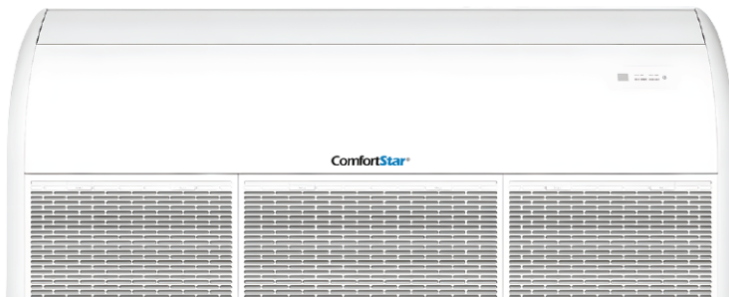

ComfortStar®

Air Conditioning & Heating Products

Service Manual



TPA32-09CD(I)
TPA32-12CD(I)
TPA32-18CD(I)
TPA32-24CD(I)



FPA32-18CD(I)
FPA32-24CD(I)



CPA32-09CD(I)
CPA32-12CD(I)
CPA32-18CD(I)
CPA32-24CD(I)

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1. Product Selection Guidebook

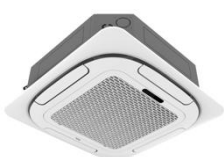
1.1. Product List

1.1.1. Indoor Unit Lineup

MATCH adopts adaptive technology to match different types of indoor units (cassette type, duct type, floor ceiling type) according to the room decoration design and user needs, saving warehouse management and after-sales maintenance costs.

It is widely applicable to different places such as apartments, villas, hotels, office buildings, and small and medium-sized supermarkets.

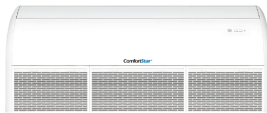
1.1.1.1. Cassette type

Model	Nominal Capacity Cooling/Heating	Power Supply (V, Ph, Hz)	Appearance	Features
CASSETTE-9K	9500/9500(Btu/h)	208/230V~/60Hz/1P		WIFI、Refrigerant leak detection
CASSETTE-12K	12000/12500(Btu/h)	208/230V~/60Hz/1P		WIFI、Refrigerant leak detection
CASSETTE-18K	16000/18000(Btu/h)	208/230V~/60Hz/1P		WIFI、Refrigerant leak detection
CASSETTE-24K	23000/25000(Btu/h)	208/230V~/60Hz/1P		WIFI、Refrigerant leak detection

1.1.1.2. Duct type

Model	Nominal Capacity Cooling/Heating	Power Supply (V, Ph, Hz)	Appearance	Features
DUCT-9K	9500/9500(Btu/h)	208/230V~/60Hz/ 1P		WIFI、Refrigerant leak detection
DUCT-12K	11000/12000(Btu/h)	208/230V~/60Hz/ 1P		WIFI、Refrigerant leak detection
DUCT-18K	17000/18000(Btu/h)	208/230V~/60Hz/ 1P		WIFI、Refrigerant leak detection
DUCT-24K	22000/25000(Btu/h)	208/230V~/60Hz/ 1P		WIFI、Refrigerant leak detection

1.1.1.3. Floor Ceiling type

Model	Nominal Capacity Cooling/Heating	Power Supply (V, Ph, Hz)	Appearance	Features
CEILING FLOOR-18K	18000/19000(Btu/h)	208/230V~/60Hz/1P		●Two installation methods to choose from: floor or ceiling mounted; It can be directly mounted on the wall, suitable for places where there is not enough space for ceiling or floor installation; ●Dual air guide louvers for multi-layer air discharge and higher level of comfort; the bright white appearance makes it simple and beautiful; ●2 digit 7-segment display of temperature and error codes; ●Optional WiFi Wired control.
CEILING FLOOR-24K	22200/24400(Btu/h)	208/230V~/60Hz/1P		

1.1.2. List of Standard and Optional parts.

Function Type	Cassette	Duct	Floor ceiling
Wired Controller	○	●	○
Remote Controller	●	○	●
WiFi Module	○	○	○
Dry Contact Gateway	○	○	○
Central control /BMS	○	○	○
The Communication Wire of Indoor Unit and Outdoor Unit	○	○	○

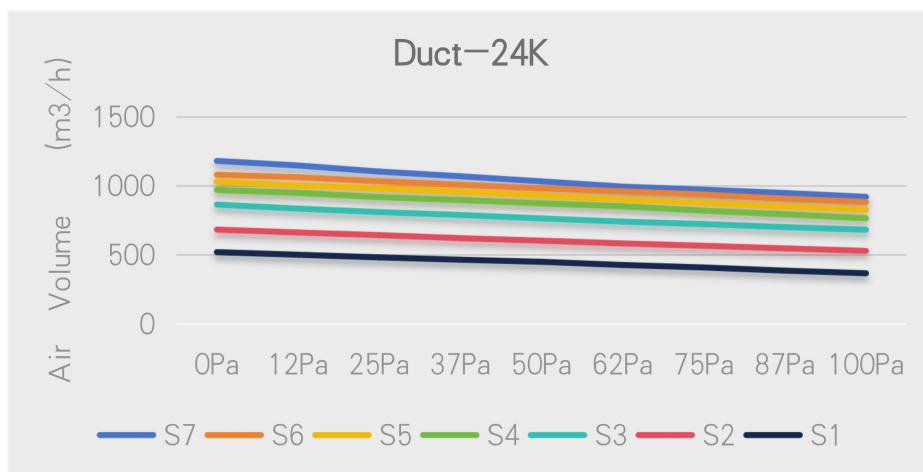
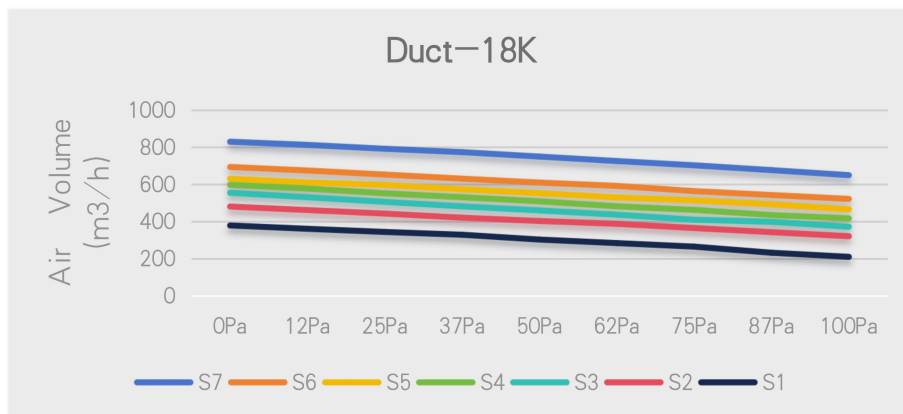
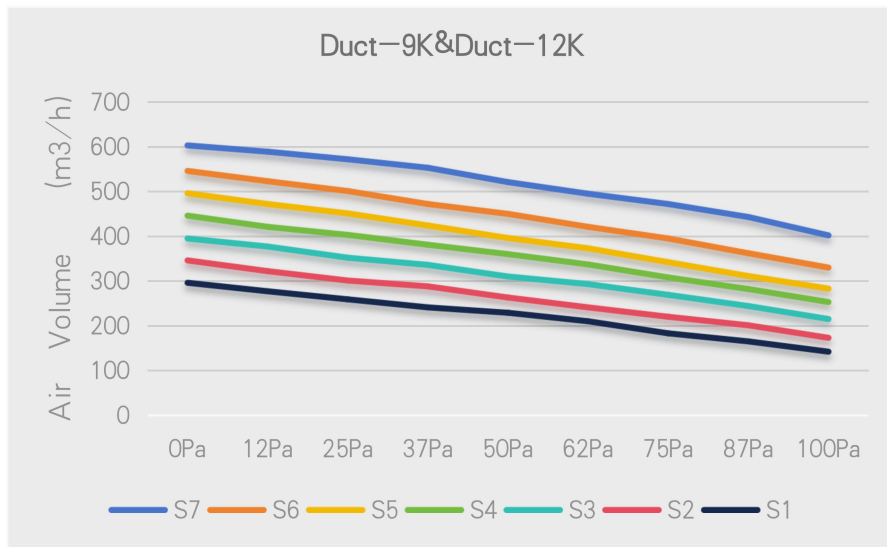
1.2. Product Parameters

1.2.1. Operation Range

Operation temperature		℃	16~31
Ambient temperature	Indoor(cooling/ heating)	℃	17≤ t ≤30
	Outdoor(cooling/heating)	℃	-15~55 / -25~30
Ambient temperature	Indoor(cooling/ heating)	F	62~89 / 32~86
	Outdoor(cooling/heating)	F	5~131 / -13~86

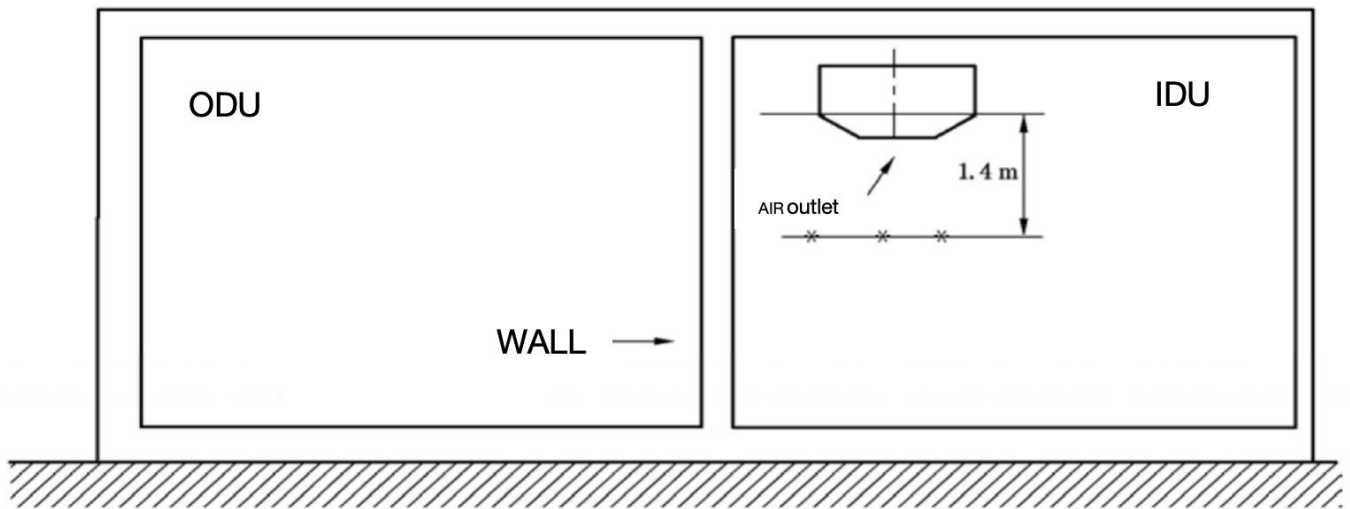
1.3. Air volume Static Pressure Curve

1.3.1. Common Duct Type



1.4. Noise

1.4.1. Cassette Type

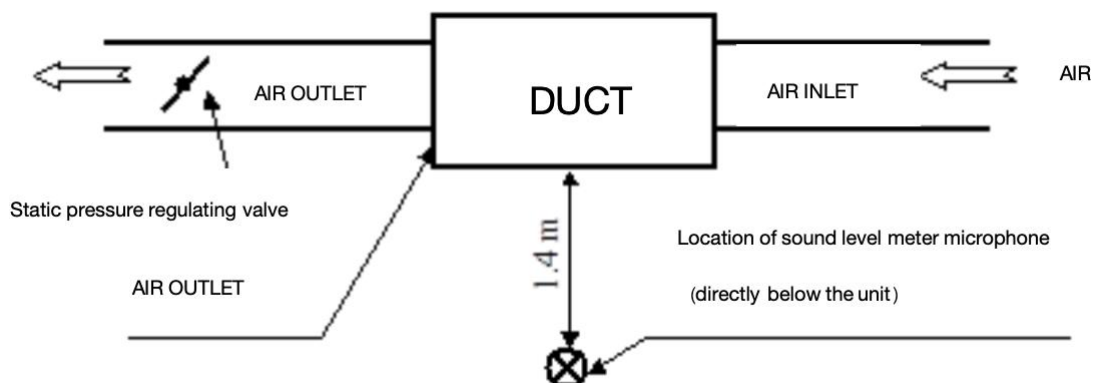


Model	Turbo dB(A)	H dB(A)	M dB(A)	L dB(A)	Mute dB(A)
CASSETTE-9K	43	41	37	33	32
CASSETTE-12K	45	43	39	35	32
CASSETTE-18K	48	46	42	39	37
CASSETTE-24K	51	48	44	40	37

Notes:

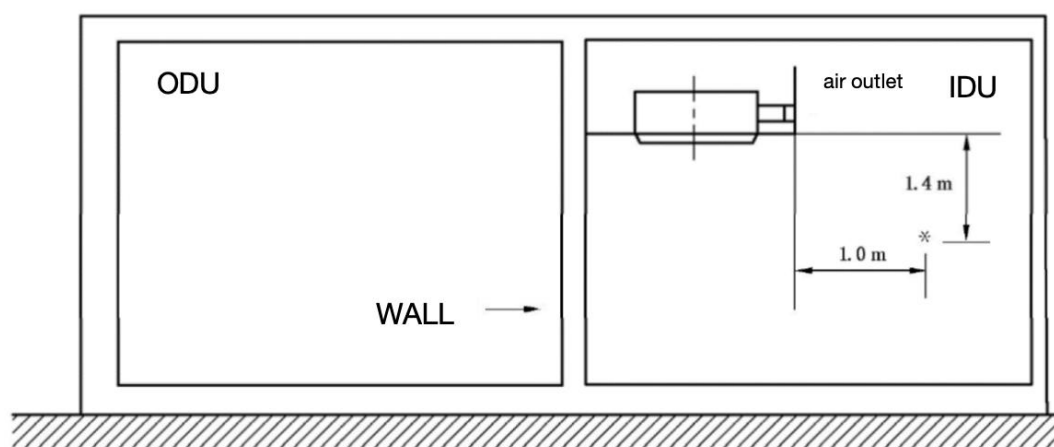
1. Above data were measured under standard conditions. Power specification: 230V ~60Hz.
2. Above data were measured in a semi-anechoic room.
3. Decibels will be varied with the change of external factors. For instance, the room structure. Please refer to the actual measurement.

1.4.2. Duct Type



Model	Turbo dB(A)	H dB(A)	M dB(A)	L dB(A)	Mute dB(A)
DUCT-9K	42	39	34	28	28
DUCT-12K	44	41	35	33	32
DUCT-18K	48	44	41	36	33
DUCT-24K	51	49	46	39	34

1.4.3. Floor Ceiling Type



Model	Turbo dB(A)	H dB(A)	M dB(A)	L dB(A)	Mute dB(A)
CEILING FLOOR-18K	50	46	44	40	36
CEILING FLOOR-24K	53	52	48	44	40

2. Installation Manual

2.1. Installation Preparation

2.1.1. Notice on Installation

1. The air conditioner must be installed by professional personnel and the Installation manual is used only for the professional installation personnel. The installation specifications should be subject to our after-sale service regulations.
2. When filling the combustible refrigerant, any of your rude operations may cause serious injury or injuries to human body and objects.
3. A leak test must be done after the installation completed.

4. It is a must to do the safety inspection before maintaining or repairing an air conditioner using combustible refrigerant in order to ensure that the fire risk is reduced to minimum.
5. It is necessary to operate the machine under a controlled procedure in order to ensure that any risk arising from the combustible gas or vapor during the operation is reduced to minimum.

2.1.2. Selection of Installation Location



WARNING!

- | |
|---|
| (1) If the outdoor unit will be exposed in strong wind, it must be securely located, otherwise it may fall down |
| (2) Install the air conditioner at a place where the inclination is less than 5°. |
| (3) Do not install the unit at a place with direct sunlight. |
| (4) Do not install the unit at a place with leakage of inflammable gas. |

Selection of Installation Location for Indoor Unit (Select a location pursuant to the following condition).

- (1) Air inlet and outlet of the indoor unit should be away from obstacles to make sure the unit's air flow can reach the entire room. Do not install the unit in a kitchen or a laundry.
- (2) Install the unit in a room without naked flame, fire source or the risk of getting the refrigerant on fire.
- (3) Select a location that can withstand 4 times the unit weight without increasing operating noise and vibration.
- (4) The installation location must be level.
- (5) The indoor piping length and wiring length should be within the allowable range.
- (6) Select a place that can easily drain condensate and connect to the drain system of the air conditioner.
- (7) If hoisting screw bolts are to be used, check whether the installation location is safe enough. If not safe, reinforce the location before installation.
- (8) Indoor unit, power cord, connecting wires and communication cords DC Inverter U-match Series Duct Type Unit.
should be at least 1m from television and radio. This is to prevent image interference or noise (Even at a distance of 1m, a very strong electric wave may still generate noise).

Selection of Installation Location for Outdoor Unit (Select a location pursuant to the following condition).

- (1) Noise and air flow produced by the outdoor unit will not disturb the neighbors.
- (2) Select a location that is safe and away from animals and plants. If not, please add safety fences to protect the unit.
- (3) Install at a place with good ventilation. Make sure the outdoor unit stays at a well-ventilated place with no obstacles nearby that may obstruct the air inlet and outlet.
- (4) The installation location should be able to withstand the weight and vibration of outdoor unit and allow the installation to be carried out safely.
- (5) Avoid installing at a place with leakage of inflammable gas, oil smoke or corrosive gas.

- (6) Keep it away from strong wind because strong wind will affect the outdoor fan and lead to insufficient air flow volume and thus affecting the unit's performance.
- (7) Install the outdoor unit at a place that is convenient for it to be connected to the indoor unit.
- (8) Away from any object that may get the air conditioner generating noise.
- (9) Install the outdoor unit at a place where condensate can be easily drained.

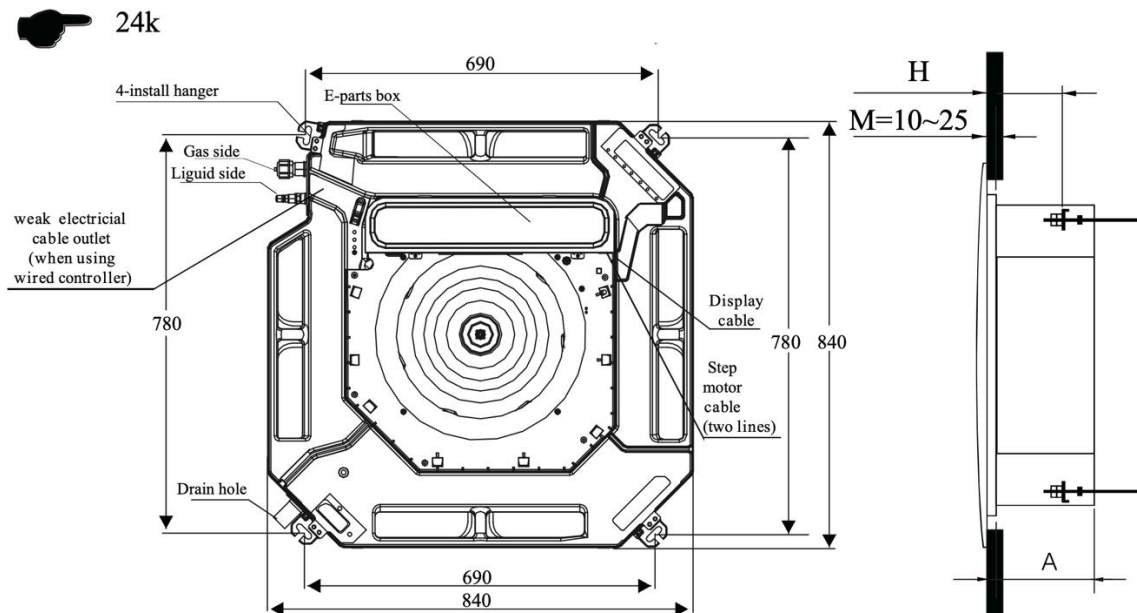
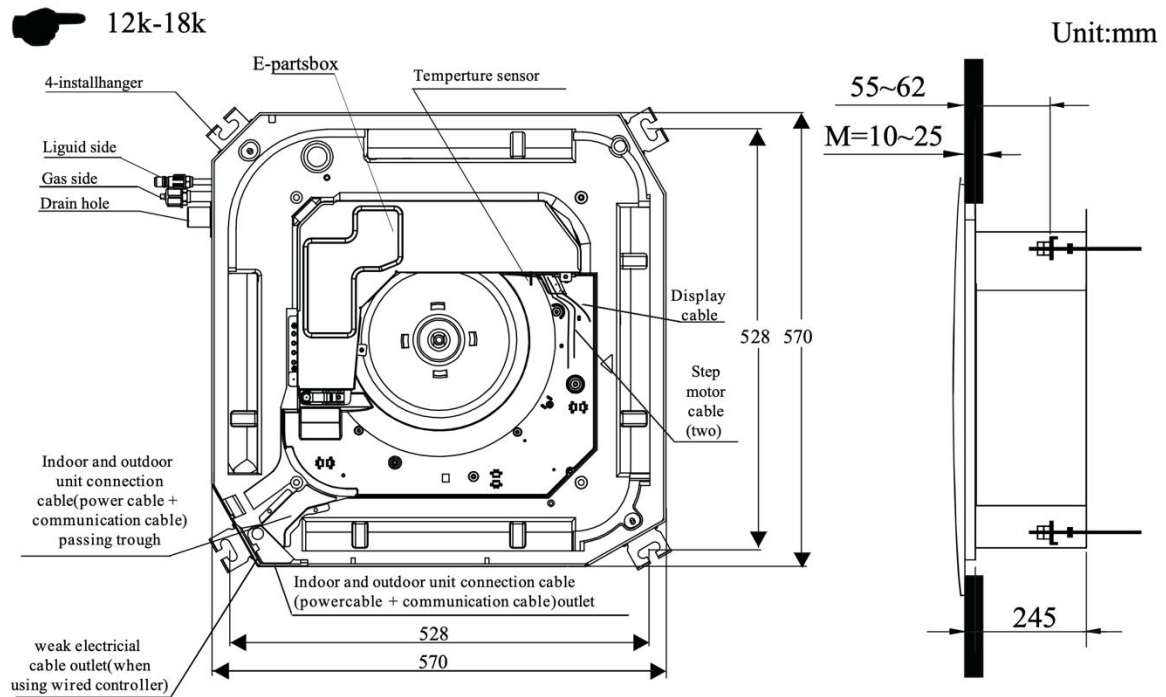
2.1.3. Unit Dimension



- (1) Install the indoor unit in a location which can withstand a load of at least five times the weight of the main unit and which will not amplify sound or vibration.
- (2) If the installation location is not strong enough, the indoor unit may fall and cause injuries.
- (3) If the job is done with the panel frame only, there is a risk that the unit will come loose. Please take care.

2.1.3.1. Indoor Unit Dimension

1. Cassette



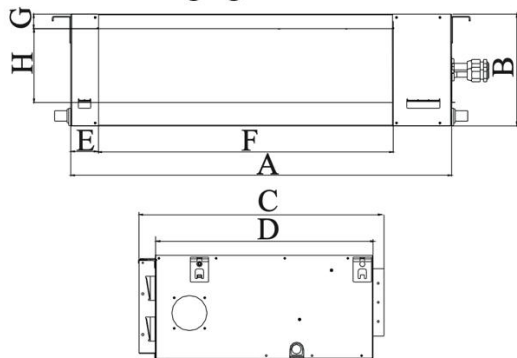
Dimension

Unit:mm(in.)

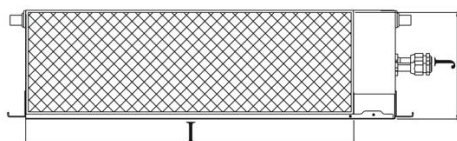
Model	A	H
CASSETTE-9K CASSETTE12K CASSETTE18K	245 (9.7)	130-135 (5.1-5.3)
CASSETTE24K	245 (9.7)	130-135 (5.1-5.3)

2. Duct

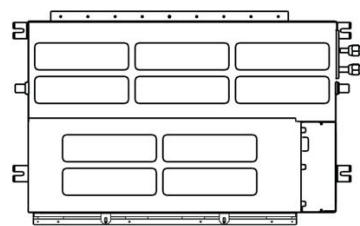
1. The positioning of elling hole,indoor unit and hanging screw bolts.



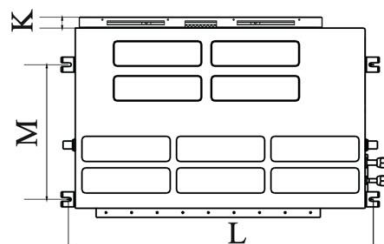
Air inlet size



Position size of descensional ventilation opening.



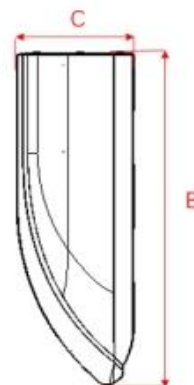
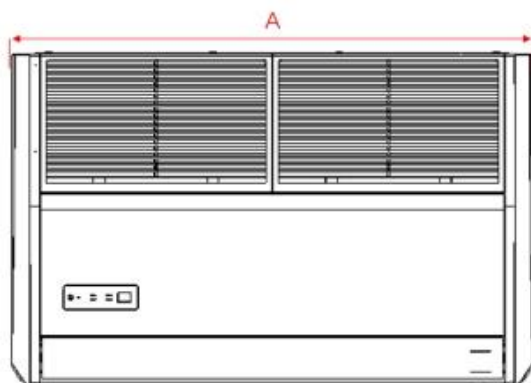
Size of mounted hook



Unit:mm(in.)

Model	Outline dimension				Air outlet opening size				Air return opening size			Size of mounted lug	
	A	B	C	D	E	F	G	H	I	J	K	L	M
DUCT-9K	700	200	490	450	45	510	17	140	600	187	35	738	298
DUCT-12K	(27.6)	(7.9)	(19.3)	(17.7)	(1.8)	(20.1)	(0.7)	(5.5)	(23.6)	(7.4)	(1.4)	(29.1)	(11.7)
DUCT-18K	920	200	490	450	45	730	17	140	820	187	35	958	298
	(36.2)	(7.9)	(19.3)	(17.7)	(1.8)	(28.7)	(0.7)	(5.5)	(32.3)	(7.4)	(1.4)	(37.7)	(11.7)
DUCT-24K	1100	200	490	450	27	930	17	140	1030	183	35	960	365
	(43.3)	(7.9)	(19.3)	(17.7)	(1.1)	(36.6)	(0.7)	(5.5)	(40.6)	(7.2)	(1.4)	(37.8)	(14.4)

3. Ceiling Floor



Unit:mm(in.)

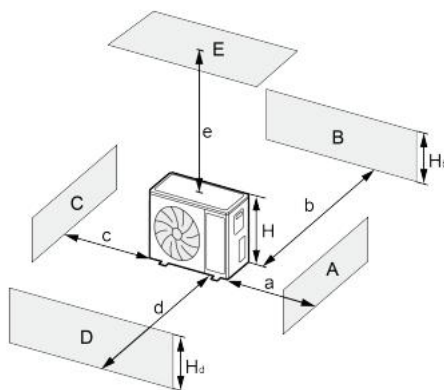
Model	Indoor unit		
	A	B	C
CEILING FLOOR-18K	1053 (41.5)	675(26.6)	235(9.3)
CEILING FLOOR-24K	1053 (41.5)	675(26.6)	235(9.3)

2.1.4. Diagram of Unit Installation Space and Location

2.1.4.1. Diagram of installation space and location for outdoor unit

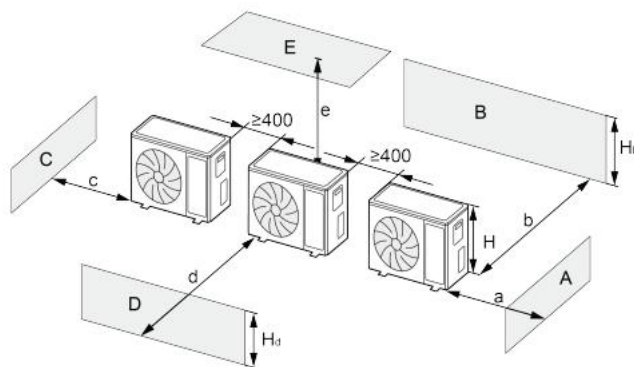
Notice: For best performance of the outdoor unit, make sure its installation space conforms to the following installation dimensions.

(1) When one outdoor unit is to be installed.



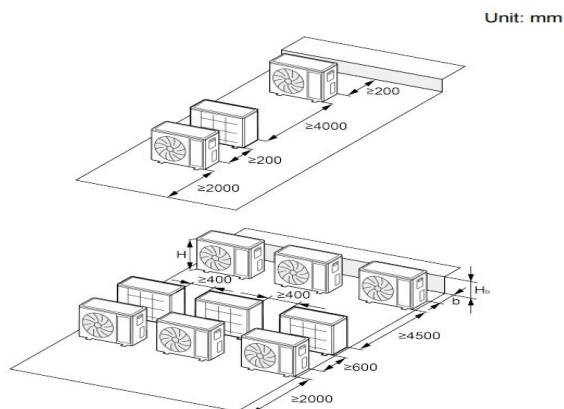
A~E	Hb	Hd	H	(mm)				
				a	b	c	d	e
B	—	—	—	—	≥100	—	—	—
A、B、C	—	—	—	≥300	≥100	≥100	—	—
B、E	—	—	—	—	≥100	—	—	≥1000
A、B、C、E	—	—	—	≥300	≥150	≥150	—	≥1000
D	—	—	—	—	—	—	≥1000	—
D、E	—	—	—	—	—	—	≥1000	≥1000
B、D	Hb<Ha	Hd>H	—	—	≥100	—	≥1000	—
	Hb>Hd	Ha<H	—	—	≥100	—	≥1000	—
B、D、E	Hb<Ha	Hb≤1/2H	—	—	≥250	—	≥2000	≥1000
	—	1/2H<Hb≤H	—	—	≥250	—	≥2000	≥1000
	—	Hb>H	Prohibited					
	Hb>Ha	Ha≤1/2H	—	—	≥100	—	≥2000	≥1000
	—	1/2H<Hd≤H	—	—	≥200	—	≥2000	≥1000
	—	Hd>H	Prohibited					

(2) When two or more outdoor units are to be installed side by side



A~E	Hb	Hd	H	(mm)				
				a	b	c	d	e
A、B、C	—	—	—	≥300	≥300	≥1000	—	—
A、B、C、E	—	—	—	≥300	≥300	≥1000	—	≥1000
D	—	—	—	—	—	—	≥2000	—
D、E	—	—	—	—	—	—	≥2000	≥1000
B、D	Hb<Ha	Hd>H	—	—	≥300	—	≥2000	—
	Hb>Ha	Hd≤1/2H	—	—	≥250	—	≥2000	—
		1/2H<Hd≤H	—	—	≥300	—	≥2500	—
B、D、E	Hb<Ha	Hb≤1/2H	—	—	≥300	—	≥2000	≥1000
		1/2H<Hb≤H	—	—	≥300	—	≥2500	≥1000
		Hb>H	Prohibited					
	Hb>Ha	Hd≤1/2H	—	—	≥250	—	≥2500	≥1000
		1/2H<Hd≤H	—	—	≥300	—	≥2500	≥1000
		Hd>H	Prohibited					

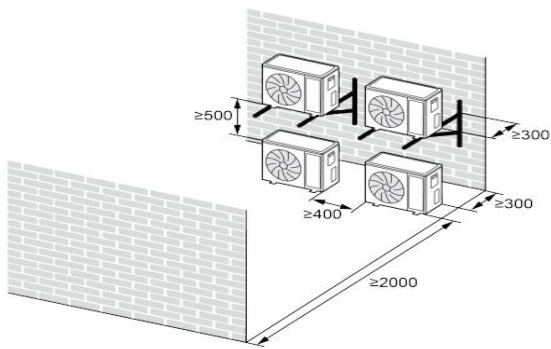
(3) When outdoor units are installed in rows.



Hb H	(mm)
$Hb \leq 1/2H$	$b \geq 250$
$1/2H < Hb \leq H$	$b \geq 300$
$Hb > H$	Prohibited

(4) When outdoor units are installed one above another.

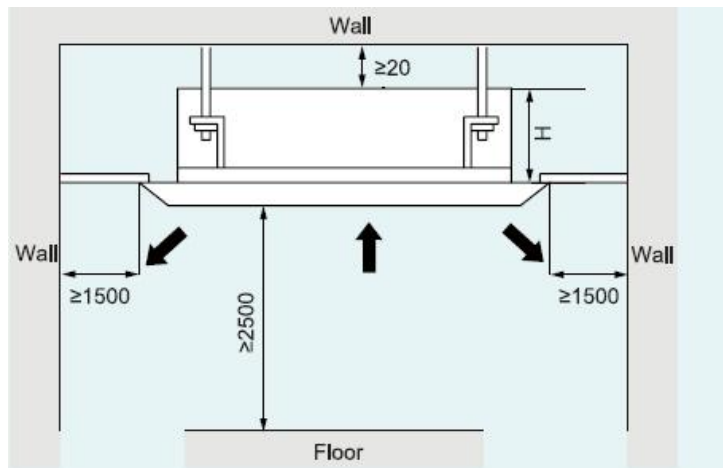
Unit: mm



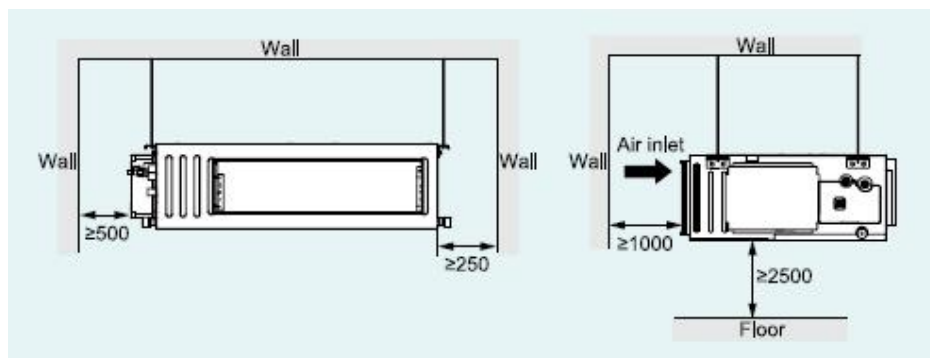
2.1.4.2. Diagram of installation location and space for indoor unit

Notice: For the best performance of indoor unit, make sure its installation space conforms to the following installation dimensions

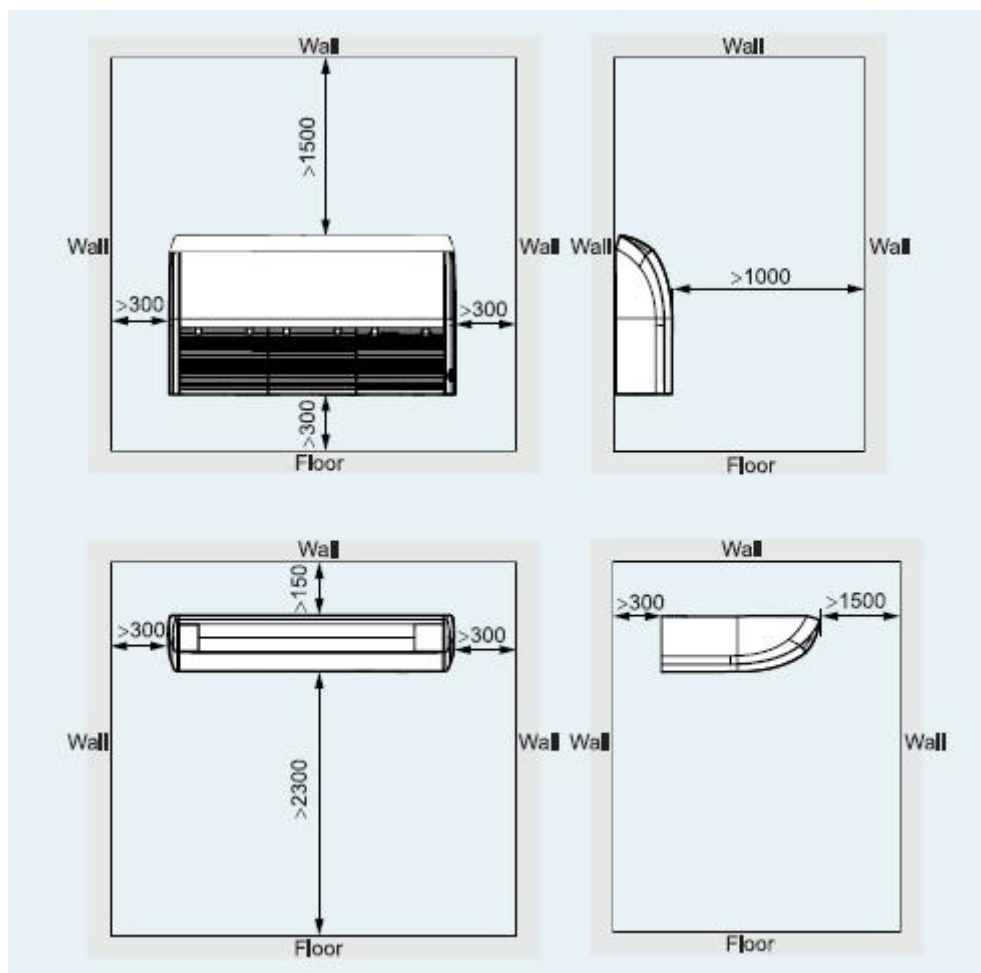
1. Cassette



2. Duct



3. Ceiling Floor



2.2. Unit Installation

2.2.1. Indoor Unit Installation

2.2.1.1. Preparation for Installing the Indoor Unit

1. Cassette

■HEIGHT BETWEEN CEILING AND FLOOR

The installation height between ceiling and floor must be greater 2.5m.

■CEILING HOLE AND THE HOOK INSTALLATION

Preparation Work on the Ceiling

- Installation method should be changed under the different construction structure. Please consult the professional for the detailed information.
- After opening a hole, the ceiling should be horizontal and strong to prevent vibration.

Cut the beams at the hole and remove them.

Reinforcing the beams that have been cut and the beams fixing the ceiling.

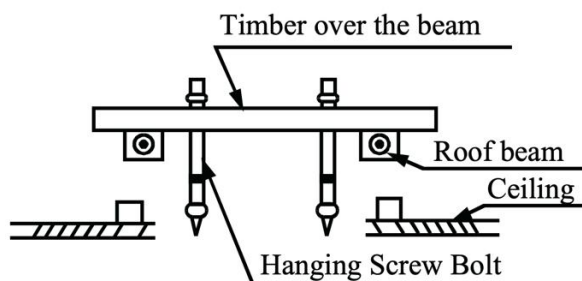
Installation of the hanging screw bolt

Bolt with M10 whorl is to be used. The center distance between the bolts is decided by the size of the unit.

Use the following method to install:

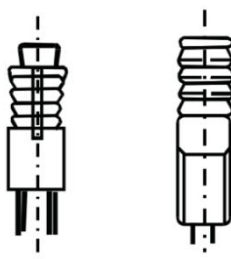
Wooden construction

Put the square timber over the roof beam, then install the hanging screw bolts.



For finished concrete bricks

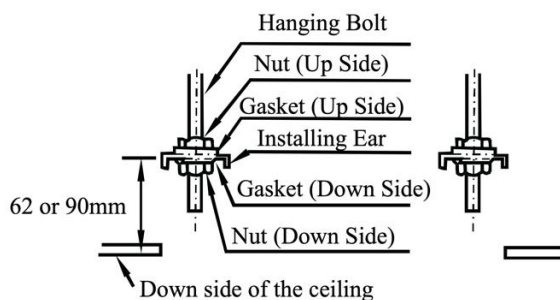
Install the hanging hook with expansible bolt into the concrete deep to 45~50mm to prevent loose.



Overhanging the indoor unit

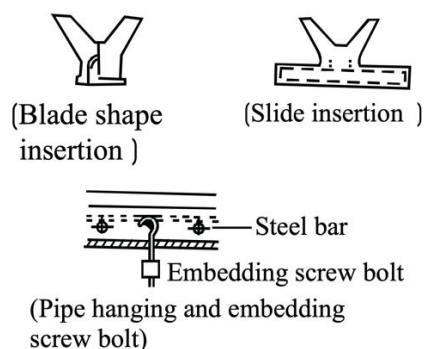
Cassette: Adjust the gasket (downside) to 90mm over the ceiling.

Compact cassette: Adjust the gasket (downside) to 62mm over the ceiling.



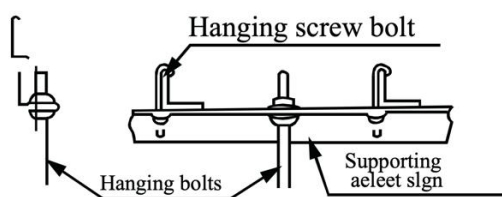
New Concrete Bricks

Inlaying or embedding the screw bolts.



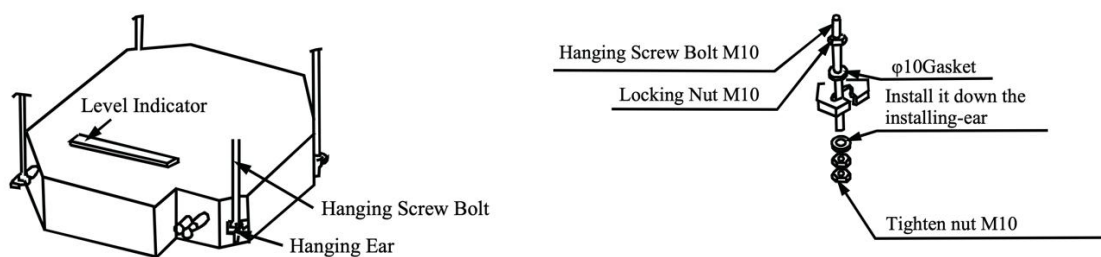
Steel roof beam structure

Install the supporting angle steel.



- Install the hanging bolt into T groove of the hanging tool.

Over hang the indoor unit and ensure it is level using a level indicator.

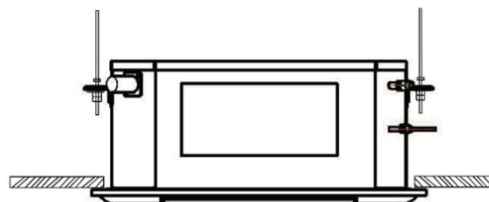
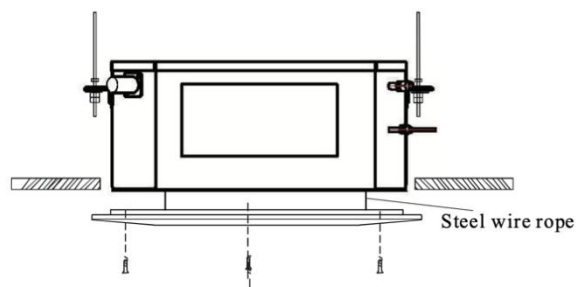
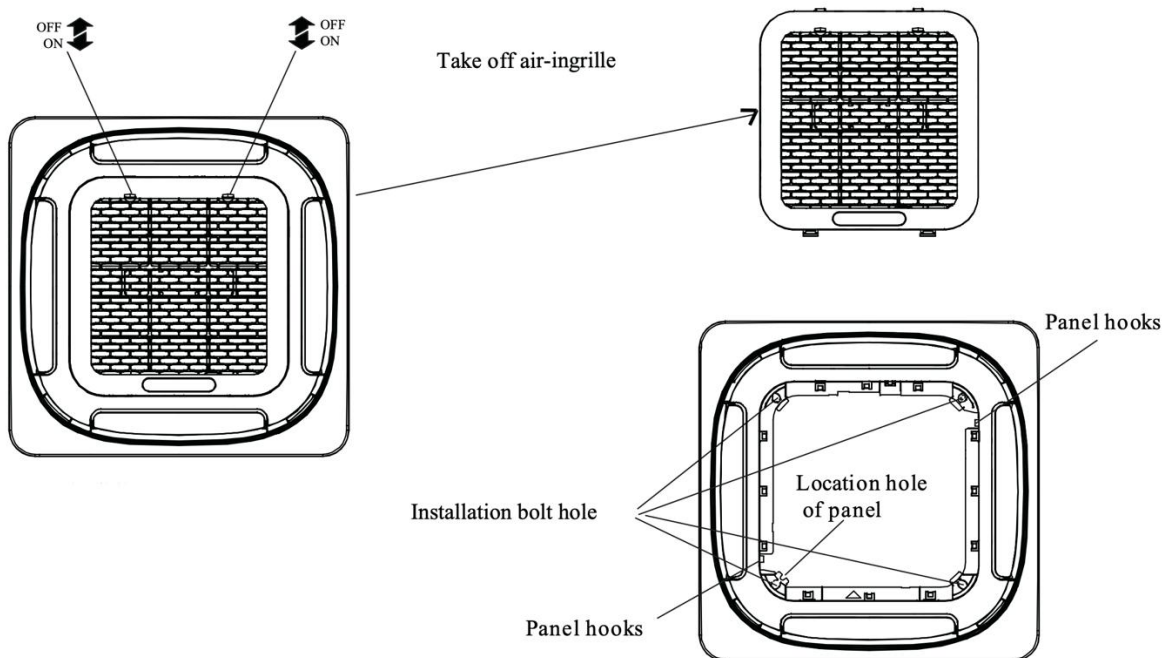


PANEL INSTALLATION

- Panel installation should be done after piping and wiring.
- Be sure that the indoor unit and ceiling hole installation size is right before installation.

CAUTION

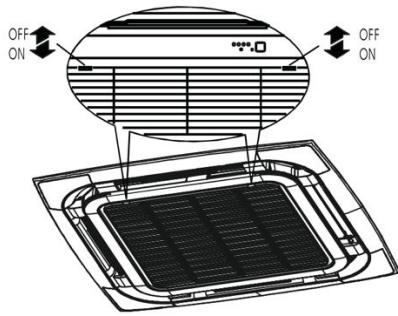
Be sure to seal the connection parts between the panel-the ceiling and the panel-the indoor unit , or even small gaps may cause wind/water leakage or condensing water.

• CASSETTE DIMENSION:18K(CASSETTE-18K)

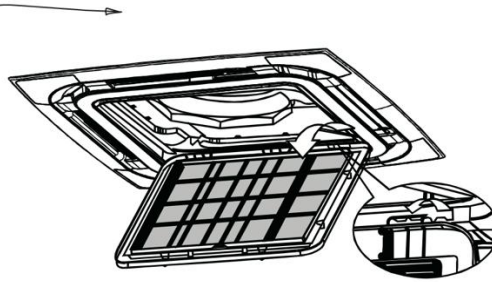
1. Please screw two M5*20 bolts at the oppsite angles of indoor unit , before fixing screws, determine the orientation of the panel: Align the positioning holes on the panel with the positioning pins on the box.
2. Please connect step motor wire, display board wire to the electrical box according to ELECTRIC WIRING DIAGRAM on the electrical box.
3. Then screw the other two M5*20 bolts through the holes of panel into indoor unit.
4. Adjust the location and direction of panel to tally louver of panel with outlet of outdoor, screw all the bolts fasten to make the panel and indoor unit pressed together.
5. Return the air-in grille and panel back to the indoor unit.

● CASSETTE DIMENSION:24K(CASSETTE-24K)

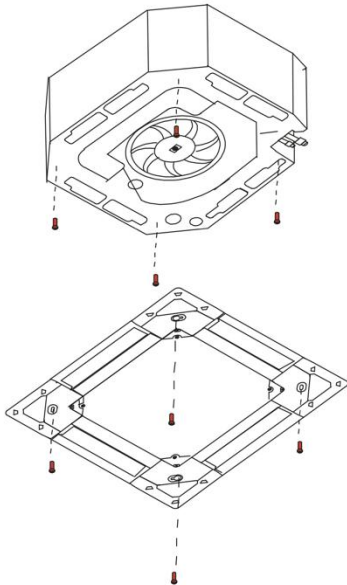
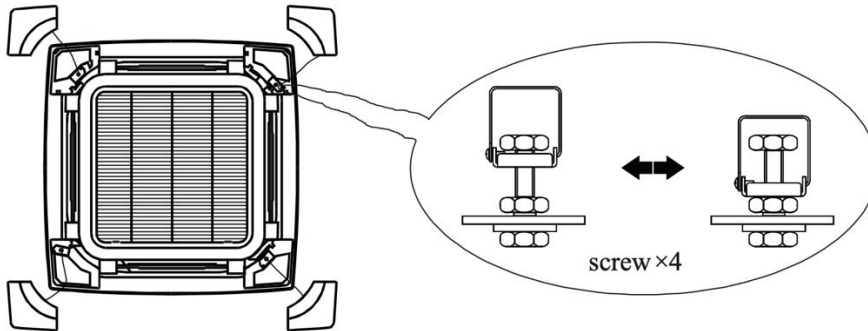
Unload air-in grille



Take off air-in grille



Unload panel installation cap



1. Please screw M10 gasket and M6*20 bolt at the corner of indoor unit, before screwing them fasten, screw other two additional bolts which locates red bolt showing as figure and notice that the direction of red arrow on the electrical box aligns the one on the panel.
2. Please connect step motor wire, display board wire to the electrical box according to ELECTRIC WIRING DIAGRAM on the electrical box.
3. Then screw the other two M6*20 bolts with M10 gasket through the hole of panel into indoor unit.
4. Adjust the location and direction of panel to tally louver of panel with outlet of outdoor, screw all the bolts fasten to make the panel and indoor unit pressed together.
5. Return the air-in grille and panel back to the indoor unit.

2. Duct

Please confirm the indoor unit dimension according to the picture below M10 whorl is to be installed. (4 sets)

◆ Please refer to the following for the center distance between the bolts.

◆ M 10 whorl is used.

◆ Please consult professional for your specific ceiling arrangement.

1. Dismantle scale of the ceiling, please keep ceiling its level. Strengthen the beam to avoid vibration.
2. Break the beam of the ceiling.
3. Strengthen the breaking point of the ceiling and reinforce the ceiling beam.

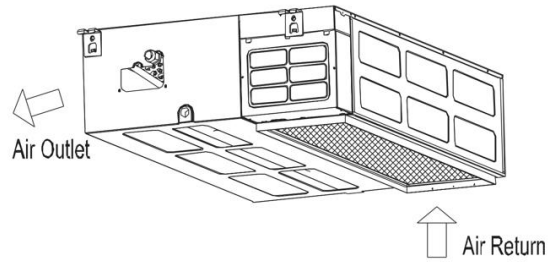
◆ After the main body hanging is finished, arrangement of pipe and line will be done in the ceiling. The direction of the pipe is determined after the installation location is chosen. If the ceiling has existed, please arrange the refrigerant pipe, drainage pipe, indoor and outdoor connecting line.

◆ Installation of the hanging screw bolt.

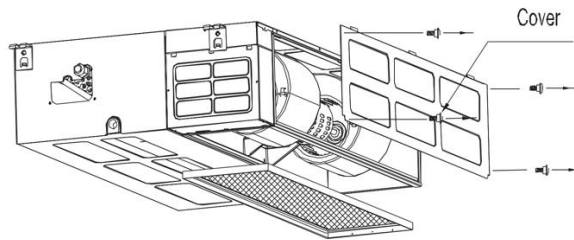
CHOICE OF AIR RETURN WAYS

This indoor unit is fitted with downward air return, which can be changed to its backward counterpart if necessary. Please follow the steps below to change it into the mode of air return backward.

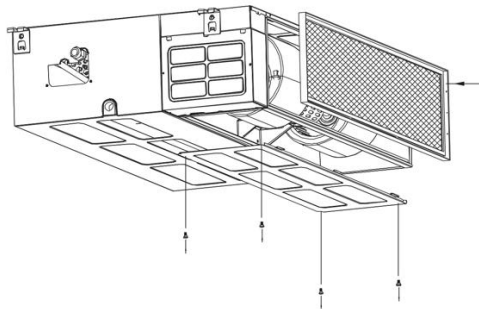
1. Air return downward



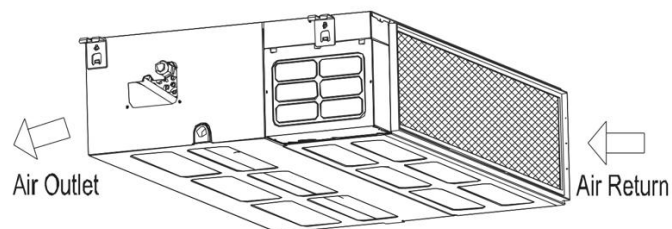
2. Loose the nut and dismantle flannel plate and filter; Loose the nut dismantel the back over .



3. Install the flannel plate and filter at the backside; Install the cover to the downside.

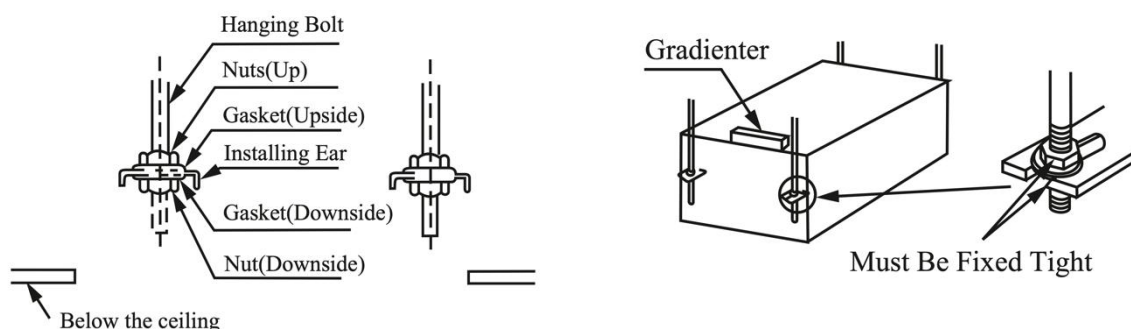


4. Air return backward.



HANGING & INSTALLATION OF INDOOR UNIT

1. Adjust the nut position while the gap between gasket (downside) and ceiling should be confirmed according to actual situations.



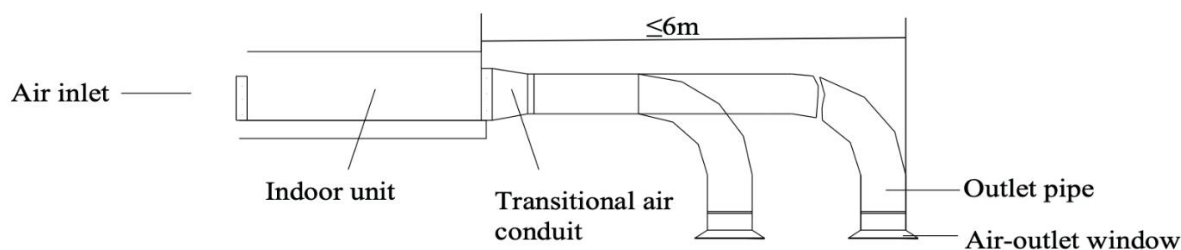
Hang the nut inside the U slot of the installation panel. To confirm level degree with gradienter.

(Leaning downside toward non-draining side is prohibited)

The suspension height is not less than 2.4 meters.

2. How to mount outlet pipe

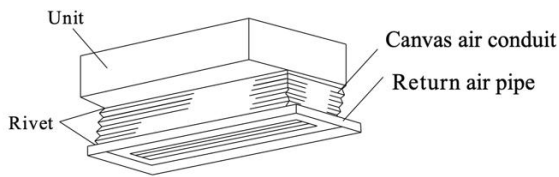
- Generally, we have two types of outlet pipe available, i.e. rectangular or round ones.
- Rectangular air conduit can be directly connected to air outlet of indoor unit by rivets. For outlet dimensions, see outline drawing of the unit.
- Round air conduit should be connected to a piece of transitional air conduit before it is connected to air outlet of indoor unit, the other end of it can be separately connected to air conduit window or connected to air conduit window after air flow diversion, and the total length should not be over 6m. As shown in figure below, air speeds at all air outlets should be set to basically consistent so as to meet the room air-conditioning requirements.



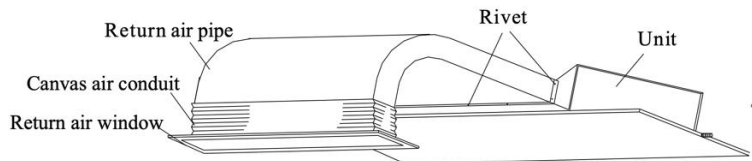
3. Installation method for return air pipe

- In case sidewise air intake is adopted, return air pipe should be fabricated and rivet-connected to return air orifice, and the other end of it should be connected to return air window.
- In case of underside air intake, purchase or fabricate a section of pleated canvas air conduit serving as transition joint for return air orifice and return air window. in this way , it can be freely adjusted according to

height of indoor ceiling board; in addition, during operation of the unit, canvas air conduit may avoid vibration of ceiling board, as shown in figure below.



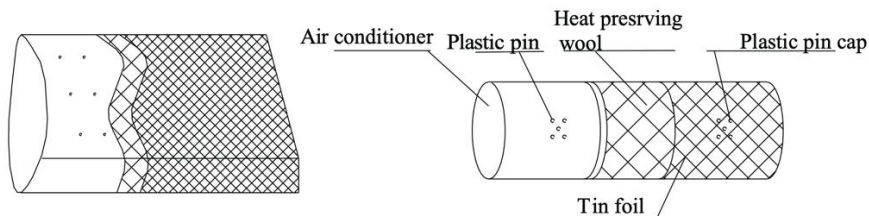
Installation mode for underside air intake



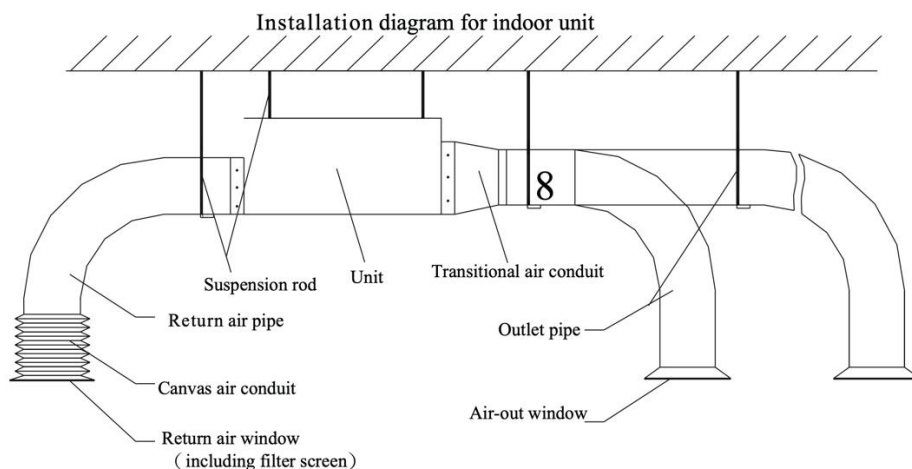
Installation mode for sidewise air intake

4. Tips for installation of return air pipe and outlet pipe

- To minimize energy loss occurring in transmission process and condensed water during heating operation, return air pipe and outlet pipe should be equipped with heat-insulating layer as shown in the figure.



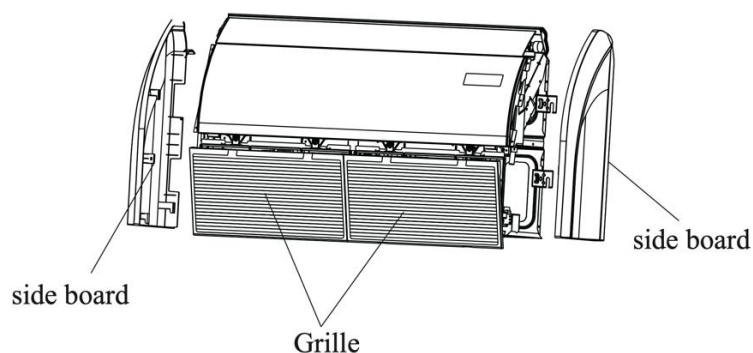
- Return air pipe and outlet pipe should be fixed to floor precast slabs by iron stand; in addition, all ports of the air conduit should be tightly sealed by gasket cement, and it is advisable that the edge clearance of return air pipe should be 150mm at least.
- Drainpipe for condensed water should be installed with minimum gradient of 1%, and the drainpipe should be insulated with heat-preserving pipe casing as well.



3. Floor ceiling

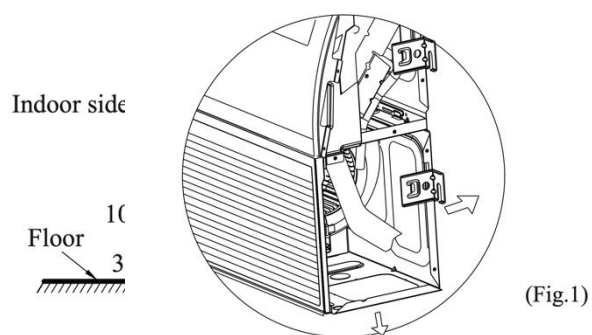
Installation procedure

Please remove the grille and the sideboard.



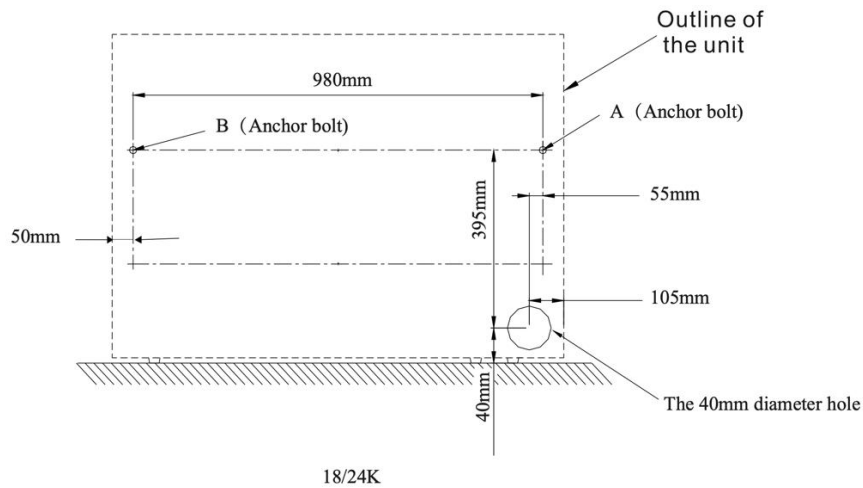
Floor console type

1. Select the piping and drainage directions. The piping and drain can be made in two directions as shown below (fig.1). When the direction is selected, please drill a 100mm(4") diameter hole on the wall, and the hole must be tilted downward towards the outdoor for smooth water flow. When the pipe is led out from the rear, make a hole in figure, at the position shown (fig.2).

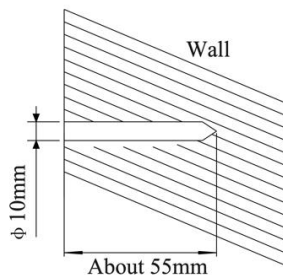


2. Drilling holes for anchor bolts and installing the anchor bolts (M10)

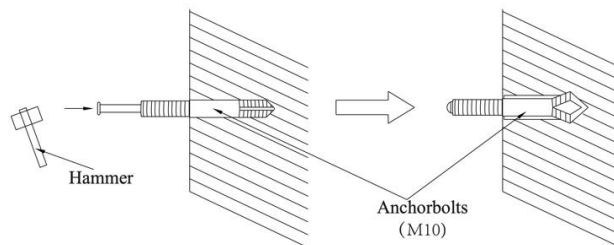
According to the position of the hole, install two expansible anchor bolts (A and B) at the position shown in the figure.



With a concrete drill, drill two 10mm diameter holes at the position (A and B) on the wall.

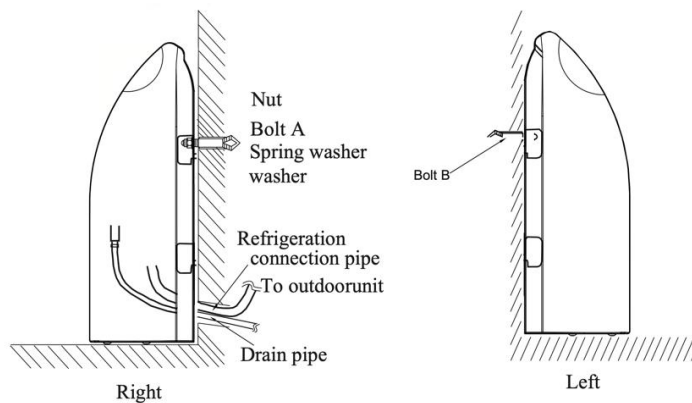


Insert the anchor bolts into the drilled holes, and drive the pins completely into the anchor bolts with a hammer.



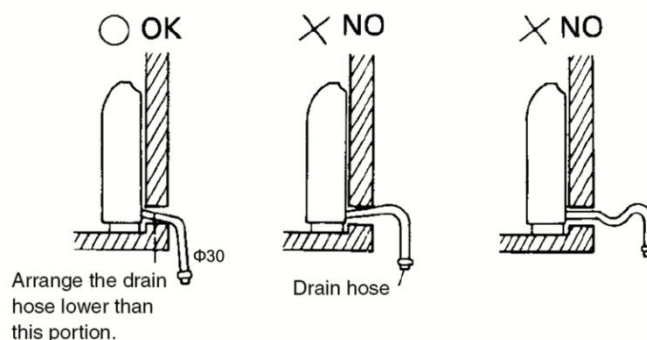
Install the unit to them with nuts, washers and spring washers.

NOTE: The installation angle should not exceed 15 degrees.



CAUTION

Be sure to arrange the drain hose so that it is leveled lower than the drain hose connecting port of the indoor unit.

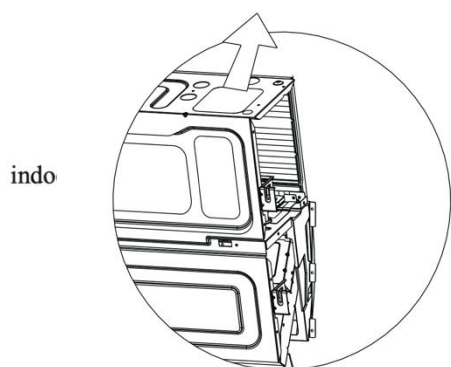


Under ceiling type

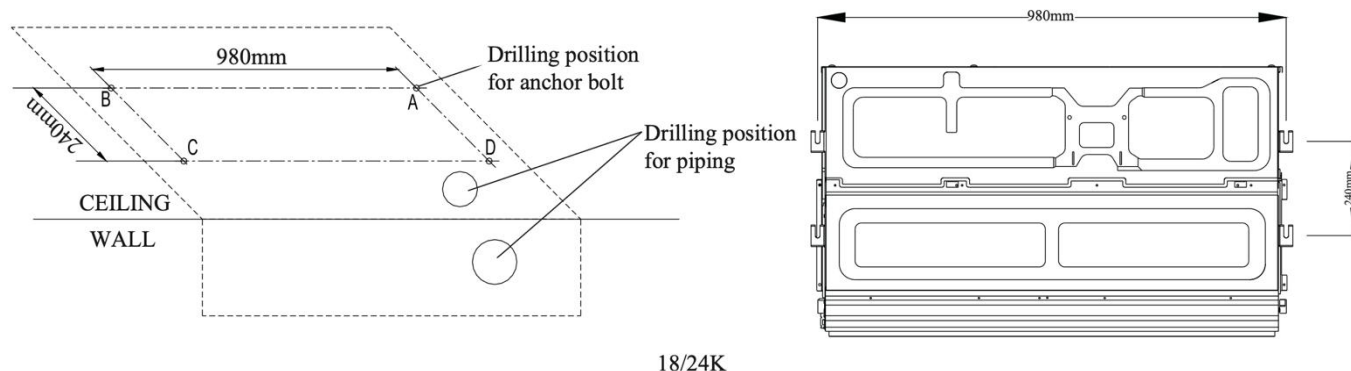
1. Select piping and drain directions.

CAUTION: Install the drainage hose at the rear, it should not be installed on the top .

When the directions are selected, drill 80 mm (3-1/8") and 50 mm (2") or 150 mm (6") dia. hole on the wall so that the hole is tilted downward toward the outdoor for smooth water flow.



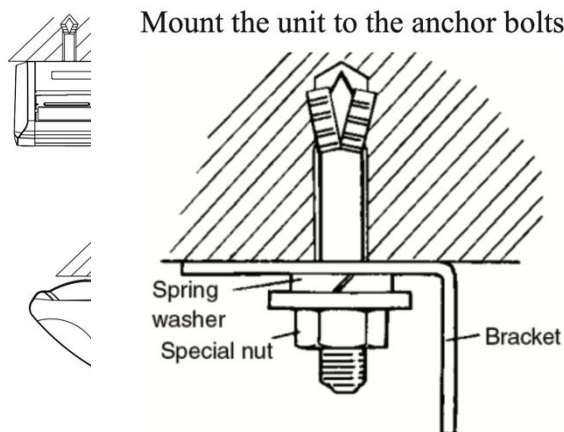
2. Drilling holes for anchor bolts and installing the anchor bolts (m10). Please drill four holes for anchor bolts at the position A, B, C and D.



3. Installing indoor unit

Now, securely tighten nuts to each bolt with washers and spring washers

NOTE: The installation angle should not exceed 10 degrees.



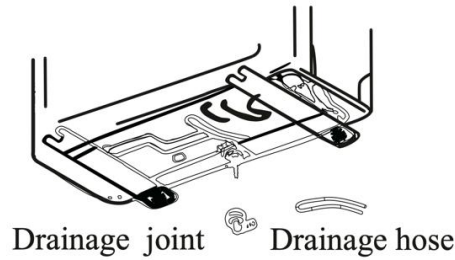
2.2.2. Outdoor Unit Installation

- The outdoor unit should be installed on a solid wall and fastened securely.
- The following procedure must be observed before connecting the pipes and connecting cables : decide which is the best position on the wall and leave enough space to be able to carry out maintenance easily.
- Fasten the support to the wall using screw anchors which are particularly suited to the type of wall.
- Use a larger quantity of screw anchors than normally required for the weight they have to bear to avoid vibration during operation and remain fastened in the same position for years without the screws becoming loose.
- The unit must be installed following the national regulations.

Outdoor unit condensed water drainage (only for heat pump models)

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

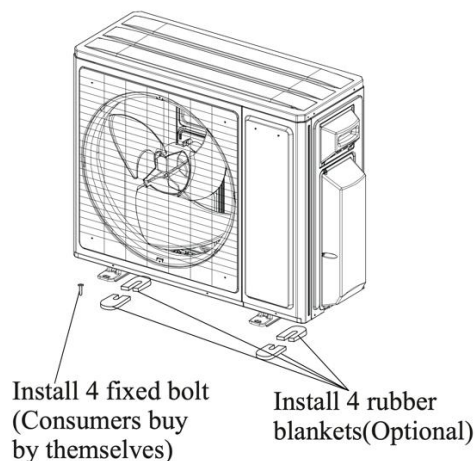
- 1) Fasten the drain port in the 25mm hole placed in the part of the unit as shown in the picture.



2) Connect the drain port and the drain pipe. Pay attention that water is drained in a suitable place.

Fix Outdoor Unit

- 1 According to the outdoor unit installation dimensions to mark the installation position for expansion bolts .
- 2 Drill holes and clean the concrete dust and place the bolts .
- 3 If applicable install 4 rubber blankets on the hole before place the outdoor unit(Optional).This will reduce vibrations and noise.
- 4 Place the outdoor unit base on the bolts and pre-drilled holes.
- 5 Use wrench to fix the outdoor unit firmly with bolts.



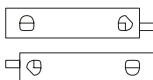
Note

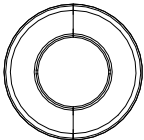
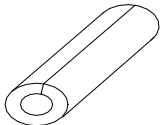
The outdoor unit can be fixed on a wall-mounting bracket. Follow the instruction of the wall-mounting bracket to fix the wall-mounting bracket on the wall, and then fasten the outdoor unit on it and keep it horizontal. The wall-mounting bracket must be able to support at least 4 times of the weight of outdoor unit.

2.2.3. Connection Pipe Installation

2.2.3.1. Installation Notice and Requirement on Connection Pipe

Accessory

Remote controller 	Remote controller supporter 	Batteries 	Vinyl tape 
--	--	--	---

Drain hose 	Hole cover 	Screw 	Insulation material 
---	---	--	--

Tools

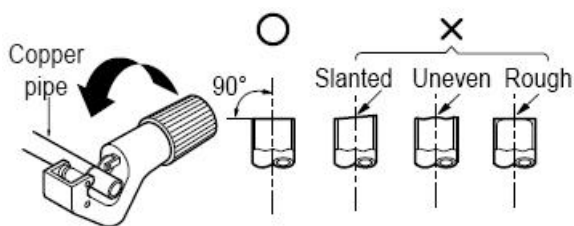
Tool name	Picture	Tool name	Picture	Tool name	Picture
Standard Wrench		Pipe Cutter		Vacuum Pump	
Adjustable/ Crescent Wrench		Screw drivers (Phillips & Flat blade)		Safety Glasses	
Torque Wrench		Manifold and Gauges		Work Gloves	
Hex Keys or Allen Wrenches		Level		Refrigerant Scale	
Drill & Drill Bits		Flaring tool		Micron Gauge	
Hole Saw		Clamp on Amp Meter			

2.2.3.2. Pipe Flaring

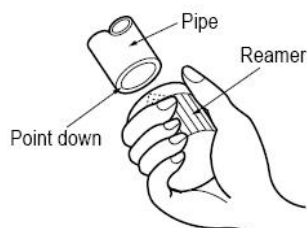
Main cause for gas leakage is due to defect in flaring work. Carry out correct flaring work in the following procedure.

A. Cut the pipes and the cable.

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

**B. Burrs removal**

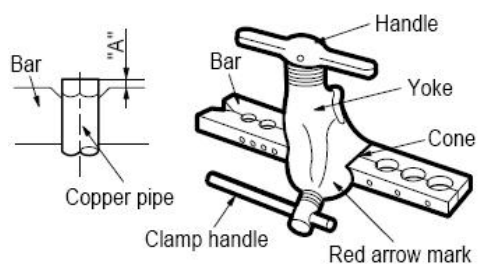
- 1) Completely remove all burrs from the cut cross section of pipe/tube.
- 2) Put the end of the copper tube/pipe in a down ward direction as you remove burrs in order to avoid dropping burrs into the tubing.

**C. Flaring work**

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

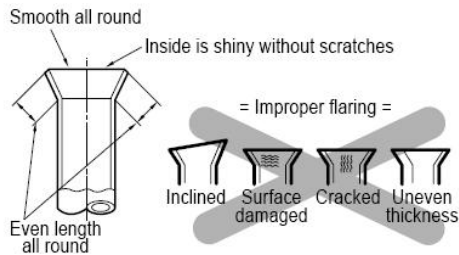
Outside Diameter		A
mm	inch	mm
ø6.35	1/4	1.0~1.3
ø9.52	3/8	0.8~1.0
ø12.7	1/2	0.5~0.8
ø15.88	5/8	0.5~0.8

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

**D. Check**

- 1) Compare the flared work with figure below.

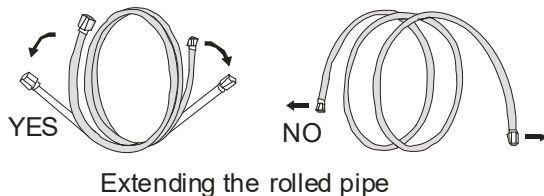
2) If flare is noted to be defective, cut off the flared section and do flaring work again.



2.2.3.3. Pipe Bending

- Do not remove the cap from the pipe until connecting it, to avoid dampness or dirt from entering.
- If the pipe is bent or pulled too often, it will become stiff. Do not bend the pipe more than three times at one point.

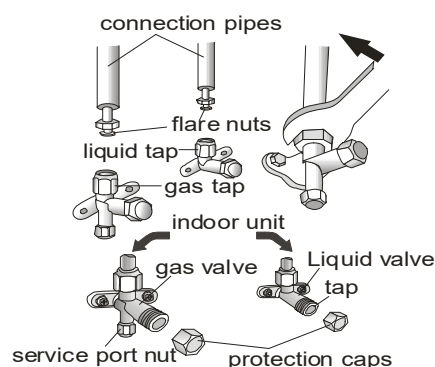
When extending the rolled pipe, straighten the pipe by unwinding it gently as shown in the picture.



2.2.3.4. Connection Pipe of Indoor and Outdoor Units

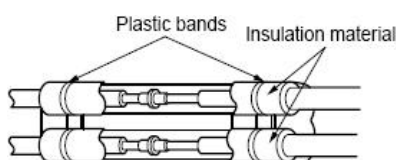
Screw the flare nuts to the outdoor unit coupling with the same tightening procedures described for the indoor unit.

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



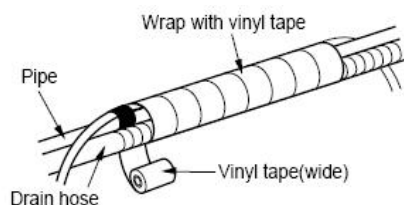
2.2.3.5. Thermal Insulation of Pipe Joint (Only for indoor unit)

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



Wrap the area which accommodates the rear piping housing section with vinyl tape.

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



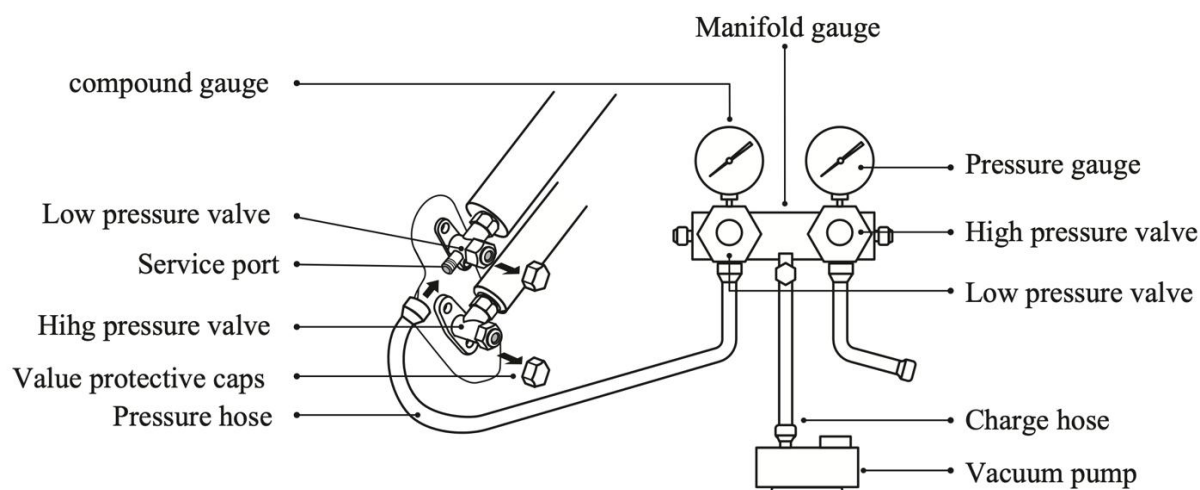
2.2.4. Connection Pipe Vacuum Pumping and Leak Detection

2.2.4.1. Vacuum Pump connection

Air and humidity left inside the refrigerant circuit can cause compressor malfunction.

After having connected the indoor and outdoor units, bleed the air and humidity from the refrigerant circuit by using a vacuum pump.

- (1) Remove the caps of the liquid valve, gas valve and also the service port.
- (2) meanwhile the gas and liquid valves should be kept closed in case of refrigerant leak.
- (3) Connect the hose used for evacuation to the vacuum pump.
- (4) Open the switch at the lower pressure side of the manifold valve assembly, Meanwhile, the switch at the high pressure side of the manifold valve assembly should be kept closed, otherwise evacuation would fail.



2.2.4.2. Vacuum Pumping

1. Switch on the vacuum pump, and system vacuum for 20-45 minutes till the pressure gauge to degree of -0.1MPa (-750mmHg),
2. Switch off vacuum pump and wait for 10min to check if the system pressure kept to **-0.1MPa**. If the pressure increase, there may be leakage and the leakage point need to check and repair.
3. Slightly open the liquid valve and let some refrigerant going to the connection pipe to balance the pressure of the connection pipe, so that air will not come into the connection pipe when removing the hose. Notice that

the gas and liquid valves can be fully opened only after the manifold valve assembly is removed.

4. Remove the manifold and open the valve core of gas and liquid valves completely.
5. Tighten the screw cap of valves and the service port..

Reference

The evacuation duration depends on the unit's capacity, generally:

Model	Time(min)
09K, 12K	20
18K	30
24K	45

2.2.4.3. Leak Detection Methods

There are two ways to check gas leakage.

- 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 bubbles coming out of this position, need to repair it.

How to check the system gas leakage?

- (1) First of all, check each welding point.

Check whether the welding points are smooth and whether there is any obvious welding hole or other abnormal condition.

- (2) Next, fill high-pressure nitrogen into the system for leak detection.

If it is only the outdoor unit that needs to be repaired and the indoor unit is confirmed normal, then it's OK to charge high-pressure nitrogen into the outdoor unit only. Fill in the nitrogen simultaneously from the high pressure side and low pressure side. We recommend charging the nitrogen from the two way and three way valves at the same time. The pressure of nitrogen should be above 20kgf. Then use soapy water to check for leaks. Check the welding points particularly.

- (3) Finally, retain the pressure of the system.

Fill high-pressure nitrogen into the system and maintain the pressure above 25kgf. Close the two way and three way valves and keep the pressure of indoor and outdoor units for more than 12h. If the pressure remains unchanged, then start vacuum pumping; otherwise, check the system for leaks again.

Temperature should be considered when judging the pressure variation. If temperature changes **1℃**, pressure will change around **0.01MPa** also. For example, if temperature is 30℃ when nitrogen of 2.5MPa is charged, and temperature changes to 25℃ after 12h, we consider that the system is qualified if the pressure is found at 2.43MPa or above.



Before and during operation, use an appropriate refrigerant leak detector to monitor the operation area and make sure the technicians can be well aware of any potential or actual leakage of inflammable gas. Make sure the leak detecting device is applicable to inflammable refrigerant. For example, it should be free of sparks, completely sealed and safe in nature.

2.2.5. Refrigerant Adding

1. Before refrigerant charging, make sure that the air conditioner is switched OFF.
2. Connect the gas bottle and the outdoor service port of three-way valve with the hose. The hose and the service port right now are not tightly connected to facilitate the air discharge in the hose.
3. Open the gas bottle valve slightly to discharge air in the hose through outdoor unit service port, after that connect the hose with service port reliably, and close the gas bottle valve at the same time.
4. Switch on the air conditioner in cooling mode, open the gas bottle valve, the air conditioner can be charged refrigerant appropriate amount.

Note

1. When quantitative gas charging is needed, the adding amount should be determined by electronic scale to avoid insufficient or overcharging.
2. No air is allowed into AC system, which is very dangerous while it's in operation.

2.2.6. Installation of Drain Pipe

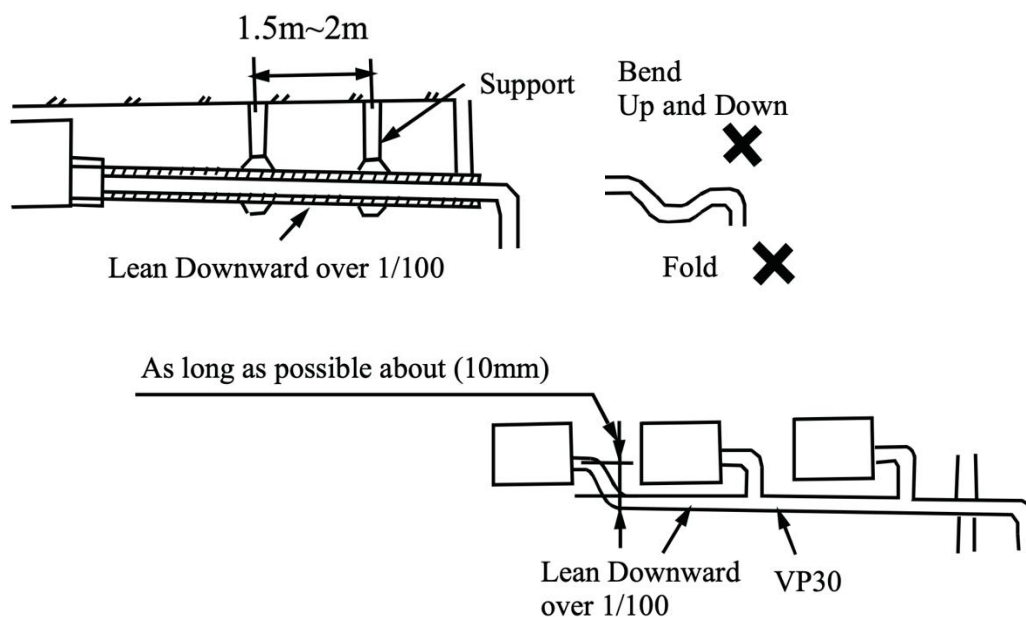
2.2.6.1. Indoor side Drain Pipe

CAUTION

Be sure to follow this Installation Manual during drainage installation, the drainage pipe must have the heat insulation to prevent condensing.



- The drainpipe of indoor unit must have the heat insulation, or it will condense dew, as well as the connections of the indoor unit.
- The declivity of the drainpipe downwards should not be over 1/100, and no winding and bending.
- The total length of the drainpipe when pulled out transversely shall not exceed 20m, when it's a long pipe, a prop stand must be installed every 1.5 to 2m to prevent winding.
- Refer to the following figures about the installation of the pipes.
- Do not impose any pressure on the connection part of the drainage pipe.



Drainage Pipe Material, Heat-insulating Material

The listed material should be used:

Drainage Pipe Material	Polyvinyl chloride pipe (φ32mm outer diameter)
Heat Insulation Material	Foamed polyethylene insulation plate (10mm thickness)

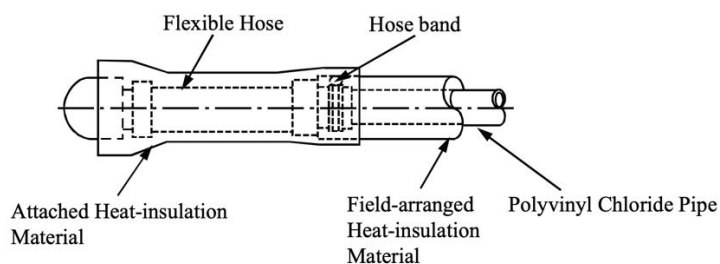
Connection Procedure

Connect the transparent pipe with the polyvinyl chloride pipe.

- Use polyvinyl chloride glue at the connection part of the drainage pipe, be sure no water leakage.
- Paste glue at the front 40mm of the polyvinyl chloride pipe, insert it into the transparent pipe.
- It needs 10 minutes for the glue to dry. Do not impose pressure on the connection during the drying period.

Heat Insulation

Wrap the flexible hose carefully with the attached heat insulation material from the start to the end (to indoor part)

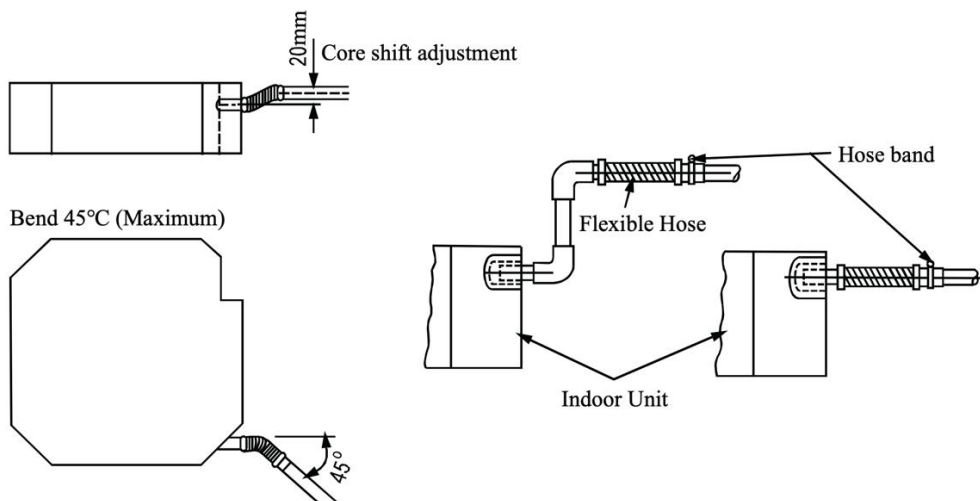


1. Cassette

Flexible Hose

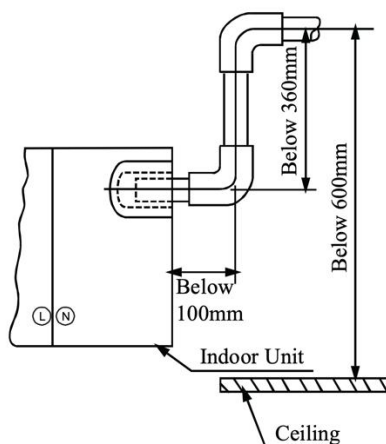
Measure diameter of the hard pipe using cutting method, and adjust the joining angle.

- Pull out the flexible hose, do not over deform than illustrated below.
- Be sure to bind it with the attached band.
- Please place the flexible hose horizontally.



Drainage Upward

To make sure that the drainage pipe would not be slanted downward, lead it upward to a height 360mm maximum, then downward lead it.



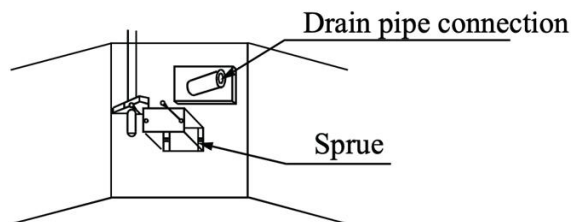
Drainage Test

Check whether the drain pipe is unhindered before testing.

- 1) Stow water from sprue to check.
- 2) Stow 600cc water with pot or hose from sprue slowly, preventing touching the drain pump motor.
- 3) After the preparation work, disconnect the water level switch, power 220-240V to AC of terminal board, and

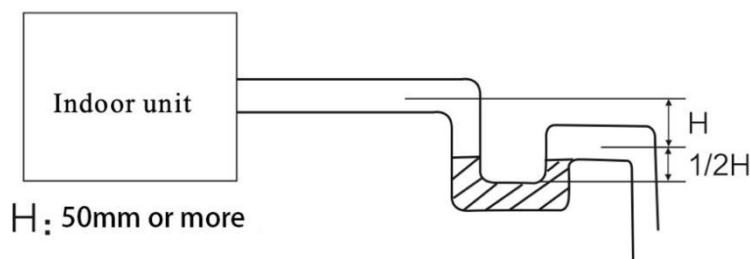
the drain pump start up immediately.

4) After drain pump run 2 min., reset the water level pin, and the drain pump motor will stop after running 22min.



2. Duct

LOW STAIC PRESSURE DRAINAGE PIPE INSTALLATION



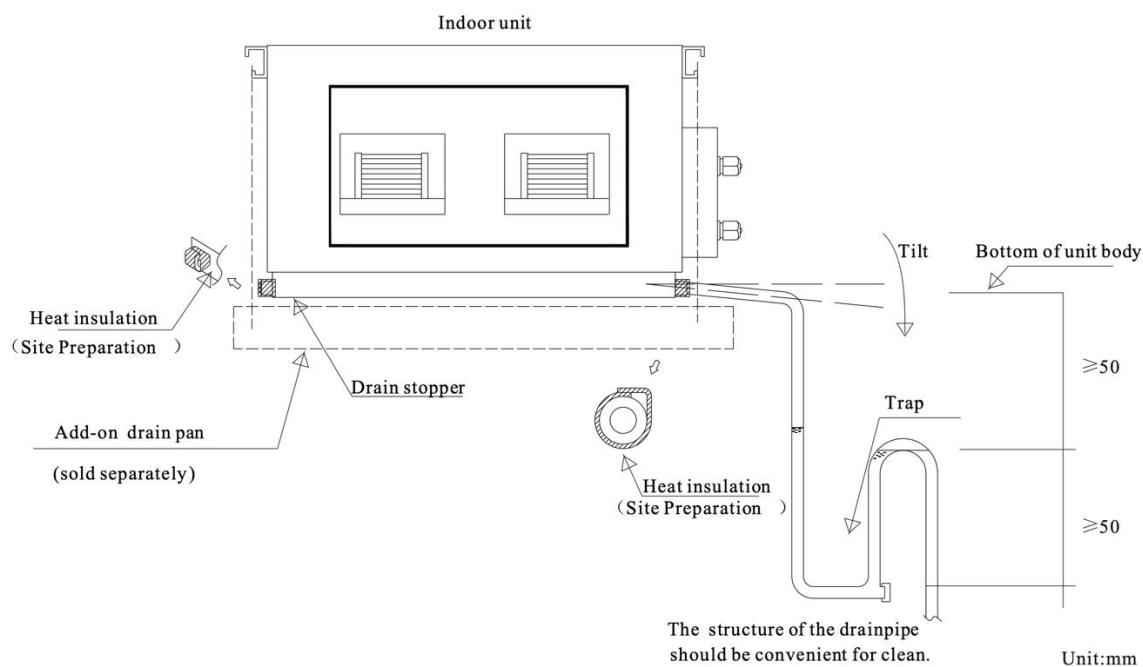
When the outlet of the drainage pipe is higher than the pumping nozzle of the main body, the drainage pipe should be vertically raised as far as possible vertical bending action, the overall lift underrated voltage 220V does not exceed 55cm, if the user has a special installation scenario, For example, if the user voltage is lower than the national grid standard, please contact the after-sales service or local installer to confirm the height, otherwise when the operation stop, the water backflow will cause overflow.

HIGHT STATIC PRESSURE DRAINAGE PIPE INSTALLATION

WARNING

The drainpipes should be installed according to the following figure to avoid water leakage.

- Assemble the main body according to Figure.
- The opening of drainpipes can be installed on the left side or the right side, the drain stopper can be also put on the left side or the right side.
- For the best effect, the pipes should keep as short as possible. And tilt the pipes to ensure the flow of fluid.
- Make sure the drainpipes have admirable heat insulation.
- It is necessary to install a trap near the opening of the rain pipe, so that when the machine is working, the pressure in the inside of the machine is lower than atmospheric pressure. If there isn't an elbow, the water will splash and the pipe will produce a bad smell.
- keep straightness of drainpipes so as to remove dirt.
- Seal the drainpipe on the other side of the machine, then wrap up the drainpipe in the heat-insulation materials .
- Put water into the drain pan to test whether the water can be discharged smoothly.
- In humid conditions, please must use a add-on drain pan(commmercially available) to cover the whole area of the indoor unit.



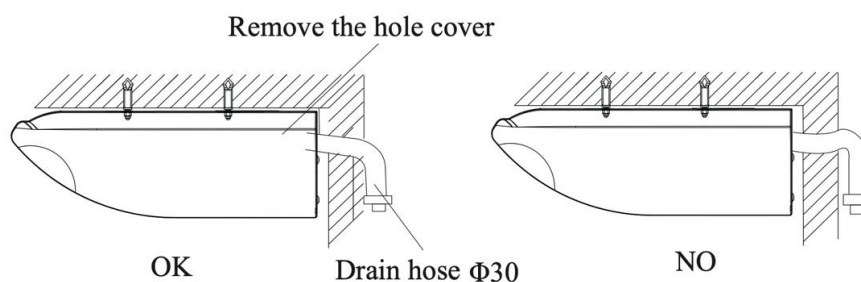
3. Ceiling Floor

1. Installing the drain hose

Insert the drain hose into the drain pan, then secure the drain hose with a nylon fastener (*The drain hose has connected to the drain pan in the production, you just need to connect the drain pipe.*).

Wrap the insulation (drain hose) around the drain hose connection.

Be sure to arrange the drain hose so that it is leveled lower than the drain hose connecting port of the indoor unit.



2. Drainage test

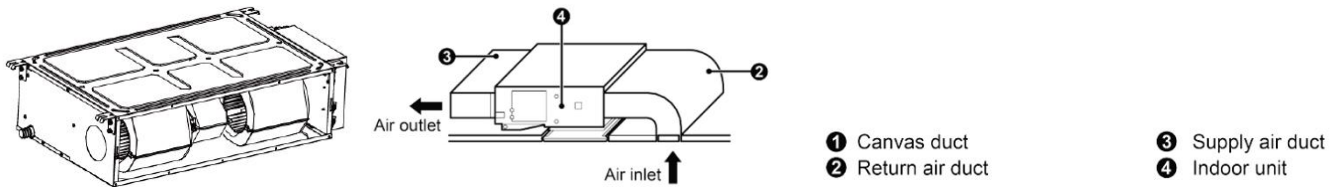
A. Check whether the drainpipe is unhindered and each joint is airtight.

B. Inject 2000ml water into the drain pan to test whether the water can flow smoothly.

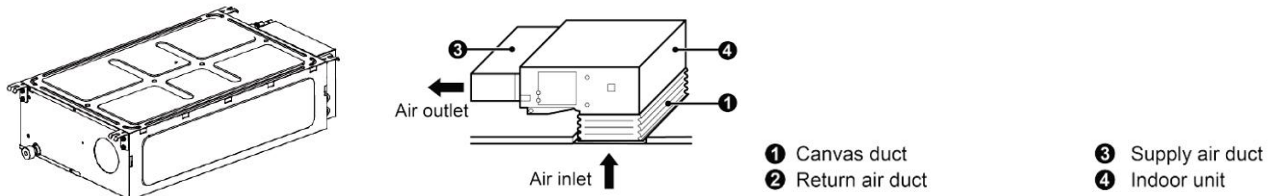
2.2.7. Return Air Method

1. DUCT

(1) The default ex-factory return air method is from the back. The return air cover shall be installed at the bottom of the unit, as is shown in the following figure.



(2) If the downward return air method is adopted, then install the return air cover at the back of the unit after dismantling it.



(3) Connect the return duct to the return air inlet of indoor unit with rivet, and the other side shall be connected to the return air inlet.

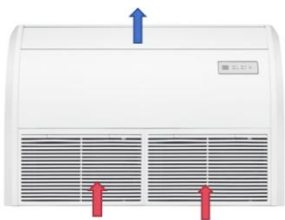
2. CASSETTE

Air inlet downward, air outlet around.



3. CELING FLOOR

Air inlet downward, air outlet upward.



2.3. Electrical Installation

2.3.1. Requirement and Notice on Electrical Installation



The electrical installation for the air conditioner should observe the following requirements:

- ①. The electrical installation must be conducted by professionals in compliance with local laws and regulations and the instructions in this manual. Never extend the power cord. The electric circuit must be equipped with a

circuit breaker and air switch both with sufficient capacity.

- ②. The unit's operating power must be within the nominal range stated in the instruction manual. Use a specialized power circuit for the air conditioner. Do not draw power from another power circuit.
- ③. The air conditioner circuit should be at least 1.5m away from any inflammable surface.
- ④. The external power cord, connection wire of indoor and outdoor units and the communication cords must be effectively fixed.
- ⑤. The external power cord, connection wire of indoor and outdoor units and the communication cords can't directly contact any hot objects. For example: they must not contact chimney pipes, warm gas pipes or other hot objects.
- ⑥. The external power cord, communication cords, and the connection wire of indoor and outdoor units must not be squeezed. Never pull, stretch or bend the wires.
- ⑦. The external power cord, communication cords and the connection wire of indoor and outdoor units must not collide with any metal beam or edge on the ceiling, or touch any metal burrs or sharp metal edge around.
- ⑧. Connect wires correspondingly by referring to the circuit diagram labeled on the unit or electric box. Screws must be tightened up. Slipped screws must be replaced by specialized flat-head screws.
- ⑨. Please use the power cables that are delivered along with the air conditioner. Do not change the power cables arbitrarily. Do not change the length and terminals of the power cables. If you want to change the power cables, please contact the local service center.
- ⑩. Wiring terminals should be connected firmly to the terminal board. Loose connection is forbidden.
- ⑪. After the electrical installation is finished, please use wire clamps to secure the power cord, connection wire of indoor and outdoor units and the communication cords. Make sure the wires are not clamped too tight.
- ⑫. The wire gauge of power cord should be large enough. Damaged power cord or other wires must be replaced by specialized wires. Wiring work must be done according to national wiring rules and regulations.

2.3.2. Electrical Parameters

2.3.2.1. Wire specifications and fuse capacity

Model	Power supply	Circuit breaker capacity	Min. sectional area of power cord
	V/Ph/Hz	A	mm ²
09K	230V ~60Hz	10	1.0
12K	230V ~60Hz	16	1.5
18K	230V ~60Hz	16	1.5
24K	230V ~60Hz	25	2.5



NOTES:

- ①. Fuse is located on the main board.
- ②. Install a circuit breaker near the outdoor units with at least 3mm contact gap. The units must be able to be plugged or unplugged.

- ③. Circuit breaker and power cord specifications listed in the above table are determined based on the maximum power input of the units.
- ④. Supply cords of parts of appliances for outdoor use shall not be lighter than polychloroprene sheathed flexible cord (code designation 60245 IEC 57).
- ⑤. Specifications of circuit breaker are based on a working condition where the working temperature is 40°C. If working condition changes, please adjust the specifications according to national standards.
- ⑥. The maximum length is 30m. Please select a proper length according to local conditions.
- ⑦. The wire of communication cord should not be less than 0.75mm². It's recommended to use 0.75mm² power cords as the communication cords.
- ⑧. It's required to adopt the shielded wire for the communication cable between the indoor unit and the centralized controller; when connection is finished, the shielding layer should be reliably grounded.

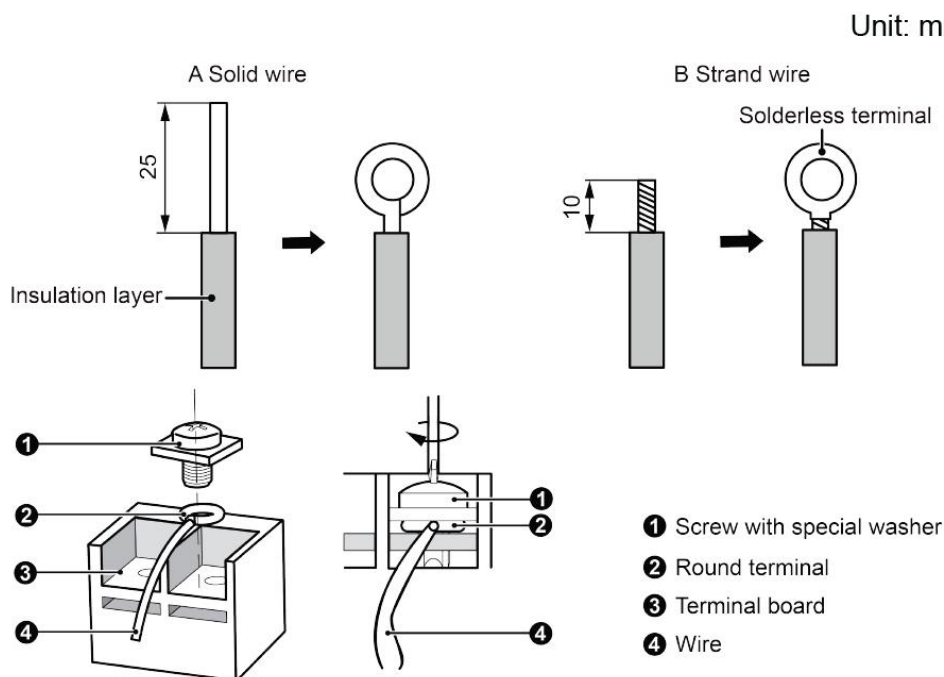
2.3.3.Connection of Power Cord and Communication Cord

1. For solid wires (as shown below):

- 1). Use wire cutters to cut off the wire end and then peel away about 25mm of the insulation layer.
- 2). Use a screwdriver to unscrew the terminal screw on the terminal board.
- 3). Use nippers to bend the solid wire into a ring that fits the terminal screw.
- 4). Form a proper ring and then put it on the terminal board. Use a screwdriver to tighten up the terminal screw.

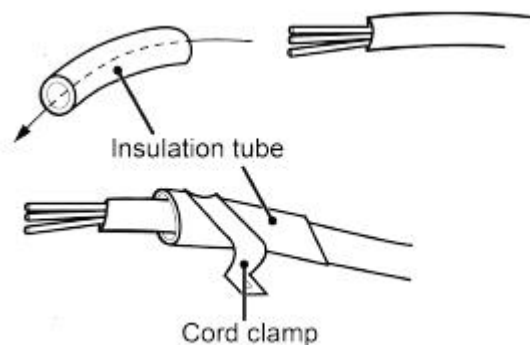
2. For strand wires (as shown below):

- 1) Use wire cutters to cut off the wire end and then peel away about 10mm of the insulation layer.
- 2) Use a screwdriver to unscrew the terminal screw on the terminal board.
- 3) Use a round terminal fastener or clamp to fix the round terminal firmly on the peeled wire end.
- 4) Locate the round terminal conduit. Use a screwdriver to replace it and tighten up the terminal screw (as shown below).



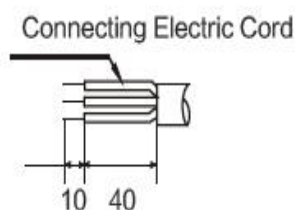
3. How to connect the connection wire and power cord.

Lead the connection wire and power cord through the insulation tube. Then fix the wires with wire clamps (as shown in the following figure).

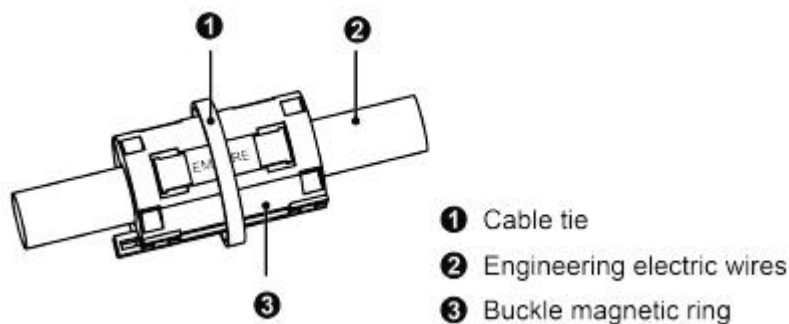


4. Outdoor unit wiring

1. Copper-cored wire should be selected.
2. As the electric control box is inside the unit body, dismantle the valve installation cover, top cover and right front board sequentially when connecting wires, then connect the responding wires from the hole of the electric of the right backboard.
3. Wrap the electric wire(conductor),which is not inserted into the connection pole, with Pvc belt and make it avoid any electric appliance or metal elements.
4. After installing cable connection lug on the main power wire, then connect to the terminal row.
5. Connection lug should be installed on the grounded wire of all cables. Only finishing that all cables can be connected to grounded bolt.
6. The electric wire from wire terminal should be through wire clips.
7. Please refer to the right illustration.

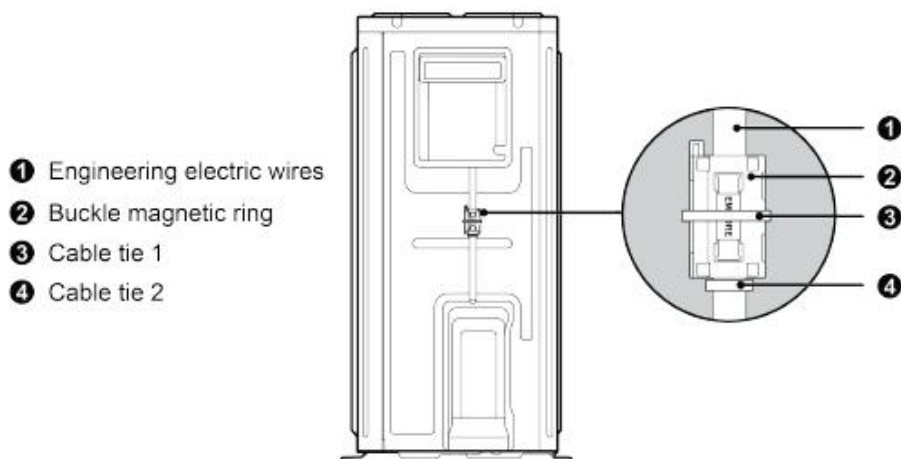


For the indoor unit whose packaging materials are with the buckle magnetic ring. The engineering electric wires (live wire, neutral wire, earthing wire and communication cable) should pass through the buckle magnetic ring before entering into the unit. The magnetic ring should be fixed reliably by cable tie. The engineering wires and buckle magnetic ring are not allowed to touch sharp edges.



Buckle magnetic ring shall be added in the power line communication cord of outdoor and indoor unit. The added buckle magnetic ring shall be fixed at the outlet of power line communication cord near the outdoor unit side; detailed operation step for the magnetic buckle is as follow:

- 1) Limit the fixation location of buckle magnetic ring at the outlet of power line communication cord near the outdoor unit side with a cable tie (refer to the mark 4 in the following picture) to prevent the buckle magnetic ring from sliding along the power line communication cord;
- 2) Then clasp the buckle magnetic ring to the location of power line communication cord confirmed with cable tie, after that, re-fix it with a cable tie (refer to the mark 3 in the following picture)



NOTE

The indoor unit should be connected correctly with the high-pressure and low-pressure stop valve of the outdoor unit as well as the signal line. Otherwise, some electrical componets and system may suffer damages



- (1) Before working, please check whether the indoor and outdoor units are powered on.
- (2) Match the wire colors with the circuit diagram.
- (3) Wrong wire connection may burn the electrical components.
- (4) Connect the wires firmly to the wiring box. Incomplete installation may lead to fire hazard.
- (5) Please use wire clamps to secure the external covers of connecting wires. (Insulators must be clamped securely; otherwise, electric leakage may occur.)
- (6) Ground wire should be connected.



- (1) High and low voltage wires should be led through different rubber rings of the electric box cover.
- (2) Do not bundle up the connection wire and communication wire of wired control or lay them side by side, otherwise errors will occur.
- (3) High and low voltage wires should be secured separately. Secure the former ones with big clamps and the latter ones with small clamps.
- (4) Use screws to tighten up the connection wires and power cords of indoor and outdoor units on the terminal board. Wrong connection may lead to fire hazard.
- (5) If the connection wires of indoor unit (outdoor unit) and power cords are not correctly connected, the air conditioner may get damaged.
- (6) Ground the indoor and outdoor units through connecting the ground wire.
- (7) The units should comply with applicable local and national rules and regulations on power consumption.
- (8) When connecting the power cord, make sure the phase sequence of the power supply matches with the corresponding terminals, otherwise the compressor will get reversed and operate abnormally.

2.4. Check after Installation

Check Items after Installation.

Check items	Possible events due to improper installation
Is the main body installed securely?	The unit may fall down, vibrate or produce noise.
Did you do water leakage test?	Cooling capacity may become unsatisfactory.
Is the unit well insulated from heat?	Condensate, water drops may occur.
Does water drainage go well?	Condensate, water drops may occur.
Is the voltage consistent with that stated on the nameplate?	The unit may fail or its components may get burned.
Are the wires and pipes installed correctly?	The unit may fail or its components may get burned.
Has the unit been safely grounded?	Risk of electric leakage.
Do the specifications of wires comply with the requirement?	The unit may fail or its components may get burned.
Is there any obstacle blocking the air inlet and outlet of the indoor or outdoor units?	Cooling capacity may become unsatisfactory.
Have you recorded the length of refrigerant pipe and the refrigerant charging amount?	The refrigerant charging amount can't be controlled.

2.5. Test Running

Preparation before connecting the power:

- (1) Power must not be connected if the installation work is not completed.
- (2) Control circuit is correct and all the wires are firmly connected.
- (3) Cut-off valves of the gas pipe and liquid pipe are open.
- (4) The inside of the unit should be clean. Take irrelevant objects out if there is any.
- (5) After checking, re-install the front side plate.

Operation after connecting the power:

- (1) If all the above works are finished, power on the unit.

- (2) Make sure the indoor and outdoor units can run normally.
- (3) Feel the air flow of the indoor unit to see if it is normal.
- (4) Press the swing button or speed control button on remote control or wired control to see if the fan can run normally.

NOTES

- ①. If you use remote control to turn off the unit and then immediately turn the unit on again, compressor will need 3min to restart. Even if you press "ON/OFF" button on the remote control, it won't be started up right away.
- ②. If there's no display on the wired control, it's probably because the connection wire between the indoor unit and wired control is not connected. Please check again.

3. Maintenance Instruction Manual

3.1. Information on servicing

The manual shall contain specific information for service personnel who shall be instructed to undertake the following when servicing an appliance that employs a flammable refrigerant.

3.1.1. Checks to the Area

Prior to beginning work on system containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the refrigerating system, the following precautions shall be complied with prior to conducting work on the system.

3.1.2. Work procedure

Working shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapour being present while the work is being performed.

3.1.3. General work Area

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out, work in confined spaces shall be avoided. The area around the work space shall be sectioned off, ensure that the conditions within the area have been made safe by control of flammable material.

3.1.4. Checking for presence of Refrigerant

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of the potentially flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with flammable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

3.1.5. Presence of Fire Extinguisher

If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or co2 fire extinguisher adjacent to the charging area.

3.1.6.No Ignition sources

No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which flammable refrigerant can possibly be released to the surrounding space. prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. "NO Smoking" signs shall be displayed

3.1.7. Ventilated Area

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation should be continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

3.1.8. Checks to the Refrigeration Equipment

When they are being changed, they shall be fit for the purpose and to the correct specification. At all times the

manufacturer's maintenance and service guidelines shall be followed. If in doubt, please consult with the manufacturer's technical department for assistance.

The following checks shall be applied to installations using flammable refrigerants.

- (1) The charge size is in accordance with the room size within which the refrigerant containing parts are installed.
- (2) The ventilation machinery and outlets are operating adequately and are not obstructed.
- (3) If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.
- (4) Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.
- (5) Refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

3.1.9. checks to electrical devices

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:

- (1). That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking.
- (2). That no live electrical components and wiring are exposed while charging, recovering or purging the system.
- (3). That there is continuity of earth bonding.

3.2. Repairs to sealed components

1. During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.

2. Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.

Ensure that apparatus is mounted securely.

Ensure that seals or sealing materials have not degraded such that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications.

NOTE

The use of silicon sealant may inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

3.3. Repair to Intrinsically safe components

DO not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.

Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating.

Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

3.4. Cabling

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of ageing or continual vibration from sources such as compressors or fans.

3.5. Detection of Flammable Refrigerants

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

3.6. Removal and Evacuation

When breaking into the refrigerant circuit to make repairs or for any other purpose, conventional procedures shall be used. However, it is important that best practice is followed since flammability is a consideration. The following procedure shall be adhered to:

- (1) Remove refrigerant.
- (2) Purge the circuit with inert gas.
- (3) Evacuate.
- (4) Purge again with inert gas.
- (5) Open the circuit by cutting or brazing.

The refrigerant charge shall be recovered into the correct recovery cylinders. The system shall be "flushed" with OFN to render the unit safe. This process may need to be repeated several times, **compressed air or oxygen shall not be used for this task.**

Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final OFN Charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. This operation is absolutely vital if brazing operations on the pipe work are to take place.

Ensure that the outlet for the vacuum pump is not close to any ignition sources and there is ventilation available.

3.7. Charging Procedures

In addition to conventional charging procedures, the following requirements shall be followed.

1. Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
2. Cylinders shall be kept upright.
3. Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.

4. Label the system when charging is complete (if not already).
5. Extreme care shall be taken not to overfill the refrigeration system .
6. Prior to recharging the system, it shall be pressure tested with OFN. The system shall be leak tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site .

3.8. Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its in detail. It is recommended good practice that all refrigerants are recovered safely prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to reuse of reclaimed refrigerant. It is essential that electrical power is available before the task is commenced:

1. Become familiar with the equipment and its operation.
2. Isolate system electrically.
3. Before attempting the procedure ensure that:
 - 1) Mechanical handling equipment is available, if required, for handling refrigerant cylinders.
 - 2) All personal protective equipment is available and being used correctly.
 - 3) The recovery process is supervised at all times by a competent person.
 - 4) Recovery equipment and cylinders conform to the appropriate standards.
4. Pump down refrigerant system, if possible.
5. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
6. Make sure that cylinder is situated on the scales before recovery takes place.
7. Start the recovery machine and operate in accordance with manufacturer's instructions.
8. Do not overfill cylinders. (No more than 80 % volume liquid charge).
9. Do not exceed the maximum working pressure of the cylinder, even temporarily.
10. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
11. Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

3.9. Labelling

Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

3.10. Recovery

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge are available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant).

Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is

at hand and shall be suitable for the recovery of flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. consult manufacturer if in doubt.

The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Notice arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. when oil is drained from a system, it shall be carried out safely.

4. Product Introduction

4.1. Control

4.1.1. Operation Mode

4.1.1.1. Cooling Mode

Temperature control: 16-31°C(60.8-87.8°F), and the operation of fan speed and vane position according to preset.

Compressor and process control

- 1). When $RT-ST \geq 0.5^{\circ}\text{C}$ (32.9°F), the compressor starts up working, AC operates as customer preset;
- 2). When
 - a. $RT-ST \leq -3^{\circ}\text{C}$ (-37.4°F) and compressor keeps 2 min continuously;
 - b. $RT-ST \leq -2^{\circ}\text{C}$ (-35.6°F) and compressor works in lowest frequency for 5 min continuously;
 - c. $RT-ST \leq -1^{\circ}\text{C}$ (-33.8°F) and compressor works in lowest frequency for 10 min continuously,

The compressor stops operation.

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

ODU Fan motor control:

- 1). While unit:
 - a. switched off.
 - b. under protection.
 - c. to the set temperature.

After compressor ceased, the fan motor stops working according to the temperature of OPT and OAT, the max delay for the motor should be less than 160s.

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

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

Anti-frosting protection

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

- 1). Frequency Slowly Increasing(FSI):
 - a. If $6^{\circ}\text{C} \leq IPT < 7^{\circ}\text{C}$ (44.6°F), the frequency increasing rate is 1Hz/60s, slowly increasing operation speed.
 - b. When $IPT \geq 7^{\circ}\text{C}$ (44.6°F), unit quit from protection.
- 2). Frequency Limitation:

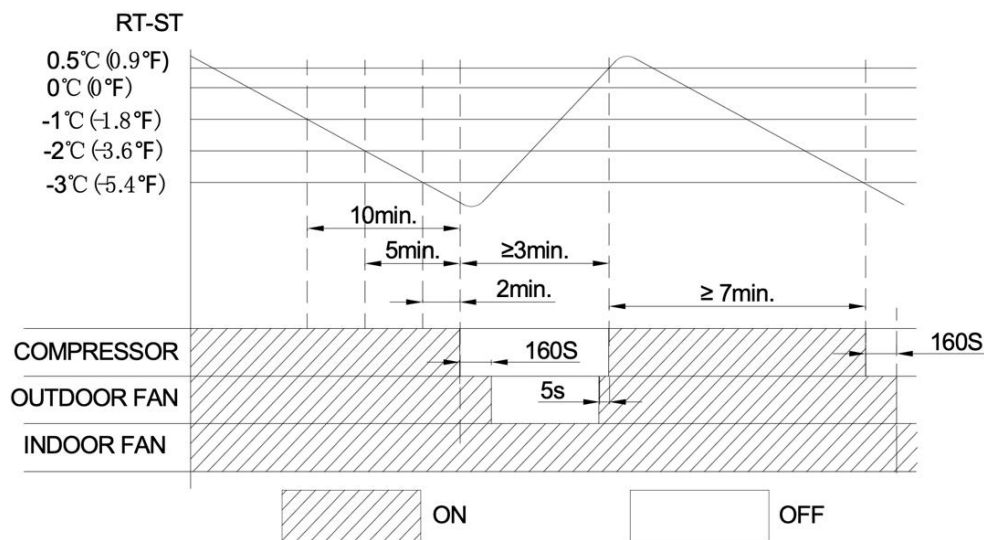
If $5^{\circ}\text{C} \leq IPT < 6^{\circ}\text{C}$ (42.8°F), the compressor frequency forbidden to increase
- 3). Normal Frequency Decreasing (NFD):

If 3°C (37.4°F) $\leq IPT < 4^{\circ}\text{C}$ (39.2°F), the frequency decreasing rate is 8Hz/90s, until to the lower frequency limit.
- 4). Fast Frequency Decreasing (FFD):

If 2°C (35.6°F) $\leq IPT < 3^{\circ}\text{C}$ (37.4°F), the frequency decreasing rate is 16Hz/90s, until to the lower frequency limit.

5). Unit stop:

- a. When $\text{IPT} < 1^{\circ}\text{C}(33.8^{\circ}\text{F})$ for 3min continuously, unit stops working for anti-defrosting protection.
- b. While $\text{IPT} > 6^{\circ}\text{C}(42.8^{\circ}\text{F})$, and the unit stopped for 3 min already, can the unit recover to operation.



4.1.1.2. Heating Mode

Temperature control: $16\text{--}31^{\circ}\text{C}(60.8\text{--}87.8^{\circ}\text{F})$.

Compressor and process control.

- 1). When $\text{ST-CRT} \geq 0.5^{\circ}\text{C}(0.9^{\circ}\text{F})$, the compressor starts up working, AC operates as customer preset;;
- 2). When
 - a. $\text{ST-CRT} \leq -3^{\circ}\text{C}(-5.4^{\circ}\text{F})$ and compressor keeps 2 min continuously;
 - b. $\text{ST-CRT} \leq -2^{\circ}\text{C}(-3.6^{\circ}\text{F})$ and compressor works in lowest frequency for 5 min continuously;
 - c. $\text{RT-CRT} \leq -1^{\circ}\text{C}(-1.8^{\circ}\text{F})$ and compressor works in lowest frequency for 10 min continuously,

The compressor stops operation.

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

IDU time delay:

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

ODU Fan motor control:

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

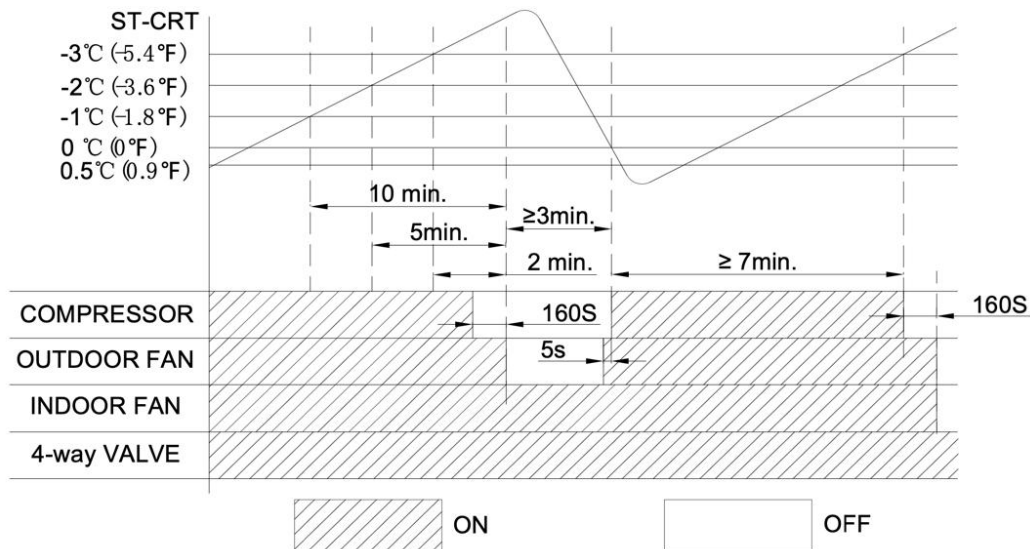
After compressor ceased, the fan motor stops working according to the temperature of OPT and OAT, the max delay for the motor should be less than 160s.

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

- 3). in the process of defrosting, the fan motor will stop operation 48s delay after compressor stopped.
- 4). defrosting finish, the compressor stops operation, the fan motor will start working simultaneously.

4-way valve control

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



4.1.2. Control Mode

4.1.2.1. Based Control

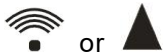
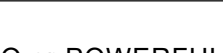
4.1.2.1.1. Compressor Control

When cooling or drying mode is turned on, indoor fan will run for a while before the compressor starts. Under different modes, the compressor can only be stopped after running for some time (special cases excluded). This is to protect the compressor from frequent start or stop. Once the compressor is stopped, it must not be restarted right away. Please wait for a few minutes.

4.1.2.1.2. Remote controller DISPLAY

Meaning of symbols on the liquid crystal display.

1	 or  or AUTO	FEEL mode indicator
2	 or COOL	COOLING indicator
3	 or  or DRY	DEHUMIDIFYING indicator
4	 or FAN	FAN ONLY OPERATION indicator
5	 or HEAT	HEATING indicator

6	 or 	SIGNAL RECEPTION indicator
7	 or  or  or 	TIMER OFF indicator
8	 or  or  or  or 	TIMER ON indicator
9	 or  or  or  or 	AUTO FAN indicator
10	 or  or  or  or  or 	LOW FAN SPEED indicator
11	 or  or  or  or  or 	MIDDLE FAN SPEED indicator
12	 or  or  or  or  or 	HIGH FAN SPEED indicator
13	 or  or  or 	SLEEP indicator
14		COMFORTABLE SLEEP indicator (optional)
15		FEEL indicator(optional)
16	 or  or  or 	FLAP SWING indicator
17		FLAP and Deflectors SWING indicator
18	 or  or 	SUPER indicator
19	 or  or  or 	HEALTHY indicator
20	 or  or 	ECO indicator
21		ANTI-MILDEW indicator
22	 or  or 	BATTERY indicator
23		CLOCK indicator
24		Mute indicator
25		GEN function indicator
26		Comfortable cooling airflow indicator
27		Comfortable heating airflow indicator

28	SLEEP TIMER I FEEL HEALTH MILDEW CLEAN DISPLAY 8 °CH WIND FREE GEN MODE	Optional functions indicator
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4.1.2.2. Special Control

4.1.2.2.1.Oil Return Control

If the unit is running at low frequency for a long time, system will enable oil return control. This is to lead oil in the pipeline back to the compressor so that the compressor will not be lack of oil.

Generally, the oil return takes about 5min. The compressor running frequency will be raised to the preset oil return frequency.

4.1.2.2.2.Overload protection function

Overload protection function in cooling and dehumidification mode.

Motor overload protection and overcurrent protection: When the motor's load exceeds the motor's capacity, the temperature increases, and the motor current exceeds the rated value.

The value of overload protection is far below the value of overcurrent protection, but it prevents the device overload than the normal load.

4.1.2.3. Protection Control

When IPM temperature $T_{IPM} \geq 87^{\circ}\text{C}(188.6^{\circ}\text{F})$, the compressor will be frequency limited/reduced for IPM over temperature protection.

When $T_{IPM} \geq 95^{\circ}\text{C}(203^{\circ}\text{F})$, the AC unit stops working for AC system protection.

If $T_{IPM} < 87^{\circ}\text{C}(188.6^{\circ}\text{F})$, and after compressor stopped for 3 min, can the unit be started to operate.

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

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

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

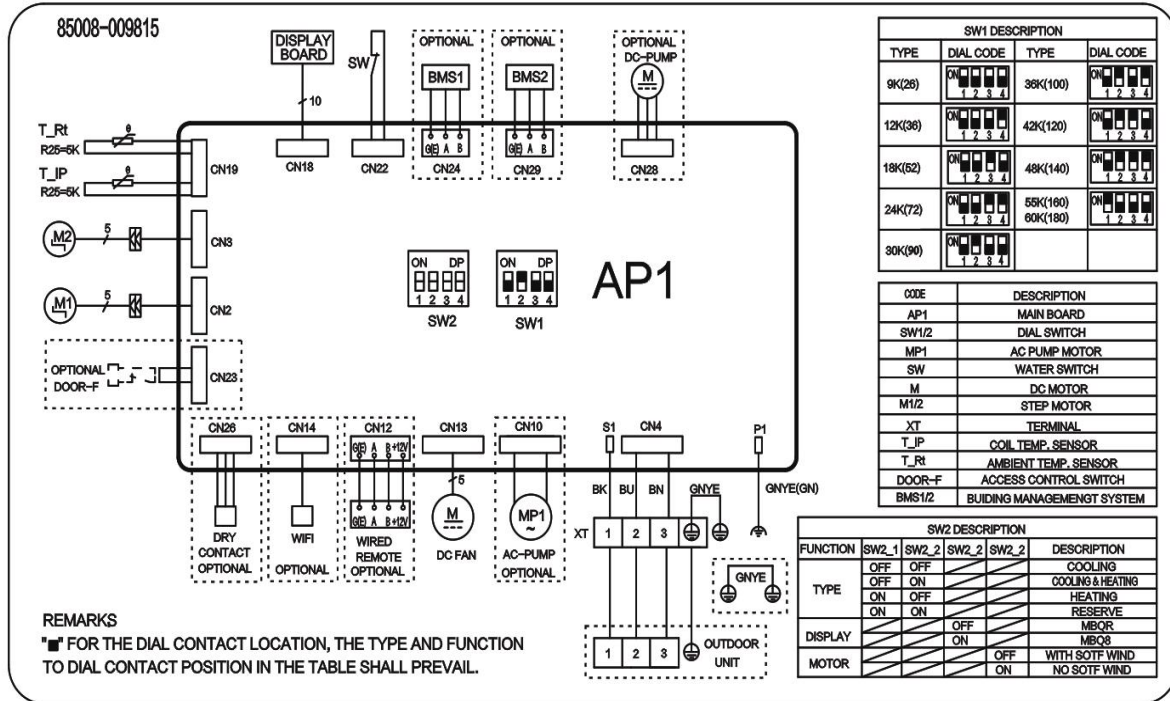
Note: If the defective failure can't be recovered, the failure can't eliminate even if operation mode changed.

4.2. Troubleshooting

4.2.1. Wiring Diagrams

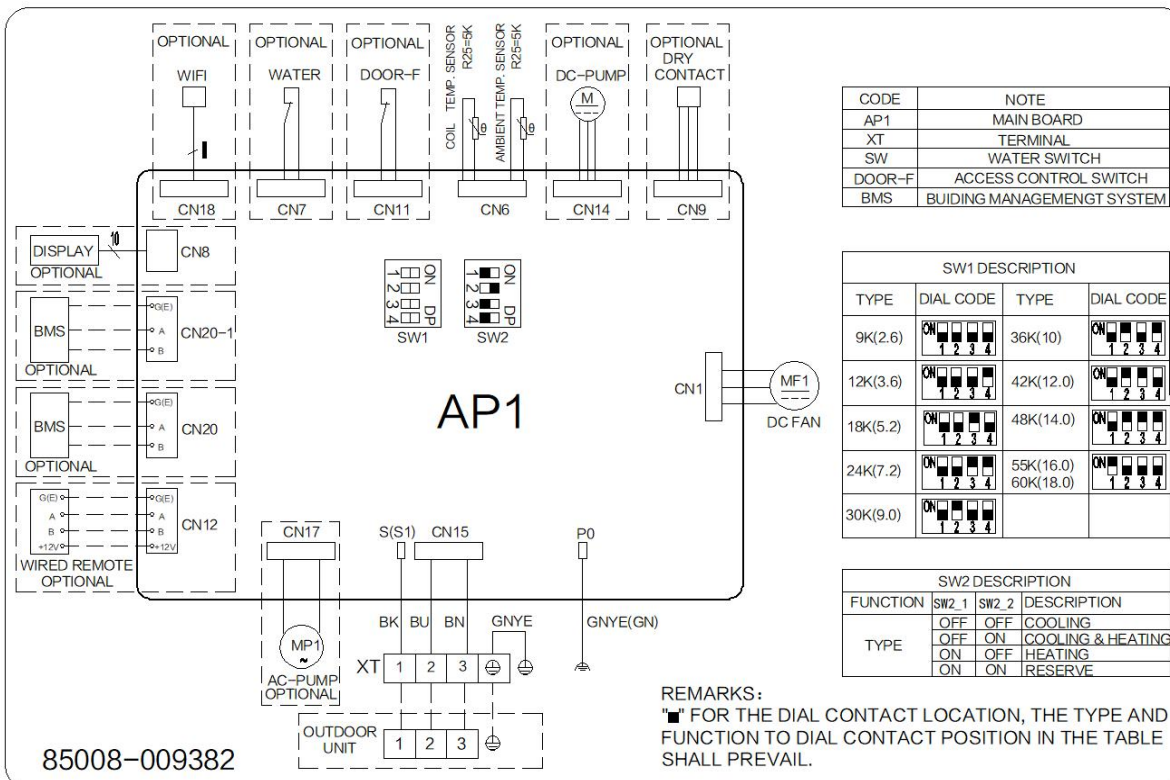
CASSETTE-9K, CASSETTE-12K

CASSETTE-18K, CASSETTE-24K

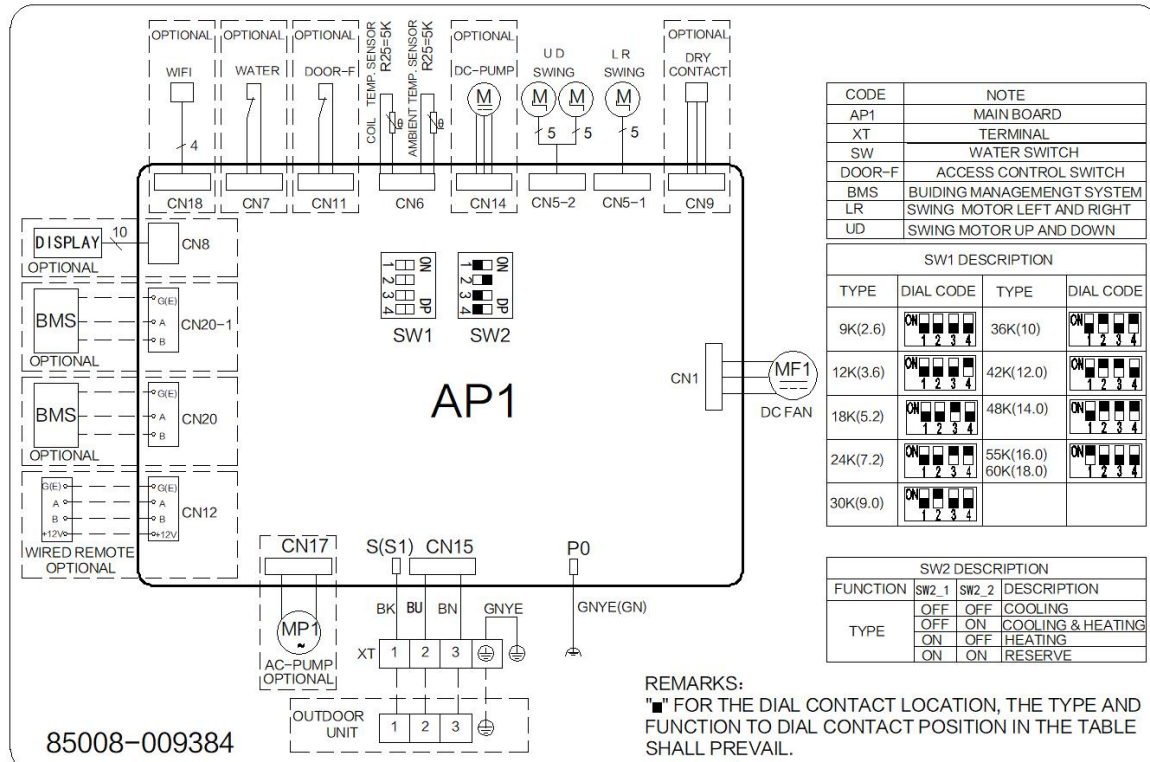


DUCT-9K,DUCT-12K

DUCT-18K,DUCT-24K



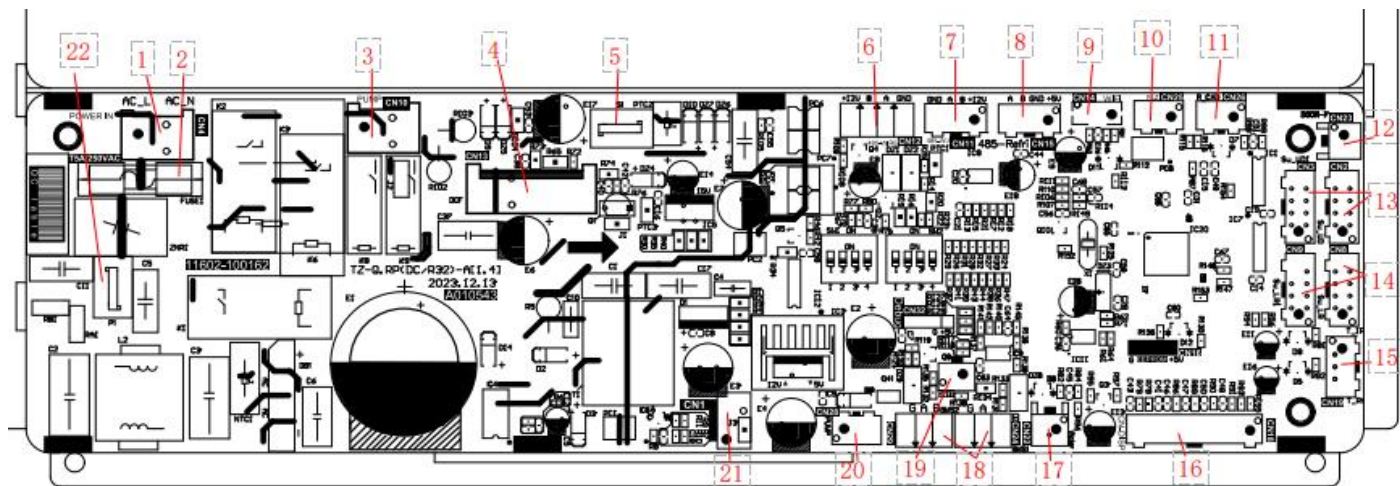
CEILING FLOOR-18K, CEILING FLOOR-24K



4.2.2.PCB Layout

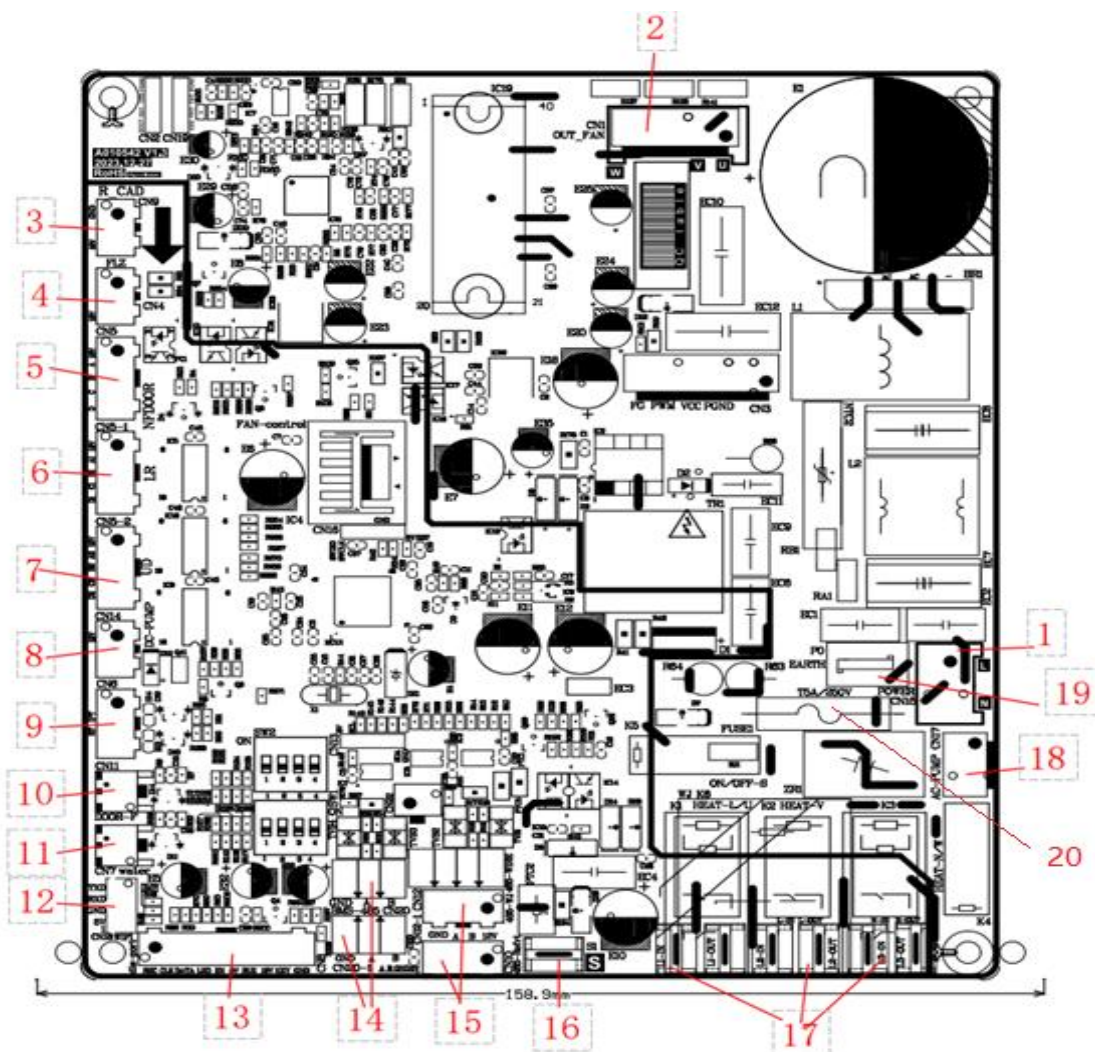
Indoor unit:

Model: CASSETTE-9K, CASSETTE-12K
CASSETTE-18K, CASSETTE-24K



1	Power supply-L&N connector	13	Up-Down swing connector
2	Fuse	14	Left-Right swing connector
3	Water pump(AC motor) connector	15	Temperature sensor connector
4	DC Fan motor connector	16	Display
5	IDU/ODU communication connector	17	Water level test
6	Wired cotrol connector	18	VRF communication port
7	RS485 communication port	19	Jump cap
8	Refrigerant Sensor connector	20	Water pump(DC motor) connector
9	WIFI connector	21	E-heater thermostat
10	Anion connector	22	EARTH

**Model: DUCT-9K, DUCT-12K, DUCT-18K
DUCT-24K, CEILING FLOOR-18K, CEILING FLOOR-24K**



1	Power supply-L&N connector	10	Dry connect
2	DC Motor connector	11	Water level test
3	Key card connector	12	WIFI connector
4	Anion connector	13	Display
5	FRESH AIR connector	14	VRF communication port
6	Left-Right swing connector	15	Wired control connector
7	Up-Down swing connector	16	IDU/ODU communication wiring
8	Water pump(DC motor) connector	17	E-heater
9	Temperature sensor connector	18	Water pump(AC motor) connector

4.2.3. Error Code

Error Code	Description	Error Code	Description
E0	Indoor and outdoor communication failure	P0	IPM module protection
E1	Indoor ambient temperature sensor failure	P1	Overvoltage and undervoltage protection
E2	Indoor fan coil temperature sensor failure	P2	Overcurrent protection
E3	Outdoor fan coil temperature sensor failure	P3	Other protections
E4	Abnormal system malfunction (lack of fluorine)	P4	Protection against excessive outdoor exhaust temperature
E5	Model configuration error	P5	Cooling protection against overcooling
E6	Indoor PG/DC fan failure	P6	Cooling and anti overheating protection
E7	Outdoor ambient temperature sensor failure	P7	Heating and anti overheating protection
E8	Outdoor exhaust temperature sensor failure	P8	Protection against high or low outdoor temperature
E9	Outdoor IPM module failure/compressor drive failure	P9	Compressor drive protection (abnormal load)
EA	Outdoor current sensor failure	PA	Communication failure/mode conflict
Eb	PCB and display screen communication failure	F0	Infrared human sensing sensor failure
EC	Outdoor modules Communication failure	F1	Battery module failure
EE	Outdoor EEPROM fault	F2	Exhaust temperature sensor failure protection
EF	Outdoor DC fan failure	F3	Failure protection of outer tube temperature sensor
EH	Outdoor suction sensor failure	F4	Abnormal protection of refrigerant circulation
EP	Outdoor compressor casing top failure	F5	PFC protection
EU	Outdoor voltage sensor failure	F6	Compressor missing/reverse phase protection
Ej	Outdoor central coil temperature sensor failure	F7	Module temperature protection
En	Outdoor air pipe temperature sensor failure	F8	Abnormal commutation of four-way valve
Ey	Outdoor liquid pipe temperature sensor failure	F9	Module temperature sensor circuit malfunction
FA	Compressor phase current detection fault	Fy	Fluorine deficiency protection
Fb	Cooling and heating overload protection limit frequency reduction	H1	High pressure switch malfunction
FC	High power protection limit/frequency reduction	H2	Low pressure switch malfunction
FE	Module current (compressor phase current) protection limit/frequency reduction	bf	TVOC sensor failure(optional)
FF	Module temperature protection limit/frequency reduction	bc	PM2.5 sensor failure(optional)
FH	Drive protection limit/frequency reduction	bj	Humidity sensor failure(optional)
FP	Anti condensation protection limit/frequency reduction	bE	CO2 sensor malfunction(optional)
FU	Anti freezing protection limit/frequency reduction	bd	Fresh air fan failure(optional)
Fj	Exhaust protection limit/frequency reduction	d4	Water full protection
Fn	External AC current protection limit/frequency reduction	d5	Access control protection
Hd	Refrigerant Leak Protection		
Fd	The communication of the refrigerant sensor is abnormal		

4.2.4. Troubleshooting

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

F3	ODU coil temperature failure PROTECTION..	Please check the troubleshooting for detail.
F4	Cooling system gas flow abnormal PROTECTION..	Please check the troubleshooting for detail.
F5	PFC PROTECTION	Please check the troubleshooting for detail.
F6	The Compressor lack of phase / Anti-phase PROTECTION.	Please check the troubleshooting for detail.
F7	IPM Module temperature PROTECTION	Please check the troubleshooting for detail.
F8	4-Way Value reversing abnormal..	Please check the troubleshooting for detail.
F9	The module temperature test circuit failure.	ODU PCB
FA	The compressor Phase-current test circuit failure.	ODU PCB
Fb	Limiting/Reducing frequency for Over load protection on Cooling/Heating mode.	Querying by press remote controller
FC	Limiting/Reducing frequency for High power consumption protection.	Querying by press remote controller
FE	Limiting/Reducing frequency for Module current protection (phase current of compressor).	Querying by press remote controller
FF	Limiting/Reducing frequency for Module temperature protection.	Querying by press remote controller
FH	Limiting/Reducing frequency for Compressor driving protection.	Querying by press remote controller
FP	Limiting/Reducing frequency for anti-condensation protection..	Querying by press remote controller
FU	Limiting/Reducing frequency for anti-frost protection.	Querying by press remote controller
Fj	Limiting/Reducing frequency for Discharge over temperature protection.	Querying by press remote controller
Fn	Limiting/Reducing frequency for ODU AC Current protection.	Querying by press remote controller
Fy	Gas leakage protection	Please check the troubleshooting for detail.
bf	TVOC sensor failure(IDU failure, optional)	Querying by press remote controller
bc	PM2.5 sensor failure(IDU failure, optional)	Querying by press remote controller
bj	Humidity sensor failure. (IDU failure)	Querying by press remote controller

4.2.5.Failures Not Caused by Errors

1. If your air conditioner fails to function normally, please first check the following items before maintenance:

Problem	Cause	Corrective measure
The air conditioner can't run	If you turn off the unit and then turn it on immediately, in order to protect the compressor and avoid system overload, the compressor will delay operation for 3min.	Please wait for a while.
	Wire connection is wrong	Connect the wires according to the wiring diagram.
	Fuse of circuit breaker is broken	Replace the fuse or switch on the circuit breaker
	Power failure	Restart after power is resumed.
	Power plug is loose	Re-insert the power plug.
	The remote controller in lower batteries.	Replace batteries.
Bad cooling effect	The air inlet and outlet of indoor or outdoor unit been blocked.	Clear the obstacles and keep the indoor and outdoor units well ventilated.
	Improper temperature presetting	Reset a proper temperature.
	Indoor unit too low fan speed	Reset a proper fan speed.
	Air flow direction is not reasonable.	Change the direction of air louvers
	Doors or windows are opened	Close please.
	Exposed under direct sunshine.	Suggest to put on curtains in front of the windows.
	Too many heat sources in the room	Remove unnecessary heat sources.
	Filter is blocked or too dirty.	Clean the filter.

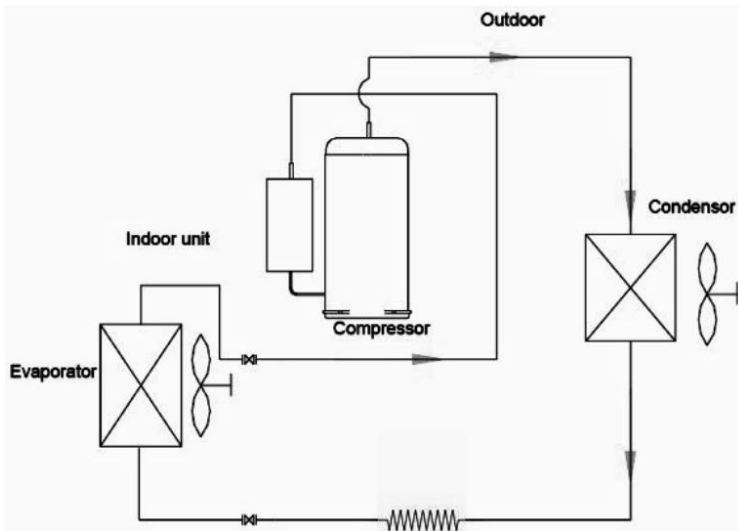
2. The following situations are not operation failures.

phenomenon	Time of occurrence	cause
Mist comes from the air conditioner	During operation	If the unit is running under high humidity, the wet air in the room will be quickly cooled down.
The air conditioner generates some noise	The air conditioner is buzzing at the beginning of operation	Temperature controller will be buzzing when it starts working, the noise will become weak 1min later.
Dust comes from the air conditioner	When the unit is turned on, it purrs	When the system is just started, the refrigerant is not stable, about 30s later, the purr of the unit becomes low.
	There is hissing sound when the unit is started or stopped and a slight hissing sound during and after operation.	It's the sound of gaseous refrigerant that stops flowing and sound of drainage system.
	There is a sound of crunching during and after operation.	Because of temperature change, front panel and other components may be

		swelled up and cause abrasion sound.
	The unit starts operation after being unused for a long time.	Dust inside the indoor unit comes out together with the air.
The air conditioner generates some smell.	During operation.	The room or the smell of cigarette comes out through the indoor unit.

4.3. Maintenance

4.3.1. System Diagram



4.3.2. Maintenance of Major Components

Maintenance

1). Inspections before maintenance.

(1) Inspection of maintenance environment

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

(2) Inspection of maintenance equipment

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

2) Inspection of air conditioner

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

3). Leak inspection before maintenance

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

Warning

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

4). Safety principles during the maintenance

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

5). Requirements for the site of maintenance-station

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

6). Requirements for fill the refrigerants

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

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

7). In-maintenance welding

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

8). Maintenance of electrical components

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

Warning

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

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

9). Emergency Accident Handling

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

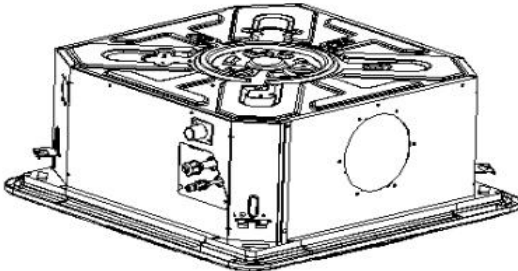
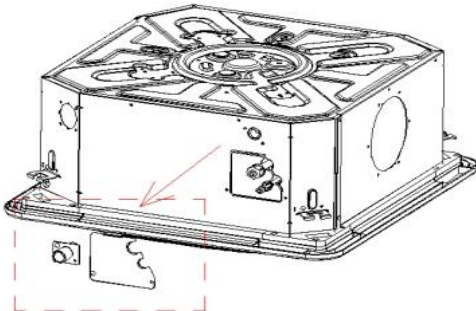
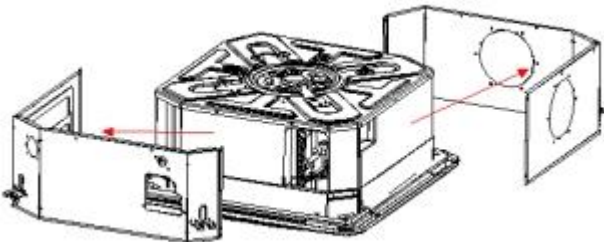
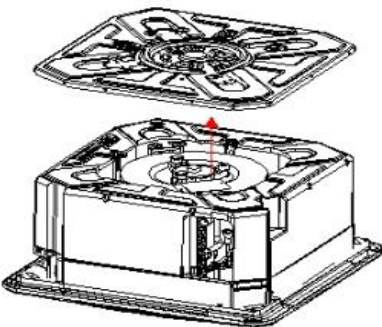
Handling suggestions when a large amount of combustible refrigerant leaks:

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

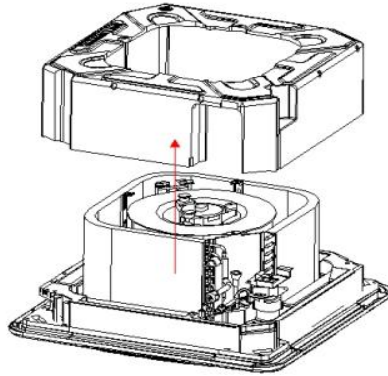
It is necessary to use nitrogen for blowing the site, especially the low-lying positions, clear away the residual combustible refrigerant gas from any area nearby and surrounding the leak point and use a handheld detector for detection and not clear the alarm until the concentration of refrigerant is zero.

4.3.3. Removal of Major Components

IDU Assembly

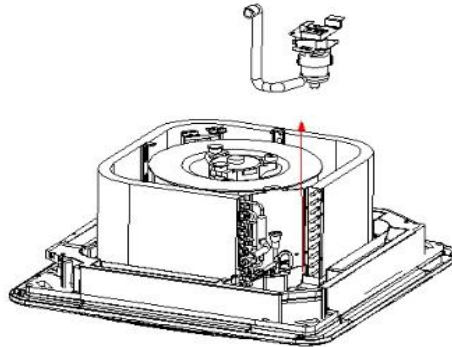
CASSETTE	
STEPS	PICTURES
1. Pre-disassembly state	
Pre disassembly	
2. Remove seal plate and drain spout	
A. Disassemble the seal plate B. Remove the drain spout	
3. Remove the front and rear fascia assembly	
A. Unfix screws and hooks of base plate, the front and rear panel assembly, and remove the front and rear fascia assembly from unit.	
4. Dismantal the base assembly	
The chassis components can be removed by removing the fixing screws between the base foam part, evaporator fix plate and base assembly.	
5. Remove the base foam assembly	

Remove the base foam assembly according to the direction shown as the red arrow.



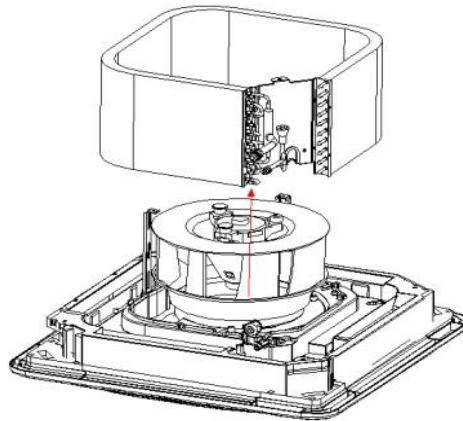
6. Disassemble the water pump assembly.

According to the direction shown as arrow to take the water pump out.



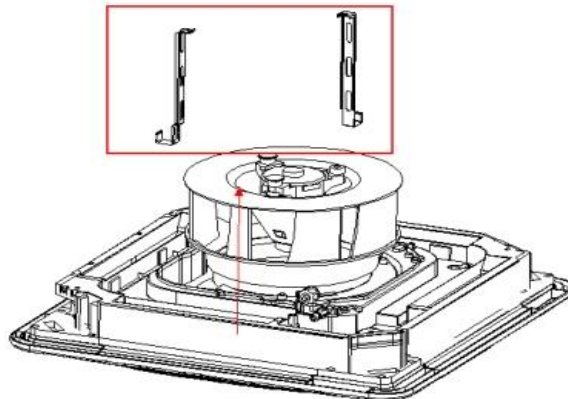
7. Dismantal the evaporator assembly

Shown as arrow to take the evaporator out.

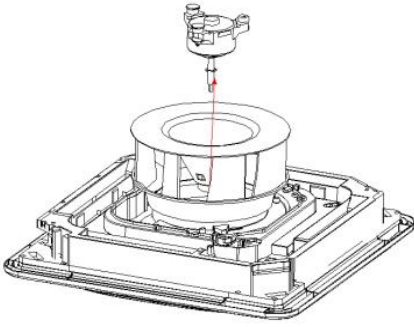
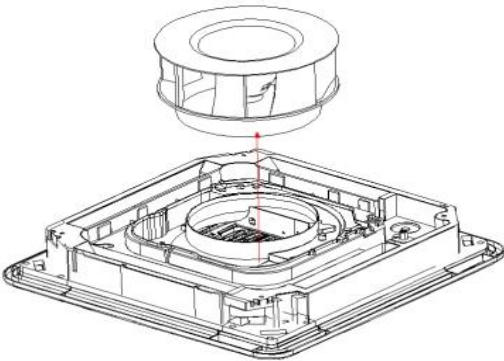
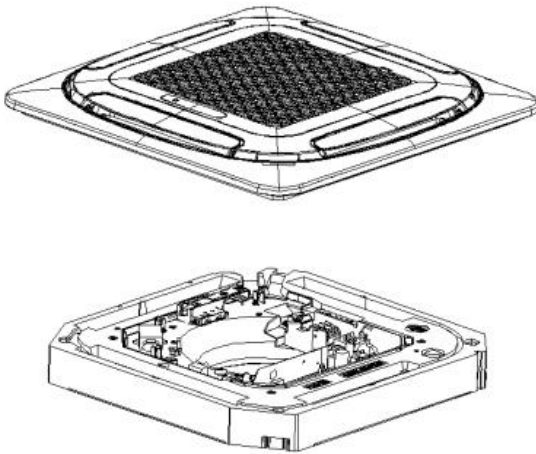
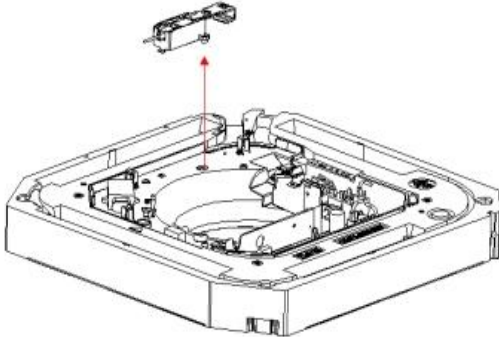


8. Remove the evaporator fixing plates

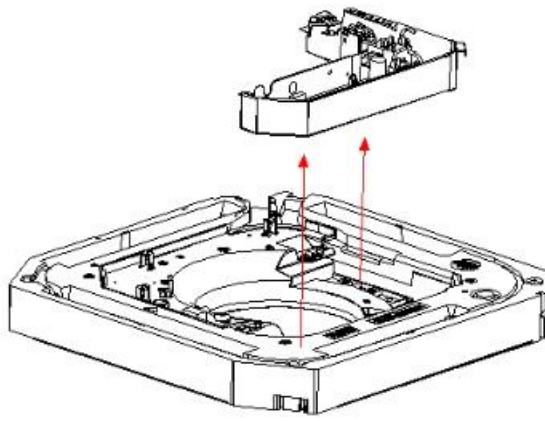
According to the direction shown as photo to remove the fixing plates.



9. disassemble the DC motor

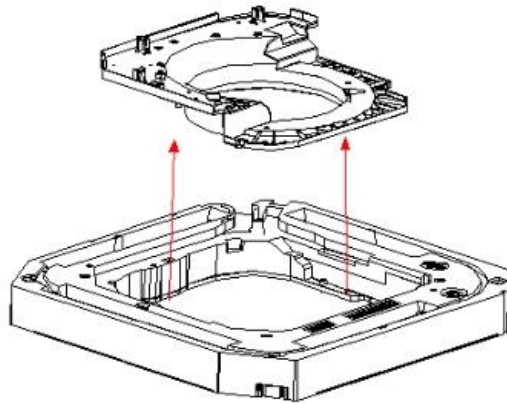
Disassemble the DC motor as photo.	
10. Remove centrifugal fan	
Take the centrifugal fan out as photo.	
11. Remove the panel assembly	
Unfix screws btw panel & drainage assembly, take the panel assembly out.	
12. Remove USB/WI-FI module.	
Unfix screw btw USB/WI-FI module and Air guide part. Take the module out.	
13. Remove the electric box assembly	

Unfix screws btw the electric control box , the water tray assembly and the air guide in the direction shown in the figure, and remove the electric control box assembly



14. Disassemble the air guide parts

Unfix screws btw the guide parts and water tray, and take the air guide parts out.



CEILING FLOOR	
STEPS	PICTURES
1. Before disassemble	
The appearance of unit.	
2. Remove the front grille	

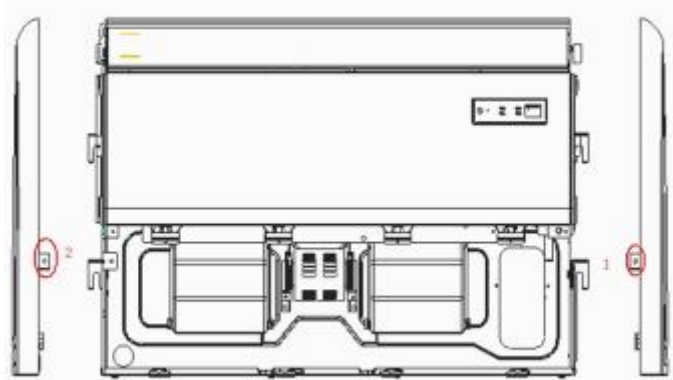
A. Remove screws by pushing the buckles in the direction of photo.

B. Open the grille and from the back snap hook to remove the grille.



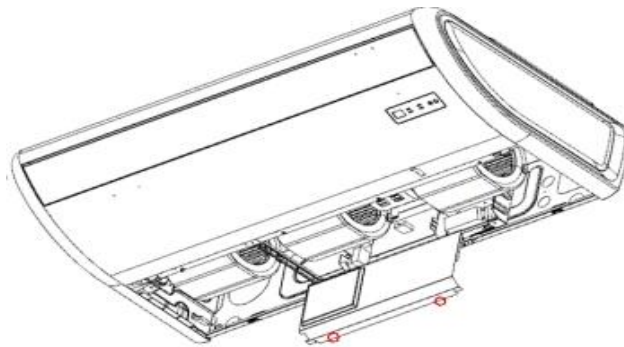
3. dismantle the left and right side plate.

Along with the illustration unfix the screws, and remove the left and right side blocks from the snap hooks.



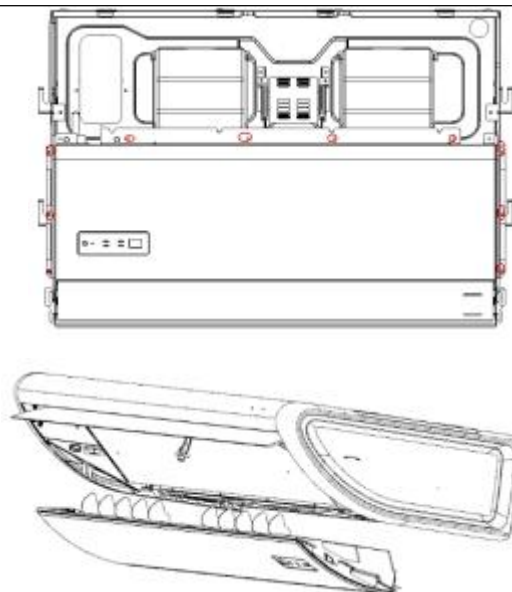
4. Remove the electronic control box assembly

Unscrew the screws shown as photo and remove the electronic control cover plate



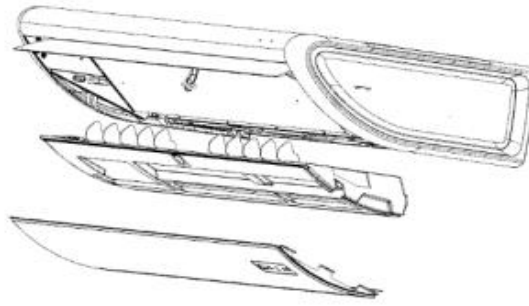
5. Remove the front panel assembly

Unfix screws of the front panel screws as shown, and then take the panel assembly out.



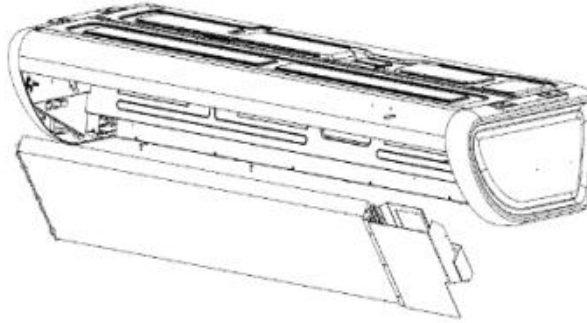
6. Remove the water tray.

Take the water tray out shown as illustration



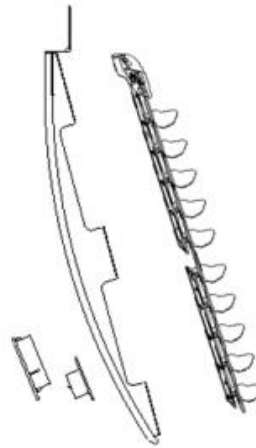
7. Remove the evaporator assembly

Take the evaporator out shown as illustration



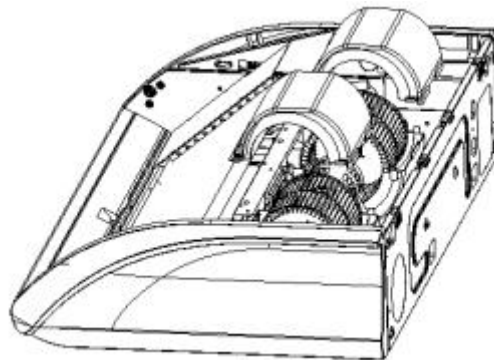
8. Remove the display panel and vane assembly

Take the the display panel and vane assembly out as photo.



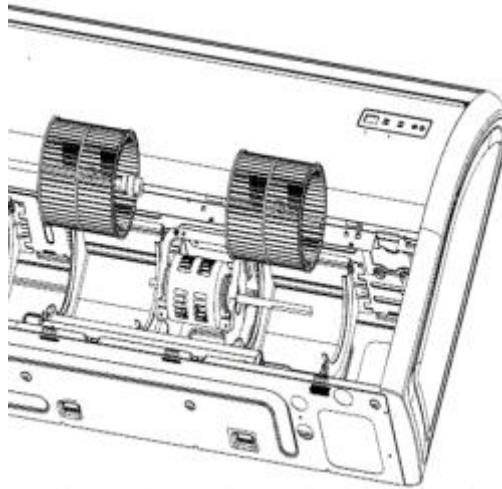
9. Remove the volute parts

Shown as illustration



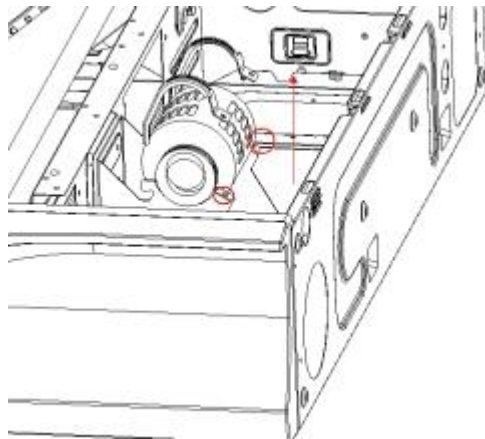
10. Disassemble the centrifugal fan

Take the centrifugal fans out as illustration



11. Dismantal the fan motor

Take out the fan motor refering to the picture.



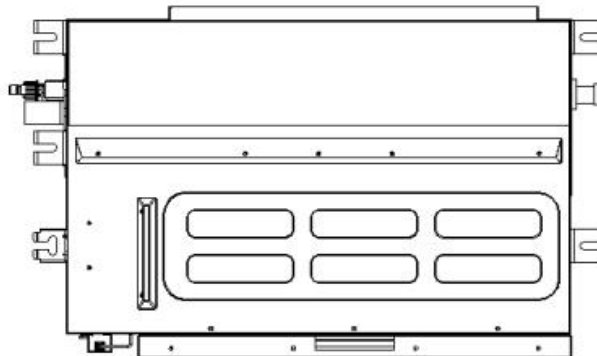
DUCT

STEPS

PICTURES

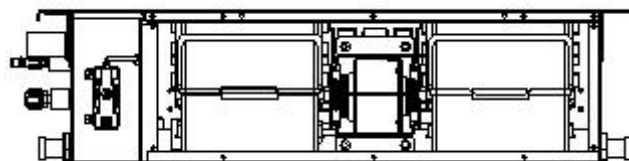
1. Before disassemble

The appearance of unit.



2. Dismantal the filter assembly

- A. Dismantal the filter assembly
- B. Take the filter out.

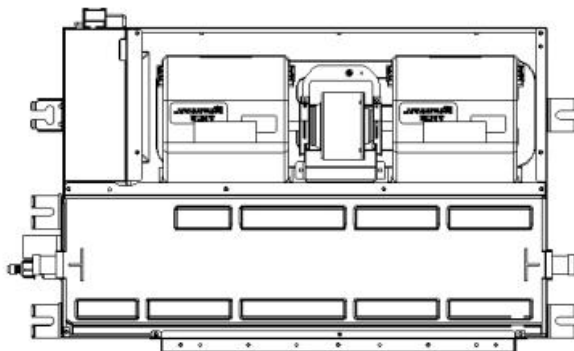


3. Disassemble the base part, air return plate

A. The base part can be removed by unfixing screws btw it with the left and right side panels, and the center partition.

B. Remove the screws between the air return plate, the left side plate, and the electric control box, remove the air return plate.

C. Remove the Wi-Fi fixing cover and take the USB connection cable out.



4. Dismantal the front panel assembly.

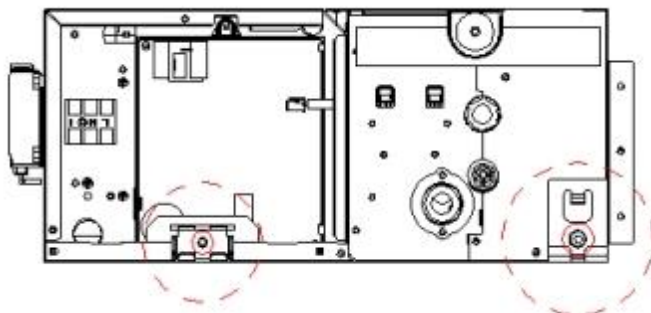
Unfix screws of the front panel and take the assembly out.



5. Remove the electrical box cover and hooks

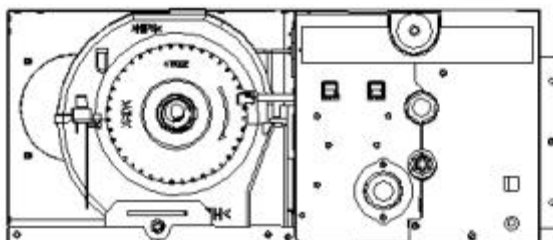
A. Unfix screws on the electrical box cover and take the cover out.

B. Unfix screws on the hooks and take the hooks out.



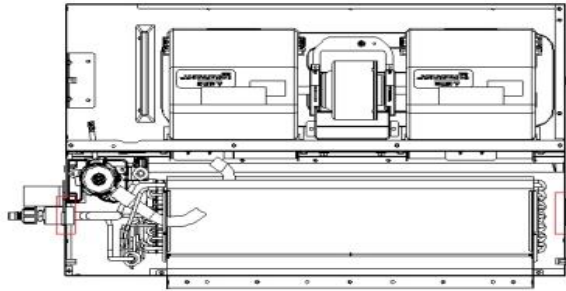
6. Remove the electric control box assembly

Unfix screws on the the electric control box, and take the electric control box out.



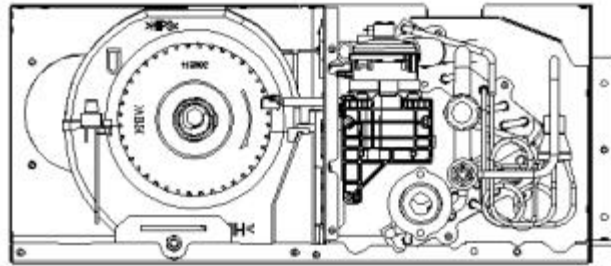
7. Remove the water tray assembly.

After removing the base plate, lift up the drain nozzles on both sides to take the water tray out.



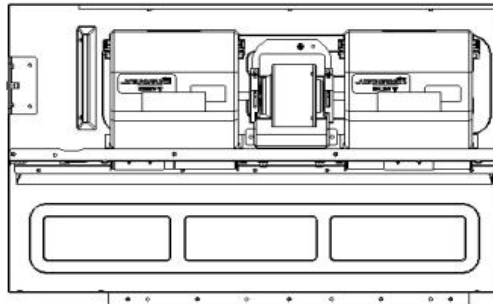
8. disassemble the right side plate, drainage mounting assembly

A. Unfix screws between the right side plate and the evaporator end plate, the top plate, the drain mounting assembly, remove the right side plate.
B. Remove the drain nozzle on the drain mounting assembly, then take the assembly out.



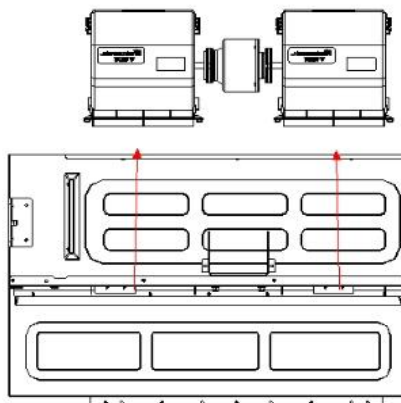
9. Remove the water pump assembly, evaporator module and left side panel parts

A. Unfix screws btw the water pump assembly and center divider, take the water pump assembly out.
B. Unfix screws btw the evaporator module and left side panel assembly, take the left side panel out.
C. Unfix screws btw the left side panel part and top panel, the center partition, take the left side panel part out.



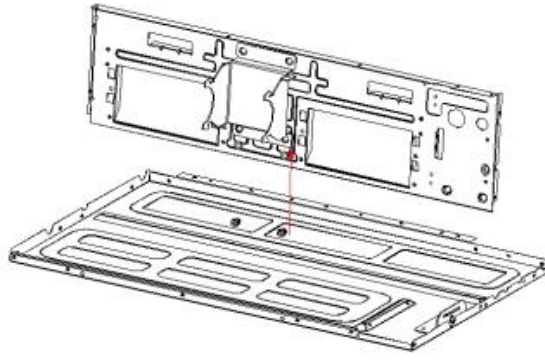
10. Remove centrifugal fan volute assembly and DC motor

Remove the motor limit clasp, then take the volute assembly and DC motor out in the direction shown as illustration.

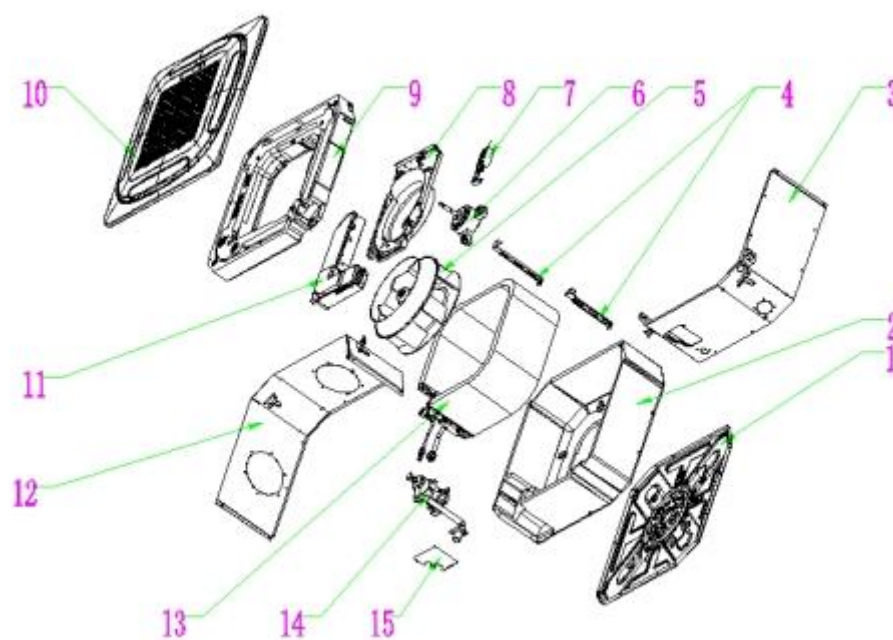


11. Remove the center divider assembly

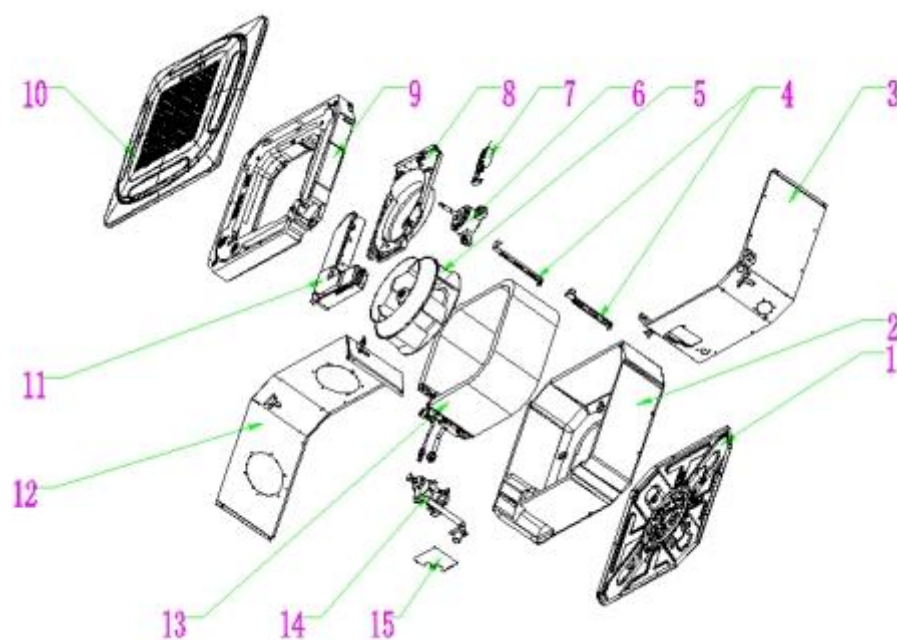
Unfix screws btw the center divider assembly and top cover, take the center divider out.



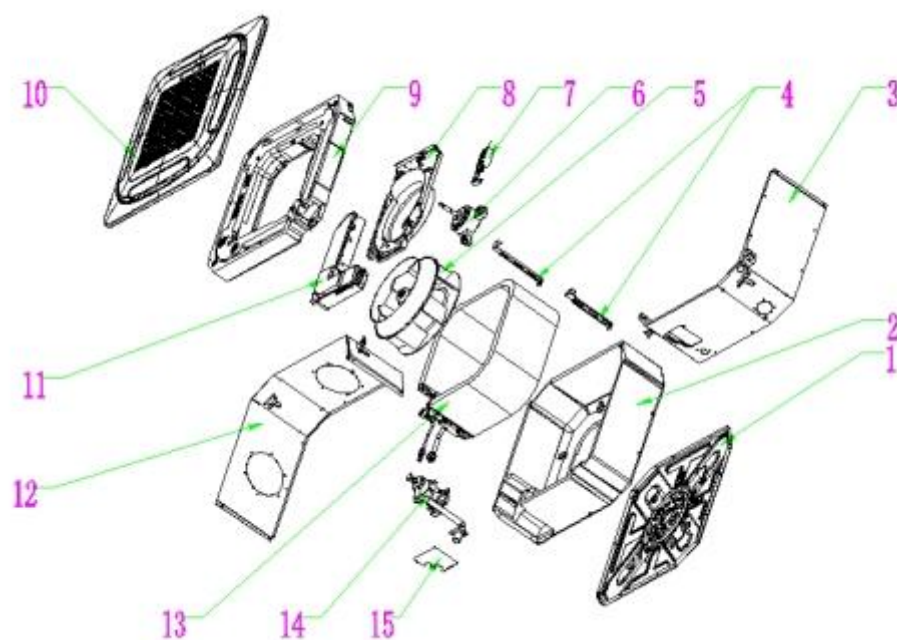
4.3.4. Explosive View and Lists of Parts



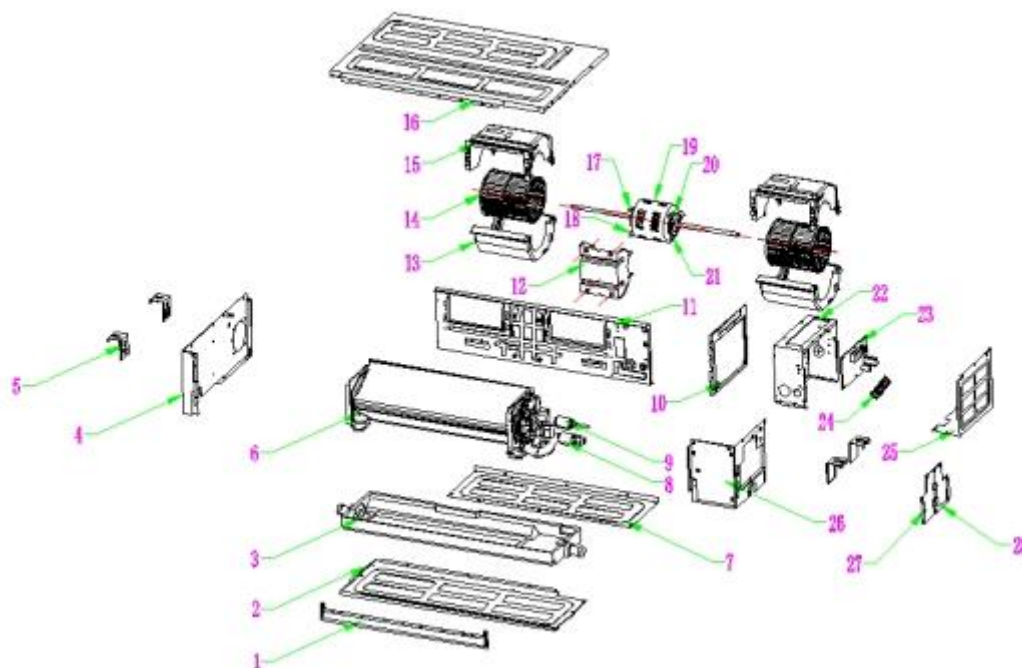
CASSETTE-9K CASSETTE-12K				
No.	Part No.	Part Name	Q'ty	Remark
1		base	1	
2		base foam	1	
3		dash panel	1	
4		fixed plate	1	
5		centrifugal fan	1	
6		dc motor	1	
7		WIFI module	1	
8		Wind deflector	1	
9		water pans	1	
10		panel	1	
11		Electronic box cover	1	
12		back surround plate	1	
13		evaporator	1	
14		Water pump component	1	
15		Outlet tube sealing plate assembly	1	
16		base carton	1	Not shown in Explosion view
17		carton	1	Not shown in Explosion view
18		packing foam	1	Not shown in Explosion view
19		packing foam	1	Not shown in Explosion view



CASSETTE-18K				
No.	Part No.	Part Name	Q'ty	Remark
1		base	1	
2		base foam	1	
3		dash panel	1	
4		fixed plate	1	
5		centrifugal fan	1	
6		dc motor	1	
7		WIFI module	1	
8		Wind deflector	1	
9		water pans	1	
10		panel	1	
11		Electronic box cover	1	
12		back surround plate	1	
13		evaporator	1	
14		Water pump component	1	
15		Outlet tube sealing plate assembly	1	
16		base carton	1	Not shown in Explosion view
17		carton	1	Not shown in Explosion view
18		packing foam	1	Not shown in Explosion view
19		packing foam	1	Not shown in Explosion view

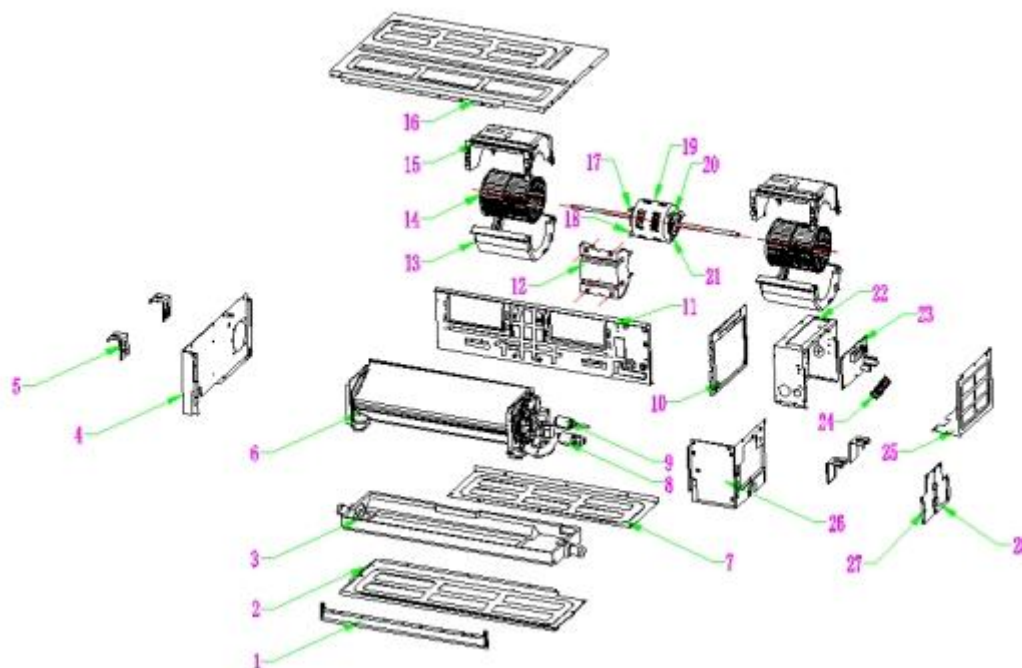


CASSETTE-24K				
No.	Part No.	Part Name	Q'ty	Remark
1		base	1	
2		base foam	1	
3		dash panel	1	
4		fixed plate	1	
5		centrifugal fan	1	
6		dc motor	1	
7		WIFI module	1	
8		Wind deflector	1	
9		water pans	1	
10		panel	1	
11		Electronic box cover	1	
12		back surround plate	1	
13		evaporator	1	
14		Water pump component	1	
15		Outlet tube sealing plate assembly	1	
16		base carton	1	Not shown in Explosion view
17		carton	1	Not shown in Explosion view
18		Packing foam	4	Not shown in Explosion view
19		Packing foam	2	Not shown in Explosion view
20		Packing foam	1	Not shown in Explosion view
21		Packing foam	1	Not shown in Explosion view



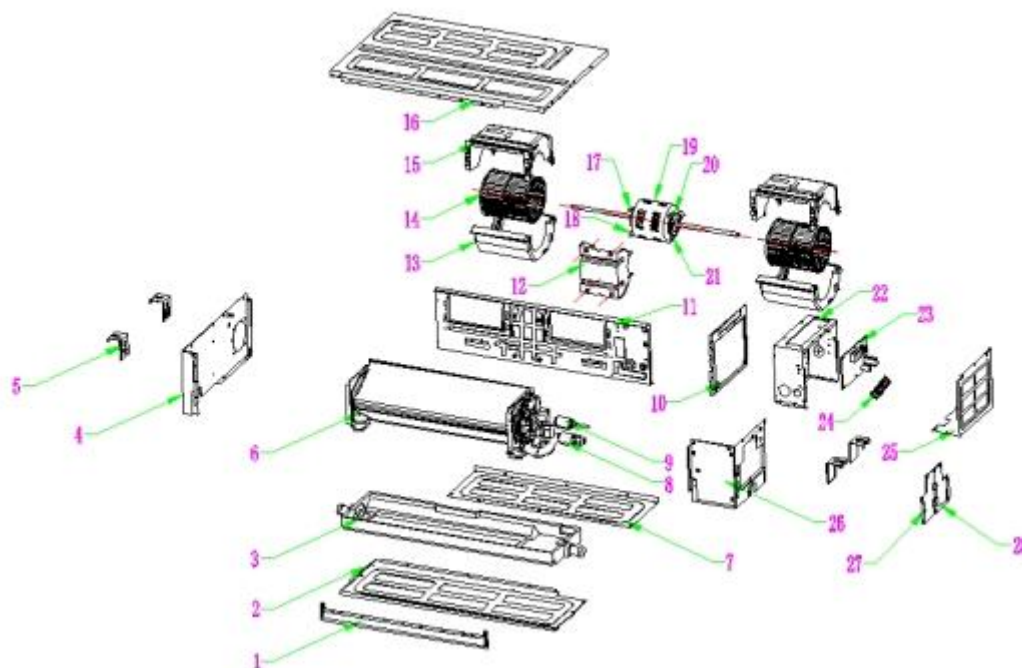
DUCT-9K DUCT-12K				
No.	Part No.	Part Name	Q'ty	Remark
1		Front panel assembly	1	
2		Base	1	
3		Water pan assembly	1	
4		Left plate assembly	1	
5		Hook	4	
6		Evaporator	1	
7		Return air plate	1	
8		Evaporator output tube assembly	1	
9		Evaporator input tube assembly	1	
10		Electric control box mounting plate	1	
11		Middle metal panel assembly	1	
12		Motor mount	1	
13		Down volute	1	
14		Centrifugal fan	1	
15		Up volute	1	
16		Top cover	1	
17		Motor buckle upper left	1	
18		Motor buckle assembly bottom left	1	
19		Fan motor	1	
20		Motor buckle upper right	2	
21		Motor buckle assembly bottom right		
22		Electrical box	1	
23		Main PCB	1	
24		Terminal	1	
25		Electrical box cover	1	
26		Right plate	1	
27		Tube sealing plate assembly	1	

28		Drainpipe mounting plate assembly	1	
29		Packing foam	1	Not shown in Explosion view
30		Packing foam	1	Not shown in Explosion view
31		Carton	1	Not shown in Explosion view
32		Base carton	1	Not shown in Explosion view
33		Bubble film	1	Not shown in Explosion view



DUCT-18K				
No.	Part No.	Part Name	Q'ty	Remark
1		Front panel assembly	1	
2		Base	1	
3		Water pan assembly	1	
4		Left plate assembly	1	
5		Hook	1	
6		Evaporator	1	
7		Return air plate	1	
8		Evaporator output tube assembly	1	
9		Evaporator input tube assembly	1	
10		Electric control box mounting plate	1	
11		Middle metal panel assembly	1	
12		Motor mount	1	
13		Down volute	2	
14		Centrifugal fan	2	
15		Up volute	2	
16		Top cover	1	
17		Motor buckle upper left	1	
18		Motor buckle assembly bottom left	1	
19		Fan motor	1	
20		Motor buckle upper right	1	
21		Motor buckle assembly bottom right	1	
22		Electrical box	1	
23		Main PCB	1	
24		Terminal	1	
25		Electrical box cover	1	

26		Right plate	1	
27		Tube sealing plate assembly	1	
28		Drainpipe mounting plate assembly	1	
29		Packing foam	1	Not shown in Explosion view
30		Packing foam	1	Not shown in Explosion view
31		Carton	1	Not shown in Explosion view
32		Base carton	1	Not shown in Explosion view
33		Bubble film	1	Not shown in Explosion view



DUCT-24K				
No.	Part No.	Part Name	Q'ty	Remark
1		Front panel assembly	1	
2		Base	1	
3		Water pan assembly	1	
4		Left plate assembly	1	
5		Hook	4	
6		Evaporator	1	
7		Return air plate	1	
8		Evaporator output tube assembly	1	
9		Evaporator input tube assembly	1	
10		Electric control box mounting plate	1	
11		Middle metal panel assembly	1	
12		Motor mount	1	
13		Down volute	2	
14		Centrifugal fan	2	
15		Up volute	2	
16		Top cover	1	
17		Motor buckle upper left	1	
18		Motor buckle assembly bottom left	1	
19		Fan motor	1	
20		Motor buckle upper right	1	
21		Motor buckle assembly bottom right	1	
22		Electrical box	1	
23		Main PCB	1	

24		Terminal	1	
25		Electrical box cover	1	
26		Right plate	1	
27		Tube sealing plate assembly	1	
28		Drainpipe mounting plate assembly	1	
29		Packing foam	1	Not shown in Explosion view
30		Packing foam	1	Not shown in Explosion view
31		Carton	1	Not shown in Explosion view
32		Base carton	1	Not shown in Explosion view
33		Bubble film	1	Not shown in Explosion view

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23		Water pan assembly	1	
24		Step Motor	1	
25		Step motor	1	
26		Evaporator left seal assembly	1	
27		Right side panel	1	

5. Appendices

5.1. Resistance/Temperature Lists of Temperature Sensors

Temp				Temp				Temp			
resistance(KΩ)				resistance(KΩ)				resistance(KΩ)			
(°C)	Rmax	R(t) Normal	Rmin	(°C)	Rmax	R(t) Normal	Rmin	(°C)	Rmax	R(t) Normal	Rmin
-30	68.080	64.104	60.343	20	6.223	6.083	5.945	70	1.112	1.073	1.035
-29	64.375	60.666	57.157	21	5.977	5.846	5.716	71	1.079	1.041	1.004
-28	60.870	57.413	54.139	22	5.742	5.620	5.498	72	1.047	1.010	0.974
-27	57.579	54.355	51.301	23	5.518	5.404	5.290	73	1.016	0.980	0.944
-26	54.487	51.480	48.630	24	5.305	5.198	5.091	74	0.988	0.952	0.917
-25	51.582	48.776	46.115	25	5.100	5.000	4.900	75	0.959	0.924	0.890
-24	48.850	46.232	43.748	26	4.909	4.811	4.713	76	0.931	0.897	0.864
-23	46.279	43.836	41.517	27	4.727	4.630	4.533	77	0.904	0.871	0.839
-22	43.861	41.581	39.415	28	4.552	4.457	4.362	78	0.879	0.846	0.814
-21	41.585	39.456	37.432	29	4.386	4.292	4.199	79	0.854	0.822	0.791
-20	39.462	37.473	35.581	30	4.225	4.133	4.042	80	0.830	0.799	0.769
-19	37.421	35.565	33.798	31	4.072	3.982	3.892	81	0.807	0.776	0.746
-18	35.519	33.785	32.134	32	3.925	3.836	3.748	82	0.784	0.754	0.725
-17	33.725	32.105	30.561	33	3.784	3.697	3.611	83	0.762	0.733	0.705
-16	32.033	30.520	29.077	34	3.649	3.564	3.479	84	0.742	0.713	0.685
-15	30.437	29.023	27.673	35	3.520	3.436	3.353	85	0.721	0.693	0.666
-14	28.931	27.609	26.347	36	3.395	3.313	3.232	86	0.701	0.674	0.647
-13	27.508	26.273	25.092	37	3.275	3.195	3.116	87	0.682	0.655	0.629
-12	26.165	25.010	23.905	38	3.161	3.082	3.004	88	0.664	0.638	0.613
-11	24.896	23.816	22.782	39	3.051	2.974	2.898	89	0.646	0.620	0.595
-10	23.697	22.687	21.720	40	2.946	2.870	2.795	90	0.629	0.604	0.580
-9	22.562	21.618	20.713	41	2.844	2.770	2.697	91	0.611	0.587	0.563
-8	21.490	20.607	19.759	42	2.748	2.675	2.604	92	0.596	0.572	0.549
-7	20.475	19.649	18.855	43	2.654	2.583	2.513	93	0.580	0.557	0.534
-6	19.515	18.742	17.999	44	2.564	2.494	2.426	94	0.565	0.542	0.520
-5	18.606	17.883	17.187	45	2.478	2.410	2.343	95	0.550	0.528	0.506
-4	17.745	17.068	16.416	46	2.395	2.328	2.263	96	0.536	0.514	0.493
-3	16.930	16.296	15.685	47	2.315	2.250	2.186	97	0.522	0.501	0.480
-2	16.156	15.563	14.991	48	2.238	2.174	2.111	98	0.509	0.488	0.468
-1	15.423	14.868	14.332	49	2.164	2.102	2.041	99	0.497	0.476	0.456
0	14.792	14.270	13.766	50	2.093	2.032	1.972	100	0.484	0.464	0.444
1	14.069	13.582	13.111	51	2.025	1.965	1.906	101	0.472	0.452	0.433
2	13.443	12.987	12.546	52	1.959	1.901	1.844	102	0.460	0.441	0.422
3	12.849	12.422	12.008	53	1.896	1.839	1.783	103	0.449	0.430	0.412
4	12.284	11.885	11.497	54	1.835	1.779	1.724	104	0.437	0.419	0.401
5	11.749	11.375	11.012	55	1.776	1.721	1.668	105	0.427	0.409	0.391
6	11.239	10.889	10.548	56	1.719	1.666	1.614	106	0.416	0.399	0.381
7	10.756	10.428	10.109	57	1.665	1.613	1.562	107	0.406	0.388	0.372

8	10.295	9.988	9.689	58	1.613	1.562	1.512	108	0.395	0.379	0.362
9	9.858	9.570	9.289	59	1.562	1.512	1.463	109	0.386	0.369	0.353
10	9.441	9.172	8.909	60	1.514	1.465	1.417	110	0.376	0.360	0.344
11	9.044	8.792	8.545	61	1.467	1.419	1.372	111	0.367	0.351	0.335
12	8.667	8.431	8.199	62	1.421	1.374	1.328	112	0.357	0.342	0.327
13	8.308	8.087	7.870	63	1.378	1.332	1.287	113	0.349	0.333	0.319
14	7.965	7.758	7.554	64	1.336	1.291	1.247	114	0.340	0.325	0.311
15	7.639	7.445	7.254	65	1.295	1.251	1.208	115	0.332	0.317	0.303
16	7.329	7.147	6.968	66	1.256	1.213	1.171	116	0.324	0.309	0.296
17	7.032	6.862	6.694	67	1.218	1.176	1.135	117	0.316	0.302	0.288
18	6.749	6.590	6.433	68	1.181	1.140	1.100	118	0.308	0.294	0.281
19	6.480	6.331	6.183	69	1.146	1.106	1.067	119	0.301	0.287	0.274
								120	0.293	0.280	0.268

1、Outdoor unit sensor temperature characteristics

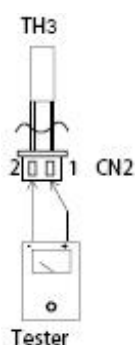
TEMP. ℃(°F)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. ℃(°F)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. ℃(°F)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)
-30(-86)	283.3	322.9	367.7	24(75.2)	19.36	20.89	22.52	78(172.4)	2.563	2.654	2.745
-29(-84.2)	267.4	304.4	346.3	25(77)	18.55	20	21.54	79(174.2)	2.481	2.567	2.654
-28(-82.4)	252.5	287.1	307.4	26(78.8)	17.77	19.14	20.6	80(176)	2.402	2.484	2.567
-27(-89.6)	238.5	270.9	307.4	27(89.6)	17.03	18.32	19.7	81(177.8)	2.327	2.404	2.483
-26(-78.8)	225.4	255.7	289.8	28(82.4)	16.32	17.55	18.85	82(179.6)	2.254	2.327	2.401
-25(-77)	213.1	241.4	273.3	29(84.2)	15.65	16.81	18.04	83(181.4)	2.183	2.253	2.323
-24(-75.2)	201.5	228	257.9	30(86)	15	16.1	17.27	84(183.2)	2.115	2.182	2.248
-23(-73.4)	190.6	215.5	243.4	31(87.8)	14.39	15.43	16.54	85(185)	2.05	2.113	2.176
-22(-71.6)	180.3	203.6	229.8	32(89.6)	13.81	14.79	15.34	86(186.8)	1.985	2.047	2.109
-21(-69.8)	170.7	192.5	217	33(91.4)	13.25	14.18	15.17	87(188.6)	1.922	1.983	2.045
-20(-68)	161.6	182.1	205	34(93.2)	12.72	13.6	14.54	88(190.4)	1.861	1.922	1.983
-19(-66.2)	153.1	172.3	193.7	35(95)	12.21	13.05	13.93	89(192.2)	1.802	1.862	1.923
-18(-64.4)	145	163.1	183.2	36(96.8)	11.72	12.52	13.36	90(194)	1.746	1.805	1.865
-17(-62.6)	137.5	154.4	173.2	37(98.6)	11.26	12.01	12.81	91(195.8)	1.692	1.75	1.809
-16(-60.8)	130.3	146.2	163.9	38(100.4)	10.82	11.53	12.29	92(197.6)	1.639	1.697	1.755
-15(-59)	123.6	138.5	155.1	39(102.2)	10.29	11.07	11.78	93(199.4)	1.589	1.646	1.703
-14(-57.2)	117.3	131.3	146.8	40(104)	9.986	10.63	11.31	94(201.2)	1.54	1.596	1.653
-13(-55.4)	111.3	124.4	139	41(105.8)	9.6	10.21	10.85	95(203)	1.493	1.549	1.604
-12(-53.6)	105.6	118	131.7	42(107.6)	9.231	9.813	10.42	96(204.8)	1.448	1.502	1.558
-11(-51.8)	100.3	111.9	124.7	43(109.4)	8.878	9.43	10	97(206.6)	1.404	1.458	1.512
-10(-50)	95.24	106.2	118.2	44(111.2)	8.54	9.064	9.612	98(208.4)	1.362	1.415	1.469
-9(-48.2)	90.49	100.8	112.1	45(113)	8.217	8.714	9.233	99(210.2)	1.321	1.373	1.426
-8(-46.4)	85.99	95.68	106.3	46(114.8)	7.908	8.38	8.872	100(212)	1.284	1.335	1.387
-7(44.6)	81.75	90.86	100.8	47(116.6)	7.612	8.06	8.526	101(213.8)	1.245	1.296	1.348
-6(-42.8)	77.74	86.31	95.74	48(118.4)	7.328	7.754	8.196	102(215.6)	1.209	1.258	1.309
-5(-41)	73.94	82.01	90.88	49(120.2)	7.057	7.461	7.88	103(217.4)	1.173	1.222	1.272
-4(-39.2)	70.35	77.95	86.29	50(122)	6.797	7.18	7.578	104(219.2)	1.139	1.187	1.236
-3(37.4)	66.96	74.11	81.96	51(123.8)	6.548	6.912	7.289	105(221)	1.105	1.153	1.202
-2(-35.6)	63.74	70.48	77.87	52(125.6)	6.309	6.655	7.013	106(222.8)	1.073	1.12	1.168

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-1(-33.8)	60.69	67.05	74	53(127.4)	6.08	6.409	6.748	107(224.6)	1.042	1.089	1.136
0(32)	57.81	63.8	70.34	54(129.2)	5.861	6.173	6.495	108(226.4)	1.013	1.058	1.104
1(33.8)	55.08	60.72	66.88	55(131)	5.651	5.947	6.253	109(228.2)	0.9833	1.028	1.074
2(35.6)	52.49	57.81	63.61	56(132.8)	5.449	5.73	6.02	110(230)	0.9553	0.9997	1.045
3(37.4)	50.03	55.05	60.52	57(134.6)	5.255	5.522	5.798	111(231.8)	0.9283	0.9719	1.016
4(39.2)	47.71	52.44	57.59	58(136.4)	5.07	5.323	5.585	112(233.6)	0.9021	0.9451	0.9892
5(41)	45.5	49.97	54.82	59(138.2)	4.891	5.132	5.381	113(235.4)	0.8765	0.9191	0.9626
6(42.8)	43.41	47.62	52.2	60(140)	4.72	4.949	5.101	114(237.2)	0.8524	0.894	0.9367
7(44.6)	41.42	45.4	49.71	61(141.8)	4.556	4.774	4.997	115(239)	0.8087	0.8595	0.9117
8(46.4)	39.53	43.2	42.33	62(143.6)	4.398	4.605	4.817	116(240.8)	0.8059	0.8461	0.8875
9(48.2)	37.74	41.29	45.12	63(145.40)	4.247	4.448	4.644	117(242.6)	0.7837	0.8233	0.8641
10(50)	36.04	39.39	43.01	64(147.2)	4.101	4.288	4.479	118(244.4)	0.7623	0.8012	0.8413
11(51.8)	34.42	37.59	41	65(149)	3.961	4.139	4.32	119(246.2)	0.7415	0.7798	0.8193
12(53.6)	32.89	35.87	39.1	66(150.8)	3.827	3.995	4.167	120(248)			
13(55.4)	31.43	34.25	37.29	67(152.6)	3.698	3.858	4.021	121(249.8)	0.702	0.7386	0.7773
14(57.2)	30.04	32.71	35.58	68(154.4)				122(251.6)	0.6631	0.7195	0.7572
15(59)	29.72	31.24	33.95	69(156.2)				123(253.4)	0.6649	0.7007	0.7378
16(60.8)				70(158)	3.339	3.476	3.616	124(255.2)	0.6472	0.6824	0.7189
17(62.6)				71(159.8)	3.229	3.359	3.491	125(257)	0.6301	0.6647	0.7006
18(64.4)	25.13	27.26	29.55	72(161.6)	3.122	3.246	3.372	126(258.8)	0.6135	0.6476	0.6829
19(66.2)	24.05	26.07	28.23	73(163.4)	3.02	3.138	3.257	127(260.6)	0.5974	0.6309	0.6657
20(68)	23.02	24.93	26.97	74(165.2)	2.921	3.033	3.146	128(262.4)	0.5818	0.6148	0.649
21(69.8)	22.04	23.84	25.77	75(167)	2.827	2.933	3.04	129(264.2)	0.5667	0.5991	0.6328
22(71.6)	21.1	22.81	24.63	76(168.8)	2.735	2.836	2.938	130(266)	0.5521	0.5839	0.6171
23(73.4)	20.21	21.83	23.55	77(170.6)	2.647	2.743	2.84				

R—Resistance

Resistance at 25°C(77°F):20 kΩ



TH3: Outdoor unit discharge pipe sensor

Before measuring resistance, disconnect connectors as shown above.

5.3. Refrigerant Notice/Concentration

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The maximum charge and the required minimum floor area

$$m_1 = (6m^3) \times LFL, m_2 = (52m^3) \times LFL, m_3 = (260m^3) \times LFL$$

Where LFL is the lower flammable limit in kg/m³, R454B LFL is 0.296kg/m³.

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

The maximum charge in a room shall be in accordance with the following:

$$m_{max} = 2.5 \times (LFL)^{5/4} \times h_0 \times (A)^{1/2}$$

The required minimum floor area A min to install an appliance with refrigerant charge M(kg)

shall be in accordance with following: $A_{min} = (M / (2.5 \times (LFL)^{5/4} \times h_0))^2$

Where:

Table GG.1 - Maximum charge (kg)

Category	LFL(kg/m3)	h0(m)	Floor area(m3)						
			4	7	10	15	20	30	50
R454B	0.296	1	0.6	1.04	1.48	2.11	2.44	2.99	3.86
		1.8	1.1	1.86	2.66	3.81	4.39	5.38	6.95
		2.2	1.3	2.28	3.26	4.65	5.37	6.58	8.49
		2.5	1.5	2.59	3.70	5.28	6.10	7.47	9.65

Table GG.2 - Minimum room area (m²)

Category	LFL(kg/m3)	h0(m)	Charge amount (M) (kg)						
			Minimum room area (m2)						
R454B	0.296		1.224kg	1.836kg	2.448kg	3.672kg	4.896kg	6.12kg	7.956kg
		0.6	/	31	56	126	223	349	590
		1	/	12	20	45	80	126	212
		1.8	/	7	9	14	25	39	66
		2.2	/	6	8	11	17	26	44

5.4. Operation Tools

The following tools will be used:

- 1) Liquid-level gauge; 2) Screwdriver; 3) Electric driven rotary hammer;
- 4) Drill; 5) Pipe expander; 6) Torque wrench; 7) Open-end wrench;
- 8) Pipe cutter; 9) Leak detector; 10) Vacuum pump; 11) Pressure gauge;
- 12) Universal meter; 13) Hexagon wrench; 14) Tapeline.

