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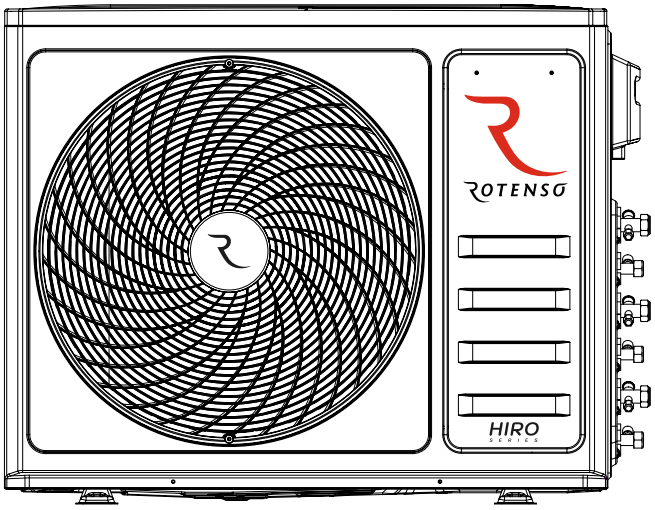


SERVICE MANUAL

MODELS:
HN40Xm2 R15
HN50Xm2 R15
HN70Xm3 R15
HN90Xm4 R15
HN120Xm5 R15

www.rotenso.com

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.

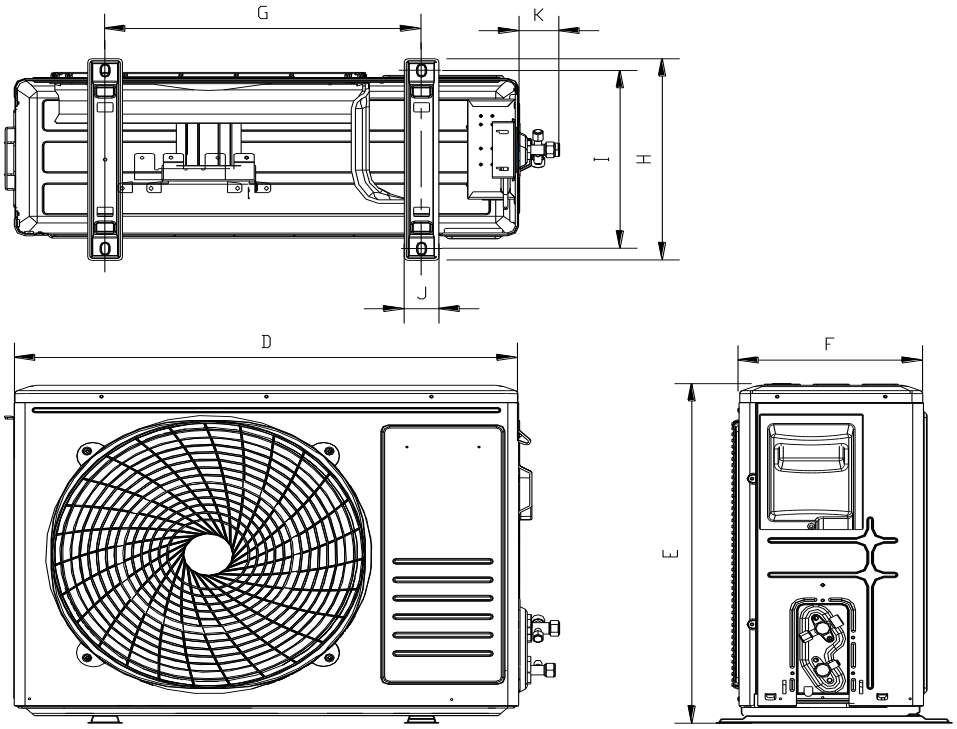
How to order spare parts

To have your order filled promptly and correctly, please furnish the following information:

1. Model No. with Indoor or Outdoor
2. No. in the Explosion View
3. Part Name
4. The quantity you ordered

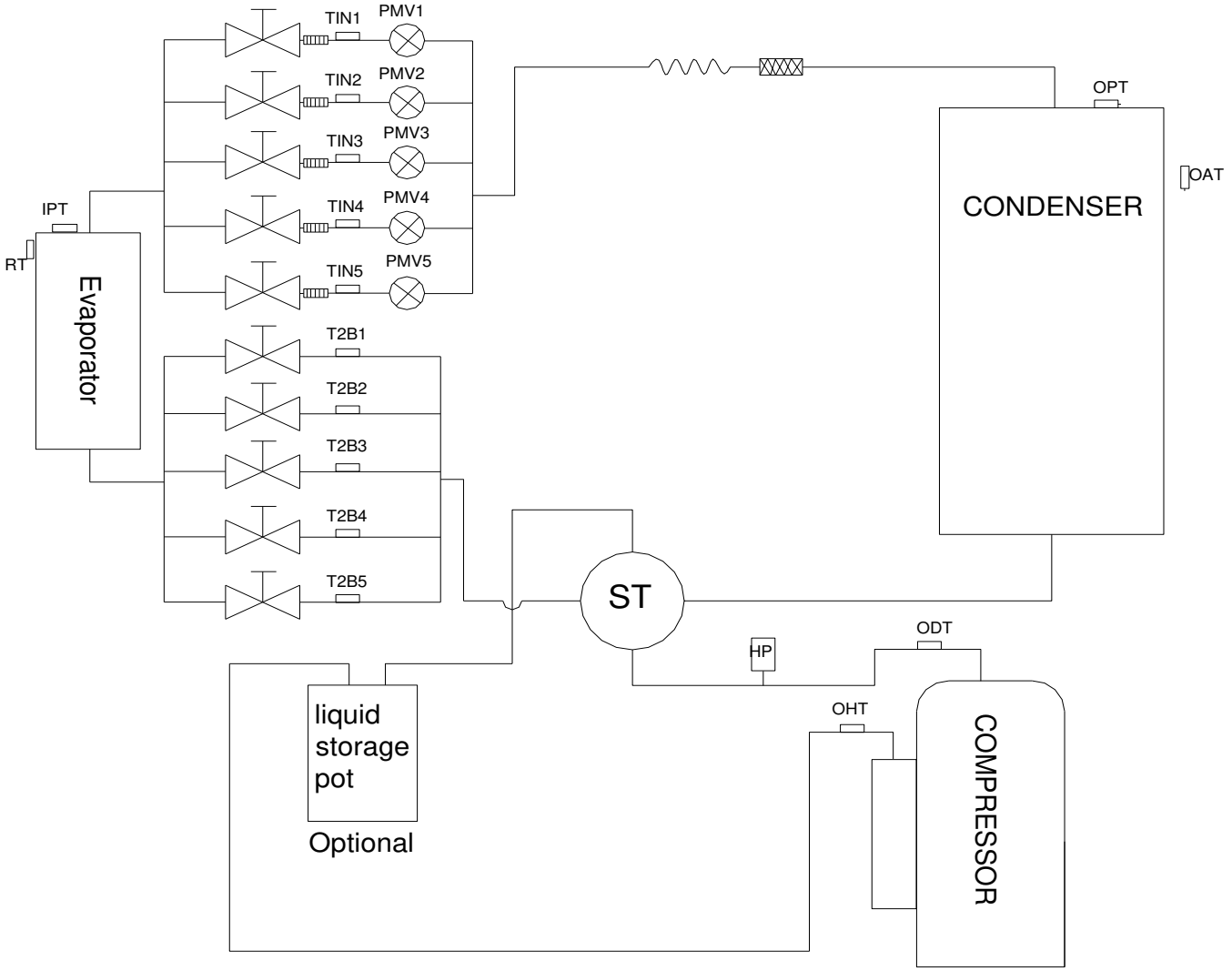
2. Product Dimensions

Outdoor Unit:



Model	Outdoor unit							
	D	E	F	G	H	I	J	K
HN40Xm2 R15	780	605	290	521	360	327.5	55	56
HN50Xm2 R15	780	605	290	521	360	327.5	55	56
HN70Xm3 R15	845	693	336	586	374.9	347.5	58.6	63
HN90Xm4 R15	940	910	340	600	400	375	80	46
HN120Xm5 R15	940	910	340	600	400	375	80	46

3. Refrigeration cycle diagram



4. Operation details

Electronic Controller

1. Safety Protection

(1) Time Delay for Safety protection

- 3 minutes delay for compressor ---The compressor is ceased for 3minutes before restarting to balance the pressure in the refrigeration cycle in order to protect the compressor.
- 150 seconds delay for 4-way valve---The 4-way valve will be ceased for 150 seconds late after compressor to prevent the refrigerant-gas abnormal noise when the HEATING operation is OFF or switch to the other operation mode.

(2) Discharge temperature protection

There is a temperature sensor on discharge pipe, when temperature on discharge pipe exceeded the limit 115℃, system control will shut down the compressor and the display board will show the error code.

(3) Lower voltage protection

When AC voltage <160V, DC voltage<170V, unit will be shut down for protection and recover while the AC voltage >170 V, DC voltage >190V.

(4) Over voltage protection

When AC voltage > 275V, DC voltage >400V unit will be shut down and recover while AC voltage<255V, DC voltage<390 V.

(5) Over current protection

When the current of outdoor unit is overload, controller will drop the operation frequency or shut down the unit immediately and show error code.

(6) Condenser temperature protection

When condenser temperature≥ 65℃ and keep 10s, the air conditioner will shut down, and show error code, and recover while condenser temperature<52℃ and the compressor stop for 3minutes.

(7) **IPM** module protection

IPM module has high temperature & over current protection itself, if there is signal feedback to IPM, the outdoor unit will shut down, LED on outdoor PCB will show the error code.

(8) Evaporator freeze protection.

When evaporator temperature<2℃, the controller will drop compressor operate frequency.

When evaporator temperature<0℃ and keep 1 minute, the expand valve of the unit will stop.

When all of the operating unit enter freeze protect, the compressor will stop and recover while evaporator temperature and stop for 3 minutes.

2. "AUTO" Mode Operation

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 Δt --the temperature difference between RT and ST shown as table:

Mode	Δt=RT-ST
COOLING	Δt >1℃
FAN	-1℃≤Δt≤ 1℃
HEATING	Δt <-1℃

3. "COOLING" Mode Operation

(1) Compressor frequency control

According to difference room temperature and set temperature (**δt = RT-ST**), running frequency of compressor is controlled by electronic controller. When room temperature is much higher than set temperature, the compressor will start at a high frequency, and as room temperature goes down, the compressor running frequency will go down. When room temperature is lower than set temperature, the compressor will run at very low frequency. In general, unit will change its running frequency according

to **δt** to make room temperature closing to set temperature.

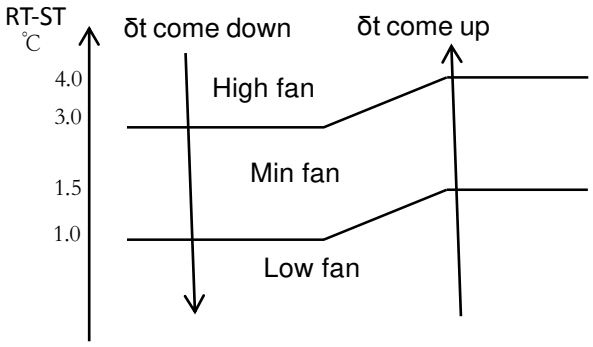
(2) Outdoor temperature affects running frequency of the compressor

Outdoor temperature affect compressor's running frequency. Difference inlet temperature of outdoor unit is adapted by difference compressor running frequency. While outdoor temperature is about 30℃, the compressor will run in high frequency.

If unit run in "cooling" mode and outdoor temperature is less than -2℃, the controller will shut down compressor and show error code, while the ambient temperature is over 1℃, the compressor will run automatically.

(3) Auto fan control in cooling mode

In cooling mode (include cooling in "Feel" mode), fan speed is determined by **δt**, as the following diagram:



4."DRY" Mode Operation

(1) The system for DRY operation used the same refrigerant circle as the cooling one.

(2) When the system operates in DRY mode, at first it operates in cooling mode, the set temperature (**ST**) is "RT-2℃". After that, the system will operate in cooling mode with lowest fan speed. During the course of this operation, you can't use remote controller to adjust the fan speed but you can control the vane direction.

(3) In the dry mode, when RT≤12℃, the compressor will stop and operates again at RT≥14℃.

5. "HEATING" Mode Operation (available for Heat Pump only)

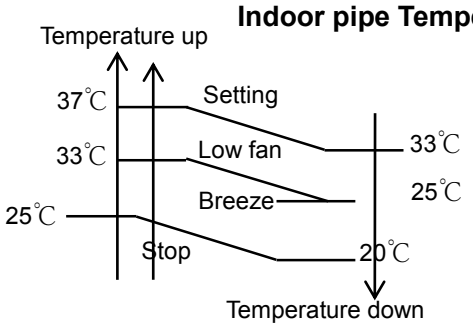
(1) Frequency control

Same as the frequency control in cooing mode, the running frequency of compressor is controlled by controller. Unit change its running frequency according to **δt** to make the room temperature closing to the set temperature.

(2) Indoor fan motor control

1) Cold Air Prevention Control

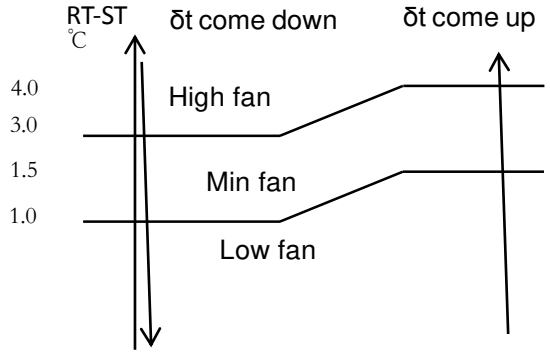
- The function is intended to prevent cold air from being discharged when heating mode selected or while in defrosting.
- The indoor fan speed will be controlled as following.



- In heating operation, if air conditioner turn off, the indoor fan motor will run most for 30 seconds since the stop of compressor.

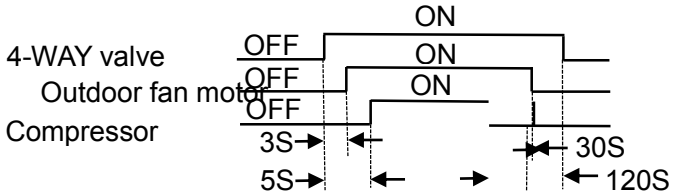
2) Auto fan control (heating)

In heating mode (include in "feel" mode) , fan speed is determined by **δt** as the following:



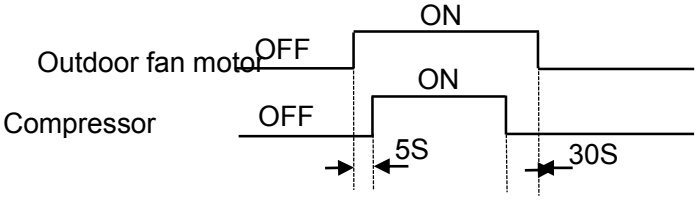
(3) 4-way valve control

In heating mode, 4-way valve will power on ahead of compressor for 8 seconds, and cut off for 2 minutes later than compressor. 4-way valve will not power off unless the machine to be switched off, mode changed or on the process of defrosting.



(4) Outdoor fan motor control

In heating mode, the outdoor fan motor will power on ahead of compressor 5 seconds, and cut off for 30seconds later than compressor.



(5) Defrosting

Defrosting is controlled by the microprocessor.

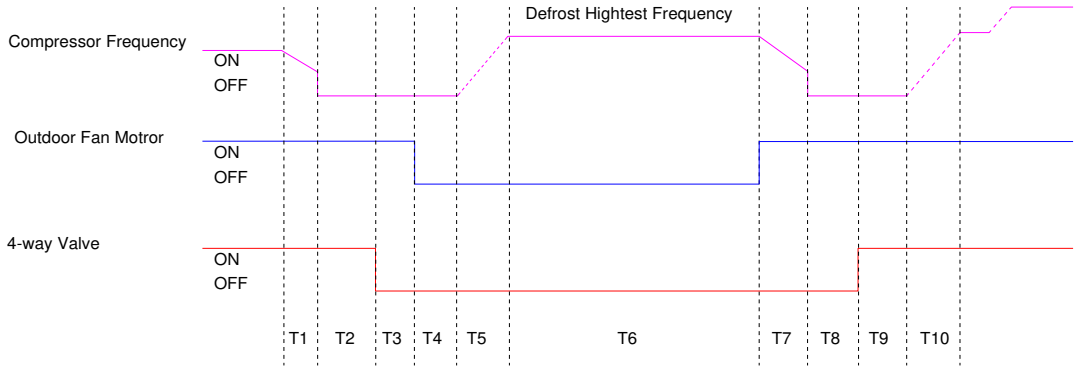
When the unit operate 30 minutes accumulated and the compressor operation more than 3 minutes continuously, one of the following conditions is satisfied, unit comes into defrosting:

a. When FrostDeg ≥ -5℃, and OPT ≤ -5℃, the .2 times defrosting interval time is 45 minutes.
b. When -10℃≤ FrostDeg < -5℃, and OPT < FrostDeg , the .2 times defrosting interval time is 45 minutes.
c. When -13℃≤ FrostDeg < -10℃, and OPT < FrostDeg , the .2 times defrosting interval time is 45 minutes.
d. When -15℃≤ FrostDeg < -13℃, and OPT < FrostDeg , the .2 times defrosting interval time is 65 minutes.
e. When -15℃≤ FrostDeg < -10℃, and OPT < FrostDeg , the .2 times defrosting interval time is 75 minutes.
f. When FrostDeg < -15℃, and OPT < -15℃, the .2 times defrosting interval time is 75 minutes.

FrostDeg = C*OAT-α
OAT: Outdoor environment temperature.
When OAT< 0℃, C=0.8, when OAT≥ 0℃, C=0.6
α=8

Before the air con comes into defrosting, compressor running frequency drop down to a lower frequency firstly, then the compressor shuts down.

In defrosting, all protection function are available.



T	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Times	Drop frequency or stop	50s	5s	5s	Rise frequency	2-11Min	Stop Defrost	50s	10s	Rise frequency

In defrosting, LED showing by winking.

No matter what AC come into or out of defrosting, indoor fan motor speed is the same as Cold Air Prevention Control.

While one of the following conditions is satisfied, unit comes out of defrosting and shifts to heating mode:

a. Outdoor coil Temperature (OPT) >5℃ and keeps 30 seconds.

b. Outdoor coil Temperature (OPT) >10℃ and keeps 2 seconds.

c. Continue 11minutes defrost Operation.

(5) Indoor exchanger overheat protection

When Indoor exchanger Temperature (IPT) is higher than 54℃, unit comes into indoor exchanger overheat protection. The compressor drops its frequency.

If IPT≥65℃ and keep for 30 seconds, control system shut down compressor, and recover while IPT drop less than 52℃.

6. "SLEEP" mode

When the SLEEP button is pressed, the AC operates as following:

- The indoor fan speed is set at low speed, the power lamp and the sleep lamp is on, the display of temperature will close after 30 seconds.
- When selecting COOLING/DRY operation with SLEEP mode, the set temperature will be raised by 1℃ 1 hour later and by 2℃ 2 hour later, after 3 hours, the set temperature will be raise by 3℃ and keeps 2hours. And then the temperature is Set+2℃, after 1 hour, the temperature is set temperature and keep.
- When selecting HEATING operation with SLEEP mode, the set temperature will be dropped by 1℃1 hour later and 2℃ 2 hours later, after 3 hours, the set temperature will be dropped by 3℃ and keep 2 hours. And then the temperature is Set-2℃, after 1 hour, the temperature is set temperature and keep.

7. EMERGENCY Operation

When the EMERGENCY Operation switch is pressed, "Beep" a short sound, COOLING mode is selected, two short sound the HEATING mode selected, and a long sound the unit off of 3s.

During the unit operation in emergency operation, when the unit receive the signal of remote controller, the unit will operates by remote.

When the remote controller missing, failed or the batteries run down, press the EMERGENCY Operation switch on front of the indoor unit for function test.

NOTE: Do not press the EMERGEMCY Operation switch during normal operation.

8. AUTO-RESTART Function (Option)

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.

Auto-restart Pre-setting (optional):

If Auto-restart function is needed, follow the steps below to activate this function:

1) Pulling the air-con's plug out of socket.
2) Pressing and holding the Emergency button (ON/OFF) on the indoor, then insert the plug into the socket again.
3) Keep pressing the Emergency button for more than 10 seconds until three short beeps heard, the Auto-restart function been activated.
4) When the unit in operation, press the timer button 10 times in 8s, the Auto-restart function will be active，if the Auto-restart is active, the Auto-restart off.

9. Water pump control(cassette and duct type)

When the unit operates in cool or dry mode, the water pump operates, once the compressor off or change to 9other mode, the water pump stop after 10 minutes.

Anytime, when the unit check the water full, the water pump operates, the unit stop and display the water full code. When full water protection is eliminated, the pump will maintain for 10 minutes and then turn off

When check the water pump switch open for 8 seconds continuous, enter water full protection, and check the water pump switch on for 180 seconds continuous, the water full protection exit.

10. Protection and Failure Display

- When protection display is available, controller will show error code, digital LED shows error code and setting temperature by turns.
- If there is more than one failure, it will show error codes according to the error list sequence.
- To insure the signal communication of indoor and outdoor unit, any failure code relates to outdoor unit will remain display for 2 minutes maximum after it’s recovered.
- Among all the failure codes, sensor failure can be recovery automatically once it comes normal.

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.
d3	Water full protection(water pump fail)	Please check the water pump.
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	Mode conflict.	Please check the mode set.
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 Value 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.
H1	High pressure protection	Please check the press valve
H2	Low pressure protection	Please check the press valve
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

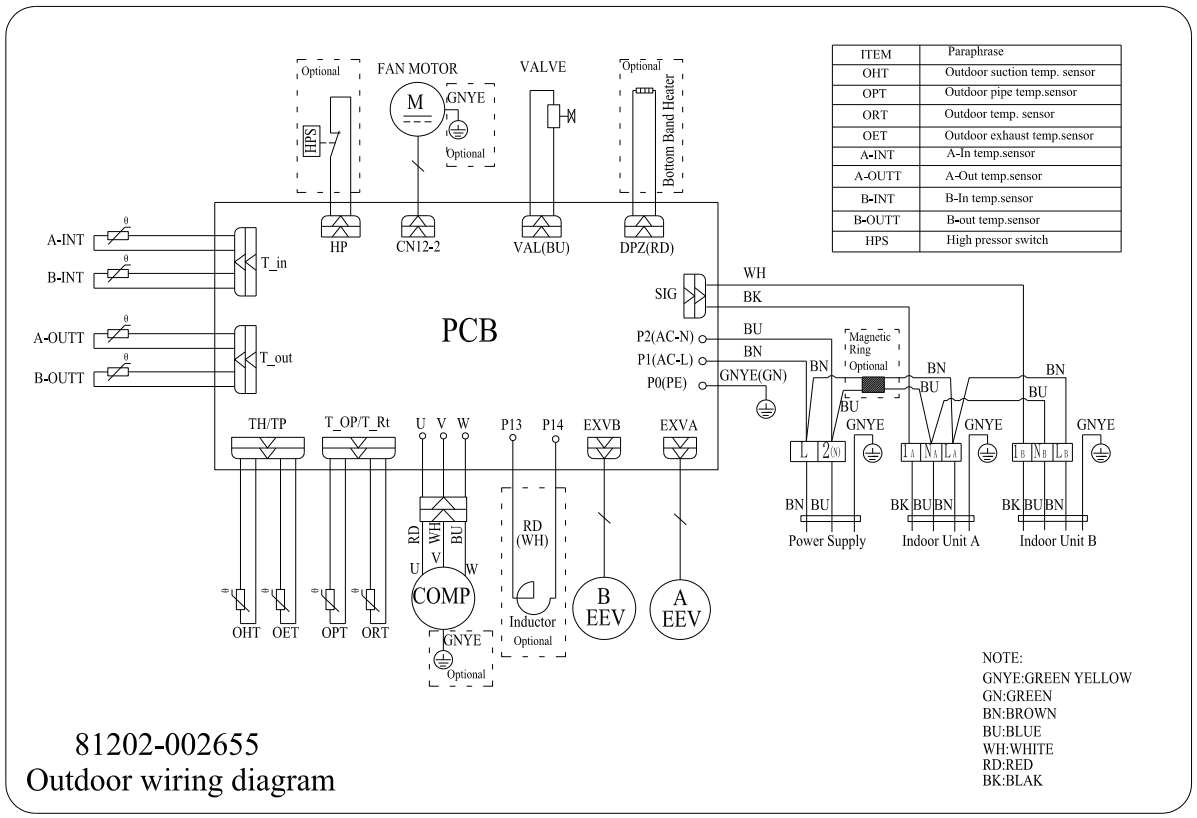
As shown in the failure codes, some of the codes (Fb~bj) need to press remote control for inspection.

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.

5. Wiring diagram

OUTDOOR UNIT

ONE TO 2 TYPE: HN40Xm2 R15, HN50Xm2 R15



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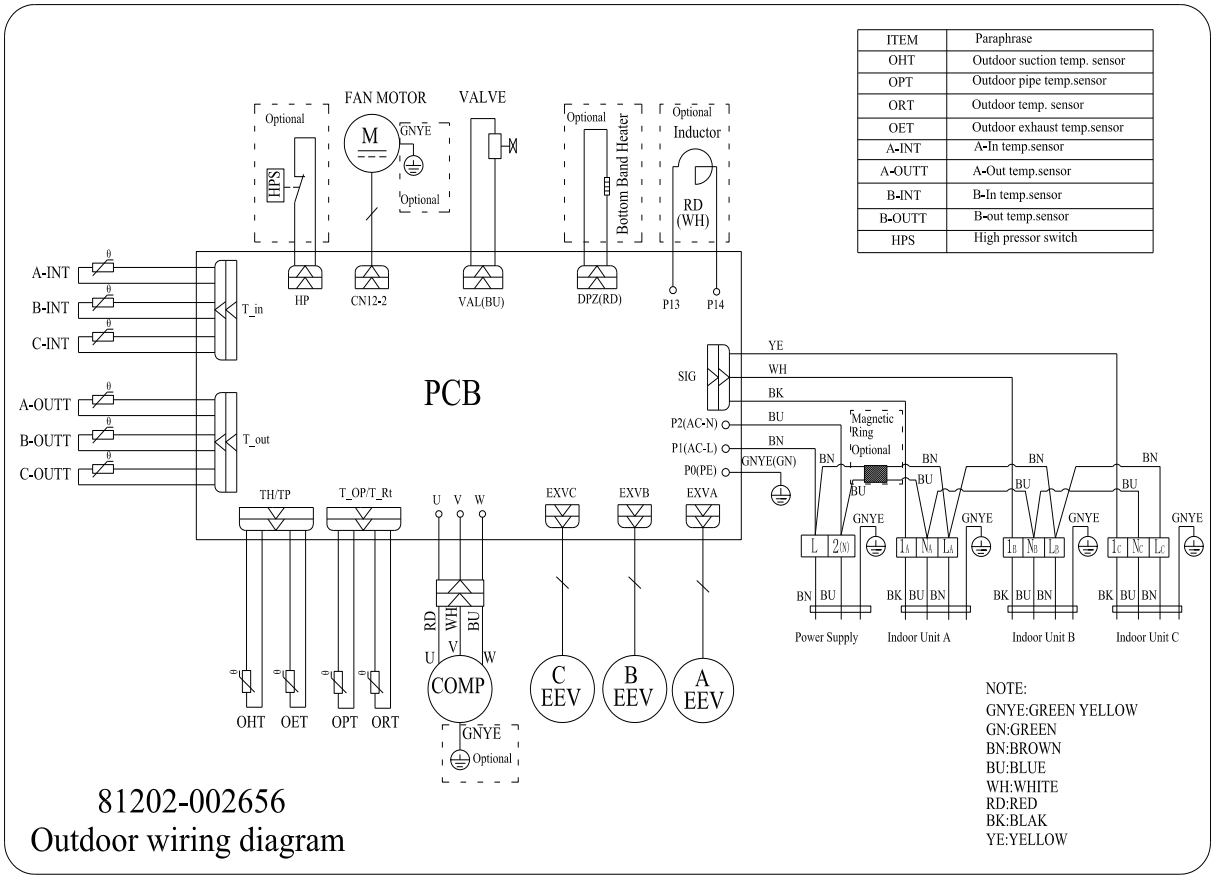
Outdoor wiring diagram

ONE TO 3 TYPE: HN70Xm3 R15



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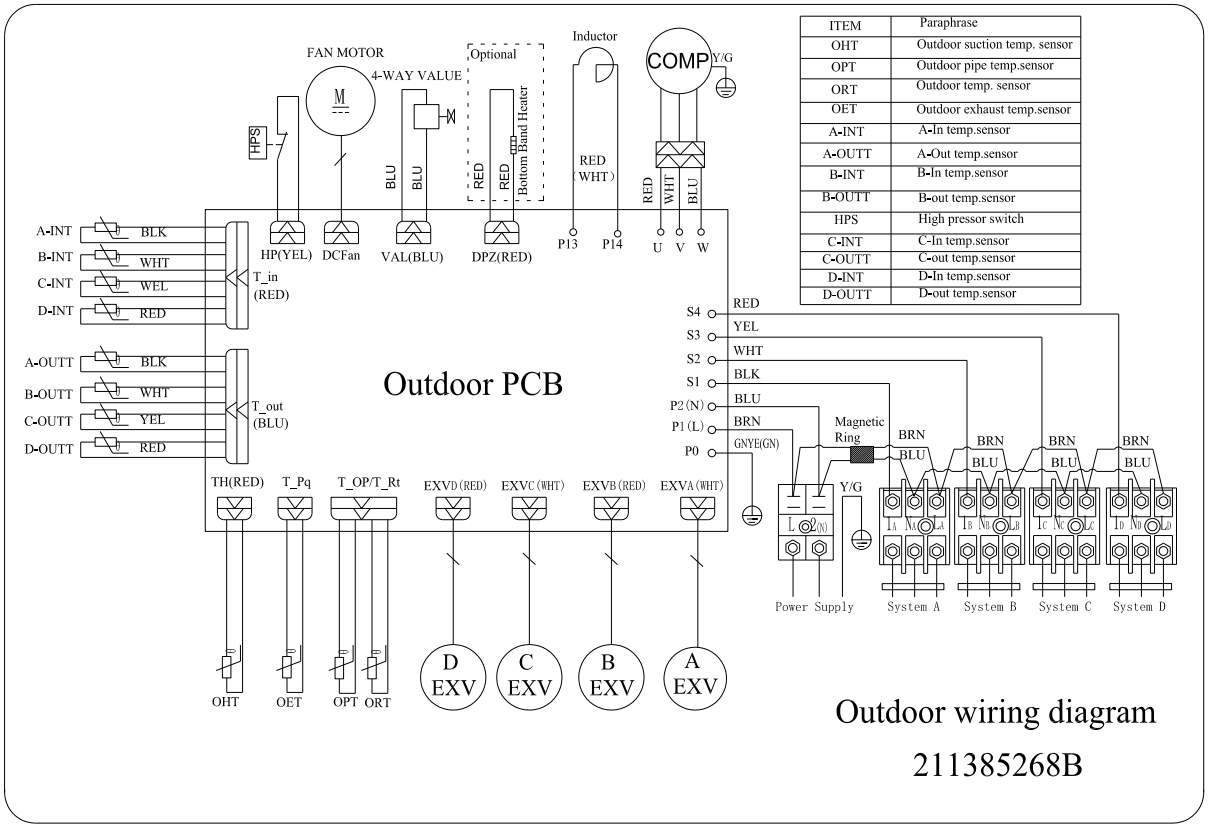
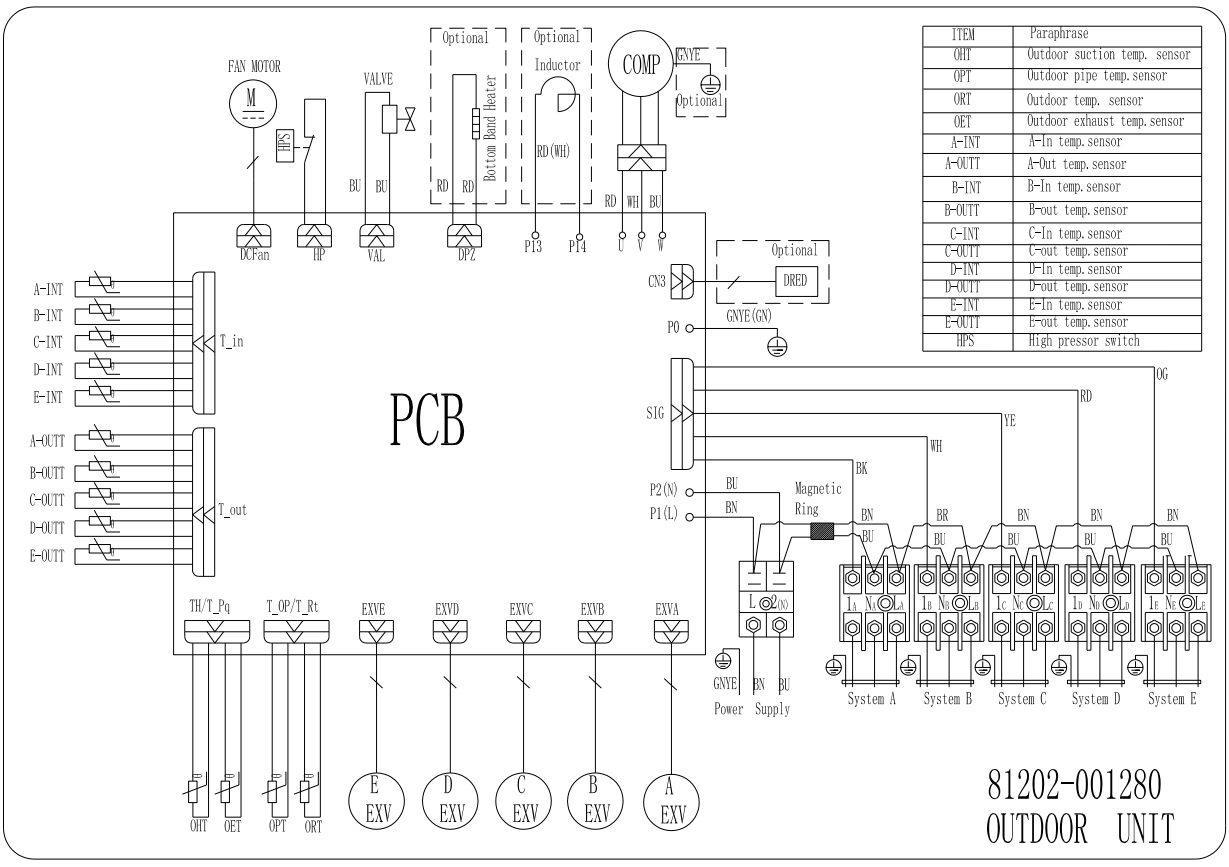
Outdoor wiring diagram

ONE TO 4 TYPE: HN90Xm4 R15



ITEM	Paraphrase
OHT	Outdoor suction temp. sensor
OPT	Outdoor pipe temp.sensor
ORT	Outdoor temp. sensor
OET	Outdoor exhaust temp.sensor
A-INT	A-In temp.sensor
A-OUTT	A-Out temp.sensor
B-INT	B-In temp.sensor
B-OUTT	B-out temp.sensor
HPS	High pressor switch
C-INT	C-In temp.sensor
C-OUTT	C-out temp.sensor
D-INT	D-In temp.sensor
D-OUTT	D-out temp.sensor

ONE TO 5 TYPE: HN120Xm5 R15



ITEM	Paraphrase
OHT	Outdoor suction temp. sensor
OPT	Outdoor pipe temp.sensor
ORT	Outdoor temp. sensor
OET	Outdoor exhaust temp.sensor
A-INT	A-In temp.sensor
A-OUTT	A-Out temp.sensor
B-INT	B-In temp.sensor
B-OUTT	B-out temp.sensor
C-INT	C-In temp.sensor
C-OUTT	C-out temp.sensor
D-INT	D-In temp.sensor
D-OUTT	D-out temp.sensor
E-INT	E-In temp.sensor
E-OUTT	E-out temp.sensor
HPS	High pressor switch

6. Precaution

6.1 SAFETY RULES AND RECOMMENDATIONS FOR THE INSTALLATION

- Read this guide before installing and using the appliance.
- During the installation of the indoor and outdoor units the access to the working area should be forbidden to children.
  Unforeseeable accidents could happen.
- Make sure that the base of the outdoor unit is firmly fixed.
- Check that air cannot enter the refrigerant system and check for refrigerant leaks when moving the air conditioner.
- Check that air cannot enter the refrigerant system and check for refrigerant leaks when moving the air conditioner.
- The ratings of the fuse installed in the built in-control unit are T 5A / 250V.
- The user must protect the indoor unit with a fuse of suitable capacity for the maximum input current or with another overload protection device.
- Ensure that the mains voltage corresponds to that stamped on the rating plate. Keep the switch or power plug clean. Insert the power plug correctly and firmly into the socket, thereby avoiding the risk of electric shock or fire due to insufficient contact.
- Check that the socket is suitable for the plug, otherwise have the socket changed.
- The appliance must be fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under over voltage category III conditions, and these means must be incorporated in the fixed wiring in accordance with the wiring rules.
- The air conditioner must be installed by professional or qualified persons. Do not install the appliance at a distance of less than 50 cm from inflammable substances (alcohol, etc.) Or from pressurized containers (e.g. spray cans).
- If the appliance is used in areas without the possibility of ventilation, precautions must be taken to prevent any leaks of refrigerant gas from remaining in the environment and creating a danger of fire.
- The packaging materials are recyclable and should be disposed of in the separate waste bins .Take the air conditioner at the end of its useful life to a special waste collection center for disposal.
- Only use the air conditioner as instructed in this booklet. These instructions are not intended to cover every possible condition and situation. As with any electrical household appliance, common sense and caution are therefore always recommended for installation, operation and maintenance.
- The appliance must be installed in accordance with applicable national regulations.
- Before accessing the terminals, all the power circuits must be disconnected from the power supply.
- The appliance shall be installed in accordance with national wiring regulations.
- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

6.2 SAFETY RULES AND RECOMMENDATIONS FOR THE USER

- Do not try to install the conditioner alone; always contact specialized technical personnel. Cleaning and maintenance must be carried out by specialized technical personnel. In any case disconnect the appliance from the mains electricity supply before carrying out any cleaning or maintenance.
- Ensure that the mains voltage corresponds to that stamped on the rating plate. Keep the switch or power plug clean. Insert the power plug correctly and firmly into the socket, thereby avoiding the risk of electric shock or fire due to insufficient contact.
- Do not pull out the plug to switch off the appliance when it is in operation, since this could create a spark and cause a fire, etc.
- This appliance has been made for air conditioning domestic environments and must not be used for any other purpose, such as for drying clothes, cooling food, etc.
- The packaging materials are recyclable and should be disposed of in the separate waste bins. Take the air conditioner at the end of its useful life to a special waste collection center for disposal.
- Always use the appliance with the air filter mounted. The use of the conditioner without air filter could cause an excessive accumulation of dust or waste on the inner parts of the device with possible subsequent failures.
- The user is responsible for having the appliance installed by a qualified technician, who must check that it is earthed in accordance with current legislation and insert a thermomagnetic circuit breaker.
- The batteries in remote controller must be recycled or disposed of properly. Disposal of Scrap Batteries

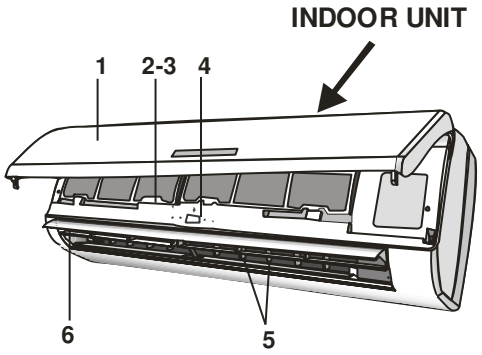
  --- Please discard the batteries as sorted municipal waste at the accessible collection point.
- Never remain directly exposed to the flow of cold air for a long time. The direct and prolonged exposition to cold air could be dangerous for your health .Particular care should be taken in the rooms where there are children, old or sick people.
- If the appliance gives off smoke or there is a smell of burning, immediately cut off the power supply and contact the Service Centre.
- The prolonged use of the device in such conditions could cause fire or electrocution.
- Have repairs carried out only by an authoritative Service Centre of the manufacturer. Incorrect repair could expose the user to the risk of electric shock, etc.
- Unhook the automatic switch if you foresee not to use the device for a long time. The airflow direction must be properly adjusted.
- The flaps must be directed downwards in the heating mode and upwards in the cooling mode.
- Only use the air conditioner as instructed in this booklet. These instructions are not in ended to cover every possible condition and situation. As with any electrical household appliance, common sense and caution are therefore always recommended for installation, operation and maintenance.
- Ensure that the appliance is disconnected from the power supply when it will remain inoperative for a long period and before carrying out any cleaning or maintenance.
- Selecting the most suitable temperature can prevent damage to the appliance.

6.3 SAFETY RULES AND PROHIBITIONS

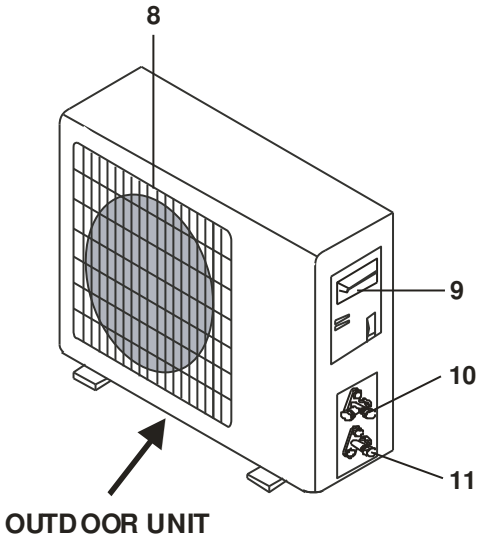
- Do not bend, tug or compress the power cord since this could damage it. Electrical shocks or fire are probably due to a damaged power cord. Specialized technical personnel only must replace a damaged power cord.
- Do not use extensions or gang modules.
- Do not touch the appliance when barefoot or parts of the body are wet or damp.
- Do not obstruct the air inlet or outlet of the indoor or the outdoor unit. The obstruction of these openings causes a reduction in the operative efficiency of the conditioner with possible consequent failures or damages.
- In no way alter the characteristics of the appliance.
- Do not install the appliance in environments where the air could contain gas, oil or sulphur or near sources of heat.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Do not climb onto or place any heavy or hot objects on top of the appliance.
- Do not leave windows or doors open for long when the air conditioner is operating.
- Do not direct the airflow onto plants or animals.
- A long direct exposition to the flow of cold air of the conditioner could have negative effects on plants and animals.
- Do not put the conditioner in contact with water. The electrical insulation could be damaged and thus causing electrocution.
- Do not climb onto or place any objects on the outdoor unit
- Never insert a stick or similar object into the appliance. It could cause injury.
- Children should be supervised to ensure that they do not play with the appliance. If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

7. Names of parts

Wall split type

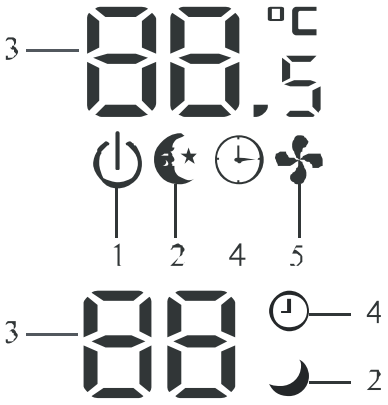


Indoor unit	
No.	Na
1	Front panel
2	Air filter
3	Special filter(option)
4	Display PCB
5	Vertical vane
6	Horizontal vane
7	Remote controller



Outdoor unit	
No.	Name
8	Air outlet grille
9	Electronic box cover
10	2-way valve
11	3-way valve

Display



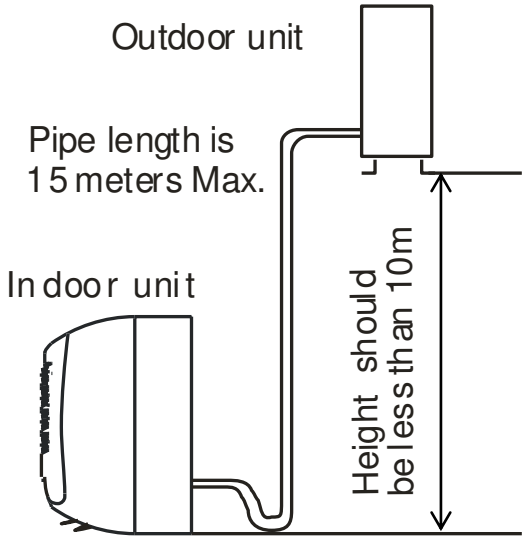
No.	Name
1	Power
2	Sleep
3	Temperature display
4	Timer
5	Run

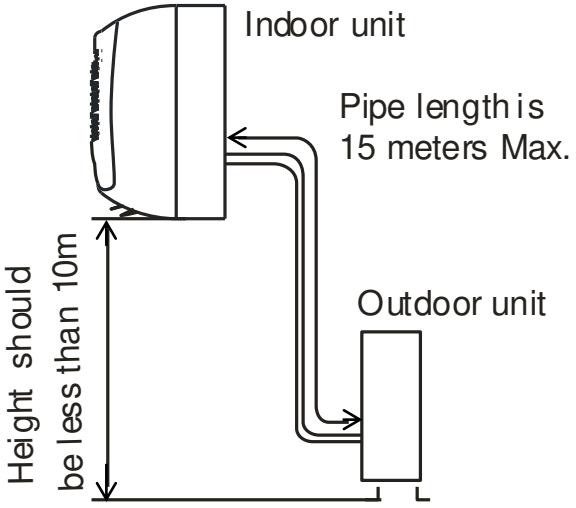
8. Installation manual

8.1 Installation Details

Connecting pipe length

Model	Pipe size(Inch)	
	Liquid	Gas
7K	1/4	3/8
9K	1/4	3/8
12K	1/4	3/8
18K	1/4	3/8





Mode	Standard length: m	Refrigerant piping Max. length: m	Additional refrigerant Calculation: ×g=20g/m(A-5m)
9K	5.0	15	15g/m
12K	5.0	15	15g/m
18K	5.0	15	15g/m

Connecting cables

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

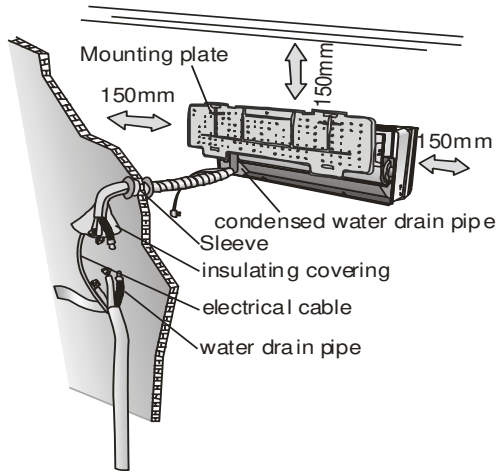
Appliance Amps	Wire Size
5	AWG21/0.75 mm2
10	AWG18/1.0 mm2
13	AWG15 /1. 5 mm2
18	AWG14/1.6 mm2
25	AWG12/2.0 mm2
30	AWG10/2.5 mm2

8.2 Installation for the first time

Indoor unit

Wall type:

- Install the indoor unit level on a strong wall that is not subject to vibrations
- The inlet and outlet ports should not be obstructed: the air should be able to blow all over the room.
- Do not install the unit near a source of heat, steam, or flammable gas.
- Install the unit near an electric socket or private circuit.
- Do not install the unit where it will be exposed to direct sunlight.
- Install the unit where connection between indoor and outdoor unit is as easy as possible.
- Install the unit where it is easy to drain the condensed water.
- Check the machine operation regularly and leave the necessary spaces as shown in the picture.
- Install the indoor unit where the filter can be easily accessible.
- Install the indoor unit in the room to be air conditioning, avoiding to installation in corridors or communal areas.

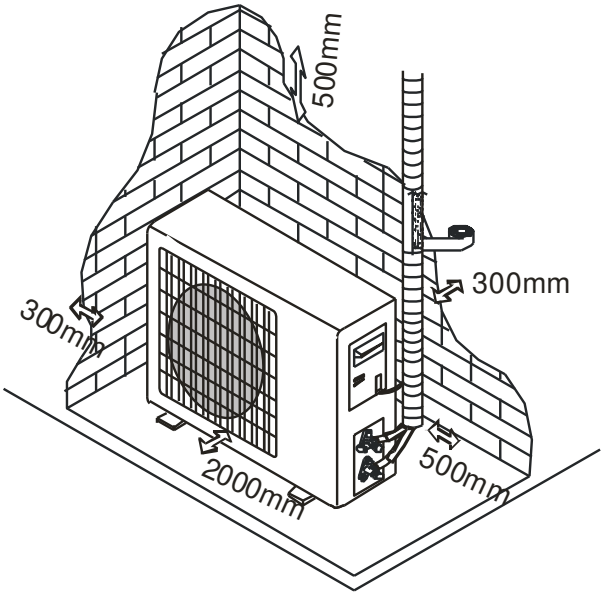


- Install the indoor unit at a height of at least 2.5m from the ground.

OUTDOOR UNIT

- Do not install the outdoor unit near sources of heat, steam or flammable gas.
- Do not install the unit in too windy or dusty places.
- Do not install the unit where people often pass. Select a place where the air discharge and operating sound level will not disturb the neighbours.
- Avoid installing the unit where it will be exposed to direct sunlight (other wise use a protection, if necessary, that should not interfere with the air flow).
- Leave the spaces as shown in the picture for
- The air to circulate freely.
- Install the outdoor unit in a safe and solid place.
- If the outdoor unit is subject to vibration, place rubber gaskets onto the feet of the unit.

Minimum space to be left (mm) showing in the picture.



To install, proceed as follows:

8.2.1 Installation of the mounting plate.

Wall split type:

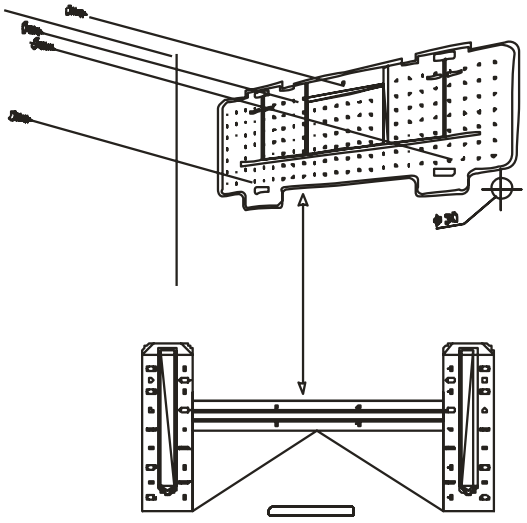
8.2.1.1 By using a level, put the mounting plate in a perfect square position vertically and horizontally.

8.2.1.2 Drill 32mm deep holes in the wall to fix the plate.

8.2.1.3 Insert the plastic anchors into the hole.

8.2.1.4 Fix the mounting plate by using the provided tapping screws.

8.2.1.5 Check that the mounting plate is correctly fixed.



Note: The shape of the mounting plate may be different from the one above, but installation method is similar.

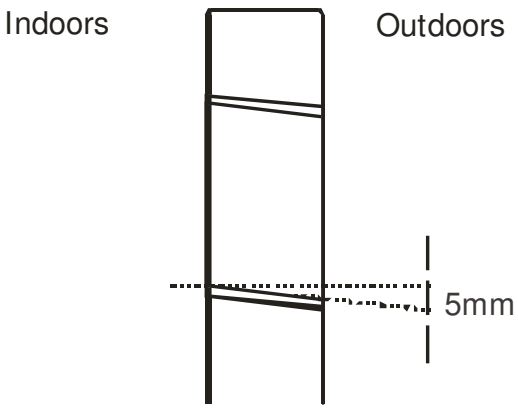
8.2.2 Drilling a hole in the wall for the piping

1) Decide where to drill the hole in the wall for the piping (if necessary) according to the position of the mounting plate

2) Install a flexible flange through the hole in the wall to keep the latter intact and clean.

The hole must slope downwards towards the exterior.

Note: Keep the drain pipe down towards the direction of the wall hole, otherwise leakage may occur.



8.2.3 Electrical connections---Indoor unit

1).Lift the front panel.

2).Take off the cover as indicated in the picture (by removing a screw or by breaking the hooks).

3).For the electrical connections, see the circuit diagram on the right part of the unit under the front panel.

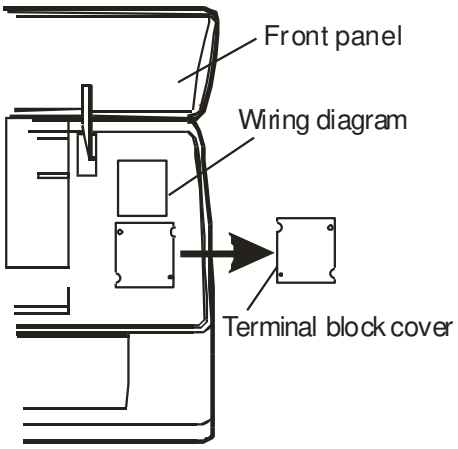
4).Connect the cable wires to the screw terminals by following the numbering, Use wire size suitable to the electric power input (see name plate on the unit) and according to all current national safety code requirements.

5).The cable connecting the outdoor and indoor units must be suitable for outdoor use.

6).The plug must be accessible also after the appliance has been installed so that it can be pulled out if necessary.

7).An efficient earth connection must be ensured.

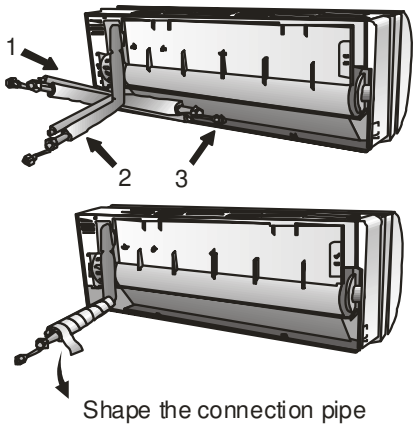
8).If the power cable is damaged, it must be replaced by an authorized Service Centre.



8.2.4 Refrigerant piping connection

The piping can be run in the 3 directions indicated by numbers in the picture. When the piping is run in direction 1 or 3, cut a notch along the groove on the side of the indoor unit with a cutter.

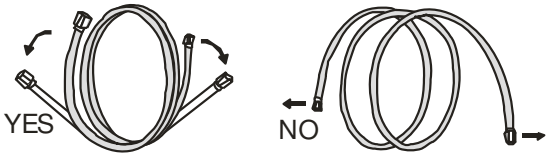
Run the piping in the direction of the wall hole and bind the copper pipes, the drain pipe and the power cables together with the tape with the drain pipe at the bottom, so that water can flow freely.



Shape the connection pipe

8.2.5 Connecting the pipes.

- Do not remove the cap from the pipe until connecting it, to avoid dampness or dirt from entering.
- If the pipe is bent or pulled too often, it will become stiff. Do not bend the pipe more than three times at one point.
- When extending the rolled pipe, straighten the pipe by unwinding it gently as shown in the picture.



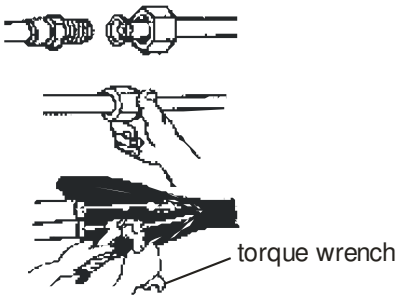
Extending the rolled pipe

8.2.6 Connections to the indoor unit

1).Remove the indoor unit pipe cap (check that there is no debris inside).

2).Insert the fare nut and create a flange at the extreme end of the connection pipe.

3).Tighten the connections by using two wrenches working in opposite directions.



8.2.7 Indoor unit condensed water drainage

The indoor unit condensed water drainage is fundamental for the success of the installation.

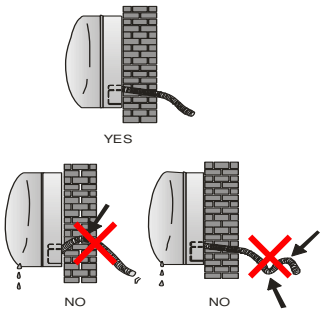
1).Place the drain hose below the piping, taking care not to create siphons.

2).The drain hose must slant downwards to aid drainage.

3).Do not bend the drain hose or leave it protruding or twisted and do not put the end of it in water. If an extension is connected to the drain hose, ensure that it is lagged when it passes into the indoor unit.

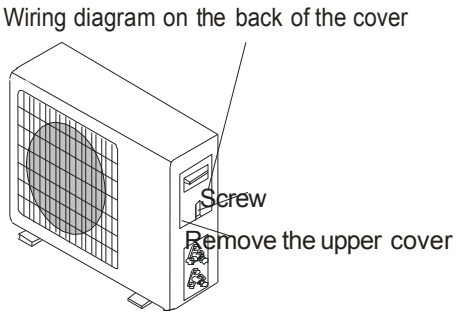
4).If the piping is installed to the right, the pipes, power cable and drain hose must be lagged and secured onto the rear of the unit with a pipe connection.

- Insert the pipe connection into the relative slot.
- Press to join the pipe connection to the base.



8.2.8 Electronic connections of outdoor unit

1. Take the cover away.
2. Connect the cable wires to the terminal board using the same numbering as in the indoor unit.
3. For the electrical connections, see the wiring diagram on the back of the cover
4. Fasten the cables with a cable-clamp.
5. An efficient earth connection must be ensured.
6. Replace the covers.

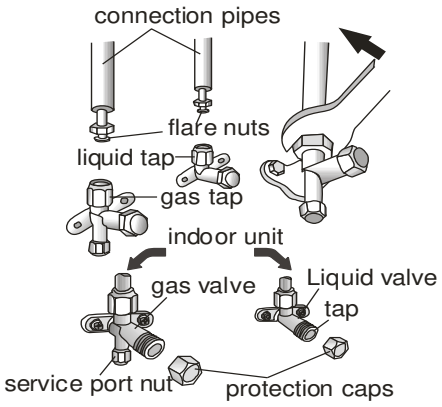


Outdoor unit

8.2.9 Connecting the pipe of outdoor unit

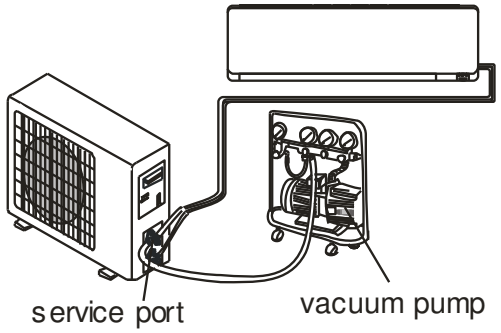
Screw the flare nuts to the outdoor unit coupling with the same tightening procedures described for the indoor unit.

Note: If the tightening torque is not sufficient, there will probably be some leakage. With excessive tightening torque there will also be some leakage, as the flange could be damaged.



8.2.10 Bleeding

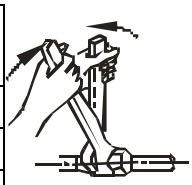
Air and humidity left inside the refrigerant circuit can cause compressor malfunction. After having connected the indoor and outdoor units, bleed the air and humidity from the refrigerant circuit by using a vacuum pump. The air and humidity left inside the refrigerant circulation can cause compressor malfunction. After having connected the indoor and outdoor units, bleed the air and humidity from the refrigerant circulation using a vacuum pump.



Notice

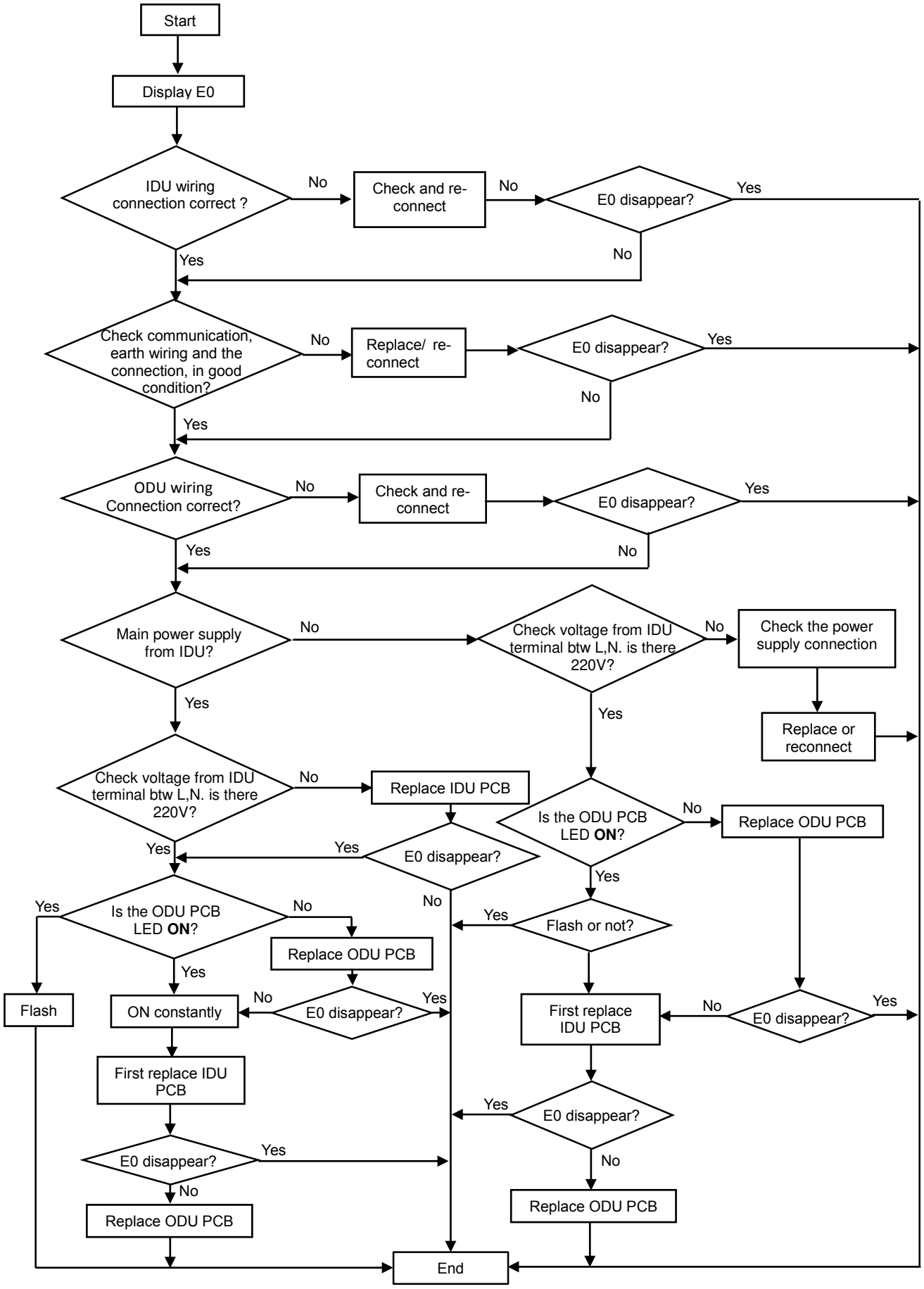
According to installation conditions, overlarge wrenched Torch will destroy the nut. (Unit. N.cm)

Pipe	Tightening torque(N.M)
1/4''	15-20
3/8''	31-35
1/2''	45-50
5/8''	60-65

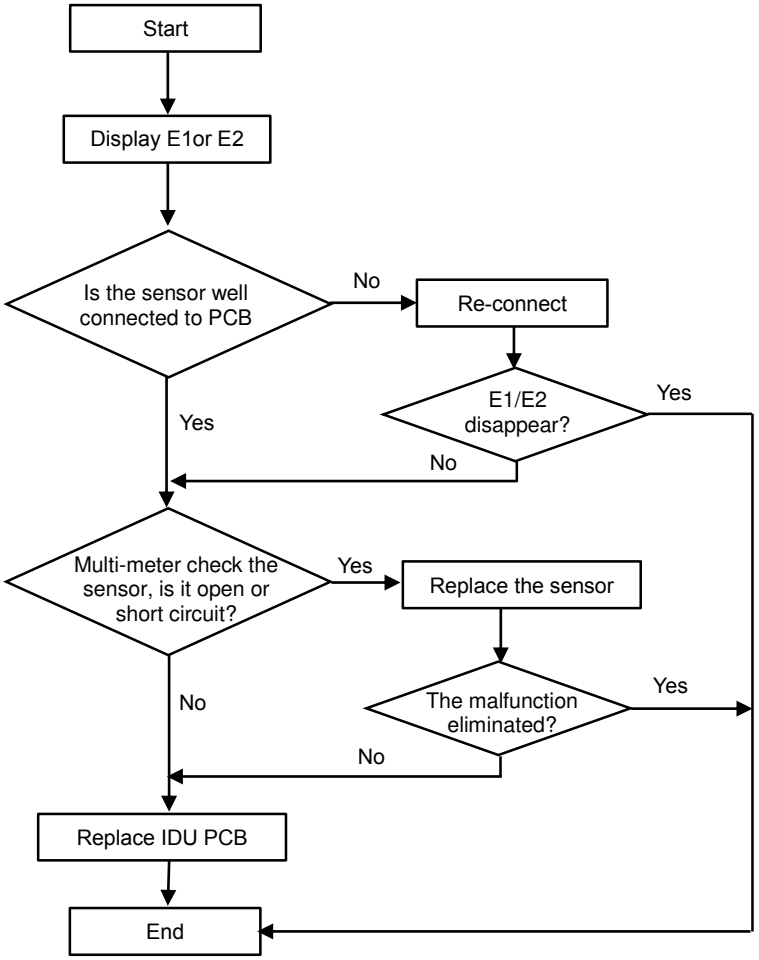


9. Trouble shooting

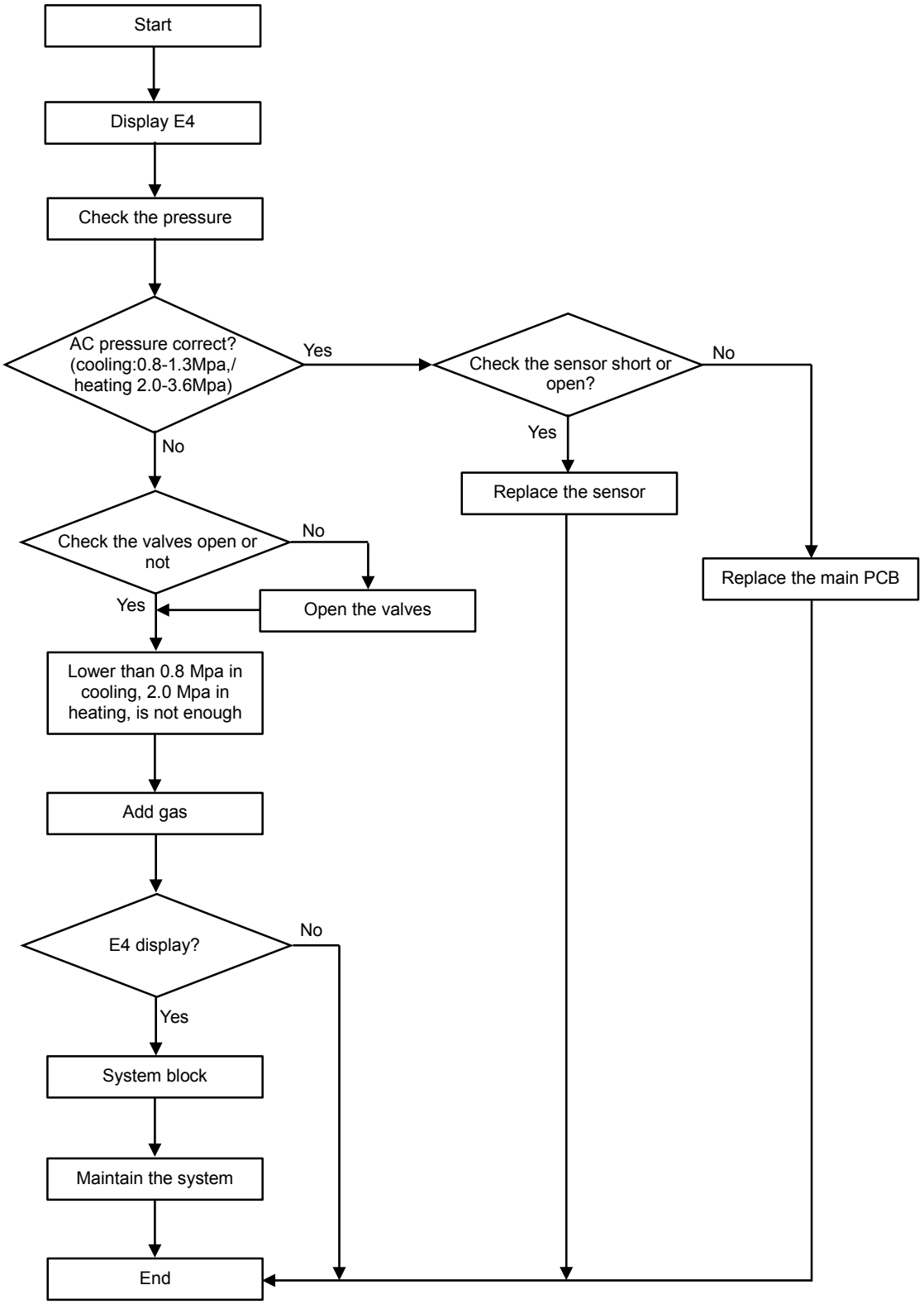
9.1 E0 Error- IDU & ODU communication failure



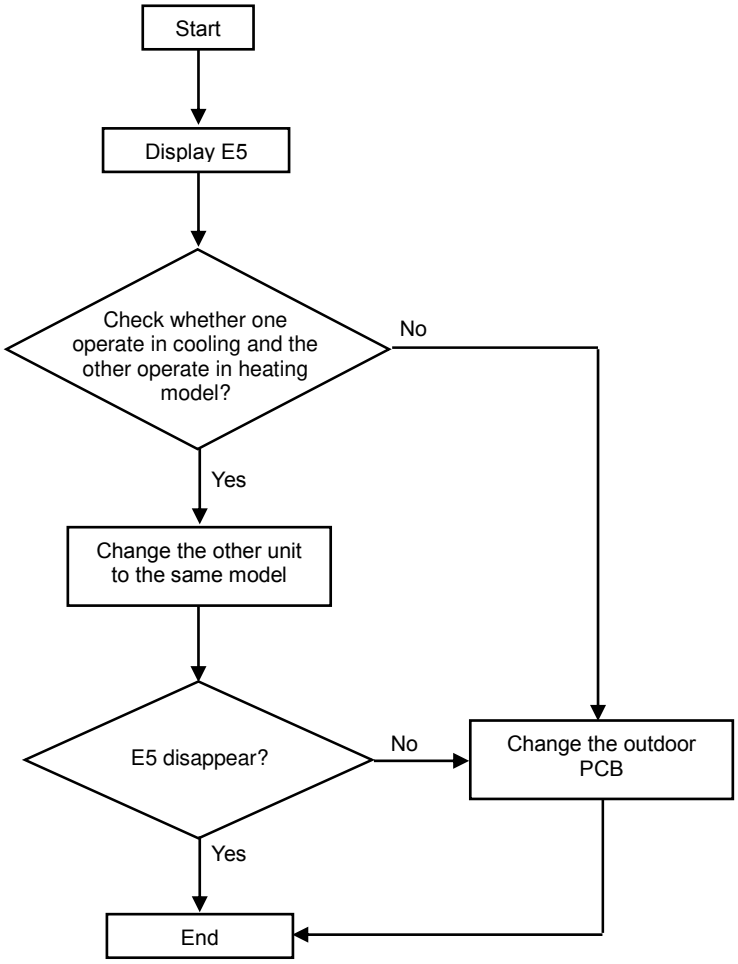
9.2 E1, E2 ---IDU Room temperature sensor and/or coil temperature sensor failure.



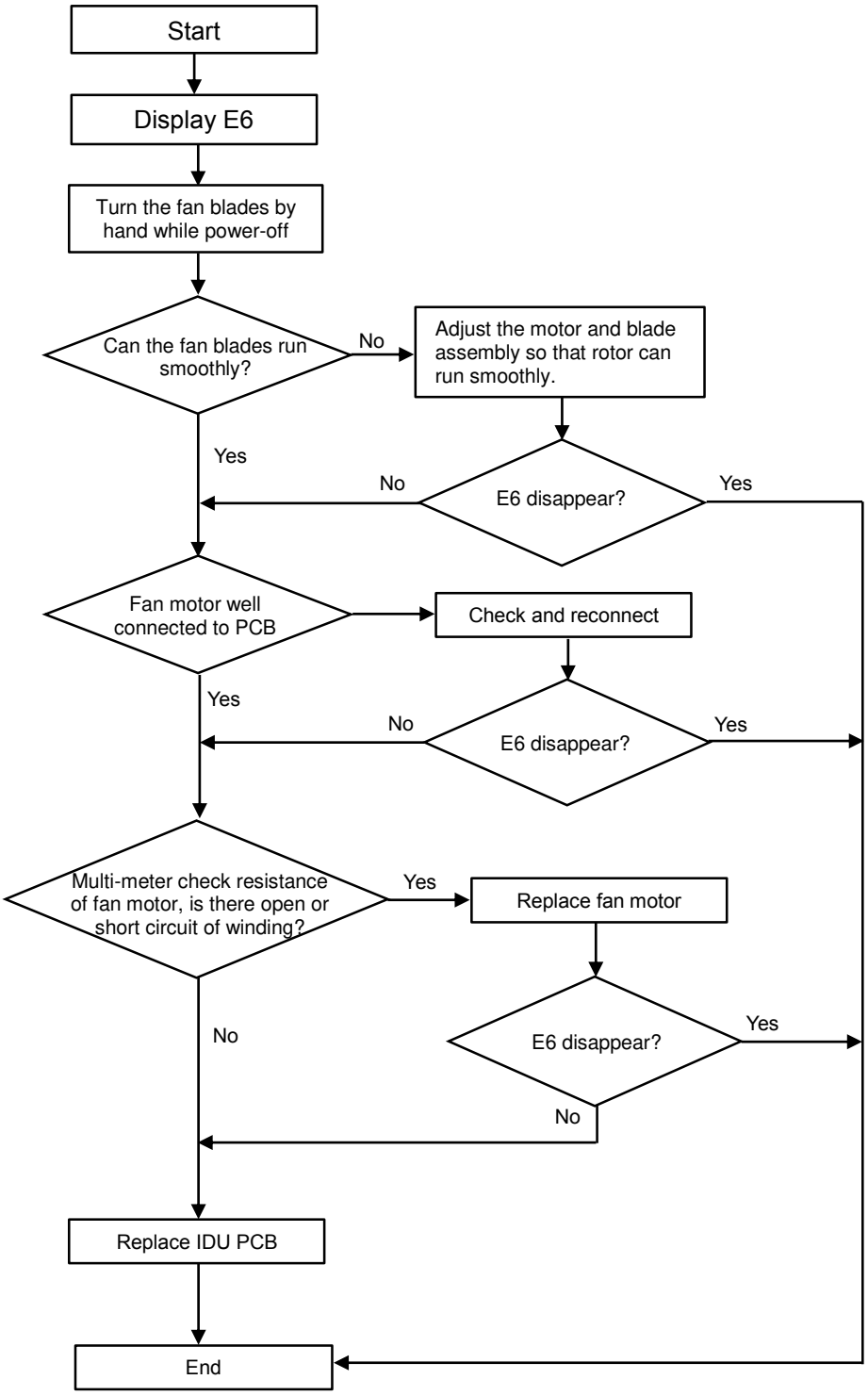
9.3 E4 --- System abnormal (Gas not enough)



9.4 E5 Error- Model configuration wrong

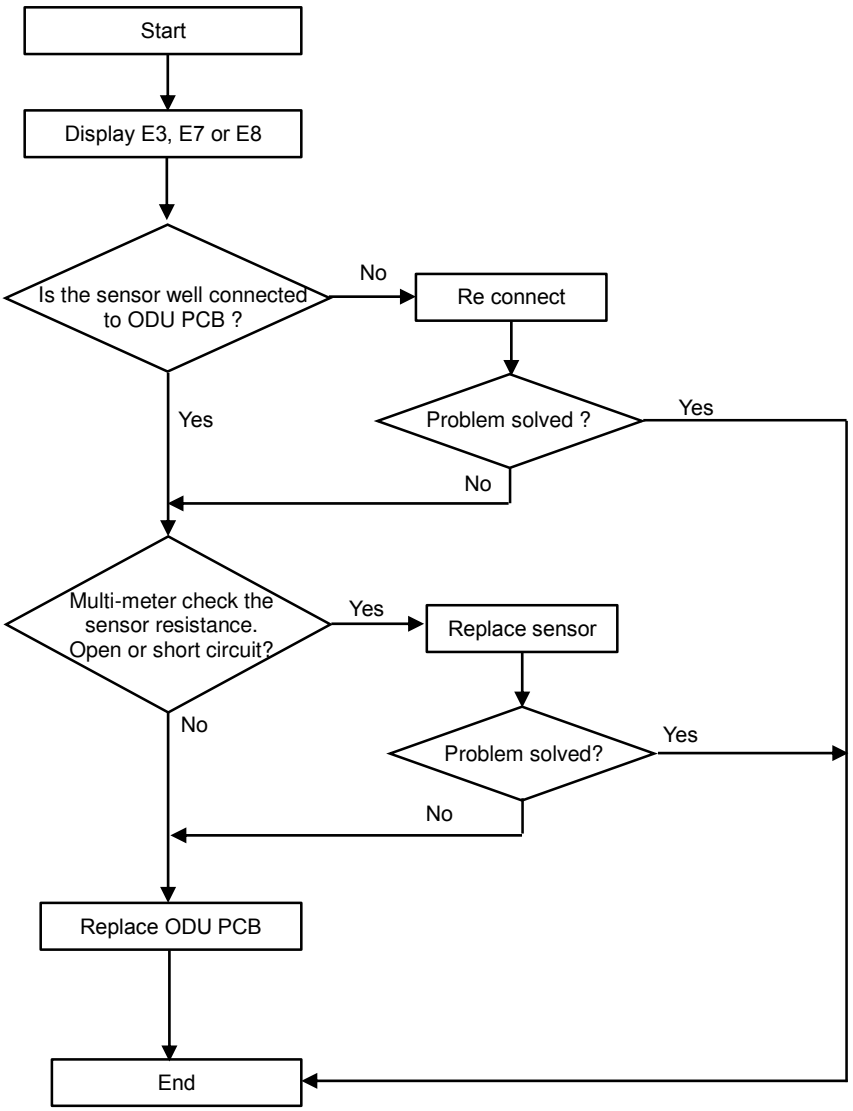


9.5 E6----IDU ventilation failure (PG and DC fan motor only)



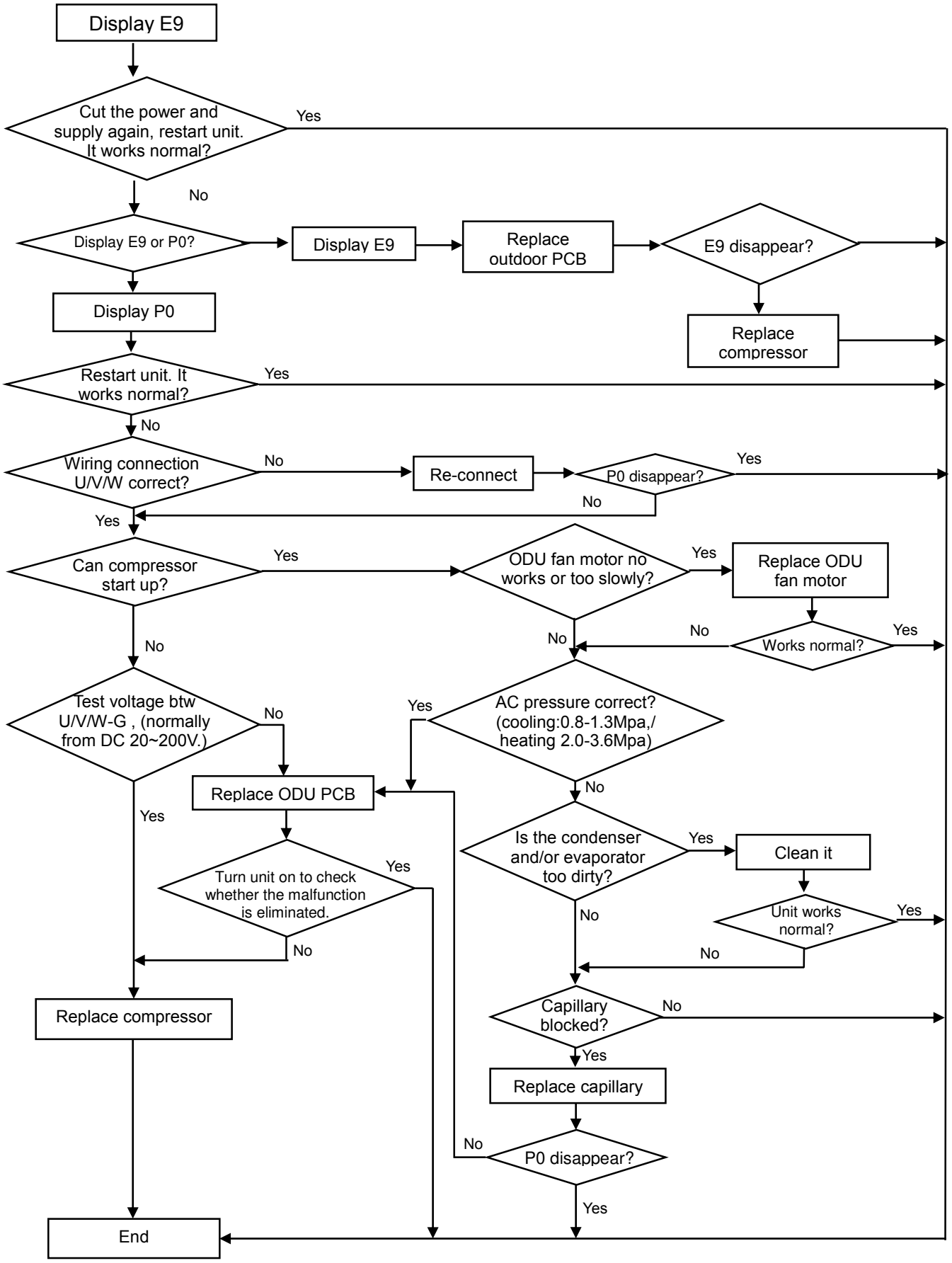
9.6 E3, E7 or E8----ODU Coil temperature sensor, Ambient temperature sensor or Discharge temperature sensor failure.

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.

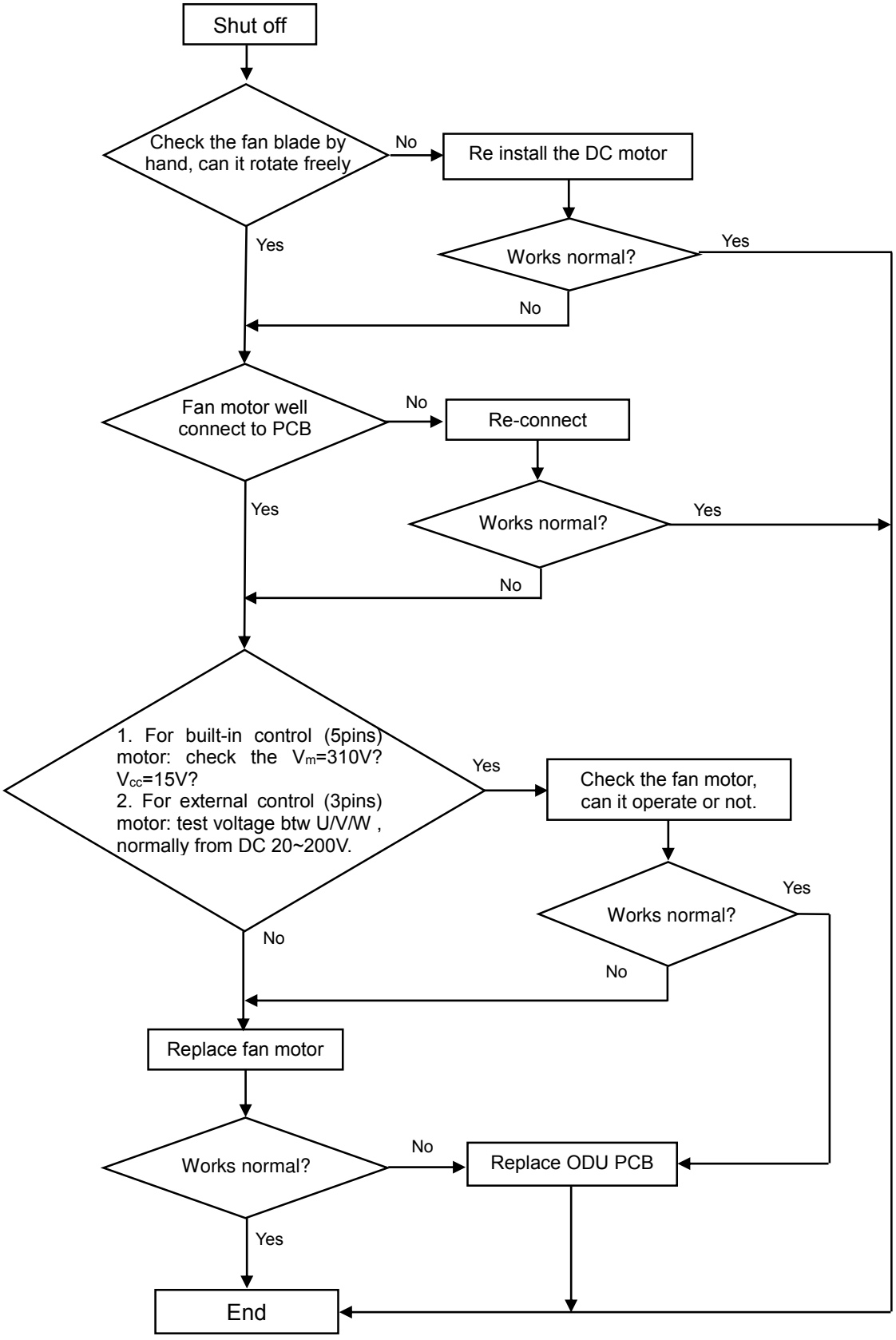


9.7 E9---ODU IPM /Compressor drive fault

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.

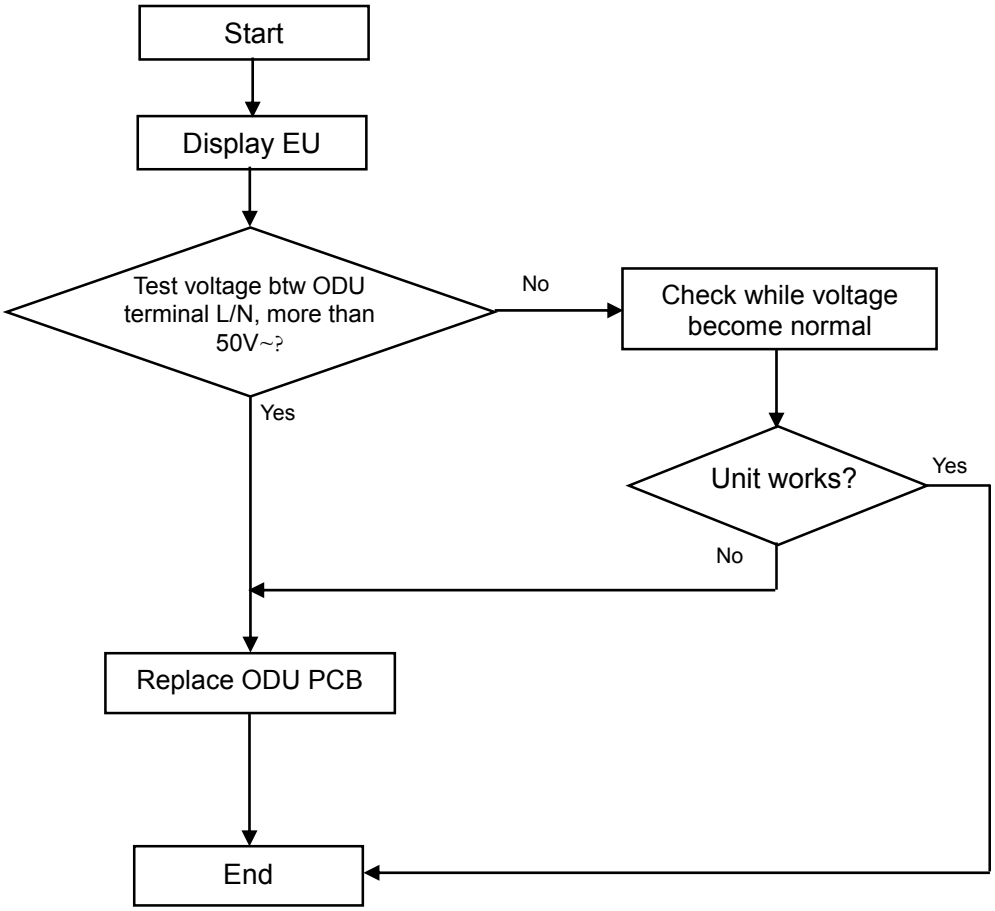


9.8 EF---ODU DC fan motor failure



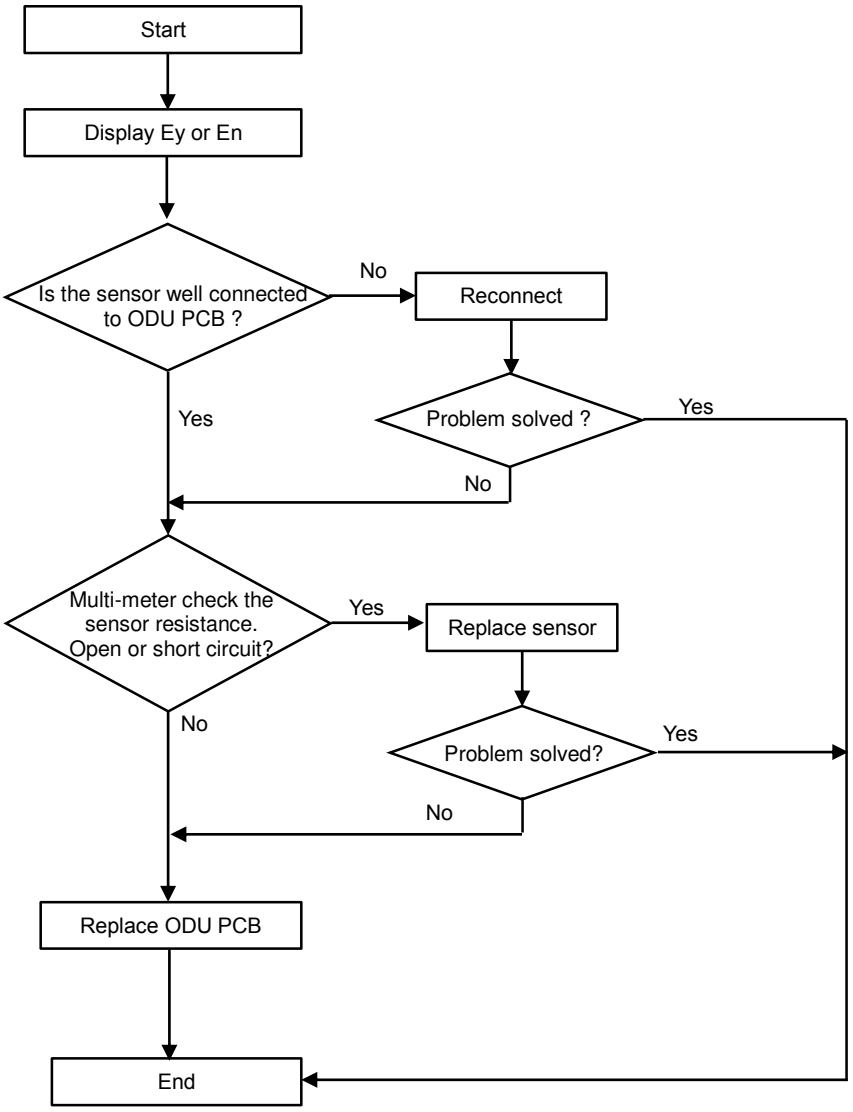
9.9 EU---ODU voltage test sensor failure

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



9.10 Ey, En, EH---- Outdoor liquid pipe temperature sensor, Outdoor gas pipe temperature sensor or suction pipe temperature sensor failure.

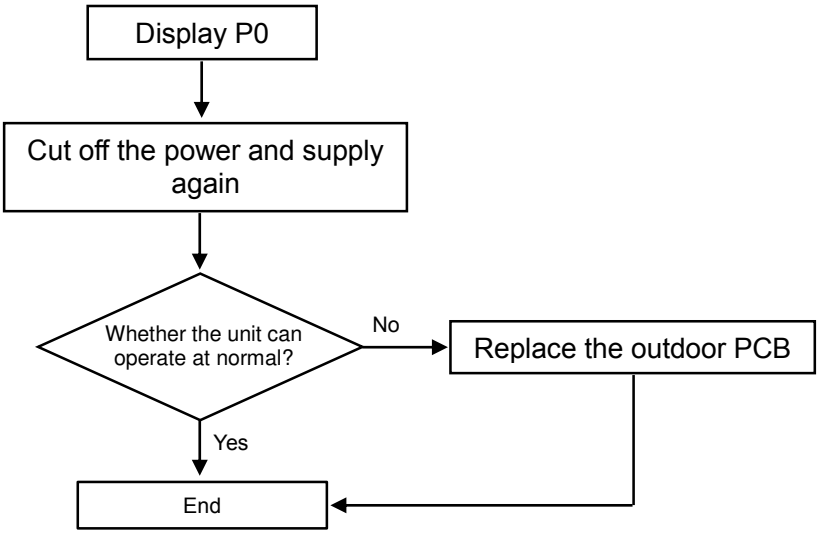
When any of the sensor resistance open or short circuit , unit will display failure code as Ey, En or EH, IDU and ODU turns off. When the sensor resistance recovery, unit revert to be standby, customer can switch on the unit directly.



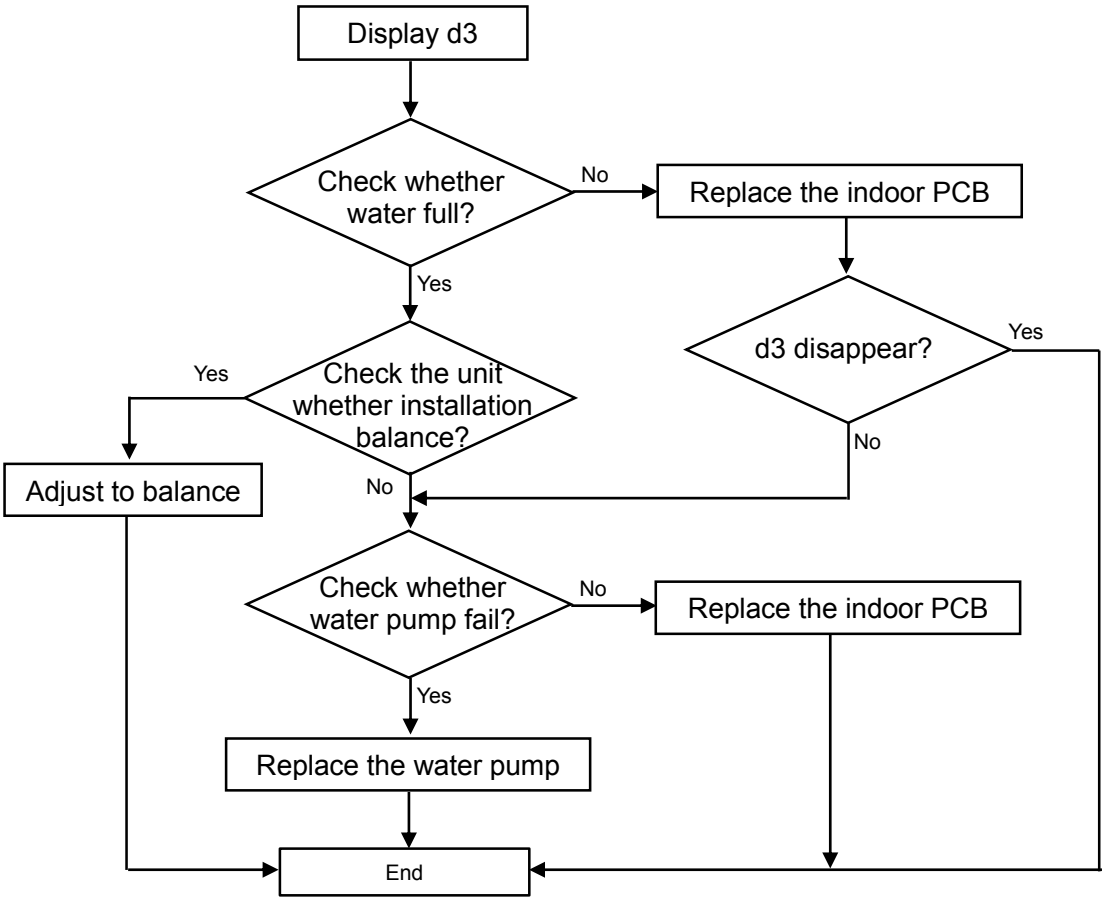
9.11 EC--- Outdoor communication failure

EA--- Current sensor fault

EE--- Outdoor EEPROM fault

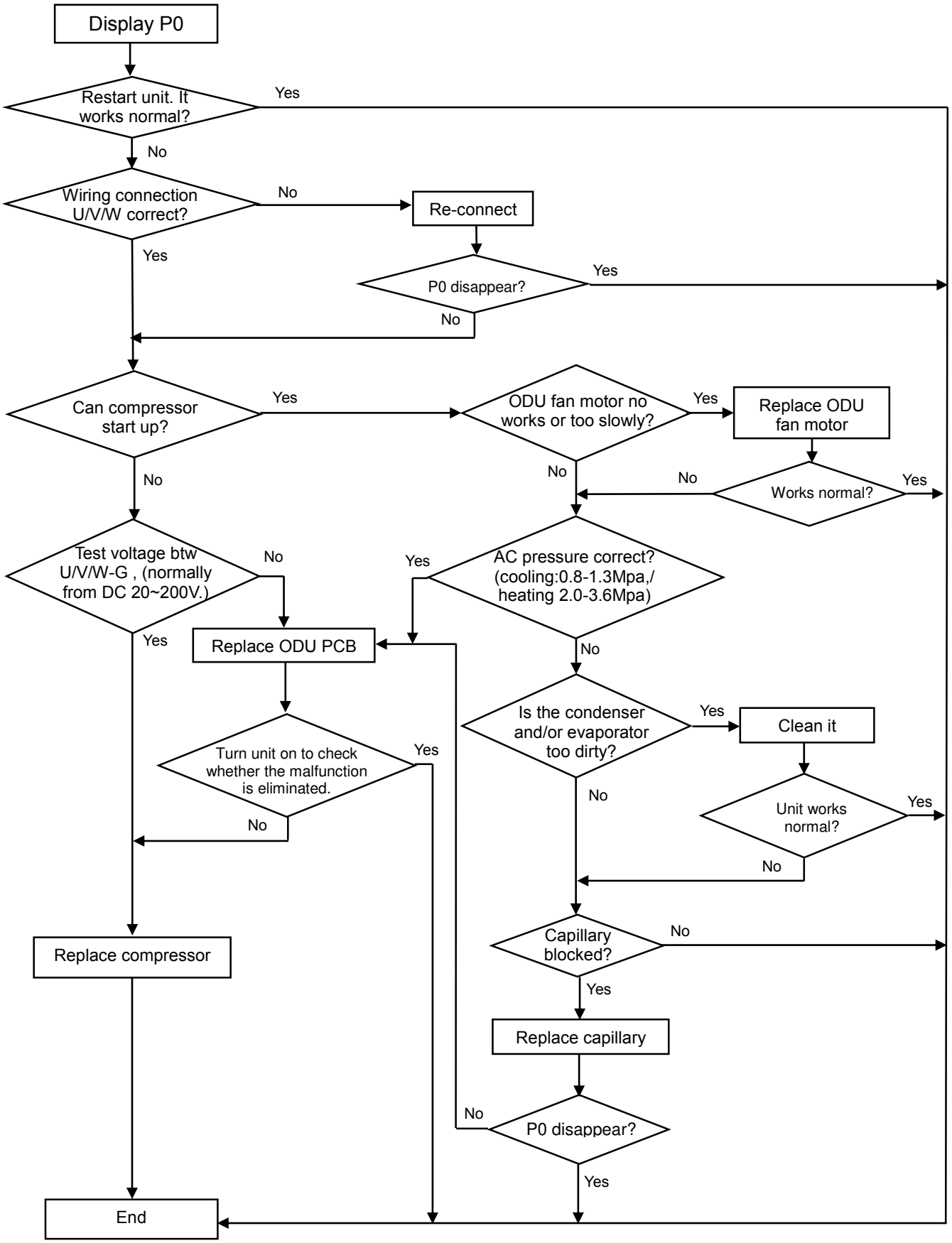


9.12 d3--- Water full protection



9.13 P0---IPM protection

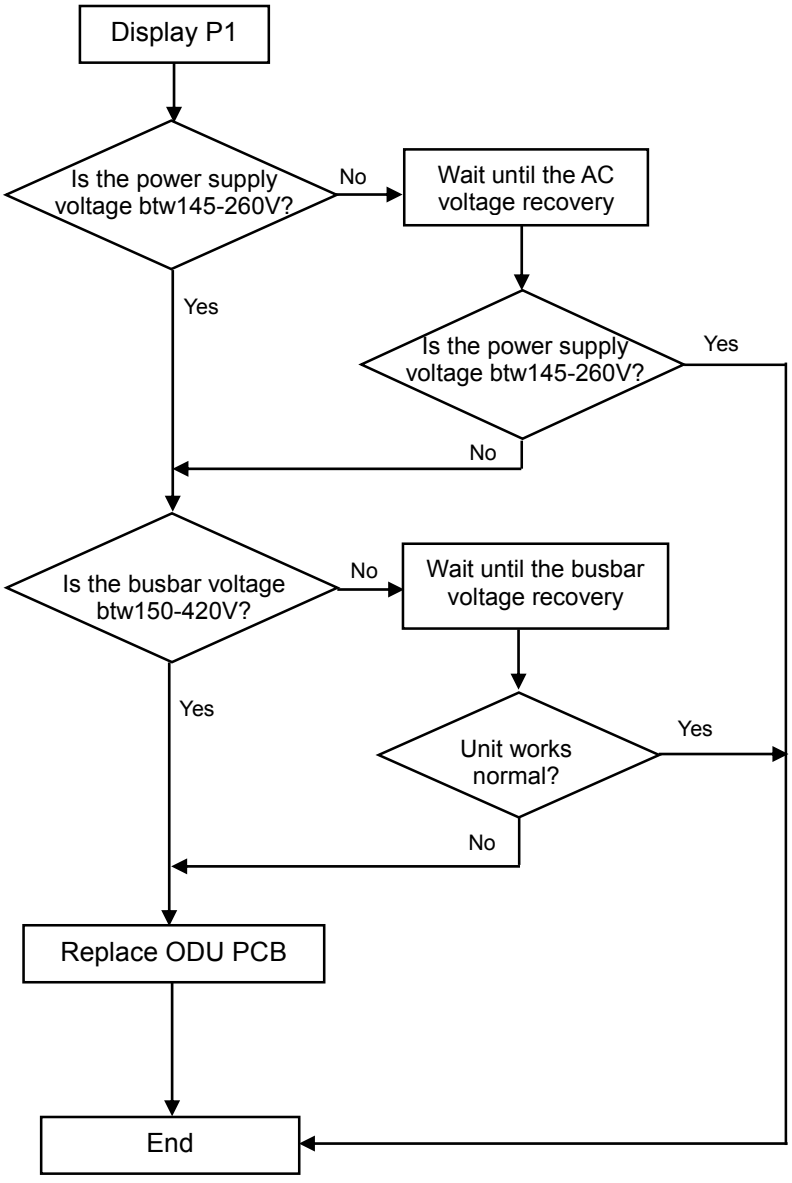
When overheat or overcurrent for IPM, AC unit will display P0 protection.



9.14 P1--- Lower voltage protection

1. Test voltage between L &N, When the power supply V＜AC155V, AC will display P1 protection, unit will recover back to previous status while V＞AC155V.

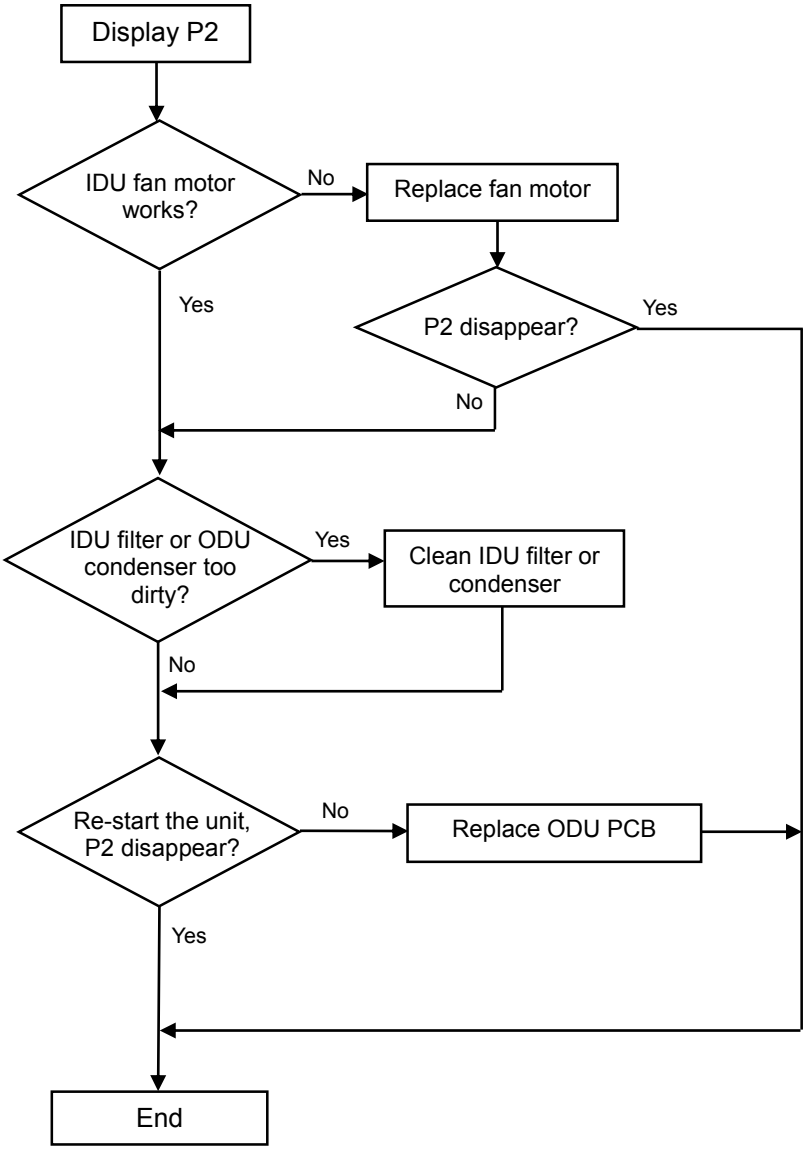
2. Test voltage on the big size electrolytic capacitor of ODU PCB, When DC busbar voltage V＞DC420V or V ＜DC150V, unit will recover back to previous status while DC190V＜V＜DC410V



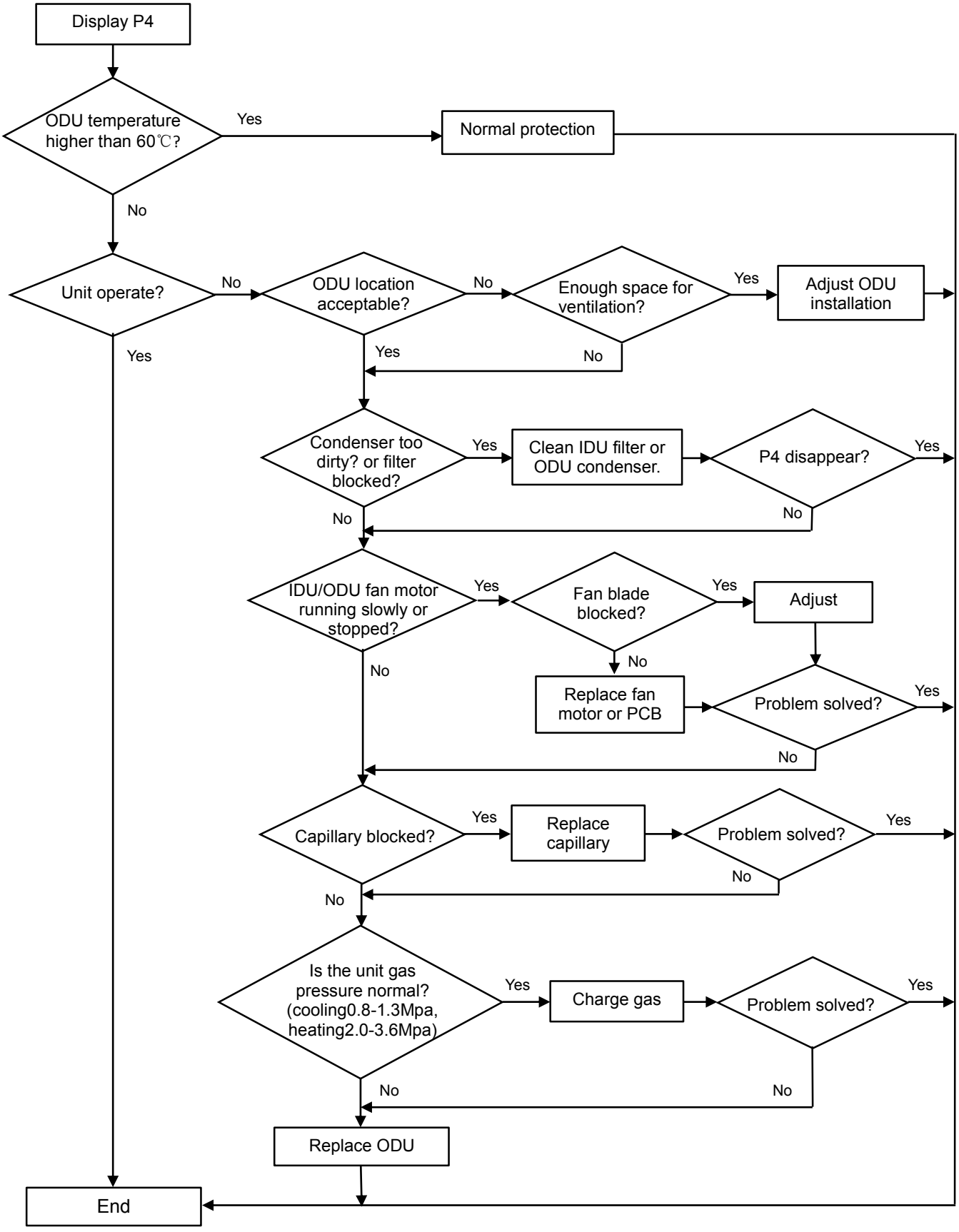
9.15 P2---Over Current protection

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 valve.

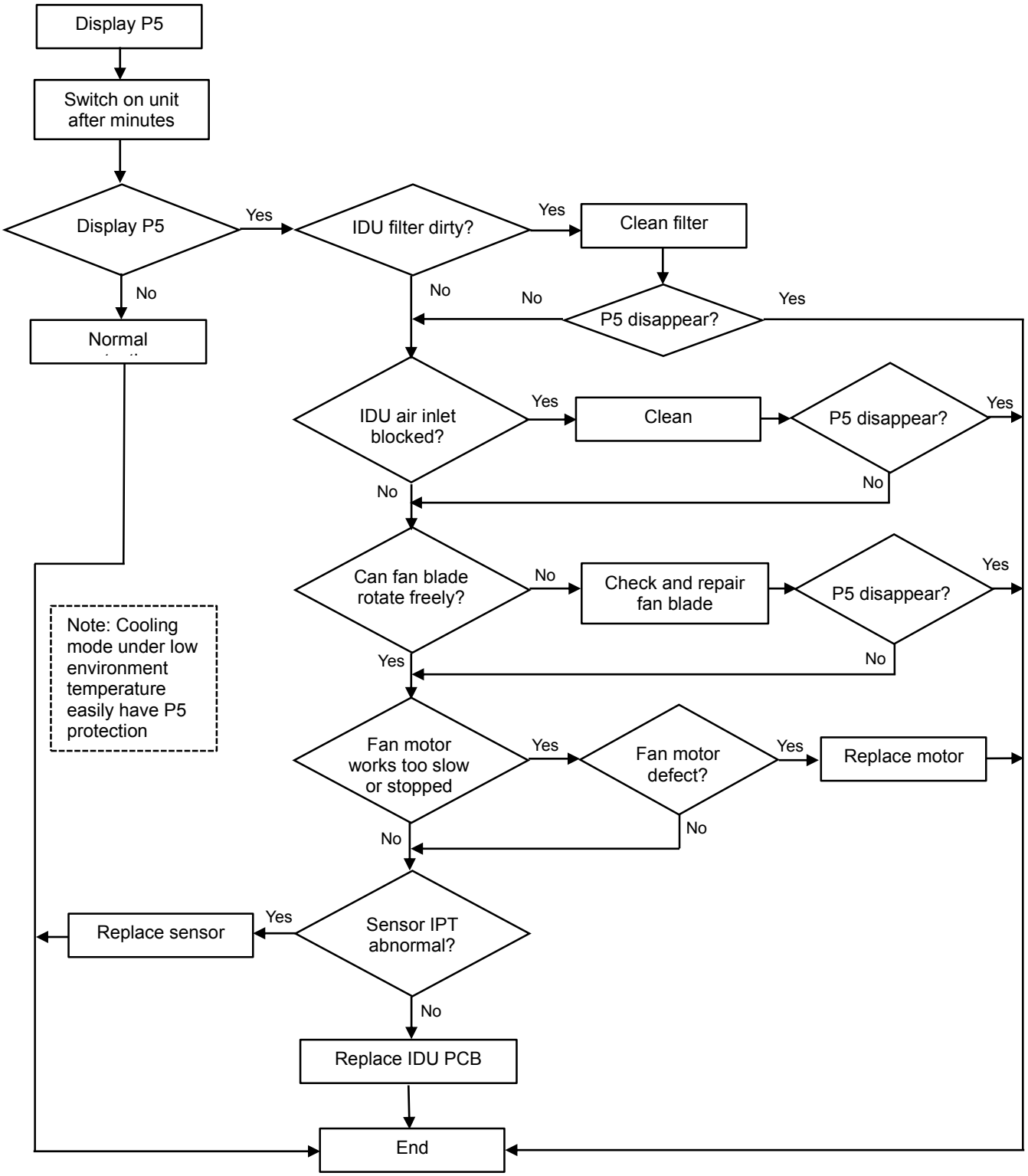


9.16 P4 ---ODU Discharge temperature overheating protection



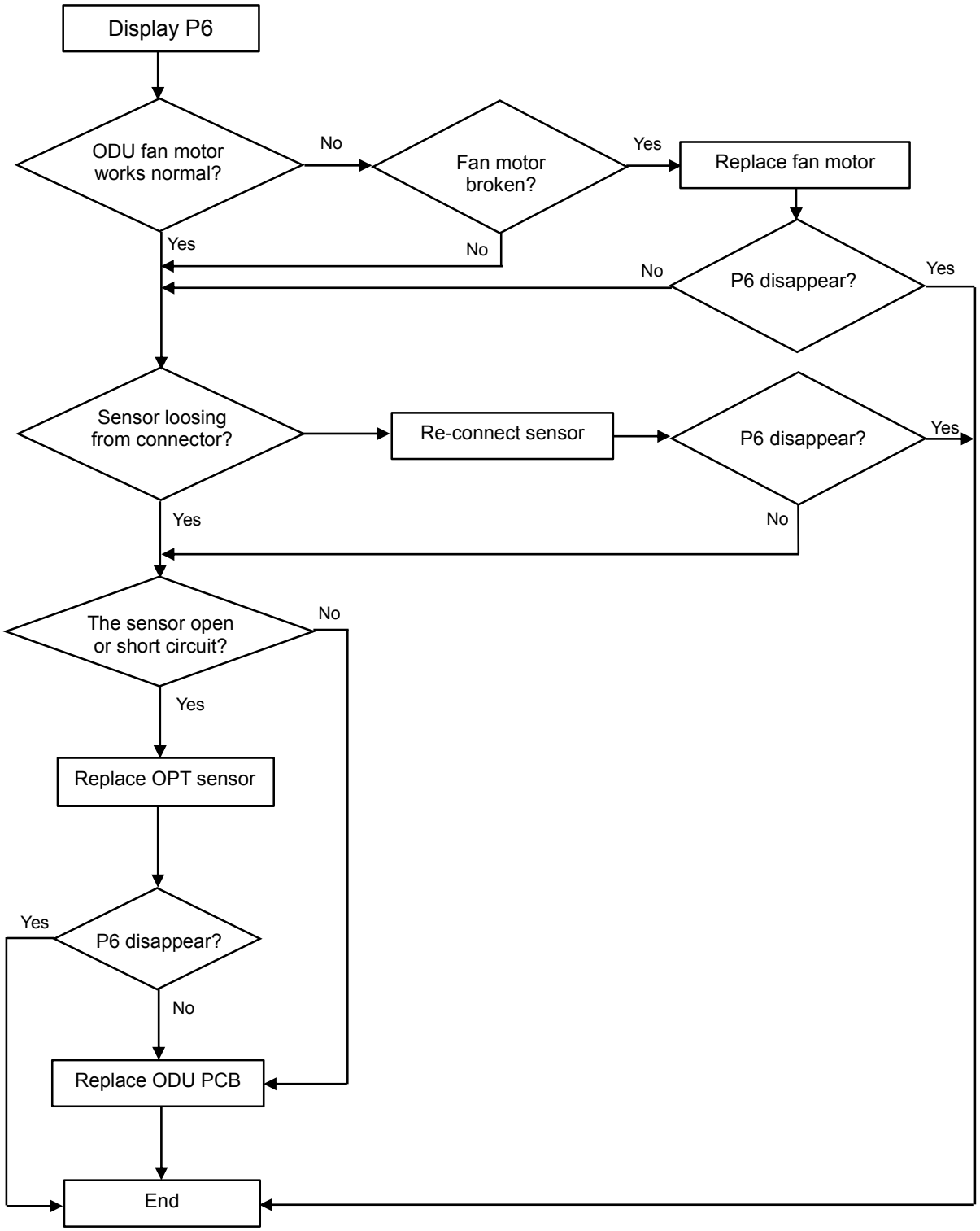
9.17 P5---Sub-cooling protection on Cooling/Dry mode

On Cooling or Dry mode, when IDU evaporator coil temperature **IPT＜1**℃ continuously for 3 min after compressor start up for 6 min, CPU will switch off outdoor unit and show P5 protection code.



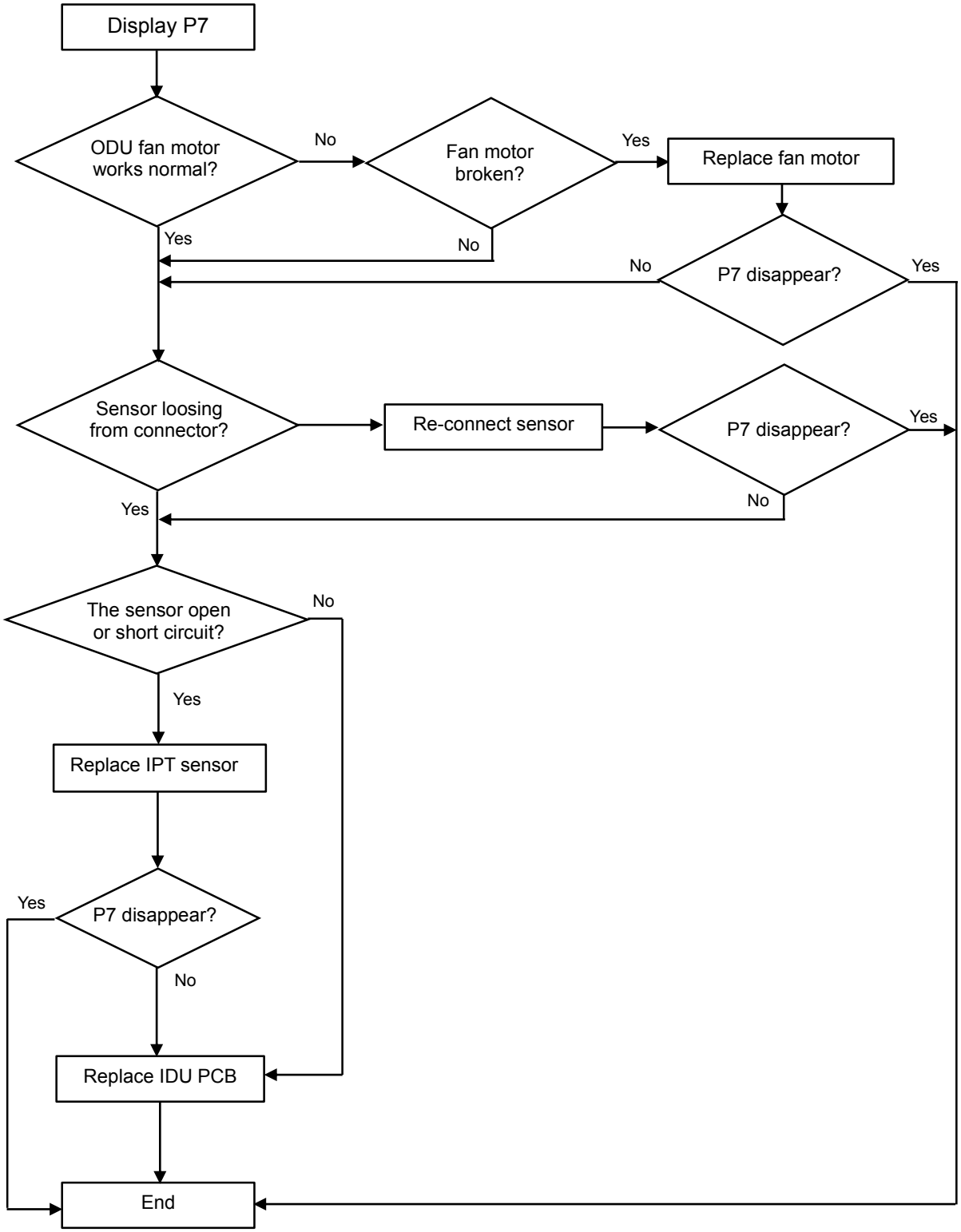
9.18 P6---Overheating protection on Cooling mode

On Cooling or Dry mode, when ODU condenser coil temperature OPT≥62℃ , MCU will switch off outdoor unit and show P6 protection code.



9.19 P7---Overheating protection on Heating mode

On heating mode, when IDU evaporator coil temperature IPT≥62℃, ODU PCB will switch off outdoor unit and show P7 failure code.



9.20 P8---Outdoor Over-temperature/Under-temperature protection

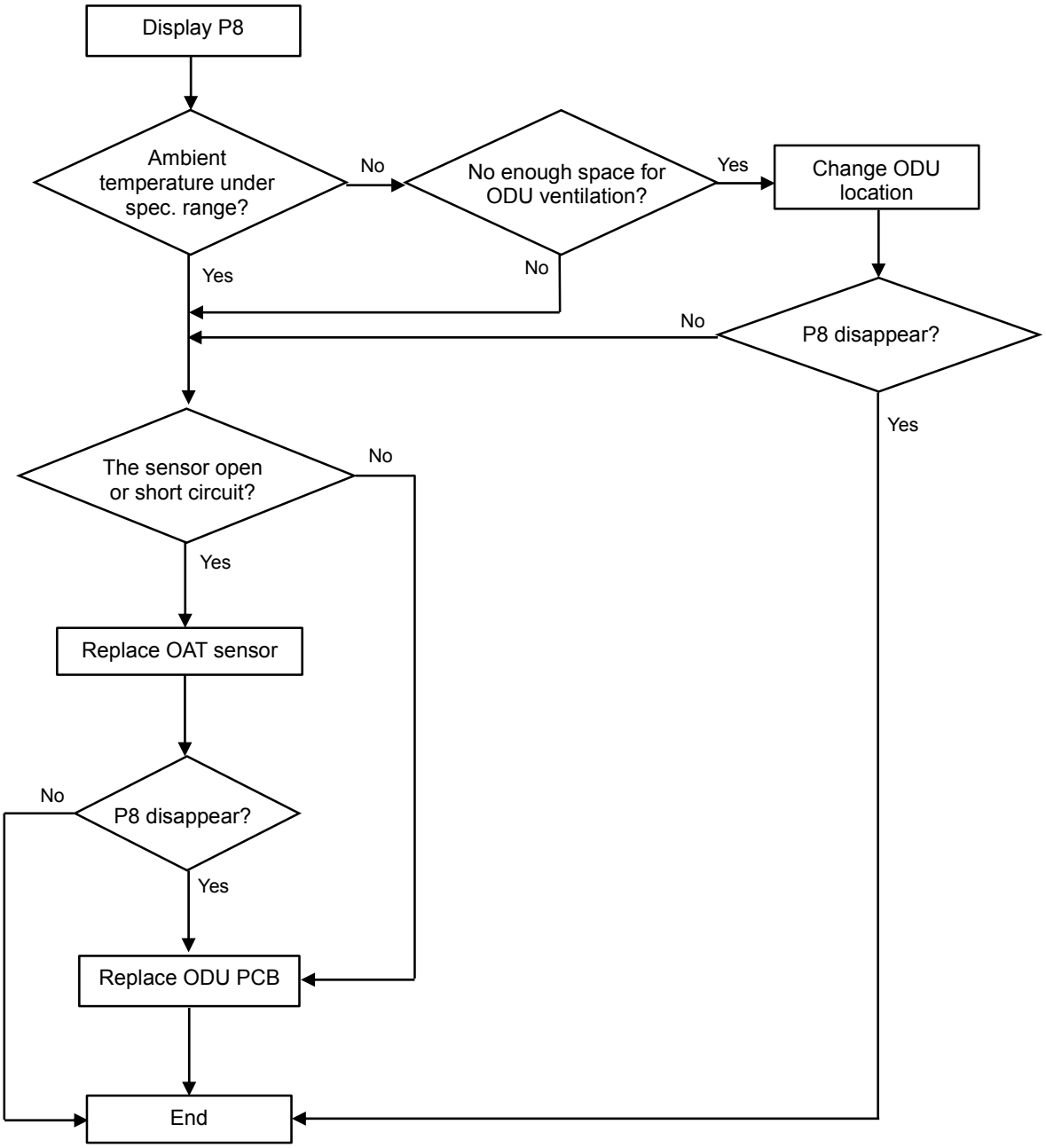
When environment temperature as below condition, the compressor will stop working, after 200s delay, the IDU will show P8 failure code.

(1). **On Cooling or Dry mode**: ODU ambient temperature: OAT＜-20℃ or OAT＞63℃;

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

a. OAT≥40℃

b. 30℃＜OAT≤40℃ and RT＞35℃



9.21 P9---The compressor driving protection (the compressor load abnormal)

When compressor start up or in the process of operation, if:

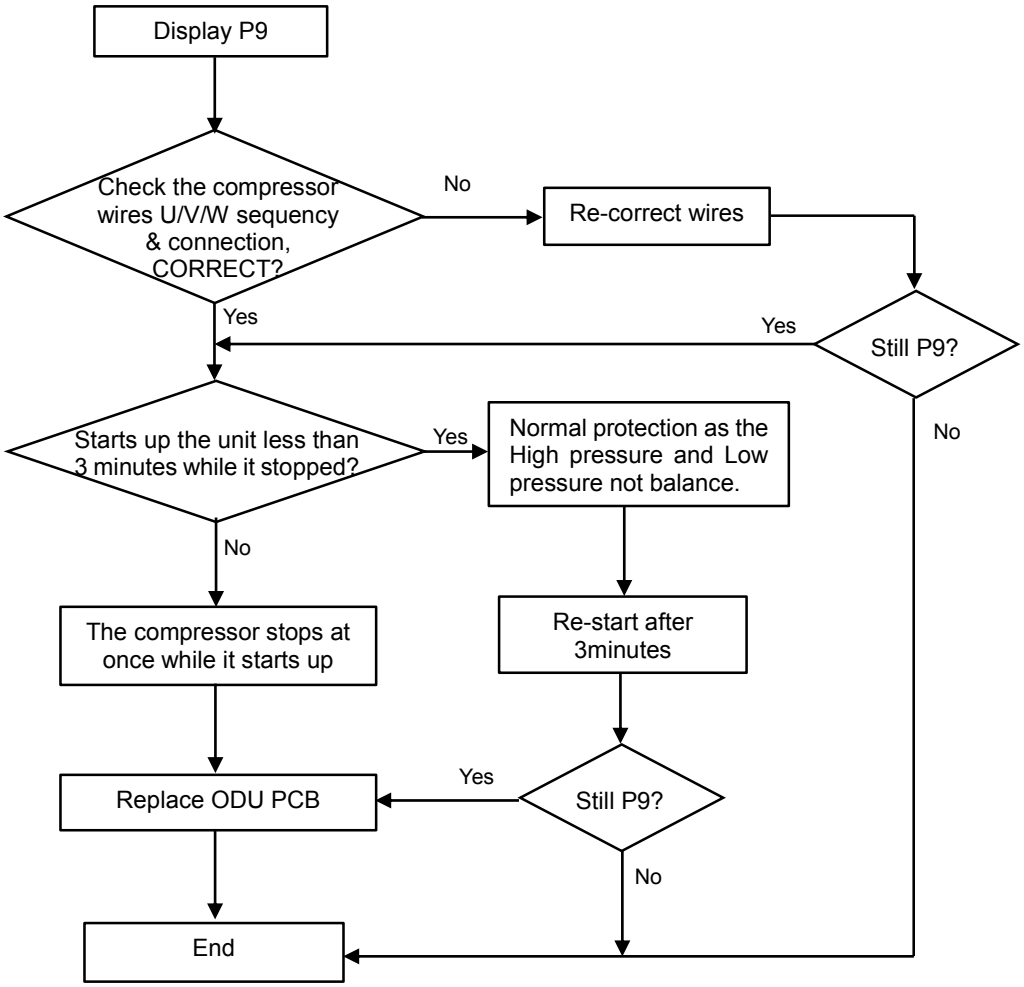
(1). MCU can't test the feedback signal from compressor, or

(2). Tested a abnormal signal from compressor, or

(3). The compressor startup abnormal.

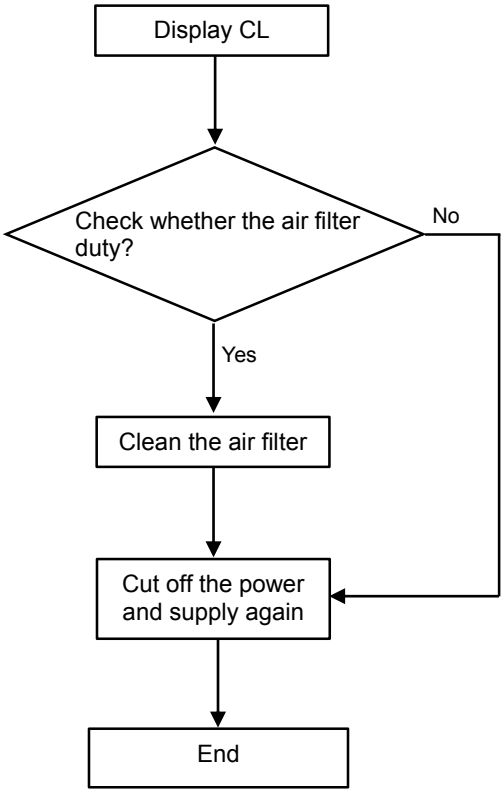
The outdoor unit will shut off, and show P9 protection.

(The unit will re-startup 6 times continuously, if it still can't work normal, then show P9 code)



9.22 CL---Duty caution

Air filter duty, the unit operation Cumulative time 500 hours, the controller will confirmation the filter dirty and display CL.



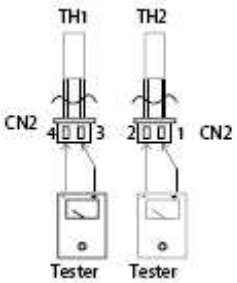
9.23 THERMISTOR TEMPERATURE CHARACTERISTICS

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

TEMP. (℃)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. (℃)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. (℃)	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				

Resistance at 25℃: wall split type 5 kΩ, cassette and duct 10kΩ.



TH1: indoor room temperature sensor and outside air temperature sensor

TH2: indoor exchange temperature sensor and outside exchange temperature sensor

TH4: Outdoor exchange temperature sensor and outside exchange temperature sensor

TH5: Outdoor ambient temperature sensor and outside exchange temperature sensor

Before measuring resistance, disconnect connectors as shown above.

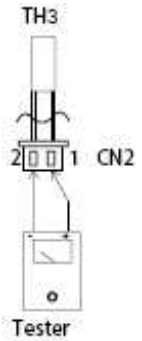
2. Outdoor unit discharge sensor temperature characteristics

TEMP. (℃)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. (℃)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. (℃)	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℃ : 20 kΩ



TH3: Outdoor unit discharge pipe sensor

Before measuring resistance, disconnect connectors as shown above.

email: info@rotenso.com

INSTALLER STAMP

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