Cycling interval capacity for heating at T <sub>j</sub> = +12°C	P <sub>cyh</sub>	x,x	kW				
Degradation coefficient <sup>(4)</sup> at T <sub>j</sub> = +12°C	C <sub>dh</sub>	x,xx	—				
Power consumption in modes other than active mode				Supplementary heater (to be declared even if not provided in the unit)			
Off mode	P <sub>OFF</sub>	0.038	kW	Rated heat output (3)	P <sub>sup</sub> = sup(T <sub>j</sub> )	x,x	kW
Thermostat-off mode(heating)	P <sub>TO</sub>	0.107	kW	Type of energy input			
Standby mode	P <sub>SB</sub>	0.038	kW				
Crankcase heater mode	P <sub>CK</sub>	0.038	kW				
Other items				Outdoor heat exchanger			
Capacity control	fixed/variable	variable		For air-to-water HP: Rated air flow rate	Q <sub>airsource</sub>	38000	m <sup>3</sup> /h
Sound power level, indoors	L <sub>WA</sub>	x	dB(A)	For water-to-water: Rated water flow rate	Q <sub>watersource</sub>	x	m <sup>3</sup> /h
Sound power level, outdoors	L <sub>WA</sub>	80.1	dB(A)	For brine-to-water: Rated brine flow rate	Q <sub>brinesource</sub>	x	m <sup>3</sup> /h
Contact details	Name and address of the manufacturer or its authorised representative.						
(1) For heat pump space heaters and heat pump combination heaters, the rated heat output Prated is equal to the design load for heating Pdesignh, and the rated heat output of a supplementary heater Psup is equal to the supplementary capacity for heating sup(Tj).							
(2) If Cdh is not determined by measurement then the default degradation coefficient is Cdh = 0,9.							

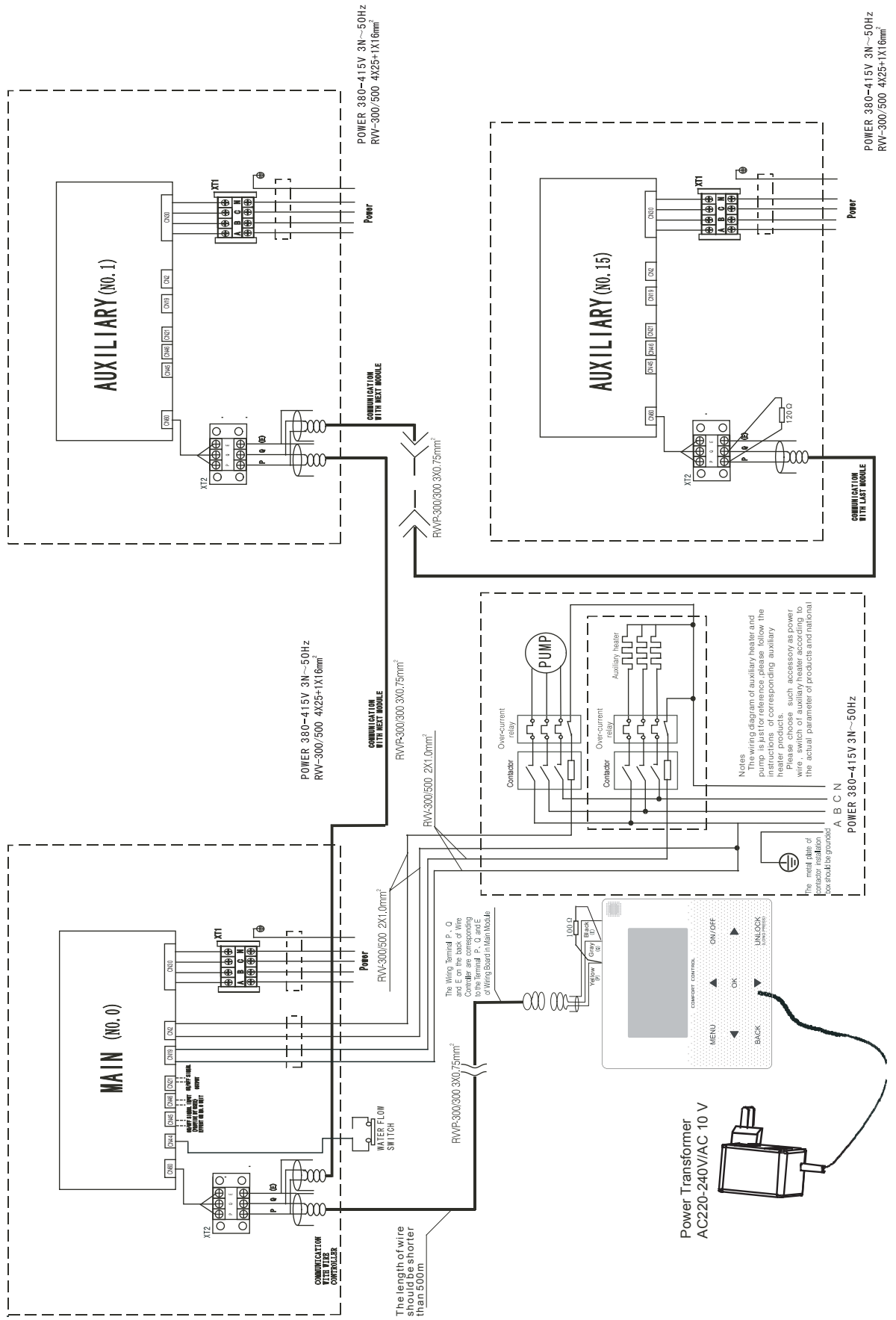
Attached picture Networking Communication Schematic of Main Unit and Auxiliary Unit (I)

Model: MC-SU30-RN1L



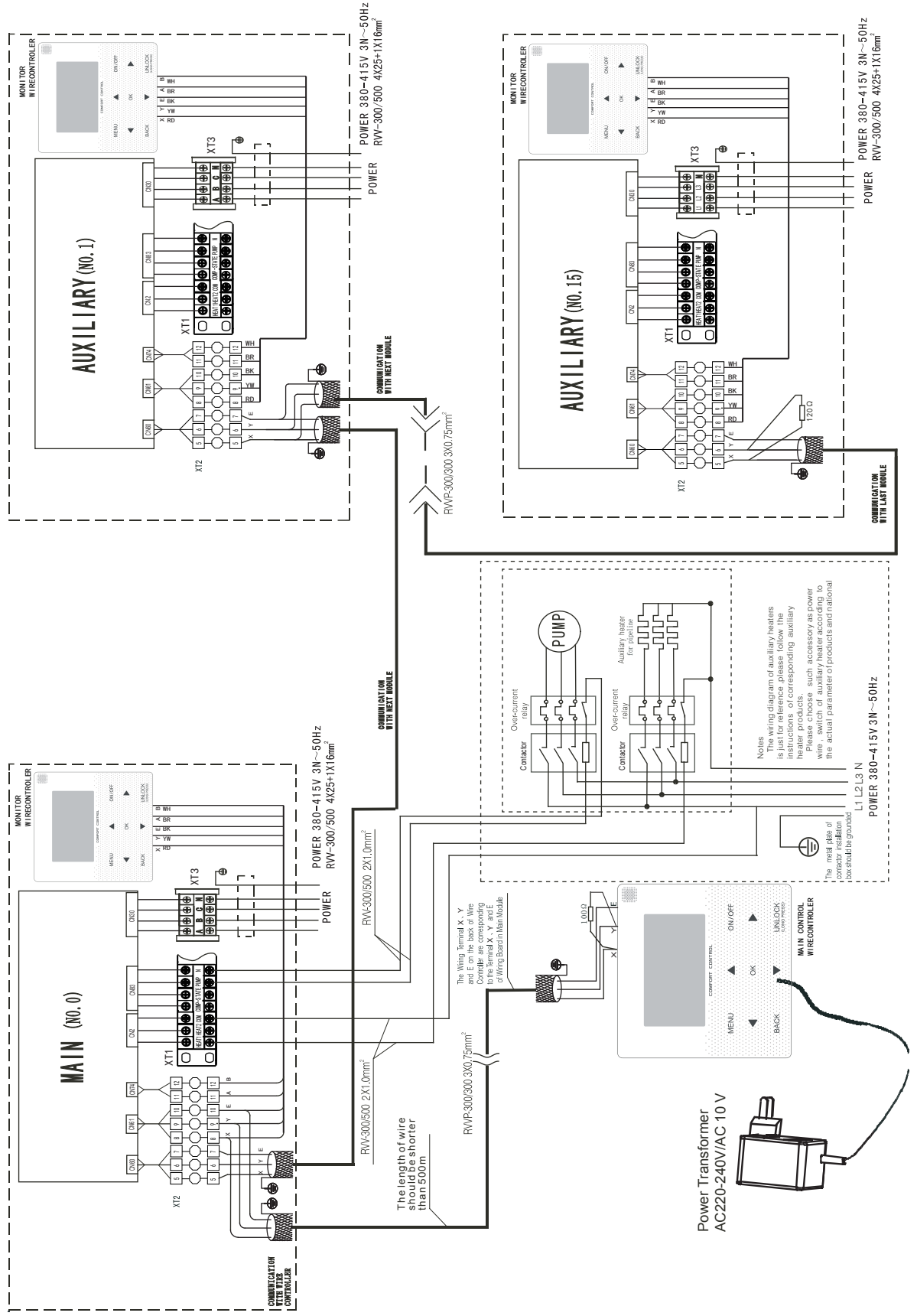
### Attached picture Networking Communication Schematic of Main Unit and Auxiliary Unit (II)

Model: MC-SU60-RN1L



# Attached picture Networking Communication Schematic of Main Unit and Auxiliary Unit (III)

Model: MC-SU90-RN1L







Version:MD17IU-001BW

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