



DELTA

Inspire Ultra Inverter S16

86HS050J248

86HS060J249

INSTRUCTION MANUAL

WARNING!

Read and follow all safety precautions in Instruction Manual - improper use can cause serious injury.

Preface

Inspire Ultra Inverter S16 Series adopt the advanced manufacturing technology and takes the environmental-friendly R410A as refrigerant, which is a green product in the 21st century. Please carefully read the manual before installation and operation.

- ◆ The total capacity of the indoor units which runs at the same time cannot exceed the capacity of the outdoor units; otherwise, the cooling (heating) effect of each indoor unit would be lower than the nominal capacity.
- ◆ Make sure that the manual is kept by the operators or serviceman.
- ◆ The refrigerant pipes and accessories must be designed exclusively for R410A.
- ◆ It is a normal phenomenon that the fan of indoor unit will still run for 20~70 seconds after the indoor unit receives the “stop” signal so as to make full use of the waste heat.
- ◆ When the work mode of the indoors is conflict with the modes of outdoor units, it will be indicated on the display of the wired controller in five seconds and then the indoor unit will stop. In this case, please harmonize their work modes: the cooling mode is compatible with the dry mode.
- ◆ If the supply power fails when the unit is running, then the indoor unit will send the “start” signal to the outdoor unit three minutes later after the power recovery.
- ◆ The power cable and transmission line must not be twisted together, but instead of separated with an interval of at least 2cm; otherwise it may be result in communication problem.
- ◆ This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.
- ◆ Cautions for the debugging and maintenance personnel:

During debugging and maintenance, before the startup of the compressor, it makes sure that the heater belt of the compressor has been energized for at least eight hours! Once the compressor is started, it must be guaranteed that it works continuously for at least 30 minutes, otherwise it would be damaged!



This product must not be disposed together with the domestic waste. This product has to be disposed at an authorized place for recycling of electrical and electronic appliances.

Thank you for purchasing Delta air conditioners. Before using, please read this manual carefully and keep it properly for further reference.

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1 Safety Precautions



Warning! : It indicates improper operation might lead to human casualty or sever injury



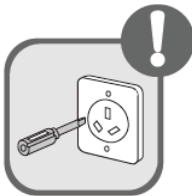
Caution! : It indicates that improper operation might lead to personal injury or property damage.



Follow this instruction to complete the installation work. Please carefully read this manual before unit startup and service.



Installation should be conducted by dealer or qualified personnel. Please do not attempt to install the unit by yourself. Improper handling may result in water leakage, electric shock or fire disaster etc.



Before installation, please check if the power supply is in accordance with the requirements specified on the nameplate. And also take care of the power safety.



Make sure the unit can be earthed properly and soundly after plugging into the socket so as to avoid electric shock. Please do not connect the ground wire to gas pipe, water pipe, lightning rod or telephone line.



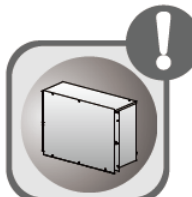
Be sure to use the exclusive accessory and part to prevent the water leakage, electric shock and fire accidents.



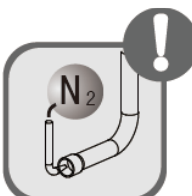
If refrigerant leakage happens during installation, please ventilate immediately. Poisonous gas will emerge if the refrigerant gas meets fire.



Wire size of power cord should be large enough. The damaged power cord and connection wire should be replaced by exclusive cable.



After connecting the power cord, please fix the electric box cover properly in order to avoid accident.



Never fail to comply with the nitrogen charge requirements. Charge nitrogen when welding pipes.



Never short-circuit or cancel the pressure switch to prevent unit damage.



Please firstly connect the wired controller before energization, otherwise wired controller can not be used.



Before using the unit, please check if the piping and wiring are correct to avoid water leakage, refrigerant leakage, electric shock, or fire etc.



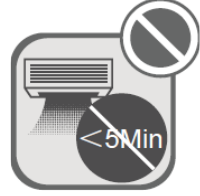
Do not insert fingers or objects into air outlet/inlet grille.



Open the door and window and keep good ventilation in the room to avoid oxygen deficit when the gas/oil supplied heating equipment is used.



Never start up or shut off the air conditioner by means of directly plug or unplug the power cord.



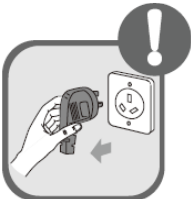
Turn off the unit after it runs at least five minutes; otherwise it will influence oil return of the compressor.



Do not allow children operate this unit.



Do not operate this unit with wet hands.



Turn off the unit or cut off the power supply before cleaning the unit, otherwise electric shock or injury may happen.



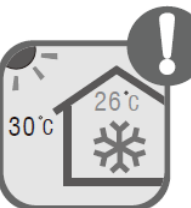
Never spray or flush water towards unit, otherwise malfunction or electric shock may happen.



Do not expose the unit to the moist or corrosive circumstances.



Electrify the unit 8 hours before operation. Please switch on for 8 hours before operation. Do not cut off the power when 24 hours short-time halting (to protect the compressor).



Under cooling mode, please don't set the room temperature too low and keep the temperature difference between indoor and outdoor unit within 5°C.



Volatile liquid, such as diluent or gas will damage the unit appearance. Only use soft cloth with a little neutral detergent to clean the outer casing of unit.



If anything abnormal happens (such as burning smell), please power off the unit and cut off the main power supply, and then immediately contact Delta appointed service center. If abnormality keeps going, the unit might be damaged and lead to electric shock or fire.



User is not allowed to repair the unit. Fault service may cause electric shock or fire accidents. Please contact Delta appointed service center for help.

Delta is not responsible of personal injury or equipment damage caused by improper installation and commission, unnecessary service and incapable of following the rules and instructions listed in the manual.

2 Attention for Installation

2.1 Precautions for R410A

- ◆ It is very strict that the refrigerant pipes should be clean and dry.
- ◆ The R410A is a mixed refrigerant, when add the refrigerant to the unit, it must keep the refrigerant in its liquid state. If the refrigerant is in gas state, the composition has been changed and the capability of the unit will decrease.
- ◆ When the refrigerant is leak out, please do not touch the leakage. Otherwise, it will result in frostbite.
- ◆ It does not support to let a lot of refrigerant go into the ambient atmosphere, because it will strengthen the green house effect. Otherwise, it will produce toxic gas when the refrigerant contacts with the fire.

2.2 Precaution for Installation

- ◆ The unit is so heavy that it is more than 110kg, so more than two persons will be needed to remove the unit. The package cannot bear it, so do not grasping it.
- ◆ When remove the units, please place the hands on the corner and take care not to hurt the hands by the fins.
- ◆ It is very likely to dispose the waste to the garbage bin after the installation.

2.3 Precaution for Operation Test

In order to protect the compressor from vibrating during transportation and 2 metal gaskets are used. They must be removed prior to commissioning and tied back the nut firmly; otherwise the unit might not be operated well.

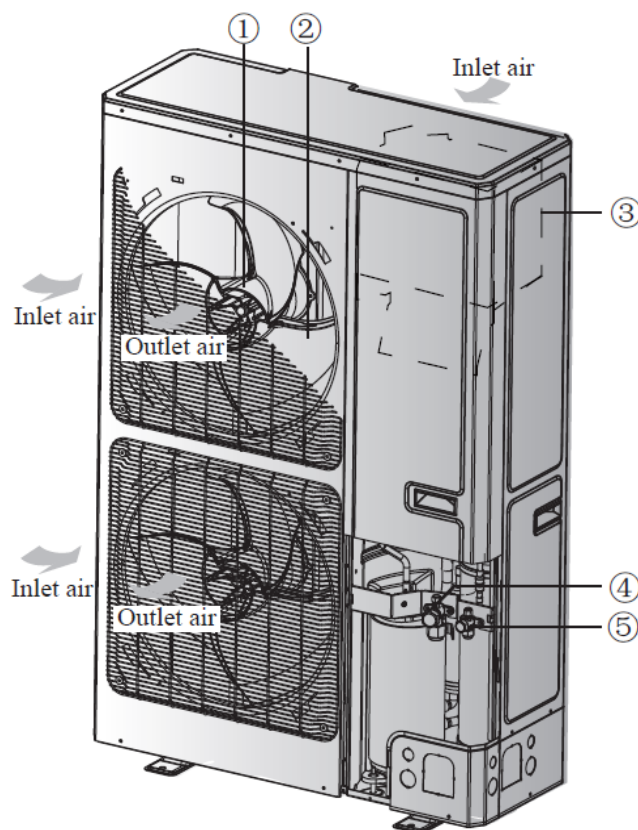
2.4 Accessories

For the accessories of the air conditioner, please look out the Packing List in the package.

3 Product Introduction

Inspire Ultra Inverter S16 adopts inverter compressor technology. According to change displacement of compressor, stepless capacity regulation within range of 10%~100% can be realized. Various product lineups are provided with capacity range from 14kW to 16kW, which can be widely used in residential house, business office, hotel and where especially applicable to the place with variable load change. Delta air conditioner is absolutely your best choice.

3.1 Names of Main Parts



NO.	①	②	③	④	⑤
Name	Fan motor	Axial flow fan blade	Electrical box	Gas side stop valve	Liquid side stop valve

Fig. 1

3.2 Combinations for Outdoor and Indoor Units

Table 1

Sorts		86HS050J248	86HS060J249
No. of indoor units to be connected	Min	2	2
	Max	8	9
No. of BM modules to be connected	Min	1	1
	Max	3	3
Total capacity of indoor units to be connected(Btu/h)	Min	24000	28000
	Max	72000	81000

3.3 Parts and Components of Unit

For the super free match series, one outdoor unit is able to drive up to three BM modules and nine indoor units which include cassette type, duct type, wall mounted type, floor ceiling type and console type. The outdoor unit will run as long as any one indoor unit receives the running command, and all indoor units stop once the outdoor unit is turned off.

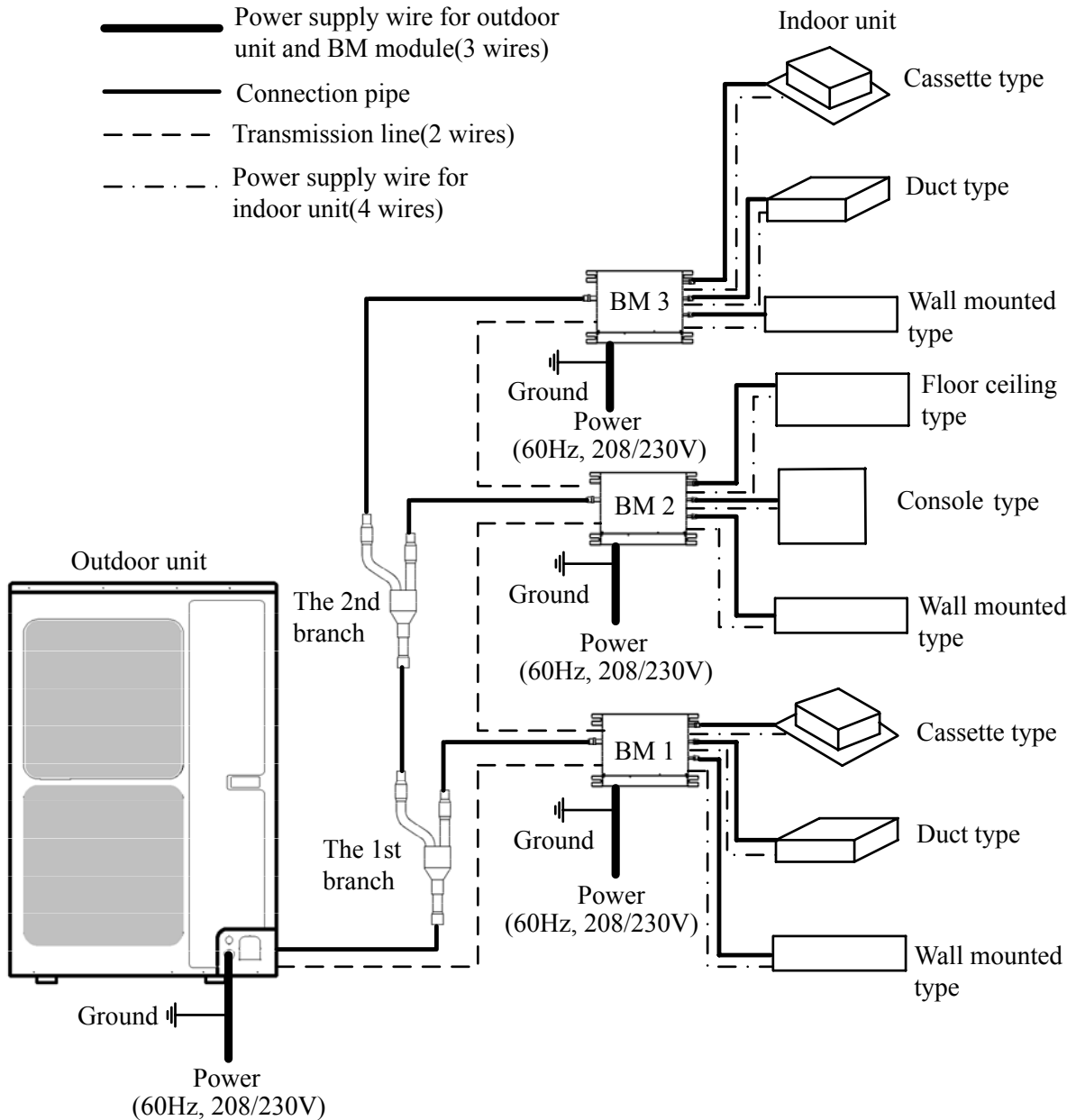


Fig. 2

3.4 Working Temperature Range

Table 2

Sorts	Outside temperature DB/WB(°C)
Maximum cooling	48/-
Minimum cooling	-18/-
Maximum heating	24/-
Minimum heating	-20/-

4 Selection of Installation Location and Precautions



Caution!

- ◆ The installation of the air conditioner must be in accordance with the national and local laws and regulations.
 - ◆ The quality of the installation will affect the capability of air conditioner directly. The installation should be left to the appointed service center. Please contact your dealer after purchasing this machine. Professional installation workers will provide installation and test services according to the installation manual.
 - ◆ The air conditioner should not install in this place where the small animals exist, because they may cause malfunctions, smoke or fire. Please keep the area around the unit clean.
-

4.1 Selection of Installation Location

- ◆ The outdoor unit must be installed on a firm and solid support which can withstand the weight and the mounting surface must be horizontal plane. Otherwise, the unit would fall down and cause injury or death.
 - ◆ There is enough space for the installation and maintenance. Otherwise, there is not any obstacle near the air inlet and outlet of the indoor and outdoor units.
 - ◆ The place should be well-ventilated, so the machine can absorb and discharge sufficient air.
 - ◆ Outdoor unit shall be installed close to the indoor unit, hence to minimize the length and bends of cooling pipe.
 - ◆ Avoid place the outdoor unit under the windows or between the constructions, hence to prevent normal operating noise from entering the room.
 - ◆ Do not install in the place where there is heat source, flammable or explosive gas, a place subject to severe dust, salty fog and polluted air.
-



Caution!

Installation at the following places might lead to the air conditioner malfunction. If it is unavoidable, please contact the appointed service center.

- ◆ A place which is full of machine oil;
 - ◆ A region with saline-sodic soil near the sea;
 - ◆ A place where the sulphide fog exists, such as the sulphur spring;
 - ◆ A place where the high frequency facilities exist, such as radio equipment, electric welder and medical equipment;
 - ◆ An environment with special conditions.
-

4.2 Outline Dimension of Outdoor Unit

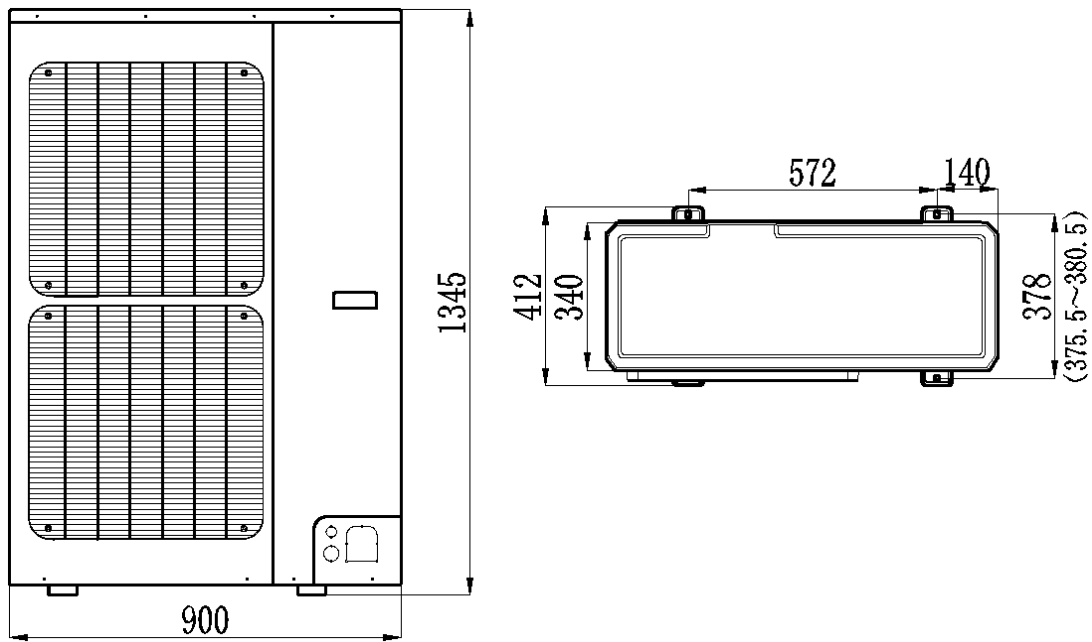


Fig. 3 (unit: mm)

4.3 Installation and Servicing Space

- 1) When the place of the installation is exposed to strong wind

When strong winds of 5 m/sec or more exist in the place of the installation, the outlet of the unit cannot face the wind. If the wind blows against the outdoor unit's air outlet, it will cause deterioration of the operational capacity and maybe break the fan.

- 2) In case of installing only one unit

In case obstacles exist around the unit, the required installation space is in the Fig. 4.

- 3) In case of installing multiple units(2 units or more)

In case multiple rows of series installation, the required installation space is in the Fig. 5.

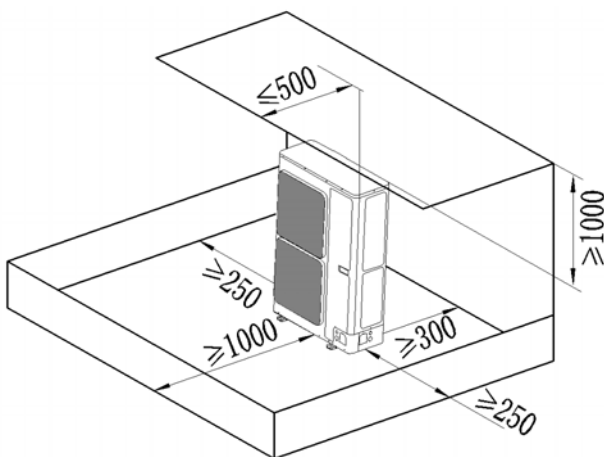


Fig. 4 (unit: mm)

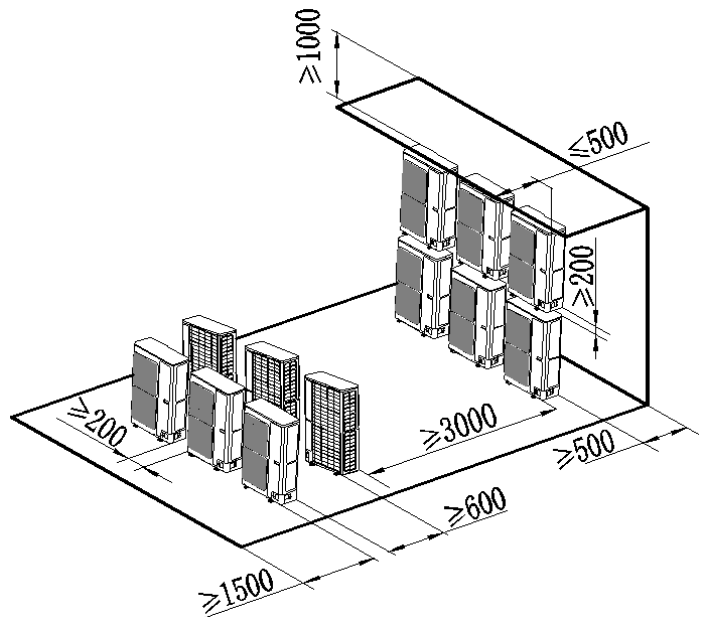


Fig. 5 (unit: mm)

5 Installation Instruction

- 1) Check the installation location and ensure it is strength and level, so that the unit will not cause any operating vibration or noise after installation.
- 2) In accordance with the foundation drawing in the following figure, please drill 4 holes in the installation location.

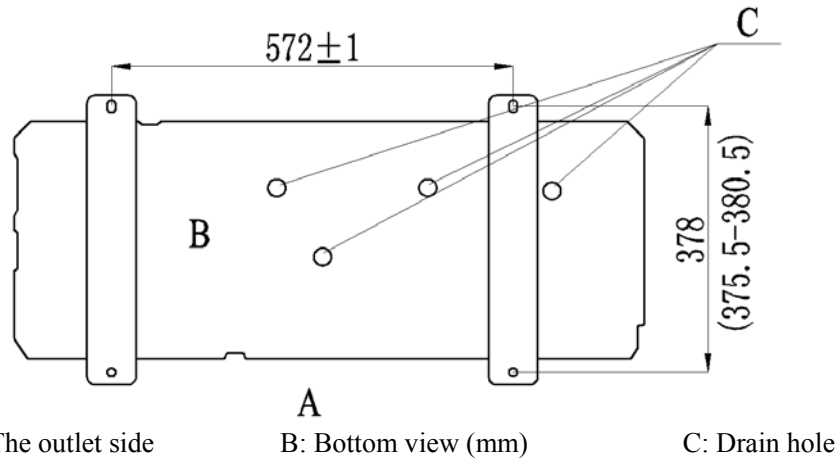


Fig. 6

- 3) Fix the unit securely with the foundation bolts. You can get the M10 or M12 foundation bolts, nuts and washers from the market.

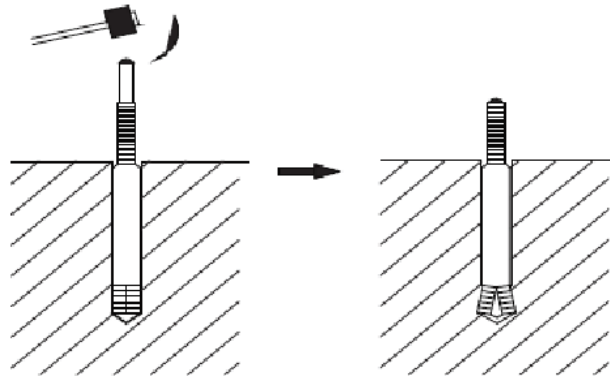


Fig. 7

- 4) Rubber or spring shock absorbers should be used during the installation of the outdoor unit to meet the noise and vibration requirements.
- 5) Screw the foundation bolts into the ground and it is better that its length is less than 20mm from the foundation face.

6 Installation of Refrigerant Pipes

6.1 Allowable Length and Drop Height of Connecting Pipe

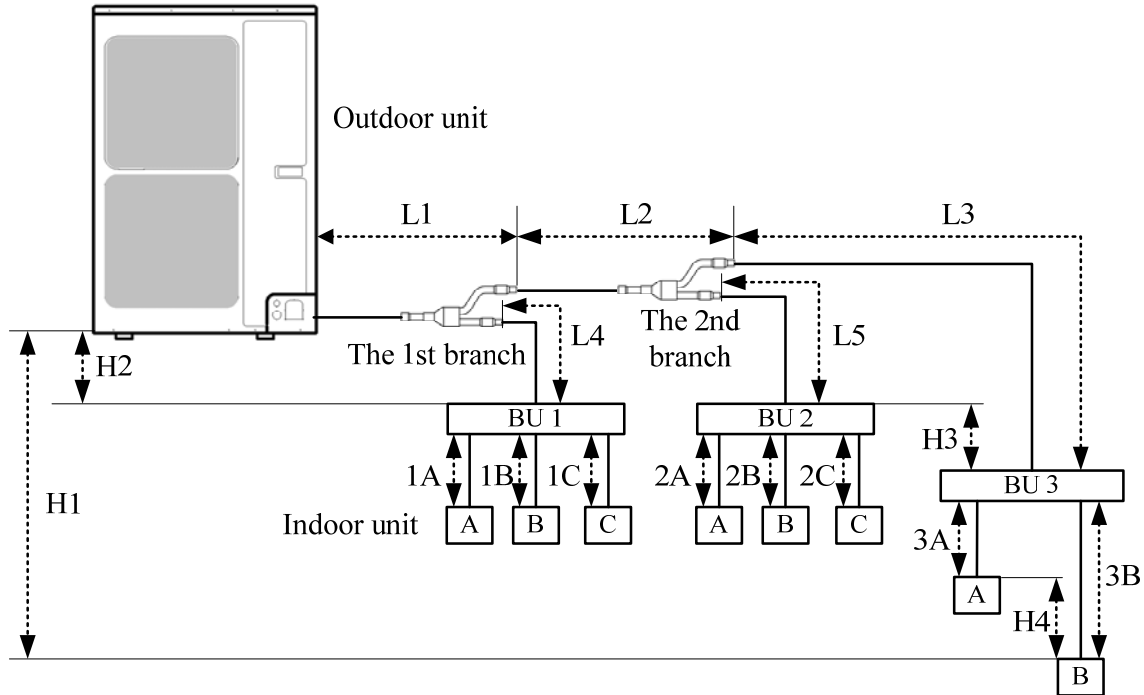


Fig. 8 (8 indoor units)

Table 3

The sorts		The pipes	Length(m)	
Maximum allowable length	Total length between outdoor unit and BM modules		$L1+L2+L3+L4+L5$	≤ 55
	Total length between indoor units and BM	86HS050J248	$1A+1B+1C+2A+2B+2C+$	≤ 80
		86HS060J249	$3A+3B$	≤ 90
	Between indoor unit and BM module		$1A;1B;1C;2A;2B;2C;3A;3B$	≤ 15
Between indoor unit and the 1st branch		$L4+1B;L2+L5+2A;$ $L2+L3+3B$	≤ 40	
Maximum allowable length	Between outdoor and indoor units		$H1$	≤ 30
	Between outdoor units and BM modules		$H2$	≤ 30
	Between BM and BM modules		$H3$	≤ 15
	Between indoor and indoor units		$H4$	≤ 15
Minimum allowable length	Between outdoor and the 1st branch		$L1$	≥ 5
	Between BM and the branch		$L3;L4;L5$	as possible as short

◆ BM module should be placed within the level between the outdoor unit and indoor unit.

6.2 Dimension of Connecting Pipe

Table 4

Sorts		Gas Pipe (mm)	Liquid Pipe(mm)
Outdoor unit	86HS050J248	Φ15.9	Φ9.52
	86HS060J249		
Between outdoor unit and the 1st branch	The pipe L1	Φ19.05	Φ9.52
Between the 1st and the 2nd branch	The pipe L2	Φ15.9	Φ9.52

6.3 Connection of Branch Pipe

- 1) If two or three BM modules used, Y-type branch pipe of FQ01A/A will be chosen.

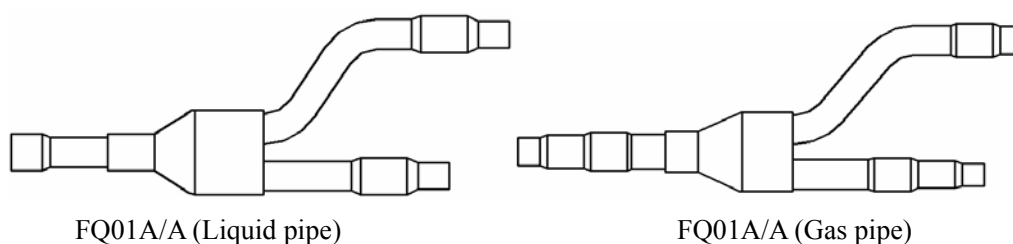


Fig. 9

- 2) Y-type branch pipe is equipped with auxiliary tubes to adjust the diameter of different pipes. If the dimension of the pipe selected is different from the dimension of branch pipe joint, Cut the copper tube in the middle with tube cutter and clear up burrs. Please do that as following figure.

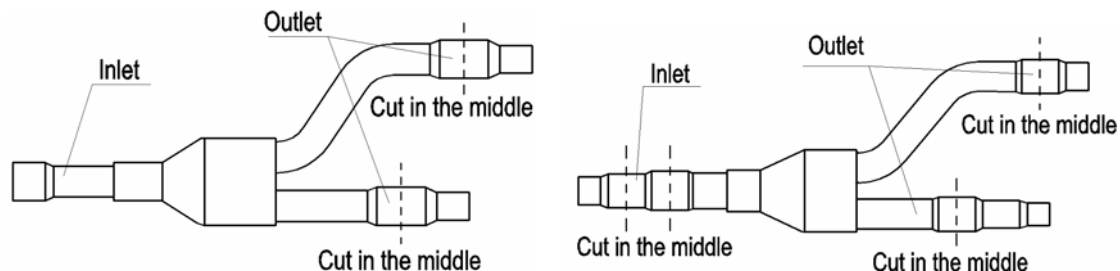


Fig. 10

- 3) Y-type branch pipe must be installed in vertical or horizontal direction. In the inlet of the branch pipe, keep at least 500mm straight pipe.

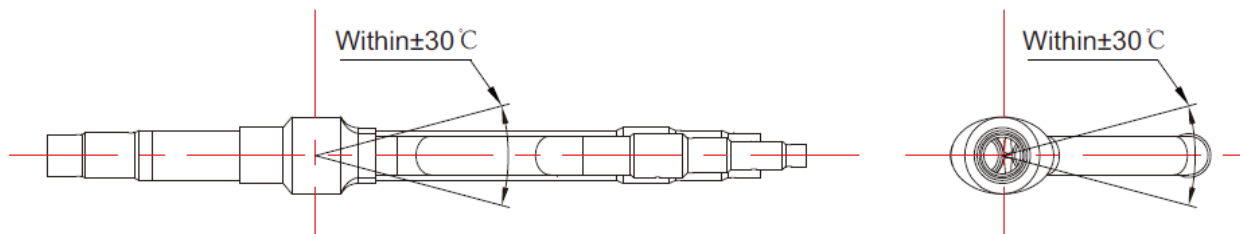


Fig. 11

6.4 Connection of Refrigerant Pipes

6.4.1 Precaution for connection

- 1) Pipe connections should follow the following rules:
 - ① Outdoor unit shall be installed close to the indoor unit, hence to minimize the length and bends of connection pipes.
 - ② The height gap of outdoor unit and indoor units should be as small as possible
- 2) The brazing operation must be strictly in accordance with the process requirements. During the installation, do not damage the pipeline.

6.4.2 The process of flaring

- ① Using the tube cutter to cut the connecting pipe in the appropriate place and remove the burrs.
- ② Install the nut before the flaring operation.
- ③ Check the flared portion, whether there is fractured or not.

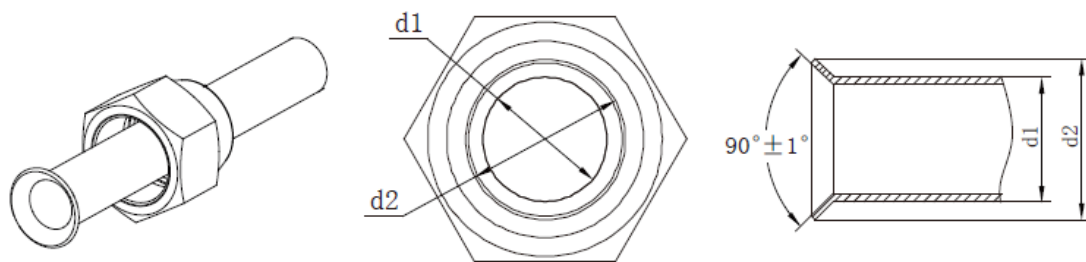


Fig. 12

6.4.3 Precaution for elbow operation

- ① The elbow operation could be done by hands. Be careful and do not damage the pipe.

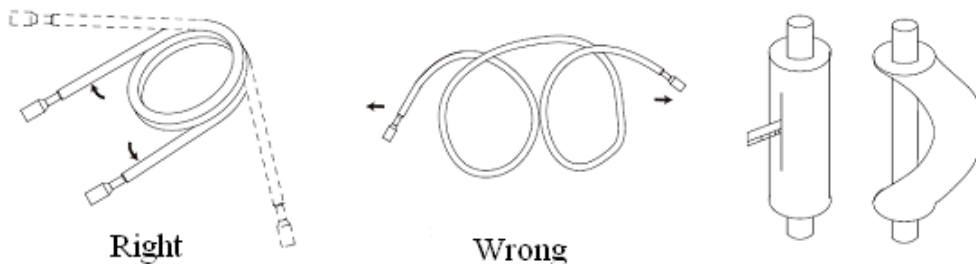


Fig. 13

- ② The bending diameter of the pipeline must be greater than 200mm. The connection pipe cannot often be bent or straightened. Otherwise it will harden and crack.
- ③ If the thermal insulation of the refrigerant pipe is not removed, please do not bend the pipe. Otherwise, it may lead the pipe to crack. It is better to make an incision with a knife in the thermal insulation and remove it. After elbow operation is finished, recover the thermal insulation with binding band.

6.4.4 The process of install refrigerant pipes

- ① Remove the screw caps from the pipes.
- ② Align the flared end of copper tube with the center of pipe joint. Tighten the nuts by hands. (If the flared end of copper tube and the center of pipe joint are not in coaxial, it is hard to tighten the nuts by hands, please do not tighten it with spanners, because the screw thread may be broken by force).
- ③ Tighten the flaring nuts with torque wrench until you hear a “click”. (The spanner and torque wrench should be perpendicular to the refrigerant pipeline).

④ The following table for the torque required to tighten the nuts.

Table 5

Pipe diameter	Thickness of copper tube	Tightening torque
Φ6.35 mm	≥0.8 mm	15~30 N·m
Φ9.52 mm	≥0.8 mm	35~40 N·m
Φ12.7 mm	≥0.8 mm	45~50 N·m
Φ15.9 mm	≥1.0 mm	60~65 N·m
Φ19.05 mm	≥1.0 mm	70~75 N·m

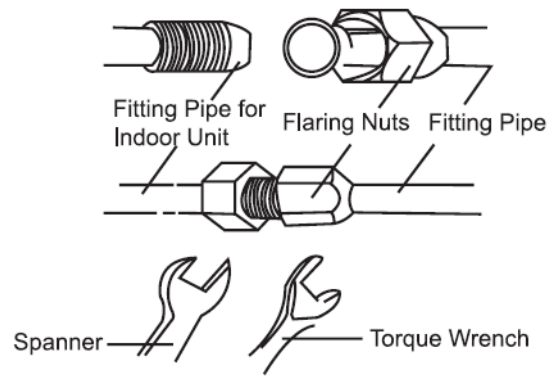
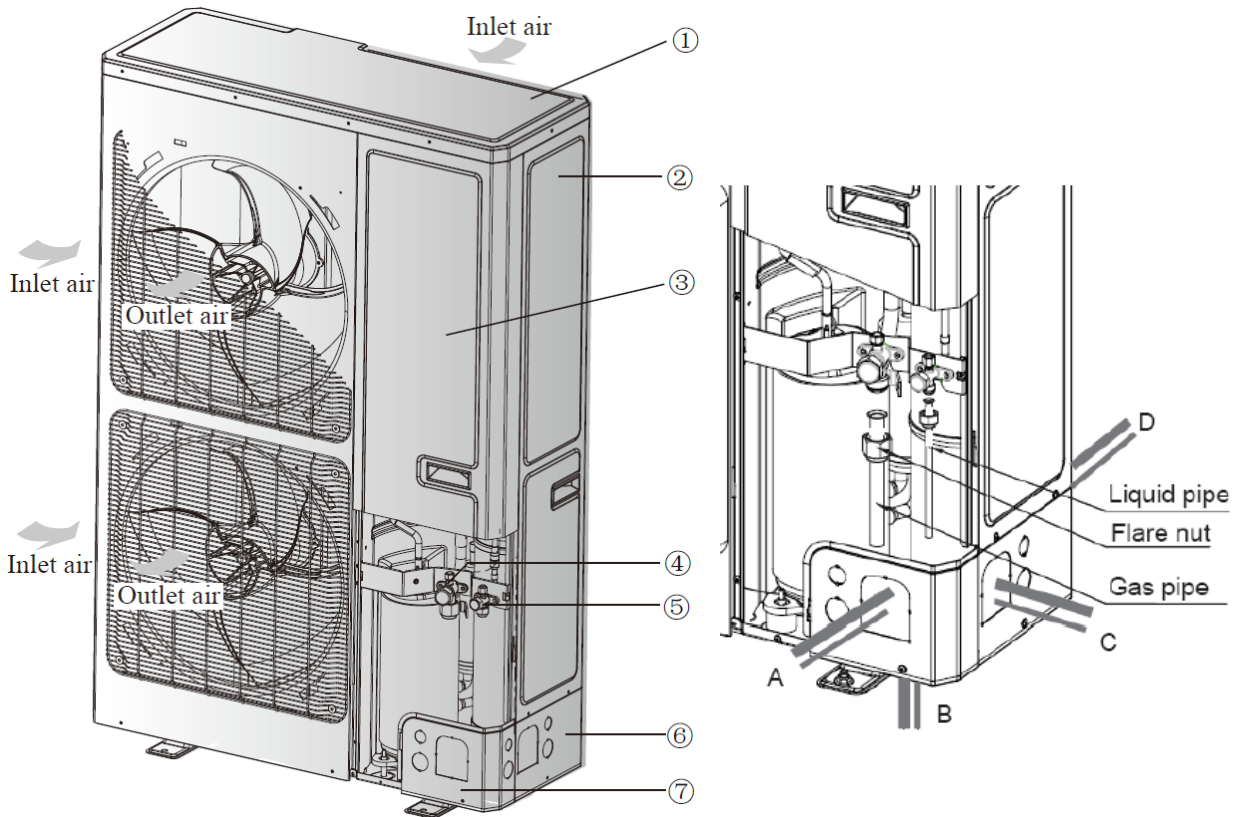


Fig. 14

! Caution!

- ◆ During the connection of the indoor unit and BM module to the refrigerant pipe, never pull any joints of the indoor unit and the BM module by force; otherwise the capillary pipe or other pipe may crack, which then would result in leakage.
- ◆ The refrigerant pipe should be supported by brackets, that is, don't let the unit withstand the weight of it.
- ◆ For the Super Free Match system, each pipe should be labeled to tell which system it belongs to avoid mistaken inaccurate piping.

6.5 Connection of Refrigerant Pipe



NO.	①	②	③	④
Name	Coping plate	Rear side plate	Front side plate	Gas side stop valve
NO.	⑤	⑥	⑦	
Name	Liquid side stop valve	Right connection board	Front connection board	
NO.	A	B	C	D
Name	Front connection	Bottom connection	Side connection	Rear connection

Fig. 15

- 1) Unscrew the coping plate, front side plate, right connection board and front connection board.
- 2) The refrigerant pipes can be installed in four directions, please choose the proper direction.
- 3) Knock the holes in the plate of the chosen direction with the drill and hammer.
- 4) Connect the pipes to the stop valves.
- 5) Bend the pipes to go through the knockout holes.
- 6) Cover the through-holes with sealing materials to prevent the water, dust or small animals going into the outdoor unit.

6.6 Leak Test

- 1) Please make sure that the stop valves of the outdoor unit are closed during the operation.
- 2) The leak test should be made by pressurizing nitrogen gas.
- 3) Turn on the Hi-knob and Lo-knob. The leak test should be done simultaneously at both the gas and liquid stop valves.
- 4) Open the pressure reducing valve, pressurize the connection pipes to 1.0 MPa (10 bar) slowly, wait fifteen minutes, and make sure that the pressure will not drop.
- 5) Rise the pressure to 4.0 MPa (40 bar) slowly, wait 24 hours, and make sure the pressure will not drop.
- 6) If the pressure does not decrease, the pipes have passed the test. Otherwise, look for where the gas leaks from.

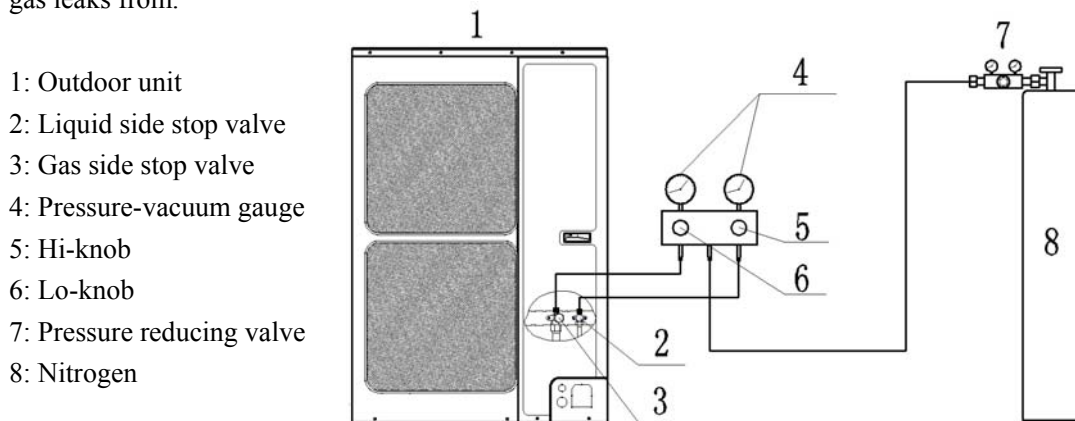


Fig. 16

6.7 Vacuum Operation

- 1) Make sure that the liquid and gas stop valve of the outdoor unit are closed fully during the operation.
- 2) As shown in the following figure, expel the gas from the refrigerant pipes by the vacuum pump.
- 3) Open the pump and turn on the knobs to evacuate the gas in the liquid and gas pipes. The vacuuming should be done simultaneously at both the gas and liquid stop valves.
- 4) When the pressure of the system is less than -0.1MPa (-1bar), keep the system for more than one hour under the condition.

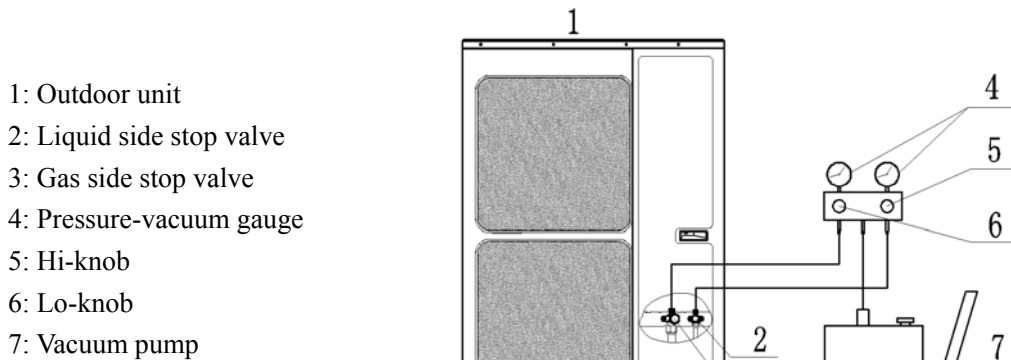


Fig. 17

- 5) Turn off the knobs firstly and then the pump, and if the pressure of the pressure-vacuum gauge does not rise within 2 hours, the system is under a vacuum. Otherwise, the system has leaked, please look for where the gas leaks in.

6.8 Refrigerant Charging

The refrigerant has been charged into the outdoor unit before shipped from the manufacturer, while additional refrigerant still need be charged into the refrigerant pipe in the field installation.

6.8.1 Calculation of the Additional Refrigerant Charging

- 1) Get the refrigerant charge of the outdoor unit from the nameplate.

Note:

- ◆ The refrigerant charge of the outdoor unit does not include the charged additionally in the indoor unit, BM module and the refrigerant pipe.
 - ◆ For the length of the connecting pipe is decided on the field, the amount of additional refrigerant shall be decided depending on the dimension and the length of the liquid pipe used on the field.
 - ◆ It does not need to add refrigerant if the total length of liquid pipe is within 30m.
-

- 2) Calculating the Mass of Additional Refrigerant

Additional Refrigerant Charge (kg) = Σ the Liquid Pipe Length of $\Phi 6.35 \times 0.022 \text{kg/m}$ + Σ the Liquid Pipe Length of $\Phi 9.52 \times 0.054 \text{kg/m}$ - 1.47(kg)

- ◆ If the additional refrigerant charge is negative, it does not need to add the refrigerant.

- 3) Example: 86HS060J249

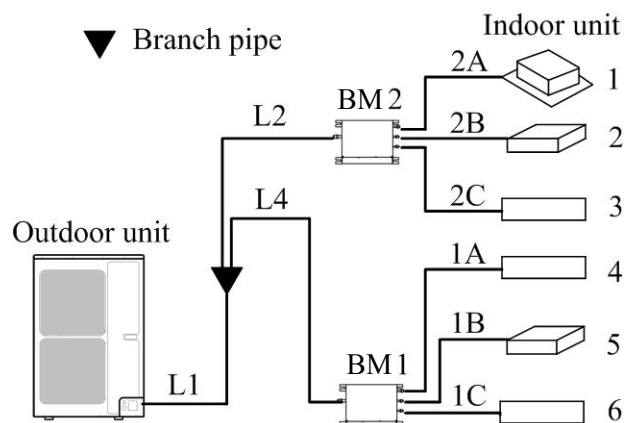


Fig. 18

Table 6

Serial No.	Model	
Indoor unit 1	Cassette type	85CM012J24
Indoor unit 2	Duct type	85PF009J24
Indoor unit 3	Wall mounted type	85WC009J24
Indoor unit 4	Wall mounted type	85WC009J24
Indoor unit 5	Duct type	85PF009J24
Indoor unit 6	Wall mounted type	85WC009J24

Table 7

Serial	Diameter(mm)	Length(m)
L1	Φ9.52	20
L2	Φ9.52	10
L4	Φ9.52	10
1A	Φ6.35	5
1B	Φ6.35	5
1C	Φ6.35	5
2A	Φ6.35	5
2B	Φ6.35	5
2C	Φ6.35	5

The total length of the liquid pipes: 20+10+10+5+5+5+5+5+5=70(m).

Thus, the total length is over than 30m, so the air conditioner needs to add refrigerant.

◆ Additional refrigerant charge

Σ the Liquid Pipe Length of $\Phi 6.35 \times 0.022\text{kg/m} + \Sigma$ the Liquid Pipe Length of $\Phi 9.52 \times 0.054\text{kg/m} - 1.47(\text{kg})$

$= (5+5+5+5+5+5)(\text{m}) \times 0.022\text{kg/m} + (20+10+10)(\text{m}) \times 0.054\text{kg/m} - 1.47(\text{kg})$

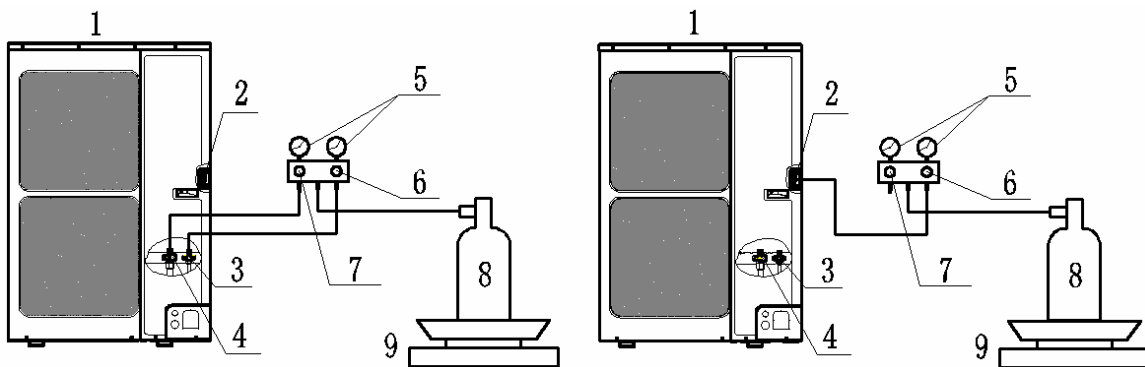
$= 1.35(\text{kg})$

4) Additional refrigerant charge record for future maintenance

Table 8

Diameter(mm)	Total length(m)	Additional refrigerant charge(kg)
Φ6.35		
Φ9.52		
Total		

6.8.2 Procedures for adding refrigerant



NO.	1	2	3	4	5
Name	Outdoor unit	Service port	Liquid side stop valve	Gas side stop valve	Pressure-vacuum gauge
NO.	6	7	8		9
Name	Hi-knob	Lo-knob	R410A tank		Scale

Fig. 19

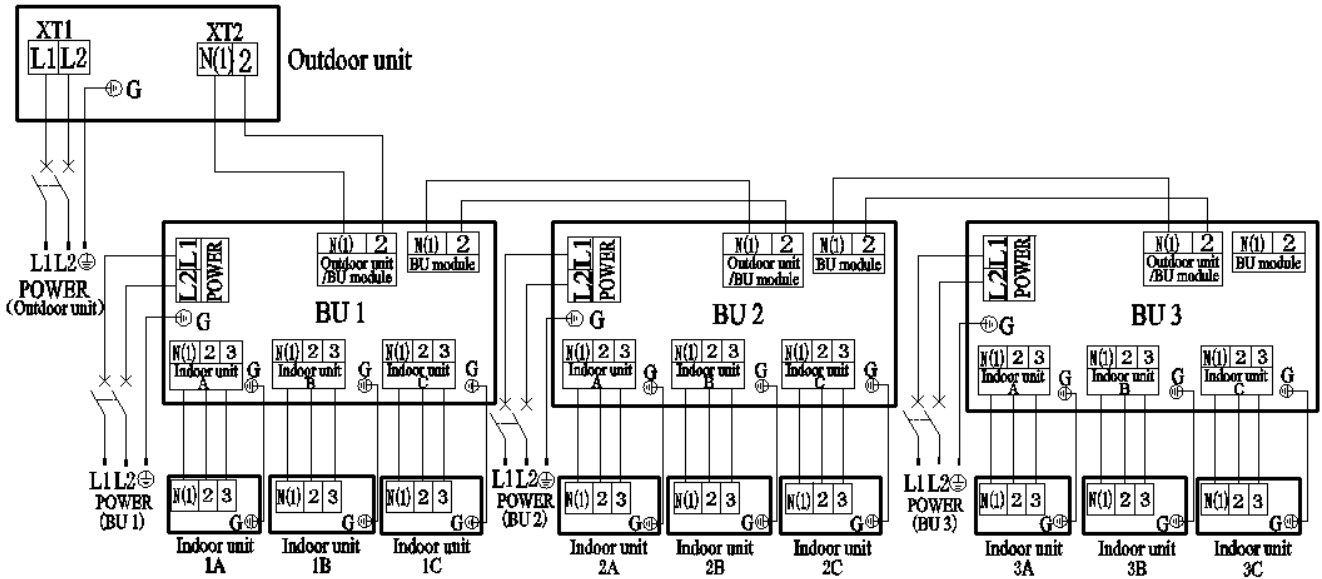
- 1) When the liquid and gas stop valves have not been opened, the system is under the vacuum:
 - ① Refer to the left of the figure above; connect the R410A tank to the system.
 - ② Turn on the R410A tank and the Hi-knob; charge the R410A refrigerant into the unit from the liquid side stop valve. The Lo-knob should be closed completely.
 - ③ Turn off the R410A tank and the Hi-knob immediately, when the adding refrigerant is enough.
 - ④ Turn on the liquid and gas side stop valves in an anticlockwise direction slowly and completely.
- 2) If the pressure of the system is too high to charge refrigerant, you can do as follow.
 - ① Turn on the liquid and gas side stop valves in an anticlockwise direction slowly and completely.
 - ② Turn on the power of the air conditioner, and set cooling mode, running more than 0.5h when outside temperature is higher than 15°C DB.
 - a) Refer to the left of the figure above; connect the R410A tank to the system.
 - b) Turn on the R410A tank and the Lo-knob; charge the R410A refrigerant into the unit from the gas side stop valve. The Hi-knob should be closed completely.
 - c) Turn off the R410A tank and the Lo-knob immediately, when adding refrigerant is enough.
 - ③ Turn on the power of the air conditioner, and set heating mode, running more than 0.5h when outside temperature is lower than 15°C DB.
 - a) Refer to the right of the figure above; connect the R410A tank to the system.
 - b) Turn on the R410A tank and the Hi-knob; charge the R410A refrigerant into the unit from the service port. The Lo-knob should be closed completely.
 - c) Turn off the R410A tank and the Hi-knob immediately, when adding refrigerant is enough.

 **Caution !**

- ◆ Make sure the liquid and gas side stop valves are opened completely after the installation.
 - ◆ Make sure the length of liquid pipe is exactly.
 - ◆ Additional refrigerant charge must be measured exactly.
 - ◆ Make sure that the refrigerant which charge into the unit is in liquid state.
 - ◆ Please prevent the refrigerant leakage from your body when remove the charging hose.
 - ◆ Please heat the refrigerant tank with hot water or hot air when the outside temperature is too low. However, it must be forbidden to heat with fire directly, otherwise it may lead to explosion.
-

7 Electrical Wiring Work

7.1 Wiring Connection



- ◆ The “L1”, “3” terminals are connected to the live wire, the “L2”, “N(1)” terminals are connected to the neutral wire and the “2” terminal is connected to the transmission line.

Fig. 20

7.2 Requirements of Power Circuit and Cable

Table 9


Phase and frequency		1Ph,60Hz
Voltage		208/230V
Recommended cable of outdoor unit (Pieces × Sectional area)	86HS050J248	3×6.0 mm ²
	86HS060J249	
Recommended cable of BM module (Pieces × Sectional area)		3×0.75 mm ²
Transmission line (Pieces × Sectional area)		2×1.5 mm ²
Recommended cable of indoor unit (Pieces × Sectional area)		4×0.75mm ²
Capacity of the air switch	86HS050J248	40A
	86HS060J249	40A
	BM module	10A

Note:

- ◆ The total length of the transmission line between the outdoor unit and the furthest BM module is not more than 55m. Otherwise, the system cannot work possibility.
- ◆ The specifications of the power cable and transmission line listed in the table above are determined based on the maximum power (maximum amps) of the unit.

- ◆ The specifications of the power cable listed in the table above are applied to the conduit-guarded multi-wire copper cable (like, YJV copper cable, consisting of PE insulated wires and a PVC cable jacket) used at 40°C and resistible to 90°C, and shall be at least those of ordinary polychloroprene sheathed cords. If the working condition changes, they should be modified according to the related national standard.
 - ◆ The specifications of the air switch listed in the table above are applied to the breaker with the working temperature at 40°C. If the working condition changes, they should be modified according to the related national standard.
 - ◆ The length of the recommended power cable should be less than 15 meters; otherwise, the diameter of the power cable is not enough.
 - ◆ Mentioned power cable and transmission line length is just a reference value. It may be different depending on the condition of installation, humidity or materials, etc.
 - ◆ An all-pole disconnection switch having a contact separation of at least 3mm in all poles should be connected in fixed wiring.
-

7.3 Ground Requirements

- ◆ The air conditioner is classified into the Class I appliances, so its ground ways must be reliable.
- ◆ The ground wire must be fixed on the screw hole with the sign as the right figure. 
- ◆ The yellow-green wire of the air conditioner is the ground wire and must be fixed by the tapping screw. And it cannot be used for other purpose or cut off. Otherwise, it will cause the hazard of electric shock.
- ◆ The reliable ground terminal should be provided and the ground wire cannot be connected to any of the following places: a. Water pipe; b. Coal gas pipe; c. Sewage pipe; d. Lightning rod e. Telephone line f. Other unreliable places considered by a professional.

7.4 Precautions on the Electrical Wiring Work

- ◆ The ground connection should be reliable and the ground wire should be connected to the dedicated device of the building by the professional.
- ◆ The electric installation should be carried out by the professional as instructed by the local laws, regulations and also this manual.
- ◆ The air switch coupled with the leakage current protection switch must be equipped in the circuits, which is of enough capacity and of both magnetic and thermal tripping functions in case of the short circuit and overload.
- ◆ The electrical work should use a cable length enough to cover the entire distance with no connection. If it is unavoidable, please make sure the connection should be reliable, the external forces will not act on the wires and the joint is not bared. Otherwise it will cause electrical shock or fire etc.
- ◆ The power cable with the rated voltage and exclusive circuit for the air conditioning should be used.
- ◆ Do not pull the power cable by force after it is installed.
- ◆ The diameter of the power cable should be large enough and once it is damaged, it must be replaced by the dedicated one.
- ◆ The multi-wire copper cable should be used for the power cable and the transmission line.

7.5 Precaution of Laying Wires

- 1) Use a wire stripper to strip off a length of the insulation layer at the end of the wires;
- 2) Loosen the screws on the terminal block of the air conditioner;
- 3) Press the ends of the cable tightly onto the round terminals corresponding to the size of the screws.
- 4) Pass the screw through the round terminals and fix it onto the terminal block.

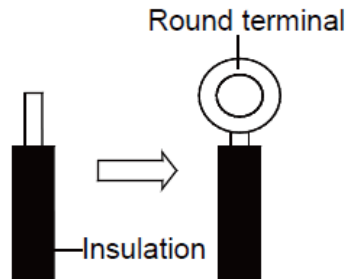


Fig. 21

7.6 Procedures for Electrical Wiring Work

- 1) Knock the holes in the plate of the chosen direction with the hammer.
- 2) Place the rubber ring on the knockout hole.
- 3) Let the power cable and transmission line go through the knockout hole.
- 4) Connect the power cable of the outdoor unit to the L1, L2 terminals with the sign of the XT1 and as well as the ground screw.
- 5) Connect the transmission line of the outdoor unit to the N(1), 2 terminals with the sign of the XT2.
- 6) Fix the power cable and transmission line firmly by cable fixing clip. In order to protect the power cable and transmission line from damage by the pipes or others, an interval of at least 2cm away is essential.
- 7) Screw the coping plate, front side plate, right connection board, front connection board back.
- 8) Cover the through-holes with sealing materials to prevent the water, dust or small animals going into the outdoor unit.



Caution!

- ◆ The transmission line and the power cable must be separated and separated with an interval of at least 2cm; otherwise it may be result in communication problem.
 - ◆ In order to protect the power cable and transmission line from damaging by the hole, the rubber ring must be placed on the hole. Otherwise, it may cause electrical shock or fire etc.
 - ◆ The power wire and transmission line must be more than one meter away from televisions or radios which can emit electromagnetic waves to prevent image interference or noise. Otherwise, the unit maybe cannot work.
 - ◆ Confirm the each cable connected to the terminal screw is exactly and securely after finishing the electric work.
 - ◆ Fix each ground wire separately with the ground screw.
 - ◆ If the connecting wire is connected to the terminal incorrectly, the unit will not work normally.
-

8 Design of Drainage Pipeline

8.1 Installation of Drain Hose

- 1) Choose one drain hole in the bottom of the outdoor unit.
- 2) Connect the drain hose to the drain hole.
- 3) The drain hose should be kept at 5~10 degrees of gradient to facilitate discharge of the condensing water. Take care that does not exert too much force on the hose.
- 4) Thermal insulation materials should be placed at the joints of the drain hose so as to prevent from dew condensation. Fix the drain hose firmly by binding band.

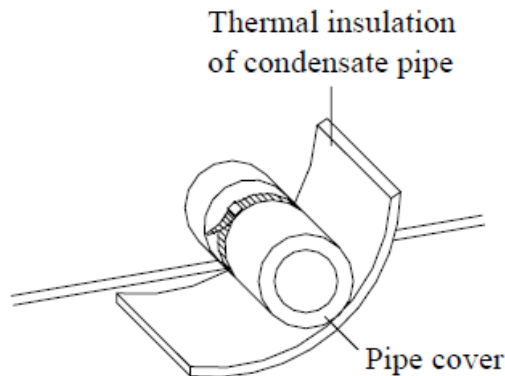


Fig. 22

- 5) The end of the drain hose should be inserted into the hole of drainage pipeline.

8.2 Design of Drainage Pipeline

- 1) The drainage pipeline should be kept at a certain gradient ($1/50$ — $1/100$) so as to avoid bulges of pipes where there might be water bends.
- 2) The drainage pipeline is form of the hard PVC pipes for common purposes which can be purchased locally. The diameter of the PVC pipes is not less than 17mm and the pipeline should be fixed as close to the BM module as possible.
- 3) Insert the drain hose into the drain hole of drainage pipeline. Use binding band to fix it tightly. It is not allowed to use adhesive glue to join the drain hose to the drainage hole.
- 4) When the drainage pipeline is laid for a couple of units, the position of the shared pipeline should be approximately 100mm lower than the drainage hole of each module. In this case, some special-purpose pipes with thicker walls will be used.
- 5) At intervals of about 1 meter, fix the drain pipes to the wall with brackets, not floating in the air.

9 Installation of Protective Layer

- 1) The refrigerant pipes should be insulated by the heat insulation material and plastic tape in order to prevent water condensation and leakage.
- 2) Do not use the foam on the branch pipe as the material for heat insulation.
The heat insulation material: Heat resistance to 100°C or more; Thickness of 9mm or more.
- 3) The joints of the system should be wrapped with the heat insulation material and no gap is allowed on the joint of the system, as shown in the following figure.

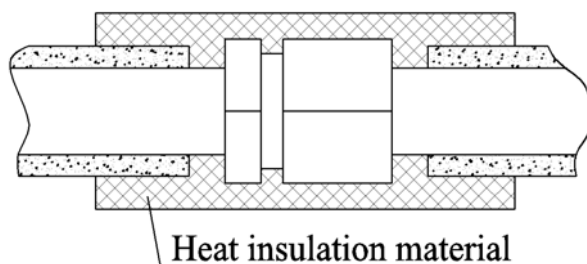


Fig. 23

- 4) Bundle the refrigerant pipe and transmission line together with tape, and separate them from the drain pipe to prevent the condensate water overflowing.
- 5) Wrap the pipe from the bottom of the outdoor unit to the top of the pipe where it enters the wall. During the wrapping, the later circle should cover half of the former one.
- 6) At intervals of about 1 meter, fix the refrigerant pipes to the wall with brackets, that is, don't let the unit withstand the weight of it or float it in the air.



Caution !

- ◆ After the pipe is protected well enough, never bend it to form a small angle($<90^\circ$), otherwise it would crack or break.
 - ◆ Do not wrap the refrigerant pipes very tight, otherwise the insulation effect would be weakened. Additionally, make sure the drain hose is separated from the refrigerant pipes.
 - ◆ After that, cover the hole on the wall with sealing materials to prevent wind and noise going into the room.
-

10 Test Operation

10.1 Check after Installation

Table 10

Items to be checked	Possible malfunction
Has it been fixed reliable?	The unit may drop, vibrate or make noise.
Has the gas leakage been checked?	It may cause insufficient cooling(heating) capacity.
Is the thermal insulation of the unit sufficient?	It may cause condensation and dripping.
Is the drainage well?	It may cause condensation and dripping.
Is the voltage in accordance with the rated voltage marked on the nameplate?	It may cause electric malfunction or the components may be burned out
Are the lines and pipelines correctly installed?	It may cause electric malfunction or the components may be burned out
Has the unit been safely grounded?	It may cause electrical leakage.
Are the models of lines in conformity with requirements?	It may cause electric malfunction or the components may be burned out
Are there any obstacles near the air inlet and outlet of the indoor and outdoor units?	It may cause insufficient cooling(heating) capacity.
Have the length of connection pipes and refrigerant charge amount been recorded?	It is not easy to decide the charge amount of refrigerant.

10.2 Test Operation

- 1) Before test operation
 - ◆ The appearance of the unit and the refrigerant pipes cannot be damaged during the installation.
 - ◆ Do not switch on power before installation is finished completely.
 - ◆ Electrical wiring must be connected correctly and securely.
 - ◆ The stop valves of the outdoor unit should be opened fully.
 - ◆ All the impurities such as scraps and thrums must be cleared from the unit.
- 2) Test operation method
 - ① The test operation should be carried out by the professionally skilled personnel on the premise that all items listed above are in normal conditions.
 - ② Set the status of the power supply switch as “ON” eight hours before the start of operation
 - ③ Press mode button, to select the COOL, or HEAT. Whether the air conditioner is work normally or not.
 - ◆ The fan motor of the indoor unit will run automatically in one minute.
 - ◆ The fan motor and compressor of the outdoor unit will run automatically in one minute.
 - ④ Make sure that every combination of indoor units can work well.

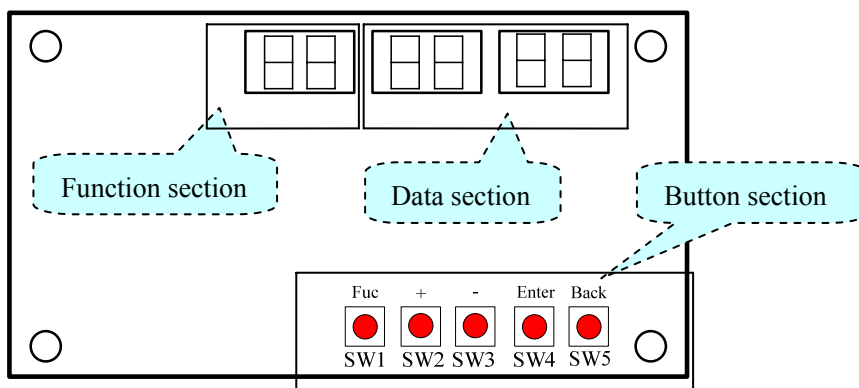
 **Caution !**

If the unit cannot work nor has any abnormal noise after the compressor is started, turn off the unit for an immediate check.

11 Testing Board Introduction

11.1 Compose of the Testing Board

The testing board is in front of electrical box and can be observed well. It has several following advantages: detect indoor unit numbers and indoor unit address, displays real running function and error code automatically. It is composed of the function section, data section and button section.



11.2 Instruction of Function and Data Section

Running state	The display of function section	The display of data section																
Stop	<p>① The section will display the numbers of the indoor units which have established communication with the outdoor unit. For example, if there are seven established indoor units, the section will display “7”.</p> <p>② It will display the address of the indoor units by turns. For example, the “1b” is represented of the indoor unit 1B. (BM module:1/2/3, Indoor unit: A/b/C/d/E)</p>	<p>① If the function section displays the numbers of the indoor units, the data section will display the outside temperature. For example, the “35” is represented of 35°C.</p> <p>② If the function section displays the address of the indoor unit, the data section will display the model of the indoor unit, for example, the “35” is represented of 35 model.</p>																
Normal	<p>The code of running state:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Code</th> <th>Running state</th> <th>Code</th> <th>Running state</th> </tr> </thead> <tbody> <tr> <td>UE</td> <td>Pressure equalization</td> <td>UH</td> <td>Heating</td> </tr> <tr> <td>UP</td> <td>Pump down</td> <td>F7</td> <td>Oil returning</td> </tr> <tr> <td>UC</td> <td>Cooling</td> <td>H1</td> <td>Defrosting</td> </tr> </tbody> </table>	Code	Running state	Code	Running state	UE	Pressure equalization	UH	Heating	UP	Pump down	F7	Oil returning	UC	Cooling	H1	Defrosting	<p>It displays the target gear of the compressor. If the gear is zero, it will display “0”. For example, the gear is the fifteenth; it will display “15”. The range of the gear is from 0 to 60.</p>
Code	Running state	Code	Running state															
UE	Pressure equalization	UH	Heating															
UP	Pump down	F7	Oil returning															
UC	Cooling	H1	Defrosting															
Malfunction	<p>If the malfunction occurs in the system, the section will display the error code. If there are several malfunctions, it will display the error codes by turns at intervals of 2 seconds.</p>	<p>① If the malfunction occurs in the outdoor unit, the section displays nothing;</p> <p>② If the malfunction occurs in the indoor units, the section displays the address of the indoor unit.</p>																

12 Troubleshooting



Caution!

- ◆ In the event of abnormal conditions (like, stinky smell), please shut off the power supply immediately and then contact the appointed service center; otherwise, the abnormal running would damage the air conditioner and also would cause electric shock or fire hazard .
 - ◆ Do not repair the air conditioning personally but instead contact the professionally skilled personnel at the appointed service center, as the incorrect repair would cause electric shock or fire hazard etc.
-

12.1 Check before Contacting Service Center

Please check the following items before contacting the maintenance serviceman.

Conditions	Causes	Corrective actions
The unit does not run at all	Broken fuse or breaker is off	Replace the damaged fuse or close the breaker
	Power off	Restart the unit after power supply resumes
	Power supply plug is loose	Plug the power supply properly
	The batteries voltage of the remote controller is insufficient	Replace with new batteries
	Remote controller is out of the control scope	The distance shall be within 8m
The unit stops soon after it starts	Air inlet or outlet of indoor unit or outdoor unit is blocked	Remove the obstacles
Cooling or heating is abnormal	Air inlet or outlet of indoor unit or outdoor unit is blocked	Remove the obstacles
	Temperature setting is improper	Adjust the setting of remote controller or wire controller
	Air speed is set too low	Adjust the setting of remote controller or wire controller
	Improper airflow direction	Adjust the setting of remote controller or wire controller
	Door or window is open	Close the door or window
	Under direct sunshine	Hang curtain or blinders over the window
	Too many people in the room	
	Too many heat sources indoors	Reduce the heat sources
	The filter screen is dirt or blocked	Clean the filter screen

If the air conditioner still runs abnormally after the above check and handling, please contact the local appointed service center and also give a description of the error occurred as well as the model of the unit.

12.2 Problem Handling

The conditions listed below are not classified into errors.

Conditions		Causes
The unit does not run	When restart the unit soon after it is stopped	The overload protection switch of the unit let the startup delayed for three minutes
	As soon as power supply is on	The unit will stand by for approximate one minute
The unit blows out mist	When the cooling operation starts	The hi-humidity air indoor is cooled quickly
The unit generates noise	The unit “clatters” as soon as it starts running	It is the sound generated during the initialization of the electronic expansion valve
	The unit “swishes” during the cooling operation	It is the sound when the refrigerant gas runs inside the unit
	The unit “swishes” when it is started or stopped	It is the sound when the refrigerant gas stops running
	The unit “swishes” when it is in and after the running	It is the sound when the draining system is operating
	The unit “squeaks” when it is in and after the running	It is the sound of frication generated by the skin plate etc which swells due to the temperature change
The unit blows out dust	When the unit restarts after it is not used for a long time	The dust inside the unit is blown out again
The unit emits odors	When the unit is running	The odors absorbed in are blown out

12.3 Error Description

If some error occurs when the unit is running, the error code will be displayed and check for more details about the meaning of each error.

Errors of definition	Main control display for outdoor unit			Indoor unit code	Testing board code
	Yellow LED	Red LED	Green LED		
The compressor is startup	Flash 1 time				
IPM current protection	Flash 3 times			H5	H5
IPM temperature protection	Flash 5 times			P8	P8
PFC current protection	Flash 7 times				HC
PFC temperature protection	Flash 8 times			P8	P8
Low voltage protection	Flash 9 times			PL	PL
High voltage protection	Flash 10 times			PH	PH
Low pressure protection	Flash 11 times				E3
High pressure protection	Flash 12 times				E8
High pressure switch protection	Flash 13 times				E1
Capacitor charging error	Flash 14 times				PU
AC current protection	Flash 15 times			E5	E5

Memory card error	Flash 16 times				EE
Compressor demagnetizing protection	Flash 17 times			HE	HE
Compressor desynchronizing	Flash 18 times			H7	H7
Compressor phase lack	Flash 19 times			U2	U2
Compressor phase circuit detection error	Flash 20 times			U1	U1
Compressor power protection	Flash 21 times			L9	L9
Compressor overload protection	Flash 22 times			H3	H3
Compressor discharge temperature protection	Flash 23 times			E4	E4
Lack of refrigerant or jam protection	Flash 31 times			F0	F0
Normal operation		Flash 1 time			
Frequency limitation for AC current		Flash 2 times			F8
Oil returning		Flash 3 times			F7
Defrosting		Flash 4 times		H1	H1
Frequency limitation for IPM temperature		Flash 5 times			EU
Frequency limitation for PFC temperature		Flash 6 times			EU
Frequency limitation for compressor overload		Flash 8 times			LU
Frequency limitation for compressor discharge temperature		Flash 9 times			F9
Frequency limitation for low pressure		Flash 10 times			Pn
Frequency limitation for high pressure		Flash 11 times			F6
Discharge temperature sensor error		Flash 12 times		F5	F5
Outdoor temperature sensor error		Flash 13 times		F3	F3
Suction temperature sensor error		Flash 15 times			dc
Condenser temperature sensor error		Flash 16 times		A7	A7
Sub-cool temperature sensor error		Flash 17 times			bC
Low pressure sensor error		Flash 18 times			dL
High pressure sensor error		Flash 19 times			e1
Fan motor error for indoor unit		Flash 20 times		H6	H6
Driving board is connected			Flash 1 time		
Testing board is connected			Flash 2 times		
Computer is connected			Flash 4 times		
Indoor unit 1 is connected			Flash 5 times		
Indoor unit 2 is connected			Flash 6 times		
Indoor unit 3 is connected			Flash 7 times		
Indoor unit 4 is connected			Flash 8 times		
Indoor unit 5 is connected			Flash 9 times		

Indoor unit 6 is connected			Flash 10 times		
Indoor unit 7 is connected			Flash 11 times		
Indoor unit 8 is connected			Flash 12 times		
Indoor unit 9 is connected			Flash 13 times		
Indoor unit anti-freeze protection				E2	E2
Indoor temperature sensor error				F1	F1
Indoor evaporator midway temperature sensor error				F2	F2
Temperature sensor error for liquid pipe of BM module				b5	b5
Temperature sensor error for gas pipe of BM module				b7	b7
Running mode conflicts				E7	E7
Communication error				E6	E6 indoor unit address
Communication error between the main board and driving board					P6
Communication error between the main board and testing board					CE
Gas sensor error of indoor unit					Fn
Humidity sensor error of indoor unit					L1
Water full error of indoor unit				E9	E9
Jumper terminal error of indoor unit				C5	C5
Phase lack of power supply					dJ
Fan motor error of outdoor unit					L3
Refrigerant recovery mode				Fo	Fo

- ◆ Display mode of Red LED and Yellow LED: At intervals of half a second, flash for half a second; if there are several malfunctions, it will display the error codes by turns at intervals of one second.
- ◆ Display mode of Green LED: At intervals of 1/4 second, flash for 1/4 second; and it displays the running states by turns at intervals of half a second.

13 Maintenance

Check, maintenance and care regularly should be performed by professional personnel, which will prolong the unit service life.

13.1 Outdoor Condenser

Outdoor condenser is required to be cleaned every two months. Use vacuum cleaner with nylon brush to clean up dust and sundries on the surface of condenser. Blow away dust by compressed air if it is available. Never use water to wash the condenser.

13.2 Drain Pipe

In order to drain condensate smoothly, please check the drain pipe regularly is clogged or not.

13.3 Check before the Seasonal Use

- ◆ Check the air inlet and outlet of the indoor and outdoor units to confirm there is no blockage.
- ◆ Check the ground wire to confirm the grounding is reliable.
- ◆ Check the batteries of the wireless remote controller to ensure that they have been replaced.
- ◆ Check the filter screen that it has been set soundly.
- ◆ If the air-conditioning unit shall be operated again after a long-term shut off, set the status of the power supply switch as “ON” eight hours before the start of operation, so as to ensure the successful startup of the air-conditioning unit.
- ◆ Check the outdoor unit to ensure the installation of it is steady. Contact the appointed service center if there is any abnormal condition.

13.4 Maintenance after Seasonal Use

- ◆ Turn off the power supply of the air conditioning unit and set the status of the power supply switch as “OFF”.
- ◆ Clean the filter screen and the housing of the indoor and outdoor units.
- ◆ Remove the dust and the foreign matters of the outdoor unit.
- ◆ In the event of rusting, please use the anti-rust paint to stop spreading of rust.

Refer to the *Installation and Operation Manual* of each indoor unit respectively for detailed maintenance.

14 After-sales Service

If the unit cannot work or has any problem, please contact the local after-sales service agency designated by Delta.

Warranty should meet the following requirements:

- ① The installation and test operation of the unit should be operated by professional personnel from appointed service center.
- ② Only Delta manufactured accessories can be used on the machine.
- ③ All the instructions listed in this manual should be followed.
- ④ Warranty will be automatically invalid if fails to obey any item mentioned above.

Thank you for Choosing



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