

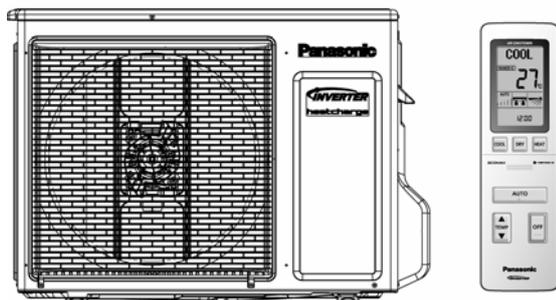
Service Manual

Air Conditioner



Indoor Unit
CS-VE9NKE
CS-VE12NKE

Outdoor Unit
CU-VE9NKE
CU-VE12NKE



⚠ WARNING

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

⚠ PRECAUTION OF LOW TEMPERATURE

In order to avoid frostbite, be assured of no refrigerant leakage during the installation or repairing of refrigerant circuit.

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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.
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- 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. Do not modify the machine, part, material during repairing service.	
2. If wiring unit is supplied as repairing part, do not repair or connect the wire even only partial wire break. Exchange the whole wiring unit.	
3. Do not wrench the fasten terminal. Pull it out or insert it straightly.	
4. Engage authorized 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.	
5. Install according to this installation instructions strictly. If installation is defective, it will cause water leakage, electric shock or fire.	
6. Use the attached accessories parts and specified parts for installation and servicing. Otherwise, it will cause the set to fall, water leakage, fire or electrical shock.	
7. Install at a strong and firm location which is able to withstand the set's weight. If the strength is not enough or installation is not properly done, the set will drop and cause injury.	
8. For electrical work, follow the local national wiring standard, regulation and the installation instruction. An independent circuit and single outlet must be used. If electrical circuit capacity is not enough or defect found in electrical work, it will cause electrical shock or fire.	
9. This equipment is strongly recommended to install with Earth Leakage Circuit Breaker (ELCB) or Residual Current Device (RCD). Otherwise, it may cause electrical shock and fire in case equipment breakdown or insulation breakdown.	
10. Do not use joint cable for indoor/outdoor connection cable. Use the specified indoor/outdoor connection cable, refer to installation instruction CONNECT THE CABLE TO THE INDOOR UNIT and connect tightly for indoor/outdoor connection. Clamp the cable so that no external force will be acted on the terminal. If connection or fixing is not perfect, it will cause heat up or fire at the connection.	
11. Wire routing must be properly arranged so that control board cover is fixed properly. If control board cover is not fixed perfectly, it will cause heat-up or fire at the connection point of terminal, fire or electrical shock.	
12. When install or relocate air conditioner, do not let any substance other than the specified refrigerant, eg. air etc. mix into refrigeration cycle (piping). (Mixing of air etc. will cause abnormal high pressure in refrigeration cycle and result in explosion, injury etc.).	
13. Do not install outdoor unit near handrail of veranda. When installing air-conditioner unit at veranda of high rise building, child may climb up to outdoor unit and cross over the handrail and causing accident.	
14. This equipment must be properly earthed. Earth line must not be connected to gas pipe, water pipe, earth of lightning rod and telephone. Otherwise, it may cause electric shock in case equipment breakdown or insulation breakdown.	
15. Keep away from small children, the thin film may cling to nose and mouth and prevent breathing.	
16. Do not use unspecified cord, modified cord, joint cord or extension cord for power supply cord. Do not share the single outlet with other electrical appliances. Poor contact, poor insulation or over current will cause electrical shock or fire.	
17. Tighten the flare nut with torque wrench according to specified method. If the flare nut is over-tightened, after a long period, the flare may break and cause refrigerant gas leakage.	
18. For R410A models, when connecting the piping, do not use any existing (R22) pipes and flare nuts. Using such same may cause abnormally high pressure in the refrigeration cycle (piping), and possibly result in explosion and injury. Use only R410A materials. Thickness of copper pipes used with R410A must be more than 0.8mm. Never use copper pipes thinner than 0.8mm. It is desirable that the amount of residual oil is less than 40 mg/10m.	

 **WARNING**

19. During installation, install the refrigerant piping properly before run the compressor. (Operation of compressor without fixing refrigeration piping and valves at opened condition will caused suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc).
20. During pump down operation, stop the compressor before remove the refrigeration piping. (Removal of compressor while compressor is operating and valves are opened will cause suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc.)
21. 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.
22. Ventilate if there is refrigerant gas leakage during operation. It may cause toxic gas when refrigerant contacts with fire.
23. Do not insert your fingers or other objects into the unit, high speed rotating fan may cause injury. 
24. Must not use other parts except original parts described in catalog and manual.
25. Using of refrigerant other than the specified type may cause product damage, burst and injury etc.

 **CAUTION**

1. Do not install the unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire. 
2. Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, water may enter the room and damage the furniture.
3. Tighten the flare nut with torque wrench according to specified method. If the flare nut is over-tightened, after a long period, the flare may break and cause refrigerant gas leakage.
4. Do not touch outdoor unit air inlet and aluminium fin. It may cause injury. 
5. Select an installation location which is easy for maintenance.
6. Pb free solder has a higher melting point than standard solder; typically the melting point is 50°F – 70°F (30°C – 40°C) higher. Please use a high temperature solder iron. In case of the soldering iron with temperature control, please set it to 700 ± 20°F (370 ± 10°C). Pb free solder will tend to splash when heated too high (about 1100°F / 600°C).
7. Power supply connection to the air conditioner. Connect the power supply cord of the air conditioner to the mains using one of the following methods.
Power supply point shall be the place where there is ease for access for the power disconnection in case of emergency. In some countries, permanent connection of this room air conditioner to the power supply is prohibited.
 - i. Power supply connection to the receptacle using a power plug. Use an approved 15/16A (3/4~1.75HP) or 16A (2.0HP) or 20A (2.5HP) or 25A (3.0HP) power plug with earth pin for the connection to the socket.
 - ii. Power supply connection to a circuit breaker for the permanent connection. Use an approved 16A (3/4~2.0HP), 20A (2.5HP) or 25A (3.0HP) circuit breaker for the permanent connection. It must be a double pole switch with a minimum 3.0 mm contact gap.
8. Do not release refrigerant during piping work for installation, servicing, reinstallation and during repairing a refrigerant parts. Take care of the liquid refrigerant, it may cause frostbite. 
9. Installation or servicing work: It may need two people to carry out the installation or servicing work.
10. Do not install this appliance in a laundry room or other location where water may drip from the ceiling, etc. 
11. Do not sit or step on the unit, you may fall down accidentally. 
12. Do not touch the sharp aluminium fins or edges of metal parts.
If you are required to handle sharp parts during installation or servicing, please wear hand glove.
Sharp parts may cause injury. 

2. Specification

Model		Indoor	CS-VE9NKE							
		Outdoor	CU-VE9NKE							
Performance Test Condition			EN 14511							
Power Supply		Phase, Hz	Single, 50							
		V	220			230				
			Min.	Mid.	Max.	Min.	Mid.	Max.		
Cooling	Capacity		kW	0.60	2.50	3.00	0.60	2.50	3.00	
	Running Current		A	—	2.3	—	—	2.2	—	
	Input Power		W	140	485	790	140	485	790	
	Annual Consumption		kWh	—	243	—	—	243	—	
	EER		W/W	—	5.15	—	—	5.15	—	
	Erp	Pdsign		kW	—	—	—	—	2.50	—
		SEER		(W/W)	—	—	—	—	8.60	—
		Annual Consumption		kWh	—	—	—	—	102	—
		Class			—	—	—	—	A+++	—
	Power Factor		%	—	94	—	—	94	—	
	Indoor Noise (H / L / QLo)		dB-A	44 / 26 / 23			44 / 26 / 23			
			Power Level dB	59 / -			59 / -			
	Outdoor Noise (H / L)		dB-A	49 / -			49 / -			
			Power Level dB	64 / -			64 / -			
Heating	Capacity		kW	0.60	3.20	7.60	0.60	3.20	7.70	
	Running Current		A	—	2.8	—	—	2.7	—	
	Input Power		W	140	585	2.65k	140	585	2.72k	
	COP		W/W	—	5.47	—	—	5.47	—	
	Erp warm/ave./cold	Pdsign		kW	—	—	—	5.60 / 3.20 / 4.70		
		Tbivalent		°C	—	—	—	2 / -10 / -19		
		SCOP		(W/W)	—	—	—	6.00 / 5.40 / 4.10		
		Annual Consumption		kWh	—	—	—	1307 / 830 / 2408		
	Class			—	—	—	A+++ / A+++ / A+			
	Power Factor		%	—	94	—	—	94	—	
	Indoor Noise (H / L / QLo)		dB-A	44 / 27 / 24			44 / 27 / 24			
			Power Level dB	59 / -			59 / -			
	Outdoor Noise (H / L)		dB-A	49 / -			49 / -			
			Power Level dB	64 / -			64 / -			
Extr Low Temp.: Capacity (kW) / I.Power (W) / COP				—			5.00 / 2.37k / 2.11			
Max Current (A) / Max Input Power (W)				14.0 / 3.22k						
Starting Current (A)				2.8			2.7			
Compressor	Type		Hermetic Motor (Rotary)							
	Motor Type		Brushless (6-poles)							
	Output Power		W	900						

Model			Indoor	CS-VE9NKE		
			Outdoor	CU-VE9NKE		
Indoor Fan	Type			Cross-flow fan		
	Material			AS+GF Resin		
	Motor Type			PWM (8-poles)		
	Input Power		W	23.6		
	Output Power		W	40		
	Speed	QLo	Cool	rpm	600	
			Heat	rpm	640	
		Lo	Cool	rpm	640	
			Heat	rpm	720	
		Me	Cool	rpm	960	
			Heat	rpm	980	
		Hi	Cool	rpm	1110	
			Heat	rpm	1110	
Shi	Cool	rpm	1190			
	Heat	rpm	1110			
Outdoor Fan	Type			Propeller Fan + Flat piece		
	Material			PP		
	Motor Type			DC Brushless (8-poles)		
	Input Power		kW	51.61		
	Output Power		W	40		
	Speed	Hi	Cool	rpm	910	
Heat			rpm	—		
Moisture Removal			L/h (Pt/h)	1.5 (3.2)		
Indoor Airflow	QLo	Cool	m ³ /min (ft ³ /m)	3.5 (124)		
		Heat	m ³ /min (ft ³ /m)	4.0 (141)		
	Lo	Cool	m ³ /min (ft ³ /m)	4.0 (141)		
		Heat	m ³ /min (ft ³ /m)	5.1 (180)		
	Me	Cool	m ³ /min (ft ³ /m)	8.1 (286)		
		Heat	m ³ /min (ft ³ /m)	8.4 (297)		
	Hi	Cool	m ³ /min (ft ³ /m)	10.0 (353)		
		Heat	m ³ /min (ft ³ /m)	10.0 (353)		
Shi	Cool	m ³ /min (ft ³ /m)	11.0 (388)			
	Heat	m ³ /min (ft ³ /m)	10.0 (353)			
Outdoor Airflow	Hi	Cool	m ³ /min (ft ³ /m)	33.0 (1165)	33.0 (1165)	
		Heat	m ³ /min (ft ³ /m)	31.5 (1112)	31.5 (1112)	
Refrigeration Cycle	Control Device			Expansion Valve		
	Refrigerant Oil		cm ³	FV50S (450)		
	Refrigerant Type		g (oz)	R410A, 1.50k (52.9)		
Dimension	Height(I/D / O/D)		mm (inch)	295 (11-5/8) / 623 (24-1/2)		
	Width (I/D / O/D)		mm (inch)	890 (35) / 799 (31-1/2)		
	Depth (I/D / O/D)		mm (inch)	275 (10-7/8) / 299 (11-3/4)		
Weight	Net (I/D / O/D)		kg (lb)	14.5 (32) / 43 (95)		
Piping	Pipe Diameter (Liquid / Gas)		mm (inch)	6.35 (1/4) / 9.52 (3/8)		
	Standard length		m (ft)	5.0 (16.4)		
	Length range (min – max)		m (ft)	3 (9.8) ~ 15 (49.2)		
	I/D & O/D Height different		m (ft)	5.0 (16.4)		
	Additional Gas Amount		g/m (oz/ft)	20 (0.2)		
Length for Additional Gas		m (ft)	7.5 (24.6)			

Model		Indoor	CS-VE9NKE	
		Outdoor	CU-VE9NKE	
Drain Hose	Inner Diameter	mm	16.7	
	Length	mm	650	
Indoor Heat Exchanger	Fin Material		Aluminium (Pre Coat)	
	FPI		26.5 + 17	
Outdoor Heat Exchanger	Fin Material		Aluminium (Pre Coat)	
	Fin Type		Corrugated Fin	
	Row x Stage x FPI		2 × 32 × 19.5	
	Size (W x H x D)	mm	871.6 × 586.24 × 37.8 840.4	
Power Supply			Indoor Power Supply	
Power Supply Cord		A	Nil	
Thermostat			Electronic Control	
Protection Device			Electronic Control	
			DRY BULB	WET BULB
Indoor Operation Range	Cooling	Maximum	32	23
		Minimum	16	11
	Heating	Maximum	30	—
		Minimum	16	—
Outdoor Operation Range	Cooling	Maximum	43	26
		Minimum	-10	—
	Heating	Maximum	24	18
		Minimum	-20	—

- Cooling capacities are based on indoor temperature of 27°C Dry Bulb (80.6°F Dry Bulb), 19.0°C Wet Bulb (66.2°F Wet Bulb) and outdoor air temperature of 35°C Dry Bulb (95°F Dry Bulb), 24°C Wet Bulb (75.2°F Wet Bulb)
- Heating capacities are based on indoor temperature of 20°C Dry Bulb (68°F Dry Bulb) and outdoor air temperature of 7°C Dry Bulb (44.6°F Dry Bulb), 6°C Wet Bulb (42.8°F Wet Bulb)
- Heating low temperature capacity, Input Power and COP measured at 230 V, indoor temperature of 20°C, outdoor 2/1°C.
- Heating extreme low temperature capacity, Input Power and COP measured at 230 V, indoor temperature of 20°C, outdoor -7/-8°C.
- Specifications are subjected to change without prior notice for further improvement.

Model		Indoor	CS-VE12NKE							
		Outdoor	CU-VE12NKE							
Performance Test Condition			EN 14511							
Power Supply		Phase, Hz	Single, 50							
		V	220			230				
			Min.	Mid.	Max.	Min.	Mid.	Max.		
Cooling	Capacity		kW	0.60	3.50	4.00	0.60	3.50	4.00	
	Running Current		A	—	4.1	—	—	3.9	—	
	Input Power		W	140	880	1.10k	140	880	1.10k	
	Annual Consumption		kWh	—	440	—	—	440	—	
	EER		W/W	—	3.98	—	—	3.98	—	
	Erp	Pdsign		kW	—	—	—	—	3.50	—
		SEER		(W/W)	—	—	—	—	8.50	—
		Annual Consumption		kWh	—	—	—	—	145	—
		Class			—	—	—	—	A+++	—
	Power Factor		%	—	97	—	—	97	—	
	Indoor Noise (H / L / QLo)		dB-A	45 / 29 / 26			45 / 29 / 26			
			Power Level dB	60 / -			60 / -			
	Outdoor Noise (H / L)		dB-A	50 / -			50 / -			
			Power Level dB	65 / -			65 / -			
Heating	Capacity		kW	0.60	4.20	8.30	0.60	4.20	8.40	
	Running Current		A	—	4.0	—	—	3.8	—	
	Input Power		W	140	855	3.08k	140	855	3.16k	
	COP		W/W	—	4.91	—	—	4.91	—	
	Erp warm/ave./cold	Pdsign		kW	—	—	—	6.10 / 4.20 / 6.10		
		Tbivalent		°C	—	—	—	2 / -10 / -17		
		SCOP		(W/W)	—	—	—	5.70 / 5.10 / 4.00		
		Annual Consumption		kWh	—	—	—	1499 / 1153 / 3203		
		Class			—	—	—	A+++ / A+++ / A+		
	Power Factor		%	—	97	—	—	97	—	
	Indoor Noise (H / L / QLo)		dB-A	45 / 33 / 30			45 / 33 / 30			
			Power Level dB	60 / -			60 / -			
	Outdoor Noise (H / L)		dB-A	50 / -			50 / -			
			Power Level dB	65 / -			65 / -			
Extr Low Temp.: Capacity (kW) / I.Power (W) / COP			—			5.60 / 2.80k / 2.00				
Max Current (A) / Max Input Power (W)			15.0 / 3.45k							
Starting Current (A)			4.1			3.9				
Compressor	Type		Hermetic Motor (Rotary)							
	Motor Type		Brushless (6-poles)							
	Output Power		W	900						

Model			Indoor	CS-VE12NKE		
			Outdoor	CU-VE12NKE		
Indoor Fan	Type			Cross-flow fan		
	Material			AS+GF Resin		
	Motor Type			PWM (8-poles)		
	Input Power		W	28.5		
	Output Power		W	40		
	Speed	QLo	Cool	rpm	660	
			Heat	rpm	750	
		Lo	Cool	rpm	740	
			Heat	rpm	870	
		Me	Cool	rpm	1040	
			Heat	rpm	1050	
		Hi	Cool	rpm	1190	
			Heat	rpm	1140	
	Shi	Cool	rpm	1270		
Heat		rpm	1140			
Outdoor Fan	Type			Propeller Fan + Flat piece		
	Material			PP		
	Motor Type			DC Brushless (8-poles)		
	Input Power		kW	57.29		
	Output Power		W	40		
	Speed	Hi	Cool	rpm	960	
Heat			rpm	—		
Moisture Removal			L/h (Pt/h)	2.0 (4.2)		
Indoor Airflow	QLo	Cool	m ³ /min (ft ³ /m)	4.3 (152)		
		Heat	m ³ /min (ft ³ /m)	5.4 (191)		
	Lo	Cool	m ³ /min (ft ³ /m)	5.3 (187)		
		Heat	m ³ /min (ft ³ /m)	6.9 (244)		
	Me	Cool	m ³ /min (ft ³ /m)	9.0 (318)		
		Heat	m ³ /min (ft ³ /m)	9.1 (321)		
	Hi	Cool	m ³ /min (ft ³ /m)	10.9 (384)		
		Heat	m ³ /min (ft ³ /m)	10.3 (362)		
Shi	Cool	m ³ /min (ft ³ /m)	11.9 (420)			
	Heat	m ³ /min (ft ³ /m)	10.3 (364)			
Outdoor Airflow	Hi	Cool	m ³ /min (ft ³ /m)	34.2 (1208)	34.2 (1208)	
		Heat	m ³ /min (ft ³ /m)	31.5 (1112)	31.5 (1112)	
Refrigeration Cycle	Control Device			Expansion Valve		
	Refrigerant Oil		cm ³	FV50S (450)		
	Refrigerant Type		g (oz)	R410A, 1.50k (52.9)		
Dimension	Height(I/D / O/D)		mm (inch)	295 (11-5/8) / 623 (24-1/2)		
	Width(I/D / O/D)		mm (inch)	890 (35) / 799 (31-1/2)		
	Depth(I/D / O/D)		mm (inch)	275 (10-7/8) / 299 (11-3/4)		
Weight	Net (I/D / O/D)		kg (lb)	14.5 (32) / 43 (95)		
Piping	Pipe Diameter (Liquid / Gas)		mm (inch)	6.35 (1/4) / 9.52 (3/8)		
	Standard length		m (ft)	5.0 (16.4)		
	Length range (min – max)		m (ft)	3 (9.8) ~ 15 (49.2)		
	I/D & O/D Height different		m (ft)	5.0 (16.4)		
	Additional Gas Amount		g/m (oz/ft)	20 (0.2)		
	Length for Additional Gas		m (ft)	7.5 (24.6)		

Model		Indoor	CS-VE12NKE	
		Outdoor	CU-VE12NKE	
Drain Hose	Inner Diameter	mm	16.7	
	Length	mm	650	
Indoor Heat Exchanger	Fin Material		Aluminium (Pre Coat)	
	FPI		26.5 + 17	
Outdoor Heat Exchanger	Fin Material		Aluminium (Pre Coat)	
	Fin Type		Corrugated Fin	
	Row x Stage x FPI		2 × 32 × 19.5	
	Size (W x H x D)	mm	871.6 × 586.24 × 37.8 840.4	
Power Supply			Indoor Power Supply	
Power Supply Cord		A	Nil	
Thermostat			Electronic Control	
Protection Device			Electronic Control	
			DRY BULB	WET BULB
Indoor Operation Range	Cooling	Maximum	32	23
		Minimum	16	11
	Heating	Maximum	30	—
		Minimum	16	—
Outdoor Operation Range	Cooling	Maximum	43	26
		Minimum	-10	—
	Heating	Maximum	24	18
		Minimum	-20	—

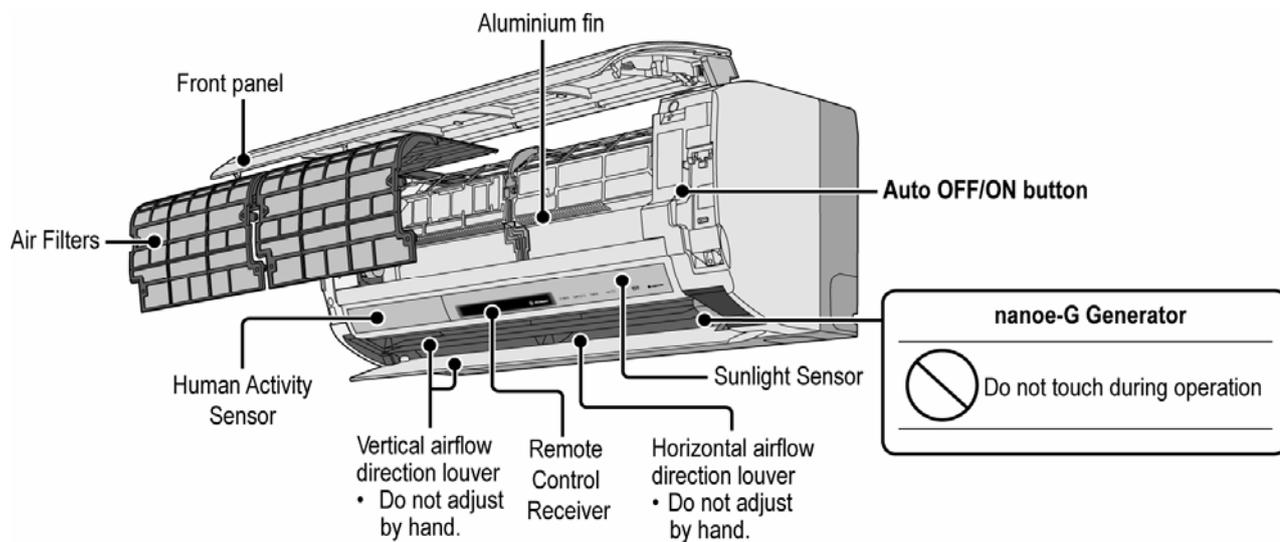
1. Cooling capacities are based on indoor temperature of 27°C Dry Bulb (80.6°F Dry Bulb), 19.0°C Wet Bulb (66.2°F Wet Bulb) and outdoor air temperature of 35°C Dry Bulb (95°F Dry Bulb), 24°C Wet Bulb (75.2°F Wet Bulb)
2. Heating capacities are based on indoor temperature of 20°C Dry Bulb (68°F Dry Bulb) and outdoor air temperature of 7°C Dry Bulb (44.6°F Dry Bulb), 6°C Wet Bulb (42.8°F Wet Bulb)
3. Heating low temperature capacity, Input Power and COP measured at 230 V, indoor temperature of 20°C, outdoor 2/1°C.
4. Heating extreme low temperature capacity, Input Power and COP measured at 230 V, indoor temperature of 20°C, outdoor -7/-8°C.
5. Specifications are subjected to change without prior notice for further improvement.

3. Features

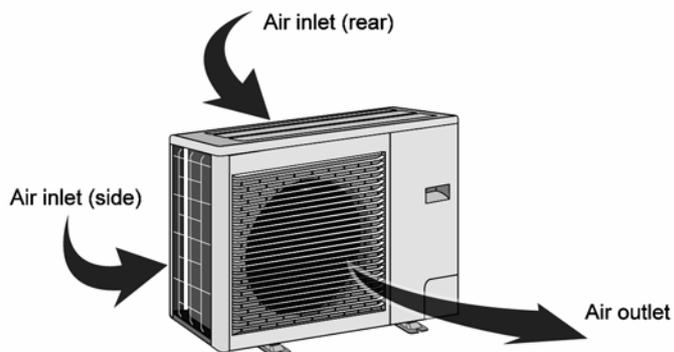
- **Inverter Technology**
 - Wider output power range
 - Energy saving
 - Quick Cooling
 - Quick Heating
 - More precise temperature control
- **Environment Protection**
 - Non-ozone depletion substances refrigerant (R410A)
- **Long Installation Piping**
 - Long piping up to 15 meters (0.75 ~ 1.75HP) during single split connection only
- **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
- **Operation Improvement**
 - Quiet mode to reduce the indoor unit operating sound
 - Powerful mode to reach the desired room temperature quickly
 - 24-hour timer setting
- **Serviceability Improvement**
 - Breakdown Self Diagnosis function

4. Location of Controls and Components

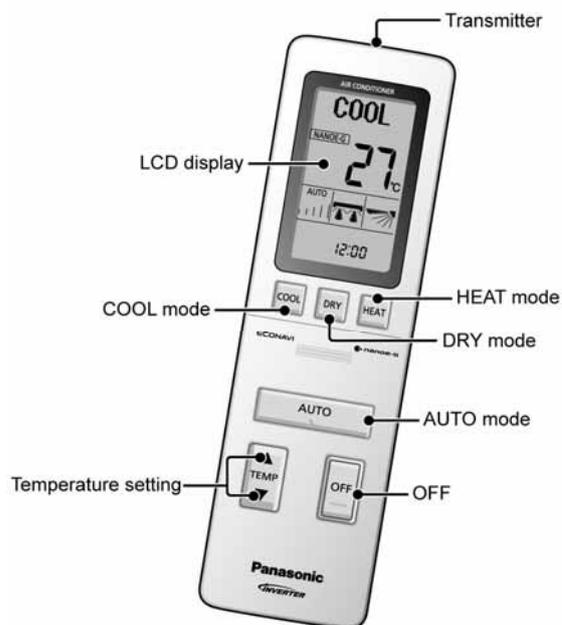
4.1 Indoor Unit



4.2 Outdoor Unit

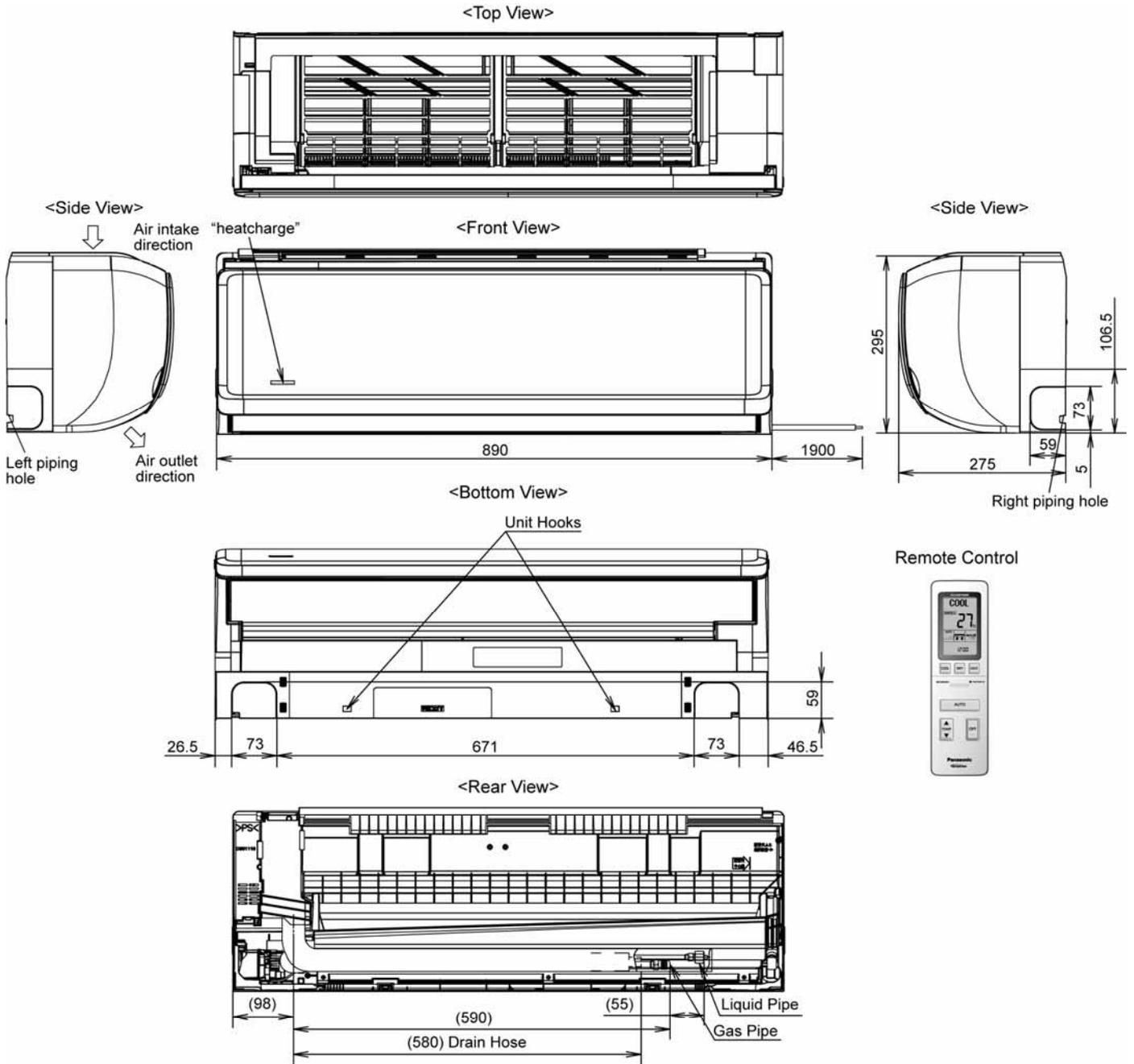


4.3 Remote Control

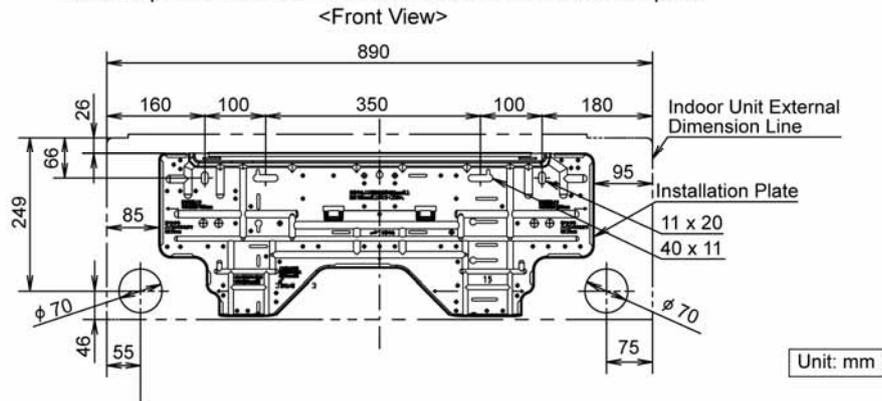


5. Dimensions

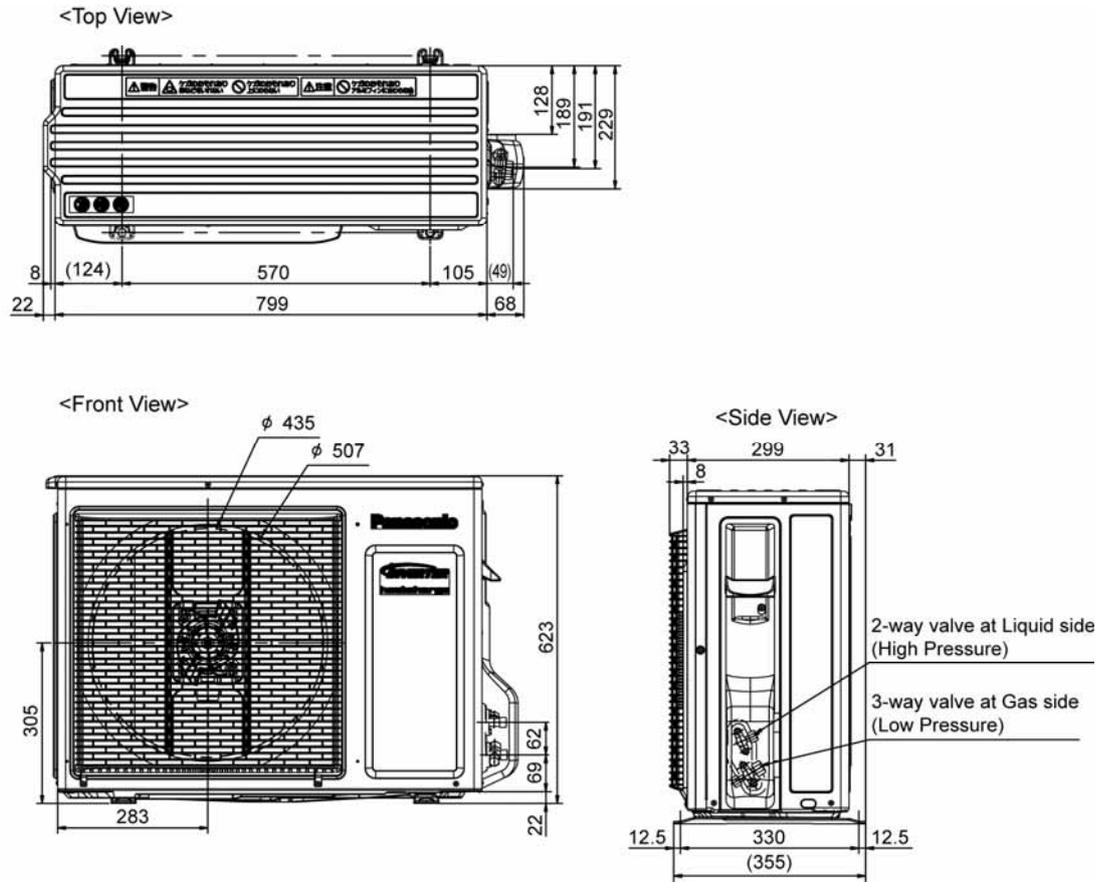
5.1 Indoor Unit & Remote Control



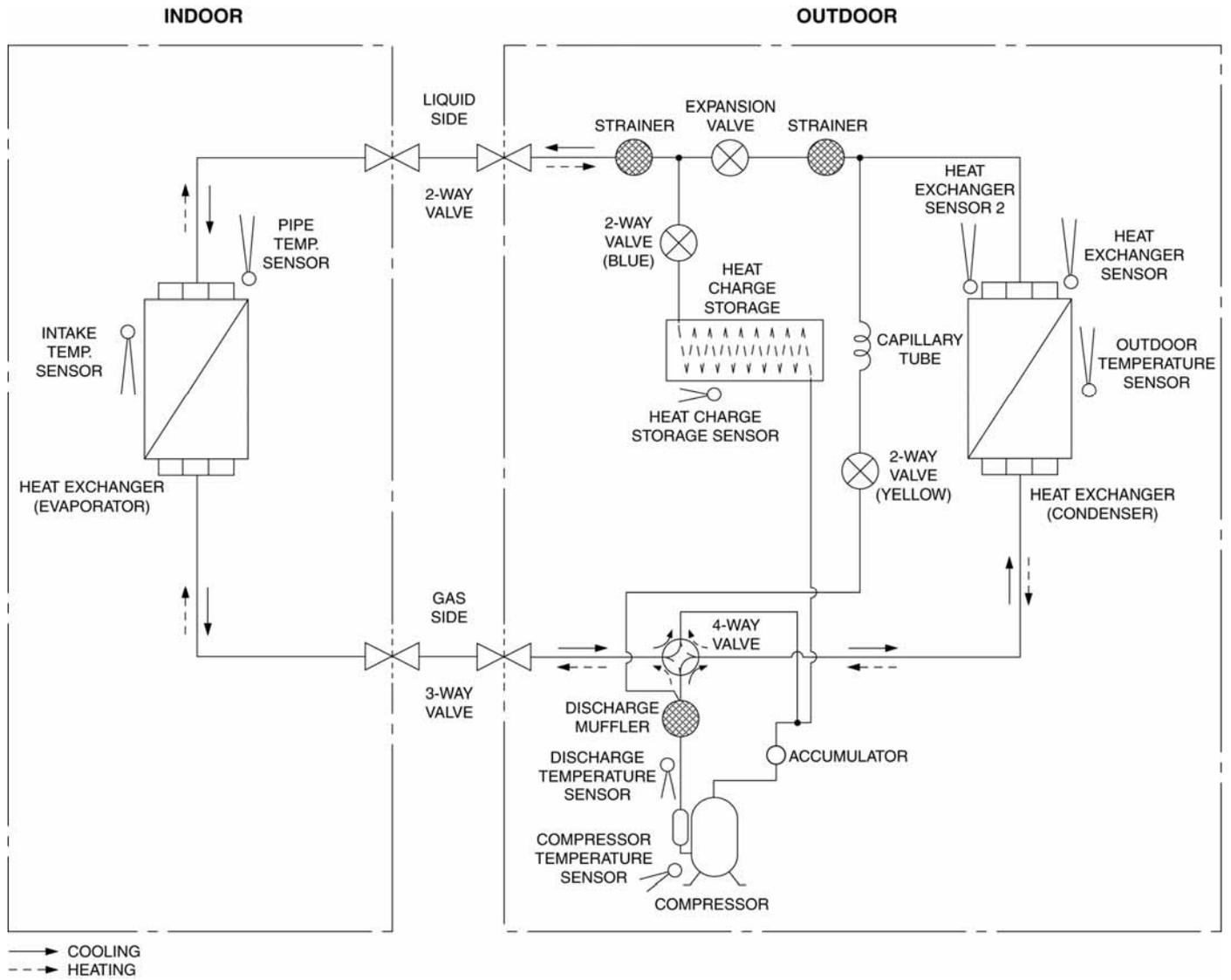
Relative position between the indoor unit and the installation plate



5.2 Outdoor Unit

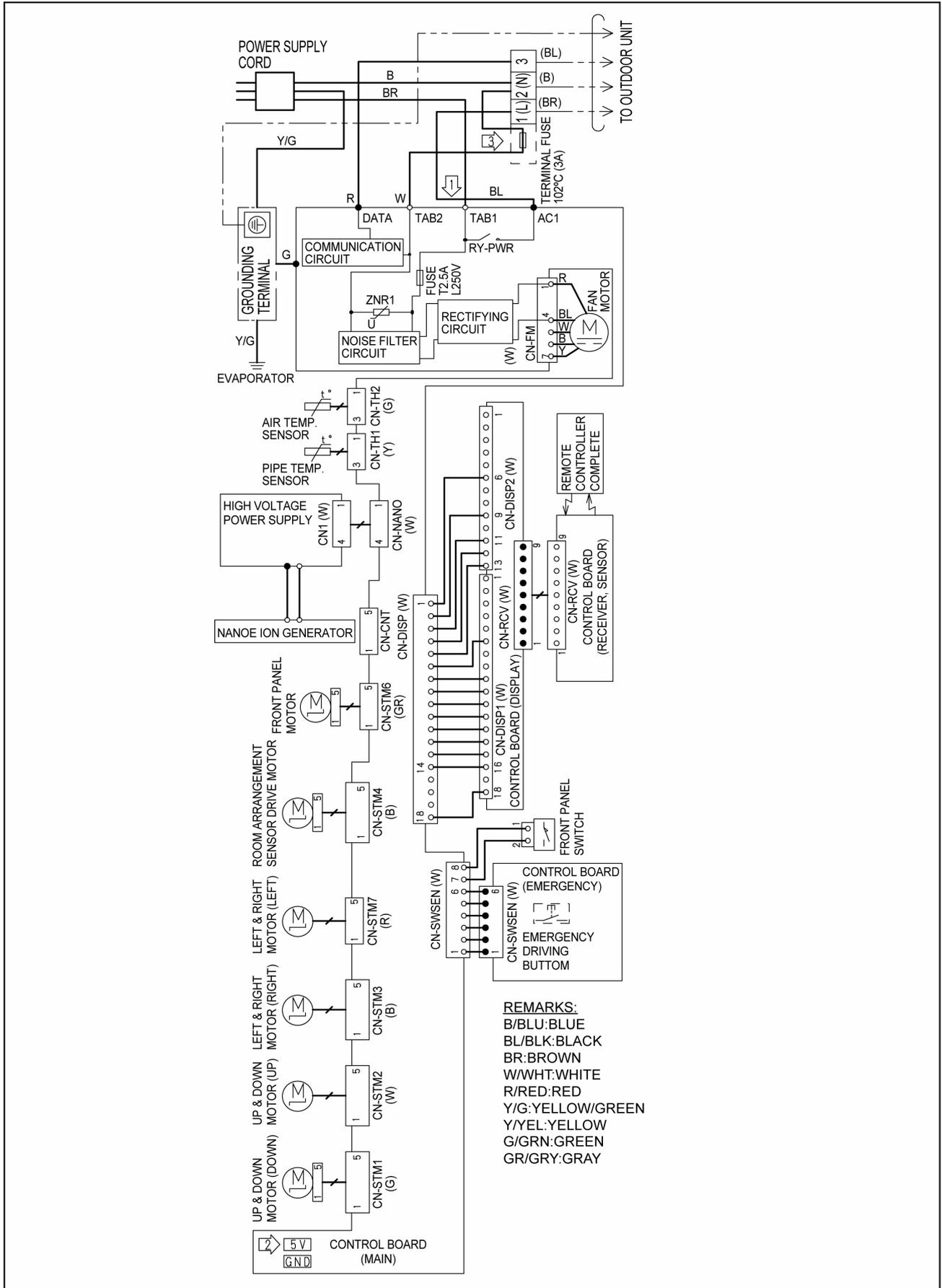


6. Refrigeration Cycle Diagram

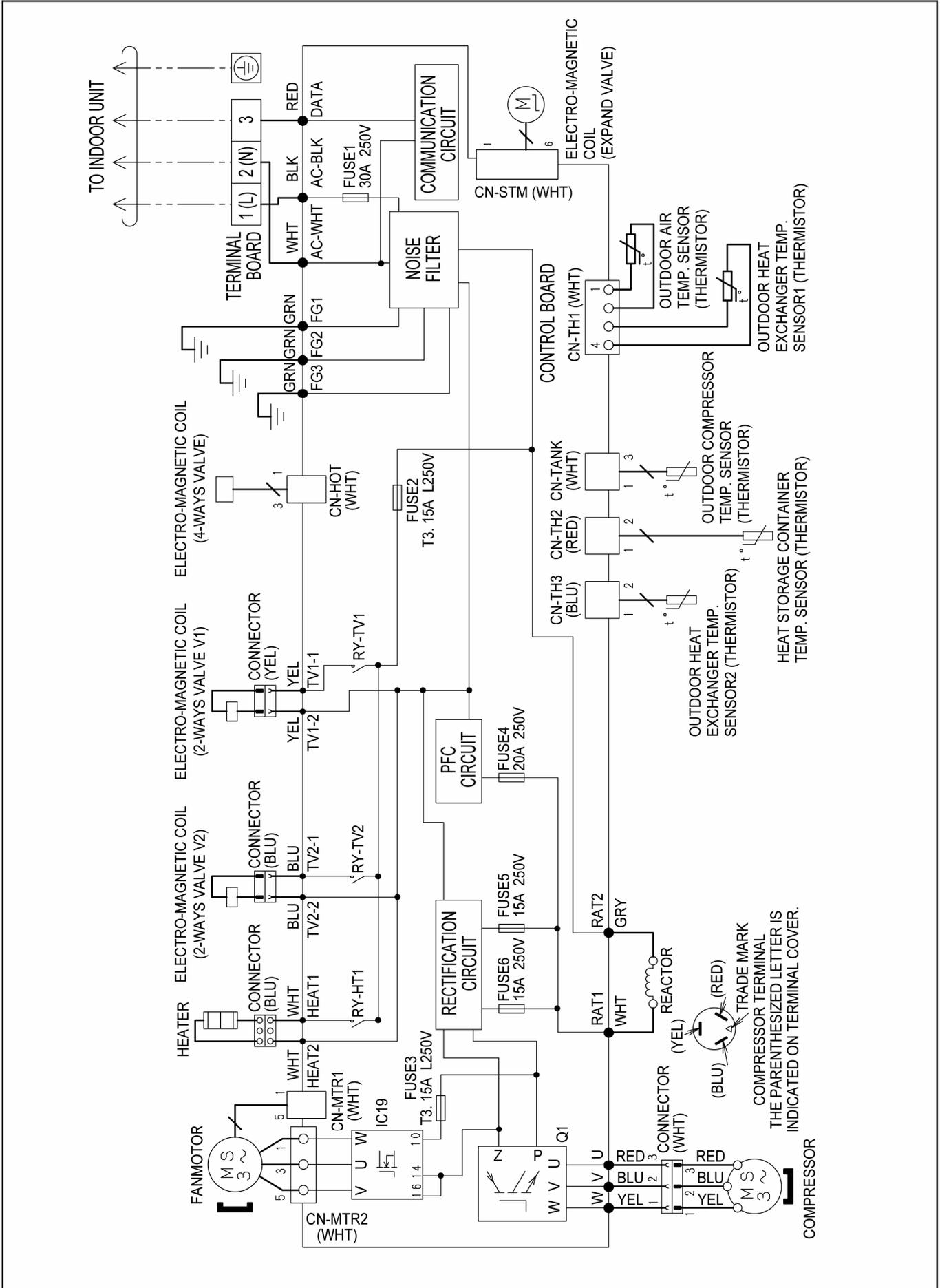


8. Wiring Connection Diagram

8.1 Indoor Unit

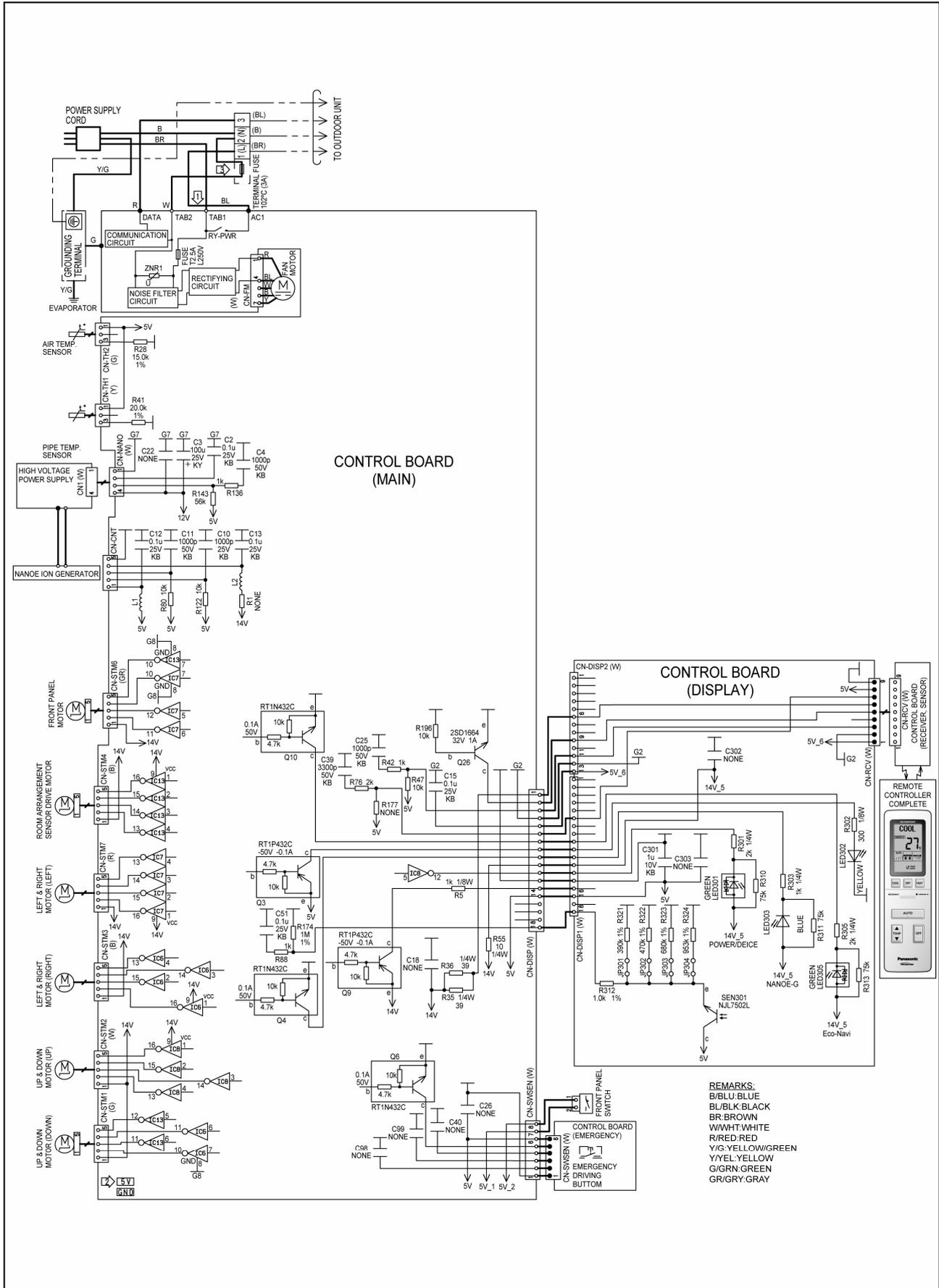


8.2 Outdoor Unit

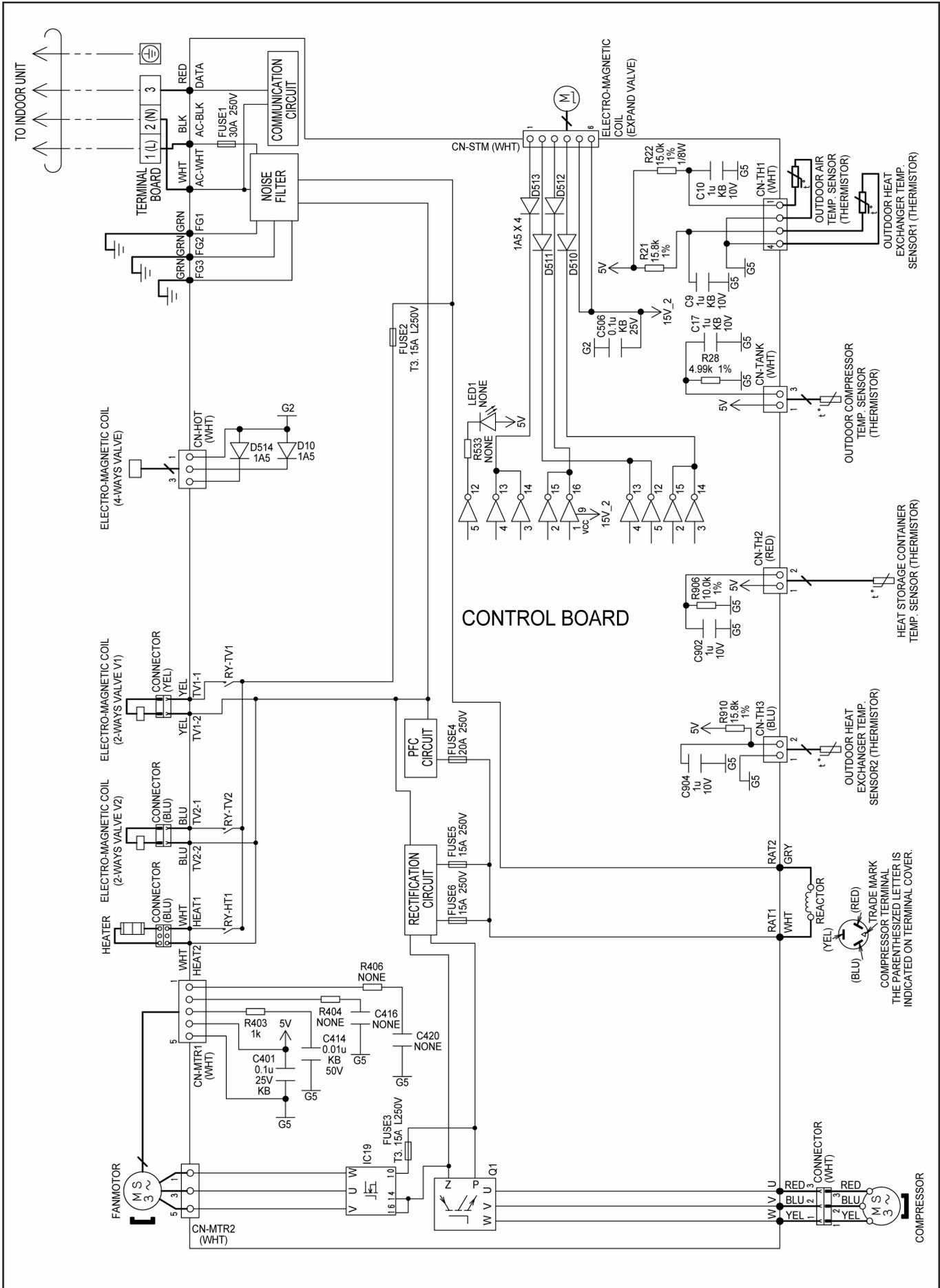


9. Electronic Circuit Diagram

9.1 Indoor Unit



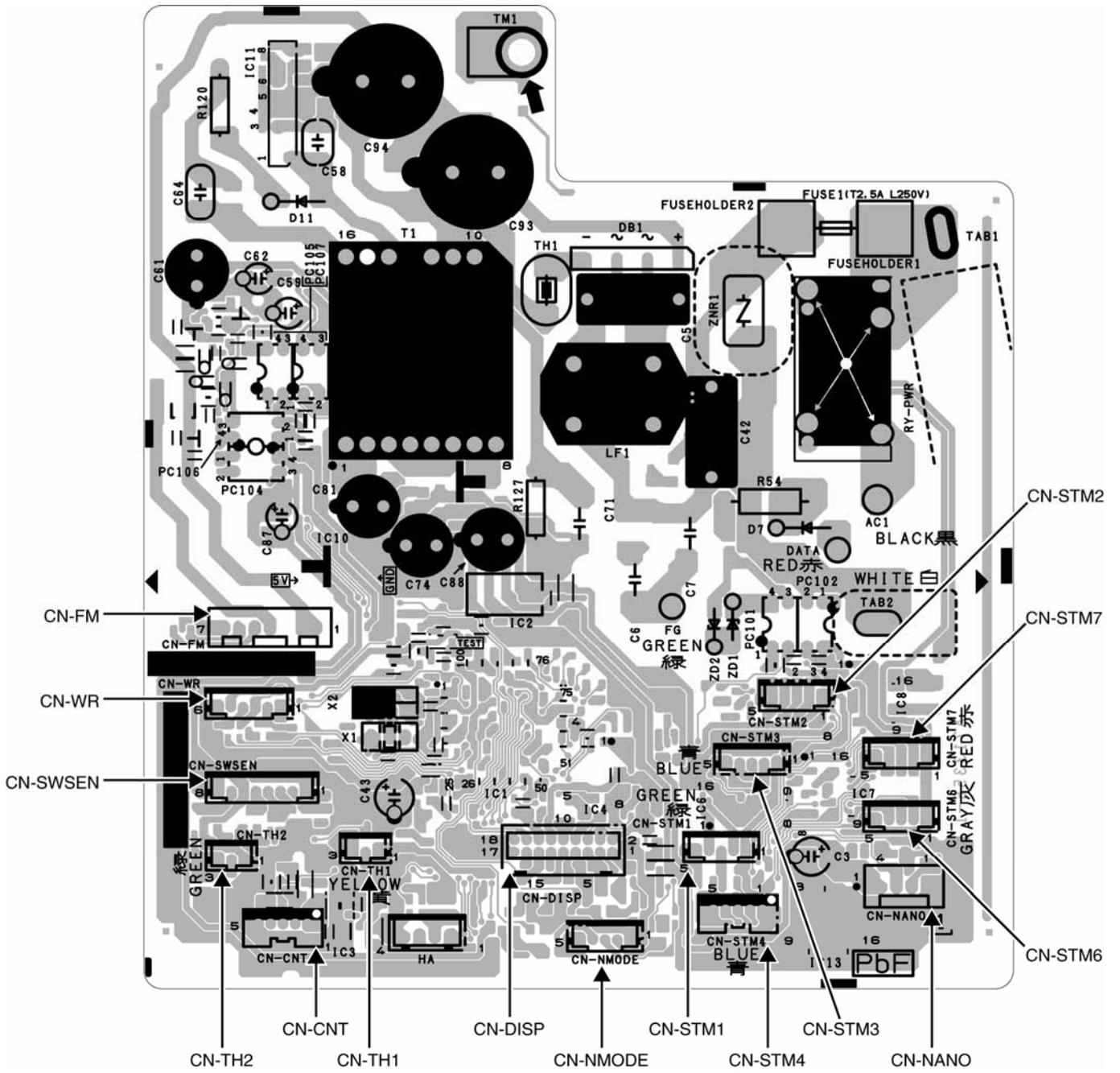
9.2 Outdoor Unit



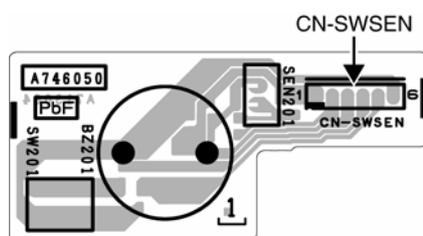
10. Printed Circuit Board

10.1 Indoor Unit

10.1.1 Main Printed Circuit Board

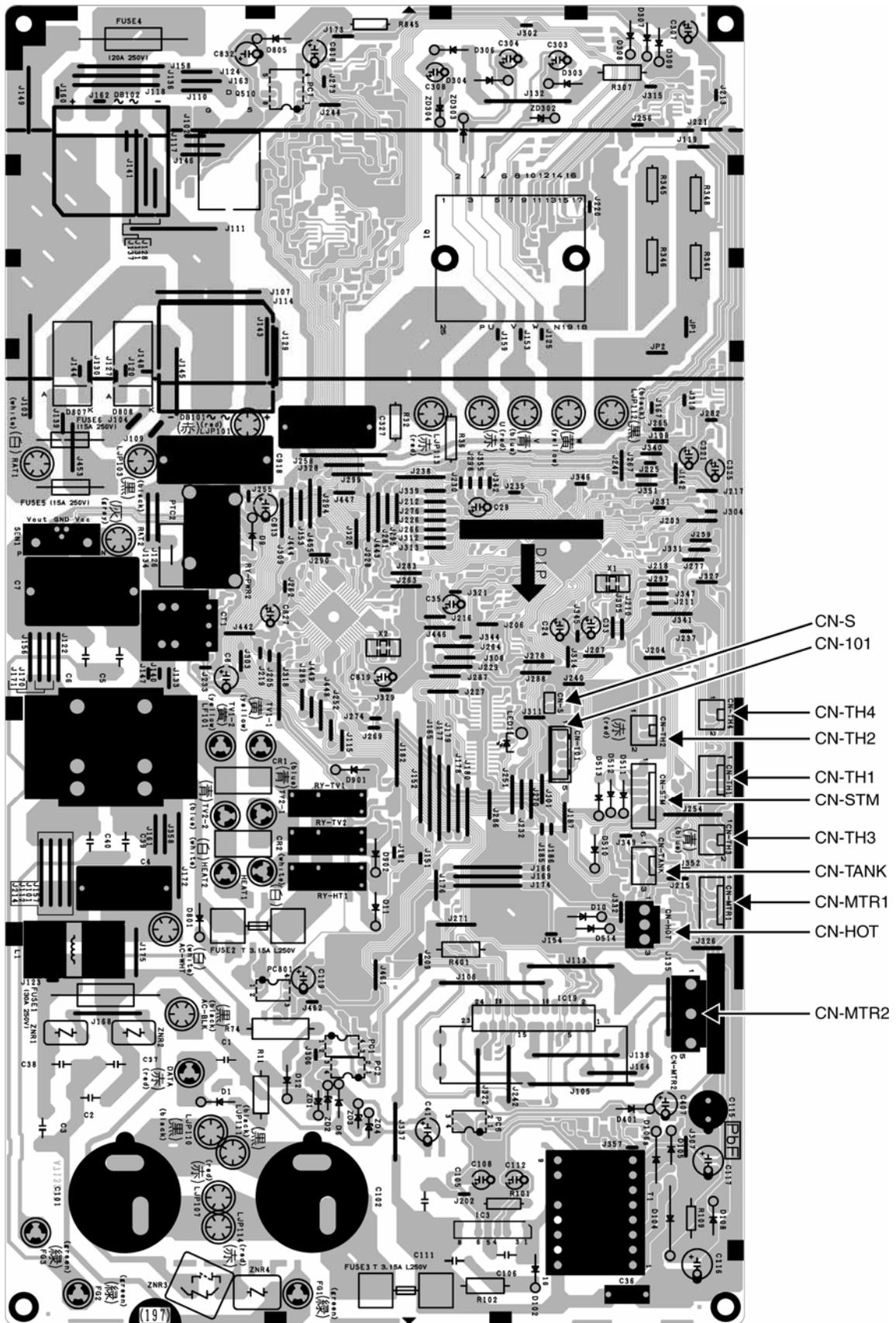


10.1.2 Printed Circuit Board



10.2 Outdoor Unit

10.2.1 Main Printed Circuit Board



11. Installation Instruction

11.1 Select the Best Location

11.1.1 Indoor Unit

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

11.1.2 Outdoor Unit

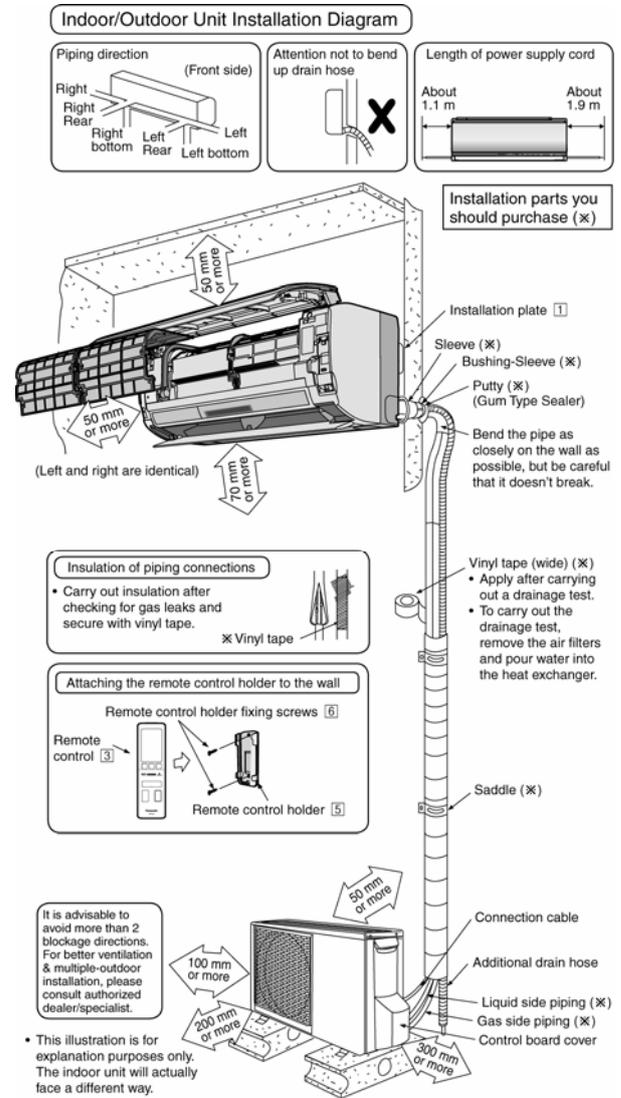
- If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.
- There should not be any animal or plant which could be affected by hot air discharged.
- Keep the spaces indicated by arrows from wall, ceiling, fence or other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

Model	Horse Power (HP)	Piping size		Std. Length (m)	Max Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)	Piping Length for add. gas (m)
		Gas	Liquid						
VE9** *	1.0HP	9.52 mm (3/8")	6.35 mm (1/4")	5	12	3	15	20	10
VE12* **	1.5HP								

Example: For VE9***

If the unit is installed at 12 m distance, the quantity of additional refrigerant should be 40 g (12-10) m x 20 g/m = 40 g.

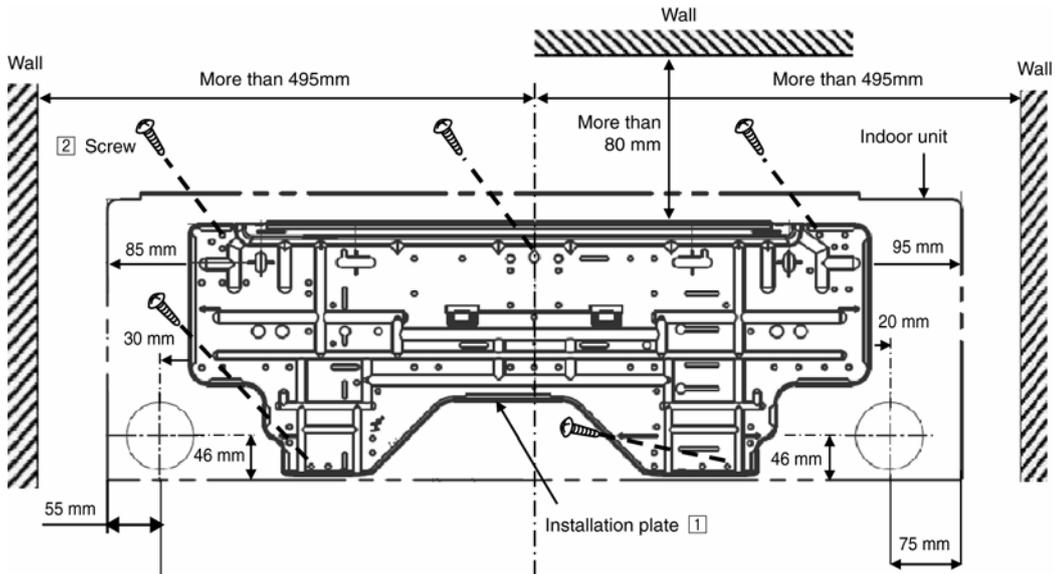
11.1.3 Indoor/Outdoor Unit Installation Diagram



11.2 Indoor Unit

11.2.1 How to Fix Installation Plate

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



The center of the installation plate should be at more than 495 mm at right and left of the wall.

The distance from installation plate edge to ceiling should more than 80 mm.

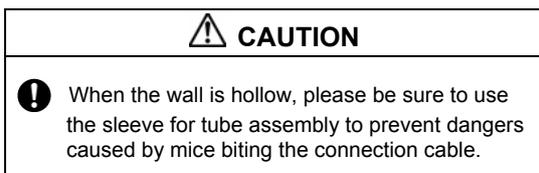
From installation plate left edge to unit's left side is 85 mm.

From installation plate right edge to unit's right is 95 mm.

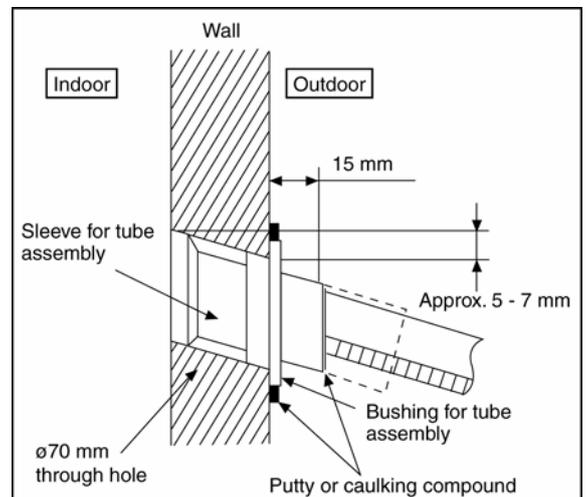
- 1 Mount the installation plate on the wall with 5 screws or more (at least 5 screws).
(If mounting the unit on the concrete wall, consider using anchor bolts.)
 - Always mount the installation plate horizontally by aligning the marking-off line with the thread and using a level gauge.
- 2 Drill the piping plate hole with $\varnothing 70$ mm hole-core drill.
 - The hole center of the right pipe is the meeting point of the following two lines, the 20 mm offset line from the vertical edge of the installation plate and the horizontally extended line of the side arrow on the plate. (see figure above).
 - The hole centre of the left pipe is the meeting point of the following two lines, the 30mm offset line from the vertical edge of the installation plate and the horizontally extended line of the side arrow on the plate. (see figure above).
 - Drill the piping hole at either the right or the left and the hole should be slightly slanted to the outdoor side.

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

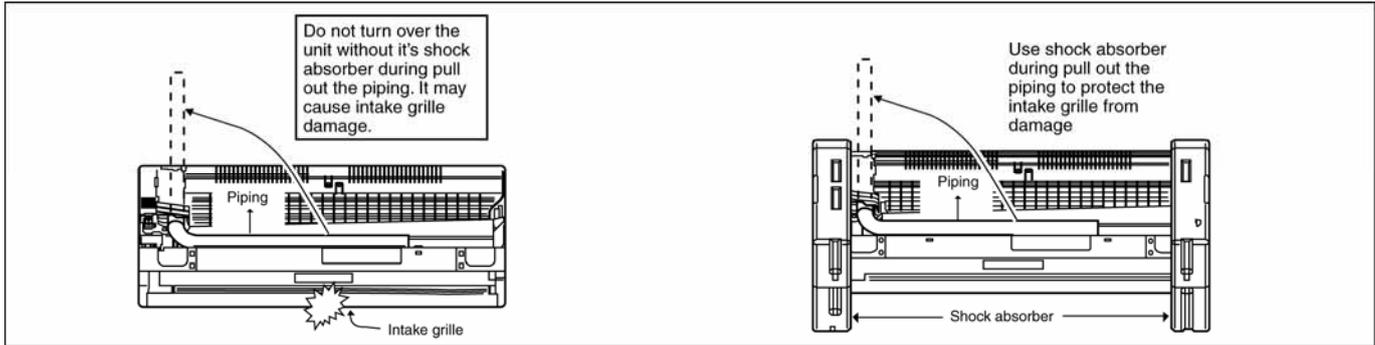
- 1 Insert the piping sleeve to the hole.
- 2 Fix the bushing to the sleeve.
- 3 Cut the sleeve until it extrudes about 15 mm from the wall.



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



11.2.3 Indoor Unit Installation



11.2.3.1 For the Right Rear Piping

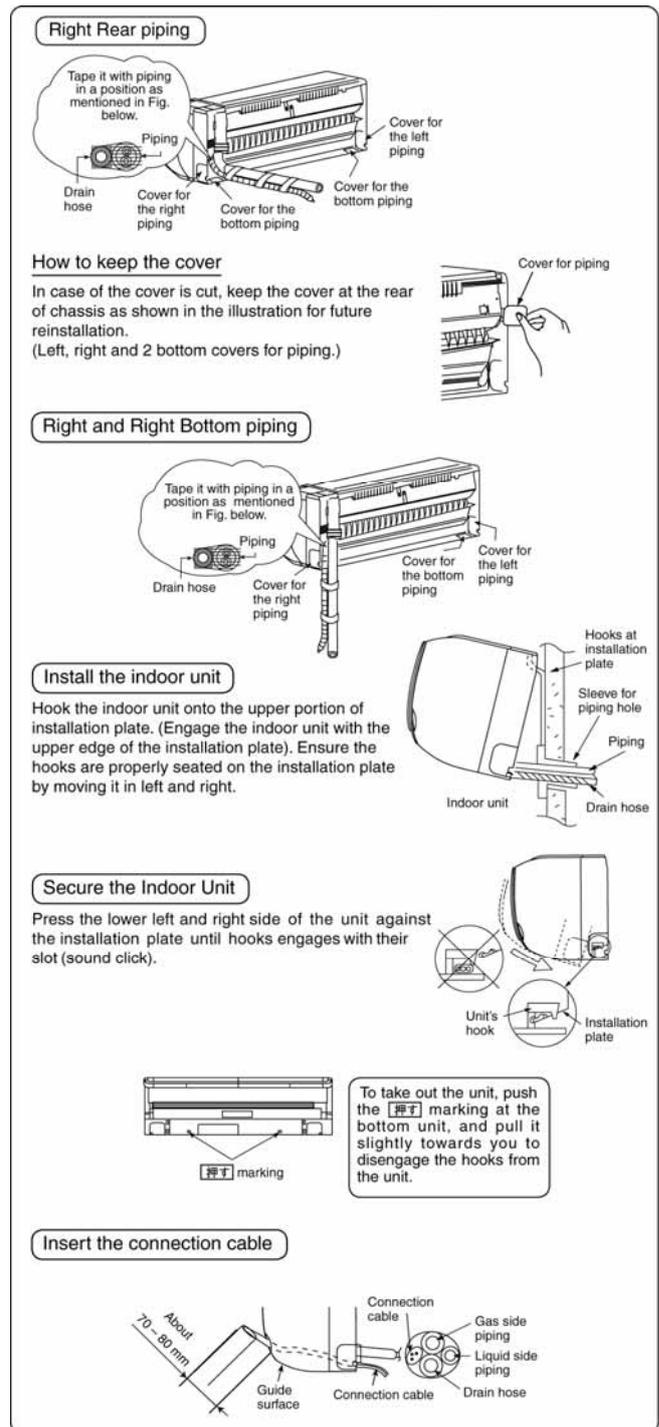
- Step-1** Pull out the Indoor piping
- Step-2** Install the Indoor Unit
- Step-3** Secure the Indoor Unit
- Step-4** Insert the connection cable

11.2.3.2 For the Right and Right Bottom Piping

- Step-1** Pull out the Indoor piping
- Step-2** Install the Indoor Unit
- Step-3** Insert the connection cable
- Step-4** Secure the Indoor Unit

11.2.3.3 For the Embedded Piping

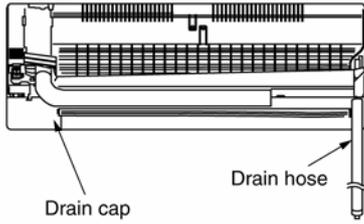
- Step-1** Replace the drain hose
- Step-2** Bend the embedded piping
 - Use a spring bender or equivalent to bend the piping so that the piping is not crushed.
- Step-3** Pull the connection cable into Indoor Unit
 - The inside and outside connection cable can be connected without removing the front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



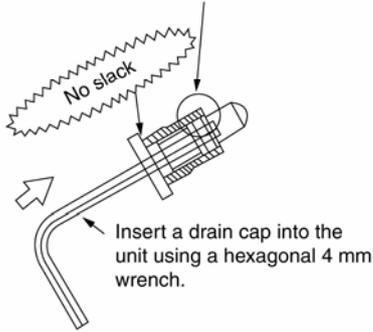
(This can be used for left rear piping and bottom piping also.)

Exchange the drain hose and the cap

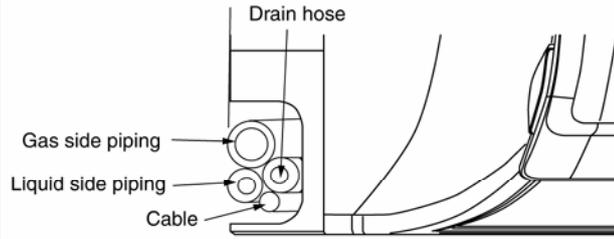
Rear view for left piping installation



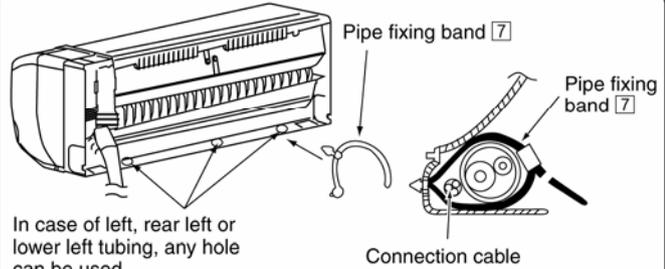
When inserting a drain cap into the unit, do not use a lubricant (such as refrigerating oil). This may cause damage and water leakage.



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



(For the right piping, follow the same procedure)

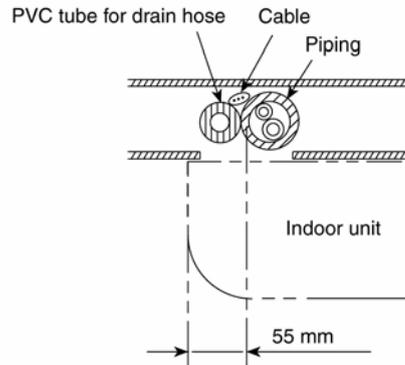
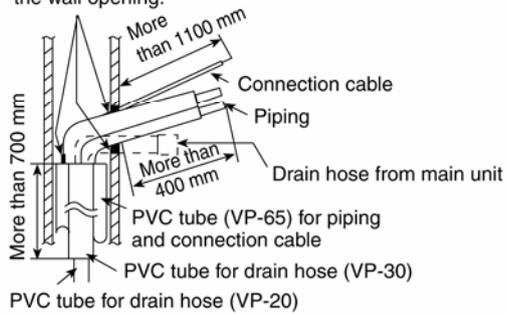


In case of left, rear left or lower left tubing, any hole can be used.

Cut off the excess hose clamp. (Otherwise, it may cause abnormal noise or water leakage.)

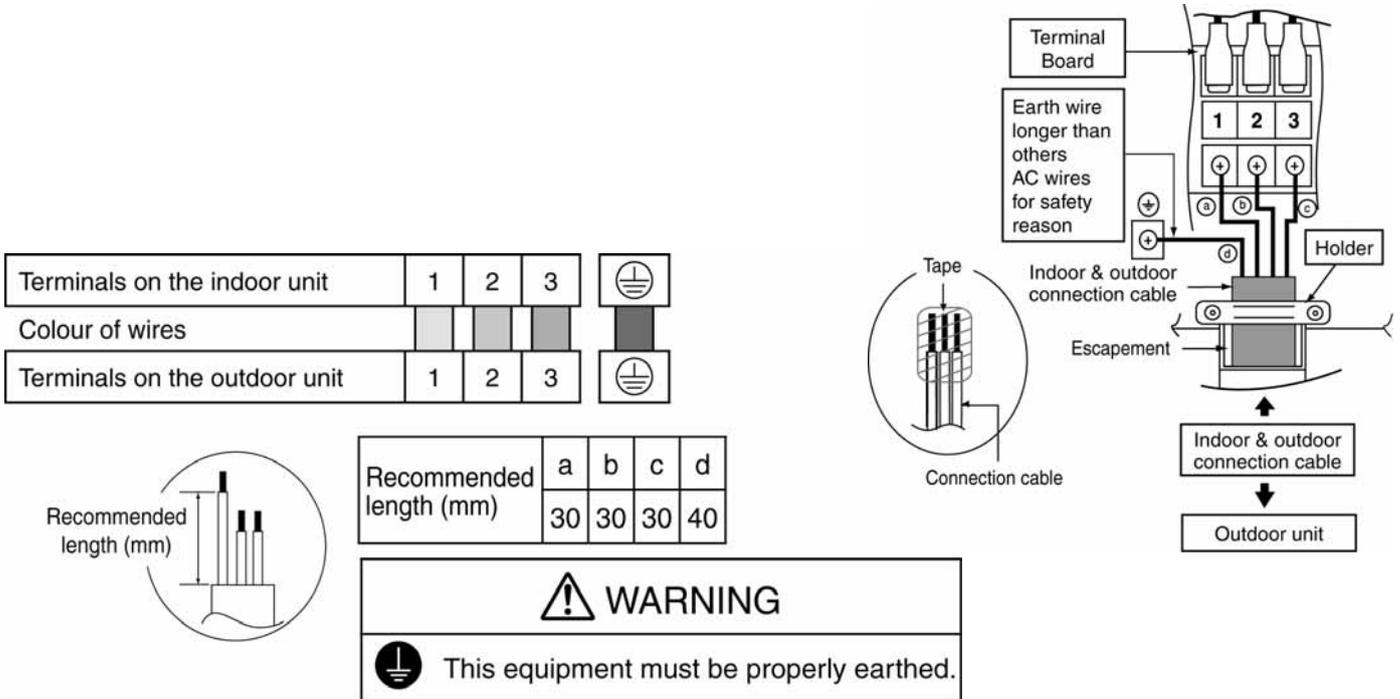
- How to pull the piping and drain hose out, in case of the embedded piping.

Apply putty or caulking material to seal the wall opening.



11.2.4 Connect the Cable to the Indoor Unit

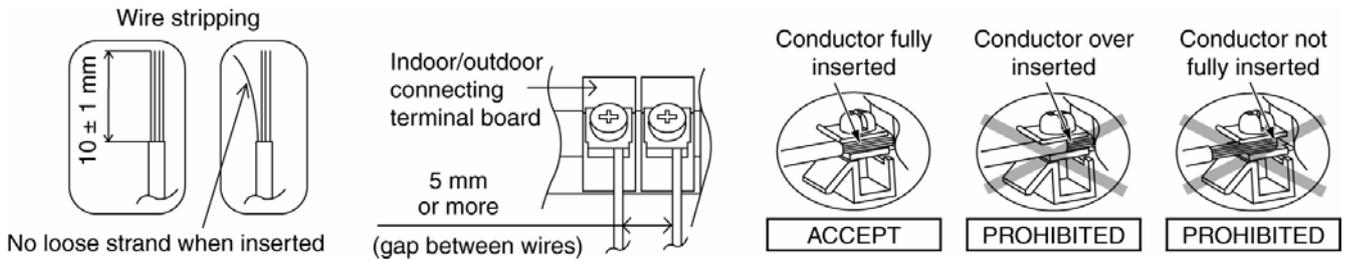
- 1 The inside and outside connection cable can be connected without removing the front grille.
- 2 **Connection cable** between indoor unit and outdoor unit shall be approved polychloroprene sheathed 4 x 1.5 mm² flexible cord, type designation 245 IEC 57 or heavier cord.
- 3 Bind all the indoor and outdoor connection cable with tape and route the connection cable via the escapement.
- 4 Remove the tapes and connect the connection cable between indoor unit and outdoor unit according to the diagram below.



Note:

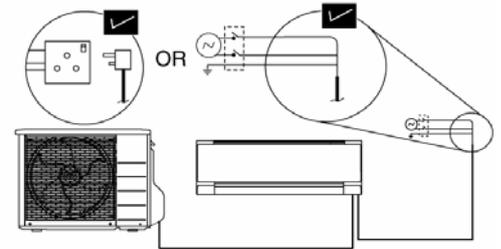
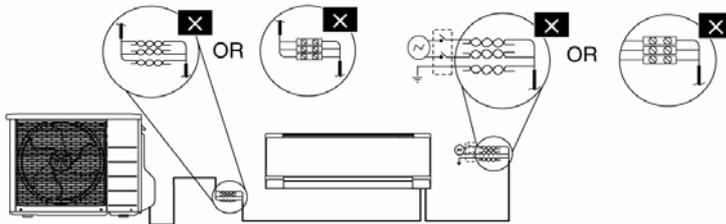
- Secure the connection cable onto the control board with the holder (clammer).
- Ensure the colour of wires of outdoor unit and the terminal Nos. are the same to the indoor's respectively.
- Earth wire shall be Yellow/Green (Y/G) in colour and longer than other AC wires for safety reason.

11.2.5 Wire Stripping and Connecting Requirement



 WARNING	RISK OF FIRE JOINING OF WIRES MAY CAUSE OVERHEATING AND FIRE.	
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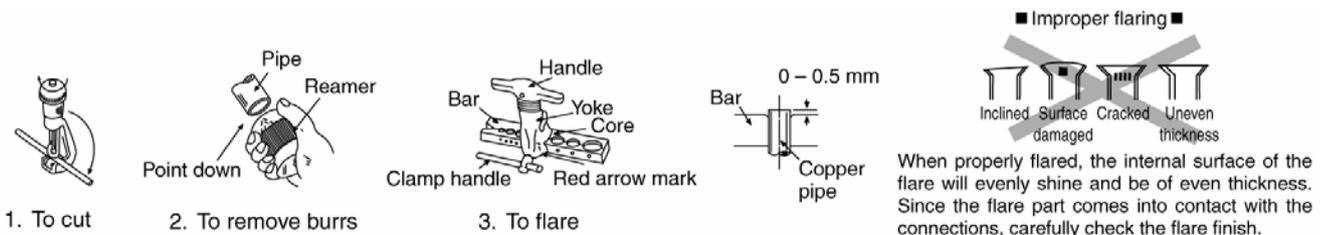
- Do not joint wires



- Use complete wire without joining.
- Use approved socket and plug with earth pin.
- Wire connection in this area must follow to national wiring rules.

11.2.6 Cutting and Flaring the Piping

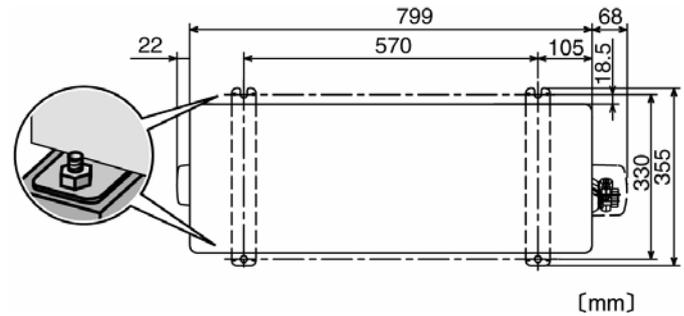
- 1 Please cut using pipe cutter and then remove the burrs.
- 2 Remove the burrs by using reamer. If burrs is not removed, gas leakage may be caused. Turn the piping end down to avoid the metal powder entering the pipe.
- 3 Please make flare after inserting the flare nut onto the copper pipes.



11.3 Outdoor Unit

11.3.1 Install the Outdoor Unit

- After selecting the best location, start installation according to Indoor/Outdoor Unit Installation Diagram.
 - Install at least 3 cm above the ground. Do not install the unit on the floor.
 - Fix the unit on concrete or rigid frame firmly and horizontally by bolt ($\varnothing 10$ mm). Install the outdoor unit in a level position and do not block the holes. Failure to do so may result in water leakage or accumulation.
 - When installing at roof, please consider strong wind and earthquake. Please fasten the installation stand firmly with bolt or nails.



11.3.2 Connect the Piping

Connecting the Piping to Indoor Unit

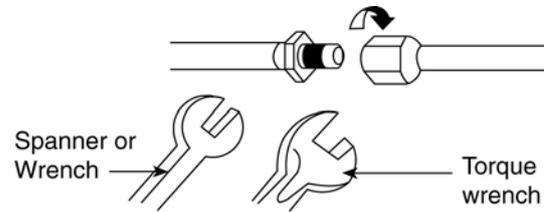
Please make flare after inserting flare nut (locate at joint portion of tube assembly) onto the copper pipe. (In case of using long piping)

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.

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.

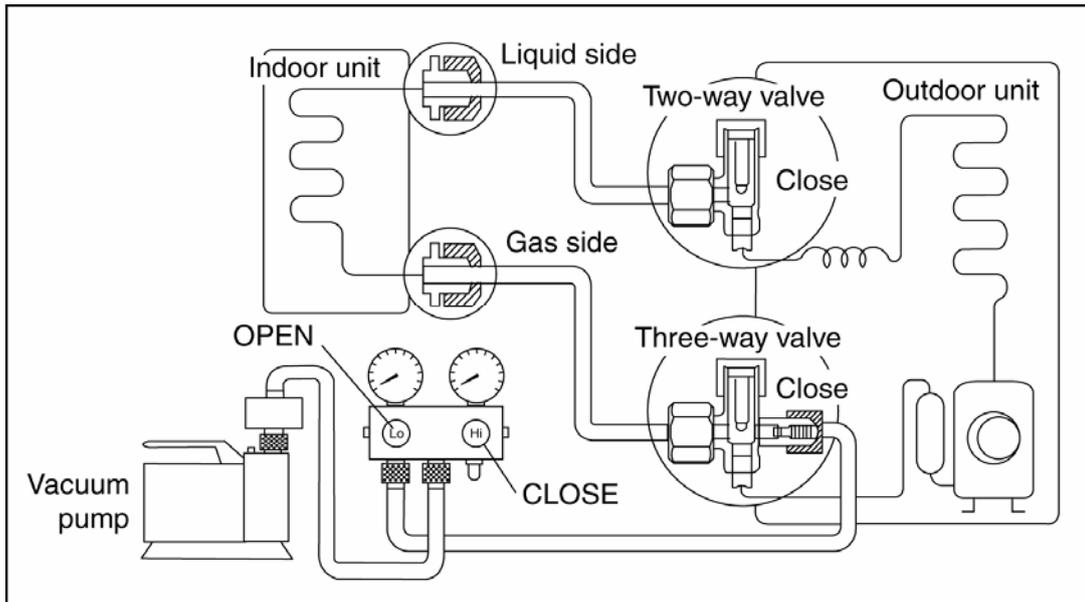


Do not overtighten, overtightening may cause gas leakage.

Piping size	Torque
6.35 mm (1/4")	[18 N•m (1.8 kgf.m)]
9.52 mm (3/8")	[42 N•m (4.3 kgf.m)]
12.7 mm (1/2")	[55 N•m (5.6 kgf.m)]
15.88 mm (5/8")	[65 N•m (6.6 kgf.m)]
19.05 mm (3/4")	[100 N•m (10.2 kgf.m)]

11.3.3 Evacuation of the Equipment

WHEN INSTALLING AN AIR CONDITIONER, BE SURE TO EVACUATE THE AIR INSIDE THE INDOOR UNIT AND PIPES in the following procedure.



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

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

11.3.4 Connect the Cable to the Outdoor Unit

- 1 Remove the control board cover from the unit by loosening the screw.
- 2 **Connection cable** between indoor unit and outdoor unit shall be approved polychloroprene sheathed 4 x 1.5 mm² flexible cord, type designation 245 IEC 57 or heavier cord.
- 3 Connect the connection cable between indoor unit and outdoor unit according to the diagram below.

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

- 4 Secure the connection cable onto the control board with the holder.
- 5 Attach the control board cover back to the original position with screw.
- 6 For wire stripping and connection requirement, refer to instruction 11.2.5 of indoor unit.

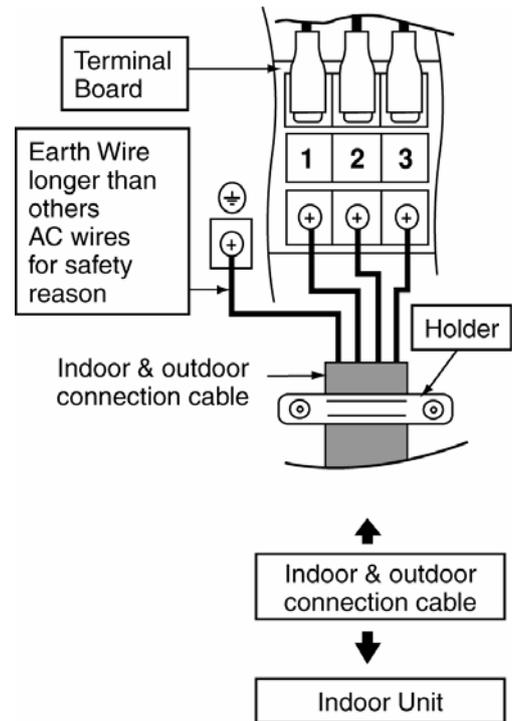
 WARNING
 This equipment must be properly earthed.

Note:

- Isolating Devices (Disconnecting means) should have minimum 3.0 mm contact gap.
- Earth wire shall be Yellow/Green (Y/G) in colour and longer than other AC wires for safety reason.

11.3.5 Piping Insulation

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



16. Disassembly and Assembly Instructions

16.1 Points of Disassembly (Indoor Unit)



WARNING



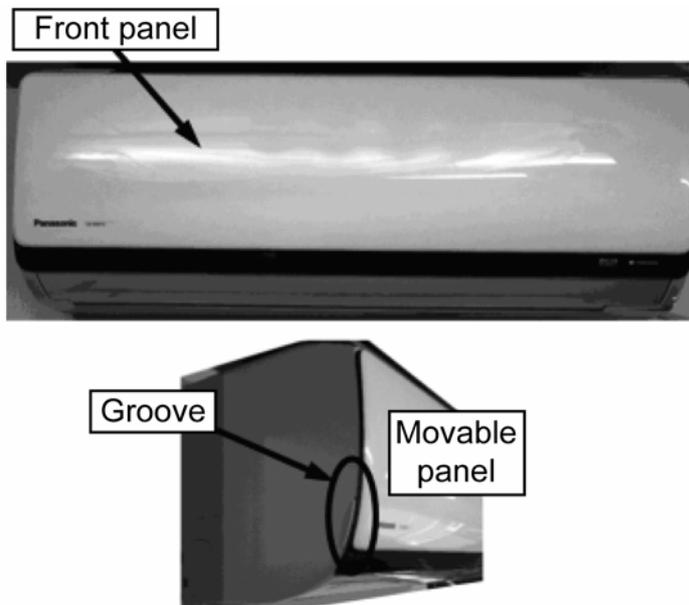
Disconnect the power plug

Be sure to disconnect the power plug from the outlet before disassembly or repair of the unit. Failure to observe this warning could result in electric shock. Be very careful not to touch the live parts when performing a repair work which requires power supply or inspecting the circuit. Also, be very careful of the fan as it can start rotating anytime.

Read this manual carefully when replacing the air filter frame (auto cleaner) block or other parts.

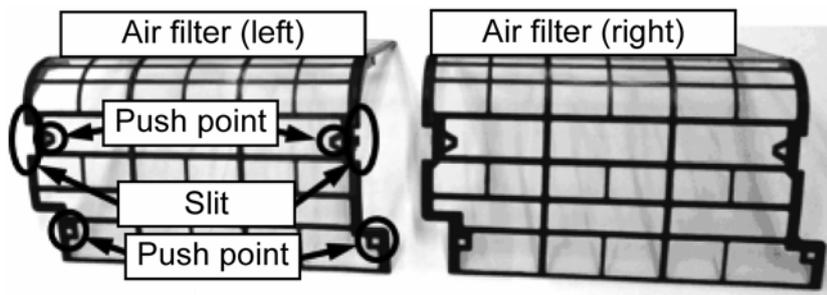
16.1.1 Removing the Front Panel

- 1 Push the panel up with both hands until it stops. Push the panel further up and then pull it towards you to remove it.
※ Note on disassembly: Hold the grooves on the front panel to open it. (The panel moves if you hold the movable part.)



16.1.2 Removing the Air Filters

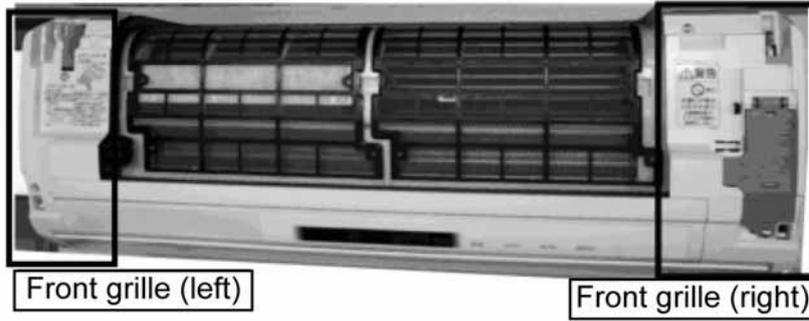
- ※ Note that the HX series 2011 does not have the “top grille”.
- 1 Raise the front panel up with both hands until it stops.
※ Note on disassembly: Hold the grooves on the front panel to open it. (The panel moves if you hold the movable part.)
 - 2 Put your fingers at the slits on both sides of the air filter and pull the filter towards you to remove it. (Left and right filters are common.)
※ Note on disassembly: The air filters are in L shape which cover up to the inner end of the top side. Pull the filters slowly towards you to avoid them from getting stuck.



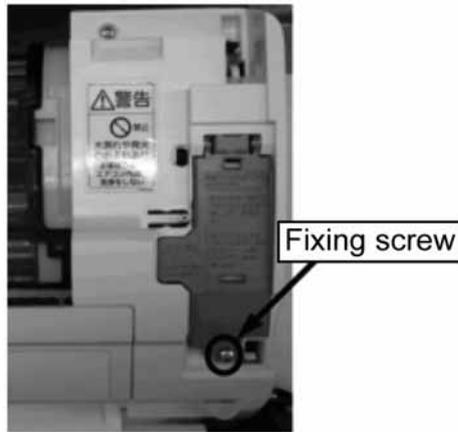
※ Note on assembly: When attaching the air filters, push the push point on the air filters securely and make sure that there is no misalignment of the filters such as lifted filter.

16.1.3 Removing the Front Grille (Right) and Front Grille (Left)

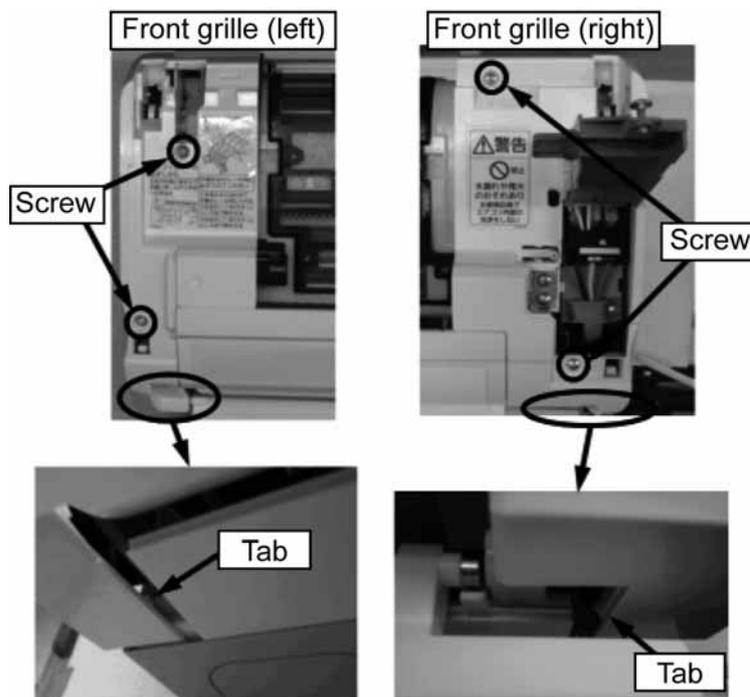
- 1 Perform "16.1.1 Removing the Front Panel".



- 2 Open the vertical airflow direction louver slowly.
- 3 Remove the fixing screw (1 piece) of the indoor/outdoor unit transmission wire cover and leave the cover open.
※ Note on disassembly: Note that the front grille cannot be removed if the cover is closed because of the reinforced safety structure of electric wiring.

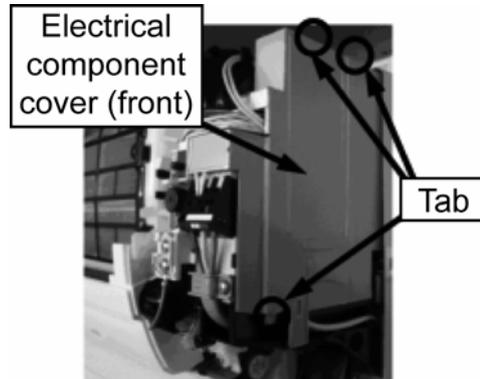


- 4 Remove the screws of the front grille (right) and (left) (2 screws each).
- 5 Disengage the tab on the bottom part of the front grille (right) and (left) (one tab each). Slightly lift the bottom part and then raise the front grilles to remove them.

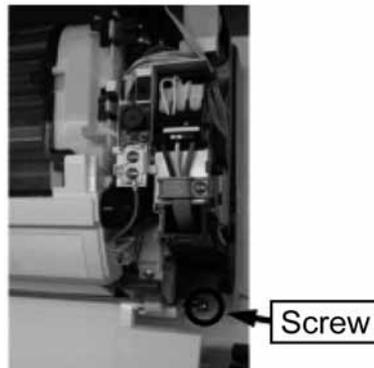


16.1.4 Removing the Control Board Box

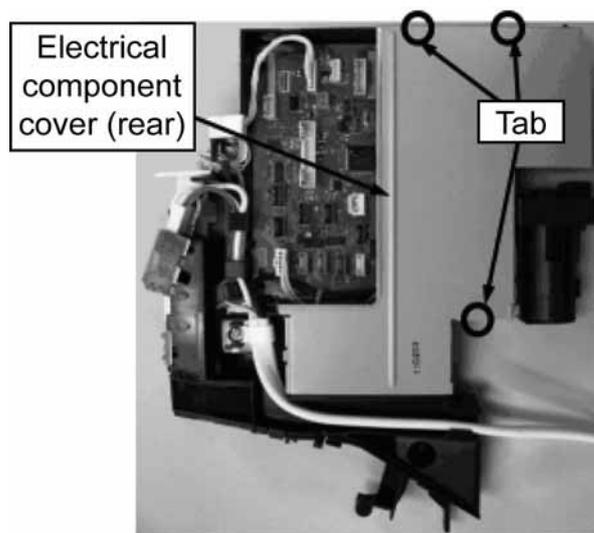
- 1 Perform "16.1.1 Removing the Front Panel".
- 2 Perform "16.1.3 Removing the Front Grille (Right) and Front Grille (Left)".
※ Note on disassembly: When removing only the control board box, remove the front grille (right) only.
- 3 Remove the electrical component cover (front) on the right side of the control board box. (There are 2 tabs on top and 1 tab at the bottom.)



- 4 Remove the screw (1 piece) at the bottom of the control board and then pull the power-supply box towards you.



- 5 Disengage the tabs (3 locations) which fix the electrical component cover (rear) to the power-supply box. Then, remove the electrical component cover (rear) on the right side of the power-supply box.



6 Disconnect the connectors and terminals.

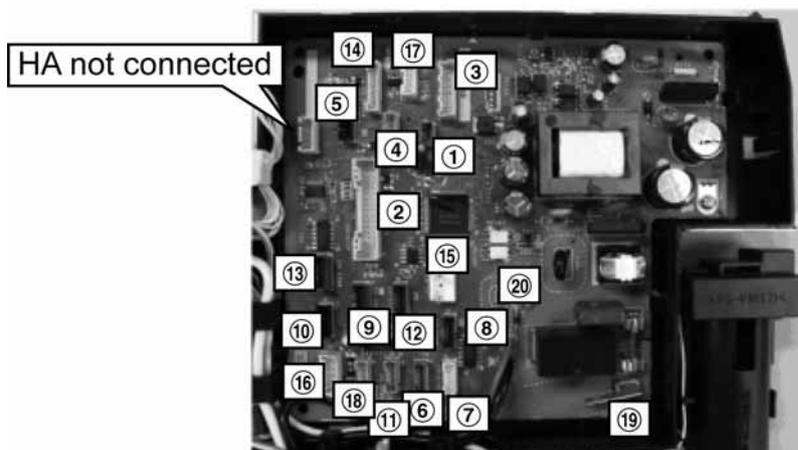
■ Connectors

- CN-TH2 (green) Indoor intake air temperature sensor No. ①
- CN-DISP (white) Control board (human sensor unit, signal receptor and indicator) No. ②
- CN-FM (white) Fan motor No. ③
- CN-TH1 (yellow) Indoor heat exchanger temperature sensor No. ④
- CN-STM1 (green) Vertical louver motor (lower) No. ⑥
- CN-STM2 (white) Vertical louver motor (upper) No. ⑦
- CN-STM3 (blue) Horizontal louver motor (right) No. ⑧
- CN-STM4 (blue) Human sensor drive motor No. ⑨
- CN-STM5 (black) Ventilation/Exhaust switching motor No. ⑩
- CN-STM6 (gray) Front panel motor No. ⑪
- CN-STM7 (red) Horizontal louver motor (left) No. ⑫
- CN-SWSEN (white) Control board (emergency operation button, front panel switch) No. ⑭ ※
- CN-NANO (white) Highvoltage power supply (nanoe) No. ⑯

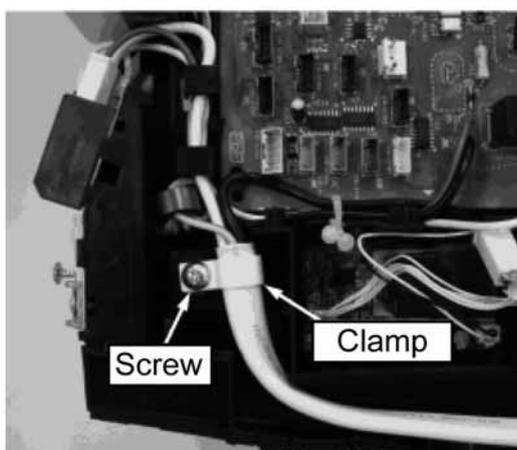
※ Note on disassembly: There is no need to disconnect the connector marked with ※ to remove the control board box. (However, when removing the control board, the connector marked with ※ should be disconnected.)

■ Tab terminals

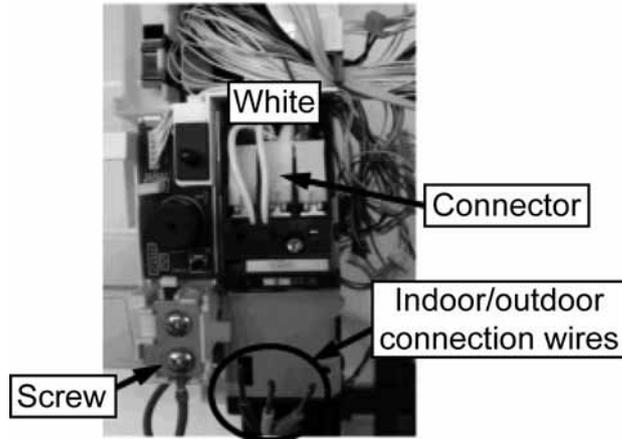
- CN-TAB1 (white) Power supply No. ⑰
- CN-TAB2 (white) Power supply No. ⑱



7 Remove the screw (1 piece) of the clamp for the power cord and then remove the clamp.

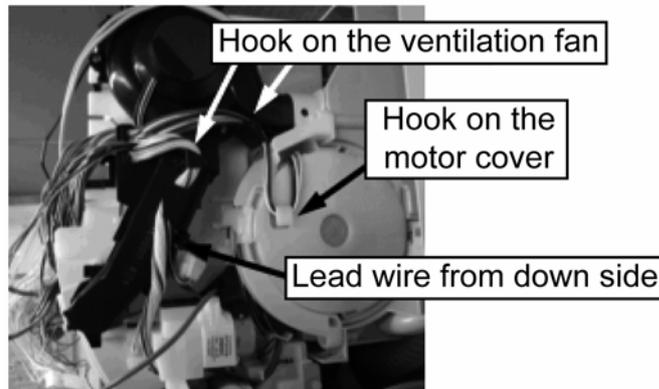


- 8 Remove the earth wire screw (1 piece) and disconnect the indoor/outdoor connection wires as well as the connector for the white wire connected to the terminal block. Then, remove the control board box.



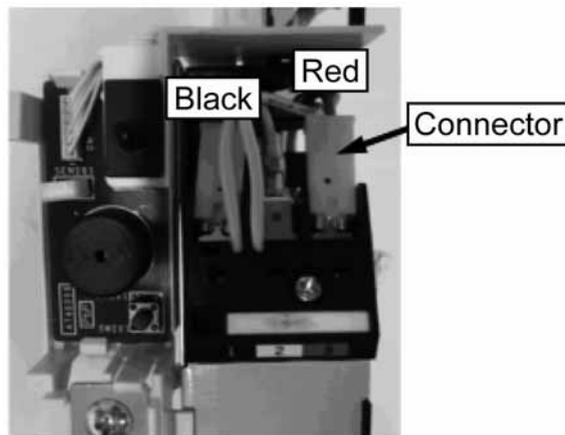
※ Note on assembly: About lead wire arrangement during assembly

- The lead wire of the indoor motor should be hung on the hook on the motor cover, then hung on the hook on the ventilation fan, and then brought to the left. Connect the connector to the control board.
- The lead wire from down side should be positioned along the ventilation fan, then hung on the hook on the ventilation fan, and then brought to the left. Connect the connector to the control board.



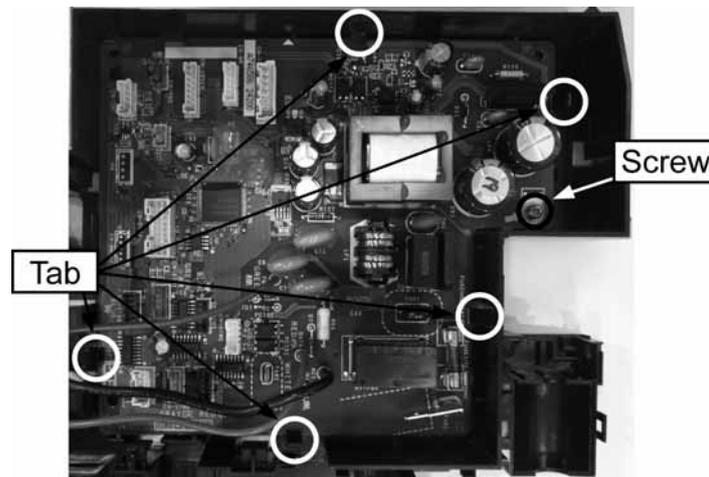
16.1.5 Removing the Control Board

- 1 Perform "16.1.1 Removing the Front Panel".
- 2 Perform "16.1.3 Removing the Front Grille (Right) and Front Grille (Left)".
※ Note on disassembly: When removing only the control board, remove the front grille (right) only.
- 3 Perform "16.1.4 Removing the Control Board Box".
- 4 Disconnect the connectors for the black and red wires connected to the terminal block.



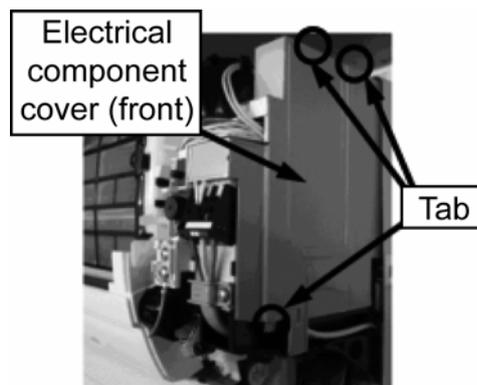
- 5 Remove the screw (1 piece) which fixes the control board.

- 6 Disengage the tabs (5 locations) which fix the control board and then remove the control board.

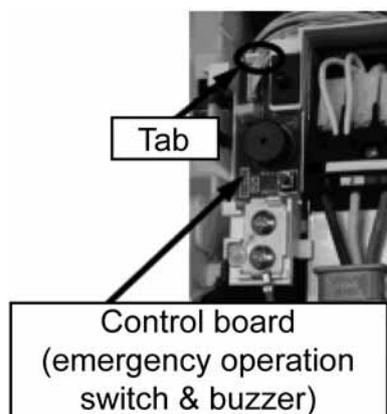


16.1.6 Removing the Control Board (Emergency Operation Switch and Buzzer)

- 1 Perform "16.1.1 Removing the Front Panel".
- 2 Perform "16.1.3 Removing the Front Grille (Right) and Front Grille (Left)".
※ Note on disassembly: When removing only the control board (emergency operation switch and buzzer), remove the front grille (right) only.
- 3 Remove the electrical component cover (front) on the right side of the control board box. (There are two tabs on top and one tab at the bottom.)

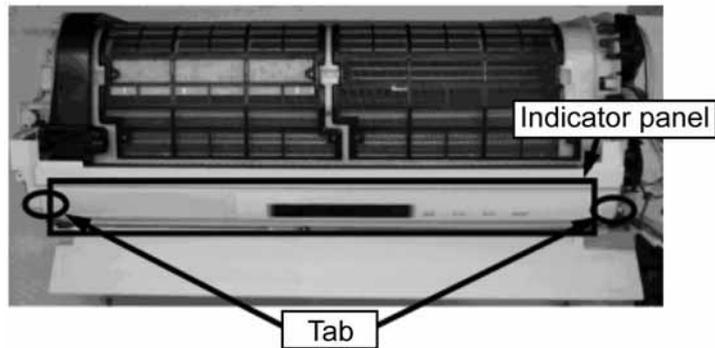


- 4 Disconnect the connector CN-SWSEN (white) connected to the control board.
- 5 Press the tab (1 location) on top of the control board (emergency operation switch & buzzer) and remove the control board (emergency operation switch and buzzer).

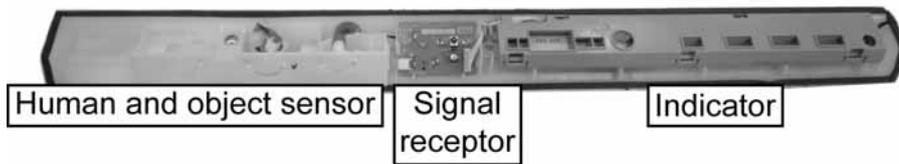
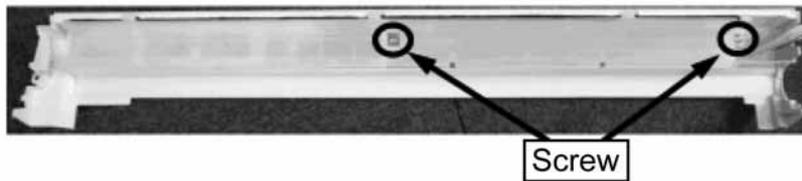


16.1.7 Removing the Human and Object Sensor of the Control Board (Indicator and Signal Receptor)

- 1 Perform "16.1.1 Removing the Front Panel".
- 2 Perform "16.1.3 Removing the Front Grille (Right) and Front Grille (Left)".
- 3 Disengage the tabs (2 locations) on both sides of the indicator panel. Then, remove the indicator panel.

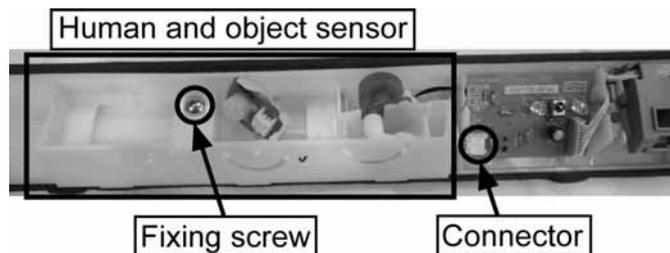


- 4 Flip the indicator panel and remove the screws (2 pieces).

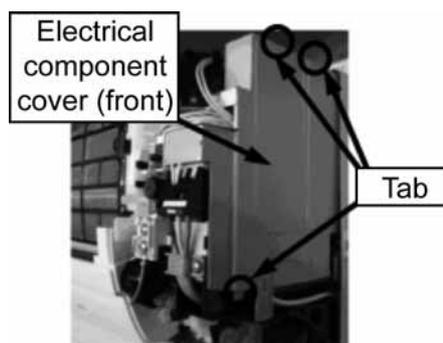


■ How to remove the human and object sensor

- 1 Disconnect the connectors (2 locations) for the control board (signal receptor).
- 2 Remove the fixing screw (1 piece) of the human and object sensor. Then, remove the human and object sensor.



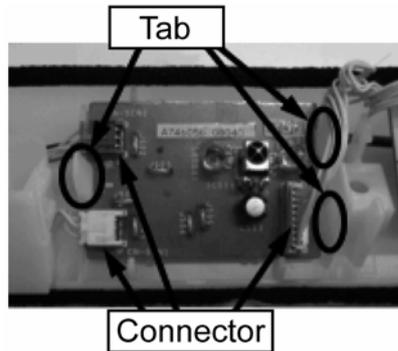
- 3 Remove the electrical component cover (front) on the right side of the control board box. (There are two tabs on top and one tab at the bottom.)



4 Disconnect the connector CNSTM4 (blue) connected to the control board.

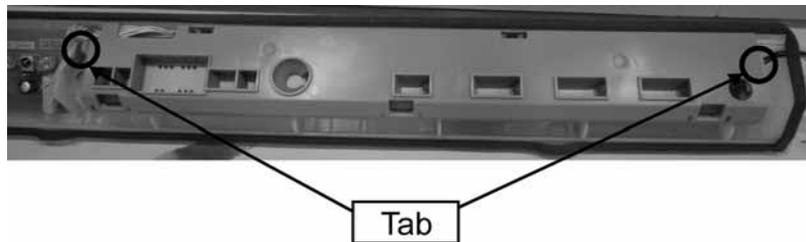
■ How to remove the control board (signal receptor)

1 Disconnect the connectors (3 locations) and disengage the tabs (3 locations) on the control board (signal receptor). Then, remove the control board (signal receptor).

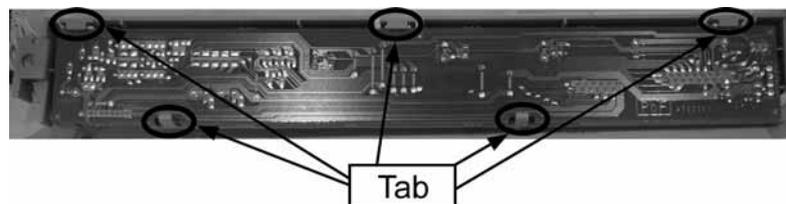


■ How to remove the control board (indicator)

1 Disengage the tabs (2 locations) on the plastic indicator cover.

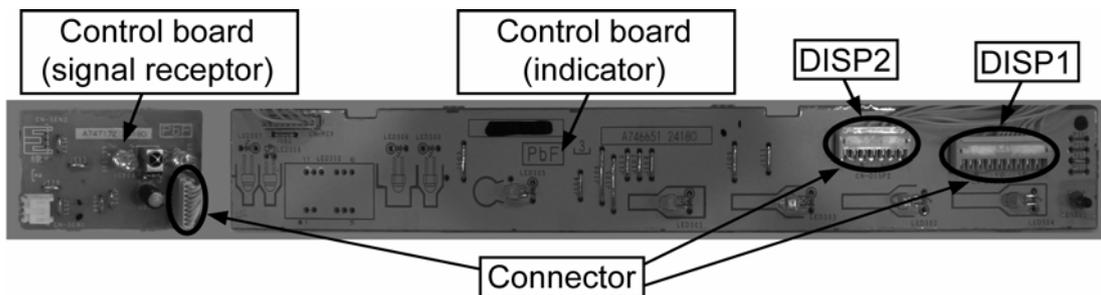


2 Flip the plastic indicator cover and disengage the tabs (5 locations).



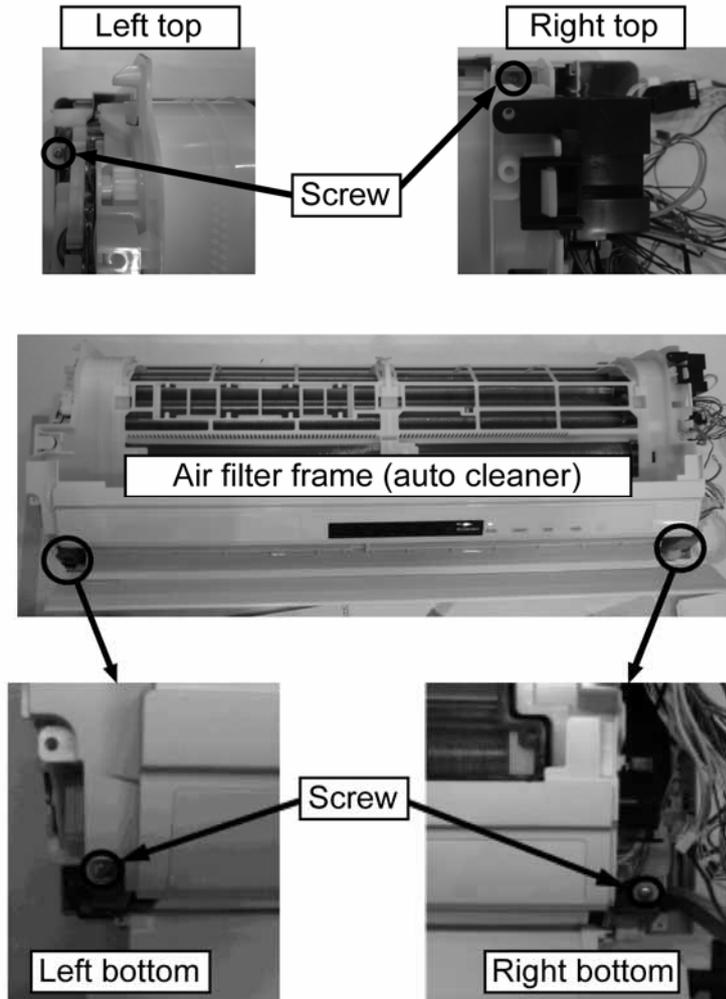
3 Disconnect the connector (1 location) on the control board (signal receptor).

4 Disconnect the connectors (2 locations) on the control board (indicator) and remove the control board (indicator).



16.1.8 Removing the Air Filter Frame (Auto Cleaner)

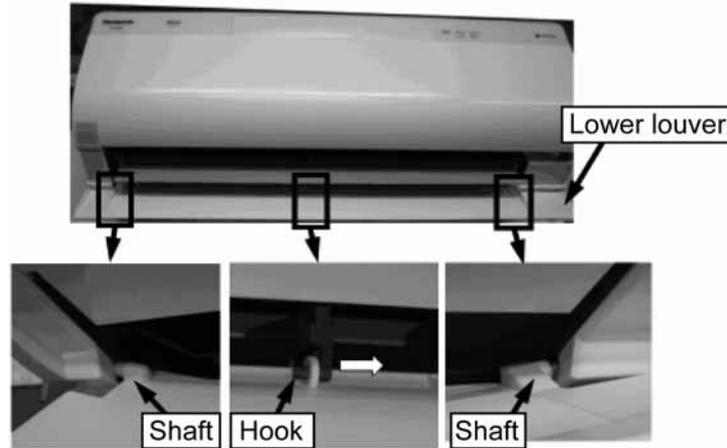
- 1 Perform "16.1.1 Removing the Front Panel".
- 2 Perform "16.1.2 Removing the Air Filters".
 - ※ Note on disassembly: The air filter frame can be removed without removing the air filters. Nevertheless, be sure to remove the air filters because the top portion of the air filters may get stuck while reattaching the air filter frame.
- 3 Perform "16.1.3 Removing the Front Grille (Right) and Front Grille (Left)".
- 4 Perform "16.1.4 Removing the Control Board Box".
 - ※ Note on disassembly: There is no need to remove the control board box. However, the air filter frame cannot be removed unless all the engaged connectors are disconnected and the terminal plate is moved a little bit.
- 5 Remove 4 screws (2 screws each on the right and left sides) which fix the air filter frame (auto cleaner).



16.1.9 Removing the Vertical Airflow Direction Louver

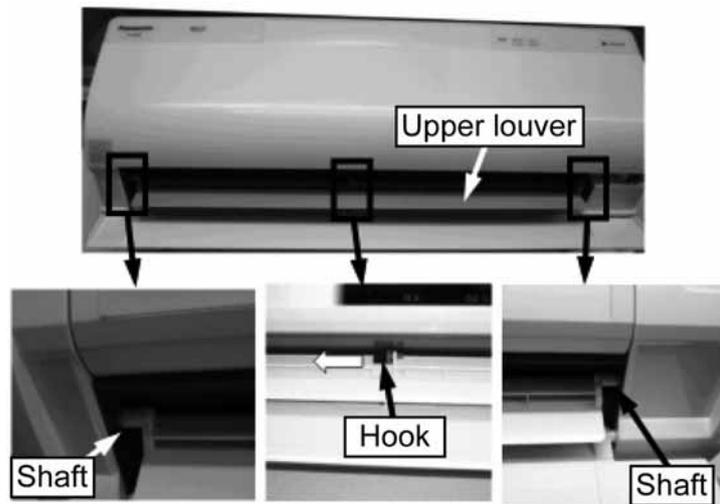
■ How to remove the lower louver of the vertical airflow direction louver

- 1 Open the lower louver.
- 2 The back side of the lower louver is designed as follows: left – inserting type; center – hook engaging type; and right – inserting into the motor type. Push the center hook to the right to disengage it.
- 3 Warp the center part of the lower louver towards you and pull out the left shaft and then the right shaft. Then, remove the lower louver.



■ How to remove the upper louver of the vertical airflow direction louver

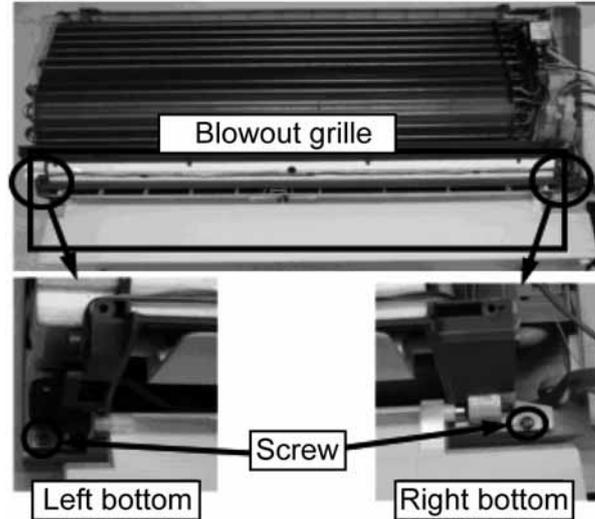
- 1 Open the lower louver and then open the upper louver.



- 2 The back side of the upper louver is designed as follows: left – inserting type; center – hook engaging type; and right – inserting into the motor type. Push the center hook to the left to disengage it.
- 3 Warp the center part of the upper louver towards you and pull out the left shaft and then right shaft. Then, remove the upper louver.

16.1.10 Removing the Blowout Grille

- 1 Perform "16.1.1 Removing the Front Panel".
- 2 Perform "16.1.2 Removing the Air Filters".
- 3 Perform "16.1.3 Removing the Front Grille (Right) and Front Grille (Left)".
- 4 Perform "16.1.4 Removing the Control Board Box".
- 5 Perform "16.1.8 Removing the Air Filter Frame (Auto Cleaner)".
- 6 Remove the screws (1 piece each on right and left) located at the bottom side of the blowout grille.



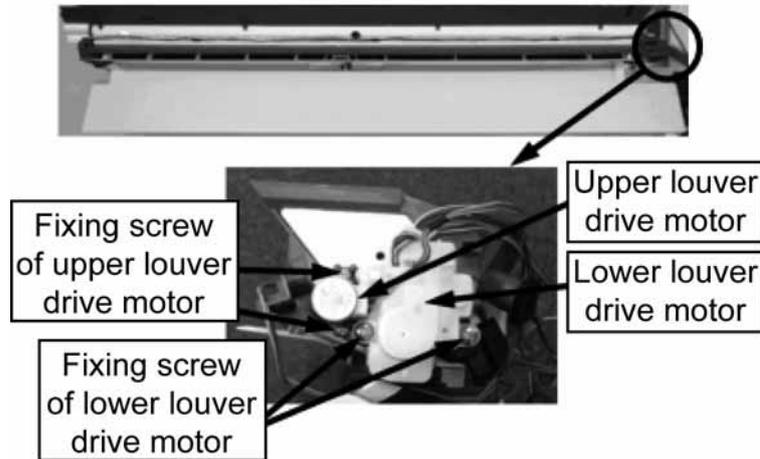
- 7 Remove the accessory panel below the framework.



- 8 Disconnect the drain hose and pull the blowout grille to remove it.
※ Note on disassembly: Be careful of the water in the drain hose and drain pan.

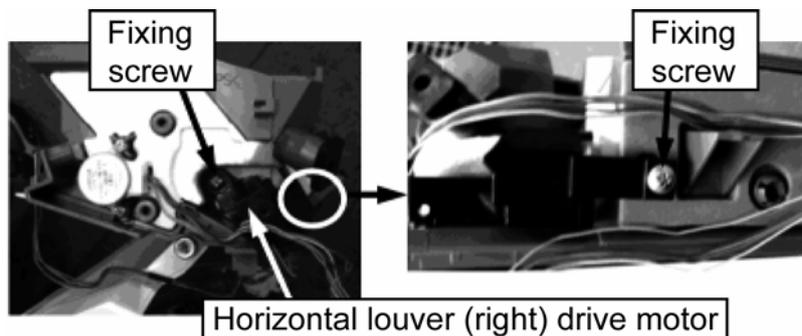
16.1.11 Removing the Drive Motor of the Vertical Airflow Direction Louver (Upper and Lower Louvers)

- 1 Perform "16.1.1 Removing the Front Panel".
- 2 Perform "16.1.2 Removing the Air Filters".
- 3 Perform "16.1.3 Removing the Front Grille (Right) and Front Grille (Left)".
- 4 Perform "16.1.4 Removing the Control Board Box".
- 5 Perform "16.1.8 Removing the Air Filter Frame (Auto Cleaner)".
- 6 Perform "16.1.11 Removing the Blowout Grille".
- 7 Remove the drive motor fixing screws (2 pieces each) on the right side of the blowout grille. Then, remove the lower louver driving motor and upper louver driving motor.

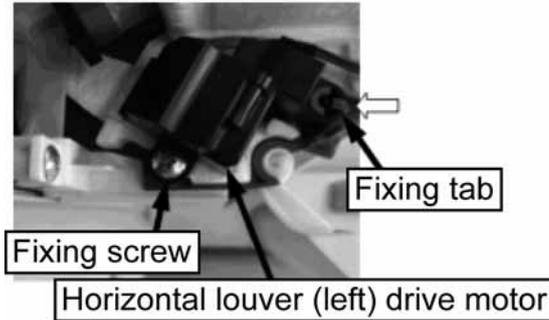


16.1.12 Removing the Drive Motor of the Horizontal Airflow Direction Louver (Right and Left Louvers)

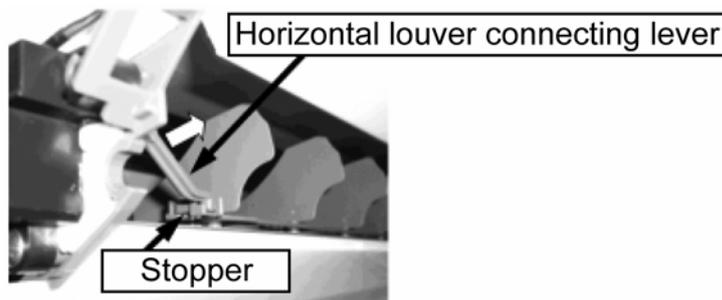
- 1 Perform "16.1.1 Removing the Front Panel".
- 2 Perform "16.1.2 Removing the Air Filters".
- 3 Perform "16.1.3 Removing the Front Grille (Right) and Front Grille (Left)".
- 4 Perform "16.1.4 Removing the Control Board Box".
- 5 Perform "16.1.8 Removing the Air Filter Frame (Auto Cleaner)".
- 6 Perform "16.1.11 Removing the Blowout Grille".
- 7 Remove the lower louver drive motor according to "16.1.12 Removing the Drive Motor of the Vertical Airflow Direction Louver (Upper and Lower Louvers)".
- 8 Remove the horizontal louver (right) drive motor.
 - o Remove the drive motor fixing screws (2 pieces) on the right side of the blowout grille and then remove the horizontal louver (right) drive motor.



- 9 Remove the horizontal louver (left) drive motor.
 - Remove the drive motor fixing screw (1 piece) on the right side of the blowout grille.
 - Push the drive motor fixing tab (1 location) towards the direction indicated by the arrow to disengage it.

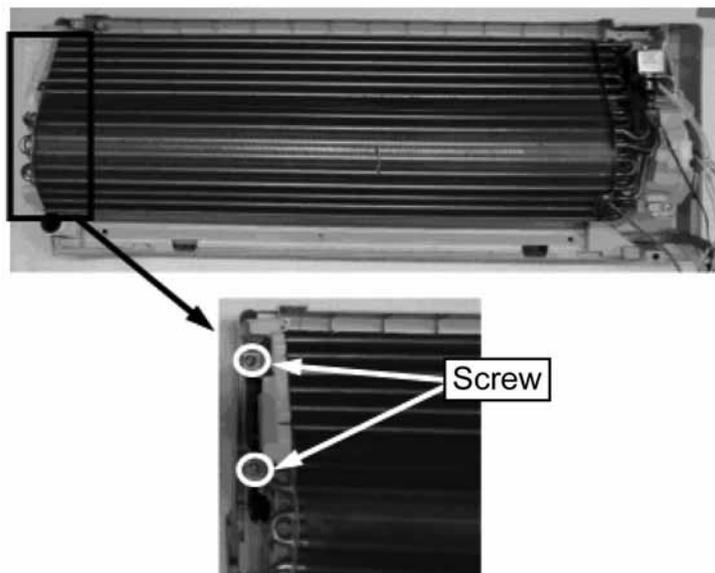


- 10 Release the lever from the horizontal louver and remove the drive motor. (A lever is connected to the horizontal louver drive motor (both right and left)).
 - Press the stopper of the lever and pull the horizontal louver connecting lever towards you to release the lever from the horizontal louver.

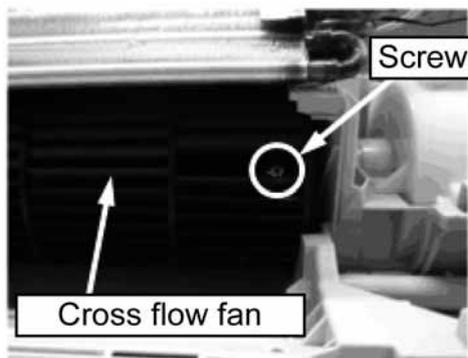


16.1.13 Removing the Indoor Motor and Cross Flow Fan

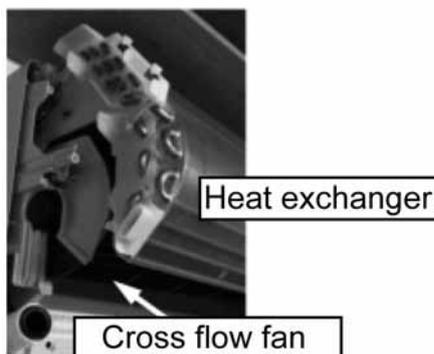
- 1 Perform "16.1.1 Removing the Front Panel".
- 2 Perform "16.1.2 Removing the Air Filters".
- 3 Perform "16.1.3 Removing the Front Grille (Right) and Front Grille (Left)".
- 4 Perform "16.1.4 Removing the Control Board Box".
- 5 Perform "16.1.8 Removing the Air Filter Frame (Auto Cleaner)".
- 6 Perform "16.1.11 Removing the Blowout Grille".
- 7 Remove the screws (2 pieces) on the left side of the heat exchanger.



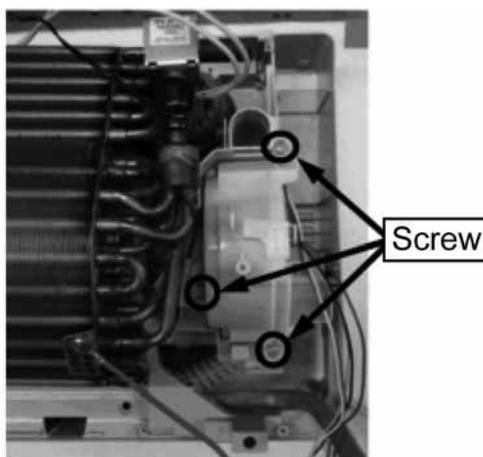
8 Loosen the fixing screw (1 screw) which fixes the cross flow fan to the indoor motor.



9 Pull out the cross flow fan while lifting up the left side of the heat exchanger.



10 Remove the screws (3 pieces) of the indoor motor cover and pull out the indoor motor together with the cover to the right side to remove it.



16.2 Points of Disassembly (Outdoor Unit)

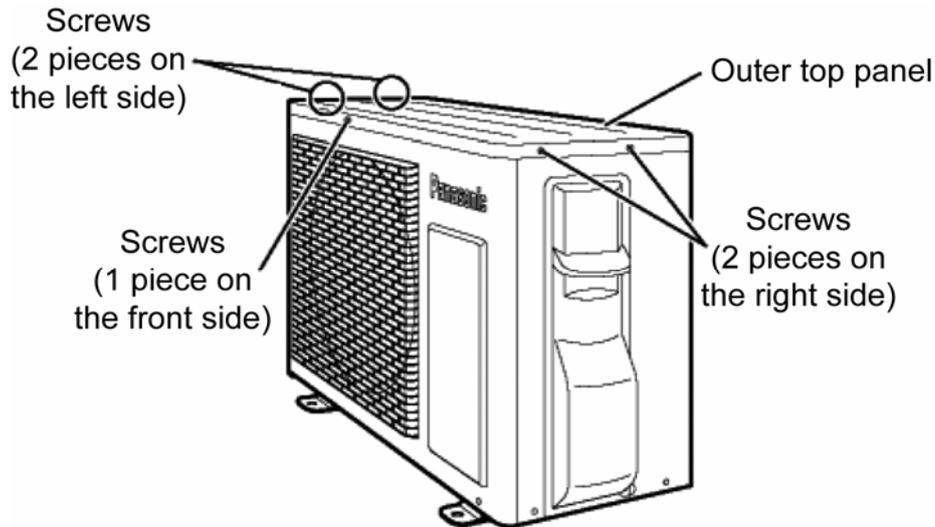


CAUTION: HIGH VOLTAGE

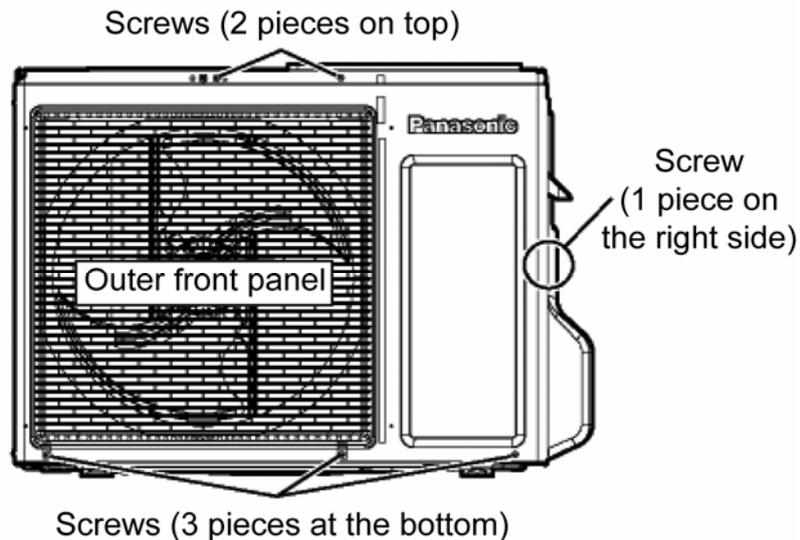
The electrical components of the outdoor unit are under high voltage by the operation of the booster capacitor. Fully discharge the capacitor before commencing a repair work. Failure to observe this warning could result in electric shock.

16.2.1 Removing the Outer Top Panel and Outer Front Panel

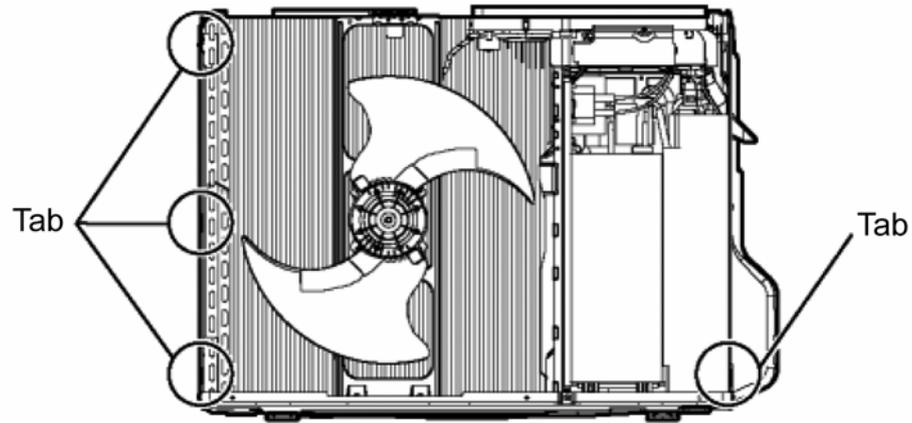
- 1 Remove the screws of the outer top panel.
 - Remove 2 screws on the right, 2 screws on the left and 1 screw on the front side, all from the front view. Then, remove the outer top panel.



- 2 Remove the screws of the outer front panel.
 - Remove 2 screws on top, 3 screws at the bottom and 1 screw on the right side, all from the front view.

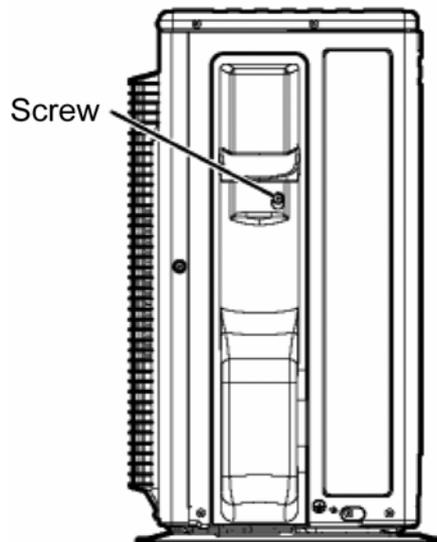


- 3 Disengage the tabs on the outer front panel (3 locations on the left side and 1 location on the right side). Remove the outer front panel while pulling it slightly up.

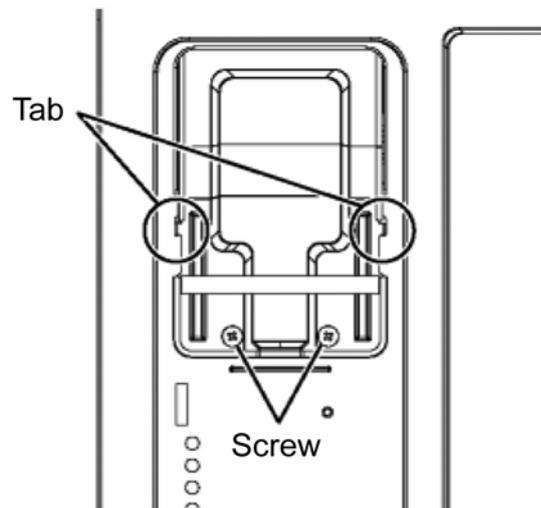


16.2.2 Removing the Electrical Component Covers (2 & 3-way valve Cover and Terminal Plate Cover)

- 1 Remove the screw (1 piece) of the electrical component cover (2 & 3-way valve cover). Slide the electrical component cover (2 & 3-way valve cover) downward to remove it.

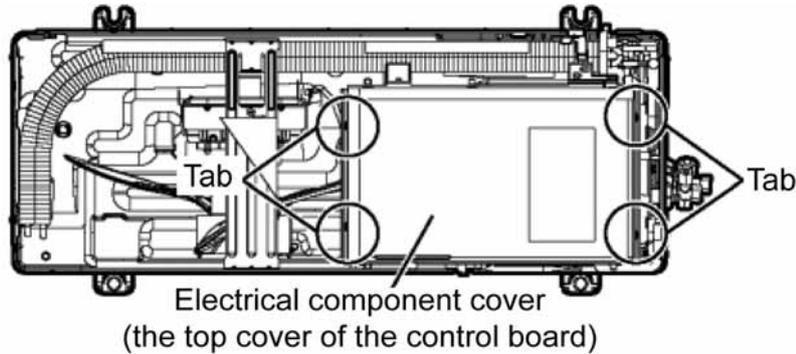


- 2 Remove the screws (2 pieces) and disengage the tabs (2 locations) of the electrical component cover (terminal plate cover). Then, remove the electrical component cover (terminal plate cover).

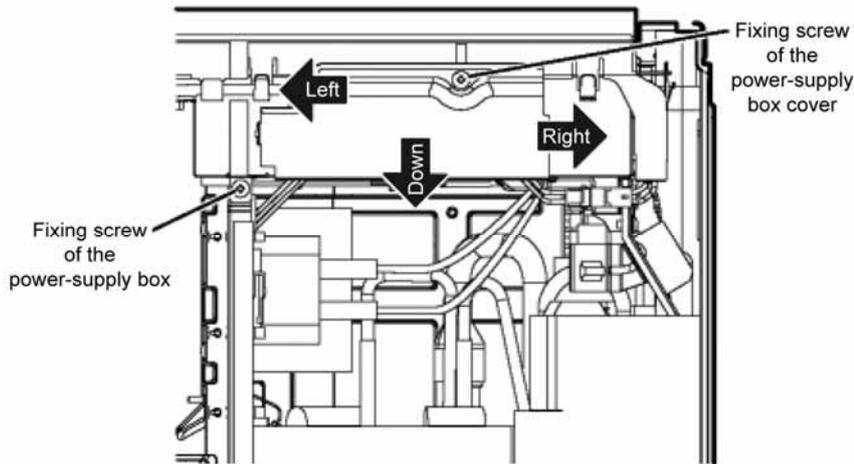


16.2.3 Removing the Power-Supply Box

- 1 Perform "16.2.1 Removing the Outer Top Panel and Outer Front Panel".
- 2 Perform "16.2.2 Removing the Electrical Component Covers (2 & 3-way valve Cover and Terminal Plate Cover)".
- 3 Disengage 4 tabs of the electrical component cover (the top cover of the control board) (2 locations each on the right and left sides). Remove the electrical component cover (the top cover of the control board).



- 4 Remove the fixing screw (1 piece) of the power-supply box and the fixing screw (1 piece) of the powersupply box cover.



- 5 Disconnect the connectors and terminals.

■ Wiring from down side

- Lead wires of the compressor (red, blue and yellow) Disconnect the intermediate connector (white) of the compressor lead wires.
- CN-HOT (white) Electromagnetic coil (4-way valve) Wire color: Yellow
- 2 wires of the reactor connecting terminal Wire color: Gray and white
- CN-TANK (white) Compressor temperature sensor
- CN-TH2 (red) Outdoor heat storage tank temperature sensor

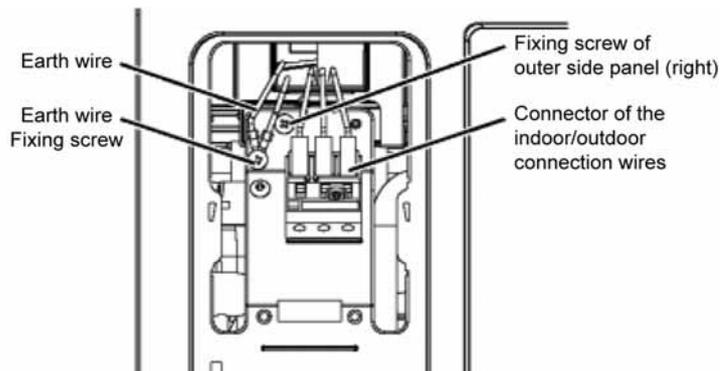
■ Wiring from left side

- CN-MTR1 (white) Outdoor motor
- CN-MTR2 (white) Outdoor motor
- ✗ Notes on assembly: When performing the wiring for the outdoor motor during replacement of the control board, close the top cover of the control board before connecting the connectors of CN-MTR1 & 2 for wiring. If the wiring is performed without closing the top cover of the control board, the wire may get pinched while closing the cover.

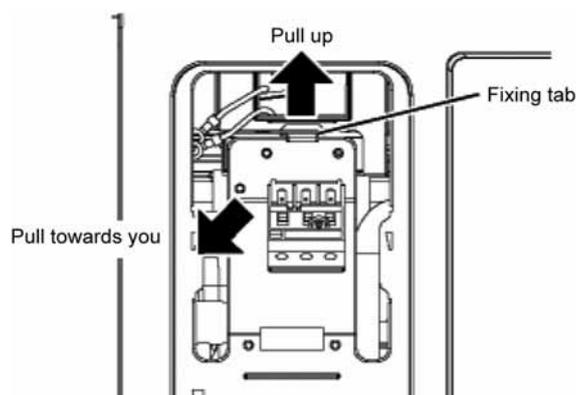
■ Wiring from right side

- CN-STM (white) Electromagnetic coil (expansion valve)
- CN-TH1 (white) Outside air temperature and pipe temperature sensor
- Lead wire of the electromagnetic coil (2-way valve V1) Intermediate connector for the defrosting 2-way valve coil (yellow)
- Lead wire of the electromagnetic coil (2-way valve V2) Intermediate connector for the heat storage tank 2-way valve coil (blue)
- CN-TH3 (blue) Outdoor heat exchanger temperature sensor 2

- 6 Disconnect the connector of the indoor/outdoor connection wires (red, white and black) and remove the fixing screw of the earth wire (green).
- 7 Remove the screw (1 piece) which fixes the power-supply box to the outer side panel (right).



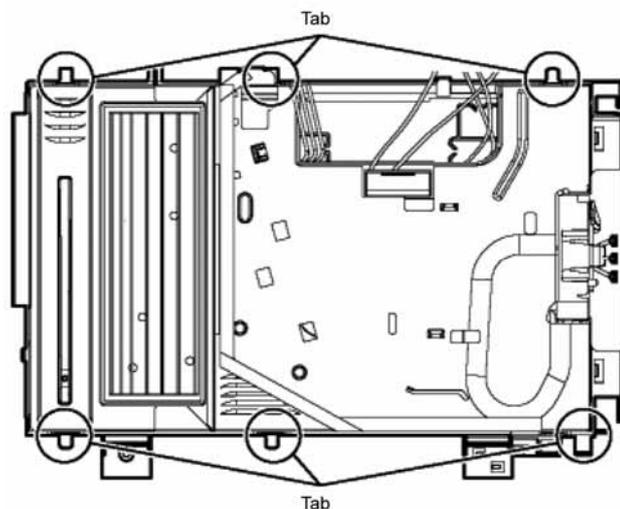
- 8 Pull the outer side panel (right) towards you while pulling up the fixing tab (1 location) of the powersupply box to disengage the tab.



- 9 Lift up the power-supply box to remove it.

16.2.4 Removing the Control Board

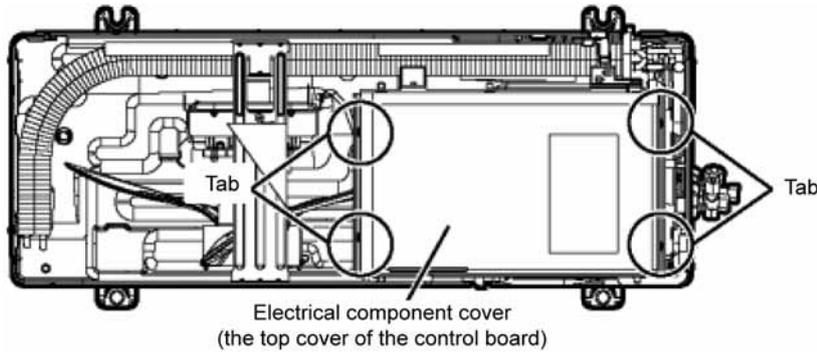
- 1 Perform "16.2.1 Removing the Outer Top Panel and Outer Front Panel".
- 2 Perform "16.2.2 Removing the Electrical Component Covers (2 & 3-way valve Cover and Terminal Plate Cover)".
- 3 Perform "16.2.3 Removing the Power-Supply Box".
- 4 Disengage the tabs (6 locations) and remove the metal cover.



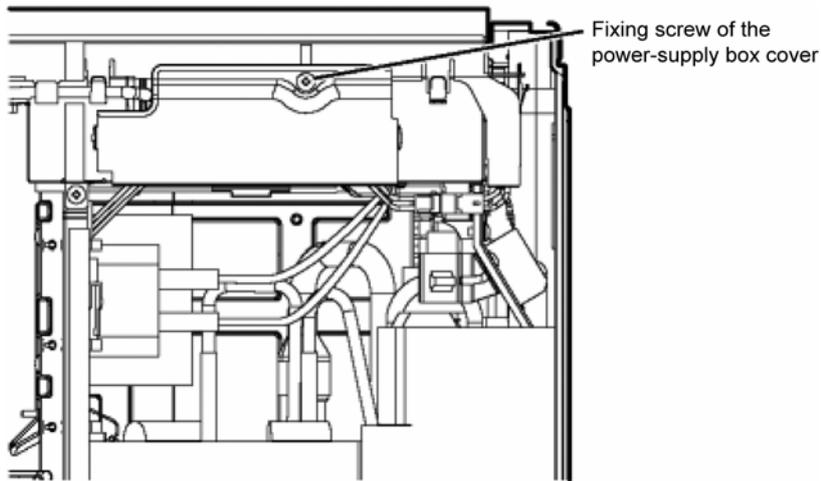
※ Notes on disassembly: During the replacement of outdoor control board, the control board and plastic power-supply box are separated by removing the screws (2 pieces) on the soldered surface. These two parts can be replaced as an integrated piece by applying silicon to them.

16.2.5 Removing the Propeller Fan and Outdoor Motor

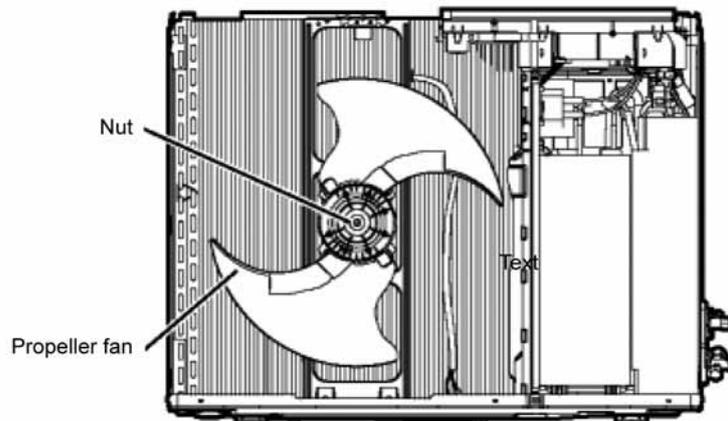
- 1 Perform "16.2.1 Removing the Outer Top Panel and Outer Front Panel".
- 2 Disengage 4 tabs of the electrical component cover (the top cover of the control board) (2 locations each on the right and left sides). Remove the electrical component cover (the top cover of the control board).



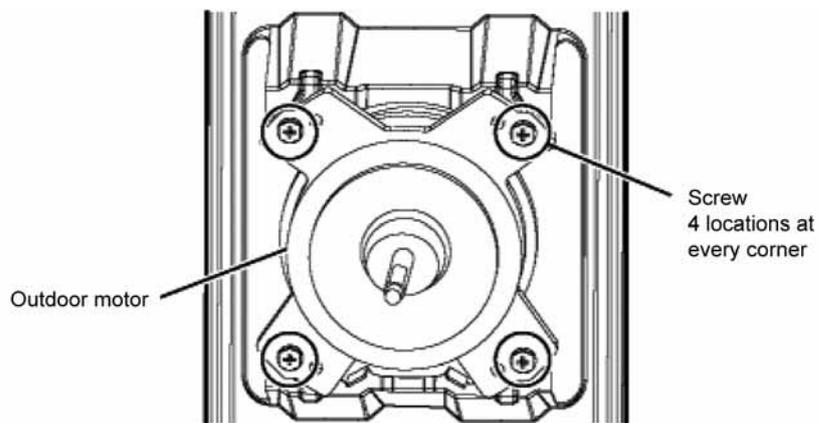
- 3 Remove the fixing screw (1 piece) of the power-supply box.



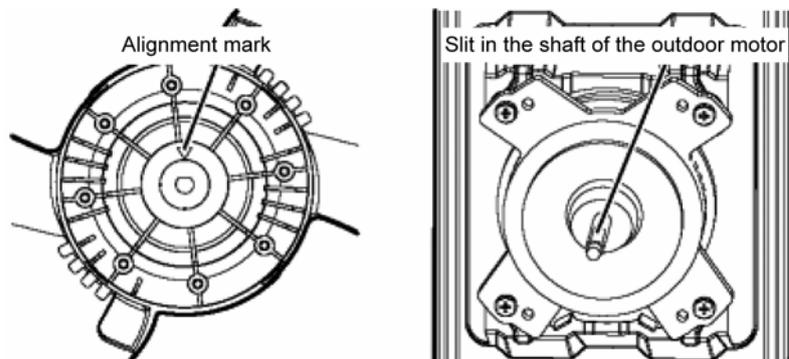
- 4 Disconnect the connectors of CN-MTR1 (white) and CN-MTR2 (white) only.
※ Notes on assembly: When performing the wiring after the replacement of the outdoor motor, close the top cover of the control board before connecting the connectors of CN-MTR1 & 2 for wiring. If the wiring is performed without closing the top cover of the control board, the wire may get pinched while closing the cover.
- 5 Rotate the nut located in the center of the propeller fan clockwise. Then, remove the propeller fan.



- Loosen the fixing screws (4 pieces) of the outdoor motor and remove the outdoor motor.

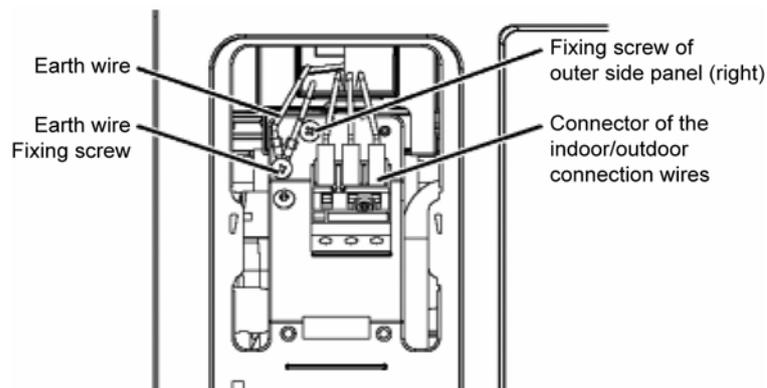


※ Notes on assembly: When assembling the propeller fan and outdoor motor, the alignment mark located in the center part of the propeller fan should be aligned with the slit in the shaft of the outdoor motor.

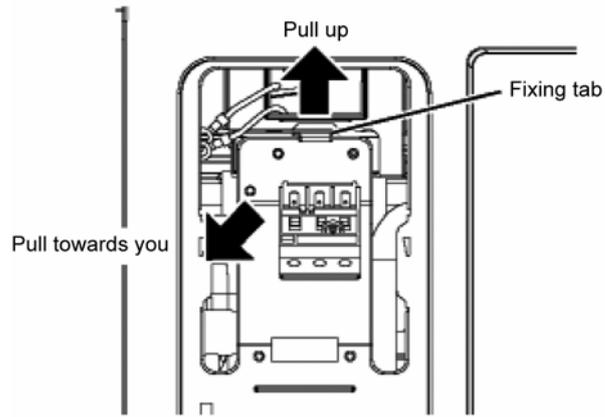


16.2.6 Removing the Outer Side Panel (Right)

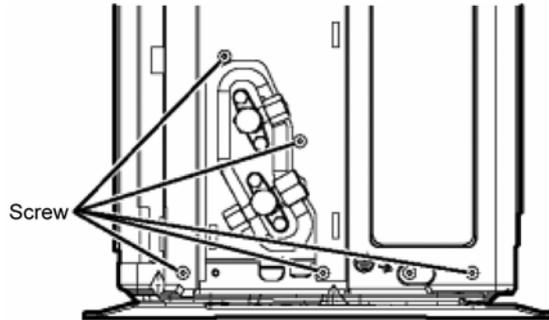
- Perform "16.2.1 Removing the Outer Top Panel and Outer Front Panel".
- Perform "16.2.2 Removing the Electrical Component Covers (2 & 3-way valve Cover and Terminal Plate Cover)".
- Disconnect the connector of the indoor/outdoor connection wires (red, white and black) and remove the fixing screw of the earth wire (green).
- Remove the screw (1 piece) which fixes the power-supply box to the outer side panel (right).



- 5 Pull the outer side panel (right) towards you while pulling up the fixing tab (1 location) of the power-supply box to disengage the tab.

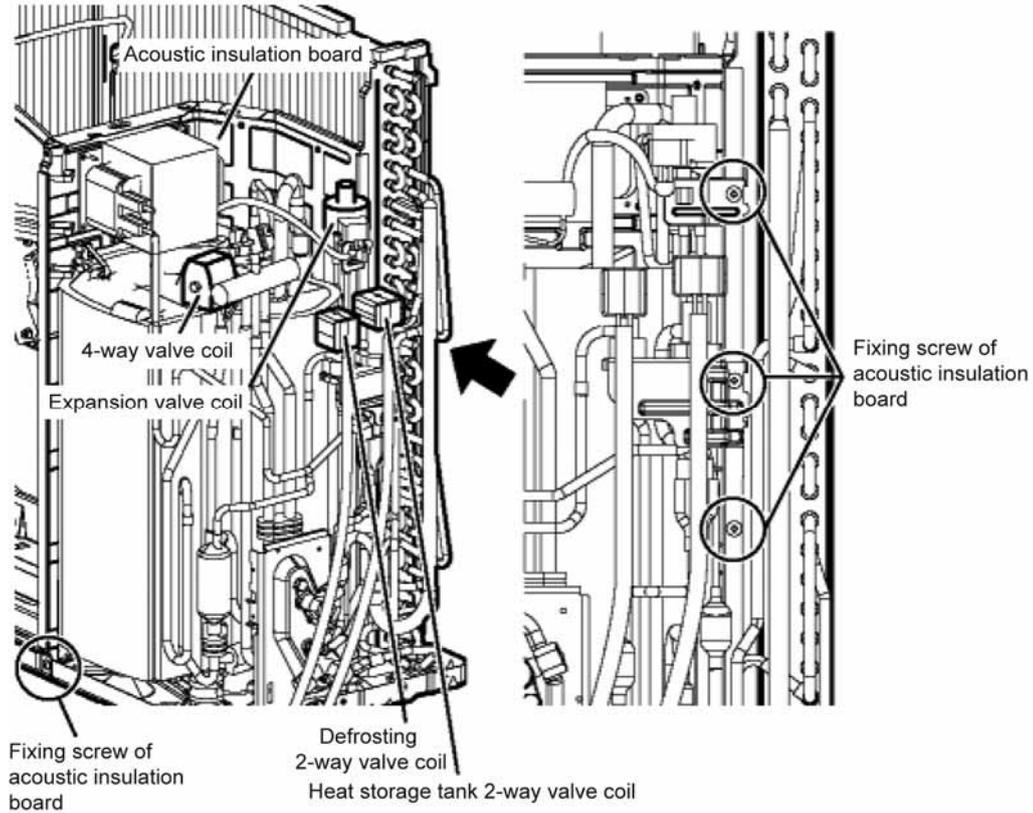


- 6 Remove the fixing screws (5 pieces) of the outer side panel (right) and remove the outer side panel (right).
※ Note on disassembly: When removing the outer side panel (right) by pulling it upward, be careful not to allow the side of the outer side panel to come into contact with the pipe insulation material/tape to avoid damage and tear of these materials.



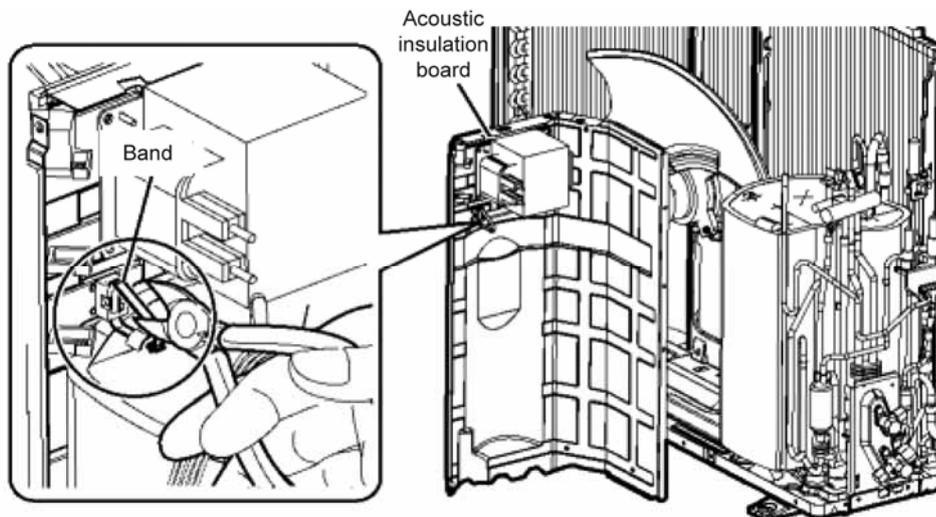
16.2.7 Removing the Compressor and Heat Storage Tank

- 1 Perform "16.2.1 Removing the Outer Top Panel and Outer Front Panel".
- 2 Perform "16.2.2 Removing the Electrical Component Covers (2 & 3-way valve Cover and Terminal Plate Cover)".
- 3 Perform "16.2.3 Removing the Power-Supply Box".
- 4 Perform "16.2.6 Removing the Outer Side Panel (Right)".
- 5 Remove the 4-way valve coil, expansion valve coil, defrosting 2-way valve coil and heat storage tank 2-way valve coil. Then, remove the fixing screws of the acoustic insulation board (3 pieces on the right side and 1 piece at the front bottom).

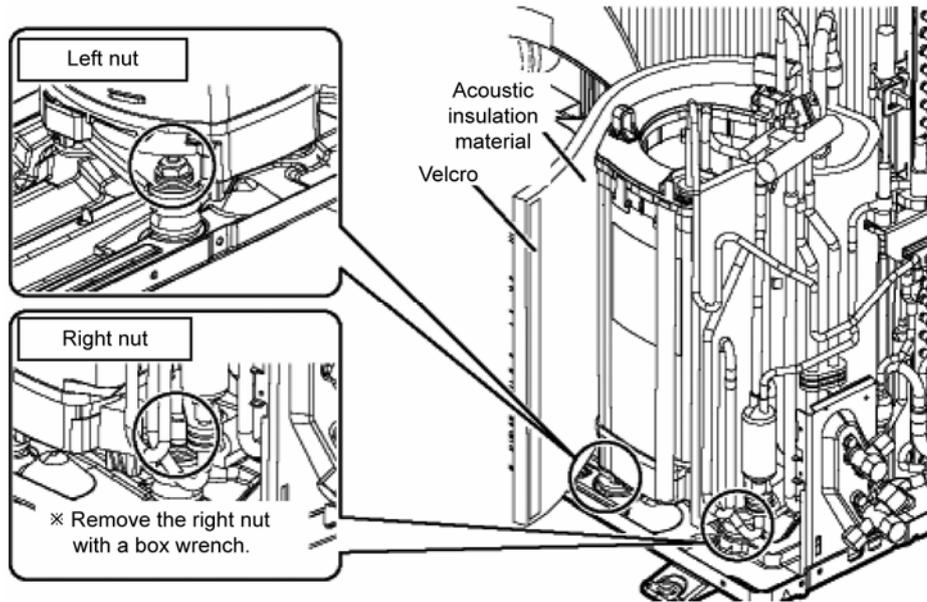


※ Note on assembly: When attaching the defrosting 2-way valve coil and heat storage tank 2-way valve coil, attach the coils according to the colors indicated on the metal sheet located below the coils to the main unit.

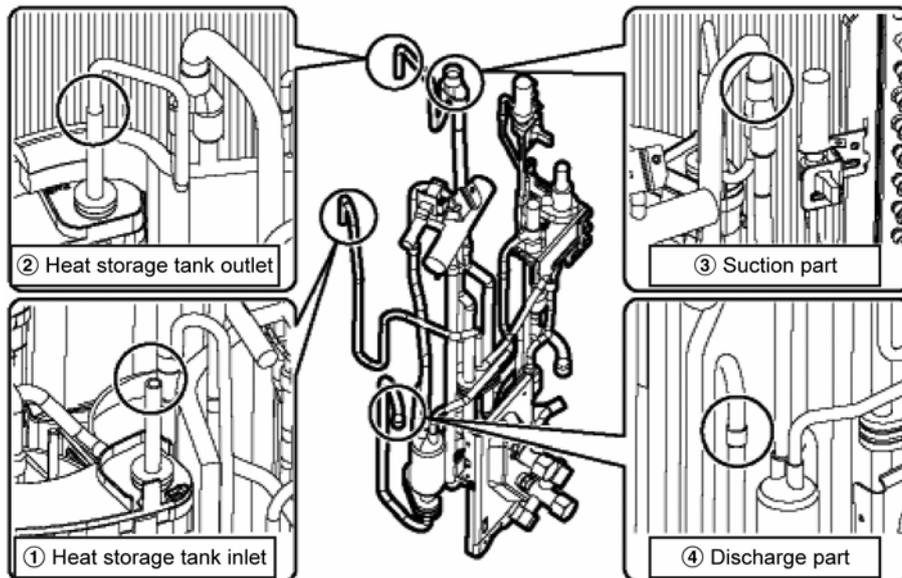
- 6 Cut the band which fixes the heat storage tank to the acoustic insulation board. Remove the acoustic insulation board.



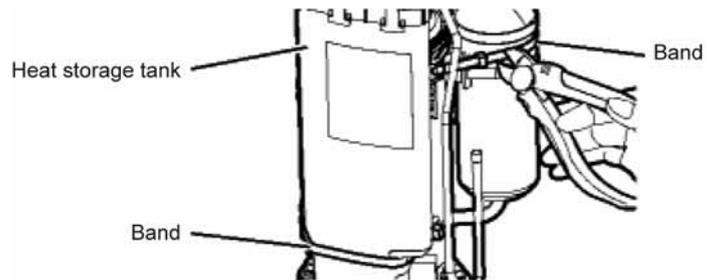
- 7 Remove the acoustic insulation material and then remove the nuts which fix the compressor (2 locations). (The heat storage tank is attached to the compressor.)
 ※ Note on disassembly: Use a box wrench to remove the nut located on the right side from the front view.



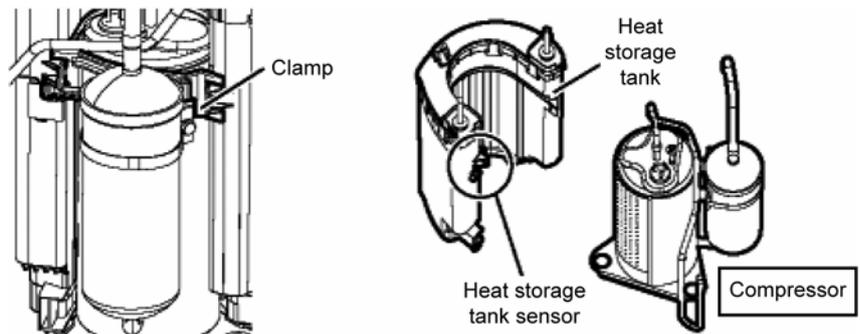
- 8 Remove the welded parts (4 locations).
 ○ Remove ① heat storage tank inlet, ② heat storage tank outlet, ③ suction part and ④ discharge part.



- 9 Remove the compressor and heat storage tank.
- Cut the bands (2 locations) which fix the compressor to the heat storage tank.



- Remove the clamp and separate the compressor and heat storage tank.
- ※ Note on disassembly: Remove the heat storage tank sensor when replacing the heat storage tank.



17. Technical Data

17.1 Operation Characteristics

17.1.1 CS-VE9NKE CU-VE9NKE

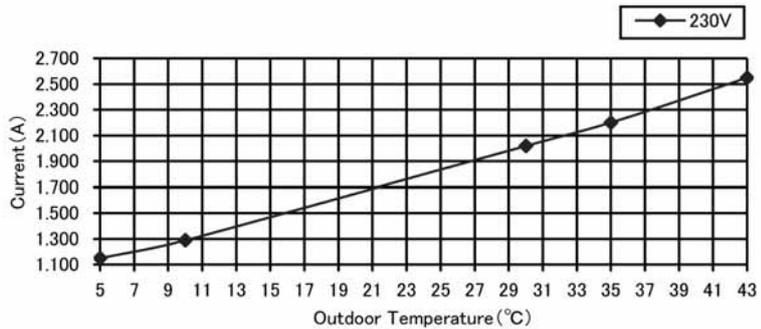
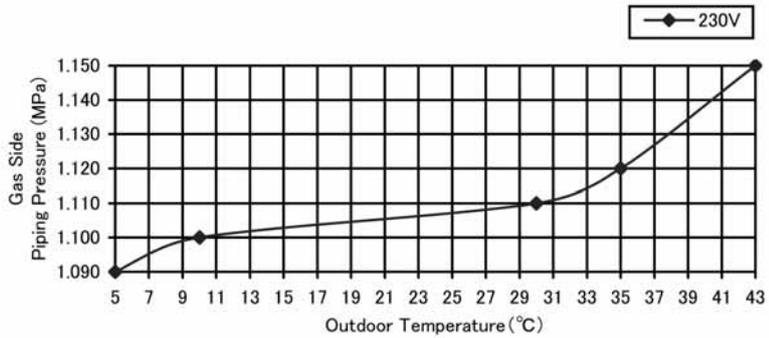
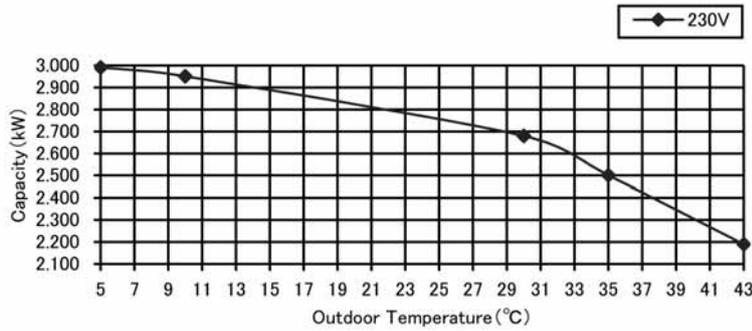
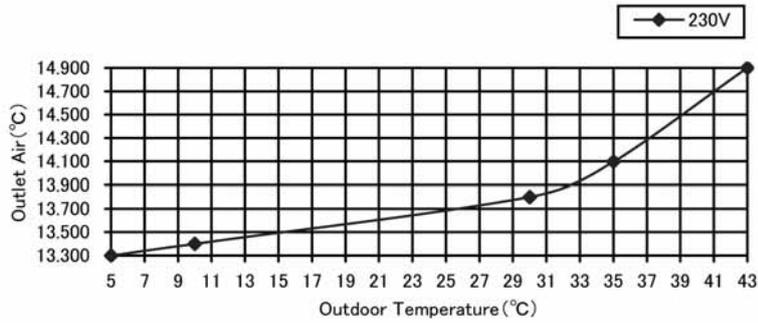
Cooling Characteristic

Condition

Room temperature: 27°C (DBT), 19°C (WBT)

Piping length: 5m

Fc : 29Hz



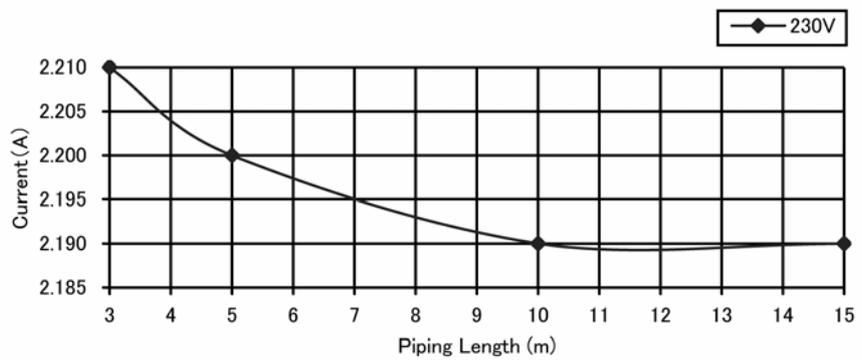
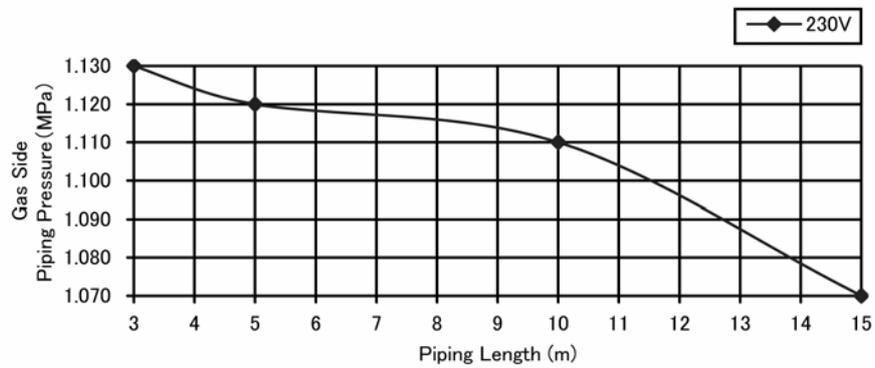
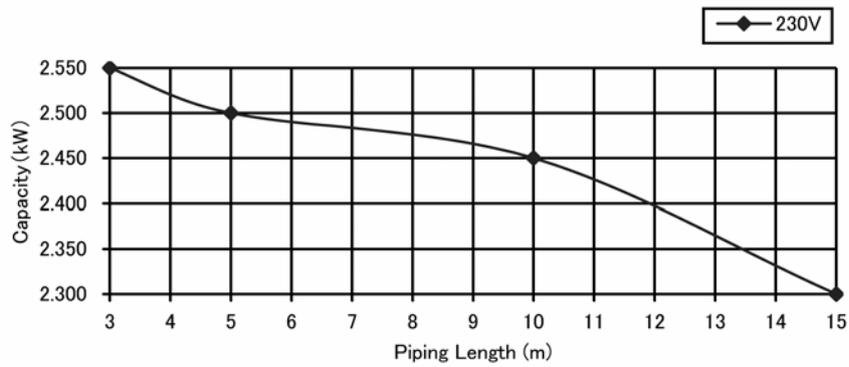
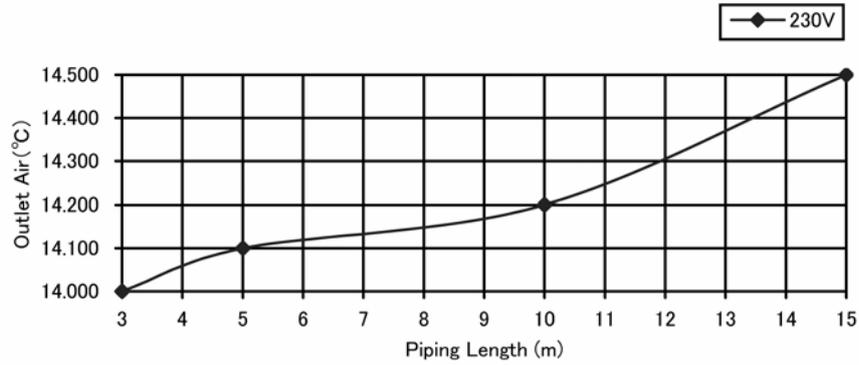
Piping Length Characteristic Cooling

Condition

Room temperature: 27°C (DBT), 19°C (WBT)

Outdoor temperature: 35°C (DBT)

Fc : 29Hz



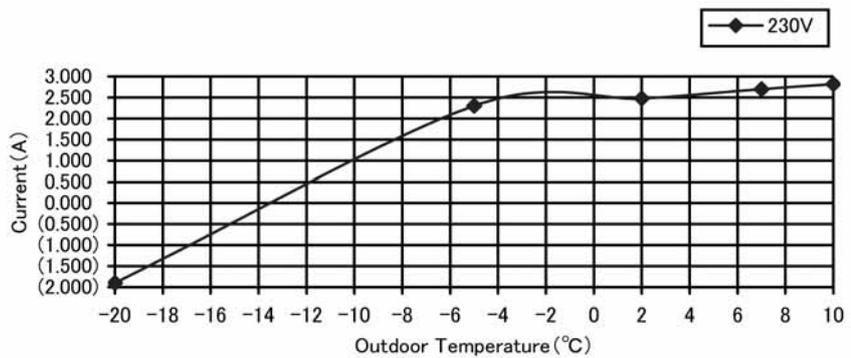
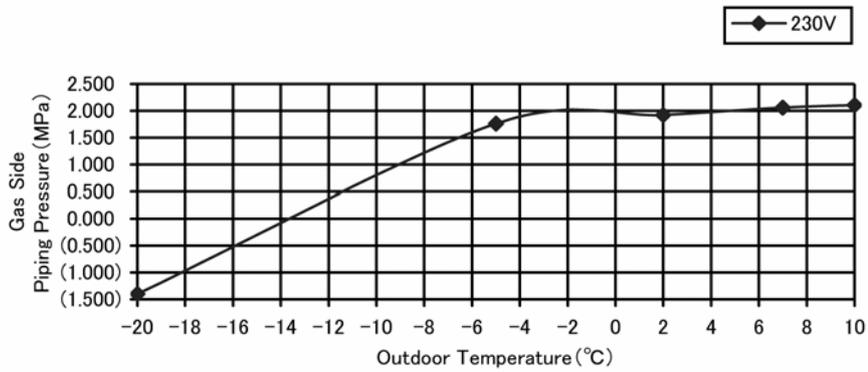
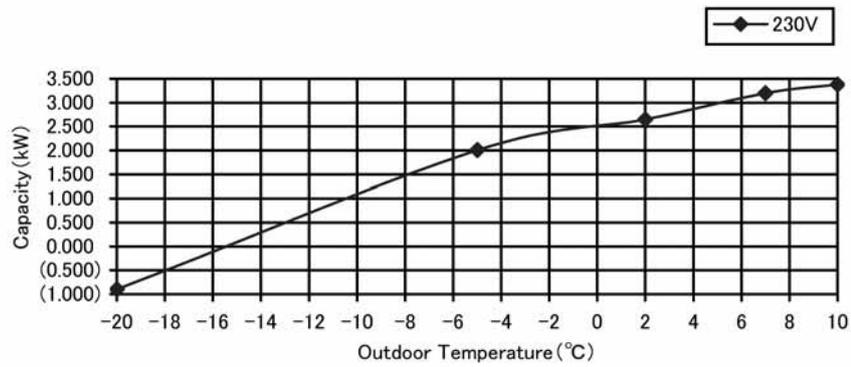
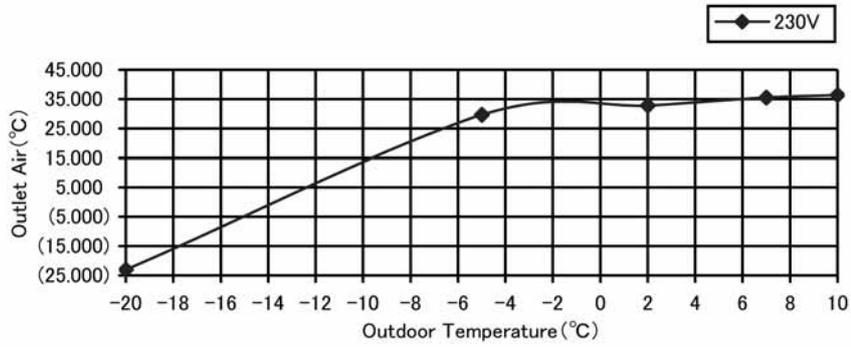
Heating Characteristic

Condition

Room temperature: 20°C (DBT)

Piping length: 5m

Fh : 37Hz



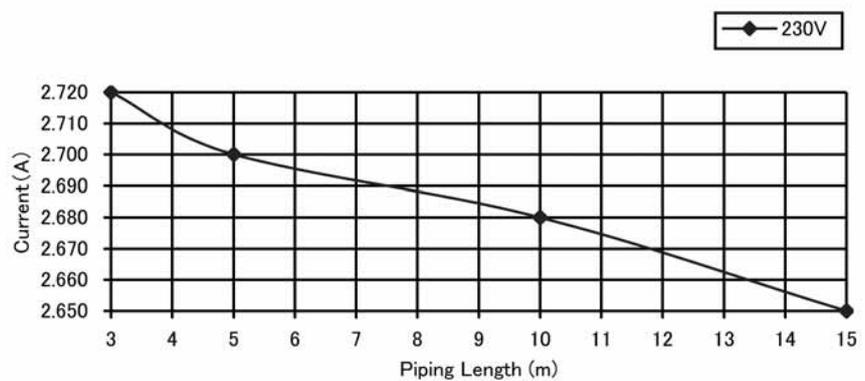
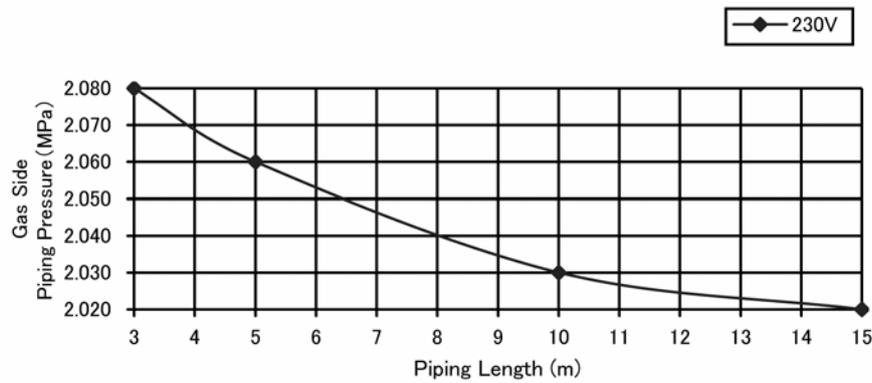
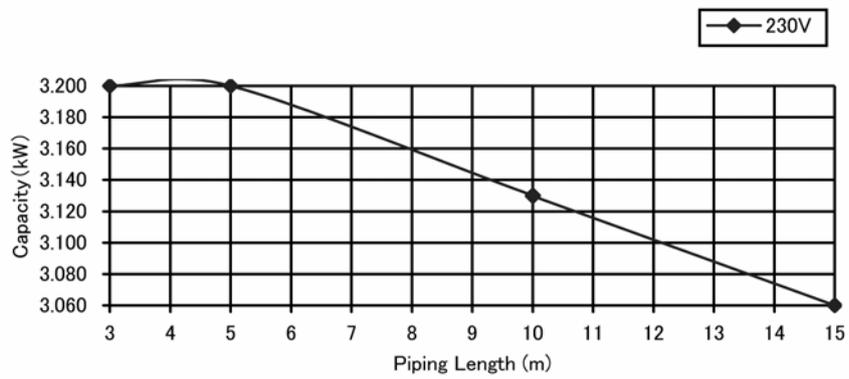
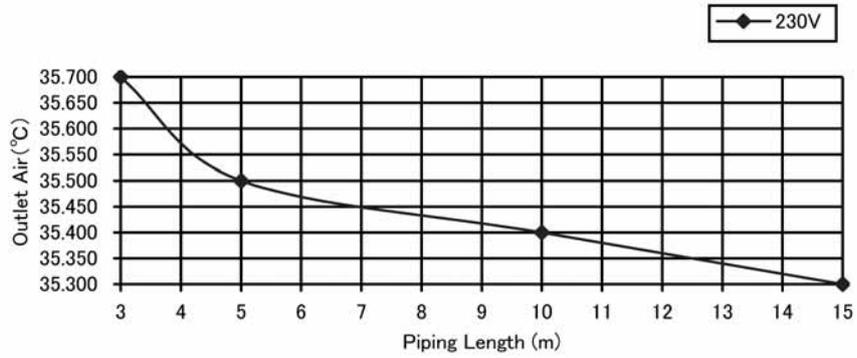
Piping Length Characteristic Heating

Condition

Room temperature: 20°C (DBT)

Outdoor temperature: 7.0°C (DBT), 6.0°C (WBT)

Fh : 37Hz



17.1.2 CS-VE12NKE CU-VE12NKE

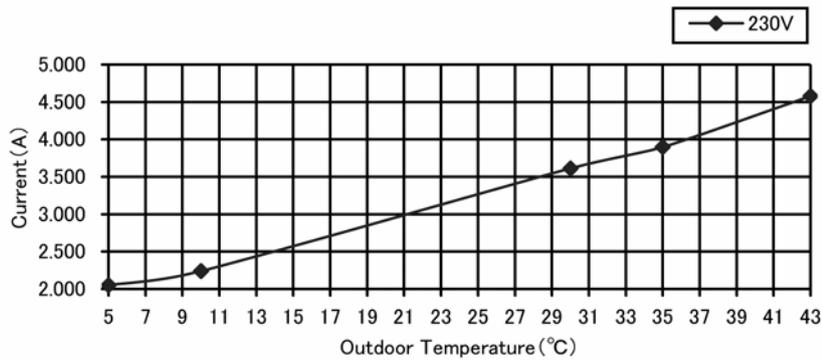
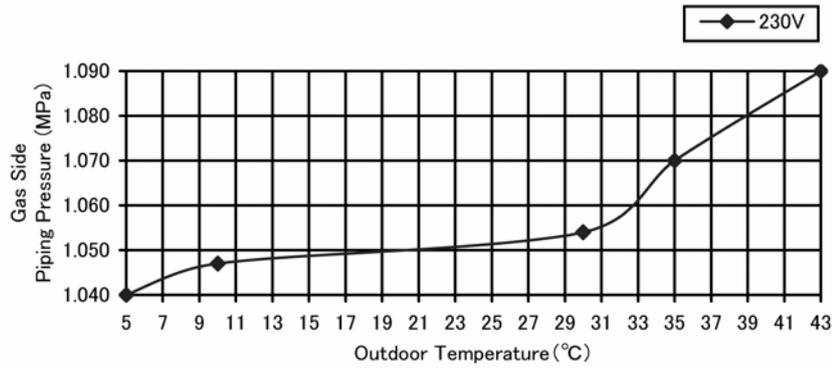
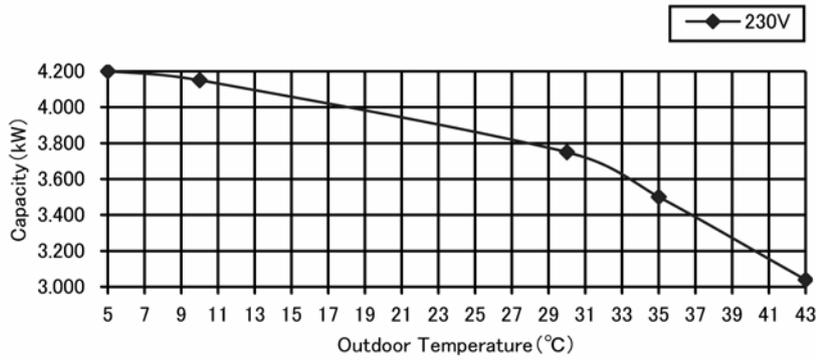
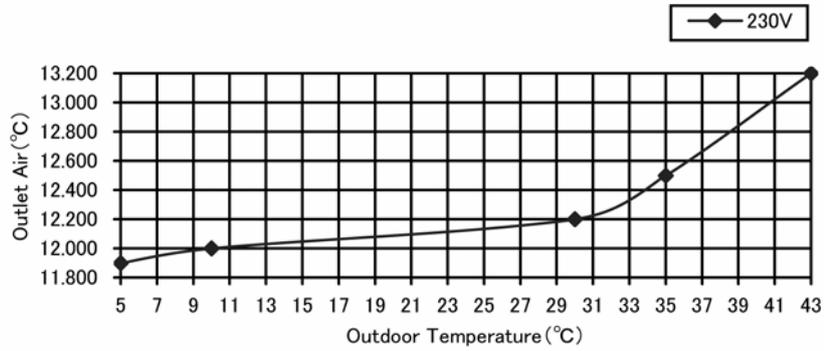
Cooling Characteristic

Condition

Room temperature: 27°C (DBT), 19°C (WBT)

Piping length: 5m

Fc : 48Hz



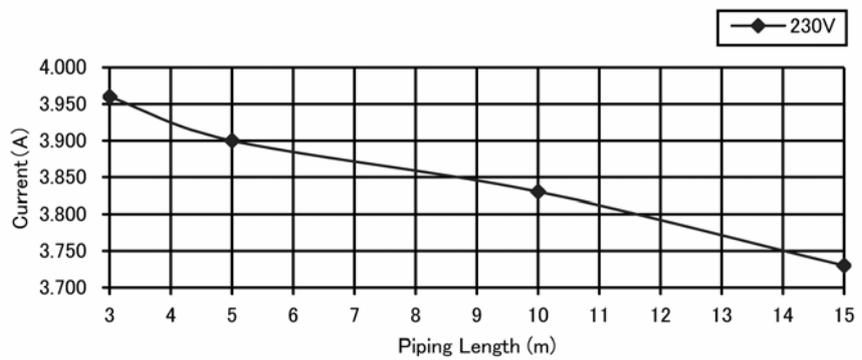
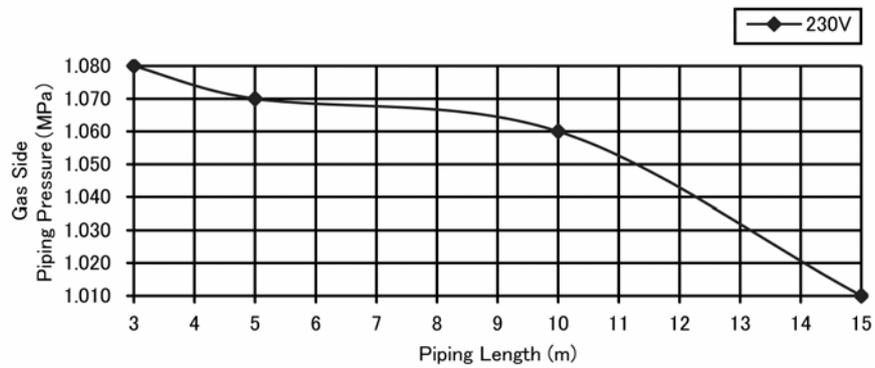
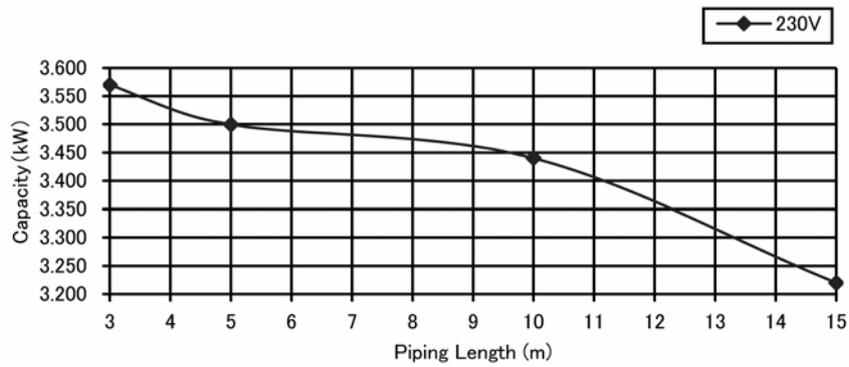
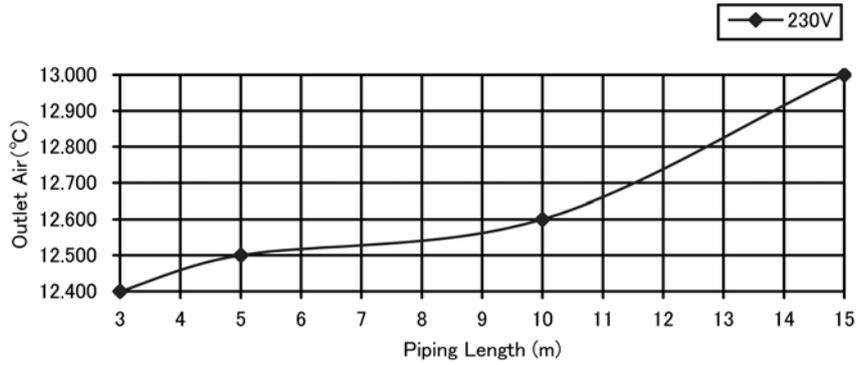
Piping Length Characteristic Cooling

Condition

Room temperature: 27°C (DBT), 19°C (WBT)

Outdoor temperature: 35°C (DBT)

Fc : 48Hz



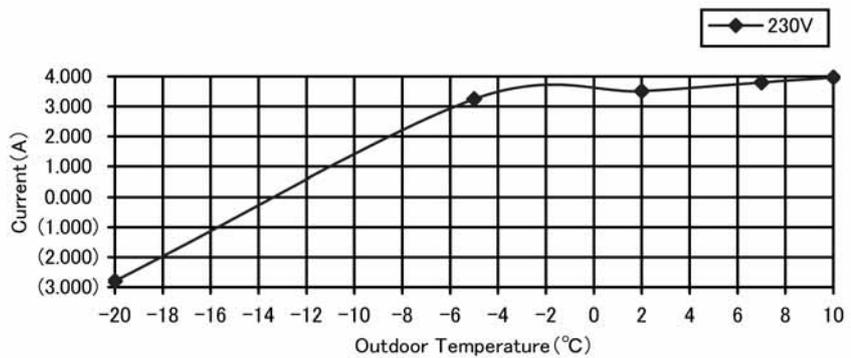
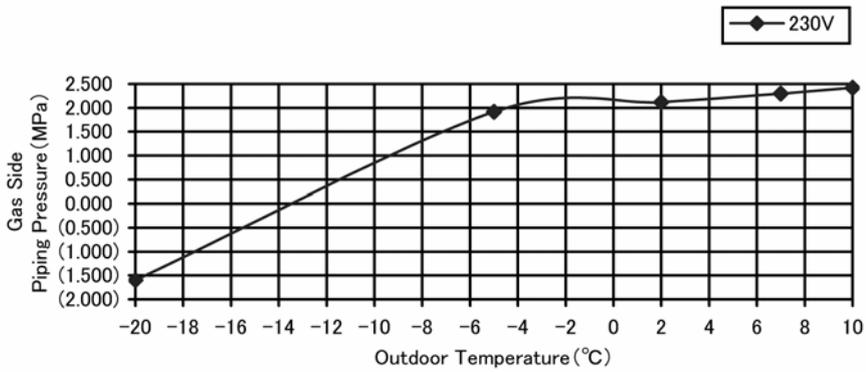
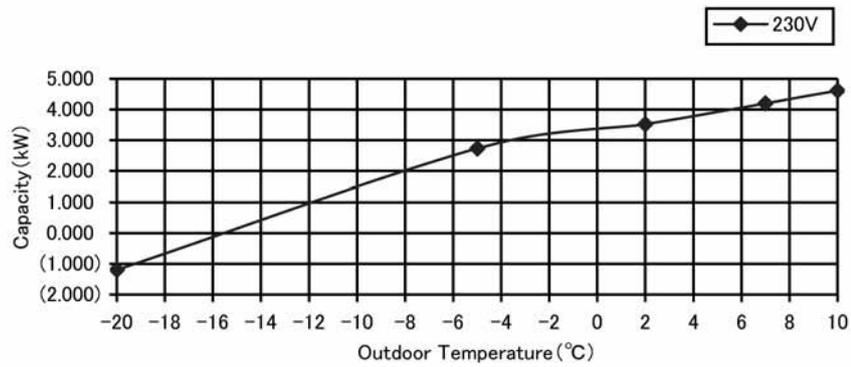
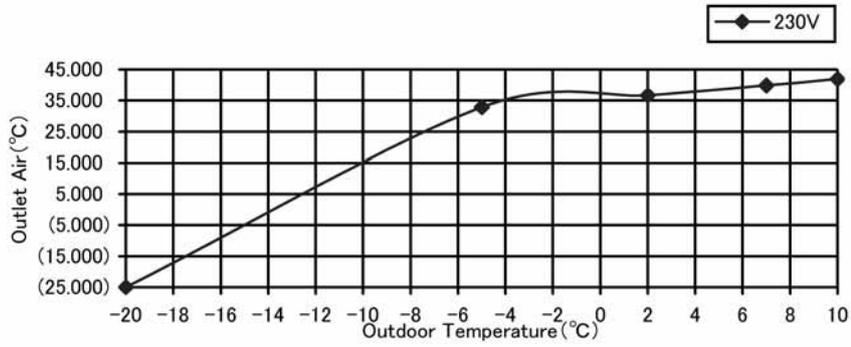
Heating Characteristic

Condition

Room temperature: 20°C (DBT)

Piping length: 5m

Fh : 49Hz



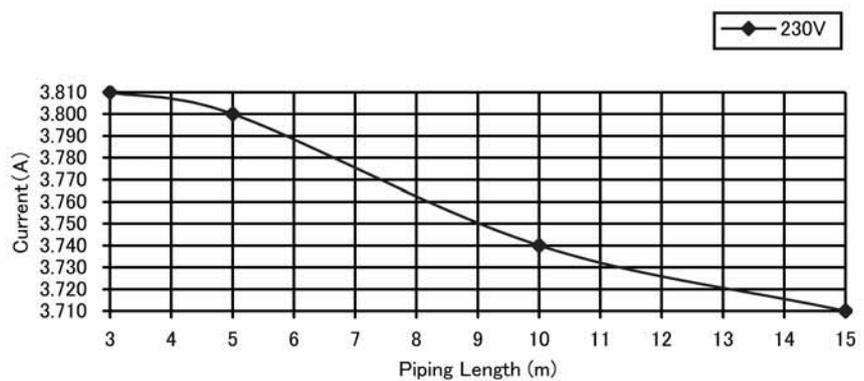
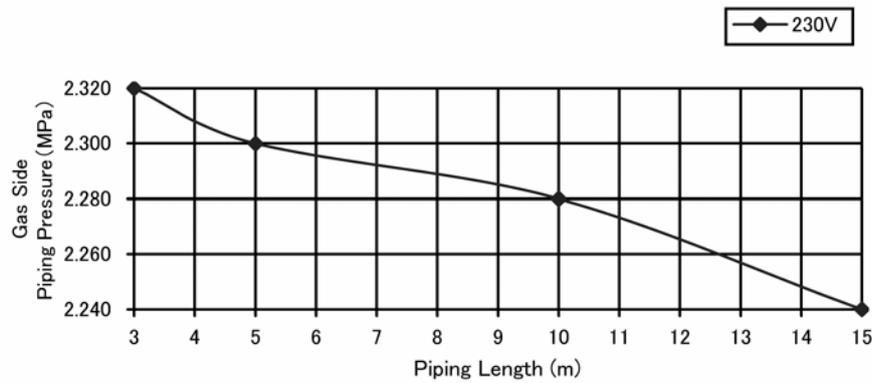
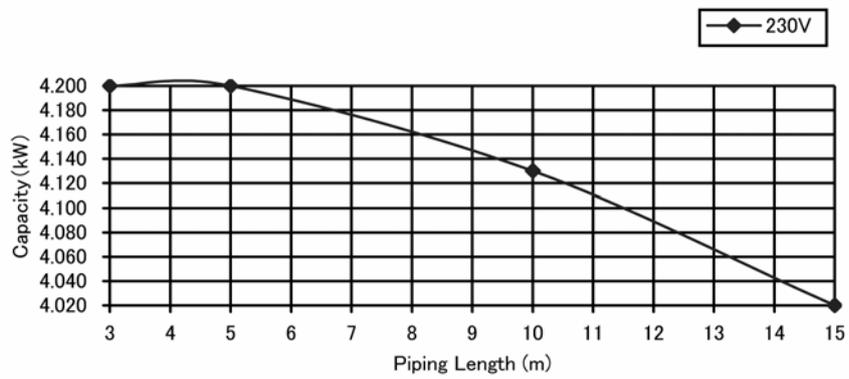
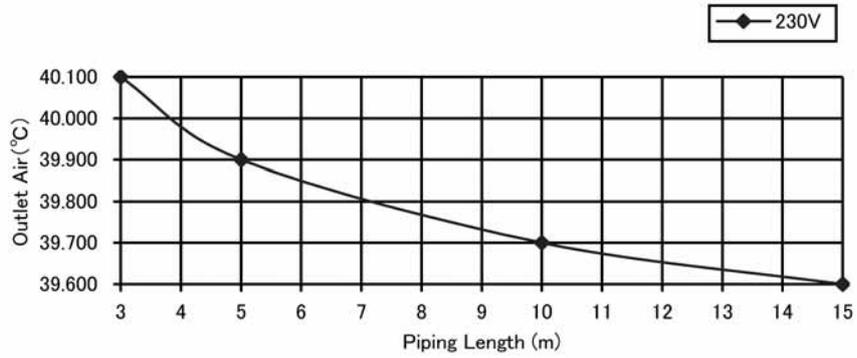
Piping Length Characteristic Heating

Condition

Room temperature: 20°C (DBT)

Outdoor temperature: 7.0°C (DBT), 6.0°C (WBT)

Fh : 49Hz



17.2 Sensible Capacity Chart

- **CS-VE9NKE CU-VE9NKE**

230V Indoor wet bulb temp.	Outdoor Temp. (°C)								
	30			35			40		
	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP
17.0°C	2.47	1.51	0.44	2.31	1.44	0.48	2.15	1.39	0.51
19.0°C				2.5		0.49			
19.5°C	2.73	1.58	0.45	2.56	1.51	0.49	2.38	1.46	0.52
22.0°C	2.98	1.63	0.46	2.78	1.57	0.49	2.59	1.51	0.53

- **CS-VE12NKE CU-VE12NKE**

230V Indoor wet bulb temp.	Outdoor Temp. (°C)								
	30			35			40		
	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP
17.0°C	3.47	2.01	0.80	3.25	1.92	0.86	3.02	1.85	0.93
19.0°C				3.5	2.0	0.88			
19.5°C	3.81	2.10	0.81	3.57	2.02	0.88	3.32	1.94	0.95
22.0°C	4.16	2.18	0.83	3.88	2.09	0.90	3.61	2.02	0.96

TC - Total Cooling Capacity (kW)

SHC - Sensible Heat Capacity (kW)

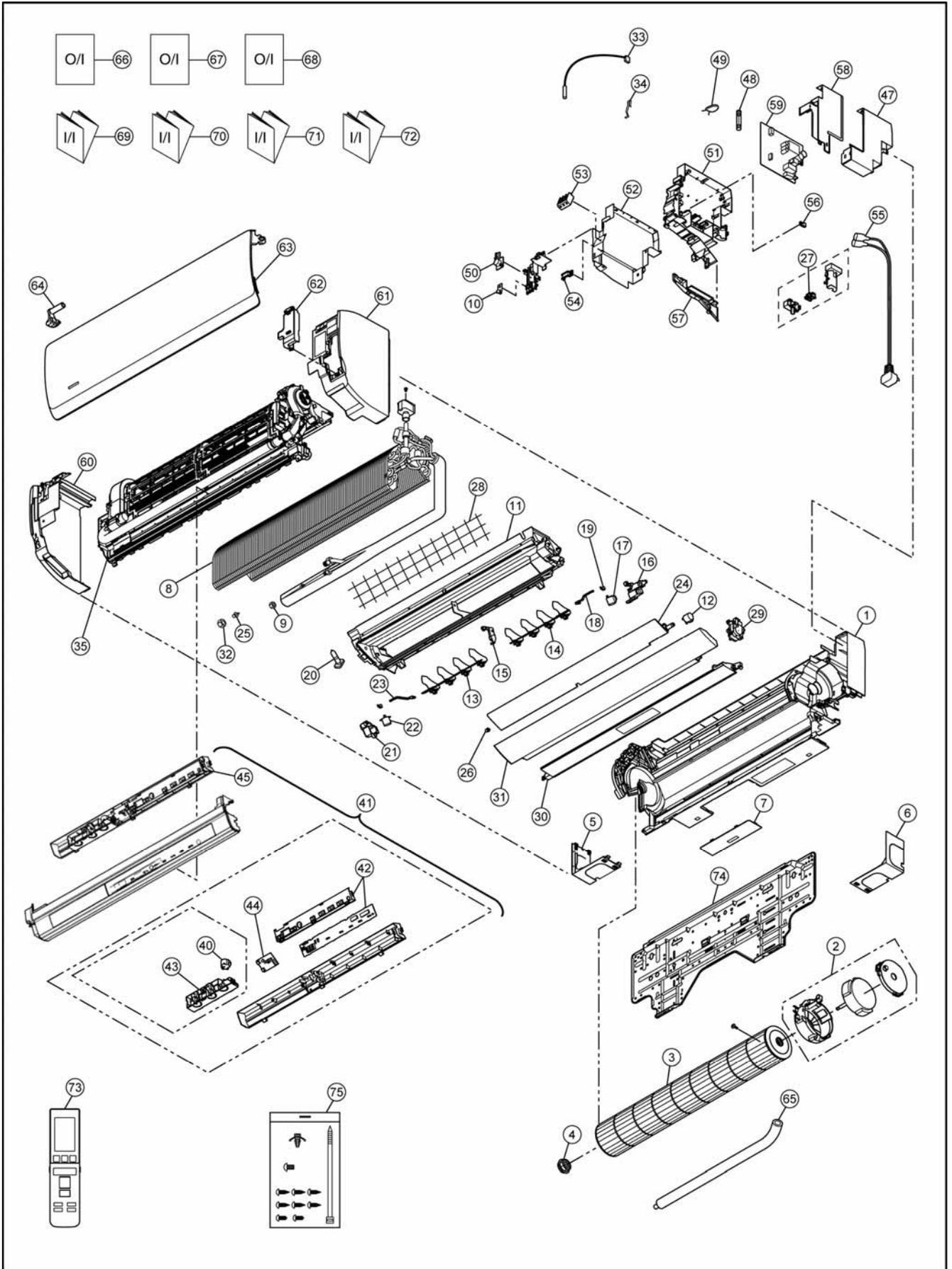
IP - Input Power

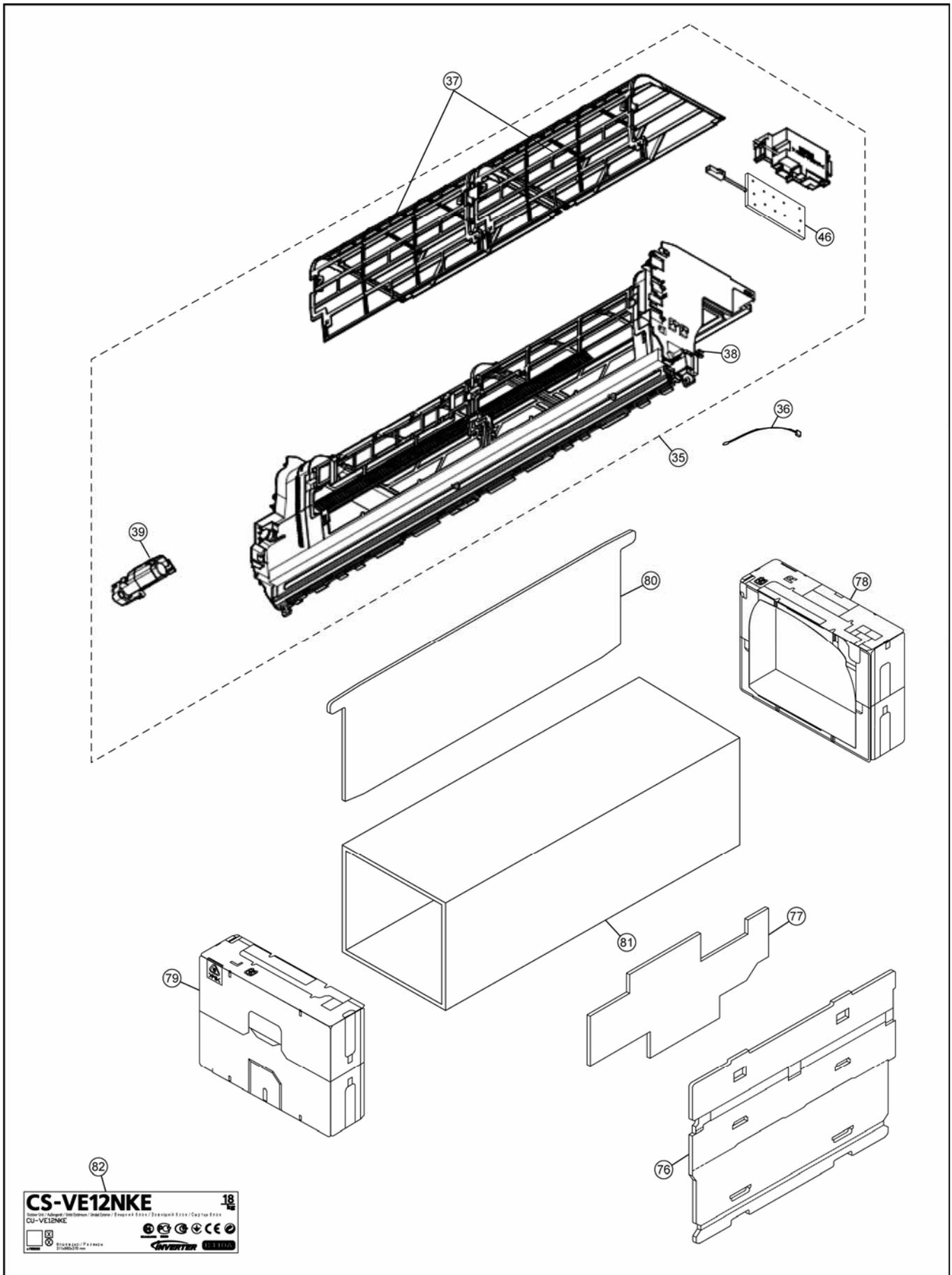
Indoor 27°C /19°C

Outdoor 35°C /24°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.

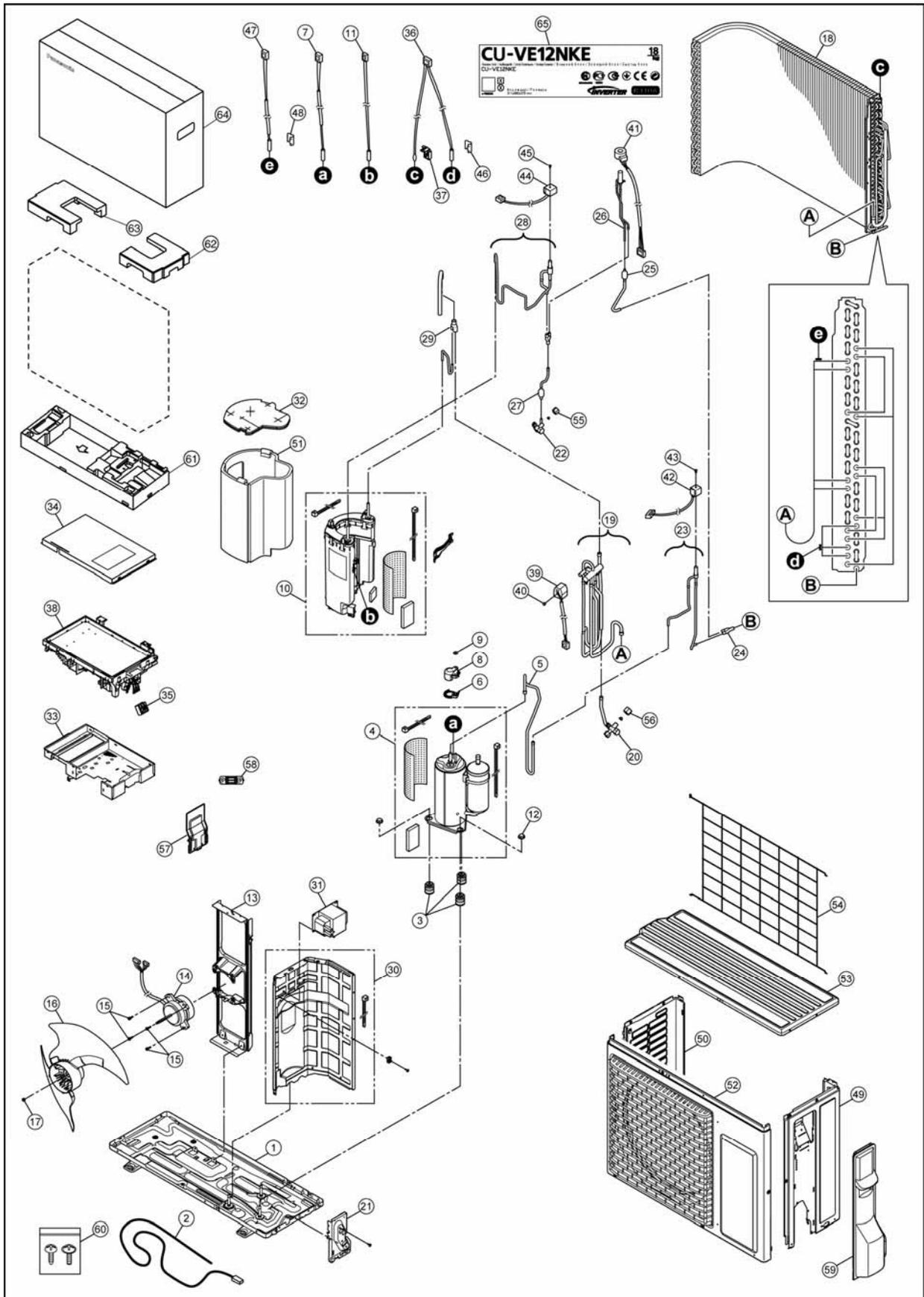
REF NO.	PART NAME & DESCRIPTION	QTY.	CS-VE9NKE	CS-VE12NKE	REMARK
1	CHASSIS	1	CWD50C1740	←	
2	MOTOR (SMALL DC)	1	ARW7714AC	←	O
3	CROSS-FLOW FAN ASS'Y	1	CWH02K1068	←	
4	BEARING ASS'Y	1	CWH64K1005	←	
5	L-SHAPED PLATE	1	CWD601212	←	
6	L-SHAPED PLATE	1	CWD601213	←	
7	PARTICULAR PLATE	1	CWD911992B	←	
8	HEAT EXCHANGER	1	CWB30C3987	←	
9	UNION NUT	1	CWT251026	←	
10	PARTICULAR PIECE	1	CWD933627	←	
11	DISCHARGE GRILLE	1	CWE20C3311	←	
12	GEARED STEPPING MOTORS	1	L6JAYYYH0030	←	
13	VANE-COMPLETE (L)	1	CWE24C1336	←	
14	VANE-COMPLETE (R)	1	CWE24C1423	←	
15	FULCRUM	1	CWH621122	←	
16	RAIN COVER	1	CWH811142	←	
17	GEARED STEPPING MOTORS	1	L6JAYYYH0031	←	O
18	LEVER ARM	1	CWH651067	←	
19	ROD	1	CWH661019	←	
20	CAP	1	CWH521096	←	
21	RAIN COVER	1	CWH811143	←	
22	GEARED STEPPING MOTORS	1	L6JAYYYH0034	←	O
23	LEVER ARM	1	CWH651068	←	
24	VANE	1	CWE241362	←	
25	CAP	1	CWH521121	←	
26	SHAFT	1	CWMH630001	←	
27	GENERATOR COMPLETE	1	CWH94C0049	←	
28	WIRE NET.RESIN NET	1	CWD041191	←	
29	GEAR-COMPLETE	1	CWH68C1073	←	
30	PARTICULAR PLATE	1	CWD91C0194	←	
31	VANE-COMPLETE	1	CWE24C1348	←	
32	UNION NUT	1	CWT251027	←	
33	SENSOR-COMPLETE	1	CWA50C2645	←	O
34	HOLDER-SENSOR	1	CWH32137	←	
35	FRAME FOR AIR FILTER	1	CWD01C1166	←	
36	SENSOR-COMPLETE	1	CWA50C2997	←	O
37	AIR FILTER	2	CWD001315	←	
38	PARTICULAR PLATE	1	CWD912160	←	
39	GEAR-COMPLETE	1	CWH68C1048	←	
40	GEARED STEPPING MOTORS	1	L6JAYYYH0017	←	O
41	SENSOR CASE	1	CWE18C1066	←	
42	ELECTRONIC CONTROL-INDICATE	1	CWA74C1093	←	O
43	SENSOR CASE	1	CWE18C1070	←	
44	ELECTRONIC CONTROL-RECEIVE	1	CWA747172	←	O
45	CONTROL PANEL	1	CWE312919	←	
46	HI-VOLT PW SUPPLY(600V MORE)	1	N0GE1F000002	←	
47	CONTROL BOARD COVER	1	CWH13C1245	←	
48	FUSE(250V,2.5A)	1	K5D252YYA053	←	
49	VARISTOR	1	ERZVEAV511	←	
50	ELECTRONIC CONTROL-AUTO	1	CWA746050	←	O
51	CONTROL BOARD	1	CWH121025	←	
52	CONTROL BOARD COVER	1	CWH131552	←	
53	TERMINAL BOARD	1	CWA28C2570	←	O
54	HOLDER-P.S. CORD	1	CWH311083	←	
55	POWER SUPPLY CORD	1	CWA20C3084	←	

REF NO.	PART NAME & DESCRIPTION	QTY.	CS-VE9NKE	CS-VE12NKE	REMARK
56	HOLDER-P.S. CORD	1	CWH311001	←	
57	PARTICULAR PIECE	1	CWD933197	←	
58	CONTROL BOARD COVER	1	CWH131370	←	
59	ELECTRONIC CONTROL-MAIN	1	CWA73C6759	CWA73C6760	O
60	FRONT GRILLE FRAME	1	CWE121212	←	
61	FRONT GRILLE FRAME	1	CWE121213	←	
62	GRILLE DOOR	1	CWE14C1100	←	
63	INTAKE GRILLE	1	CWE22C1788	←	
64	GEAR	1	CWH681032	←	
65	DRAIN HOSE	1	CWH851142	←	
66	OPE.. INST. (EN,FR,ES,DE,IT,NL)	1	CWF568728	←	
67	OPE.. INST. (BG,SE,DK,FI,NO,HR)	1	CWF568770	←	
68	OPE.. INST. (RU,UA,KZ)	1	CWF568771	←	
69	INSTAL. INST. (NO,SE,FI,DK)	1	CWF60C1732	←	
70	INSTAL. INST. (EN,ES,IT,NL)	1	CWF60C1733	←	
71	INSTAL. INST. (BG,FR,DE,HR)	1	CWF60C1734	←	
72	INSTAL. INST. (RU,UA,KZ)	1	CWF60C1735	←	
73	REMOTE CONTROL	1	CWA75C4116	←	
74	INSTALLING HOLDER	1	CWH361115	←	
75	SCREWS FOR INSTALLATION	1	CWH82C1461	←	
76	PACKAGING-C.C.BOARD	1	CWG572706	←	
77	SHOCK ABSORBER	1	CWG713379	←	
78	SHOCK ABSORBER	1	CWG70C2171	←	
79	SHOCK ABSORBER	1	CWG70C2172	←	
80	PACKAGING-C.C.BOARD	1	CWG572654	←	
81	PACKAGING-C.C.CASE	1	CWG568488	←	
82	MODEL LABEL	2	CWF858656	CWF858614	

(Note)

- All parts are supplied from ACBU, Japan (Vendor Code: 00025800).
- "O" marked parts are recommended to be kept in stock.

18.2 Outdoor 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.	DESCRIPTION & NAME	QTY.	CU-VE9NKE	CU-VE12NKE	REMARK
1	CHASSIS	1	CWD50K2229	←	
2	HEATER	1	CWA341072	←	
3	ANTI-VIBRATION BUSHING	3	CWH50077	←	
4	COMPRESSOR	1	CWB092610	←	O
5	MULTIBENT TUBE	1	CWT338949	←	
6	PARTICULAR PIECE	1	CWD933310	←	
7	SENSOR-COMPLETE	1	CWA50C2676	←	
8	TERMINAL COVER	1	CWH171053	←	
9	NUT-TERMINAL COVER	1	CWH7080300J	←	
10	HEAT CHARGER	1	CWH90C0037X	←	
11	SENSOR-COMPLETE	1	CWA50C2742XE	←	O
12	NUT	2	CWH56000J	←	
13	FAN MOTOR BRACKET	1	CWD541140	←	
14	MOTOR (SMALL DC)	1	ARS8406AC	←	O
15	SCREW	4	CWH55252J	←	
16	PROPELLER FAN ASSY	1	CWH03K1067	←	
17	NUT	1	CWH56053J	←	
18	HEAT EXCHANGER	1	CWB32C3187	←	
19	TUBE ASS'Y (4-WAYS VALVE)	1	CWT028012	←	
20	3-WAYS VALVE	1	CWB011654	←	O
21	HOLDER-COUPLING	1	CWH351180	←	
22	2-WAYS VALVE	1	CWB021540	←	O
23	TUBE ASS'Y (2-WAYS VALVE)	1	CWT028014	←	
24	MANIFOLD TUBE	1	CWT071013	←	
25	TUBE ASS'Y (STRAINER)	1	CWT028162	←	
26	TUBE ASS'Y (EXPANSION VALVE)	1	CWT027235	←	
27	TUBE ASS'Y (STRAINER)	1	CWT027224	←	
28	TUBE ASS'Y (2-WAYS VALVE)	1	CWT028175	←	
29	MANIFOLD TUBE	1	CWT071014	←	
30	SOUND-PROOF BOARD	1	CWH15C1066	←	
31	REACTOR	1	G0C392J00011	←	
32	SOUND PROOF MATERIAL	1	CWG302688	←	
33	PARTICULAR PLATE-A'SSY	1	CWD90K1059	←	
34	CONTROL BOARD COVER	1	CWH131550	←	
35	TERMINAL BOARD ASS'Y	1	CWA28K1121	←	O
36	SENSOR-COMPLETE	1	CWA50C2765	←	O
37	HOLDER-SENSOR	1	CWH321091	←	
38	ELECTRONIC CONTROL-MAIN	1	CWA73C6695R	CWA73C6696R	O
39	V-COIL 4-WAYS VALVE	1	CWA43C2400	←	
40	SCREW	1	CWH551298	←	
41	V-COIL EXPANTION VALVE	1	CWA43C2413	←	
42	V-COIL 2-WAYS VALVE	1	CWA43C2426	←	
43	SCREW	1	CWH551068J	←	
44	V-COIL 2-WAYS VALVE	1	CWA43C2471	←	
45	SCREW	1	CWH551068J	←	
46	HOLDER-SENSOR	1	CWH321048	←	
47	SENSOR-COMPLETE	1	CWA50C2746	←	O
48	HOLDER-SENSOR	1	CWH321048	←	
49	CABINET SIDE PLATE	1	CWE04C1401	←	
50	CABINET SIDE PLATE	1	CWE041673	←	
51	SOUND PROOF MATERIAL	1	CWG302588	←	
52	CABINET FRONT PLATE	1	CWE06C1436	←	
53	CABINET TOP PLATE	1	CWE031130	←	
54	WIRE NET.RESIN NET	1	CWD041143	←	
55	UNION NUT 1/4"	1	CWT251048	←	

REF. NO.	DESCRIPTION & NAME	QTY.	CU-VE9NKE	CU-VE12NKE	REMARK
56	UNION NUT 3/8"	1	CWT251049	←	
57	CONTROL BOARD COVER	1	CWH131551	←	
58	HOLDER-P.S. CORD	1	CWH311082	←	
59	CONTROL BOARD COVER	1	CWH13C1214	←	
60	SCREW	2	CWH551060J	←	
61	PACKAGING-C.C.CASE	1	CWG50C2950	←	
62	SHOCK ABSORBER	1	CWG713492	←	
63	SHOCK ABSORBER	1	CWG713493	←	
64	PACKAGING-C.C.CASE	1	CWG568489	←	
65	MODEL LABEL	4	CWF858652	CWF858653	

(Note)

- All parts are supplied from ACBU, Japan (Vendor Code: 00025800).
- "O" marked parts are recommended to be kept in stock.