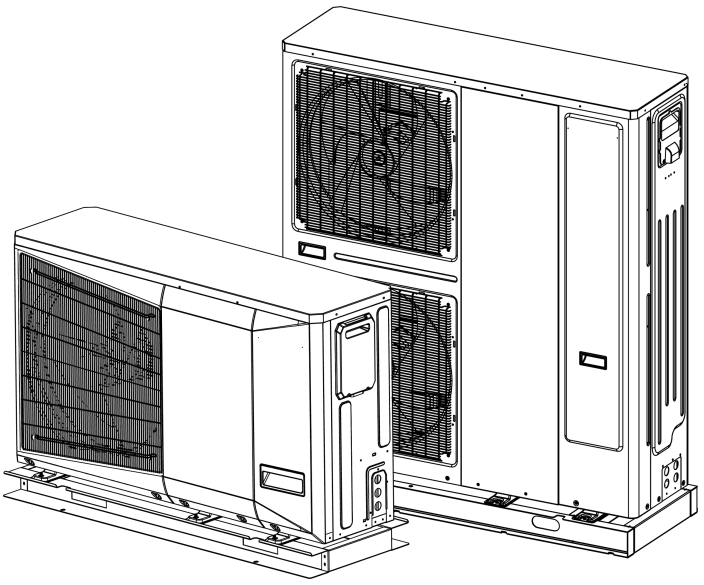
Service manual

R32 Monobloc heat pump



Content

1. General Information

1.1.General presentation

This series of monobloc is using the R32 refrigerant and reached the high efficiency with A+++. It is designed for heating and cooling applications in new and existing individual homes and small businesses.

The unit is compatible with low to medium temperature emitters: underfloor heating, fan coil units, radiators, domestic hot water, etc.

The unit is operating with wide temperature range and leaving water temperature range:

Operation in cooling mode with an outdoor temperature of -5°C ~50°C, leaving water temperature of 5°C ~25°C.

Operation in heating mode with an outdoor temperature of -25°C ~43°C, leaving water temperature of 25°C ~62°C.

1.2.Product line

The capacity of the monobloc includes 4kW-16kW as the below table:

Table 1-2-1

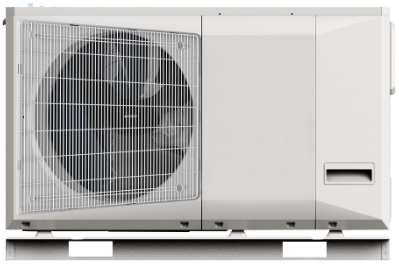
Capacity (Kw)	4	6	8	10	12	14	16
Power supply	220-240V/1N/50Hz				220-240V/1N/50Hz 380-415V/1N/50Hz		

Note: The capacity from 4-10kW only has 1-phase; while the 12-16kW has both 1- phase and 3-phase.

1.3.External appearance

The external appearance of the unit:

Table 1-3-1

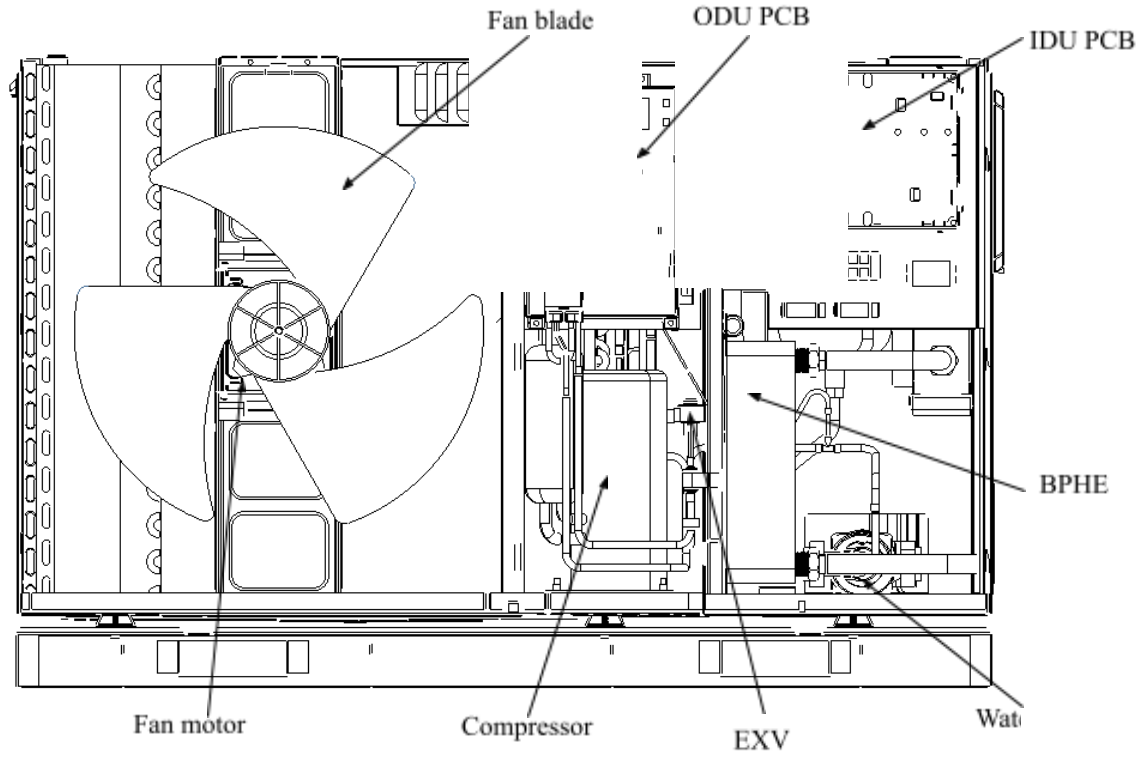
Capacity	4-10kW	12-16kW
Pictures		

2. Product overview

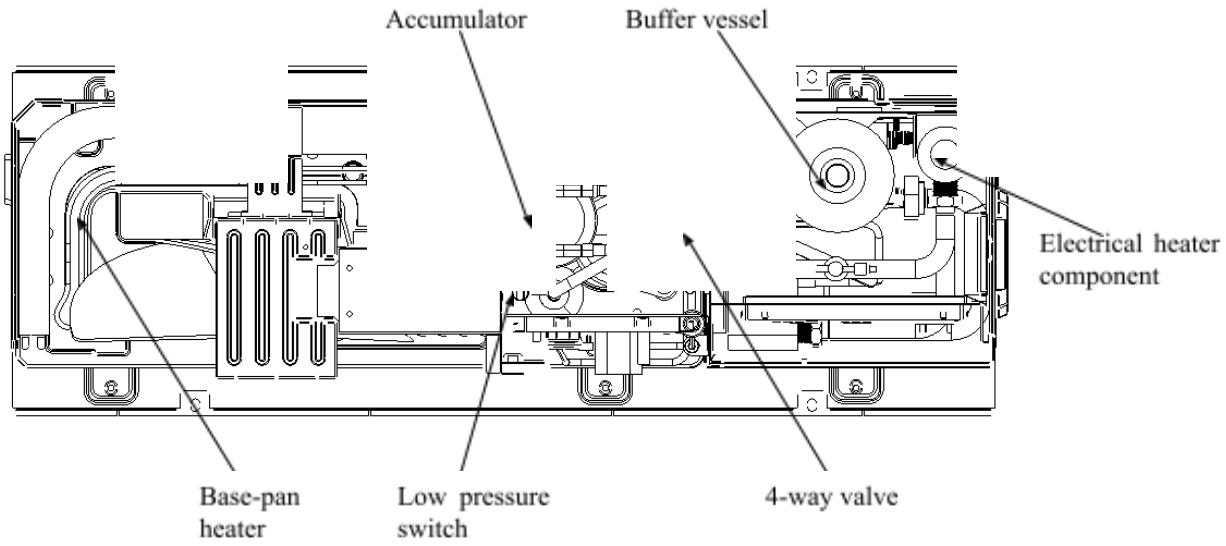
2.1.Layout of components

4-10kW

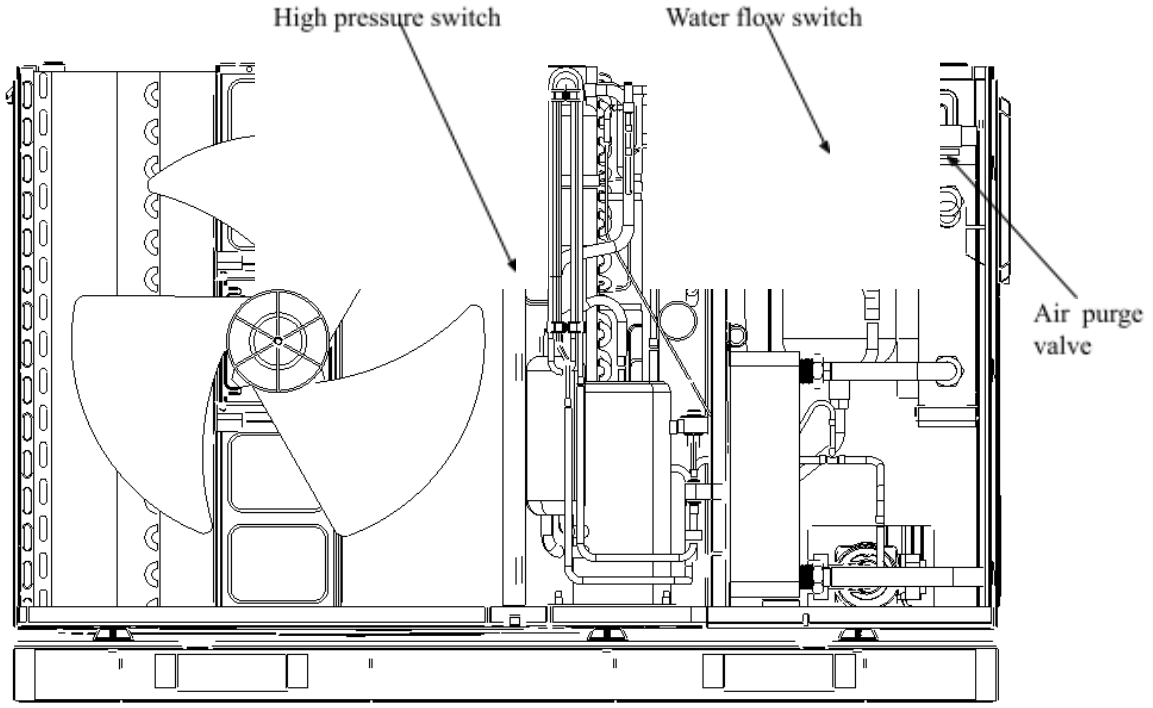
Picture 2-1-1: front view with E-box



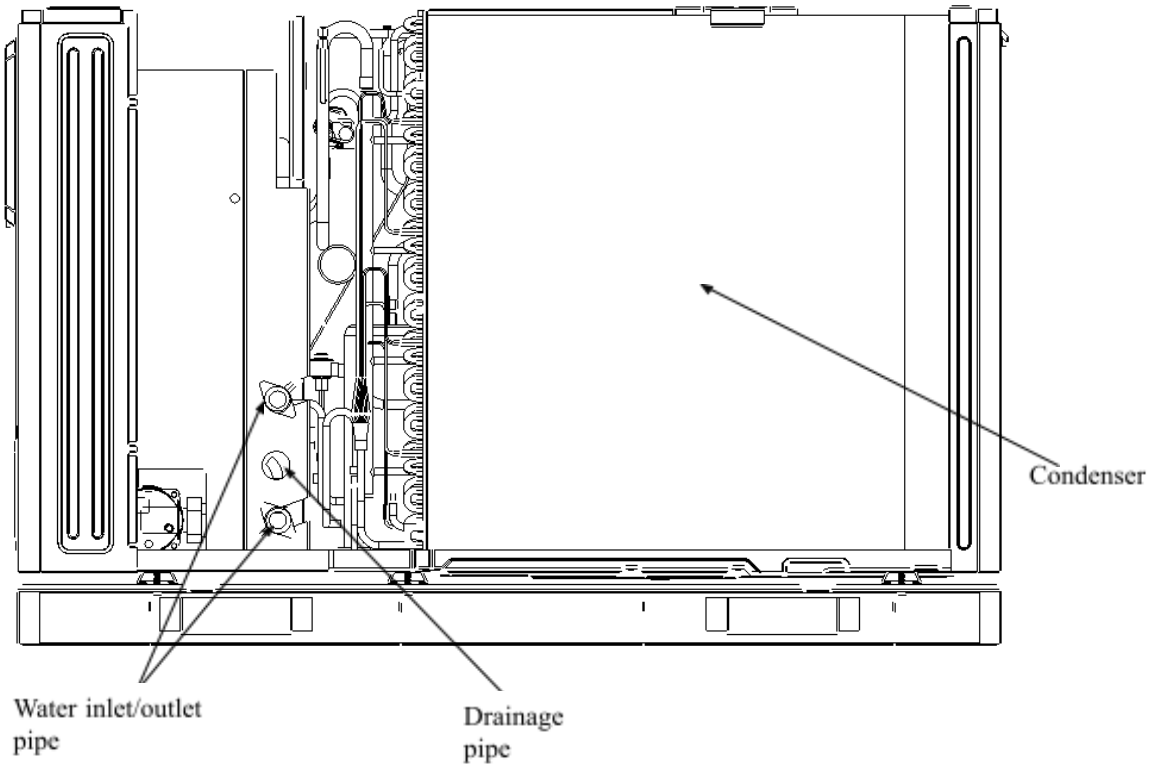
Picture 2-1 ith E-box



Picture 2-1-3: front view without E-box

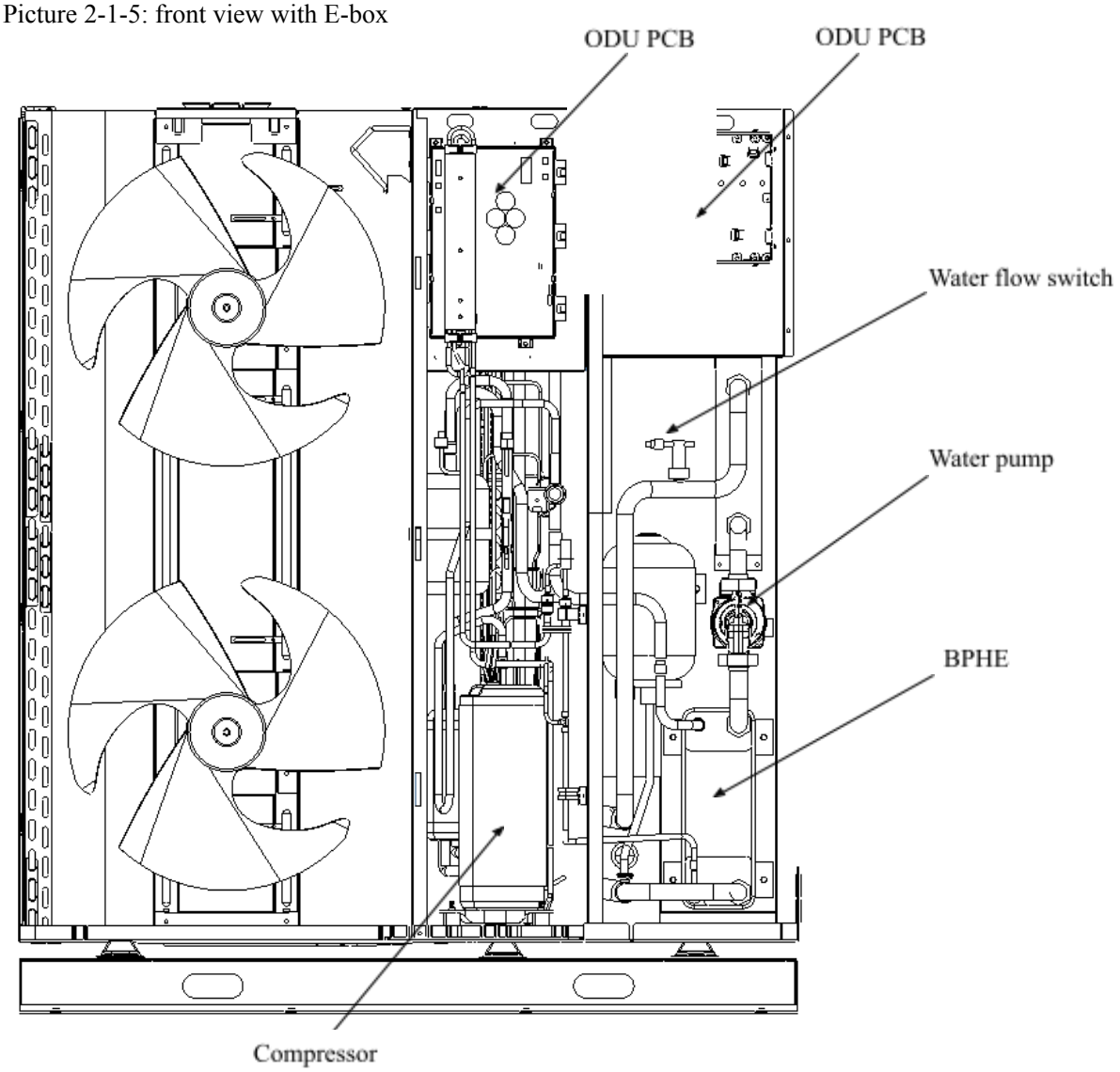


Picture 2-1-4: rear view without E-box

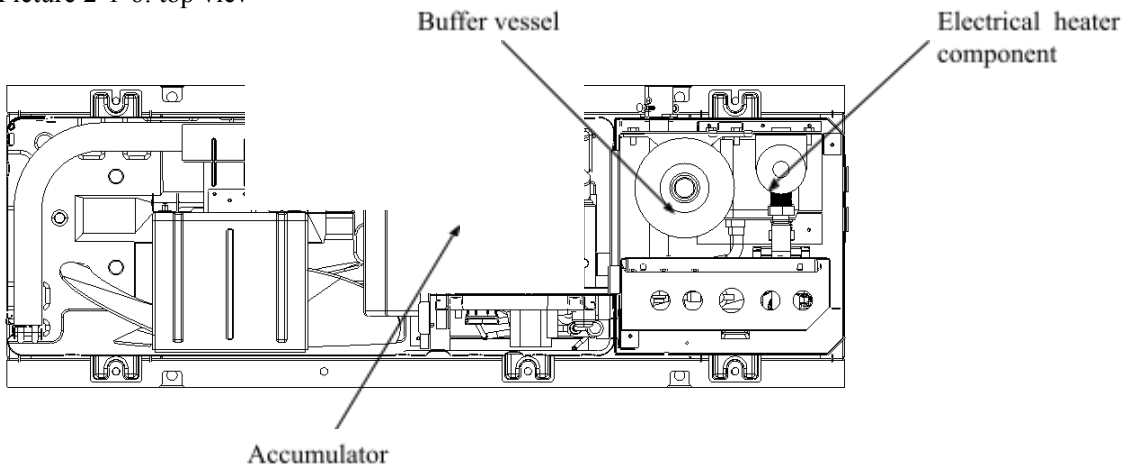


12-16kW

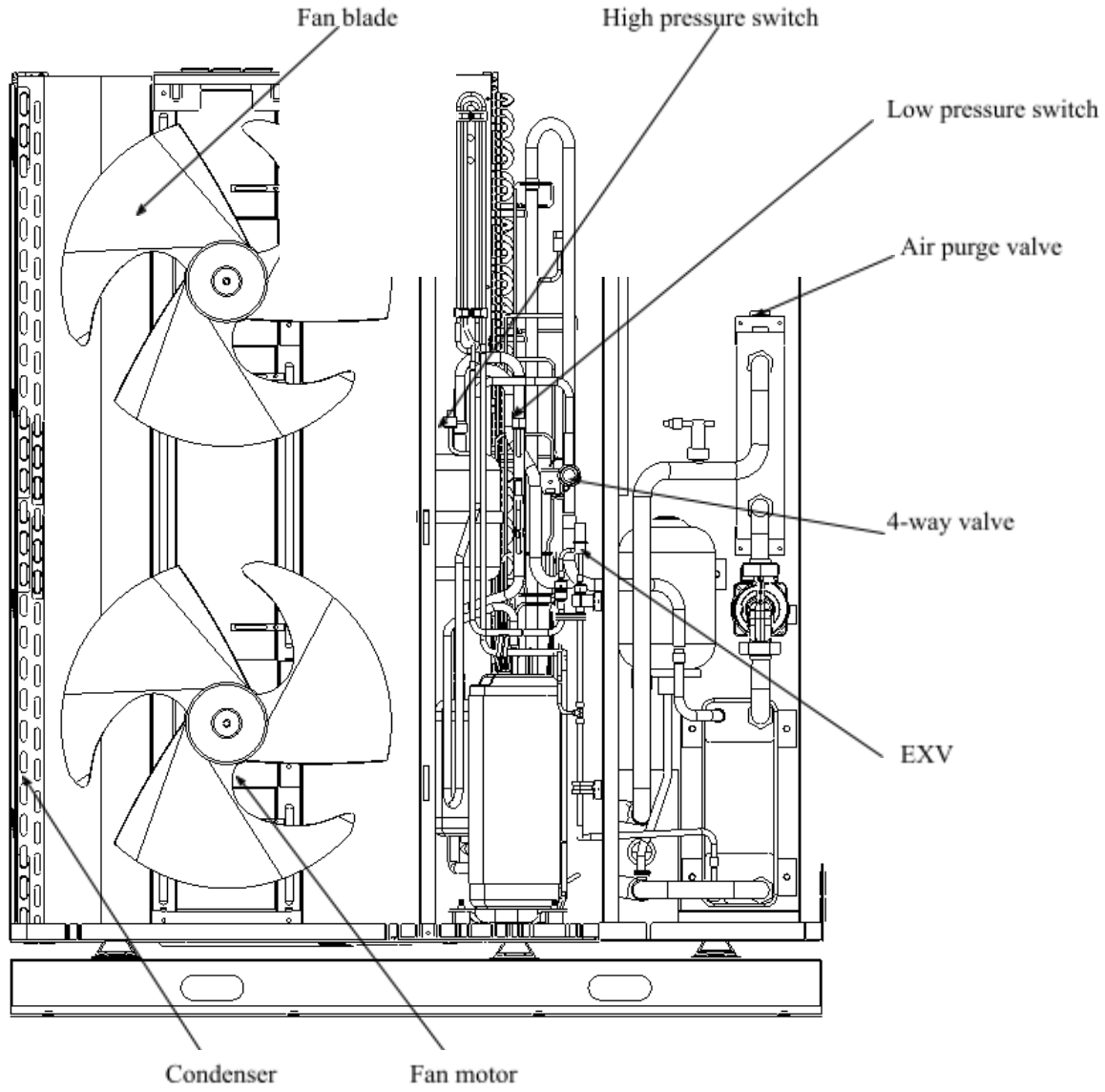
Picture 2-1-5: front view with E-box



Picture 2-1-6: top view

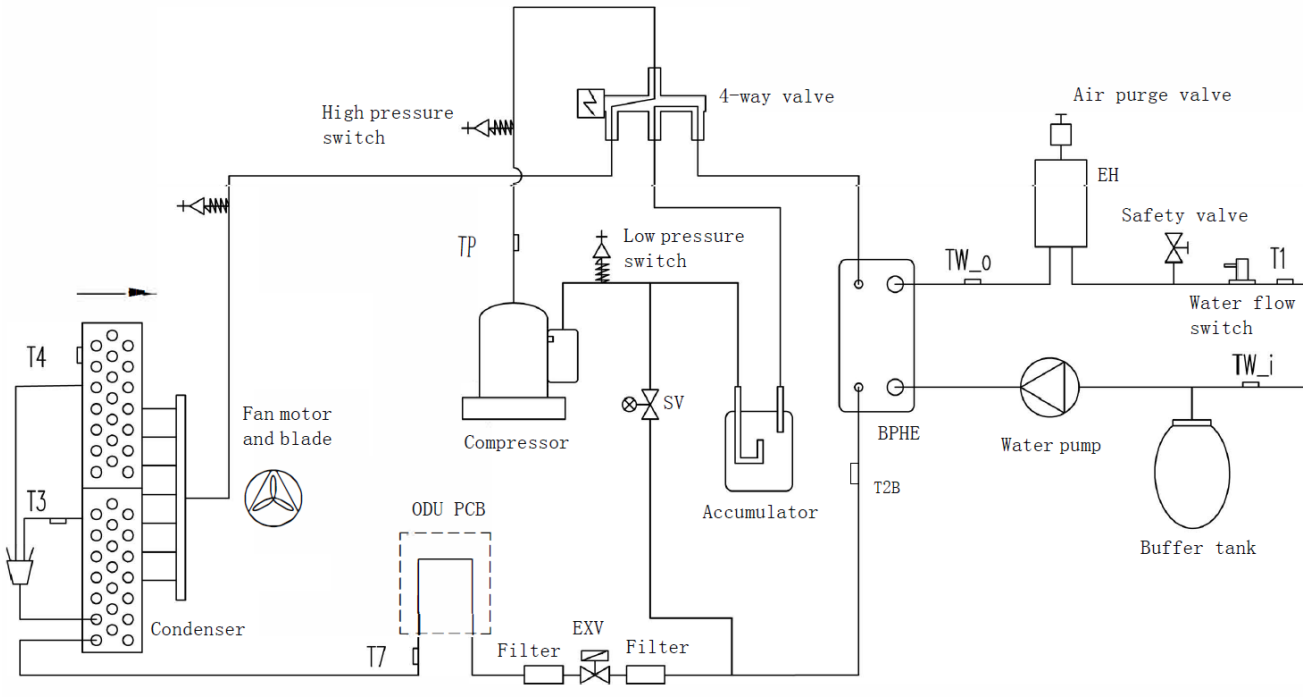


Picture 2-1-7: front view without E-box



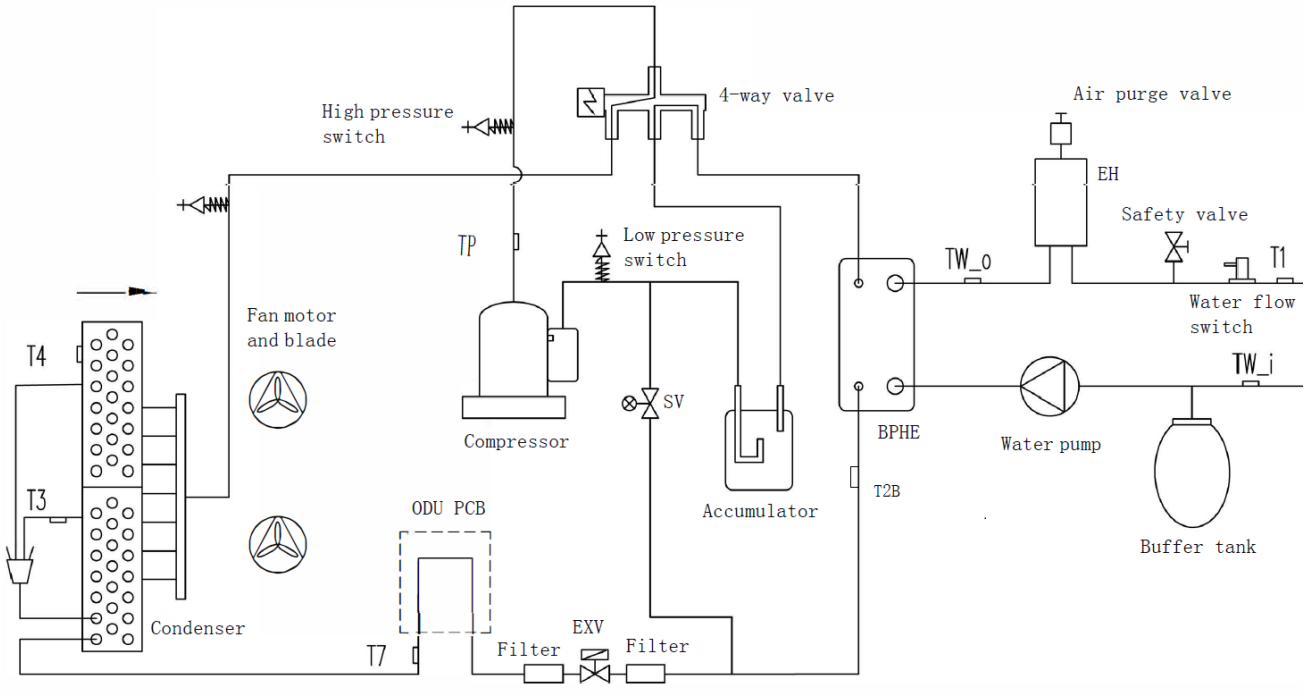
2.2.Piping diagram

Piping diagram of 4-10kW



Picture 2-2-1

Piping diagram of 12-16kW



Picture 2-2-2

Acronym

T1: Leaving water sensor after electrical heater;
Tw-i: Entering water sensor
Tw-o: Leaving water sensor after BPHE
T2B: Refrigerant temp. of BPHE
T3: Refrigerant temperature of condenser

T4: Outdoor ambient temperature
TP: Discharged temperature
T7: PCB refrigerant cooling pipe temperature
BPHE: Brazed plate heat exchanger
EXV: Electronic expansion valve
SV: Solenoid valve

Key components

1. Accumulator:

Stores liquid refrigerant and oil to protect compressor from liquid hammering.

2. Electronic expansion valve (EXV):

Controls refrigerant flow and reduces refrigerant pressure.

3. Four-way valve:

Controls refrigerant flow direction. Closed in cooling mode and open in heating mode. When closed, the air side heat exchanger functions as a condenser and water side heat exchanger functions as an evaporator; when open, the air side heat exchanger functions as an evaporator and water side heat exchanger function as a condenser.

4. High-pressure and low-pressure switches:

Regulate refrigerant system pressure. When refrigerant system pressure rises above the upper limit or falls below the lower limit, the high-pressure switch or low-pressure switch turns off, stopping the compressor.

5. Air purge valve:

Automatically removes air from the water circuit.

6. Safety valve:

Prevents excessive water pressure by opening at 6 bar and discharging water from the water circuit.

7. Buffer tank:

Balances water system pressure.

8. Water flow switch:

Detects water flow rate to protect compressor and water pump in the event of insufficient water flow.

9. Backup heater:

Provides additional heating capacity when the heating capacity of the heat pump is insufficient due to very low outdoor temperature. Also protects the external water piping from freezing.

10. Water pump:

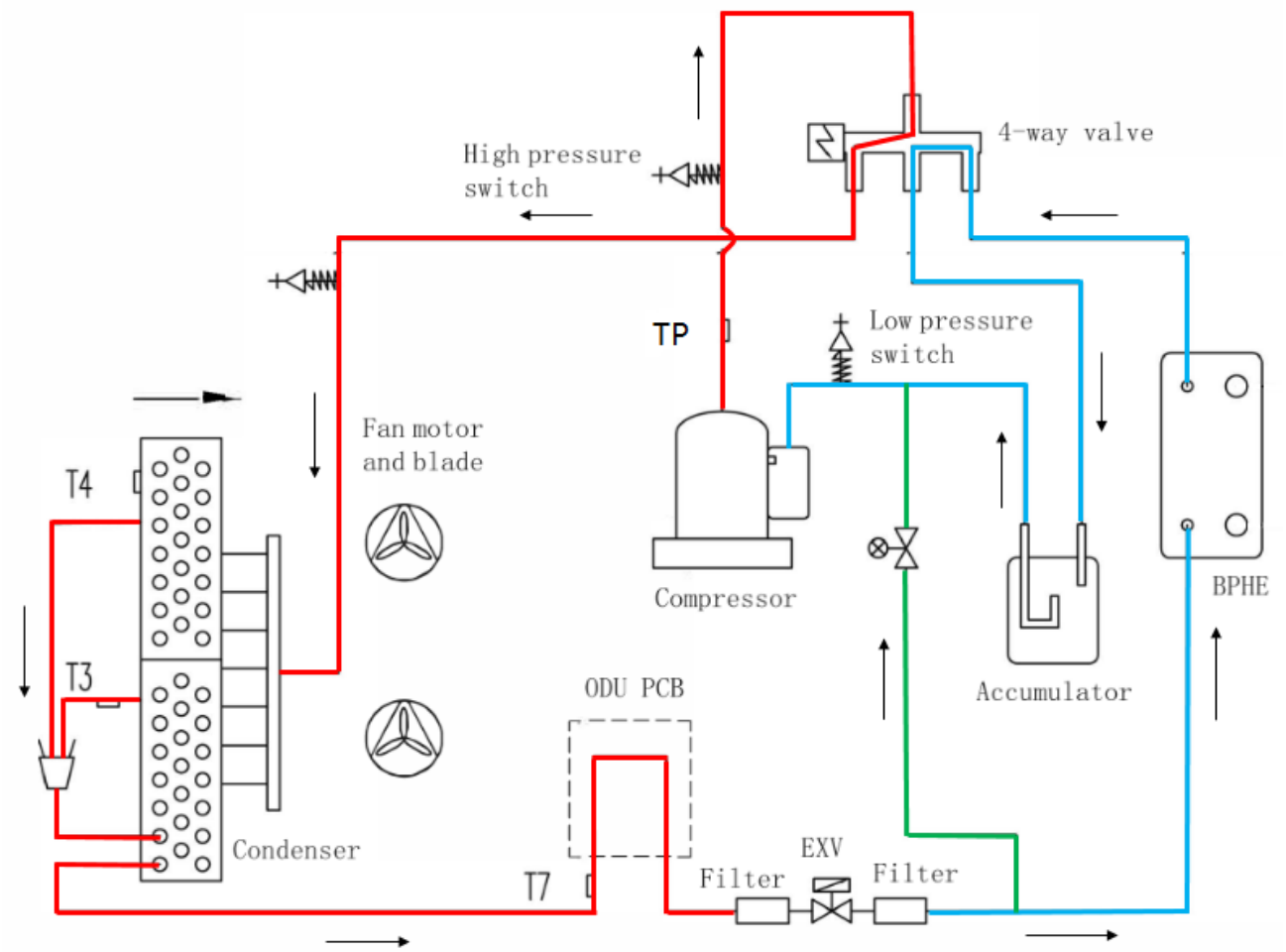
Circulates water in the water circuit.

2.3.Refrigerant flow diagram

Here are the refrigerant flow diagrams during unit's operation (12-16kW, double fan for example):

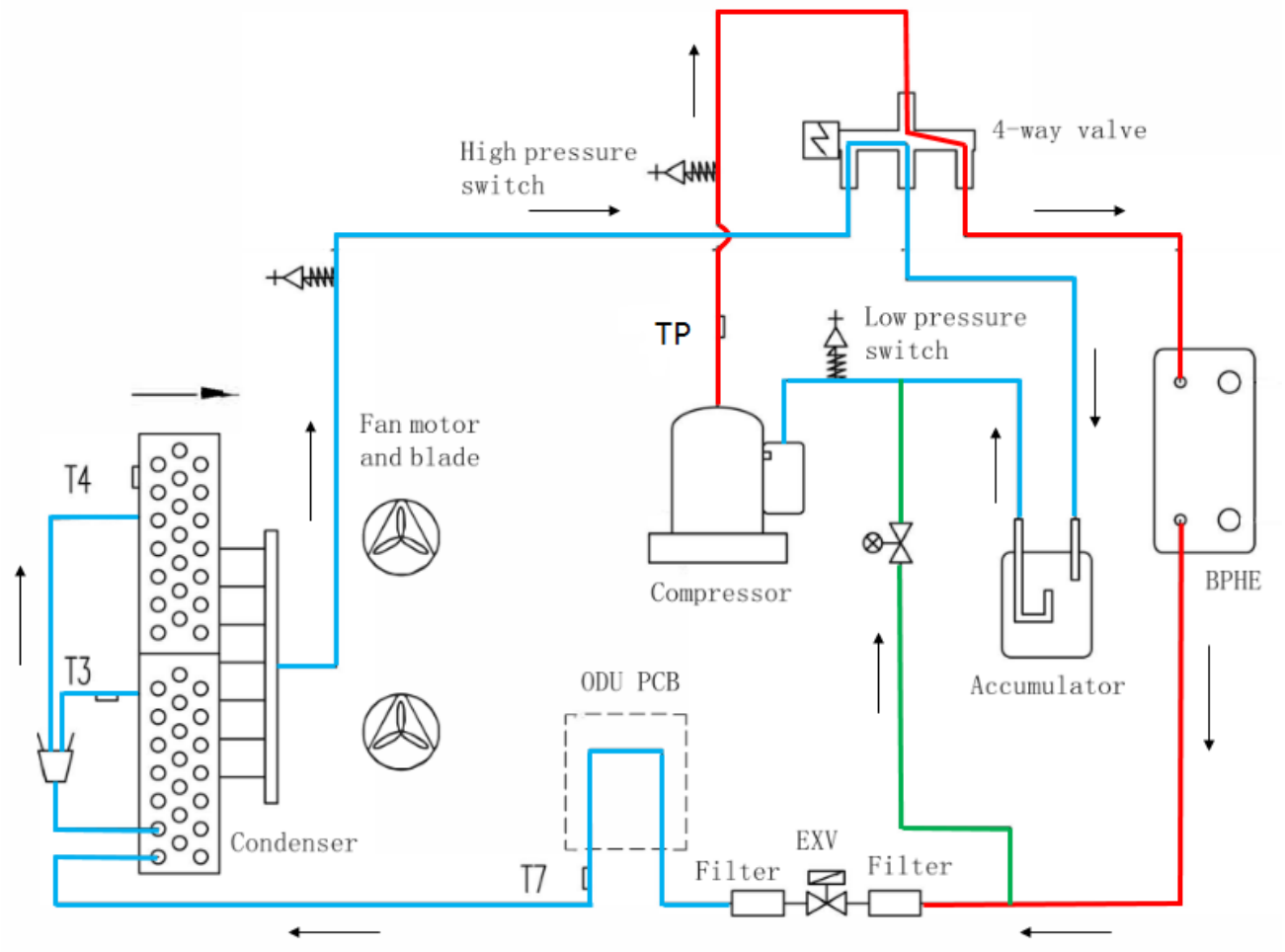
: High temperature refrigerant
: Low temperature refrigerant
: Spray liquid cooling pipe
: Flow direction

Cooling mode and defrost operation:



Picture 2-3-1

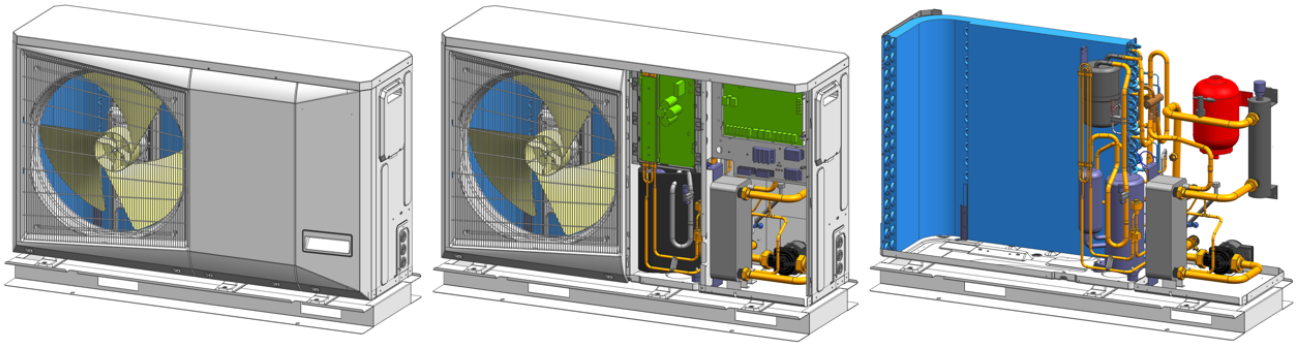
Heating mode and domestic hot water operation:

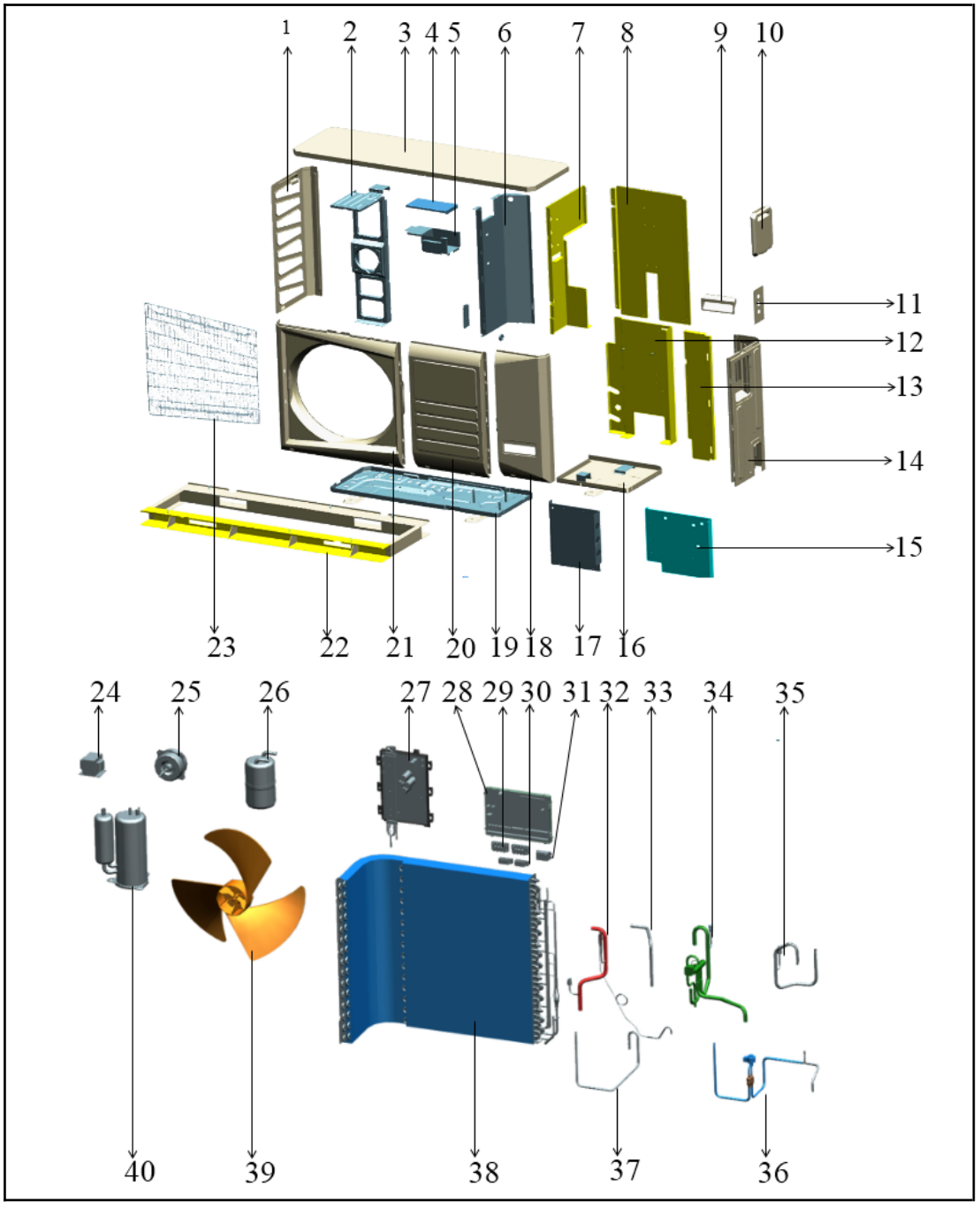


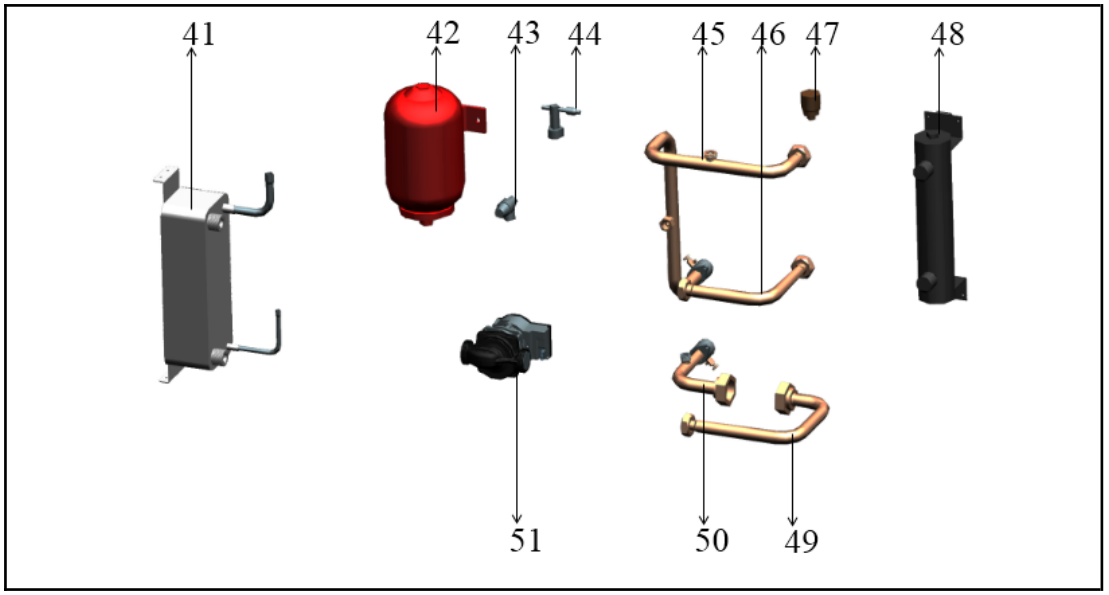
Picture 2-3-2

2.4.Exploded views

Exploded view of 4-10kW





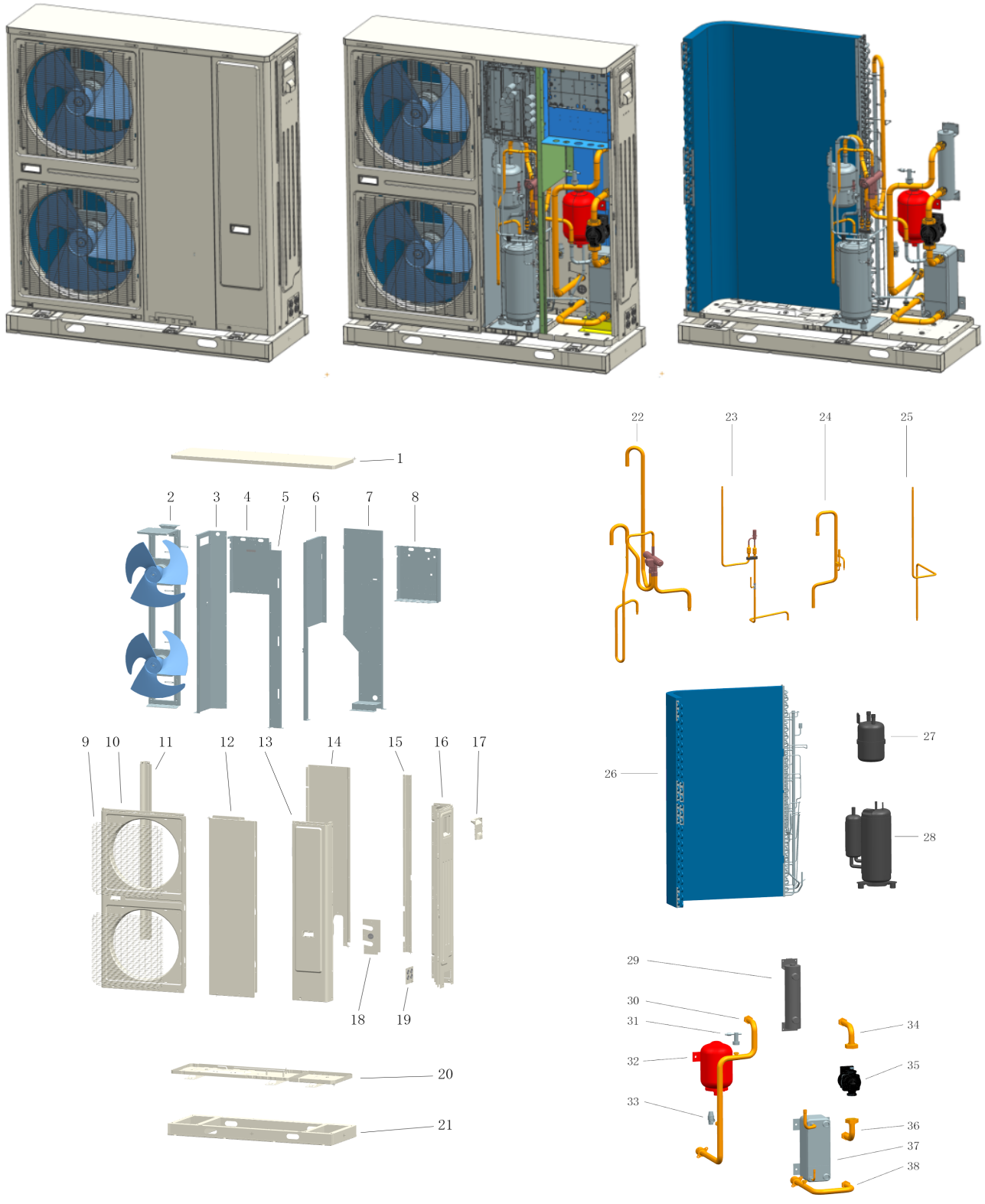


Picture 2-4-1

Table 2-4-1

No.	Name	QTY	No.	Name	QTY
1	Left plate	1	27	ODU PCB	1
2	Holder component of motor	1	28	IDU PCB	1
3	Top cover	1	29	Terminal	2
4	Cover of reactor box	1	30	Pressing button of cable	2
5	Reactor box	1	31	Relay	1
6	Septum of refrigerant system	1	32	Suction pipe components	1
7	Septum of water system	1	33	Inlet pipe of accumulator	1
8	Rear plate	1	34	4-way valve component	1
9	Hander 1	1	35	Discharged pipe component	1
10	Hander 2	1	36	EXV component	1
11	Seat plate of cable hole	1	37	PCB refrigerant cool pipe	1
12	Holder plate of electrical heater	1	38	Condenser	1
13	Column	1	39	Fan blade	1
14	Right-rear plate	1	40	Compressor	1
15	Holder plate of IDU PCB	1	41	Brazed plate heat exchanger	1
16	Base-pan of hydraulic kit	1	42	Buffer vessel	1
17	Holder plate of ODU PCB	1	43	Safety valve	1
18	Right-front plate	1	44	Water flow switch	1
19	Base-pan of refrigerant system	1	45	Water outlet pipe of unit	1
20	Medium-front plate	1	46	Water outlet pipe of BPHE	1
21	Front plate	1	47	Air purge valve	1
22	Holder seat of unit	1	48	Electrical heater component	1
23	Grill	1	49	Water inlet pipe of BPHE	1
24	Reactor	1	50	Water inlet pipe of unit	1
25	DC motor	1	51	Water pump	1
26	Accumulator	1			

Exploded view of 12-16kW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Picture 2-4-2

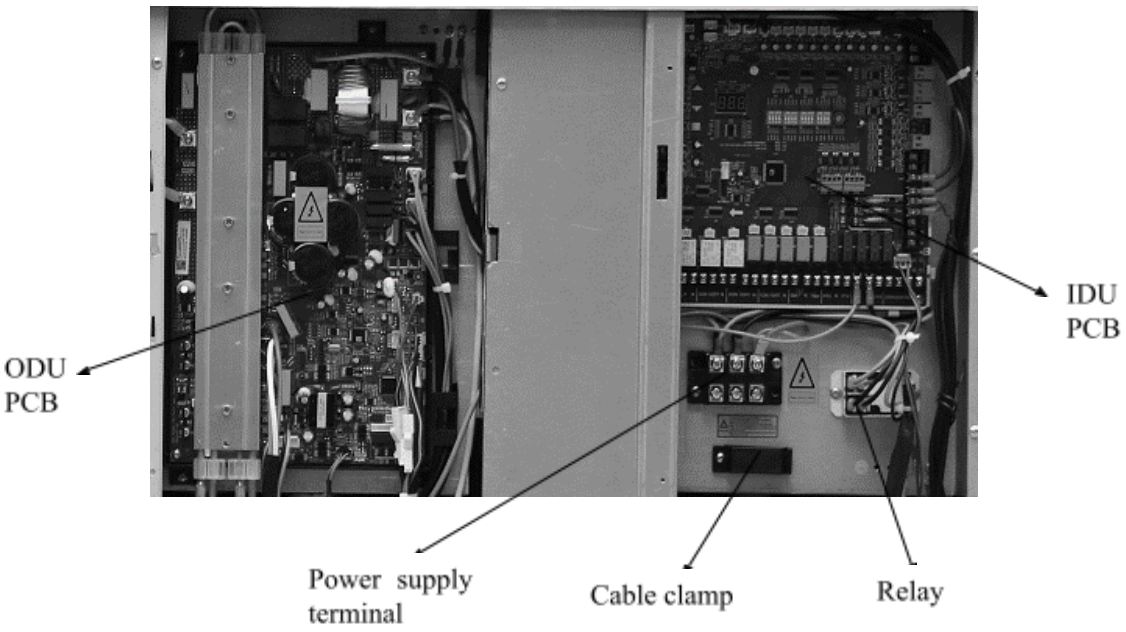
Table 2-4-2

No.	Name	QTY	No.	Name	QTY
1	Top cover component	1	21	Base-pan holder	1
2.1	Motor holder	1	22	4-way valve component	1
2.2	Connected plate of motor holder	1	23	EXV component	1
2.3	DC Motor	2	24	Suction pipe	1
2.4	Fan blade	2	25	Condenser outlet pipe component	1
3	Median septum	1	26	Condenser component	1
4	ODU PCB seat component	1	27	Accumulator	1
5	Front column	1	28	Compressor	1
6	Right septum	1	29.1	Electrical heater component	1
7	Seat plate of BPHE	1	29.2	Air purge valve	1
8	IDU PCB seat component	1	30	Water connected pipe	1
9	Grill	2	31	Water flow switch	1
10	Front panel	1	32.1	Expansion vessel	1
11	Column	1	32.2	Softy connected pipe	1
12	Mid-front panel	1	33.1	Safety valve	1
13	Service panel	1	33.2	Connector	1
14	Mid-rear panel	1	33.3	Drainage pipe	1
15	Rear column	1	34	Water pipe of pump	1
16	Right panel	1	35	Pump	1
17	Big hander	1	36	Connected pipe between BPHE & Pump	1
18	Valve seat	1	37	BPHE	1
19	Seat plate of cable cross-hole	1	38	Water inlet pipe of BPHE	1
20.1	Base-pan of hydraulic kit	1			
20.2	Base-pan of refrigerant system	1			

3. Electronic parts

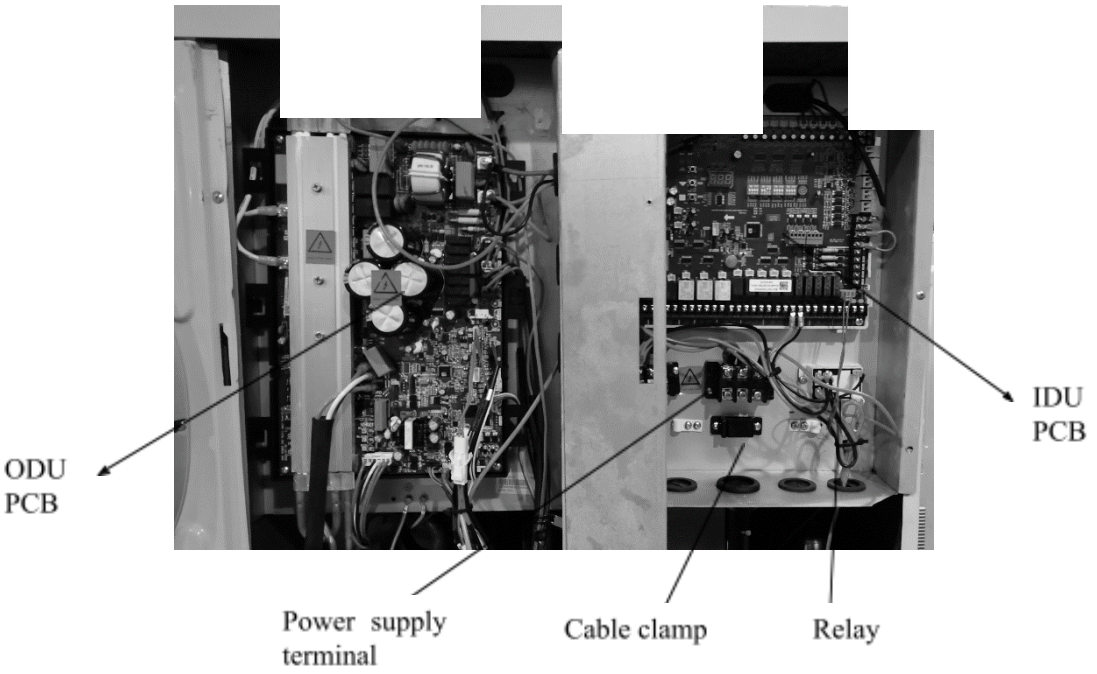
3.1.Layout of the electronic parts

4-10kW



Picture

12-16kW



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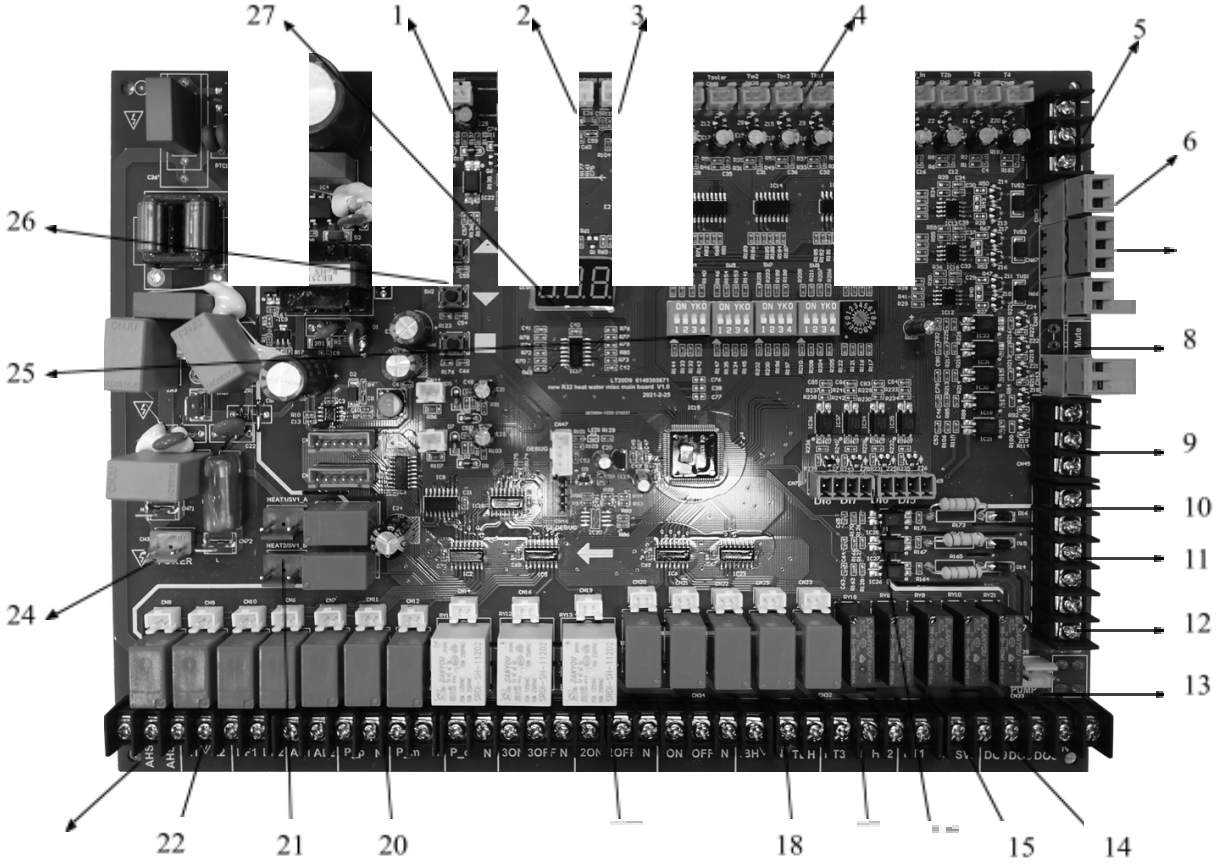
3.2.Presentation of PCB

Presentation of IDU PCB



Picture 3-2-1

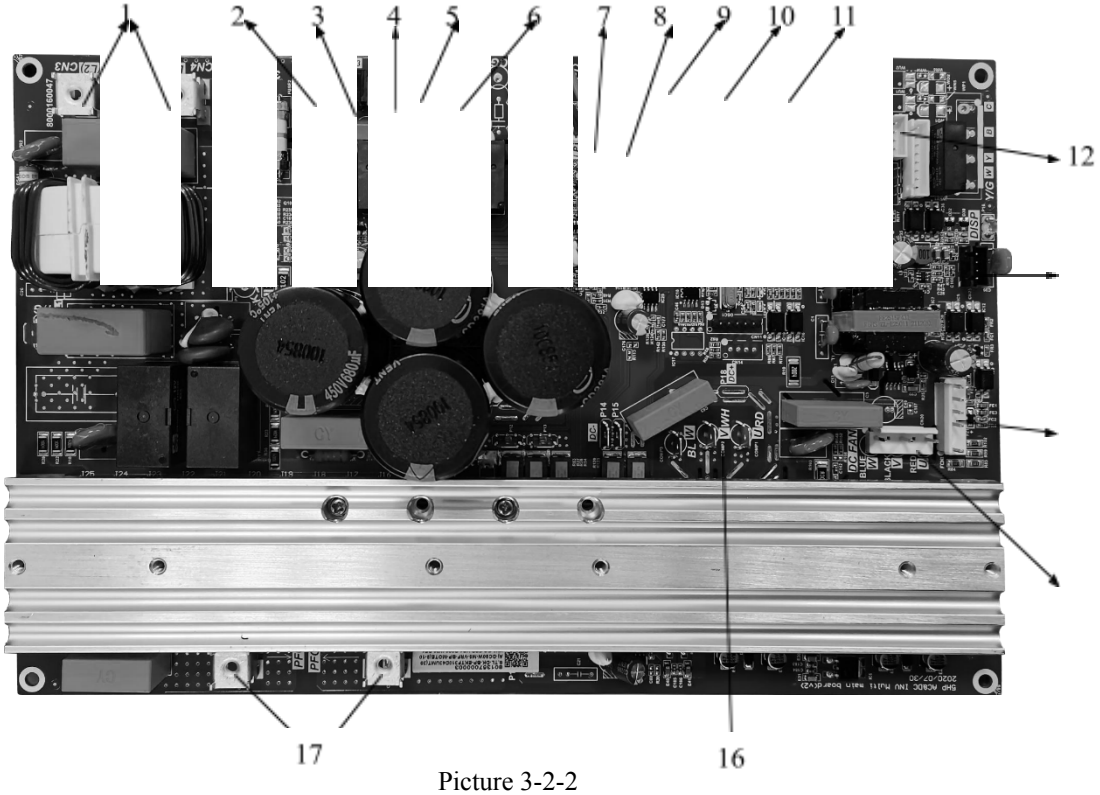
The following table:

Table 3-2-1

	tion	f V	
	nic	or U PCB	
	led	po v. Pump	
4	Ports of sensors		
5	IDU combination port		Reserved
6	ODU combination port		Reserved
7	Modbus connection port		T5: DHW sensor; T1B: External heat source LWT sensor; Tsolar: Reserved; Tw2: Bi-zone sensor, reserved Tbt2: EWT sensor of the buffer vessel Tbt1: LWT sensor of the buffer vessel T1: LWT sensor of the unit Tw-out: LWT sensor of the BPHE Tw-in: EWT sensor of the BPHE T2B: Refrigerant temperature sensor of BPHE inlet pipe T2: Refrigerant temperature sensor pf BPHE outlet pipe (Reserved) T4: Indoor ambient temperature sensor (Reserved)
8	Standard dry controlled port		Cool/heat; ON/OFF; Home/away
9	Water flow switch port		
10	Remote on/off port		Room card function

11	Solar heat source control signal port	Reserved
12	Thermostat controlled port	220V control for ON/OFF (can not work together with WUI)
13	Inv. Pump power port	
14	Customized input	Dry contact
15	Bi-zone valve	Reserved
16	Customized input	Dry contact
17	Electrical heater ports for main water loop	
18	Electrical heater ports for DHW tank	
19	3-way valve connection ports	SV3-1: External heat source 3-way valve SV3-2: Reserved SV3-3: DHW 3-way valve
20	Additional pump connection port	P-p: Bi-zone water pump P-o: Main water loop water pump P-m: External heat source water pump
21	Anti-frozen crank heater	For expansion vessel
22	Unit state signal ports	220V outputs R1-R2: Running signal DF1-DF2: Defrost signal AL1-AL2: Alarm signal
23	External heat source control signal port	220V output AHS1-ASH2
24	IDU 220V power supply port	
25	DIP switches	
26	Checking buttons	
27	LED display	

Presentation of ODU PCB (Single phase)



Picture 3-2-2

The port of the ODU PCB is definite w table:

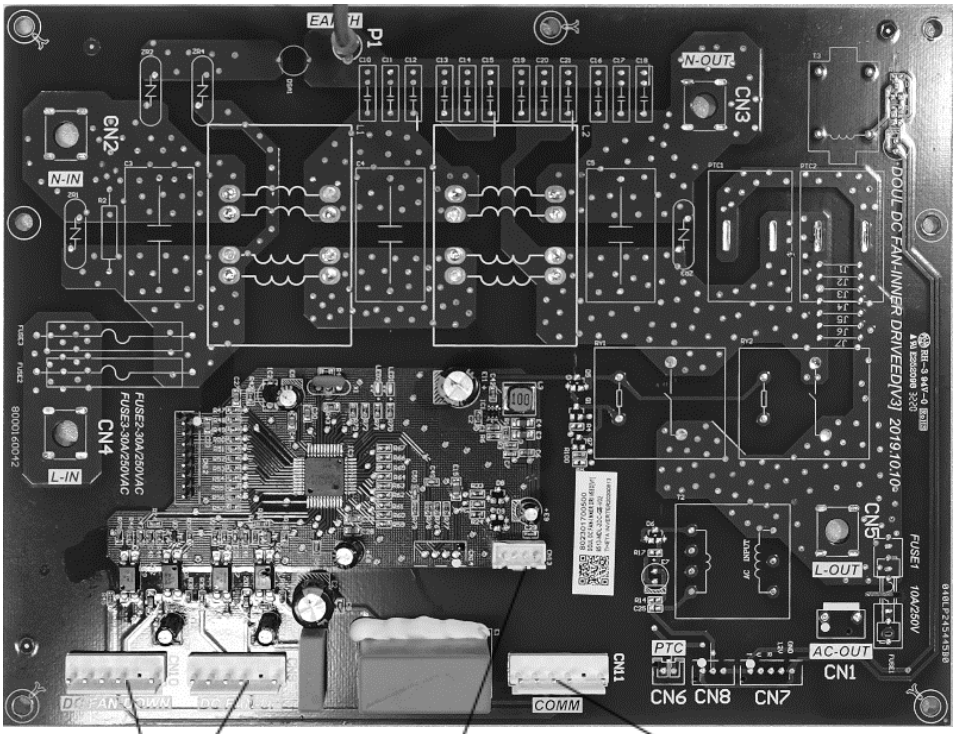
Table 3-2-2

No.	Defi	Note
1	220Vpower supply por	
2	SV2 valve connection	Spray liqui g solenoid valve
3	SV3 valve connection	Reserved
4	Compressor crank heat nection port	
5	Base-pan heater connection port	
6	4-way valve coil connection port	
7	LP&HP switches port	Low pressure and high pressure
8	High pressure sensor connection port	Reserved
9	T7 sensor connection port	Refrigerant cooling pipe sensor if IPM
10	Sensors group connection port	T3: ODU condenser pipe temp. sensor T4: ODU ambient sensor TP: Discharged temp. sensor
11	EXV connection port	
12	Fan driven board power connection port	Only for 12-16kw, double fan unit
13	IDU PCB communication port	
14	Fan driven board communication board	Only for 12-16kw, double fan unit
15	DC motor connection port	Only for 4-10kw, single fan unit
16	Compressor connection port	
17	Reactor connection ports	

Presentation of ODU PCB (Three phase)

(reserved)

Presentation of fan driven PCB (Only for 12-16kw, single phase)



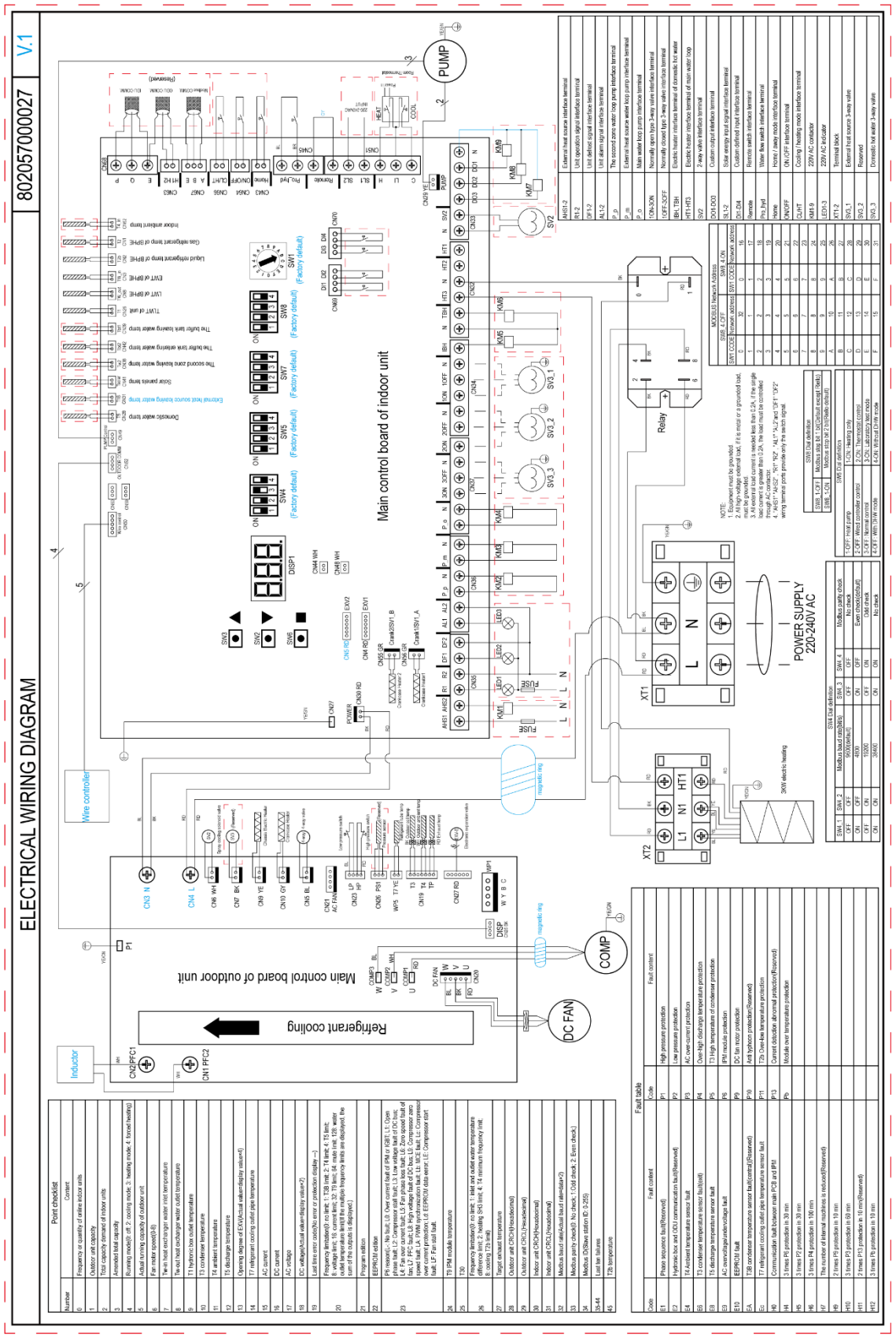
Connection ports of motor

Communication port of ODU PCB

Power supply from ODU PCB

3.3.Wiring diagram

4-10kW-1Ph



12-16kW-1Ph

ELECTRICAL WIRING DIAGRAM

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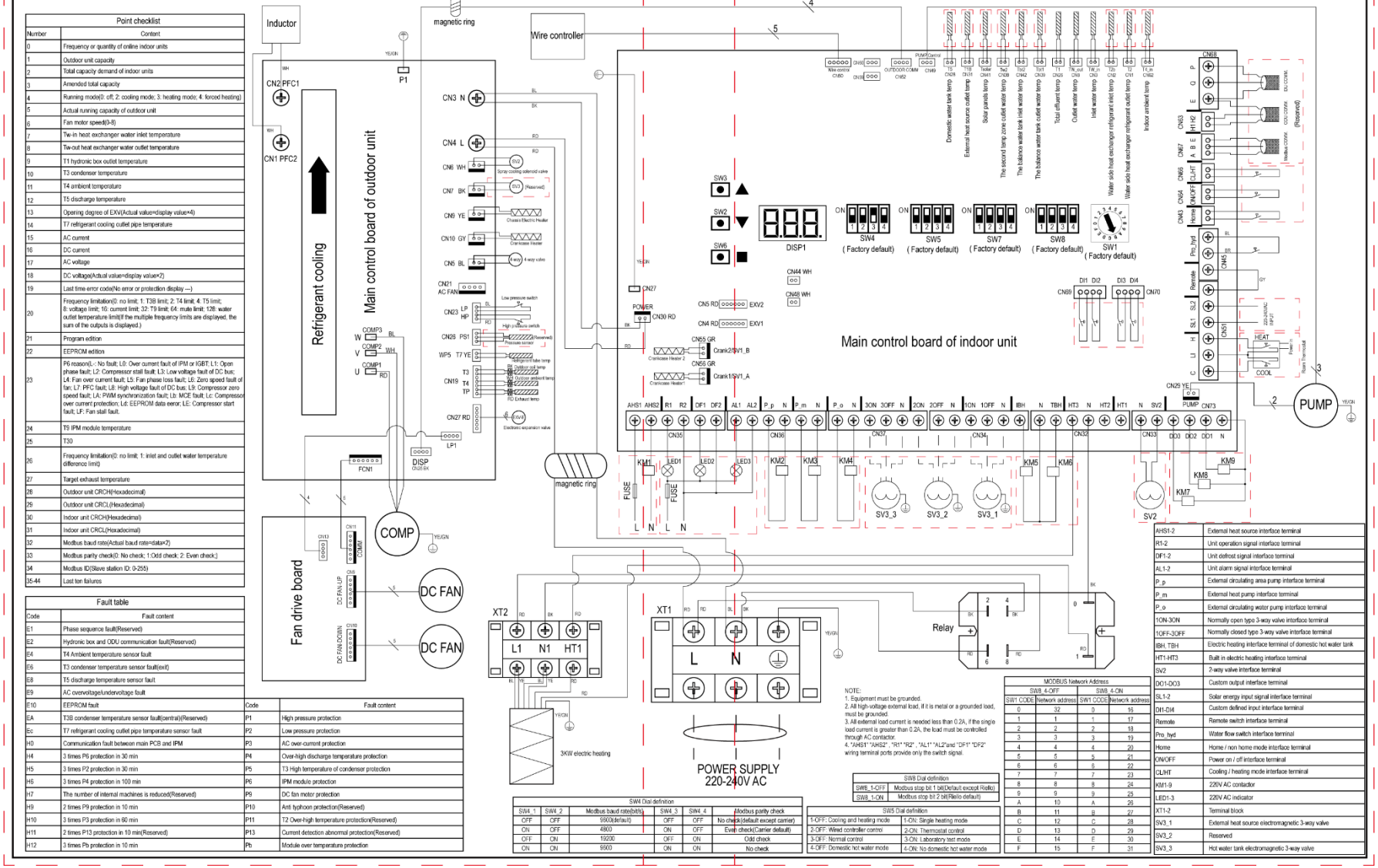


Point checklist	
Number	Content
0	Frequency or quantity of online indoor units
1	Outdoor unit capacity
2	Total capacity demand of indoor units
3	Amended total capacity
4	Running mode(0: off; 2: cooling mode; 3: heating mode; 4: forced heating)
5	Actual running capacity of outdoor unit
6	Fan motor speed(0-8)
7	Tw-in heat exchanger water inlet temperature
8	Tw-out heat exchanger water outlet temperature
9	T1 hydronic box outlet temperature
10	T3 condenser temperature
11	T4 ambient temperature
12	T5 discharge temperature
13	Opening degree of EXV(Actual value=display value×4)
14	T7 refrigerant cooling outlet pipe temperature
15	AC current
16	DC current
17	AC voltage
18	DC voltage(Actual value=display value×2)
19	Last time error code(No error or protection display ---)
20	Frequency limitation(0: no limit; 1: T3B limit; 2: T4 limit; 4: T5 limit; 8: voltage limit; 16: current limit; 32: T9 limit; 64: mute limit; 128: water outlet temperature limit(If the multiple frequency limits are displayed, the sum of the outputs is displayed.)
21	Program edition
22	EEPROM edition
23	P6 reason(L-: No fault; L0: Over current fault of IPM or IGBT; L1: Open phase fault; L2: Compressor stall fault; L3: Low voltage fault of DC bus; L4: Fan over current fault; L5: Fan phase loss fault; L6: Zero speed fault of fan; L7: PFC fault; L8: High voltage fault of DC bus; L9: Compressor zero speed fault; LA: PWM synchronization fault; Lb: MCE fault; Lc: Compressor over current protection; Ld: EEPROM data eeror; LE: Compressor start fault; LF: Fan stall fault.
24	T9 IPM module temperature
25	T30
26	Frequency limitation(0: no limit; 1: inlet and outlet water temperature difference limit)
27	Target exhaust temperature
28	Outdoor unit CRCH(Hexadecimal)
29	Outdoor unit CRCL(Hexadecimal)
30	Indoor unit CRCH(Hexadecimal)
31	Indoor unit CRCL(Hexadecimal)
32	Modbus baud rate(Actual baud rate=data×2)
33	Modbus parity check(0: No check; 1:Odd check; 2: Even check;)
34	Modbus ID(Slave station ID: 0-255)
35-44	Last ten failures

Fault table	
Code	Fault content
E1	Phase sequence fault(Reserved)
E2	Hydronic box and ODU communication fault(Reserved)
E4	T4 Ambient temperature sensor fault
E6	T3 condenser temperature sensor fault(exit)
E8	T5 discharge temperature sensor fault
E9	AC overvoltage/undervoltage fault
E10	EEPROM fault
EA	T3B condenser temperature sensor fault(central)(Reserved)
Ec	T7 refrigerant cooling outlet pipe temperature sensor fault
H0	Communication fault between main PCB and IPM
H4	3 times P6 protection in 30 min
H5	3 times P2 protection in 30 min
H6	3 times P4 protection in 100 min
H7	The number of internal machines is reduced(Reserved)
H9	2 times P9 protection in 10 min
H10	3 times P3 protection in 60 min
H11	2 times P13 protection in 10 min(Reserved)
H12	3 times Pb protection in 10 min

Code	Fault content
P1	High pressure protection
P2	Low pressure protection
P3	AC over-current protection
P4	Over-high discharge temperature protection
P5	T3 High temperature of condenser protection
P6	IPM module protection
P9	DC fan motor protection
P10	Anti typhoon protection(Reserved)
P11	T2 Over-high temperature protection(Reserved)
P13	Current detection abnormal protection(Reserved)
Pb	Module over temperature protection

SW4 Dial definition					
SW4_1	SW4_2	Modbus baud rate(bit/s)	SW4_3	SW4_4	Modbus parity check
OFF	OFF	9600(default)	OFF	OFF	No check(default except carrier)
ON	OFF	4800	ON	OFF	Even check(Carrier default)
OFF	ON	19200	OFF	ON	Odd check
ON	ON	9600	ON	ON	No check

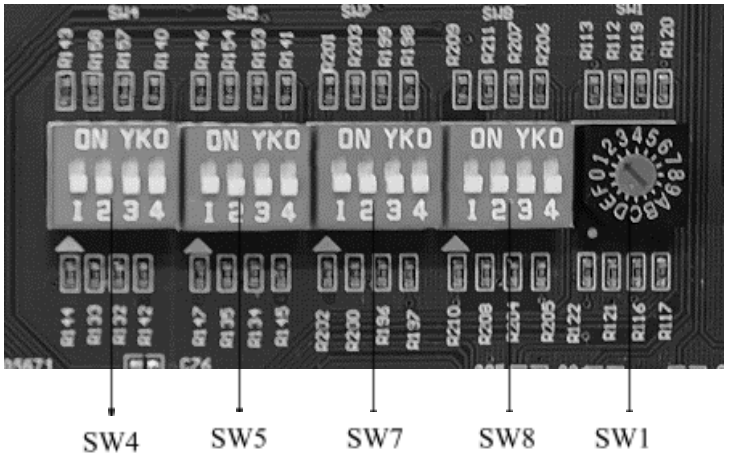
SW8 Dial definition	
SW8_1-OFF	Modbus stop bit 1 bit(Default except Rello)
SW8_1-ON	Modbus stop bit 2 bit(Rello default)

SW5 Dial definition	
1-OFF: Cooling and heating mode	1-ON: Single heating mode
2-OFF: Wired controller control	2-ON: Thermostat control
3-OFF: Normal control	3-ON: Laboratory test mode
4-OFF: Domestic hot water mode	4-ON: No domestic hot water mode

MODBUS Network Address			
SW9_4-OFF		SW9_4-ON	
SW1 CODE	Network address	SW1 CODE	Network address
0	32	0	16
1	1	1	17
2	2	2	18
3	3	3	19
4	4	4	20
5	5	5	21
6	6	6	22
7	7	7	23
8	8	8	24
9	9	9	25
A	10	A	26
B	11	B	27
C	12	C	28
D	13	D	29
E	14	E	30
F	15	F	31

AHS1-2	External heat source interface terminal
R1-2	Unit operation signal interface terminal
DF1-2	Unit defrost signal interface terminal
AL1-2	Unit alarm signal interface terminal
P_p	External circulating area pump interface terminal
P_m	External heat pump interface terminal
P_o	External circulating water pump interface terminal
1ON-3ON	Normally open type 3-way valve interface terminal
1OFF-3OFF	Normally closed type 3-way valve interface terminal
IBH, TBH	Electric heating interface terminal of domestic hot water tank
HT1-HT3	Built in electric heating interface terminal
SV2	2-way valve interface terminal
DO1-DO3	Custom output interface terminal
SL1-2	Solar energy input signal interface terminal
DI1-DI4	Custom defined input interface terminal
Remote	Remote switch interface terminal
Pro_hyd	Water flow switch interface terminal
Home	Home / non home mode interface terminal
ON/OFF	Power on / off interface terminal
CL/HT	Cooling / heating mode interface terminal
KM1-9	220V AC contactor
LED1-3	220V AC indicator
XT1-2	Terminal block
SV3_1	External heat source electromagnetic 3-way valve
SV3_2	Reserved
SV3_3	Hot water tank electromagnetic 3-way valve

3.4.Switch setting and function information



Pic

The functions of switches are a ab

Table 3-4-1

No.					**Function**
1	**2**	**Modl**			**Modbus parity check**
OFF	OFF	0	F		No check
ON	OFF	4800	ON	OFF	Even parity check
OFF	ON	19200	OFF	ON	Odd parity check
ON	ON	9600	ON	ON	No check

Table 3-4-2

SW5		
No.	**State**	**Function**
1	OFF	Cooling and heating type unit
	ON	Heating only unit
2	OFF	WUI control
	ON	Thermostat control
3	OFF	Normal control (user mode)
	ON	Lab test mode (only for capacity test)
4	OFF	With domestic hot water
	ON	Without domestic hot water

Table 3-4-3

SW7				
1	**2**	**3**	**4**	**Brand**
OFF	OFF	OFF	ON	/

Table 3-4-4

SW8		
No.	**State**	**Function**
1	OFF	Modbus stop bit: 1 bit
	ON	Modbus stop bit: 2 bit
2	OFF	Reserved
	ON	Reserved
3	OFF	Reserved
	ON	Reserved
4	OFF	Refer to table 3-4-5
	ON	

Table 3-4-5

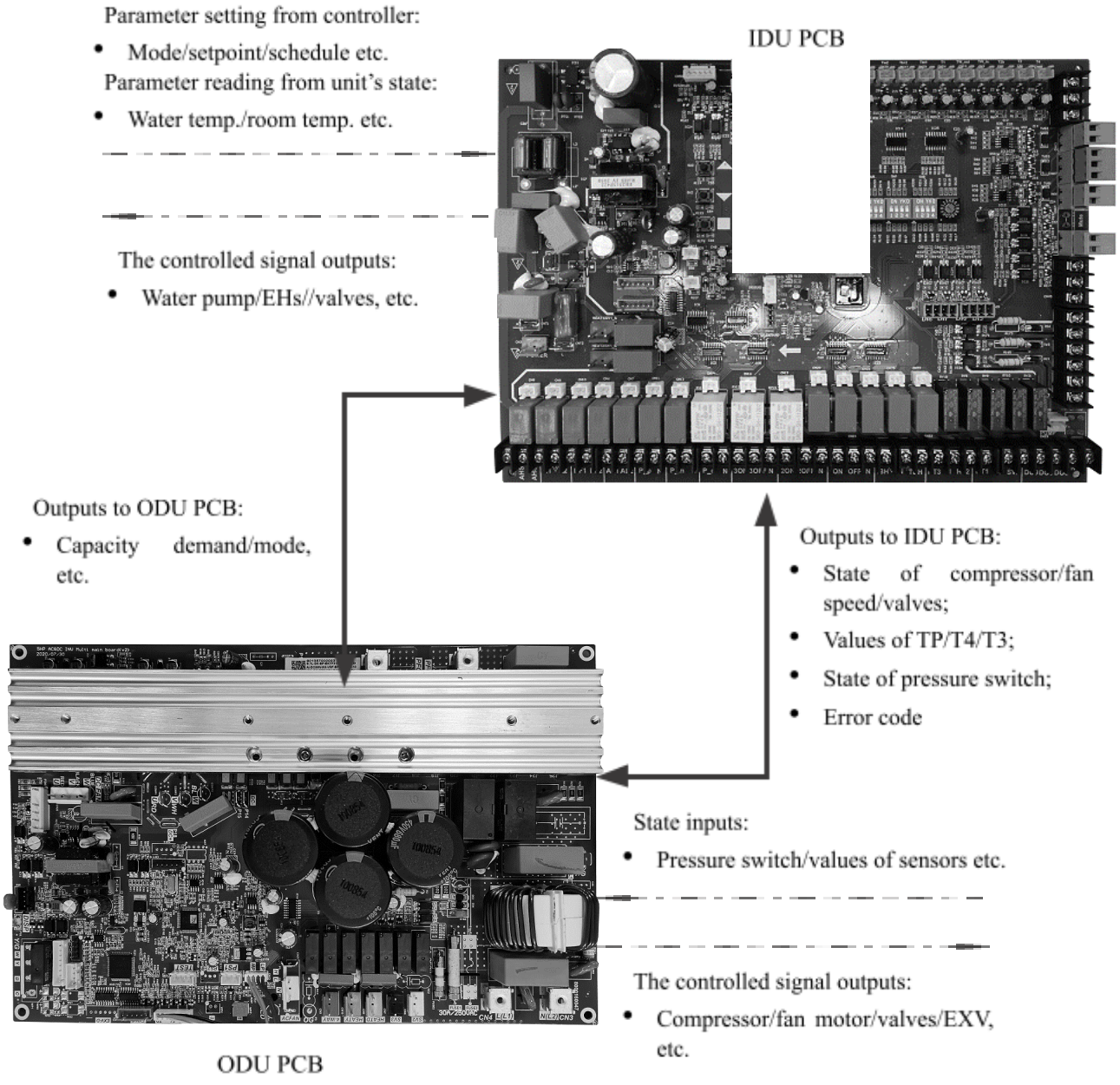
Modbus address			
SW8-4 OFF		SW8-4 ON	
SW1	Address	SW1	Address
0	32	0	16
1	1	1	17
2	2	2	18
3	3	3	19
4	4	4	20
5	5	5	21
6	6	6	22
7	7	7	23
8	8	8	24
9	9	9	25
A	10	A	26
B	11	B	27
C	12	C	28
D	13	D	29
E	14	E	30
F	15	F	31

4. Control logic

4.1.General control logic

1. Communication logic

The unit has two PCBs including IDU PCB and ODU PCB. The IDU PCB is used to receive the setting parameters from controller, and then calculates the capacity demand basing on the system state, as well as feeds back the error to controller. ODU PCB is used to receive the demand signal from IDU PCB, and then controls the compressor, fan motor, valves, base-pan crank heater, etc.



2. Control setpoint type

To achieve better comfort, the unit can set the room temperature setpoint control or water setpoint control according to your needs. No matter air setpoint control or water setpoint control, they can both set the climate curves (also call auto mode):

2.1 Air setpoint control

- Set the air temperature manually to control the unit;
- Choose the climate curves to control the unit automatically according to ambient temperature.

2.2 Water setpoint control

- Set the water temperature manually to control the unit;
- Choose the climate curves to control the unit automatically according to ambient temperature.

3. Domestic hot water control

For heat pump with a domestic water tank, the DHW mode is used to produce hot water for domestic purposes. The system control manages to operation the hot domestic water tank, as well as the diverting value. The heat pump is standard fitted with a variable speed pump in a hydraulic kit, and this pump is controlled with adjustable speed according to entering water temperature and leaving water temperature.

The heat pump would control the domestic hot water according to schedule or priority mode;

3.1 Schedule

If set the schedule of domestic hot water, then the heat pump would run DHW mode according schedule and DHW demand together.

Table 4-1-1

DHW schedule configurate	Schedule days	Select the days for operating DHW mode Monday/Tuesday/Wednesday/Thursday/Friday/Saturday/Sunday
	Starting time	Time of starting up DHW mode (00:00 to 23:59)
	Stopping time	Time of stop DHW mode (00:00 to 23:59)

3.2 Priority mode

If the set the DHW mode as priority mode, then the heat pump would run the DHW mode according the DHW demand only.

4. Anti-legionella control

In order to protect the health of human, it must have the anti-legionella function once configurate the domestic hot water. The anti-legionella function is controlled to turn on/off according to the temperature of the domestic hot water and schedule or manually by controller.

If set the schedule of anti-legionella, then the heat pump would run anti-legionella according schedule and setpoint, and will exit this function after running for 3h or reaching the setpoint.

Table 4-1-2

Anti-legionella configurate	Schedule days	Select the days for operating DHW mode Monday/Tuesday/Wednesday/Thursday/Friday/Saturday/Sunday
	Starting time	Time of starting up anti-legionella function (00:00 to 23:59)
	Setpoint	Temperature value of stop anti-legionella function (60 to 70°C)

4.2.Start up control

1. Compressor startup delay control

In initial startup control and in restart control (except defrosting operation), compressor startup is delayed 3 minimums in order to prevent frequent compressor on/off and to equalize the pressure within the refrigerant system.

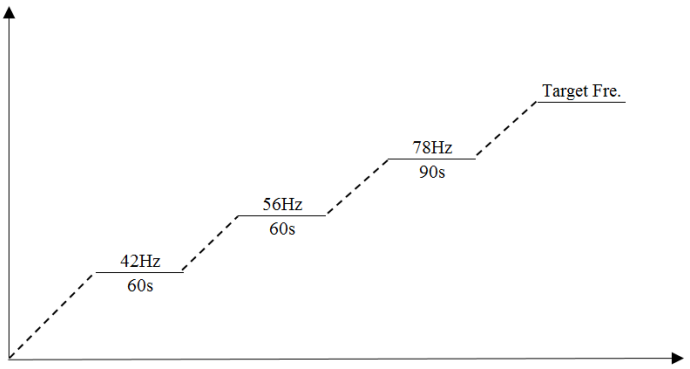
2. Compressor startup program

In initial startup control and in re-start control, compressor startup is controlled according to outdoor ambient temperature and discharged temperature. Compressor startup follows one of two startup programs until the target rotation speed is reached.

When it meets one of the below conditions, the heat pump will start with startup program I, otherwise the heat pump starts with startup program II.

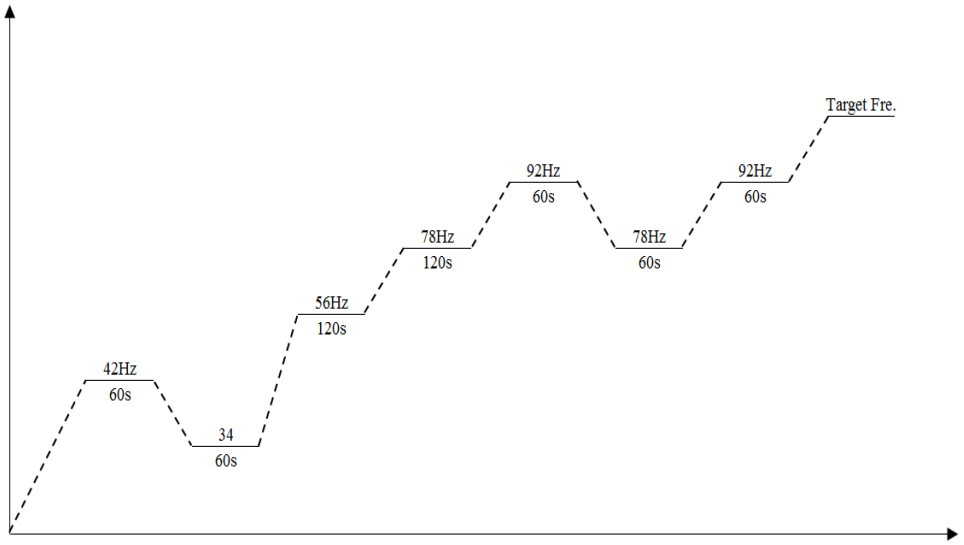
- Discharged temperature ≥ 15°C;
- Outdoor ambient temperature ≥ 3°C.

Startup program I:



Picture 4-2-1 Startup program I

Startup program II



Picture 4-2-2 Startup program II

Note: If the target frequency is lower than plat frequency, then the heat pump would not complete the whole startup plat program.

3. State and control of components

Startup control for cooling operation

Table 4-2-1

Components	4-16kW	Control functions and states	Note
Inverter compressor	•	Compressor startup program according to T4 and Td. [1]	TP: Discharged temp. T4: Outdoor ambient temp. T3: Outdoor coil temp.
DC fan motor	•	Fan motor startup with speed W7. [2]	
Electronic expansion valve	•	0-480 pules, start with a certain opening degree, and controlled according to compressor frequency, TP, T4 and T3.	
4-way valve	•	OFF	

Startup control for heating and domestic hot water operation

Table 4-2-2

Components	4-16kW	Control functions and states	Note
Inverter compressor	•	Compressor startup program according to ambient temperature and discharged temperature. [1]	TP: Discharged temp. T4: Outdoor ambient temp. LWT: Leaving water temp.

DC fan motor	•	Fan motor startup with speed W7. [2]	
Electronic expansion valve	•	0-480 pules, start with a certain opening degree, and controlled according to compressor frequency, TP, T4 and LWT.	
4-way valve	•	ON	

Note:
1. Refer to section 4.2 startup control, part 2 compressor startup control, picture 4-2-1 & picture 4-2-2.
2. Refer to section 4.3 normal operation control, part 5 “outdoor fan control”, table 4.3-3.

4.3.Normal operation control

1. Component control during operation

Normal operation control in cooling mode

Table 4-3-1

Components	4-16kW	Control functions and states	Note
Inverter compressor	•	Compressor frequency is controlled according to requirement of hydraulic kit and T4.	TP: Discharged temp. T4: Outdoor ambient temp. T3: Outdoor coil temp.
DC fan motor	•	Fan motor speed is controlled according to TP, T3 and T4.	
Electronic expansion valve	•	0-480 pules, start with a certain opening degree, and controlled according to compressor frequency, TP, T4 and T3.	
4-way valve	•	OFF	

Normal operation control in heating and domestic hot water mode

Table 4-3-2

Components	4-16kW	Control functions and states	Note
Inverter compressor	•	Compressor frequency is controlled according to requirement of hydraulic kit and T4.	TP: Discharged temp. T4: Outdoor ambient temp. T3: Outdoor coil temp. LWT: Leaving water temp.
DC fan motor	•	Fan motor speed is controlled according to compressor frequency, T3 and T4.	
Electronic expansion valve	•	0-480 pules, start with a certain opening degree, and controlled according to compressor frequency, TP, T4 and LWT.	
4-way valve	•	ON	

2. Compressor control

The compressor rotation speed is controlled according to the load requirement and ambient temperature. Before compressor startup, the heat pump unit determines the compressor target speed according to outdoor ambient temperature, leaving water setting temperature and actual leaving water temperature and then runs the appropriate compressor startup program. Refer to section 4.2, Part 2 “Compressor Startup Program”. Once the startup program is completed, the compressor runs at the target rotation speed.

During operation the compressor speed is controlled according to the difference between setting temperature and actually leaving water temperature, outdoor ambient temperature, and limited by the refrigerant temperature, running current, and power supply voltage.

3. 4-way valve control

The four-way valve is used to change the direction of refrigerant flow through the water side heat exchanger in

order to switch between cooling and heating/DHW operations.

During heating and DHW operations, the four-way valve is on; during cooling and defrosting operations, the four-way valve is off.

4. Electronic expansion valve control

The position of the electronic expansion valve is controlled from 0 (full closed) to 480 (full open).

- After power-on
  The EXV first closes fully, then moves to standby position.
  When it is running cooling mode, then the EXV changes to initial position for a few mins, and is controlled according to compressor frequency, outdoor ambient temperature, discharged temperature and condenser temperature.
  When it is running heating/DHW mode, then the EXV changes to initial position for a few mins, and is controlled according to compressor frequency, outdoor ambient temperature, discharged temperature and leaving water temperature.
- When unit in standby mode
  The EXV is at standby position.
- When unit is stopped
  The EXV first closes fully, then moves to standby position.

5. Outdoor fan control

The outdoor fan speed is controlled and adjusted according to following table.

Table 4-3-3

Fan speed	4-10kW (RPM)	12-16kW (RPM)	
		Up motor	Down motor
0	0	0	0
W1	250	250	310
W2	330	330	410
W3	430	430	510
W4	530	530	610
W5	630	630	710
W6	730	730	760
W7	780	780	840
W8	860	860	860

6. Water pump control

The inverter pump will start 60s before compressor running, and delay 120s to close after turning off the heat pump or reaching the setting temperature. This inverter water pump adjust the speed from 30% to 100% according to the entering water temperature and leaving water temperature.

7. Spray liquid cooling control

When the discharged temperature of compressor exceeds 100°C, the solenoid valve opens and the frequency of compressor drops in order to reduce the discharged temperature. When the discharged temperature is below 90°C, the solenoid valve closes.

4.4.Stop control

The stop operation occurs for one of the following reasons:

1. The system stops when the set temperature has been reached.
2. Abnormal shutdown: in order to protect the system, if an abnormal state occurs the system a ‘stop with thermo off’ operation and an error code is displayed on the PCB digital display and on the user interface.

4.5.Standby control

1. Compressor crank heater control

The crank heater is used to prevent refrigerant from mixing with compressor oil when is stopped. It is controlled according to the outdoor ambient temperature and the compressor on/off state.

When the outdoor ambient temperature is above 0°C or compressor is running, the crank heater is off;

When the outdoor ambient temperature is below or at 0°C and either the compressor has been stopped for 30mins or the has just been powered-on (either manually or when the power has returned following a power outage), or when the outdoor ambient temperature is below or at -5°C and either compressor has been stopped, the crank heater turns on.

2. Water pump control

When the unit is in standby, the internal and external circulator pumps run according to anti-frozen logic.

4.6.Protection control

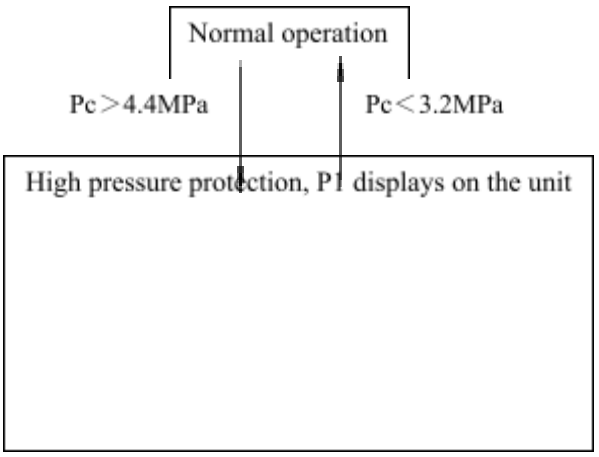
1. Pressure protection

The system equips with high-pressure and low-pressure switches to protect the system from abnormal pressure.

- High pressure protection

  This protection is used to protect the refrigerant system from abnormally high pressure and protect compressor from transient spikes in pressure.

  When the discharge pressure rises above 4.4MPa the system displays P1 protection and the unit stops running. When the discharge pressure drops below 3.2MPa, the compressor enters re-start control.



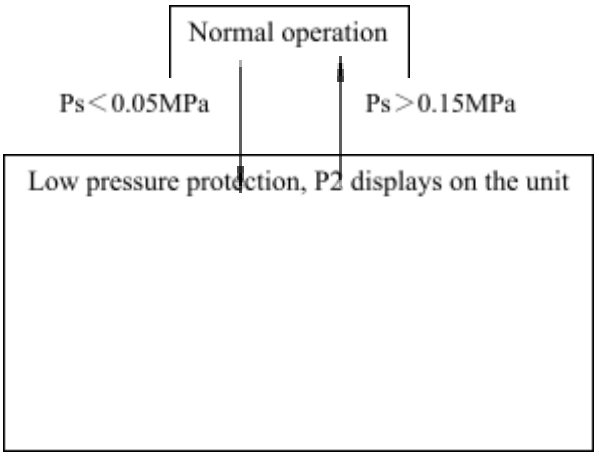
Picture 4-6-1

Note: Pc is the discharged pressure.

- Low pressure protection

  This protection is used to protect the refrigerant system from abnormally low pressure and protects the compressor from transient drops in pressure.

  When the suction pressure drops below 0.05MPa the system displays P2 protection and the unit stops running. When the suction pressure rises above 0.15MPa, the compressor enters re-start control.



Picture 4-6-2

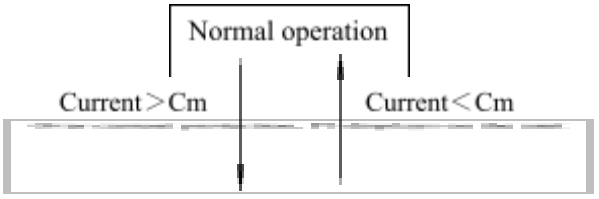
Note: Ps is the suction pressure.

2. Current protection

This control protects the compressor from abnormally high currents.

When the compressor current rises above max. current the system displays P3 protection and the unit stops running. When the compressor current drops below

max. current, the compressor enters re-start control.



Picture 4-6-3

Note: Cm is the max. current.

Table 4-6-1

Capacity		4-6kW 1Ph		12kW 1Ph		12kW 3Ph	14-16kW 3Ph
AC		18	22	25	30		
CF≥60Hz	DC	15	18	20	22		
40≤CF＜60		14	17	19	21		
CF＜40		13	16	18	20		

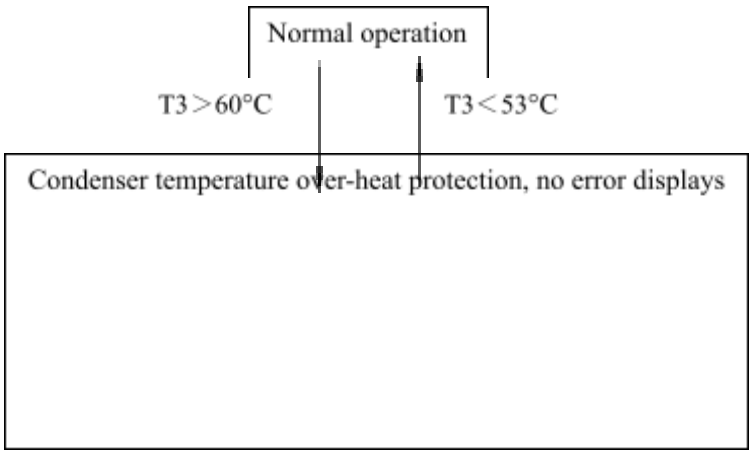
Note: CF is the compressor frequency, Hz.

3. Overheat protection

- Condenser temperature overheat

This control protects the system from abnormally high temperature.

When the outdoor condenser temperature rises above 60°C the system will be under protection and the unit stops running. When the discharge temperature drops below 53°C, the compressor enters re-start control.



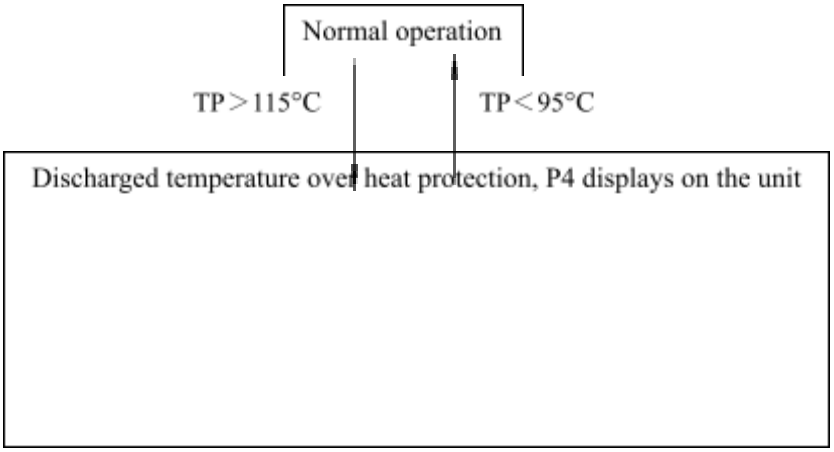
Picture 4-6-4

Note: T3 is the outdoor condenser temperature.

- Compressor discharged temperature overheat

This control protects the compressor from abnormally high temperatures and transient spikes in temperature.

When the discharge temperature rises above 115°C the system displays P4 protection and the unit stops running. When the discharge temperature drops below 105°C, the compressor enters re-start control.



Picture 4-6-5

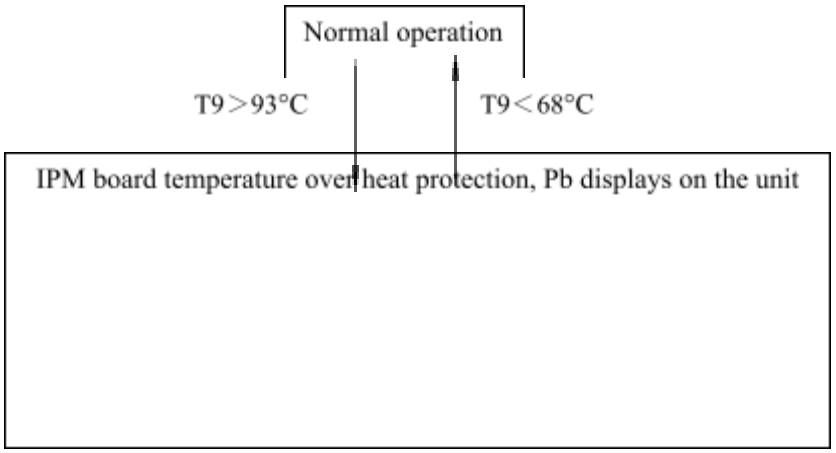
Note: TP is the discharged

temperature.

- IPM board overheat

  This control protects the IPM board from abnormally high temperature.

  When the IPM board temperature rises above 93°C the system will be under protection and the unit stops running. When the discharge temperature drops below 68°C, the compressor enters re-start control.

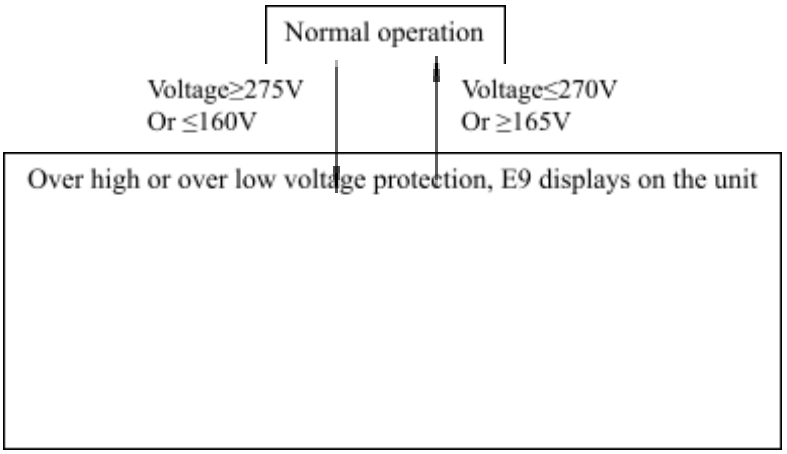


Picture 4-6-6

Note: T9 is the IPM board temperature.

4. Voltage protection

When the phase voltage of AC power supply is at or above 275V for more than 30 seconds, the system displays E9 protection and the unit stops running. When the phase voltage drops below 270V for more than 30 seconds, the refrigerant system restarts once the compressor re-start delay has elapsed. When the phase voltage is at or below 160V, the system displays H7 protection and the unit stops running. When the AC voltage rises to at or more than 165V, the refrigerant system restarts once the compressor re-start delay has elapsed.



Picture 4-6-7

4.7.Special control

1. Defrosting control

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.

Table 4-7-1

Components	4-16kW	Control functions and states
Inverter compressor	•	Compressor runs at defrosting rotation speed
DC fan motor	•	OFF.
Electronic expansion valve	•	Fully open.
4-way valve	•	OFF

2. Anti-frozen control

This control is used to protect the water system from low ambient temperature or low water temperature to against the damaging the water system such as BPHE, water pipe, etc. It operates according to the ambient temperature, running mode, water temperature. During the anti-frozen, unit will display “d0”.

Table 4-7-2

Condition	Water	Unit	Electronic heaters	External	Exit

Mode	Temperature	pump			heat source	
Standby	T4＜7°C &T-ai ≤ 3°C	ON	Run heating mode	Inner EHs: ON DHW EHs: ON Anti-frozen EHs: ON	ON	T4≥7°C or T-ai ≥25°C
Heating	T4≤ 3°C & T-ai ≤ 3°C	ON	Run heating mode	Inner EHs: ON DHW EHs: ON Anti-frozen EHs: ON	ON	T4≥7°C or T-ai ≥25°C
Cooling	T-ai ≤ 3°C	ON	Run heating mode	Inner EHs: ON DHW EHs: ON Anti-frozen EHs: ON	ON	T-ai ≤ 10°C

Note: Inner EHs which includes 3 electrical heaters, 3kw is standard equipment in the unit, another two is field supply if configurating.

The inner heaters & DHW heaters as well as external heat source are belonged to back up, which needs configurate first, otherwise, it will be off always.

T-ai is the min. one of the T1, Tw-in, Tw-out

T1: Leaving water temperature of unit

Tw-in: Entering water temperature of BPHE

Tw-out: Leaving water temperature of BPHE

T4: Outdoor ambient temperature.

3. Night mode control

The aim of this function is to reduce the noise emitted by the heat pump during the night. When night mode is configurated, the unit will limit its max. compressor speed within 76Hz and fan speed within W6.

Table 4-7-3

Night mode configurate	Function activate	0-Inactivate; 1-Activate
	Starting time	The time of start night mode (00:00-23:59)
	Exiting time	The time of exit night mode (00:00-23:59)

4. Base-pan crank heater control

This control is used to heat the base pan according to ambient temperature in order to drainage the water out the base-pan successful with only one drainage hole in the base-pan. The control of the base-pan crank heater is as below:

Start conditions: (meet all below conditions)

- Unit is running heating mode
- Compressor is running
- Outdoor ambient is below -9°C

Exit condition: (meet one of the below conditions)

- Unit is running cooling mode
- Compressor is stopped
- Outdoor ambient is above -7°C

5. Backup control

The aim of the backup function is to heat the water loop in case the heat pump capacity is not sufficient to heat the water in the low ambient temperature or failure. The backup control includes inner electrical heaters of main water loop, DHW electrical heaters in DHW tank, gas boiler. These works as booster simultaneously with heat pump or as backup alone while heat pump is stopped. They are activated according to outdoor ambient temperature, compressor running time and temperature difference between water setpoint and actually water temperature.

Table 4-7-4

Backup type	0- Inner EHs of main water loop + DHW EHs + boiler 1- Inner EHs of main water loop + DHW EHs 2- DHW EHs + boiler 3- Inner EHs of main water loop + boiler 4- DHW EHs only 5- Boiler only 6- Inner EHs of main water loop only

	7- Non back up
Minimum OAT for heating	-26~10°C, default as -26°C
Booster OAT threshold	-10~0°C, default as -5°C
Heat pump warm up time	0~120min, default 60min
Booster Delta temperature	1~20°C, default as 10°C

Note: Inner EHs which includes 3 electrical heaters, 3kw is standard equipment in the unit, another two is field supply if configurating.
EHs: Electrical heaters
OAT: Outdoor ambient temperature
DHW: Domestic hot water.

6. Dry contact control

The heat pump equips with contact to control the system in order to match different controlled requirements.

It equips with 3 dry contacts as standard and 4 dry contacts as customized, as well as 3 standard output contacts and 3 customized outputs which are 230V output terminals.

The details of the contact function are shown as below table:

Table 4-7-5

<table>
<tr><td rowspan="6">Standard</td><td>DI1</td><td>ON / OFF operation</td></tr>
<tr><td>DI2</td><td>Cooling mode / heating mode operation</td></tr>
<tr><td>DI3</td><td>Home / away operation</td></tr>
<tr><td>DO1</td><td>Unit is in operating state</td></tr>
<tr><td>DO2</td><td>Unit is defrosting</td></tr>
<tr><td>DO3</td><td>Unit is in alarm</td></tr>
<tr><td rowspan="7">Customized</td><td>DI1</td><td rowspan="4">0- Disable
1- Power limitation (Night mode activate)
2- Load-shed electrical heaters
3- Domestic hot water request
4- Anti-legionella request
5- Domestic hot water priority</td></tr>
<tr><td>DI2</td></tr>
<tr><td>DI3</td></tr>
<tr><td>DI4</td></tr>
<tr><td>DO1</td><td rowspan="3">0- Disable
1- Unit is in alarm
2- Unit is in standby mode
3- Unit is running
4- Unit is in cooling mode
5- Unit is in heating mode
6- Unit is in domestic hot water mode
7- Unit is defrosting
8- Unit is controlled by Modbus</td></tr>
<tr><td>DO2</td></tr>
<tr><td>DO3</td></tr>
</table>

4.8.Function table of sensors

The location of the sensors is as below:

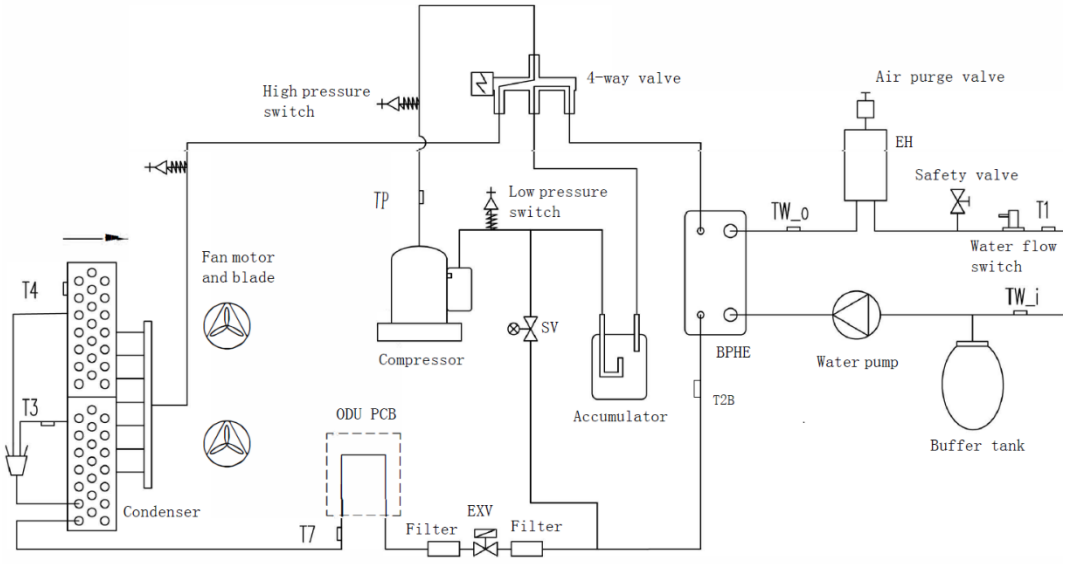


Table 4-8-1

Sensor code	Sensor name	Mode	Function of sensor
T1	Leaving water temperature sensor of unit	Cooling Heating DHW	• Capacity request control • Backup control • Anti-frozen control
TW-i	Entering water temperature sensor of BPHE	Heating DHW	• Anti-frozen control
TW-o	Leaving water temperature sensor of BPHE	Cooling Heating DHW	• Capacity request control • Backup control • Anti-frozen control
T1B	External heat source leaving water temperature sensor	Heating	• External heat source control
T2B	Refrigerant sensor of BPHE	Cooling	• Compressor frequency control • Anti-freezing protection control
T5	Domestic hot water temperature sensor	DHW	• DHW capacity control • Anti-legionella control
TP	Discharged temperature sensor	Cooling Heating DHW	• Compressor frequency control • Expansion valve control
T3	Outdoor coil temperature sensor	Cooling Heating DHW	• Compressor frequency control • Expansion valve control • DC fan motor speed control • Defrost control
T4	Outdoor ambient temperature sensor	Cooling Heating DHW	• Compressor frequency control • DC fan motor speed control • Expansion valve control • Defrost control
T6	Indoor ambient temperature sensor	Cooling Heating DHW	• Capacity request control by ambient - -
T7	IPM board cooling	Cooling	• Compressor frequency control

	pipe temperature sensor	Heating DHW	• DC fan motor speed control
T9	IPM board temperature sensor	Cooling Heating DHW	• Compressor frequency control • DC fan motor speed control

5. Troubleshooting

5.1.Error code

1. General presentation

For the error, here are two display devices: one is the user interface and the other is the IDU PCB digital tube. It must pay attention to the error where it is displayed to get the correct meaning of the problem.

2. Error code list of user interface

Table 5-1-1

Alarm code	Description
E0	Water flow switch fault
E1	Communication fault between IDU board and ODU board
E2	LWT of unit sensor (T1 sensor) fault
E3	Gas refrigerant temp sensor (T2 sensor) fault (reserved)
E4	Liquid refrigerant temp sensor (T2B sensor) fault
E5	ODU (module part) alarm
E6	DHW sensor (T7 sensor) fault
E7	EWT sensor (Tw_in sensor) fault
E8	LWT of BPHE sensor (Tw_out sensor) fault
E9	Communication fault between WUI and function board
EA	Second zone LWT sensor (Tw_2 sensor) fault (Only valid after setting second zone function, reserved)
Eb	External heat source LWT sensor (T1B sensor) fault (Only valid after set the external heat source – boiler)
Ec	Reserved
Ed	Reserved
EE	Reserved
EF	Mode conflict (reserved)
P0	EEPROM fault
P1	Protection of huge different values between EWT and LWT
P2	Protection of lack of water
P3	Protection of abnormal different value between EWT and LWT
P6	Protection of the standard electrical heater over heat

Note:

1. When it is displayed the E5-ODU alarm, that needs to check the alarm on the IDU PCB for more detail.
2. P0-P3 will only be displayed after it occurs 3 times in 1h, and can't resume unless repower the system.

3. Error code list of IDU PCB

Table 5-1-2

Alarm code	Description
E1	Phase sequence fault
E2	Communication fault between IDU PCB and ODU PCB
E4	T4 ambient temperature sensor fault
E6	T3 ODU condenser temperature sensor fault
E8	TP discharged temperature sensor fault
E9	Power supply voltage over-high/over-low protection
E10	EPPROM fault
Ec	T7 refrigerant cooling pipe temperature sensor fault
H0	Communication fault between main chip of ODU PCB and module chip of ODU PCB
H4	3 times P6 error in 30mins
H5	3 times P2 error in 30mins
H6	3 times P4 error in 100mins
H7	IDU quantity decrease alarm (reserved)
H9	2 times P9 error in 10mins
H10	3 times P3 error in 60mins
H11	2 times P13 error in 10mins (reserved)
H12	3 times Pb error in 60mins
P1	High pressure protection
P2	Low pressure protection
P3	Over current protection
P4	Over-heat protection of discharged temperature
P5	Condenser over-heat protection
P6	IPM board protection
P9	DC motor protection
P10	Anti-typhoon protection (reserved)
P11	T2B refrigerant temperature of HPHE over-low protection
Pb	IPM temperature over-heat protection

Note: The error H4-H12 must repower to resume.

5.2.Running parameter checking

1. General presentation

For the running parameter checking, here are two devices to check the value: one is the user interface and the other is the IDU PCB digital tube.

2. Parameter checking from user interface

Press the “query” button to go into the parameter query interface, and press “confirm” button or without pressing any button for more than 10s to exit the parameter query interface.

After going into query interface, press “up” or “down” button to check the parameters or status as follow table:

 : Query button;

 : Confirm button

 : Up button

 : Down button

Picture 5-2-1

Table 5-2-1

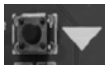
No.	Definition	Description
1	Setting temp.: Ts1	Display Ts1 during standby/cool/heat mode
2	Setting temp.: Ts2	Display Ts2 during DHW mode
3	Setting temp.: Ts3	Display Ts3 when it chooses the air setpoint control
4	Capacity of unit	HP*10, example: 10 means that unit is 1HP capacity
5	Target frequency	
6	Running frequency	
7	Water flow rate	m^3/h, feedback from inverter water pump
8	Capacity output	=1.163* (water flow rate) * [Tw_out – Tw_in] (kW)
9	T3 value	ODU coil temp.
10	T4 value	OAT
11	TP value	Discharged temp.
12	T7 value	Temp. of refrigerant for PCB cool
13	EVX opening degree	Actually value
14	ODU fan motor speed	
15	AC current	
16	AC voltage	
17	IPM temp. (T9)	Compressor module temp.
18	Limitation reason of compressor frequency	0: no limitation; 1: T3B temp. limitation (reserved); 2: OAT limitation; 4: Discharged temp. limitation; 8: Voltage limitation

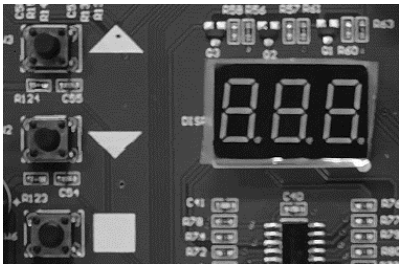
		16: Current limitation 32: IPM temp' limitation 64: Night mode limitation 128: LWT limitation If occur multi limitation, display value=sum of all limitation value
19	Limitation reason of compressor frequency	0: no limitation; 1: Limitation of different value between EWT&LWT
20	Tw_in value	EWT
21	Tw_out value	LWT of BPHE
22	T1 value	LWT of unit (after the EHs inside the unit)
23	T6 value	IAT, the sensor built inside the wired controller
24	T5 value	DHW value
25	Tw-2 value	Second zone EWT value when set this function (reserved)
26	T1B value	External heat source (boiler) LWT value
27	Capacity demand	
28	Inv. Pump speed	
29	Last alarm	
30	Penult alarm	
31	Antepenultimate alarm	
32	Current protection	P0-P3: check the detail in alarm table
33	Detail of P6 alarm in function board	L-: no alarm; L0: IPM or IGBT over current; L1: lack of phase L2: Compressor losing speed fault; L3: DC voltage is too low to protect L4: Fan motor over current protection L5: Fan motor lack of phase; L6: Fan motor zero speed fault L7: PFC fault L8: DC voltage is too high to protect L9: Compressor zero speed fault LA: PWM synchronization fault Lb: MCE fault Lc: Compressor over current protection Ld: EEPROM data is wrong LE: Compressor fail to start; LF: fan motor losing speed fault
34	SV2 statue of water loop	2-way valve which is used to change the cool/heat water between fan coil and radiator (OFF-0; ON-1)
35	SV3 statue of water loop	DHW 3-way valve
36	Main water loop EHs statue	Standard equip with one EH, another two are field supply (OFF-0; ON-1)
37	DHW EHs	OFF-0; ON-1
38	External heat source statue	OFF-0; ON-1
39	P_o	External main water loop pump (OFF-0; ON-1)
40	P_p	Second zone water loop pump (OFF-0; ON-1)
41	P_m	External heat source water loop pump (OFF-0; ON-1)
42	Anti-frozen heater statue	OFF-0; ON-1
43	Chassis heater statue	OFF-0; ON-1
44	Crank heater statue	OFF-0; ON-1
45	SV2 statue of refrigerant system	Liquid spray cool value (OFF-0; ON-1)

3. Parameter checking from IDU PCB

Press “up” or “down” button to check the parameters or status as follow table:

 : Up button

 : Down button



Picture 5-2-2

Table 5-2-2

No.	Definition	Description
0	Frequency/QTY of IDU	Display the qty of IDU while standby/display frequency while running
1	The capacity of unit	
2	Capacity demand of IDU	
3	Capacity demand after ODU amending	
4	Running mode	0-OFF; 2-cooling; 3-heating; 4-force heating
5	Actual output of ODU	
6	Fan speed	0-8
7	Tw-in value	EWT of BPHE
8	Tw-out value	LWT of BPHE
9	T1 value	LWT of unit after electrical heater
10	T3 value	ODU condenser temperature
11	T4 value	ODU ambient temperature
12	TP value	Discharged temperature
13	EVX opening degree	Actually value = display value * 4
14	T7 value	Temperature of refrigerant cooling pipe
15	AC current	
16	DC current	
17	AC voltage	
18	DC voltage	
19	Last error	It will display “---" if no error had occurred
20	Limitation reason of compressor frequency	0: no limitation; 1: T3B temp. limitation (reserved); 2: OAT limitation; 4: Discharged temp. limitation; 8: Voltage limitation 16: Current limitation 32: IPM temp’ limitation 64: Night mode limitation 128: LWT limitation If occur multi limitations, display value=sum of all limitation value
21	Version of ODU software	
22	Version of EPPROM	
23	Detail of P6 alarm in function board	L-: no alarm; L0: IPM or IGBT over current; L1: lack of phase

		L2: Compressor losing speed fault; L3: DC voltage is too low to protect L4: Fan motor over current protection L5: Fan motor lack of phase; L6: Fan motor zero speed fault L7: PFC fault L8: DC voltage is too high to protect L9: Compressor zero speed fault LA: PWM synchronization fault Lb: MCE fault Lc: Compressor over current protection Ld: EEPROM data is wrong LE: Compressor fail to start; LF: fan motor losing speed fault
24	T9 value	IPM board temperature
25	T30	Target T3 value for defrost control
26	Limitation reason of compressor frequency	0- no limitation; 1- limitation due to huge different value between EWT&LWT
27	Target discharged temperature	
28	ODU CRCH	Hex.
29	ODU CRCL	Hex.
30	IDU CRCH	Hex.
31	IDU CRCL	Hex.
32	Modbus baud rate	
33	Modbus parity check	0-non; 1-odd parity check; 2-even parity check
34	Modbus ID	1-255
35	Last 1st error	
36	Last 2nd error	
37	Last 3rd error	
38	Last 4th error	
39	Last 5th error	
40	Last 6th error	
41	Last 7th error	
42	Last 8th error	
43	Last 9th error	
44	Lat 10th error	
45	T2B refrigerant sensor temp.	The refrigerant pipe temp. of BPHE

5.3.Troubleshooting

1. Troubleshooting for error of user interface

Table 5-3-1

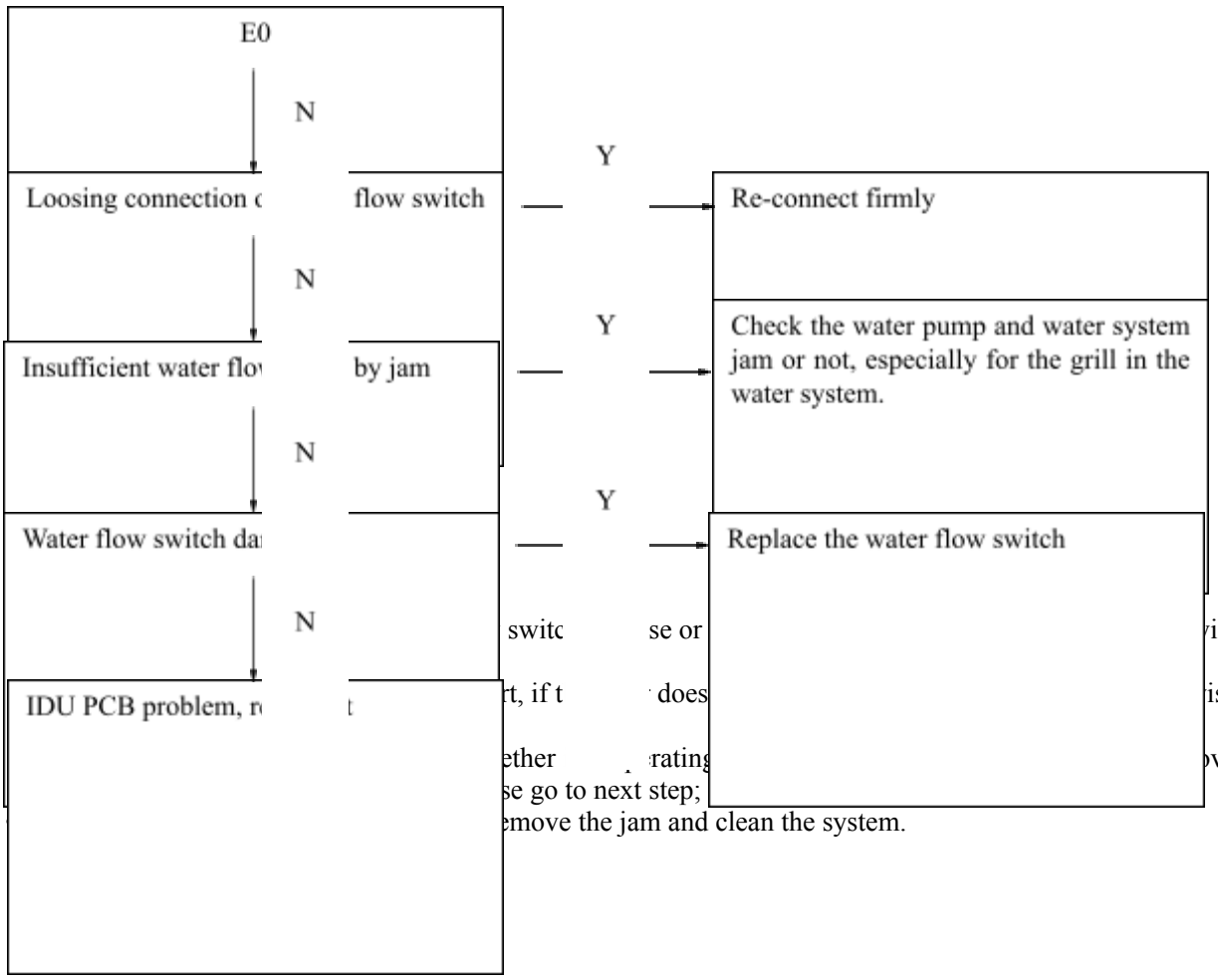
Alarm code	Description
E0	Water flow switch fault
E1	Communication fault between IDU board and ODU board
E2	LWT of unit sensor (T1 sensor) fault
E3	Gas refrigerant temp sensor (T2 sensor) fault (reserved)
E4	Liquid refrigerant temp sensor (T2B sensor) fault
E5	ODU (module part) alarm
E6	DHW sensor (T7 sensor) fault
E7	EWT sensor (Tw_in sensor) fault
E8	LWT of BPHE sensor (Tw_out sensor) fault
E9	Communication fault between WUI and function board
EA	Second zone LWT sensor (Tw_2 sensor) fault (Only valid after setting second zone function, reserved)
Eb	External heat source LWT sensor (T1B sensor) fault (Only valid after set the external heat source – boiler)
Ec	Reserved
Ed	Reserved
EE	Reserved
EF	Mode conflict (reserved)
P0	EEPROM fault
P1	Protection of huge different values between EWT and LWT
P2	Protection of lack of water
P3	Protection of abnormal different value between EWT and LWT

E0: Water flow switch fault

Description:
It will occur when the water flow rate is below 0.72m^3/h, and the unit would stop, then giving the error “E0” on the user interface.

Possible causes:
- Water pump or water system jam
- Water flow switch damage
- IDU PCB damage

Procedure



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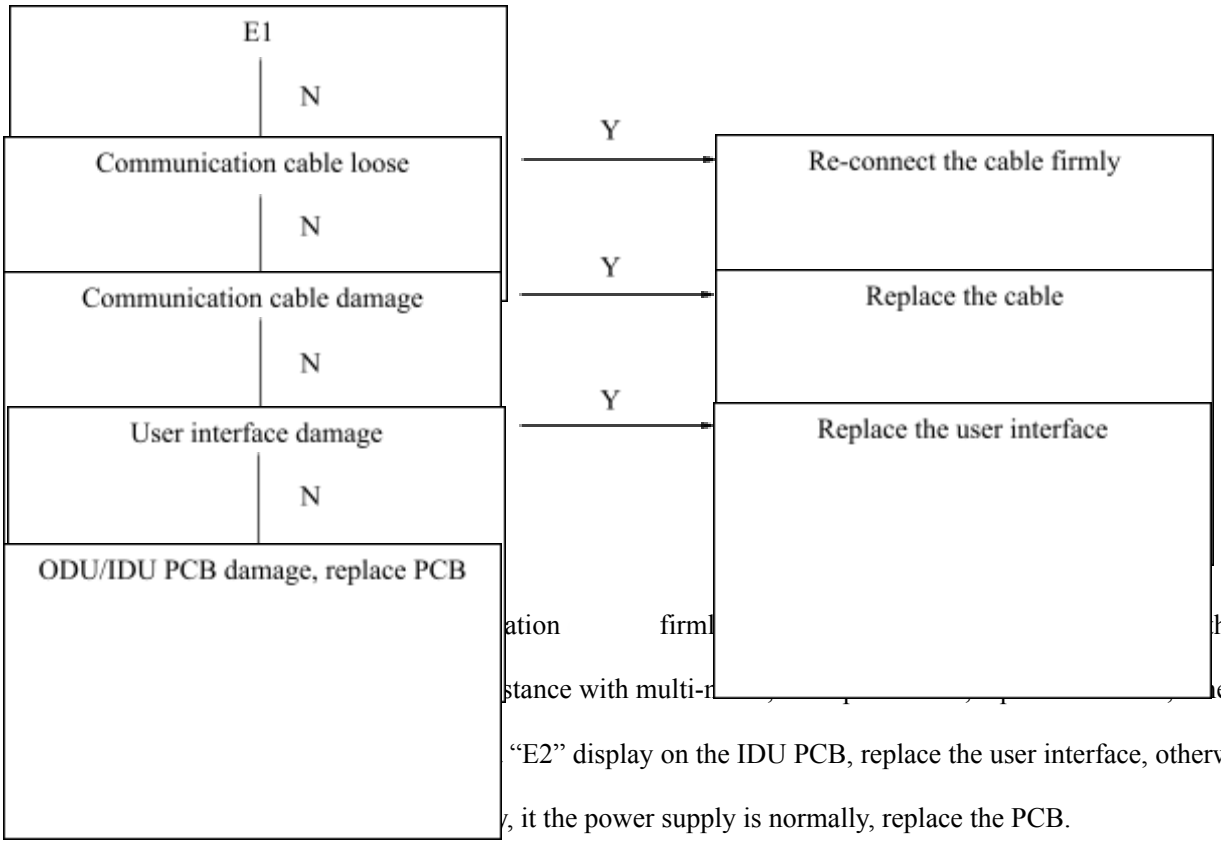
se go to next step;
emove the jam and clean the system.

E1: Communication fault between IDU board and ODU board

Description:
It will occur when the IDU PCB and ODU PCB loose communication more than 2mins, and the unit would stop, "E1" display on the user interface.

Possible causes:
- Communication cable do not connect firmly or damage
- ODU PCB damage
- IDU PCB damage
- User interface damage

Procedure



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"E2" display on the IDU PCB, replace the user interface, otherwise go

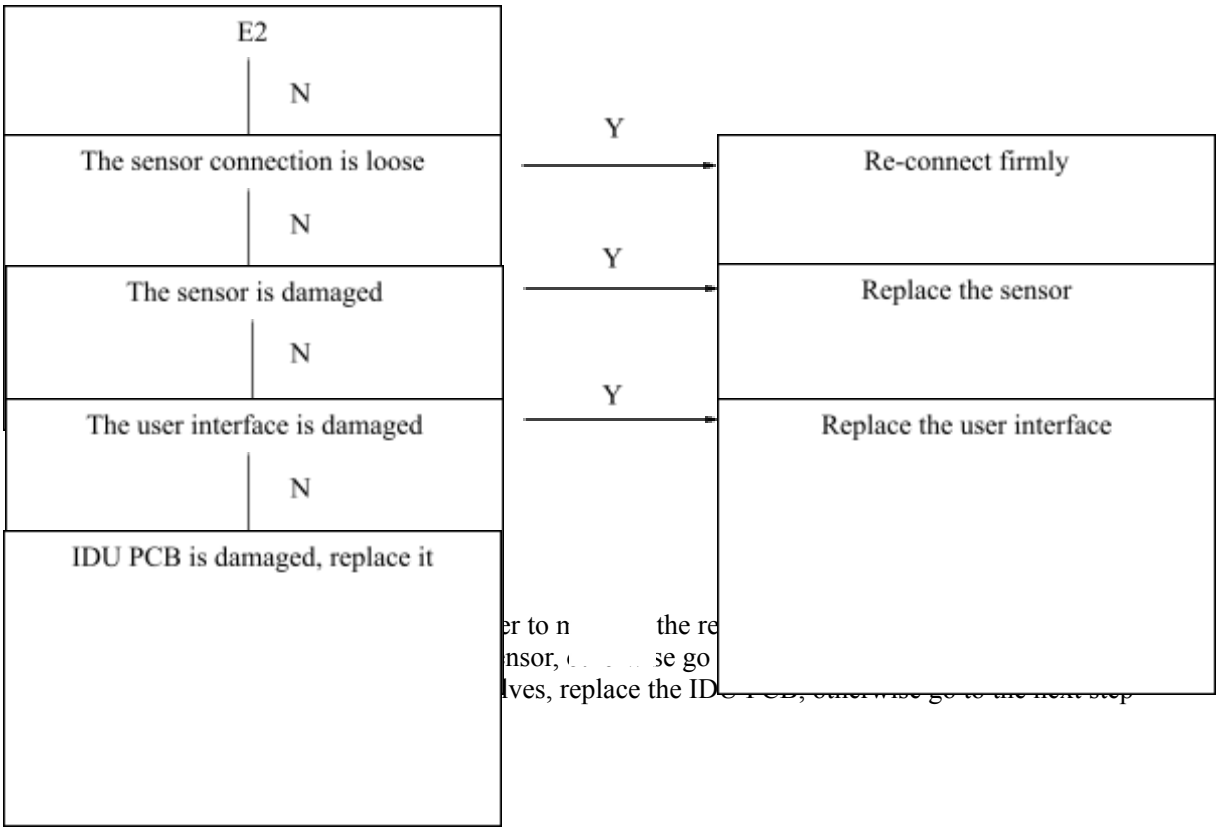
, it the power supply is normally, replace the PCB.

E2: LWT of unit sensor (T1 sensor) fault

Description:
The IDU PCB can not read the normal value of T1 sensor, and the unit keeps run, “E2” display on the user interface.

Possible causes:
- The T1 sensor is loose or short-circuit/open-circuit
- IDU PCB damage
- User interface damage

Procedure:

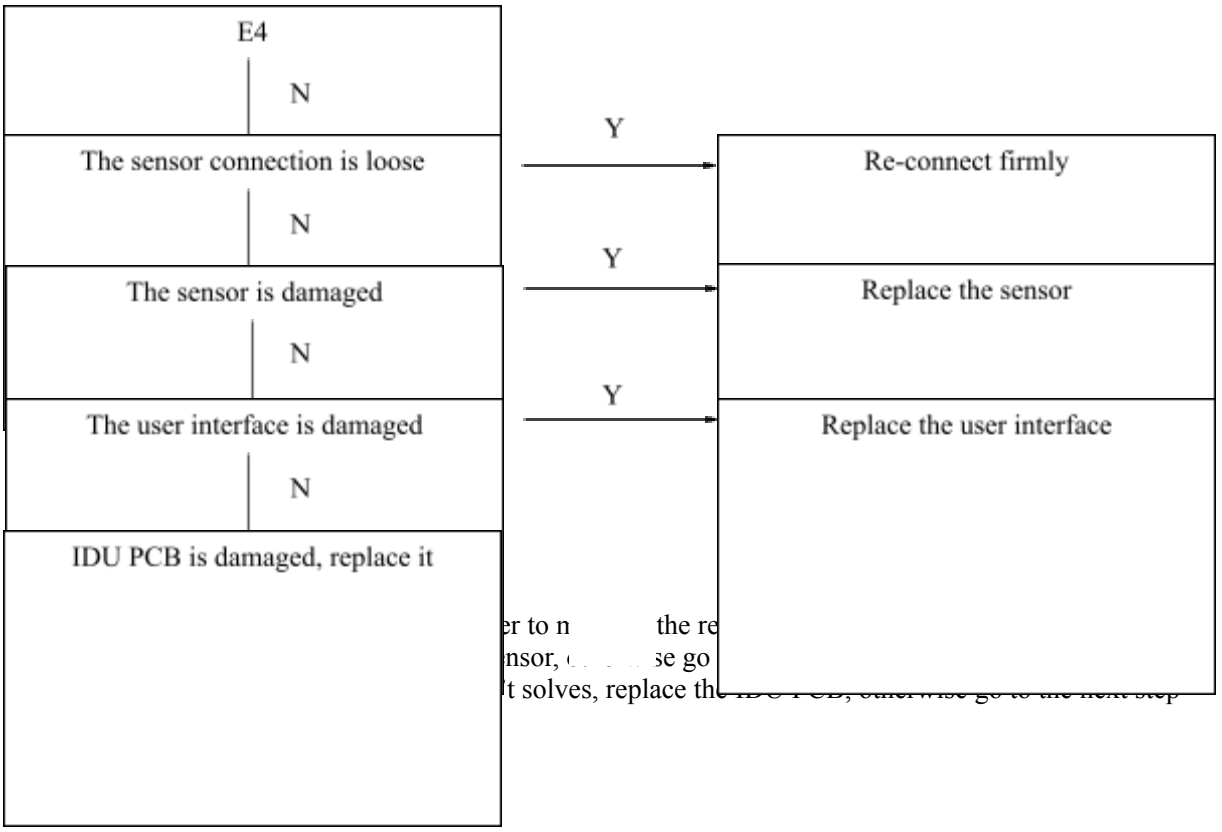


E4: Liquid refrigerant temp. sensor of BPHE (T2B sensor) fault

Description:
The IDU PCB can not read the normal value of T2B sensor, and the unit keeps run, “E4” display on the user interface.

Possible causes:
- The T2B sensor is loose or short-circuit/open-circuit
- IDU PCB damage
- User interface damage

Procedure:

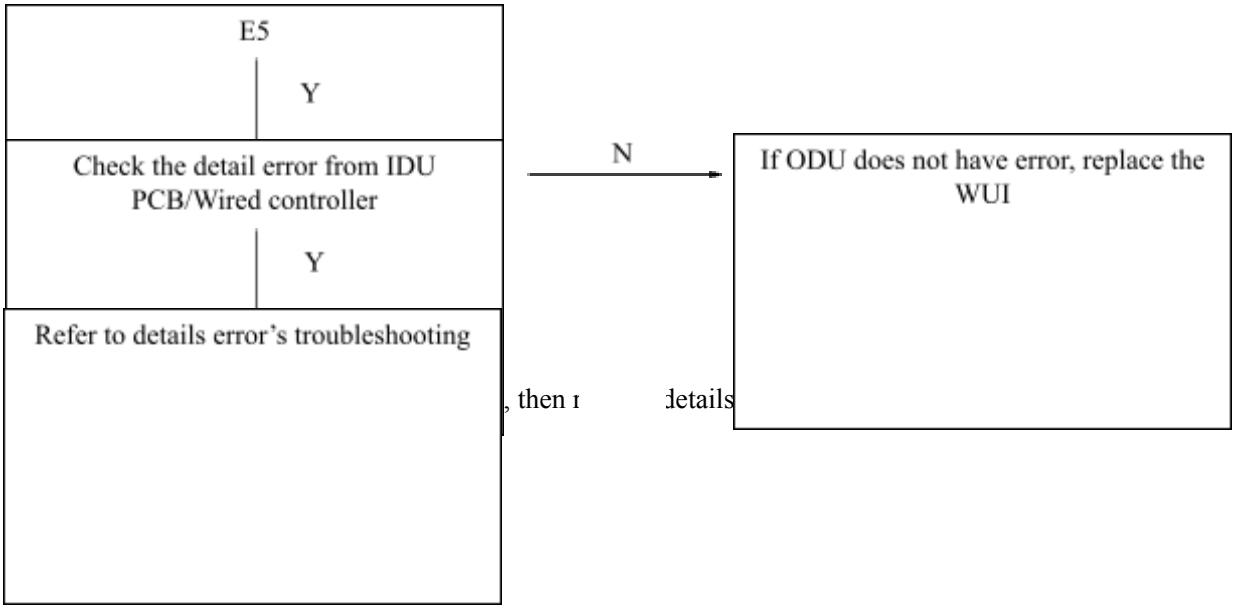


E5: ODU (module part) alarm

Description:
The ODU part has error, and “E5” displays on the WUI. It needs to check the detail error from IDU PCB.

Possible causes:
- ODU part happens with error, need to check the details from IDU PCB.

Procedure:

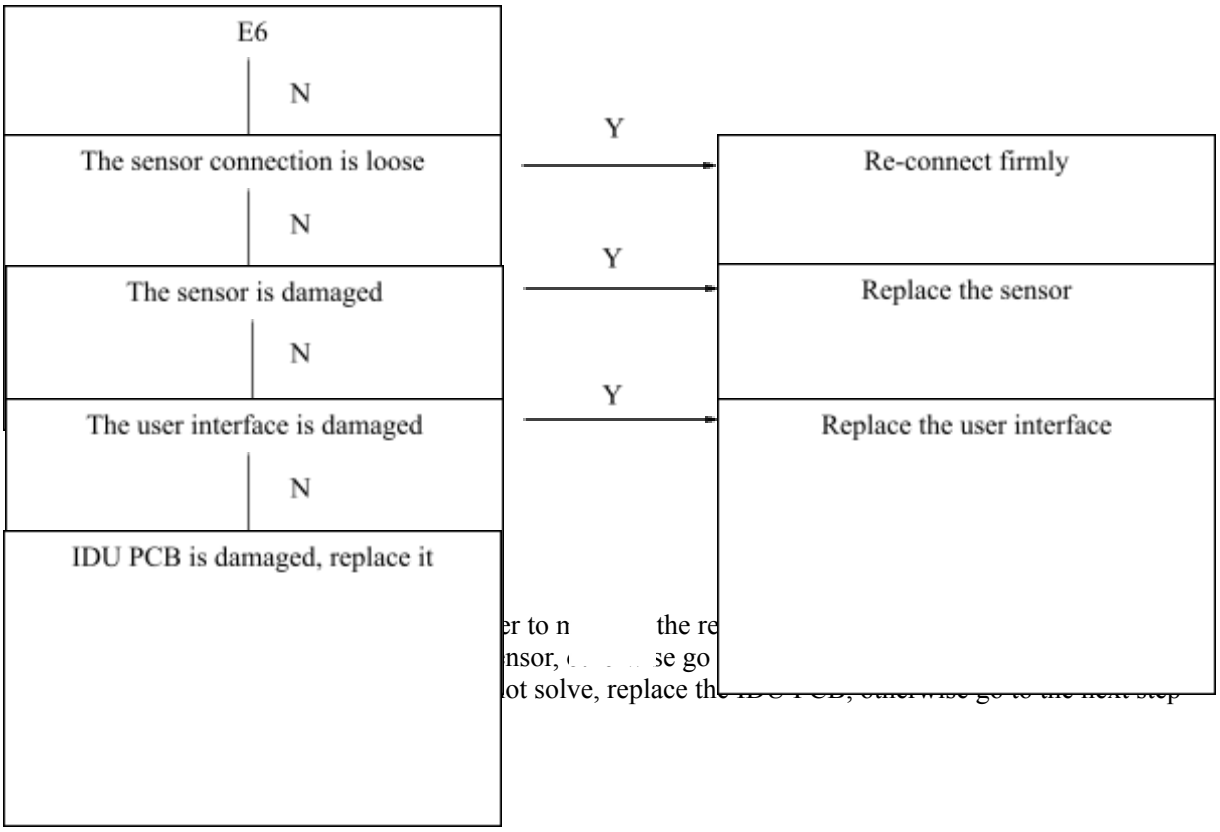


E6: DHW sensor (T5 sensor) fault

Description:
The IDU PCB can not read the normal value of T5 sensor, and the unit can not run DHW mode, “E6” display on the user interface.

Possible causes:
- The T5 sensor is loose or short-circuit/open-circuit
- IDU PCB damage
- User interface damage

Procedure:

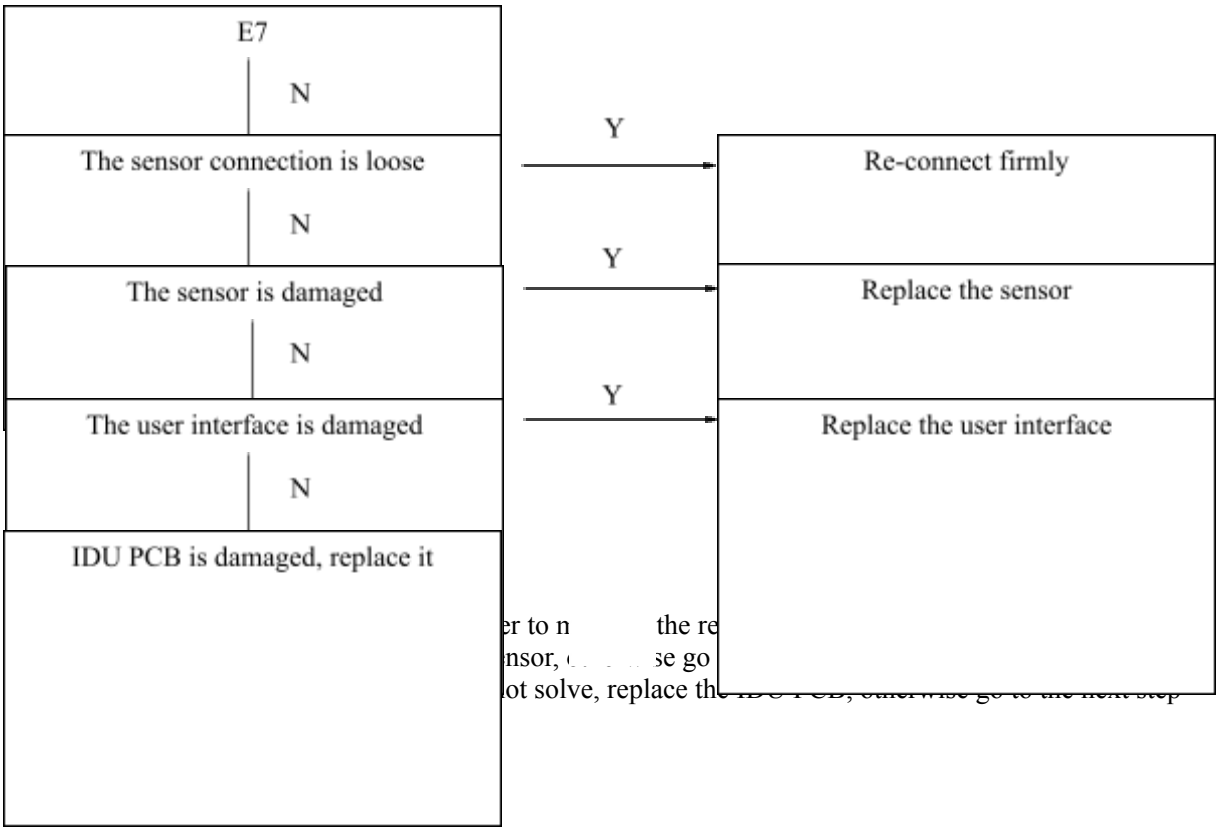


E7: Entering water temp. sensor (Tw-in sensor) fault

Description:
The IDU PCB can not read the normal value of Tw-in sensor, and the unit can not run, “E7” display on the user interface.

Possible causes:
- The Tw-in sensor is loose or short-circuit/open-circuit
- IDU PCB damage
- User interface damage

Procedure:

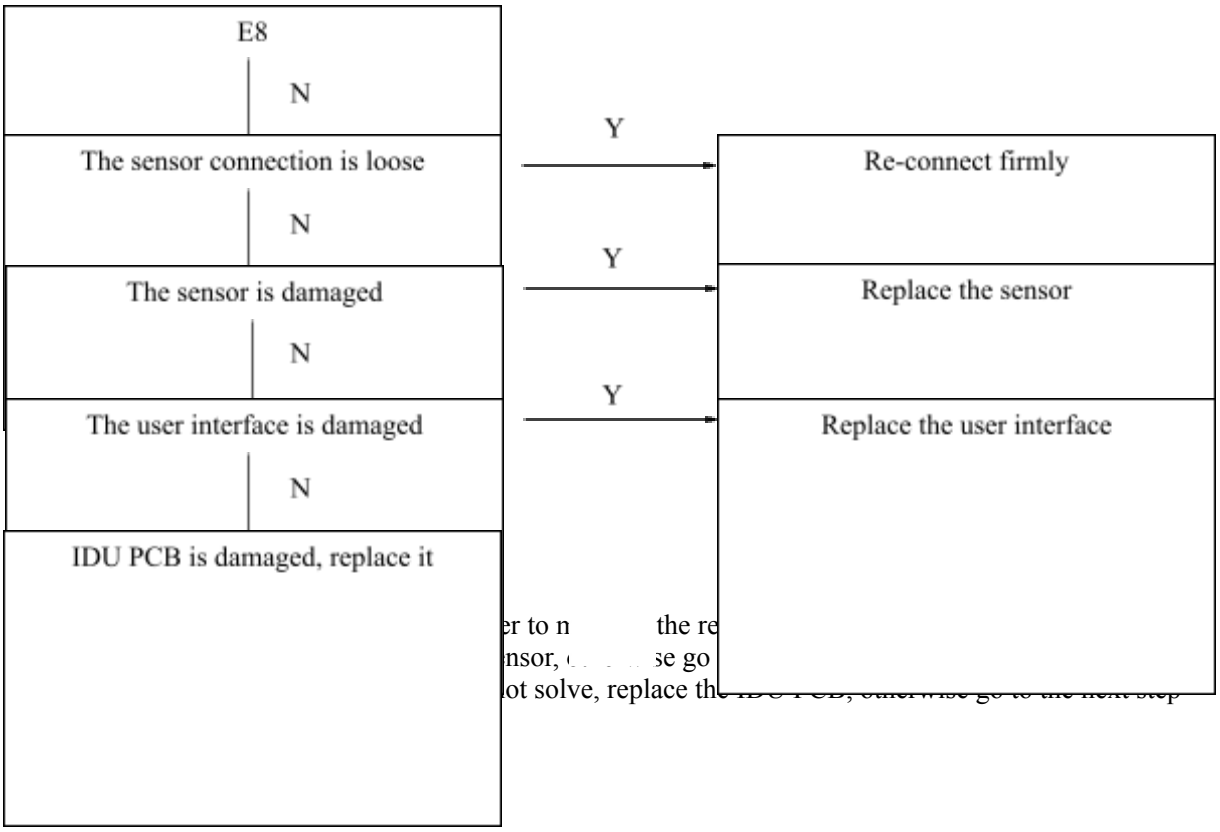


E8: Leaving water temp. sensor of BPHE (Tw-out sensor) fault

Description:
The IDU PCB can not read the normal value of Tw-out sensor, and the unit can not run cooling mode, “E8” display on the user interface.

Possible causes:
- The Tw-out sensor is loose or short-circuit/open-circuit
- IDU PCB damage
- User interface damage

Procedure:

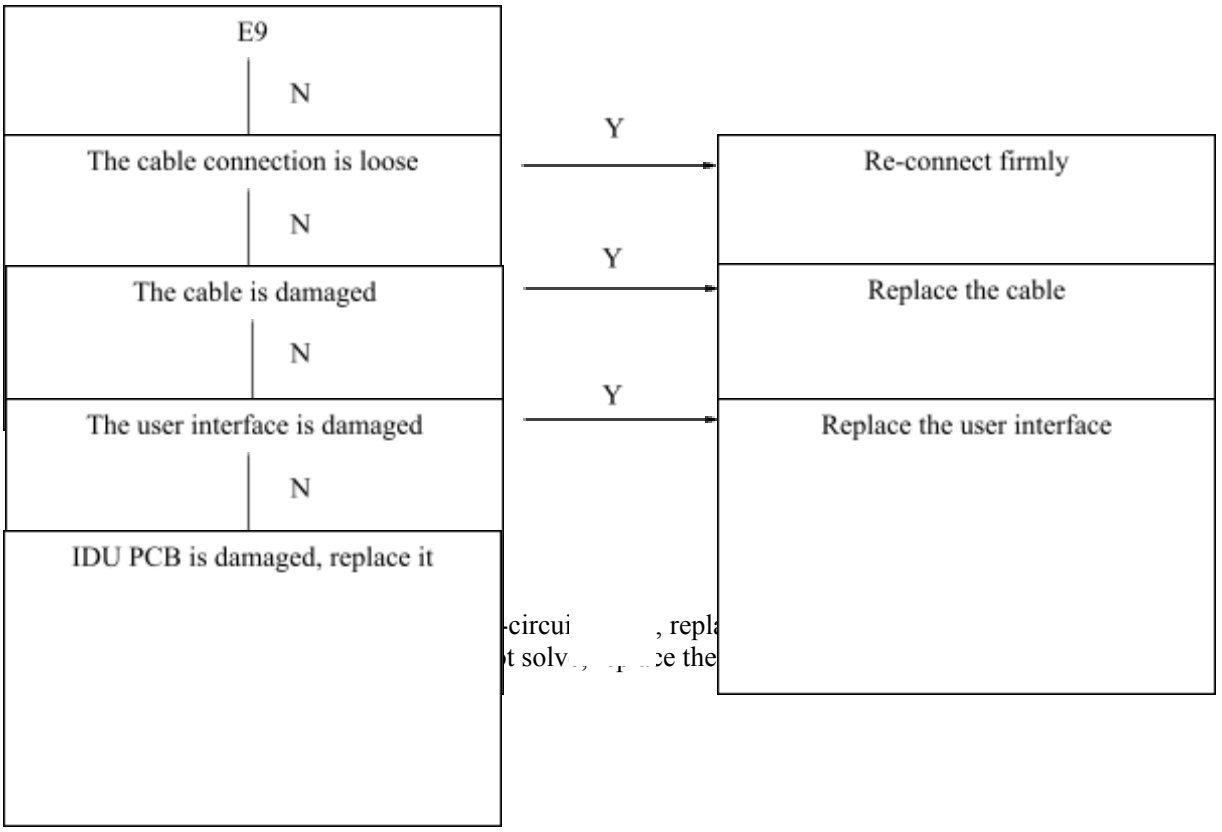


E9: Communication fault between WUI and IDU PCB

Description:
The IDU PCB can not read the normal value of T1B sensor, and the unit can not run with gas boiler function, “E9” display on the user interface. (It must configure the gas boiler as backup)

Possible causes:
- The connection is loose or sensor is damaged
- IDU PCB damage
- User interface damage

Procedure:

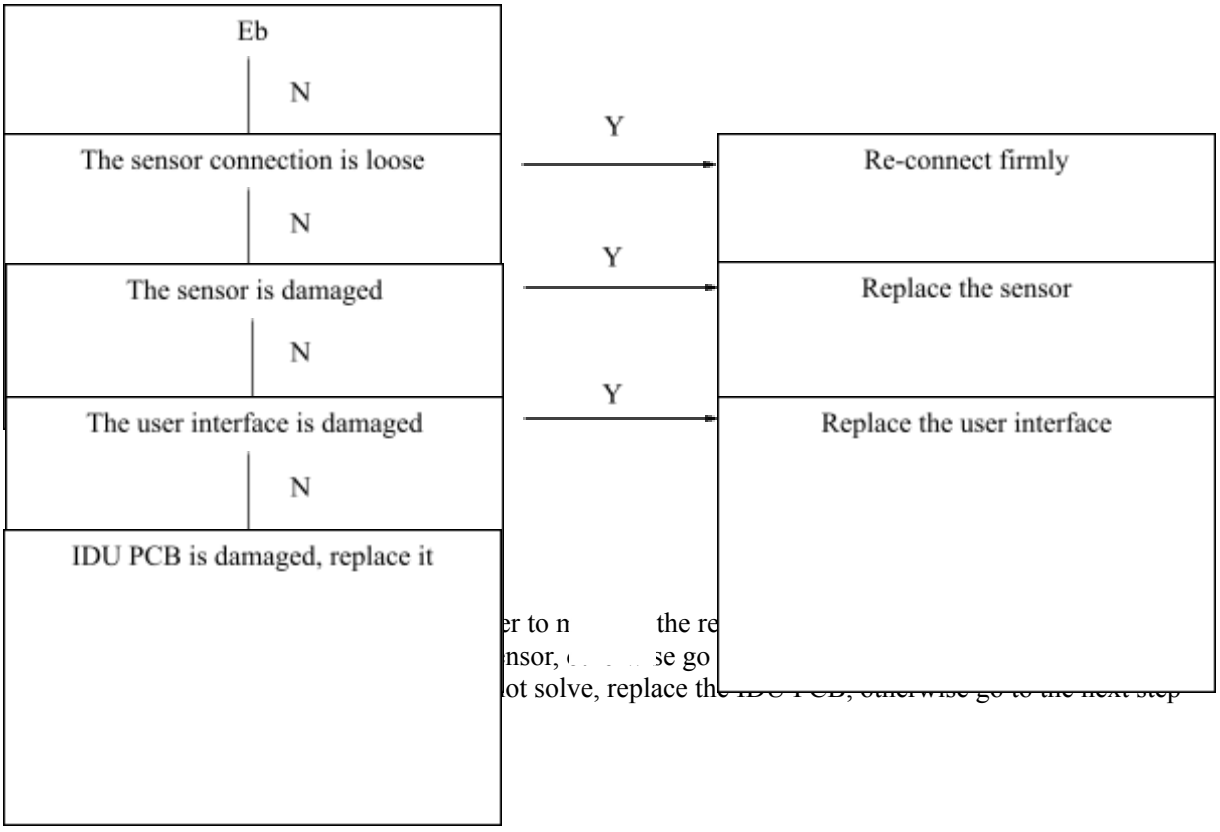


Eb: External heat source (gas boiler) LWT sensor (T1B sensor) fault

Description:
The WUI loses the communication with the IDU PCB, and “Eb” is displayed on the user interface.

Possible causes:
- The Tw-in sensor is loose or short-circuit/open-circuit
- IDU PCB damage
- User interface damage

Procedure:

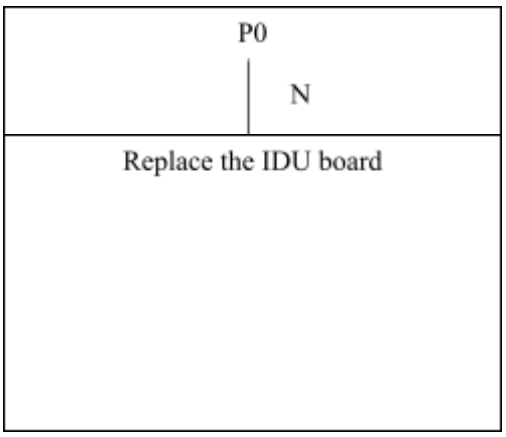


P0: EEPROM fault

Description:
The EEPROM parameter can not be read with correct value, and “P0” is displayed on the user interface.

Possible causes:
- The EEPROM is damaged
- IDU PCB damage

Procedure:

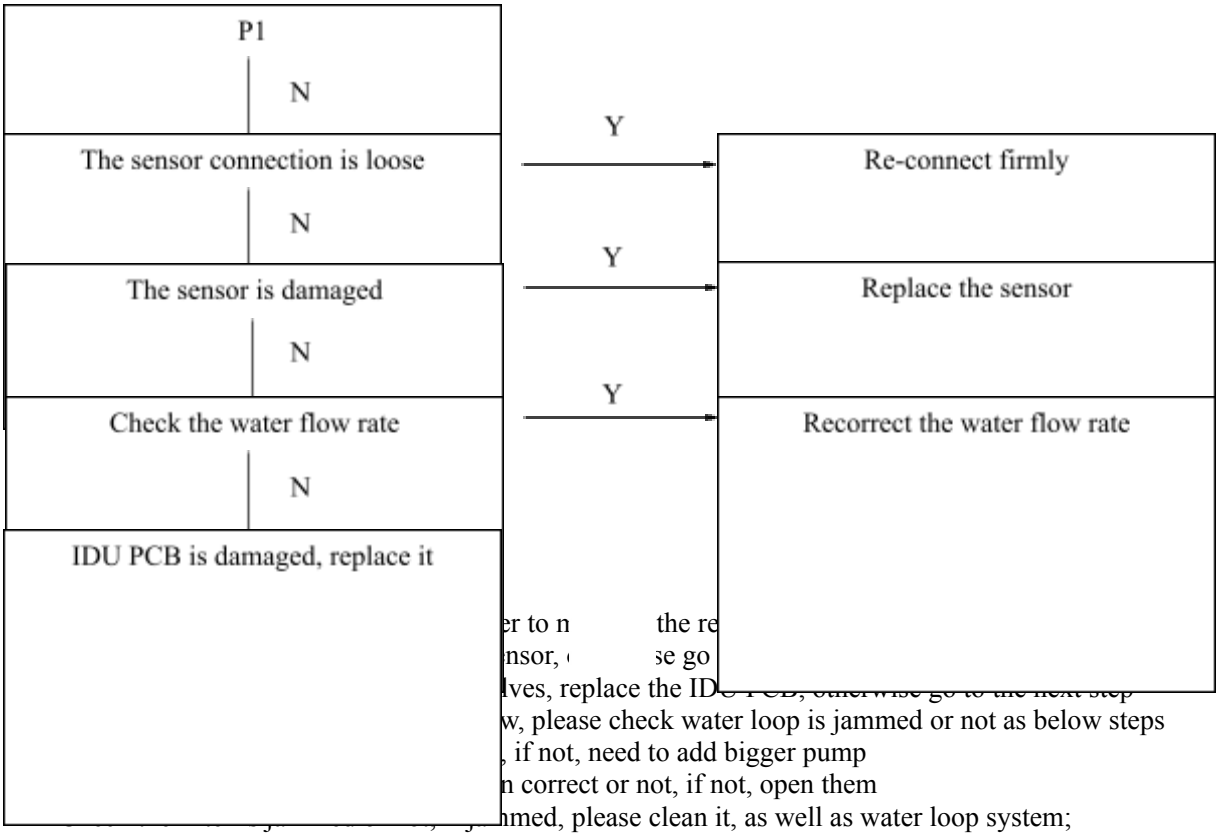


P1: Protection of huge different value between EWT and LWT

Description:
The tolerance between LWT and EWT is quite big, and P1 is displayed on the user interface.
△T≥13℃ for 60s in cooling mode
△T≥20℃ for 60s in heating/DHW mode

Possible causes:
- The Tw-in sensor and Tw-out sensor are loose or damaged to get wrong data
- The water flow rate is not enough
- The IDU PCB is damaged

Procedure:



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nsor, se go
lves, replace the ID
w, please check water loop is jammed or not as below steps
, if not, need to add bigger pump
n correct or not, if not, open them
mmed, please clean it, as well as water loop system;

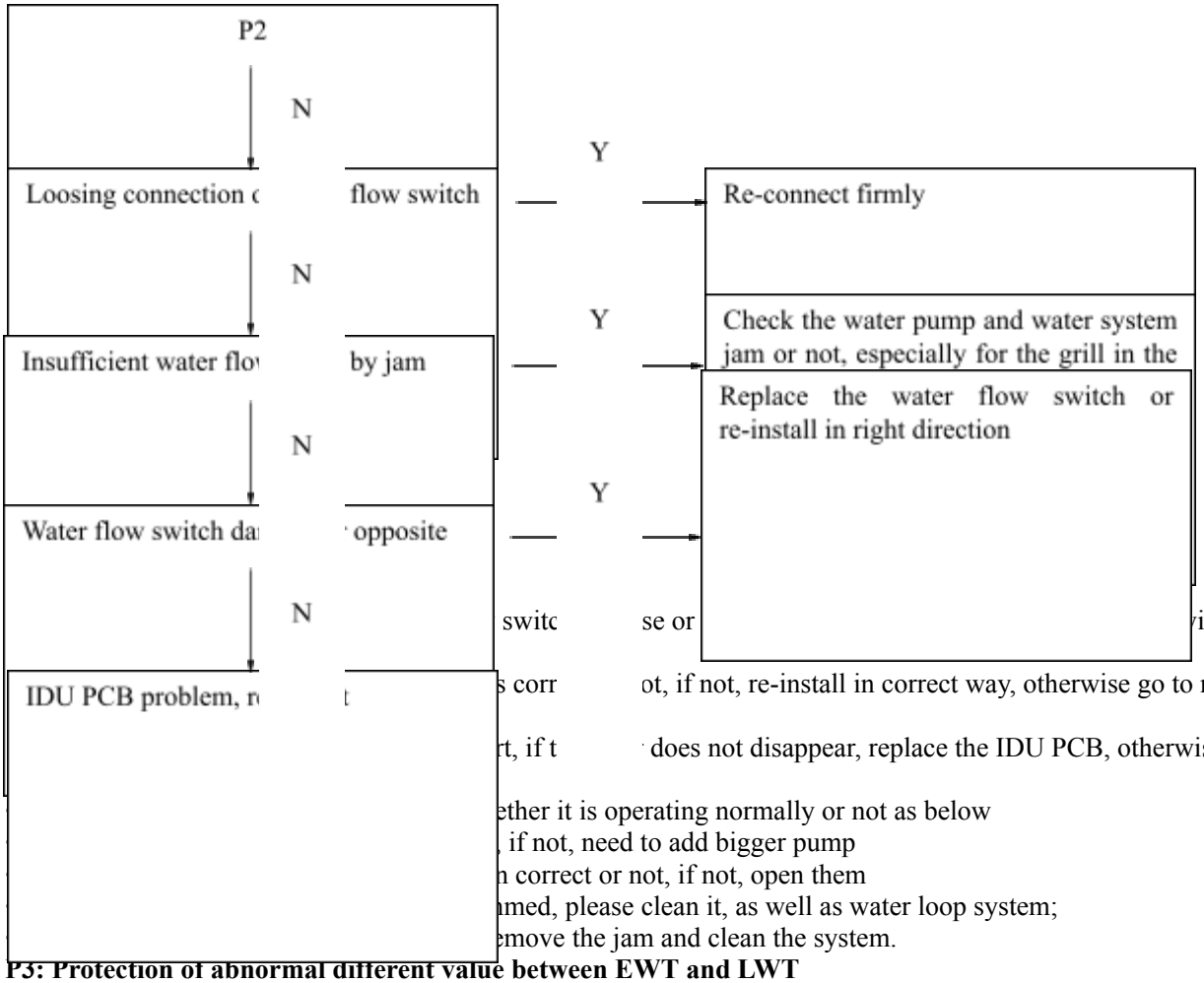
- If all above steps are done, still P1 error, replace the IDU PCB.

P2: Protection of lack of water flow

Description:
When water pump starts for 100s, it start to detect the water flow rate by the water flow switch. It will occur when the water flow rate is below 0.72m^3/h, and the unit would stop, then giving the error "P2" on the user interface.

Possible causes:
- Water pump or water system jam
- Water flow switch is installed in opposite
- Water flow switch damage
- IDU PCB damage

Procedure



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s corr ot, if not, re-install in correct way, otherwise go to next

rt, if t does not disappear, replace the IDU PCB, otherwise go

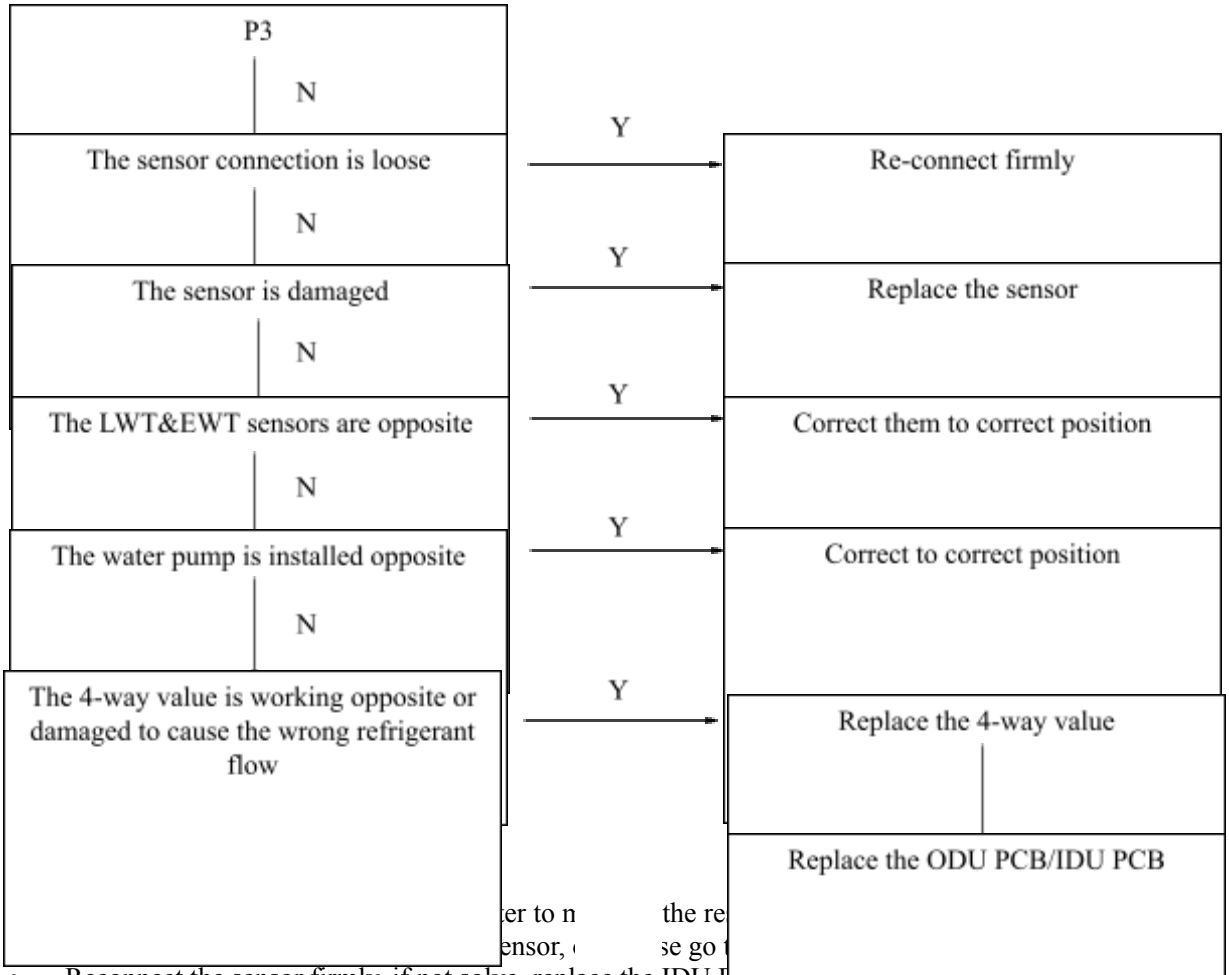
ether it is operating normally or not as below
, if not, need to add bigger pump
n correct or not, if not, open them
med, please clean it, as well as water loop system;
move the jam and clean the system.

P3: Protection of abnormal different value between EWT and LWT

Description:
The tolerance between LWT and EWT is quite big, and P1 is displayed on the user interface.
After running cooling mode for 10mins, $\Delta T \leq 0℃$ (ΔT=Tw-in – Tw-out)
After running heating/DHW mode for 10mins, $\Delta T \leq 0℃$ (ΔT= Tw-out – Tw-in)

Possible causes:
- The Tw-in sensor and Tw-out sensor are installed opposite
- The Tw-in sensor and Tw-out sensor are loose or damaged to get wrong data
- The water pump is installed opposite
- The 4-way value is not working correct
- The IDU PCB is damaged

Procedure:



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ensor, se go t

- Reconnect the sensor firmly, if not solve, replace the IDU P
- Check the LWT sensor is connected to Tw-o port, EWT ser correct them to right ports, otherwise go to next step;
- Check the water pump is installed in right direction or not,
- Check the 4-way valve is operation correct in cooling mod lled cable of 4-way valve; if still not in correct operation, replace the 4-way valve.
- If all the above steps are done, replace the PCB.

2. Troubleshooting for error of IDU PCB

Table 5-3-2

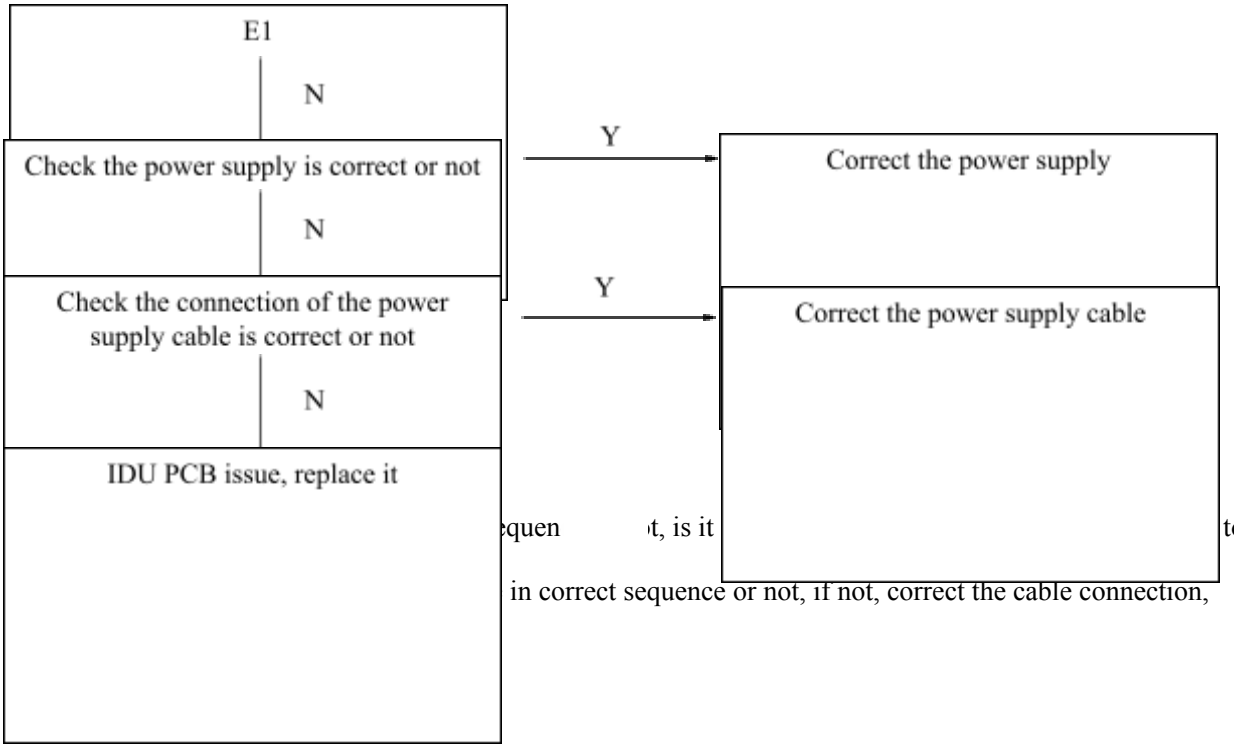
Alarm code	Description
E1	Phase sequence fault
E2	Communication fault between IDU PCB and ODU PCB
E4	T4 ambient temperature sensor fault
E6	T3 ODU condenser temperature sensor fault
E8	TP discharged temperature sensor fault
E9	Power supply voltage over-high/over-low protection
E10	EPPROM fault
Ec	T7 refrigerant cooling pipe temperature sensor fault
H0	Communication fault between main chip of ODU PCB and module chip of ODU PCB
H4	3 times P6 error in 30mins
H5	3 times P2 error in 30mins
H6	3 times P4 error in 100mins
H7	IDU quantity decrease alarm (reserved)
H9	2 times P9 error in 10mins
H10	3 times P3 error in 60mins
H11	2 times P13 error in 10mins (reserved)
H12	3 times Pb error in 60mins
P1	High pressure protection
P2	Low pressure protection
P3	Over current protection
P4	Over-heat protection of discharged temperature
P5	Condenser over-heat protection
P6	IPM board protection
P9	DC motor protection
P10	Anti-typhoon protection (reserved)
P11	T2B refrigerant temperature of HPHE over-low protection
Pb	IPM temperature over-heat protection

E1：**Phase sequence fault**

Description:
The sequence of the power supply is not correct, and the “P1” displays on the IDU PCB.

Possible causes:
- The power connection cable is in wrong sequence
- The 3-phase power supply has problem
- The IDU PCB is fault

Procedure:



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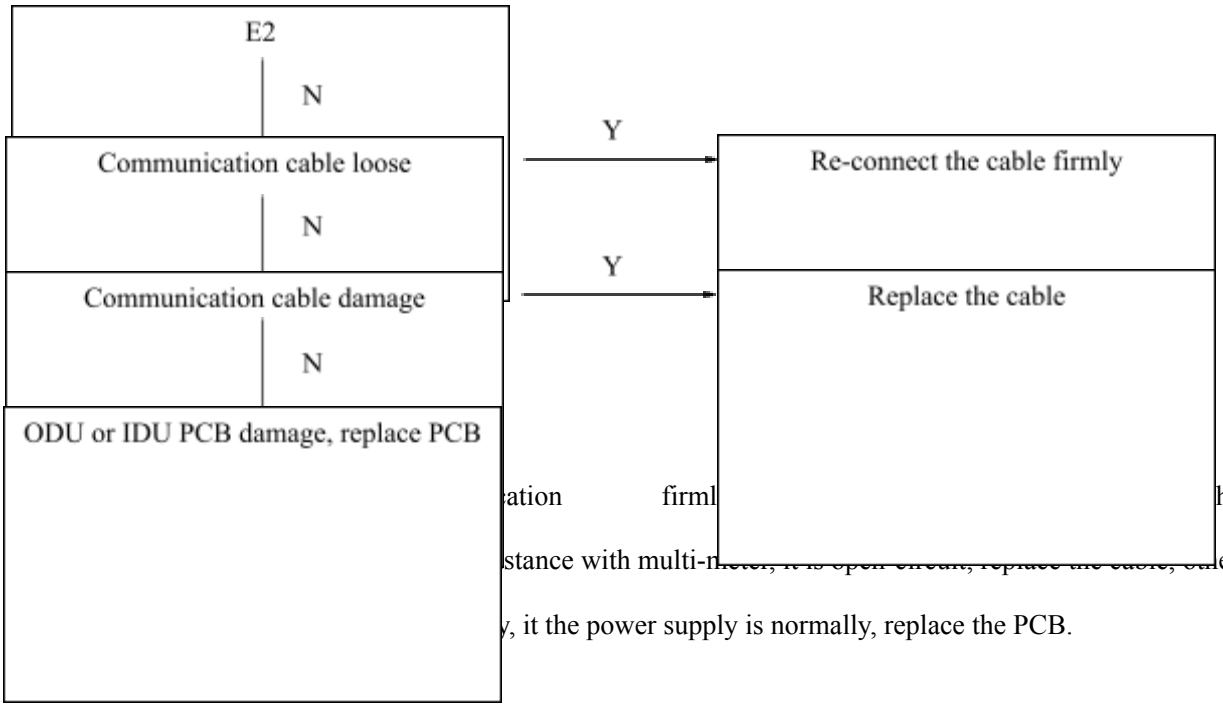
in correct sequence or not, if not, correct the cable connection,

E2：**Communication fault between IDU PCB and ODU PCB**

Description:
It will occur when the IDU PCB and ODU PCB loose communication more than 2mins, and the unit would stop, “E2” display on the IDU PCB.

Possible causes:
- Communication cable do not connect firmly or damage
- ODU PCB damage
- IDU PCB damage

Procedure



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stance with multi-meter, it is open circuit, replace the cable, otherwise

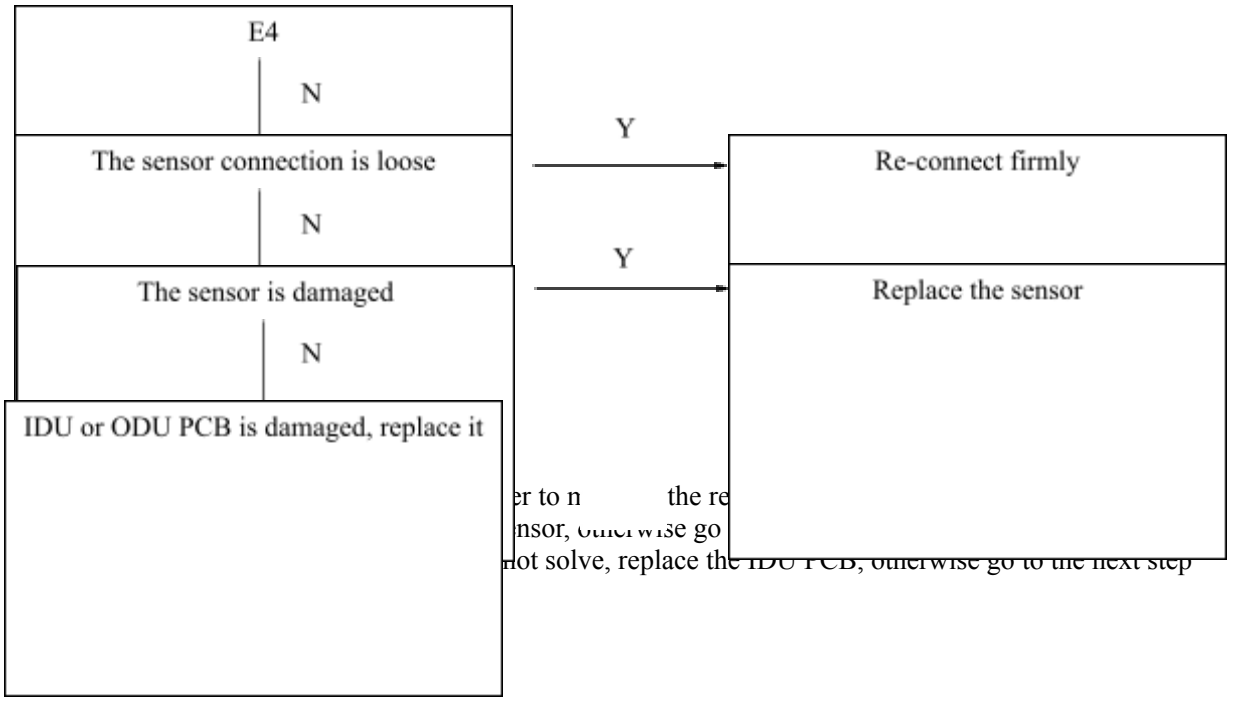
y, it the power supply is normally, replace the PCB.

E4: Outdoor ambient temperature sensor (T4 sensor) fault

Description:
The ODU PCB can not read the normal value of T4 sensor, and the unit stops running, “E4” display on the IDU PCB.

Possible causes:
- The T4 sensor is loose or short-circuit/open-circuit
- IDU PCB damage
- ODU PCB damage

Procedure:



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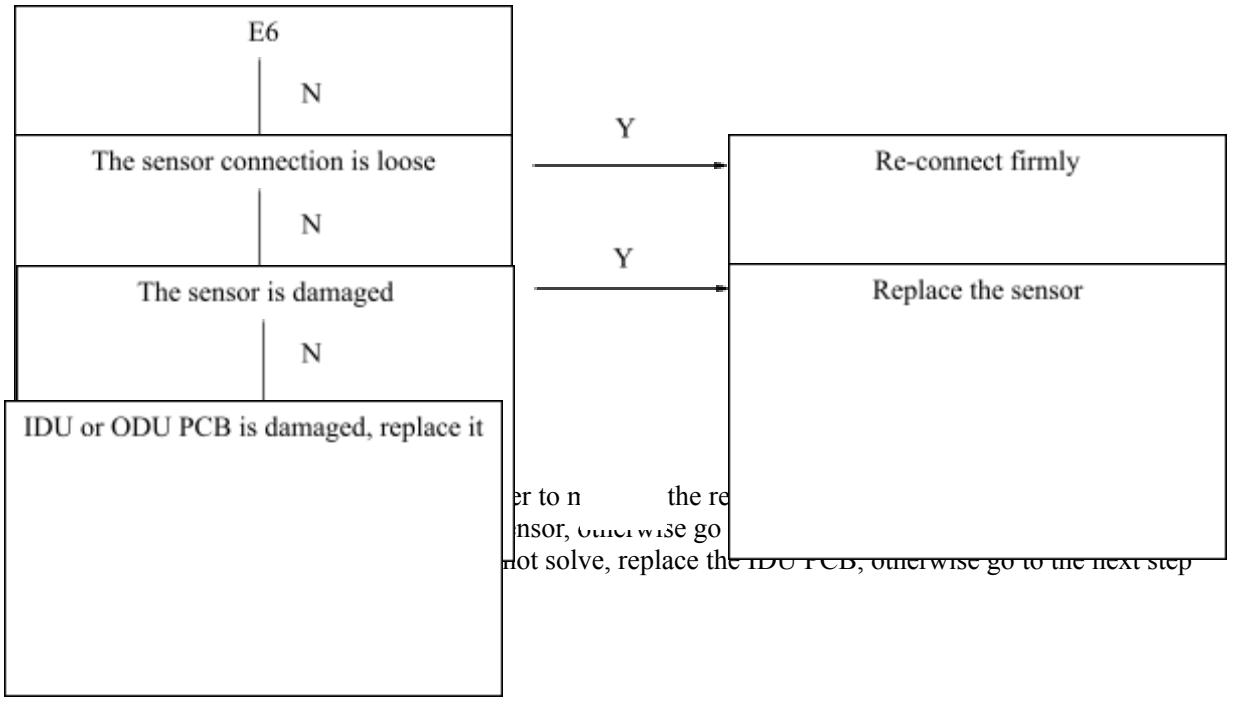
nsor, otherwise go
not solve, replace the IDU PCB, otherwise go to the next step

E6: ODU condenser temperature sensor (T3 sensor) fault

Description:
The ODU PCB can not read the normal value of T3 sensor, and the unit stops running, “E6” display on the IDU PCB.

Possible causes:
- The T3 sensor is loose or short-circuit/open-circuit
- IDU PCB damage
- ODU PCB damage

Procedure:



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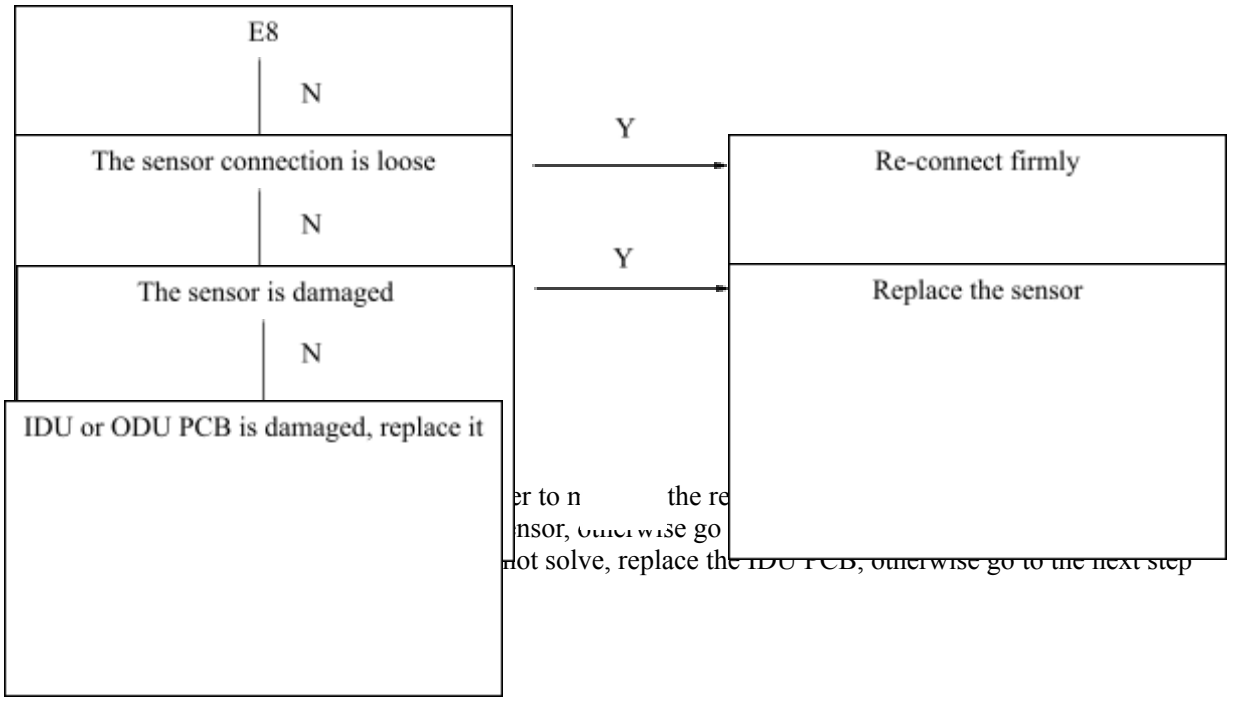
nsor, otherwise go
not solve, replace the IDU PCB, otherwise go to the next step

E8: Outdoor discharged temperature sensor (TP sensor) fault

Description:
The ODU PCB can not read the normal value of TP sensor, and the unit stops running, “E8” display on the IDU PCB.

Possible causes:
- The TP sensor is loose or short-circuit/open-circuit
- IDU PCB damage
- ODU PCB damage

Procedure:



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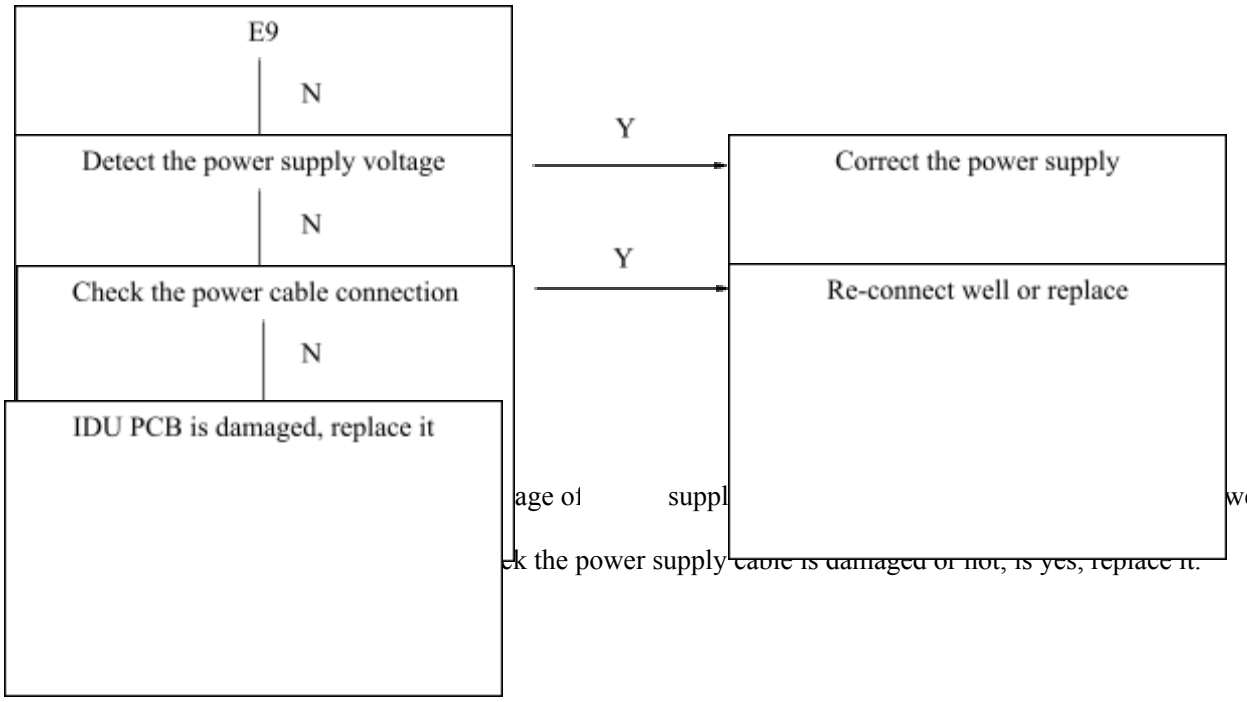
nsor, otherwise go
not solve, replace the IDU PCB, otherwise go to the next step

E9: Power supply voltage over-high/over-low protection

Description:
The IDU PCB detects that the power supply voltage is over 275V or below 160V for single phase, “E9” display on the IDU PCB.

Possible causes:
- The power supply is not correct
- The power cable is not connected well or damaged
- IDU PCB damage

Procedure:



age of suppl wer

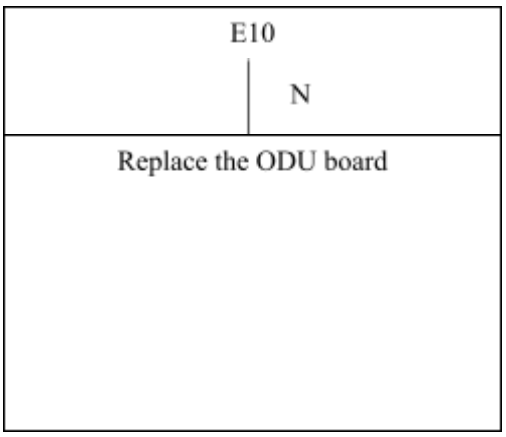
k the power supply cable is damaged or not, is yes, replace it.

E10: EEPROM fault

Description:
The EEPROM parameter can not be read with correct value, and “E10” is displayed on the IDU PCB.

Possible causes:
- The EEPROM is damaged
- ODU PCB damage

Procedure:

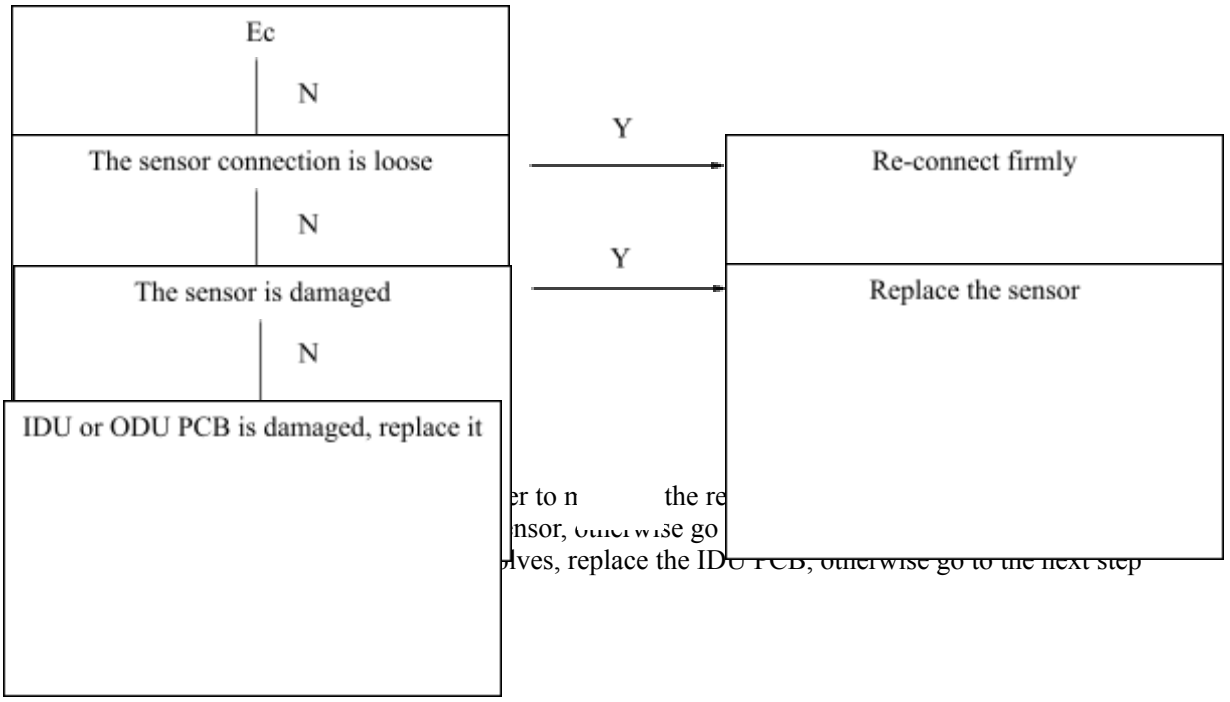


Ec: Refrigerant cooling pipe temperature sensor (T7 sensor) fault

Description:
The ODU PCB can not read the normal value of T7 sensor, and the unit stops running, “Ec” display on the IDU PCB.

Possible causes:
- The T7 sensor is loose or short-circuit/open-circuit
- IDU PCB damage
- ODU PCB damage

Procedure:



er to n the re
nsor, otherwise go
lves, replace the IDU PCB, otherwise go to the next step

H0: Communication fault between main chip and module chip of ODU PCB

Description:
The main chip of ODU PCB and the module chip of ODU PCB is loose communication, which need to replace the ODU PCB.

H4: 3 times P6 error in 30mins

Description:
Refer to P6.

H5: 3 times P2 error in 30mins

Description:
Refer to P2.

H6: 3 times P4 error in 100mins

Description:
Refer to P4.

H9: 2 times P9 error in 10mins

Description:
Refer to P9.

H10: 3 times P3 error in 60mins

Description:
Refer to P3.

H12: 3 times Pb error in 60mins

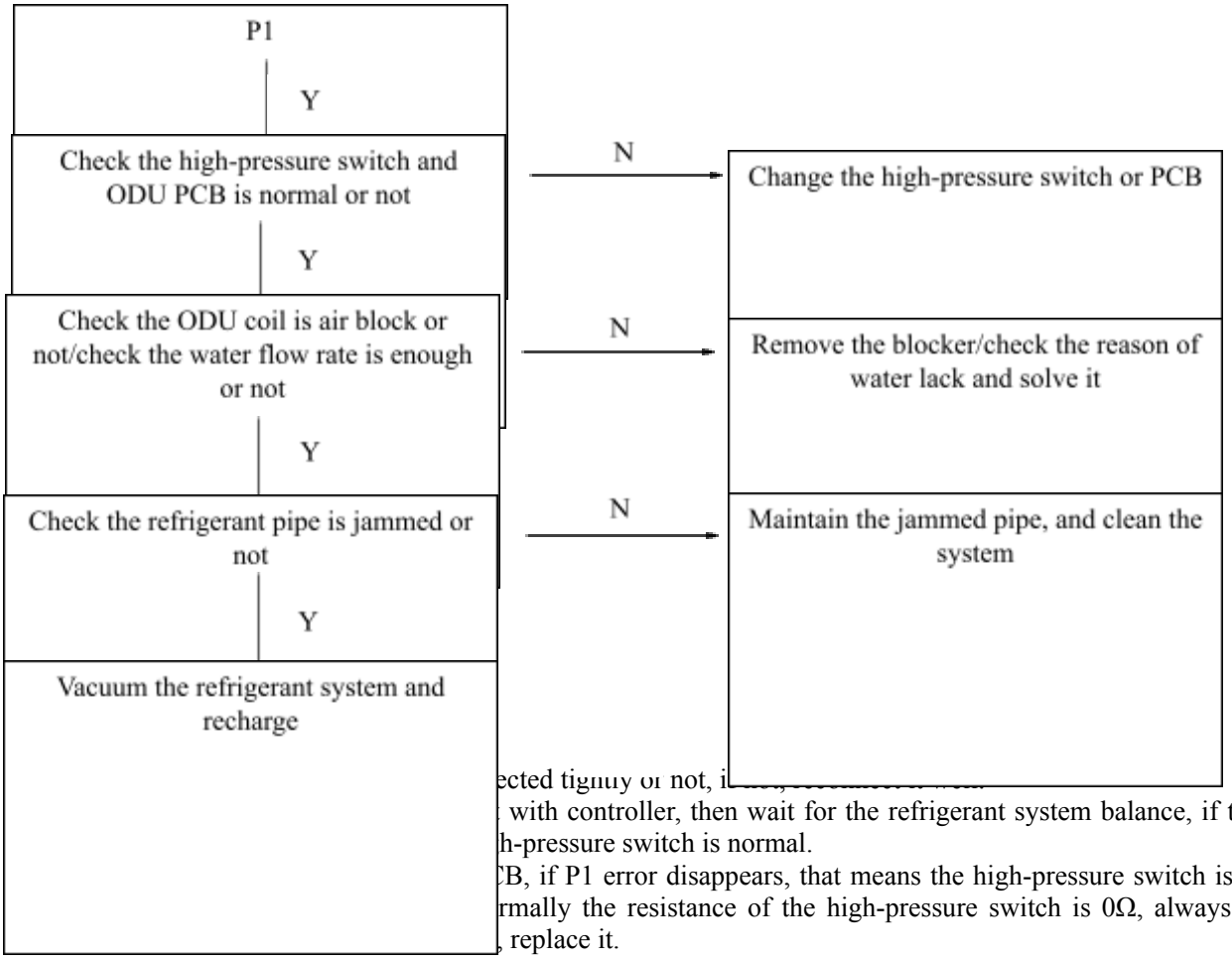
Description:
Refer to Pb.

P1：**High pressure protection**

Description:
The high-pressure error, which is the ODU high-pressure port open circuit and send signal to IDU PCB, then "P1" displays on the IDU PCB, unit will stop running.

Possible causes:
- High-pressure switch is not connected well
- ODU PCB fault or high-pressure switch fault.
- The ODU coil is air block or lack of water
- The refrigerant pipe is jammed to cause high pressure
- The refrigerant system is recharged with air or other gas inside, overcharge, etc.

Procedure:



ected tightly or not, i
with controller, then wait for the refrigerant system balance, if the P1
h-pressure switch is normal.
B, if P1 error disappears, that means the high-pressure switch is fault,
rmally the resistance of the high-pressure switch is 0Ω, always close
, replace it.

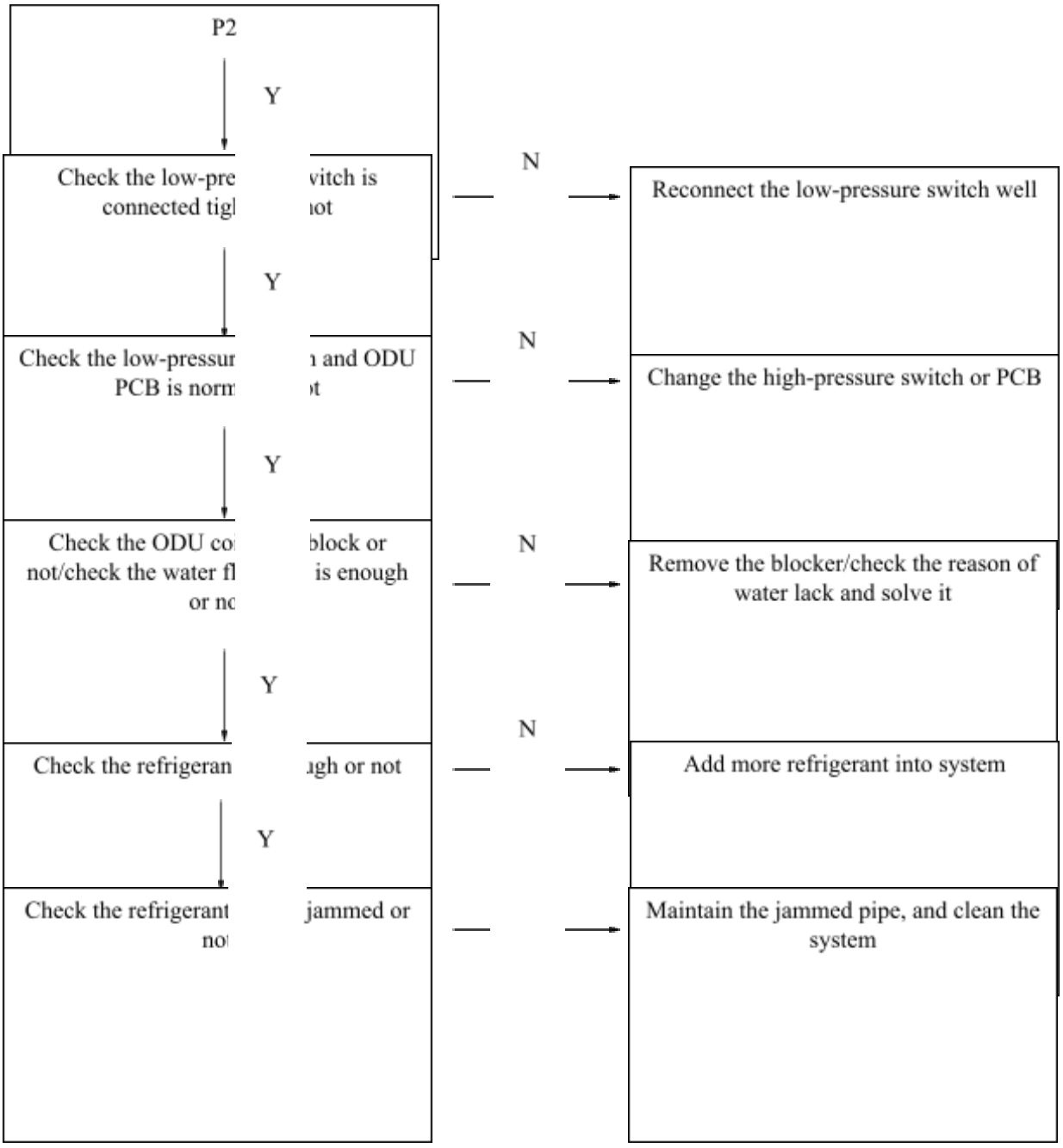
- Check the ODU coil if it is air block in cooling mode, if yes, remove the blocker.
- Check the BPHE is lack of water which can not evaporate the refrigerant in heating mode, make sure the water flow rate is suit the unit according to the specification.
- Check if the refrigerant pipe if high pressure side is jammed or not, if yes, maintain it.
- If all above steps are normal, it may cause by the air or other gas inside the refrigerant system, need to vacuum the system and recharge.

P2：**Low pressure protection**

Description:
The low-pressure error, which is the ODU low-pressure port open circuit and send signal to IDU PCB, then “P2” displays on the IDU PCB, unit will stop running.

Possible causes:
- Low-pressure switch is not connected well
- ODU PCB fault or low-pressure switch fault.
- The ODU coil is air block or lack of water
- The refrigerant pipe is jammed to cause low pressure
- The refrigerant system is lack of refrigerant

Procedure:



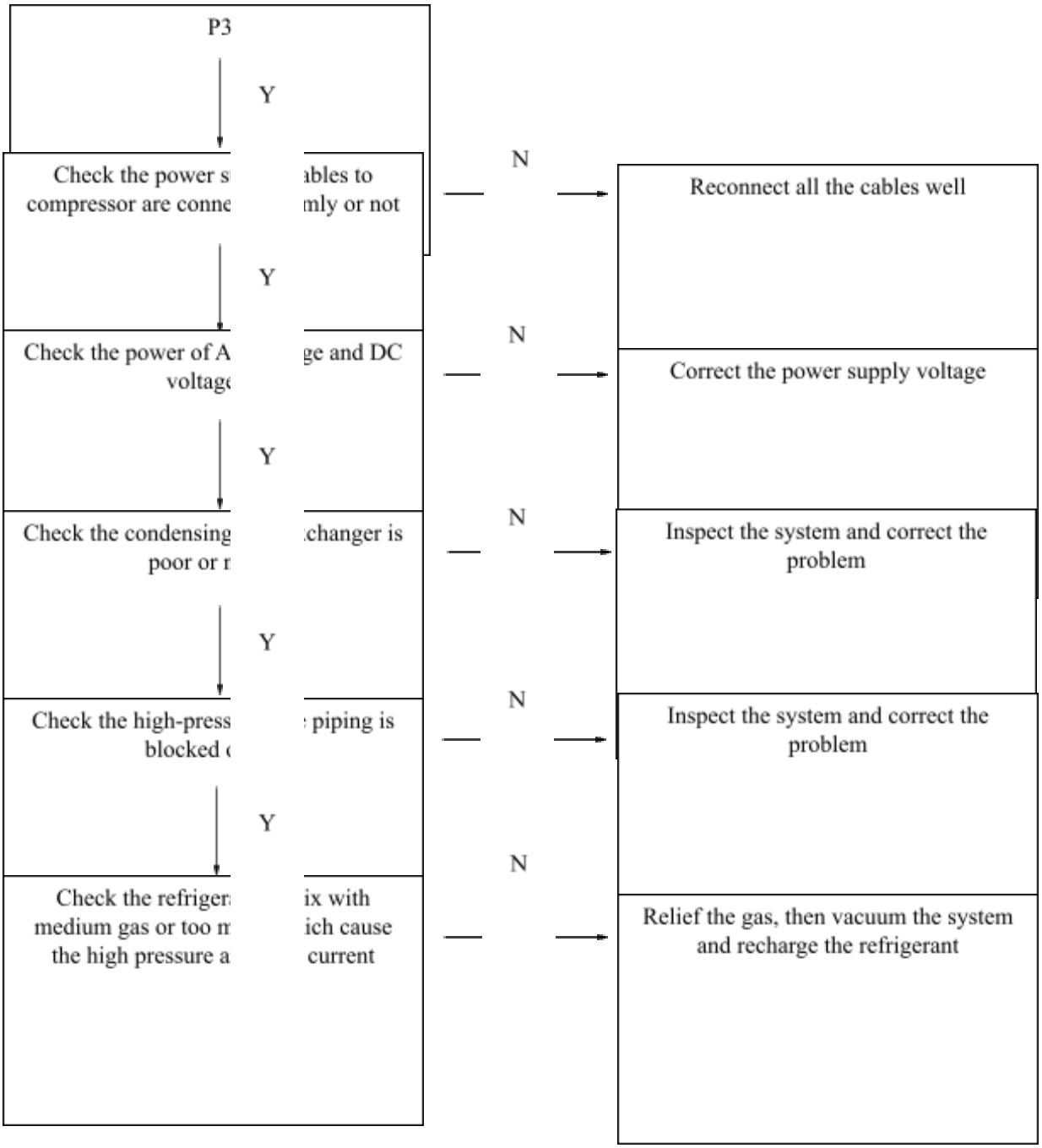
- Check the low-pressure switch is connected tightly or not, if not, reconnect it well.
- When the P2 happen, turn off the unit with controller, then wait for the refrigerant system balance, if the P2 disappears, that means the PCB and high-pressure switch is normal.
- If not, short connect the LP port of PCB, if P2 error disappears, that means the low-pressure switch is fault, replace the high-pressure switch. (Normally the resistance of the low-pressure switch is 0Ω, always close type), if not, the ODU PCB is damaged, replace it.
- Check the ODU coil if it is air block in heating mode, if yes, remove the blocker.
- Check the BPHE is lack of water which can not evaporate the refrigerant in cooling mode, make sure the water flow rate is suit the unit according to the specification.
- Check the refrigerant is insufficient or not, if yes, charge refrigerant correct according to the nameplate.
- Check the refrigerant pipe is jammed or not, if yes, maintain it.

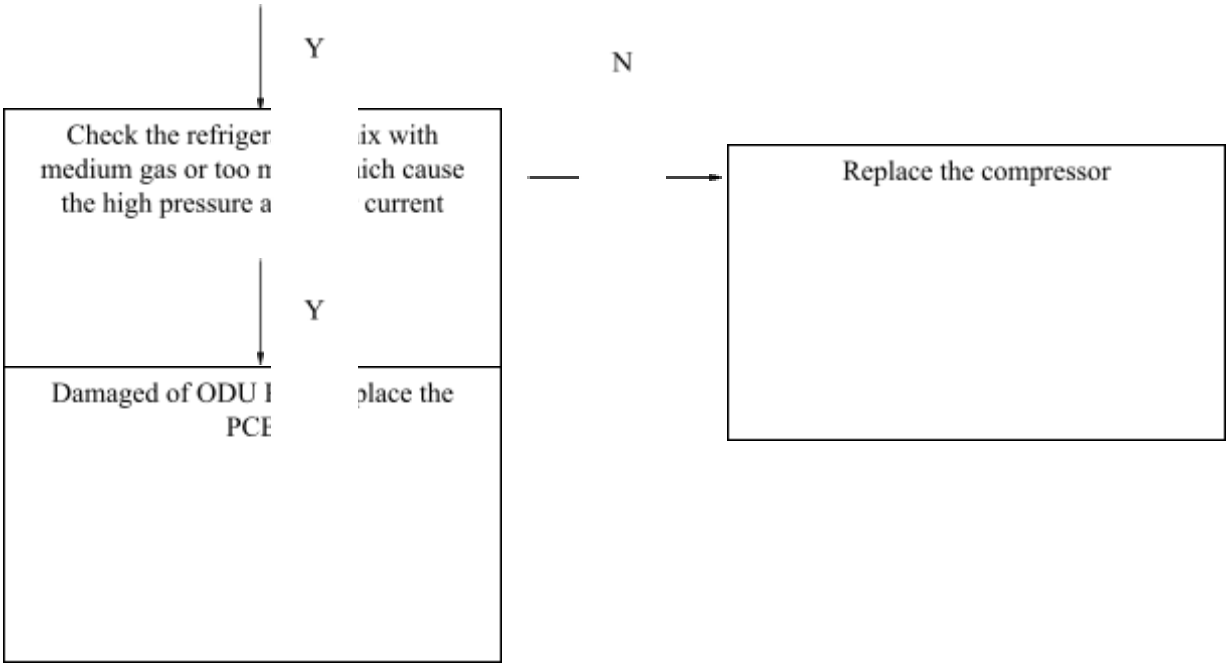
P3：Over current protection

Description:
The unit will stop while it detects the AC current or DC current is higher than the protection value, which will give "P3" error in the IDU PCB, as for the detail value of protection logic, please refer to section "current protection".

Possible causes:
- Power supply cables do not connect well or voltage is too low
- The power connection of compressor is not firmly
- The high-pressure side pipe is block or medium gas inside the system
- The poor heat exchange of condenser, heating mode check the BPHE, cooling mode check the ODU coil
- The inverter module of ODU PCB damaged
- The compressor is damaged

Procedure:





Note:

(1) AC voltage is coming from the power supply to the ODU PCB, single phase of the AC voltage is 220-240V; DC voltage is the power supply to the compressor from ODU PCB, 1-phase unit of the DC voltage is 310-340V, 3-phase unit of DC voltage is 540-590V.

(2) In heating mode check water side heat exchanger, water piping, circulator pumps and water flow switch for dirt/blockages. In cooling mode check air side heat exchanger, fan(s) and air outlets for dirt/blockages.

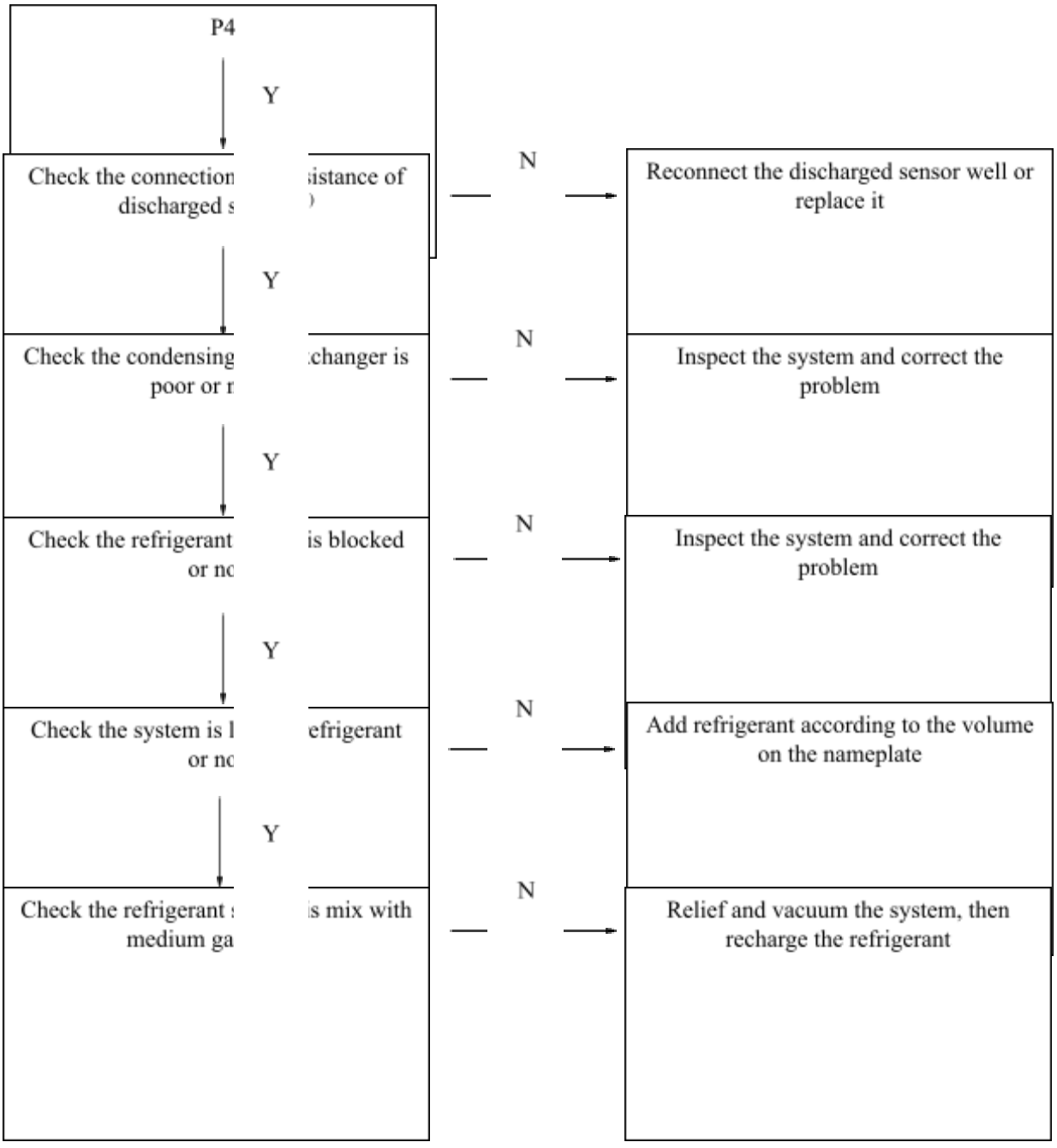
- Check the power supply to the ODU PCB, use the multi-meter to check the AC voltage of ODU "L-N" port, normally is 220-240V AC (380-415V for L1-L2 if 3-phase unit), if not, correct the power supply, otherwise go to next step.
- Check the condensing heat exchanger, if it is in the poor heat exchange position: in cooling mode, check the ODU coil is air block or dirty or in bad ventilation, correct the it; in heating mode, check the BPHE is enough with water, the water pump and water flow switch is working normally or not, or water side is jam or not, correct it; otherwise go to next step.
- Check the piping system is bent/jam, which cause high pressure to cause the over current, if yes, maintain it, otherwise go to next step.
- Check the pressure of the system, if it is mix with medium gas or over charge the refrigerant, if yes, relief and recharge.
- Check the resistance of compressor, U-V-W, each port should be within 20Ω, U-G, V-G, W-G should be MΩ or ∞, if not, the compressor is damaged, replace it; if the resistance is correct, use the multi-meter to check the current of U-V-W of compressor, and check the check item 16, DC current, if the value of check item 16 is not similar to the multi-meter, replace the ODU PCB, otherwise go to the next step.
- If the multi-meter detects the compressor is quite big, while the compressor frequency is not high, that means compressor is damaged, replace the compressor; otherwise go to next step.
- If all above steps are correct, replace the ODU PCB.

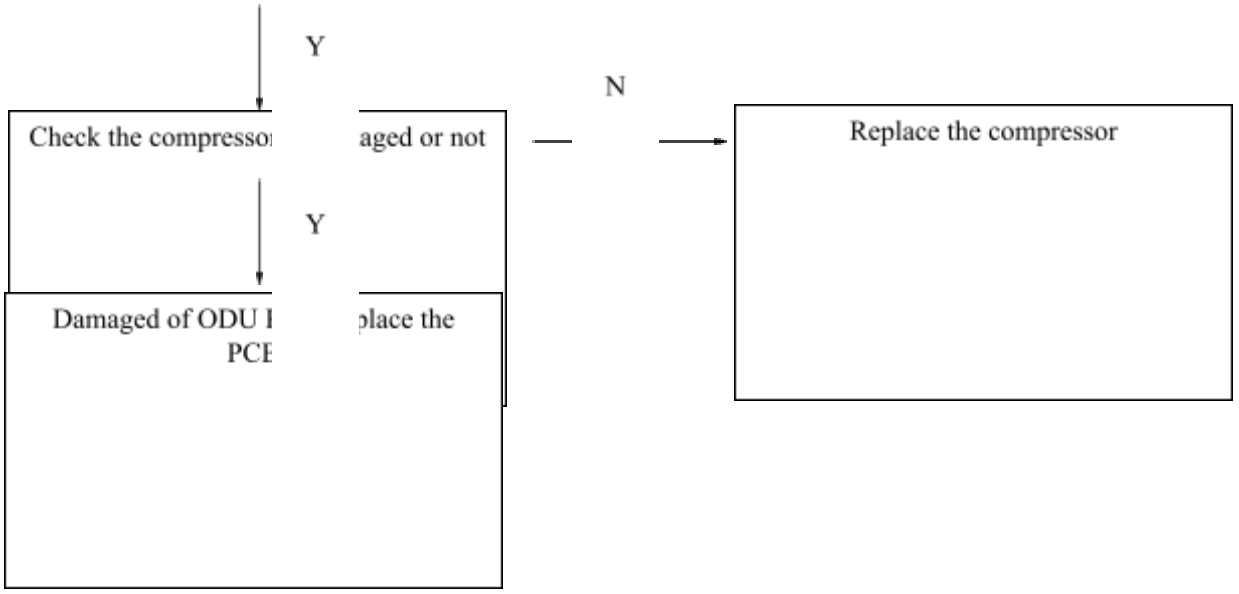
P4：**Over-heat protection of compressor discharged temperature**

Description:
The unit will stop while it detects the discharged temperature is higher than the protection value, which will give "P4" error in the IDU PCB, as for the detail value of protection logic, please refer to section "compressor discharged temperature protection".

Possible causes:
- The discharged temperature sensor is fault
- Lack of refrigerant or medium gas inside the system
- The refrigerant pipe is block
- The poor heat exchange of condenser, heating mode check the BPHE, cooling mode check the ODU coil
- The compressor is damaged
- The ODU PCB is damaged

Procedure:





Note:

(1) The resistance of the sensor can refer to the annex I, resistance table of sensor.

(2) In heating mode check water side heat exchanger, water piping, circulator pumps and water flow switch for dirt/blockages. In cooling mode check air side heat exchanger, fan(s) and air outlets for dirt/blockages.

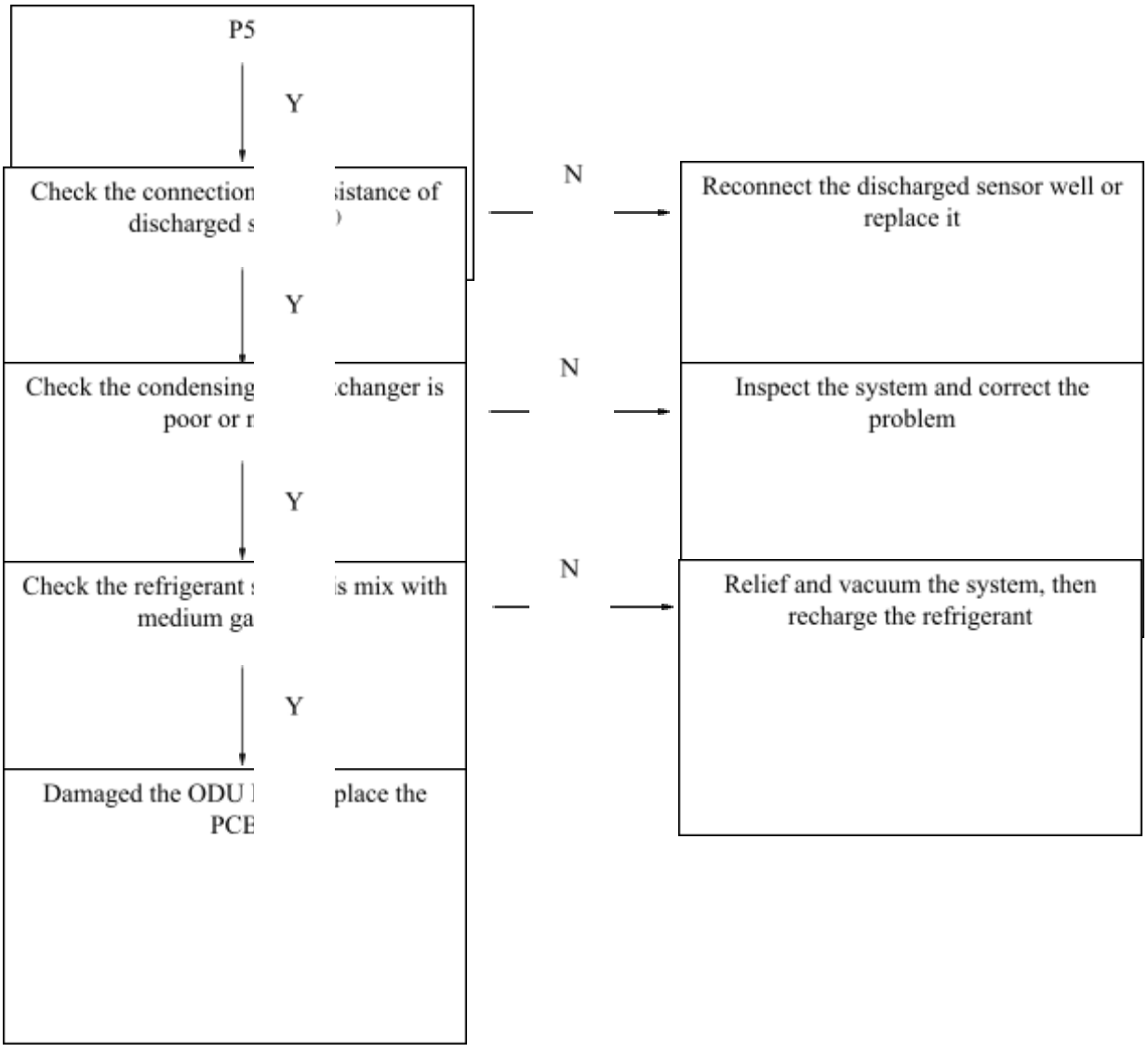
- Check the connection and resistance of the discharged temperature sensor, if the resistance is not correct, replace the sensor, otherwise go to next step.
- Check the connection and resistance of T-in, Tout, T1, T5 sensors, connect them firmly, if the resistance is not correct, replace it, otherwise go to next step. (The capacity demand is calculated basing on the LWT and setting temperature, so these sensors will affect the compressor frequency in high level even the EWT is high)
- Check the condensing heat exchanger, if it is in the poor heat exchange position: in cooling mode, check the ODU coil is air block or dirty or in bad ventilation, correct the it; in heating mode, check the BPHE is enough with water, the water pump and water flow switch is working normally or not, or water side is jam or not, correct it; otherwise go to next step.
- Check the piping system is bent/jam, if yes, maintain it, otherwise go to next step.
- Check the pressure of the system, if it is mix with medium gas or lack of refrigerant, if yes, relief and recharge or add the refrigerant basing on the volume in nameplate.
- Check the resistance of compressor, U-V-W, each port should be within 20Ω, U-G, V-G, W-G should be MΩ or ∞, if not, the compressor is damaged, replace it; if the resistance is correct, check the check item 16, DC current, if the value of check item 16 is quite big, while the compressor frequency is not high, that means compressor is damaged, replace the compressor; otherwise go to next step.
- If all above steps are correct, running the system, check the SV2 valve, the “CN6” port of ODU PCB before the P4 error, the SV2 should be open once the discharged temperature reach the 100℃, if not, replace the ODU PCB.

P5：**Over-heat protection of condenser temperature**

Description:
The unit will stop while it detects the condensing temperature is higher than the protection value, which will give "P5" error in the IDU PCB, as for the detail value of protection logic, please refer to section "compressor discharged temperature protection".

Possible causes:
- The condenser temperature sensor is fault
- The poor heat exchange ODU coil
- The medium gas is inside the system
- The ODU PCB is damaged

Procedure:



Note:
(1) The resistance of the sensor can refer to the annex I, resistance table of sensor.
(2) In cooling mode check air side heat exchanger, fan(s) and air outlets for dirt/blockages.

- Check the connection and resistance of the condenser temperature sensor, if the resistance is not correct, replace the sensor, otherwise go to next step.
- Check the condensing heat exchanger, if it is in the poor heat exchange position: in cooling mode, check the

ODU coil is air block or dirty or in bad ventilation, correct the it; otherwise go to next step.

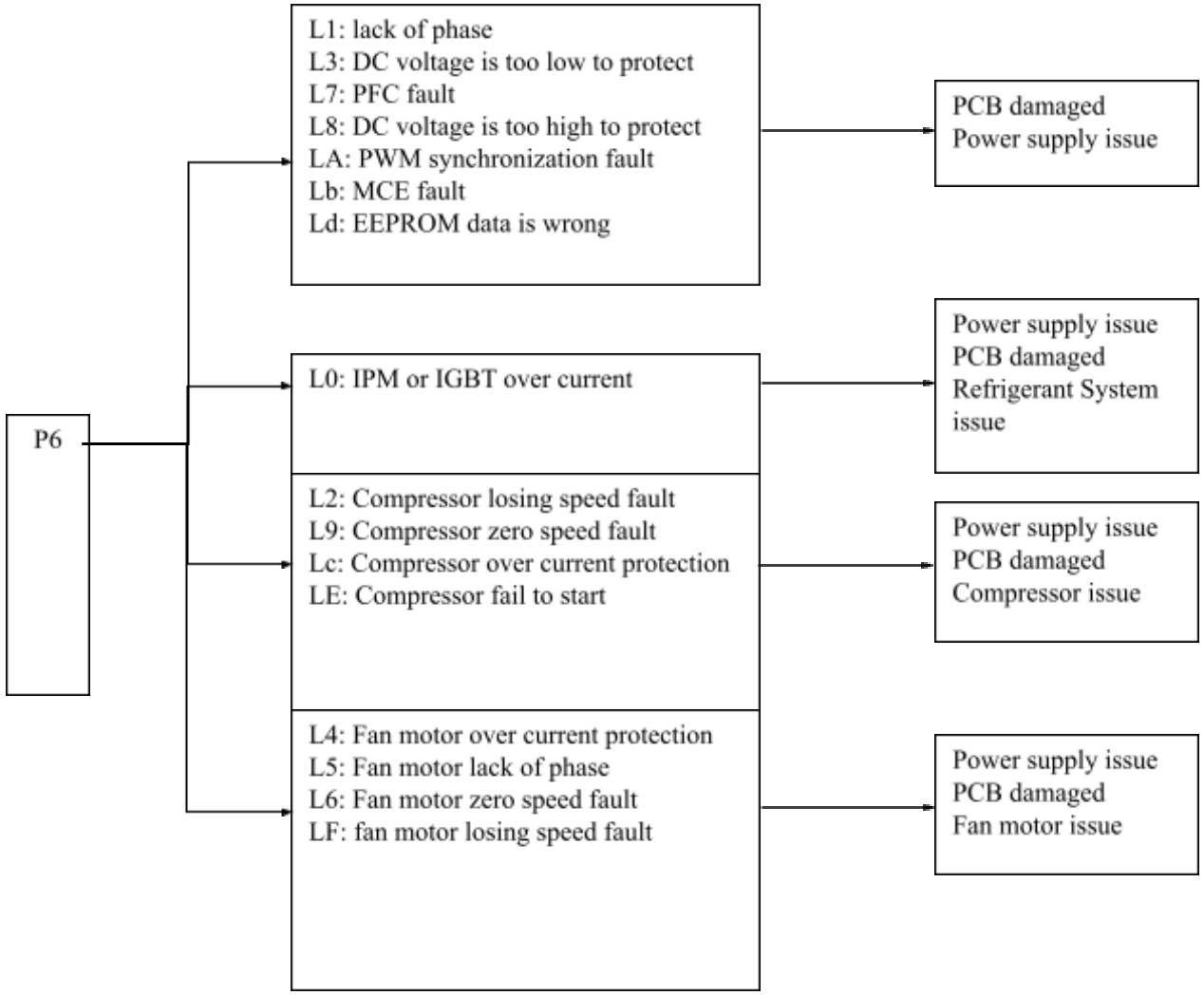
- Check the pressure of the system, if it is mix with medium gas, if yes, relief and recharge the refrigerant basing on the volume in nameplate.
- If all above steps are correct, replace the ODU PCB.

P6：**IPM board protection (Inverter module error)**

Description:
The unit will stop while it occurs the IPM board protection, and the IDU PCB will display the “P6” error, in this case, it can use the WUI or IDU PCB to check the detail of the error which is caused the P6. For WUI, please refer to the check item 33, and for IDU PCB, refer to the check item 23.

Possible causes:
- The ODU PCB damaged
- The power supply is not correct
- The heat exchange condition is poor
- Fan motor or compressor damaged

Procedure:

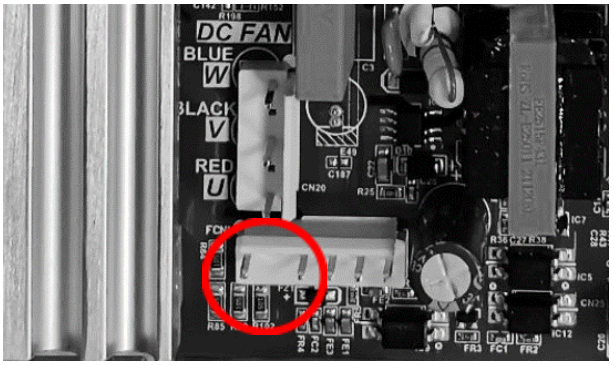


- Refer to the detail reason of P6 error.

L0: IPM or IGBT over current

Check step:

- Use the multi-meter to check the power supply, the AC voltage between L-N should be 220-240V (for 3-phase unit, L1/L2/L3-N must test one by one), if not, correct the power supply; if yes, go to next step;
- Use the multi-meter to check the DC voltage in below port in red ring, normally it should be DC 310-380V, if not, replace the ODU PCB, if yes, go to next step; (For this step, it can also check this DC voltage through the checked parameter of IDU PCB, item 18, 310-380V for single phase, 5410-590V for 3-phase.)

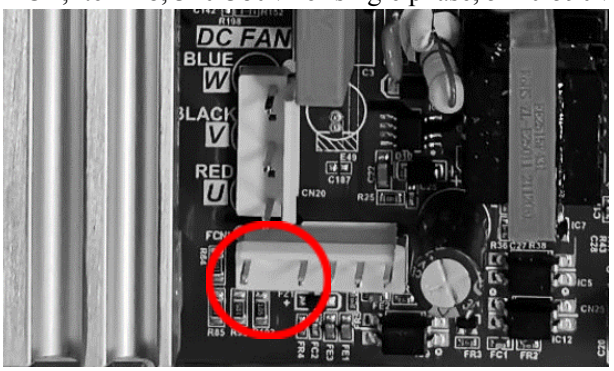


- It may cause by the refrigerant system issue, refer to P3 and P9.

L1/L3/L7/L8/LA/Lb/Ld: lack of phase/ DC voltage is too low to protect/ PFC fault/ DC voltage is too high to protect /PWM synchronization fault/ MCE fault/ EEPROM data is wrong

Check step:

- Use the multi-meter to check the power supply, the AC voltage between L-N should be 220-240V (for 3-phase unit, L1/L2/L3-N must test one by one), if not, correct the power supply; if yes, go to next step;
- Use the multi-meter to check the DC voltage in below port in red ring, normally it should be DC 310-380V, if not, replace the ODU PCB. (For this step, it can also check this DC voltage through the checked parameter of IDU PCB, item 18, 310-380V for single phase, 5410-590V for 3-phase.)

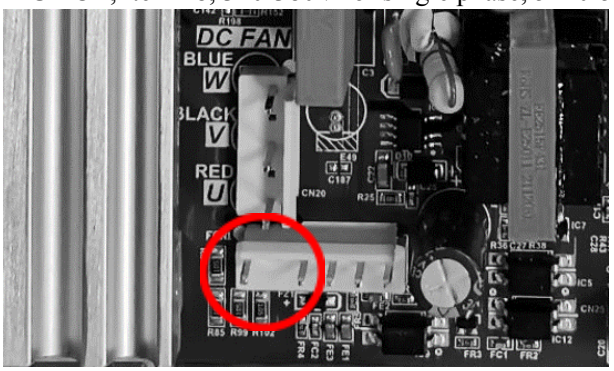


- If all above steps are correct, replace the ODU PCB.

L2/L9/Lc/LE: Compressor losing speed fault/Compressor zero speed fault/Compressor over current protection/Compressor fail to start

Check step:

- Use the multi-meter to check the power supply, the AC voltage between L-N should be 220-240V (for 3-phase unit, L1/L2/L3-N must test one by one), if not, correct the power supply; if yes, go to next step;
- Use the multi-meter to check the DC voltage in below port in red ring, normally it should be DC 310-380V, if not, replace the ODU PCB. (For this step, it can also check this DC voltage through the checked parameter of IDU PCB, item 18, 310-380V for single phase, 5410-590V for 3-phase.)

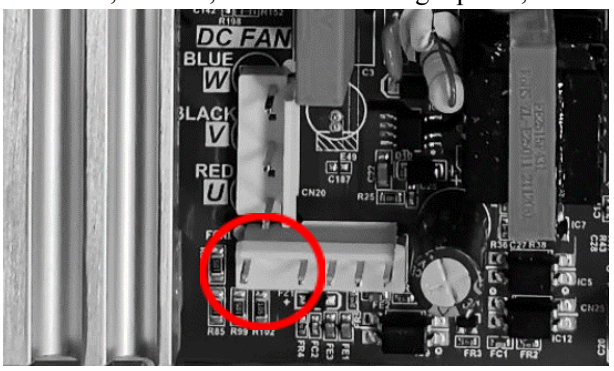


- Check the condensing heat exchanger, if it is in the poor heat exchange position: in cooling mode, check the ODU coil is air block or dirty or in bad ventilation, correct the it; in heating mode, check the BPHE is enough with water, the water pump and water flow switch is working normally or not, or water side is jam or not, correct it; otherwise go to next step.
- Check the piping system is bent/jam, which cause high pressure to cause the over current, if yes, maintain it, otherwise go to next step.
- Check the pressure of the system, if it is mix with medium gas or over charge the refrigerant, if yes, relief and recharge.
- Check the “UVW” connection of the compressor is correct sequency or not, if not, correct it; if it is, go to next step.
- Use the multi-meter to check the current of U-V-W of compressor, each line of current should be similar, otherwise the “UVW” may lack of sequency, replace the ODU PCB.
- Check the resistance of compressor, U-V-W, each port should be within 20Ω, U-G, V-G, W-G should be MΩ or ∞, if not, the compressor is damaged, replace it; if the resistance is correct, go to the next step.
- If the multi-meter detects the compressor is quite big, while the compressor frequency is not high, that means compressor is damaged, replace the compressor.

L4/L5/L6/LF: Fan motor over current protection/ Fan motor lack of phase/ Fan motor zero speed fault/ Fan motor losing speed fault

Check step:

- Use the multi-meter to check the power supply, the AC voltage between L-N should be 220-240V (for 3-phase unit, L1/L2/L3-N must test one by one), if not, correct the power supply; if yes, go to next step;
- Use the multi-meter to check the DC voltage in below port in red ring, normally it should be DC 310-380V, if not, replace the ODU PCB. (For this step, it can also check this DC voltage through the checked parameter of IDU PCB, item 18, 310-380V for single phase, 5410-590V for 3-phase.)



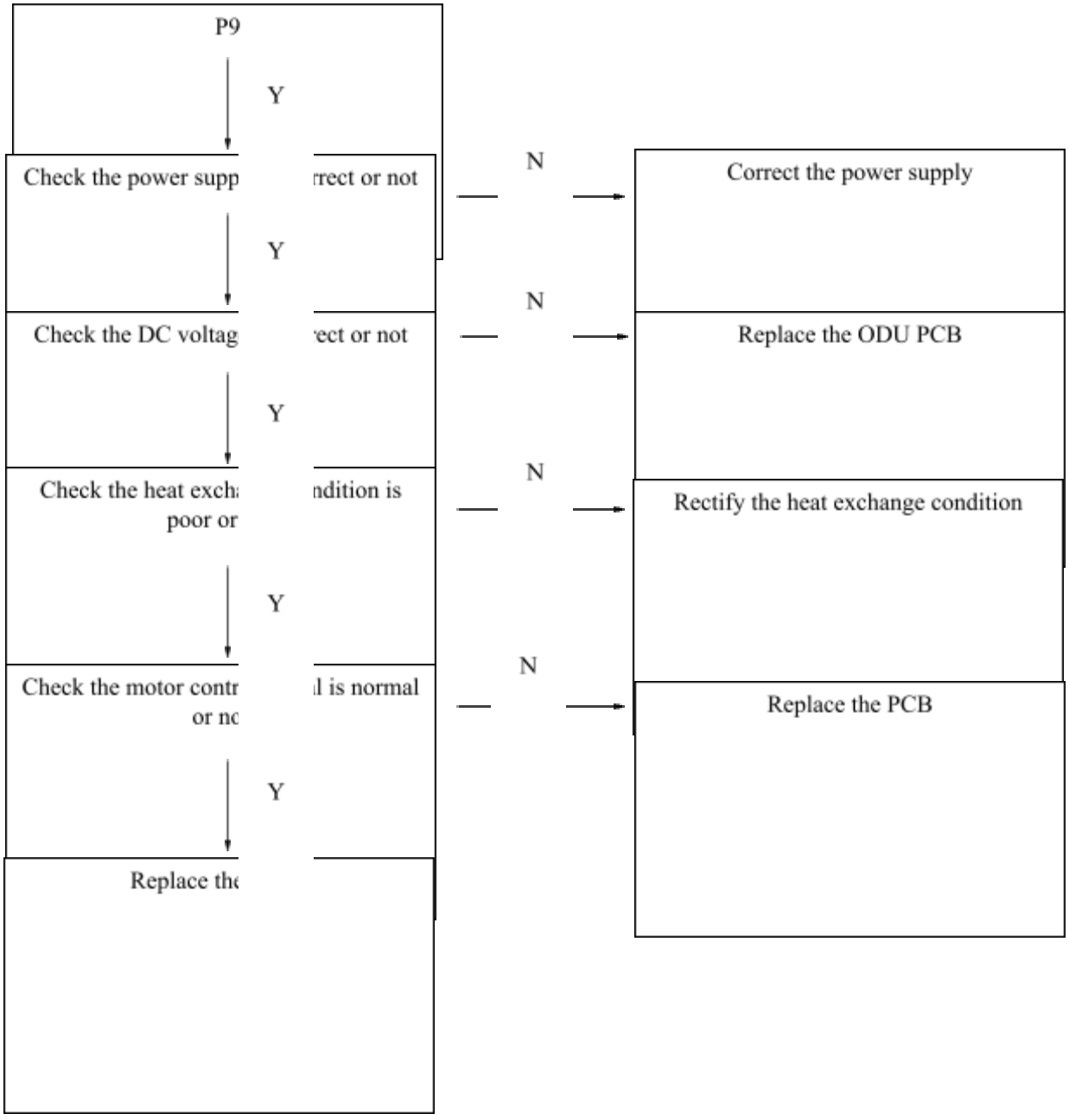
- If the voltage is correct, refer to the P9.

P9：**DC motor protection (DC motor or DC motor module error)**

Description:
The unit will stop while the unit happen with “P9” error, which is the DC motor protection, and the IDU PCB would display “P9” error.

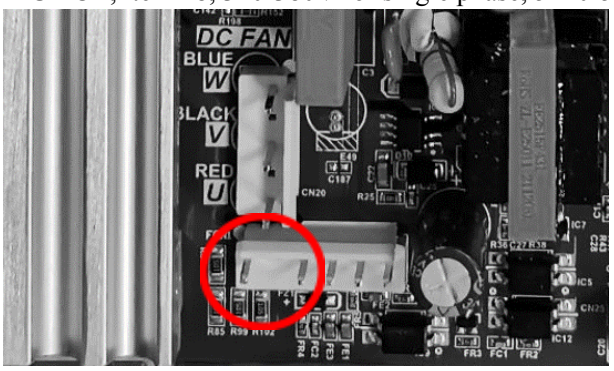
Possible causes:
- The damage of DC motor
- The damage of DC Motor module
- The damage of ODU PCB
- The heat exchange condition is poor

Procedure:



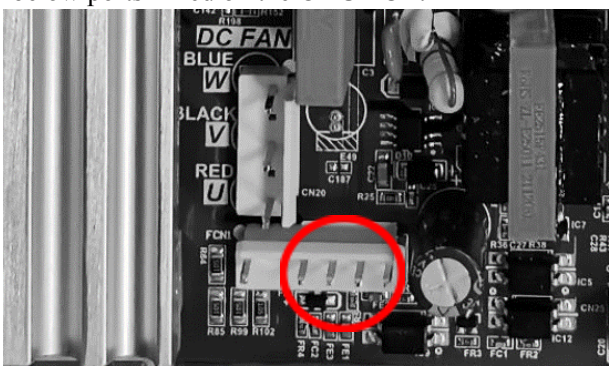
- Use the multi-meter to check the power supply, the AC voltage between L-N should be 220-240V (for 3-phase unit, L1/L2/L3-N must test one by one), if not, correct the power supply; if yes, go to next step;

- Use the multi-meter to check the DC voltage in below port in red ring, normally it should be DC 310-380V, if not, replace the ODU PCB. (For this step, it can also check this DC voltage through the checked parameter of IDU PCB, item 18, 310-380V for single phase, 5410-590V for 3-phase.)



- Check the condensing heat exchanger, if it is in the poor heat exchange position: in cooling mode, check the ODU coil is air block or dirty or in bad ventilation, correct the it; in heating mode, check the BPHE is enough with water, the water pump and water flow switch is working normally or not, or water side is jam or not, correct it; otherwise go to next step.
- Check the motor if it is blocked or not, if it is, correct it; otherwise go to next step.
- For singe fan unit, if above the step are correct, replace the ODU PCB, if it still not solved, replace the motor.
- For double fan unit, if the above the correct, please follow the below steps.

❖ Check the DC voltage in below ports in red on the ODU PCB:

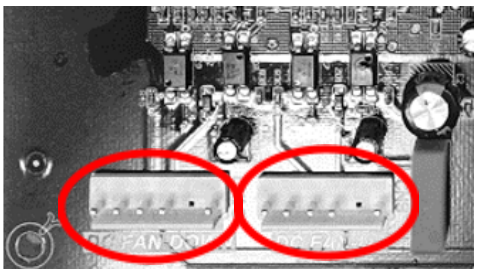


There are four ports from left to right: GND/+15V/control signal/feedback signal, if the +15V is not correct, replace the ODU PCB.

The voltage between GND-control signal is DC 0-5V, and when unit is on, it should be around 2.5V which is fluctuant, when the unit is off, it should be 0V, if not, replace the ODU PCB, otherwise go to next step.

❖ Check the connection cables between ODU PCB and fan motor driven board, if they are not connected well, re-connect it, otherwise go to next step.

❖ Check the DC voltage of these ports in the fan motor driven board



For each port, there are five ports from left to right: GND/+15V/control signal/feedback signal, if the +15V is not correct, replace the fan motor driven board.

The voltage between GND-control signal is DC 0-5V, and when unit is on, it should be around 2.5V which is fluctuant, when the unit is off, it should be 0V, if not, replace the driven board, otherwise go to next step.

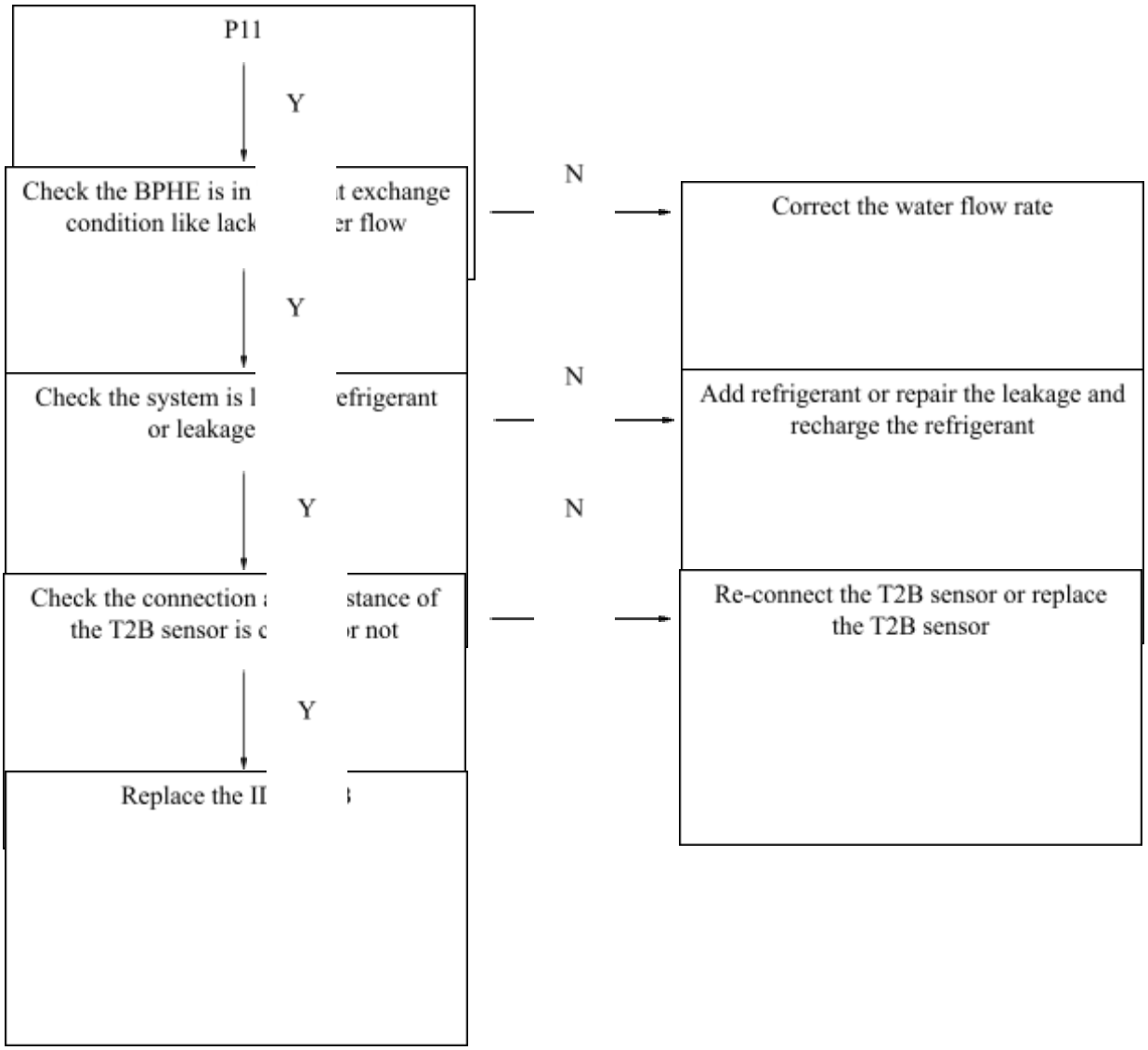
❖ If all above steps are correct, replace the fan motor.

P11：**T2B refrigerant temperature of BPHE over-low protection**

Description:
The unit will stop while the unit detects the T2B refrigerant temperature is low (below -10℃ while the compressor is off; below -5℃ while the compressor is running) in cooling mode, and the IDU PCB will display “P11”. It is used to protect the BPHE against the ice frozen.

Possible causes:
- The damage of the T2B sensor
- The damage of IDU PCB
- The heat exchange condition is poor
- Lack of refrigerant

Procedure:



- Check the T2B sensor is connected firmly or not, if not, reconnect it well, otherwise go to next step.
- Take out the T2B sensor, and then use the multi-meter to detect the resistance of the T2B to check if it normal or not. If not, replace the sensor, otherwise go to next step. (Normally it is 5K at 25℃, refer to the annex I for detail of the resistance table.)
- Check the system is water flow rate or not, it can check the water flow rate via WUI according to the check item 7, if yes, please rectify the water flow, otherwise go to the next step.

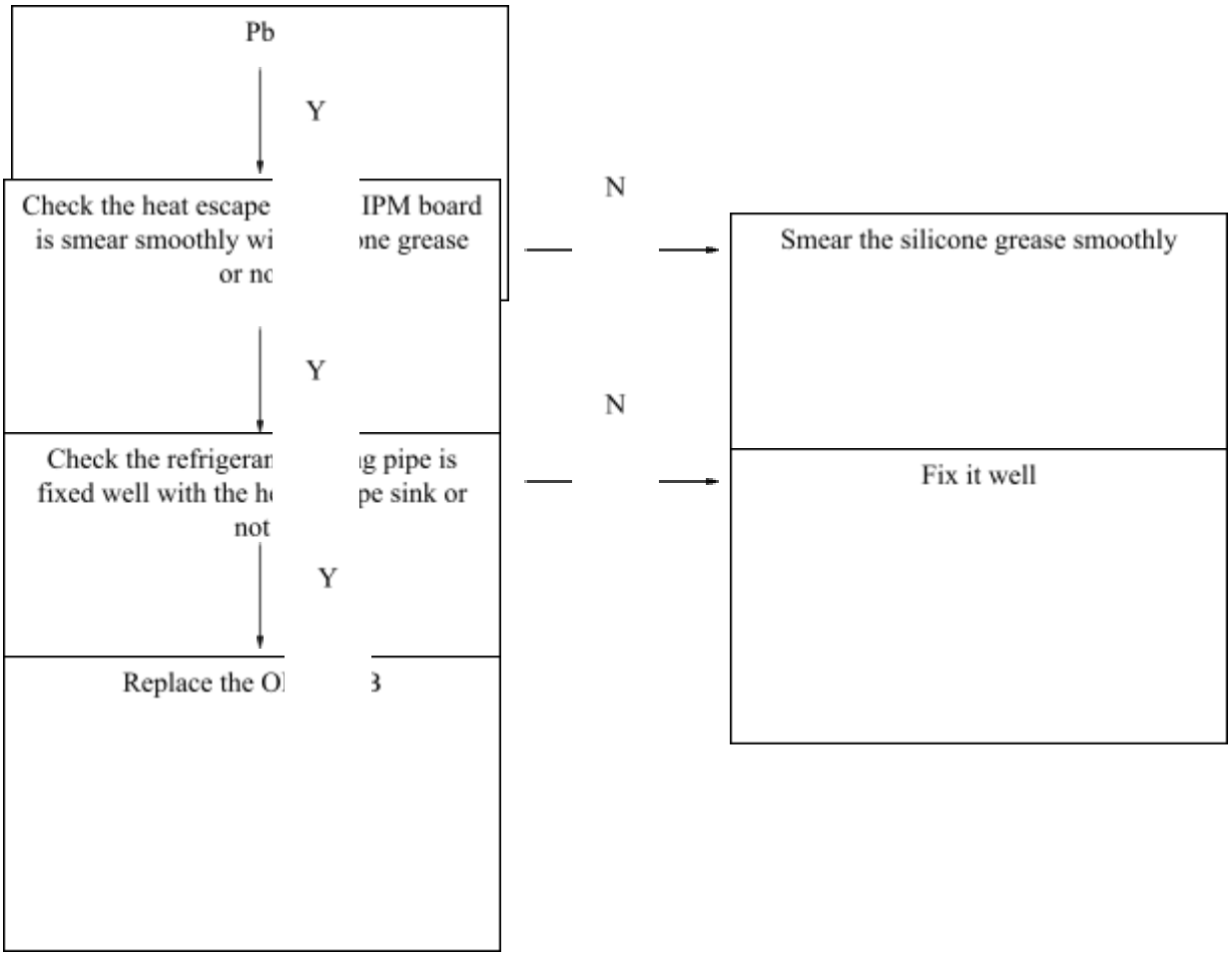
- Check the system is lack of refrigerant or leakage or not, if yes, repair it and charge the refrigerant according the nameplate, otherwise go to the next step.
- If all the above steps are correct, replace the IDU PCB.

Pb：**IPM temperature over-heat protection**

Description:
The unit will stop while the unit detects the IPM temperature is higher than 93℃, and the IDU PCB will display "Pb".

Possible causes:
- The poor heat escape of IPM board
- The damage of ODU PCB

Procedure:



- Check the heat escape sink of IPM board is smear with silicone grease smoothly, if not, smear the silicone smoothly, otherwise go to the next step.
- Check the refrigerant cooling pipe is fixed well with the heat escape sink, if not, fix it well, otherwise go to the next step.
- If above steps are correct, replace the ODU PCB.

6. Components maintaining

6.1.Tooling presentation

Here attached the maintaining tooling which will be used for main components service, the pictures below are just for reference, they may be different in local market. Please choose the correct tools according to the local market to service.

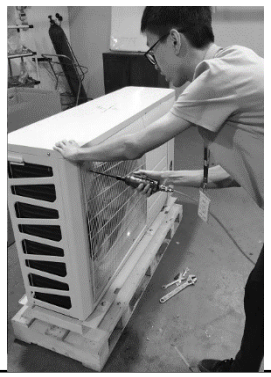
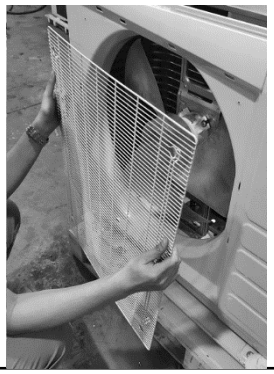
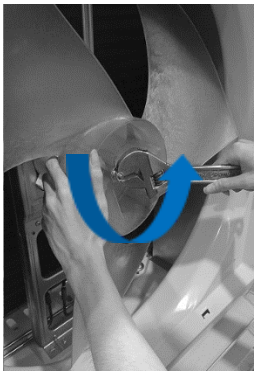
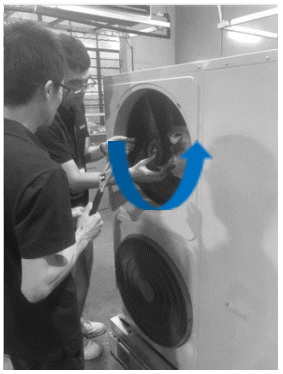
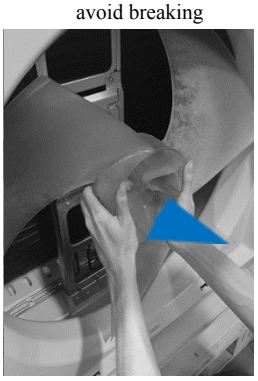
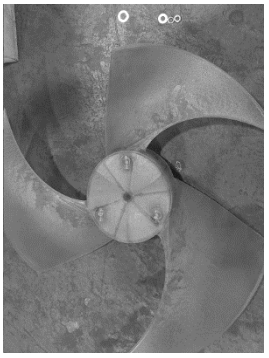
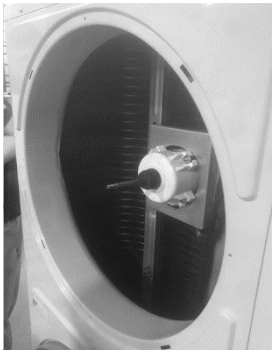
Table 6-1-1

Name	Picture	Name	Picture
Screw		Pliers	
Spanner		Hexagonal socket wrench	
Cutter		Welding device	
Piping cutter		Vacuum pump	
Pressure gage		Flaring tool	

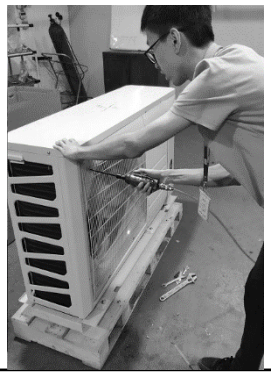
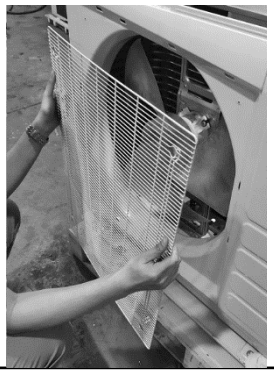
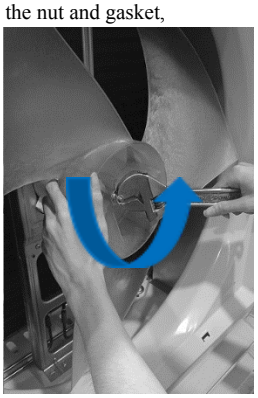
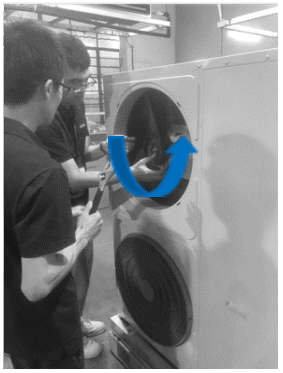
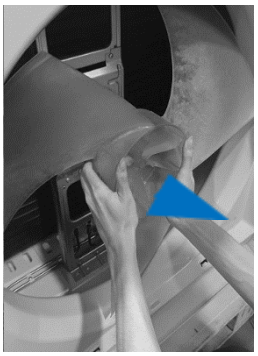
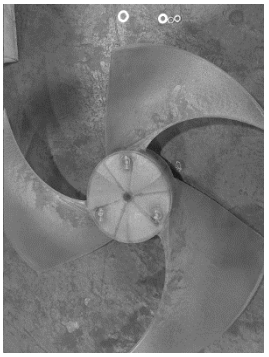
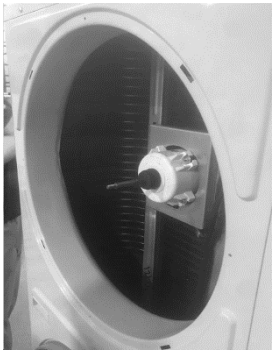
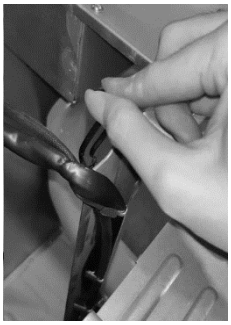
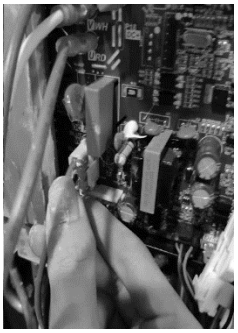
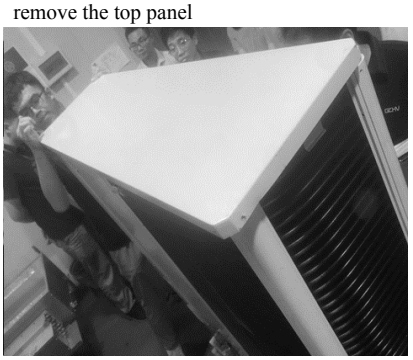
6.2.Maintaining step

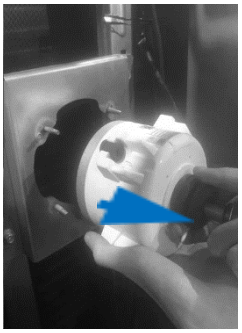
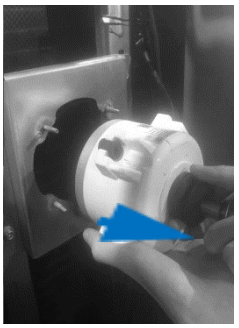
Around the heat pump, it has two body size that 4-10kW is single fan and 12-16kW is double fan. Here attached the guidance for the main components service of these two body.

- **Fan blade**

Steps	4-10kW	12-16kW
1	❖ Remove the 4 screws with the screw, then take out the fan grill  	❖ Remove the 4 screws with the screw, then take out the fan grill 
2	❖ Hold the fan blade and release the nut with spanner, remove the nut and gasket, 	❖ Hold the fan blade and release the nut with spanner, remove the nut and gasket 
3	❖ Hold the fan blade with hands to take it out careful to avoid breaking  	❖ Hold the fan blade with hands to take it out careful to avoid breaking  

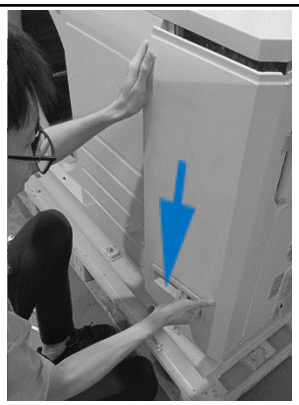
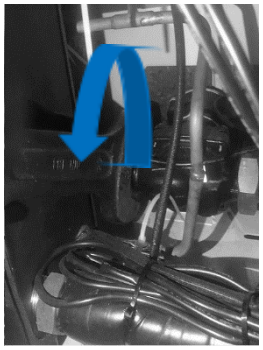
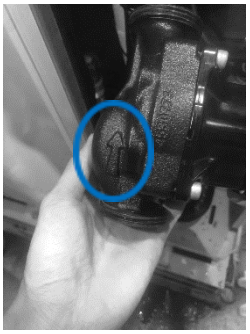
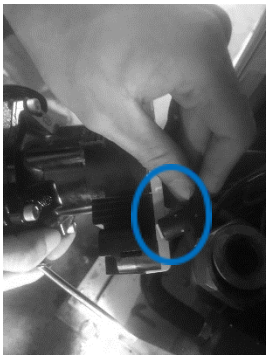
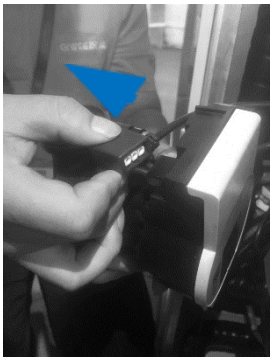
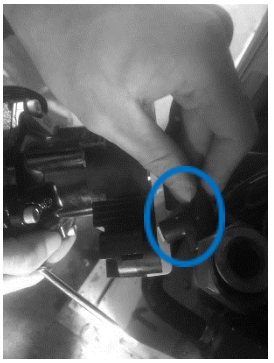
- **Fan motor**

Steps	4-10kW	12-16kW
1	❖ Remove the 4 screws with the screw, then take out the fan grill  	❖ Remove the 4 screws with the screw, then take out the fan grill 
2	❖ Hold the fan blade and release the nut with spanner, remove the nut and gasket, 	❖ Hold the fan blade and release the nut with spanner, remove the nut and gasket 
3	❖ Hold the fan blade with hands to take it out careful to avoid breaking  	❖ Hold the fan blade with hands to take it out careful to avoid breaking  
4	❖ Lose the fixing clamp, and take out the motor cable connector from PCB  	❖ Use the screw to lose the screws of top panel, and then remove the top panel 
5	❖ Use the hexagonal socket wrench to release the 4 nuts,	❖ Use the pliers to take out the motor cable from fan

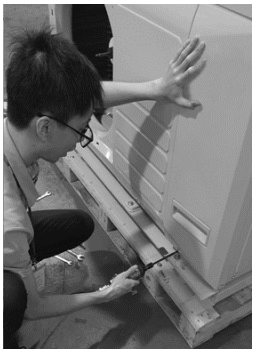
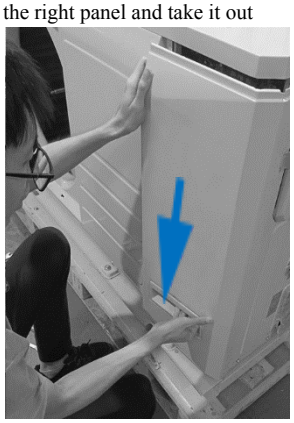
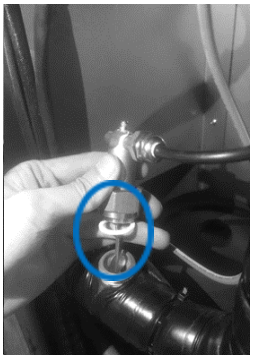
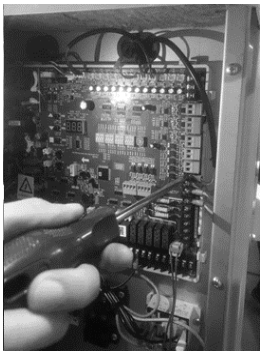
	and take off the gaskets 	motor module board (this board is in the rear side), and lose the clamp  
6	❖ Hold the motor with hands, then take it out  	❖ Use the hexagonal socket wrench to release the 4 nuts, and take off the gaskets 
7		❖ Hold the motor with hands, then take it out 

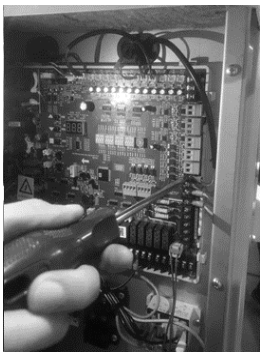
- **Water pump**

Steps	4-10kW	12-16kW
1	❖ Remove the screws of right panel 	❖ Remove the screws of the right panel  
2	❖ Hold the right panel and take it out	❖ Hold the right panel and take it out

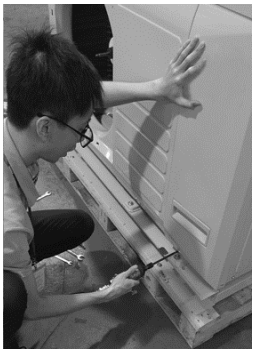
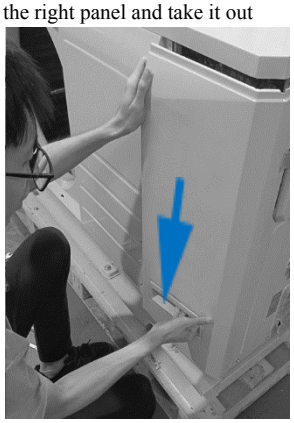
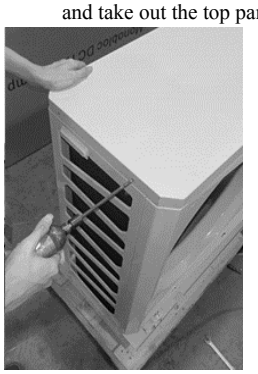
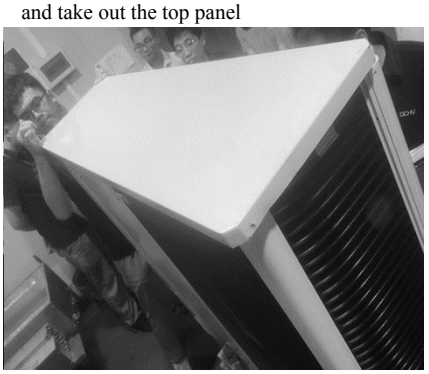
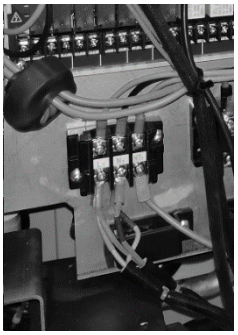
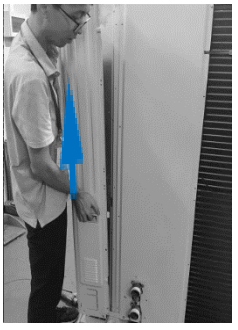
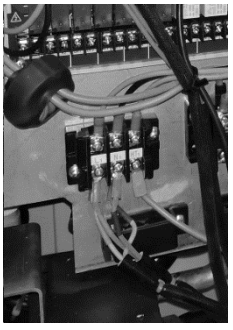
		
3	❖ Use the spanner to lose the 2 nuts of the water pump  	❖ Use the spanner to lose the 2 nuts of the water pump  
4	❖ Take out the water pump with hands after full release the nuts, please not the water flow direction symbol of the pump, it should be same as water flow  	❖ Take out the water pump with hands after full release the nuts, please not the water flow direction symbol of the pump, it should be same as water flow  
5	❖ Take out the cable out from the pump, then take the water pump full out from the unit  	❖ Take out the cable out from the pump, then take the water pump full out from the unit  

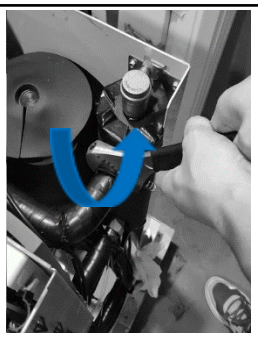
- **Water flow switch**

Steps	4-10kW	12-16kW
1	❖ Remove the screws of right panel 	❖ Remove the screws of the right panel  
2	❖ Hold the right panel and take it out 	❖ Hold the right panel and take it out 
3	❖ Use the screw to release the screws of the top panel, and take out the top panel  	❖ Use the spanner to lose the water flow switch, and then take it out from the water pipe (please not the sealed gasket should keep to seal)  
4	❖ Use the spanner to lose the water flow switch, and then take it out from the water pipe (please not the sealed gasket should keep to seal)  	❖ Use the screw to lose the water flow switch signal from PCB 

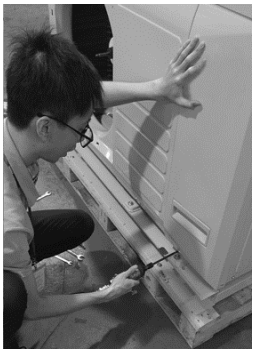
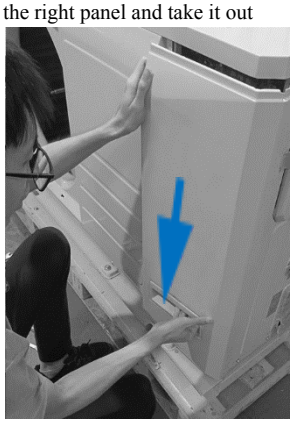
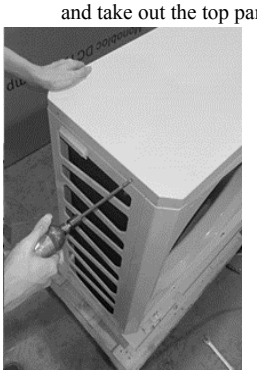
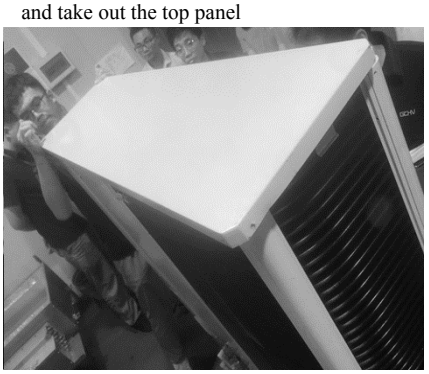
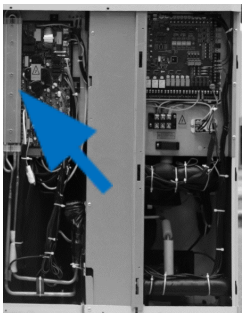
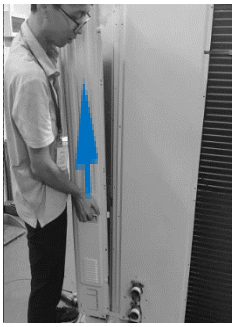
5	❖ Use the screw to lose the water flow switch signal from PCB 	

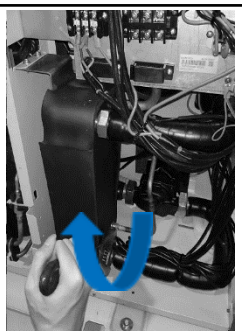
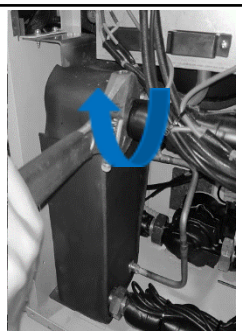
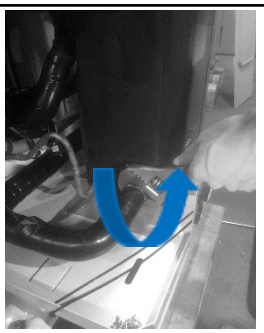
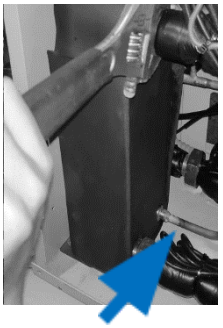
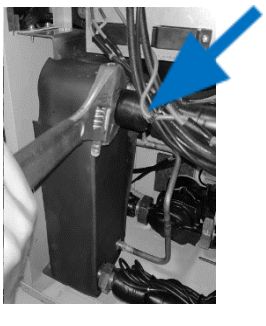
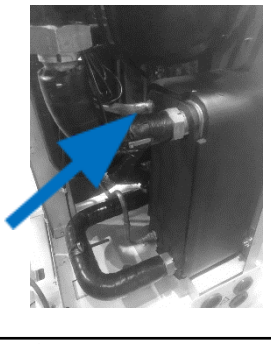
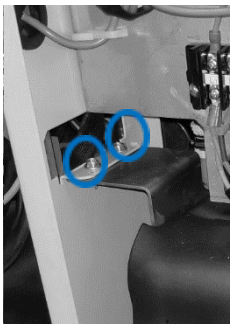
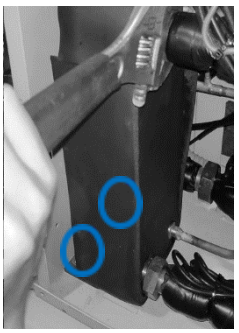
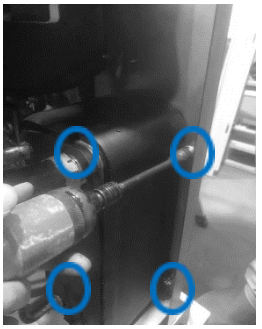
- **Standard electronic heater**

Steps	4-10kW	12-16kW
1	❖ Remove the screws of right panel 	❖ Remove the screws of the right panel  
2	❖ Hold the right panel and take it out 	❖ Hold the right panel and take it out 
3	❖ Use the screw to release the screws of the top panel, and take out the top panel  	❖ Use the screw to release the screws of the top panel, and take out the top panel 
4	❖ Use the screw to release the screws of right-back panel, and release the electronic heater power cable from terminal  	❖ Use the screw to release the screws of right-back panel, and release the electronic heater power cable from terminal  
5	❖ Use the spanner to lose the water pipe connection nuts	❖ Use the spanner to lose the water pipe connection nuts

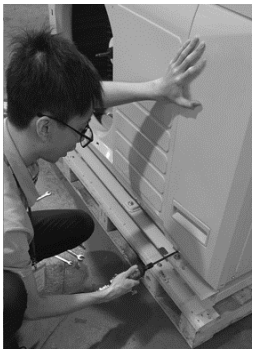
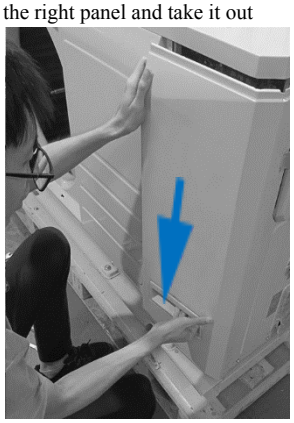
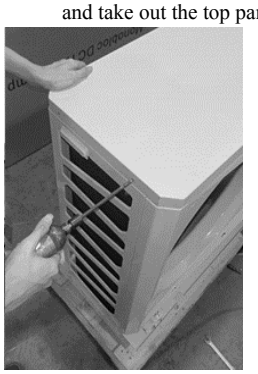
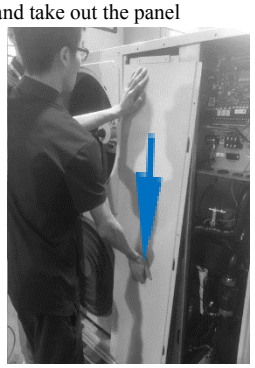
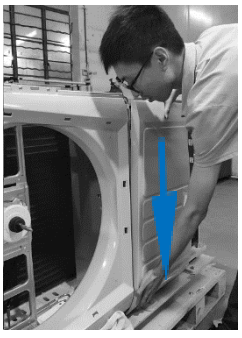
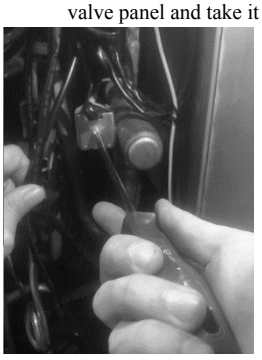
	 	 
6	❖ After release the water pipe nuts, remove the water pipe (Please take care about the sealed material which is needful) 	❖ After release the water pipe nuts, remove the water pipe (Please take care about the sealed material which is needful)  
7	❖ Use the screws to release the screws of electronic heater component from the back plate, then take it out. 	❖ Use the screws to release the screws of electronic heater component from the back plate, then take it out.  

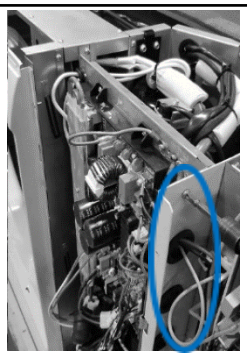
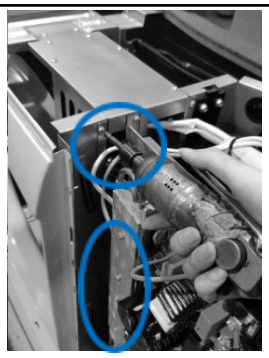
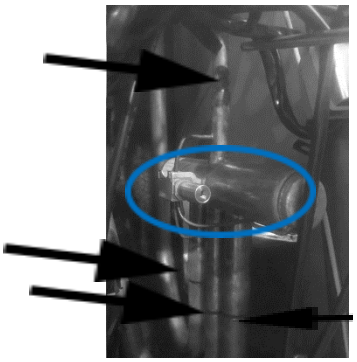
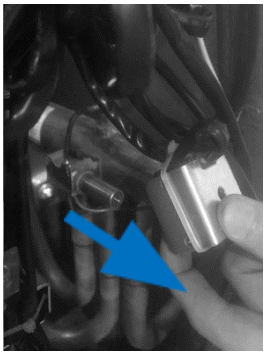
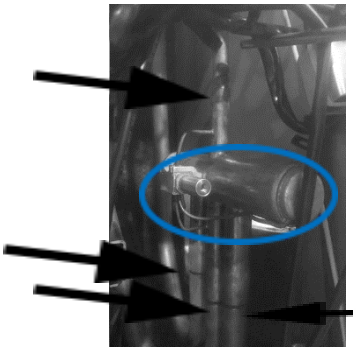
- **Brazed plate heat exchanger**

Steps	4-10kW	12-16kW
1	❖ Remove the screws of right panel 	❖ Remove the screws of the right panel  
2	❖ Hold the right panel and take it out 	❖ Hold the right panel and take it out 
3	❖ Use the screw to release the screws of the top panel, and take out the top panel  	❖ Use the screw to release the screws of the top panel, and take out the top panel 
4	❖ Use the screw to release the screws of front septum, and take it out 	❖ Use the screw to release the screws of right-back panel and take it out 
5	❖ Use the spanner to lose the water pipe connection nuts of BPHE	❖ Use the spanner to lose the water pipe connection nuts of BPHE

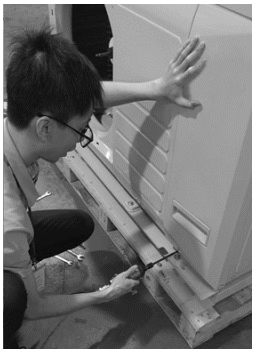
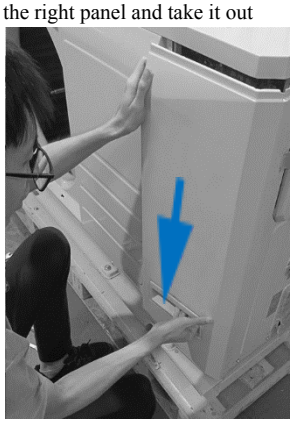
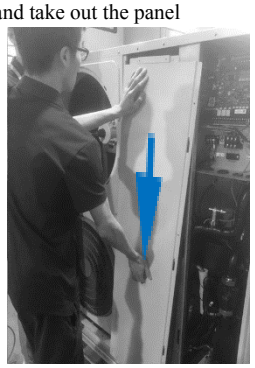
	 	 
6	❖ After release the water pipe nuts, use the welding tool to weld the refrigerant pipe of BPHE out (Please note that it must release the refrigerant before welding)  	❖ After release the water pipe nuts, use the welding tool to weld the refrigerant pipe of BPHE out (Please note that it must release the refrigerant before welding)  
7	❖ Use the screws to release the 4 screws of BPHE holder, then take it out.  	❖ Use the hexagonal socket wrench to release the 4 hexagonal screws of BPHE holder, then take it out. 

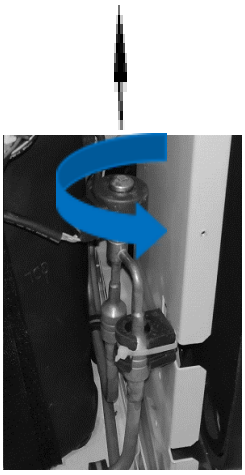
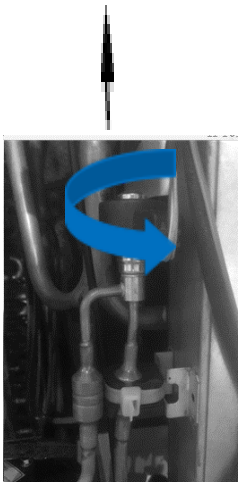
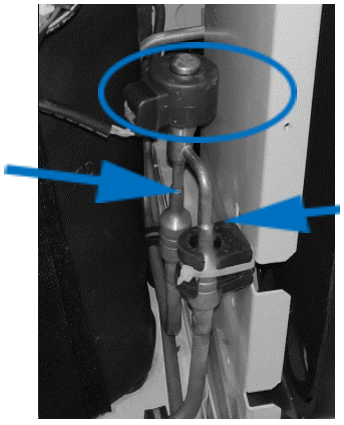
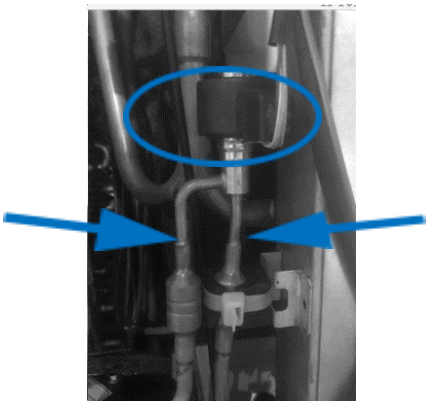
- **4-way valve**

Steps	4-10kW	12-16kW
1	❖ Remove the screws of right panel 	❖ Remove the screws of the right panel  
2	❖ Hold the right panel and take it out 	❖ Hold the right panel and take it out 
3	❖ Use the screw to release the screws of the top panel, and take out the top panel  	❖ Use the screw to release the screws of the mid-front panel, and take out the panel 
4	❖ Use the screw to release the screws of mid-front panel, and take it out 	❖ Use the screw to release the screws of coil of 4-way valve panel and take it out  
5	❖ Use the screw to release the screws of refrigerant cool sink, and ODU electronic box, then take the ODU electronic out	❖ Use the welding tool to weld the 4-way valve off (Before welding, it must full release the refrigerant out, and during the welding, it must cool the 4-way valve

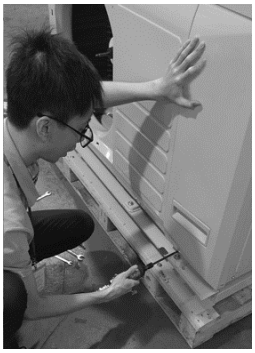
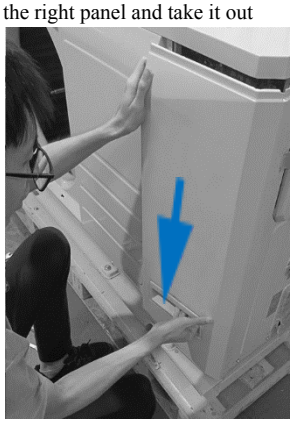
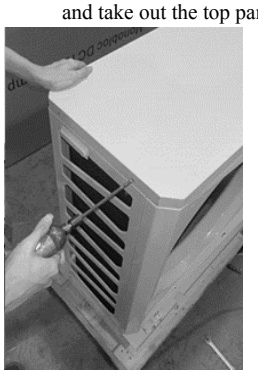
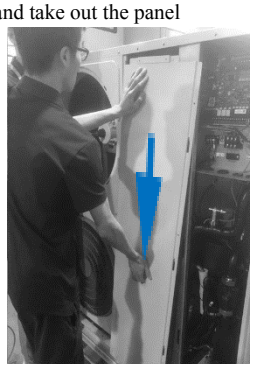
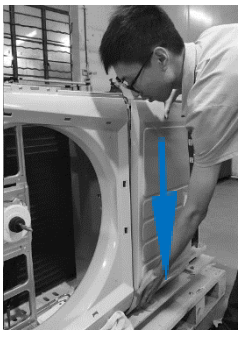
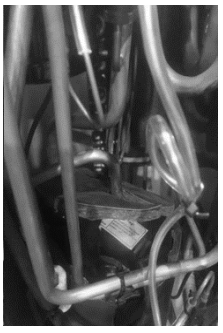
	 	body efficiently with wet fabric)  Cool the body
6	❖ Use the screw to release the screws of coil of 4-way valve panel and take it out  	
7	❖ Use the welding tool to weld the 4-way valve off (Before welding, it must full release the refrigerant out, and during the welding, it must cool the 4-way valve body efficiently with wet fabric)  Cool the body	

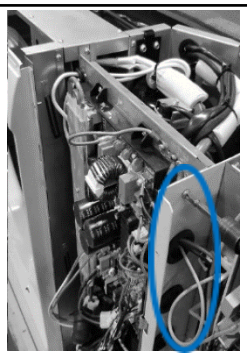
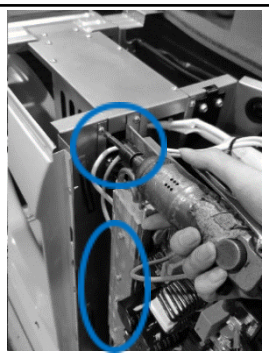
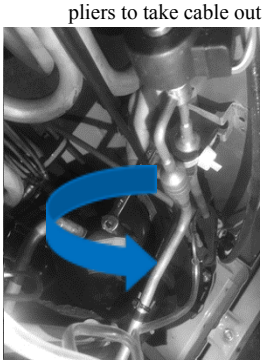
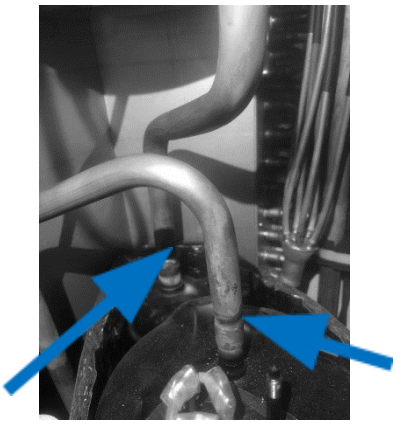
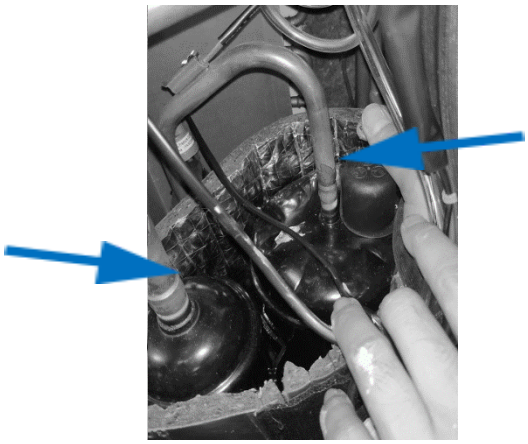
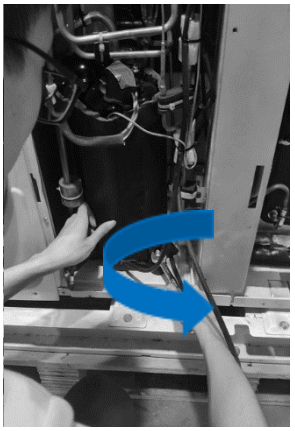
- **Electronic expansion valve**

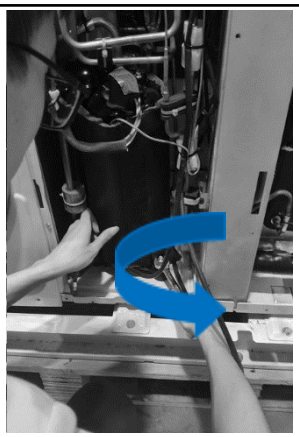
Steps	4-10kW	12-16kW
1	❖ Remove the screws of right panel 	❖ Remove the screws of the right panel  
2	❖ Hold the right panel and take it out 	❖ Hold the right panel and take it out 
3	❖ Use the screw to release the screws of mid-front panel, and take it out 	❖ Use the screw to release the screws of the mid-front panel, and take out the panel 
4	❖ Remove the coil of electronic expansion valve, and take it out	❖ Remove the coil of electronic expansion valve, and take it out

		
5	❖ Use the welding tool to weld the electronic expansion valve off (Before welding, it must full release the refrigerant out, and during the welding, it must cool the 4-way valve body efficiently with wet fabric)  Cool the body	❖ Use the welding tool to weld the electronic expansion valve off (Before welding, it must full release the refrigerant out, and during the welding, it must cool the 4-way valve body efficiently with wet fabric) 

- **Compressor**

Steps	4-10kW	12-16kW
1	❖ Remove the screws of right panel 	❖ Remove the screws of the right panel  
2	❖ Hold the right panel and take it out 	❖ Hold the right panel and take it out 
3	❖ Use the screw to release the screws of the top panel, and take out the top panel  	❖ Use the screw to release the screws of the mid-front panel, and take out the panel 
4	❖ Use the screw to release the screws of mid-front panel, and take it out 	❖ Remove the top cover of the insulation of compressor, and take it out 
5	❖ Use the screw to release the screws of refrigerant cool sink, and ODU electronic box, then take the ODU electronic out	❖ use the spanner to release the screw of the terminal cover of compressor, then remove it, after that, use the

	 	pliers to take cable out  
6	❖ Remove the top cover of the insulation of compressor, and use the spanner to release the screw of the terminal cover of compressor, then remove it, after that, use the pliers to take cable out  	❖ Use the welding tool to weld the suction pipe and discharged pipe of compressor (Before welding, it must full release the refrigerant out) 
7	❖ Use the welding tool to weld the suction pipe and discharged pipe of compressor (Before welding, it must full release the refrigerant out) 	❖ Use the spanner to release the 3 nuts of compressor, then take the compressor out 
8	❖ Use the spanner to release the 3 nuts of compressor, then take the compressor out	

7. WUI operation

7.1.Presentation

This WUI (wall-mounted user interface) is used to control the operation of unit and configuration of the system. It can also be used to check the system running parameter and display the status of system via the LCD screen.

The WUI communicates with the IDU (Indoor unit) board with certain protocol, and detect the communication status at real time. IDU board will give communication fault alarm once it loses communication. But it will not give alarm if you did not connect the WUI to the IDU board when power on the system. So please note that if the WUI is not necessary, please do not connect it before power on the system.

The WUI will off its screen for energy saving without pressing for 35s (except the technical parameter configuration), and will wake up once you press any button.

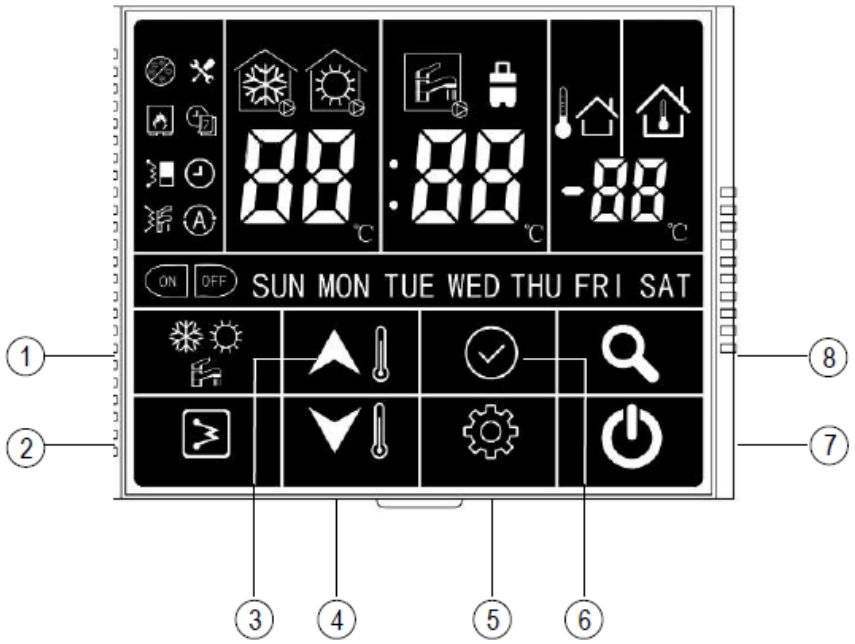
Application of WUI:

1 Power supply: Take power supply from IDU board (12V power supply);
2 Working temperature range: -30℃~50℃;
3 Working humidity range: RH10%~95%

WUI can be installed inside your home or on the unit itself.
This manual provides guidelines on how to use this interface effectively.
If you have any questions regarding the display and its configuration, please contact your installer for more information.

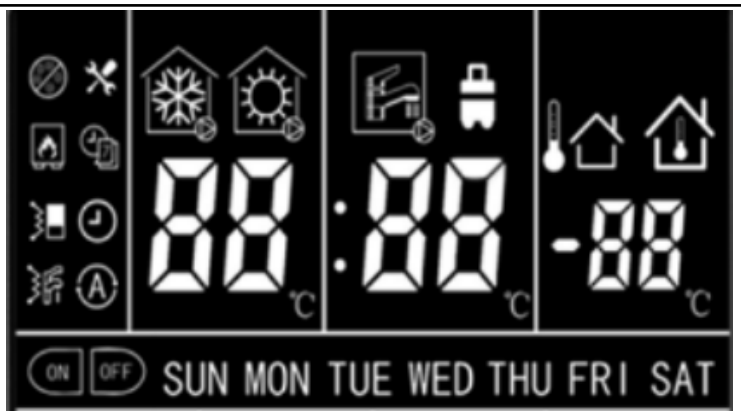
a) Interface introduction

- Button overview



Definition	Description
1 Mode button	Used to change the running mode
2 Electric heater button	Used to manual on/off the DHW EHs manually
3 Up button	Used to change the value of parameter or turn page during system configuration or commissioning
4 Down button	Used to change the value of parameter or turn page during system configuration or commissioning
5 Setting button	Used to set user parameter configuration or technical parameter configuration
6 Confirm button	Used to confirm the current setting
7 ON/OFF button	Used to turn on/off the unit
8 Query button	Used to query the operation parameter or configuration parameter

- Icon overview



	Non-operating cooling mode		Non-operating heating mode		Non-operating DHW mode
	Operating cooling mode		Operating heating mode		Operating DHW mode
	Anti-frozen protection		Main water loop EHs		DHW EHs
	External heat source (boiler)		Weekly timer		Clock
	Timer on		Timer off		Alarm
	Air purge mode		OTA (water setpoint control)		IAT (air setpoint control)
	LWT/time display (hour)/alarm		DHW temp./time display (minute)		IAT/OAT (OAT is reserved)
LED display (Left)		LED display (Middle)		LED display (Right)	
SUN MON TUE WED THU FRI SAT	Days of week		Constant light: Eco mode Flash: Away mode		

Please note that the home screen display may vary depending on unit configuration and screen setting.

b) Button introduction

This WUI has 8 buttons for the setpoint control, configuration, parameter check, etc. Detail of each button is as below table:

 ON/OFF	• Press this button to turn on and turn off the unit.
 Confirm	• Press this button to confirm the setting to exit interface of parameter setting or query.
 Mode	• Press this button to change the mode: cooling-heating-cooling. • Press and hold this button to active the anti-legionella mode manually.
 Query	• Press this button to check the configuration and running parameters. • Refer to the section 3, parameter and status check for details.
 EHs	• While operating heating mode, press this button to activate/deactivate the main water loop EHs manually. • While operating the DHW mode, press this button to activate/deactivate the DHW EHs manually. • Press and hold this button to start the force-defrosting, and WUI will display “dF” for 5s.
 Up  Down	1 Temperature setting • While in standby mode, first time press this button to change the setting value of LWT, press the confirm button or wait for 5s without pressing any button to DHW temperature setting. • While operating cooling/heating mode, first time press this button to change the setting value of LWT, press the confirm button or wait for 5s without pressing any button to DHW temperature setting. • While operating DHW mode, first time press this button to change the setting temperature of DHW, press the confirm button or wait for 5s without pressing any button to setting value of LWT. 2 Time correction and timer setting • Refer to details of configuration.
 Setting	• User parameter configuration, please refer to configuration section. • Technical parameter configuration, please refer to configuration section.

7.2.User operation

a) Clock setting

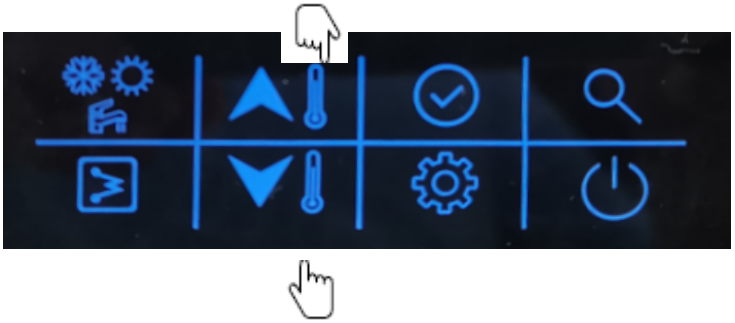
Before using the WUI, it is necessary to set the time and day of the controller. Please follow below steps to set the correct clock:

1 Press the “setting” button, then press “confirm” button to enter day setting；the day is flashing at this moment.

2 Then press “up” or “down” button to change the day if necessary;

3 After day stetting, press the “confirm” button er hour setting, the hour is flashing at this moment.

4 Then press “up” or “down” button to set the correct time in hour;



5 After hour stetting, press the “confirm” button to enter minute setting, the minute is flashing at this moment.

6 Then press “up” or “down” button to set the correct time in minute;

7 Press “confirm” button to confirm and exit setting. You can also press “setting” button to go to next parameter.（Refer the user parameter configuration for the full parameters setting）

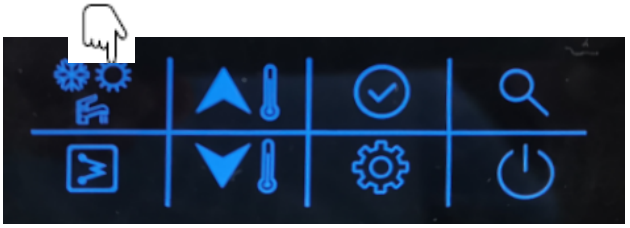
Example: Friday, 3:05:31

b) ON-OFF setting

Press this button to turn on and turn off the unit. And the mode icon is lighting at this moment.

c) Mode setting

Press this button to change the mode: cooling-heating-cooling.



Example:

Mode	Cooling	Mode heating	Heating
Occupancy	Home	Occupancy	Home
Temp. control	Water setpoint control	Temp. control	Water setpoint control
Setpoint of LWT	17℃	Setpoint of LWT	18℃
Setpoint of DHW	25℃	Setpoint of DHW	25℃

d) Current setpoint setting

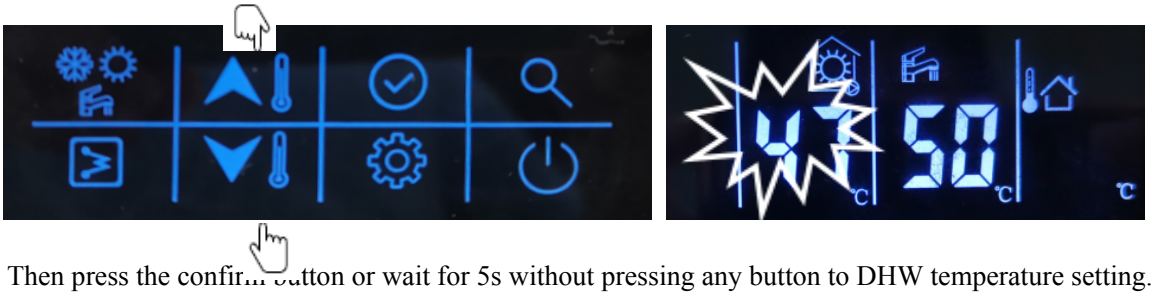
Here are two setpoint control: (Refer to the technical parameter configuration, item 1 for details setting)

- Water setpoint control; the unit is controlled by water setpoint;
- Air setpoint control: the unit is controlled by the air setpoint, and it requests to install the WUI into the room. There is an IAT sensor built inside the WUI to detect the room temperature.

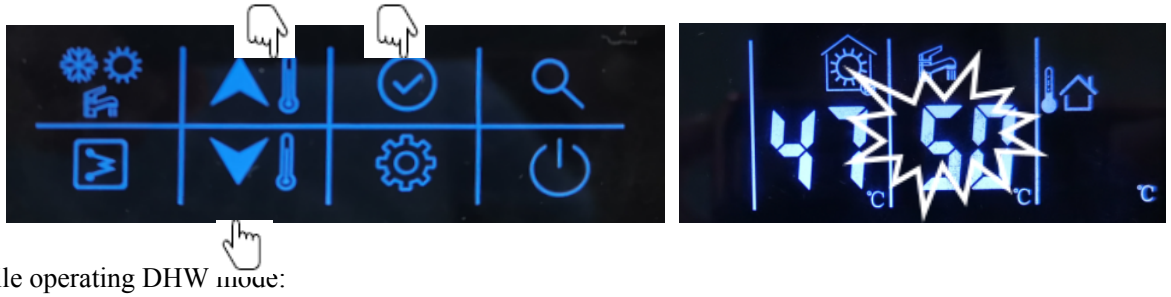
Here are the steps to change setting of water setpoint control:

1 While in standby mode or operating cooling/heating mode:

i. First time press “up” or “down” button to change the setting value of LWT;

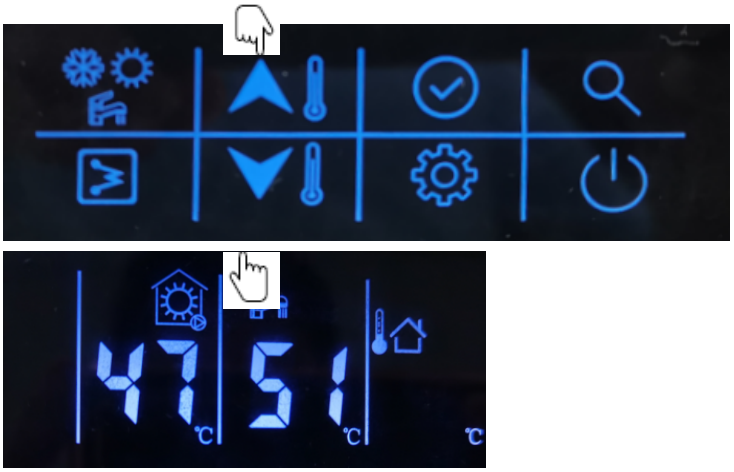


ii. Then press the confirm button or wait for 5s without pressing any button to DHW temperature setting. Then press “up” or “down” button to change the setting value of DHW.



2 While operating DHW mode:

i. First time press “up” or “down” button to change the setting temperature of DHW;



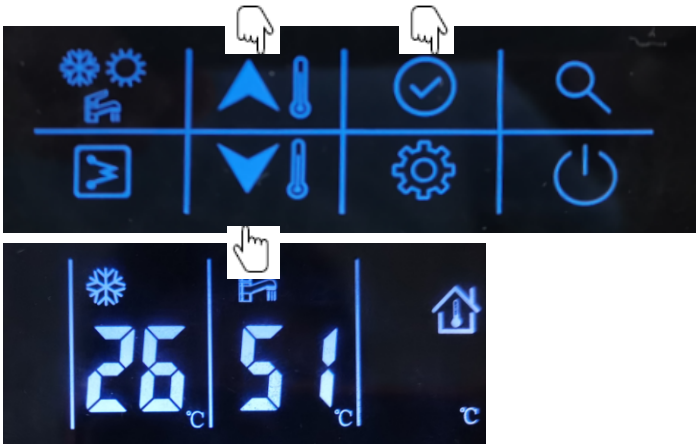
ii. Press the confirm button or wait for 5s without pressing any button to setting value of LWT. Then press “up” or “down” button to change the setting value of LWT.

Here are the steps to change setting of air setpoint control:

1 While in standby mode or operating cooling/heating mode:

i. First time press “up” or “down” button to change the setting value of air setpoint;

ii. Then press the confirm button or wait for 5s without pressing any button to DHW temperature setting. Then press “up” or “down” button to change the setting value of DHW.



2 While operating DHW mode:

i. First time press “up” or “down” button to change the setting temperature of DHW;

ii. press the confirm button or wait for 5s without pressing any button to setting value of LWT. Then press “up” or “down” button to change the setting value of air setpoint.

e) Home/away/eco setting

To optimize energy efficiency of the building, you can select the occupancy mode manually according to following steps. Each occupancy mode is associated with a pre-defined temperature range.

1 Press the “setting” button to item 5: Occupancy mode select

2 Press “up” or “down” button to change the value. (0-Home; 1-Eco; 2-Away)

3 Then press “confirm” button to confirm and exit user setting or you can also press “setting” button to go to next item.

(Refer to the user parameter configuration for the full parameters setting)

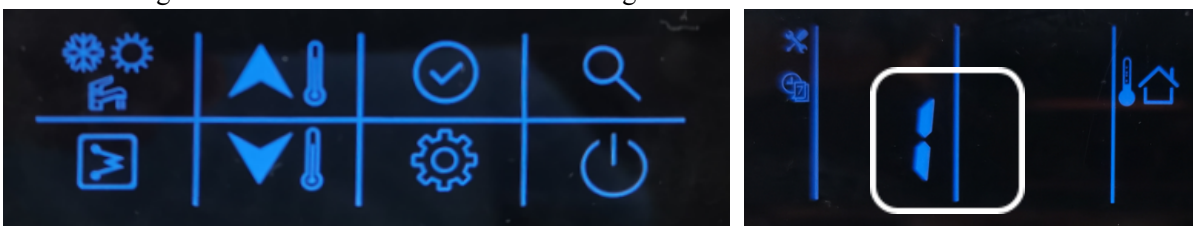
Example: Eco mode:

 This coin is lighting after set the eco mode.

f) DHW schedule setting

This schedule is used to set the operating of DHW mode automatically according to time schedule. Please follow below steps to set the DHW schedule:

1 Press the “setting” button to item 1: DHW schedule setting

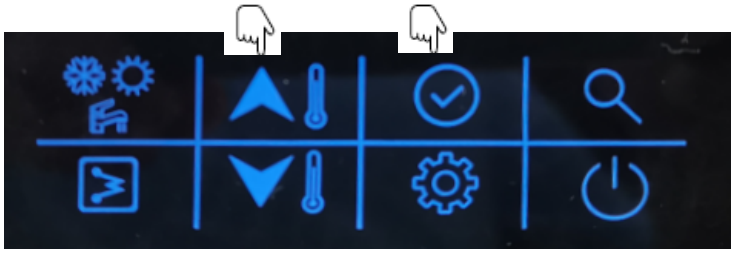


2 Press and hold the “confirm” button, the icon “on” will be flashing, then press the “confirm” button to confirm, the icon “on” will be constant lighting;

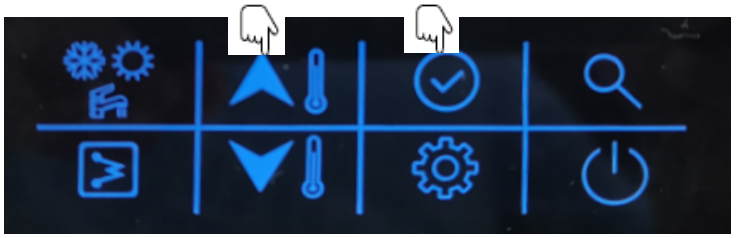
3 Press and hold the “down” button to enter day setting, then press “up” or “down” button to select the day, press the “confirm” button to confirm day setting, after that, the icon of that day will be constant lighting;

4 Press and hold the “down” button to enter hour setting, then press “up” or “down” button to select the time in hour, press the “confirm” button to confirm;

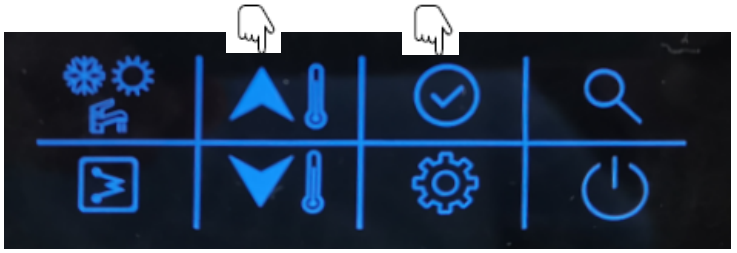
5 Press and hold “down” button to enter minute setting, then press “up” or “down” button to select the time in minute, press the “confirm” button to confirm;




6 Press and hold “dov ɔutton to set the timer off, then press the “down” button to enter hour setting, then press “up” or “down” button to select the time in hour, press the “confirm” button to confirm;




7 Press and hold “dowı ıtton to enter minute setting, then press “up” or “down” button to select the time in minute, press the “confirm” button to confirm;




8 Press and hold “conf button to confirm and exit user setting. You can also press “setting” button to go to next item.

(Refer to the user parameter configuration for the full parameters setting)

Example:

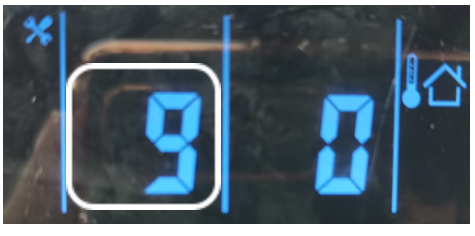
The unit will operate the DHW mode at 22:00 from Monday to Friday, and will exit DHW mode automatically at 6:00 from Tuesday to Saturday.

Schedule of DHW mode							
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
	√	√	√	√	√	×	×
Time on	22:00	22:00	22:00	22:00	22:00	22:00	22:00
Time off	6:00	6:00	6:00	6:00	6:00	6:00	6:00

g) WUI button lock setting

Used to lock the button of WUI in case of touching by mistake; and double press “setting” button to unlock.

1 Press the “setting” button to item 9: WUI button lock

2 Press the “up” or “down” button to set the value (0-unlock; 1-lock)

3 Then press “confirm” button to confirm and exit user setting or you can also press “setting” button to go to next item.

(Refer to the user parameter configuration for the full parameters setting)

7.3.Configuration

This WUI can be used to configurate the system setting during the installation and operation. Here enclosed two configuration sections: user parameter configuration and technical parameter configuration, please check the details in a) & b).

a) User parameter configuration

Press the "setting" button to go into the user parameter configuration interface, and press this button to page down the setting item from 0-9 as circuit. Used the "up" or "down" button to change the value of each item.

Details of the user parameter configuration table is as below: (The No. in below table will be displayed in the left LED tube except "0")

No.	Item	Description
0	Clock setting	1 Press the "setting" button, then press "confirm" button to enter day setting, then press "up" or "down" button to change the day if necessary; 2 After day stetting, press the "confirm" button to enter hour setting, press "up" or "down" button to set the correct time in hour; 3 After hour stetting, press the "confirm" button to enter minute setting, press "up" or "down" button to set the correct time in minute; 4 Press "confirm" button to confirm and exit clock setting. You can also press "setting" button to go to next parameter.
1	Schedule of DHW	1 Press and hold the "confirm" button, the icon "on" will be flashing, then press the "confirm" button to confirm, the icon "on" will be constant lighting; 2 Press and hold the "down" button to enter day setting, then press "up" or "down" button to select the day, press the "confirm" button to confirm day setting, after that, the icon of that day will be constant lighting; 3 Press and hold the "down" button to enter hour setting, then press "up" or "down" button to select the time in hour, press the "confirm" button to confirm; 4 Press and hold "down" button to enter minute setting, then press "up" or "down" button to select the time in minute, press the "confirm" button to confirm; 5 Press and hold "down" button to set the timer off, then press the "down" button to enter hour setting, then press "up" or "down" button to select the time in hour, press the "confirm" button to confirm; 6 Press and hold "down" button to enter minute setting, then press "up" or "down" button to select the time in minute, press the "confirm" button to confirm; 7 Press and hold "confirm" button to confirm and exit user setting. You can also press "setting" button to go to next item.
2	Power memory setting	This is used to record the setting once power is shutdown, and system will recovery the previous status once power come back 1 Press "up" or "down" button to set the value; 0- Without power memory; 1- With power memory (default)
3	WIFI statue	Reserved
4	Air purge setting	1 Press the "up" or "down" button to set the value; 0- Not start air purge mode 1- Start air purge mode If choose 0, then press the "setting" button to go to next item; If choose 1, then press the "confirm" button to exit the setting and unit will start the air purge mode; during the air purge mode, WUI will be displayed "PA", and only the "ON/OFF" button are valid to exit this mode.
5	Occupancy mode setting	1 Press "up" or "down" button to set the value; 2 Then press "confirm" button to confirm and exit user setting or you can also press "setting" button to go to next item. 0- Home

		1- Eco 2- Away
6	Night mode setting	This is used to setting the night mode for low noise during night-time. Press “up” or “down” button to set the value; 0- Without night mode 1- With night mode If choose 0, press “confirm” button to confirm and exit user setting or you can also press “setting” button to go to next item; If choose 1, then follow as below: 1 Press “confirm” button to set the start timer setting, then press “up” or “down” button to set time in hour; 2 Press “confirm” button to enter minute setting, then press “up” or “down” button to set time in minute; 3 Press the “confirm” button to enter the stop timer setting, then press “up” or “down” button to set time in hour; 4 Press “confirm” button to enter minute setting, then press “up” or “down” button to set time in minute; 5 Then press “confirm” button to confirm and exit user setting or you can also press “setting” button to go to next item.
7	Anti-legionella temperature setting	Press the “up” or “down” button to set the value; Temperature range: 60-70℃, default as 60℃.
8	Anti-legionella timer start	1 Press and hold “confirm” button to enter day setting, press “down” button to set the day, then press the “confirm” button to confirm, after that, the icon of the day will be constant lighting; 2 Press and hold the “down” button to enter hour setting, then press “up” or “down” button to select the time in hour, press the “confirm” button to confirm; 3 Press and hold “down” button to enter minute setting, then press “up” or “down” button to select the time in minute, press the “confirm” button to confirm; 4 Press and hold “confirm” button to confirm and exit user setting or you can also press “setting” button to go to next item.
9	Lock of WUI	Used to lock the button of WUI in order to child touch for mistake; double press the “setting” button to unlock. 1 Press the “up” or “down” button to set the value; 2 Then press “confirm” button to confirm and exit user setting or you can also press “setting” button to go to next item. 0- Without lock 1- With lock

b) Technical parameter configuration

Press and hold the “setting” button to go into the technical parameter configuration interface, and press “setting” button to turn down the setting item from 0-22. You can use “up” or “down” button to change the value of each item.

Details of the user parameter configuration table as below:

No.	Item	Description
0	Control setpoint type	0- Water setpoint control 1- Air setpoint control
1	Controller selection	0- WUI (Wired controller) 1- Dry contact
2	Back up function	0- Main water loop EHs + DHW EHs + boiler 1- Main water loop EHs + DHW EHs 2- DHW EHs + boiler 3- Main water loop EHs + boiler 4- DHW EHs only 5- Boiler only

		6- Main water loop EHs only 7- Non back up
3	Climate curve selection	0- Non climate curve 1- Climate curve After set the 1 with climate curve, please follow the below steps: 1 After choose 1, enter heating climate setting, press “up” or “down” button to choose the climate curve 1-13, if choose 1-12, press “confirm” button, then go to step ③; if choose 13, press “confirm” button, then go to step ②; 2 Customized heating curve value input: • Press “up” or “down” to set the value of MinOAT; • Then press “confirm” button to set MaxOAT, press “up” or “down” to set the value of MaxOAT; • Then press “confirm” button to set MinWSP, press “up” or “down” to set the value of MinWSP; • Then press “confirm” button to set MaxWSP, press “up” or “down” to set the value of MaxWSP; • Press the “confirm” button to step ③; 3 Press “up” or “down” button to set the heating climate offset from -5~5℃, default as 0℃; then press “confirm” button to go to step ④; 4 Enter cooling climate setting, press “up” or “down” button to choose the climate curve 1-3, if choose 1-2, press “confirm” button, then go to step ⑥; if choose 3, press “confirm” button to go to step ⑤; 5 Customized heating curve value input: • Press “up” or “down” to set the value of MinOAT; • Then press “confirm” button to set MaxOAT, press “up” or “down” to set the value of MaxOAT; • Then press “confirm” button to set MinWSP, press “up” or “down” to set the value of MinWSP; • Then press “confirm” button to set MaxWSP, press “up” or “down” to set the value of MaxWSP; • Press the “confirm” button to go to step ⑥; 6 Press the “up” or “down” button to set the heating climate offset from -5~5℃, default as 0℃; then press “confirm” button to confirm and exit or “setting” button to go to next item
4	Capacity test setting	Reserved
5	3-way valve type select	0- Normal open 1- Normal closed
6	DI5	0- Disable 1- Power limitation (night mode) 2- Load-shed 3- DHW request 4- Anti-legionella request 5- DHW priority
7	DI6	
8	DI7	
9	DI8	
10	DO5	9- Disable 10- Unit in alarm 11- Unit in standby 12- Unit running 13- Unit in cooling 14- Unit in heating 15- Unit in DHW 16- Unit in defrost 17- Unit controlled by Modbus
11	DO7	

12	DO8	
13	Eco mode cooling setpoint offset	If choose air setpoint, it is air setpoint offset, otherwise is water setpoint offset 0~10℃, default as 2℃
14	Away mode cooling setpoint offset	If choose air setpoint, it is air setpoint offset, otherwise is water setpoint offset 0~10℃, default as 4℃
15	Eco mode heating setpoint offset	If choose air setpoint, it is air setpoint offset, otherwise is water setpoint offset -20~0℃, default as -2℃
16	Away mode heating setpoint offset	If choose air setpoint, it is air setpoint offset, otherwise is water setpoint offset -20~0℃, default as -4℃
17	Eco mode DHW setpoint offset	-10~0℃, default as -5℃
18	Minimum OAT for heating	-26~10℃, default as -26℃
19	Booster OAT Threshold	-10~0℃, default as -5℃
20	Heat pump warmup time	0~120min, default 60min
21	Booster Delta temperature	1~20℃, default 10℃
22	Second zone setting	Reserved

Note: All the setting will only be changed by reset, never be cleaned by repower.

7.4.Parameter and statue checking

This WUI can be used to check the system status and running parameter. Press the “query” button to go into the parameter query interface, and press “confirm” button or without pressing any button for more than 10s to exit the parameter query interface.

After going into query interface, press “up” or “down” button to check the parameters or status as follow table:

No.	Definition	Description
1	Setting temp.: Ts1	Display Ts1 during standby/cool/heat mode
2	Setting temp.: Ts2	Display Ts2 during DHW mode
3	Setting temp.: Ts3	Display Ts3 when it chooses the air setpoint control
4	Capacity of unit	HP*10, example: 10 means that unit is 1HP capacity
5	Target frequency	
6	Running frequency	
7	Water flow rate	m^3/h, feedback from inverter water pump
8	Capacity output	=1.163* (water flow rate) * [Tw_out – Tw_in] (kW)
9	T3 value	ODU coil temp.
10	T4 value	OAT
11	TP value	Discharged temp.
12	T7 value	Temp. of refrigerant for PCB cool
13	EVX opening degree	Actually value
14	ODU fan motor speed	
15	AC current	
16	AC voltage	
17	IPM temp. (T9)	Compressor module temp.
18	Limitation reason of compressor frequency	0: no limitation; 1: T3B temp. limitation (reserved); 2: OAT limitation; 4: Discharged temp. limitation; 8: Voltage limitation 16: Current limitation 32: IPM temp’ limitation 64: Night mode limitation 128: LWT limitation If occur multi limitation, display value=sum of all limitation value
19	Limitation reason of compressor frequency	0: no limitation; 1: Limitation of different value between EWT&LWT
20	Tw_in value	EWT
21	Tw_out value	LWT of BPHE
22	T1 value	LWT of unit (after the EHs inside the unit)
23	T6 value	IAT, the sensor built inside the wired controller
24	T5 value	DHW value
25	Tw-2 value	Second zone EWT value when set this function (reserved)
26	T1B value	External heat source (boiler) LWT value
27	Capacity demand	
28	Inv. Pump speed	
29	Last alarm	
30	Penult alarm	
31	Antepenultimate alarm	
32	Current protection	P0-P3: check the detail in alarm table
33	Detail of P6 alarm in function board	L-: no alarm; L0: IPM or IGBT over current; L1: lack of phase L2: Compressor losing speed fault; L3: DC voltage is too low to protect L4: Fan motor over current protection

		L5: Fan motor lack of phase; L6: Fan motor zero speed fault L7: PFC fault L8: DC voltage is too high to protect L9: Compressor zero speed fault LA: PWM synchronization fault Lb: MCE fault Lc: Compressor over current protection Ld: EEPROM data is wrong LE: Compressor fail to start; LF: fan motor losing speed fault
34	SV2 statue of water loop	2-way valve which is used to change the cool/heat water between fan coil and radiator (OFF-0; ON-1)
35	SV3 statue of water loop	DHW 3-way valve
36	Main water loop EHs statue	Standard equip with one EH, another two are field supply (OFF-0; ON-1)
37	DHW EHs	OFF-0; ON-1
38	External heat source statue	OFF-0; ON-1
39	P_o	External main water loop pump (OFF-0; ON-1)
40	P_p	Second zone water loop pump (OFF-0; ON-1)
41	P_m	External heat source water loop pump (OFF-0; ON-1)
42	Anti-frozen heater statue	OFF-0; ON-1
43	Chassis heater statue	OFF-0; ON-1
44	Crank heater statue	OFF-0; ON-1
45	SV2 statue of refrigerant system	FCU water loop valve, to cut off water supply to radiator/space heater coil in cool mode (OFF-0; ON-1)

7.5.Error code of WUI

This WUI is also worked as the detector to display the alarm of the unit as follow table:
Example: E1

: This icon will be lighting once alarm happen.

Alarm code	Description
E0	Water flow switch fault
E1	Communication fault between IDU board and ODU board
E2	LWT of unit sensor (T1 sensor) fault
E3	Gas refrigerant temp sensor (T2 sensor) fault (reserved)
E4	Liquid refrigerant temp sensor (T2B sensor) fault (reserved)
E5	ODU (module part) alarm
E6	DHW sensor (T7 sensor) fault
E7	LWT sensor (T_ in sensor) fault
E8	LWT of BPHE sensor (T_ out sensor) fault
E9	Communication fault between WUI and function board
EA	Second zone LWT sensor (Tw_2 sensor) fault (Only valid after setting second zone function, reserved)
Eb	External heat source LWT sensor (T1B sensor) fault (Only valid after set the external heat source – boiler)
Ec	Reserved
Ed	Reserved
EE	Reserved
EF	Mode conflict (reserved)
P0	EEPROM fault
P1	Protection of huge different values between EWT and LWT
P2	Protection of lack of water
P3	Protection of abnormal different value between EWT and LWT

Note:

- When it is displayed the E5-ODU alarm, that needs to check the alarm on the IDU PCB for more detail.
- P0-P3 will only be displayed after it occurs 3 times in 1h, and can’t resume unless repower the system.

Annex I

Resistance table of sensors

- Sensor except discharged temperature sensor (5K)

Temp. (℃)	R-Min (KΩ)	R-Std (KΩ)	R-Max (KΩ)	Voltage (V)5V、4.3K		Temp. (℃) R-Min	R-Min (KΩ)	R-Std (KΩ)	R-Max (KΩ)	Voltage (V)5V、4.3K	
				up	down					up	down
-30	51.159	52.84	54.521	0.38	***4.62***	26	4.771	4.821	4.871	2.36	***2.64***
-29	48.659	50.232	51.805	0.39	***4.61***	27	4.599	4.649	4.699	2.4	***2.6***
-28	46.299	47.772	49.248	0.41	***4.59***	28	4.434	4.485	4.535	2.45	***2.55***
-27	44.071	45.452	46.832	0.43	***4.57***	29	4.277	4.327	4.377	2.49	***2.51***
-26	41.968	43.261	44.554	0.45	***4.55***	30	4.126	4.176	4.226	2.54	***2.46***
-25	39.981	41.193	42.405	0.47	***4.53***	31	3.981	4.031	4.081	2.58	***2.42***
-24	38.102	39.238	40.375	0.49	***4.51***	32	3.842	3.892	3.942	2.62	***2.38***
-23	36.326	37.391	38.457	0.52	***4.48***	33	3.709	3.759	3.808	2.67	***2.34***
-22	34.646	35.645	36.645	0.54	***4.46***	34	3.581	3.631	3.68	2.71	***2.29***
-21	33.055	33.993	34.931	0.56	***4.44***	35	3.495	3.508	3.557	2.77	***2.23***
-20	31.55	32.43	33.31	0.59	***4.41***	36	3.34	3.389	3.438	2.8	***2.2***
-19	30.097	30.923	31.748	0.61	***4.39***	37	3.226	3.275	3.323	2.84	***2.16***
-18	28.722	29.497	30.271	0.64	***4.36***	38	3.117	3.165	3.213	2.88	***2.12***
-17	27.42	28.147	28.873	0.66	***4.34***	39	3.012	3.06	3.107	2.92	***2.08***
-16	26.186	26.868	27.55	0.69	***4.31***	40	2.912	2.959	3.006	2.96	***2.04***
-15	**25.017**	**25.657**	**26.297**	**0.72**	***4.28***	41	2.815	2.861	2.908	3	***2***
-14	23.908	24.509	25.11	0.75	***4.25***	42	2.722	2.768	2.814	3.04	***1.96***
-13	22.857	23.421	23.985	0.78	***4.22***	43	2.633	2.678	2.724	3.08	***1.92***
-12	21.859	22.389	22.918	0.81	***4.19***	44	2.547	2.592	2.637	3.12	***1.88***
-11	20.912	21.409	21.907	0.84	***4.16***	45	2.464	2.509	2.553	3.16	***1.84***
-10	20.013	20.48	20.917	0.87	***4.13***	46	2.385	2.429	2.473	3.2	***1.8***
-9	19.116	19.584	20.023	0.9	***4.1***	47	2.308	2.352	2.395	3.23	***1.77***
-8	18.322	18.734	19.146	0.93	***4.07***	48	2.235	2.278	2.231	3.27	***1.73***
-7	17.54	17.927	18.314	0.97	***4.03***	49	2.164	2.207	2.249	3.3	***1.7***
-6	16.797	17.16	17.524	1	***4***	50	2.096	2.138	2.18	3.34	***1.66***
-5	16.09	16.431	16.733	1.04	***3.96***	51	2.03	2.071	2.112	3.37	***1.63***
-4	15.418	15.739	16.06	1.07	***3.93***	52	1.966	2.006	2.047	3.41	***1.59***
-3	14.779	15.08	15.382	1.11	***3.89***	53	1.904	1.944	1.984	3.44	***1.54***
-2	14.17	14.454	14.737	1.15	***3.85***	54	1.844	1.884	1.923	3.48	***1.52***
-1	13.591	13.857	14.124	1.18	***3.82***	55	1.787	1.826	1.865	3.51	***1.49***
0	**13.04**	**13.29**	**13.54**	**1.22**	***3.78***	56	1.732	1.77	1.809	3.54	***1.46***
1	12.505	12.739	12.974	1.26	***3.74***	57	1.679	1.717	1.754	3.57	***1.43***
2	11.995	12.215	12.436	1.3	***3.7***	58	1.628	1.665	1.702	3.6	***1.4***
3	11.509	11.717	11.924	1.34	***3.66***	59	1.579	1.615	1.652	3.63	***1.37***

4	11.047	11.241	11.436	1.38	***3.62***		60	1.531	1.567	1.603	3.66	***1.34***
5	10.606	10.789	10.971	1.42	***3.58***		61	1.485	1.521	1.556	3.69	***1.31***
6	10.186	10.357	10.529	1.47	***3.53***		62	1.441	1.476	1.511	3.72	***1.28***
7	9.785	9.945	10.107	1.51	***3.49***		63	1.399	1.433	1.467	3.75	***1.25***
8	9.403	9.554	9.705	1.55	***3.45***		64	1.357	1.391	1.425	3.78	***1.22***
9	9.038	9.18	9.322	1.59	***3.41***		**65**	**1.318**	**1.351**	**1.384**	**3.8**	***1.2***
10	8.69	8.823	8.956	1.64	***3.36***		66	1.279	1.312	1.344	3.83	***1.17***
11	8.357	8.482	8.607	1.68	***3.32***		67	1.242	1.274	1.306	3.86	***1.14***
12	8.04	8.157	8.274	1.73	***3.27***		68	1.206	1.237	1.269	3.88	***1.12***
13	7.736	7.816	7.957	1.77	***3.23***		69	1.171	1.202	1.233	3.91	***1.09***
14	7.446	7.55	7.653	1.81	***3.19***		70	1.137	1.168	1.199	3.93	***1.07***
15	7.169	7.266	7.363	1.86	***3.14***		71	1.105	1.135	1.165	3.96	***1.04***
16	6.9	6.991	7.082	1.9	***3.1***		72	1.074	1.103	1.133	3.98	***1.02***
17	6.644	6.729	6.814	1.95	***3.05***		73	1.043	1.072	1.101	4	***1***
18	**6.398**	**6.478**	**6.558**	**1.99**	***3.01***		74	1.014	1.043	1.071	4.02	***0.98***
19	6.163	6.238	6.313	2.04	***2.96***		75	0.986	1.014	1.042	4.05	***0.95***
20	5.938	6.008	6.078	2.09	***2.91***		76	0.959	0.986	1.014	4.07	***0.93***
21	5.723	5.789	5.854	2.13	***2.87***		77	0.932	0.959	0.986	4.09	***0.91***
22	5.517	5.578	5.64	2.18	***2.82***		78	0.907	0.933	0.96	4.11	***0.89***
23	5.32	5.377	5.484	2.22	***2.78***		79	0.882	0.908	0.934	4.13	***0.87***
24	5.131	5.185	5.238	2.27	***2.73***		80	0.858	0.884	0.91	4.15	***0.85***
25	4.95	5	5.05	2.31	***2.69***		**3274 type sensor resistance table**					

❖ Discharged temperature sensor (50K)

T (°C)	R-min (KΩ)	R-nom (KΩ)	R-max (KΩ)	T (°C)	R-min (KΩ)	R-nom (KΩ)	R-max (KΩ)
0	157.7	161.2	164.7	56	14.16	14.48	14.81
1	150.2	153.4	156.7	57	13.65	13.96	14.28
2	142.9	145.9	148.9	58	13.15	13.46	13.77
3	136.1	138.9	141.7	59	12.69	12.99	13.30
4	129.7	132.3	134.9	60	12.23	12.53	12.83
5	123.6	126.0	128.4	61	11.80	12.09	12.39
6	117.8	120.0	122.3	62	11.39	11.67	11.96
7	112.2	114.3	116.4	63	10.98	11.26	11.54
8	107.1	109.0	111.0	64	10.60	10.87	11.15
9	102.1	103.9	105.7	65	10.23	10.50	10.77
10	97.42	99.08	100.8	66	9.880	10.14	10.41
11	92.97	94.51	96.06	67	9.537	9.792	10.05
12	88.74	90.17	91.61	68	9.211	9.460	9.715
13	84.73	86.05	87.38	69	8.897	9.141	9.391
14	80.92	82.14	83.37	70	8.595	8.834	9.078
15	77.29	78.42	79.56	71	8.306	8.539	8.778
16	73.84	74.89	75.95	72	8.028	8.256	8.490
17	70.57	71.54	72.51	73	7.759	7.983	8.212
18	67.46	68.35	69.25	74	7.501	7.720	7.944
19	64.49	65.32	66.15	75	7.254	7.468	7.687
20	61.68	62.44	63.20	76	7.016	7.225	7.440
21	59.00	59.70	60.40	77	6.786	6.991	7.201
22	56.44	57.09	57.74	78	6.565	6.765	6.971
23	54.02	54.61	55.20	79	6.352	6.548	6.749
24	51.70	52.25	52.80	80	6.147	6.339	6.536
25	49.50	50.00	50.50	81	5.950	6.138	6.331
26	47.37	47.87	48.37	82	5.761	5.944	6.133
27	45.34	45.84	46.34	83	5.578	5.757	5.942
28	43.41	43.91	44.41	84	5.401	5.577	5.758
29	41.59	42.08	42.57	85	5.231	5.403	5.580
30	39.84	40.33	40.82	86	5.069	5.237	5.410
31	38.18	38.66	39.15	87	4.912	5.076	5.245
32	36.59	37.07	37.55	88	4.760	4.921	5.087
33	35.07	35.55	36.03	89	4.615	4.772	4.934
34	33.64	34.11	34.58	90	4.474	4.628	4.787
35	32.27	32.73	33.20	91	4.338	4.489	4.645
36	30.95	31.41	31.87	92	4.207	4.354	4.506
37	29.70	30.15	30.61	93	4.081	4.225	4.374
38	28.50	28.95	29.40	94	3.958	4.099	4.245
39	27.37	27.81	28.25	95	3.840	3.978	4.121
40	26.29	26.72	27.16	96	3.726	3.861	4.001
41	25.24	25.67	26.10	97	3.616	3.748	3.885
42	24.25	24.67	25.09	98	3.509	3.639	3.773
43	23.31	23.72	24.14	99	3.407	3.534	3.665
44	22.41	22.81	23.22	100	3.308	3.432	3.560
45	21.53	21.93	22.33	101	3.212	3.333	3.459
46	20.71	21.10	21.50	102	3.119	3.238	3.361
47	19.92	20.30	20.69	103	3.030	3.146	3.267
48	19.16	19.54	19.92	104	2.942	3.056	3.174
49	18.44	18.81	19.18	105	2.858	2.970	3.086
50	17.75	18.11	18.48	106	2.778	2.887	3.000
51	17.08	17.44	17.80	107	2.699	2.806	2.917
52	16.44	16.79	17.14	108	2.623	2.728	2.837

53	15.84	16.18	16.53	109	2.549	2.652	2.758
54	15.26	15.59	15.93	110	2.479	2.579	2.683
55	14.69	15.02	15.35				

Annex II

Version information

Version	Editor	Time	Revised information
	Serhii	2023/09/25	Second edition