



Freedom **SERIES**

User Manual



CONTENT

PART 1 FREEDOM SERIES UNIT

1. Specifications
2. Dimensions
3. Service Space
4. Piping Diagrams
5. Wiring Diagrams
6. Electric Characteristics
7. Operation Limits

PART 2 INSTALLATION

1. Precaution on installation
2. Vacuum dry and leakage checking
3. Additional refrigerant charge
4. Water drainage
5. Insulation Work
6. Wiring
7. Test operation

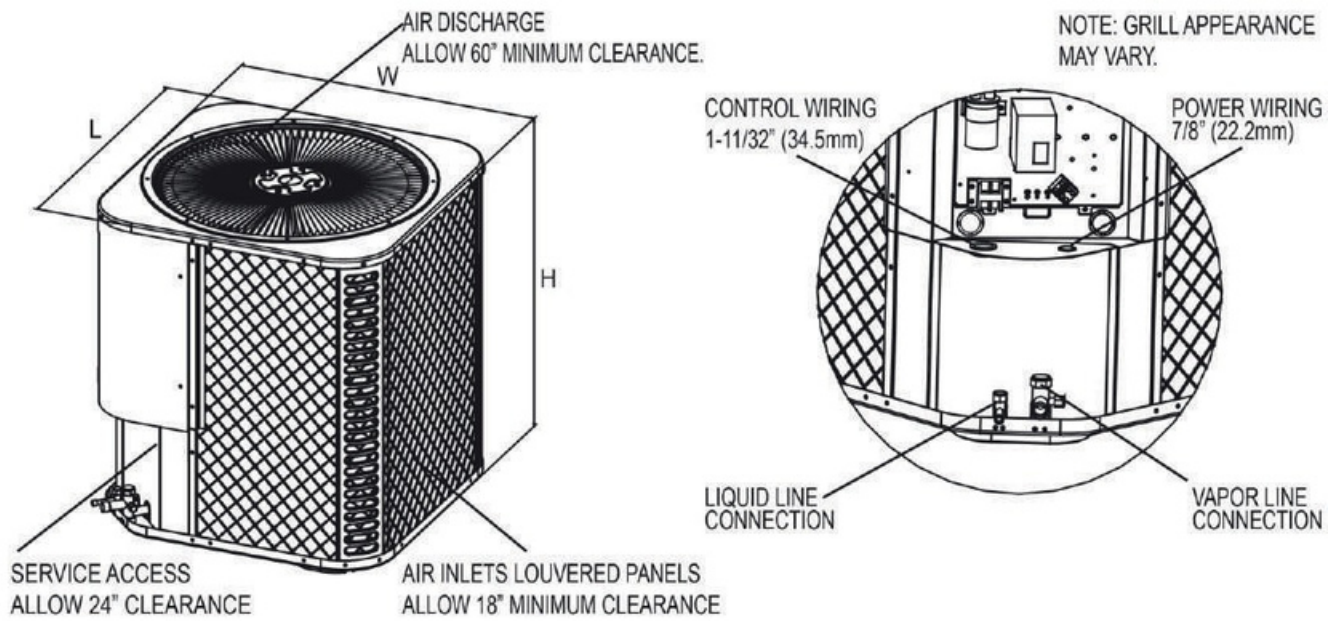
※ The specifications, designs, and information in this book are subject to change without notice for product improvement.

Part 1 Freedom Series Unit

1. Specifications

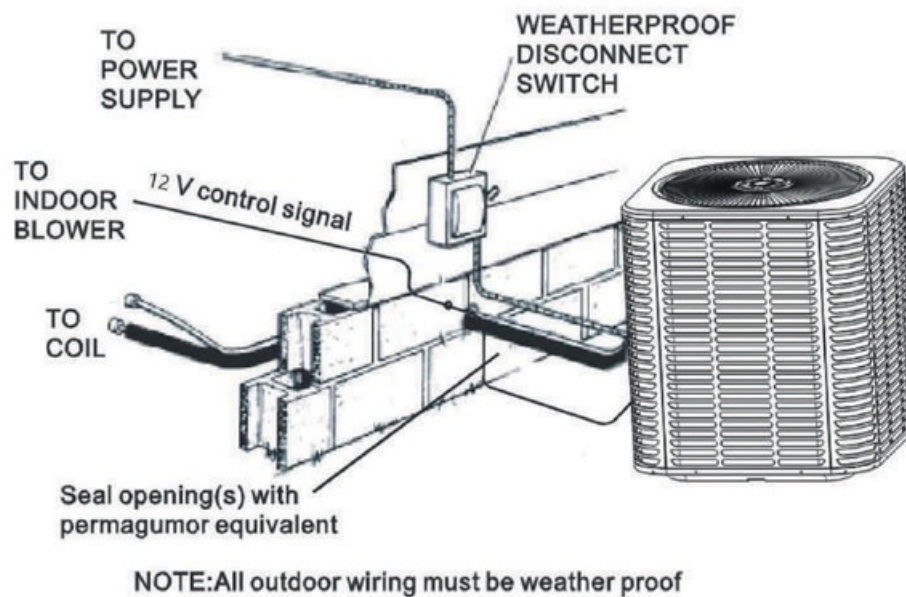
Model name	Universal Outdoor Unit		AFREE-T-CON3617	AFREE-T-CON6017
Power supply		V/Ph/Hz	208~230V/60Hz/1ph	208~230V/60Hz/1ph
Max. input consumption		W	4400	6700
Max. current		A	20	30.5
Starting current		A	/	/
Max Operating Pressure(MPa)	Discharge	MPa	4.2	4.2
	Suction	MPa	1.5	1.5
Compressor	Brand		GMCC	HIGHLY
	Model		KTM240D43UMT	GTH420SKPC8DQ
	Type		Rotary	Rotary
	Capacity	W	7740	11800
	Input	W	2065	3580
	Rated current(RLA)	A	9.4	15.8
	Locked rotor Amp(LRA)	A	/	/
	Thermal protector		/	/
	Capacitor	mF	/	/
	Refrigerant oil	ml	620	1050
Outdoor coil	Number of row		2	2
	Fin spacing	mm	1.2	1.2
	Fin material		Louver or Corrugated Fin	Louver or Corrugated Fin
	Tube outside diameter	mm	φ5	φ5
	Tube material		Innergroover tube type	Innergroover tube type
	Coil length x height x width	mm	2187×585×23.2	2187×800×23.2
	Number of circuit		4	10
Outdoor motor	Motor type		DC motor	DC motor
	Brand		BROADOCEAN	BROADOCEAN
	Model		ZW511D000018L	ZW511D000018L
	Capacitor	mF	/	/
	Speed	rpm	1000	1050
Outdoor air flow		m ³ /h	5500	7000
Outdoor noise level		dB(A)	61	62
Outdoor dimension	Unit (WxHxD)	mm	740×633×740	740×843×740
	Packing (WxHxD)	mm	769×656×769	769×865×769
Outdoor weight	Net	kg	52	66
	Gross	kg	57	71
Refrigerant	Type		R410a	R410a
	Charge	g	2300	3000
Throttle type			electronic expansion valve	electronic expansion valve
Refrigerant pipe	Liquid side	mm	9.52	9.52
	Gas side	mm	15.88	19.05
	Max. refrigerant pipe length	m	25	30
	Max. difference in level	m	15	20
Ambient temperature range	Cooling	°C	5~48	5~48
	Heating	°C	/	/

2. Dimensions



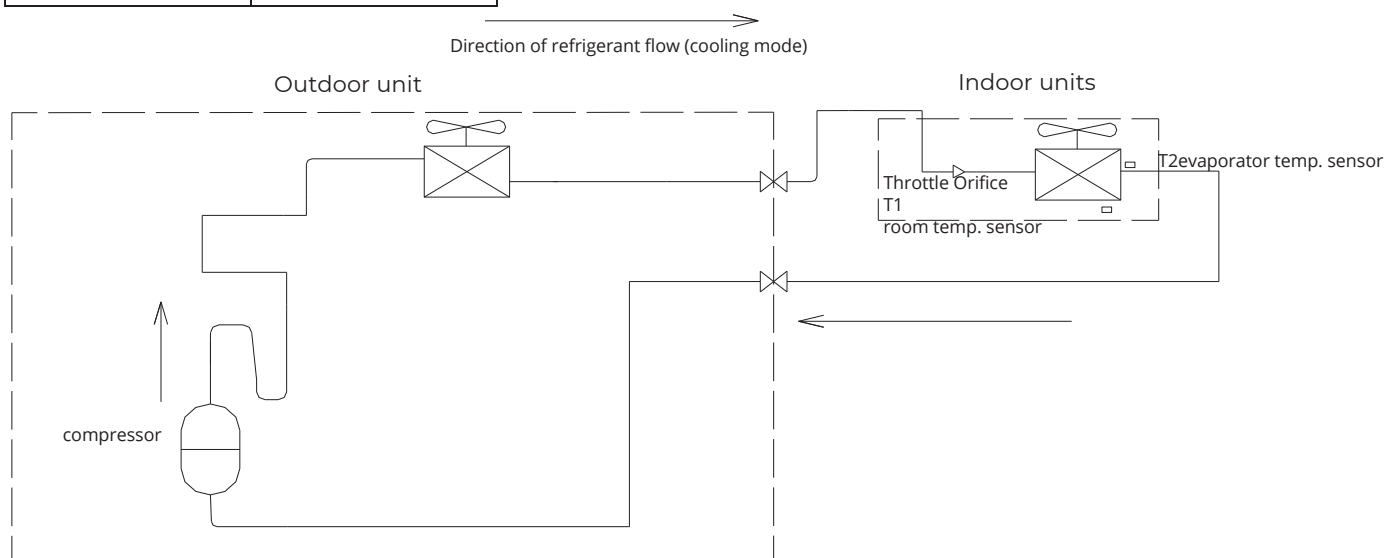
Unit Model (Btu/h)	Dimensions (Inches)			Refrigerant Connection Service Valve Size	
	"H" in [mm]	"W" in [mm]	"L" in [mm]	Liquid in	Vapor in
36000	33-3/16(843)	29-1/8(740)	29-1/8(740)	3/8	7/8
55000	33-3/16(843)	29-1/8(740)	29-1/8(740)	3/8	7/8

3. Service Space



4. Piping Diagrams

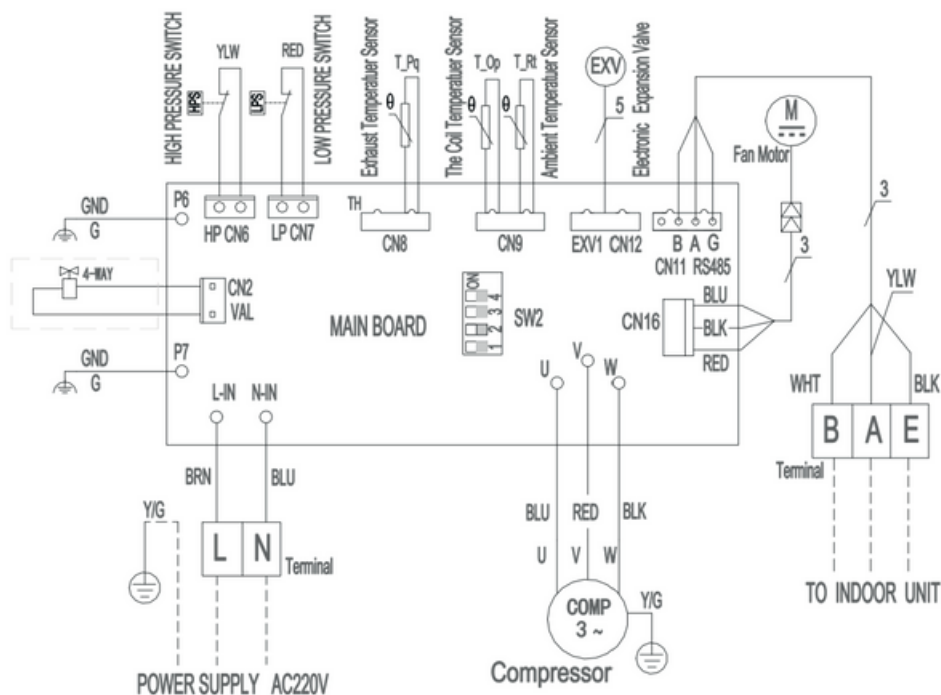
AFREE-T-CON3617 AFREE-T-CON6017



Wiring Diagrams

AFREE-T-CON3617

85008-006340



SW2 DESCRIPTION			
TYPE	DIAL CODE	TYPE	DIAL CODE
36K		55K	
42K			
48K			

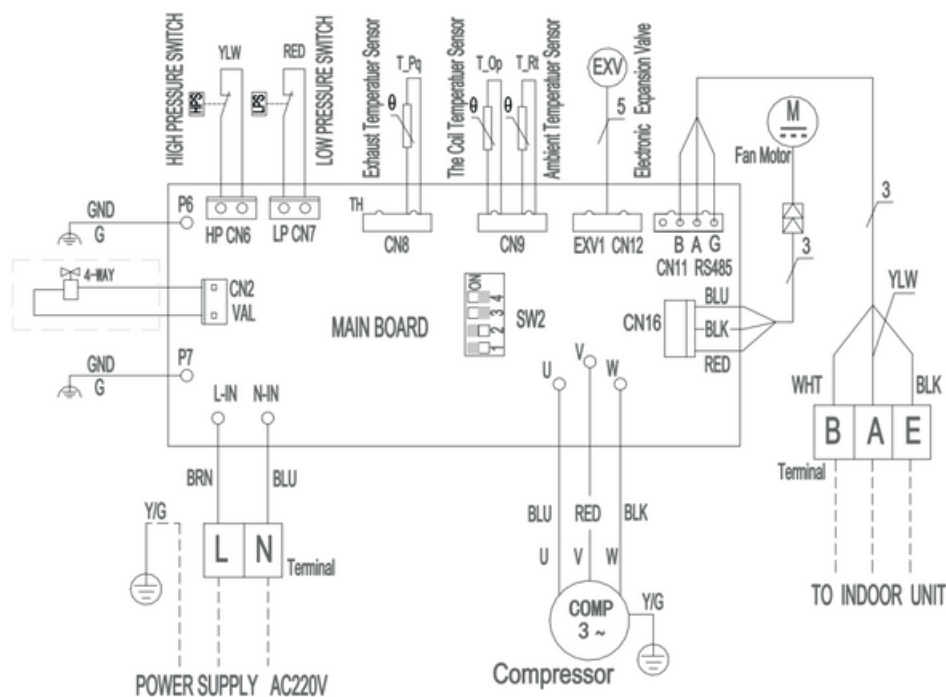
Remarks:

"■" for the dial contact location, the type to dial contact position in the table shall prevail;

— LINE - FACTORY CONNECTION
— WIRE - FACTORY CONNECTION
--- INSTALLATION WIRING

AFREE-T-CON6017

85008-006341



SW2 DESCRIPTION			
TYPE	DIAL CODE	TYPE	DIAL CODE
36K		55K	
42K			
48K			

Remarks:

"■" for the dial contact location, the type to dial contact position in the table shall prevail;

— LINE - FACTORY CONNECTION
— WIRE - FACTORY CONNECTION
--- INSTALLATION WIRING

5. Electric Characteristics

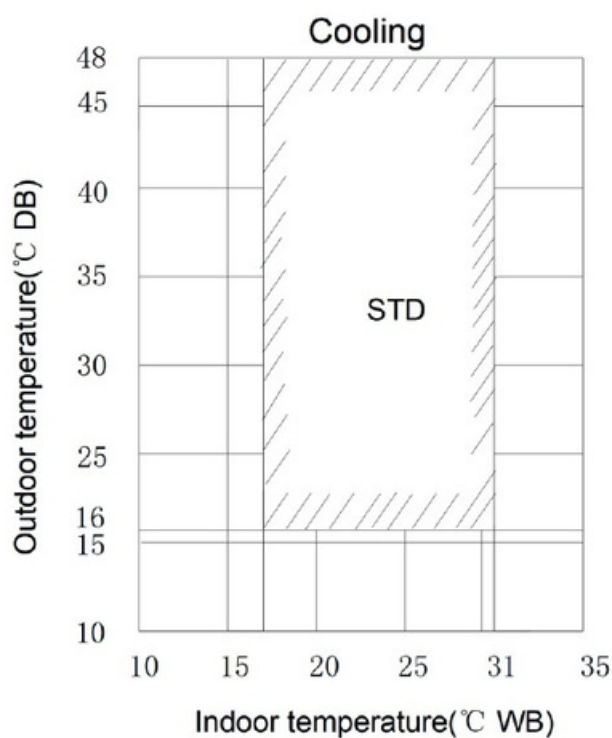
Model	Outdoor Units				Outdoor Fan Motor
	Hz	Voltage Min.		Max.	kW
AFREE-T-CON3617	50/60	220-230V	198V	242V	0.11
AFREE-T-CON6017	50/60	220-230V	198V	242V	8

0.21

7

6. Operation Limits

Operation mode	Outdoor temperature(°C)	Room temperature(°C)
Cooling operation	5~48	5~48



Heating operation	/	/
-------------------	---	---

Part 2 Installation

1. Precaution on Installation

1). Measure the necessary length of the connecting pipe, and make it by the following way. a.

Connect the indoor unit at first, then the outdoor unit.

Bend the tubing in proper way. Do not harm them.

Specially Notice the pipe length/height/dimension of each capacity.

Maximum pipe length

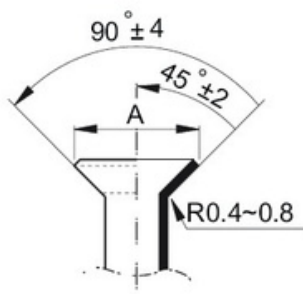
Model	Max. Length	Max. Elevation
36,000Btu/h	25m	15m
60,000Btu/h	30m	20m

Piping sizes

Model	Liquid(mm)	Gas(mm)
36,000 Btu/h	9.52	15.88
60,000 Btu/h	9.52	19.05

CAUTIONS

- ☐ Daub the surfaces of the flare pipe and the joint nuts with frozen oil, and wrench it for 3~4 rounds.
- ☐ With hands before fasten the flare nuts.
- ☐ Be sure to use two wrenches simultaneously when you connect or disconnect the pipes.

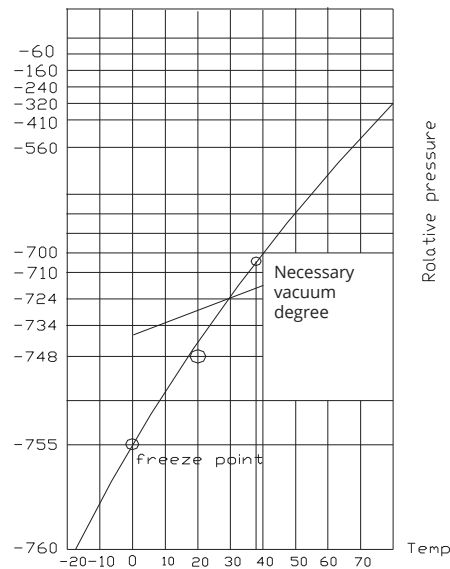
Pipe gauge	Tightening torque	Flare dimension A Min(mm) Max(mm)		Flare shape
Φ6.4	15~16N.m (153~163 kgf.cm)	8.3	8.7	
Φ9.5	25~26N.m (255~265 kgf.cm)	12.0	12.4	
Φ12.7	35~36N.m (357~367 kgf.cm)	15.4	15.8	
Φ15.9	45~47N.m (459~480 kgf.cm)	18.6	19.1	
Φ19.1	65~67N.m (663~684 kgf.cm)	22.9	23.3	
Φ22.2	69~70N.m (703~714 kgf.cm)	26.0	26.5	

b. The stop value of the outdoor unit should be closed absolutely (as original state). Every time you connect it, first loosen the nuts at the part of stop value, then connect the flare pipe immediately (in 5 minutes). If the nuts have been loosened for a long time, dusts and other impurities may enter the pipe system and may cause malfunction later. So please expel the air out of the pipe with refrigerant before connection.

-
- c. Expel the air after connecting the refrigerant pipe with the indoor unit and the outdoor unit. Then fasten the nuts at the repair-points.
 - 2) Locate the Pipe
 - a. Drill a hole in the wall (suitable just for the size of the wall conduit), then set on the fittings such as the wall conduit and its cover.
 - b. Bind the connecting pipe and the cables together tightly with binding tapes. Do not let air in, which will cause water leakage by condensation.
 - c. Pass the bound connecting pipe through the wall conduit from outside. Be careful of the pipe allocation to do no damage to the tubing.
 - 3) Connect the pipes.
 - 4) Then, open the stem of stop values of the outdoor unit to make the refrigerant pipe connecting the indoor unit with the outdoor unit in fluent flow.
 - 5) Be sure of no leakage by checking it with leak detector or soap water.
 - 6) Cover the joint of the connecting pipe to the indoor unit with the soundproof / insulating sheath (fittings), and bind it well with the tapes to prevent leakage.

2. Vacuum Dry and Leakage Checking

1) Vacuum Dry: use vacuum pump to change the moisture (liquid) into steam (gas) in the pipe and discharge it out of the pipe to make the pipe dry. Under one atmospheric pressure, the boiling point of water(steam temperature) is 100°C. Use vacuum pump to make the pressure in the pipe near vacuum state, the boiling point of water falls relatively. When it falls under outdoor temperature, the moisture in the pipe will be vaporized.

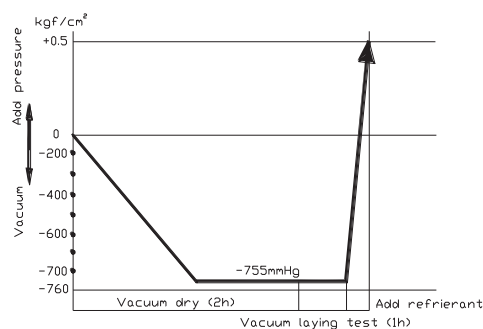


2) Vacuum dry procedure

There are two methods of vacuum dry due to different construction environment: common vacuum dry, special vacuum dry.

①. Common vacuum dry procedure

- Vacuum dry (for the first time) ---connect the all-purpose detector to the inlet of liquid pipe and gas pipe, and run the vacuum pump more than two hours (the vacuum pump should be below -755mmHg)
- If the pump can't achieve below -755mmHg after pumping 2 hours, moisture or leakage point will still exist in the pipe. At this time, it should be pumped 1 hour more.
- If the pump can't achieve -755mmHg after pumping 3 hours, please check if there are some leakage points.
- Vacuum placement test: place 1 hour when it achieves -755mmHg, pass if the vacuum watch shows no rising. If it rises, it shows there's moisture or leakage point.
- Vacuuming from liquid pipe and gas pipe at the same time.
- Sketch map of common vacuum dry procedure.



②. Special vacuum dry procedure

- ☐ This vacuum dry method is used in the following conditions:
- ☐ There's moisture when flushing the refrigerant pipe.
- ☐ Rainwater may enter into the pipe.
- ☐ Vacuum dry for the first time 2h pumping

③. Vacuum destroy for the second time Fill nitrogen to 0.5Kg/cm²

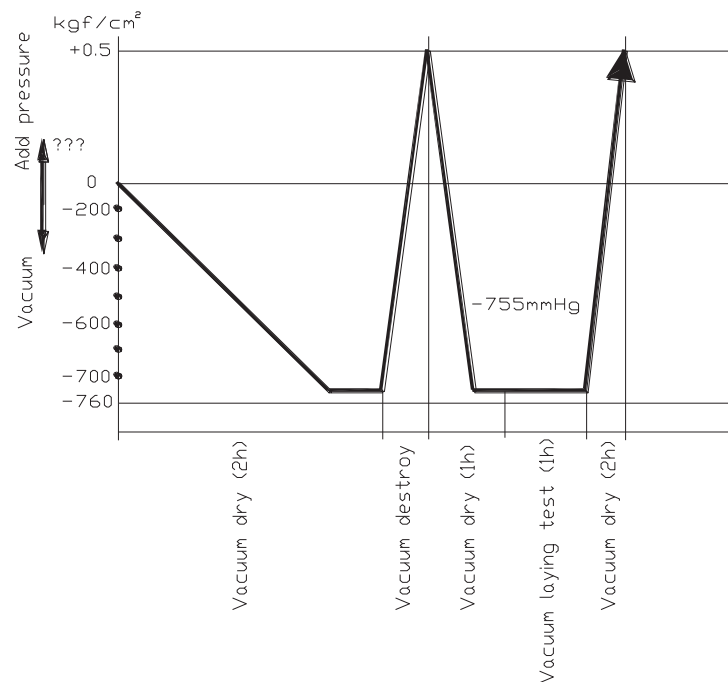
Because nitrogen is for drying gas, it has vacuum drying effect during vacuum destroy. But if the moisture is too much, this method can't dry thoroughly. So, please pay more attention to prevent water entering and forming condensation water.

④. Vacuum dry for the second time 1h pumping

Determinant: Pass if achieving below -755mmHg. If -755mmHg can't be achieved in 2h, repeat procedure ③ and ④.

⑤. Vacuum placing test 1h

⑥. Sketch map of special vacuum dry procedure



3. Additional Refrigerant Charge

Caution

- a) Refrigerant cannot be charged until field wiring has been completed.
- b) Refrigerant may only be charged after performing the leak test and the vacuum pumping.
- c) When charging a system, care shall be taken that its maximum permissible charge is never exceeded, in view of the danger of liquid hammer.
- d) Charging with an unsuitable substance may cause explosions and accidents, so always ensure that

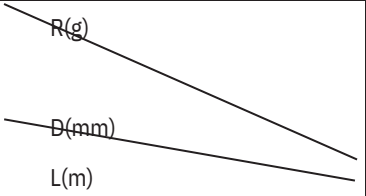
the appropriate refrigerant is charged.

e) Refrigerant containers shall be opened slowly.

f) Always use protective gloves and protect your eyes when charging refrigerant.

The outdoor unit is factory charged with refrigerant. Calculate the added refrigerant according to the diameter and the length of the liquid side pipe of the outdoor unit/indoor unit.

For 24, 36, 48, 60kBtu/h (indoor unit throttle)

	φ6.4	Φ9.52	Φ12.7
Less than 5m (One-way)	—	—	—
Added Refrigerant When Over 5m(One-way)	22g/m×(L-7.5)	54g/m×(L-7.5)	110g/m×(L-7.5)

Remark:

R (g): Additional refrigerant to be charged

L (m): The length of the refrigerant pipe (one-way) D

(mm): Liquid side piping diameter

4. Water Drainage

4.1 Gradient and Supporting

1). Keep the drainpipe sloping downwards at a gradient of at least 1/50. Keep the drainpipe as short as possible and eliminate the air bubble.

2). The horizontal drainpipe should be short. When the pipe is too long, a prop stand must be installed to keep the gradient of 1/50 and prevent bending. Refer to the following table for the specification of the prop stand.

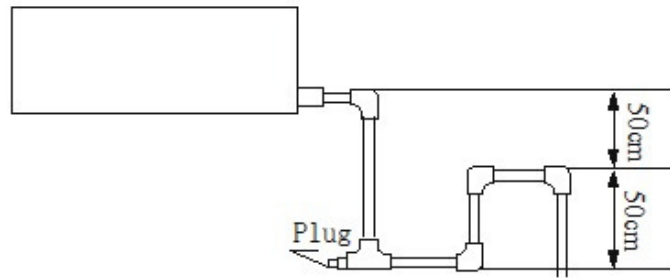
	Diameter	Distance between the prop stands
Hard PVC pipe	25~40mm	1~1.5m

3). Precautions

- ① The diameter of drainpipe should meet the drainage requirement at least.
- ② the drainpipe should be heat-insulated to prevent atomization.
- ③ Drainpipe should be installed before installing indoor unit. After powering on, there is some water in water-receiver plate. Please check if the drain pump can operate correctly.
- ④ All connection should be firm.
- ⑤ Wipe color on PVC pipe to note connection.
- ⑥ Climbing, horizontal and bending conditions are prohibited.
- ⑦ The dimension of drainpipe can't less than the connecting dimension of indoor drainpipe.
- ⑧ Heat-insulation should be done well to prevent condensation.
- ⑨ Indoor units with different drainage type can't share one convergent drainpipe.

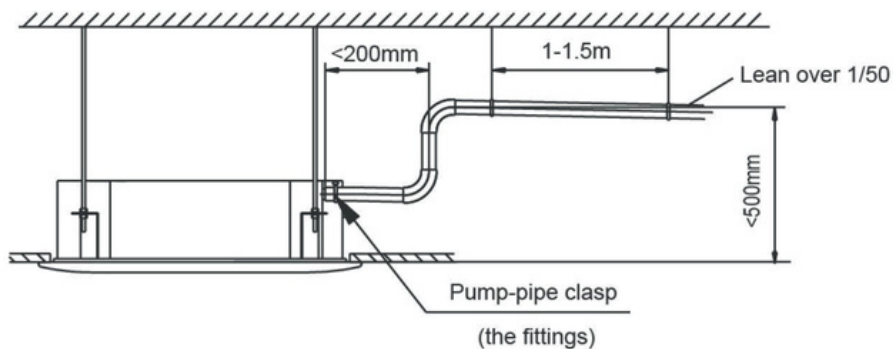
4.2 Drainpipe Trap

- 1). If the pressure at the connection of the drainpipe is negative, it needs to design drainpipe trap.
- 2). Every indoor unit needs one drainpipe trap.
- 3). A plug should be designed to do cleaning.

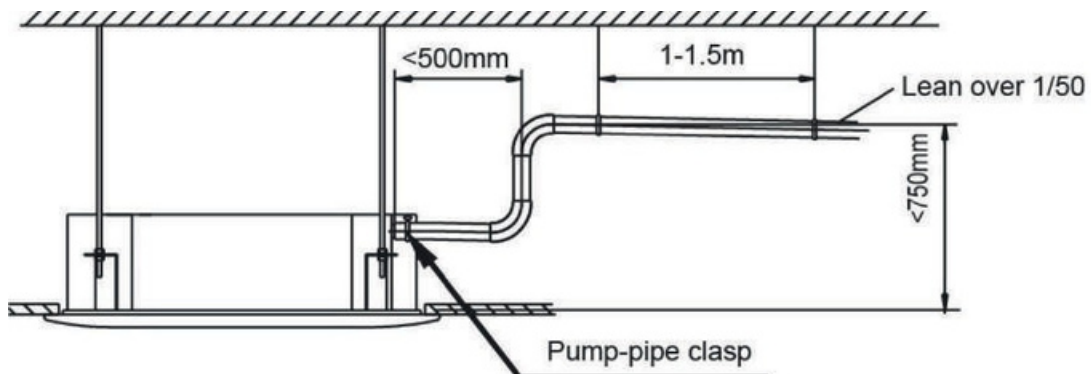


4.3 Upwards drainage (drain pump)

For Eight-way cassette(compact)

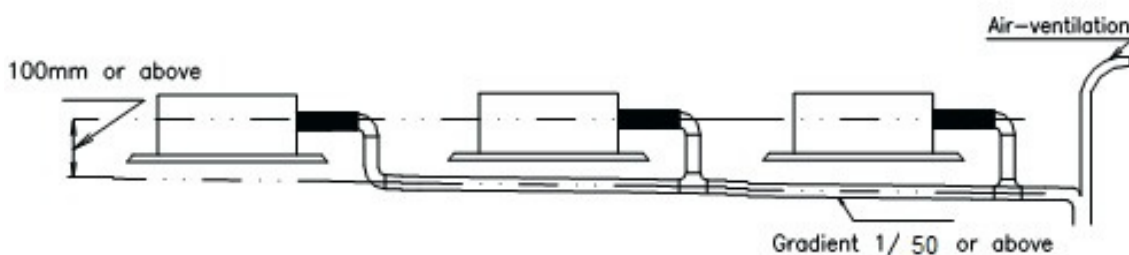


For Eight-way cassette



4.4 Convergent drainage

- 1). The number of indoor units should be as small as possible to prevent the traverse main pipe overlong.
- 2). Indoor unit with drain pump and indoor unit without drain pump should be in different drainage system.



3). Selecting the diameter

Number of connecting indoor units → Calculate drainage volume → Select the diameter

Calculate allowed volume = Total cooling capacity of indoor units (HP) × 2 (l/ hr)

	Allowed volume(lean 1/50) (l/ hr)	I.D. (mm)	Thick
Hard PVC	$\infty \leq 14$	Φ25	3.0
Hard PVC	$14 < \infty \leq 88$	Φ30	3.5
Hard PVC	$88 < \infty \leq 334$	Φ40	4.0
Hard PVC	$175 < \infty \leq 334$	Φ50	4.5
Hard PVC	$334 < \infty$	Φ80	6.0

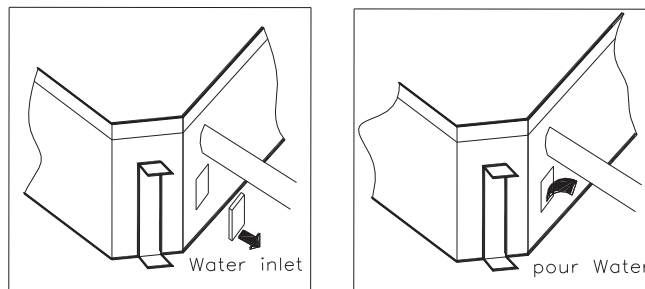
4.5 Drainage test

1). Drainage without drain pump

After finishing drainpipe installation, pour some water into the water receiver plate to check if the water flows smoothly.

2). Drainage with drain pump

① Poke the Water Level Switch, remove the cover, use water pipe to pour 2000ml water into the water receipt plate through the water inlet.



② Turn on the power to Cooling operation. Check the pump's operation and switch on the Water Level Switch. Check the pump's sound and look into the transparent hard pipe in the outlet at the same time to check if the water can discharge normally.

③ Stop the air conditioner running, turn off the power, and put back the cover.

□ Stop the air conditioner. After 3 minutes, check if it has abnormality. If the collocation of drainpipes is illogical, the water will flow back overfull, which will cause the alarm lamp flashes, even overflow from the water receipt plate.

□ Keep on pouring water until it gives an alarm signal for high water level, check if the pump drains water at once. If the water level can't fall below the alarmed water level after 3 minutes, the air conditioner will stop. Turn off the power and drain the remained water, and then turn on the air conditioner.

Note: the drain stuff in the main water receipt plate is for maintenance. Stuff up the drain stuff to prevent water leakage.

5. Insulation Work

5.1 Insulation material and thickness

1). Insulation material

Insulation material should adopt the material which is able to endure the pipe's temperature: no less than 70°C in the high-pressure side, no less than 120°C in the low-pressure side (For the cooling type machine, no requirements at the low-pressure side.)

Example: Heat pump type----Heat-resistant Polyethylene foam (withstand above 120°C)

Cooling only type---- Polyethylene foam (withstand above 100°C)

2). Thickness choice for insulation material

Insulation material thickness is as follows:

	Pipe diameter (mm)	Adiabatic material thickness
Refrigerant pipe	Φ6.4—Φ25.4	10mm
	Φ28.6—Φ38.1	15mm
Drainage pipe	Inner diameter Φ20—Φ32	6mm

5.2 Refrigerant pipe insulation

1). Work Procedure

- ① Before laying the pipes, the non-jointing parts and non-connection parts should be heat insulated.
- ② When the gas proof test is eligible, the jointing area, expanding area and the flange area should be heat insulated

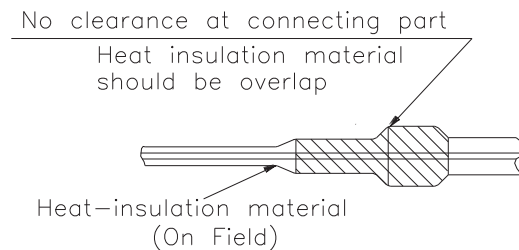
2). Insulation for non-jointing parts and non-connection parts

wrong	right	
Gas pipe and liquid pipe should not be put together to insulate	Insulate the gas pipe (cooling only)	Insulate the gas pipe and liquid pipe

For construction convenience, before laying pipes, use insulation material to insulate the pipes to be deal with, at the same time, at two ends of the pipe, remain some length not to be insulated, in order to be welded and check the leakage after laying the pipes.

3). Insulate for the jointing area, expanding area and the flange area

- ① Insulate for the jointing area, expanding area and the flange area should be done after checking leakage of the pipes
- ② Make sure there's no clearance in the joining part of the accessorial insulation material and local preparative insulation material.



5.3 Drainage pipe insulation

- 1) The connection part should be insulated, or else water will be condensing at the non-insulation part.

5.4 Note

- 1) The jointing area, expanding area and the flange area should be heat insulated after passing the pressure test.
- 2) The gas and liquid pipe should be heat insulated individually; the connecting part should be heat insulated individually.
- 3) Use the attached heat-insulation material to insulate the pipe connections (pipes' tie-in ,expand nut) of the indoor unit.

6. Wiring

Please refer to the Wiring Diagram.

7. Test Operation

(1) The test operation must be carried out after the entire installation has been completed. (2) Please confirm the following points before the test operation.

- ☐ The indoor unit and outdoor unit are installed properly.
 - ☐ Tubing and wiring are correctly completed.
 - ☐ The refrigerant pipe system is leakage-checked.
 - ☐ The drainage is unimpeded.
 - ☐ The ground wiring is connected correctly.
 - ☐ The length of the tubing and the added stow capacity of the refrigerant have been recorded.
 - ☐ The power voltage fits the rated voltage of the air conditioner.
 - ☐ There is no obstacle at the outlet and inlet of the outdoor and indoor units.
 - ☐ The gas-side and liquid-side stop valves are both opened.
 - ☐ The air conditioner is pre-heated by turning on the power.
- (3) According to the user's requirement, install the remote controller when the remote controller's signal can reach the indoor unit smoothly.
- (4) Test operation

Set the air conditioner under the mode of "COOLING" with the remote controller, and check the following points.

Indoor unit

- ☐ Whether the switch on the remote controller works well.
- ☐ Whether the buttons on the remote controller works well.
- ☐ Whether the air flow louver moves normally.
- ☐ Whether the room temperature is adjusted well.
- ☐ Whether the indicator lights normally.
- ☐ Whether the temporary buttons works well.
- ☐ Whether the drainage is normal.
- ☐ Whether there is vibration or abnormal noise during operation.

Outdoor unit

- ☐ Whether there is vibration or abnormal noise during operation.
- ☐ Whether the generated wind, noise, or condensed of by the air conditioner have influenced your neighborhood.
- ☐ Whether any of the refrigerant is leaked.