

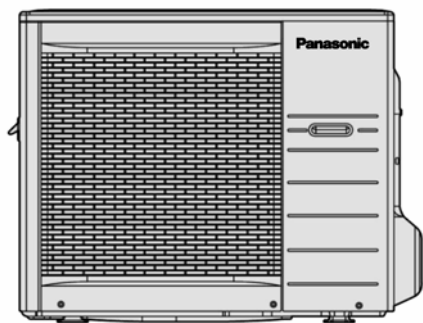
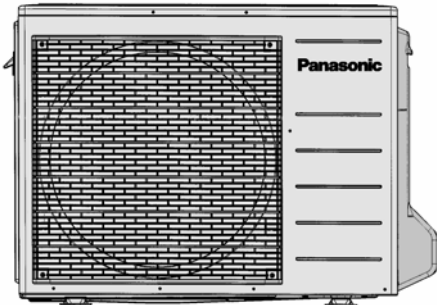
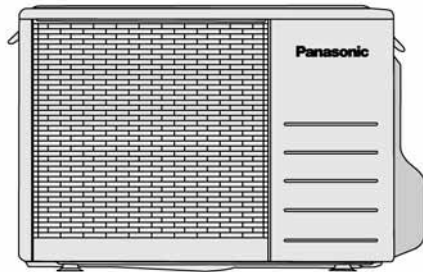
Service Manual

Air Conditioner



Indoor Unit
CS-C12MKF-2
CS-C18MKF-2
CS-C24MKF-2

Outdoor Unit
CU-C12MKF-2
CU-C18MKF-2
CU-C24MKF-2



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-technical 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 products dealt with in this service information by anyone else could result in serious injury or death.

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1. Safety Precautions







- Read the following "SAFETY PRECAUTIONS" carefully before perform any servicing.
- Electrical work must be installed or serviced by a licensed electrician. Be sure to use the correct rating of the power plug and main circuit for the model installed.
- The caution items stated here must be followed because these important contents are related to safety. The meaning of each indication used is as below. Incorrect installation or servicing due to ignoring of the instruction will cause harm or damage, and the seriousness is classified by the following indications.

 WARNING	This indication shows the possibility of causing death or serious injury.
 CAUTION	This indication shows the possibility of causing injury or damage to properties.


- The items to be followed are classified by the symbols:

	This symbol denotes item that is PROHIBITED from doing.
-----------------------------------------------------------------------------------	---------------------------------------------------------







- Carry out test running to confirm that no abnormality occurs after the servicing. Then, explain to user the operation, care and maintenance as stated in instructions. Please remind the customer to keep the operating instructions for future reference.

 WARNING	
1. Do not modify the machine, part, material during repairing service.	
2. If wiring unit is supplied as repairing part, do not repair or connect the wire even only partial wire break. Exchange the whole wiring unit.	
3. Do not wrench the fasten terminal. Pull it out or insert it straightly.	
4. Engage dealer or specialist for installation and servicing. If installation of servicing done by the user is defective, it will cause water leakage, electrical shock or fire.	
5. Install according to this installation instructions strictly. If installation is defective, it will cause water leakage, electric shock or fire.	
6. Use the attached accessories parts and specified parts for installation and servicing. Otherwise, it will cause the set to fall, water leakage, fire or electrical shock.	
7. Install at a strong and firm location which is able to withstand the set's weight. If the strength is not enough or installation is not properly done, the set will drop and cause injury.	
8. For electrical work, follow the local national wiring standard, regulation and the installation instruction. An independent circuit and single outlet must be used. If electrical circuit capacity is not enough or defect found in electrical work, it will cause electrical shock or fire.	
9. This equipment is strongly recommended to install with Earth Leakage Circuit Breaker (ELCB) or Residual Current Device (RCD). Otherwise, it may cause electrical shock and fire in case equipment breakdown or insulation breakdown.	
10. Do not use joint cable for indoor / outdoor connection cable. Use the specified Indoor/Outdoor connection cable, refer to installation instruction CONNECT THE CABLE TO THE INDOOR UNIT and connect tightly for indoor / outdoor connection. Clamp the cable so that no external force will be acted on the terminal. If connecting or fixing is not perfect, it will cause heat up or fire at the connection.	
11. Wire routing must be properly arranged so that control board cover is fixed properly. If control board cover is not fixed perfectly, it will cause heat-up or fire at the connection point of terminal, fire or electrical shock.	
12. When install or relocate air conditioner, do not let any substance other than the specified refrigerant, eg. air etc. mix into refrigeration cycle (piping). (Mixing of air etc. will cause abnormal high pressure in refrigeration cycle and result in explosion, injury etc.)	
13. Do not install outdoor unit near handrail of veranda. When installing air-conditioner unit at veranda of high rise building, child may climb up to outdoor unit and cross over the handrail and causing accident.	
14. This equipment must be properly earthed. Earth line must not be connected to gas pipe, water pipe, earth of lightning rod and telephone. Otherwise, it may cause electric shock in case equipment breakdown or insulation breakdown.	
15. Keep away from small children, the thin film may cling to nose and mouth and prevent breathing.	
16. Do not use unspecified cord, modified cord, joint cord or extension cord for power supply cord. Do not share the single outlet with other electrical appliances. Poor contact, poor insulation or over current will cause electrical shock or fire.	
17. Tighten the flare nut with torque wrench according to specified method. If the flare nut is over-tightened, after a long period, the flare may break and cause refrigerant gas leakage.	
18. During pump down operation, stop the compressor before remove the refrigeration piping. (Removal of compressor while compressor is operating and valves are opened will cause suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc.)	
19. During installation, install the refrigerant piping properly before run the compressor. (Operation of compressor without fixing refrigeration piping and valves at opened condition will caused suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc.)	

**WARNING**

20. After completion of installation or service, confirm there is no leakage or refrigerant gas. It may generate toxic gas when the refrigerant contacts with fire.
21. Ventilate if there is refrigerant gas leakage during operation. It may cause toxic gas when refrigerant contacts with fire.
22. Do not insert your fingers or other objects into the unit, high speed rotating fan may cause injury. 
23. Must not use other parts except original parts described in catalog and manual.

**CAUTION**

1. Do not install the unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire. 
2. Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, water may enter the room and damage the furniture.
3. Tighten the flare nut with torque wrench according to specified method. If the flare nut is over-tightened, after a long period, the flare may break and cause refrigerant gas leakage.
4. Do not touch outdoor unit air inlet and aluminium fin. It may cause injury. 
5. Select an installation location which is easy for maintenance.
6. Pb free solder has a higher melting point than standard solder; typically the melting point is 50°F – 70°F (30°C – 40°C) higher. Please use a high temperature solder iron. In case of the soldering iron with temperature control, please set it to 700 ± 20°F (370 ± 10°C). Pb free solder will tend to splash when heated too high (about 1100°F / 600°C).
7. Power supply connection to the air conditioner. Connect the power supply cord of the air conditioner to the mains using one of the following methods.
Power supply point shall be the place where there is ease for access for the power disconnection in case of emergency. In some countries, permanent connection of this room air conditioner to the power supply is prohibited.
i. Power supply connection to the receptacle using a power plug. Use an approved 15/16A (3/4~1.5HP) or 16A (2.0HP) or 20A (2.5HP) or 25A (3.0HP) power plug with earth pin for the connection to the socket.
ii. Power supply connection to a circuit breaker for the permanent component. Use an approved 16A (3/4~2.0HP) or 20A (2.5HP) or 25A (3.0HP) circuit breaker for the permanent connection. It must be a double pole switch with a minimum 3.0 mm contact gap.
8. Do not release refrigerant during piping work for installation, servicing, reinstallation and during repairing a refrigerant parts. Take care of the liquid refrigerant, it may cause frostbite. 
9. Installation or servicing work: It may need two people to carry out the installation or servicing work.
10. Do not install this appliance in a laundry room or other location where water may drip from the ceiling, etc. 
11. Do not sit or step on the unit, you may fall down accidentally. 
12. Do not touch the sharp aluminum fins or edges of metal parts.
If you are required to handle sharp parts during installation or servicing, please wear hand glove.
Sharp parts may cause injury. 

2. Specification

Model			Indoor	CS-C12MKF-2	CS-C18MKF-2
			Outdoor	CU-C12MKF-2	CU-C18MKF-2
Performance Test Condition				NEW JIS	NEW JIS
Power Supply			Phase, Hz	Single, 50	Single, 50
			V	220	220
Cooling	Capacity		kW	3.38	5.19
			BTU/h	11500	17700
			kJ/h	12170	18680
	Running Current		A	5.1	7.8
	Input Power		W	1.10k	1.69k
	EER		W/W	3.07	3.07
			BTU/hW	10.45	10.47
	Power Factor		%	98	98
	Indoor Noise (H / L)		dB-A	41 / 30	45 / 39
			Power Level dB	-	-
	Outdoor Noise (H / L)		dB-A	51 / -	55 / -
			Power Level dB	-	-
Max Current (A) / Max Input Power (W)				6.8 / 1.54k	10.0 / 2.27k
Starting Current (A)				23.0	43.0
Compressor		Type		Hermetic Motor	Hermetic Motor
		Motor Type		Induction (2-poles)	Induction (2-poles)
		Output Power	W	950	1.5k
Indoor Fan	Type			Cross-Flow Fan	Cross-Flow Fan
	Material			ASG20K1	ASG30K1
	Motor Type			Induction (8-poles)	Transistor (8-poles)
	Input Power		W	46.2	94.8
	Output Power		W	40	40
	Speed	QLo	rpm	730 - 730	970
		Lo	rpm	800 – 800	1060
		Me	rpm	980 – 980	1150
		Hi	rpm	1150 – 1150	1280
SHi		rpm	1190 - 1190	1390	
Outdoor Fan	Type			Propeller Fan	Propeller Fan
	Material			PP Resin	PP Resin
	Motor Type			Induction (6-poles)	Induction (6-poles)
	Input Power		W	92.1	148.2
	Output Power		W	42	74
	Speed	Hi	rpm	870	815
Moisture Removal			L/h (Pt/h)	1.9 (4.0)	2.9 (6.1)
Indoor Airflow		QLo	m³/min (ft³/min)	7.1 (251)	12.1 (428)
		Lo	m³/min (ft³/min)	7.8 (275)	13.3 (468)
		Me	m³/min (ft³/min)	9.5 (337)	14.4 (508)
		Hi	m³/min (ft³/min)	11.2 (395)	16.0 (565)
		SHi	m³/min (ft³/min)	11.6 (409)	17.4 (614)
Outdoor Airflow		Hi	m³/min (ft³/min)	30.8 (1090)	52.0 (1840)
Refrigeration Cycle		Control Device		Capillary tube	Capillary tube
		Refrigerant Oil	cm³	ATMOS NM56M or SUNISO 4GDID (350)	ATMOS NM56M or SUNISO 4GDID (700)
		Refrigerant Type	g (oz)	R22, 800 (28.2)	R22, 1.37k (48.4)

Dimension		Height (I/D / O/D)	mm (inch)	290 (11-7/16) / 540 (21-9/32)		290 (11-7/16) / 695 (27-3/8)	
		Width (I/D / O/D)	mm (inch)	870 (34-9/32) / 780 (30-23/32)		1070 (42-5/32) / 875 (34-15/32)	
		Depth (I/D / O/D)	mm (inch)	204 (8-1/16) / 289 (11-13/32)		235 (9-9/32) / 320 (12-5/8)	
Weight		Net (I/D / O/D)	kg (lb)	9 (20) / 35 (77)		12 (26) / 50 (110)	
Piping	Pipe Diameter (Liquid / Gas)		mm (inch)	6.35 (1/4) / 12.70 (1/2)		6.35 (1/4) / 12.70 (1/2)	
	Standard length		m (ft)	7.5 (24.6)		5.0 (16.4)	
	Length range (min – max)		m (ft)	3 (9.8) ~ 15 (49.2)		3 (9.8) ~ 25 (82.0)	
	I/D & O/D Height different		m (ft)	5 (16.4)		20 (65.6)	
	Additional Gas Amount		g/m (oz/ft)	10 (0.1)		20 (0.2)	
	Length for Additional Gas		m (ft)	7.5 (24.6)		7.5 (24.6)	
Drain Hose		Inner Diameter	mm	16		16	
		Length	mm	650		650	
Indoor Heat Exchanger		Fin Material		Pre Coat		Pre Coat	
		Fin Type		Slit Fin		Slit Fin	
		Row x Stage x FPI		2 X 15 X 21		2 x 15 x 21	
		Size (W x H x L)	mm	610 x 315 x 25.4		810 x 315 x 25.4	
Outdoor Heat Exchanger		Fin Material		Blue Coated		Blue Coated	
		Fin Type		Slit Fin		Slit Fin	
		Row x Stage x FPI		2 X 24 X 17		2 x 31 x 17	
		Size (W x H x L)	mm	25.4 X 504 X 693.4:713.4		25.4 x 651 x 846.6:866.6	
Air Filter		Material		Polypropelene		Polypropelene	
		Type		One-touch		One-touch	
Power Supply				Indoor		Indoor	
Power Supply Cord			A	15		16	
Thermostat				-		-	
Protection Device				Overload Protector		-	
				Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb
Indoor Operation Range			Maximum	32	23	32	23
			Minimum	16	11	16	11
Outdoor Operation Range			Maximum	52	31	52	31
			Minimum	16	11	16	11

- Cooling capacities are based on indoor temperature of 27°C Dry Bulb (80.6°F Dry Bulb), 19.0°C Wet Bulb (66.2°F Wet Bulb) and outdoor air temperature of 35°C Dry Bulb (95°F Dry Bulb), 24°C Wet Bulb (75.2°F Wet Bulb)
- Specifications are subjected to change without prior notice for further improvement.

Model		Indoor	CS-C24MKF-2	
		Outdoor	CU-C24MKF-2	
Performance Test Condition			NEW JIS	
Power Supply		Phase, Hz	Single, 50	
		V	220	
Cooling	Capacity		kW	6.50
			BTU/h	22200
			kJ/h	23400
	Running Current		A	9.7
	Input Power		W	2.12k
	EER		W/W	3.07
			BTU/hW	10.47
	Power Factor		%	99
	Indoor Noise (H / L)		dB-A	49 / 41
			Power Level dB	-
	Outdoor Noise (H / L)		dB-A	57 / -
			Power Level dB	-
Max Current (A) / Max Input Power (W)			12.7 / 2.91k	
Starting Current (A)			46.0	
Compressor	Type		Hermetic Motor	
	Motor Type		Induction (2-poles)	
	Output Power	W	1.8k	
Indoor Fan	Type			Cross-Flow Fan
	Material			ASG30K1
	Motor Type			Transistor (8-poles)
	Input Power		W	94.8
	Output Power		W	40
	Speed	QLo	rpm	1020
		Lo	rpm	1110
		Me	rpm	1240
		Hi	rpm	1430
SHi		rpm	1500	
Outdoor Fan	Type			Propeller Fan
	Material			PP Resin
	Motor Type			Induction (6-poles)
	Input Power		W	170.5
	Output Power		W	88
	Speed	Lo	rpm	450
		Hi	rpm	875
	Moisture Removal		L/h (Pt/h)	3.7 (7.8)
Indoor Airflow	QLo	m³/min (ft³/min)	13.3 (471)	
	Lo	m³/min (ft³/min)	14.5 (512)	
	Me	m³/min (ft³/min)	16.2 (572)	
	Hi	m³/min (ft³/min)	18.7 (660)	
	SHi	m³/min (ft³/min)	19.6 (692)	
Outdoor Airflow	Lo	m³/min (ft³/min)	26.7 (946)	
	Hi	m³/min (ft³/min)	52.0 (1840)	
Refrigeration Cycle	Control Device		Capillary tube	
	Refrigerant Oil	cm³	ATMOS NM56M or SUNISO 4GDID (700)	
	Refrigerant Type	g (oz)	R22, 1.66k (58.6)	

Dimension	Height (I/D / O/D)	mm (inch)	290 (11-7/16) / 750 (29-17/32)	
	Width (I/D / O/D)	mm (inch)	1070 (42-5/32) / 875 (34-15/32)	
	Depth (I/D / O/D)	mm (inch)	235 (9-9/32) / 345 (13-19/32)	
Weight	Net (I/D / O/D)	kg (lb)	12 (26) / 58 (128)	
Piping	Pipe Diameter (Liquid / Gas)	mm (inch)	6.35 (1/4) / 15.88 (5/8)	
	Standard length	m (ft)	5.0 (16.4)	
	Length range (min – max)	m (ft)	3 (9.8) ~ 25 (82.0)	
	I/D & O/D Height different	m (ft)	20 (65.6)	
	Additional Gas Amount	g/m (oz/ft)	30 (0.3)	
	Length for Additional Gas	m (ft)	7.5 (24.6)	
Drain Hose	Inner Diameter	mm	16	
	Length	mm	650	
Indoor Heat Exchanger	Fin Material		Pre Coat	
	Fin Type		Slit Fin	
	Row x Stage x FPI		2 x 15 x 21	
	Size (W x H x L)	mm	810 x 315 x 25.4	
Outdoor Heat Exchanger	Fin Material		Blue Coated	
	Fin Type		Louver Fin	
	Row x Stage x FPI		2 x 28 x 19	
	Size (W x H x L)	mm	44 x 711.2 x 811.1:845.5	
Air Filter	Material		Polypropylene	
	Type		One-touch	
Power Supply			Indoor	
Power Supply Cord		A	20	
Thermostat			Mechanical	
Protection Device			-	
			Dry Bulb	Wet Bulb
Indoor Operation Range	Maximum		32	23
	Minimum		16	11
Outdoor Operation Range	Maximum		52	31
	Minimum		16	11

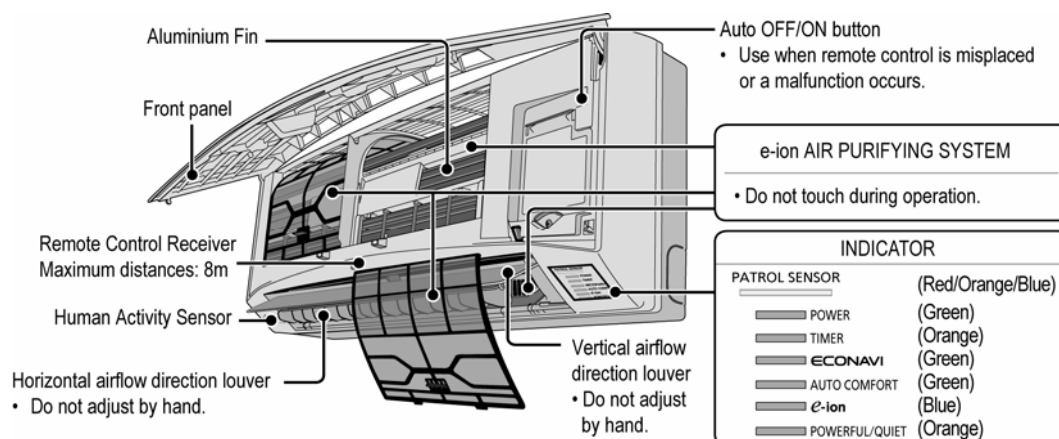
- Cooling capacities are based on indoor temperature of 27°C Dry Bulb (80.6°F Dry Bulb), 19.0°C Wet Bulb (66.2°F Wet Bulb) and outdoor air temperature of 35°C Dry Bulb (95°F Dry Bulb), 24°C Wet Bulb (75.2°F Wet Bulb)
- Specifications are subjected to change without prior notice for further improvement.

3. Features

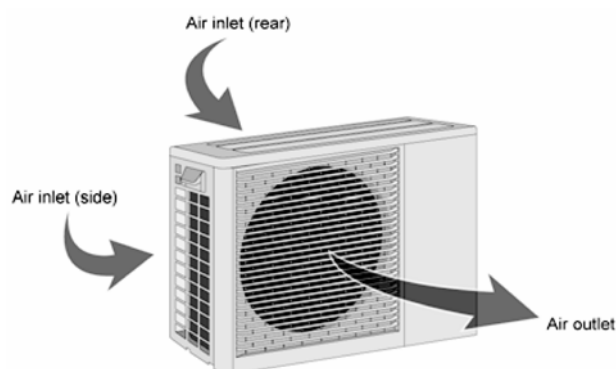
- E-ion Air Purifying System with Patrol Sensor
 - Active e-ions are released to catch dust particles and bring them back the large positively charged filter
 - Patrol Sensor color changes to indicate the dirt level in the air
- Long Installation Piping
 - CS/CU-C12MK, long piping up to 15 meters
 - CS/CU-C18MK, CS/CU-C24MK, long piping up to 25 meters
- Easy to use remote control
- Quality Improvement
 - Random auto restart after power failure for safety restart operation
 - Gas leakage protection
 - Prevent compressor reverse cycle
 - Inner protector to protect compressor
 - Noise prevention during soft dry operation
 - Blue coated condenser for high resistance to corrosion
- Operation Improvement
 - Quiet mode to reduce the indoor unit operating sound
 - Powerful mode to reach the desired room temperature quickly
 - 24-hour timer setting

4. Location of Controls and Components

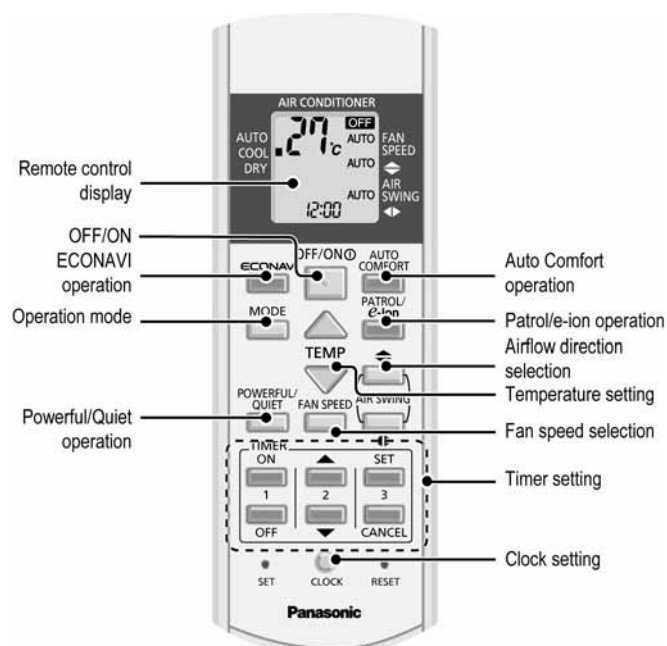
4.1 Indoor Unit



4.2 Outdoor Unit



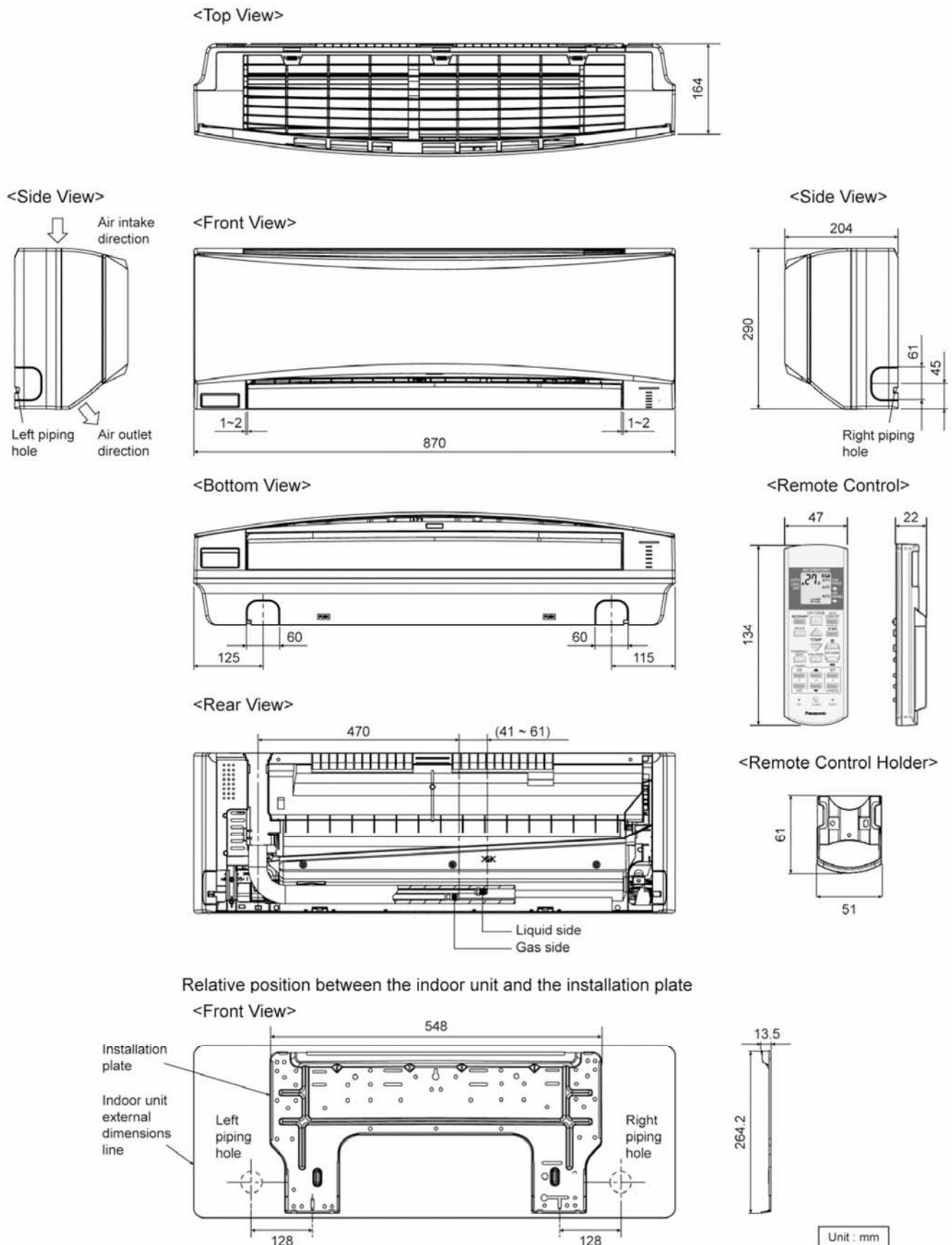
4.3 Remote Control



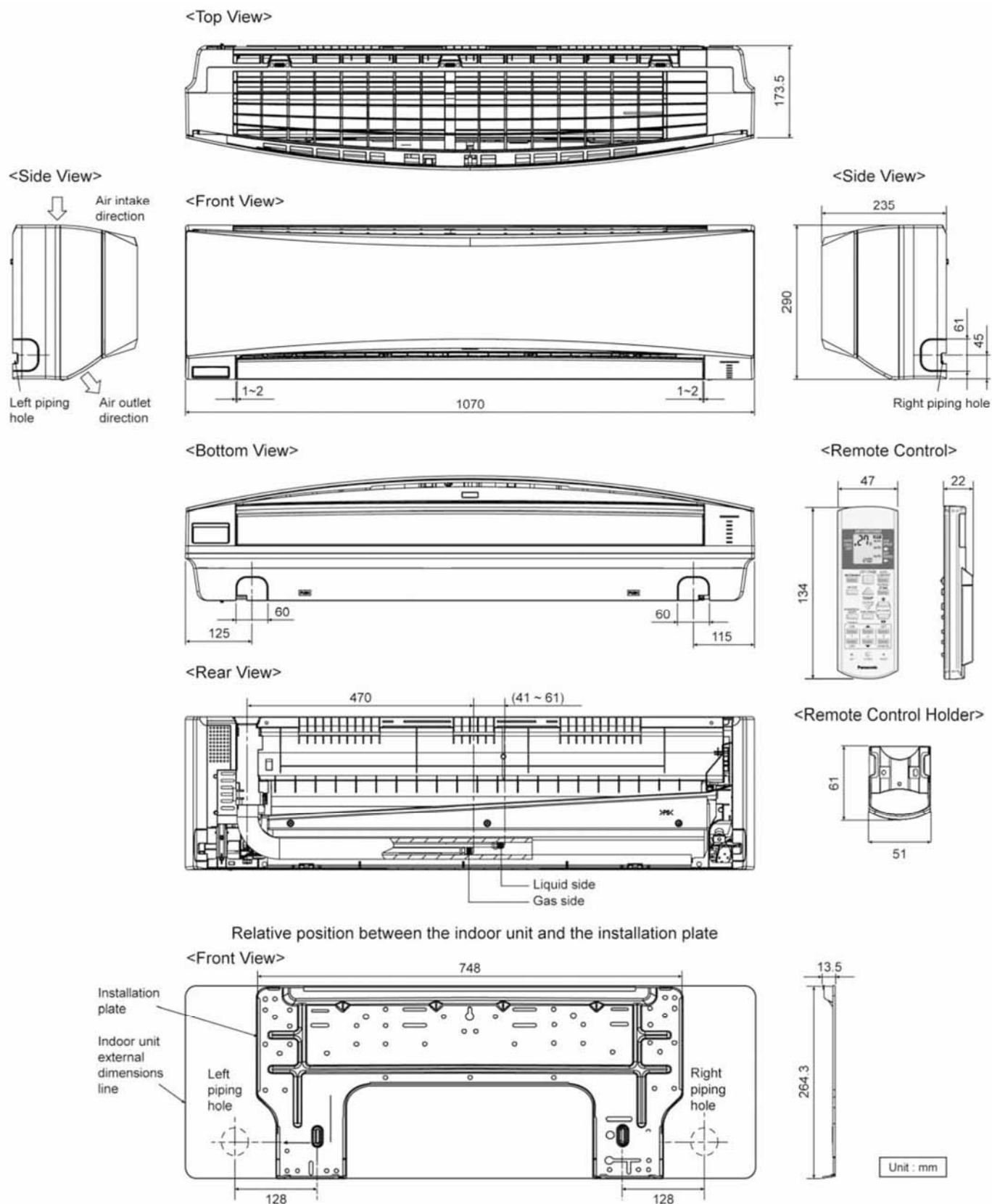
5. Dimensions

5.1 Indoor Unit

5.1.1 CS-C12MKF-2

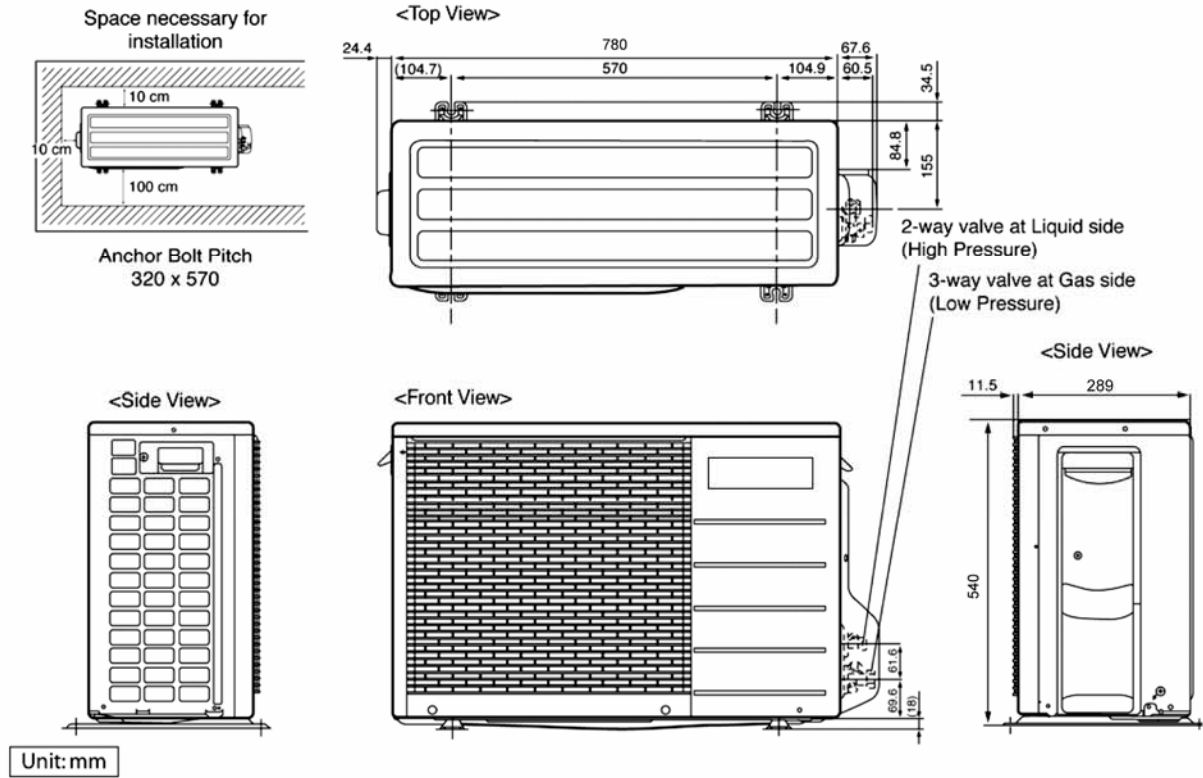


5.1.2 CS-C18MKF-2 CS-C24MKF-2

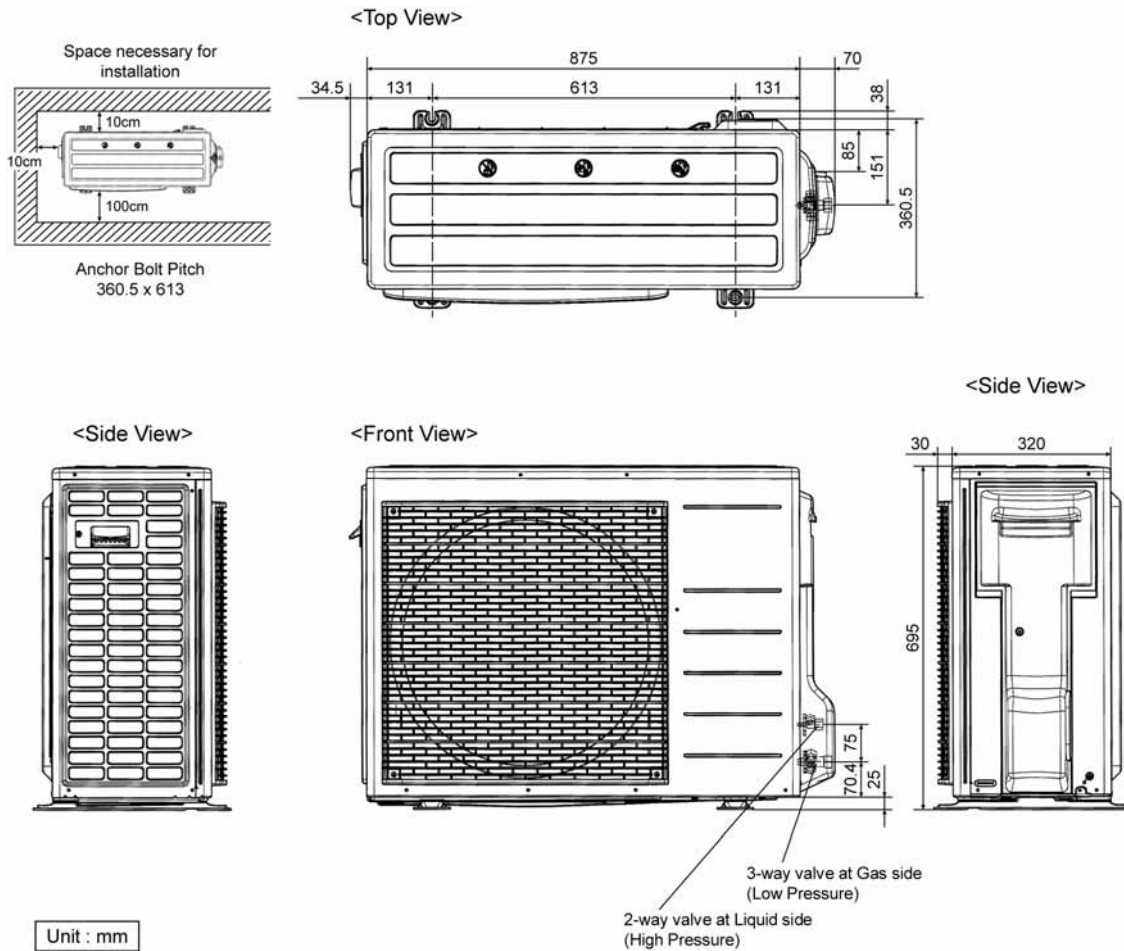


5.2 Outdoor Unit

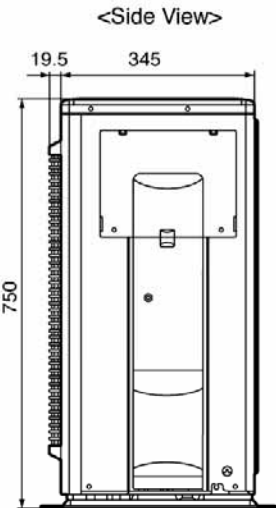
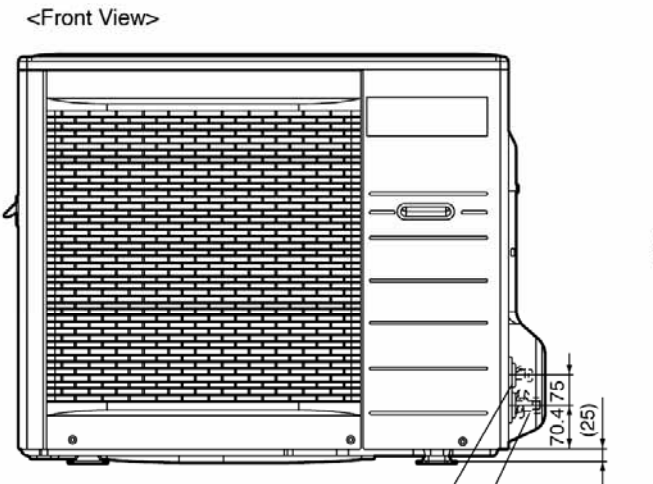
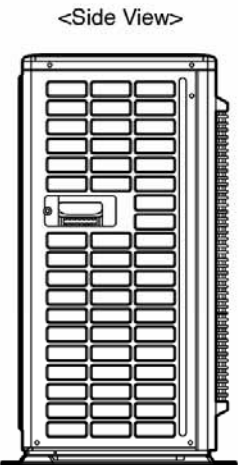
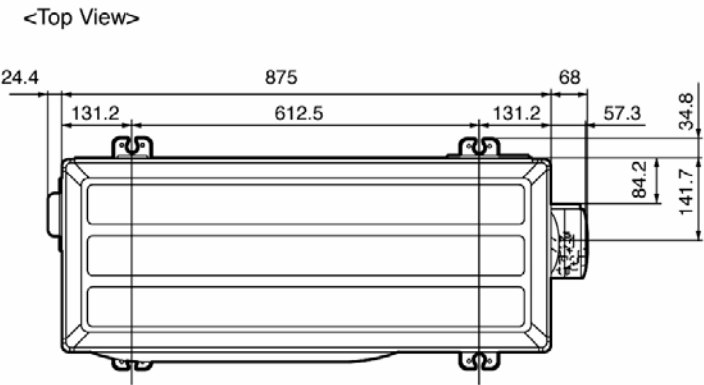
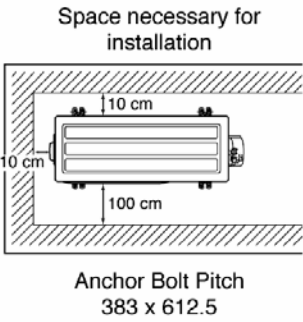
5.2.1 CU-C12MKF-2



5.2.2 CU-C18MKF-2

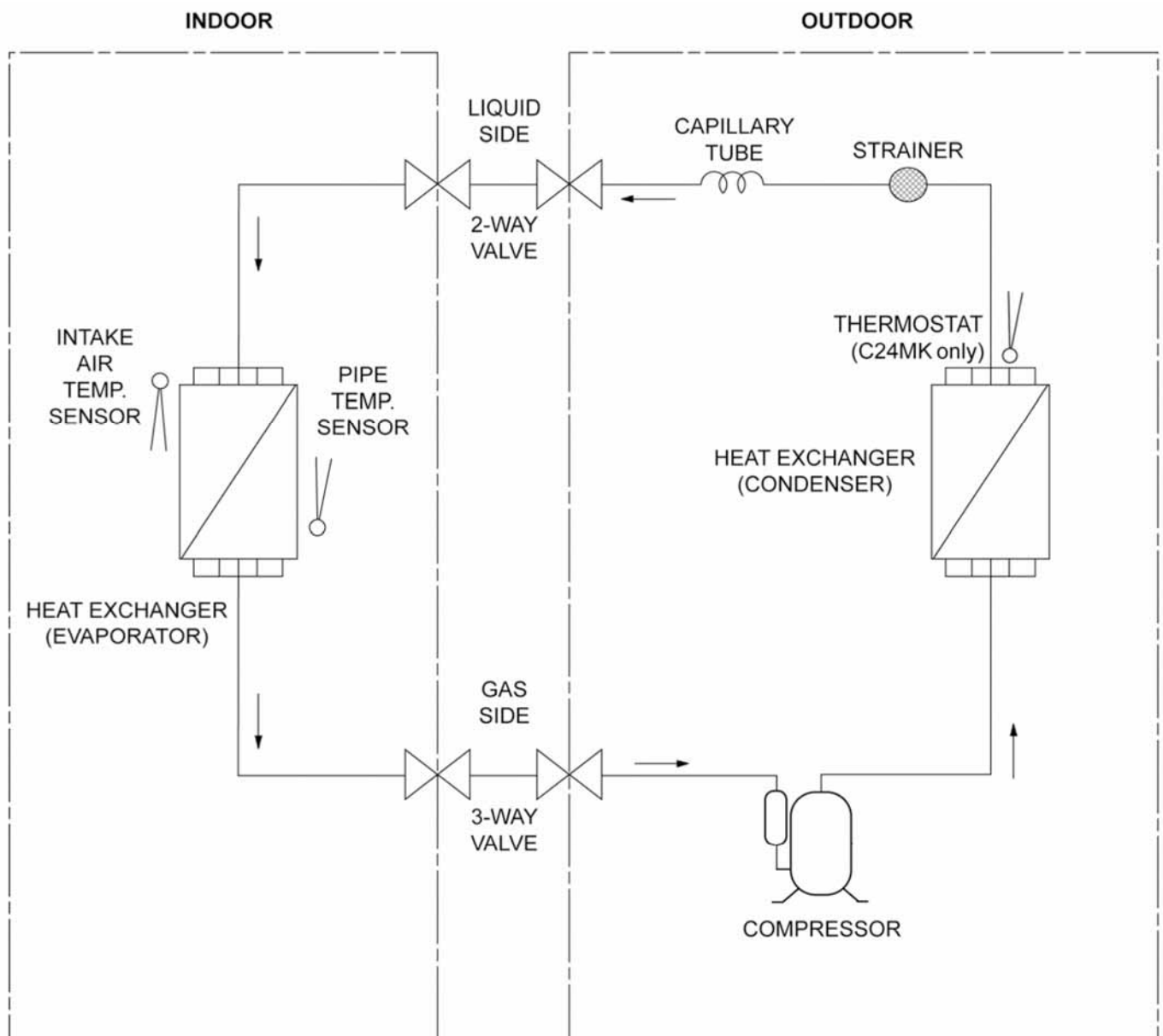


5.2.3 CU-C24MKF-2

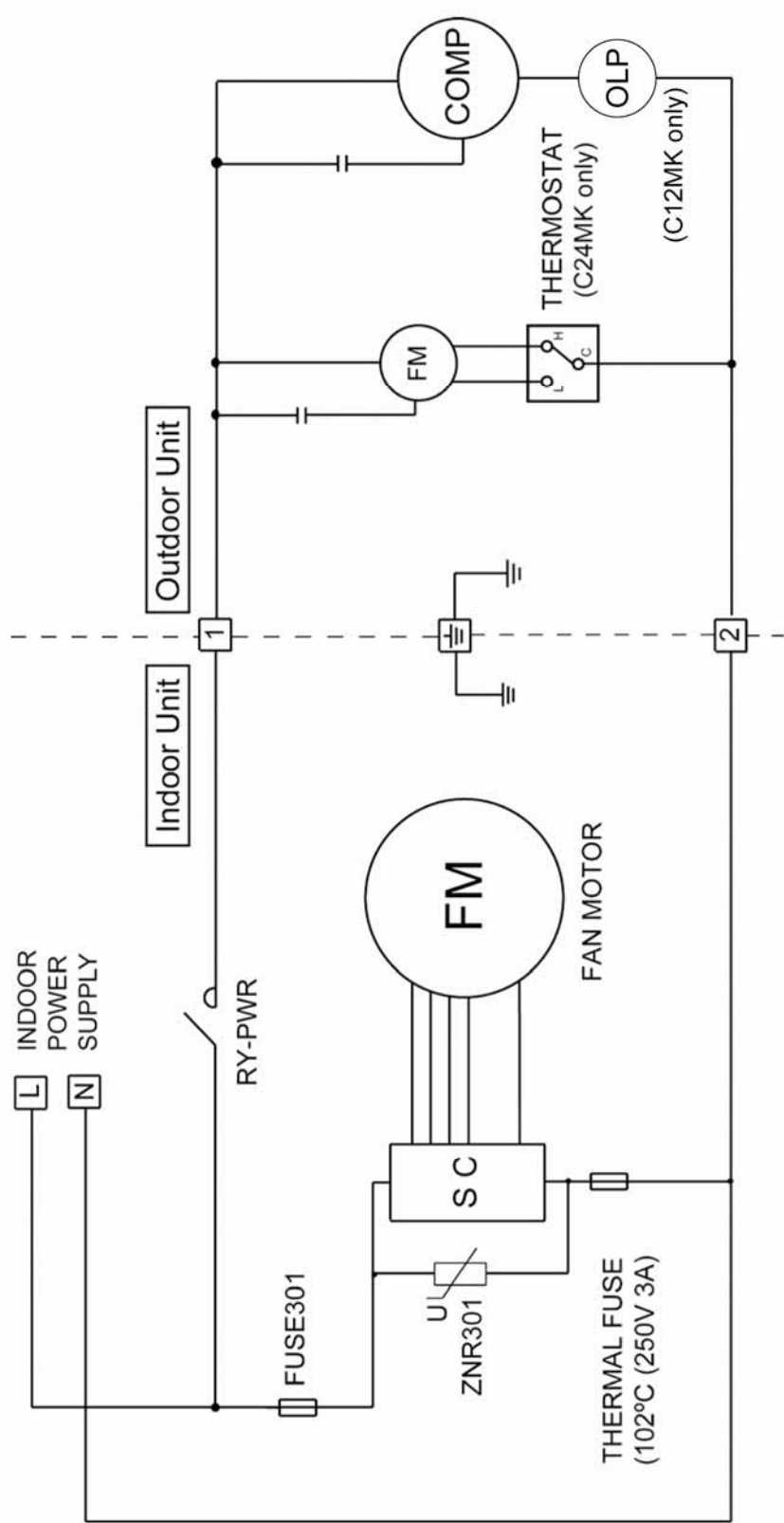


Unit: mm

6. Refrigeration Cycle Diagram

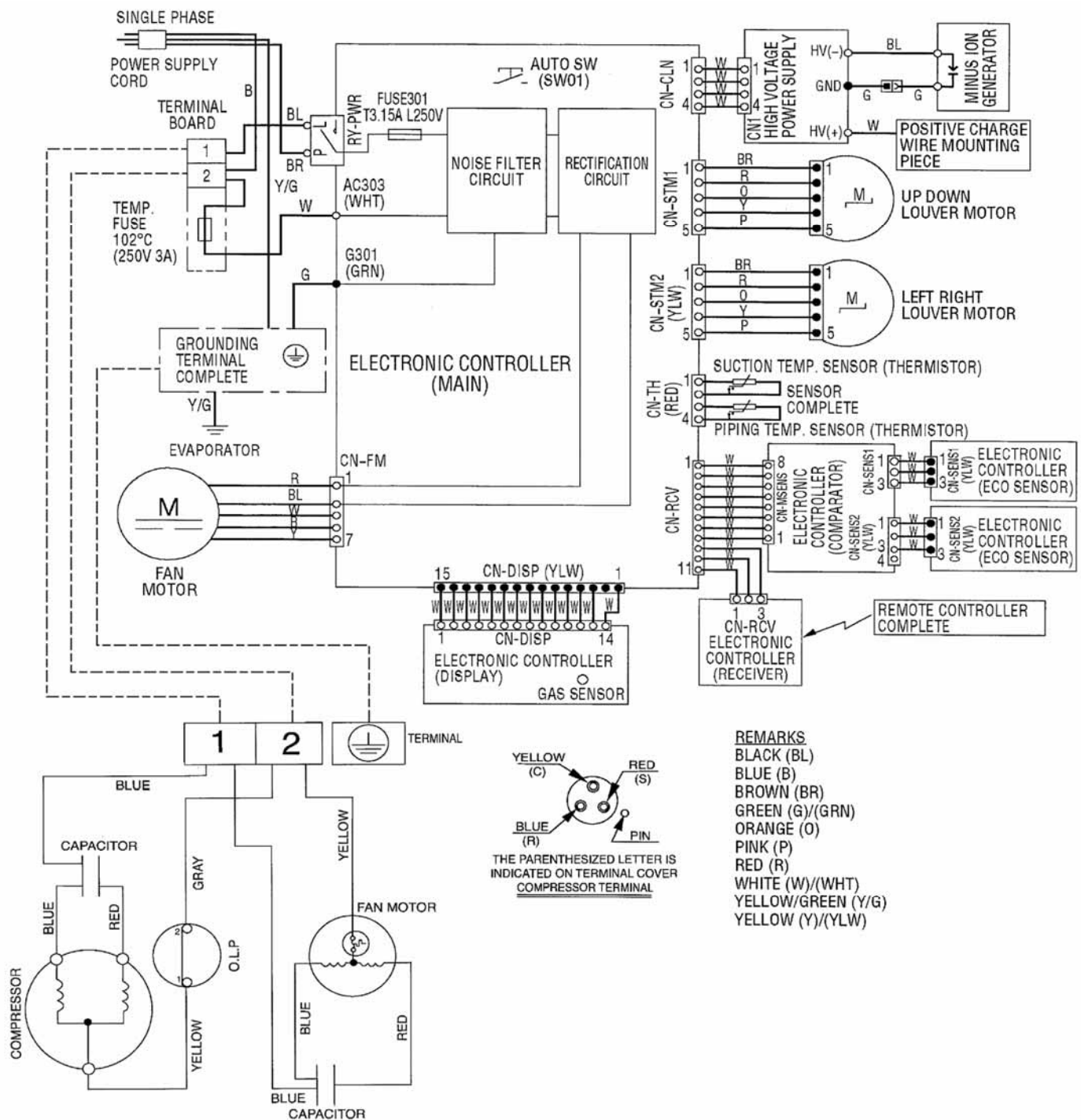


7. Block Diagram



8. Wiring Connection Diagram

8.1 CS-C12MKF-2 CU-C12MKF-2



Resistance of Outdoor Fan Motor Windings

MODEL	CU-C12MKF-2
CONNECTION	CWA951693
BLUE-YELLOW	240Ω
YELLOW-RED	273Ω

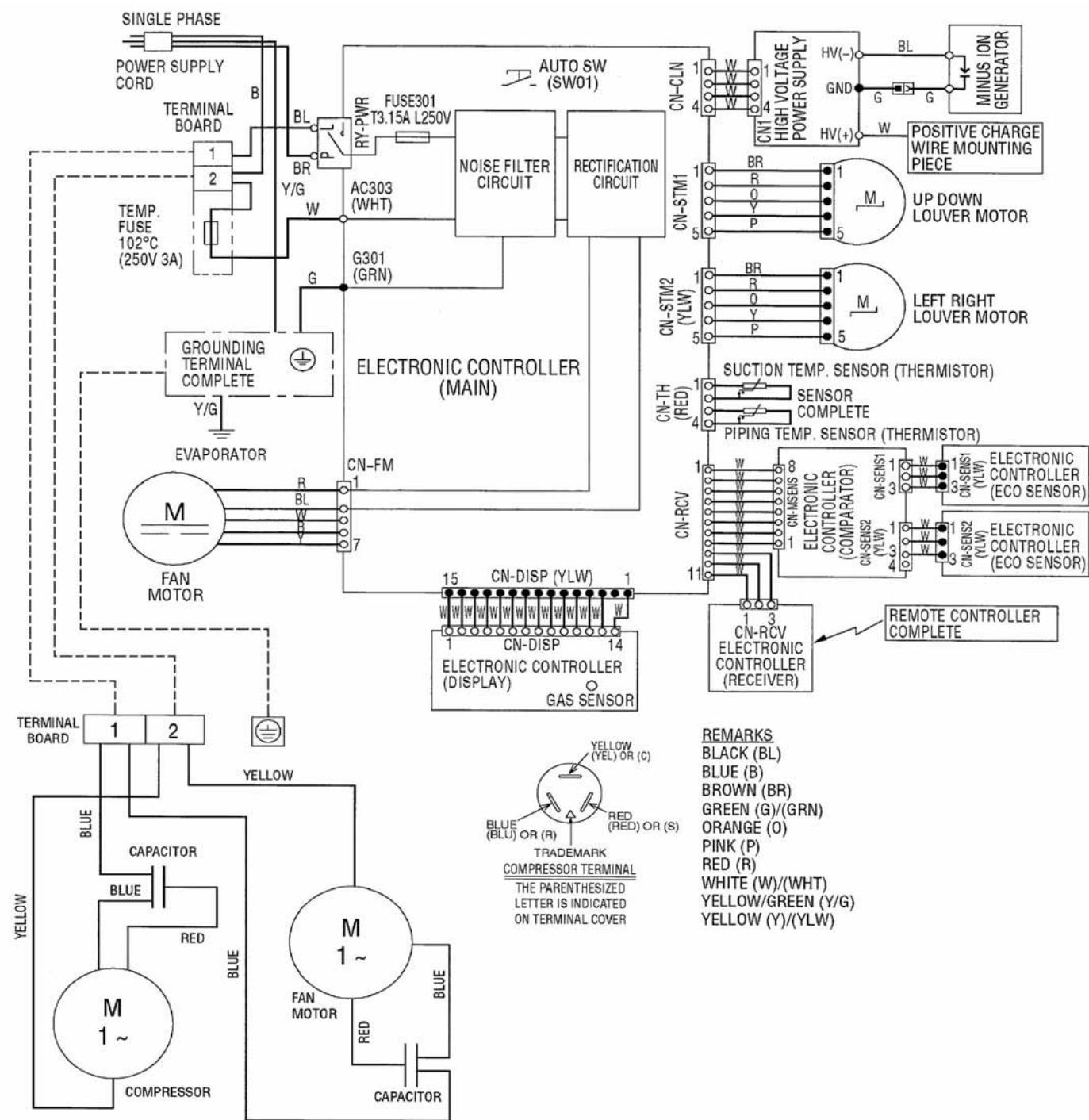
Note: Resistance at 20°C of ambient temperature.

Resistance of Compressor Windings

MODEL	CU-C12MKF-2
CONNECTION	2PS206D2BA06
C-R	3.252Ω
C-S	4.313Ω

Note: Resistance at 20°C of ambient temperature.

8.2 CS-C18MKF-2 CU-C18MKF-2



Resistance of Outdoor Fan Motor Windings

MODEL	CU-C18MKF-2
CONNECTION	CWA951577
BLUE-YELLOW	85.7Ω
YELLOW-RED	98.0Ω

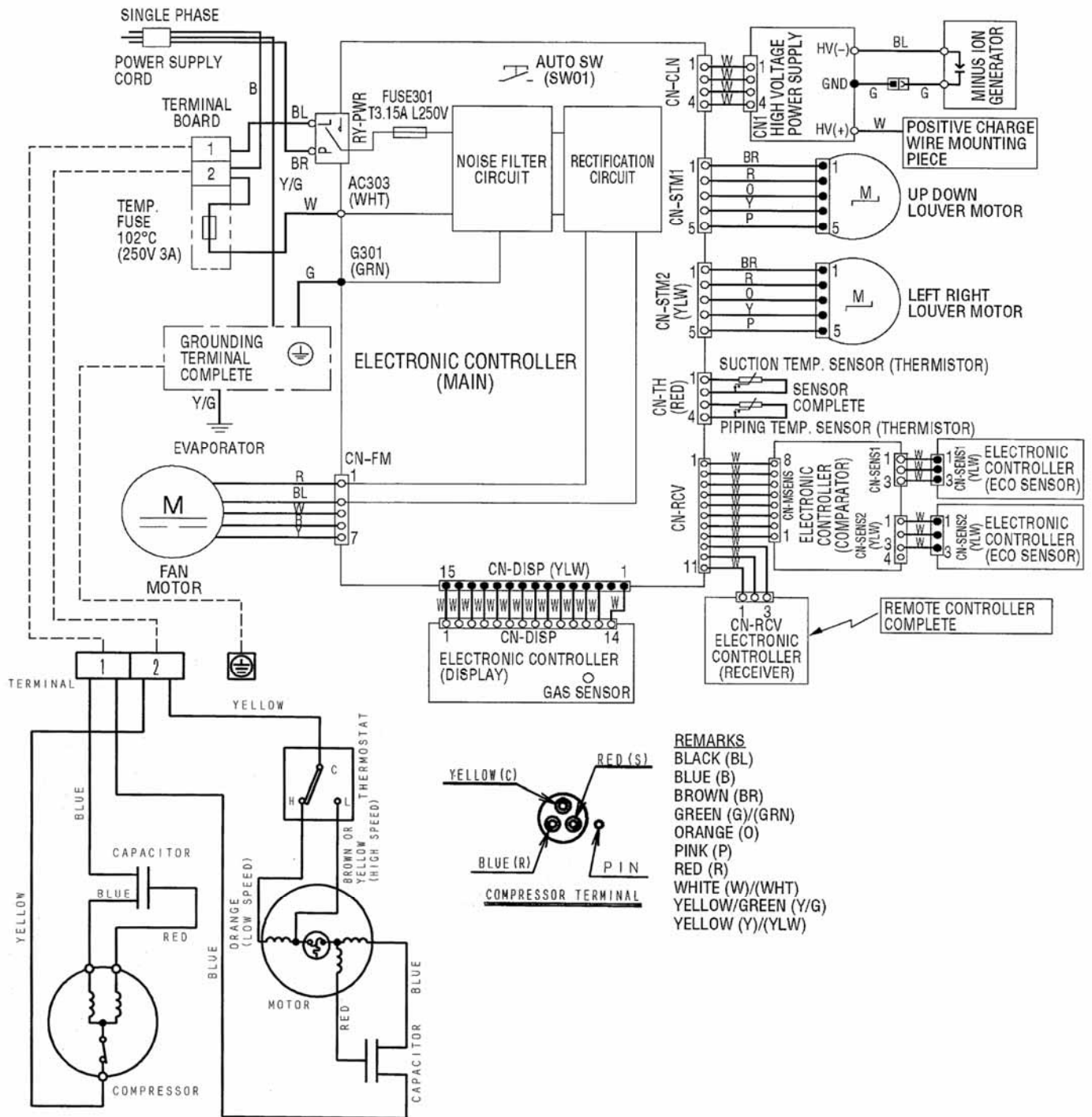
Note: Resistance at 20°C of ambient temperature.

Resistance of Compressor Windings

MODEL	CU-C18MKF-2
CONNECTION	2JS318D3EA02
C-R	1.430Ω
C-S	2.422Ω

Note: Resistance at 20°C of ambient temperature.

8.3 CS-C24MKF-2 CU-C24MKF-2



Resistance of Outdoor Fan Motor Windings

MODEL	CU-C24MKF-2
CONNECTION	CWA951689
BLUE-YELLOW	64Ω
YELLOW-ORANGE	90Ω
YELLOW-RED	55Ω

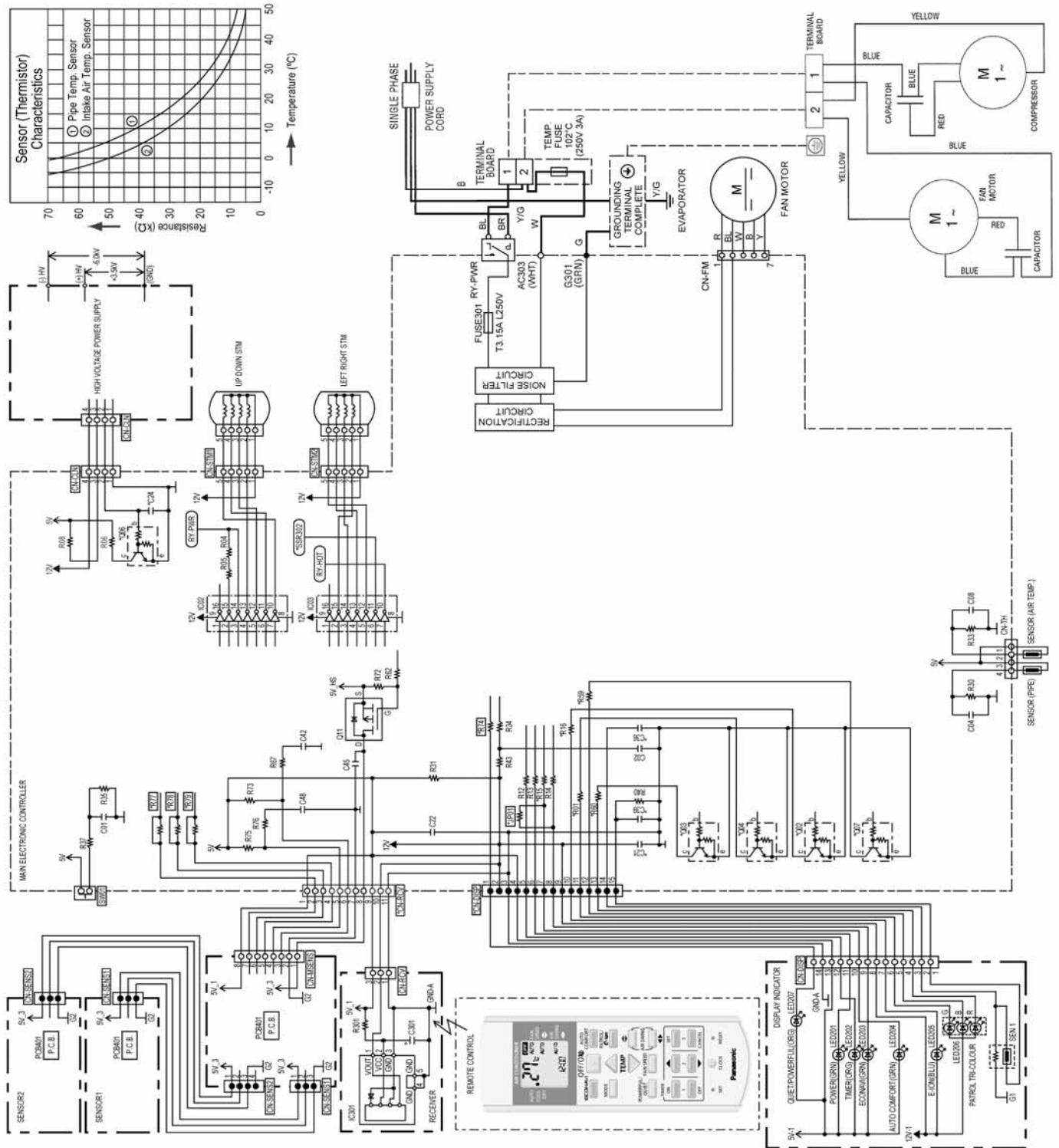
Note: Resistance at 20°C of ambient temperature.

Resistance of Compressor Windings

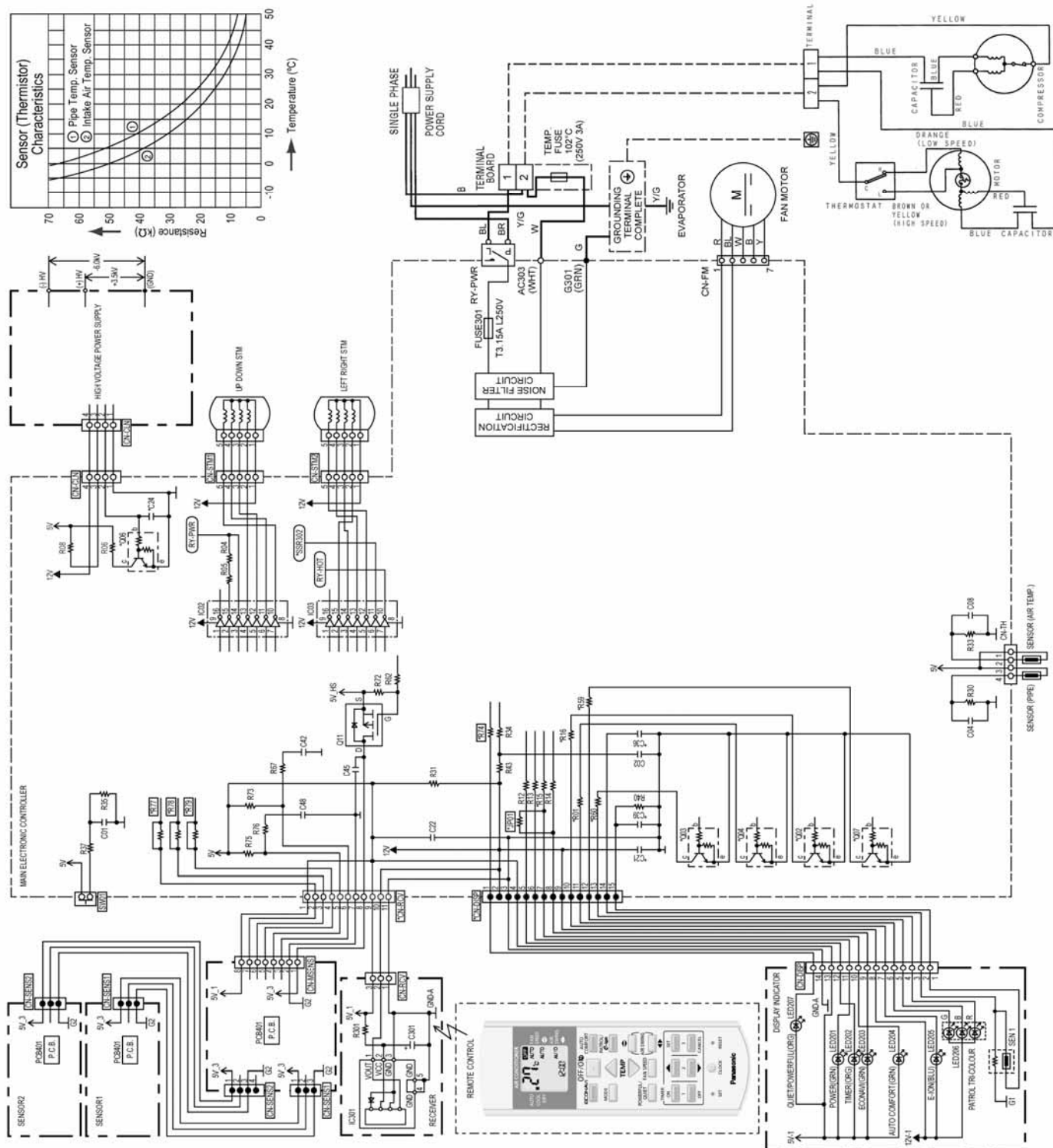
Resistance of Compressor Windings	
MODEL	CU-C24MKF-2
CONNECTION	2JS386D3DA02
C-R	1.164Ω
C-S	1.844Ω

Note: Resistance at 20°C of ambient temperature.

9.2 CS-C18MKF-2 CU-C18MKF-2



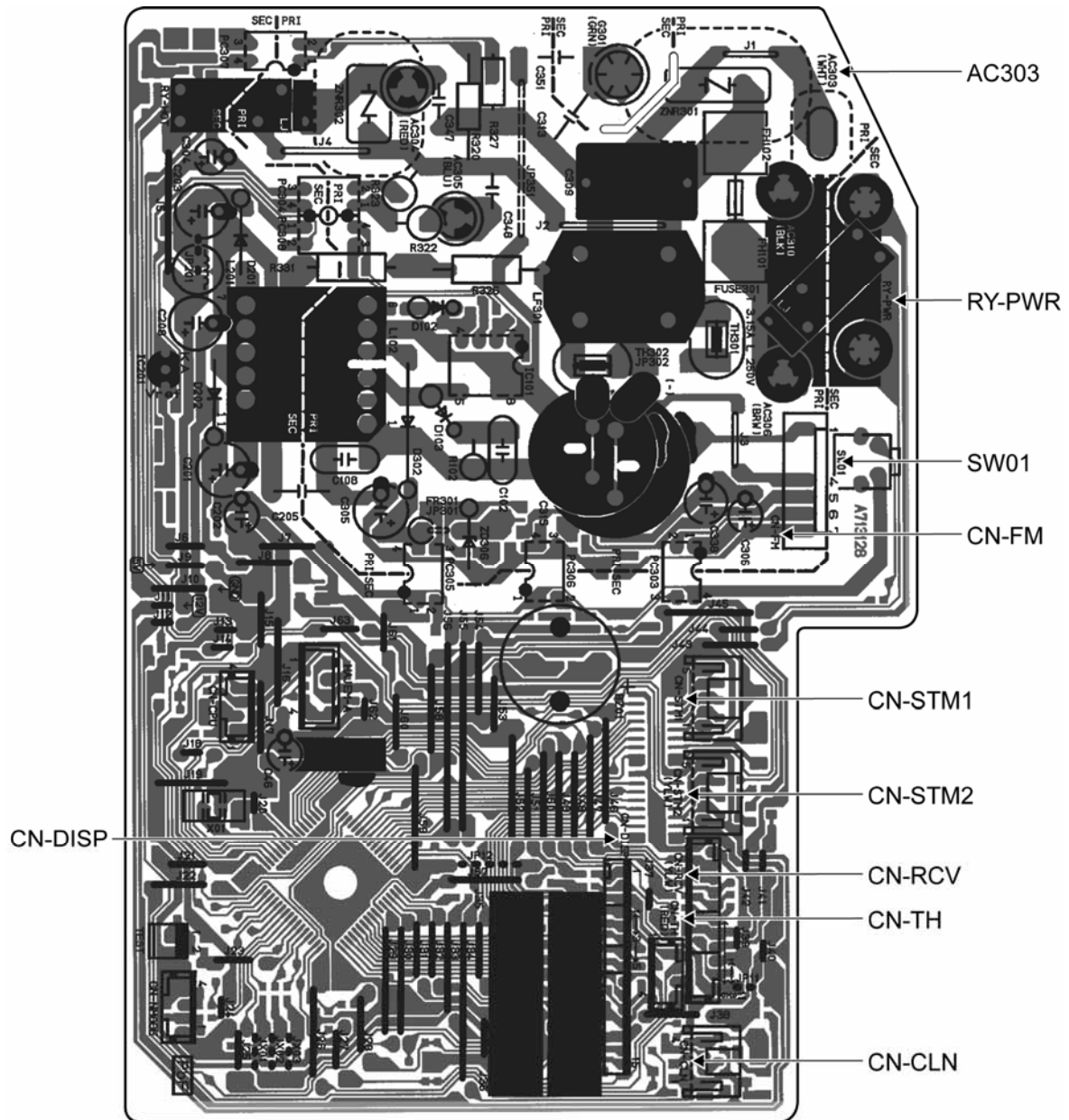
9.3 CS-C24MKF-2 CU-C24MKF-2



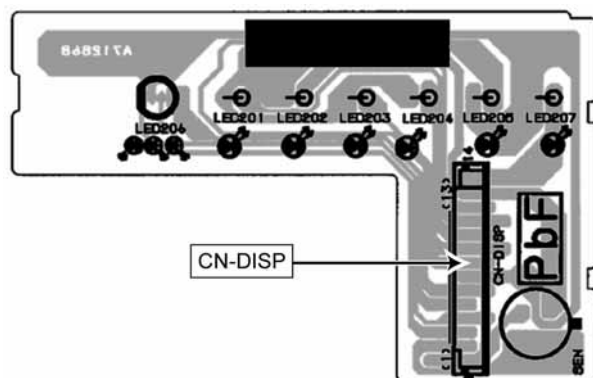
10. Printed Circuit Board

10.1 Indoor Unit

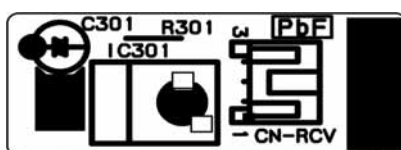
10.1.1 Main Printed Circuit Board



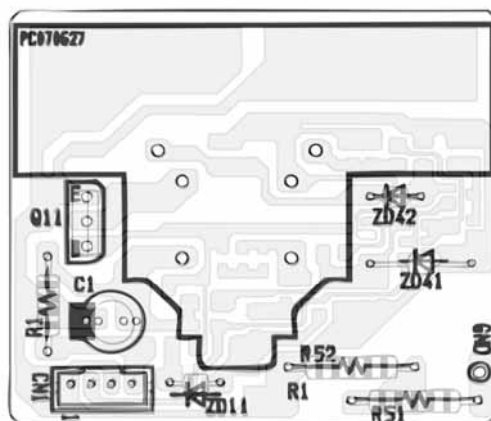
10.1.2 Indicator Printed Circuit Board



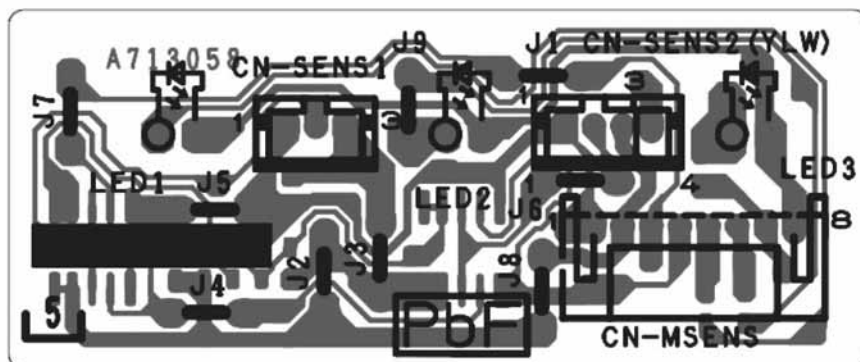
10.1.3 Receiver Printed Circuit Board



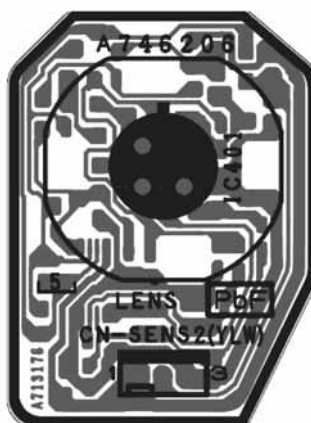
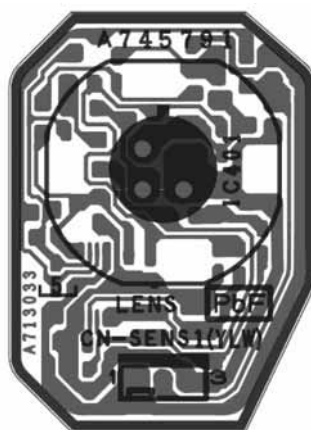
10.1.4 High Voltage Power Supply Printed Circuit Board



10.1.5 Comparator Printed Circuit Board



10.1.6 Human Activity Sensor Printed Circuit Board



11. Installation Instruction

11.1 Select the Best Location

11.1.1 Indoor Unit

- Do not install the unit in excessive oil fume area such as kitchen, workshop and etc.
- 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.
- Recommended installation height for indoor unit shall be at least 2.5 m.

11.1.2 Outdoor Unit

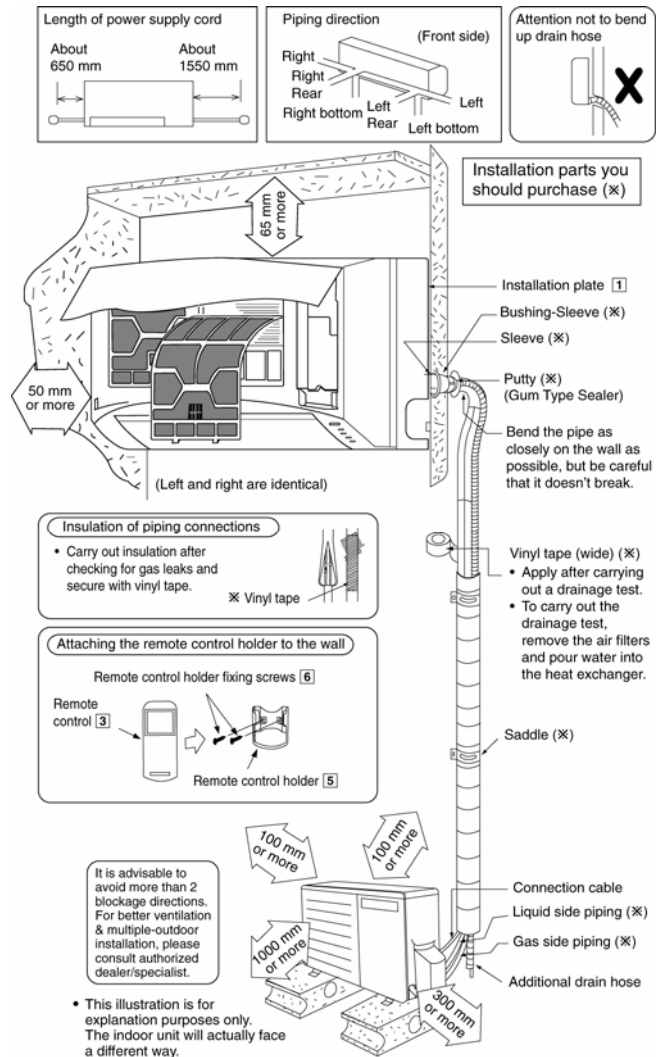
- If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.
- There should not be any animal or plant which could be affected by hot air discharged.
- Keep the spaces indicated by arrows from wall, ceiling, fence or other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

Model	Horse Power (HP)	Piping size		Std. Length (m)	Max Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)	Piping Length for add. gas (m)
		Gas	Liquid						
C12***	1.5HP	12.7 mm (1/2")	6.35 mm (1/4")	7.5	5	3	15	10	7.5
C18***	2.0HP	15.88 mm (5/8")		20	20	3	25	20	7.5
C24***, PC24***	2.5HP	15.88 mm (5/8")		20	20	3	25	30	7.5

Example: For C18***

If the unit is installed at 10 m distance, the quantity of additional refrigerant should be 50 g (10-7.5) m x 20 g/m = 50g.

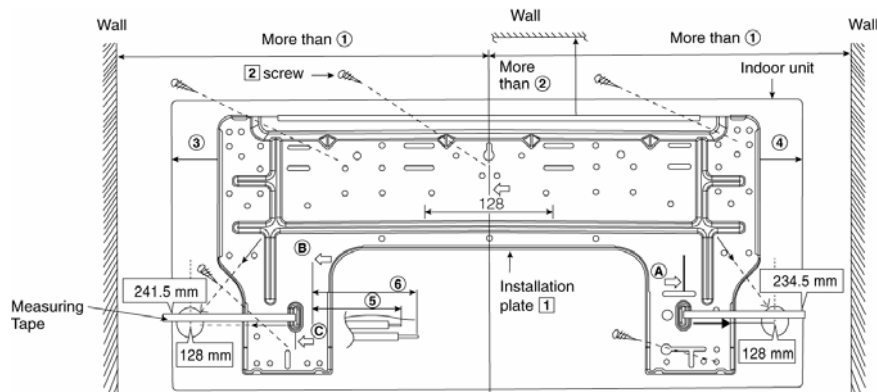
11.1.3 Indoor/Outdoor Unit Installation Diagram



11.2 Indoor Unit

11.2.1 How to Fix Installation Plate

The mounting wall shall be strong and solid enough to prevent it from the vibration.



Model	Dimension					
	①	②	③	④	⑤	⑥
C12***	485 mm	82 mm	165 mm	158 mm	43 mm	95 mm
C18***, C24***, PC24***	585 mm	82 mm	165 mm	158 mm	169 mm	219 mm

The center of installation plate should be at more than ① at right and left of the wall.

The distance from installation plate edge to ceiling should more than ②.

From installation plate left edge to unit's left side is ③.

From installation plate right edge to unit's right side is ④.

- ⑤ : For left side piping, piping connection for liquid should be about ⑤ from this line.
 ⑥ : For left side piping, piping connection for gas should be about ⑥ from this line.

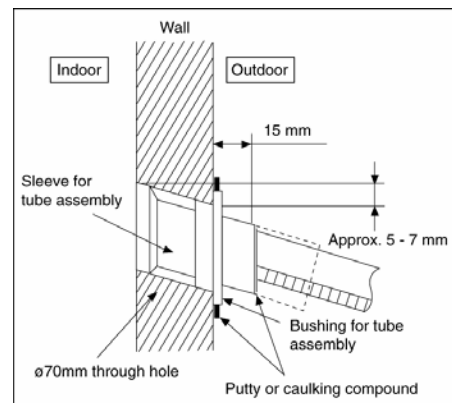
- Mount the installation plate on the wall with 5 screws or more (at least 5 screws).
(If mounting the unit on the concrete wall, consider using anchor bolts.)
 - Always mount the installation plate horizontally by aligning the marking-off line with the thread and using a level gauge.
- Drill the piping plate hole with $\phi 70$ mm hole-core drill.
 - Putting measuring tape at position as shown in the diagram above.
The hole center is obtained by measuring the distance namely 128 mm for left and right hole respectively. Another method is intersection point of arrow mark extension. The meeting point of the extension arrow mark is the hole center position.
 - Drill the piping hole at either the right or the left and the hole should be slightly slanting to the outdoor side. (refer step 3)

11.2.2 To Drill a Hole in the Wall and Install a Sleeve of Piping

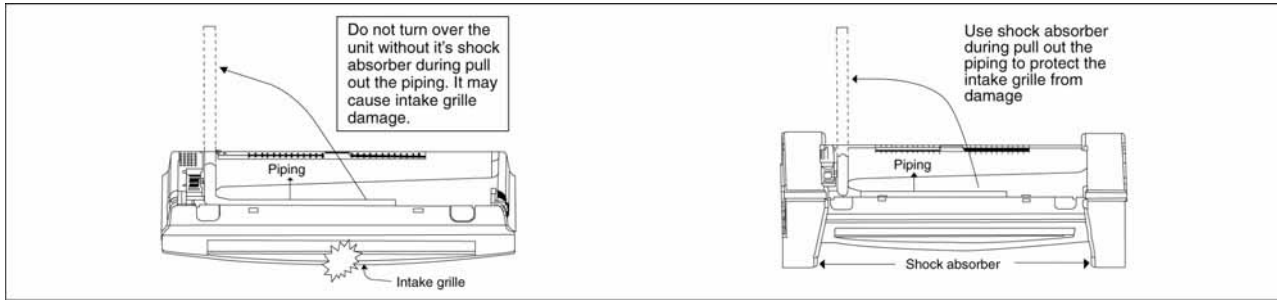
- Insert the piping sleeve to the hole.
- Fix the bushing to the sleeve.
- Cut the sleeve until it extrudes about 15 mm from the wall.

CAUTION
<p>❶ When the wall is hollow, please be sure to use the sleeve for tube assembly to prevent dangers caused by mice biting the connection cable.</p>

- Finish by sealing the sleeve with putty or caulking compound at the final stage.



11.2.3 Indoor Unit Installation



11.2.3.1 For the Right Rear Piping

- Step-1** Pull out the Indoor piping
- Step-2** Install the Indoor Unit
- Step-3** Secure the Indoor Unit
- If indoor power supply, excess length of power supply must arrange accordingly, please refer "Power supply cord arrangement" before secure the indoor unit.
- Step-4** Insert the connection cable

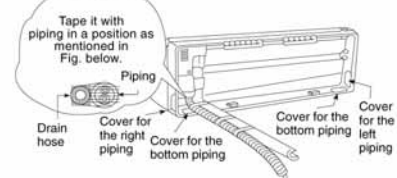
11.2.3.2 For the Right and Right Bottom Piping

- Step-1** Pull out the Indoor piping
- Step-2** Install the Indoor Unit
- Step-3** Insert the connection cable
- Step-4** Secure the Indoor Unit
- If indoor power supply, excess length of power supply must arrange accordingly, please refer "Power supply cord arrangement" before secure the indoor unit.

11.2.3.3 For the Embedded Piping

- Step-1** Replace the drain hose
- Step-2** Bend the embedded piping
- Use a spring bender or equivalent to bend the piping so that the piping is not crushed.
- Step-3** Pull the connection cable into Indoor Unit
- The inside and outside connection cable can be connected without removing the front grille.
- Step-4** Cut and flare the embedded piping
- When determining the dimensions of the piping, slide the unit all the way to the left on the installation plate.
 - Refer to the section "Cutting and flaring the piping".
- Step-5** Install the Indoor Unit
- Step-6** Connect the piping
- Please refer to "Connecting the piping" column in outdoor unit section. (Below steps are done after connecting the outdoor piping and gas-leakage confirmation.)
- Step-7** Insulate and finish the piping
- Please refer to "Insulation of piping connection" column as mentioned in indoor/outdoor unit installation.
- Step-8** Secure the Indoor Unit

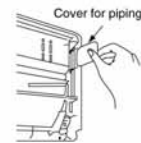
Right Rear piping



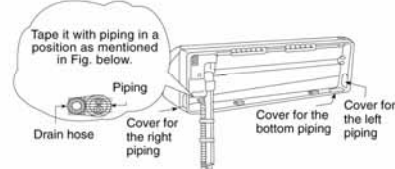
How to keep the cover

In case of the cover is cut, keep the cover at the rear of chassis as shown in the illustration for future reinstallation.

(Left, right and 2 bottom covers for piping.)

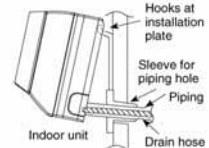


Right and Right Bottom piping



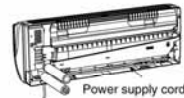
Install the indoor unit

Hook the indoor unit onto the upper portion of installation plate. (Engage the indoor unit with the upper edge of the installation plate). Ensure the hooks are properly seated on the installation plate by moving it in left and right.

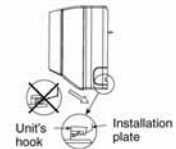


Secure the Indoor Unit

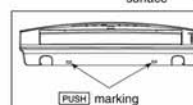
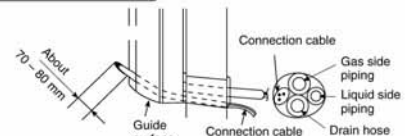
- Power supply cord arrangement**
Excess length of power supply cord should be arranged behind the chassis at piping keeping area as shown in the diagram without tying up in a bundle. Ensure that the power supply cord is not clamped in between unit's hook (2 position) and installation plate. Ensure that the power supply cord is not stretched between chassis back and installation plate. It may create squeak sound.



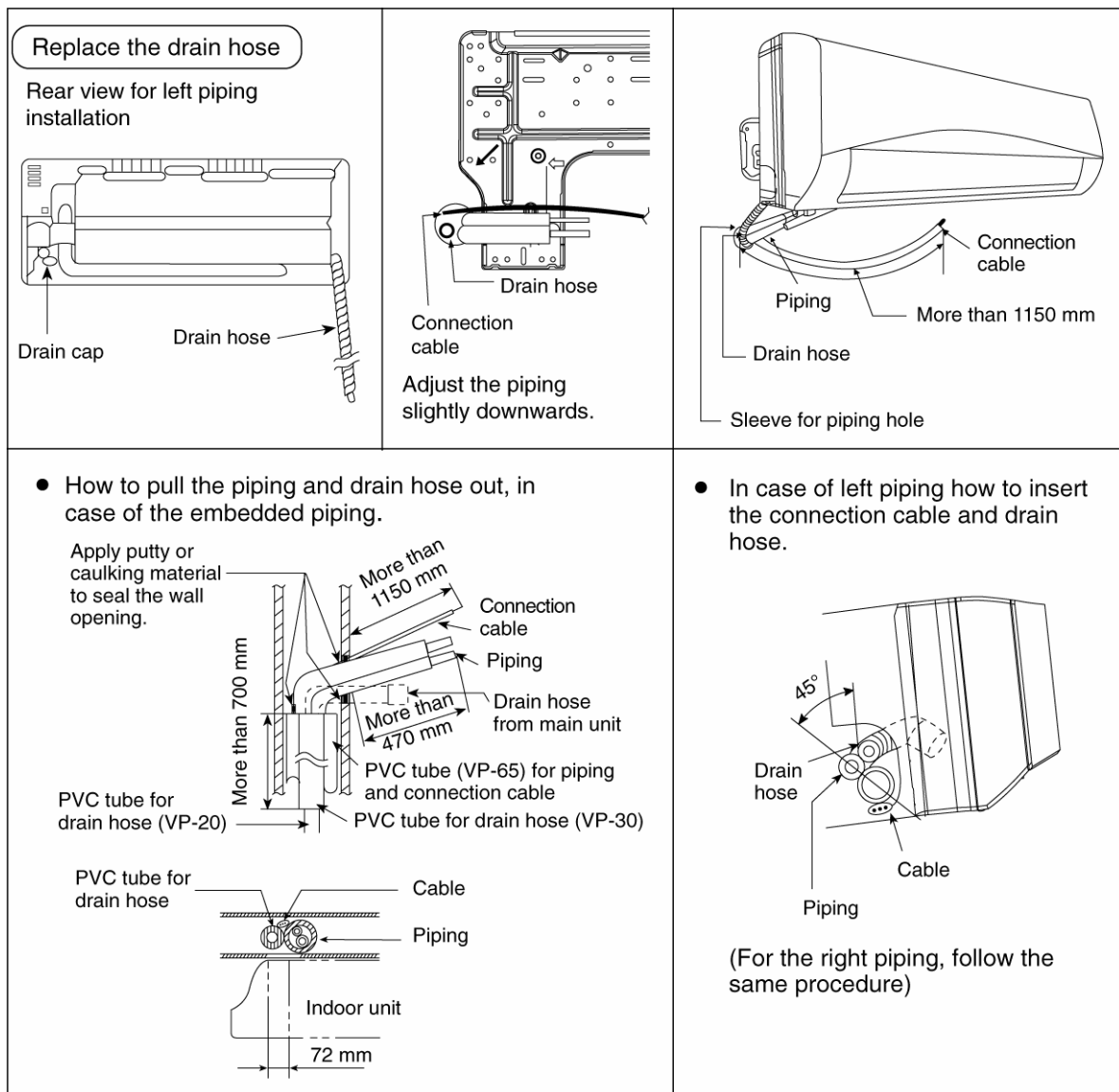
- Press the lower left and right side of the unit against the installation plate until hooks engages with their slot (sound click).



Insert the connection cable



(This can be used for left rear piping and bottom piping also.)

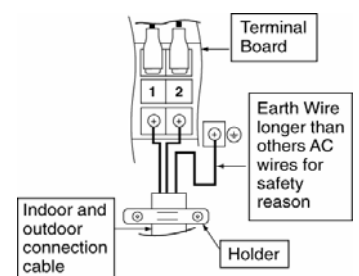


11.2.4 Connect the Cable to the Indoor Unit

- The inside and outside connection cable can be connected without removing the front grille.
- Connection cable** between indoor unit and outdoor unit shall be approved polychloroprene sheathed $3 \times 1.5 \text{ mm}^2$ (1.5HP) or $3 \times 2.5 \text{ mm}^2$ (2.0 ~ 2.5HP) flexible cord, type designation 245 IEC 57 or heavier cord.

Terminals on the indoor unit	1	2	
Colour of wires			
Terminals on the outdoor unit	1	2	

- Secure the connection cable onto the control board with the holder.

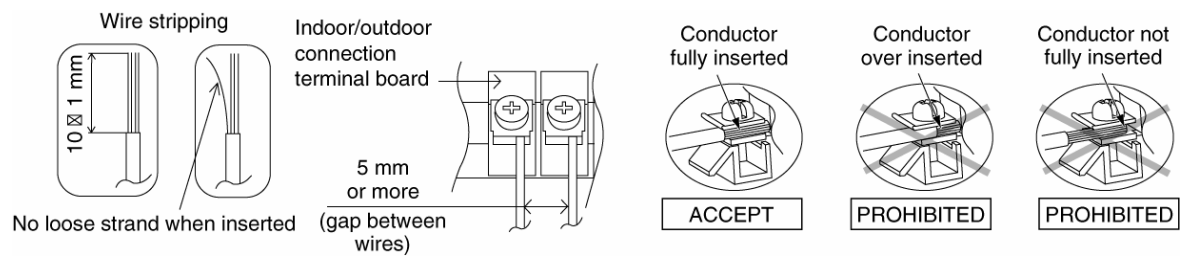


WARNING

This equipment must be properly earthed.

- Ensure the colour of wires of outdoor unit and the terminal Nos. are the same to the indoor's respectively.
- Earth wire shall be Yellow/Green (Y/G) in colour and longer than other AC wires for safety reason.

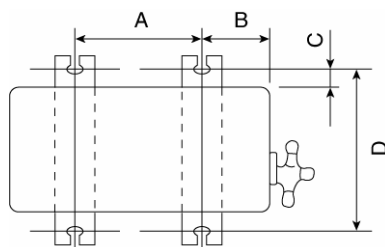
11.2.5 Wire Stripping and Connecting Requirement



11.3 Outdoor Unit

11.3.1 Install the Outdoor Unit

- After selecting the best location, start installation to Indoor/Outdoor Unit Installation Diagram.
 - Fix the unit on concrete or rigid frame firmly and horizontally by bolt nut ($\varnothing 10$ mm).
 - When installing at roof, please consider strong wind and earthquake.
Please fasten the installation stand firmly with bolt or nails.



Model	A	B	C	D
C12***	570 mm	105 mm	18.5 mm	320 mm
C18***	613 mm	131 mm	16 mm	360.5 mm
C24***, PC24***	612.5 mm	131 mm	19 mm	383 mm

11.3.2 Connect the Piping

11.3.2.1 Connecting the Piping to Indoor

Please make flare after inserting flare nut (locate at joint portion of tube assembly) onto the copper pipe. (In case of using long piping)

Connect the piping

- Align the center of piping and sufficiently tighten the flare nut with fingers.
- Further tighten the flare nut with torque wrench in specified torque as stated in the table.

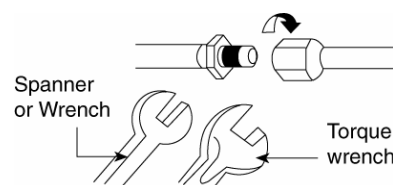
Do not overtighten, overtightening may cause gas leakage.	
Piping size	Torque
6.35 mm (1/4")	[18 N•m (1.8 kgf.m)]
9.52 mm (3/8")	[42 N•m (4.3 kgf.m)]
12.7 mm (1/2")	[55 N•m (5.6 kgf.m)]
15.88 mm (5/8")	[65 N•m (6.6 kgf.m)]
19.05 mm (3/4")	[100 N•m (10.2 kgf.m)]

11.3.2.2 Connecting the Piping to Outdoor

Decide piping length and then cut by using pipe cutter. Remove burrs from cut edge.

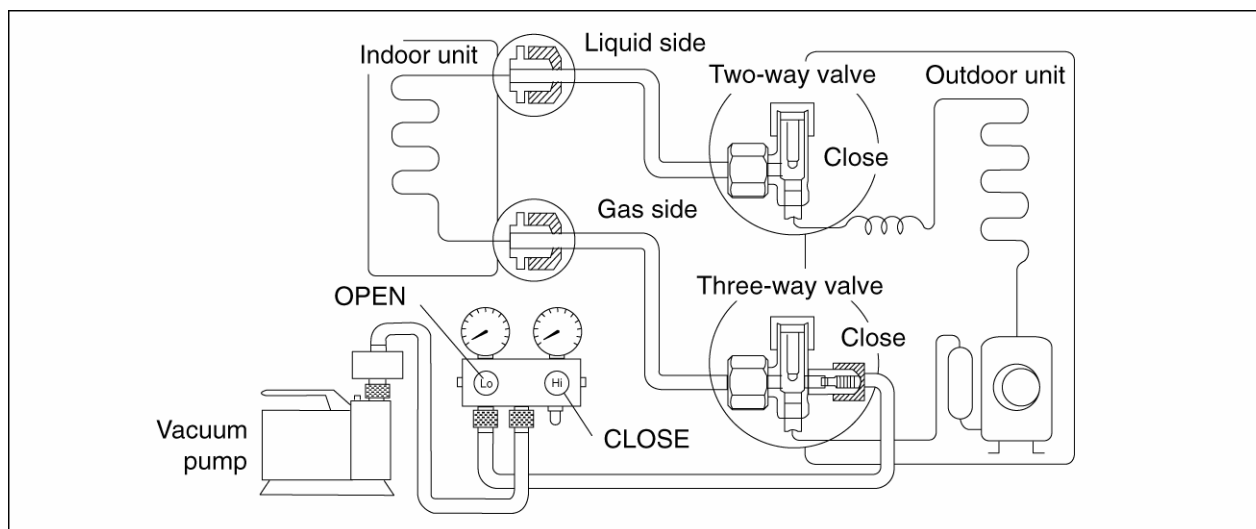
Make flare after inserting the flare nut (locate at valve) onto the copper pipe.

Align center of piping to valve and then tighten with torque wrench to the specified torque as stated in the table.



11.3.3 Evacuation of the Equipment

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 of a charging set and the service port of the 3-way valve.
 - Be sure to connect the end of the charging hose with the push pin to the service port.
- 2 Connect the center 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 approximately ten minutes.
- 4 Close the Low side 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 TAKE THIS PROCEDURE IN ORDER TO AVOID REFRIGERANT GAS LEAKAGE.
- 5 Disconnect the charging hose from the vacuum pump and from the service port of the 3-way valve.
- 6 Tighten the service port caps of the 3-way valve at a torque of 18 N·m with a torque wrench.
- 7 Remove the valve caps of both of the 2-way valve and 3-way valve. Position both of the valves to "OPEN" using a hexagonal wrench (4 mm).
- 8 Mount valve caps onto the 2-way valve and the 3-way valve.
 - Be sure to check for gas leakage.

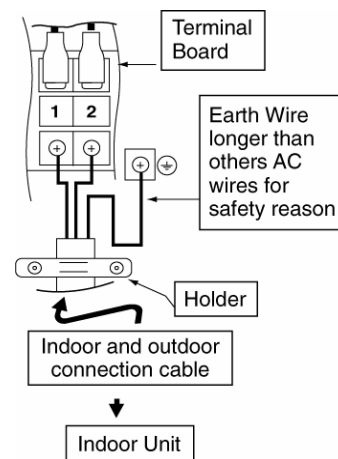
- If gauge needle does not move from 0 cmHg (0 MPa) to -76 cmHg (-0.1 MPa), in step ③ above take the following measure:
 - If the leak stops when the piping connections are tightened further, continue working from step ③.
 - If the leak does not stop when the connections are retightened, repair location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


11.3.4 Connect the Cable to the Outdoor Unit

- 1 Remove the control board cover from the unit by loosening the screw.
- 2 **Connection cable** between indoor unit and outdoor unit shall be approved polychloroprene sheathed 3 x 1.5 mm² (1.5HP) or 3 x 2.5 mm² (2.0 ~ 2.5HP) flexible cord, type designation 245 IEC 57 or heavier cord.

Terminals on the outdoor unit	1	2	
Colour of wires			
Terminals on the indoor unit	1	2	

- 3 Secure the cable onto the control board with the holder (clammer).
- 4 Attach the control board cover back to the original position with screw.
- 5 For wire stripping and connection requirement, refer to instruction ⑤ of indoor unit.




WARNING

 This equipment must be properly earthed.

- Earth wire shall be Yellow/Green (Y/G) in colour and longer than other AC wires for safety reason.

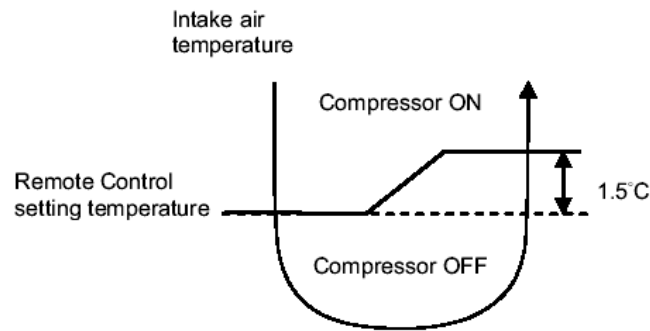
11.3.5 Piping Insulation

- 1 Please carry out insulation at pipe connection portion as mentioned in Indoor/Outdoor Unit Installation Diagram. Please wrap the insulated piping end to prevent water from going inside the piping.
- 2 If drain hose or connecting piping is in the room (where dew may form), please increase the insulation by using POLY-E FOAM with thickness 6 mm or above.

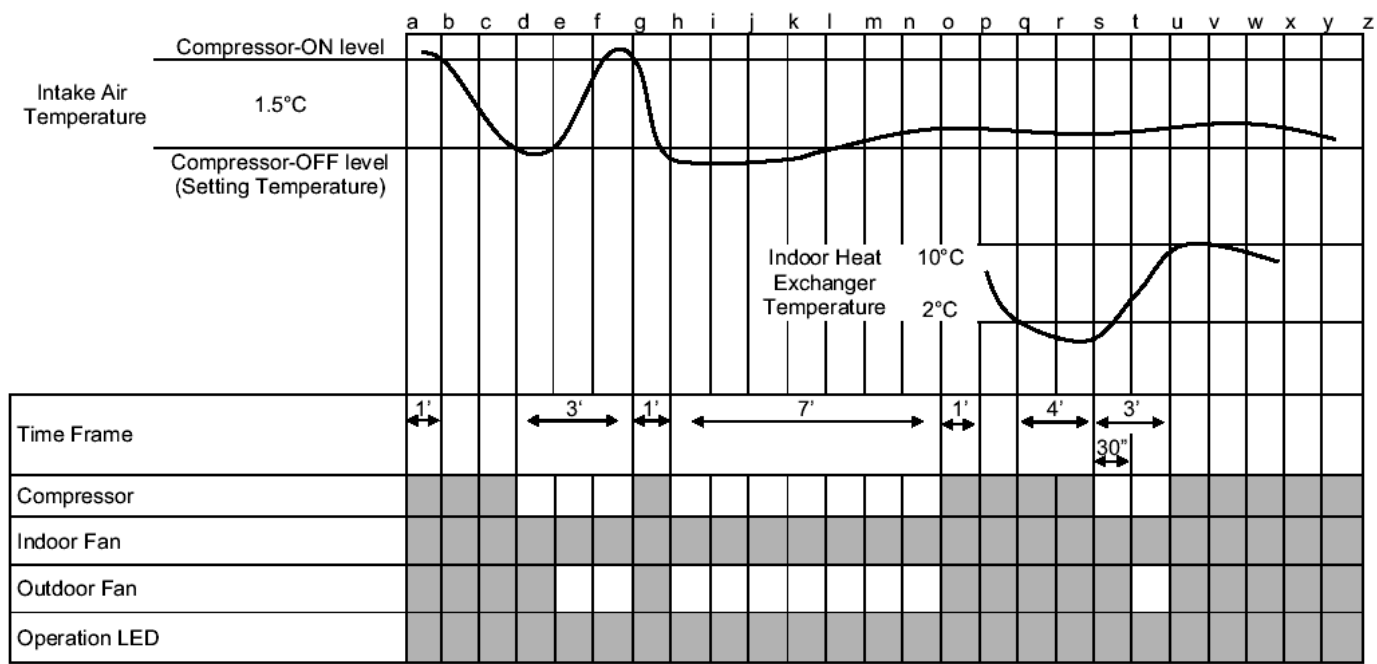
12. Operation Control

12.1 Cooling Operation

- Cooling operation can be set using remote control.
- This operation is applied to cool down the room temperature to the setting temperature set on the remote control.
- The remote control setting temperature, which takes the reading of intake air temperature sensor, can be adjusted from 16°C to 30°C.
- During cooling operation, the compressor will stop and restart as shown in figure below:





12.1.1 Cooling Operation Time Diagram (For CS-C12MK CU-C12MK)

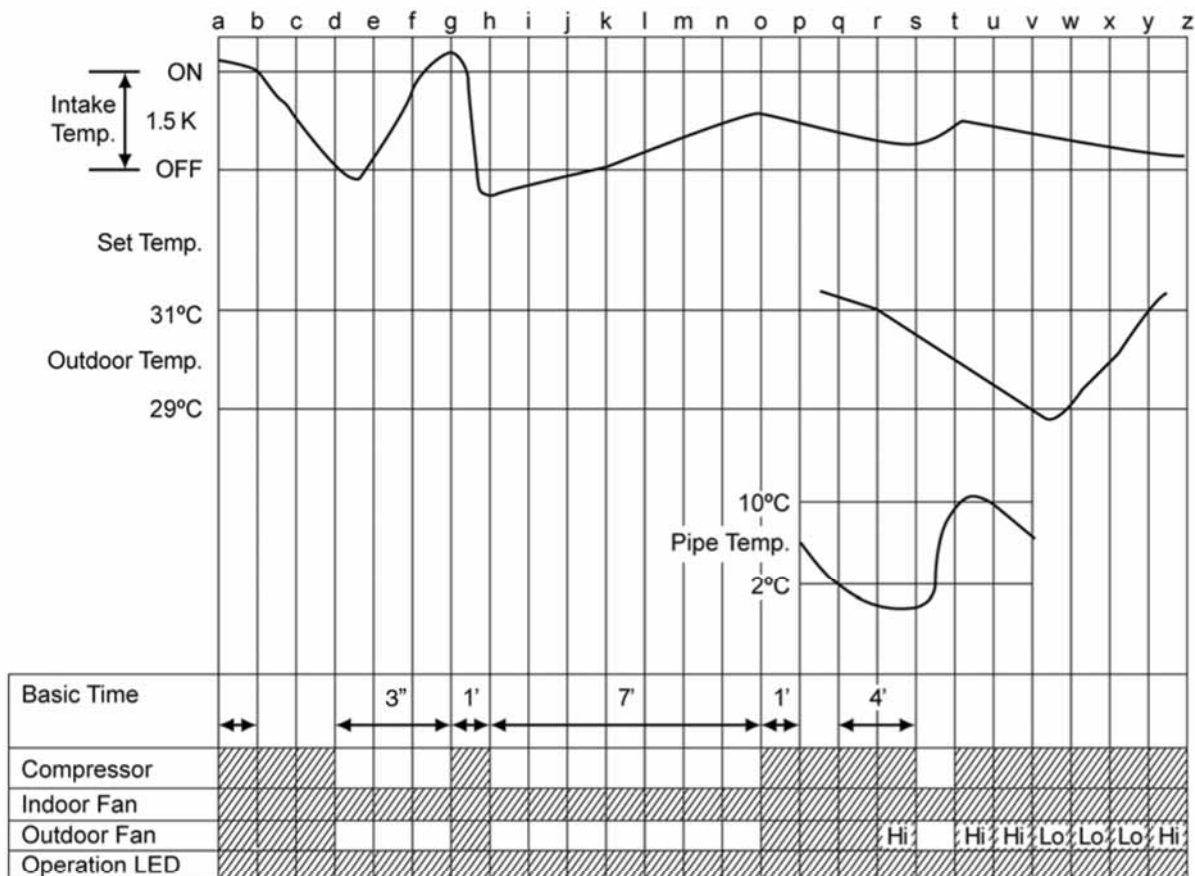


<Description of operation>

- a – b, g – h : Minimum 60 seconds forced operation
- d – g, s – u : Minimum 3 minutes restart control (Time Delay Safety Control)
- h – o : Maximum 7 minutes time save control
- q – u : Freeze Prevention Control

 Operation
 Stop

12.1.2 Cooling Operation Time Diagram (For CS-C18MK CU-C18MK, CS-C24MK CU-C24MK)



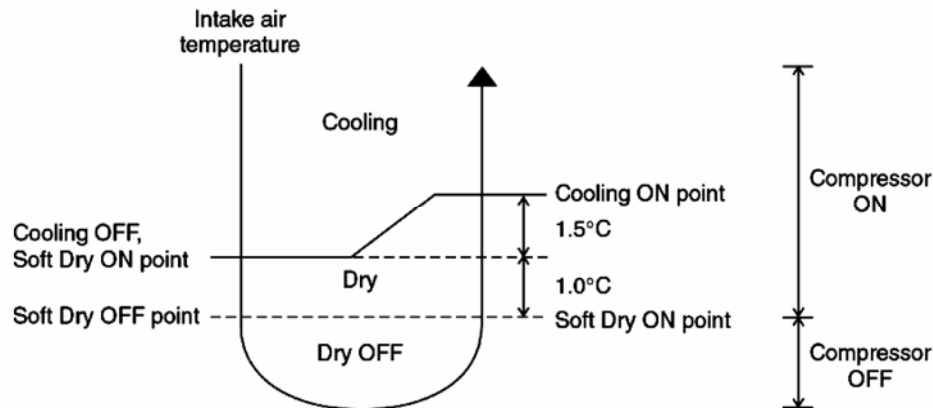
<Description of operation>

- d - g : restart control (waiting for 3 min.)
- a - b, g - h, o - p : 60 sec. forcible operation.
- h - o : 7 min. time save control.
- q - t : freeze prevention control.
- v - y : outdoor fan control.

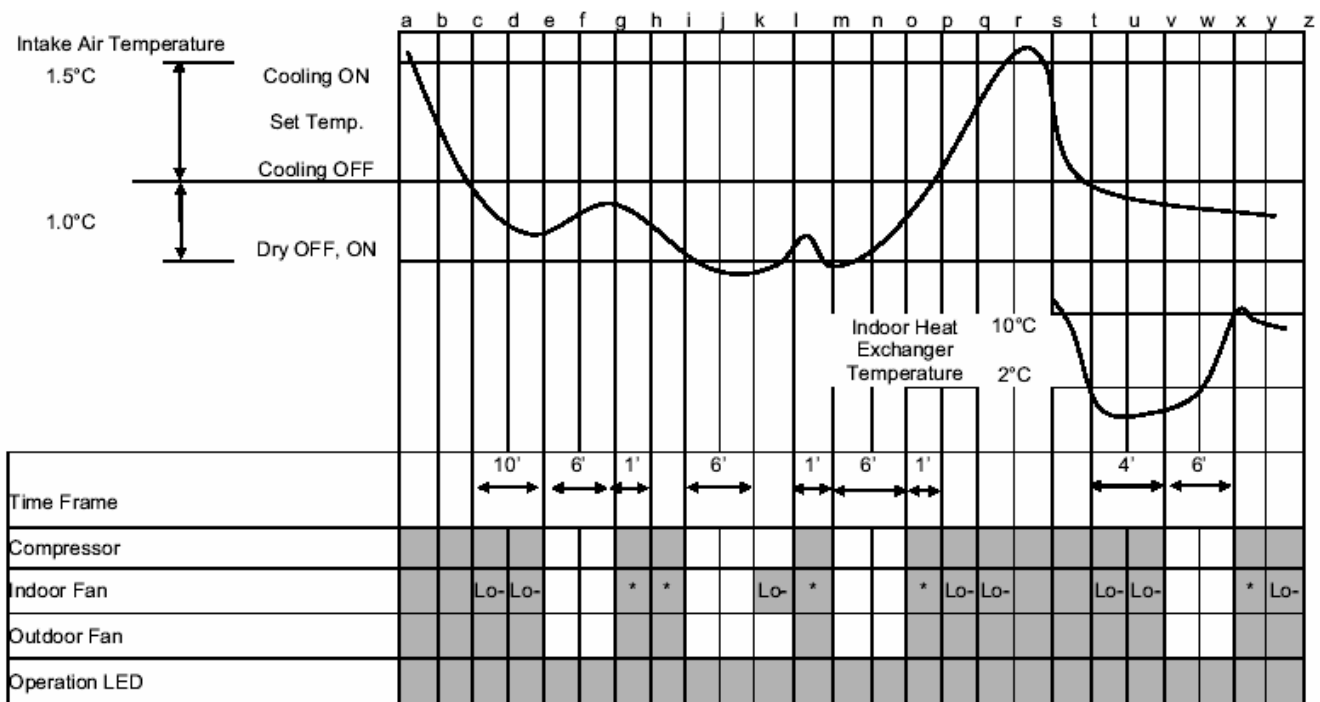
 Operation
 Stop

12.2 Soft Dry Operation

- Soft Dry operation can be set using remote control.
- Soft Dry operation is applied to dehumidify and to perform a gentle cooling to the room.
- This operation starts when the intake air temperature sensor reaches the setting temperature on the remote control.
- When operation begins, Soft Dry will be switched "ON" for a maximum 10 minutes, then Soft Dry operation will be turn "OFF" for a minimum 6 minutes. After that, the Soft Dry operation will be "ON" and "OFF" based on the setting temperature as shown in figure below.
- However after 3 minutes of compressor off, during Soft Dry "OFF" (within 6 minutes Soft Dry restart control), the indoor unit will start to operate at normal Cooling mode if the intake temperature is higher than Cooling "ON" point.



12.2.1 Soft Dry Operation Time Diagram (For CS-C12MK CU-C12MK)



<Description of operation>

g - h, l - m, o - p

: Minimum 60 seconds forced operation

Operation

a - c

: Minimum 3 minutes restart control (Time Delay Safety Control) - Cooling operation

Stop

c - e

: 10 minutes dry operation

e - g, i - k, m - o, v - x

: Minimum 6 minutes restart control (Time Delay Safety Control) - Soft dry operation

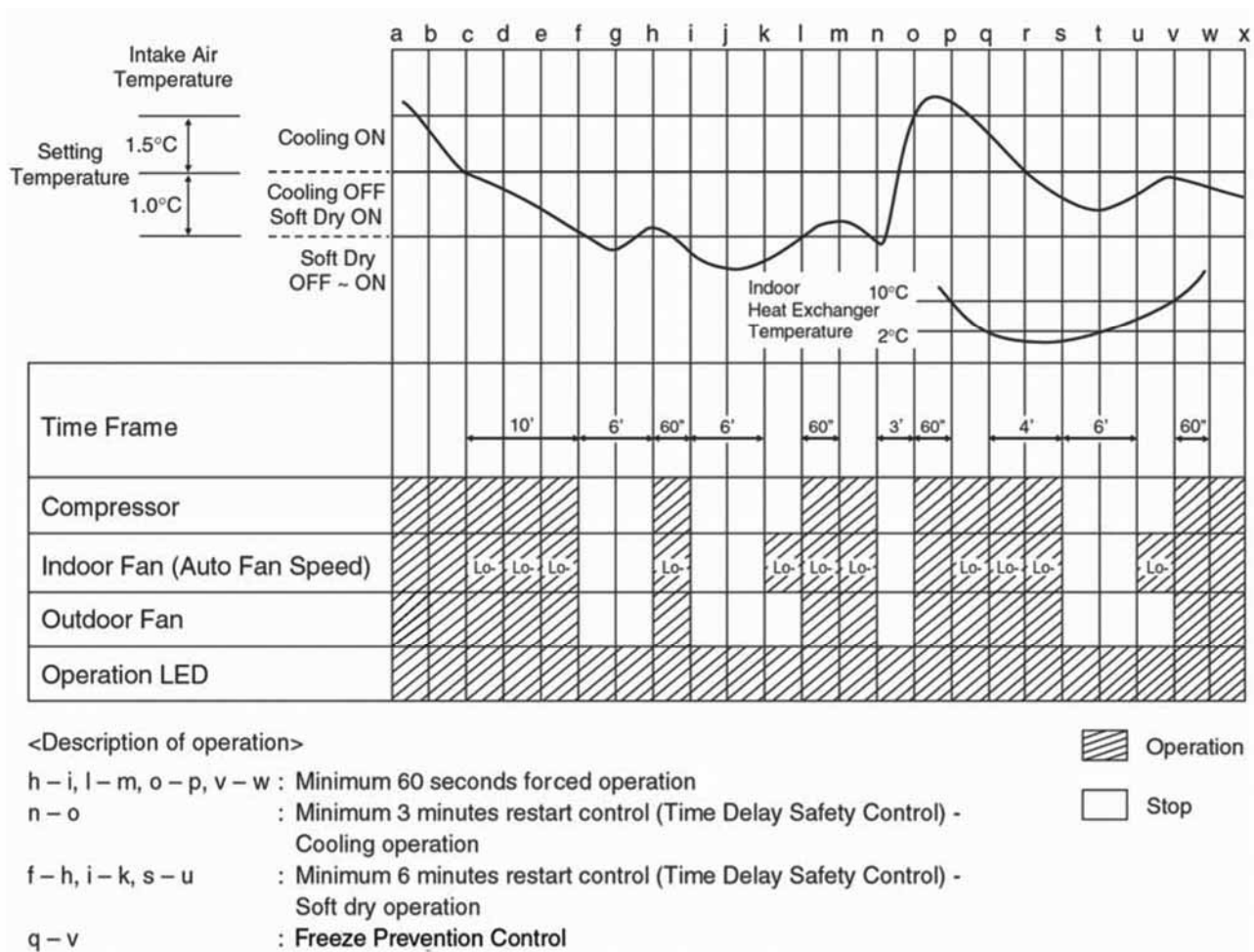
t - x

: Freeze Prevention Control

*

: Indoor fan OFF for 40" and then rotates at Lo-

12.2.2 Soft Dry Operation Time Diagram (For CS-C18MK CU-C18MK, CS-C24MK CU-C24MK)



12.3 Automatic Operation

- Automatic operation can be set using remote control.
- This operation starts to operate with indoor fan at SLo speed for 20 seconds to judge the intake air temperature.
- After judged the temperature, the operation mode is determined by referring to the below standard.

Intake Air Temperature	↑	23°C		Cooling Operation
	↓			Soft Dry Operation

- Then, the unit starts to operate at determined operation mode, until it is switched off using remote control, with the setting temperature as shown in table below.

	Setting Temperature (Standard)
Cooling Operation	25°C
Soft Dry Operation	22°C

- The setting temperature for all the operations can be changed one level up or one level down from the standard temperature as shown in table below by pressing the temperature up or temperature down button at remote control.

			Cooling	Soft Dry
Higher	→	+2°C	27°C	24°C
Standard	→	±0°C#	25°C	22°C
Lower	→	-2°C#	23°C	20°C

- The operation mode judging temperature and standard setting temperature can be increased by 2°C permanently, by open the circuit of JX03 at indoor unit's printed circuit board.

Intake Air Temperature	↑ 25°C ↓			
		Cooling Operation	Cooling Operation	Setting Temperature (Standard) 27°C
		Soft Dry Operation	Soft Dry Operation	24°C

12.4 Indoor Fan Speed Control

- Indoor fan speed can be set using remote control.

12.4.1 Fan Speed Rotation Chart

Speed	Fan Speed (rpm)		
	CS-C12MKF-2	CS-C18MKF-2	CS-C24MKF-2
Shi	1190	1390	1500
Hi	1150	1280	1430
Me	980	1150	1240
HLo	840	1140	1190
CLo	800	1060	1110
Lo-	760	850	970
SLo	740	670	750
Qhi	1080	1190	1340
QMe	910	1060	1150
QLo	730	970	1020

12.4.2 Automatic Fan Speed Control

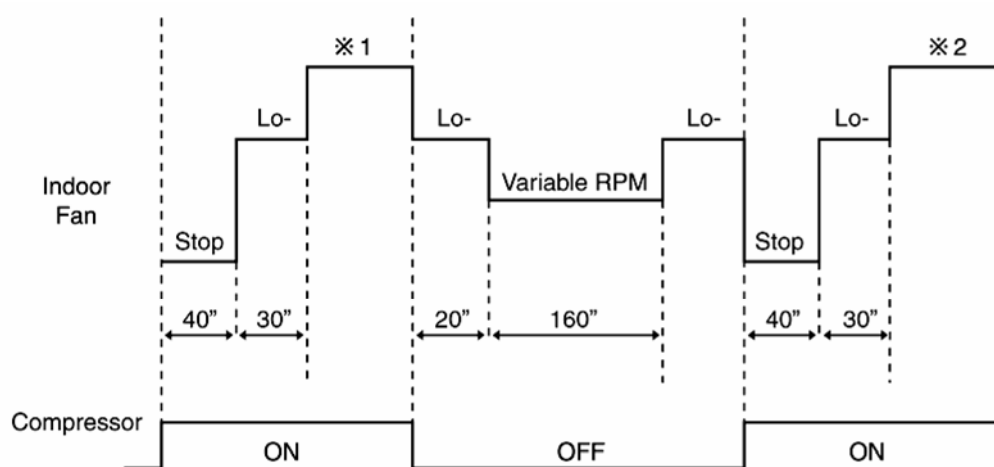
- When set to Auto Fan Speed, the fan speed is adjusted between maximum and minimum setting as shown in the table.
 - Fan speed rotates in the range of Hi and Me (For CS-C12MK).
 - Fan speed rotates in the range of Hi, Me and Lo- (For CS-C18MK, CS-C24MK).
 - Deodorizing Control will be activated.

For CS-C12MK

				SHi	Hi	Me	HLo	CLo	Lo-	SLo	Variable rpm	Stop
Cooling	Normal	Manual	Hi		o							
			Me			o						
			Lo					o				
		Auto			o	o			o		o	o
	Quiet	Manual	QHi		Hi-70							
			QMe			Me-70						
			QLo					CLo-70				
		Auto			Hi-70	Me-70			o		o	o
	Powerful	Manual		o								
		Auto		o								
Soft Dry	Normal	Manual							o			o
		Auto							o			o
	Quiet	Manual							o			o
		Auto							o			o
	Powerful	Manual							o			o
		Auto							o			o

				SHi	Hi	Me	HLo	CLo	Lo-	SLo	Stop
Cooling	Normal	Manual	Hi		o						
			Me			o					
			Lo					o			
		Auto			o	o			o		o
	Quiet	Manual	QHi		Hi-90						
			QMe			Me-90					
			QLo					CLo-90			
		Auto			Hi-90	Me-90			o		o
Soft Dry	Normal	Manual		o							
		Auto		o							
	Quiet	Manual							o		o
		Auto							o		o
	Powerful	Manual									
		Auto									
	Normal	Manual							o		o
		Auto							o		o

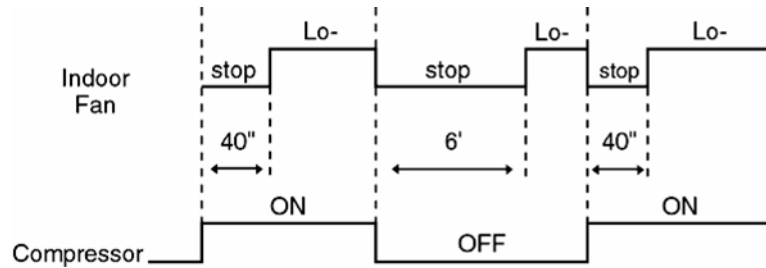
- Auto Fan Speed during cooling operation:
 - Indoor fan will rotate alternately between off and on as shown in below diagram.
 - At the beginning of each compressor starts operation, indoor fan speed increases gradually for deodorizing purpose.
 - For the first time the compressor operates, indoor fan will be switched to Hi fan speed from Lo- after 70 seconds from the start of compressor. This cause the room temperature to achieve the setting temperature quickly.
 - During compressor stops, indoor fan will operate at Lo- for the beginning 20 seconds to prevent higher volume of refrigerant in liquid form returning to the compressor.
 - After the compressor turned off for 3 minutes, indoor fan will start to operate at Lo- to circulate the air in the room. This is to obtain the actual reading of the intake air temperature.
 - For the resume of compressor operation, indoor fan will operate at Me fan speed to provide comfort and lesser noise environment, after 70 seconds from the restarts of compressor.



※ 1 Fan Speed is Hi until the compressor stops (when the room temperature reaches setting temperature).

※ 2 Fan Speed is Me after the compressor restarts.

- Auto Fan Speed during Soft Dry operation.
 - 1 Indoor fan will rotate alternately between off and Lo-.
 - 2 At the beginning of each compressor starts operation, indoor fan will increase fan speed gradually for deodorizing purpose.
 - 3 When compressor turned off for 6 minutes, indoor fan will start at Lo- to circulate the air in the room. This is to obtain the actual reading of intake air temperature.



12.4.3 Manual Fan Speed Control

- Manual fan speed adjustment can be carried out by using the Fan Speed selection button at the remote control.
- There are 3 types of fan speed settings: Lo, Me, Hi.

12.4.4 Indoor Fan Motor rpm Abnormal Control

- Immediate after the fan motor is started, rpm abnormal control is performed every second.
- During fan motor on, if fan motor feedback ≥ 2550 rpm or < 50 rpm continuously for 10 seconds, the fan motor error counter increased; fan motor is then stopped and restarted. If the fan motor error counter increased to 7, then air conditioner will stop operation.

12.5 Outdoor Fan Speed Control

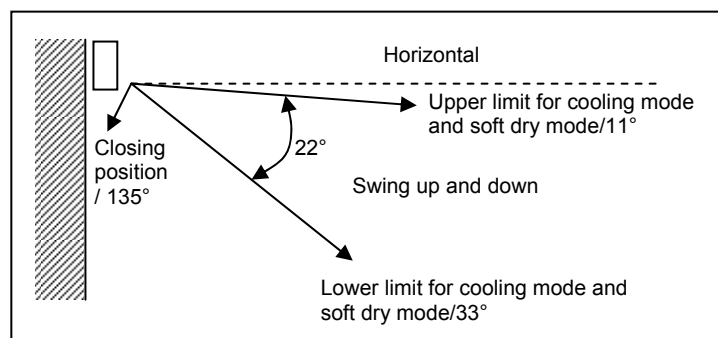
- There is only one speed for outdoor fan motor. (Applicable for CU-C12MK and CU-C18MK)
- There is 2 speeds for outdoor fan motor. Outdoor fan speed can be changed to Hi or Lo according to outdoor temperature. (Applicable for CU-C24MK).
- For Cooling and Soft Dry operation, when outdoor temperature reaches to 31°C (Hi-speed), 29°C (Lo-speed). (Applicable for CU-C24MK).
- When air conditioner is turned on, the compressor and the outdoor fan will operate simultaneously.
- Likewise, both compressor and outdoor fan will stop at the same time if the unit is turned off.

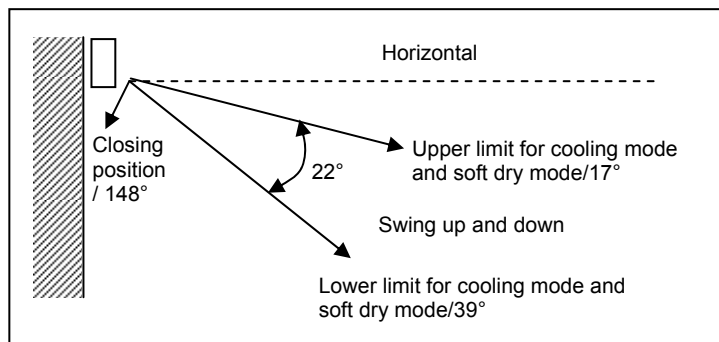
12.6 Vertical Airflow Direction Control

12.6.1 Auto Control

- When the vertical airflow direction is set to Auto using the remote control, the louver swings up and down as shown in the diagram.
- When stops operation using the remote control, the discharge vent is reset and stops at the closing position.
- During Cooling operation or Soft Dry operation, indoor fan motor may stop to rotate at certain periods. At that condition, the louver will stop swinging.

For CS-C12MK

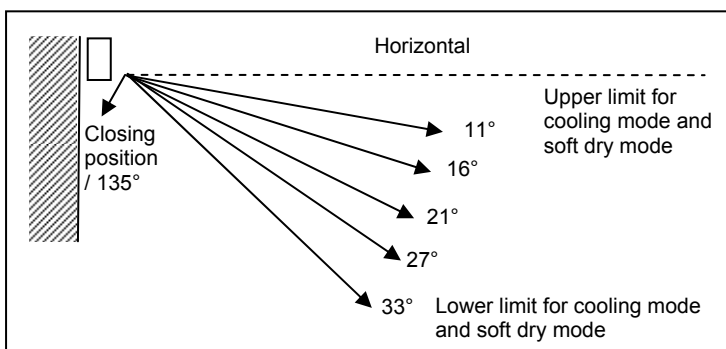




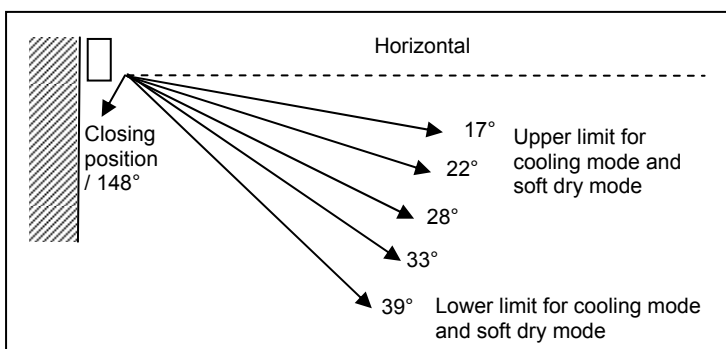
12.6.2 Manual Control

- When the vertical airflow direction is set to Manual using the remote control, the automatic airflow is released and the airflow direction louver move up and down in the range shown in the diagram.
- The louver can be adjusted by pressing the button to the desired louver position.
- When stop operation using the remote control, the discharge vent is reset, and stop at the closing position.

For CS-C12MK



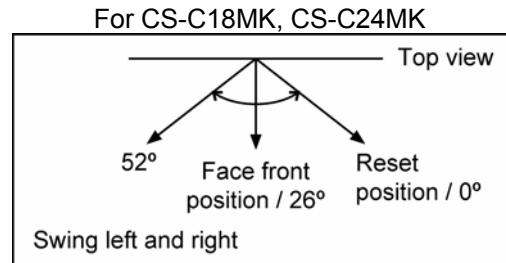
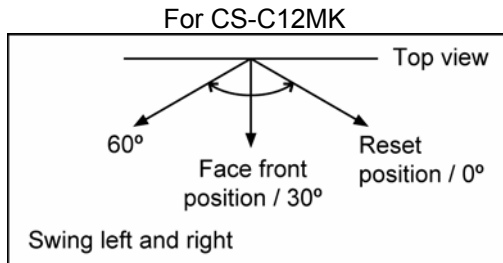
For CS-C18MK, CS-C24MK



12.7 Horizontal Airflow Direction Control

12.7.1 Auto Control

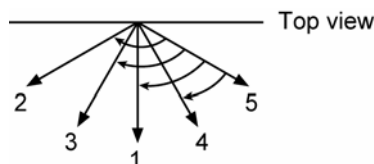
- When the horizontal airflow is set to Auto using the remote control, the vanes swing left and right as shown in the diagram.
- When stopped with remote control, the discharge vanes are reset and stop at the reset position.
- During Cooling operation or Soft Dry operation, indoor fan motor may stop to rotate at certain periods. At that condition, the vane will stop swinging and rest at face front position.



12.7.2 Manual Control

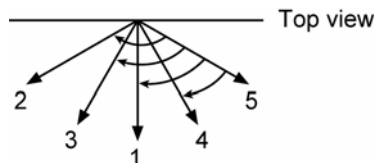
- When the horizontal airflow direction is set to Manual using the remote control, the automatic airflow is released and the airflow direction vane move left and right in the range shown in the diagram.
- The louver can be adjusted by pressing the button to the desired vane position.
- When stopped with remote control, the vanes is reset and stopped at reset position.

For CS-C12MK



Pattern	1	2	3	4	5
Airflow Direction Patterns of Remote Control					
Vane Angle (°)	30°	60°	45°	15°	0°

For CS-C18MK, CS-C24MK



Pattern	1	2	3	4	5
Airflow Direction Patterns of Remote Control					
Vane Angle (°)	26°	52°	39°	13°	0°

12.8 Powerful Operation

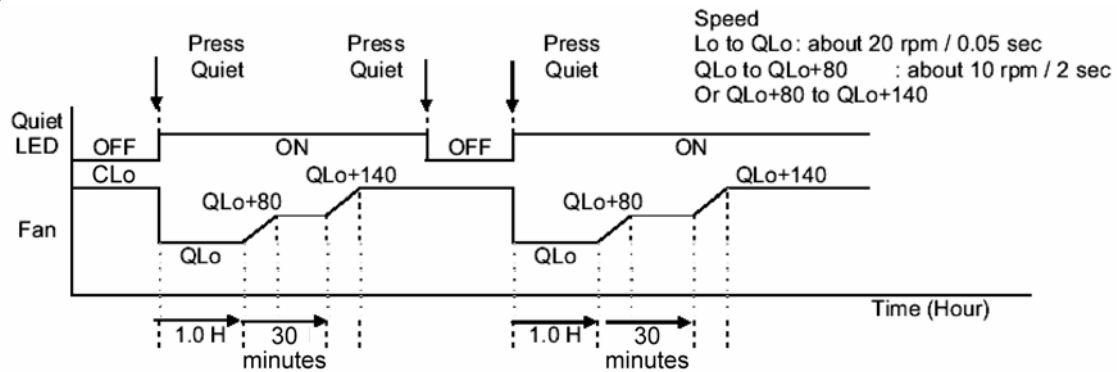
- To achieve the setting temperature quickly.
- When powerful operation is set, the setting temperature will be automatically decreased 3°C internally against the present setting temperature (Lower temperature limit: 16°C).
- This operation automatically running under Shi fan speed (Cooling), Lo- Fan Speed (Soft Dry) is applicable for C12MK only.
- Vertical Airflow Direction:
 - In "Manual" setting, the vane will automatically shift down 10° lower than previous setting.
 - In "Auto" setting, the vane will automatically swing up and down. However the lower limit will be shifted 10° downward.
- Powerful operation stops when:
 - Powerful/Quiet button is pressed again.
 - Powerful operation has operate for 15 minutes.
 - Stopped by OFF/ON operation button.
 - Timer OFF activates.
 - Operation mode is changed.

12.9 Quiet Operation

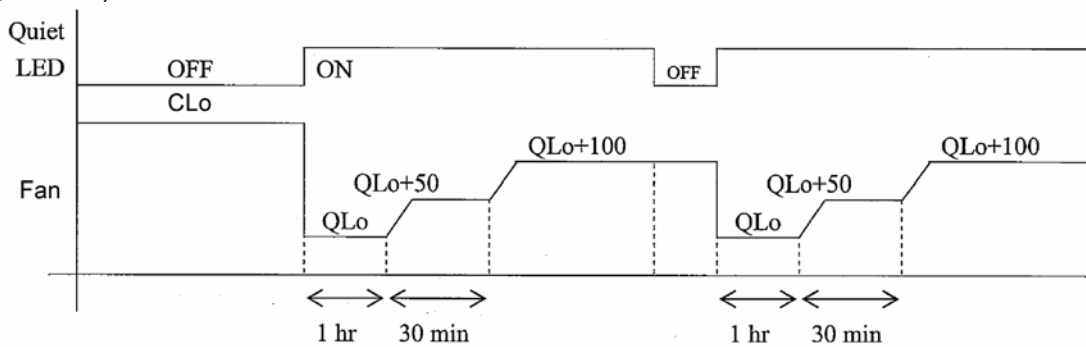
(For Cooling Operation or cooling region of Soft Dry Operation)

- To provide quiet cooling operation condition.
- Once the Quiet Operation is set at the remote control, the Quiet LED brightness will be dimmed. The sound level will reduce around 2dB(A) for Lo fan speed or 3dB(A) for Hi/Me fan speed against the present operation sound level.
- Dew formation become severe at Quite Lo Cool, therefore Quiet Lo cool operated only for 1 hour 30 minutes (1 hour QLo, 30 minutes QLo + 80rpm) (for C12MK) and Quiet Lo cool operated only 1 hour 30 minutes (1 hour QLo, 30 minutes QLo + 50 rpm) (for C18MK, C24MK).
- Manual Airflow Direction:
 - RPM control during Lo cool

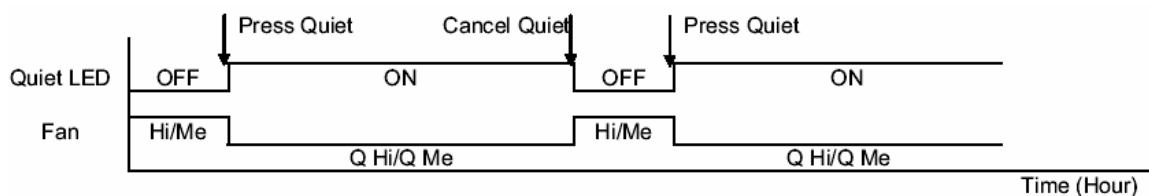
(For C12MK)



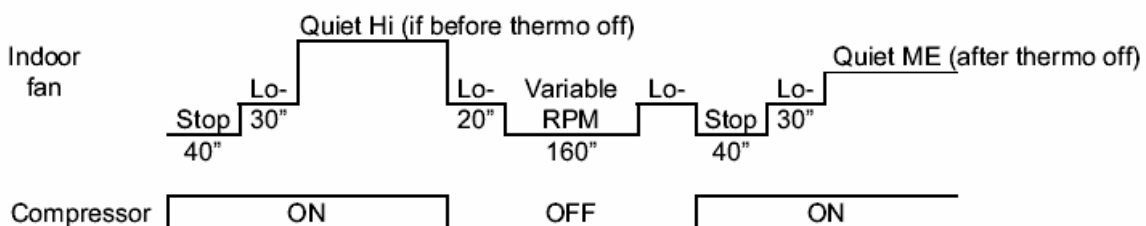
(For C18MK, C24MK)



- RPM control during Hi & Me cool



- Auto Fan Speed



- Quiet operation stops when:
 - Quiet button is pressed again.
 - Stopped by OFF/ON operation button.
 - Timer OFF activates.
 - Operation mode button is changed.

12.10 Timer Control

12.10.1 ON Timer

- When the ON Timer is set by using the remote control, the unit will start to operate slightly before the set time, so that the room will reach nearly to the set temperature by the set time.
- For Cooling and Soft Dry operation, the operation will start 15 minutes before the set time.
- For Automatic operation, the indoor fan will operate at SLo speed for 20 seconds, 15 minutes before the set time to detect the intake air temperature to determine the operation mode. The power LED will blink.

12.10.2 OFF Timer

- When the OFF Timer is set using the remote control, the unit will stop operate according to the desired setting.
Notes:
 - 1 By pressing ON/OFF operation button, the ON Timer or OFF Timer will not be cancel.
 - 2 To cancel the previous timer setting, press CANCEL button.
 - 3 To activate the previous timer setting, press SET button.
 - 4 If main power supply is switched off, the Timer setting will be cancel.

12.11 Random Auto Restart Control

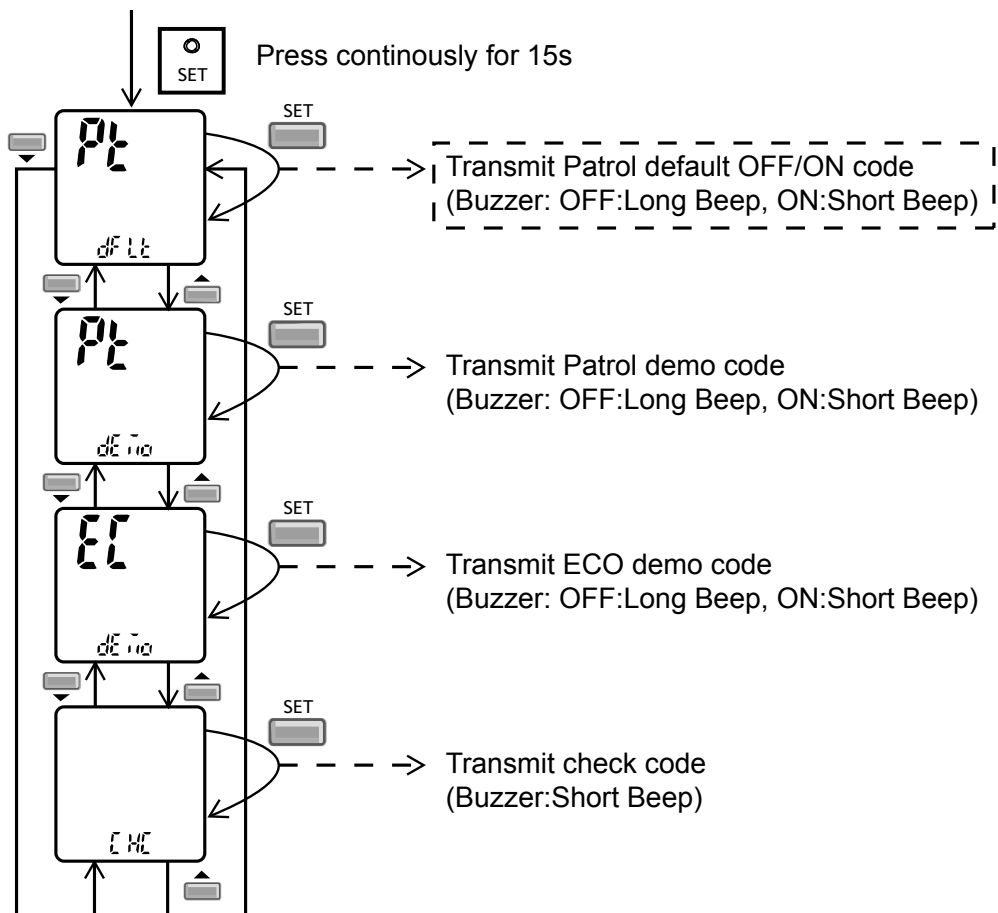
- If there is a power failure during operation, the air conditioner will automatically restart after 3 to 4 minutes when the power is resumed.
- It will start with previous operation mode and airflow direction.
- If there are more than one air conditioner unit in operation and power failure occur, restart time for each unit to operate will be decided randomly using 4 parameters:- intake air temperature, setting temperature, fan speed and air swing louver position.
- This Random Auto Restart Control is not available when Timer is set.
- This control can be omitted by open the circuit of JX02 at indoor unit printed circuit board.

12.12 Remote Control Signal Receiving Sound

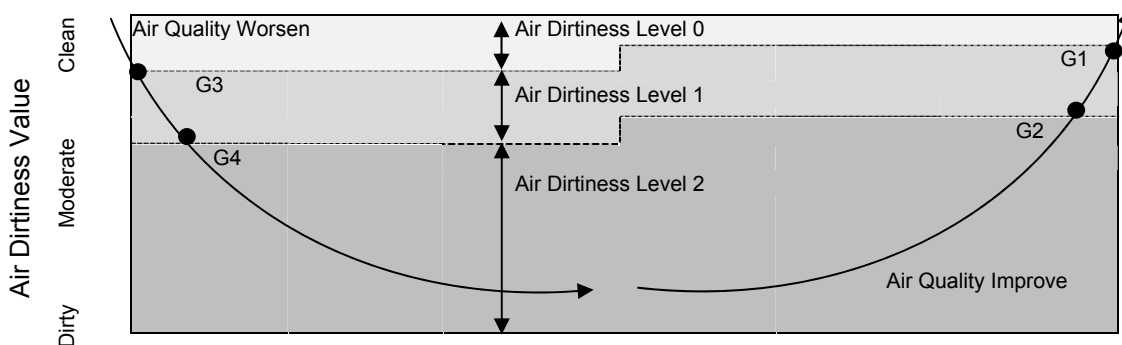
- Short beep sound will be heard when turn ON the air conditioner or enabling other operations.
- Long beep sound will be heard when turn OFF the air conditioner or disabling other operations.

12.13 Patrol Operation

- To monitor air dirtiness level by using Patrol sensor and to maintain air freshness by activates e-ion operation
- Patrol Operation starts condition
 - When the unit operation is started with "OFF/ON" button.
 - When the unit stops, "Patrol" operation is selected, Patrol individual operation will start.
 - During cooling only operation, "Patrol" operation is selected.
- Patrol Operation stops condition (when any of the following condition is fulfilled):
 - When "OFF/ON" button is selected.
 - During any operation with Patrol, "PATROL/e-ion" button is pressed.
 - When OFF Timer activates.
- To disable the Patrol Operation during unit starts (default) with "OFF/ON" button
 - Press "Set" button continuously for 15 seconds by using pointer during Air Conditioner is OFF condition to enter internal setting mode.
 - Press "Timer Decrement" button to select "Pt dFLt".
 - Press "Timer Set" button to toggle Patrol Operation default OFF/ON.
 - Long "beep": Turn OFF Patrol Operation default.
 - Short "beep": Turn ON Patrol Operation default.



- Patrol Sensor Control
 - First 2 minutes from Patrol function activates is stabilization time, during stabilization time, no air dirtiness level is monitored. The Air Dirtiness level is set to Clean, Patrol LED turns blue color.
 - After that, Patrol sensor starts to record the resistance value at fixed interval. Higher resistance value indicates cleaner air.
 - The air dirtiness level is monitored by comparing the current resistance value with maximum resistance value from time to time to get the Air Dirtiness Value.
 - There are 3 air dirtiness level, based on the Air Dirtiness Value:
 - Air Dirtiness level 0: Clean – Patrol LED = blue color
 - Air Dirtiness level 1: Moderate – Patrol LED = orange color
 - Air Dirtiness level 2: Contaminated – Patrol LED = red color



- Dirtiness level sensitivity adjustment

It is possible to change the Patrol sensor sensitivity, where the Threshold value (G1 ~ G4) will be shifted accordingly:

 - 1 Press and release “SET” button.
 - 2 Press Timer ▲ / Timer ▼ button to select sensitivity.
(Air 1 “Low Sensitivity” ↔ Air 2 “Standard” (Default) ↔ Air 3 “High Sensitivity”)
 - 3 Confirm setting by pressing “Timer Set” button. LCD returned to original display after 2 seconds.
 - 4 LCD returned to original display if remote control does not operate for 30 seconds.
- e-ion Control
 - e-ion operation starts condition
 - When dirtiness at level 2 (Patrol LED turns red).
 - 2 minutes after stabilization time (Patrol LED turns red).
 - 4 hours at level 0 (Patrol LED turns red).
 - e-ion operation time
 - If dirtiness level improves from level 2 to level 1 (Patrol LED from red to orange), the unit carries out level change after 60 seconds.
 - When dirtiness level returns to level 0 (Patrol LED turns blue) continuously for 11 minutes or more, e-ion operation stops.
- Dirtiness Level and fan speed
 - When e-ion operation starts, the fan speed increases based on dirtiness level:

	Dirtiness level	rpm shift		
		Patrol individual operation	Combine operation	
			Auto	Manual
e-ion ON	Dirtiness level 0	No change	No change	No change
	Dirtiness level 1	Me -	+ 20	+1 fan tap (max - Hi)
	Dirtiness level 2	Me	+ 40	+2 fan tap (max - Hi)

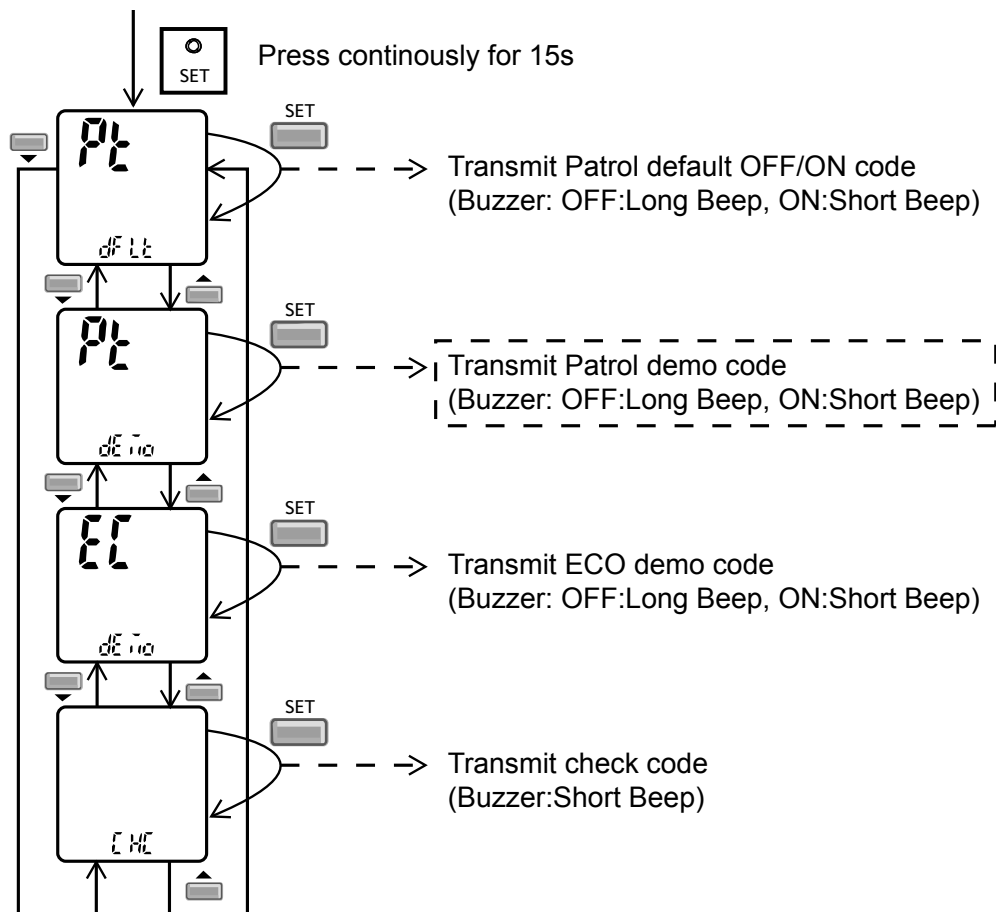
- Indoor Fan Control
 - During any operation mode combines with Patrol operation, fan speed follows respective operation mode.
 - During Patrol individual operation if e-ion starts, only Auto Fan Speed and no Powerful operation is allowed. Even if “Fan Speed” button is pressed, no signal is sent to air conditioner, and no change on LCD display.
 - During Patrol individual operation if e-ion stops, Indoor Fan stop operation.

- Airflow direction (Horizontal, Vertical) Control
 - During any operation mode combines with Patrol operation, airflow direction follows respective operation mode.
 - During Patrol individual operation if e-ion starts, only Auto Air Swing is allowed. Even if “Air Swing” button is pressed, no signal is sent to air conditioner, and no change on LCD display.
 - During Patrol individual operation if e-ion stops, Airflow direction louver closed.
- LED display (**Applicable to all models except MKD models**)
 - When Patrol operation is selected, Patrol LED illuminates.
 - During Patrol individual operation, only Patrol LED illuminates. When e-ion air purifying operation starts based on dirtiness level, Power LED, Patrol LED and e-ion LED illuminates.

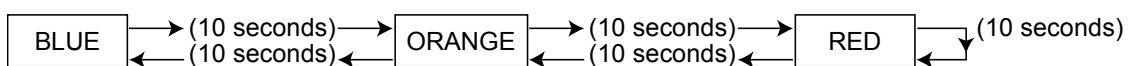
No	Description	PATROL LED			E-ION	TIMER
		BLUE	ORANGE	RED	BLUE	ORANGE
1	When patrol function is not selected	OFF	OFF	OFF	-	-
2	During gas sensor error detection control	OFF	OFF	Blinking	OFF	OFF
3	During E-ion abnormal discharge error	OFF	OFF	OFF	Blinking	OFF
4	During E-ion breakdown error	OFF	OFF	OFF	Blinking	Blinking
5	During Test Mode	OFF	OFF	OFF	OFF	OFF
6	During stop	OFF	OFF	OFF	OFF	OFF
7	2 minutes gas sensor initial stabilization time (Level 0)	ON	OFF	OFF	OFF	OFF
8	During operation During patrol	a. Dirtiness level 0*	ON	OFF	OFF	OFF
		b. Dirtiness level 1	OFF	ON	OFF	OFF
		c. Dirtiness level 1*	OFF	ON	ON	OFF
		d. Dirtiness level 2	OFF	OFF	ON	OFF

- Remote Control Receiving Sound
 - Normal Operation → Patrol Mode : Beep
 - Patrol Mode → Stop : Long Beep
 - Patrol Mode → Normal Operation : Beep
 - Stop → Patrol : Beep
- Timer Control
 - When ON timer activates when unit stops, previous operation resumes and restored last saved Patrol operation status.
 - When ON timer activates during any operation, no change and carry on current operation.
 - When OFF timer activates during any operation, all operation stops and the latest Patrol operation status is saved.
- Power Failure Control
 - During Patrol individual operation, if power failure occurs, after power resumes, Patrol individual operation resumes immediately.
 - During combination operation, if power failure occurs, after power resumes combination operation resume immediately.

- Patrol Operation Demo Mode
 - Patrol Operation Demo Mode start condition
 - Press "Set" button continuously for 15 seconds by using pointer during Air Conditioner is OFF condition to enter internal setting mode.
 - Press "Timer Decrement" button to select "Pt demo".
 - Press "Timer Set" button to toggle Patrol Operation Demo Mode.
 - Long "beep": Turn OFF Patrol Operation Demo Mode.
 - Short "beep": Turn ON Patrol Operation Demo Mode.



- The Patrol indicator change color every 10 seconds follows the pattern below for demo purpose:



- During demo, all operation stops, remote control buttons and auto OFF/ON button are ignored.
- Patrol Operation Demo Mode stop condition.
 - Power supply reset.

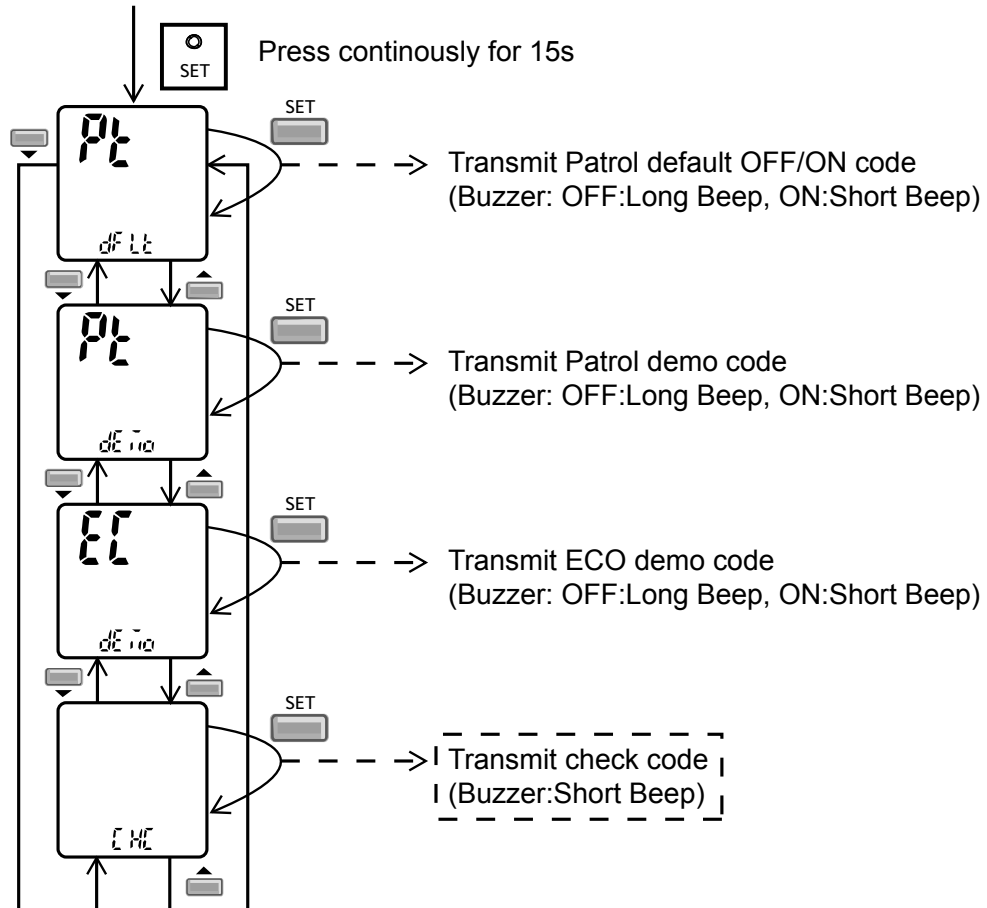
12.14 *E-ion Operation*

- This operation provides clean air by producing negative ions to attract dust captured at the positively charged active e-ion filters.
- e-ion operation start condition
 - During unit running at any operation mode, if “e-ion” operation is selected, combination operation (operation mode + e-ion operation) starts.
 - During unit is OFF, if “e-ion” operation is selected, e-ion individual operation starts.
- e-ion operation stop condition
 - When “OFF/ON” button is pressed to stop the operation.
 - When “PATROL/e-ion” button is pressed.
 - When OFF Timer activates.
- e-ion operation pause condition
 - When indoor fan stop (during deice, odor cut control, thermostat off, etc.). e-ion operation resume after indoor fan restarts.
 - When indoor intake temperature $\geq 40^{\circ}\text{C}$. e-ion operation resume after indoor intake temperature $< 40^{\circ}\text{C}$ continuously for 30 minutes.
- Indoor fan control
 - During any operation mode combines with e-ion operation, fan speed follows respective operation mode.
 - During e-ion individual operation – only Auto Fan Speed and no Powerful operation is allowed. Even if Fan Speed button is pressed, no signal is sent to air conditioner, and no change on LCD display.

Auto Fan Speed for e-ion operation switches from SHi to Hi after 4 hours of operation.
- Airflow direction control
 - During any operation mode combines with e-ion operation, airflow direction follows respective operation mode.
 - During e-ion individual operation, only Auto Air Swing is allowed. Even if Air Swing button is pressed, no signal is sent to air conditioner, and no change on LCD display.
- Timer control
 - When ON timer activates when unit stops, previous operation resumes and restored last saved e-ion operation status.
 - When ON timer activates during any operation, no change and carry on current operation.
 - When OFF timer activates during any operation, all operation stops and the latest e-ion operation status is saved.
- Indicator
 - When e-ion operation starts, e-ion indicator ON.
- Remote Control Receiving Sound

○ Normal Operation	➔ e-ion Operation	: Beep
○ e-ion Operation	➔ Normal Operation	: Beep
○ Stop	➔ e-ion individual Operation	: Beep
○ e-ion individual Operation	➔ Stop	: Long Beep
- Power failure
 - During e-ion individual operation, if power failure occurs, after power resumes, e-ion individual operation resumes immediately.
 - During combination operation, if power failure occurs, after power resumes, combination operation resume immediately.
 - e-ion operation status is not memorized after OFF the unit. After OFF, when the operation is ON again, air conditioner operates without e-ion operation.

- e-ion Check Mode
 - e-ion abnormality check mode.
 - Purpose is to improve sensor serviceability when sensor is malfunction.
- (1) Control starting condition
 - When all of the conditions are formed
 - Not in Patrol Demo mode.
 - e-ion operation ON.
 - When e-ion check mode signal is received; the procedure of selection is as shown:
 - Press “Set” button continuously for 15 seconds by using pointer to enter internal setting mode.
 - Press “Timer Decrement” button to select “CHC”.
 - Confirm setting by pressing “Timer Set” button, a “beep” sound will be heard.



- If abnormal discharge is detected at filter (short-circuited) due to water or dust adhesion, etc., the e-ion indicator blinks immediately.

- Error Detection Control

When e-ion indicator blink, it indicates error listed below:

- Active e-ion Air Purifying system PCB main connector open:
 - Judgment Method
 - During e-ion operation (include during Patrol operation), Active e-ion Air Purifying system main connector to PCB is opened.
 - Troubleshooting Methods
 - Connect the connector or stop operation (include during Patrol operation) to cancel the blinking.
- Abnormal Discharge error:
 - Judgment Method
 - During e-ion operation, feedback voltage is-Lo (at microcontroller) is detected, it is judged abnormal discharge and stops power supplies to the Active e-ion Air Purifying system.
 - Abnormal discharge is caused by ionizer or filter's high voltage power supply short-circuits due to water or dust adhesion, and so forth.
 - When abnormal discharge occurred, every 30 minutes the unit supplies power to the Active e-ion Air Purifying system.
 - When abnormal discharge occurs for 24 times continuously, e-ion indicator blinks (not applicable for e-ion Check Mode, where the error will shows immediately despite the 24 times counter)
 - Troubleshooting Method
 - Press "PATROL/e-ion" button or "OFF/ON" button to stop the operation and check the Active e-ion Air Purifying system main connector to PCB.
 - After that, press "e-ion" button again to confirm the e-ion indicator not blinking.
 - The 24 times counter will be clear after 10 minutes of normal operation or when operation stops.
 - Error Reset Method
 - Press "OFF/ON" button to OFF the operation.
 - Press AUTO OFF/ON button at indoor unit to OFF the operation.
 - OFF Timer activates.
 - Power supply reset.
- Active e-ion Air Purifying system breakdown error:
 - Judgment Method
 - When hi-feedback voltage (at microcontroller) supplied to filter during e-ion stop, Active e-ion Air Purifying system breakdown error shows immediately.
 - It is due to indoor PCB or filter's high voltage power supply damage.
 - Operations except e-ion continue. Both Timer indicator and e-ion indicator blink.
 - Troubleshooting Method
 - Press "PATROL/e-ion" button or "OFF/ON" button to stop the operation.
 - Change main circuit board or filter's high voltage power supply.
 - When lo-feedback voltage supplied to Active e-ion Air Purifying system during e-ion operation, e-ion indicator and Timer indicator stop blinking.

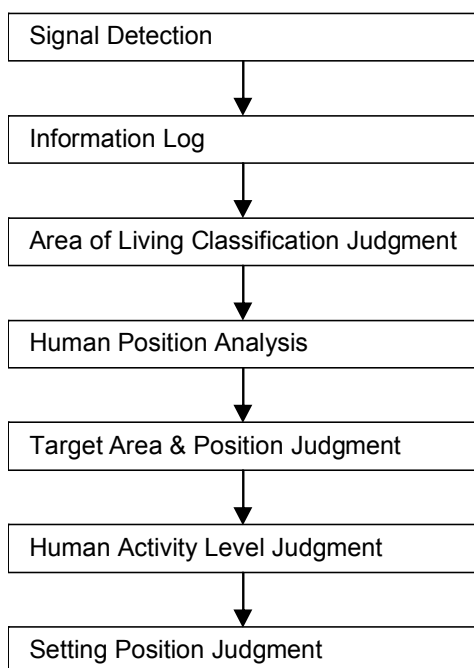
12.15 AUTO COMFORT and ECO NAVI Operation

- Area of human availability, activity level and absent is judged based on pulses by using 2 infrared sensors. The internal setting temperature shift, fan speed and horizontal airflow direction are adjusted in order to provide comfort environment while maintain the energy saving level.
- AUTO COMFORT start condition:
 - When AUTO COMF button is pressed.
- AUTO COMFORT stop conditions:
 - When AUTO COMF button is pressed again.
 - When unit is OFF by OFF/ON button.
 - When unit is OFF when OFF TIMER activates.
 - When unit is OFF by AUTO OFF/ON button at indoor unit.
 - When POWERFUL or QUIET operation activates.
 - When ◀▶ button is pressed.
- ECO NAVI start condition:
 - When ECO NAVI button is pressed.
- ECO NAVI stop conditions:
 - When ECO NAVI button is pressed again.
 - When unit is OFF by OFF/ON button.
 - When unit is OFF when OFF TIMER activates.
 - When unit is OFF by AUTO OFF/ON button at indoor unit.
 - When POWERFUL or QUIET operation activates.
 - When ◀▶ button is pressed.
- AUTO COMFORT / ECO NAVI initialization

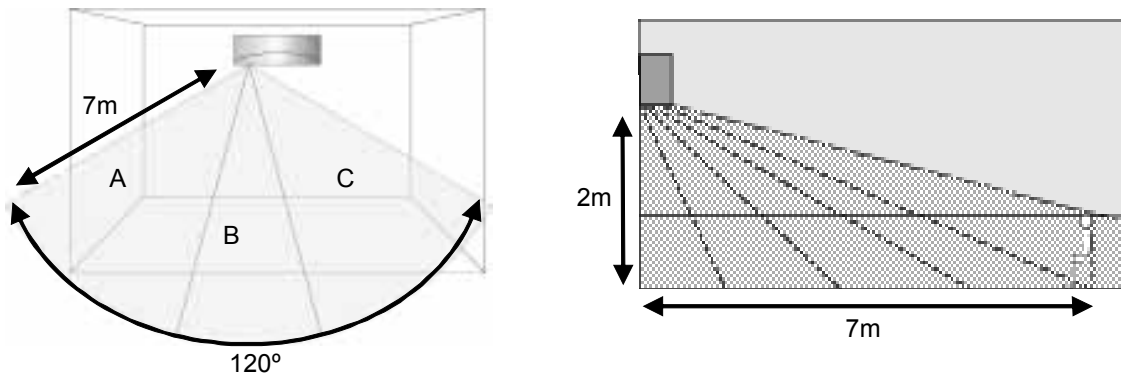
	Initialize indication	Human Activity Indicator		
1	0 – 2 seconds	□	□	□
2	2 – 3 seconds	■	■	■
3	3 – 70 seconds	I	■	□
		II	■	■
		III	■	□
		IV	□	■
		Repeat Step I to IV		

* □ Indicator ON, ■ Indicator OFF

- Human activity judgment is as following



12.15.1 Signal Detection



- Human Activity sensor will turn on according to infrared sensor signal detection.

Signal detection		Possible detected human position area	Human Activity Indicator		
Sensor 1	Sensor 2		Left	Center	Right
1	0	C	■	■	□
0	1	A	□	■	■
1	1	B	■	□	■
		A & C	■	□	■
		B & C	■	□	■
		A & C	■	□	■
		A, B & C	■	□	■
0	0	-	■	■	■

* □ Indicator ON, ■ Indicator OFF

- However, once the Human Activity Indicator is ON, it will maintain ON status for 5 seconds. If there is no signal detection from either infrared sensor, the final display condition will be kept until absence status.

12.15.2 Information Log

- The signal from Infrared sensors will be log to human activity database for further analysis.

12.15.3 Area of Living Classification Judgment

- The system is able to judge area of living according to human activity database, classified as following:
 - Living Area – In front of television, dining table, etc.
 - Walkway – Human detection is relatively less.
 - Non-Living Area – near windows, wall, etc.

12.15.4 Human Position Analysis

- According to Area of Living, frequency of activity and indoor unit intake temperature, the system will analyze the human position away from the indoor unit.

12.15.5 Target Area and Position Judgment

- The system will judge the indoor unit installation position according to human activity Non-Living Area:
 - Non-Living Area at Position A – Indoor unit installed at left side of the room.
 - Non-Living Area at Position C – Indoor unit installed at right side of the room.
 - Other than above – Indoor unit installed at center of the room.
- Every 4 hours, the Target Area and Position Judgment will restart.

12.15.6 Human Activity Level Judgment

- Human Activity Level is judged based on the frequency of pulses detected by the infrared sensors within a timeframe. The activity level will be categorized into High, Normal, Low level.
- When a pulse is detected within this timeframe, the status of human presence is judged.
- When there is no signal detection continues for 20 minutes or more, the status of human absence is judged.

12.15.7 Setting Position Judgment

- According to installation position when there is only one activity area detected, the horizontal airflow direction louver position is fixed according to chart below:

Target area	Horizontal airflow direction louver position		
	Left installation	Center installation	Right installation
A	2	1	1
B	5	5	4
C	3	3	3

- When 2 activity areas have been detected, according to Human Activity Level, the timing of horizontal airflow direction louver steps at the targeted activity areas is judged.

Operation Mode	Activity level difference	Louver stop time
Cooling	1 level	Higher Activity level ≈ 60 seconds Lower Activity level ≈ 30 seconds
	2 levels	Higher Activity level ≈ 60 seconds Lower Activity level ≈ 8 seconds
Heating	1 level	Higher Activity level ≈ 8 seconds Lower Activity level ≈ 30 seconds
	2 levels	Higher Activity level ≈ 8 seconds Lower Activity level ≈ 60 seconds

- When 3 activity areas have been detected, according to Human Activity Level the timing of horizontal airflow louver steps at the targeted activity areas is judged.

Operation Mode	Activity level	Louver stop time
Cooling	Hi	≈ 45 seconds
	Me	≈ 30 seconds
	Lo	≈ 20 seconds
Heating	Hi	≈ 20 seconds
	Me	≈ 30 seconds
	Lo	≈ 45 seconds

- When 3 activity areas have same activity level, the horizontal airflow direction louver will swing left and right.

12.15.8 Setting Temperature and Fan Speed Shift

- Cooling Dual Sensor

ECONAVI — To optimize energy saving

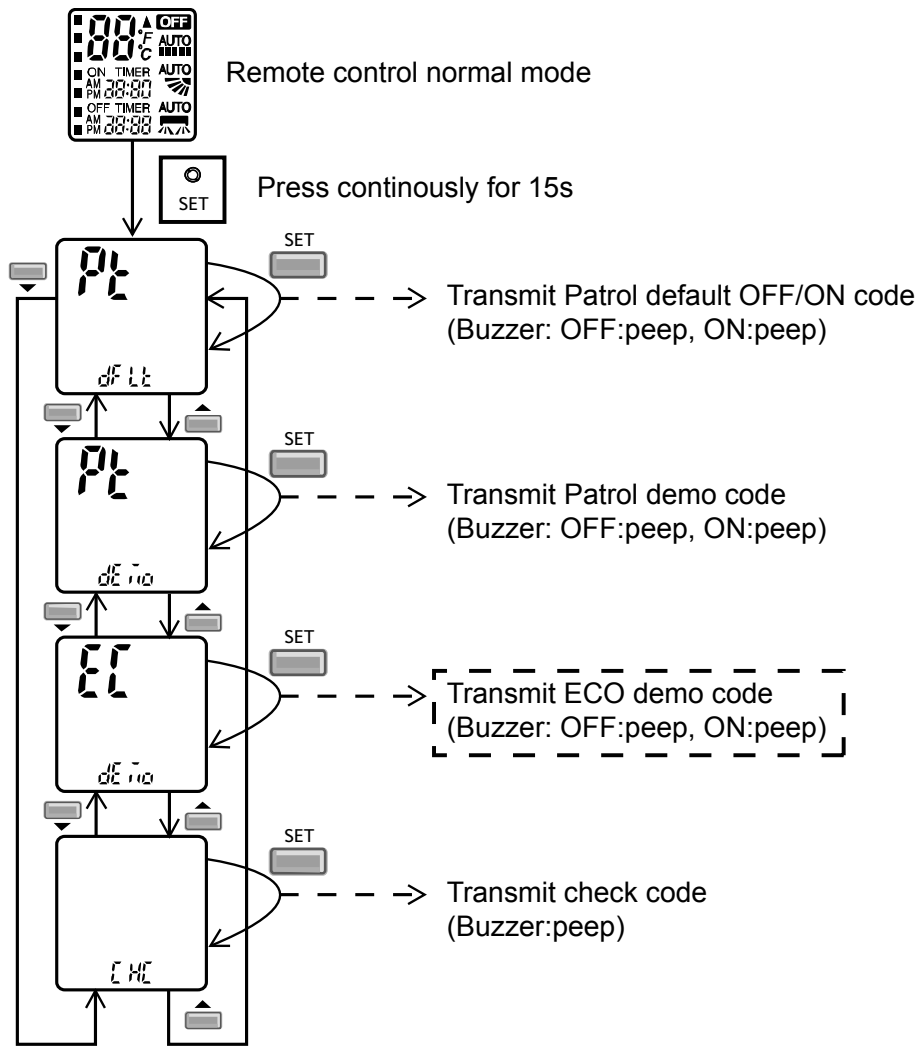
AUTO COMFORT ----- To maximize comfort

Heat Source & Movement	Low	High	Normal	None
Set Temperature	+1°C			+2°C
Set Fan Speed	+1 tap*	-1°C +1 tap		≤ Medium Fan

* For first 15 minutes or until set temperature is reached.

12.15.9 ECO NAVI and AUTO COMF Demo Mode

- To enable ECO DEMO mode:



- To disable ECO Demo MODE:
 - Transmit ECO Demo signal again.
 - Transmit Patrol Demo signal.

Operation details

Infrared Sensor		Human Activity Indicator			Vane Position	Fan Speed
Sensor 1	Sensor 2	Left	Center	Right		
1	0	■	■	□	5	HI
1	1	■	□	■	Auto Swing	HI
0	1	□	■	■	1	HI
0	0	■	■	■	Auto Swing	LO

- The target area will maintain for 5 seconds before changeover to next detection.
- If no activity detection, the last action will maintain for 30 seconds before changeover to human absence status.

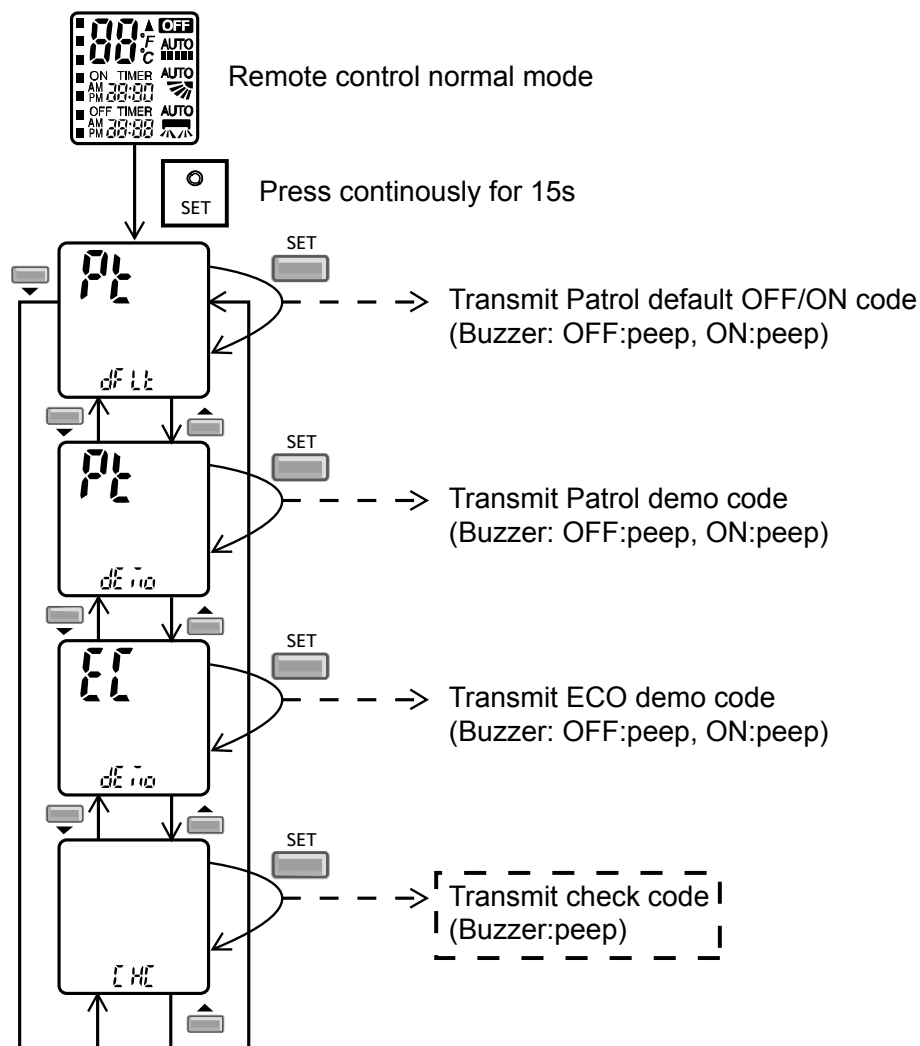
12.15.10 Infrared Sensor Abnormality

- Abnormality detection:
 - Connector disconnection / Wire cut abnormality
 - Sensor judge Hi level continuously for 25 seconds.
 - Circuit abnormality
 - 70 seconds after power ON, if infrared sensor judge Lo level continuously for 25 seconds.
- Error Code judgment
 - When abnormality happened, internal counter increase by 1 time.
 - Infrared sensor power OFF, retry after 5 seconds.
 - When the infrared sensor maintains normal condition for 120 seconds, the counter reset or AC reset.
 - When abnormality counter reached 4 times – No TIMER indicator blinking.
- When error code happened, the unit is able to operate without AUTO COMF / ECO NAVI.

12.15.11 Infrared Sensor Check Mode

- To enable Infrared sensor abnormality check mode:

“VARIOUS SETTING” mode:



- During ECO NAVI / AUTO COMF is ON, when CHECK signal received, if either sensors has abnormality, the 4 times abnormality counter is ignored, ECO NAVI Indicator will blink immediately and error code is memorized.
- The unit could operate without ECO NAVI or AUTO COMF.
- The ECO NAVI indicator blinking could be cancelled by pressing ECO NAVI/AUTO COMF button again.
- If the Infrared sensor has no abnormality, the CHECK process will end and continue with normal operation.

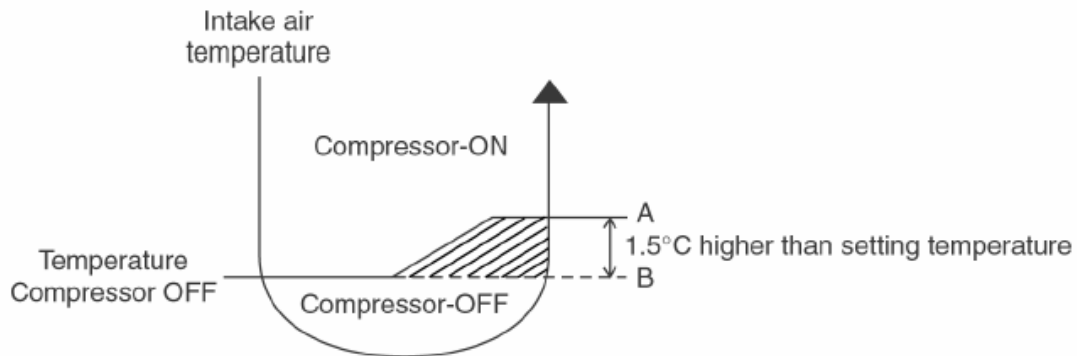
13. Protection Control

13.1 Restart Control (Time Delay Safety Control)

- When the thermo-off temperature (temperature which compressor stops to operate) is reached during:-
 - Cooling operation – the compressor stops for 3 minutes (minimum) before resume operation.
 - Soft Dry operation – the compressor stops for 6 minutes (minimum) before resume operation.
- If the operation is stopped by the remote control, the compressor will not turn on within 3 minutes from the moment operation stop, although the unit is turned on again within the period.
- This phenomenon is to balance the pressure inside the refrigerant cycle.

13.2 7 Minutes Time Save Control

- The compressor will start automatically if it has stopped for 7 minutes and the intake air temperature falls between the compressor ON temperature (A) and compressor OFF temperature (B) during the period.
- This phenomenon is to reduce the built up humidity inside a room.



13.3 60 Seconds Forced Operation

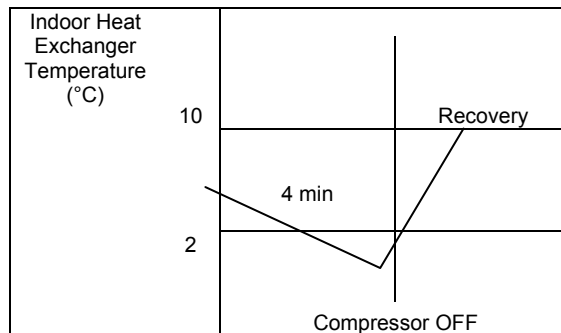
- Once the air conditioner is turned on, the compressor will not stop within 60 seconds in a normal operation although the intake air temperature has reached the thermo-off temperature. However, forced stop by pressing the OFF/ON operation button at the remote control is permitted.
- The reason for the compressor to force operate at the minimum 60 seconds is to allow the refrigerant oil run in a full cycle and return back to the outdoor unit.

13.4 Starting Current Control

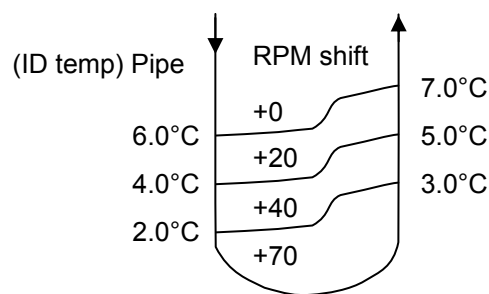
- When the compressor, outdoor fan motor and indoor fan motor are simultaneously started, the indoor fan motor will start to operate at 1.6 seconds later.
- The reason of the difference is to reduce the starting current flow.

13.5 Freeze Prevention Control

- To protect indoor heat exchanger from freezing and to prevent higher volume of refrigerant in liquid form return to compressor.
- This control will activate when temperature of indoor heat exchanger falls below 2°C continuously for more than 4 minutes and compressor turn off.



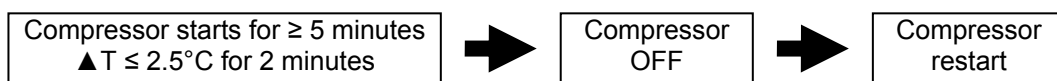
- The current fan speed will change to freeze prevention speed after 70 seconds compressor on. The fan speed will be increased according to the indoor pipe temperature as below figure: (Applicable for C12MK ONLY)



- Compressor will restart again when the indoor heat exchanger temperature rises to 10°C (Recovery).
- Restart control (Time Delay Safety Control) will be applied in this control if the recovery time is too short.

13.6 Compressor Reverse Rotation Protection Control

- If the compressor is operating continuously for 5 minutes or longer and the temperature difference between intake air and indoor heat exchanger is 2.5°C or less for continuously 2 minutes, compressor will stop and restart automatically.
- Time Delay Safety Control is activated before the compressor restart.



▲ T = Intake air temperature – Indoor heat exchanger temperature

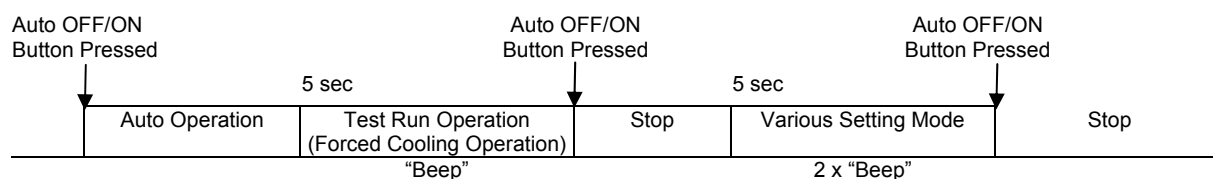
- This is to prevent compressor from rotate reversely when there is an instantaneous power failure.
- If this condition happens continuously for 5 times within 50 minutes, unit will turn OFF with TIMER LED blinks.
- The 5 Times counter can be reset when either one of the following condition happen:
 - Unit is OFF by remote control or AUTO OFF/ON button.
 - Indoor intake temperature – Indoor piping temperature > 5°C for one minute or more.
 - Operation mode change.
- The unit could be ON by pressing OFF/ON button at remote control but the TIMER LED will continue blinking.
- TIMER LED blinking will be reset if:
 - Indoor intake temperature – Indoor piping temperature > 5°C for one minute or more.
 - Power supply reset.

13.7 Dew Prevention Control

- To prevent dew formation at indoor unit discharge area.
- This control starts if:
 - Cooling mode or Quiet mode is activated.
 - Remote Control setting temperature is less than 25°C.
 - Fan speed is at CLo or QLo.
 - Room temperature is constant ($\pm 1^{\circ}\text{C}$) for 30 minutes.
 - Compressor is continuously running.
- Fan speed will be adjusted accordingly in this control.
 - Fan speed will be increased slowly if the unit is in quiet mode and Lo fan speed.
- Dew prevention stop condition.
 - Remote control setting temperature is more than 25°C.
 - Fan speed is not at Lo or QLo.
 - Select Powerful operation.

14. Servicing Mode

14.1 Auto OFF/ON Button



1 AUTO OPERATION MODE

The Auto Operation will be activated immediately once the Auto OFF/ON button is pressed. This operation can be used to operate air conditioner with limited function if remote control is misplaced or malfunction.

2 TEST RUN OPERATION (FOR PUMP DOWN/SERVICING PURPOSE)

The Test Run Operation will be activated if the Auto OFF/ON button is pressed continuously for more than 5 seconds. A "beep" sound will be heard at the fifth seconds, in order to identify the starting of this operation.

3 VARIOUS SETTING MODE

The Various Setting Mode will be activated if (within 20 seconds of Test Run Operation) the Auto OFF/ON button is pressed for more than 5 seconds. 2 "beep" sounds will be heard to identify the starting of this operation.

Under Various Setting Mode, user could perform the following operation:

i. Press Auto OFF/ON button to toggle remote control receiving sound.

- Short "beep": Turn ON remote control receiving sound.
- Long "beep": Turn OFF remote control receiving sound.

After Auto OFF/ON button is pressed, the 20 seconds counter for Remote Control Receiving Sound OFF/ON Mode is restarted.

ii. Remote Control Number Switch.

- There are 4 types of remote control transmission code could be selected and stored in EEPROM of indoor unit. The indoor unit will only operate when received signal with same transmission code from remote control. This could prevent signal interference when there are 2 or more indoor units installed nearby together.
- To change remote control transmission code, short or open jumpers at the remote control printed circuit board.

	Remote Control Printed Circuit Board		
	Jumper A (J1)	Jumper B (D2)	Remote Control No.
	Short	Open	A (Default)
	Open	Open	B
	Short	Short	C
	Open	Short	D

- During Various Setting Mode, press any button at remote control to transmit and store the desired transmission code to the EEPROM.
- After signal is received, the Various Setting Mode is cancelled and return to normal operation.
- If there is no code is transmitted of Auto OFF/ON button is not pressed within 20 seconds, the Various Setting Mode will be cancelled.

14.2 Remote Control Button

14.2.1 SET Button

- To check current remote control transmission code and store the transmission code to EEPROM:
 - Press “Set” button continuously for 10 seconds by using pointer.
 - Press “Timer Set” button until a “beep” sound is heard as confirmation of transmission code change.
- To change the air quality sensor:
 - Press and release by using pointer.
 - Press the Timer Decrement button to select sensitivity:
 1. Low sensitivity
 2. Standard (Default)
 3. Hi sensitivity
 - Confirm setting by pressing Timer Set button, a “beep” sound will be heard. LCD returns to original display after 2 seconds.
 - LCD returns to original display if remote control does not operate for 30 seconds.

14.2.2 RESET

- To clear and restore the remote control setting to factory default.
 - Press once to clear the memory.

14.2.3 TIMER ▲

- To change indoor unit indicators' intensity:
 - Press continuously for 5 seconds.

14.2.4 TIMER ▼

- To change remote control display from Degree Celsius (°C) to Degree Fahrenheit (°F)
 - Press continuously for 10 seconds.

15. Troubleshooting Guide

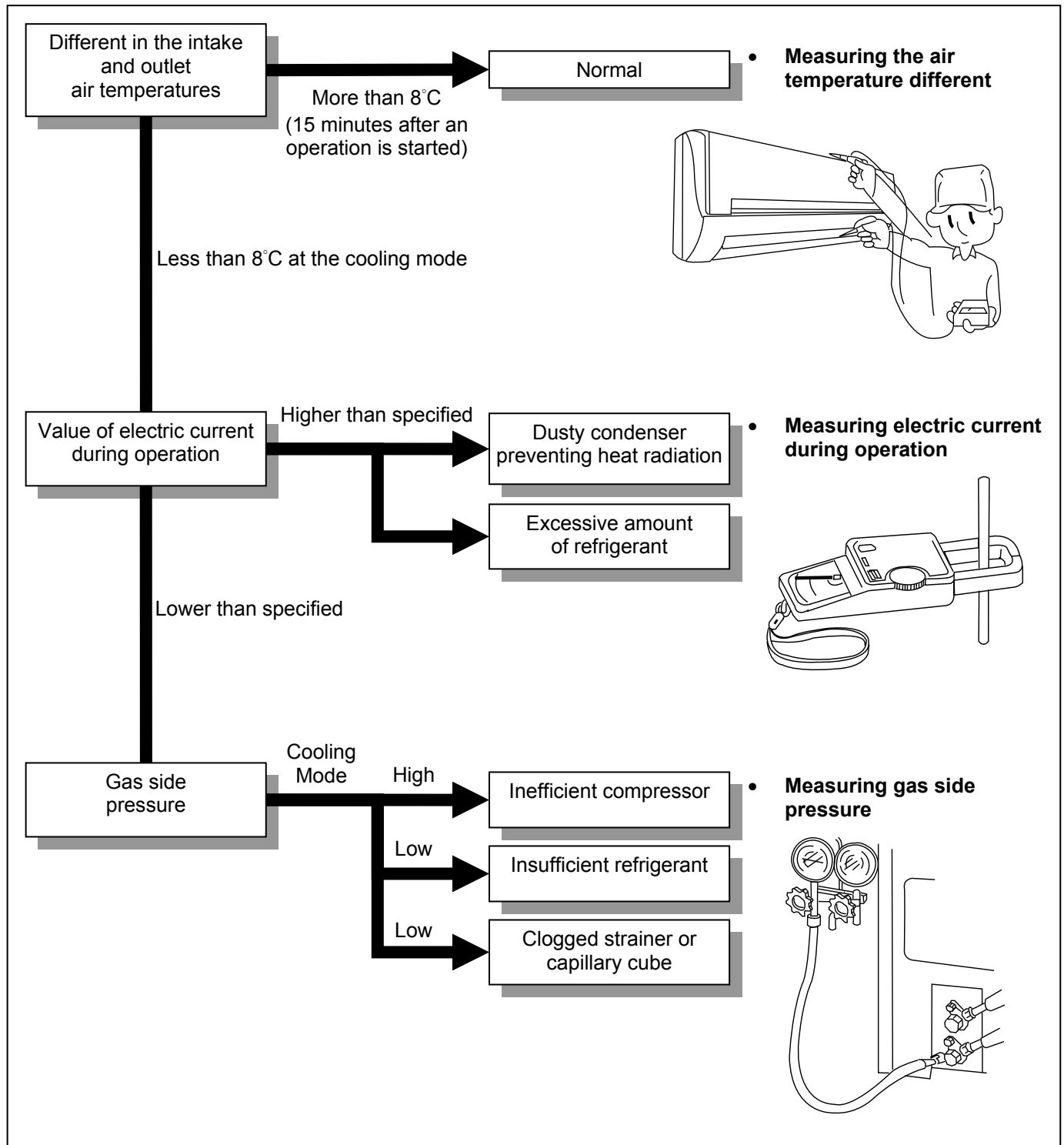
15.1 Refrigeration Cycle System

In order to diagnose malfunctions, ensure the air conditioner is free from electrical problems before inspecting the refrigeration cycle. Such problems include insufficient insulation, problem with the power source, malfunction of a compressor and a 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 Pressure Mpa (kg/cm ² G)	Outlet air Temperature (°C)
Cooling Mode	0.4 ~ 0.6 (4 ~ 6)	12 ~ 16

Condition: Indoor fan speed = High
Outdoor temperature = 35°C



15.1.1 Relationship between the condition of the air conditioner and pressure 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 or strainer	↘	↘	↘
Short circuit in the indoor unit	↘	↘	↘
Heat radiation deficiency of the outdoor unit	↗	↗	↗
Inefficient compression	↗	↘	↘

- Carry out the measurement of pressure, electric current, and temperature fifteen minutes after an operation is started.

15.1.2 Diagnosis methods of a malfunction of a compressor

Nature of fault	Symptom
Insufficient compressing of a compressor	<ul style="list-style-type: none"> • Electric current during operation becomes approximately 20% lower than the normal value. • The discharge tube of the compressor becomes abnormally hot (normally 70°C to 90°C). • The different between high pressure and low pressure becomes almost zero.
Locked compressor	<ul style="list-style-type: none"> • 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.

16. Disassembly and Assembly Instructions



WARNING

High Voltage is generated in the electrical parts area by the capacitor. Ensure that the capacitor has discharged sufficiently before proceeding with repair work. Failure to heed this caution may result in electric shocks.

16.1 CS-C12MKF-2

16.1.1 Indoor Electronic Controllers, Cross Flow Fan and Indoor Fan Motor Removal Procedures

16.1.1.1 To remove front grille

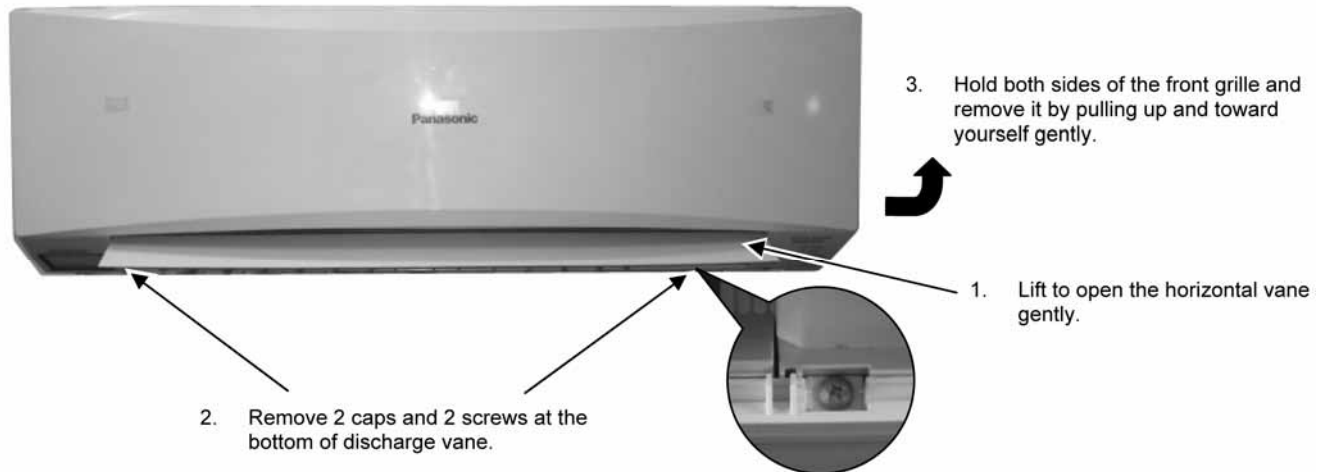


Figure 1

16.1.1.2 To remove power electronic controller

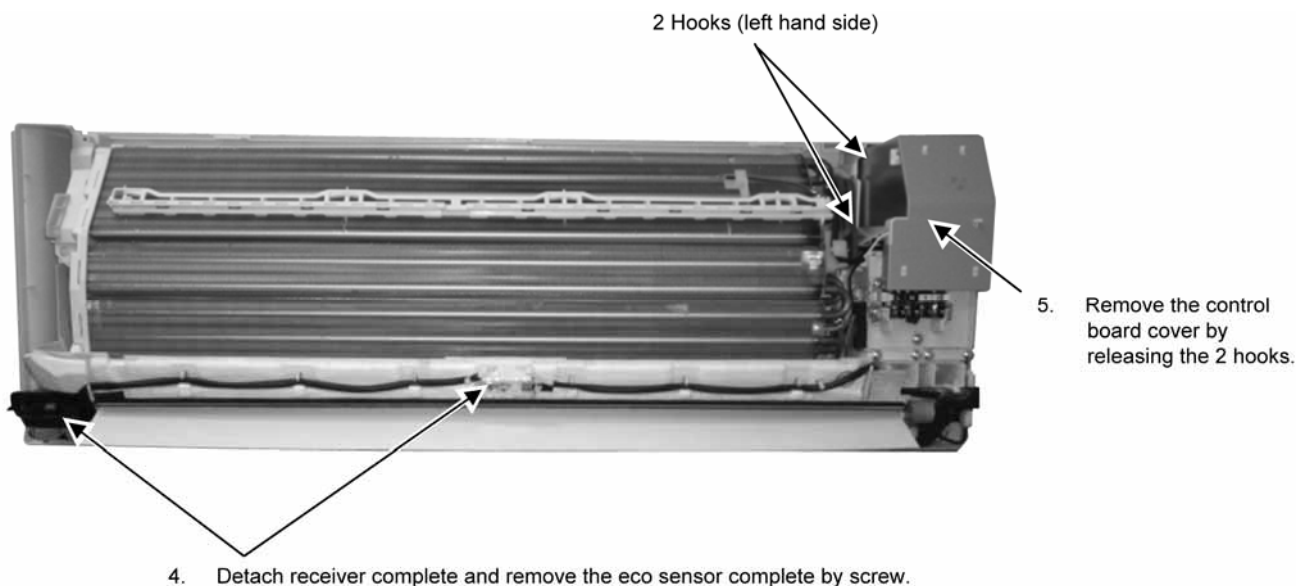


Figure 2

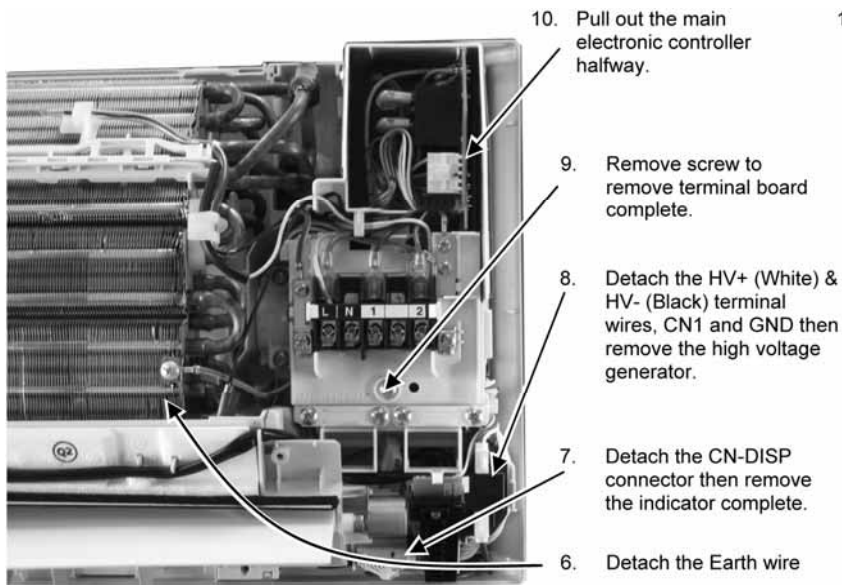


Figure 3

11. Detach the AC303, RY-PWR, CN-PCFM, CN-FB, CN-STM1, CN-STM2, CN-RCV, CN-TH and CN-CLN from the main electronic controller. Then pull out main electronic controller gently.

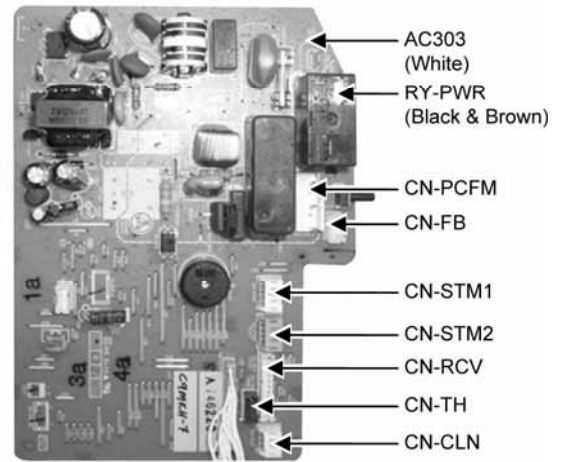


Figure 4

16.1.1.3 To remove discharge grille

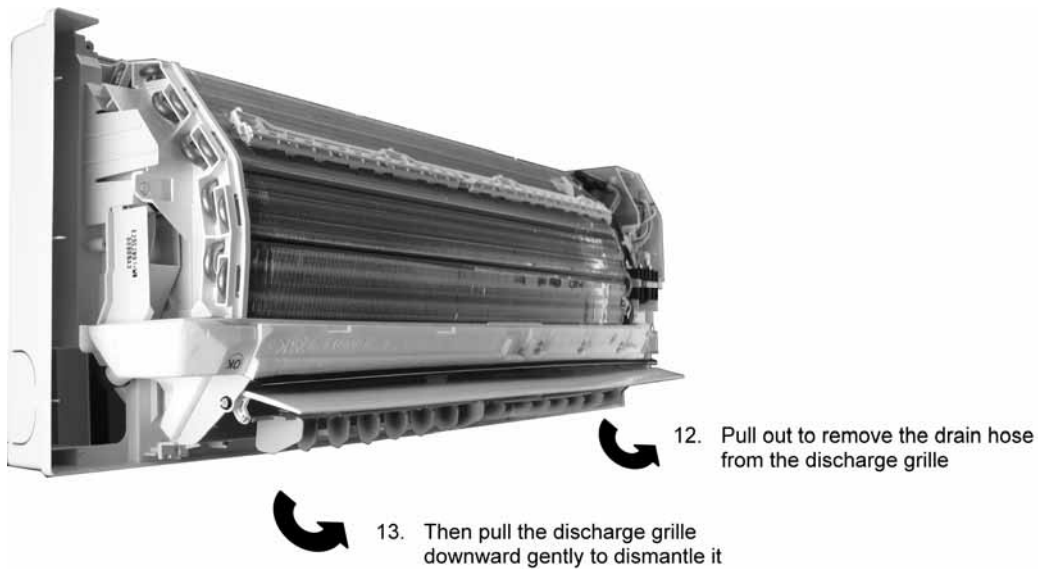


Figure 5

16.1.1.4 To remove control board

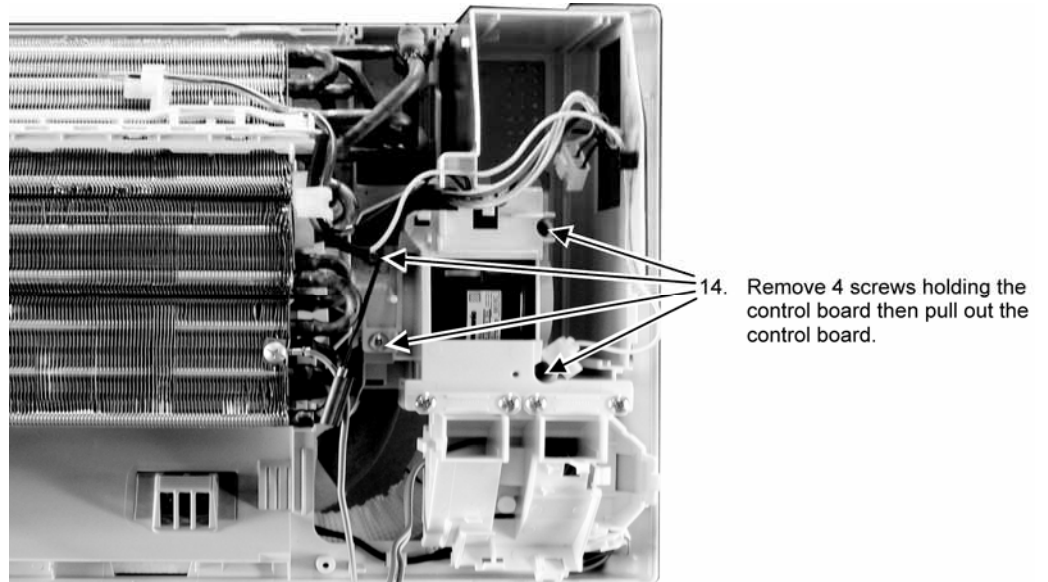


Figure 6

16.1.1.5 To remove cross flow fan and indoor fan motor

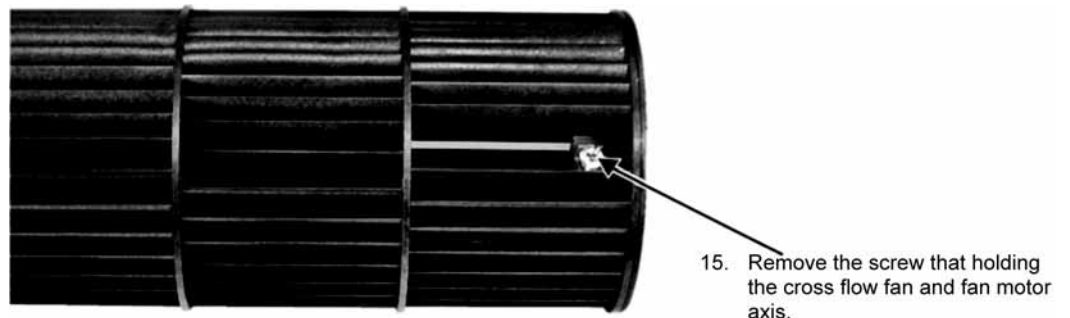


Figure 7

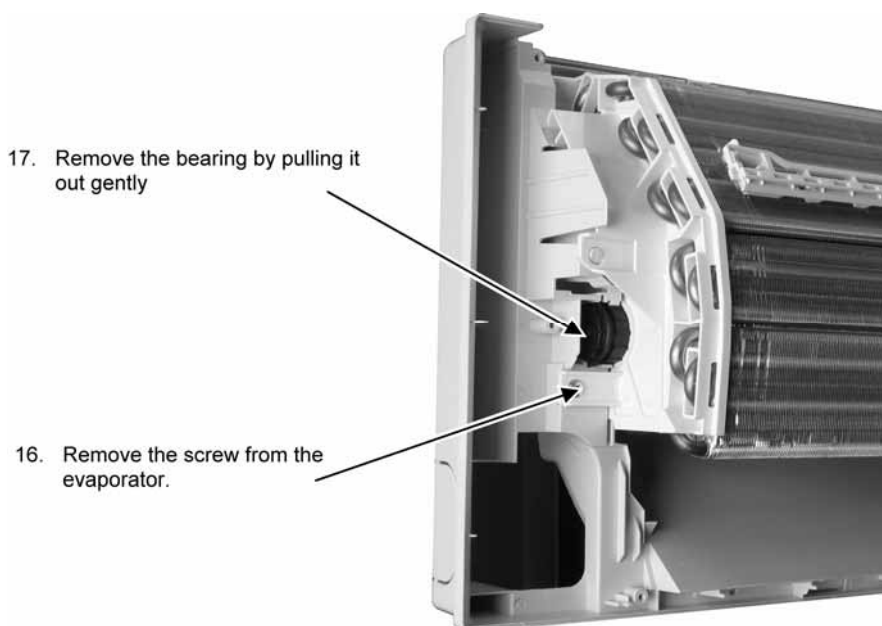


Figure 8

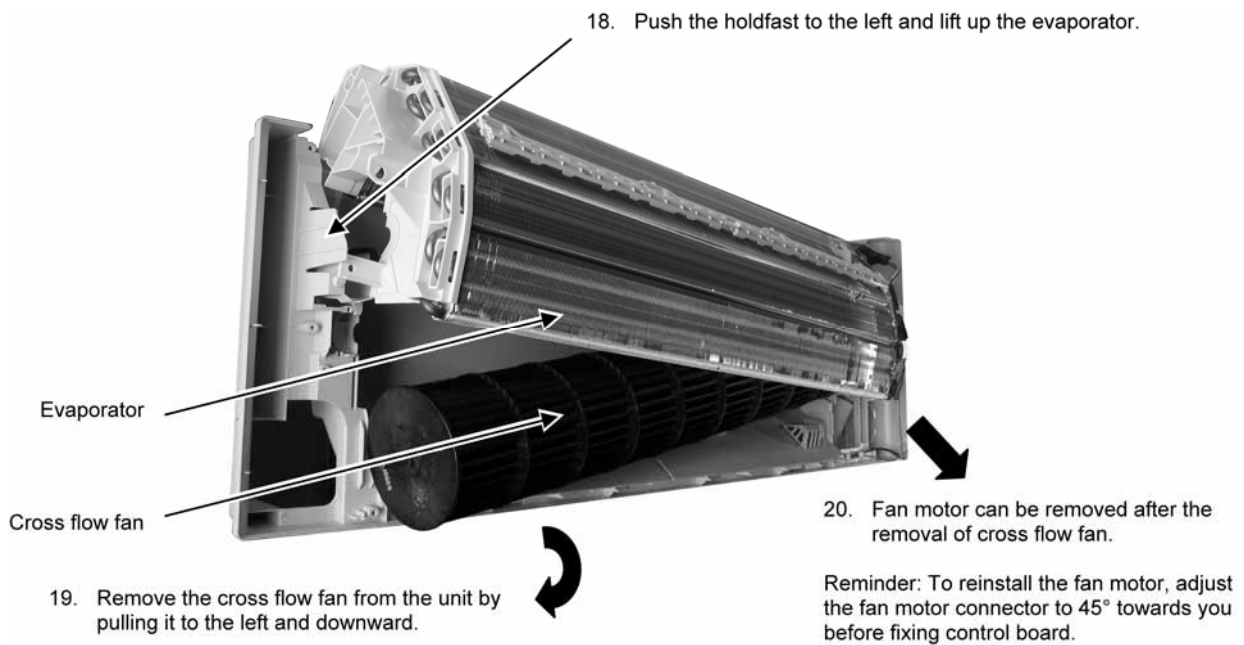


Figure 9

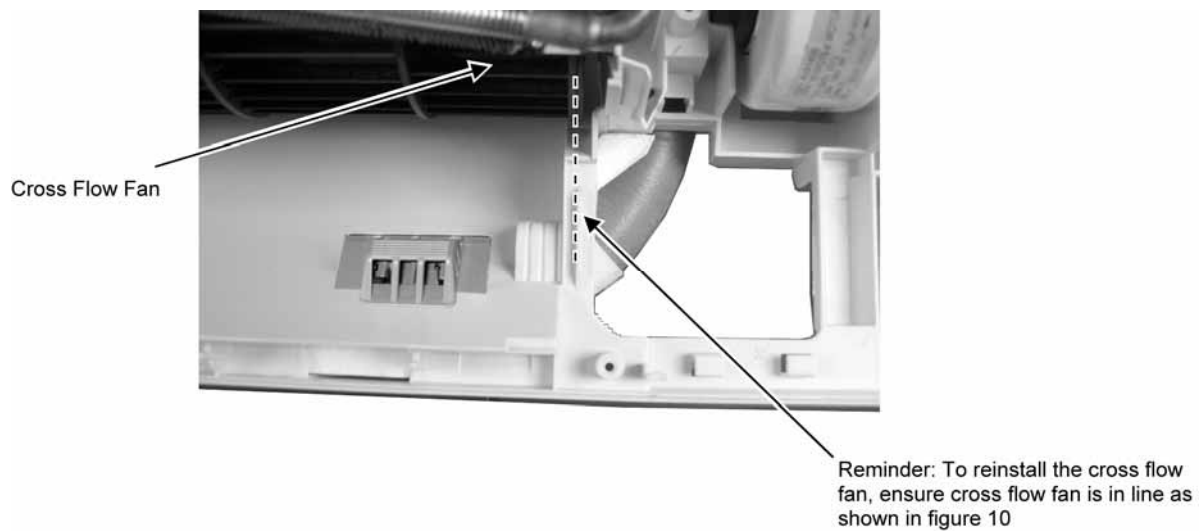


Figure 10



WARNING

High Voltage is generated in the electrical parts area by the capacitor. Ensure that the capacitor has discharged sufficiently before proceeding with repair work. Failure to heed this caution may result in electric shocks.

16.2 CS-C18MKF-2 CS-C24MKF-2

16.2.1 Indoor Electronic Controllers, Cross Flow Fan and Indoor Fan Motor Removal Procedures

16.2.1.1 To remove front grille

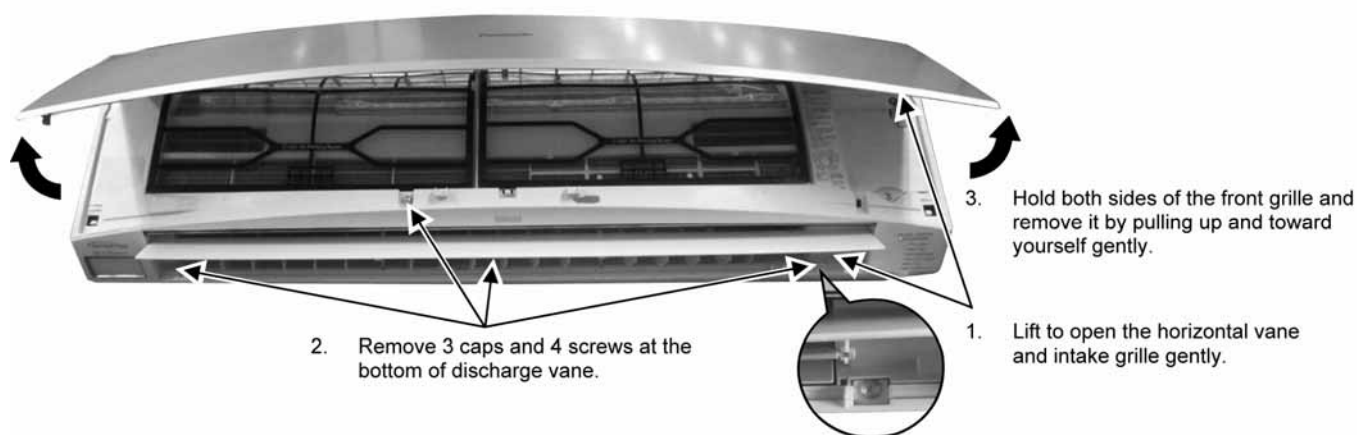


Figure 11

16.2.1.2 To remove horizontal vane

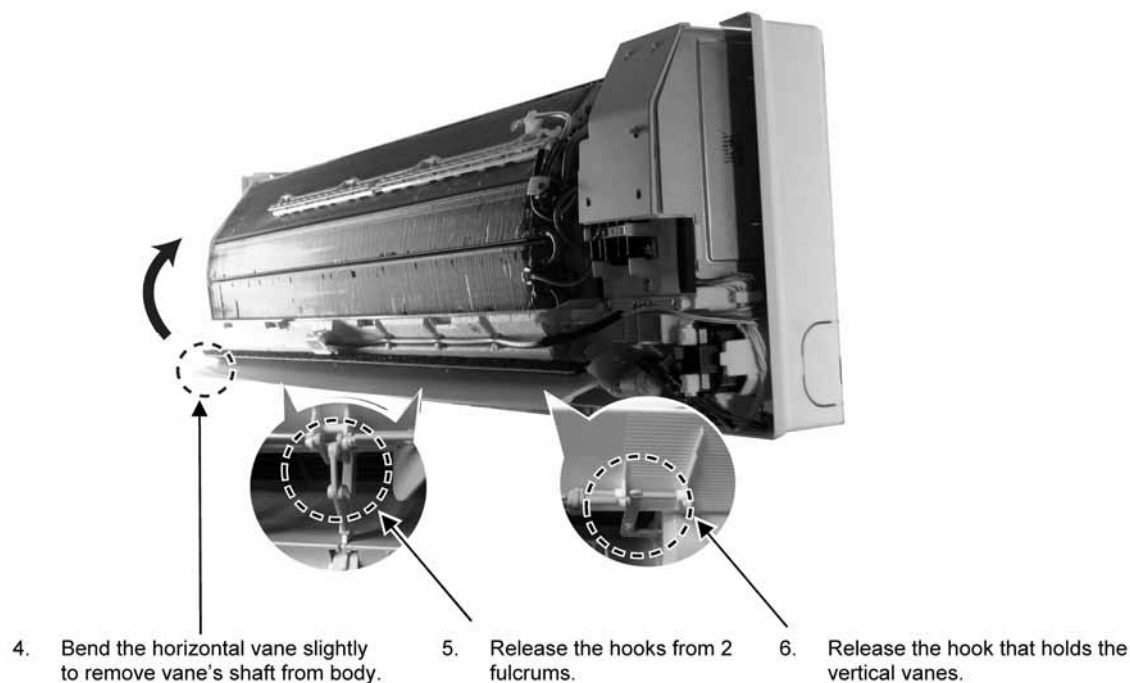


Figure 12

16.2.1.3 To remove power electronic controller

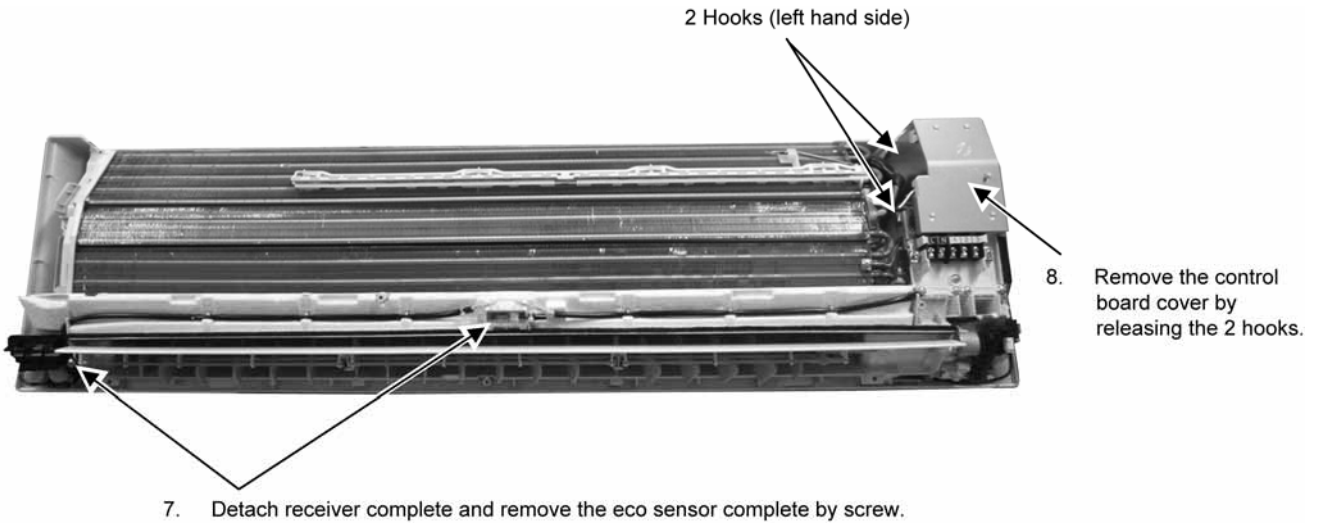


Figure 13

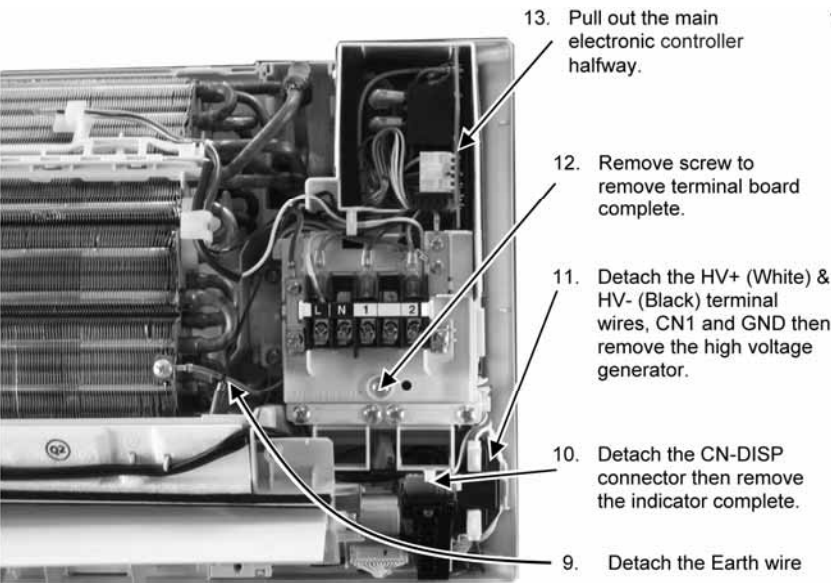


Figure 14

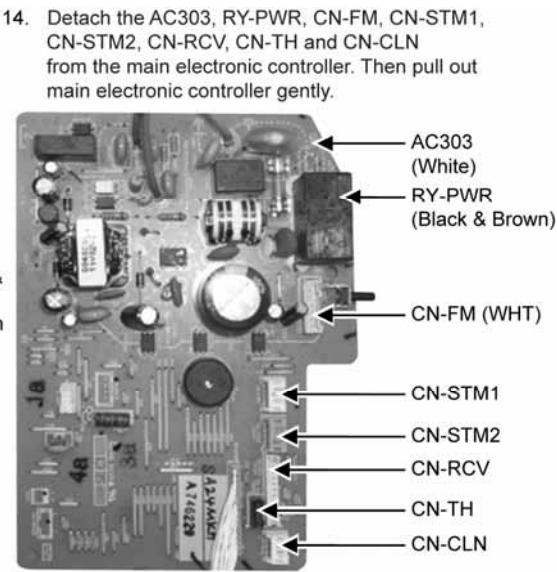


Figure 15

16.2.1.4 To remove discharge grille

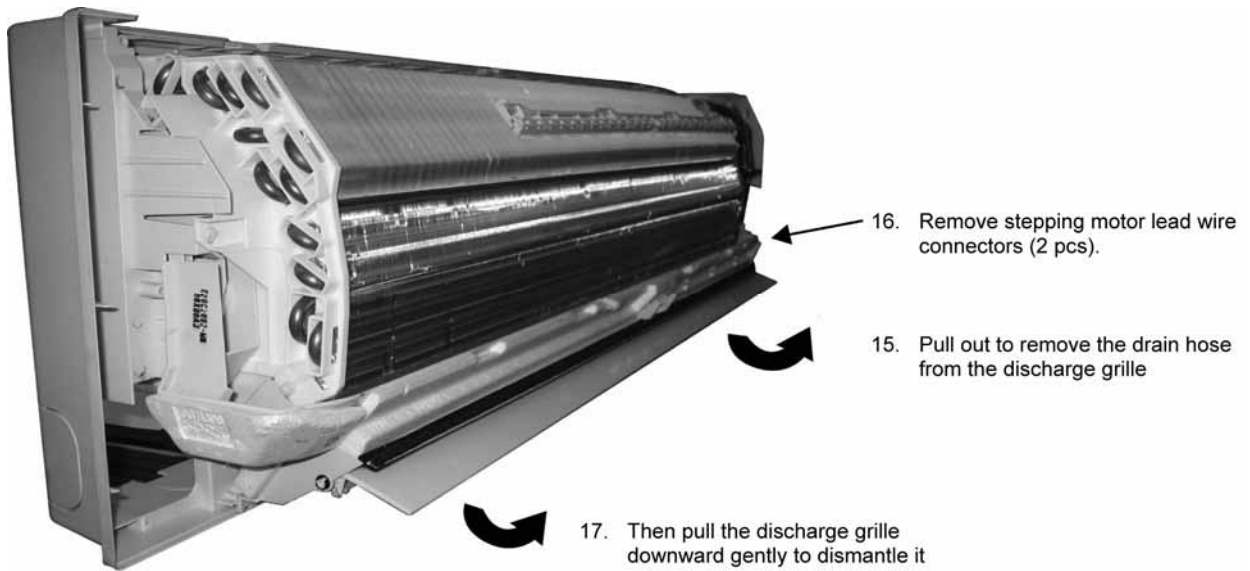


Figure 16

16.2.1.5 To remove control board

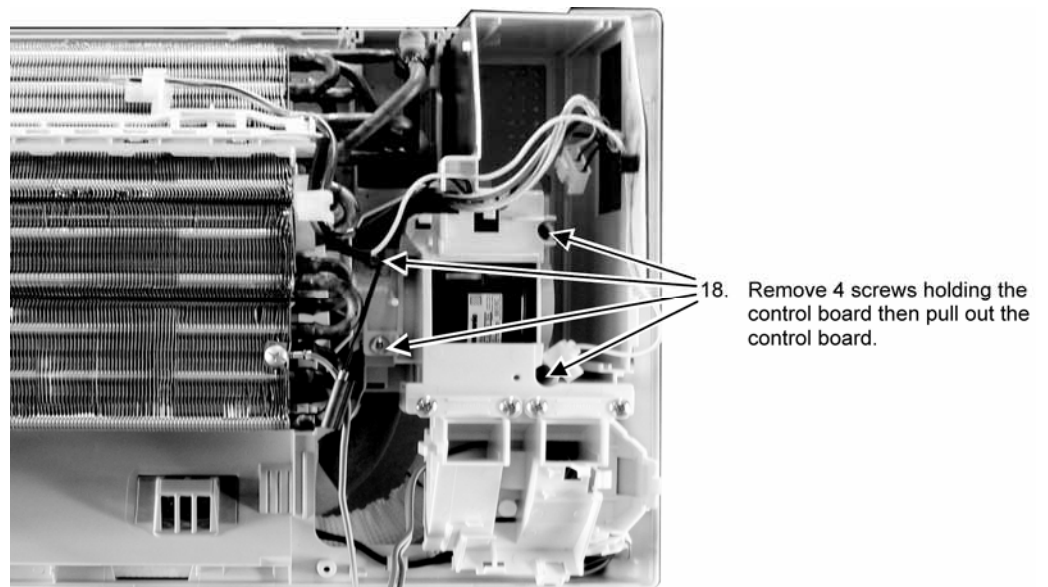


Figure 17

16.2.1.6 To remove cross flow fan and indoor fan motor

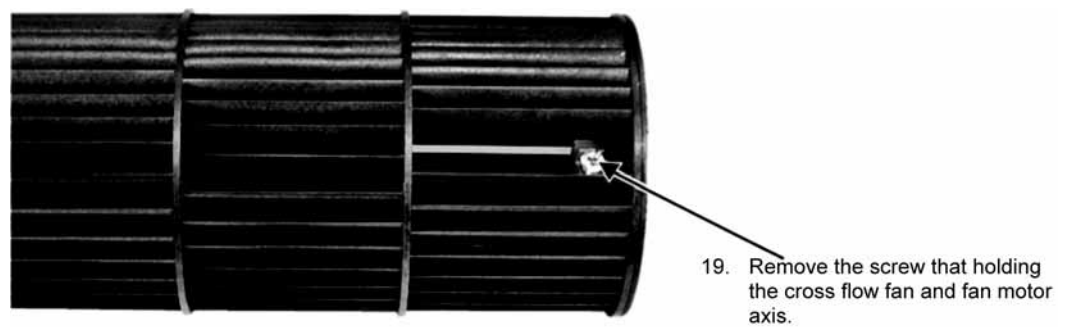
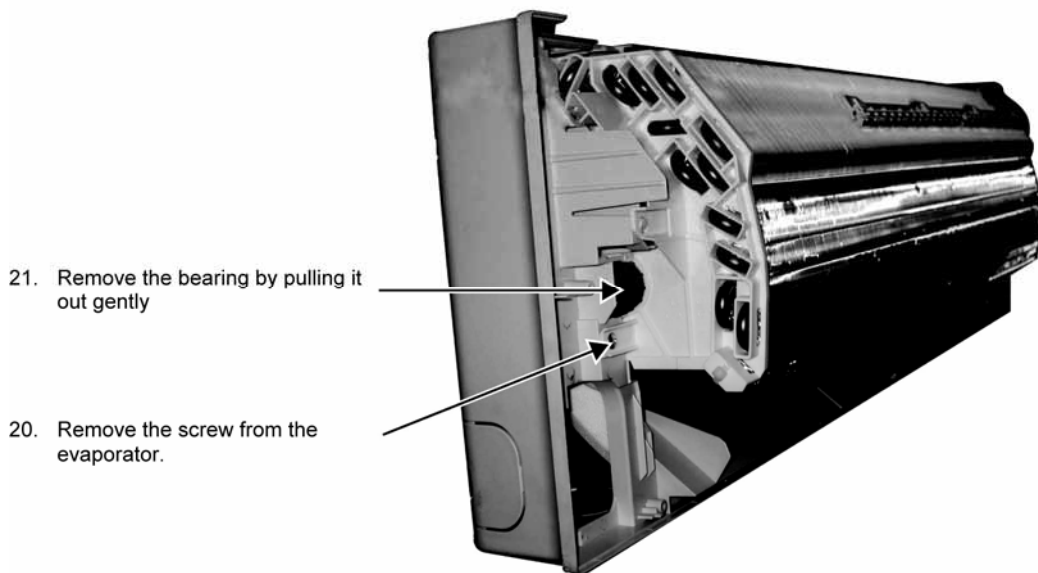


Figure 18

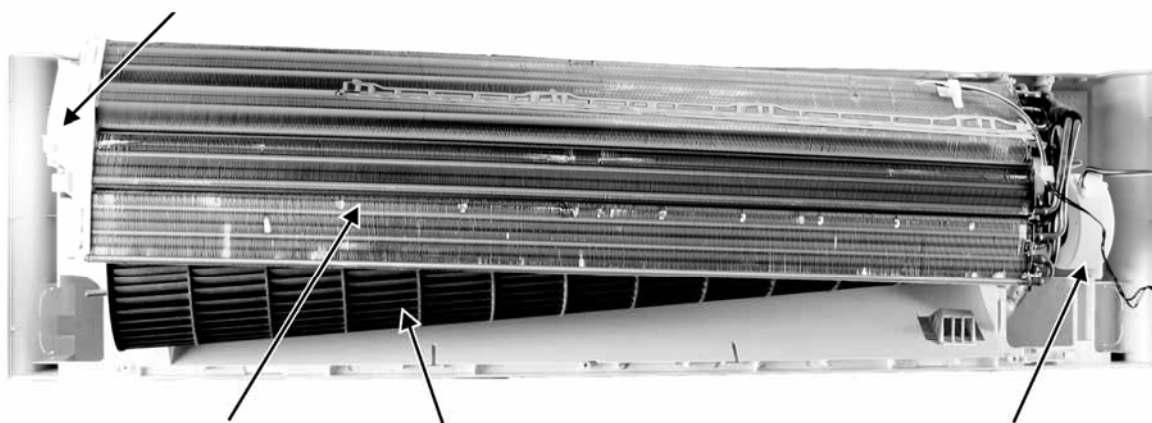


21. Remove the bearing by pulling it out gently

20. Remove the screw from the evaporator.

Figure 19

22. Push the holdfast to the left and lift up the evaporator.



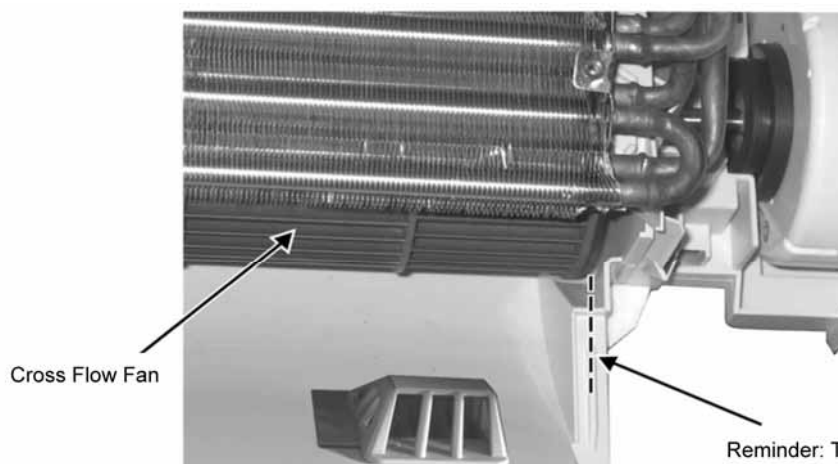
Evaporator

23. Remove the cross flow fan from the unit by pulling it to the left and downward.

24. Fan motor can be removed after the removal of cross flow fan.

Reminder: To reinstall the fan motor, adjust the fan motor connector to 45° towards you before fixing control board.

Figure 20



Cross Flow Fan

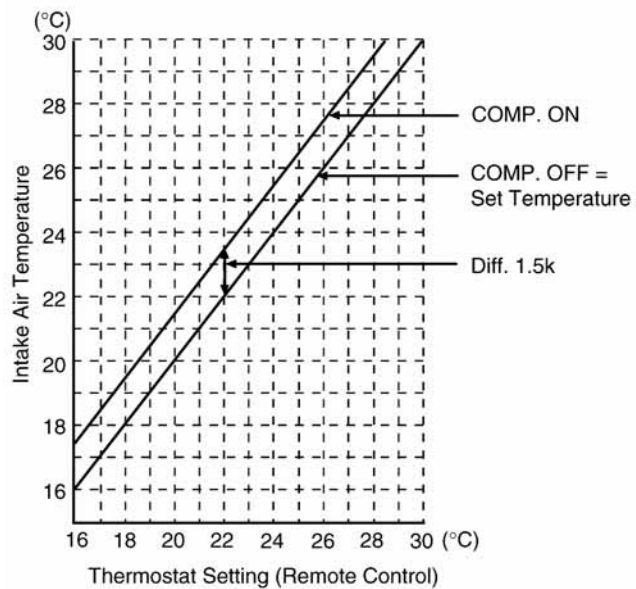
Reminder: To reinstall the cross flow fan, ensure cross flow fan is in line as shown in figure 21.

Figure 21

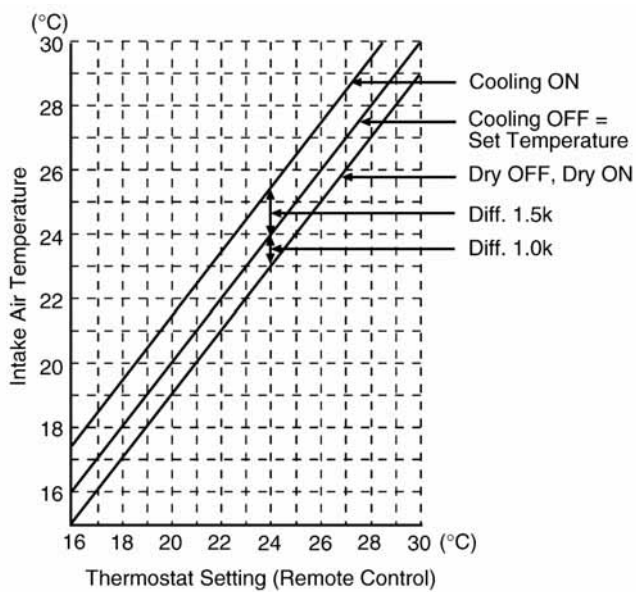
17. Technical Data

17.1 Thermostat Characteristics

Cooling



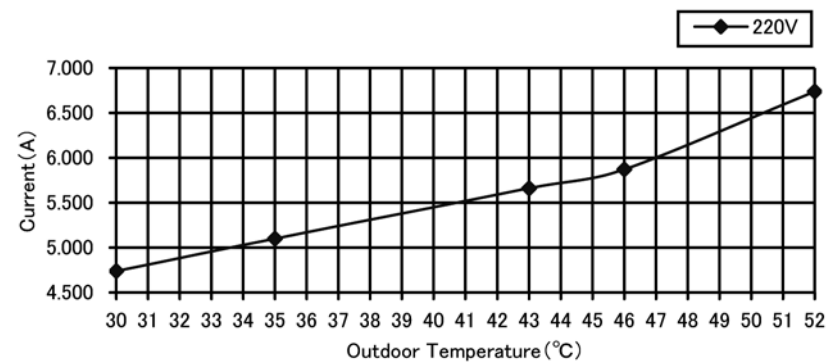
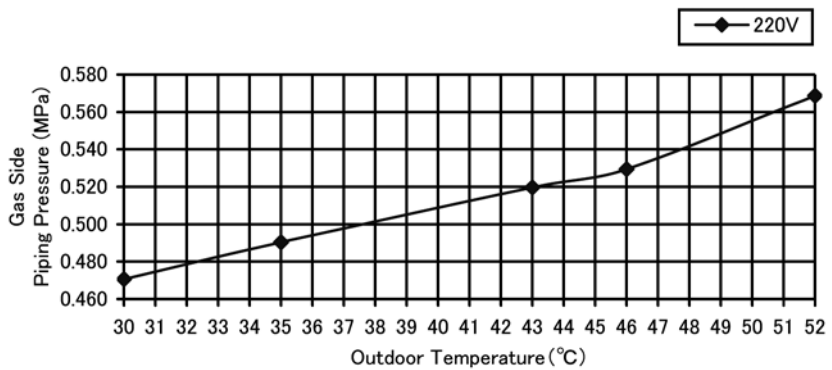
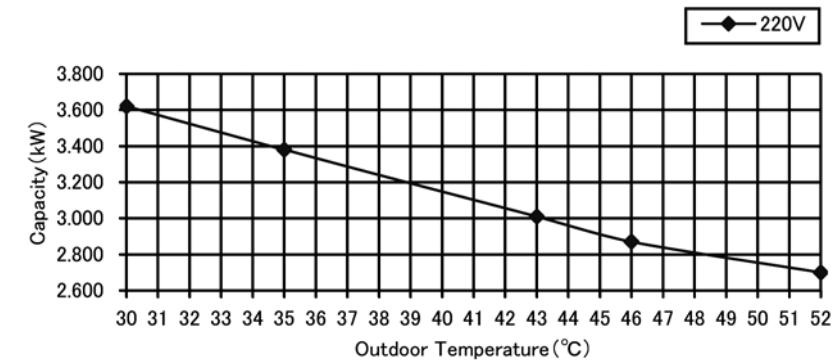
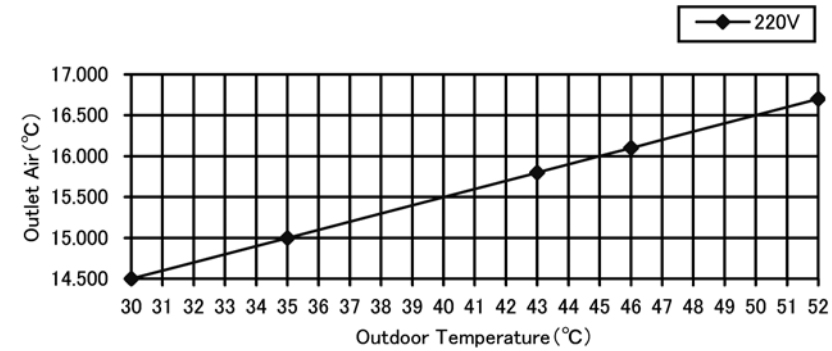
Soft Dry



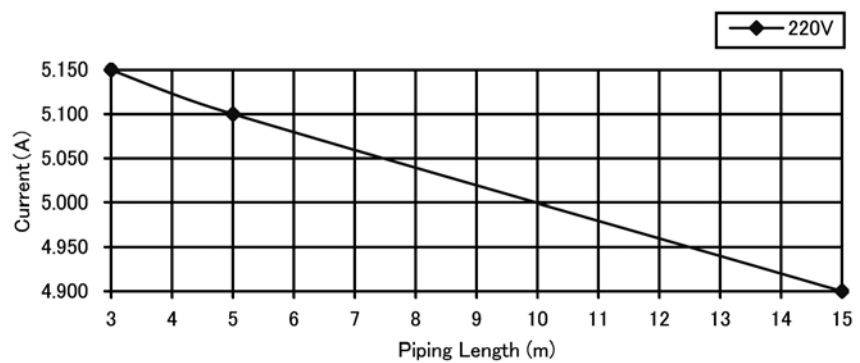
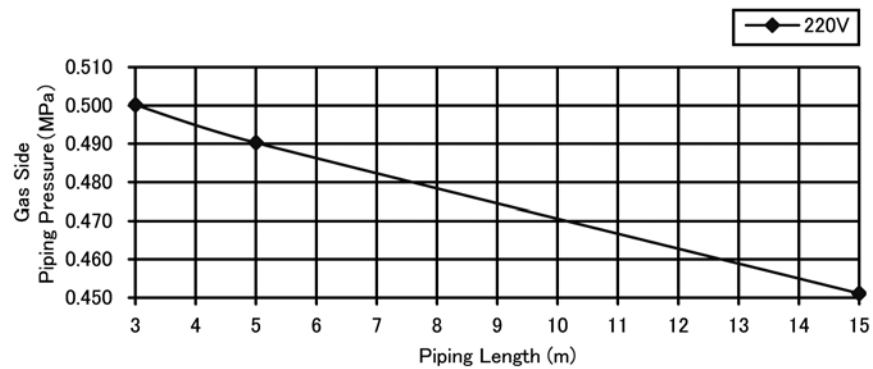
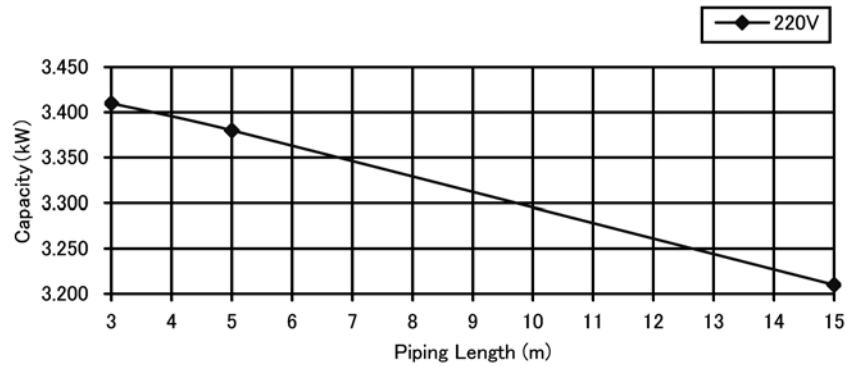
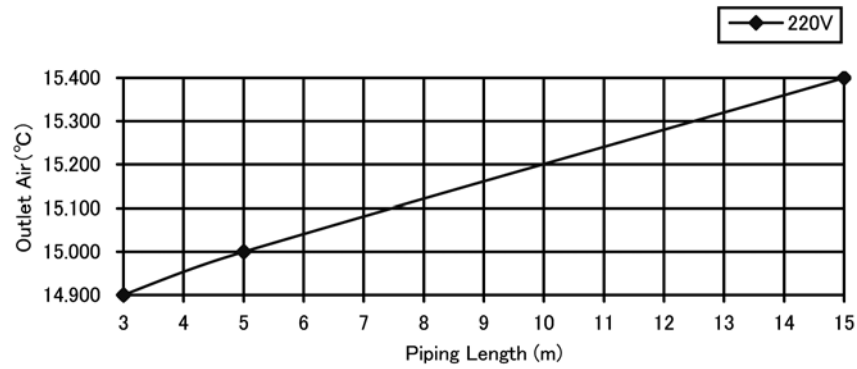
17.2 Operation Characteristics

17.2.1 CS-C12MKF-2 CU-C12MKF-2

- Cooling Characteristic
 - Room temperature: 27°C (DBT), 19°C (WBT)
 - Operation condition: High fan speed
 - Piping length: 7.5m

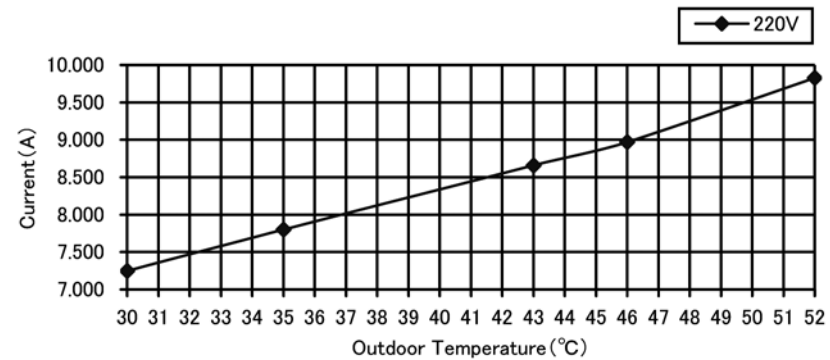
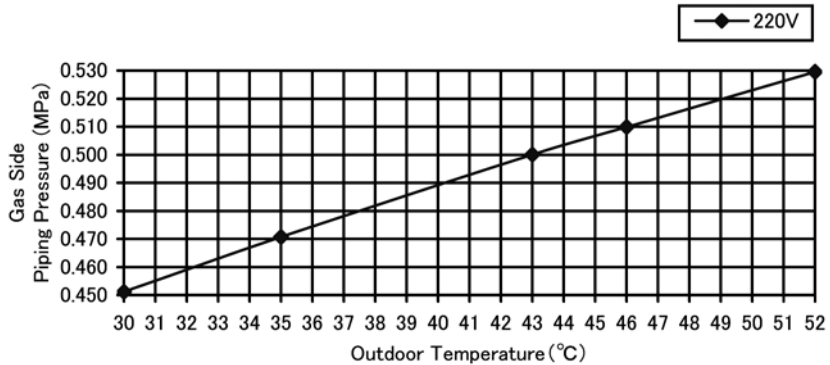
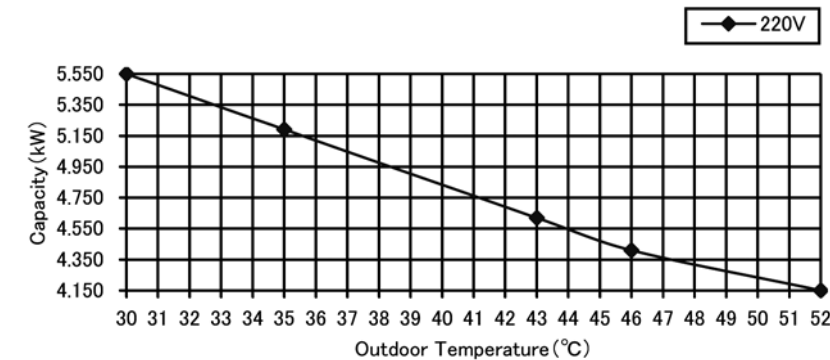
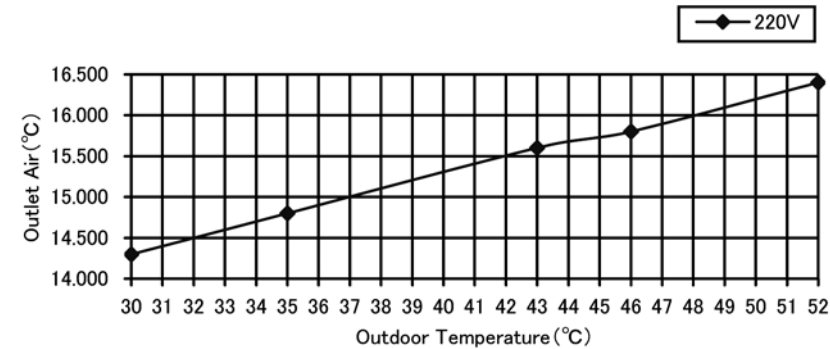


- Piping Length Characteristic
 - Outdoor temperature: 35°C (DBT), 24°C (WBT)
 - Operation condition: High fan speed
 - Piping length: 7.5m

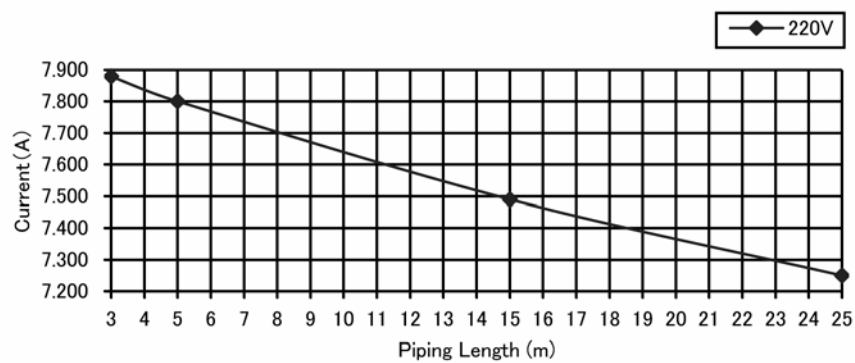
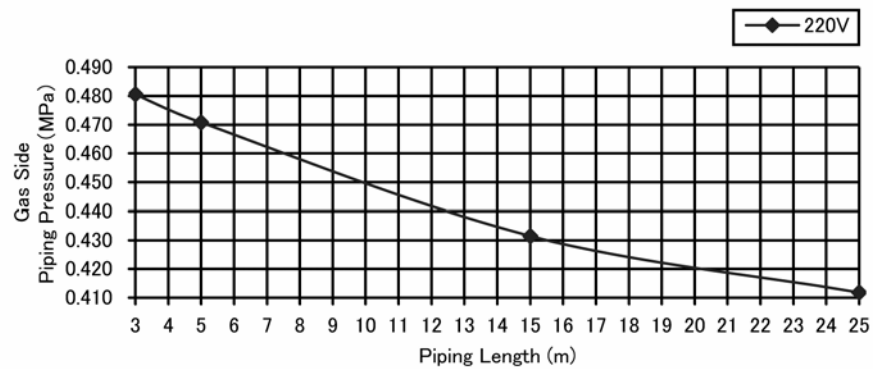
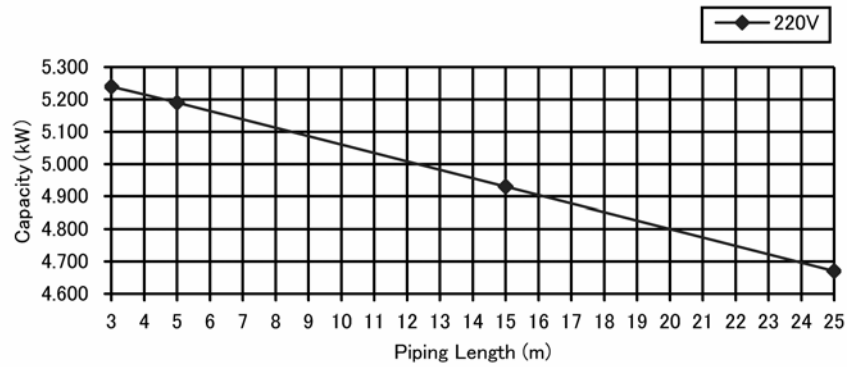
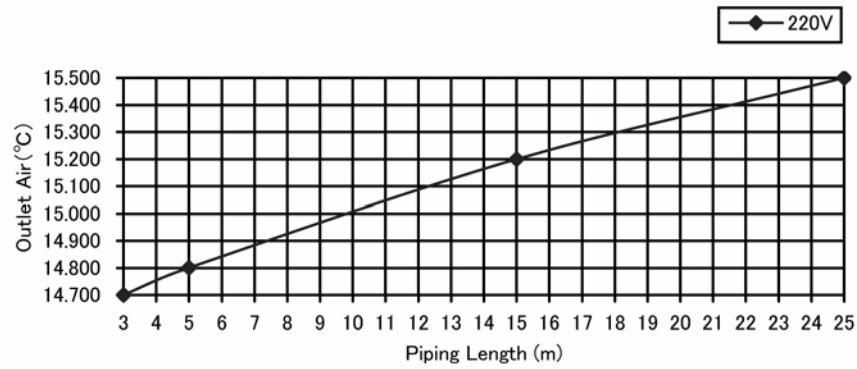


17.2.2 CS-C18MKF-2 CU-C18MKF-2

- Cooling Characteristic
 - Room temperature: 27°C (DBT), 19°C (WBT)
 - Operation condition: High fan speed
 - Piping length: 5.0m

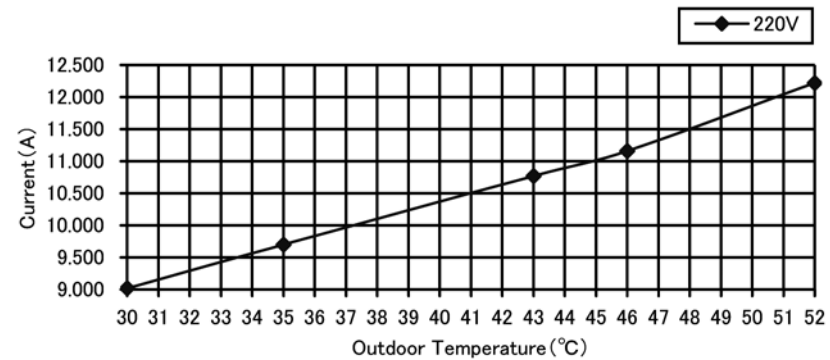
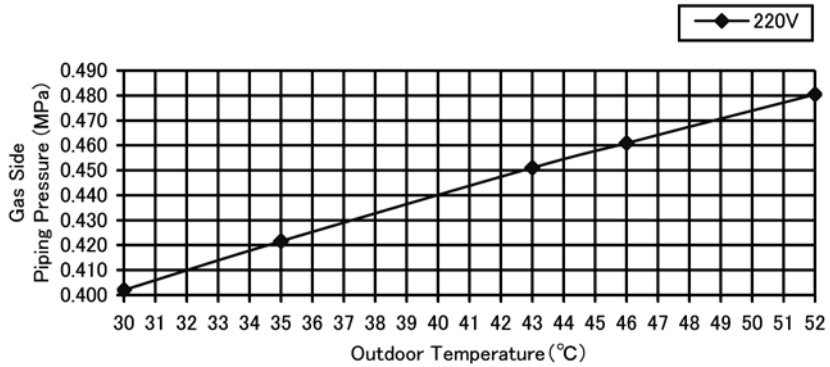
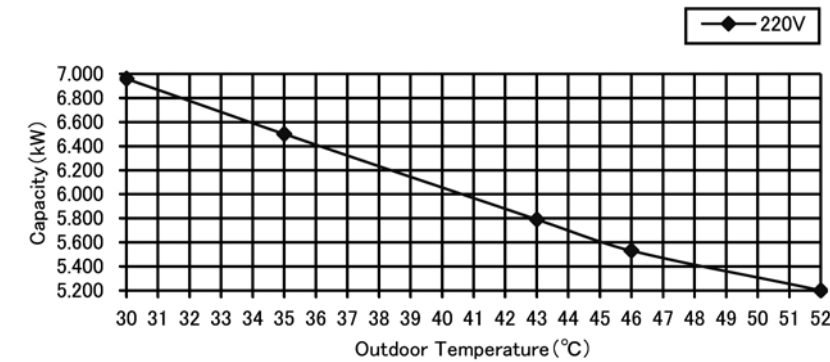
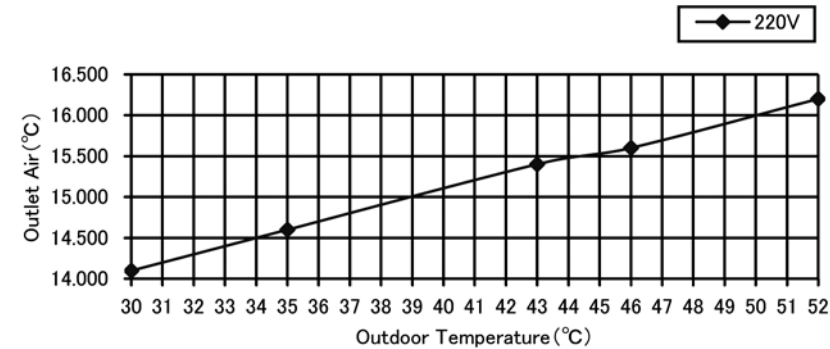


- Piping Length Characteristic
 - Outdoor temperature: 35°C (DBT), 24°C (WBT)
 - Operation condition: High fan speed
 - Piping length: 5.0m

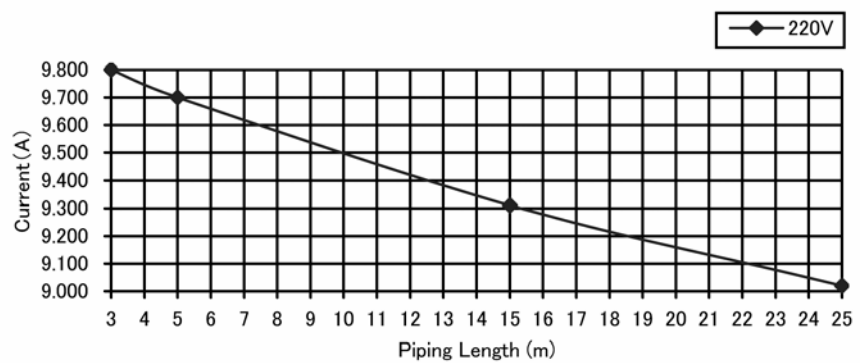
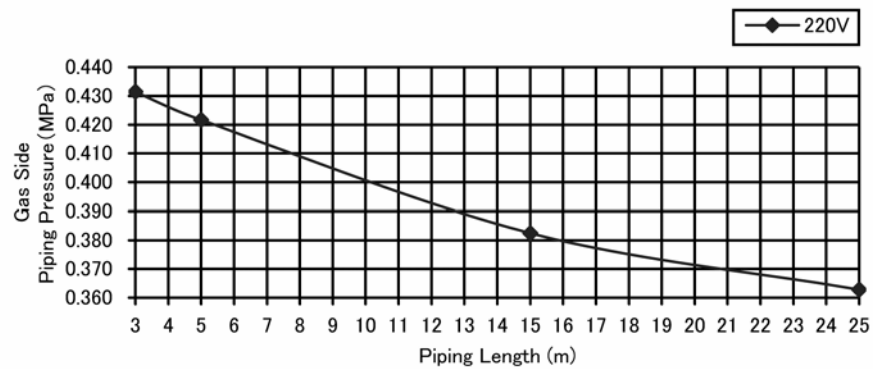
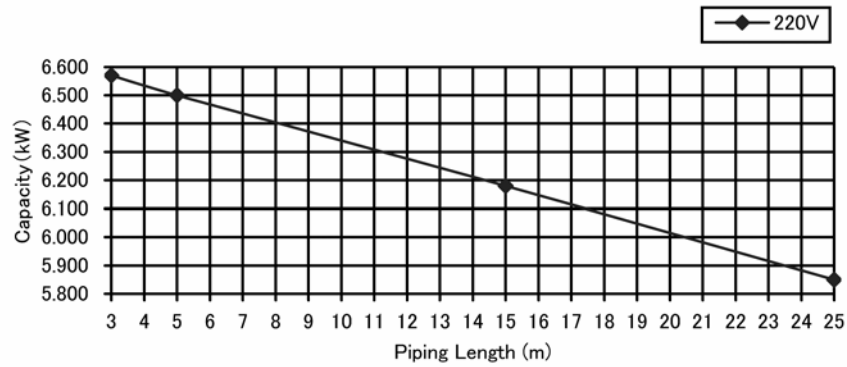
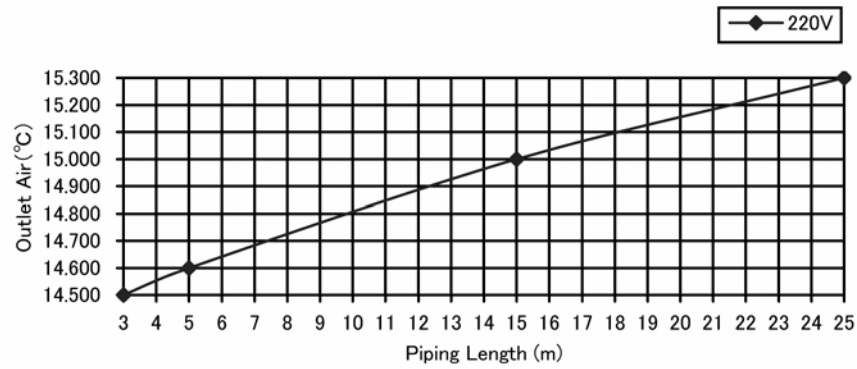


17.2.3 CS-C24MKF-2 CU-C24MKF-2

- Cooling Characteristic
 - Room temperature: 27°C (DBT), 19°C (WBT)
 - Operation condition: High fan speed
 - Piping length: 5.0m



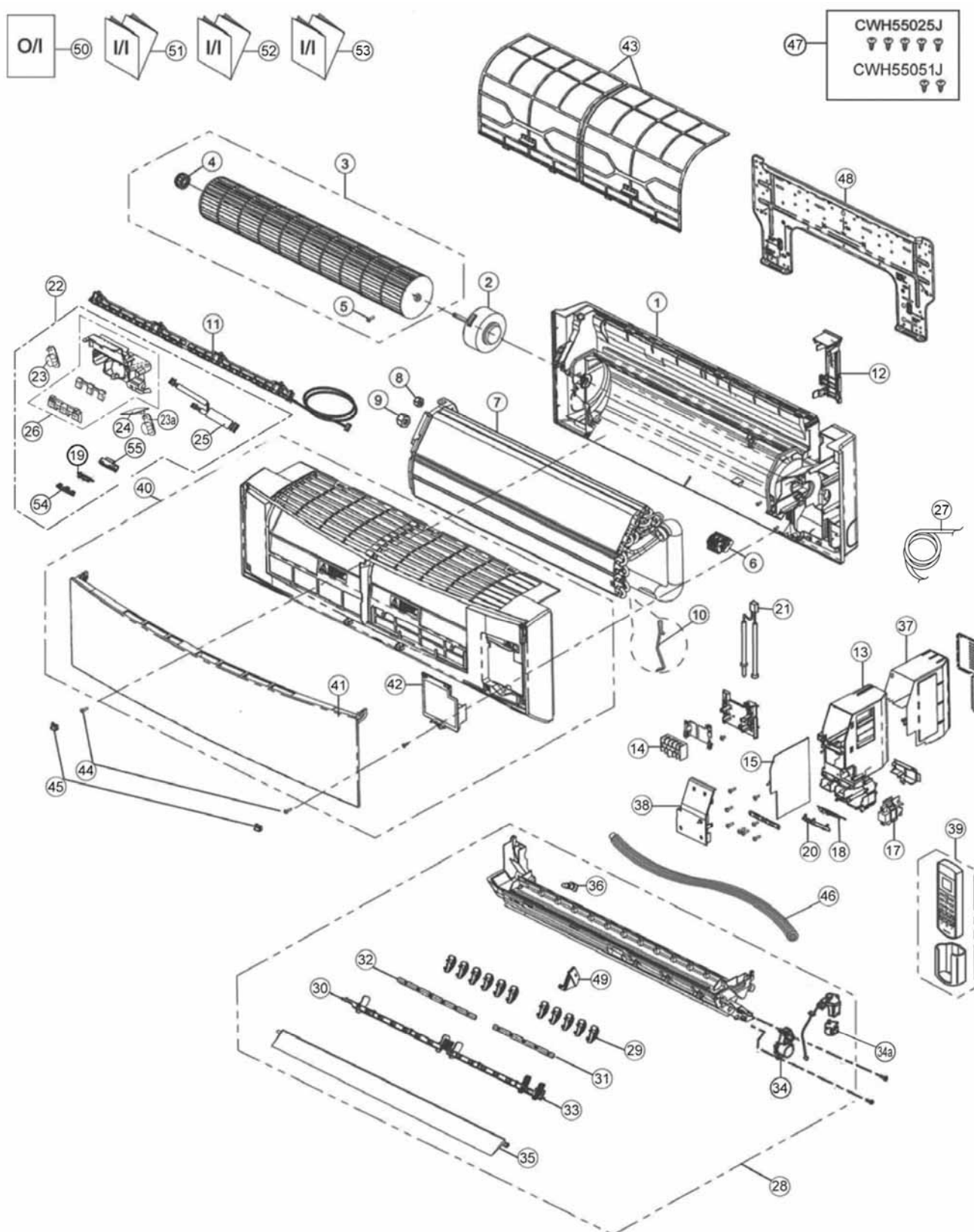
- Piping Length Characteristic
 - Outdoor temperature: 35°C (DBT), 24°C (WBT)
 - Operation condition: High fan speed
 - Piping length: 5.0m



18. Exploded View and Replacement Parts List

18.1 Indoor Unit

18.1.1 CS-C12MKF-2



Note

The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

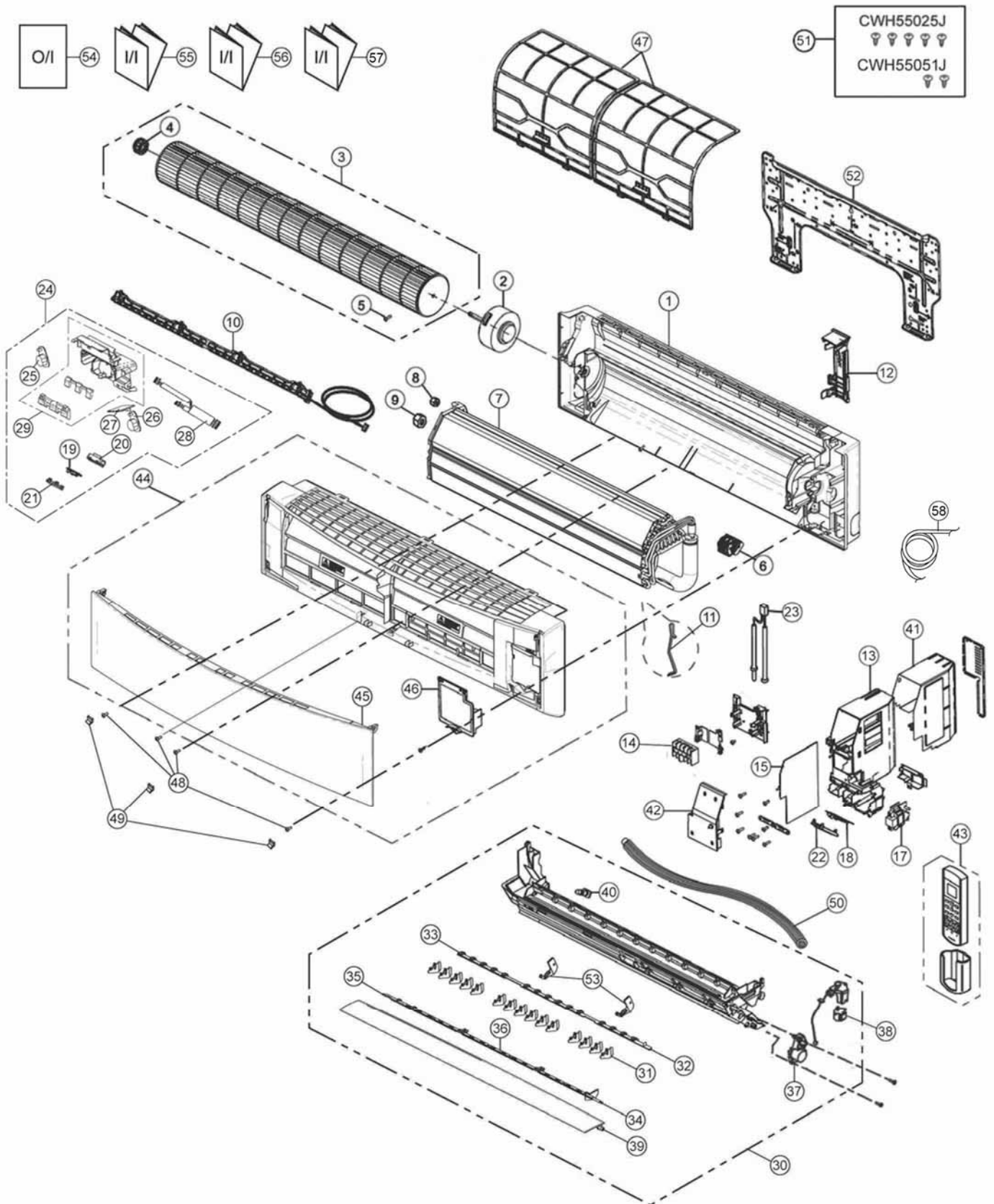
REF. NO.	PART NAME & DESCRIPTION	QTY	CS-C12MKF-2	REMARK
1	CHASSIS COMPLETE	1	CWD50C1599	
2	FAN MOTOR	1	ARW7628AC	O
3	CROSS FLOW FAN COMPLETE	1	CWH02C1076	
4	BEARING ASS'Y	1	CWH64K007	
5	SCREW - CROSS FLOW FAN	1	CWH551146	
6	GENERATOR COMPLETE	1	CWH94C0028	
7	EVAPORATOR	1	CWB30C3328	
8	FLARE NUT (LIQUID)	1	CWT251026	
9	FLARE NUT (GAS)	1	CWT251062	
10	HOLDER SENSOR	1	CWH32143	
11	E-ION AIR PURIFYING SYSTEM	1	CWD93C1090	
12	BACK COVER CHASSIS	1	CWD933233	
13	CONTROL BOARD CASING	1	CWH102370	
14	TERMINAL BOARD COMPLETE	1	CWA28C2403	O
15	ELECTRONIC CONTROLLER - MAIN	1	CWA73C5738	O
17	ELECTRONIC CONTROLLER - HVU	1	CWA745348	O
18	ELECTRONIC CONTROLLER - INDICATOR	1	CWA746280	O
19	ELECTRONIC CONTROLLER - RECEIVER	1	CWA745288	O
20	INDICATOR HOLDER	1	CWD933021	O
21	SENSOR COMPLETE	1	CWA50C2401	
22	SENSOR COMPLETE (ECO)	1	CWA50C2758	
23	ELECTRONIC CONTROLLER (ECO SENSOR - L)	1	CWA745791	
23a	ELECTRONIC CONTROLLER (ECO SENSOR - R)	1	CWA746206	
24	ELECTRONIC CONTROLLER (COMPARATOR)	1	CWA746205	
25	LEAD WIRE - PCB ECO	1	CWA67C9160	
26	CONTROL BOARD CASING FOR PCB ECO	1	CWD93C1108	
27	POWER SUPPLY CORD	1	CWA20C2827	
28	DISCHARGE GRILLE COMPLETE	1	CWE20C3123	
29	VERTICAL VANE	11	CWE241350	
30	CONNECTING BAR	1	CWE261152	
31	CONNECTING BAR	1	CWE261216	
32	CONNECTING BAR	1	CWE261215	
33	CONNECTING BAR	1	CWE261217	
34	AIR SWING MOTOR	1	CWA981264	
34a	AIR SWING MOTOR	1	CWA98K1015	O
35	HORIZONTAL VANE	1	CWE24C1365	
36	CAP - DRAIN TRAY	1	CWH521096	
37	CONTROL BOARD TOP COVER	1	CWH131350	
38	CONTROL BOARD FRONT COVER	1	CWH13C1183	
39	REMOTE CONTROL COMPLETE	1	CWA75C3706	O
40	FRONT GRILLE COMPLETE	1	CWE11C4820	O
41	INTAKE GRILLE COMPLETE	1	CWE22C1678	O
42	GRILLE DOOR	1	CWE14C1029	
43	E-ION FILTER	2	CWD00K1016	
44	SCREW - FRONT GRILLE	2	XTT4+16CFJ	
45	CAP - FRONT GRILLE	2	CWH521194	
46	DRAIN HOSE	1	CWH851173	
47	BAG COMPLETE - INSTALLATION SCREW	1	CWH82C1705	
48	INSTALLATION PLATE	1	CWH361097	
49	FULCRUM	1	CWH621102	

50	OPERATING INSTRUCTION	1	CWF567995	
51	INSTALLATION INSTRUCTION	1	CWF614838	
52	INSTALLATION INSTRUCTION	1	CWF614839	
53	INSTALLATION INSTRUCTION	1	CWF614840	
54	COVER FOR RECEIVER (UPPER)	1	CWD933022	
55	COVER FOR RECEIVER (BOTTOM)	1	CWD933209	

Note:

- All parts are supplied from PHAAM, Malaysia (Vendor Code: 00029488).
- “O” marked parts are recommended to be kept in stock.

18.1.2 CS-C18MKF-2 CS-C24MKF-2



Note

The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

REF. NO.	PART NAME & DESCRIPTION	QTY	CS-C18MKF-2	CS-C24MKF-2	REMARK
1	CHASSIS COMPLETE	1	CWD50C1623	←	
2	FAN MOTOR	1	ARW7628AC	ARW7627AC	O
3	CROSS FLOW FAN COMPLETE	1	CWH02C1077	←	
4	BEARING ASS'Y	1	CWH64K007	←	
5	SCREW - CROSS FLOW FAN	1	CWH551146	←	
6	ION GENERATOR	1	CWH94C0028	←	
7	EVAPORATOR	1	CWB30C3126	CWB30C3543	
8	FLARE NUT (LIQUID)	1	CWT251026	←	
9	FLARE NUT (GAS)	1	CWT251062	CWT251036	
10	E-ION AIR PURIFYING SYSTEM	1	CWD93C1090	←	
11	HOLDER SENSOR	1	CWH32143	←	
12	BACK COVER CHASSIS	1	CWD933031	←	
13	CONTROL BOARD CASING	1	CWH102370	←	
14	TERMINAL BOARD COMPLETE	1	CWA28C2393	CWA28C2394	O
15	ELECTRONIC CONTROLLER - MAIN	1	CWA73C5741	CWA73C5740	O
17	ELECTRONIC CONTROLLER - HVU	1	CWA745348	←	O
18	ELECTRONIC CONTROLLER - INDICATOR	1	CWA746280	←	O
19	ELECTRONIC CONTROLLER - RECEIVER	1	CWA745288	←	O
20	COVER FOR RECEIVER (BOTTOM)	1	CWD933209	←	O
21	COVER FOR RECEIVER (UPPER)	1	CWD933022	←	
22	INDICATOR HOLDER	1	CWD933021	←	
23	SENSOR COMPLETE	1	CWA50C2401	←	
24	SENSOR COMPLETE (ECO)	1	CWA50C2759	←	O
25	ELECTRONIC CONTROLLER (ECO SENSOR - L)	1	CWA745791	←	O
26	ELECTRONIC CONTROLLER (ECO SENSOR -R)	1	CWA746206	←	O
27	ELECTRONIC CONTROLLER (COMPARATOR)	1	CWA746205	←	O
28	LEAD WIRE - PCB ECO	1	CWA67C9218	←	
29	CONTROL BOARD CASING FOR PCB ECO	1	CWD93C1108	←	
30	DISCHARGE GRILLE COMPLETE	1	CWE20C3124	←	
31	VERTICAL VANE	15	CWE241355	←	
32	CONNECTING BAR	1	CWE261220	←	
33	CONNECTING BAR	1	CWE261158	←	
34	CONNECTING BAR	1	CWE261221	←	
35	CONNECTING BAR	1	CWE261159	←	
36	CONNECTING BAR	1	CWE261160	←	
37	A.S.MOTOR, DC SINGLE 12V 300OHM	1	CWA981241	←	
38	A.S MOTOR, DC SINGLE 12V 300OHM	1	CWA98K1015	←	O
39	HORIZONTAL VANE	1	CWE24C1364	←	O
40	CAP - DRAIN TRAY	1	CWH521096	←	
41	CONTROL BOARD TOP COVER	1	CWH131350	←	
42	CONTROL BOARD FRONT COVER	1	CWH13C1183	←	
43	REMOTE CONTROL COMPLETE	1	CWA75C3706	←	
44	FRONT GRILLE COMPLETE	1	CWE11C4798	CWE11C4795	O
45	INTAKE GRILLE COMPLETE	1	CWE22C1680	←	O
46	GRILLE DOOR	1	CWE14C1029	←	O
47	E-ION FILTER	2	CWD00K1017	←	
48	SCREW - FRONT GRILLE	4	XTT4+16CFJ	←	
49	CAP - FRONT GRILLE	3	CWH521194	←	
50	DRAIN HOSE	1	CWH851173	←	

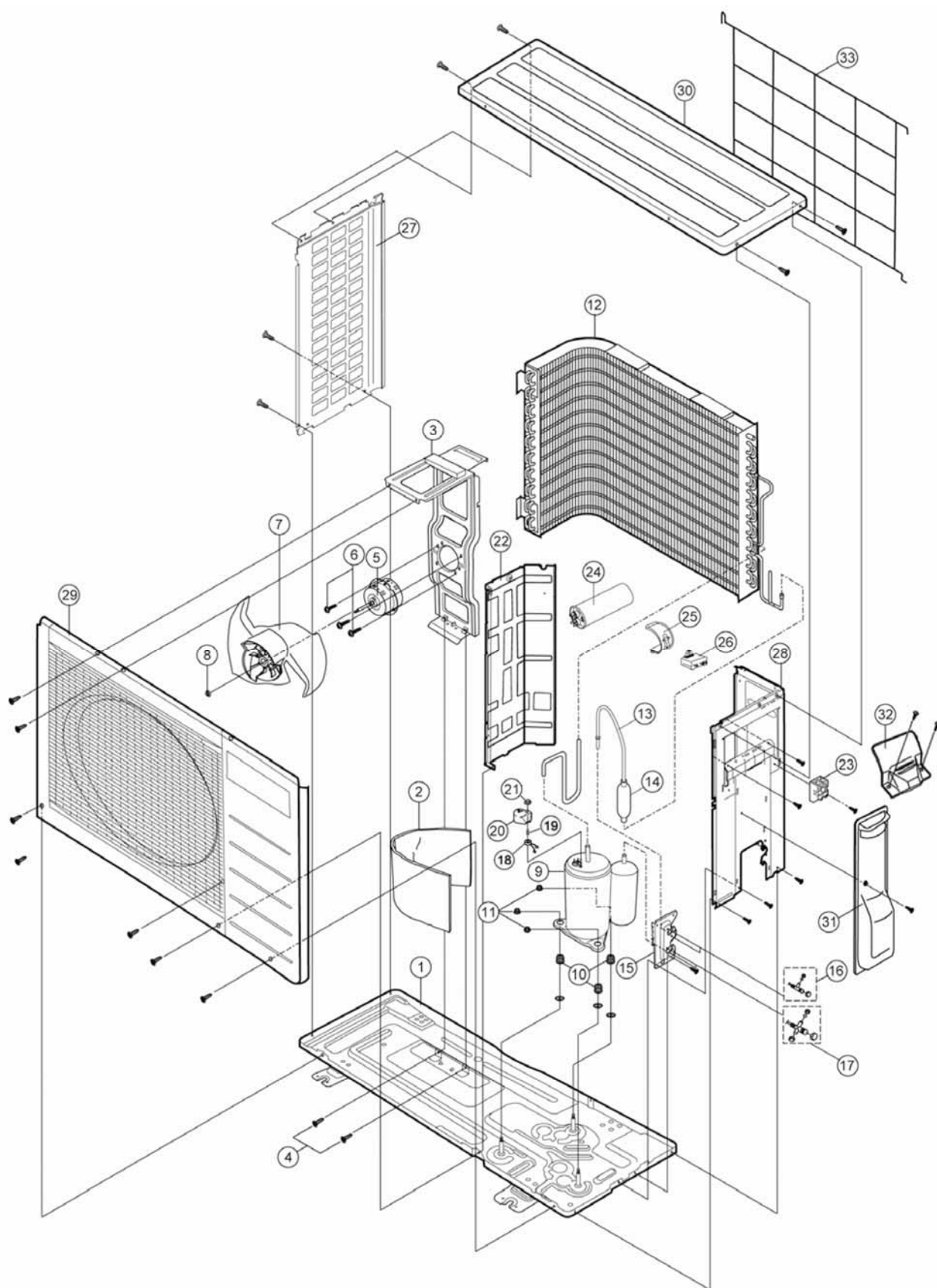
51	BAG COMPLETE - INSTALLATION SCREW	1	CWH82C1705	←	
52	INSTALLATION PLATE	1	CWH361098	←	
53	FULCRUM	2	CWH621103	←	
54	OPERATING INSTRUCTION	1	CWF567995	←	
55	INSTALLATION INSTRUCTION	1	CWF614838	←	
56	INSTALLATION INSTRUCTION	1	CWF614839	←	
57	INSTALLATION INSTRUCTION	1	CWF614840	←	
58	POWER SUPPLY CORD	1	CWA20C2829	CWA20C2836	

Note:

- All parts are supplied from PHAAM, Malaysia (Vendor Code: 00029488).
- “O” marked parts are recommended to be kept in stock.

18.2 Outdoor Unit

18.2.1 CU-C12MKF-2



Note

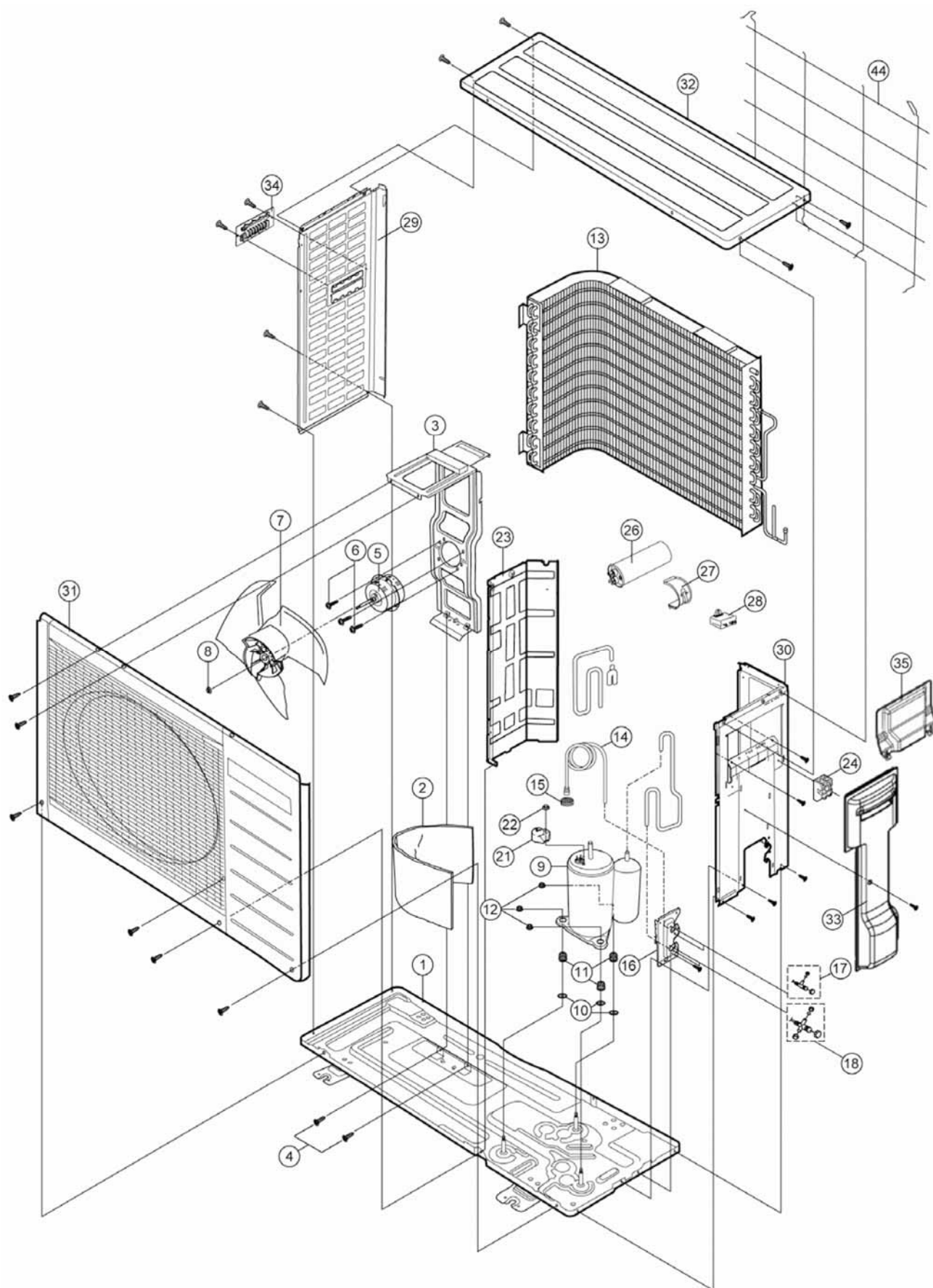
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

REF. NO.	PART NAME & DESCRIPTION	QTY	CU-C12MKF-2	REMARK
1	CHASSIS ASS'Y	1	CWD50K2088	
2	SOUND PROOF MATERIAL	1	CWG302110	
3	FAN MOTOR BRACKET	1	CWD541030	
4	SCREW - FAN MOTOR BRACKET	2	CWH551217	
5	FAN MOTOR	1	CWA951693	O
6	SCREW - FAN MOTOR MOUNT	4	CWH55406J	
7	PROPELLER FAN ASS'Y	1	CWH03K1006	
8	NUT - PROPELLER FAN	1	CWH56053J	
9	COMPRESSOR	1	2PS206D2BA06	O
10	ANTI - VIBRATION BUSHING	3	CWH50055	
11	NUT - COMPRESSOR MOUNT	3	CWH561049	
12	CONDENSER	1	CWB32C2795	
13	CAPILLARY TUBE ASS'Y	1	CWB15K1328	
14	STRAINER	1	CWB111011	
15	HOLDER COUPLING	1	CWH351023	
16	2-WAY VALVE (LIQUID)	1	CWB021362	O
17	3-WAY VALVE (GAS)	1	CWB011482	O
18	OVERLOAD PROTECTOR WITH WIRE	1	CWA67C8643	
19	HOLDER - O.L.P.	1	CWH7041200	
20	TERMINAL COVER	1	CWH171011	
21	NUT - TERMINAL COVER	1	CWH7080300J	
22	SOUND PROOF BOARD	1	CWH151023	
23	TERMINAL BOARD ASS'Y	1	CWA28K1064J	
24	CAPACITOR - COM.	1	CWA312076	O
25	HOLDER CAPACITOR	1	CWH30057	
26	CAPACITOR - F.M	1	DS441205NPQA	O
27	CABINET SIDE PLATE	1	CWE041248A	
28	CABINET SIDE PLATE COMPLETE	1	CWE04C1118	
29	CABINET FRONT PLATE ASS'Y	1	CWE06K1034	
30	CABINET TOP PLATE	1	CWE031014A	
31	CONTROL BOARD COVER COMP	1	CWH13C1064	
32	PLATE – C.B.COVER TERMINAL	1	CWH131295	
33	WIRE NET	1	CWD041111A	

Note:

- All parts are supplied from PHAAM, Malaysia (Vendor Code: 00029488).
- "O" marked parts are recommended to be kept in stock.

18.2.2 CU-C18MKF-2



Note

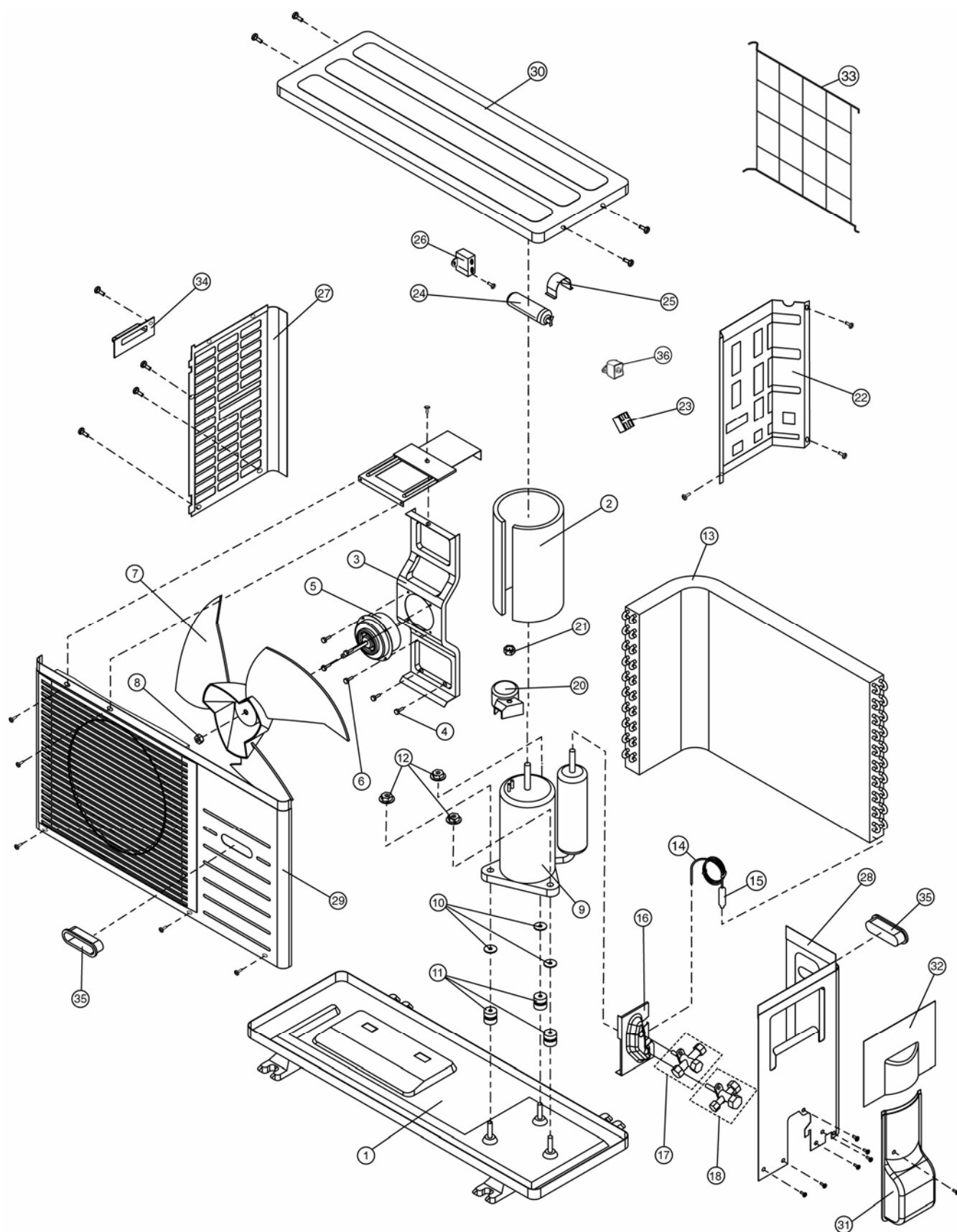
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

REF. NO.	PART NAME & DESCRIPTION	QTY	CU-C18MKF-2	REMARK
1	CHASSIS ASS'Y	1	CWD52K1248	
2	SOUND PROOF MATERIAL	1	CWG302221	
3	FAN MOTOR BRACKET	1	CWD541154	
4	SCREW - FAN MOTOR BRACKET	4	CWH551217	
5	FAN MOTOR	1	CWA951577	O
6	SCREW - FAN MOTOR MOUNT	3	CWH55252J	
7	PROPELLER FAN ASS'Y	1	CWH03K1017	
8	NUT - PROPELLER FAN	1	CWH561038J	
9	COMPRESSOR	1	2JS318D3EA02	O
10	PACKING	3	CWB81043	
11	ANTI - VIBRATION BUSHING	3	CWH50055	
12	NUT - COMPRESSOR MOUNT	3	CWH561049	
13	CONDENSER	1	CWB32C3104	
14	CAPILLARY TUBE ASS'Y	1	CWB15K1378	
15	STRAINER	1	CWB11025	
16	HOLDER COUPLING	1	CWH351036	
17	2-WAY VALVE (LIQUID)	1	CWB021175	O
18	3-WAY VALVE (GAS)	1	CWB011483	O
21	TERMINAL COVER	1	CWH171012	
22	NUT - TERMINAL COVER	1	CWH7080300J	
23	SOUND PROOF BOARD	1	CWH151237	
24	TERMINAL BOARD ASS'Y	1	CWA28K1064J	
26	CAPACITOR - COM.	1	CWA312079	O
27	HOLDER CAPACITOR	1	CWH30060	
28	CAPACITOR - F.M	1	DS441355NPQA	O
29	CABINET SIDE PLATE	1	CWE041520A	
30	CABINET SIDE PLATE COMPLETE	1	CWE04C1268	
31	CABINET FRONT PLATE ASS'Y	1	CWE06K1077	
32	CABINET TOP PLATE	1	CWE031145A	
33	CONTROL BOARD COVER COMP	1	CWH13C1238	
34	HANDLE	1	CWE161010	
35	CONTROL BOARD COVER(RIGHT-TOP)	1	CWH131409A	
44	WIRE NET	1	CWD041160A	

Note:

- All parts are supplied from PHAAM, Malaysia (Vendor Code: 00029488).
- "O" marked parts are recommended to be kept in stock.

18.2.3 CU-C24MKF-2



Note

The above exploded view is for the purpose of parts disassembly and replacement. The non-numbered parts are not kept as standard service parts.

REF. NO.	PART NAME & DESCRIPTION	QTY.	CU-C24MKF-2	REMARK
1	BASE PAN ASS'Y	1	CWD50K2100	
2	SOUND PROOF MATERIAL	1	CWG302221	
3	FAN MOTOR BRACKET	1	CWD541055	
4	SCREW - FAN MOTOR BRACKET	2	CWH551217	
5	FAN MOTOR	1	CWA951689	O
6	SCREW - FAN MOTOR MOUNT	3	CWH55252J	
7	PROPELLER FAN ASS'Y	1	CWH03K1017	
8	NUT - PROPELLER FAN	1	CWH561038J	
9	COMPRESSOR	1	2JS386D3DA02	O
10	PACKING	3	CWB81043	
11	ANTI - VIBRATION BUSHING	3	CWH50055	
12	NUT - COMPRESSOR MOUNT	3	CWH561049	
13	CONDENSER	1	CWB32C2904	
14	CAPILLARY TUBE ASS'Y	1	CWB15K1385	
15	STRAINER	1	CWB11025	
16	HOLDER COUPLING	1	CWH351036	
17	2-WAY VALVE (LIQUID)	1	CWB021175	O
18	3-WAY VALVE (GAS)	1	CWB011484	O
20	TERMINAL COVER	1	CWH171012	
21	NUT - TERMINAL COVER	1	CWH7080300J	O
22	SOUND PROOF BOARD	1	CWH151051	O
23	TERMINAL BOARD ASS'Y	1	CWA28K1064J	
24	CAPACITOR - COM.	1	DS371606CPNA	O
25	HOLDER CAPACITOR	1	CWH301055	
26	CAPACITOR - F.M	1	DS441505NPQB	
27	CABINET SIDE PLATE(L)	1	CWE041082A	
28	CABINET SIDE PLATE COMPLETE	1	CWE04C1123	
29	CABINET FRONT PLATE ASS'Y	1	CWE06K1043	
30	CABINET TOP PLATE	1	CWE03K1009A	
31	CONTROL BOARD COVER COMP	1	CWH131168	
32	CONTROL BOARD COVER (RIGHT TOP)	1	CWH131169A	
33	WIRE NET	1	CWD041041A	
34	HANDLE	1	CWE161010	
35	HANDLE	2	CWE16000E	
36	THERMOSTAT	1	CWA151061	

Note:

- All parts are supplied from PHAAM, Malaysia (Vendor Code: 00029488).
- "O" marked parts are recommended to be kept in stock.