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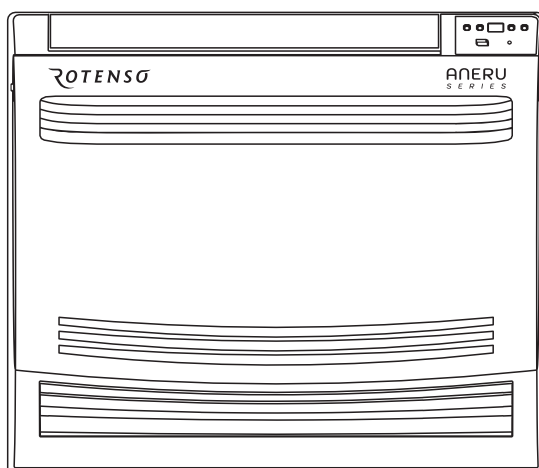
EN



## ANERU

S E R I E S

IDU & ODU UNITS



## SERVICE MANUAL

### MODELS:

AN35X

AN50X

[www.rotenso.com](http://www.rotenso.com)

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## Part I Technical Information

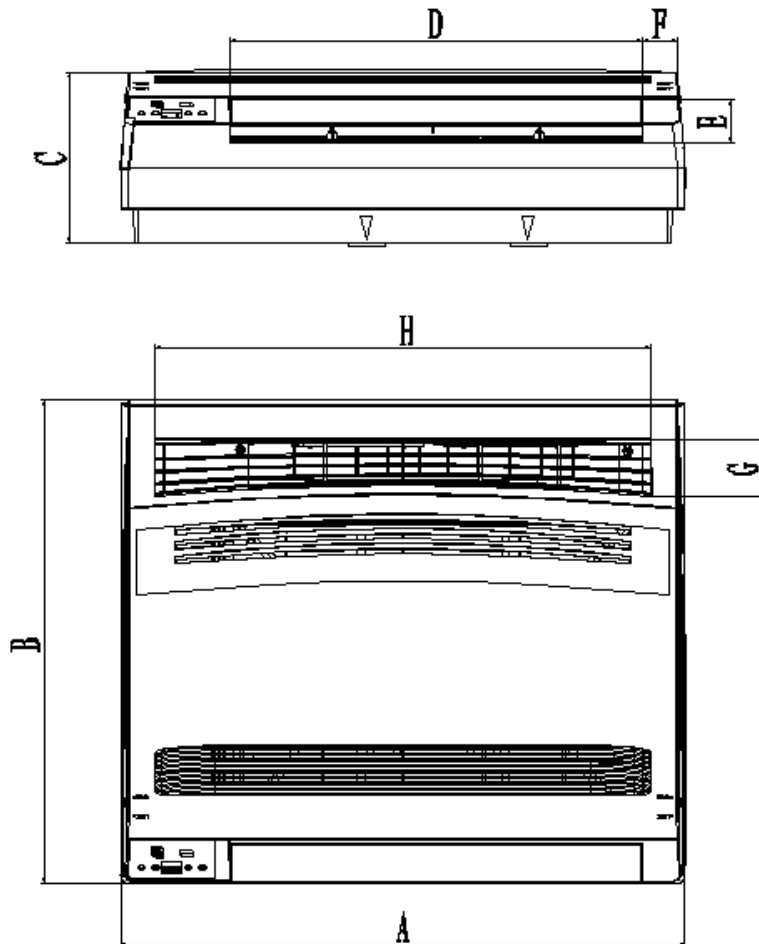
### 1. Important Notice

This service manual is intended for use by individuals possessing adequate backgrounds of electrical, electronic and mechanical experience. Any attempt to repair the appliance may result in personal injury and property damage. The manufacturer or seller cannot be responsible for the interpretation of this information, nor can it assume any liability in connection with its use.

The information, specifications and parameter are subject to change due to technical modification or improvement without any prior notice. The accurate specifications are presented on the nameplate label.

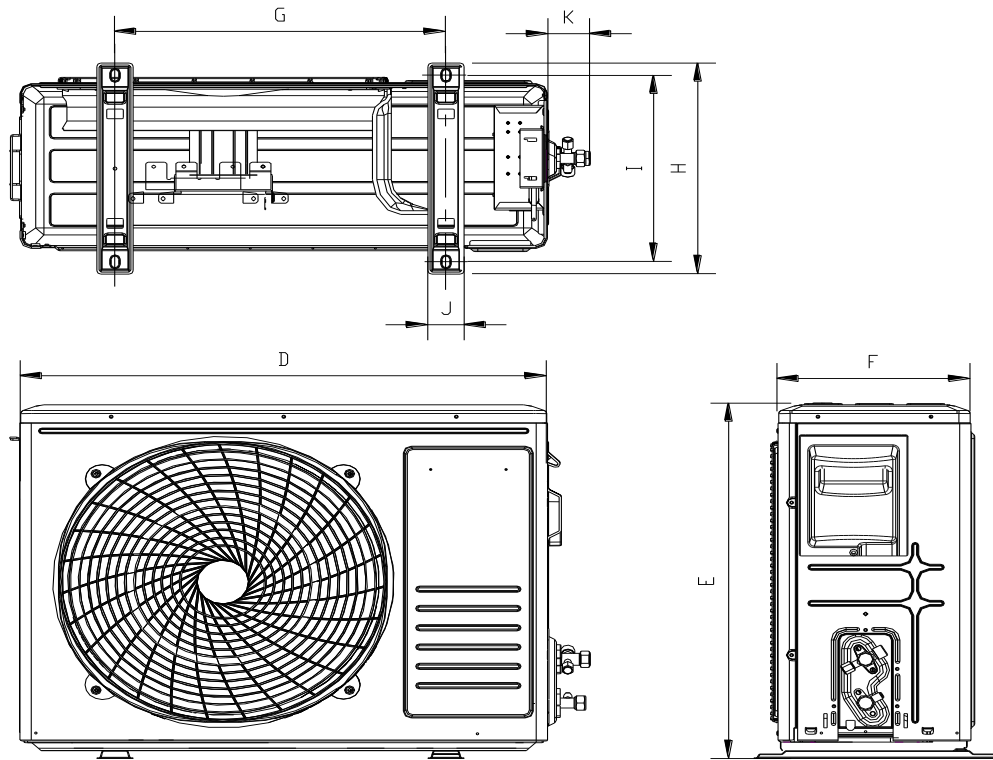
### 2. Product Dimensions

#### Indoor Unit:



	Outline dimension			Air outlet opening size			Air return opening size	
	A	B	C	D	E	F	G	H
09K	700	600	212	510	33	45	70	615
12K	700	200	469	46	511	18	595	170
18K	920	200	469	46	731	18	815	170

# Outdoor Unit:

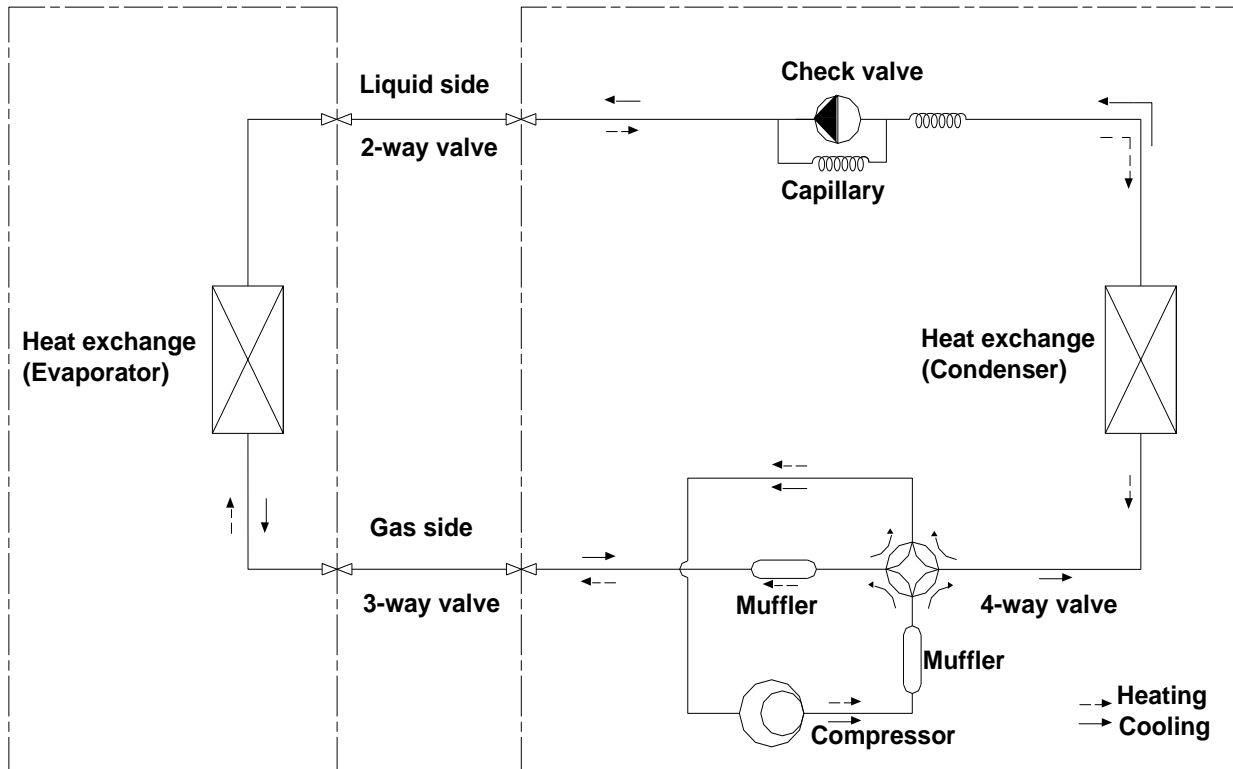


Model	Outdoor unit							
	D	E	F	G	H	I	J	K
AN35Xo	712	498	234	415	291	225	48.5	52
AN50Xo	780	605	290	516	349	314	54	63

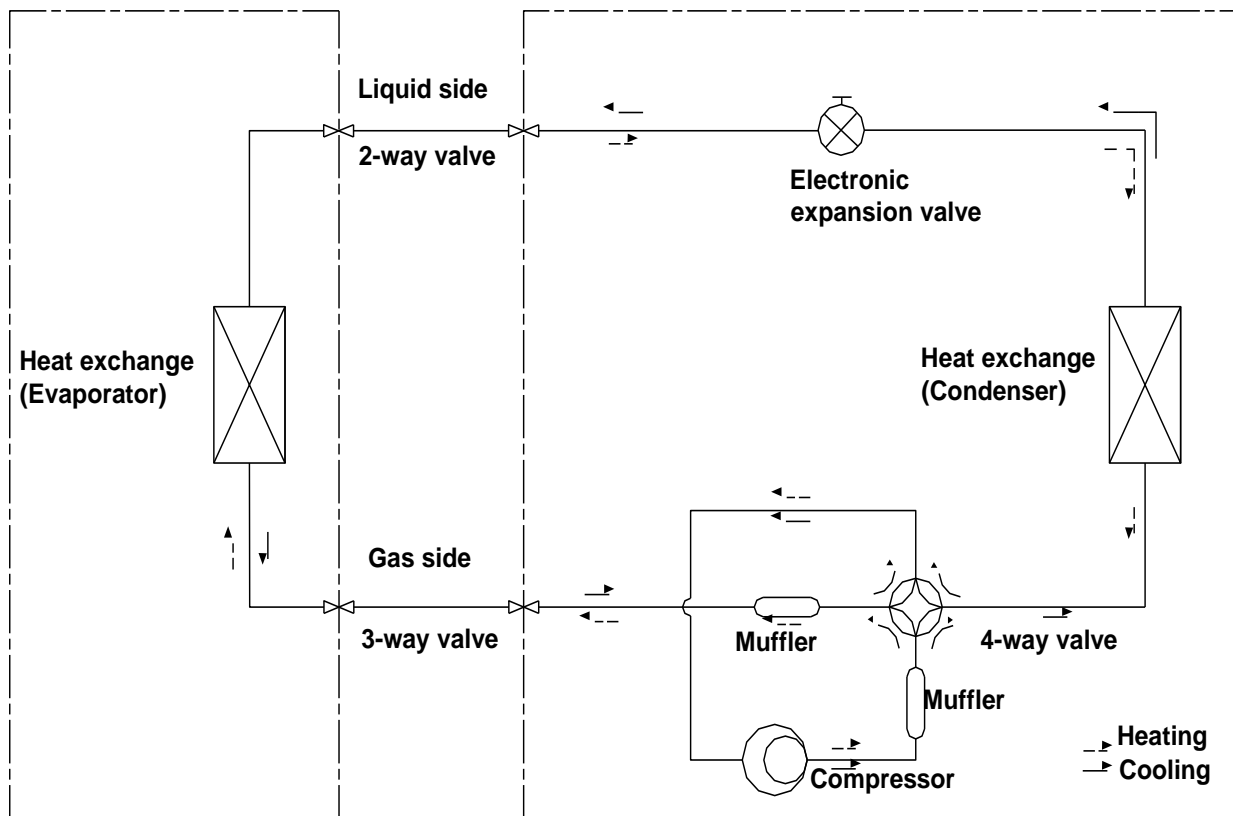
### 3. Refrigeration cycle diagram

#### Heat pump

9K,12K,18K



24K

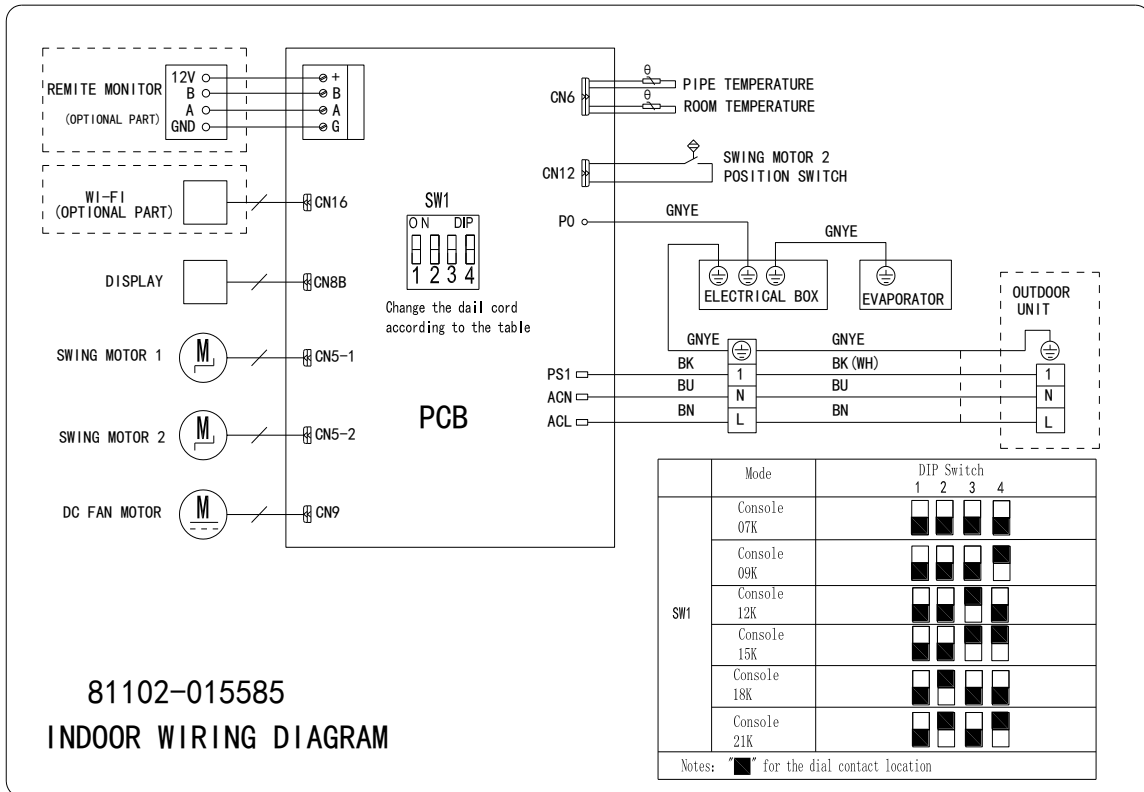


## 4. Electric Diagram

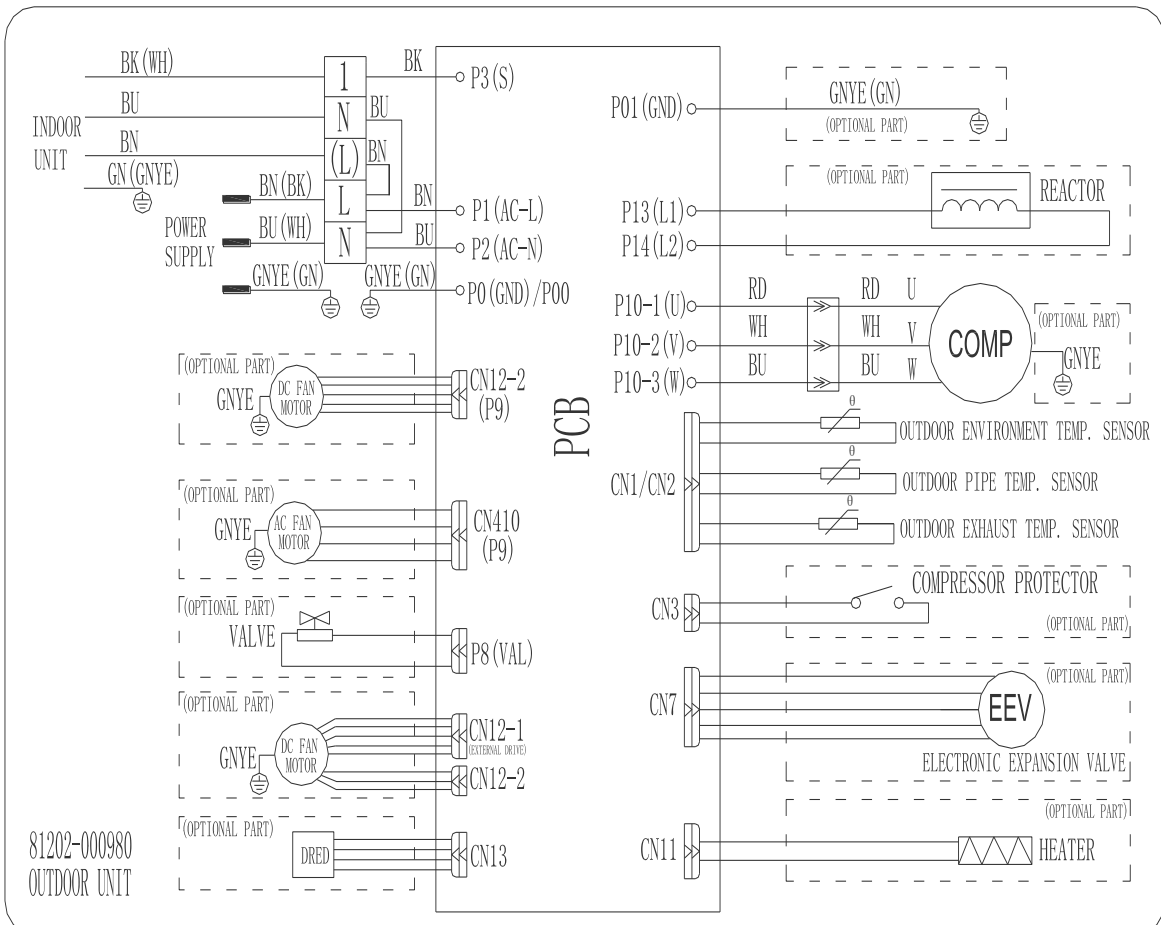
### 4.1 Wiring diagram

MODEL: AN35Xi/o R15

INDOOR UNIT:

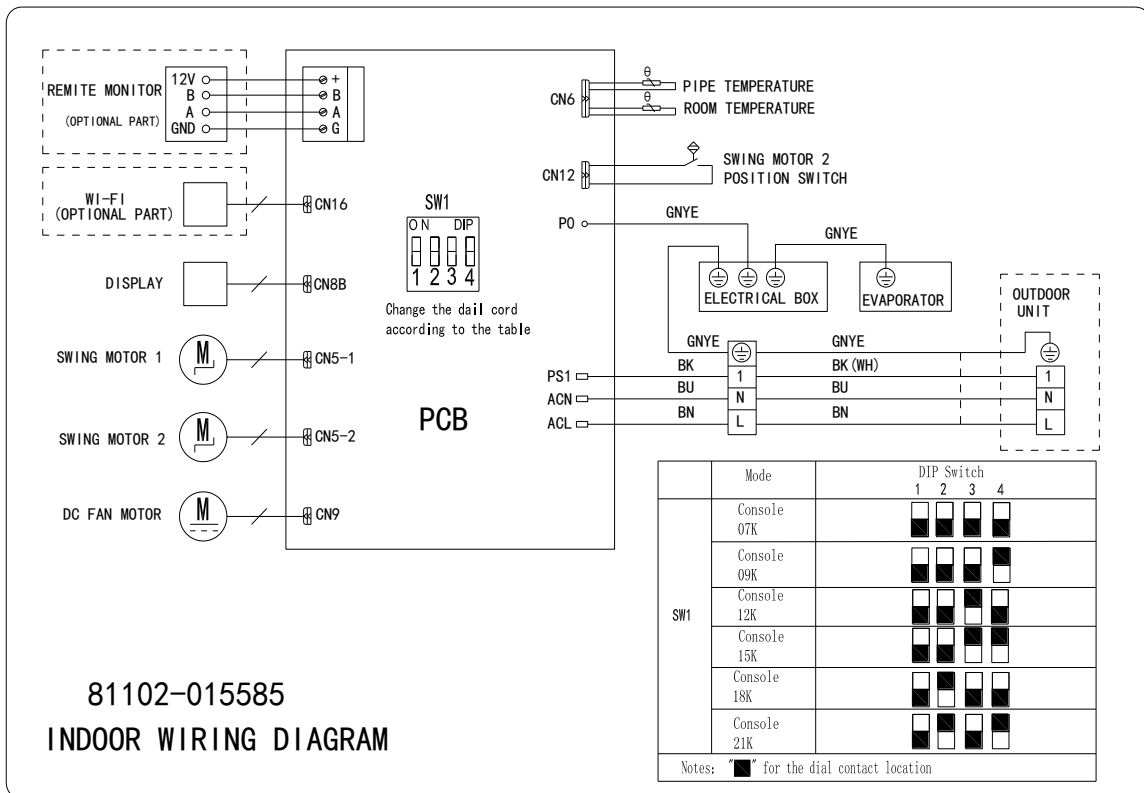


OUTDOOR UNIT:

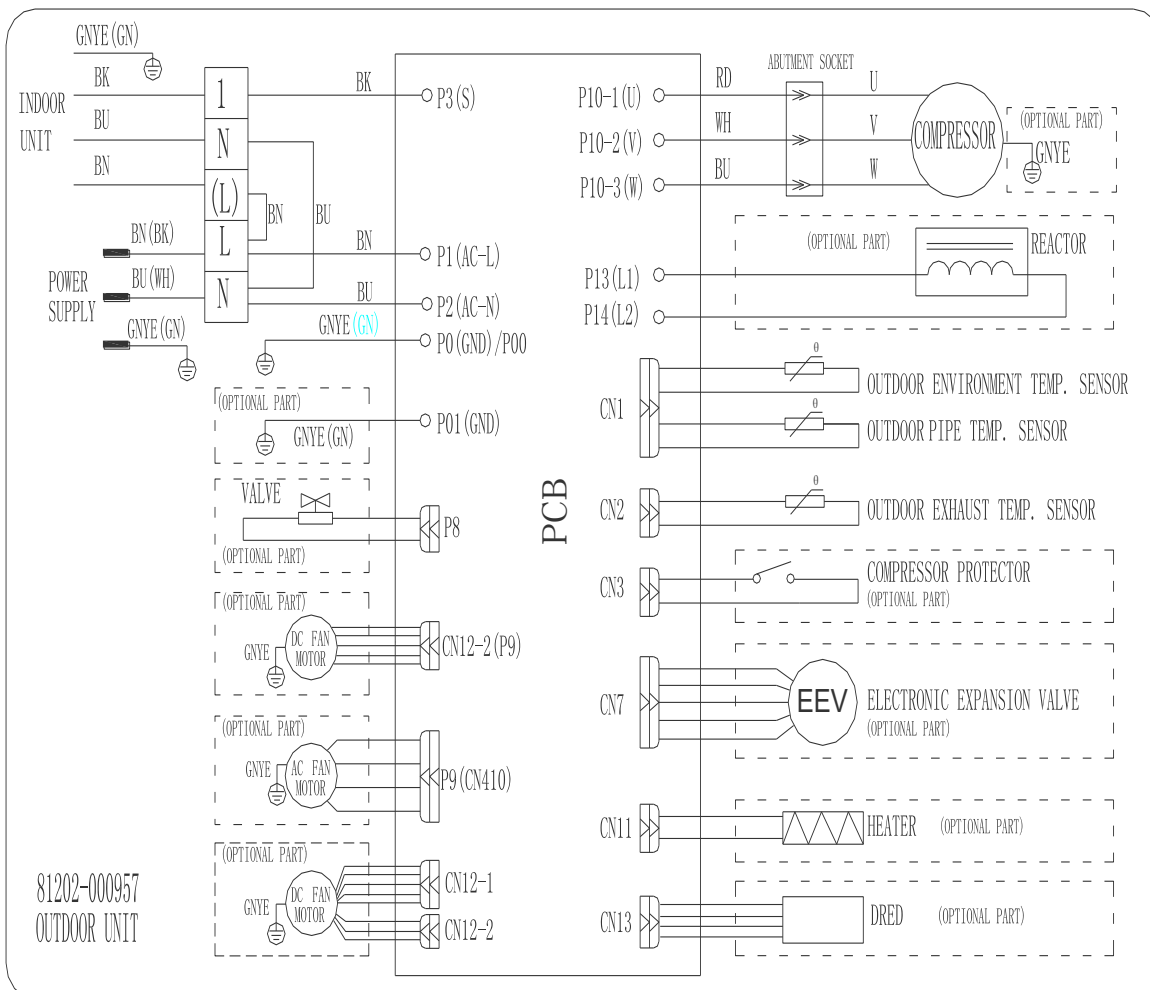


MODEL: AN50Xi/o R15

INDOOR UNIT:

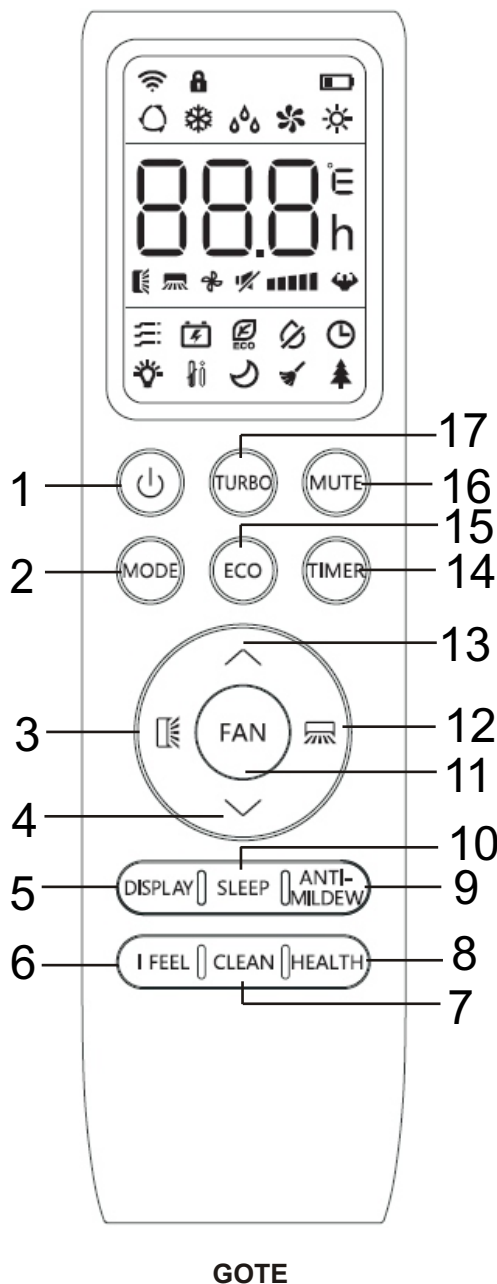


OUTDOOR UNIT:



## 5. Operation Details

### 5.1 Remote controller



- 1 ON/OFF button**  
To switch the conditioner on and off.
- 2 MODE button**  
To select the mode of operation.
- 3 SWING button**  
To activate the swing of horizontal flap(up/down) or deactivate it.
- 4 TEMP DOWN button**  
Decrease the temperature or time by 0.5 unit.
- 5 DISPLAY button**  
Press DISPLAY button to switch off the LED display on the panel. Press again to switch on the LED display.
- 6 I FEEL button**  
To switch - activr/deactive "I FEEL" function. The air conditioner will regulate the room temperature base on the temperature around the remote controller.This function will terminate 2 hours later once it's active.
- 7 CLEAN button**  
To active this function, press CLEAN button at the same time, until hear a beep from indoor unit.Only optional for heating pump inverter appliance.
- 8 HEALTH button**  
To switch - on /off HEALTHY funtion. It is a button which controls the ionizer or negative generator only for inverter type.
- 9 ANTI-MILDEW button**  
Press this button to activate/deactivate the ANTI-MILDEW function.
- 10 SLEEP button**  
To activate the function "SLEEP" .
- 11 FAN SPEED button**  
To select the fan speed of auto/mute/low/mid-low/mid /mid-high/high/turbo , cycle as below.  
Fashing
- 12 SWING button**  
To activate the swing of vertical flap(left/right) or deactivate it.
- 13 TEMP UP button**  
Increase the temperature or time by 0.5 unit.
- 14 TIMER button**  
To set automatic switching-on/off.
- 15 ECO button**  
Press this button to activate/deactivate the ECO function.
- 16 MUTE button**  
To activate the function of Mute.
- 17 TURBO button**  
Press this button to activate/deactivate the Super function which enables the unit to reach the preset temperature in the shortest time.
































































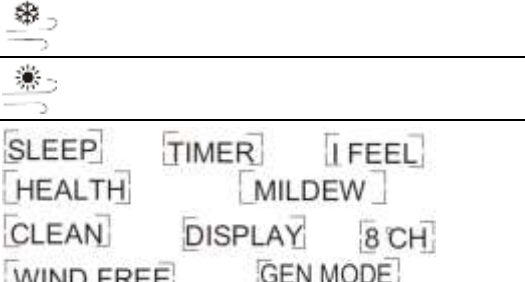
**Note :**

If the remote controller is cooling only, you can press MODE button for 5 seconds when the remote controller off.

If the unit display fahrenheit degree, you can press TURBO button for 5 seconds change to centigrade degree.



## Meaning of symbols on the liquid crystal display.

1	 or  or AUTO	FEEL mode indicator
2	 or COOL	COOLING indicator
3	 or  or DRY	DEHUMIDIFYING indicator
4	 or FAN	FAN ONLY OPERATION indicator
5	 or HEAT	HEATING indicator
6	 or 	SIGNAL RECEPTION indicator
7	 or  or  or 	TIMER OFF indicator
8	 or  or  or  or 	TIMER ON indicator
9	 or  or  or  or 	AUTO FAN indicator
10	 or  or  or  or 	LOW FAN SPEED indicator
11	 or  or  or  or 	MIDDLE FAN SPEED indicator
12	 or  or  or  or 	HIGH FAN SPEED indicator
13	 or  or  or 	SLEEP indicator
14		COMFORTABLE SLEEP indicator (optional)
15		FEEL indicator(optional)
16	 or  or  or 	FLAP SWING indicator
17		FLAP and Deflectors SWING indicator
18	 or TURBO or POWERFUL	SUPER indicator
19	 or  or 	HEALTHY indicator
20	 or ECO or 	ECO indicator
21		ANTI-MILDEW indicator
22	 or  or 	BATTERY indicator
23		CLOCK indicator
24		Mute indicator
25	GEN	GEN function indicator
26		Comfortable cooling airflow indicator
27		Comfortable heating airflow indicator
28		Optional functions indicator

## 5.2 Electronic controller

**RT-----Room Temperature.**

**IPT-----Indoor Pipe (Coil) Temperature.**

**ST-----Indoor Setting Temperature.**

**OPT---Outdoor Pipe Temperature.**

**OAT---Outdoor Ambient Temperature.**

**ODT---Outdoor Discharge Temperature.**

**CRT---Compensated Room Temperature.**

**IDU--- Indoor unit**

**ODU---Outdoor unit.**

**Note:** When AC finishing installation, because of the air ventilation and the distance of temperature test sensor to different location of the house, the temperature for IDU PCB control need compensation.

**1. Cooling mode. CRT=RT;**

**2. Heating mode. CRT=RT-3℃-----Split AC.**

### 5.2.1 Auto mode

1. The set temperature can be adjusted from 16-31℃ on auto mode, the operation of fan speed and vane position according to preset.

2. Operation

When unit set to auto mode, it will work on cooling, heating or fan mode totally according to  $\Delta t$  --the temperature difference between RT and ST shown as table:

Mode	$\Delta t = RT - ST$
COOLING	$\Delta t > 1^\circ\text{C}$
FAN	$-1^\circ\text{C} \leq \Delta t \leq 1^\circ\text{C}$
HEATING	$\Delta t < -1^\circ\text{C}$

### 5.2.2 Cooling mode

**1. Temperature control :**16-31℃, and the operation of fan speed and vane position according to preset.

#### 2. Compressor and process control

1). When  $RT - ST \geq 0.5^\circ\text{C}$ , the compressor starts up working, AC operates as customer preset;

2). When

a.  $RT - ST \leq -3^\circ\text{C}$  and compressor keeps 2 min continuously; or

b.  $RT - ST \leq -2^\circ\text{C}$  and compressor works in lowest frequency for 5 min continuously; or

c.  $RT - ST \leq -1^\circ\text{C}$  and compressor works in lowest frequency for 10 min continuously,

The compressor stops operation.

3). The compressor frequency control: Based on relation of RT & ST, and the changing speed of RT.

4). The compressor will also stop working while unit:

a. switched off.

b. under protection.

c. changed to fan mode.

5). Under normal operation, the compressor can be stopped by program only working after 7 min once it starts up.

6). In the process of unit operation, once the compressor ceased, it should be 3 min delay for the next procedure.

#### 3. ODU Fan motor control:

1). While unit:

a. switched off.

b. under protection.

c. to the set temperature.

After compressor ceased, the fan motor stops working according to the temperature of OPT and OAT, the max

delay for the motor should be less than 160s.

2). When switch on unit on cooling mode, ODU fan motor will delay 5s after compressor starts up.

#### 4. When ODU failure or stops for protection, IDU works as preset.

#### 5. Anti-frosting protection

Control the unit operation frequency and the frequency changing rate to achieve anti-frosting protection.

1). Frequency Slowly Increasing(FSI):

a. If  $6^{\circ}\text{C} \leq \text{IPT} < 7^{\circ}\text{C}$ , the frequency increasing rate is 1Hz/60s, slowly increasing operation speed.

b. When  $\text{IPT} \geq 7^{\circ}\text{C}$ , unit quit from protection.

2). Frequency Limitation:

If  $5^{\circ}\text{C} \leq \text{IPT} < 6^{\circ}\text{C}$ , the compressor frequency forbidden to increase

3). Normal Frequency Decreasing (NFD):

If  $3^{\circ}\text{C} \leq \text{IPT} < 4^{\circ}\text{C}$ , the frequency decreasing rate is 8Hz/90s, until to the lower frequency limit.

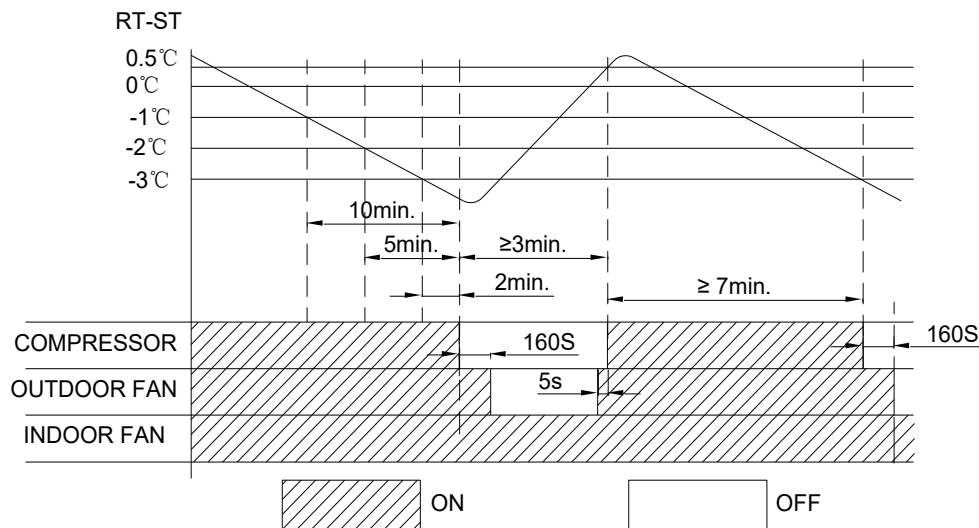
4). Fast Frequency Decreasing (FFD):

If  $2^{\circ}\text{C} \leq \text{IPT} < 3^{\circ}\text{C}$ , the frequency decreasing rate is 16Hz/90s, until to the lower frequency limit.

5). Unit stop:

a. When  $\text{IPT} < 1^{\circ}\text{C}$  for 3min continuously, unit stops working for anti-defrosting protection.

b. While  $\text{IPT} > 6^{\circ}\text{C}$ , and the unit stopped for 3 min already, can the unit recover to operation.



#### 5.2.3 Dry mode

1. Temperature control: 16~31°C.

Fan speed: low

Vane blade position: as customer preset

2. When ODU failure or stops for protection, IDU works as preset.

3. Failure protection: as cooling mode.

4. Energy saving and sleep mode: Invalid.

5. ODU Fan motor stops working.

#### 5.2.4 Heating mode

1. Temperature control: 16-31°C.

#### 2. Compressor and process control.

1). When  $\text{ST-CRT} \geq 0.5^{\circ}\text{C}$ , the compressor starts up working, AC operates as customer preset;;

2). When

a.  $\text{ST-CRT} \leq -3^{\circ}\text{C}$  and compressor keeps 2 min continuously; or

b.  $\text{ST-CRT} \leq -2^{\circ}\text{C}$  and compressor works in lowest frequency for 5 min continuously; or

c.  $\text{RT-CRT} \leq -1^{\circ}\text{C}$  and compressor works in lowest frequency for 10 min continuously,

The compressor stops operation.

- 3). The compressor frequency control: Based on relation of RT & ST, and the changing speed of RT.
- 4). The compressor will also stop working while unit:
  - a. switched off.
  - b. under protection.
  - c. changed to fan mode.
- 5). Under normal operation, the compressor can be stopped by program only working after 7 min once it starts up.
- 6). In the process of unit operation, once the compressor ceased, it should be 3 min delay for the next procedure.

**3. IDU time delay:** When compressor stops or unit switches off while in heating mode, IDU fan motor will work for a few seconds more to prevent overheat.

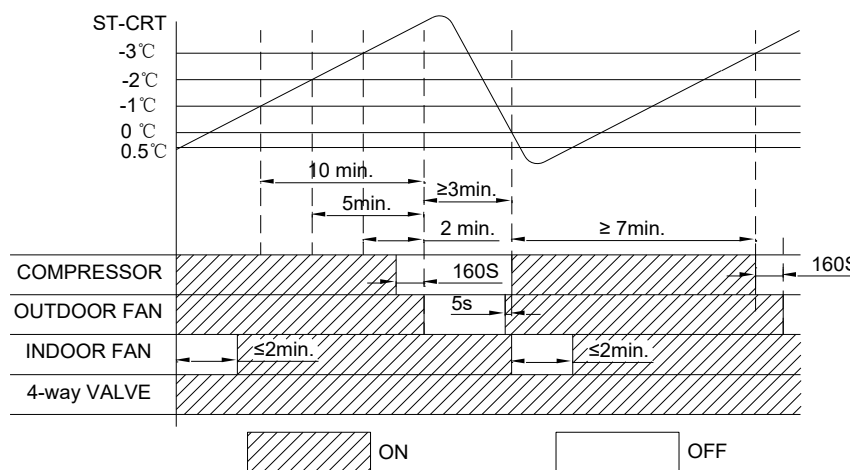
#### 4: ODU Fan motor control:

- 1). While unit:
  - a. To be switched off
  - b. Under protection.
  - c. To the set temperature

After compressor ceased, the fan motor stops working according to the temperature of OPT and OAT, the max delay for the motor should be less than 160s.
- 2). When switch on unit on heating mode, ODU fan motor will delay 5s after compressor starts up
- 3). in the process of defrosting, the fan motor will stop operation 48s delay after compressor stopped.
- 4). defrosting finish, the compressor stops operation, the fan motor will start working simultaneously.

#### 5. 4-way valve control

- 1). On Cooling/Dry/Fan mode, 4-way valve: **OFF**, when unit switched on heating mode, 4-way valve: **ON**.
- 2). When heating mode switched off, or changed from heating to other modes, the 4-way valve will be **OFF** 2 min delay after the compressor stops working.
- 3). Unit stops working caused by any kind of protection, the 4-way valve will be **OFF** 4 min delay.
- 4). In the process of defrosting, 4-way valve will be **OFF** 43s delay after compressor stopped.
- 5). When defrosting finish, the compressor stops operation, 4-way valve will be **ON** after 43s delay.



#### 6. Defrost

*Note: t1: compressor continuous works time.*

*t2: AC unit operation first time going to defrost circle.*

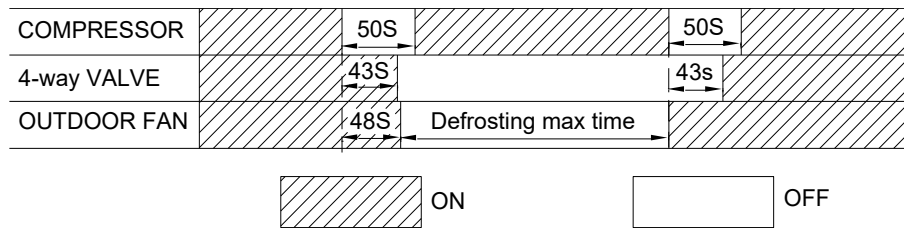
*t3: compressor accumulated working time (when  $OPT \leq 3^\circ\text{C}$  unit starts to count the time for t3).*

When AC unit working to:

- a.  $t1 \geq t2$ , or
- b.  $t3 \leq t1 < t2$ .

and also the temperature (related to OAT & OPT) tested 3 min continuously meets for defrosting.

- 1) **Defrosting start up:** Compressor stops working, and re-starts to working after 50s delay;
  - 2) Conditions for quitting defrosting
    - a. After defrosting 60s, and  $OAT \geq 12^{\circ}\text{C}$ ; or
    - b.  $OAT < -5^{\circ}\text{C}$ , and  $OPT \geq 8^{\circ}\text{C}$  for 80s continuously; or
    - c. The defrosting for 10 min.
- When AC meet any of condition a, b or c, defrosting finish.



- 3) **Defrosting end off:** Compressor stops working, and re-starts to working after 50s delay;

## 7. Cold air prevention:

This function intends to prevent cold air from being discharged when the heating operation starts up

- 1). IDU fan motor cold air prevention

- ① .When  $RT < 24^{\circ}\text{C}$ :

- a. If  $ITP > 31^{\circ}\text{C}$  while compressor works for 5 min, fan motor will work according to preset fan speed.
- b. If  $ITP \leq 31^{\circ}\text{C}$ , fan motor stops working while compressor operation within 2min, if  $ITP \geq 27^{\circ}\text{C}$ , fan motor works in low speed 2 min, then change to preset speed.

- ② When  $RT \geq 24^{\circ}\text{C}$ :

- a. Within 2 min after compressor start up working, once  $ITP > 27^{\circ}\text{C}$ , fan motor will change to preset speed.
- b. After compressor starts working 2 min, fan motor change to preset speed directly.

- 2). Vane blade operation for cold air prevention.

- a. If the vane works on status of **non-swing**: While  $ITP$  increase to a special degree, the vane blade will change the position to:

- ① Default angle; or
- ② Previous position; or
- ③ Customer preset.

The above operation can work one time only, when compressor stops working, the unit will once again inspect the function.

- b. If the vane works on **swing**: When IDU quits from cold air prevention, vane operate as preset.

## 8. "8°C" Heating

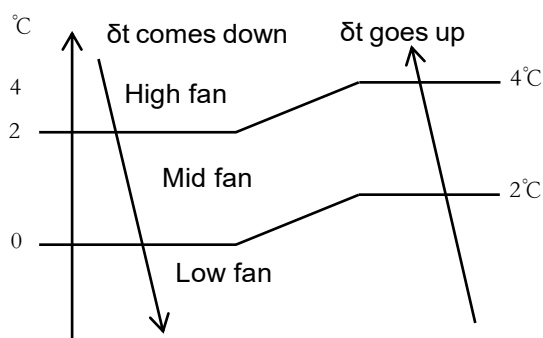
When function effective, it will make sure the room temperature not lower than  $8^{\circ}\text{C}$ , unit works on heating mode.

### 5.2.5 Fan mode

1. The temperature setting:  $16 \sim 31^{\circ}\text{C}$ ,

Fan speed and vane position: as preset. The function for remote controller 58E only.

2. For above function, when unit preset to be auto fan mode, the fan motor will change its operation speed based on the temperature difference of ambient and preset temperature.
3. ODU always OFF.



## 5.2.6 Timer

The unit has times control, when the unit meet the timer preset, it will be switched on or off automatically.

### 1. TIMER ON

- 1). TIMER ON can be set only when the air conditioner is OFF.
- 2). Press TIMER on the remote control ONCE to enter time setting.
- 3). Press “▲” or “▼” to set the time for unit to start working.
- 4). Set other function as MODE, FAN SPEED, SWING etc.
- 5). Press TIMER ONCE AGAIN to confirm the TIME ON setting

### 2. TIMER OFF

- 1). TIMER OFF can be set only when the air conditioner is ON.
- 2). Press TIMER on the remote control ONCE to enter time setting.
- 3). Press “▲” or “▼” to set the time for unit to stop working.
- 4). Press TIMER ONCE AGAIN to confirm the TIME OFF setting

Note: In case of no selection for the time setting within 10s, the timer function will be OFF automatically.

## 5.2.7 Sleeping mode

While AC works in sleeping mode, the light of POWER SUPPLY and SLEEP always ON, and the temperature display will be OFF after 15s.

In this mode, the AC unit works according to the SLEEP CURVE as designed.

Sleeping mode the unit can work 10 hours continuously, after that it will quit from this mode and work as previous presetting.

## 5.2.8 Emergency switch

When the EMERGENCY switch is pressed one time, COOLING mode is selected and if it pressed again within 3s, HEATING mode selected, while press once again, the unit will be switched off.

When the remote controller out of function, batteries lost power, for example, the EMERGENCY button in the front of indoor unit can be used for function test.

NOTE: Do not press the EMERGENCY switch during normal operation.

## 5.2.9 Auto-restart function

While air conditioner is operating in one mode, all of its operation data, such as working mode, preset temperature etc. would be memorized into IC by main PCB. If power supply cut off due to reasons and recover again, the AUTO-RESTART function will set synchronously and the air conditioner would work at the same mode as before.

### Note: The function setting:

Within 3 min while power on unit, set the unit on cooling mode, set temperature 30℃, and mid fan speed, press the ECO button 10 times within 8s, the AUTO-RESTART will be activated.

## 5.2.10 Protection

### 5.2.10.1 Overload protection

#### 1. Overload protection for Cooling or Dry mode

- 1). if:
  - a.  $OPT \geq 62^{\circ}\text{C}$ , unit stops working for overload protection.
  - b.  $OPT < 55^{\circ}\text{C}$ , after compressor stopped for 3 min, can the unit be started to operate.
- 2). When  $OPT \geq 55^{\circ}\text{C}$ , the compressor will be frequency limited/reduced for over load protection.
- 3). If unit have 6 times of over load stop-working protection continuously, this protection can't be recovered unless press ON/OFF button, and unit will show failure code.

In the process of operation, once the compressor runs continuously more than 6 min, the counter of over load

stop-working protection will be reset to zero and start a new counting process.

The failure and times for protection will eliminate immediately once the unit to be switched off, on fan mode or changed to be heating mode from others.

Note: If the defective failure can't be recovered, the failure can't eliminate even if operation mode changed.

## 2. Overload protection for Heating mode

1). If:

- a.  $IPT \geq 62^{\circ}\text{C}$ , unit stops working for overload protection.
- b.  $IPT < 55^{\circ}\text{C}$ , after compressor stopped for 3 min, can the unit be started to operate.

2). When  $IPT \geq 55^{\circ}\text{C}$ , the compressor will be frequency limited/reduced for over load protection.

3). If unit have 6 times of over load stop-working protection continuously, this protection can't be recovered unless press ON/OFF button, and unit will show failure code.

In the process of operation, once the compressor runs continuously more than 6 min, the counter of over load stop-working protection will be reset to zero and start a new counting process.

The failure and times for protection will eliminate immediately once the unit to be switched off, on fan mode or changed to be heating mode from others.

Note: If the defective failure can't be recovered, the failure can't eliminate even if operation mode changed.

### 5.2.10.2 The compressor discharge temperature protection

1. If  $ODT \geq 115^{\circ}\text{C}$ , unit stops working for over temperature protection;

While  $ODT < 100^{\circ}\text{C}$ , & after compressor stopped for 3 min, the unit can be started to operate.

2. If  $ODT \geq 100^{\circ}\text{C}$ , the compressor will be frequency limited/reduced for over temperature protection.

3. If unit have 6 times of **discharge over temperature stop working protection** continuously, this protection can't be recovered unless press ON/OFF button, and unit will show failure code.

In the process of operation, once the compressor runs continuously more than 6 min, the counter of discharge over temperature stop working protection will be reset to zero and start a new counting process.

The failure and times for protection will eliminate immediately once the unit to be switched off, or changed to fan mode.

Note: If the defective failure can't be recovered, the failure can't eliminate even if operation mode changed.

### 5.2.10.3 The current protection

1. If the unit A/C working current more than **Limited current ( $I_{LC}$ )**, the compressor will be frequency limited / reduced for over current protection.

2. When unit A/C working current more than **Stopped current ( $I_{SC}$ )**, AC unit stops working. Only when the compressor stops for 3 min can the unit be recovered operation.

3. If unit have 6 times of **over current stop-working protection** continuously, this protection can't be recovered unless press ON/OFF button.

In the process of unit operation, once the compressor runs continuously more than 6 min, the counter of stop-working protection will be reset to zero and re-start a new counting process.

Note: For different models,  $I_{LC}$  and  $I_{SC}$  have different programmed value.

### 5.2.10.4 IPM overheating protection

1. When IPM temperature  $T_{IPM} \geq 87^{\circ}\text{C}$ , the compressor will be frequency limited / reduced for IPM over temperature protection.

2. When  $T_{IPM} \geq 95^{\circ}\text{C}$ , the AC unit stops working for AC system protection.

If  $T_{IPM} < 87^{\circ}\text{C}$ , and after compressor stopped for 3 min, can the unit be started to operate.

3. If unit have 6 times of **IPM over temperature stop working protection** continuously, this protection can't be recovered unless press ON/OFF button, and unit will show failure code.

In the process of operation, once the compressor runs continuously more than 6 min, the counter of over load stop working protection will be reset to zero and re-start a new counting process.

The failure and times for protection will eliminate immediately once the unit to be switched off, or changed to fan

mode.

Note: If the defective failure can't be recovered, the failure can't eliminate even if operation mode changed.

### **5.2.11 Complementary**

#### **5.2.11.1 Energy saving (ECO)**

Function effective on Cooling and Heating mode only.

On cooling mode, the set temperature range from 26℃ to 31℃, on heating mode, from 16℃ to 25℃.

#### **5.2.11.2 TURBO**

Function effective on Cooling, Heating, Fan and Auto modes, and fan speed operates on highest.

#### **5.2.11.3 The communication control**

If ODU PCB can't get signal feedback from IDU for 2 min continuously, AC unit stops working and shows E0 error code as IDU/ODU communication failure.

Once the IDU & ODU communication recovery, and also the compressor stopped for 3 min already, can the unit be recovered to operate.



### 5.3 WIFI OPERATION MAUAL

#### 5.3.1 Download and installation

Customer can scan the QR in the user manual or from appliance APP store to download the APP and install it in the cell phone, while installation achieved, there would be an icon as picture created on the desktop. Register the account and add the device to system, customer can control the air conditioner by internet or LAN.

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## PART II Installation and Maintenance

### 1. Notes for installation and maintenance

#### Safety Precautions

##### Important!

Please read the safety of precautions carefully before installation and maintenance. The following contents are very important for installation and maintenance. Please follow the instructions below.

- The installation or maintenance must accord with the instructions.
- Comply with all national electrical codes and local electrical codes.
- Pay attention to the warnings and cautions in this manual.
- All installation and maintenance shall be performed by distributor or qualified person.
- All electric work must be performed by licensed technician according to local regulations and instructions given in this manual.
- Be caution during installation and maintenance. Prohibit incorrect operation to prevent electric shock, casualty and other accidents.

#### Warnings

##### Electrical safety Precautions.

- 1) Cut off the power supply of air conditioner before checking and maintenance.
- 2) The air conditioner must apply specialized circuit and prohibit share the same circuit with other appliances.
- 3) The air conditioner should be installed in suitable location and ensure the power plug is touchable.
- 4) Make sure each wiring terminal is connected firmly during installation and maintenance.
- 5) Have the unit adequately grounded. The grounding wire can't be used for other purposes.
- 6) Must apply protective accessories such as protective boards, cable-cross loop and wire clip.
- 7) The live wire, neutral wire and grounding wire of power supply must be corresponding to the live wire, neutral wire and grounding wire of the air conditioner.
- 8) The power cord and power connection wires can't be pressed by hard objects.
- 9) If power cord or connection wire is broken, it must be replaced by qualified person.
- 10) If the power cord or connection wire is not long enough, please get the specialized power cord or connection wire from the manufacture or distributor. Prohibit prolong the wire by yourself.
- 11) For the air conditioner without plug, an air switch must be installed in the circuit. The air switch should be all-pole parting and the contact parting distance should be more then 3mm.
- 12) Make sure all wires and pipes are connected properly and the valves are opened before energizing.
- 13) Check if there is electric leakage on the unit body. If yes, please eliminate the electric leakage.
- 14) Replace the fuse with a new one of the same specification if it is burnt down, don't replace it with a cooper wire or conducting wire.
- 15) If the unit is to be installed in a humid place, the circuit breaker must be installed.

##### Installation Safety Precaution

- 1) Select the installation location according to the requirement of this manual. (See the requirements in installation part).
- 2) Handle unit transportation with care, the unit should not be carried by only one person if it is more than 20kg.
- 3) When installing the indoor unit and outdoor unit, a sufficient fixing bolt must be installed, make sure the installation supporter is firm.
- 4) Ware safety belt if the height of working is above 2m.
- 5) Use equipped components or appointed components during installation.
- 6) Make sure no foreign objects are left in the unit after finishing installation.

**Improper installation may lead to fire hazard, explosion, electric shock or injury.**

**Safety precautions for Installing and Relocating the unit.**

**To ensure safety, please be mindful of the following precautions.**

**Warnings**

- 1) When installing or relocating the unit, be sure to keep the refrigerant circuit free from air or substances other than the specified refrigerant.

Any presence of air or other foreign substance in the refrigerant circuit will cause system pressure rise or compressor rupture, resulting in injury.

- 2) When installing or moving this unit, do not charge the refrigerant which is not comply with that on the nameplate or unqualified refrigerant.

Otherwise, it may cause abnormal operation, wrong action, mechanical malfunction or even series safety accident.

- 3) When refrigerant needs to be recovered during relocating or repairing the unit, be sure that the unit is running in cooling mode. Then, fully close the valve at high pressure side (two-way valve). About 30-40 seconds later, fully close the valve at low pressure side (3-way valve), immediately stop the unit and disconnect power. Please note that the time for refrigerant recover should not exceed 1 minute.

If refrigerant recovery takes too much time, may be cause compressor overheat, resulting in injury.

- 4) During refrigerant recovery, make sure that two-way valve and 3-way valve are fully closed and power is disconnected before detaching the connecting pipe.

If compressor starts running when the valves is open and connecting pipe is not yet connected, air will be sucked in and cause pressure rise and then compressor overheat or gas leak, resulting in injury.

- 5) When installing the unit, make sure that connecting pipe is securely connected before the compressor starts running.

If compressor starts running when the valves is open and connecting pipe is not yet connected, air will be sucked in and cause pressure rise and then compressor overheat or gas leak, resulting in injury.

- 6) Prohibit installing the unit at the place where there may be leaked corrosive gas or flammable gas.

If there leaked gas around the unit, it may cause explosion and other accidents.

- 7) Do not use extension cords for electrical connections. If the electric wire is not long enough, please contact a local service center authorized and ask for a proper electric wire.

Poor connection may lead to electric shock or fire.

- 8) Use the specified types of wires for electrical connections between the indoor and outdoor units. Firmly clamp the wires so that their terminals receive no external stresses.

**Electric wires with insufficient capacity, wrong wire connections and insecure wire terminals may cause electric shock or fire.**

**Introduction R32, R290 air conditioner installation****1) Introduction to Refrigerants R32 & R290**

The refrigerants used for air conditioners are environmentally friendly hydrocarbons R32 and R290. The two kinds of refrigerants are combustible and odorless. Moreover, they can burn and explode under certain condition. However, there will be no risk of burning and explosion if you comply with the following table to install your air conditioner in a room with an appropriate area and use it correctly.

Compared with ordinary refrigerants, Refrigerants R32 & R290 are environmentally friendly and do not destroy the ozone sphere and that their values of greenhouse effect are also very low.

**2) R32/R290 air conditioner installation area requirement**

$$m1=(4m^3)\times LFL, m2=(26m^3)\times LFL, m3=(130m^3)\times LFL$$

Where LFL is the lower flammable limit in kg/m<sup>3</sup>, R290 LFL is 0.038kg/m<sup>3</sup>, R32 LFL is 0.306kg/m<sup>3</sup>.

**For the appliances with a charge amount  $m_1 < M < m_2$ :**

The maximum charge in a room shall be in accordance with the following:  $M_{\max} = 2.5 \times (\text{LFL})^{(5/4)} \times h_0 \times A^{1/2}$

The required minimum floor area  $A_{\min}$  to install an appliance with refrigerant charge M(kg) shall be in accordance with following:  $A_{\min} = (M / (2.5 \times (\text{LFL})^{(5/4)} \times h_0))^2$

Where:

$M_{\max}$  is the allowable maximum charge in a room, in kg;

M is the refrigerant charge amount in appliance, in kg;

$A_{\min}$  is the required minimum room area, in m<sup>2</sup>;

A is the room area, in m<sup>2</sup>;

LFL is the lower flammable limit, in kg/m<sup>3</sup>;

$h_0$  is the installation height of the appliance, in meters for calculating  $M_{\max}$  or  $A_{\min}$ , 1.8 m for wall mounted;

**Table GG.1 - Maximum charge (kg)**

Category	LFL (kg/m <sup>3</sup> )	h <sub>0</sub> (m)	Floor area (m <sup>2</sup> ) Maximum charge (kg)						
			4	7	10	15	20	30	50
R290	0.038	0.6	0.05	0.07	0.08	0.1	0.11	0.14	0.18
		1	0.08	0.11	0.03	0.06	0.09	0.2	0.3
		1.8	0.15	0.2	0.24	0.29	0.34	0.41	0.53
		2.2	0.18	0.24	0.29	0.36	0.41	0.51	0.65
R32	0.306	0.6	0.68	0.9	1.08	1.32	1.53	1.87	2.41
		1	1.14	1.51	1.8	2.2	2.54	3.12	4.02
		1.8	2.05	2.71	3.24	3.97	4.58	5.61	7.254
		2.2	2.5	3.31	3.96	4.85	5.6	6.86	8.85

**Table GG.2 - Minimum room area (m<sup>2</sup>)**

Category	LFL (kg/m <sup>3</sup> )	h <sub>0</sub> (m)	Charge amount (M) (kg) Minimum room area (m <sup>2</sup> )						
			0.152kg	0.228kg	0.304kg	0.456kg	0.608kg	0.76kg	0.988kg
R290	0.038								
		0.6	/	82	146	328	584	912	1514
		1	/	30	53	118	210	328	555
		1.8	/	9	16	36	65	101	171
		2.2	/	6	11	24	43	68	115
R32	0.306		1.224kg	1.836kg	2.448kg	3.672kg	4.896kg	6.12kg	7.956kg
		0.6	/	29	51	116	206	321	543
		1	/	10	19	42	74	116	196
		1.8	/	3	6	13	23	36	60
		2.2	/	2	4	9	15	24	40

**Caution:**

- Please contact the nearest after-sale service center when maintenance is necessary. At the time of maintenance, the maintenance personnel must strictly comply with the Operation Manual provided by the corresponding manufacturer and any non-professional is prohibited to maintain the air conditioner.
- It is necessary to comply with the provisions of gas-related national laws and regulations.
- It is necessary to clear away the refrigerant in the system when maintaining or scrapping an air conditioner.
- When filling the combustible refrigerant, any of your rude operations may cause serious injury or injuries to human body or bodies and object or objects.
- A leak test must be done after the installation is completed.
- It is a must to do the safety inspection before maintaining or repairing an air conditioner using combustible

refrigerant in order to ensure that the fire risk is reduced to minimum.

### 3) Installation Safety

#### Installation Safety Principles

##### Site Safety



Open Flames Prohibited



Ventilation Necessary

##### Operation Safety

Open Flames Prohibited



Mind Static Electricity    Must wear protective clothing and anti-static gloves    Don't use mobile phone

##### Installation Safety

- Refrigerant Leak Detector
- Appropriate Installation Location



The left picture is the schematic diagram of a refrigerant leak detector.

#### Caution:

- The installation should be in a well-ventilated condition location.
- When you installing or maintaining an air conditioner using Refrigerant R32/R290, the location should be free fire from open or any other goods temperature higher than 370°C for R290/548°C for R32 which easily produces open fire include welding, smoking, drying oven.
- When installing an air conditioner of R32/R290, it is necessary to take appropriate anti-static measures such as wear anti-static clothing and gloves.
- It is necessary to choose the location for installation or maintenance where in the air inlets and outlets of the indoor and outdoor units should be not surrounded by obstacles or close to any heat source or combustible and/or explosive environment.
- If the indoor unit suffers refrigerant leak during the installation, it is necessary to immediately turn off the valve of the outdoor unit and all the personnel should go out till the refrigerant leaks completely for 15 minutes. If the product is damaged, it is a must to carry such damaged product back to the maintenance station and it is prohibited to weld the refrigerant pipe or conduct other operations on the user's site.
- It is necessary to choose the place where the inlet and outlet air of the indoor unit is even.
- It is necessary to avoid the places where there are other electrical products, power switch plugs and sockets, kitchen cabinet, bed, sofa and other valuables right under the lines on two sides of the indoor unit.

#### Special tools:

Tool Name	Requirement(s) for Use
Mini Vacuum Pump	It should be an explosion-proof vacuum pump; can ensure certain precision and its vacuum degree should be lower than 10Pa.

Filling Device	It should be a special explosion-proof filling device; have certain precision and its filling deviation should be less than 5g.
Leak Detector	It should be calibrated regularly; and its annual leak rate should not exceed 10g.
Concentration Detector	<p>A) The maintenance site should be equipped with a fixed-type combustible refrigerant concentration detector and connected to a safeguard alarm system; its error must be not more than 5%.</p> <p>B) The installation site should be equipped with a portable combustible refrigerant concentration detector which can realize two-level audible and visual alarm; its error must be not more than 10%.</p> <p>C) The concentration detectors should be calibrated regularly.</p> <p>D) It is necessary to check and confirm the functions before using the concentration detectors.</p>
Pressure Gauge	<p>A) The pressure gauges should be calibrated regularly.</p> <p>B) The pressure gauge used for Refrigerant 22 can be used for Refrigerants R290 and R161; the pressure gauge used for R410A can be used for Refrigerant 32.</p>
Fire Extinguisher	It is necessary to carry fire extinguisher(s) when installing and maintaining an air conditioner. On the maintenance site, there should be two or more kinds of dry powder, carbon dioxide and foam fire extinguishers and that such fire extinguishers should be placed at stipulated positions, with eye-catching labels and in handy places.

## Maintenance

### 1). Inspections before maintenance.

#### (1) Inspection of maintenance environment

- There should be no leaked refrigerant in the room before operation.
- It is only allowed to operate in a room which meets the area requirement on the nameplate.
- It is necessary to make the room keep a continuous ventilation state at the time of maintenance.
- The room in the maintenance should be free from fire or welding, smoking, drying oven or any other goods temperature higher than 370°C (R290)/548°C (R32) which easily produces fire.
- During the maintenance, it is necessary to ensure that any person's any mobile phone or any electronic product with radiation in the room is powered off.
- The maintenance area should be equipped with a drying powder or carbon dioxide fire extinguisher and that such fire extinguisher can work.

#### (2) Inspection of maintenance equipment

- Check the maintenance equipment is applicable to the refrigerant or not and it is only allowed to use the professional equipment recommended by the air conditioner manufacturer.
- Check the refrigerant leak detector whether has been calibrated. The set maximum alarm concentration of the refrigerant leak detector should not exceed 25% of the lower explosion limit (LEL), the refrigerant leak detector must be working during maintenance.

### 2) Inspection of air conditioner

- It is necessary to ensure that the air conditioner is in reliable ground connection before maintenance.
- Make sure powered supply to air conditioner is off. Before maintenance, it is necessary to cut off the power and discharge the capacitor power which used in the air conditioner. If it is a must to need the power supply during the maintenance, it is necessary to do ongoing leak detection at the most dangerous position/point in order to avoid potential danger.

- Check the warning labels on the air conditioner whether are in good condition. It is necessary to replace the damaged or smeared warning labels.

### 3). Leak inspection before maintenance

Before maintenance, use the leak detector or concentration detector (pump-type) recommended by the corresponding air conditioner manufacturer to check the air conditioner leak or not.

#### Warning

If leak may exist, it is necessary to move all the fire out from the site or extinguish fire and then immediately shut off the air conditioner. Meanwhile, it is necessary to make sure well-ventilated.

### 4). Safety principles during the maintenance

- At the time of maintenance, it is necessary to ensure well-ventilation on the site.
- It is prohibited to use fire including welding, smoking or other purposes. It is prohibited to use mobile phones.
- At the time of maintenance, if the relative humidity is lower than 40%, it is necessary to wear anti-static clothing and gloves.
- If the combustible refrigerant is found leaking during the maintenance, it is a must to immediately take forced ventilation and plug up the leak source.
- If the product is damaged to the extent that it is a must to open the refrigerating system for maintenance, it is a must to carry the product back to the maintenance station for maintenance. (It is prohibited to weld the refrigerant pipe and do other operations on the user's site.)
- It is necessary to return the air conditioner to its initial state if it is necessary to provide visiting service again due to lacking spare part during the maintenance. Moreover, it is a must to ensure that the refrigerating system is in secure ground connection.
- If it is necessary to provide visiting service with a refrigerant cylinder, the volume of refrigerant filled in such refrigerant cylinder should not exceed the stipulated value. When such cylinder is stored in a vehicle or placed on the installation or maintenance site, it is necessary to place it vertically and securely and keep it away from any place where there is any heat source, combustion source, radiation source or electrical equipment.

### 5). Requirements for the site of maintenance-station

- The maintenance location should be well-ventilated, with leveled ground and not in a basement.
- The maintenance should be divided into welding and non-welding areas both of which should be labeled clearly. There should be a certain safety distance between the two areas. The maintenance location should be equipped with ventilating and air-exhausting equipment to prevent the refrigerant gas from aggregating.
- It is necessary to provide some relevant instruments such as combustible refrigerant leak detector and have a leak detecting instrument management system. It is necessary to confirm that the leak detector can work normally before maintenance.
- The main power switch should be set outside the maintenance location and equipped with protective (explosion-proof) devices.
- It is necessary to provide firefighting devices such as dry powder or carbon dioxide fire extinguisher appropriate for extinguishing the electrical fire and keep such firefighting devices in a usable condition.
- Temporary wires and sockets are prohibited on the maintenance location.

### 6). Requirements for fill the refrigerants

- It is necessary to use nitrogen to clear the cyclic system before operating the refrigerating system and vacuumize the outdoor unit for 30 minutes at least.
- It is necessary to ensure that there is no cross contamination among different refrigerants when the refrigerant filling device is used. The total length including the refrigerant pipeline should be as short

as possible in order to reduce the residual refrigerant inside such pipeline.

- It is necessary to vertically place the refrigerant storage tanks.
- It is necessary to ensure that the refrigerating system is in ground connection before the refrigerant is filled.
- When filling the refrigerant, it is necessary to fill corresponding type and volume of refrigerant as per the requirements on the product nameplate and overfilling is prohibited.
- It is necessary to seal the system in a safe sealing way after maintaining the refrigerating system.
- It is necessary to ensure that the maintenance will not damage or reduce the safety protection grade of the original system.

#### **7). In-maintenance welding**

- It is necessary to ensure that the maintenance location is well-ventilated.
- Before welding the outdoor unit, it is a must to confirm that the refrigerating system has been drained and the system has been cleaned and ensure that there has been no refrigerant in the outdoor unit.
- It is necessary to close the stop valve of the outdoor unit when using a welding gun to do the maintenance work such as cutting and welding.

#### **8). Maintenance of electrical components**

- It is necessary to use a special leak detector to check whether the maintained electrical parts location have the leak refrigerant.
- It is not allowed to refit, remove or cancel any component with the safety protection function after finishing the maintenance process.
- When maintaining the sealed parts, it is necessary to turn off the power of air conditioner before opening the sealing cover. When power supply is needed, it is necessary to do the ongoing leak detection at the most dangerous position in order to prevent potential danger.
- It is necessary to specially note that the maintenance of electrical components will not affect the replacement of protective cover.
- In order to ensure that the sealing function is not damaged after maintenance or the sealing material will not lose the effect of preventing the combustible gas leak due to ageing. So the substitute components should meet the requirements recommended by the air conditioner manufacturer.

## **Warning**

Before doing the trial operation after finishing the maintenance, it is a must to use a practical leak detector to inspect the leakage and reliability of ground connection in order to ensure that no refrigerant leakage and reliable ground connection.

The refrigerant storage tanks should be separately placed in a well-ventilated place at the temperature ranging from -10°C to 50°C and label them with warning labels.

#### **9). Emergency Accident Handling**

A maintenance station should establish emergency handling plans. It is necessary to take appropriate precautionary measures in work. For example, it is prohibited to enter the location with any kindling material and it is prohibited to wear clothing or shoes which easily produce static.

Handling suggestions when a large amount of combustible refrigerant leaks:

- It is necessary to immediately operate the ventilating equipment while cutting off other power supply and evacuating the affected personnel urgently from the location.
- It is necessary to inform near residents of evacuating for over 20 meters from the location, make an alarm call, set the emergency area and prohibit irrelevant personnel and vehicles from approaching.
- The professional firefighters should wear anti-static clothing to handle the emergency on the site and cut off the source of leak.
- It is necessary to use nitrogen for blowing the site, especially the low-lying positions, clear away the



residual combustible refrigerant gas from any area nearby and surrounding the leak point and use a handheld detector for detection and not clear the alarm until the concentration of refrigerant is zero.

## 2 Installation

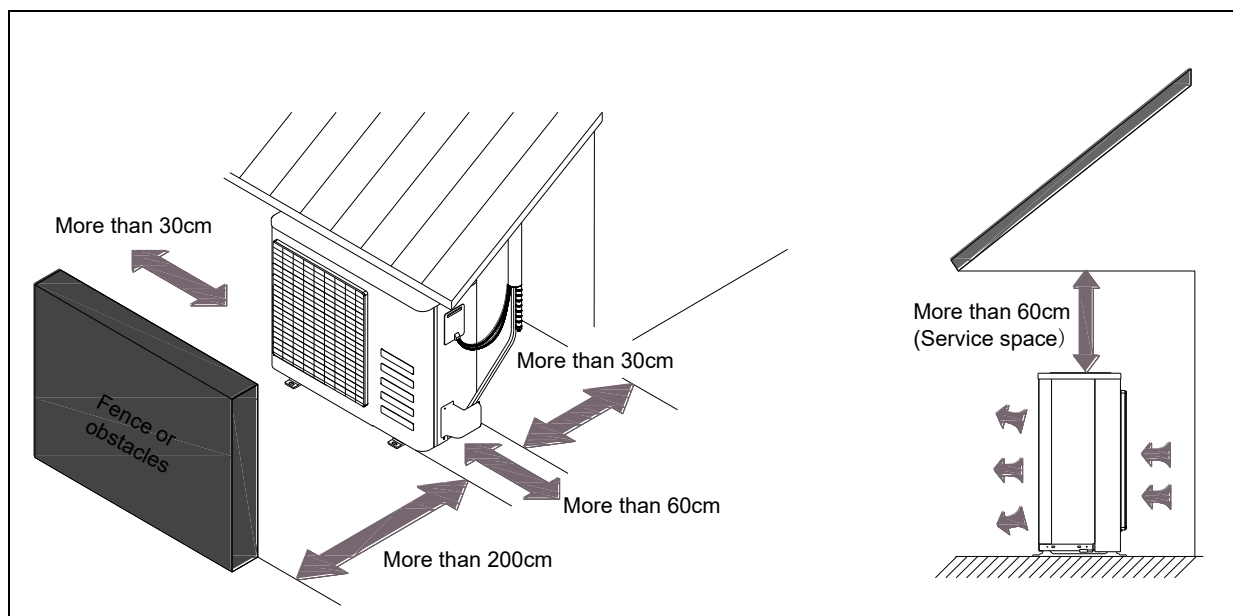
### 2.1 Location Selection

#### 2.1.1 Indoor Unit Location Selection

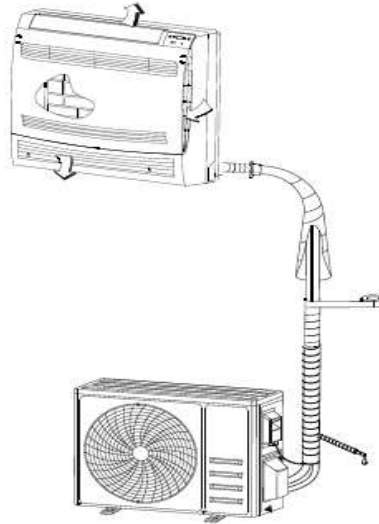
- The place shall easily support the indoor unit's weight.
- The place can ensure the indoor unit installation and inspection.
- The place can ensure the indoor unit horizontally installed.
- The place shall allow easy water drainage.
- The place shall easily connect with the outdoor unit.
- The place where air circulation in the room should be good.
- There should not be any heat source or steam near the unit.
- There should not be any oil gas near the unit
- There should not be any corrosive gas near the unit
- There should not be any salty air near the unit
- There should not be strong electromagnetic wave near the unit
- There should not be inflammable materials or gas near the unit
- There should not be strong voltage vibration.

#### 2.1.2 Outdoor Unit Location Selection

- The place shall easily support the outdoor unit's weight.
- Locate the outdoor unit as close to indoor unit as possible
- The piping length and height drop can not exceed the allowable value.
- The place where the noise, vibration and outlet air do not disturb the neighbors.
- There is enough room for installation and maintenance.
- The air outlet and the air inlet are not impeded, and not face the strong wind.
- It is easy to install the connecting pipes and cables.
- There is no danger of fire due to leakage of inflammable gas.
- It should be a dry and well ventilation place
- The support should be flat and horizontal
- Do not install the outdoor unit in a dirty or severely polluted place, so as to avoid blockage of the heat exchanger in the outdoor unit.
- If is built over the unit to prevent direct sunlight, rain exposure, direct strong wind, snow and other scraps accumulation, make sure that heat radiation from the condenser is not restricted.

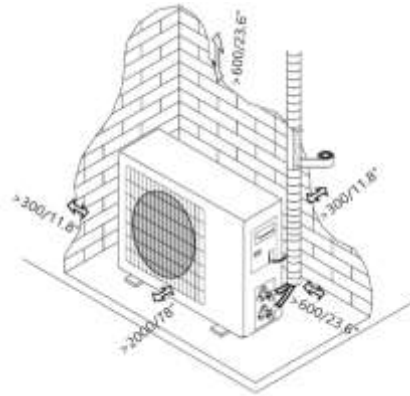


## 2.2 Indoor Unit Installation



## 2.3 Outdoor Unit Installation

### 2.3.1 Service Space for Outdoor Unit



**NOTE:** The minimum distance between the outdoor unit and walls described in the installation guide does not apply to airtight rooms. Be sure to keep the unit unobstructed in at least two of the three directions (Front, Left, Right). (As shown on the right)

### 2.3.2 Install the Unit

Bolt pitch refers to the part of 3.4.3

Since the gravity center of the unit is not at its physical center, so please be careful when lifting it with a sling.

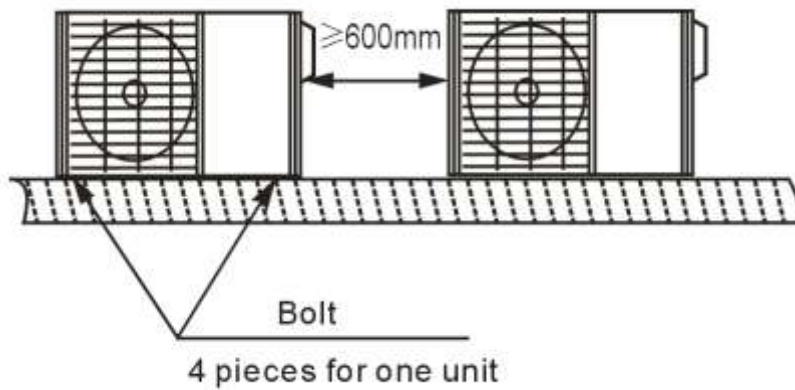
Never hold the inlet of the outdoor unit to prevent it from deforming.

Do not touch the fan with hands or other objects.

Do not lean it more than 45° , and do not lay it sidelong.

Make concrete foundation according to the specifications of the outdoor units.

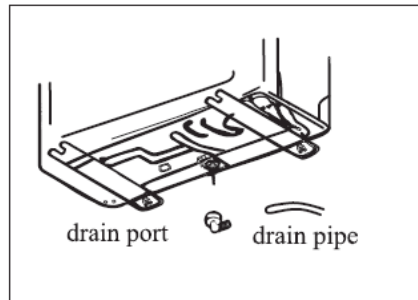
Fasten the feet of this unit with bolts firmly to prevent it from collapsing in case of earthquake or strong wind.



### 2.3.3 Outdoor Unit Condensed Water Drainage (Optional)

The condensed water and the ice formed in the outdoor unit during heating operation can be drained away through the drain pipe

1. Fasten the drain port in the 25mm hole placed in the part of the unit as shown in the picture.
2. Connect the drain port and the drain pipe. Pay attention that water is drained in a suitable place.



## 2.4 The Procedure of Connecting Pipes

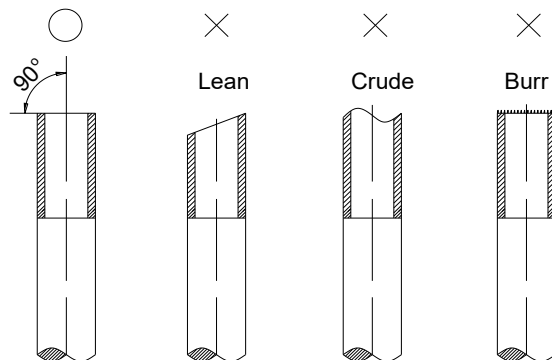
2.4.1 Choose the Pipe Size according to the Specification Table.

2.4.2 Confirm the Cross Way of the Pipes.

2.4.3 Measure the Necessary Pipe Length.

2.4.4 Cut the Selected Pipe with Pipe Cutter

- Make the section flat and smooth.

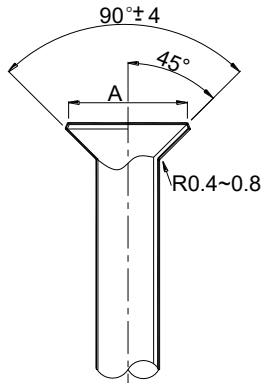


### 2.4.5 Insulate the Copper Pipe

- Before test operation, the joint parts should not be heat insulated.

### 2.4.6 Flare the Pipe

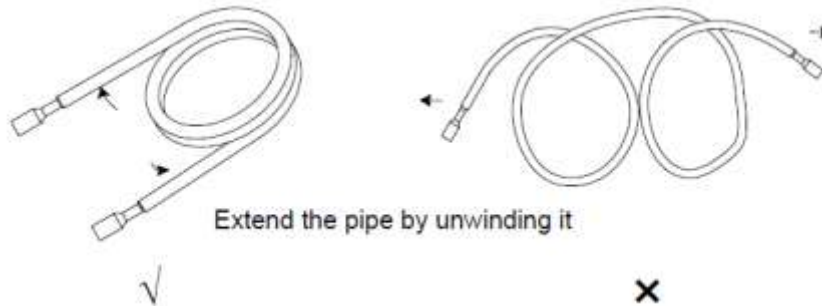
- Insert a flare nut into the pipe before flaring the pipe
- According to the following table to flare the pipe

Pipe diameter	Flare dimension A (mm)		Flare shape
	Min	Max	
1/4" (6.35)	8.3	8.7	
3/8" (9.52)	12.0	12.4	
1/2" (12.7)	15.4	15.8	
5/8" (15.9)	18.6	19.1	
3/4" (19)	22.9	23.3	

➤ After flared the pipe, the opening part must be seal by end cover or adhesive tape to avoid duct or exogenous impurity come into the pipe.

#### 2.4.7 Bending Pipes

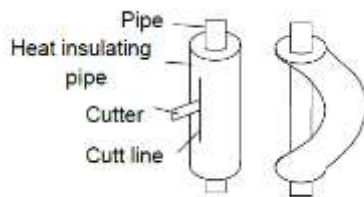
(1) The pipes are shaped by your hands. Be careful not to collapse them.



(2) Do not bend the pipes in an angle more than 90°.

(3) When pipes are repeatedly bent or stretched, the material will harden, making it difficult to bend or stretch them any more. Do not bend or stretch the pipes more than three times.

(4) When bending the pipe, do not bend it as is. The pipe will be collapsed. In this case, cut the heat insulating pipe with a sharp cutter as shown in Figure 3-3-3, and bend it after exposing the pipe. After bending the pipe as you want, be sure to put the heat insulating pipe back on the pipe, and secure it with tape.



#### NOTE:

- ① To prevent breaking of the pipe, avoid sharp bends. Bend the pipe with a radius of curvature of 150mm (5-7/8inch) or over.
- ③ If the pipe is bent repeatedly at the same place, it will break.

#### 2.4.8 Drill Holes if the Pipes Need to Pass the Wall.

#### 2.4.9 According to the Field Condition to Bend the Pipes so that It Can Pass the Wall Smoothly.

#### 2.4.10 Set the Wall Conduit.

#### 2.4.11 Set the Supporter for the Pipe.

#### 2.4.12 Locate the Pipe and Fix It by Supporter.

- For horizontal refrigerant pipe, the distance between supporters should not be exceed 1m.
- For vertical refrigerant pipe, the distance between supporters should not be exceed 1.5m.

### 2.4.13 Connect the Pipe to Indoor Unit and Outdoor Unit by Using Two Spanners.

**NOTE:** Connect the copper pipes to the indoor unit first, then connect it to the outdoor unit. You should first connect the low-pressure pipe, then the high-pressure pipe.

- When connecting the flare nuts, apply a thin coat of refrigeration oil to the flared ends of the pipes.
- Align the center of the two pipes that you will connect.
- Tighten the flare nut as tightly as possible by hand.
- Using a spanner, grip the nut on the unit tubing.
- Be sure to use two spanners and proper torque to fasten the nut, too large torque will damage the bellmouthing, and too small torque may cause leakage. Refer the following table for different pipe connection.

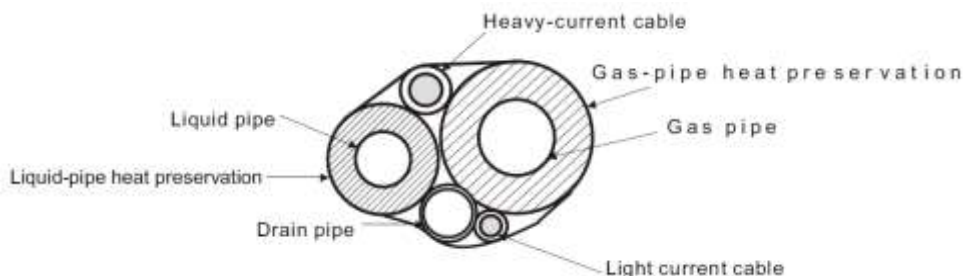
Pipe Diameter	Torque		Sketch map
	(kgf.cm)	(N.cm)	
1/4" (6.35)	144~176	1420~1720	
3/8" (9.52)	333~407	3270~3990	
1/2" (12.7)	504~616	4950~6030	
5/8" (15.9)	630~770	6180~7540	
3/4" (19)	990~1210	9270~11860	

**NOTE:** Ensure to wrap insulation around the piping. Direct contact with the bare piping may result in burns or frostbite.

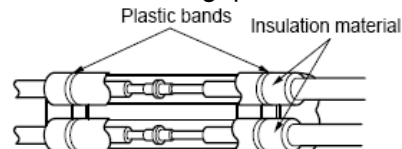
Make sure the pipe is properly connected. Over tightening may damage the bell mouth and under tightening may lead to leakage.

- After connecting the copper pipes to the indoor unit, wrap the power cable, signal cable and the piping together with binding tape.

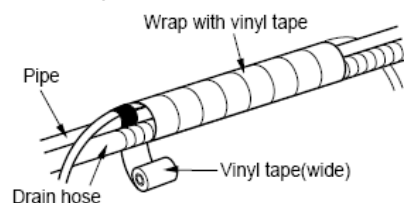
**NOTE:** While bundling these items together, DO NOT intertwine or cross the signal cable with any other wiring.



- Overlap the connection pipe insulation material and the indoor unit pipe insulation material. Bind them together with vinyl tape so that there is no gap



- Bundle the piping and drain hose together by wrapping them with vinyl tape over the range within which they fit into the rear piping housing section.



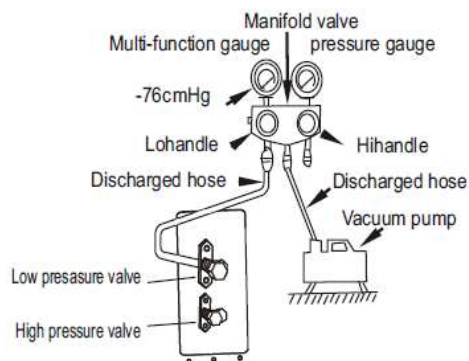
## 2.5 Vacuum Drying and Leakage Detection

### 2.5.1 Safety Precautions

- Use a vacuum pump with a gauge reading lower than -0.1 MPa and an air discharge capacity above 40L/min.
- The outdoor unit does not need vacuuming. DO NOT open the outdoor unit's gas and liquid stop valves.
- Ensure that the Compound Meter reads -0.1 MPa or below after 2 hours. If after three hours of operation and the gauge reading is still above -0.1 MPa, check if there is a gas leak or water inside the pipe. If there is no leakage, perform another evacuation for 1 or 2 hours.
- DO NOT use refrigerant gas to evacuate the system.

### 2.5.2 Evacuation Instructions

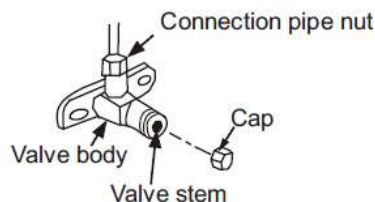
**NOTE:** Before using manifold pressure gauge and vacuum pump, please read their operating instructions and be familiar with how to use the manual correctly



1. Connect the hose of manifold pressure gauge to the maintenance port on the low pressure valve of outdoor unit.
2. Connect another hose from manifold pressure gauge to vacuum pump.
3. Open the Low Pressure side of the manifold gauge. Keep the High Pressure side closed.
4. Turn on the vacuum pump to empty the gas in the system.
5. Run the vacuum pump for at least 15 minutes, or until the compound meter reads - 76cmhg (- 1 X105pa).
6. Close the low pressure side of the manifold pressure gauge and close the vacuum pump.
7. Wait for 5 minutes and check whether the system pressure changes.

**NOTE:** If there is no change in system pressure, unscrew the cap from the high pressure valve. If there is a change in system pressure, there may be a gas leak.

8. Insert a hex wrench into the high-pressure valve and open the valve by turning the wrench in a 1 /4 counter clockwise turn. Listen for any gas coming out of the system and close the valve after 5 seconds.



9. Observe the pressure gauge for one minute to make sure that the pressure does not change. The pressure gauge should read slightly above atmospheric pressure
10. Remove the charge hose from the service port.
11. Using hexagonal wrench, fully open both the high pressure and low pressure valves.
12. Tighten valve caps by hand, then tighten it using the proper tool.

**NOTE:** When opening valve stems, turn the hexagonal wrench until it hits against the stopper. DO NOT try to force the valve to open further.

### 2.5.3 Leakage Detection

1).With leakage detection.

Check if there is leakage with leakage detection.

2).With soap water. If leakage detection is not available, please use soap water for leakage detection. Apply soap water at the suspected position and keep the soap water for more than 3min. If there are air bubbles coming out of this position, there a leakage.

### 2.6 Additional Refrigerant Charge

#### Note:

- Refrigerant charging must be done after wiring, vacuuming and leak testing.
- Use electronic scale or fluid infusion apparatus to weight refrigerant to be recharged. Be sure to avoid extra refrigerant charged, it may cause liquid hammer of the compressor or protections.
- Charging with mismatched refrigerant can cause an explosion or an accident. Make sure that a suitable refrigerant is used.
- The refrigerant container must be opened slowly. Always use guards when charging the system.
- Do not mix refrigerant types. For R32 refrigerant models, when adding refrigerant to the air conditioner, ensure the safety of the conditions in the area by controlling flammable materials
- Always use gloves and glasses to protect your hands and eyes during the charge work.
- Use supplementing flexible pipe to connect refrigerant cylinder, pressure gauge and outdoor unit. And The refrigerant should be charged in liquid state. Before recharging, The air in the flexible pipe and manifold gauge should be exhausted.
- After finished refrigerant recharge process, check whether there is refrigerant leakage at the connection joint part.(Using gas leakage detector or soap water to detect).

Some systems require additional refrigerant charge depending on the length of the pipe. The standard pipe length of this air conditioner is 5 meters (16 feet). The following table can be used to calculate the additional refrigerant to be charged:

Liquid pipe diameter	6.35(1/4")	9.52(3/8")	12.71(1/2")
Additional charge for 1m/ft (R32)	12g/0.13oz	24g/0.26oz	40g/0.42oz
Additional charge for 1m/ft (R410A)	15g/0.16oz	30g/0.32oz	65g/0.69oz

### 2.7 Engineering of Insulation

#### 2.7.1 Insulation of Refrigerant Pipe

##### 2.7.1.1 Operational Procedure of Refrigerant Pipe Insulation

Cut the suitable pipe → insulation (except joint section) → flare the pipe → piping layout and connection → vacuum drying → insulate the joint parts

##### 2.7.1.2 Purpose of Refrigerant Pipe Insulation

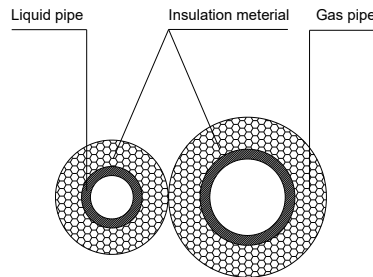
- During operation, temperature of gas pipe and liquid pipe shall be over-heating or over-cooling extremely. Therefore, it is necessary to carry out insulation; otherwise it shall debase the performance of unit and burn compressor.
- Gas pipe temperature is very low during cooling. If insulation is not enough, it shall form dew and cause leakage.
- Temperature of gas pipe is very high (generally 50-100°C) during heating. Insulation work must be carried out to prevent hurt by carelessness touching.

##### 2.7.1.3 Insulation Material Selection for Refrigerant Pipe

- The burning performance should over 120°C
- According to the local law to choose insulation materials
- The thickness of insulation layer shall be above 10mm.If in hot or wet environment place, the layer of insulation should be thicker accordingly.

### 2.7.1.4 Installation Highlights of Insulation Construction

- Gas pipe and liquid pipe shall be insulated separately, if the gas pipe and liquid pipe were insulated together; it will decrease the performance of air conditioner.



- The insulation material at the joint pipe shall be 5~10cm longer than the gap of the insulation material.
- The insulation material at the joint pipe shall be inserted into the gap of the insulation material.
- The insulation material at the joint pipe shall be banded to the gap pipe and liquid pipe tightly.
- The linking part should be use glue to paste together
- Be sure not bind the insulation material over-tight, it may extrude out the air in the material to cause bad insulation and cause easy aging of the material.

## 2.7.2 Insulation of Drainage Pipe

### 2.7.2.1 Operational Procedure of Refrigerant Pipe Insulation

Select the suitable pipe → insulation (except joint section) → piping layout and connection → drainage test → insulate the joint parts

### 2.7.2.2 Purpose of Drainage Pipe Insulation

The temperature of condensate drainage water is very low. If insulation is not enough, it shall form dew and cause leakage to damage the house decoration.

### 2.7.2.3 Insulation Material Selection for Drainage Pipe

- The insulation material should be flame retardant material, the flame retardancy of the material should be selected according to the local law.
- Thickness of insulation layer is usually above 10mm.
- Use specific glue to paste the seam of insulation material, and then bind with adhesive tape. The width of tape shall not be less than 5cm. Make sure it is firm and avoid dew.

### 2.7.2.4 Installation and Highlights of Insulation Construction

- The single pipe should be insulated before connecting to another pipe, the joint part should be insulated after the drainage test.
- There should be no insulation gap between the insulation material.

## 2.8 Electricity and wiring

### Safety precaution

- 1) Must follow the electric safety regulations when installing the unit.
- 2) According to the local safety regulations, use qualified power supply circuit and air switch.
- 3) Make sure the power supply matches with the requirement of air conditioner. Unstable power supply or incorrect wiring may result in electric shock, fire hazard or malfunction. Please install proper power supply cables before using the air conditioner.

The power cord should be selected according to the following specifications sheet.

Appliance Amps(A)	Wire Size (mm <sup>2</sup> )
5	0.75
10	1.0
16	1.5
25	2.5
32	4.0
40	6.0



### 3. Maintenance

#### 3.1 Failure code

Code	Reason	Remark
E0	IDU & ODU Communication failure	The IDU & ODU wiring connection correct?
E1	IDU Room Temperature sensor failure. (IDU RT failure)	IDU sensor and PCB.
E2	IDU Coil temperature sensor failure. (IDU IPT failure)	IDU sensor and PCB.
E3	ODU Coil temperature sensor failure. (OPT)	ODU coil sensor and ODU PCB
E4	AC Cooling system abnormal	Gas leakage? 2-way or 3-way valve blocked etc.
E5	IDU/ODU mismatched failure (specially performance test on the production line)	/
E6	IDU PG Fan motor / DC fan motor works abnormal (IDU failure)	Fan motor, fan blade and PCB.
E7	ODU Ambient Temperature sensor failure	ODU ambient sensor and ODU PCB.
E8	ODU Discharge Temperature sensor failure.	ODU discharge sensor and ODU PCB.
E9	IPM / Compressor driving control abnormal.	ODU PCB , compressor, etc.
EA	ODU Current Test circuit failure	ODU PCB broken?
Eb	The Communication abnormal of Main PCB and Display board (IDU failure)	Display board and main PCB.
EE	ODU EEPROM failure.	1. ODU PCB broken? 2. Try to re-power on AC unit.
EF	ODU DC fan motor failure.	Fan motor, ODU PCB.
EU	ODU Voltage test circuit abnormal.	ODU PCB.
P0	IPM module protection.	ODU PCB
P1	Over / under voltage protection.	1. ODU PCB broken? 2. Power supply abnormal?
P2	Over current protection.	1. ODU PCB broken? 2. Power supply abnormal?
P4	ODU Discharge pipe Over temperature protection.	Please check the troubleshooting for detail.
P5	Sub-cooling protection on Cooling mode.	Please check the troubleshooting for detail.
P6	Overheating protection on Cooling mode.	Please check the troubleshooting for detail.
P7	Overheating protection on Heating mode.	Please check the troubleshooting for detail.
P8	Outdoor Over temperature/Under temperature protection.	Please check the troubleshooting for detail.
P9	Compressor driving protection (Load abnormal).	Please check the troubleshooting for detail.
PA	Communication failure for TOP flow unit/ Preset mode conflict. (IDU failure)	Please check the troubleshooting for detail.
F0	Infrared Customer feeling test sensor failure. (IDU failure)	Querying by press remote controller
F1	Electric Power test module failure. (IDU failure)	Querying by press remote controller
F2	Discharge temperature sensor failure PROTECTION.	Please check the troubleshooting for detail.
F3	ODU coil temperature failure PROTECTION..	Please check the troubleshooting for detail.
F4	Cooling system gas flow abnormal PROTECTION..	Please check the troubleshooting for detail.

F5	PFC PROTECTION	Please check the troubleshooting for detail.
F6	The Compressor lack of phase / Anti-phase PROTECTION.	Please check the troubleshooting for detail.
F7	IPM Module temperature PROTECTION	Please check the troubleshooting for detail.
F8	4-Way Valve reversing abnormal..	Please check the troubleshooting for detail.
F9	The module temperature test circuit failure.	ODU PCB
FA	The compressor Phase-current test circuit failure.	ODU PCB
Fb	Limiting/Reducing frequency for Over load protection on Cooling/Heating mode.	Querying by press remote controller
FC	Limiting/Reducing frequency for High power consumption protection.	Querying by press remote controller
FE	Limiting/Reducing frequency for Module current protection ( phase current of compressor).	Querying by press remote controller
FF	Limiting/Reducing frequency for Module temperature protection.	Querying by press remote controller
FH	Limiting/Reducing frequency for Compressor driving protection.	Querying by press remote controller
FP	Limiting/Reducing frequency for anti-condensation protection..	Querying by press remote controller
FU	Limiting/Reducing frequency for anti-frost protection.	Querying by press remote controller
Fj	Limiting/Reducing frequency for Discharge over temperature protection.	Querying by press remote controller
Fn	Limiting/Reducing frequency for ODU AC Current protection.	Querying by press remote controller
Fy	Gas leakage protection	Please check the troubleshooting for detail.
bf	TVOC sensor failure (IDU failure, optional)	Querying by press remote controller
bc	PM2.5 sensor failure (IDU failure, optional)	Querying by press remote controller
bj	Humidity sensor failure. (IDU failure)	Querying by press remote controller

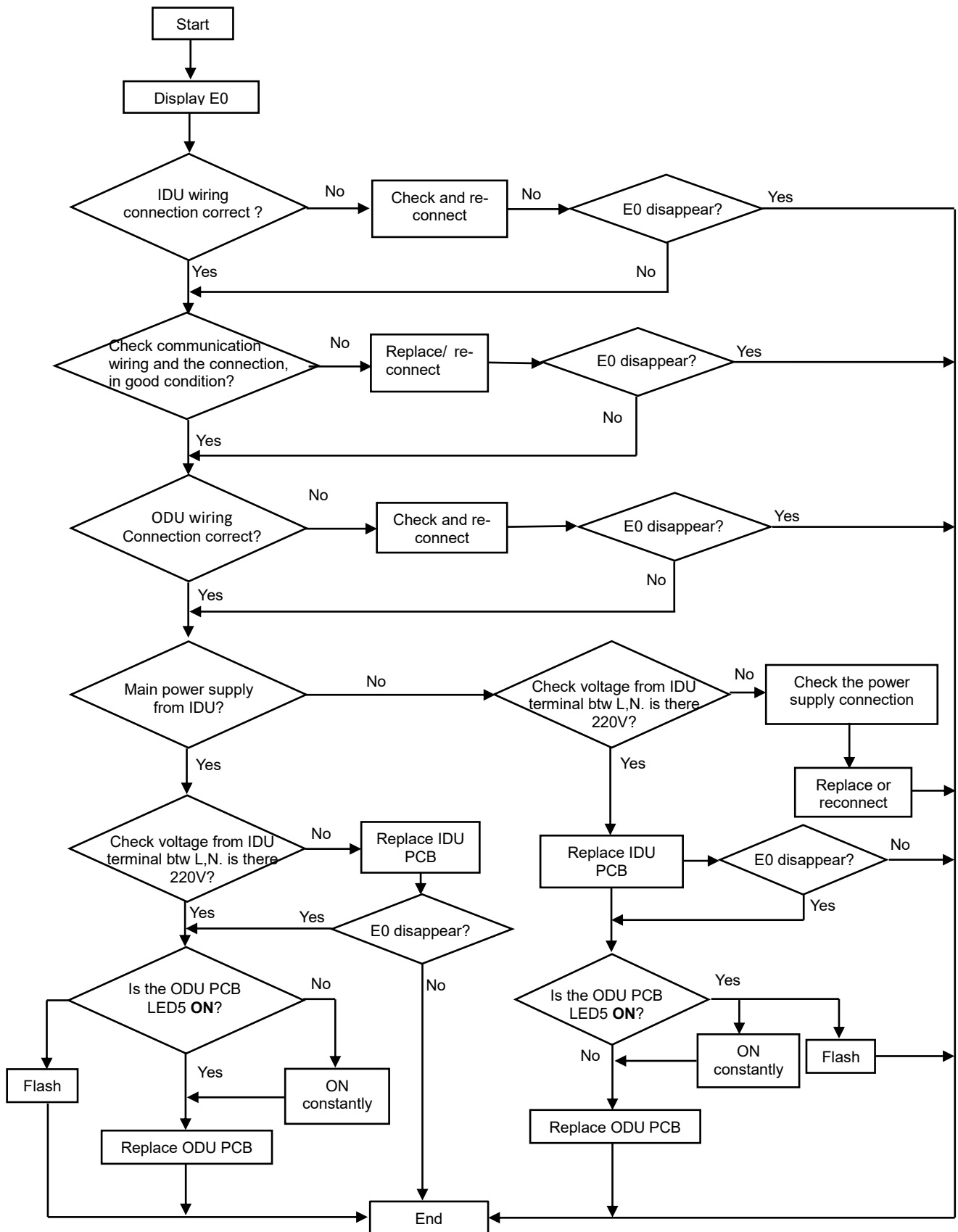
### Note: Remote controller FAILURE CODE Querying function

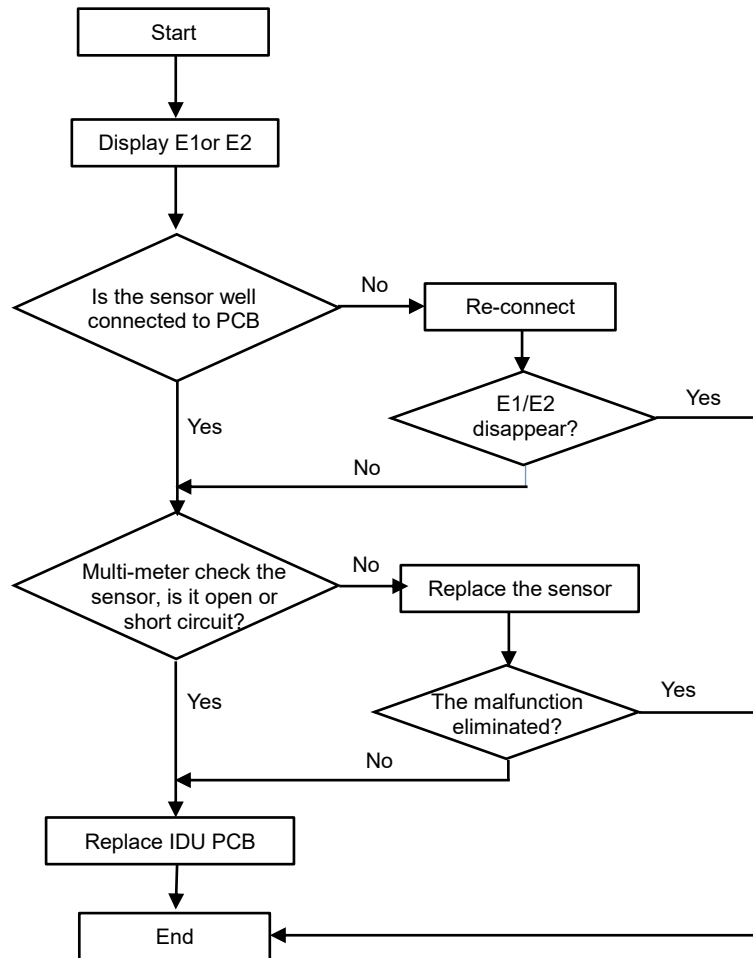
As shown in the failure codes, some of the codes (Fb~bj) need to press remote control for inspection.

While unit on operation, press the ECO button 8 times with 8 seconds, the buzzer BIBI 2 times, you can inspect the special failure code as Fb ~Fn, bj etc.

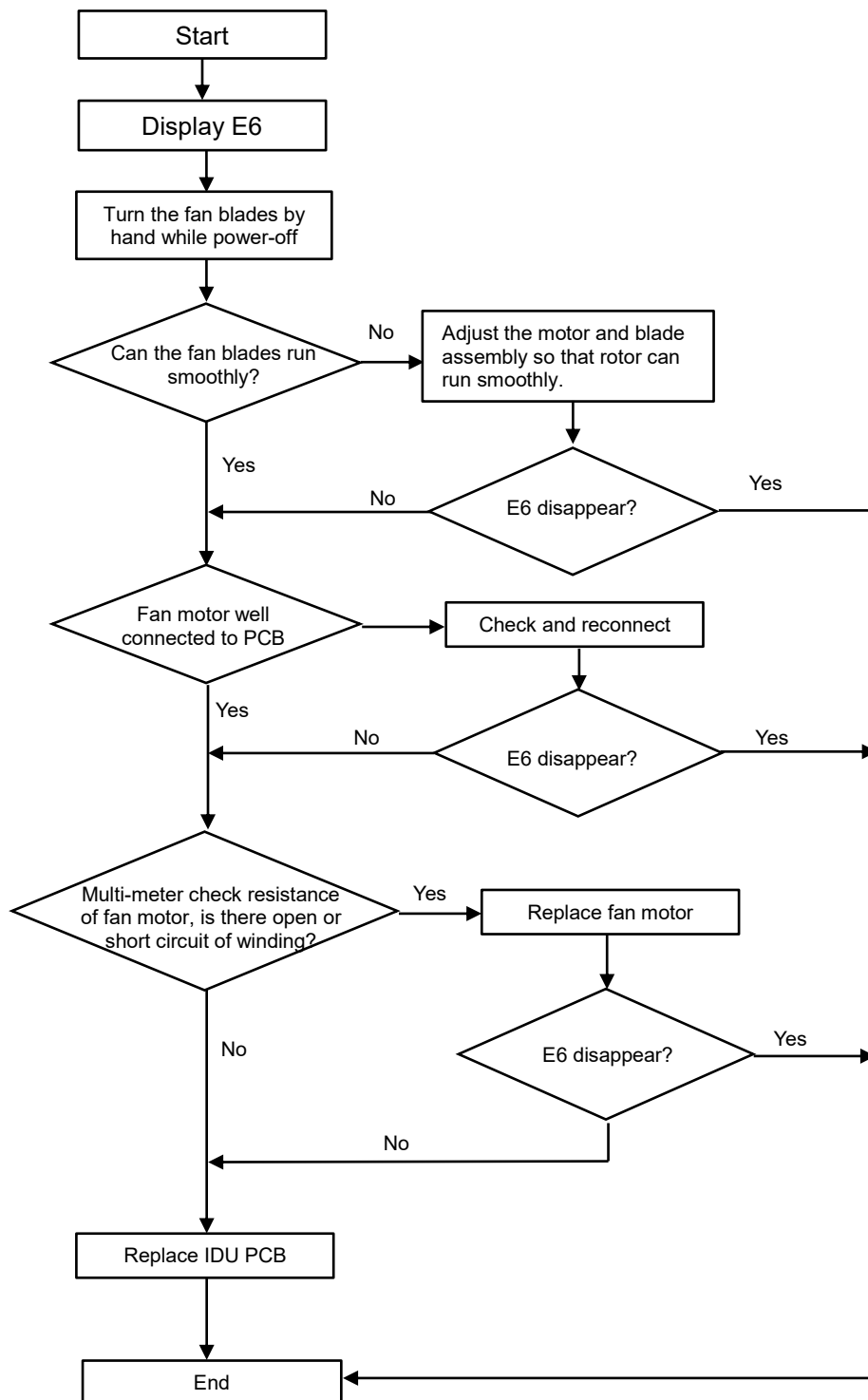
## 3.2 Trouble shooting

### 3.2.1 E0 ---IDU & ODU communication failure



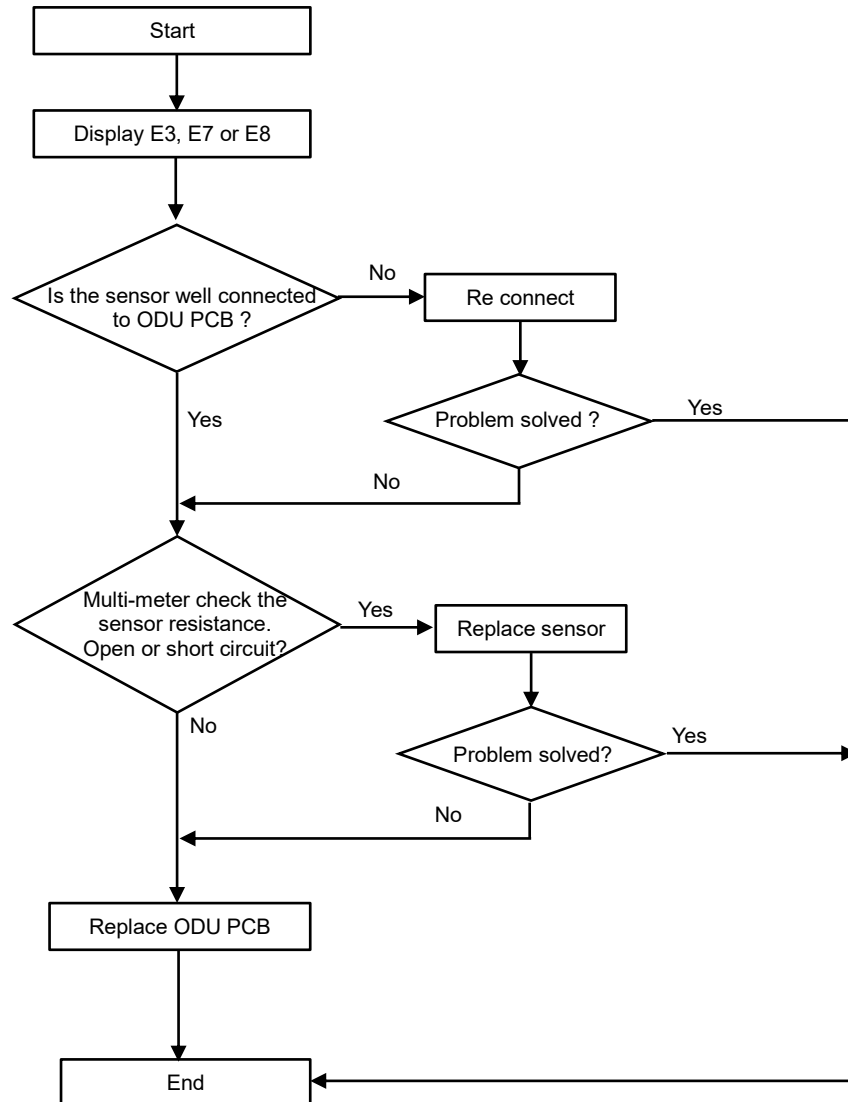
**3.2.2 E1, E2 ---IDU Room temperature sensor and/or coil temperature sensor failure.**

### 3.2.3 E6----IDU ventilation failure (PG and DC fan motor only)



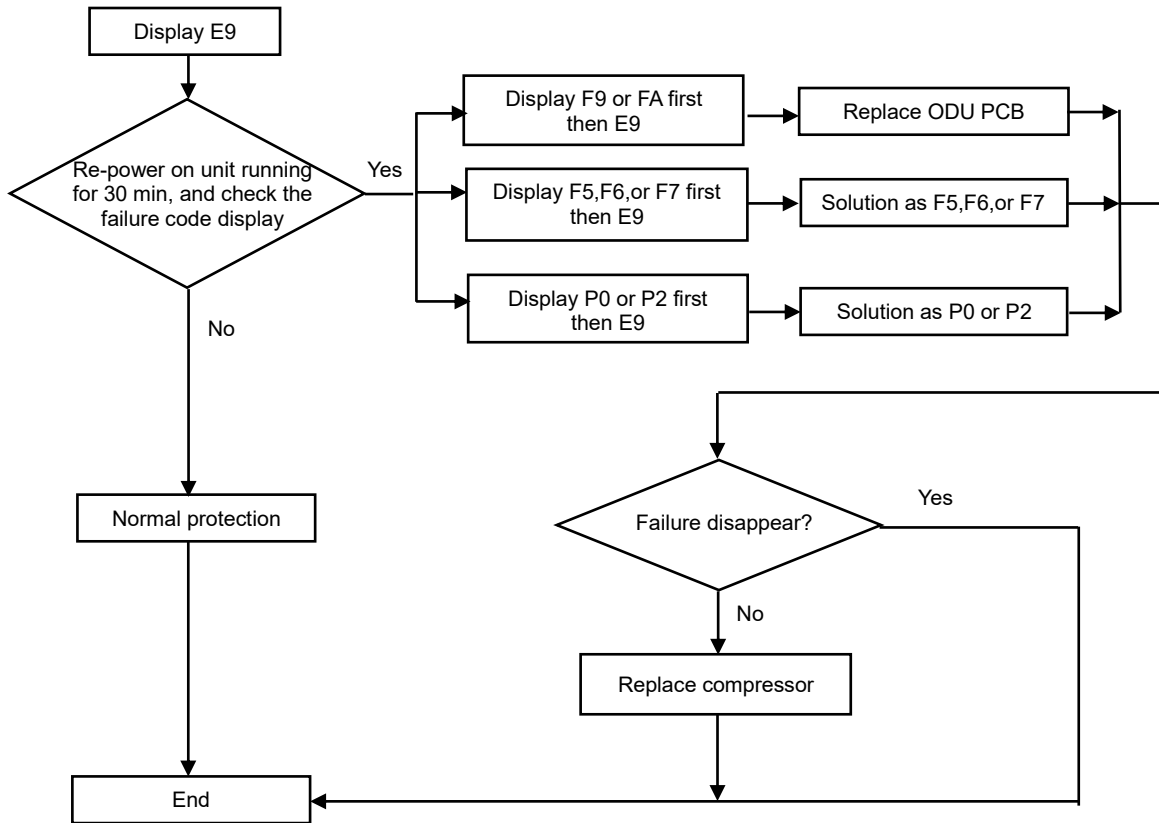
### 3.2.4 E3, E7 or E8----ODU Coil temperature sensor, Ambient temperature sensor or Discharge temperature sensor failure.

When any of the sensor resistance open or short circuit , unit will display failure code as E3/E7 or E8, IDU and ODU turns off. When the sensor resistance recovery, unit revert to be standby, customer can switch on the unit directly.

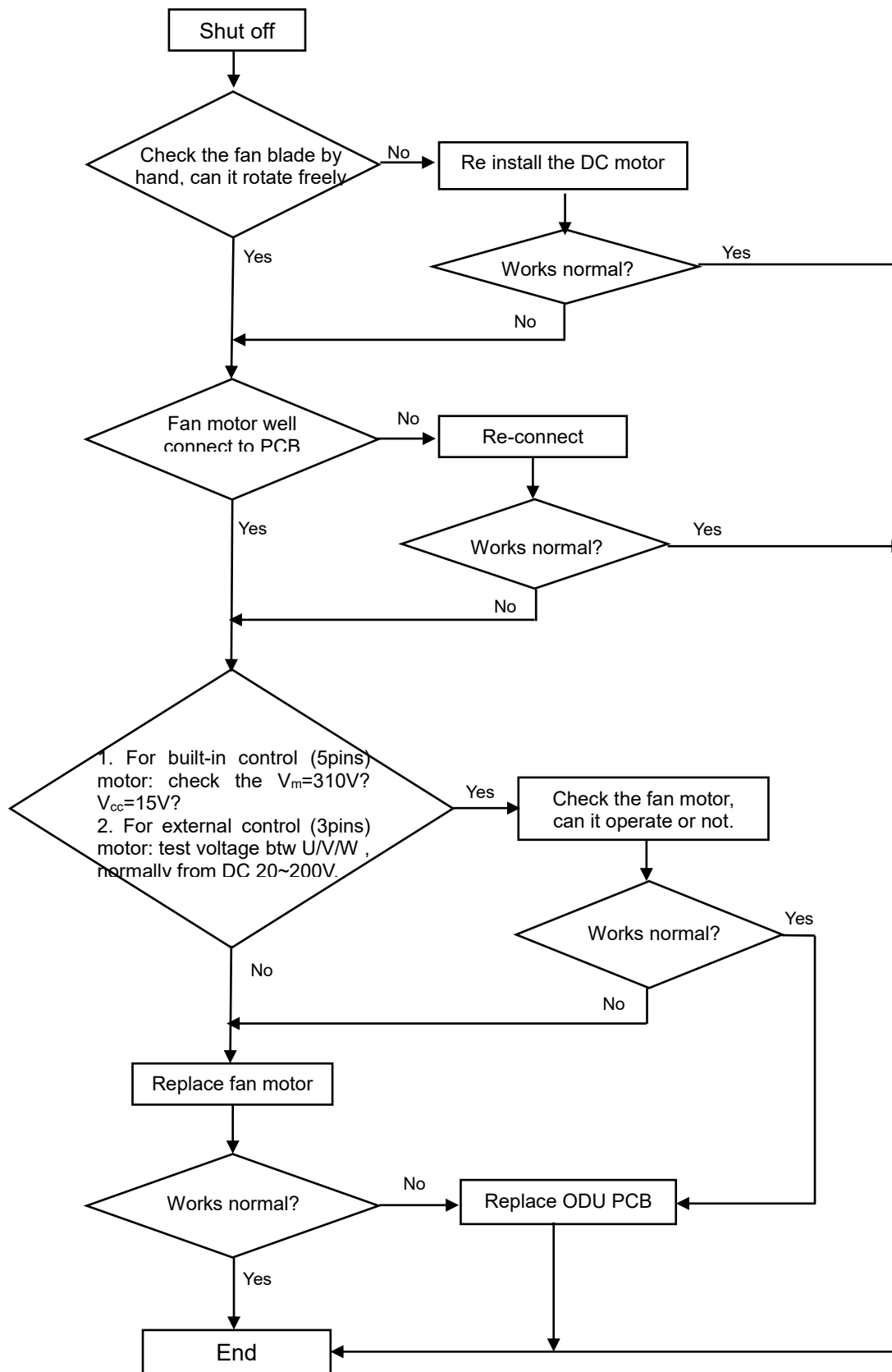


### 3.2.5 E9---ODU IPM /Compressor drive fault

If unit have 6 times stopping works for IPM protection (P0) continuously, it will display E9 error, and unit can't be recovered to operation, except press ON/OFF button.



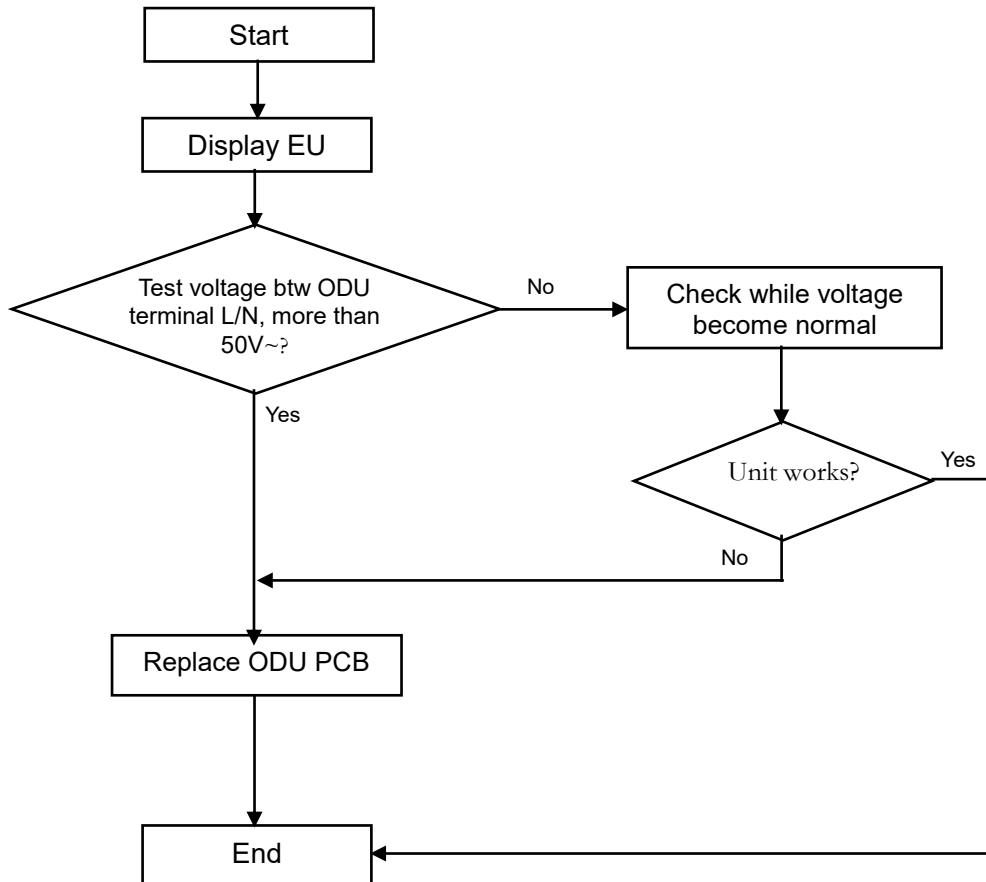
### 3.2.6 EF---ODU DC fan motor failure





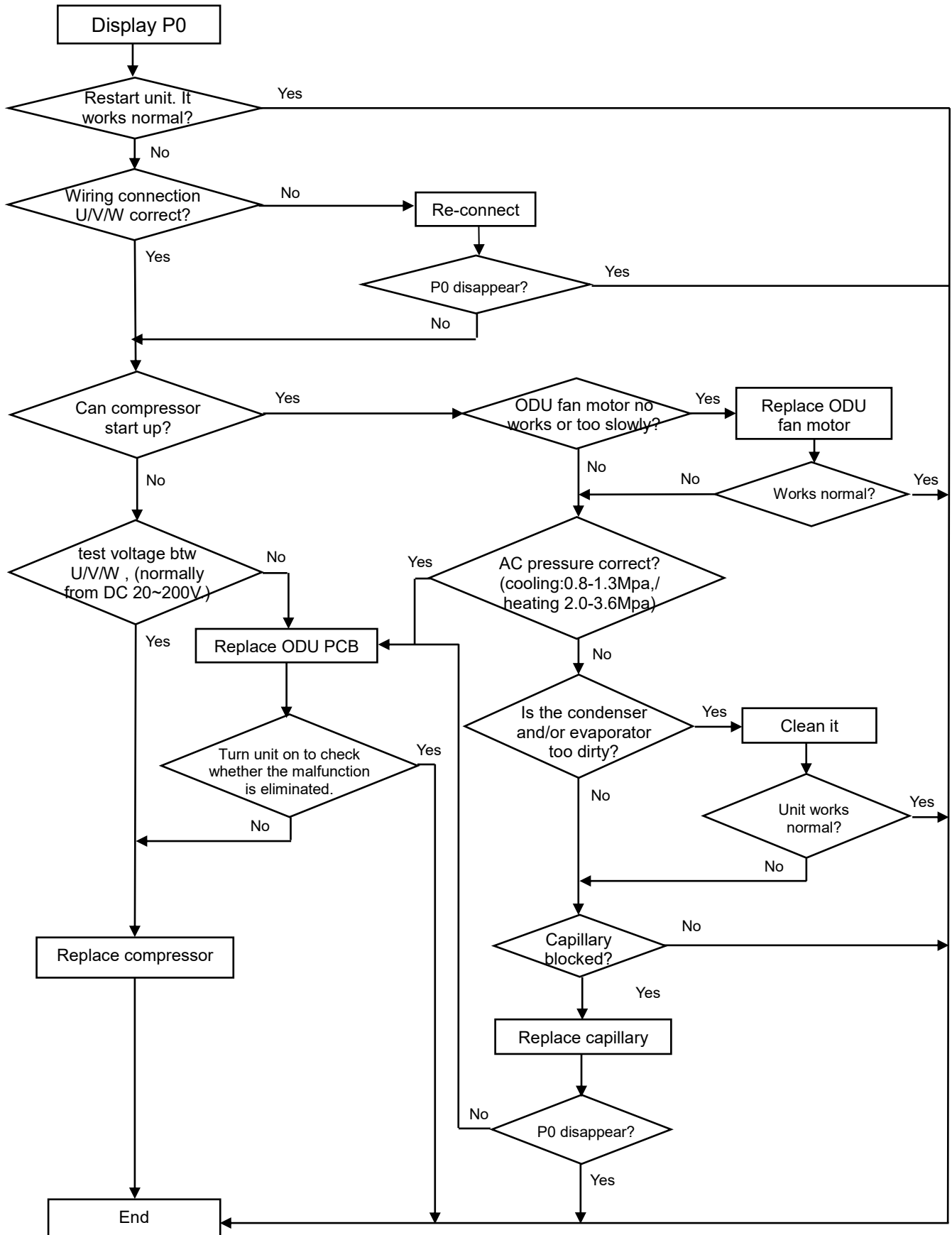
### 3.2.7 EU---ODU voltage test sensor failure

After power relay works, when tested voltage effective value less than 50V for 3s continuously, unit will display EU.



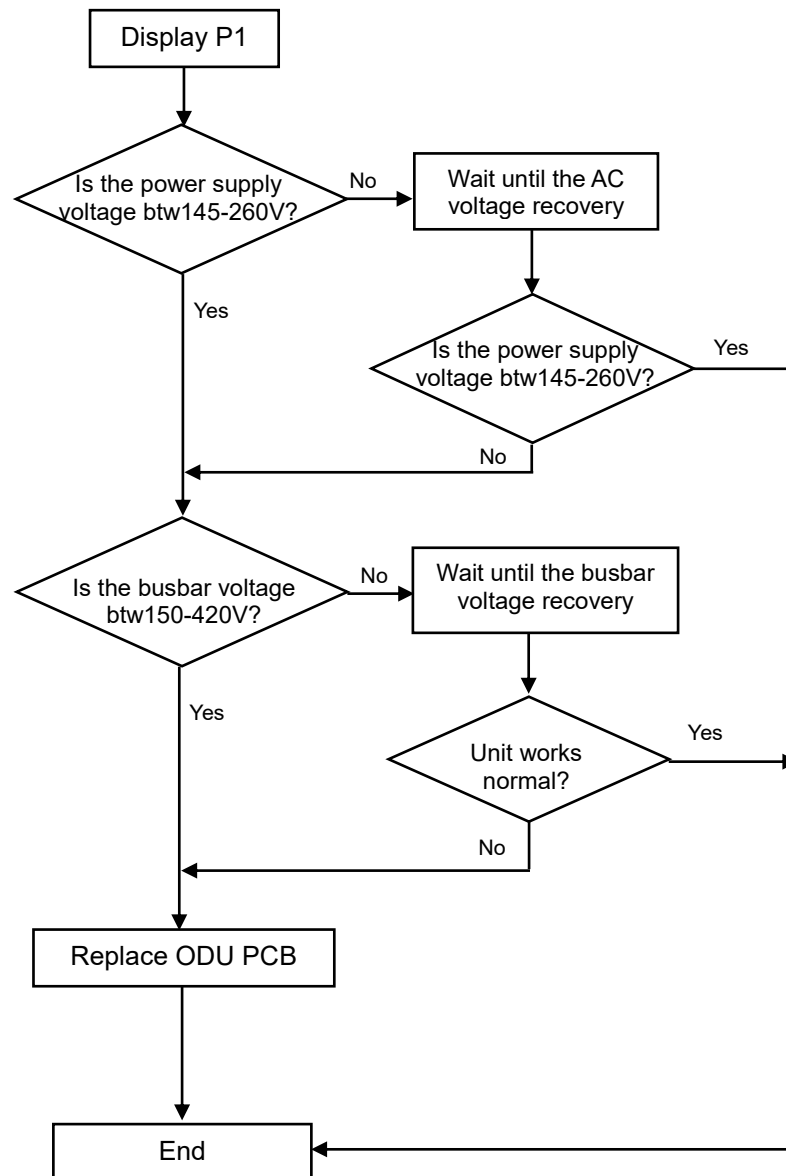
### 3.2.8 P0---IPM protection

When overheat or overcurrent for IPM, AC unit will display P0protection.



### 3.2.9 P1--- Over / under voltage protection

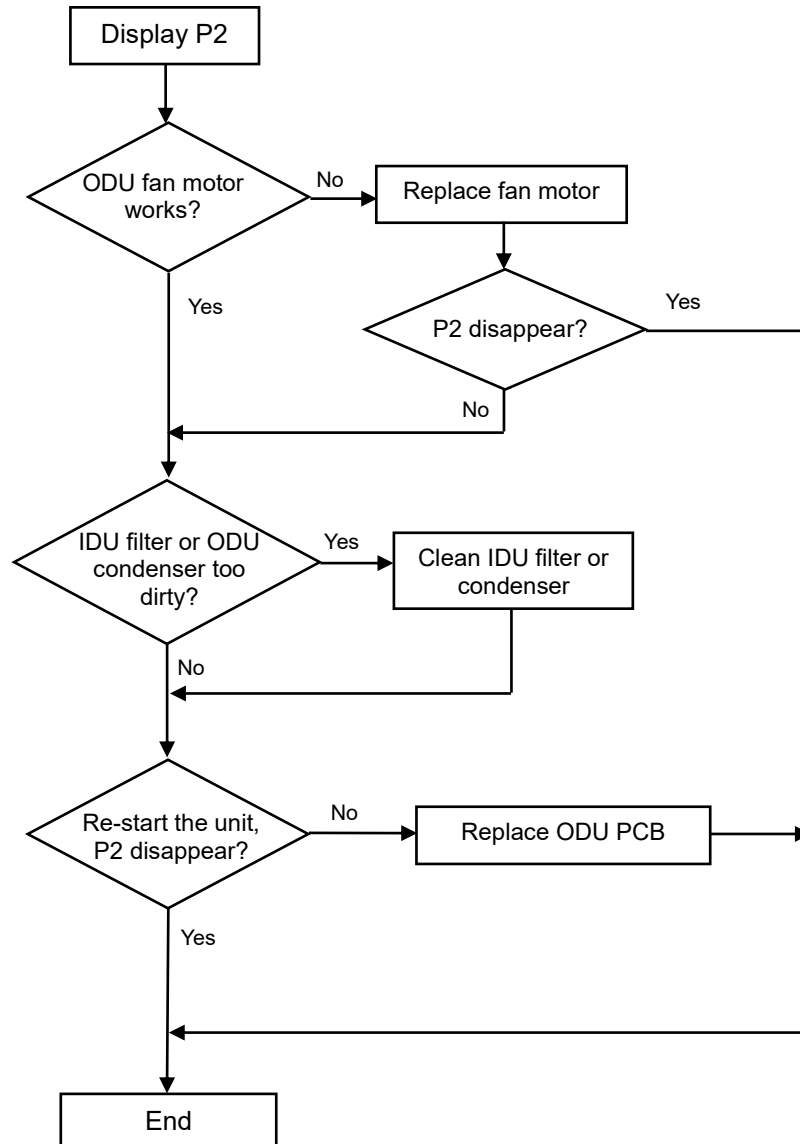
1. Test voltage between L & N, When the power supply  $V > AC260V$  or  $V < AC150V$ , AC will display P1 protection, unit will recover back to previous status while  $V > AC155V$ .
2. Test voltage on the big size electrolytic capacitor of ODU PCB, When DC busbar voltage  $V > DC420V$  or  $V < DC150V$ , unit will recover back to previous status while  $DC190V < V < DC410V$



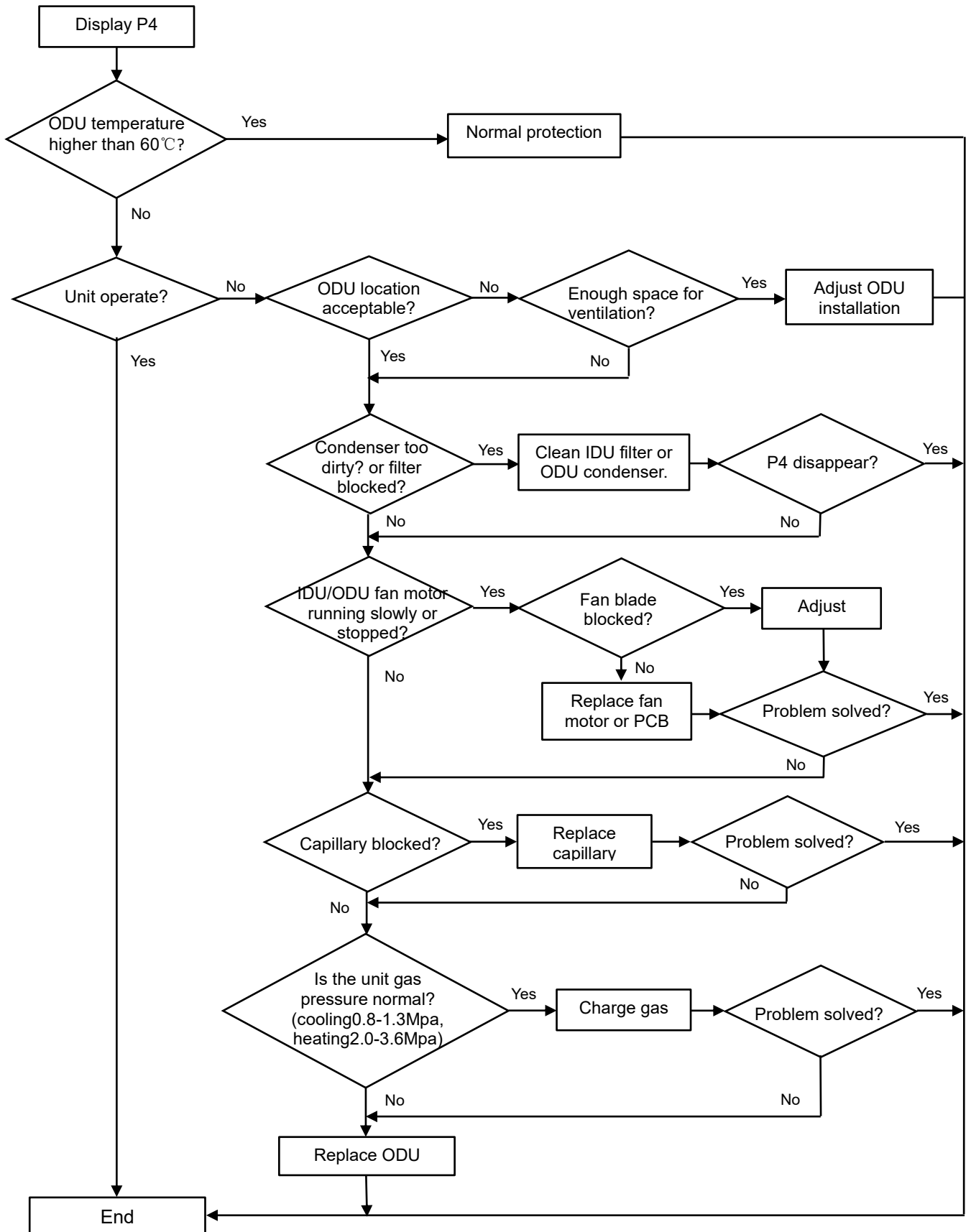
### 3.2.10 P2---Over Current protection

When the AC unit running current more than  $I_{max}$ , it will stop and display P2 protection.

*Note: for different AC model,  $I_{max}$  has difference value.*

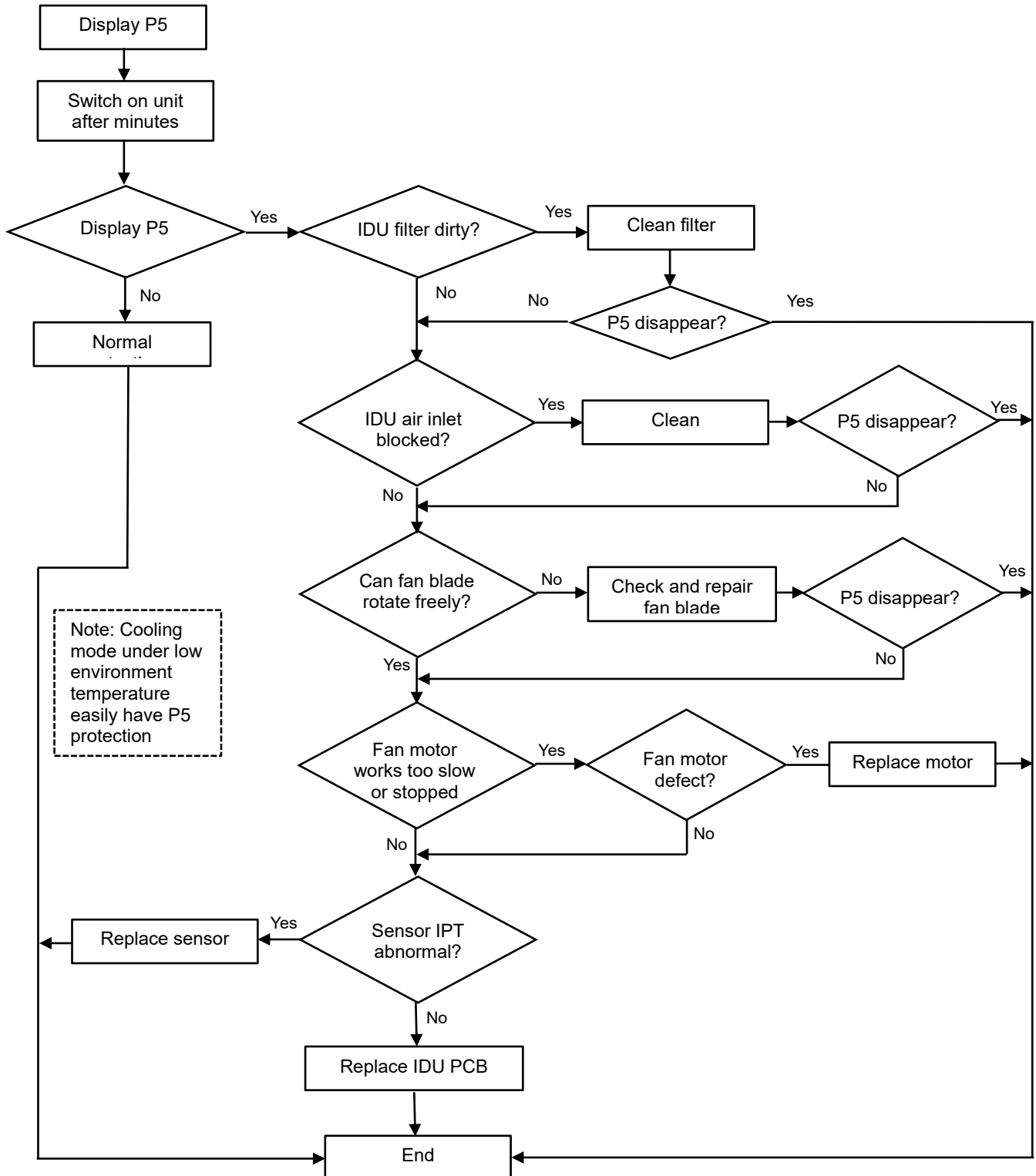


### 3.2.11 P4 ---ODU Discharge temperature overheating protection



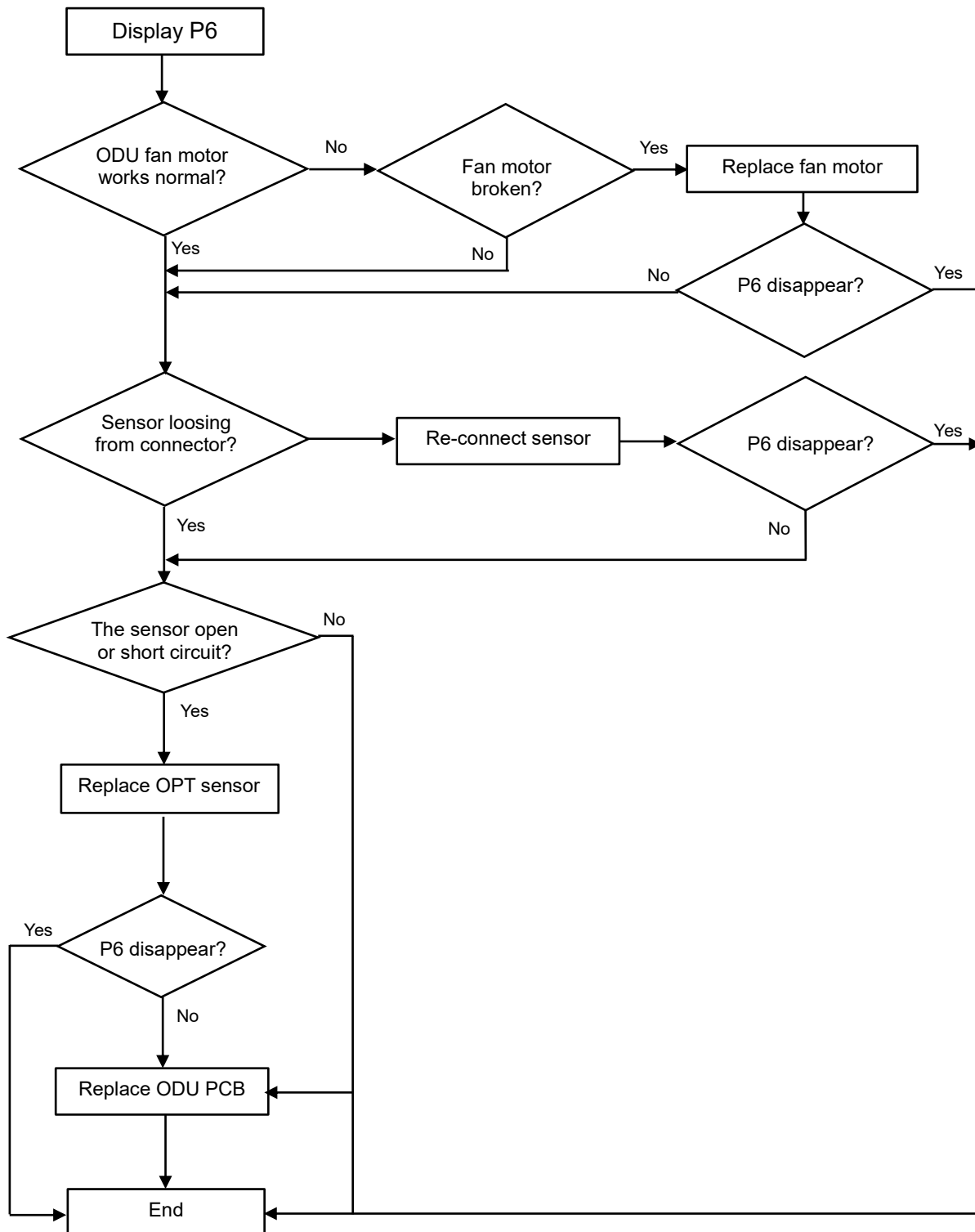
### 3.2.12 P5---Sub-cooling protection on Cooling/Dry mode

On Cooling or Dry mode, when IDU evaporator coil temperature  $IPT < 1^{\circ}\text{C}$  continuously for 3 min after compressor start up for 6 min, CPU will switch off outdoor unit and show P5 failure code.



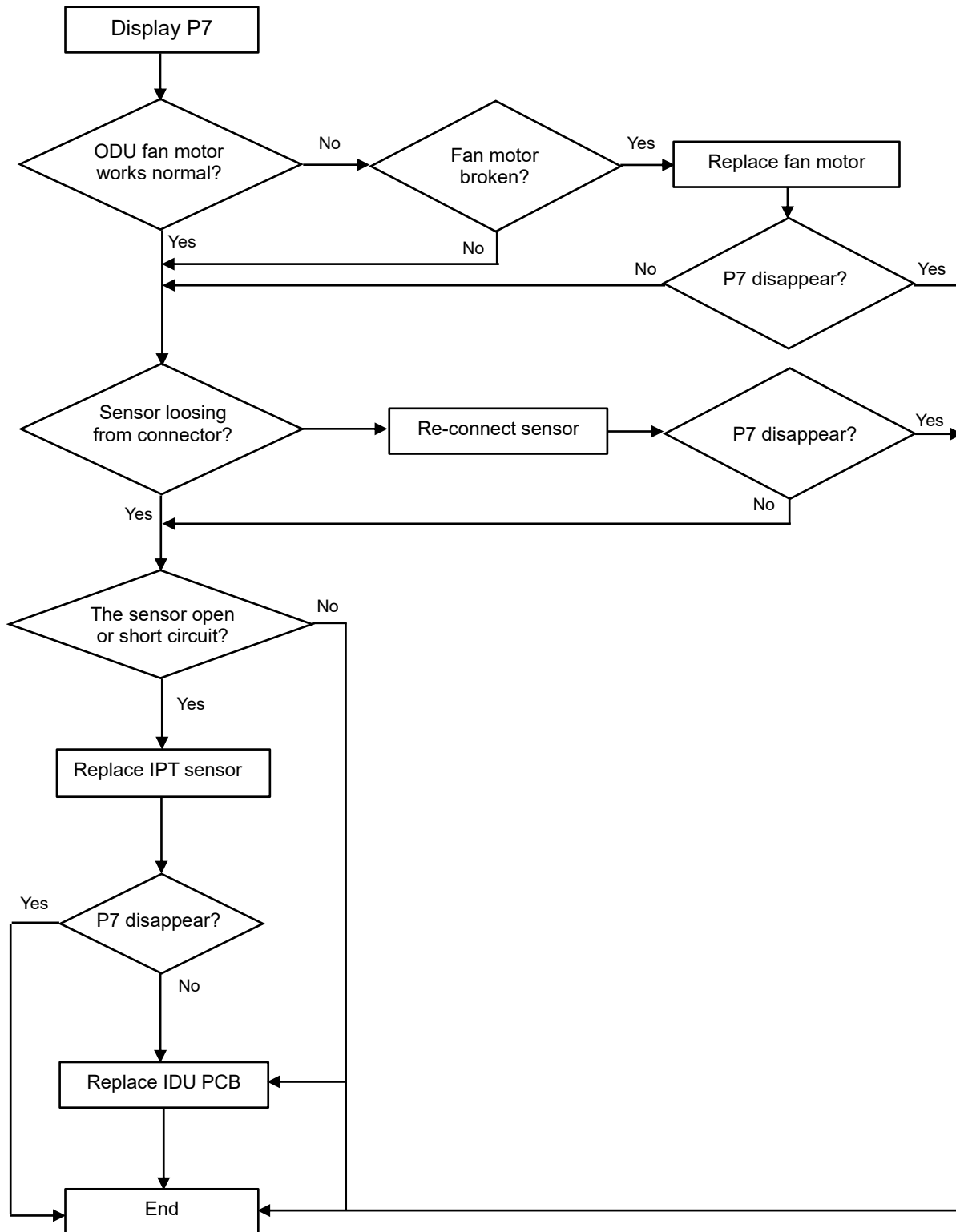
### 3.2.13 P6---Overheating protection on Cooling mode

On Cooling or Dry mode, when ODU condenser coil temperature  $OPT \geq 62^{\circ}\text{C}$  , MCU will switch off outdoor unit and show P6 failure code.



### 3.2.14 P7---Overheating protection on Cooling mode

On heating mode, when IDU evaporator coil temperature  $IPT \geq 62^{\circ}\text{C}$ , ODU PCB will switch off outdoor unit and show P7 failure code.





### 3.2.15 P8---Outdoor Overtemperature/Under-temperature protection

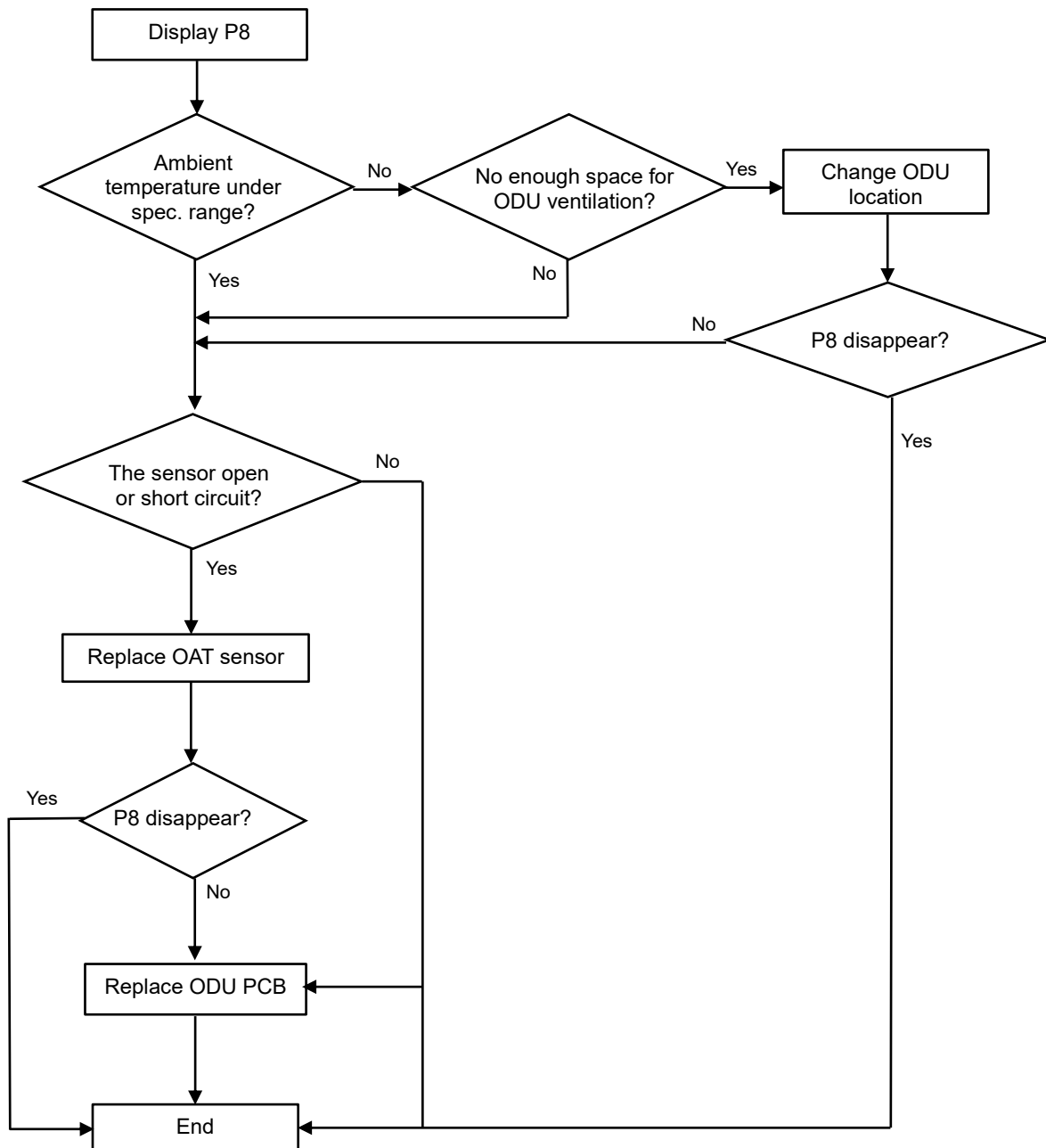
When environment temperature as below condition, the compressor will stop working, after 200s delay, the IDU will show P8 failure code.

(1). **On Cooling or Dry mode:** ODU ambient temperature:  $OAT < -20^{\circ}\text{C}$  or  $OAT > 63^{\circ}\text{C}$ ;

(2). **On Heating mode:**

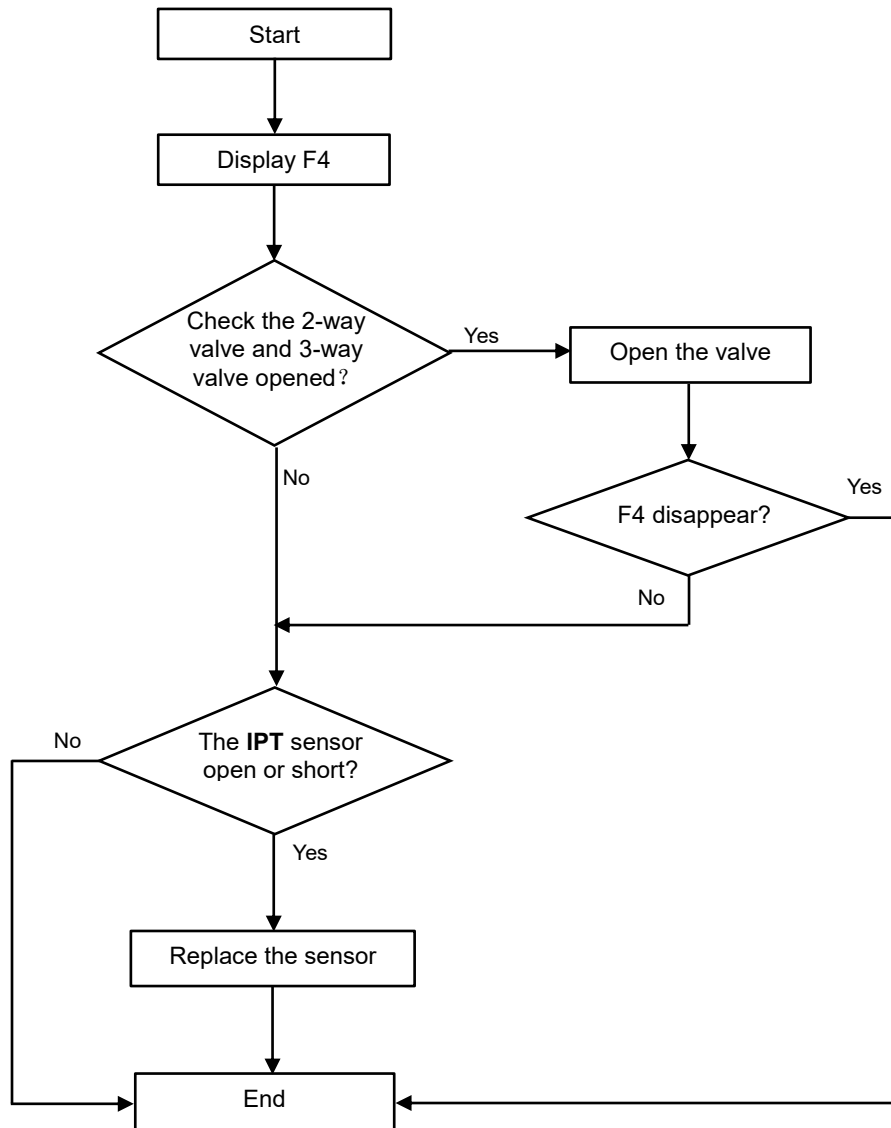
a.  $OAT \geq 40^{\circ}\text{C}$  or

b.  $30^{\circ}\text{C} < OAT \leq 40^{\circ}\text{C}$  and  $RT > 35^{\circ}\text{C}$



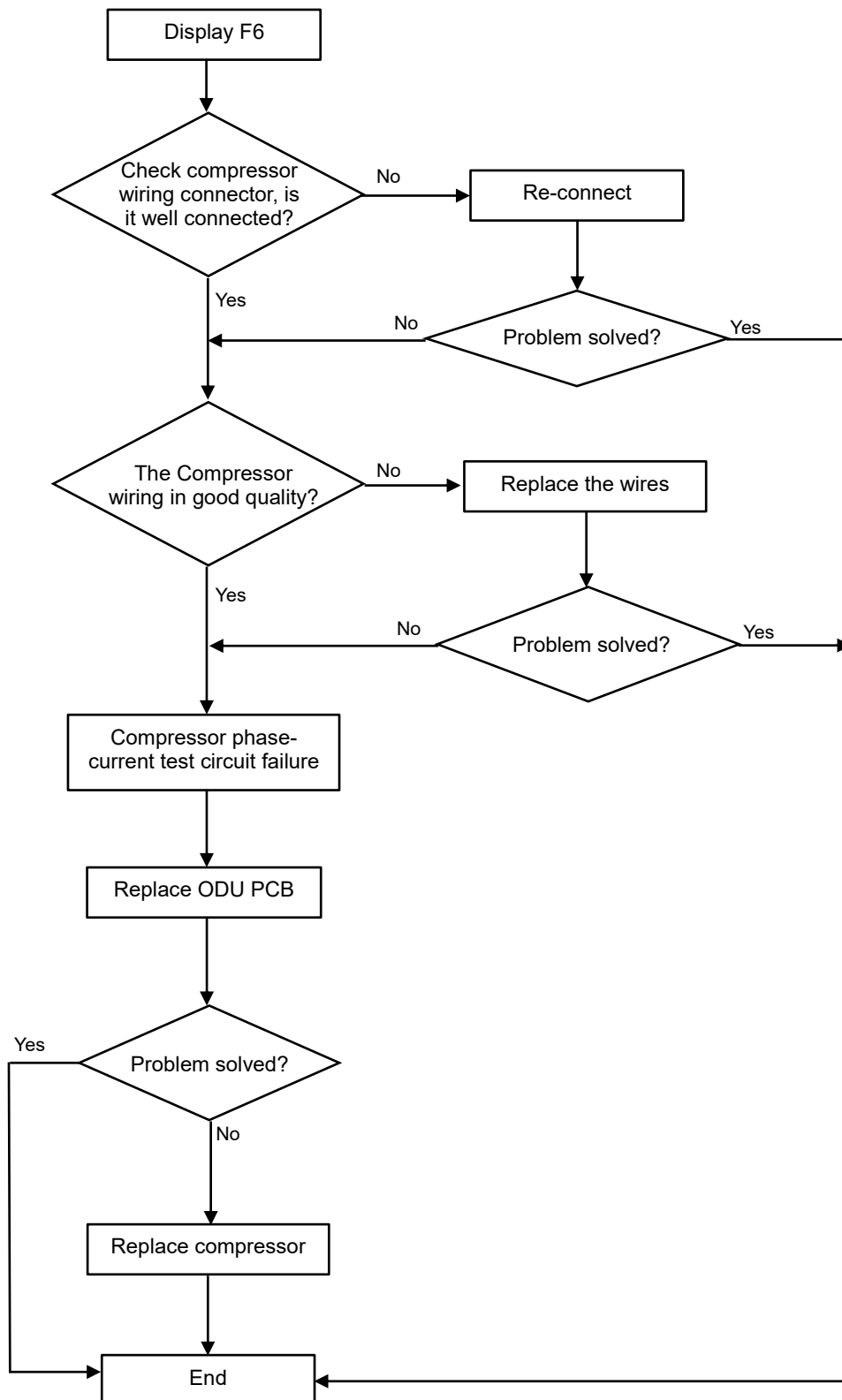
### 3.2.16 F4---Cooling system Gas flow abnormal protection

When compressor startup, unit will check the variation of IDU coil temperature. If there is mistake installer forgetting to open the 2-way or 3-way valve on ODU, the gas can't flow in the cooling system, it will show F4 protection.



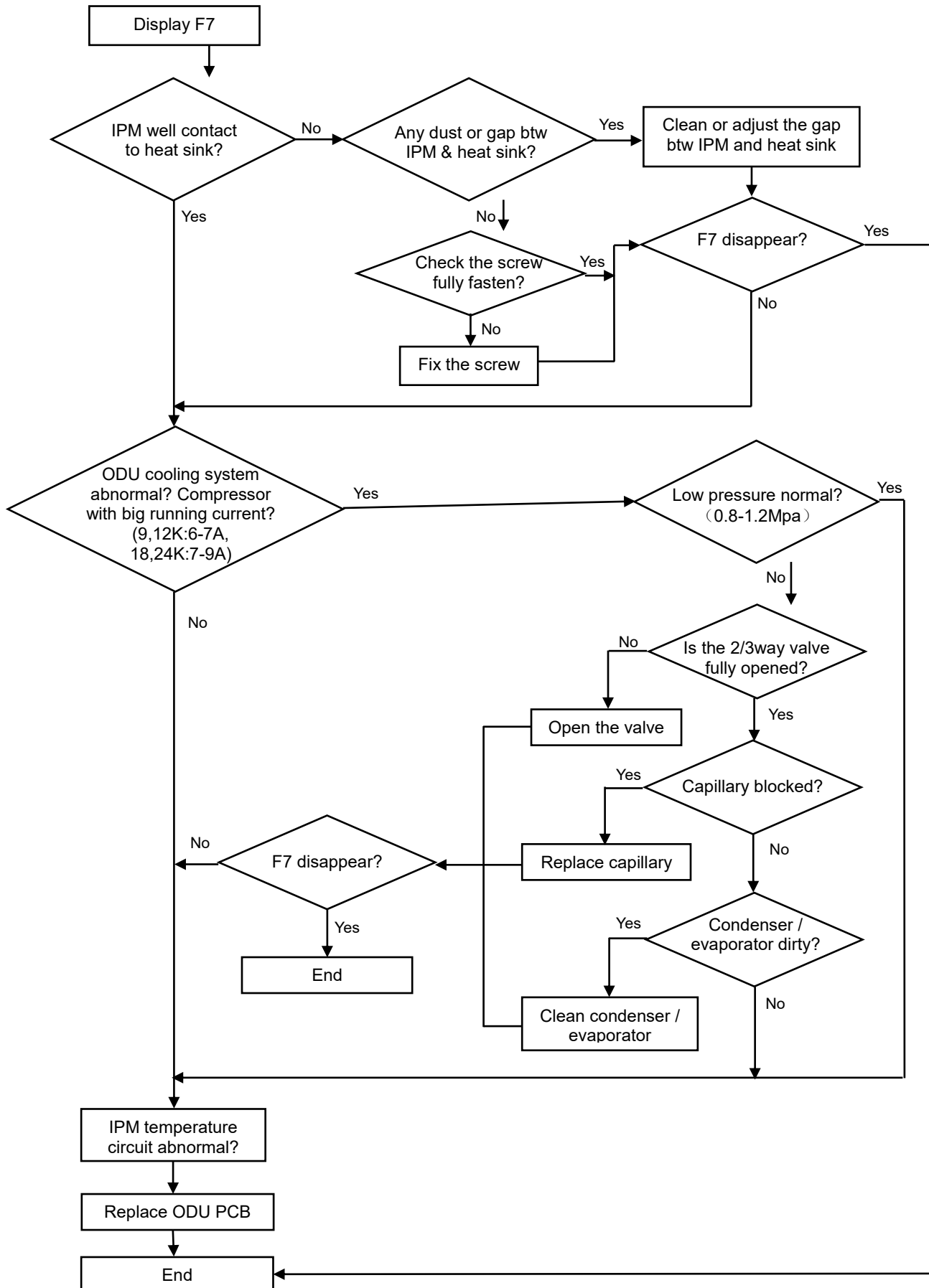
### 3.2.17 F6 The Compressor Lack of phase / Anti-phase protection.

If ODU PCB can't test one, or even three phase of compressor current, it will show F6 protection.



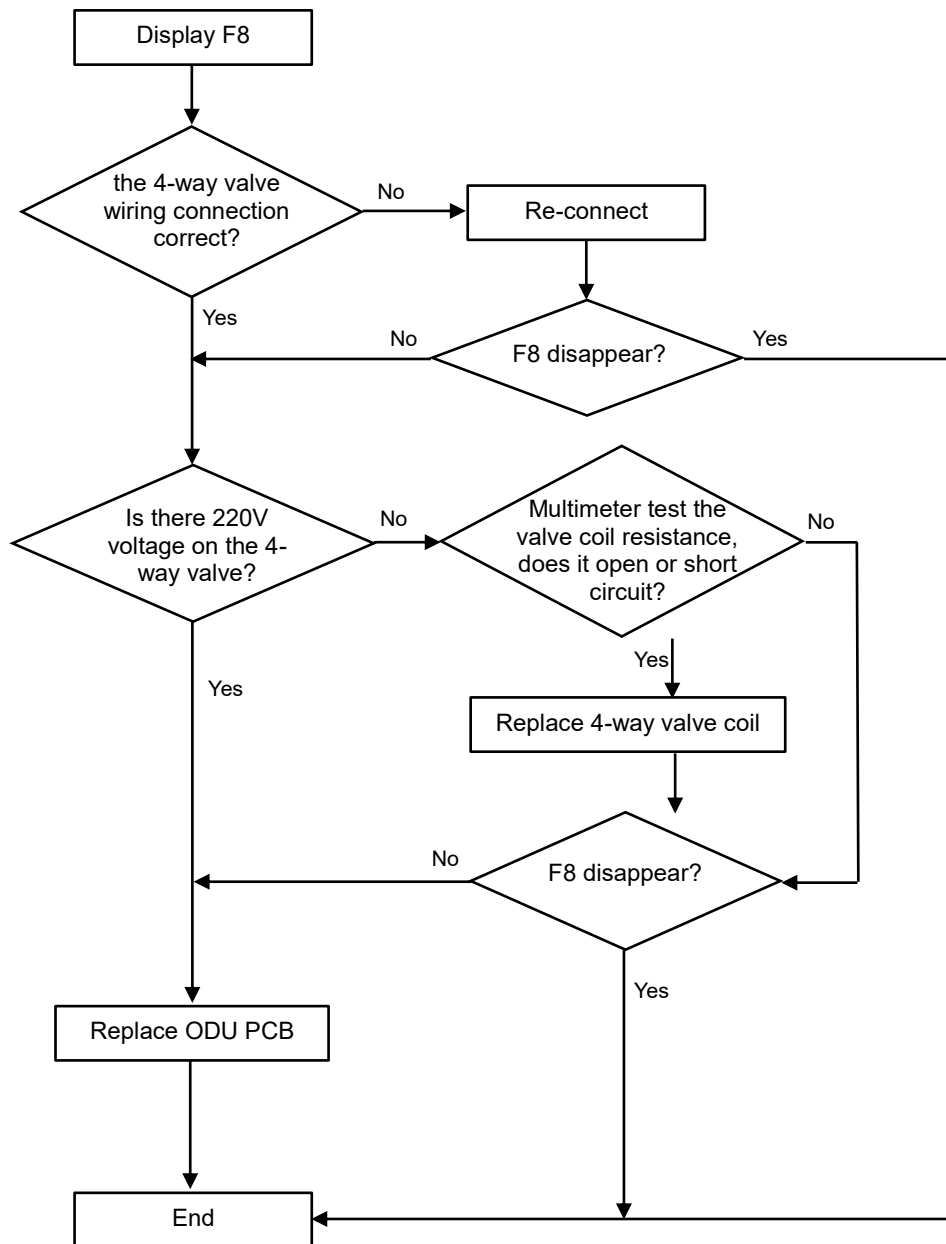
### 3.2.18 F7---Module temperature protection.

IPM overtemperature protection, when IPM temperature more than 95℃, it will show F7.



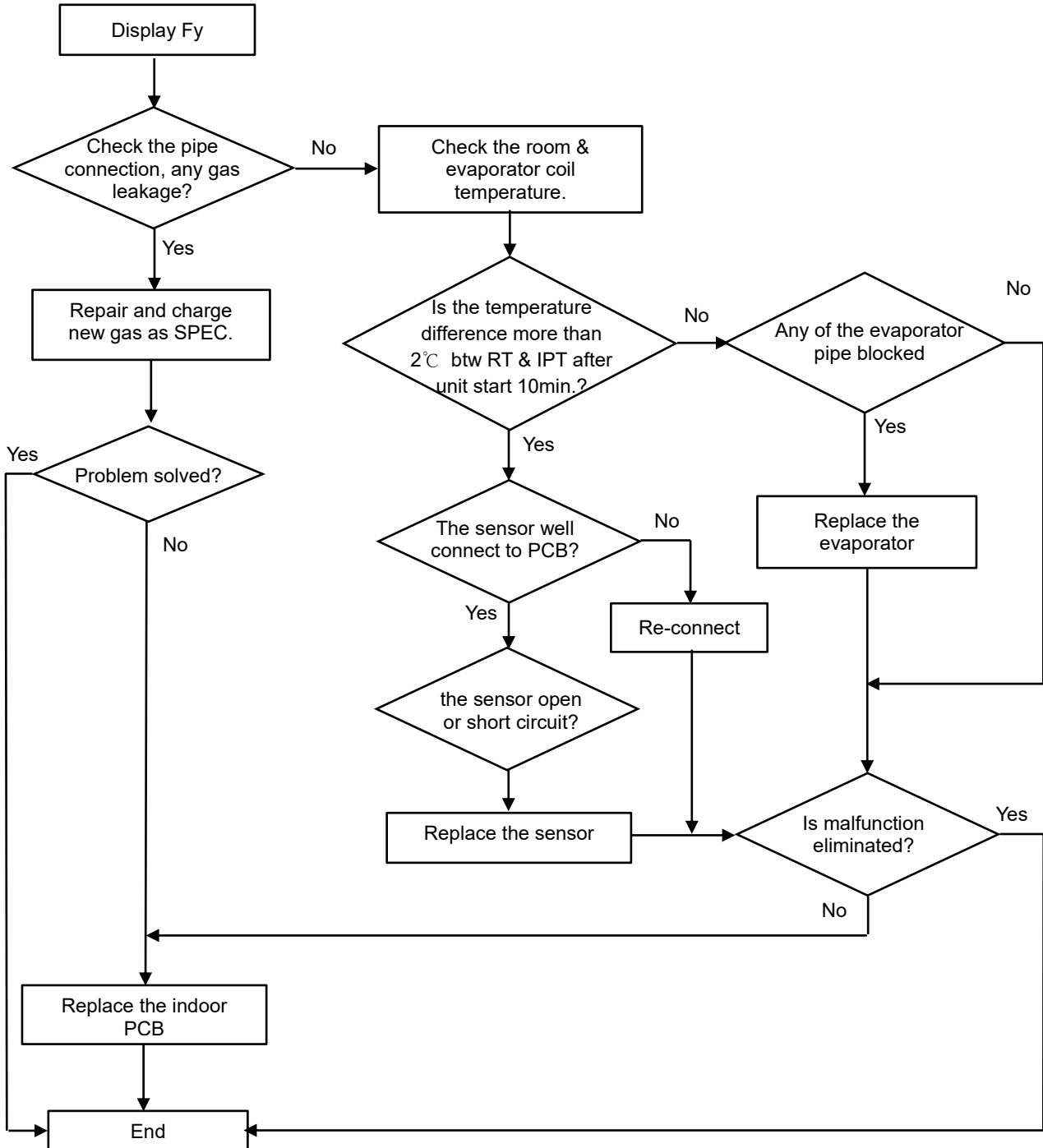
### 3.2.19 F8---4-Way Value Reversing abnormal

On heating mode, if IDU Coil temperature tested lower than Room temperature 5℃ or even more after compressor works for 8min, unit will show F8 code.



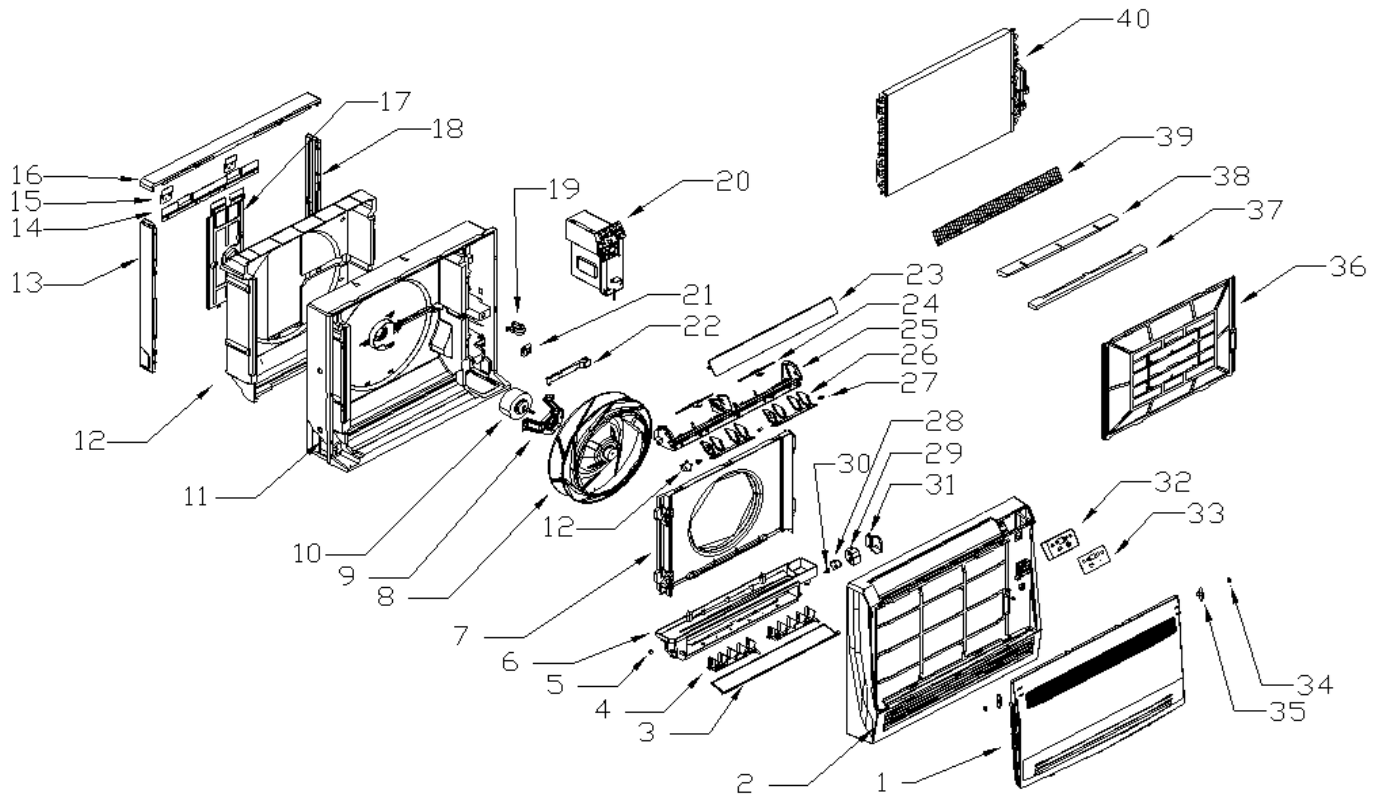
## 9.2.20 Fy--- Gas leakage protection

After compressor works in high frequency for 9 min, if the temperature on IDU evaporator & ODU condenser has only a little variation comparing previous, but, the compressor discharge temperature on high level, then the unit will show Fy failure code.



## 4. Exploded view and parts list

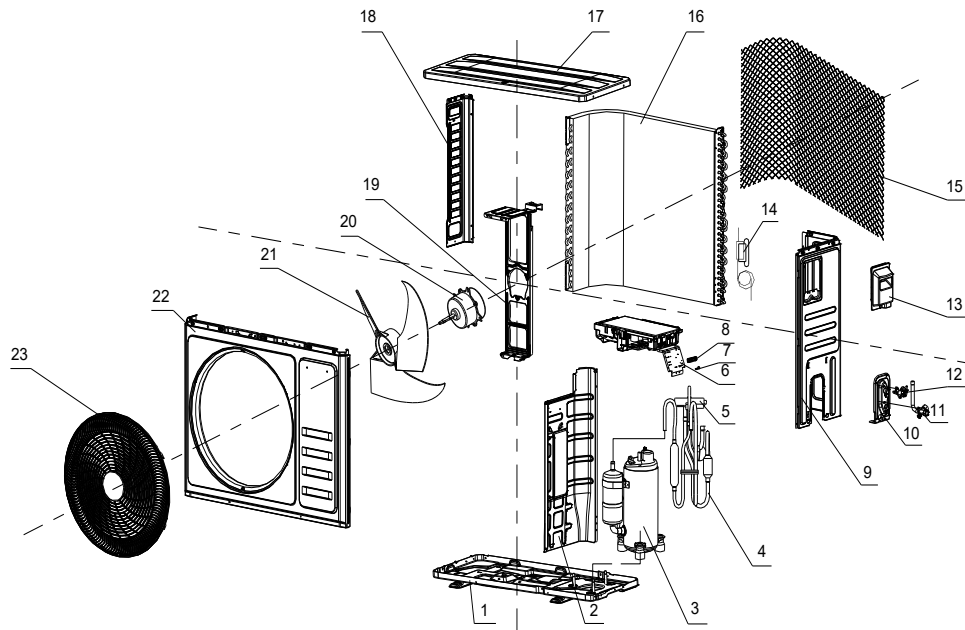
IndoorUnit: AN35Xi R15



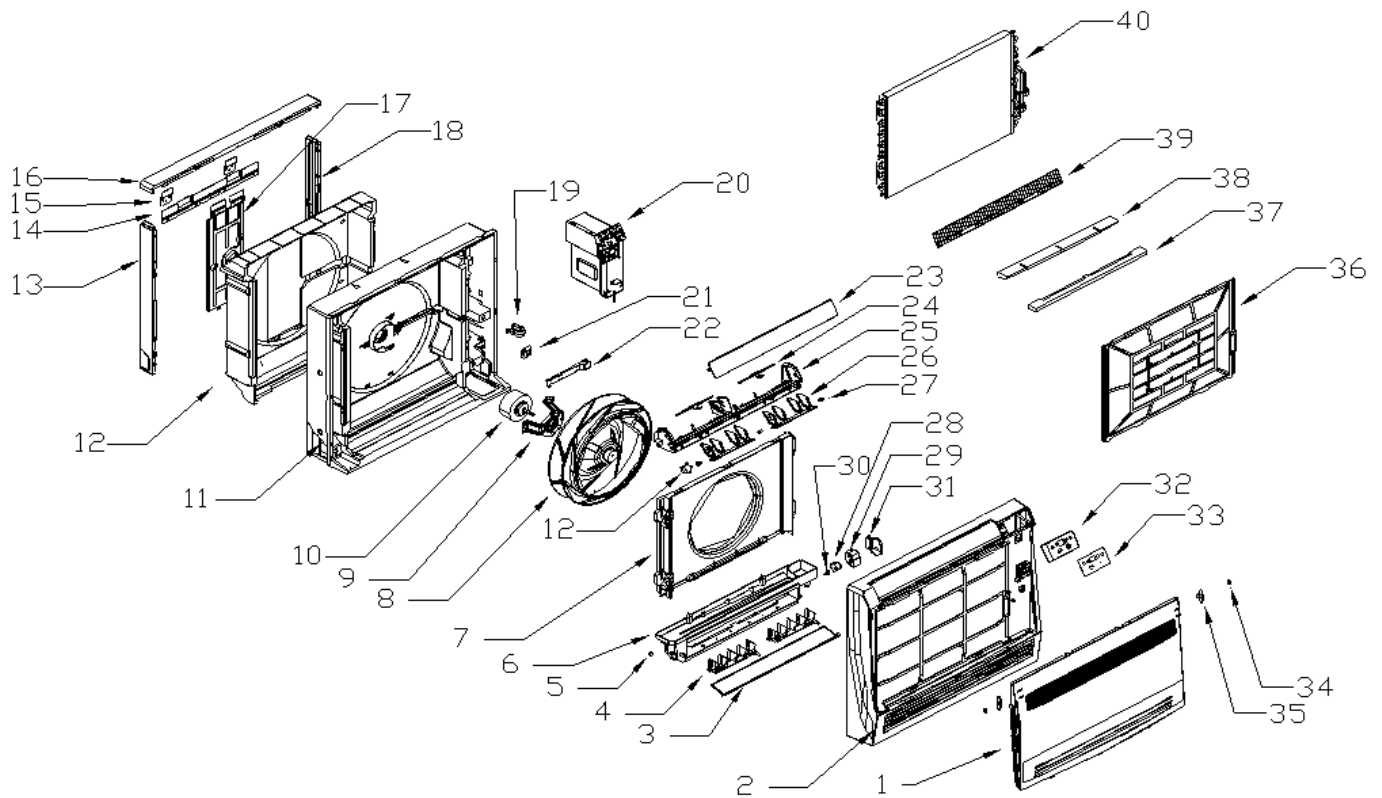
No.	Part No.	Part Name	Q'ty	Remark
1	45014-001266	Front Panel	1	
2	46601-000037	Face Frame Assembly	1	
3	45008-000018	Downward Vane Assembly	1	
4	45801-000100	Downward Vertical Vane	2	
5	45002-000084	Downward Vertical Vane Bush	1	
6	45008-000286	Downward Out Blow Casing	1	
7	45008-000252	Air guide assembly	1	
8	45009-000038	Centrifugal Fan	1	
9	45005-000276	Supporter of motor	1	
10	25001-000049	Fan Motor	1	
11	45014-002903	Cotton Base assembly	1	
12	A5006-000008	Base Rear Foam Assembly	1	
13	45013-000054	Left trim strip	1	
14	45001-000002	Installation Plate	1	
15	45014-002500	Hanger	2	
16	45014-001832	Upward trim strip	1	
17	45005-000217	Fan motor back plate	1	
18	45014-001773	Right trim strip	1	
19	45002-000176	Pipe Clamp	1	
20	32901-000003	Main PCB	1	
21	45002-000146	Clip for pipe sensor	1	
22	45014-002349	Line groove	1	
23	45008-000091	Guider louver	1	

24	45801-000045	Upward vane connecting crank	2	
25	45008-000218	Upward Out Blow Casing	1	
26	45801-000071	Upward Vane	2	
27	45008-000287	Air guide board bolt	2	
28	22001-000494	Step Motor	1	
29	45005-000179	Fixed seat with wind motor	1	
30	45002-000088	Motor Vane Bush	2	
31	45005-000331	Air Guide Splash motor cover	1	
32	35010-000002	Display panel	1	
33	41505-000323	Display Film	1	
34	35006-000001	Buckle base	2	
35	46701-000003	Buckle cover	2	
36	45014-002709	Air filter	1	
37	45004-000231	Downward out blow foam	1	
38	45004-000147	Downward out blow foam	1	
39	45008-000230	Fan guard grille	1	
40	95003-003465	Evaporator	1	
41	22013-003743	Remote Controller	1	Not shown in Explosion view
42	42001-000014	Remote Controller supporter	1	
43	32001-000277	WIFI Module	1	



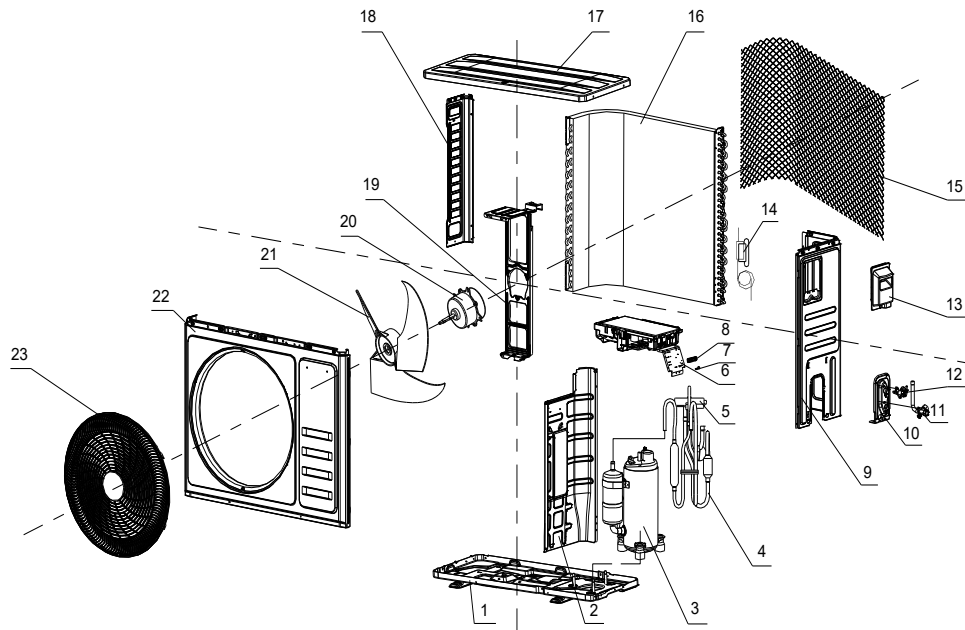
**Outdoor Unit : AN35Xo R15**

No.	Part No.	Part Name	Q'ty	Remark
1	41202-000216	Base	1	
2	41208-000142	Partition plate	1	
3	92014-000542	Compressor and accessories	1	
4	92007-005836	4-way valve assembly	1	
5	92008-000209	4-way valve	1	
6	31201-001674	Outdoor PCB Assembly	1	
7	42001-000038	Cable clamp	1	
	42001-000035	Cable clamp	1	
8	11304-100004	Terminal	1	
9	41205-000211	Right plate	1	
10	41204-000018	Valve supporter	1	
11	92007-001041	Three-way valve	1	
12	92007-001050	Two-way valve	1	
13	41201-000029	Electronic Box Cover	1	
14	92007-007454	Capillary assembly	1	
15	42011-000127	Grille	1	
16	92011-000777	Condenser	1	
17	41207-000029	Top cover	1	
18	41205-000121	Left plate	1	
19	41203-000054	Outdoor motor supporter	1	
20	22001-000049	Outdoor motor	1	
21	42004-000107	Propeller fan	1	
22	41206-000054	Front plate	1	
23	42011-000100	Fan guard	1	
24	10104-100055	Outdoor Temp. sensor assembly	1	Not shown in explosion view
25	A2005-000523	Base carton	1	
26	N/A	Cabinet carton	1	
27	A1202-000031	Base foaming	1	
28	41213-000023	Cover foaming	1	

**IndoorUnit: AN50Xi R15**

No.	Part No.	Part Name	Q'ty	Remark
1	45014-001266	Front Panel	1	
2	46601-000037	Face Frame Assembly	1	
3	45008-000018	Downward Vane Assembly	1	
4	45801-000100	Downward Vertical Vane	2	
5	45002-000084	Downward Vertical Vane Bush	1	
6	45008-000286	Downward Out Blow Casing	1	
7	45008-000252	Air guide assembly	1	
8	45009-000038	Centrifugal Fan	1	
9	45005-000276	Supporter of motor	1	
10	25001-000049	Fan Motor	1	
11	45014-002903	Cotton Base assembly	1	
12	A5006-000008	Base Rear Foam Assembly	1	
13	45013-000054	Left trim strip	1	
14	45001-000002	Installation Plate	1	
15	45014-002500	Hanger	2	
16	45014-001832	Upward trim strip	1	
17	45005-000217	Fan motor back plate	1	
18	45014-001773	Right trim strip	1	
19	45002-000176	Pipe Clamp	1	
20	32901-000003	Main PCB	1	
21	45002-000146	Clip for pipe sensor	1	
22	45014-002349	Line groove	1	
23	45008-000091	Guider louver	1	
24	45801-000045	Upward vane connecting crank	2	
25	45008-000218	Upward Out Blow Casing	1	

26	45801-000071	Upward Vane	2	
27	45008-000287	Air guide board bolt	2	
28	22001-000494	Step Motor	1	
29	45005-000179	Fixed seat with wind motor	1	
30	45002-000088	Motor Vane Bush	2	
31	45005-000331	Air Guide Splash motor cover	1	
32	35010-000002	Display panel	1	
33	41505-000323	Display Film	1	
34	35006-000001	Buckle base	2	
35	46701-000003	Buckle cover	2	
36	45014-002709	Air filter	1	
37	45004-000231	Downward out blow foam	1	
38	45004-000147	Downward out blow foam	1	
39	45008-000230	Fan guard grille	1	
40	95003-003465	Evaporator	1	
41	22013-003743	Remote Controller	1	Not shown in Explosion view
42	42001-000014	Remote Controller supporter	1	
43	32001-000277	WIFI Module	1	

**Outdoor Unit : AN50Xi R15**

No.	Part No.	Part Name	Q'ty	Remark
1	41202-000252	Base	1	
2	41208-000151	Partition plate	1	
3	92014-000357	Compressor and accessories	1	
4	92007-000967	4-way valve assembly	1	
5	92008-000207	4-way valve	1	
6	22011-000004	Inductor	1	
7	31201-001558	Outdoor PCB assembly	1	
8	42001-000038	Cable clamp	1	
9	11304-100004	Terminal	1	
10	41205-000184	Right plate	1	
11	41204-000018	Valve supporter	1	
12	92007-001041	Three-way valve	1	
13	92007-001056	Two-way valve	1	
14	41201-000029	Electrical box cover	1	
15	92013-001889	Capillary Assembly	1	
16	42011-000105	Grille	1	
17	92011-005383	Condenser	1	
18	41207-000033	Top cover	1	
19	41205-000119	Left grille supporter	1	
20	41203-000052	Outdoor motor supporter	1	
21	22001-000096	Outdoor motor	1	
22	42004-000104	Propeller fan	1	
23	41206-000055	Front plate	1	
24	42011-000089	Fan guard	1	
25	10104-100033	Pipe Temp. sensor and outdoor Temp. sensor	1	Not shown in explosion view
26	10104-100036	Discharge Temp. sensor	1	
27	A2005-000540	Base carton	1	
28	N/A	Cabinet carton	1	
29	A1202-000026	Base foaming	1	
30	41213-000019	Cover foaming	1	

## APPENDIX

### Appendix 1 The comparison table of Celsius-Fahrenheit temperature

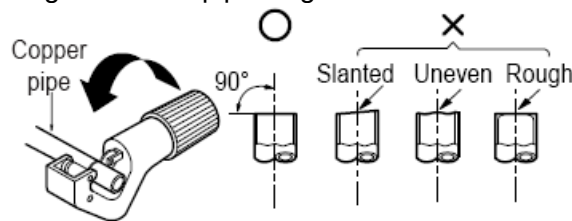
Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius (°C)	Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius (°C)	Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius (°C)
61	60.8	16	69/70	69.8	21	78/79	78.8	26
62/63	62.6	17	71/72	71.6	22	80/81	80.6	27
64/65	64.4	18	73/74	73.4	23	82/83	82.4	28
66/67	66.2	19	75/76	75.2	24	84/85	84.2	29
68	68	20	77	77	25	86	86	30

### Appendix 2 Pipes Flaring

Main cause for gas leakage is due to defect in flaring work. Carry out correct flaring work in the following procedure.

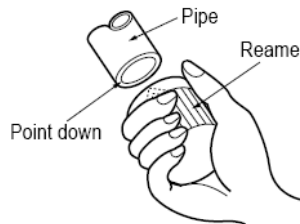
#### A. Cut the pipes and the cable.

- 1) Use the piping kit accessory or the pipes purchased locally.
- 2) Measure the distance between the indoor and the outdoor unit.
- 3) Cut the pipes a little longer than measured distance.
- 4) Cut the cable 1.5m longer than the pipe length.



#### B. Burrs removal

- 1) Completely remove all burrs from the cut cross section of pipe/tube.
- 2) Put the end of the copper tube/pipe in a down ward direction as you remove burrs in order to avoid dropping burrs into the tubing.

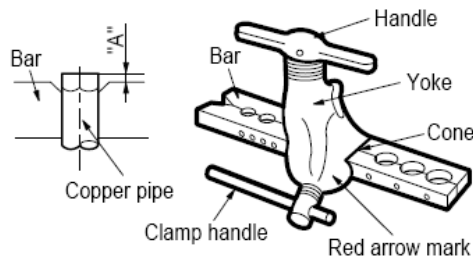


#### C. Flaring work

- Carry out flaring work using flaring tool as shown below.

Outside diameter		A
mm	inch	mm
ø6.35	1/4	1.0~1.3
ø9.52	3/8	0.8~1.0
ø12.7	1/2	0.5~0.8
ø15.88	5/8	0.5~0.8

Firmly hold copper pipe in a die in the dimension shown in the table above.



#### D. Check

- 1) Compare the flared work with figure below.
- 2) If flare is noted to be defective, cut off the flared section and do flaring work again.



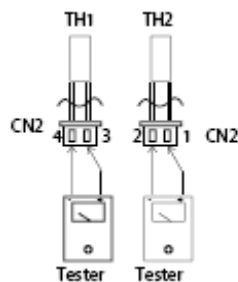
### Appendix 3 THERMISTOR TEMPERATURE CHARACTERISTICS

#### 1). Indoor unit and outdoor exchange temperature and outside air temperature sensor temperature characteristics

TEMP. (°C)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. (°C)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. (°C)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)
-40	346.552	369.932	393.312	10	20.042	20.501	20.960	59	2.368	2.436	2.504
-39	324.501	346.097	367.693	11	19.084	19.505	19.926	60	2.279	2.346	2.413
-38	303.696	323.923	343.877	12	18.177	18.562	18.947	61	2.194	2.260	2.326
-37	284.864	303.286	321.726	13	17.317	17.669	18.021	62	2.112	2.177	2.242
-36	267.028	284.073	301.117	14	16.504	16.825	17.146	63	2.034	2.097	2.160
-35	250.420	266.178	281.936	15	15.732	16.025	16.318	64	1.959	2.021	2.083
-34	234.934	249.505	264.076	16	15.002	15.268	15.534	65	1.887	1.948	2.009
-33	220.488	233.964	247.440	17	14.308	14.550	14.792	66	1.818	1.878	1.938
-32	207.007	219.473	231.939	18	13.651	13.870	14.089	67	1.752	1.811	1.870
-31	194.423	205.957	217.490	19	13.028	13.226	13.424	68	1.689	1.746	1.803
-30	182.859	193.543	204.227	20	12.437	12.615	12.793	69	1.628	1.684	1.740
-29	171.781	181.663	191.545	21	11.876	12.036	12.196	70	1.570	1.626	1.682
-28	161.453	170.597	179.741	22	11.343	11.486	11.629	71	1.514	1.568	1.622
-27	151.820	160.283	168.746	23	10.837	10.965	11.093	72	1.460	1.513	1.566
-26	142.828	150.662	158.496	24	10.357	10.470	10.583	73	1.408	1.460	1.512
-25	134.429	141.683	148.937	25	9.900	10.000	10.100	74	1.359	1.410	1.461
-24	126.578	133.296	140.014	26	9.453	9.554	9.655	75	1.311	1.361	1.411
-23	119.235	125.458	131.681	27	9.029	9.130	9.231	76	1.265	1.314	1.363
-22	112.365	118.130	123.895	28	8.627	8.728	8.829	77	1.221	1.269	1.317
-21	105.932	111.273	116.614	29	8.244	8.345	8.446	78	1.179	1.226	1.273
-20	99.906	104.855	109.804	30	7.880	7.981	8.082	79	1.139	1.185	1.231
-19	94.260	98.844	103.428	31	7.535	7.636	7.737	80	1.100	1.145	1.190
-18	88.967	93.212	97.457	32	7.207	7.307	7.407	81	1.062	1.106	1.150
-17	84	87.932	91.864	33	6.894	6.994	7.094	82	1.036	1.069	1.112
-16	79.338	82.980	86.622	34	6.597	6.696	6.795	83	0.992	1.034	1.076

-15	74.960	78.334	81.708	35	6.315	6.413	6.511	84	0.959	1.000	1.041
-14	70.848	73.973	77.098	36	6.046	6.143	6.240	85	0.927	0.967	1.007
-13	66.983	69.877	72.771	36	6.046	6.143	6.240	86	0.895	0.935	0.975
-12	63.350	66.030	68.710	37	5.790	5.886	5.982	87	0.866	0.905	0.944
-11	59.933	62.415	64.897	38	5.546	5.641	5.736	88	0.838	0.876	0.914
-10	56.718	59.016	61.314	39	5.314	5.408	5.502	89	0.811	0.848	0.885
-9	53.693	55.820	57.947	40	5.092	5.185	5.278	90	0.784	0.821	0.858
-8	50.844	52.813	54.782	41	4.881	4.973	5.065	91	0.759	0.795	0.831
-7	48.161	49.983	51.805	42	4.680	4.771	4.862	92	0.735	0.770	0.805
-6	45.634	47.320	49.006	43	4.488	4.578	4.668	93	0.712	0.746	0.780
-5	43.252	44.811	46.314	44	4.306	4.394	4.482	94	0.689	0.723	0.757
-4	41.006	42.448	43.797	45	4.131	4.218	4.305	95	0.668	0.701	0.734
-3	38.889	40.222	41.472	46	3.964	4.050	4.136	96	0.648	0.680	0.712
-2	36.892	38.124	39.255	47	3.806	3.890	3.974	97	0.627	0.659	0.691
-1	35.008	36.146	37.197	48	3.654	3.737	3.820	98	0.608	0.639	0.670
0	33.229	34.280	35.241	49	3.509	3.591	3.673	99	0.589	0.620	0.651
1	31.550	32.520	33.400	50	3.371	3.451	3.531	100	0.572	0.602	0.632
2	29.965	30.860	31.695	51	3.238	3.317	3.396	101	0.556	0.585	0.614
3	28.466	29.292	30.068	52	3.112	3.190	3.268	102	0.539	0.568	0.597
4	27.051	27.812	28.513	53	2.991	3.067	3.143	103	0.524	0.552	0.580
5	25.714	26.415	27.055	54	2.875	2.950	3.025	104	0.509	0.537	0.565
6	24.450	25.095	25.695	55	2.764	2.838	2.912	105	0.495	0.522	0.549
7	23.255	23.848	24.395	56	2.659	2.731	2.803				
8	22.124	22.669	23.168	57	2.558	2.629	2.700				
9	21.054	21.555	22.010	58	2.460	2.530	2.600				

Resistance at 25°C : 10 kΩ.



TH1: indoor room temperature sensor and outside air temperature sensor

TH2: indoor exchange temperature sensor and outside exchange temperature sensor

Before measuring resistance, disconnect connectors as shown above.

#### 1) Outdoor unit ambient and pipe sensor temperature characteristics

TEMP. (°C)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. (°C)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. (°C)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)
-30	60.343	64.104	68.080	21	5.716	5.846	5.977	72	0.974	1.010	1.047
-29	57.157	60.666	64.375	22	5.498	5.620	5.742	73	0.944	0.980	1.016
-28	54.139	57.413	60.870	23	5.290	5.404	5.518	74	0.917	0.952	0.988
-27	51.301	54.355	57.579	24	5.091	5.198	5.305	75	0.890	0.924	0.959
-26	48.630	51.480	54.487	25	4.900	5.000	5.100	76	0.864	0.897	0.931
-25	46.115	48.776	51.582	26	4.713	4.811	4.909	77	0.839	0.871	0.904

-24	43.748	46.232	48.850	27	4.533	4.630	4.727	78	0.814	0.846	0.879
-23	41.517	43.836	46.279	28	4.362	4.457	4.552	79	0.791	0.822	0.854
-22	39.415	41.581	43.861	29	4.199	4.292	4.386	80	0.769	0.799	0.830
-21	37.432	39.456	41.585	30	4.042	4.133	4.225	81	0.746	0.776	0.807
-20	35.581	37.473	39.462	31	3.892	3.982	4.072	82	0.725	0.754	0.784
-19	33.798	35.565	37.421	32	3.748	3.836	3.925	83	0.705	0.733	0.762
-18	32.134	33.785	35.519	33	3.611	3.697	3.784	84	0.685	0.713	0.742
-17	30.561	32.105	33.725	34	3.479	3.564	3.649	85	0.666	0.693	0.721
-16	29.077	30.520	32.033	35	3.353	3.436	3.520	86	0.647	0.674	0.701
-15	27.673	29.023	30.437	36	3.232	3.313	3.395	87	0.629	0.655	0.682
-14	26.347	27.609	28.931	37	3.116	3.195	3.275	88	0.613	0.638	0.664
-13	25.092	26.273	27.508	38	3.004	3.082	3.161	89	0.595	0.620	0.646
-12	23.905	25.010	26.165	39	2.898	2.974	3.051	90	0.580	0.604	0.629
-11	22.782	23.816	24.896	40	2.795	2.870	2.946	91	0.563	0.587	0.611
-10	21.720	22.687	23.697	41	2.697	2.770	2.844	92	0.549	0.572	0.596
-9	20.713	21.618	22.562	42	2.604	2.675	2.748	93	0.534	0.557	0.580
-8	19.759	20.607	21.490	43	2.513	2.583	2.654	94	0.520	0.542	0.565
-7	18.855	19.649	20.475	44	2.426	2.494	2.564	95	0.506	0.528	0.550
-6	17.999	18.742	19.515	45	2.343	2.410	2.478	96	0.493	0.514	0.536
-5	17.187	17.883	18.606	46	2.263	2.328	2.395	97	0.480	0.501	0.522
-4	16.416	17.068	17.745	47	2.186	2.250	2.315	98	0.468	0.488	0.509
-3	15.685	16.296	16.930	48	2.111	2.174	2.238	99	0.456	0.476	0.497
-2	14.991	15.563	16.156	49	2.041	2.102	2.164	100	0.444	0.464	0.484
-1	14.332	14.868	15.423	50	1.972	2.032	2.093	101	0.433	0.452	0.472
0	13.766	14.270	14.792	51	1.906	1.965	2.025	102	0.422	0.441	0.460
1	13.111	13.582	14.069	52	1.844	1.901	1.959	103	0.412	0.430	0.449
2	12.546	12.987	13.443	53	1.783	1.839	1.896	104	0.401	0.419	0.437
3	12.008	12.422	12.849	54	1.724	1.779	1.835	105	0.391	0.409	0.427
4	11.497	11.885	12.284	55	1.668	1.721	1.776	106	0.381	0.399	0.416
5	11.012	11.375	11.749	56	1.614	1.666	1.719	107	0.372	0.388	0.406
6	10.548	10.889	11.239	57	1.562	1.613	1.665	108	0.362	0.379	0.395
7	10.109	10.428	10.756	58	1.512	1.562	1.613	109	0.353	0.369	0.386
8	9.689	9.988	10.295	59	1.463	1.512	1.562	110	0.344	0.360	0.376
9	9.289	9.570	9.858	60	1.417	1.465	1.514	111	0.335	0.351	0.367
10	8.909	9.172	9.441	61	1.372	1.419	1.467	112	0.327	0.342	0.357
11	8.545	8.792	9.044	62	1.328	1.374	1.421	113	0.319	0.333	0.349
12	8.199	8.431	8.667	63	1.287	1.332	1.378	114	0.311	0.325	0.340
13	7.870	8.087	8.308	64	1.247	1.291	1.336	115	0.303	0.317	0.332
14	7.554	7.758	7.965	65	1.208	1.251	1.295	116	0.296	0.309	0.324
15	7.254	7.445	7.639	66	1.171	1.213	1.256	117	0.288	0.302	0.315
16	6.968	7.147	7.329	67	1.135	1.176	1.218	118	0.281	0.294	0.308
17	6.694	6.862	7.032	68	1.100	1.140	1.181	119	0.274	0.287	0.301
18	6.433	6.590	6.749	69	1.067	1.106	1.146	120	0.268	0.280	0.293
19	6.183	6.331	6.480	70	1.035	1.073	1.112				
20	5.945	6.083	6.223	71	1.004	1.041	1.079				



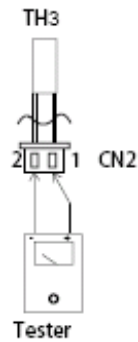
**2) Outdoor unit discharge pipe sensor temperature characteristics**

TEMP. (°C)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. (°C)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. (°C)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)
-30	288.879	337.780	386.68	23	20.114	21.847	23.579	76	2.733	2.835	2.937
-29	272.641	318.219	263.797	24	19.263	20.900	22.538	77	2.646	2.742	2.839
-28	257.401	299.897	342.392	25	18.453	20.000	21.547	78	2.561	2.653	2.745
-27	243.09*2	282.727	322.363	26	17.681	19.143	20.605	79	2.480	2.567	2.654
-26	299.654	266.633	303.613	27	16.945	18.327	19.710	80	2.401	2.484	2.567
-25	217.028	251.541	286.054	28	16.243	17.551	18.858	81	2.326	2.404	2.483
-24	205.162	237.383	269.604	29	15.575	16.811	18.047	82	2.183	2.253	2.324
-23	194.005	224.097	254.188	30	14.937	16.106	17.275	83	2.183	2.253	2.324
-22	183.513	211.625	239.736	31	14.328	15.434	16.541	84	2.115	2.182	2.249
-21	173.642	199.912	226.181	32	13.748	14.794	15.841	85	2.050	2.113	2.176
-20	164.353	188.909	213.465	33	13.194	14.184	15.175	86	1.984	2.047	2.109
-19	155.608	178.569	201.530	34	12.665	13.602	14.540	87	1.921	1.983	2.045
-18	147.373	168.850	190.326	35	12.160	13.048	13.935	88	1.860	1.921	1.982
-17	139.616	159.710	179.803	36	11.678	12.518	13.358	89	1.801	1.862	1.922
-16	132.307	151.112	169.917	37	11.217	12.013	12.809	90	1.744	1.804	1.864
-15	125.417	143.022	160.627	38	10.777	11.531	12.248	91	1.690	1.749	1.808
-14	118.921	135.407	151.893	39	10.357	11.071	11.784	92	1.637	1.695	1.754
-13	112.794	128.236	143.679	40	9.955	10.631	11.307	93	1.586	1.644	1.701
-12	107.014	121.483	135.952	41	9.571	10.211	10.852	94	1.537	1.594	1.651
-11	101.559	115.120	128.680	42	9.203	9.810	10.417	95	1.490	1.546	1.602
-10	96.410	109.123	121.836	43	8.852	9.427	10.002	96	1.444	1.500	1.555
-9	91.548	103.469	115.391	44	8.516	9.061	9.606	97	1.400	1.455	1.509
-8	86.956	98.138	109.320	45	8.194	8.711	9.228	98	1.358	1.412	1.465
-7	82.617	93.108	103.600	46	7.886	8.376	8.866	99	1.317	1.370	1.423
-6	78.516	88.362	98.209	47	7.591	8.056	8.520	100	1.277	1.329	1.382
-5	74.640	83.883	93.126	48	7.309	7.750	8.190	101	1.239	1.290	1.342
-4	70.974	79.653	88.332	49	7.039	7.750	8.190	102	1.202	1.253	1.303
-3	67.507	75.659	83.810	50	6.780	7.176	7.572	103	1.166	1.216	1.266
-2	64.227	71.885	79.543	51	6.532	6.908	7.283	104	1.132	1.181	1.230
-1	61.123	68.319	75.515	52	6.294	6.650	7.007	105	1.099	1.147	1.195
0	58.184	64.948	71.712	53	6.066	6.404	6.743	106	1.066	1.114	1.162
1	55.402	61.761	68.120	54	5.847	6.168	6.489	107	1.035	1.082	1.129
2	52.766	58.746	64.726	55	5.638	5.942	6.247	108	1.005	1.051	1.098
3	50.269	55.894	61.519	56	5.437	5.726	6.015	109	0.976	1.022	1.067
4	47.903	53.195	58.488	57	5.244	5.518	5.793	110	0.948	0.993	1.038
5	45.661	50.641	55.621	58	5.059	5.319	5.580	111	0.921	0.965	1.009
6	43.543	48.222	52.910	59	4.882	5.129	5.376	112	0.895	0.938	0.981
7	41.517	45.931	50.345	60	4.711	4.946	5.180	113	0.869	0.912	0.955
8	39.604	43.761	47.917	61	4.548	4.770	4.993	114	0.845	0.887	0.929
9	37.789	41.704	45.619	62	4.39	4.602	4.813	115	0.821	0.862	0.904
10	36.066	39.755	43.443	63	4.240	4.440	4.641	116	0.798	0.839	0.879
11	34.431	37.907	41.383	64	4.094	4.285	4.475	117	0.776	0.816	0.856

12	32.787	36.154	39.430	65	3.955	4.136	4.317	118	0.754	0.794	0.833
13	31.403	34.491	37.580	66	3.821	3.993	4.164	119	0.733	0.772	0.811
14	30.001	32.914	35.826	67	3.693	3.855	4.018	120	0.713	0.751	0.789
15	28.670	31.417	34.163	68	3.569	3.723	3.878	121	0.694	0.731	0.769
16	27.404	29.995	32.586	69	3.450	3.596	3.743	122	0.675	0.712	0.749
17	26.200	28.645	31.090	70	3.335	3.475	3.614	123	0.657	0.693	0.729
18	25.056	27.363	29.671	71	3.225	3.357	3.490	124	0.639	0.675	0.710
19	23.967	26.145	28.324	72	3.119	3.245	3.370	125	0.622	0.657	0.692
20	22.931	24.988	27.044	73	3.017	3.136	3.225				
21	21.946	23.888	25.830	74	2.919	3.032	3.145				
22	21.007	22.842	24.676	75	2.824	2.932	3.093				

### R—Resistance

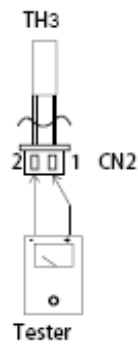
Resistance at 25°C :5 kΩ



TH3: Outdoor unit ambient sensor  
TH4: Outdoor unit pipe sensor

### R—Resistance

Resistance at 25°C :20 kΩ



TH5: Outdoor unit discharge pipe sensor

Before measuring resistance, disconnect connectors as shown above.



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