AUX
Stable Solutions

Technical & Service Manual

R32 Split

Air to Water Heat Pump

Capacity	ODU models	Hydraulic box models
4kw	ACHP-H04/4R3HA-O	ACHP-H04/4R3HA-I
6kw	ACHP-H06/4R3HA-O	ACHP-H06/4R3HA-I
8kw	ACHP-H08/4R3HA-O	ACHP-H08/5R3HA-I
10kw	ACHP-H10/4R3HA-O	ACHP-H10/5R3HA-I
12kw	ACHP-H12/5R3HA-O	ACHP-H12/5R3HA-I
14kw	ACHP-H14/5R3HA-O	ACHP-H14/5R3HA-I
16kw	ACHP-H16/5R3HA-O	ACHP-H16/5R3HA-I

Version 5

2023-02-10

Contents

Part1 General information

1. Nomenclature

Outdoor Unit

1	2	3	4		5	6	7		8	9	10	11	12		13
A	C	H	P	-	H	0	4	/	4	R	3	H	A	-	O

NOTE:

1、A: AUX

2、C:chiller

3、H: heat

4、P: pump

5、H: cooling and heating

6-7、capacity：04:4kW; 06:6kW; 08:8kW; 10:10kW; 12:12kW; 14:14kW; 16:16kW;

8、power supply：4：220V-240V-1N~50Hz；5：380V-415V-3N~50Hz

9-10、R3：R32

11、H：high efficiency

12、A：design number

13、O：outdoor unit
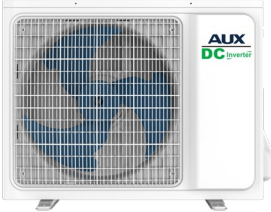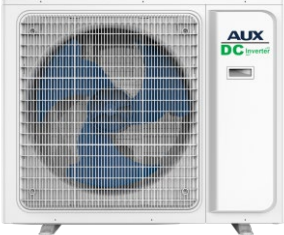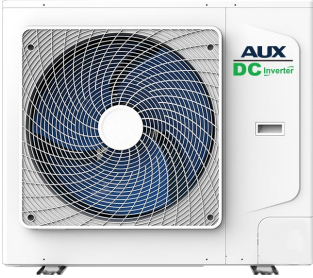
hydraulic box

1	2	3	4		5	6	7		8	9	10	11	12		13
A	C	H	P	-	H	0	4	/	4	R	3	H	A	-	O

NOTE:

1、A: AUX

2、C: :chiller

3、H: heat

4、P: pump

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8、power supply：4：220V-240V-1N~50Hz；5：380V-415V-3N~50Hz

9-10、R3：R32

11、H：high efficiency

12、A：design number

13、I：indoor unit

2. Unit appearance

Capacity	Outdoor unit		Hydraulic box	
	Model	Appearance	Model	Appearance
4kW	ACHP-H04/4R3HA-O		ACHP-H04/4R3HA-I	
6kW	ACHP-H06/4R3HA-O		ACHP-H06/4R3HA-I	
8kW	ACHP-H08/4R3HA-O		ACHP-H08/5R3HA-I	
10kW	ACHP-H10/4R3HA-O		ACHP-H10/5R3HA-I	
12kW	ACHP-H12/5R3HA-O		ACHP-H12/5R3HA-I	
14kW	ACHP-H14/5R3HA-O		ACHP-H14/5R3HA-I	
16kW	ACHP-H16/5R3HA-O		ACHP-H16/5R3HA-I	

3. Product line

Capacity	Outdoor unit models	Hydraulic box models	Power supply(V)
4KW	ACHP-H04/4R3HA-O	ACHP-H04/4R3HA-I	220V-240V-1N~50Hz
6KW	ACHP-H06/4R3HA-O	ACHP-H06/4R3HA-I	
8KW	ACHP-H08/4R3HA-O	ACHP-H08/5R3HA-I	ODU: 220V-240V-1N~50Hz IDU : 380V-415V-3N~50Hz
10KW	ACHP-H10/4R3HA-O	ACHP-H10/5R3HA-I	
12KW	ACHP-H12/5R3HA-O	ACHP-H12/5R3HA-I	380V-415V-3N~50Hz
14KW	ACHP-H14/5R3HA-O	ACHP-H14/5R3HA-I	
16KW	ACHP-H16/5R3HA-O	ACHP-H16/5R3HA-I	

4. Selection and System Design

4.1 Selection procedure

Step 1 Total heat load calculation

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

Step 2 System configuration

Decide whether to include AHS (auxiliary heat source) and set AHS switching temperature Decide whether backup electric heater is enabled or disabled

Step3Selection of outdoor units

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

Provisionally select A-Thermal Split unit capacity based on nominal capacity

Correct capacity of the outdoor units for the following items: Outdoor air temperature / Outdoor humidity / Water outlet temperature1 / Altitude / Antifreeze fluid

Is corrected A-Thermal Split unit capacity Required total heat load on outdoor units

Yes

NO

System selection s complete

Select a larger model or enable backup electric heater operation

Notes:

1. If the required water temperatures of the heat emitters are not all the same, the A-Thermal Splits outlet water temperature setting should be set at the highest of the heat emitter required water temperatures. If the water outlet design temperature falls between two temperatures listed in the outdoor unit's capacity table, calculate the corrected capacity by interpolation.

2. If the outdoor unit selection is to be based on total heating load and total cooling load, select Split units which satisfy not only the total heating load requirements but also the total cooling load requirements.

4.2 Leaving Water Temperature (LWT) Selection

The recommended design LWT ranges for different types of heat emitter are

➢ For floor heating: 30 to 35℃

➢ For fan coil units: 30 to 45℃

➢ For radiators: 40 to 50℃

The recommended design LWT ranges for different type of cooling emitter are

➢ For fan coil units: 7 to 18℃

➢ For floor cooling: 18 to 25℃

The recommended design water tank temperature for domestic hot water

➢ Water tank: 50 to 55℃

4.3 Selection of water tank(Procured locally by customers

Capacity(kW)	4-6kW	8-10kW	12~16kW
Water Tank Volume (L)	100~250	150~300	200~500
Minimum heat exchange area of Stainless steel coil (m^2)	1.4	1.4	1.6
Minimum heat exchange area of enamel coil (m^2)	2.0	2.0	2.5

4.4 Selection of water pump(Procured locally by customers)

Type	Recommended Brand	Recommended model
External circulation pump	grundfos	UPMM25-95
	wilo	Para25/9
Floor heating mixing water pump	grundfos	UPMM25-95
	wilo	Para25/9
DHW water pump	wilo	RS15/6
solar water pump	wilo	Para25/8

4.5 Optimizing System Design

To get the most comfort with the lowest energy consumption with A-Thermal, it is important to take account of the

following considerations:

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

➢ Make sure the correct weather dependency curve is selected to match the installation environment (building structure, climate) as well as users demands.

➢ Connecting room thermostats (field supplied) to the hydraulic system helps prevent excessive space heating by stopping the outdoor unit and circulating pump when the room temperature is above the thermostat set point

Part2 Features

1. Heating + Cooling +Domestic hot water

2. DC INVERTER Technology, High Energy Efficient

Full DC INVERTER system, INVERTER compressor + DC external fan + INVERTER water pump. Leading in the energy efficiency industry, the highest SCOP=5.2(A+++), far exceeding the EU energy efficiency standard by 14.4%

3. Wide ambient temperature and water temperature operation ranges

4. Floating water temperature control more comfort

Changes in outdoor air temperature, changes in heat required indoors, But fix water temperature, provide constant heat, overheating, waste

5. Long piping length

Maximum piping length for outdoor unit and hydraulic box -- 30m, see amend table below

Minimum piping length for outdoor unit and hydraulic box -- 3m

Maximum piping height difference for outdoor unit and hydraulic box -- 20m

When the water tank is connected,

Maximum length between the 3-way valve and hydraulic box -- 3m

Maximum length between the water tank and hydraulic box -- 10m

single connection pipe(m)			amend factor					
			5	10	15	20	25	30
height difference between the hydraulic box and ODU	hydraulic box above the ODU	0m	1	0.98	0.96	0.94	0.92	0.9
		5m	-	0.97	0.95	0.93	0.91	0.89
		10m	-	-	0.94	0.92	0.9	0.88
		15m	-	-	-	0.91	0.89	0.87
		20m	-	-	-	-	0.88	0.86
	hydraulic box under the ODU	0m	1	0.98	0.96	0.94	0.92	0.9
		5m	-	0.98	0.96	0.94	0.92	0.9
		10m	-	-	0.96	0.94	0.92	0.9
		15m	-	-	-	0.94	0.92	0.9
		20m	-	-	-	-	0.92	0.9

Note:

1).When the single pipe length of the connecting pipe exceeds 30m, it may affect the performance of the unit.so It is not recommended that the single pipe length exceeds 30m.

6. Backup electric heating

7. Sterilization function

8. User interface

New type touch key wired controller; Real-time check of operating parameters

Built-in temperature sensor; Built-in WIFI module; Multiple languages

MODBUS protocol and network flexibility, etc.

Note：for more information，please refer to the product introduction PPT

Part3 Piping System

1. Piping diagram

1.1 Outdoor Unit
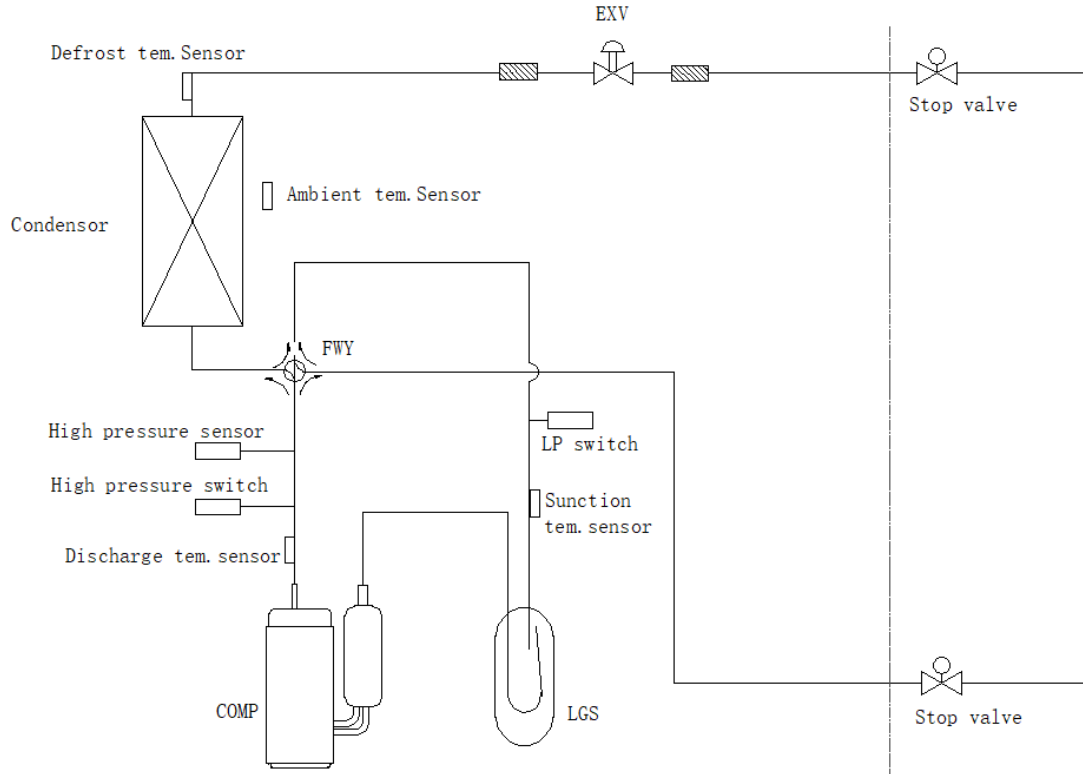
1.2 Hydraulic box
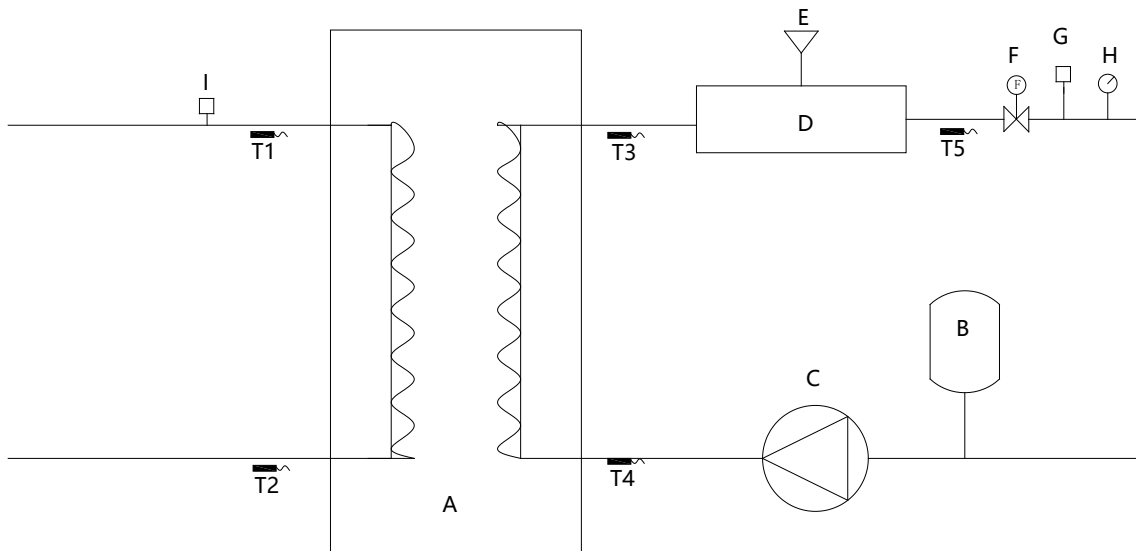
A	Plate heat exchanger(PHE)	H	Pressure gauge
B	Expansion tank	T1	Gas pipe Temp.sensor
C	Inverter water pump	T2	Liquid pipe Temp.sensor
D	E-heater	T3	PHE outlet Temp.sensor
E	Discharge valve	T4	PHE inlet Temp.sensor
F	Flow switch	T5	Hydronic box outlet Temp.sensor
G	Safty valve	I	Anti-freeze pressure switch

1.3 A-Thermal system
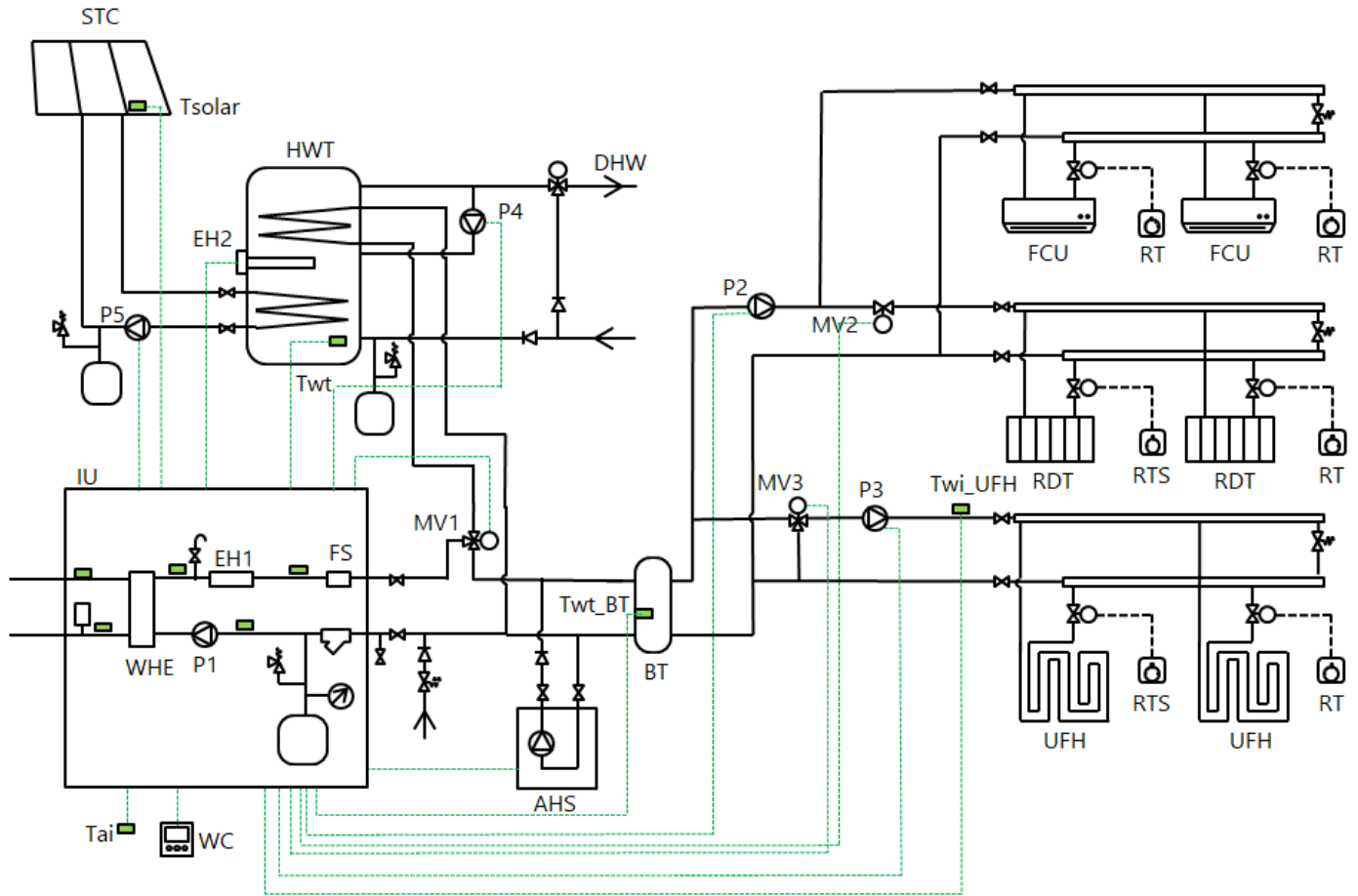
Tsolar	Solar panel temperature	**FS**	Flow switch
Twt	Domestic hot water tank temperature(DHW)	**WC**	Wired controller
Tai	Indoor temperature	**IU**	Indoor unit
Twt_BT	Buffer tank temperature	**WHE**	Plate heat exchanger
Twi_UFH	Under floor heating inlet water temperature	**HWT**	DHW tank
P1	Internal water pump	**STC**	Solar panel
P2	External water pump	**AHS**	Gas boil
P3	Under floor heating mix pump	**BT**	Buffer tank
P4	DHW pump	**UFH**	Under floor heating
P5	Solar panel pump	**RDT**	Radiator
MV1	Three way valve for air conditioner and DHW	**FCU**	Fan coil
MV2	Two way valve for radiator and FCU	**RT**	Thermostat
MV3	Under floor heating mix valve		
EH1	Internal electric heater		
EH2	DHW tank electric heater		

R32 Split Type Air Source heat pump unit is an integrated air to water system which can supply heating, cooling and domestic hot water. The outdoor heat pump system extracts heat from the outdoor air and transfers this heat through refrigerant piping to the plate heater exchange in the hydraulic box. The heated water in the hydraulic box circulates to low temperature heat emitters (underfloor heating loops or low temperature radiators) to provide heating, and to the domestic hot water tank to provide domestic hot water. The 4way valve in the outdoor unit can reverse the refrigerant cycle so that the hydraulic box can provide chilled water for cooling using fan coil units

The heating capacity decreases under low ambient temperature. Backup electric heater is optional to provide additional heating capacity for user during extremely cold weather when the heat pump capacity is

insufficient.

2. System Configurations

R32 Split Type Air Source heat pump unit can be configured to run with the electric heater either enabled or disabled and can also be used in conjunction with an auxiliary heat source such as a boiler.

The chosen configuration affects the size of heat pump that is required. Three typical configurations are described below.

Configuration 1: Heat pump only

➢ The heat pump covers the required capacity and no extra heating capacity is necessary.

➢ Requires selection of larger capacity heat pump and implies higher initial investment.

➢ Ideal for new construction in projects where energy efficiency is paramount

Configuration 2: Heat pump and backup electric heater

➢ Heat pump covers the required capacity until the ambient temperature drops below the point at which the heat pump is able to provide sufficient capacity. When the ambient temperature is below this equilibrium point, the backup electric heater supplies the required additional heating capacity

➢ Best balance between initial investment and running costs, results in lowest life cycle cost

➢ Ideal for new construction.

Configuration 3:Heat pump conjunction with auxiliary heat source

➢ Heat pump covers the required capacity until the ambient temperature drops below the point at which the heat pump is able to provide sufficient capacity. When the ambient temperature is below this equilibrium point, depending on the system settings, either the auxiliary heat source supplies the required additional heating capacity or the heat pump does not run and the auxiliary heat source covers the required capacity.

➢ Enables selection of lower capacity heat pump.

➢ Ideal for refurbishments and upgrades.

System configurations
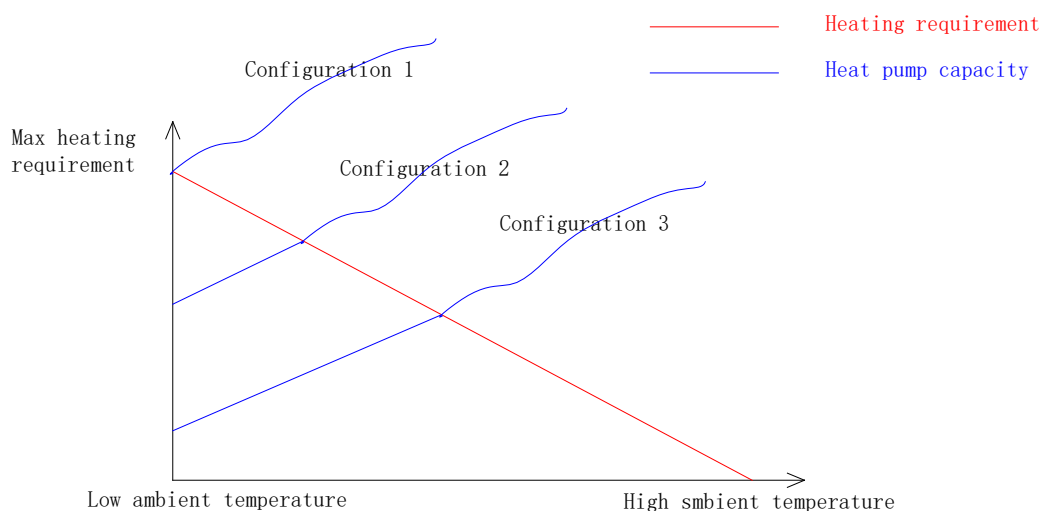
3. Typical Applications

3.1 Space Heating Only

The room thermostat is used as a switch. When there is a heating request from the room thermostat, the unit operates to achieve the target water temperature set on the Wired controller. When the room temperature reaches the thermostats set temperature, the unit stops.

When the heating terminal uses floor heating and Heating radiator at the same time, the two ends of the floor heating and low temperature radiator require different working water temperatures. In order to meet these two different working water temperatures at the same time, it is necessary to install a mixing valve and a mixing water pump at the inlet and outlet of the floor heating , The outlet water temperature of the unit is set to the water temperature required by the heating radiator, and the water mixing valve and water mixing pump are set to reduce the inlet water temperature of the floor heating.
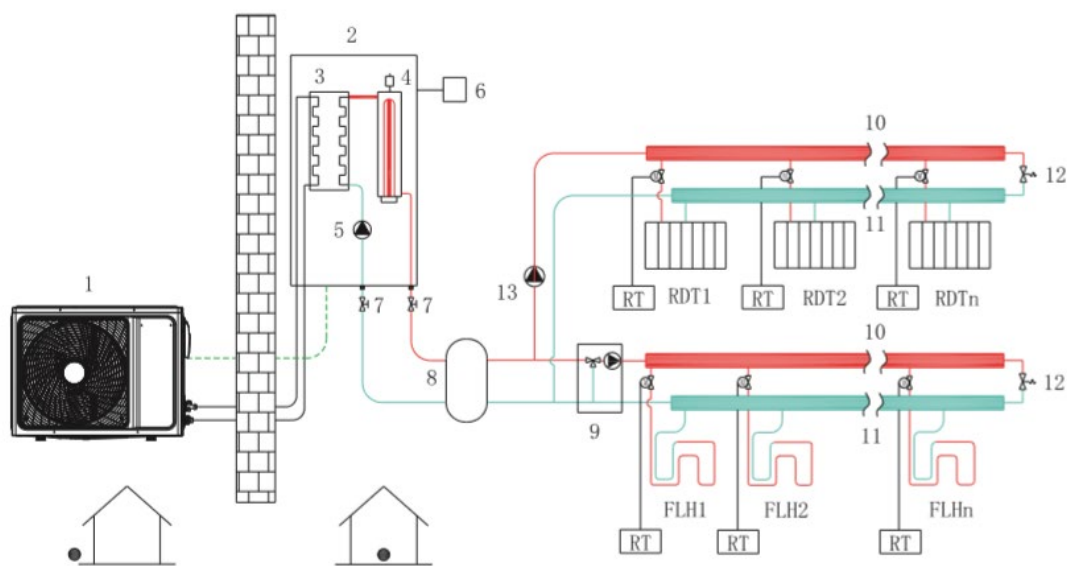
REMARK			
1	Outdoor unit	9	Mixing valve and mixing water pump
2	hydraulic box	10	Distributor
3	Plate heater exchange	11	Distributor
4	Backup electric heater(optional)	12	Bypass valve
5	Internal circulating pump	13	External circulation pump
6	Wired controller	RDT	Heating radiator
7	Stop valve (local)	FLH	Floor heating loops
8	Buffer tank	RT	Room thermostats

3.2 Space Heating and Domestic Hot Water

The room thermostats also can connect to a motorized valve. Each rooms temperature is regulated by the motorized valve on its water circuit. Domestic hot water is supplied from the domestic hot water tank connected to the hydraulic box. The water tank should built in a temperature sensor which connect to the hydraulic box. A bypass valve is required.
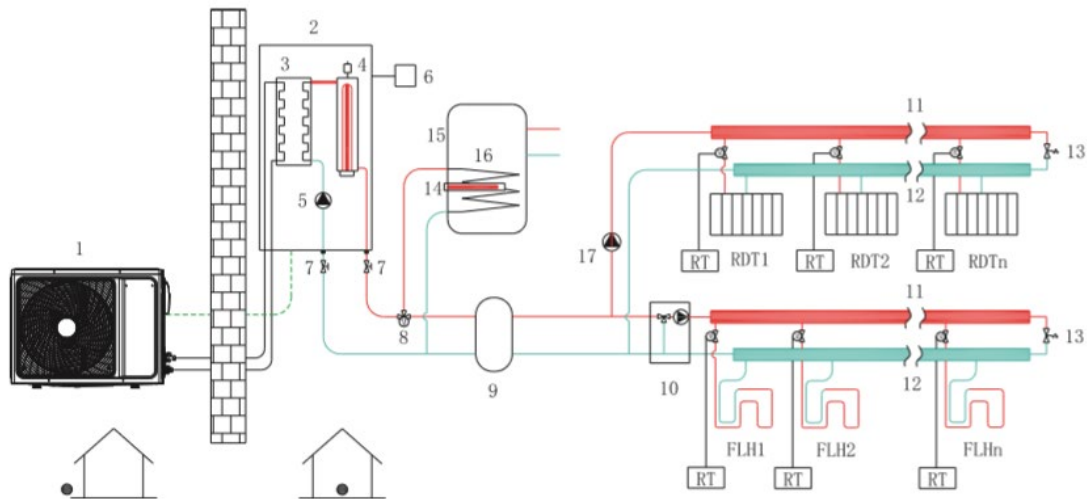
REMARK			
1	Outdoor unit	11	Distributor
2	hydraulic box	12	Distributor
3	Plate heater exchange	13	Bypass valve
4	Backup electric heater	14	Electric heating
5	Internal circulating pump	15	Domestic hot water tank
6	Wired controller	16	Coil in the water tank
7	Stop valve (field supplied)	17	External circulation pump
8	Motorized 3way valve	RDT	Heating Radiator
9	Buffer tank	FLH	Floor heating loops
10	Mixing valve and mixing water pump	RT	Room thermostats

3.3 Space Heating, Space Cooling and Domestic Hot Water

Floor heating loops & Heating radiator & Fan coil units are used for space heating , fan coil units are used for space cooling. Domestic hot water is supplied from the domestic hot water tank connected to the hydraulic box. The unit switches to heating or cooling mode according to the temperature detected by the room thermostat. In space cooling mode, the 2way valve is closed to prevent cold water entering the floor heating loops & Heating radiator.
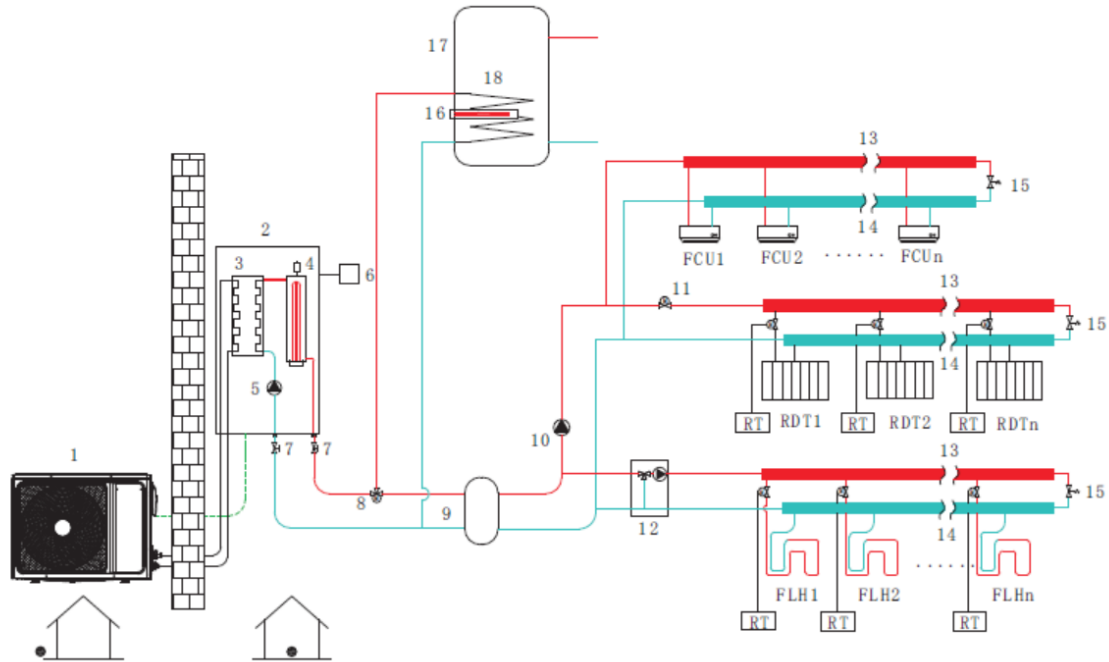
REMARK			
1	Outdoor unit	12	Mixing valve and mixing water pump
2	hydraulic box	13	Distributor
3	Plate heater exchange	14	Distributor
4	Backup electric heater(optional)	15	Bypass valve
5	Internal circulating pump	16	Electric heating
6	Wired controller	17	Domestic hot water tank
7	Stop valve	18	Coil in the water tank
8	Motorized 3way valve	RDT	Heating Radiator
9	Buffer tank	FLH	Floor heating loops
10	External circulation pump	FCU	Fan coil units
11	Two way valve	RT	Room thermostats

3.4 Space Heating and Space Cooling

Floor heating loops & Heating radiator & fan coil units are used for space heating , fan coil units are used for space cooling. In space cooling mode, the 2way valve is closed to prevent cold water entering the floor heating loops & Heating radiator.
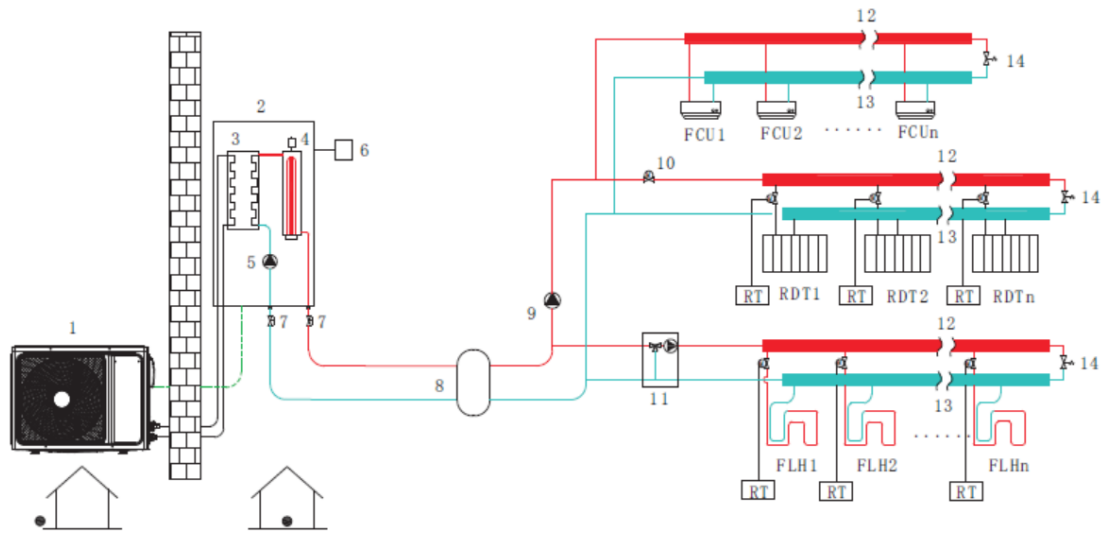
Remark			
1	Outdoor unit	10	Two way valve
2	hydraulic box	11	Mixing valve and mixing water pump
3	Plate heater exchange	12	Distributor
4	Backup electric heater(optional)	13	Distributor
5	Internal circulating pump	14	Bypass valve
6	Wired controller	RDT	Radiator
7	Stop valve	FLH1n	Floor heating loops
8	Buffer tank	FCU	Fan coil units
9	External circulation pump	RT	Room thermostats

3.5 Auxiliary heat source provides space heating only

Users can also use only gas water heaters for heating
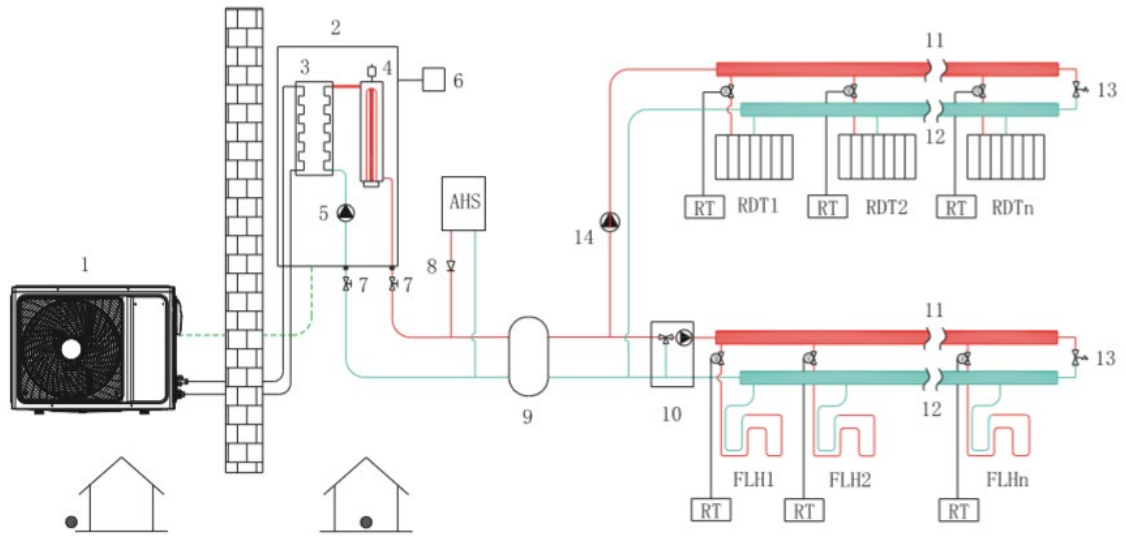
REMARK			
1	Outdoor unit	10	Mixing valve and mixing water pump
2	hydraulic box	11	Distributor
3	Plate heater exchange	12	Distributor
4	Backup electric heater(optional)	13	Bypass valve
5	Internal circulating pump	14	External circulation pump
6	Wired controller	RDT	Heating Radiator
7	Stop valve	FLH	Floor heating loops
8	One way valve	AHS	Auxiliary heating source
9	Buffer tank	RT	Room thermostats

3.6 Space Heating Through Floor Heating Loops and Fan Coil Units

The floor heating loops and fan coil units require different operating water temperatures. To achieve these two set points, a mixing station is required. Room thermostats for each zone are optional.

The outlet water temperature of the unit is set to the water temperature required by the fan coil unit, and the mixing valve and mixing pump are set to reduce the inlet water temperature of the floor heating

Figure 3.6: Space heating through floor heating loops and fan coil units
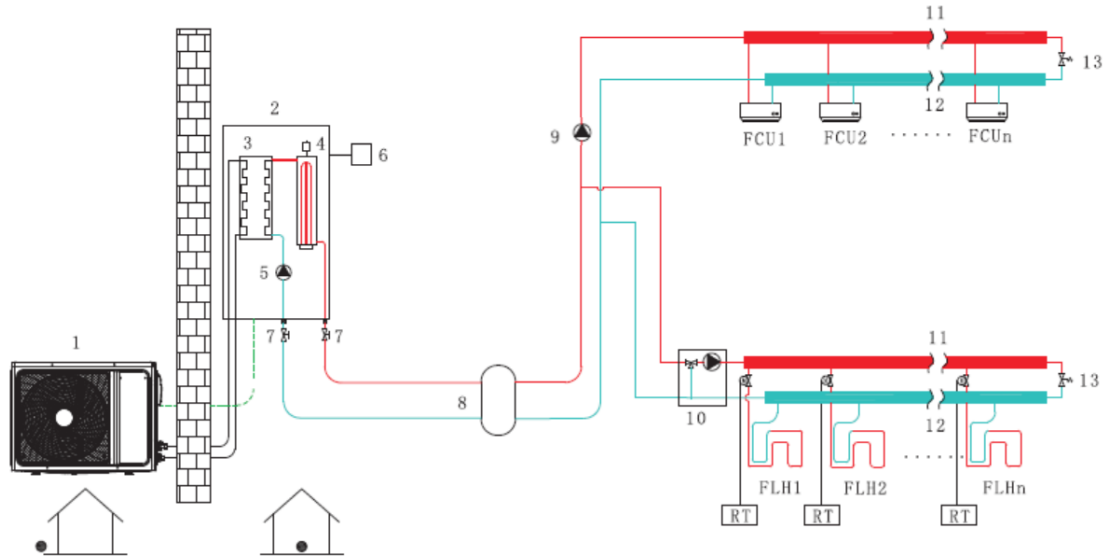
REMARK			
1	Outdoor unit	9	External circulation pump
2	hydraulic box	10	Mixing valve and mixing water pump
3	Plate heater exchange	11	Distributor
4	Backup electric heater(optional)	12	Distributor
5	Internal circulating pump	13	Bypass valve
6	Wired controller	FCU	Fan coil units
7	Stop valve	FLH	Floor heating loops
8	Buffer tank	RT	Room thermostats

3.7 Space Heating, Space Cooling and Domestic Hot Water Compatible with Solar Water Heater

Floor heating loops & Heating Radiator &fan coil units are used for space heating, and fan coil units are used for space cooling. The temperature in the domestic hot water tank is controlled by the hydraulic box. A temperature sensor needs to be placed in the domestic hot water tank and connected to the hydraulic box. When it is detected that the temperature of the domestic hot water tank is lower than the set temperature and meets the requirements for solar hot water activation When conditions are met, turn on the solar water pump to realize the solar hot water function.

Figure 3.7 Space heating, space cooling and domestic hot water compatible with solar water heater
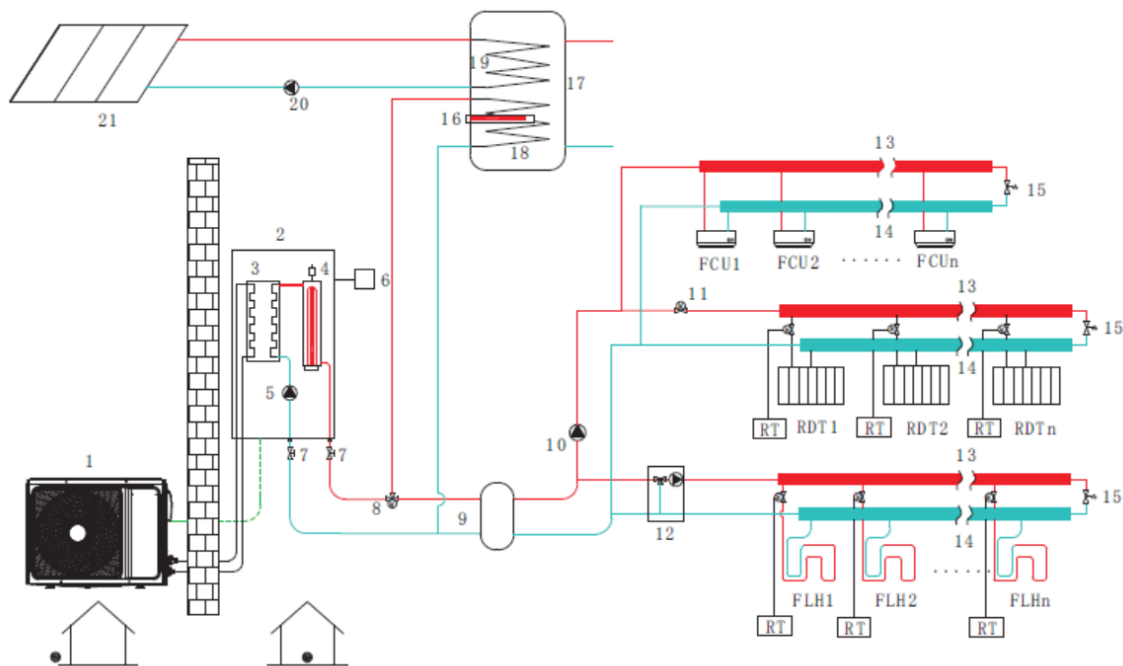
REMARK			
1	Outdoor unit	14	Distributor
2	hydraulic box	15	Bypass valve
3	Plate heater exchange	16	Electric heating
4	Backup electric heater(optional)	17	Domestic hot water tank
5	Internal circulating pump	18	Coil 1 in the water tank
6	Wired controller	19	Coil 2 in the water tank
7	Stop valve	20	solar water pump
8	Motorized 3way valve	21	Solar panel
9	Buffer tank	RDT	Heating Radiator
10	External circulation pump	FLH	Floor heating loops
11	Two way valve	FCU	Fan coil units
12	Mixing valve and mixing water pump	RT	Room thermostats
13	Distributor		

3.8 Space Heating with heat pump and AHS, space cooling with heat pump and solar for hot water

When the heating insufficient, the gas boiler (AHS) is used as an additional heat source, and floor heating or fan coils or low temperature radiators are used for space heating (also can be used in combination with various types of terminals), The fan coil is used for space cooling. The temperature in the domestic hot water tank is controlled by the hydraulic box. A temperature sensor needs to be placed in the domestic hot water tank and connected to the hydraulic box. When it is detected that the temperature of the domestic hot water tank is lower than the set temperature and meets the requirements for solar hot water activation When conditions are met, turn on the solar water pump to realize the solar hot water function.

Figure 3.8 Space Heating with heat pump and AHS, space cooling with heat pump and solar for hot water
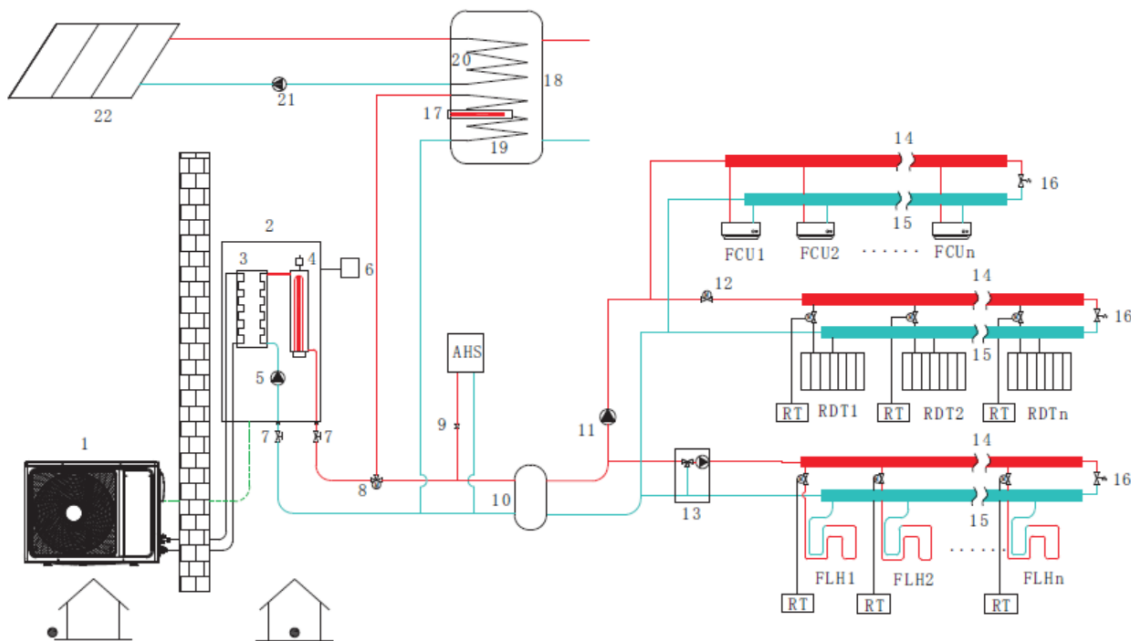
REMARK			
1	Outdoor unit	14	Distributor
2	hydraulic box	15	Distributor
3	Plate heater exchange	16	Bypass valve
4	Backup electric heater(optional)	17	Electric heating
5	Internal circulating pump	18	Domestic hot water tank
6	Wired controller	19	Coil 1 in the water tank
7	Stop valve	20	Coil 2 in the water tank
8	Motorized 3way valve	21	solar water pump
9	One way valve	22	Solar panel
10	Buffer tank	RDT	Radiator
11	External circulation pump	FLH	Floor heating loops
12	One way valve	FCU	Fan coil units
13	Mixing valve and mixing water pump	RT	Room thermostats

Part4 Dimension

1. Outdoor Unit

4kW, 6kW
ACHP-H04/4R3HA-O / ACHP-H06/4R3HA-O
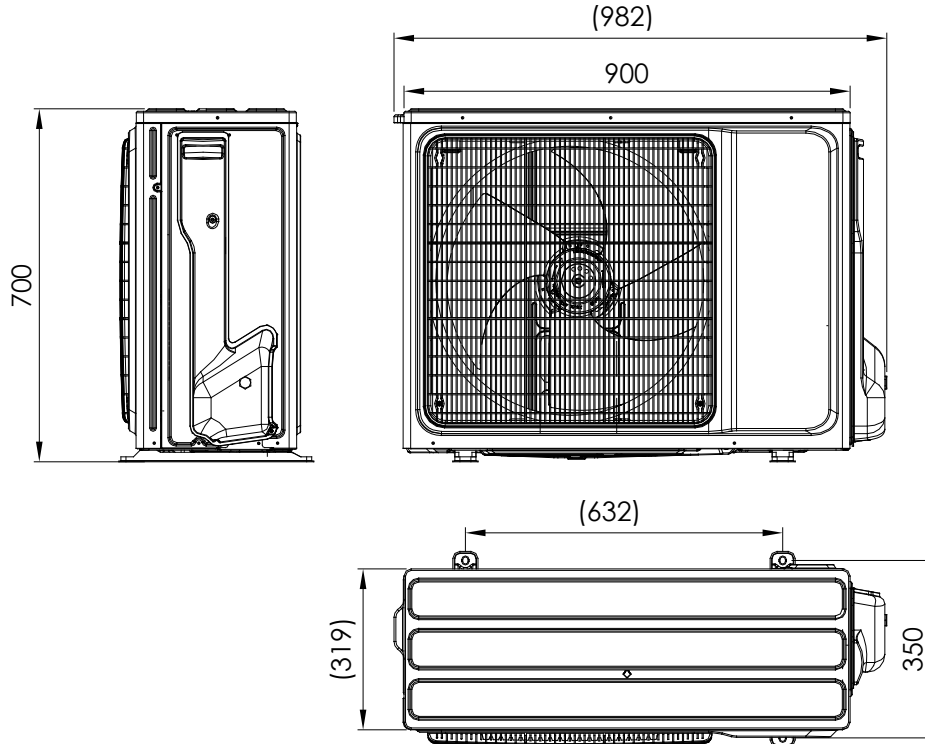
8kW, 10kW
ACHP-H08/4R3HA-O / ACHP-H10/4R3HA-O
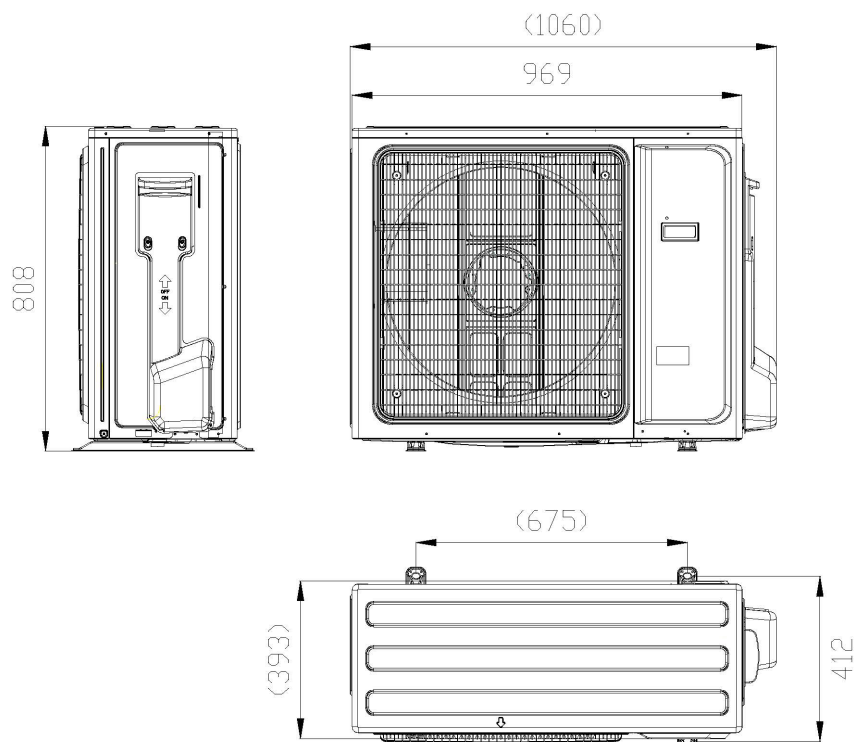
12kW, 14kW, 16kW
ACHP-H12/5R3HA-O；ACHP-H14/5R3HA-O；ACHP-H16/5R3HA-O；
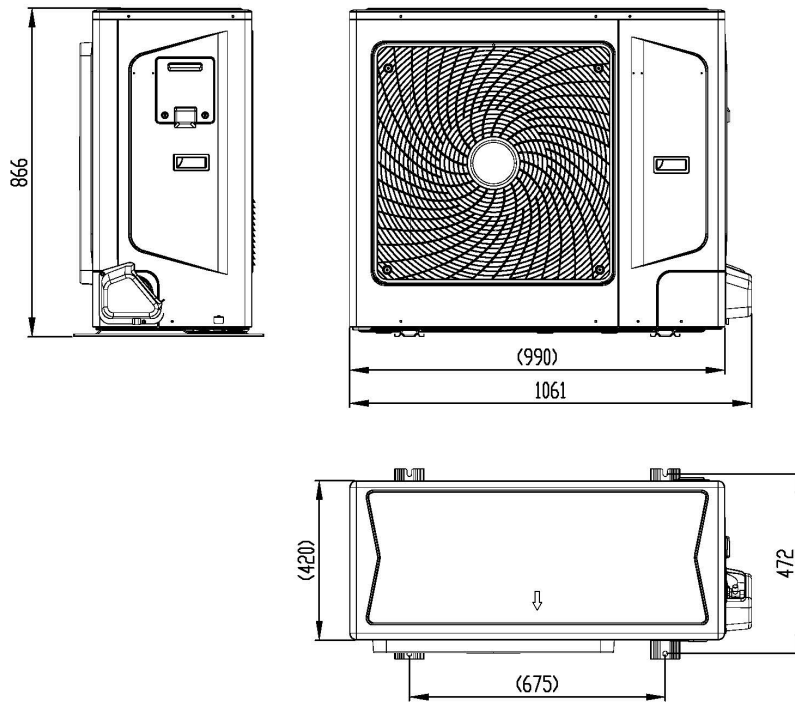
2. Hydraulic box

ACHP-H04/4R3HA-I; ACHP-H06/4R3HA-I; ACHP-H08/5R3HA-I; ACHP-H10/5R3HA-I
ACHP-H12/5R3HA-I; ACHP-H14/5R3HA-I; ACHP-H16/5R3HA-I
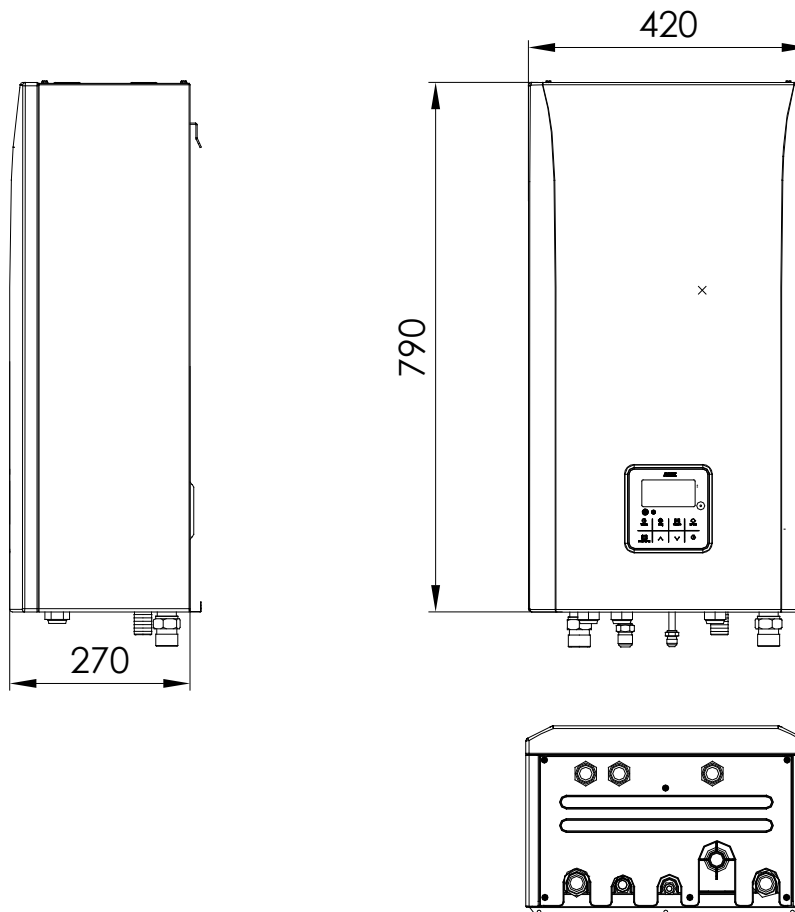
Part5 Electrical Principle Diagram

1. Outdoor Unit

4kW(ACHP-H04/4R3HA-O), 6kW (ACHP-H06/4R3HA-O)
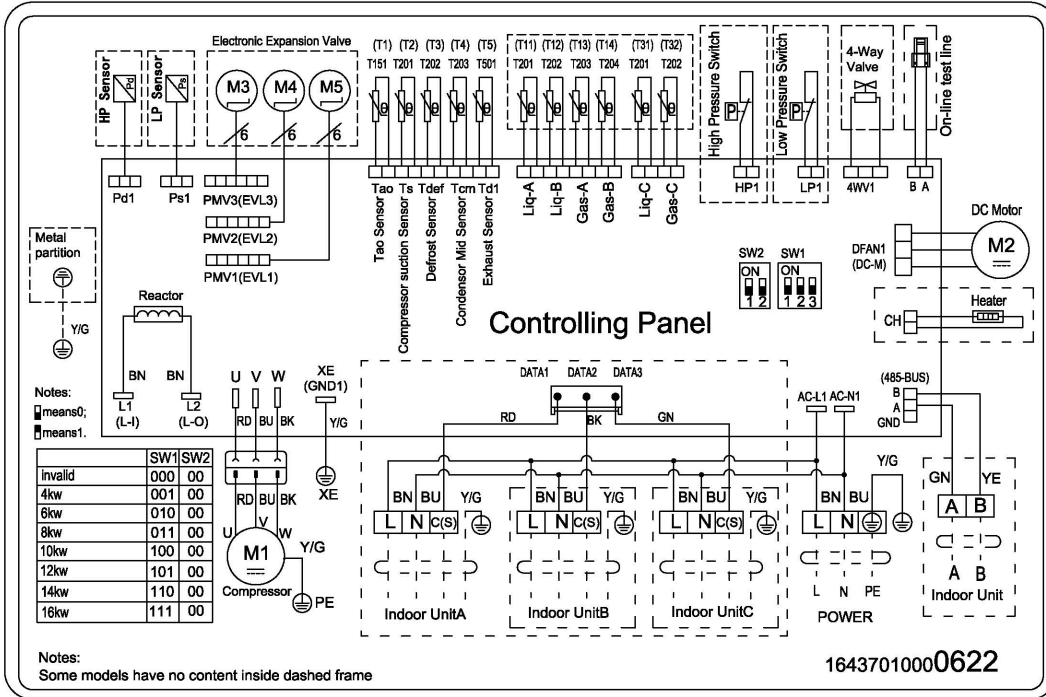
8kW (ACHP-H08/4R3HA-O), 10kW (ACHP-H10/4R3HA-O)
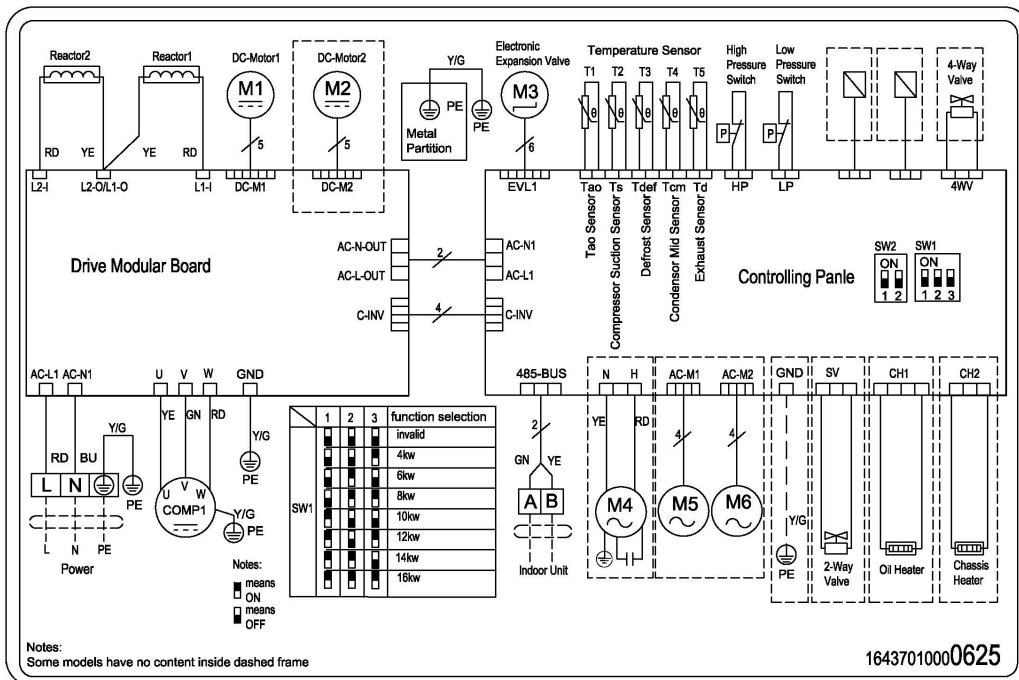
12kW(ACHP-H12/5R3HA-O), 14kW (ACHP-H14/5R3HA-O), 16kW (ACHP-H16/5R3HA-O)

Compressor
M3
U V W PE Y/G
YE GN RD Y/G

Reactor
WH WH

Transformer
TR1
TR2

U V W GND
Compressor Drive Modular Board
R S T L-IN N-IN L-CON C-INV

C-INV

CH1 — Oil Heater
CH2 — Chassis Heater
SV2 — Fluid Bypass Valve
4WV — 4-Way Valve
HP — High Pressure Switch
LP — Low Pressure Switch

SW1 SW2
ON ON
1 2 3 1 2

YE GN RD RD BU
R S T
L-OUT2 N-OUT2
Filter Board
L1-1 L2-1 L3-1 N GND1
N-OUT1 L-OUT1
AC-N1 AC-L1

Td(TD) — T5 Exhaust Sensor
Tcm(TCM) — T4 Condensor Mid Sensor
Tdef(TDEF) — T3 Defrost Sensor
Ts(TS) — T2 Compressor Suction Sensor
Tao(TAO) — T1 Tao Sensor

Controlling panel

Y/G
DC Motor M1
YE GN RD BU
L1 L2 L3 N
GND DC-M
AC-L1 AC-N1
DC Fan Drive Modular Board
C-FAN C-FAN

EVL1 — 5 — M4 EXV
Ps — 3 — LP Sensor
Pd — 3 — HP Sensor

485-BUS

L1 L2 L3 N PE
Power

GN YE
A B

To indoor unit

GND
Y/G

AC Fan Motor
AC-M1 — 4 — M2 Capacitor

Notes:
■ means ON
▪ means OFF

Type	SW1			SW2	
	1	2	3	1	2
Invalid					
4kw			■		
6kw		■			
8kw		■	■		
10kw	■				
12kw	■		■		
14kw	■	■			
16kw	■	■	■		

Wire Color:
BN--Brown
BU--Blue
BK--Black
RD--Red
YE--Yellow
GN--Green
WH--White
Y/G--Yellow/Green

Notes: Some models have no content inside dashed frame. 16437010000637

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2. Hydraulic box

ACHP-H04/4R3HA-I；ACHP-H06/4R3HA-I；ACHP-H08/5R3HA-I；ACHP-H10/5R3HA-I

ACHP-H12/5R3HA-I；ACHP-H14/5R3HA-I；ACHP-H16/5R3HA-I

Notes:
1. The wiring instructions of XT2 is for user wiring(wiring according to user)；
2. Disconnect the power supply when connecting cables；
3. Some models have no content inside dashed frame.

1643701000**0612**

Part6 Capacity Amendment

1. Operating Limits

1.1 Heating operating limits
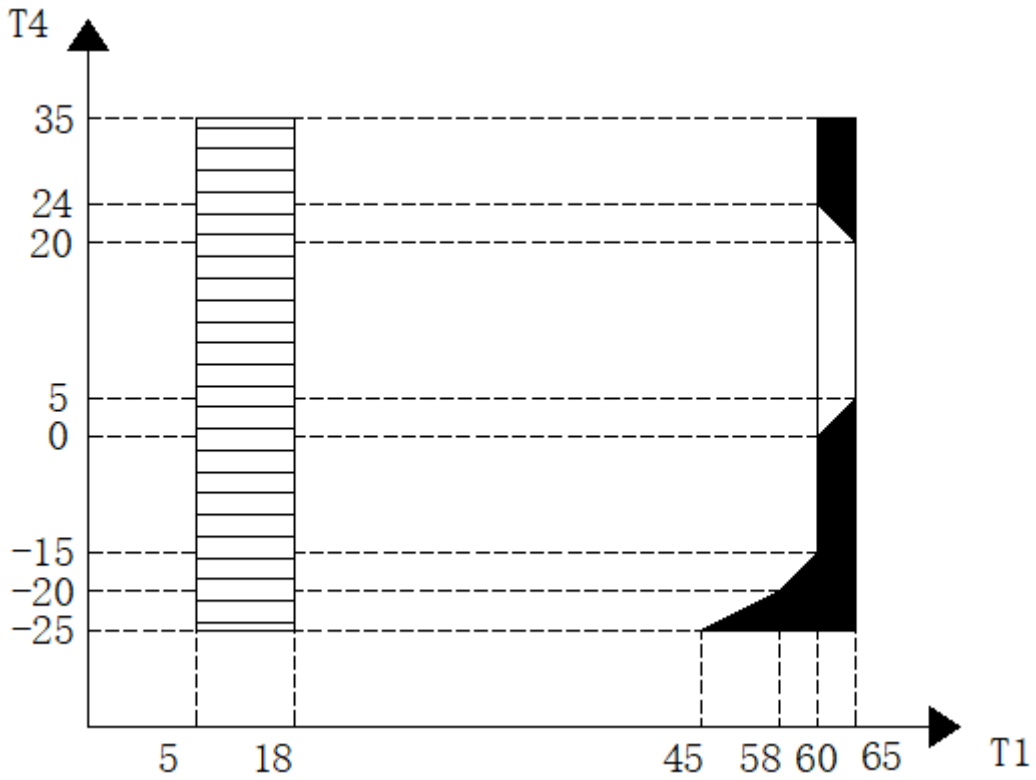
1.2 Cooling operating limits
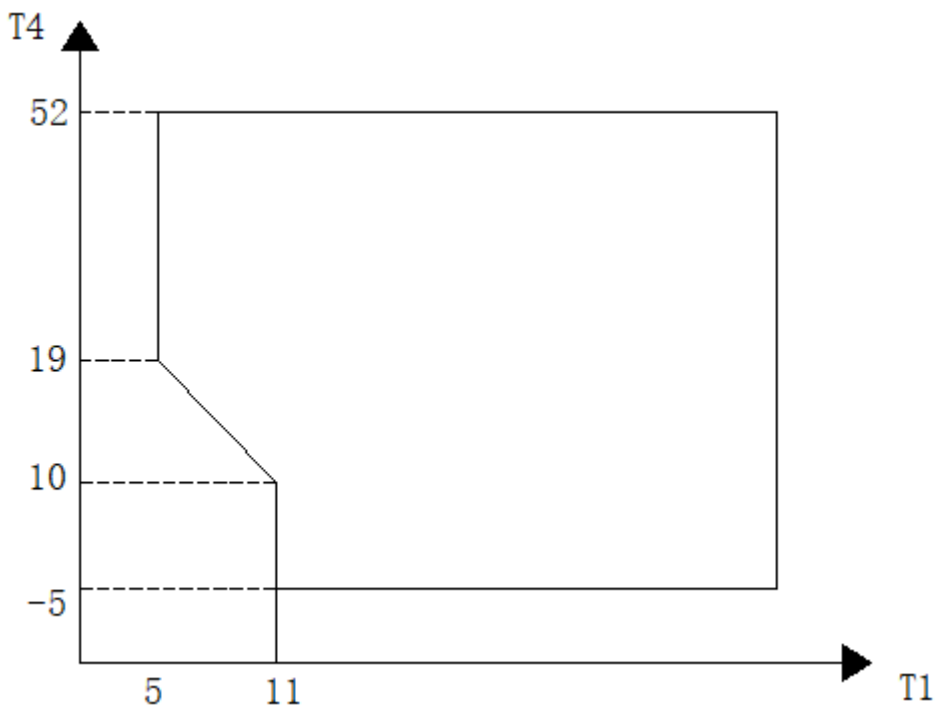
1.3 Domestic hot water operating limits
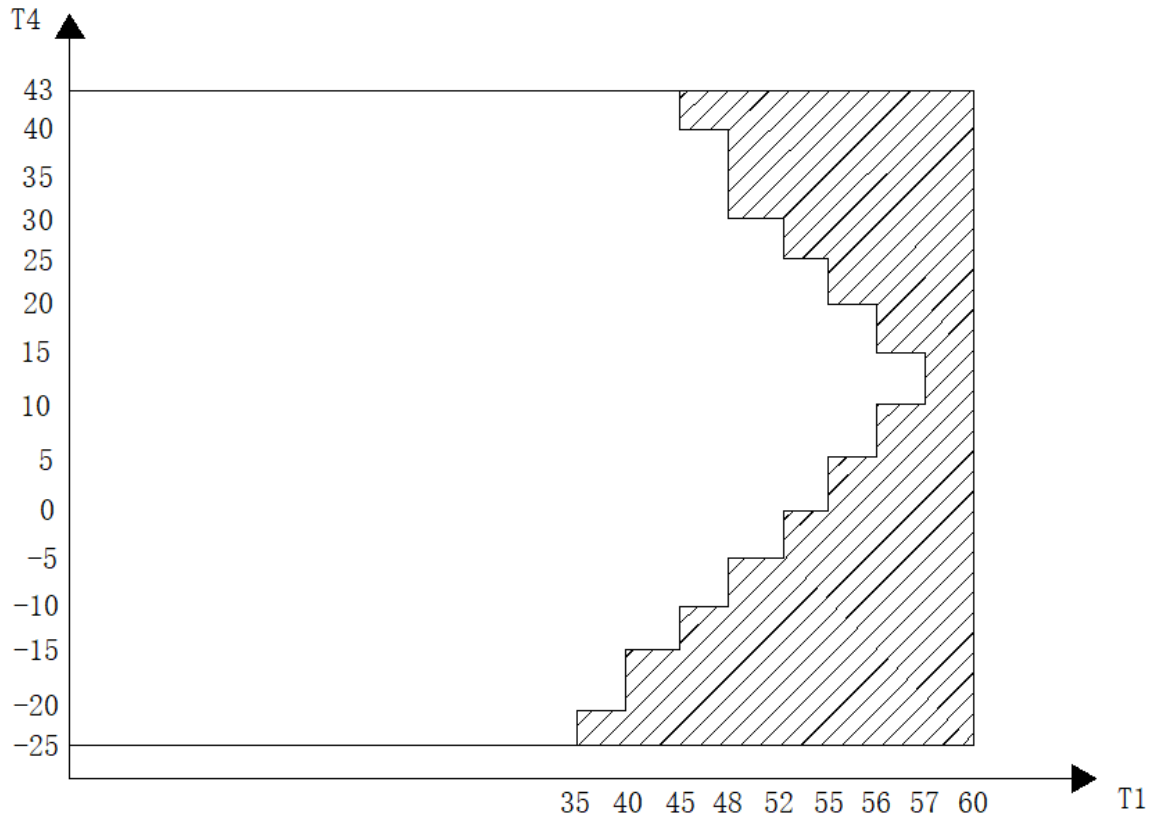
Abbreviations:

T4:Outdoor temperature(℃)

T1:Leaving water temperature(℃) / watertank temperature(℃)

Notes:

1. ▤   If the auxiliary electric heating/auxiliary heat source is set to be valid, only the auxiliary electric heating/auxiliary heat source is running; if the auxiliary electric heating/auxiliary heat source is set to be invalid, only the heat pump is running

2. ▨   The rise or fall of water temperature is regulated by the water system(Use water tank electric heating to raise to desired temperature).

3. ■   Only auxiliary electric heating/auxiliary heat source operate

Note：please refer to the Capacity table for more information

Part7 Hydraulic Performance

ACHP-H04/4R3HA-I; ACHP-H06/4R3HA-I
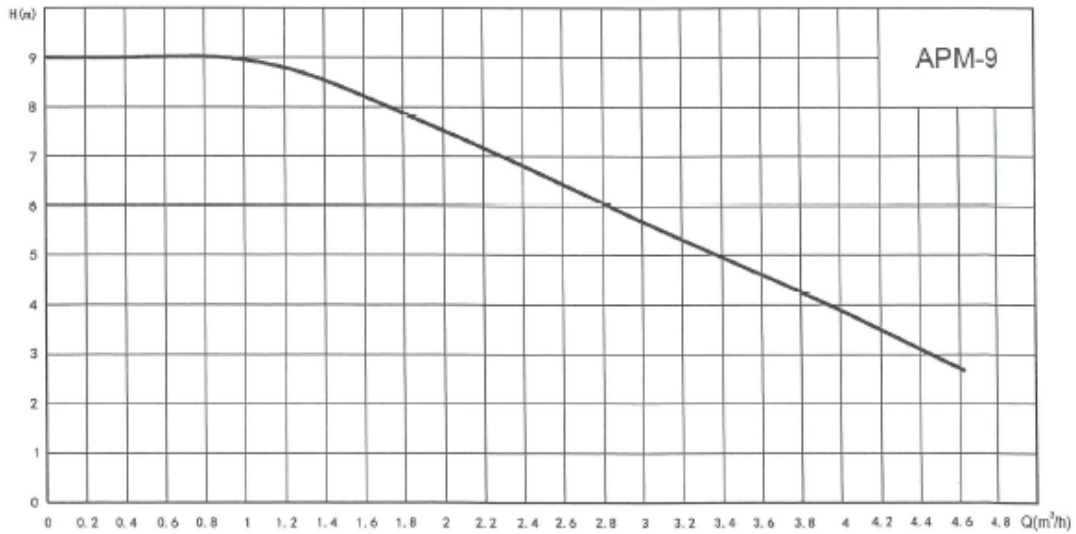
ACHP-H08/5R3HA-I; ACHP-H10/5R3HA-I; ACHP-H12/5R3HA-I
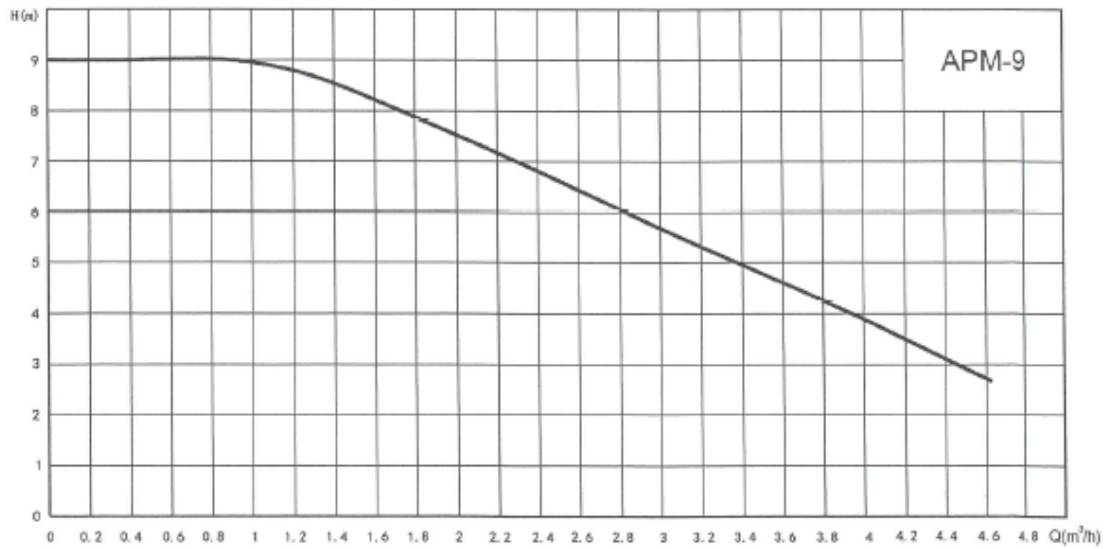
ACHP-H14/5R3HA-I; ACHP-H16/5R3HA-I
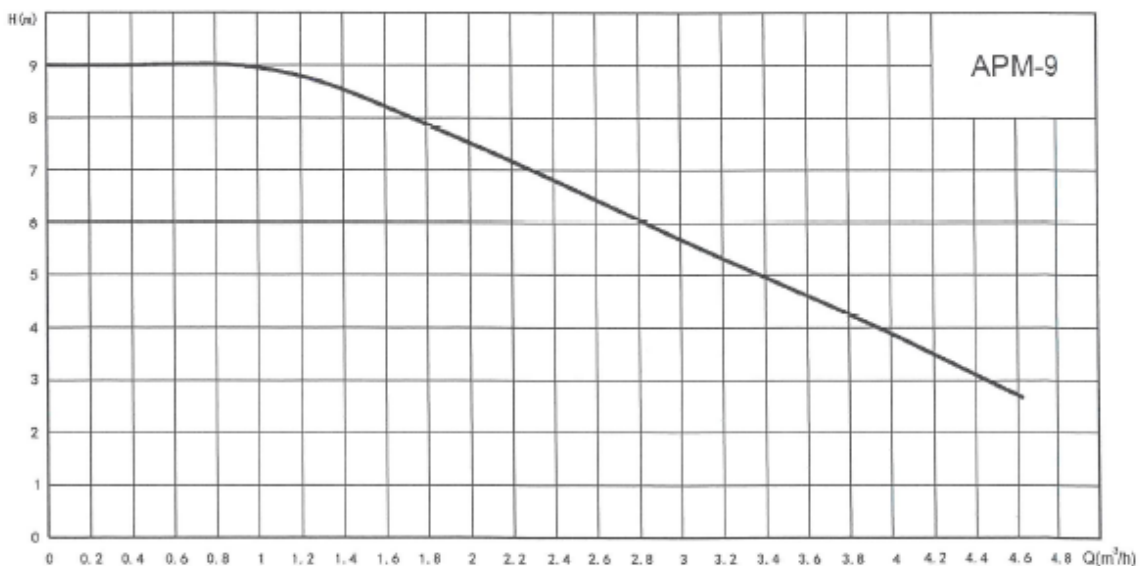
Part8 Sound Levels

1. Outdoor unit sound pressure levels
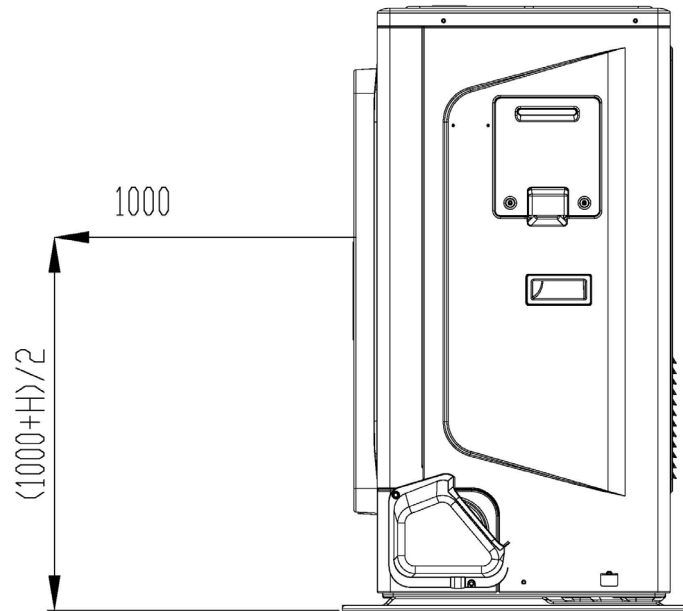
Outdoor unit sound pressure level measurement(unit:mm)

ODU Models	dB(A)
ACHP-H04/4R3HA-O	38
ACHP-H06/4R3HA-O	38
ACHP-H08/4R3HA-O	45
ACHP-H10/4R3HA-O	48
ACHP-H12/5R3HA-O	49
ACHP-H14/5R3HA-O	50
ACHP-H16/5R3HA-O	54

Notes

1.Sound pressure level is measured at a position1m in front of the unit and (1+H)/2m (where H is the height of the unit)above the floor in a semi an-echoic chamber.During actual operation,sound pressure levels may be higher as a result of ambient noise.

2. Outdoor air temperature：dry bulb7℃. Wet bulb 6℃;EWT30℃,LWT35℃.

3. Outdoor air temperature：dry bulb 7℃ Wet bulb 6℃; EWT 40℃, LWT 45℃.

4. Outdoor air temperature：dry bulb 7℃ Wet bulb 6℃; EWT 47℃,LWT 55℃.

5. Sound pressure level is the maximum value tested under the three conditions of Notes2, Notes3 and Notes4.

2. ODU Octave band levels

ACHP-H04/4R3HA-O
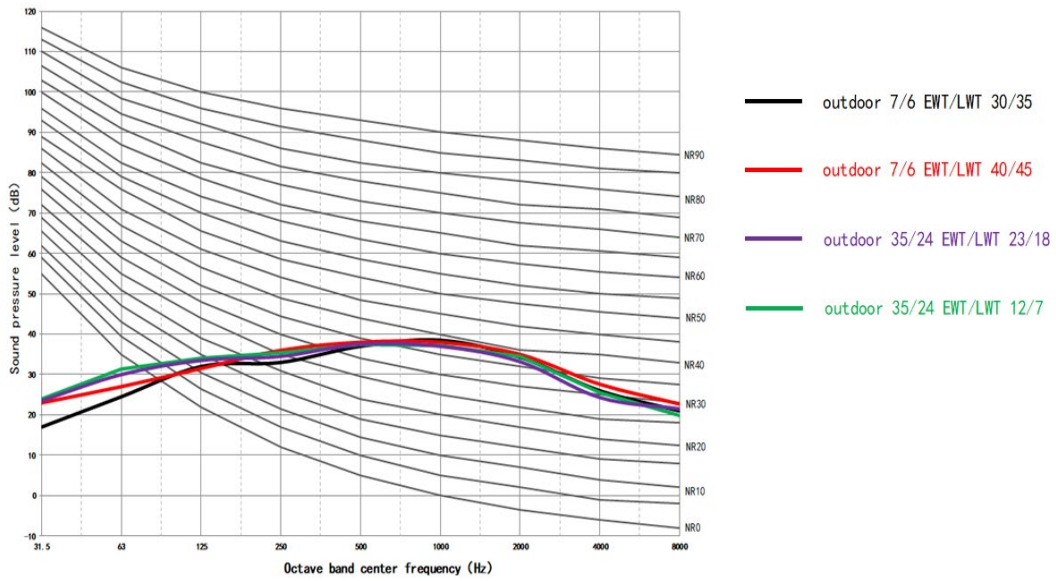
ACHP-H06/4R3HA-O
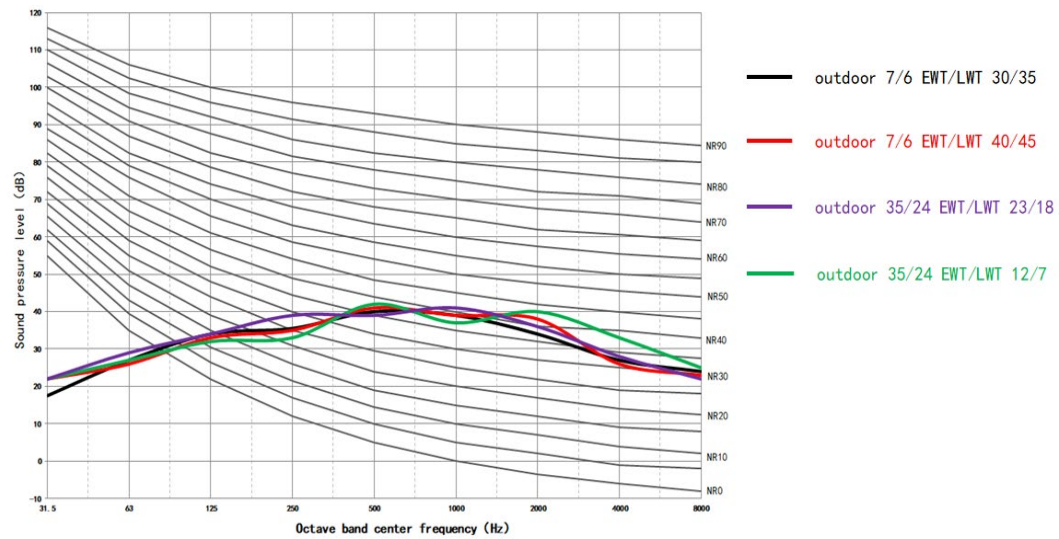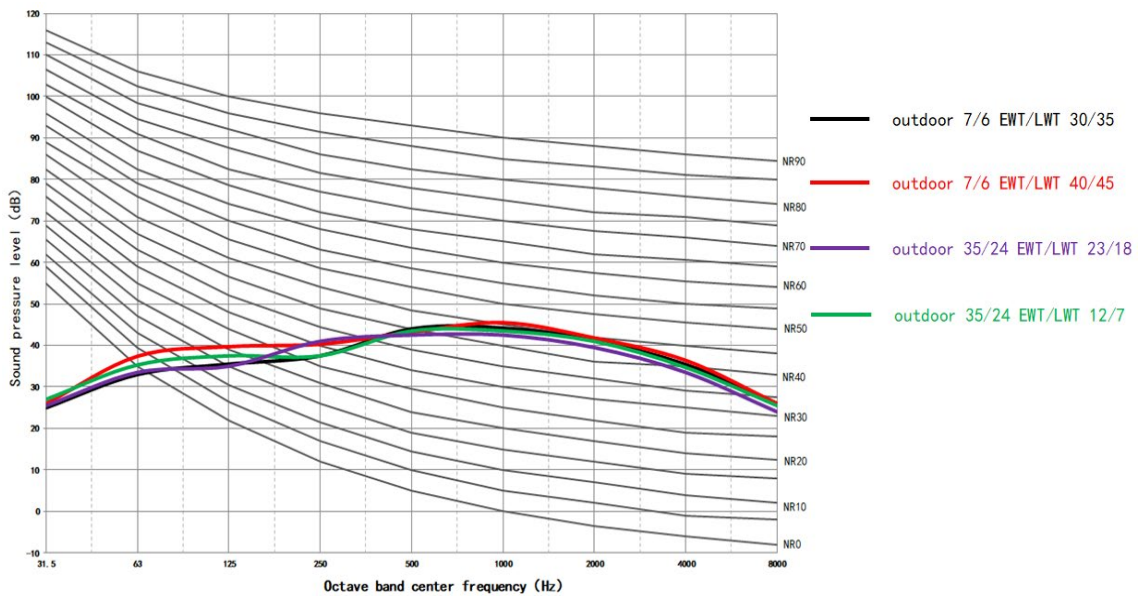
ACHP-H08/4R3HA-O
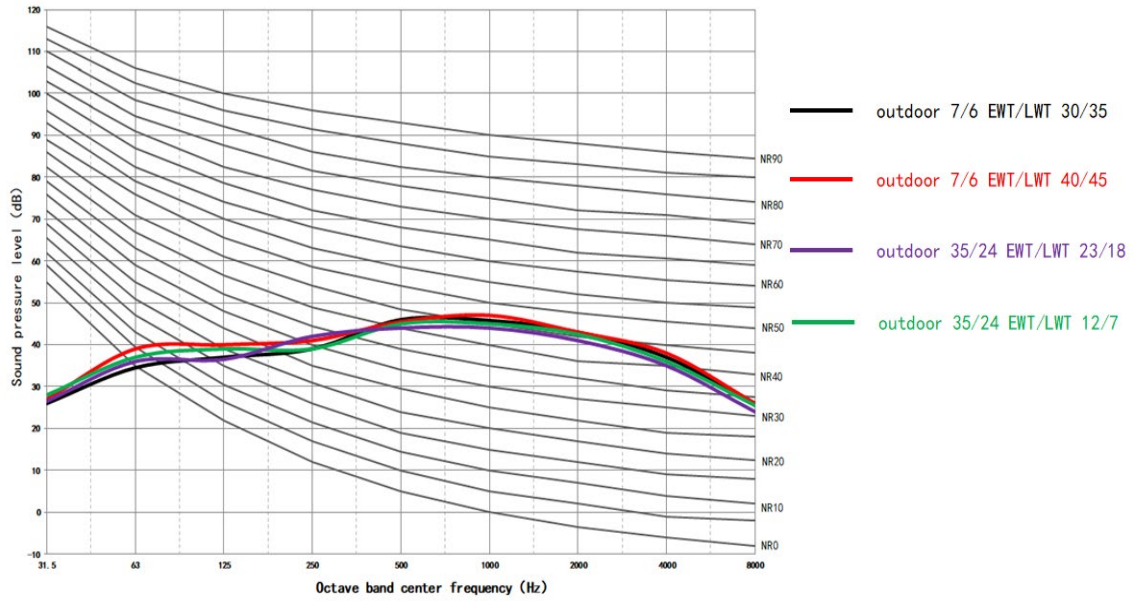
ACHP-H10/4R3HA-O
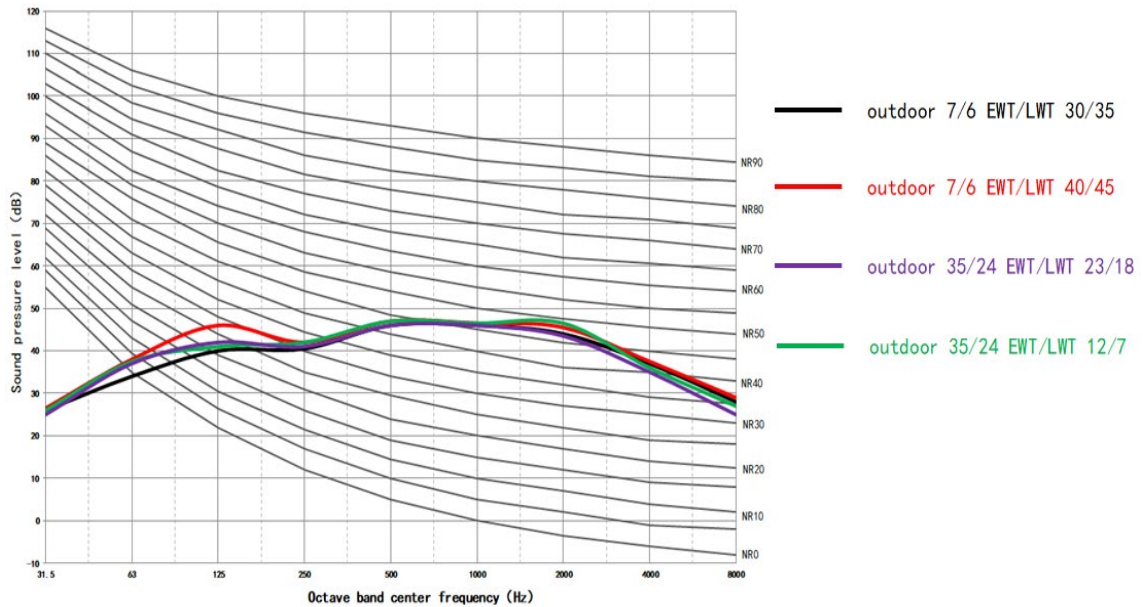
ACHP-H12/5R3HA-O
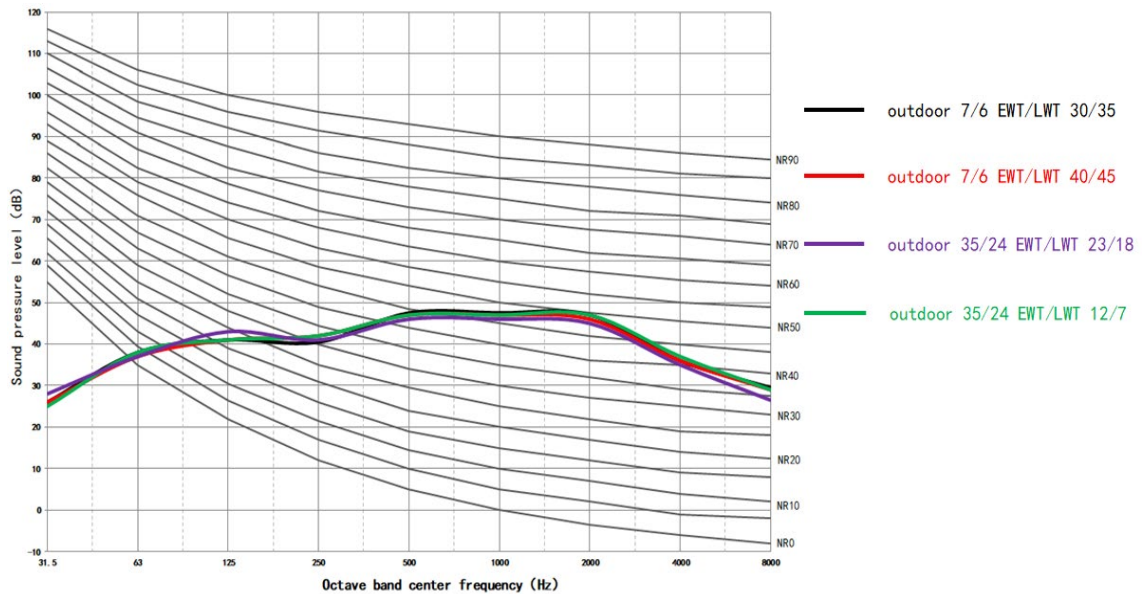
ACHP-H14/5R3HA-O
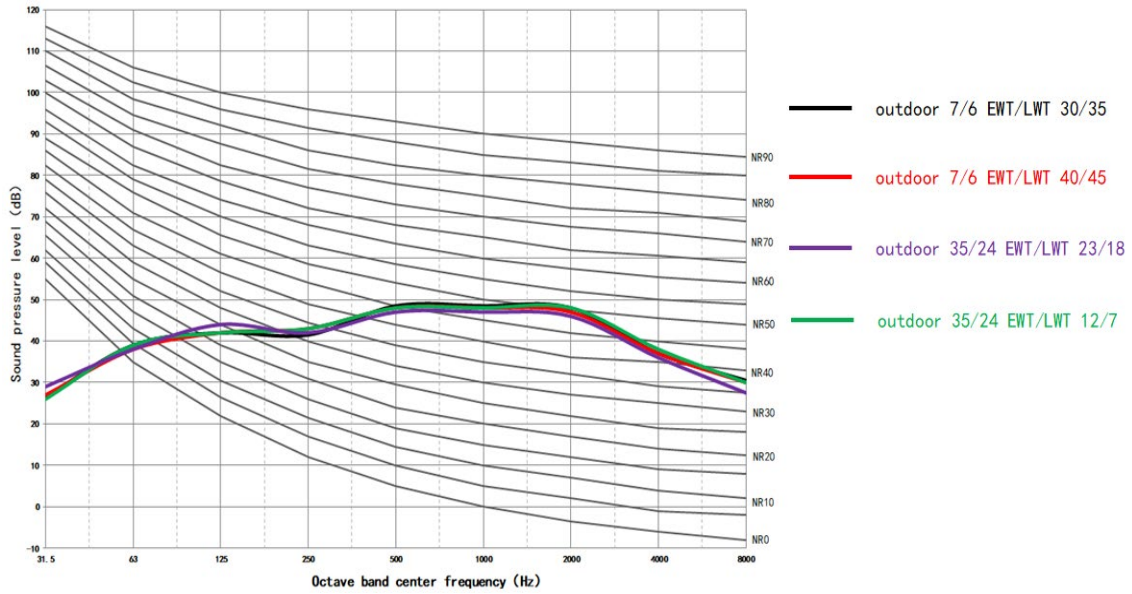
ACHP-H16/5R3HA-O

3. Indoor unit sound pressure levels
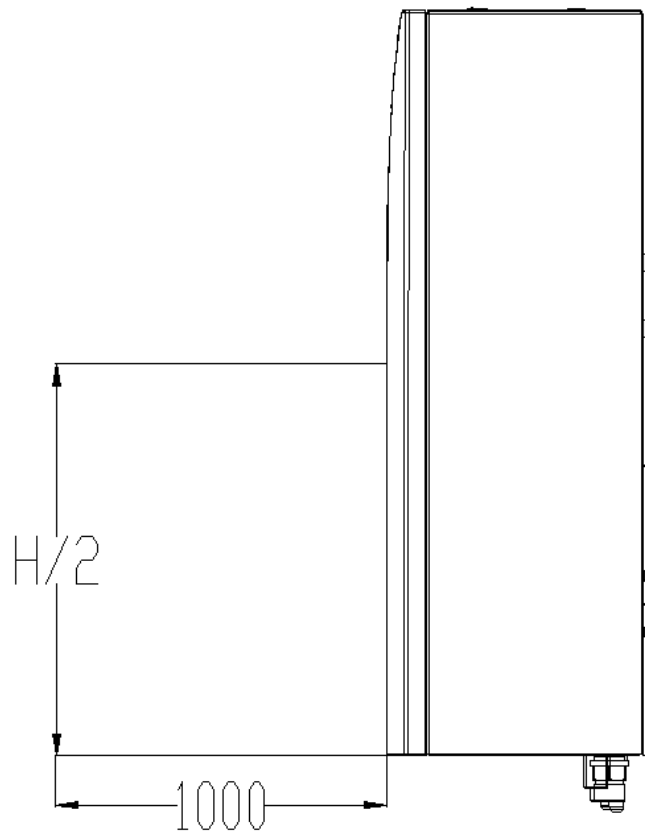
Indoor unit sound pressure level measurement(unit:mm)

ODU Models	dB(A)
ACHP-H04/4R3HA-I	28
ACHP-H06/4R3HA-I	28
ACHP-H08/5R3HA-I	31
ACHP-H10/5R3HA-I	31
ACHP-H12/5R3HA-I	31
ACHP-H14/5R3HA-I	31

ACHP-H16/5R3HA-I	31

Notes

1.Sound pressure level is measured at a position1m in front of the unit and H/2 (where H is the height of the unit)at the bottom of the unit in a semi an-echoic chamber.During actual operation,sound pressure levels may be higher as a result of ambient noise.

2. Outdoor air temperature：dry bulb7℃. Wet bulb 6℃;EWT30℃,LWT35℃.

3. Outdoor air temperature：dry bulb 7℃ Wet bulb 6℃; EWT 40℃, LWT 45℃.

4. Outdoor air temperature：dry bulb 7℃ Wet bulb 6℃; EWT 47℃,LWT 55℃.

5. Sound pressure level is the maximum value tested under the three conditions of Notes2, Notes3 and Notes4.

Part9 Wired Controller

1. Introduction

During installation, the parameter settings should be configured by the installer to suit the installation configuration, climate conditions and user preferences. The relevant settings are accessible and programmable through the FOR SERVICEMAN menu on the wired controller.

Wired controller
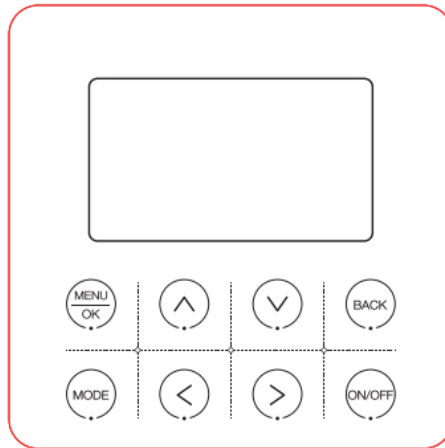
The wired controller button

NO	Name	Logo	Description
1	Menu/Confirm	MENU/OK	Enter the next menu interface/setting confirmation
2	Up	∧	Upward selection/value increase or content change
3	Down	∨	Downward selection/decrease value or content change
4	Back	BACK	Return to the previous level/View current fault
5	Mode	MODE	Mode Switch
6	Left	<	Change selected item
7	Right	>	Change selected item
8	ON/OFF	ON/OFF	Control unit on/off

Illustration：
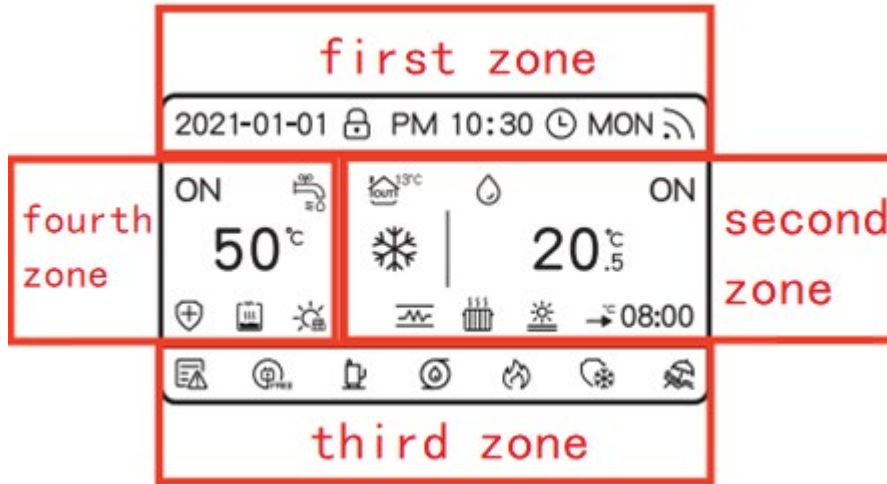
zone division

1# zone：

Name	icon	Name	icon
date	0000-00-00	Monday	MON
time	00:00	Tuesday	TUE
screen lock	🔒	Wednesday	WED
schedule	📅	Thursday	THU
time appointment	🕐	Friday	FRI
WIFI distribution network successfully	📶	Saturday	SAT
morning	AM	Sunday	SUN
afternoon	PM	WIFI distribution network failed	📶

2# zone：

Name	icon	Name	icon
heating	☀	temperature unit	℃
refrigeration	❄	temperature hold	08:00
automatic	♺	Temperature drop	↓℃08:00
open	ON	The temperature rises	↑℃08:00
close	OFF	fan coil unit	🌀
water temperature icon	◇	ON	🌀

Automatic water temperature	AUTO	fan coil unit	♨
water temperature	38(setting)	OFF	▥
Electric tube heat source	⚍	heat sink	♨
floor preheating	♨	ON	═
floor drying	☀	heat sink	21℃ (OUT)
emergency	⊡	Indoor temp	21℃ (IN)

3# zone：

Name	icon	Name	icon
temperature unit	▤	antifreeze	❄
temperature hold	FREE	defrost	❄
Temperature drop	⩗	vacation	⌀
The temperature rises	⩘	mute	◁×
Fan coil unit ON	⬭	energy saving	⬯
Fan coil OFF	◎	Additional heat source	♨

4# zone：

Name	icon	Name	icon
Hot water ON	⛲	disinfect	⊕
Hot water OFF	🚰	solar enabled	☼
Quick hot water ON	⛲	Water tank electric heating ON	▦
hot water on	ON	set/tank temperature	50(setting)
Hot water shutdown	OFF	temperature unit	℃

Other：

Name	icon	Name	icon
⬤▬	enabled	▬⬤	Not enabled

Note: more detailed information please refer to the wired controller instructions

Part10 Control

1. Control way (Cooling mode and heating mode)

1.1 Outlet water temperature control

By measure the outlet water temperature to control heat pump turn on or turn off:

1) cooling mode :

   ① When outlet water temperature is lower than (Tset – dTSC_OFF), the heat pump will turn off

   ② When outlet water temperature is higher than (Tset + dTSC_ON), the heat pump will turn on

2) heating mode:

   ① When outlet water temperature of is higher than (Tset + dTSH_OFF), the heat pump will turn off

   ② When outlet water temperature of is lower than (Tset - dTSH_ON), the heat pump will turn on

1.2 Buffer tank temperature control

By measure the buffer tank temperature to control heat pump turn on or turn off:

1) Cooling mode(same with outlet water temperature control) :

   ① When buffer tank temperature is lower than (Tset – dTSC_OFF), the heat pump will turn off

   ② When buffer tank temperature is higher than (Tset + dTSC_ON), the heat pump will turn on

2) Heating mode(same with outlet water temperature control):

   ① When outlet water temperature of is higher than (Tset + dTSH_OFF), the heat pump will turn off

   ② When outlet water temperature of is lower than (Tset - dTSH_ON), the heat pump will turn on

1.3 Thermostat control

Many thermostats can be connected to the heat pump, when thermostat control is activate, user can set room temperature by thermostat, and heat pump turn on or turn off is controlled by thermostat.

① When one or more thermostat is send on signal，heat pump will turn on;

② When all thermostat is send the off signal, heat pump will turn off.

1.4 Room temperature control

When choose the room temperature control, heat pump will operate according to the detected indoor temperature.

1) Cooling mode:

   ① When room temperature is higher than Tset，target water temperature is drop to reach room temperature;

   ② When room temperature is in Tset to Tset-1℃，target water temperature is maintain, and compressor is running according to water temperature.

   ③ When room temperature is lower than Tset-1℃,target water temperature is upraise to teach room temperature, and compressor is running according to water temperature

   ④ When room temperature is lower than Tset – dTSC_OFF, heat pump will turn off

   ⑤ When room temperature is higher than Tset + dTSC_ON, heat pump will turn on

2) Heating mode:

① When room temperature is higher than Tset +1℃, target water temperature is drop to reach room temperature;

② When room temperature is in Tset+1℃ to Tset, target water temperature is maintain, and compressor is running according to water temperature.

③ When room temperature is lower than Tset, target water temperature is upraise to teach room temperature, and compressor is running according to water temperature

④ When room temperature is higher than Tset – dTSH_OFF, heat pump will turn off

⑤ When room temperature is lower than Tset + dTSH_ON, heat pump will turn on

2. DHW mode

2.1 Whether DHW mode is enabled (DHW mode)

Set whether to enable the DHW mode through the wired controller. When it is set to enable, the unit operates according to the control logic of the DHW mode. When the DHW mode is not enabled, the unit will turn off the hot water function. The interface is as shown below：
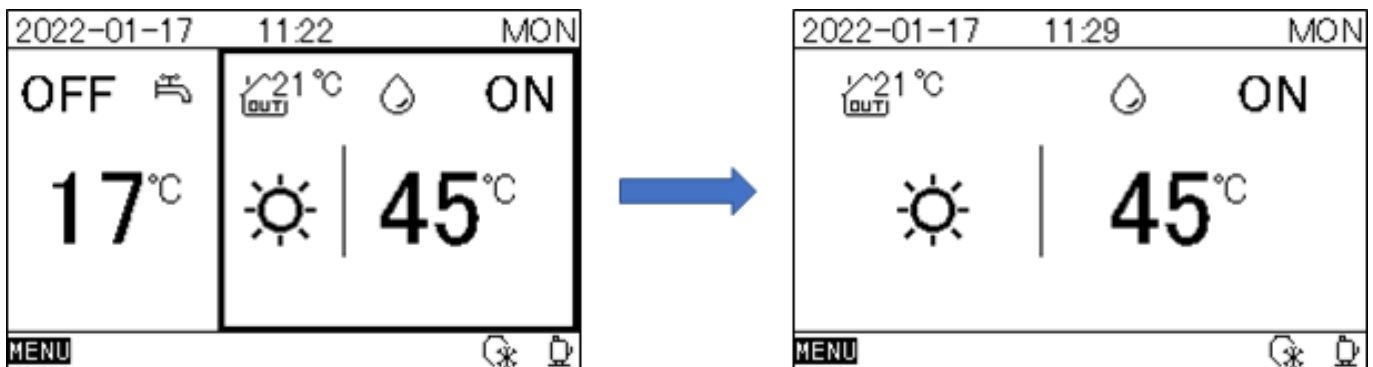
2.2 Whether DHW PRIORITY is enabled (DHW PRIORITY)

When both the DHW mode and the air conditioner (cooling/heating mode) are turned on, you can set whether to turn on the DHW priority through the wired controller．

If the DHW priority is enabled：

1)If the water tank temperature≥water tank setting temperature - DHW mode start-operating temperature difference(dTSDHW_ON), the AC (cooling mode/heating mode) will run until the heat pump heating/cooling limit time (t_DHWHP_RESTRICT), then switch to DHW mode, after water tank reaching the target set temperature or the DHW mode reaching maximum time (t_DHWHP_MAX), switch back to AC (cooling mode/heating mode).

2)During the heat pump heating/cooling limit time(t_DHWHP_RESTRICT),if the water tank temperature ＜water tank setting temperature - DHW mode start-operating temperature difference(dTSDHW_ON), switch directly to DHW mode, after water tank reaching the target set temperature or the DHW mode reaching maximum time (t_DHWHP_MAX), switch back to AC (cooling mode/heating mode).

If the DHW priority is not enabled, the heat pump will run the AC (cooling mode/heating mode) first. After running until the water outlet temperature of the hydraulic box reaches the target set temperature, it will switch to DHW mode, and the DHW mode will keep running until the water tank temperature reaching the water

tank set target temperature or the maximum time (t_DHWHP_MAX), then switch to the AC (cooling mode/heating mode) operation。
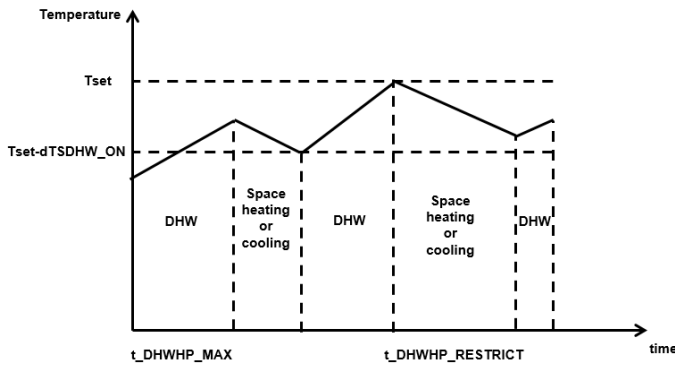
DHW PRIORITY
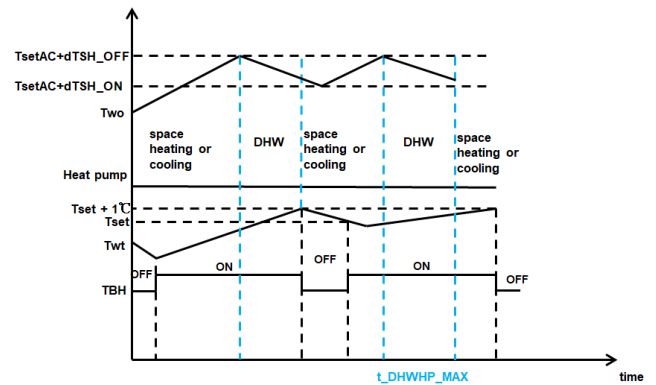
without DHW PRIORITY

2.3 Maximum ambient temperature (Tao_DHWMAX)、Minimum ambient temperature (Tao_DHWMIN)

In the DHW mode setting interface, you can set the maximum ambient temperature (Tao_DHWMAX) and the minimum ambient temperature (Tao_DHWMIN) of the heat pump in DHW mode. When the outside ambient temperature＞Tao_DHWMAX or ＜Tao_DHWMIN, only the water tank electric heating (TBH) is turned on to produce hot water. Only When the outside ambient temperature＞ Tao_DHWMIN and＜ Tao_DHWMAX)，the heat pump will produce hot water
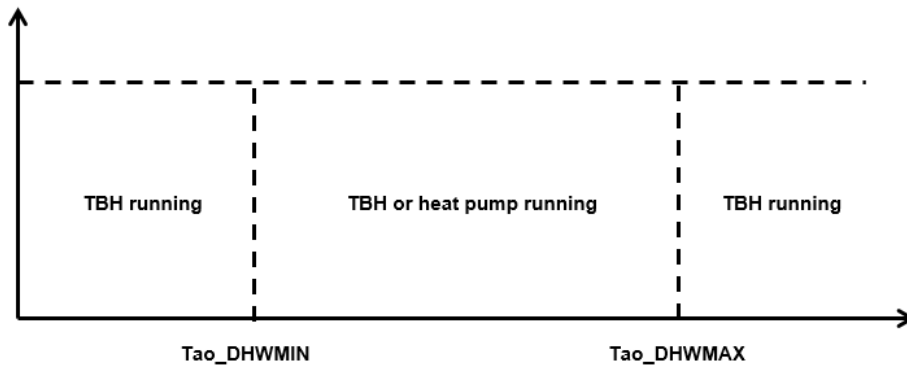
2.4 Delay time of water tank electric heating start after compressor start(t_TBH_DELAY)、Ambient temperature that allows water tank electric heating to start(Tao_TBS_ON)

Set the delay time of water tank electric heating start after compressor start (t_TBH_DELAY) by the wired controller，When the heat pump running time ≥ t_TBH_DELAY, and the outdoor ambient temperature <Tao_TBS_ON), if the temperature of the water tank does not reach the target temperature, turn on the electric heating of the water tank, and run together with the heat pump to produce hot water

2.5 Whether DHW PUMP is enabled (DHW PUMP)

Set whether the DHW pump is enabled or not through the wired controller. When the setting is enabled, set the start time and running duration of the DHW pump (DHW PUMP RUN TIME),When it is time to start the pump, the pump will start running, and when the running duration reaches the DHW PUMP RUN TIME,

the pump will turn off.

2.6 DHW mode operation

The unit can heat water by controlling the operation of the compressor and the water tank electric heating (TBH). As shown below：
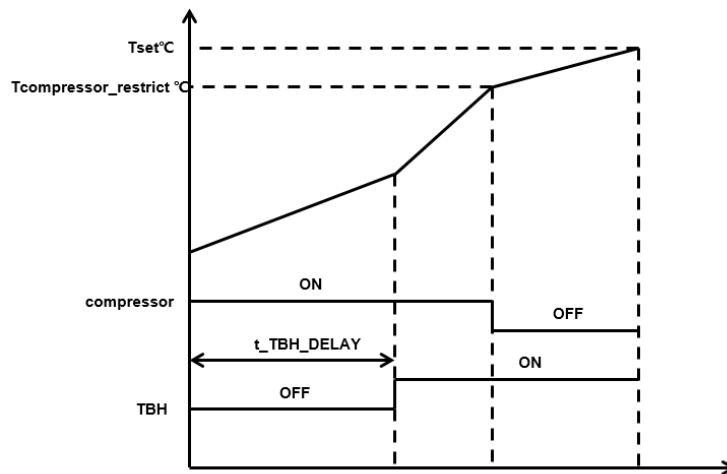
When the water tank temperature < Tset of the water tank, the compressor will turn on to produce hot water. When the compressor running time ＞t_TBH_DELAY and the outside ambient temperature <Tao_TBS_ON, if the water tank temperature＜ Tset, the electric heating of the water tank will turn on, and it runs together with the heat pump to produce hot water. When the water temperature in the water tank＞the max temperature of the water tank that the compressor can run, the compressor will turn off, and only use water tank electric heating to produce hot water. When the water tank temperature > the target set water tank temperature Tset°C, the electric heating of the water tank will turn off

3. Cooling mode

3.1 Whether cooling mode is enabled

Set whether to enable the cooling mode through the wired controller. When it is set to enable, the unit will operate cooling mode. When the cooling mode is set to be disabled, the unit will turn off cooling function.

3.2 Maximum outdoor ambient temperature (Tao_CMAX)、Minimum Outdoor Ambient Temperature (Tao_CMIN)

by setting the maximum cooling outdoor ambient temperature (Tao_CMAX) and the minimum outdoor ambient temperature (Tao_CMIN) to limit the operating temperature range of cooling mode. When outdoor ambient temperature ＞Tao_CMAX or＜Tao_CMIN, the unit will stop cooling operation
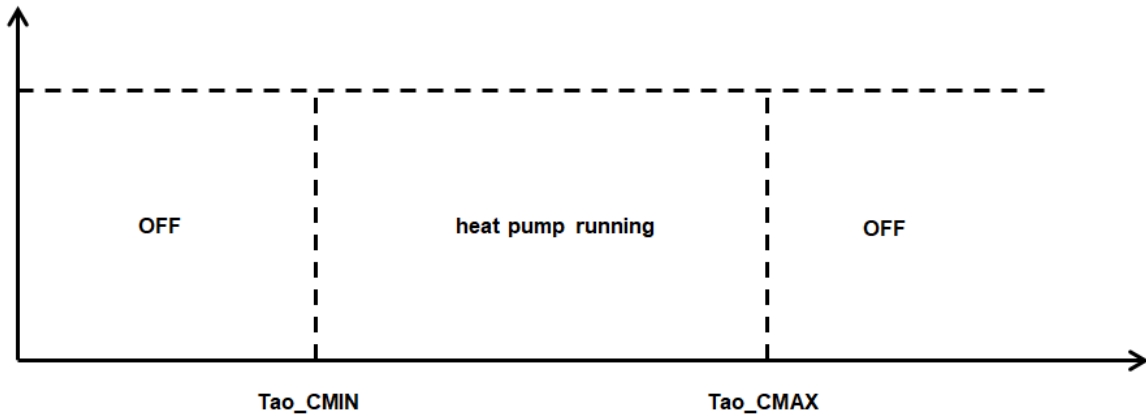
3.3 Cooling stop-operating temperature difference (dTSC_OFF)、cooling start-operating temperature difference (dTSC_ON)

In cooling mode, when the outlet water temperature of Hydraulic box reaches (Tset – dTSC_OFF), the heat pump is stopped and only the water pump is turned on; When it is detected that the outlet water temperature of Hydraulic box reaches (Tset + dTSC_ON), the heat pump is turned on for cooling operation
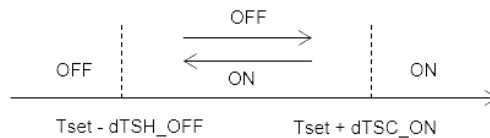
4. Double zone control

4.1 Floor heating mixed pump

After the double zone control is opened, the floor heating mixed pump continues to run.

4.2 Return valve

1) If the floor heating water inlet temperature≥(Tset_FLH+dTwi_FLH_ON),the mix valve turn off.

2) If the floor heating water inlet temperature＜(Tset_FLH+dTwi_FLH_OFF),the mix valve turn on..

3) If (Tset_FLH+dTwi_FLH_OFF)≤the floor heating water inlet temperature＜
   (Tset_FLH+dTwi_FLH_OFF),the return valve is time controlled.

4) Time control depends on floor heating mixed pump adjustment cycle(TIME_ADJUST) and opening time ratio of floor heating mixed pump(PER_START), pump running time=(TIME_ADJUST)*
   (PER_START).
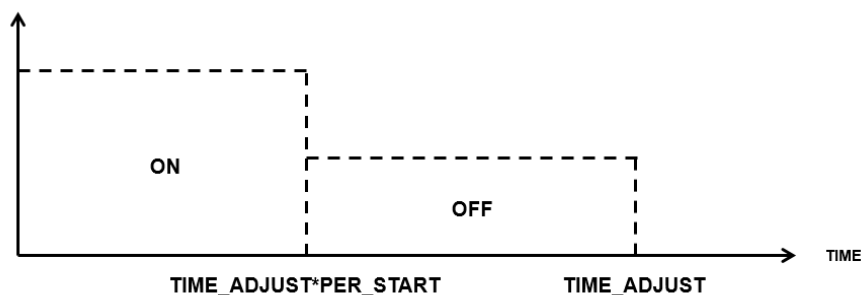
5. Heating mode

5.1 Whether heating mode is enabled (heat MODE)

Set whether to enable the heating mode through the wired controller. When enabled, the unit operates in the heating mode. When it is not enabled, the unit can not operate heating function. If both the heating mode and the cooling mode are set to be disabled, the figure as shown below：
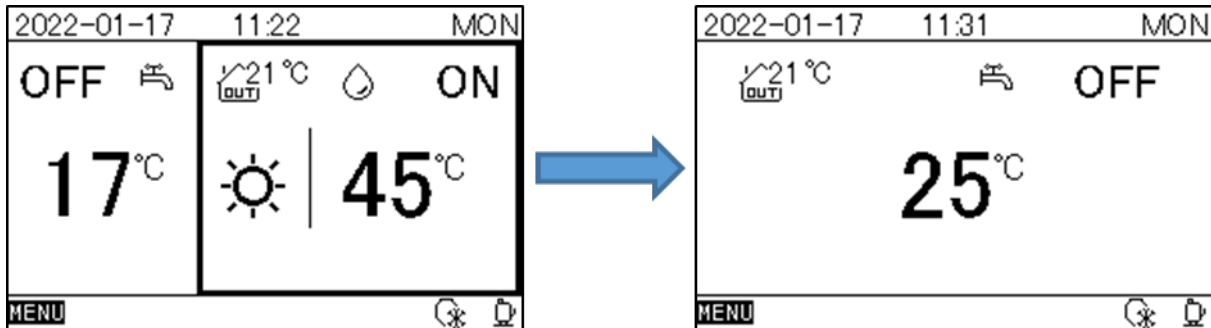
5.2 Maximum outdoor ambient temperature (Tao_HMAX)、Minimum Outdoor Ambient Temperature (Tao_HMIN)

by setting the maximum heating outdoor ambient temperature (Tao_HMAX) and the minimum outdoor ambient temperature (Tao_HMIN) to limit the operating temperature range of heating mode. When the outdoor ambient temperature＞Tao_CMAX or＜ Tao_CMIN, the unit will stop heating operation
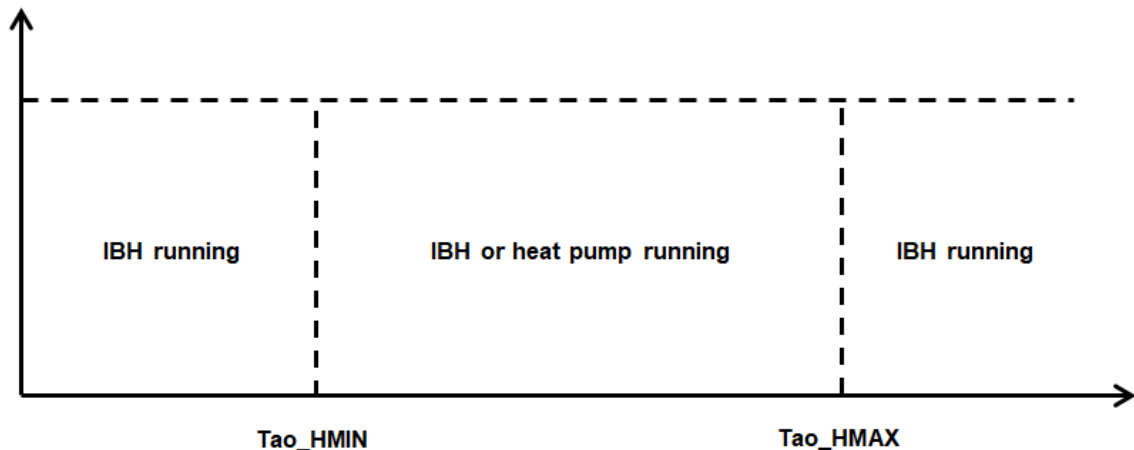
5.3 Heating stop-operating temperature difference (dTSH_OFF)、heating start-operating temperature difference (dTSH_ON)

In heating mode, when the outlet water temperature reaches (Tset + dTSH_OFF), the heat pump will stop operation and only the water pump is turned on; When the outlet water temperature reaches (Tset - dTSH_ON), the heat pump is turned on for heating operation.
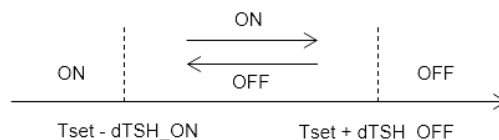
5.4 Delay time of Hydraulic box electric heating start after compressor start (t_IBH_DELAY)、Ambient temperature that allows Hydraulic box electric heating to start

(Tao_IBH_ON)

Set Delay time of Hydraulic box electric heating start after compressor start (t_IBH_DELAY) by Wired controller， When the heat pump running time ≥ (t_IBH_DELAY), and the outdoor ambient temperature < (Tao_TBS_ON), if the outlet water temperature does not reach the set target outlet water temperature TsetAC, the unit will turn on the electric heating, and run together with the heat pump to produce hot water

5.5 The ambient temperature at which the gas water heater is allowed to start (Tao_AHS_ON)

Set (Tao_AHS_ON) by Wired controller, when the gas water heater is enabled, and the outdoor ambient temperature < (Tao_AHS_ON), and the outlet water temperature ＜TsetAC, the gas water heater will be turned on

5.6 Heating mode operation

The unit can produce hot water by controlling the operation of the compressor, electric heating (IBH), and gas water heater (AHS). As shown below：
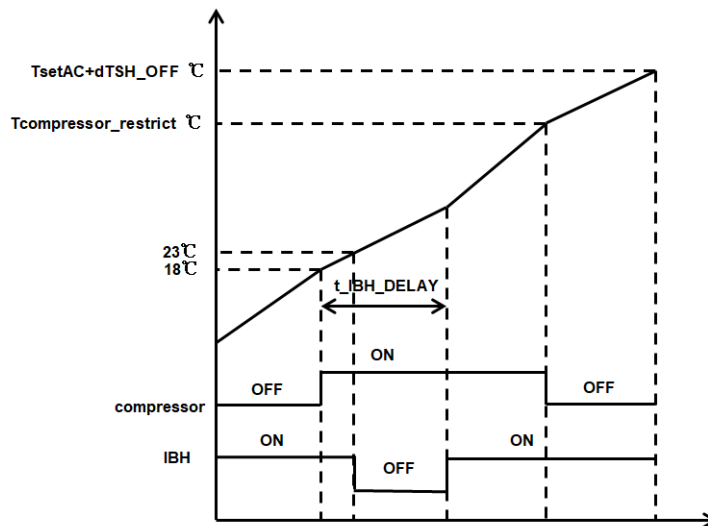
When the heating mode is turned on, if the outlet water temperature ＜18°C, turn on the electric heating first, and then turn on the compressor after the outlet water temperature ＞ 18°C，After the outlet water temperature ＞23℃, turn off the electric heating and only the compressor keeps running。When the compressor running time ＞t_IBH_DELAY) And when the outdoor ambient temperature <Tao_IBH_ON, the electric heating starts to run, and when the outlet water temperature reaches the maximum outlet water temperature (Tcompressor_restrict) the compressor stops running, and the outlet water temperature reaches (TsetAC+dTSH_OFF), the electric heating stops running。

6. Automatic mode

When the user selects the automatic mode, the operation mode is automatically switched according to the set cooling minimum temperature (Tao_AUTOCMIN) and heating maximum temperature (Tao_AUTOHMAX). When the outdoor ambient temperature <Tao_AUTOHMAX, the heat pump operates in the heating mode, and when the outdoor ambient temperature>Tao_AUTOCMIN), the heat pump operates in the cooling mode.If the DHW mode is enabled, the unit runs in Part10-2.DHW mode.

Heat mode+(DHW)   (DHW)   Cool mode+(DHW)

Tao_AUTOHMAX   Tao_AUTOCMIN
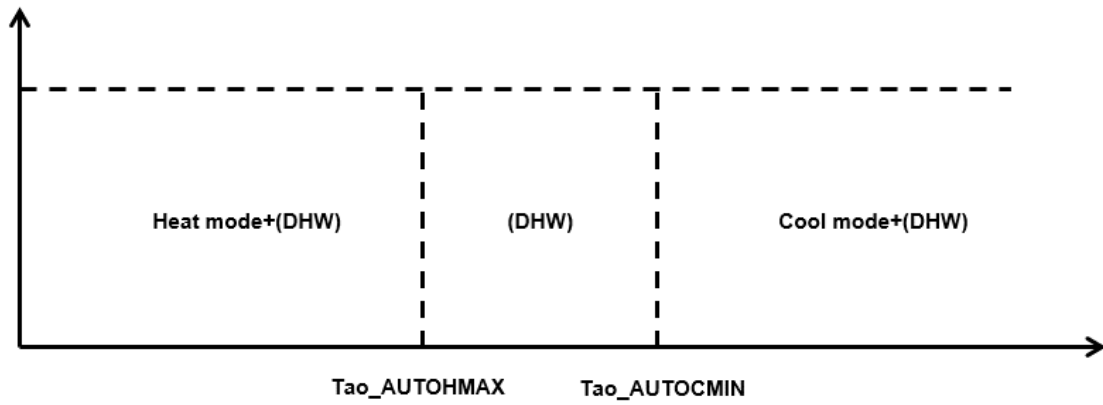
Note: a）In automatic cooling mode, MODBUS allow setting range: 5~25℃

b）In automatic heating mode, MODBUS allow setting range: 25~65℃

7. Disinfect

Set whether the water tank disinfection is enabled or not by the wire controller. When it is set to enable, after reaching the set opening time, the unit automatically turns on the water tank disinfection function, and runs according to the set disinfection water temperature and disinfection time. When it is not enabled, the unit will close the tank disinfection function
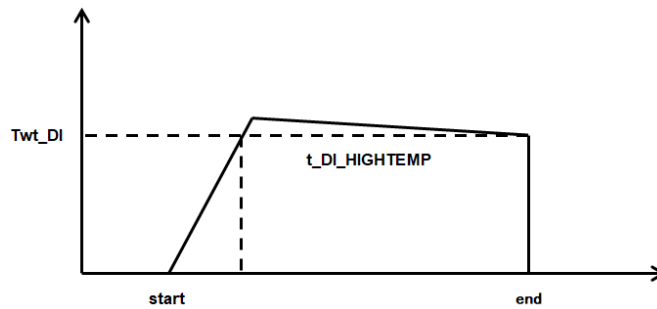
After the disinfection function of the water tank is turned on, the unit runs DHW mode and turns on the electric heating of the water tank, so that the temperature of the water tank rises.;After rising to the disinfection water temperature (Twt_DI)+1℃, the heat pump and the electric heating of the water tank are turned off, and the temperature in the water tank＞the disinfection water temperature (Twt_DI) ,operation time ≥ disinfection duration (t_DI_HIGHTEMP), exit the water tank for disinfection

8. Fast DHW

Set whether to enable the fast DHW function by the wired controller. After entering the fast DHW function, the heat pump operation mode is immediately switched to the DHW mode, and the electric heating of the water tank is turned on immediately. When the water tank temperature ≥ (Tset+1)℃ , exit the fast DHW, the electric heating of the water tank is turned off, and the heat pump returns to normal operation

9. ECO mode

The user can enter the ECO mode by the wired controller. the user selects one of the 8 built-in curves in the wired controller.then enter ECO mode, The heat pump automatically sets the target outlet water temperature TsetAC according to the set terminal type、the selected operating curve and outdoor ambient

temperature

When the user selects the heating mode, there are high water temperature curves and low water temperature curves. If the terminal type selected by the user is only floor heating (FLH), the low water temperature curve of the heating mode will be run, as shown in the figure below. :
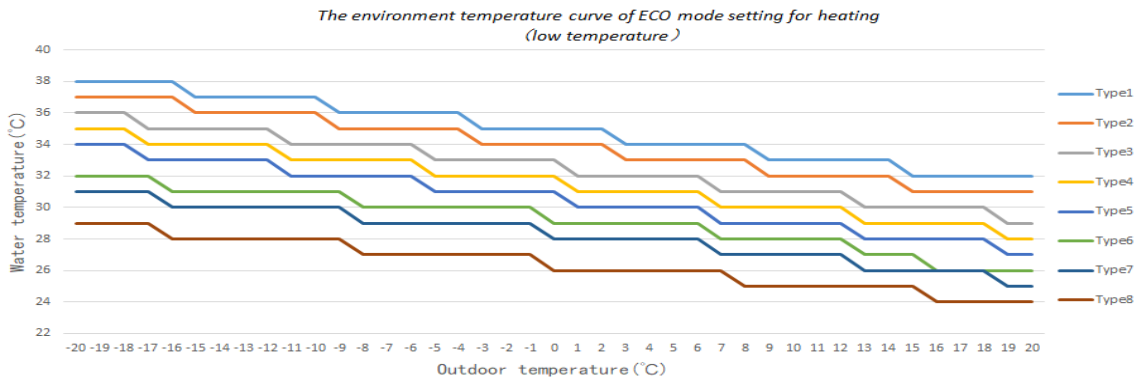
When the user selects the heating mode, if the selected terminal type contains radiator (RAD) or fan coil (FCU), the high water temperature curve of the heating mode will be run, as shown in the figure below：
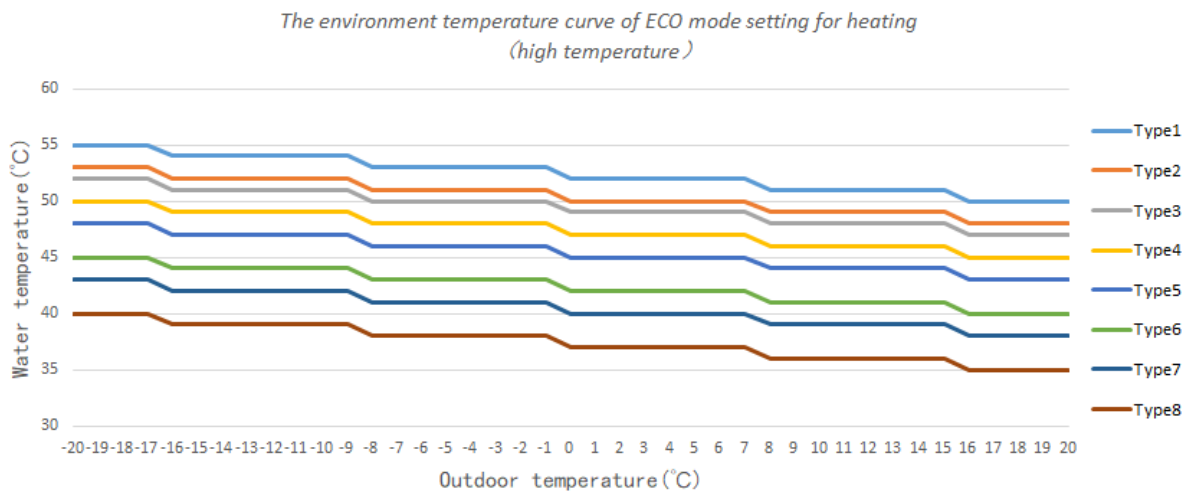
When the user selects the cooling mode, there are two water temperature curves: the high water temperature curve and the low water temperature curve. If the terminal type selected by the user contains floor heating (FLH) or radiator (RAD), the high water temperature curve of the cooling mode will be run, as shown in the figure below. :

The environment temperature curve of ECO mode setting for cooling
(high temperature)
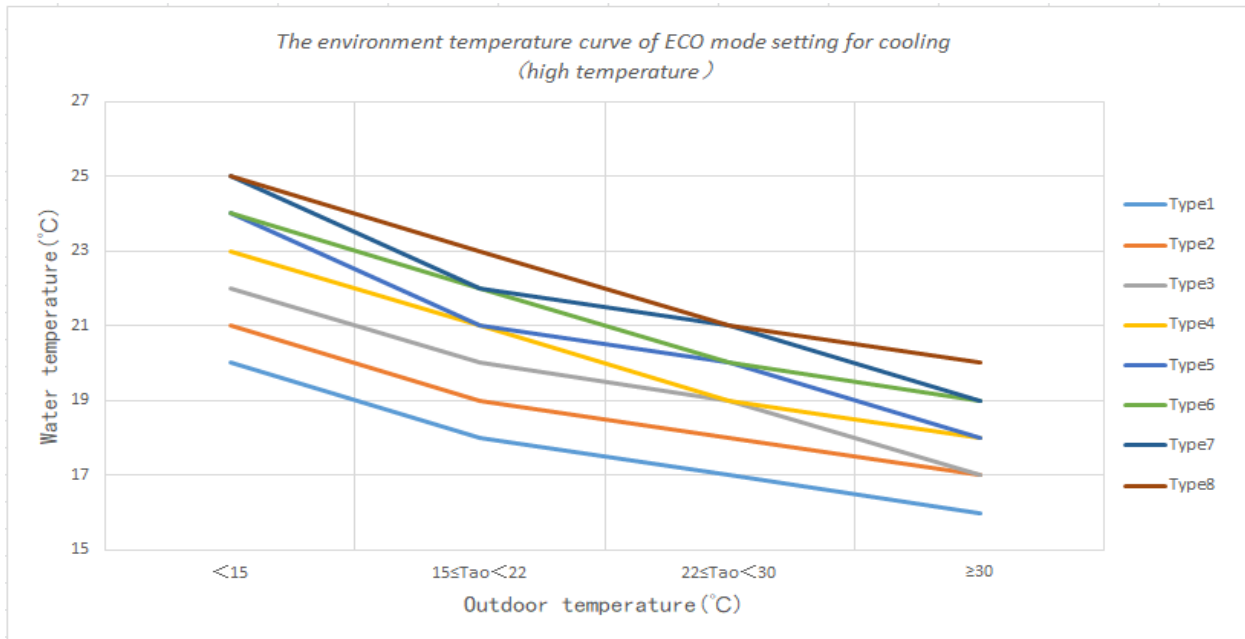
When the user selects the cooling mode, if there is only fan coil (FCU) in the selected terminal type, the low water temperature curve of the cooling mode will be run, as shown in the figure below.：

The environment temperature curve of ECO mode setting for cooling
(low temperature)
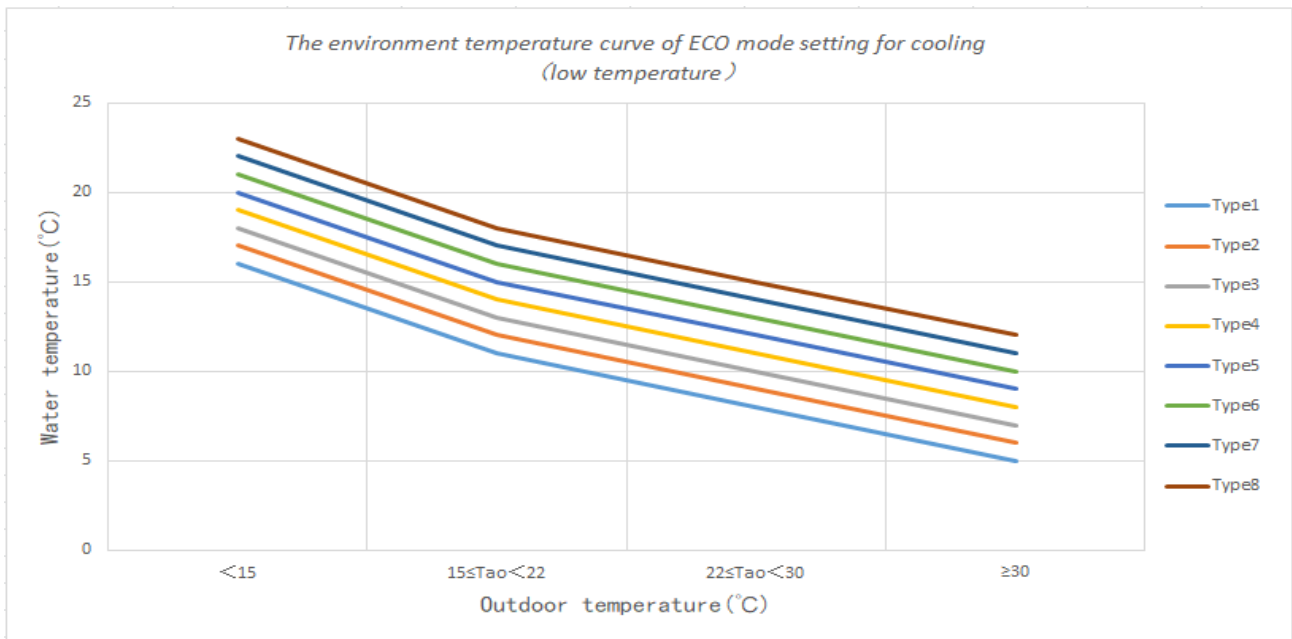
Note：ECO allowable setting range: Type1~Type8; after ECO is set, the automatic water temperature cannot be set.

10. Automatic water temperature function of Hydraulic box

When setting the automatic water temperature, the user can customize the running curve of the water temperature. The user only needs to set two outdoor ambient temperatures and two water temperatures as needed, and then a water temperature curve can be drawn, as shown in the figure.：

In this mode, the heat pump automatically sets the target outlet water temperature according to the drawn
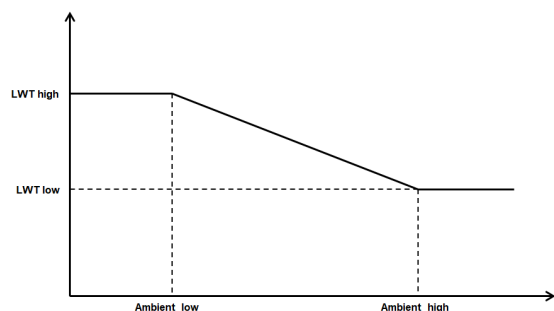
water temperature curve。

Note: Automatic water temperature allowable setting range: Type1~Type9, after automatic water temperature is set, the ECO cannot be set.

11. Mute function

After entering the mute function, according to the selected mute level, limit the maximum operating frequency of the compressor of the outdoor unit and the maximum speed of the fan to achieve mute function。

12. Holiday-away

After entering the holiday mode, the unit operates according to the setting heating outlet water temperature and DHW temperature during the holiday。

13. Holiday- home

After entering the holiday-home function, the unit operates according to the setting operation mode, outlet water temperature, water tank temperature, etc. during the holiday-home period.。

14. Floor Preheating

The floor preheating function is divided into 5 stages, and the heat pump calculates the target outlet water temperature of each stage according to the detected outlet water temperature T0 and the set value of the outlet water temperature(Tset_B_PREHEATING). Calculate the running time of each stage according to the set duration t_fristFH of the floor preheating function。

After entering the floor preheating function, the heat pump operates in the heating mode. When the outlet water temperature reaches the target outlet water temperature of the current stage, the timing starts.；After the temperature is maintained for the running time of the current stage, the unit will enter next stage   until the end of the 5th stage of operation. After the fifth stage, the unit enters the normal operation state。
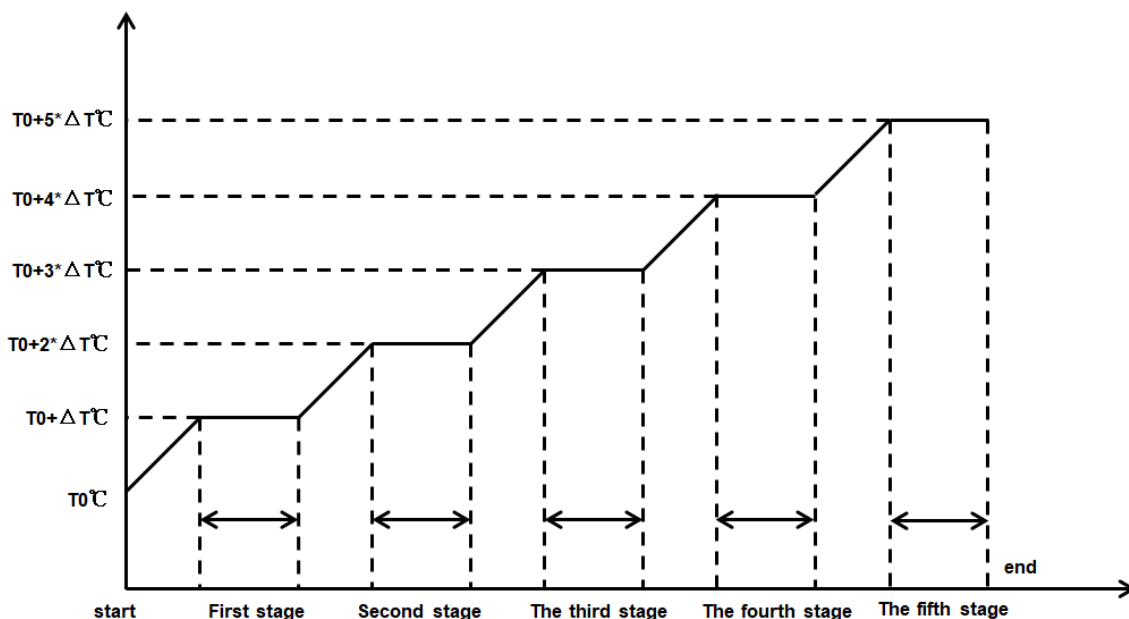
Note: Do not set ECO or automatic water temperature function when the Floor preheating is running

15. Floor drying

The floor drying function is divided into 3 operation cycles: heating cycle, holding cycle and cooling cycle. Each cycle is divided into different stages according to the settings.。

During the heating cycle, the heat pump calculates the target outlet water temperature at each stage according to the outlet water temperature T0, the maximum floor drying water temperature T_DRYPEAK, and the heating cycle duration t_DRYUP. When the outlet water temperature reaches the target outlet water temperature of this stage, the timing starts. After the time meets the duration of the current stage, the next stage is entered. After the heating cycle is completed, the unit will enter holding cycle。

During the holding period, the target outlet water temperature of the heat pump is the maximum dry floor water temperature T_DRYPEAK. After the running time reaches the holding period duration t_HIGHPEAK, the unit will enter the cooling period。

During the cooling cycle, the heat pump calculates the target outlet water temperature for each stage according to the maximum drying water temperature T_DRYPEAK and the duration of the cooling cycle t_DRYDOWN. When the outlet water temperature reaches the target outlet water temperature of this stage, the timing starts. After the time meets the duration of the current stage, the unit will enter next stage. After the cooling cycle is completed,the unit will exit the floor drying mode。
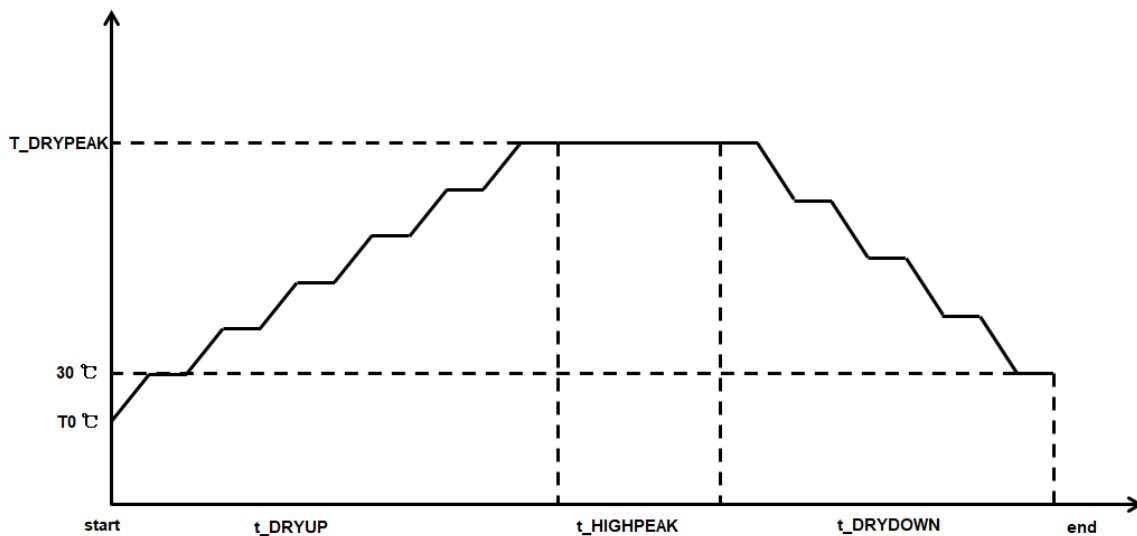
Note: Do not set ECO or automatic water temperature function when the Floor drying is running

16. Auto-restart function

When the auto-restart function is enabled, after power-on, the unit will continue to run according to the operation mode, the set target water temperature before the power-off

17. Manual operation function

Turn on the manual operation function, which can control the switch status of the system circulating water pump, electric heating, water tank electric heating, external circulating water pump, floor heating mixed water pump, solar water pump, domestic hot water (DHW) water pump, electric valve, etc.

18. Automatic exhaust function of water system

After the installation of the water system and the completion of adding water, the automatic exhaust function of the water system can be used to drain the water in the system.。

After entering the automatic exhaust function of the water system, the pump runs for 5 minutes and stops for 1 minute as a cycle.。

The electric valve works as follows: 1) Electric valve MV1 is OFF, electric valve MV2 is ON, and 4 pump cycles are run; 2) Electric valve MV1 is ON, electric valve MV2 is OFF, and 2 pump cycles are run; cyclic operation

19. Heating water by gas water heater

When the heating function of the gas water heater is set to be enabled, set the outdoor ambient temperature Tao_AHS_ON that allows the gas water heater to be turned on by the wired controller. When the outdoor ambient temperature <Tao_AHS_ON and the outlet water temperature of the Hydraulic box < (TsetAC -dTSH_ON), the gas water heater is turned on. When the outdoor ambient temperature ≥ Tao_AHS_ON or the Hydraulic box outlet water temperature Two_B ≥(TsetAC + dTSH_OFF), the gas water heater is turned off。

20. Heating water by Solar

The user can use solar energy to heat water by controlling the start and stop of the solar water pump. There are two control methods: signal control and temperature control.

Temperature control: when solar panel temperature Tsolar > water tank temperature Twt+8°C, and water tank temperature Twt < 65°C, the solar water pump is turned on; when solar panel temperature Tsolar < water tank temperature Twt+3°C or water tank temperature Twt≥70 °C, the solar water pump is turned off.

Signal control: when it is detected that the solar input signal is closed and the water tank temperature Twt<65°C, the solar water pump is turned on; when it is detected that the solar energy input signal is disconnected or the water tank temperature Twt≥70°C, the solar water pump is turned off。

Abbreviation

No	description	Unit	Range	Default	abbreviation
1	Maximum ambient temperature of DHW mode	°C	35~43	43	Tao_DHWMAX
2	Minimum ambient temperature of DHW mode	°C	−25~5	−10	Tao_DHWMIN
3	Delay time of water tank electric heating start after compressor start	min	0~240	30	t_TBH_DELAY
4	the sterilization water temperature	°C	60~70	65	Twt_DI
5	sterilization duration	min	5~60	15	t_DI_HIGHTEMP.
6	sterilization max duration	min	90~300	210	t_DI_MAX
7	the heat pump heating/cooling limit time	min	10~600	30	t_DHWHP_RESTRICT
8	maximum time of DHW mode	min	10~600	90	t_DHWHP_MAX
9	Water pump operation time of DHW mode	min	5~120	5	DHW PUMP RUNNING TIME
10	Maximum outdoor ambient temperature of cooling mode	°C	35~60	43	Tao_CMAX

11	Minimum outdoor ambient temperature of cooling mode	℃	−5~25	10	Tao_CMIN
12	Maximum outdoor ambient temperature of heating mode	℃	20~35	35	Tao_HMAX
13	Minimum outdoor ambient temperature of heating mode	℃	−25~15	−15	Tao_HMIN
14	Automatic water temperature 1 of heating mode	℃	25~60	35	TsetAC_H1
15	Automatic water temperature 2 of heating mode	℃	25~60	28	TsetAC_H2
16	outdoor ambient temperature 1 of heating mode	℃	−25~35	−5	Tao_H1
17	outdoor ambient temperature 2 of heating mode	℃	−25~35	7	Tao_H2
18	Automatic water temperature 1 of cooling mode	℃	5~25	10	TsetAC_C1
19	Automatic water temperature 2 of cooling mode	℃	5~25	16	TsetAC_C2
20	outdoor ambient temperature 1 of cooling mode	℃	−5~52	35	Tao_C1
21	outdoor ambient temperature 2 of cooling mode	℃	−5~52	25	Tao_C2
22	Cooling minimum temperature of auto mode	℃	20~35	25	Tao_AUTOCMIN
23	Heating maximum temperature of auto mode	℃	10~17	17	Tao_AUTOCMAX
24	Delay time of Hydraulic box electric heating start after compressor start	min	20~120	50	t_IBH_DELAY
25	Delay time of gas water heater start after compressor start	min	5~120	30	t_AHS_DELAY
26	outdoor ambient temperature that allows the gas water heater to be turned on	℃	−25~10	−5	Tao_AHS_ON
27	set value of the outlet water temperature of floor preheating	℃	30~45	30	Tset_B_PREHEATING
28	Duration of floor preheating	HOURS	24~72	72	t_fristFH
29	heating cycle of floor drying	days	2~8	8	t_DRYUP
30	holding cycle of floor drying	days	1~5	5	t_HIGHPEAK
31	cooling cycle of floor drying	days	0~5	5	t_DRYDOWN
32	maximum water temperature of floor drying	℃	35~45	45	T_DRYPEAK
33	the floor heating mixed pump on temperature difference	℃	5~10	5	dTwi_FLH_ON
34	the floor heating mixed pump off temperature difference	℃	−10~−5	−5	dTwi_FLH_OFF
35	cooling stop-operating temperature difference	℃	2~10	2	dTSC_OFF
36	cooling start-operating temperature difference	℃	2~10	5	dTSC_ON
37	heating stop-operating temperature difference	℃	2~10	2	dTSH_OFF
38	heating start-operating temperature difference	℃	0~10	5	dTSH_ON
39	Ambient temperature that allows Hydraulic box electric heating to start	℃	−15~10	−5	Tao_IBH_ON
40	Ambient temperature that allows water tank electric heating to start	℃	−5~20	5	Tao_TBH_ON
41	DHW mode start-operating temperature difference	℃	2~10	5	dTSDHW_ON
42	Floor heating mixed pump adjustment cycle	min	1~60	5	TIME_ADJUST
43	Opening time ratio of floor heating mixed pump	%	0~100%	20%	PER_START

21. Stop Operation

The stop operation occurs for one of the following reasons:

1)Abnormal shutdown: in order to protect the compressors, if an abnormal state occurs the system makes a stop with thermos off operation and an error code is displayed on the outdoor unit PCB digital

displays and wired controller.

2)The system stops when the set temperature has been reached,the compressor stop and the water pump will stop after 150 seconds.

22. Crankcase Heater Control

When the power supply is connected (ON), the following two conditions are used for control:

1)When compressor is ON:

When T exhaust ≤55(° C), open the heating belt; when T exhaust > 65(° C), close the heating belt.
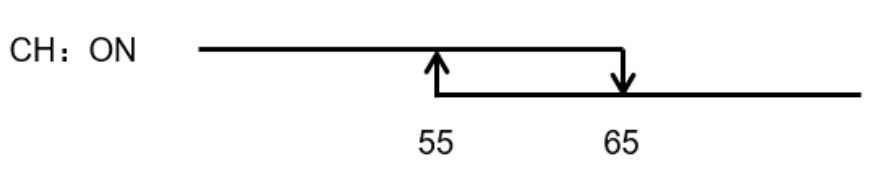
2) When compressor is OFF:

① When T exhaust ＞35(℃),close the heating belt; when T exhaust≤25(℃), open the heating belt.
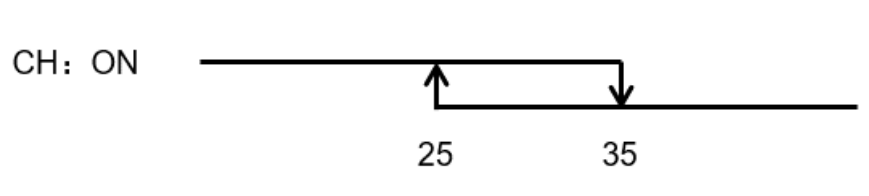
② The downtime of the compressor is more than 168 hours, no matter how much T exhaust is, close the heating belt.

23. Water Pump Control

①The system stops when the set temperature has been reached, the internal water pump will stop after compressor stop 150s.

②When reached the running condition, the internal water pump will turn on immediately.

24. Compressor Startup Delay Control

Before starting the compressor again, it needs to ensure that the minimum shutdown time of the compressor is 3 minutes. This balances the pressure in the refrigerant system and prevents frequent compressor on/off.

25. Compressor Startup Program

Run at 30Hz for 3 minutes, then the compressor frequency is controlled by temperature difference between set temperature and outlet water temperature.

26. Startup Control for Heating and Domestic Hot Water Operation

Component	Wiring diagram label	4-16kW	Control functions and states
Inverter compressor	COMP	●	According to the compressor startup control
DC fan motor	FAN	●	According to ambient temperature
Electronic expansion valve	EXV	●	According to initial steps and ambient

			temperature
Four-way valve	4-WAY	●	ON

27. Startup Control for Cooling Operation

Component	Wiring diagram label	4-16kW	Control functions and states
Inverter compressor	COMP	●	According to the compressor startup control
DC fan motor	FAN	●	According to ambient temperature
Electronic expansion valve	EXV	●	According to initial steps and ambient temperature
Four-way valve	4-WAY	●	OFF

28. Component Control during Normal Operation

28.1 Heating and Domestic Hot Water Operation

Component	Wiring diagram label	4-16kW	Control functions and states
Inverter compressor	COMP	●	According to the compressor startup control
DC fan motor	FAN	●	According to ambient temperature
Electronic expansion valve	EXV	●	According to ambient temperature、 Suction superheat and exhaust superheat control
Four-way valve	4-WAY	●	ON

28.2 Cooling

Component	Wiring diagram label	4-16kW	Control functions and states
Inverter compressor	COMP	●	According to the compressor startup control
DC fan motor	FAN	●	According to ambient temperature
Electronic expansion valve	EXV	●	According to ambient temperature、 Suction superheat and exhaust superheat control
Four-way valve	4-WAY	●	OFF

29. Compressor Output Control

Compressor frequency is controlled by temperature difference between set temperature and outlet water temperature.

30. Compressor Step Control

Normal up and down frequency:1Hz/s

31. Four-way Valve Control

When heating or DHW operation, four-way valve ON; When cooling or defrosting, four-way valve OFF.

32. Electronic Expansion Valve Control

Adjustment range: 0-480PLS

First power-on: Reset the electronic expansion valve

Control adjustment: Determine the initial opening according to the operating mode and outdoor ambient temperature, and then adjust according to the suction superheat and exhaust superheat

33. Outdoor Fan Control

Fan speed index	Fan speed (rpm)		
	4-6Kw	8-10Kw	12-16Kw
W1	350	240	200
W2	450	360	300
W3	550	480	410
W4	650	660	520
W5	750	750	630
W6	820	750	740

34. High Pressure Protection Control

Pd > 4.5MPa, indicating high pressure protection H1

Pd < 3.5MPa, the fault is recovered

High pressure protection occurs for three consecutive times, and the fault is locked. Power off and restart is required to eliminate the fault

35. Low Pressure Protection Control

Pd < 0.05MPa, indicating low pressure protection H1

Pd > 0.15MPa, the fault is recovered

Low pressure protection occurs for three consecutive times, and the fault is locked. Power off and restart is required to eliminate the fault

36. Discharge Temperature Protection Control

Td > 115℃, indicating exhaust temperature protection E3

Td < 90℃, the fault is recovered

37. Compressor Current Protection Control

This control protects the compressor from abnormally high currents.
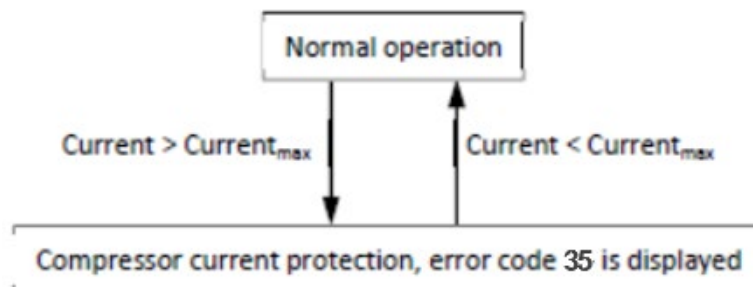
When the compressor current rises above Currentmax the system displays 35 protection and the unit stops running.

When the compressor current drops below Currentmax, the compressor enters re-start control.

38. Voltage Protection Control

This control protects the machine from abnormally high or abnormally low voltages.
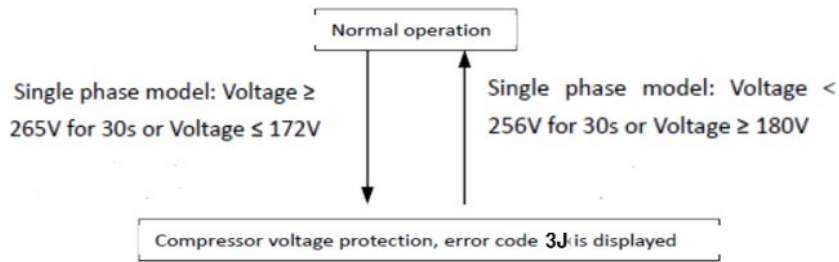
When the voltage of AC power supply is at or above 265V for more than 30 seconds, the system displays 3J protection and the unit stops running. When the phase voltage drops below 265V for more than 30 seconds, the refrigerant system restarts once the compressor re-start delay has elapsed. When the phase voltage is below 172V, the system displays 3J protection and the unit stops running. When the AC voltage rises to more than 180V, the refrigerant system restarts once the compressor re-start delay has elapsed.

39. DC Fan Motor Out of Step Protection Control

The out-of-step protection signal shall be detected immediately after the fan motor is started. Once the out-of-step protection signal is detected, the machine will be stopped immediately and the fan motor will stop immediately. It is recorded as temporary out-of-step protection (no fault is displayed). If the accumulative times exceed 3 times, it will display fan motor out-of-step fault for 3H.

40. Water pipe Anti-freeze Protection Control

Ambient temperature < 3℃, and inlet water temperature or leaving water temperature <10 ℃, run the water pump.

Ambient temperature < 0℃, and inlet water temperature or leaving water temperature <10 ℃, run the Electric heating and compressor.

41. Oil Return Operation

In order to prevent the compressor from running out of oil, the oil return operation is conducted to recover oil that has flowed out of the compressor and into the refrigerant piping.

1) The oil return operation starts when the following condition occurs:

The compressor frequency is less than 50HZ, and the accumulated running time is 4h.

2) The oil return operation ceases when any one of the following three conditions occurs:

① Oil return operation duration reaches 3 minutes.

② Compressor stops.

42. Defrosting Operation

In order to recover heating capacity, the defrosting operation is conducted when the outdoor unit air side heat exchanger is performing as a condenser. The defrosting operation is controlled according to outdoor ambient temperature, air side heat exchanger refrigerant outlet temperature

and the compressor running time.

Component	Wiring diagram label	4-16kW	Control functions and states
Inverter compressor	COMP	●	According to the compressor startup control
DC fan motor	FAN	●	OFF
Electronic expansion valve	EXV	●	480pls
Four-way valve	4-WAY	●	OFF

43. Fast DHW Operation

Component	Wiring diagram label	4-16kW	Control functions and states
Inverter compressor	COMP	●	According to the compressor startup control
DC fan motor	FAN	●	According to ambient temperature
Electronic expansion valve	EXV	●	According to ambient temperature、 Suction superheat and exhaust superheat control
Four-way valve	4-WAY	●	ON
Tank electric heater	TBH	●	ON

44. Smart grid control

Unit adjusts the operation according to different electric signals to realize energy saving.

Free electric energy signal: DHW mode turn on, the setting temperature will be changed to 70 ℃ automatically, and the TBH operate as below:T5<69. the TBH is on, T5≥70, the TBH is off. The unit operates in cooling/heating mode as the normal logic.

Valley energy signal: unit operates according to users' need.

Peak energy signal: only available for cooling or heating mode and user can set the maximum operating time.

45. Buffer tank temperature control

Buffer tank temperature sensor is used to control on/off of heat pump.

Once the heat pump stops, internal pump stops to save energy and then buffer tank provides hot water for space heating.

In addition, buffer tank can store energy to provide hot water whilst heat pump runs heating/cooling mode, which can reduce the host selection and the initial investment.

Part11 PCB Instruction

1. ODU electrical control box

ACHP-H04/4R3HA-O；　ACHP-H06/4R3HA-O：
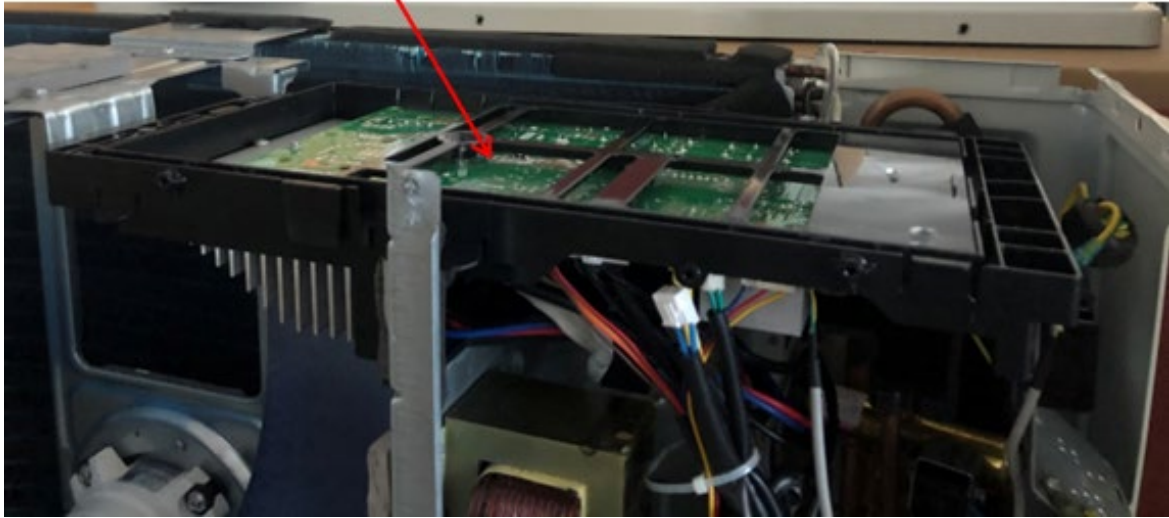
ACHP-H08/4R3HA-O；ACHP-H10/4R3HA-O：
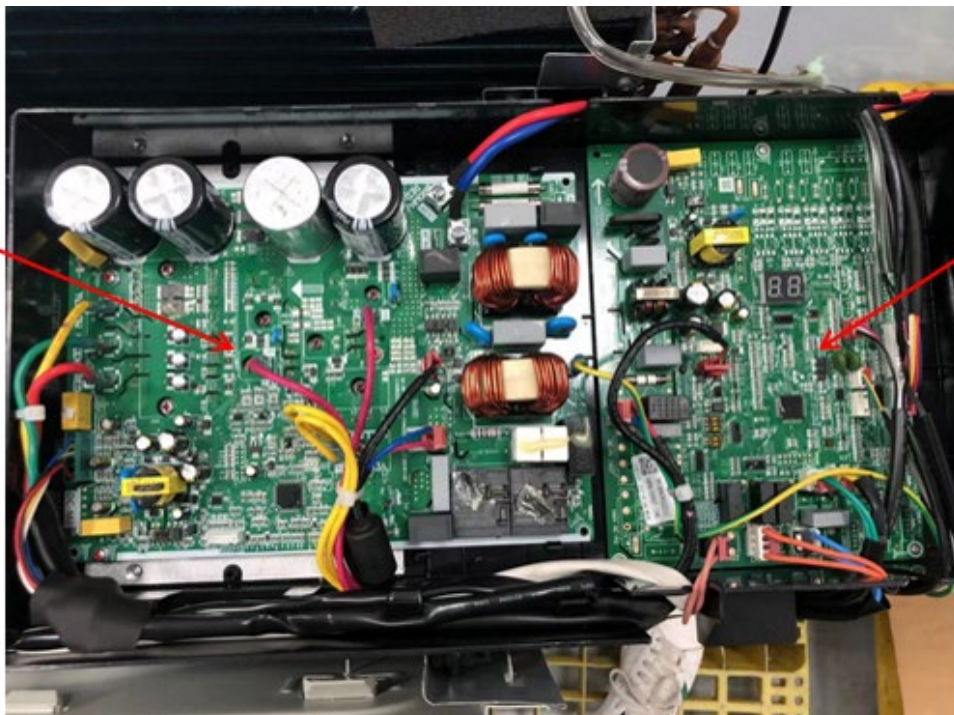
ACHP-H12/5R3HA-O；ACHP-H14/5R3HA-O；ACHP-H16/5R3HA-O：
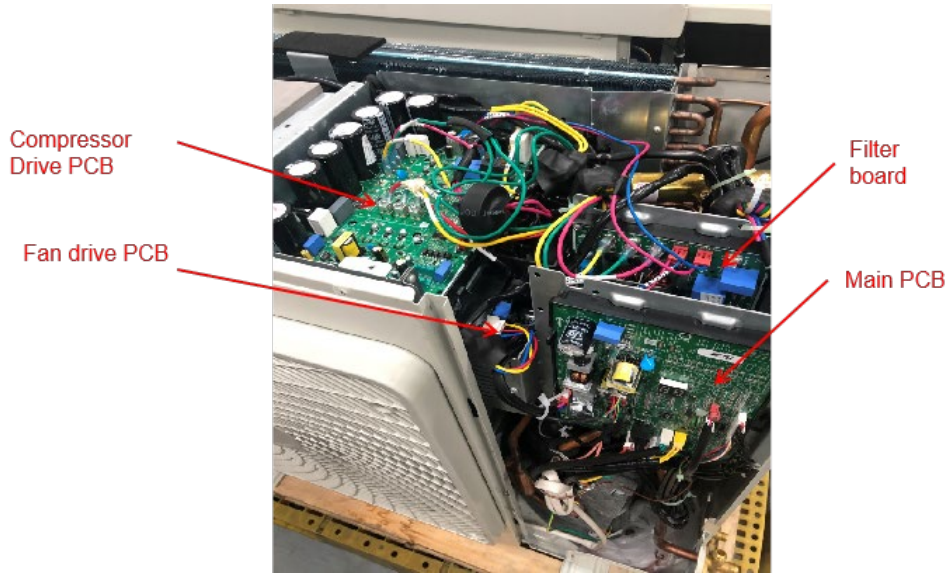
2. ODU control PCB

2.1 4-6kW (ACHP-H04/4R3HA-O、ACHP-H06/4R3HA-O)

11222542000150　　**Main PCB**　　CJ 控制板 RSW-BP-DC4-2P-R32-E1(SY
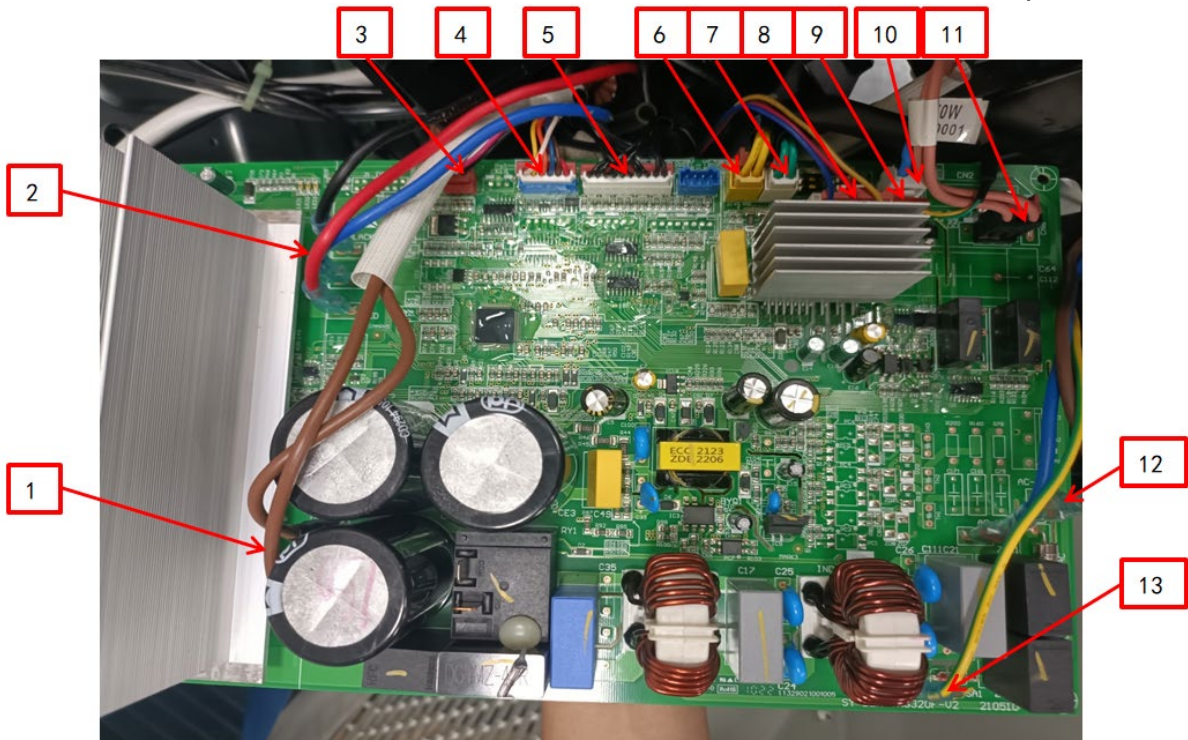
Num.	Remark	Num.	Remark
1	Reactor	8	Fan motor
2	Compressor line UVW	9	Communication line between indoor unit and out door unit
3	High pressure sensor	10	Four-way valve
4	Electronic expansion valve	11	Chassis electric heating
5	Temperature Sensor	12	Power supply
6	High switch	13	Ground lead

7	Low switch		

2.2 8-10kW(ACHP-H08/4R3HA-O、ACHP-H10/4R3HA-O)

11222543000075　Compressor drive PCB　CJ 模块板 QD-12321F-EKTM225D63UFZR-1(SY)
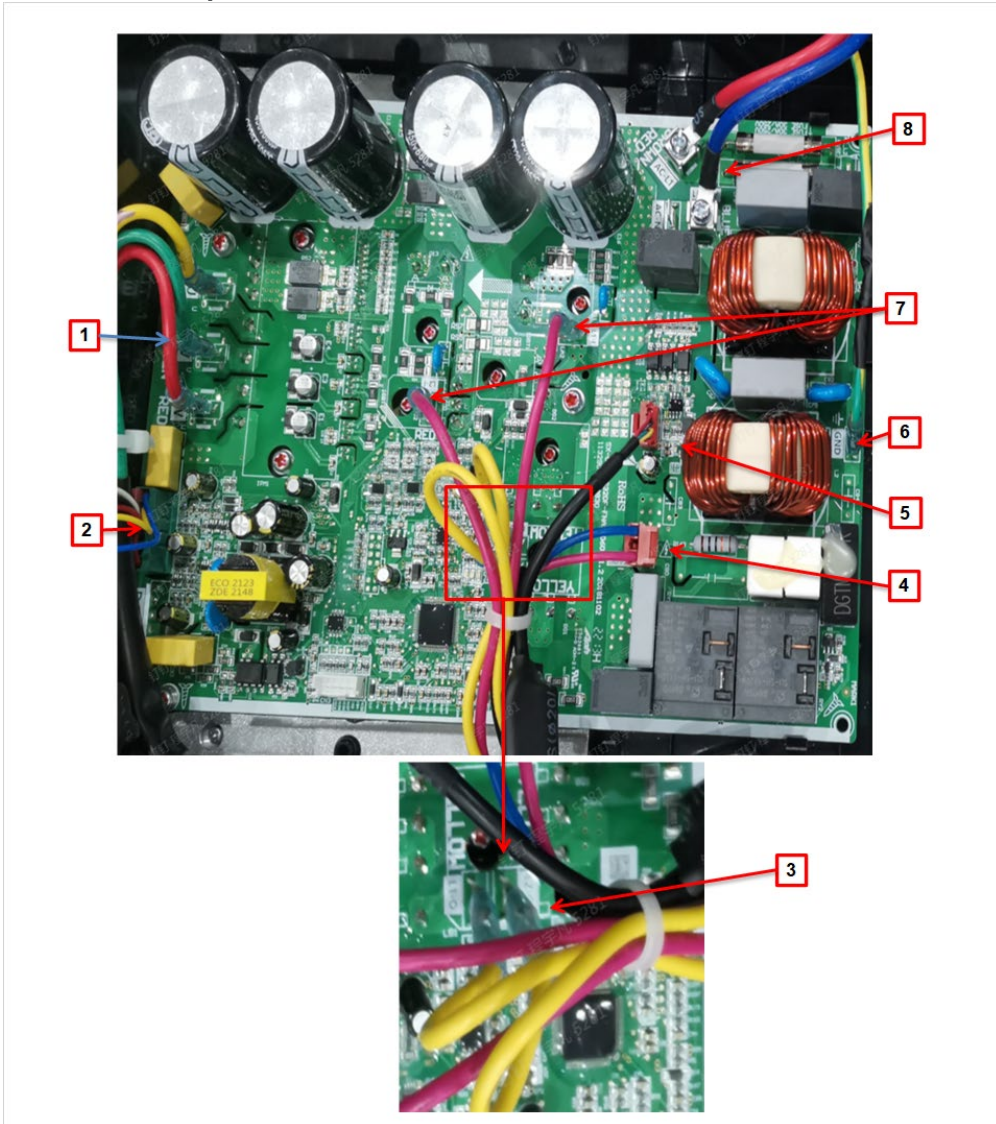
Num.	Remark	Num.	Remark
1	Compressor line UVW	5	Communication line between driver board and main PCB
2	Fan motor	6	Driver board ground wire
3	Reactor (yellow wire)	7	Reactor (red wire)
4	Driver board -main PCB power cable	8	Terminal board -driver board LN power cable

11222542000146 Main PCB   **CJ 控制板 RSW-BP-DC45P 热泵-E1(SY)**
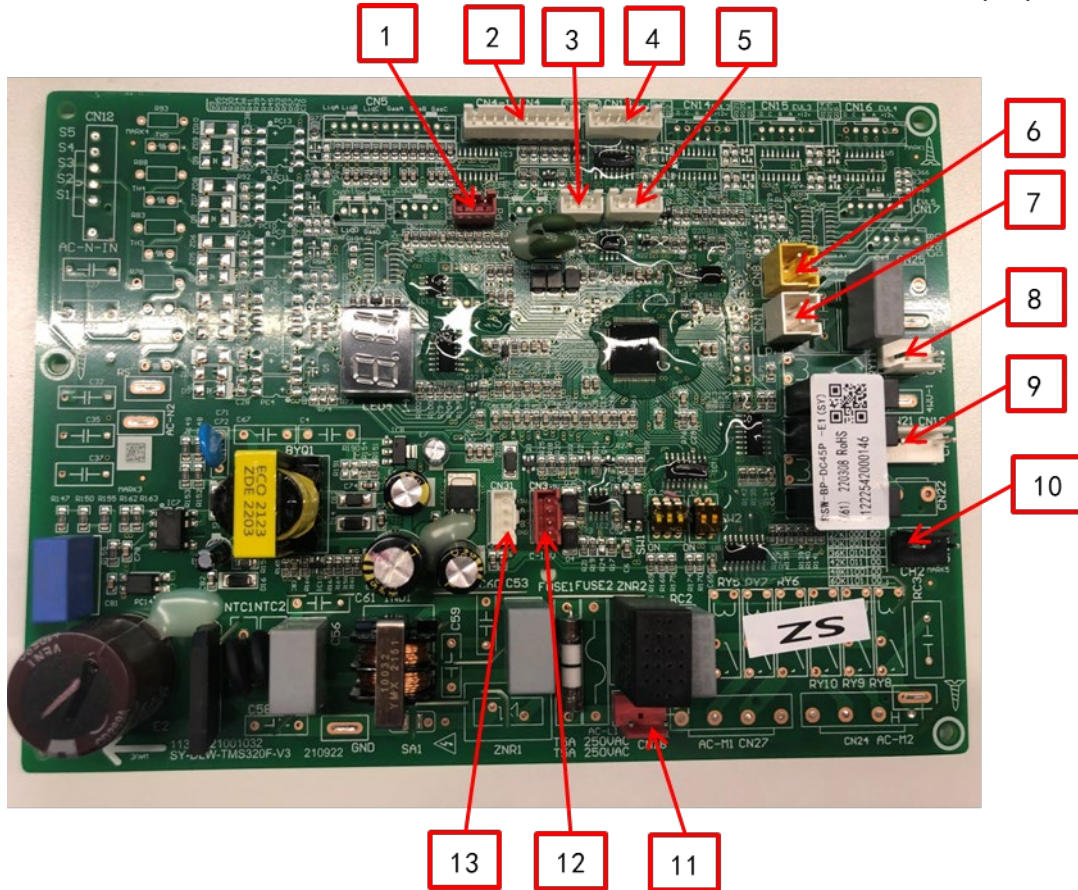
Num.	Remark	Num.	Remark
1	High pressure pressure sensor	7	Low pressure switch
2	Temperature Sensor	8	Four-way valve
3	Internal and external communication	9	Oil temperature heating
4	Electronic expansion valve	10	chassis heating
5	reserved	11	Main PCB power supply
6	High pressure switch	12	Main PCB and fan driver communication
		13	Reserved

2.3 12-16kW(ACHP-H12/5R3HA-O、ACHP-H14/5R3HA-O、ACHP-H16/5R3HA-O)

11222543000074   Fan drive PCB
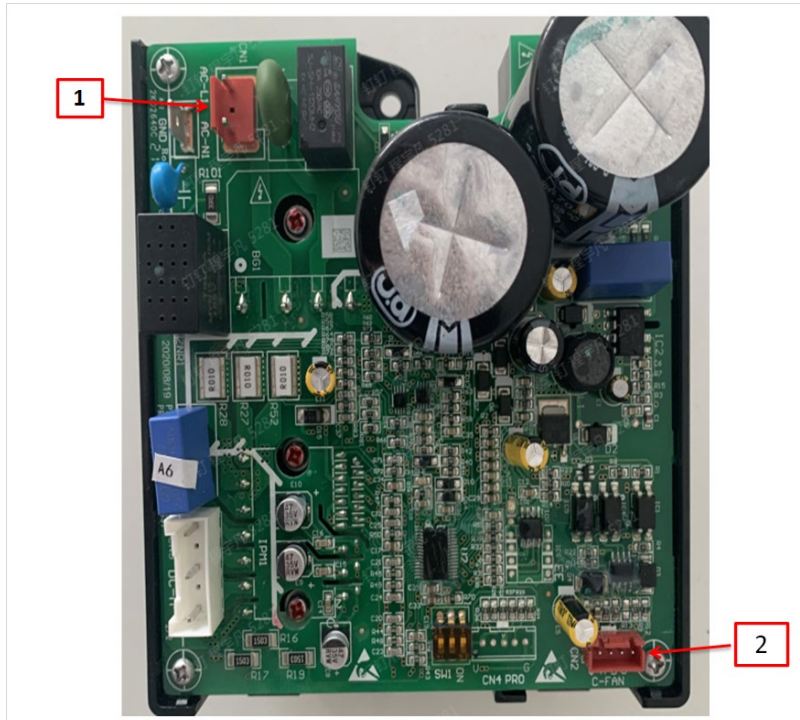
Num.	Remark	Num.	Remark
1	Filter board and fan driver PCB power cable	2	Communication between the main PCB and the fan driver PCB

11222548000006   Filter PCB
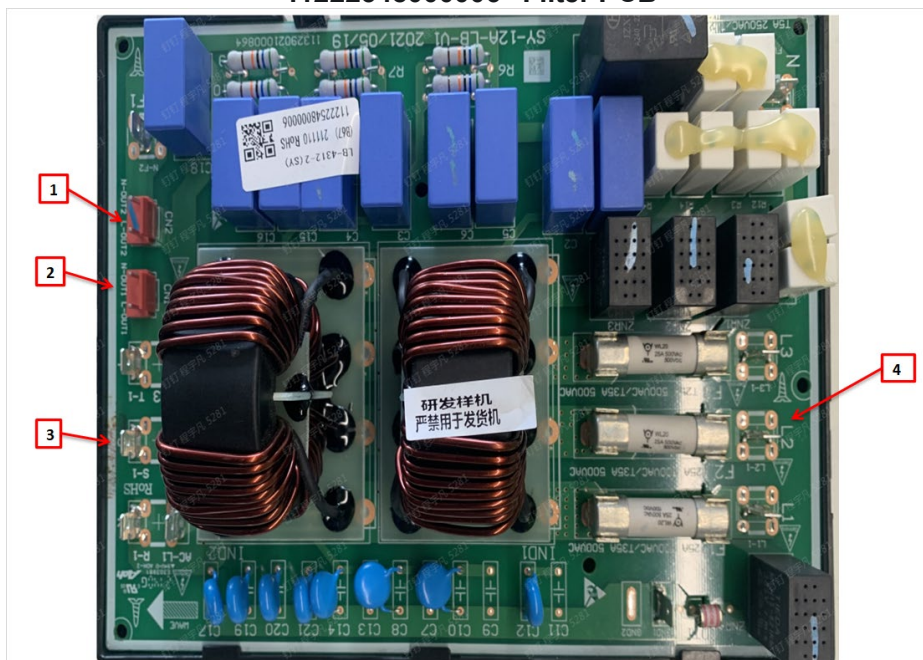
Num.	Remark	Num.	Remark
1	Filter-compressor LN power wire	3	Filter-compressor 3 PHASE power wire,L3/L2/L1;red/green/yellow from top to bottom
2	Filter- Fan-main PCB LN power wire	4	Terminal board- Filter 3 PHASE power wire,L3/L2/L1;red/green/yellow from top to bottom

11222543000073 Compressor drive PCB :
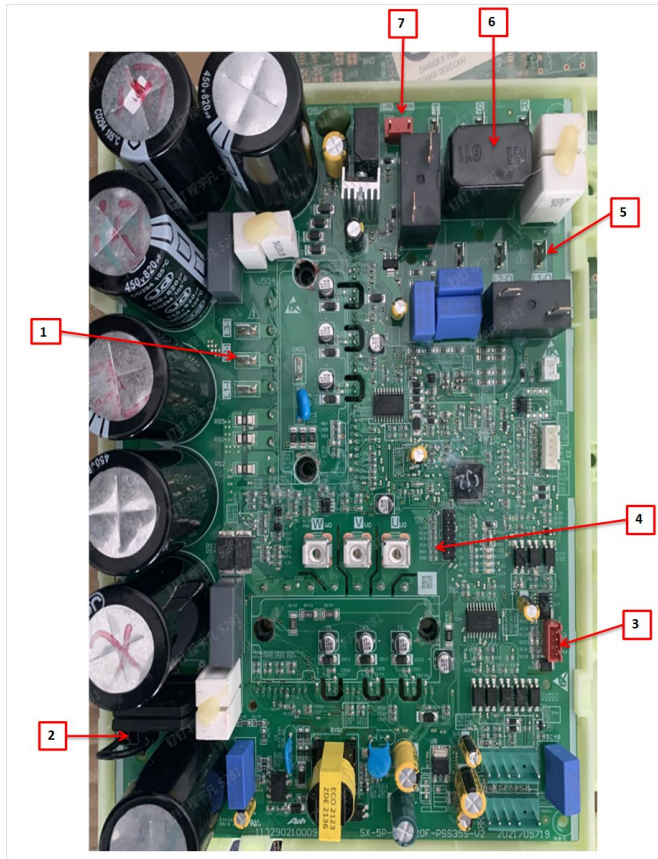
Num.	Remark	Num.	Remark
1	Reactor Insert,L3/L2/L1; red/green/yellow from top to bottom	5	Reactor Insert, L3/L2/L1;red/green/yellow from left to right
2	Reactor reserved	6	Filter- **Compressor drive** 3 PHASE power wire ,T/S/R ,red/green/yellow from left to right
3	Main PCB- **Compressor drive communication wire**	7	Filter- **Compressor drive** LN power wire
4	**Compressor wire,** red/green/yellow from left to right		

11222542000146 Main PCB
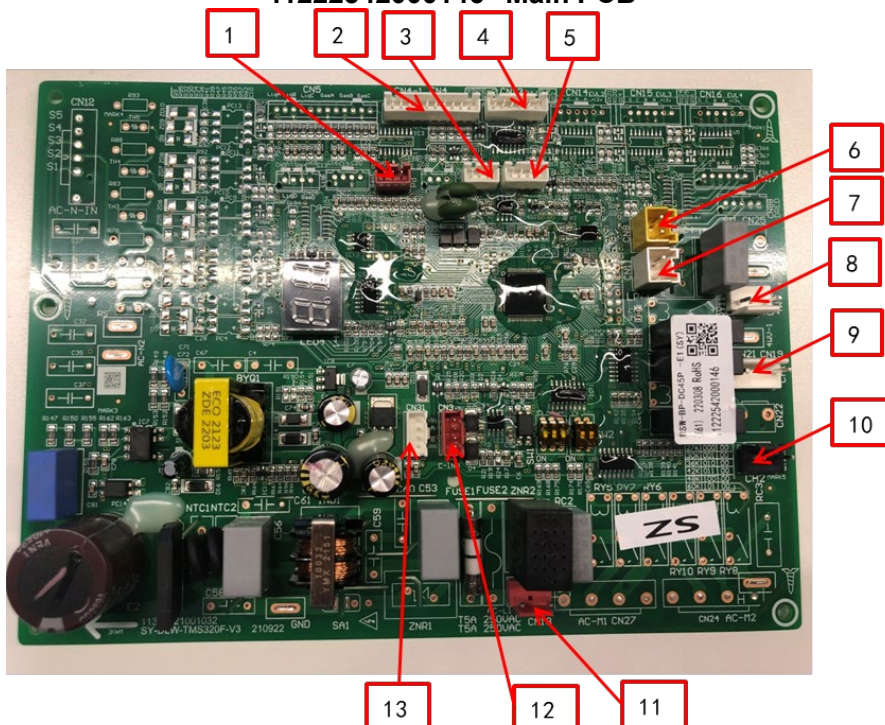
Num.	Remark	Num.	Remark
1	High pressure pressure sensor	7	Low pressure switch
2	Temperature Sensor	8	Four-way valve
3	Internal and external communication	9	Oil temperature heating
4	Electronic expansion valve	10	chassis heating
5	4G module (reserved)	11	Main PCB power supply
6	High pressure switch	12	Main PCB and fan driver communication

3. Hydraulic box electrical control box

ACHP-H04/4R3HA-I；ACHP-H06/4R3HA-I；
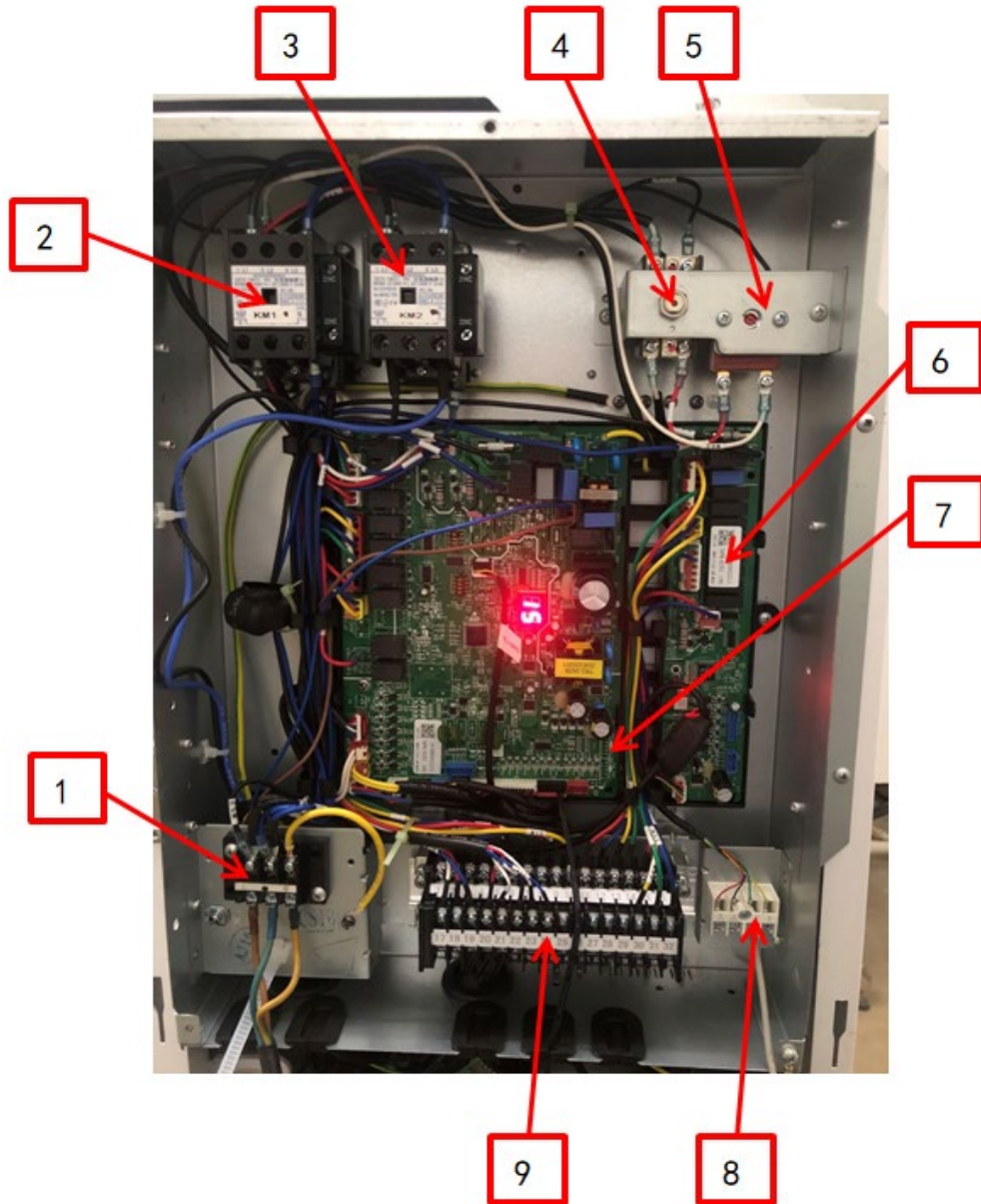
Num.	Remark	Num.	Remark
1	Power supply terminal	6	Extended PCB
2	Power supply relay	7	Main PCB
3	Electric heating relay	8	Communication terminal
4	Electric heater thermal protector (manual recovery)	9	Load wiring terminal
5	Electric heater thermal protector (automatic recovery)		

ACHP-H08/5R3HA-I；ACHP-H10/5R3HA-I
ACHP-H12/5R3HA-I；ACHP-H14/5R3HA-I；ACHP-H16/5R3HA-I
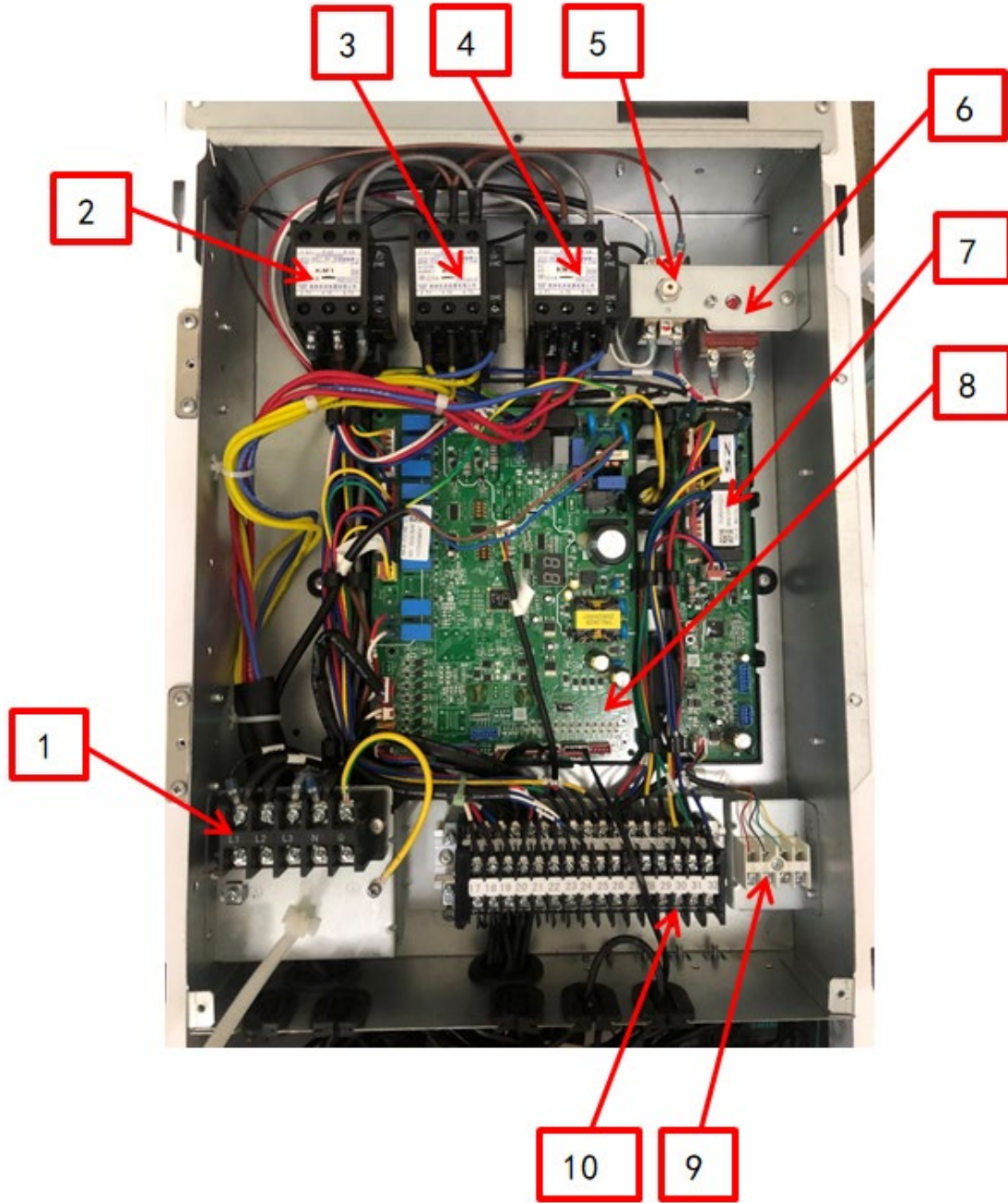
Num.	Remark	Num.	Remark
1	Power supply terminal	6	Electric heater thermal protector (automatic recovery)
2	Power supply relay	7	Expansion PCB
3	Electric heating relay (3kW)	8	Main PCB
4	Electric heating relay (6kW)	9	Communication terminal
5	Electric heater thermal protector (manual recovery)	10	Load wiring terminal

4. Hydraulic box control PCB

ACHP-H04/4R3HA-I；ACHP-H06/4R3HA-I；ACHP-H08/5R3HA-I；ACHP-H10/5R3HA-I

ACHP-H12/5R3HA-I；ACHP-H14/5R3HA-I；ACHP-H16/5R3HA-I

Code：11222542000147　　Main PCB
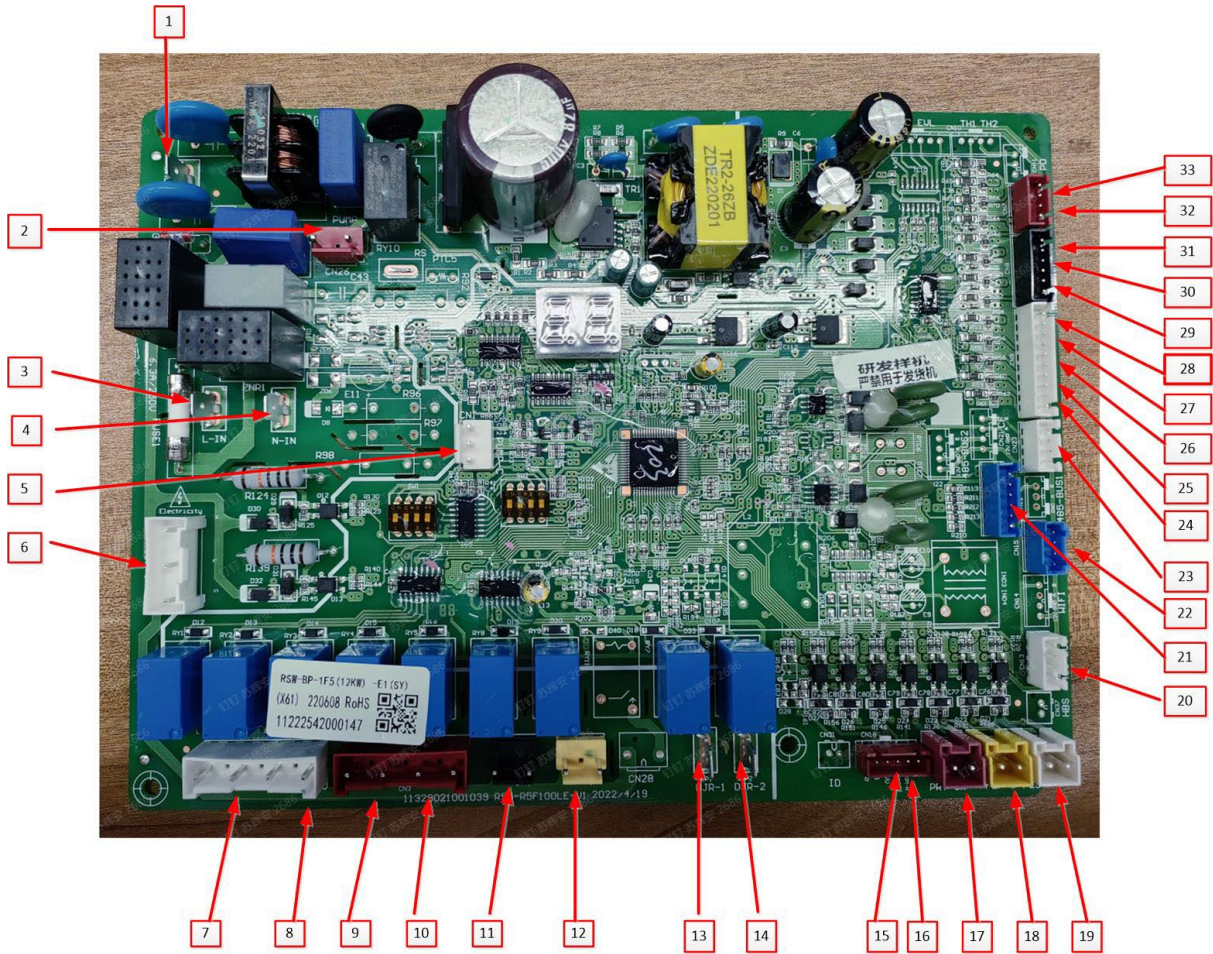
Num.	Abbreviation	Remark	Num.	Abbreviation	Remark
1	/	ground wire	17	/	Electric heating protection switch
2	/	Inverter water pump power wire	18	AFLP	low voltage switch for Antifreeze
3	/	live wire	19	FLS	target flow switch
4	/	Neutral wire	20	/	Communication between IDU &ODU
5	/	Inverter water pump signal wire	21	/	WiFi
6	/	reserved	22	/	Wired controller
7	3W	Three-way valve	23	/	expanding board
8	2W	two-way valve	24	TWO1	Outlet water Temp.
9	KM4	water pump 1	25	TWO2	Electric heating outlet water Temp.
10	KM5	water pump 2	26	TWI	Inlet water Temp.
11	KM6	Electric heating for water tank	27	TICO	Indoor coil outlet temperature
12	KM7	antifreeze heating belt	28	TICI	Indoor coil inlet temperature
13	EH	electric heating 1	29	TWT-BT	Buffer tank Temp.
14	EH	electric heating 2	30	TWT-FLH	Floor heating inlet Temp.
15		Smart grid switch	31	TWT	Hot water tank Temp.
16		reserved	32	ROOM	Room Temp.

			33	TSOLAR	Solar panels Temp.

Code：11329021001050   expansion board
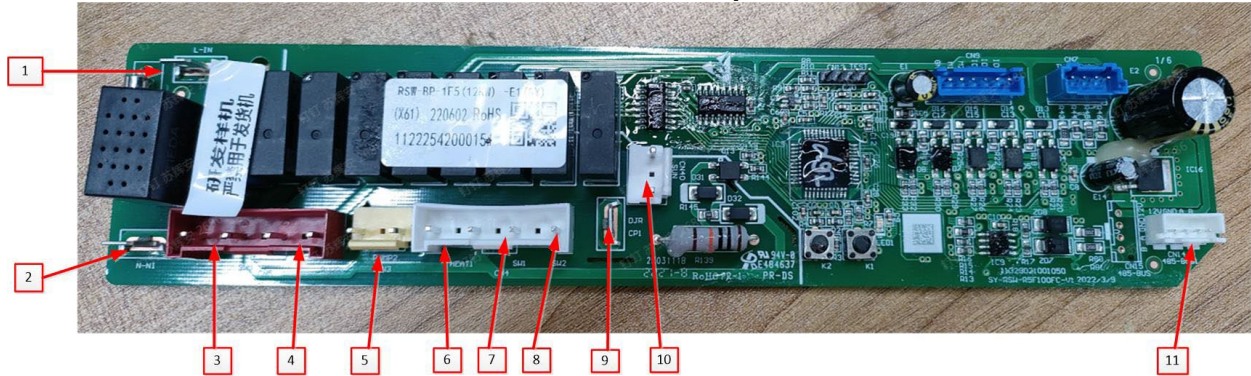
Num.	Remark	Num.	Remark
1	live wire	7	Defrost signal
2	Neutral wire	8	compressor signal
3	Three-way valve	9	Electric heating
4	solar water pump	10	solar switch
5	Floor heating mixing water pump	11	Communicate with the water module
6	Additional heat		

Note: If heat pump is connected smart grid, after open smart grid function when first power on, detect the first 10s of the smart grid signal, the data may not be read in time, please wait for the data update.

Part12 Trouble Shooting

1. ODU Error Code Table

CODE	Fault code description
C1	Environment temperature sensor Tao fault
C2	Defrost temperature sensor T-def fault
C3	Discharge temperature sensor failure
C6	Suction temperature of compressor failure
J2	Communication error between ODU and IDU
J3	The communication between main PCB and compressor drive module failure
J4	The communication between main PCB and DC fan motor drive module failure
H1	High pressure switch protection
H4	Low pressure switch protection
39	drive module high temperature shutdown protection
E3	Compressor discharge temperature too high shutdown protection
FH	Compressor discharge overheat too low shutdown protection
E1	Fault of four-way valve
F1	High pressure sensor "Pd" failure
F3	【Pd】High pressure too high
31	Fault with the inverter module protection
32	Compressor drive hardware protection
33	Compressor drive software protection
35	Fault with the over electric current protection
36	Fault with the over-voltage or low-voltage protection
37	Fault with the modular temperature sensor on the ODU
3E	Compressor drive AC current input protection
3F	Compressor drive PFC hardware protection
3H	Fault with fan motor of outdoor unit
J7	Fault with the outdoor unit EEPROM

2. Hydraulic box Error code table

CODE	Fault code description
93	Final outlet water temp. sensor (TWO2) fault
94	Inlet water temp. sensor (TWI) fault
95	Outlet water temp. sensor (TWO1) fault
96	Water tank temp. sensor (TWT) fault
A3	Refrigerant liquid temp. sensor (TICI) fault
A4	Refrigerant gas temp. sensor (TICO) fault
7E	Floor heating water inlet temp. sensor (TWI_FLH) fault
7F	Solar temp. sensor (T-solar) fault
AA	Communication fault between controller and IDU
A9	Communication fault between ODU and IDU
7D	Communication fault between main PCB and expansion board
A7	Water flow fault
98	Early closing fault of water flow switch
A5	Water pump fault
97	Anti-freezing low pressure switch (AFLP) protection
AF	Electric heating overheat protection
A8	EE fault

Note：please refer to the trouble shooting PPT for more information

3. Failure analysis

3.1 【C1】【C2】【C3】【C6】 Temperature sensor fault troubleshooting

3.1.1   Description

- C1 indicates an ambient temperature sensor error

- C2 indicates a defrost temperature sensor error

- C3 indicates a discharge temperature sensor error

- C6 indicates a suction pipe temperature sensor error

3.1.2   Error logic

- Error appear：The sensor connection port be disconnected and lasts for 10s, compressor stops running, error code is displayed on ODU&IDU main PCB and the user interface of controller

- Error disappear：The sensor connection port be connected and lasts for 10s, compressor restoration，error code disappear

3.1.3   Procedure

```
          ┌─────────────────────┐
          │   C1/C2/C3/C6        │
          └──────────┬──────────┘
                     │
          ┌──────────▼──────────┐   YES   ┌────────────────────────┐
          │ Whether the         ├────────▶│ Ensure the sensor is   │
          │ connection of sensor │         │ connected properly     │
          │ is loose            │         └────────────────────────┘
          │ (pipe and PCB       │
          │  connector)         │
          └──────────┬──────────┘
                     │ NO
          ┌──────────▼──────────┐   YES   ┌────────────────────────┐
          │ Temperature sensor  ├────────▶│ Replace the sensor     │
          │ has short-circuited │         └────────────────────────┘
          │ or failed           │
          └──────────┬──────────┘
                     │ NO
          ┌──────────▼──────────┐
          │ Replace refrigerant │
          │ system main PCB     │
          └─────────────────────┘
```
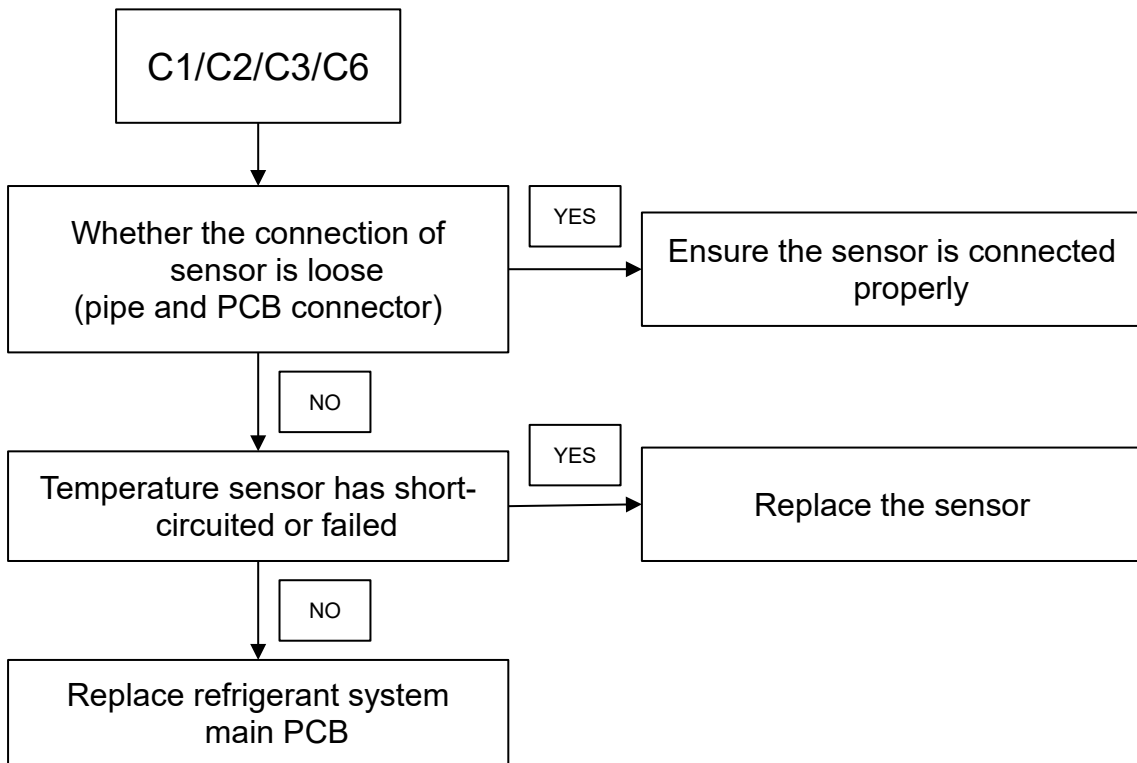
3.2 【J2】【J3】【J4】Communication fault troubleshooting

3.2.1   Description

- J2 indicates a communication error between ODU and IDU
- J3 indicates a communication error between main PCB and compressor drive module error
- J4 indicates a communication error between main PCB and DC fan motor drive module error

3.2.2   Error logic

- ODU PCB detect no signal from IDU side, then will appear J2
- No signal between main PCB and compressor drive module, then will appear J3
- No signal between main PCB and fan drive module, then will appear J4

3.2.3   Procedure

【J2】Communication error between ODU and IDU
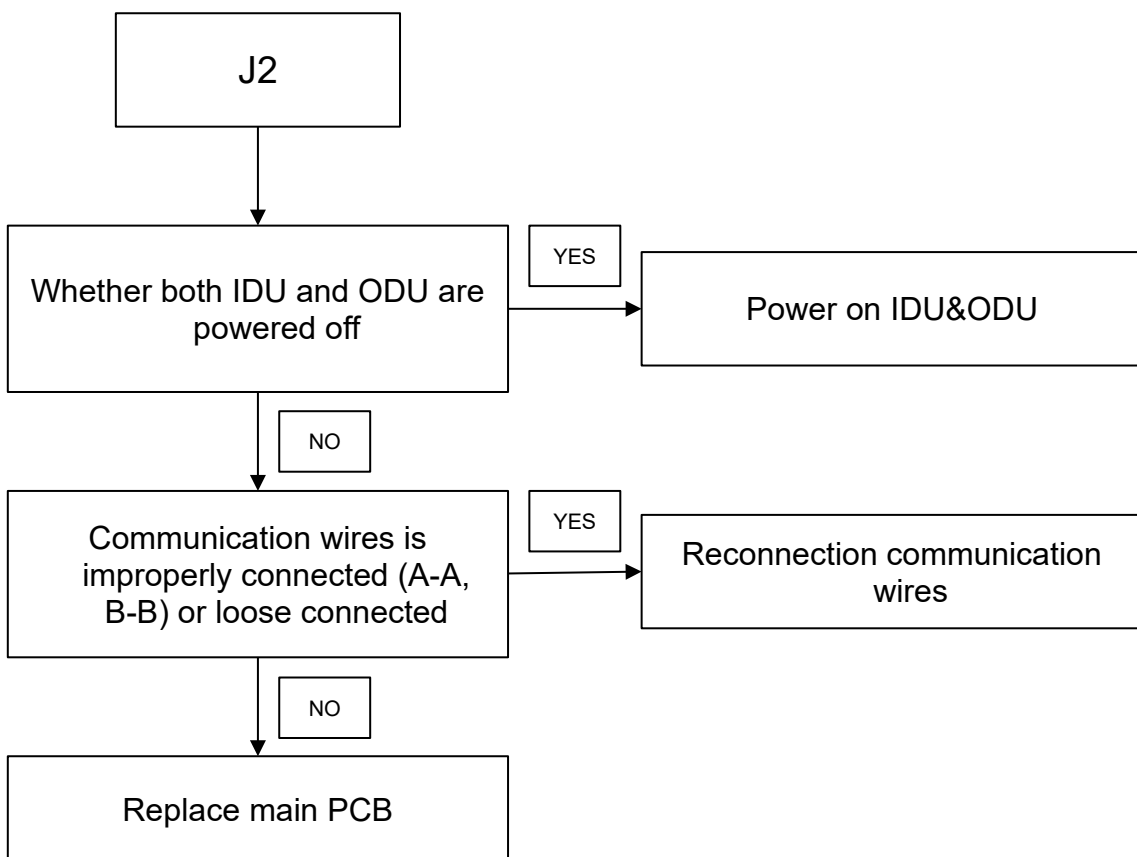
```
                    ┌─────────────────┐
                    │                 │
                    │       J2        │
                    │                 │
                    └────────┬────────┘
                             │
                             ▼
        ┌──────────────────────────┐   YES   ┌──────────────────────────┐
        │  Whether both IDU and ODU │────────▶│    Power on IDU&ODU      │
        │        powered off        │         │                          │
        └──────────────┬───────────┘         └──────────────────────────┘
                       │ NO
                       ▼
        ┌──────────────────────────┐   YES   ┌──────────────────────────┐
        │   Communication wires is  │────────▶│ Reconnection communication│
        │  improperly connected (A-A,│        │           wires           │
        │   B-B) or loose connected │         │                          │
        └──────────────┬───────────┘         └──────────────────────────┘
                       │ NO
                       ▼
        ┌──────────────────────────┐
        │     Replace main PCB      │
        └──────────────────────────┘
```

【J3】The communication between main PCB and compressor drive module failure
【J4】The communication between main PCB and DC fan motor drive module failure

```
┌─────────────┐
│    J3/J4    │
└─────────────┘
       │
       ▼
┌──────────────────────┐  YES  ┌──────────────────────┐
│ Whether the connection│─────▶│ Ensure the plug is   │
│ plug is loose or not  │       │ connected properly   │
└──────────────────────┘       └──────────────────────┘
       │ NO
       ▼
┌──────────────────────┐  YES  ┌──────────────────────┐
│ Whether the compressor│─────▶│ Replace a new        │
│ drive module and fan  │       │ compressor drive     │
│ drive module is       │       │ module or a fan      │
│ failure or not        │       │ drive module         │
└──────────────────────┘       └──────────────────────┘
       │ NO
       ▼
┌──────────────────────┐
│  Replace main PCB    │
└──────────────────────┘
```
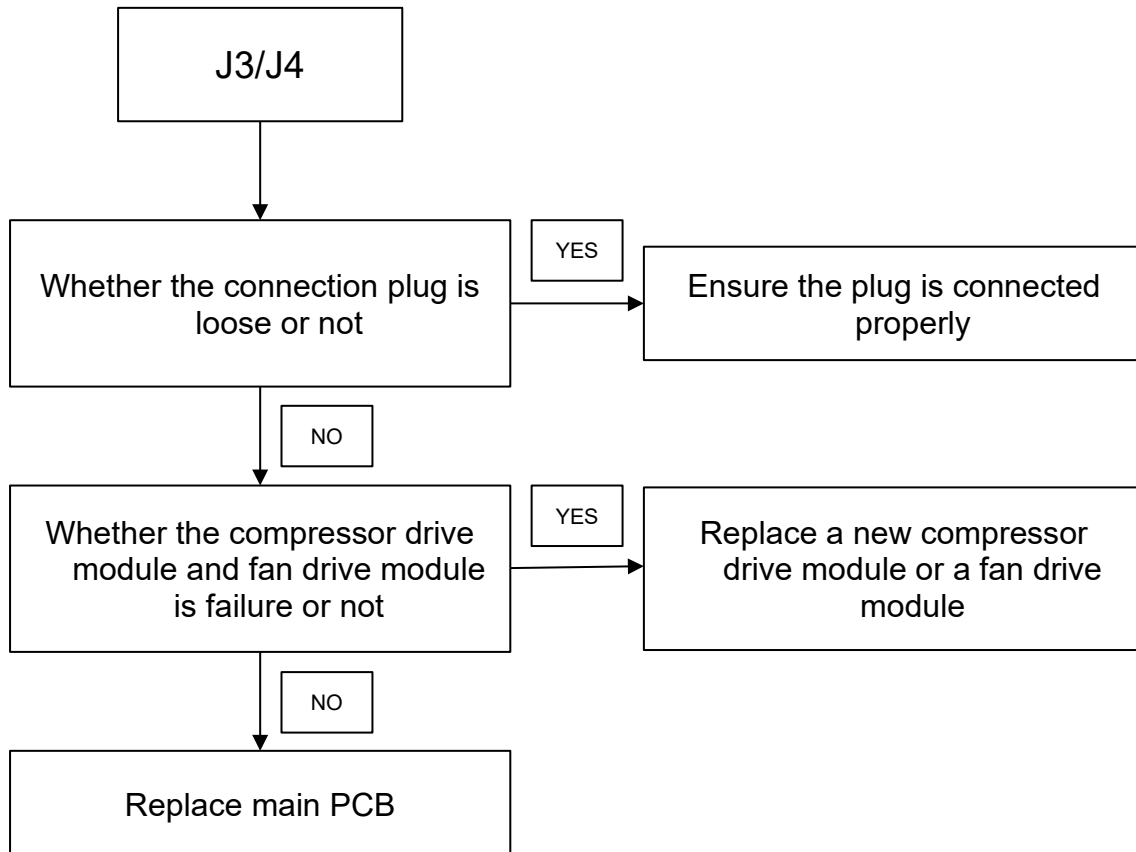
3.3 【H1】【H4】Pressure switch fault troubleshooting

3.3.1 Description

● H1 indicates high pressure switch protection

● H4 indicates low pressure switch protection

3.3.2 Error logic

● Error appear：High / Low pressure switch be disconnected and lasts for 3s

● Error disappear：the error will disappear under the situation which the switch be connected more than 10s during first 2 times within 1 hour

● Error locked：the error will be locked under the situation which the switch be disconnected the 3

times within 1h, it is necessary to repower to clean the error

3.3.3 Procedure

【H1】High pressure Switch Protection

```
                    ┌─────────────┐
                    │     H1      │
                    └──────┬──────┘
                           │
                           ▼
    ┌──────────────────────────┐      ┌──────┐      ┌──────────────────────────┐
    │   High pressure switch    │      │ YES  │      │ Ensure the switch is      │
    │   connection or pressure  │─────▶│      │─────▶│ connected properly        │
    │   sensor connection on    │      └──────┘      │                           │
    │   refrigerant system      │                    └──────────────────────────┘
    │   main PCB is loose       │
    └──────────┬───────────────┘
               │  ┌──────┐
               │  │  NO  │
               ▼  └──────┘
    ┌──────────────────────────┐      ┌──────┐      ┌──────────────────────────┐
    │   Pressure sensor has     │      │ YES  │      │ Replace the pressure      │
    │   short-circuited or      │─────▶│      │─────▶│ sensor                    │
    │   failed                  │      └──────┘      └──────────────────────────┘
    └──────────┬───────────────┘
               │  ┌──────┐
               │  │  NO  │
               ▼  └──────┘
    ┌──────────────────────────┐      ┌──────┐      ┌──────────────────────────┐
    │   The high pressure side  │      │ YES  │      │ Check the refrigerant     │
    │   is blocked, caused by    │─────▶│      │─────▶│ system and repair the     │
    │   crushed or bent pipe or  │      └──────┘      │ fault                     │
    │   blocked EXV             │                    └──────────────────────────┘
    └──────────┬───────────────┘
               │  ┌──────┐
               │  │  NO  │
               ▼  └──────┘
    ┌──────────────────────────┐      ┌──────┐      ┌──────────────────────────┐
    │   The heat exchange is     │      │ YES  │      │ Cleaning heat exchanger/  │
    │   poor/ The water flow     │─────▶│      │─────▶│ Regulating water flow     │
    │   rate is not sufficient   │      └──────┘      └──────────────────────────┘
    │   in cooling mode         │
    └──────────┬───────────────┘
               │  ┌──────┐
               │  │  NO  │
               ▼  └──────┘
    ┌──────────────────────────┐
    │   Replace main PCB        │
    └──────────────────────────┘
```

【H4】Low pressure switch protection

```
                    ┌─────────────────┐
                    │                 │
                    │       H4        │
                    │                 │
                    └────────┬────────┘
                             │
                             ▼
        ┌──────────────────────────┐   ┌─────┐   ┌──────────────────────────┐
        │ Insufficient refrigerant │   │ YES │   │ Add refrigerant or       │
        │ caused by refrigerant    │──────────▶  │ inspect the system for   │
        │ leakage                  │   └─────┘   │ leaks                    │
        └────────────┬─────────────┘             └──────────────────────────┘
                     │   ┌────┐
                     │   │ NO │
                     ▼
        ┌──────────────────────────┐   ┌─────┐   ┌──────────────────────────┐
        │ The low pressure side is │   │ YES │   │                          │
        │ blocked, caused by       │──────────▶  │ Replace the pressure     │
        │ crushed or bent pipe,    │   └─────┘   │ sensor                   │
        │ blocked EXV, or dirty    │             └──────────────────────────┘
        │ filter                   │
        └────────────┬─────────────┘
                     │   ┌────┐
                     │   │ NO │
                     ▼
        ┌──────────────────────────┐   ┌─────┐   ┌──────────────────────────┐
        │ The high pressure side   │   │ YES │   │ Cleaning heat exchanger/ │
        │ is blocked, caused by    │──────────▶  │ Regulating water flow    │
        │ crushed or bent pipe or  │   └─────┘   │                          │
        │ blocked EXV              │             └──────────────────────────┘
        └────────────┬─────────────┘
                     │   ┌────┐
                     │   │ NO │
                     ▼
        ┌──────────────────────────┐
        │ Replace main PCB         │
        └──────────────────────────┘
```

3.4 【E3】【FH】Temperature abnormal fault

3.4.1 Description

● E3 indicates compressor discharge temperature【Tda】is too high to stop the protection

● FN indicates compressor discharge temperature【Tda】is too low to stop the protection

3.4.2 Error logic

● Compressor discharge temperature sensor "Td" detected ≥115℃ and lasts for 10s, whole system will stop run to protect compressor, then E3 error will be displayed

● The temperature difference between discharge temperature "Td" and high pressure sensor detect value less than the protection value (5 ℃), will stop run to protect compressor ,then FH will be displayed

3.4.3 Procedure

【E3】Compressor discharge temperature too high shutdown protection
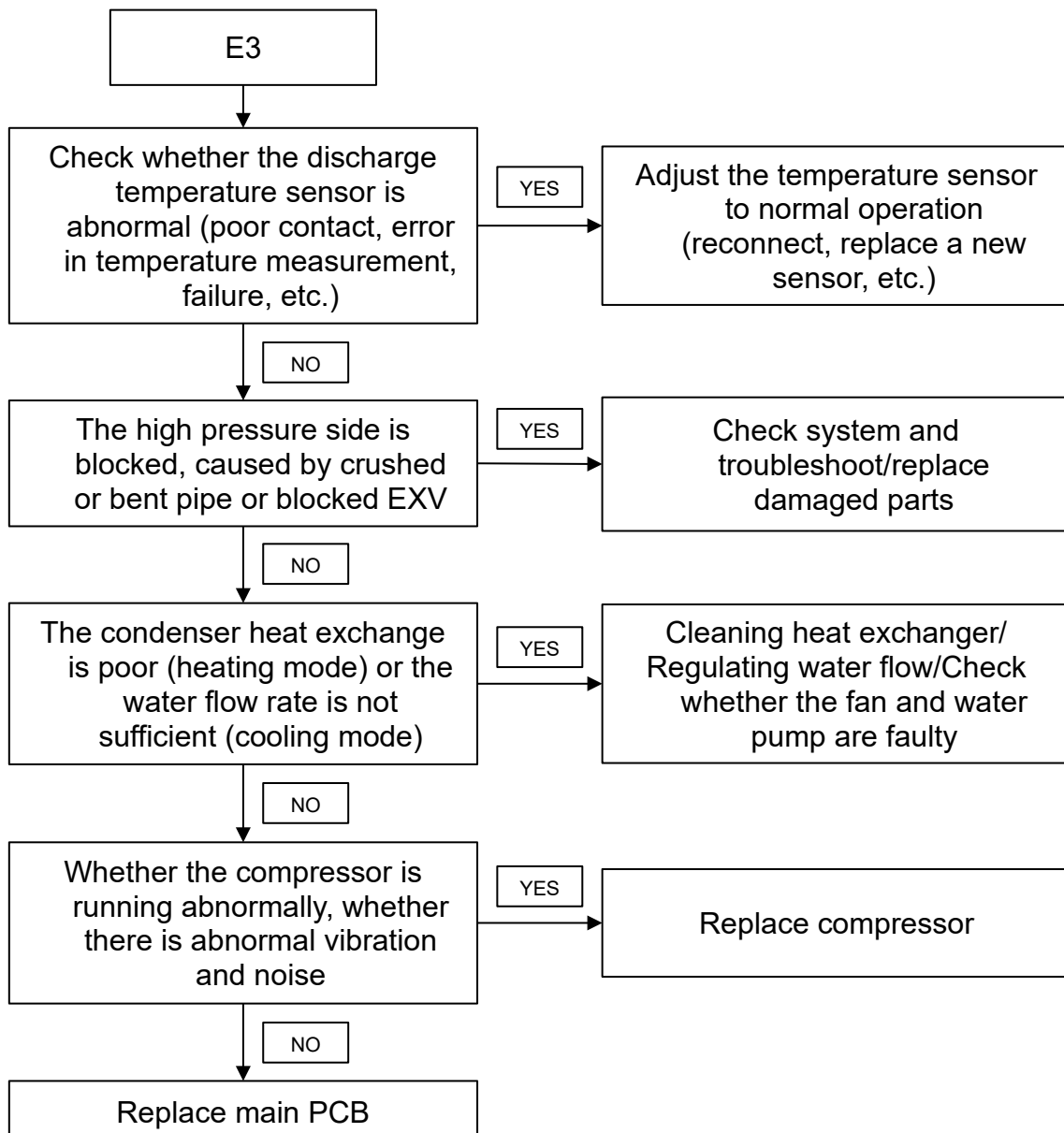
【FH】Compressor discharge superheat too low shutdown protection

```
                    ┌─────────────────┐
                    │       FH        │
                    └─────────────────┘
                            │
                            ▼
        ┌─────────────────────────────┐  ┌─────┐  ┌─────────────────────────────┐
        │ Whether high pressure sensor│  │ YES │  │ Adjust the temperature sensor│
        │ and discharge temperature   │──┤     ├─▶│ and pressure sensor         │
        │ sensor is faulty or loose   │  └─────┘  │ (reconnect, replace a new   │
        └─────────────────────────────┘          │ sensor, etc.)               │
                            │                     └─────────────────────────────┘
                         ┌────┐
                         │ NO │
                         └────┘
                            ▼
        ┌─────────────────────────────┐  ┌─────┐  ┌─────────────────────────────┐
        │ Condenser，EXV was blocked  │  │ YES │  │ Check system and            │
        │ or fan abnormal or poor heat│──┤     ├─▶│ troubleshoot/replace        │
        │ exchange, exhaust pipe was  │  └─────┘  │ damaged parts               │
        │ blocked                     │          └─────────────────────────────┘
        └─────────────────────────────┘
                            │
                         ┌────┐
                         │ NO │
                         └────┘
                            ▼
        ┌─────────────────────────────┐  ┌─────┐  ┌─────────────────────────────┐
        │ Whether the refrigerant is  │  │ YES │  │                             │
        │ excessive                   │──┤     ├─▶│ Refill the refrigerant      │
        │                             │  └─────┘  │                             │
        └─────────────────────────────┘          └─────────────────────────────┘
                            │
                         ┌────┐
                         │ NO │
                         └────┘
                            ▼
        ┌─────────────────────────────┐
        │ Replace main PCB            │
        └─────────────────────────────┘
```

3.5 【E1】【F1】【F3】ODU component fault

3.5.1   Description

- E1 indicates a four-way valve error
- F1 indicates a high pressure sensor "Pd" error
- F3 indicates compressor discharge pressure is too high to stop the protection

3.5.2   Error logic

- The four-way valve connection port is disconnected
- PCB received voltage feedback which from the port of "Pd" too big or too low (Normal DC 0~5V), then F1 error will be displayed
- High pressure sensor detected Pd ≥ 4.1Mpa ,then E1,F3 error will be displayed

3.5.3   Procedure

【E1】Fault of four-way valve

```
                    ┌─────────────────┐
                    │       E1        │
                    └────────┬────────┘
                             │
                             ▼
        ┌─────────────────────────┐   YES   ┌─────────────────────────┐
        │ Whether the connection  ├────────▶│ Ensure the connector is │
        │ port is loose           │         │ connected properly      │
        └────────────┬────────────┘         └─────────────────────────┘
                     │ NO
                     ▼
        ┌─────────────────────────┐   YES   ┌─────────────────────────┐
        │ Check whether the       ├────────▶│ Replace the four-way    │
        │ four-way valve coil is  │         │ valve                   │
        │ damaged or faulty       │         └─────────────────────────┘
        └────────────┬────────────┘
                     │ NO
                     ▼
        ┌─────────────────────────┐
        │   Replace main PCB      │
        └─────────────────────────┘
```

【F1】High pressure sensor "Pd" failure

```
┌──────────────┐
│      F1      │
└──────────────┘
        │
        ▼
┌────────────────────────┐   YES   ┌──────────────────────────┐
│ Whether the high       │────────▶│ Ensure the sensor is     │
│ pressure sensor        │         │ connected properly       │
│ connection on          │         └──────────────────────────┘
│ refrigerant system     │
│ main PCB is loose      │
└────────────────────────┘
        │ NO
        ▼
┌────────────────────────┐   YES   ┌──────────────────────────┐
│ High pressure sensor   │────────▶│ Replace the sensor       │
│ has short-circuited    │         └──────────────────────────┘
│ or failed              │
└────────────────────────┘
        │ NO
        ▼
┌────────────────────────┐
│ Replace main PCB       │
└────────────────────────┘
```

【F3】High pressure sensor "Pd" failure

```
┌─────────────────────┐
│         F3          │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐      ┌─────┐      ┌──────────────────────────┐
│ Check whether the   │      │ YES │─────▶│ Adjust the high pressure │
│ high pressure sensor│─────▶│     │      │ sensor normal operation  │
│ is abnormal (poor   │      └─────┘      │ (reconnect, replace a    │
│ contact, short-     │                   │ new sensor, etc.)        │
│ circuited, failure, │                   └──────────────────────────┘
│ etc.)               │
└─────────────────────┘
          │ NO
          ▼
┌─────────────────────┐      ┌─────┐      ┌──────────────────────────┐
│ The high pressure   │      │ YES │─────▶│ Check system and         │
│ side is blocked,    │─────▶│     │      │ troubleshoot/replace     │
│ caused by crushed   │      └─────┘      │ damaged parts            │
│ or bent pipe or     │                   └──────────────────────────┘
│ blocked EXV         │
└─────────────────────┘
          │ NO
          ▼
┌─────────────────────┐      ┌─────┐      ┌──────────────────────────┐
│ The condenser heat  │      │ YES │─────▶│ Cleaning heat exchanger/ │
│ exchange is poor    │─────▶│     │      │ Regulating water flow/   │
│ (heating mode) or   │      └─────┘      │ Check whether the fan    │
│ the water flow rate │                   │ and water pump are faulty│
│ is not sufficient   │                   └──────────────────────────┘
│ (cooling mode)      │
└─────────────────────┘
          │ NO
          ▼
┌─────────────────────┐
│  Replace main PCB   │
└─────────────────────┘
```

3.6 【31】【32】【33】【35】【36】【37】【39】【3E】【3F】Compressor dirve module fault

3.6.1   Description

- 31 indicates an IPM module protection in compressor drive

- 32 indicates a hardware protection error in compressor drive

- 33 indicates a software protection in compressor drive

- 35 indicates an over electric current protection in compressor drive

- 36 indicates an over-voltage or low-voltage protection in compressor drive

- 37 indicates a built in temperature sensor abnormal in compressor drive

- 39 indicates a high temperature shutdown protection in compressor drive

- 3E indicates an AC current input protection in compressor drive

- 3F indicates a PFC module protection in compressor drive

3.6.2   Error logic

When the temperature, current, or voltage of the PCB of the driver module exceeds the protection value or the compressor is abnormal, the operation will stop due to high current

3.6.3   Procedure

```
┌─────────────────────┐
│ 31/32/33/35/36/37   │
│    /39/3E/3F        │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐   YES   ┌─────────────────────────┐
│ Whether the         │ ──────► │ The refrigerant system  │
│ compressor runs     │         │ may be faulty, refer to │
│ when a fault occurs │         │ the next table          │
└─────────────────────┘         └─────────────────────────┘
          │ NO
          ▼
┌─────────────────────┐   YES   ┌─────────────────────────┐
│ The electrical      │ ──────► │ Ensure that the power   │
│ control may be      │         │ cable is securely       │
│ faulty, test        │         │ connected and the       │
│ whether unstable    │         │ power supply is stable  │
│ voltage input,      │         └─────────────────────────┘
│ whether connection  │
│ wire loose, poor    │
│ contact             │
└─────────────────────┘
          │ NO
          ▼
┌─────────────────────┐   YES   ┌─────────────────────────┐
│ Whether the IPM     │ ──────► │ Replace a new IPM       │
│ module is abnormal  │         │ module                  │
└─────────────────────┘         └─────────────────────────┘
          │ NO
          ▼
┌─────────────────────┐
│ Replace main PCB    │
└─────────────────────┘
```

```
┌─────────────────────────┐
│   31/32/33/35/36/37      │
│      /39/3E/3F           │
└─────────────────────────┘
              │
              ▼
┌─────────────────────────┐   YES   ┌─────────────────────────┐
│ Whether the compressor  │ ──────► │ The electrical control  │
│ is not started          │         │ may be faulty, refer to │
│                         │         │ the last table          │
└─────────────────────────┘         └─────────────────────────┘
              │ NO
              ▼
┌─────────────────────────┐   YES   ┌─────────────────────────┐
│ The refrigerant system  │ ──────► │ Clean the heat          │
│ may be faulty, check    │         │ exchanger or replace    │
│ whether the heat        │         │ the fan motor           │
│ exchanger is dirty and  │         └─────────────────────────┘
│ blocked and whether the │
│ fan motor works normally│
└─────────────────────────┘
              │ NO
              ▼
┌─────────────────────────┐   YES   ┌─────────────────────────┐
│ Check whether the       │ ──────► │ Refill the refrigerant  │
│ working pressure is too  │         │                         │
│ high and the refrigerant │         └─────────────────────────┘
│ is sufficient           │
└─────────────────────────┘
              │ NO
              ▼
┌─────────────────────────┐
│ Check compressor        │
│ abnormal or not,        │
│ replace new compressor  │
└─────────────────────────┘
```

3.7 【3H】Fan drive module start up failure

3.7.1   Error logic

- When the drive module PCB temperature, current, voltage too high over than the protection value or fan motor abnormal cause high current will stop run, appear 3H error

3.7.2   Procedure

```
                        ┌──────────────────┐
                        │        3H        │
                        └──────────────────┘
                                 │
                                 ▼
        ┌─────────────────────────────────┐    ┌─────┐    ┌──────────────────────────┐
        │  Whether unstable voltage input, │    │ YES │    │ Ensure that the power cable is │
        │     whether connection wire      │───▶│     │───▶│   securely connected and the   │
        │       loose or poor contact      │    └─────┘    │    power supply is stable      │
        └─────────────────────────────────┘               └──────────────────────────┘
                      │  ┌────┐
                      │  │ NO │
                      ▼  └────┘
        ┌─────────────────────────────────┐    ┌─────┐    ┌──────────────────────────┐
        │  Whether the FAN drive module    │    │ YES │    │   Replace a new FAN drive     │
        │          is abnormal             │───▶│     │───▶│          module               │
        └─────────────────────────────────┘    └─────┘    └──────────────────────────┘
                      │  ┌────┐
                      │  │ NO │
                      ▼  └────┘
        ┌─────────────────────────────────┐
        │       Replace main PCB           │
        └─────────────────────────────────┘
```
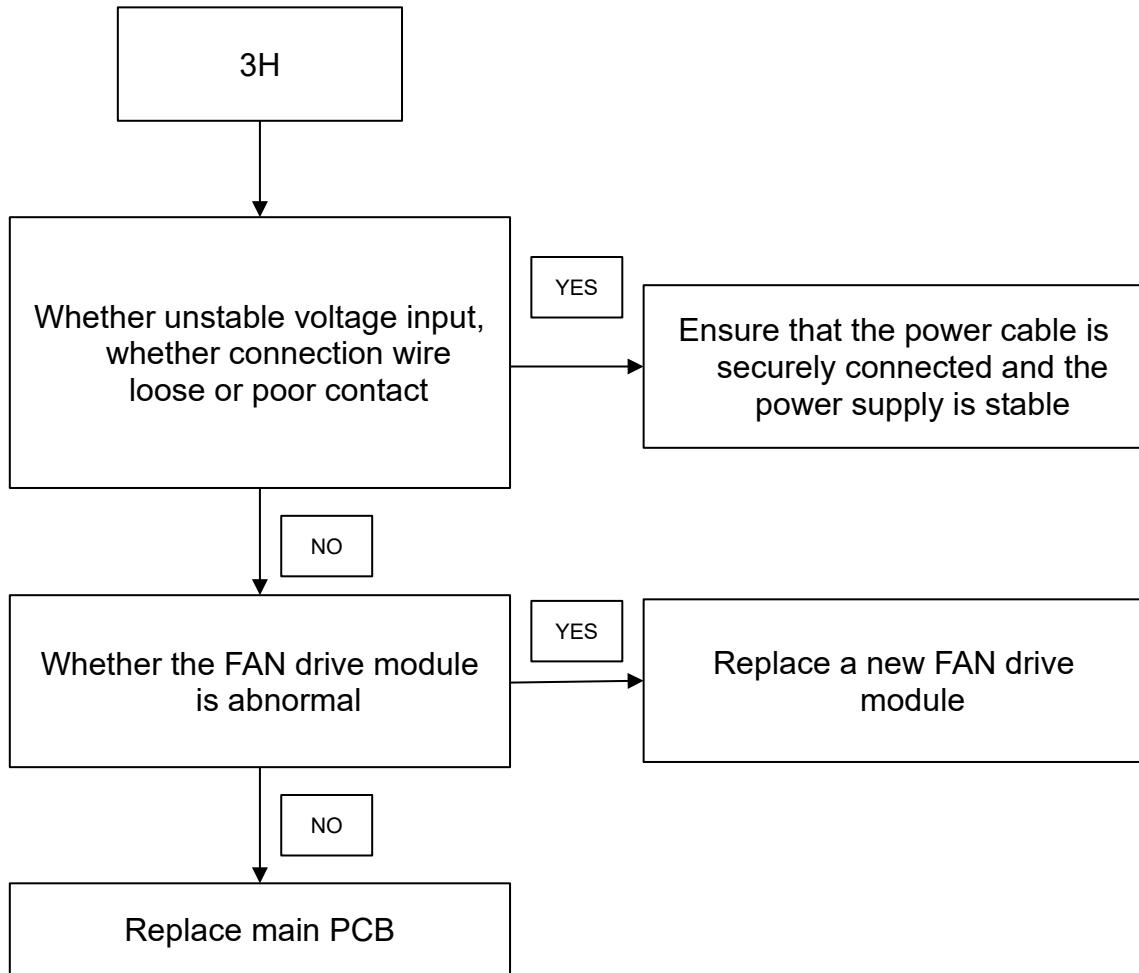
3.8 【J5】Outdoor unit parameter setting incorrect

3.8.1   Error logic

- When main PCB DIP switch be set incorrect, then will appear error

3.8.2   Procedure

```
                    ┌─────────────────┐
                    │       J5        │
                    └─────────────────┘
                             │
                             ▼
     ┌──────────────────────────┐   ┌─────┐   ┌──────────────────────────┐
     │ Whether the PCB DIP switch│   │ YES │   │  Adjust the dip switch   │
     │ is inconsistent with that │──▶│     │──▶│  correctly against the   │
     │   of the corresponding    │   └─────┘   │      instructions        │
     │          model            │            └──────────────────────────┘
     └──────────────────────────┘
                  │   ┌─────┐
                  │   │ NO  │
                  ▼   └─────┘
     ┌──────────────────────────┐
     │                          │
     │     Replace main PCB     │
     │                          │
     └──────────────────────────┘
```
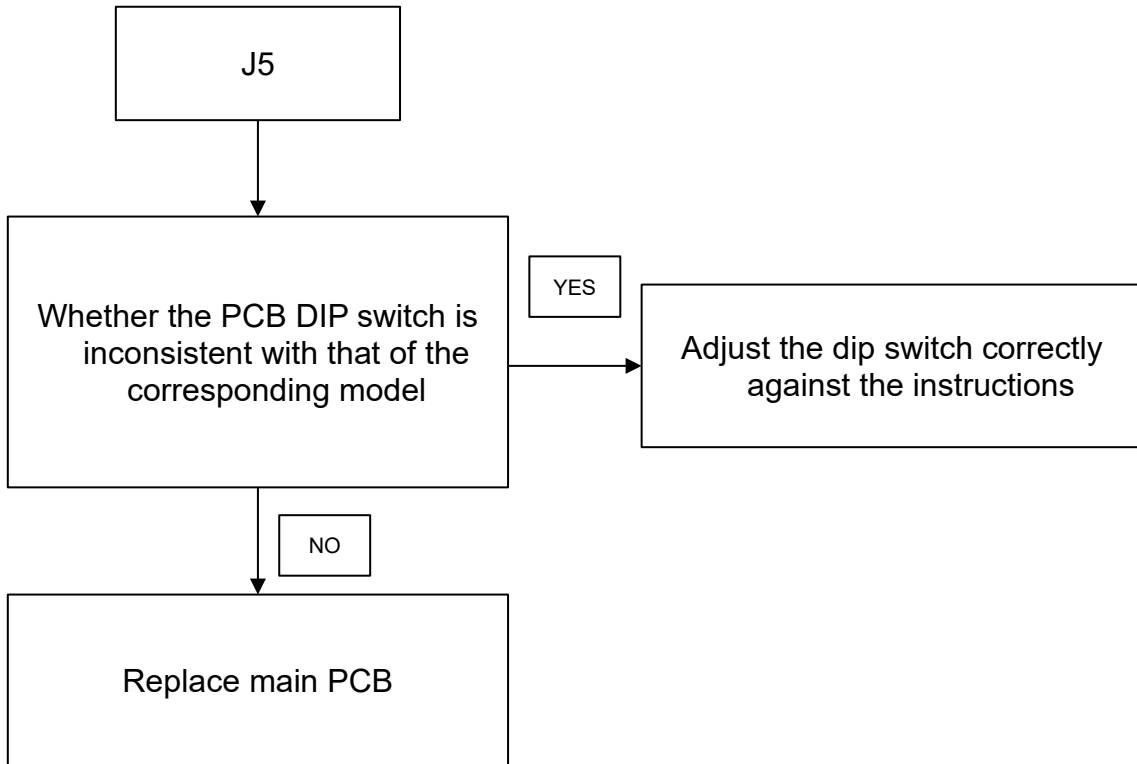
3.9 【J7】Fault with the outdoor unit EPROM

3.9.1   Error logic

- EPROM hardware or software abnormal, then will appear error

3.9.2   Procedure

```
              ┌─────────────────┐
              │       J7        │
              └─────────────────┘
                       │
                       ▼
         ┌──────────────────────────┐
         │                          │
         │     Replace main PCB     │
         │                          │
         └──────────────────────────┘
```
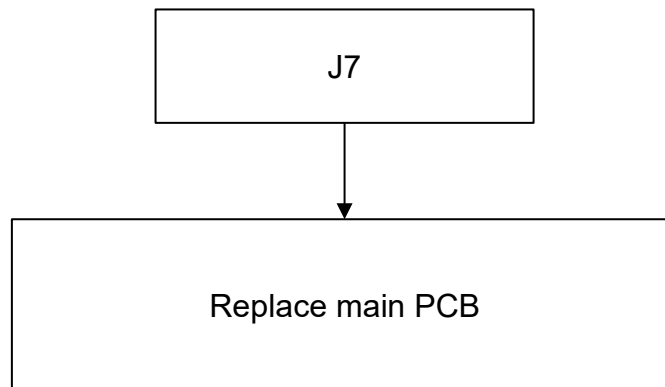
3.10 【93】【94】【95】【96】【A3】【A4】【7E】【7F】 IDU Temperature sensor fault troubleshooting

3.10.1 Description

- 93 indicates a final outlet water temperature sensor error

- 94 indicates an inlet water temperature sensor error

- 95 indicates an outlet water temperature sensor error

- 96 indicates a water tank temperature sensor error

- A3 indicates a refrigerant liquid temperature sensor error

- A4 indicates a refrigerant gas temperature sensor error

- 7E indicates a floor heating water inlet temperature sensor error

- 7F indicates a solar temp temperature sensor error

3.10.2 Error logic

- Error appear：The sensor connection port be disconnected and lasts for 10s

- Error disappear：The sensor connection port be connected and lasts for 10s

3.10.3 Procedure

```
┌─────────────────────┐
│  93/94/95/96/A3/    │
│     A4/7E/7F        │
└──────────┬──────────┘
           │
           ▼
┌─────────────────────┐   YES   ┌──────────────────────────┐
│ Whether the         │────────▶│ Ensure the sensor is     │
│ connection of       │         │ connected properly       │
│ sensor is loose     │         └──────────────────────────┘
│ (pipe and PCB       │
│ connector)          │
└──────────┬──────────┘
           │ NO
           ▼
┌─────────────────────┐   YES   ┌──────────────────────────┐
│ Temperature sensor  │────────▶│ Replace the sensor       │
│ has short-circuited │         └──────────────────────────┘
│ or failed           │
└──────────┬──────────┘
           │ NO
           ▼
┌─────────────────────┐
│ Replace main PCB    │
└─────────────────────┘
```
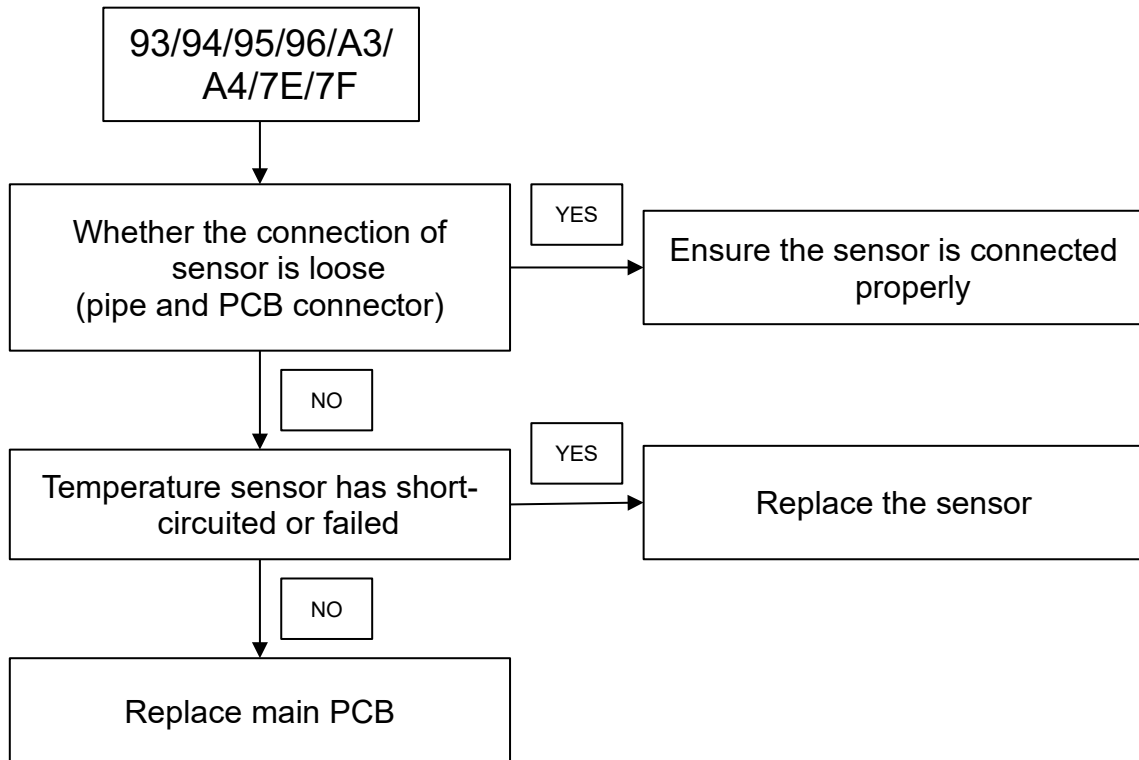
3.11 【AA】【A9】【7D】IDU Communication fault troubleshooting

3.11.1 Description

- AA indicates a communication error between controller and IDU
- A9 indicates a communication error between ODU and IDU
- 7D indicates a communication error between main PCB and expansion board

3.11.2 Error logic

- Error appear：Communication data is not received normally for 15s between each communication module
- Error clearing：The communication data can be received normally

3.11.3 Procedure

【AA】Communication fault between controller and IDU

```
                    ┌─────────────────┐
                    │       AA        │
                    └────────┬────────┘
                             │
                             ▼
         ┌───────────────────────────┐   YES   ┌──────────────────────────┐
         │ Communication wires is    │────────▶│ Reconnect the communication│
         │ improperly connected or   │         │ wires                    │
         │ loose connected           │         └──────────────────────────┘
         └───────────┬───────────────┘
                     │ NO
                     ▼
         ┌───────────────────────────┐   YES   ┌──────────────────────────┐
         │ Communication wires is too│────────▶│ Keep the communication   │
         │ long to leads to signal   │         │ wires to a reasonable    │
         │ attenuation               │         │ length (max:60m)         │
         └───────────┬───────────────┘         └──────────────────────────┘
                     │ NO
                     ▼
         ┌───────────────────────────┐   YES   ┌──────────────────────────┐
         │ Whether there is a high   │────────▶│ To add a barrier to      │
         │ magnetic field or high    │         │ protect the unit or to   │
         │ power and indoor unit     │         │ move the unit to other   │
         │ interface, such as lifts, │         │ place                    │
         │ large power transformers, │         └──────────────────────────┘
         │ etc…                      │
         └───────────┬───────────────┘
                     │ NO
                     ▼
         ┌───────────────────────────┐
         │ Replace main PCB or       │
         │ controller                │
         └───────────────────────────┘
```

【A9】Communication fault between ODU and IDU

```
┌─────────────────┐
│       A9        │
└────────┬────────┘
         │
         ▼
┌─────────────────────┐   YES   ┌──────────────────────┐
│ Whether both IDU    │────────▶│  Power on IDU&ODU    │
│ and ODU are         │         └──────────────────────┘
│ powered off         │
└─────────┬───────────┘
          │ NO
          ▼
┌─────────────────────┐   YES   ┌──────────────────────┐
│ Communication wires │────────▶│ Reconnection         │
│ is improperly       │         │ communication wires  │
│ connected (A-A,     │         └──────────────────────┘
│ B-B) or loose       │
│ connected           │
└─────────┬───────────┘
          │ NO
          ▼
┌─────────────────────┐
│  Replace main PCB   │
└─────────────────────┘
```

【7D】Communication fault between main PCB and expansion board

```
┌─────────────────┐
│       7D        │
└────────┬────────┘
         │
         ▼
┌─────────────────────┐   YES   ┌──────────────────────┐
│ The connection      │────────▶│ Reconnect the        │
│ between the PCB and  │         │ communication wires  │
│ the expansion board │         └──────────────────────┘
│ is loose            │
└─────────┬───────────┘
          │ NO
          ▼
┌─────────────────────┐
│ Replace main PCB or │
│ expansion board     │
└─────────────────────┘
```

3.12 【A7】【98】Flow switch protection

3.12.1 Description

- AA indicates a communication error between controller and IDU
- A9 indicates a communication error between ODU and IDU

3.12.2 Error logic

- The flow switch protection connection port be disconnected ≥20s after turn on the unit or the port be disconnected ≥5s during the system running, error code A7 is displayed
- The flow switch protection connection port be connected ≥5s after turn off the unit, error code 98 is displayed

3.12.3 Procedure

【A7】Water flow fault

```
                    ┌─────────────────┐
                    │       A7        │
                    └────────┬────────┘
                             │
                             ▼
        ┌────────────────────────────┐   YES   ┌──────────────────────────┐
        │ Whether the water stop      │────────▶│ Open the water stop valve │
        │ valve is not opened         │         └──────────────────────────┘
        └────────────┬───────────────┘
                     │ NO
                     ▼
        ┌────────────────────────────┐   YES   ┌──────────────────────────┐
        │ Whether pipeline accessories│────────▶│   Clean the accessory     │
        │ cause high water resistance │         └──────────────────────────┘
        └────────────┬───────────────┘
                     │ NO
                     ▼
        ┌────────────────────────────┐   YES   ┌────────────────────────────────┐
        │ Whether the water flow      │────────▶│ Reconnect the water flow switch │
        │ switch is disconnected      │         └────────────────────────────────┘
        └────────────┬───────────────┘
                     │ NO
                     ▼
        ┌────────────────────────────┐
        │  Replace main PCB or FLS    │
        └────────────────────────────┘
```

【98】 Early closing fault of water flow switch

```
┌─────────────────────┐
│         98          │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐   YES   ┌─────────────────────────┐
│ Whether the water   │ ──────▶ │  Turn off the water pump │
│ pump is not         │         │                         │
│ turned off          │         └─────────────────────────┘
└─────────────────────┘
           │ NO
           ▼
┌─────────────────────┐   YES   ┌─────────────────────────┐
│ Whether Port FLS    │ ──────▶ │ Reconnect the water     │
│ be short            │         │ flow switch             │
│ connected           │         └─────────────────────────┘
└─────────────────────┘
           │ NO
           ▼
┌─────────────────────┐
│ Replace main PCB    │
│ or FLS              │
└─────────────────────┘
```

3.13 【A5】Water pump fault

3.13.1 Error logic

- When port PUMP-C detect feedback running rate not same as the target running rate, will appear A5 error

3.13.2 Procedure

```
                    ┌──────────────┐
                    │      A5      │
                    └──────┬───────┘
                           │
                           ▼
   ┌──────────────────────────────┐   YES   ┌──────────────────────────────┐
   │ Whether the water stop valve │────────▶│   Open the water stop valve  │
   │        is not opened         │         │                              │
   └──────────────┬───────────────┘         └──────────────────────────────┘
                  │ NO
                  ▼
   ┌──────────────────────────────┐   YES   ┌──────────────────────────────┐
   │  Whether power and signal    │────────▶│ Reconnect the power and signal│
   │        wire is loose         │         │             wire             │
   └──────────────┬───────────────┘         └──────────────────────────────┘
                  │ NO
                  ▼
   ┌──────────────────────────────┐   YES   ┌──────────────────────────────┐
   │   Check whether the pump     │────────▶│     Regulating voltage       │
   │     voltage is incorrect     │         │                              │
   └──────────────┬───────────────┘         └──────────────────────────────┘
                  │ NO
                  ▼
   ┌──────────────────────────────┐
   │    Replace the water pump    │
   └──────────────────────────────┘
```
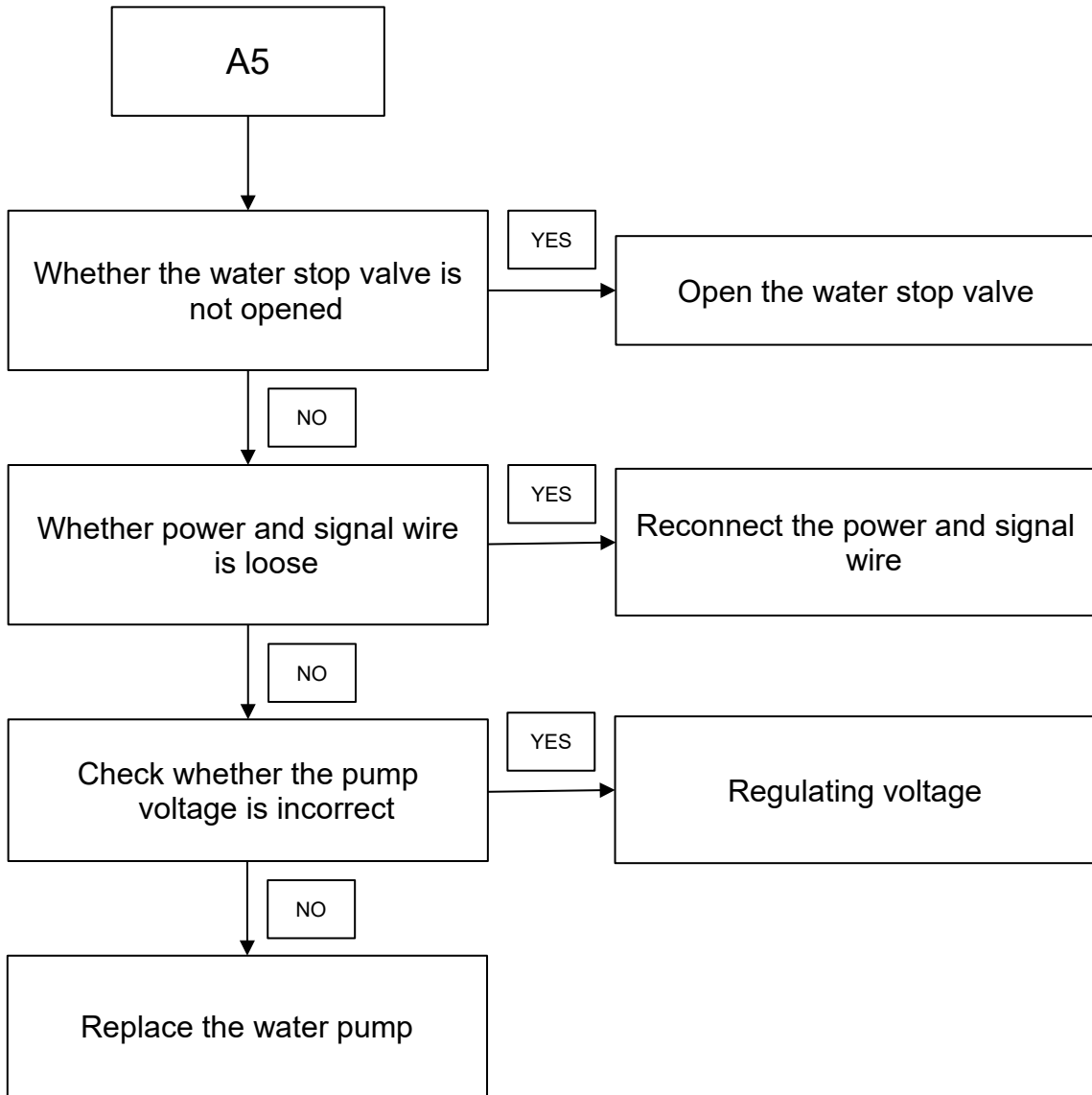
3.14 【97】Anti-freezing low pressure switch (AFLP) protection

3.14.1 Error logic

- The AFLP port be disconnected ≥3s after turn on the cooling mode 3 minutes, error code 97 is displayed (When LPS detect the refrigerant pressure ≤ 0.45 Mpa , LPS will send disconnected signal to port AFLP)

3.14.2 Procedure

```
        ┌──────────────────────┐
        │          97          │
        └──────────┬───────────┘
                   │
                   ▼
┌────────────────────────────┐   YES   ┌──────────────────────────┐
│  Short connect the AFLP port,├───────▶│    Replace a new PCB      │
│  whether the fault still exists│       └──────────────────────────┘
└──────────────┬─────────────┘
            NO │
               ▼
┌────────────────────────────┐   YES   ┌──────────────────────────┐
│  Test low pressure value in ├───────▶│     Replace new LPS       │
│  cooling mode, whether the  │        └──────────────────────────┘
│  low pressure > 0.45 Mpa    │
└──────────────┬─────────────┘
            NO │
               ▼
┌────────────────────────────┐
│  Connect to monitoring software│
│  and share record data to   │
│  AUX team, check whether    │
│  EXV blocked or lack of      │
│  refrigerant                │
└────────────────────────────┘
```
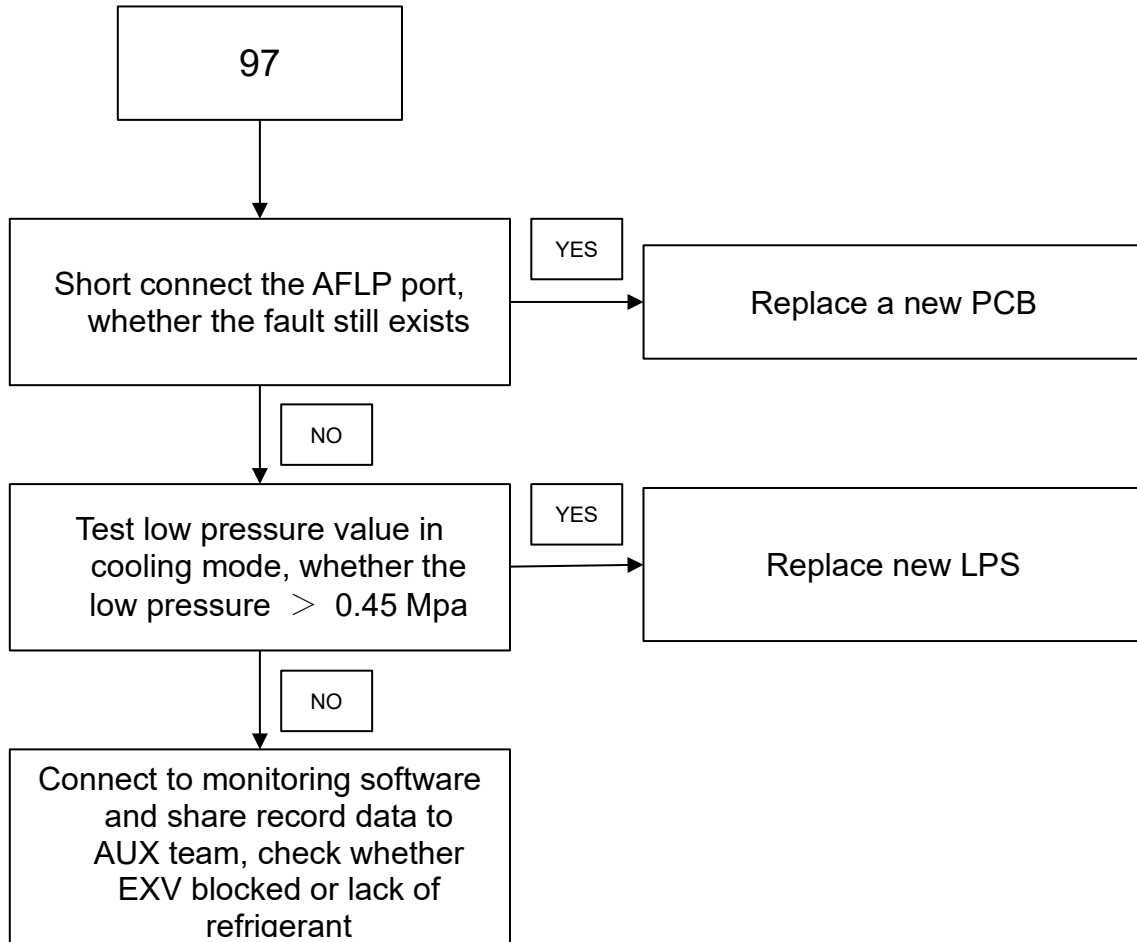
3.15 【AF】Electric heating overheat protection

3.15.1 Error logic

- When Port : PRT-SW be disconnected，then will appear error code AF

3.15.2 Procedure

```
┌─────────────────┐
│       AF        │
└─────────────────┘
         │
         ▼
┌─────────────────────┐   YES   ┌──────────────────────┐
│ Whether the port    │────────▶│ Reconnect the PRT-SW │
│ PRT-SW not connected│         └──────────────────────┘
│ or connect not firm │
└─────────────────────┘
         │ NO
         ▼
┌─────────────────────┐   YES   ┌──────────────────────┐
│ Whether the filter  │────────▶│   Clean the filter   │
│ is dirty and blocked│         └──────────────────────┘
│ cause low water flow│
└─────────────────────┘
         │ NO
         ▼
┌─────────────────────┐   YES   ┌──────────────────────┐
│ Whether thermostat  │────────▶│ Replace new thermostat│
│ protection switch   │         │ protection switch     │
│ abnormal (low water │         └──────────────────────┘
│ temperature but     │
│ appear A8 error)    │
└─────────────────────┘
         │ NO
         ▼
┌─────────────────────┐
│  Replace a new PCB  │
└─────────────────────┘
```
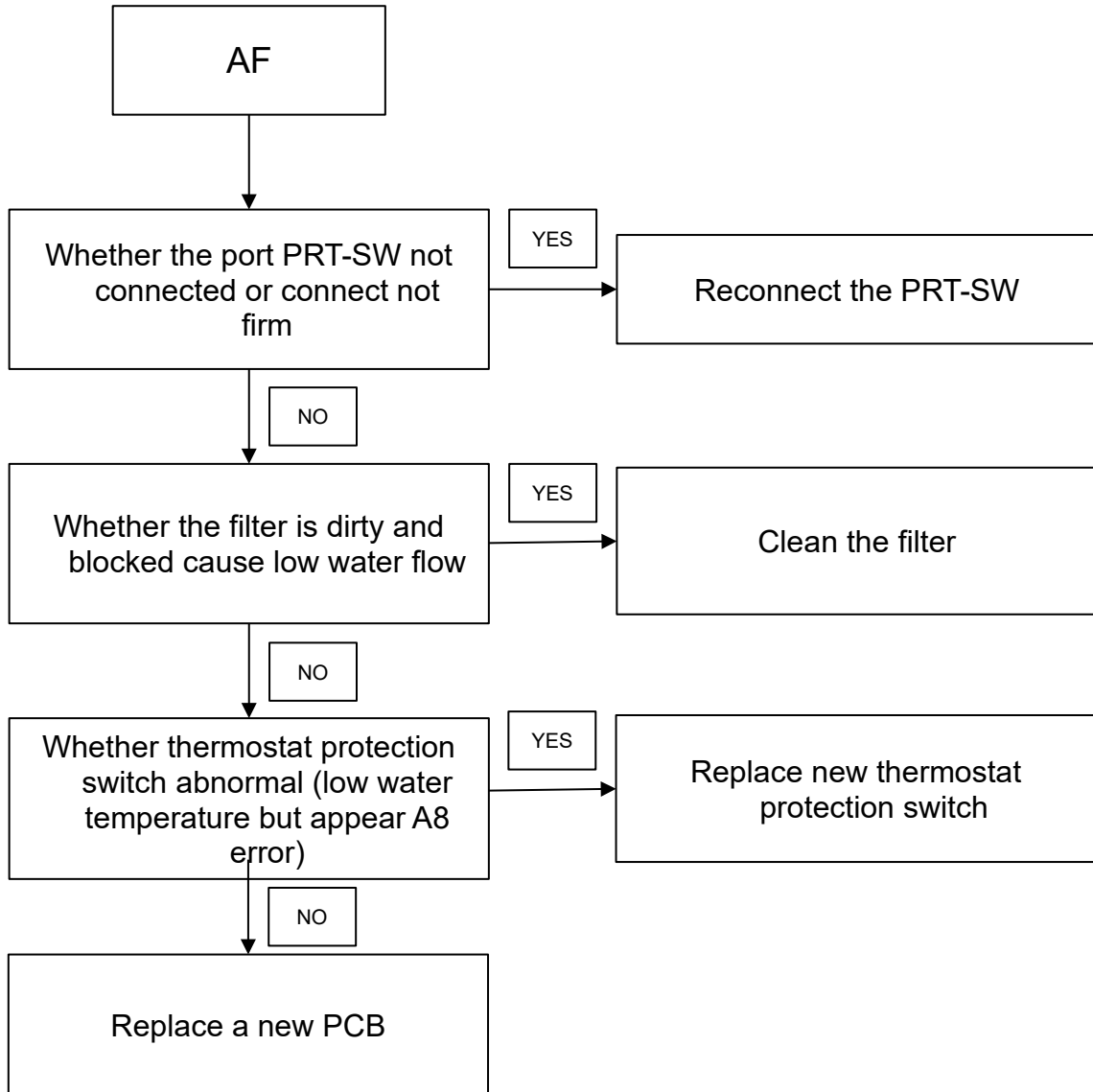
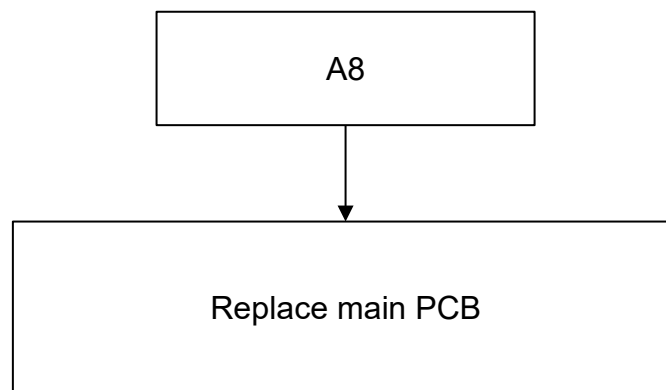## 3.16 【A8】EE fault

3.16.1 Error logic

- EPROM hardware or software abnormal, then will appear error

3.16.2 Procedure

```
┌─────────────────────────────┐
│                             │
│             A8              │
│                             │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────────────┐
│                                     │
│          Replace main PCB           │
│                                     │
│                                     │
└─────────────────────────────────────┘
```

NINGBO AUX ELECTRIC CO.,LTD

Web: Http://auxcac.cn

Tel:+86-574-88220564

E-mail:auxcac@mail.auxgroup.com

Add: NO. 1166 North Ming guang Road, Jiang shan, Ningbo, Zhejinag, PR. China

The above designs and specifications are subject to charge without prior notice. Final specifications please refer to latest technical specification provided by sales representative. 201810 Technical Support Department

Updated record

Version	Name	Data	Updated remark
Version 2	Summer	2022-06-15	1. Updated electrical wiring 2. Updated PCB Instruction
Version 3	Summer	2022-08-10	1. Add control part 2. Updated error code
Version 4	Rex	2022-09-19	1.Add automatic mode 2.Add ECO, automatic water temperature 3.Add floor drying and floor preheating 4.Add Smart Grid Remark: The above changes are in yellow background.
Version 5	Choy	2023-02-10	1.System diagram modification 2.Add stop valve protection cover to unit outline drawing 3.Electronic control chart modification 4.Add indoor temperature icon 5.Modify the control sequence diagram 6.Uniform Hydraulic module to Hydraulic box; balance tank module to buffer tank 7.Delete 17 Floor heating mixing pump control 8.Performance parameter adjustment 9.Part10 add some control logic 10. Improve troubleshooting Ps：Details of modification points are shown in the attached table