



## **PORTABLE AIR CONDITIONER (LOCAL)**

# **MILO PLUS**



## **SERVICE MANUAL**

Read the instructions carefully before operating the appliance or carrying out maintenance work. Observe all the safety instructions; failure to observe the instructions may lead to accidents and/or damage. Store these instructions in a safe place for future reference.

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## Abbreviations Used Within this Manual:

Abbreviation	Clear Words
OFDN	Oxygen free and dry nitrogen
PPE	Personnel protective equipment
LFL	Lower flammability level
UFL	Upper flammability level
HC	Hydrocarbon

## INTRODUCTION

### ATTENTION



Please read this manual carefully before installing and operating the Argoclima Hydrocarbon Air- Conditioner unit.

Careless installation and operation could cause severe injuries to operators, workers and damage to the air-conditioner unit itself.

Keep this manual in a location for easy access as it is needed for reference during installation, maintenance, service and operation of the unit.

This manual does not cover all aspects of installation, maintenance and service of the chiller units; if additional information is needed, contact the Argoclima Customer Service or Sales Office.

### General Information

Warning and cautions appear at appropriate locations throughout this manual book.

# Notices

## General Safety Instructions

Please pay careful attention to these safety instructions, to avoid risks to people and property. Before starting work on maintenance read this manual thoroughly and pay particular attention to the relevant chapters.

Regardless of further requirements of the country, in which the equipment will be installed: assembly, first start up, technical service, maintenance and repair and as well as dismantling and disposal have to be carried out by authorised personnel only.

During every operation strictly follow the instructions within this manual. Pay attention to the specific rules of air conditioning, electrics and refrigerant handling of the country within which the equipment is installed.

Key sections and/or sentences are highlighted with specific icons and symbols to the right side of the page. Please pay particular attention to this information.

## The Symbols Used in this Manual are as Follows

**This is a specific remark and points out the importance of a specific section**

Information window highlighting important content of the specific section or additional information to consider.



This sign will indicate that you are handling a flammable substance and the surrounding environment can possibly contain it.



This is a general warning sign.



The Label is used to indicate that the flammable refrigerant is present within the application and service equipment.



Images that indicate something what you should strictly avoid.



Specific bans!



Specific commandments!



Instructions for first aid!



Fire protection!



Carefully read the instructions!

Working on components with safety-relevant functions jeopardise the safe operation of the installation. In case it is necessary to replace components, only use approved parts from Argoclima, the Original Equipment Manufacturer (OEM) or Argoclima released or authorised components. The system contains the refrigerant R-290 (propane). This condition requires special safety precautions to be observed. Maintenance for the system is strictly prohibited. At the installation site, no matter what kind of activities are executed, smoking is strictly prohibited! Likewise, ensure the installation site is well ventilated. For further details as far as it concerns the handling of the refrigerant R-290 (propane) .

## The Symbols Used in this Manual are as Follows

Electric operations (installation, repair, modification, maintenance, adjustment) have to be fulfilled by trained and authorised personnel only. When dealing with electrical issues, the specific rules of the country within which the equipment is installed must be followed, in addition to the instructions within this manual.

When working on the equipment or parts of it, the system has to be deenergised (by master switch, circuit breaker or separate cut-out) and made safe against restart of the system. Do not reconnect the system to the electric circuit until all work is done and all connections are tested. If handled unsafely or unprofessionally, severe electric shocks can occur. Consider the wiring diagram and follow the instructions of this manual very carefully whilst working on electrical parts. Wrong connections or incorrect grounding may lead to severe injuries and mortal danger.

Ground the system according to the particular requirements of the country within which the equipment is installed.

Connect all the wires properly and durably. Loose cables may lead to overheating or fire

## Minimum Room Size

HC R290 is a flammable refrigerant and can form explosive mixtures in low concentrations. To minimise the risk of fire or explosion, the system must be installed in a room with a minimum floor area.

Unless there are further requirements, standards and legislation of the country within which the equipment is installed may apply. Any technicians that works on GREE hydrocarbon air- conditioners must be competent in the safe handling of flammable refrigerants, in addition to being in possession of knowledge and skills to maintain best refrigeration installation and servicing practices.

There are already training activities in place for engineers, technicians and sales staff to provide professional knowledge and skills for the handling of HC refrigerants and refrigeration systems operating with HCs.

**Get trained and have your  
“HC Refrigeration Professional” certification!**

**ONLY original  
Argoclima (OEM)  
spare-parts are  
permitted for  
Service and Re-  
pair!**



**Proceed  
according the  
manuals  
Instructions!**



**Pay attention to  
the room size for  
indoor unit  
installation!**

**For specific in-  
formation refer  
page XXX of this  
manual.**

**Get your Best  
Practices  
knowledge and  
skills update for  
HC refrigerants  
and be  
certificated for  
these jobs!**



## Basics in RAC

Knowledge of the basic SI standard units for temperature, pressure, mass, density, energy.

Understanding of the basic theory of refrigeration systems including the functions of the main components in the system (compressor, evaporator, condenser, thermostatic expansion valves).

Understanding how to read a refrigerant flow chart and an electrical circuit diagram.

The determination of non condensable gases in the refrigeration system and how to eliminate them.

The importance of the use of oxygen free dry nitrogen (OFDN) for system flushing, leak test and strength test.

The elimination of humidity from the refrigeration system and how to recover or vent HC refrigerant from a system.

Usage of tables and diagrams (log p/h diagram, saturation tables of a refrigerant, diagram of a single compression refrigeration cycle) and interpretation of these tables and diagrams.

Knowledge of the basic operation of the following components in a refrigeration system and their role and importance for refrigerant leakage prevention and identification:

- Temperature and pressure controls
- Sight glass and moisture indicators
- Defrost controls, reverse cycle operation
- System protectors
- Measuring devices such as the pressure gauge manifold
- Thermometer
- Leak detector
- Refrigerant charging devices
- Vacuum pump
- Oxygen free dry nitrogen cylinder and pressure regulator

### Fault finding – analysis and repair.

- Knowledge of flammable refrigerants
- Risk analysis for the application of flammable refrigerant and properties of flammable refrigerants
- Electrical circuit assessment and repair

Read More!  
SAFETY CODE  
OF PRACTICE  
FOR REFRIG-  
ERATING SYS-  
TEMS  
UTILISING A2 &  
A3 REFRIGE-  
RANTS

ISBN  
1 872719 15 5

## Checks before putting in operation, after a long period of nonuse, after maintenance or repair intervention or during operation.

Carry out a pressure and leak test to check the strength and the tightness of the system.

Usage of a vacuum pump.

Evacuation of the system to remove air and moisture according to standard practice.



## Checks for Leakage

Knowledge of potential leakage points of refrigeration, air-conditioning and heat pump equipment. Making a visual and manual inspection of the whole system.

Carry out a check for leakage of the system using an indirect method and/or one of the direct methods.

### Direct leak detection methods:

1. Fixed leakage detection systems
2. Portable electronic gas detectors
3. Ultraviolet (UV) indication fluids
4. Weak soapy water solution (bubble test) also in combination with OFDN
5. New installation tightness test for leakage detection procedure e.g. H2/N2
6. Operational system tightness test for leakage detection procedure

### Indirect refrigerant detection methods:

1. Visual
2. Manual checks

## HC R290 Refrigerant Issues

Please notice that the unit is filled with propane. Details to this refrigerant are found in chapter "refrigerant". Propane is highly flammable and leads to explosion under certain conditions. Inappropriate treatment of the unit involves the risk of severe damages of people and material.

### Basics

HC R-290 (propane) is an odourless and colourless gas of the group of hydrocarbons.

HC R-290 is heavier than air and at high concentrations can cause narcotic effects and eventually asphyxiation.

R-290 is highly flammable within the range of 2,1% and 9,5% by volume, or 38 g/m<sup>3</sup> to 170 g/m<sup>3</sup> in air. The auto-ignition temperature is about 470°C.

Since R-290 is an odourless and colourless gas, it is difficult to perceive that it is present (as with most other refrigerants).

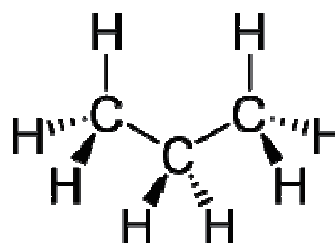
Propane is often used as a fuel such as for heating or barbecues. However, for use on refrigeration systems, fuel-grade propane is not suitable since it contains high levels of impurities, which would damage the refrigeration system and may not provide the desired refrigerating capacity or efficiency.



HC R-290 refrigerant has a high grade of purity.

Propane as a cooking gas is not useful for refrigeration purpose!

### The structural formula of HC R-290 (propane)



### Important Refrigerant Properties and Parameters:

Molecular formula	C <sub>3</sub> H <sub>8</sub>
Melting point [°C]	-188
Boiling point under atmospheric pressure [°C]	-42
Molar mass [g mol <sup>-1</sup> ]	44,10
Critical temperature [°C]	96,8
Critical pressure [bar]	42
Practical limit [g/m <sup>3</sup> ]	8
Lower flammability level LFL [g/m <sup>3</sup> ]	38
Lower flammability level LFL [%]	2,1
Upper flammability level UFL [g/m <sup>3</sup> ]	171
Upper flammability level UFL [%]	9,5
Ignition temperature [°C]	470

Read More!

Guidlines for the safe use of hydrocarbon refrigerants

GIZ—PROKLIMA

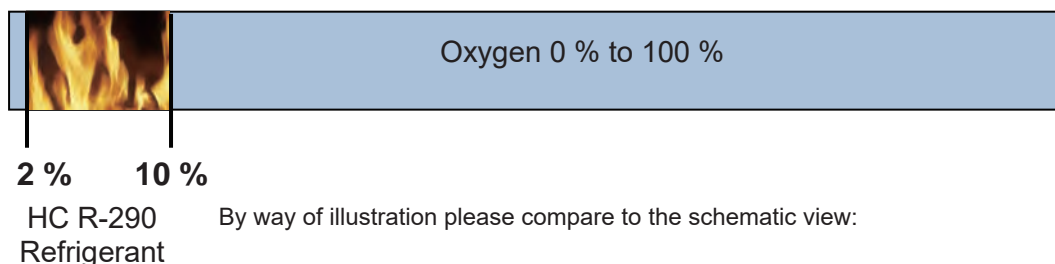
<http://www.gtz.de/proklima>

## Flammability

Three components are needed simultaneously for causing fire:

1. Oxygen
2. Ignition source
3. The flammable concentration of HC

For ignition, the concentration of HC in air has to be between the lower and upper flammable limits. If the concentration is below the lower flammability limit (LFL) of about 2% by volume in air, there is not enough HC for combustion. If the concentration is above the upper flammability limit (UFL) of about 10% there is insufficient oxygen for combustion.



### Possible ignition sources are:

1. A flame, for example from brazing torch, halide torch leak lamp, match or lighter, cigarette
2. A spark from an electrical component
3. Static electricity
4. Hot surfaces



To ignite HC R-290, three (3) components must exist at the same time at work area to cause the refrigerant burning!



## Safety Data

### Hazard Identification

- Extremely flammable (F+).
- Readily forms an explosive air-vapour mixture at ambient temperatures.
- Vapour is heavier than air and may travel to remote sources of ignition (e.g. along drainage systems, into basements etc).
- Liquid releases generate large volumes of flammable vapour (approx 250:1)
- Cold burns (frostbite) will result from skin / eye contact with liquid.
- Liquid release or vapour pressure jets present a risk of serious damage to the eyes.
- Abuse involving inhalation of high concentrations of vapour, even for short periods, which can produce unconsciousness or may prove fatal. Inhalation may cause irritation to the nose and throat, headache, nausea, vomiting, dizziness and drowsiness. In poorly ventilated areas unconsciousness or asphyxiation may result.

1 kg of liquid HC R-290 refrigerant creates about 250 litres of gas

Beside the flammability, most other safety properties are similar to other refrigerants!

Rely always on best service practices in refrigeration!

## First Aid Measures

### Inhalation:

Remove the affected person to fresh air. If breathing has stopped, administer artificial respiration. Give external cardiac massage if necessary. If the person is breathing but unconscious, place them in the recovery position. Obtain medical assistance immediately.

### Skin:

In case of cold burns: flush with water to normalize temperature. Cover the burns with sterile dressings. Do not use ointments or powders. Obtain medical assistance immediately.

### Eyes:

Cold burns should be flushed with water to normalise temperature, cover the eye with a sterile dressing and obtain medical assistance immediately.



## Fire Fighting Measures

HC R-290 is delivered, stored, and used at temperatures above their flash point. Avoid all naked flames, sparks, cigarettes etc.

- In case of fire, immediately alert fire brigade
- Ensure an escape path is always available from any fire
- If gas has ignited do not attempt to extinguish but stop gas flow and allow to burn out.
- Use water spray to cool heat-exposed containers, and to protect surrounding areas and personnel effecting the shut off
- Every precaution must be taken to keep containers cool to avoid the possibility of a boiling liquid expanding vapour explosion (BLEVE)

## Extinguishing Media:

In case of a large fire:

Release must be stopped and container cooled by water spray.

Water mist should be used to assist approach to the source of the fire.

Large fires should only be handled by Fire Brigade.

**DO NOT USE WATER JET**

### Small fire:

Use dry powder extinguisher



## DO NOT USE WATER JET

### Special protective equipment for fire fighters:

In confined spaces use self-contained breathing apparatus

### Hazardous combustion products:

Incomplete combustion may form carbon monoxide.



## Accidental Release Measures

### Immediate emergency action:

- Clear people away from the area to a safe place
- Do not operate electrical equipment unless "Ex"-rated
- Summon the emergency services
- Treat or refer casualties if necessary

### Further actions:

- Stop release
- Use dry powder or carbon dioxide extinguishers
- Cool containers exposed to fire by using water / mist spray.

### Further action (when release is made safe):

- Extinguish all naked lights – avoid creating sparks
- Position fire fighting equipment
- Cover drains and disperse vapour with water spray.

Note: vapour may collect in confined spaces.

## Accidental Release Measures

Due to the flammability of R-290 and the risk of fire or explosion during servicing, special safety rules must be followed during operation. In order to avoid damage for people and property, particular requirements are listed hereafter.

Before servicing the unit, the surrounding area where the work will be done must be clear of safety hazards to ensure safe working. Nevertheless it is required to carry out a risk assessment in order to minimise the risk of ignition of R-290.



The following safety measures must be followed:

1. Any employees and other present persons must be informed about the service and the way the service is done, first.
2. It is recommended to isolate the working environment in order to keep out any unauthorised personnel.
3. It is useful to set up signs such as „no smoking“ or „access denied“.
4. It is prohibited to store any combustible goods within the working environment.
5. Within two (2) metres radius, ignition sources are not allowed in the working area.
6. Fire extinguisher (dry powder) must be easily accessible at any time.
7. During service work, proper ventilation of the environment must be ensured.





The HC leak detector is indeed a Personal Protective Equipment (PPE) device!

Sign plate to protect and mark the working area.

Appropriate detectors, suitable for hydrocarbons, must be available and operational all the time. Appropriate tools and appliances must be available and ready for operation.

**Any employees need to be instructed extensively about the safety measures and the possible safety hazard.**

## Gas Detection

While servicing the unit it is recommended for the whole period of work — before, during and after — to monitor the gas concentration in the air within the work environment. By monitoring the air within the work environment the danger of a possible formation of flammable atmosphere can be detected early.

The HC leak detector is indeed a PPE device!

Doing the monitoring, ensure that the gas detectors are suitable for hydrocarbon detection. Never use open fire or a device with an ignition source for the detection of gas or for leak detection.

Before operation of the gas detector the instruction manual must be read carefully. In case of any questions refer to the detector manufacturer. Furthermore ensure the detector is correctly calibrated. Instructions for calibration can be found in the instruction manual of the detector or upon request from the manufacturer.

A possible re-calibration must be done within an area which is free of refrigerants.

In case of a positive detection by the detector any work must be stopped immediately. Any open flames or ignition sources must be extinguished or removed. In addition to a suitable and approved HC gas detectors, portable gas detectors can be used.

Such a detector can be clipped to clothing or placed on the floor within the working area. It should be switched on for the duration of the work, and set to alarm at 15% of the lower flammability level (LFL), to warn that flammable concentration may be nearby. In this way, technicians can be alerted whenever an inadvertent release of flammable refrigerant occurs, and can immediately act upon the relevant emergency procedures.



Portable HC Gas Detector

## Pressure—Temperature Chart

HC Refrigerant R-290							
Temperature		Absolute pressure			Gauge pressure		
°C	°F	kPa	bar	PSI	kPa(g)	bar(g)	PSI(g)
-40	-40	111,12	1,11	16,12	11,12	0,11	1,61
-39	-38,2	116,00	1,16	16,83	16,00	0,16	2,32
-38	-36,4	121,05	1,21	17,56	21,05	0,21	3,05
-37	-34,6	126,27	1,26	18,31	26,27	0,26	3,81
-36	-32,8	131,66	1,32	19,10	31,66	0,32	4,59
-35	-31	137,23	1,37	19,90	37,23	0,37	5,40
-34	-29,2	142,97	1,43	20,74	42,97	0,43	6,23
-33	-27,4	148,90	1,49	21,60	48,90	0,49	7,09
-32	-25,6	155,02	1,55	22,48	55,02	0,55	7,98
-31	-23,8	161,33	1,61	23,40	61,33	0,61	8,89
-30	-22	167,83	1,68	24,34	67,83	0,68	9,84
-29	-20,2	174,54	1,75	25,31	74,54	0,75	10,81
-28	-18,4	181,44	1,81	26,32	81,44	0,81	11,81
-27	-16,6	188,56	1,89	27,35	88,56	0,89	12,84
-26	-14,8	195,89	1,96	28,41	95,89	0,96	13,91
-25	-13	203,43	2,03	29,51	103,43	1,03	15,00
-24	-11,2	211,19	2,11	30,63	111,19	1,11	16,13
-23	-9,4	219,18	2,19	31,79	119,18	1,19	17,29
-22	-7,6	227,39	2,27	32,98	127,39	1,27	18,48
-21	-5,8	235,84	2,36	34,21	135,84	1,36	19,70
-20	-4	244,52	2,45	35,46	144,52	1,45	20,96
-19	-2,2	253,44	2,53	36,76	153,44	1,53	22,26
-18	-0,4	262,61	2,63	38,09	162,61	1,63	23,58
-17	1,4	272,03	2,72	39,45	172,03	1,72	24,95
-16	3,2	281,70	2,82	40,86	181,70	1,82	26,35
-15	5	291,62	2,92	42,30	191,62	1,92	27,79
-14	6,8	301,81	3,02	43,78	201,81	2,02	29,27
-13	8,6	312,27	3,12	45,29	212,27	2,12	30,79
-12	10,4	323,00	3,23	46,85	223,00	2,23	32,34
-11	12,2	334,00	3,34	48,44	234,00	2,34	33,94
-10	14	345,28	3,45	50,08	245,28	2,45	35,58
-9	15,8	356,85	3,57	51,76	256,85	2,57	37,25
-8	17,6	368,70	3,69	53,48	268,70	2,69	38,97
-7	19,4	380,85	3,81	55,24	280,85	2,81	40,73
-6	21,2	393,29	3,93	57,04	293,29	2,93	42,54
-5	23	406,04	4,06	58,89	306,04	3,06	44,39
-4	24,8	419,09	4,19	60,78	319,09	3,19	46,28
-3	26,6	432,45	4,32	62,72	332,45	3,32	48,22
-2	28,4	446,13	4,46	64,71	346,13	3,46	50,20
-1	30,2	460,13	4,60	66,74	360,13	3,60	52,23
0	32	474,46	4,74	68,82	374,46	3,74	54,31
1	33,8	489,11	4,89	70,94	389,11	3,89	56,44
2	35,6	504,10	5,04	73,11	404,10	4,04	58,61
3	37,4	519,43	5,19	75,34	419,43	4,19	60,83
4	39,2	535,10	5,35	77,61	435,10	4,35	63,11
5	41	551,12	5,51	79,93	451,12	4,51	65,43
6	42,8	567,49	5,67	82,31	467,49	4,67	67,80
7	44,6	584,22	5,84	84,74	484,22	4,84	70,23
8	46,4	601,31	6,01	87,21	501,31	5,01	72,71
9	48,2	618,77	6,19	89,75	518,77	5,19	75,24
10	50	636,60	6,37	92,33	536,60	5,37	77,83

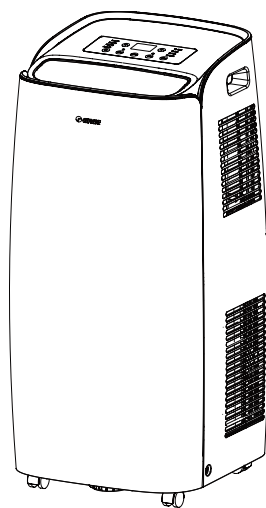
HC Refrigerant R-290							
Temperature		Absolute pressure			Gauge pressure		
11	51,8	654,81	6,55	94,97	554,81	5,55	80,47
12	53,6	673,40	6,73	97,67	573,40	5,73	83,17
13	55,4	692,38	6,92	100,42	592,38	5,92	85,92
14	57,2	711,75	7,12	103,23	611,75	6,12	88,73
15	59	731,51	7,32	106,10	631,51	6,32	91,59
16	60,8	751,68	7,52	109,02	651,68	6,52	94,52
17	62,6	772,25	7,72	112,01	672,25	6,72	97,50
18	64,4	793,24	7,93	115,05	693,24	6,93	100,55
19	66,2	814,64	8,15	118,16	714,64	7,15	103,65
20	68	836,46	8,36	121,32	736,46	7,36	106,82
21	69,8	858,71	8,59	124,55	758,71	7,59	110,04
22	71,6	881,39	8,81	127,84	781,39	7,81	113,33
23	73,4	904,51	9,05	131,19	804,51	8,05	116,69
24	75,2	928,07	9,28	134,61	828,07	8,28	120,10
25	77	952,07	9,52	138,09	852,07	8,52	123,58
26	78,8	976,53	9,77	141,64	876,53	8,77	127,13
27	80,6	1001,45	10,01	145,25	901,45	9,01	130,75
28	82,4	1026,83	10,27	148,93	926,83	9,27	134,43
29	84,2	1052,68	10,53	152,68	952,68	9,53	138,18
30	86	1079,00	10,79	156,50	979,00	9,79	141,99
31	87,8	1105,79	11,06	160,38	1005,79	10,06	145,88
32	89,6	1133,08	11,33	164,34	1033,08	10,33	149,84
33	91,4	1160,85	11,61	168,37	1060,85	10,61	153,87
34	93,2	1189,12	11,89	172,47	1089,12	10,89	157,97
35	95	1217,88	12,18	176,64	1117,88	11,18	162,14
36	96,8	1247,16	12,47	180,89	1147,16	11,47	166,38
37	98,6	1276,94	12,77	185,21	1176,94	11,77	170,70
38	100,4	1307,24	13,07	189,60	1207,24	12,07	175,10
39	102,2	1338,07	13,38	194,07	1238,07	12,38	179,57
40	104	1369,42	13,69	198,62	1269,42	12,69	184,12
41	105,8	1401,31	14,01	203,25	1301,31	13,01	188,74
42	107,6	1433,73	14,34	207,95	1333,73	13,34	193,44
43	109,4	1466,71	14,67	212,73	1366,71	13,67	198,23
44	111,2	1500,23	15,00	217,59	1400,23	14,00	203,09
45	113	1534,31	15,34	222,54	1434,31	14,34	208,03
46	114,8	1568,96	15,69	227,56	1468,96	14,69	213,06
47	116,6	1604,18	16,04	232,67	1504,18	15,04	218,17
48	118,4	1639,97	16,40	237,86	1539,97	15,40	223,36
49	120,2	1676,34	16,76	243,14	1576,34	15,76	228,63
50	122	1713,30	17,13	248,50	1613,30	16,13	233,99
51	123,8	1750,86	17,51	253,94	1650,86	16,51	239,44
52	125,6	1789,02	17,89	259,48	1689,02	16,89	244,98
53	127,4	1827,79	18,28	265,10	1727,79	17,28	250,60
54	129,2	1867,17	18,67	270,81	1767,17	17,67	256,31
55	131	1907,17	19,07	276,62	1807,17	18,07	262,11
56	132,8	1947,80	19,48	282,51	1847,80	18,48	268,01
57	134,6	1989,07	19,89	288,49	1889,07	18,89	273,99
58	136,4	2030,98	20,31	294,57	1930,98	19,31	280,07
59	138,2	2073,54	20,74	300,75	1973,54	19,74	286,24
60	140	2116,75	21,17	307,01	2016,75	20,17	292,51

# Part I : Technical Information

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## 1. Summary

Model



Remote Controller



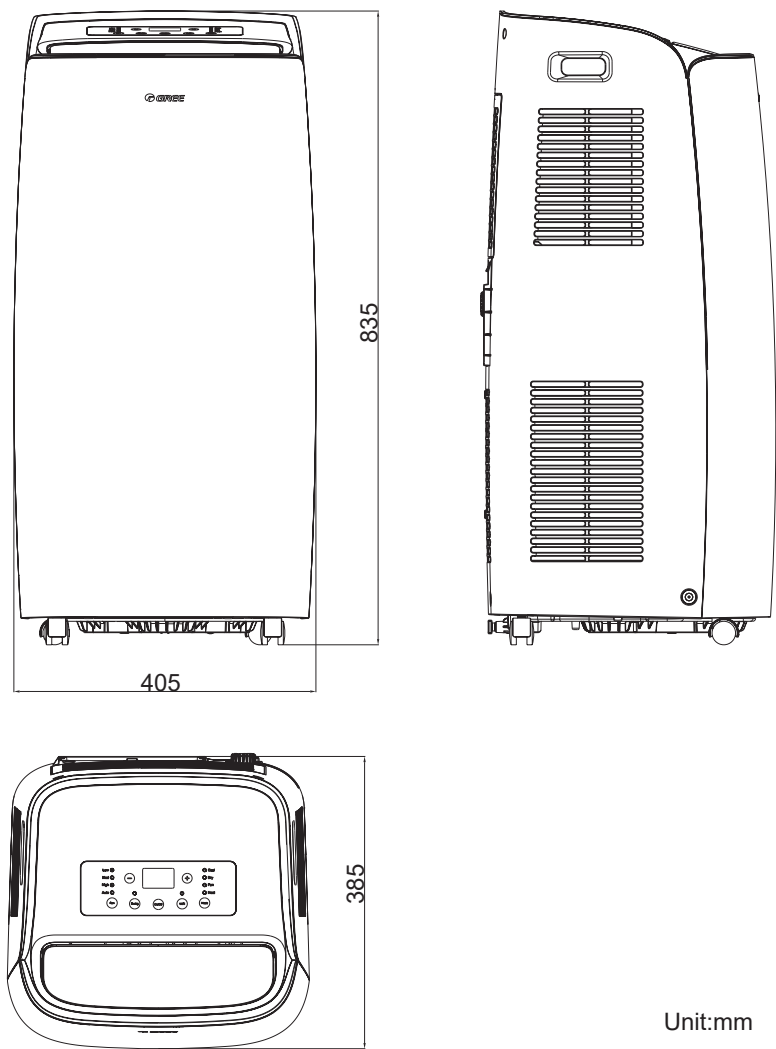
## 2. Specifications

Model	-	MILO PLUS
Product Code	-	39800016
Power Supply	Rated Voltage	V~
	Rated Frequency	Hz
	Phases	-
Cooling Capacity	W	3500
Heating Capacity	W	3500
Cooling Power Input	W	1345
Heating Power Input	W	1130
Cooling Power Current	A	5.9
Heating Power Current	A	4.9
Rated Input	W	1650
Rated Current	A	8.4
Air Flow Volume	m <sup>3</sup> /h	380/330/280
Dehumidifying Volume	L/h	1.80
EER	W/W	2.60
COP	W/W	3.10
Application Area	m <sup>2</sup>	15-22
Climate Type	-	T1
Isolation	-	I
Moisture Protection	-	IPX0
Permissible Excessive Operating Pressure for the Discharge Side	MPa	3
Permissible Excessive Operating Pressure for the Suction Side	MPa	1.5
Maximum Allowable Pressure	MPa	3
Throttling Method	-	Capillary
Defrosting Method	-	Automatic Defrosting
Fuse current	A	3.15
Set Temperature Range	°C	16~30
Cooling Operation Ambient Temperature Range	°C	16~35
Heating Operation Ambient Temperature Range	°C	10~27
Sound Pressure Level (H/M/L)	dB (A)	53/51/49
Sound Power Level (H/M/L)	dB (A)	65/63/61
Dimension (WXHXD)	mm	405X835X385
Dimension of Carton Box (LXWXH)	mm	577X451X864
Dimension of Package (LXWXH)	mm	580X454X879
Net Weight	kg	36.0
Gross Weight	kg	41.5
Refrigerant	-	R290
Refrigerant Charge	kg	0.30

Compressor	Compressor Manufacturer	-	ZHUHAI LANDA COMPRESSOR CO., LTD./GREE
	Compressor Model	-	QXD-B222A030
	Compressor Oil	-	5GSD-TB or equivalent
	Compressor Type	-	Rotary
	Compressor LRA	A	26.00
	Compressor RLA	A	4.50
	Compressor Power Input	W	1000
	Compressor Overload Protector	-	HPA-030
Evaporator	Fan Type	-	Centrifugal
	Fan Diameter Length(D×L)	mm	Φ204.6×72
	Cooling Speed	r/min	1000/860/730
	Heating Speed	r/min	1000/860/730
	Fan Motor Power Output	W	23
	Fan Motor RLA	A	0.3
	Fan Motor Capacitor	μF	2.5
	Evaporator Form	-	Aluminum Fin-copper Tube
	Evaporator Pipe Diameter	mm	Φ7
	Evaporator Row-fin Gap	mm	3-1.4
	Evaporator Coil Length (L×D×W)	mm	520×38.1×228.6
	Swing Motor Model	-	MP24AA
	Swing Motor Power Output	W	1.5
Condenser	Fan Type		Centrifugal
	Fan Diameter	mm	Φ224.5×80
	Fan Motor Speed	rpm	980/800
	Fan Motor Power Output	W	50
	Fan Motor RLA	A	0.5
	Fan Motor Capacitor	μF	2.5
	Condenser Form		Aluminum Fin-copper Tube
	Condenser Pipe Diameter	mm	Φ5
	Condenser Rows-fin Gap	mm	2-1.3 + 1-1.4
	Condenser Coil Length (L×D×W)	mm	576 x 22.8 x 304.8 + 475 x 11.4 x 266.7

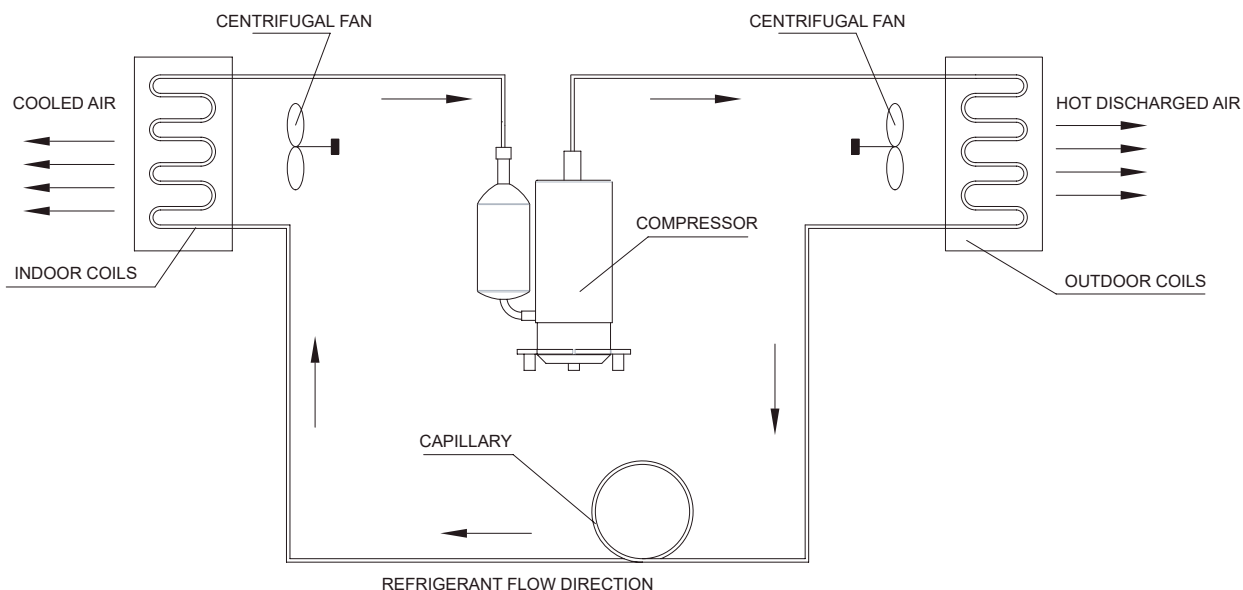
The above data is subject to change without notice. Please refer to the nameplate of the unit.

### 3. Outline Dimension Diagram

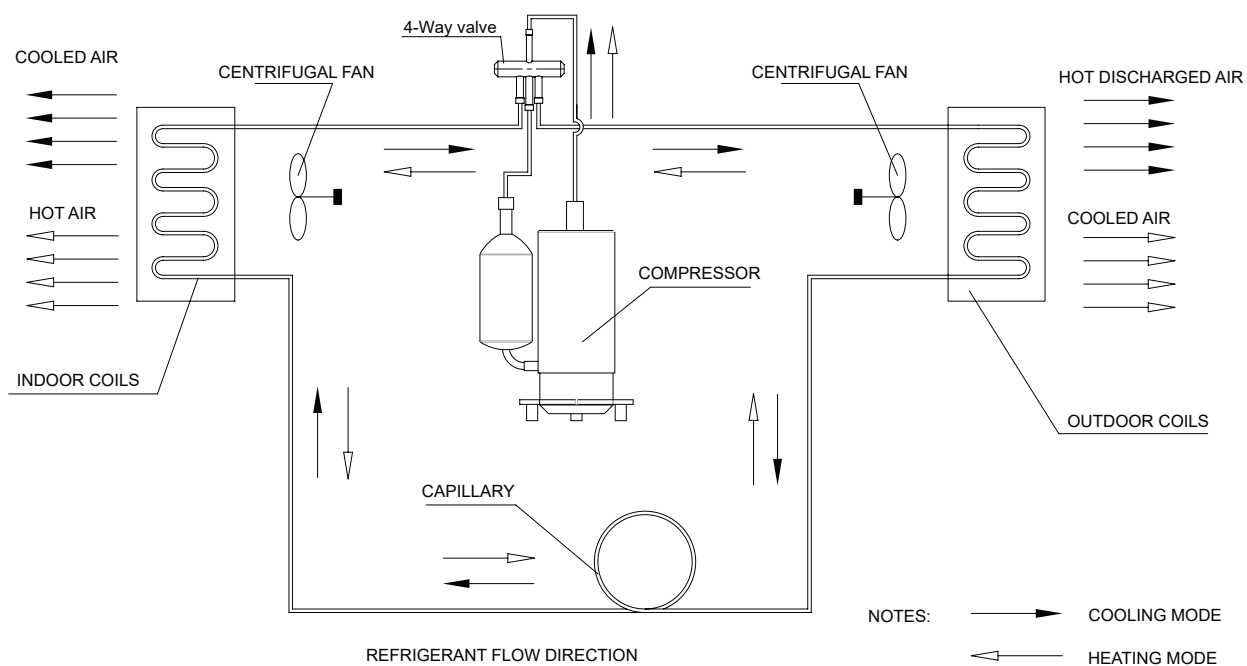


## 4. Refrigerant System Diagram

Cooling Only Model



Cooling & Heating Model






# 5. Electrical Part

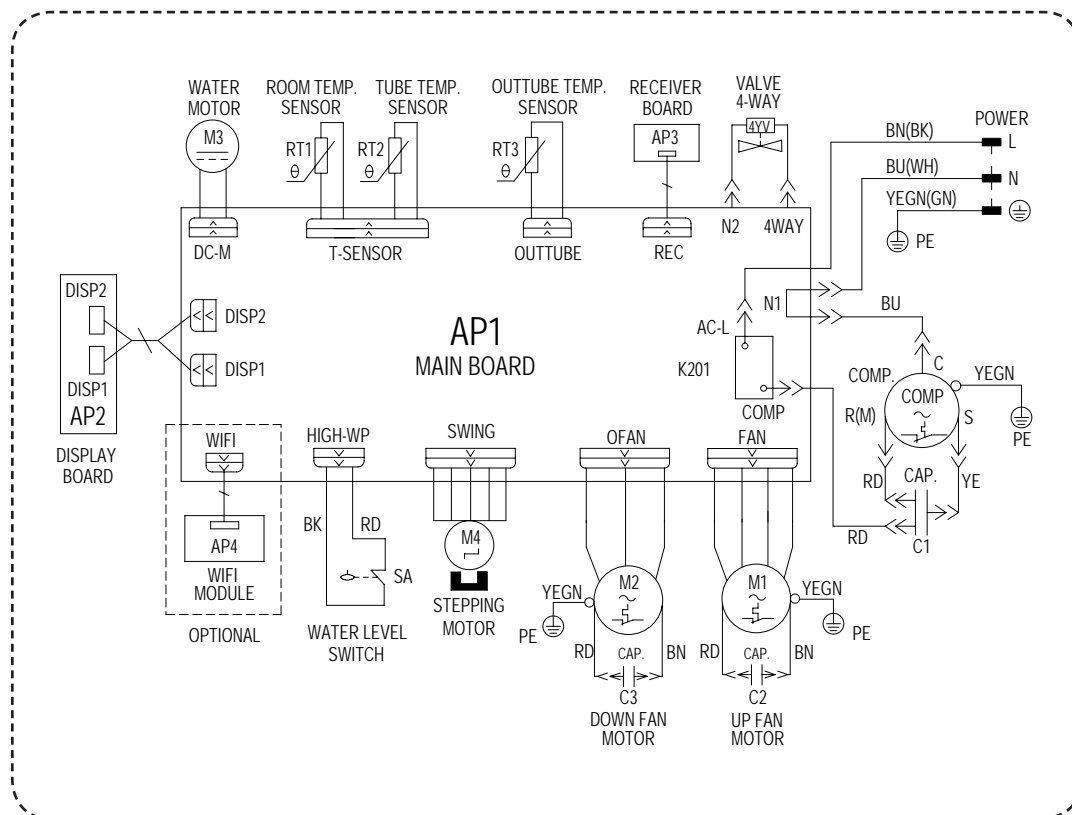
## 5.1 Wiring Diagram

●Instruction

Symbol	Symbol Color	Symbol	Symbol Color	Symbol	Name
WH	White	GN	Green	CAP	Jumper cap
YE	Yellow	BN	Brown	COMP	Compressor
RD	Red	BU	Blue		Grounding wire
YEGN	Yellow/Green	BK	Black	/	/
VT	Violet	OG	Orange	/	/

Note: Jumper cap is used to determine fan speed and the swing angle of horizontal lover for this model.

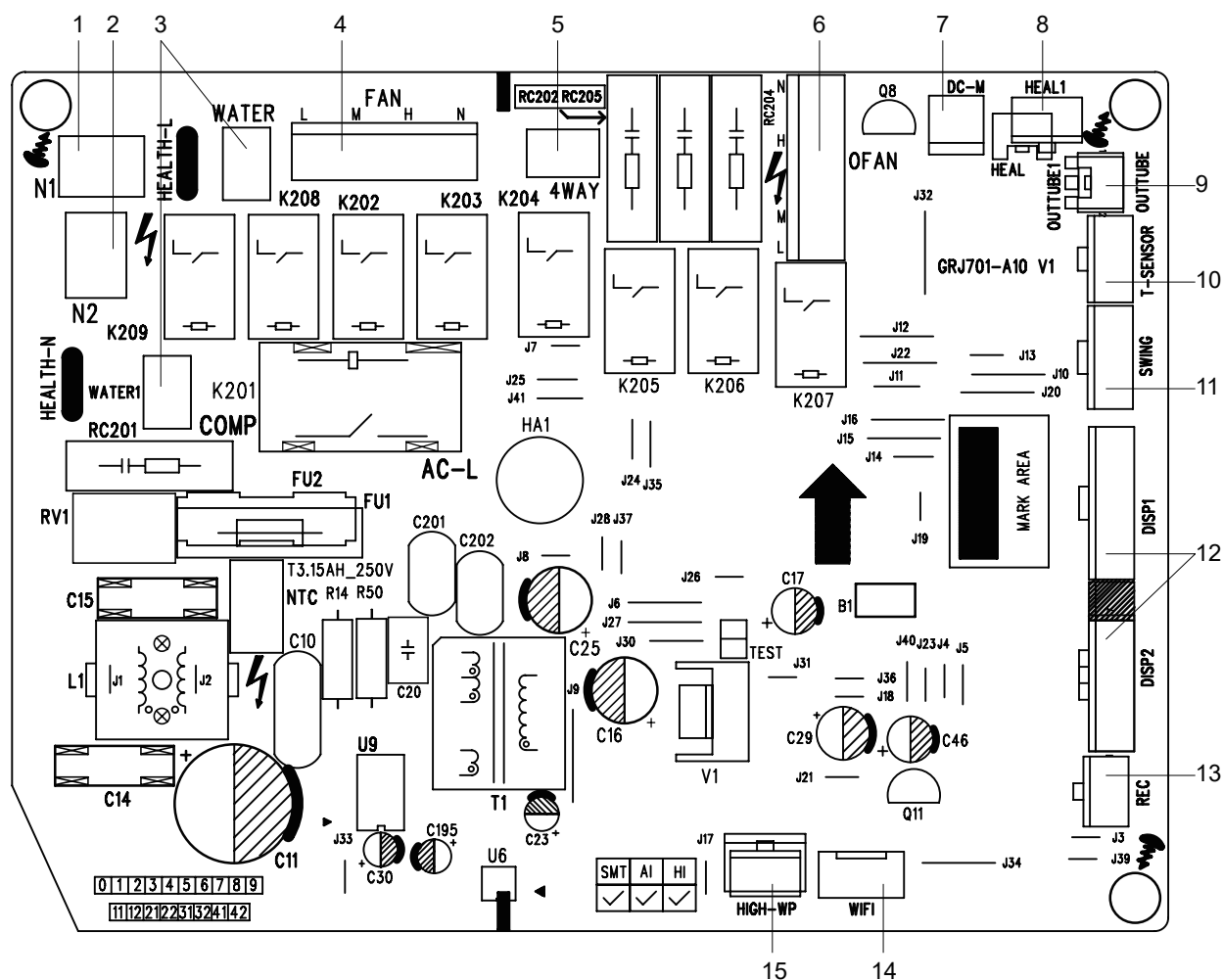
## ●Electric Diagram



These wiring diagrams are subject to change without notice; please refer to the one supplied with the unit.

## 5.2 PCB Printed Diagram

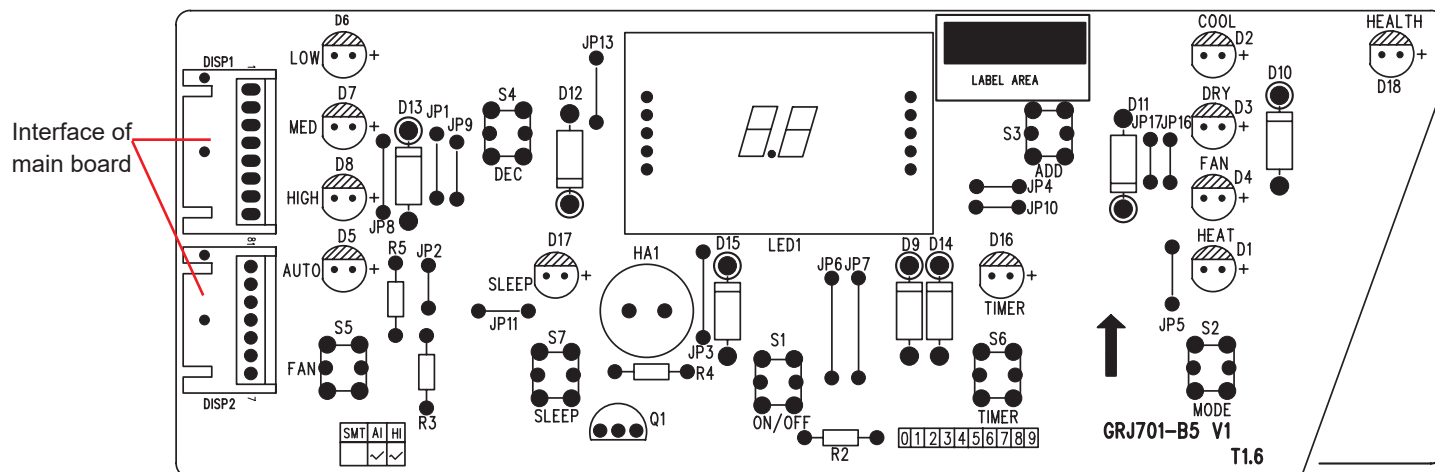
### (1)Silk screen on main board



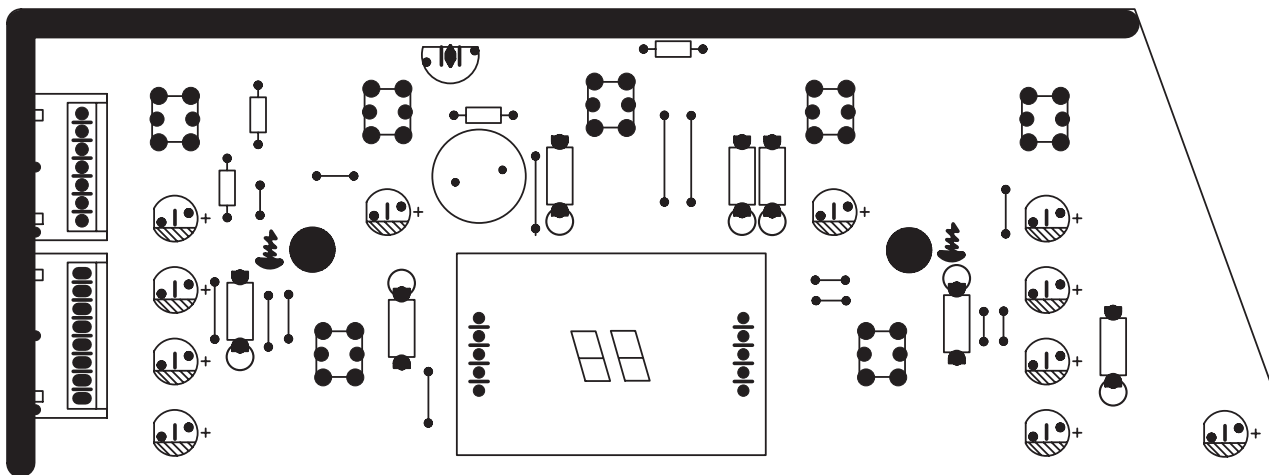
No.	Name	No.	Name
1	Neutral Wire Insertion 1	9	Outdoor Tube Temperature Sensor Needle Stand
2	Neutral Wire Insertion 2	10	Temperature Sensor Needle Stand
3	Water of Motor Insertion	11	Swing Needle Stand
4	Indoor fan Needle Stand	12	Display Board Needle Stand
5	Four-way Valve Needle Stand	13	Remoter Needle Stand
6	Outdoor Fan Needle Stand	14	Wi-Fi Needle Stand
7	DC Water Pumping Needle Stand	15	High Water Level Switch
8	Health Needle Stand		

## (2)Silk screen on display board

### • TOP VIEW

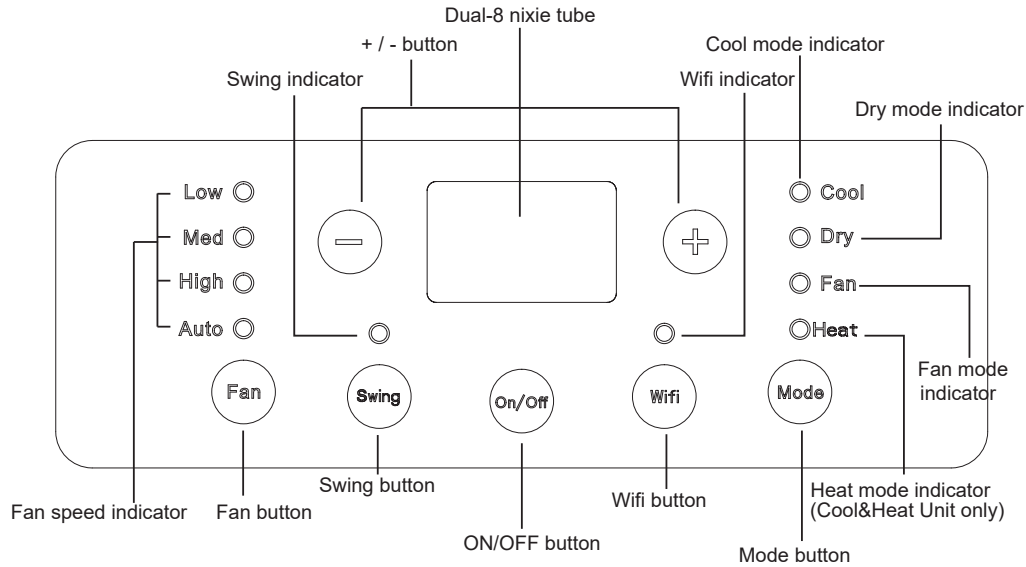


### • BOTTOM VIEW



## 6. Function and Control

### 6.1 Introduction of control panel



#### Operation of control panel

Note:

- After putting through the power, the air conditioner will give out a sound. After that, you can operate the air conditioner by the control panel.
- Under ON status, after each pressing of the button on control panel, the air conditioner will give out a sound. Meanwhile, corresponding indicator on control panel will be bright.
- Under OFF status, dual-8 nixie tube on control panel won't display.

Under ON status, dual-8 nixie tube on control panel will display set temperature under cooling mode and Heating mode (Cool&Heat Unit only), while it won't display under other modes.

#### 1.ON/OFF button

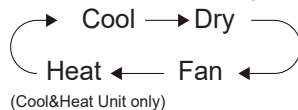
Pressing this button can turn on or turn off the air conditioner.

#### 2. + / - button

Under cooling or heating mode, press "+" or "-" button to increase or decrease set temperature by 1°C(°F). Set temperature range is 16°C(61°F)~30°C(86°F) Under auto, dry or fan mode, this button is invalid.

#### 3. Mode button

Press this button and the mode will circulate according to below sequence:



**Cool:** Under this mode, cooling mode indicator is bright. Dual-8 nixie tube displays set temperature. Temperature setting range is 16°C(61°F)~30°C(86°F)

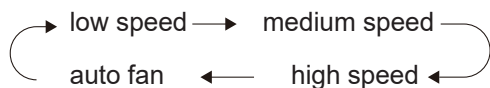
**Dry:** Under this mode, drying mode indicator is bright. Dual-8 nixie tube won't display.

**Fan:** Under this mode, the air conditioner only blow fan. Fan indicator is bright. Dual-8 nixie tube won't display.

**Heat Cool&Heat Unit only :** Under this mode, heating mode indicator is bright. Dual-8 nixie tube displays set temperature. Temperature setting range is 16°C(61°F)~30°C(86°F).

#### 4.Fan button

Press this button and the fan speed will circulate as:



#### 5.Wifi button

Press " Wifi " button to turn on or turn off Wifi function. When Wifi button function is turned on, the Wifi button indicator will be displayed. Press and hold the button for 10s to reset Wifi button function.

#### 6.Swing button

Press this button , horizontal louver of air conditioner will swing up&down automatically. Single press it to switch over between on and off.

## Using the remote controller

This is a general use remote controller, it could be used for the air conditioners with multifunction; For some function, which the model doesn't have, if press the corresponding button on the remote controller that the unit will keep the original running status.

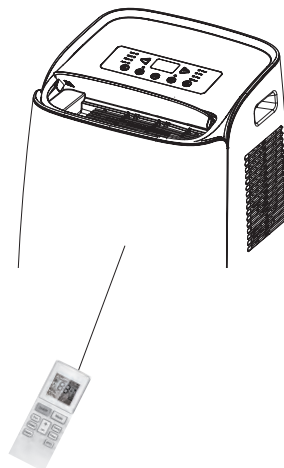
## How to use the remote controller

Point the remote control toward the signal receiver and press the desired button. The unit generates a beep when it receives the signal.

- Make sure nothing, such as curtains, blocks the signal receiver window.
- The signal effective distance is no more than 8m.

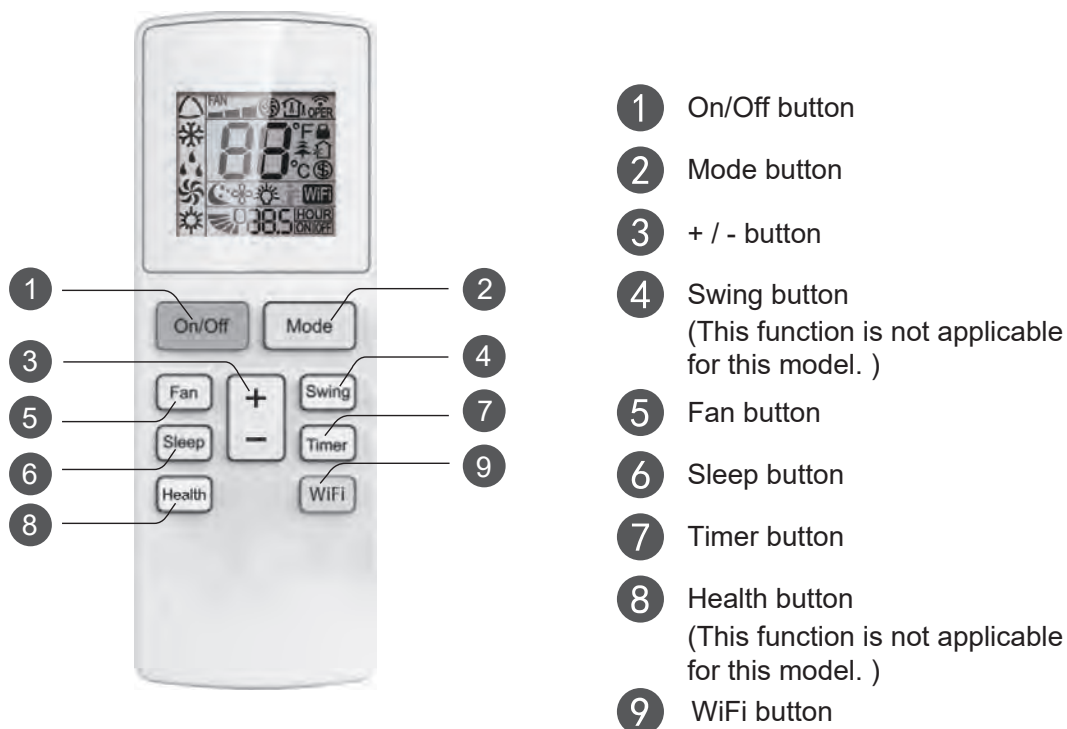
### ⚠ CAUTION:

- Do not expose the receiver window to direct sunlight. This may adversely affect its operation.
- Use of certain fluorescent lamp in the same room may interfere with transmission of the signal.
- Do not leave the remote control in direct sunlight or near a heater. Protect the remote control from moisture and shock.

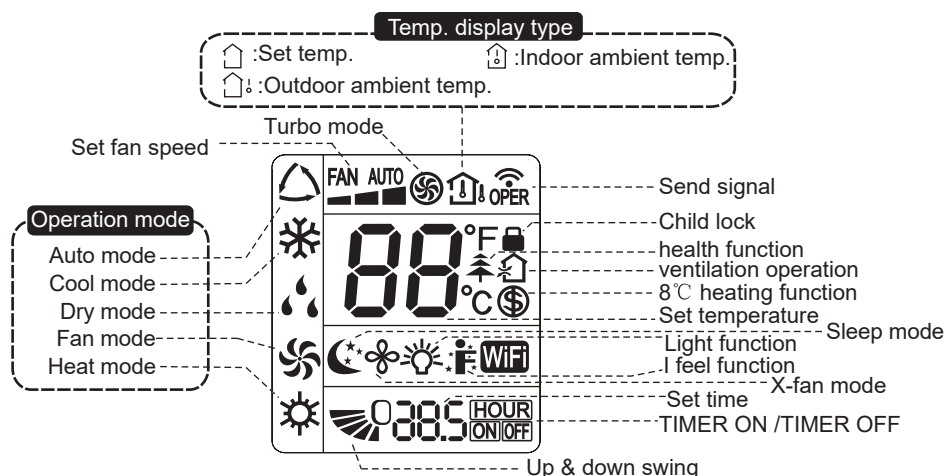


## 6.2 Remote Controller Introduction (WiFi)

### Buttons on Remote Controller



### Introduction for Icons on Display Screen



**NOTICE:** "WiFi" This is a general remote controller. Some models have this function while some do not. Please refer to the actual models.

### Introduction for Buttons on Remote Controller

#### Note:

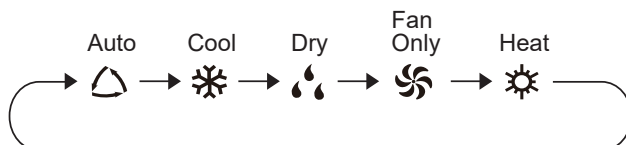
- This is a general use remote controller, it could be used for the air conditioners with multifunction; For some function, which the model doesn't have, if press the corresponding button on the remote controller that the unit will keep the original running status.

**1** ON/OFF button

Press this button to turn on the unit. Press this button again to turn off the unit.

**2** MODE button

Press this button can your required operation mode in turn. Corresponding indicator will be on.



- **Auto:** Under this mode, the unit will operate automatically according to ex-factory setting. In this case, set temperature cannot be adjusted.
- **Cool:** Under this mode, air conditioner operates under cooling mode. Cooling indicator will be on. Press “ Fan ” button can adjust the fan speed.
- **Dry:** Under this mode, the unit runs in low fan speed for dehumidification and the corresponding indicator is on; under dry mode, the fan speed can not be adjusted.
- **Fan Only:** Under this mode, air conditioner will not cool or heat, only blow wind. Fan indicator will be on. Press “ Fan ” button can adjust the fan speed.
- **Heat:** Under this mode, air conditioner operates under heating mode. Press “ Fan ” button can adjust the fan speed. (Cooling only unit won't receive heating mode signal. If setting heat mode with remote controller, press ON/OFF button can't start up the unit).

**3** + / - button

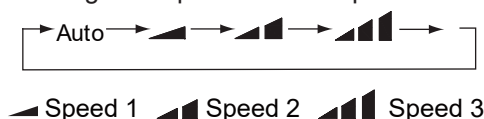
- Pressing “+” or “-” button once will increase or decrease set temperature by 1°C(°F). Hold “+” or “-” button for 2s, set temperature on remote controller will change quickly. Release the button after your required set temperature is reached.
- Under timer setting status, after each pressing of “+” or “-” button, time will increase or decrease 0.5h. Hold “+” or “-” button, 2s later, time displayed on dual-8 nixie tube will change quickly. Loosen the button until the time is reached to your set time.

**4** Swing button (This function is not applicable for some model. )

Press this button to turn “ON” & “OFF” swing.

**5** Fan button

This button is used for setting Fan Speed in the sequence that goes from AUTO, , , to  then back to Auto.



NOTE: There are 3 speeds for the Fan Speed of this model.

**6** Sleep button

Press this button to go into the Sleep operation mode. Press it again to cancel this function. This function is available in COOL, HEAT (Only for models with heating function) mode to maintain the most comfortable temperature for you.

**7** Timer button

Under ON status, press this button to set timer OFF; Under OFF status, press this button to set timer ON. Press this button once and the characters of HOUR ON (OFF) will flash to be displayed. Meanwhile, press “+” button or “-” button to adjust timer setting (time will change quickly if holding “+” or “-” button ). Time setting range is 0.5~24 hours. Press this button again to confirm timer setting and the characters of HOUR ON (OFF) will stop flashing. If the characters are flashing but you haven't press timer button, timer setting status will be quit after 5s. If timer is confirmed, press this button again to cancel timer.



## 8 Health button (This function is not applicable for this model. )

Press this button to achieve the on and off of healthy and scavenging functions in operation status. Press this button for the first time to start scavenging function; LCD displays "🏠". Press the button for the second time to start healthy and scavenging functions simultaneously; LCD displays "🏠" and "🌳". Press this button for the third time to quit healthy and scavenging functions simultaneously.

Press the button for the fourth time to start healthy function; LCD display "🌳". Press this button again to repeat the operation above.

"T his function is applicable to partial of models.

## 9 WiFi button

When WiFi function is turned on, " WiFi " icon will be displayed on the remote controller; when WiFi function is turned off, " WiFi " icon will disappear.

How to turn on WiFi: Press " WiFi " button to turn on WiFi function.

How to turn off WiFi: Hold " WiFi " button for 5s to turn off WiFi function.

Under off status, press "MODE" and " WiFi " buttons simultaneously for 1s, WiFi module will restore factory settings.

This function is only available for some models.

If "H1" is displayed on the remote controller while it's not operated by the professional person/after-sales person, it belongs to the misoperation.

Please operate it as below to cancel it. Under the OFF status of remote controller, hold the Mode button for 5s to cancel "H1" display.

Note:

If remote controller displays "H1", it belongs to the normal function reminder. If the unit is defrosting under heating mode, it operates according to H1 defrosting mode. "H1" won't be displayed on the panel of indoor unit;

Once you set H1 mode, if you turn off unit by remote controller, H1 will display 3 times on the remote controller and then disappear;

Also, when you set H1 mode, when you change to heating mode, H1 will display 3 times on the remote controller and then disappear.

## Function introduction for combination buttons

### Temperature display switchover function

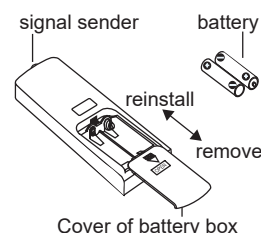
Under OFF status, press "-" and "Mode" buttons simultaneously to switch temperature display between °C and °F

### Light function

Under switch-on or switch-off state, you may hold "+" and "FAN" buttons simultaneously to set the lamp on or off and send the code. After being energized the lamp is defaulted on.

## Replacement of batteries in remote controller

1. Press the back side of remote controller marked with "OPEN", as shown in the fig, and then push out the cover of battery box along the arrow direction.
2. Replace two 7# (AAA 1.5V) dry batteries, and make sure the position of "+" polar and "-" polar are correct.
3. Reinstall the cover of battery box.



### NOTICE:

The distance between signal sender and receiving window should be no more than 8m, and there should be no obstacles between them.

As the signal will be interfered in the room with electronic fluorescent lamp, conversion fluorescent lamp or wireless phone , please get closer to the air conditioner when using the remote controller.

Replace new batteries of the same model when replacement is required.

When you don't use remote controller for a long time, please take out the batteries .

## 6.3 Introduction of Basic Mode Function

### 1. Temperature Parameter

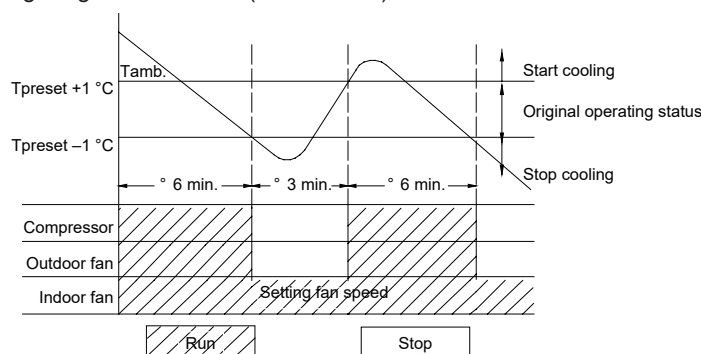
- ◆ Indoor setting temperature ( $T_{\text{preset}}$ )
- ◆ Indoor ambient temperature ( $T_{\text{amb.}}$ )

### 2. Basic Functions of System

After the unit is energized, the interval of start-up time for compressor is no less than 3min under any conditions; when the compressor is started, the unit is off without the temperature change in 6min.

#### 2.1 Cool Mode

- a) When  $T_{\text{amb.}} \geq T_{\text{preset}} + 1^{\circ}\text{C}$  ( $2^{\circ}\text{F}$ ), the unit will start to run in cooling mode, the compressor and kick motor start to run, and fan motor runs under preset fan speed.
  - b) When  $T_{\text{amb.}} \leq T_{\text{preset}} - 1^{\circ}\text{C}$  ( $2^{\circ}\text{F}$ ), the compressor and kick motor stop to run, and fan motor runs under preset fan speed.
  - c) When  $T_{\text{preset}} - 1^{\circ}\text{C}$  ( $2^{\circ}\text{F}$ )  $< T_{\text{amb.}} < T_{\text{preset}} + 1^{\circ}\text{C}$  ( $2^{\circ}\text{F}$ ), the unit will keep the current running status.
- Under this mode, the temperature setting range is  $61^{\circ}\text{F}$ - $86^{\circ}\text{F}$  ( $16^{\circ}\text{C}$ - $30^{\circ}\text{C}$ ).



#### 2.2 Dry mode

Under this mode, set temperature and ambient temperature won't be displayed. Indoor fan operates at low fan speed.  $2^{\circ}\text{C}$  ( $36^{\circ}\text{F}$ )  $\leq T_{\text{amb.}} \leq 45^{\circ}\text{C}$  ( $113^{\circ}\text{F}$ ), Compressor and draw water motor operates continuously.

#### 2.3 Fan mode

Under this mode, set temperature and ambient temperature won't be displayed. Indoor fan operates at set fan speed.

## 3. Other Control Function Introduction

### 3.1 TIMER Function

#### • General timer

- a) **TIMER ON:** It can set timer on when the system is off, the setting time range is 0.5h-24h, when the time of setting timer on reaches, and the system runs with the previous setting mode.
- b) **TIMER OFF:** It can set timer on when the system is on, the setting time range is 0.5h-24h, when the time of setting timer off reaches, the system stop to work.

#### • Clock timer

- a) **TIMER ON:** If set timer on when the system is running, it continues to run; if set timer on when the system is off, when the time of setting timer on reaches, and the system runs with the previous setting mode.
- b) **TIMER OFF:** If set timer off when the system is off, the system keeps the stand-by status when setting timer off; if set timer off when the system is on, when the time of timer off reaches, the system stops to run.

### 3.2 SLEEP Function

- a) Under cooling mode, after 1h of setting sleep process,  $T_{\text{preset}}$  increases  $2^{\circ}\text{F}$  ( $1^{\circ}\text{C}$ ); 2h later,  $T_{\text{preset}}$  increases  $4^{\circ}\text{F}$  ( $2^{\circ}\text{C}$ ). After 2h, the setting temperature never increases, but the upper limit of increased setting temperature is  $86^{\circ}\text{F}$  ( $30^{\circ}\text{C}$ ).
- b) Under heating mode, after 1h of setting sleep process,  $T_{\text{preset}}$  decreases  $2^{\circ}\text{F}$  ( $1^{\circ}\text{C}$ ); 2h later,  $T_{\text{preset}}$  decreases  $4^{\circ}\text{F}$  ( $2^{\circ}\text{C}$ ). After 2h, the setting temperature never decreases, but the upper limit of decreased setting temperature is  $61^{\circ}\text{F}$  ( $16^{\circ}\text{C}$ ).
- c) There is no sleep function under fan and dry mode.
- d) When set sleep function, shift mode will cancel sleep function.
- e) The setting temperature display is the same with remote controller; it is not influenced by the setting temperature increases/decreases.

### 3.3 Auto Fan speed control

- a) Auto fan speed under
 

$T_{\text{amb.}} \geq T_{\text{preset}} + 4^{\circ}\text{F}$ ( $2^{\circ}\text{C}$ )	Cooling mode; High fan;
$T_{\text{preset}} < T_{\text{amb.}} < T_{\text{preset}} + 4^{\circ}\text{F}$ ( $2^{\circ}\text{C}$ )	Med fan;
$T_{\text{amb.}} \leq T_{\text{preset}}$	Low fan
- b) There is 3.5min delay for auto fan shift.

### 3.4 Memory Function

The system memories the setting running status of previous power-off, and runs automatically with the setting running status before it power-off when it is energized again. If the unit is on before power-off, the compressor will 3min delay protection when it is energized again.

### 3.5 Indicator Lamp, dual-8 digital pipe

- a) When the unit runs, under cooling mode, cooling indicator lamp lights, dual-8 displays preset temperature.
- b) When the unit runs, under fan mode, fan indicator lamp lights, dual-8 does not display.
- c) When the unit runs, under dry mode, dry indicator lamp lights, dual-8 does not display.
- d) When the unit runs, under heating mode, heating indicator lamp lights, dual-8 displays preset temperature.

### 3.6 Setting button function

- a) ON/OFF button: It controls system's switch.
- b) Mode button: Mode setting cycle with below sequence: Cooling only unit: cooling-> dry-> fan.
- c) Temp. "-" button: Set temperature when the unit is on, the setting temperature decreases 1°C or °F per press Temp. "-" button; it will never setting when the setting reaches to 16°C or 61°F. The button is not valid under dry and fan mode.
- d) Temp. "+" button: Set temperature when the unit is on, the setting temperature increases 1°C or °F per press Temp. "+" button; it will never setting when the setting reaches to 30°C or 86°F. The button is not valid under dry and fan mode.

## 4. Protection Function

### 4.1 Anti-freeze Protection

When the anti-freeze protection is inspected, the compressor stops, fan motor runs with setting fan speed.

When the anti-freeze protection is canceled and reaches to the 3min time-delay, it runs with the original status.

Temperature sensor failure inspection

- a) Environment temperature sensor is open, short circuit: dual-8 displays F1, the cooling indicator lamp goes out 3S and blinks 1 time, and it will light up 0.5S and go out 0.5S when it is blinking.
- b) Indoor pipe temperature sensor is open, short circuit: dual-8 displays F2, the cooling indicator lamp goes out 3S and blinks 2 times, and it will light up 0.5S and go out 0.5S when it is blinking.
- c) Outdoor pipe temperature sensor is open, short circuit: dual-8 displays F4, the cooling indicator lamp goes out 3S and blinks 4 times, and it will light up 0.5S and go out 0.5S when it is blinking.
- d) The compressor or electric heating pipe stops when the temperature sensor failure and the unit is on, The fan motor will be deal regarding compressor or electric pipe reach to the temperature point and stops.

### 4.2 Water over-flow protection

If the Water over-flow protection is detected for 3S, it will enter into Water over-flow protection. Display code H8, heating indicator lamp or water over-flow indicator lamp goes out 3S and blinks 8 times.

### 4.3 Compressor protection

Compressor can be restarted only after 3 minutes delayed.

# Part II: Installation and Maintenance

## 7. Notes Maintenance Safety Precautions

### Important!

Please read the safety 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 a licensed technician according to local regulations and the 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 should be installed in suitable location and ensure the power plug is touchable.
3. Make sure each wiring terminal is connected firmly during installation and maintenance.
4. Have the unit adequately grounded. The grounding wire Can't be used for other purposes.
5. Must apply protective accessories such as protective boards, cable-cross loop and wire clip.
6. 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.
7. The power cord and power connection wires Can't be pressed by hard objects.
8. If power cord or connection wire is broken, it must be replaced by a qualified person.
9. 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 than 3mm.
10. Check if there is electric leakage on the unit body. If yes, please eliminate the electric leakage.
11. Replace the fuse with a new one of the same specification if it is burnt down; dont replace it with a cooper wire or

conducting wire.

12. If the unit is to be installed in a humid place, the circuit breaker must be installed.

### Refrigerant Safety Precautions:

When refrigerant leaks or requires discharge during installation, maintenance, or disassembly, it should be handled by certified professionals or otherwise in compliance with local laws and regulations.

1. This unit adopts R290 refrigerant. System maintenance is strictly prohibited.
2. If the refrigerant leaks or the pipeline is damaged, it is forbidden to conduct the maintenance. The unit should be recycled and disposed according to local regulations.
3. It is strictly forbidden to cut or weld the refrigerant. Otherwise, it may lead to explosion.

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



Appliance filled with flammable gas R290.



Before install and use the appliance, read the owner's manual first.



Before install the appliance, read the installation manual first.



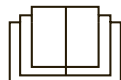
Before repair the appliance, read the service manual first.

## The Refrigerant

- To realize the function of the air conditioner unit, a special refrigerant circulates in the system. The used refrigerant is the fluoride R290, which is specially cleaned. The refrigerant is flammable and inodorous. Furthermore, it can leads to explosion under certain conditions.
- Compared to common refrigerants, R290 is a nonpolluting refrigerant with no harm to the ozonosphere. The influence upon the greenhouse effect is also lower. R290 has got very good thermodynamic features which lead to a really high energy efficiency. The units therefore need a less filling.
- Please refer to the nameplate for the charging quantity of R290.

### WARNING :

- Appliance filled with flammable gas R290.
- Appliance shall be installed, operated and stored in a room with a floor area larger than 15m<sup>2</sup>.
- The appliance shall be stored in a room without continuously operating ignition sources . (for example: open flames, an operating gas appliance or an operating electric heater.)
- The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.
- The appliance shall be stored so as to prevent mechanical damage from occurring.
- Ducts connected to an appliance shall not contain an ignition source.
- Keep any required ventilation openings clear of obstruction.
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odour.
- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- Servicing shall be performed only as recommended by the manufacturer.
- Should repair be necessary, contact your nearest authorized Service Centre. Any repairs carried out by unqualified personnel may be dangerous.
- Compliance with national gas regulations shall be observed.
- Read specialist's manual.



Frequency band(s) in which the radio equipment operates: 2400MHz-2483.5MHz

Maximum radio-frequency power transmitted in the frequency band(s) in which the radio equipment operates: 20dBm

R290:3



This marking indicates that this product should not be disposed with other house hold wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased.

They can take this product for environmental safe recycling.

## 8. Installation Precaution

### WARNING:

- Observe all governing codes and ordinances.
- Do not use damaged or non-standard power cord.
- Be caution during installation and maintenance. Prohibit incorrect operation to prevent electric shock, casualty and other accidents.

### 8.1 Selection of installation location

#### Basic requirement

Installing the unit in the following places may cause malfunction. If it is unavoidable, please consult the local dealer:

1. The place with strong heat sources, vapors, flammable or explosive gas, or volatile objects spread in the air.
2. The place with high-frequency devices (such as welding machine, medical equipment).
3. The place near coast area.
4. The place with oil or fumes in the air.
5. The place with sulfured gas.
6. Other places with special circumstances.
7. It's not allowed to be installed on the unstable or motive base structure (such as truck) or in the corrosive environment (such as chemical factory).

#### Requirement of air conditioner

1. Air inlet should be far away from obstacles and do not put any objects near air outlet. Otherwise, it will affect the radiation of heat discharge pipe.
2. Select a location where the noise and outflow air emitted by the outdoor unit will not affect neighborhood.
3. Please try your best to keep far away from fluorescent lamp.
4. The appliance shall not be installed in the laundry.

### 8.2 Requirements for electric connection

#### 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.
3. For appliances with type Y attachment, the instructions shall contain the substance of the following. 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.
4. Properly connect the live wire, neutral wire and grounding wire of power socket.
5. Be sure to cut off the power supply before proceeding any work related to electricity and safety.
6. Do not put through the power before finishing installation.
7. The air conditioner is first class electric appliance. It must be properly grounding with specialized grounding device by a professional. Please make sure it is always grounded effectively, otherwise it may cause electric shock.
8. The yellow-green wire or green wire in air conditioner is grounding wire, which can't be used for other purposes.
9. The grounding resistance should comply with national electric safety regulations.
10. The appliance shall be installed in accordance with national wiring regulations.
11. To be in compliance with IEC 61000-3-11, impedance value of power-supply system connected to product must be less than or equal to the allowable maximum value of  $|Z_{sys}|$  in the following sheet:

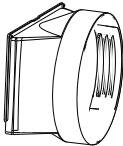
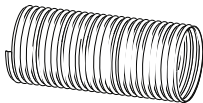
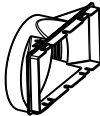
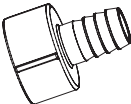
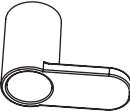



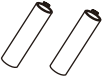
models	max $ Z_{sys} $ unit:ohms
All models	0.13

## 9. Install


## Preparation before Installation

**Note:** check if the accessories are available before installation

## Accessory list

 <p>Joint A</p>	 <p>Heat discharge pipe</p>	 <p>Rear clip</p>
 <p>Drain connector</p>	 <p>Power cord hooks</p>	 <p>Screws</p>
 <p>Remote controller</p>	 <p>User's manual</p>	 <p>Battery (AAA 1.5V)</p>

## Optional

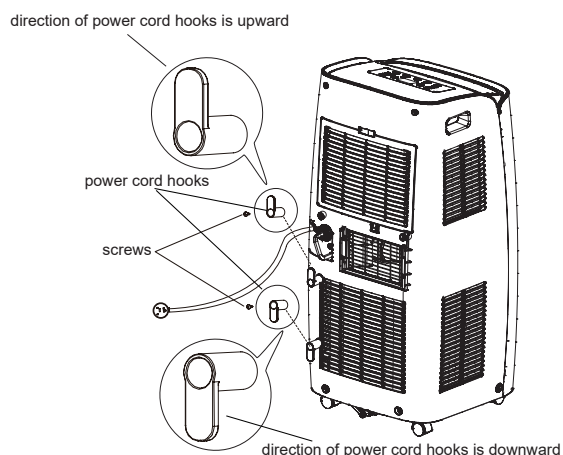


Drainage hose

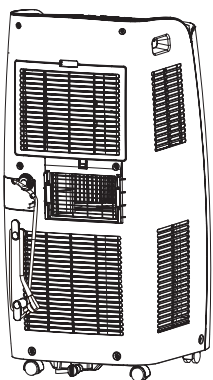


## Install Power cord Hooks

- Assemble the power cord hooks at the back of the unit with screws (the direction of power cord hooks is as shown in following fig).



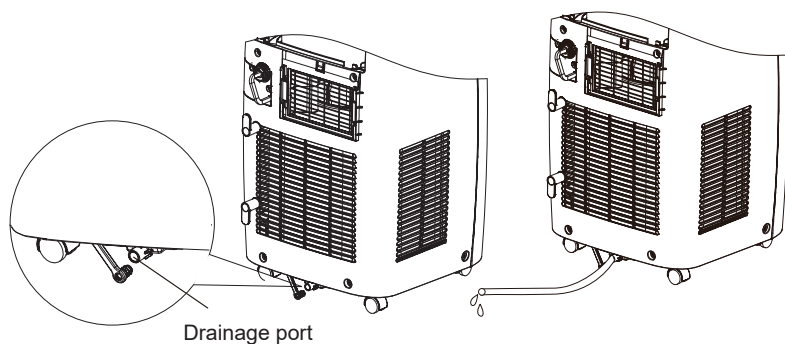
- Wind the power cord around the power cord hooks.



## Drain water

There are 2 ways to remove collected water:

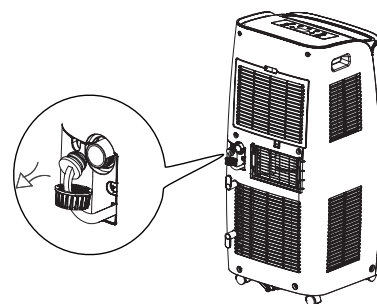
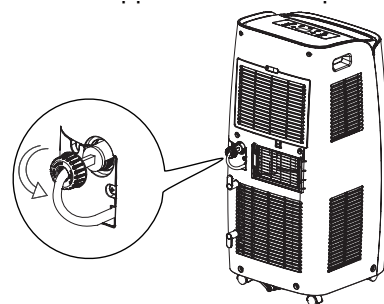
- To reach the maximum performance, it is not recommended to drain water, during Cool mode.
- It is recommended to use the middle drainage port to drain water, during Dry mode.
- It is recommended to use the bottom drainage port to drain water, during Heat mode.
- To drain water from the bottom drainage port when the display shows "H8".



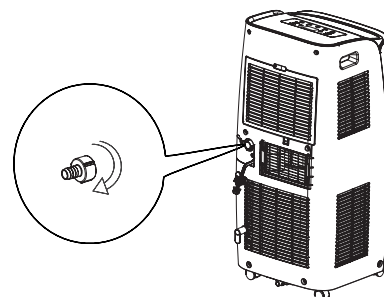
### 2.Drain water from the middle drainage port.

**NOTICE:**Water can be automatically emptied into a floor drain by attaching 13mm inner diameter hose (not included).

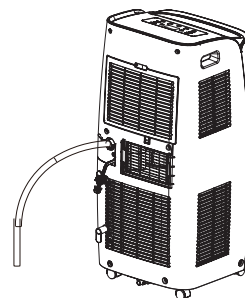
- Remove the continuous drain cap 1 by turning it counter clockwise then remove the rubber stopper 2 from the spout.



- Screw the drain connector to (included in the package) the spout by turning clockwise.



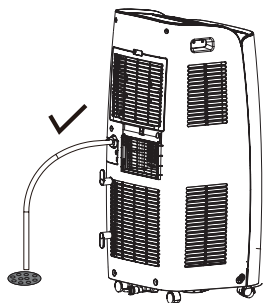
- Insert the drainage hose into drain connector.



### ATTENTION:

When using continuous drainage option from the middle hole, place portable on a level surface and make sure garden hose is clear of any obstructions and is directed downward. Placing portable on an uneven surface or improper hose installation may result in water filling up the chassis and causing the unit to shut off. Empty water in the chassis if shut off occurs, then check portable location and hose for proper setup.

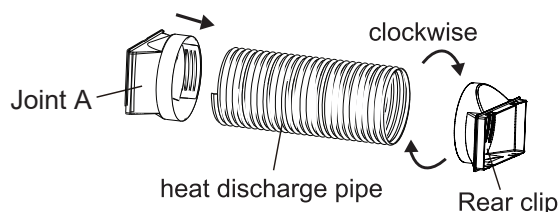




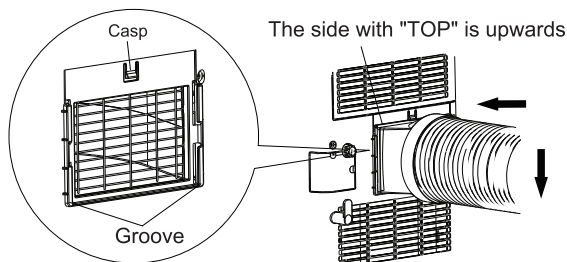
## Installation of heat discharge pipe

### Install heat discharge pipe

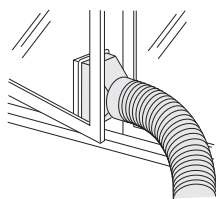
1. Rotate joint A and Rear clip clockwise into the two ends of heat discharge pipe.



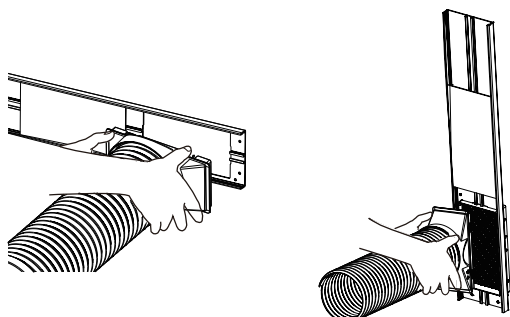
2. Insert joint A of heat discharge pipe into the groove until you hear a sound.



3. Lead the heat discharge pipe outdoors.



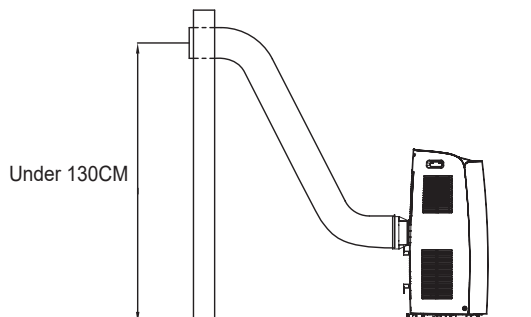
4. Slide and open the exhaust cover on the window panel, and attach the Rear clip. (Optional)



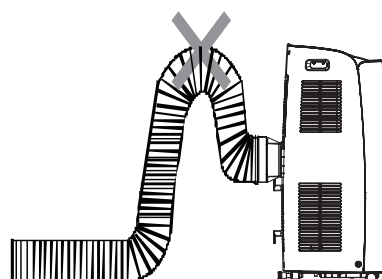
### Note of Installing heat discharge pipe

In order to improve cooling efficiency, the heat discharge pipe should be as short as possible and flat without curve to ensure smooth heat discharge.

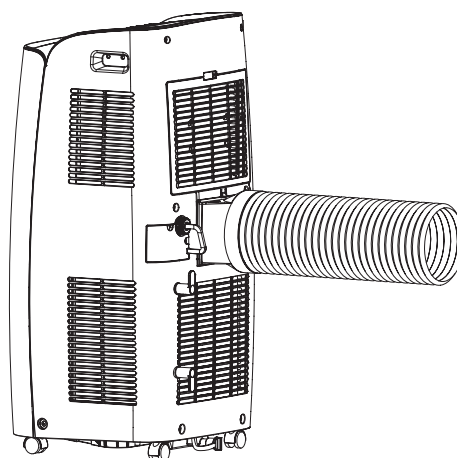
The discharge pipe is suggested to be installed according to below figure by the manufacturer.



User can adjust the installation method of the discharge pipe basing on the requirement, while the similar installation methods as below which will lead to unsmoothly air-out are not allowed.



- The length of the heat discharge pipe is less than 1m. It is recommended to use it with shortest length.
- When installing, heat discharge pipe should be as flat as possible. Don't prolong the pipe or connect it with other heat discharge pipe.



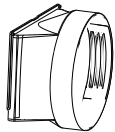
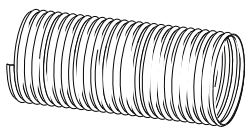
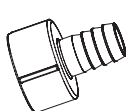





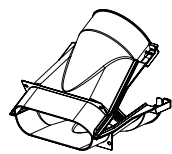

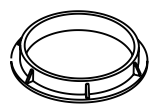
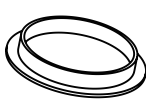
### Operation Test

- Put through the power supply and then press ON/OFF button on remote controller to start the unit.
- Press mode button to select auto, cooling, drying, fan or heating function, and then check if the unit operates normally.
- If ambient temperature is below 16°C, the unit can't operate in cooling mode.

## Preparation before Installation

**Note:** check if the accessories are available before installation

### Accessory list

				
Joint A	Heat discharge pipe		Drain connector	
				
Power cord hooks	Screws	Remote controller	Battery (AAA 1.5V)	User's manual
				
Joint H	Joint F	Joint G	Plastic Cover	

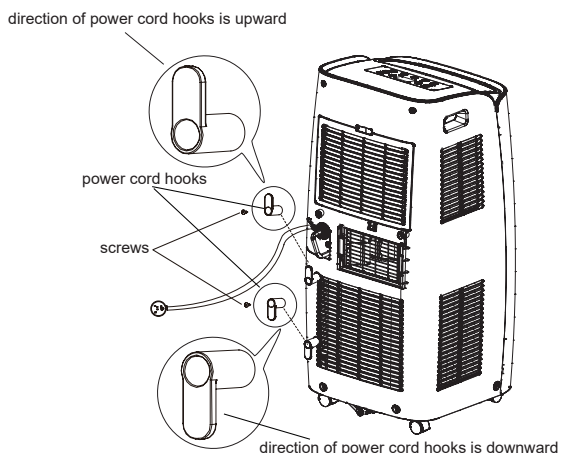
### Optional 1



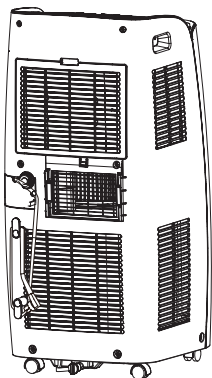
Drainage hose

## Install Power cord Hooks

- Assemble the power cord hooks at the back of the unit with screws (the direction of power cord hooks is as shown in following fig).



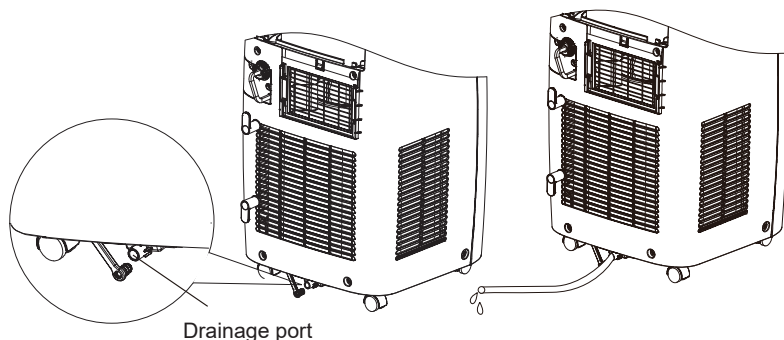
- Wind the power cord around the power cord hooks.



## Drain water

There are 2 ways to remove collected water:

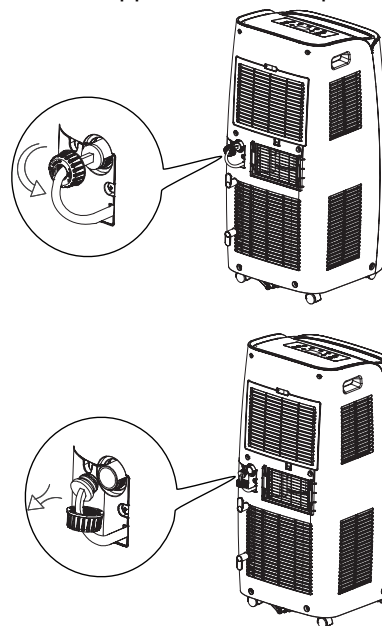
- To reach the maximum performance, it is not recommended to drain water, during Cool mode.
- It is recommended to use the middle drainage port to drain water, during Dry mode.
- It is recommended to use the bottom drainage port to drain water, during Heat mode.
- To drain water from the bottom drainage port when the display shows "H8".



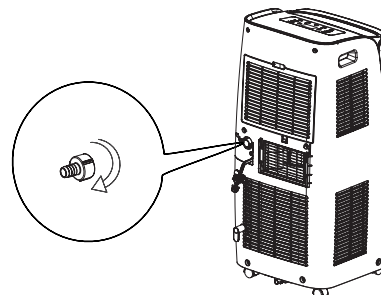
### 2.Drain water from the middle drainage port.

**NOTICE:**Water can be automatically emptied into a floor drain by attaching 13mm inner diameter hose (not included).

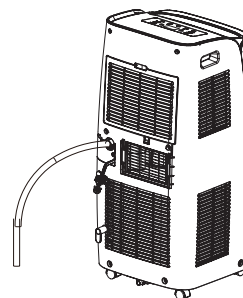
- Remove the continuous drain cap 1 by turning it counter clockwise then remove the rubber stopper 2 from the spout.



- Screw the drain connector to (included in the package) the spout by turning clockwise.

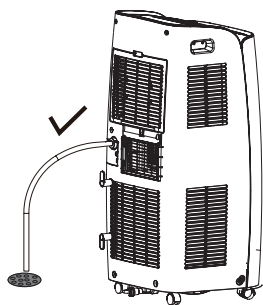


- Insert the drainage hose into drain connector.



### ATTENTION:

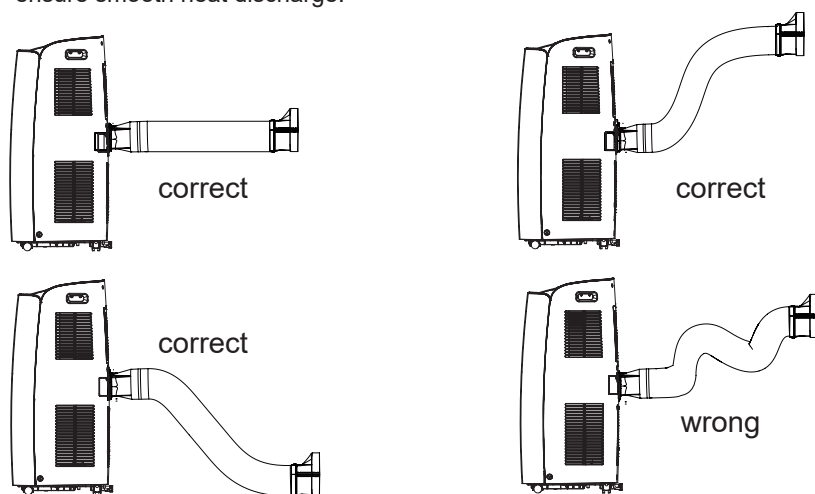
When using continuous drainage option from the middle hole, place portable on a level surface and make sure garden hose is clear of any obstructions and is directed downward. Placing portable on an uneven surface or improper hose installation may result in water filling up the chassis and causing the unit to shut off. Empty water in the chassis if shut off occurs, then check portable location and hose for proper setup.



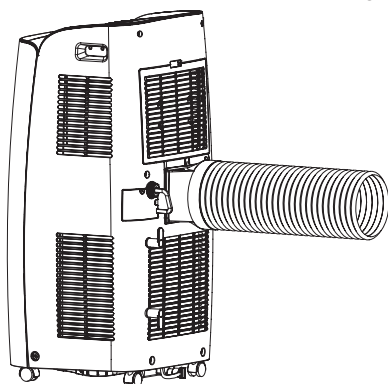
## Installation of Heat Discharge Pipe

### Note of Installing heat discharge pipe

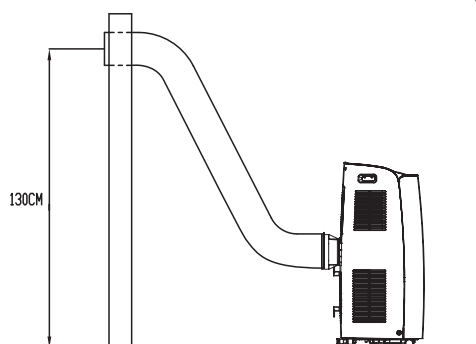
In order to improve cooling efficiency, the heat discharge pipe should be as short as possible and flat without curve to ensure smooth heat discharge.



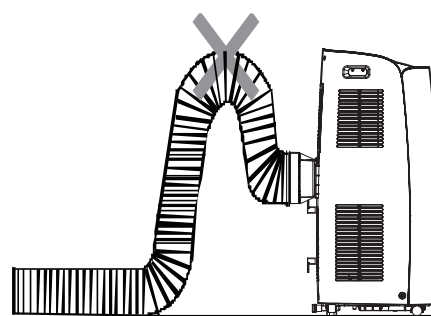
- The length of the heat discharge pipe is less than 1m. It is recommended to use it with shortest length.
- When installing, heat discharge pipe should be as flat as possible. Don't prolong the pipe or connect it with other heat discharge pipe.



- Correct installation is as shown in figure (When installing it on wall, height of wall should not be over 130cm from floor).

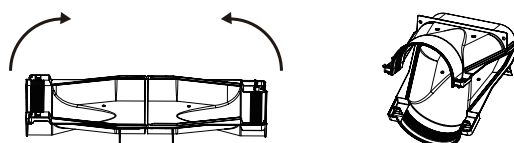


- Wrong installation is shown in following figure (If the pipe is bent too much, it would easily cause malfunction.)

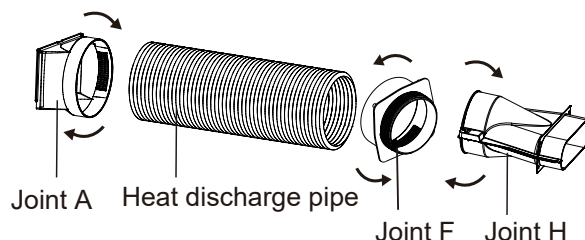


## Installation in the window

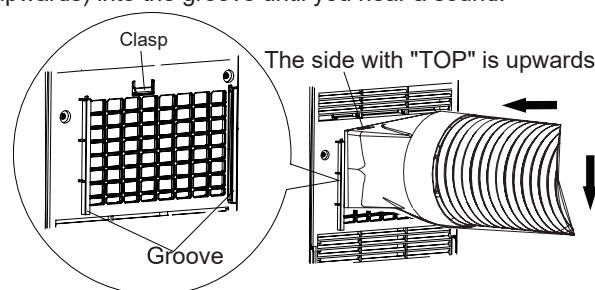
1. Fold the rear joint inwards until these two clasps have tightly connected the rear joint together.



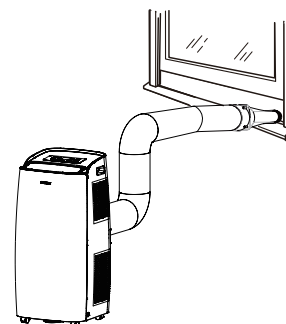
2. Rotate joint A and joint F into the two ends of heat discharge pipe. Then, rotate joint H to joint F, connect tightly.



3. Insert joint A of heat discharge pipe (the side with "TOP" is upwards) into the groove until you hear a sound.

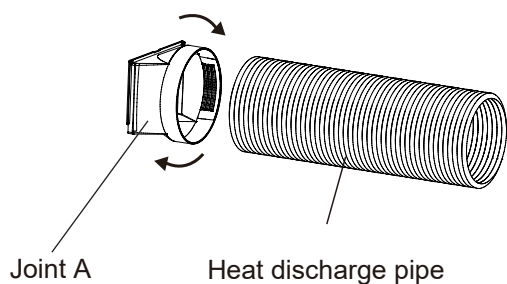


4. Lead the exhaust house outdoors.

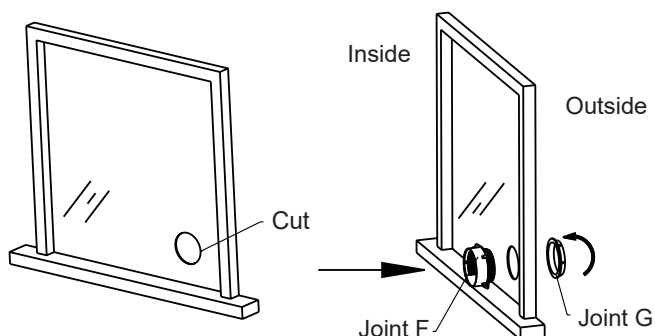


## Installation in immovable window

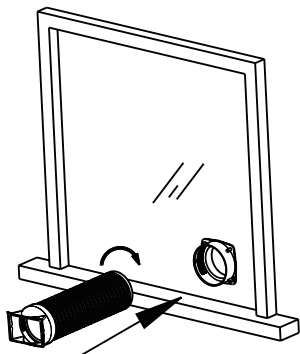
1. Rotate joint A into the ends of heat discharge pipe.



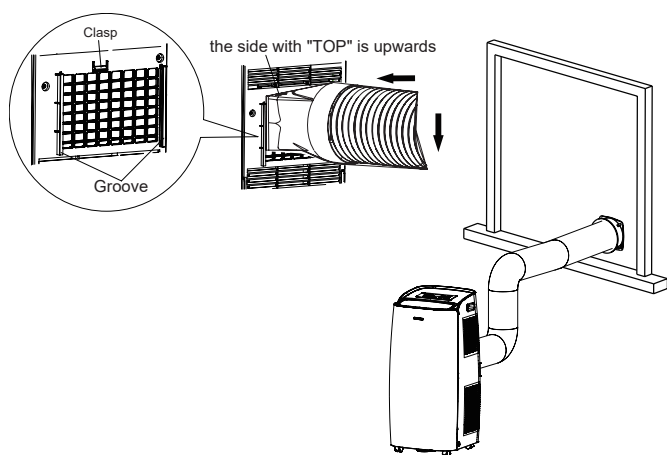
2. If the window is immovable, cut a hole to install joint F and joint G tightly.



3. Install the other side of heat discharge pipe clockwise into joint F.

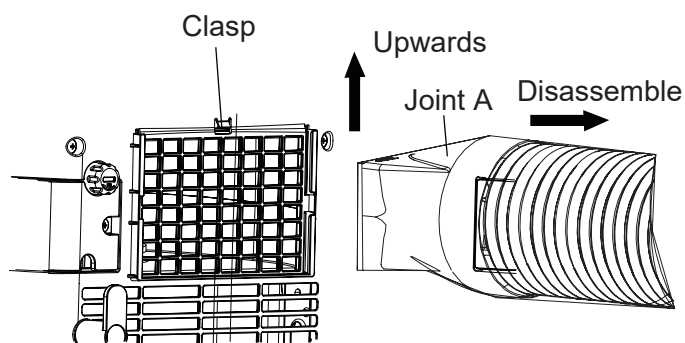


4. Insert joint A of heat discharge pipe (the side with "TOP" is upwards) into the groove until you hear a sound.

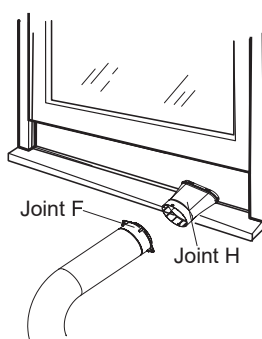


## Disassembly for installation in window

1. Remove joint A:  
Press the clasp and lift joint A upwards to remove it.

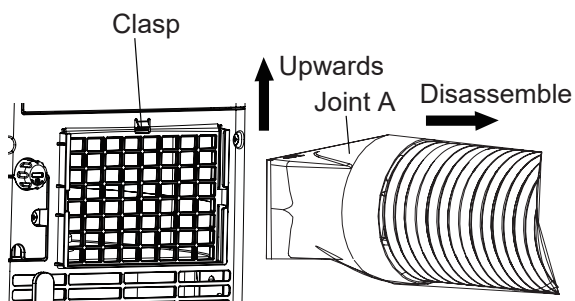


2. Remove joint F:  
remove joint F from joint H.

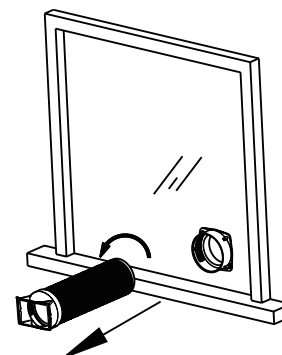


## Disassembly for installation in immovable window

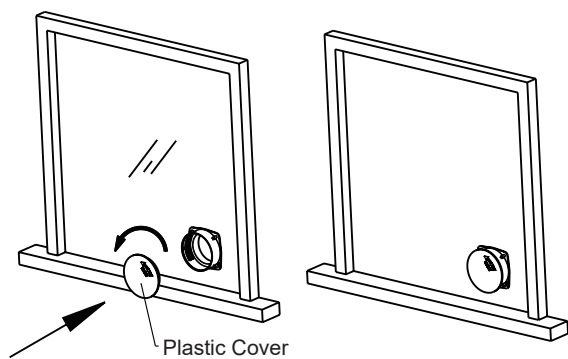
1. Remove joint A:  
Press the clasp and lift joint A upwards to remove it.



2. Remove the heat discharge pipe from the joint F.



3. When heat discharge pipe is removed, Install the plastic cover into joint F in case of the insect into the house .



## Operation Test

- Put through the power supply and then press ON/OFF button on remote controller to start the unit.
- Press mode button to select auto, cooling, drying, fan or heating function, and then check if the unit operates normally.
- If ambient temperature is below 16°C, the unit can't operate in cooling mode.

## 10. Maintenance

### 10.1 Safety Principle of Maintenance

1. The maintenance spot must have good ventilation. Do not close the door or the window.
2. Do not use naked flame, including welding, smoking. Do not use power tools. Do not use mobile phone. Tell the user not to cook with naked flame.
3. Take antistatic measures, including wearing pure cotton clothes and gloves etc.
4. If flammable refrigerant leakage is found during maintenance, it is a must to reinforce ventilation and take effective protective measures.
5. During maintenance, it is necessary to keep the spot safe when fetching the lacked spare parts.
6. It is necessary to keep the case of the air conditioner grounded during maintenance.
7. The maintenance unrelated to refrigerant vessel, inner refrigerant pipe and cooling component can be performed in the user's place, including cleaning the cooling system and sludging.
8. Ensure that the density tester is working during maintenance.
9. Ensure there is necessary safety precaution and emergency measures on the spot. Put suitable fire extinguishers (CO2 or dry powder) in the nearest area.
10. There must be natural ventilation in the maintenance spot.
11. The maintenance staff shall take safety actions.
12. Paste suitable signs such as "No Smoking" and "No Entry".

### 10.2 Preparation before Maintenance

#### 1. Inspection of Environment

- (1) Ensure that electric product with radiation is power off in the maintenance area. All the persons in the room shall turn off the mobile phone.
- (2) Check if there is refrigerant leakage in the maintenance area. Ensure that all the leak testers are suitable for this air conditioner.
- (3) Ensure that the room area reaches the requirement.
- (4) Check if the maintenance area is ventilated. Keep the room ventilated.

#### 2. Inspection of Air Conditioner

- (1) Ensure that the air conditioner is reliably grounded.
- (2) Ensure that the power supply of the air conditioner is cut off. Discharge the electricity of the capacitor. If power supply is necessary, perform leak test to prevent the potential danger.

#### 3. Inspection of Maintenance Equipment

- (1) Check if the maintenance equipment is suitable for the refrigerant. Only the special equipment recommended by the air conditioner supplier can be used.
- (2) The set alarm density of the leak tester shall not be higher than 25% of the LEL. The tester must keep operating during maintenance.

#### 4. Leak Test before Maintenance

- (1) After cutting off the power supply, perform leak test with the recommended leak detector or density tester (pump suction type) (ensure the equipment is calibrated; leakage ratio of leak detector is 2g/year.)

Note: do not use solvent with chlorine in case causing corrosion of the steel pipe.

- (2) If leakage is found, remove all fire source ensure good ventilation of the area.

#### 5. Check List

No.	Check information	Result	Yes/No
1	Maintenance equipment is complete		
2	Persons in the maintenance area turn off the mobile phone.		
3	Power supply of tools is 2m away.		
4	Density tester can be used.		
5	Other tools are normal.		
6	Maintenance staffs are qualified.		
7	The spare parts are provided by the manufacturer and qualified.		
8	The air conditioner needed to be serviced is under safe state.		
9	The wire of power socket is reliably connected.		
10	There is natural ventilation in maintenance area.		
11	There is no operating electric appliance or naked flame within 2m of Maintenance area.		



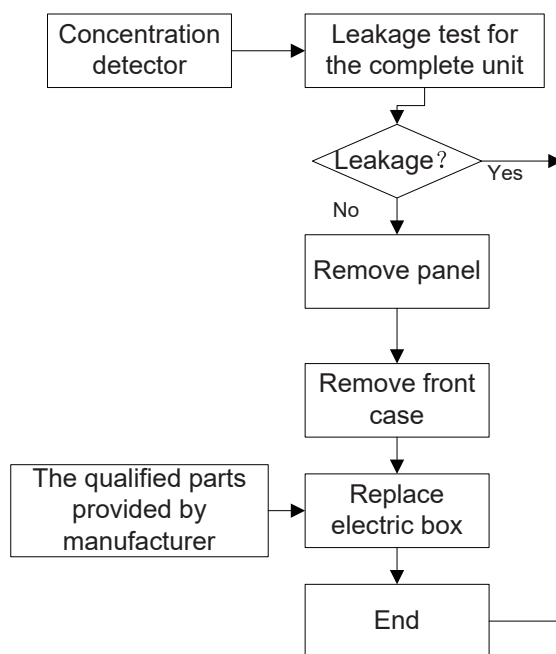
## 10.3 Maintenance Cautions

If it is necessary to replace components, all the components used shall be made by manufacturer. Otherwise, the supplier shall not bear the responsibility.

### 1.Maintenance of Electrical Parts

- (1) Replace the power cord and connecting wire with that of the same specification.
- (2) When inspecting the circuit with power on, check if there is electric leakage for the metal component such as evaporator or condenser. During inspection, do not touch the circuit so as to prevent electric shock.
- (3) When inspecting the capacitor, ensure that the maintenance area is well ventilated. After conforming there is no refrigeration leakage, discharge electricity of capacitor.
- (4) Before replacing the component, cut of the power supply of the air conditioner.
- (5) Cut off the power before disconnecting and connecting the wire. Disconnect the live wire first and then ground wire.
- (6) During maintenance, do not remove the protective component. Use the component of same supplier and specification.
- (7) When servicing the hermetic parts, cut of the power of the air conditioner before opening the sealing cover. If it is necessary to use power supply, perform leak test to prevent potential danger.
- (8) Do not replace the case which may affect the protective grade.
- (9) Ensure that the sealing material is not degraded and that it can prevent entry of flammable gas. The parts used for replacement must reach the requirement of the supplier.

#### (1).Replace electric box



### 2.Maintenance of Refrigeration System

Before the maintenance, check whether there is any leakage or blockage in the refrigeration system. If yes, it is forbidden to conduct the maintenance. The unit should be recycled and disposed according to local regulations.





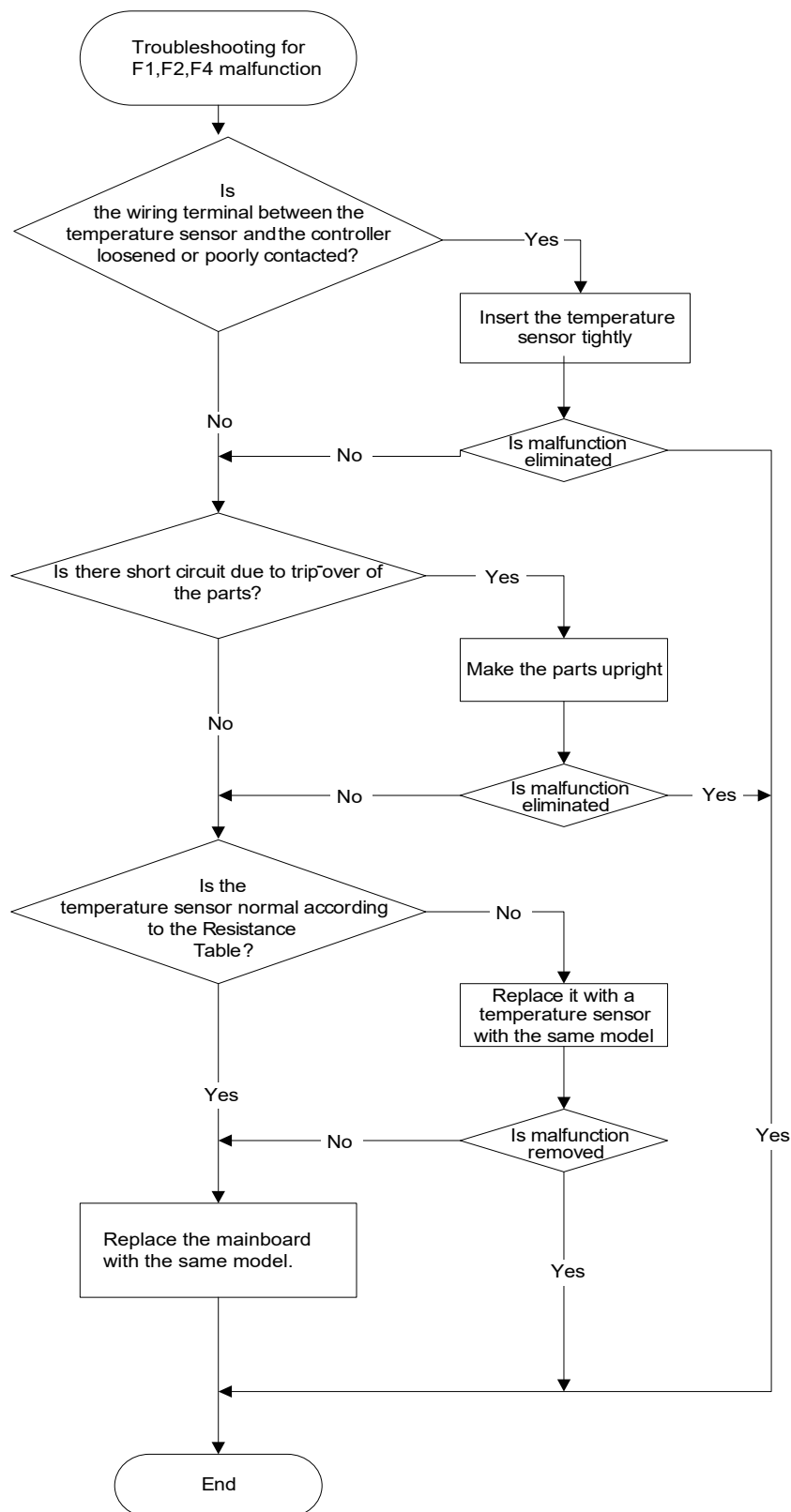
## 10.4 Error Code

NO.	Malfunction Name	Display Method of Indoor Unit	A/C Status	Possible Causes
		Error Code		
1	Indoor ambient temperature sensor is open/short-circuited	F1	Compressor and motor stop operation. When the fan operates for 2mins, the complete unit will be turned off;	1. The wiring terminal between indoor ambient temperature sensor and main board is loosened or poorly contacted.
				2. There's short circuit due to trip-over of the parts on main board.
				3. Indoor ambient temperature sensor is damaged (Please check it by referring to the resistance table for temperature sensor).
				4. Main board is damaged.
2	Indoor evaporator temperature sensor is open/short-circuited	F2	Compressor and motor stop operation. When the fan operates for 2mins, the complete unit will be turned off;	1. The wiring terminal between indoor evaporator temperature sensor and main board is loosened or poorly contacted.
				2. There's short circuit due to the trip-over of the parts on main board.
				3. Indoor evaporator temperature sensor is damaged (Please check it by referring to the resistance table for temperature sensor).
				4. Main board is damaged.
3	Outdoor condenser temperature sensor is open/short-circuited	F4	Compressor and motor stop operation. When the fan operates for 2mins, the complete unit will be turned off;	1. The wiring terminal between outdoor condenser temperature sensor and main board is loosened or poorly contacted.
				2. There's short circuit due to the trip-over of the parts on main board.
				3. Outdoor condenser temperature sensor is damaged (Please check it by referring to the resistance table for temperature sensor).
				4. Main board is damaged.
4	Insufficient Refrigerant protection	F0	Indoor and outdoor fan keeps on running, other loads stop operation	1. Heat exchangers are too dirty or the air inlet/outlet is blocked. 2. Compressor doesn't work normally. Strange noise or leakage occurs. Temperature of the shell is too high. 3. System is blocked inside (dirt block, ice block, oil block, Y-valve not fully open). 4. The refrigerant is leaking.
5	Water over-flow protection	H8	Compressor and motor stop operation. When the fan operates for 2mins, the complete unit will be turned off;	During cooling or drying operation, condensate water will flow into chassis. If it's detected that water inside water chassis is full for 3s successively, it comes into water over-flow protection. Buzzer will give out 8 sounds and dual-8 nixie tube displays error code "H8".
6	Overload protection for compressor	H3	The compressor stops operation. Indoor fan operates at current fan speed and the outdoor fan operates at low fan speed;	1. Heat exchangers are too dirty or the air inlet/outlet is blocked. 2. The fan operates abnormally; fan speed is too low or the fan doesn't run. 3. Compressor doesn't work normally. Strange noise or leakage occurs. Temperature of the shell is too high. 4. System is blocked inside (dirt block, ice block, oil block, Y-valve not fully open). 5. Draw-water motor Can't operate normally. 6. Water outlet hasn't been blocked well by rubber cork. 7. The refrigerant is leaking and causes overheating protection to compressor.

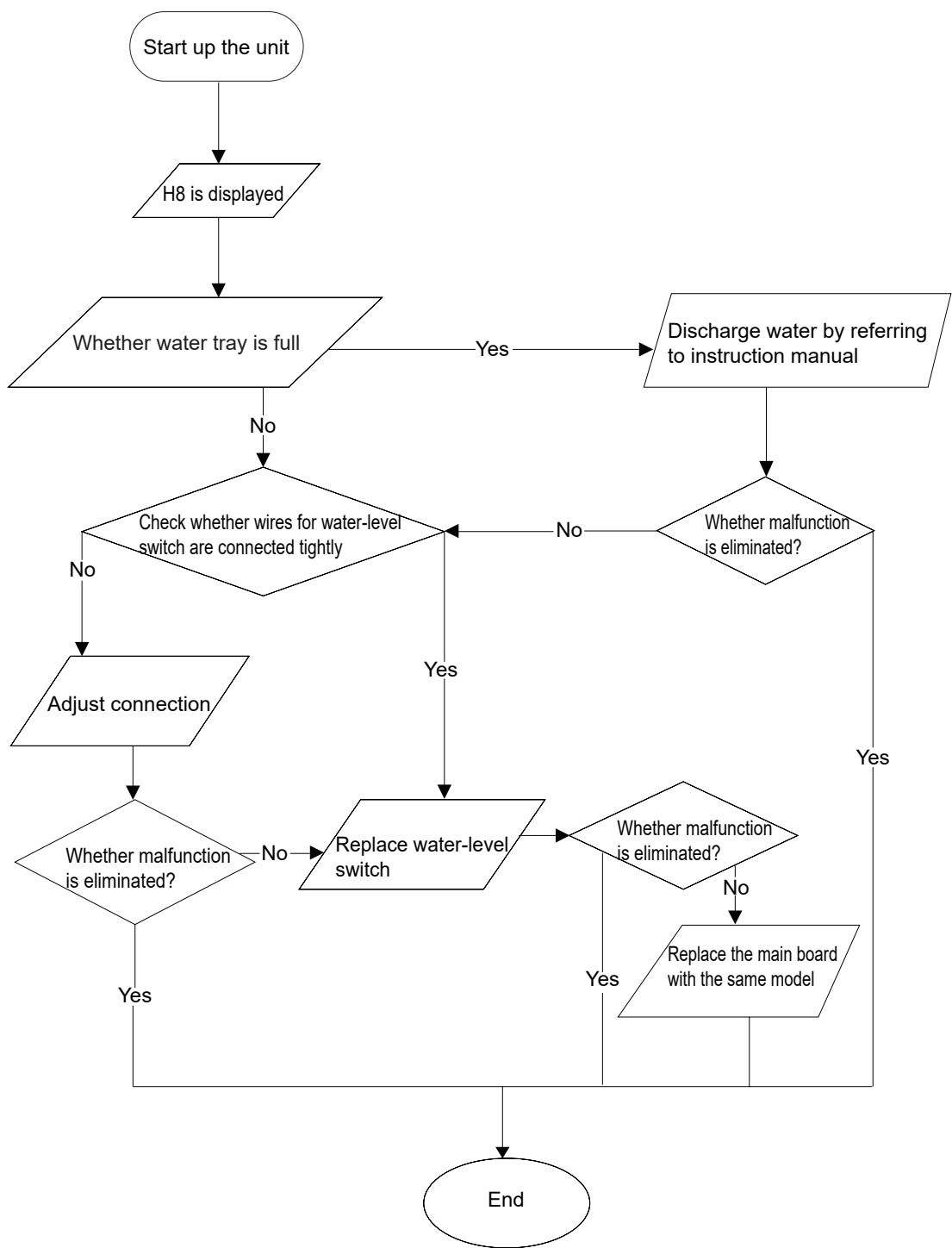
NO.	Malfunction Name	Display Method of Indoor Unit	A/C Status	Possible Causes
		Error Code		
7	Overload malfunction	E8	Indoor and outdoor fan keeps on running, other loads stop operation	1. The environment is formidable. 2. Heat exchangers are too dirty or the air inlet/outlet is blocked. 3. Fan motor is not working Abnormal fan speed; fan speed is too low or the fan doesn't run. 4. Compressor doesn't work normally. Strange noise or leakage occurs. Temperature of the shell is too high. 5. System is blocked inside (dirt block, ice block, oil block, Y-valve not fully open). 6. Temperature sensor of main board Can't detect correctly.

## 10.5 Malfunction Detection Flowchart

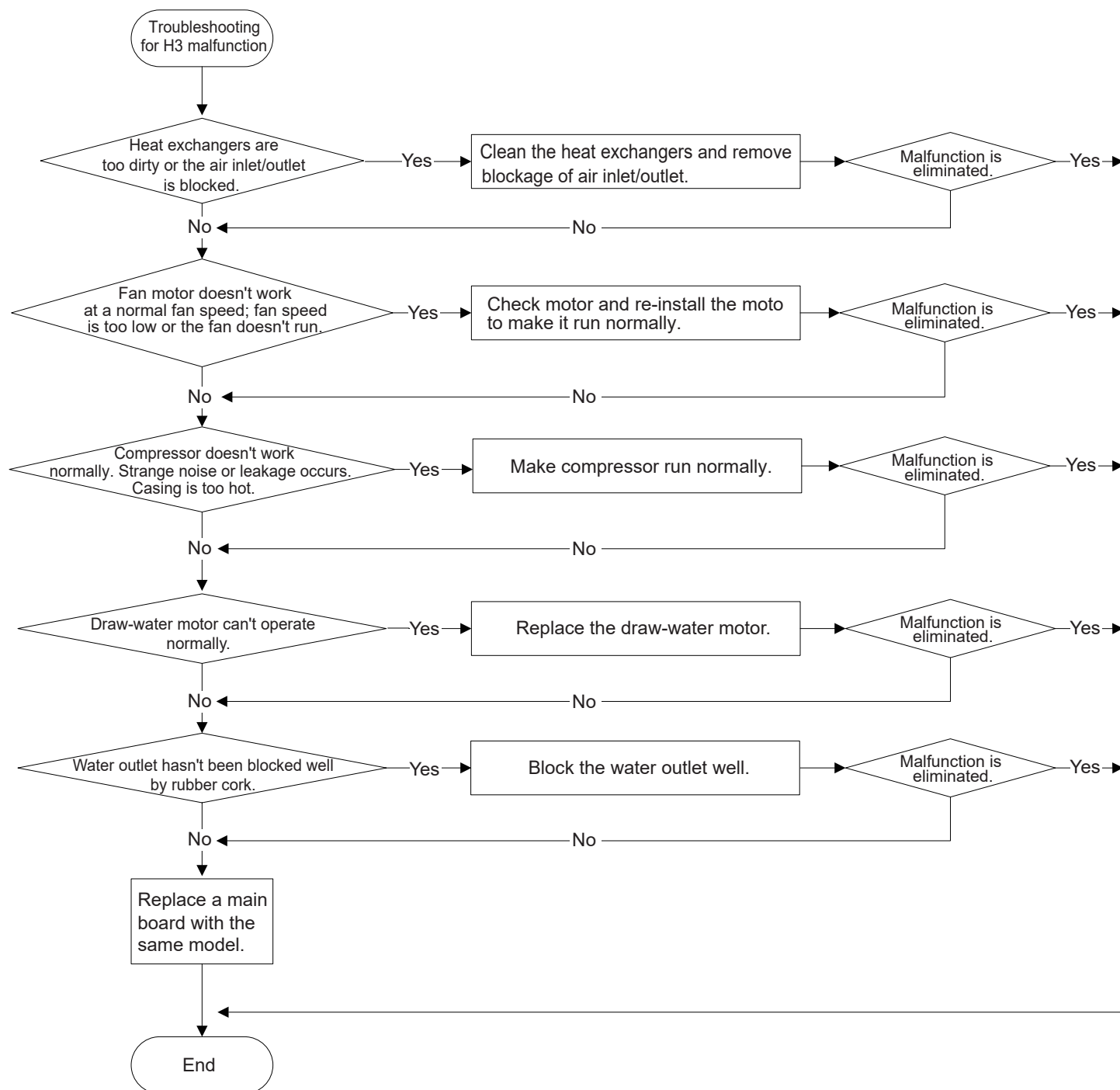
### (1) Malfunction of temperature sensor F1, F2, F4



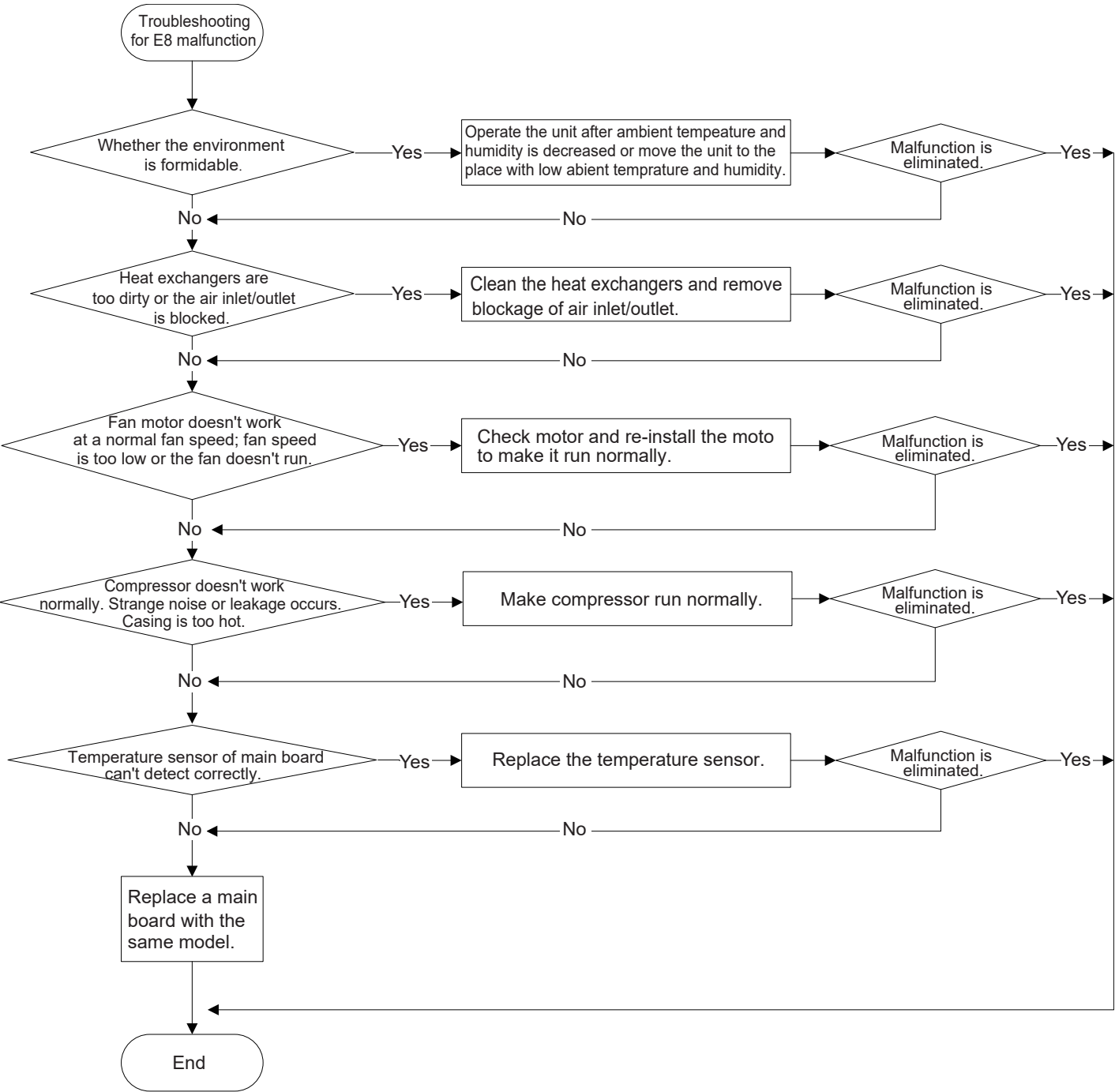
(2) Bucket full protection H8



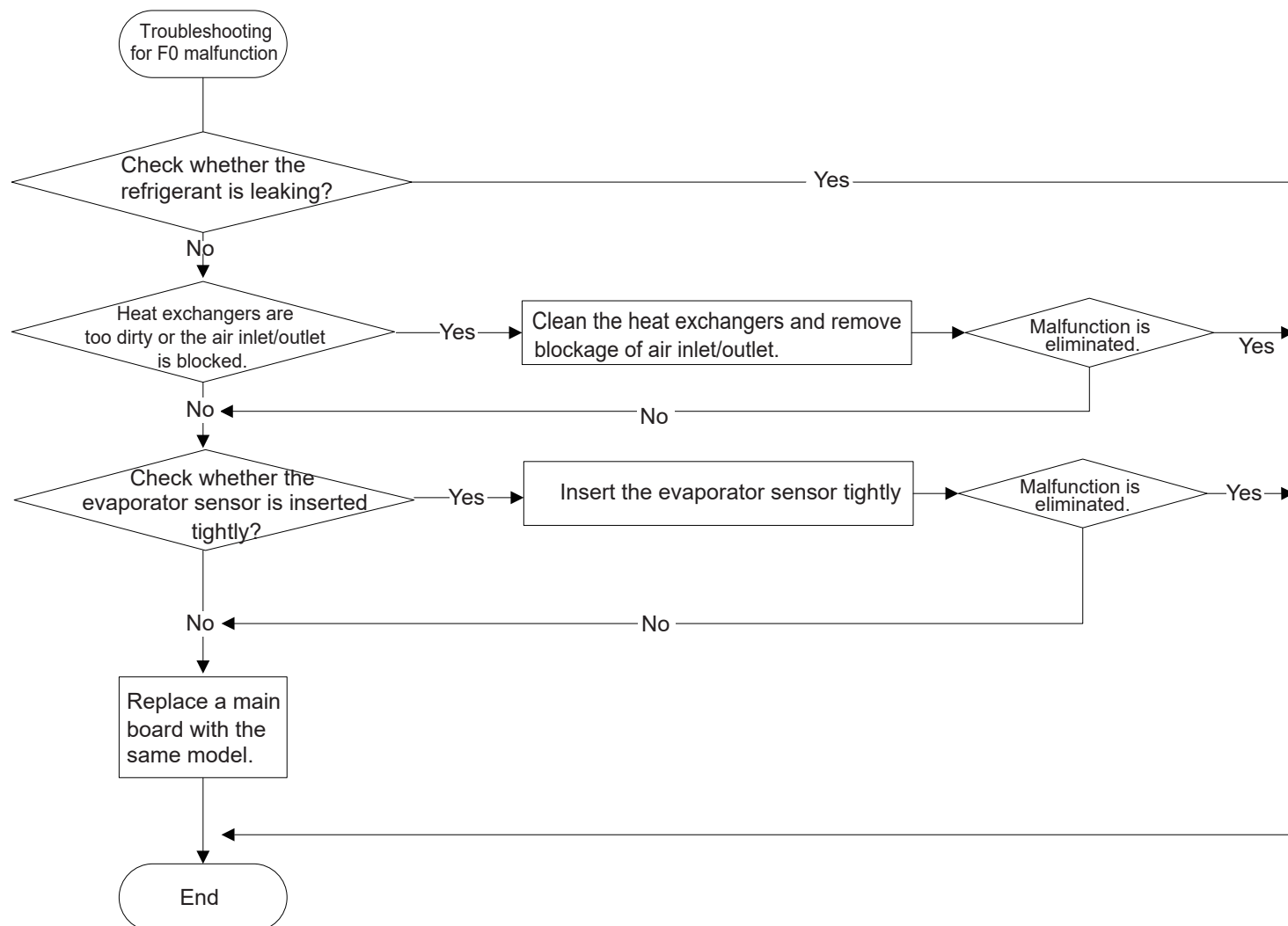
## (3) Malfunction of Overload protection for compressor H3



(4) Overload malfunction E8



## (5) Malfunction of Insufficient Refrigerant protection F0





## 10.6 Maintenance Method for Common Malfunction

### 1. Air Conditioner Can't be Started Up

Possible Causes for Malfunction	Distinguish Method (A/C status)	Maintenance Method
No power supply; power plug hasn't been inserted tightly and poorly connected; wires haven't been connected well.	Operation indicator is OFF and buzzer won't give out sound.	Check whether there's power supply; Check power plug and wire connection.
Ambient temperature sensor is damaged (no connection, loosen, wires are damaged, resistance value for temperature sensor is abnormal).	After energization, the unit will give out a sound, while it can't be started up after pressing ON/OFF button.	Check wire connection of temperature sensor or replace temperature sensor.
Electric leakage for air conditioner	After energization, room circuit breaker trips off at once.	Make sure the air conditioner is grounded reliably. Make sure wires of air conditioner are connected correctly. Check the wiring inside air conditioner. Check whether the insulation layer of power cord is damaged; if yes, place the power cord.
Model selection for air switch is improper	After energization, air switch trips off.	Select proper air switch.
Malfunction of remote controller	After energization, operation indicator is bright, while no display on remote controller or buttons have no action.	Replace batteries for remote controller. Repair or replace remote controller.
Water inside water chassis is full	Dual8 nixie tube displays H8 and buzzer gives out 8 sounds (water over-flow protection).	Discharge condensate water.
Malfunction of water-level switch		Check water-level switch and connection (refer to detection flow chart 3).

### 2. Poor Cooling (Heating) for Air Conditioner

Possible Causes	Discriminating Method (Air conditioner Status)	Troubleshooting
Set temperature is improper	Observe the set temperature on remote controller	Adjust the set temperature.
Fan speed is set too slow	Small fan blow at air outlet	Set the fan speed at high or medium.
Filter unit is blocked	Check the filter to see whether it's blocked by sundries	Clean the filter.
Refrigerant is leaking	Discharged air temperature during cooling is higher than normal discharged wind temperature; Discharged air temperature during heating is lower than normal discharged wind temperature; Unit pressure is much lower than regulated range	Please contact the after-sales service person.
Evaporator is frosted	Has set COOL (DRY) mode, but there's no cool fan	The system is defrosting. Resume operation after defrosting is finished.
Malfunction of capillary	Discharged air temperature during cooling is higher than normal discharged wind temperature; Discharged air temperature during heating is lower than normal discharged wind temperature; Unit pressure is much lower than regulated range. If refrigerant isn't leaking, part of capillary is blocked	Replace the capillary.
Malfunction of fan	Fan Can't operate	Refer to point 3 for detailed maintenance method.
Malfunction of compressor	Compressor Can't operate	Refer to point 4 of maintenance method for details.

### 3. Fan Can't Swing

Possible Causes	Discriminating Method (Air conditioner Status)	Troubleshooting
Wrong wire connection, or poor connection	Check the wiring status according to circuit diagram	Connect wires according to wiring diagram to make sure all wiring terminals are connected firmly
Fan capacitor is damaged	Use universal meter to measure voltage at both ends of fan capacitor	Replace fan capacitor
Supply voltage is too low or too high	Use universal meter to measure the voltage	You are suggested to equip with voltage regulator
Motor is damaged	Above circumstances are normal, while the fan Can't operate	Repair or replace motor

### 4. Compressor Can't Operate

Possible causes	Discriminating method (air conditioner status)	Troubleshooting
Wrong wire connection, or poor connection	Check the wiring status according to circuit diagram	Connect wires according to wiring diagram to make sure all wiring terminals are connected firmly
Capacity of compressor is damaged	Measure the capacity of fan capacitor with an universal meter and find that the capacity is out of the deviation range indicated on the nameplate of fan capacitor.	Replace the compressor capacitor
Power voltage is a little low or high	Use universal meter to measure the power supply voltage. The voltage is a little high or low	Suggest to equip with voltage regulator
Coil of compressor is burnt out	Use universal meter to measure the resistance between compressor terminals and its 0	Repair or replace compressor
Cylinder of compressor is blocked	Compressor Can't operate	Repair or replace compressor


### 5. Unit hasn't stop operation after bucket full or bucket full protection occurs frequently

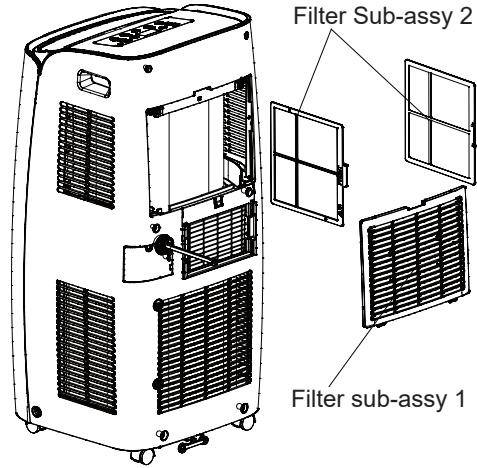
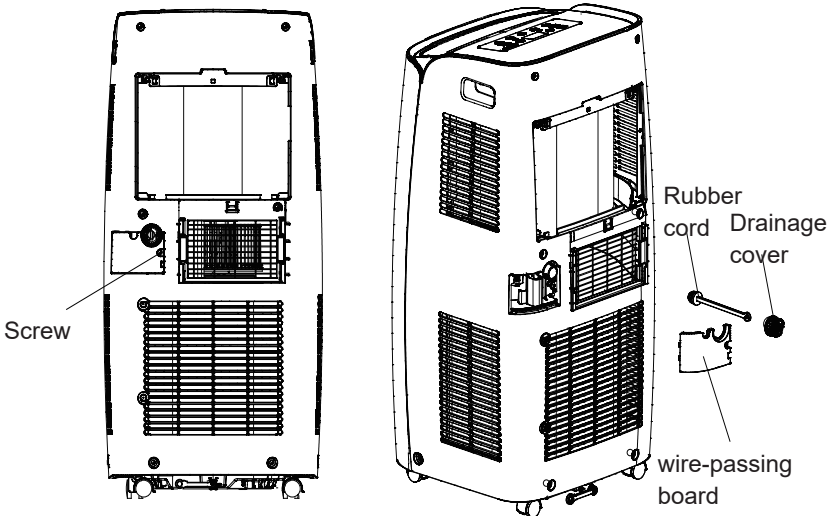
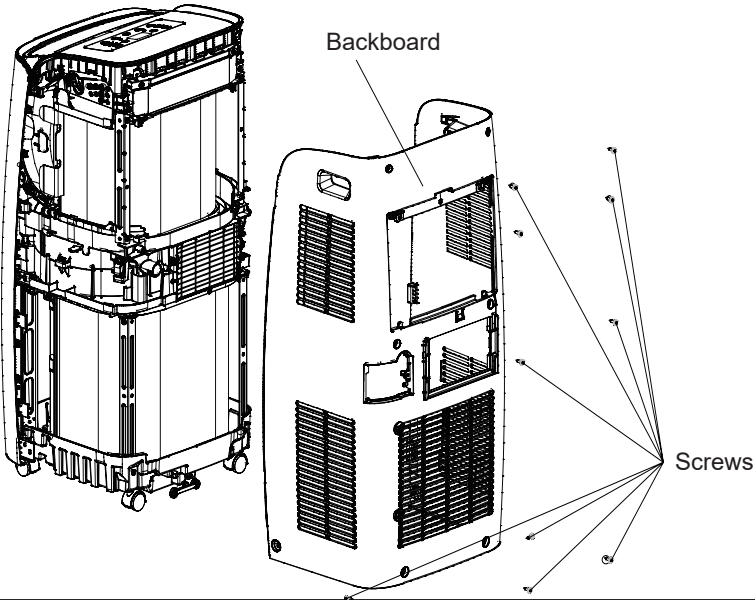
Possible causes	Discriminating method (air conditioner status)	Troubleshooting
Water-level switch is open-circuited	The unit hasn't stop operation when water is full and there's water leakage	Check and repair the water-level switch
Draw water motor is damaged	Water over-flow protection occurs frequently and H8 is displayed	Replace draw water motor

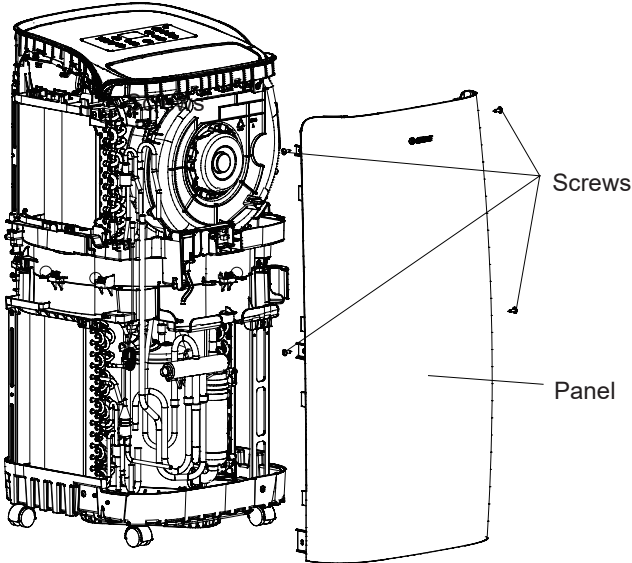
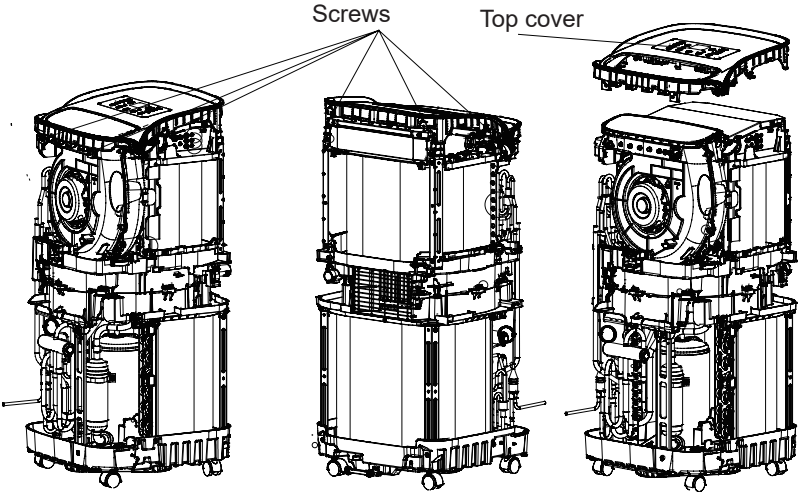
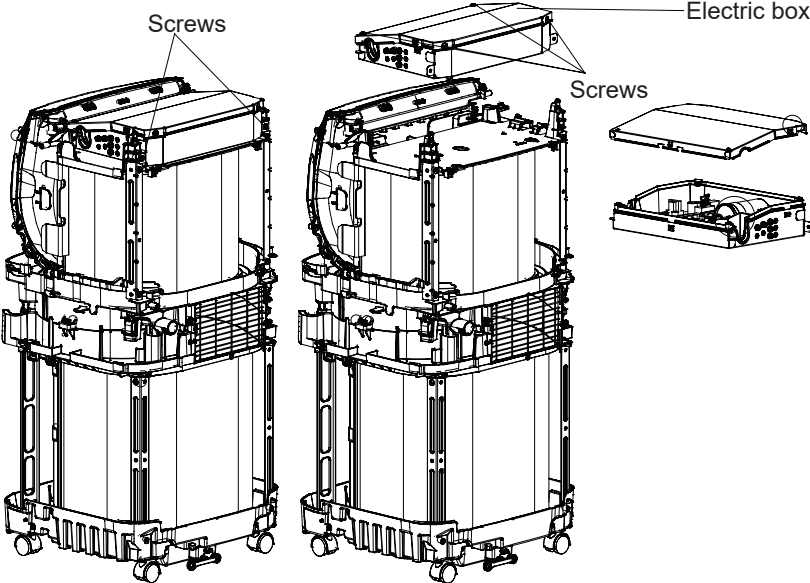
### 6. Abnormal Sound and Vibration

Possible causes	Discriminating method (air conditioner status)	Troubleshooting
When turn on or turn off the unit, the panel and other parts will expand and there's abnormal sound	There's the sound of "PAPA"	Normal phenomenon. Abnormal sound will disappear after a few minutes.
When turn on or turn off the unit, there's abnormal sound due to flow of refrigerant inside air conditioner	Water-running sound can be heard	Normal phenomenon. Abnormal sound will disappear after a few minutes.
There're foreign objects inside air conditioner or parts are contacting with each other	Abnormal sound	Take out foreign objects. Adjust the position of parts. Stick damping plaster between contacting parts.
Abnormal shake of compressor	Outdoor unit gives out abnormal sound	Adjust the support foot mat of compressor, tighten the bolts.
Abnormal sound inside the compressor	Abnormal sound inside the compressor	If add too much refrigerant during maintenance, please reduce refrigerant properly. Replace compressor for other circumstances.

# 11. Removal Procedure

 **Prohibit disassembling and maintaining the refrigeration system pipeline and parts (include evaporator, condenser, compressor, capillary, 4-way valve, etc.)**

Step	Procedure	
1.Remove filter sub-assy	<div><div>Remove filter sub-assy 1 and filter sub-assy 2.</div><div><p>Filter Sub-assy 2</p><p>Filter sub-assy 1</p></div></div>	
2. Remove rubber cord and drainage cover wire-passing board	<div><div>Remove one screw, and then twist off the drainage cover and rubber cord. Finnaly, take out the wire-passing board.</div><div><p>Screw</p><p>Rubber cord</p><p>Drainage cover</p><p>wire-passing board</p></div></div>	
3.Remove backboard	<div><div>Remove 10 screws on the backboard and then take out the backboard.</div><div><p>Backboard</p><p>Screws</p></div></div>	

Step	Procedure
4.Remove panel	
Remove 4 screws on the panel and then take out the panel.	 <p>Screws</p> <p>Panel</p>
5.Remove top cover	
Remove 6 screws used for fixing the top cover and then take out the top cover.	 <p>Screws</p> <p>Top cover</p>
6.Remove electric box	
Remove 4 screws on the electric box and then open the electric box.	 <p>Screws</p> <p>Electric box</p> <p>Screws</p>

## Appendix 1: Reference Sheet of Celsius and Fahrenheit

### Set 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

Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius (°C)	Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius (°C)	Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius (°C)
32/33	32	0	55/56	55.4	13	79/80	78.8	26
34/35	33.8	1	57/58	57.2	14	81	80.6	27
36	35.6	2	59/60	59	15	82/83	82.4	28
37/38	37.4	3	61/62	60.8	16	84/85	84.2	29
39/40	39.2	4	63	62.6	17	86/87	86	30
41/42	41	5	64/65	64.4	18	88/89	87.8	31
43/44	42.8	6	66/67	66.2	19	90	89.6	32
45	44.6	7	68/69	68	20	91/92	91.4	33
46/47	46.4	8	70/71	69.8	21	93/94	93.2	34
48/49	48.2	9	72	71.6	22	95/96	95	35
50/51	50	10	73/74	73.4	23	97/98	96.8	36
52/53	51.8	11	75/76	75.2	24	99	98.6	37
54	53.6	12	77/78	77	25			

## Appendix 2: List of Resistance for Temperature Sensor

Resistance table of temperature sensor (15K)

Temp(°C)	Resistance(kΩ)		Temp(°C)	Resistance(kΩ)		Temp(°C)	Resistance(kΩ)		Temp(°C)	Resistance(kΩ)
-19	138.1		20	18.75		59	3.848		98	1.071
-18	128.6		21	17.93		60	3.711		99	1.039
-17	121.6		22	17.14		61	3.579		100	1.009
-16	115		23	16.39		62	3.454		101	0.98
-15	108.7		24	15.68		63	3.333		102	0.952
-14	102.9		25	15		64	3.217		103	0.925
-13	97.4		26	14.36		65	3.105		104	0.898
-12	92.22		27	13.74		66	2.998		105	0.873
-11	87.35		28	13.16		67	2.896		106	0.848
-10	82.75		29	12.6		68	2.797		107	0.825
-9	78.43		30	12.07		69	2.702		108	0.802
-8	74.35		31	11.57		70	2.611		109	0.779
-7	70.5		32	11.09		71	2.523		110	0.758
-6	66.88		33	10.63		72	2.439		111	0.737
-5	63.46		34	10.2		73	2.358		112	0.717
-4	60.23		35	9.779		74	2.28		113	0.697
-3	57.18		36	9.382		75	2.206		114	0.678
-2	54.31		37	9.003		76	2.133		115	0.66
-1	51.59		38	8.642		77	2.064		116	0.642
0	49.02		39	8.297		78	1.997		117	0.625
1	46.6		40	7.967		79	1.933		118	0.608
2	44.31		41	7.653		80	1.871		119	0.592
3	42.14		42	7.352		81	1.811		120	0.577
4	40.09		43	7.065		82	1.754		121	0.561
5	38.15		44	6.791		83	1.699		122	0.547
6	36.32		45	6.529		84	1.645		123	0.532
7	34.58		46	6.278		85	1.594		124	0.519
8	32.94		47	6.038		86	1.544		125	0.505
9	31.38		48	5.809		87	1.497		126	0.492
10	29.9		49	5.589		88	1.451		127	0.48
11	28.51		50	5.379		89	1.408		128	0.467
12	27.18		51	5.197		90	1.363		129	0.456
13	25.92		52	4.986		91	1.322		130	0.444
14	24.73		53	4.802		92	1.282		131	0.433
15	23.6		54	4.625		93	1.244		132	0.422
16	22.53		55	4.456		94	1.207		133	0.412
17	21.51		56	4.294		95	1.171		134	0.401
18	20.54		57	4.139		96	1.136		135	0.391
19	19.63		58	3.99		97	1.103		136	0.382

Temp(°C)	Resistance(kΩ)		Temp(°C)	Resistance(kΩ)		Temp(°C)	Resistance(kΩ)		Temp(°C)	Resistance(kΩ)
-19	181.4		20	25.01		59	5.13		98	1.427
-18	171.4		21	23.9		60	4.948		99	1.386
-17	162.1		22	22.85		61	4.773		100	1.346
-16	153.3		23	21.85		62	4.605		101	1.307
-15	145		24	20.9		63	4.443		102	1.269
-14	137.2		25	20		64	4.289		103	1.233
-13	129.9		26	19.14		65	4.14		104	1.198
-12	123		27	18.13		66	3.998		105	1.164
-11	116.5		28	17.55		67	3.861		106	1.131
-10	110.3		29	16.8		68	3.729		107	1.099
-9	104.6		30	16.1		69	3.603		108	1.069
-8	99.13		31	15.43		70	3.481		109	1.039
-7	94		32	14.79		71	3.364		110	1.01
-6	89.17		33	14.18		72	3.252		111	0.983
-5	84.61		34	13.59		73	3.144		112	0.956
-4	80.31		35	13.04		74	3.04		113	0.93
-3	76.24		36	12.51		75	2.94		114	0.904
-2	72.41		37	12		76	2.844		115	0.88
-1	68.79		38	11.52		77	2.752		116	0.856
0	65.37		39	11.06		78	2.663		117	0.833
1	62.13		40	10.62		79	2.577		118	0.811
2	59.08		41	10.2		80	2.495		119	0.77
3	56.19		42	9.803		81	2.415		120	0.769
4	53.46		43	9.42		82	2.339		121	0.746
5	50.87		44	9.054		83	2.265		122	0.729
6	48.42		45	8.705		84	2.194		123	0.71
7	46.11		46	8.37		85	2.125		124	0.692
8	43.92		47	8.051		86	2.059		125	0.674
9	41.84		48	7.745		87	1.996		126	0.658
10	39.87		49	7.453		88	1.934		127	0.64
11	38.01		50	7.173		89	1.875		128	0.623
12	36.24		51	6.905		90	1.818		129	0.607
13	34.57		52	6.648		91	1.736		130	0.592
14	32.98		53	6.403		92	1.71		131	0.577
15	31.47		54	6.167		93	1.658		132	0.563
16	30.04		55	5.942		94	1.609		133	0.549
17	28.68		56	5.726		95	1.561		134	0.535
18	27.39		57	5.519		96	1.515		135	0.521
19	26.17		58	5.32		97	1.47		136	0.509

Resistance table of temperature sensor (50K)

Temp(°C)	Resistance(kΩ)		Temp(°C)	Resistance(kΩ)		Temp(°C)	Resistance(kΩ)		Temp(°C)	Resistance(kΩ)
-29	853.5		10	98		49	18.34		88	4.75
-28	799.8		11	93.42		50	17.65		89	4.61
-27	750		12	89.07		51	16.99		90	4.47
-26	703.8		13	84.95		52	16.36		91	4.33
-25	660.8		14	81.05		53	15.75		92	4.20
-24	620.8		15	77.35		54	15.17		93	4.08
-23	580.6		16	73.83		55	14.62		94	3.96
-22	548.9		17	70.5		56	14.09		95	3.84
-21	516.6		18	67.34		57	13.58		96	3.73
-20	486.5		19	64.33		58	13.09		97	3.62
-19	458.3		20	61.48		59	12.62		98	3.51
-18	432		21	58.77		60	12.17		99	3.41
-17	407.4		22	56.19		61	11.74		100	3.32
-16	384.5		23	53.74		62	11.32		101	3.22
-15	362.9		24	51.41		63	10.93		102	3.13
-14	342.8		25	49.19		64	10.54		103	3.04
-13	323.9		26	47.08		65	10.18		104	2.96
-12	306.2		27	45.07		66	9.83		105	2.87
-11	289.6		28	43.16		67	9.49		106	2.79
-10	274		29	41.34		68	9.17		107	2.72
-9	259.3		30	39.61		69	8.85		108	2.64
-8	245.6		31	37.96		70	8.56		109	2.57
-7	232.6		32	36.38		71	8.27		110	2.50
-6	220.5		33	34.88		72	7.99		111	2.43
-5	209		34	33.45		73	7.73		112	2.37
-4	198.3		35	32.09		74	7.47		113	2.30
-3	199.1		36	30.79		75	7.22		114	2.24
-2	178.5		37	29.54		76	7.00		115	2.18
-1	169.5		38	28.36		77	6.76		116	2.12
0	161		39	27.23		78	6.54		117	2.07
1	153		40	26.15		79	6.33		118	2.02
2	145.4		41	25.11		80	6.13		119	1.96
3	138.3		42	24.13		81	5.93		120	1.91
4	131.5		43	23.19		82	5.75		121	1.86
5	125.1		44	22.29		83	5.57		122	1.82
6	119.1		45	21.43		84	5.39		123	1.77
7	113.4		46	20.6		85	5.22		124	1.73
8	108		47	19.81		86	5.06		125	1.68
9	102.8		48	19.06		87	4.90		126	1.64





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