GREE
Change for Life

Service Manual

Models: GWHD(18)NK3JO(DRED)
GWHD(24)NK3JO(DRED)
GWHD(28)NK3JO(DRED)
(Refrigerant:R410A)

GREE ELECTRIC APPLIANCES,INC.OF ZHUHAI

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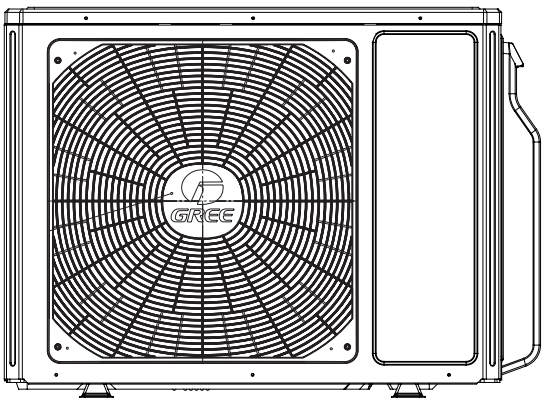
Part Ⅰ : Technical Information

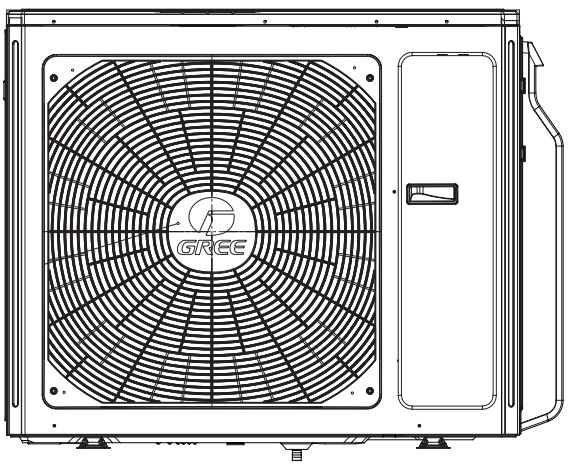
1. Summary

Outdoor Unit

GWHD(18)NK3JO(DRED)



GWHD(24)NK3JO(DRED)
GWHD(28)NK3JO(DRED)



2. Specifications

Model			GWHD(18)NK3JO(DRED)
Product Code			CB228W05900
Power supply	Rated Voltage	V~	220-240
	Rated Frequency	Hz	50
	Phases		1
Cooling capacity(max~min)		W	5400(2850~6500)
Heating capacity(max~min)		W	5650(2400~6650)
Cooling Power Input(max~min)		W	1530
Heating Power Input(max~min)		W	1530
Cooling Current Input		A	6.79
Heating Current Input		A	6.79
Rated Power Input		W	2700
Rated Current		A	11.98
EER		W/W	3.53
COP		W/W	3.69
Outdoor Unit	Compressor Trademark		ZHUHAI LANDA COMPRESSOR CO.,LTD
	Compressor Model		QXA-B141zF030A
	Compressor Refrigerant Oil Type		RB68EP
	Compressor Type		Rotary
	L.R.A	A	/
	Compressor Rated Load Amp (RLA)	A	7.2
	Compressor Power Input	W	1440
	Compressor Thermal Protector		1NT11L-6233
	Throttling Method		Electron expansion valve
	Cooling Operation Ambient Temperature Range	^{O}C	-15~43
	Heating Operation Ambient Temperature Range	^{O}C	-15~24
	Condenser Material		Aluminum Fin-copper Tube
	Condenser Pipe Diameter	mm	Φ7
	Rows-Fin Gap(mm)	mm	2-1.4
	Coil length (l) X height (H) X coil width (L)	mm	851X38.1X660
	Fan Motor Speed (rpm) (H/M/L)	rpm	800
	Output of Fan Motor	W	60
	Fan Motor RLA	A	/
	Fan Motor Capacitor	μF	/
	Air Flow Volume of Outdoor Unit	m^3/h	3200
	Fan Type-Piece		Axial-flow
	Fan Diameter	mm	Φ520
	Defrosting Method		Automatic Defrosting
	Climate Type		T1
	Isolation		I
	Moisture Protection		IP24
	Permissible Excessive Operating Pressure for the Discharge Side	MPa	4.3
	Permissible Excessive Operating Pressure for the Suction Side	MPa	2.5
	Dimension (WXHXD)	mm	963X700X396
	Dimension of Package (LXWXH)	mm	1026X455X735
	Dimension of Package(LXWXH)	mm	1029X458X750
	Net Weight	kg	47
	Gross Weight	kg	51.5
	efrigerant Charge		R410A
	Refrigerant Charge	kg	1.6

Outdoor Unit	Cross-sectional Area of Power Cable Conductor	mm^2	2.50
	Recommended Power Cable(Core)	N	3
	Connection Pipe Connection Method	-	Flare Connection
	Not Additional Gas Connection Pipe Length	m	10(Liquid pipe total length)
	Connection Pipe Gas Additional Charge	g/m	20
	Outer Diameter of Liquid Pipe1(GREE Allocation)(Metric)	mm	Φ6
	Outer Diameter of Liquid Pipe2(GREE Allocation)(Metric)	mm	Φ6
	Outer Diameter of Gas Pipe1(GREE Allocation)(Metric)	mm	Φ9.52
	Outer Diameter of Gas Pipe2(GREE Allocation)(Metric)	mm	Φ9.52
	Connection Pipe Max. Height Distance(indoor and indoor)	m	5
	Max. equivalent connection pipe length(outdoor to last indoor)	m	10
	Connection Pipe Max. Length Distance(total lenght)	m	20

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

Model			GWHD(24)NK3JO(DRED)
Product Code			CB228W05800
Power supply	Rated Voltage	V~	220-240
	Rated Frequency	Hz	50
	Phases		1
Cooling capacity(max~min)		W	7300(4500~10000)
Heating capacity(max~min)		W	8800(4000~11000)
Cooling Power Input(max~min)		W	2180
Heating Power Input(max~min)		W	2500
Cooling Current Input		A	9.67
Heating Current Input		A	11.09
Rated Power Input		W	4550
Rated Current		A	20.19
SEER		W/W	3.35
SCOP		W/W	3.52
Outdoor Unit	Compressor Trademark		ZHUHAI LANDA COMPRESSOR CO.,LTD
	Compressor Model		QXAS-D23zX090B
	Compressor Refrigerant Oil Type		RB68EP
	Compressor Type		Rotary
	L.R.A	A	/
	Compressor Rated Load Amp (RLA)	A	11.5
	Compressor Power Input	W	2550
	Compressor Thermal Protector		1NT11L-6233
	Throttling Method		Electron expansion valve
	Cooling Operation Ambient Temperature Range	^{O}C	-15~43
	Heating Operation Ambient Temperature Range	^{O}C	-15~24
	Condenser Material		Aluminum Fin-copper Tube
	Condenser Pipe Diameter	mm	Φ7
	Rows-Fin Gap(mm)	mm	2-1.4
	Coil length (l) X height (H) X coil width (L)	mm	982.2X38.1X748
	Fan Motor Speed (rpm) (H/M/L)	rpm	710
	Output of Fan Motor	W	90
	Fan Motor RLA	A	/
	Fan Motor Capacitor	μF	/
	Air Flow Volume of Outdoor Unit	m^3/h	4000
	Fan Type-Piece		Axial-flow
	Fan Diameter	mm	Φ550
	Defrosting Method		Automatic Defrosting
	Climate Type		T1
	Isolation		I
	Moisture Protection		IP24
	Permissible Excessive Operating Pressure for the Discharge Side	MPa	4.3
	Permissible Excessive Operating Pressure for the Suction Side	MPa	2.5
	Dimension (WXHXD)	mm	1001X790X427
	Dimension of Package (LXWXH)	mm	1080X485X840
	Dimension of Package(LXWXH)	mm	1083X488X855
	Net Weight	kg	59
	Gross Weight	kg	64
	efrigerant Charge		R410A
	Refrigerant Charge	kg	2.2

Outdoor Unit	Cross-sectional Area of Power Cable Conductor	mm^2	2.50
	Recommended Power Cable(Core)	N	3
	Connection Pipe Connection Method	-	Flare Connection
	Not Additional Gas Connection Pipe Length	m	30(Liquid pipe total length)
	Connection Pipe Gas Additional Charge	g/m	20
	Outer Diameter of Liquid Pipe1(GREE Allocation)(Metric)	mm	Φ6
	Outer Diameter of Liquid Pipe2(GREE Allocation)(Metric)	mm	Φ6
	Outer Diameter of Liquid Pipe3(GREE Allocation)(Metric)	mm	Φ6
	Outer Diameter of Liquid Pipe4(GREE Allocation)(Metric)	mm	/
	Outer Diameter of Gas Pipe1(GREE Allocation)(Metric)	mm	Φ9.52
	Outer Diameter of Gas Pipe2(GREE Allocation)(Metric)	mm	Φ9.52
	Outer Diameter of Gas Pipe3(GREE Allocation)(Metric)	mm	Φ9.52
	Outer Diameter of Gas Pipe4(GREE Allocation)(Metric)	mm	/
	Connection Pipe Max. Height Distance(indoor and indoor)	m	5
	Max. equivalent connection pipe length(outdoor to last indoor)	m	20
	Connection Pipe Max. Length Distance(total lenght)	m	60

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

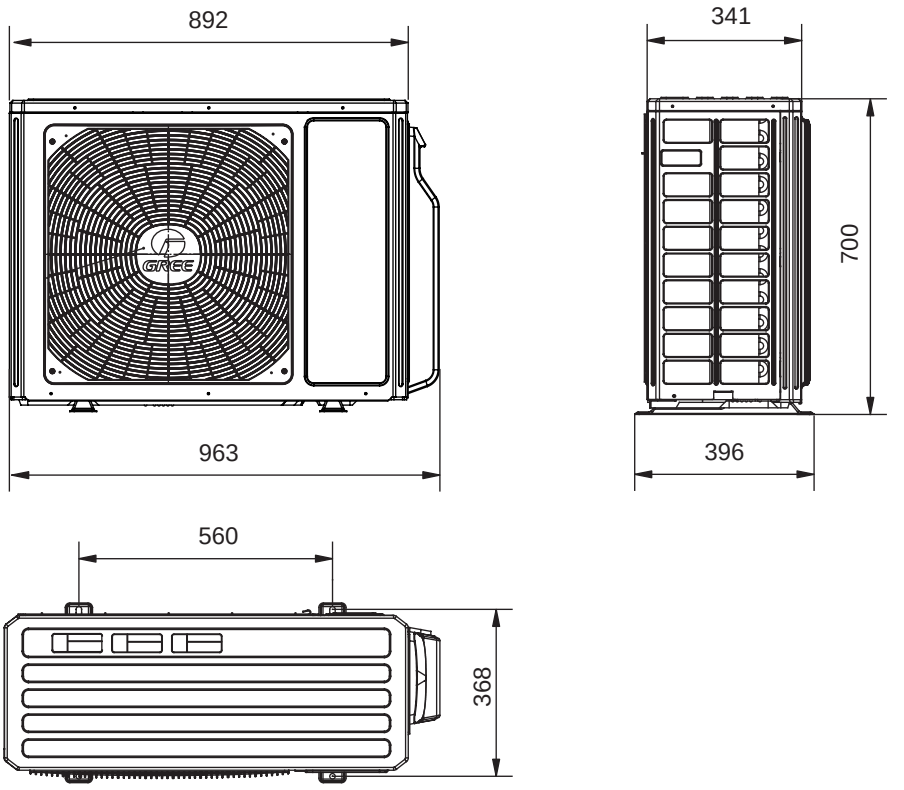
Model			GWHD(28)NK3JO(DRED)
Product Code			CB228W05700
Power supply	Rated Voltage	V~	220-240
	Rated Frequency	Hz	50
	Phases		1
Cooling capacity(max~min)		W	8150(5000~10000)
Heating capacity(max~min)		W	9300(3000~11000)
Cooling Power Input(max~min)		W	2430
Heating Power Input(max~min)		W	2540
Cooling Current Input		A	10.78
Heating Current Input		A	11.27
Rated Power Input		W	4550
Rated Current		A	20.19
SEER		W/W	3.35
SCOP		W/W	3.66
Outdoor Unit	Compressor Trademark		ZHUHAI LANDA COMPRESSOR CO.,LTD
	Compressor Model		QXAS-D23zX090B
	Compressor Refrigerant Oil Type		RB68EP
	Compressor Type		Rotary
	L.R.A	A	/
	Compressor Rated Load Amp (RLA)	A	11.5
	Compressor Power Input	W	2550
	Compressor Thermal Protector		1NT11L-6233
	Throttling Method		Electron expansion valve
	Cooling Operation Ambient Temperature Range	^{O}C	-15~43
	Heating Operation Ambient Temperature Range	^{O}C	-15~24
	Condenser Material		Aluminum Fin-copper Tube
	Condenser Pipe Diameter	mm	Φ7
	Rows-Fin Gap(mm)	mm	2-1.4
	Coil length (l) X height (H) X coil width (L)	mm	982.2X38.1X748
	Fan Motor Speed (rpm) (H/M/L)	rpm	710
	Output of Fan Motor	W	90
	Fan Motor RLA	A	/
	Fan Motor Capacitor	μF	/
	Air Flow Volume of Outdoor Unit	m^3/h	4000
	Fan Type-Piece		Axial-flow
	Fan Diameter	mm	Φ550
	Defrosting Method		Automatic Defrosting
	Climate Type		T1
	Isolation		I
	Moisture Protection		IP24
	Permissible Excessive Operating Pressure for the Discharge Side	MPa	4.3
	Permissible Excessive Operating Pressure for the Suction Side	MPa	2.5
	Dimension (WXHXD)	mm	1001X790X427
	Dimension of Package (LXWXH)	mm	1080X485X840
	Dimension of Package(LXWXH)	mm	1083X488X855
	Net Weight	kg	65
	Gross Weight	kg	70
	efrigerant Charge		R410A
	Refrigerant Charge	kg	2.3

Outdoor Unit	Cross-sectional Area of Power Cable Conductor	mm^2	2.50
	Recommended Power Cable(Core)	N	3
	Connection Pipe Connection Method	-	Flare Connection
	Not Additional Gas Connection Pipe Length	m	40(Liquid pipe total length)
	Connection Pipe Gas Additional Charge	g/m	20
	Outer Diameter of Liquid Pipe1(GREE Allocation)(Metric)	mm	Φ6
	Outer Diameter of Liquid Pipe2(GREE Allocation)(Metric)	mm	Φ6
	Outer Diameter of Liquid Pipe3(GREE Allocation)(Metric)	mm	Φ6
	Outer Diameter of Liquid Pipe4(GREE Allocation)(Metric)	mm	Φ6
	Outer Diameter of Gas Pipe1(GREE Allocation)(Metric)	mm	Φ9.52
	Outer Diameter of Gas Pipe2(GREE Allocation)(Metric)	mm	Φ9.52
	Outer Diameter of Gas Pipe3(GREE Allocation)(Metric)	mm	Φ9.52
	Outer Diameter of Gas Pipe4(GREE Allocation)(Metric)	mm	Φ9.52
	Connection Pipe Max. Height Distance(indoor and indoor)	m	5
	Max. equivalent connection pipe length(outdoor to last indoor)	m	20
	Connection Pipe Max. Length Distance(total lenght)	m	70

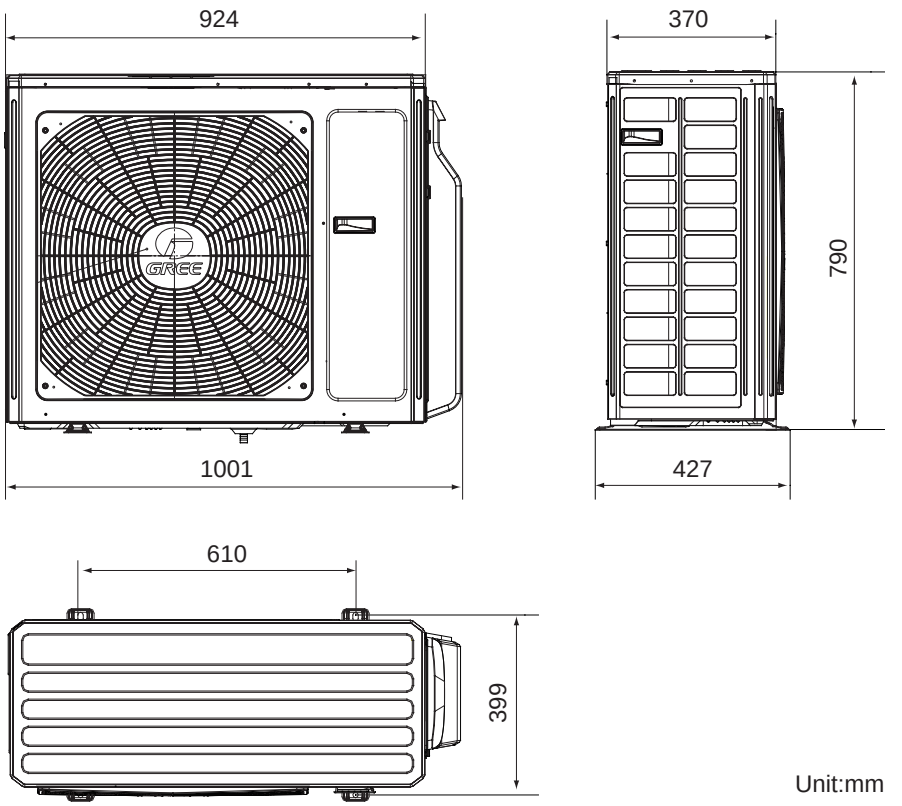
The above data is subject to change without notice. Please refer to the nameplate of the unit.

3. Outline Dimension Diagram

(1)Model:GWHD(18)NK3JO(DRED)

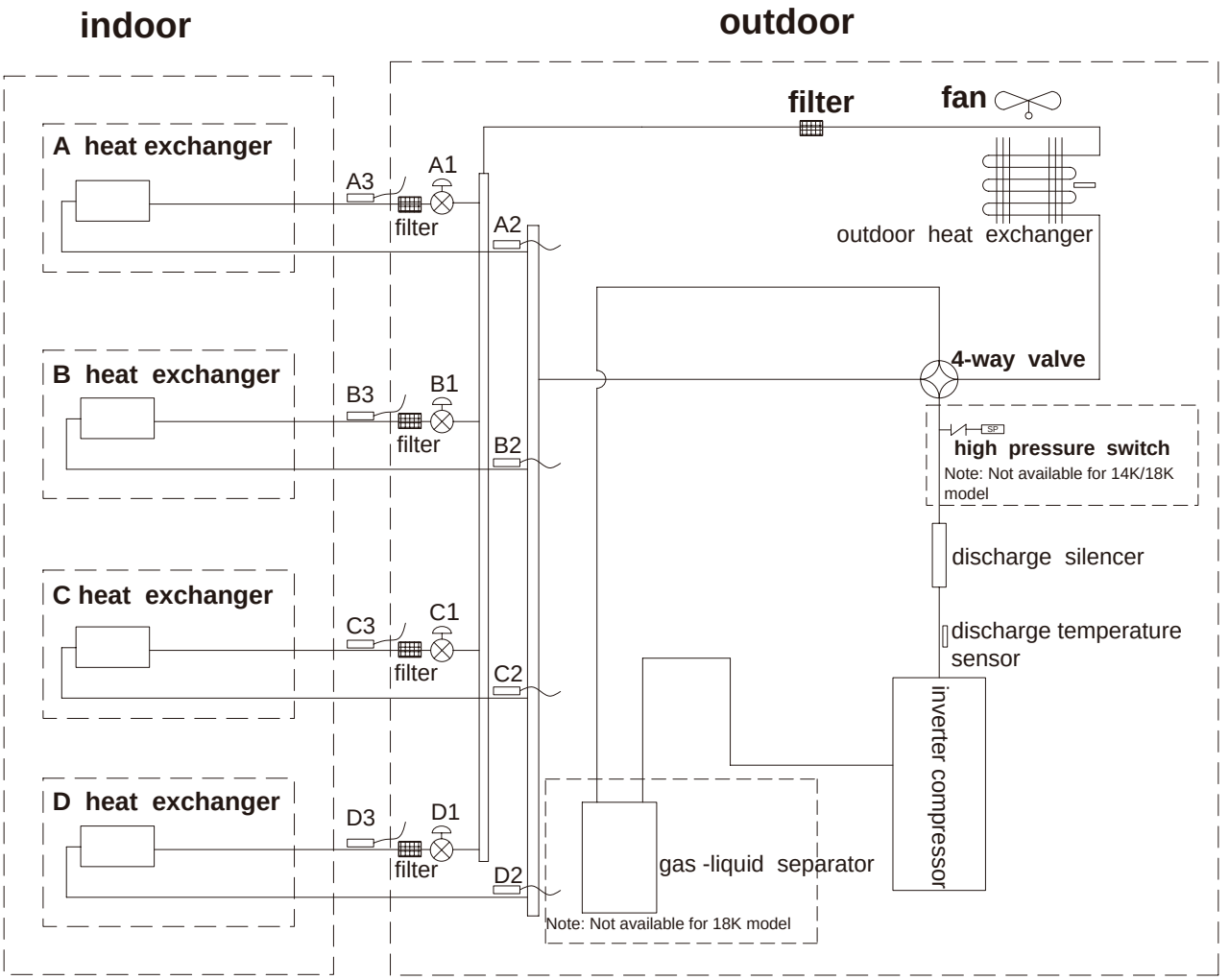


(2)Models:GWHD(24)NK3JO(DRED) GWHD(28)NK3JO(DRED)



Unit:mm

4. Refrigerant System Diagram



A1:A-unit electronic expansion valve B1:B-unit electronic expansion valve
C1:C-unit electronic expansion valve D1:D-unit electronic expansion valve
A2:A-unit gas pipe temperature sensor B2:B-unit gas pipe temperature sensor
C2:C-unit gas pipe temperature sensor D2:D-unit gas pipe temperature sensor
A3:A-unit liquid pipe temperature sensor B3:B-unit liquid pipe temperature sensor
C3:C-unit liquid pipe temperature sensor D3:D-unit liquid pipe temperature sensor

5. Electrical Part

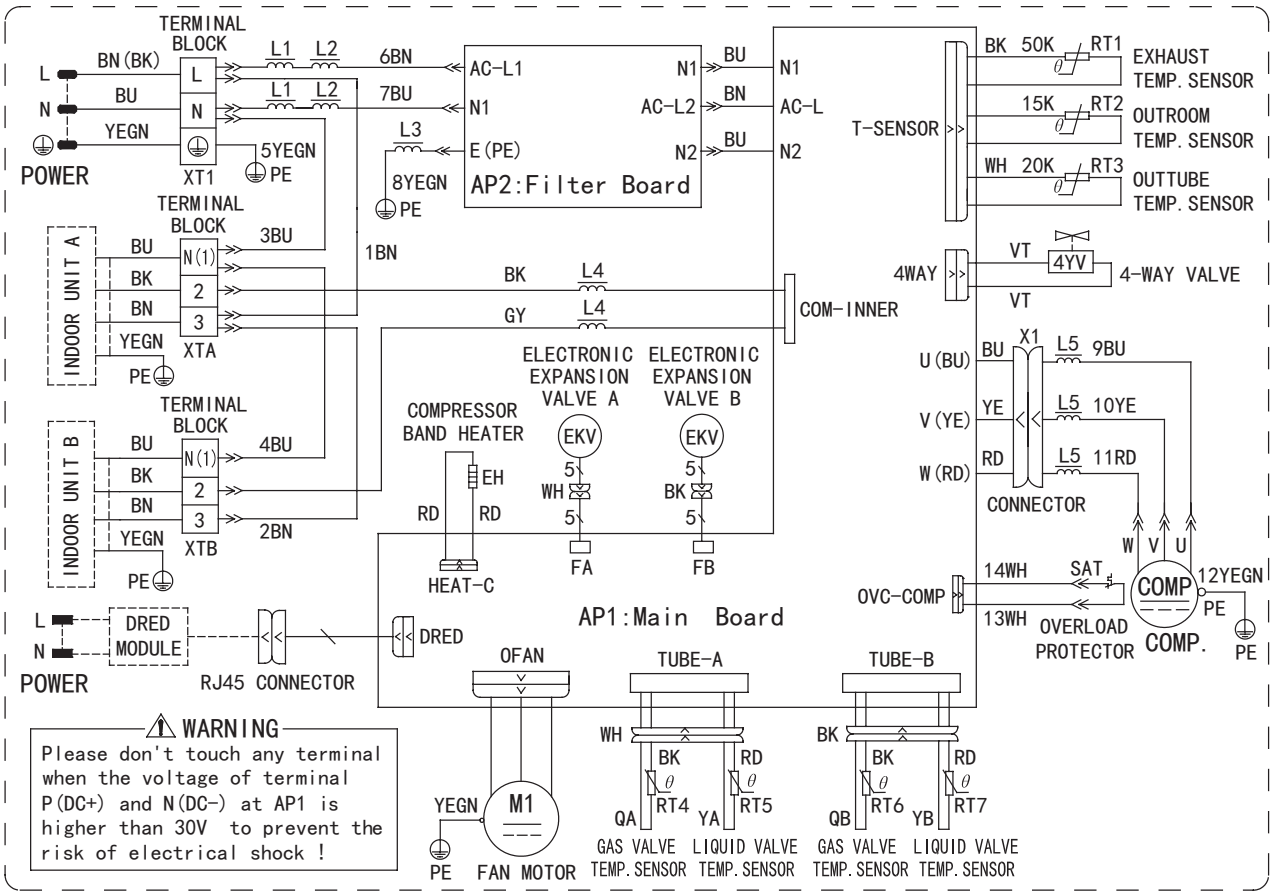
5.1 Wiring Diagram

●Instruction

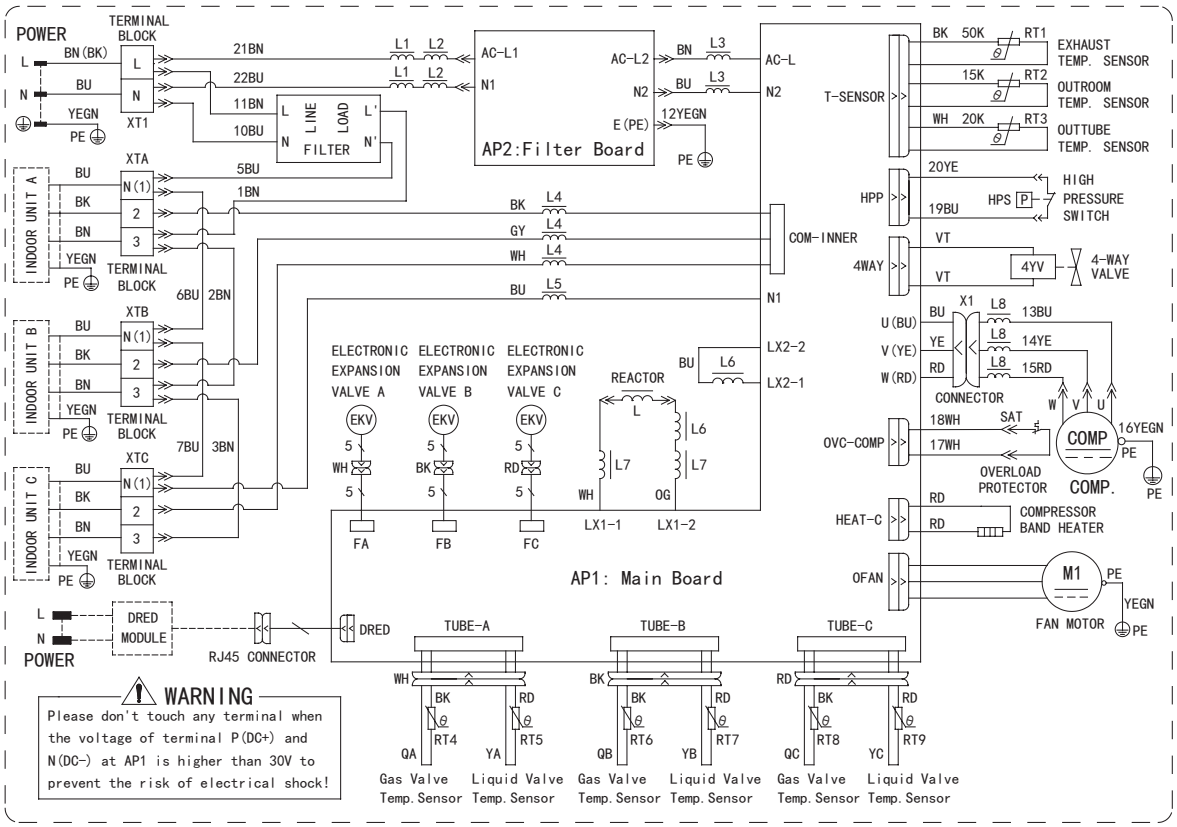
Symbol	Symbol Color	Symbol	Symbol Color	Symbol	Name
WH	White	GN	GREEN	COMP	Compressor
YE	Yellow	BN	Brown	⏚	Grouding wire
RD	Red	BU	Blue		
YEGN	Yellow/Green	BK	Black		
VT	Violet	OG	Orange		

• Outdoor Unit

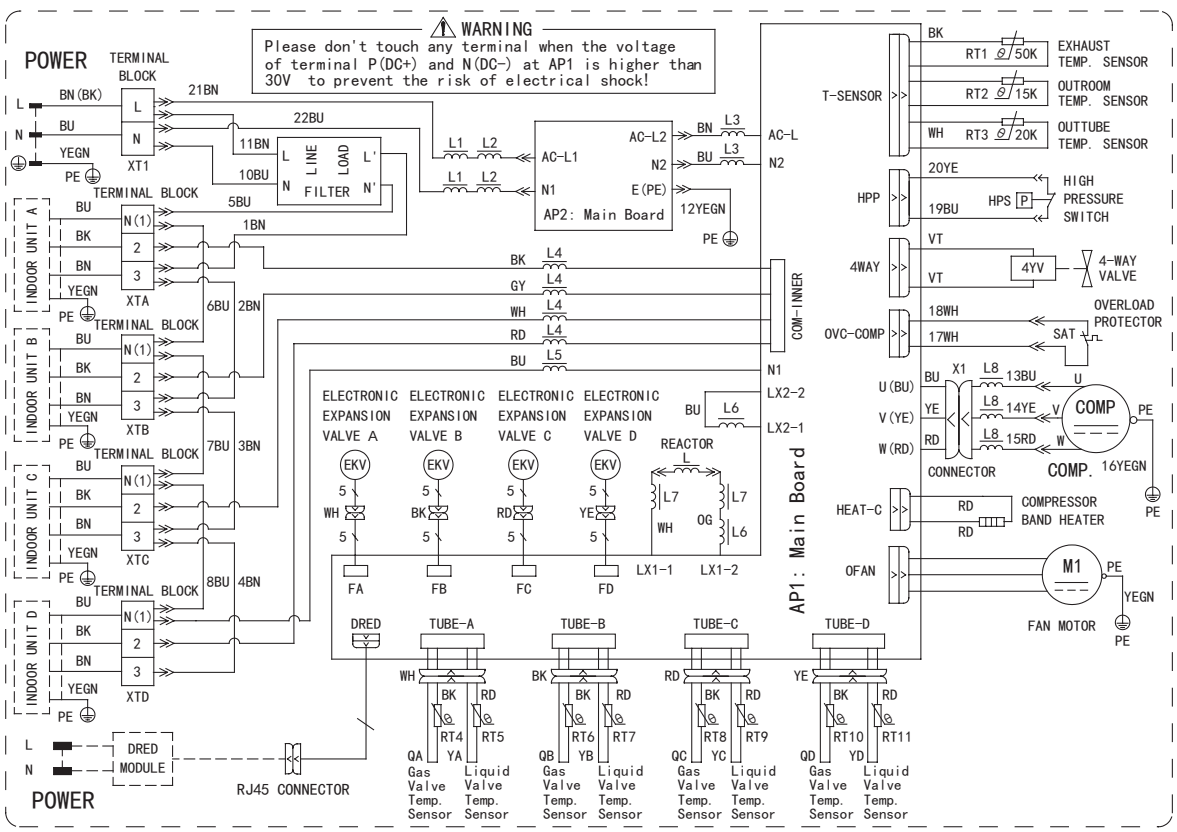
(1)Model:GWHD(18)NK3JO(DRED)



(2)Model:GWHD(24)NK3JO(DRED)



(3)Model:GWHD(28)NK3JO(DRED)

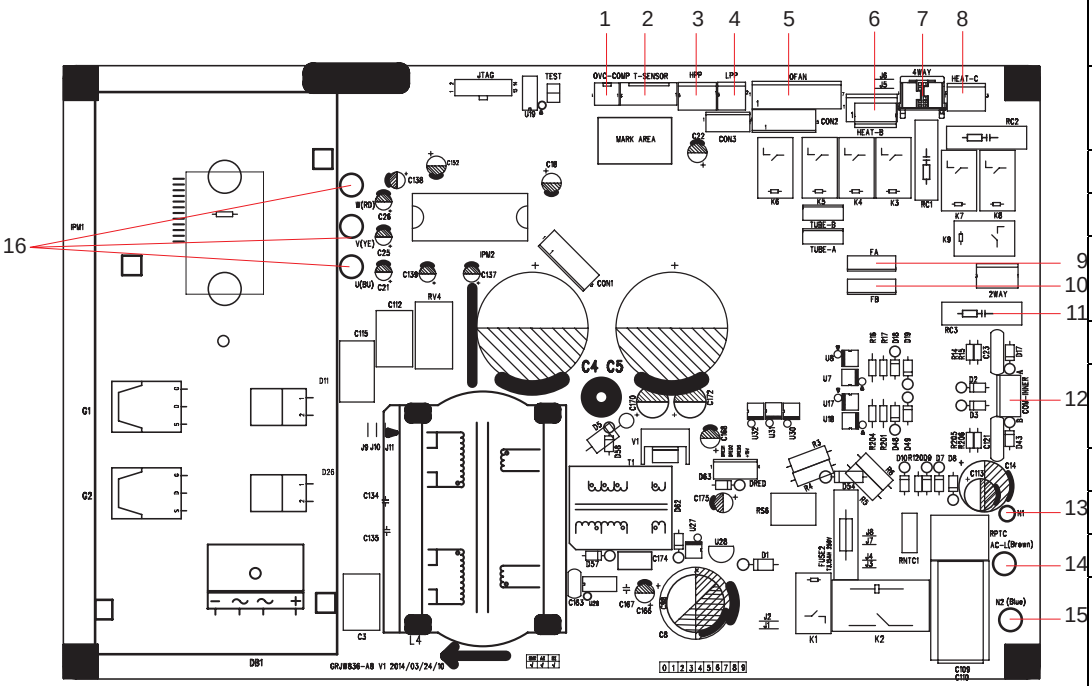


These circuit diagrams are subject to change without notice, please refer to the one supplied with the unit.

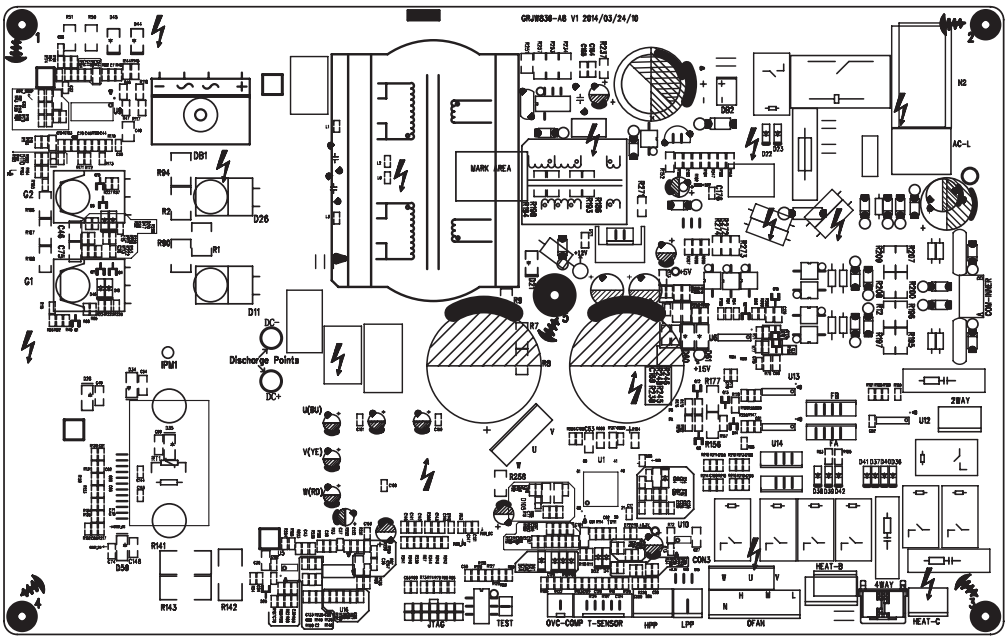
5.2 PCB Printed Diagram

(1)Model:GWHD(18)NK3JO(DRED)

● Top view



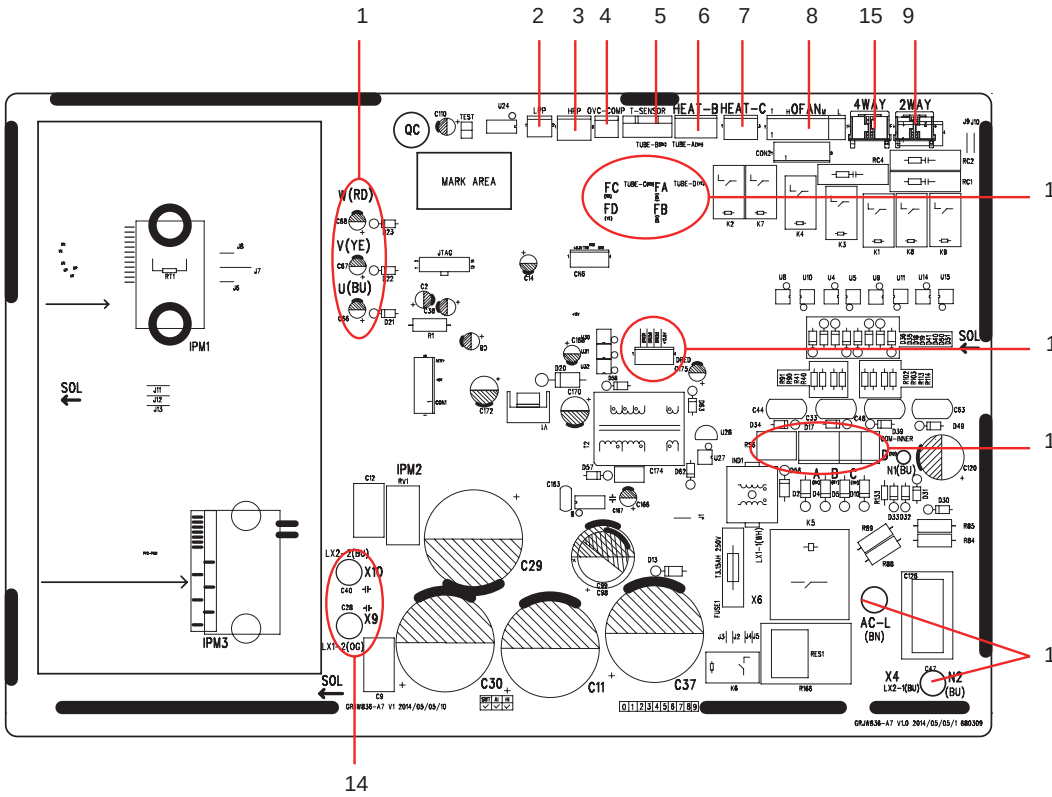
● Bottom view



1	1. OVC-COMP: overload
2	T-SENSOR: terminal of temperature sensor
3	HPP: high pressure protection terminal
4	LPP: low pressure protection terminal
5	OFAN: Drive terminal of DC fan
6	HEAT-B: control terminal of chassis electric heating
7	4WAY: 4-way valve terminal
8	HEAT-C: control terminal of compressor electric heating
9	FA： electronic expansion valve A
10	FB: electronic expansion valve B
11	2WAY: 2-way valve terminal
12	COM-INNER ： communication terminal for indoor unit and outdoor unit
13	N1: neutral wire of communication
14	AC-L(Brown): live wire
15	N2(Blue); neutral wire
16	W(RD), V(YE), U(BU): compressor wire

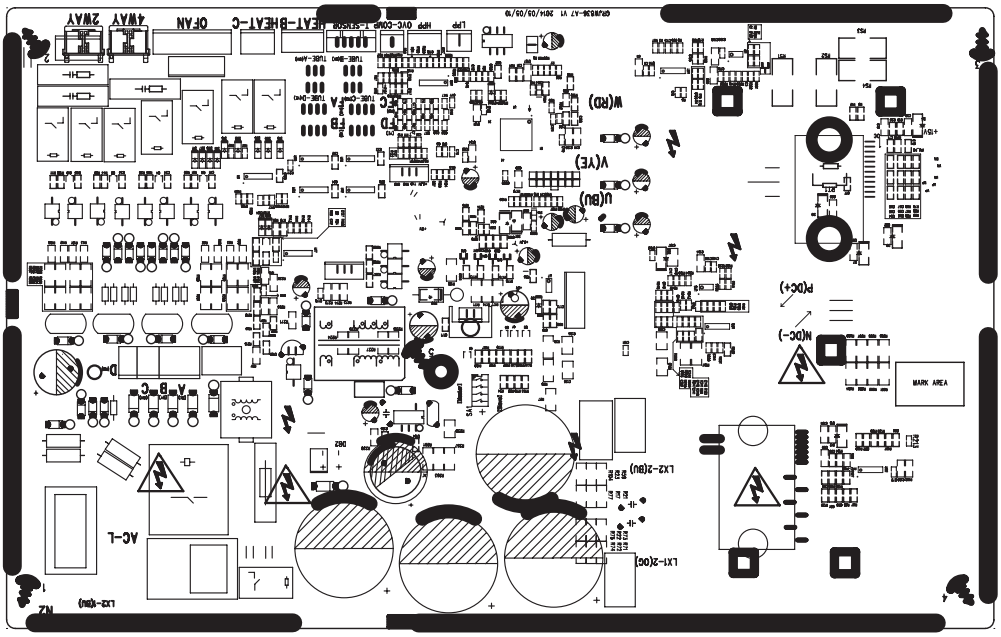
(2)Models:GWHD(24)NK3JO(DRED) GWHD(28)NK3JO(DRED)

● Top view



1	Interface of compressor wire
2	Low pressure protection
3	High pressure protection
4	Overload of compressor
5	Temperature sensor
6	Electric chassis belt of chassis
7	Electric chassis belt of compressor
8	Interface of fan
9	Interface of 2-way valve
10	Circuit for gas valve and liquid valve
11	Network wire of DRED
12	Communication interface of neutral wire and live wire
13	Neutral wire and live wire
14	Interface of PFC induction wire
15	Interface of 4-way valve

● Bottom view



6. Function and Control

1 Basic functions of the system

1.1 Cooling Mode

1.1.1 Cooling conditions and process:

If the compressor is in stop status and start the unit for cooling operation, when one of the indoor units reaches the cooling operation condition, the unit start cooling operation; in this case, the electronic expansion valve, the outdoor fan and the compressor start operation.

1.1.2 Stop in cooling operation

1.1.2.1 Compressor stops

The compressor stops immediately, the outdoor fan stops after 1min.

1.1.2.2 Some of the indoor units reach the stop condition (the compressor does not stop)

The compressor operates immediately according to the required frequency. For the indoor unit with no requirement, the corresponding electronic expansion valve is closed to OP.

1.1.3 Cooling mode transfers to heating mode

When the unit transfers to heating mode, the 4-way valve is energized after the compressor stops for 2min. The other disposals are the same as stopping in cooling mode.

1.1.4 4-way valve: in this mode, the 4-way valve is closed.

1.1.5 Outdoor fan control in cooling mode

The outdoor fan starts before 5s of the starting of compressor. The outdoor fan will run in high speed for 3min after starting and then it will run in set speed. The fan shall run at every speed for at least 80s. (When the quantity of running indoor unit is changed, the unit will enter the control described in 1.3.5.1 and 1.3.5.2);

When the compressor stops, the outdoor fan runs at present speed and stops after 1min.

1.2 Dry Mode

1.2.1 The dry conditions and process are the same as those in cooling mode;

1.2.2 The status of 4-way valve: closed;

1.2.3 The temperature setting range: 16 ~ 30℃;

1.2.4 Protection function: the same as those in cooling mode;

1.2.5 In dry mode, the maximum value A of the capacity requirement percentage of single unit is 90% of that in cooling mode.

The open condition of the electronic expansion valve, outdoor fan and compressor is the same as those in cooling mode.

1.3 Heating Mode

1.3.1 Heating conditions and process:

When one of the indoor units reaches the heating operation condition, the unit starts heating operation.

1.3.2 Stop in heating operation:

1.3.2.1 When all the indoor units reach the stop condition, the compressor stops and the outdoor fan stops after 1min;

1.3.2.2 Some of the indoor units reach the stop condition

The compressor reduces the frequency immediately and operates according to the required frequency;

1.3.2.3 Heating mode transfers to cooling mode(dry mode), fan mode

a. The compressor stops; b. the power of 4-way valve is cut off after 2min; c. the outdoor fan stops after 1min; d. the status of 4-way valve: energized;

1.3.3 Outdoor fan control in heating mode

The outdoor fan starts before 5s of the starting of compressor and then it will run in high speed for 40s;

The fan shall run at every speed for at least 80s;

When the compressor stops, the outdoor fan stops after 1min.

1.3.4 Defrosting function

When the defrosting condition is met, the compressor stops; the electronic expansion valve of all indoor units open in big angle; the outdoor fan stops after 40s of the stop of compressor, meanwhile, the 4-way valve reverses the direction; after the 4-way valve reverses the direction, the compressor starts; then begin to calculate the time of defrosting, the frequency of the compressor rises to reach the defrosting frequency.

1.3.5 Oil-returned control in heating mode

1.3.5.1 Oil-returned condition

The whole unit is operating in low frequency for a long time

1.3.5.2 Oil-returned process in heating mode

The indoor unit displays “H1”

1.3.5.3 Oil-returned finished condition in heating mode

The duration reaches 5min

1.4 Fan Mode

The compressor, the outdoor fan and the 4-way valve are closed; temperature setting range is 16～30℃.

2. Protection Function

2.1 Mode Conflict Protection of indoor unit

1.Without master indoor unit

The mode of the first operating indoor unit is the basic mode and then compare it to the modes of the other indoor units to see if there is a conflict. If there is a conflict, “E7” will be displayed.

If the mode of the first operating indoor unit is fan mode(invalid mode), while the outdoor unit is without operation mode, two statuses will exist:

If the mode of the second operating indoor unit is cooling mode, the mode of outdoor unit will be cooling mode. The indoor unit under fan mode will operate normally;

If the mode of the second operating indoor unit is heating mode, the mode of outdoor unit will be heating mode. The indoor unit under fan mode will display “E7” and react according to mode conflict;

2.Master indoor unit is on

The mode of the master indoor unit is the basic mode. The cooling/heating status of the units will change with the operation mode of master indoor unit.

If the master indoor unit is under cooling mode or dry mode, while other indoor units are under heating mode, “E7” will be displayed;

If the master indoor unit is under heating mode, while other indoor units are under cooling mode, dry mode and fan mode, “E7” will be displayed;

If the mode of the master indoor unit is fan mode, while the outdoor unit is without operation mode, two statuses will exist:

If the mode of the second operating indoor unit is cooling mode, the mode of outdoor unit will be cooling mode. The indoor unit under fan mode will operate normally;

If the mode of the second operating indoor unit is heating mode, the mode of outdoor unit will be heating mode. The indoor unit under fan mode will display “E7” and react according to mode conflict;

3.Master indoor unit is off

The mode of the first operating indoor unit is the basic mode and then compare it to the modes of the other indoor units to see if there is a conflict. If there is a conflict, “E7” will be displayed.

4.Master indoor unit is under fan mode or under communication malfunction

If multi master indoor units are set, the one with smallest address will be the valid master indoor unit;

If the master indoor unit is under fan mode or under communication malfunction, while other indoor units have been set as master indoor unit and they are under cooling/dry/heating mode, the indoor unit with smallest address will be the new master indoor unit automatically;

If the previous master indoor unit returns to cooling/dry/heating mode, or resumes communication, this unit will be the master indoor unit.

2.2 Overload protection function

When the tube temperature is a little low, the compressor raises the operation frequency; when the tube temperature is a little high, the compressor frequency is restricted or lows down the operation frequency; when the tube temperature is too high, the compressor protection stops running.

If the discharge temperature protection continuously appears for 6 times, the compressor can't resume running. The compressor can resume running after cutting off the power and then putting through the power. (if the running time of the compressor is longer than 7min, the protection times record will be cleared)

2.3 Discharge Protection Function

When the discharge temperature is a little low, the compressor raises the operation frequency; when the discharge temperature is a little high, the compressor frequency is restricted or lows down the operation frequency; when the discharge temperature is too high, the compressor protection stops running.

If the discharge temperature protection continuously appears for 6 times, the compressor can't resume running. The compressor can resume running after cutting off the power and then putting through the power. (if the running time of the compressor is longer than 7min, the protection times record will be cleared)

2.4 Communication malfunction

Detection of the quantity of installed indoor units:

After 3min of energizing, if the outdoor unit does not receive the communication data of certain indoor unit, the outdoor unit will judge that indoor unit is not installed and will treat it as it is not installed. If the outdoor unit receives the communication data of that indoor unit later, the outdoor unit will treat that unit as it is installed.

2.5 Overcurrent Protection

a. Overcurrent protection of complete unit; b. phase wire current protection; c. compressor phase current protection

2.6 Compressor high-pressure protection

2.6.1 When the high-pressure switch is detected cut off for 3s continuously, the compressor will enter high-pressure protection as it stops when reaching set temperature. Meanwhile, the outdoor unit will send the signal of "high-pressure protection" to the indoor units;

2.6.2 After the appearance of high-pressure protection, when the high-pressure switch is detected closed for 6s continuously, the compressor can resume running only after cutting off the power and then putting through the power.

2.7 Compressor overload protection

If the compressor overload switch is detected having movement, the indoor unit will display the corresponding malfunction as it stops when the indoor temperature reaching set temperature. When the compressor stops for more than 3min and the compressor overload switch is reset, the unit will resume operation status automatically. If the protection appears for more than 6 times (if the running time of the compressor is longer than 30min, the protection times record will be cleared), the unit can not resume operation status automatically, but can resume running only after cutting off the power and then putting through the power.

2.8 Compressor Phase-lacking Protection

When the compressor starts, if one of the three phases is detected open, the compressor will enter phase-lacking protection. The malfunction will be cleared after 1min, the unit will restart and then detect if there is still has phase-lacking protection. If the phase-lacking protection is detected for 6 times continuously, the compressor will not restart but can resume running only after cutting off the power and then putting through the power. If the running time of the compressor is longer than 7min, the protection times record will be cleared.

2.9 IPM Protection

2.9.1 When the IPM module protection is detected, the unit will stop as the indoor temperature reaching set temperature, PFC is closed, display IPM protection malfunction. After the compressor stops for 3min, the unit will resume operation status automatically; if the IPM protection is detected for more than 6 times continuously (If the running time of the compressor is longer than 7min, the protection times record will be cleared), the system will stop and send the signal of module protection to indoor unit. The unit can not resume operation status automatically, but can resume running only after cutting off the power and then putting through the power.

2.9.2 IPM module overheating protection

2.9.2.1 When T_{IPM} > 85℃, prohibit to raise frequency;

2.9.2.2 When T_{IPM}≥ 90℃, the operation frequency of compressor lows down by 15% every 90s according to the present capacity requirement of the complete unit. It will keep 90s after lowing down the frequency. After lowing down the frequency, if T_{IPM}≥ 90℃, the unit will circulate the above movement until reaching the minimum frequency; if 85℃ < T_{IPM} < 90℃, the unit will run at this frequency; when T_{IPM}≤ 85℃, the unit will run at the frequency according to the capacity requirement;

2.9.2.3 When T_{IPM}≥ 95℃, the compressor stops. After the compressor stops for 3min, if T_{IPM} < 85℃, the compressor and the outdoor fan will resume operation.

3.0 DRED function

If the power of DRED device is supplied by switching power supply, when different DRED signals are received, the corresponding optocouplers are put through to make the AD sample circuit on the main board detect the different voltages. Different voltages are corresponding to different DRED modes. After entering DRED mode, the indoor unit displays the corresponding operation code of DRED mode.

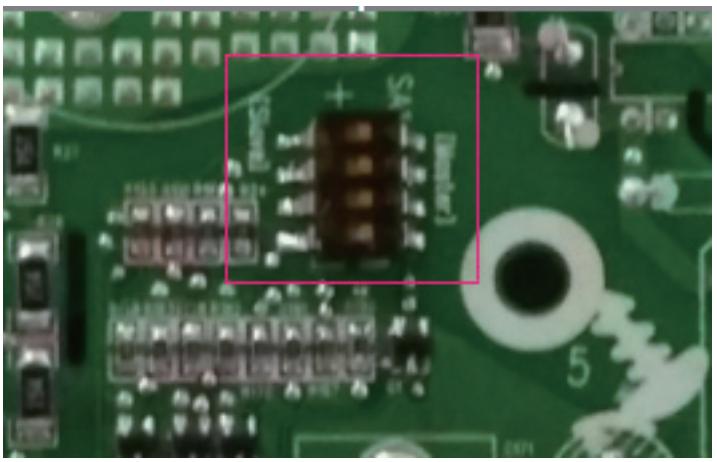
d1: Outdoor compressor stops;

d2: The electricity consumption of complete unit in 30min is less than or equals to 50% of rated electricity consumption;

d3: The electricity consumption of complete unit in 30min is less than or equals to 75% of rated electricity consumption

3.1 Setting function of master/slave indoor unit

Picture of DIP switch on outdoor mainboard;



SA1(4-bit):dial-switch for master/slave indoor unit,

4-bit dial-switch to set master/slave indoor unit: it is corresponding to indoor unit of NO.1 to NO.4. Dial the switch to ON(master side. Right side) to set that indoor unit as master indoor unit ,and dial the switch to slave side(left side) to set indooe unit as slave indoor unit. There can be only one master unit in a system. If more than one indoor units are set as master unit with smallest number is the master unit. (smallest number here means number 1 to number 5 on the switch)

Part Ⅱ : Installation and Maintenance

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

Installation Safety Precautions:

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

Refrigerant Safety Precautions:

1. Avoid contact between refrigerant and fire as it generates poisonous gas; Prohibit prolong the connection pipe by welding.
2. Apply specified refrigerant only. Never have it mixed with any other refrigerant. Never have air remain in the refrigerant line as it may lead to rupture or other hazards.
3. Make sure no refrigerant gas is leaking out when installation is completed.
4. If there is refrigerant leakage, please take sufficient measure to minimize the density of refrigerant.
5. Never touch the refrigerant piping or compressor without wearing glove to avoid scald or frostbite.

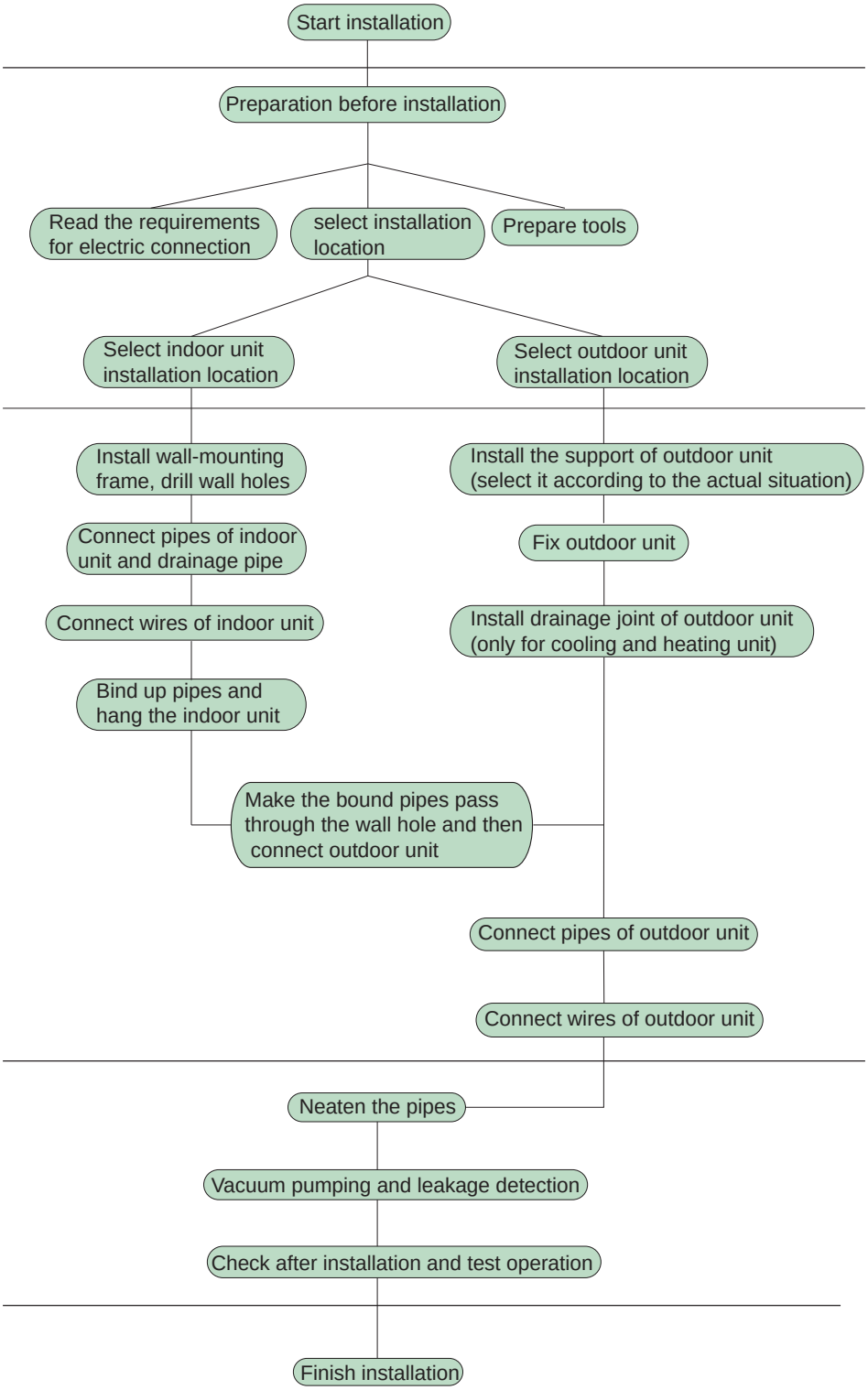
Improper installation may lead to fire hazard, explosion, electric shock or injury.

Main Tools for Installation and Maintenance

1. Level meter, measuring tape 	**2. Screw driver** 	**3. Impact drill, drill head, electric drill** 
4. Electroprobe 	**5. Universal meter** 	**6. Torque wrench, open-end wrench, inner hexagon spanner** 
7. Electronic leakage detector 	**8. Vacuum pump** 	**9. Pressure meter** 
10. Pipe pliers, pipe cutter   	**11. Pipe expander, pipe bender**  	**12. Soldering appliance, refrigerant container**  

8. Installation Manual

Installation procedures

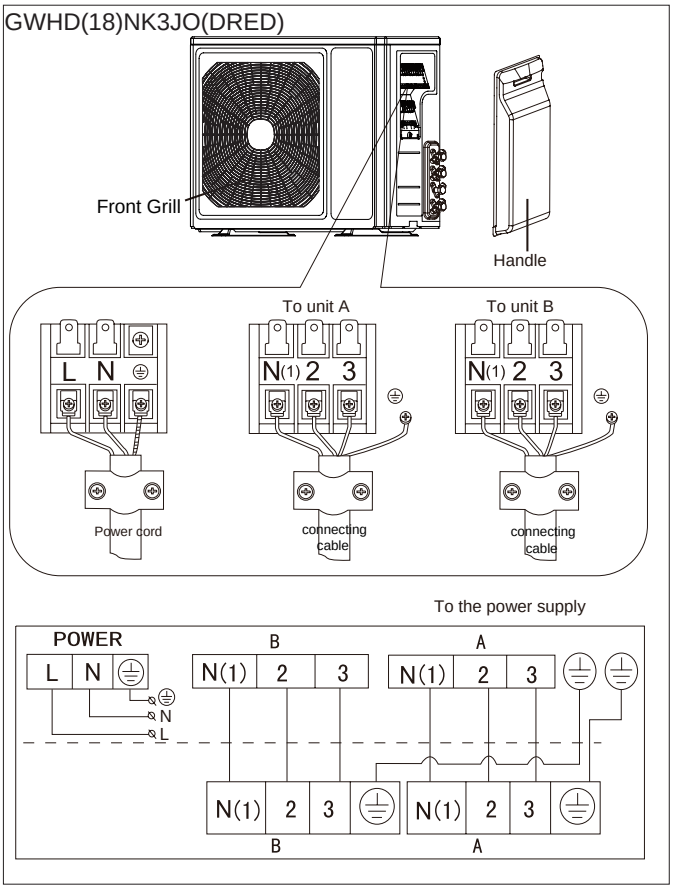


Note: this flow is only for reference; please find the more detailed installation steps in this section.

8.1 Electrical Connections

GWHD(18)NK3JO(DRED)

1. Remove the handle at the right side plate of the outdoor unit (one screw).
2. Remove the cable clamp, connect the power connection cable with the terminal at the row of connection and fix the connection. The fitting line distributing must be consistent with the indoor unit. terminal of line bank. Wiring should meet that of indoor unit.
3. Fix power connection wire by wire clamp.
4. Ensure wire has been fixed well.
5. Install the handle.



⚠ Including an air switch with suitable capacity,please note the following table. Air switch should be included magnet buckle and heating buckle function, it can protect the circuit-short and overload. (Caution: please do not use the fuse only for protect the circuit)

Air-conditioner	Air switch capacity
GWHD(18)NK3JO(DRED)	16A

⚠ An all-pole disconnection switch having a contact separation of at least 3mm in all pole should be connected in fixed wiring.

⚠ Wrong wire connection may cause malfunction of some electric components.After fixing cable, ensure that leads between connection to fixed point have some space.

⚠ The connection pipes and the connectiong wirings of the unit A and unit B must be corresponding to each other respective.

⚠ The appliance shall be installed in accordance with national wiring regulations.

Note: the above figures are only intended to be a simple diagram of the appliance and may not correspond to the appearance of the units that have been purchased.

GWHD(24)NK3JO(DRED)

1. Remove the handle at the right side plate of the outdoor unit (one screw).
2. Remove the cable clamp, connect the power connection cable with the terminal at the row of connection and fix the connection. The fitting line distributing must be consistent with the indoor unit. terminal of line bank. Wiring should meet that of indoor unit.
3. Fix power connection wire by wire clamp.
4. Ensure wire has been fixed well.
5. Install the handle.

⚠ Including an air switch with suitable capacity,please note the following table. Air switch should be included magnet buckle and heating buckle function, it can protect the circuit-short and overload. (Caution: please do not use the fuse only for protect the circuit)

Air-conditioner	Air switch capacity
GWHD(24)NK3JO(DRED)	25A

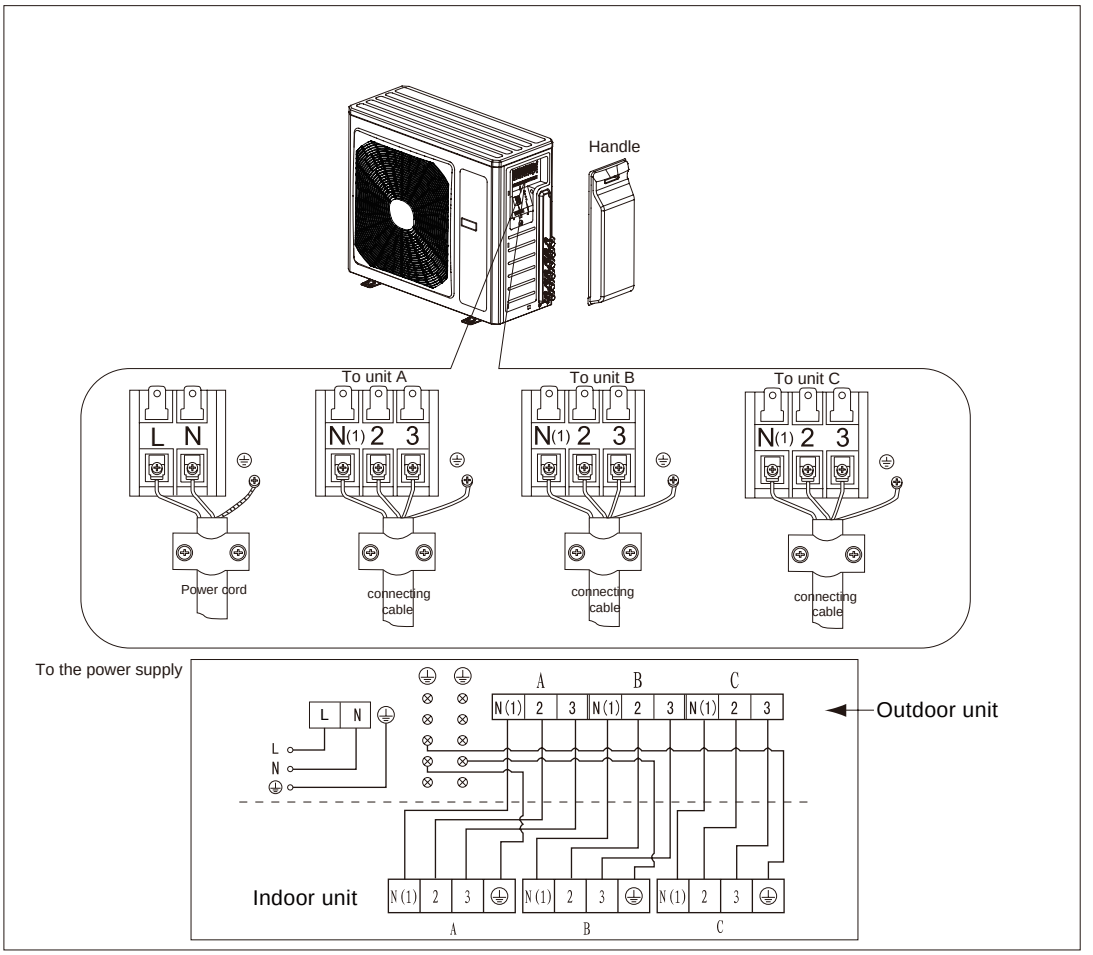
⚠ An all-pole disconnection switch having a contact separation of at least 3mm in all pole should be connected in fixed wiring.

⚠ Wrong wire connection may cause malfunction of some electric components.After fixing cable, ensure that leads between connection to fixed point have some space.

⚠ The connection pipes and the connectiong wirings of the unit A, unit B, unit C and unit D must be corresponding to each other respective.

⚠ The appliance shall be installed in accordance with national wiring regulations.

Note: The above figures are only intended to be a simple diagram of the appliance and may not correspond to the appearance of the units that have been purchased.



GWHD(28)NK3JO(DRED)

1. Remove the handle at the right side plate of the outdoor unit (one screw).
2. Remove the cable clamp, connect the power connection cable with the terminal at the row of connection and fix the connection. The fitting line distributing must be consistent with the indoor unit. terminal of line bank. Wiring should meet that of indoor unit.
3. Fix power connection wire by wire clamp.
4. Ensure wire has been fixed well.
5. Install the handle.

⚠ Including an air switch with suitable capacity,please note the following table. Air switch should be included magnet buckle and heating buckle function, it can protect the circuit-short and overload. (Caution: please do not use the fuse only for protect the circuit)

Air-conditioner	Air switch capacity
GWHD(28)NK3JO(DRED)	25A

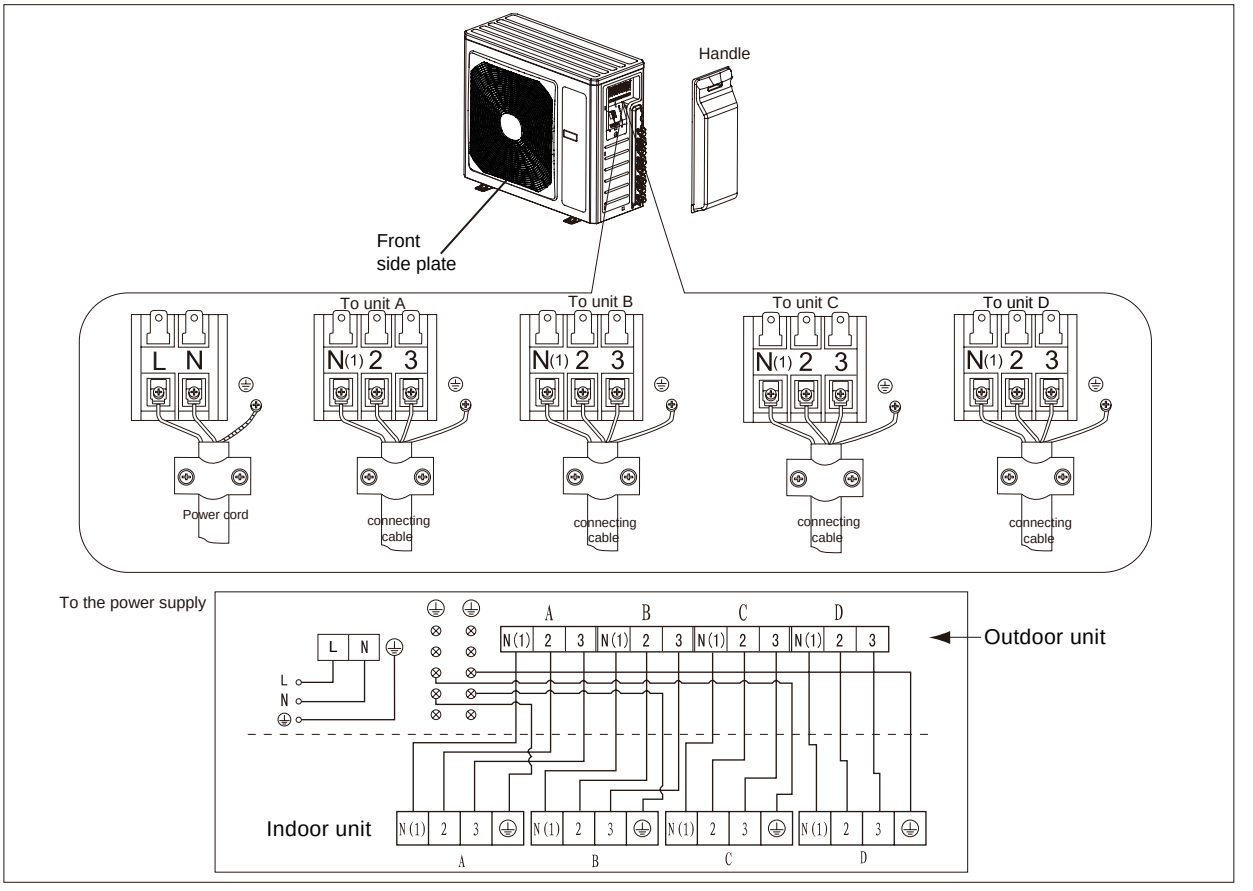
⚠ An all-pole disconnection switch having a contact separation of at least 3mm in all pole should be connected in fixed wiring.

⚠ Wrong wire connection may cause malfunction of some electric components.After fixing cable, ensure that leads between connection to fixed point have some space.

⚠ The connection pipes and the connectiong wirings of the unit A, unit B, unit C and unit D must be corresponding to each other respective.

⚠ The appliance shall be installed in accordance with national wiring regulations.

Note: The above figures are only intended to be a simple diagram of the appliance and may not correspond to the appearance of the units that have been purchased.



8.2 Installing the Outdoor Unit

Use bolts to secure the unit to a flat, solid floor. When mounting the unit on a wall or the roof, make sure the support is firmly secured so that it cannot move in the event of intense vibrations or a strong wind.

Do not install the outdoor unit in pits or air vents

Installing the pipes

Use suitable connecting pipes and equipment for the refrigerant R410A.

Models(m)	18K	24K	28K
Max. connection pipe length	20	60	70
Max. connection pipe length(Simple one indoor unit)	10	20	20

The refrigerant pipes must not exceed the maximum heights 10m.

Wrap all the refrigerant pipes and joints.

Tighten the connections using two wrenches working in opposite directions.

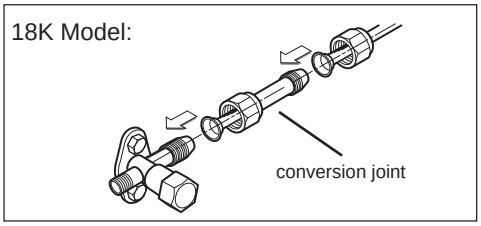
Caution: Installation Must be Performed in Accordance with the NEC/CEC by Authorized Personnel Only.

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

1.Unscrew and remove the caps from the 2-way and 3-way valves.
2.Unscrew and remove the cap from the service valve.
3.Connect the vacuum pump hose to the service valve.
4.Operate the vacuum pump for 10-15 minutes until an absolute vacuum of 10 mm Hg has been reached.
5.With the vacuum pump still in operation, close the low-pressure knob on the vacuum pump coupling. Stop the vacuum pump.
6.Open the 2-way valve by 1/4 turn and then close it after 10 seconds Check all the joints for leaks using liquid soap or an electronic leak device.
7.Turn the body of the 2-way and 3-way valves. Disconnect the vacuum pump hose.
8.Replace and tighten all the caps on the valves.

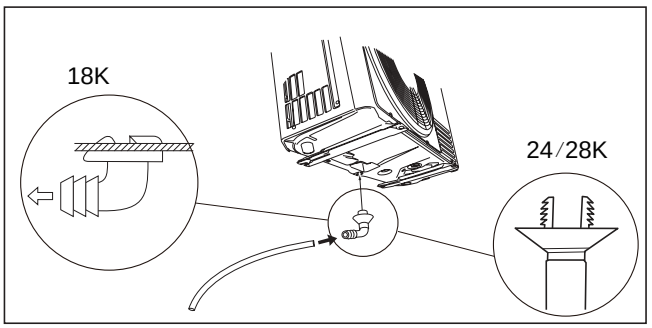
Diameter (mm)	Twisting moment (N.m)
Φ6	15-20
Φ9.52	35-40
Φ16	60-65
Φ12	45-50
Φ19	70-75

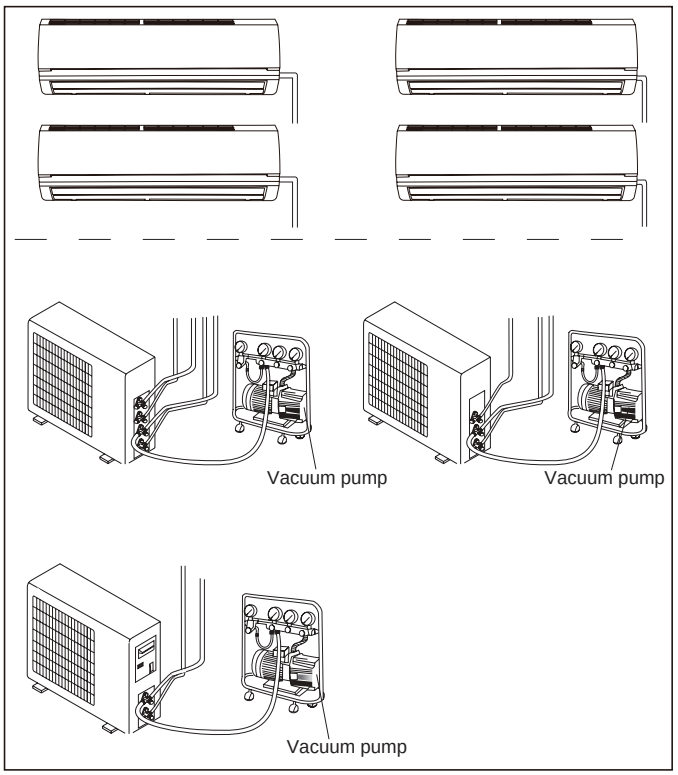
18K unit need to be installed the indoor unit

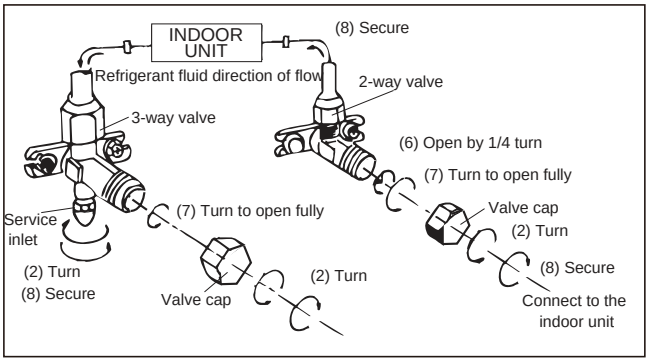


Installthedrainfittingandthedrainhose(for modelwithheatpumponly)

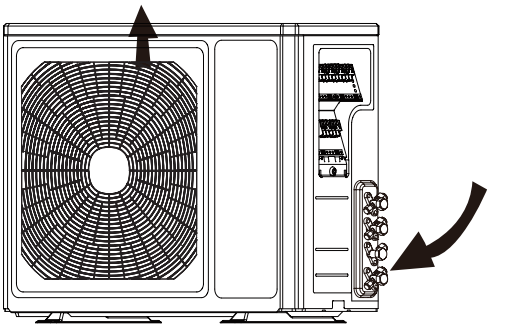
Condensation is produced and flows from the outdoor unit when the appliance is operating in the heating mode. In order not to disturb neighbours and to respect the environment, install a drain fitting and a drain hose to channel the condensate water. Install the drain fitting and rubber washer on the outdoor unit chassis and connect a drain hose to it as shown in the figure.







8.3 Installation Dimension Diagram



⚠ Use suitable instruments for the refrigerant R410A.

● Do not use any other refrigerant than R410A.

⚠ Do not use mineral oils to clean the unit.

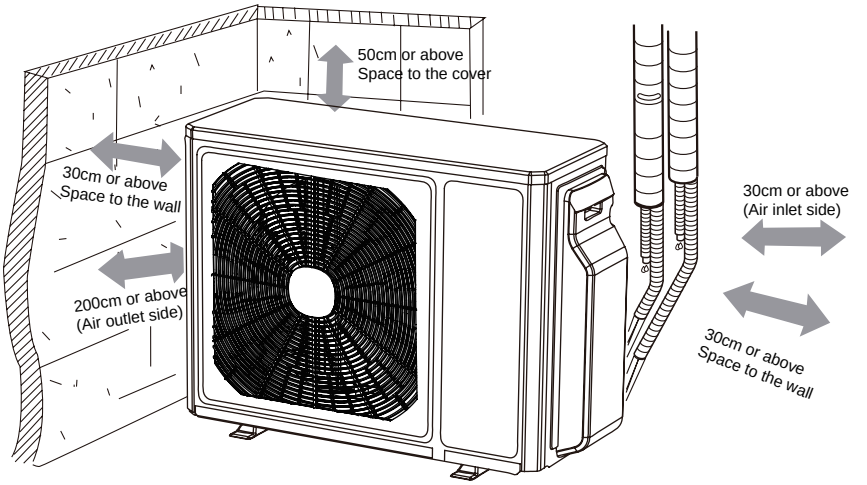
⚠ The installation must be done by trained and qualified service personnel with reliability according to this manual.

⚠ Contact service center before installation to avoid the malfunction due to unprofessional installation.

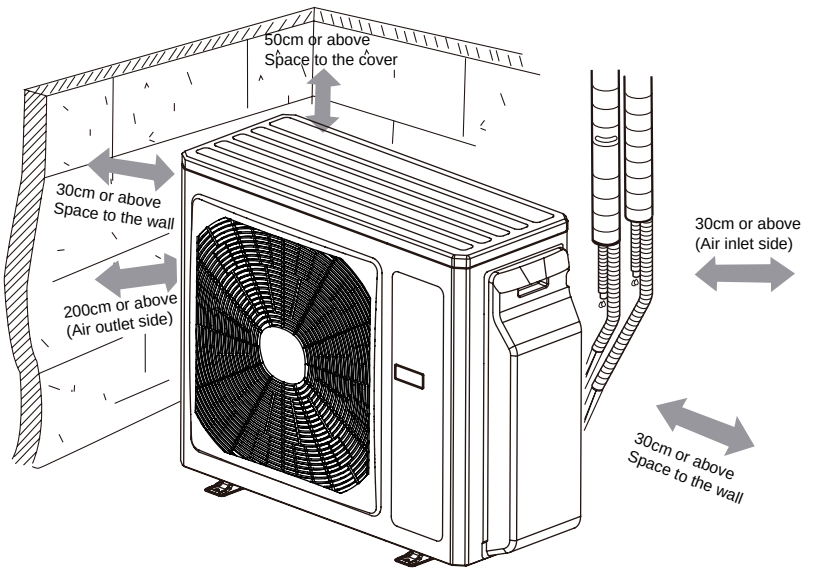
⚠ When picking up and moving the units, you must be guidedby trained and qualified person.

⚠ Ensure that the recommende dspace is left around the appliance.

18K



24/28K



8.4 Check after Installation

Check Items	Problems Owing to Improper Installation
Is the installation reliable?	The unit may drop, vibrate or make noises
Has the gas leakage been checked?	May cause unsatisfactory cooling (heating) effect
Is the thermal insulation of the unit sufficient?	May cause condensation and water dropping
Is the drainage smooth?	May cause condensation and water dropping
Does the power supply voltage accord with the rated voltage specified on the nameplate?	The unit may bread down or the components may be burned out
Are the lines and pipelines correctly installed?	The unit may bread down or the components may be burned out
Has the unit been safely grounded?	Risk of electrical leakage
Are the models of lines in conformity with requirements?	The unit may bread down or the components may be burned out
Are there any obstacles near the air inlet and outlet of the indoor and outdoor units?	The unit may bread down or the components may be burned out
Have the length of refrigerating pipe and refrigerant charge amount been recorded?	It is not easy to decide the charge amount of refrigerant.

9. Maintenance

9.1 Precautions before Performing Inspection or Repair

There are high-capacity electrolytic capacitors on the outdoor mainboard. Thus, even the power is cut off, there is high voltage inside the capacitors and it needs more than 20min to reduce the voltage to safety value. Touching the electrolytic capacitor within 20min after cutting the power will cause electric shock. If maintenance is needed, follow the steps below to discharge electricity of electrolytic capacitor after power off.

(1) Open the top cover of outdoor unit and then remove the cover of electric box cover.

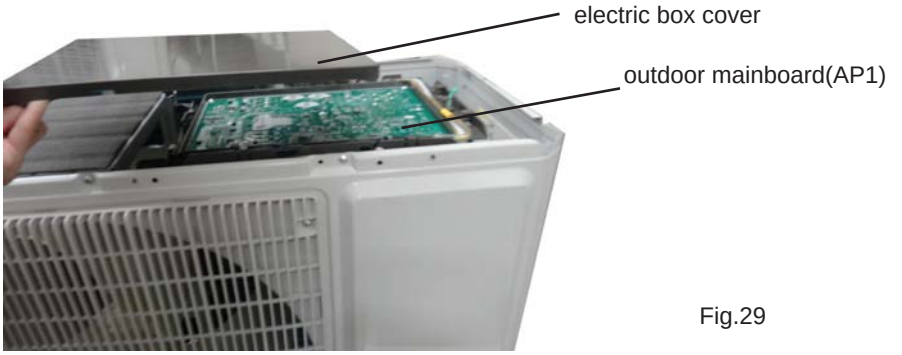


Fig.29

(2) As shown in the fig below, connect the plug of discharge resistance (about 100ohm, 20W) (if there is no discharge resistance, you can use the plug of soldering iron) to point A and B of electrolytic capacitor. There will be sparks when touching them. Press them forcibly for 30s to discharge electricity of electrolytic capacitor.

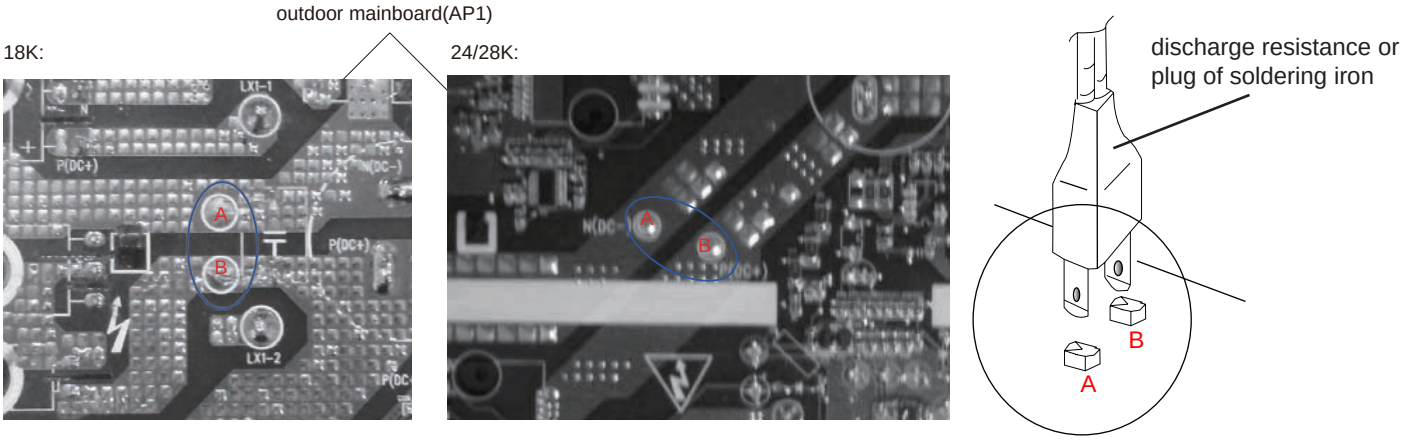


Fig.30

(3) After finish discharging electricity, measure the voltage between point A and B with universal meter to make sure if electricity discharging is completed, in order to prevent electric shock. If the voltage between the two points is below 20V, you can perform maintenance safely.

9.2 Flashing LED of Indoor/Outdoor Unit and Primary Judgement

1. Requirement of malfunction display

When several malfunctions happen at the same time, malfunction codes will be displayed circularly.

2. Malfunction display method

(1) Hardware malfunction: it will be displayed immediately, please refer to “Malfunction status sheet”;

(2) Operation status: it will be displayed immediately, please refer to “Malfunction status sheet”;

(3) Other malfunction: It will be displayed after the compressor has been stopped for 200s, please refer to “Malfunction status sheet”.

(Note: when the compressor starts up again, malfunction display waiting time (200s) will be cleared.)

3. Malfunction display control

Indoor unit displays malfunction code as shown in the sheet below. ODU communication light will be off for 1s and then blink for 1s circularly.

4. Viewing malfunction code through remote controller

Enter viewing malfunction code: pressing light button for 6 times within 3S to view malfunction code;

Exit viewing malfunction code: pressing light button for 6 times within 3S or after the malfunction code is displayed for 5min.

Malfunction status sheet		
Malfunction name	Malfunction type	Nixie tube
Zero cross detection circuit malfunction	Hardware malfunction	U8
Malfunction protection of jumper cap	Hardware malfunction	C5
Feedback of without IDU motor	Hardware malfunction	H6
Indoor ambient temperature sensor is open/short circuited	Hardware malfunction	F1
Indoor evaporator temperature sensor is open/short circuited	Hardware malfunction	F2
Liquid valve temperature sensor is open/short circuited	Hardware malfunction	b5
Gas valve temperature sensor is open/short circuited	Hardware malfunction	b7
Modular temperature sensor is open/short circuited	Hardware malfunction	P7
Outdoor ambient temperature sensor is open/short circuited	Hardware malfunction	F4
Outdoor condenser inlet pipe temperature sensor is open/short circuited (commercial)	Hardware malfunction	A5
Outdoor condenser middle pipe temperature sensor is open/short circuited	Hardware malfunction	F4
Outdoor condenser outlet pipe temperature sensor is open/short circuited (commercial)	Hardware malfunction	A7
Outdoor discharge temperature sensor is open/short circuited	Hardware malfunction	F5
Communication malfunction	Hardware malfunction	E6
Malfunction of phase current detection circuit for compressor	Hardware malfunction	U1
Compressor demagnetization protection	Viewing malfunction code through remote controller within 200s; displayed directly on nixietube after 200s	HE
Malfunction of voltage dropping for DC bus-bar		U3
Module high temperature protection		P8
Refrigerant lacking or blockage protection of system (not available for residential ODU)		F0
Charging malfunction of capacitor	Hardware malfunction	PU
High pressure protection of system	Hardware malfunction	E1
Low pressure protection of system (reserved)	Hardware malfunction	E3

Compressor overload protection	Viewing malfunction code through remote controller within 200s; displayed directly on nixietube after 200s	H3
Indoor unit and outdoor unit do not match	Hardware malfunction	LP
Malfunction of memory chip	Hardware malfunction	EE
Wrong connection of communication wire or malfunction of electronic expansion valve	Hardware malfunction	dn
Malfunction of complete units current detection	Hardware malfunction	U5
Malfunction protection of outdoor fan 1	Hardware malfunction	L3
Detection status of wrong connection of communication wire or malfunction of electronic expansion valve	Operation status	dd
Mode conflict	Operation status	E7
Refrigerant recycling mode	Operation status	Fo
X-fan	Operation status	AL
Defrosting or oil return in heating mode	Operation status	H1
Start failure of compressor	Viewing malfunction code through remote controller within 200s; displayed directly on nixietube after 200s	Lc
High discharge temperature protection of compressor		E4
Overload protection		E8
Whole unit overcurrent protection		E5
Compressor phase current protection		P5
Compressor desynchronizing		H7
Compressor phase-lacking/phase-inverse protection		Ld
IPM modular protection		H5
DC bus-bar low voltage protection		PL
DC bus-bar high voltage protection		PH
PFC protection		HC
The four-way valve is abnormal		U7

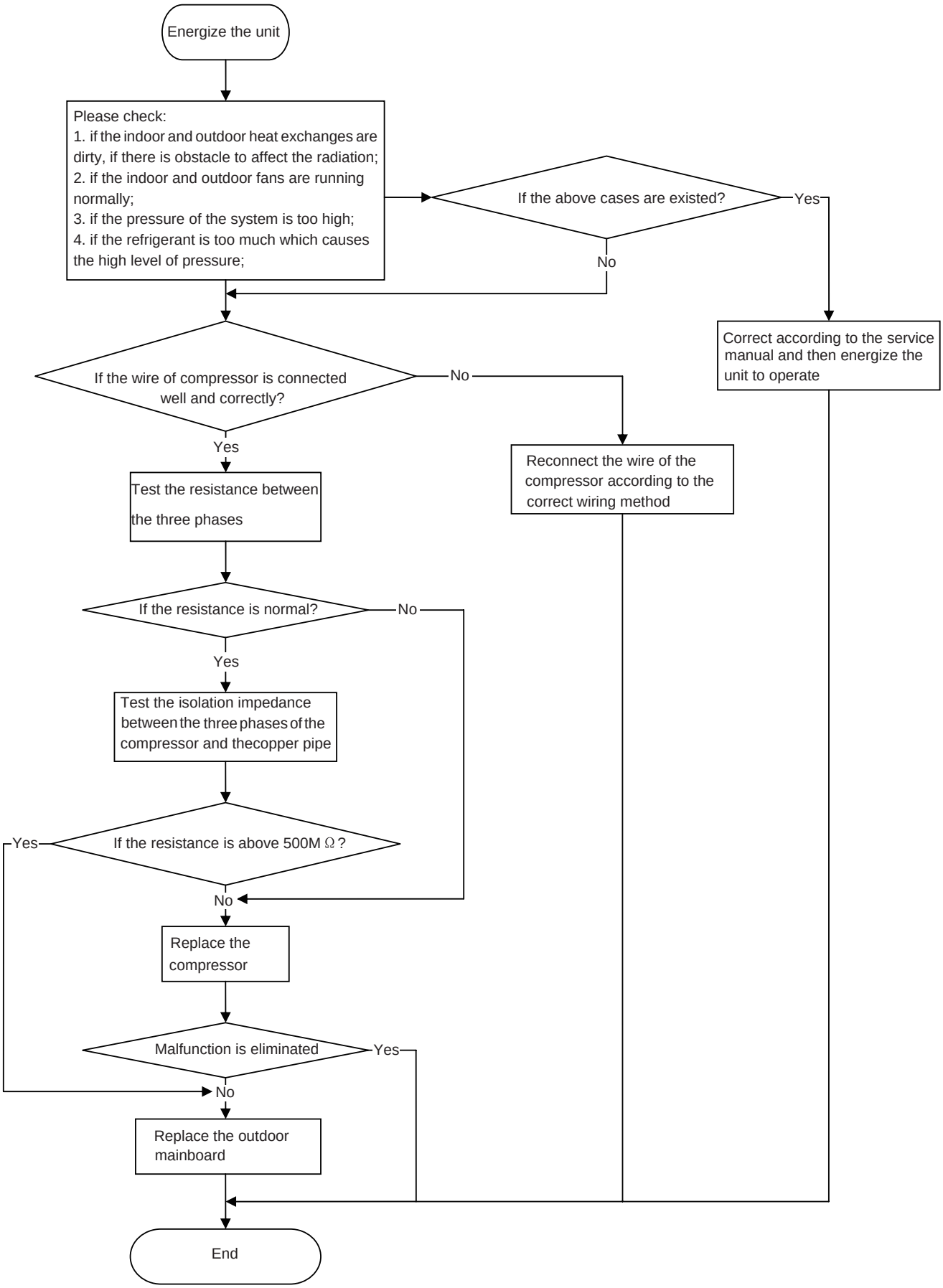
9.3 Malfunction Checking and Elimination

1 IPM protection malfunction:

Main checking point:

- If the input voltage of the unit is within normal range?
- If the connection wire of compressor is connected well? Is it loose? If the connection sequence is correct?
- If the resistance of compressor coil is normal? If the isolation of compressor coil with copper pipe is good?
- If the unit is overloaded? If the heat radiation of the unit is good?
- If the refrigerant charge is suitable?

Flow chart:


Energize the unit
Please check:
1. if the indoor and outdoor heat exchanges are dirty, if there is obstacle to affect the radiation;
2. if the indoor and outdoor fans are running normally;
3. if the pressure of the system is too high;
4. if the refrigerant is too much which causes the high level of pressure;
If the above cases are existed?
Yes
No
Correct according to the service manual and then energize the unit to operate
If the wire of compressor is connected well and correctly?
No
Yes
Reconnect the wire of the compressor according to the correct wiring method
Test the resistance between the three phases
If the resistance is normal?
No
Yes
Test the isolation impedance between the three phases of the compressor and thecopper pipe
If the resistance is above 500M Ω ?
Yes
No
Replace the compressor
Malfunction is eliminated
Yes
No
Replace the outdoor mainboard
End

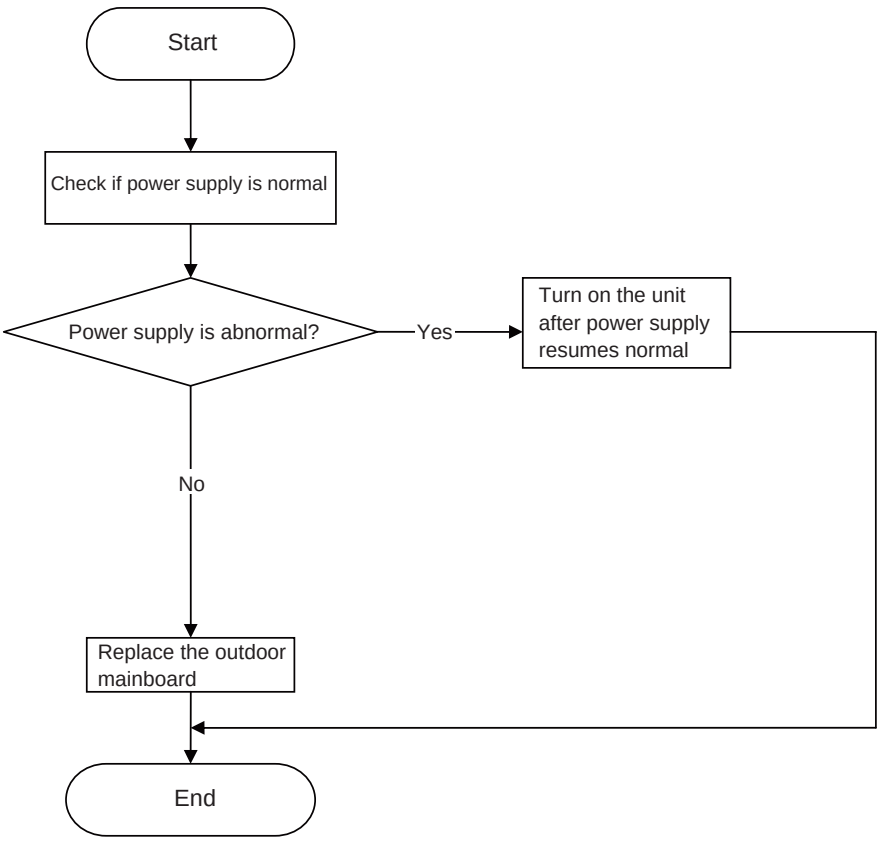
2. PFC protection malfunction, capacity charging malfunction

Main checking points:

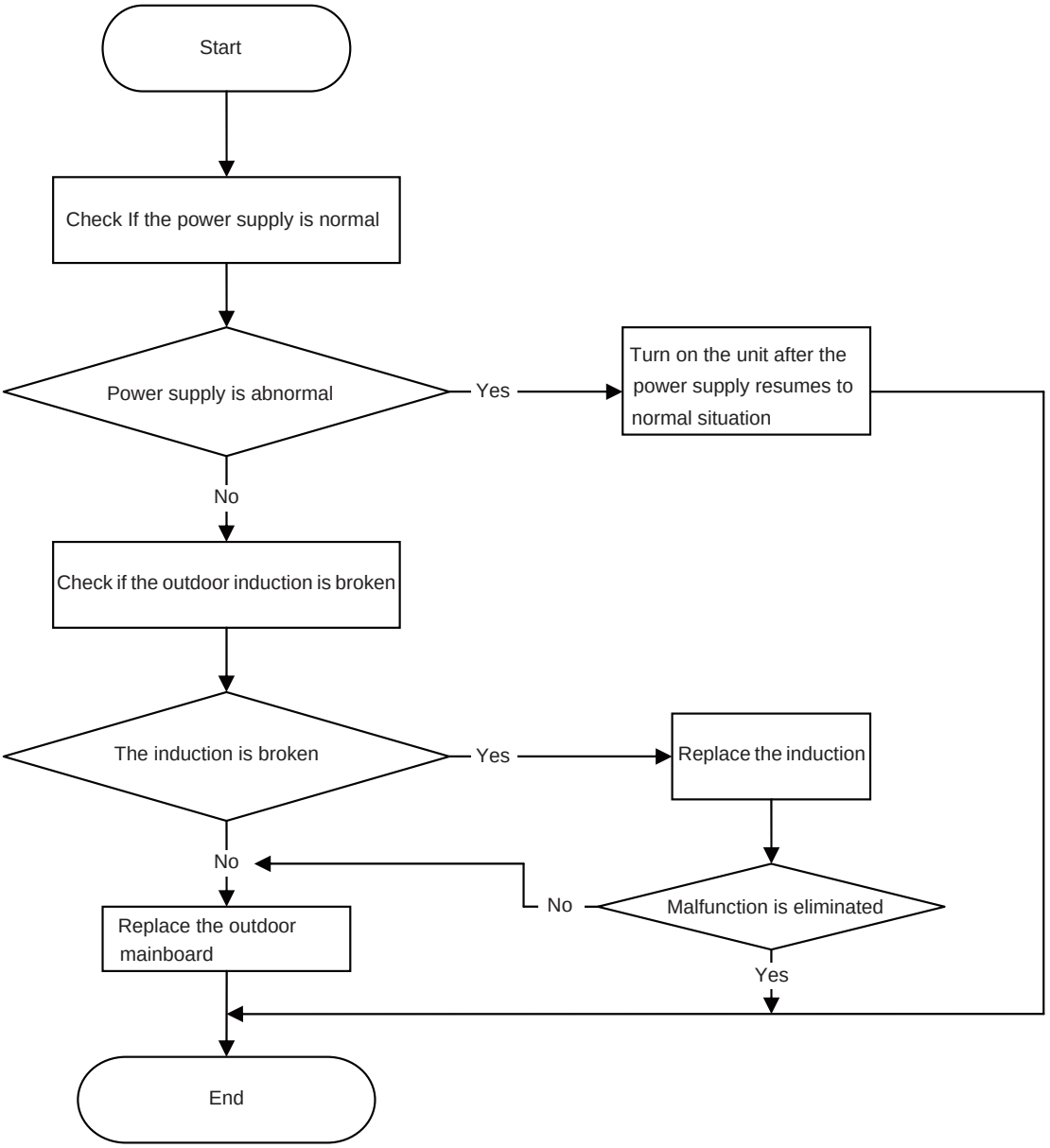
- If the wiring of the induction is connected well and if the induction is broken;
- If the mainboard is broken;

Flow chart:

For 18K



For 24/28K

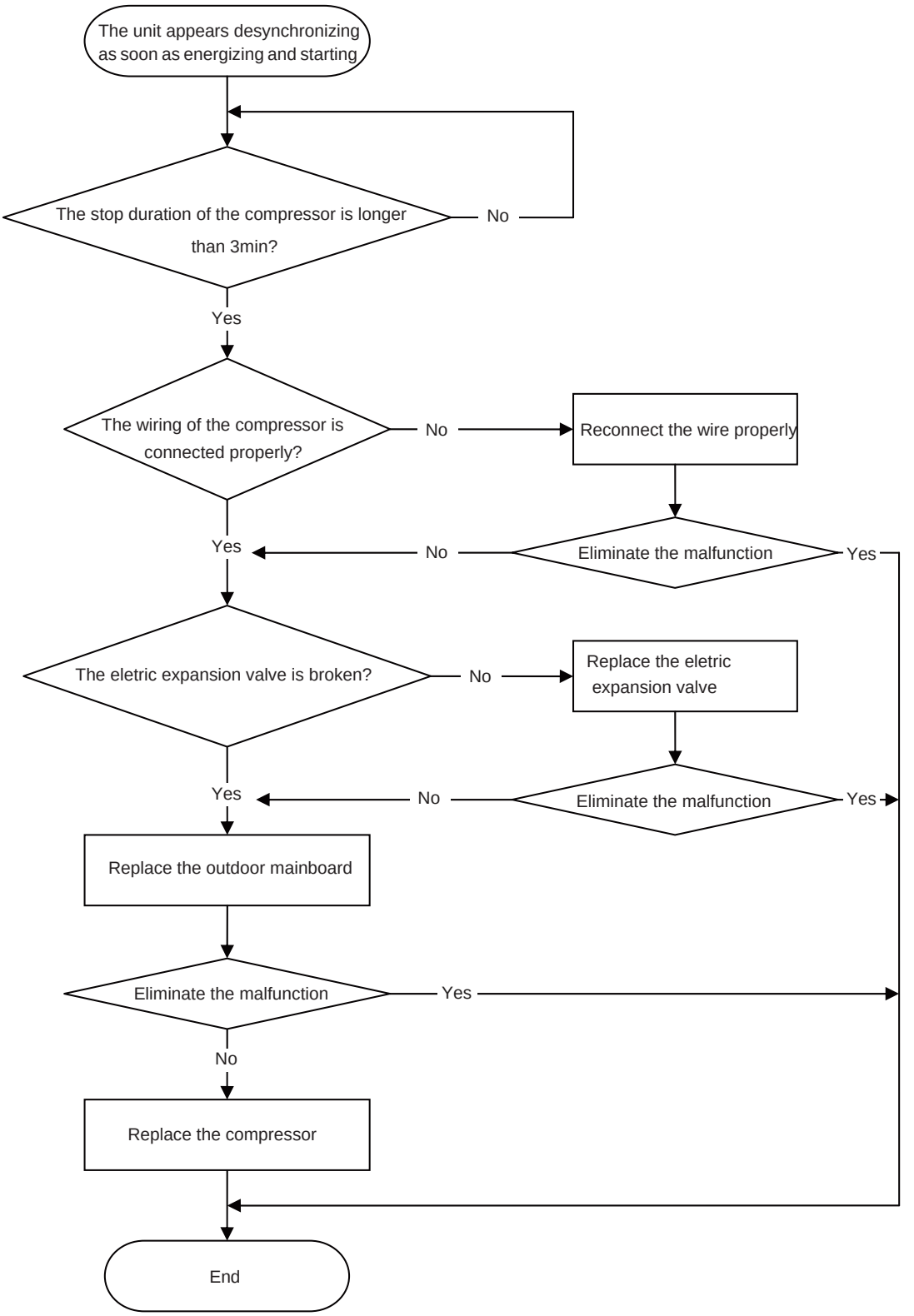

Start
Check If the power supply is normal
Power supply is abnormal
Yes
Turn on the unit after the power supply resumes to normal situation
No
Check if the outdoor induction is broken
The induction is broken
Yes
Replace the induction
No
No
Malfunction is eliminated
Replace the outdoor mainboard
Yes
End

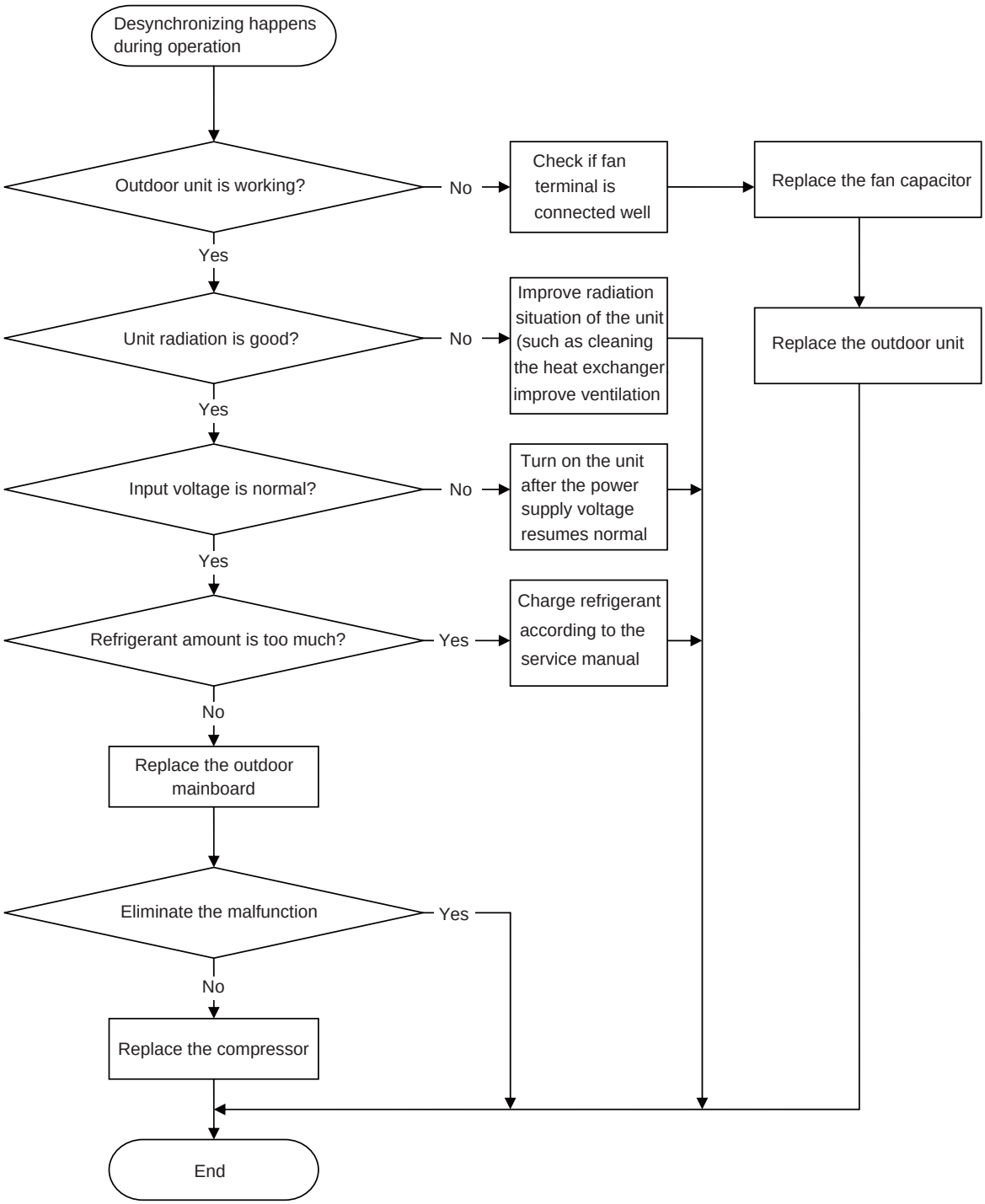
3. Compressor desynchronizing malfunction

Main checking points:

- If the pressure of the system is too high;
- If the eletric expansion valve is working normally or it is broken;
- If the radiation of the unit is good;

Flow chart:



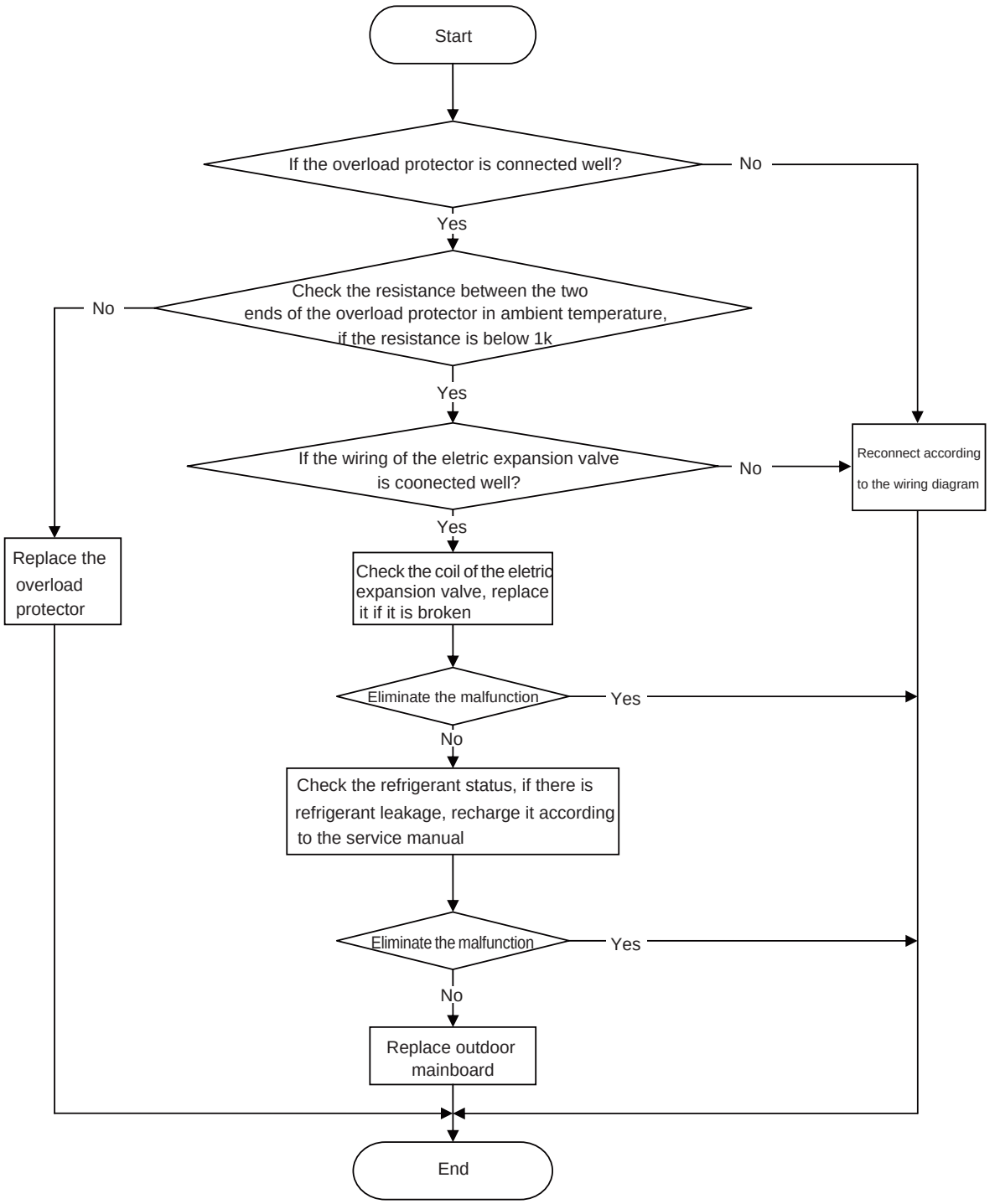

Desynchronizing happens during operation
Outdoor unit is working?
No
Check if fan terminal is connected well
Replace the fan capacitor
Yes
Unit radiation is good?
No
Improve radiation situation of the unit (such as cleaning the heat exchanger improve ventilation
Replace the outdoor unit
Yes
Input voltage is normal?
No
Turn on the unit after the power supply voltage resumes normal
Yes
Refrigerant amount is too much?
Yes
Charge refrigerant according to the service manual
No
Replace the outdoor mainboard
Eliminate the malfunction
Yes
No
Replace the compressor
End

4. Compressor overload, diacharge protectionmalfunction

Main checking points:

- If the eletric expansion valve is connected well or it is broken;
- If there is refrigerant leakage;
- If the overload protector is broken;

Flow chart:



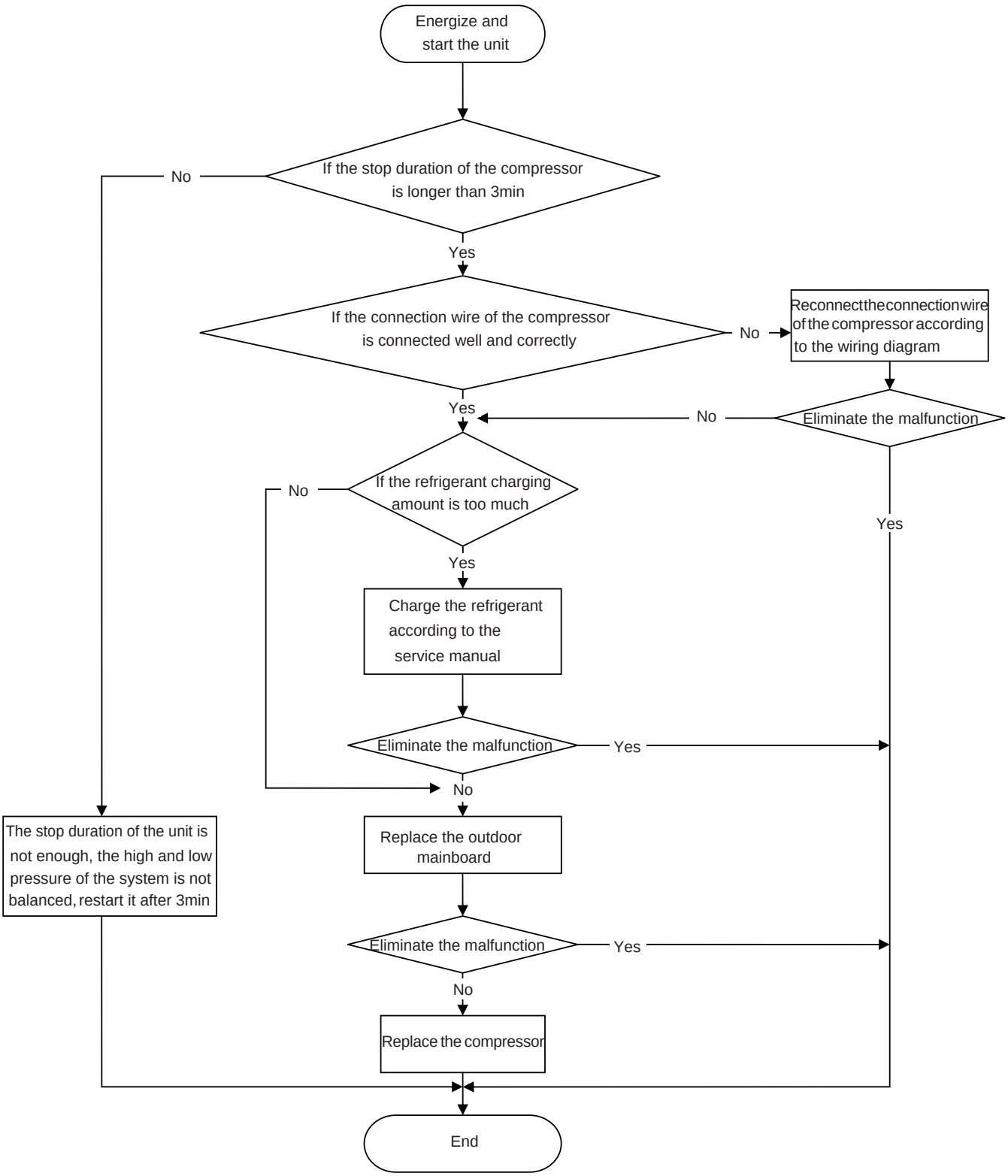
Note: the detection method of the coil of the eletric expansion valve: there is five pieces of coil of the eletric expansion valve, the resistance of one of them (the leftmost or the rightmost one) is almost the same as the resistance of other terminal (within 100 Ω). Judge the condition of the electronic expansion valve through detecting these resistance.

5. Start failuremalfunction

Main checking points:

- If the connection wire of the compressor is connected properly;
- If the stop duration of the compressor is sufficient;
- If the compressor is broken;
- If the refrigerant charging amount is too much;

Flow chart:

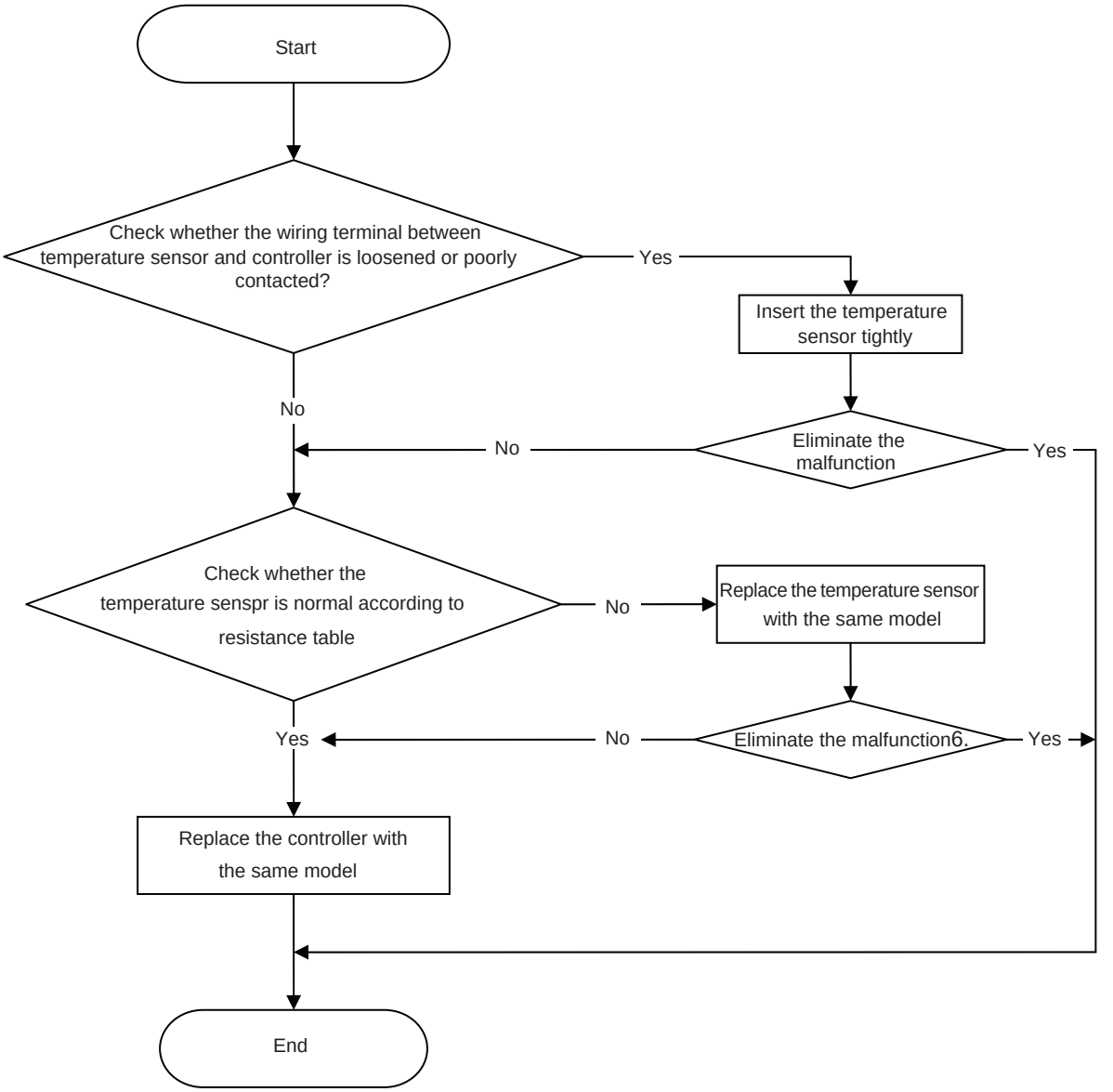


6. Temperature sensor malfunction

Main checking points:

- If the temperature sensor is damaged or broken
- If the terminal of the temperature sensor is loosended or not connected;
- If the mainboard is broken;

Flow chart:

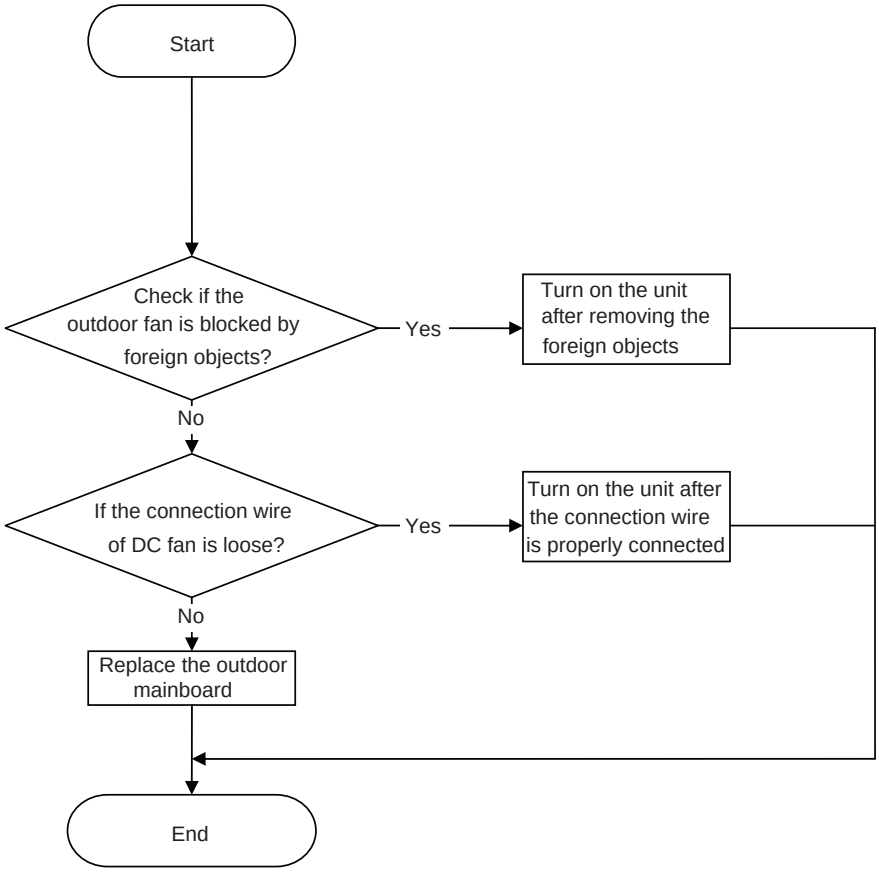


7. DC fan malfunction

Main checking points:

- If the outdoor fan is blocked by foreign objects;
- The connection wire of DC fan is connected reliably? If it is loose?

Flow chart:

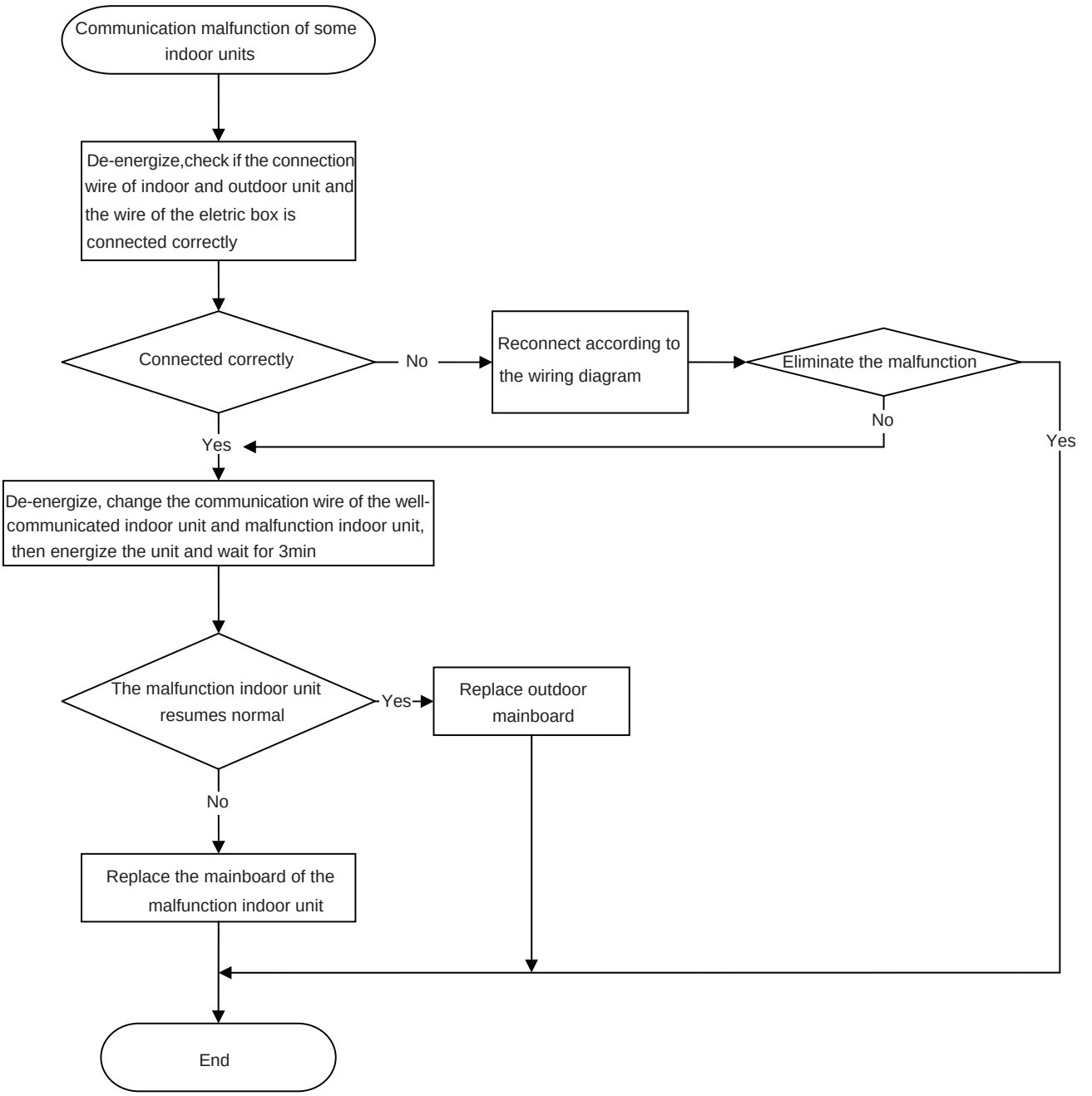


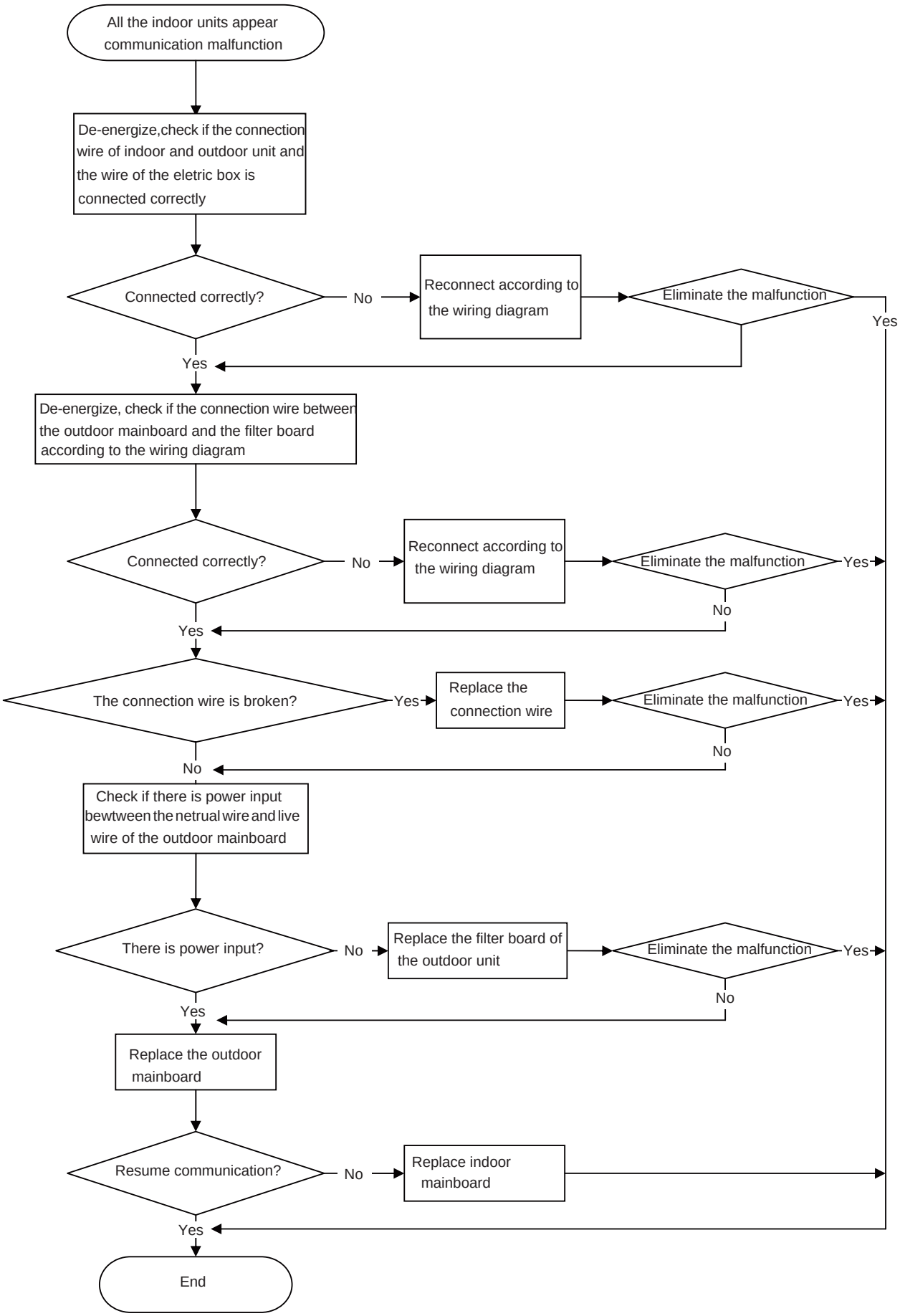
8. Communication malfunction

Main checking points:

- If the connection wire between the indoor unit and outdoor unit is connected well, if the wires inside the unit is connected well;
- If the indoor mainboard or outdoor main board is broken;

Flow chart:



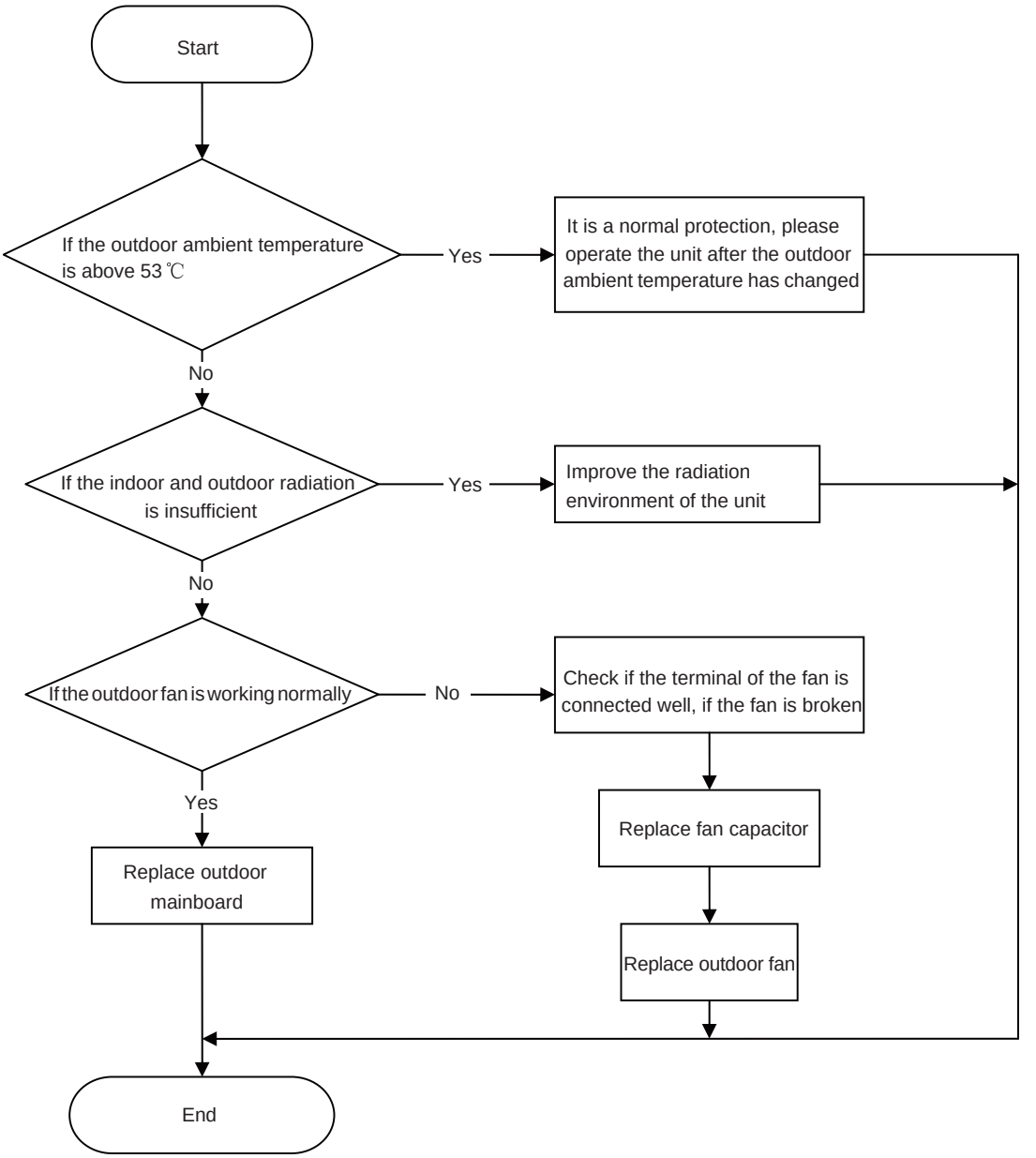

All the indoor units appear communication malfunction
De-energize,check if the connection wire of indoor and outdoor unit and the wire of the eletric box is connected correctly
Connected correctly?
No
Reconnect according to the wiring diagram
Eliminate the malfunction
Yes
Yes
De-energize, check if the connection wire between the outdoor mainboard and the filter board according to the wiring diagram
Connected correctly?
No
Reconnect according to the wiring diagram
Eliminate the malfunction
Yes
No
Yes
The connection wire is broken?
Yes
Replace the connection wire
Eliminate the malfunction
Yes
No
No
Check if there is power input bewtween the netrual wire and live wire of the outdoor mainboard
There is power input?
No
Replace the filter board of the outdoor unit
Eliminate the malfunction
Yes
No
Yes
Replace the outdoor mainboard
Resume communication?
No
Replace indoor mainboard
Yes
End

9. Anti-high temperatureand overload malfunction

Main checking points:

- If the outdoor ambient temperature is within the normal range;
- If the indoor fan and outdoor fan are running normally;
- If the indoor and outdoor radiation environment is good;

Flow chart:



9.4 Maintenance Method for Normal Malfunction

1. Air Conditioner Can't be Started Up

Possible Causes	Discriminating Method (Air conditioner Status)	Troubleshooting
No power supply, or poor connection for power plug	After energization, operation indicator isn't bright and the buzzer can't give out sound	Confirm whether it's due to power failure. If yes, wait for power recovery. If not, check power supply circuit and make sure the power plug is connected well.
Wrong wire connection between indoor unit and outdoor unit, or poor connection for wiring terminals	Under normal power supply circumstances, operation indicator isn't bright after energization	Check the circuit according to circuit diagram and connect wires correctly. Make sure all wiring terminals are connected firmly
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 is 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

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
Rotation speed of the IDU fan motor is set too low	Small wind blow	Set the fan speed at high or medium
Filter of indoor unit is blocked	Check the filter to see it's blocked	Clean the filter
Installation position for indoor unit and outdoor unit is improper	Check whether the installation postion is proper according to installation requirement for air conditioner	Adjust the installation position, and install the rainproof and sunproof for outdoor unit
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's pressure is much lower than regulated range	Find out the leakage causes and deal with it. Add refrigerant.
Malfunction of 4-way valve	Blow cold wind during heating	Replace the 4-way valve
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't pressure is much lower than regulated range. If refrigerant isn't leaking, part of capillary is blocked	Replace the capillary
Flow volume of valve is insufficient	The pressure of valves is much lower than that stated in the specification	Open the valve completely
Malfunction of horizontal louver	Horizontal louver can't swing	Refer to point 3 of maintenance method for details
Malfunction of the IDU fan motor	The IDU fan motor can't operate	Refer to troubleshooting for H6 for maintenance method in details
Malfunction of the ODU fan motor	The ODU fan motor can't operate	Refer to point 4 of maintenance method for details
Malfunction of compressor	Compressor can't operate	Refer to point 5 of maintenance method for details

3. Horizontal Louver 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
Stepping motor is damaged	Stepping motor can't operate	Repair or replace stepping motor
Main board is damaged	Others are all normal, while horizontal louver can't operate	Replace the main board with the same model

4. ODU Fan Motor 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 the ODU fan motor 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 capacity of fan
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
Motor of outdoor unit is damaged	When unit is on, cooling/heating performance is bad and ODU compressor generates a lot of noise and heat.	Change compressor oil and refrigerant. If no better, replace the compressor with a new one

5. 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 it's 0	Repair or replace compressor
Cylinder of compressor is blocked	Compressor can't operate	Repair or replace compressor

6. Air Conditioner is Leaking

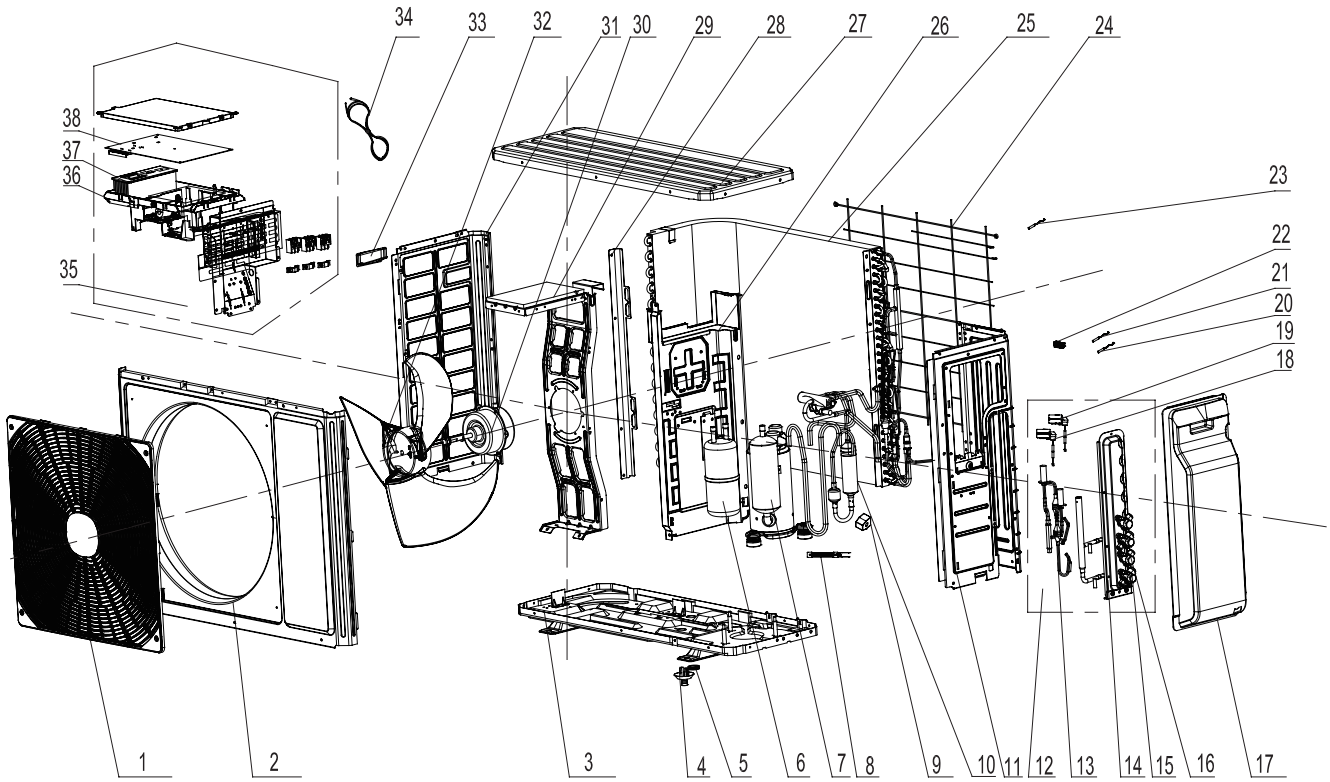
Possible causes	Discriminating method (air conditioner status)	Troubleshooting
Drain pipe is blocked	Water leaking from indoor unit	Eliminate the foreign objects inside the drain pipe
Drain pipe is broken	Water leaking from drain pipe	Replace drain pipe
Wrapping is not tight	Water leaking from the pipe connection place of indoor unit	Wrap it again and bundle it tightly

7. 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.
Foreign objects inside the indoor unit or there're parts touching together inside the indoor unit	There's abnormal sound fro indoor unit	Remove foreign objects. Adjust all parts' position of indoor unit, tighten screws and stick damping plaster between connected parts
Foreign objects inside the outdoor unit or there're parts touching together inside the outdoor unit	There's abnormal sound fro outdoor unit	Remove foreign objects. Adjust all parts' position of outdoor unit, tighten screws and stick damping plaster between connected parts
Short circuit inside the magnetic coil	During heating, the way valve has abnormal electromagnetic sound	Replace magnetic coil
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.

10. Exploded View and Parts List

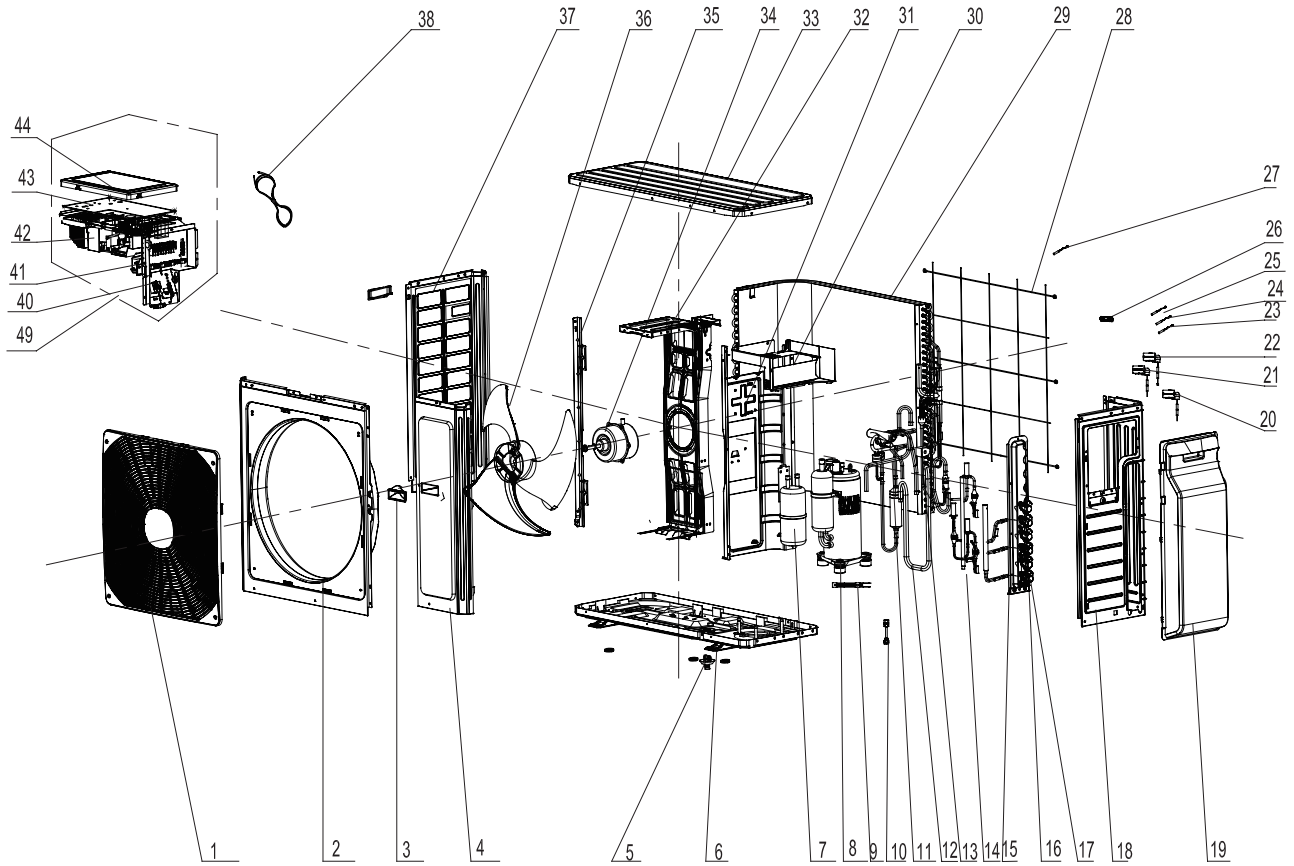
(1) Model:GWHD(18)NK3JO(DRED)



NO.	Description	Part Code	Qty
		GWHD(18)NK3JO(DRED)	
	Product Code	CB228W05900	
1	Front Grill	22413025	1
2	Front Panel	01535013P	1
3	Chassis Sub-assy	0280326301P	1
4	Drainage Connecter	06123401	1
5	Drainage hole Cap	06813401	3
6	Gas-liquid Separator Assy	07225017	1
7	Compressor and fittings	00105249G	1
8	Electric Heater(Compressor)	32003001	1
9	Magnet Coil	4300040045	1
10	4-Way Valve Assy	03073156	1
11	Right Side Plate	01303268P	1
12	Valve Support Assy	07133845	1
13	Electronic Expansion Valve assy	07133846	1
14	Valve Support Sub-Assy	0171312802P	1
15	Cut off Valve	071302391	1
16	Cut off Valve	07130239	1
17	Valve Cover	20123029	1
18	Electric Expand Valve Fitting	43000084	1
19	Electric Expand Valve Fitting	4300008401	1
20	Temperature Sensor	39000073	1
21	Temperature Sensor	3900007301	1
22	Wiring Clamp	26115004	1
23	Temperature Sensor	3900030901	1
24	Rear Grill	01473043	1
25	Condenser Assy	01163938	1
26	Clapboard Assy	0123315301	1
27	Coping	01255005P	1
28	Supporting Board(Condenser)	01795010	1
29	Motor Support Sub-Assy	01705036	1
30	Fan Motor	1501506402	1
31	Left Side Plate	01305093P	1
32	Axial Flow Fan	10335008	1
33	Handle	26233053	1
34	Connecting Cable	4002054027	0
35	Electric Box Assy	10000100179	1
36	Electric Box	20113027	1
37	Radiator	49010252	1
38	Main Board	30138000489	1

Above data is subject to change without notice.

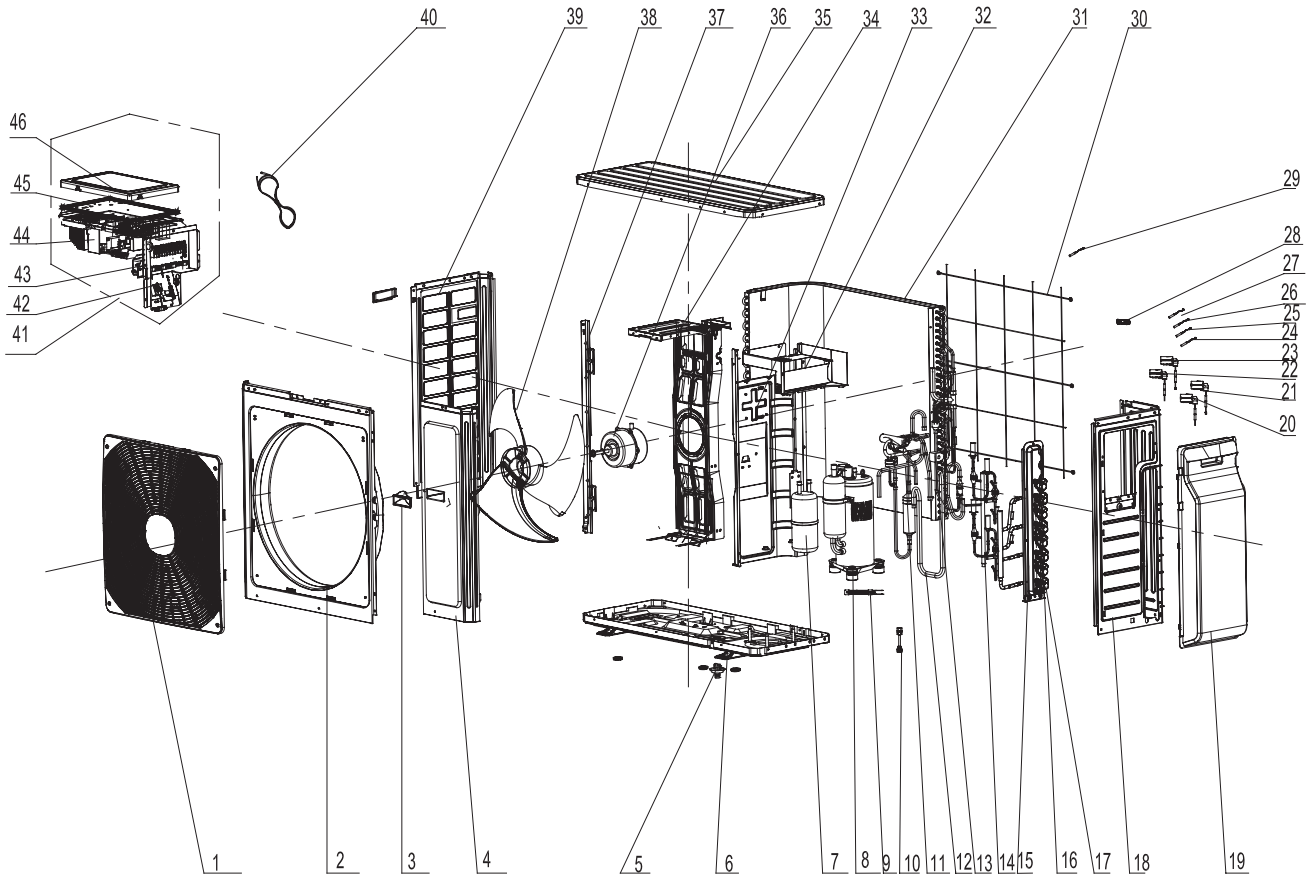
(2) Model:GWHD(24)NK3JO(DRED)



NO.	Description	Part Code	Qty
		GWHD(24)NK3JO(DRED)	
	Product Code	CB228W05800	
1	Front Grill	22413026	1
2	Cabinet	01435004P	1
3	Left Handle	26235401	2
4	Front Side Plate	01305086P	1
5	Drainage Connecter	06123401	1
6	Chassis Sub-assy	0280328001P	1
7	Gas-liquid Separator Assy	07225017	1
8	Compressor and Fittings	0010524501	1
9	Electric Heater(Compressor)	7651873215	1
10	Tube Connector Sub-assy	06643008	2
11	4-Way Valve Assy	03073181	1
12	Connection Pipe	05113723	1
13	Magnet Coil	4300040045	1
14	Electronic Expansion Valve assy	0713395301	1
15	Valve Support Assy	0713395401	1
16	Cut off Valve	07130239	1
17	Cut off Valve	071302391	1
18	Right Side Plate	01314100009P	1
19	Valve Cover	26904100012	1
20	Electric Expand Valve Fitting	43000084	1
21	Electric Expand Valve Fitting	4300008401	1
22	Electric Expand Valve Fitting	4300008402	1
23	Temperature Sensor	39000073	1
24	Temperature Sensor	3900007305	1
25	Temperature Sensor	3900007306	1
26	Wiring Clamp	26115004	1
27	Temperature Sensor	3900030901	1
28	Rear Grill	01574100003	1
29	Condenser Assy	01163980	1
30	Electric Box (Fireproofing)	01413426	1
31	Clapboard Sub-Assy	01233190	1
32	Motor Support Sub-Assy	01705025	1
33	Coping	01255006P	1
34	Fan Motor	1501403402	1
35	Condenser Support Plate	01175092	1
36	Axial Flow Fan	10335014	1
37	Left Side Plate	01305043P	1
38	Connecting Cable	4002054026	0
39	Electric Box Assy	10000100180	1
40	Terminal Board	420111041	1
41	Connection Support	01703211	1
42	Electric Box	20113015	1
43	Main Board	30138000490	1
44	Electric Box Cover Sub-Assy	2603217	1

Above data is subject to change without notice.

(3) Model:GWHD(28)NK3JO(DRED)



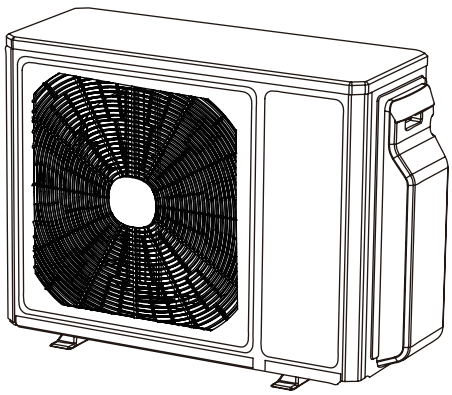
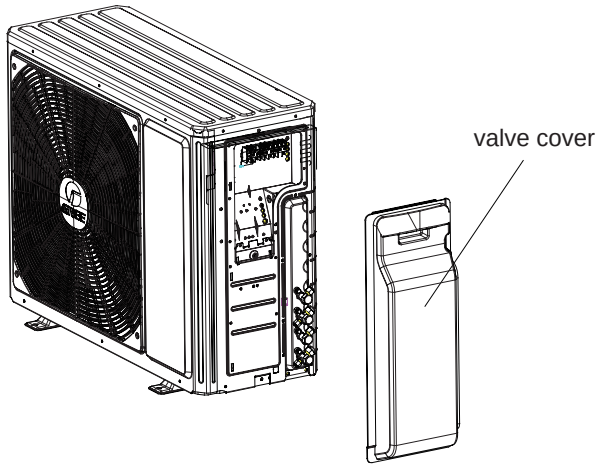
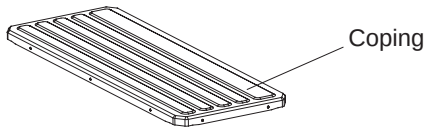
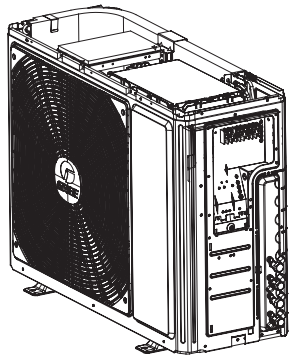
NO.	Description	Part Code	Qty
		GWHD(28)NK3JO(DRED)	
	Product Code	CB228W05700	
1	Front Grill	22413026	1
2	Cabinet	01435004P	1
3	Left Handle	26235401	2
4	Front Side Plate	01305086P	1
5	Drainage Connecter	06123401	1
6	Chassis Sub-assy	0280328001P	1
7	Gas-liquid Separator Assy	07225017	1
8	Compressor and Fittings	0010524501	1
9	Electric Heater(Compressor)	7651873215	1
10	Tube Connector Sub-assy	06643008	2
11	4-Way Valve Assy	03073181	1
12	Connection Pipe	05113723	1
13	Magnet Coil	4300040045	1
14	Electronic Expansion Valve assy	07133953	1
15	Valve Support Assy	07133954	1
16	Cut off Valve	07130239	1
17	Cut off Valve	07130239	1
18	Right Side Plate	01314100009P	1
19	Valve Cover	26904100012	1
20	Electric Expand Valve Fitting	43000084	1
21	Electric Expand Valve Fitting	4300008401	1
22	Electric Expand Valve Fitting	4300008402	1
23	Electric Expand Valve Fitting	4300008403	1
24	Temperature Sensor	39000073	1
25	Temperature Sensor	3900007305	1
26	Temperature Sensor	3900007306	1
27	Temperature Sensor	3900007307	1
28	Wiring Clamp	26115004	1
29	Temperature Sensor	3900030901	1
30	Rear Grill	01574100003	1
31	Condenser Assy	01163980	1
32	Electric Box (Fireproofing)	01413426	1
33	Clapboard Sub-Assy	01233190	1
34	Motor Support Sub-Assy	01705025	1
35	Coping	01255006P	1
36	Fan Motor	1501403402	1
37	Condenser Support Plate	01175092	1
38	Axial Flow Fan	10335014	1
39	Left Side Plate	01305043P	1
40	Connecting Cable	4002054026	0
41	Electric Box Assy	10000100178	1
42	Terminal Board	420111041	1
43	Connection Support	0170321101	1
44	Electric Box	20113015	1
45	Main Board	30138000491	1
46	Electric Box Cover Sub-Assy	02603217	1

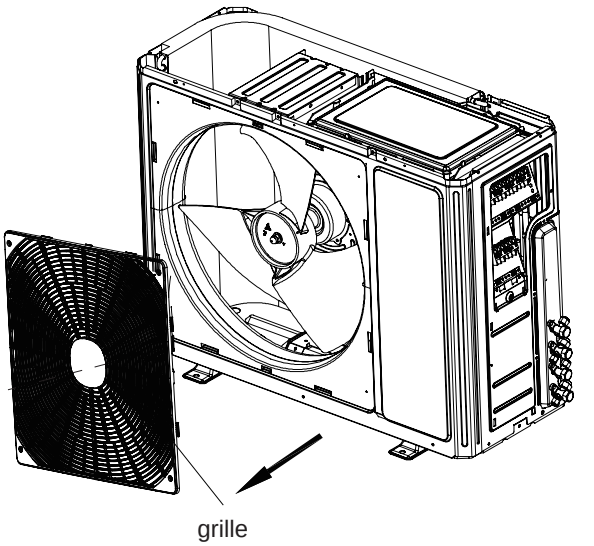
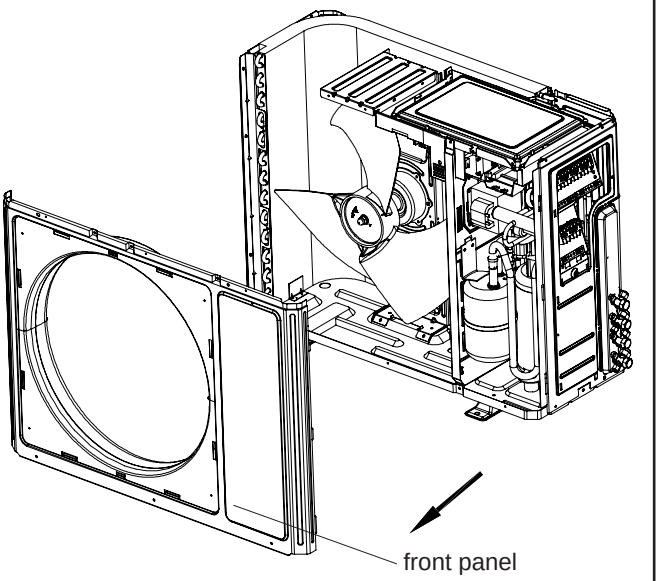
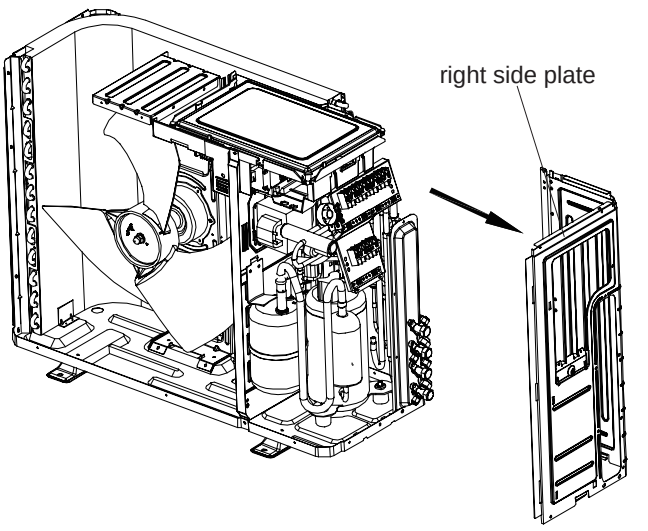
The data above are subject to change without notice.

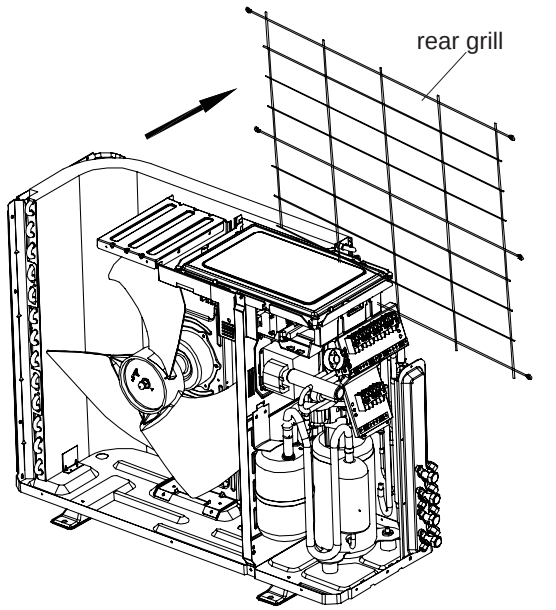
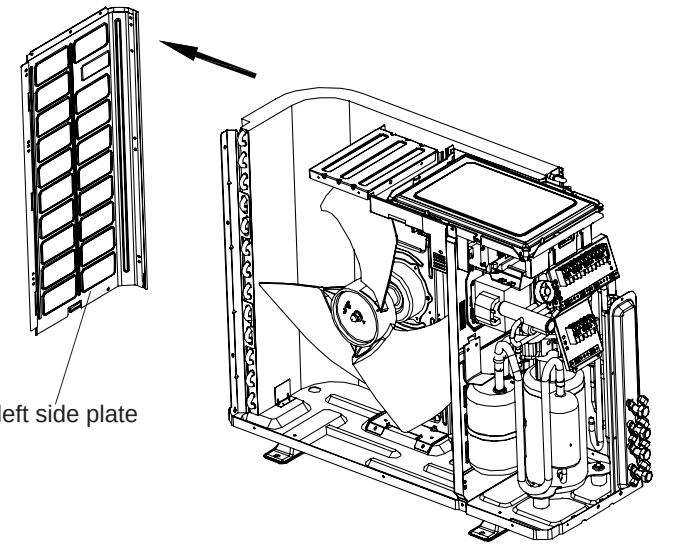
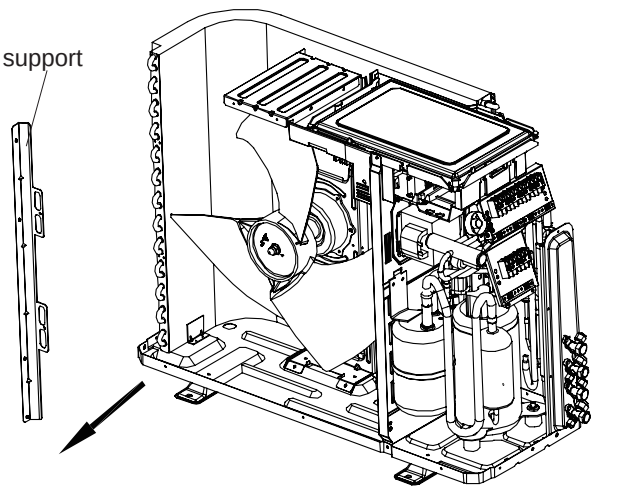
11. Removal Procedure

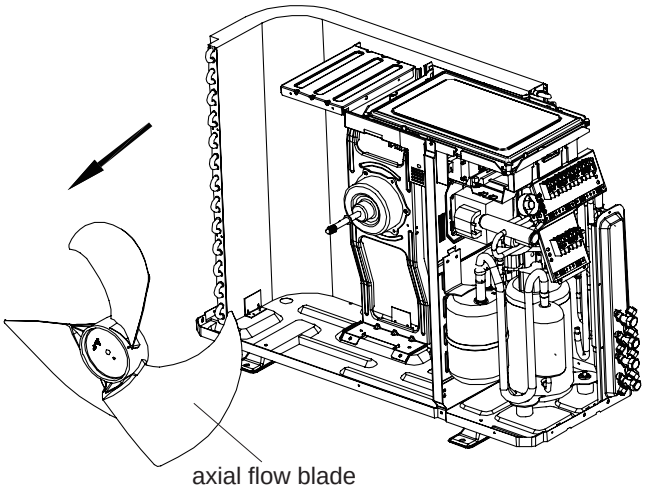
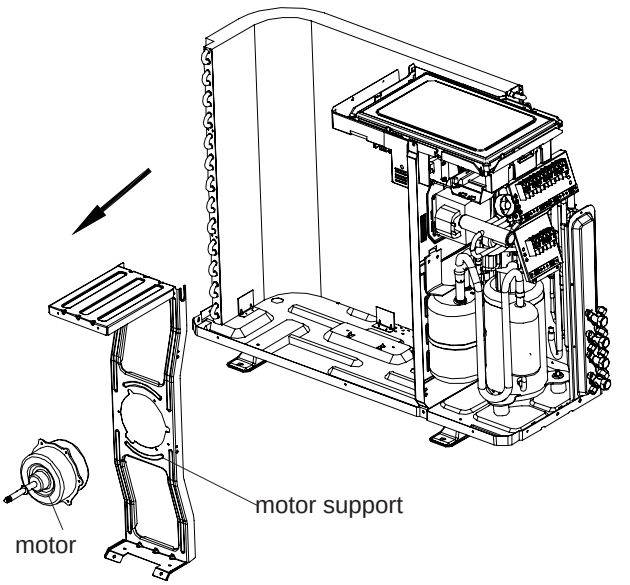
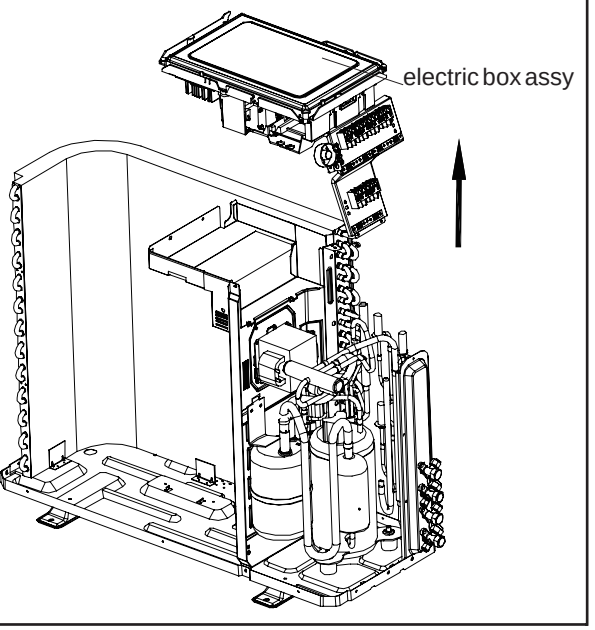
⚠ Warning: Be sure to wait for a minimum of 20 minutes after turning off all power supplies and discharge the refrigerant completely before removal.

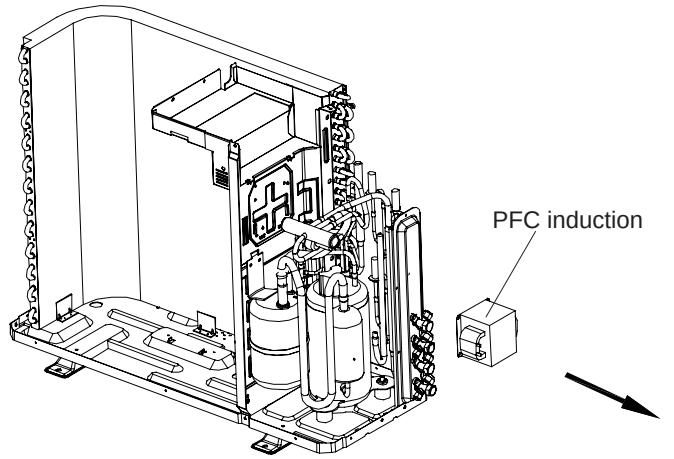
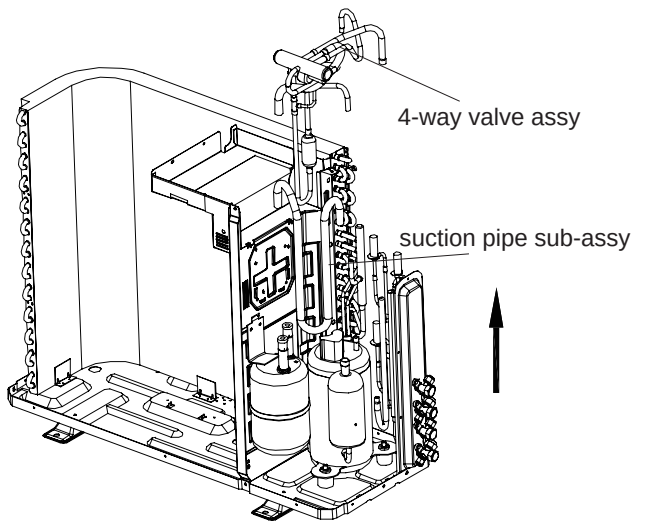
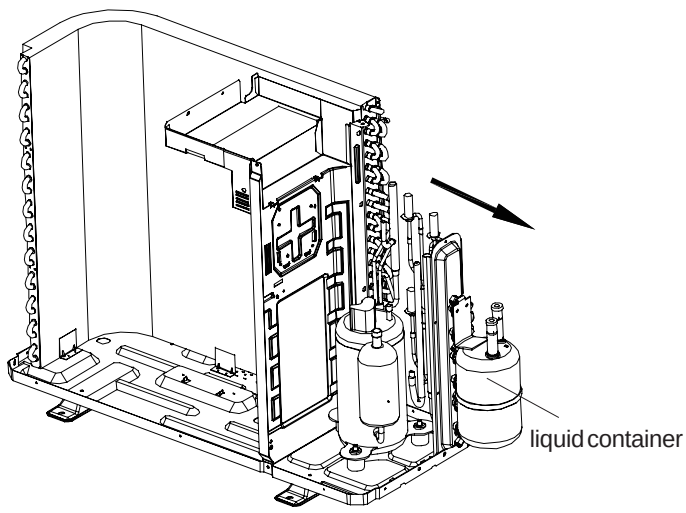
(1)Model:GWHD(18)NK3JO(DRED)

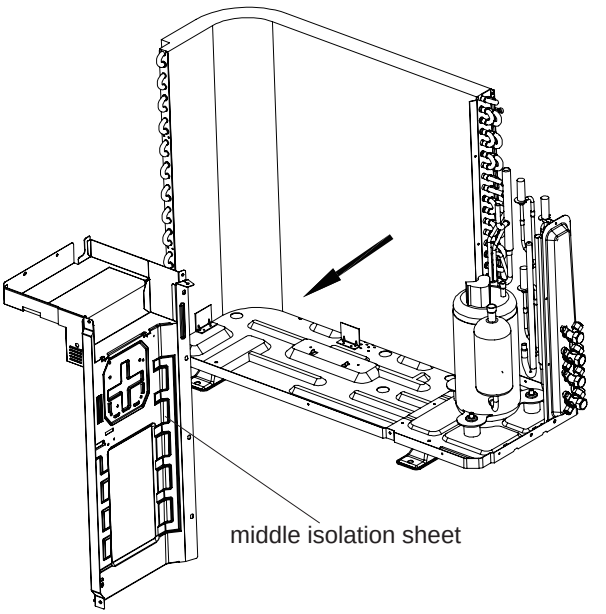
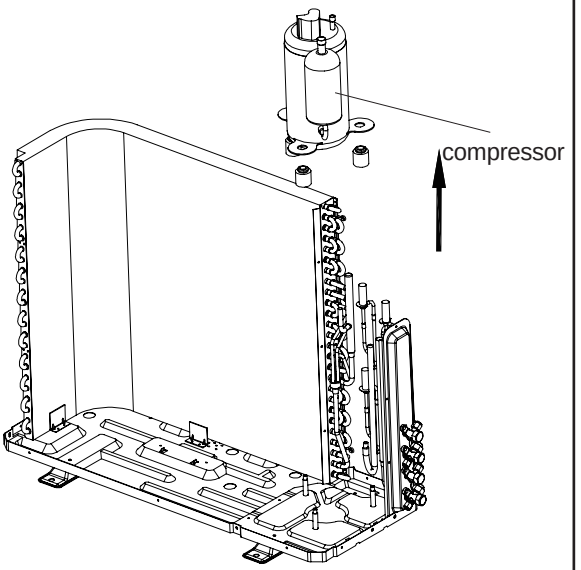
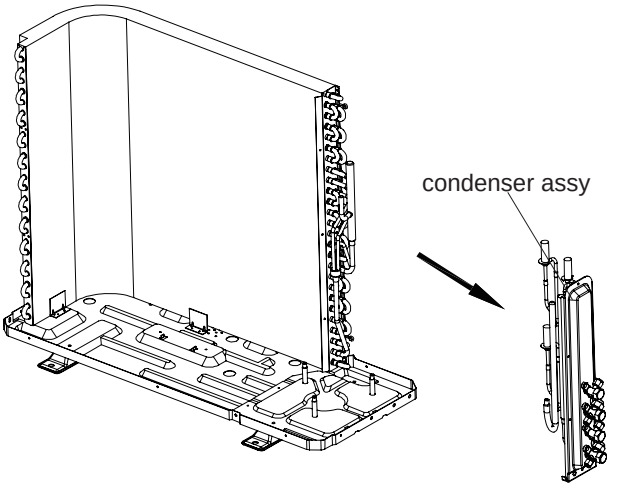
Steps	Procedure	
1. Before disassembly		
	Complete axonometric drawing.	
2. Remove valve cover		
	Remove the connection screw fixing the valve cover and then remove the valve cover.	
3. Remove Coping		 
	Remove the connection screws connecting the top panel with the right side plate and the left side plate, and then remove the Coping.	

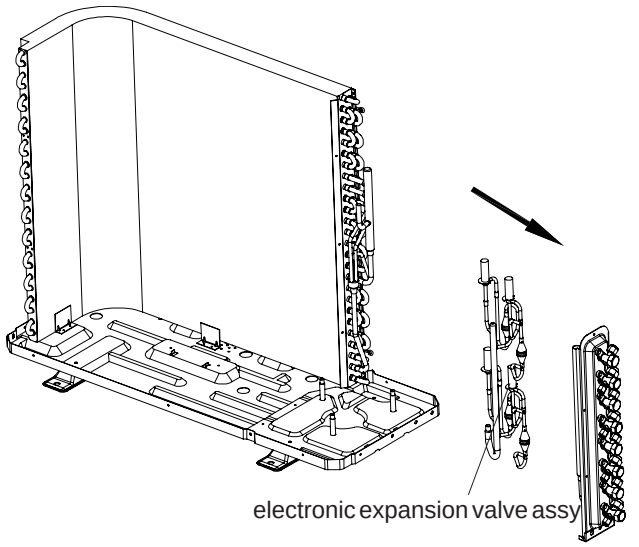
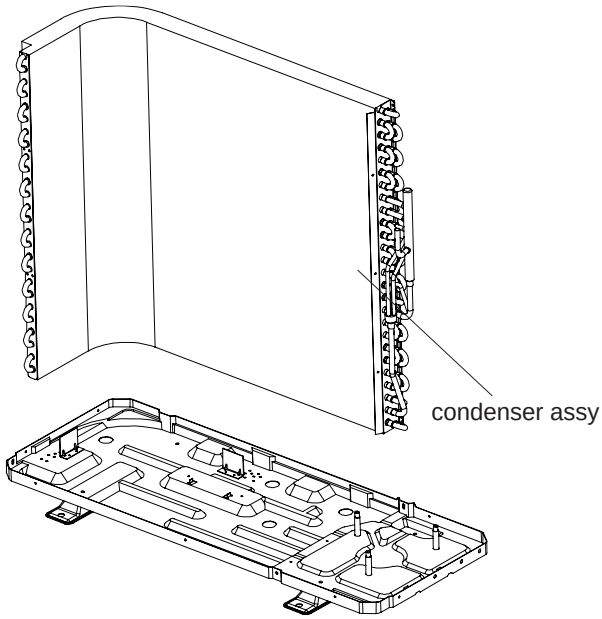
Steps	Procedure
4. Remove front grille	
Remove the connection screws connecting the front grille and the front panel, and then loosen the clasp to remove the front grille.	
5. Remove front panel	
Remove the screws connecting the front panel and then remove the front panel.	
6. Remove right side plate	
Remove the screws connecting the right side plate with the chassis and the valve support. Then remove the right side plate.	

Steps	Procedure
7. Remove rear grill	
Remove the screws connecting the rear grill and the left side plate, and then remove the rear grill.	
8. Remove left side plate	
Remove the screws fixing the left side plate with the chassis and the condenser support, and then remove the left side plate.	
9. Remove condenser support	
Remove the connection screws connecting the condenser support and the chassis, and then remove the condenser support.	

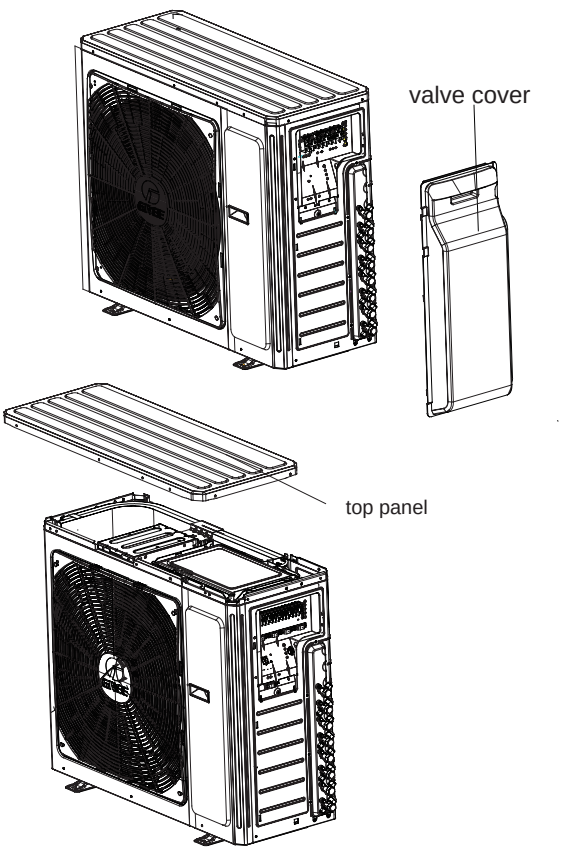
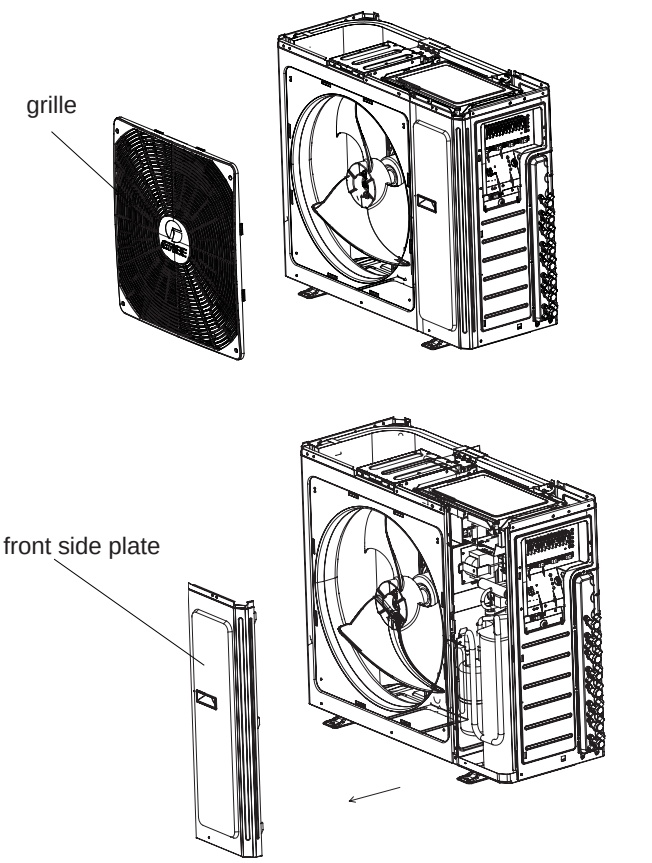
Steps	Procedure
10. Remove axial flow blade	
Remove the nut on the blade and then remove the axial flow blade.	
11. Remove motor and motor support	
Remove the 4 tapping screws fixing the motor and disconnect the leading wire insert of the motor. Then remove the motor. Remove the 2 tapping screws fixing the motor support and chassis, and then lift the motor support to remove it.	
12. Remove electric box assy	
Remove the screws fixing the electric box assy and the middle isolation sheet, and then lift the electric box assy to remove it.	

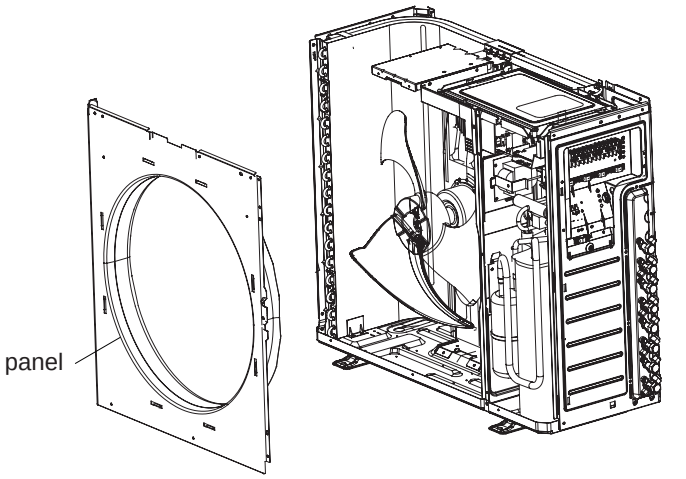
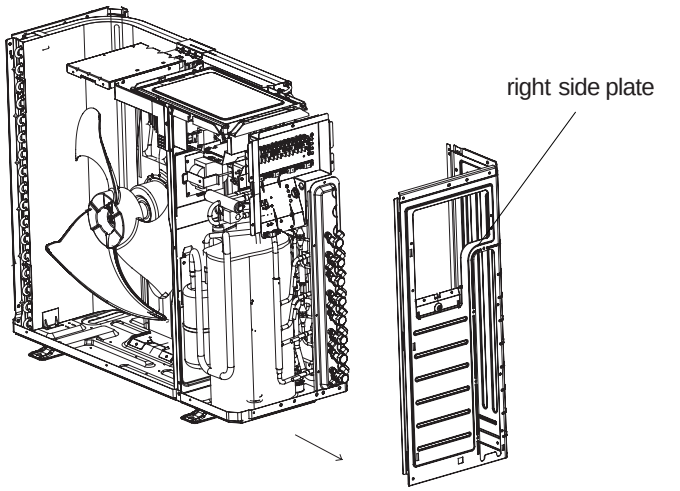
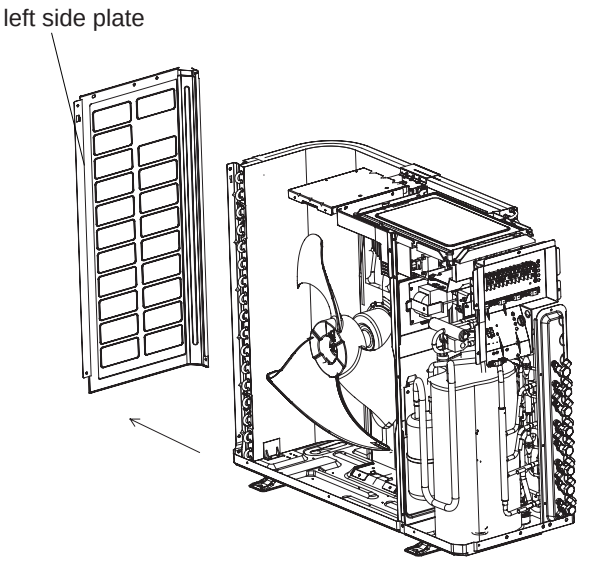
Steps	Procedure
13. Remove PFC induction	
Remove the screw connecting the PFC induction and middle isolation sheet, and then remove the PFC induction.	
14. Remove 4-way valve assy and suction pipe sub-assy	
Unsolder the welding joint connecting the 4-way valve assy with compressor suction and discharge port, the valve with the outlet pipe of condenser. Then lift the 4-way valve assy to remove it. (NOTE: Discharge the refrigerant completely before unsoldering.) Unsolder the welding joint connecting the suction pipe sub-assy with compressor and liquid container, and then remove the suction pipe sub-assy.	
15. Remove liquid container	
Remove the screws connecting the isolation plate sub-assy and the liquid container, and then lift the liquid container to remove it.	

Steps	Procedure
16. Remove middle isolation sheet	
Remove the screws connecting the middle isolation sheet with the chassis assy and the condenser assy, and then remove the middle isolation sheet.	
17. Remove compressor	
Remove the 3 foot nuts fixing the compressor and then remove the compressor.	
18. Remove valve support sub-assy	
Remove the screw connecting the valve support assy and the chassis sub-assy, and then remove the valve support assy.	

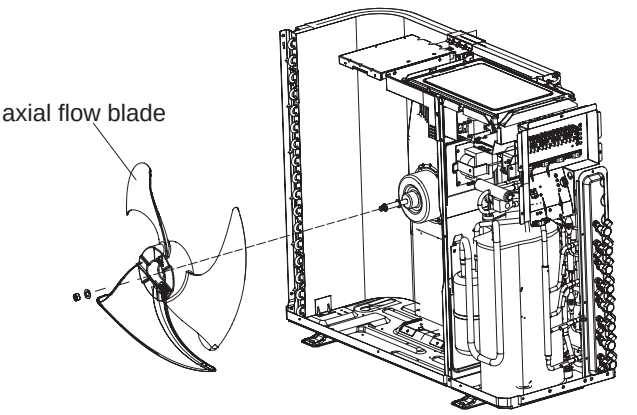
Steps	Procedure
19. Remove electronic expansion valve assy	
Unsolder the welding joint connecting the electronic expansion valve sub-assy with the gas collection pipe, and then remove the electronic expansion valve assy. (Note: when unsoldering, wrap the gas valve with a wet cloth completely to avoid damage to the valve caused by high temperature).	
20. Remove condenser assy	
Remove the screws connecting the condenser assy and the chassis assy, and then remove the condenser assy.	

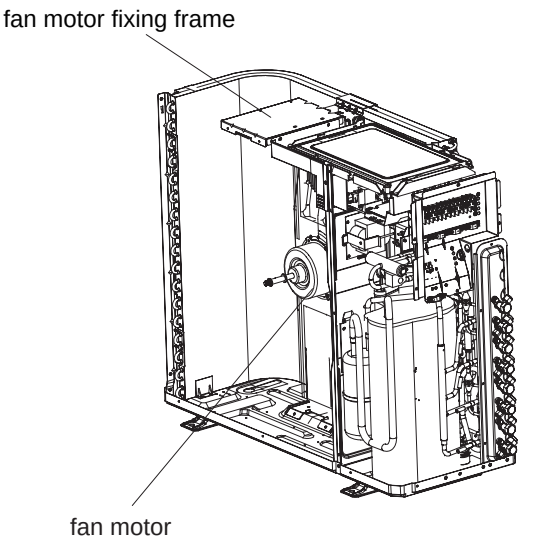
(2)Models:GWHD(24)NK3JO(DRED) GWHD(28)NK3JO(DRED)

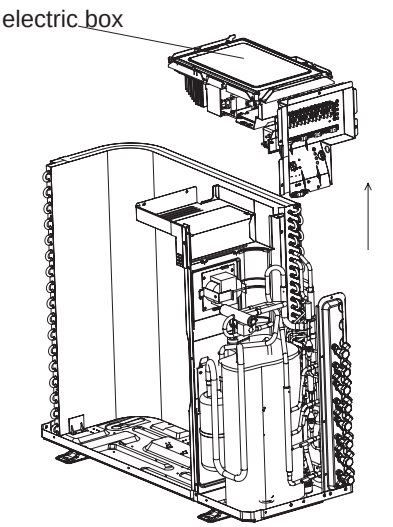
Steps	Procedure
1. Remove valve cover and top panel	
1 Twist off the screws used for fixing and valve cover , pull valve cover up ward to remove it.	
2 Remove the 3 screws connecting the top panel with the front panel and the right side plate, and then remove the top panel.	
2. Remove grille,front side plate and panel.	
1 Remove the 2 screws connecting the grille and the panel, and then remove the grille.	
2 Remove the 1 screw connecting the front side plate and the panel,and then remove the front side plate.	

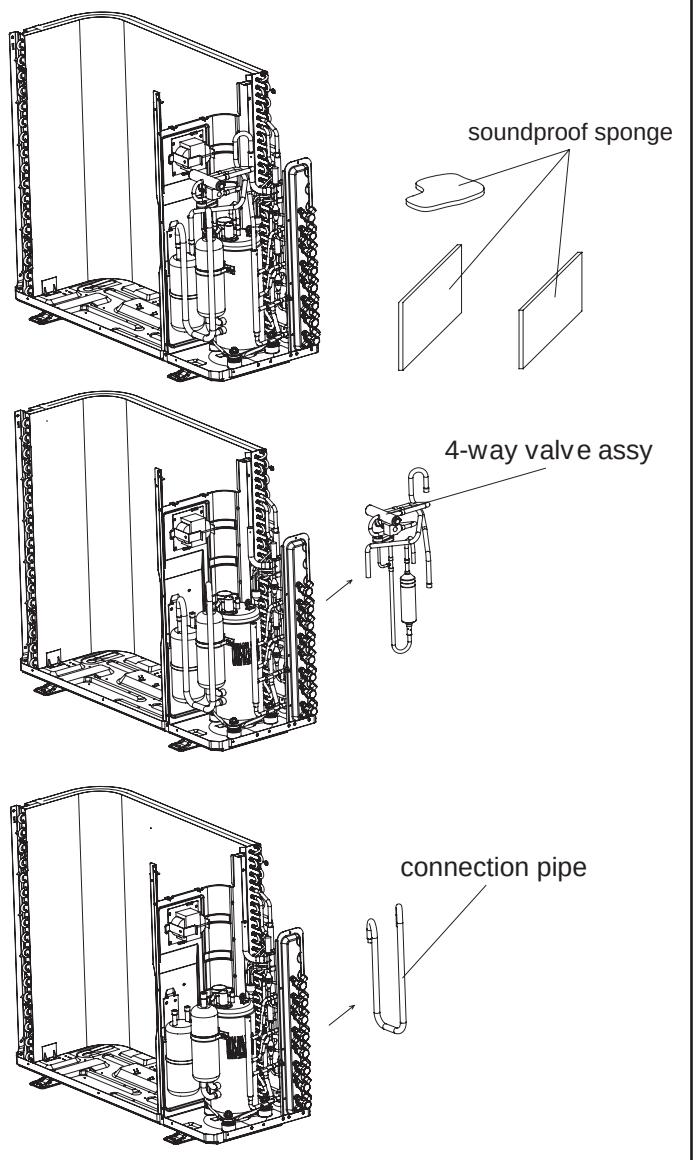
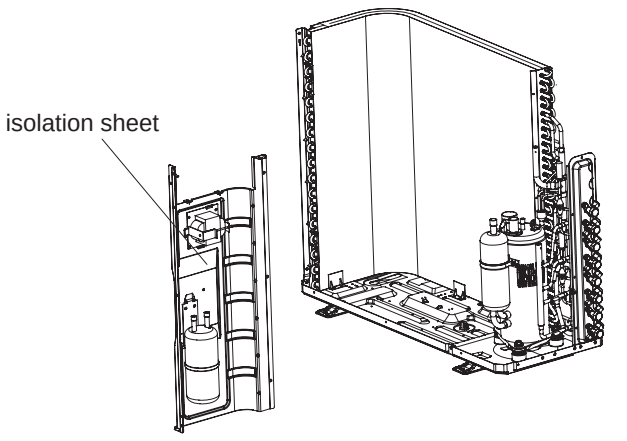
Steps	Procedure	
3	Remove the 5 screws connecting the panel with the chassis and the motor support, and then remove the panel.	
3. Remove right side plate and left side plate		
1	Remove the screws connecting the right side plate with the chassis, the valve support and the electric box, and then remove the right side plate assy.	
2	Remove the screws connecting the left side plate and the chassis, and then remove the left side plate assy.	

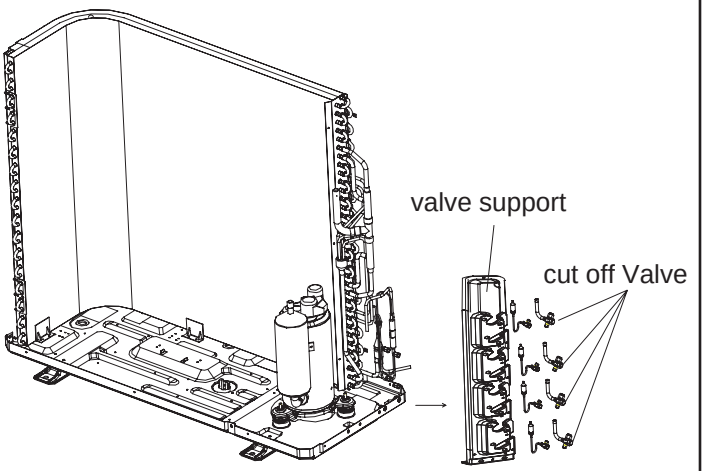
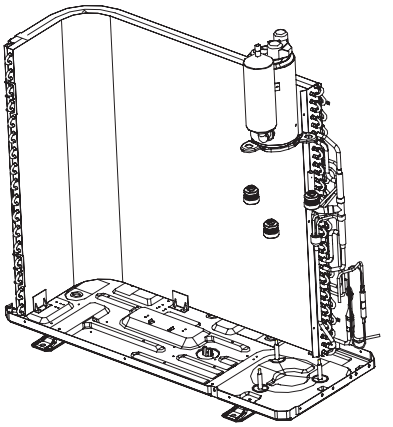
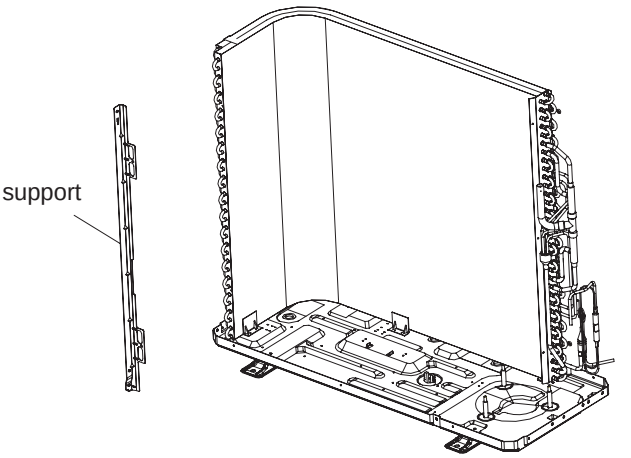
Steps	Procedure
4. Remove fan motor and axial flow blade	
1	Remove the nuts fixing the blade and then remove the axial flow blade.
2	Remove the 4 tapping screws fixing the motor; disconnect the leading wire insert of the motor and then remove the motor. Remove the 2 tapping screws fixing the motor support and then pull the motor support upwards to remove it.
5. Remove electric box	
	Remove the screws fixing the electric box sub-assy; loosen the wire bundle; pull out the wiring terminals and then pull the electric box upwards to remove it.



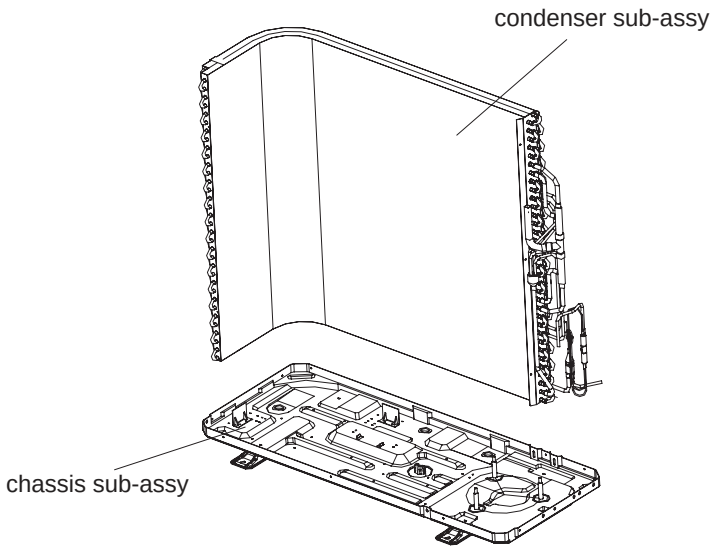




Steps	Procedure
6.Remove soundproof sponge and 4-way valve assy	
1 Since the piping ports on the soundproof sponge are torn easily, remove the soundproof sponge carefully	
2 Discharge the refrigerant completely;unsolder the pipelines connecting the compressor and the condenser assy,and then remove the 4-way valve assy.	
7. Remove Isolation sheet	
Remove the 3 screws fixing the isolation sheet and then remove the Isolation sheet.	

Steps	Procedure	
8. Remove Cut off Valve and Valve Support		
	Remove the 2 bolts fixing the valve subassemblies. Unsolder the welding joint connecting the gas valve and the return air pipe. Remove the gas valve. (Note: When unsoldering the soldering joint, wrap the gas valve with wet cloth completely to avoid damage to the valve caused by high temperature.) Unsolder the welding joint connecting the liquid valve and the connecting pipe.Remove the liquid valve. Remove screws fixing valve support and then remove the valve support.	
9. Remove compressor		
	Remove the 3 foot nuts fixing the compressor and then remove the compressor.	
10.Remove support		
1	Remove the screws connecting the support and condenser assy,and thenremove the support.	

Steps	
11.Remove condenser sub-assy	
	Remove the chassis sub-assy and condenser sub-assy.



Appendix:

Appendix 1: Reference Sheet of Celsius and Fahrenheit

Conversion formula for Fahrenheit degree and Celsius degree: Tf=Tcx1.8+32

Set temperature

Fahrenheit display temperature (℉)	Fahrenheit (℉)	Celsius (℃)		Fahrenheit display temperature (℉)	Fahrenheit (℉)	Celsius (℃)		Fahrenheit display temperature (℉)	Fahrenheit (℉)	Celsius (℃)
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

Ambient temperature

Fahrenheit display temperature (℉)	Fahrenheit (℉)	Celsius (℃)		Fahrenheit display temperature (℉)	Fahrenheit (℉)	Celsius (℃)		Fahrenheit display temperature (℉)	Fahrenheit (℉)	Celsius (℃)
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: Configuration of Connection Pipe

1.Standard length of connection pipe

● 16.4ft,24.6ft, 26.2ft.

2.Min. length of connection pipe is 9.84ft.

3.Max. length of connection pipe and max. high difference.

4.The additional refrigerant oil and refrigerant charging required after prolonging connection pipe

● After the length of connection pipe is prolonged for 32.8ft at the basis of standard length, you should add 5ml of refrigerant oil for each additional 16.4ft of connection pipe.

● The calculation method of additional refrigerant charging amount (on the basis of liquid pipe):

Cooling capacity	Max length of connection pipe	Max height difference
5000 Btu/h(1465 W)	49.2 ft	16.4 ft
7000 Btu/h(2051 W)	49.2 ft	16.4 ft
9000 Btu/h(2637 W)	49.2 ft	32.8 ft
12000 Btu/h(3516 W)	65.6 ft	32.8 ft
18000 Btu/h(5274 W)	82.0 ft	32.8 ft
24000 Btu/h(7032 W)	82.0 ft	32.8 ft
28000 Btu/h(8204 W)	98.4 ft	32.8 ft
36000 Btu/h(10548 W)	98.4 ft	65.6 ft
42000 Btu/h(12306 W)	98.4 ft	65.6 ft
48000 Btu/h(14064 W)	98.4 ft	65.6 ft

● When the length of connection pipe is above 16.4ft, add refrigerant according to the prolonged length of liquid pipe. The additional refrigerant charging amount per meter is different according to the diameter of liquid pipe. See the following sheet.

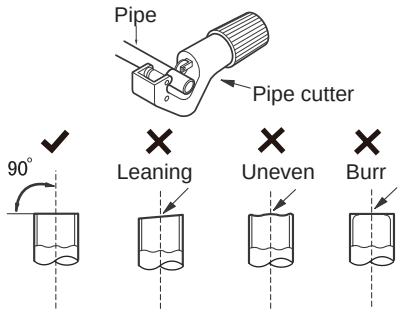
● Additional refrigerant charging amount = prolonged length of liquid pipe X additional refrigerant charging amount per meter

Additional refrigerant charging amount for R22, R407C, R410A and R134a			
Diameter of connection pipe		Outdoor unit throttle	
Liquid pipe(inch)	Gas pipe(inch)	Cooling only(oz/ft)	Cooling and heating(oz/ft)
Φ0.23	Φ0.37 or Φ0.47	0.53	0.71
Φ0.23 or Φ0.37	Φ0.63 or Φ0.75	0.53	0.71
Φ0.47	Φ0.75 or Φ0.84	1.06	4.23
Φ0.63	Φ1.0 or Φ1.25	2.12	4.23
Φ0.75	/	8.82	8.11
Φ0.84	/	12.34	12.34

Appendix 3: Pipe Expanding Method

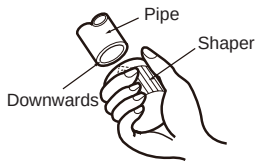
⚠ **Note:**

Improper pipe expanding is the main cause of refrigerant leakage.Please expand the pipe according to the following steps:



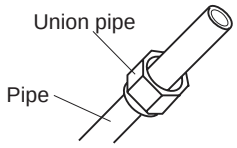
A:Cut the pip
- Confirm the pipe length according to the distance of indoor unit and outdoor unit.
- Cut the required pipe with pipe cutter.

B:Remove the burrs
- Remove the burrs with shaper and prevent the burrs from getting into the pipe.



C:Put on suitable insulating pipe

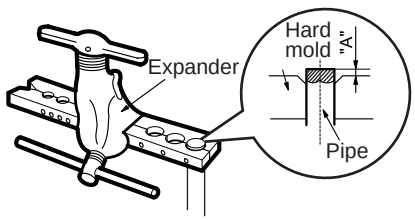
D:Put on the union nut
- Remove the union nut on the indoor connection pipe and outdoor valve; install the union nut on the pipe.



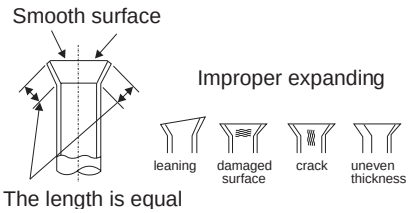
E:Expand the port
- Expand the port with expander.

⚠ **Note:**
- "A" is different according to the diameter, please refer to the sheet below:

Outer diameter(inch)	A(inch)	
	Max	Min
Φ0.23 - 0.25 (1/4")	0.051	0.028
Φ9.52 (3/8")	0.063	0.039
Φ0.37 - 0.5 (1/2")	0.071	0.039
Φ0.63 (5/8")	0.095	0.087



F:Inspection
- Check the quality of expanding port. If there is any blemish, expand the port again according to the steps above.



Appendix 4: List of Resistance for Temperature Sensor

Resistance Table of Ambient Temperature Sensor for Indoor and Outdoor Units(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

Resistance Table of Tube Temperature Sensors for Indoor and Outdoor (20K)

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 Discharge Temperature Sensor for Outdoor(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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