MINI-VRF Outdoor Unit

Instruction Manual

Applicable types:

CC-MAH008-3PS1
CC-MAH009-3PS1
CC-MAH010-3PS1
CC-MAH011-3PS1
CC-MAH012-3PS1
CC-MAH013-3PS1

Content

The equipment contains fluorinated
Greenhouse gas R410A
Global Warming Potential(GWP):2087.5

1.Safety precautionary measure

Warning

This air conditioner is a comforting unit which cannot be used in any special place for storing machines, precise instruments, food, plants, poultries or artworks, etc.

- The installation work must be done by the distributor or a professional worker.
  The installation worker must be equipped with all related knowledge as a wrong operation may cause fire risk, electric shock, injury or water leakage, etc.
- If the unit is to be installed in a small room, suitable measures shall be taken to make sure any refrigerant leakage concentration if happened in the room will not exceed the critical level.
  For detailed measures, place consult with the distributor. Connection of power supply must be complying with rules specified by the local electrical authority.
- If the air conditioner is to be moved or reinstalled, please let the distributor or a professional worker operate.
- Incorrect installation will cause fire risk, electric shock, injury or water leakage, etc.
  The user is not permitted to rebuild or repair the unit of own accord.
- Incorrect repairing will cause fire risk, electric shock, injury or water leakage, etc, so repairing must be performed by the distributor or a professional worker.
- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.
- Children shall not play with the appliance.
- Cleaning and user maintenance shall not be made by children without supervision.
- Main board Fuse:Refer to the 5-1 parameter on page 15.

Notice

- Make sure the water drainage ditch is useable.
- Make sure a current leakage protection switch is equipped.
  The current leakage protection switch must be equipped or there may be an electric shock.
- It mustn't be installed in any position with potential leakage of inflammable gas.
  If any inflammable gas leaks, there may be a fire risk around the indoor unit.
- Make sure the foundation installation or suspending installation is firm and reliable.
  If the foundation or suspension is not firm and reliable enough, there may be a fall accident.
- Make sure all electric cables are correctly connected.
  If any electric cable is incorrectly connected, any electrical part may be damaged.
- If the refrigerant leaks during installation, the room must be ventilated at once.
  The leaked refrigerant may generate some toxic gas if it contacts any flame.
- After installation, make sure there is no refrigerant leakage.
  If the refrigerant gas enters and contacts some flame source such as a heater, a stove or an electric cooker, it may generate some toxic gas.
- A lightning protection device must be equipped as per the applicable national regulation, or the machine may be damaged by a lightning strike.

2.Key points in installation inspection

2-1 Arrival of goods and unpacking inspection

1) When the machine is received, check if there is any damage in transportation. If any surface or internal damage is found, please inform the transportation agency in a written form.

2) After the machine is received, check if the device type, specification and quantity are complying with the contract.

3) When unpacking the product, please well keep the instruction manual and check all accessories.

2-2 Refrigerant pipe

1) The refrigerant pipe installation must be performed by the special refrigerant dispenser (separately ordered) for the central air conditioner.

2) The refrigerant pipe must be of the specified pipe diameter and pipe wall thickness.

3) Copper pipe welding must be performed with nitrogen filled protection, and the pipe must be filled with nitrogen gas of 0.2kgf/cm^2 which cannot be cut off until welding is completed and the copper pipe is thoroughly cooled down.

4) The refrigerant pipe must be treated with thermal insulation.

5) After the refrigerant pipe is installed and before gas tightness test and vacuumization, the indoor unit cannot be electrified.

2-3 Air tightness test

After the refrigerant pipe is installed, nitrogen gas of 40kgf/cm^2 (4.0MPa) must be filled from the gas side and liquid side at the same time for 24 hour gas tightness test.

2-4 Vacuumizations

After the gas tightness test, vacuumization (vacuum degree -0.1MPa) must be performed from both the gas side and the liquid side at the same time.

2-5 Refrigerant refilling

1) The volume of refrigerant to be refilled is calculated on the diameter and length (actual length) of the pipes at the outdoor unit and indoor unit liquid side.

2) The volume of refrigerant to be refilled, liquid pipe diameter, pipe length and height difference between the outdoor unit and indoor unit shall be recorded on the confirmation table (on the cover of the electrical box) for future reference.

2-6 Electrical wiring

1) The selection of power supply capacity and wire diameter shall be complying with the design manual. The diameter of power supply cable for an air conditioner is usually larger than the diameter of motor cable.

2) To prevent any disoperation of the air conditioner, the power supply cable (220～240V/ 380～415V 3N) cannot be twisted with any connecting cable of outdoor unit and indoor unit (low voltage cable).

3) The indoor unit can be electrified after gas tightness test and vacuumization.

2-7 Trial running

1) Trial running cannot be started unless the outdoor unit is electrified and preheated for more than 12h, or the system may be damaged.

3.Installation of outdoor unit

Notice

- The air conditioner must be installed in a place of enough strength to support the machine weight.
- If it lacks of strength, the machine may fall down and cause some personal injury.
- The installation must be performed specially to prevent strong wind or earthquake.
- Incorrect installation may cause some accident because of machine falling down.

3-1 Selection of installation position

1) Enough space for installation and maintenance;
2) No barrier at the inlet and outlet air ports and away from strong wind;
3) Dry and ventilating;
4) The flat supporting platform has enough capacity to carrying the outdoor unit weight which can be horizontally installed without increasing any noise or vibration;
5) Neighbors not influenced by operating noise and exhaust gas;
6) No leakage of inflammable gas;
7) Convenient for pipe connection and electrical connection.

3-2 Dimension figure of outdoor unit (Unit: mm)

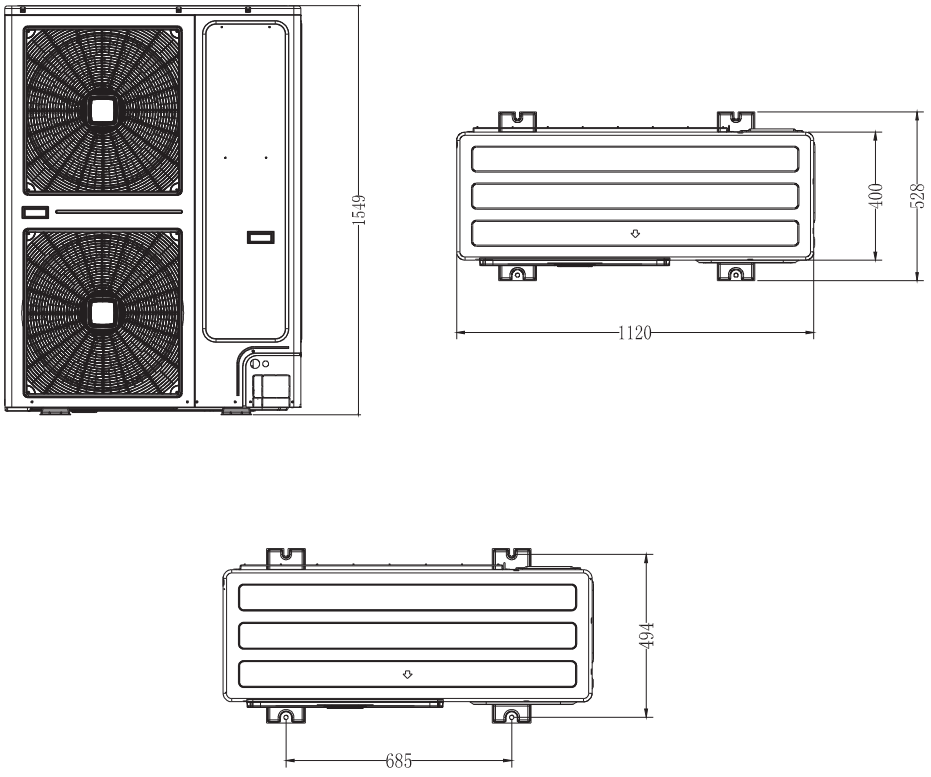


Figure 3-1(260/280/335)

3.Installation of outdoor unit

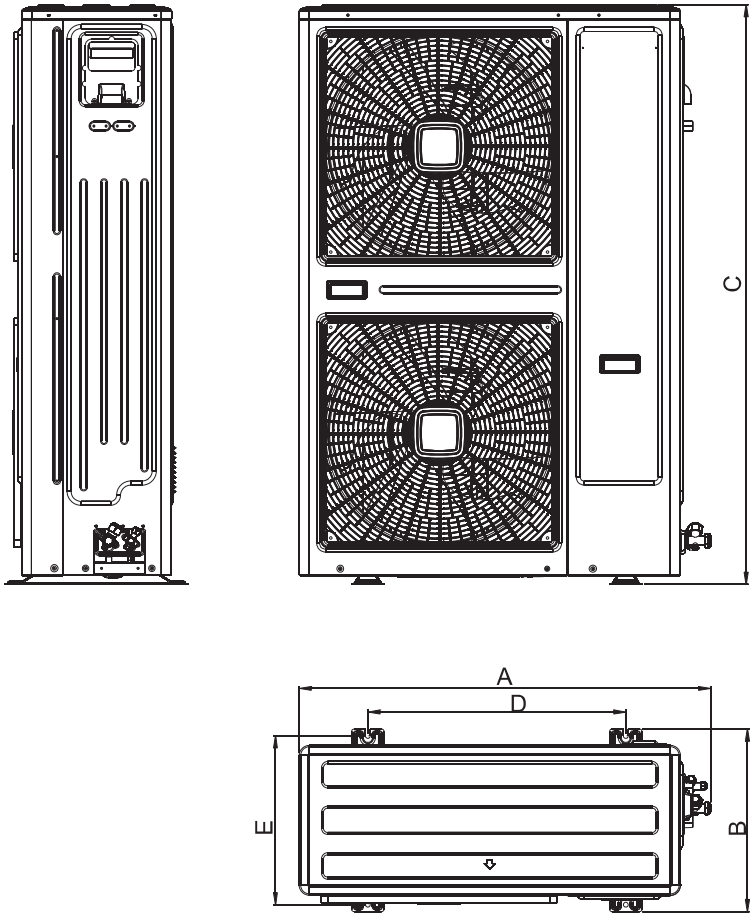


Figure3-2(125~224)

Table 3-2: unit :mm

Model of outdoor unit \ Size code	A	B	C	D	E
200/224	1015	450	1430	636	417
125/140/160/180	975	400	1335	586	370

3-4 Hoisting of outdoor unit

1) No packing material can be removed during hoisting, hoisting shall be made by two ropes of 8cm above bound on the package, and the machine must be balanced and hoisted safely and reliably. If there is no package or the packing material is broken, some backing board or packing material shall be used for protection.

2) The outdoor units shall be handled and hoisted vertically within 15°, and safety is the most important during handling and hoisting.

3) The unit center of gravity is not in the center, so please take care when lifting.

4) Never hold the housing suction inlet, or it will deform.

3-5 Installation and maintenance space of outdoor unit

1) Provide a firm and adequate foundation to:

① Protect the outdoor machine from sinking;

② Prevent any abnormal noise cause by the foundation.

2) Foundation type

① Steel structure

② Concrete structure (shown as the figure)

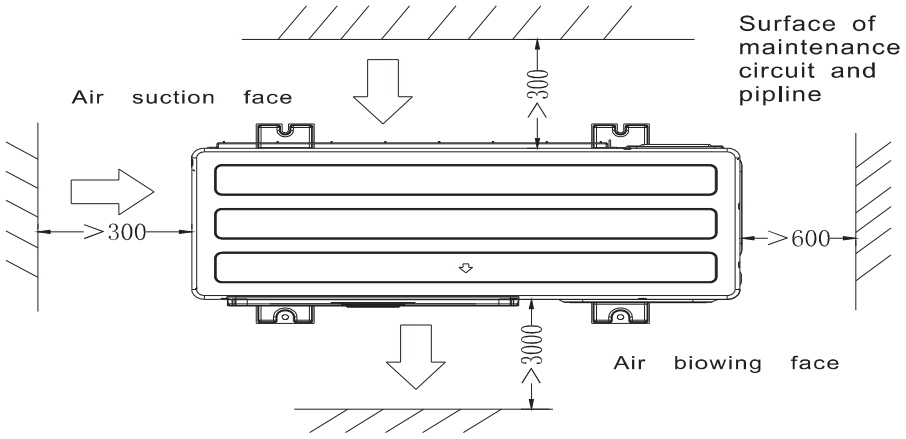


Figure 3-3

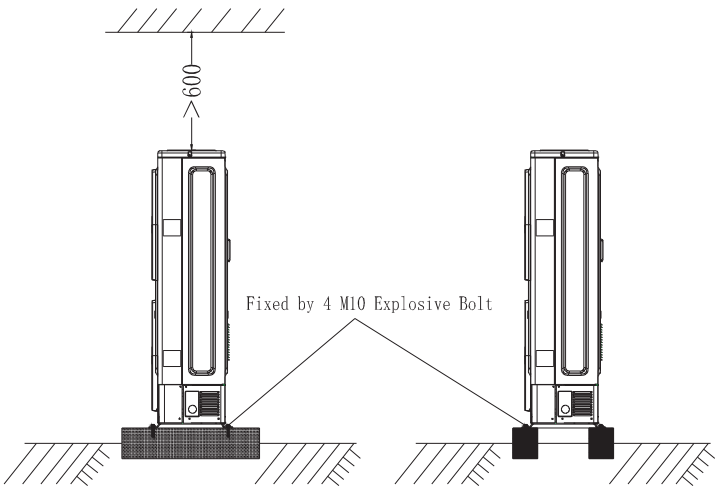


Figure 3-4

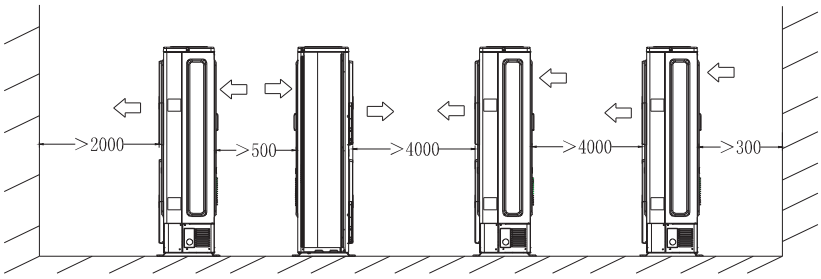


Figure 3-5

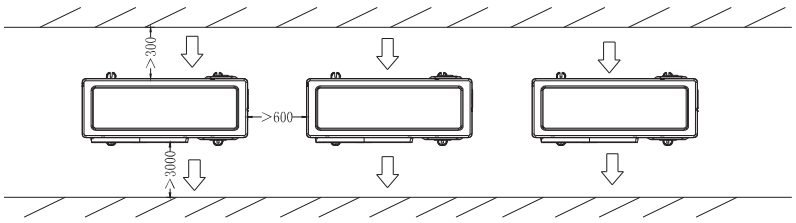


Figure 3-6

3-6 Exit pipe position and installation

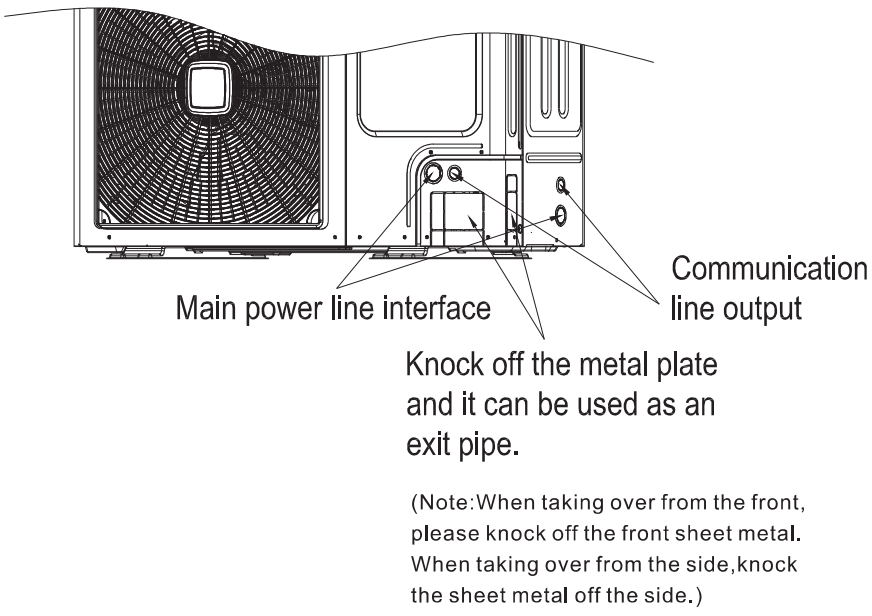


Figure 3-7

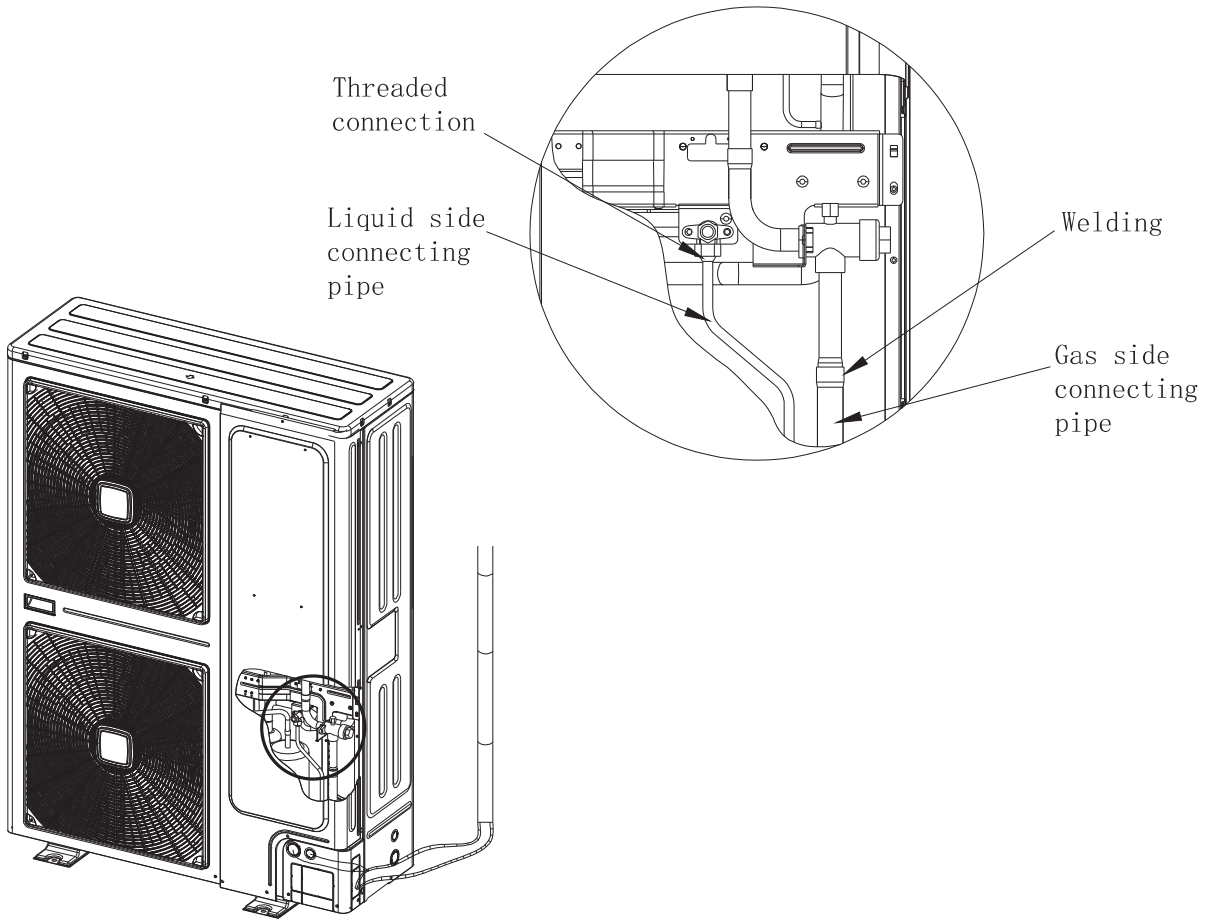


Figure 3-8

3-7 Chassis centralized drainage

When the outdoor unit needs a centralized drainage, shown in Figure 3-9.Install the curved outlet pipe and the plug together with the chassis,then connect the drain centralized drainage.

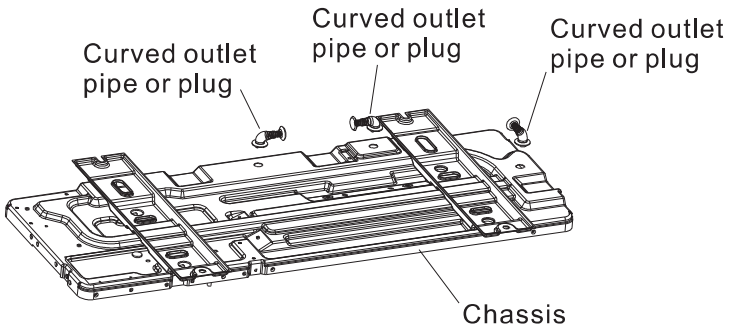


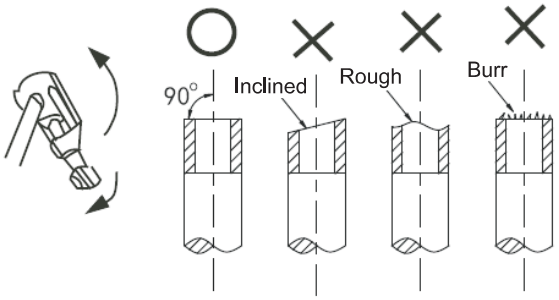
Figure 3-9

4.Connecting pipe installation

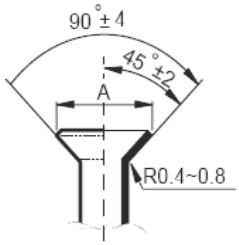
4-1 Refrigerant piping

4-1-1 Flaring

Use a pipe cutter to cut the refrigerant pipe and use an expander to make a flaring.

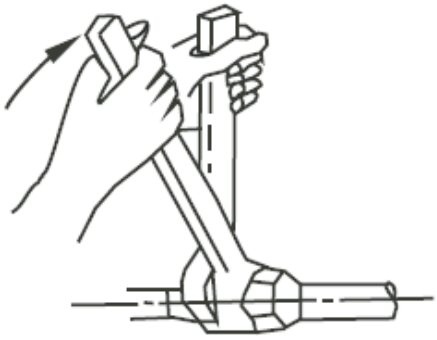


External diameter (mm)	A(mm)	
	Maximum	Minimum
Φ6. 4	8. 7	8. 3
Φ9. 5	12. 4	12. 0
Φ12. 7	15. 8	15. 4
Φ15. 9	19. 0	18. 6
Φ19. 1	23. 3	22. 9



4-1-2 Fastening nut

Align the connecting pipe, tighten it by hand, and then use a wrench to further tighten it



Piping size (mm)	Tightening torque (N. m)
Φ6. 4	14. 2～17. 2 N. m (144～176 kgf. cm)
Φ9. 5	32. 7～39. 9 N. m (333～407 kgf. cm)
Φ12. 7	49. 5～60. 3 N. m (504～616 kgf. cm)
Φ15. 9	61. 8～75. 4 N. m (630～770 kgf. cm)
Φ19. 1	97. 2～118. 6 N. m (1115～1364 kgf. cm)

Notice

1.To prevent the copper pipe from internal oxidation, its welding must be done with nitrogen filled. Otherwise, the oxide skin will plug the refrigeration system!

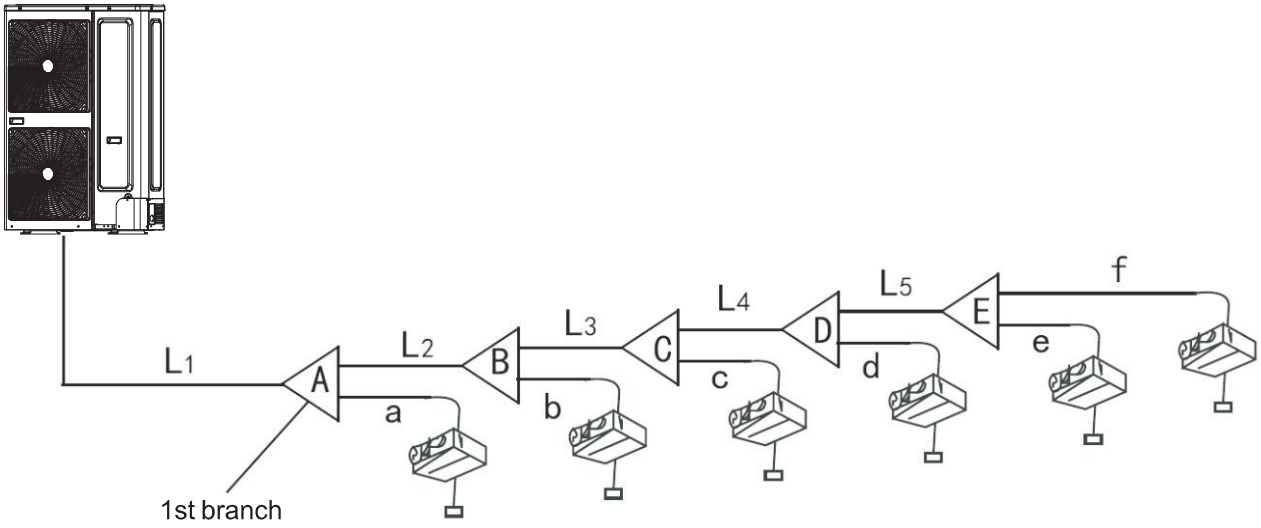
2.While the nut is being fastened, too much force will break the flared socket, but too weak force will result in leakage. Please refer to the tightening torque in the table above to fasten the nuts.

4-2 Set refrigerant pipe dimension and joint pipe steps

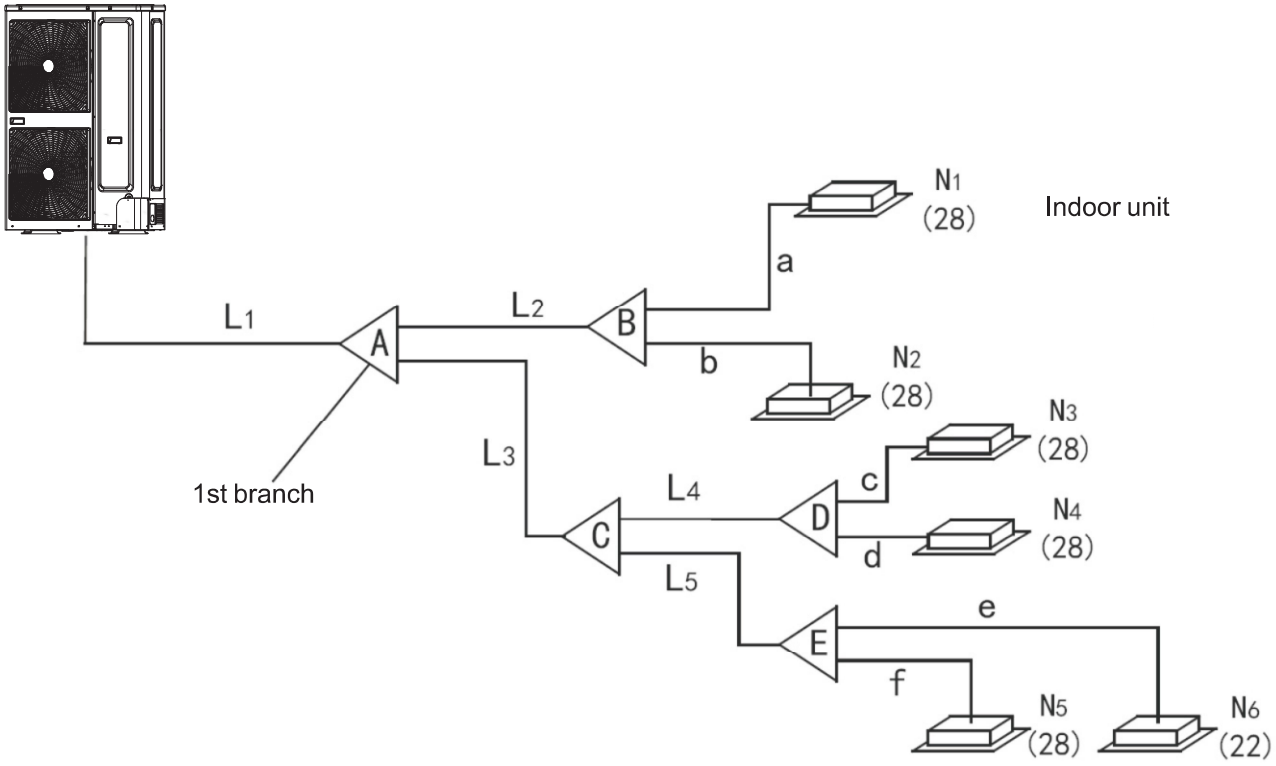
Piping name	Piping connecting position	Code
Main pipe	Pipe from the outdoor unit to the first indoor branch	L_1
Main piping for indoor unit	Pipe after the first indoor manifold and indirectly connected to the indoor unit	L_2~L_5
Branch piping for indoor unit	Pipe after the manifold and directly connected to the indoor unit	a, b, c, d, e, f
Branch manifold assembly for indoor unit	Piping assembly for connecting the main pipe, main branch piping and branch piping	A, B, C, D, E

4.Connecting pipe installation

Connecting mode 1



Connecting mode 2



Notice

1.All branches must adopt our company's special branch pipes. Otherwise, it may cause severe faults of the system!

2.The indoor unit should be equally installed on both sides of the U-type branch.

4-3 Main pipe (L1) diameter confirmation

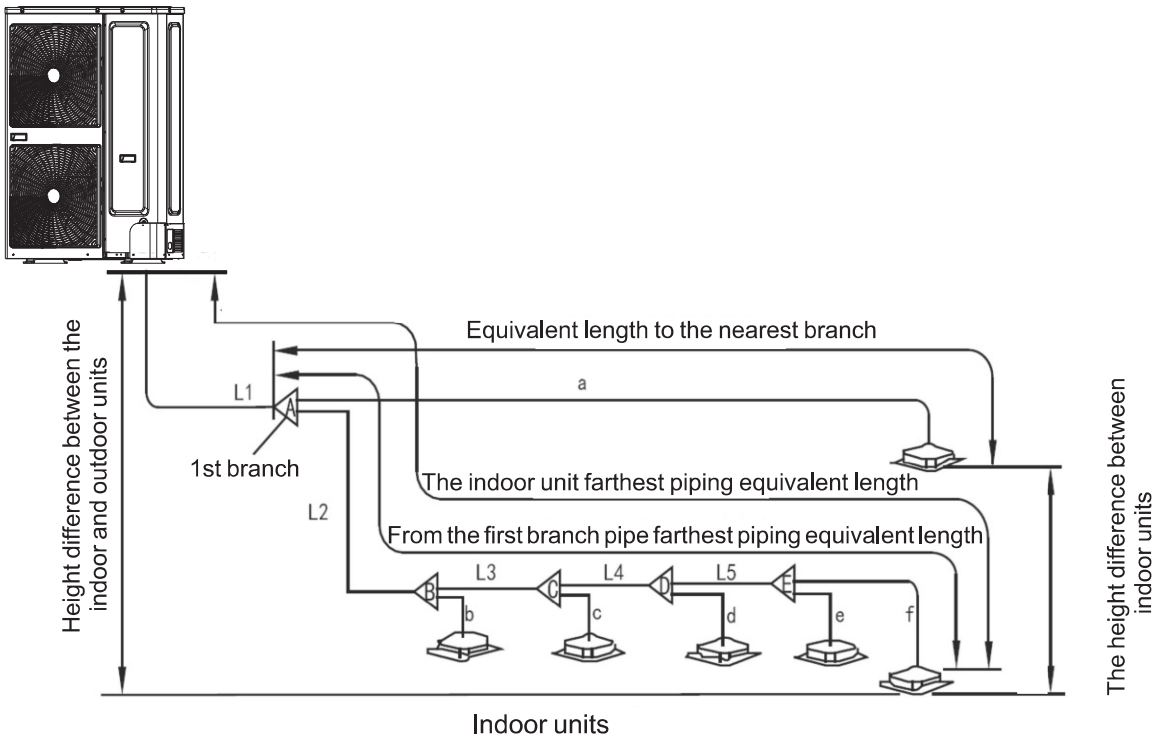
Outdoor unit capacity (kW)	Piping					
	L1＜30m			L1≥30m		
	Main pipe(mm)		First branch	Main pipe(mm)		First branch
	Liquid pipe	Gas pipe		Liquid pipe	Gas pipe	
12.5/14/16	Φ9.52	Φ15.88	SP-FQG-N01D	Φ9.52	Φ19.05	SP-FQG-N01D
18/20/22.4	Φ9.52	Φ19.05	SP-FQG-N01D	Φ9.52	Φ22.2	SP-FQG-N01D
26.0	Φ9.52	Φ22.2	SP-FQG-N02D	Φ12.7	Φ25.4	SP-FQG-N02D
28.0	Φ12.7	Φ28.6	SP-FQG-N03D	Φ12.7	Φ28.6	SP-FQG-N03D
33.5	Φ12.7	Φ28.6	SP-FQG-N03D	Φ12.7	Φ28.6	SP-FQG-N03D

4-4 Main pipe (L2-L5) diameter of IDU confirmation

Downstream indoor unit Capacity(kW)	Downstream equivalent piping length		
	Main piping dimension of IDU(mm)		Applied branch pipe
	Liquid pipe	Gas pipe	
W＜6.5	Φ9.52	Φ12.7	SP-FQG-N01D
6.5≤W＜18	Φ9.52	Φ15.88	SP-FQG-N01D
18≤W≤22.4	Φ9.52	Φ19.05	SP-FQG-N01D
22.4＜W＜28	Φ9.52	Φ22.2	SP-FQG-N02D
28≤W≤33.5	Φ12.7	Φ28.6	SP-FQG-N03D

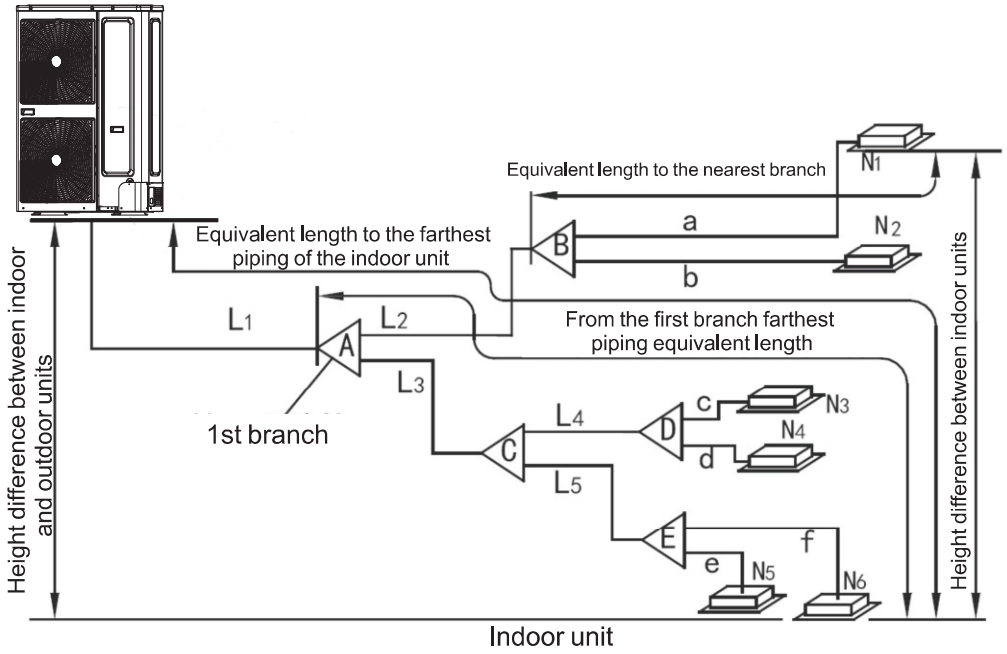
4-5 Allowed length and height difference of refrigerant pipe

Connecting mode 1



4.Connecting pipe installation

Connecting mode 2



				Allowable value	Piping part
12.5kW 14.0kW 16.0kW 18.0kW 20.0kW 22.4kW	Piping length	Total piping length		≤100m	L1+L2+L3+L4+L5+a+b+c+d+e+f
		Farthest piping length L	Actual length	≤60m	L1+L2+L3+L4+L5 +f (Connecting mode 1) or L1+ L3 +L5 +f (Connecting mode 2)
			Equivalent length	≤70m	
		Equivalent length to the farthest piping of the first branch		≤20m	L2+L3+L4+L5 +f (Connecting mode 1) or L3 +L5 +f (Connecting mode 2)
		Equivalent length to the nearest branch		≤15m	a, b, c, d, e, f
	Height difference	Height difference between indoor and outdoor units	Outdoor upper	≤30m	—
			Outdoor lower	≤20m	—
		Height difference between indoor units		≤8m	—

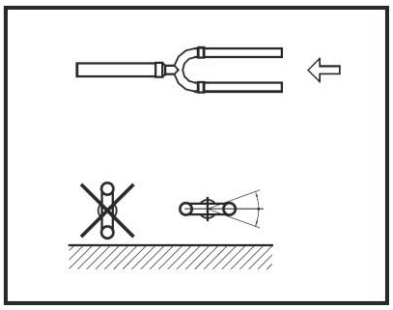
				Allowable value	Piping part
26.0kW 28.0kW 33.5kW	Piping length	Total piping length		≤120m	L1+L2+L3+L4+L5+a+b+c+d+e+f
		Farthest piping length L	Actual length	≤60m	L1+L2+L3+L4+L5 +f (Connecting mode 1) or L1+ L3 +L5 +f (Connecting mode 2)
			Equivalent length	≤70m	
		Equivalent length to the farthest piping of the first branch		≤20m	L2+L3+L4+L5 +f (Connecting mode 1) or L3 +L5 +f (Connecting mode 2)
		Equivalent length to the nearest branch		≤15m	a, b, c, d, e, f
	Height difference	Height difference between indoor and outdoor units	Outdoor upper	≤30m	—
			Outdoor lower	≤20m	—
		Height difference between indoor units		≤8m	—

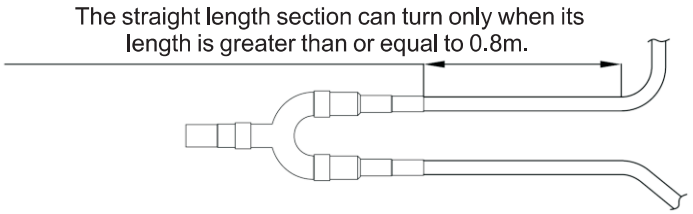
4-6 Installation of branch pipes

1)The branch pipes should adopt U-type or Y-type ones, but never T-type ones.

2)The branch pipe must be installed horizontally,with the deviation angle no greater than ±10°.

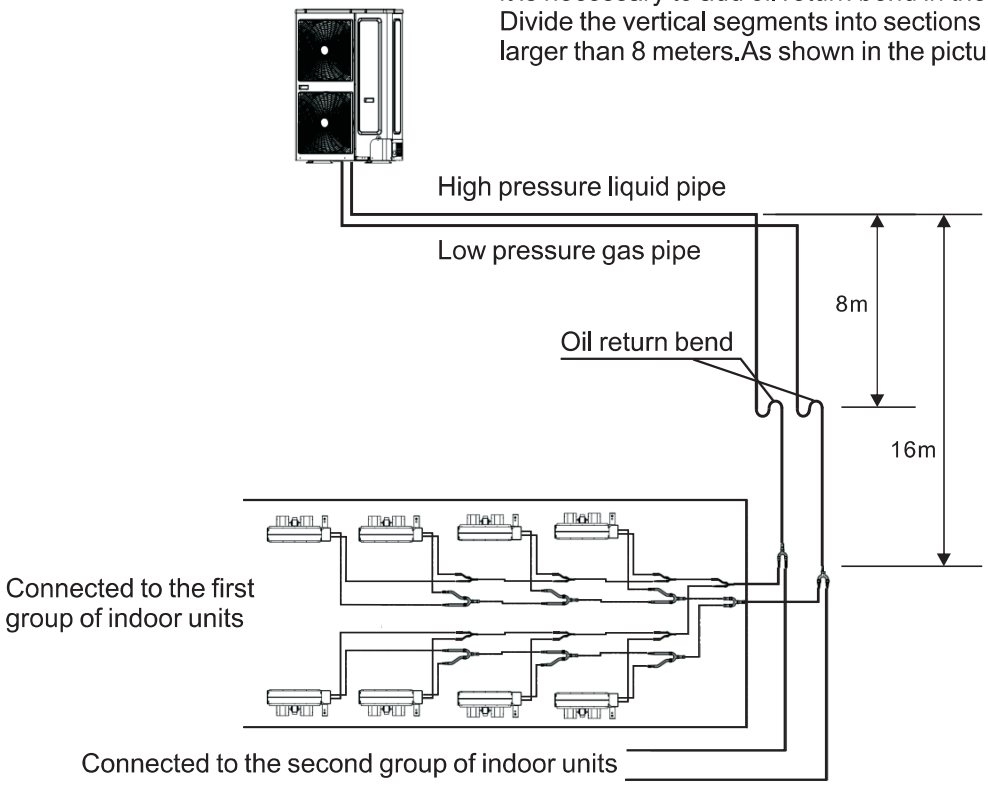
3)The branch pipe cannot turn directly when led out, and the straight length section cannot be less than 0.8 meters.





4-7 Oil return bend settings

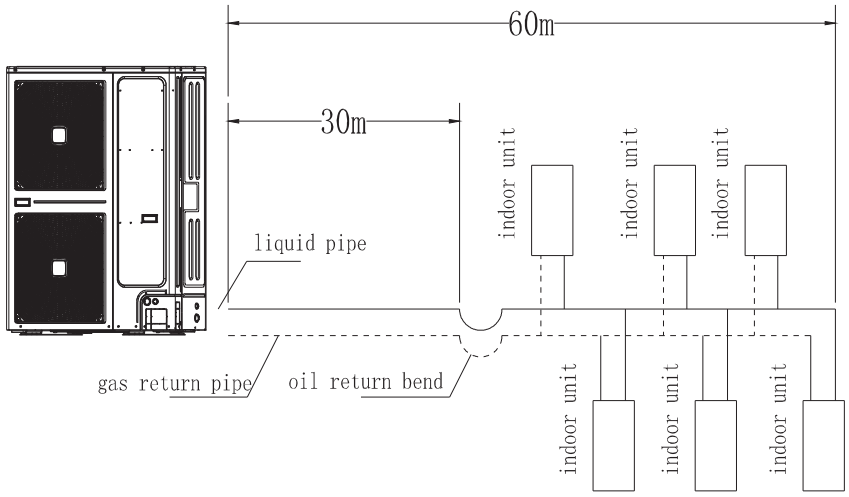
Note:When the vertical height is more than 10 meters, it is necessary to add oil return bend in the middle. Divide the vertical segments into sections not larger than 8 meters.As shown in the picture:



Oil return bending pipe set of vertical direction

Explaination:

When the horizontal distance is over 40m, it is necessary to add the oil return bend in the middle. The horizontal pipe is divided into each period of less than 30m. As shown in figure.



setting of the horizontal oil return bend

4-8 Remove foreign materials in the pipeline.

1) The refrigerant piping may be subject to foreign materials in time of installation, so it must be cleaned with high pressure nitrogen;

2) While cleaning, never connect the indoor unit;

3) Never use refrigerant or oxygen and any other combustible toxic gas to replace nitrogen.

4-9 Gas tightness test

1) After the refrigerant piping has been installed with the indoor unit connected and before the indoor-outdoor connecting pipe is connected to the outdoor unit valve, you must inject the nitrogen of 40kgf / cm ² (4.0MPa) at the same time from the gas and liquid side with the pressure value correctly identified for a 24 hours' air tightness test.

2) If the pressure is found dropping, then check the leakage of all interfaces and then keep the pressure for 24 hours.

3) During pressure maintenance, never connect the outdoor unit.

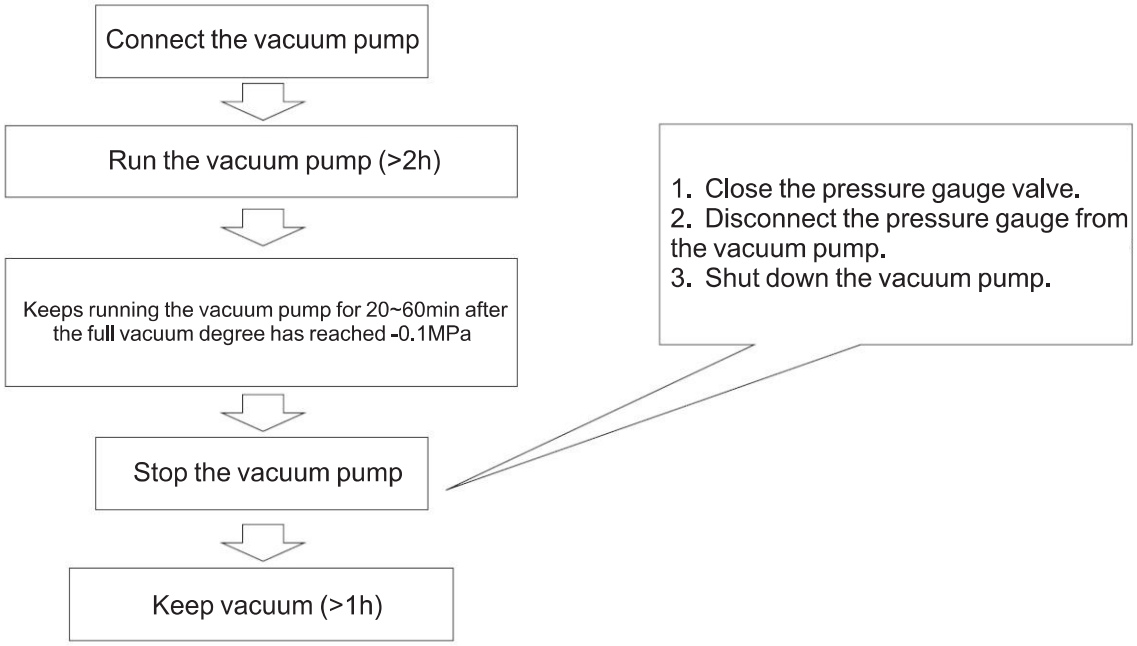
4-10 Vacuumizing by a vacuum pump

1) The vacuum degree of the vacuum pump is -0.1MPa below and the air flow rate is 40L/min above.

2) Vacuumization for the outdoor unit is unnecessary, and it is forbidden to open the check valves at the gas side and liquid side of the outdoor unit.

3) Make sure the vacuum pump can reach -0.1MPa below within 2 hours, and if it fails to reach -0.1MPa below after 3 hours, it means some water or air has mixed inside, and the pump and pipeline system must be inspected.

4) Vacuum pump must have check valve.



Notice

- Tools and measuring apparatus for different refrigerants or directly contacting the refrigerant cannot be mixed for using.
- Refrigerant gas cannot be used for air impelling.
- If the vacuum degree cannot reach -0.1MPa, please check if there is some leakage, and if not, please make the vacuum further run for 1~2h.

4-11 Refrigerant refilling volume

The volume of refrigerant to be refilled (R410A) is calculated as per the diameter and length of pipe at the liquid side of the outdoor and indoor units.

Diameter of piping at liquid side	Refrigerant of to be refiled for every 1m of pipe length(unit:kg)
Φ6.35	0. 022
Φ9.52	0. 054
Φ12.7	0.110

Notice: Refrigerant R410A must be weighed for refilling by an electronic weigher in the liquid mode.

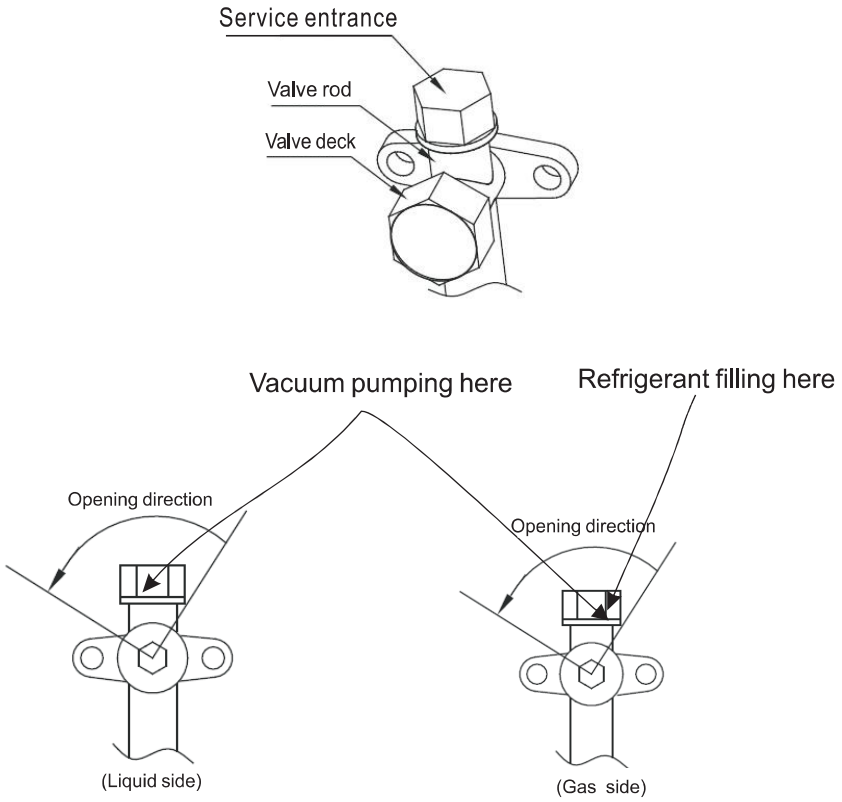
4-12 Stop valve instructions

1) It is at its closed state when delivered;

2) Use a 6mm socket head wrench to open or close the valve, turn counterclockwise to open it, and clockwise to close it;

3) After the operation is finished, the valve cover must be tightened;

4) In time of vacuum pumping and refrigerant filling through the service entrance, the R410A special tool must be used. Fill in refrigerant through service entrance to the gas side valve, and carry out vacuum pumping simultaneously at the liquid and gas side valves.



4-13 Piping insulation treatment

1) Apply insulation treatment to the gas and liquid side piping respectively;

2) Use obturator heat insulating materials, with the flame retardant grade of B1 and high temperature resistance of 120℃;

3) When the copper pipe diameter ≤Φ12.7, the cotton insulation thickness shall be no less than 15mm; the copper pipe diameter ≥Φ15.88, the cotton insulation thickness shall be no less than 20mm.

4) The indoor unit nut joints must accept heat insulation treatment.

5.Electrical wiring

Notice

Precautions in electrical wiring

1)The power supplies for indoor unit and outdoor units shall be separately designed.

2)The power supply must be designed with special branch circuit, and equipped with current leakage protector and manual switch.

3)The indoor unit power supply in the same system must be in the same circuit and switched on or off at the same time, each indoor unit cannot mounted power switch.

4)The indoor and outdoor connecting and wiring system shall be included in the same system with the refrigerant pipe system.

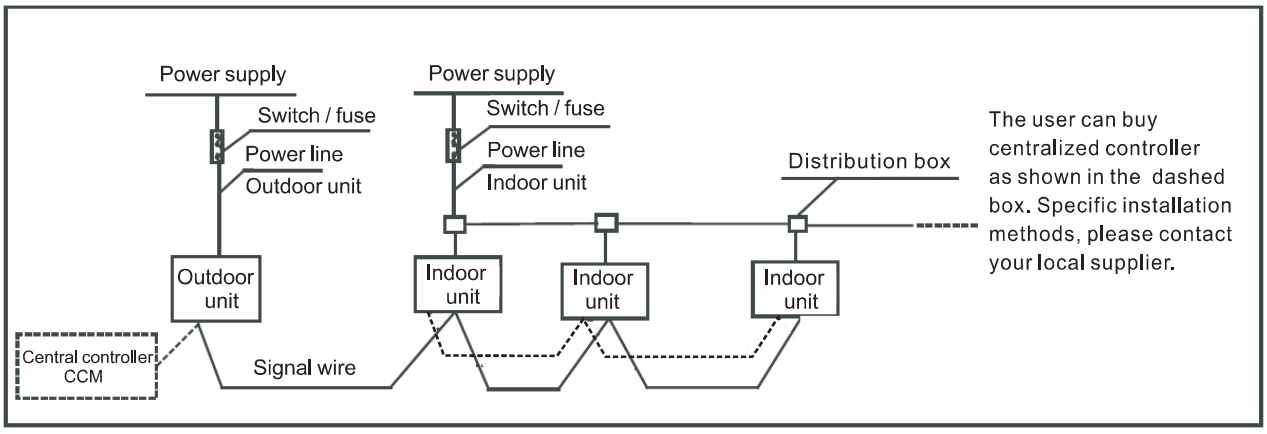
5)To reduce the interference, the indoor and outdoor signal line shall be the 3-core shielded cable other than unshielded multi-core cable.

6)Electrical wiring shall be performed according to national related standards.

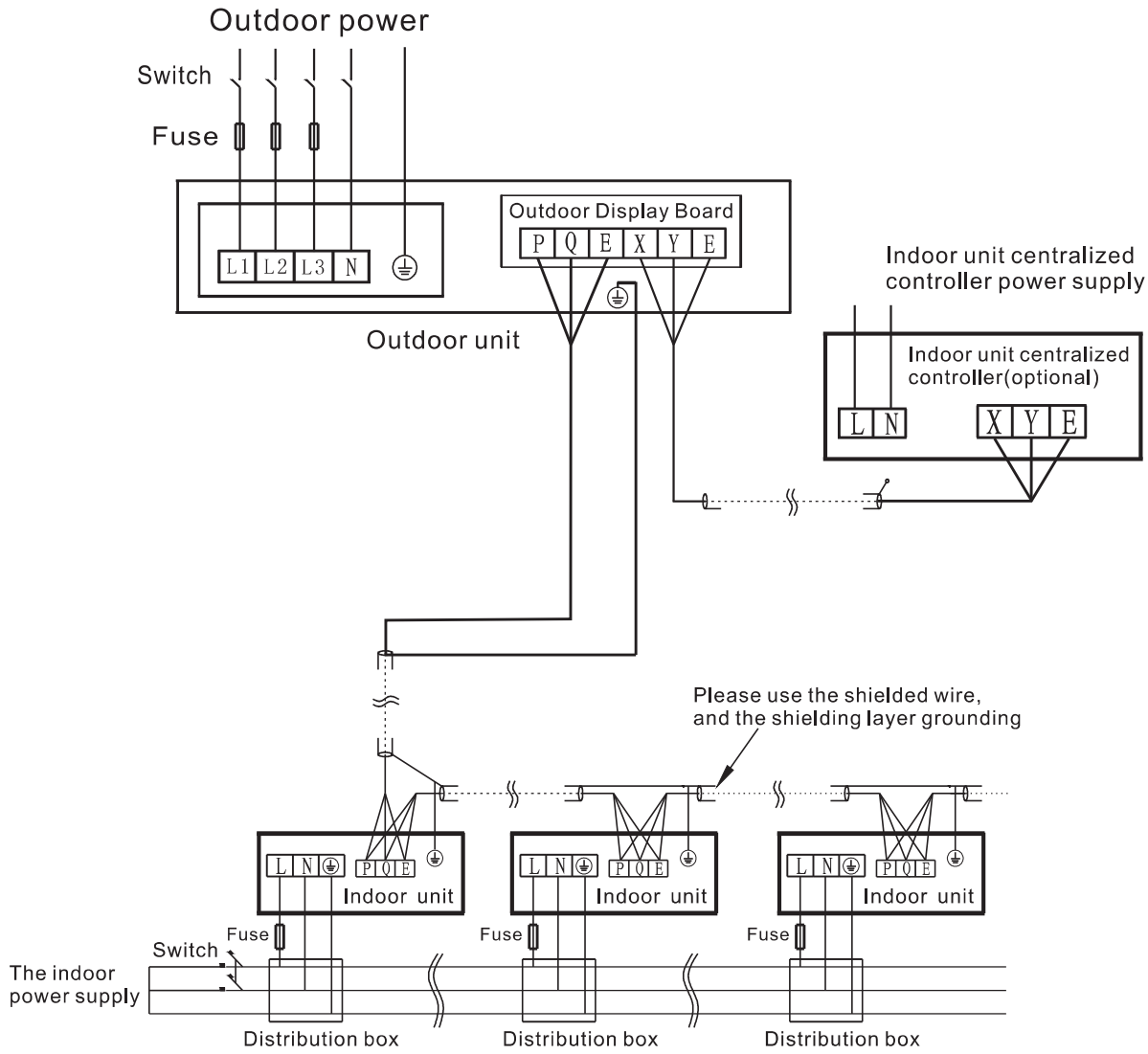
7)Electrical wiring must be done by a professional electrician.

5-1 Outdoor unit power supply wiring

Power		125/140/160/180	200/224/260	280	335
Out door Power	Phase	3 phases	3 phases	3 phases	3 phases
	Voltage and frequency	380~415V 50&60Hz	380~415V 50&60Hz	380~415V 50&60Hz	380~415V 50&60Hz
	Power wire(㎟)	5X2.5	5X6	5X6	5X6
Breaker/fuse(A)		25	30	40	40
Indoor unit/outdoor unit signal wire(㎟) (weakness electric signal wire)		3 cores shield wire 3X1.0			(2 cores shield wire 2X1.0)



5.Electrical wiring

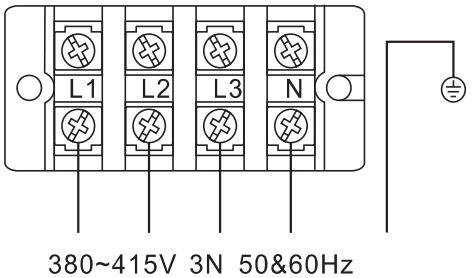


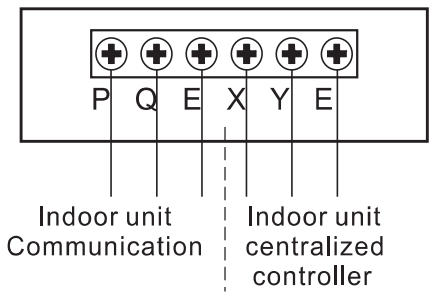
Electrical connection mode of outdoor unit

Note: 1.When the signal line adopts a 2-core shielded wire, the shielding net should be connected to “E” of the terminal; when a 3-core shielded wire, the shielding network must be connected to the ground.

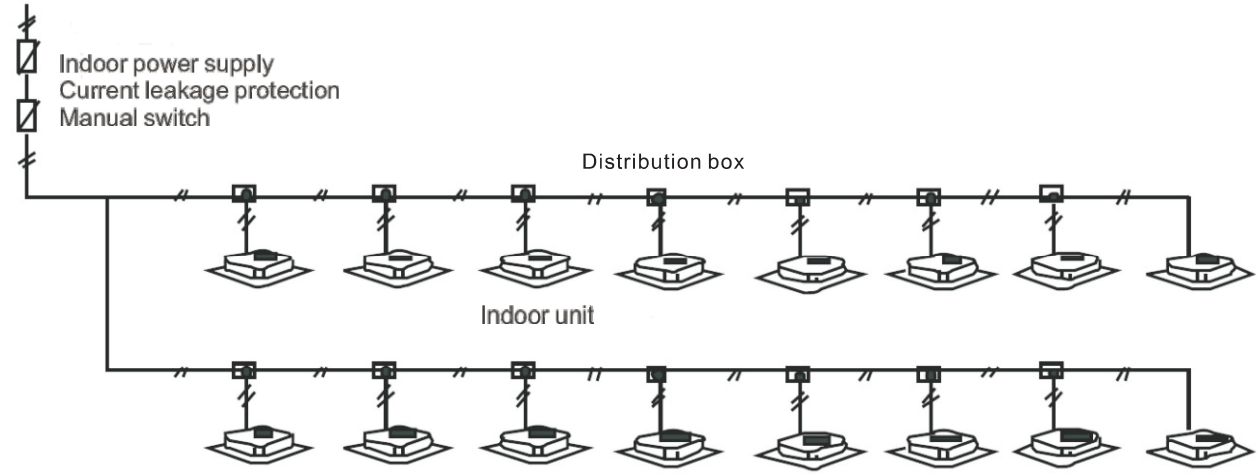
2.Never connect the power line (strong current) to the signal line (weak current) terminal. Otherwise, the electronic controller will be burnt out.

5-2 Terminal Function Description





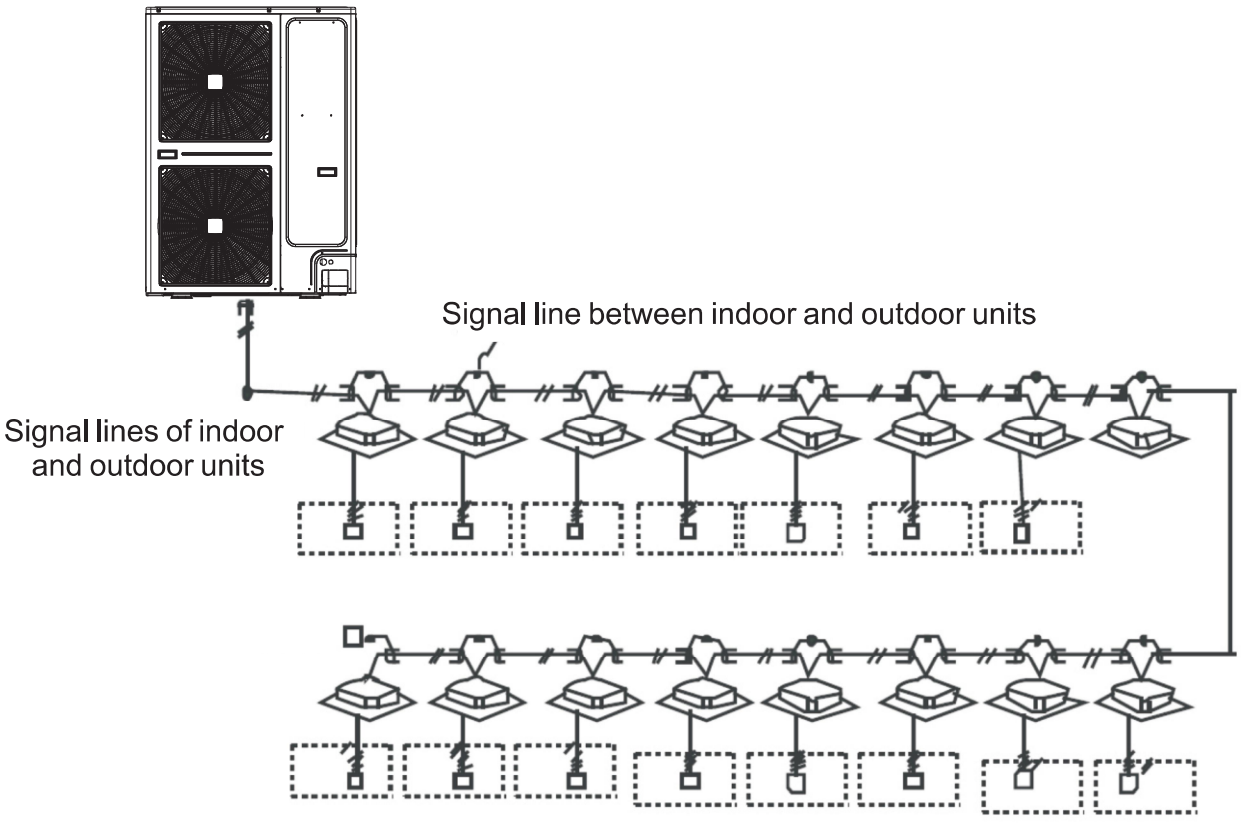
5-3 Indoor unit power supply wiring



Notice

When the power line is parallel to the signal line, please put the electric wire into their own line pipes, and proper line spacing (10A or below: 300mm, 50A or below: 500mm) should be left.

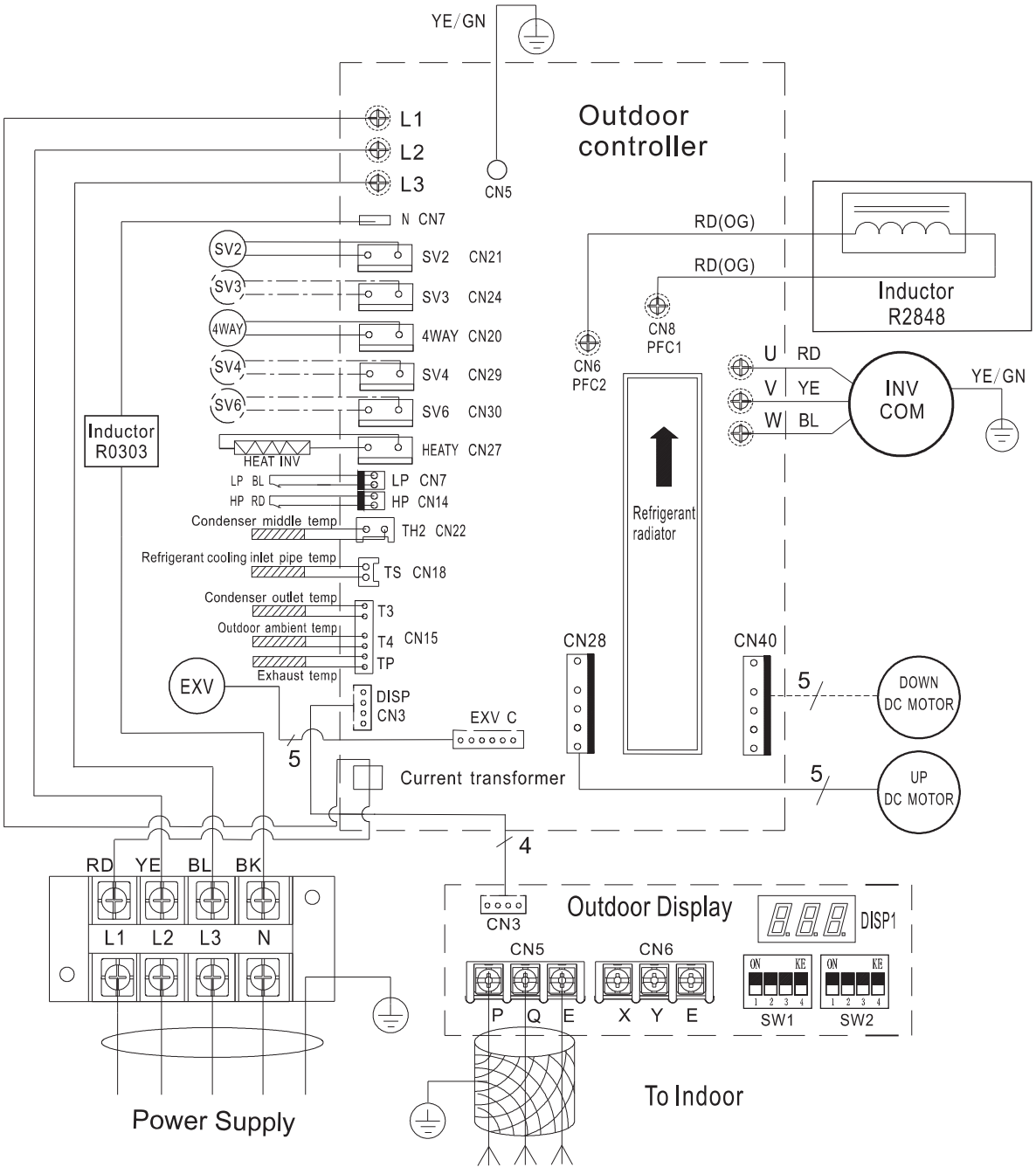
5-4 Indoor unit signal line wiring



When needed, the user can purchase a wire controller, as shown in the dashed box.

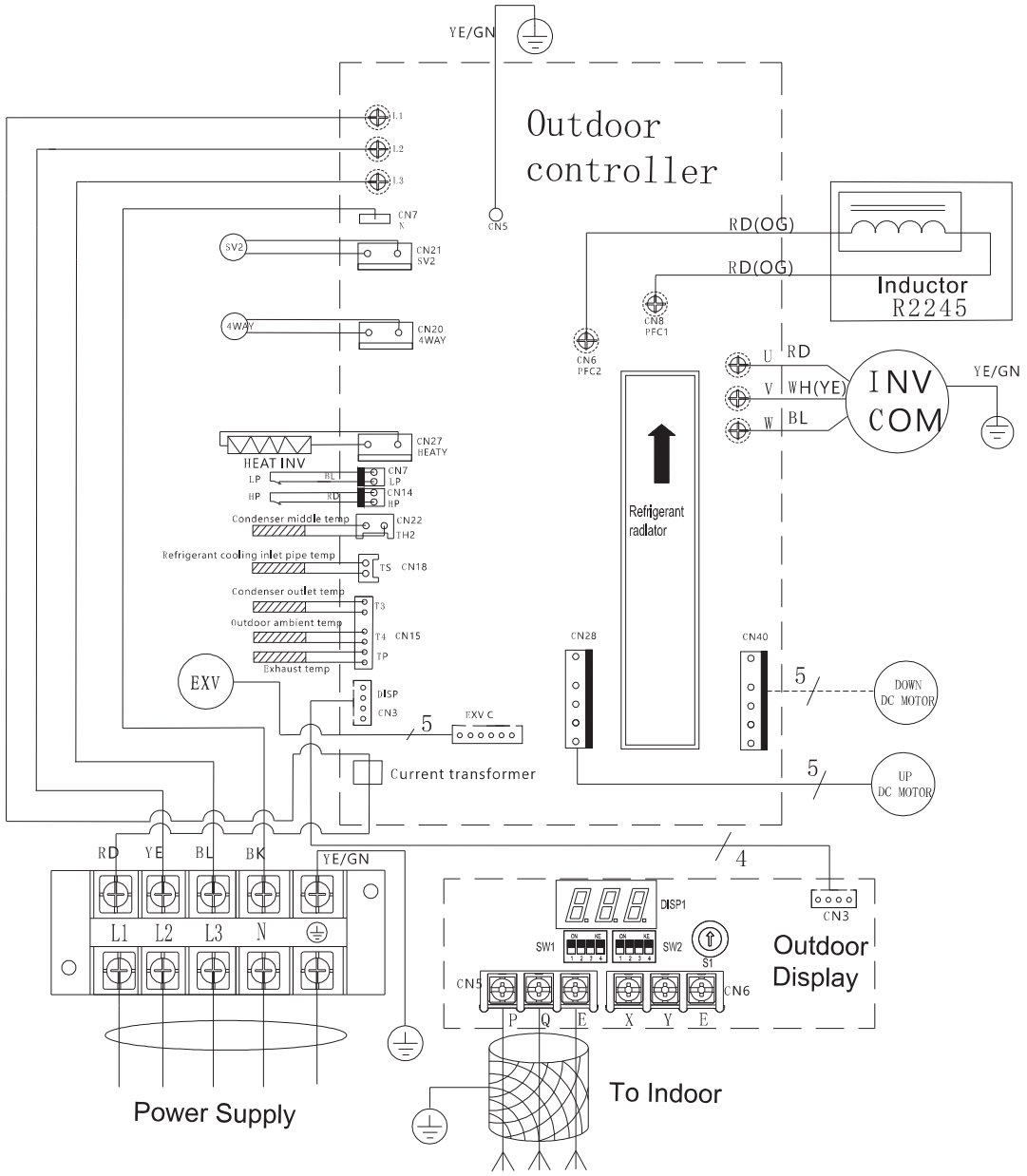
5-4 Wiring figure

260/280/335



Note: the power line where the current transformer is located passes through the current transformer.

125~224



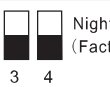
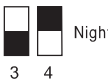
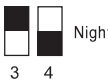
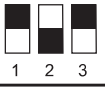
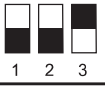
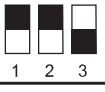
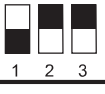
Note: the power line where the current transformer is located passes through the current transformer.

5-5 Outdoor unit spot-check instructions

Description for spot inspection

Check Table			
NUM	Display content	NUM	Display content
0	Frequency / the number of indoor units	16	DC current
1	Outdoor power	17	AC voltage(Actual value=display value *2)
2	Run mode (0:shut down/air supply;2:refrige -ration;3:heating;4:forced refrigeration)	18	DC voltage(Actual value=display value *4)
		19	The number of indoor units
3	Indoor demand	20	The number of running indoor units
4	Outdoor after correction demand	21	Priority mode: 0:automatic selection; 1:Heating mode preferred; 2:Refrigeration mode preferred; 3:Only heating mode; 4:Only refrigeration mode; 5:According to the first mode ; 6:VIP+Automatic mode priority
5	Actual operation ability		
6	Fan speed state (0-8)	22	Reserved
7	T2/T2B average temp.	23	Reserved
8	T3 condenser outlet temp.	24	Reserved
9	T3B condenser middle temp.	25	Reserved
10	T4 outdoor ambient temp.	26	Frequency limit display: 0:unlimited frequency; 1:T3B frequency limits; 2:T4 frequency limits; 4:TP frequency limits; 8:Voltage limiting frequency; 16:current limiting frequency; 32:T6 restrictions; 64:mute frequency limit
11	TP exhaust temp.		
12	T6/T9 module temp.	27	Last failure or protection code
13	T7 refrigerant cooling inlet pipe temp.	28	Soft version
14	Electronic expansion valve opening (Actual value=Show value * 4)	29	Memorizer version
		30	- - -
15	AC current		

Failure and Protection			
Code	Failure or protection definition	Code	Failure or protection definition
E1	Phase sequence failure	P1	High pressure protection
E2	Comm. failure between indoor and outdoor units	P2	Low pressure protection
E4	Environment temperature sensor failure(T4)	P3	Over current protection
E6	Condensate temperature sensor failure(T3)	P4	Excessive exhaust temperature protection
E8	TP temperature sensor failure(TP)	P5	T3 or T3B condenser over temperature protection
E9	AC overvoltage/undervoltage protection	P6	IPM modules protection
E10	EEPROM failure	P9	DC fan protection
EA	Condensate temperature sensor failure(T3B)	P10	Protected against typhoons
Eb	Reserved	P11	Heating T2 high temperature protection
Ec	Refrigerant cooling inlet pipe temperature sensor failure(T7)	P13	The current detect abnormal protection
H0	Comm. failure between master chip and DSP	Pb	Module over temperature protection
H4	The protection of three times P6 in 30 minutes		
H5	The protection of three times P2 in 30 minutes		
H6	The protection of three times P4 in 100 minutes		
H7	The decrease in the number of indoor		
H9	The protection of two times P9 in 10 minutes		
H10	The protection of three times P3 in 60 minutes		
H11	The protection of two times P13 in 10 minutes		
H12	The protection of three times Pb in 60 minutes		

SW1 Description (NO. 1 & NO. 2)	SW1 Description (NO. 3 & NO. 4)
 Standard silence mode (Factory default)  Reserved	 Night time 6/10 (Factory default)  Night time 8/12
 Nocturnal silence mode  Force mute mode	 Night time 8/10  Night time 6/12
SW2 Description (NO. 1 & NO. 2 & NO. 3)	 According to the first mode
 Automatically select mode is preferred (Factory default)	 Only heating mode
 Refrigeration mode is preferred	 Only refrigeration mode
 Heating mode is preferred	 VIP+Automatically select mode is preferred

6-1 Inspection and confirmation before debugging

1) Check and make sure the refrigerating pipeline and communication line between the indoor and outdoor units are in the same refrigerating system, or some operation fault may occur.

2) The voltage power supply is within ±10% of the rated voltage.

3) Check and make sure the power supply line and control line are correctly connected.

4) Make sure there is not short circuit before the system is electrified.

5) Make sure all units have passed the 24h nitrogen pressure maintaining test (40kgf/cm^2).

6) Make sure the system is fully vacuumized, dried and filled with the refrigerant as per the specification.

6-2 Preparation before debugging

1) Calculate the amount of refrigerant to be refilled as per the field liquid pipe length.

2) Prepare the required refrigerant.

3) Prepare the system planar drawing, system pipeline drawing and control line drawing.

4) Record the well set address codes on the system planar drawing.

5) Turn on the outdoor unit power supply switch in advance, and make sure it is connected for more than 12h to make the heater heating the compressor oil.

6) Fully open the outdoor unit gas pipe check valve, liquid pipe check valve and oil balance valve, or the machine may be damaged.

7) Check if the phase sequence of the outdoor unit power supply is correct.

8) Check if all dialing switches of the outdoor and indoor units are set as per the product technical requirement.

6-3 Name filling of connected systems

When setting several indoor units, each connecting system of the indoor unit and outdoor units shall be identified and named and recorded on the nameplate of outdoor unit electrical control box cover

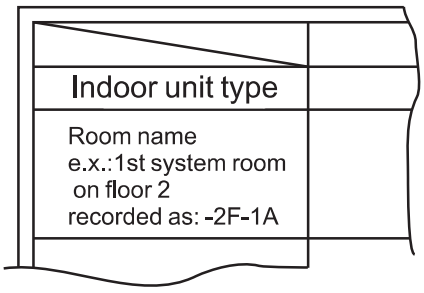


Fig. 6.1

6-4 Precautions against refrigerant leakage

1) The refrigerant itself of this air conditioner is harmless, nonflammable and safe.

2) The air conditioner room shall be of a suitable space size so that the refrigerant concentration will not go beyond the limit even if leakage happens, and some necessary measures can be taken additionally.

3) The critical gas concentration harmless for the human body is 0.3kg/m^3 .

4) Confirm the critical concentration as per the following steps and take necessary measures correspondingly.

a) Calculate the full volume of refrigerant to be filled (A[kg])

Full refrigerant volume = refrigerant volume at delivery (see the nameplate) + refrigerant volume to be refilled for the corresponding pipe length

b) Calculate the indoor cubage (B[m^3]) (as per the minimum cubage)

c) Calculate the refrigerant concentration

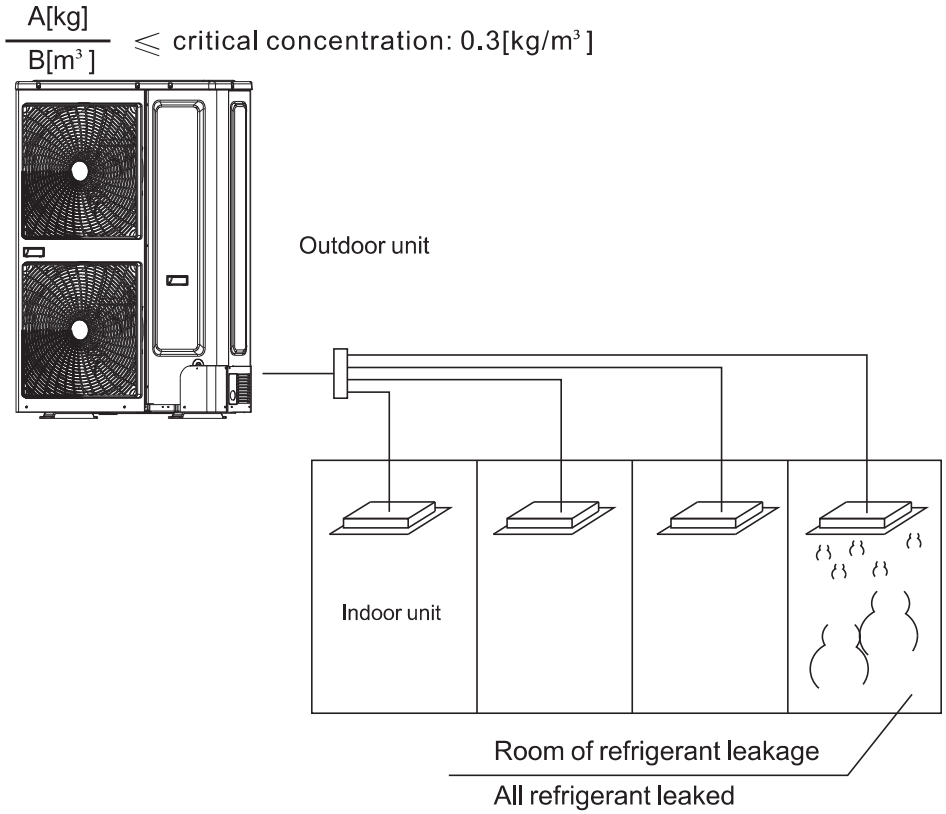
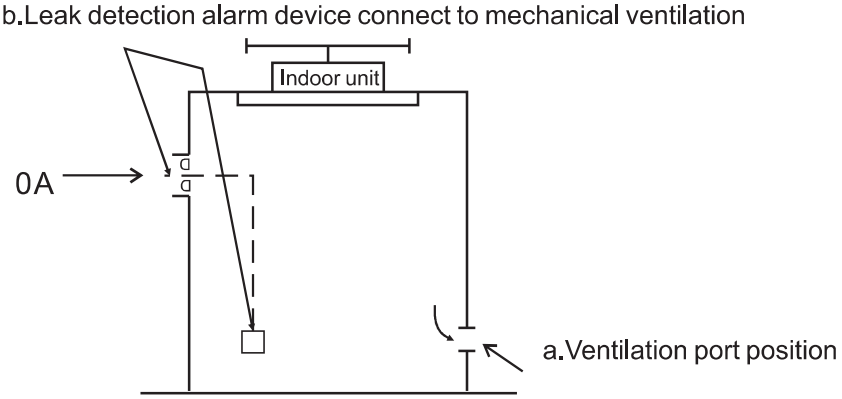


Fig. 6.2

5) Measures against exceeding the critical concentration

a) To control the refrigerant concentration below the critical concentration, a mechanical air ventilating device shall be installed (for frequent air ventilating).

b) If frequent air ventilating cannot be realized, please install a leakage warning and detecting apparatus interlinked with the mechanical air ventilating device.



(the leakage warning and detecting apparatus shall be installed in a place with dense refrigerant accumulation)

Fig. 6.3

802000190368
A-ZM36ENG-3