Order N0. PHAAG0606013C3

Service Manual

Floor Standing Room Air Conditioners

CS-C45FFH
CU-C45FFH

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-techical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

CONTENTS

Panasonic®

1 Features

■ High Efficiency

■ Comfort Environment

Air filter with function to reduce dust and smoke

Wide range of horizontal discharge air

■ Random Auto Restart Control

Automatically restart afer power failure

■ 12-hour Timer Setting

2 Functions

Remote Control

OFF/ON — Operation START/STOP

MODE — Operation Mode Selection

- Automatic Mode Operation
- Cooling Mode Operation
- Soft Dry Mode Operation
- Air Circulation Mode Operation

FAN SPEED — Indoor Fan Speed Selection

- ▬ Low Speed
- ▬▬▬ High Speed
- AUTO Automatic Speed

▼TEMP▲ — Room Temperature Setting

- Temperature Setting(16℃ to 30℃)
- Auto Operation
  - ▲ STD — Operate with 2℃ higher than standard temperature.
  - STD — Operate with standard temperature.
  - ▼ STD — Operate with 2℃ lower than standard temperature.

TIMER OFF/ON — Timer Operation Selection

- Stop/Start Operation Control (set the ON/OFF Timer hourly later)

TIMER SET/ CANCEL — Set /Cancel Timer Operation

- Set timer/Cancel the set timer

Indoor Unit

Power swith OFF/ON

AUTO

OFF/ON

Power Switch OFF/ON

- When the remote control cannot be used or for repairing and testing ,please use this button.

Test Run

- Keep pressing this button less than 5 second to start auto operation mode.
- Keep pressingthis button for approximate 5 seconds to active force cooling operation. (Test Run).(One “Beep” is heard.)

Signal Receiving Sound Control

- Keep pressing this button for approximate 10seconds to turn on or turn off the signal receiving sound.(” Beep,Beep” are heard.)

Auto restart control

- If the unit is stopped due to a power failure, it will restart with the previous setting automatically when the power is resumed. But the timer setting will be cancelled.
- The control can be omitted by keeping pressing this button for approximate 15seconds until “Beep,Beep,Beep-” is heard. To resume the control, repeat the process above untill “Beep, Beep,Beep” is heard.

Demonstration Mode

- Keep pressing this button for 20seconds to start or end the Demonstration Mode. (Four “Beep”s are heard.)

Operation Indication Lamps

- Power (green) ..... Lights up in operation; Blinks during Test Run operation and determining Auto Operation mode
- Timer(orange) ..... Lights up while Timer in operation

Operation Mode

- Auto/Cooling/Soft Dry/Fan Operation

Anti-freezing Control for the Evaporator

- Cooling or Soft Dry Operation

Indoor Fan Speed Control

- High,Low
- Auto Fan Speed

Airflow Direction Control

- Both vertical and horizontal airflow direction can be only adjusted manually by hand.

Time Delay Safety Control

- The unit will restart operation after 3 minutes after each pause.

7 Minutes Time Save Control

- If the compressor is stopped(not by remote control or due to a power failure) during Cooling operation, it will restart automatically in 7 minutes even if the temperature is lower than the set temperature.

Outdoor Unit

3-minutes Test Operation Control

- Once the compressor is activated, it does not stop for 3 minutes. It stops immediately with remote control or indoor unit control panel ON/OFF button.

Compressor High Pressure Protection

- If the high pressure switch is open, the compressor will be stopped. The compressor will restart when the high pressure switch is closed, but time delay safety control is available

Compressor Discharge Temp Control

When the discharge temperature is 120℃ or above, the compressor will stop and when the temperature declines to 90℃ or below, the compressor will start.

Residual Heat Remove Control

- When the compressor is stopped, the outdoor fan will run at the highest speed for 60 seconds to remove the residual heat of the condenser.

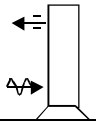
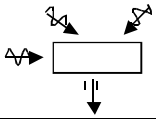
Compressor Overcurrent Protection

- When the current tested by CT1 or CT2 remains 16A or above for 5 seconds, the compressor will cease.

Compressor Delayed Start Control

- When the starting instruction is received, the compressor will start in 2 seconds.

3 Product Specifications

			Unit	CS-C45FFH	CU-C45FFH
Cooling Capacity			KW	12.0-12.5	
Moisture Removal			L/h	7.5	
Power Source			Phase	3-phase	
			V	380-415	
			Cycle	50	
Airflow Method			OUTLET / INTAKE	SIDE VIEW 	TOP VIEW 
Air Circulation	Indoor Air (low)		m^3/min	19.7-23.3	-
	Indoor Air (medium)		m^3/min	-	-
	Indoor Air (high)		m^3/min	25-27	-
	Outdoor Air		m^3/min	-	92
Noise Level			dB(A)	High53,Low47	High57, -
Electrical Data	Input		KW	4.71-4.80	
	Running Current		A	8.40	
	EER		W/W	2.54-2.60	
	Starting Current		A	55	
Piping Connection Port(Flare piping)			Inch Inch	G:half union6/8" L:half union3/8"	G:3-way valve6/8" L:3-way valve3/8"
Piping Size(Flare piping)			Inch Inch	G:gas side6/8" L:liquid side3/8"	G:gas side6/8" L:liquid side3/8"
Drain Hose	Inner Diameter		mm	12	-
	Length		m	0.6	-
Power Supply Cord Length (Number of core-wire)			m	-	-
Dimensions	Height		mm	1880	1175
	Width		mm	600	900
	Depth		mm	350	320
Net Weight			kg	52	88
Compressor	Type			-	Scroll
	Motor Type			-	Induction
	Rated Output		KW	-	3.75
Air Circulation	Type			Sirocco fan	Propeller fan
	Motor Type			Induction(8 pole)	Induction(6 pole)
	Input		W	-	-
	Rated Output		W	85	50
	Fan Speed	Low	rpm	380-410±40	-
		Med	rpm	-	-
		High	rpm	480-520±30	770-800±30

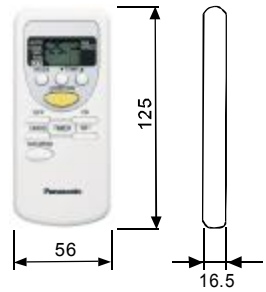
		Unit	CS-C45FFH	CU-C45FFH
Heat Exchanger	Description		Evaporator	Condenser
	Tube Material		Copper	Copper
	Fin Type		Slot type	Corrugation type
	Rows/Stage		(Plate fin configuration,forced draft) 2 x 44	1 x 44
	FPI		21	21
	Dimensions	mm	480x924x25.4	900x1168.4x38.1
Refrigerant Control Device			-	Capillary Tube
Refrigeration Oil		(c.c)	-	4GSD/SAY56T
Refrigerant (R-22)		g	-	2400
Thermostat			Electronic Control	-
Protection Device			-	O.L.P.
Capillary	Length Circulation Inner Diameter	mm L/min mm	- - -	250±30 29±0.5 3.0
Air Filter			P.P. Honeycomb	-
Refrigerant Circulation Control Device			Capillary	
Compressor Capacitor		µF V	-	-
Fan Motor Capacitor		µF V	5µF 440V	3.0µF 440V

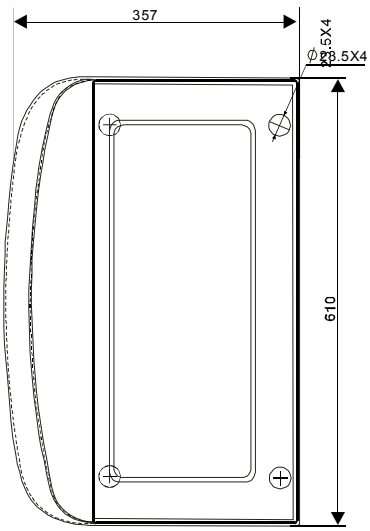
- Specifications are subject to change without notice for further improvement.

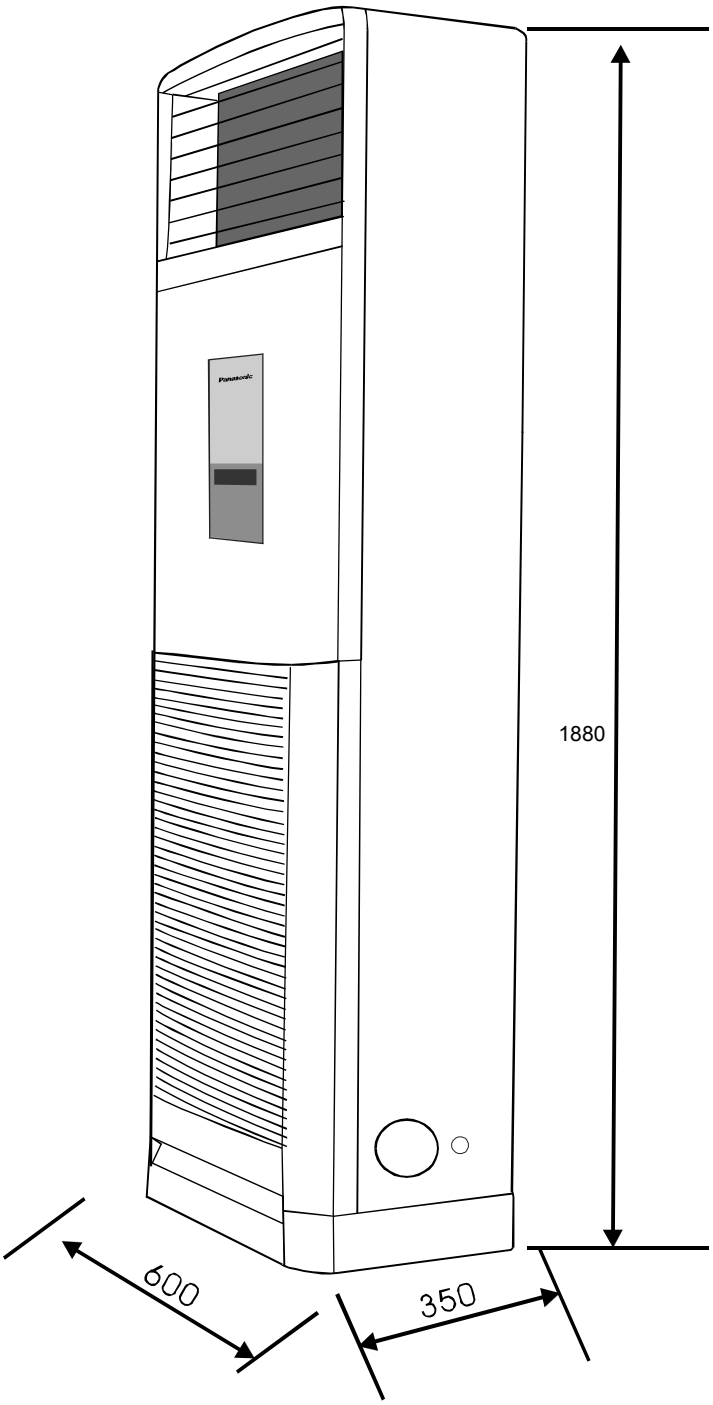
4 Dimensions

Indoor Unit

Remote Controller

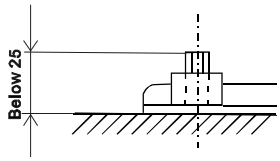


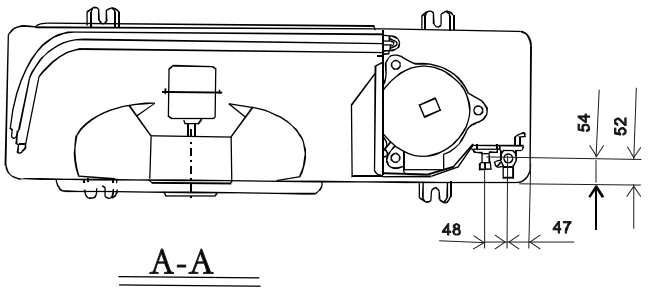


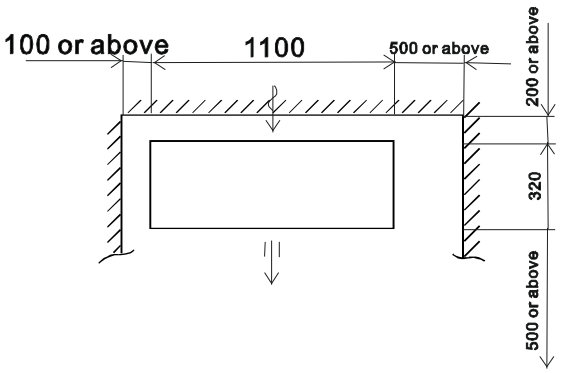


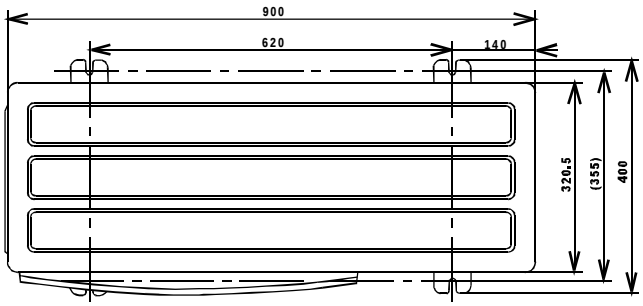
Outdoor Unit

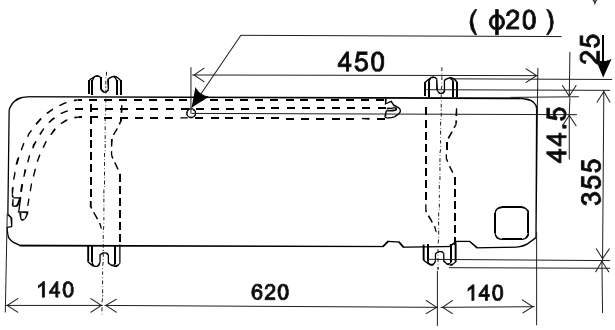
CU-C45FFH

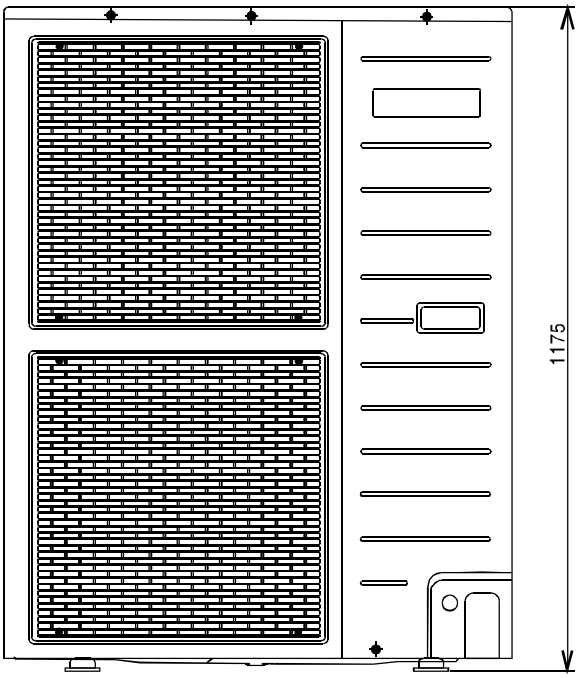


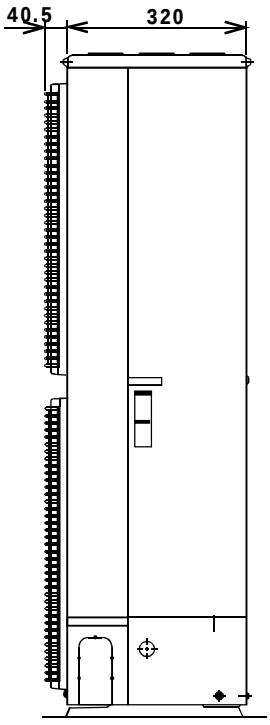






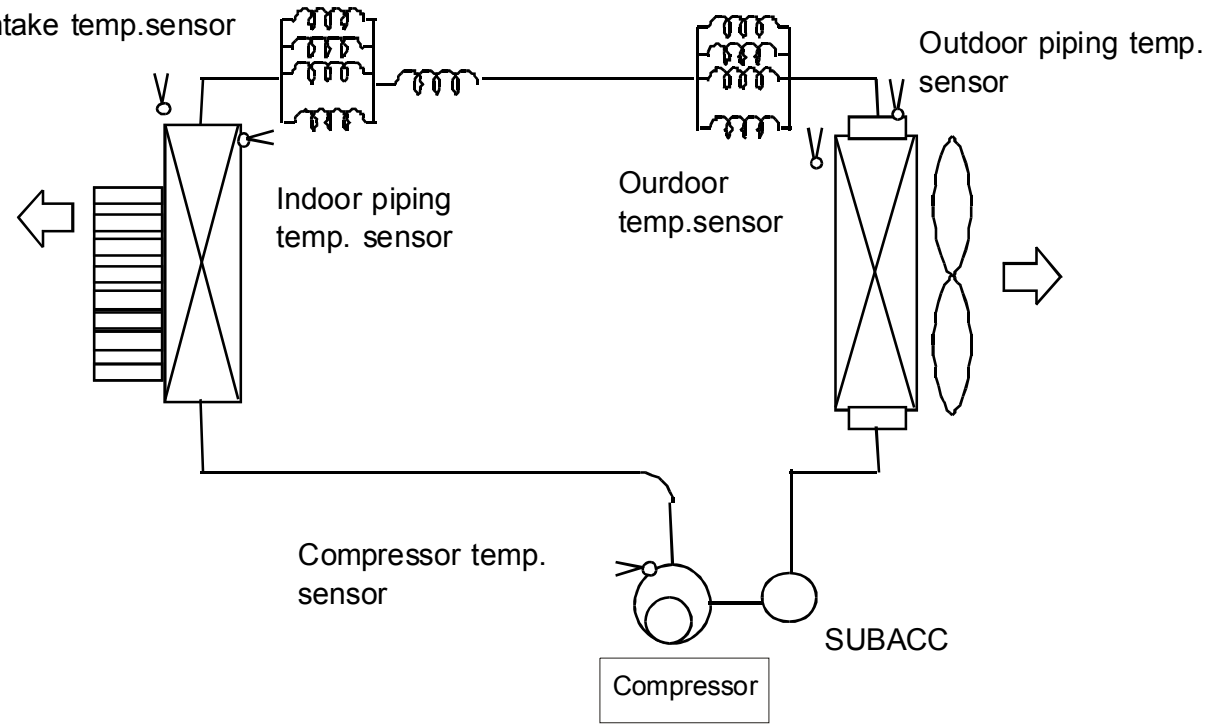






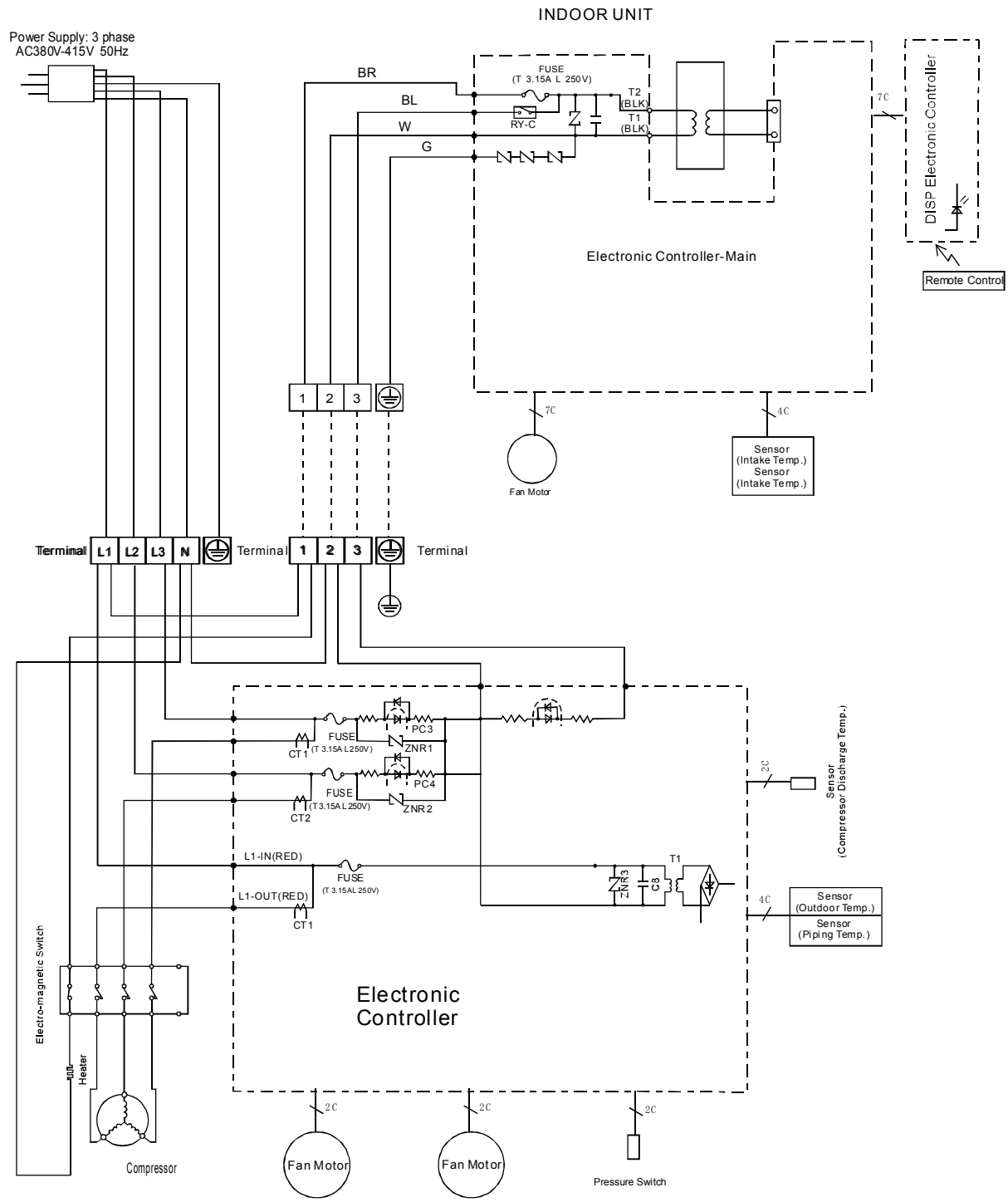
5 Refrigeration Cycle Diagram

CS-C45FFH/CU-C45FFH



6 Block Diagram

CS-C45FFH/CU-C45FFH

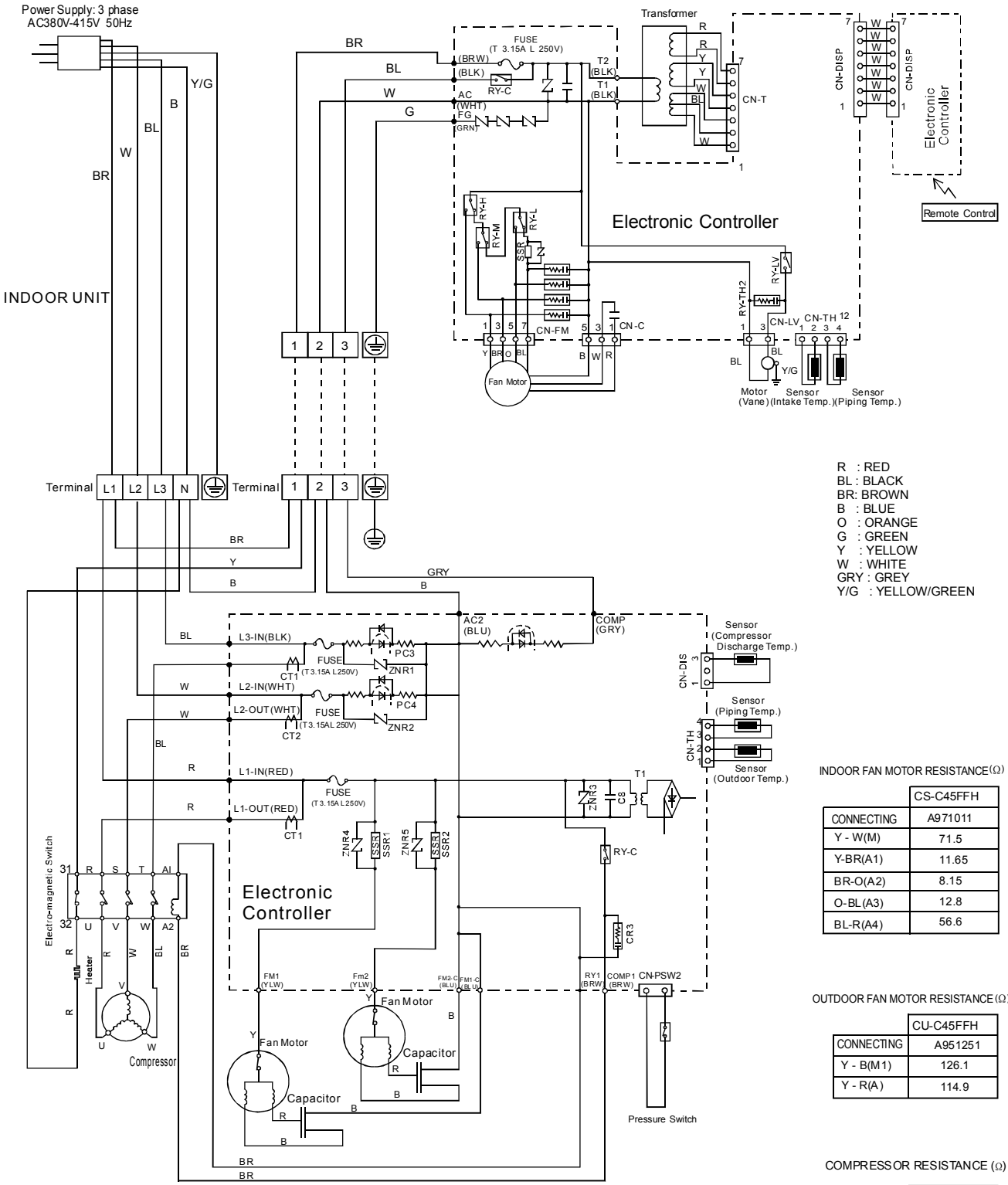


※ ▭ Indicates the electronic control unit.

※ "C" indicates the number of core wires.(example:6C=6 core wires)

7 Wiring Diagram

CS-C45FFH/CU-C45FFH



R : RED
BL : BLACK
BR: BROWN
B : BLUE
O : ORANGE
G : GREEN
Y : YELLOW
W : WHITE
GRY : GREY
Y/G : YELLOW/GREEN

INDOOR FAN MOTOR RESISTANCE (Ω)

	CS-C45FFH
CONNECTING	A971011
Y - W(M)	71.5
Y-BR(A1)	11.65
BR-O(A2)	8.15
O-BL(A3)	12.8
BL-R(A4)	56.6

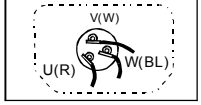
OUTDOOR FAN MOTOR RESISTANCE (Ω)

	CU-C45FFH
CONNECTING	A951251
Y - B(M1)	126.1
Y - R(A)	114.9

COMPRESSOR RESISTANCE (Ω)

	CU-C45FFH
CONNECTING	B092164
U-V	2.806
U-W	2.806
W-V	2.651

☆Compressor Terminal



8 Operation Details

8.1. Cooling Mode Operation

When selecting the Cooling Mode Operation, the unit will operate according to the setting by the Remote Controller or the control panel on the indoor unit and the operation is as the following.

Time Delay Safety Control

- 3 min.----If the compressor stops, it will not restart within 3 minutes.(Protection of compressor).

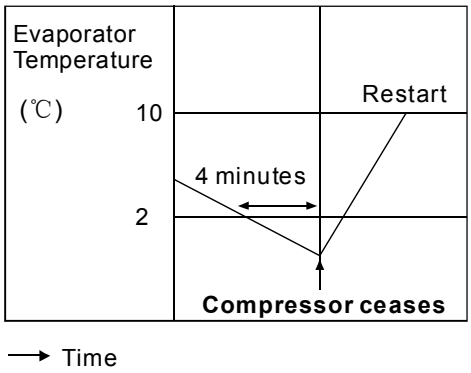
7 Minutes Time Save Control

- 7 min.----The unit will automatically operate in 7 minutes even if the room temperature is not reached. (Prevention of raising the humidity)

Anti-Freezing Control

- Compressor runs continuesely for 9 minutes or more.
- If temperature of evaporator is lower than 2℃ continuously for 4 minutes, the compressor will cease to prevent the evaporator from freezing. Fan speed setting will not be changed.
- When temperature of evaporator reaches 10℃,compressor will restart in 3 minutes.

※ During Cooling Mode Operation, the Time Delay Safety Control is available.



Outdoor Temperature Control

- If the temperature of outdoor heat exchanger is below 12℃, a ten-minutes timer will start timing. When the situation persists for 10 minutes, the compressor will stop and time delay safety control is available. When the temperature of outdoor heat exchanger rises to 13.5℃ or above, the timer can be reset.

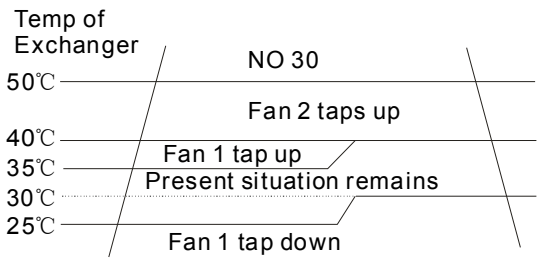
Outdoor Fan Start Control

- When the compressor is started, within 30 seconds , the outdoor fan speed is controlled by the temperature of outdoor heat exchanger. (Refer to Outdoor Fan Motor Control)

Temperature of Condenser	Fan Speed (Tap)
T<0℃	1
0℃≤T<10℃	4
10℃≤T<20℃	7
20℃≤T<25℃	17
25℃≤T	30

Outdoor Fan Low Temp Control

- The fan speed changes every two minutes and it is determined by the temperature of 1'50'' and 2' after the previous determination.
  If temperature of outdoor heat exchanger is 45℃ or above the timer will be cleared. If the temperature declines below 45℃, the timer starts to operate.



Compressor Reverse Rotation Protection Control

- If the compressor is operating continuously for 5 minutes or longer and temperature difference between intake air and indoor heat exchanger is 2.5°C or less for 2 minutes, compressor will stop and restart automatically. (Time delay safety control is valid)

Compressor starts for 5 minutes ▲T ≤ 2.5°C for 2 minutes → Compressor OFF → Compressor restarts

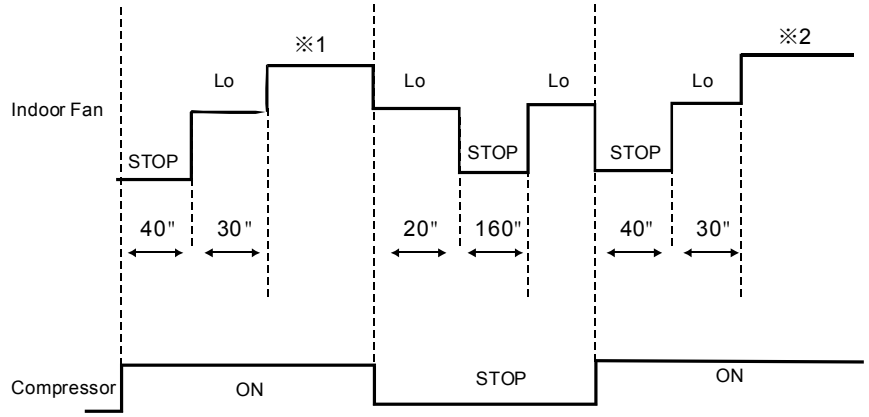
▲T = Intake air temperature - Indoor heat exchager temperature

This is to protect reverse rotation of the compressor whten there is a instantaneous power failure.

Automatic Fan Speed Mode

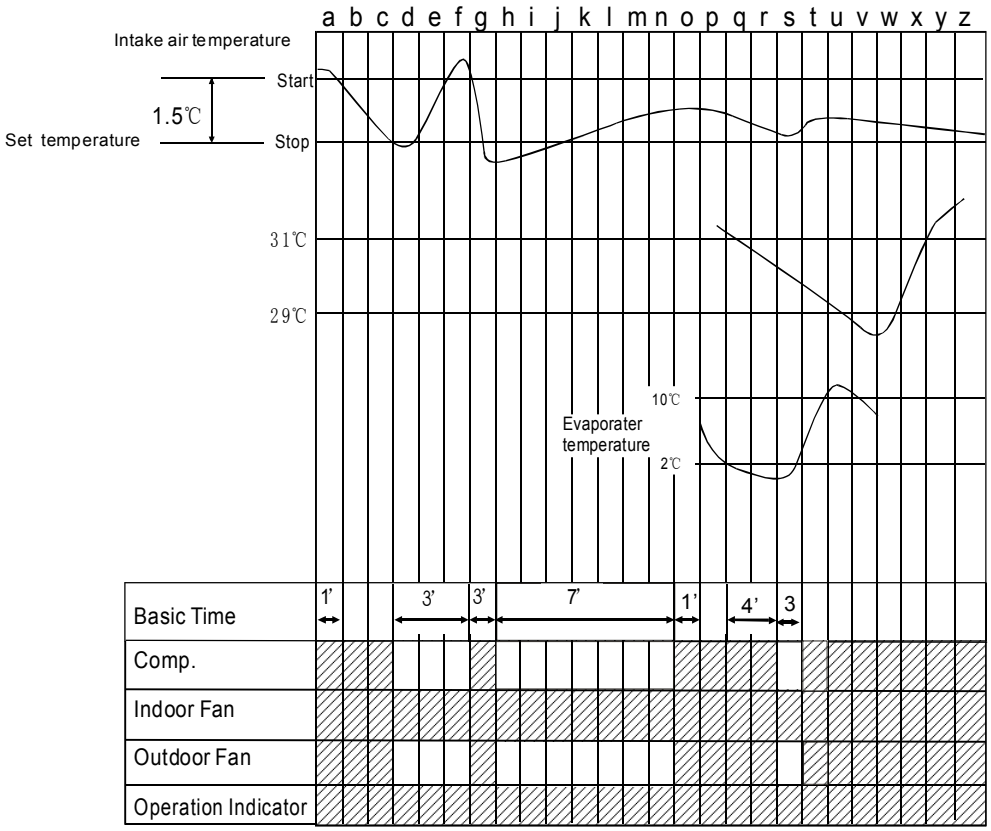
During Cooling Mode Operation, use remote controller to select Automatic Fan Speed.

- Fan speed will be at the point between "High speed" and "Medium speed".
- Deodorization control.



※ 1 Fan speed will be at "Hi" till the compressor ceases (set temperature reached).
※ 2 Fan speed will be at "Lo" when the compressor restarts.

Time Graph for Cooling Operation



〈Operation status〉

d-f,s	:	Time delay safety control
g	:	Compressor Test control
h-n	:	Auto restart control
q-t	:	Anti-freezing Control

Time

Operate

Stop

8.2. Soft Dry Mode Operation

- When selecting Soft Dry mode operation, the operation will be cooling until the room temperature reaches the set temp on remote control, and then Soft Dry will be activated. (During Soft Dry Mode the fan of indoor unit will operate at super low speed. The soft dry mode will run for less than 20 minutes.)
- Once Soft Dry mode operation is turned off, indoor fan, compressor and outdoor fan will stop for 6 minutes.

Time Delay Safety Protection

- During cooling mode operation, if the compressor ceased, it will not restart within 3 minutes.

Anti Freezing Control

- Same as the denotation in Cooling Operation.(P14)
  (During Soft Dry Mode Opeeration, compressor will stop for at least 6 min.)

Outdoor Fan Start Control

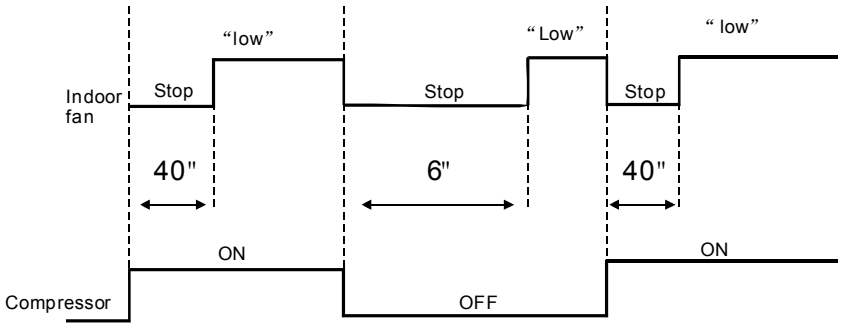
- The same to Cooling Operation.

Outdoor Fan Low Temp Control

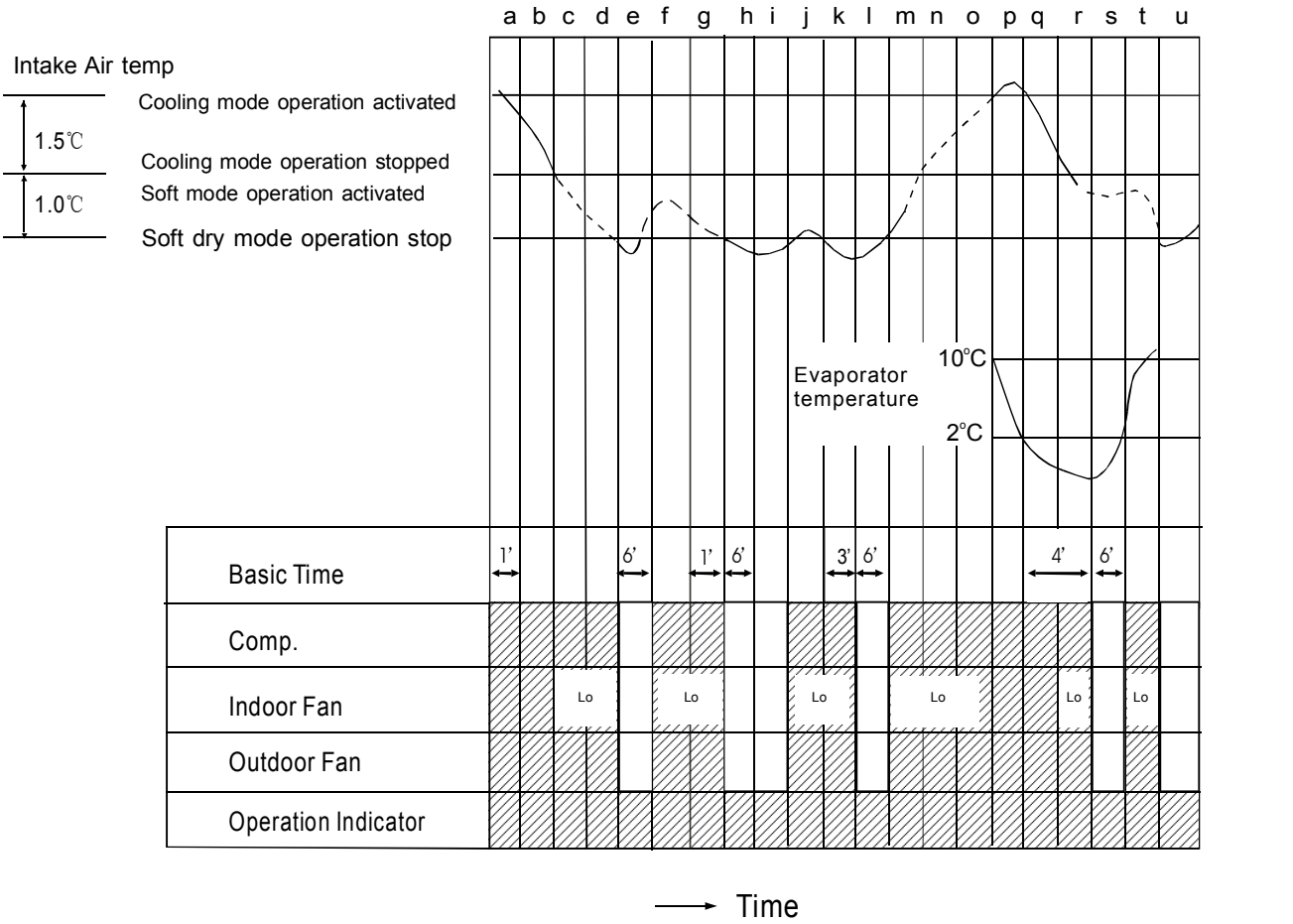
- The same to Cooling Operation.

Indoor Fan Speed Control

- Cooling Operation Region
  The same to Cooling Operation.
- Soft Dry Operation Region
  1.Manual Fan Speed
  When using the remote control to select the Manual Fan Speed Mode, the fan speed will be at Low.
  2.Auto Fan Speed
  During Soft Dry Operation, use remote control to select Auto Fan Speed mode.
  Deodorization control.



Time Graph for soft dry operation



〈Operation status〉

a-b, p-q	:	Cooling Mode Operation
c-p, r-u	:	Soft Dry Mode Operation
e, h-i, k-l	:	Soft Dry Mode Operation Stopped
j-k	:	Compressor Test Operation Control
q-t	:	Anti Freezing Control

—— Cooling mode operation

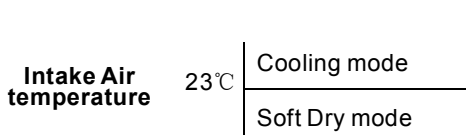
- - - - Soft Dry Mode operation

▨ Operate

□ Stop

8.3. Automatic Mode Operation

Standard for Determining Operation Mode



	Setting Temperature (standard)
Cooling mode	25℃
Soft Dry mode	22℃

1. Indoor fan operates at super low speed for 20 seconds.
2. After judging indoor air temperature, the operation is determined and operation continued at the mode determined.
3. After the operation mode has been determined, the mode does not change. However, Soft Dry mode operation includes cooling mode operation.
4. If automatic mode operation is started while the unit is operating, operation will continue.
   If current operation is in cooling mode (including the cooling mode operation when is a part of Soft Dry mode operation) it will be maintained, and if current operation is not cooling mode, the appropriate operation mode is determined for 20 seconds at super low fan speed.
   Then the selected mode will continue.
5. Room temperature adjustment.

Higher	→	+2℃
Standard	→	±0℃
Lower	→	−2℃

8.4. Air Circulation Mode Operation

1. An additional heater may make the warm air evenly covering each corner of the room.
2. Indoor Fan Speed Control:
   a. Manual Control
      The fan speed can be adjusted manually.
   b. Auto Control
      In the first 10 minutes of operation, the fan speed will be at Low.

8.5. Indoor Fan Motor Control

- Automatic fan speed control
  When automatic fan speed set,the available range for fan speed is from Hi to Lo
- Manual Fan Speed Control
  Basic fan speed can be manually adjusted (Lo,Hi) by using the fan speed selection button.
- Basic Fan Speed

Category		Hi	Me	Lo	SLo	STOP
Cooling Mode Operation	Manual	○	○	○		
	Auto	○	○		○	※○
Soft Dry Operation	Manual				○	○
	Auto				○	※○

※ Deodorization control

8.6. Outdoor Fan Motor Control

The outdoor fan speed is controlled by ON-OFF status of the SSR on the outdoor PCB.

Tap N0.	Fan ON(ms)	Fan OFF(ms)	Tap N0.	Fan ON(ms)	Fan OFF(ms)
0	0	4000	16	1900	2100
1	400	3600	17	2000	2000
2	500	3500	18	2100	1900
3	600	3400	19	2200	1800
4	700	3300	20	2300	1700
5	800	3200	21	2400	1600
6	900	3100	22	2500	1500
7	1000	3000	23	2600	1400
8	1100	2900	24	2700	1300
9	1200	2800	25	2800	1200
10	1300	2700	26	2900	1100
11	1400	2600	27	3000	1000
12	1500	2500	28	3100	900
13	1600	2400	29	3200	800
14	1700	2300	30	4000	0
15	1800	2200			

8.7. Delayed ON-Timer Control

- When the delayed ON-Time is set by using the remote control,the unit will start operate slightly before the set time, so that the room will reach nearly to the set temperature by the desired time.
- For Cooling and Soft Dry mode, the operation will start 15 minutes before the set time.
- For Automatic mode, the operation will starts 30 minutes before the set time. The indoor fan will operate at Lo speed for 25 seconds to detect the intake air temperature to determine the operation mode. The operation lamp will blink at this time.

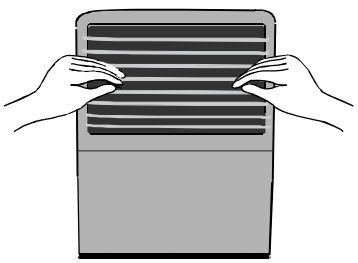
8.8. Random Auto Restart Control

- If the operation is stopped due to a power failure, it will restart automatically when the power supply is resumed.
- Auto restart control is active with the manufacturer original set. The control can be omitted by keeping pressing AUTO OFF/ON button on indoor decoration pannel for approximate 15seconds until “Beep,Beep,Beep-” is heard.
- To resume the control, repeat the process above(press AUTO OFF/ON button for approximate 15 minutes) untill “Beep, Beep,Beep” is heard.

8.9. Airflow Direction Control

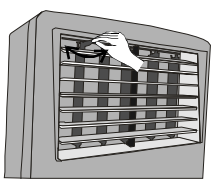
Both vertical airflow directiononly can be adjusted manually.

A. Vertical Airflow Direction



1.Pull the vane by the right and left portion gently.
2.Don’t use the uppermost and the lowest vane to adjust.
3.Don’t let the vanes downward continuously for a long time, otherwise condensation may be caused around the discharge vent.

B. Horizontal Airflow Deirection control



To adjust horizontal airflow vanes gently byholding thecontrol handle on the top left.(Refer to the figure on the right.)

8.10 Demo Mode (Outdoor unit not needed)

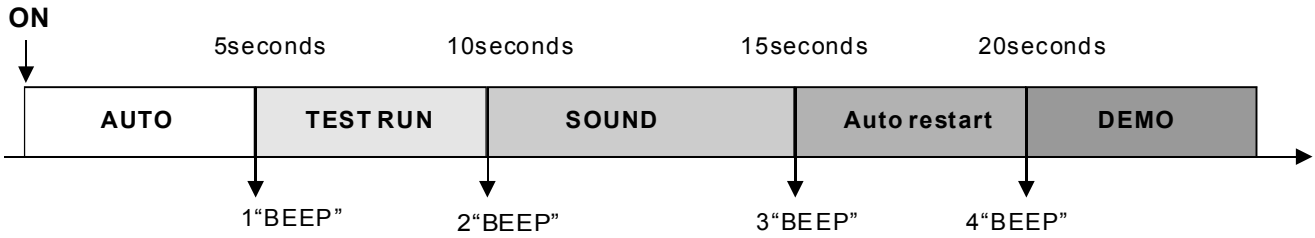
Activate the demo mode:

Keep the AUTO button on the indoor unit depressed continuously for 20 seconds until 4 beeps are heard and the demo mode is activated. → Turn off the air conditioner → Demo mode operation will be restarted automatically in 1 minute.

- In demo mode, the air conditioner can be operated(if the outdoor unit is connected to the indoor unit); Whenever you turned off the air conditioner, it will restart automatically into demo mode opertion.

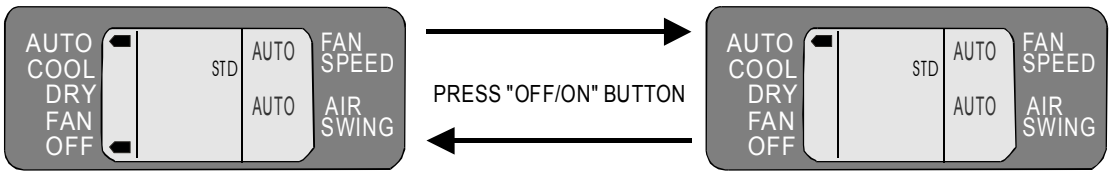
Cancel the demo mode:

- Keep the AUTO button on the indoor unit depressed continuously for 20 seconds until 4 beeps are heard.



8.11 About Cursor Key Which Points To “OFF” On Remote Control

- When the ON/OFF button on the remote control is pressed, the cursor key which points to “OFF” will appear or disappear to indicate the ON/OFF status of the air conditioner.



- For some reason (Ex. The signal of the remote control does not reach the signal receiver of the indoor unit.), the display of the remote control will not correspond with the actual ON/OFF status of the indoor unit:
  1. The air conditioner is running but the cursor key which points to “OFF” appears. The air conditioner can be stopped with any button (Except for “ON/OFF”, “TIMER SET”, “TIMER ON”) pressed.
  2. The air conditioner is on standby, but the cursor key which points to “OFF” disappears. The air conditioner can be started with any button(Except for “ON/OFF”, “TIMER SET”, “TIMER OFF”) pressed.

9 Self-diagnosis

According to the LED on the outdoor PCB, locations of malfunction can be detected. Other than indications below occurring, switch off the power supply, then switch on to restart the operation.

	LEDS ON OUTDOOR PCB					ERROR	CHECK LOCATION
No	LED5	LED4	LED3	LED2	LED1		
1	●		●		●	Power Supply Phase Problem	Negative or open phase or improper connection of main supply.
2	●			●		Discharge pressure protection	Refrigeration cycle
3	●				●	Compressor over current protection	Open phase or lock in compressor
4	●			●	●	Compressor discharge temperature protection	Insufficient refrigerant
5		●		●		Condenser outlet sensor problem	The sensor or the connector CN-TH(3,4)
6		●			●	Compressor discharge sensor problem	The sensor or the connector CN-DIS
7		●	●			Outdoor ambient air temperature sensor problem	The senor or the connector CN-TH(1,2)
8		●		●	●	Compressor current detector open circuit problem	Open phase of power supply, compressor current detector open circuit.
9		●	●	●		Heating pressure switch open circuit problem	Heating pressure switch or the connector CN-PSW1
10		●	●		●	High pressure switch open circuit problem	High pressure switch or the connector CN-PSW2
11	●	●		●	●	Refrigeration cycle problem	Insufficient refrigerant or connector CN-HOT

● **LED Flashing Blank: OFF**

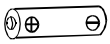
10 Installation

10.1. Before Installation

WARNING

- Engage dealer or specialist for installation. If installation done by the user is defective, it will cause water leakage, electrical shock or fire.
- Use the specified cable (2.5mm^2) and connect tightly for indoor/outdoor connection.
- Power supply connection to a circuit breaker for the permanent connection. Use an approved 25A circuit breaker for the permanent connection. It must be a 4-pole switch with a minimum 3 mm contact gap.
- The unit must be earthed, or it will cause fire or electric shock.

Accessory parts attached together with the Indoor Unit.

No.	Accessories parts	Qty.
1	Fixing Tool of Indoor Unit 	1
2	Remote Control 	1
3	Fixing Screw 	4
4	Battery 	2
5	Band 	3

No.	Accessories parts	Qty.
6	Bushing for Piping 	1
7	Bushing for Cable 	1
8	Heat Insulator 	1
9	Operating Instructions 	1
10	Installation Instructions 	1

SELECT THE BEST LOCATION

INDOOR UNIT

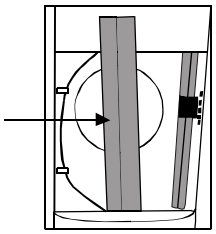
- There should not be any heat source or steam near the unit.
- There should not be any obstacles blocking the air circulation.
- A place where air circulation in the room is good.
- A place where drainage can be easily done.
- A place where noise prevention is taken into consideration.
- Do not install the unit near the door way.
- Ensure the spaces indicated by arrows from the wall, ceiling, fence or other obstacles.

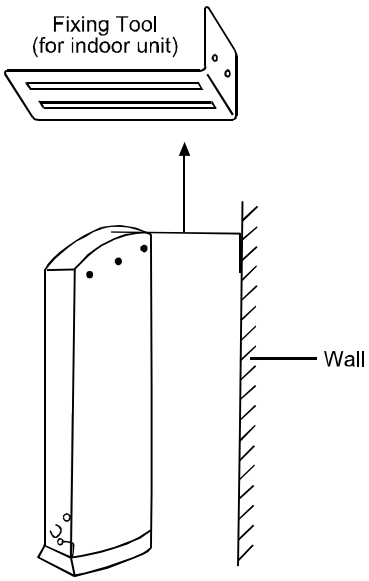
OUTDOOR UNIT

- If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.
- There should not be any animal or plant which could be affected by hot air discharged.
- Keep the spaces indicated by arrows from wall, ceiling, fence or other obstacles.
- Do not place any obstacles which may cause a short circuit of the discharged air.

Indoor/Outdoor Unit Installation Diagram

Note: Before operating, remove this supporting tool.





Generally,the installing place of outdoor unit is higher than that of the indoor unit.
The coil preventing compressor oil from entering into the indoor unit is needed.

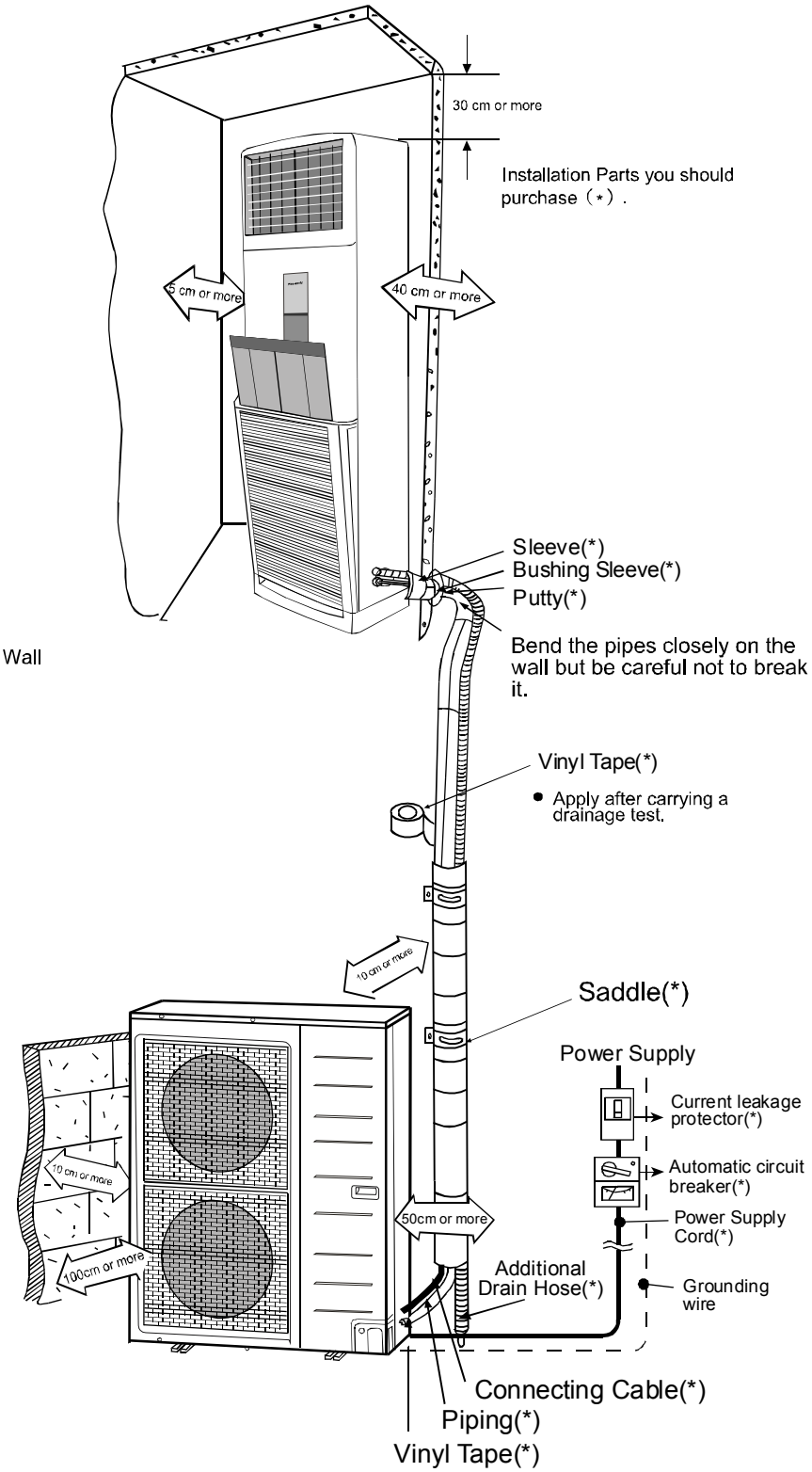


Fig 1

10.2. Installation of Indoor, Outdoor Unit

10.2.1. Select the best location

1. Indoor unit
   - There should not be any heat source of steam near the unit.
   - There should not be any obstacles to prevent the air circulation.
   - A place where air circulation will be good.
   - A place where drainage can be easily obtained.
   - A place where noise prevention is taken into consideration.
   - Do not install the unit near the doorway.
   - Ensure the spaces indicated by arrows from the wall, ceiling, fence, or other obstacles.(Fig 2)

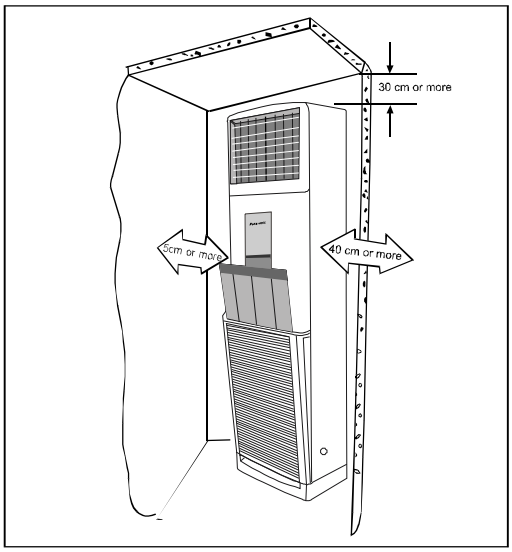


Fig.2

2. Outdoor unit
   - If an awning is built over the unit to prevent direct sunlight or rain exposure, be careful that heat radiation from the condenser is not restricted.
   - There should not be any animals or plants which could be affected by hot air discharged.
   - Ensure the spaces indicated by arrows from the wall, ceiling, fence, or other obstacles.(Fig 3)

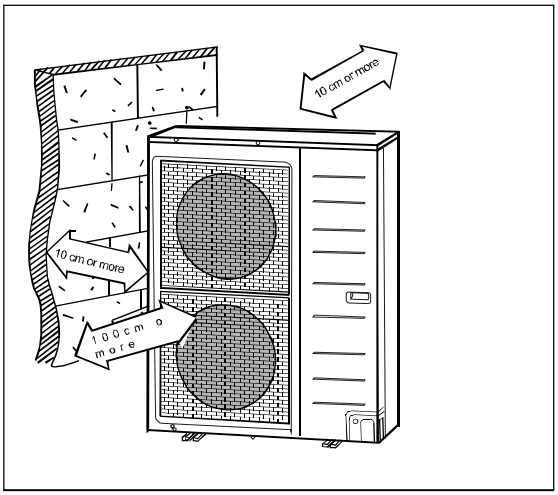


Fig.3

3. Piping length and Elevation

Piping Size		Max.Piping Length(m)	Max. Elevation (m)	Additional Refrigerant (g/m)	Max.Length Without Recharging (m)
Gas	Liquid				
6/8"	3/8"	50	30	50	30

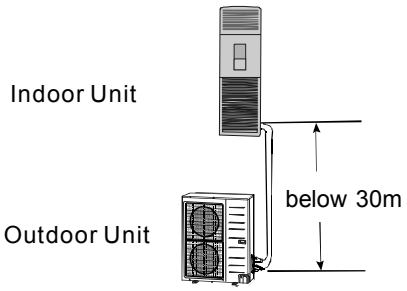


Fig.4

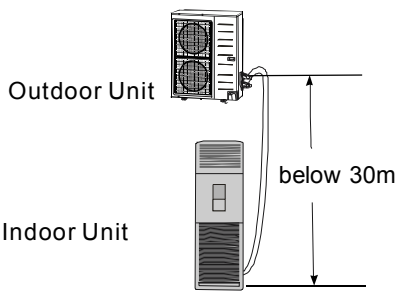


Fig.5

10.2.2. Indoor unit Installation

There are three piping arrangements: left, right and right rear piping.

1. Drill a hole as the right figure.(Fig7)
2. Insert the piping sleeve to the hole.
3. Fix the bushing to the sleeve.
4. Cut the sleeve until it extrudes about 15 mm from the wall.
5. Finish by sealing the sleeve with putty or caulking compound at the final stage.

Caution

When the wall is horrow, please be sure to use the sleeve for tube ass'y to prevent dangers caused by mice biting the connecting cable.

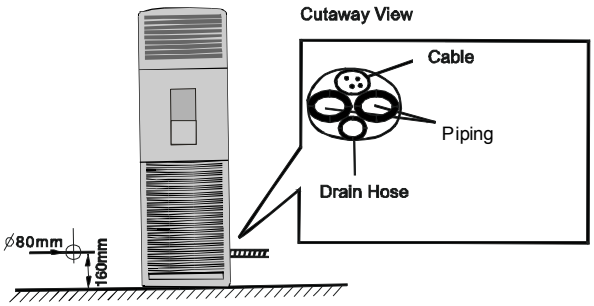


Fig 6

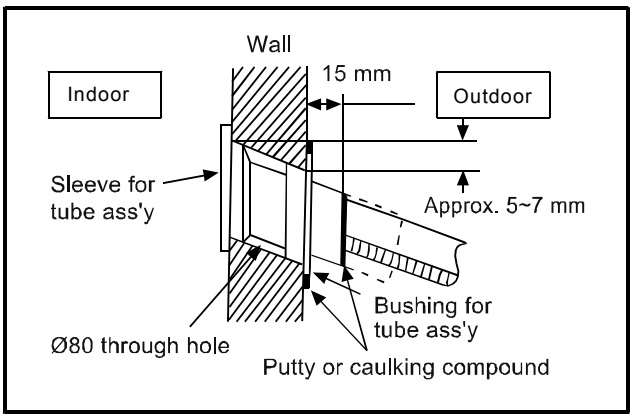


Fig.7

10.2.3. Outdoor unit installation

After selecting the best location, start installation according to Indoor /Outdoor Unit Installation Diagram.

1. Fix the unit on concrete or rigid frame firmly and horizontally by bold nut (10 mm).
2. When installing at roof, please consider strong wind and earthquake. P lease fasten the installation stand firmly with bolt or nails.

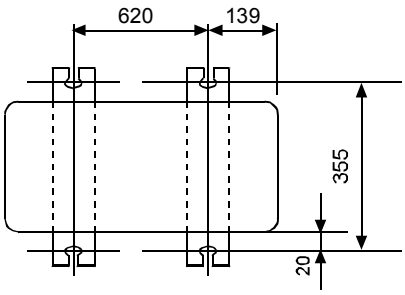


Fig.8

10.3. Piping and Drainage of Indoor Unit

10.3.1. Preparation of piping

1. Cut the pipes and the cable
   - Use the accessory piping kit or pipes purchased locally
   - Measure the distance between the indoor and the outdoor unit.
   - Cut the pipes a little longer than the measured distance.
   - Cut the cable a little longer than the pipe length.

Model	Pipe size	
	Gas side	Liquid side
CS-C45FFH/ CU-C45FFH	6/8”	3/8”

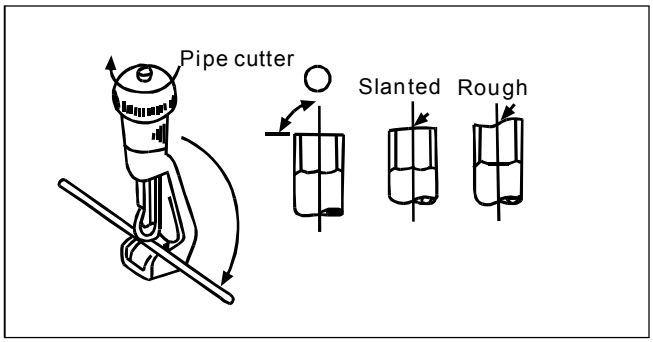


Fig.9

2. Remove burrs
   - Remove burrs from cut edges of pipes.
   - Turn the pipe end down to avoid the metal powder entering the pipe.

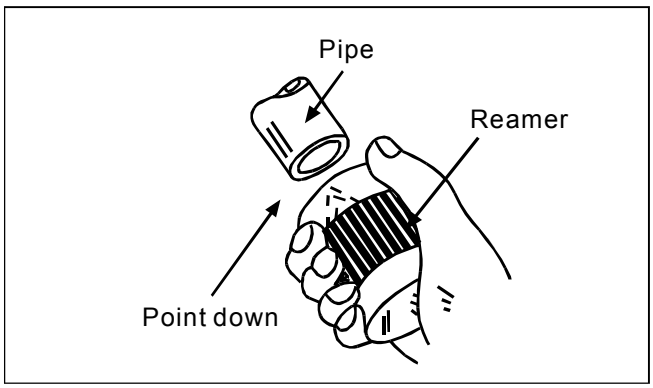


Fig.10

Caution
If burrs are not removed, they may cause a gas leakage.

3. Flaring the pipe
   - Insert the flare nuts, mounted on the connection ports of both indoor and outdoor unit, onto the copper pipes.
   - Fit the copper pipe end into the bar of flare tool about 0.5-1.5mm higher.(See illustration)
   - Flare the pipe ends.

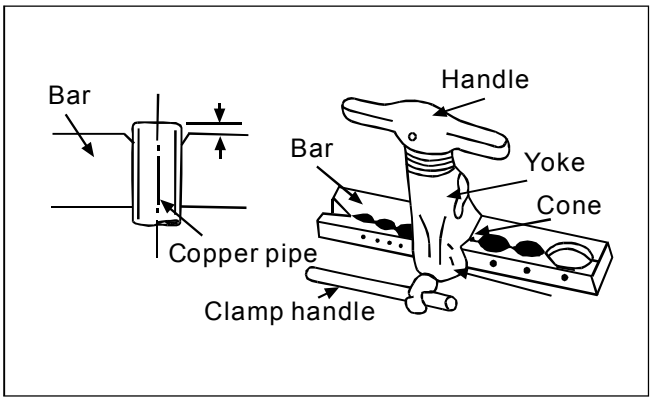


Fig.11

4. Tape the flaring portion to protect it from dust or damage.

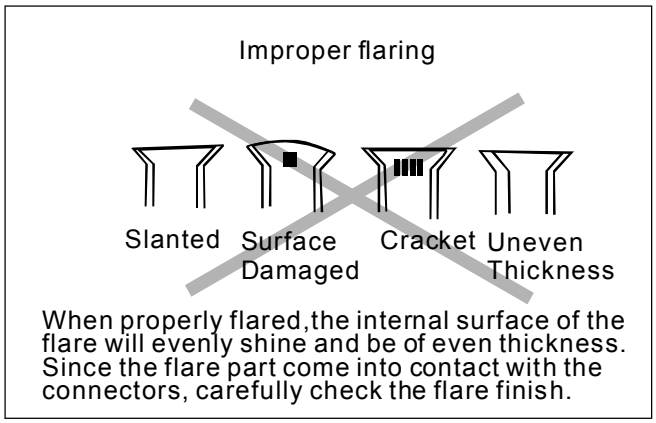


Fig.12

10.3.2. Connecting the piping to the indoor unit and outdoor unit.

- Align the center of the piping and sufficiently tighten the flare nut with fingers.
- Finally, tighten the flare nut with torque wrench until the wrench clicks.
- When tightening the flare nut with torque wrench, ensure the direction for tightening follows arrow on the wrench.

Model	Piping side	Torque
CS-C45FFH/ CU-C45FFH	Liquid side3/8"	42N·m
	Gas side 6/8"	100N·m

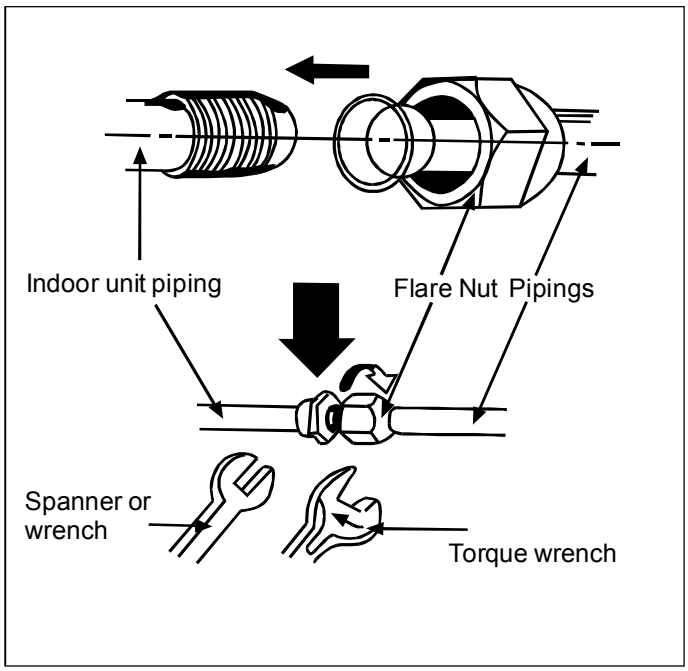


Fig.13

9.3.3. Connecting the drain hose to the indoor unit.

1.The drain hose should be insulated.
2.The drain hose should be sloped down. Any upturn is not permitted.(Fig 14)
3.The foamed plastic around the air inlet duct should not be touched by the drain hose.
4.A drainage test should be carried out to assure a good drainage.

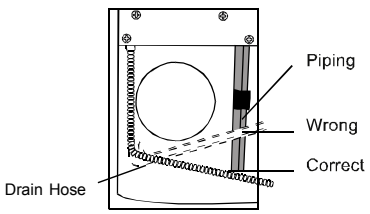
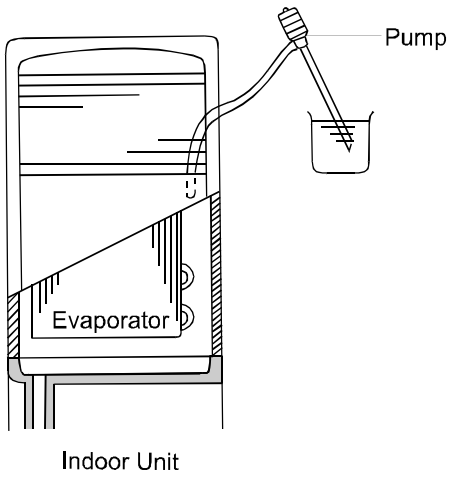


Fig.14

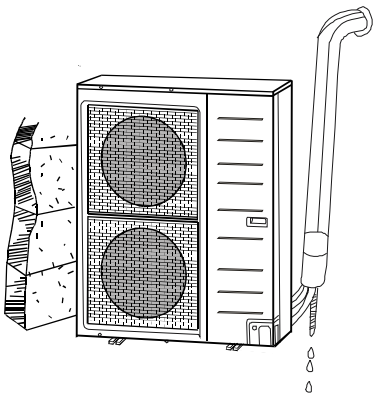
9.3.4. Check the drainage.

1.Insert the pump into the indoor unit from the right side of the discharge vent and inject 1 liter of water.
2.Connect the drain hose and insulate it.
3.The drain hose can not be connected to drainage way which produces sulphur gas.



Indoor Unit

Fig.15



Outdoor Unit

Fig.16

10.4 Evacuation of Indoor Unit And Piping

WHEN INSTALLING AN AIR CONDITIONER, BE SURE TO EVACUATE THE AIR INSIDE THE INDOOR UNIT AND PIPES IN THE FOLLOWING PROCEDURE.

1. Connect a charging hose with a push pin to the Low side and High side of a charging set and the service ports of 3-way valves. Be sure to connect the end of the charging hose with the push pin to service port.
2. Connect the centre hose of the charging set to a vacuum pump with check valve, or vacuum pump and vacuum pump adaptor.
3. Turn on the power switch of the vacuum pump and make sure that the needle in the gauge moves from 0 cmHg(0MPa) to -76cmHg(-0.1MPa).Then evacuate the air approximately 1hour.
4. Close the valve of the charging set and turn off the vacuum pump. Make sure that the needle in the gauge does not move after approximately five minutes.

Note:
BE SURE TO FOLLOW THIS PROCEDURE IN ORDER TO AVOID REFRIGERANT GAS LEAKAGE.

5. Disconnect the charging hose from the vacuum pump and the service port of the 3-way valves.
6. Tighten the service port caps of the 3-way valves at a torque of 18 N.m with a torque wrench.
7. Remove the valve caps of both the 3-way valves. Position both of the valves to “OPEN” position using a hexagonal wrench (4mm).
8. Mount valve caps onto two valves.
   Be sure to check for gas leakage.

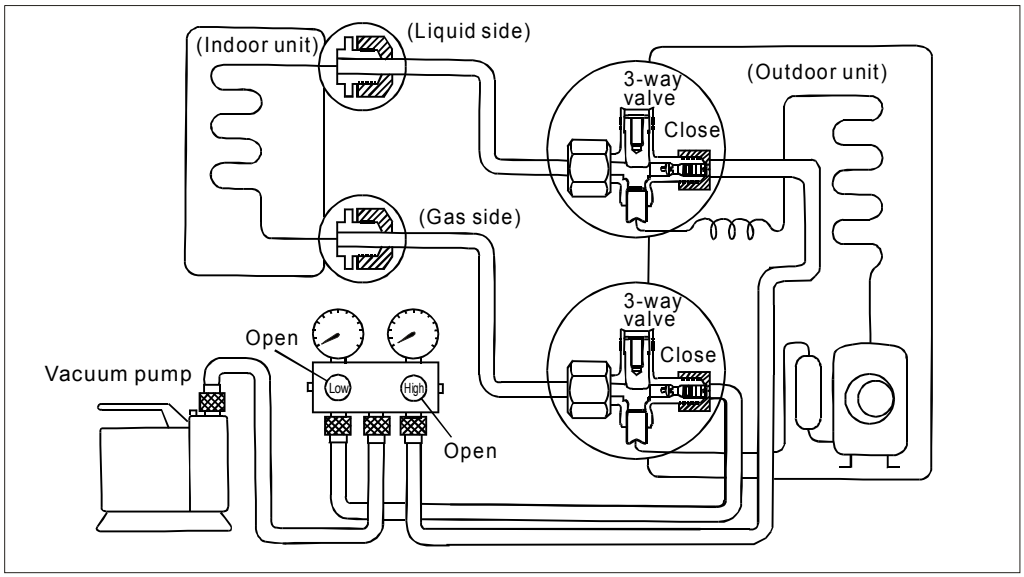


Fig. 17

Caution

- If the gauge needle does not move from 0 cmHg(0MPa) to -76 cmHg(-0.1MPa) in step 3 above, take the following measure:
- If the leak stops when the piping connections are tightened further, continue working from step 3.
- If the leak does not stop when the connections are retightened, repair the location of leak.
- Do not release refrigerant during piping work for installation or reinstallation. Take care of the liquid refrigerant, it may cause frostbite.

10.5. Connecting Cable and Power Supply Cord

10.5.1. Connecting the cable to the indoor unit

1.Take away the intake grille.
2.Loosen the four screws, remove the terminal board cover. (Fig 18)
3.Fix the connecting cable onto the terminals on the control board.
4.Secure the connecting cable using clamp.(Fig 19)
Note: Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed 4×2.5mm^2 flexible cord, type designation 345 IEC 57 or heavier cord.

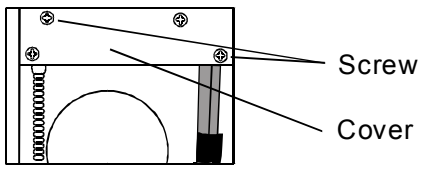


Fig 18

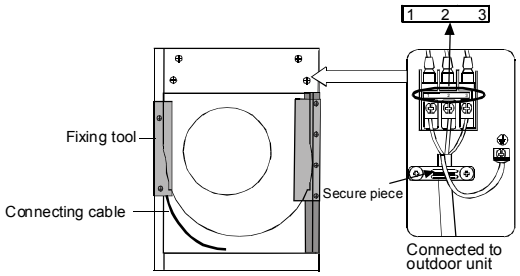
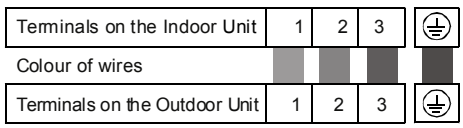


Fig 19

10.5.2. Connecting the cable to the outdoor unit

1.Remove the control board cover from the unit by loosening the screw.
2.Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed flexible cord(4X2.5mm^2), type designation 245IEC 57 or heavier cord.
3.Secure the cable onto the control board with the clamp.



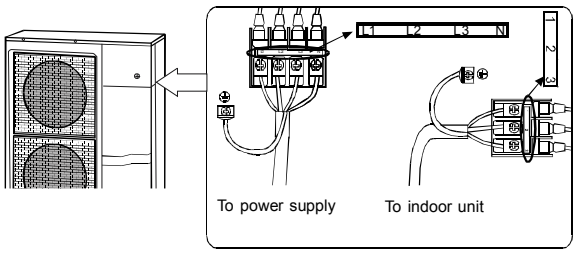


Fig 20

10.5.3 Connect the power cord to outdoor unit.

The outdoor unit power supply cord should be connected to an independent power supply. Power supply cord shall be approved polychloroprene sheathed 5x4.0 mm^2 flexible cord, type designation 245 IEC 57 or heavier cord.The length of the power supply cord should be less than 40m. A circuit breaker and a current leakage protector should be installed.

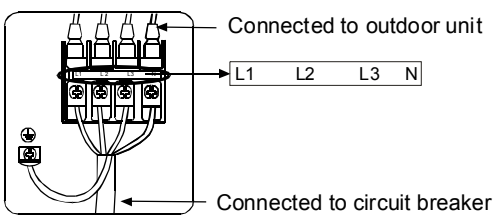


Fig 21

10.6. Wrapping the Piping

Using vinyl tape to wrap the indoor unit connecting portion. When connecting the drain hose, keep the outlet port above the ground. (Do not dip it into water and fix it onto wall to prevent swinging in wind.)

10.6.1. When the indoor unit is above outdoor unit

1.Wrap the piping, drain hose and connecting cable with tape upwardly.
2.Secure the piping with clamps onto the wall.

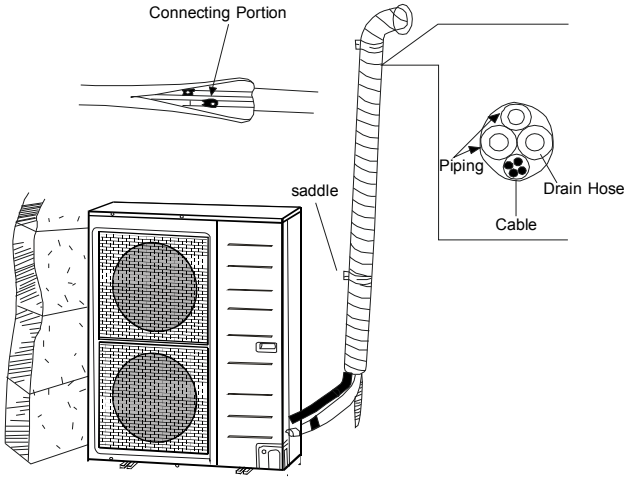


Fig 22

10.6.2. When the outdoor unit is above indoor unit

1.Wrap the piping and the connecting cable with tape upwardly.
2.Secure the piping onto the wall and bend the piping to prevent rain from entering into room. (Ensure the lowest part of the piping is lower than the wall opening to prevent rain entering) (Fig 23).
3.Secure the piping with clamps and seal the wall opening.

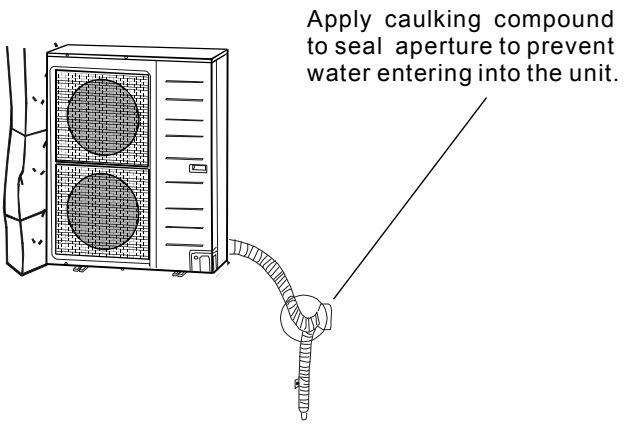


Fig 23

Note:

Apply putty or caulking material to the wall opening to prevent rain from entering into the air conditioner, otherwise, cooling efficiency may be affected or water dripping may be resulted.

10.7.Evaluation of the Performance

1.Operate the unit at cooling operation mode for fifteen minutes or more.
2.Meassure the temperature of the intake and discharge air.
3.Ensure the difference between the intake temperature and the discharge temperature is more than 8℃.

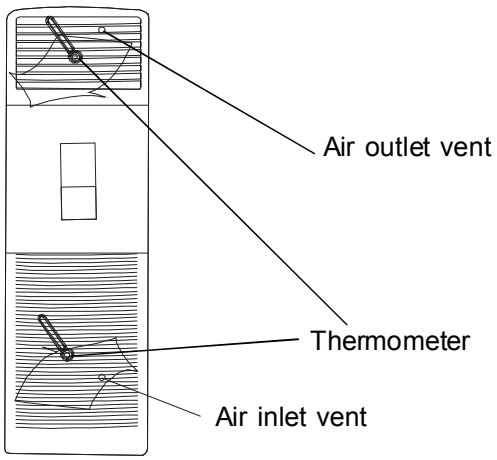
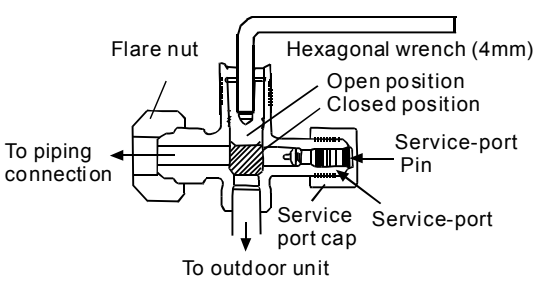
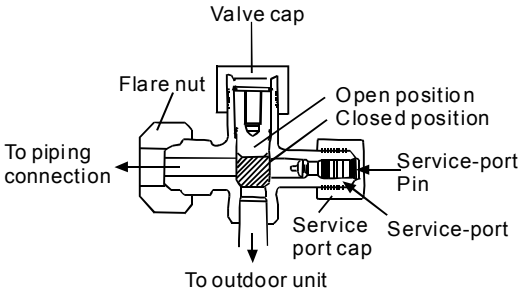


Fig 24

11 3-way Valve

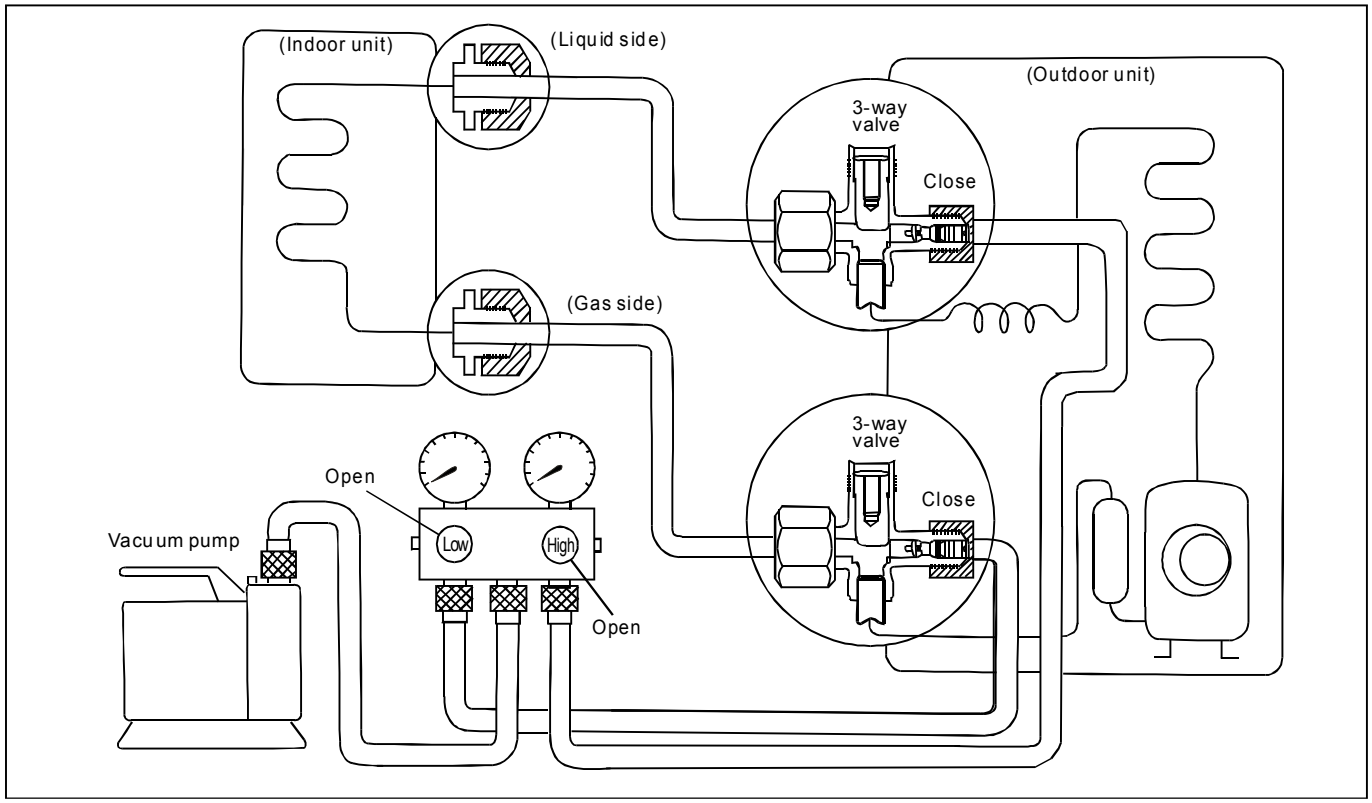
	3-way valve (Liquid side)		3-way valve (Gas side)	
				
Works	Shaft Position	Service Port	Shaft Position	Service Port
Shipping	Closed (With valve cap)	Closed (With valve cap)	Closed (With valve cap)	Closed (With cap)
Evacuation (Installation and Re-installation)	Closed (Clockwise)	Open (Connected manifold gauge with vacuum pump)	Closed (Clockwise)	Open (Push-pin)
Operation	Open (With valve cap)	Closed (With cap)	Open (With valve cap)	Closed (With cap)
Pumping down (Transferring)	Closed (Clockwise)	Closed (With cap)	Open (Counter-clockwise)	Open (Connected manifold gauge)
Evacuation (Servicing)	Open (Counter-clockwise)	Open (Connected manifold gauge)	Open (Counter-clockwise)	Open (Connected manifold gauge)
Gas Charging (Servicing)	Open (Counter-clockwise)	Open (Connected manifold gauge)	Open (Counter-clockwise)	Open (Connected manifold gauge)
Pressure check (Servicing)	Open (Counter-clockwise)	Closed (With cap)	Open (Counter-clockwise)	Open (Connected manifold gauge)
Gas releasing (Servicing)	Open (Counter-clockwise)	Open (Connected manifold gauge)	Open (Counter-clockwise)	Open (Connected manifold gauge)

11.1. Evacuation of the installation

When installing an air conditioner,be sure to evacuate the air inside the indoor unit and pipes in the following procedure.

Required tools: Hexagonal wrench, adjustable wrench, torque wrenches, wrench to hold the joints, gas leak detector, and charging set.

The air in the indoor unit and in the piping must be purged. If air remains in the refrigeration pipings, it will affect the compressor, reduce the cooling capacity, and could lead to a malfunction.



Service port cap

Be sure, using a torque wrench to tighten the service port cap(after using the service port),so that it prevents the gas leakage from the refrigeration cycle.

Procedure:

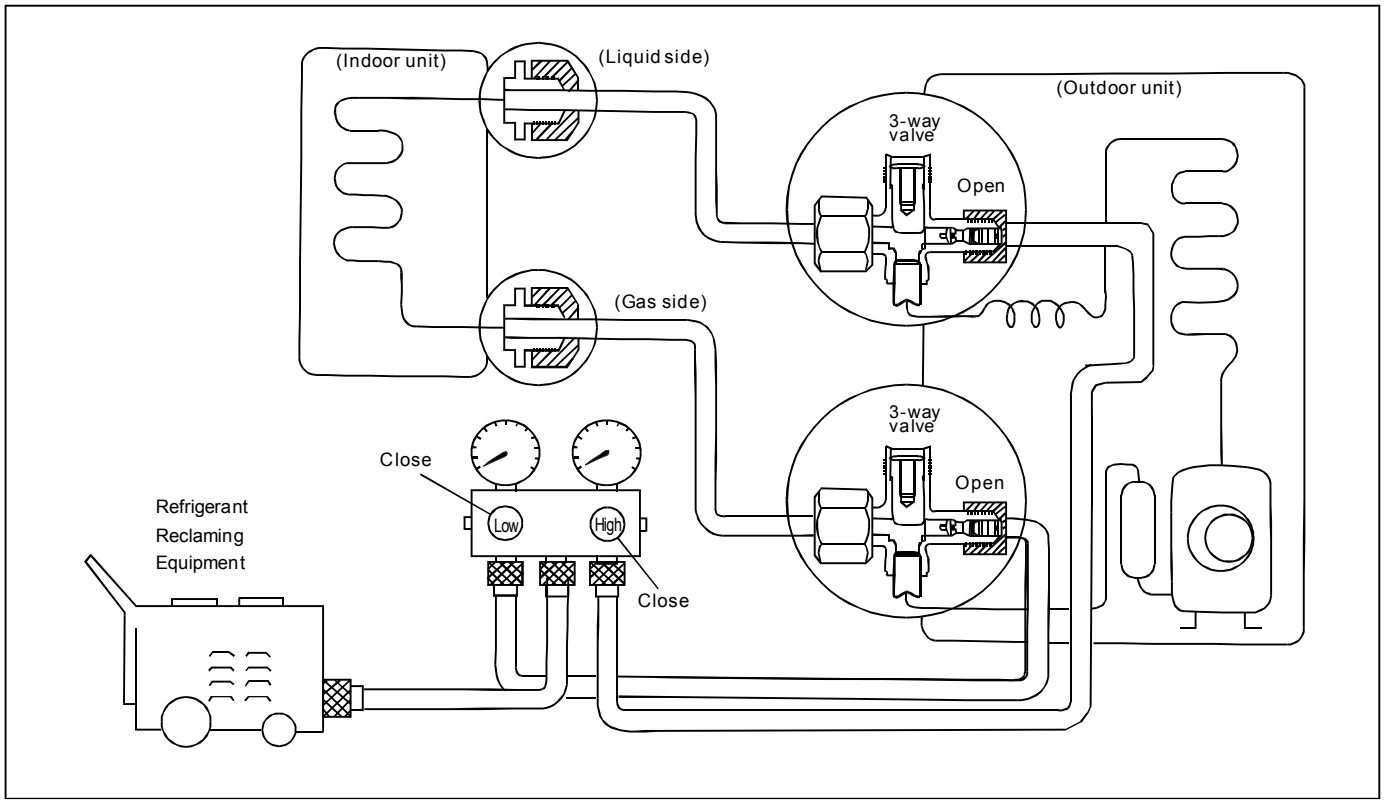
1. **Connect two charging hoses with push pins to the Low and High sides of a charging set and the service ports of 3-way valves.**
   - Be sure to connect the end of the charging hose with the push pin to the service port.
2. **Connect the centre hose of the charging set to a vacuum pump.**
3. **Turn on the power switch of the vacuum pump and make sure that the needle in the gauge moves from 0 cmHg (0 Mpa) to -76 cmHg (-0.1 Mpa). Then evacuate the air for approximately 1 hour.**
4. **Close the valve of both the Low and High sides of the charging set and turn off the vacuum pump. Make sure that the needle in the gauge does not move after approximately 5 minutes.**
   BE SURE TO TAKE THIS PROCEDURE IN ORDER TO AVOID REFRIGERANT GAS LEAKAGE.
5. **Disconnect the charging hose from the vacuum pump and from the service ports of the 3-way valves.**
6. **Tighten the service port caps of both the 3-way valve at a torque of 18 N.m with a torque wrench.**
7. **Remove the valve caps of both the 3-way valves. Position both of the valves to "open" using a hexagonal wrench (4 mm).**
8. **Mount valve caps onto both the 3-way valves.**

●Be sure to check for gas leakage.

Caution

If gauge needle does not move from 0 cmHg(0 Mpa) to -76cmHg (-0.1MPa) in step (3) above, take the following measures:
If the leaks stop when the piping connections are tightened further, continue working from step (3).
If the leaks do not stop when the connections are retightened, repair the location of the leak.

11.2. Pumping down



Procedure

1.Confirm that both the 3-way valves are set to open position.
- Remove the valve stem caps and confirm that the valve stems are in the open position.
- Be sure to use a hexagonal wrench to operate the valve stems.

2.Operate the unit for 10 to 15 minutes.

3.Stop operation and wait for 3 minutes, then connect the charge set to the service ports of the 3-way valves.
- Connect the charge hose with the push pin to the gas side service port.

4.Air purging of the charge hose.
- Open the low-pressure valve on the charge set slightly to purge air from the charge hose.

5.Set the liquid side 3-way valve to the closed position.

6.Operate the air conditioner at the cooling cycle and stop it when the gauge indicates 1 kg/cm^{2}G (0.1 Mpa).
- If the unit cannot be operated at the cooling mode operation (weather is rather cold),press the MODE button and TEMP down button simultaneously on the indoor unit to start test operation, so that the unit can be operated.

7.Immediately set gas side 3-way valve to the closed position.
- Do this quickly so that the gauge ends up indicating 1 to 3kg/cm^{2}G (0.1 to 0.3 Mpa).

8.Use refrigerant reclaiming equipment to collect refrigerant from indoor unit and pipes.

9.Disconnect the charge set, and mount both the 3-way valve stem's nuts and the service port caps.
- Use torque wrench to tighten the service port caps to torque of 18N.m.
- Be sure to check for gas leakage

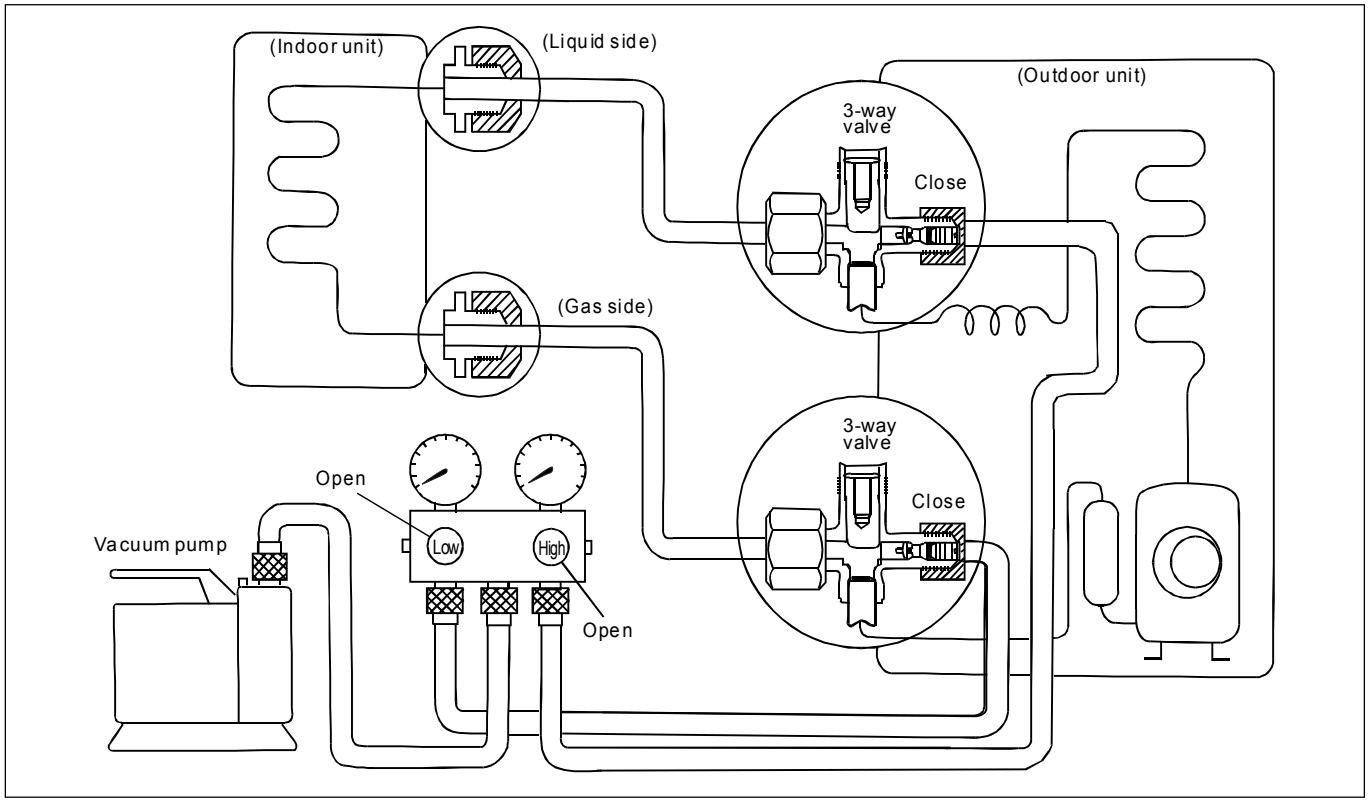
10.Disconnect pipes from indoor unit and outdoor unit.

.

11.3. Evacuation of Re-installation

WHEN INSTALLING AN AIR CONDITIONER, BE SURE TO EVACUATE THE AIR INSIDE THE INDOOR UNIT AND PIPES IN THE FOLLOWING PROCEDURE.

If air remains in the indoor unit and refrigeration pipes, it will affect the compressor, reduce to cooling capacity, and could lead to a malfunction.



Procedure:

1. **Connect two charging hoses with push pins to the Low and High sides of a charging set and the service ports of the 3-way valves.**
   - Be sure to connect the end of the charging hose with the push pin to the service port.

2. **Connect the centre hose of the charging set to a vacuum pump.**

3. **Turn on the power switch of the vacuum pump and make sure that the needle in the gauge moves from 0 cmHg (0 Mpa) to -76 cmHg (-0.1 Mpa). Then evacuate the air for approximately 1 hour.**

4. **Close the valves of both the Low and High sides of the charging set and turn off the vacuum pump. Make sure that the needle in the gauge does not move after approximately 5 minutes.**
   BE SURE TO TAKE THIS PROCEDURE IN ORDER TO AVOID REFRIGERANT GAS LEAKAGE.

5. **Disconnect the charging hose from the vacuum pump.**

6. **Charge the pipes and indoor unit with gas refrigerant from liquid (High) side 3-way valve service port and then discharge the refrigerant until gas (Low) side gauge needle indicates 3 kg/cm^2 (0.3 Mpa)**
   - **BE SURE TO USE REFRIGERANT RECLAIMING EQUIPMENT WHILE DISCHARGING THE REFRIGERANT.**
   - **Purge the air from charge set's centre hose.**
   - **Be sure to check for gas leakage.**

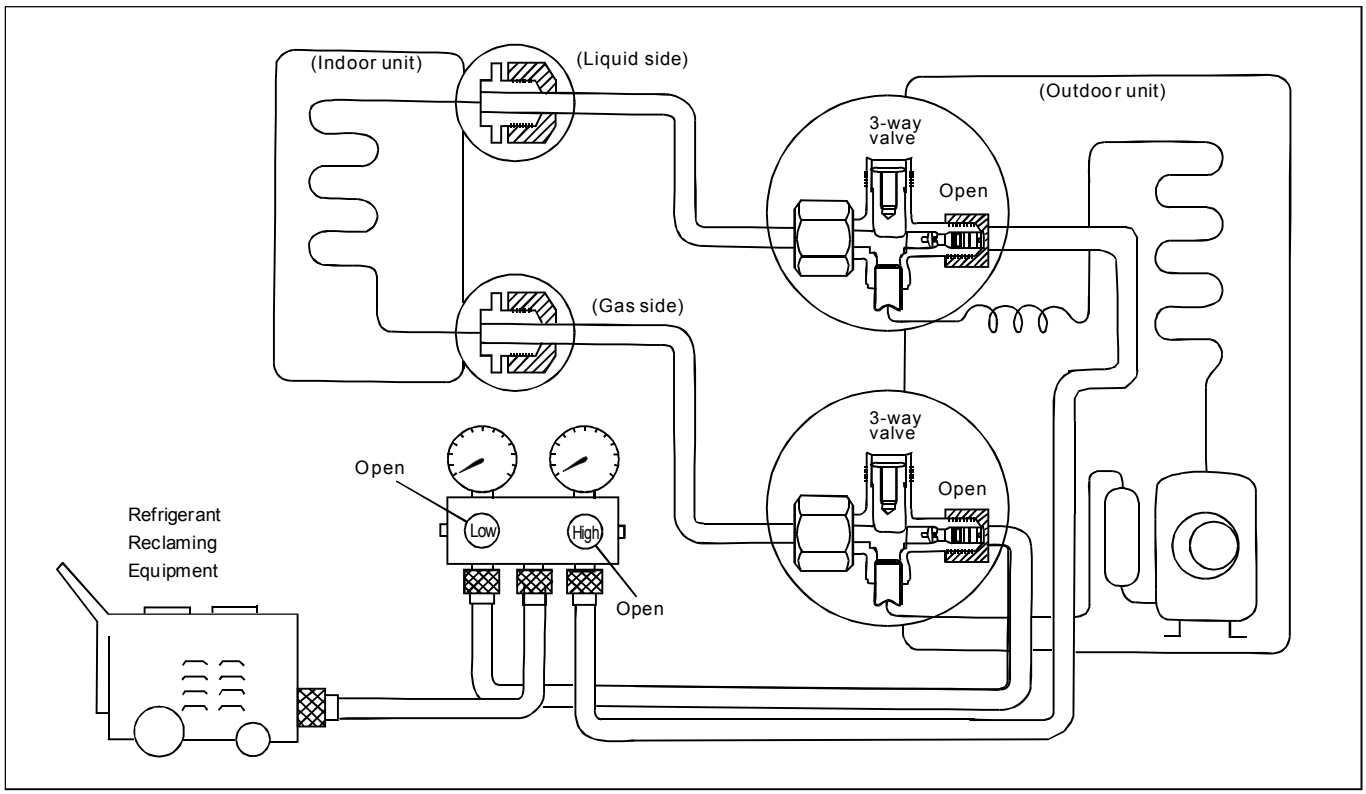
Caution

If gauge needle does not move from 0 cmHg(0 Mpa) to -76cmHg (-0.1MPa) in step (3) above, take the following measures:
If the leaks stop when the piping connections are tightened further, continue working from step (3).
If the leaks do not stop when the connections are retightened, repair the location of the leak.

7. **Tighten the service port caps of both the 3-way valve at a torque of 18 N.m with a torque wrench.**
8. **Remove the valve caps of both the 3-way valves. Position both of the valves to "open" using a hexagonal wrench (4 mm).**
9. **Mount valve caps onto both of the 3-way valves.**

11.4. Balance refrigerant of the 3-way valves

(Lack of refrigerant in the refrigeration cycle)



Procedure

1. **Confirm that both the 3-way valves are set to the open position.**

2. **Connect the charge set to the 3-way valve's service port.**
   - Leave the valve on the charge set closed
   - Connect the charge hose with the push-pin to the service port.
   - Confirm whether the pressure indicates more than 0.1 MPa (1 kg/cm^{2}G)

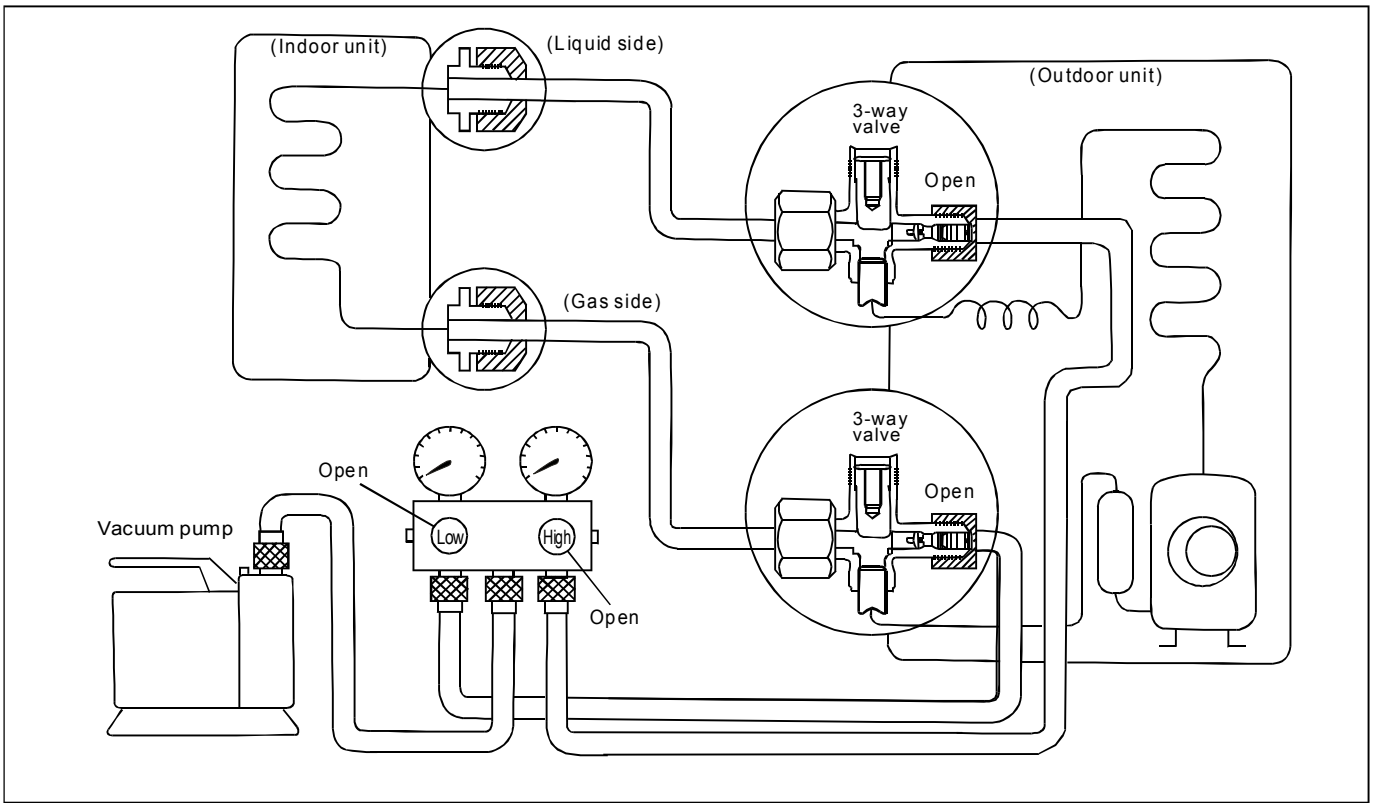
3. **Connect the charge set's centre hose to refrigerant reclaiming equipment.**

4. **Open the valve (Low side) on the charge set and loosen the hose connected with the Refrigerant Reclaiming Equipment to purge the air from the hose.**

5. **Turn on refrigerant reclaiming equipment to collect the refrigerant until the needle indicates 0 (no refrigerant is remaining).**

11.5. Evacuation

(No refrigerant in the refrigeration cycle)



Procedure

1. **Connect the vacuum pump to the charge set's centre hose.**

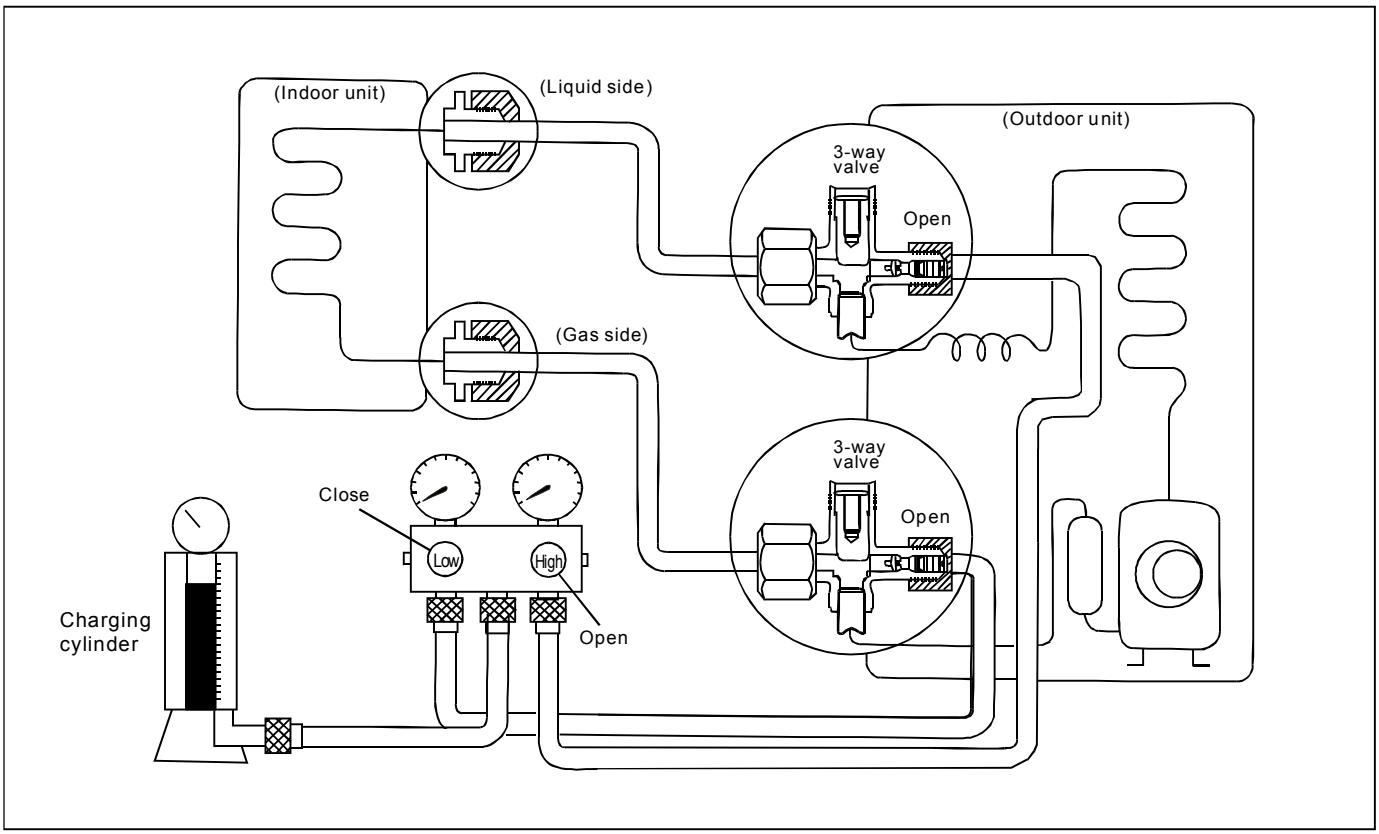
2. **Turn on the vacuum pump to evacuate the unit.**
   - Confirm that the gauge needle has moved toward -76 cmHg (-0.1MPa).
   - Apply the vacuum for approximaterly 1 hour (vacuum of 4 mmHg or less).

3. **Close the valve (Low side and High side) on the charge set, turn off the vacuum pump, and confirm that the gauge needle does not move (approximately 5 minutes after the vacuum pump is turned off).**

4. **Disconnect the charge hose from the vacuum pump.**

11.6. Gas charging

(After Evacution)



Procedure

1.**Connect the charge hose to the charging cylinder.**

- Connect the charge hose which was disconnected from the vacuum pump to the valve at the bottom of the cylinder.

2.**Purge the air from the charge hose.**

- Open the valve at the bottom of the cylinder and use a screwdriver to press the check valve on the charge set to purge the air.(Be careful of the liquid refrigerant.)

3.**Open the valve (High side) on the charge set and charge the refrigerant with liquid refrigerant.**

- Be sure to open only the High side valve on the charge set to charge the system from the liquid-side (high-pressure) pipe. (If the system cannot be charged with the specified amount of refrigerant, operate the compressor until the specified amount can be charged, and then close the valve at the bottom of the charge cylinder.)

4.**Immediately disconnect the charge hose from the 3-way valve's service ports.**

5.**Mount the valve stem nuts and the service port.**

- Use a torque wrench to tighten the service port caps to a torque of 1.8kg.m (18 N.m)
- Be sure to check for gas leakage.

12 Disassembly of the parts

12.1. Indoor Electronic Controller

1.Pull the intake grille outward and loosen the fixing screws. (Fig 1)

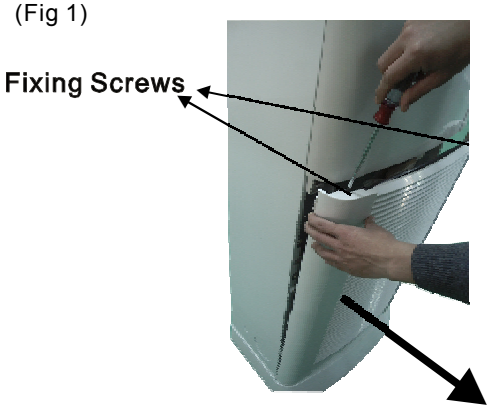


Fig 1

2.Remove the supporting tool.(Fig 2)

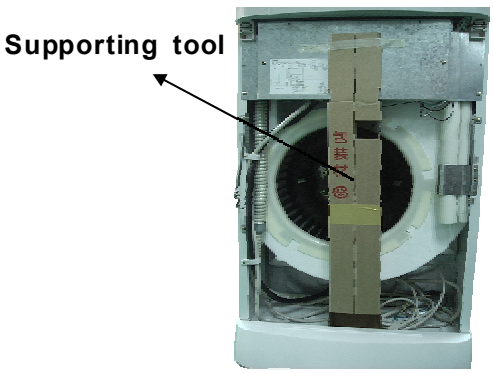


Fig 2

3.Loosen the screws on the control board cover **(Note:When loosening the screws, be careful not let the cover drop.) (Fig3)**

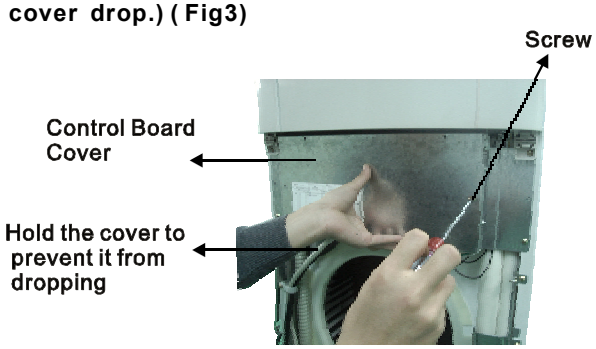


Fig 3

4.Release all the connectors of the wires and the holders of the control board. You can remove the electronic controller. (Fig 4)

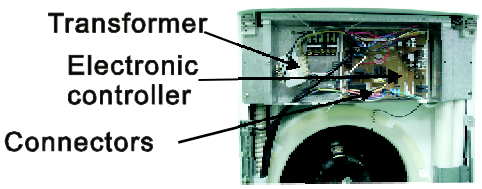


Fig 4

12.2 Indoor Flow Fan and Fan Motor Removal Procedure

1.In order to remove the flow fan and the fan motor, the intake grille should be removed first(refer to the previous procedure). Release the sensor of inlet air.(Fig 5)

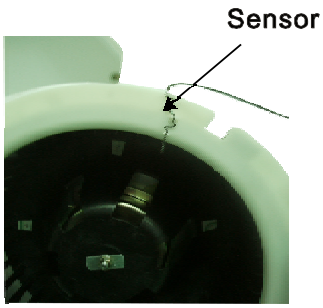


Fig 5

2.Turn the fixing tool of the intake air duct clockwise to pull it out.

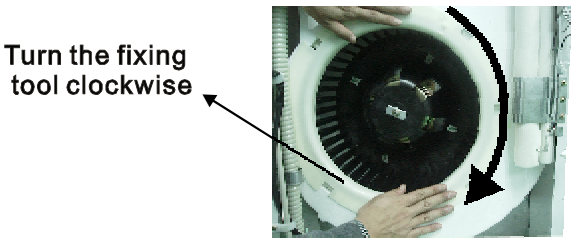


Fig 6

3.Loosen the fixing nut of the airflow fan and take out the airflow fan.(Fig 7)

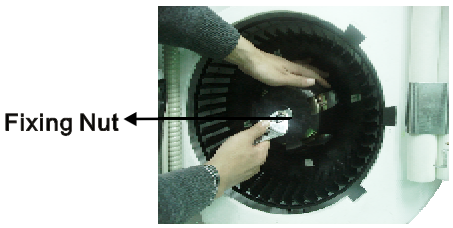


Fig 7

4. Loosen the fixing screws of the fan motor to remove the fan motor.(Fig 8)

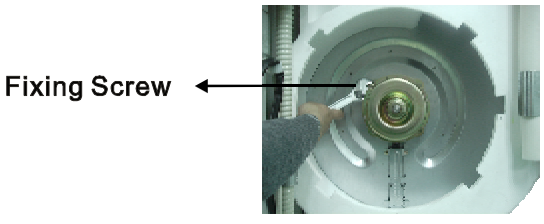


Fig 8

12.3. Removal procedure of VFD and the discharge grille .

1.Loosen the two screws of the front panel and take down the front panel.

2..After taking down the front panel, release the screws of the display PCB Holder. (Fig 10)

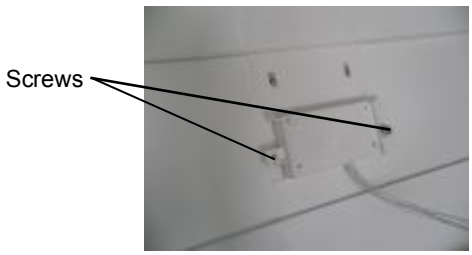
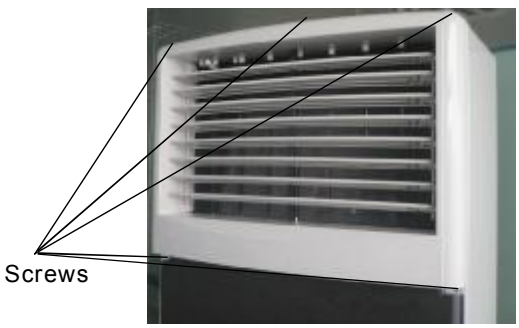


Fig 10

3.Take down the holder and the display PCB can be seen. Loosen the fixing screw of the PCB to remove it.(Fig 11)

Fig 11

4.Loosen the five screws of the discharge grille and pull out the discharge grille.(Fig 12)



Discharge Grille Complete

Fig 12

12.4. Removal procedure of the indoor heat exchanger.

1.After removing the discharge grille and the front panel, loosen the screws of the front plate and remove the plate.(Fig 13)

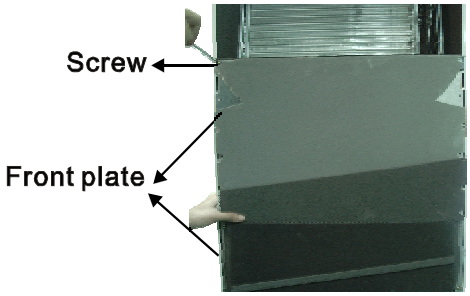


Fig 13

2.Loosen the screws of the heat exchanger and take out the heat exchanger.(Fig 14)

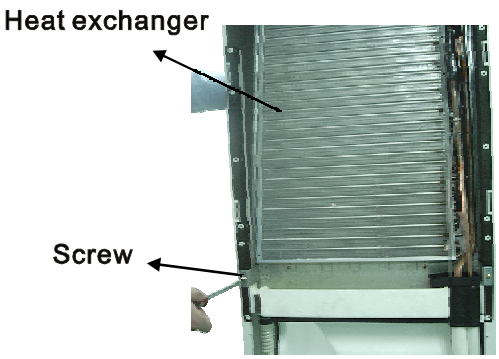


Fig 14

13 Troubleshooting Guide

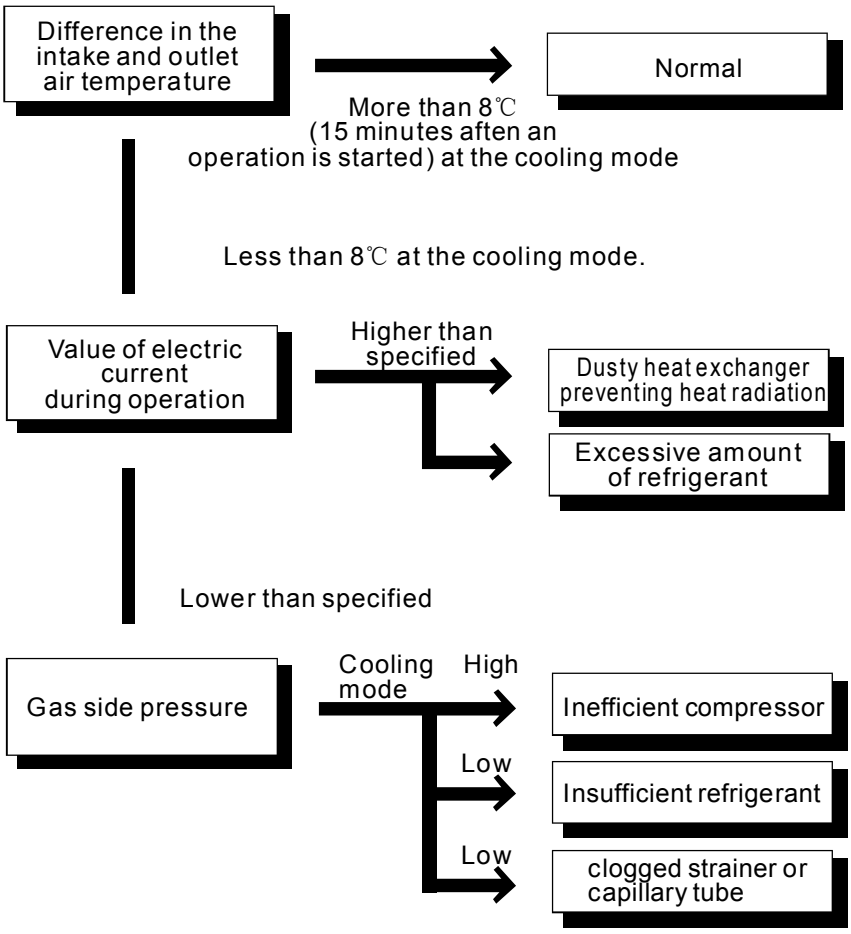
13.1. Refrigeration cycle system

In order to diagnose malfunctions, make sure that there are no electrical problems before inspecting the refrigeration cycle. Such problems include insufficient insulation, problem with the power source, malfunction of compressor or fan.
The normal outlet air temperature and pressure of the refrigeration cycle depends on various conditions, the standard values for them are shown in the table to the right.

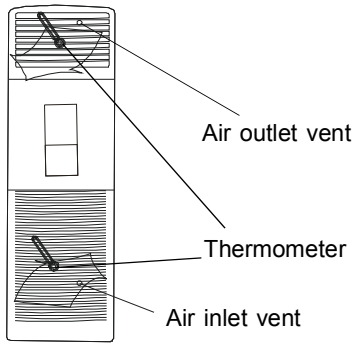
Normal pressure and outlet air temperature(standard)

	Gas side pressure Mpa (kg/cm^2G)	Outlet air tempera ture (℃)
Cooling mode	0.4~0.6(4~6)	12~16

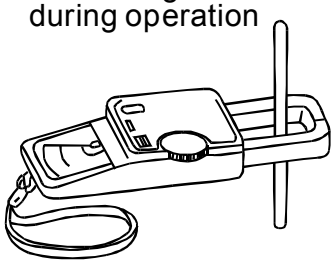
★ Condition: indoor fan speed: high
outdoor temperature: 35℃
(cooling mode)



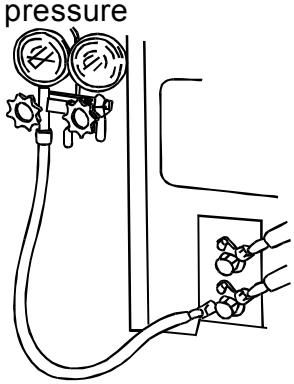
- Measuring the air temperature difference



- Measuring electric current during operation



- Measuring gas side pressure



13.2. Relationship between the condition of air conditioner and pressrue and electric current

Condition of the air conditioner	Cooling mode		
	Low pressure	High pressure	Electric current during operation
Insufficient refrigerant (gas leakage)	↘	↘	↘
Clogged capillary tube	↘	↘	↘
Short circuit in the indoor unit	↘	↘	↘
Heat radiation deficiency of the outdoor unit	↗	↗	↗
Insufficient compression	↗	↘	↘

13.3. Diagnosis methods of a malfunction of a compressor .

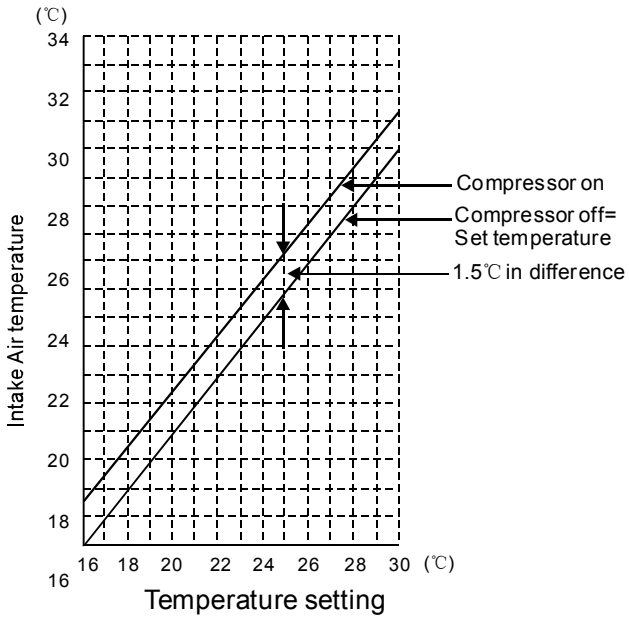
Nature of fault	Symptom
Insufficient compressing of a compressor	• Electric current during operation becomes approximately 80% lower than the normal level. • The discharge tube of the compressor becomes abnormally hot (normally 70~90℃). • The difference between high pressure and low pressure becomes almost zero.
Locked compressor	• Electric current reaches a high level abnormally, and the value exceeds the limit of an ammeter. In some cases, a breaker turns off. • The compressor has a humming sound.

14 Technical Data

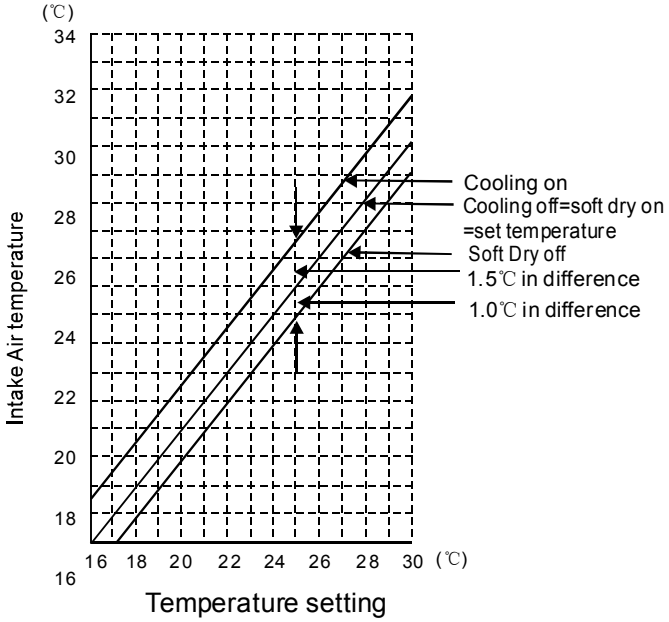
■ Thermostat characteristics

CS-C45FFH

- Cooling mode



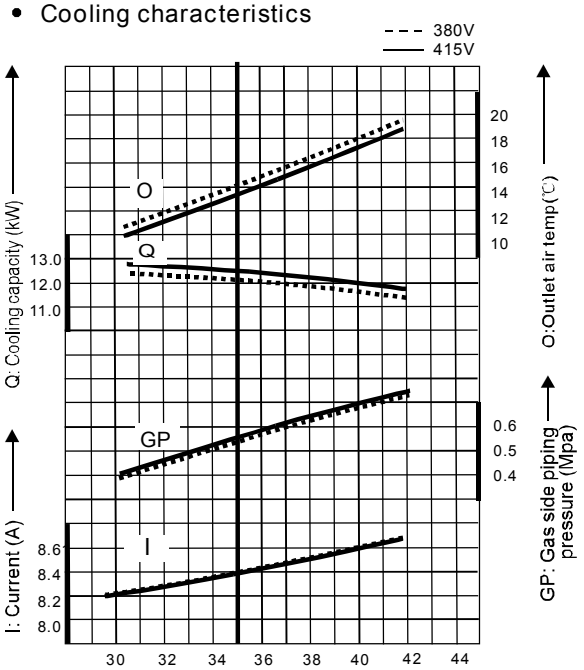
- Soft dry mode



■ Operating characteristics

CS-C45FFH/CU-C45FFH

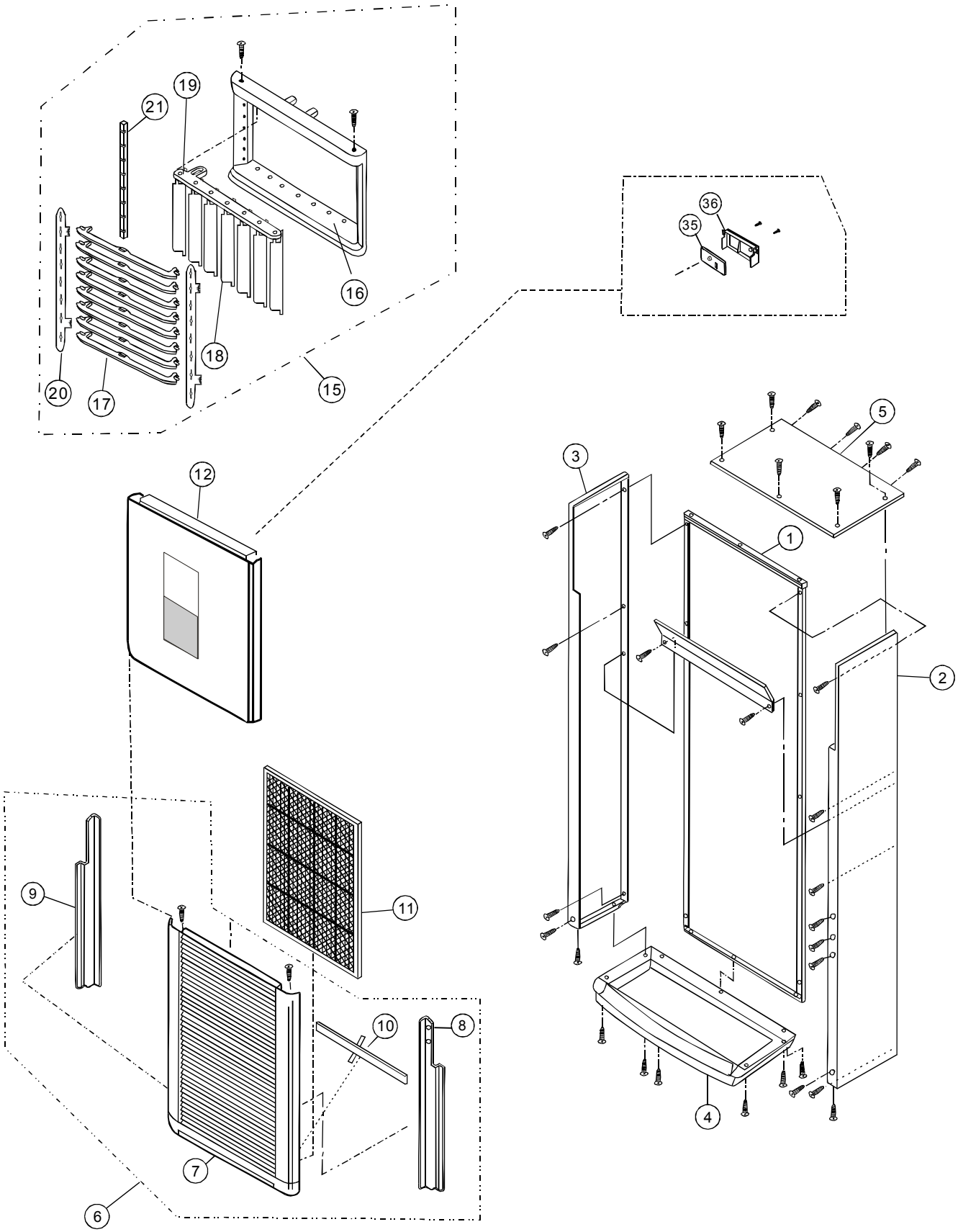
- Cooling characteristics



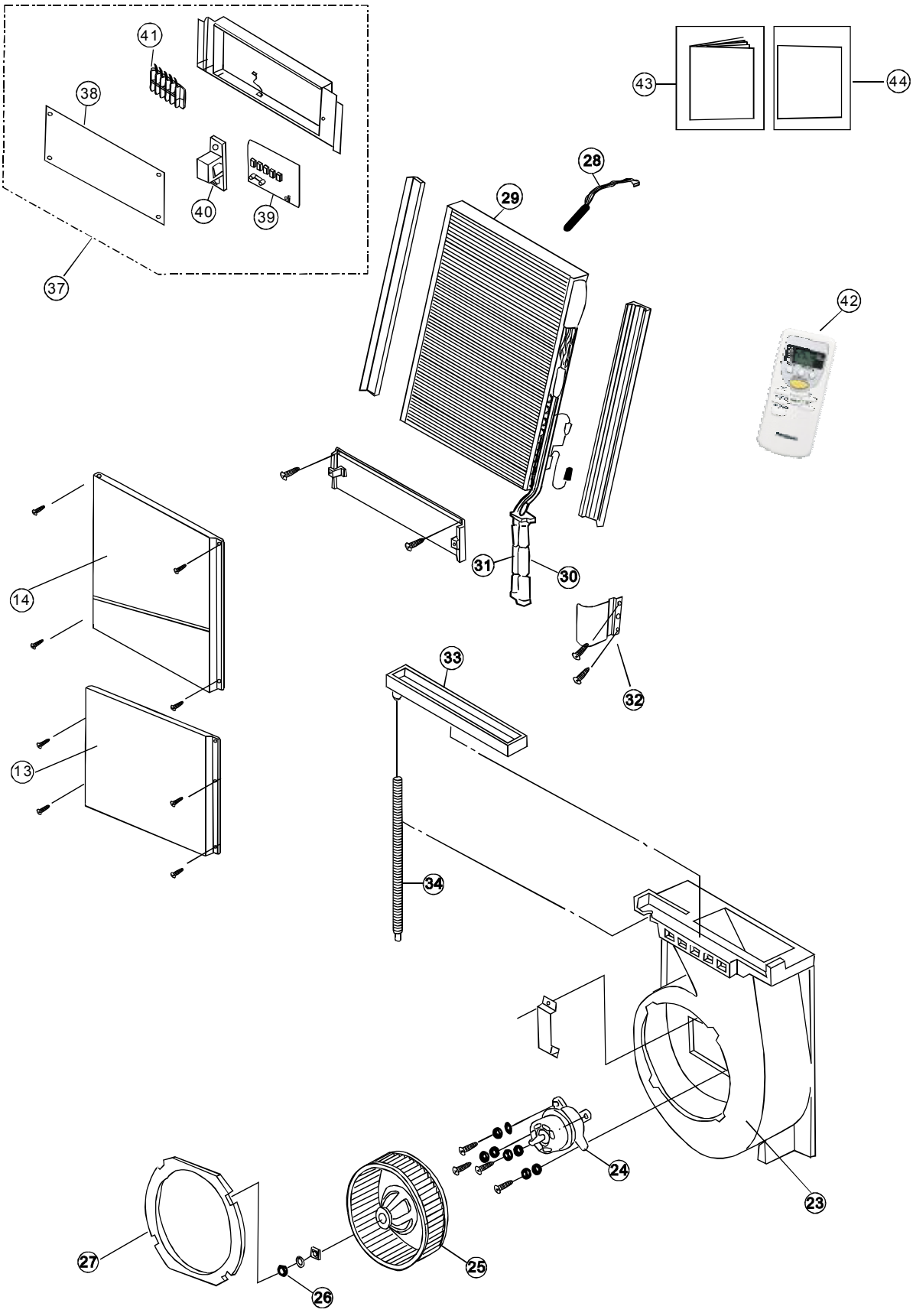
[Condition] Room temp: 27/19℃
Cooling operation:at high speed
Piping length:5m

15 Exploded View

CS-C45FFH



CS-C45FFH



16 Replacement Parts List

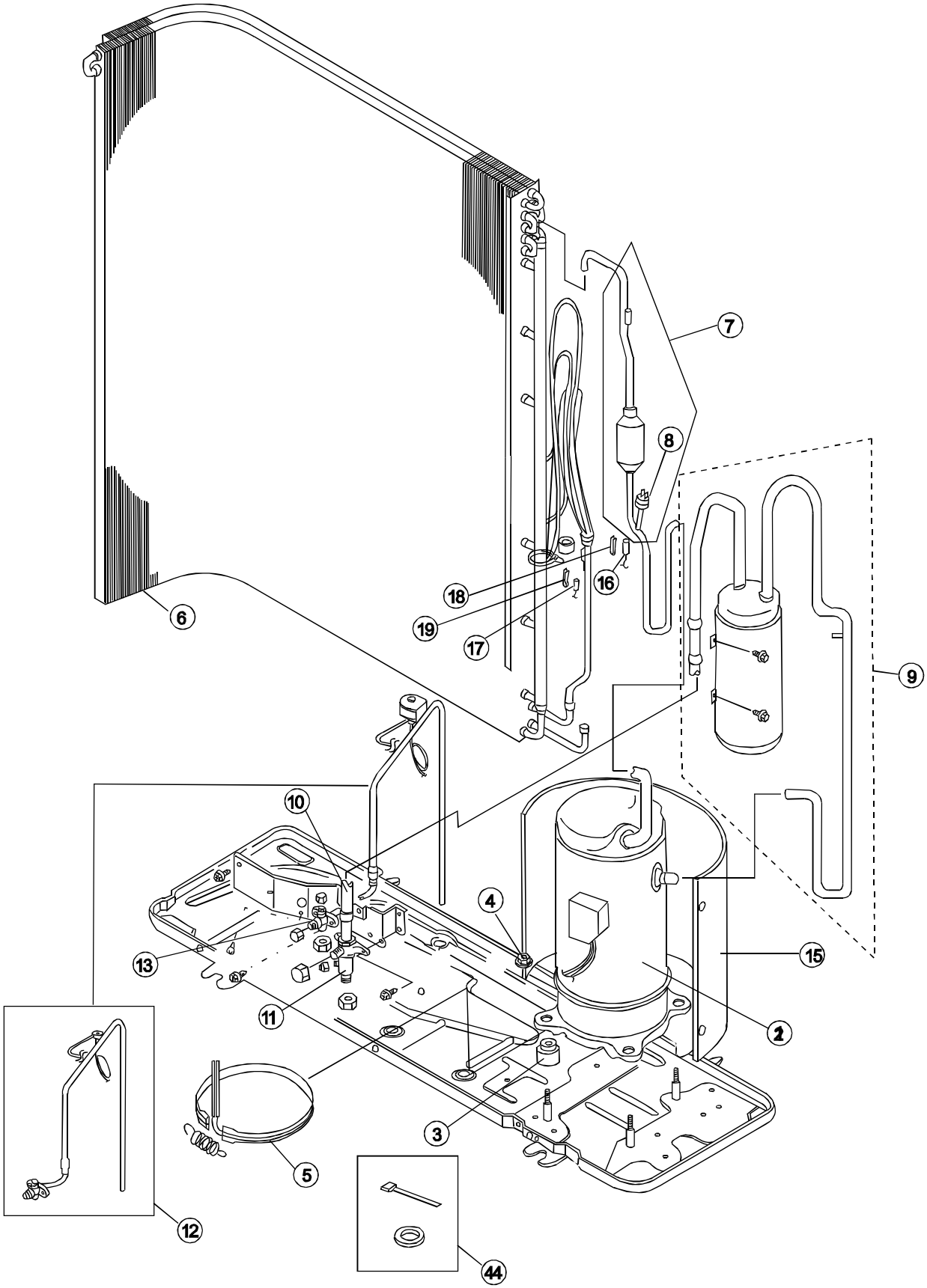
CS-C45FFH

No.	PART DESCRIPTION	QTY.	CS-C45FFH	Remarks
1	BACK PLATE	1	CWE02K1003	
2	RIGHT PLATE	1	CWE04C1021	
3	LEFT PLATE	1	CWE04C1020	
4	CHASS'Y	1	CWE051006	
5	TOP PLATE	1	CWE03C1013	
6	INTAKE GRILLE COMPLETE	1	CWE22C1080	*
7	INTAKE GRILLE	1	CWE221078	
8	FIXING TOOL-RIGHT	1	CWD601098	
9	FIXING TOOL-LEFT	1	CWD601099	
10	FIXING TOOL	1	CWD90K1020	
11	AIR PURIFYING FILTER	1	CWD001089	*
12	FRONT PANEL	1	CWE06C1185	*
13	PARTICULAR PLATE	1	CWD91C0011	
14	PARTICULAR PLATE	1	CWD91C0010	
15	DISCHARGE GRILLE COMPLETE	1	CWE20C2601	
16	DISCHARGE GRILLE	1	CWE201045	*
17	VERTICAL AIRFLOW VANE	8	CWE241121	*
18	HORIZONTAL AIRFLOW VANE	7	CWE241120	
19	CONNECTING BAR	1	CWE261107	
20	CONNECTING BAR	2	CWE261050	
21	FULCRUM	1	CWH621029	
23	AIR INLET GUIDER	1	CWD321044	
24	FAN MOTOR	1	CWA971034	*
25	CENTRIFUGAL FAN	1	CWH01K1018	*
26	NUT-FAN	1	CWH56060J	
27	AIR INLET GUIDER	1	CWD321045	
28	SENSOR	1	CWA50C2405	
29	EVAPORATOR	1	CWB302162	
30	TUBE ASS'Y (GAS)	1	CWT022783	
31	TUBE ASS'Y (LIQUID)	1	CWT022784	
32	FIXING TOOL-TUBE	1	CWD911251	
33	DRAIN PLATE	1	CWH40K1008	
34	DRAIN HOSE	1	CWH851046	
35	DISPLAY PCB	1	CWA744422	
36	DISPLY PCB HOLDER	1	CWD661086	
37	CONTROL BOX COMPLETE	1	CWH14C5298	*
38	COVER-CONTROL BOX	1	CWH131291	
39	ELECTRONIC CONTROLLER	1	CWA73C2235	*
40	TRANSFORMER	1	CWA40C1047	*
41	TERMINAL BOARD	1	CWA28K1076J	
42	REMOTE CONTROL COMPLETE	1	CWA75C3034	*
43	OPERATING INSTRUCTIONS	1	CWF565393	
44	INSTALLATION INSTRUCTIONS	1	CWF613047	

*** marked parts are recommended to be kept in stock.**

17 Exploded View

CU-C45FFH



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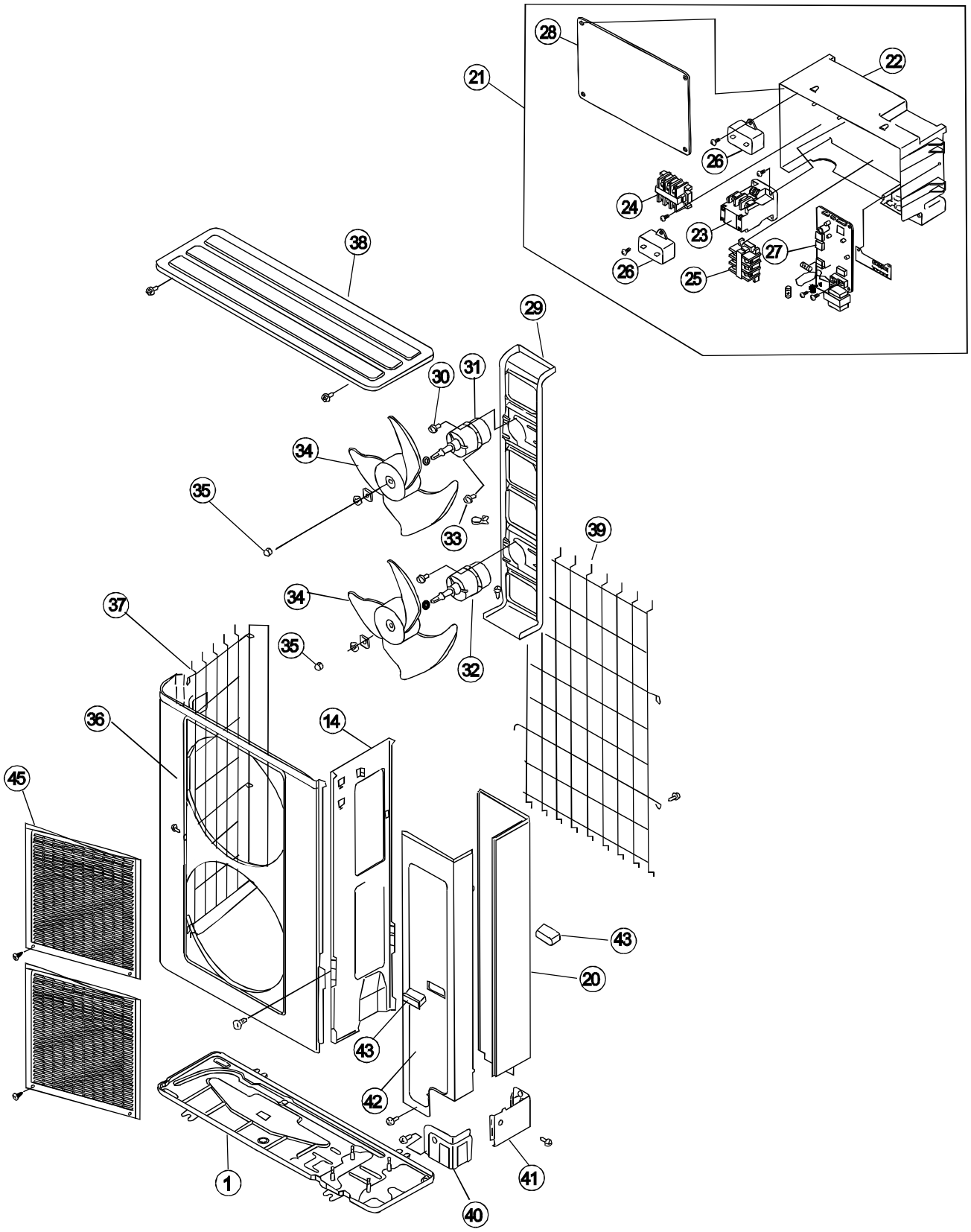
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18 Replacement Parts List

CU-C45FFH

No.	PART DESCRIPTION	QTY.	PART NO.	REMARK
1	BASE ASS'Y	1	CWD52K1150A	
2	COMPRESSOR	1	CWB092363	*
3	ANTI-VIBRATION BUSHING	4	CWB81079	
4	NUT FOR COMP. MOUNT.	3	CWH561049	
5	CRANK CASE HEATER	1	CWA341036	
6	CONDENSER COMPLETE	1	CWB32C1832	
7	TUBE ASS'Y	1	CWT024311	
8	HIGH PRESSURE SWITCH	1	CWA101009	*
9	ACCUMULATOR	1	CWB13K1058	
10	TUBE ASS'Y (3-WAY VALVE-GAS)	1	CWT024389	
11	3-WAY VALVE-GAS	1	CWB011301	*
12	TUBE ASS'Y (VALVE)	1	CWT024307	
13	3-WAY VALVE	1	CWB011299	*
14	SOUND-PROOF BOARD ASS'Y	1	CWH151158	
15	SOUND-PROOF MATERIAL-COMP.	1	CWG302105	
16	PIPING SENSOR(DISCHARGE)	1	CWA501243	
17	PIPING SENSOR(COIL)	1	CWA50C2146	
18	SPRING FOR SENSOR	1	CWH711010	
19	SPRING FOR SENSOR	1	CWH321054	
20	CABINET REAR PLATE	1	CWE021039A	
21	CONTROL BOX COMPLETE	1	CWH14C5293	
22	CONTROL BOARD	1	CWH102295	
23	COMPRESSOR RELAY	1	K6C5E8A00002	*
24	TERMINAL BOARD ASS'Y	1	CWA28K1066J	*
25	TERMINAL BOARD ASS'Y	1	CWA28K1076J	*
26	CAPACITOR-FAN MOTOR	2	CWA312148	
27	ELECTRONIC CONTROLLER	1	CWA73C2308	*
28	COVER-CONTROL BOX	1	CWD661066	
29	BRACKET-FAN MOTOR	1	CWD54K1018	
30	SCREW-BRACKET FAN MOTOR	2	CWH551040J	
31	FAN MOTOR	1	CWA951529	*
32	FAN MOTOR	1	CWA951525	*
33	SCREW-FAN MOTOR	8	CWH551040J	
34	PROPELLER FAN	2	CWH03K1039	*
35	NUT for PROPELLER FAN	2	CWH561038J	
36	FRONT PLATE	1	CWE061102A	
37	SIDE WIRE NET	1	CWD041110A	
38	CABINET TOP PLATE	1	CWE03C1030	
39	PROOF NET-CONDENSOR	1	CWD041073A	
40	L-SHAPED PLATE(FRONT)	1	CWD601138A	
41	L-SHAPED PLATE(BACK)	1	CWD601139A	
42	CABINET FRONT PLATE	1	CWE06C1099	
43	HANDLE	2	CWE161008	
44	ACCESSORY COMPLETE	1	CWH82C1459	
45	DISCHARGE GRILLE	2	CWE201086	

*** marked parts are recommended to be kept in stock.**