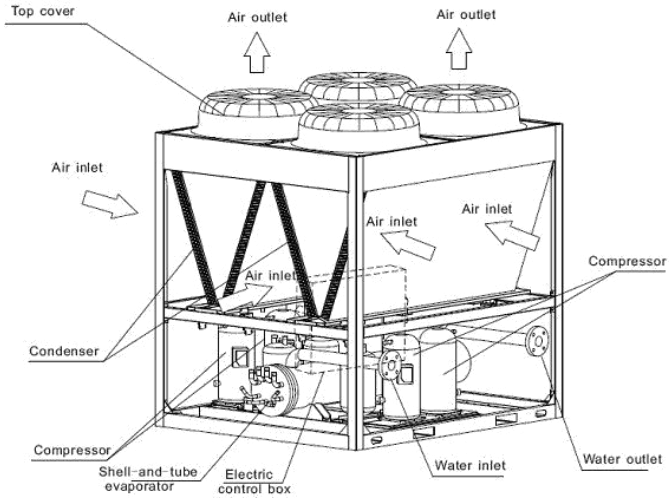
AIR-COOLED MODULAR CHILLER TECHNICAL MANUAL



CAM-H300C-3F
CAM-H650C-3F
CAM-H1300C-3F

SM-FI-CAMH-20140414

Content

AIR-COOLED MODULAR CHILLER

1. Preface

Introduction

Air-cooled modular chiller is a kind of central air-conditioning unit which adopts air as the cooling (or heating) source and water as cooling (or heating) heat exchange medium. As a sort of integrated equipment, it no needs cooling tower, cooling water pump, boiler and corresponding auxiliary parts for the condenser, which makes system more simple to install and convenient to maintenance, saves energy and installation space, thus it is very suitable for the regions that are short of water.

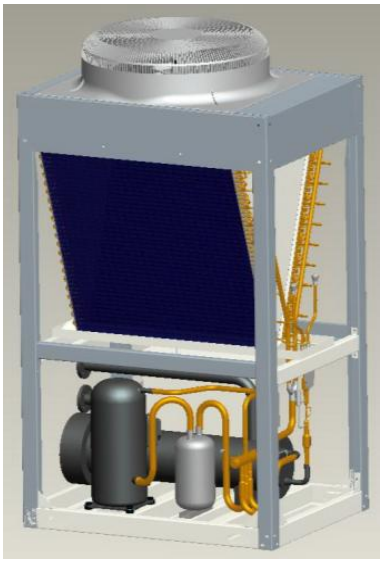
Air-cooled modular chillers are designed and produced on the basement of sufficiently absorbing the top technology in AC areas, adopting high quality self-control components which are made by world famous producers. Moreover, after improvement, units can run more efficiently and more stably. 30kW module adopts independent unit frame, 65kW module consists of two units and 130kW module consists of three, and also several modules can be formed into a integrated unit by connecting each module's inlet & outlet pipeline in parallel. The whole unit consists of 2-16 modules and the max capacity can be achieved to 2080kW.

Air-cooled modular chillers can be widely applied to civilian projects and industrial projects, such as office, hotel, villa, restaurant, hospital, factory, etc.. It is a wise choice for the regions where water is insufficient or there are strict limits on noise level and surroundings.

2. Products Line-up

No	Model	Refrigerant	Net dimension (L×W×H) (unit: mm)	Net weight (kg)	Power supply
1	CAM-H300C-3F	R410A	1160×900×2090	320	380V/3ph/50Hz
2	CAM-H650C-3F	R410A	2000×900×2090	570	380V/3ph/50Hz
3	CAM-H1300C-3F	R410A	2000×1700×2090	1100	380V/3ph/50Hz

3. External Appearance

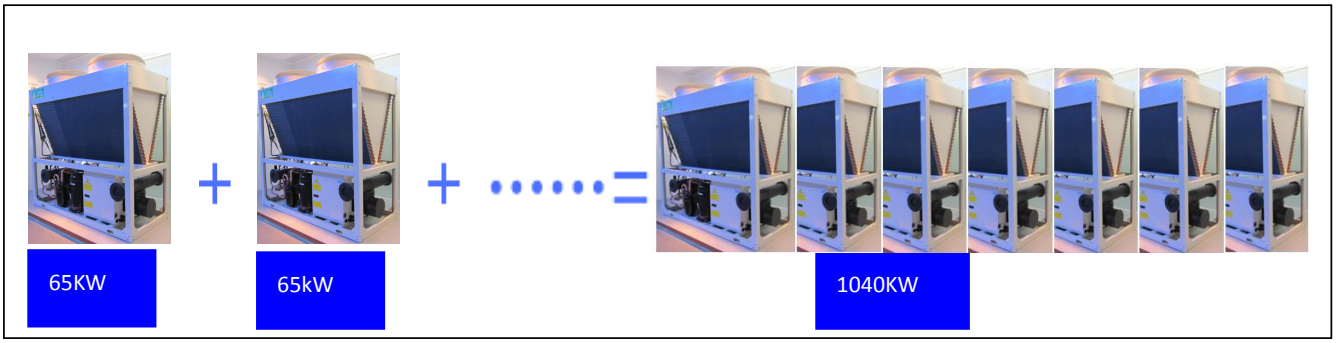
30kW	65kW
	
130kW	
	

4. Features

4.1 Modular design, flexible combination, more convenient for installation and transportation.

The unit adopts modular design, which can make more units connect together. The unit can combine 16 separate modules (30, 65, 130module). Meanwhile every separate module can operate as main unit, also each module can be a slave unit with modules combination, more convenient for design and installation.

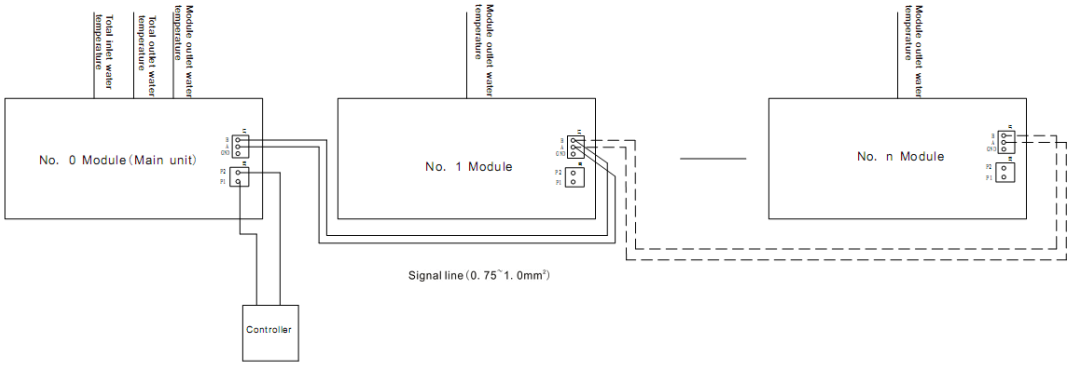
4.2 The maximum combination of the system consists of 1 main unit and 15 slave units.



4.3 Chilled water outlet temperature adjustable.

Chilled water outlet temperature can be adjusted by wired controller according to customer's demand. In cooling mode, the adjustable range from 7℃-25℃.

4.4 Easy connection between main unit and slave units.



4.5 Compact structure, no need cooling tower, which reducing installation cost.

4.6 Strong micro-computer intelligent control and monitor function.

4.7 System will be more reliable with new type efficient heat exchanger

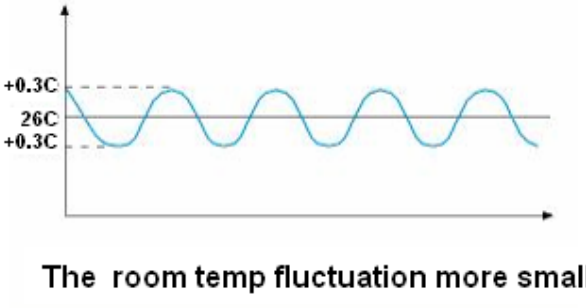
Evaporator adopts tube-in-shell heat exchanger, higher reliability and efficiency, lower requirement of the water quality.

4.8 Environmental care

- ecological refrigerant R410A for choice meet different requirement.
- Chlorine-free and environmental friendly refrigerant, zero ozone depletion potential.
- High density refrigerant, therefore, less refrigerant required.
- Leak-tight refrigerant circuit, Brazed refrigerant connections for increased leak-tightness.

4.9 Economical operation

New design adopts electronic expansion valve precise refrigerant control in wider range. Electronic expansion valve allows operation at lower condensing pressure, adjustment can be made fast linear response, making the system more stable output, the indoor temperature more uniform, and enhance human comfortable.



4.10Back up function

When unit is failure

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

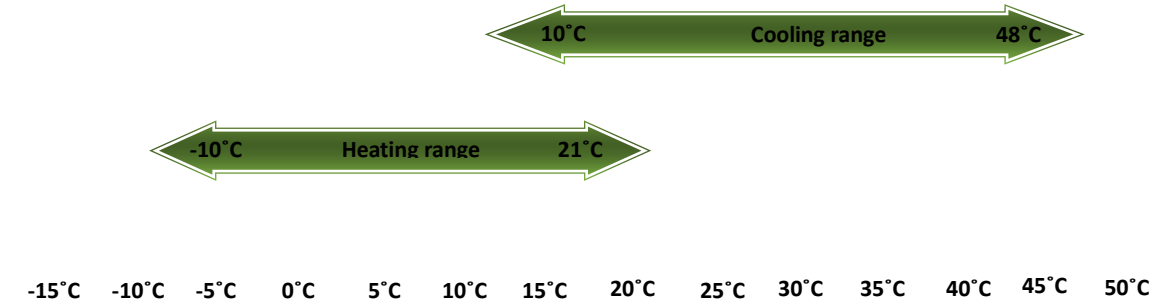
When unit is under protection

- If master unit's protection occurs, this system will stop.
- If slave unit's protection occurs, this unit will stop but the others will keep running.

4.11Applicable temperature range

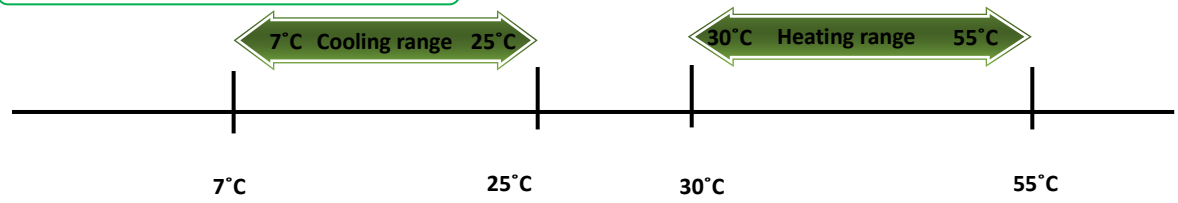
Mode	Ambient temperature range	Water inlet temperature range
Cooling	10˚C ~48˚C	7˚C ~25˚C (12˚C is default)
Heating	-10˚C ~21˚C	30˚C ~55˚C (40˚C is default)

Ambient temperature range



Chilled outlet water temperature can be adjusted by wire controller according to customer's demand.

Inlet water temperature range



4.12Capacity Lineup

Model	Mode	Compressor quantity	Refrigerant	Refrigeration system	Electrical	Maximum combinations
CAM-H300C-3F	Cooling & Heating	1	R410A	1	1	16
CAM-H650C-3F	Cooling & Heating	2	R410A	2	1	16
CAM-H1300C-3F	Cooling & Heating	4	R410A	4	1	16

R410A/50Hz

Model			CAM-H300C-3F	CAM-H650C-3F	CAM-H1300C-3F
Cooling Capacity		kW	30	65	130
		Btu/h	8.5	18.5	37
Heating Capacity		kW	32	69	140
Power supply		V/Ph/Hz	380V/3Ph/50Hz	380V/3Ph/50Hz	380V/3Ph/50Hz
Power supply	Manual switch	100	150	250	250
	Fuse	50	100	200	200
Compressor	Type		Scroll	Scroll	Scroll
	Brand		Copeland	Copeland	Copeland
	Model		ZP144KCE-TFD-522	ZP144KCE-TFD-522	ZP144KCE-TFD-522
	Quantity	Pieces	1	2	4
Power input	Cooling	kW	11.1	22	44
	Cooling rated current	A	19	38	78
	Heating	kW	10.8	21.3	43
	Heating rated current	A	18	37	76
Max. Input consumption		kW	16	28	56
Max. Current		A	29	51	102
Refrigerant	Type		R410A	R410A	R410A
	Refrigerant control		EXV+ capillary throttle	EXV+ capillary throttle	EXV+ capillary throttle
	Weight	kg	7.0	7.0×2	7.5×4
Condenser (Air side)	Air side heat-exchanger type		Finned coil pipe type	Finned coil pipe type	Finned coil pipe type
	Quantity of fan motor	Pieces	1	2	4
	Air flow volume	$10^3m^3/h$	12	24	48
	Fan motor model		YDK550-6S01	YDK550-6S01	YDK550-6S01
	Fan motor rated current	A	4.2	4.2	4.2
	Fan motor input	kW	0.911	0.911	0.911
Evaporator (Water side)	Water side heat-exchanger type		shell and tube	shell and tube	shell and tube
	Water resistance loss	kPa	30	30	40
	Water inlet/outlet pipeline inside normal diameter	mm	DN40	DN100	DN65
	Water flow volume	m^3/h	5.16	11.18	22.36
	Max. Pressure	MPa	1.1/2.75	1.1/2.75	1.1/2.75
	Water pipe connection type		flange connection	flange connection	flange connection
Dimension	Net(W×H×D)	mm	1160×2090×900	2000×2090×900	2000×2090×1700
	Packing size(W×H×D)	mm	1240×2250×950	2080×2250×950	2080×2250×1740
Weight	Net weight	kg	320	570	1100
	Gross weight	kg	330	600	1120
Connection wiring	Power wiring	mm2×No	16mm2×3+10mm2×2	16mm2×3+10mm2×2	25mm2×3+10mm2×2
	Signal wiring	mm2×N	（0.5~1）mm2×2	（0.5~1）mm2×2	（0.5~1）mm2×2

		o			
Control type			wired controller	wired controller	wired controller
Safety protection device			Power supply protection （lack of phase, phase sequence, frequency, voltage)		
			Chilled water pump overload protection		
			Chiller water shortage protection		
			Water outlet temp. protection		
			Compressor discharge temp. protection		
			Compressor low pressure protection		
			Compressor high pressure protection		
			Sensor malfunction protection.		
			Compressor current input protection		
			Fin temp. (ambient temp.) protection		
			Anti-frozen protection		
Sound level(semi-anechoic)		**dB(A)**	62	65	68
Operation water temp.	**cooling**	℃	7-25	7-25	7-25
	heating	℃	30-55	30-55	30-55
Ambient temp	**cooling**	℃	10-48	10-48	10-48
	heating	℃	-10-21	-10-21	-10-21
Remarks: Specifications are based on the following conditions:					
Cooling : chilled water inlet/outlet: 12˚C / 7˚C, and outdoor ambient temp. of 35°C DB.					
Heating : warm water inlet/outlet: 40˚C / 45˚C, and outdoor ambient temp. 7˚C DB/6°CWB.					
Water side fouling factor: 0.086m2˚C /kW.					

4.14 Electric Characteristics

Model	Outdoor Unit			Application		Power Supply		Compressor			OFM		
	Hz	VOL	Ph	Min.	Max.	TOCA	MFA	LRA	RLA	Qty	KW	FLA	Qty
CAM-H300C-3F	50	380	3	342	418	31	50	107	19	1	550	5.06	1
CAM-H650C-3F	50	380	3	342	418	53	100	107	19	2	550	5.06	2
CAM-H1300C-3F	50	380	3	342	418	105	200	107	19	4	550	5.06	4

Remark:

TOCA: Total Over-current Amps. (A)

MFA: Max. Fuse Amps. (A)

LRA: Locked Rotor Amps. (A)

RLA: Rated Load Amps. (A)

OFM: Outdoor Fan Motor.

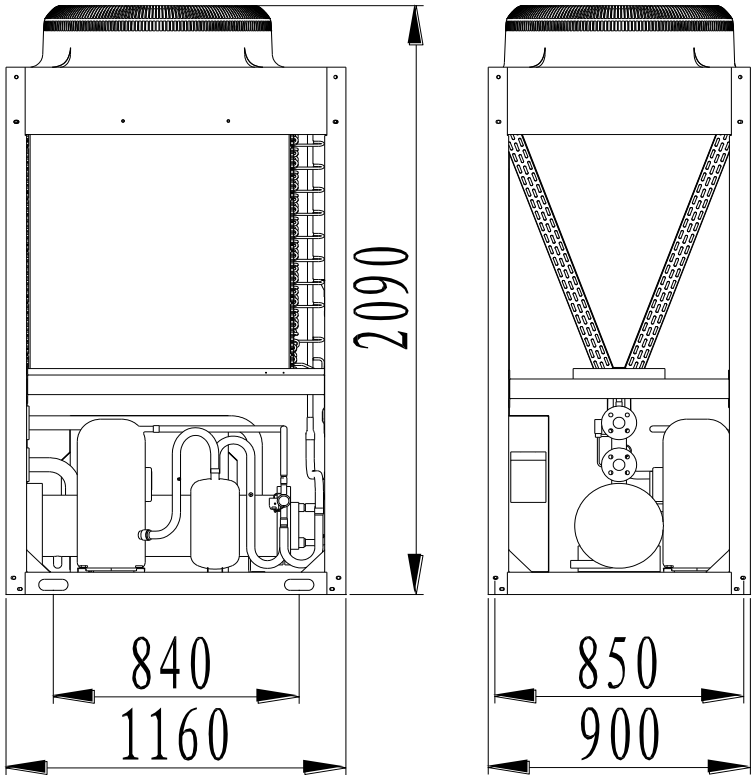
FLA: Full Load Amps. (A)

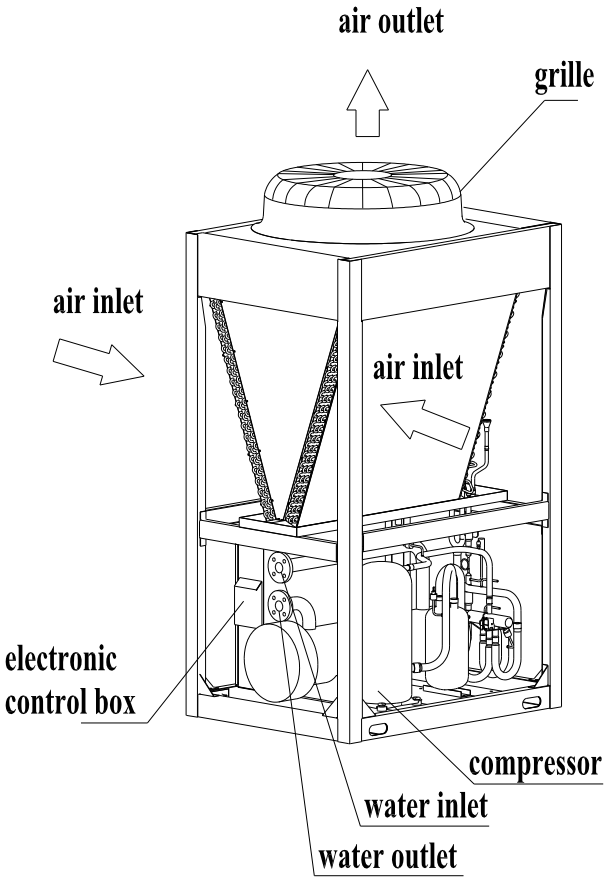
KW: Rated Motor Input (KW)

Voltage vibration between phases: <2%.

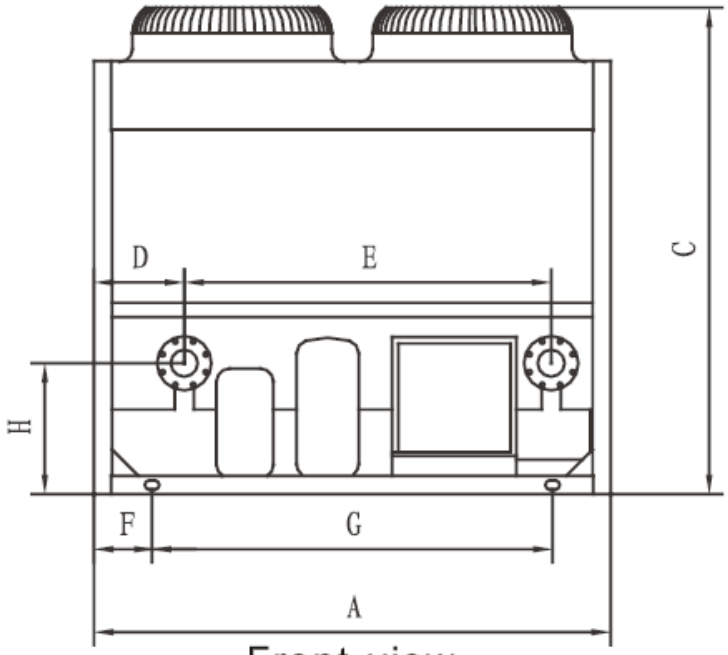
4.15Outlook drawing

30kW: (CAM-H300C-3F

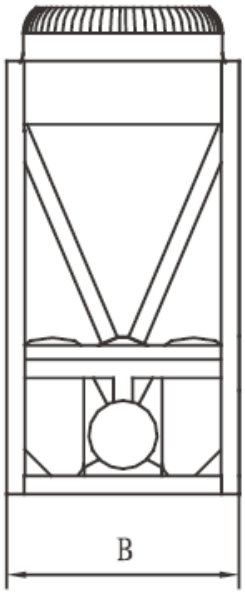




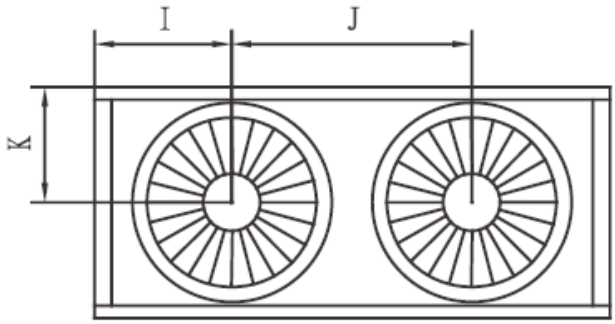
65kW(CAM-H650C-3F



Front view

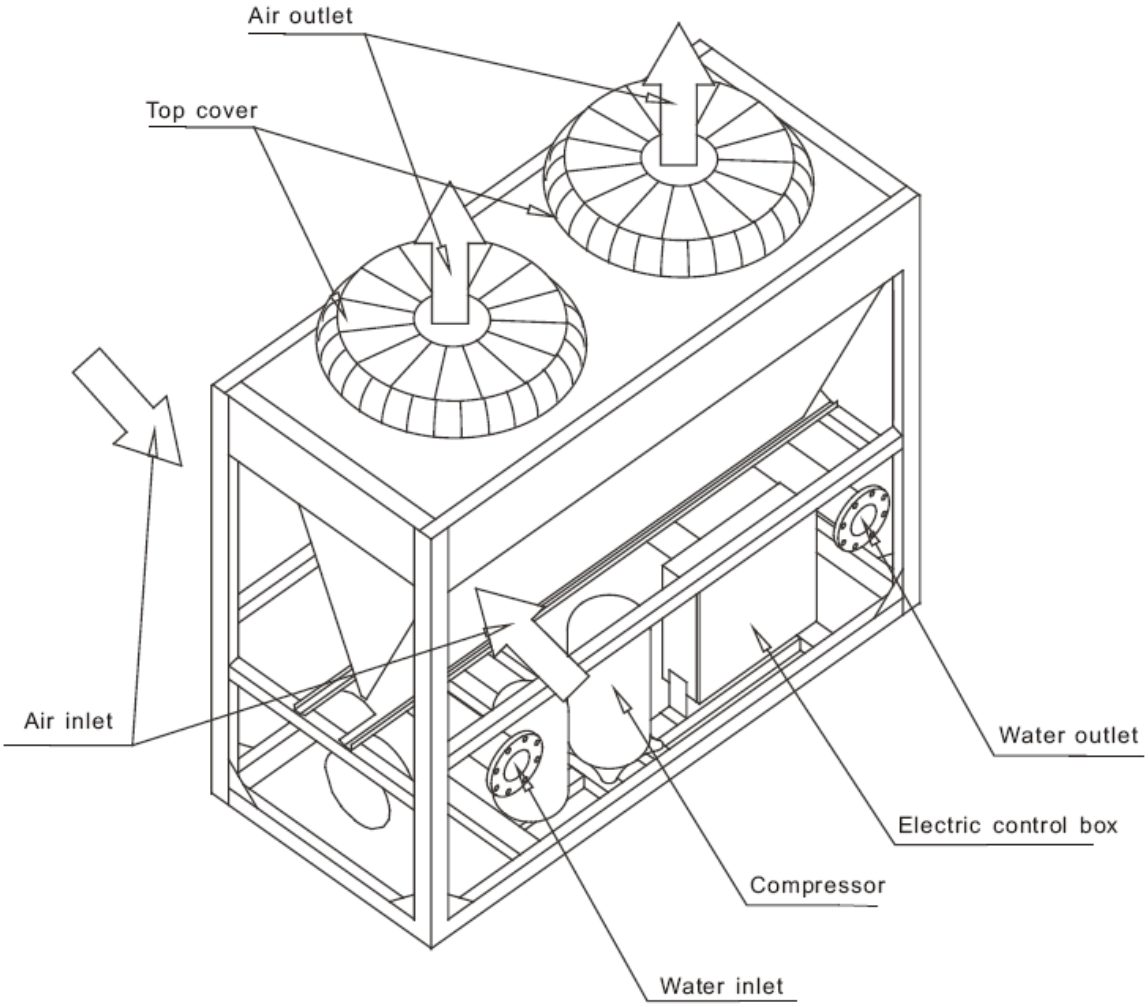


Left view

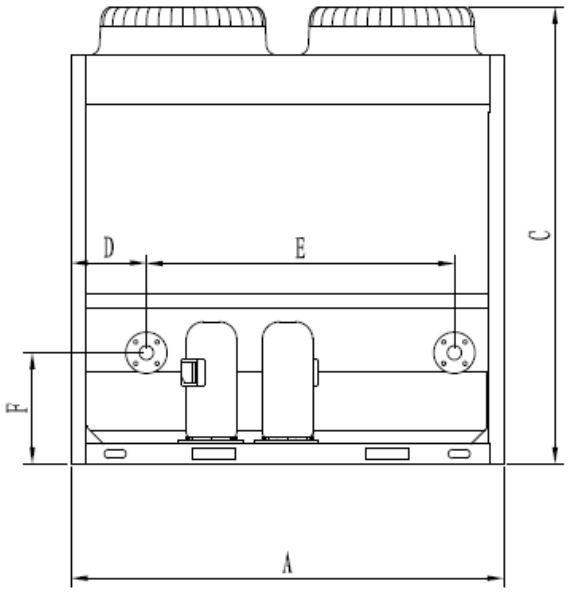


Top view Fig 1

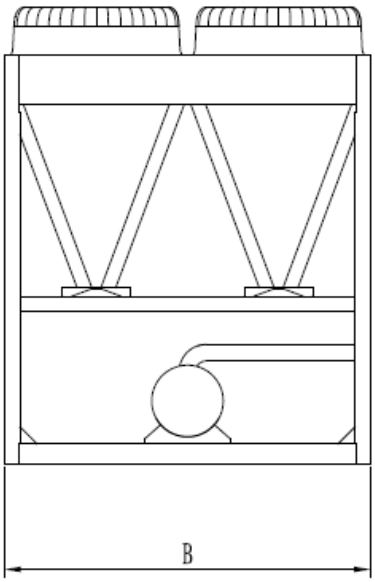
Rated cooling capacity (kW)	A	B	C	D	E	F	G	H
65kW	2000	900	2090	350	1420	540.5	1586	846


Air outlet
Top cover
Air inlet
Water outlet
Electric control box
Compressor
Water inlet

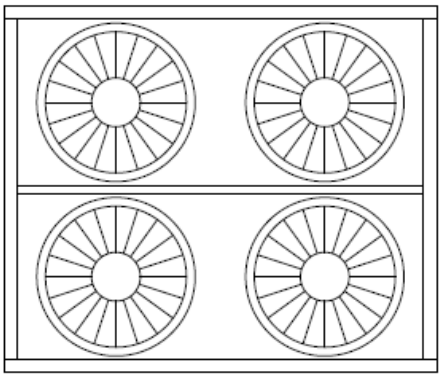
130kW(CAM-H1300C-3F



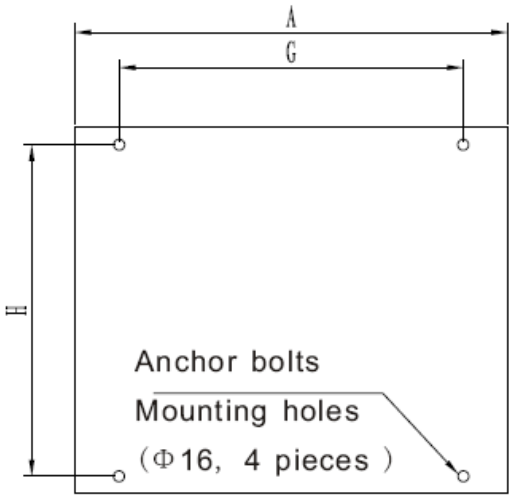
Front view



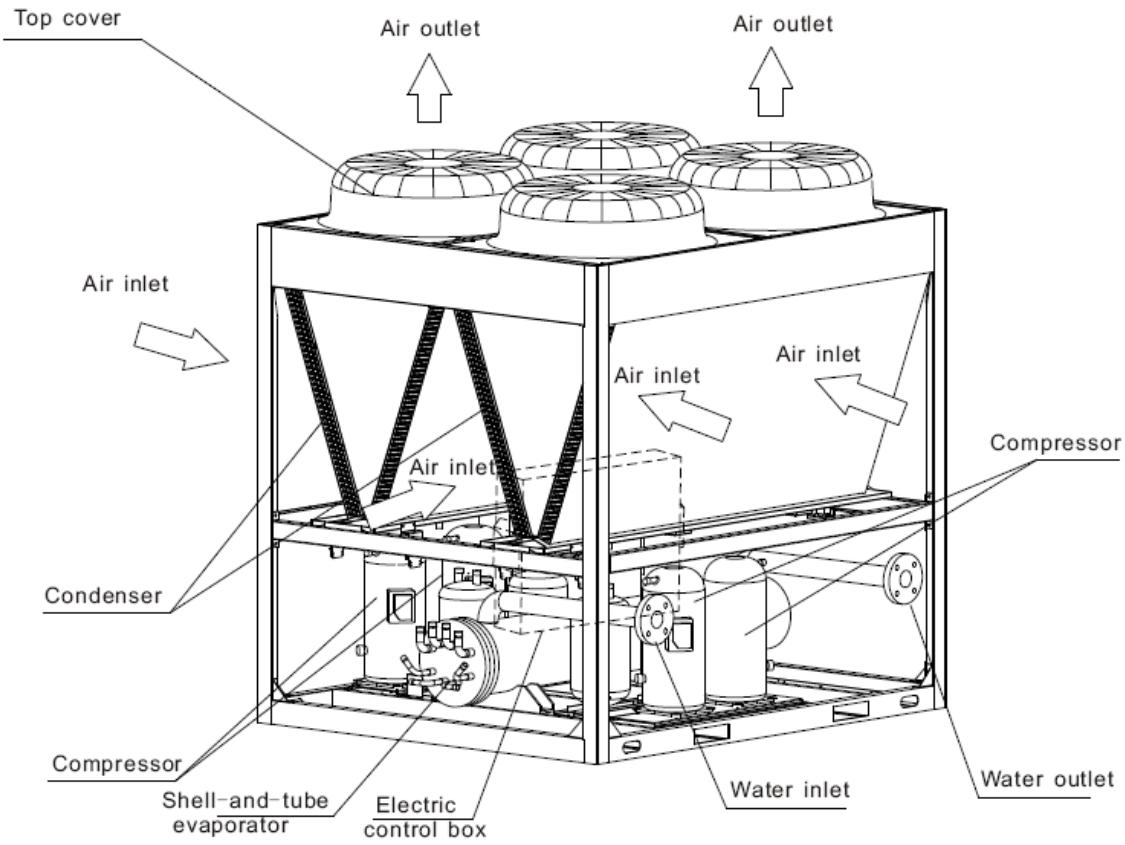
Left view



Top view

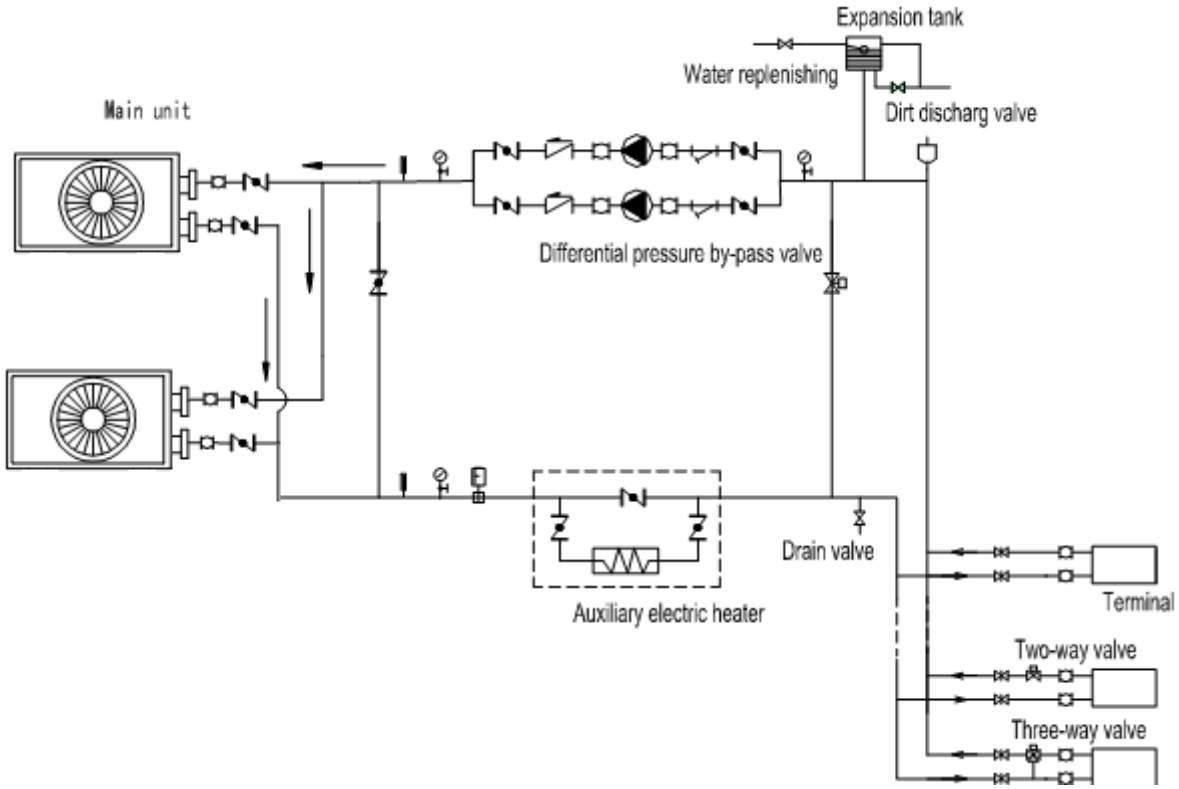


Rated cooling capacity (kW)	A	B	C	D	E	F	G	H
130kW	2000	1700	2090	347	1420	510.5	1586	846


Top cover
Air outlet
Air outlet
Air inlet
Air inlet
Air inlet
Air inlet
Compressor
Condenser
Compressor
Shell-and-tube evaporator
Electric control box
Water inlet
Water outlet

5. Pipe Connection Drawing

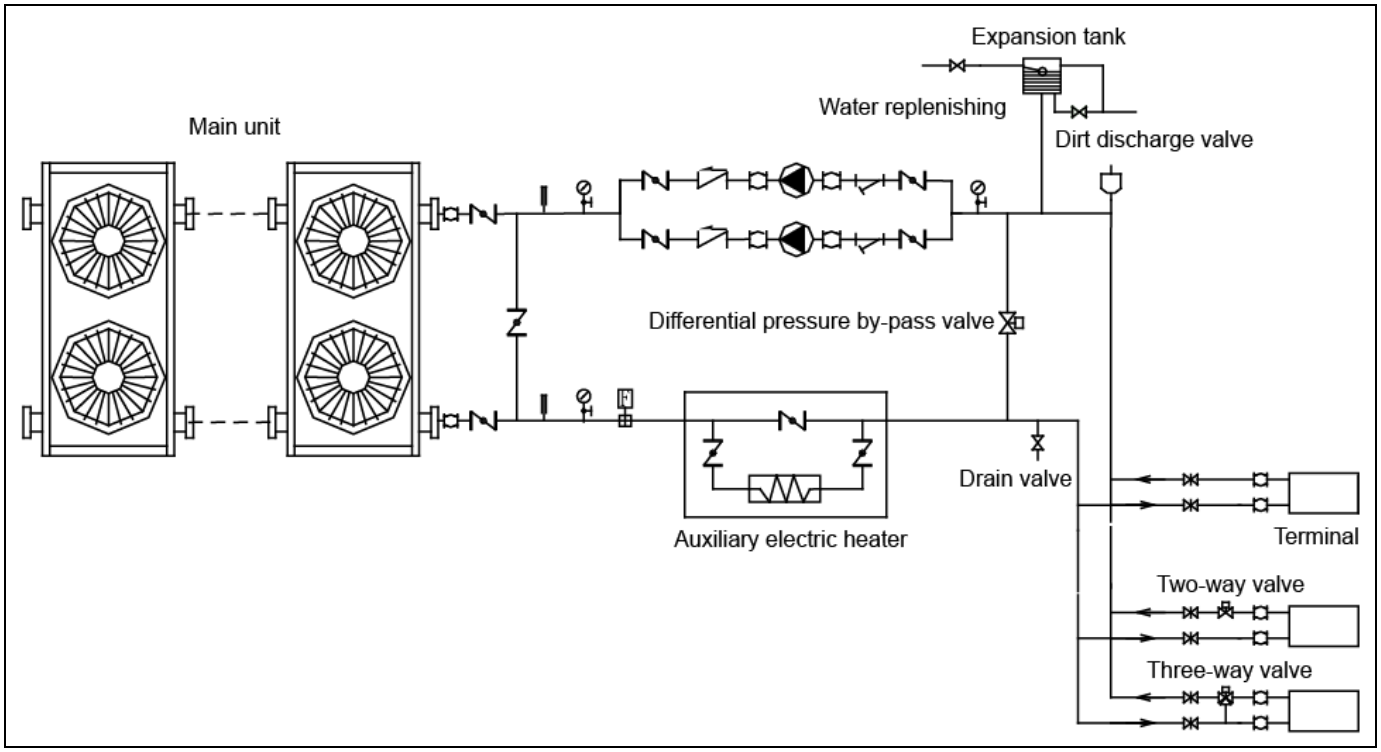
5.1 30kW



The table below describes the symbols.

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

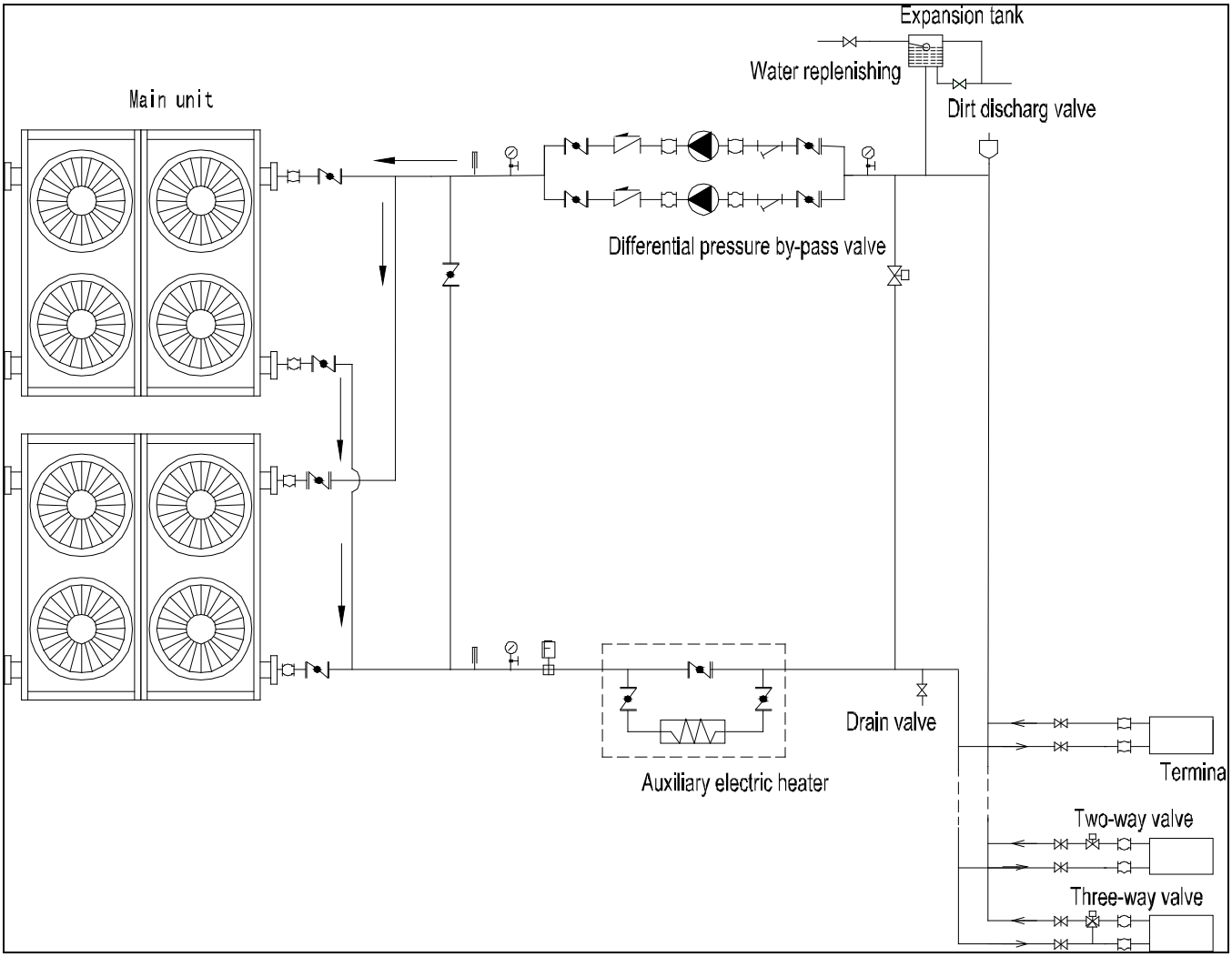
5.2 65kW



The table below describes the symbols.

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

5.3 130kW



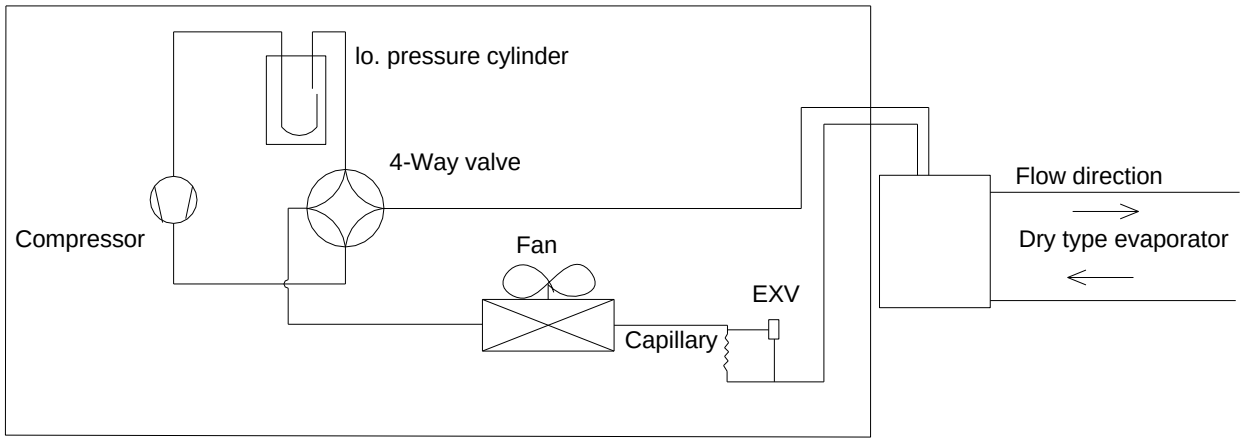
The table below describes the symbols.

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

6. Refrigeration system drawing

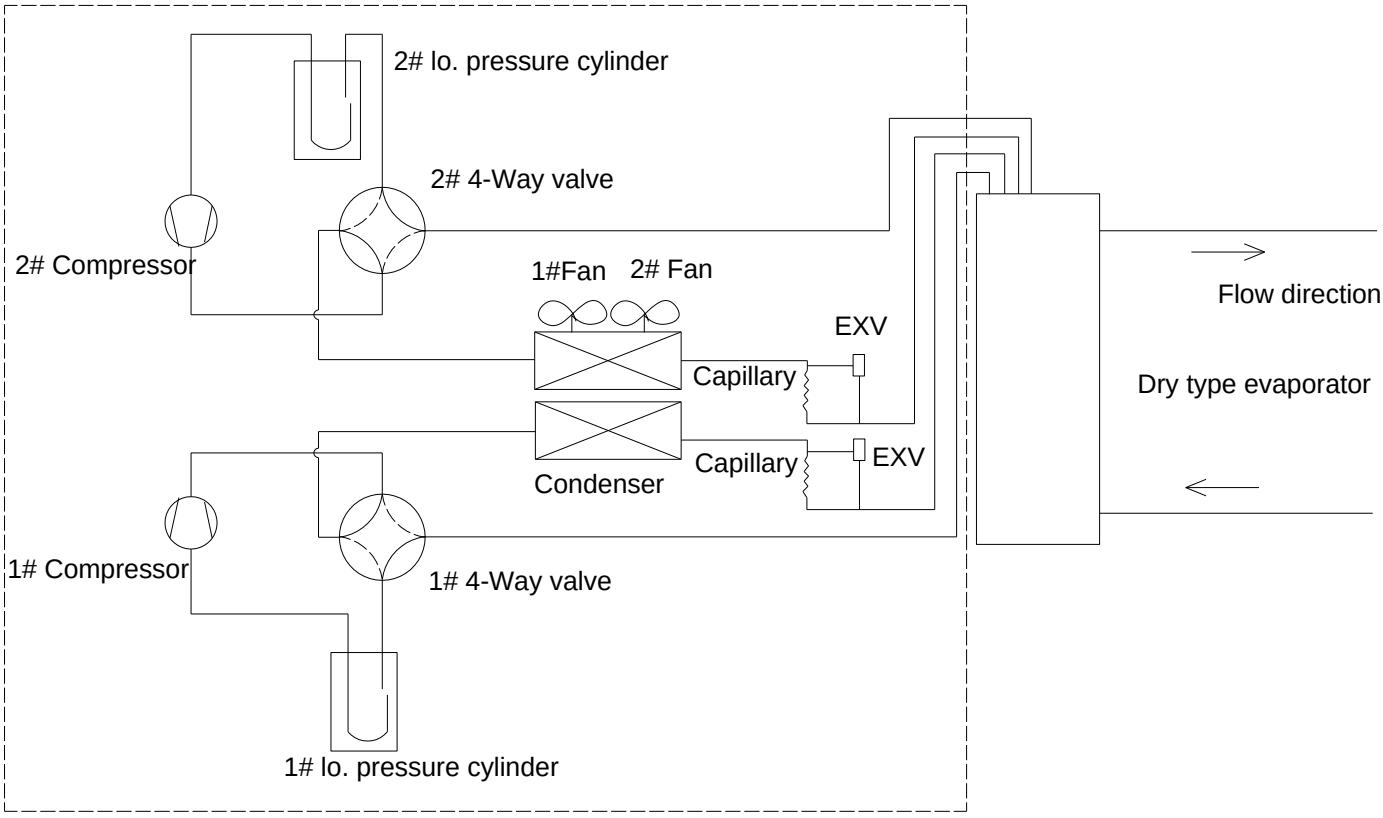
6.1 30kW

Each module has two compressors with one A/C system, one shell and tube evaporate for two systems.



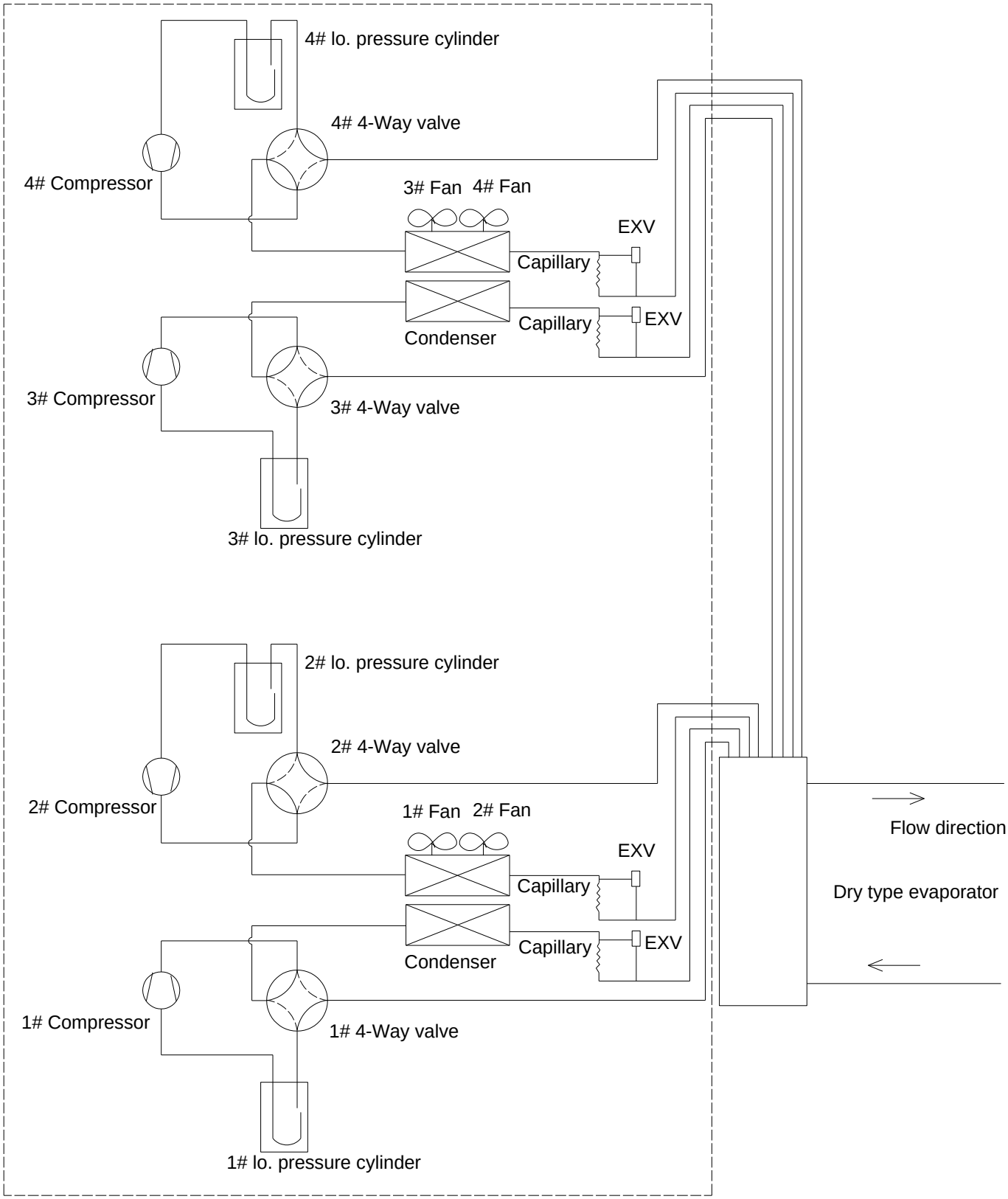
6.2 65kW

Each module has two compressors with two separate A/C systems, one shell and tube evaporate for two systems.



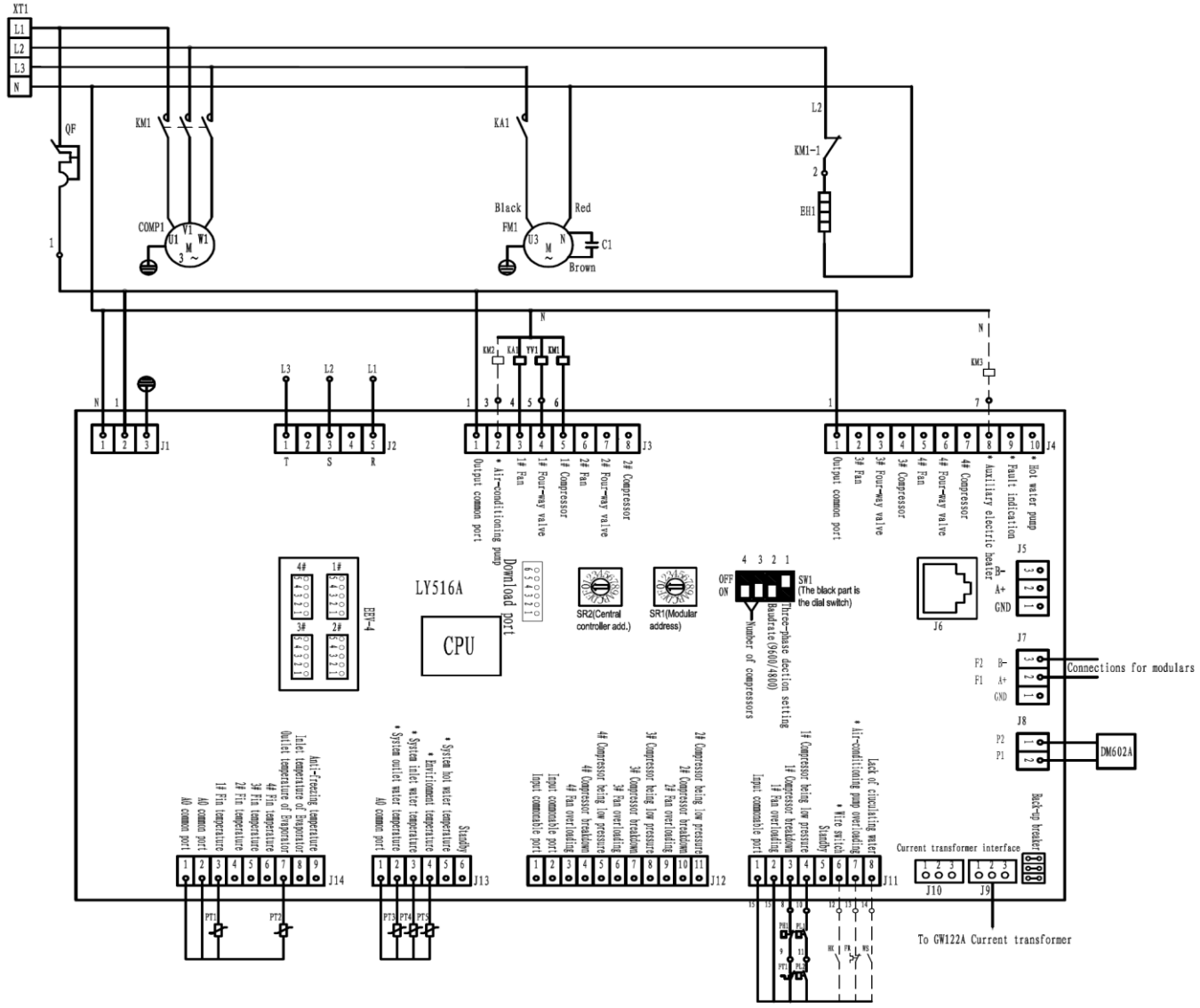
6.3 130kW

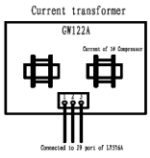
Each module has four compressors with four separate A/C system, one tube-in-shell evaporate for four systems.



7. Wiring Diagrams

7.1 30kW





SR2	SR1	Instruction
0	0	Main unit (1# Modular unit)
0	1	Sub-unit (2# Modular unit)
0	2	Sub-unit (3# Modular unit)
……	……	……
0	14	Sub-unit (15# Modular unit)
0	15	Sub-unit (16# Modular unit)

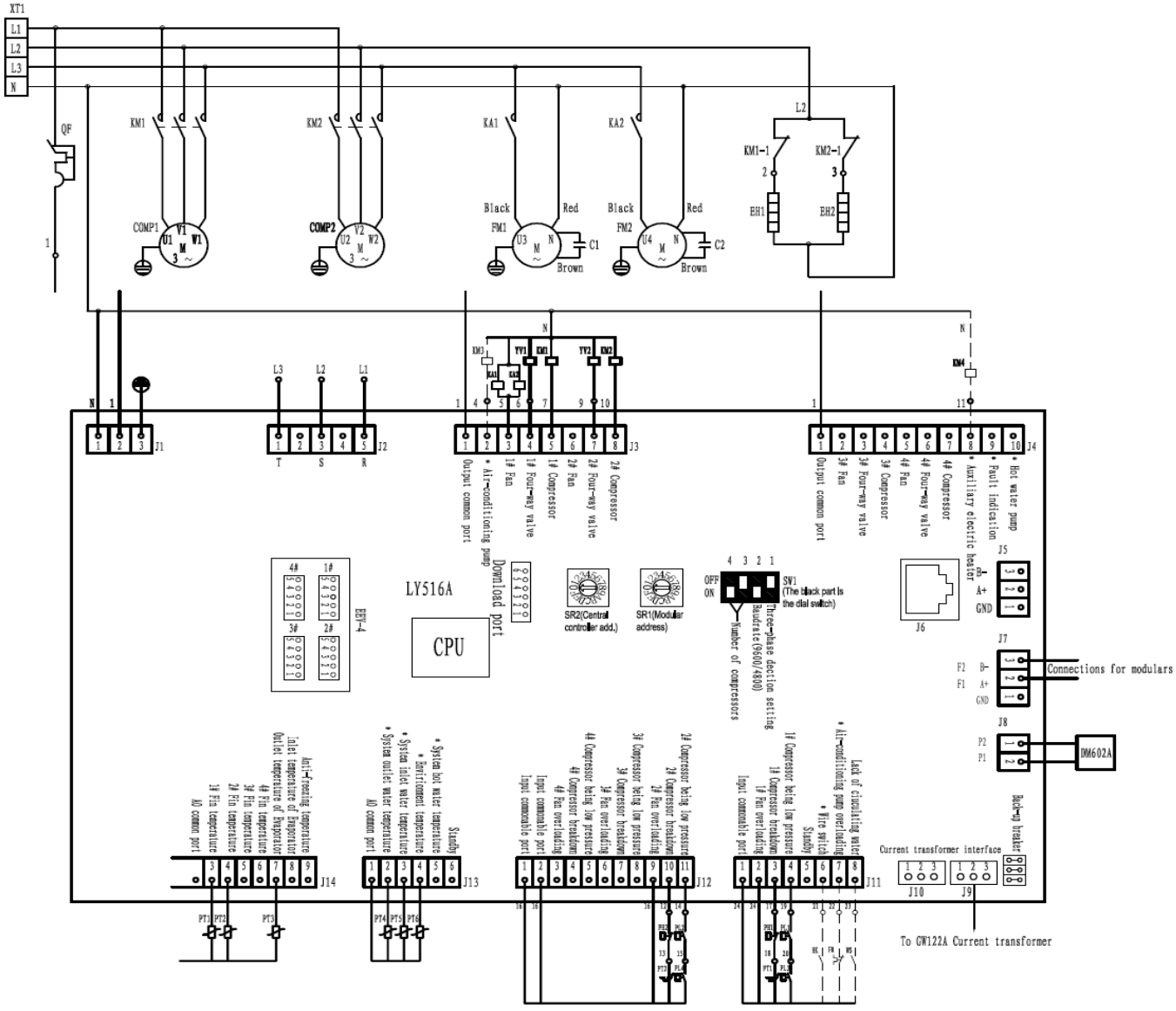
CODE INSTRUCTION

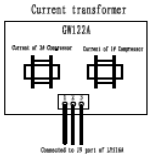
Code	Name	Code	Name
COMP1	Compressor	YV1	Four-way valve
FM1	Fan	WS	Flow switch
DM602A	Wire controller	PL1	Low-pressure switch
LY516A	Control panel	PL2	Pressure switch
PT1-5	Temperature probe	PH1	High-pressure switch
GW122A	Current transformer	FT1	Exaust thermostat
QF	Breaker	HK	Wire switch
KM1	Alternating contactor	XT1	Power terminal
KA1	relay	XT2	Output terminal
EH1	Crankcase heater	FR	Thermorelay

Instruction

1. As for Single-module units, "0" is set as SR1 and the outlet water temperature sensor of the module is idle;
2. Dial switch settings: "1" is for Three-phase dection setting and it is at "ON" position; "2" means Baudrate(4800/9600) and it is at "OFF" position（9600）;Both "3"and "4"are for numbers of compressors and "3" is at "OFF"position while "4" is at "OFF" position.
3. Environment temperature, system inlet/outlet water temperature, air-conditioning pump overloading and wire switch are just applicable for the main modular rather than sub-modulars.

7.2 65kW





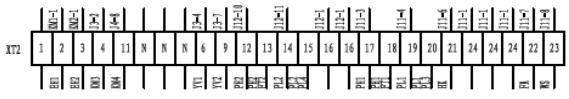
SR2	SR1	Instruction
0	0	Main unit (1# Modular unit)
0	1	Sub-unit (2# Modular unit)
0	2	Sub-unit (3# Modular unit)
.....		
0	14	Sub-unit (15# Modular unit)
0	15	Sub-unit (16# Modular unit)

CODE INSTRUCTION

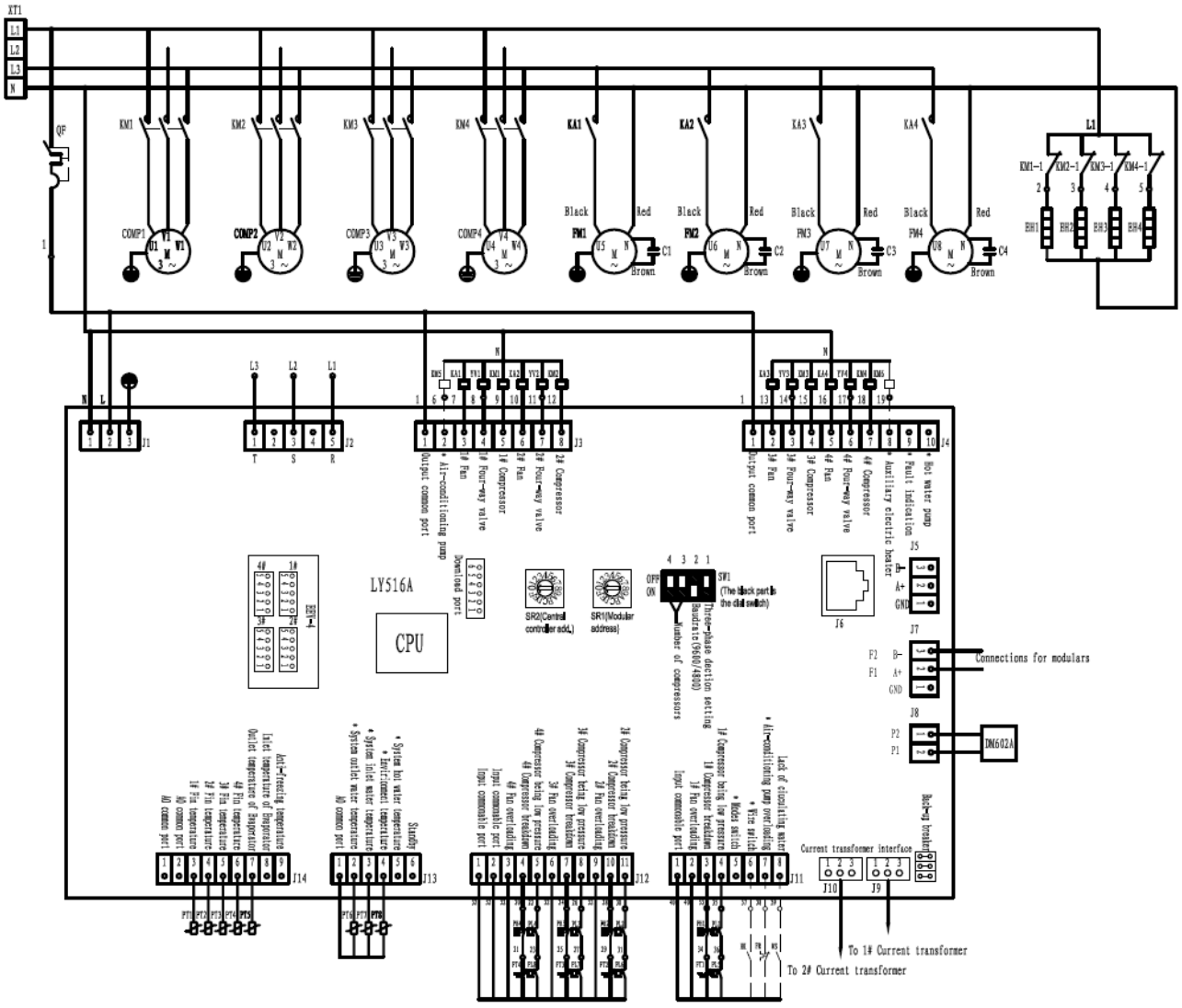
Code	Name	Code	Name
COMP1-2	Compressor	YV1-2	Four-way valve
FM1-2	Fan	WS	Flow switch
DM602A	Wire controller	PL1-2	Low-pressure switch
LY516A	Control panel	PL3-4	Pressure switch
PT1-6	Temperature probe	PH1-2	High-pressure switch
CW122A	Current transformer	FT1-2	Exaust thermostat
QF	Breaker	HK	Wire switch
KM1-2	Alternating contactor	XT1	Power terminal
KA1-2	relay	XT2	Output terminal
EH1-2	Crankcase heater	FR	Thermorelay

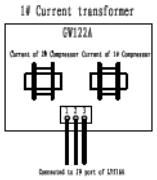
Instruction

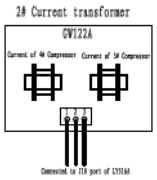
1. As for Single-module units, "0" is set as SR1 and the outlet water temperature sensor of the module is idle;
2. Dial switch settings: "1" is for Three-phase dection setting and it is at "ON" position; "2" means Baudrate(4800/9600) and it is at "OFF" position（9600）;Both "3"and "4"are for numbers of compressors and "3" is at "ON"position while "4" is at "OFF" position.
3. Environment temperature, system inlet/outlet water temperature, air-conditioning pump overloading and wire switch are just applicable for the main modular rather than sub-modulars.



7.3 130kW







CODE INSTRUCTION

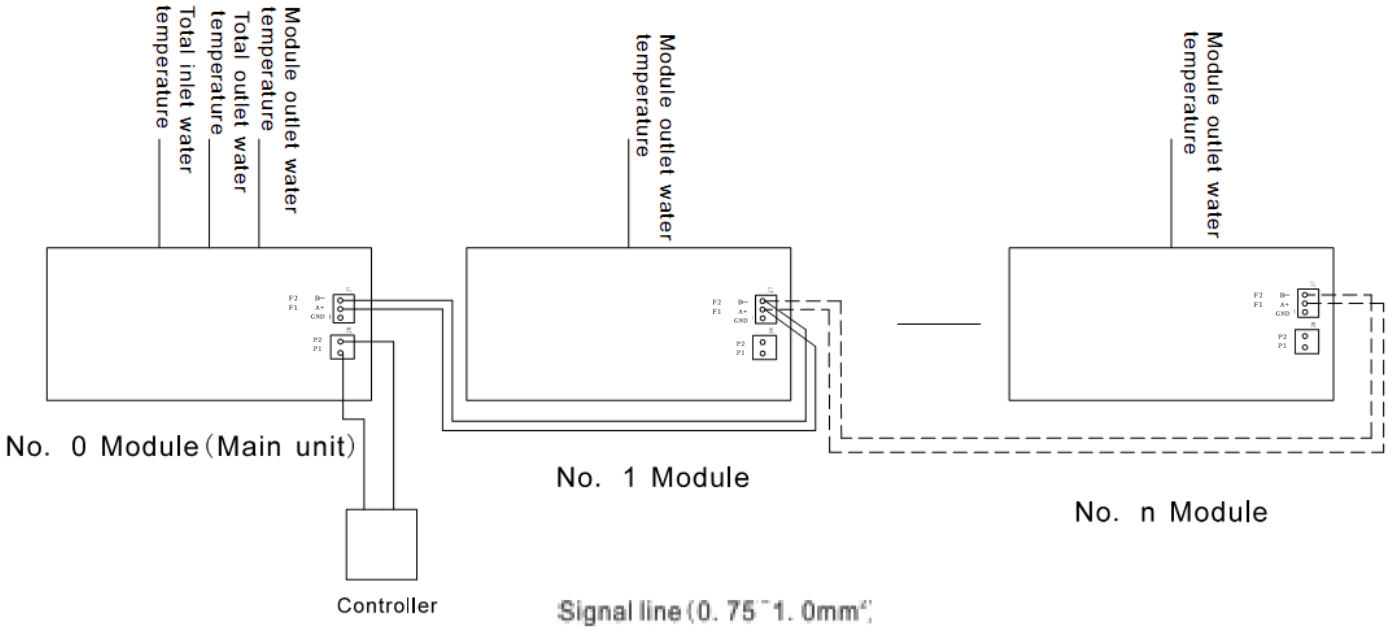
Code	Name	Code	Name
COMP1—4	Compressor	YV1—4	Four-way valve
FM1—4	Fan	WS	Flow switch
DM602A	Wire controller	PL1—4	Low-pressure switch
LY516A	Control panel	PL5—8	Pressure switch
PT1—8	Temperature probe	PH1—4	High-pressure switch
GW122A	Current transformer	PT1—4	Exaust thermostat
QF	Breaker	HK	Wire switch
KM1—6	Alternating contactor	XT1	Power terminal
KA1—4	relay	XT2	Output terminal
EH1—4	Crankcase heater	FR	Thermorelay

Instruciton

1. As for Single-module units, "0" is set as SR1 and the outlet water temperature sensor of the module is idle;
2. Dial switch settings: "1" is for Three-phase dection setting and it is at "ON" position; "2" means Baudrate(4800/9600) and it is at "OFF" position(9600);Both "3"and "4"are for numbers of compressors and at "ON"positions.
3. Environment temperature, system inlet/outlet water temperature, air-conditioning pump overloading and wire switch are just applicable for the main modular rather than sub-modulars.

SR2	SR1	Instruction
0	0	Main unit (1# Modular unit)
0	1	Sub-unit (2# Modular unit)
0	2	Sub-unit (3# Modular unit)
……	……	……
0	14	Sub-unit (15# Modular unit)
0	15	Sub-unit (16# Modular unit)

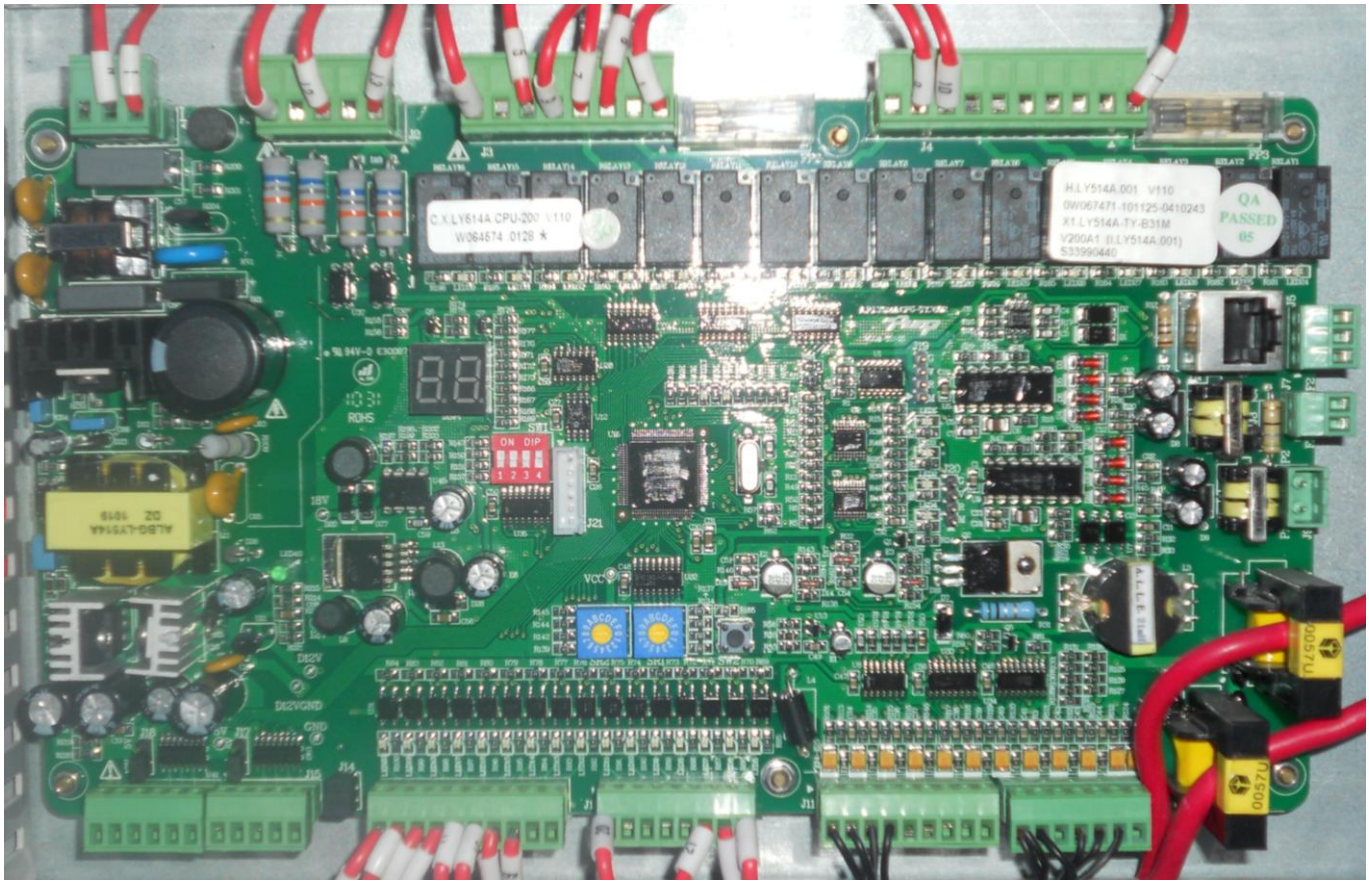
8. Networking Communication wiring diagram

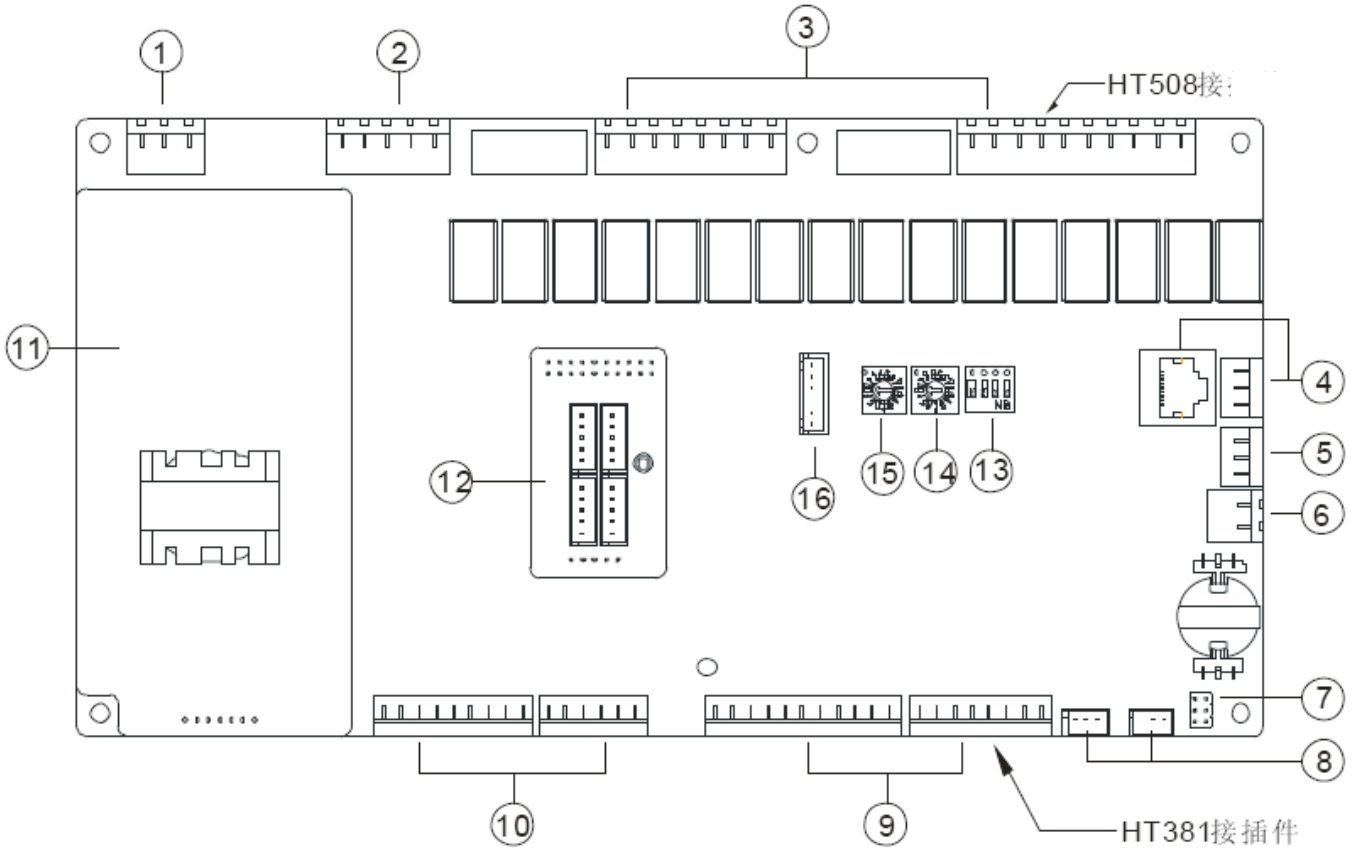


Remark:

- The number of modules in each refrigeranting system is not more than 16.
- The specification of the signal line is the two-core RVV in 2*0.75mm^2.

9. Control system





① Power supply input
② Power supply phase sequence detection
③ 16 relay output
④ Central control interface (RS-485) **J5**
⑤ Cascade interface (RS-485) **J7**
⑥ Wired controller interface **J8**
⑦ Spare jumper
⑧ 2 current mutual inductance
⑨ 16 on-off control input
⑩ 12 NTC humidity
⑪ Switching Power Supply
⑫ 4 stepper motor interface
⑬ Switching function
⑭ SR1-cascade address selection
⑮ SR2-central control address selection
⑯ Download Port

Part 2.

Trouble Shooting

1. Malfunction & Protection Codes

Code	Fault contents	Remarks
0	Communication fault	Power fault of Main module
1	Power fault	
2	EEPROM data fault	
3	External chain alarm	
8	Air conditioner pump overloading short supply	
9	Air conditioner water in short supply	Water of Main module in short
10	Heat recovery pump overloading	
11	Heat water in short supply	
33	Environment temperature sensor fault	
34	System outlet water temperature sensor fault	
35	System inlet water temperature sensor fault	
36	Heat recovery temperature sensor fault	
40	System outlet water temperature being too high	
41	System outlet water temperature being too low	
48	Pressure of 1# Compressor being too low	1# Compressor faults
49	Pressure of 1# Compressor being too high	
50	1# Compressor overheating	
52	1# Suction temperature sensor fault	
53	1# Inlet temperature sensor of evaporate fault	
55	1# Fin temperature sensor fault	
57	Current of 1# Compressor being too low	
58	1# Fin temperature being too high	
60	Current of 1# Compressor being too high	

Code	Fault contents	Remarks
80	Pressure of 2# Compressor being too low	2# Compressor faults
81	Pressure of 2# Compressor being too high	
82	2# Compressor overheating	
84	2# Suction temperature sensor fault	
85	2# Inlet temperature sensor of evaporate fault	
87	2# Fin temperature sensor fault	
89	Current of 2# Compressor being too low	
90	2# Fin temperature being too high	
92	Current of 2# Compressor being too high	
177	Power fault	Module faults
178	Module EEPROM data fault	
182	Module air conditioner water in short supply	
185	1# Fan overloading	
186	2# Fan overloading	
189	Module air supply pressure difference	
192	1# Outlet water temperature sensor fault	
193	2# Outlet water temperature sensor fault	
195	1# Outlet water temperature overheating	
197	2# Outlet water temperature overheating	
200	1# Outlet water temperature overcooling	
201	2# Outlet water temperature overcooling	

2. Troubles and Solutions

Error	Possible reason	Detect and settle measure
Over high air discharge pressure (Cooling operation)	Air or other non-condensing gas still in the system	Discharge gas from fluorin charging inlet. Re-vacuum the system if necessary.
	Fins in the condenser are dirty or foreign substance blocking fins.	Clean condenser fins.
	Insufficient chilling air volume or condenser fan error	Check and repair the condenser fan, recover the normal operation
	Excessive high air suction pressure	See "Excessive high air suction pressure"
	Excessive refrigerant charging volume	Discharge the excessive refrigerant
	Over high ambient temperature	Check ambient temperature
Over low air discharge pressure (Cooling operation)	Over cool air in the side of air heat exchanger	Check ambient temperature
	Refrigerant leakage or insufficient r efrigerant volume	Test leakage or charge sufficient refrigerant to the system
	Excessive low air suction pressure	See "Excessive low air suction pressure"
Over high air suction pressure (Cooling operation)	Excessive refrigerant charging volume	Discharge the excessive refrigerant
	Over high temperature in chilling water inlet	Check thermal insulation layer of water pipe and the specification of this layer
Over low air suction pressure (Cooling operation)	Insufficient water flow volume	Check temperature difference at water inlet and outlet, and adjust the water flow volume
	Over low temperature in chilling water inlet and outlet	Check and installation state
	Refrigerant leakage or insufficient refrigerant volume	Test leakage or charge sufficient refrigerant to the system
	Incrustant in evaporator	Eliminate incrustant
Over high air discharge pressure (Heating operation)	Insufficient water flow	Check temperature difference at water inlet and outlet, and adjust the water flow volume
	Air or other non-condensing gas still in the system	Discharge gas from fluorin charging inlet. Re-vacuum the system if necessary.
	Incrustant in water side of heat exchanger	Eliminate incrustant
	Over high temperature in chilling water inlet	Check water temperature
	Excessive high air suction pressure	See "Excessive high air suction pressure"
Over low air discharge pressure (Heating operation)	Over low temperature of chilling water	Check chilling water temperature
	Refrigerant leakage or insufficient refrigerant volume	Test leakage or charge sufficient refrigerant to the system
	Excessive low air suction pressure	See "Excessive low air suction pressure"
Over high air suction pressure (Heating operation)	Over heat air in the side of air heat exchanger	Check ambient temperature around it
	Excessive refrigerant charging volume	Discharge the excessive refrigerant
Over low air suction pressure (Heating operation)	Insufficient refrigerant charging volume	Charge sufficient refrigerant to the system
	Insufficient air flow volume	Check fan rotating direction
	Air loop short-circuit	Reason about remove air short-circuit
	Insufficient frost-removal operation	Error comes out from 4-way valve or thermal resistor. Replace a new one if necessary.
Compressor stops because of freeze-proof protection (Cooling operation)	Insufficient chilling water flow volume	Error comes from pump or flow-type water volume control. Check and repair or replace a new one.
	Gas still in water loop	Discharge air
	Thermal resistor error	Upon error have been confirmed, please replace a new one.
Compressor stops because of Hi-pressure protection	Over high air expelling pressure	See "Over high air expelling pressure"
	Hi-pressure switch error	Upon error have been confirmed, please replace a new one.

Error	Possible reason	Detect and settle measure
Compressor stops because of motor Overcurrent.	Over high air expelling pressure and air suction pressure	See "Over high air expelling pressure" and "Over high air suction pressure"
	Hi-voltage or Lo-voltage, signal phase or phase unbalance	Confirm voltage not higher or lower than the rated voltage 20V
	Short circuit comes out from motor or connecting interface	Confirm resistors at motor are connected corresponding to terminals
	Overcurrent assembly error	Replace a new one
Compressor stops because of integrate temperature sensor or air discharge temperature protection.	Over high or over low voltage	Confirm voltage not higher or lower than the rated voltage 20V
	Over high air expelling pressure or excessive low air suction pressure	See "Over high air expelling pressure" and "excessive low air suction pressure "
	Component error	Check the integrated temperature sensor after motor is cool down.
Compressor stops because of Lo.-pressure protection	Filter in front (or rear) of expanding valve is blocked	Replace a new filter
	Lo-voltage switch error	If the switch is defective, please replace a new one.
	Excessive low air suction pressure	See "Excessive low air suction pressure"
Abnormal noise gives out form compressor	Liquid refrigerant flows into compressor from evaporator result in liquid slugging.	Adjust refrigerant charge volume
	Aging of compressor	Replace a new compressor
Compressor is unable to drive	Overcurrent relay trip up, fuse burnt out	Replace damaged assembly
	Control circuit without power though	Check the wring of control system
	Hi-voltage or lo-voltage protection	Reference to mention in above the parts of air suction and discharge pressure error
	Coils in contactor are burnt out	Replace damaged assembly
	Wrong connection of phase sequence	Re-connect and adjust the any 2 wires among 3 phases
	Water system error and flow type volume controller short connection	Check water system
	Error signal delivered from wire controller	Find out the error type and carry out the corresponding measure to settle
Air side heat exchanger excessive frost	4-way valve or thermal resistor error	Check the running state. Replace a new one if necessary.
	Air loop short-circuit	Settle the short-circuit of air discharge
With noise	Fixing screws at panel are loosen	Fix up all assemblies

Part 3. Installation

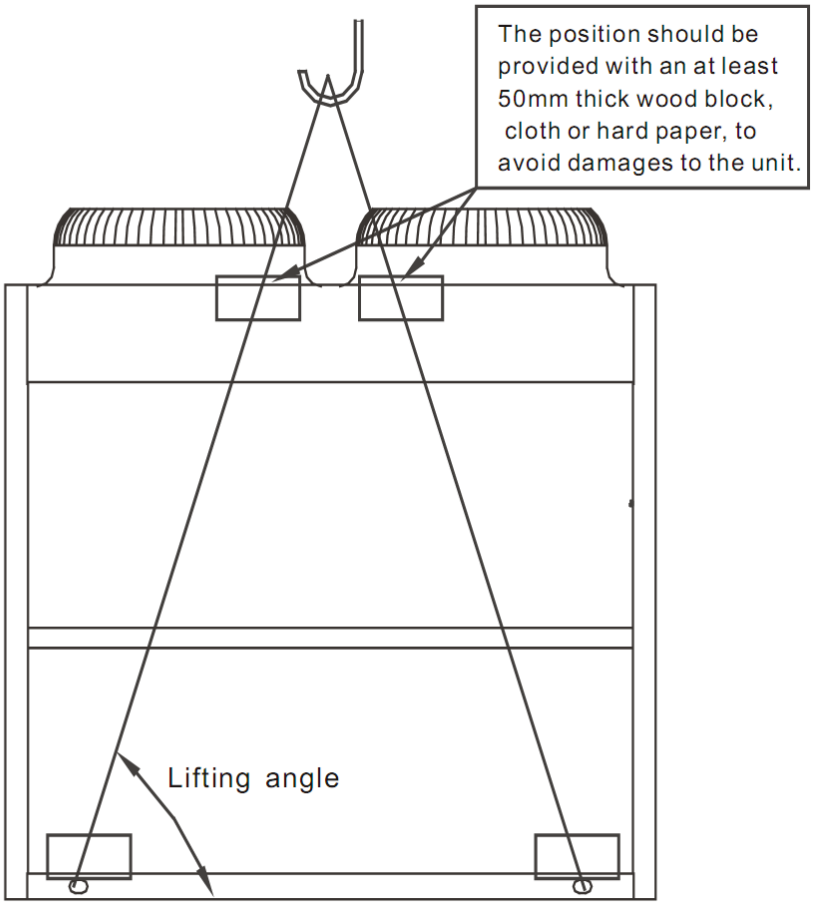
1. Transportation and Foundation Installation

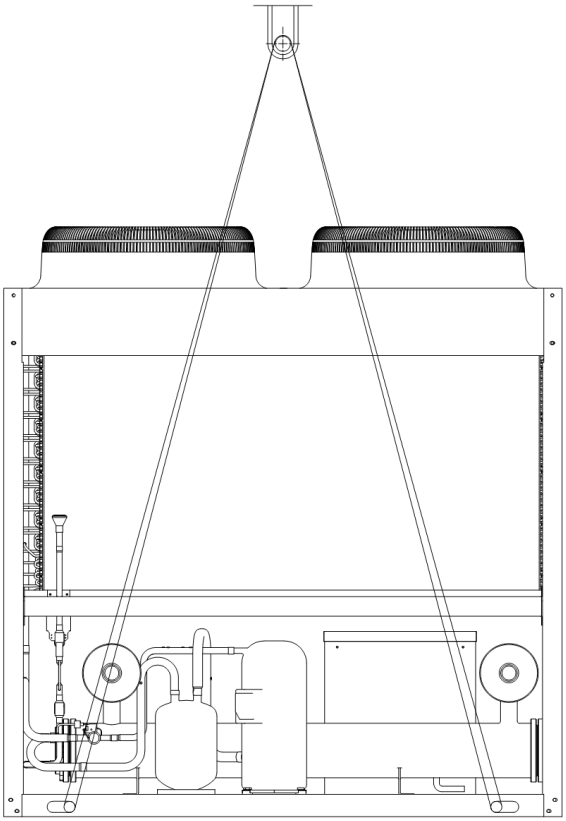
1.1 Transportation

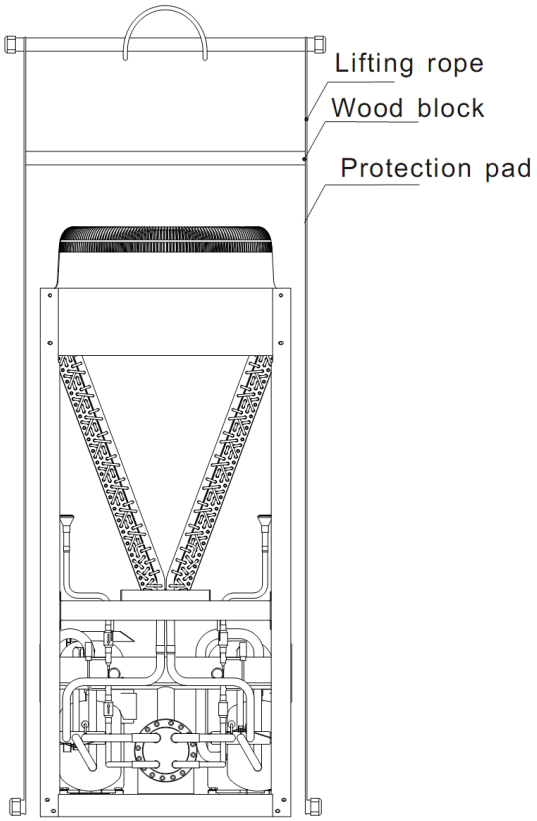
The angle of inclination should not be more than 15º when carrying the unit, to avoid over turn of the unit.

1.1.1 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.

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



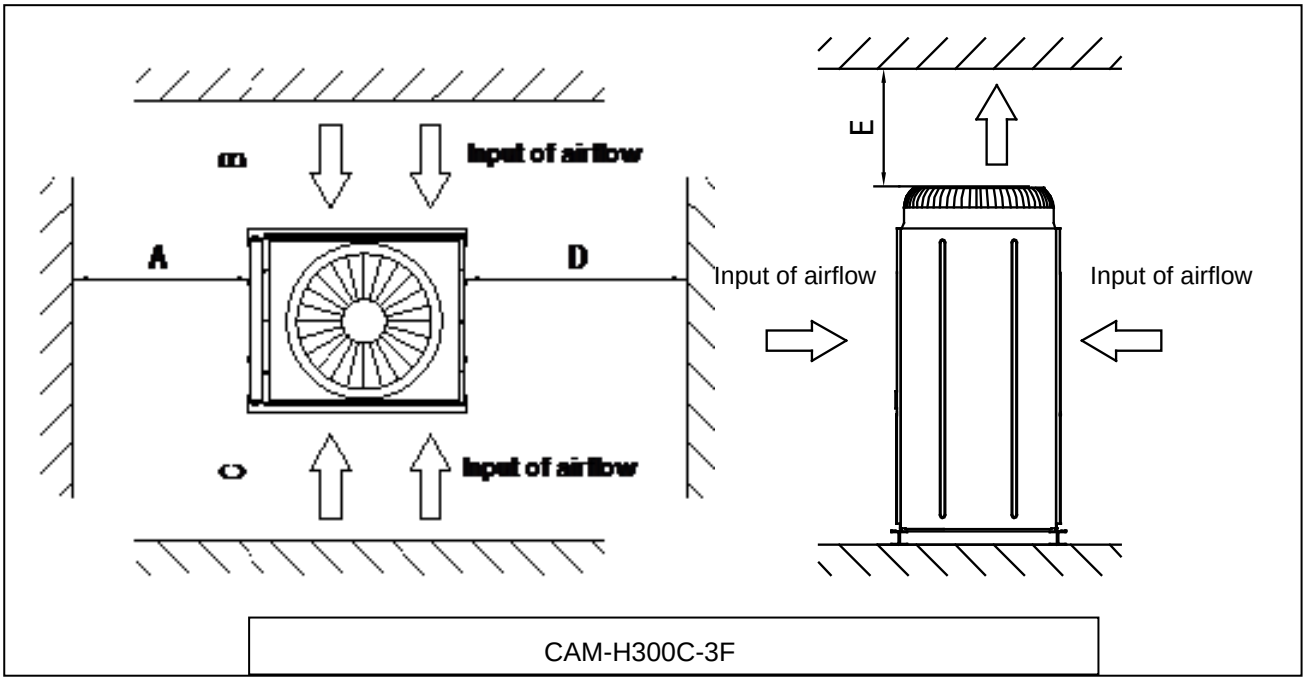



Lifting rope
Wood block
Protection pad

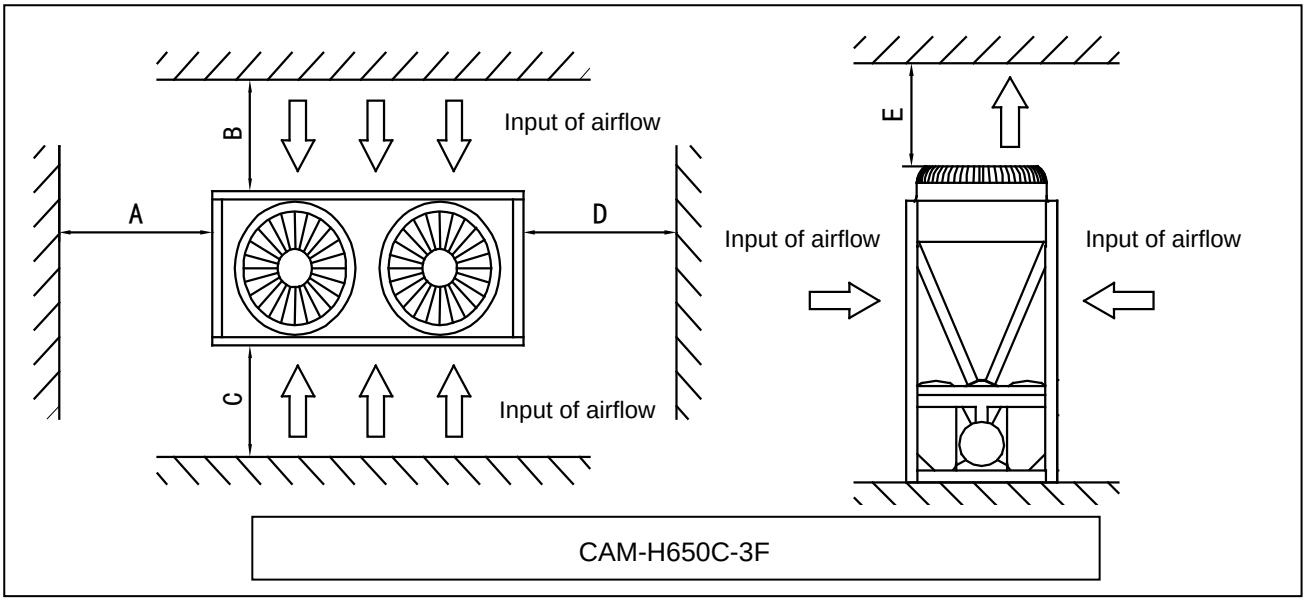
1.2 Installation space

1.2.1 Requirements of arrangement space of the unit

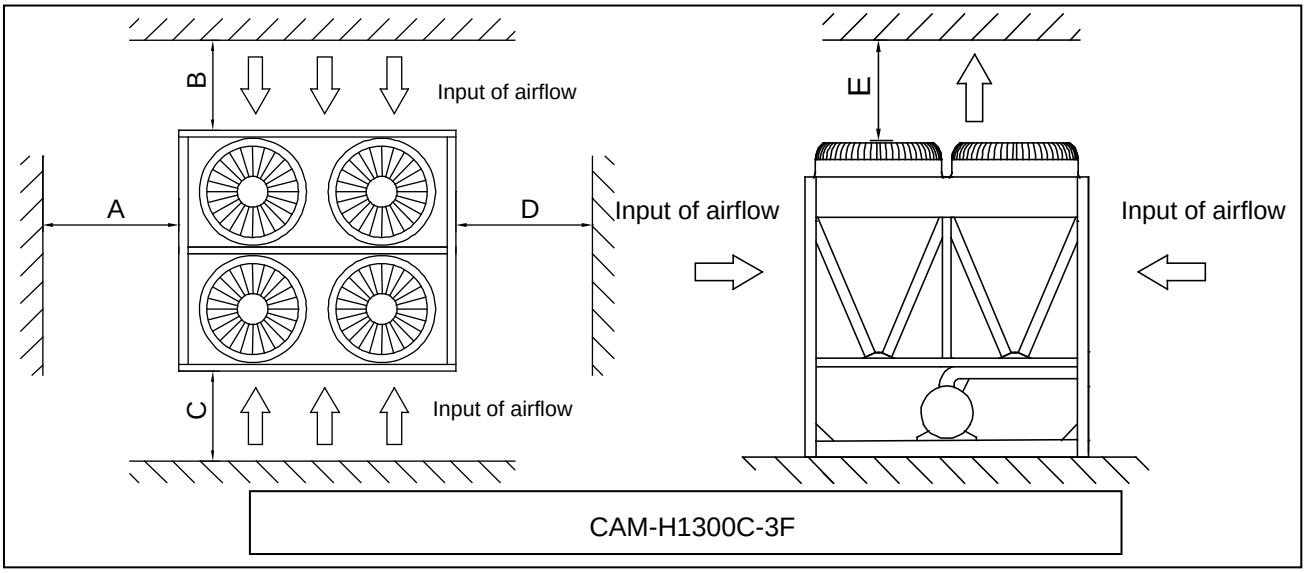
1) To ensure adequate airflow entering the condenser, the influence of descending airflow caused by the high-rise buildings around upon the unit should be taken into account when installing the unit.
2) If the unit is installed where the flowing speed of air is high, such as on the exposed roof, the measures including sunk fence and Persian blinds can be taken, to prevent the turbulent flow from disturbing the air entering the unit. If the unit needs to be provided with sunk fence, the height of the latter should not be more than that of the former; if Persian blinds are required, the total loss of static pressure should be less than the static pressure outside the fan. The space between the unit and sunk fence or Persian blinds should also meet the requirement of the minimum installation space of the unit.
3) If the unit needs to operate in winter, and the installation site may be covered by snow, the unit should be located higher than the snow surface, to ensure that air flows through the coils smoothly.



CAM-H300C-3F



CAM-H650C-3F



The recommend space parameter

Module	Installation space (mm)				
	A	B	C	D	E
30kW, 65kW, 130kW	≥1500	≥2000	≥1500	≥2000	≥8000

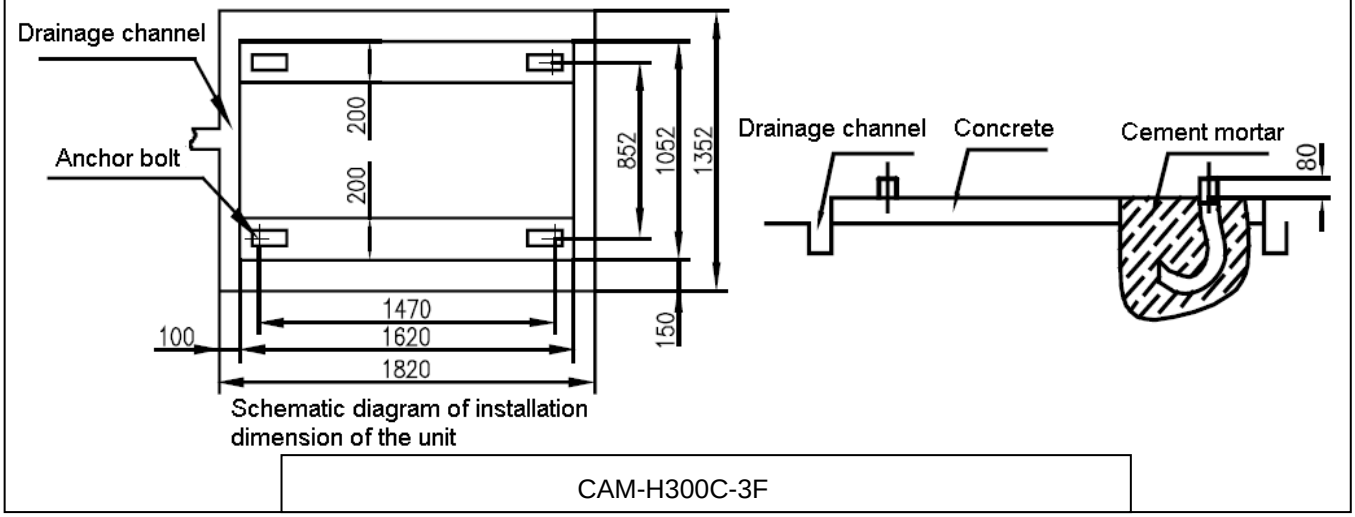
1.2.2 Space requirements for parallel installation of multiple modular units

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 the figure above, the spaces between the unit and the obstacle are given in the figure above, 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 the figure above, the spaces between the unit and the obstacle are given in the figure above, 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 the figure above, 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.

1.3 Installation Foundation

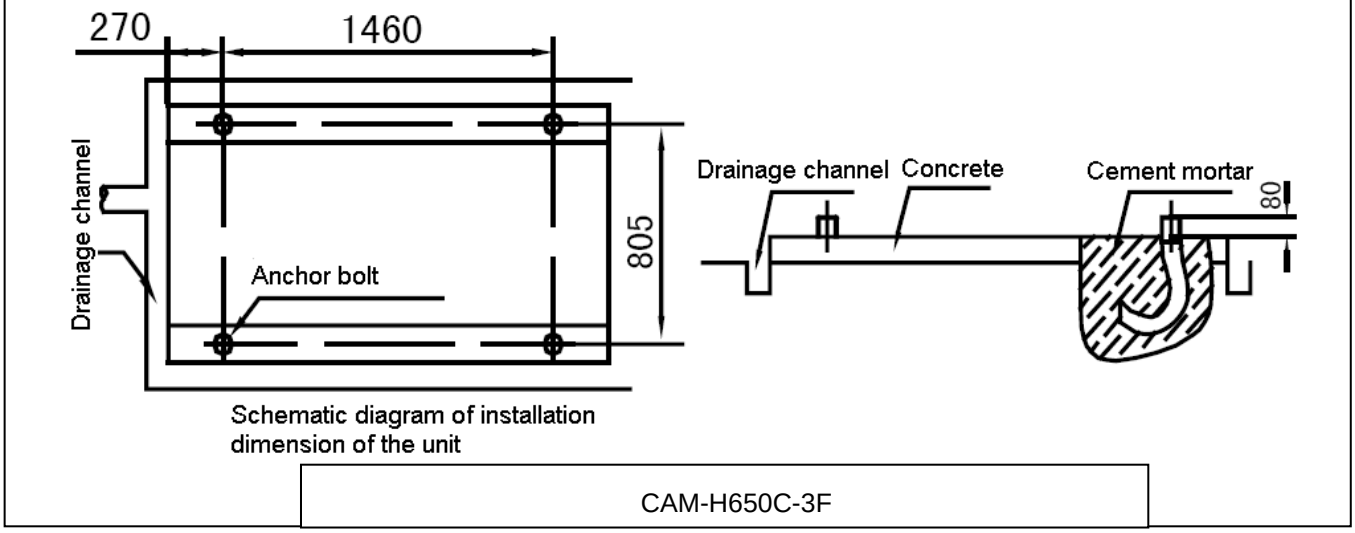
The unit should be located on the horizontal foundation, the ground floor or the roof which can bear operating weight of the unit and the weight of maintenance personnel. Refer to the operating weight parameters in specification table.
If the unit is located so high that it is inconvenient for maintenance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

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



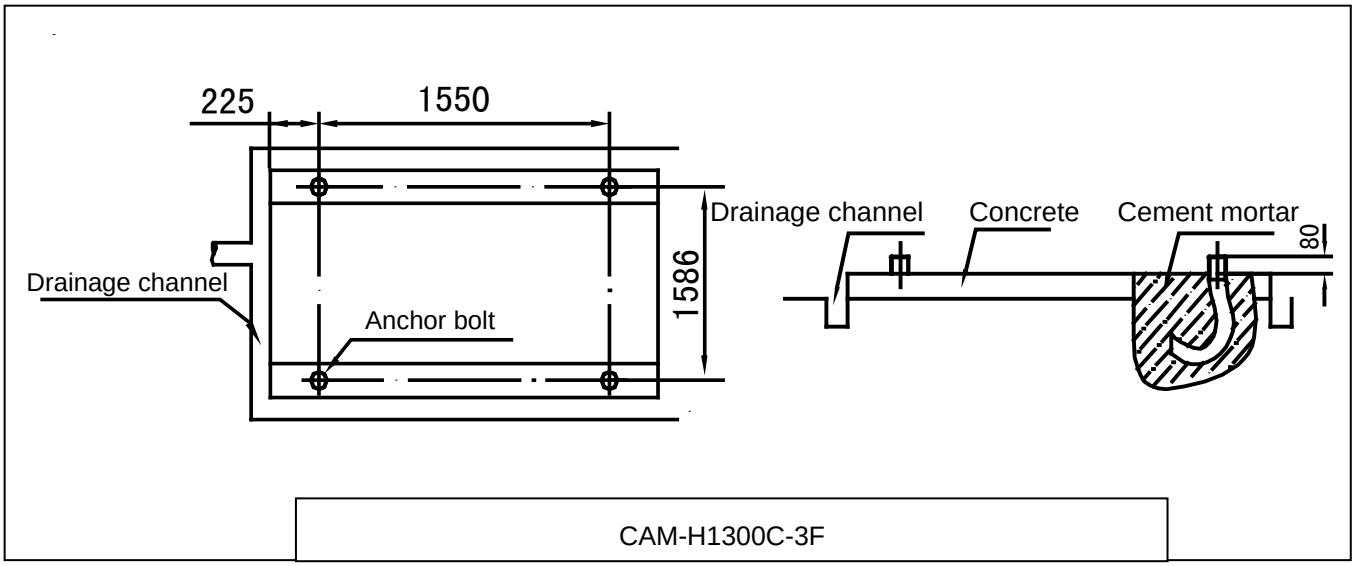
Schematic diagram of installation dimension of the unit

CAM-H300C-3F



Schematic diagram of installation dimension of the unit

CAM-H650C-3F



CAM-H1300C-3F

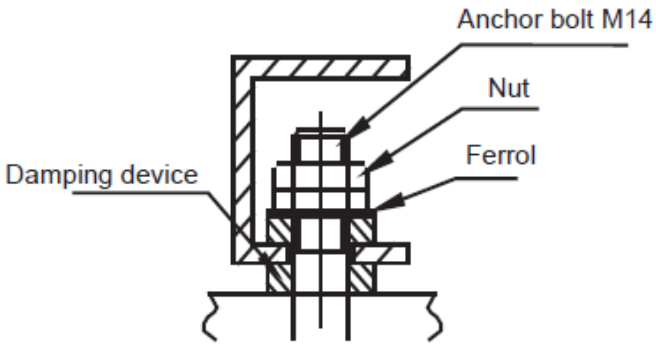
1.4 Installation of damping devices

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

By means of the Φ15mm diameter installation holes on the steel frame of the unit base, the unit can be fastened on the foundation through the spring damper. See upper pictures (Schematic diagram of installation dimension of the unit) for details about center distance of the installation holes. The damper does not go with the unit, and the user can select the damper according to the relevant requirements. When the unit is installed on the high roof or the area sensitive to vibration, please consult the relevant persons before selecting the damper

Installation steps of the damper

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



2. Water System Installation

Notice:

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

2.1 Basic requirements of connection of chilled water pipes

No.	Content
1	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.
2	Water must enter the heat exchanger through the inlet; otherwise the performance of the unit will decline.
3	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”. The wires of the target flow controller should be led to the electric cabinet through shielded cable. 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.
4	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.
5	The pipes and their ports must be independently supported but should not be supported on the unit.
6	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.
7	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.
8	The by-pass pipes and by-pass valves as shown in the figure of “Connection drawing of pipeline system” must be mounted for the heat exchanger, to facilitate cleaning of the outside system of water passage before the unit is adjusted. During maintenance, the water passage of the heat exchanger can be cut off without disturbing other heat exchangers.
9	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.
10	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.
11	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.
12	All possible water pipes in the system to be chilled should be under heat preservation, including inlet pipes and flanges of the heat exchanger.
13	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.
14	When the ambient temperature is lower than 2℃, and the unit will be not used for a long time, water inside the unit should be drained. If the unit is not drained in winter, its power supply should not be cut off, and the fan coils in the water system must be provided with three-way valves, to ensure smooth circulation of the water system when the anti-freezing pump is started up in winter.
15	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.

2.2 Water Quality

Water quality control

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

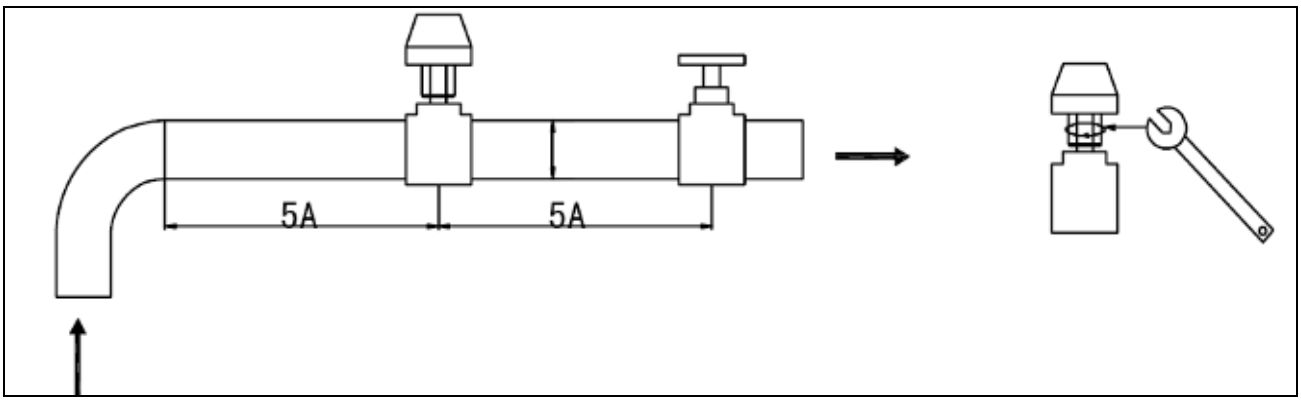
Applicable standard of water quality for the unit

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

2.3 Installation & regulation guide for target flow controller

- Please carefully check flow switches before conducting installation of the target flow controller. Packing should be in good condition, and the appearance should be free of damage and deformation. If any problem, please contact the manufacturer.
- Flow switches can be installed in the horizontal pipeline or the vertical pipeline with upward flowing direction but cannot be mounted in the pipeline with downward flowing direction. The inlet water of gravity should be taken into account when flow switches are installed in the pipeline with upward flowing direction.
- Target flow controller must be installed on a section of straight-line pipeline, and it's both ends must be supplied with straight-line pipes whose length is at least 5 times diameter of the pipe. In the meanwhile, the fluid flowing direction in the pipeline must be consistent with the direction of arrow on the controller. The connection terminal should be located where wiring connection can be easily done.
- Pay attention to the following items when conducting installation and wire connection:
  - Collision of the wrench with the soleplate of the flow switch is prohibited, since such collision may cause deformation and failure of the flow switch.
  - To avoid electric shock and damages to the devices, the power supply should be cut off, when wires are connected or adjustment is done.
  - When wiring connection is conducted, adjustment of other screws except connection terminals of micro switches and ground screws is prohibited. In the meanwhile, over great force should not applied when wires of micro switches are connected, otherwise micro switches may suffer displacement, thus leading to failure of flow switches.
  - Special grounding screws should be used for earth connection. Bolts should not be installed or removed at will; otherwise flow switches may suffer deformation and failure.
  - Flow switches have been set at minimal flow value before leaving the factory. They should not be adjusted below the setting value at the factory, or they may suffer failure. After installing flow switches, please press the flow switch lever several times to check them. When the lever is found not to respond with "clatter", rotate the screw in a clockwise direction, until "clatter" occurs.
  - Be sure to determine the model of target slice according to the rated flow of the unit, the diameter of the outlet pipe and the adjustment range of the target slice of the flow switch. Besides, the target slice should not contact with other restrictors in the pipeline or on the inner wall of the pipeline, or the flow switch cannot be reset normally.
- Determine whether the flow switch and the system connected with it are in good operation according to the measured value by flow meter, namely, when the measured value on flow meter is less than 60% of rated water flow of the unit, the target flow controller should be cut off and observed for 3 working periods, and it should be covered with flow switch shell timely.

Schematic diagram of target flow controller



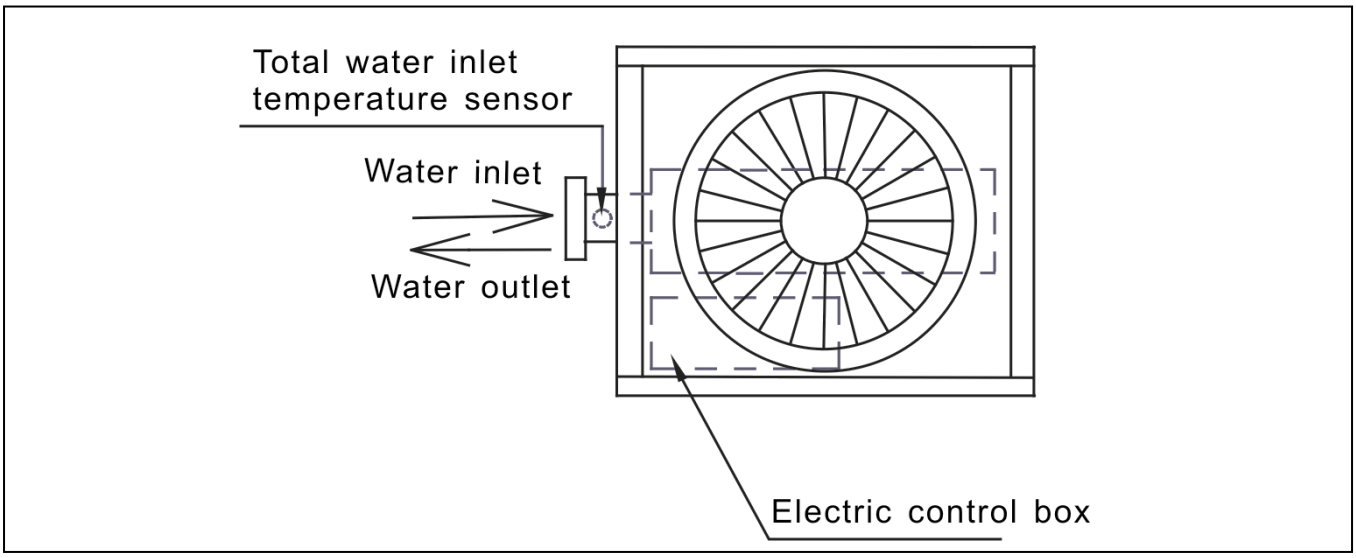
3. Installation of water system pipeline

The total outlet water pipe diameter after combined as below table:

Total cooling capacity (Unit model x quantity) kW	Total inlet and outlet water pipe diameters (nominal diameter)	Total cooling capacity (Unit model x quantity) kW	Total inlet and outlet water pipe diameters (nominal diameter)
(60×1=) 60	DN65	(130×6=) 780	DN150
(65×1=) 65		(130×7=) 910	
(130×1=) 130		(60×11=) 660	
(60×2=) 120		(65×11=) 715	
(65×2=) 130		(60×12=) 720	
(60×3=) 180	DN80	(65×12=) 780	
(65×3=) 195		(60×13=) 780	
(130×2=) 260	DN100	(65×13=) 845	
(130×3=) 390		(60×14=) 840	
(60×4=) 240		(65×14=) 910	
(65×4=) 260		(130×8=) 1040	DN200
(60×5=) 300		(60×15=) 900	
(65×5=) 325		(65×15=) 975	
(60×6=) 360		(60×16=) 960	
(65×6=) 390		(65×16=) 1040	
(130×4=) 520	DN125	(130×9=) 1170	
(130×5=) 650		(130×10=) 1300	
(60×7=) 420		(130×11=) 1430	
(65×7=) 455		(130×12=) 1560	DN250
(60×8=) 480		(130×13=) 1690	
(65×8=) 520		(130×14=) 1820	
(60×9=) 540		(130×15=) 1950	
(65×9=) 585		(130×16=) 2080	
(60×10=) 600			
(65×10=) 650			

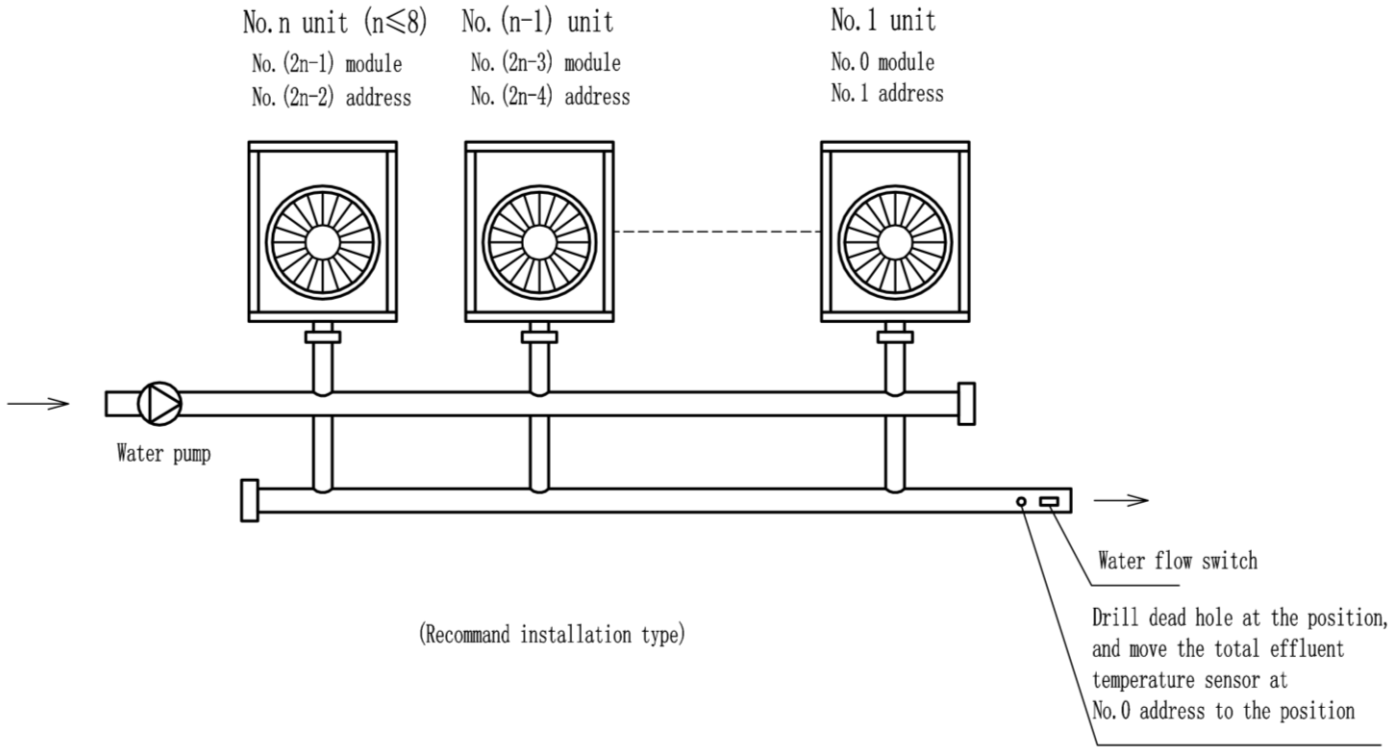
3.1 CAM-H300C-3F

Installation of single-module water system pipeline

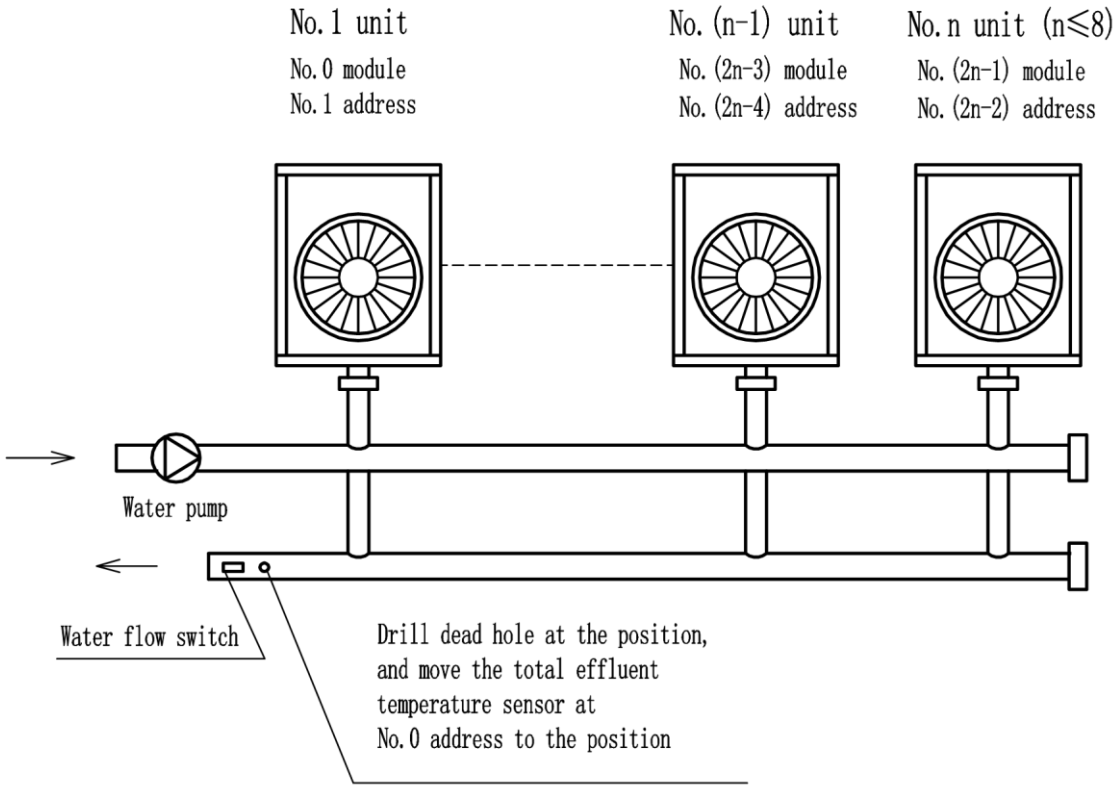


Installation of multi-module water system pipeline

3.1.1 Installation mode I (recommended installation mode)

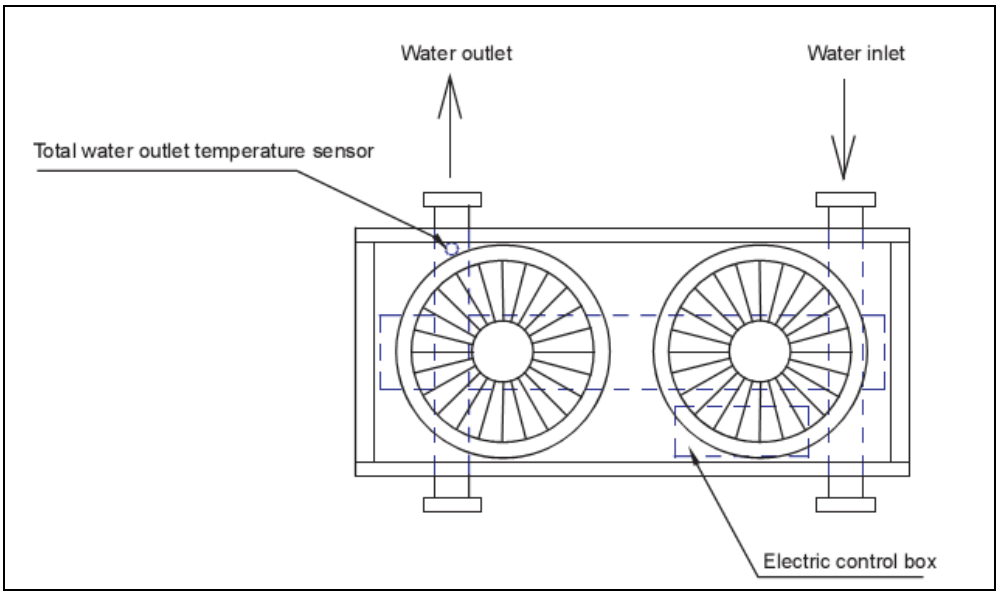


3.1.2 Installation mode II



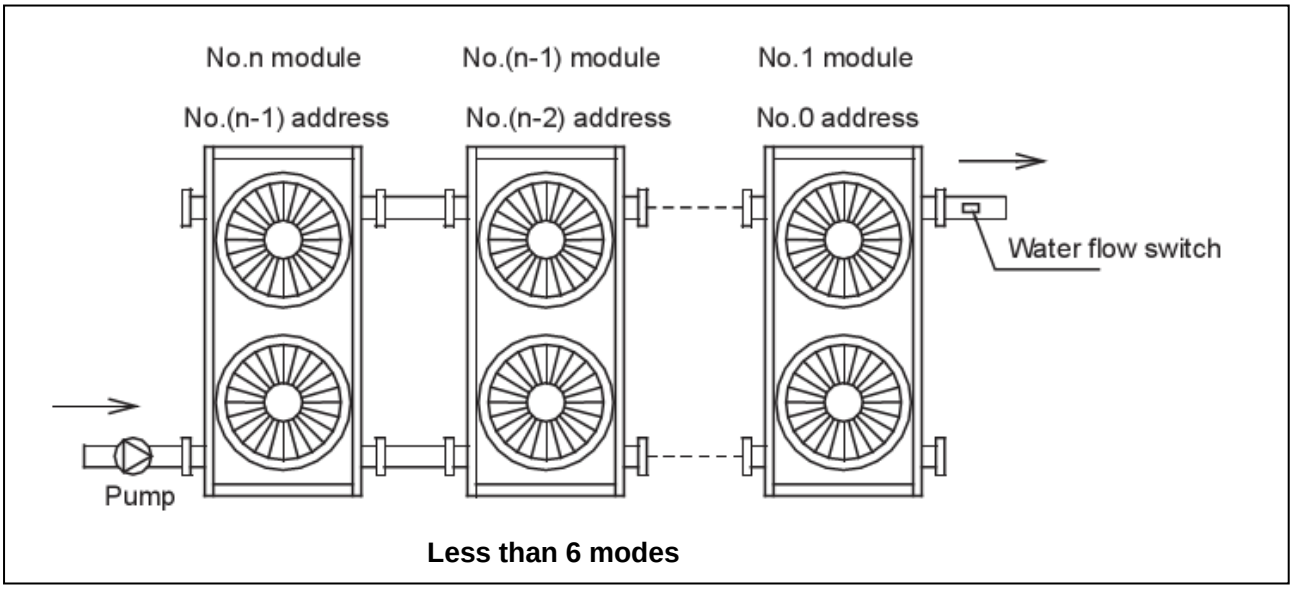
3.2 CAM-H650C-3F

Installation of single-module water system pipeline



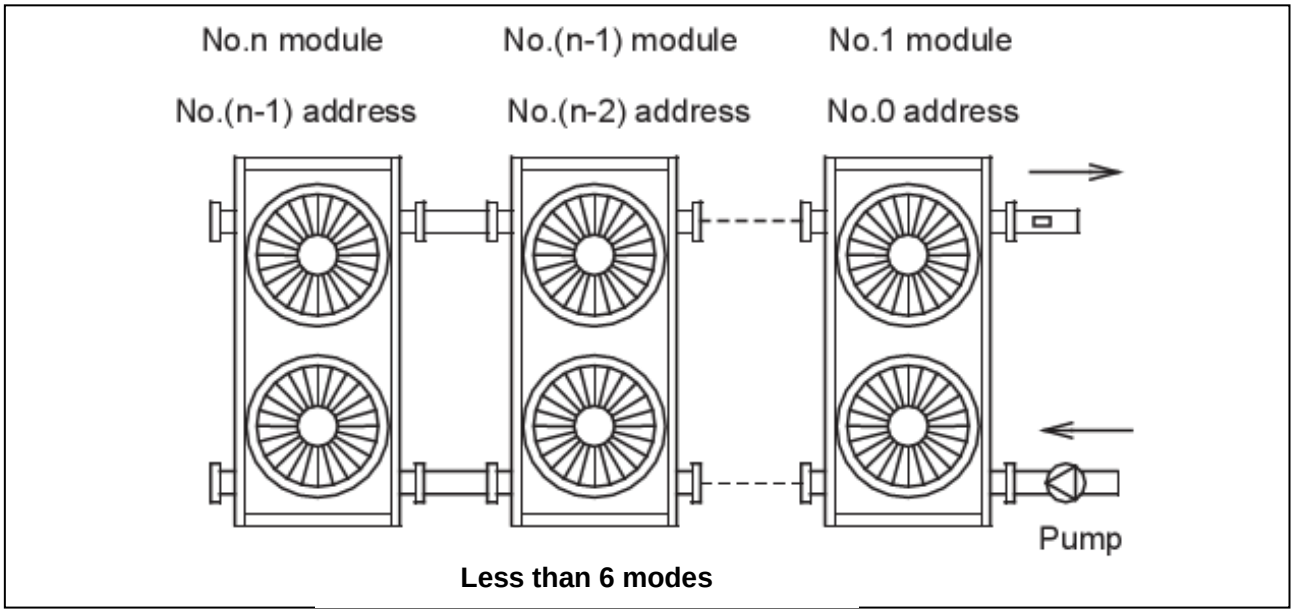
Installation of multi-module water system pipeline

3.2.1 Installation mode I (recommended installation mode)



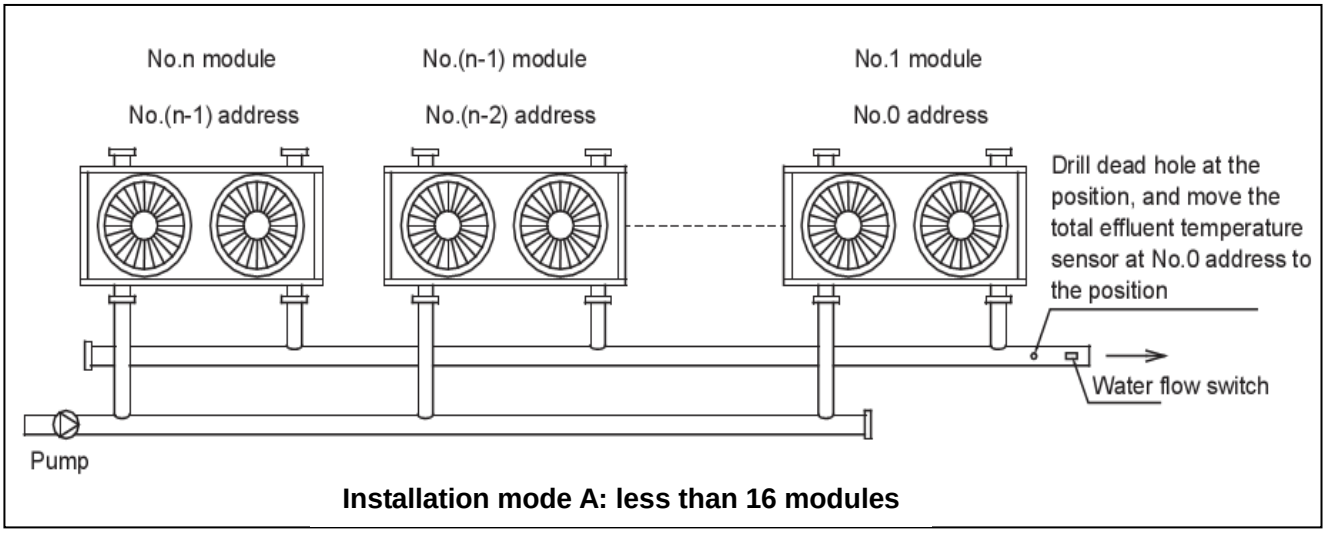
Less than 6 modes

3.2.2 Installation mode II

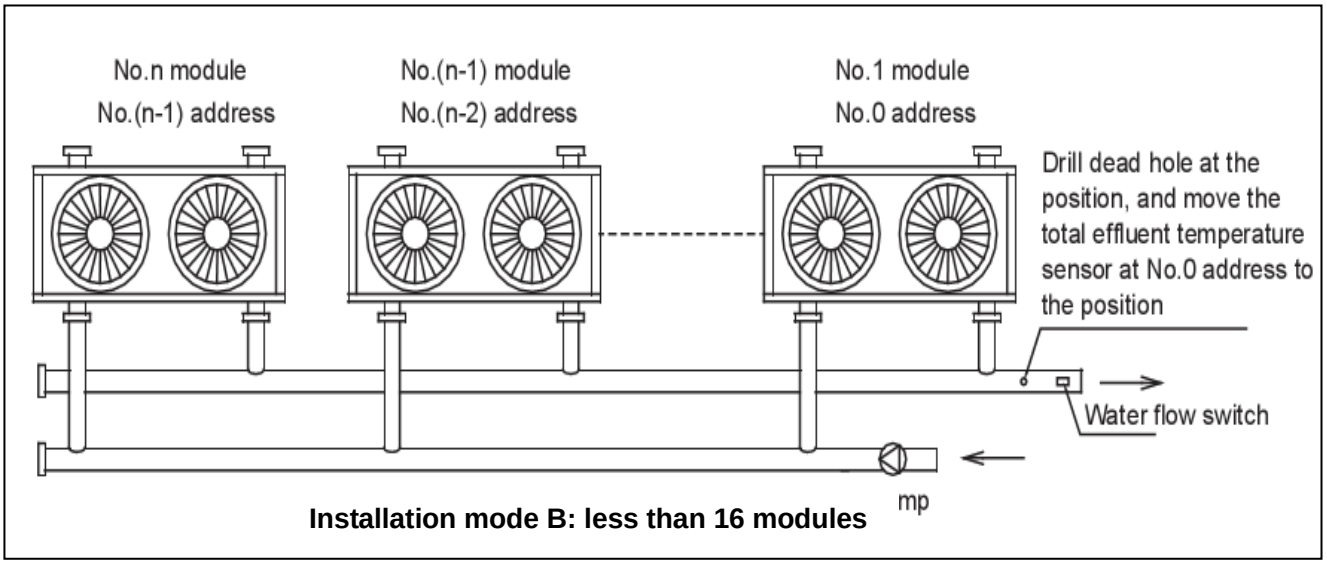


Less than 6 modes

3.2.3 Installation mode III (recommended installation mode)

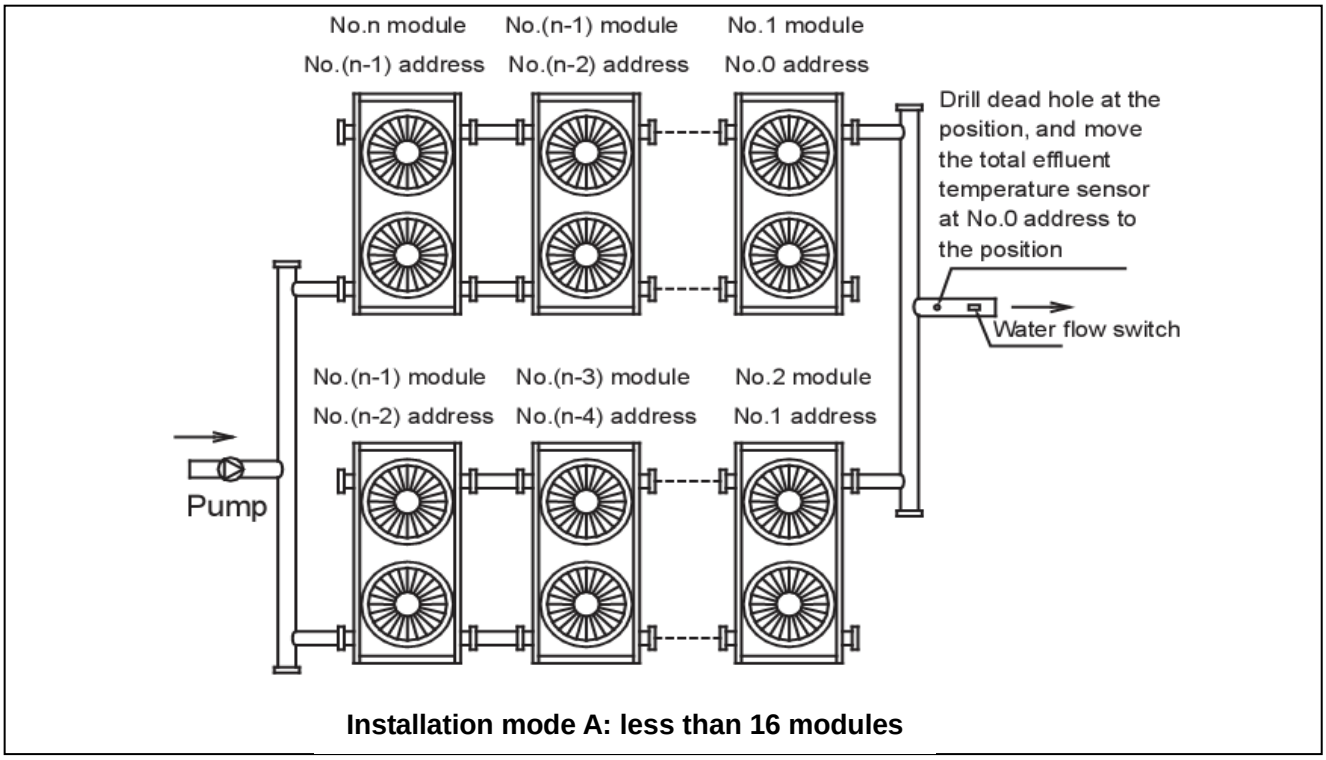


Installation mode A: less than 16 modules

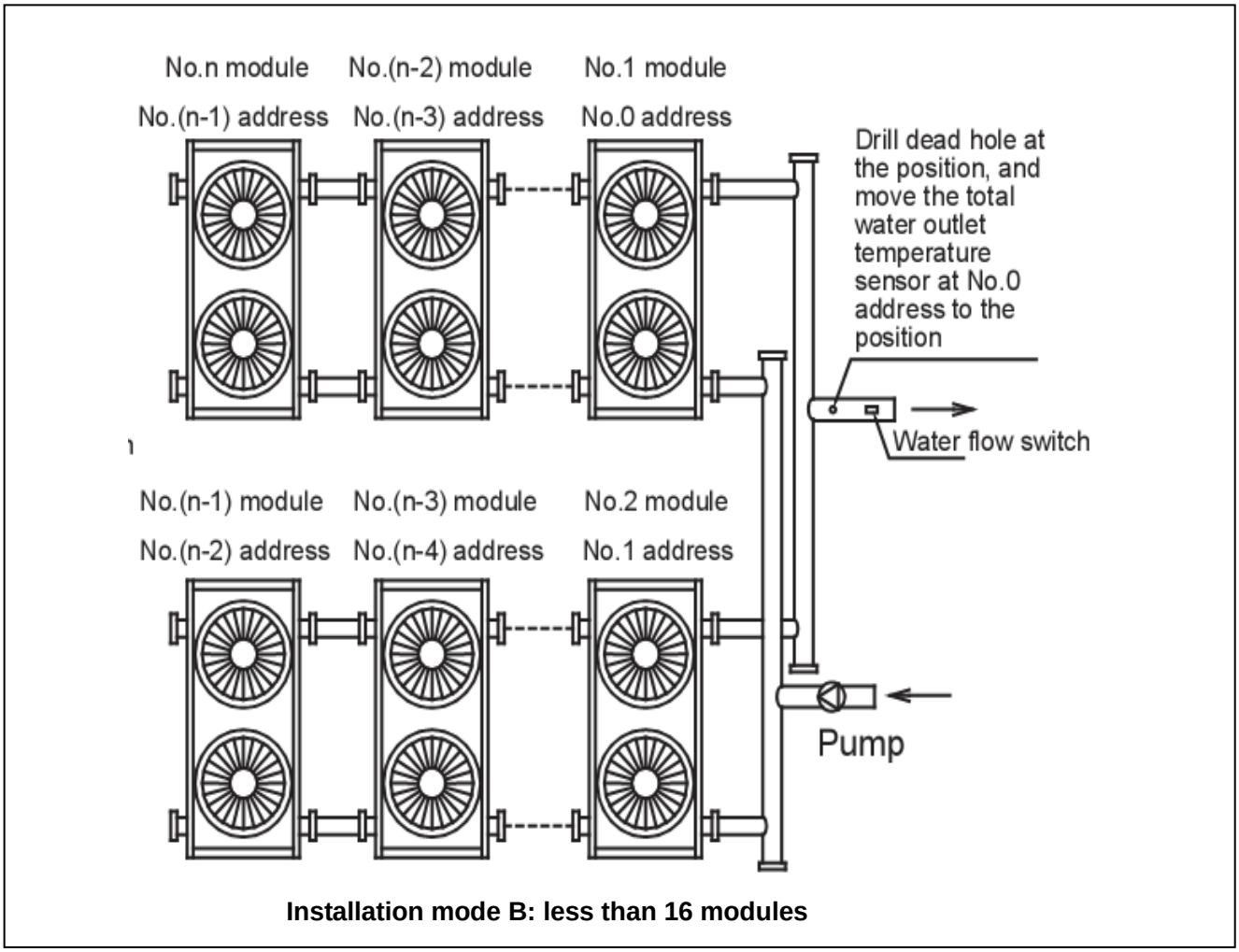


Installation mode B: less than 16 modules

3.2.4 Installation mode IV

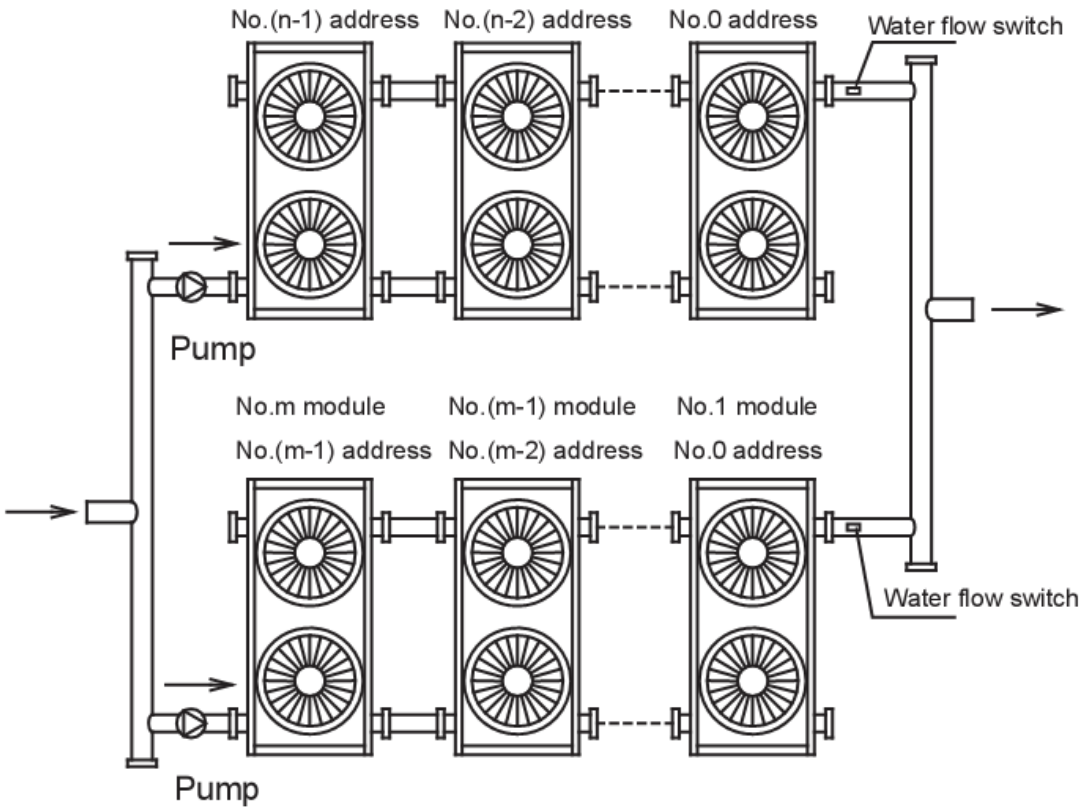


Installation mode A: less than 16 modules

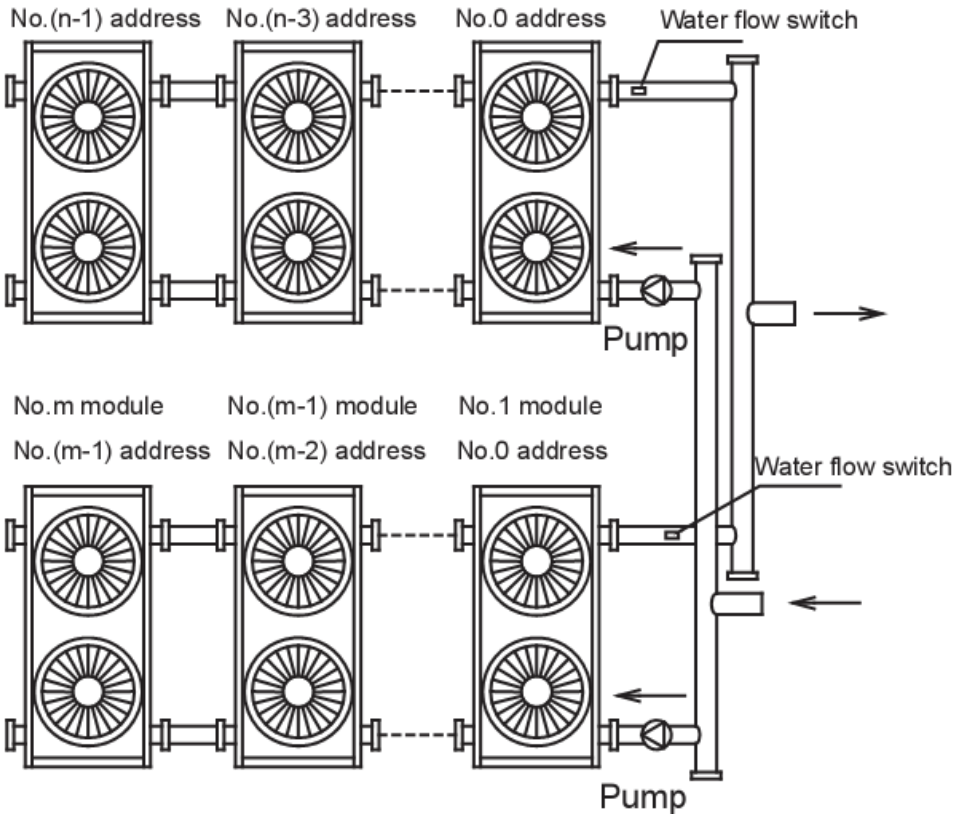


Installation mode B: less than 16 modules

3.2.5 Installation mode V



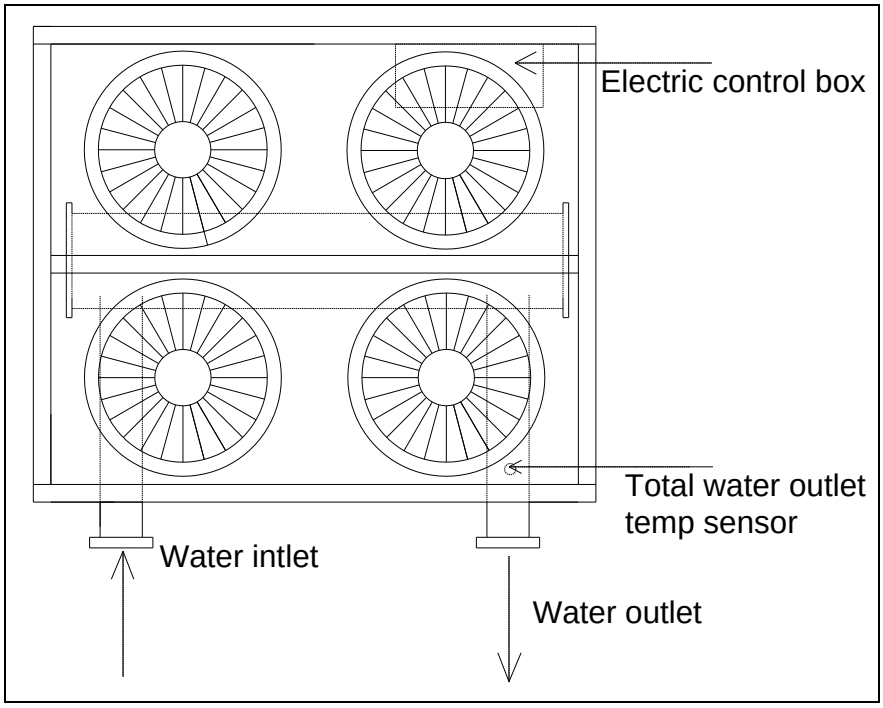
Installation mode A: less than 16 modules



Installation mode B: less than 16 modules

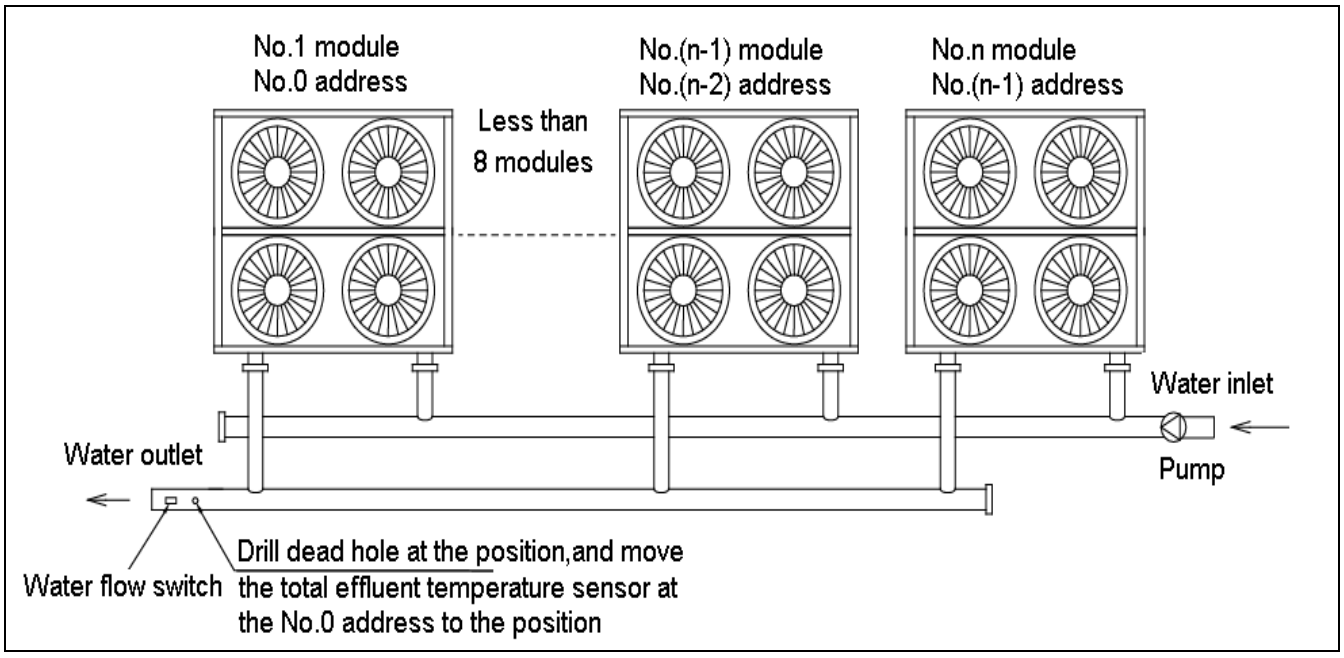
3.3 CAM-H1300C-3F

Installation of single-module water system pipeline

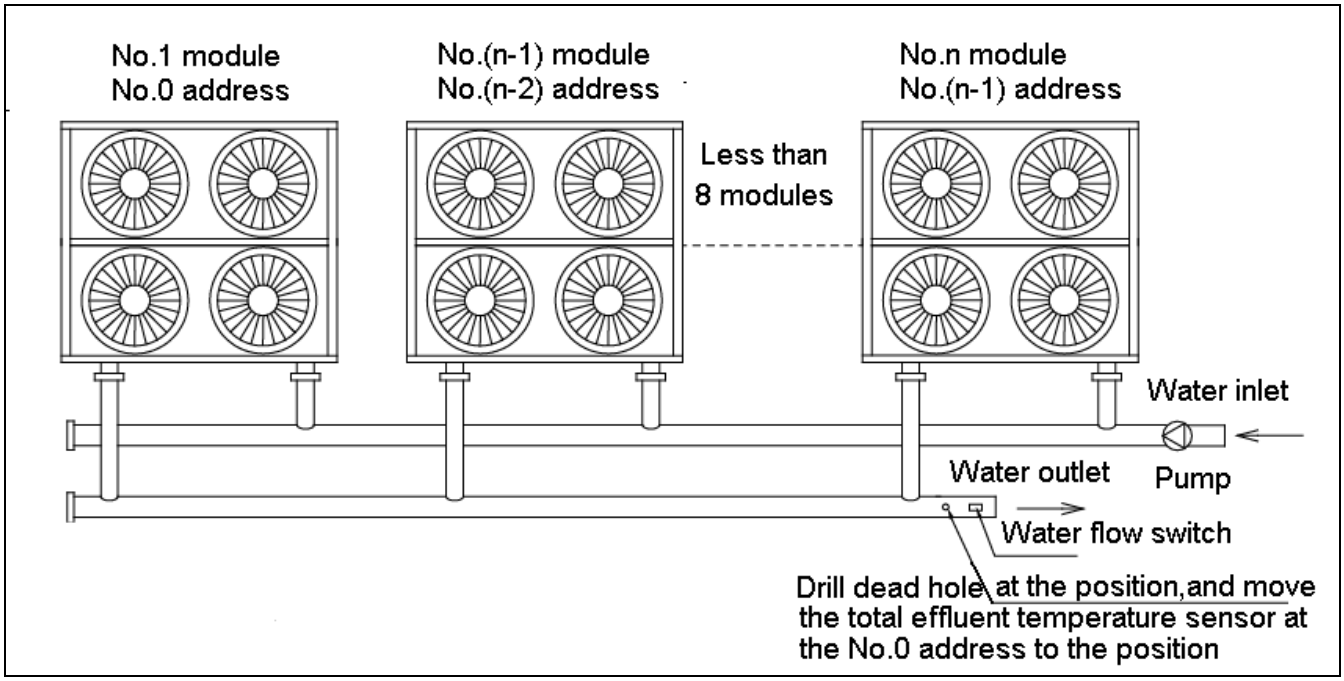


Installation of multi-module water system pipeline

3.3.1 Installation mode I (recommended installation mode)



3.3.2 Installation mode II



Notices :

- For installation of multi-module, the most modules should be not more than 8 modular units.
- For installation of multi-module, please drill a dead hole(Φ9mm) at the total water outlet pipeline, and move the total water effluent temperature sensor at No.0 address to the hole.

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 ≤50m away from the outdoor unit.

4. Wiring Installation

All wiring installation should be done by qualified person.

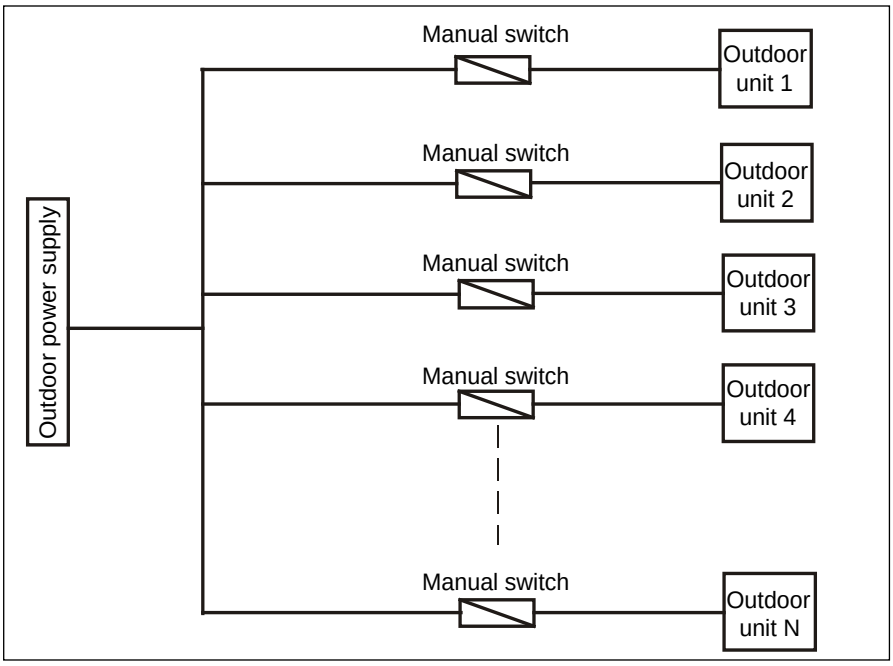
4.1 Precautions:

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

4.2 Requirements of Wiring Connection

- No additional control components are required in the electric cabinet (such as relay, and so on), and the power supply and control wires not connected with the electric cabinet are not allowed to go through the electric box. Otherwise, electromagnetic interference may cause failure of the unit and control components and even damages to them, which thus lead to protective failure.
- All cables led to the electric box should be supported independently but by the electric box.
- The strong current wires generally pass the electric box, and 220-240V alternating current may also pass the control board, so wiring connection should conform to the principle of separation of strong current and weak current, and the wires of power supply should be kept more than 100 mm away from the control wires.
- Only use rated power supply for the unit, and the maximum allowable range of voltage is 380V~415V.
- All electric wires must conform to local wiring connection norm. The suitable cables should be connected to power supply terminal through wiring connection holes at the bottom of the electric cabinet. According to Chinese standard, the user is responsible for providing voltage and current protection for the input power supply of the unit.
- All power supplies connected to the unit must pass one manual switch, to ensure that the voltages on all nodes of electric circuit of the unit are released when the switch is cut off.

- The cables of correct specification must be used to supply power for the unit. The unit should use independent power supply, and the unit is not allowed to use the same power supply together with other electric devices, to avoid over-load danger. The fuse or manual switch of the power supply should be compatible with working voltage and current of the unit. In case of parallel connection of multiple modules, the requirements of wiring connection mode and configuration parameters for the unit are shown in the following figure.
- Some connection ports in the electric box are switch signals, for which the user needs to provide power, and the rated voltage of the power should be 380-415VAC. The user must be aware that all power supplies they provided should be obtained through power circuit breakers (provided by the user), to ensure that all voltages on the nodes of the provided power supply circuit are released when the circuit breakers are cut off.
- All inductive components provided by the user (such as coils of contactor, relay, and so on) must be suppressed with standard resistance-capacitance suppressors, to avoid electromagnetic interference, thus leading to failure of the unit and its controller and even damages to them.
- All weak current wires led to the electric box must apply shielded wires, which must be provided with grounding wires. The shield wires and power supply wires should be laid separately, to avoid electromagnetic interference.
- The unit must be provided with grounding wires, which are not allowed to be connected with the grounding wires of gas fuel pipelines, water pipelines, lightning conductors or telephones. Improper earth connection may cause electric shock, so please check whether earth connection of the unit is firm or not frequently.



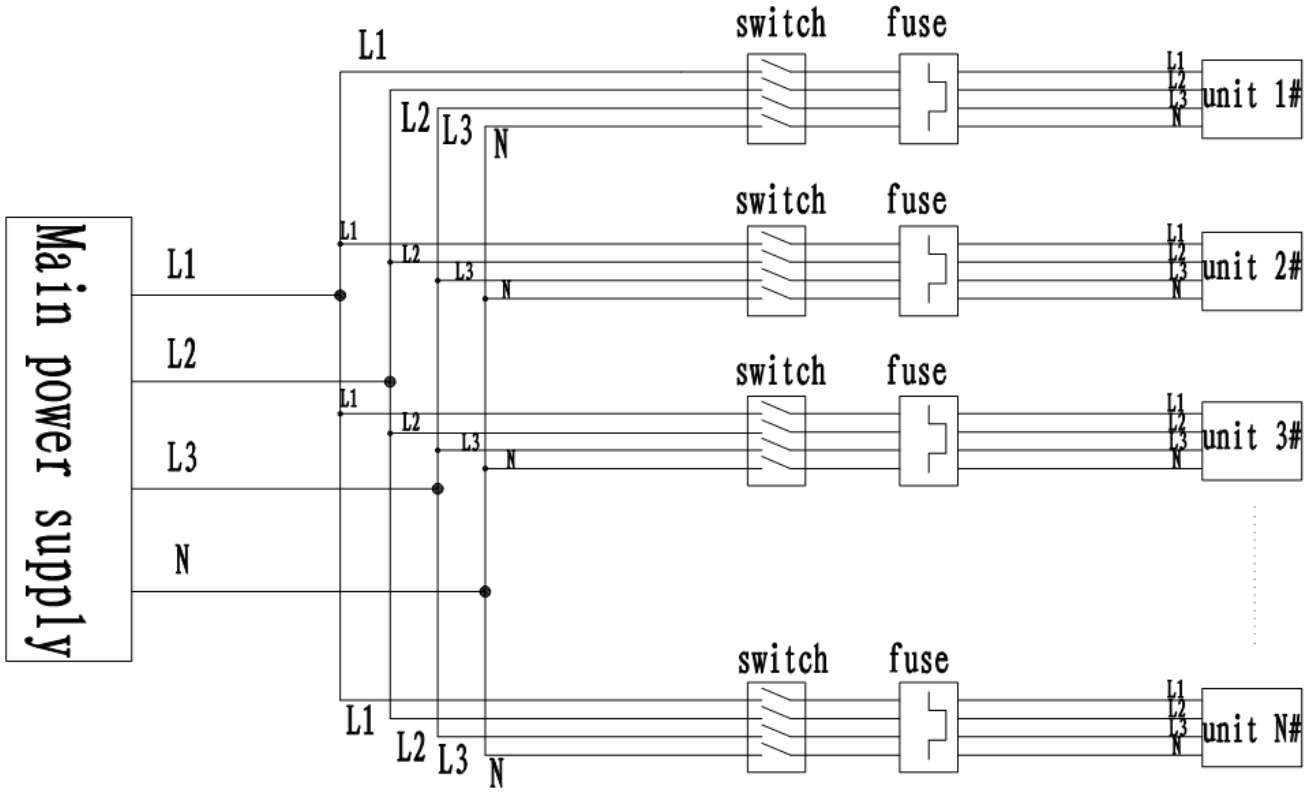
Notes:

- Only 16 modular units can be combined at most.

4.3 Wiring Steps

Step	Content
1	Check the unit and ensure that it is connected with grounding wires correctly, to avoid leakage, and the grounding devices should be mounted in strict accordance with the requirements of electrical engineering rules. The grounding wires can prevent electric shock.
2	The control box of the main power switch must be mounted in a proper position.
3	Wiring connection holes of the main power should be provided with glue cushion.
4	The main power and neutral wires and grounding wires of power supply are led into the electric box of the unit.
5	The wires of the main power must pass the bonding clamp.
6	Wires should be connected firmly to the connection terminals L1, L2, L3 , N.
7	Phase sequences must be consistent when the wires of the main power.
8	The main power should be located out of easy reach of non-professional maintenance personnel, to avoid mal-operation and improve safety.

4.4 Field wiring



5. Trial Operation

5.1 Points for Attention Prior to Trial Run

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, and then make sure that water flow and the pressure at the outlet meet the requirements.

The unit is connected to the main power 12 hours before being started up, to supply power to the heating belt and pre-heat the compressor. Inadequate pre-heating may cause damages to the compressor.

Set up the wired controller. See details of the manual concerning setting contents of the controller, including such basic settings as refrigerating and heating mode, manual adjustment and automatic adjustment mode and pump mode. Under normal circumstances, the parameters are set around standard operating conditions for trial run, and extreme working conditions should be prevented as much as possible.

Carefully adjust the 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 as below Table.

5.2 Check Items Table After Installation

Checking Items	Description	Yes	No
Whether Installing Site Is Meet for Requirement	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 for snow proof measures are meeting for requirement.		
	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.		
	Terminal 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 Electrical Wiring System Is Meeting for Requirement.	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.		

5.3 Trial Operation

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

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.

Trail run and operation data

Temperature The table below contains the measurable temperatures.

Measurement	Value
Inlet water temperature	Standard cooling :7~25ºC Standard heating:30~55 ºC
Outdoor temperature	Standard cooling :10~48ºC Standard heating:-10~24 ºC

Voltage Current The table below contains the measurable voltage.

Measurement	Value
Power supply voltage	Within ±10% of the rated voltage.
Phase imbalance	Within ±2% of the rated voltage.
Control circuit voltage	380V AC for main electromagnetic switches,

Current The table below contains the currents and fuses.

Unit	Maximum current(A)	Fuse
30kW	25.5A	50
65kW	51A	100
130kW	102A	200

Part 4. Maintenance

1. For Maintenance

1.1 Maintenance for main components：

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

1.2 Water quality inspection and dirt remove

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

- Water-side heat exchanger should be done be professionals.
- Clean the pipe and heat exchanger with clean water after cleaning agent is used. Conduct water treatment to prevent water system from being eroded or re-absorption of scale.
- In case of using cleaning agent, adjust the density of the agent, cleaning time and temperature according to the scale settlement condition.
- After pickling is completed, neutralization treatment needs to be done on the waste liquid. Contact relevant company for treating the treated waste liquid.
- Protection 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.

1.3 Winter shutdown

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

1.4 Replacing parts

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

First startup after shutdown

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

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

1.5 Refrigeration system

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

1.5.1 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.

- 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.
- 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.

1.5.2 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.
- Inject refrigerant slowly 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.

1.6 Disassembling compressor

Follow the following procedures if compressor needs to be disassembled:

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

1.7 Auxiliary electric heater

When the ambient temperature is lower than 2℃, the heating efficiency decreases with the decline of the outdoor temperature. In order to make the 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 using auxiliary electric heater. Please refer to relevant professionals for the power of auxiliary electric heater.

1.8 System anti-freezing

In case of freezing at the water-side heat exchanger interval channel, severe damage may be caused, i.e. heat exchange may be broken and appears leakage. This damage of frost crack is not within the warranty scope, so attention must be paid to anti-freezing.

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

1.8.2 Water pipe may be frozen when the chilled water target flow controller and anti-freezing temperature senor become ineffective at running, therefore, the target flow controller must be connected in accordance with the connection diagram.

1.8.3 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 thoghly discharged.

2. Periodical check

Electrical checks

Inspection checks and actions	Remark
Check that all electrical wiring is properly connected and securely tightened.	/
Check the electrical components for damage or loss.	/
Check if the power supply corresponds with the identification label of the unit.	/
Check the operation of the circuit breaker and the earth leak detector of the local supply panel.	/
Check the operation of the safety devices.	No operation can cause damage of the unit.

Refrigerant checks

Inspection checks and actions	Remark
Check the refrigerant system. If the unit leaks, please contact your supplier.	/

Water checks

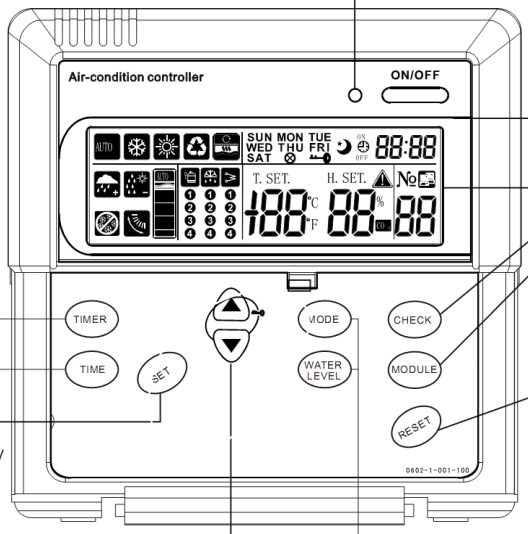
Inspection checks and actions	Remark
Check the water condition. Drain the water from the air release plug. If the water is dirty, please replace all water in the system.	Dirty water causes a cooling capacity drop as well as corrosion of the water heat exchanger and pipe.
Check the water connection.	/
Check the water velocity.	/
Check the function of the flow switch.	The evaporator probably freezes up if the flow switch cannot operate.
Make sure that there is no air mixed in water pipes.	Even if air is removed at the beginning, sometimes air can enter later.
Check the water filter.	If dirty and is stopped.

Noise checks

Inspection checks and actions	Remark
Check for any abnormal noise. Locate the noise producing section and search the cause.	If the cause of the noise cannot be located, contact your supplier.

Part 5. Wired Controller

■ Panel Introduction



● The number 0~7 can be used for password setting , while the number 8 and 9 will be replaced by 0 and 1 separately
● ON/OFF button, RESET button and SET buttons are not set with the corresponding number.

LED: ● Yellow light turns on: Normal standby
● Green light flashes: starting operation (standby →operating)
● Green light turns on: Normal operating
● Red light flashes: stopping operation (operating →standby)
● Red light turns on: serious break-down

ON/OFF button: It will carry on STOP operation if it is pressed during anti-freezing operation.

Display screen

6_ CHECK button: For fault check

7_ MODEL button:
● It is used for module switching on the check interface;
● It is used for switching current setting position on the setting interface;

RESET button:
● The sound will be eliminated by pressing the button when the system gives a fault alarm;
● The fault will be reset by pressing the key for noalarming case.
● The modification can not be saved by pressingit for returning operation

0_ TIME button: For setting the time;

1_ TIMER button: For setting the timing time;

SET button:
● Affirm the modification;
● Enter to the temperature setting interface by pressing it on the main interface;

2_ ADD button:
● For turning to the front page;
● For increasing the parameter value;

3_ SUB button:
● For turning to the next page;
● For reducing the parameter value;

4_ MODE button: It is used for setting unit modes;

5_ WATER LEVEL button: It is used for setting the water level;

1. Long keys and key combination (Press down both keys at the same time)

1) : All keys will be locked/unlocked;

2) SET + RESET : Preheating operation will be cancelled;

3) Press down and hold TIMER for 3s: Timing function will be set;

4) SET + MODULE : The current module will carry on forced-defrost operation ;

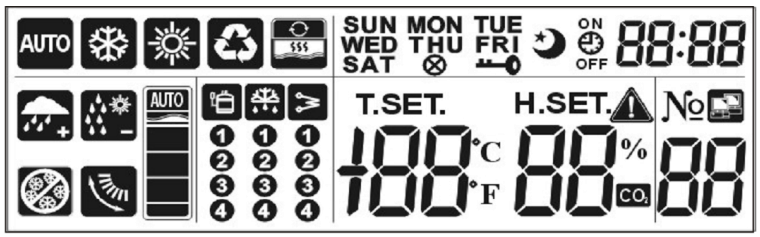
5) Press down and hold SET and CHECK for 3s: The system will enter to the interface for factory setting;

6) SET + CHECK : The system will enter to the interface for maintenance setting;

7) Press down and hold SET for 3s: The system will enter to the interface for project setting;

8) Press down and hold CHECK for 3s: The system will enter to the interface for monitor setting;

2. Display section:



1) Operating modes:

AUTO


COOL


HEAT


FAN


Heat recovery


Hot water

2) Operating states of the unit:


HUMI


DRY


ANTI-FR


FAULT


Module number


SWING

3) Operating states of equipment:


Water level


Wind speed


Indicating the compressor running


Sleeping


Timing


When it turns on, it means defrosting function.

Number
When it turns on, it means that the corresponding compressor is defrosting;
When it flashes, it means the forced-defrost order is received.


When it turns on, it means that the electric heating is operating;
When it flashes, it means the unit is carrying on preheating operation

4) Buttons state:


Buttons locked


Invalid button

Appendix

1. Accessories

Item	Name of accessory	Type	Qty	Shape	Usage
1	Installation and owner's manual	---	1		Installation and using instruction.
3	Wired controller		1		Control the system.

2. Temperature-Resistance Characteristic Sheet

Suiting for pipe temperature sensor，ambient temperature sensor，inlet water temperature sensor and outlet water temperature sensor.

Sensor characteristic sheet **Unit**：Temp:℃, Resistance :KΩ

Temp.	Resistance	Temp.	Resistance	Temp.	Resistance	Temp.	Resistance
-20	106.732	12	18.646	44	4.387	76	1.321
-19	100.552	13	17.743	45	4.213	77	1.276
-18	94.769	14	16.888	46	4.046	78	1.233
-17	89.353	15	16.079	47	3.887	79	1.191
-16	84.278	16	15.313	48	3.735	80	1.151
-15	79.521	17	14.588	49	3.59	81	1.113
-14	75.059	18	13.902	50	3.451	82	1.076
-13	70.873	19	13.251	51	3.318	83	1.041
-12	66.943	20	12.635	52	3.191	84	1.007
-11	63.252	21	12.05	53	3.069	85	0.974
-10	59.784	22	11.496	54	2.952	86	0.942
-9	56.524	23	10.971	55	2.841	87	0.912
-8	53.458	24	10.473	56	2.734	88	0.883
-7	50.575	25	10	57	2.632	89	0.855
-6	47.862	26	9.551	58	2.534	90	0.828
-5	45.308	27	9.125	59	2.44	91	0.802
-4	42.903	28	8.721	60	2.35	92	0.777
-3	40.638	29	8.337	61	2.264	93	0.753
-2	38.504	30	7.972	62	2.181	94	0.73
-1	36.492	31	7.625	63	2.102	95	0.708
0	34.596	32	7.296	64	2.026	96	0.686
1	32.807	33	6.982	65	1.953	97	0.666
2	31.12	34	6.684	66	1.883	98	0.646
3	29.528	35	6.401	67	1.816	99	0.627
4	28.026	36	6.131	68	1.752	100	0.609
5	26.608	37	5.874	69	1.69	101	0.591
6	25.268	38	5.63	70	1.631	102	0.574
7	24.003	39	5.397	71	1.574	103	0.558
8	22.808	40	5.175	72	1.519	104	0.542
9	21.678	41	4.964	73	1.466	105	0.527
10	20.61	42	4.763	74	1.416		
11	19.601	43	4.571	75	1.367		