



Service Manual

Model: GWH18QD-K3DNA6C
(Refrigerant:R410A)

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2. Specifications

2.1 Specification Sheet

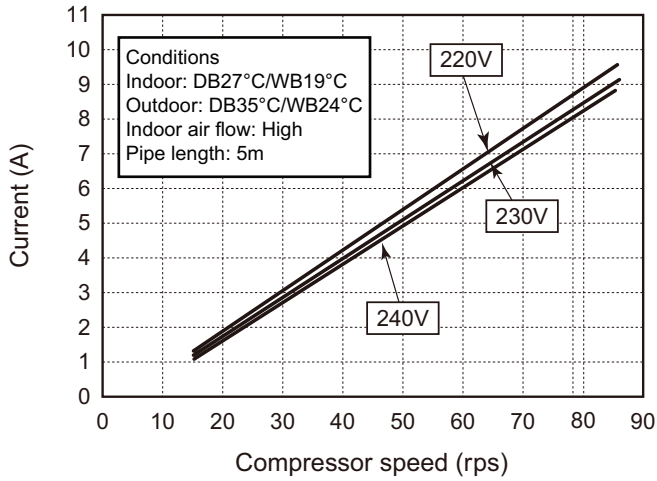
Model			GWH18QD-K3DNA6C	
Product Code			CB427004100	
Power Supply	Rated Voltage	V~	220-240	
	Rated Frequency	Hz	50	
	Phases		1	
Power Supply Mode			Outdoor	
Cooling Capacity(Min~Max)		W	4600(650~5200)	
Heating Capacity(Min~Max)		W	5000(700~5275)	
Cooling Power Input(Min~Max)		W	1430(150~1860)	
Heating Power Input(Min~Max)		W	1380(160~1680)	
Cooling Current Input		A	6.34	
Heating Current Input		A	6.12	
Rated Input		W	1860	
Rated Current		A	8.25	
Air Flow Volume(SH/H/M/L/SL)		m ³ /h	850/720/610/520/-	
Dehumidifying Volume		L/h	1.8	
EER		W/W	3.22	
COP		W/W	3.62	
SEER			6.1	
SCOP			4.0(Average)/ 5.1(Warmer)/ 3.3 (Colder)	
Application Area		m ²	21-31	
Indoor Unit	Indoor Unit Model		GWH18QD-K3DNA6C/I	
	Indoor Unit Product Code		CB427N04100	
	Fan Type		Cross-flow	
	Fan Diameter Length(DXL)		mm	Φ106X706
	Cooling Speed(SH/H/M/L/SL)		r/min	1230/1130/1030/800/-
	Heating Speed(SH/H/M/L/SL)		r/min	1350/1200/1050/900/-
	Fan Motor Power Output		W	/
	Fan Motor RLA		A	0.35
	Fan Motor Capacitor		μF	2.5
	Evaporator Form			Aluminum Fin-copper Tube
	Evaporator Pipe Diameter		mm	Φ7
	Evaporator Row-fin Gap		mm	2-1.4
	Evaporator Coil Length(LXDXW)		mm	715X25.4X304.8
	Swing Motor Model			MP35CJ
	Swing Motor Power Output		W	2.5
	Fuse Current		A	3.15
	Sound Pressure Level(SH/H/M/L/SL)		dB (A)	45/41/37/33/-
	Sound Power Level(SH/H/M/L/SL)		dB (A)	58/53/50/45/-
	Dimension(WXHXD)		mm	970X300X224
	Dimension of Carton Box(LXWXH)		mm	1038X380X305
	Dimension of Package(LXWXH)		mm	1041X383X320
Net Weight		kg	13.5	
Gross Weight		kg	16.5	

Outdoor Unit	Model of Outdoor Unit		GWH18QD-K3DNA6C/O	
	Product Code of Outdoor Unit		CB427W04100	
	Compressor Manufacturer/Trademark		ZHUHAI GREE DAIKIN DEVICE CO., LTD	
	Compressor Model		1GDY23AXD	
	Compressor Oil		FVC50K	
	Compressor Type		Swing	
	L.R.A.	A		17
	Compressor RLA	A		4
	Compressor Power Input	W		845
	Overload Protector			KSD115/HPC115/95
	Throttling Method			Capillary
	Operation temp	°C		16~30
	Ambient temp (cooling)	°C		-15~48
	Ambient temp (heating)	°C		-22~24
	Condenser Form			Aluminum Fin-copper Tube
	Pipe Diameter	mm		Φ7
	Rows-fin Gap	mm		1-1.4
	Coil Length (LXDXW)	mm		742X38.1X550
	Fan Motor Speed	rpm		900
	Output of Fan Motor	W		30
	Fan Motor RLA	A		0.4
	Fan Motor Capacitor	μF		/
	Air Flow Volume of Outdoor Unit	m ³ /h		2200
	Fan Type			Axial-flow
	Fan Diameter	mm		Φ438
	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
	Sound Pressure Level (H/M/L)	dB (A)		54/-/-
Sound Power Level (H/M/L)	dB (A)		63/-/-	
Dimension (WXHDXD)	mm		842X596X320	
Dimension of Carton Box (LXWXH)	mm		878X360X630	
Dimension of Package (LXWXH)	mm		881X363X645	
Net Weight	kg		33.5	
Gross Weight	kg		36.5	
Refrigerant			R410A	
Refrigerant Charge	kg		1.2	
Connection Pipe	Length	m	5	
	Gas Additional Charge	g/m	20	
	Outer Diameter Liquid Pipe	mm	Φ6	
	Outer Diameter Gas Pipe	mm	Φ9.52	
	Max Distance Height	m	10	
	Max Distance Length	m	20	
Note: The connection pipe applies metric diameter.				

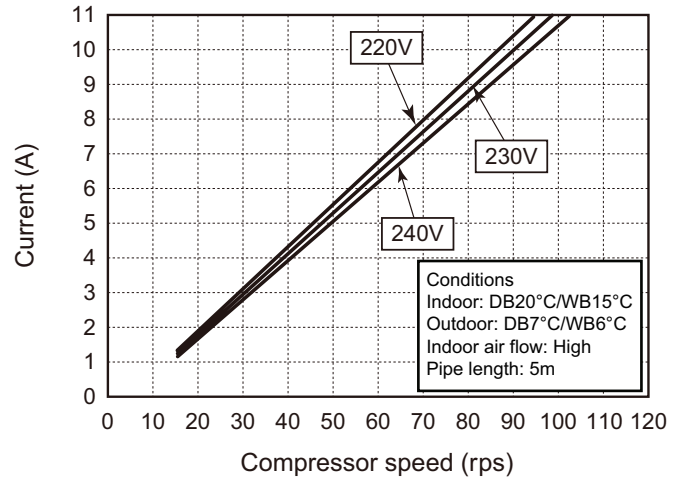
The above data is subject to change without notice; please refer to the nameplate of the unit.

2.2 Operation Characteristic Curve

Cooling

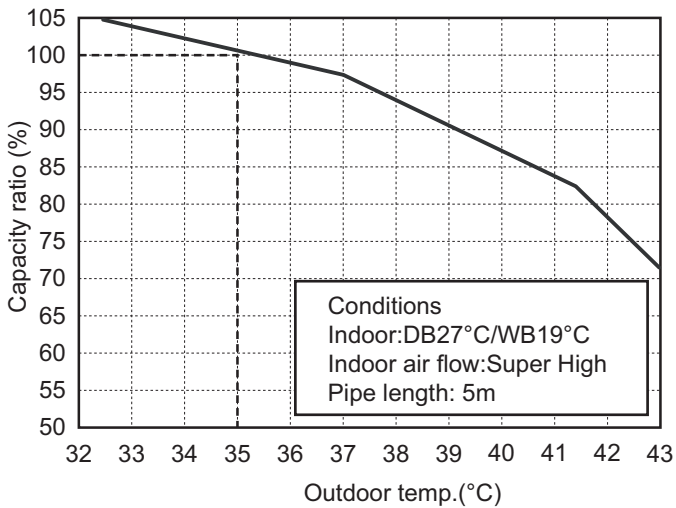


Heating

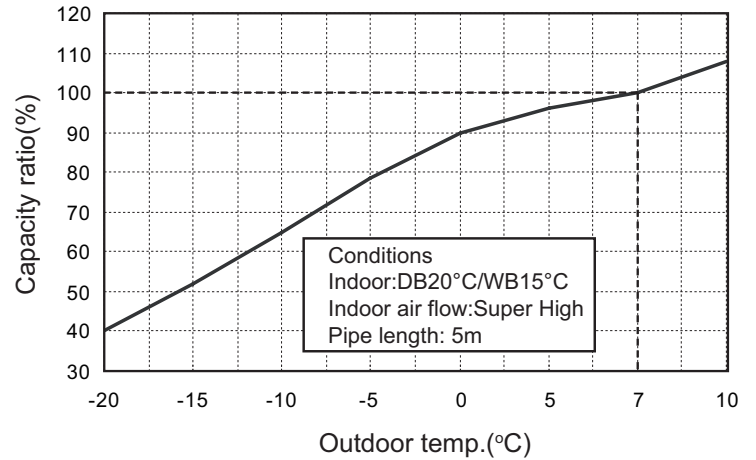


2.3 Capacity Variation Ratio According to Temperature

Cooling



Heating



2.4 Cooling and Heating Data Sheet in Rated Frequency

Cooling:

Rated cooling condition(°C) (DB/WB)		Model	Pressure of gas pipe connecting indoor and outdoor unit	Inlet and outlet pipe temperature of heat exchanger		Fan speed of indoor unit	Fan speed of outdoor unit
Indoor	Outdoor			T1 (°C)	T2 (°C)		
27/19	35/24	18K	P (MPa) 0.8 to 1.0	12 to 14	80 to 40	Super High	High

Heating:

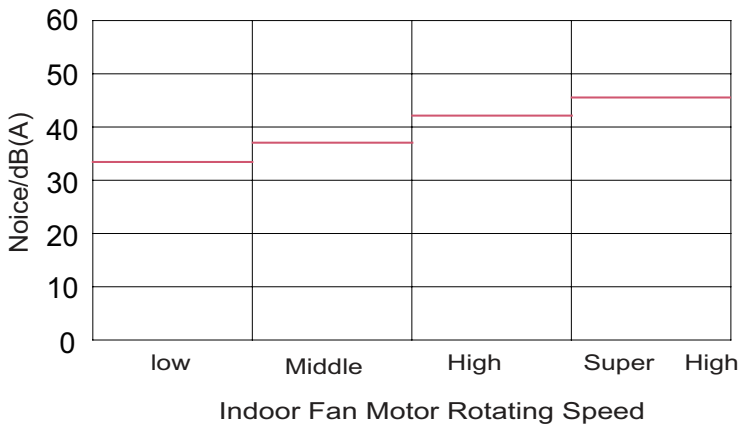
Rated heating condition(°C) (DB/WB)		Model	Pressure of gas pipe connecting indoor and outdoor unit	Inlet and outlet pipe temperature of heat exchanger		Fan speed of indoor unit	Fan speed of outdoor unit
Indoor	Outdoor			T1 (°C)	T2 (°C)		
20/15	7/6	18K	P (MPa) 2.2 to 2.4	70 to 40	1 to 5	Super High	High

Instruction:

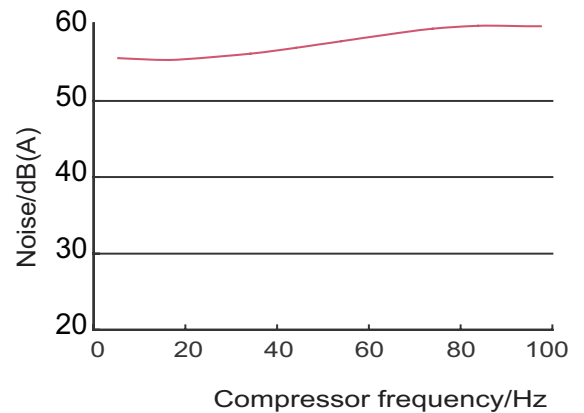
T1: Inlet and outlet pipe temperature of evaporator
 T2: Inlet and outlet pipe temperature of condenser
 P: Pressure at the side of big valve
 Connection pipe length: 5 m.

2.5 Noise Curve

Indoor side noise

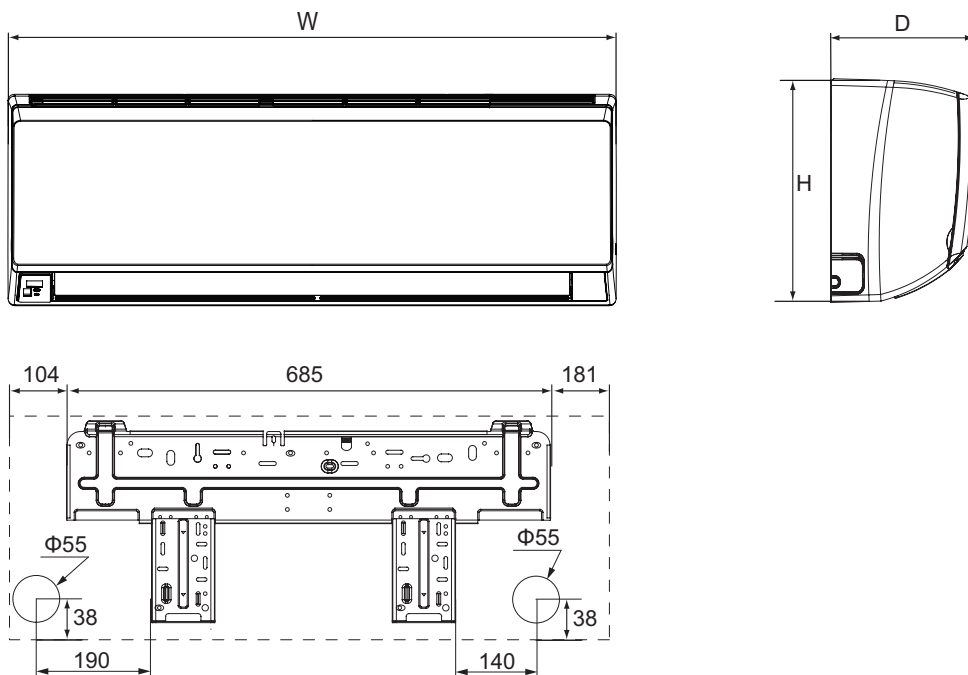


Outdoor side noise



3. Outline Dimension Diagram

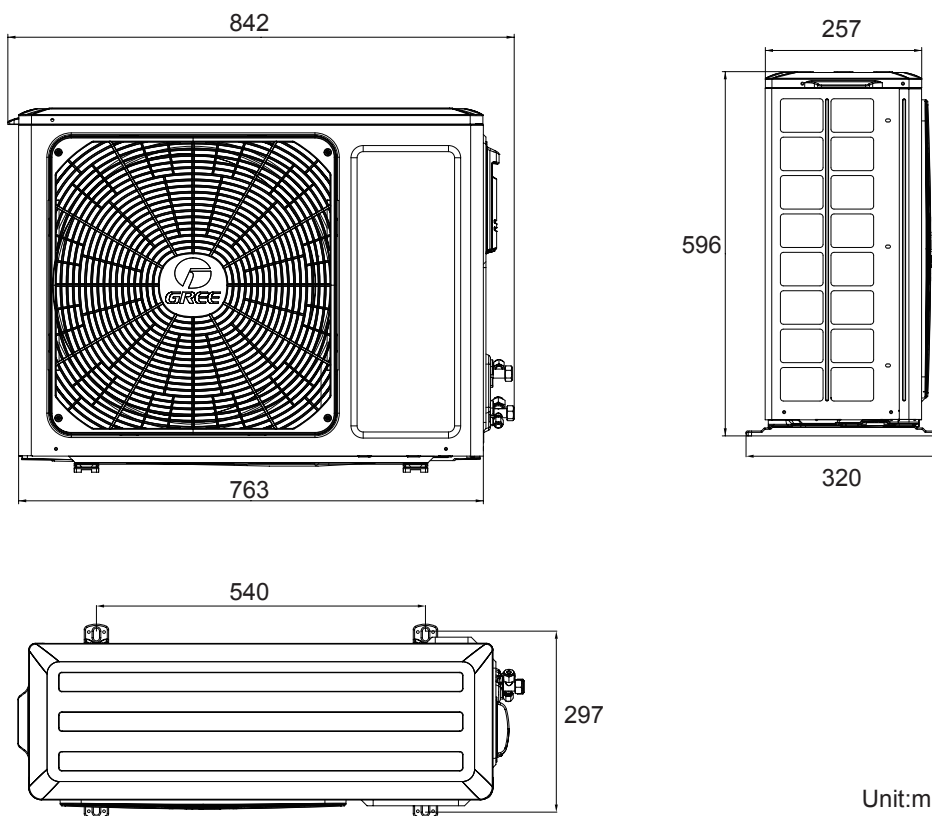
3.1 Indoor Unit



Unit:mm

Models	W	H	D
18K	970	300	224

3.2 Outdoor Unit



Unit:mm

5. Electrical Part

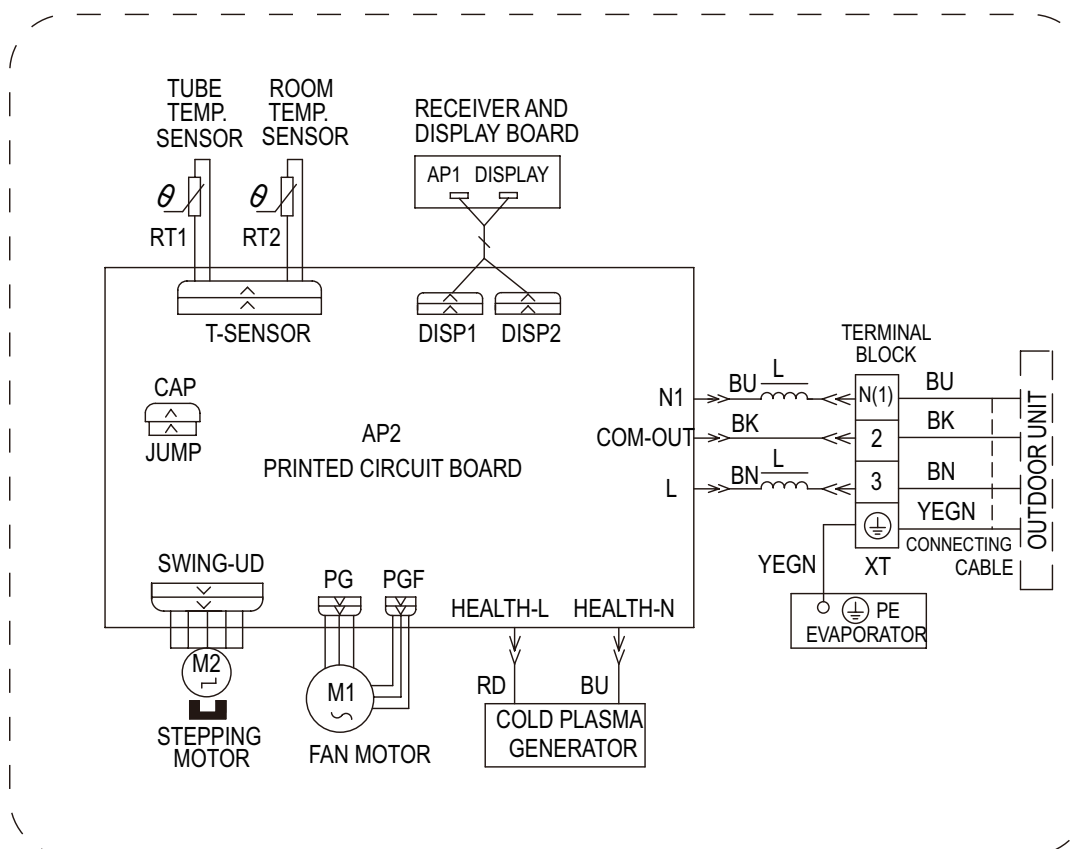
5.1 Wiring Diagram

• Instruction

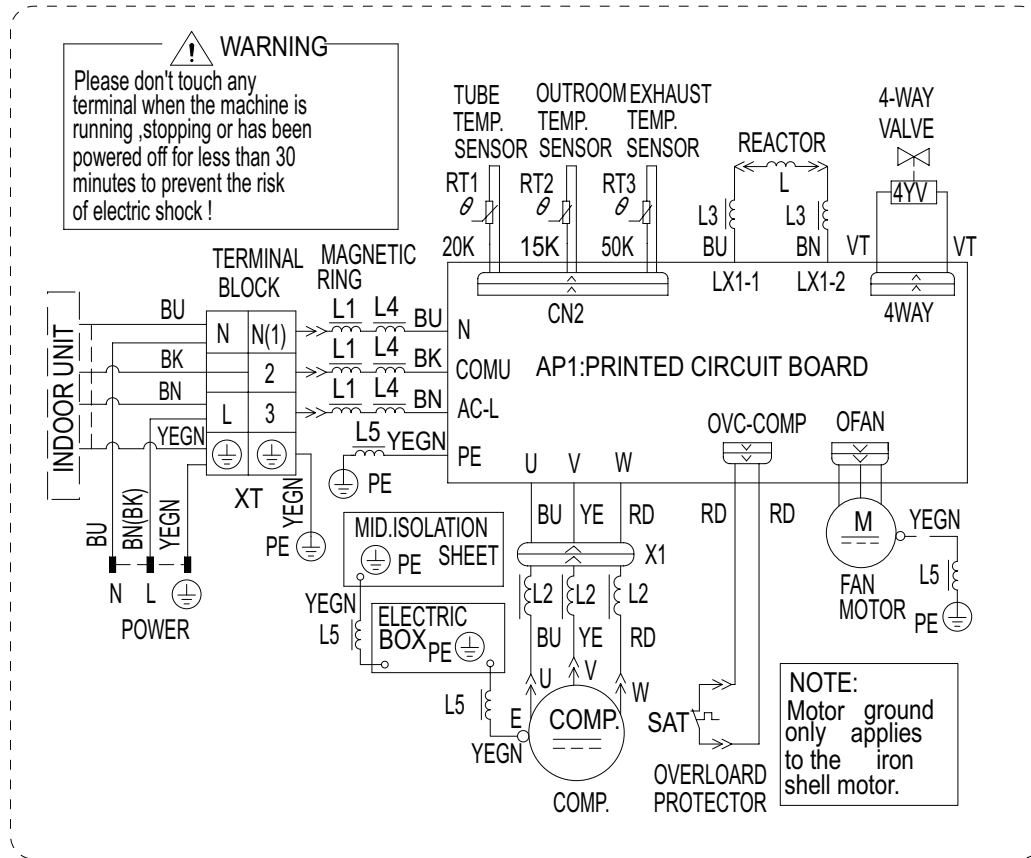
Symbol	Symbol Color	Symbol	Symbol Color	Symbol	Name
WH	White	GN	Green	CAP	Jumper cap
YE	Yellow	BN	Brown	COMP	Compressor
RD	Red	BU	Blue		Grounding wire
YEGN	Yellow/Green	BK	Black	/	/
VT	Violet	OG	Orange	/	/

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

• Indoor Unit



• Outdoor Unit

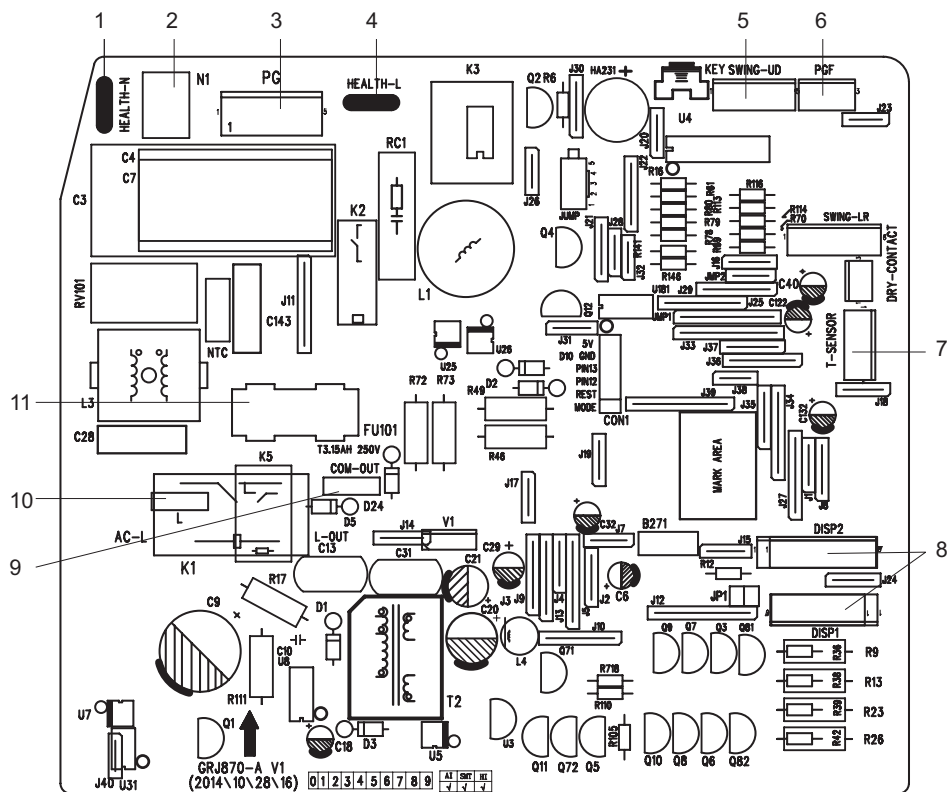


These circuit diagrams are subject to change without notice, please refer to the one supplied with the unit.

5.2 PCB Printed Diagram

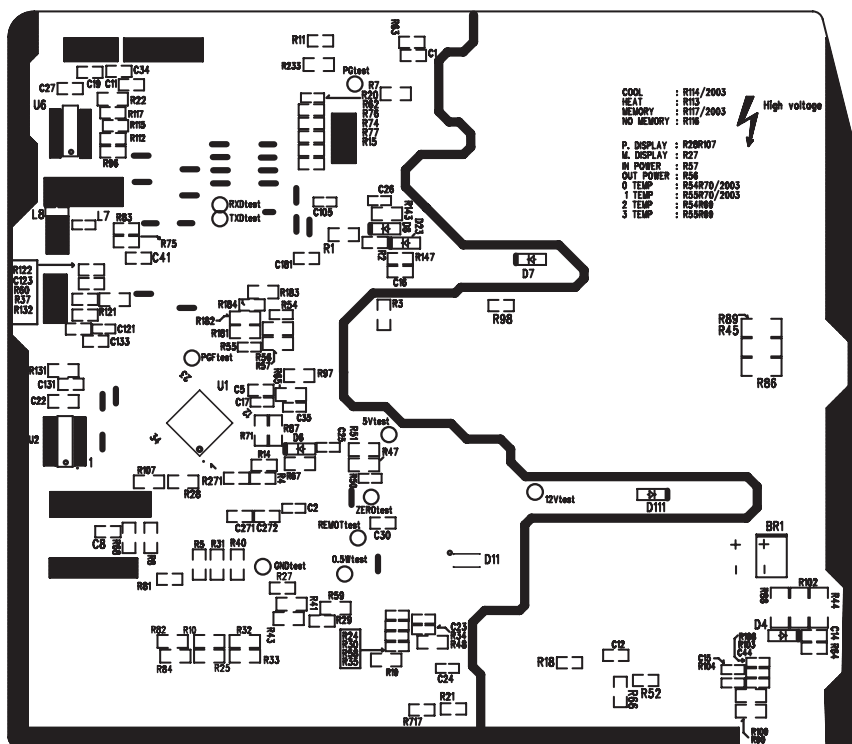
Indoor Unit

• Top view



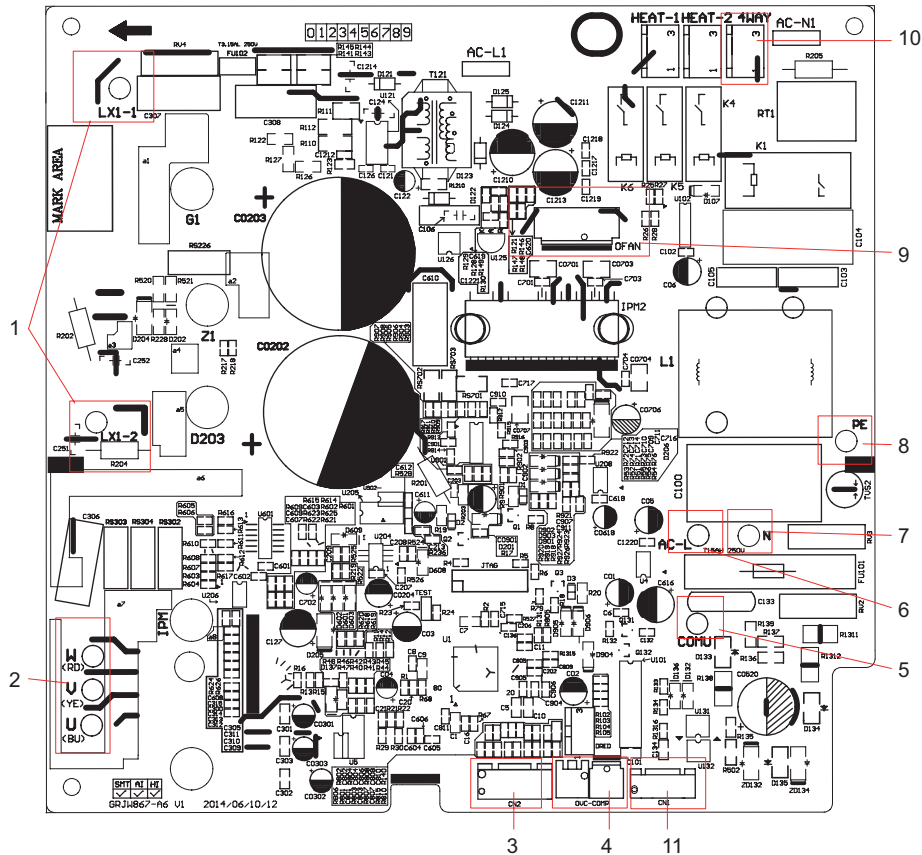
No.	Name
1	Neutral wire interface of cold plasma
2	Neutral wire interface of power supply
3	Interface of PG motor
4	Live wire interface of cold plasma
5	Interface of up & down swing motor
6	Interface of indoor fan feedback
7	Interface of temperature sensor
8	Interface of display
9	Communication wire
10	Live wire interface of power supply
11	Interface of fuse

• Bottom view



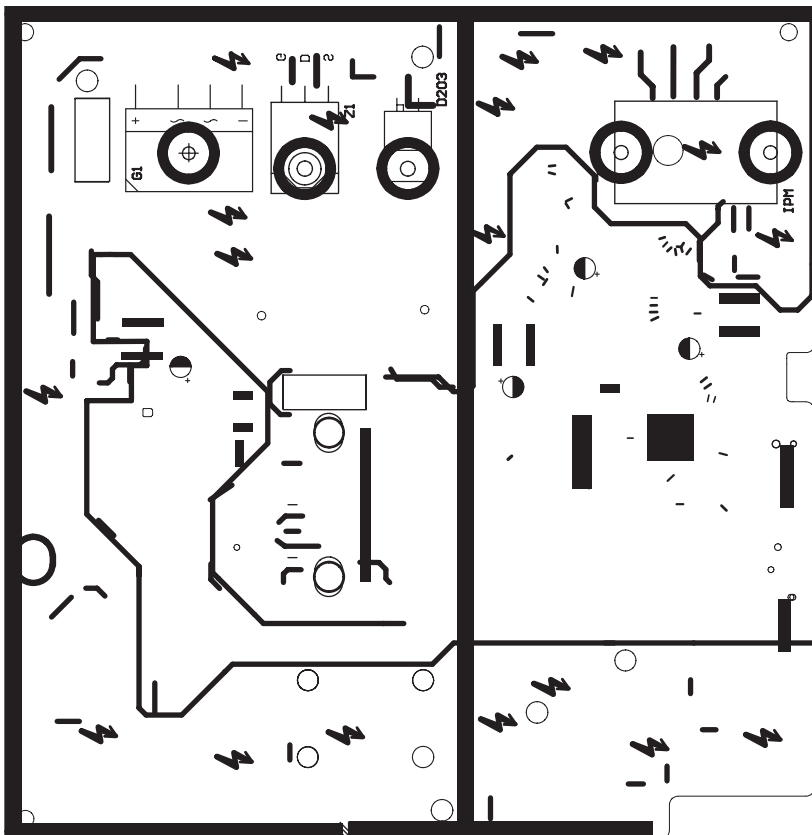
Outdoor Unit

• Top view



No.	Name
1	Reactor wiring terminal
2	Compressor wiring terminal
3	Terminal of outdoor unit temperature sensor
4	Compressor overload protection terminal
5	Terminal with indoor unit communication wire
6	Terminal of power supply live wire terminal
7	Terminal of power supply neutral wire
8	Interface of earthing wire
9	Terminal of outdoor fan
10	Interface of 4-way valve
11	Terminal of electronic expansion valve

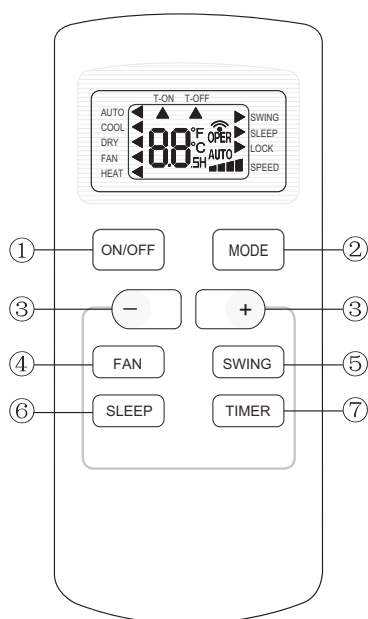
• Bottom view



6. Function and Control

6.1 Remote Controller Introduction

Buttons on Remote Controller



①: ON/OFF button

②: MODE button

③: +/- button

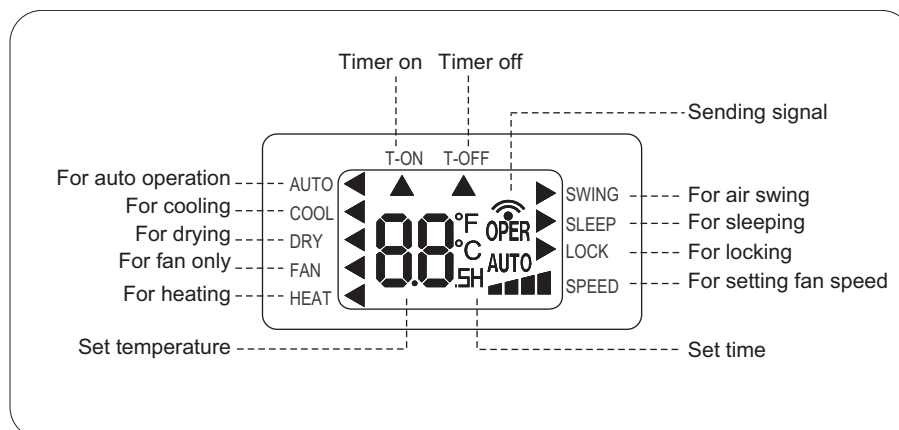
④: FAN button

⑤: SWING button

⑥: SLEEP button


⑦: TIMER button

Icon Display on Remote Controller



Operation introduction of remote controller


Note:

- ◆ When power is connected(stand by condition), you can operate the air conditioner through the remote controller.
- ◆ When unit is on, each time you press the button on remote controller, the sending signal icon  on the display of remote controller will blink once. If the air conditioner gives out a beep sound, it means the signal has been sent.
- ◆ When unit is off, set temperature will be displayed on the remote controller(If the light of indoor unit display is turned on, the corresponding icon will be displayed); When unit is on, it will display the icon of the on-going function.

1. ON/OFF Button

Press this button to turn unit on/off.

2. MODE Button

Pressing this button once can select your required mode circularly as below(the corresponding icon  will be lit up after the mode is selected):



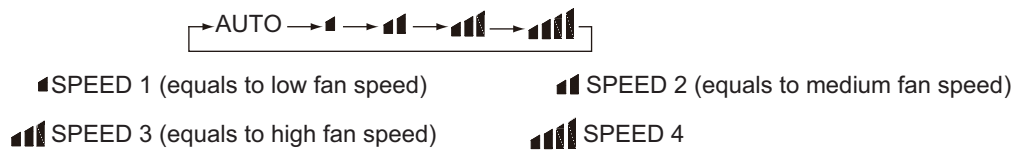
- ◆ When selecting auto mode, air conditioner will operate automatically according to ex-factory setting. Set temperature can't be adjusted and won't be displayed either. Press FAN button to adjust fan speed. (This function is not available in this air conditioner.)
- ◆ When selecting cool mode, air conditioner will operate under cool mode. Then press + or -- button to adjust set temperature. Press FAN button to adjust fan speed.
- ◆ When selecting dry mode, air conditioner will operate at low fan speed under dry mode. In dry mode, fan speed can't be adjusted.
- ◆ When selecting fan mode, air conditioner will operate in fan mode only. Then press FAN button to adjust fan speed.
- ◆ When selecting heat mode, air conditioner will operate under heat mode. Then press + or -- button to adjust set temperature. Press FAN button to adjust fan speed.

3. +/- button

- ◆ Pressing + or - button once will increase or decrease set temperature by 1 °F(°C). Hold + or -- button for 2s, set temperature on remote controller will change quickly. Release the button after your required set temperature is reached.
- ◆ When setting Timer On, Timer Off or Clock, press + or -- button to adjust the time (See TIMER Button for setting details).

4. FAN Button

Pressing this button can select fan speed circularly as: AUTO, SPEED 1(▬), SPEED 2(▬▬), SPEED 3(▬▬▬), SPEED 4(▬▬▬▬) (unavailable in this air conditioner. Speed 4 is the same with speed 3).



Note:

- ◆ Under Auto mode, air conditioner will select proper fan speed automatically according to ex-factory setting.
- ◆ Fan speed can't be adjusted under Dry mode.

5. SWING Button

Press this button to turn on up&down air swing.

6. SLEEP Button

Under Cool, Heat, Dry mode, press this button to turn on Sleep function. Press this button to cancel Sleep function. Under Fan and Auto mode, this function is unavailable.

7. TIMER Button

- ◆ When unit is on, press this button to set Timer Off. T-OFF and H icon will be blinking. Within 5s, press + or - button to adjust the time for Timer Off. Pressing + or - button once will increase or decrease the time by 0.5h. Hold + or - button for 2s, time will change quickly. Release the button after your required set time is reached. Then press TIMER button to confirm it. T-OFF and H icon will stop blinking.
- ◆ When unit is off, press this button to set Timer On. T-ON and H icon will be blinking. Within 5s, press + or - button to adjust the time for Timer On. Pressing + or - button once will increase or decrease the time by 0.5h. Hold + or - button for 2s, time will change quickly. Release the button after your required set time is reached. Then press TIMER button to confirm it. T-ON and H icon will stop blinking.
- ◆ Cancel Timer On/Off: If Timer function is set up, press TIMER button once to review the remaining time. Within 5s, press TIMER button again to cancel this function.


Note:

- ◆ Range of time setting is: 0.5~24h.
- ◆ The interval between two motions can't exceed 5s, otherwise the remote controller will exit setting status.

Simple operationfirst

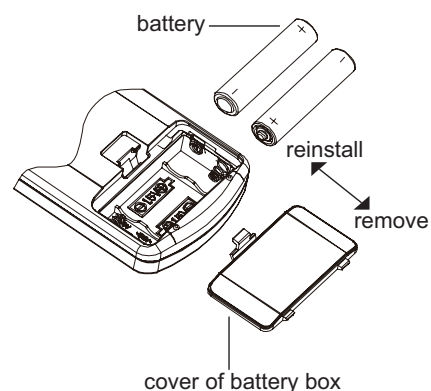
- 1.After putting through power “ON/OFF” button on remote controller to turn on the air conditioner.
- 2.Press “MODE” button to select your required operation mode: AUTO, COOL, DRY, FAN.
- 3.Press “+” or “-” button to set your required temperature.(temperature can't adjusted under AUTO mode)
- 4.Press “FAN” button to select your required fan speed: auto, first notch, second notch, third notch, fourth notch (fourth notch is same as third notch for this air conditioner.)

Replacement of Batteries in Remote Controller

1. Press the back side of remote controller on the spot marked with , and then push out the cover of battery box along the arrow direction.
2. Replace two No.7 (AAA 1.5V) dry batteries and make sure the positions of + and -- polar are correct.
3. Reinstall the cover of battery box.

Note:

- ◆ During operation, point the signal sender of the remote controller at the receiving window of the indoor unit;
- ◆ The distance between signal sender and receiving window should be within 8m. There should be no obstacle between them.
- ◆ Signal may be interfered easily in the room where there is fluorescent lamp or wireless telephone; Remote controller should be close to indoor unit during operation.
- ◆ Replace new batteries of the same model when replacement is required.
- ◆ If you don't use remote controller for a long time, please take out the batteries.
- ◆ If the display on remote controller is fuzzy or if there's no display, please replace batteries.



6.2 Brief Description of Modes and Functions

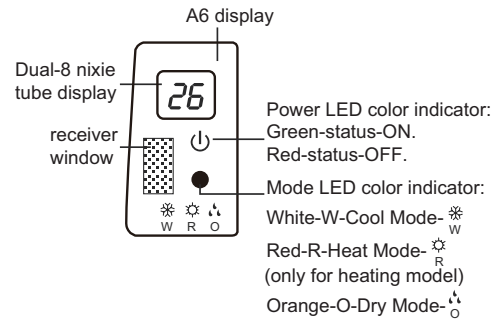
1 General introduction

(1) Buzzer

When the controller is energized or receives any command or signal from the buttons or the remote controller, the buzzer will give out a beep.

(2) Display

After energizing, the unit will display all icons. Under standby status, power indicator is displayed in red. If the unit is started by remote controller, power indicator is displayed in green. Meanwhile, the mode indicator is displayed in the color of corresponding operation mode. (displayed color of mode indicator: white-cooling mode, red-heating mode, green-dry mode).



(3) Temperature parameters

- ◆ Indoor set temperature (Tset)
- ◆ Indoor ambient temperature (Tamb.)
- ◆ Indoor evaporator inner tube temperature (Tinner tube)
- ◆ Indoor condenser outer tube temperature (Touter tube)
- ◆ Outdoor discharge pipe temperature (Tdischarge)
- ◆ Outdoor IMP module temperature (Tmodule)

2. Introduction of basic mode function

Once the compressor is energized, there should be a minimum interval of 3 mins between two start-ups.

If the unit is with memory function and is off before power failure, the compressor can be restarted without an interval of 3 mins after the system is energized; if the unit is on before power failure, the compressor will be restarted with an interval of 3 mins.

Once started, the compressor won't stop within 7 mins according to the change of room temp.

(1) Auto mode

① Auto mode conditions and process

In this mode, the unit will automatically select its operation mode (cooling, heating or fan) according to the change of indoor ambient temperature. There is a 30-second delay protection for mode switchover.

- ◆ When $T_{amb.} \geq 26^{\circ}\text{C}$, the unit runs in cooling mode; in this case, the factory default set temperature is 25°C .
- ◆ For cooling and heating model: when $T_{amb.} \leq 22^{\circ}\text{C}$, the unit runs in heating mode; in this case, the factory default set temperature is 20°C .
- ◆ For cooling only model: when $T_{amb.} \leq 22^{\circ}\text{C}$, the unit runs in fan mode; in this case, the factory default set temperature is 25°C .
- ◆ When $22^{\circ}\text{C} < T_{amb.} < 26^{\circ}\text{C}$: the unit will run in fan mode when it enters auto mode just after power on; the unit will keep the previous operation mode when it enters auto mode from cooling, heating or fan mode; the unit will run in fan mode when it enters auto mode from dry mode.

② The indoor unit displays the operation icon, operation mode icon and set temperature, but set temperature can't be adjusted.

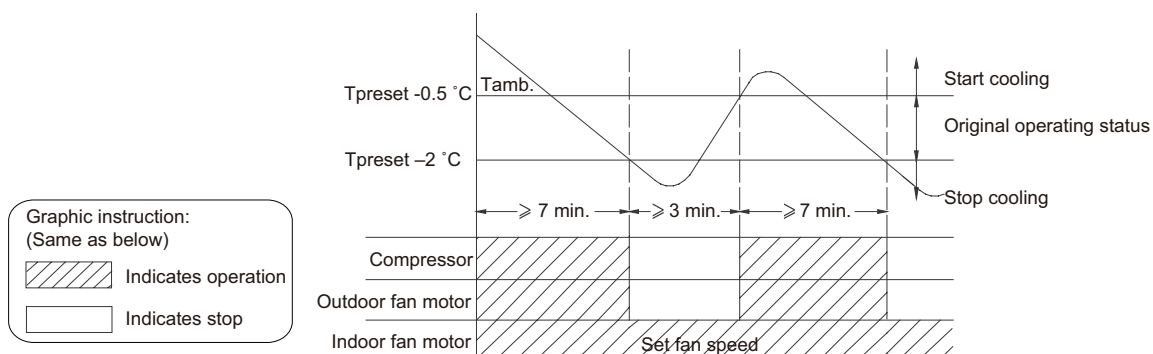
③ Protection functions are the same as those in any other mode. (See function protection of this section)

(2) Cooling mode

① Cooling conditions and process

- ◆ When $T_{amb.} \geq T_{set} - 0.5^{\circ}\text{C}$, the unit starts cooling. In this case, the compressor and the ODU fan motor run, and the IDU fan motor runs at set speed.
- ◆ When $T_{amb.} \leq T_{set} - 2^{\circ}\text{C}$, the compressor and the ODU fan motor stop after a few seconds, while the IDU fan motor runs at set speed.
- ◆ When $T_{set} - 2^{\circ}\text{C} < T_{amb.} < T_{set} - 0.5^{\circ}\text{C}$, the unit will maintain its present operation status.
- ◆ When the unit stops due to malfunction or protection, the compressor and ODU fan motor stop, while the IDU maintains its present operation status.
- ◆ In cooling process, when $T_{amb.}$ is quite different from T_{set} , the compressor will run in relatively high frequency for quick cooling; when $T_{amb.}$ is near T_{set} , the compressor frequency will decrease automatically for high coziness and efficiency.

In this mode, the 4-way valve is de-energized (cooling only unit is without 4-way valve). Temperature setting range is $16 \sim 30^{\circ}\text{C}$.



② The indoor unit displays operation icon, cooling icon and set temperature.

③ Protection functions (See function protection of this section)

(3) Dry Mode

① Dry conditions and process

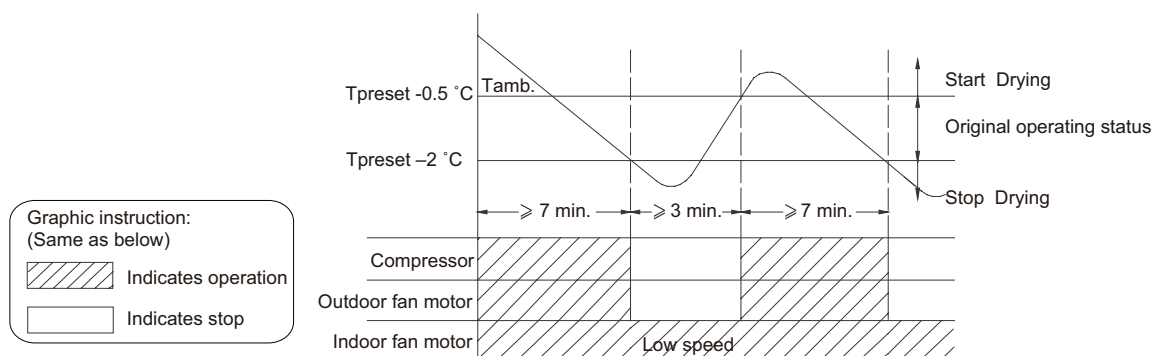
◆ When $T_{\text{amb.}} \geq T_{\text{set}} - 0.5\text{ }^{\circ}\text{C}$, the unit starts drying and cooling. In this case, the compressor and the ODU fan motor run, and the IDU fan motor runs at low speed.

◆ When $T_{\text{amb.}} \leq T_{\text{set}} - 2\text{ }^{\circ}\text{C}$, the compressor and the ODU fan motor stop after a few seconds, while the IDU fan motor runs at low speed.

◆ When $T_{\text{set}} - 2\text{ }^{\circ}\text{C} < T_{\text{amb.}} < T_{\text{set}} - 0.5\text{ }^{\circ}\text{C}$, the unit will maintain its present operation status.

◆ When the unit stops due to malfunction or protection, the indoor unit maintains its present operation status and displays malfunction code.

In this mode, the 4-way valve is de-energized (cooling only unit is without 4-way valve). Temperature setting range is $16 \sim 30\text{ }^{\circ}\text{C}$.



② The indoor unit displays operation icon, dry icon and set temperature.

③ Protection functions (See function protection of this section)

(4) Fan mode

① Fan conditions and process

In this mode, IDU fan motor runs at set speed while the compressor and ODU fan motor stop operation. The 4-way valve is de-energized (cooling only unit is without 4-way valve). Temperature setting range is $16 \sim 30\text{ }^{\circ}\text{C}$.

② The indoor unit displays operation icon and set temperature.

③ Protection functions (See function protection of this section)

(5) Heating mode (not available for cooling only type)

① Heating conditions and process

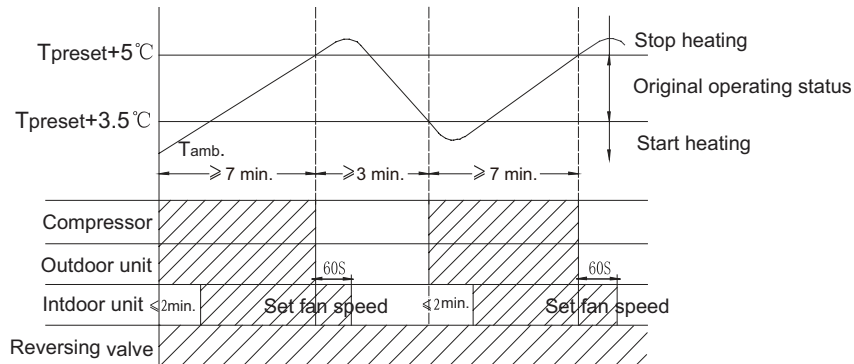
◆ When $T_{\text{amb.}} \leq T_{\text{set}} + 3.5\text{ }^{\circ}\text{C}$, the unit starts heating operation. In this case, the 4-way valve, compressor and ODU fan motor run simultaneously; the IDU fan motor runs after a while to prevent blowing out cold air.

◆ When $T_{\text{amb.}} \geq T_{\text{set}} + 5\text{ }^{\circ}\text{C}$, the compressor and ODU fan motor stop after a few seconds; the 4-way valve remains energized; the IDU

fan motor blows residual heat for a while at set speed to prevent high temperature inside the unit.

- ◆ When $T_{set}+3.5^{\circ}\text{C} < T_{amb.} < T_{set}+5^{\circ}\text{C}$, the unit will maintain its previous operation status.
- ◆ When the unit stops due to malfunction or protection, the compressor, IDU fan motor and ODU fan motor stop operation.
- ◆ In heating process, when $T_{amb.}$ is quite different from T_{set} , the compressor will run in relatively high frequency for quick heating; when $T_{amb.}$ is near T_{set} , the compressor frequency will decrease automatically for high coziness and efficiency.

In this mode, the 4-way valve is energized. Temperature setting range is $16 \sim 30^{\circ}\text{C}$.



② The indoor unit displays operation icon, heating icon and set temperature.

③ Defrost conditions and process

In order to ensure heating effect, the unit will defrost automatically according to the frost status of outdoor unit. Indoor unit displays H1 during defrosting (for some models, the display status is that heating icon is bright for a while and then off for a while).

④ Protection functions (See function protection of this section)

(6) Compressor control function

- ① The controller controls the operation frequency of compressor according to the relationship between ambient temperature and set temperature and the changing speed of ambient temperature.
- ② When turning on the unit in cooling, heating or dry mode, the compressor starts after the ODU fan motor has operated for 5 seconds.
- ③ The compressor stops immediately when turning off the unit, switching to fan modes and unit stops for protection.
- ④ In each mode: once started, the compressor won't stop within 7 mins (note: including stop operation when reaching the temperature point; not including malfunction protection, turning off the unit by remote controller or switching modes in which stopping operation of compressor is needed).
- ⑤ In each mode: once stopped, the compressor won't start again within 3 mins; if the unit is with memory function, the compressor can be restarted without delay when turning off the unit and then energizing again.

(7) 4-way valve control function

- ① The 4-way valve is de-energized in cooling, dry and fan mode;
- ② The 4-way valve is energized in heating mode;
- ③ When turning off the unit in heating mode or switching to other mode from heating mode, the compressor stops and the 4-way valve is de-energized after a while;
- ④ When the unit stops for protection, the 4-way valve is de-energized after a while;
- ⑤ When starting defrosting, the compressor stops and the 4-way valve is de-energized after a while;
- ⑥ When existing defrosting, the compressor stops and the 4-way valve is energized after a while;

3.Other control functions

(1) Timer function

① General timer and clock timer functions are compatible by equipping remote controller with different functions. ① General timer: the timer precision is 30min and set unit ON/OFF after a desired hour.

◆ Timer ON: timer ON can be set at unit OFF. If selected ON time is reached, the unit will start to run according to previous setting status. Time setting range is 0.5~24hr in 30-minute increments.

◆ Timer OFF: timer OFF can be set at unit ON. If selected OFF time is reached, the unit will stop. Time setting range is 0.5~24hr in 30-minute increments.

② Clock timer: the timer precision is 1min and set unit ON/OFF at a certain time every day.

- ◆ **Timer ON:** If timer ON is set during operation of the unit, the unit will continue to operate. If timer ON is set at unit OFF, upon ON time reaches the unit will start to run according to previous setting status.
- ◆ **Timer OFF:** if timer OFF is set at unit OFF, the system will keep OFF status. If timer OFF is set at unit ON, upon OFF time reaches the unit will stop operation.

◆ **Timer change:**

Although timer has been set, the unit still can be turned on/off by pressing ON/OFF button of the remote controller. You can also reset the timer.

If timer ON and timer OFF are set at the same time during ON status, the unit will keep running at current status. When OFF time reaches, the unit will stop operation. Then upon ON time reaches, the unit will start operation automatically. The unit will operate circularly like this every day.

If timer ON and timer OFF are set at the same time during OFF status, the unit will keep OFF status. When ON time reaches, the unit will start operation. Then upon OFF time reaches, the unit will stop operation automatically. The unit will operate circularly like this every day.

(2) Emergency operation switch

If pressing this button in OFF status, the unit will operate in AUTO mode and IDU fan motor will operate at auto speed; meanwhile, the swing motor operates. Press this button again to turn off the unit.



(3) Sleep function

In this mode, the unit will automatically select appropriate sleep curve to operate according to different set temperature.

- ① If sleep function is set in cooling or dry mode, the system will increase set temperature automatically for operation in a certain degree.
- ② If sleep function is set in heating mode, the system will decrease set temperature automatically for operation in a certain degree.

(4) Turbo function

This function can be set in cooling or heating mode. When turbo function is set, the system will operate in the highest fan speed.

(5) X-FAN function

This function can be set in cooling or dry mode. When X-FAN function is set, fan motor will run for a while and then stop operation after the unit is turned off. During X-FAN operation, press X-FAN button on remote controller again to exit X-FAN function.

(6) Indoor fan speed control

Indoor fan speed can be set in super-high, high, medium and low speed through remote controller; auto fan speed can also be set in cooling, heating and fan mode. In auto fan speed mode, the IDU fan motor will automatically select high, medium or low speed according to the change of ambient temperature. (Note: super-high speed is only available in cooling and heating mode).

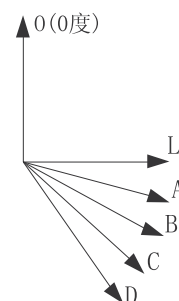
(7) Up & down swing

① After energizing, up & down swing motor will firstly have the horizontal louver rotate anticlockwise to position 0 to close air outlet. If swing function has not been set after turning on the unit, the horizontal louver will turn clockwise to position D in heating mode, or turn clockwise to level position L in other modes.

② If swing function is set when starting up the unit, the horizontal louver will swing between L and D.

There are 7 swing status of horizontal louver:

- ◆ Positions L: corresponding setting on the remote controller:
- ◆ Positions A: corresponding setting on the remote controller:
- ◆ Positions B: corresponding setting on the remote controller:
- ◆ Positions C: corresponding setting on the remote controller:
- ◆ Positions D: corresponding setting on the remote controller:
- ◆ Swing between L and D, corresponding setting on the remote controller:
- ◆ Stop at any position between L and D (angles between L and D are equiangular); corresponding setting on the remote controller: without display



③ Upon turning off the unit, the horizontal louver will close at position 0.

④ Swing function is available only when swing function is set and IDU fan motor is operating.

(8) Display of nixie tube on indoor unit

◆ When energized & started for the first time, the nixie tube defaults to displaying current set temperature.

◆ When set temperature display is set by remote controller, it will display set temperature; when switching to indoor ambient temperature display from other display status, indoor ambient temperature will be displayed for 3-5 seconds firstly and then set temperature display returns; if other status are set by remote controller, it will still display original set temperature.

◆ When malfunction occurs, the nixie tube will display corresponding error code. (refer to Error Code List)

◆ In auto defrosting mode, the nixie tube will display "H1". It is a normal phenomenon. (For some models, the display status is that heating icon is bright for a while and then off for a while.)

◆ The display light can be closed by pressing light button.

(9) Memory function

① Power failure in unit ON status

◆ Memorized items: unit ON status, mode, up & down swing, light, set temperature, set fan speed, general timer and Fahrenheit/ Celsius.

◆ General timer will be memorized and the timer time will be recalculated after re-energizing.

◆ Clock timer will not be memorized.

② Power failure in unit OFF status

◆ Memorized items: unit OFF status, mode, up & down swing, light, set temperature, set fan speed, general timer and Fahrenheit/ Celsius.

◆ General timer will be memorized and the timer time will be recalculated after re-energizing.

◆ Clock timer will not be memorized.

(10) Refrigerant recycling function (applicable when changing installation location or in maintenance)

① Enter refrigerant recycling function

Within 5min after energizing (unit ON or OFF status is ok), continuously press LIGHT button for 3 times within 3s to enter refrigerant recycling mode; Fo is displayed and refrigerant recycling function is started. At this moment, the maintenance people closes liquid valve. After 5min, stick the thimble of maintenance valve with a tool. If there is no refrigerant spraying out, close the gas valve immediately and then turn off the unit to remove the connection pipe.

② Exit refrigerant recycling function

After entering refrigerant recycling mode, when receive any remote control signal or enter refrigerant recycling mode for 25min, the unit will exit refrigerant recycling mode automatically. If the unit is in standby mode before refrigerant recycling, it will be still in standby mode after finishing refrigerant recycling; if the unit is in ON status before refrigerant recycling, it will still run in original operation mode.

(11) Outdoor fan motor control function

① When turning off the unit by remote controller, unit stopping for protection, unit stopping as reaching the temperature point, the compressor stops and outdoor fan motor stops after 1min.

② In fan mode, the outdoor fan motor stops.

③ After entering defrosting mode, the compressor stops and outdoor fan motor stops after 50s.

④ After finishing defrosting, the compressor restarts heating and outdoor fan motor starts operation 5s ahead.

⑤ Outdoor fan motor is DC motor and it will automatically adjust rotation speed according to ambient temperature.

4 Special functions

(1) Health function (applicable for the models with health function)

① If the unit is equipped with the remote controller with HEALTH button, the unit defaults health function ON. Health function will be closed by pressing the HEALTH button on remote controller or turning off the unit.

② If the unit is equipped with the remote controller without HEALTH button, the unit defaults health function ON. Health function will be closed when turning off the unit.

(2) I Feel function

When I FEEL command is received, the controller will operate according to the ambient temperature sent by the remote controller (For defrosting and cold air prevention, the unit operates according to the ambient temperature sensed by the air conditioner). The remote controller will regularly send ambient temperature data to the controller. When the data has not been received for a long time, the unit will operate according to the temperature sensed by the air conditioner. If I FEEL function is not set, the ambient temperature will be that sensed by the air conditioner.

5 Main system protection (more details please refer to maintenance section)

(1) Indoor fan motor does not operate (indoor unit displays H6 in cooling, heating, dry or fan mode)

If the controller detects that the rotation speed of indoor fan motor is below 300round/min or the indoor fan motor stops operation, it judges that the motor operation is abnormal. In order to prevent damaging the motor, the system judges that the indoor fan motor is blocked and then stops the unit for protection with error code displayed on the indoor unit (refer to Error Code List). After the unit is turned off, the error code will not be displayed.

Turn off the unit and then turn it on, the malfunction display will be cleared.

(2) Freeze protection (indoor unit displays E2 in cooling or dry mode)

① In cooling and dry mode, if $T_{\text{indoor pipe}} < 0^{\circ}\text{C}$ is detected for 3min continuously, the outdoor unit will stop for freeze protection; if $T_{\text{indoor pipe}} > 6^{\circ}\text{C}$ and the compressor has stopped for 3min, the unit will resume previous running status;

② In cooling and dry mode, if $T_{\text{indoor pipe}} < 6^{\circ}\text{C}$, running frequency of compressor will be decreased or stop increasing;

③ If the unit stops for freeze protection for 6 times continuously, it can not resume operation automatically and displays error code; it can resume operation by pressing ON/OFF button on the remote controller.

(3) Overload protection (indoor unit displays E8 in cooling, heating or dry mode)

① In cooling and dry mode: if $T_{\text{outdoor}} \geq 65^{\circ}\text{C}$, the unit will stop for overload protection; if $T_{\text{outdoor pipe}} < 55^{\circ}\text{C}$ and the compressor has stopped for 3min, the unit will resume previous running status;

② In cooling and dry mode: if $T_{\text{outdoor pipe}} \geq 55^{\circ}\text{C}$, running frequency of compressor will be decreased or stop increasing;

③ In heating mode: if $T_{\text{indoor pipe}} \geq 64^{\circ}\text{C}$, the unit will stop for overload protection; if $T_{\text{indoor pipe}} < 54^{\circ}\text{C}$ and the compressor has stopped for 3min, the unit will resume running;

④ In heating mode: if $T_{\text{indoor pipe}} \geq 55^{\circ}\text{C}$, running frequency of compressor will be decreased or stop increasing.

(4) Compressor high discharge temperature protection (indoor unit displays E4 in cooling, heating or dry mode)

① If $T_{\text{discharge}} \geq 115^{\circ}\text{C}$, the unit will stop for high discharge temperature protection; if $T_{\text{discharge}} < 97^{\circ}\text{C}$ and the compressor has stopped for 3min, the unit will resume running;

② If $T_{\text{discharge}} \geq 97^{\circ}\text{C}$, running frequency of compressor will be decreased or stop increasing.

(5) Drop off voltage protection (indoor unit displays U3 in cooling, heating or dry mode)

During compressor operation, if voltage drops off rapidly, the system will stop running for drop off voltage protection; when the voltage resumes normal, the malfunction will be eliminated automatically; if the compressor has stopped for 3min, the unit will resume previous running status.

(6) Communication malfunction (indoor unit displays E6 in cooling, heating, dry or fan mode)

If the indoor unit and outdoor unit can not communicate smoothly, the unit will stop for communication malfunction; if communication malfunction is eliminated and the compressor has stopped for 3min, the unit will resume previous running status.

(7) IPM module protection (indoor unit displays H5 in cooling, heating or dry mode)

① When the compressor starts, if there is overcurrent or low control voltage for IPM module due to some abnormal reasons, the unit will stop for IMP module protection; when the IMP module current decreases or control voltage increases, the protection will be eliminated automatically; if the compressor has stopped for 3min, the unit will resume previous running status.

② If unit stopping for module protection continuously occurs for three times, the unit can not resume running automatically and you should press ON/OFF button on remote controller to resume running.

(8) Module overheating protection (indoor unit displays P8 in cooling, heating or dry mode)

① If $T_{\text{module}} \geq 80^{\circ}\text{C}$, running frequency of compressor will be decreased or stop increasing;

② If $T_{\text{module}} \geq 95^{\circ}\text{C}$, the unit will stop for module overheating protection; if $T_{\text{module}} < 87^{\circ}\text{C}$ and the compressor has stopped for 3min, the unit will resume running.

(9) Compressor overload protection (indoor unit displays H3 in cooling, heating or dry mode)

① If disconnection of compressor overload switch is detected for 3S continuously, the system will stop for compressor overload protection; when the protection is eliminated and the compressor has stopped for 3min, the unit will resume running;

② If unit stopping for compressor overload protection continuously occurs for three times, the unit can not resume running automatically and you should press ON/OFF button on remote controller to resume running; the times of compressor overload protection will be cleared if the compressor has run for 30min.

(10) Overcurrent protection (indoor unit displays E5 in cooling, heating or dry mode)

If overcurrent is detected for 3s continuously, the system will stop for overcurrent protection; when the protection is eliminated and the compressor has stopped for 3min, the unit will resume running.

(11) Temperature sensor malfunction detection (indoor unit displays F1, F2, F3, F4, F5 in cooling, heating, dry or fan mode)

① Malfunction of indoor ambient temperature sensor: indoor unit displays F1, which means indoor ambient temperature sensor is open-circuit or short-circuit, or its detection circuit element is broken;

② Malfunction of indoor evaporator temperature sensor: indoor unit displays F2, which means indoor evaporator temperature sensor is open-circuit or short-circuit, or its detection circuit element is broken;

③ Malfunction of outdoor ambient temperature sensor: indoor unit displays F3, which means outdoor ambient temperature sensor is open-circuit or short-circuit, or its detection circuit element is broken;

④ Malfunction of outdoor condenser temperature sensor: indoor unit displays F4, which means outdoor condenser temperature sensor is open-circuit or short-circuit, or its detection circuit element is broken;

⑤ Malfunction of outdoor discharge temperature sensor: indoor unit displays F5, which means outdoor discharge temperature sensor is open-circuit or short-circuit, or its detection circuit element is broken.

When temperature sensor malfunction occurs, the unit stops for protection.

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 3mm.

12. Make sure all wires and pipes are connected properly and the valves are opened before energizing.

13. Check if there is electric leakage on the unit body. If yes, please eliminate the electric leakage.

14. Replace the fuse with a new one of the same specification if it is burnt down; don't replace it with a cooper wire or conducting wire.

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

Installation Safety 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.

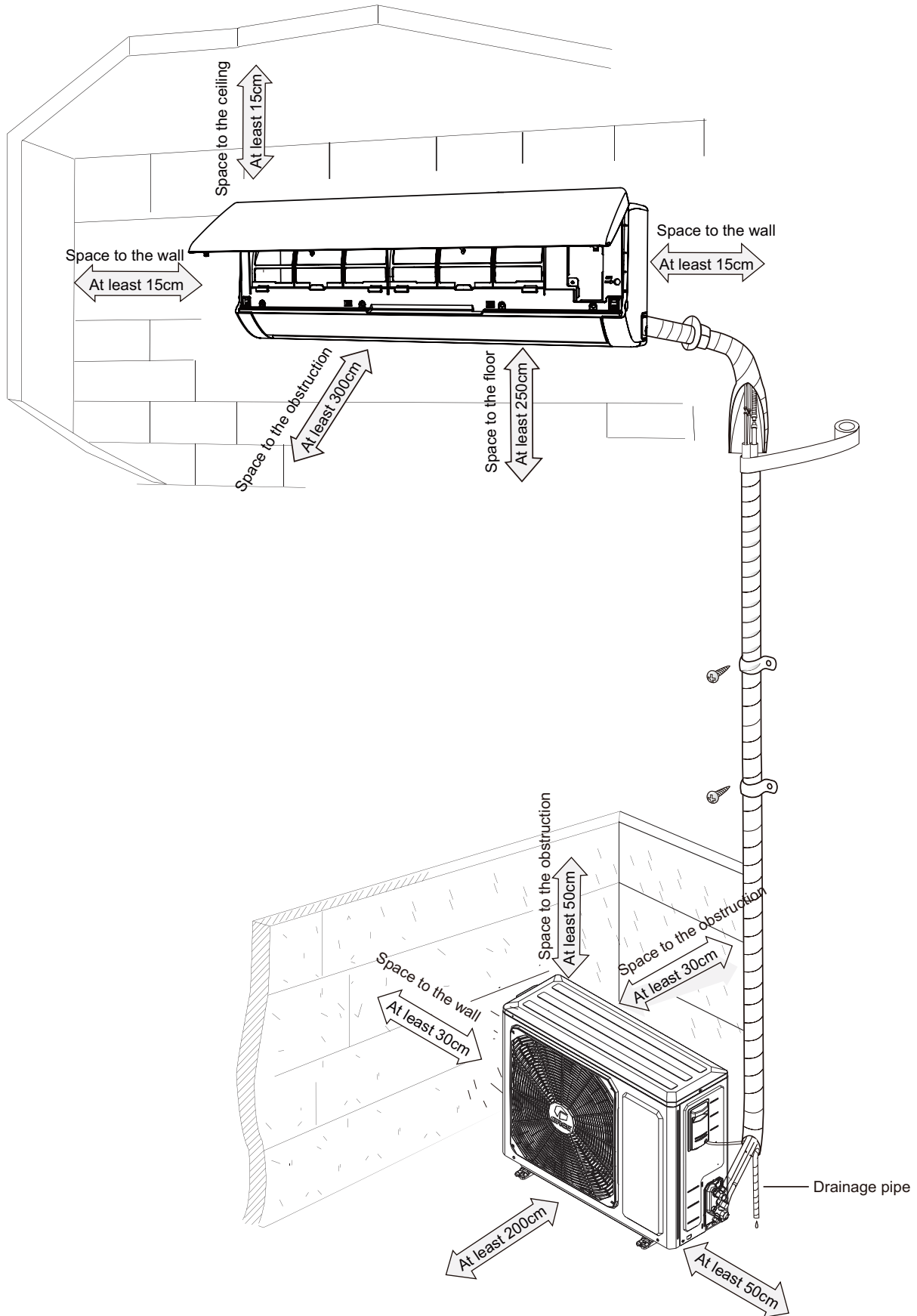
Improper installation may lead to fire hazard, explosion, electric shock or injury.

Main Tools for Installation and Maintenance

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

8. Installation

8.1 Installation Dimension Diagram



8.2 Installation Parts-checking

No.	Name	No.	Name
1	Indoor unit	8	Sealing gum
2	Outdoor unit	9	Wrapping tape
3	Connection pipe	10	Support of outdoor unit
4	Drainage pipe	11	Fixing screw
5	Wall-mounting frame	12	Drainage plug(cooling and heating unit)
6	Connecting cable(power cord)	13	Owner's manual, remote controller
7	Wall pipe		

⚠ Note:

1. Please contact the local agent for installation.
2. Don't use unqualified power cord.

8.3 Selection of Installation Location

1. Basic Requirement:

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

- (1) The place with strong heat sources, vapors, flammable or explosive gas, or volatile objects spread in the air.
- (2) The place with high-frequency devices (such as welding machine, medical equipment).
- (3) The place near coast area.
- (4) The place with oil or fumes in the air.
- (5) The place with sulfured gas.
- (6) Other places with special circumstances.

2. Indoor Unit:

- (1) There should be no obstruction near air inlet and air outlet.
- (2) Select a location where the condensation water can be dispersed easily and won't affect other people.
- (3) Select a location which is convenient to connect the outdoor unit and near the power socket.
- (4) Select a location which is out of reach for children.
- (5) The location should be able to withstand the weight of indoor unit and won't increase noise and vibration.
- (6) The appliance must be installed 2.5m above floor.
- (7) Don't install the indoor unit right above the electric appliance.
- (8) The appliance shall not be installed in the laundry.

3. Outdoor Unit:

- (1) Select a location where the noise and outflow air emitted by the outdoor unit will not affect neighborhood.
- (2) The location should be well ventilated and dry, in which the outdoor unit won't be exposed directly to sunlight or strong wind.
- (3) The location should be able to withstand the weight of outdoor unit.
- (4) Make sure that the installation follows the requirement of installation dimension diagram.
- (5) Select a location which is out of reach for children and far away from animals or plants. If it is unavoidable, please add fence for safety purpose.

8.4 Electric Connection Requirement

1. Safety Precaution

- (1) Must follow the electric safety regulations when installing the unit.
- (2) According to the local safety regulations, use qualified power supply circuit and air switch.
- (3) Make sure the power supply matches with the requirement of air conditioner. Unstable power supply or incorrect wiring may result in electric shock, fire hazard or malfunction. Please install proper power supply cables before using the air conditioner.
- (4) Properly connect the live wire, neutral wire and grounding wire of power socket.
- (5) Be sure to cut off the power supply before proceeding any work related to electricity and safety.
- (6) Do not put through the power before finishing installation.
- (7) For appliances with type Y attachment, the instructions shall contain the substance of the following. If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.
- (8) The temperature of refrigerant circuit will be high, please keep the interconnection cable away from the copper tube.

2. Grounding Requirement:

- (1) The air conditioner is first class electric appliance. It must be properly grounded with specialized grounding device by a professional. Please make sure it is always grounded effectively, otherwise it may cause electric shock.
- (2) The yellow-green wire in air conditioner is grounding wire, which can't be used for other purposes.
- (3) The grounding resistance should comply with national electric safety regulations.
- (4) The appliance must be positioned so that the plug is accessible.
- (5) An all-pole disconnection switch having a contact separation of at least 3mm in all poles should be connected in fixed wiring.
- (6) 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
18K	10A

8.5 Installation of Indoor Unit

1. Choosing Installation location

Recommend the installation location to the client and then confirm it with the client.

2. Install Wall-mounting Frame

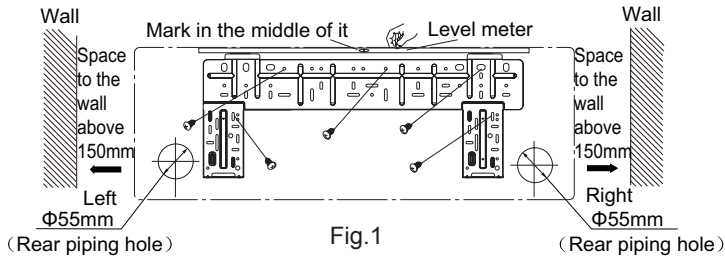
- (1) Hang the wall-mounting frame on the wall; adjust it in horizontal position with the level meter and then point out the screw fixing holes on the wall.
- (2) Drill the screw fixing holes on the wall with impact drill (the specification of drill head should be the same as the plastic expansion particle) and then fill the plastic expansion particles

in the holes.

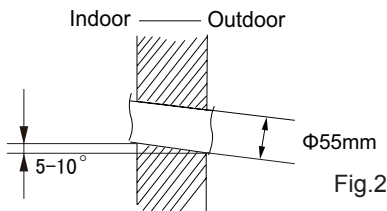
(3) Fix the wall-mounting frame on the wall with tapping screws (ST4.2X25TA) and then check if the frame is firmly installed by pulling the frame. If the plastic expansion particle is loose, please drill another fixing hole nearby.

3. Install Wall-mounting Frame

(1) Choose the position of piping hole according to the direction of outlet pipe. The position of piping hole should be a little lower than the wall-mounted frame.(As show in Fig.1)



(2) Open a piping hole with the diameter of Φ55mm on the selected outlet pipe position. In order to drain smoothly, slant the piping hole on the wall slightly downward to the outdoor side with the gradient of 5-10°. (As show in Fig.2)



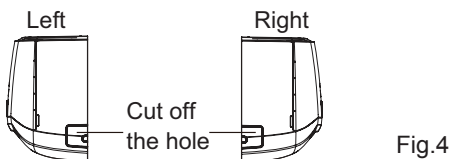
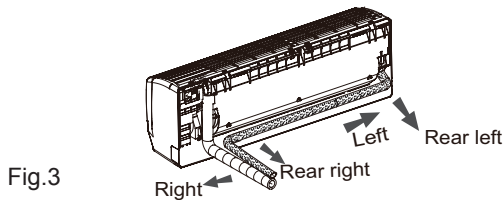
⚠ Note:

- (1) Pay attention to dust prevention and take relevant safety measures when opening the hole.
- (2) The plastic expansion particles are not provided and should be bought locally.

4. Outlet Pipe

(1) The pipe can be led out in the direction of right, rear right, left or rear left. (As show in Fig.3)

(2) When selecting leading out the pipe from left or right, please cut off the corresponding hole on the bottom case. (As show in Fig.4)



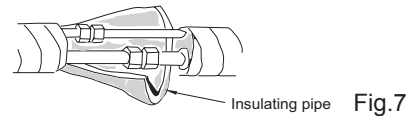
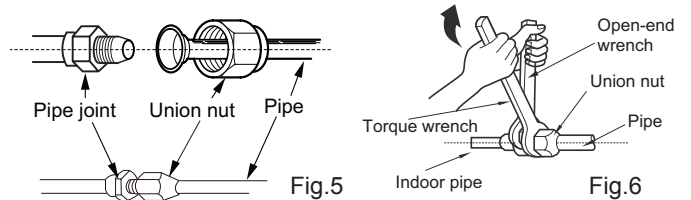
5. Connect the Pipe of Indoor Unit

(1) Aim the pipe joint at the corresponding bellmouth. (As show in Fig.5)

(2) Pretightening the union nut with hand.

(3) Adjust the torque force by referring to the following sheet. Place the open-end wrench on the pipe joint and place the torque wrench on the union nut. Tighten the union nut with torque wrench. (As show in Fig.6)

(4) Wrap the indoor pipe and joint of connection pipe with insulating pipe, and then wrap it with tape. (As show in Fig.7)



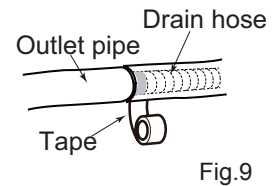
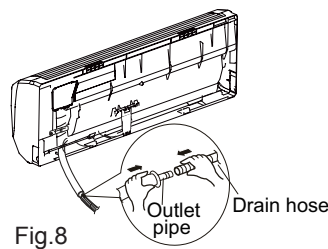
Refer to the following table for wrench moment of force:

Hex nut diameter(mm)	Tightening torque(N·m)
Φ6	15~20
Φ9.52	30~40
Φ12	45~55
Φ16	60~65
Φ19	70~75

6. Install Drain Hose

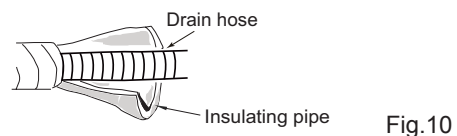
(1) Connect the drain hose to the outlet pipe of indoor unit. (As show in Fig.8)

(2) Bind the joint with tape. (As show in Fig.9)



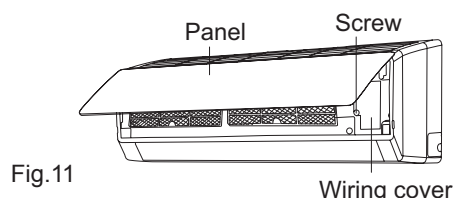
⚠ Note:

- (1) Add insulating pipe in the indoor drain hose in order to prevent condensation.
- (2) The plastic expansion particles are not provided. (As show in Fig.10)

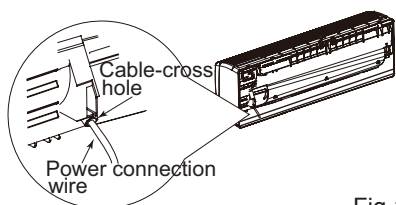


7. Connect Wire of Indoor Unit

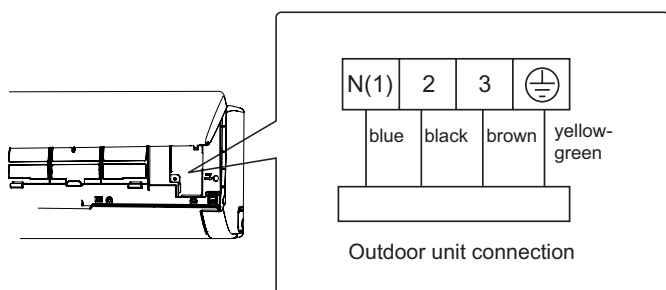
(1) Open the panel, remove the screw on the wiring cover and then take down the cover.(As show in Fig.11)



(2) Make the power connection wire go through the cable-cross hole at the back of indoor unit and then pull it out from the front side.(As show in Fig.12)



(3) Remove the wire clip; connect the power connection wire to the wiring terminal according to the color; tighten the screw and then fix the power connection wire with wire clip.(As show in Fig.13)



Note: The wiring connect is for reference only, please refer to the actual one.

Fig.13

(4) Put wiring cover back and then tighten the screw.
 (5) Close the panel.

⚠ Note:

- (1) All wires of indoor unit and outdoor unit should be connected by a professional.
- (2) If the length of power connection wire is insufficient, please contact the supplier for a new one. Avoid extending the wire by yourself.
- (3) For the air conditioner with plug, the plug should be reachable after finishing installation.
- (4) For the air conditioner without plug, an air switch must be installed in the line. The air switch should be all-pole parting and the contact parting distance should be more than 3mm.

8. Bind up Pipe

- (1) Bind up the connection pipe, power cord and drain hose with the band.(As show in Fig.14)
- (2) Reserve a certain length of drain hose and power cord for installation when binding them. When binding to a certain degree, separate the indoor power and then separate the drain hose.(As show in Fig.15)
- (3) Bind them evenly.
- (4) The liquid pipe and gas pipe should be bound separately at the end.

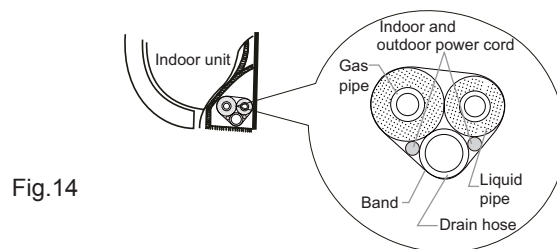


Fig.14

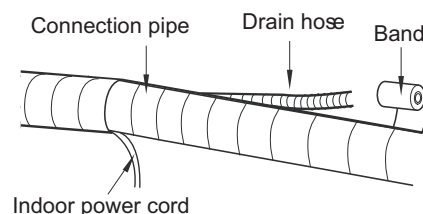


Fig.15

⚠ Note:

- (1) The power cord and control wire can't be crossed or winding.
- (2) The drain hose should be bound at the bottom.

9. Hang the Indoor Unit

- (1) Put the bound pipes in the wall pipe and then make them pass through the wall hole.
- (2) Hang the indoor unit on the wall-mounting frame.
- (3) Stuff the gap between pipes and wall hole with sealing gum.
- (4) Fix the wall pipe. (As show in Fig.16)
- (5) Check if the indoor unit is installed firmly and closed to the wall.(As show in Fig.17)

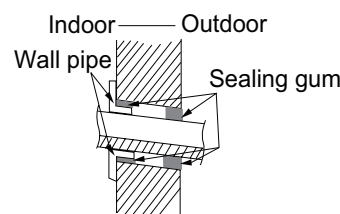


Fig.16

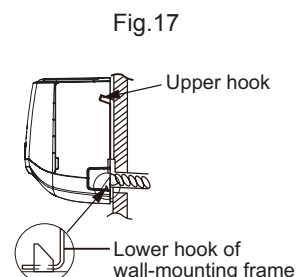


Fig.17

⚠ Note:

Do not bend the drain hose too excessively in order to prevent blocking.

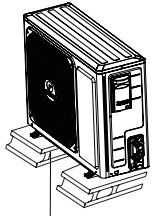
8.6 Installation of Outdoor Unit

1. Fix the Support of Outdoor Unit(select it according to the actual installation situation)

- (1) Select installation location according to the house structure.
- (2) Fix the support of outdoor unit on the selected location with expansion screws.

⚠ Note:

- (1) Take sufficient protective measures when installing the outdoor unit.
- (2) Make sure the support can withstand at least four times the unit weight.
- (3) The outdoor unit should be installed at least 3cm above the floor in order to install drain joint.(As show in Fig.18)
- (4) For the unit with cooling capacity of 2300W~5000W, 6 expansion screws are needed; for the unit with cooling capacity of 6000W~8000W, 8 expansion screws are needed; for the unit with cooling capacity of 10000W~16000W, 10 expansion screws are needed.



At least 3cm above the floor
Fig.18

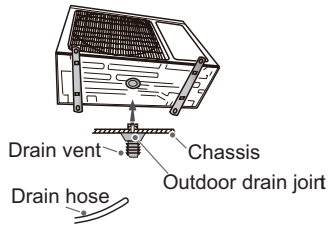


Fig.19

2. Install Drain Joint(Only for cooling and heating unit)

- (1) Connect the outdoor drain joint into the hole on the chassis.
 - (2) Connect the drain hose into the drain vent.
- (As show in Fig.19)

3. Fix Outdoor Unit

- (1) Place the outdoor unit on the support.
 - (2) Fix the foot holes of outdoor unit with bolts.
- (As show in Fig.20)

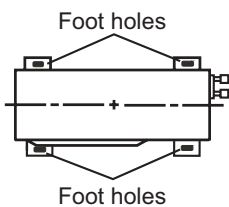


Fig.20

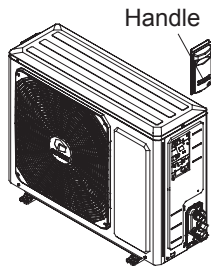


Fig.21

4. Connect Indoor and Outdoor Pipes

- (1) Remove the screw on the right handle of outdoor unit and then remove the handle.(As show in Fig.21)
- (2) Remove the screw cap of valve and aim the pipe joint at the bellmouth of pipe.(As show in Fig.22)

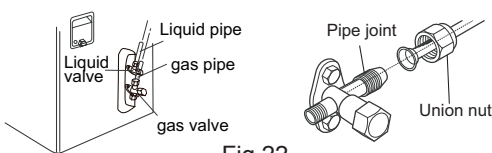


Fig.22

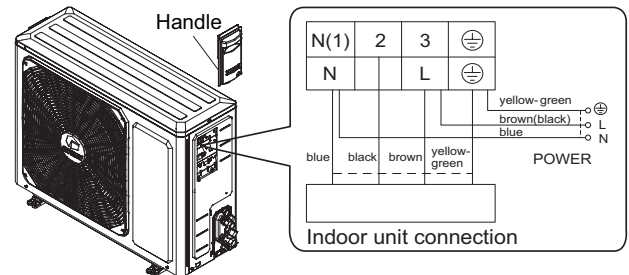
- (3) Pretightening the union nut with hand.
- (4) Tighten the union nut with torque wrench .

Refer to the following table for wrench moment of force :

Hex nut diameter(mm)	Tightening torque(N·m)
Φ6	15~20
Φ9.52	30~40
Φ12	45~55
Φ16	60~65
Φ19	70~75

5. Connect Outdoor Electric Wire

- (1) Remove the wire clip; connect the power connection wire and power cord to the wiring terminal according to the color; fix them with screws.(As show in Fig.23)



Note: the wiring connect is for reference only, please refer to the actual one.

Fig.23

- (2) Fix the power connection wire with wire clip.

⚠ Note:

- (1) After tightening the screw, pull the power cord slightly to check if it is firm.
- (2) Never cut the power connection wire to prolong or shorten the distance.

6. Neaten the Pipes

- (1) The pipes should be placed along the wall, bent reasonably and hidden possibly. Min. semidiameter of bending the pipe is 10cm.
- (2) If the outdoor unit is higher than the wall hole, you must set a U-shaped curve in the pipe before pipe goes into the room, in order to prevent rain from getting into the room.(As show in Fig.24)

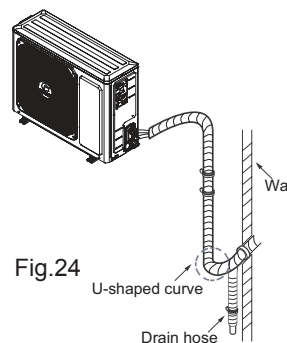


Fig.24

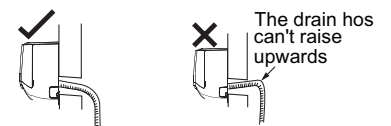
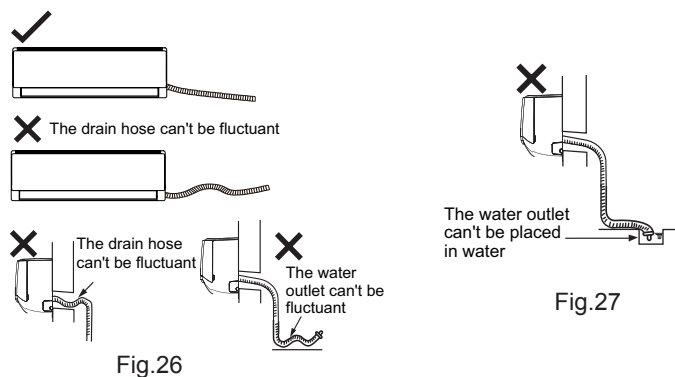


Fig.25

⚠ Note:

- (1) The through-wall height of drain hose shouldn't be higher than the outlet pipe hole of indoor unit.(As show in Fig.25)
- (2) Slant the drain hose slightly downwards. The drain hose can't be curved, raised and fluctuant, etc.(As show in Fig.26)

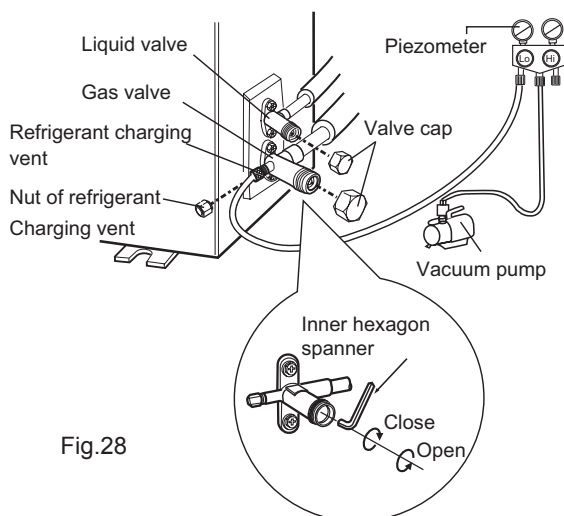
(3) The water outlet can't be placed in water in order to drain smoothly.(As show in Fig.27)



8.7 Vacuum Pumping and Leak Detection

1. Use Vacuum Pump

- (1) Remove the valve caps on the liquid valve and gas valve and the nut of refrigerant charging vent.
- (2) Connect the charging hose of piezometer to the refrigerant charging vent of gas valve and then connect the other charging hose to the vacuum pump.
- (3) Open the piezometer completely and operate for 10-15min to check if the pressure of piezometer remains in -0.1MPa.
- (4) Close the vacuum pump and maintain this status for 1-2min to check if the pressure of piezometer remains in -0.1MPa. If the pressure decreases, there may be leakage.
- (5) Remove the piezometer, open the valve core of liquid valve and gas valve completely with inner hexagon spanner.
- (6) Tighten the screw caps of valves and refrigerant charging vent. (As show in Fig.28)



2. Leakage Detection

- (1) With leakage detector:
Check if there is leakage with leakage detector.
- (2) With soap water:
If leakage detector is not available, please use soap water for leakage detection. Apply soap water at the suspected position and keep the soap water for more than 3min. If there are air bubbles coming out of this position, there's a leakage.

8.8 Check after Installation and Test Operation

1. Check after Installation

Check according to the following requirement after finishing installation.

No.	Items to be checked	Possible malfunction
1	Has the unit been installed firmly?	The unit may drop, shake or emit noise.
2	Have you done the refrigerant leakage test?	It may cause insufficient cooling (heating) capacity.
3	Is heat insulation of pipeline sufficient?	It may cause condensation and water dripping.
4	Is water drained well?	It may cause condensation and water dripping.
5	Is the voltage of power supply according to the voltage marked on the nameplate?	It may cause malfunction or damage the parts.
6	Is electric wiring and pipeline installed correctly?	It may cause malfunction or damage the parts.
7	Is the unit grounded securely?	It may cause electric leakage.
8	Does the power cord follow the specification?	It may cause malfunction or damage the parts.
9	Is there any obstruction in air inlet and air outlet?	It may cause insufficient cooling (heating).
10	The dust and sundries caused during installation are removed?	It may cause malfunction or damaging the parts.
11	The gas valve and liquid valve of connection pipe are open completely?	It may cause insufficient cooling (heating) capacity.

2. Test Operation

- (1) Preparation of test operation
 - The client approves the air conditioner installation.
 - Specify the important notes for air conditioner to the client.
- (2) Method of test operation
 - Put through the power, press ON/OFF button on the remote controller to start operation.
 - Press MODE button to select AUTO, COOL, DRY, FAN and HEAT to check whether the operation is normal or not.
 - If the ambient temperature is lower than 16°C , the air conditioner can't start cooling.

9. Maintenance

9.1 Error Code List

No.	Malfunction Name	Display Method of Indoor Unit		Display Method of Outdoor Unit (Indicator has 3 kinds of display status and they will be displayed circularly every 5s.)				A/C Status	Possible Causes	Countermeasures	
		Display of dual-8 nixie tube	Indicator Display (during blinking, ON 0.5s and OFF 0.5s)	□OFF ■Illuminated ☆Blink							
				Operation Indicator	Heat Indicator	D40	D41				D42
1	High pressure protection	E1	Flash once every 3s		□	☆	☆	☆	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	Refrigerant is superabundant;	1. Reduce refrigerant volume;
										Poor heat-exchanging (including heat exchanger is dirty and radiating environment is not good);	2. Clean the heat exchanger; improve radiating environment of unit;
										Ambient temperature is too high;	3. Reduce load
										Poor connection of LPP;	4. After de-energization, reinsert LPP terminal tightly;
										Pressure switch is damaged;	5. Replace pressure switch;
										Hardware malfunction of outdoor unit's main board;	6. Replace outdoor unit's main board;
2	Freeze protection	E2	Flash twice every 3s		■	□	■	□	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	Poor air return of indoor unit;	1. Check whether indoor unit's horizontal louver can close normally;
										Rotation speed of indoor fan is abnormal;	2. Replace indoor unit's main board→replace indoor fan
										Evaporator is dirty;	3. Clean evaporator of indoor unit;

3	High discharge temperature protection of compressor	E4	Flash 4 times every 3s		■	□	■	☆	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	See 9.3 (diagnosis of overheating prevention and overload protection)	Refer to maintenance flowchart
4	Overcurrent protection	E5	Flash 5 times every 3s		□	■	☆	□	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	Power voltage is unstable, big fluctuation.	1. Check whether power supply network is abnormal;
										Power voltage is too low; overload.	2. Reduce load;
										Malfunction of hardware.	3. Replace outdoor unit's main board AP1
5	Communication malfunction	E6	Flash 6 times every 3s		□	□	□	☆	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	See 9.3 (diagnosis of communication malfunction)	Refer to maintenance flowchart
6	Overload protection	E8	Flash 8 times every 3s		■	□	■	■	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	See 9.3(diagnosis of overheating prevention and overload protection)	Refer to maintenance flowchart

7	Indoor ambient temperature sensor is open/ short- circuited	F1							<p>The unit will stop operation as it reaches the temperature point. During cooling and drying operation, compressor and outdoor unit stop, while indoor fan operates; During heating operation, the complete unit stops operation.</p>	<p>Connection terminal between indoor ambient temperature sensor and main board is loose or poor connection.</p> <p>There's short circuit due to trip-over of the parts on main board;</p> <p>Indoor ambient temperature sensor is damaged (Please check it by referring to the resistance table for temperature sensor)</p> <p>Main board is damaged.</p>	Refer to maintenance flowchart
8	Indoor evaporator temperature sensor is open/ short-circuited	F2							<p>The unit will stop operation as it reaches the temperature point. During cooling and drying operation, compressor and outdoor unit stop, while indoor fan operates; During heating operation, the complete unit stops operation.</p>	<p>Connection terminal between indoor evaporator temperature sensor and main board is loose or poor connection.</p> <p>There's short circuit due to trip-over of the parts on main board;</p> <p>Indoor evaporator temperature sensor is damaged (Please check it by referring to the resistance table for temperature sensor)</p> <p>Main board is damaged.</p>	Refer to maintenance flowchart

9	Blockage protection of indoor unit	H6	Flash 11 times every 3s						Indoor fan, outdoor fan, compressor and electric heating tube all stop operation; horizontal louver stops at current position.	Feedback terminal of PG motor hasn't been inserted tightly.	Refer to maintenance flowchart
										Control terminal of PG motor is not inserted tightly.	
										Fan is blocked	
										Malfunction of motor.	
10	Malfunction protection of jumper cap	C5	Flash 15 times every 3s						Operation of remote controller or control panel is available, but the unit won't act.	Jumper cap hasn't been inserted on main board.	Refer to maintenance flowchart
										Jumper cap hasn't been inserted correctly and tightly.	
										Jumper cap is damaged.	
										Circuit of main board is abnormal.	
11	Indoor fan circuit malfunction by zero cross detection	U8	Flash 17 times every 3s						Operation of remote controller or control panel is available, but the unit won't act.	1. Discharging speed of capacitor is slow, which lead to wrong judgement of controller.	Refer to maintenance flowchart
										Zero-crossing detection circuit of main board is abnormal	

12	Malfunction of outdoor ambient temperature sensor	F3			□	□	☆	■	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.		
13	Malfunction of outdoor condenser temperature sensor	F4			□	□	☆	□	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	1.T-SENSOR terminal hasn't been inserted tightly; 2. Hardware malfunction of outdoor unit's main board;	1. After de-energization, reinsert T-SENSOR terminal tightly; 2. Replace outdoor unit's main board AP1;
14	Malfunction of outdoor discharge temperature sensor	F5			□	□	☆	☆	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.		
15	Limit/decrease frequency due to overload	F6			■	□	☆	☆	All loads operates normally, while operation frequency of compressor decreases.		
16	Decrease frequency due to overcurrent	F8			■	■	□	■	All loads operates normally, while operation frequency of compressor decreases.	Input power voltage is too low;	1. Check whether power supply network is abnormal;
										Pressure of system is too high; overload	2. Reduce load;

17	Decrease frequency due to high air discharge	F9			■	■	□	□	All loads operates normally, while operation frequency of compressor decreases.	Overload; ambient temperature is too high; Refrigerant is not enough Malfunction of electronic expansion valve (EKV)	1. Reduce load; 2. Add refrigerant 3. Replace electronic expansion valve → replace outdoor unit's main board AP1
18	DC busbar voltage is too high	PH			□	■	□	☆	During cooling and drying operation, compressor stops while indoor fan operates. During heating operation, all loads stop.	1. Measure the voltage at position L and N on wiring board (XT). If the voltage is higher than 265VAC, wait until the power voltage is decreased within normal range and then turn on the unit; 2. If AC input is normal, measure the voltage between A and B ends of electrolytic capacitor (fig. 30 in 9.1) on control board (AP1) after turning on the unit. If it's normal, the circuit has malfunction. Please replace the main board of outdoor unit.	1. Check whether power supply network is abnormal; 2. Replace outdoor unit's main board AP1;
19	Detection malfunction of system current	U5			□	■	☆	■	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	Malfunction of circuit on outdoor unit's main board AP1. Replace outdoor unit's main board AP1.	1. Replace outdoor unit's main board AP1

20	Overcurrent protection of phase current	P5			□	☆	□	□	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	See 9.3 (diagnosis of IPM protection, desynchronizing malfunction, overcurrent protection of phase current of compressor)	Refer to maintenance flowchart
21	Defrosting	H1		Flash once every 3s						Normal function	
22	Overload protection of compressor	H3		Flash 3 times every 3s	□	☆	☆	□	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	1:Wiring terminal OVC-COMP is loose (Under normal circumstances, the resistance between both ends of this terminal should be less than 1Ω.)	1. After de-energization, insert OVC-COMP terminal tightly;
										2: See 9.3 (diagnosis of overload and discharge protection)	2. Refer to maintenance flowchart
23	System is abnormal	H4		Flash 4 times every 3s	■	□	■	■	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	See 9.3(diagnosis of overheating prevention and overload protection)	Refer to maintenance flowchart
24	IPM protection	H5		Flash 5 times every 3s	□	☆	□	■	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	See 9.3 (diagnosis of IPM protection, desynchronizing malfunction, overcurrent protection of phase current of compressor)	Refer to maintenance flowchart

25	PFC protection	HC		Flash 6 times every 3s	□	■	☆	☆	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	See 9.3 (diagnosis of PFC protection)	Refer to maintenance flowchart
26	Desynchronizing of compressor	H7		Flash 7 times every 3s	□	☆	■	☆	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	See 9.3 (diagnosis of IPM protection, desynchronizing malfunction, overcurrent protection of phase current of compressor)	Refer to maintenance flowchart
27		H0		Flash 10 times every 3s	■	□	☆	☆		See 9.3(diagnosis of overheating prevention and overload protection)	Refer to maintenance flowchart
28	Failure startup	Lc		Flash 11 times every 3s	□	☆	□	☆	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	See 9.3 (diagnosis of failure startup)	Refer to maintenance flowchart
29	Circuit malfunction of phase current circuit detection for compressor	U1		Flash 13 times every 3s	□	☆	■	□	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	Hardware malfunction of outdoor unit's main board;	1. Replace outdoor unit's main board AP1

30	malfunction of read EEPROM	EE		Flash 15 times every 3s	□	□	□	■	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	Wrong match between indoor unit and outdoor unit;	1. Check whether the capacity of indoor unit and outdoor unit is matching with each other;
										Hardware malfunction of indoor unit's main board;	2. Replace indoor unit's main board AP2;
										Hardware malfunction of outdoor unit's main board;	3. Replace outdoor unit's main board AP1;
31	Charging malfunction of capacitor	PU		Flash 17 times every 3s	□	■	□	■	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	See 9.3 (diagnosis of charging malfunction for capacitor)	Refer to maintenance flowchart
32	Circuit malfunction of module temperature sensor	P7		Flash 18 times every 3s	□	□	■	☆	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	Hardware malfunction of outdoor unit's main board;	1. Replace outdoor unit's main board AP1;
33	Module temperature protection	P8		Flash 19 times every 3s	■	□	☆	■	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	Radiating grease on IPM module of outdoor unit's main board is not enough; screws haven't been fixed tightly;	1. After the system is de-energized for 20min and discharge, check whether radiating grease on IPM Module of outdoor control board AP1 is enough and whether the radiating is fixed tightly;
										Hardware malfunction of outdoor unit's main board;	2. Replace outdoor unit's main board AP1;

34	Drop malfunction of DC busbar voltage	U3		Flash 20 times every 3s	□	■	■	■	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	Power voltage is unstable, big fluctuation.	1. Check whether power supply network is abnormal;
35	Low voltage protection of DC bus bar	PL		Flash 21 times every 3s	□	■	■	□	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	The voltage at positions L and N on wiring board (XT) is lower than 150 VAC	1. Check whether power supply network is abnormal;
										Hardware malfunction of outdoor unit's main board;	2. Replace outdoor unit's main board AP1;
36	Limit/decrease frequency due to module temperature protection	EU			■	■	■	☆	All loads operates normally, while operation frequency of compressor decreases.	Radiating grease on IPM module of outdoor unit's main board is not enough; screws haven't been fixed tightly;	1. After the system is de-energized for 20min and discharge, check whether radiating grease on IPM Module of outdoor control board AP1 is enough and whether the radiating is fixed tightly;
										Hardware malfunction of outdoor unit's main board;	2. Replace outdoor unit's main board AP1;
37	4-way valve is abnormal	U7			■	□	☆	□	This malfunction occurs under heating operation: all loads stop.	Power voltage is lower than AC175V	
										Wiring terminal 4V is loose or broken	2. After de-energization, insert OVC-COMP tightly or replace wiring
										Hardware malfunction of outdoor unit's main board;	3. Replace outdoor unit's main board AP1;

38	Zero-crossing malfunction of outdoor unit	U9			■	■	☆	□	During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all loads stop.	Hardware malfunction of outdoor unit's main board;	1. Replace outdoor unit's main board AP1;
39	Limit/decrease frequency due to freeze protection	FH			■	■	■	□	All loads operates normally, while operation frequency of compressor decreases.	Poor air return of indoor unit or speed of fan is too low	1. Check whether indoor unit's horizontal louver can close normally → replace indoor unit's main board → replace indoor unit's motor;

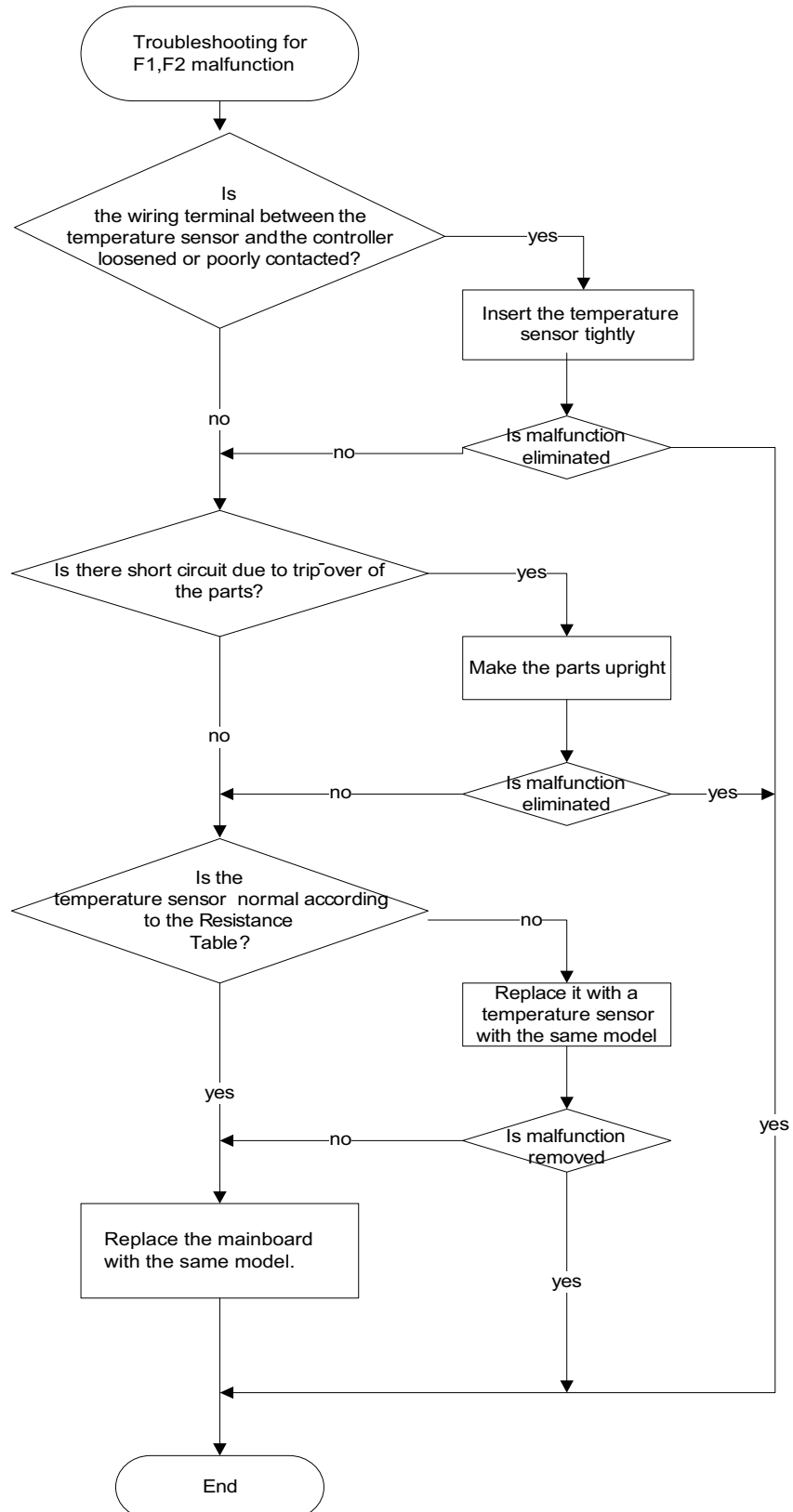
9.2 Troubleshooting for Main Malfunction

1. Malfunction of Temperature Sensor F1, F2

Main detection points:

- Is the wiring terminal between the temperature sensor and the controller loosened or poorly contacted?
- Is there short circuit due to trip-over of the parts?
- Is the temperature sensor broken?
- Is mainboard broken?

Malfunction diagnosis process:

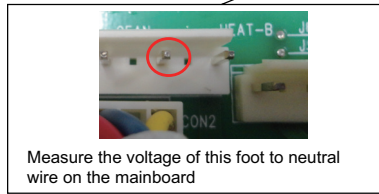
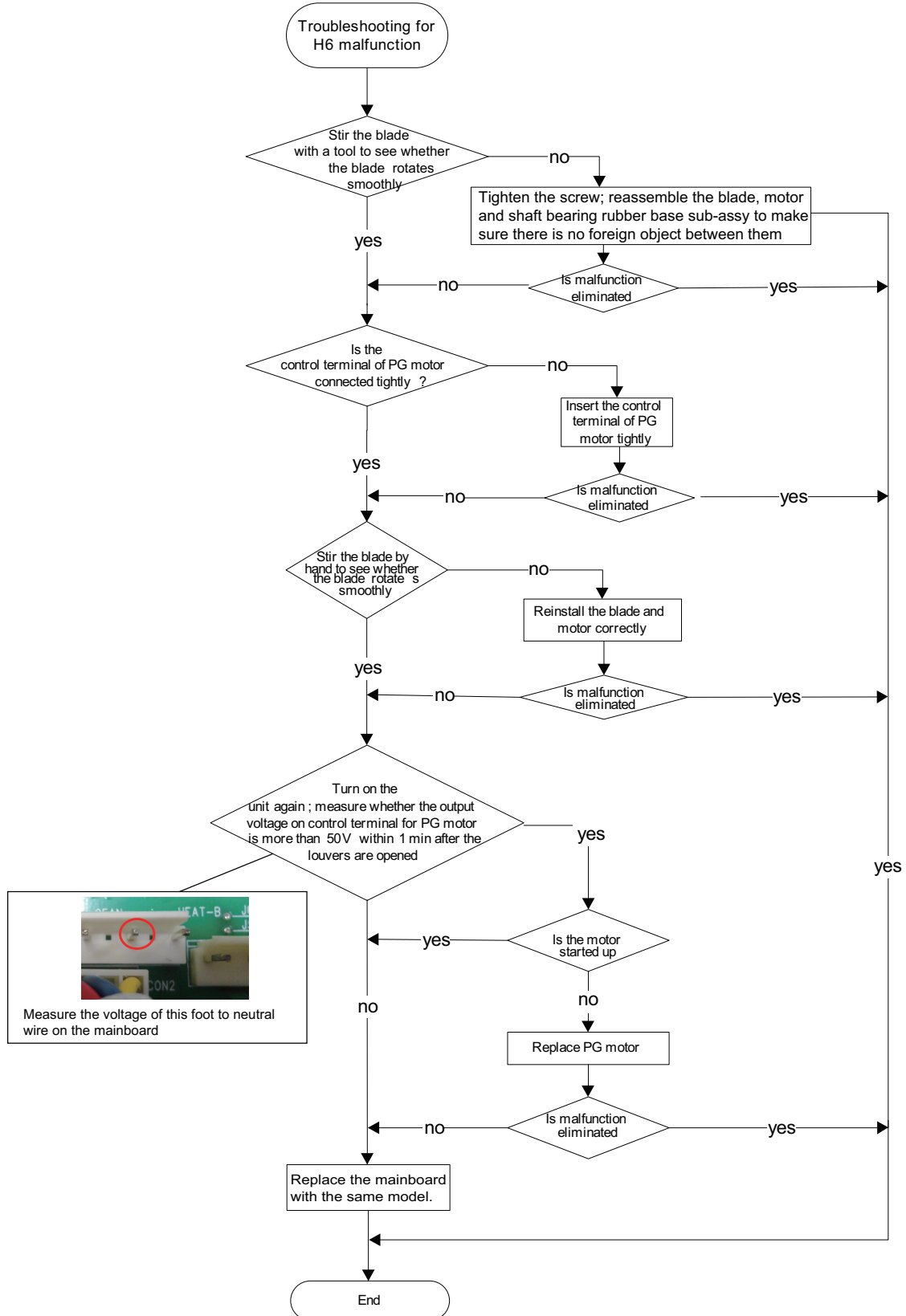


2. Malfunction of Blocked Protection of IDU Fan Motor H6

Main detection points:

- Is the control terminal of PG motor connected tightly?
- Is the feedback interface of PG motor connected tightly?
- The fan motor can't operate ?
- The motor is broken?
- Detection circuit of the mainboard is defined abnormal?

Malfunction diagnosis process:

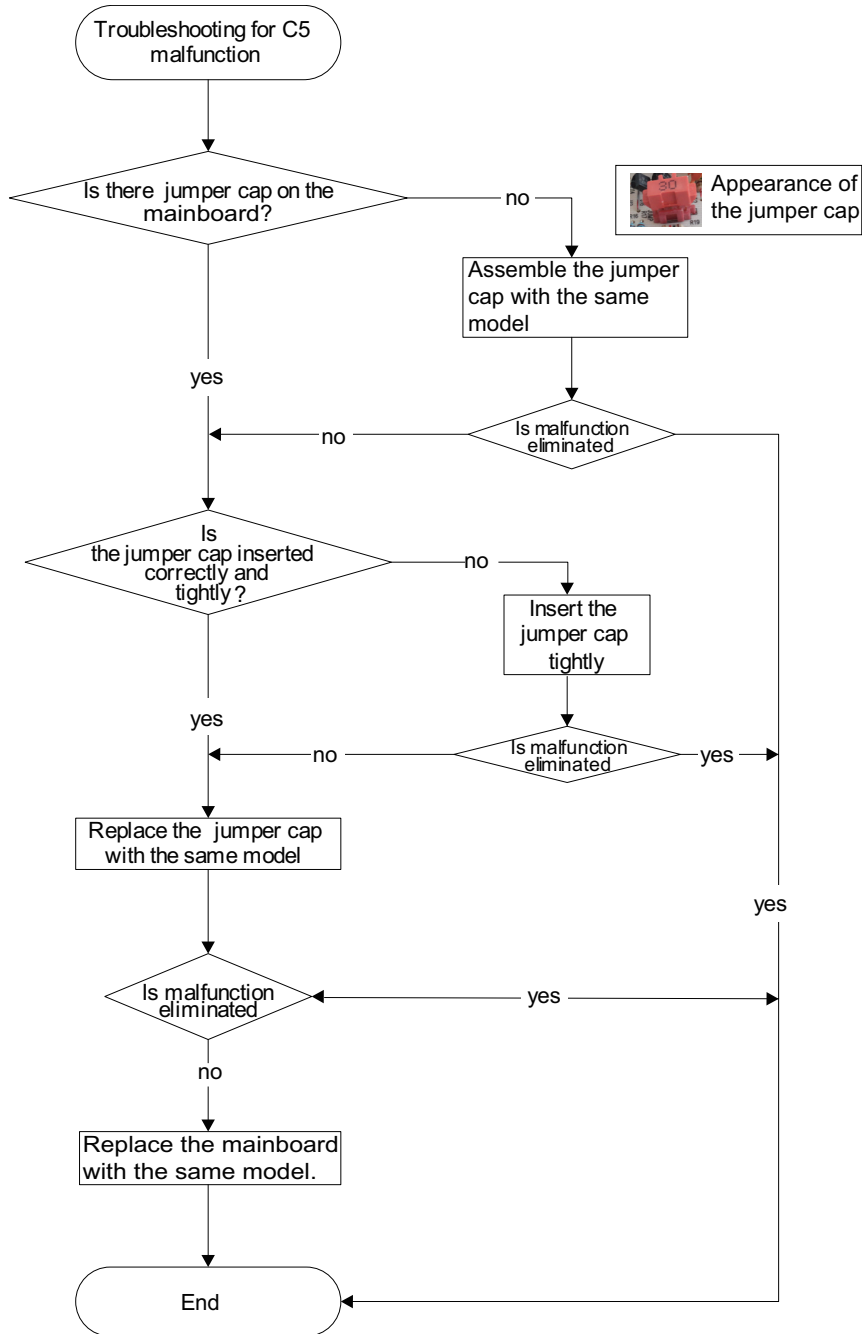


3. Malfunction of Protection of Jumper Cap C5

Main detection points:

- Is there jumper cap on the mainboard?
- Is the jumper cap inserted correctly and tightly?
- The jumper is broken?
- Detection circuit of the mainboard is defined abnormal?

Malfunction diagnosis process:

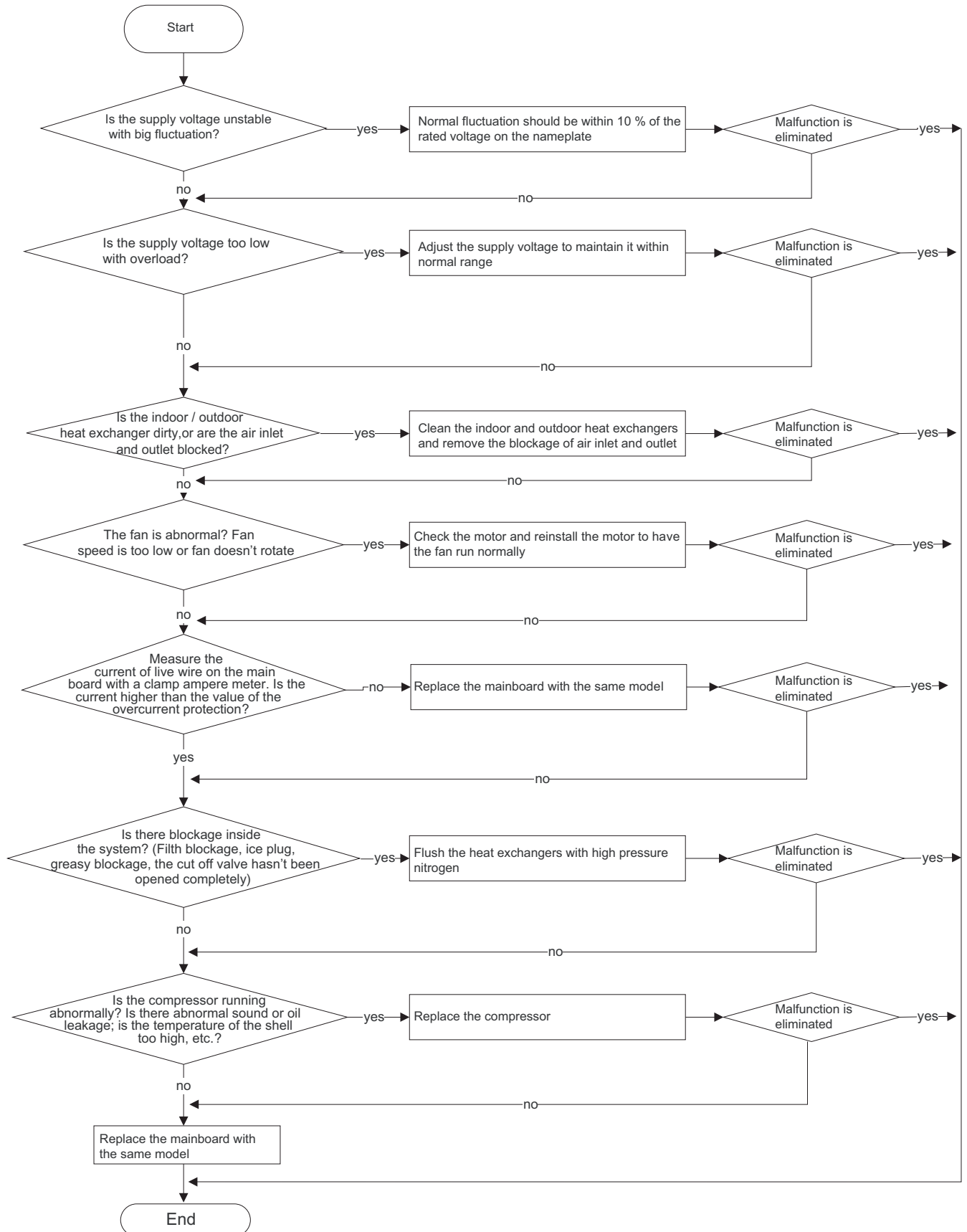


4. Malfunction of Overcurrent Protection E5

Main detection points:

- Is the supply voltage unstable with big fluctuation?
- Is the supply voltage too low with overload?
- Hardware trouble?

Malfunction diagnosis process:

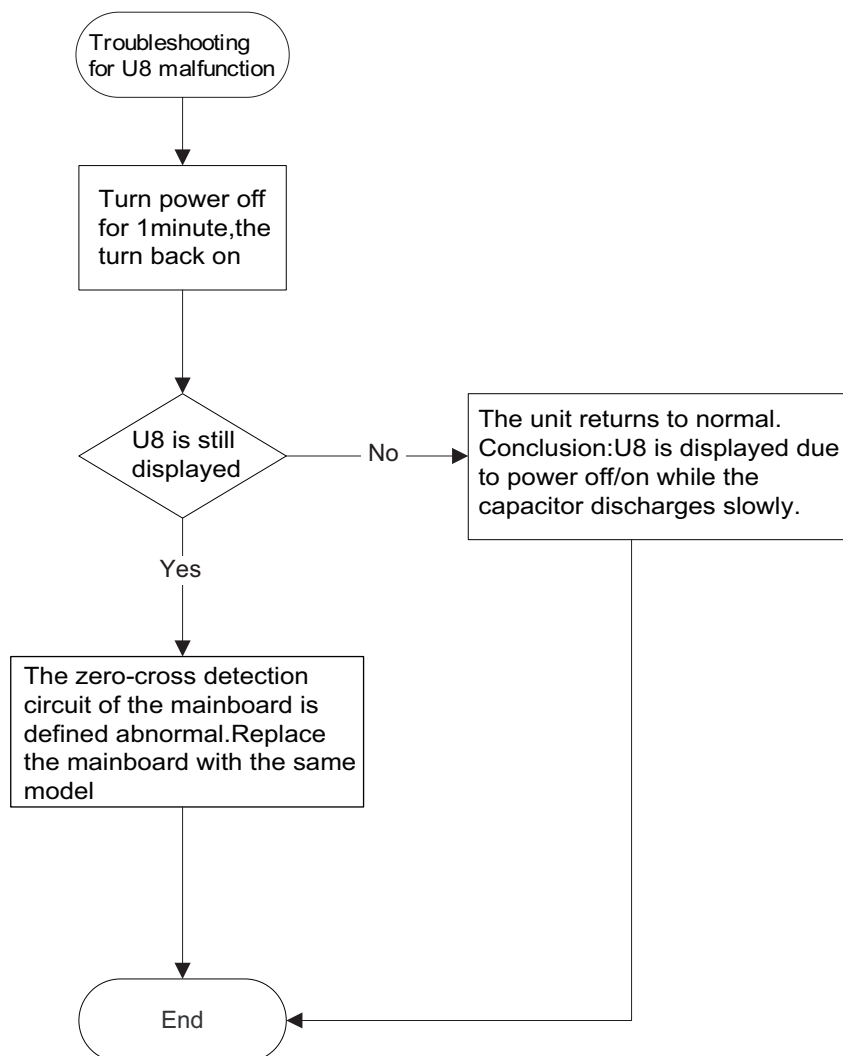


5. Malfunction of Zero-crossing Inspection Circuit Malfunction of the IDU Fan Motor U8

Main detection points:

- Instant energization after de-energization while the capacitor discharges slowly?
- The zero-cross detection circuit of the mainboard is defined abnormal?

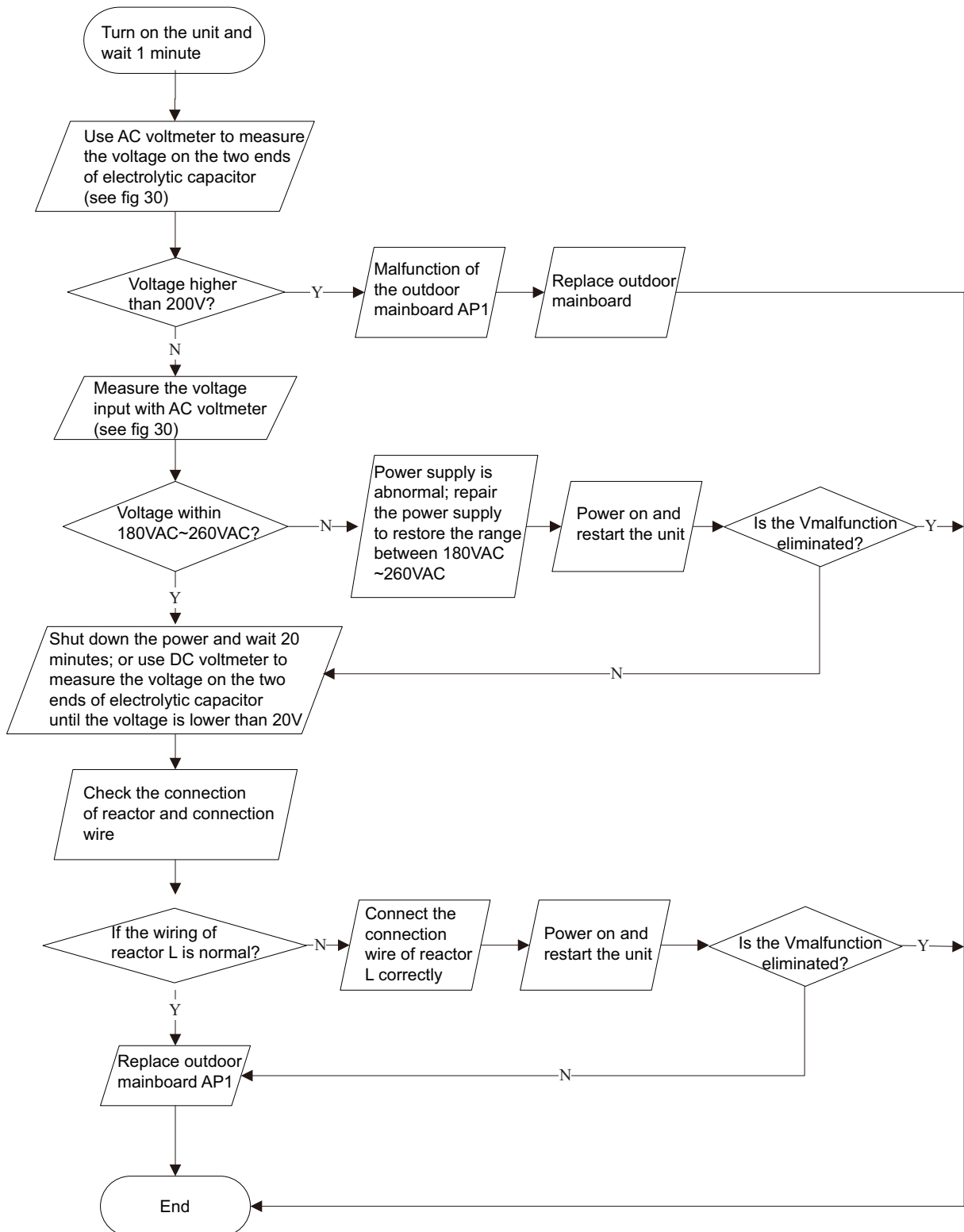
Malfunction diagnosis process:



6. Capacity charging malfunction (outdoor unit malfunction) (AP1 below means control board of outdoor unit)

Main detection points:

- Detect if the voltage of L and N terminal of XT wiring board is between 210VAC-240VAC by alternating voltage meter;
 - Is reactor (L) well connected? Is connection wire loosened or pulled out? Is reactor (L) damaged?
- Malfunction diagnosis process:

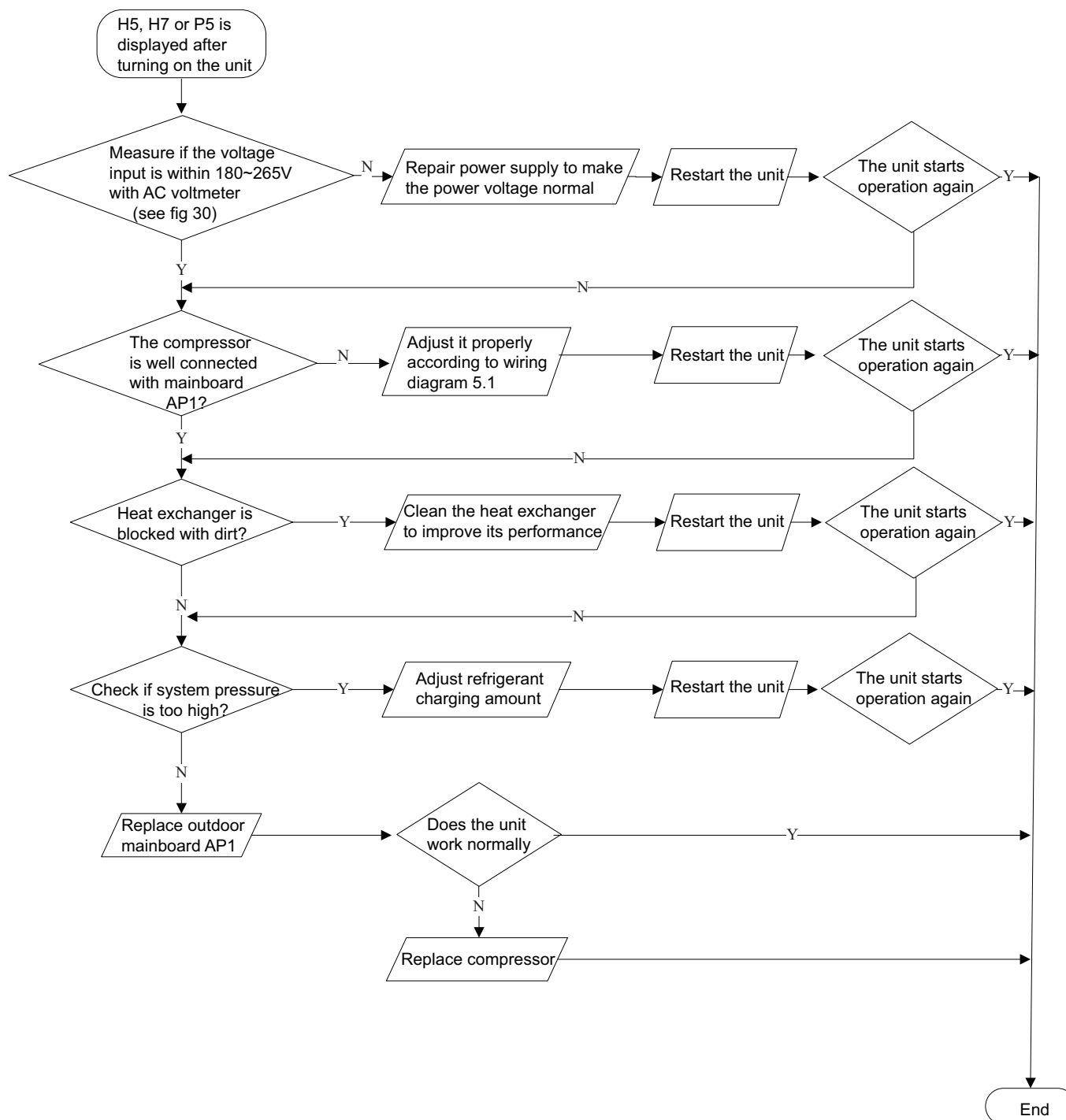


7. IPM protection(H5), desynchronizing malfunction(H7), overcurrent of compressor phase current (P5) (AP1 below means control board of outdoor unit)

Main detection points:

- Is voltage input within the normal range
- If the control board AP1 is well connected with compressor COMP? If they are loosened? If the connection sequence is correct?
- Heat exchange of unit is not good (heat exchanger is dirty and unit radiating environment is bad);
- If the system pressure is too high?
- If the refrigerant charging amount is appropriate?
- If coil resistance of compressor is normal? Is compressor coil insulating to copper pipe well?
- If the work load of unit is heavy? If radiating of unit is good?

Malfunction diagnosis process:

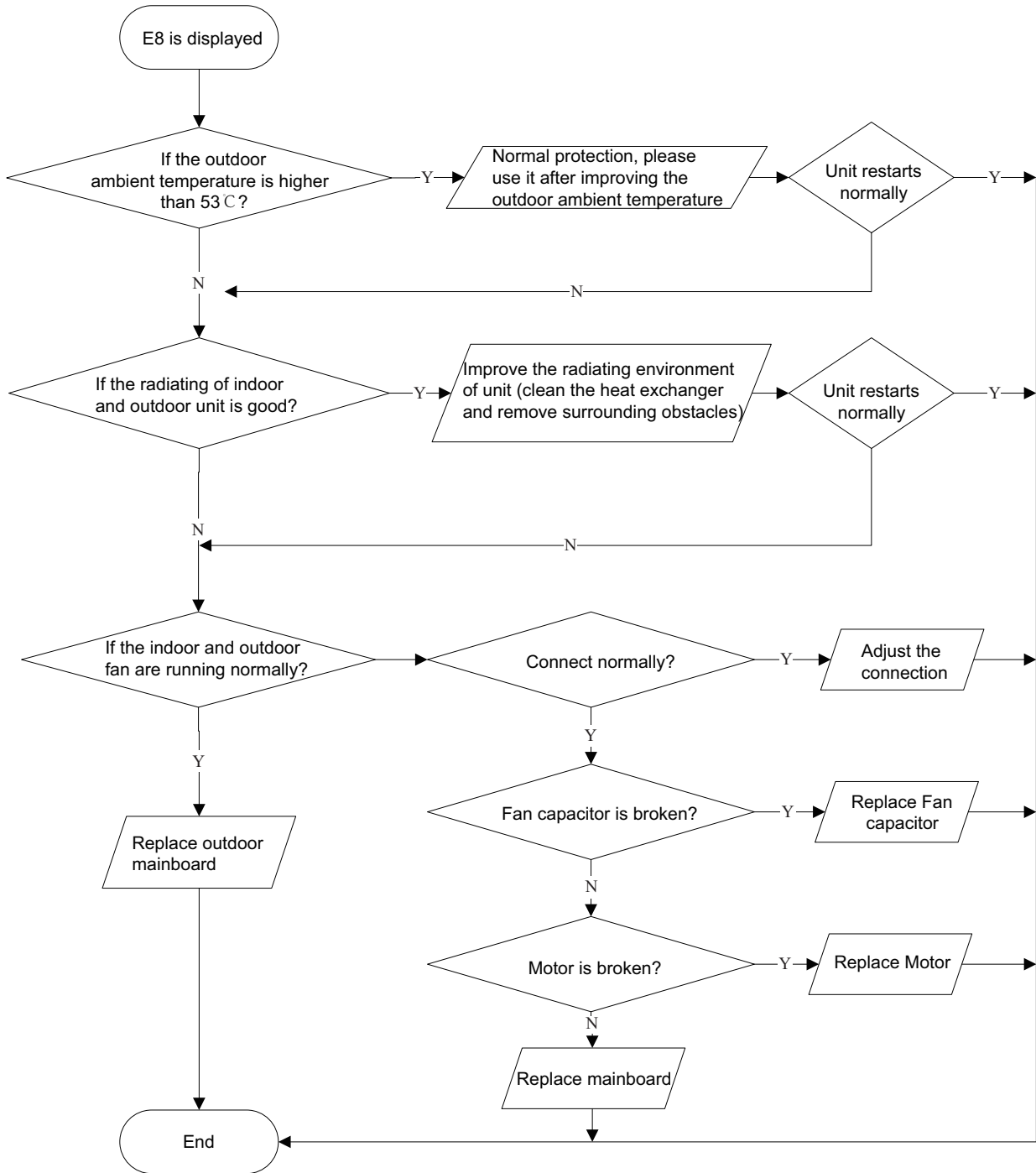


8. High temperature and overload protection (E8)(AP1 below means control board of outdoor unit)

Main detection points:

- If the outdoor ambient temperature is in normal range;
- If the indoor and outdoor fan are running normally;
- If the radiating environment of indoor and outdoor unit is good.

Malfunction diagnosis process:

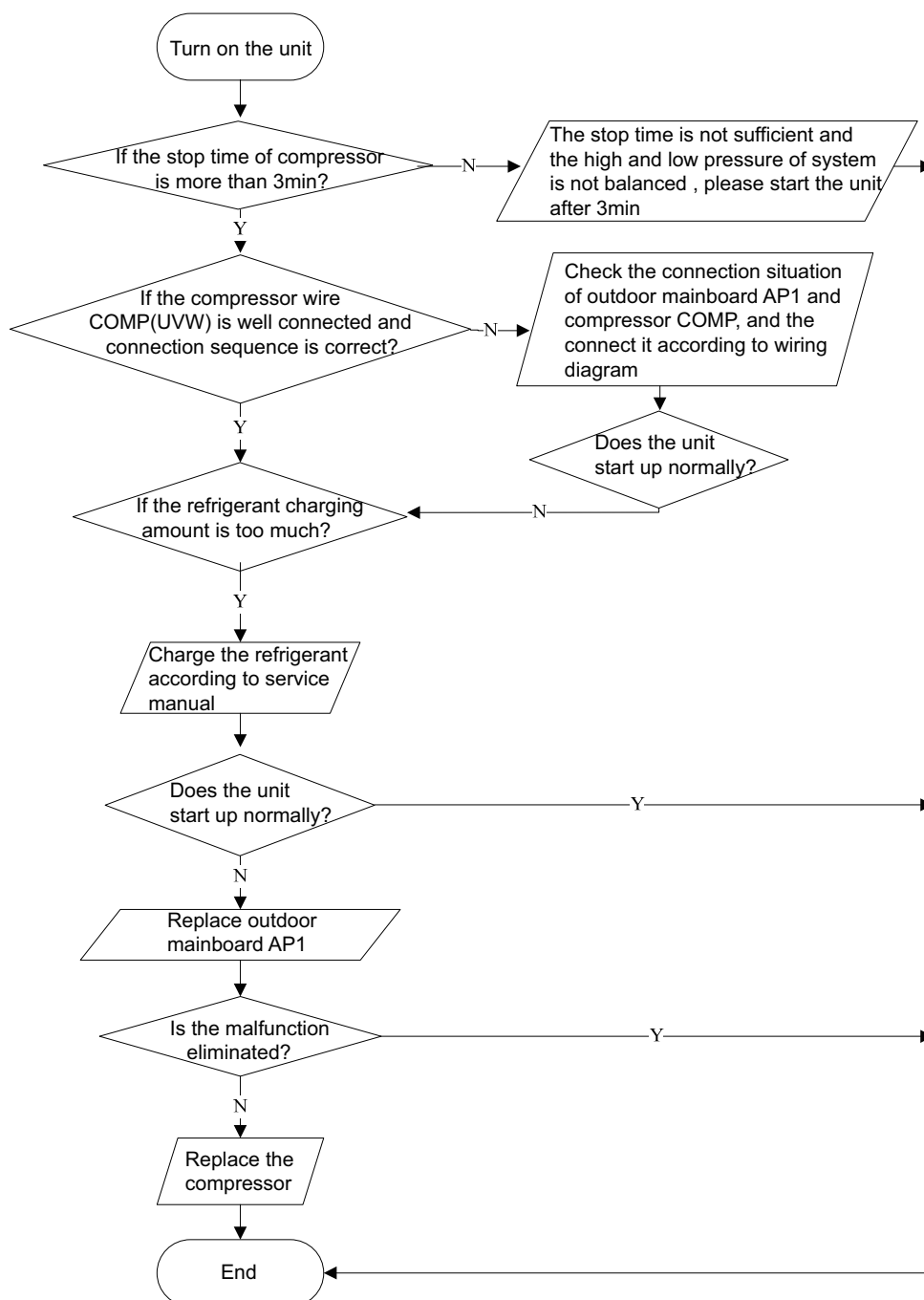


9. Start-up failure (LC) (AP1 below means control board of outdoor unit)

Main detection points:

- If the compressor wiring is correct?
- If the stop time of compressor is sufficient?
- If the compressor is damaged?
- If the refrigerant charging amount is too much?

Malfunction diagnosis process:



10. Overload and high discharge temperature malfunction

Main detection points:

- If the electronic expansion valve is connected well? Is the electronic expansion valve damaged?
- If the refrigerant is leaked?
- The compressor overload protection terminal is not connected well with the mainboard?
- If the overload protector is damaged?
- Heat exchange of unit is not good? (heat exchanger is dirty and unit radiating environment is bad)
- Too much load of the system causes high temperature of compressor after working for a long time?
- Malfunction of discharge temperature sensor?

Malfunction diagnosis process:

9.3 Troubleshooting 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 position 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's 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. 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

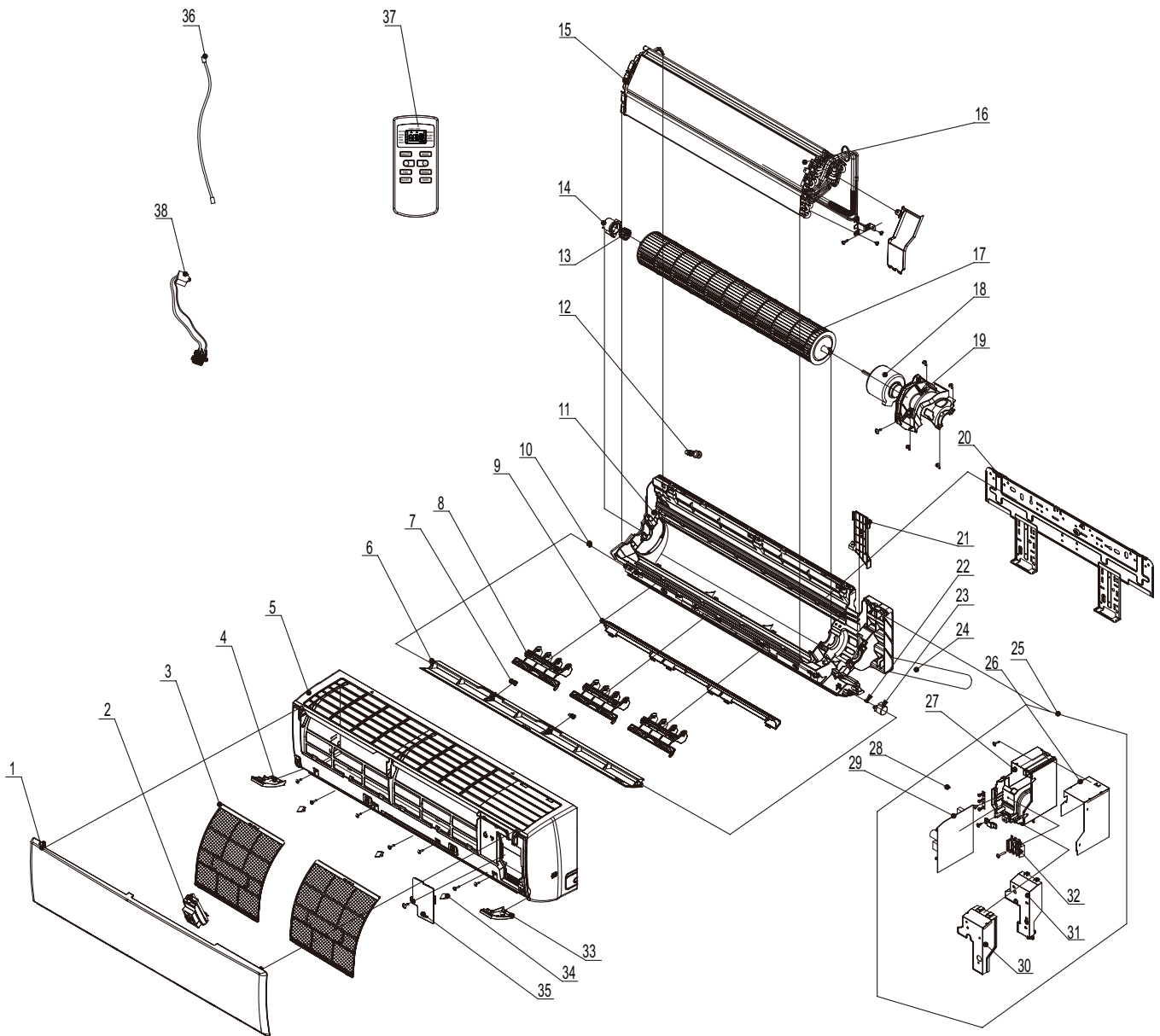
5. Abnormal Sound and Vibration

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

10.1 Indoor Unit

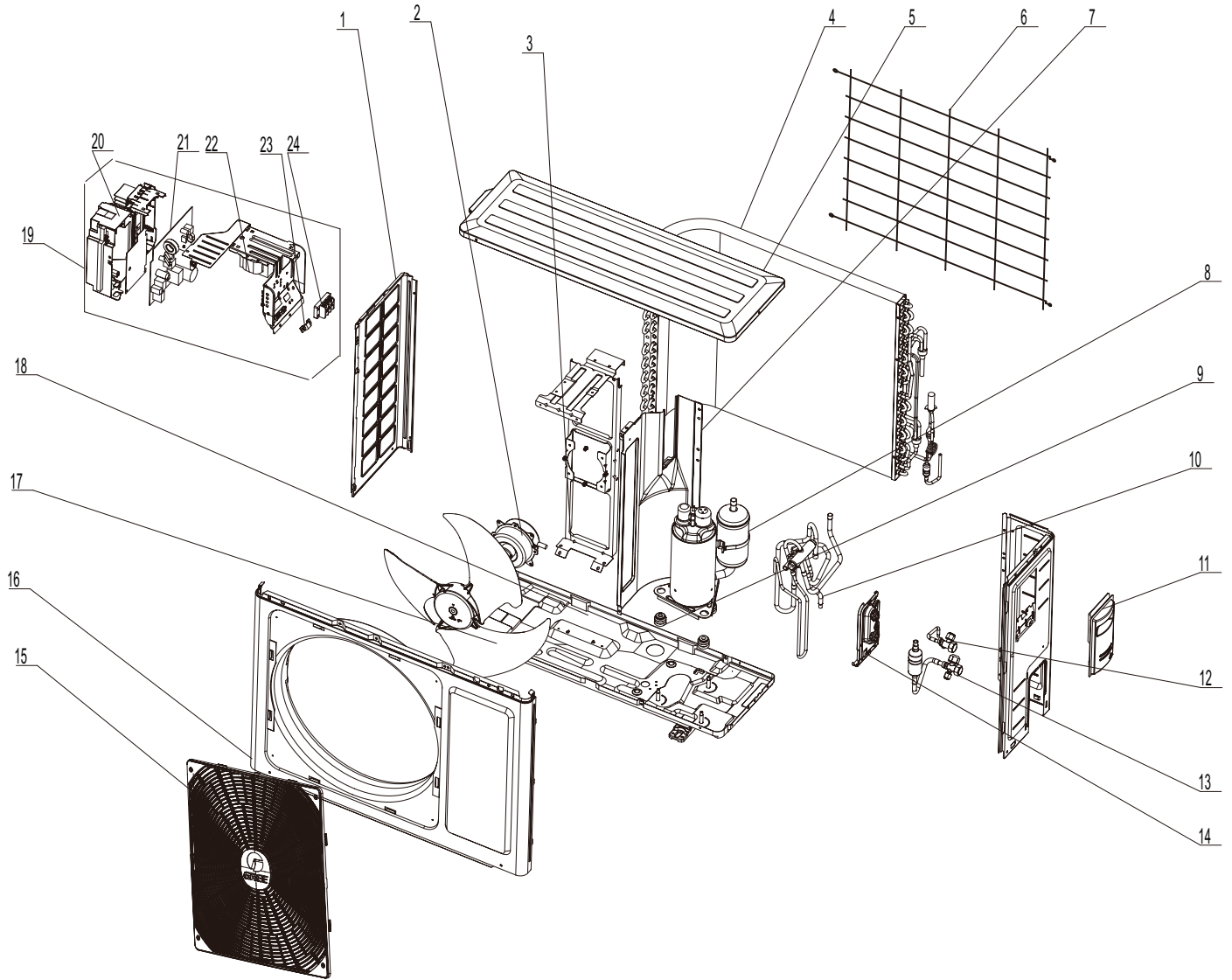
GWH18QD-K3DNA6C/I



No.	Description	Part Code	Qty
		GWH18QD-K3DNA6C/I	
Product Code		CB427N04100	
1	Front Panel	2002269501S	1
2	Display Board	30565264	1
3	Filter Sub-Assy	11122089	2
4	Decorative Board	2019267001	1
5	Front Case	2002248401	1
6	Guide Louver	1051276501	1
7	Axile Bush	10542036	2
8	Air Louver(Manual)	10512732	3
9	Helicoid tongue	26112512	1
10	Left Axile Bush	10512037	1
11	Rear Case assy	22202571	1
12	Rubber Plug (Water Tray)	76712012	1
13	O-Gasket sub-assy of Bearing	7651205102	1
14	Ring of Bearing	26152025	1
15	Evaporator Support	24212177	1
16	Evaporator Assy	01100100020	1
17	Cross Flow Fan	10352060	1
18	Fan Motor	1501214502	1
19	Motor Press Plate	26112511	1
20	Wall Mounting Frame	01362026	1
21	Connecting pipe clamp	2611218801	1
22	Crank	73012005	1
23	Stepping Motor	1521240212	1
24	Drainage hose	05230014	1
25	Electric Box Assy	10000202575	1
26	Lower Shield of Electric Box	01592139	1
27	Electric Box	20112211	1
28	Jumper	4202300121	1
29	Main Board	30148828	1
30	Shield Cover of Electric Box	01592140	1
31	Electric Box Cover	20112209	1
32	Terminal Board	42011233	1
33	Decorative Board	2019267001	1
34	Screw Cover	2425201726	3
35	Electric Box Cover2	20112210	1
36	Connecting Cable	4002052317	0
37	Remote Controller	30510065	1
38	Cold Plasma Generator	1114001602	1

Above data is subject to change without notice.

10.2 Outdoor Unit



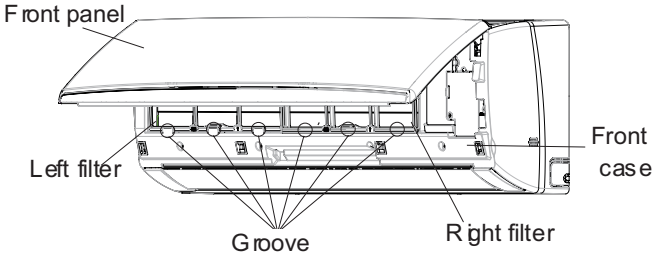
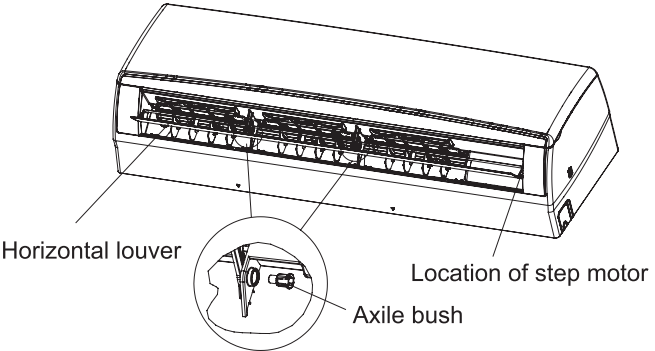
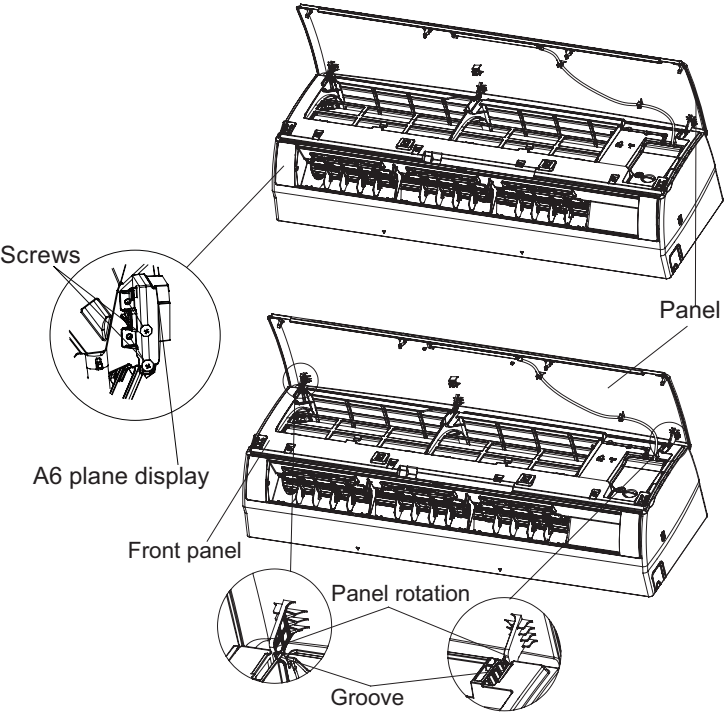
No.	Description	Part Code	Qty
		GWH18QD-K3DNA6C/O	
	Product Code	CB427W04100	
1	Left Side Plate	01303200P	1
2	Fan Motor	15013085	1
3	Motor Support	01703136	1
4	Condenser Assy	01100200506	1
5	Top Cover Sub-Assy	01253081	1
6	Rear Grill	01475014	1
7	Clapboard Sub-Assy	01233180	1
8	Compressor and Fittings	00103892	1
9	Compressor Gasket	76713027	3
10	4-Way Valve Assy	03073406	1
11	Big Handle	2623343106	1
12	Cut off Valve Assy	07133474	1
13	Cut off Valve Assy	07133474	1
14	Valve Support	0171314201P	1
15	Front Grill	22413047	1
16	Cabinet	01433033P	1
17	Axial Flow Fan	10333011	1
18	Chassis Sub-assy	01700000033P	1
19	Electric Box Assy	10000100617	1
20	Electric Box	20113032	1
21	Main Board	30138000886	1
22	Reactor	43130184	1
23	Wire Clamp	71010103	2
24	Terminal Board	42010313	1

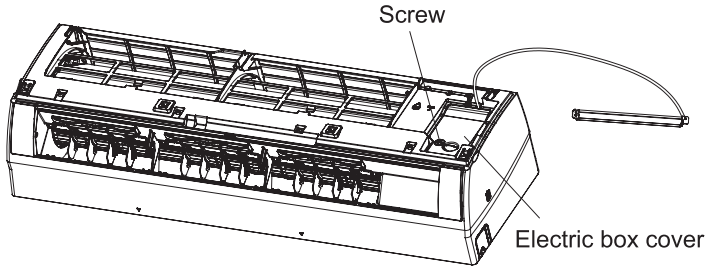
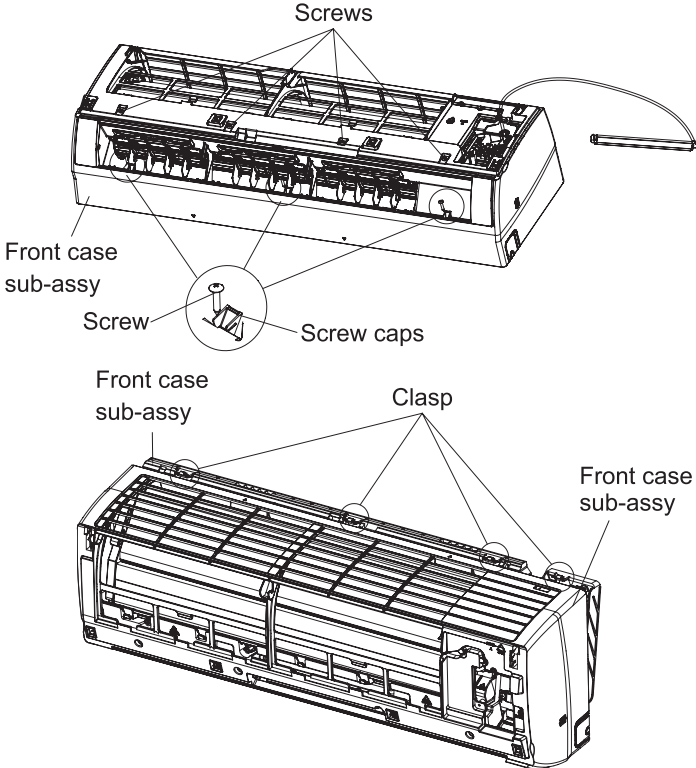
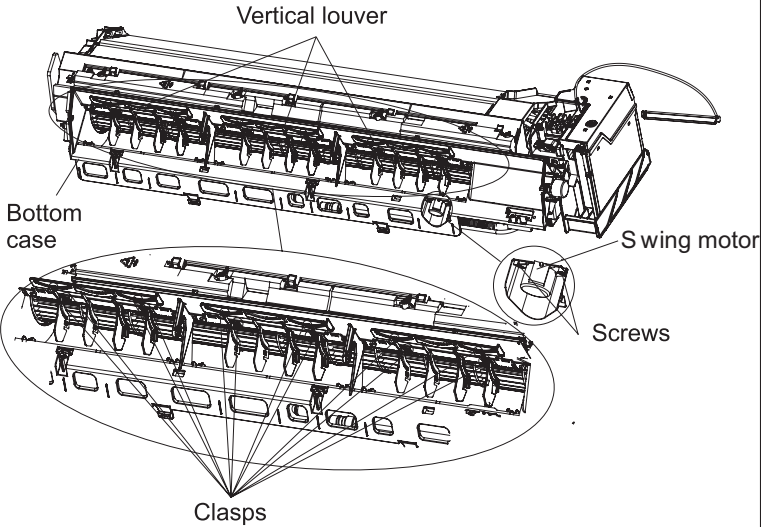
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11. Removal Procedure

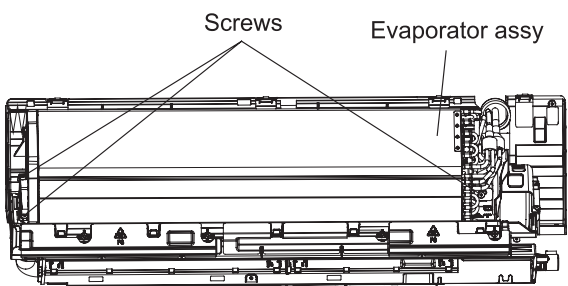
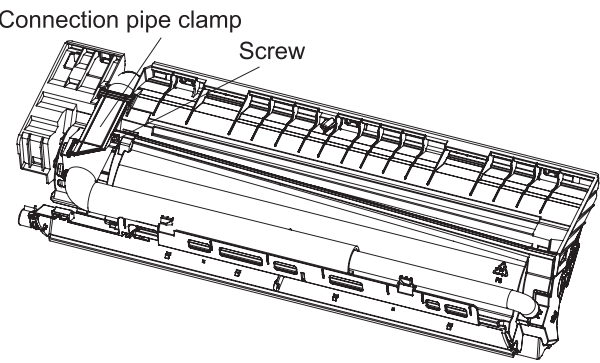
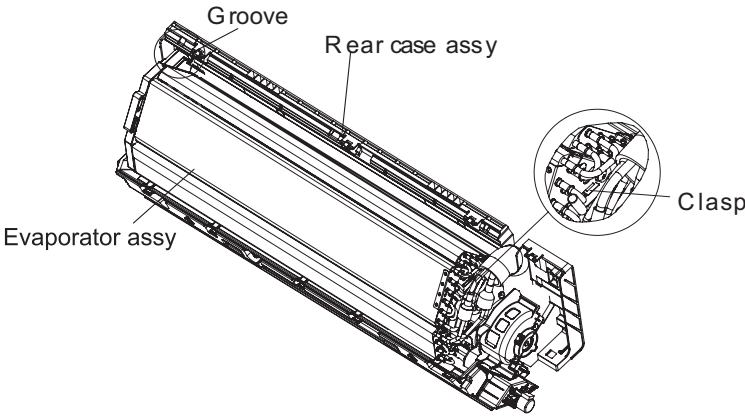
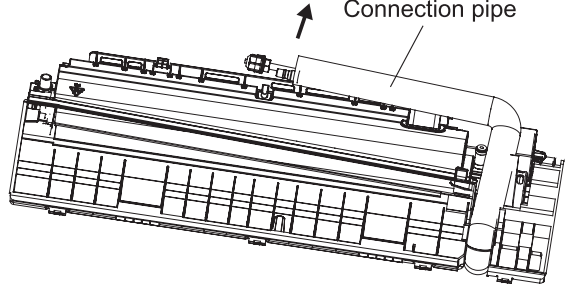
Warning: Be sure to wait for a minimum of 20 minutes after turning off all power supplies and discharge the refrigerant completely before removal.

11.1 Removal Procedure of Indoor Unit

Step	Procedure	Procedure
1. Remove filter assy	<p>Open the front panel. Push the left and right filters to make them break away from the groove on the front case. Then remove the left and right filters one by one.</p>	
2. Remove horizontal louver	<p>Push out the axle bush on horizontal louver. Bend the horizontal louver with hand and then separate the horizontal louver from the crankshaft of step motor to remove it.</p>	
3. Remove panel and display	<p>a Screw off the 2 screws that are locking the display board. Separate the display board from the front panel.</p> <p>b Separate the panel rotation shaft from the groove fixing the front panel and then removes the front panel.</p>	

Step	Procedure	Procedure
4. Remove electric box cover	Remove the screws on the electric box cover to remove the electric box cover.	
5. Remove front case sub-assy	<p>a Remove the screws fixing front case.</p> <p>Note: 1. Open the screw caps before removing the screws around the air outlet. 2. The quantity of screws fixing the front case sub-assy is different for different models.</p> <p>b Loosen the connection clasps between front case sub-assy and bottom case. Lift up the front case sub-assy and take it out.</p>	
6. Remove vertical louver	<p>Loosen the connection clasps between vertical louver and bottom case to remove vertical louver.</p> <p>Screw off the screws that are locking the swing motor and take the motor off.</p>	

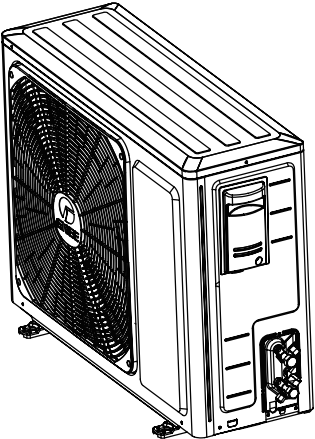
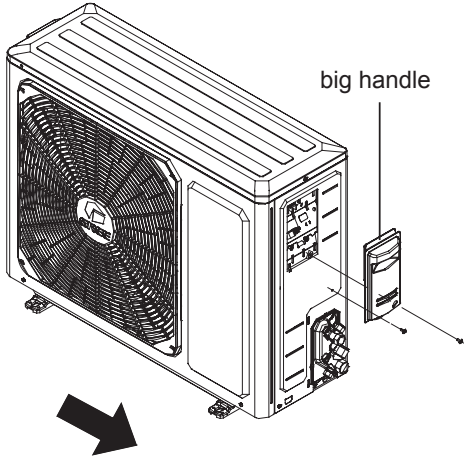
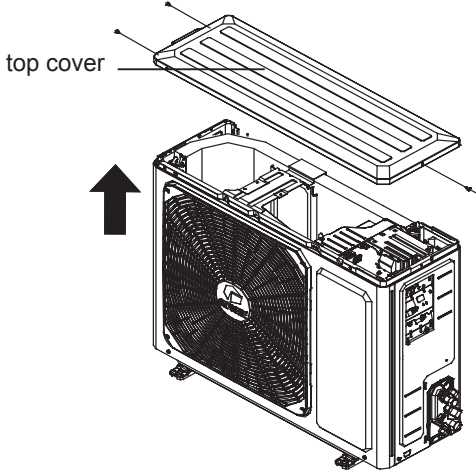
Step	Procedure
7. Remove electric box assy	<div data-bbox="219 307 738 460"> <p>a Loosen the connection clasps between shield cover of electric box sub-assy and electric box, and then remove the shield cover of electric box sub-assy. Remove the screw fixing electric box assy .</p> </div> <div data-bbox="219 760 738 984"> <p>b</p> <ol style="list-style-type: none"> ① Cut off the wire binder and pull out the indoor tube temperature sensor. ② Screw off one grounding screw. ③ Remove the wiring terminals of motor and stepping motor. ④ Remove the electric box assy. ⑤ Screw off the screws that are locking each lead wire. </div> <div data-bbox="219 1319 738 1432"> <p>c Rotate the electric box assy. Twist off the screws that are locking the wire clip and loosen the power cord. Remove the wiring terminal of power cord. Lift up the main board and take it off.</p> </div> <div data-bbox="219 1603 738 1961"> <p>Instruction: Some wiring terminal of this product is with lock catch and other devices. The pulling method is as below:</p> <ol style="list-style-type: none"> 1.Remove the soft sheath for some terminals at first, hold the circlip and then pull out the terminals. 2.Pull out the holder for some terminals at first (holder is not available for some wiring terminal), hold the connector and then pull the terminal. </div> <div data-bbox="868 207 1388 687"> </div> <div data-bbox="755 716 1534 1277"> </div> <div data-bbox="787 1343 1356 1550"> </div> <div data-bbox="812 1638 1494 1911"> </div>

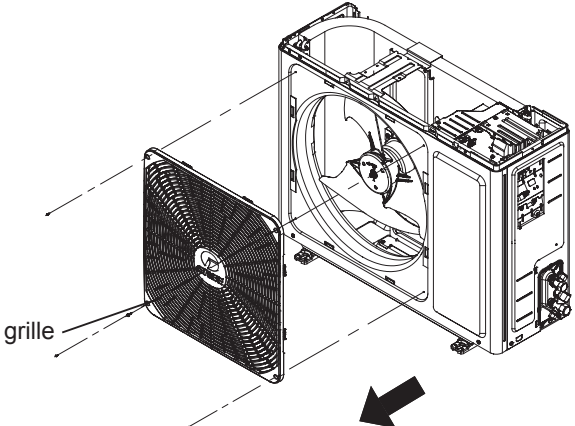
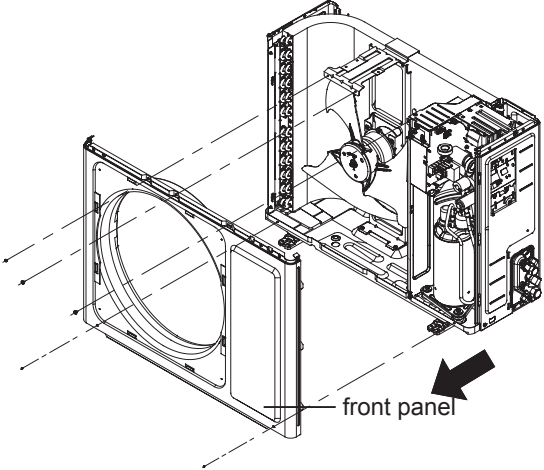
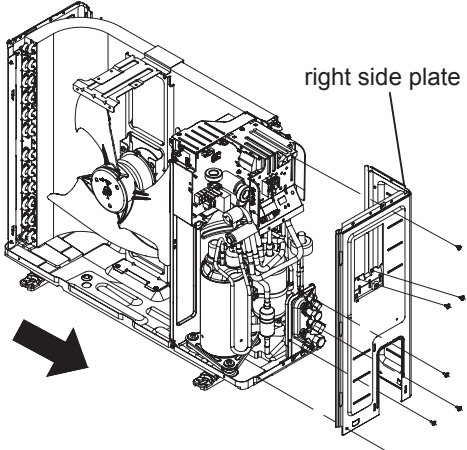
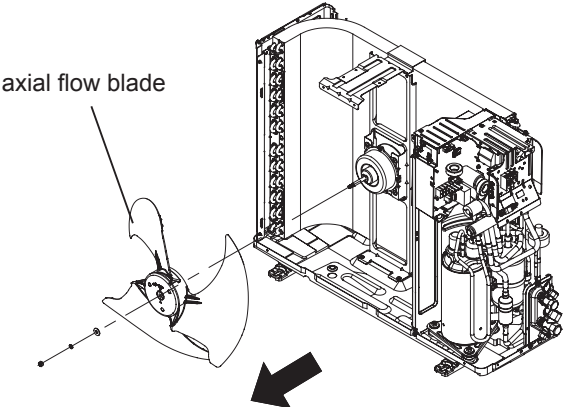
Step	Procedure
8. Remove evaporator assy	
a	<p>Remove 3 screws fixing evaporator assy.</p>  <p>The diagram shows a top-down view of the evaporator assembly mounted on the rear case. Three screws are indicated by lines pointing to their locations along the top edge of the evaporator.</p>
b	<p>At the back of the unit, remove the screw fixing connection pipe clamp and then remove the connection pipe clamp.</p>  <p>The diagram shows the rear view of the unit. A screw is shown being removed from a clamp that holds a connection pipe. The clamp is then shown being lifted away from the pipe.</p>
c	<p>First remove the left side of evaporator from the groove on the rear case assy. Then remove the right side from the clasp on the rear case assy.</p>  <p>The diagram shows the evaporator assembly being lifted away from the rear case assembly. A groove on the rear case is shown where the left side of the evaporator was seated. A circular inset shows a close-up of the clasp mechanism on the rear case that the right side of the evaporator was attached to.</p>
d	<p>Adjust the position of connection pipe on evaporator slightly and then lift the evaporator upwards to remove it.</p>  <p>The diagram shows the evaporator assembly being lifted upwards from the rear case. An arrow points to the connection pipe, indicating that its position should be adjusted before lifting.</p>

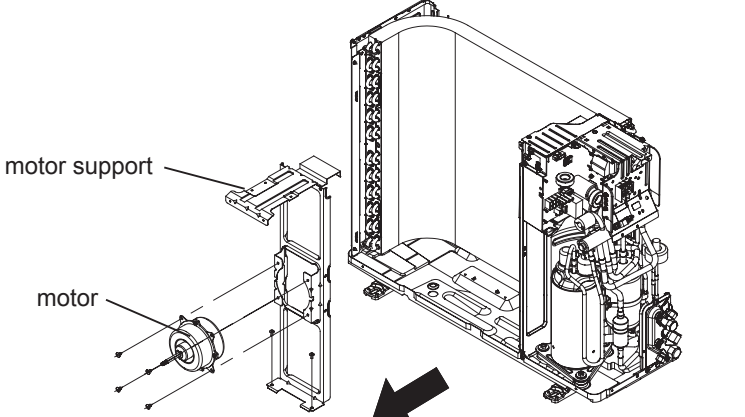
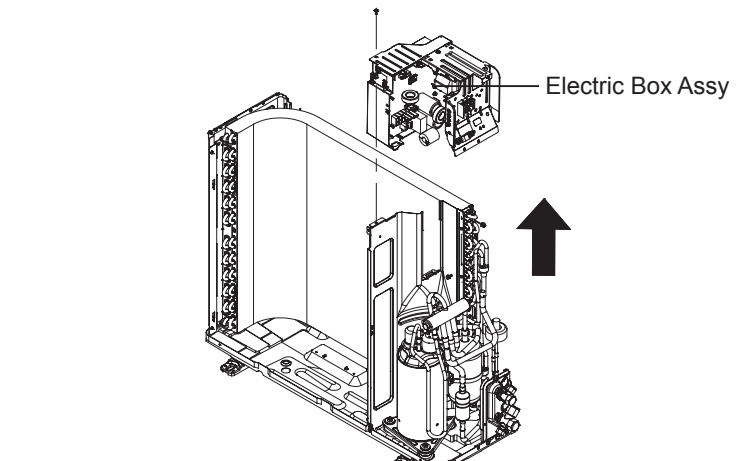
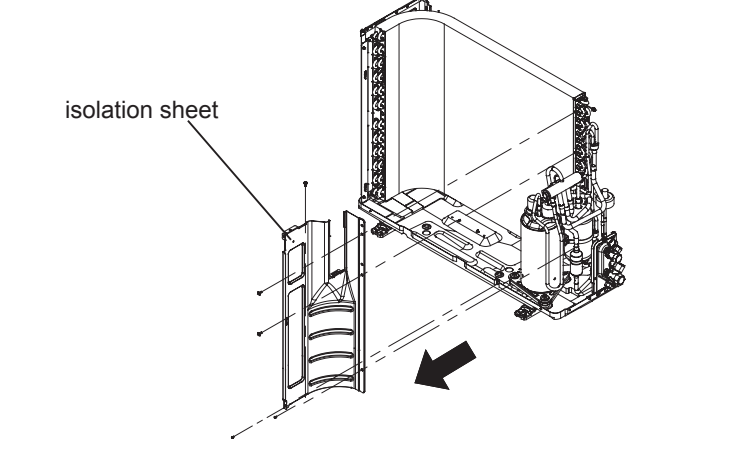
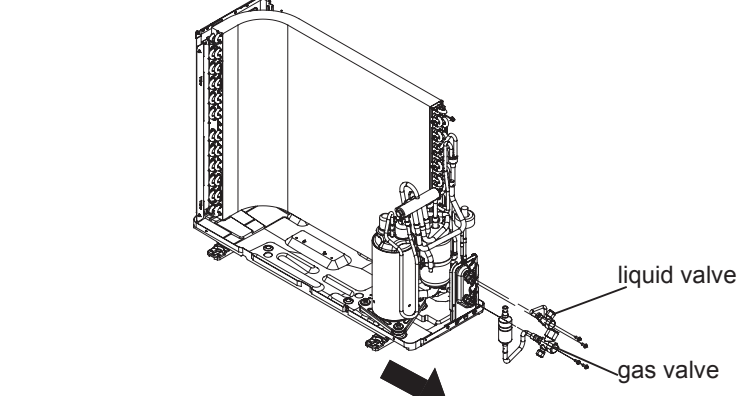
Step	Procedure
9. Remove motor and cross flow blade	
a	<p>Remove the screws fixing motor clamp and then remove the motor clamp.</p>
b	<p>Remove the screws at the connection place of cross flow blade and motor; lift the motor and cross flow blade upwards to remove them. Remove the bearing holder sub-assy. Remove the screw fixing step motor and then remove the step motor.</p>

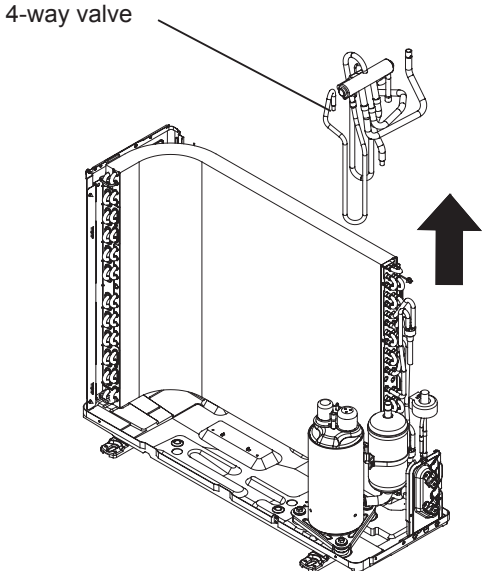
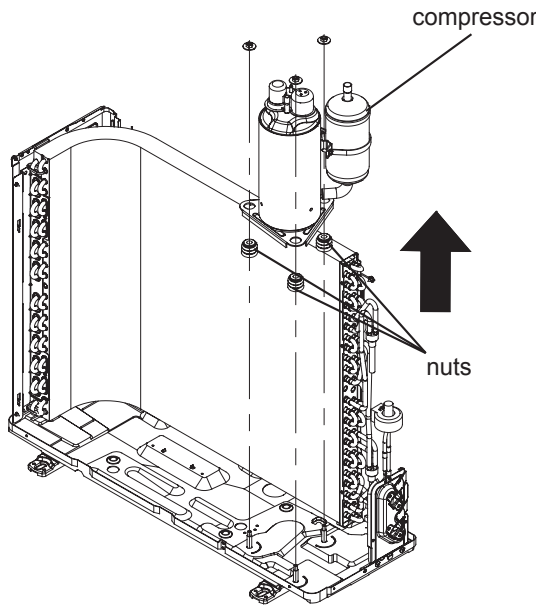
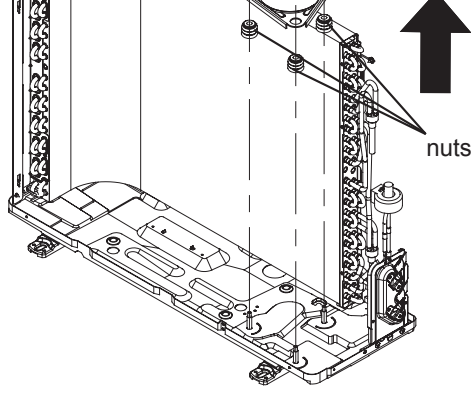
11.2 Removal Procedure of Outdoor Unit

GWH18QD-K3DNA6C/O

Steps	Procedure
1. Before disassembly	
2. Remove big handle	<p data-bbox="261 1022 695 1078">Remove the connection screw fixing the big handle.</p> 
3. Remove top cover	<p data-bbox="258 1574 699 1683">Remove connection screws connecting the top panel with the front panel and the right side plate, and then remove the top panel.</p> 

Steps	Procedure
<p>4. Remove grille</p>	<p>Remove connection screws between the front grille and the front panel. Then remove the grille.</p> 
<p>5. Remove front panel</p>	<p>Remove connection screws connecting the front panel with the chassis and the motor support and then remove the front panel.</p> 
<p>6. Remove right side plate</p>	<p>Remove connection screws connecting the right side plate with the valve support and the electric box. Then remove the right side plate.</p> 
<p>7. Remove axial flow blade</p>	<p>Remove the nut on the blade and then remove the axial flow blade.</p> 

Steps	Procedure
<p>8. Remove motor and motor support</p> <p>Remove the tapping screws fixing the motor and disconnect the leading wire insert of the motor. Then remove the motor. Remove the tapping screws fixing the motor support and lift the motor support to remove it.</p>	
<p>9. Remove Electric Box Assy</p> <p>Remove screws fixing the electric box subassembly; loosen the wire bundle and unplug the wiring terminals. Then lift the electric box to remove it.</p>	
<p>10. Remove isolation sheet</p> <p>Remove the screws fixing the isolation sheet and then remove the isolation sheet.</p>	
<p>11. Remove compressor</p> <p>a</p> <p>Unsolder the welding joint connecting the capillary, valves and the outlet pipe of condenser to remove the capillary. Do not block the capillary with welding slag during unsoldering.</p>	

Steps	Procedure	
b	<p>Remove the 2 screws fixing the gas valve and unsolder the welding joint between the gas valve and the air-return pipe to remove the gas valve. (NOTE: Discharge the refrigerant completely before unsoldering; when unsoldering, wrap the gas valve with a wet cloth completely to avoid damage to the valve caused by high temperature).</p> <p>Remove the 2 screws fixing the liquid valve and unsolder the welding joint connecting the liquid valve to the Y-type pipe to remove the liquid valve.</p>	 <p>4-way valve</p>
c	<p>Unsolder pipes connecting with compressor.</p>	 <p>compressor</p>
d	<p>Remove the 3 foot nuts on the compressor and then remove the compressor.</p>	 <p>nuts</p>

Appendix:

Appendix 1: Reference Sheet of Celsius and Fahrenheit

Conversion formula for Fahrenheit degree and Celsius degree: $T_f = T_c \times 1.8 + 32$

Set temperature

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

Ambient temperature

Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius(°C)	Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius(°C)	Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius(°C)
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

- Standard length of connection pipe
 - 5m, 7.5m, 8m.
- Min. length of connection pipe is 3m.
- Max. length of connection pipe and max. high difference.
- The additional refrigerant oil and refrigerant charging required after prolonging connection pipe
 - After the length of connection pipe is prolonged for 10m at the basis of standard length, you should add 5ml of refrigerant oil for each additional 5m 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)	15 m	5 m
7000 Btu/h(2051 W)	15 m	5 m
9000 Btu/h(2637 W)	15 m	10 m
12000 Btu/h(3516 W)	20 m	10 m
18000 Btu/h(5274 W)	25 m	10 m
24000 Btu/h(7032 W)	25 m	10 m
28000 Btu/h(8204 W)	30 m	10 m
36000 Btu/h(10548 W)	30 m	20 m
42000 Btu/h(12306 W)	30 m	20 m
48000 Btu/h(14064 W)	30 m	20 m

- When the length of connection pipe is above 5m, 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(mm)	Gas pipe(mm)	Cooling only(g/m)	Cooling and heating(g/m)
Φ6	Φ9.5 or Φ12	15	20
Φ6 or Φ9.5	Φ16 or Φ19	15	20
Φ12	Φ19 or Φ22.2	30	120
Φ16	Φ25.4 or Φ31.8	60	120
Φ19	/	250	250
Φ22.2	/	350	350

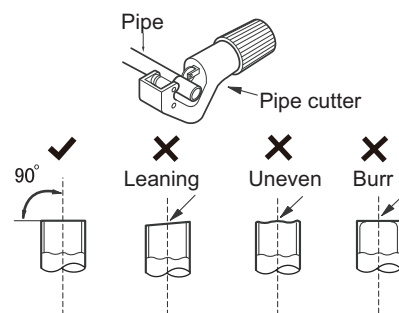
Appendix 3: Pipe Expanding Method

⚠ Note:

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

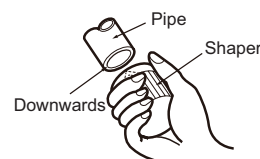
A: Cut the pip

- 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

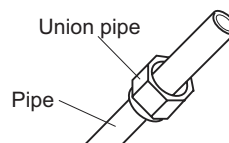
- Remove the burrs with shaper and prevent the burrs from getting into the pipe.



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.



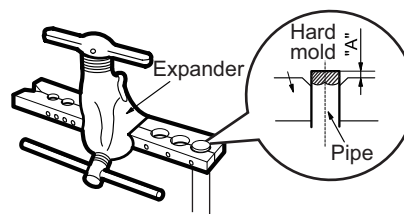
E: Expand the port

- Expand the port with expander.

⚠ Note:

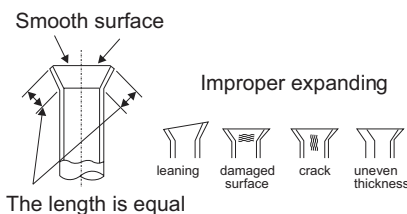
- "A" is different according to the diameter, please refer to the sheet below:

Outer diameter(mm)	A(mm)	
	Max	Min
Φ6 - 6.35 (1/4")	1.3	0.7
Φ9.52 (3/8")	1.6	1.0
Φ12 - 12.70 (1/2")	1.8	1.0
Φ16 - 15.88 (5/8")	2.4	2.2



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 (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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