

Service Manual

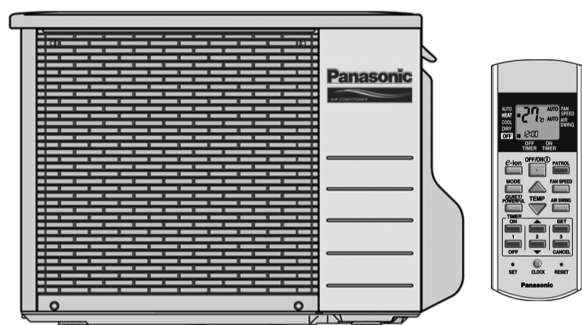
Air Conditioner

Indoor Unit Outdoor Unit

CS-A7HKD CU-A7HKD

CS-A9HKD CU-A9HKD

CS-A12HKD CU-A12HKD



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 product or 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 run 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. Engage dealer or specialist for installation and servicing. If installation or servicing done by the user is defective, it will cause water leakage, electrical shock or fire.
2. Install according to this installation instructions strictly. If installation is defective, it will cause water leakage, electrical shock or fire.
3. 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.
4. 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.
5. 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.
6. 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.
7. Use the specified cable and connect tightly for indoor/outdoor connection. Connect tightly and clamp the cable so that no external force will be acted on the terminal. If connection or fixing is not perfect, it will cause heat-up or fire at the connection.
8. 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 connection point of terminal, fire or electrical shock.
9. When carrying out piping connection, take care not to let air substances other than the specified refrigerant go into refrigeration cycle. Otherwise, it will cause lower capacity, abnormal high pressure in the refrigeration cycle, explosive and injury.
10. 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.
11. 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. 
12. When connecting the piping, do not allow air or any substances other than the specified refrigerant to enter the refrigeration cycle. Otherwise, this may lower the capacity, cause abnormally high pressure in the refrigeration cycle, and possibly result in explosion and injury. 
13. Do not damage or use unspecified power supply cord. Otherwise it will cause fire or electric shock. 
14. Do not modify the length of the power supply cord or use extension cord, and do not share the single outlet with other electrical appliances. Otherwise, it will cause fire or electric shock. 
15. It is desirable that the amount of residual oil is less than 40 mg/10 m. 
16. During installation, before run the compressor, confirm the refrigerant pipes are fixed. Operation of compressor without fixing the piping, setting the valves at open condition, a burst may occur and cause injury.
17. 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.
18. Ventilate if there is refrigerant gas leakage during operation. It may cause toxic gas when refrigerant contacts with fire.



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).

<p>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.</p> <ul style="list-style-type: none"> i. Power supply connection to the receptacle using a power plug. Use an approved power plug with earth pin for the connection to the socket. ii. Power supply connection to a circuit breaker for the permanent connection. Use an approved circuit breaker for the permanent connection. It must be a double pole switch with a minimum 3.5 mm contact gap. 	
<p>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.</p>	
<p>9. Installation work: It may need two people to carry out the installation work.</p>	
<p>10. Do not install this appliance in a laundry room or other location where water may drip from the ceiling, etc.</p>	

2 Specifications

2.1. CS-A7HKD CU-A7HKD

Item		Unit	Indoor unit	Outdoor unit
Performance Test Condition			NEW JIS	
C O O L I N G	Capacity	kW	2.00 - 2.00	
		BTU/h	6820 - 6820	
		kcal/h	1720 - 1720	
	EER	W/W	3.28 - 3.17	
		BTU/hW	11.2 - 10.8	
	Noise Level	dB (A)	High: 33 Low: 26	High: 46 - 47
Power level dB		High: 46	High: 61 - 62	
H E A T I N G	Capacity	kW	2.10 - 2.10	
		BTU/h	7160 - 7160	
		kcal/h	1810 - 1810	
	Cop	W/W	4.20 - 4.00	
		BTU/hW	14.3 - 13.6	
	Noise Level	dB (A)	High: 36 Low: 28	High: 48 - 49
Power level dB		High: 49	High: 64 - 65	
Moisture Removal		l/h	1.3	
		(pt/h)	2.7	
Air Volume	Lo	m ³ /m (ft ³ /m)	Cooling; 5.9 (210) Heating; 6.3 (220)	—
	Me	m ³ /m (ft ³ /m)	Cooling; 7.0 (250) Heating; 6.9 (240)	—
	Hi	m ³ /m (ft ³ /m)	Cooling; 7.8 (280) Heating; 9.0 (320)	Cooling; 29.5 (1040) - 30.0 (1060)
	SHi	m ³ /m (ft ³ /m)	Cooling; 9.1 (320)	—
Refrigerant Control Device			—	Capillary Tube
Refrigerant Oil (Charged)		cm ³	—	ATMOS NM56M or SUNISO 4GDID (290cm ³)
Refrigerant (Charged) R22		kg (oz)	—	0.71 (25.0)
Dimension	Height	mm (inch)	280 (11 - 1/32)	510 (20 - 3/32)
	Width	mm (inch)	799 (31 - 15/32)	650 (25 - 19/32)
	Depth	mm (inch)	183 (7 - 7/32)	230 (9 - 1/16)
Net Weight		kg (lbs)	9 (20)	24 (53)
Pipe Diameter	Gas	mm (inch)	9.52 (3/8")	
	Liquid	mm (inch)	6.35 (1/4")	
Height Difference		m (ft)	5 (16.4)	
Pipe Length Range		m (ft)	3 (9.8) ~ 10 (32.8)	
Additional Gas Amount		g/m (oz/ft)	20 (0.2)	
Refrigeration Charge Less		m (ft)	7.5 (24.6)	
Drain Hose	Inner diameter	mm	16	—
	Length	mm	650	—
Compressor	Type		—	Rotary (1 cylinder) rolling piston type
	Motor Type		—	Induction (2-poles)
	Rated Output	W	—	550

Item		Unit	Indoor unit	Outdoor unit
Fan	Type		Cross-flow Fan	Propeller Fan
	Material		ASG20K1	PP Resin
	Motor Type		Induction (4-poles)	Induction (6-poles)
	Input power	W	42 - 47	56 - 63
	Output power	W	15	30
	Fan Speed	Lo (Cool / Heat)	rpm	780 / 840
		Me (Cool / Heat)	rpm	920 / 920
		Hi (Cool / Heat)	rpm	1030 / 1200
		SHi (Cool / Heat)	rpm	1200 / —
Heat Exchanger	Fin material		Aluminium (Pre Coat)	Aluminium (Blue Coat)
	Fin Type		Slit Fin	Corrugate Fin
	Row × Stage × FPI		2 × 15 × 21	1 × 19 × 17
	Size (W × H × L)	mm (inch)	610 × 315 × 25.4	22 × 483 × 576
Air Filter Type	Material		Polypropelene	—
	Style		One-touch	—

1. Cooling capacities are based on indoor temperature of 27°C D.B. (80.6°F D.B.), 19.0°C W.B. (66.2°F W.B.) and outdoor air temperature of 35°C D.B. (95°F D.B.), 24°C W.B. (75.2°F W.B.)
2. Heating capacities are based on indoor temperature of 20°C D.B. (68°F D.B.) and outdoor air temperature of 7°C D.B. (44.6°F D.B.), 6°C W.B. (42.8°F W.B.)

Item		Unit		
Power Source (Phase, Voltage, Cycle)		ø	Single	Single
		V	220	230
		Hz	50	50
Input power	Cooling	W	610	630
	Heating	W	500	525
Starting Current		A	12.4	12.4
Running Current	Cooling	A	2.9	2.8
	Heating	A	2.4	2.4
Maximum Current		A	3.4	3.4
Power Factor	Cooling	%	96	98
	Heating	%	95	95
Power factor means total figure of compressor, indoor fan motor and outdoor fan motor.				
Power Cord	Number of core		3 (1.5mm)	
	Length	m (ft)	2 (6)	
Thermostat			—	—
Protection Device			—	2 Stage Overload Protector

Note:

- Specification are subjected to change without prior notice for further improvement.

2.2. CS-A9HKD CU-A9HKD

Item			Unit	Indoor unit	Outdoor unit	
Performance Test Condition				NEW JIS		
C O O L I N G	Capacity		kW	2.65 - 2.65		
			BTU/h	9040 - 9040		
			kcal/h	2280 - 2280		
	EER		W/W	3.19 - 3.08		
			BTU/hW	10.9 - 10.5		
	Noise Level		dB (A)	High: 36 Low: 26	High: 48 - 49	
			Power level dB	High: 49	High: 63 - 64	
H E A T I N G	Capacity		kW	2.80 - 2.85		
			BTU/h	9550 - 9720		
			kcal/h	2410 - 2450		
	Cop		W/W	4.00 - 3.85		
			BTU/hW	13.6 - 13.1		
	Noise Level		dB (A)	High: 38 Low: 28	High: 48 - 49	
			Power level dB	High: 51	High: 64 - 65	
Moisture Removal			l/h	1.6		
			(pt/h)	3.4		
Air Volume		Lo	m ³ /m (ft ³ /m)	Cooling; 6.4 (230) Heating; 6.7 (240)	—	
		Me	m ³ /m (ft ³ /m)	Cooling; 7.8 (270) Heating; 7.5 (260)	—	
		Hi	m ³ /m (ft ³ /m)	Cooling; 9.4 (330) Heating; 9.8 (350)	Cooling; 29.5 (1040) - 30.0 (1060)	
		SHi	m ³ /m (ft ³ /m)	Cooling; 10.2 (360)	—	
Refrigerant Control Device				—	Capillary Tube	
Refrigerant Oil (Charged)			cm ³	—	ATMOS M60 or SUNISO 4GDID (350cm ³)	
Refrigerant (Charged) R22			kg (oz)	—	0.67 (23.7)	
Dimension		Height	mm (inch)	280 (11 - 1/32)	510 (20 - 3/32)	
		Width	mm (inch)	799 (31 - 15/32)	650 (25 - 19/32)	
		Depth	mm (inch)	183 (7 - 7/32)	230 (9 - 1/16)	
Net Weight			kg (lbs)	9 (20)	27 (60)	
Pipe Diameter		Gas	mm (inch)	9.52 (3/8")		
		Liquid	mm (inch)	6.35 (1/4")		
Height Difference			m (ft)	5 (16.4)		
Pipe Length Range			m (ft)	3 (9.8) ~ 10 (32.8)		
Additional Gas Amount			g/m (oz/ft)	20 (0.2)		
Refrigeration Charge Less			m (ft)	7.5 (24.6)		
Drain Hose		Inner diameter	mm	16	—	
		Length	mm	650	—	
Compressor		Type		—	Rotary (1 cylinder) rolling piston type	
		Motor Type		—	Induction (2-poles)	
		Rated Output	W	—	750	
Fan		Type		Cross-flow Fan	Propeller Fan	
		Material		ASG20K1	PP Resin	
		Motor Type		Induction (4-poles)	Induction (6-poles)	
		Input power	W	42 - 47	56 - 63	
		Output power	W	15	30	
		Fan Speed	Lo (Cool / Heat)	rpm	830 / 890	—
			Me (Cool / Heat)	rpm	1000 / 1000	—
			Hi (Cool / Heat)	rpm	1210 / 1310	800 - 830 / —
SHi (Cool / Heat)	rpm		1310 / —	—		

	Item	Unit	Indoor unit	Outdoor unit
Heat Exchanger	Fin material		Aluminium (Pre Coat)	Aluminium (Blue Coat)
	Fin Type		Slit Fin	Corrugate Fin
	Row × Stage × FPI		2 × 15 × 21	1 × 19 × 17
	Size (W × H × L)	mm (inch)	610 × 315 × 25.4	22 × 483 × 576
Air Filter Type	Material		Polypropelene	—
	Style		One-touch	—

1. Cooling capacities are based on indoor temperature of 27°C D.B. (80.6°F D.B.), 19.0°C W.B. (66.2°F W.B.) and outdoor air temperature of 35°C D.B. (95°F D.B.), 24°C W.B. (75.2°F W.B.)
2. Heating capacities are based on indoor temperature of 20°C D.B. (68°F D.B.) and outdoor air temperature of 7°C D.B. (44.6°F D.B.), 6°C W.B. (42.8°F W.B.)

	Item	Unit		
Power Source (Phase, Voltage, Cycle)		Ø	Single	Single
		V	220	230
		Hz	50	50
Input power	Cooling	W	830	860
	Heating	W	700	740
Starting Current		A	18	18
Running Current	Cooling	A	3.9	3.9
	Heating	A	3.3	3.3
Maximum Current		A	5.1	5.1
Power Factor	Cooling	%	97	96
	Heating	%	96	97
Power factor means total figure of compressor, indoor fan motor and outdoor fan motor.				
Power Cord	Number of core		3 (1.5mm)	
	Length	m (ft)	2 (6)	
Thermostat			—	—
Protection Device			—	2 Stage Overload Protector

Note:

- Specification are subjected to change without prior notice for further improvement.

2.3. CS-A12HKD CU-A12HKD

Item			Unit	Indoor unit	Outdoor unit	
Performance Test Condition				NEW JIS		
C O O L I N G	Capacity		kW	3.52 - 3.54		
			BTU/h	12000 - 12100		
			kcal/h	3030 - 3040		
	EER		W/W	3.26 - 3.16		
			BTU/hW	11.1 - 10.8		
	Noise Level		dB (A)	High: 39 Low: 29	High: 48 - 49	
			Power level dB	High: 52	High: 63 - 64	
H E A T I N G	Capacity		kW	4.00 - 4.05		
			BTU/h	13640 - 13810		
			kcal/h	3440 - 3480		
	Cop		W/W	3.67 - 3.62		
			BTU/hW	12.5 - 12.3		
	Noise Level		dB (A)	High: 40 Low: 29	High: 48 - 49	
			Power level dB	High: 53	High: 64 - 65	
Moisture Removal			l/h	2.0		
			(pt/h)	4.2		
Air Volume		Lo	m ³ /m (ft ³ /m)	Cooling; 6.1 (220) Heating; 6.5 (230)	—	
		Me	m ³ /m (ft ³ /m)	Cooling; 8.5 (300) Heating; 8.5 (300)	—	
		Hi	m ³ /m (ft ³ /m)	Cooling; 9.9 (350) Heating; 10.0 (350)	Cooling; 32.5 (1150) - 33.0 (1160)	
		SHi	m ³ /m (ft ³ /m)	Cooling; 10.1 (360)	—	
Refrigerant Control Device				—	Capillary Tube	
Refrigerant Oil (Charged)			cm ³	—	ATMOS NM56M or SUNISO 4GDID (350cm ³)	
Refrigerant (Charged) R22			kg (oz)	—	1.01 (35.7)	
Dimension		Height	mm (inch)	280 (11 - 1/32)	540 (21 - 9/32)	
		Width	mm (inch)	799 (31 - 15/32)	780 (30 - 23/32)	
		Depth	mm (inch)	183 (7 - 7/32)	289 (11 - 13/32)	
Net Weight			kg (lbs)	9 (20)	34 (75)	
Pipe Diameter		Gas	mm (inch)	12.70 (1/2")		
		Liquid	mm (inch)	6.35 (1/4")		
Height Difference			m (ft)	5 (16.4)		
Pipe Length Range			m (ft)	3 (9.8) ~ 15 (49.2)		
Additional Gas Amount			g/m (oz/ft)	20 (0.2)		
Refrigeration Charge Less			m (ft)	7.5 (24.6)		
Drain Hose		Inner diameter	mm	16	—	
		Length	mm	650	—	
Compressor		Type		—	Rotary (1 cylinder) rolling piston type	
		Motor Type		—	Induction (2-poles)	
		Rated Output	W	—	950	
Fan		Type		Cross-flow Fan	Propeller Fan	
		Material		ASG20K1	PP Resin	
		Motor Type		Induction (4-poles)	Induction (6-poles)	
		Input power	W	42 - 47	64 - 73	
		Output power	W	15	31	
		Fan Speed	Lo (Cool / Heat)	rpm	800 / 860	—
			Me (Cool / Heat)	rpm	1120 / 1120	—
			Hi (Cool / Heat)	rpm	1300 / 1320	845 - 860 / —
SHi (Cool / Heat)	rpm		1320 / —	—		

	Item	Unit	Indoor unit	Outdoor unit
Heat Exchanger	Fin material		Aluminium (Pre Coat)	Aluminium (Blue Coat)
	Fin Type		Slit Fin	Corrugate Fin
	Row × Stage × FPI		2 × 15 × 21	2 × 24 × 17
	Size (W × H × L)	mm (inch)	610 × 315 × 25.4	36.38 × 504 × 713:684
Air Filter Type	Material		Polypropelene	—
	Style		One-touch	—

1. Cooling capacities are based on indoor temperature of 27°C D.B. (80.6°F D.B.), 19.0°C W.B. (66.2°F W.B.) and outdoor air temperature of 35°C D.B. (95°F D.B.), 24°C W.B. (75.2°F W.B.)
2. Heating capacities are based on indoor temperature of 20°C D.B. (68°F D.B.) and outdoor air temperature of 7°C D.B. (44.6°F D.B.), 6°C W.B. (42.8°F W.B.)

	Item	Unit		
Power Source (Phase, Voltage, Cycle)		Ø	Single	Single
		V	220	230
		Hz	50	50
Input power	Cooling	W	1.08	1.12
	Heating	W	1.09	1.12
Starting Current		A	20	20
Running Current	Cooling	A	5.1	5.1
	Heating	A	5.2	5.1
Maximum Current		A	6.0	6.0
Power Factor	Cooling	%	96	95
	Heating	%	95	95
Power factor means total figure of compressor, indoor fan motor and outdoor fan motor.				
Power Cord	Number of core		3 (1.5mm)	
	Length	m (ft)	2 (6)	
Thermostat			—	—
Protection Device			—	Overload Protector

Note:

- Specification 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-A7HK, CS/CU-A9HK, long piping up to 10 meter
- CS/CU-A12HK, long piping up to 15 meter

- **Easy to use remote control**

- **Quality Improvement**

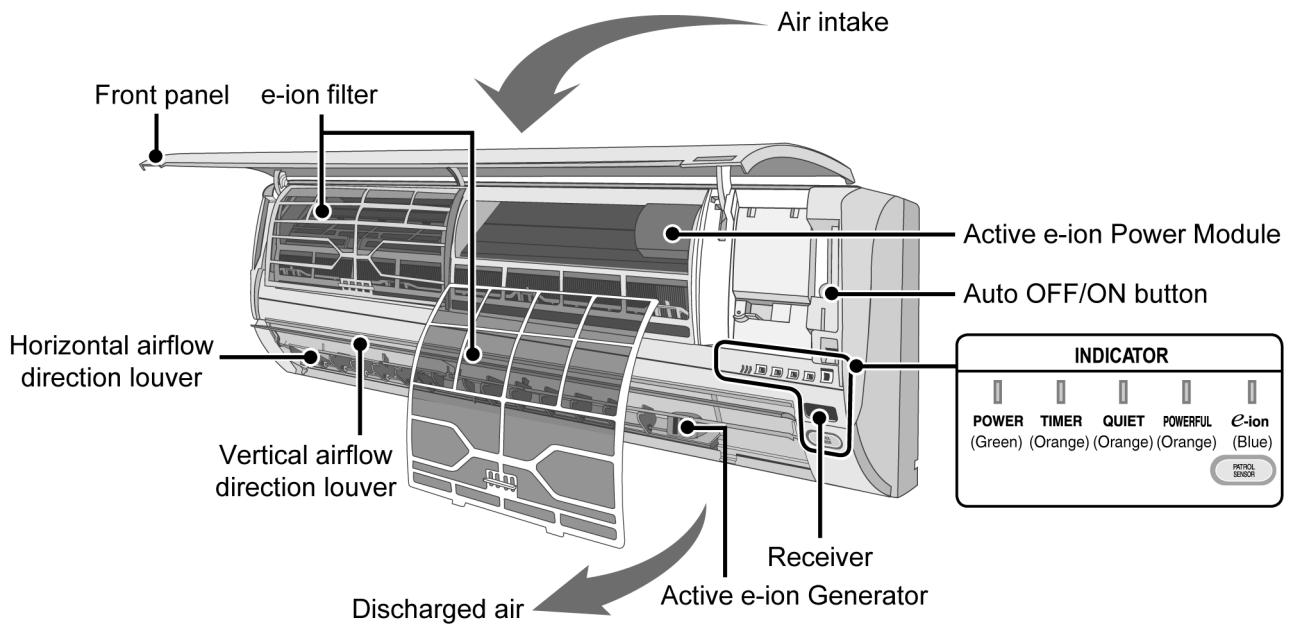
- Random auto restart after power failure for safety restart operation
- Gas leakage protection
- Prevent compressor reverse cycle
- Inner protector to protect Compressor
- Noise prevention during soft dry operation
- Blue Coated Condenser for high resistance to corrosion

- **Operation Improvement**

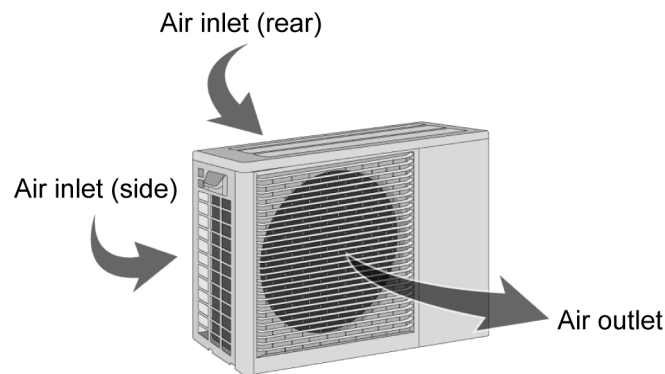
- Quiet mode to reduce the indoor unit operating sound
- Powerful mode to reach the desired room temperature quickly
- 24-hour timer setting

4 Location of Controls and Components

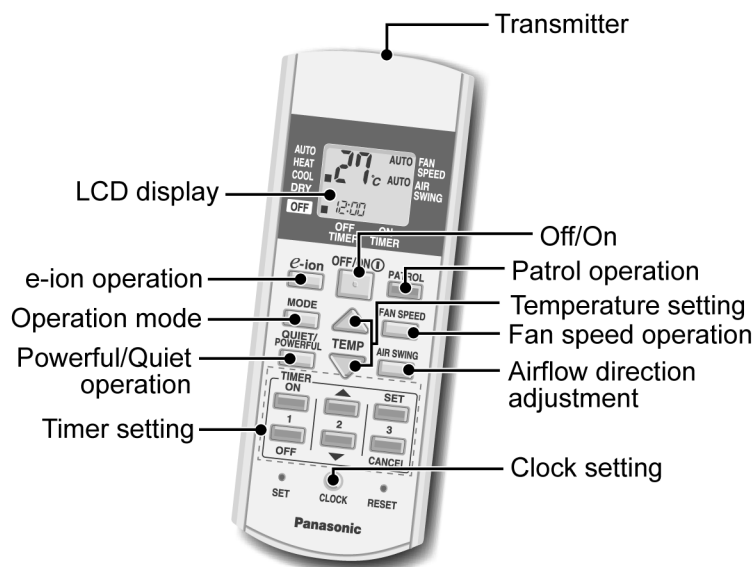
4.1. Indoor Unit



4.2. Outdoor Unit



4.3. Outdoor Unit



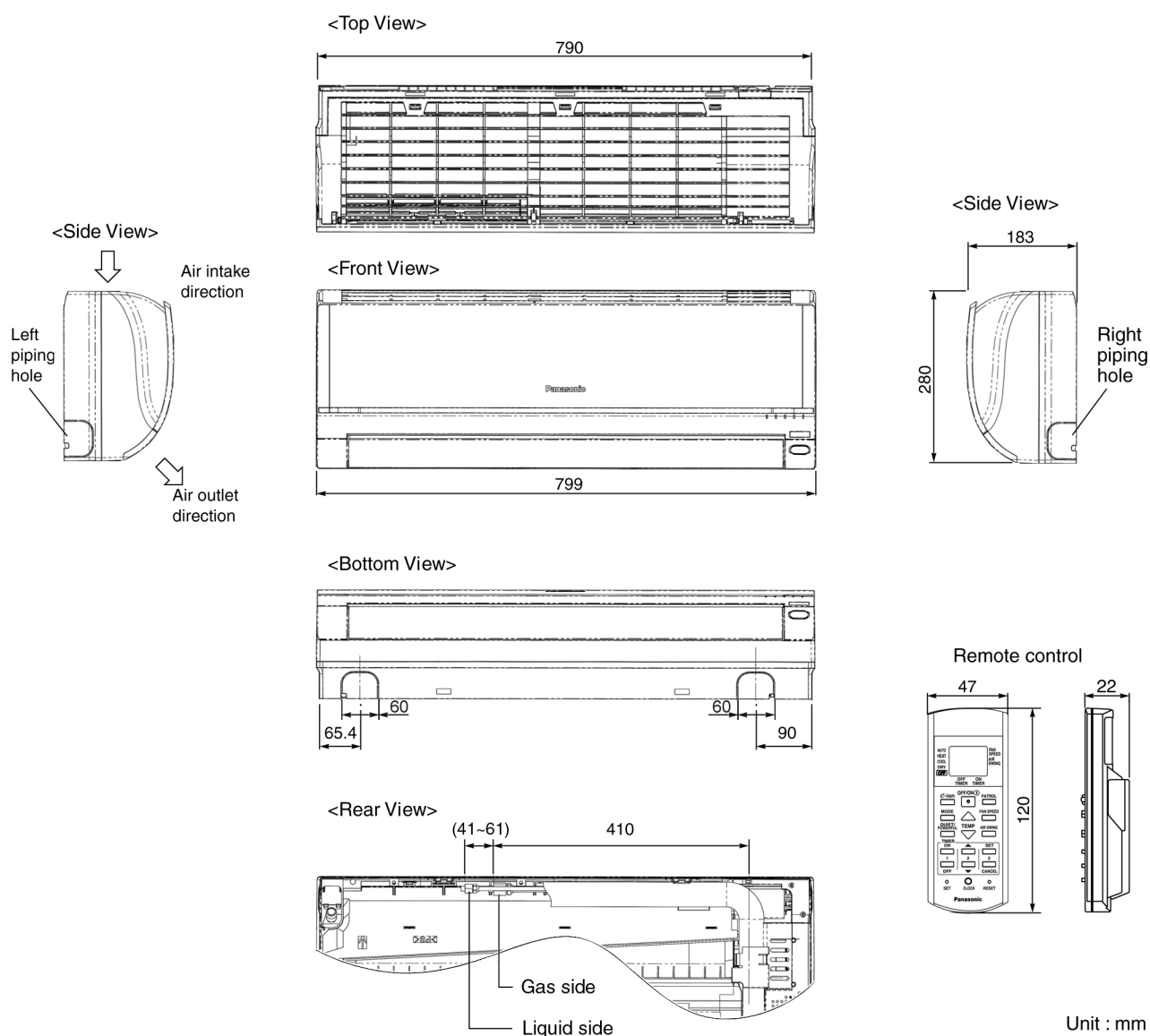
* For normal operation, the **SET** button is not in use.

* Press **RESET** button to restore the remote control's default setting.

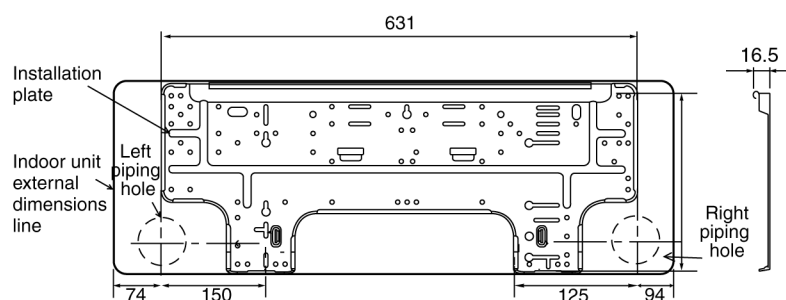
5 Dimensions

5.1. Indoor Unit & Remote Control

5.1.1. CS-A7HKD CS-A9HKD CS-A12HKD

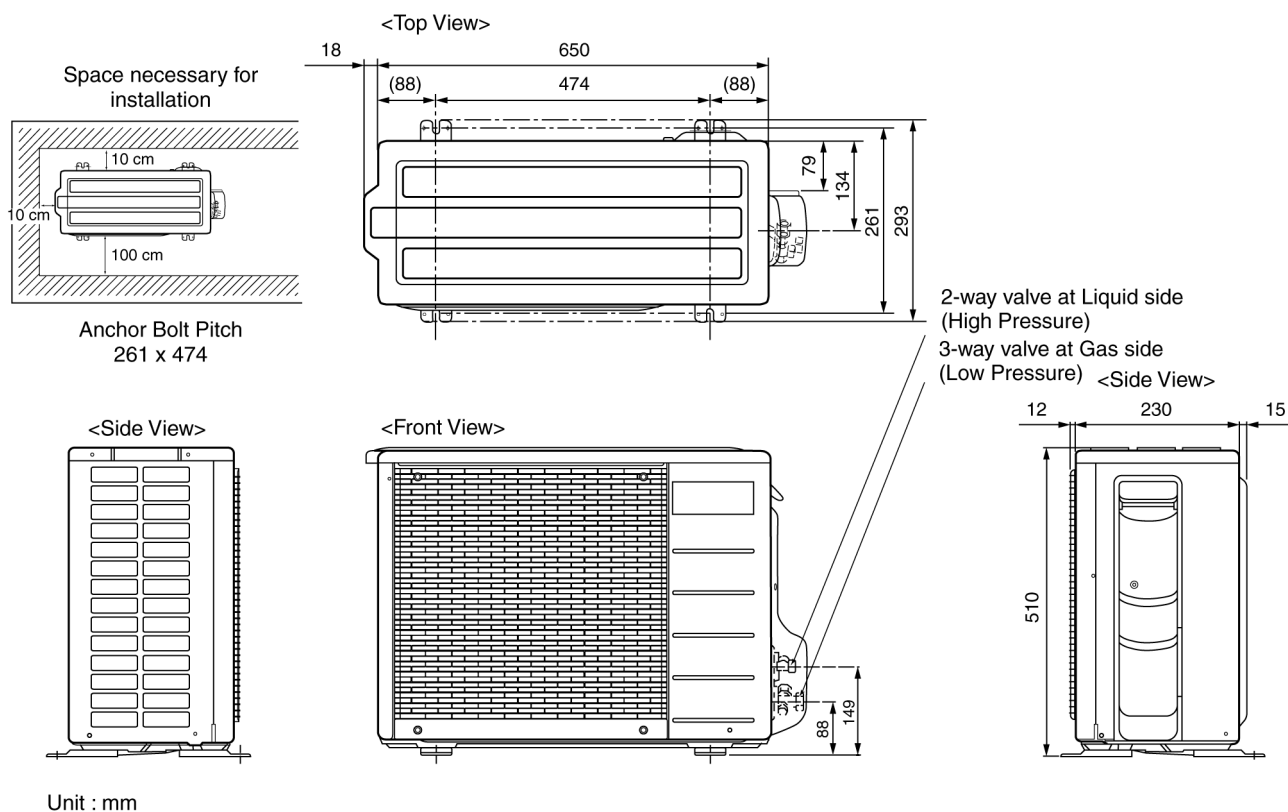


Relative position between the indoor unit and the installation plate <Front View>

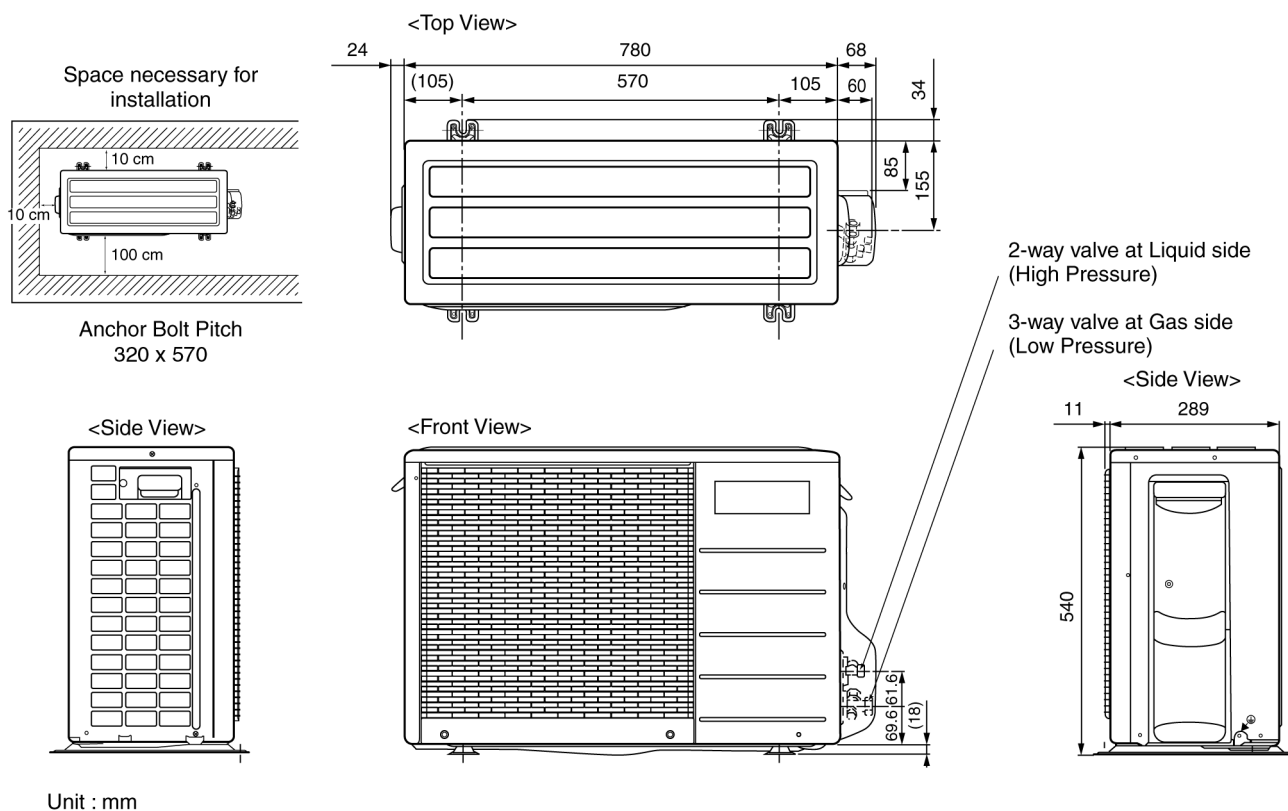


5.2. Outdoor Unit

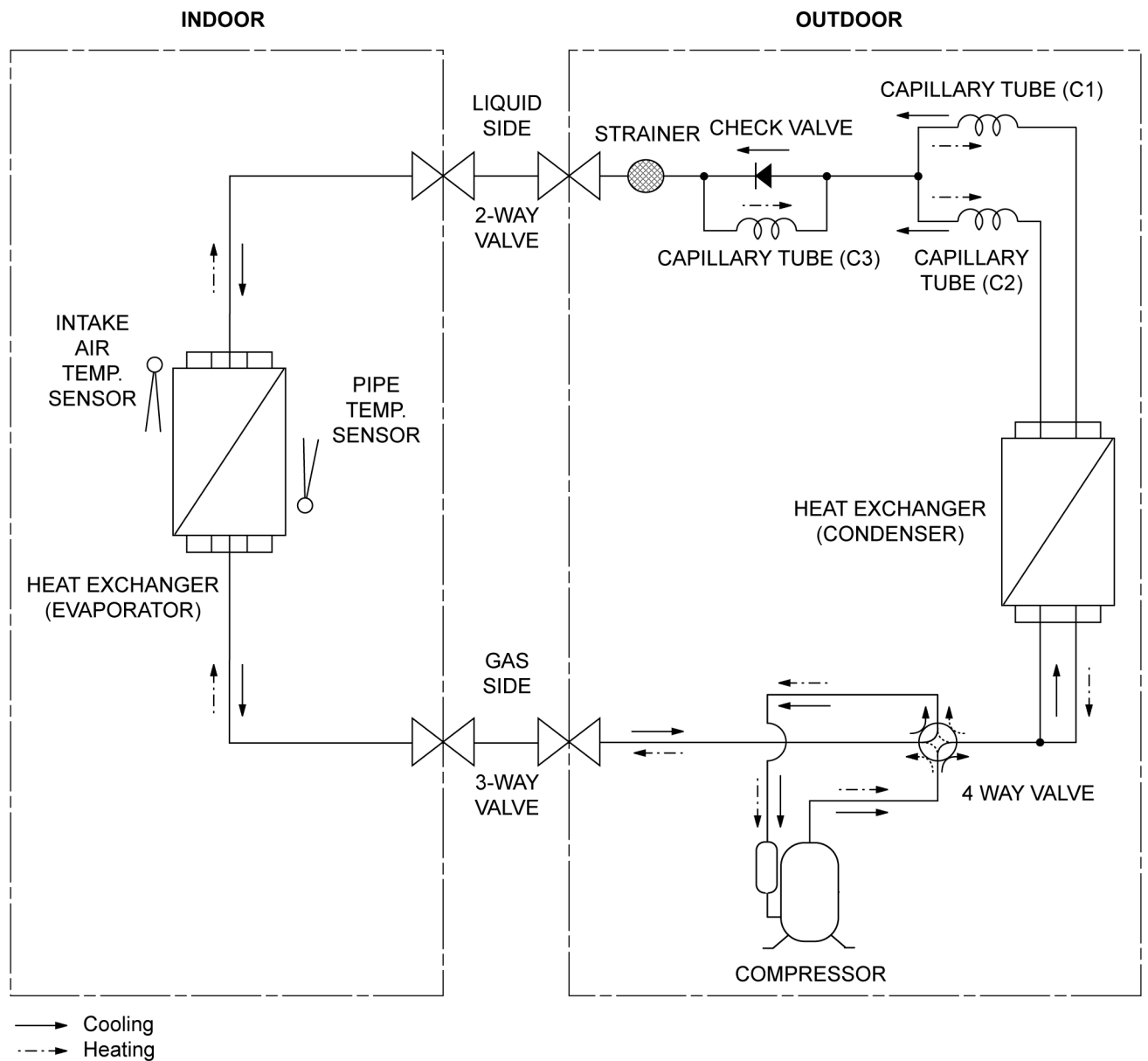
5.2.1. CU-A7HKD CU-A9HKD



5.2.2. CU-A12HKD

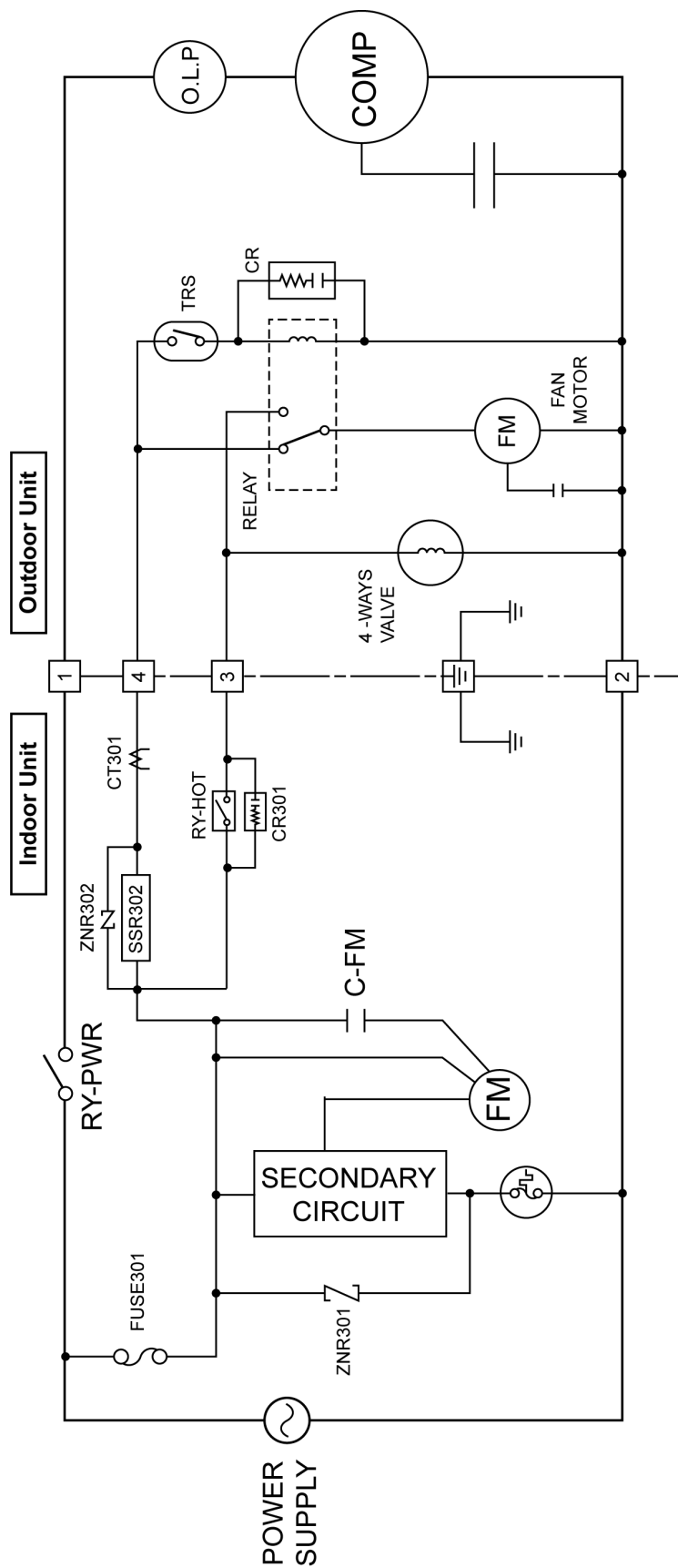


6 Refrigeration Cycle Diagram

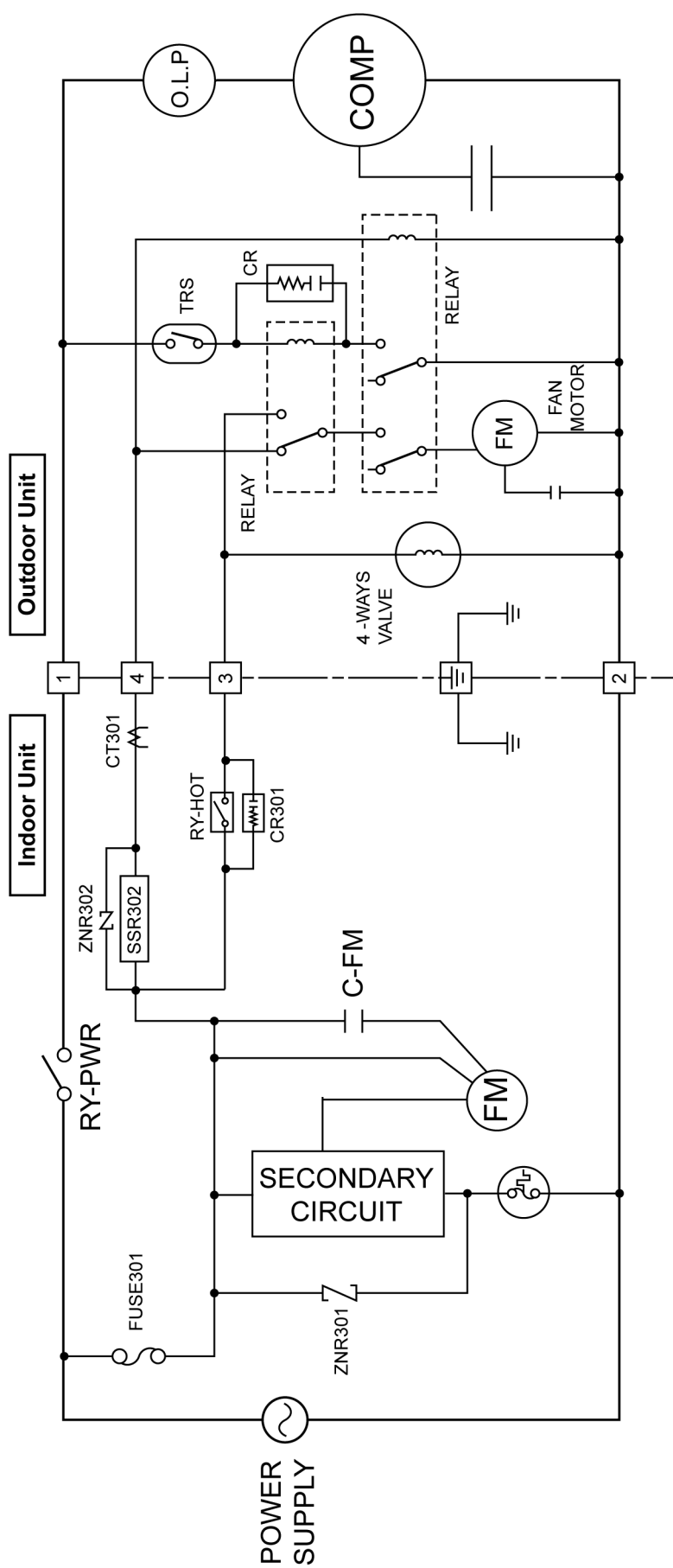


7 Block Diagram

7.1. CS-A7HKD CU-A7HKD CS-A9HKD CU-A9HKD

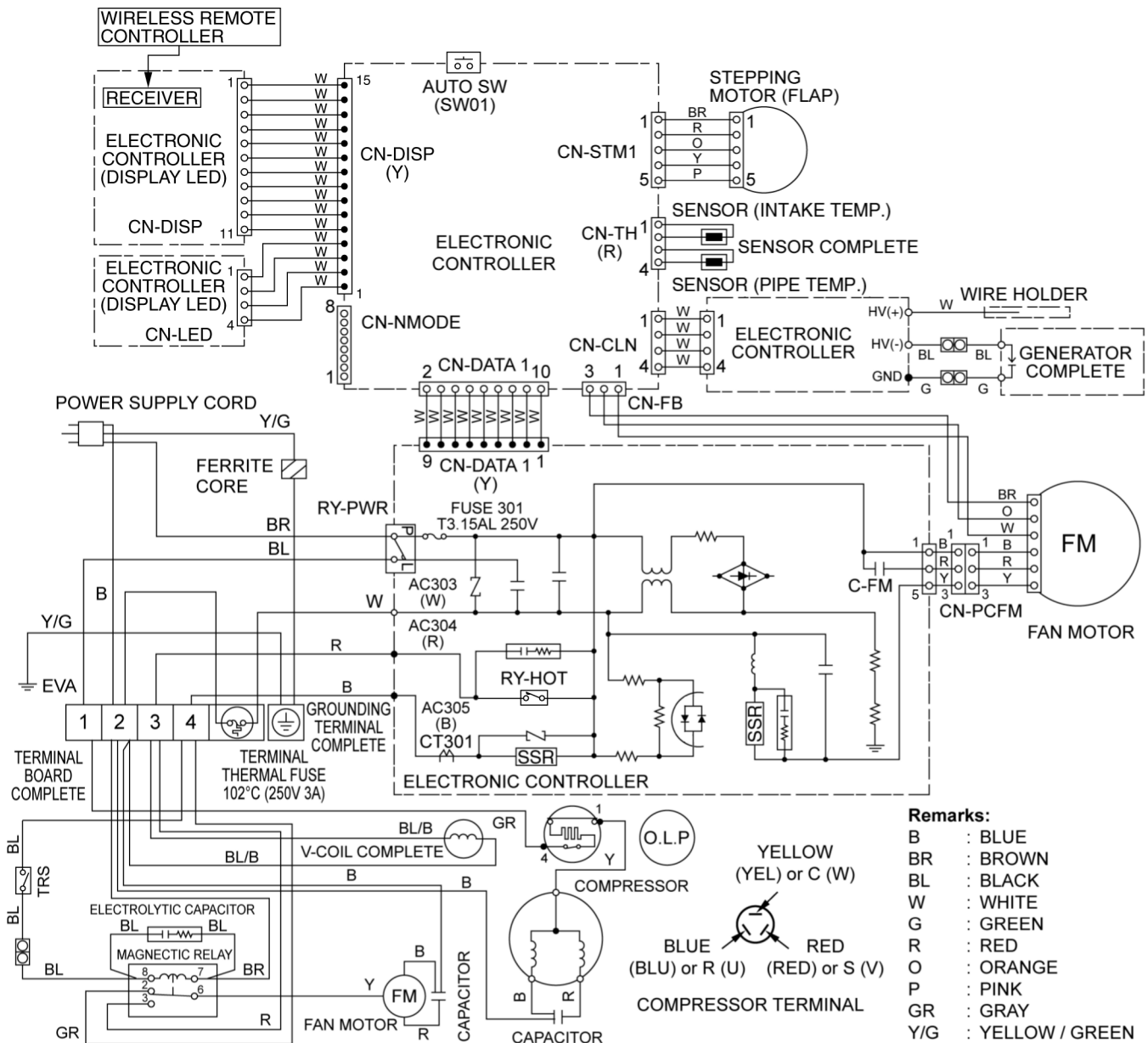


7.2. CS-A12HKD CU-A12HKD



8 Wiring Connection Diagram

8.1. CS-A7HKD CU-A7HKD CS-A9HKD CU-A9HKD



Resistance of Indoor Fan Motor Windings

MODEL	CS-A7HK CS-A9HK
CONNECTION	CWA921373
BLUE-YELLOW	390.0 Ω
YELLOW-RED	394.0 Ω

Note: Resistance at 25°C of ambient temperature.

Resistance of Outdoor Fan Motor Windings

MODEL	CU-A7HK CU-A9HK
CONNECTION	CWA951526
BLUE-YELLOW	309 Ω
YELLOW-RED	210 Ω

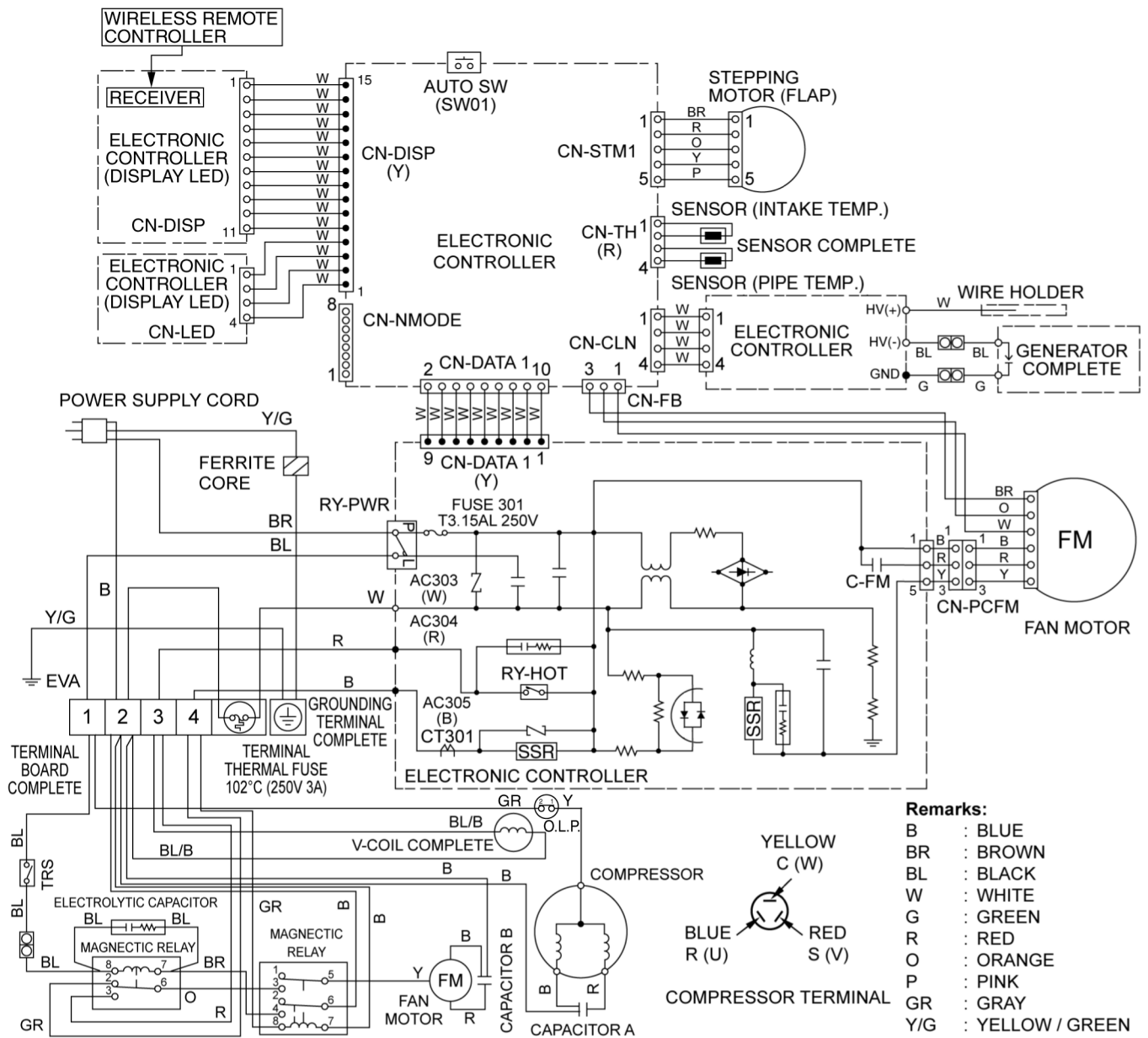
Note: Resistance at 25°C of ambient temperature.

Resistance of Compressor Windings

MODEL	CU-A7HK	CU-A9HK
CONNECTION	2RS122D5BG02	2PS156D3BB02
C - R	5.193 Ω	3.501 Ω
C - S	5.557 Ω	3.405 Ω

Note: Resistance at 20°C of ambient temperature.

8.2. CS-A12HKD CU-A12HKD



Resistance of Indoor Fan Motor Windings

MODEL	CS-A12HK
CONNECTION	CWA921373
BLUE-YELLOW	390.0 Ω
YELLOW-RED	394.0 Ω

Note: Resistance at 25°C of ambient temperature.

Resistance of Outdoor Fan Motor Windings

MODEL	CU-A12HK
CONNECTION	CWA951117J
BLUE-YELLOW	230 Ω
YELLOW-RED	255 Ω

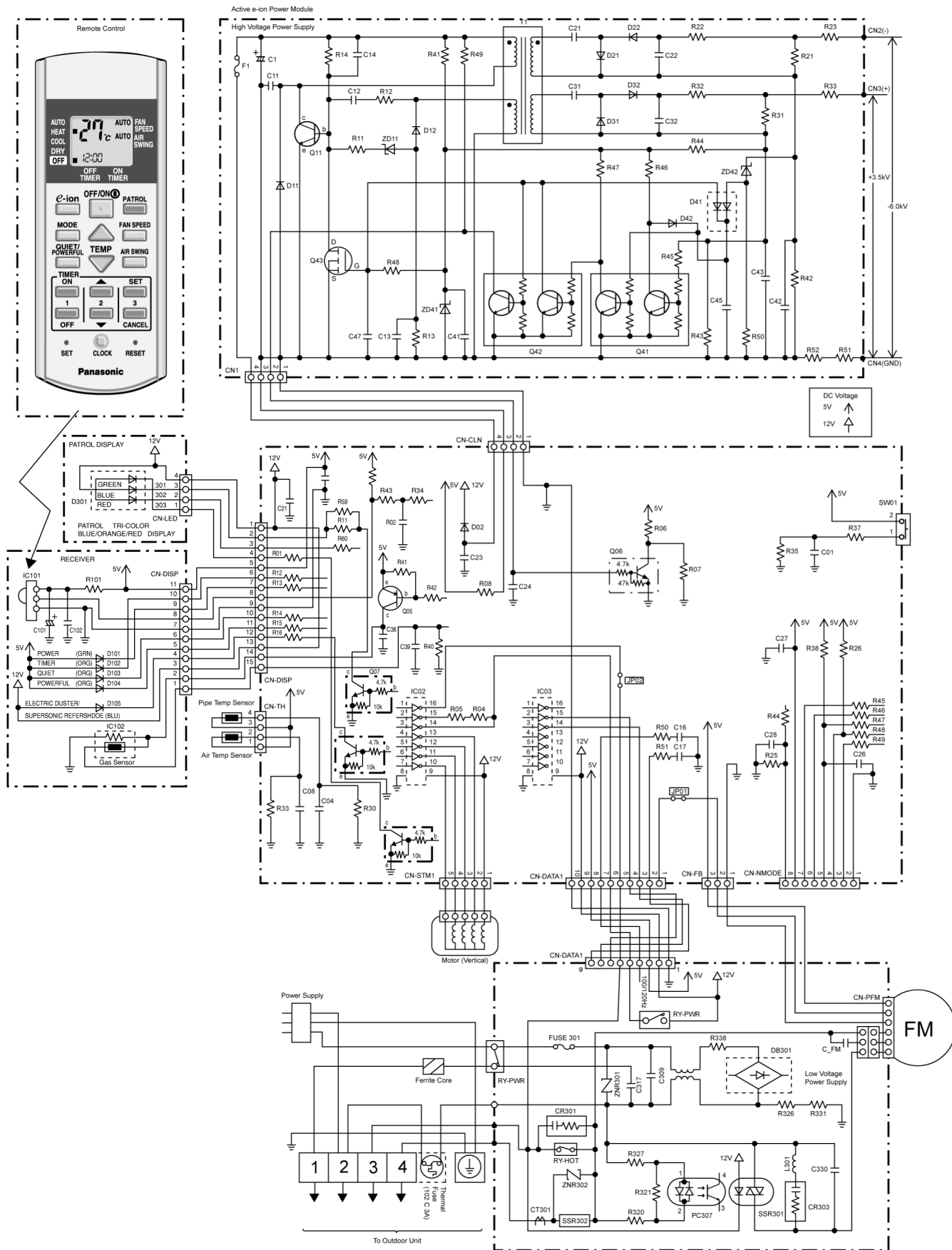
Note: Resistance at 25°C of ambient temperature.

Resistance of Compressor Windings

MODEL	CU-A12HK
CONNECTION	2PS206D2BA02
C - R	3.207 Ω
C - S	3.256 Ω

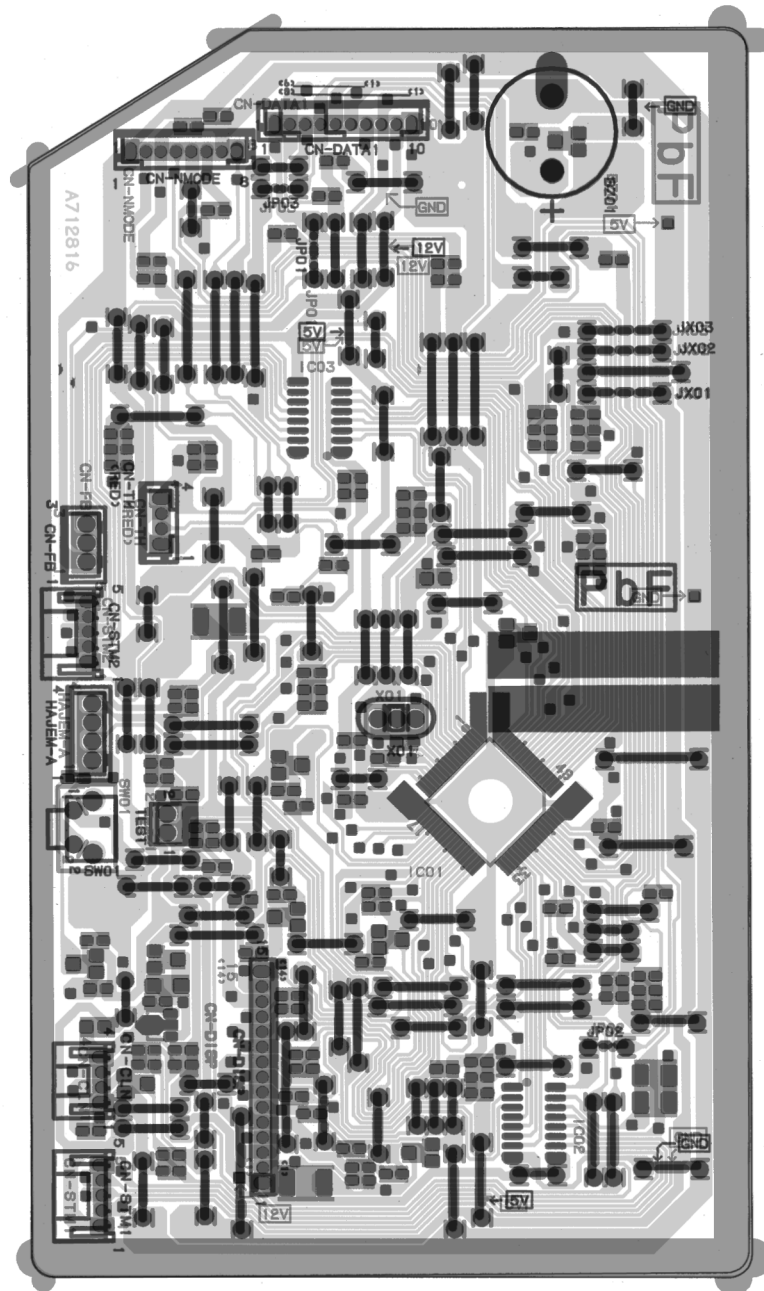
Note: Resistance at 20°C of ambient temperature.

9 Electronic Circuit Diagram

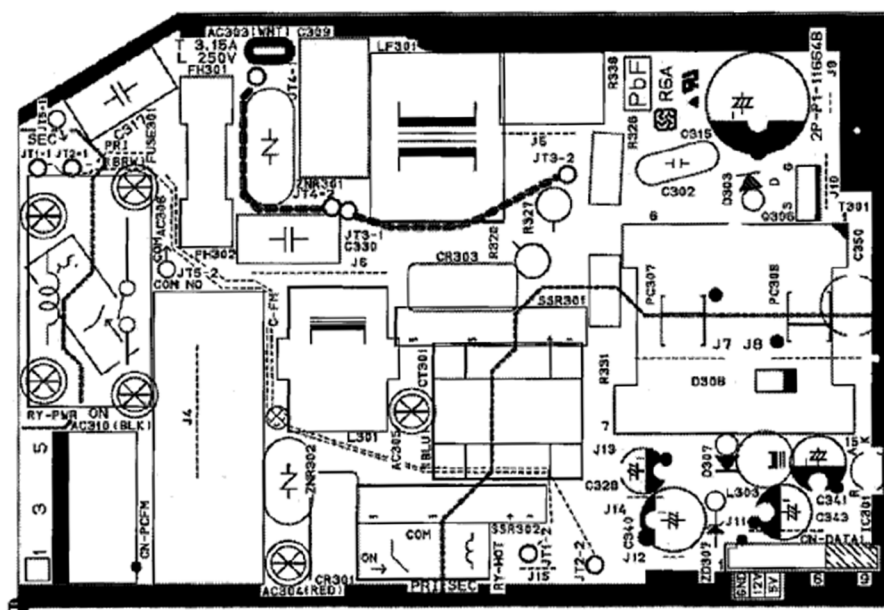


10 Printed Circuit Board

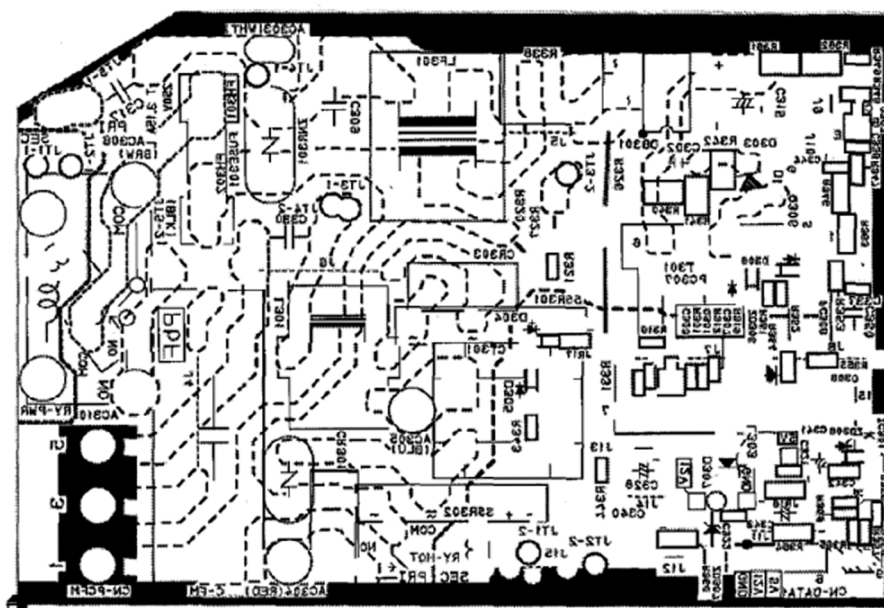
10.1. Main Printed Circuit Board



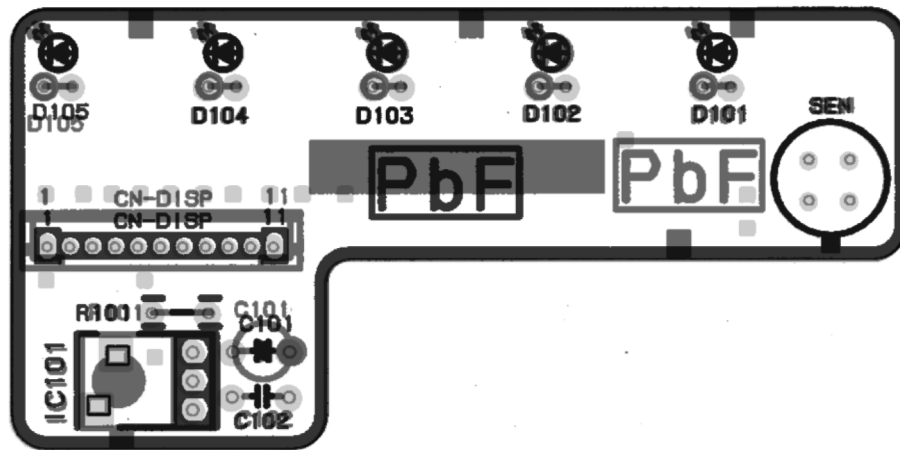
TOP VIEW



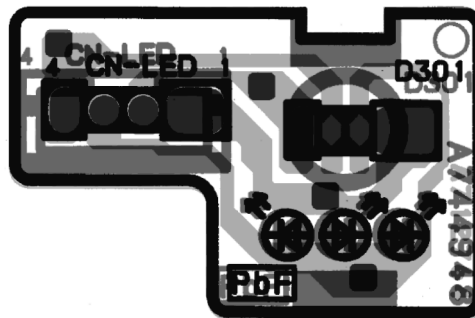
BOTTOM VIEW



10.3. Indicator Printed Circuit Board



10.4. Patrol Printed Circuit Board



11 Installation Instruction

11.1. Select The Best Location

INDOOR UNIT

- There should not be any heat source or steam near the unit.
- There should not be any obstacles blocking the air circulation.
- A place where air circulation in the room is good.
- A place where drainage can be easily done.
- A place where noise prevention is taken into consideration.
- Do not install the unit near the door way.
- Ensure the spaces indicated by arrows from the wall, ceiling, fence or other obstacles.
- Recommended installation height for indoor unit shall be at least 2.5 m.

OUTDOOR UNIT

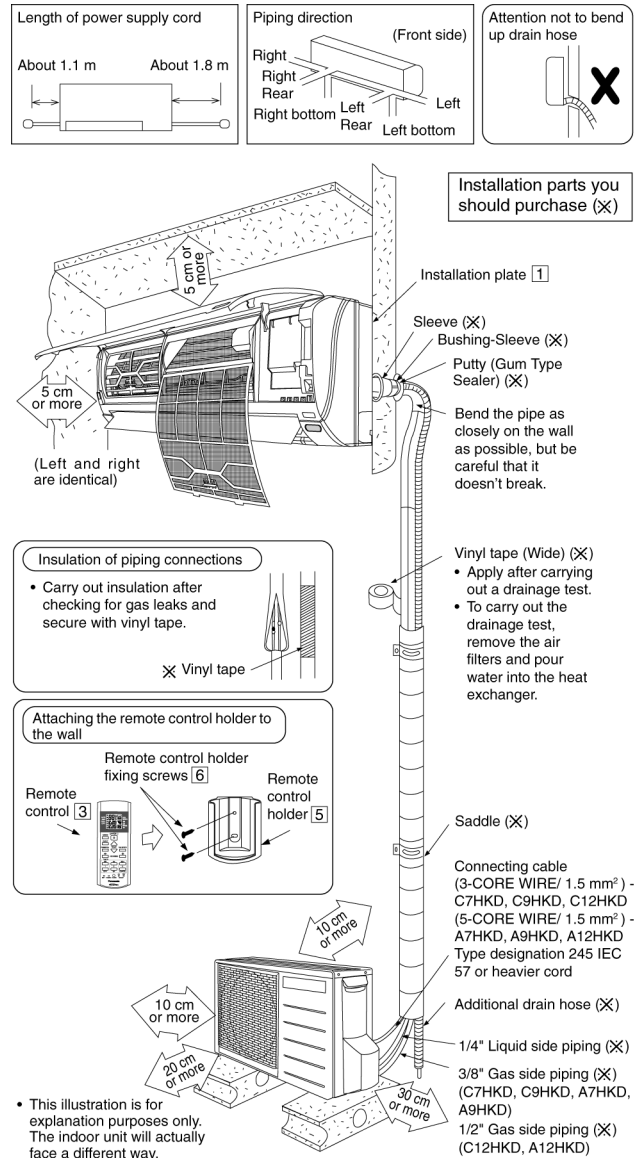
- If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.
- There should not be any animal or plant which could be affected by hot air discharged.
- Keep the spaces indicated by arrows from wall, ceiling, fence or other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

Model	Piping size		Rated Length (m)	Max Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid					
C7HKD C9HKD	3/8"	1/4"	7.5	5	3	10	10
A7HKD A9HKD	3/8"	1/4"	7.5	5	3	10	20
C12HKD	1/2"	1/4"	7.5	5	3	15	10
A12HKD	1/2"	1/4"	7.5	5	3	15	20

Example: For C7HKD

If the unit is installed at 10 m distance, the quantity of additional refrigerant should be 25 g $(10 - 7.5) \text{ m} \times 10 \text{ g/m} = 25 \text{ g}$

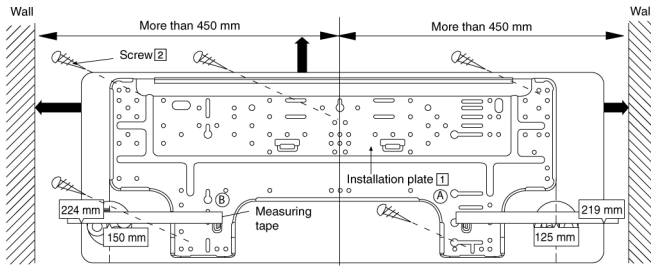
11.2. Indoor/Outdoor Unit Installation Diagram



11.3. Indoor Unit

11.3.1. HOW TO FIX INSTALLATION PLATE

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



The centre of installation plate should be at more than 450 mm at right and left of the wall.

The distance from installation plate edge to ceiling should more than 67 mm.

From installation plate left edge to unit's left side is 74 mm.

From installation plate right edge to unit's right is 94 mm.

- ⑧ :
- For left side piping, piping connection for liquid should be about 15 mm from this line.
 - For left side piping, piping connection for gas should be about 45 mm from this line.
 - For left side piping, piping connection cable should be about 800 mm from this line.

- Mount the installation plate on the wall with 5 screws or more.
(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 $\varnothing 70$ mm hole-core drill.
 - Line according to the left and right side of the installation plate. The meeting point of the extended line is the centre of the hole. Another method is by putting measuring tape at position as shown in the diagram above. The hole centre is obtained by measuring the distance namely 150 mm and 125 mm for left and right hole respectively.
 - Drill the piping hole at either the right or the left and the hole should be slightly slanted to the outdoor side.

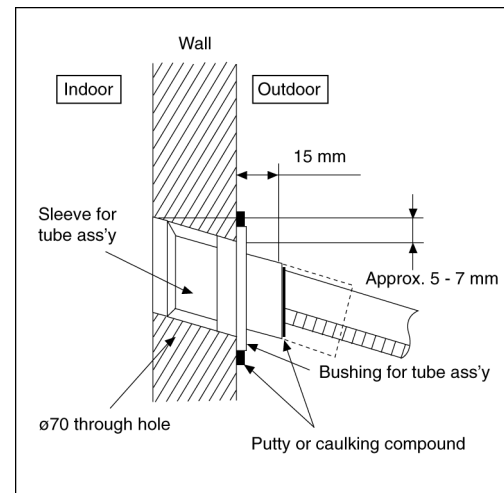
11.3.2. TO DRILL A HOLE IN THE WALL AND INSTALL A SLEEVE OF PIPING

- 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

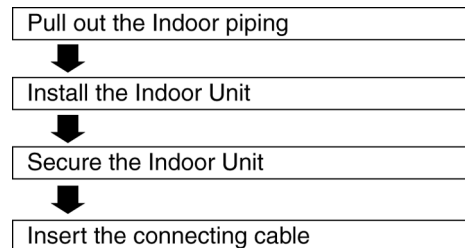
When the wall is hollow, please be sure to use the sleeve for tube ass'y to prevent dangers caused by mice biting the connecting cable.

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

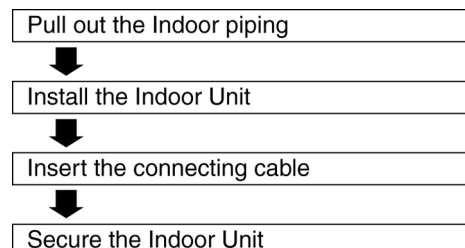


11.3.3. INDOOR UNIT INSTALLATION

1. For the right rear piping



2. For the right and right bottom piping



3. For the embedded piping

Replace the drain hose



Bend the embedded piping



- Use a spring bender or equivalent to bend the piping so that the piping is not crushed.

Install the Indoor Unit



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".

Pull the connecting cable into Indoor Unit



- The inside and outside connecting cable can be connected without removing the front grille.

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.)

Insulate and finish the piping

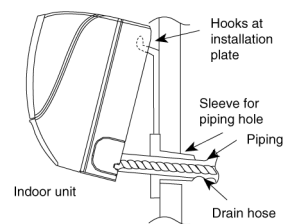


- Please refer to "Piping and finishing" column of outdoor section and "Insulation of piping connections" column as mentioned in Indoor/Outdoor Unit Installation.

Secure the Indoor Unit

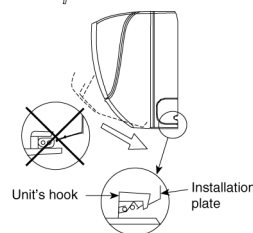
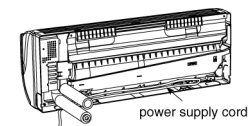
Install the indoor unit

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.



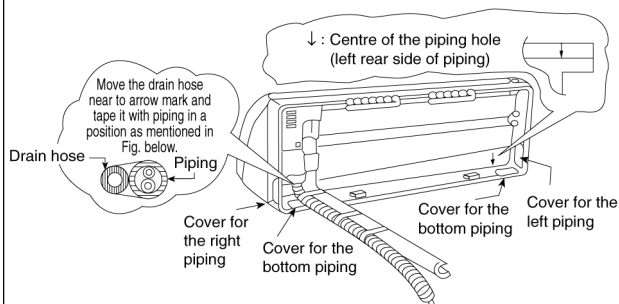
Secure the Indoor Unit

1. 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.
2. Press the lower left and right side of the unit against the installation plate until hooks engages with their slot (sound click).



Do not tie up power supply cord into a bundle by band. It may generate heat and cause fire.

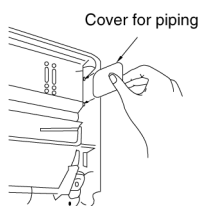
Pull out the piping and drain hose



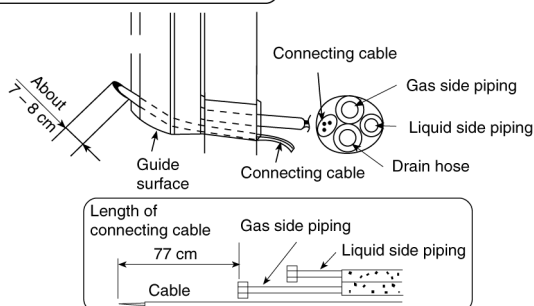
How to keep the cover

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

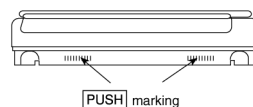
(Left, right and 2 bottom covers for piping.)



Insert the connecting cable



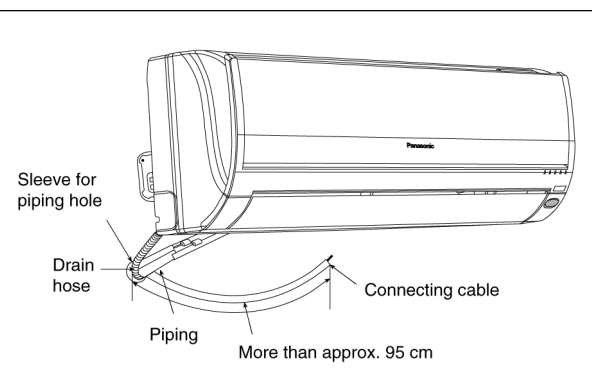
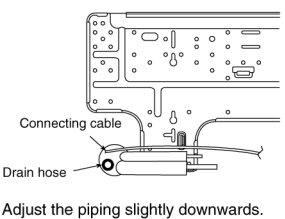
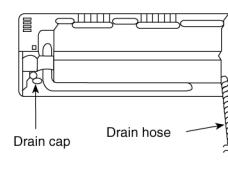
To take out the unit, push the **PUSH** marking at the bottom unit, and pull it slightly towards you to disengage the hooks from the unit.



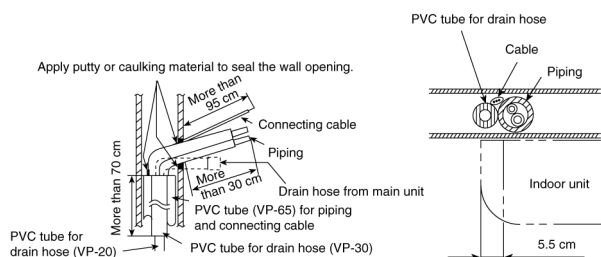
(This can be used for left rear piping and left bottom piping also.)

Exchange the drain hose and the cap

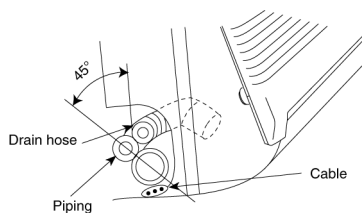
Rear view for left piping installation



- How to pull the piping and drain hose out, in case of the embedded piping.



- In case of left piping how to insert the connecting cable and drain hose.



11.3.4. CONNECT THE CABLE TO THE INDOOR UNIT

1. The inside and outside connecting cable can be connected without removing the front grille.
 2. Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed 3 (C7HKD, C9HKD, C12HKD) or 5 (A7HKD, A9HKD, A12HKD) x 1.5 mm² flexible cord, type designation 245 IEC 57 or heavier cord.
- Ensure the colour of wires of outdoor unit and the terminal Nos. are the same to the indoor's respectively.
 - Earth lead wire shall be longer than the other lead wires as shown in the figure for the electrical safety in case of the slipping out of the cord from the anchorage.

C7HKD, C9HKD, C12HKD

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

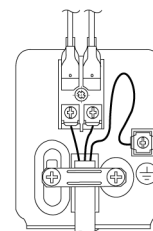
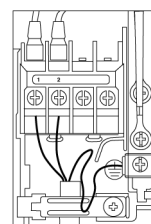
A7HKD, A9HKD, A12HKD

Terminals on the indoor unit	1	2	3	4	
Colour of wires					
Terminals on the outdoor unit	1	2	3	4	

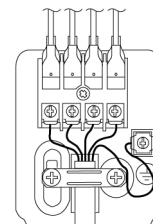
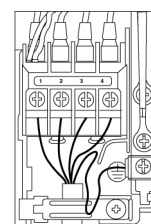
- Secure the cable onto the control board with the holder (clammer).

Indoor

Outdoor



C7HKD, C9HKD, C12HKD

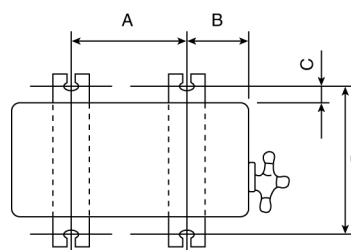


A7HKD, A9HKD, A12HKD

11.4. Outdoor Unit

11.4.1. INSTALL THE OUTDOOR UNIT

- After selecting the best location, start installation according to Indoor/Outdoor Unit Installation Diagram.
- 1. Fix the unit on concrete or rigid frame firmly and horizontally by bolt nut (ø10 mm).
- 2. 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
C7HKD, C9HKD, C12HKD, A7HKD, A9HKD	474 mm	87 mm	18.5 mm	261 mm
A12HKD	570 mm	105 mm	18.5 mm	320 mm

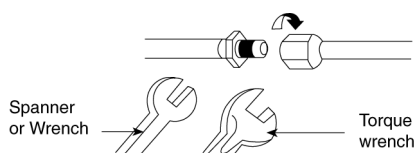
11.4.2. CONNECTING THE PIPING

Connecting The Piping To Indoor Unit

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.



Model	Piping size (Torque)	
	Gas	Liquid
C7HKD, C9HKD, A7HKD, A9HKD	3/8" [42 N•m]	1/4" [18 N•m]
C12HKD, A12HKD	1/2" [55 N•m]	1/4" [18 N•m]

CAUTION
Do not over tighten, over tightening cause gas leakage.

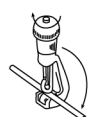
Connecting The Piping To Outdoor Unit

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.

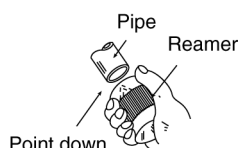
Align center of piping to valves and then tighten with torque wrench to the specified torque as stated in the table.

CUTTING AND FLARING THE PIPING

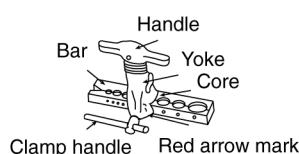
- Please cut using pipe cutter and then remove the burrs.
- Remove the burrs by using reamer. If burrs is not removed, gas leakage may be caused.
Turn the piping end down to avoid the metal powder entering the pipe.
- Please make flare after inserting the flare nut onto the copper pipes.



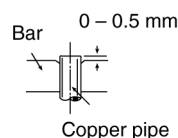
1. To cut



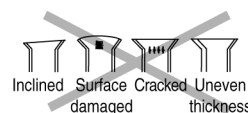
2. To remove burrs



3. To flare



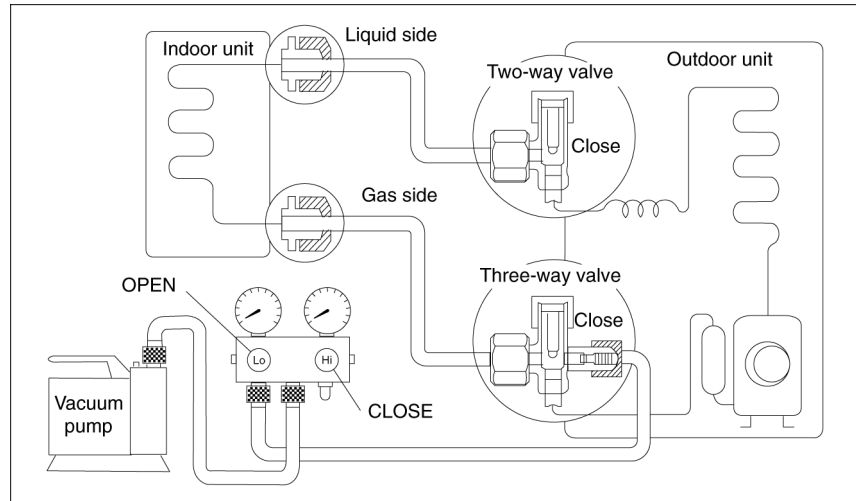
Improper flaring



When properly flared, the internal surface of the flare will evenly shine and be of even thickness. Since the flare part comes into contact with the connections, carefully check the flare finish.

11.4.3. 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.

CAUTION

- 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 the location of leak.
- Do not release refrigerant during piping work for installation and reinstallation. Take care of the liquid refrigerant, it may cause frostbite.

11.4.4. CONNECT THE CABLE TO THE OUTDOOR UNIT

1. Remove the control board cover from the unit by loosening the screw.
2. Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed 3 (C7HKD, C9HKD, C12HKD) or 5 (A7HKD, A9HKD, A12HKD) x 1.5 mm² flexible cord, type designation 245 IEC 57 or heavier cord.

C7HKD, C9HKD, C12HKD

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

A7HKD, A9HKD, A12HKD

Terminals on the indoor unit	1	2	3	4	
Colour of wires					
Terminals on the outdoor unit	1	2	3	4	

3. Secure the cable onto the control board with the holder (clammer).

4. Attach the control board cover to the original position with the screw.

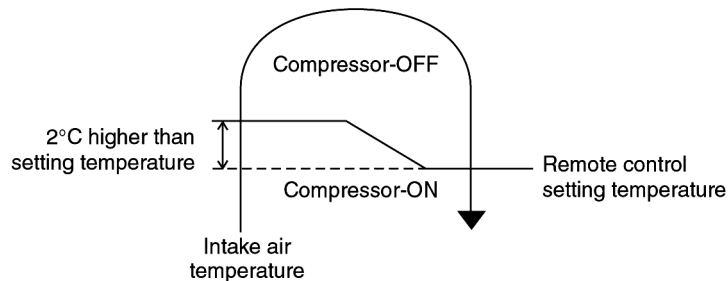
11.4.5. PIPE INSULATION

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.

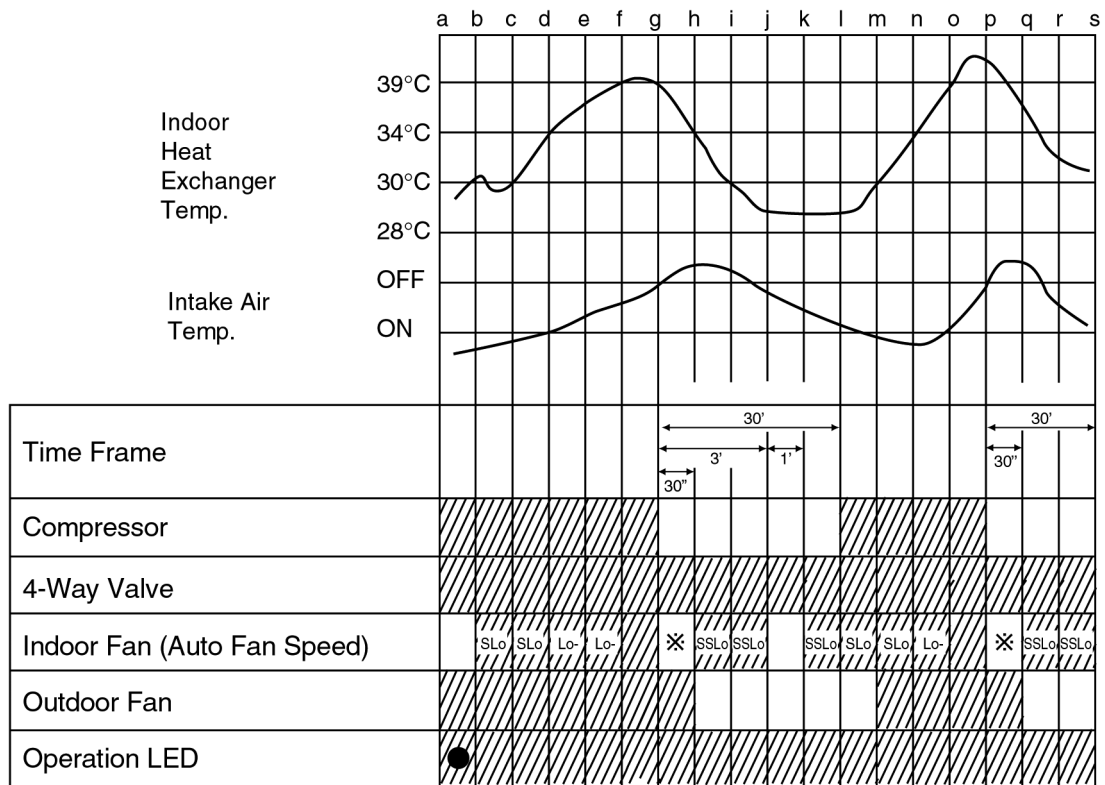
12 Operation Control

12.1. Heating Operation

- Heating operation can be set using remote control.
- This operation is applied to warm the room temperature reaches 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 heating operation, the compressor will stop running and restart as shown in below figure.



12.1.1. Heating Operation Time Diagram



<Description of operation>

a - f, l - o : Hot start

g - l : 30 Minutes Time Save Control/Anti Cold Draft Control

g - h, p - q : Outdoor Fan Motor Control (30 sec. Forced Operation) after compressor stops.

● : Blinking

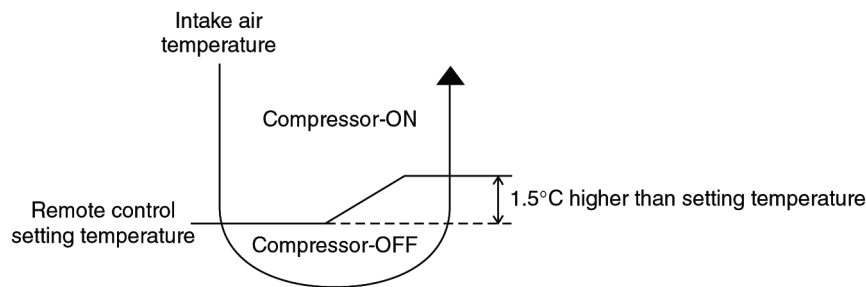
✱ : Fan Speed will follow Indoor heat exchanger temperature.

Operation

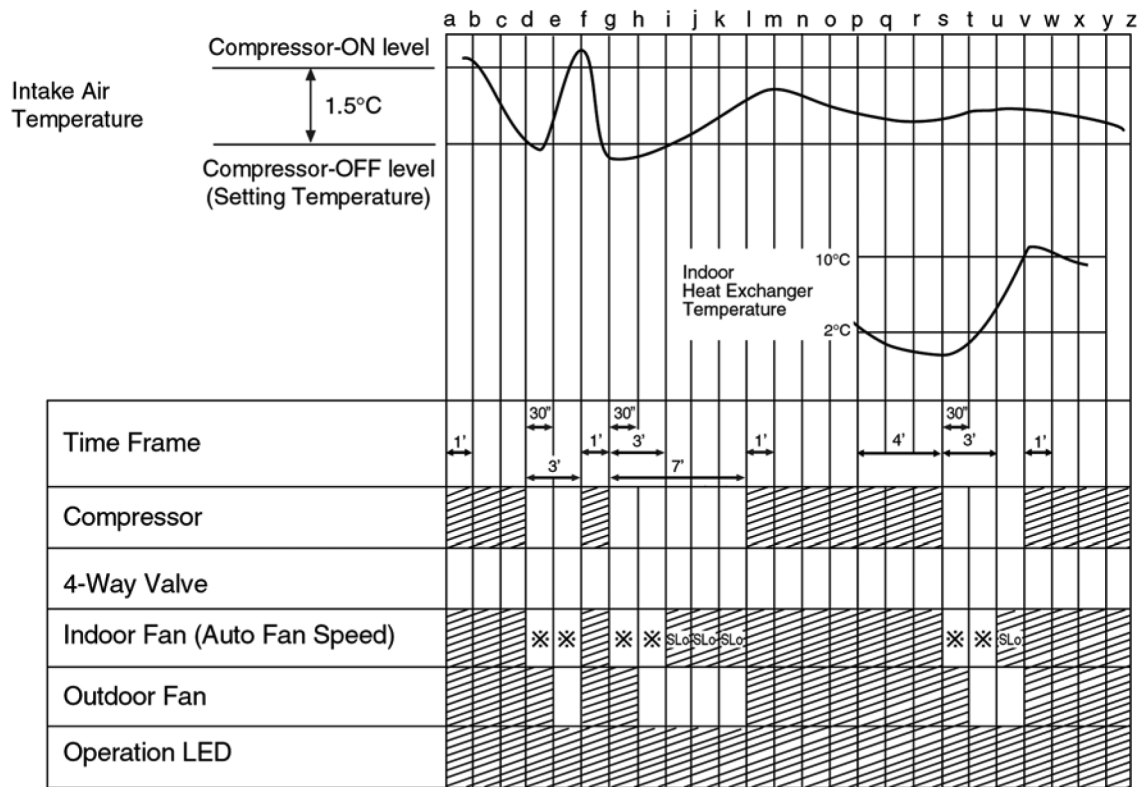
Stop

12.2. Cooling Operation

- Cooling operation can be set using remote control.
- This operation is applied to cool down the room temperature reaches 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 running and restart as shown in below figure.



12.2.1. Cooling Operation Time Diagram



<Description of operation>


- a – b, f – g, l – m, v – w : Minimum 60 seconds forced operation


d – f, g – i, s – u : Minimum 3 minutes restart control (Time Delay Safety Control)

g – l : Maximum 7 minutes time save control

p – v : Anti-Freezing Control

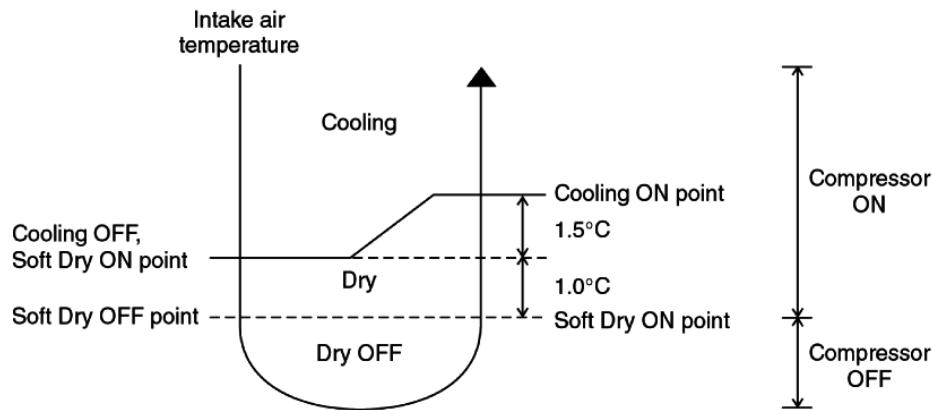
d – e, g – h, s – t : Outdoor Fan Motor Control (30 sec. Forced Operation) after compressor stops

(※) d – f, g – i, s – u : Indoor fan rotates at SLo for 20 seconds and off for 160 seconds.
-  Operation

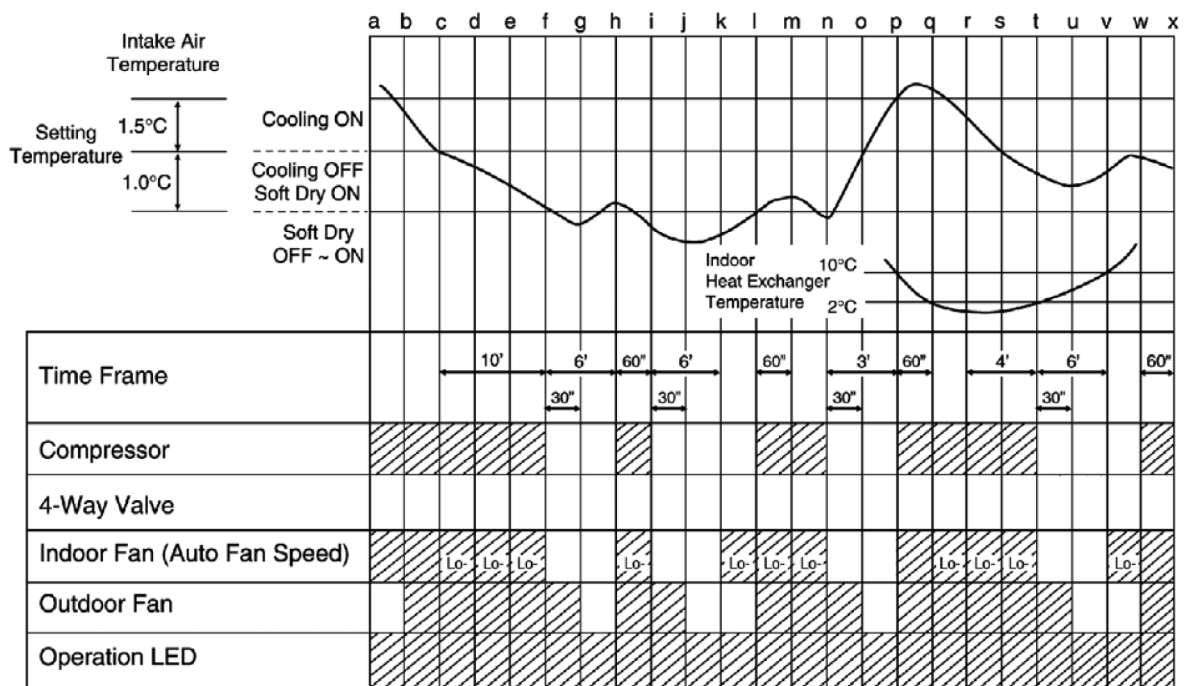
 Stop

12.3. 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 turned "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 below figure.
- 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.



12.3.1. Soft Dry Operation Time Diagram



<Description of operation>

- h - i, l - m, p - q, w - x : Minimum 60 seconds forced operation
- n - p : Minimum 3 minutes restart control (Time Delay Safety Control) - Cooling operation
- f - h, i - k, t - v : Minimum 6 minutes restart control (Time Delay Safety Control) - Soft dry operation
- r - w : Anti-Freezing Control
- f - g, i - j, n - o, t - u : Outdoor Fan Motor Control

Operation

Stop

12.4. Automatic Operation

- Automatic operation can be set using remote control.
- This operation starts to operate with indoor fan at SLo speed for 25 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
	20°C	Soft Dry Operation
		Heating Operation

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

	Setting Temperature (Standard)
Cooling Operation	25°C
Soft Dry Operation	22°C
Heating Operation	21°C

- Operation mode will be determine again for judgement after 1 hour of operation, if the room temperature reaches to set temperature and compressor off time is over 7 minutes 30 seconds continuously.

- ✕ The present operation mode will be continued, if the room temperature does not reach to set temperature (Compressor keeps running) even though after 1 hour from automatic operation mode started.

Standard for Determining Operation Mode 2nd Judgement onwards

Present Mode	Judgement	Next Mode		
		Cooling	Soft Dry	Heating
Cooling	23°C Cooling Heating	○ (Judgement 23°C & Above)	Not Applicable	○ (Judgement Below 23°C)
Soft Dry	20°C Soft Dry Heating	Not Applicable	○ (Judgement 20°C & Above)	○ (Judgement Below 20°C)
Heating	25°C Cooling Heating	○ (Judgement Above 25°C)	Not Applicable	○ (Judgement 25°C & Below)

- ✕ Automatic Set Temperature
Refer as below.

- Automatic Set Temperature

For each operation, set temperature will automatically set as shown below.

However it can be selected 2°C higher or 2°C lower from standard set temperature by pressing the "Room Temperature Setting button".

Operation	Hi	(Standard)	Lo
	(+2°C)	(±0°C)	(-2°C)
Cooling	27°C	25°C	23°C
Soft Dry	24°C	22°C	20°C
Heating	23°C	21°C	19°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 below table by pressing on the temperature up or temperature down button at remote control.

		Cooling	Soft Dry	Heating
Higher	→ +2°C	27°C	24°C	23°C
Standard	→ ±0°C	25°C	22°C	21°C
Lower	→ -2°C	23°C	20°C	19°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 electronic controller.

↑ Intake Air Temperature	25°C	Cooling Operation
	22°C	Soft Dry Operation
		Heating Operation

	Setting Temperature (Standard)
Cooling Operation	27°C
Soft Dry Operation	24°C
Heating Operation	23°C

12.5. Indoor Fan Speed Control

- Indoor Fan Speed can be set using remote control.

12.5.1. Fan Speed Rotation Chart

Fan Speed (rpm)	CS-A7HKD	CS-A9HKD	CS-A12HKD
S Hi	1200	1310	1320
Hi	1030	1210	1300
Me	920	1000	1120
H Lo	840	890	860
C Lo	780	830	800
Lo-	750	780	750
S Lo	700	750	700
SS Lo	300	300	300
Q S Hi	1100	1210	1220
Q Hi	930	1110	1200
Q Me	820	900	1020
Q H Lo	770	790	810
Q Lo	680	730	700

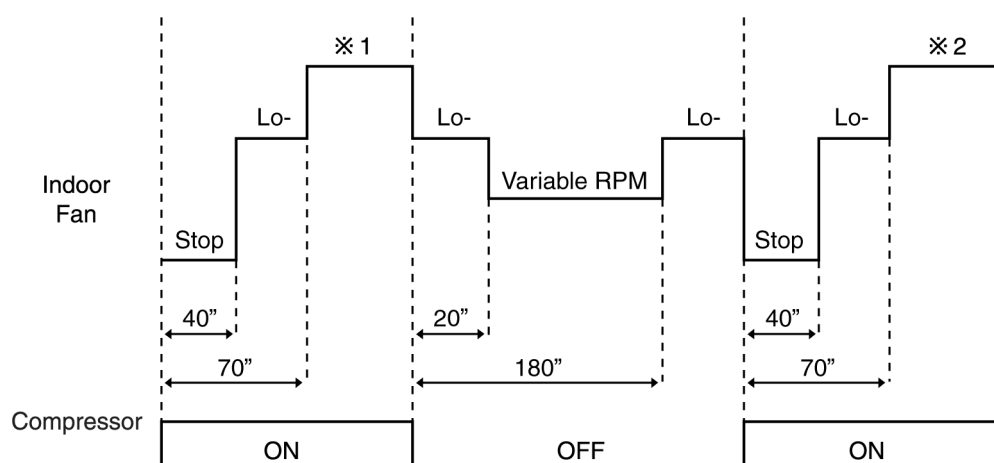
12.5.2. Automatic Fan Speed Control

- 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, Me and Lo-.
 - Deodorizing Control will be activated.

Speed Mode				S Hi	Hi	Me	H Lo	C Lo	Lo-	S Lo	SSLo	Stop
Cooling	Normal	Manual	Hi		○							
			Me		○							
			Lo				○					
		Auto Volume Auto			○	○			○			○
	Powerful	Manual		○								
Auto Volume Auto		○										
Dry		Manual							○			○
		Auto Volume Auto							○			○
Heating	Normal	Normal	Hi	○					○			○
			Me		○			○	○	○	○	
			Lo			○		○	○	○	○	
		Auto Volume Auto				○	○		○	○	○	
	Powerful	Manual		○		○	○		○	○	○	○
		Auto Volume Auto				○	○		○	○	○	○
Mode judgement		Normal								○		
Cooling	Quiet	Manual	Q Hi		Hi-100							
			Q Me		Me-100							
			Q Lo				CLo-100					
		Auto Volume Auto			Hi-100	Me-100			○			○
Dry	Quiet	Manual							○			○
		Auto Volume Auto							○			○
Heating	Quiet	Manual	Q Hi	SHi-100					○	○	○	○
			Q Me		Me-100				○	○	○	○
			Q Lo			HLo-100		○	○	○	○	
		Auto Volume Auto				Me-100	HLo-100		○	○	○	○

- 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 start operation, indoor fan will increase fan speed gradually for deodorizing purpose.
- For the first time the compressor operate, 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 stop, indoor fan will operate at Lo- for the beginning 3 minutes to prevent higher volume of refrigerant in liquid form returning to the compressor.
- 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 restart of compressor.

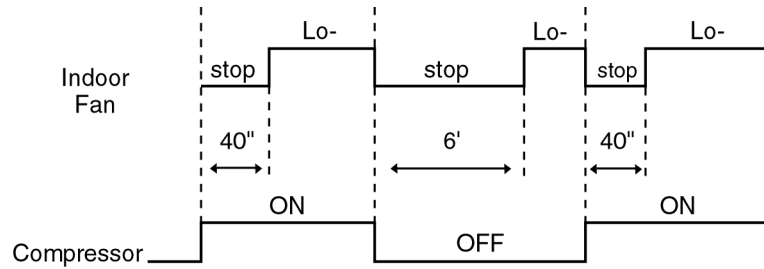


※ 1 Fan Speed is Hi until the compressor stops (when the room temperature reaches setting temperature).

※ 2 Fan Speed is Me after the compressor restarts.

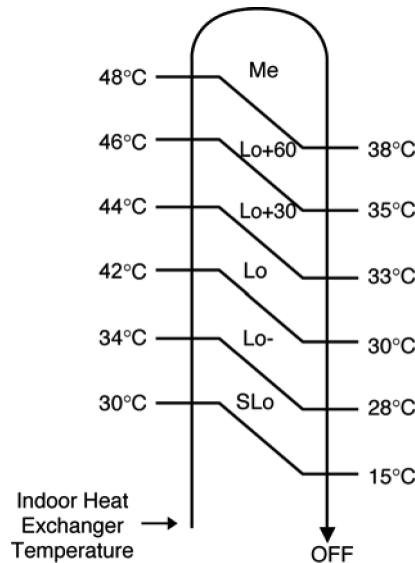
- Auto Fan Speed during Soft Dry operation:

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



- Auto Fan Speed during Heating operation.

1. Indoor fan will rotate in the range of SLo → Me according to the heat exchanger temperature.



12.5.3. 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.

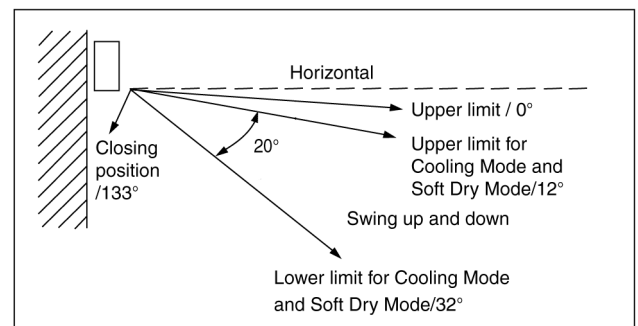
12.6. Outdoor Fan Speed Control

- There is only one speed for outdoor fan motor.
- When the 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.

12.7. Vertical Airflow Direction Control

12.7.1. Auto Control

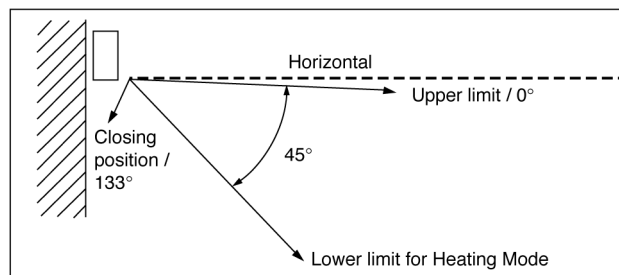
- When the vertical airflow direction is set to Auto using the remote control, the louver swings up and down as shown in the diagram.
- When stop operation using the remote control, the discharge vent is reset, and stop at the closing position.
- During Cooling operation or Soft Dry operation, indoor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



(Heating Operation condition)

- When the piping air temperature reaches 38°C, the louver is changed from upper to lower limit. When the piping air temperature falls to 35°C, the louver is changed from lower to upper limit.

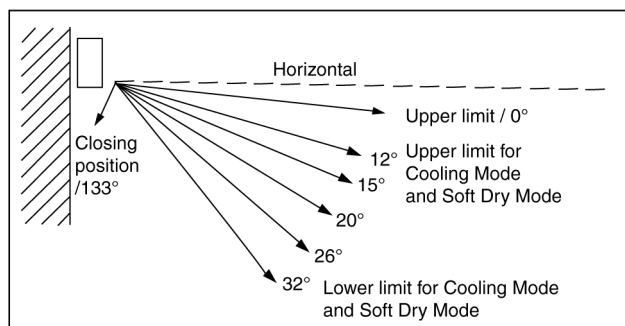
Heating Operation



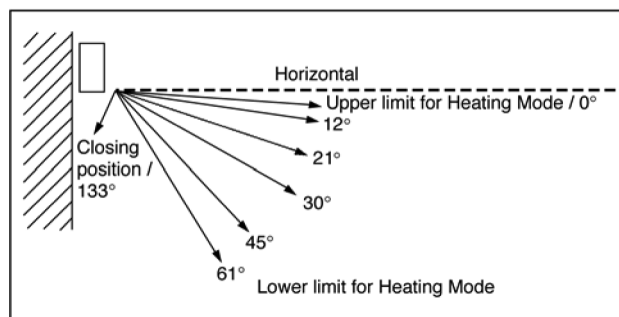
12.7.2. Manual Control

- 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.
- During Anti-dew condensation prevention, Airflow Direction Manual control angle change from 10°, 15°, 20°, 26°, 32° to 22°, 24°, 26°, 28°, 30° under Cooling and Soft Dry operation mode.

Cooling and Soft Dry Operation



Heating Operation



12.8. Horizontal Airflow Direction Control

- The horizontal airflow direction louvers can be adjusted manually by hand.

12.9. Powerful Operation

- To achieve the setting temperature quickly.

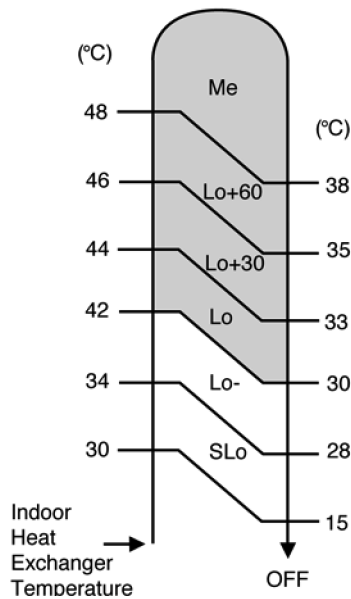
(Cooling and Soft Dry Operation condition)

- 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 will be running under SHi fan Speed (Cooling).
- 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.

(Heating Operation condition)

- When Powerful operation is set, the setting temperature will be automatically increased 3°C against the present setting temperature (Higher temperature: 30°C).

- The Fan Speed will shift as shown below:



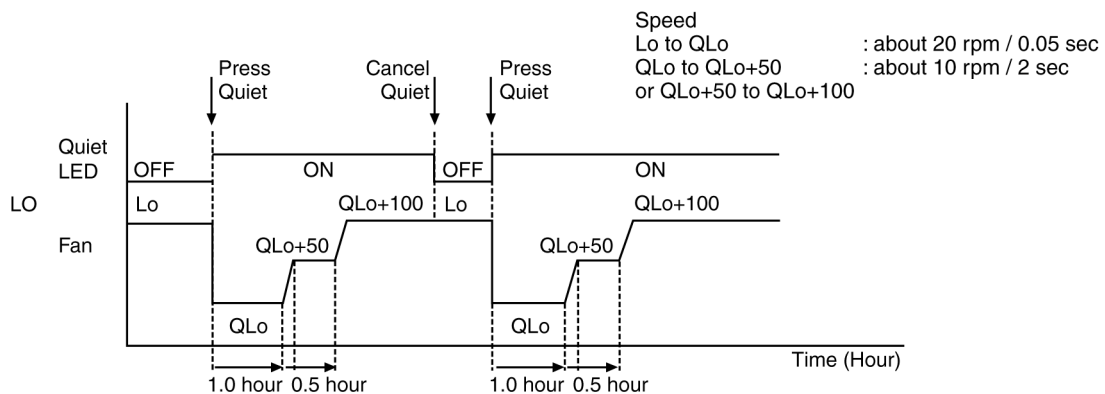
- When the Auto Fan speed is selected, the fan speed will automatically change from SLo to Me depending to the Indoor Heat Exchanger Temperature.
- When the manual Fan Speed is selected, the fan speed will change to the fan speed setting when the Indoor Heat Exchanger Temperature reaches 42°C.

- Vertical Airflow Direction:-
 - In "Manual" setting, the vane will automatically shift down 5° lower than previous setting.
 - In "Auto" setting, the vane will automatically shift between upper and lower limit depending on the intake air temperature as Heating Mode, Airflow Direction Auto-Control. However the upper and lower limit will be shifted 5° downward.
- Powerful operation stops when:-
 - Powerful operation has operate for 15 minutes.
 - Powerful button is pressed again.
 - Quiet button is pressed.
 - Stopped by OFF/ON operation button.
 - Timer OFF activates.
 - Operation mode is changed.

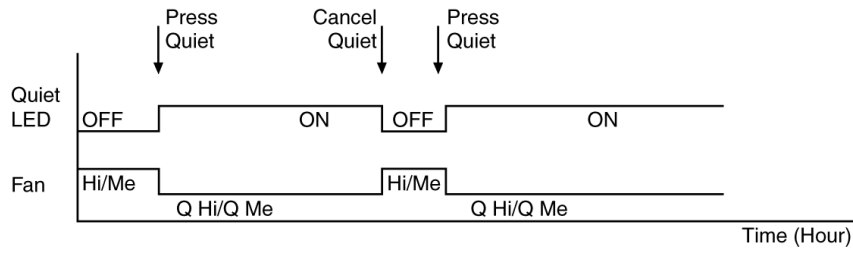
12.10. Quiet Operation

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

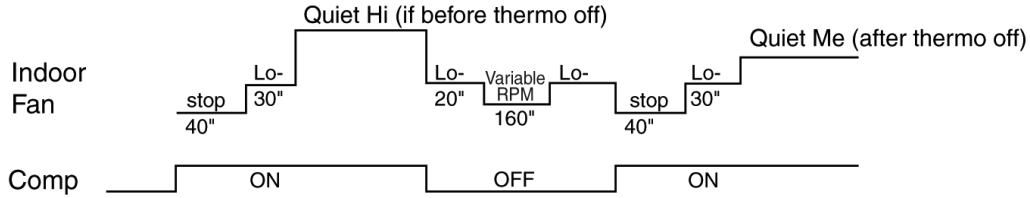
- To provide quiet cooling operation condition compare to normal operation.
- Once the Quiet Mode is set at the remote control, the Quiet Mode LED illuminated. The sound level will reduce around 2 dB(A) for Lo fan speed or 3 dB(A) for Hi/Me fan speed against the present operation sound level.
- Dew formation become severe at Quiet Lo cool, therefore Quiet Lo cool is operated only 1hr 30 min (1hr QLo, 30 min QLo + 50 rpm). After that, it goes back to Lo cool (However Quiet LED remains on).
- Manual Airflow Direction:-
 - RPM control during Lo cool



- RPM control during Hi & Me cool



• Auto Fan Speed:-

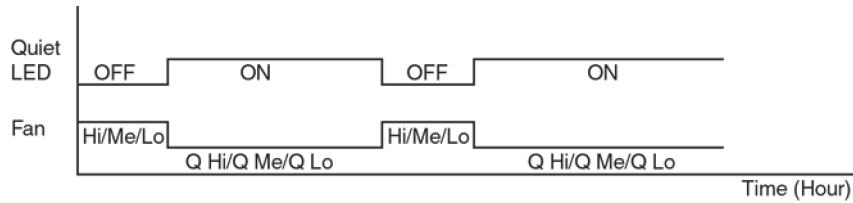


• Quiet operation stops when:-

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

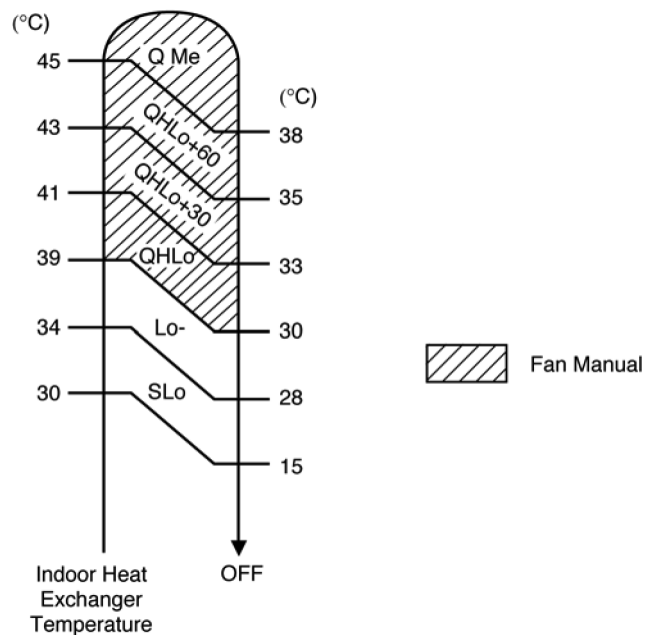
(Heating Operation condition)

- When the Quiet Mode is set at the remote control, Quiet Mode LED illuminates. The sound level will reduce either around 2 dB (Lo) or 3 dB (Hi, Me), against the present sound level operation.
- Quiet setting of fan speed rpm refer to Indoor Fan Speed Control.
- Manual Fan Speed:-
 - Rpm control during Lo, Me & Hi Cool



• Auto Fan Speed:-

- Rpm control depends on the piping air temperature sensor of Indoor heat exchanger



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

12.11. Timer Control

12.11.1. 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, 30 minutes before the set time to detect the intake air temperature to determine the operation mode. The operation indication lamp will blink at this time.

12.11.2. OFF Timer

- When the OFF Timer is set by 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 setting will not be cancelled.
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 cancelled.

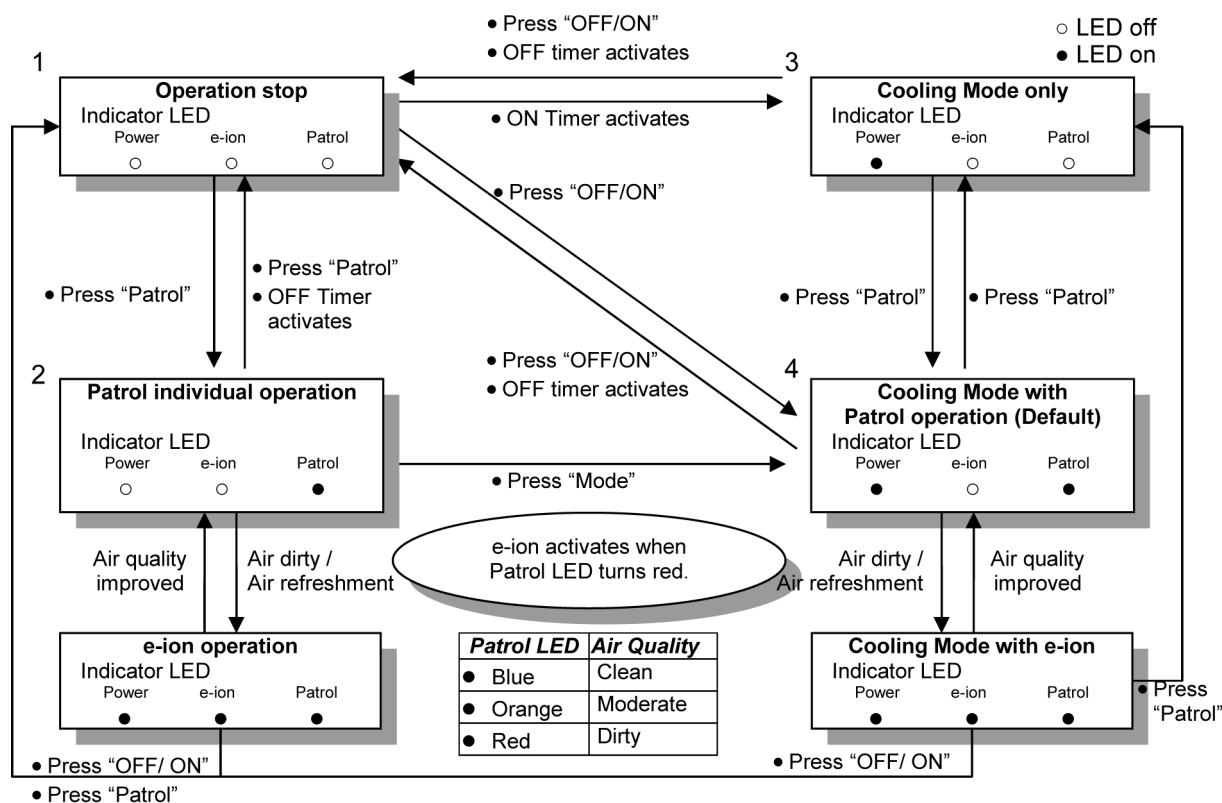
12.12. Random Auto Restart Control

- 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. (Refer printed circuit board indoor unit)

12.13. Remote Control Signal Receiving Sound

- Long beep sound will be heard when:-
 - stopping the air conditioner using ON/OFF switch.
- Short beep sound will be heard for other settings.

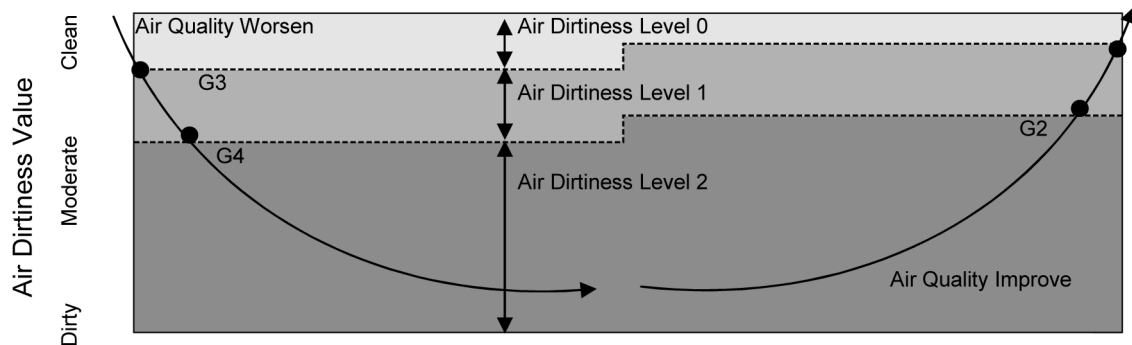
12.14. Patrol Operation



- 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" button is pressed, Patrol individual operation will start.
 - During cooling only operation, "Patrol" button is pressed.
- Patrol operation stops condition (when any of the following condition is fulfilled):
 - When "OFF/ON" button is pressed.
 - During any operation with Patrol, "Patrol" button is pressed again.
 - When "e-ion" button is pressed.
 - When OFF Timer activates.
- Patrol operation disable
 - To disable the Patrol Operation during unit starts (default) with "OFF/ON" button, press "Patrol" button and hold for 5 seconds, then release.
 - To disable the Patrol Operation, press "Patrol" button and hold for 15 seconds, then release.

• 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).
- e-ion operation time
 - If dirtiness level improves from level 2 to level 1 (Patrol LED turns 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
e-ion ON	Dirtiness level 0	No change	No change
	Dirtiness level 1	+ 20	+ 20
	Dirtiness level 2	+ 40	+ 40

- 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, air flow 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.

- Indicator

- When Patrol operation starts, Patrol LED is ON with 3 different colors:

Patrol LED	Air Quality
Blue	Clean
Orange	Moderate
Red	Dirty

- Then e-ion operation starts based on dirtiness level, both Patrol LED and e-ion LED are ON.

- 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 without Patrol operation.
- When ON timer activates during any operation, no change and carry on current operation.
- When OFF timer activates during any operation, all operation stops.

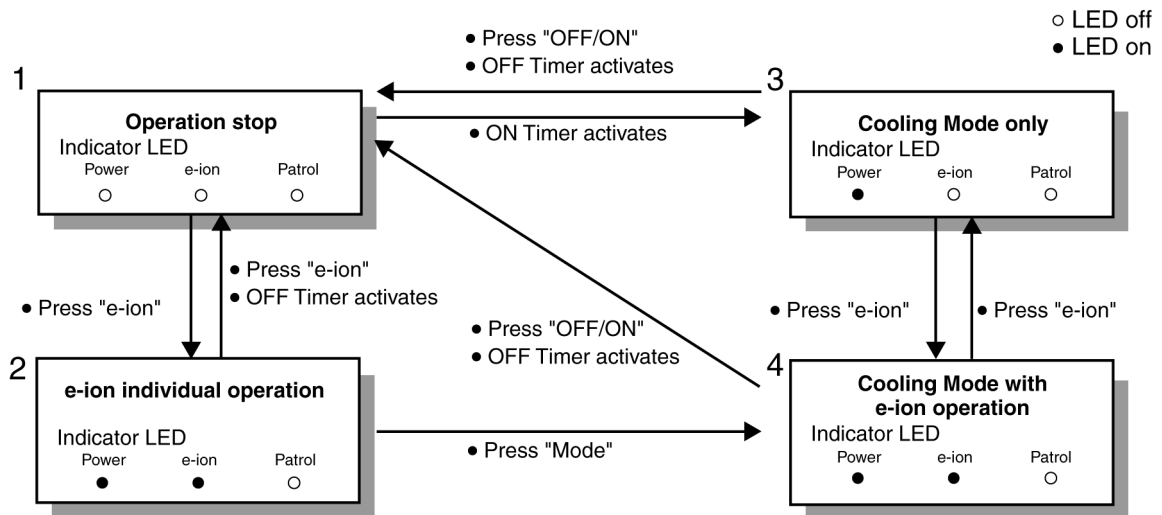
- Power Failure Control

- 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.

- Error Detection Control

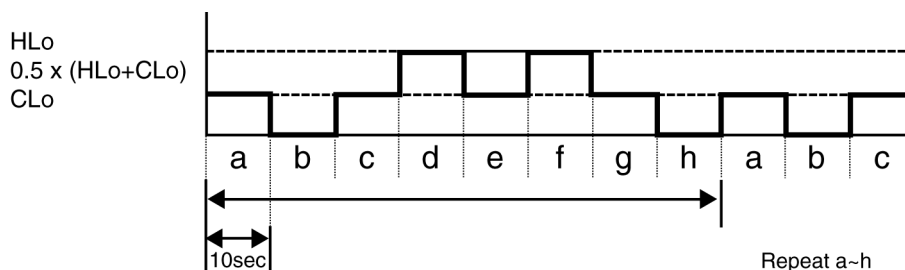
- The Patrol error detection control starts once the power is supplied to Patrol sensor. However, the error will display when the Patrol operation is ON.
- Error detection method:
 - If the Patrol sensor is opened circuit continuously for 6 hours, Patrol sensor error occurs. However, the error will display only when the Patrol operation is ON.
- Patrol Sensor Control after error occurs
 - During any operation mode combines with Patrol operation
 - Power supply to Patrol sensor is OFF
 - Air conditioner normal mode operation continues with Patrol LED blinking.
 - The Patrol LED continues blinking if the patrol operation is ON and stops blinking if the patrol operation is OFF.
 - During Patrol individual mode
 - Power supply to Patrol sensor is OFF
 - Patrol LED blinks.
 - The Patrol LED continues blinking if the Patrol operation is ON and stops blinking if the Patrol operation is OFF.
- Error cancel condition:
 - Power supply reset

12.15. 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” button is pressed, combination operation (operation mode + e-ion operation) starts.
 - During unit is OFF, if “e-ion” button is pressed, e-ion individual operation starts.
- e-ion operation stop condition
 - When “OFF/ON” button is pressed to stop the operation.
 - When “e-ion” button is pressed again.
 - When “Patrol” 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 between HLo and CLo at pattern below:



- Airflow direction control
 - During any operation mode combines with e-ion operation, air flow 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 without e-ion operation.
 - When ON timer activates during any operation, no change and carry on current operation.
 - When OFF timer activates during any operation, all operation stops.

- 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
 - To check if e-ion is malfunctioning, during e-ion operation press e-ion button for 15 seconds and release to enter e-ion Check Mode and supplies power to the Active e-ion Air Purifying System.
 - 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 "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
 - Press "e-ion" button during e-ion individual mode.
 - 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 "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.

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/Heating 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 turn 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 and compressor OFF temperature during the period.
- This phenomenon is to reduce the built up humidity inside a room.

13.3. 60 Seconds Forced Operation

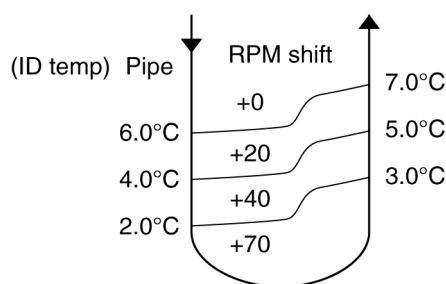
- Once the air conditioner is turned on, the compressor will not stop within 60 seconds in a normal operation although the intake air temperature has reached the thermo-off temperature. However, force stop by pressing the OFF/ON operation button at the remote control is permitted.
- The reason for the compressor to force operate at 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 second later.
- The reason of the difference is to reduce the starting current flow.

13.5. Freeze Preventive Control

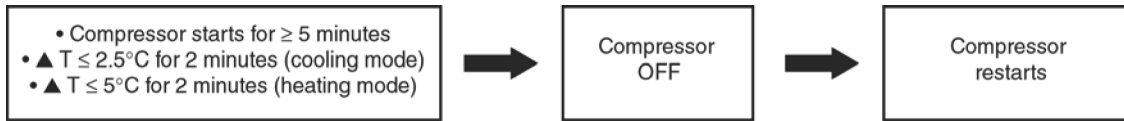
- To protect indoor heat exchanger from freezing and to prevent higher volume of refrigerant in liquid form return to compressor.
- This control will activate when the temperature of indoor heat exchanger falls below 2°C continuously for more than 4 minutes.
- The current fan speed will change to freeze prevention speed after 70 seconds compressor on. When indoor pipe temperature reaches certain temperature for 5 sec. the speed will be increased as in below figure.



- Compressor will turn off when indoor temperature falls below 2°C for more than 4 minutes. It will restart again when indoor heat exchanger temperature rises to 10°C.
- Restart control (Time Delay Safety Control) will be applied in this control.

13.6. Compressor Reverse Rotation Protection Control

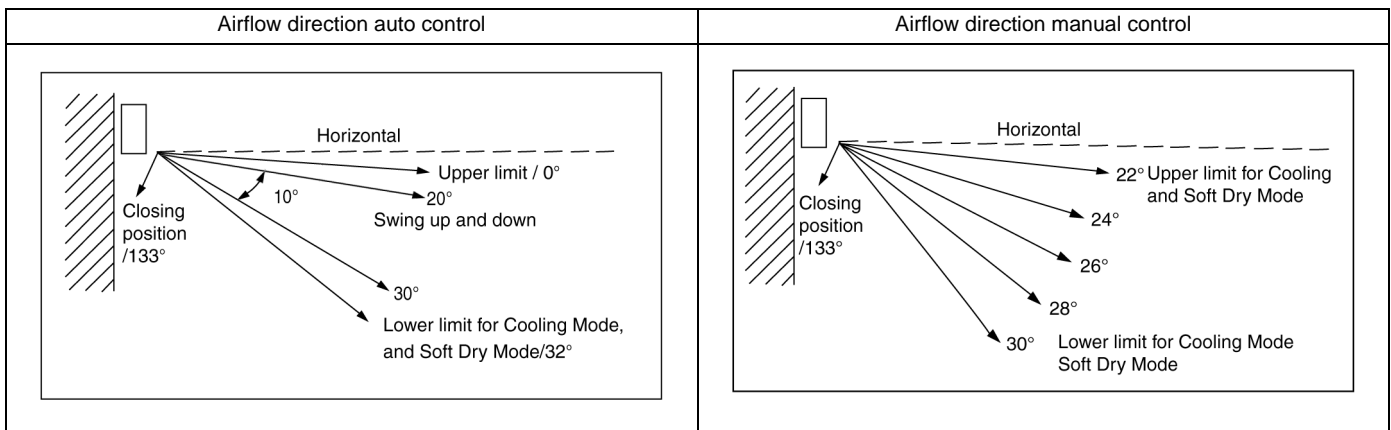
- If the compressor is operating continuously for 5 minutes or longer and the temperature difference between intake air and indoor heat exchanger is 2.5°C (cooling mode)/5°C (heating mode) or less for continuous 2 minutes, compressor will stop and restart automatically.
- Time Delay Safety Control is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

13.7. Dew Prevention control

- To prevent dew formation at indoor unit discharge area.
- This control will be activated if:-
 - Cooling mode or Quiet mode.
 - 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 and angle of horizontal louver (vertical airflow angle) will be adjusted accordingly in this control.
 - Fan speed will be increased slowly if the unit is in quiet mode but no change in normal cooling mode.
 - The angle of horizontal louver will be changed as below figure.



- Dew prevention stop condition
 - Remote control setting temperature is more than 25°C.
 - Fan speed is not set to CLo or QLo.
 - Select Powerful operation.

13.8. 30 Minutes Time Save Control

- The compressor will start automatically if it has stopped for 30 minutes and the intake air temperature falls between the compressor OFF temperature and compressor ON temperature during the period.
- This is to maintain the room temperature as set. Despite of this, it is to prevent a wrong judgement of intake air temperature due to poor installation near the sensor area.

13.9. Compressor Overload Protection Control

Outdoor Fan Control

- If the temperature of the indoor heat exchanger rises to 51°C, outdoor fan stops. The outdoor fan restarts when the indoor heat exchanger temperature falls to 49°C.

Compressor high pressure protection

- If the indoor heat exchanger becomes 65°C or more, the compressor will stop and restart automatically. (Time Delay Safety Control - 4 minutes waiting).
- This is to reduce the pressure, as to reduce the indoor heat exchanger temp. Nevertheless, is to protect the compressor from overload of too high temperature.

13.10. 4-Way Valve Control

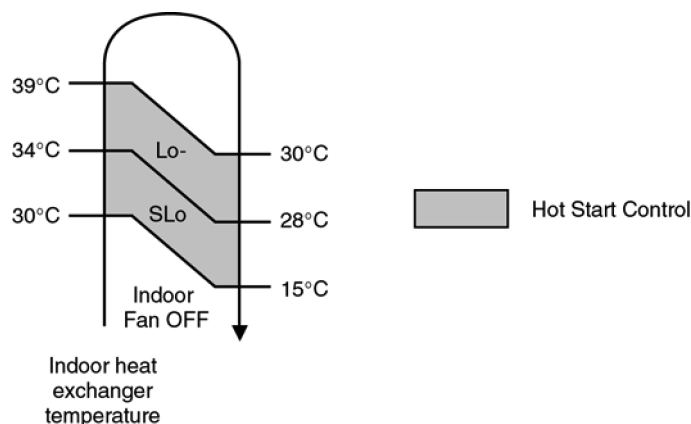
- 4-way valve always on during Heating operation. (except deicing operation)
- When the unit is switched off by remote control during Heating operation, the 4-way valve stay at Heating position for 5 minutes.
- This is to prevent the refrigerant flow process sound for being occur.

13.11. Outdoor Fan Motor Control

- When compressor stops (reaches room temperature), outdoor fan will operate for 30 seconds (forced operation).
- This is to release the heat and to obtain the lowest pressure as fast as possible.

13.12. Hot Start Control

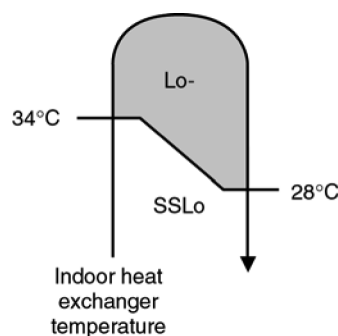
- Hot Start Control is to prevent cool air discharge into the room when heating operation start.
- When Heating operation starts, Indoor fan will not start until the indoor heat exchanger reaches 30°C as diagram shown.



- Hot start is completed when indoor heat exchanger rises to 39°C or operation over 4 minutes.

13.13. Cold Draft Prevention Control

- This operation is to prevent the Cold Draft during Heating mode operation.
- The operation will start when compressor OFF (Thermo OFF) during Heating operation.
- For the first 30 sec. from compressor OFF (Thermo OFF), Indoor fan speed will operate accordingly to the Indoor heat exchanger temperature as shown below:



- After 30 sec. from compressor OFF (thermo OFF), Indoor fan will run at SSLo speed only.
- Anti Cold Draft Control will stop when:
 - Intake temperature < set temperature. (Time Delay Safety Control 4 minutes waiting is valid)
 - 30 Minutes Time Save Control activates.

13.14. Deice Control

Deice starts to prevent frosting at outdoor heat exchanger.

- Normal Deice

Deice operations detection commences after 30 minutes of Heating operation starts or 60 minutes after previous deice operation. If the TRS (Thermal Reed Switch) senses the outdoor piping temperature drops to -3°C (TRS CLOSE) or less for 50 sec. continuously during compressor is in operation, deice will start.

(There is no detection during Outdoor Fan stops.)

- Overload Deice

During heating operation, if the outdoor Fan OFF duration (due to overload protection control) is accumulated up to 60 minutes and after compressor starts for 1 minutes, deice starts.

- Deice ends when

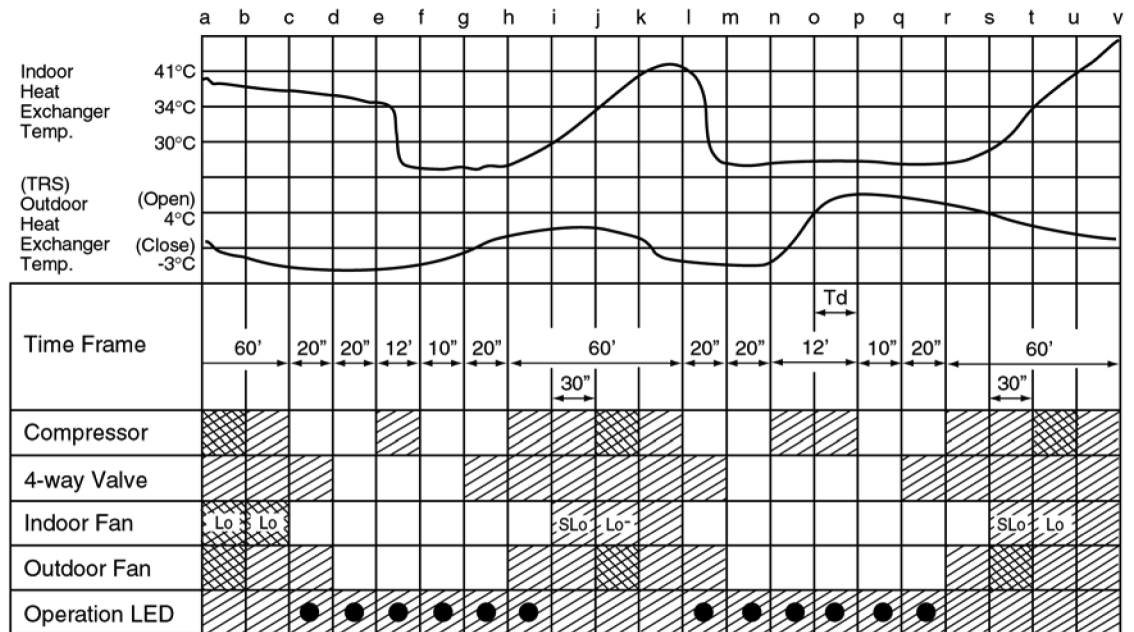
1. 12 minutes after deicing operation starts;
2. TRS senses the outdoor piping temperature rises to 4°C (TRS OPEN).

✕ Deice will not end immediately as time delay (Td) is valid as shown below:

Time taken from deicing starts to TRS OPEN (T)	Deice recovery time	Td (seconds)
$T \leq 1 \text{ minutes}$	1 min. wait (Min.)	0
$1 \text{ minutes} < T < 3 \text{ minutes}$	T	0
$3 \text{ minutes} < T < 8 \text{ minutes}$	T + 60 sec.	60
$8 \text{ minutes} < T < 11 \text{ minutes}$	T + 120 sec.	120
$T > 11 \text{ minutes}$	12 min wait (Max.)	—

- Once deice operation starts, it will not end for 60 seconds.
- After deice operation, compressor stops for 30 seconds and 4-way valve stays at cooling position for 10 seconds.

Normal Deice Time Diagram



<Description of operation>

- a - c : Deicing operation judging condition established
- c - e, l - n : Deicing operation (timer detected)
- e - h : Deice operation (timer detected)
- h - i, r - s : Hot start (no thermo OFF)
- i - j, s - t : No thermo OFF (after finished hot start)
- n - r : Deicing operation (TRS detected)

● : Blinking

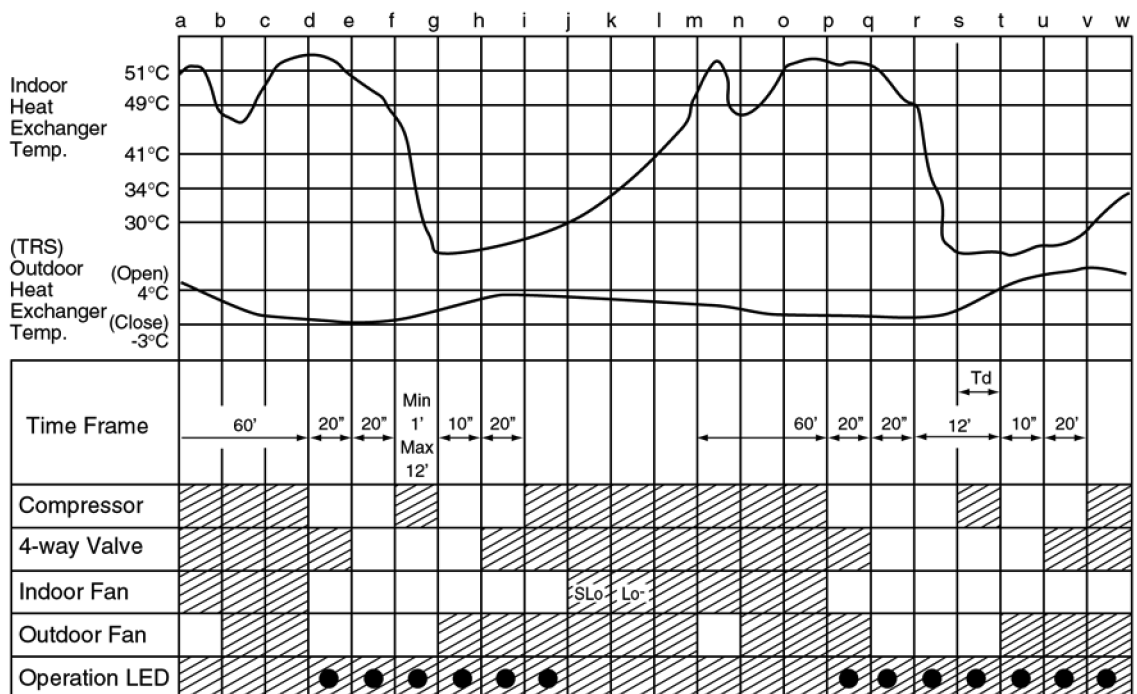
▨ : Operation

□ : Stop

▩ : Operation or Stop

Td : Time Delay

Overload Deice Time Diagram



<Description of operation>

- a - d, m - p : Overload control. (intergrate)
- d - f, p - r : Preparation time for Deicing
- f - i : Overload deicing (timer detected)
- i - j : Hot start (indoor fan OFF)
- j - k : Hot start (indoor fan SLo)
- r - t : Overload control (TRS detected)

● : Blinking

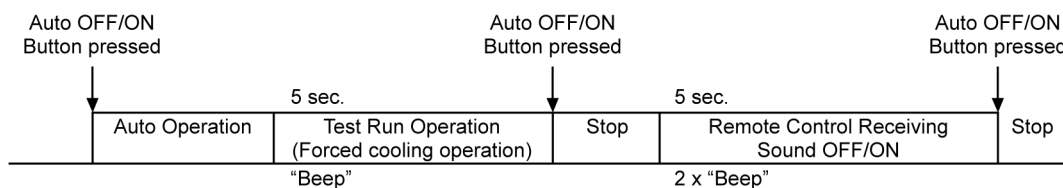
▨ : Operation

□ : Stop

Td : Time Delay

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 occur at the fifth seconds, in order to identify the starting of Test Run operation.

3. REMOTE CONTROL RECEIVING SOUND OFF/ON MODE

The Remote Control Receiving Sound OFF/ON operation 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" sound will occur at to identify the starting of Remote Control Receiving Sound Off/On Mode.

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.

14.2. Select Remote Control Transmission Code

- There are 4 type 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 unit 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 (J-A)	Jumper B (J-B)	Remote Control No.
Short	Open	A (Default)
Open	Open	B
Short	Short	C
Open	Short	D

- During Remote Control Receiving Sound OFF/ON Mode, press any button at remote control to transmit and store the desired transmission code to the EEPROM.

14.3. Remote Control Button

14.3.1. SET BUTTON

- To check current remote control transmission code.
 - Press for more than 10 seconds.
- To change the air quality sensor sensitivity:
 - Press and release with 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.

14.3.2. CLOCK BUTTON

- To change the remote control's time format.
 - Press for more than 5 seconds.

14.3.3. RESET

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

14.3.4. TIMER ▲

- To change indoor unit indicator's LED intensity.
 - Press continuously for 5 seconds.

14.3.5. TIMER ▼

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

15 Troubleshooting Guide

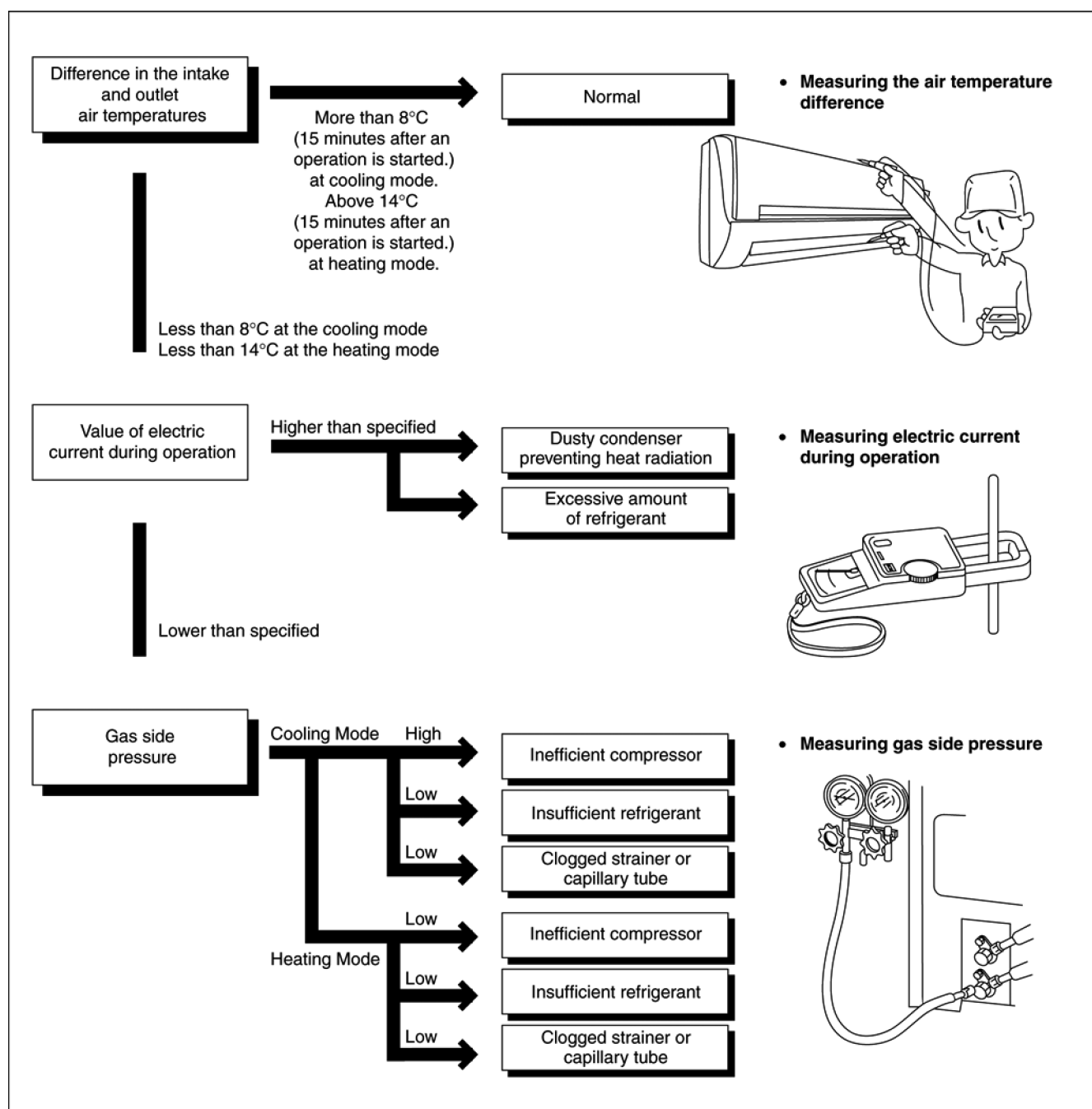
15.1. Refrigeration cycle system

In order to diagnose malfunctions, make sure that there are no electrical problems before inspecting the refrigeration cycle. Such problems include insufficient insulation, problem with the power source, malfunction of 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
Heating Mode	1.5 ~ 2.1 (15 ~ 21)	36 ~ 45

- ★ Condition:
- Indoor fan speed; High
 - Outdoor temperature 35°C at cooling mode and 7°C at heating mode.
 - Compressor operates at rated frequency



15.1.1. Relationship Between The Condition of The Air Conditioner and Pressure and Electric Current

Condition of the air conditioner	Cooling Mode			Heating Mode		
	Low Pressure	High Pressure	Electric current during operation	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 measurements of pressure, electric current, and temperature fifteen minutes after an operation is started.

15.1.2. Diagnosis Methods Of A Malfunction Of A Compressor And 4-way Valve

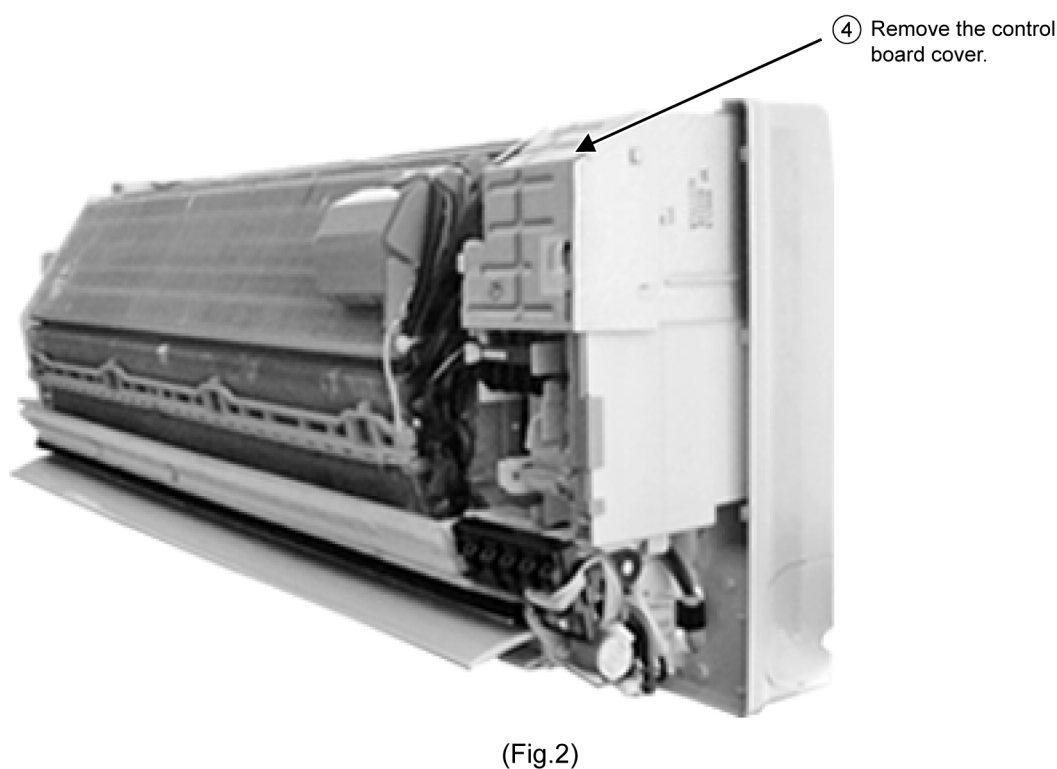
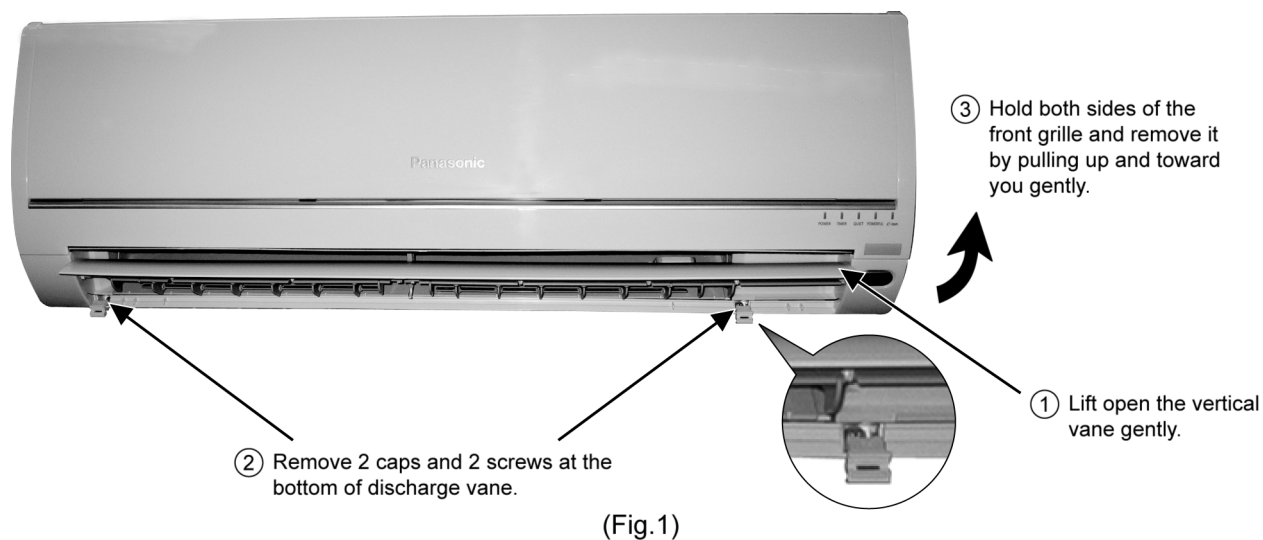
Nature of fault	Symptom
Insufficient compressing of a compressor	<ul style="list-style-type: none"> • Electric current during operation becomes approximately 20% lower than the normal value. • The discharge tube of the compressor becomes abnormally hot (normally 70 to 90°C). • The difference between 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.
Insufficient switches of the 4-way valve	<ul style="list-style-type: none"> • Electric current during operation becomes approximately 80% lower than the normal value. • The temperature different between from the discharge tube to the 4-way valve and from suction tube to the 4-way valve becomes almost zero.

16 Disassembly and Assembly Instructions

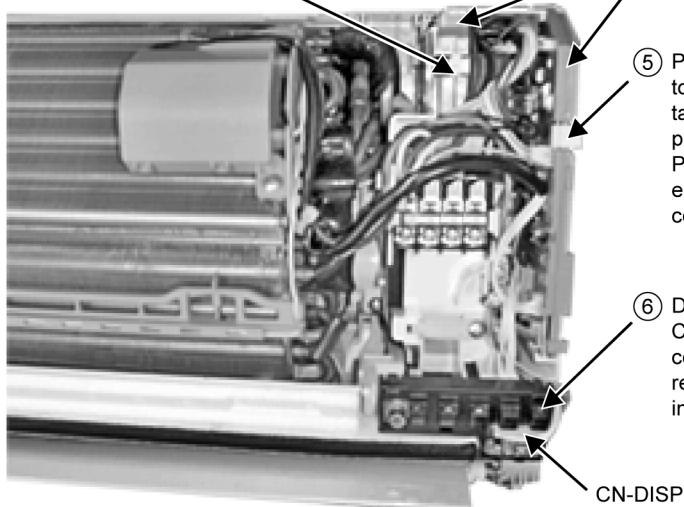
WARNING

- Cautions! When handling electronic controller, be careful of electrostatic discharge.
- Be sure to return the wiring to its original position.
- There are many high voltage components within the heat sink cover so never touch the interior during operation. Wait at least two minutes after power has been turned off.

16.1. Indoor Electronic Controllers and Control Board Removal Procedures

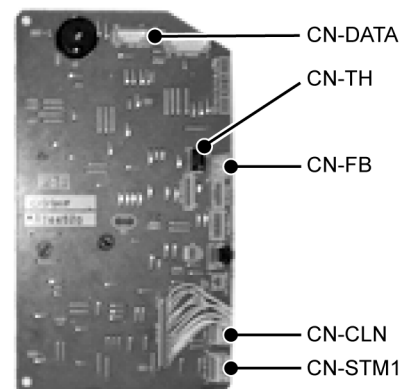


- ⑧ Press the fastener to the left then take out the particular piece.

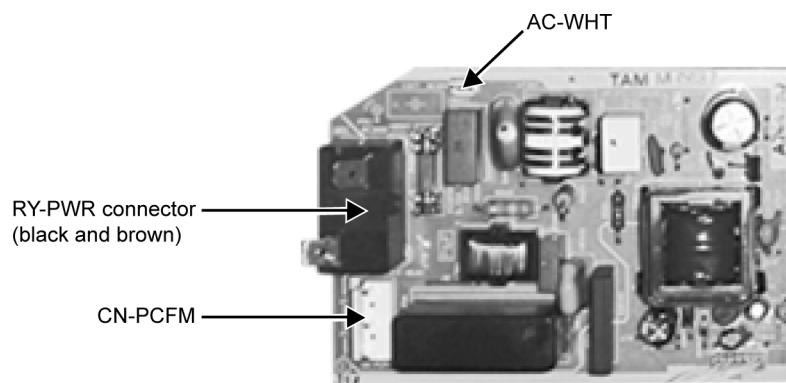


(Fig.3)

- ⑦ Detach 5 connectors as labeled from the electronic controller. Then pull out slowly while pressing the fastener to the right.

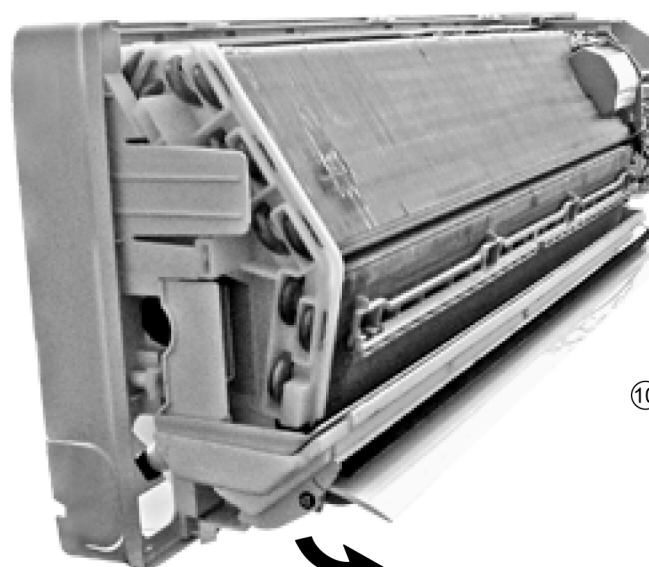


(Fig.4)



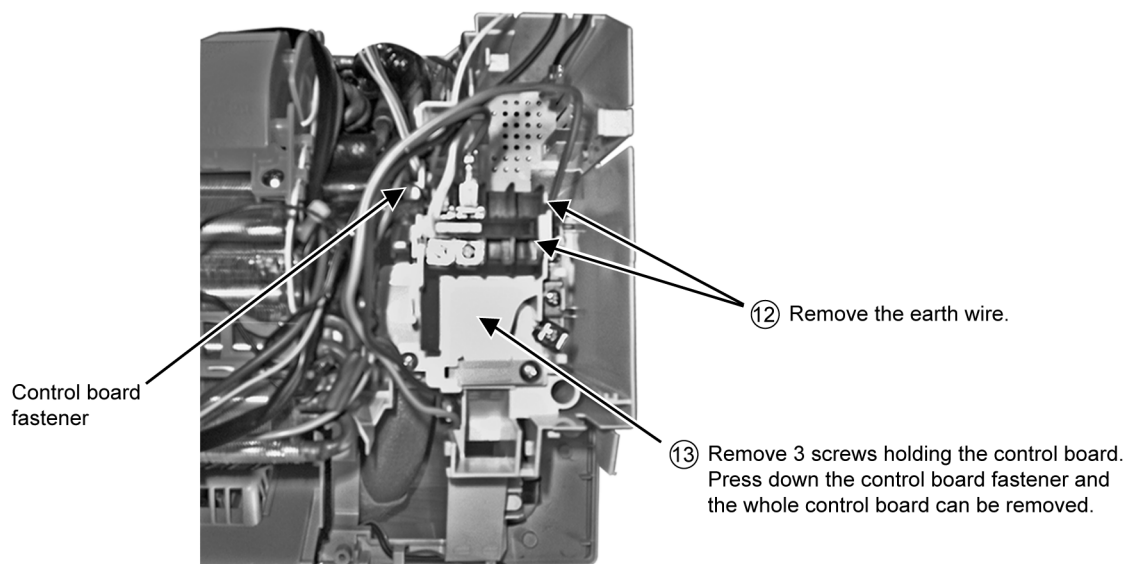
(Fig.5)

- ⑨ Detach the RY-PWR, AC-WHT and CN-PCFM connector from the electronic controller. Then, pull it slowly while pressing the fastener to the left.



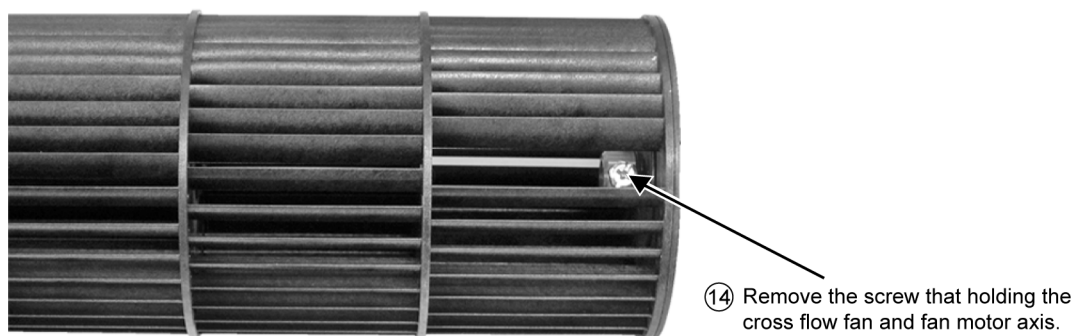
- ⑩ Pull out to remove the drain hose from the discharge grille.
- ⑪ Then pull the discharge grille downward gently to dismantle it.

(Fig.6)

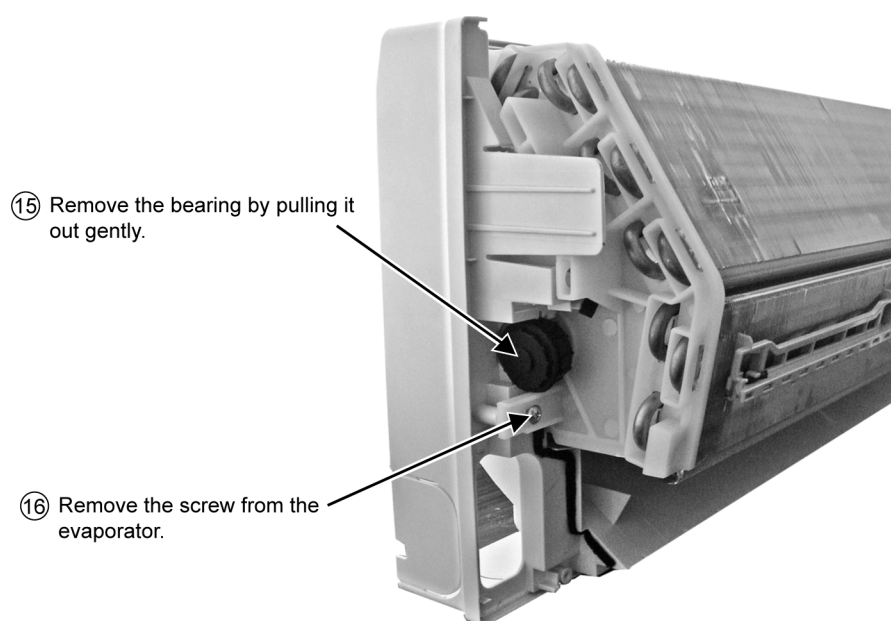


(Fig.7)

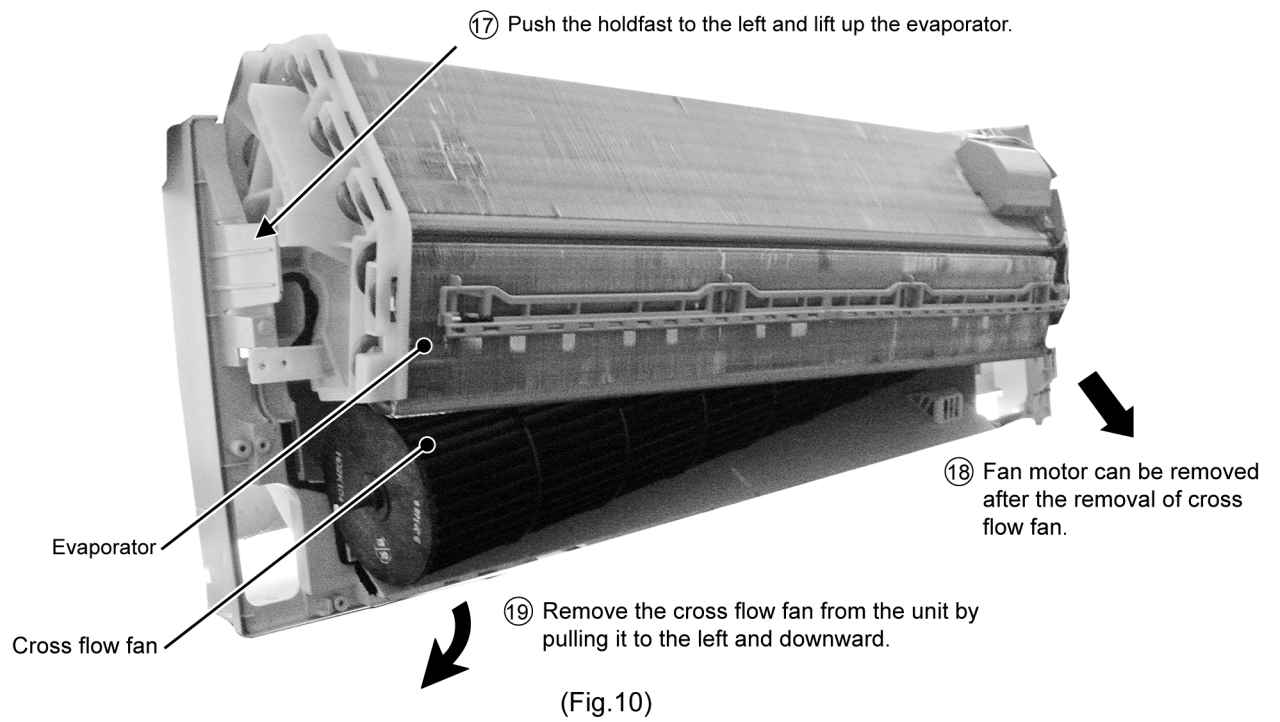
16.2. Indoor Fan Motor and Cross Flow Fan Removal Procedures



(Fig.8)



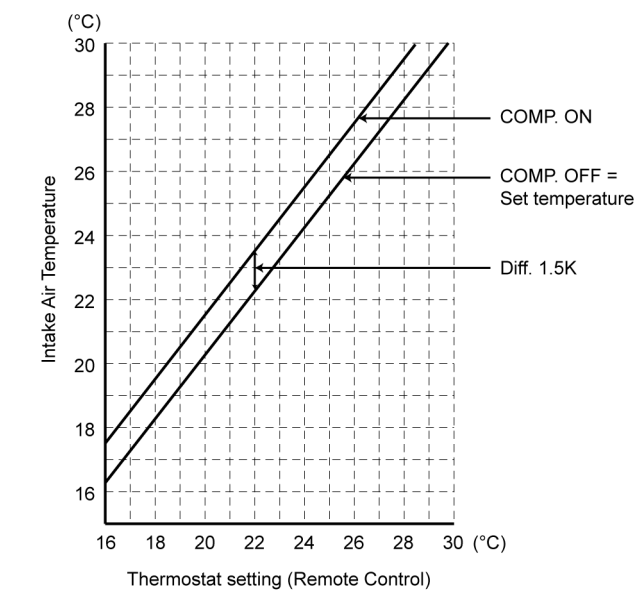
(Fig.9)



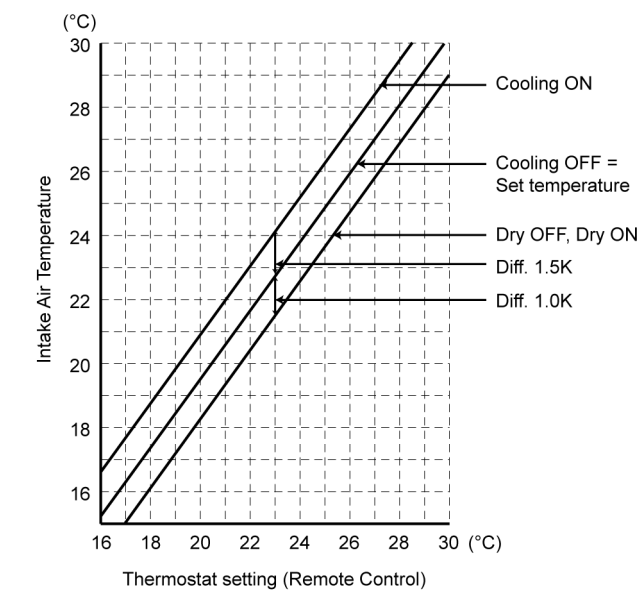
17 Technical Data

17.1. Thermostat Characteristics

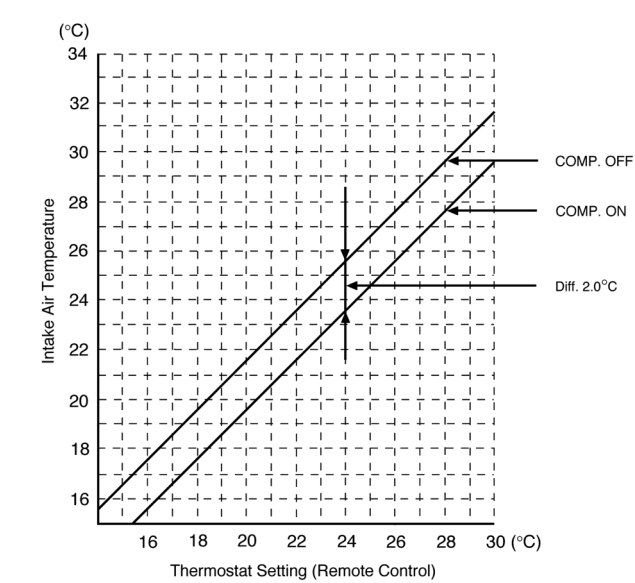
Cooling



Soft Dry



Heating



17.2. Operation Characteristics

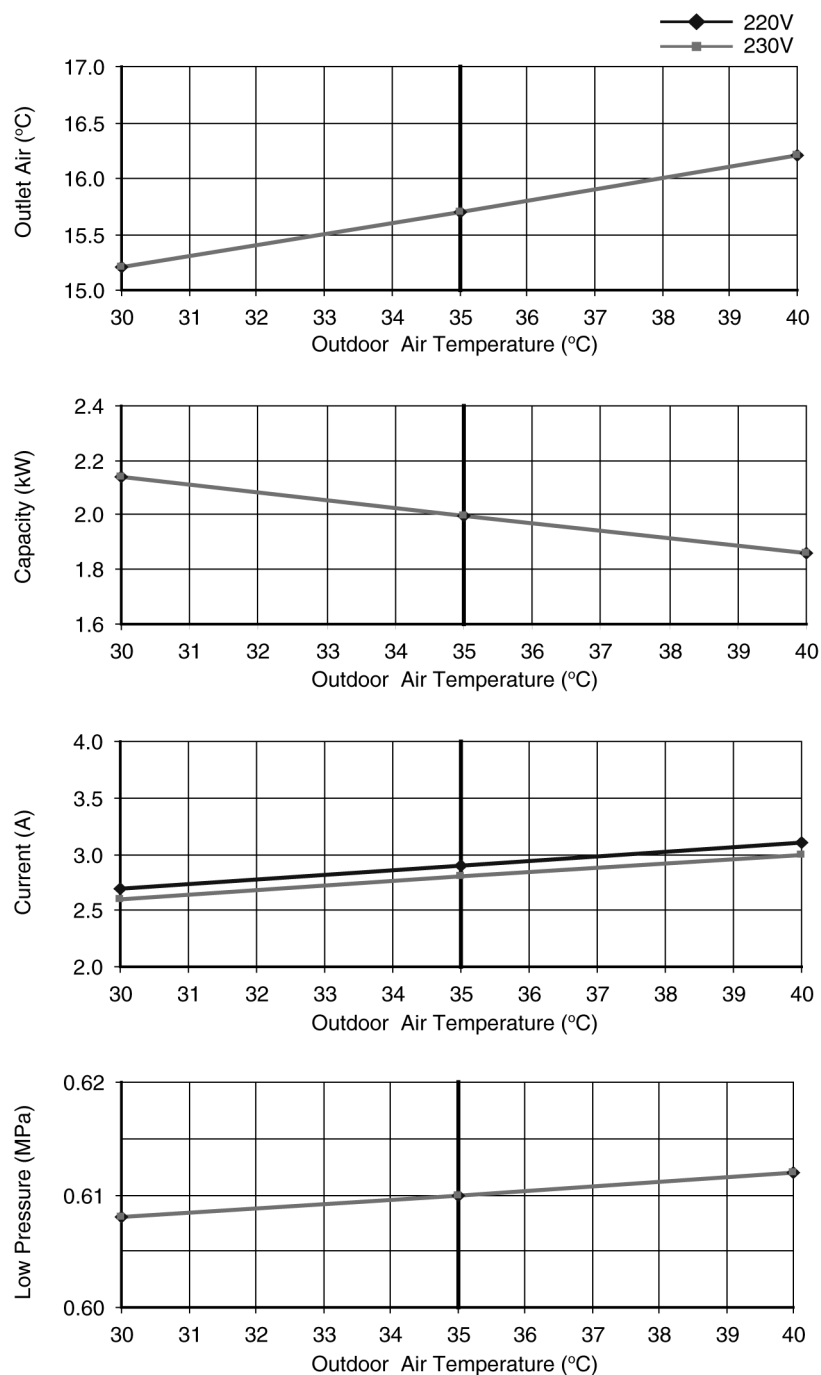
17.2.1. CS-A7HKD CU-A7HKD

• Cooling Characteristic

[Condition] Room temperature: 27/19°C

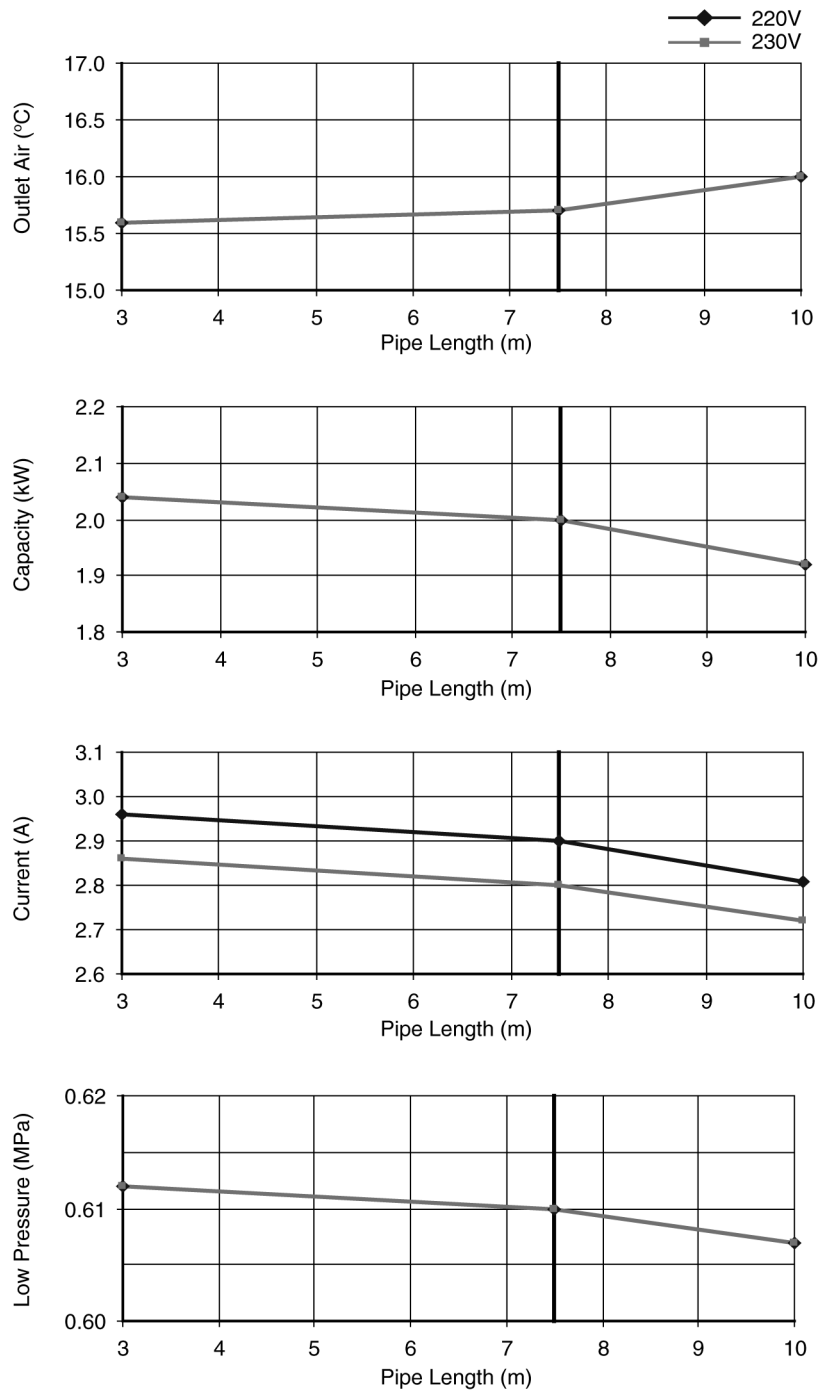
Operation condition: High fan speed (Rated Frequency)

Piping length: 7.5 m



• Piping Length Characteristic

[Condition] Room temperature: 27/19°C
Operation condition: High fan speed (Rated Frequency)
Outdoor temperature: 35/24°C

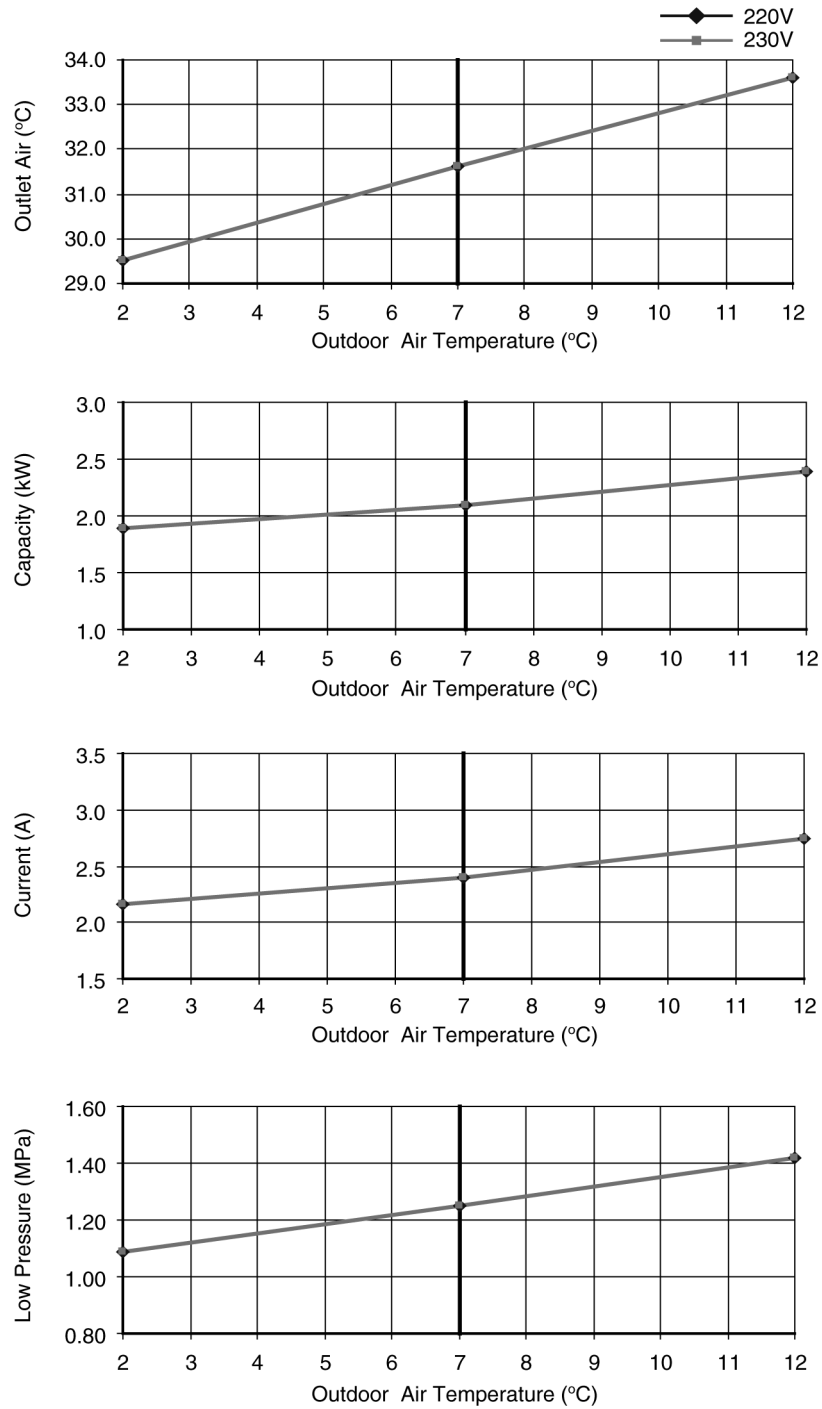


• Heating Characteristic

[Condition] Room temperature: 20/-°C

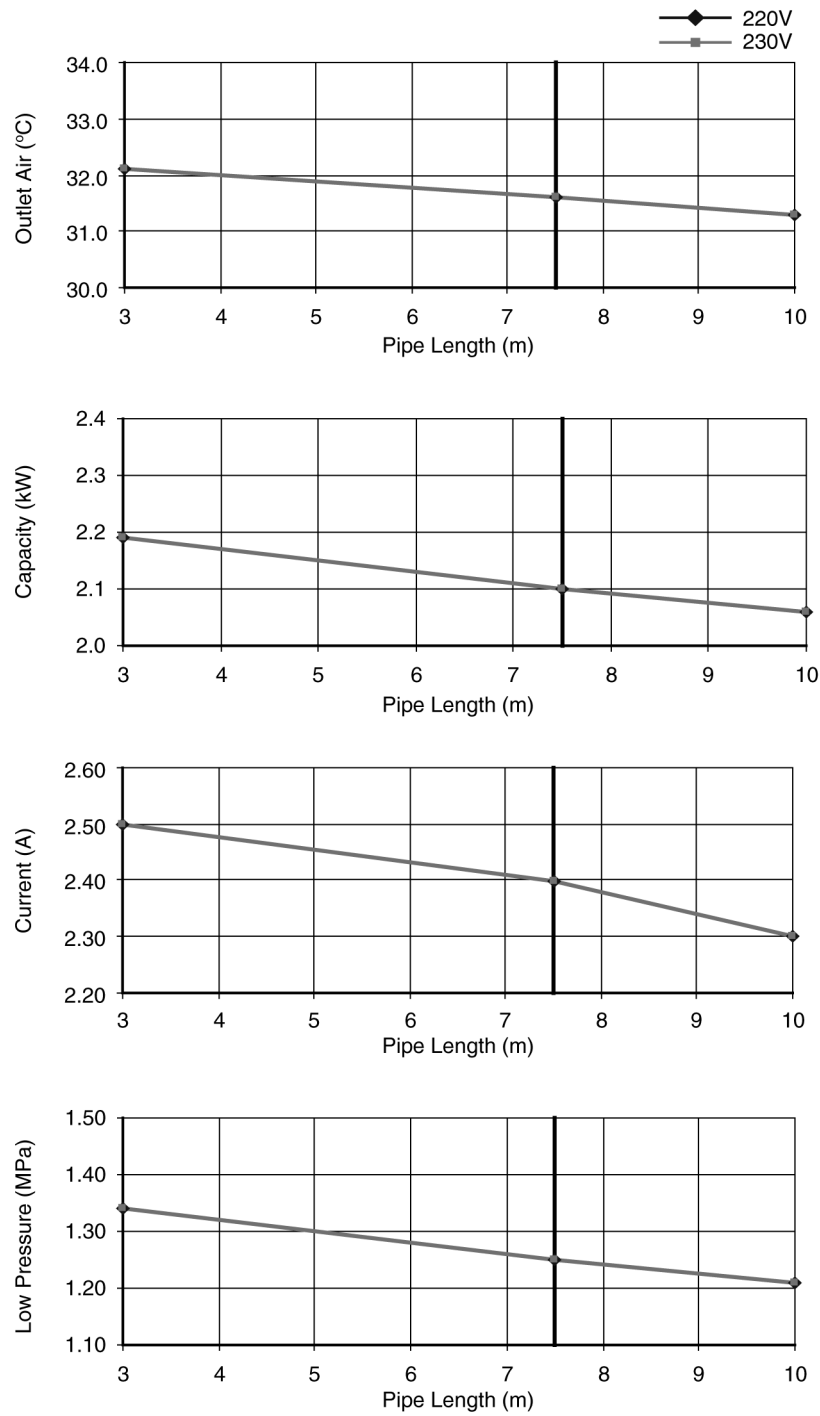
Operation condition: High fan speed (Rated Frequency)

Piping length: 7.5 m



• Piping Length Characteristic

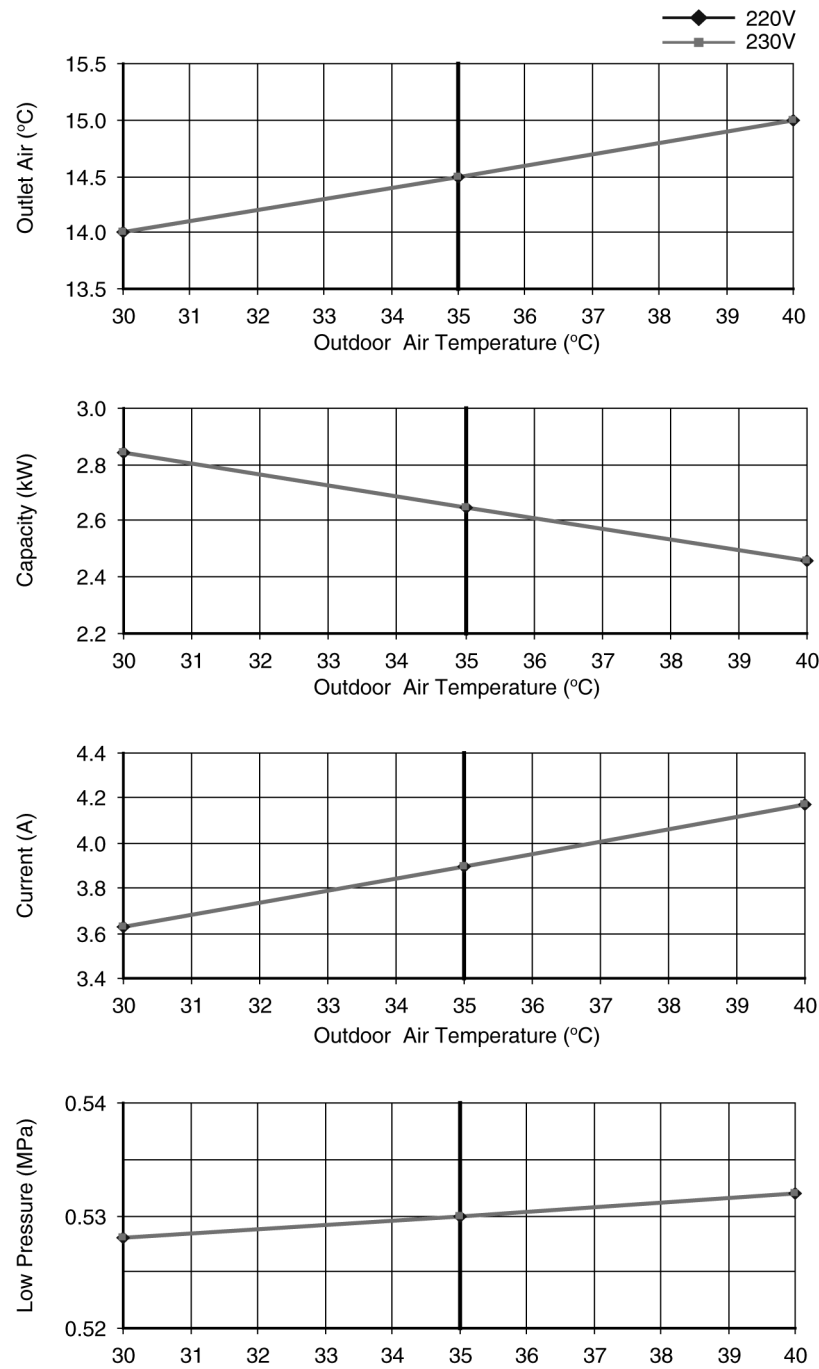
[Condition] Room temperature: 20/-°C
Operation condition: High fan speed (Rated Frequency)
Outdoor temperature: 7/6°C



17.2.2. CS-A9HKD CU-A9HKD

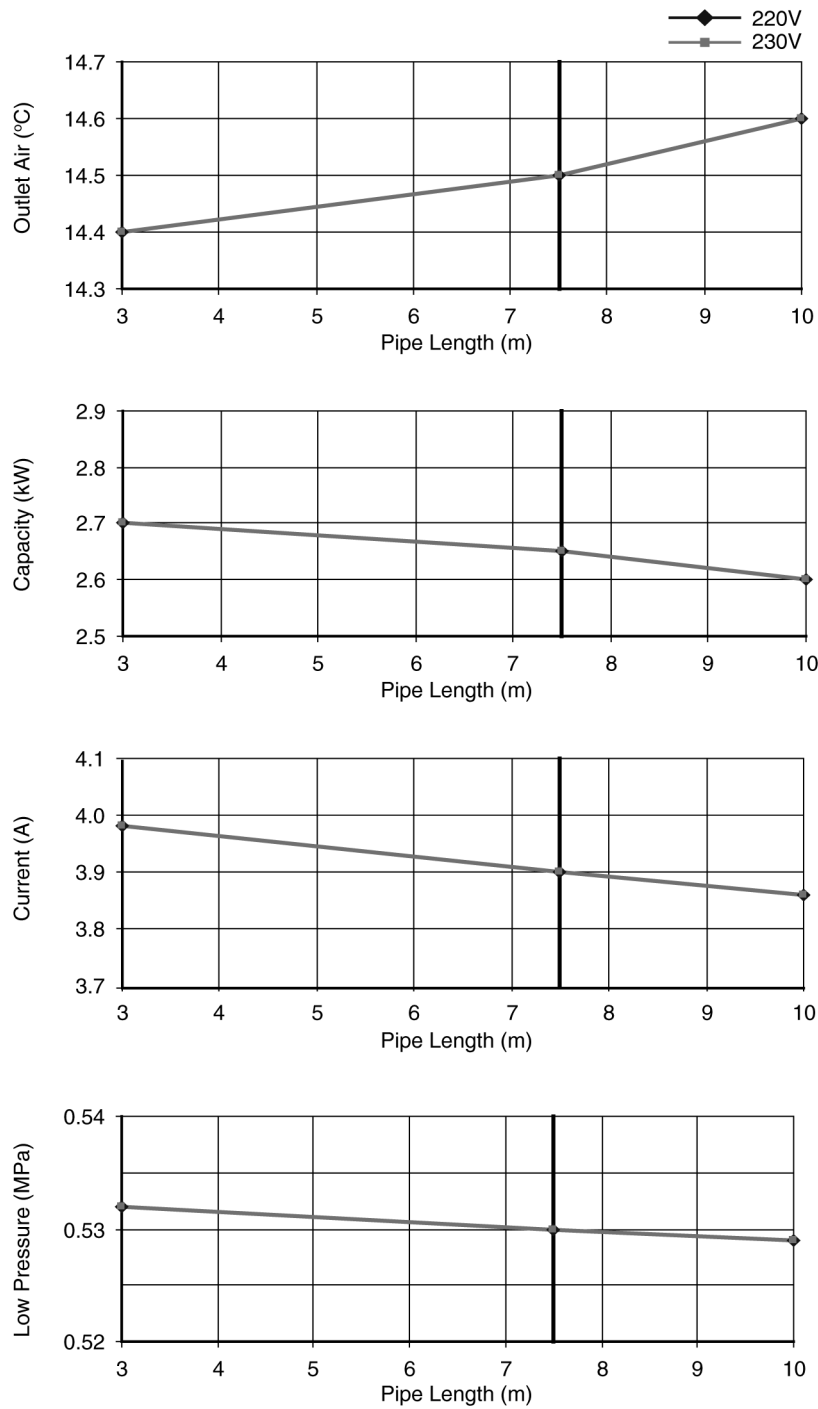
• Cooling Characteristic

[Condition] Room temperature: 27/19°C
Operation condition: High fan speed (Rated Frequency)
Piping length: 7.5 m



• Piping Length Characteristic

[Condition] Room temperature: 27/19°C
Operation condition: High fan speed (Rated Frequency)
Outdoor temperature: 35/24°C

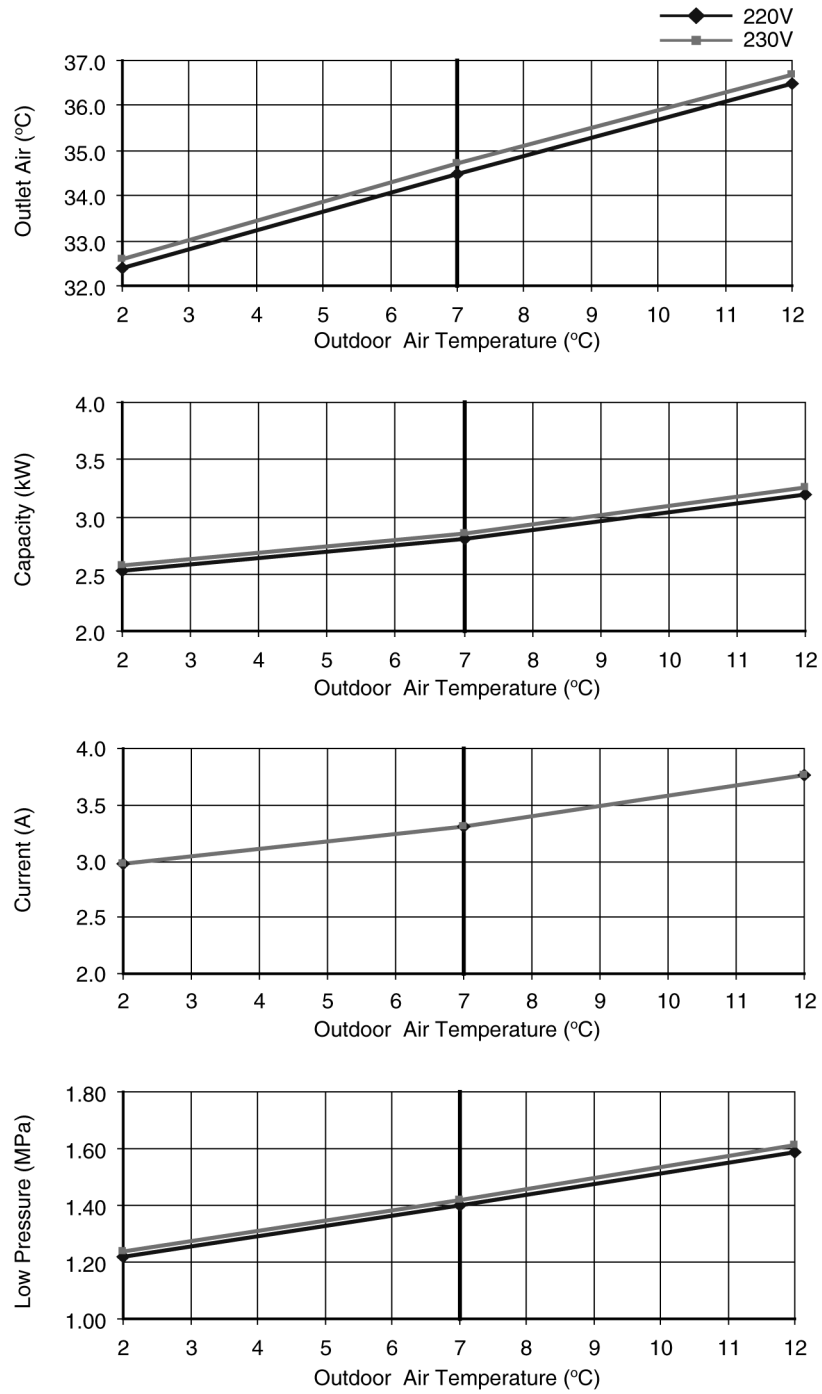


• Heating Characteristic

[Condition] Room temperature: 20/-°C

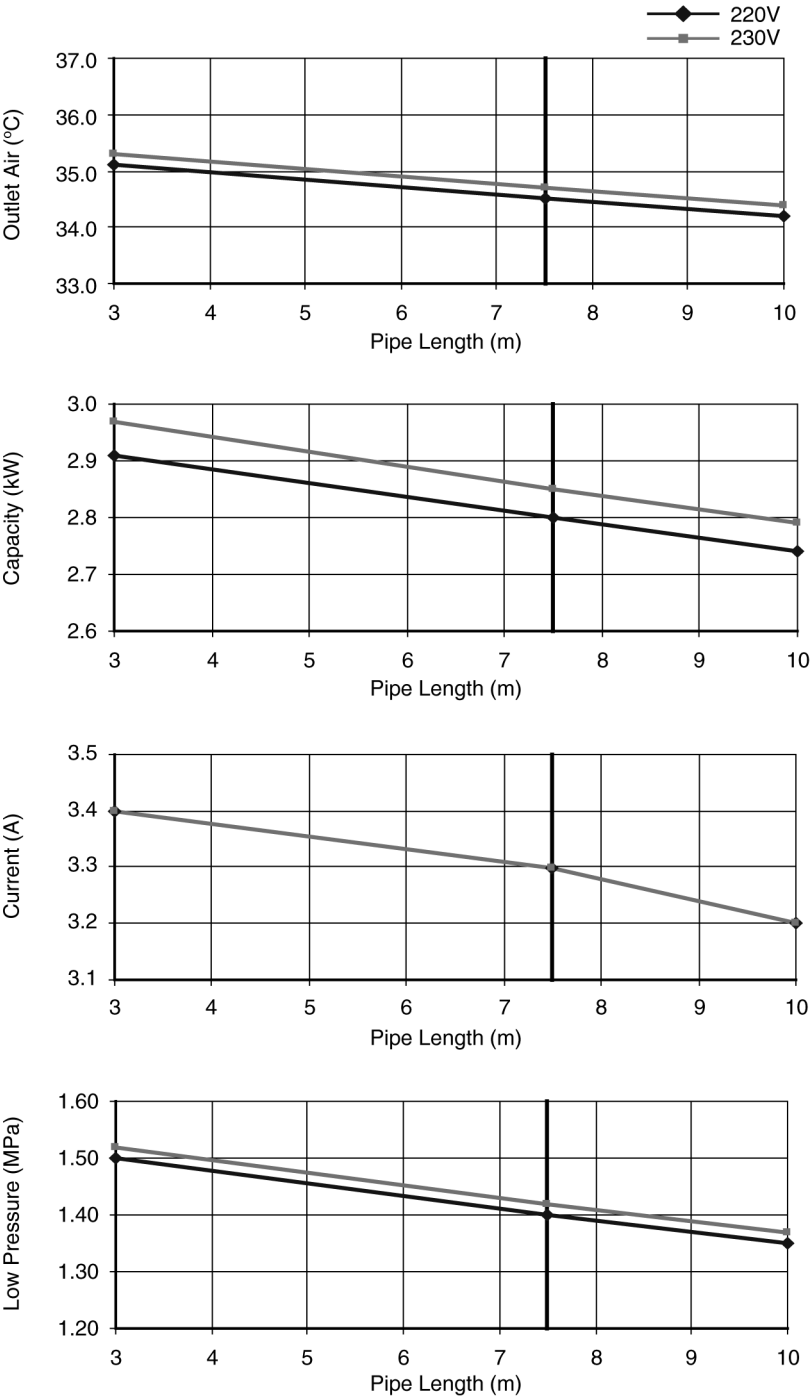
Operation condition: High fan speed (Rated Frequency)

Piping length: 7.5 m



• Piping Length Characteristic

[Condition] Room temperature: 20/-°C
Operation condition: High fan speed (Rated Frequency)
Outdoor temperature: 7/6°C



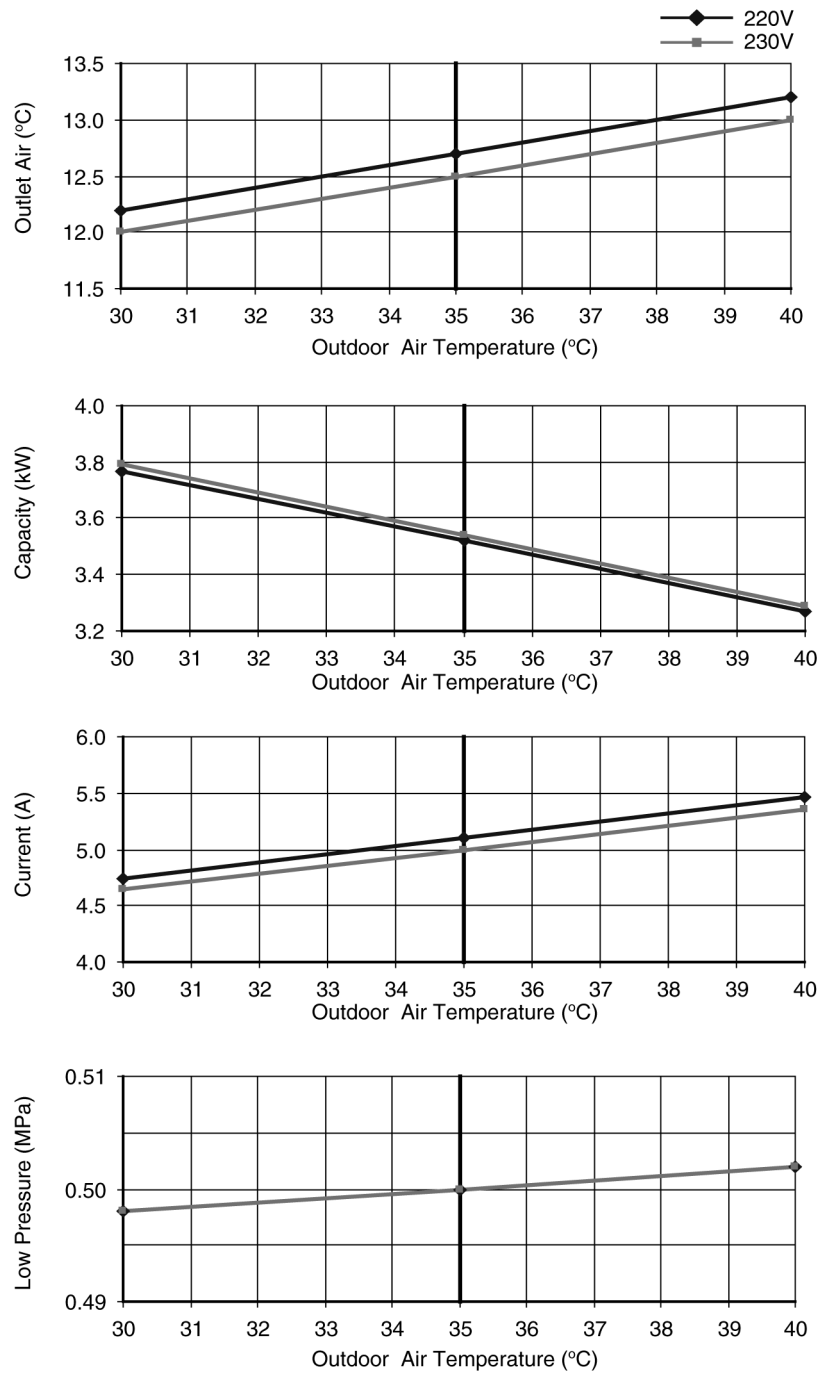
17.2.3. CS-A12HKD CU-A12HKD

• Cooling Characteristic

[Condition] Room temperature: 27/19°C

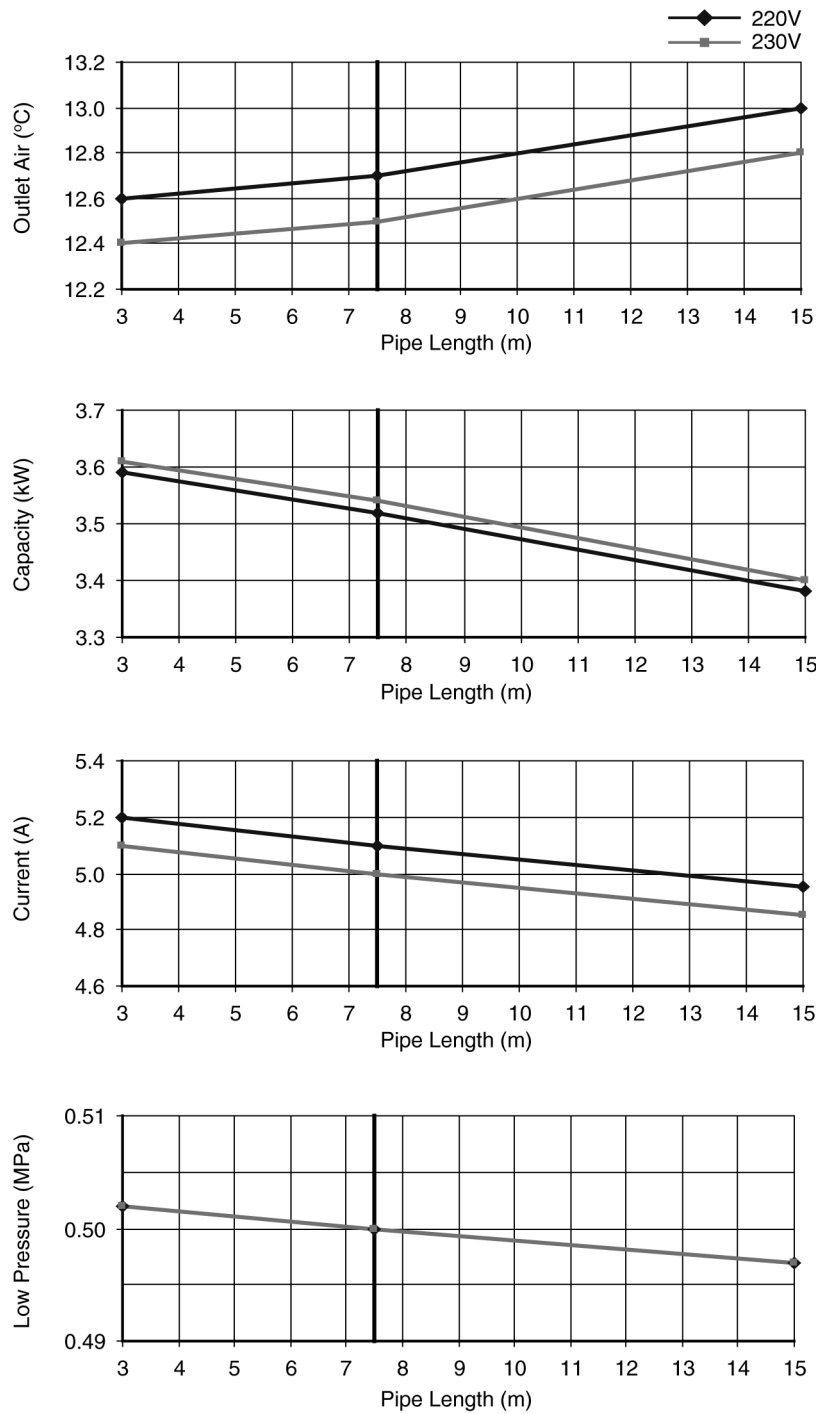
Operation condition: High fan speed (Rated Frequency)

Piping length: 7.5 m



• Piping Length Characteristic

[Condition] Room temperature: 27/19°C
Operation condition: High fan speed (Rated Frequency)
Outdoor temperature: 35/24°C

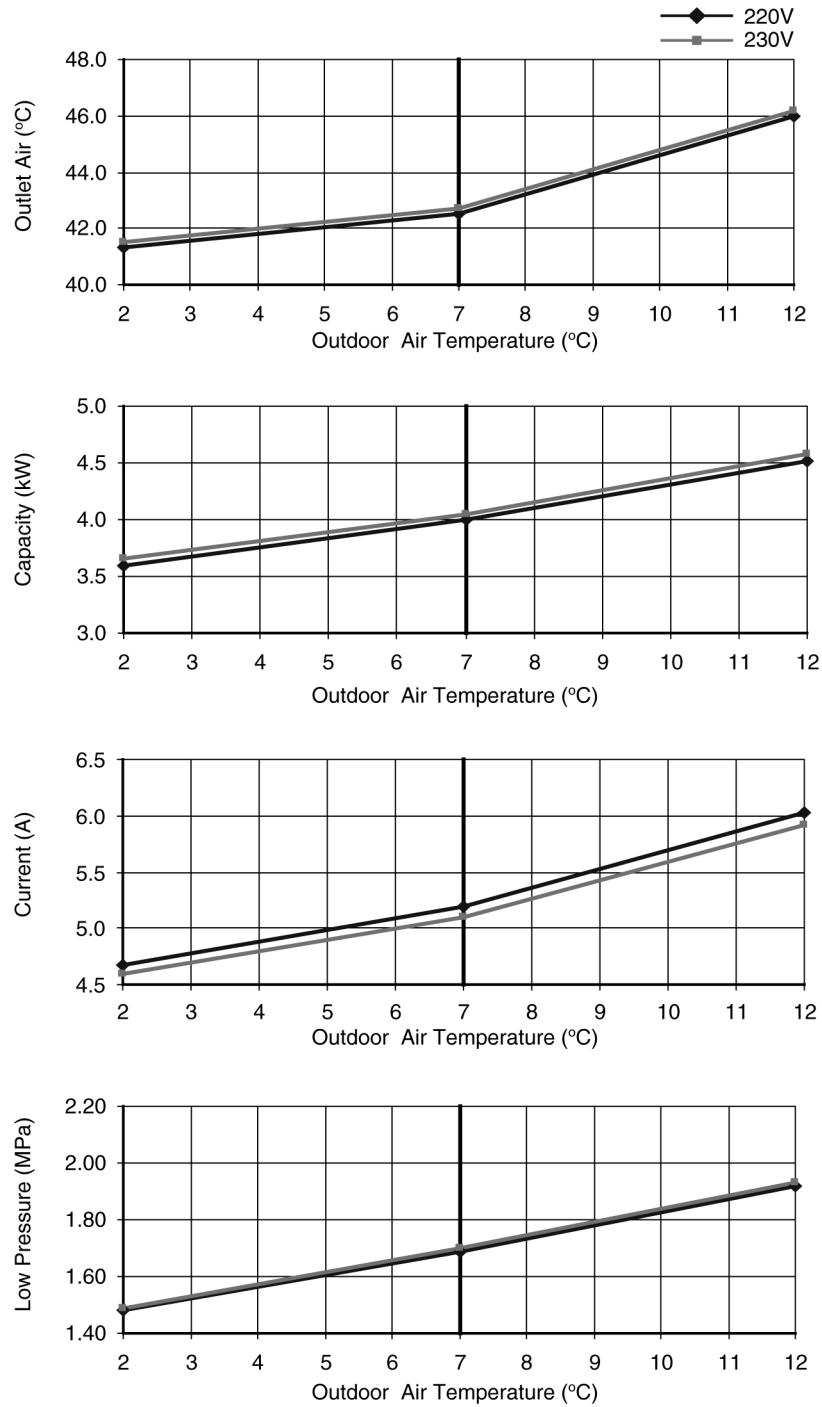


• Heating Characteristic

[Condition] Room temperature: 20/-°C

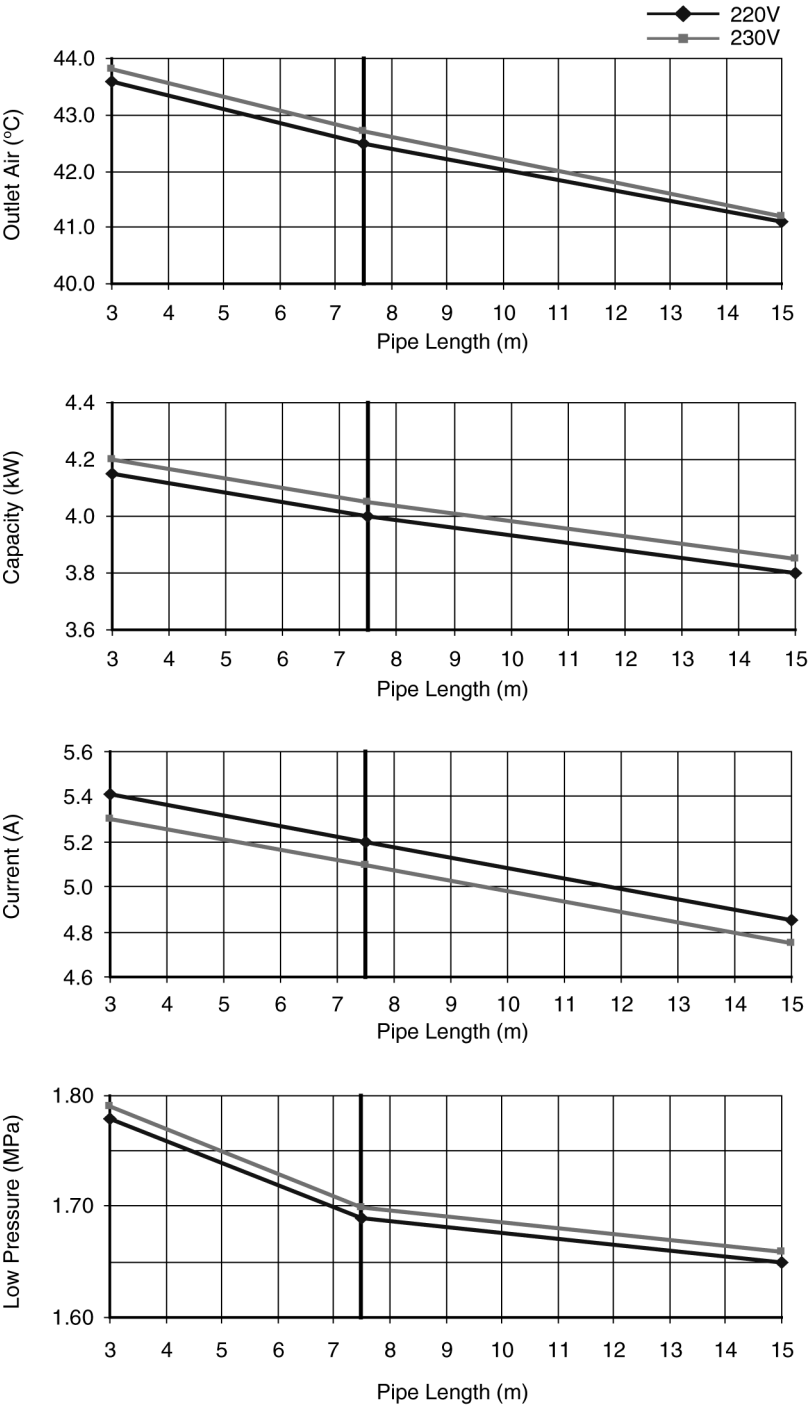
Operation condition: High fan speed (Rated Frequency)

Piping length: 7.5 m



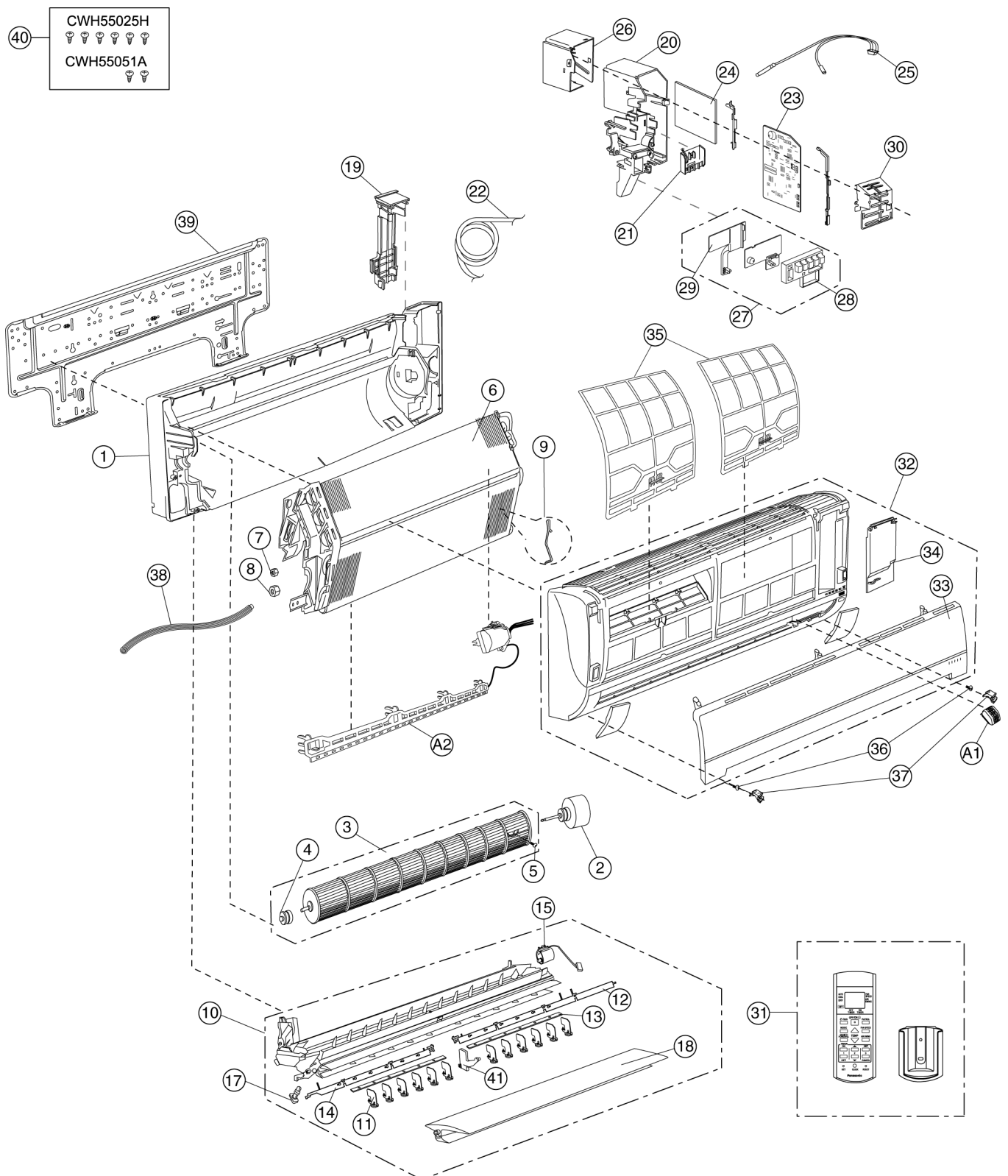
• Piping Length Characteristic

[Condition] Room temperature: 20/-°C
Operation condition: High fan speed (Rated Frequency)
Outdoor temperature: 7/6°C



18 Exploded View and Replacement Parts List

18.1. Indoor Unit



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.

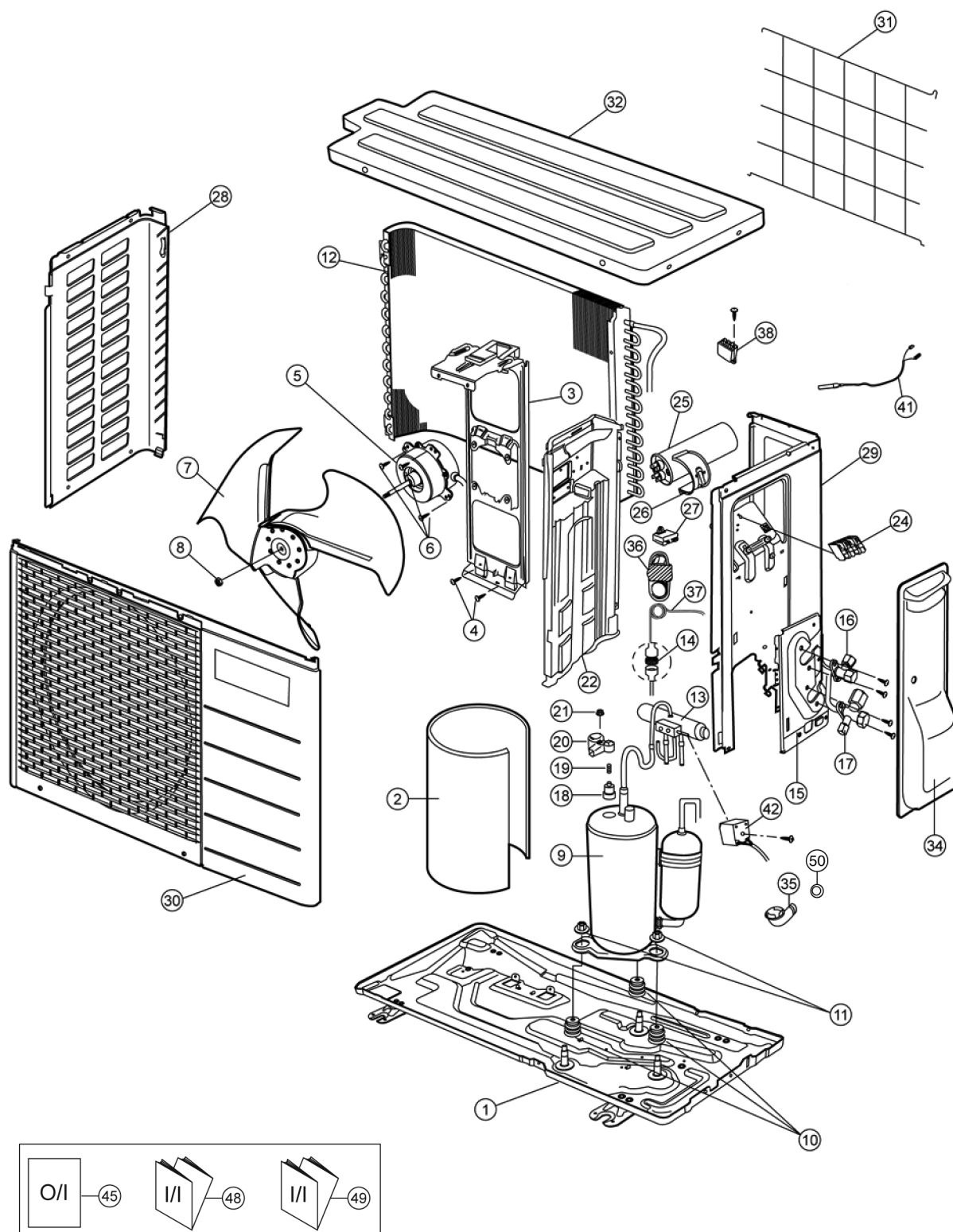
REF. NO.	PART NAME & DESCRIPTION	QTY.	CS-A7HKD	CS-A9HKD	CS-A12HKD
1	CHASSY COMPLETE	1	CWD50C1572	←	←
2	FAN MOTOR, AC 15W SINGLE	1	CWA921373	←	←
3	CROSS FLOW FAN COMPLETE	1	CWH02C1045	←	←
4	BEARING ASS'Y	1	CWH64K007	←	←
5	SCREW - CROSS FLOW FAN	1	CWH551146	←	←
AI	ION GENERATOR	1	CWH94C0014	←	←
6	EVAPORATOR CO.	1	CWB30C2416	CWB30C2411	CWB30C2397
7	FLARE NUT (1/4)	1	CWT251026	←	←
8	FLARE NUT (3/8) (1/2)	1	CWT25005	←	CWT25007
A2	E-ION AIR PURIFYING SYSTEM	1	CWH14C5332	←	←
9	CLIP FOR SENSOR	1	CWH32143	←	←
10	DISCHARGE GRILLE COMPLETE	1	CWE20C2627	←	←
11	VERTICAL VANE	12	CWE241157	←	←
12	CONNECTING BAR	1	CWE261092	←	←
13	CONNECTING BAR	2	CWE261071	←	←
14	CONNECTING BAR	1	CWE261091	←	←
15	A.S.MOTOR, DC SINGLE 12V300 OHM	1	CWA981091	←	←
17	CAP - DRAIN TRAY	1	CWH521096	←	←
18	HORIZONTAL VANE COMPLETE	1	CWE24C1183	←	←
19	BACK COVER CHASSIS	1	CWD932454	←	←
20	CONTROL BOARD CASING	1	CWH102321	←	←
21	TERMINAL BOARD COMPLETE	1	CWA28C2312	←	CWA28C2313
22	P.S.CORD W/OUT PLUG	1	CWA20C2590	←	←
23	ELECTRONIC CONTROLLER - MAIN	1	CWA73C2989	CWA73C2991	CWA73C2990
24	ELECTRONIC CONTROLLER - POWER	1	CWA744529	←	←
25	SENSOR COMPLETE	1	CWA50C2122	←	CWA50C2401
26	CONTROL BOARD FRONT COVER	1	CWH131207	←	←
27	INDICATOR COMPLETE	1	CWE39C1183	←	←
28	INDICATOR HOLDER	1	CWD932744	←	←
29	INDICATOR HOLDER	1	CWD932745	←	←
30	CONTROL BOARD TOP COVER	1	CWH13C1171	←	←
31	REMOTE CONTROL COMPLETE	1	CWA75C3173	←	←
32	FRONT GRILLE COMPLETE	1	CWE11C3911	←	←
33	INTAKE GRILLE COMPLETE	1	CWE22C1409	←	←
34	GRILLE DOOR COMPLETE	1	CWE14C1010	←	←
35	E-ION FILTER	2	CWD00K1004	←	←
36	SCREW - FRONT GRILLE	2	XTT4+16CFJ	←	←
37	CAP - FRONT GRILLE	2	CWH521109	←	←
38	DRAIN HOSE	1	CWH851063	←	←
39	INSTALLATION PLATE	1	CWH361067	←	←
40	BAG COMPLETE - INSTALLATION SCREW	1	CWH82C067	←	←
41	FULCRUM	1	CWH621049	←	←

(Note)

All parts are supplied from PHAAM, Malaysia (Vendor Code: 061).

18.2. Outdoor Unit

18.2.1. CU-A7HKD CU-A9HKD



Note:

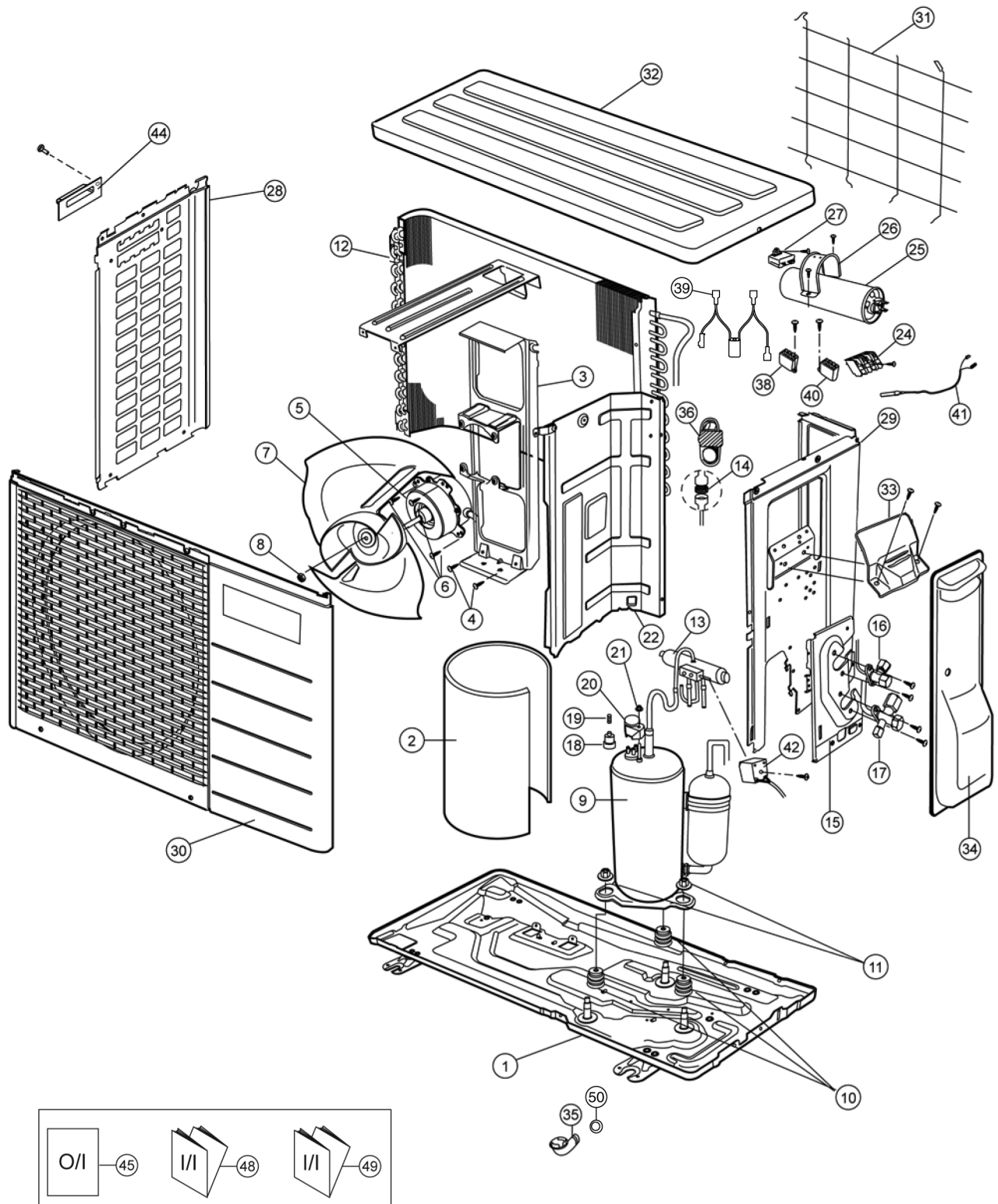
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

REF. NO.	PART NAME & DESCRIPTION	QTY.	CU-A7HKD	CU-A9HKD
1	CHASSY ASS'Y	1	CWD50K2112	←
2	SOUND PROOF MATERIAL	1	CWG302255	←
3	FAN MOTOR BRACKET	1	CWD541075	←
4	SCREW - FAN MOTOR BRACKET	2	CWH551217	←
5	FAN MOTOR (AC 30W SINGLE)	1	CWA951526	←
6	SCREW - FAN MOTOR MOUNT	3	CWH55406J	←
7	PROPELLER FAN ASS'Y	1	CWH03K1020	←
8	NUT - PROPELLER FAN	1	CWH56053J	←
9	COMPRESSOR	1	2RS122D5BG02	2PS156D3BB02
10	ANTI - VIBRATION BUSHING	3	CWH50077	←
11	NUT - COMPRESSOR MOUNT	3	CWH56000J	←
12	CONDENSER	1	CWB32C2416	CWB32C2417
13	4-WAY VALVE	1	CWB001024J	CWB001055
14	STRAINER	1	CWB11025	←
15	HOLDER COUPLING	1	CWH351047	←
16	2-WAY VALVE (LIQUID)	1	CWB021218	CWB021217
17	3-WAY VALVE (GAS)	1	CWB011258	CWB011257
18	OVERLOAD PROTECTOR	1	CWA121050J	CWA121210J
19	HOLDER - O.L.P.	1	CWH7041200	←
20	TERMINAL COVER	1	CWH171011	←
21	NUT - TERMINAL COVER	1	CWH7080300J	←
22	SOUND PROOF BOARD	1	CWH151074	←
24	TERMINAL BOARD ASS'Y	1	CWA28K1021J	←
25	CAPACITOR - COM.	1	DS371206CPNA	F0GAH306A004
26	HOLDER CAPACITOR	1	CWH301038	CWH301035
27	CAPACITOR - F.M	1	DS441205NPQA	←
28	CABINET SIDE PLATE (L)	1	CWE041110A	←
29	CABINET SIDE PLATE COMP.	1	CWE04C1042	←
30	CABINET FRONT PLATE ASS'Y	1	CWE06K1048	←
31	WIRE NET	1	CWD041057A	←
32	CABINET TOP PLATE	1	CWE031041A	←
34	CONTROL BOARD COVER	1	CWH13C1099	←
35	L. TUBE (FLEXIBLE PIPE)	1	CWH5850080	←
36	TUBE ASS'Y (CHK VALVE, CAPILLARY)	1	CWT01C3976	—
37	CAPILLARY TUBE ASS'Y	1	—	CWB15K1166-1
38	ELECTRO MAGNETIC SWITCH	1	CWA00059	←
41	TEMPERATURE RELAY	1	CWA14C1009	←
42	V-COIL COMPLETE	1	CWA43C2187	←
45	OPERATION INSTRUCTIONS	1	CWF565757	←
48	INSTALLATION INSTRUCTIONS	1	CWF613305	←
49	INSTALLATION INSTRUCTIONS	1	CWF613306	←
50	PACKING - L. TUBE	1	CWB81012	←

(Note)

- All parts are supplied from PHAAM, Malaysia (Vendor Code: 061).

18.2.2. CU-A12HKD



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-A12HKD
1	CHASSY ASS'Y	1	CWD50K2074
2	SOUND PROOF MATERIAL	1	CWG302410
3	FAN MOTOR BRACKET	1	CWD541030
4	SCREW - FAN MOTOR BRACKET	2	CWH551217
5	FAN MOTOR (AC 30W SINGLE)	1	CWA951117J
6	SCREW - FAN MOTOR MOUNT	3	CWH55406J
7	PROPELLER FAN ASS'Y	1	CWH03K1006
8	NUT - PROPELLER FAN	1	CWH56053J
9	COMPRESSOR	1	2PS206D2BA02
10	ANTI - VIBRATION BUSHING	3	CWH50055
11	NUT - COMPRESSOR MOUNT	3	CWH561049
12	CONDENSER	1	CWB32C2418
13	4-WAY VALVE	1	CWB001026J
14	STRAINER	1	CWB11025
15	HOLDER COUPLING	1	CWH351023
16	2-WAY VALVE (LIQUID)	1	CWB021117
17	3-WAY VALVE (GAS)	1	CWB011482
18	OVERLOAD PROTECTOR	1	CWA121251
19	HOLDER - O.L.P.	1	CWH7041200
20	TERMINAL COVER	1	CWH171011
21	NUT - TERMINAL COVER	1	CWH7080300J
22	SOUND PROOF BOARD	1	CWH151023
24	TERMINAL BOARD ASS'Y	1	CWA28K1034J
25	CAPACITOR - COMP.	1	F0GAH356A001
26	HOLDER CAPACITOR	1	CWH30060
27	CAPACITOR - F.M	1	DS441205NPQA
28	CABINET SIDE PLATE (L)	1	CWE041248A
29	CABINET SIDE PLATE COMP.	1	CWE04C1118
30	CABINET FRONT PLATE ASS'Y	1	CWE06K1034
31	WIRE NET	1	CWD041111A
32	CABINET TOP PLATE	1	CWE031014A
33	PLATE - C.B.COVER	1	CWH131295
34	CONTROL BOARD COVER	1	CWH13C1064
35	L. TUBE (FLEXIBLE PIPE)	1	CWH5850080
36	TUBE ASS'Y (CHK VALVE, CAPILLARY)	1	CWT01C3650-1
38	ELECTRO MAGNETIC SWITCH	1	CWA00059
39	ELECTROLYTIC CAPACITOR - COMPLETE	1	CWA32C067
40	MAGNET RELAYS	1	K6A2C7A00002
41	TEMPERATURE RELAYS	1	CWA14C1009
42	V-COIL COMPLETE	1	CWA43C2273
44	HANDLE	1	CWE161010
45	OPERATION INSTRUCTIONS	1	CWF565757
48	INSTALLATION INSTRUCTIONS	1	CWF613305
49	INSTALLATION INSTRUCTIONS	1	CWF613306
50	PACKING - L. TUBE	1	CWB81012

(Note)

All parts are supplied from PHAAM, Malaysia (Vendor Code: 061).

"O" marked parts are recommended to be kept in stock.