DAIKIN

SiUS041111

Service Manual

Inverter Pair
Wall Mounted Type K-Series

[Applied Models]

- **Inverter Pair : Cooling Only**
- **Inverter Pair : Heat Pump**

Inverter Pair Wall Mounted Type K-Series

●Cooling Only

Indoor Unit
FTXN09KEVJU
FTXN12KEVJU
FTXN15KVJU
FTXN18KVJU
FTXN24KVJU

Outdoor Unit
RKN09KEVJU
RKN12KEVJU
RKN15KEVJU
RKN18KEVJU
RKN24KEVJU

●Heat Pump

Indoor Unit
FTXN09KEVJU
FTXN12KEVJU
FTXN15KVJU
FTXN18KVJU
FTXN24KVJU

Outdoor Unit
RXN09KEVJU
RXN12KEVJU
RXN15KEVJU
RXN18KEVJU
RXN24KEVJU

Safety Considerations

Read these ***SAFETY CONSIDERATIONS*** carefully before performing any repair work. Comply with these safety symbols without fail.

Meanings of **DANGER**, **WARNING**, **CAUTION**, and **NOTE** Symbols:

⚠ **DANGER** ..... Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ **WARNING** ..... Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ **CAUTION** ..... Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

⚠ **NOTE** ..... Indicates situations that may result in equipment or property-damage accidents only.

0.1 Safety Considerations for Repair

- **If refrigerant gas leaks during repair or service, ventilate the area immediately. Refrigerant gas may produce toxic gas if it comes into contact with flames. Refrigerant gas is heavier than air and replaces oxygen. In the event of an accident, a massive leak could lead to oxygen depletion, especially in basements, and an asphyxiation hazard could occur leading to serious injury or death.**
- **Do not start or stop the air conditioner or heat pump operation by plugging or unplugging the power cable plug if a plug is used. Plugging or unplugging the power cable plug to operate the equipment may cause an electrical shock or fire.**
- **Use parts listed in the service parts list and appropriate tools to conduct repair work. The use of inappropriate parts or tools may cause an electrical shock or fire.**
- **Disconnect power before disassembling the equipment for repairs. Working on the equipment that is connected to the power supply may cause an electric shock. If it is necessary to supply power to the equipment to conduct repairs or to inspect the circuits, do not touch any electrically charged sections of the equipment.**
- **The step-up capacitor supplies high-voltage electricity to the electrical components of the outdoor unit. Discharge the capacitor completely before conducting repair work. A charged capacitor may cause an electrical shock.**
- **If refrigerant gas is discharged during repair work, do not touch the discharged refrigerant gas. The refrigerant gas may cause frostbite.**
- **Use only pipes, flare nuts, tools, and other materials designed specifically for R410A refrigerant systems. Never use tools or materials designed for R22 refrigerant systems on an R410A refrigerant system. Doing so can cause a serious accident or an equipment failure.**
- **Check to see if the parts and wires are mounted and connected properly, and if the connections at the soldered or crimped terminals are secure. Improper installation and connections may cause excessive heat generation, fire, or electrical shock.**
- **Prior to disconnecting the suction or discharge pipe from the compressor at the welded section, pump-down the refrigerant gas completely in a well-ventilated place first. If there is refrigerant gas or oil remaining inside the compressor, the refrigerant gas or oil can discharge when the pipe is being disconnected and it may cause an injury.**
- **Wear a safety helmet, gloves, and a safety belt when working at an elevated height of more than 6.5 ft (2 m). Insufficient safety measures may cause a fall resulting in injury.**
- **Do not mix air or gas other than the specified refrigerant R410A to the refrigerant system. If air enters the refrigerant systems, it can cause an excessive high pressure resulting in equipment damage and injury.**
- **When relocating the equipment, check if the new installation site has sufficient strength to withstand the weight of the equipment. If the installation site does not have sufficient strength and the equipment is not properly secured, the equipment may fall and cause injury.**
- **Securely fasten the outside unit terminal cover (panel). If the terminal cover/panel is not fastened properly, dust or water may enter the outside unit causing fire or electric shock.**
- **When relocating the system, keep the refrigerant circuit free from substances other than the specified refrigerant (R-410A) such as air. Any presence of air or other foreign substance in the refrigerant circuit can cause an abnormal pressure rise or rupture, resulting in injury.**
- **If refrigerant gas leaks, locate the leaking point and repair it before charging refrigerant. After charging refrigerant, check for refrigerant leaks. If the leaking point cannot be located and the repair work must be stopped, perform a pump-down and close the service valve to prevent the refrigerant gas from leaking into the room. The refrigerant gas itself is harmless, but it may generate toxic gases if it comes into contact with flames.**

- **Do not repair the electrical components with wet hands. Working on the equipment with wet hands may cause an electrical shock.**
- **Do not clean the air conditioner or heat pump by splashing water on it. Washing the unit with water may cause an electrical shock.**
- **Turn off the power when cleaning the equipment to prevent internal fans that rotate at high speed from starting suddenly as they can cause injury.**
- **Let the refrigerant lines cool down before performing any repair work. Working on the unit when the refrigerant lines are hot may cause burns.**
- **All welding and cutting operations must be done in a well-ventilated place to prevent the accumulation of toxic fumes or possibly oxygen deficiency to occur.**
- **Check the grounding before repairing equipment in a humid or wet place to avoid electrical shocks. Improper grounding may cause an electrical shock.**
- **Measure the insulation resistance after the repair. The resistance must be 1MΩ or higher. Faulty insulation may cause an electrical shock.**
- **Check the drainage of the indoor unit after finishing repair work. Faulty drainage may cause water to enter the room resulting in wet floors and furniture.**
- **Do not tilt the unit when removing it. The water inside the unit may spill resulting in wet floors and furniture.**
- **Dismantling of the unit, disposal of the refrigerant, oil, and additional parts, should be done in accordance with the relevant local, state, and national regulations.**

0.2 Safety Considerations for Users

- **Never attempt to modify the equipment. Doing so can cause electrical shock, excessive heat generation, or fire.**
- **If the power cable and lead wires have scratches or have become deteriorated, have them replaced. Damaged cable and wires may cause an electrical shock or fire.**
- **Do not use a joined power cable or an extension cord, or share the same power outlet with other electrical appliances as it may cause an electrical shock or fire.**
- **Use an exclusive power circuit for the equipment. Insufficient circuit amperage capacity may cause an electrical shock or fire.**
- **Do not damage or modify the power cable. Damaged or modified power cables may cause an electrical shock or fire. Placing heavy items on the power cable or pulling the power cable may damage the cable.**
- **Check the unit foundation for damage on a continual basis, especially if it has been in use for a long time. If left in a damaged condition, the unit may fall and cause injury. If the installation platform or frame has corroded, have it replaced. A corroded platform or frame may cause the unit to fall resulting in injury.**
- **If the unit has a power cable plug and it is dirty, clean the plug before securely inserting it into a power outlet. If the plug has a loose connection, tighten it or it may cause electrical shock or fire.**
- **After replacing the battery in the remote controller, dispose of the old battery to prevent children from swallowing it. If a child swallows the battery, see a doctor immediately.**
- **Never remove the fan guard of the unit. A fan rotating at high speed without the fan guard is very dangerous.**
- **Before cleaning the unit, stop the operation of the unit by turning the power off or by pulling the power cable plug out from its receptacle. Otherwise an electrical shock or injury may result.**
- **Do not wipe the controller operation panel with benzene, thinner, chemical dust cloth, etc. The panel may get discolored or the coating can peel off. If it is extremely dirty, soak a cloth in a water-diluted neutral detergent, squeeze it well, and wipe the panel clean. Then wipe it with another dry cloth.**

Part 1
List of Functions

1. Functions

Category	Functions	FTXN09/12KEVJU RKN09/12KEVJU	FTXN09/12KEVJU RXN09/12KEVJU	Category	Functions	FTXN09/12KEVJU RKN09/12KEVJU	FTXN09/12KEVJU RXN09/12KEVJU
Basic Function	Inverter (with Inverter Power Control)	●	●	Health & Clean	Air-Purifying Filter	—	—
	Operation Limit for Cooling (°FDB)	50 ~ 114.8	50 ~ 114.8		Photocatalytic Deodorizing Filter	—	—
	Operation Limit for Heating (°FWB)	—	5 ~ 64.4		Air-Purifying Filter with Photocatalytic Deodorizing Function	—	—
	PAM Control	●	●		Titanium Apatite Photocatalytic Air-Purifying Filter	●	●
	Standby Electricity Saving	●	●				
Compressor	Oval Scroll Compressor	—	—		Air Filter (Prefilter)	●	●
	Swing Compressor	●	●		Wipe-Clean Flat Panel	●	●
	Rotary Compressor	—	—		Washable Grille	—	—
	Reluctance DC Motor	●	●		MOLD PROOF Operation	—	—
Comfortable Airflow	Power-Airflow Louver (Horizontal Blade)	●	●		Good-Sleep Cooling Operation	—	—
	Power-Airflow Dual Louvers	—	—	Timer	WEEKLY TIMER	—	—
	Power-Airflow Diffuser	—	—		24-Hour ON/OFF TIMER	●	●
	Wide-Angle Fins (Vertical Blades)	●	●		NIGHT SET Mode	●	●
	Vertical Auto-Swing (Up and Down)	●	●	Worry Free “Reliability & Durability”	Auto-Restart (after Power Failure)	●	●
	Horizontal Auto-Swing (Right and Left)	—	—		Self-Diagnosis (Digital, LED) Display	●	●
	3-D Airflow	—	—		Wiring Error Check Function	—	—
	COMFORT AIRFLOW Operation	●	●		Anti-Corrosion Treatment of Outdoor Heat Exchanger	●	●
Comfort Control	Auto Fan Speed	●	●	Flexibility	Multi-Split / Split Type Compatible Indoor Unit	—	—
	Indoor Unit Quiet Operation	●	●				
	NIGHT QUIET Mode (Automatic)	—	—		H/P, C/O Compatible Indoor Unit	●	●
	Outdoor Unit Quiet Operation (Manual)	—	—		Flexible Power Supply Correspondence	—	—
	INTELLIGENT EYE Operation	—	—		Chargeless	32.8 ft	32.8 ft
	Quick Warming Function (Preheating Operation)	—	●		Either Side Drain (Right or Left)	●	●
	Hot-Start Function	—	●		Power Selection	—	—
	Automatic Defrosting	—	●		Low Temperature Cooling Operation (–15°C) (5°F)	●	●
Operation	Automatic Operation	—	●				
	Program Dry Function	●	●		°F/°C Changeover R/C Temperature Display (factory setting : °F)	●	●
	Fan Only	●	●	Remote Control	5-Room Centralized Controller (Option)	●	●
Lifestyle Convenience	New POWERFUL Operation (Non-Inverter)	—	—		Remote Control Adaptor (Normal Open-Pulse Contact) (Option)	●	●
	Inverter POWERFUL Operation	●	●		Remote Control Adaptor (Normal Open Contact) (Option)	●	●
	Priority-Room Setting	—	—				
	COOL / HEAT Mode Lock	—	—		DIII-NET Compatible (Adaptor) (Option)	●	●
	HOME LEAVE Operation	—	—	Remote Controller	Wireless	●	●
	ECONO Operation	●	●		Wired (Option)	●	●
	Indoor Unit ON/OFF Button	●	●				
	Signal Receiving Sign	●	●				
	R/C with Back Light	●	●				
	Temperature Display	—	—				

Note: ● : Holding Functions
— : No Functions

Category	Functions	FTXN15/18/24KVJU RKN15/18/24KEVJU	FTXN15/18/24KVJU RXN15/18/24KEVJU	Category	Functions	FTXN15/18/24KVJU RKN15/18/24KEVJU	FTXN15/18/24KVJU RXN15/18/24KEVJU
Basic Function	Inverter (with Inverter Power Control)	●	●	Health & Clean	Air-Purifying Filter	—	—
	Operation Limit for Cooling (°FDB)	50 ~ 114.8	50 ~ 114.8		Photocatalytic Deodorizing Filter	—	—
	Operation Limit for Heating (°FWB)	—	5 ~ 64.4		Air-Purifying Filter with Photocatalytic Deodorizing Function	—	—
	PAM Control	●	●		Titanium Apatite Photocatalytic Air-Purifying Filter	●	●
	Standby Electricity Saving	—	—				
Compressor	Oval Scroll Compressor	—	—		Air Filter (Prefilter)	●	●
	Swing Compressor	●	●		Wipe-Clean Flat Panel	●	●
	Rotary Compressor	—	—		Washable Grille	—	—
	Reluctance DC Motor	●	●		MOLD PROOF Operation	—	—
Comfortable Airflow	Power-Airflow Louver (Horizontal Blade)	—	—		Good-Sleep Cooling Operation	—	—
	Power-Airflow Dual Louvers	●	●				
	Power-Airflow Diffuser	—	—	Timer	WEEKLY TIMER	—	—
	Wide-Angle Fins (Vertical Blades)	●	●		24-Hour ON/OFF TIMER	●	●
	Vertical Auto-Swing (Up and Down)	●	●		NIGHT SET Mode	●	●
	Horizontal Auto-Swing (Right and Left)	—	—	Worry Free “Reliability & Durability”	Auto-Restart (after Power Failure)	●	●
	3-D Airflow	—	—		Self-Diagnosis (Digital, LED) Display	●	●
	COMFORT AIRFLOW Operation	—	—		Wiring Error Check Function	—	—
Comfort Control	Auto Fan Speed	●	●		Anticorrosion Treatment of Outdoor Heat Exchanger	●	●
	Indoor Unit Quiet Operation	●	●	Flexibility	Multi-Split / Split Type Compatible Indoor Unit	—	—
	NIGHT QUIET Mode (Automatic)	—	—		H/P, C/O Compatible Indoor Unit	●	●
	Outdoor Unit Quiet Operation (Manual)	—	—		Flexible Power Supply Correspondence	—	—
	INTELLIGENT EYE Operation	—	—		Chargeless	32.8 ft	32.8 ft
	Quick Warming Function (Preheating Operation)	—	●		Either Side Drain (Right or Left)	●	●
	Hot-Start Function	—	●		Power Selection	—	—
	Automatic Defrosting	—	●		Low Temperature Cooling Operation (–15°C) (5°F)	●	●
Operation	Automatic Operation	—	●		°F/°C Changeover R/C Temperature Display (factory setting : °F)	●	●
	Program Dry Function	●	●	Remote Control	5-Room Centralized Controller (Option)	●	●
	Fan Only	●	●		Remote Control Adaptor (Normal Open-Pulse Contact) (Option)	●	●
Lifestyle Convenience	New POWERFUL Operation (Non-Inverter)	—	—		Remote Control Adaptor (Normal Open Contact) (Option)	●	●
	Inverter POWERFUL Operation	●	●		DIII-NET Compatible (Adaptor) (Option)	●	●
	Priority-Room Setting	—	—	Remote Controller	Wireless	●	●
	COOL / HEAT Mode Lock	—	—		Wired (Option)	●	●
	HOME LEAVE Operation	—	—				
	ECONO Operation	—	—				
	Indoor Unit ON/OFF Button	●	●				
	Signal Receiving Sign	●	●				
	R/C with Back Light	●	●				
	Temperature Display	—	—				

Note: ● : Holding Functions
— : No Functions

Part 2
Specifications

1. Specifications

1.1 Cooling Only

60 Hz, 208 - 230 V

Model	Indoor Unit		FTXN09KEVJU	FTXN12KEVJU
	Outdoor Unit		RKN09KEVJU	RKN12KEVJU
Capacity Rated (Min. ~ Max.)		kW	2.64 (1.30 ~ 2.78)	3.52 (1.3 ~ 3.52)
		Btu/h	9,000 (4,400 ~ 9,500)	12,000 (4,400 ~ 12,000)
		kcal/h	2,270 (1,120 ~ 2,390)	3,030 (1,120 ~ 3,030)
Running Current (Rated)		A	4.4 - 4.0	6.2 - 5.6
Power Consumption Rated (Min. ~ Max.)		W	750 (330 ~ 800)	1,210 (330 ~ 1,210)
Power Factor		%	81.9 - 81.5	93.8 - 93.9
EER (Rated) (Min. ~ Max.)		Btu/h-W	12.0 (13.33 ~ 11.90)	9.90 (13.33 ~ 9.90)
COP (Rated) (Min. ~ Max.)		W/W	3.52 (3.94 ~ 3.48)	2.90 (3.94 ~ 2.90)
Piping Connections	Liquid	inch (mm)	ϕ 1/4 (6.4)	ϕ 1/4 (6.4)
	Gas	inch (mm)	ϕ 3/8 (9.5)	ϕ 3/8 (9.5)
	Drain	inch (mm)	ϕ 5/8 (16.0)	ϕ 5/8 (16.0)
Heat Insulation			Both Liquid and Gas Pipes	Both Liquid and Gas Pipes
Max. Interunit Piping Length		feet (m)	65.6 (20)	65.6 (20)
Max. Interunit Height Difference		feet (m)	49.2 (15)	49.2 (15)
Chargeless		feet (m)	32.8 (10)	32.8 (10)
Amount of Additional Charge of Refrigerant		oz/ft (g/m)	0.22 (20)	0.22 (20)
Indoor Unit			**FTXN09KEVJU**	**FTXN12KEVJU**
Front Panel Color			White	White
Airflow Rate	H	cfm (m^3/min)	325 (9.2)	328 (9.3)
	M		244 (6.9)	254 (7.2)
	L		162 (4.6)	184 (5.2)
	SL		138 (3.9)	152 (4.3)
Fan	Type		Cross Flow Fan	Cross Flow Fan
	Motor Output	W	16	16
	Speed	Steps	5 Steps, Quiet, Auto	5 Steps, Quiet, Auto
Air Direction Control			Right, Left, Horizontal, Downward	Right, Left, Horizontal, Downward
Air Filter			Removable / Washable / Mildew Proof	Removable / Washable / Mildew Proof
Running Current (Rated)		A	0.20 - 0.18	0.20 - 0.18
Power Consumption (Rated)		W	40	40
Power Factor		%	96.2 - 96.6	96.2 - 96.6
Temperature Control			Microcomputer Control	Microcomputer Control
Dimensions (H × W × D)		inch (mm)	11-9/64 × 30-5/16 × 7-51/64 (283 × 770 × 198)	11-9/64 × 30-5/16 × 7-51/64 (283 × 770 × 198)
Packaged Dimensions (H × W × D)		inch (mm)	10-17/64 × 33-7/32 × 13-15/32 (261 × 844 × 342)	10-17/64 × 33-7/32 × 13-15/32 (261 × 844 × 342)
Weight		Lbs (kg)	16 (7)	16 (7)
Gross Weight		Lbs (kg)	24 (11)	24 (11)
Operation Sound	H / M / L / SL	dB(A)	40 / 33 / 26 / 22	42 / 34 / 27 / 23
Sound Power		dB(A)	56	58
Outdoor Unit			**RKN09KEVJU**	**RKN12KEVJU**
Casing Color			Ivory White	Ivory White
Compressor	Type		Hermetically Sealed Swing Type	Hermetically Sealed Swing Type
	Model		1YC23AEXD	1YC23AEXD
	Motor Output	W	750	750
Refrigerant Oil	Type		FVC50K	FVC50K
	Charge	oz (L)	12.5 (0.375)	12.5 (0.375)
Refrigerant	Type		R-410A	R-410A
	Charge	Lbs (kg)	2.20 (1.0)	2.20 (1.0)
Airflow Rate	H	cfm (m^3/min)	921 (26.1)	921 (26.1)
Fan	Type		Propeller	Propeller
	Motor Output	W	33	33
Running Current (Rated)		A	4.20 - 3.82	6.00 - 5.42
Power Consumption (Rated)		W	710	1,170
Power Factor		%	81.3 - 80.8	93.8 - 93.9
Starting Current		A	5.0	6.2
Dimensions (H × W × D)		inch (mm)	21-21/32 × 25-29/32 × 10-13/16 (550 × 658 × 275)	21-21/32 × 25-29/32 × 10-13/16 (550 × 658 × 275)
Packaged Dimensions (H × W × D)		inch (mm)	23-5/16 × 30-23/64 × 13-45/64 (592 × 771 × 348)	23-5/16 × 30-23/64 × 13-45/64 (592 × 771 × 348)
Weight		Lbs (kg)	66 (30)	66 (30)
Gross Weight		Lbs (kg)	76 (34)	76 (34)
Operation Sound		dB(A)	48	50
Sound Power		dB(A)	62	64
Drawing No.			3D072555	3D072556

Note: ■ The data are based on the conditions shown in the table below.

Cooling	Piping Length
Indoor ; 80°FDB (27°CDB) 67°FWB (19.4°CWB) Outdoor ; 95°FDB (35°CDB) 75°FWB (24°CWB)	25 ft (7.5 m)

Conversion Formulae
kcal/h = kW × 860 Btu/h = kW × 3412 cfm = m^3/min × 35.3

60 Hz, 208 - 230 V

Model	Indoor Unit			FTXN15KVJU	FTXN18KVJU
	Outdoor Unit			RKN15KEVJU	RKN18KEVJU
Capacity Rated (Min. ~ Max.)			kW	4.4 (1.7 ~ 4.4)	5.28 (1.7 ~ 5.28)
			Btu/h	15,000 (5,800 ~ 15,000)	18,000 (5,800 ~ 18,000)
			kcal/h	3,780 (1,460 ~ 3,780)	4,540 (1,460 ~ 4,540)
Moisture Removal			L/h	2.9	3.9
Running Current (Rated)			A	6.11 - 5.53	7.33 - 6.63
Power Consumption Rated (Min. ~ Max.)			W	1,250 (280 ~ 1,250)	1,500 (300 ~ 1,500)
Power Factor			%	98.4 - 98.3	98.4 - 98.4
EER (Rated) (Min. ~ Max.)			Btu/h-W	12.0	12.0
COP (Rated) (Min. ~ Max.)			W/W	3.52 (6.07 ~ 3.52)	3.52 (5.67 ~ 3.52)
Piping Connections	Liquid		inch (mm)	ϕ 1/4 (6.4)	ϕ 1/4 (6.4)
	Gas		inch (mm)	ϕ 1/2 (12.7)	ϕ 1/2 (12.7)
	Drain	Indoor Unit	inch (mm)	I.D. ϕ 9/16 (14.0), O.D. ϕ 11/16 (18.0)	I.D. ϕ 9/16 (14.0), O.D. ϕ 11/16 (18.0)
		Outdoor Unit		I.D. ϕ 11/16 (18.0) (Hole)	I.D. ϕ 11/16 (18.0) (Hole)
Heat Insulation				Both Liquid and Gas Pipes	Both Liquid and Gas Pipes
Max. Interunit Piping Length			feet (m)	98.4 (30)	98.4 (30)
Max. Interunit Height Difference			feet (m)	65.6 (20)	65.6 (20)
Chargeless			feet (m)	32.8 (10)	32.8 (10)
Amount of Additional Charge of Refrigerant			oz/ft (g/m)	0.21 (20)	0.21 (20)
Indoor Unit				**FTXN15KVJU**	**FTXN18KVJU**
Front Panel Color				White	White
Airflow Rate	H		cfm (m^3/min)	519 (14.7)	572 (16.2)
	M			438 (12.4)	480 (13.6)
	L			364 (10.3)	403 (11.4)
	SL			335 (9.5)	360 (10.2)
Fan	Type			Cross Flow Fan	Cross Flow Fan
	Motor Output		W	43	43
	Speed		Steps	5 Steps, Quiet, Auto	5 Steps, Quiet, Auto
Air Direction Control				Right, Left, Horizontal, Downward	Right, Left, Horizontal, Downward
Air Filter				Removable / Washable / Mildew Proof	Removable / Washable / Mildew Proof
Running Current (Rated)			A	0.17 - 0.15	0.17 - 0.15
Power Consumption (Rated)			W	34 - 34	34 - 34
Power Factor			%	96.2 - 98.6	96.2 - 98.6
Temperature Control				Microcomputer Control	Microcomputer Control
Dimensions (H × W × D)			inch (mm)	11-7/16 × 41-5/16 × 9-3/8 (290 × 1,050 × 238)	11-7/16 × 41-5/16 × 9-3/8 (290 × 1,050 × 238)
Packaged Dimensions (H × W × D)			inch (mm)	13-9/32 × 45-5/32 × 14-13/32 (337 × 1,147 × 366)	13-9/32 × 45-5/32 × 14-13/32 (337 × 1,147 × 366)
Weight			Lbs (kg)	26.5 (12)	26.5 (12)
Gross Weight			Lbs (kg)	38.0 (17)	38.0 (17)
Operation Sound	H / M / L / SL		dB(A)	45 / 41 / 36 / 33	45 / 41 / 36 / 33
Sound Power			dB(A)	61	61
Outdoor Unit				**RKN15KEVJU**	**RKN18KEVJU**
Casing Color				Ivory White	Ivory White
Compressor	Type			Hermetically Sealed Swing Type	Hermetically Sealed Swing Type
	Model			2YC36BXD	2YC36BXD
	Motor Output		W	1,100	1,100
Refrigerant Oil	Type			FVC50K	FVC50K
	Charge		oz (L)	22.1 (0.65)	22.1 (0.65)
Refrigerant	Type			R-410A	R-410A
	Charge		Lbs (kg)	3.2 (1.45)	3.2 (1.45)
Airflow Rate	H		cfm (m^3/min)	1,472 (41.7)	1,667 (47.2)
Fan	Type			Propeller	Propeller
	Motor Output		W	60	60
Running Current (Rated)			A	5.94 - 5.38	7.16 - 6.48
Power Consumption (Rated)			W	1,216 - 1,216	1,466 - 1,466
Power Factor			%	98.4 - 98.3	98.4 - 98.4
Starting Current			A	6.11	7.33
Dimensions (H × W × D)			inch (mm)	23-7/16 × 31-5/16 × 11-13/16 (595 × 795 × 300)	23-7/16 × 31-5/16 × 11-13/16 (595 × 795 × 300)
Packaged Dimensions (H × W × D)			inch (mm)	25-3/4 × 37-3/32 × 15-3/4 (654 × 942 × 400)	25-3/4 × 37-3/32 × 15-3/4 (654 × 942 × 400)
Weight			Lbs (kg)	93 (42)	93 (42)
Gross Weight			Lbs (kg)	100 (45)	100 (45)
Operation Sound	H		dB(A)	51	53
Sound Power	H		dB(A)	65	67
Drawing No.				3D071519D	3D071520C

Note: ■ The data are based on the conditions shown in the table below.

Cooling	Piping Length
Indoor ; 80°FDB (27°CDB) 67°FWB (19.4°CWB) Outdoor ; 95°FDB (35°CDB) 75°FWB (24°CWB)	25 ft (7.5 m)

Conversion Formulae
kcal/h = kW × 860 Btu/h = kW × 3412 cfm = m^3/min × 35.3

60 Hz, 208 - 230 V

Model	Indoor Unit			FTXN24KVJU
	Outdoor Unit			RKN24KEVJU
Capacity Rated (Min. ~ Max.)			kW	6.45 (1.7 ~ 6.45)
			Btu/h	22,000 (5,800 ~ 22,000)
			kcal/h	5,550 (1,460 ~ 5,550)
Moisture Removal			L/h	4.5
Running Current (Rated)			A	12.51 - 11.32
Power Consumption Rated (Min. ~ Max.)			W	2,560 (300 ~ 2,560)
Power Factor			%	98.4 - 98.3
EER (Rated) (Min. ~ Max.)			Btu/h-W	8.6
COP (Rated) (Min. ~ Max.)			W/W	2.52 (5.67 ~ 2.52)
Piping Connections	Liquid		inch (mm)	ϕ 1/4 (6.4)
	Gas		inch (mm)	ϕ 1/2 (12.7)
	Drain	Indoor Unit	inch (mm)	I.D. ϕ 9/16 (14.0), O.D. ϕ 11/16 (18.0)
		Outdoor Unit		I.D. ϕ 11/16 (18.0) (Hole)
Heat Insulation				Both Liquid and Gas Pipes
Max. Interunit Piping Length			feet (m)	98.4 (30)
Max. Interunit Height Difference			feet (m)	65.6 (20)
Chargeless			feet (m)	32.8 (10)
Amount of Additional Charge of Refrigerant			oz/ft (g/m)	0.21 (20)
Indoor Unit				**FTXN24KVJU**
Front Panel Color				White
Airflow Rate	H		cfm (m^3/min)	572 (16.2)
	M			480 (13.6)
	L			403 (11.4)
	SL			360 (10.2)
Fan	Type			Cross Flow Fan
	Motor Output		W	43
	Speed		Steps	5 Steps, Quiet, Auto
Air Direction Control				Right, Left, Horizontal, Downward
Air Filter				Removable / Washable / Mildew Proof
Running Current (Rated)			A	0.17 - 0.15
Power Consumption (Rated)			W	34 - 34
Power Factor			%	96.2 - 98.6
Temperature Control				Microcomputer Control
Dimensions (H × W × D)			inch (mm)	11-7/16 × 41-5/16 × 9-3/8 (290 × 1,050 × 238)
Packaged Dimensions (H × W × D)			inch (mm)	13-9/32 × 45-5/32 × 14-13/32 (337 × 1,147 × 366)
Weight			Lbs (kg)	26.5 (12)
Gross Weight			Lbs (kg)	38.0 (17)
Operation Sound	H / M / L / SL		dB(A)	46 / 42 / 37 / 34
Sound Power			dB(A)	62
Outdoor Unit				**RKN24KEVJU**
Casing Color				Ivory White
Compressor	Type			Hermetically Sealed Swing Type
	Model			2YC36BXD
	Motor Output		W	1,100
Refrigerant Oil	Type			FVC50K
	Charge		oz (L)	22.1 (0.65)
Refrigerant	Type			R-410A
	Charge		Lbs (kg)	3.2 (1.45)
Airflow Rate	H		cfm (m^3/min)	1,667 (47.2)
Fan	Type			Propeller
	Motor Output		W	60
Running Current (Rated)			A	12.34 - 11.17
Power Consumption (Rated)			W	2,526 - 2,526
Power Factor			%	98.4 - 98.3
Starting Current			A	12.51
Dimensions (H × W × D)			inch (mm)	23-7/16 × 31-5/16 × 11-13/16 (595 × 795 × 300)
Packaged Dimensions (H × W × D)			inch (mm)	25-3/4 × 37-3/32 × 15-3/4 (654 × 942 × 400)
Weight			Lbs (kg)	93 (42)
Gross Weight			Lbs (kg)	100 (45)
Operation Sound	H		dB(A)	54
Sound Power	H		dB(A)	68
Drawing No.				3D071521C

Note: ■ The data are based on the conditions shown in the table below.

Cooling	Piping Length
Indoor ; 80°FDB (27°CDB) 67°FWB (19.4°CWB) Outdoor ; 95°FDB (35°CDB) 75°FWB (24°CWB)	25 ft (7.5 m)

Conversion Formulae
kcal/h = kW × 860 Btu/h = kW × 3412 cfm = m^3/min × 35.3

1.2 Heat Pump

60 Hz, 208 - 230 V

Model	Indoor Unit		FTXN09KEVJU		FTXN12KEVJU	
	Outdoor Unit		RXN09KEVJU		RXN12KEVJU	
			Cooling	Heating	Cooling	Heating
Capacity Rated (Min. ~ Max.)		kW	2.64 (1.30 ~ 2.78)	2.93 (1.3 ~ 3.4)	3.52 (1.3 ~ 3.52)	3.96 (1.3 ~ 4.8)
		Btu/h	9,000 (4,400 ~ 9,500)	10,000 (4,400 ~ 11,600)	12,000 (4,400 ~ 12,000)	13,500 (4,400 ~ 16,400)
		kcal/h	2,270 (1,120 ~ 2,390)	2,520 (1,120 ~ 2,920)	3,030 (1,120 ~ 3,030)	3,410 (1,120 ~ 4,130)
Running Current (Rated)		A	4.4 - 4.0	5.0 - 4.5	6.2 - 5.6	6.3 - 5.7
Power Consumption Rated (Min. ~ Max.)		W	750 (330 ~ 800)	840 (310 ~ 910)	1,210 (330 ~ 1,210)	1,220 (310 ~ 1,500)
Power Factor		%	81.9 - 81.5	80.8 - 81.2	93.8 - 93.9	93.1 - 93.1
EER (Rated) (Min. ~ Max.)		Btu/h-W	12.0 (13.33 ~ 11.90)	11.9 (14.19 ~ 12.75)	9.90 (13.33 ~ 9.90)	11.10 (14.19 ~ 10.90)
COP (Rated) (Min. ~ Max.)		W/W	3.52 (3.94 ~ 3.48)	3.49 (4.19 ~ 3.74)	2.90 (3.94 ~ 2.90)	3.25 (4.19 ~ 3.20)
Piping Connections	Liquid	inch (mm)	ϕ 1/4 (6.4)		ϕ 1/4 (6.4)	
	Gas	inch (mm)	ϕ 3/8 (9.5)		ϕ 3/8 (9.5)	
	Drain	inch (mm)	ϕ 5/8 (16.0)		ϕ 5/8 (16.0)	
Heat Insulation			Both Liquid and Gas Pipes		Both Liquid and Gas Pipes	
Max. Interunit Piping Length		feet (m)	65.6 (20)		65.6 (20)	
Max. Interunit Height Difference		feet (m)	49.2 (15)		49.2 (15)	
Chargeless		feet (m)	32.8 (10)		32.8 (10)	
Amount of Additional Charge of Refrigerant		oz/ft (g/m)	0.22 (20)		0.22 (20)	
Indoor Unit			**FTXN09KEVJU**		**FTXN12KEVJU**	
Front Panel Color			White		White	
Airflow Rate	H	cfm (m^3/min)	325 (9.2)	342 (9.7)	328 (9.3)	357 (10.1)
	M		244 (6.9)	275 (7.8)	254 (7.2)	293 (8.3)
	L		162 (4.6)	212 (6.0)	184 (5.2)	226 (6.4)
	SL		138 (3.9)	187 (5.3)	152 (4.3)	201 (5.7)
Fan	Type		Cross Flow Fan		Cross Flow Fan	
	Motor Output	W	16		16	
	Speed	Steps	5 Steps, Quiet, Auto		5 Steps, Quiet, Auto	
Air Direction Control			Right, Left, Horizontal, Downward		Right, Left, Horizontal, Downward	
Air Filter			Removable / Washable / Mildew Proof		Removable / Washable / Mildew Proof	
Running Current (Rated)		A	0.20 - 0.18		0.20 - 0.18	
Power Consumption (Rated)		W	40		40	
Power Factor		%	96.2 - 96.6		96.2 - 96.6	
Temperature Control			Microcomputer Control		Microcomputer Control	
Dimensions (H × W × D)		inch (mm)	11-9/64 × 30-5/16 × 7-51/64 (283 × 770 × 198)		11-9/64 × 30-5/16 × 7-51/64 (283 × 770 × 198)	
Packaged Dimensions (H × W × D)		inch (mm)	10-17/64 × 33-7/32 × 13-15/32 (261 × 844 × 342)		10-17/64 × 33-7/32 × 13-15/32 (261 × 844 × 342)	
Weight		Lbs (kg)	16 (7)		16 (7)	
Gross Weight		Lbs (kg)	24 (11)		24 (11)	
Operation Sound	H / M / L / SL	dB(A)	40 / 33 / 26 / 22	40 / 34 / 28 / 25	42 / 34 / 27 / 23	41 / 35 / 29 / 26
Sound Power		dB(A)	56	56	58	57
Outdoor Unit			**RXN09KEVJU**		**RXN12KEVJU**	
Casing Color			Ivory White		Ivory White	
Compressor	Type		Hermetically Sealed Swing Type		Hermetically Sealed Swing Type	
	Model		1YC23AEXD		1YC23AEXD	
	Motor Output	W	750		750	
Refrigerant Oil	Type		FVC50K		FVC50K	
	Charge	oz (L)	12.5 (0.375)		12.5 (0.375)	
Refrigerant	Type		R-410A		R-410A	
	Charge	Lbs (kg)	2.20 (1.0)		2.20 (1.0)	
Airflow Rate	H	cfm (m^3/min)	921 (26.1)	921 (26.1)	921 (26.1)	921 (26.1)
Fan	Type		Propeller		Propeller	
	Motor Output	W	33		33	
Running Current (Rated)		A	4.20 - 3.82	4.80 - 4.32	6.00 - 5.42	6.10 - 5.52
Power Consumption (Rated)		W	710	800	1,170	1,180
Power Factor		%	81.3 - 80.8	80.1 - 80.5	93.8 - 93.9	93.0 - 93.0
Starting Current		A	5.0		6.3	
Dimensions (H × W × D)		inch (mm)	21-21/32 × 25-29/32 × 10-13/16 (550 × 658 × 275)		21-21/32 × 25-29/32 × 10-13/16 (550 × 658 × 275)	
Packaged Dimensions (H × W × D)		inch (mm)	23-5/16 × 30-23/64 × 13-45/64 (592 × 771 × 348)		23-5/16 × 30-23/64 × 13-45/64 (592 × 771 × 348)	
Weight		Lbs (kg)	68 (31)		68 (31)	
Gross Weight		Lbs (kg)	78 (35)		78 (35)	
Operation Sound		dB(A)	48	48	50	51
Sound Power		dB(A)	62	62	64	65
Drawing No.			3D072505		3D072506	

Note: ■ The data are based on the conditions shown in the table below.

Cooling	Heating	Piping Length
Indoor ; 80°FDB (27°CDB) 67°FWB (19.4°CWB) Outdoor ; 95°FDB (35°CDB) 75°FWB (24°CWB)	Indoor ; 70°FDB (21°CDB) 60°FWB (15.5°CWB) Outdoor ; 47°FDB (8.3°CDB) 43°FWB (6°CWB)	25 ft (7.5 m)

Conversion Formulae
kcal/h = kW × 860 Btu/h = kW × 3412 cfm = m^3/min × 35.3

60 Hz, 208 - 230V

Model	Indoor Unit			FTXN15KVJU		FTXN18KVJU	
	Outdoor Unit			RXN15KEVJU		RXN18KEVJU	
				Cooling	Heating	Cooling	Heating
Capacity Rated (Min. ~ Max.)			kW	4.4 (1.7 ~ 4.4)	5.28 (1.7 ~ 6.2)	5.28 (1.7 ~ 5.28)	6.33 (1.7 ~ 7.03)
			Btu/h	15,000 (5,800 ~ 15,000)	18,000 (5,800 ~ 21,200)	18,000 (5,800 ~ 18,000)	21,600 (5,800 ~ 24,000)
			kcal/h	3,780 (1,460 ~ 3,780)	4,540 (1,460 ~ 5,330)	4,540 (1,460 ~ 4,540)	5,440 (1,460 ~ 6,050)
Moisture Removal			L/h	2.9	—	3.9	—
Running Current (Rated)			A	6.11 - 5.53	8.46 - 7.65	7.33 - 6.63	10.75 - 9.72
Power Consumption Rated (Min. ~ Max.)			W	1,250 (280 ~ 1,250)	1,730 (260 - 2,160)	1,500 (300 ~ 1,500)	2,200 (270 ~ 2,530)
Power Factor			%	98.4 - 98.3	98.3 - 98.3	98.4 - 98.4	98.4 - 98.4
EER (Rated) (Min. ~ Max.)			Btu/h-W	12.0	-	12.0	-
COP (Rated) (Min. ~ Max.)			W/W	3.52 (6.07 ~ 3.52)	3.05 (6.54 ~ 2.87)	3.52 (5.67 ~ 3.52)	2.88 (6.30 ~ 2.78)
Piping Connections	Liquid		inch (mm)	ϕ 1/4 (6.4)		ϕ 1/4 (6.4)	
	Gas		inch (mm)	ϕ 1/2 (12.7)		ϕ 1/2 (12.7)	
	Drain	Indoor Unit	inch (mm)	I.D. ϕ 9/16 (14.0), O.D. ϕ 11/16 (18.0)		I.D. ϕ 9/16 (14.0), O.D. ϕ 11/16 (18.0)	
		Outdoor Unit		I.D. ϕ 11/16 (18.0) (Hole)		I.D. ϕ 11/16 (18.0) (Hole)	
Heat Insulation				Both Liquid and Gas Pipes		Both Liquid and Gas Pipes	
Max. Interunit Piping Length			feet (m)	98.4 (30)		98.4 (30)	
Max. Interunit Height Difference			feet (m)	65.6 (20)		65.6 (20)	
Chargeless			feet (m)	32.8 (10)		32.8 (10)	
Amount of Additional Charge of Refrigerant			oz/ft (g/m)	0.21 (20)		0.21 (20)	
Indoor Unit				**FTXN15KVJU**		**FTXN18KVJU**	
Front Panel Color				White		White	
Airflow Rate	H		cfm (m^3/min)	519 (14.7)	568 (16.1)	572 (16.2)	614 (17.4)
	M			438 (12.4)	491 (13.9)	480 (13.6)	533 (15.1)
	L			364 (10.3)	406 (11.5)	403 (11.4)	448 (12.7)
	SL			335 (9.5)	360 (10.2)	360 (10.2)	403 (11.4)
Fan	Type			Cross Flow Fan		Cross Flow Fan	
	Motor Output		W	43		43	
	Speed		Steps	5 Steps, Quiet, Auto		5 Steps, Quiet, Auto	
Air Direction Control				Right, Left, Horizontal, Downward		Right, Left, Horizontal, Downward	
Air Filter				Removable / Washable / Mildew Proof		Removable / Washable / Mildew Proof	
Running Current (Rated)			A	0.17 - 0.15	0.18 - 0.16	0.17 - 0.15	0.18 - 0.16
Power Consumption (Rated)			W	34 - 34	36 - 36	34 - 34	36 - 36
Power Factor			%	96.2 - 98.6	96.2 - 97.8	96.2 - 98.6	96.2 - 97.8
Temperature Control				Microcomputer Control		Microcomputer Control	
Dimensions (H × W × D)			inch (mm)	11-7/16 × 41-5/16 × 9-3/8 (290 × 1,050 × 238)		11-7/16 × 41-5/16 × 9-3/8 (290 × 1,050 × 238)	
Packaged Dimensions (H × W × D)			inch (mm)	13-9/32 × 45-5/32 × 14-13/32 (337 × 1,147 × 366)		13-9/32 × 45-5/32 × 14-13/32 (337 × 1,147 × 366)	
Weight			Lbs (kg)	26.5 (12)		26.5 (12)	
Gross Weight			Lbs (kg)	38.0 (17)		38.0 (17)	
Operation Sound	H / M / L / SL		dB(A)	45 / 41 / 36 / 33	44 / 40 / 35 / 32	45 / 41 / 36 / 33	44 / 40 / 35 / 32
Sound Power			dB(A)	61	60	61	60
Outdoor Unit				**RXN15KEVJU**		**RXN18KEVJU**	
Casing Color				Ivory White		Ivory White	
Compressor	Type			Hermetically Sealed Swing Type		Hermetically Sealed Swing Type	
	Model			2YC36BXD		2YC36BXD	
	Motor Output		W	1,100		1,100	
Refrigerant Oil	Type			FVC50K		FVC50K	
	Charge		oz (L)	22.1 (0.65)		22.1 (0.65)	
Refrigerant	Type			R-410A		R-410A	
	Charge		Lbs (kg)	3.2 (1.45)		3.2 (1.45)	
Airflow Rate	H		m^3/min (cfm)	1,472 (41.7)	1,501 (42.5)	1,667 (47.2)	1,501 (42.5)
Fan	Type			Propeller		Propeller	
	Motor Output		W	60		60	
Running Current (Rated)			A	5.94 - 5.38	8.28 - 7.49	7.16 - 6.48	10.57 - 9.56
Power Consumption (Rated)			W	1,216 - 1,216	1,694 - 1,694	1,466 - 1,466	2,164 - 2,164
Power Factor			%	98.4 - 98.3	98.4 - 98.3	98.4 - 98.4	98.4 - 98.4
Starting Current			A	8.46		10.75	
Dimensions (H × W × D)			inch (mm)	23-7/16 × 31-5/16 × 11-13/16 (595 × 795 × 300)		23-7/16 × 31-5/16 × 11-13/16 (595 × 795 × 300)	
Packaged Dimensions (H × W × D)			inch (mm)	25-3/4 × 37-3/32 × 15-3/4 (654 × 942 × 400)		25-3/4 × 37-3/32 × 15-3/4 (654 × 942 × 400)	
Weight			Lbs (kg)	93 (42)		93 (42)	
Gross Weight			Lbs (kg)	100 (45)		100 (45)	
Operation Sound	H		dB(A)	51	53	53	53
Sound Power	H		dB(A)	65	67	67	67
Drawing No.				3D071516D		3D071517C	

Note: ■ The data are based on the conditions shown in the table below.

Cooling	Heating	Piping Length
Indoor ; 80°FDB (27°CDB) 67°FWB (19.4°CWB) Outdoor ; 95°FDB (35°CDB) 75°FWB (24°CWB)	Indoor ; 70°FDB (21°CDB) 60°FWB (15.5°CWB) Outdoor ; 47°FDB (8.3°CDB) 43°FWB (6°CWB)	25 ft (7.5 m)

Conversion Formulae
kcal/h = kW × 860 Btu/h = kW × 3412 cfm = m^3/min × 35.3

60 Hz, 208 - 230V

Model	Indoor Unit			FTXN24KVJU	
	Outdoor Unit			RXN24KEVJU	
				Cooling	Heating
Capacity Rated (Min. ~ Max.)			kW	6.45 (1.7 ~ 6.45)	7.03 (1.7 ~ 7.44)
			Btu/h	22,000 (5,800 ~ 22,000)	24,000 (5,800 ~ 25,400)
			kcal/h	5,550 (1,460 ~ 5,550)	6,050 (1,460 ~ 6,400)
Moisture Removal			L/h	4.5	—
Running Current (Rated)			A	12.51 - 11.32	12.37 - 11.18
Power Consumption Rated (Min. ~ Max.)			W	2,560 (300 ~ 2,560)	2,530 (270 ~ 2,720)
Power Factor			%	98.4 - 98.3	98.3 - 98.4
EER (Rated) (Min. ~ Max.)			Btu/h-W	8.6	-
COP (Rated) (Min. ~ Max.)			W/W	2.52 (5.67 ~ 2.52)	2.78 (6.30 ~ 2.74)
Piping Connections	Liquid		inch (mm)	ϕ 1/4 (6.4)	
	Gas		inch (mm)	ϕ 1/2 (12.7)	
	Drain	Indoor Unit	inch (mm)	I.D. ϕ 9/16 (14.0), O.D. ϕ 11/16 (18.0)	
		Outdoor Unit		I.D. ϕ 11/16 (18.0) (Hole)	
Heat Insulation				Both Liquid and Gas Pipes	
Max. Interunit Piping Length			feet (m)	98.4 (30)	
Max. Interunit Height Difference			feet (m)	65.6 (20)	
Chargeless			feet (m)	32.8 (10)	
Amount of Additional Charge of Refrigerant			oz/ft (g/m)	0.21 (20)	
Indoor Unit				**FTXN24KVJU**	
Front Panel Color				White	
Airflow Rate	H		cfm (m^3/min)	572 (16.2)	614 (17.4)
	M			480 (13.6)	533 (15.1)
	L			403 (11.4)	448 (12.7)
	SL			360 (10.2)	403 (11.4)
Fan	Type			Cross Flow Fan	
	Motor Output		W	43	
	Speed		Steps	5 Steps, Quiet, Auto	
Air Direction Control				Right, Left, Horizontal, Downward	
Air Filter				Removable / Washable / Mildew Proof	
Running Current (Rated)			A	0.17 - 0.15	0.18 - 0.16
Power Consumption (Rated)			W	34 - 34	36 - 36
Power Factor			%	96.2 - 98.6	96.2 - 97.8
Temperature Control				Microcomputer Control	
Dimensions (H × W × D)			inch (mm)	11-7/16 × 41-5/16 × 9-3/8 (290 × 1,050 × 238)	
Packaged Dimensions (H × W × D)			inch (mm)	13-9/32 × 45-5/32 × 14-13/32 (337 × 1,147 × 366)	
Weight			Lbs (kg)	26.5 (12)	
Gross Weight			Lbs (kg)	38.0 (17)	
Operation Sound	H / M / L / SL		dB(A)	46 / 42 / 37 / 34	46 / 42 / 37 / 34
Sound Power			dB(A)	62	62
Outdoor Unit				**RXN24KEVJU**	
Casing Color				Ivory White	
Compressor	Type			Hermetically Sealed Swing Type	
	Model			2YC36BXD	
	Motor Output		W	1,100	
Refrigerant Oil	Type			FVC50K	
	Charge		oz (L)	22.1 (0.65)	
Refrigerant	Type			R-410A	
	Charge		Lbs (kg)	3.2 (1.45)	
Airflow Rate	H		cfm (m^3/min)	1,667 (47.2)	1,564 (44.3)
Fan	Type			Propeller	
	Motor Output		W	60	
Running Current (Rated)			A	12.34 - 11.17	12.19 - 11.02
Power Consumption (Rated)			W	2,526 - 2,526	2,494 - 2,494
Power Factor			%	98.4 - 98.3	98.4 - 98.4
Starting Current			A	12.51	
Dimensions (H × W × D)			inch (mm)	23-7/16 × 31-5/16 × 11-13/16 (595 × 795 × 300)	
Packaged Dimensions (H × W × D)			inch (mm)	25-3/4 × 37-3/32 × 15-3/4 (654 × 942 × 400)	
Weight			Lbs (kg)	93 (42)	
Gross Weight			Lbs (kg)	100 (45)	
Operation Sound	H		dB(A)	54	54
Sound Power	H		dB(A)	68	68
Drawing No.				3D071518C	

Note: ■ The data are based on the conditions shown in the table below.

Cooling	Heating	Piping Length
Indoor ; 80°FDB (27°CDB) 67°FWB (19.4°CWB) Outdoor ; 95°FDB (35°CDB) 75°FWB (24°CWB)	Indoor ; 70°FDB (21°CDB) 60°FWB (15.5°CWB) Outdoor ; 47°FDB (8.3°CDB) 43°FWB (6°CWB)	25 ft (7.5 m)

Conversion Formulae
kcal/h = kW × 860 Btu/h = kW × 3412 cfm = m^3/min × 35.3

Part 3
Printed Circuit Board Connector Wiring Diagram

1. Indoor Unit

1.1 09/12 Class

Connectors and Other Parts

PCB(1): Control PCB

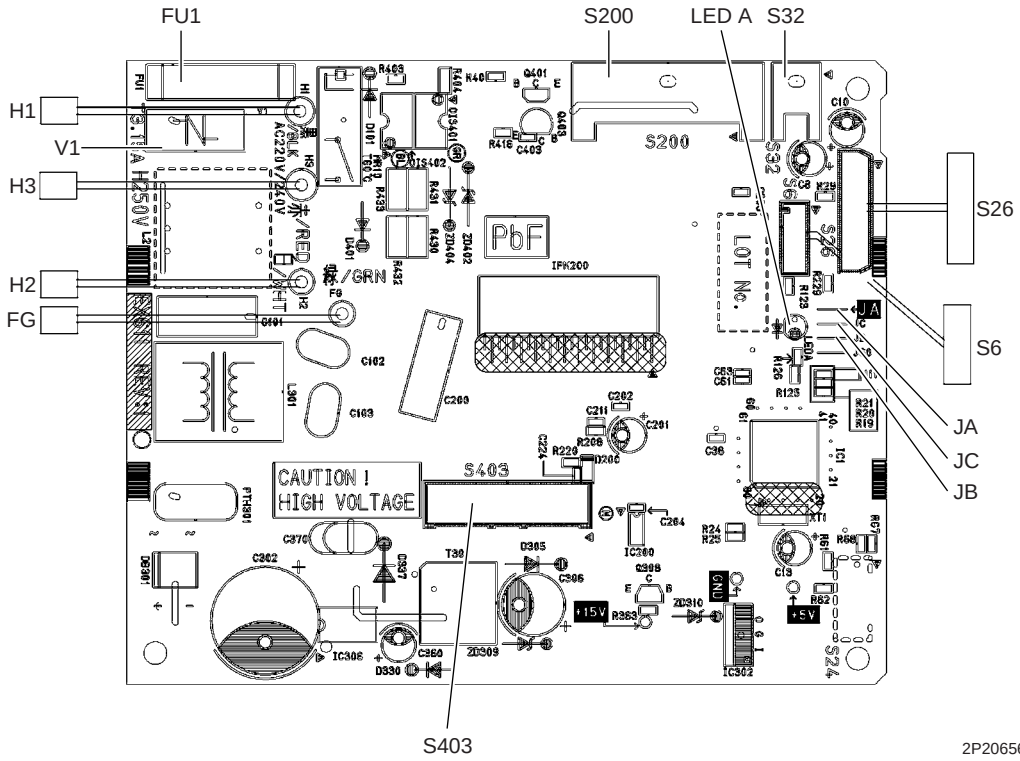
1)	S6	Connector for swing motor (horizontal blade)
2)	S26	Connector for display PCB
3)	S32	Connector for indoor heat exchanger thermistor
4)	S200	Connector for fan motor
5)	S403	Connector for adaptor PCB (option)
6)	H1, H2, H3, FG	Connector for terminal board
7)	V1	Varistor
8)	JA	Address setting jumper
		∗ Refer to page 225 for detail.
	JB	Fan speed setting when compressor stops for thermostat OFF
	JC	Power failure recovery function (auto-restart)
		∗ Refer to page 227 for detail.
9)	LED A	LED for service monitor (green)
10)	FU1 (F1U)	Fuse (3.15A, 250V)

PCB(2): Display PCB

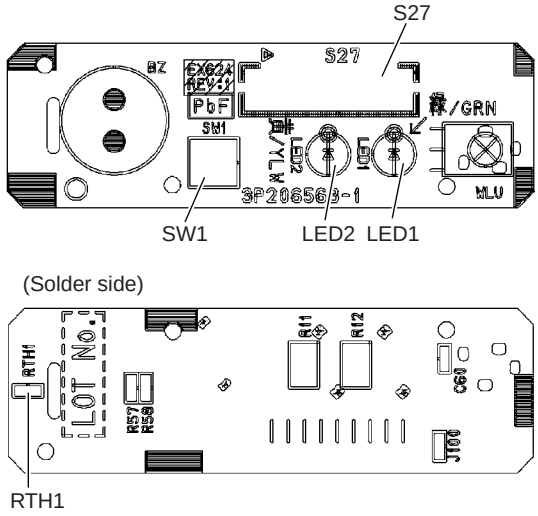
1)	S27	Connector for control PCB
2)	SW1 (S1W)	Forced cooling operation ON/OFF button
3)	LED1 (H1P)	LED for operation (green)
4)	LED2 (H2P)	LED for timer (yellow)
5)	RTH1 (R1T)	Room temperature thermistor

PCB Detail

PCB(1): Control PCB



PCB(2): Display PCB



1.2 15/18/24 Class

Connectors and Other Parts

PCB (1): Control PCB

1)	S1	Connector for DC fan motor
2)	S6	Connector for swing motor (horizontal blades)
3)	S21	Connector for centralized control (HA)
4)	S26	Connector for buzzer PCB
5)	S28	Connector for signal receiver PCB
6)	S32	Indoor heat exchanger thermistor
7)	H1, H2, H3, FG	Connector for terminal board
8)	JA	Address setting jumper
		∗ Refer to page 225 for detail.
	JB	Fan speed setting when compressor stops for thermostat OFF
	JC	Power failure recovery function (auto-restart)
		∗ Refer to page 227 for detail.
9)	LED A	LED for service monitor (green)
10)	FU1	Fuse (3.15 A, 250 V)
11)	V1	Varistor

PCB (2): Signal Receiver PCB

1)	S29	Connector for control PCB
2)	SW1 (S1W)	Forced cooling operation ON/OFF button

PCB (3): Buzzer PCB

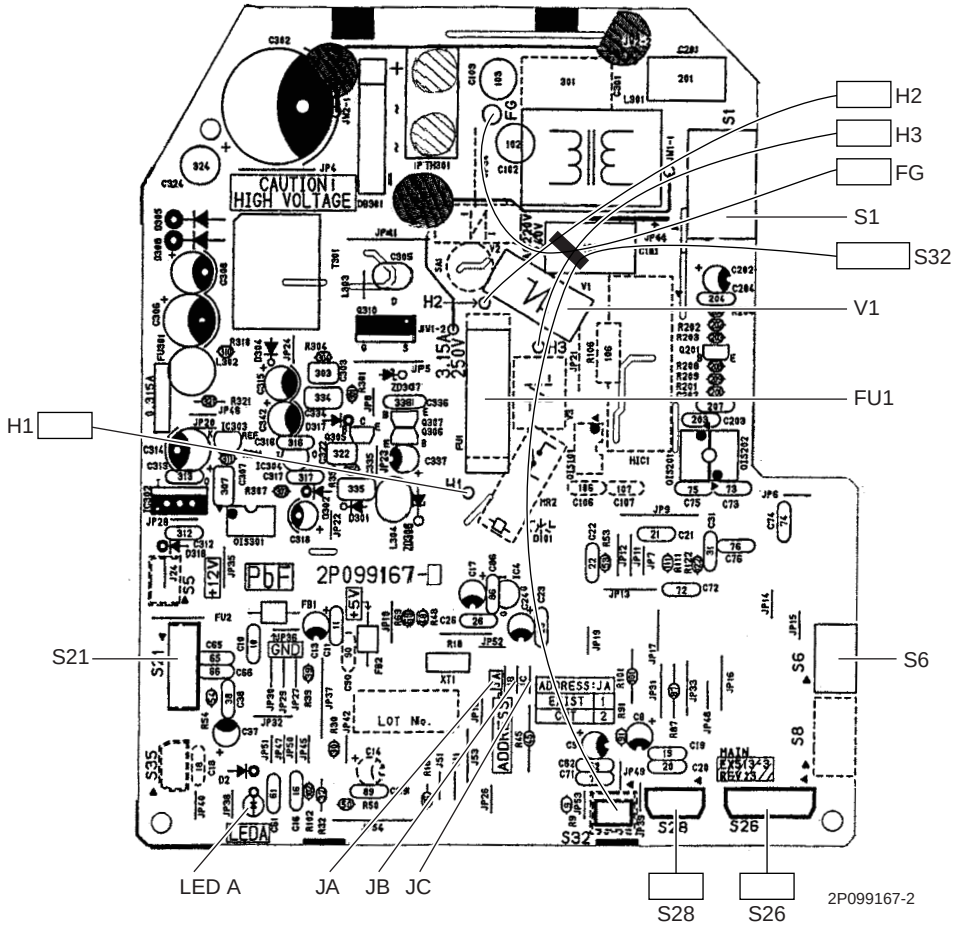
1)	S27	Connector for control PCB
2)	S38	Connector for display PCB
3)	RTH1 (R1T)	Room temperature thermistor

PCB (4): Display PCB

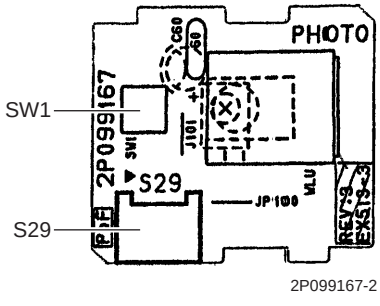
1)	S37	Connector for buzzer PCB
2)	LED1 (H1P)	LED for operation (green)
3)	LED2 (H2P)	LED for timer (yellow)

PCB Detail

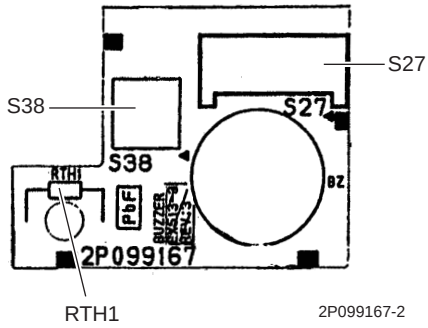
PCB (1): Control PCB



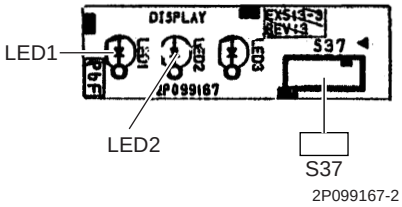
PCB (2): Signal Receiver PCB



PCB (3): Buzzer PCB



PCB (4): Display PCB



★LED3 does not function.

2. Outdoor Unit

2.1 09/12 Class

Connectors and Other Parts

PCB(1): Filter PCB

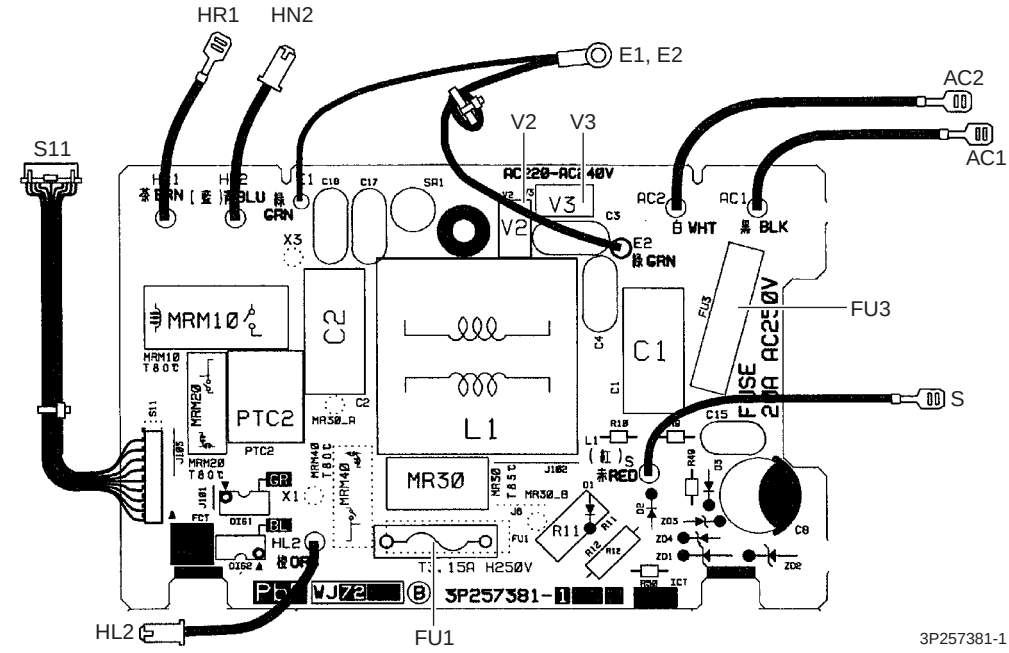
1) S11	Connector for main PCB
2) AC1, AC2, S	Connector for terminal board
3) E1, E2	Terminal for ground
4) HL2, HN2	Connector for main PCB
5) HR1	Connector for reactor
6) FU1	Fuse (3.15 A, 250 V)
7) FU3	Fuse (20 A, 250 V)
8) V2, V3	Varistor

PCB(2): Main PCB

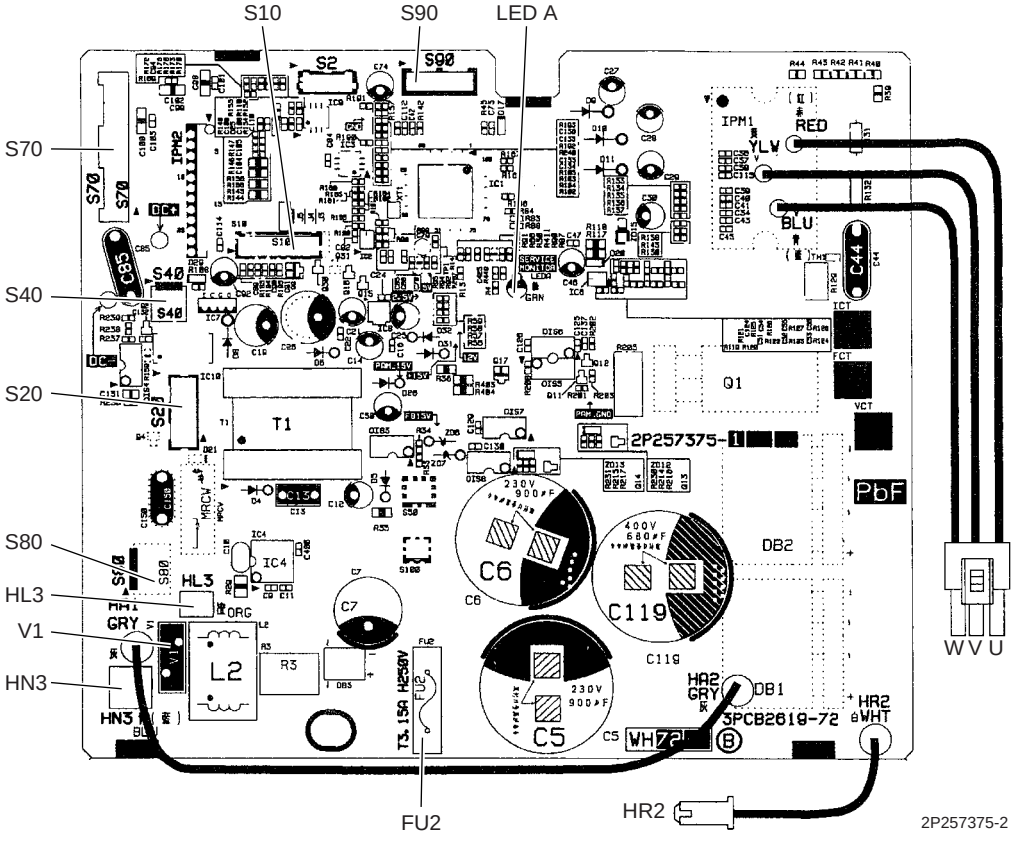
1) S10	Connector for filter PCB
2) S20	Connector for electronic expansion valve coil
3) S40	Connector for overload protector
4) S70	Connector for fan motor
5) S80	Connector for four-way valve coil
6) S90	Connector for thermistors (outdoor temperature, outdoor heat exchanger, discharge pipe)
7) HL3, HN3	Connector for filter PCB
8) HR2	Connector for reactor
9) U, V, W	Connector for compressor
10) FU2	Fuse (3.15 A, 250 V)
11) LED A	LED for service monitor (green)
12) V1	Varistor

PCB Detail

PCB(1): Filter PCB



PCB(2): Main PCB



2.2 15/18/24 Class

Connectors and Other Parts

PCB (1): Filter PCB

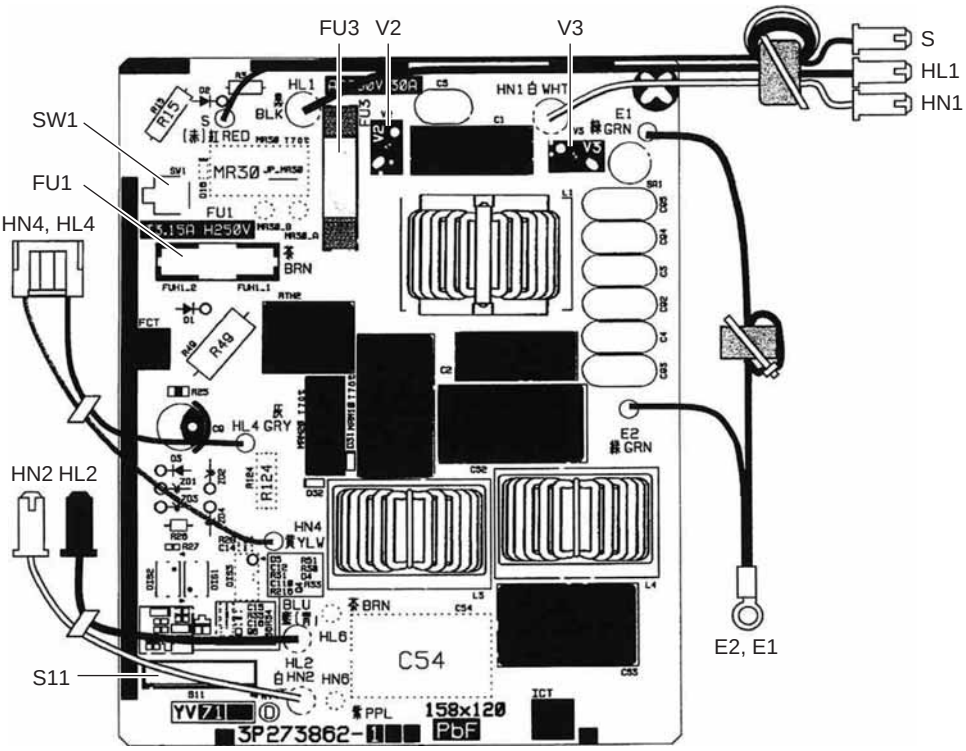
1)	S11	Connector for [S10] on main PCB
2)	HL1, HN1, S	Connector for terminal board
3)	E1, E2	Terminal for ground
4)	HL2, HN2	Connector for [HL3] [HN3] on main PCB
5)	HL4, HN4	Connector for [S12] on main PCB
6)	FU1	Fuse (3.15 A, 250 V)
7)	FU3	Fuse (30 A, 250 V)
8)	V2, V3	Varistor
9)	SW1	Forced cooling operation ON/OFF switch

PCB (2): Main PCB

1)	S10	Connector for [S11] on filter PCB
2)	S12	Connector for [HL4] [HN4] on filter PCB
3)	S20	Connector for electronic expansion valve coil
4)	S40	Connector for overload protector
5)	S70	Connector for fan motor
6)	S80	Connector for four-way valve coil
7)	S90	Connector for thermistors (outdoor temperature, outdoor heat exchanger, discharge pipe)
8)	HL3, HN3	Connector for [HL2] [HN2] on filter PCB
9)	U, V, W	Connector for compressor
10)	FU2	Fuse (3.15 A, 250 V)
11)	LED A	LED for service monitor (green)
12)	V1	Varistor

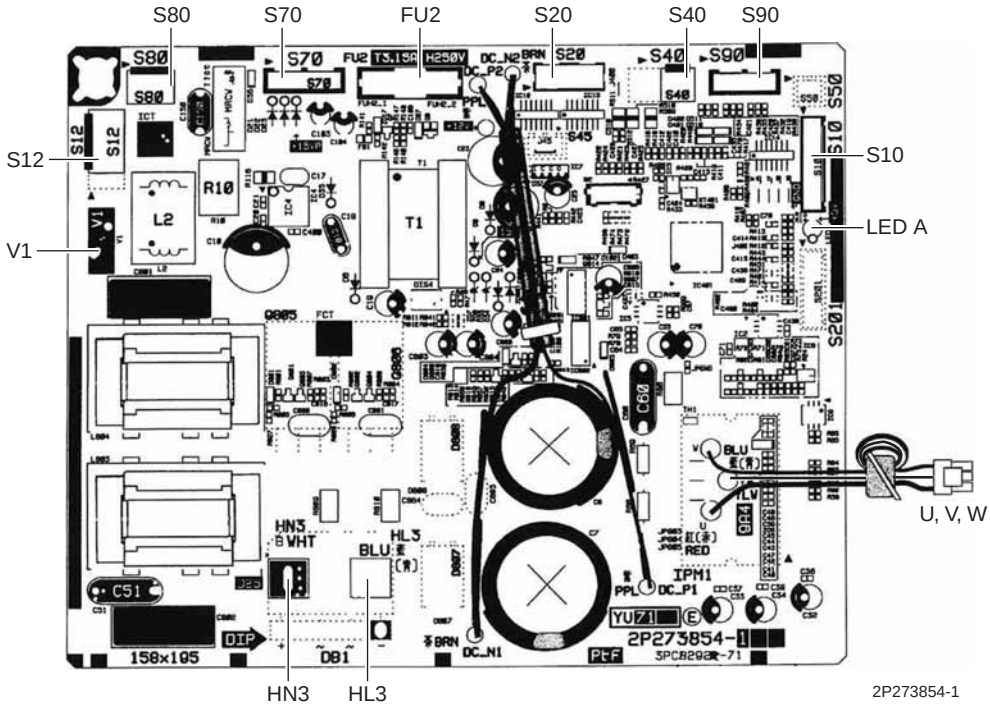
PCB Detail

PCB (1): Filter PCB



3P273862-1

PCB (2): Main PCB



2P273854-1

Part 4
Function and Control

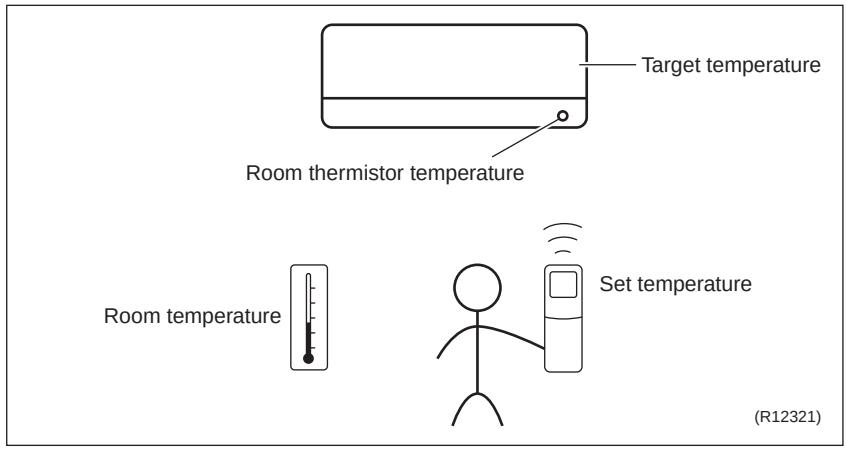
1. Main Functions

1.1 Temperature Control

Definitions of Temperatures

The definitions of temperatures are classified as following.

- Room temperature: temperature of lower part of the room
- Set temperature: temperature set by remote controller
- Room thermistor temperature: temperature detected by room temperature thermistor
- Target temperature: temperature determined by microcomputer



Temperature Control

The temperature of the room is detected by the room temperature thermistor. However, there is difference between the “temperature detected by room temperature thermistor” and the “temperature of lower part of the room”, depending on the type of the indoor unit or installation condition. Practically, the temperature control is done by the “target temperature appropriately adjusted for the indoor unit” and the “temperature detected by room temperature thermistor”.

1.2 Frequency Principle

Main Control Parameters

The compressor is frequency-controlled during normal operation. The target frequency is set by the following 2 parameters coming from the operating indoor unit:

- The load condition of the operating indoor unit
- The difference between the room thermistor temperature and the target temperature

Additional Control Parameters

The target frequency is adapted by additional parameters in the following cases:

- Frequency restrictions
- Initial settings
- Forced cooling operation

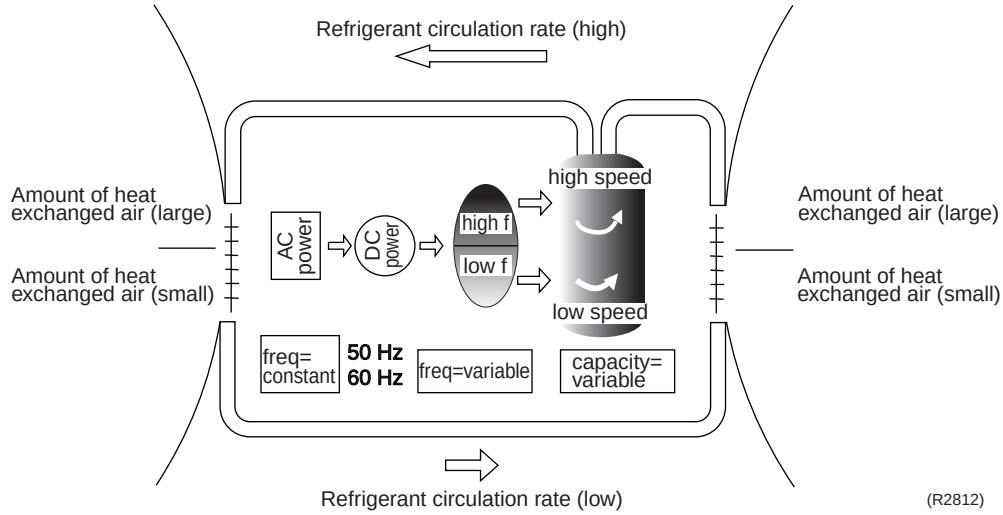
Inverter Principle

To regulate the capacity, a frequency control is needed. The inverter makes it possible to vary the rotation speed of the compressor. The following table explains the conversion principle:

Phase	Description
1	The supplied AC power source is converted into the DC power source for the present.
2	The DC power source is reconverted into the three phase AC power source with variable frequency. ■ When the frequency increases, the rotation speed of the compressor increases resulting in an increased refrigerant circulation. This leads to a higher amount of the heat exchange per unit. ■ When the frequency decreases, the rotation speed of the compressor decreases resulting in a decreased refrigerant circulation. This leads to a lower amount of the heat exchange per unit.

Drawing of Inverter

The following drawing shows a schematic view of the inverter principle:



Inverter Features

The inverter provides the following features:

- The regulating capacity can be changed according to the changes in the outdoor temperature and cooling / heating load.
- Quick heating and quick cooling
  The compressor rotational speed is increased when starting the heating (or cooling). This enables to reach the set temperature quickly.
- Even during extreme cold weather, high capacity is achieved. It is maintained even when the outdoor temperature is 2°C (35.6°F).
- Comfortable air conditioning
  A fine adjustment is integrated to keep the room temperature constant.
- Energy saving heating and cooling
  Once the set temperature is reached, the energy saving operation enables to maintain the room temperature at low power.

Frequency Limits

The following functions regulate the minimum and maximum frequency:

Frequency	Functions
Low	■ Four-way valve operation compensation. Refer to page 37.
High	■ Compressor protection function. Refer to page 37. ■ Discharge pipe temperature control. Refer to page 39. ■ Input current control. Refer to page 40. ■ Freeze-up protection control. Refer to page 41. ■ Heating peak-cut control. Refer to page 41. ■ Defrost control. Refer to page 43.

Forced Cooling Operation

Refer to page 222 for detail.

1.3 Airflow Direction Control

Power-Airflow Louver(s)

The large louver sends a large volume of air downward to the floor and provides an optimum control in cooling, dry, and heating mode.

Cooling / Dry Mode

During cooling or dry mode, the louver retracts into the indoor unit. Then, cool air can be blown far and distributed all over the room.

Heating Mode

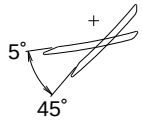
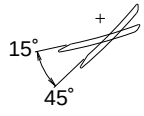
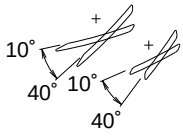
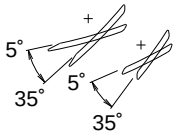
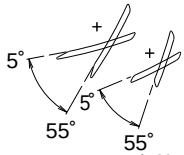
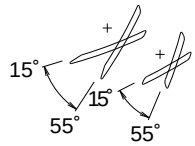
During heating mode, the large louver directs airflow downward to spread the warm air to the entire room.

Wide-Angle Fins

The fins, made of elastic synthetic resin, provide a wide range of airflow that guarantees a comfortable air distribution.

Auto-Swing

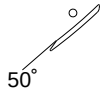
The following table explains the auto swing process for cooling, dry, heating, and fan:

	Vertical Swing (up and down)			
	Cooling	Dry	Fan	Heating
09/12 class	 (R11256)			 (R11257)
15/18/24 class	 (R2814)	 (R2815)	 (R2816)	 (R2813)

COMFORT AIRFLOW Operation

09/12 class

The horizontal blade (louver) is controlled not to blow the air directly on the person in the room.

Cooling	Heating
 (R11259)	 (R11258)

1.4 Fan Speed Control for Indoor Unit

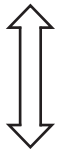
Outline

Phase control and fan speed control contains 9 steps: LLL, LL, SL, L, ML, M, MH, H, and HH. The airflow rate can be automatically controlled depending on the difference between the room thermistor temperature and the target temperature. This is done through phase control and Hall IC control.

For more information about Hall IC, refer to the troubleshooting for fan motor on page 82.

Automatic Fan Speed Control

In automatic fan speed operation, the step “SL” is not available.

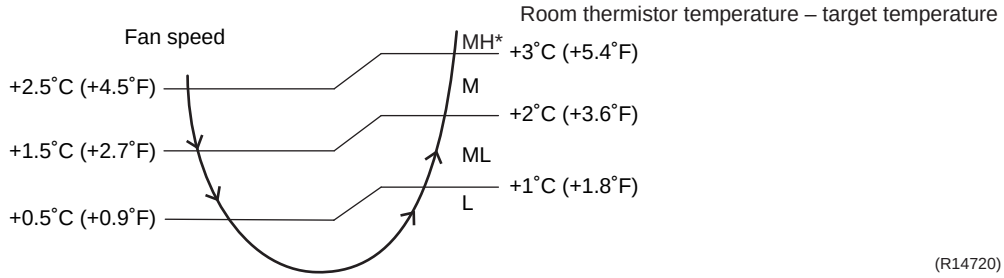
Step	Cooling		Heating
	09/12 class	15/18/24 class	
LLL	 (R11681)	 (R6833)	 (R6834)
LL			
L			
ML			
M			
MH			
H			
HH (POWERFUL)			

⟺ = The airflow rate is automatically controlled within this range when the FAN setting button is set to automatic.

<Cooling>

The following drawing explains the principle of fan speed control for cooling.

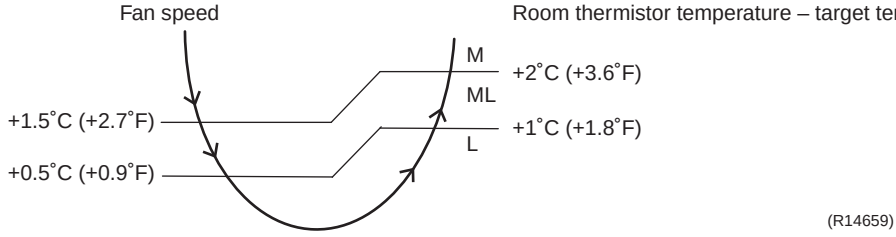
09/12 class



(R14720)

*In automatic fan speed operation, upper limit is at M tap in 30 minutes from the operation start.

15/18/24 class



(R14659)

<Heating>

On heating mode, the fan speed is regulated according to the indoor heat exchanger temperature and the difference between the room thermistor temperature and the target temperature.

Note:

1. During POWERFUL operation, fan rotates at H tap + 80 ~ 90 rpm.
2. Fan stops during defrost operation.

COMFORT AIRFLOW Operation

09/12 class

- The fan speed is controlled automatically.
- The latest command has the priority between POWERFUL and COMFORT AIRFLOW.

1.5 Program Dry Operation

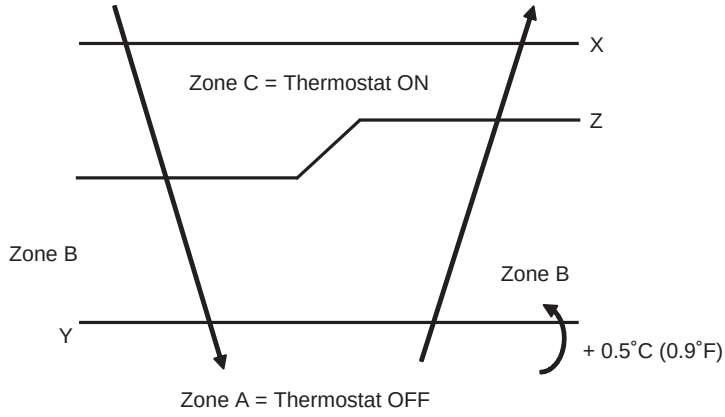
Outline

Program dry operation removes humidity while preventing the room temperature from lowering. Since the microcomputer controls both the temperature and airflow rate, the temperature adjustment and fan adjustment buttons are inoperable in this mode.

Detail

The microcomputer automatically sets the temperature and airflow rate. The difference between the room thermistor temperature at start-up and the target temperature is divided into two zones. Then, the unit operates in the dry mode with an appropriate capacity for each zone to maintain the temperature and humidity at a comfortable level.

Room thermistor temperature at start-up	Target temperature X	Thermostat OFF point Y	Thermostat ON point Z
24°C (75.2°F) or more	Room thermistor temperature at start-up	X – 2.5°C (–4.5°F)	X – 0.5°C (– 0.9°F) or Y + 0.5°C (0.9°F) (zone B) continues for 10 min.
23.5°C (74.3°F) ≀ 18°C (64.4°F)		X – 2.0°C (–3.6°F)	X – 0.5°C (– 0.9°F) or Y + 0.5°C (0.9°F) (zone B) continues for 10 min.
17.5°C (63.5°F) ≀	18°C (64.4°F)	X – 2.0°C (–3.6°F)	X – 0.5°C (– 0.9°F) = 17.5°C (63.5°F) or Y + 0.5°C (0.9°F) (zone B) continues for 10 min.



(R11587)

1.6 Automatic Operation

Outline

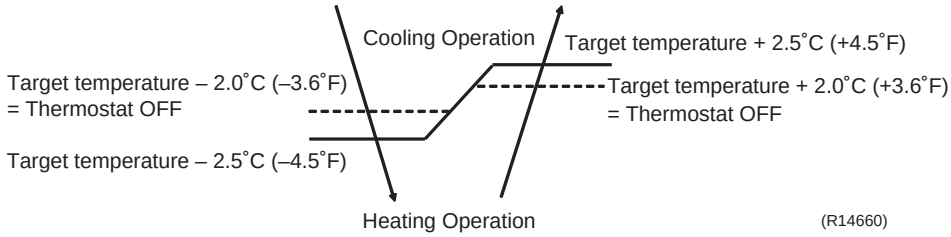
Automatic Cooling / Heating Function

When the AUTO mode is selected with the remote controller, the microcomputer automatically determines the operation mode as cooling or heating according to the room temperature and the set temperature at start-up, and automatically operates in that mode.
The unit automatically switches the operation mode to maintain the room temperature at the set temperature.

Detail

Ts: set temperature (set by remote controller)
Tt: target temperature (determined by microcomputer)
Tr: room thermistor temperature (detected by room temperature thermistor)
C: correction value

1. The set temperature (Ts) determines the target temperature (Tt).
   (Ts = 18 ~ 30°C, 64.4 ~ 86°F).
2. The target temperature (Tt) is calculated as;
   Tt = Ts + C
   where C is the correction value.
   C = 0°C (0°F)
3. Thermostat ON/OFF point and mode switching point are as follows.
   Tr means the room thermistor temperature.
   (1) Heating → Cooling switching point:
   Tr ≥ Tt + 2.5°C (+4.5°F)
   (2) Cooling → Heating switching point:
   Tr < Tt – 2.5°C (–4.5°F)
   (3) Thermostat ON/OFF point is the same as the ON/OFF point of cooling or heating operation.
4. During initial operation
   Tr ≥ Ts : Cooling operation
   Tr < Ts : Heating operation



Ex: When the target temperature is 25°C (77°F)
Cooling → 23°C (73.4°F): Thermostat OFF → 22°C (71.6°F): Switch to heating
Heating → 26.5°C (79.7°F): Thermostat OFF → 27.5°C (81.5°F): Switch to cooling

1.7 Thermostat Control

Thermostat control is based on the difference between the room thermistor temperature and the target temperature.

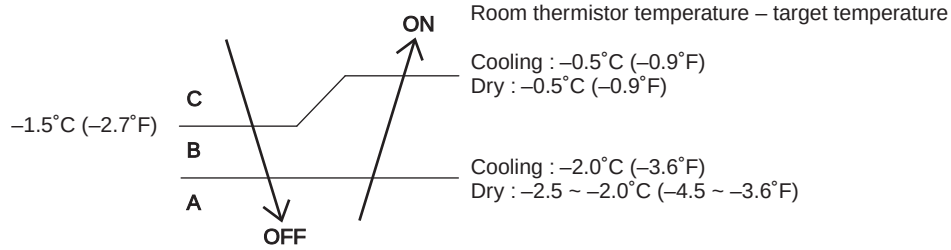
Thermostat OFF Condition

- The temperature difference is in the zone A.

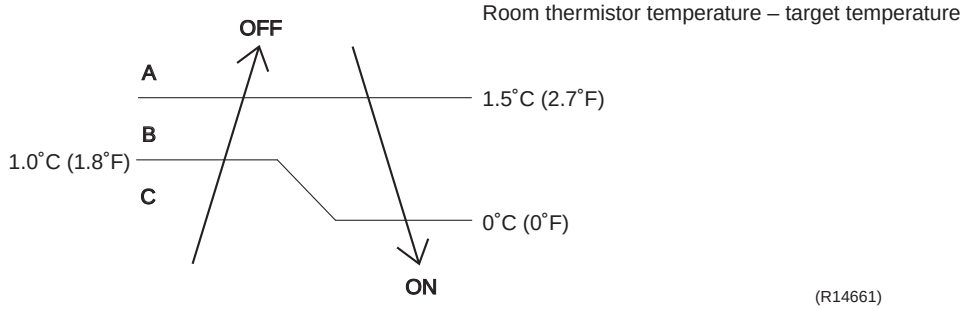
Thermostat ON Condition

- The temperature difference returns to the zone C after being in the zone A.
- The system resumes from defrost control in any zones except A.
- The operation turns on in any zones except A.
- The monitoring time has passed while the temperature difference is in the zone B. (Cooling / Dry: 10 minutes, Heating: 10 seconds)

<Cooling / Dry>



<Heating>



Refer to “Temperature Control” on page 21 for detail.

1.8 NIGHT SET Mode

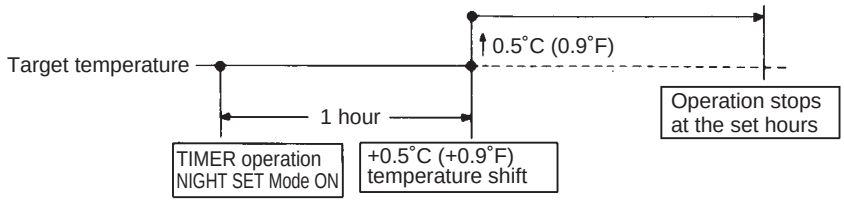
Outline

When the OFF timer is set, the NIGHT SET Mode is automatically activated. The NIGHT SET Mode keeps the airflow rate setting.

Detail

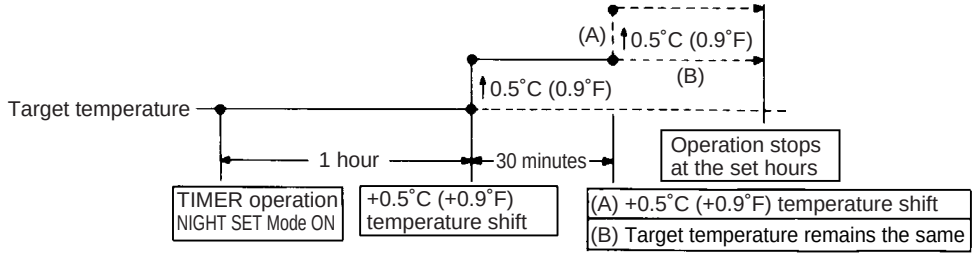
The NIGHT SET Mode continues operation at the target temperature for the first one hour, then automatically raises the target temperature slightly in the case of cooling, or lowers it slightly in the case of heating. This prevents excessive cooling in summer and excessive heating in winter to ensure comfortable sleeping conditions, and also conserves electricity.

<Cooling>
09/12 class



(R14453)

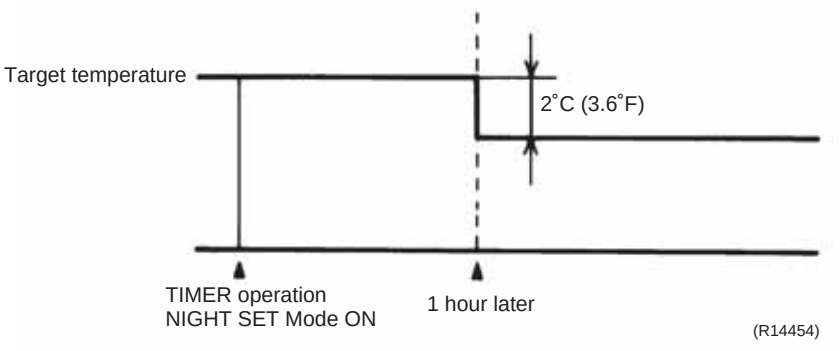
15/18/24 class



(A) : When the outdoor temperature is normal and the room temperature is at the set temperature.
(B) : When the outdoor temperature is high (27˚C (80.6˚F) or higher).

(R14662)

<Heating>



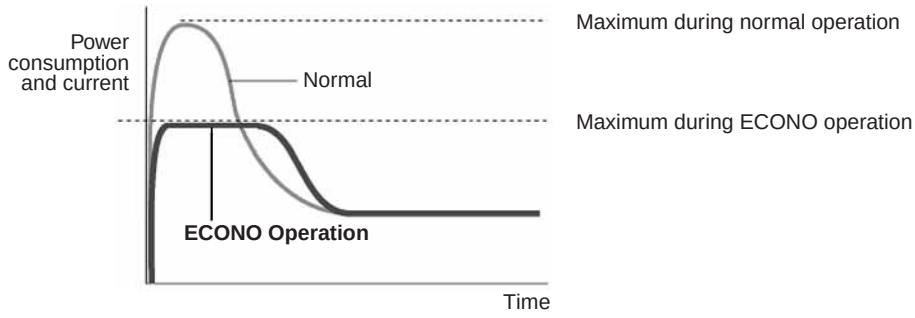
(R14454)

1.9 ECONO Operation

09/12 class

The "ECONO operation" reduces the maximum operating current and the power consumption. This operation is particularly convenient for energy-saving-oriented users. It is also a major bonus for those whose breaker capacities do not allow the use of multiple electrical devices and air conditioners.
It is easily activated from the wireless remote controller by pushing the ECONO button.

- When this function is activated, the maximum capacity also decreases.
- The remote controller can send the ECONO command when the unit is in COOL, HEAT, DRY, or AUTO operation. This function can only be set when the unit is running. Pressing the ON/OFF button on the remote controller cancels the function.
- This function and POWERFUL operation cannot be used at the same time. The latest command has the priority.



(R9288)

1.10 Inverter POWERFUL Operation

Outline

In order to exploit the cooling and heating capacity to full extent, operate the air conditioner by increasing the indoor fan rotating speed and the compressor frequency.

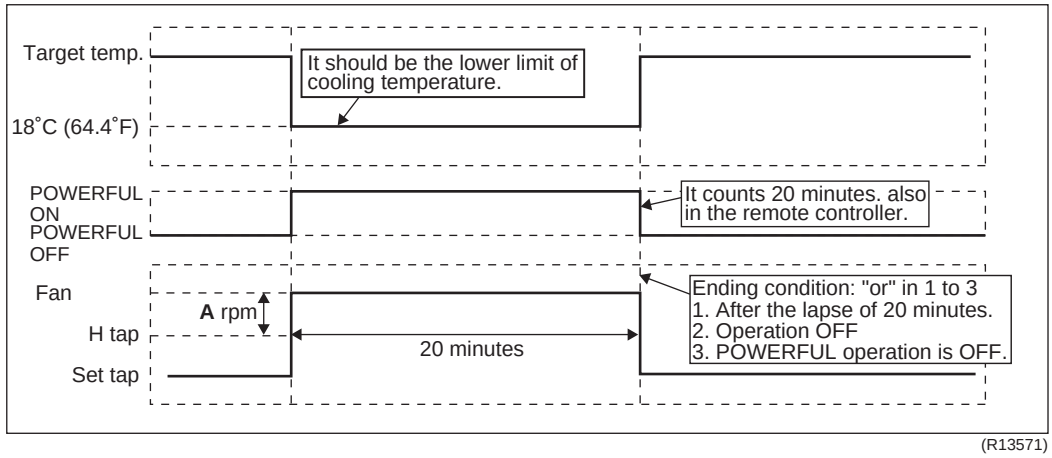
Detail

When POWERFUL button is pressed, the fan speed and target temperature are converted to the following states for 20 minutes.

Operation mode	Fan speed	Target temperature
COOL	H tap + **A** rpm	18°C (64.4°F)
DRY	Dry rotating speed + **A** rpm	Lowered by 2.5°C (4.5°F)
HEAT	H tap + **A** rpm	31 ~ 32°C (87.8 ~ 89.6°F)
FAN	H tap + **A** rpm	—
AUTO	Same as cooling / heating in POWERFUL operation	The target temperature is kept unchanged.

A = 80 ~ 90 rpm

Ex.): POWERFUL operation in cooling mode.



(R13571)

1.11 Other Functions

1.11.1 Hot-Start Function

In order to prevent the cold air blast that normally comes when heating operation is started, the temperature of the indoor heat exchanger is detected, and either the airflow is stopped or is made very weak thereby carrying out comfortable heating of the room.
*The cold air blast is also prevented using a similar control when the defrosting operation is started or when the thermostat is turned ON.

1.11.2 Signal Receiving Sign

When the indoor unit receives a signal from the remote controller, the unit emits a signal receiving sound.

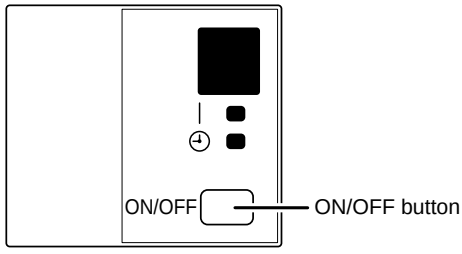
1.11.3 Indoor Unit ON/OFF Button

An ON/OFF button is provided on the display of the unit.

- Press this button once to start operation. Press once again to stop it.
- This button is useful when the remote controller is missing or the battery has run out.
- The operation mode refers to the following table.

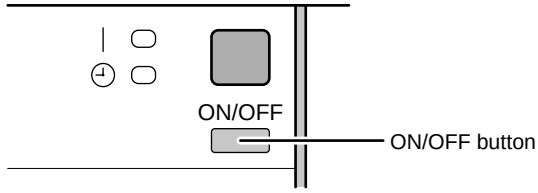
	Mode	Temperature setting	Airflow rate
Cooling Only	COOL	22°C (71.6°F)	Automatic
Heat Pump	AUTO	25°C (77°F)	Automatic

09/12 class



(R14568)

15/18/24 class



(R14380)

<Forced cooling operation>
Forced cooling operation can be started by pressing the ON/OFF button for 5 to 9 seconds while the unit is not operating.
Refer to page 222 for detail.

Note: When the ON/OFF button is pressed for 10 seconds or more, the forced cooling operation is stopped.

1.11.4 Titanium Apatite Photocatalytic Air-Purifying Filter

This filter combines the Air-Purifying Filter and Titanium Apatite Photocatalytic Deodorizing Filter as a single highly effective filter. The filter traps microscopic particles, decomposes odors and even deactivates bacteria and viruses. It lasts for 3 years without replacement if washed about once every 6 months.

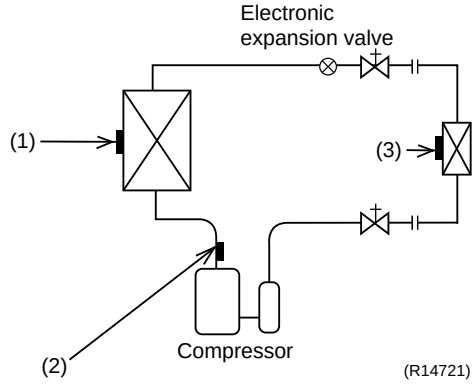
1.11.5 Auto-restart Function

If a power failure (including one for just a moment) occurs during the operation, the operation restarts automatically when the power is restored in the same condition as before the power failure.

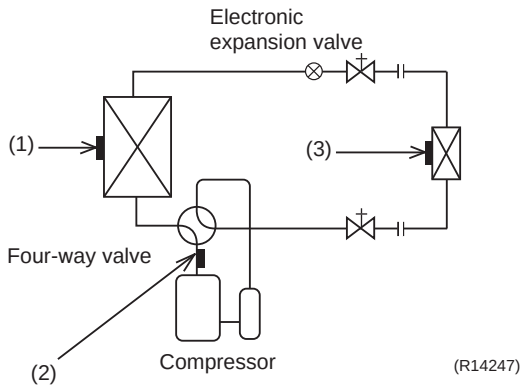
Note: It takes 3 minutes to restart the operation because the 3-minute standby function is activated.

2. Function of Thermistor

RKN09/12KEVJU



RKN15/18/24KEVJU
RXN09/12/15/18/24KEVJU



(1) Outdoor Heat Exchanger Thermistor

1. The outdoor heat exchanger thermistor is used for controlling target discharge pipe temperature. The system sets the target discharge pipe temperature according to the outdoor and indoor heat exchanger temperature, and controls the electronic expansion valve opening so that the target discharge pipe temperature can be obtained.
2. In cooling operation, the outdoor heat exchanger thermistor is used for detecting disconnection of the discharge pipe thermistor. When the discharge pipe temperature becomes lower than the outdoor heat exchanger temperature, the discharge pipe thermistor is judged as disconnected.
3. In cooling operation, the outdoor heat exchanger thermistor is used for high pressure protection.

(2) Discharge Pipe Thermistor

1. The discharge pipe thermistor is used for controlling discharge pipe temperature. If the discharge pipe temperature (used in place of the inner temperature of the compressor) rises abnormally, the operating frequency becomes lower or the operation halts.
2. The discharge pipe thermistor is used for detecting disconnection of the discharge pipe thermistor.

(3) Indoor Heat Exchanger Thermistor

1. The indoor heat exchanger thermistor is used for controlling target discharge pipe temperature. The system sets the target discharge pipe temperature according to the outdoor and indoor heat exchanger temperature, and controls the electronic expansion valve opening so that the target discharge pipe temperature can be obtained.
2. In cooling operation, the indoor heat exchanger thermistor is used for freeze-up protection control. If the indoor heat exchanger temperature drops abnormally, the operating frequency becomes lower or the operation halts.
3. In heating operation, the indoor heat exchanger thermistor is used for detecting disconnection of the discharge pipe thermistor. When the discharge pipe temperature becomes lower than the indoor heat exchanger temperature, the discharge pipe thermistor is judged as disconnected.

3. Control Specification

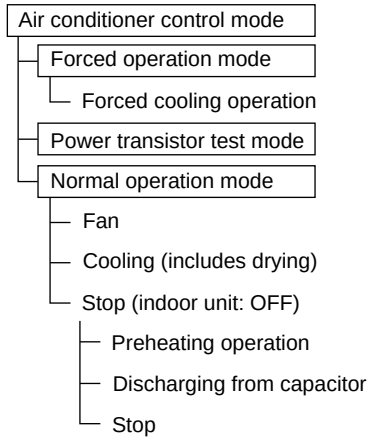
3.1 Mode Hierarchy

Outline

There are two modes; the one is the normal operation mode and the other is the forced operation mode for installation and servicing.

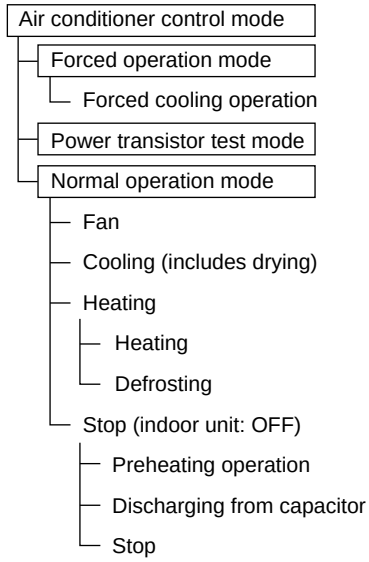
Detail

For Cooling Only Model



(R14428)

For Heat Pump Model



(R14248)

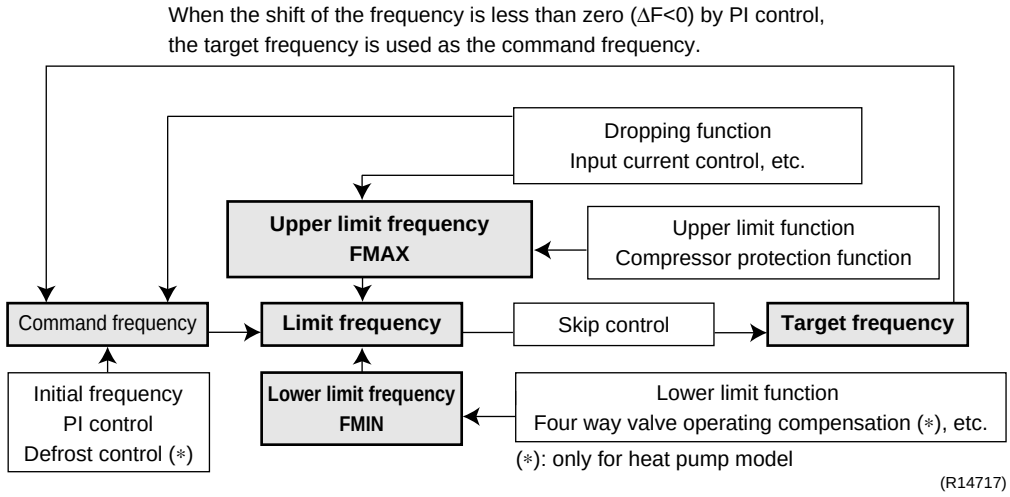
Note: Unless specified otherwise, an indoor dry operation command is regarded as cooling operation.

3.2 Frequency Control

Outline

Frequency is determined according to the difference between the room thermistor temperature and the target temperature.
The function is explained as follows.

1. How to determine frequency
2. Frequency command from the indoor unit (Difference between the room thermistor temperature and the target temperature)
3. Frequency initial setting
4. PI control



Detail

How to Determine Frequency

The compressor's frequency is determined by taking the following steps.

For Cooling Only Model

1. Determine command frequency

- Command frequency is determined in the following order of priority.
  1. Forced cooling
  2. Indoor frequency command

2. Determine upper limit frequency

- The minimum value is set as an upper limit frequency among the frequency upper limits of the following functions:
  Compressor protection, input current, discharge pipe temperature, freeze-up protection.

3. Determine lower limit frequency

- The maximum value is set as an lower limit frequency among the frequency lower limits of the following function:
  Pressure difference upkeep.

4. Determine prohibited frequency

- There is a certain prohibited frequency such as a power supply frequency.

For Heat Pump Model

1. Determine command frequency

- Command frequency is determined in the following order of priority.
  1. Limiting defrost control time
  2. Forced cooling
  3. Indoor frequency command

2. Determine upper limit frequency

- The minimum value is set as an upper limit frequency among the frequency upper limits of the following functions:
  Compressor protection, input current, discharge pipe temperature, heating peak-cut, freeze-up protection, defrost.

3. Determine lower limit frequency

- The maximum value is set as an lower limit frequency among the frequency lower limits of the following functions:
  Four-way valve operation compensation, draft prevention, pressure difference upkeep.

4. Determine prohibited frequency

- There is a certain prohibited frequency such as a power supply frequency.

Indoor Frequency Command (ΔD signal)

The difference between the room thermistor temperature and the target temperature is taken as the "ΔD signal" and is used for frequency command.

Temperature difference	ΔD signal	Temperature difference	ΔD signal	Temperature difference	ΔD signal	Temperature difference	ΔD signal
–2.0°C (–3.6°F)	∗Th OFF	0°C (0°F)	4	2.0°C (3.6°F)	8	4.0°C (7.2°F)	C
–1.5°C (–2.7°F)	1	0.5°C (0.9°F)	5	2.5°C (4.5°F)	9	4.5°C (8.1°F)	D
–1.0°C (–1.8°F)	2	1.0°C (1.8°F)	6	3.0°C (5.4°F)	A	5.0°C (9°F)	E
–0.5°C (–0.9°F)	3	1.5°C (2.7°F)	7	3.5°C (6.3°F)	B	5.5°C (9.9°F)	F

∗Th OFF = Thermostat OFF

Frequency Initial Setting

<Outline>

When starting the compressor, the frequency is initialized according to the ΔD value and the Q value of the indoor unit.

Q value: Indoor unit output determined from indoor unit volume, airflow rate and other factors.

PI Control (Determine Frequency Up / Down by ΔD Signal)

1. P control

The ΔD value is calculated in each sampling time (20 seconds), and the frequency is adjusted according to its difference from the frequency previously calculated.

2. I control

If the operating frequency does not change for more than a certain fixed time, the frequency is adjusted according to the ΔD value.

When the ΔD value is low, the frequency is lowered.

When the ΔD value is high, the frequency is increased.

3. Frequency management when other controls are functioning

- When frequency is dropping;
  Frequency management is carried out only when the frequency drops.
- For limiting lower limit
  Frequency management is carried out only when the frequency rises.

4. Upper and lower limit of frequency by PI control

The frequency upper and lower limits are set according to the command on indoor unit.

When the indoor or outdoor unit quiet operation command comes from the indoor unit, the upper limit frequency is lower than the usual setting.

3.3 Controls at Mode Changing / Start-up

3.3.1 Preheating Operation

Outline

The inverter operation in open phase starts with the conditions of the preheating command from the indoor unit, the outdoor temperature, and the discharge pipe temperature.

Detail

■ **09/12 class**

Outdoor temperature ≥ 7°C (44.6°F) → Control A (preheating for normal state)
Outdoor temperature < 7°C (44.6°F) → Control B (preheating of increased capacity)

Control A

- ON condition
  Discharge pipe temperature < 10°C (50°F)
- OFF condition
  Discharge pipe temperature > 12°C (53.6°F)
  Radiation fin temperature ≥ 90°C (194°F)

Control B

- ON condition
  Discharge pipe temperature < 20°C (68°F)
- OFF condition
  Discharge pipe temperature > 22°C (71.6°F)
  Radiation fin temperature ≥ 90°C (194°F)

■ **15/18/24 class**

ON Condition

- When the discharge pipe temperature is below 10°C (50°F), the inverter operation in open phase starts.

OFF Condition

- When the discharge pipe temperature is higher than 12°C (54°F), the inverter operation in open phase stops.

3.3.2 Four-Way Valve Switching

Outline

In heating operation, current is conducted, and in cooling and defrosting, current is not conducted. In order to eliminate the switching sound when the heating is stopped, as the four-way valve coil switches from ON to OFF, the OFF delay switch of the four-way valve is carried out after the operation stopped.

Detail

OFF delay switch of four-way valve:
The four-way valve coil is energized for 160 seconds after the operation is stopped.

3.3.3 Four-Way Valve Operation Compensation

Outline

At the beginning of the operation as the four-way valve is switched, the differential pressure to activate the four-way valve is acquired by having output frequency which is more than a certain fixed frequency, for a certain fixed time.

Detail

Starting Conditions

1. When starting compressor for heating
2. When the operation mode changes from heating to cooling
3. When starting compressor for defrosting
4. When starting compressor for heating after defrosting
5. When starting compressor for the first time after resetting with the power ON
6. When starting compressor after the fault of switching over cooling / heating

The lower limit of frequency keeps **A** Hz for **B** seconds with any conditions 1 through 6 above.

	09/12 class	15/18/24 class
A (Hz)	62	52
B (seconds)	50	60

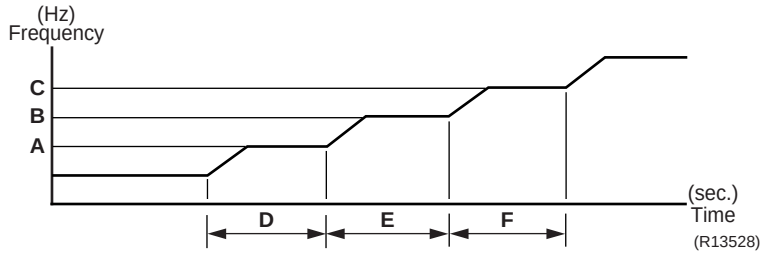
3.3.4 3-minute Standby

Turning on the compressor is prohibited for 3 minutes after turning it off.
(Except when defrosting.)

3.3.5 Compressor Protection Function

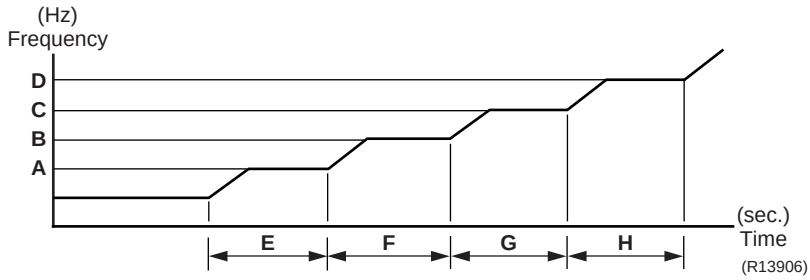
When turning the compressor from OFF to ON, the upper limit of frequency is set as follows. (The function is not activated when defrosting.)

■ **09/12 class**



A (Hz)	58
B (Hz)	72
C (Hz)	90
D (seconds)	180
E (seconds)	180
F (seconds)	10

■ **15/18/24 class**



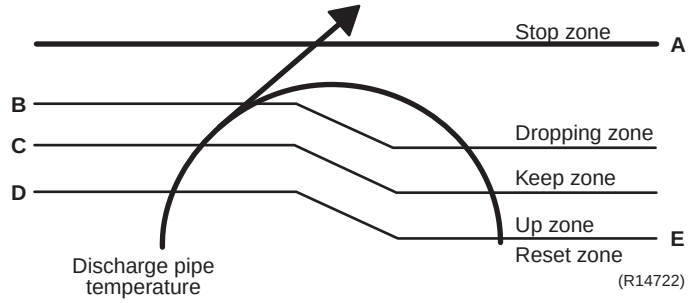
A (Hz)	52
B (Hz)	66
C (Hz)	78
D (Hz)	Cooling: 98, Heating: 96
E (seconds)	120
F (seconds)	120
G (seconds)	480
H (seconds)	60

3.4 Discharge Pipe Temperature Control

Outline

The discharge pipe temperature is used as the internal temperature of the compressor. If the discharge pipe temperature rises above a certain level, the upper limit of frequency is set to keep this temperature from going up further.

Detail



Zone	Control
Stop zone	When the temperature reaches the stop zone, the compressor stops.
Dropping zone	The upper limit of frequency decreases.
Keep zone	The upper limit of frequency is kept.
Up zone	The upper limit of frequency increases.
Reset zone	The upper limit of frequency is canceled.

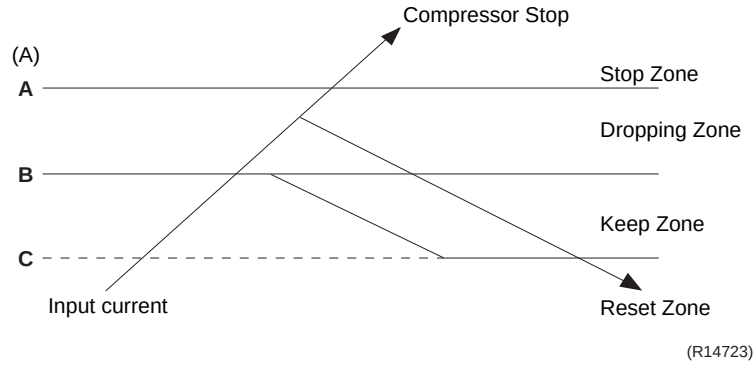
	09/12 class	15/18/24 class
A	110°C (230°F)	118°C (244.4°F)
B	105°C (221°F)	108°C (226.4°F)
C	101°C (213.8°F)	103°C (217.4°F)
D	99°C (210.2°F)	97°C (206.6°F)
E	97°C (206.6°F)	85°C (185°F)

3.5 Input Current Control

Outline

The microcomputer calculates the input current during the compressor is running, and sets the frequency upper limit from the input current.
In case of heat pump model, this control which is the upper limit control of the frequency takes priority to the lower limit of control of four-way valve operation compensation.

Detail



Frequency control in each zone

Stop zone

- After 2.5 seconds in this zone, the compressor is stopped.

Dropping zone

- The upper limit of the compressor frequency is defined as operation frequency – 2 Hz.
- After this, the output frequency is pulled down by 2 Hz every second until it reaches the keep zone.

Keep zone

- The present maximum frequency goes on.

Reset zone

- Limit of the frequency is canceled.

■ **09/12 class**

		09 class		12 class	
		Cooling	Heating	Cooling	Heating
A (A)		14.0		14.0	
B (A)	Normal mode	7.0	8.5	7.75	8.5
	ECONO mode	2.75		2.75	
C (A)	Normal mode	6.25	7.75	7.0	7.75
	ECONO mode	2.0		2.0	

■ **15/18/24 class**

	Cooling	Heating
A (A)	14.5	15.0
B (A)	11.5	12.0
C (A)	10.5	11.0

Limitation of current dropping and stop value according to the outdoor temperature

- The current drops when outdoor temperature becomes higher than a certain level (depending on the model).

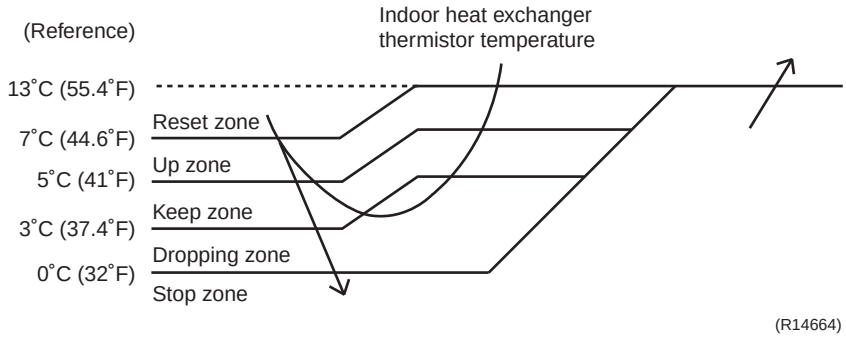
3.6 Freeze-up Protection Control

Outline

During cooling operation, the signal sent from the indoor unit controls the operating frequency limitation and prevents freezing of the indoor heat exchanger. (The signal from the indoor unit is divided into zones.)

Detail

The operating frequency limitation is judged with the indoor heat exchanger temperature.

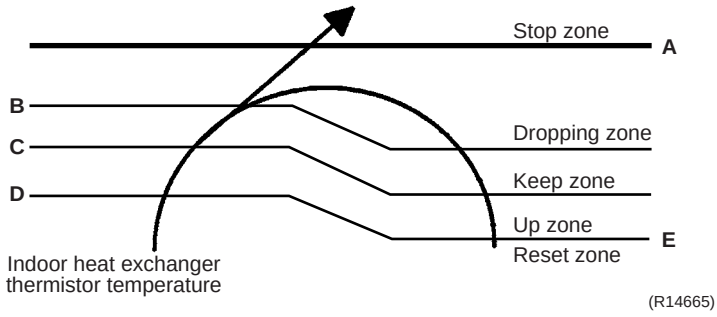


3.7 Heating Peak-cut Control

Outline

During heating operation, the indoor heat exchanger temperature determines the frequency upper limit to prevent abnormal high pressure.

Detail



Zone	Control
Stop zone	When the temperature reaches the stop zone, the compressor stops.
Dropping zone	The upper limit of frequency decreases.
Keep zone	The upper limit of frequency is kept.
Up zone	The upper limit of frequency increases.
Reset zone	The upper limit of frequency is canceled.

	09/12 class	15/18/24 class
A	65°C (149°F)	60°C (140°F)
B	51°C (123.8°F)	54°C (129.2°F)
C	48°C (118.4°F)	51°C (123.8°F)
D	46°C (114.8°F)	49°C (120.2°F)
E	41°C (105.8°F)	44°C (111.2°F)

3.8 Outdoor Fan Control

1. Fan OFF delay when stopped
The outdoor fan is turned OFF 70 seconds after the compressor stops.

2. Fan ON control to cool down the electrical box
The outdoor fan is turned ON when the electrical box temperature is high while the compressor is OFF.

3. Fan OFF control while defrosting
The outdoor fan is turned OFF while defrosting.

4. Fan ON/OFF control when operation starts / stops
The outdoor fan is turned ON when the operation starts. The outdoor fan is turned OFF when the operation stops.

5. Fan speed control while forced cooling operation
The outdoor fan is controlled as well as normal operation while the forced cooling operation.

6. Fan speed control while indoor unit quiet operation (15/18/24 class)
The rotation speed of the outdoor fan is reduced by the command of the indoor unit quiet operation.

7. Fan speed control for POWERFUL operation (15/18/24 class)
The rotation speed of the outdoor fan is increased while the POWERFUL operation.

8. Fan speed control for pressure difference upkeep
The rotation speed of the outdoor fan is controlled for keeping the pressure difference while cooling with low outdoor temperature.
- When the pressure difference is low, the rotation speed of the outdoor fan is reduced.
- When the pressure difference is high, the rotation speed of the outdoor fan is controlled as well as normal operation.

3.9 Liquid Compression Protection Function

Outline

In order to obtain the dependability of the compressor, the compressor is stopped according to the outdoor temperature and temperature of the outdoor heat exchanger.

Detail

■ Operation stops depending on the outdoor temperature
Compressor turns off under the conditions that the system is in cooling operation and outdoor temperature is below 0°C (32°F).

3.10 Defrost Control

Outline

Defrosting is carried out by the cooling cycle (reverse cycle). The defrosting time or outdoor heat exchanger temperature must be more than a certain value to finish.

Detail

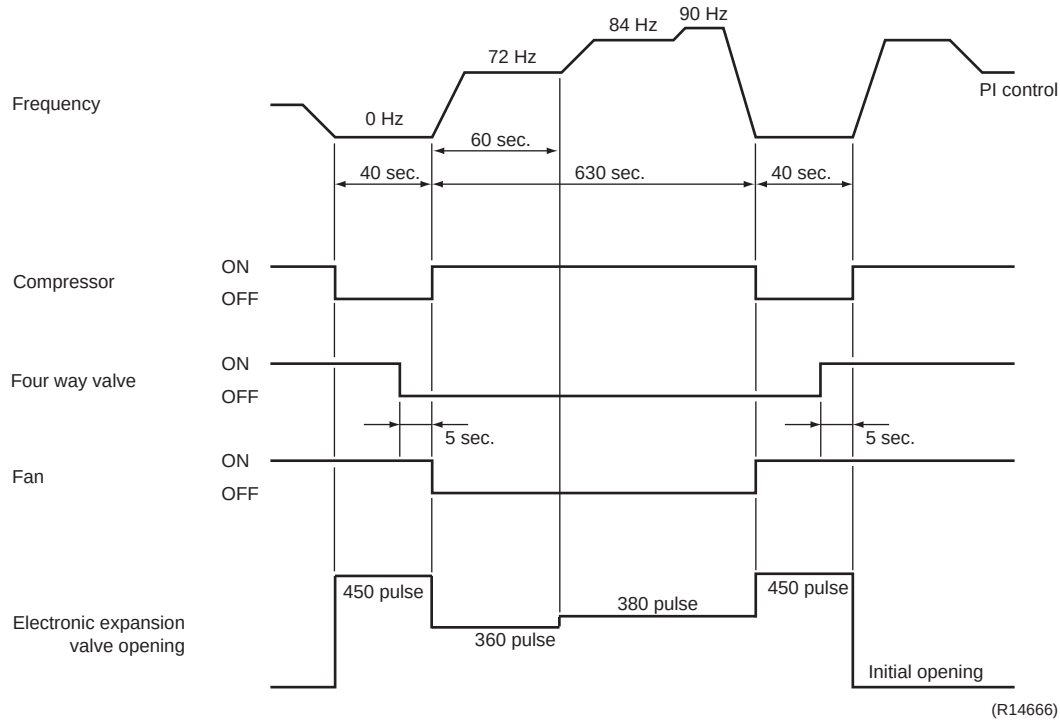
Conditions for Starting Defrost

- The starting conditions are determined with the outdoor temperature and the outdoor heat exchanger temperature.
- The system is in heating operation.
- The compressor operates for 6 minutes.
- More than 28 minutes of accumulated time pass since the start of the operation, or ending the previous defrosting. (09/12 class)
- More than 15 ~ 25 minutes (depending on the duration of the previous defrost control) of accumulated time have passed since the start of the operation, or ending the previous defrosting. (15/18/24 class)

Conditions for Canceling Defrost

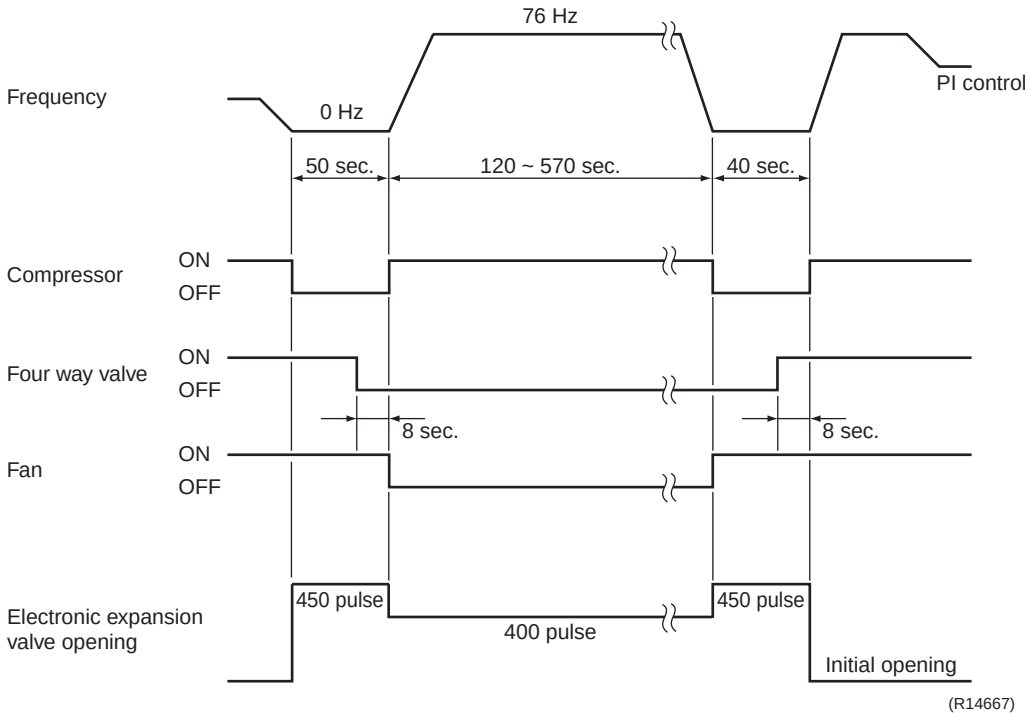
- **09/12 class**

The judgment is made with outdoor heat exchanger temperature. (4 ~ 22°C, 39.2 ~ 71.6°F)



■ **15/18/24 class**

The judgment is made with outdoor heat exchanger temperature. (6 ~ 30°C, 42.8 ~ 86°F)



3.11 Electronic Expansion Valve Control

Outline

The following items are included in the electronic expansion valve control.

Electronic expansion valve is fully closed

1. Electronic expansion valve is fully closed when turning on the power.
2. Pressure equalizing control

Open Control

1. Electronic expansion valve control when starting operation
2. Electronic expansion valve control when the frequency changes
3. Electronic expansion valve control for defrosting
4. Electronic expansion valve control when the discharge pipe temperature is abnormally high
5. Electronic expansion valve control when the discharge pipe thermistor is disconnected

Feedback Control

1. Target discharge pipe temperature control

Detail

The followings are the examples of control which function in each mode by the electronic expansion valve control.

h : function – : not function	When the power turns on or when the compressor stops	When the operation starts	When the frequency changes under starting control	During target discharge pipe temperature control	When the frequency changes under target discharge pipe temperature control	When the disconnection of the discharge pipe thermistor is ascertained	When the frequency changes under the control for disconnection of the discharge pipe thermistor	Under defrost control
Cooling								
Starting control	–	h	–	–	–	–	–	–
Control when the frequency changes	–	–	h	–	h	–	–	–
Target discharge pipe temperature control	–	–	–	h	–	–	–	–
Control for disconnection of the discharge pipe thermistor	–	–	–	–	–	h	h	–
High discharge pipe temperature control	–	h	h	h	h	–	–	–
Pressure equalizing control	h	–	–	–	–	–	–	–
Opening limit control	–	h	h	h	h	h	h	–
Heating								
Starting control	–	h	–	–	–	–	–	–
Control when the frequency changes	–	–	h	–	h	–	–	–
Target discharge pipe temperature control	–	–	–	h	–	–	–	–
Control for disconnection of the discharge pipe thermistor	–	–	–	–	–	h	h	–
High discharge pipe temperature control	–	h	h	h	h	–	–	–
Defrost control	–	–	–	–	–	–	–	h
Pressure equalizing control	h	–	–	–	–	–	–	–
Opening limit control	–	h	h	h	h	h	h	–

(R14458)

3.11.1 Fully Closing with Power ON

The electronic expansion valve is initialized when turning on the power. The opening position is set and the pressure equalization is developed.

3.11.2 Pressure Equalizing Control

When the compressor is stopped, the pressure equalizing control is activated. The electronic expansion valve opens, and develops the pressure equalization.

3.11.3 Opening Limit Control

Outline

A maximum and minimum opening of the electronic expansion valve are limited.

Detail

	09/12 class	15/18/24 class
Maximum opening (pulse)	470	470
Minimum opening (pulse)	52	17

The electronic expansion valve is fully closed when cooling operation stops, and is opened at fixed degree during defrosting.

3.11.4 Starting Operation Control

The electronic expansion valve opening is controlled when the operation starts, and prevents the superheating or liquid compression.

3.11.5 Control when the frequency changes

When the target discharge pipe temperature control is active, if the target frequency is changed for a specified value in a certain time period, the target discharge pipe temperature control is canceled and the target opening of the electronic expansion valve is changed according to the shift.

3.11.6 High Discharge Pipe Temperature Control

When the compressor is operating, if the discharge pipe temperature exceeds a certain value, the electronic expansion valve opens and the refrigerant runs to the low pressure side. This procedure lowers the discharge pipe temperature.

3.11.7 Control for Disconnection of the Discharge Pipe Thermistor

Outline

The disconnection of the discharge pipe thermistor is detected by comparing the discharge pipe temperature with the condensation temperature. If the discharge pipe thermistor is disconnected, the electronic expansion valve opens according to the outdoor temperature and the operation frequency, and operates for a specified time, and then stops.
After 3 minutes of waiting, the operation restarts and checks if the discharge pipe thermistor is disconnected. If the discharge pipe thermistor is disconnected, the system stops after operating for a specified time.
If the disconnection is detected repeatedly, then the system is shut down. When the compressor runs for 60 minutes without any error, the error counter is reset.

Detail

When the starting control finishes, the detection timer for disconnection of the discharge pipe thermistor (720 seconds) starts. When the timer is over, the following adjustment is made.

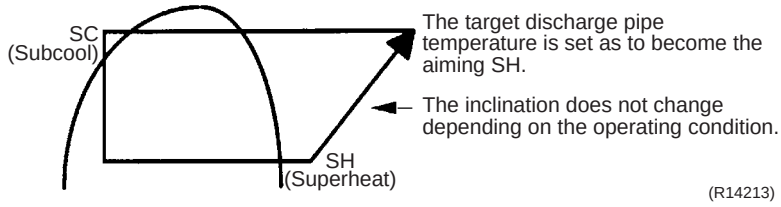
1. When the operation mode is cooling
   When the following condition is fulfilled, the discharge pipe thermistor disconnection is ascertained.
   Discharge pipe temperature + 6°C (+ 10.8°F) < outdoor heat exchanger temperature
2. When the operation mode is heating
   When the following condition is fulfilled, the discharge pipe thermistor disconnection is ascertained.
   Discharge pipe temperature + 6°C (+ 10.8°F) < indoor heat exchanger temperature

Adjustment when the thermistor is disconnected

When the disconnection is ascertained, the compressor continues operation for 9 minutes and then stops.
When the compressor stops repeatedly, the system is shut down.

3.11.8 Target Discharge Pipe Temperature Control

The target discharge pipe temperature is obtained from the indoor and outdoor heat exchanger temperature, and the electronic expansion valve opening is adjusted so that the actual discharge pipe temperature becomes close to the target discharge pipe temperature. (Indirect SH (superheating) control using the discharge pipe temperature)



The electronic expansion valve opening and the target discharge pipe temperature are adjusted every 20 seconds. The target discharge pipe temperature is controlled by indoor heat exchanger temperature and outdoor heat exchanger temperature. The opening degree of the electronic expansion valve is controlled by followings.

- Target discharge pipe temperature
- Actual discharge pipe temperature
- Previous discharge pipe temperature

3.12 Malfunctions

3.12.1 Sensor Malfunction Detection

Sensor malfunction may occur in the thermistor.

Relating to Thermistor Malfunction

1. Outdoor heat exchanger thermistor
2. Discharge pipe thermistor
3. Radiation fin thermistor
4. Outdoor temperature thermistor

3.12.2 Detection of Overcurrent and Overload

Outline

An excessive output current is detected and, the OL temperature is observed to protect the compressor.

Detail

- If the OL (compressor head) temperature exceeds 120 ~ 130°C (248 ~ 266°F), the system shuts down the compressor.
- If the inverter current exceeds about 15 A, the system shuts down the compressor.
  The upper limit of the current decreases when the outdoor temperature exceeds a certain level.

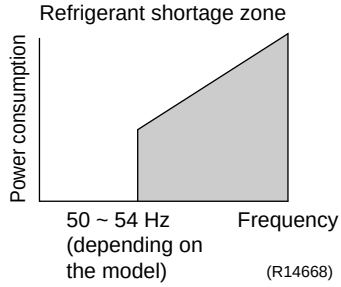
3.12.3 Refrigerant Shortage Control

Outline

I: Detecting by power consumption

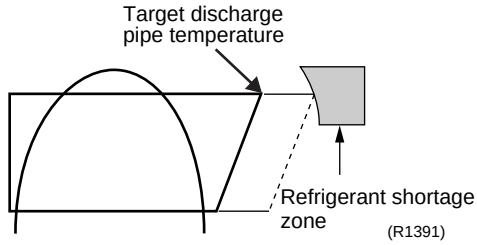
If the power consumption is below the specified value and the frequency is higher than the specified frequency, it is regarded as refrigerant shortage.

The power consumption is low comparing with that in the normal operation when refrigerant is insufficient, and refrigerant shortage is detected by checking a power consumption.



II: Detecting by discharge pipe temperature

If the discharge pipe temperature is higher than the target discharge pipe temperature, and the electronic expansion valve is fully open for more than the specified time, it is regarded as refrigerant shortage.



III Detecting by the difference of temperature

If the difference between suction and discharge temperature is smaller than the specified value, it is regarded as refrigerant shortage.

Refer to page 112 for detail.

Part 5
Operation Manual

1. System Configuration

After installation and test operation of the room air conditioner are completed, the air conditioner should be handled and operated as described in the following pages. Every user should be informed on the correct method of operation and how to check if it can cool (or heat) well, and how to use it efficiently.

Providing instructions to the user can reduce requests for servicing by 80%. However proficient the installation and operating functions of the AC system are, the customer may fault either the room air conditioner or its installation work when it is actually due to improper handling. The installation work and the handing-over of the unit can only be considered completed when its handling has been fully explained to the user without using technical terms, and while imparting full knowledge of the equipment.

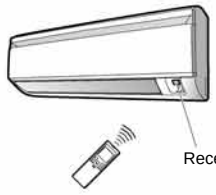
2. 09/12 Class

2.1 Remote Controller

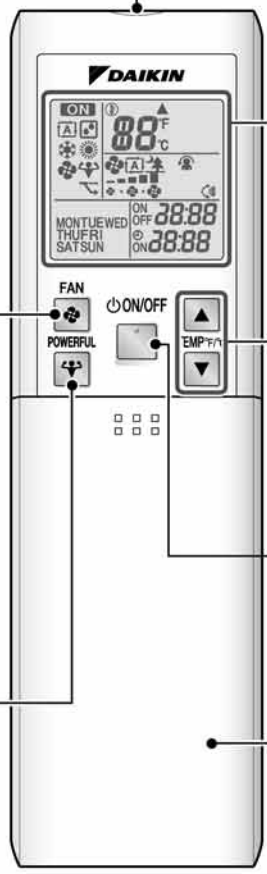
Name of Parts

Remote Controller

Signal transmitter



- To use the remote controller, aim the transmitter at the indoor unit. If there is anything to block signals between the unit and the remote controller, such as a curtain, the unit will not operate.
- Do not drop the remote controller. Do not get it wet.
- The maximum distance for communication is approximately 23ft (7m).



Display (LCD)

- Displays the current settings. (In this illustration, each section is shown with all its displays on for the purpose of explanation.)

TEMPERATURE adjustment buttons

- Changes the temperature setting. Page 12

FAN setting button

- Selects the airflow rate setting. Page 14

ON/OFF button

- Press this button once to start operation. Press once again to stop it. Page 11

POWERFUL button

- POWERFUL operation. Page 16

Front cover

- Open the front cover. Page 8

<ARC452A19>

7

■ Open the front cover

MODE selector button
- Selects the operation mode. (AUTO/DRY/COOL/HEAT/FAN) Page 11

ECONO button
- ECONO operation. Page 17

COMFORT button
- COMFORT AIRFLOW operation. Page 15

SWING button
- Adjusting the airflow direction. Page 13

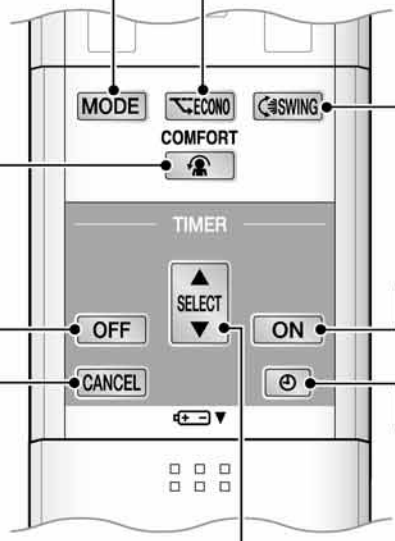
OFF TIMER button Page 18

ON TIMER button Page 19

TIMER CANCEL button
- Cancels the timer setting. Page 18,19

CLOCK button

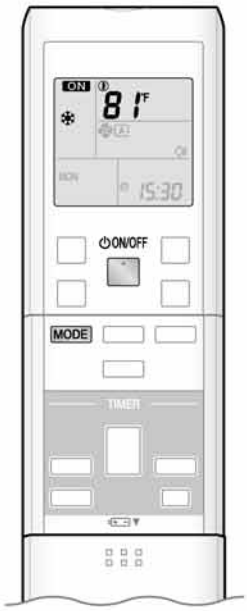
SELECT button
- Changes the ON/OFF TIMER settings. Page 18,19



8

2.2 AUTO · DRY · COOL · HEAT · FAN Operation

AUTO · DRY · COOL · HEAT · FAN Operation



The air conditioner operates with the operation mode of your choice.
From the next time on, the air conditioner will operate with the same operation mode.

■ To start operation

1. Press MODE and select an operation mode.

• Each pressing of the button advances the mode setting in sequence.

COOLING ONLY model

DRY → COOL → FAN

HEAT PUMP model

AUTO → DRY → COOL → HEAT → FAN

2. Press ⏻ON/OFF.

• "ON" is displayed on the LCD.
• The OPERATION lamp lights green.

Display

■ To stop operation

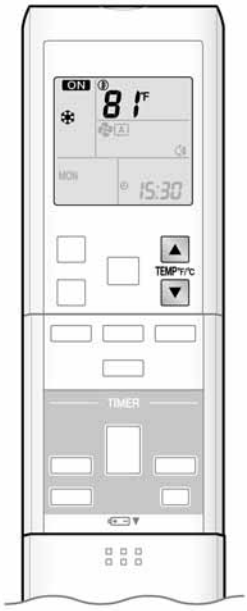
Press ⏻ON/OFF again.

• "ON" is no longer displayed on the LCD.
• The OPERATION lamp goes off.

NOTE

MODE	Notes on each operation mode
HEAT	• Since this air conditioner heats the room by taking heat from outdoor air to indoors, the heating capacity becomes smaller in lower outdoor temperatures. If the heating effect is insufficient, it is recommended to use another heating appliance in combination with the air conditioner. • The heat pump system heats the room by circulating hot air around all parts of the room. After the start of HEAT operation, it takes some time before the room gets warmer. • In HEAT operation, frost may occur on the outdoor unit and lower the heating capacity. In that case, the system switches into defrosting operation to take away the frost. • During defrosting operation, hot air does not flow out of indoor unit.
COOL	• This air conditioner cools the room by releasing the heat in the room outside. Therefore, the cooling performance of the air conditioner may be degraded if the outdoor temperature is high.
DRY	• The computer chip works to rid the room of humidity while maintaining the temperature as much as possible. It automatically controls temperature and airflow rate, so manual adjustment of these functions is unavailable.
AUTO	• In AUTO operation, the system selects an appropriate operation mode (COOL or HEAT) based on the room and outside temperatures and starts the operation. • The system automatically reselects setting at a regular interval to bring the room temperature to user-setting level.
FAN	• This mode is valid for fan only.

11



■ To change the temperature setting

Press ▲ TEMP°F/°C or TEMP°F/°C ▼.

• The displayed items on the LCD will change whenever either one of the buttons is pressed.

COOL operation	HEAT operation	AUTO operation	DRY or FAN operation
64-90˚F (18-32˚C)	50-86˚F (10-30˚C)	64-86˚F (18-30˚C)	The temperature setting is not variable.
Press ▲ to raise the temperature and press ▼ to lower the temperature.			

■ Operating conditions

■ Recommended temperature setting

• For cooling: 78-82˚F (26-28˚C)

• For heating: 68-75˚F (20-24˚C)

■ Tips for saving energy

• Be careful not to cool (heat) the room too much.
Keeping the temperature setting at a moderate level helps save energy.

• Cover windows with a blind or a curtain.
Blocking sunlight and air from outdoors increases the cooling (heating) effect.

• Clogged air filters cause inefficient operation and waste energy. Clean them once in about every 2 weeks.

■ Notes on the operating conditions

• The air conditioner always consumes 50-120btu/h (15-35W) of electricity even while it is not operating.
The outdoor unit consumes 3.4-34btu/h (1-10W) to have its electric components work even while it is not operating.
During standby electricity saving mode : about 3.4btu/h (1W)
The outdoor unit consumes about 120btu/h (35W) of power at the time of compressor preheating.

• If you are not going to use the air conditioner for a long period, for example in spring or autumn, turn the breaker off.

• Use the air conditioner in the following conditions.

MODE	Operating conditions	If operation is continued out of this range
COOL	Outdoor temperature : 50-115˚F (10-46˚C) Indoor temperature : 64-90˚F (18-32˚C) Indoor humidity : 80% max.	• A safety device may work to stop the operation. • Condensation may occur on the indoor unit and drip.
HEAT	Outdoor temperature : 5-75˚F (–15-24˚C) Indoor temperature : 50-86˚F (10-30˚C)	• A safety device may work to stop the operation.
DRY	Outdoor temperature : 50-115˚F (10-46˚C) Indoor temperature : 64-90˚F (18-32˚C) Indoor humidity : 80% max.	• A safety device may work to stop the operation. • Condensation may occur on the indoor unit and drip.

• Operation outside this humidity or temperature range may cause a safety device to disable the system.

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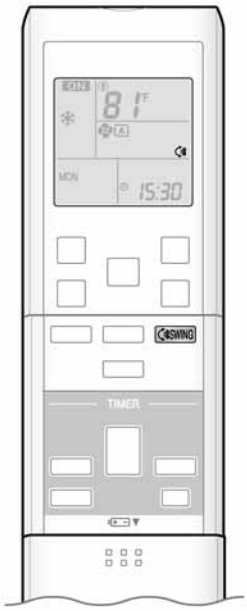
2.3 Adjusting the Airflow Direction and Rate

Adjusting the Airflow Direction and Rate



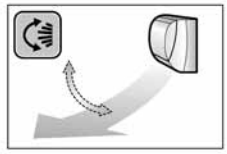
You can adjust the airflow direction to increase your comfort.

■ To start auto swing

Upper and lower airflow direction

Press SWING.

- "" is displayed on the LCD.
- The louver (horizontal blade) will begin to swing.



■ To set the louver at desired position

- This function is effective while louver is in auto swing mode.

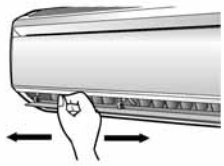
Press SWING when the louver has reached the desired position.

- The louver will stop moving.
- "" is no longer displayed on the LCD.

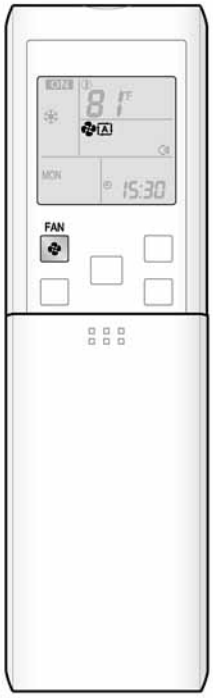
■ To adjust the fins (vertical blades)

Hold the knob and move the fins.
(You will find a knob on the left-side and the right-side blades.)

- When the unit is installed in the corner of a room, the direction of the fins should be facing away from the wall. If they face the wall, the wall will block off the wind, causing the cooling (or heating) efficiency to drop.



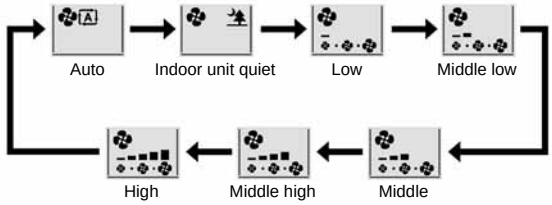
13



■ To adjust the airflow rate setting

Press .

• Each pressing of advances the airflow rate setting in sequence.



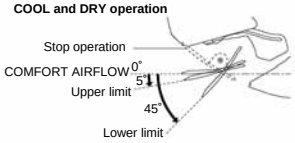
• When the airflow is set to " ", indoor unit quiet operation will start and the noise from the unit will become quieter.
• In indoor unit quiet operation, the airflow rate is set to a weak level.
• In DRY operation, the airflow rate setting is not variable.

NOTE

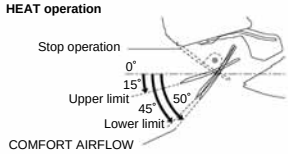
■ Notes on the angles of the louver

• The louver swinging range depends on the operation. (See the figure.)

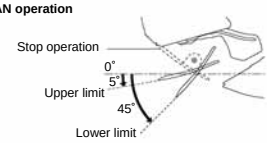
COOL and DRY operation



HEAT operation



FAN operation



• If the air conditioner is HEAT or DRY operation with the louver kept stopped in the downward direction, the louver will automatically start operating in approximately an hour in order to prevent dew condensation.

■ Note on airflow rate setting

• At smaller airflow rates, the cooling (heating) effect is also smaller.

⚠ CAUTION

• Always use a remote controller to adjust the angles of the louver. If you attempt to move the louver and fins forcibly with hand when they are swinging, the mechanism may be broken.
• Be careful when adjusting the fins. Inside the air outlet, a fan is rotating at a high speed.

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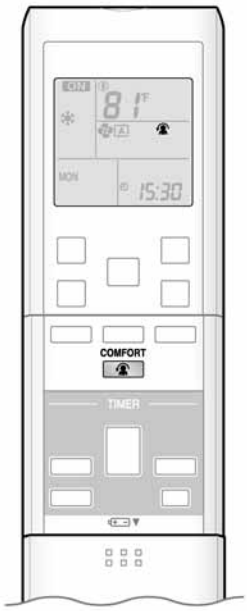
2.4 COMFORT AIRFLOW Operation

COMFORT AIRFLOW Operation



The flow of air will be in the upward direction while in COOL operation and in the downward direction while in HEAT operation, which will provide a comfortable wind that will not come in direct contact with people.

■ To start COMFORT AIRFLOW operation

Press [ ] .

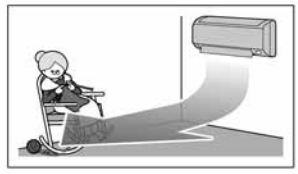
- "[ ]" is displayed on the LCD.
- Airflow rate is set to auto.
  <COOL/DRY>The louver will go up.
  <HEAT>The louver will go down.

■ To cancel COMFORT AIRFLOW operation

Press [ ] again.

- The louver will return to the memory position from before COMFORT AIRFLOW operation.
- "[ ]" is no longer displayed on the LCD.

COOL operation



HEAT operation

NOTE

■ **Notes on COMFORT AIRFLOW operation**

- The louver position will change, preventing air from blowing directly on the occupants of the room.
- POWERFUL operation and COMFORT AIRFLOW operation cannot be used at the same time.
  Priority is given to the function of whichever button is pressed last.
- The airflow rate will be set to auto. If the upper and lower airflow direction is selected, the COMFORT AIRFLOW operation will be canceled.

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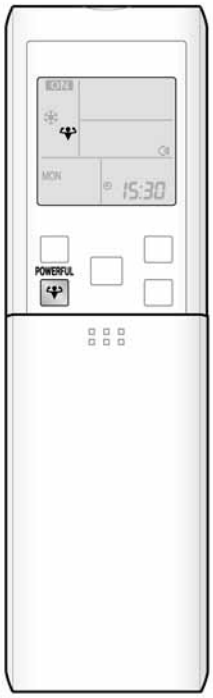
2.5 POWERFUL Operation

POWERFUL Operation



POWERFUL operation quickly maximizes the cooling (heating) effect in any operation mode. You can get the maximum capacity.

■ To start POWERFUL operation

Press [POWERFUL] during operation.

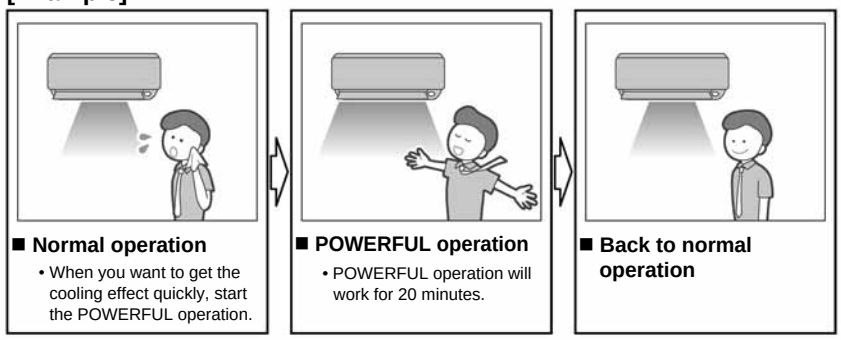
- POWERFUL operation ends in 20 minutes. Then the system automatically operates again with the previous settings which were used before POWERFUL operation.
- "POWERFUL" is displayed on the LCD.

■ To cancel POWERFUL operation

Press [POWERFUL] again.

- "POWERFUL" is no longer displayed on the LCD.

[Example]



■ **Normal operation**
- When you want to get the cooling effect quickly, start the POWERFUL operation.

■ **POWERFUL operation**
- POWERFUL operation will work for 20 minutes.

■ **Back to normal operation**

NOTE

■ **Notes on POWERFUL operation**
- When using POWERFUL operation, there are some functions which are not available.
- POWERFUL operation cannot be used together with ECONO and COMFORT AIRFLOW operation.
  Priority is given to the function of whichever button is pressed last.
- POWERFUL operation will not increase the capacity of the air conditioner if the air conditioner is already in operation with its maximum capacity demonstrated.
- **In COOL, HEAT and AUTO operation**
  To maximize the cooling (heating) effect, the capacity of outdoor unit is increased and the airflow rate is fixed to the maximum setting.
  The temperature and airflow settings are not variable.
- **In DRY operation**
  The temperature setting is lowered by 4.5˚F (2.5˚C) and the airflow rate is slightly increased.
- **In FAN operation**
  The airflow rate is fixed to the maximum setting.

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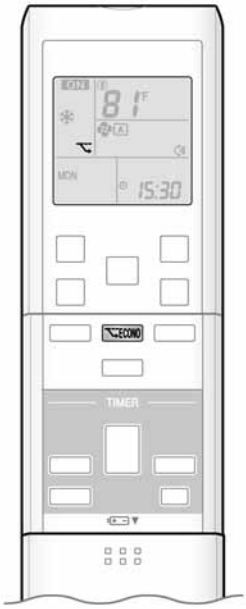
2.6 ECONO Operation

ECONO Operation



ECONO operation is a function which enables efficient operation by limiting the maximum power consumption value.
This function is useful for cases in which attention should be paid to ensure a circuit breaker will not trip when the product runs alongside other appliances.

■ To start ECONO operation

Press ECONO during operation.

• "ECONO" is displayed on the LCD.

■ To cancel ECONO operation

Press ECONO again.

• "ECONO" is no longer displayed on the LCD.

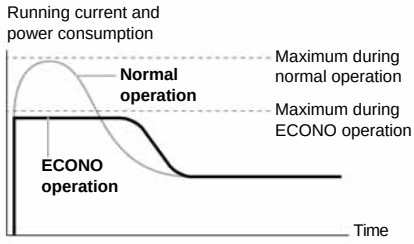
[Example]

Normal operation

• In case the air conditioner and other appliances which require high power consumption are used at same time, a circuit breaker may trip if the air conditioner operate with its maximum capacity.

ECONO operation

• The maximum power consumption of the air conditioner is limited by using ECONO operation. The circuit breaker is unlikely to trip even if the air conditioner and other appliances are used at same time.



From start up until set temperature is reached

• This diagram is a representation for illustrative purposes only.
The maximum running current and power consumption of the air conditioner in ECONO operation vary with the connecting outdoor unit.

NOTE

■ **Notes on ECONO operation**

- ECONO operation is a function which enables efficient operation by limiting the power consumption of the outdoor unit (operating frequency).
- ECONO operation functions in AUTO, COOL, DRY, and HEAT operation.
- POWERFUL and ECONO operation cannot be used at the same time.
  Priority is given to the function of whichever button is pressed last.
- If the level of power consumption is already low, ECONO operation will not drop the power consumption.

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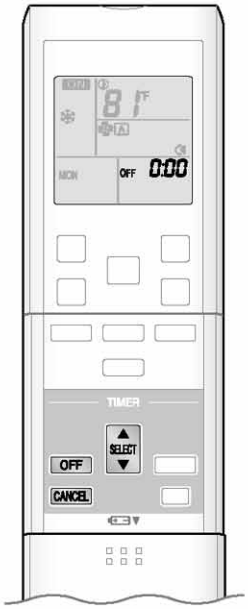
2.7 OFF TIMER Operation

OFF TIMER Operation



Timer functions are useful for automatically switching the air conditioner on or off at night or in the morning. You can also use OFF TIMER and ON TIMER in combination.

■ To use OFF TIMER operation

• Check that the clock is correct.
If not, set the clock to the present time.

1. Press OFF .

" 0:00 " is displayed on the LCD.
" OFF " blinks.

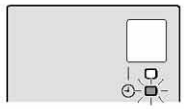
• " " is no longer displayed on the LCD.

2. Press SELECT until the time setting reaches the point you like.

• Each pressing of either button increases or decreases the time setting by 10 minutes. Holding down either button changes the time setting rapidly.

3. Press OFF again.

• " OFF " and setting time are displayed on the LCD.
• The TIMER lamp lights yellow.



Display

■ To cancel OFF TIMER operation

Press CANCEL .

• " OFF " and setting time are no longer displayed on the LCD.
• " " and day of the week are displayed on the LCD.
• The TIMER lamp goes off.

NOTE

■ **Notes on TIMER operation**
- When TIMER is set, the present time is not displayed.
- Once you set ON/OFF TIMER, the time setting is kept in the memory. The memory is canceled when remote controller batteries are replaced.
- When operating the unit via the ON/OFF TIMER, the actual length of operation may vary from the time entered by the user. (Maximum approximately 10 minutes)

■ **NIGHT SET mode**
- When the OFF TIMER is set, the air conditioner automatically adjusts the temperature setting (0.9˚F (0.5˚C) up in COOL, 3.6˚F (2.0˚C) down in HEAT) to prevent excessive cooling (heating) for your pleasant sleep.

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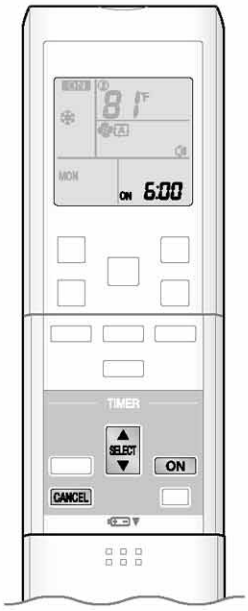
2.8 ON TIMER Operation

ON TIMER Operation



■ To use ON TIMER operation

• Check that the clock is correct.
If not, set the clock to the present time.

1. Press ON.

" 6:00 " is displayed on the LCD.
" ON" blinks.

• " " is no longer displayed on the LCD.

2. Press SELECT until the time setting reaches the point you like.

• Each pressing of either button increases or decreases the time setting by 10 minutes.
Holding down either button changes the setting rapidly.

3. Press ON again.

• " ON " and setting time are displayed on the LCD.
• The TIMER lamp lights yellow.

Display

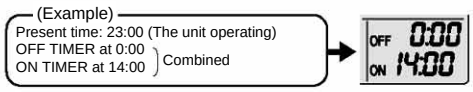
■ To cancel ON TIMER operation

Press CANCEL.

• " ON " and setting time are no longer displayed on the LCD.
• " " and day of the week are displayed on the LCD.
• The TIMER lamp goes off.

■ To combine ON TIMER and OFF TIMER

• A sample setting for combining the 2 timers is shown below.



NOTE

■ **In the following cases, set the timer again.**
• After a breaker has turned off.
• After a power failure.
• After replacing batteries in the remote controller.

19

3P272441-1

3. 15/18/24 Class

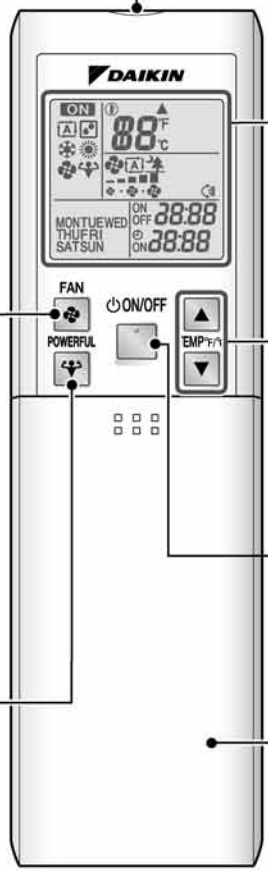
3.1 Remote Controller

Name of Parts

Remote Controller

Signal transmitter

- To use the remote controller, aim the transmitter at the indoor unit. If there is anything to block signals between the unit and the remote controller, such as a curtain, the unit will not operate.
- Do not drop the remote controller. Do not get it wet.
- The maximum distance for communication is approximately 23ft (7m).



Display (LCD)
- Displays the current settings. (In this illustration, each section is shown with all its displays on for the purpose of explanation.)

TEMPERATURE adjustment buttons
- Changes the temperature setting. ▶Page 12

FAN setting button
- Selects the airflow rate setting. ▶Page 14

ON/OFF button
- Press this button once to start operation. Press once again to stop it. ▶Page 11

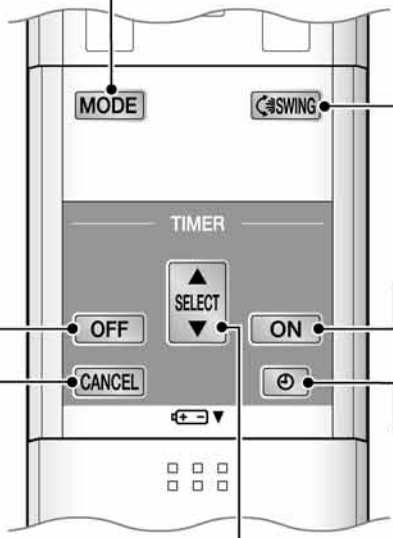
POWERFUL button
- POWERFUL operation. ▶Page 15

Front cover
- Open the front cover ▶Page 8

<ARC452A20>

7

■ Open the front cover



MODE selector button
• Selects the operation mode. (AUTO/DRY/COOL/HEAT/FAN) Page 11

SWING button
• Adjusting the airflow direction. Page 13

OFF TIMER button Page 16

ON TIMER button Page 17

TIMER CANCEL button
• Cancels the timer setting. Page 16,17

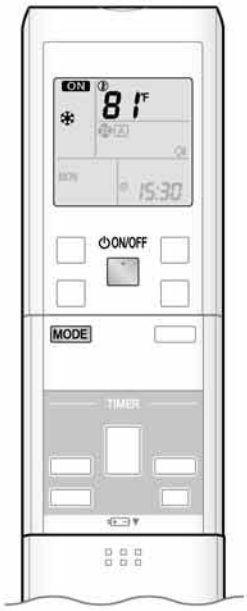
CLOCK button

SELECT button
• Changes the ON/OFF TIMER settings. Page 16,17

8

3.2 AUTO · DRY · COOL · HEAT · FAN Operation

AUTO · DRY · COOL · HEAT · FAN Operation



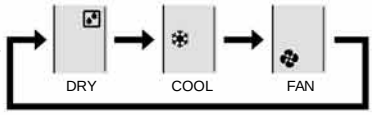
The air conditioner operates with the operation mode of your choice.
From the next time on, the air conditioner will operate with the same operation mode.

■ To start operation

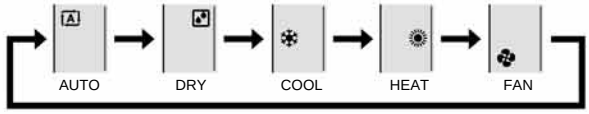
1. Press MODE and select an operation mode.

• Each pressing of the button advances the mode setting in sequence.

COOLING ONLY model



HEAT PUMP model



2. Press ⏻ON/OFF .

• "ON" is displayed on the LCD.
• The OPERATION lamp lights green.

Display

■ To stop operation

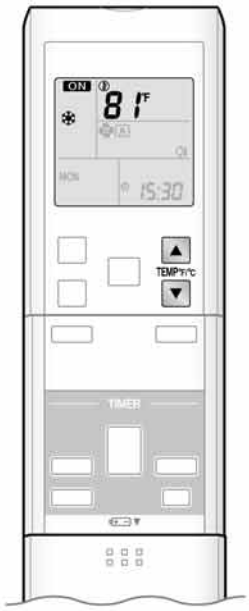
Press ⏻ON/OFF again.

• "ON" is no longer displayed on the LCD.
• The OPERATION lamp goes off.

NOTE

MODE	Notes on each operation mode
HEAT	• Since this air conditioner heats the room by taking heat from outdoor air to indoors, the heating capacity becomes smaller in lower outdoor temperatures. If the heating effect is insufficient, it is recommended to use another heating appliance in combination with the air conditioner. • The heat pump system heats the room by circulating hot air around all parts of the room. After the start of HEAT operation, it takes some time before the room gets warmer. • In HEAT operation, frost may occur on the outdoor unit and lower the heating capacity. In that case, the system switches into defrosting operation to take away the frost. • During defrosting operation, hot air does not flow out of indoor unit.
COOL	• This air conditioner cools the room by releasing the heat in the room outside. Therefore, the cooling performance of the air conditioner may be degraded if the outdoor temperature is high.
DRY	• The computer chip works to rid the room of humidity while maintaining the temperature as much as possible. It automatically controls temperature and airflow rate, so manual adjustment of these functions is unavailable.
AUTO	• In AUTO operation, the system selects an appropriate operation mode (COOL or HEAT) based on the room and outside temperatures and starts the operation. • The system automatically reselects setting at a regular interval to bring the room temperature to user-setting level.
FAN	• This mode is valid for fan only.

11



■ To change the temperature setting

Press ▲ TEMP°F/°C or TEMP°F/°C ▼ .

• The displayed items on the LCD will change whenever either one of the buttons is pressed.

COOL operation	HEAT operation	AUTO operation	DRY or FAN operation
64-90˚F (18-32˚C)	50-86˚F (10-30˚C)	64-86˚F (18-30˚C)	The temperature setting is not variable.
Press ▲ to raise the temperature and press ▼ to lower the temperature.			

■ Operating conditions

■ Recommended temperature setting

• For cooling: 78-82˚F (26-28˚C)
• For heating: 68-75˚F (20-24˚C)

■ Tips for saving energy

• Be careful not to cool (heat) the room too much.
Keeping the temperature setting at a moderate level helps save energy.
• Cover windows with a blind or a curtain.
Blocking sunlight and air from outdoors increases the cooling (heating) effect.
• Clogged air filters cause inefficient operation and waste energy. Clean them once in about every 2 weeks.

■ Notes on the operating conditions

• The air conditioner always consumes a small amount of electricity even while it is not operating.
• If you are not going to use the air conditioner for a long period, for example in spring or autumn, turn the breaker off.
• Use the air conditioner in the following conditions.

MODE	Operating conditions	If operation is continued out of this range
COOL	Outdoor temperature : 50-115˚F (10-46˚C) Indoor temperature : 64-90˚F (18-32˚C) Indoor humidity : 80% max.	• A safety device may work to stop the operation. • Condensation may occur on the indoor unit and drip.
HEAT	Outdoor temperature : 5-75˚F (–15-24˚C) Indoor temperature : 50-86˚F (10-30˚C)	• A safety device may work to stop the operation.
DRY	Outdoor temperature : 50-115˚F (10-46˚C) Indoor temperature : 64-90˚F (18-32˚C) Indoor humidity : 80% max.	• A safety device may work to stop the operation. • Condensation may occur on the indoor unit and drip.

• Operation outside this humidity or temperature range may cause a safety device to disable the system.

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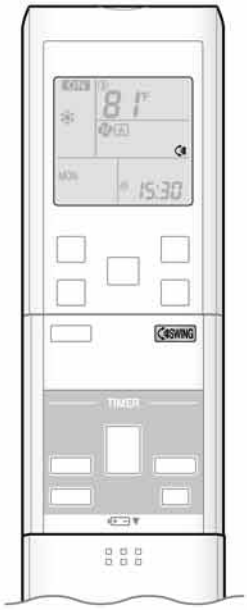
3.3 Adjusting the Airflow Direction and Rate

Adjusting the Airflow Direction and Rate



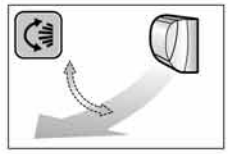
You can adjust the airflow direction to increase your comfort.

■ To start auto swing

Upper and lower airflow direction

Press SWING.

- " " is displayed on the LCD.
- The louvers (horizontal blades) will begin to swing.



■ To set the louvers at desired position

- This function is effective while louvers are in auto swing mode.

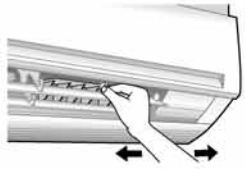
Press SWING when the louvers have reached the desired position.

- The louvers will stop moving.
- " " is no longer displayed on the LCD.

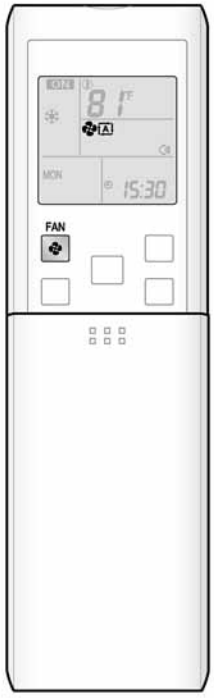
■ To adjust the fins (vertical blades)

Hold the knob and move the fins.
(You will find a knob on the left-side and the right-side blades.)

- When the unit is installed in the corner of a room, the direction of the fins should be facing away from the wall.
  If they face the wall, the wall will block off the wind, causing the cooling (or heating) efficiency to drop.



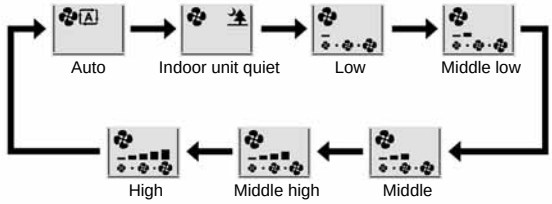
13



■ To adjust the airflow rate setting

Press .

• Each pressing of advances the airflow rate setting in sequence.

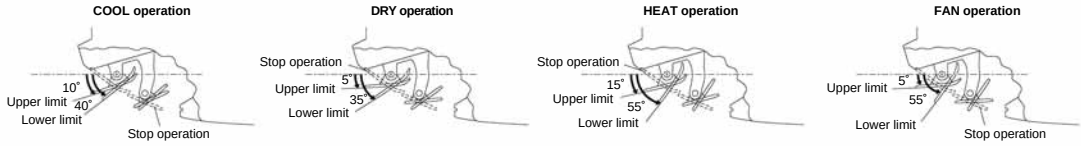


• When the airflow is set to " ", indoor unit quiet operation will start and the noise from the unit will become quieter.
• In indoor unit quiet operation, the airflow rate is set to a weak level.
• In DRY operation, the airflow rate setting is not variable.

NOTE

■ **Notes on the angles of the louvers**

• The louvers swinging range depends on the operation. (See the figure.)



• If the air conditioner is HEAT or DRY operation with the louvers kept stopped in the downward direction, the louvers will automatically start operating in approximately an hour in order to prevent dew condensation.

■ **Note on airflow rate setting**

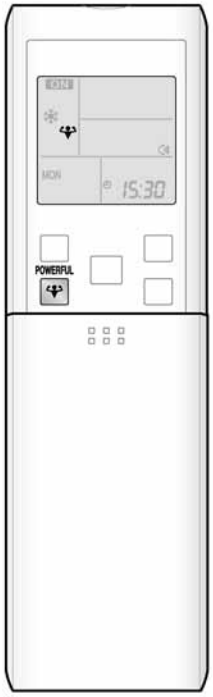
• At smaller airflow rates, the cooling (heating) effect is also smaller.

⚠ CAUTION

• Always use a remote controller to adjust the angles of the louvers. If you attempt to move the louvers and fins forcibly with hand when they are swinging, the mechanism may be broken.
• Be careful when adjusting the fins. Inside the air outlet, a fan is rotating at a high speed.

3.4 POWERFUL Operation

POWERFUL Operation



POWERFUL operation quickly maximizes the cooling (heating) effect in any operation mode. You can get the maximum capacity.

■ To start POWERFUL operation

Press [POWERFUL] during operation.

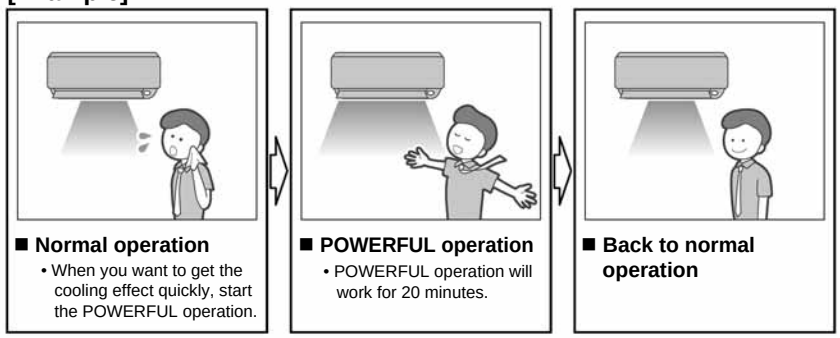
- POWERFUL operation ends in 20 minutes. Then the system automatically operates again with the previous settings which were used before POWERFUL operation.
- "POWERFUL" is displayed on the LCD.

■ To cancel POWERFUL operation

Press [POWERFUL] again.

- "POWERFUL" is no longer displayed on the LCD.

[Example]



■ **Normal operation**
- When you want to get the cooling effect quickly, start the POWERFUL operation.

■ **POWERFUL operation**
- POWERFUL operation will work for 20 minutes.

■ **Back to normal operation**

NOTE

■ **Notes on POWERFUL operation**
- When using POWERFUL operation, there are some functions which are not available.
- POWERFUL operation will not increase the capacity of the air conditioner if the air conditioner is already in operation with its maximum capacity demonstrated.
- **In COOL, HEAT and AUTO operation**
  To maximize the cooling (heating) effect, the capacity of outdoor unit is increased and the airflow rate is fixed to the maximum setting. The temperature and airflow settings are not variable.
- **In DRY operation**
  The temperature setting is lowered by 4.5˚F (2.5˚C) and the airflow rate is slightly increased.
- **In FAN operation**
  The airflow rate is fixed to the maximum setting.

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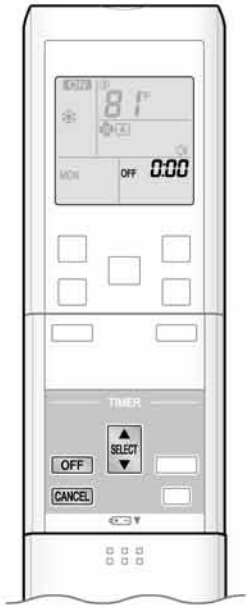
3.5 OFF TIMER Operation

OFF TIMER Operation



Timer functions are useful for automatically switching the air conditioner on or off at night or in the morning. You can also use OFF TIMER and ON TIMER in combination.

■ To use OFF TIMER operation

• Check that the clock is correct.
If not, set the clock to the present time.

1. Press OFF .

" 0:00 " is displayed on the LCD.
" OFF " blinks.

• " ◴ " is no longer displayed on the LCD.

2. Press SELECT until the time setting reaches the point you like.

• Each pressing of either button increases or decreases the time setting by 10 minutes. Holding down either button changes the time setting rapidly.

3. Press OFF again.

• " OFF " and setting time are displayed on the LCD.
• The TIMER lamp lights yellow.

Display

■ To cancel OFF TIMER operation

Press CANCEL .

• " OFF " and setting time are no longer displayed on the LCD.
• " ◴ " and day of the week are displayed on the LCD.
• The TIMER lamp goes off.

NOTE

■ **Notes on TIMER operation**
- When TIMER is set, the present time is not displayed.
- Once you set ON/OFFTIMER, the time setting is kept in the memory. The memory is canceled when remote controller batteries are replaced.
- When operating the unit via the ON/OFF TIMER, the actual length of operation may vary from the time entered by the user. (Maximum approximately 10 minutes)

■ **NIGHT SET mode**
- When the OFF TIMER is set, the air conditioner automatically adjusts the temperature setting (0.9˚F (0.5˚C) up in COOL, 3.6˚F (2.0˚C) down in HEAT) to prevent excessive cooling (heating) for your pleasant sleep.

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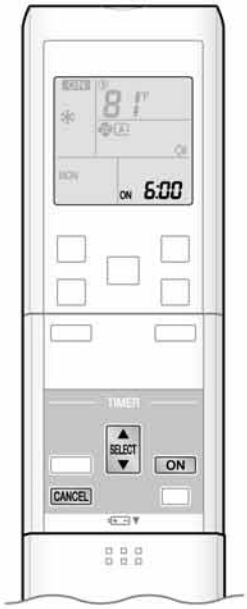
3.6 ON TIMER Operation

ON TIMER Operation



■ To use ON TIMER operation

• Check that the clock is correct.
If not, set the clock to the present time.

1. Press ON .

"6:00" is displayed on the LCD.
"ON" blinks.

• "🕘" is no longer displayed on the LCD.

2. Press SELECT until the time setting reaches the point you like.

• Each pressing of either button increases or decreases the time setting by 10 minutes. Holding down either button changes the setting rapidly.

3. Press ON again.

• "ON" and setting time are displayed on the LCD.
• The TIMER lamp lights yellow.

Display

■ To cancel ON TIMER operation

Press CANCEL .

• "ON" and setting time are no longer displayed on the LCD.
• "🕘" and day of the week are displayed on the LCD.
• The TIMER lamp goes off.

■ To combine ON TIMER and OFF TIMER

• A sample setting for combining the 2 timers is shown below.

(Example)
Present time: 23:00 (The unit operating)
OFF TIMER at 0:00 } Combined
ON TIMER at 14:00

NOTE

■ **In the following cases, set the timer again.**
• After a breaker has turned off.
• After a power failure.
• After replacing batteries in the remote controller.

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3P276856-2

Part 6
Service Diagnosis

1. Troubleshooting with LED

1.1 Indoor Unit

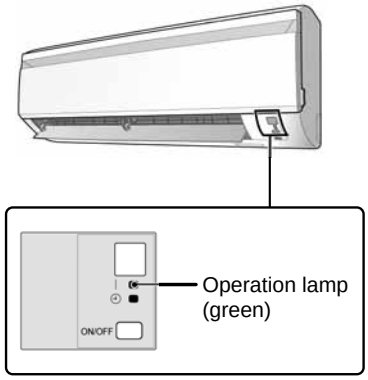
Operation Lamp

The operation lamp blinks when any of the following errors is detected.

1. When a protection device of the indoor or outdoor unit is activated, or when the thermistor malfunctions.
2. When a signal transmission error occurs between the indoor and outdoor units.

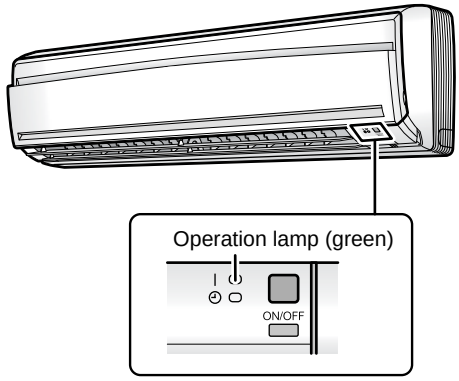
In either case, conduct the diagnostic procedure described in the following pages.

09/12 class



(R11599)

15/18/24 class



(R14251)

Service Monitor

The indoor unit has one green LED (LED A) on the control PCB. When the microcomputer works in order, the LED A blinks.

1.2 Outdoor Unit

The outdoor unit has one green LED (LED A) on the main PCB. When the microcomputer works in order, the LED A blinks.

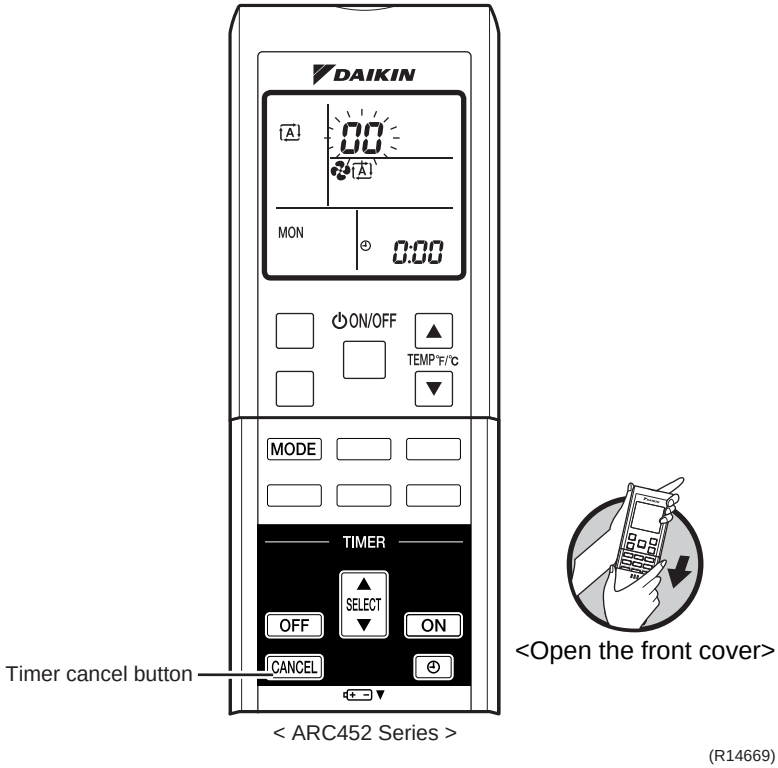
2. Problem Symptoms and Measures

Symptom	Check Item	Details of Measure	Reference Page
The unit does not operate.	Check the power supply.	Check if the rated voltage is supplied.	—
	Check the type of the indoor unit.	Check if the indoor unit type is compatible with the outdoor unit.	—
	Check the outdoor temperature.	Heating operation cannot be used when the outdoor temperature is 24°C (75.2°F) or higher, and cooling operation cannot be used when the outdoor temperature is below 10°C (50°F).	—
	Diagnose with remote controller indication.	—	78
	Check the remote controller addresses.	Check if address settings for the remote controller and indoor unit are correct.	225
Operation sometimes stops.	Check the power supply.	A power failure of 2 to 10 cycles stops air conditioner operation. (Operation lamp OFF)	—
	Check the outdoor temperature.	Heating operation cannot be used when the outdoor temperature is 24°C (75.2°F) or higher, and cooling operation cannot be used when the outdoor temperature is below 10°C (50°F).	—
	Diagnose with remote controller indication.	—	78
The unit operates but does not cool, or does not heat.	Check for wiring and piping errors in the connection between the indoor unit and outdoor unit.	—	—
	Check for thermistor detection errors.	Check if the thermistor is mounted securely.	—
	Check for faulty operation of the electronic expansion valve.	Set the unit to cooling operation, and check the temperature of the liquid pipe to see if the electronic expansion valve works.	—
	Diagnose with remote controller indication.	—	78
	Diagnose by service port pressure and operating current.	Check for refrigerant shortage.	112
Large operating noise and vibrations	Check the output voltage of the power module.	—	126
	Check the power module.	—	—
	Check the installation condition.	Check if the required spaces for installation (specified in the installation manual) are provided.	—

3. Service Check Function

Check Method 1

1. When the timer cancel button is held down for 5 seconds, 00 is displayed on the temperature display screen.



2. Press the timer cancel button repeatedly until a long beep sounds.

■ The code indication changes in the sequence shown below.

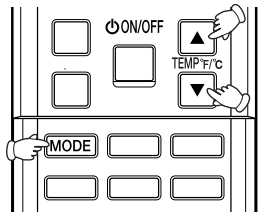
No.	Code	No.	Code	No.	Code
1	00	13	C7	25	UA
2	U4	14	A3	26	UH
3	L5	15	H8	27	P4
4	E6	16	H9	28	L3
5	H6	17	C9	29	L4
6	H0	18	C4	30	H7
7	A6	19	C5	31	U2
8	E7	20	J3	32	EA
9	U0	21	J6	33	AH
10	F3	22	E5	34	FA
11	A5	23	A1	35	H1
12	F6	24	E1	36	P9

Note:

1. A short beep and two consecutive beeps indicate non-corresponding codes.
2. To return to the normal mode, hold the timer cancel button down for 5 seconds. When the remote controller is left untouched for 60 seconds, it also returns to the normal mode.
3. Not all the error codes are displayed. When you cannot find the error code, try the check method 2. (→ Refer to page 76.)

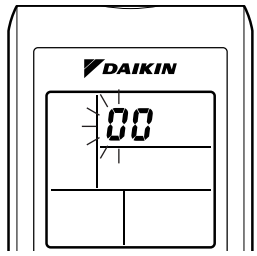
Check Method 2

1. Press the 3 buttons (TEMP▲, TEMP▼, MODE) simultaneously to enter the diagnosis mode.



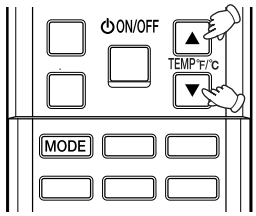
(R14550)

The left-side number blinks.



(R9430)

2. Press the TEMP▲ or ▼ button and change the figure until you hear the beep(s).

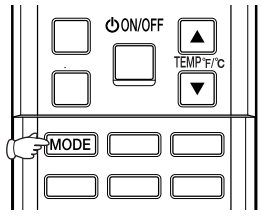


(R14551)

3. Diagnose by the sound.
   - ★ beep : The left-side number does not correspond with the error code.
   - ★ beep beep : The left-side number corresponds with the error code but the right-side number does not.
   - ★ long beep : Both the left-side and right-side numbers correspond with the error code.

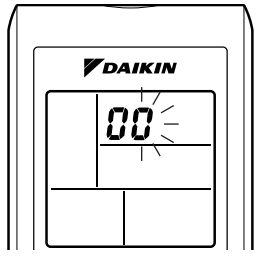
   Error codes and description → Refer to page 78.

4. Press the MODE button.



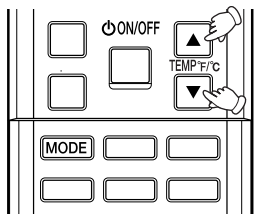
(R14552)

The right-side number blinks.



(R9429)

5. Press the TEMP▲ or ▼ button and change the figure until you hear the beep(s).

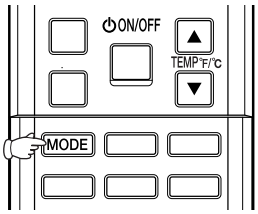


(R14547)

6. Diagnose by the sound.
   ★ beep : The left-side number does not correspond with the error code.
   ★ beep beep : The left-side number corresponds with the error code but the right-side number does not.
   ★ long beep : Both the left-side and right-side numbers correspond with the error code.
   Error codes and description → Refer to page 78.

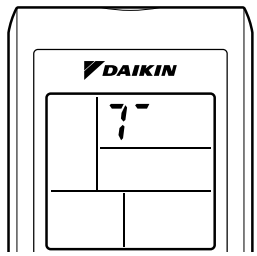
7. Determine the error code.
   The numbers indicated when you hear the long beep are the error code.
   Error codes and description → Refer to page 78.

8. Press the MODE button to exit from the diagnosis mode.



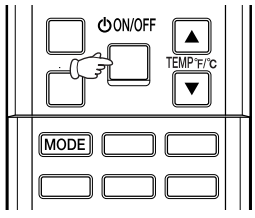
(R14548)

   The display 7- means the trial operation mode.
   (Refer to page 223 for trial operation.)



(R9879)

9. Press the ON/OFF button twice to return to the normal mode.



(R14549)

Note: When the remote controller is left untouched for 60 seconds, it returns to the normal mode.

4. Troubleshooting

4.1 Error Codes and Description

	Error Codes	Description	Reference Page
System	00	Normal	—
	U0★	Refrigerant shortage	112
	U2	Low-voltage detection or over-voltage detection	114
	U4	Signal transmission error (between indoor unit and outdoor unit)	86
	UA	Unspecified voltage (between indoor unit and outdoor unit)	88
Indoor Unit	A1	Indoor unit PCB abnormality	79
	A5	Freeze-up protection control or heating peak-cut control	80
	A6	Fan motor (DC motor) or related abnormality	82
	C4	Indoor heat exchanger thermistor or related abnormality	85
	C9	Room temperature thermistor or related abnormality	85
Outdoor Unit	E1	Outdoor unit PCB abnormality	89
	E5★	OL activation (compressor overload)	90
	E6★	Compressor lock	91
	E7★	DC fan lock	92
	E8	Input overcurrent detection	93
	EA	Four-way valve abnormality	94
	F3	Discharge pipe temperature control	96
	F6	High pressure control in cooling	98
	H0	Compressor system sensor abnormality	100
	H6	Position sensor abnormality	101
	H8	DC voltage / current sensor abnormality (09/12 class only)	103
	H9	Outdoor temperature thermistor or related abnormality	104
	J3★	Discharge pipe thermistor or related abnormality	104
	J6	Outdoor heat exchanger thermistor or related abnormality	104
	L3	Electrical box temperature rise	106
	L4	Radiation fin temperature rise	108
	L5★	Output overcurrent detection	110
	P4	Radiation fin thermistor or related abnormality	104

★: Displayed only when system-down occurs.

4.2 Indoor Unit PCB Abnormality

Remote Controller Display

A1

Method of Malfunction Detection

The system checks if the circuit works properly within the microcomputer of the indoor unit.

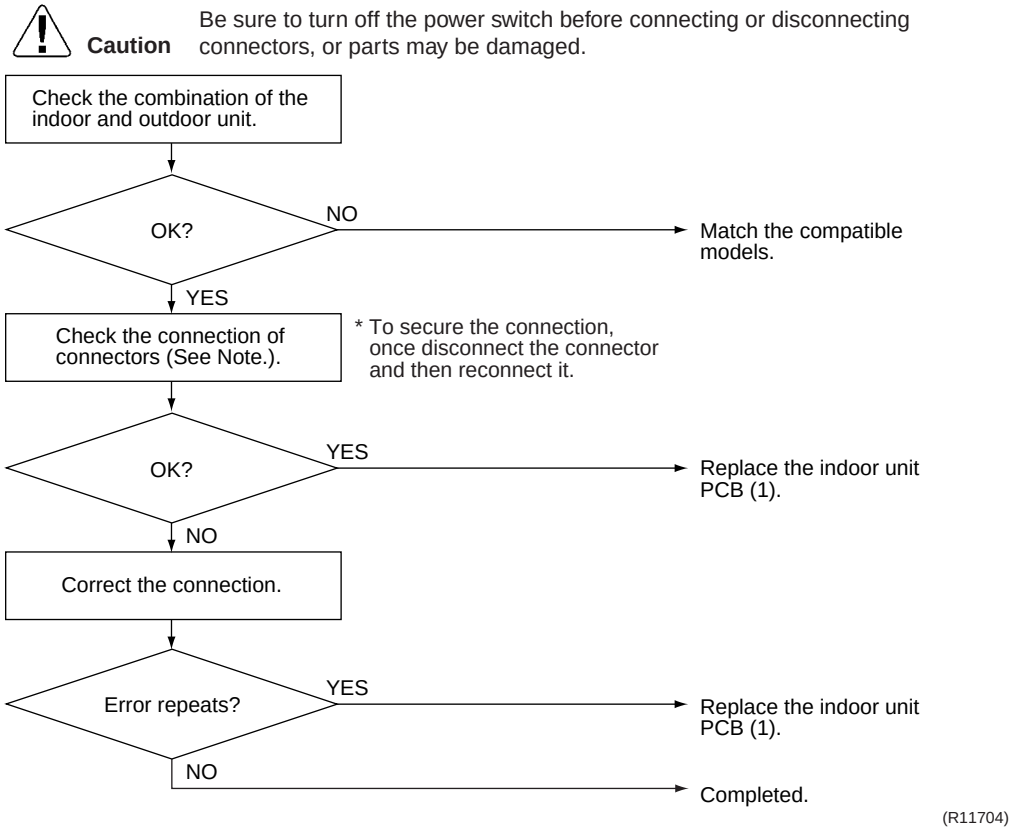
Malfunction Decision Conditions

The system cannot set the internal settings.

Supposed Causes

- Wrong models interconnected
- Defective indoor unit PCB
- Disconnection of connector

Troubleshooting



Note: Check the following connector.

Model Type	Connector
Wall Mounted Type	Terminal board ~ Control PCB

4.3 Freeze-up Protection Control or Heating Peak-cut Control

Remote Controller Display

A5

Method of Malfunction Detection

- Freeze-up protection control
  During cooling operation, the freeze-up protection control (operation halt) is activated according to the temperature detected by the indoor heat exchanger thermistor.
- Heating peak-cut control
  During heating operation, the temperature detected by the indoor heat exchanger thermistor is used for the heating peak-cut control (operation halt, outdoor fan stop, etc.)

Malfunction Decision Conditions

- Freeze-up protection control
  During cooling operation, the indoor heat exchanger temperature is below 0°C (32°F).
- Heating peak-cut control
  During heating operation, the indoor heat exchanger temperature is above 65°C (149°F).

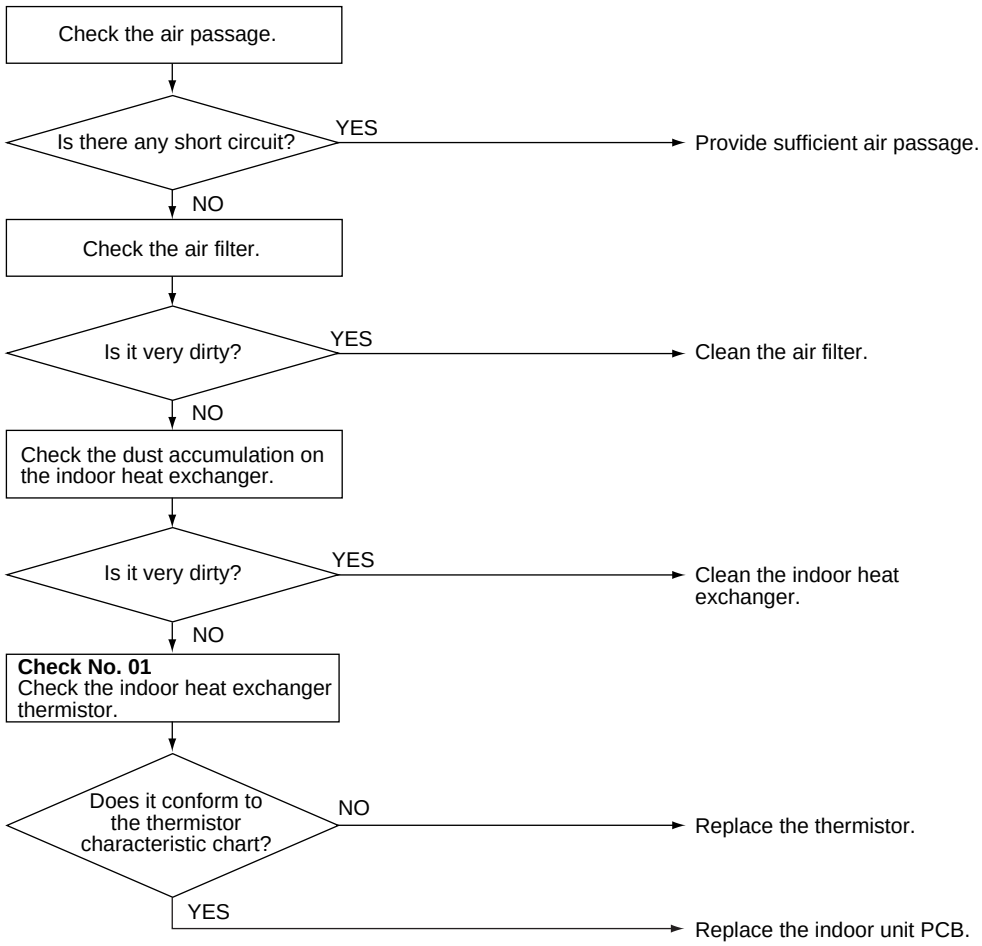
Supposed Causes

- Short-circuited air
- Clogged air filter of the indoor unit
- Dust accumulation on the indoor heat exchanger
- Defective indoor heat exchanger thermistor
- Defective indoor unit PCB

Troubleshooting

Check No.01
Refer to P.116

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.



(R14402)

4.4 Fan Motor (DC Motor) or Related Abnormality

Remote Controller Display

A6

Method of Malfunction Detection

The rotation speed detected by the Hall IC during fan motor operation is used to determine abnormal fan motor operation.

Malfunction Decision Conditions

The detected rotation speed does not reach the demanded rotation speed of the target tap, and is less than 50% of the maximum fan motor rotation speed.

Supposed Causes

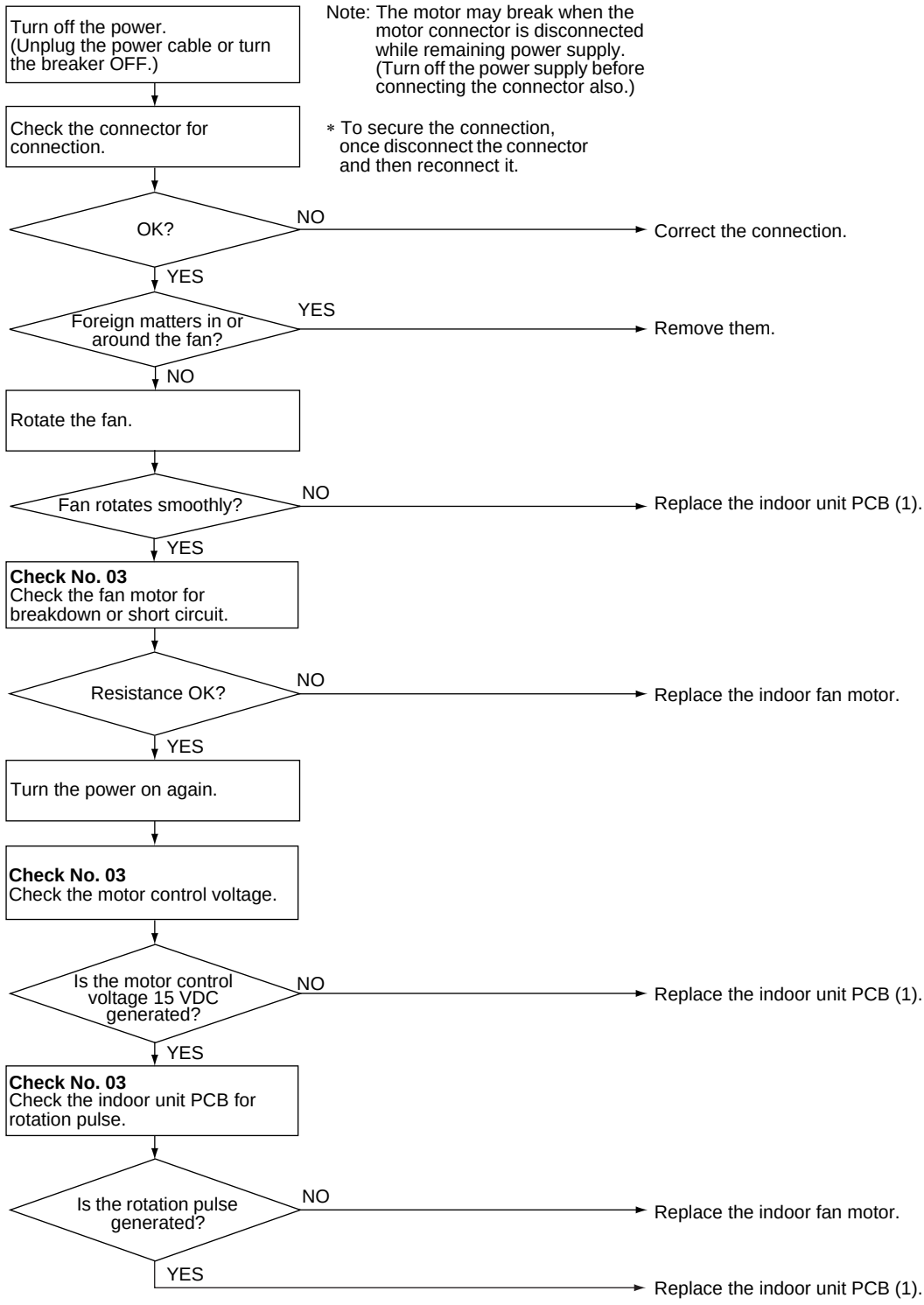
- Disconnection of connector
- Foreign matters stuck in the fan
- Layer short inside the fan motor winding
- Breaking of wire inside the fan motor
- Breaking of the fan motor lead wires
- Defective capacitor of the fan motor
- Defective indoor unit PCB

Troubleshooting

FTXN09/12KEVJU

Check No.03
Refer to P.117

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.

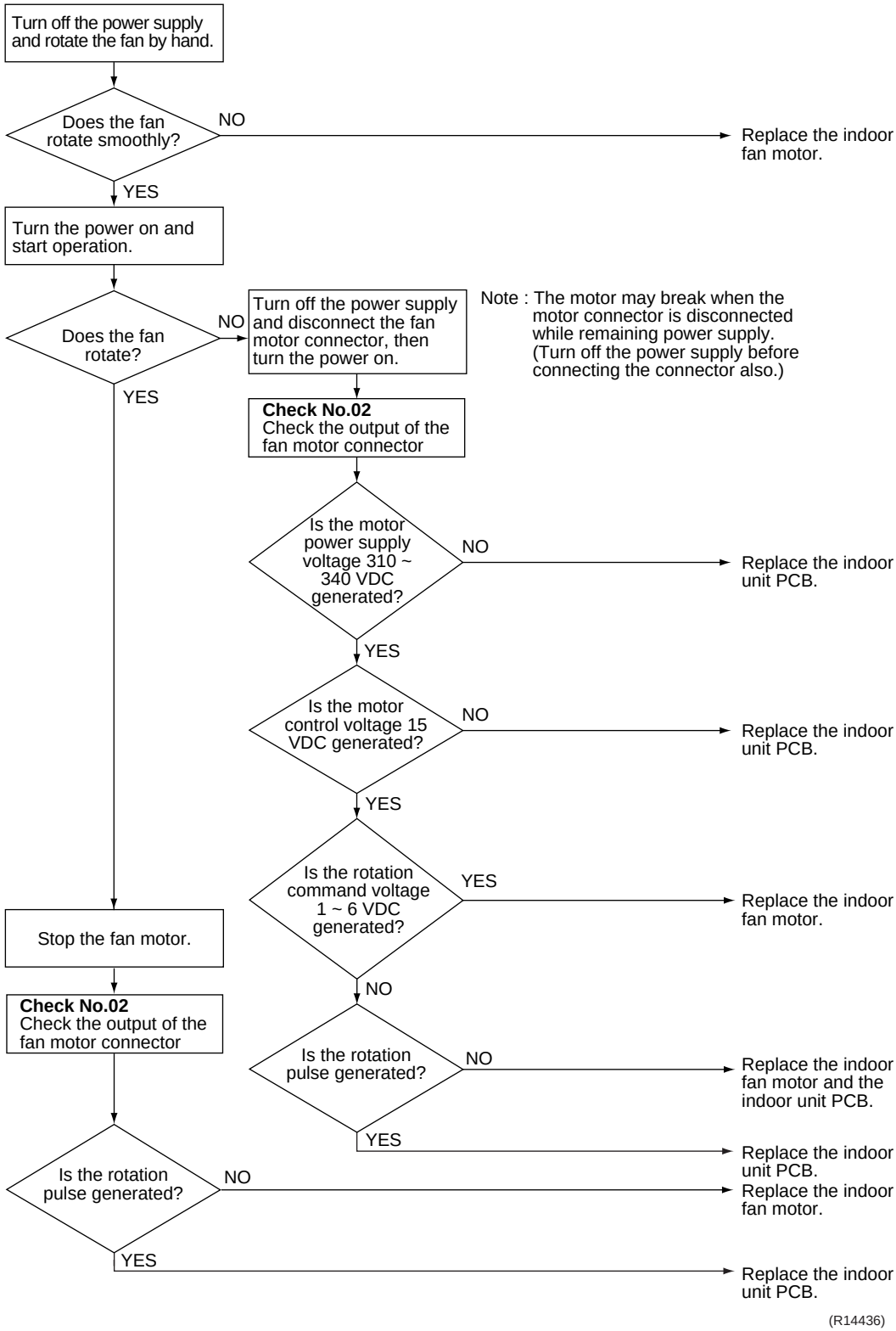


(R14405)

Troubleshooting FTXN15/18/24KVJU

Check No.02
Refer to P.117

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.



(R14436)

4.5 Thermistor or Related Abnormality (Indoor Unit)

Remote Controller Display

C4, C9

Method of Malfunction Detection

The temperatures detected by the thermistors determine thermistor errors.

Malfunction Decision Conditions

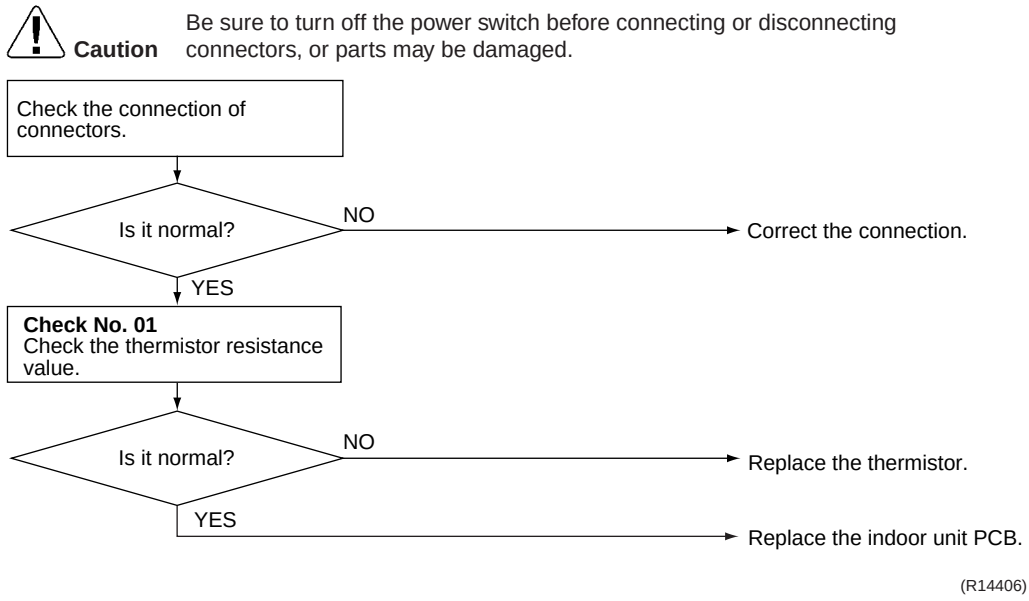
The thermistor input is more than 4.96 V or less than 0.04 V during compressor operation.

Supposed Causes

- Disconnection of connector
- Defective thermistor
- Defective indoor unit PCB

Troubleshooting

Check No.01
Refer to P.116



C4 : Indoor heat exchanger thermistor
C9 : Room temperature thermistor

4.6 Signal Transmission Error (between Indoor Unit and Outdoor Unit)

Remote Controller Display

U4

Method of Malfunction Detection

The data received from the outdoor unit in indoor unit - outdoor unit signal transmission is checked whether it is normal.

Malfunction Decision Conditions

The data sent from the outdoor unit cannot be received normally, or the content of the data is abnormal.

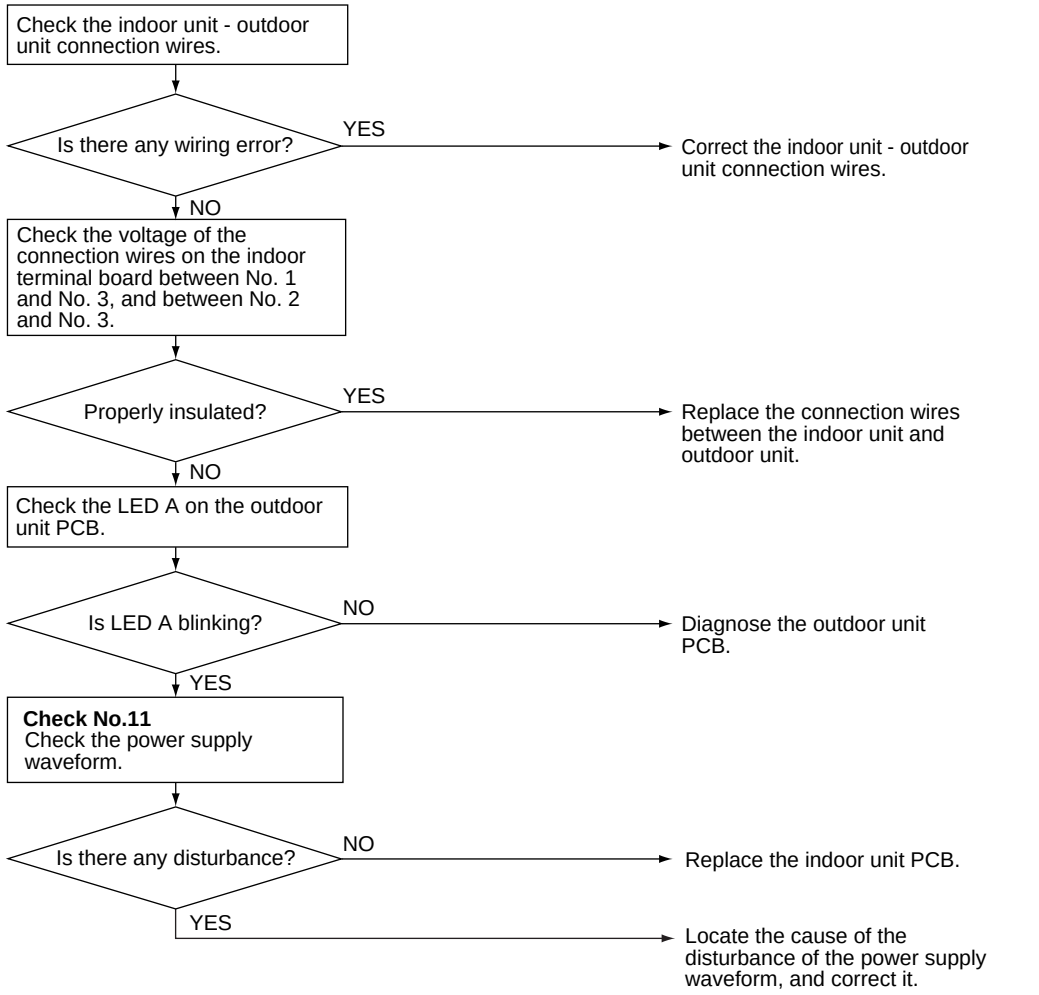
Supposed Causes

- Wiring error
- Breaking of the connection wires between the indoor and outdoor units (wire No. 3)
- Defective outdoor unit PCB
- Defective indoor unit PCB
- Disturbed power supply waveform

Troubleshooting

Check No.11
Refer to P.118

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.



(R14437)

4.7 Unspecified Voltage (between Indoor Unit and Outdoor Unit)

Remote Controller Display

UA

Method of Malfunction Detection

The supply power is detected for its requirements (different from pair type and multi type) by the indoor / outdoor transmission signal.

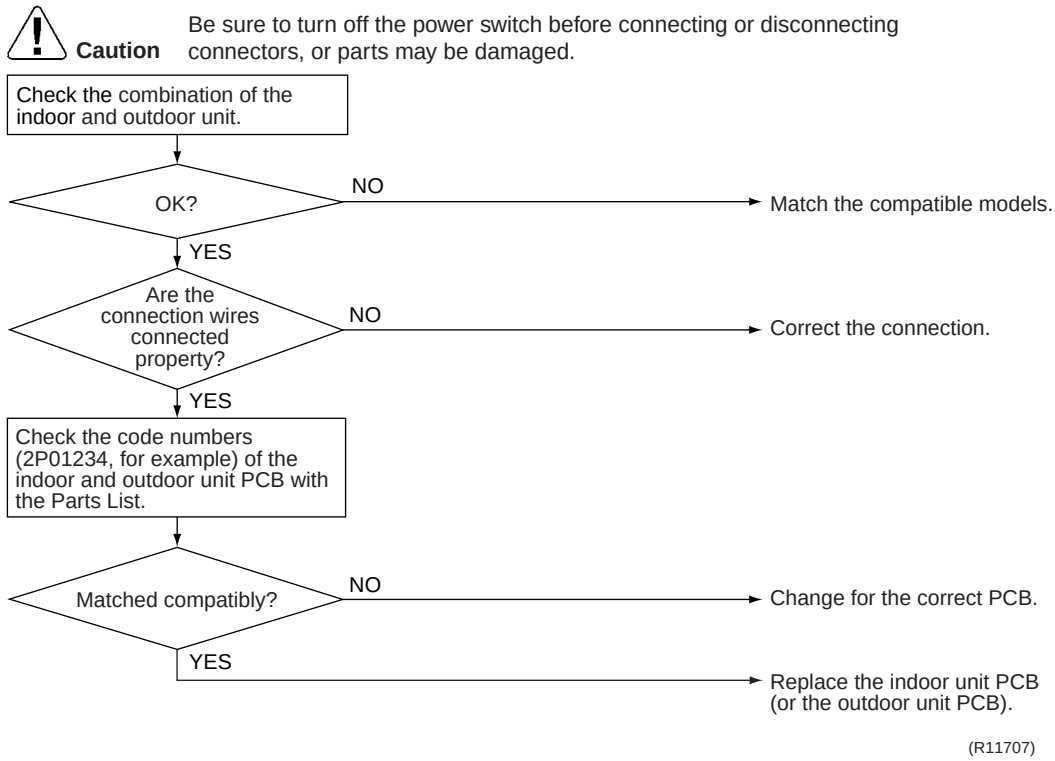
Malfunction Decision Conditions

The pair type and multi type are interconnected.

Supposed Causes

- Wrong models interconnected
- Wrong wiring of connecting wires
- Wrong indoor unit PCB or outdoor unit PCB mounted
- Defective indoor unit PCB
- Defective outdoor unit PCB

Troubleshooting



4.8 Outdoor Unit PCB Abnormality

Remote Controller Display

E1

Method of Malfunction Detection

- The system follows the microprocessor program as specified.
- The system checks to see if the zero-cross signal comes in properly.

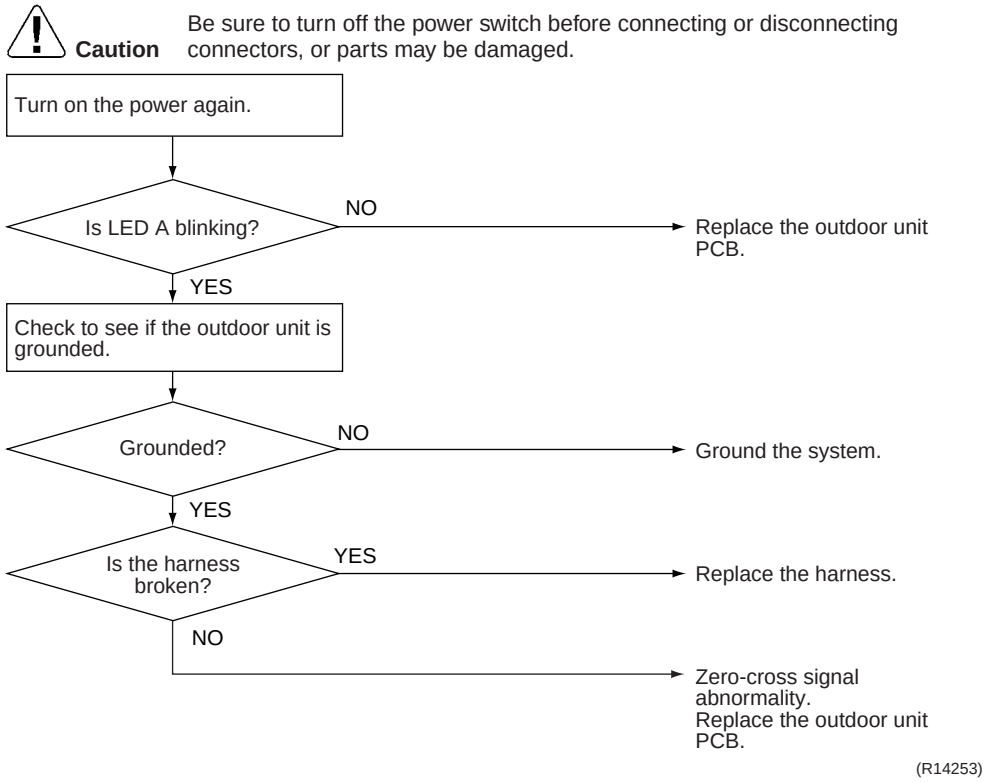
Malfunction Decision Conditions

- The microprocessor program runs out of control.
- The zero-cross signal is not detected.

Supposed Causes

- Defective outdoor unit PCB
- Broken harness between PCBs
- Noise
- Momentary fall of voltage
- Momentary power failure

Troubleshooting



4.9 OL Activation (Compressor Overload)

Remote Controller Display

E5

Method of Malfunction Detection

A compressor overload is detected through compressor OL.

Malfunction Decision Conditions

- If the error repeats, the system is shut down.
- Reset condition: Continuous run for about 60 minutes without any other error

∗ The operating temperature condition is not specified.

Supposed Causes

- Defective discharge pipe thermistor
- Defective electronic expansion valve or coil
- Defective four-way valve or coil
- Defective outdoor unit PCB
- Refrigerant shortage
- Water mixed in refrigerant
- Defective stop valve

Troubleshooting

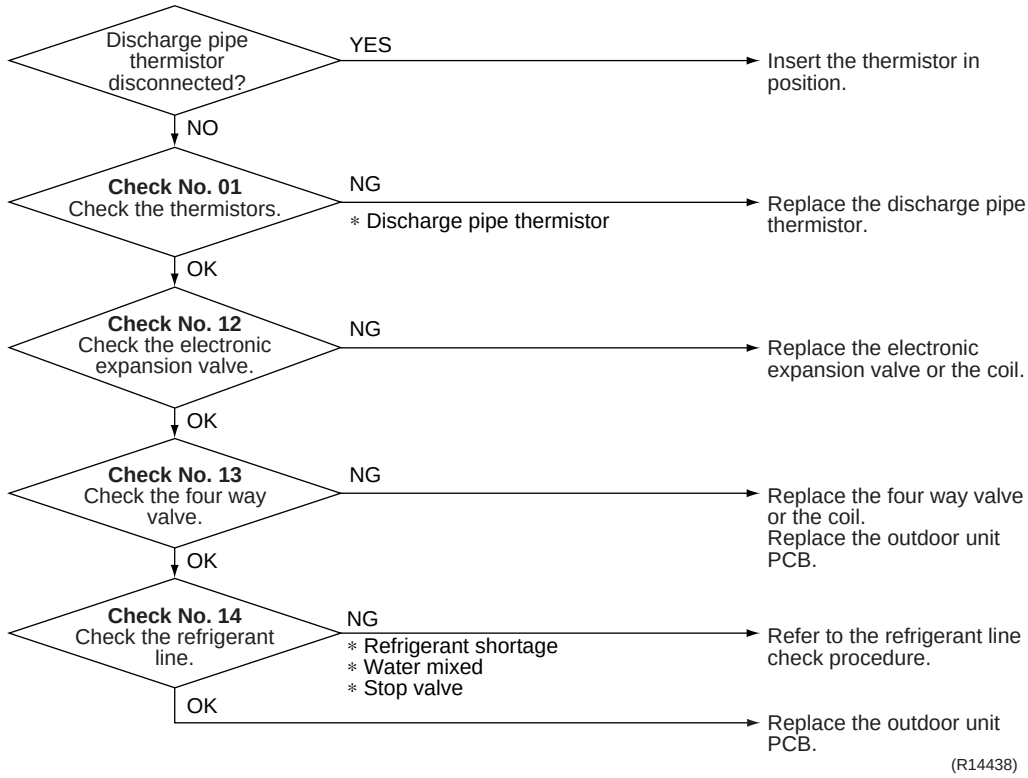
Check No.01
Refer to P.116

Check No.12
Refer to P.118

Check No.13
Refer to P.119

Check No.14
Refer to P.119

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.



(R14438)

4.10 Compressor Lock

Remote Controller Display

E6

Method of Malfunction Detection

A compressor lock is detected by the current waveform generated when applying high-frequency voltage to the motor.

Malfunction Decision Conditions

- If the error repeats, the system is shut down
- Reset condition: Continuous run for about 11 minutes without any other error

Supposed Causes

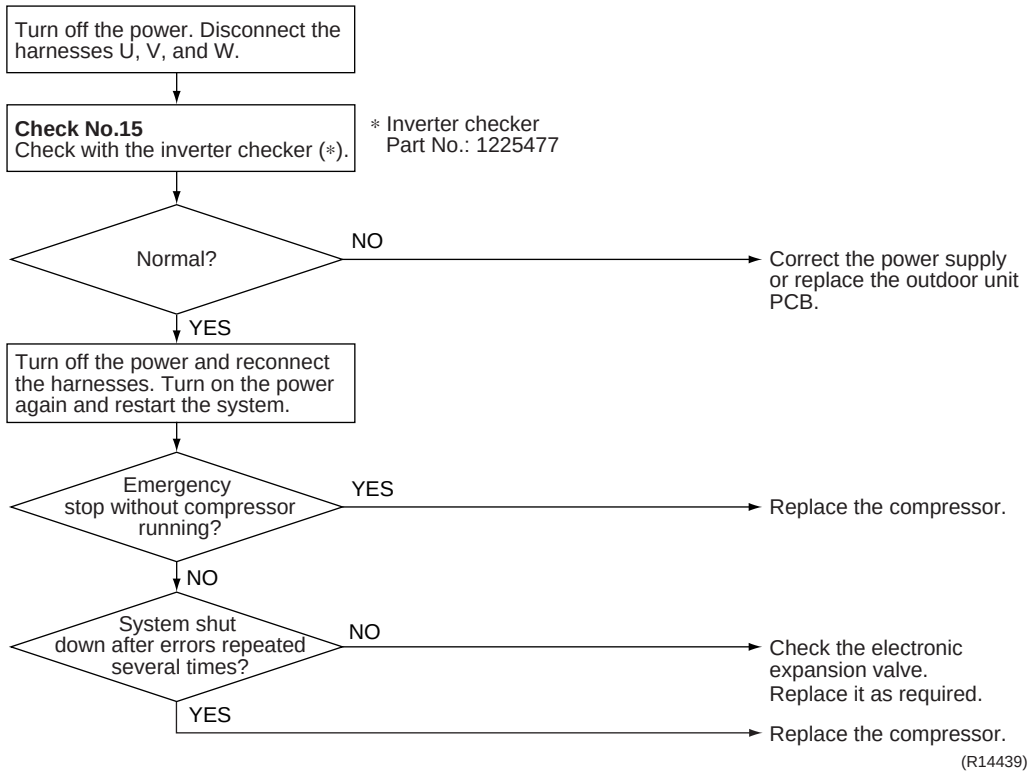
- Compressor locked
- Disconnection of compressor harness

Troubleshooting

Check No.15
Refer to P.120

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.

(Precaution before turning on the power again)
Make sure the power has been off for at least 30 seconds.



(R14439)

4.11 DC Fan Lock

Remote Controller Display

E7

Method of Malfunction Detection

An error is determined with the high-voltage fan motor rotation speed detected by the Hall IC.

Malfunction Decision Conditions

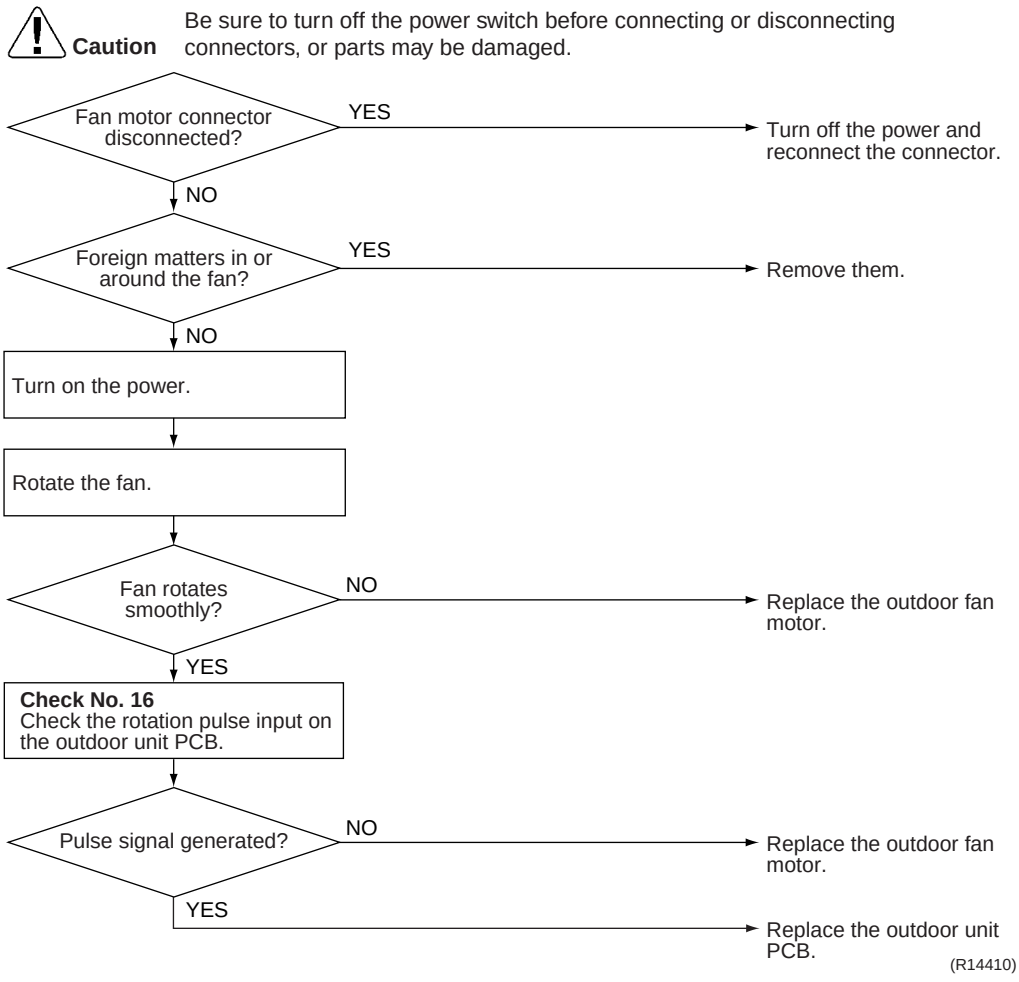
- The fan does not start in about 15 seconds even when the fan motor is running.
- If the error repeats, the system is shut down.
- Reset condition: Continuous run for about 11 minutes without any other error

Supposed Causes

- Disconnection of fan motor
- Foreign matters stuck in the fan
- Defective fan motor
- Defective outdoor unit PCB

Troubleshooting

Check No.16
Refer to P.122



4.12 Input Overcurrent Detection

Remote Controller Display

E8

Method of Malfunction Detection

An input overcurrent is detected by checking the input current value with the compressor running.

Malfunction Decision Conditions

- The current exceeds about 15 A for 2.5 seconds with the compressor running. (The upper limit of the current decreases when the outdoor temperature exceeds a certain level.)

Supposed Causes

- Defective compressor
- Defective outdoor unit PCB
- Short circuit

Troubleshooting

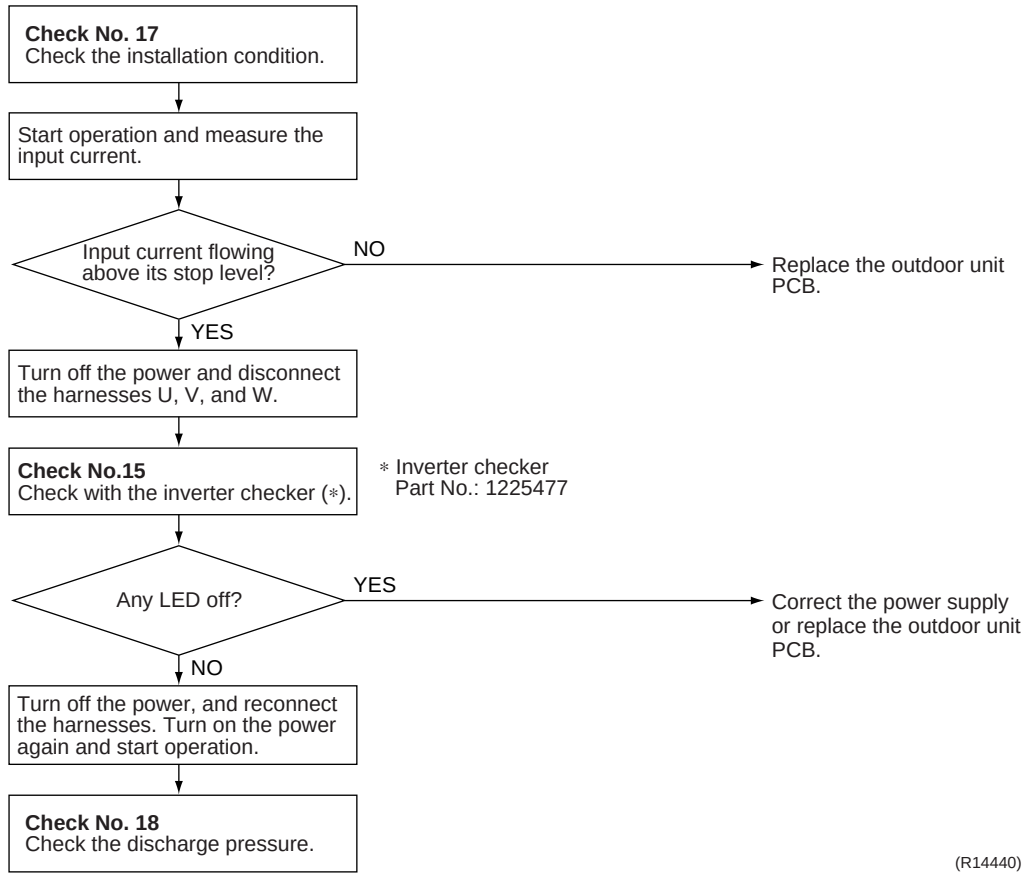
Check No.15
Refer to P.120

Check No.17
Refer to P.123

Check No.18
Refer to P.124

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.

∗ An input overcurrent may result from wrong internal wiring. If the system is interrupted by an input overcurrent after the wires have been disconnected and reconnected for part replacement, check the wiring again.



4.13 Four-Way Valve Abnormality

Remote Controller Display

EA

Method of Malfunction Detection

The room temperature thermistor, the indoor heat exchanger thermistor, the outdoor temperature thermistor, and the outdoor heat exchanger thermistor are checked if they function within their normal ranges in each operation mode.

Malfunction Decision Conditions

A following condition continues over 10 minutes after operating for 5 minutes.

- Cooling / Dry
  (room thermistor temp. – indoor heat exchanger temp.) < –5°C (–9°F)
- Heating
  (indoor heat exchanger temp. – room thermistor temp.) < –5°C (–9°F)

- If the error repeats, the system is shut down.
- Reset condition: Continuous run for about 60 minutes without any other error

Supposed Causes

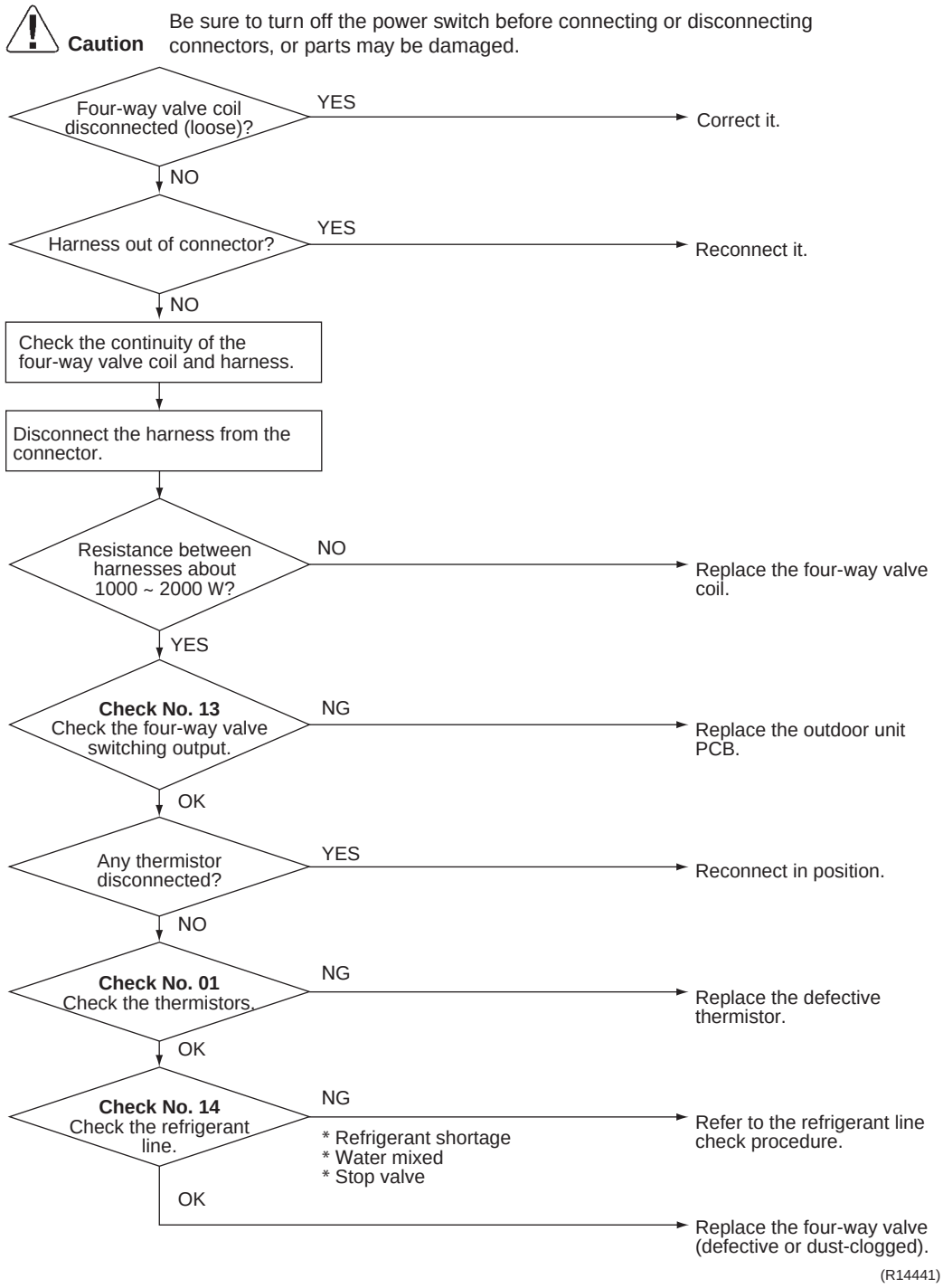
- Disconnection of four-way valve coil
- Defective four-way valve, coil, or harness
- Defective outdoor unit PCB
- Defective thermistor
- Refrigerant shortage
- Water mixed in refrigerant
- Defective stop valve

Troubleshooting

Check No.01
Refer to P.116

Check No.13
Refer to P.119

Check No.14
Refer to P.119



4.14 Discharge Pipe Temperature Control

Remote Controller Display

F3

Method of Malfunction Detection

An error is determined with the temperature detected by the discharge pipe thermistor.

Malfunction Decision Conditions

- If the temperature detected by the discharge pipe thermistor rises above **A**, the compressor stops.
- The error is cleared when the discharge pipe temperature has dropped below **B**.

09/12 class

Stop temperatures	A		B	
	°C	°F	°C	°F
(1) above 50 Hz (rising), above 45 Hz (dropping)	110	230	97	206.6
(2) 39 ~ 50 Hz (rising), 34 ~ 45 Hz (dropping)	105	221	92	197.6
(3) below 39 Hz (rising), below 34 Hz (dropping)	100	212	87	188.6

15/18/24 class

Stop temperatures	A		B	
	°C	°F	°C	°F
(1) above 50 Hz (rising), above 45 Hz (dropping)	118	244.4	85	185
(2) 35 ~ 50 Hz (rising), 30 ~ 45 Hz (dropping)	110	230	77	170.6
(3) below 35 Hz (rising), below 30 Hz (dropping)	93	199.4	60	140

- If the error repeats, the system is shut down.
- Reset condition: Continuous run for about 60 minutes without any other error

Supposed Causes

- Defective discharge pipe thermistor
  (Defective outdoor heat exchanger thermistor or outdoor temperature thermistor)
- Defective electronic expansion valve or coil
- Refrigerant shortage
- Defective four-way valve
- Water mixed in refrigerant
- Defective stop valve
- Defective outdoor unit PCB

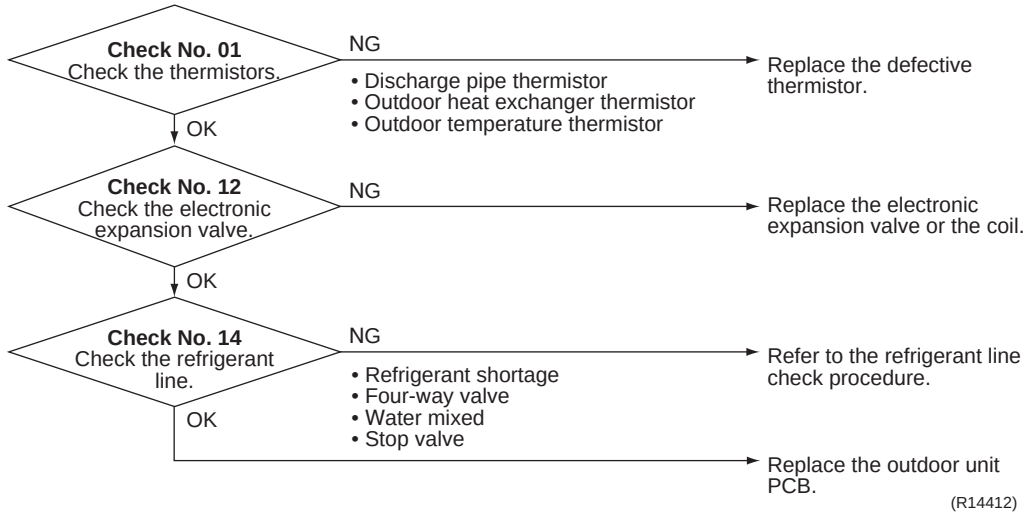
Troubleshooting

Check No.01
Refer to P.116

Check No.12
Refer to P.118

Check No.14
Refer to P.119

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.



(R14412)

4.15 High Pressure Control in Cooling

Remote Controller Display

F6

Method of Malfunction Detection

High-pressure control (operation halt, frequency drop, etc.) is activated in cooling operation if the temperature sensed by the outdoor heat exchanger thermistor exceeds the limit.

Malfunction Decision Conditions

- The temperature sensed by the outdoor heat exchanger thermistor rises above about 60°C (140°F).
- The error is cleared when the temperature drops below about 50°C (122°F).

Supposed Causes

- The installation space is not large enough.
- Dirty outdoor heat exchanger
- Defective outdoor fan motor
- Defective stop valve
- Defective electronic expansion valve or coil
- Defective outdoor heat exchanger thermistor
- Defective outdoor unit PCB

Troubleshooting

Check No.01
Refer to P.116

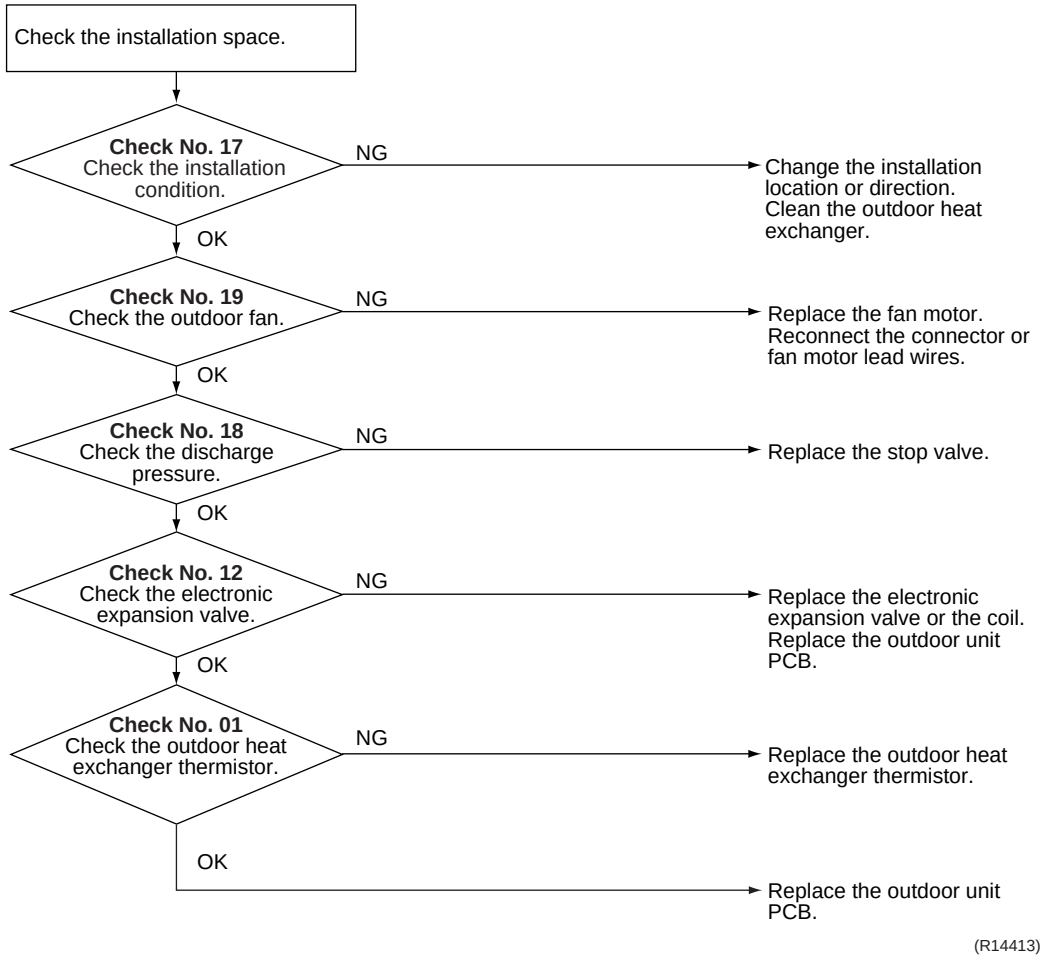
Check No.12
Refer to P.118

Check No.17
Refer to P.123

Check No.18
Refer to P.124

Check No.19
Refer to P.124

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.



(R14413)

4.16 Compressor System Sensor Abnormality

Remote Controller Display

H0

Method of Malfunction Detection

- The system checks the DC current before the compressor starts.

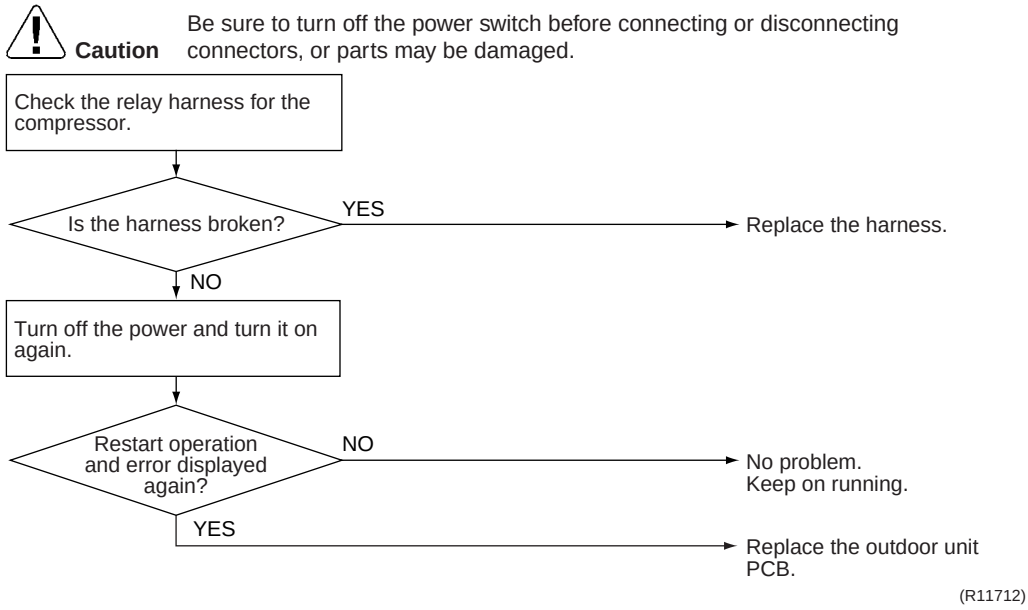
Malfunction Decision Conditions

- The DC current before compressor start-up is out of the range 0.5 - 4.5 V (sensor output converted to voltage value)
- The DC voltage before compressor start-up is below 50 V.

Supposed Causes

- Broken or disconnection of harness
- Defective outdoor unit PCB

Troubleshooting



4.17 Position Sensor Abnormality

Remote Controller Display

H6

Method of Malfunction Detection

A compressor start-up failure is detected by checking the compressor running condition through the position detection circuit.

Malfunction Decision Conditions

- The compressor fails to start in about 15 seconds after the compressor run command signal is sent.
- If the error repeats, the system is shut down.
- Reset condition: Continuous run for about 11 minutes without any other error

Supposed Causes

- Disconnection of compressor relay harness
- Defective compressor
- Defective outdoor unit PCB
- Start-up failure caused by the closed stop valve
- Input voltage is out of specification

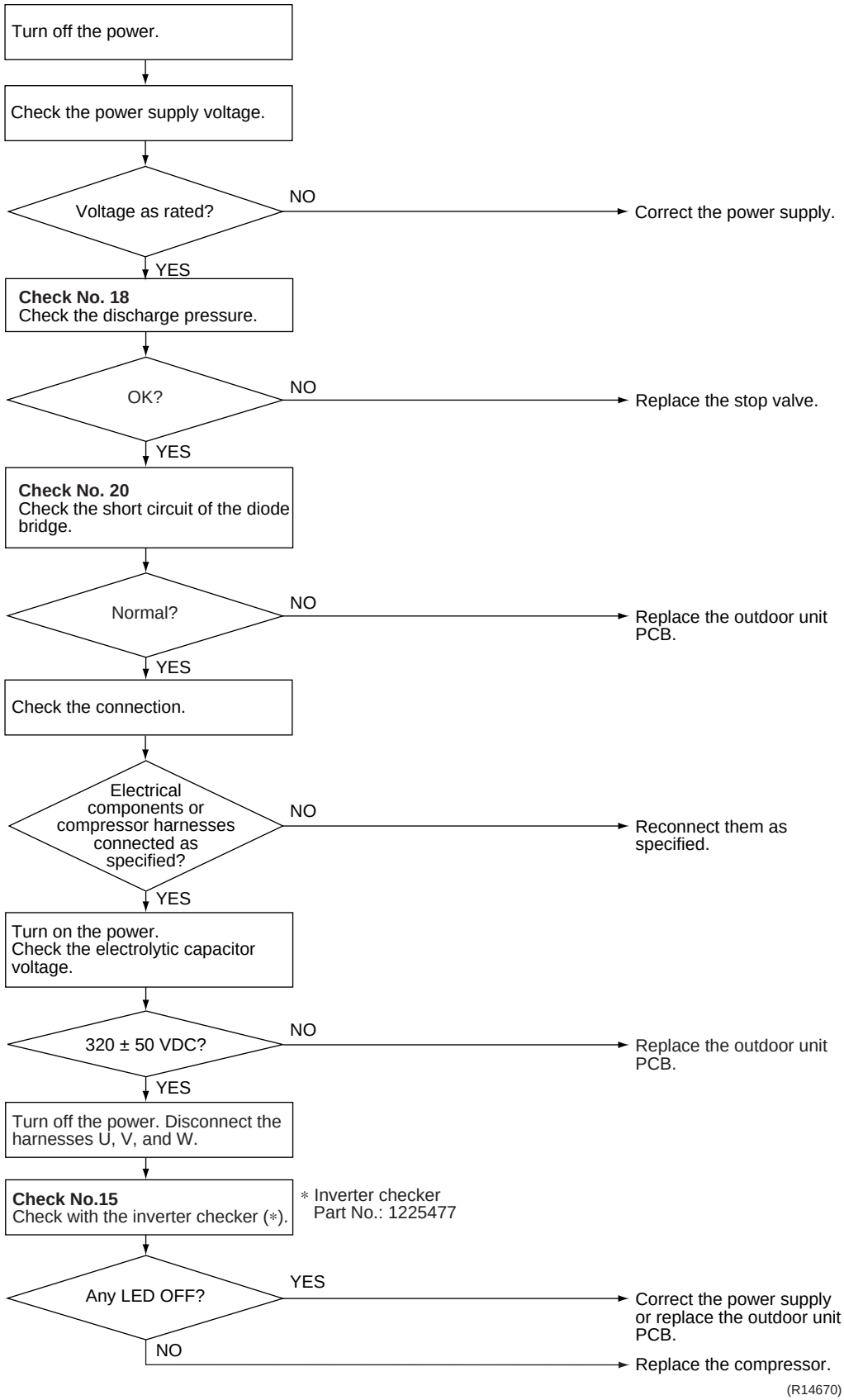
Troubleshooting

Check No.15
Refer to P.120

Check No.18
Refer to P.124

Check No.20
Refer to P.125

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.



(R14670)

4.18 DC Voltage / Current Sensor Abnormality (09/12 Class Only)

Remote Controller Display

H8

Method of Malfunction Detection

DC voltage or DC current sensor abnormality is identified based on the compressor running frequency and the input current.

Malfunction Decision Conditions

- The compressor running frequency is above 52 Hz. (The input current is also below 0.1 A.)
- If the error repeats the system is shut down.
- Reset condition: Continuous run for about 60 minutes without any other error.

Supposed Causes

- Defective outdoor unit PCB

Troubleshooting

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.

Replace the outdoor unit PCB.

4.19 Thermistor or Related Abnormality (Outdoor Unit)

Remote Controller Display

H9, J3, J6, P4

Method of Malfunction Detection

This fault is identified based on the thermistor input voltage to the microcomputer.
A thermistor fault is identified based on the temperature sensed by each thermistor.

Malfunction Decision Conditions

- The thermistor input voltage is above 4.96 V or below 0.04 V with the power on.
- J3 error is judged if the discharge pipe temperature is lower than the heat exchanger temperature.

Supposed Causes

- Disconnection of the connector for the thermistor
- Defective thermistor corresponding to the error code
- Defective heat exchanger thermistor in the case of J3 error (outdoor heat exchanger thermistor in cooling operation, or indoor heat exchanger thermistor in heating operation)
- Defective outdoor unit PCB

Troubleshooting

In case of "P4"

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.

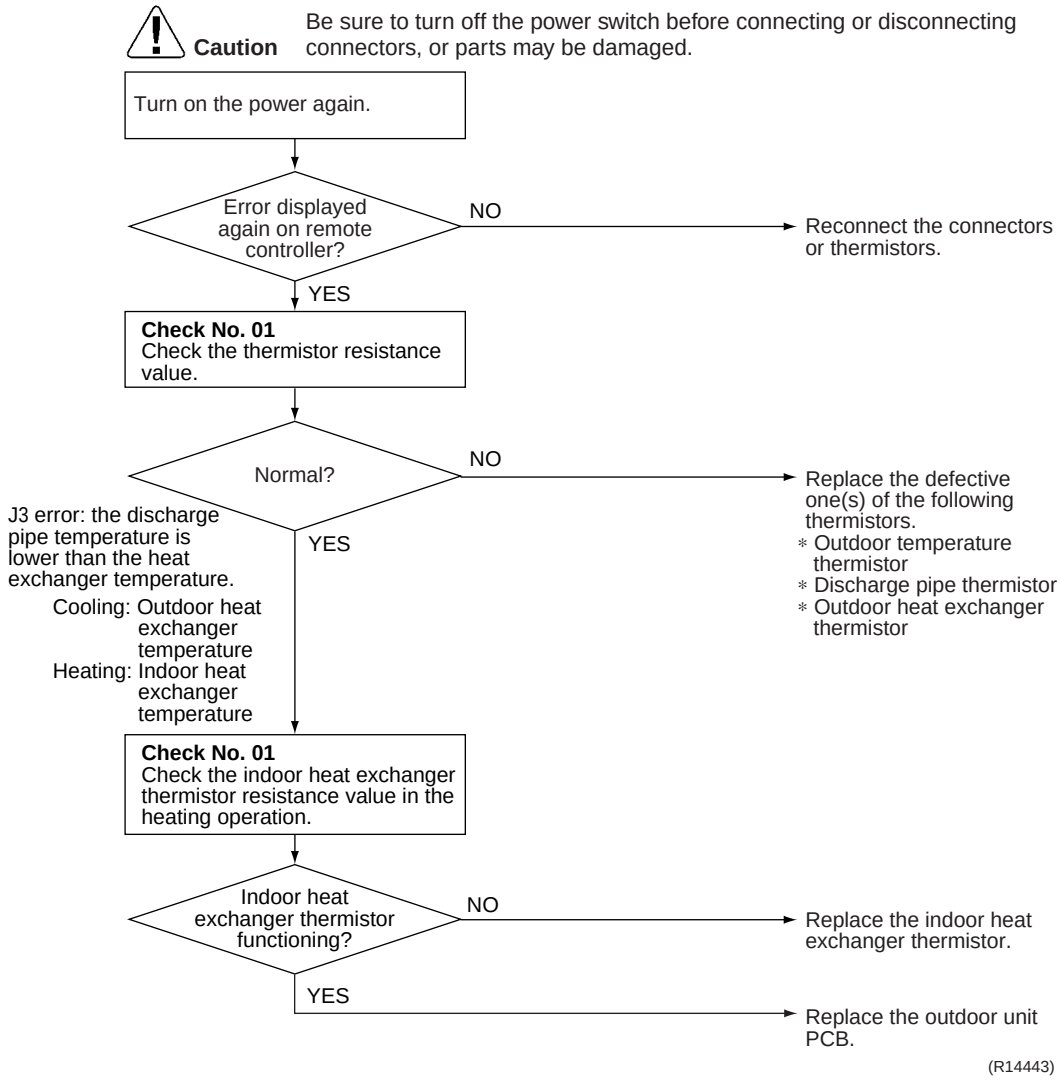
Replace the outdoor unit PCB.

P4 : Radiation fin thermistor

Troubleshooting

In case of "H9" "J3" "J6"

Check No.01
Refer to P.116



H9 : Outdoor temperature thermistor
J3 : Discharge pipe thermistor
J6 : Outdoor heat exchanger thermistor

4.20 Electrical Box Temperature Rise

Remote Controller Display

L3

Method of Malfunction Detection

An electrical box temperature rise is detected by checking the radiation fin thermistor with the compressor off.

Malfunction Decision Conditions

- With the compressor off, the radiation fin temperature is above **A**.
- The error is cleared when the radiation fin temperature drops below **B**.
- To cool the electrical components, the outdoor fan starts when the radiation fin temperature rises above **C** and stops when it drops below **B**.

	09/12 class	15/18/24 class
A	99°C (210.2°F)	122°C (251.6°F)
B	76°C (168.8°F)	64°C (147.2°F)
C	84°C (183.2°F)	113°C (235.4°F)

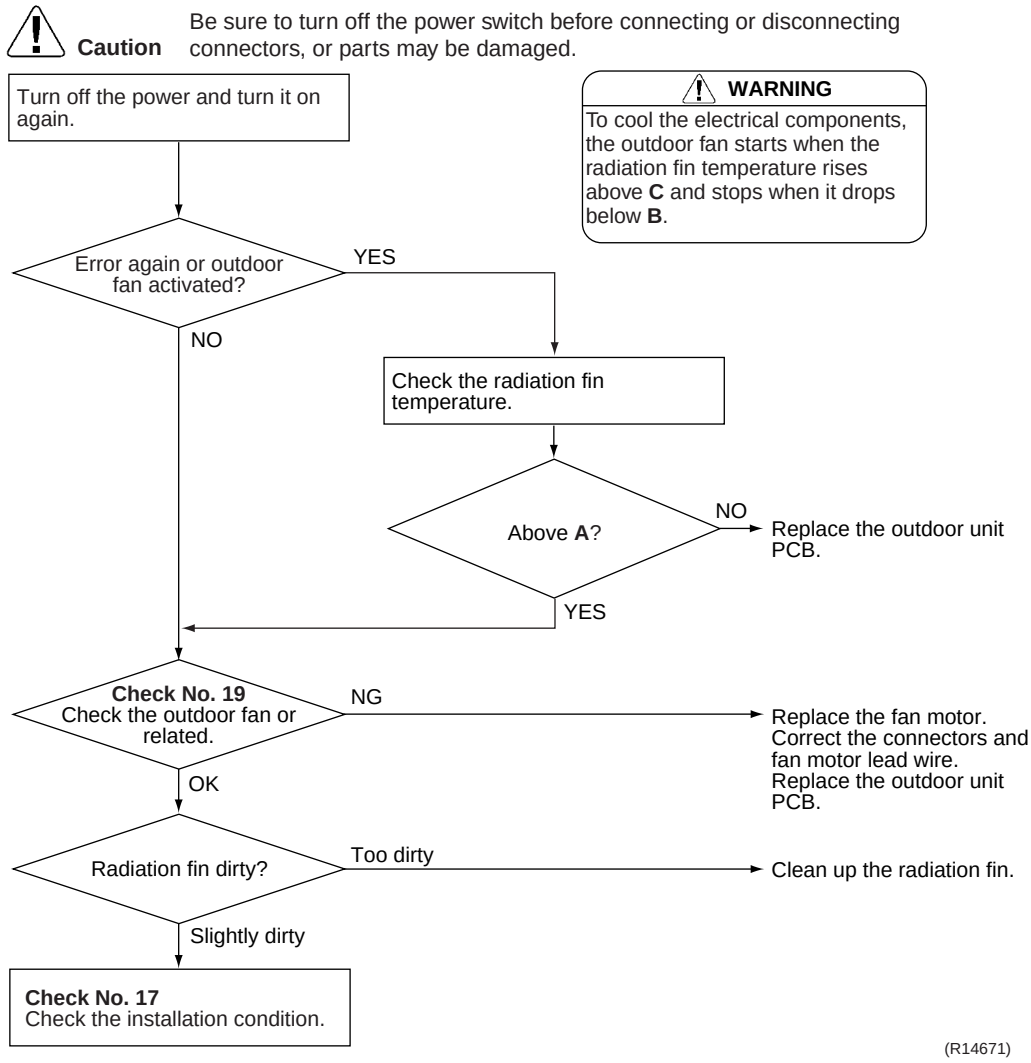
Supposed Causes

- Defective outdoor fan motor
- Short circuit
- Defective radiation fin thermistor
- Disconnection of connector
- Defective outdoor unit PCB

Troubleshooting

Check No.17
Refer to P.123

Check No.19
Refer to P.124



	09/12 class	15/18/24 class
A	99°C (210.2°F)	122°C (251.6°F)
B	76°C (168.8°F)	64°C (147.2°F)
C	84°C (183.2°F)	113°C (235.4°F)

4.21 Radiation Fin Temperature Rise

Remote Controller Display

L4

Method of Malfunction Detection

A radiation fin temperature rise is detected by checking the radiation fin thermistor with the compressor on.

Malfunction Decision Conditions

- If the radiation fin temperature with the compressor on is above **A**.
- The error is cleared when the radiation fin temperature drops below **B**.
- If the error repeats, the system is shut down.
- Reset condition: Continuous run for about 60 minutes without any other error

	09/12 class	15/18/24 class
A	99°C (210.2°F)	85°C (185°F)
B	84°C (183.2°F)	56°C (132.8°F)

Supposed Causes

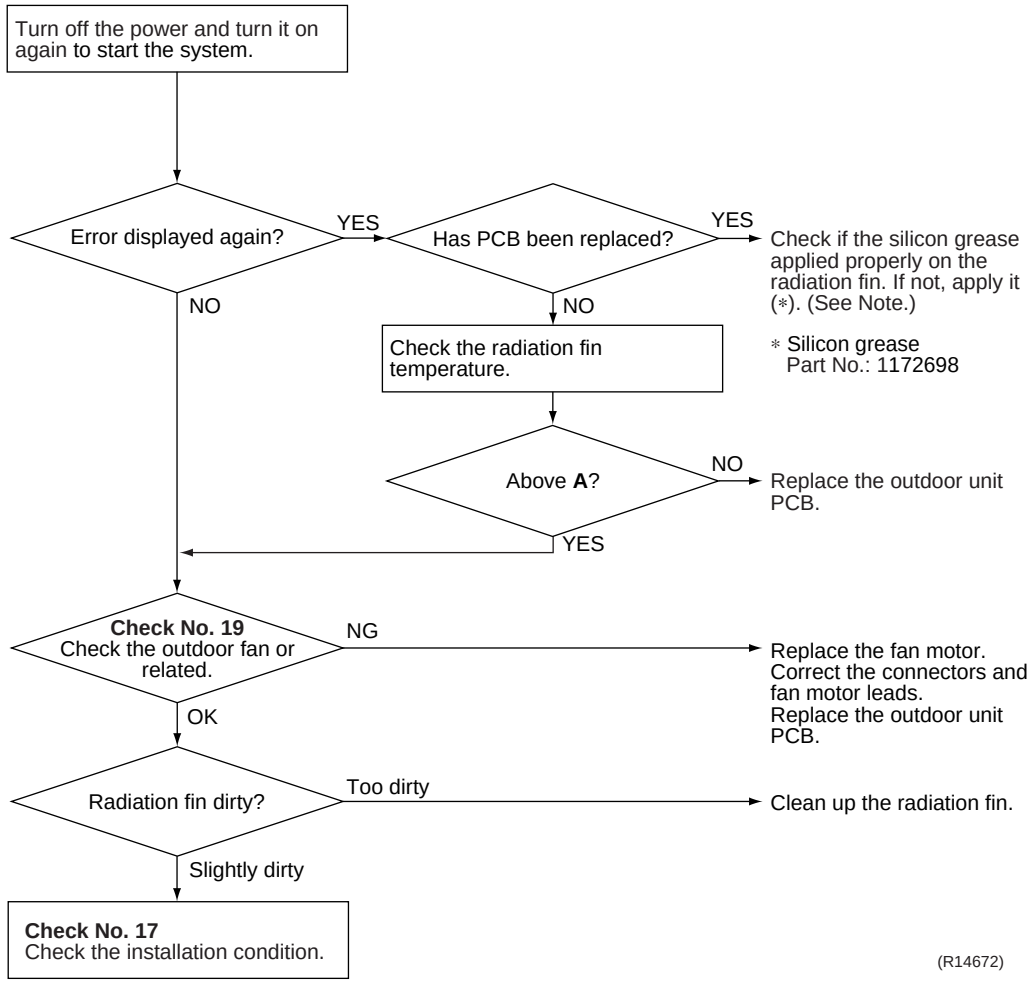
- Defective outdoor fan motor
- Short circuit
- Defective radiation fin thermistor
- Disconnection of connector
- Defective outdoor unit PCB
- Silicon grease is not applied properly on the radiation fin after replacing the outdoor unit PCB.

Troubleshooting

Check No.17
Refer to P.123

Check No.19
Refer to P.124

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.



	09/12 class	15/18/24 class
A	99°C (210.2°F)	85°C (185°F)

Note: Refer to “Application of silicon grease to a power transistor and a diode bridge” on page 228 for detail.

4.22 Output Overcurrent Detection

Remote Controller Display

L5

Method of Malfunction Detection

An output overcurrent is detected by checking the current that flows in the inverter DC section.

Malfunction Decision Conditions

- A position signal error occurs while the compressor is running.
- A speed error occurs while the compressor is running.
- An output overcurrent signal is fed from the output overcurrent detection circuit to the microcomputer.
- If the error repeats, the system is shut down.
- Reset condition: Continuous run for about 11 minutes without any other error

Supposed Causes

- Poor installation condition
- Closed stop valve
- Defective power module
- Wrong internal wiring
- Abnormal supply voltage
- Defective outdoor unit PCB
- Defective compressor

Troubleshooting

Check No.15
Refer to P.120

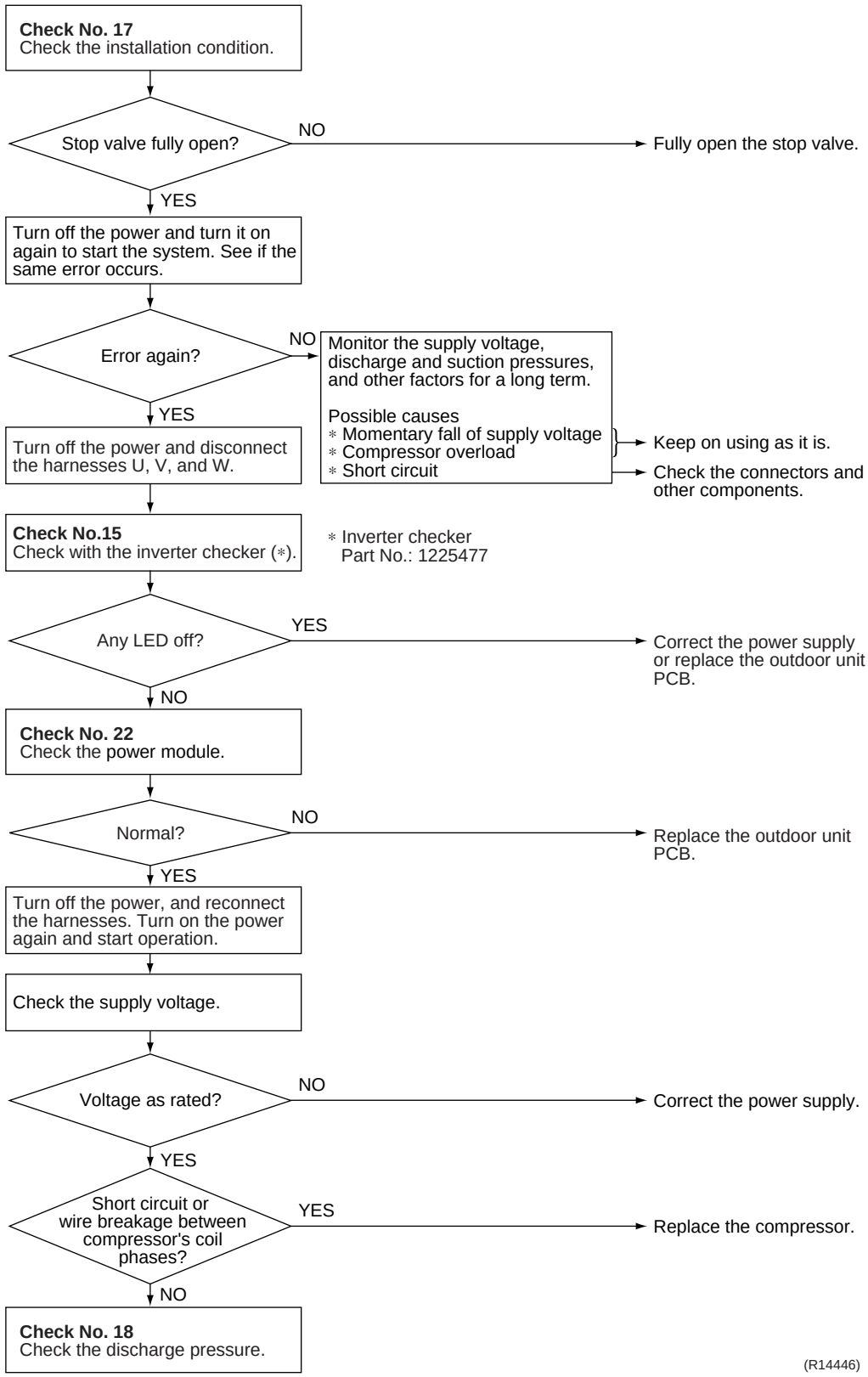
Check No.17
Refer to P.123

Check No.18
Refer to P.124

Check No.22
Refer to P.126

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.

* An output overcurrent may result from wrong internal wiring. If the system is interrupted by an output overcurrent after the wires have been disconnected and reconnected for part replacement, check the wiring again.



4.23 Refrigerant Shortage

Remote Controller Display

U0

Method of Malfunction Detection

Refrigerant shortage detection I:
Refrigerant shortage is detected by checking the input current value and the compressor running frequency. If the refrigerant is short, the input current is lower than the normal value.

Refrigerant shortage detection II:
Refrigerant shortage is detected by checking the discharge pipe temperature and the opening of the electronic expansion valve. If the refrigerant is short, the discharge pipe temperature tends to rise.

Refrigerant shortage detection III:
Refrigerant shortage is detected by checking the difference between suction and discharge temperature.

Malfunction Decision Conditions

Refrigerant shortage detection I:
The following conditions continue for 7 minutes.

- Input current × input voltage ≤ **A** × output frequency + **B**
- Output frequency > **C**

	A (–)	**B** (W)	**C** (Hz)
09/12 class	777/256	–15	50
15/18/24 class	2000/256	–181	54

Refrigerant shortage detection II:
The following conditions continue for 80 seconds.

- Opening of the electronic expansion valve ≥ **D**
- Discharge pipe temperature (°C) > **E** × target discharge pipe temperature (°C) + **F** (°C)
  (Discharge pipe temperature (°F) > **E** × target discharge pipe temperature (°F) + **G** (°F))

		D (pulse)	**E** (–)	**F** (°C)	**G** (°F)
09/12 class	Cooling	470	160/128	–1.5	–10.7
	Heating		172/128	–8.0	–25.4
15/18/24 class		470	128/128	20	36

Refrigerant shortage detection III: (15/18/24 class only)
When the difference of the temperature is smaller than **H**, it is regarded as refrigerant shortage.

		H
Cooling	room thermistor temperature – indoor heat exchanger temperature	4.0°C (7.2°F)
	outdoor heat exchanger temperature – outdoor temperature	4.0°C (7.2°F)
Heating	indoor heat exchanger temperature – room thermistor temperature	4.0°C (7.2°F)
	outdoor temperature – outdoor heat exchanger temperature	4.0°C (7.2°F)

- If the error repeats, the system is shut down.
- Reset condition: Continuous run for about 60 minutes without any other error

Supposed Causes

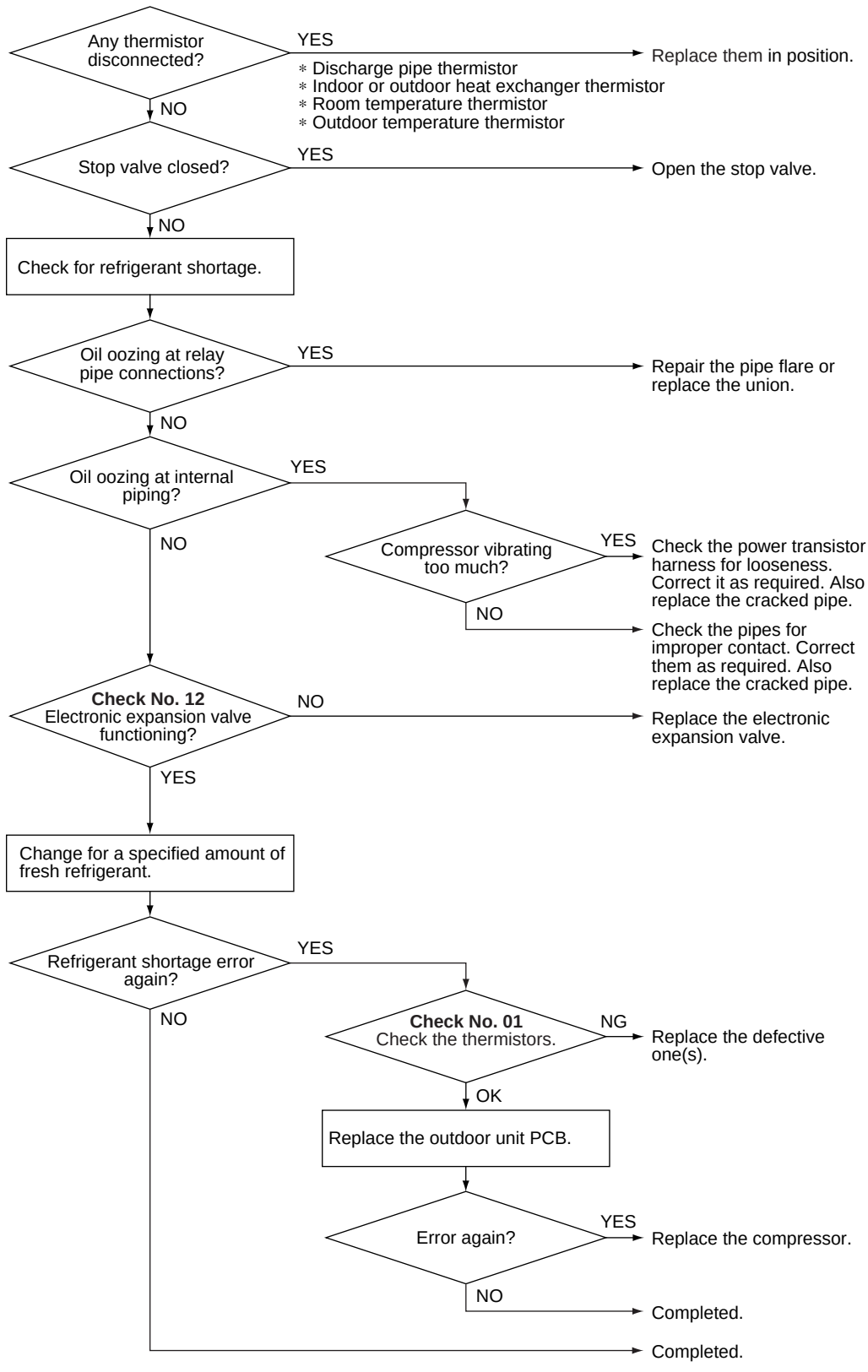
- Disconnection of discharge pipe thermistor, indoor or outdoor heat exchanger thermistor, room or outdoor temperature thermistor
- Closed stop valve
- Refrigerant shortage (refrigerant leakage)
- Poor compression performance of compressor
- Defective electronic expansion valve

Troubleshooting

Check No.01
Refer to P.116

Check No.12
Refer to P.118

Caution Be sure to turn off the power switch before connecting or disconnecting connectors, or parts may be damaged.



(R14447)

4.24 Low-voltage Detection or Over-voltage Detection

Remote Controller Display

U2

Method of Malfunction Detection

Low-voltage detection:
An abnormal voltage drop is detected by the DC voltage detection circuit.

Over-voltage detection:
An abnormal voltage rise is detected by the over-voltage detection circuit.

Malfunction Decision Conditions

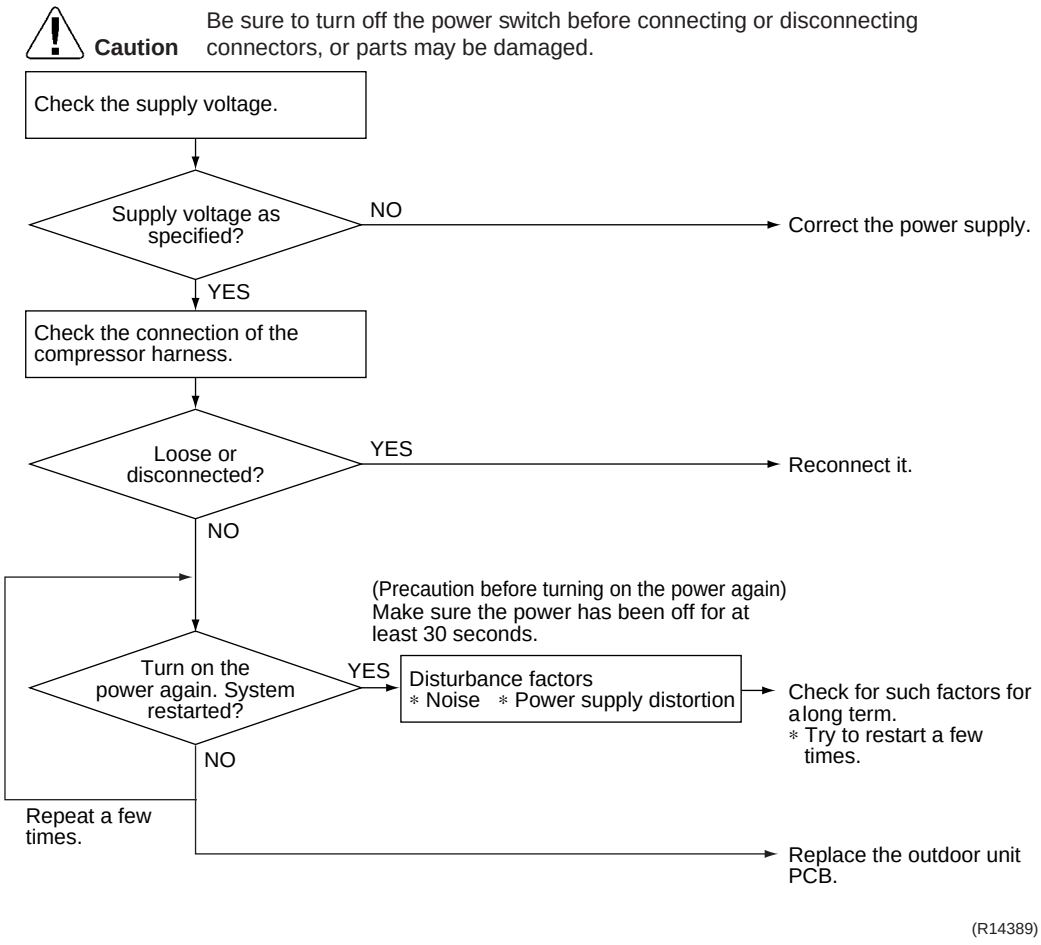
Low-voltage detection:
- The voltage detected by the DC voltage detection circuit is below about 200 V.
- The compressor stops if the error occurs, and restarts automatically after 3-minute standby.

Over-voltage detection:
- An over-voltage signal is fed from the over-voltage detection circuit to the microcomputer.
- The compressor stops if the error occurs, and restarts automatically after 3-minute standby.

Supposed Causes

- Supply voltage is not as specified.
- Defective DC voltage detection circuit
- Defective over-voltage detection circuit
- Defective PAM control part
- Disconnection of compressor harness
- Noise
- Momentary fall of voltage
- Momentary power failure

Troubleshooting



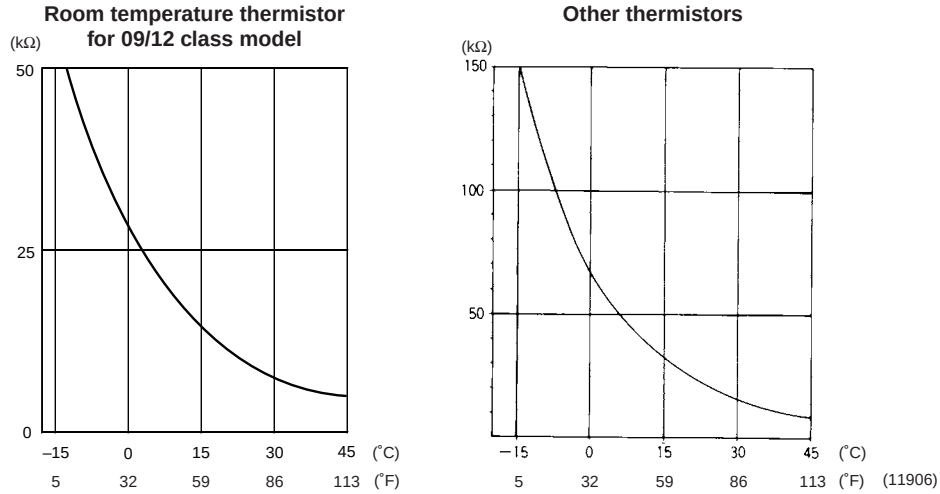
5. Check

5.1 Thermistor Resistance Check

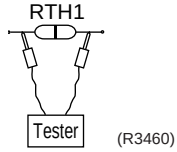
Check No.01

Disconnect the connectors of the thermistors from the PCB, and measure the resistance of each thermistor using tester.
The relationship between normal temperature and resistance is shown in the table and the graph below.

Thermistor temperature (°C / °F)	Resistance (kΩ)	
	Room temperature thermistor for 09/12 class model	Other thermistors
–20 / –4	73.4	211.0
–15 / 5	57.0	150.0
–10 / 14	44.7	116.5
–5 / 23	35.3	88.0
0 / 32	28.2	67.2
5 / 41	22.6	51.9
10 / 50	18.3	40.0
15 / 59	14.8	31.8
20 / 68	12.1	25.0
25 / 77	10.0	20.0
30 / 86	8.2	16.0
35 / 95	6.9	13.0
40 / 104	5.8	10.6
45 / 113	4.9	8.7
50 / 122	4.1	7.2
	(R25°C (77°F) = 10 kΩ, B = 3435 K)	(R25°C (77°F) = 20 kΩ, B = 3950 K)



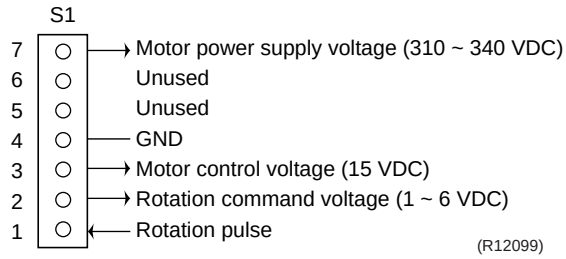
- For the models in which the thermistor is directly mounted on the PCB, disconnect the connector for the PCB and measure.



5.2 Fan Motor Connector Output Check

Check No.02 **FTXN15/18/24KVJU**

1. Check the connection of connector.
2. Check the motor power supply voltage output (pins 4 - 7).
3. Check the motor control voltage (pins 4 - 3).
4. Check the rotation command voltage (pins 4 - 2).
5. Check the rotation pulse (pins 4 - 1).



Check No.03 **FTXN09/12KEVJU**

- Fan motor wire breakdown / short circuit check

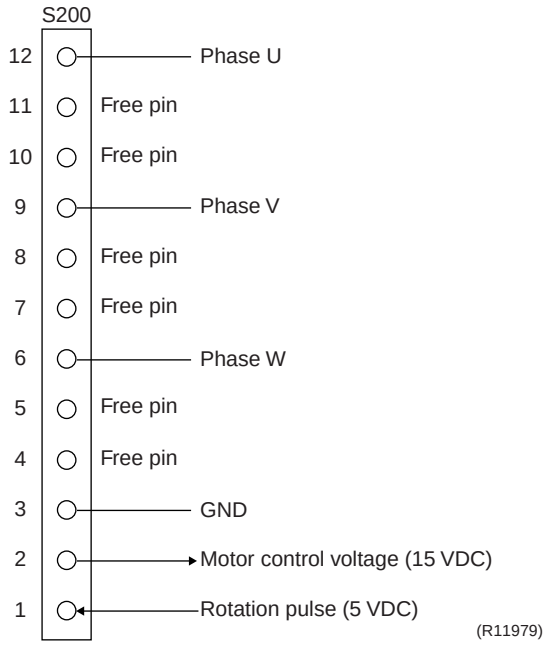
1. Check the connector for connection.
2. Turn the power off.
3. Check if each resistance at the phases U - V and V - W is 90 Ω ~ 100 Ω (between the pins 12 - 9, and between 9 - 6).

- Motor control voltage check

1. Check the connector for connection.
2. Check the motor control voltage is generated (between the pins 2 - 3).

- Rotation pulse check

1. Check the connector for connection.
2. Turn the power on and stop the operation.
3. Check if the Hall IC generates the rotation pulse 4 times when the fan motor is manually rotated once (between the pins 1 - 3).



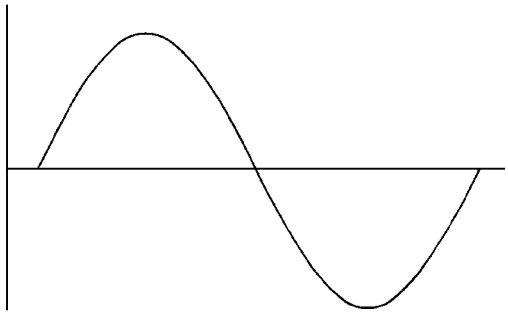
5.3 Power Supply Waveforms Check

Check No.11

Measure the power supply waveform between No. 1 and No. 2 on the terminal board, and check the waveform disturbance.

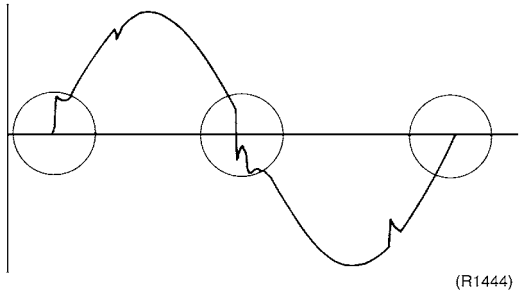
- Check to see if the power supply waveform is a sine wave. (Fig.1)
- Check to see if there is waveform disturbance near the zero cross. (sections circled in Fig.2)

Fig.1



(R1736)

Fig.2



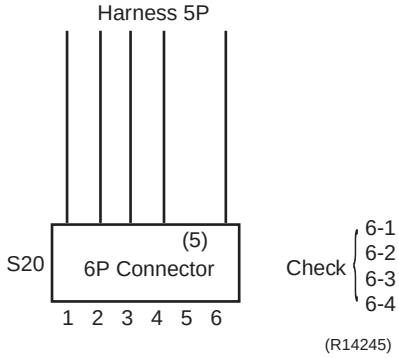
(R1444)

5.4 Electronic Expansion Valve Check

Check No.12

Conduct the followings to check the electronic expansion valve (EV).

1. Check to see if the EV connector is correctly connected to the PCB.
2. Turn the power off and on again, and check to see if the EV generate latching sound.
3. If the EV does not generate latching sound in the above step 2, disconnect the connector and check the continuity using a tester.
4. Check the continuity between the pins 1 - 6, 2 - 6, 3 - 6, 4 - 6. If there is no continuity between the pins, the EV coil is faulty.



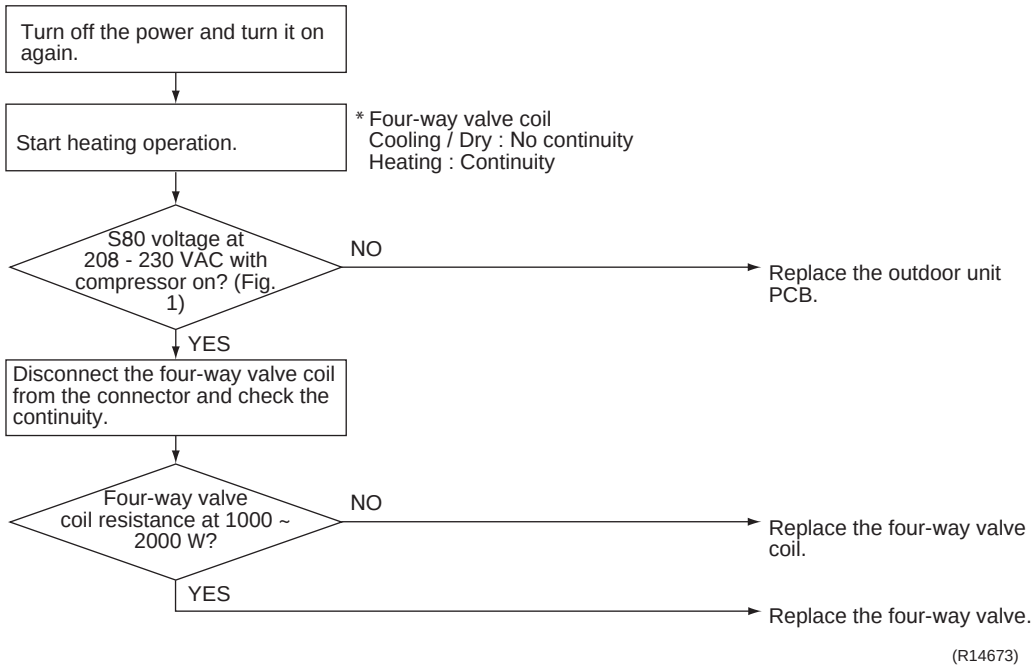
(R14245)

5. If the continuity is confirmed in the above step 3, the outdoor unit PCB is faulty.

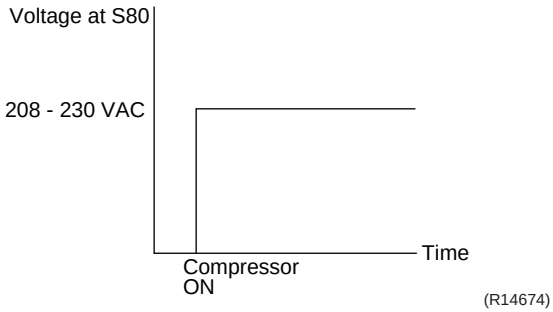
Note: Please note that the latching sound varies depending on the valve type.

5.5 Four-Way Valve Performance Check

Check No.13

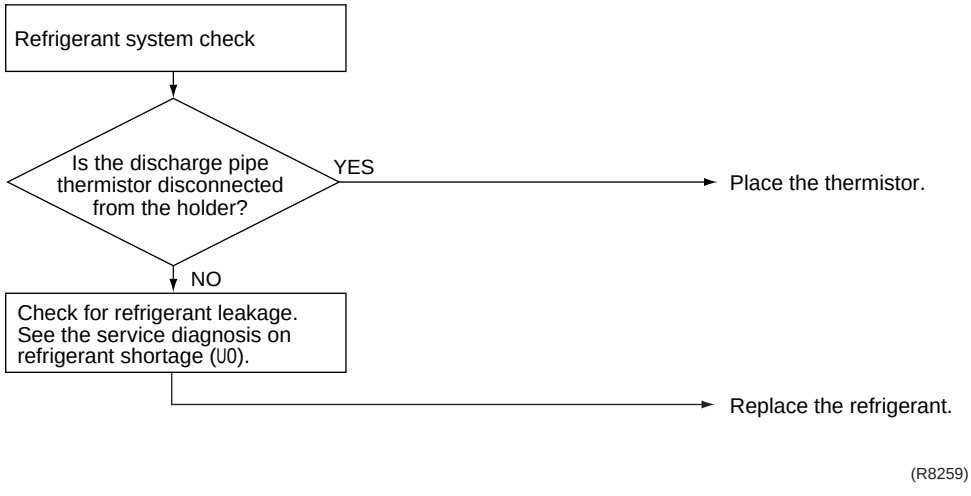


(Fig. 1)



5.6 Inverter Unit Refrigerant System Check

Check No.14



5.7 “Inverter Checker” Check

Check No.15

■ **Characteristics**

If an abnormal stop occurs due to compressor startup failure or overcurrent output when using inverter unit, it is difficult to judge whether it is caused by the compressor failure or other failure (control PCB, power module, etc.). The inverter checker makes it possible to judge the cause of trouble easily and securely. Connect this checker as a quasi-compressor instead of compressor and check the output of inverter.

■ **Operation Method**

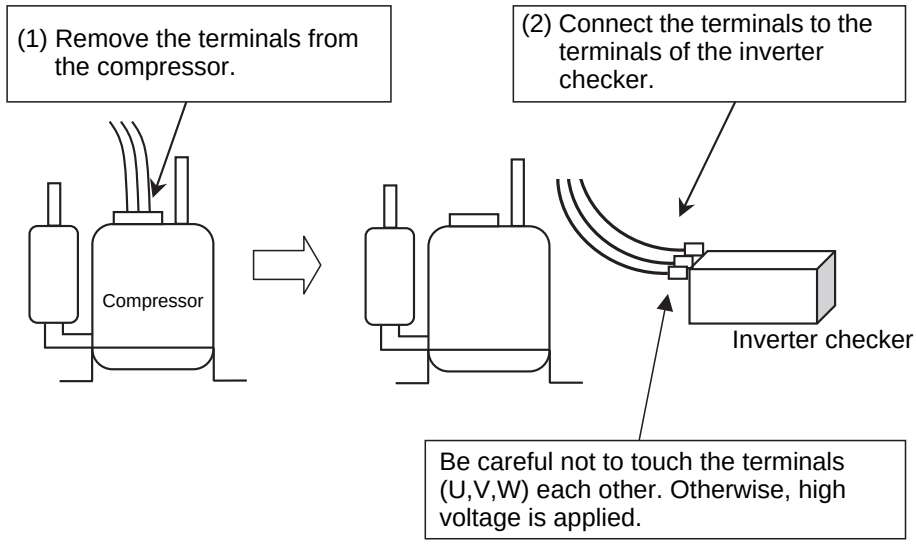
Step 1

Be sure to turn the power off.

Step 2

Install the inverter checker instead of a compressor.

Note:
Make sure the charged voltage of the built-in smoothing electrolytic capacitor drops to 10 VDC or below before carrying out the service work.



Reference:
If the terminals of the compressor are not FASTON terminals (difficult to remove the wire on the terminals), it is possible to connect wires available on site to the outdoor unit from the output side of the PCB. Do not connect them to the compressor at the same time, otherwise it may result in incorrect detection.

Step 3

09/12 class: Activate power transistor test operation from indoor unit.

1) Turn the power on.
2) Select FAN operation with the [MODE] button on the remote controller.
3) Press the 3 buttons (TEMP▲, TEMP▼, MODE) simultaneously.
   → 00 is displayed with the left-side number blinking.
4) Press the [MODE] button.
   → 00 is displayed with the right-side number blinking.
5) Press the [MODE] button.
   → T is displayed.
6) Press the [ON/OFF] button.
   → Power transistor test operation starts.

15/18/24 class: Activate power transistor test operation from the outdoor unit.

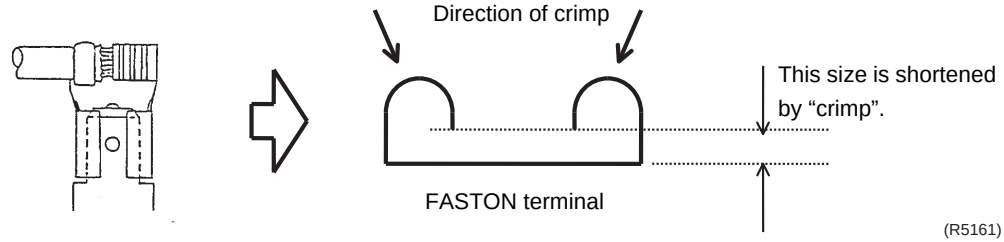
1) Press the forced cooling operation ON/OFF button for 5 seconds.
   (Refer to page 222 for the position.)
   → Power transistor test operation starts.

■ **Diagnose method (Diagnose according to 6 LEDs lighting status.)**

(1) When all the LEDs are lit uniformly, the compressor is defective.
   → Replace the compressor.
(2) When the LEDs are not lit uniformly, check the power module.
   → Refer to **Check No.13**.
(3) If NG in **Check No.13**, replace the power module (control PCB).
   If OK in **Check No.13**, check if there is any solder cracking on the filter PCB.
(4) If any solder cracking is found, replace the filter PCB or repair the soldered section.
   If the filter PCB is OK, replace the control PCB.

Caution

(1) When the output frequency is low, the LEDs blink slowly. As the output frequency increases, the LEDs blink quicker. (The LEDs look like they are lit.)
(2) On completion of diagnose by the inverter checker, be sure to re-crimp the FASTON terminals. Otherwise, the terminals may be burned due to loosening.

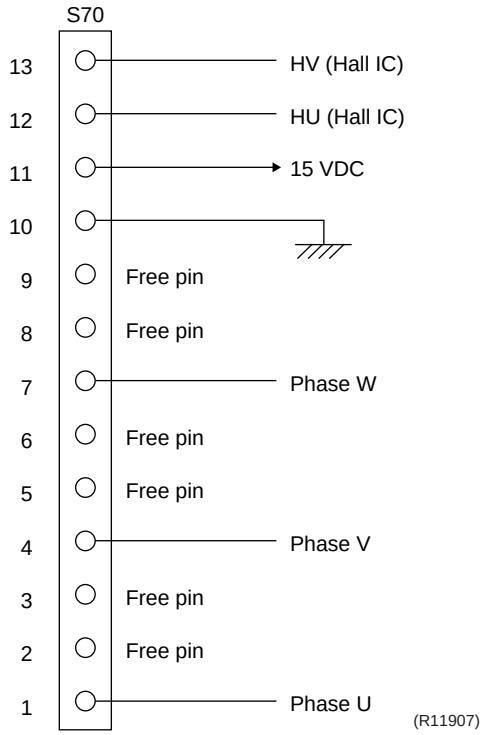


5.8 Rotation Pulse Check on the Outdoor Unit PCB

Check No.16

09/12 class

1. Check that the voltage between the pins 10 - 11 is 15 VDC.
2. Check if the Hall IC generates the rotation pulse (0 ~ 15 VDC) 4 times between the pins 10 -12, 10 - 13, when the fan motor is manually rotated once.



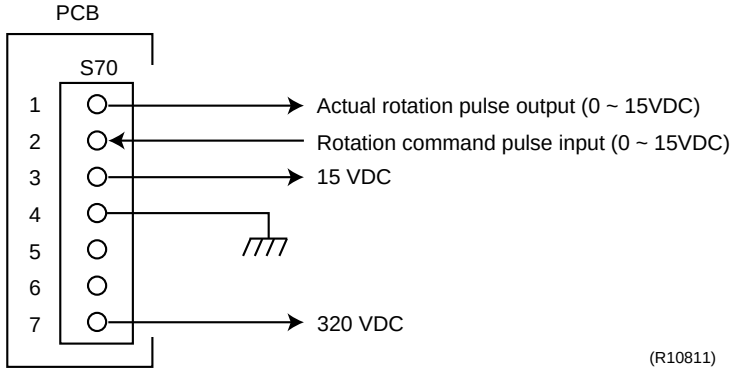
15/18/24 class

Make sure that the voltage of 320 ± 30 V is applied.

1. Set operation off and power off. Disconnect the connector S70.
2. Check that the voltage between the pins 4 - 7 is 320 VDC.
3. Check that the control voltage between the pins 3 - 4 is 15 VDC.
4. Check that the rotation command voltage between the pins 2 - 4 is 0 ~ 15 VDC.
5. Keep operation off and power off. Connect the connector S70.
6. Check whether 2 pulses (0 ~ 15 VDC) are output at the pins 1 - 4 when the fan motor is rotated 1 turn by hand.

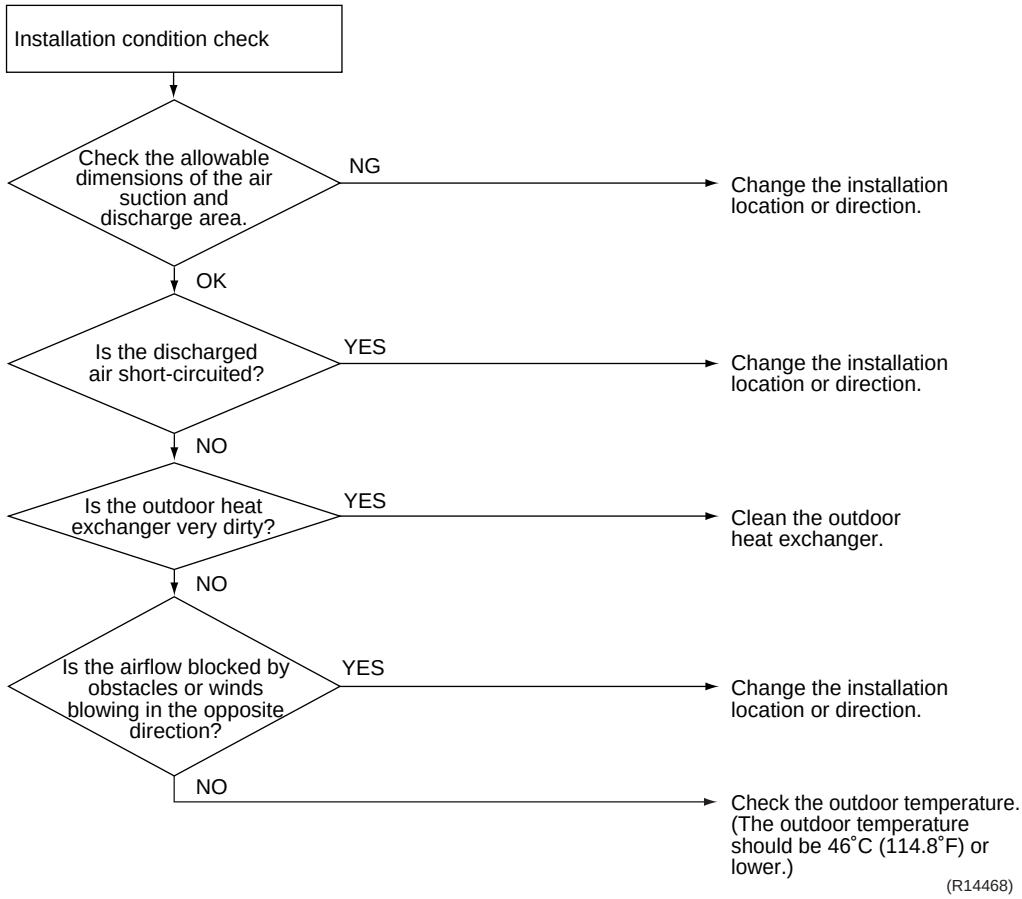
When the fuse is melted, check the outdoor fan motor for proper function.

If NG in step 2 → Defective PCB→ Replace the outdoor unit PCB.
If NG in step 4 → Defective Hall IC→ Replace the outdoor fan motor.
If OK in both steps 2 and 4 → Replace the outdoor unit PCB.



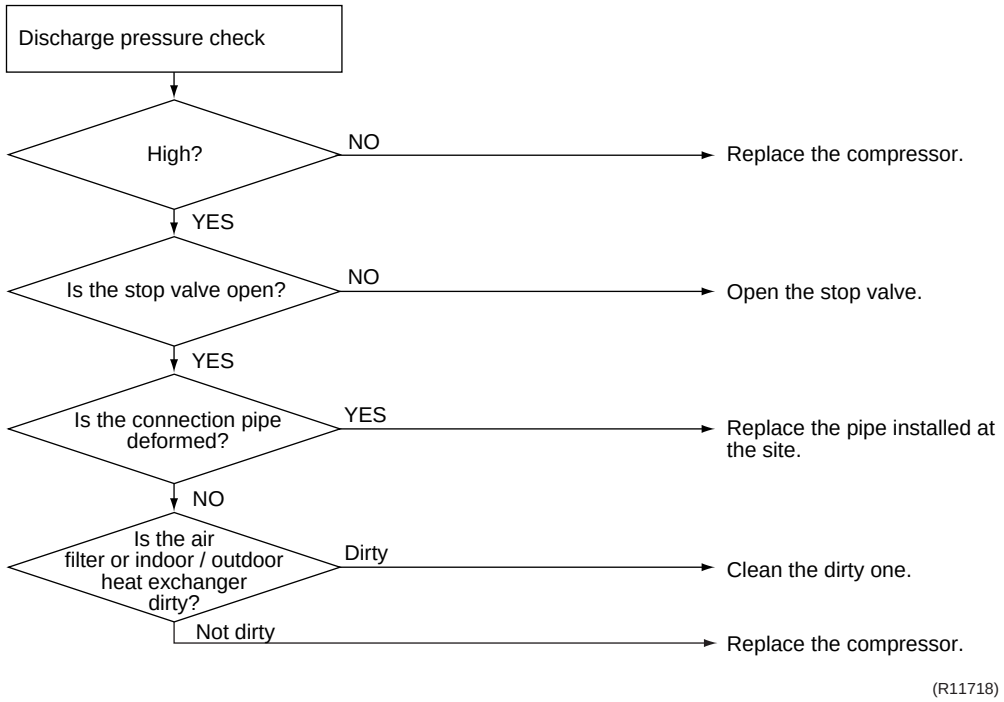
5.9 Installation Condition Check

Check No.17



5.10 Discharge Pressure Check

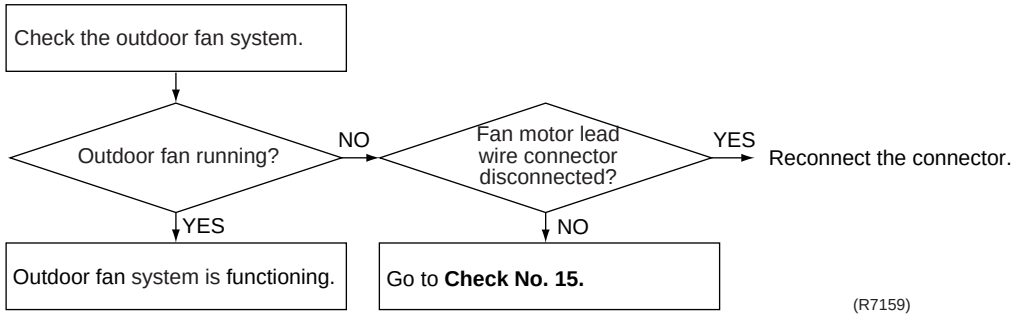
Check No.18



(R11718)

5.11 Outdoor Fan System Check

Check No.19 **DC motor**



(R7159)

5.12 Main Circuit Short Check

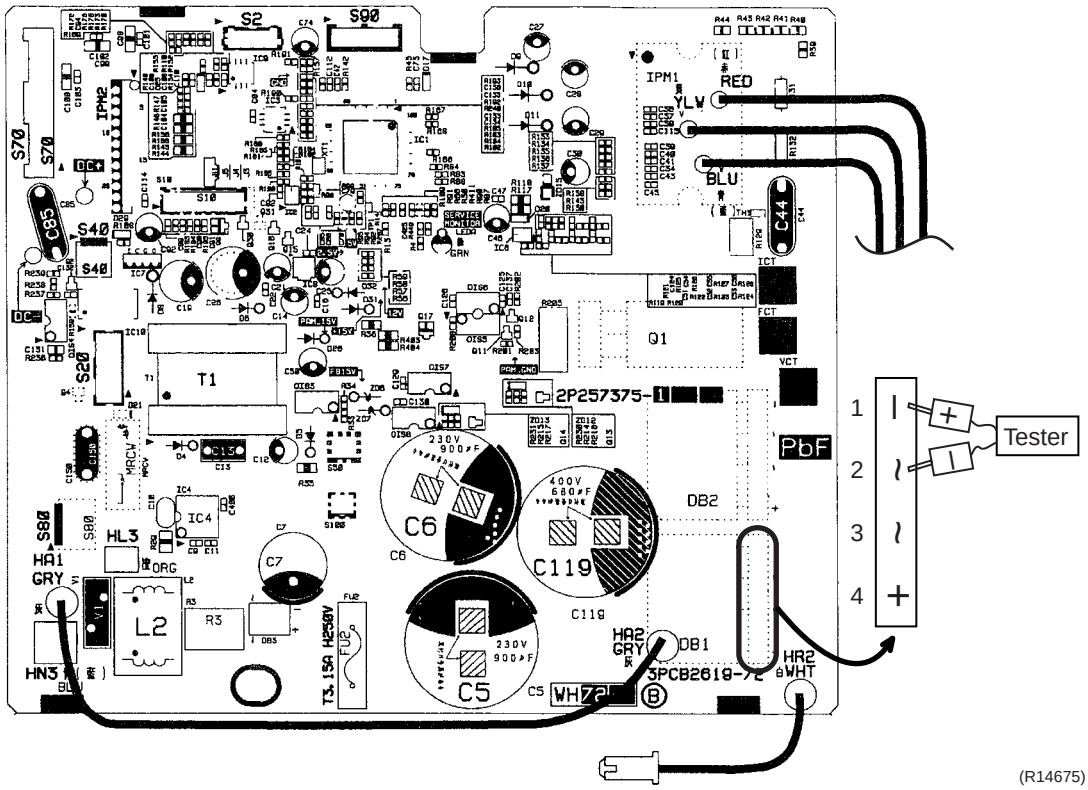
Check No.20

Note: Check to make sure that the voltage between (+) and (–) of the diode bridge (DB1) is approx. 0 V before checking.

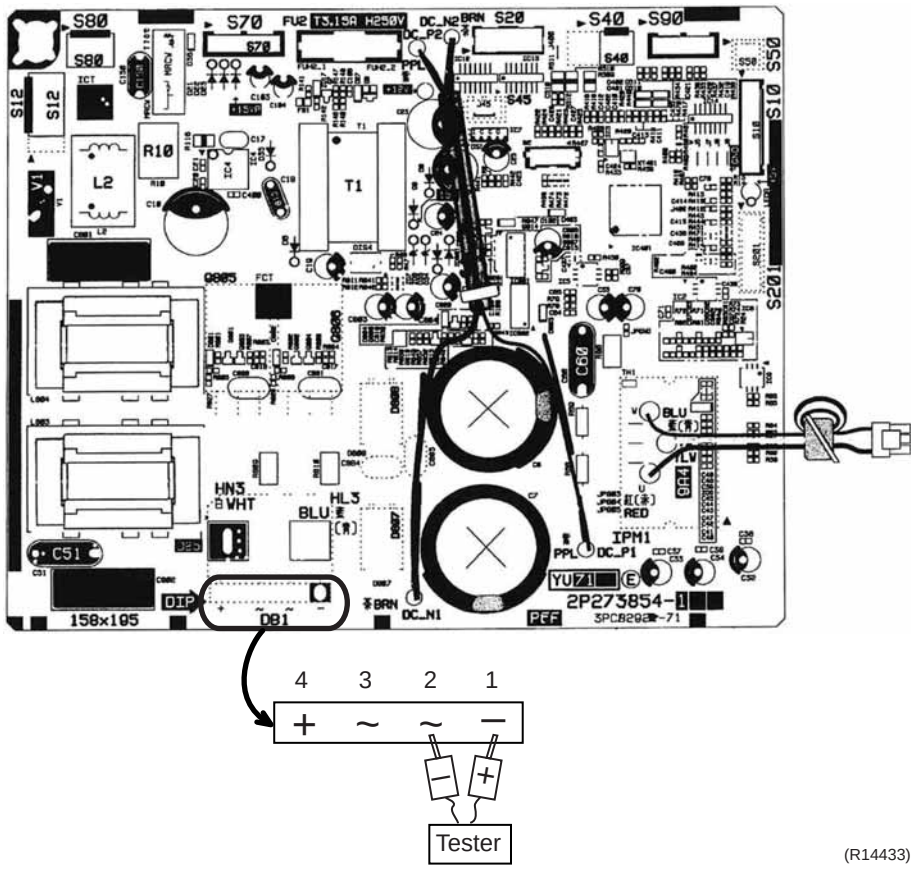
- Measure the resistance between the pins of the DB1 as below.
- If the resistance is ∞ or less than 1 kW, short circuit occurs on the main circuit.

(–) terminal of the tester (in case of digital, (+) terminal)	~ (2, 3)	+ (4)	~ (2, 3)	– (1)
(+) terminal of the tester (in case of digital, (–) terminal)	+ (4)	~ (2, 3)	– (1)	~ (2, 3)
Resistance is OK.	several kΩ ~ several MΩ	∞	∞	several kΩ ~ several MΩ
Resistance is NG.	0 Ω or ∞	0	0	0 Ω or ∞

09/12 class



15/18/24 class



5.13 Power Module Check

Check No.22

Note: Check to make sure that the voltage between (+) and (–) of the diode bridge (DB1) is approx. 0 V before checking.

- Disconnect the compressor harness connector from the outdoor unit PCB. To disengage the connector, press the protrusion on the connector.
- Follow the procedure below to measure resistance between the terminals of the DB1 and the terminals of the compressor with a multi-tester. Evaluate the measurement results for a judgment.

Negative (–) terminal of tester (positive terminal (+) for digital tester)	DB1 (+)	UVW	DB1 (–)	UVW
Positive (+) terminal of tester (negative terminal (–) for digital tester)	UVW	DB1 (+)	UVW	DB1 (–)
Resistance in OK	several kΩ ~ several MΩ			
Resistance in NG	0 Ω or ∞			

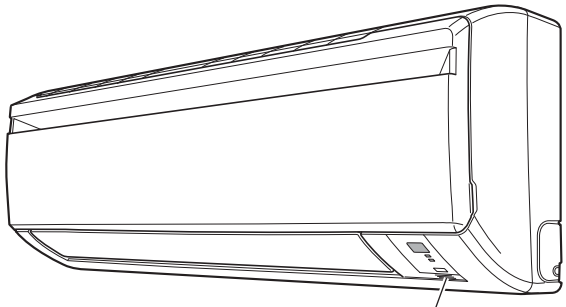
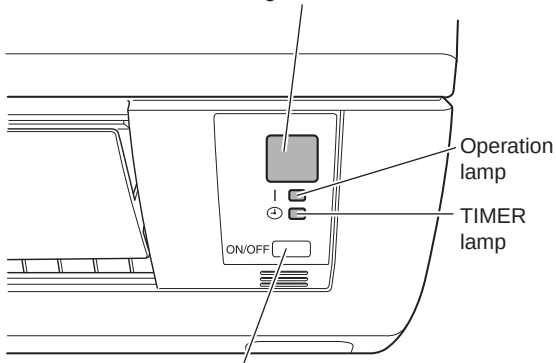
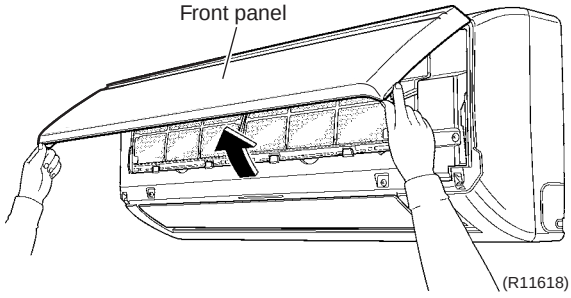
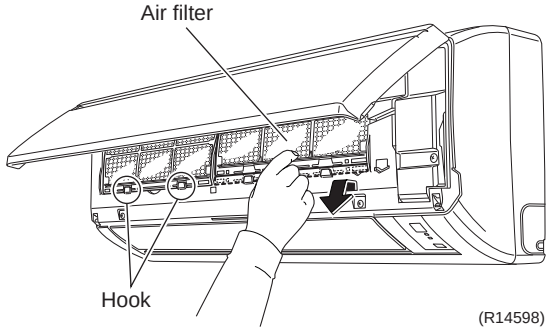
Part 7
Removal Procedure

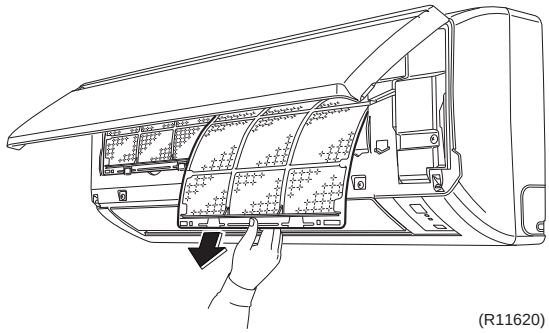
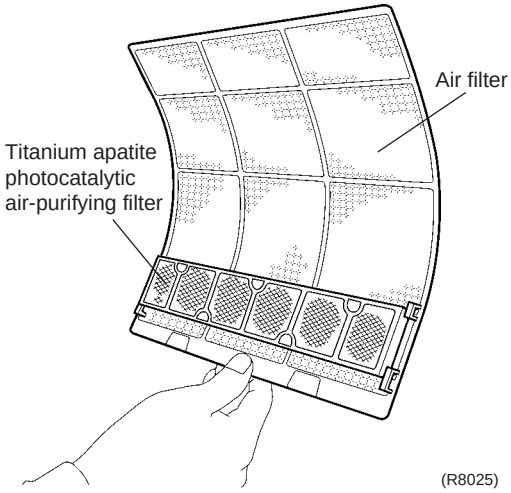
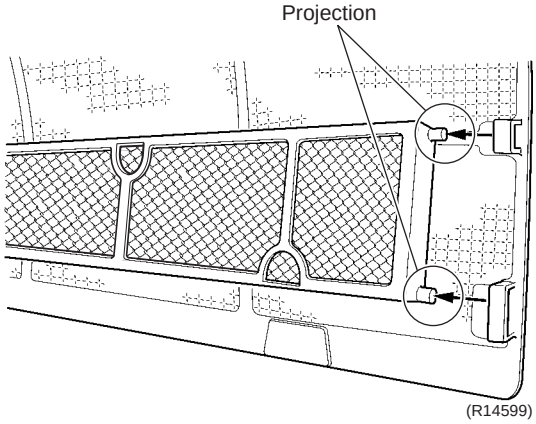
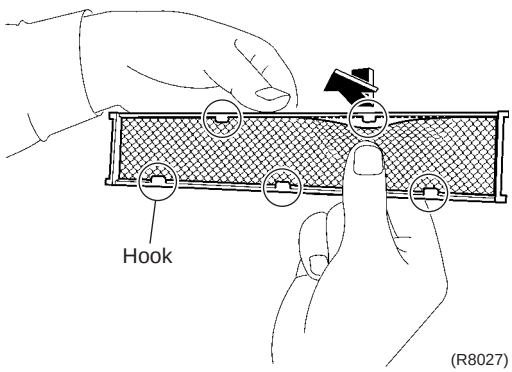
1. Indoor Unit: 09/12 Class

1.1 Removal of Air Filters

Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

Step	Procedure	Points
1. Appearance features	 (R11616)  (R11617)	**Warning** **Dangerous: High voltage** **A high voltage is applied to all the electric circuits of this product including thermistors.** ■ When a signal from the remote controller is received, the receiving tone sounds and the operation lamp flickers immediately to confirm the signal reception. ■ When the ON/OFF button is kept pressed for 5 seconds, the forced cooling operation is performed for about 15 minutes.
2. Remove the air filters. 1 Open the front panel to the position where it stops.	 (R11618)	
2 Slightly push up the knob at the center of the air filter.	 (R14598)	■ The air filter is not marked for difference between the right and left sides. ■ The air filter can be set easily by inserting it along the guides. ■ Insert the air filter with the “FRONT” mark faced up. ■ Be sure to insert the hooks (at 2 lower positions) when mounting the air filter.

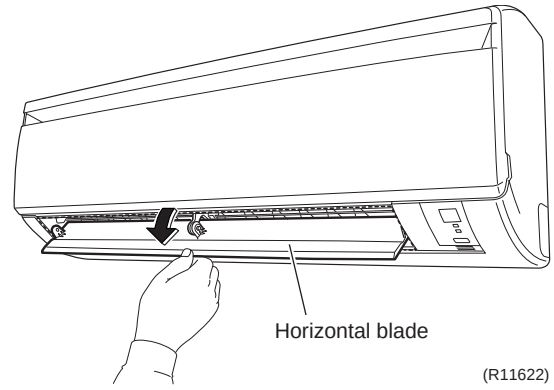
Step	Procedure		Points
3	Pull out the air filter downward and remove it.	 (R11620)	
3. Remove the Titanium apatite photocatalytic air-purifying filters.			
1	The Titanium apatite photocatalytic air-purifying filter is attached to the back of the air filter.	 (R8025)	
2	Remove the Titanium apatite photocatalytic air-purifying filter frame by bending the air filter and unfastening the projections from the air filter frame.	 (R14599)	
3	Remove the Titanium apatite photocatalytic air-purifying filter from its frame (at 5 positions) by bending it.	 (R8027)	■ To prevent the damage, do not remove the Titanium apatite photocatalytic air-purifying filter from the frame when cleaning it. ■ The Titanium apatite photocatalytic air-purifying filter is not marked for difference between the right and left sides.

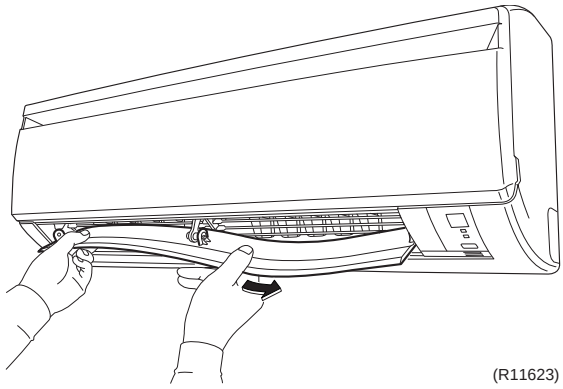
1.2 Removal of Horizontal Blade

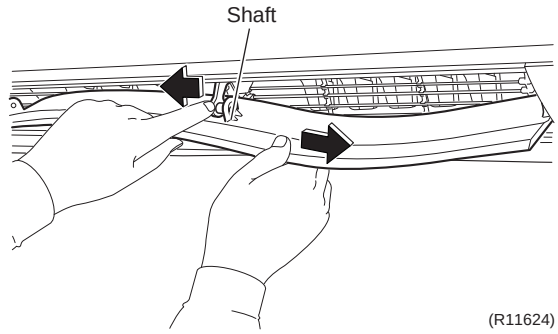
Procedure

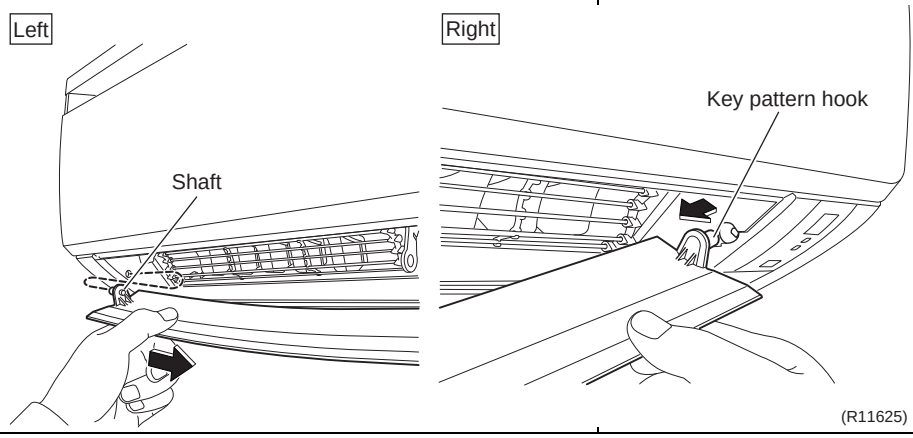
Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

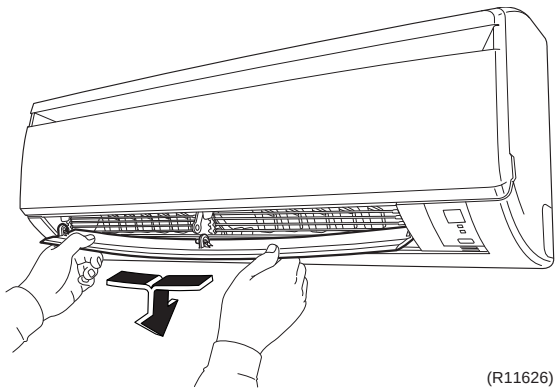
Step	Procedure	Points
1	Open the horizontal blade.	
2	Unfasten the center shaft while bending the horizontal blade slightly.	■ The center shaft can be released easily by bending the blade.
3	Unfasten the left shaft of the horizontal blade.	**Cautions for reassembling** 1. Since the key pattern hook is provided, rotate the horizontal blade and fit it to the right shaft first. 2. Fit the horizontal blade to the center and left shafts.
4	Unfasten the right shaft of the horizontal blade.	





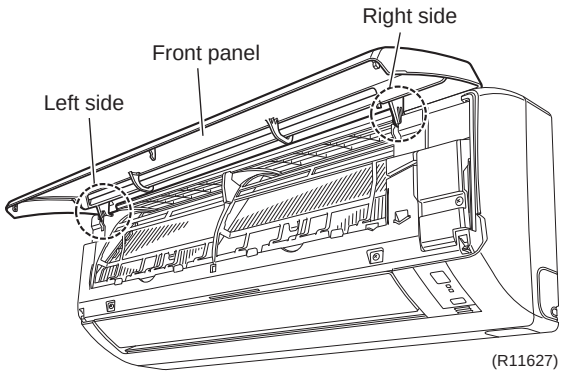
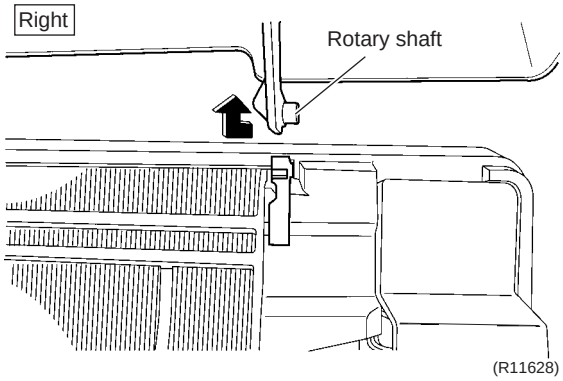
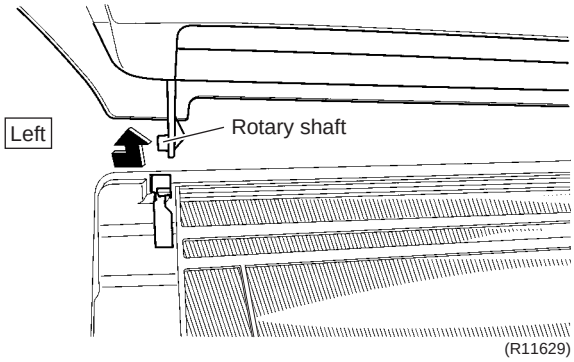
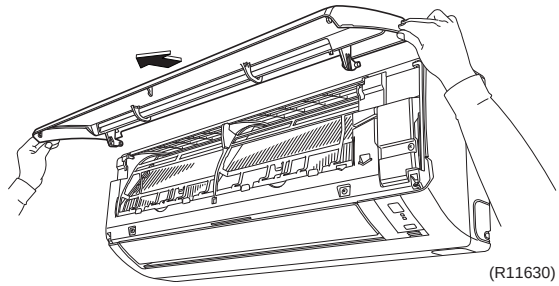




Step	Procedure		Points
5	Remove the horizontal blade.	 (R11626)	

1.3 Removal of Front Panel

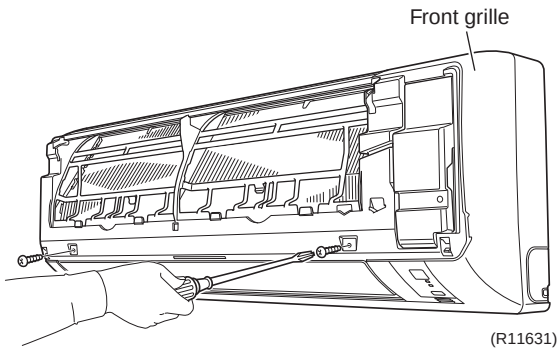
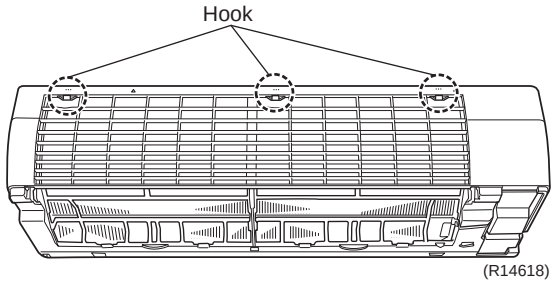
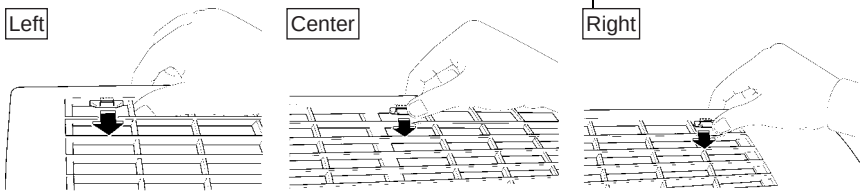
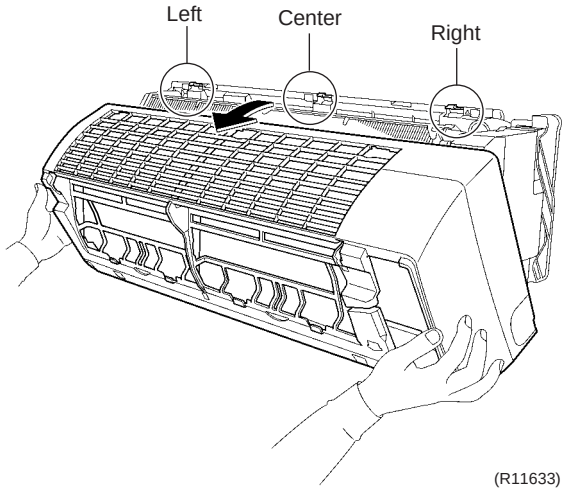
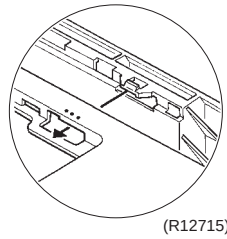
Procedure **Warning** **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

Step	Procedure		Points
1	Open the front panel over the position where it stops.		
2	Release the right rotary shaft.		■ The rotary shaft on each side can be released easily by sliding each shaft inwards.
3	Release the left rotary shaft.		
4	Remove the front panel.		■ When reassembling the front panel, fit the right and left rotary shafts one by one into the grooves and fully push them in position.

1.4 Removal of Front Grille

Procedure

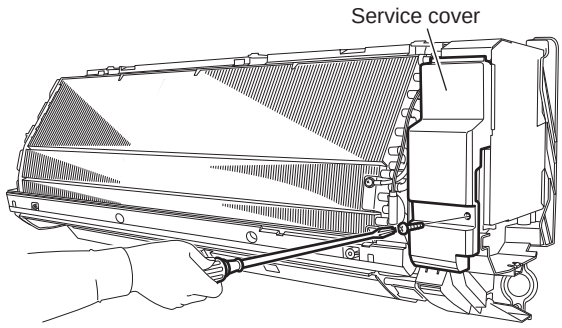
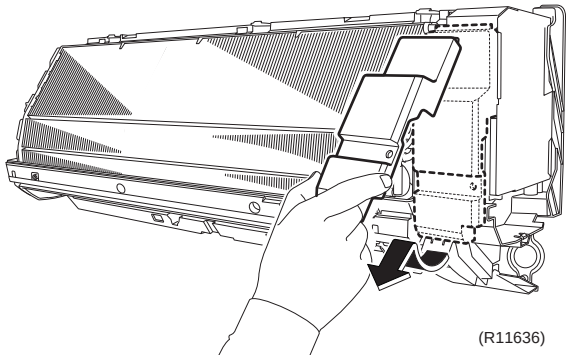
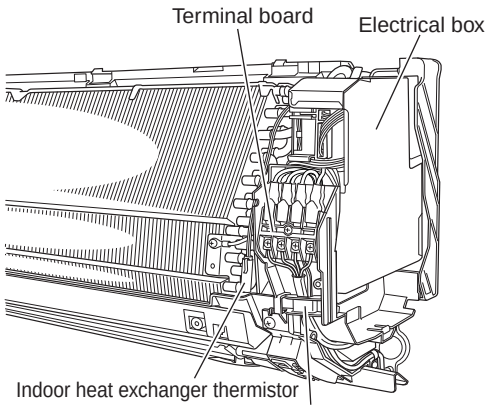
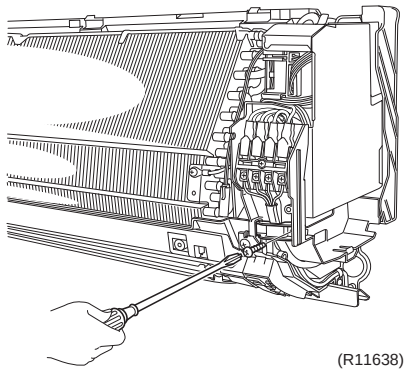
Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

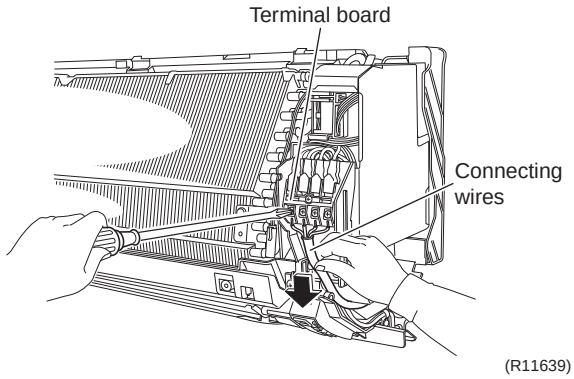
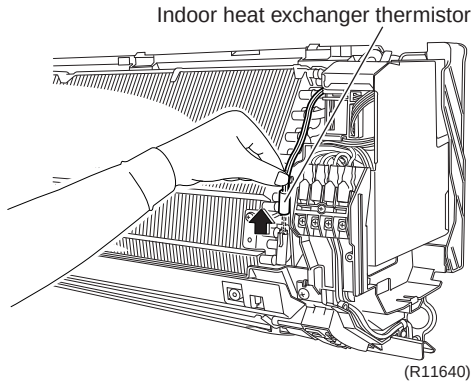
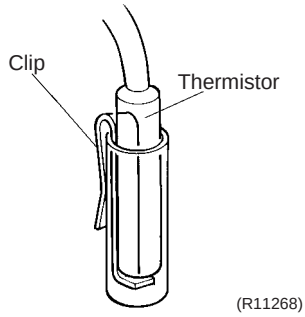
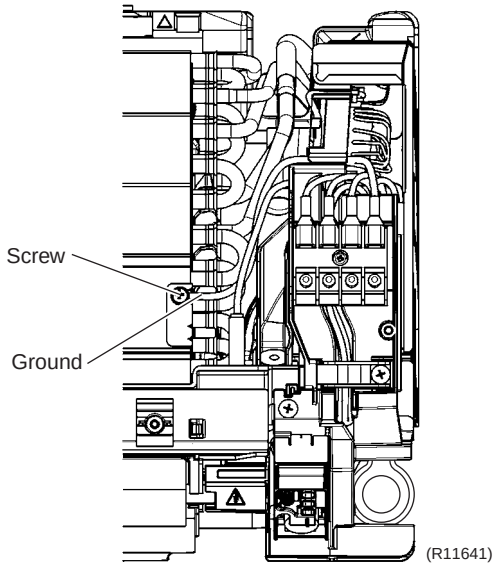
Step	Procedure		Points
1	Remove the 2 screws, which fix the front grille to the main body.	 (R11631)	
2	The front grille has 3 hooks on the upper part.	 (R14618)	■ Refer to the removal procedure in a reverse way when reassembling.
3	Press each hook, and also lift the grille up to unfasten the hooks.	 (R8030)	
4	Pull the upper part of the front grille out and lift the lower part up, and then remove the front grille.	 (R11633)	■ The convex marks (...) on the front panel indicate the position of the hooks.  (R12715) ■ When reassembling, make sure that all the 3 hooks are fastened as they were.

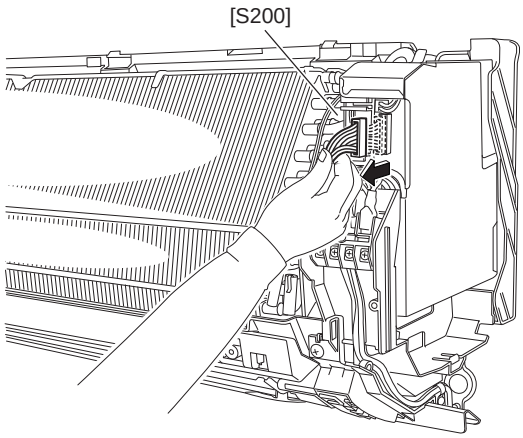
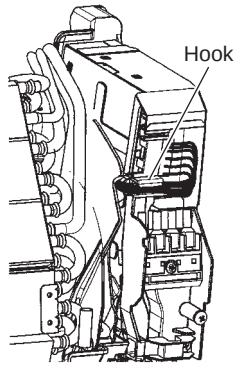
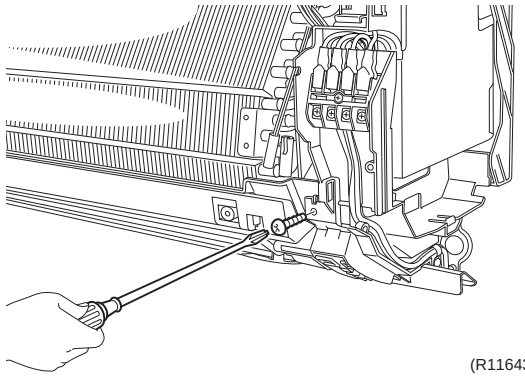
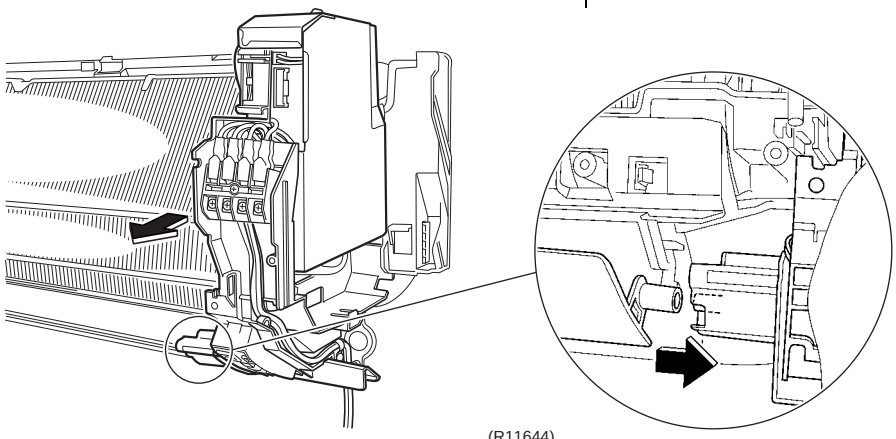
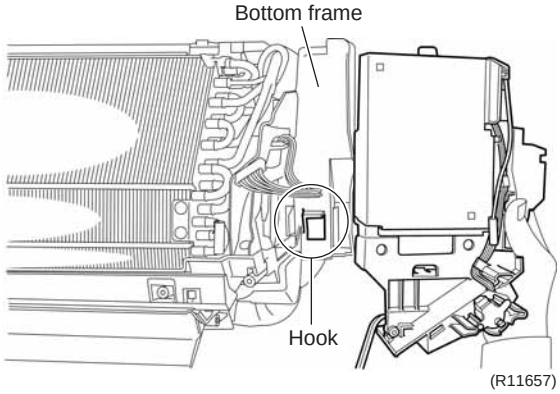
1.5 Removal of Electrical Box / Vertical Blades

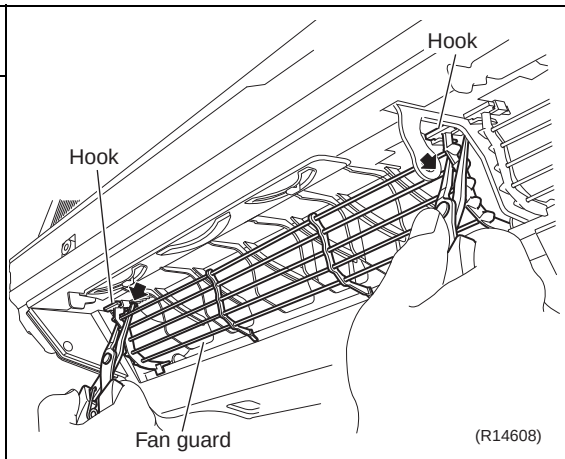
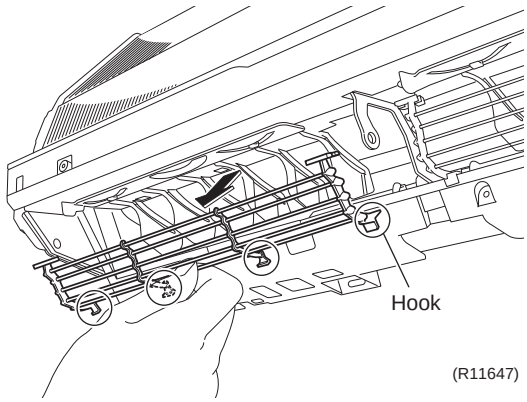
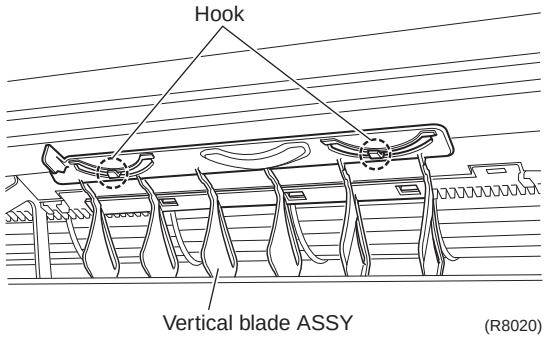
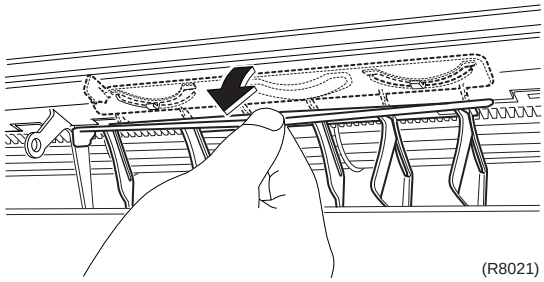
Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

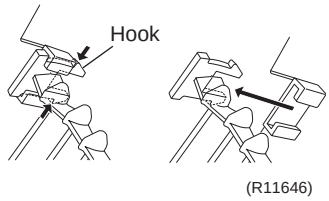
Step	Procedure	Points
1. Disconnect the connecting wires.		**Preparation** ■ Remove the front grille according to the “Removal of Front Grille”.
1 Remove the screw of the service cover.	 (R14676)	
2 Pull out the service cover down in the direction of the arrow.	 (R11636)	
3 The figure shows the connections of wire harnesses.	 (R11637)	
4 Remove the screw of the wire retaining plate.	 (R11638)	

Step	Procedure		Points
5	Loosen the screws of the terminal board and disconnect the connecting wires.		■ Connecting wires black (1) ----- power supply white (2) ----- power supply red (3) ----- transmission yellow / green (⏚) ----- ground
6	Pull out the indoor heat exchanger thermistor.		■ Take care not to lose the clip of thermistor. 
2. Remove the electrical box.			
1	Remove the screw and disconnect the ground wire.		

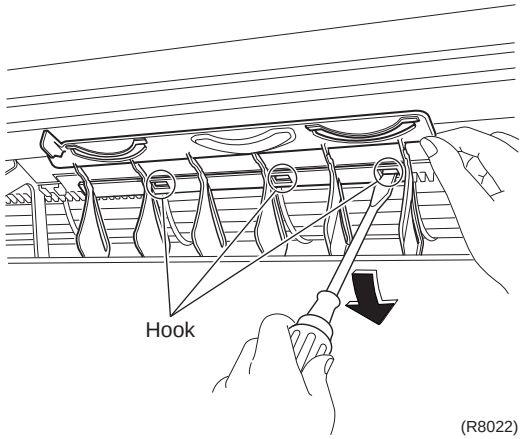
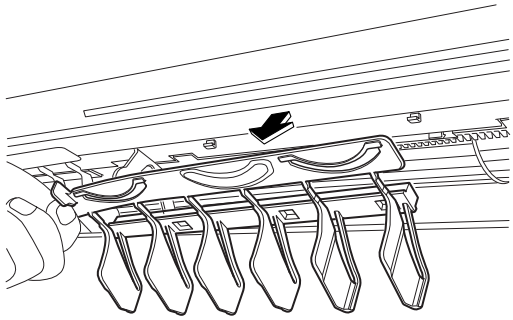
Step	Procedure	Points
2	Disconnect the connector for the fan motor [S200]. Release the fan motor harnesses from the hook.	 (R11642)  (R14602)
3	Remove the screw of the electrical box.	 (R11643)
4	Slide the electrical box to the right first and detach the horizontal blade from the electrical box.	 (R11644)
5	Pull the electrical box.	 (R11657)
		■ There is a hook on the bottom frame. When reassembling, fit the rear side of the electrical box to the hook.

Step	Procedure	Points
3. Remove the vertical blade assembly.		
1	Unfasten the right and left hooks of the fan guard with pliers.	
2	Unfasten the 4 hooks at the bottom. Remove the fan guard.	
3	Unfasten the hooks at the upper 2 positions.	 

- Narrow the edges of the hook to unfasten it.



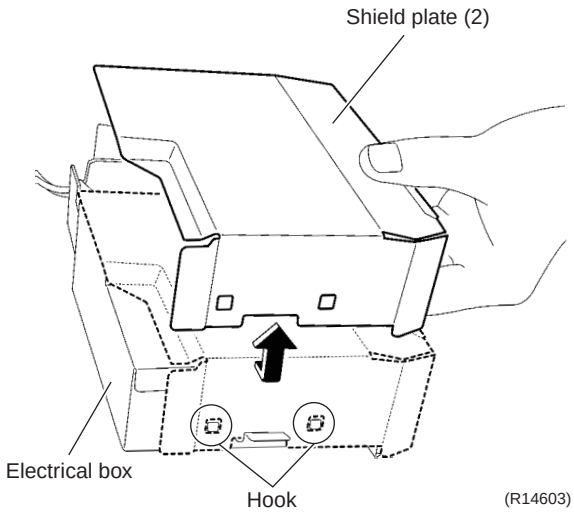
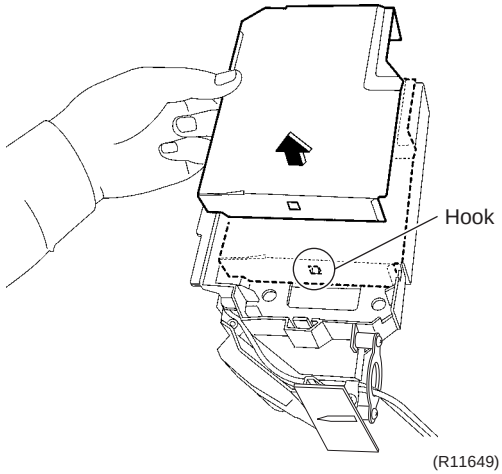
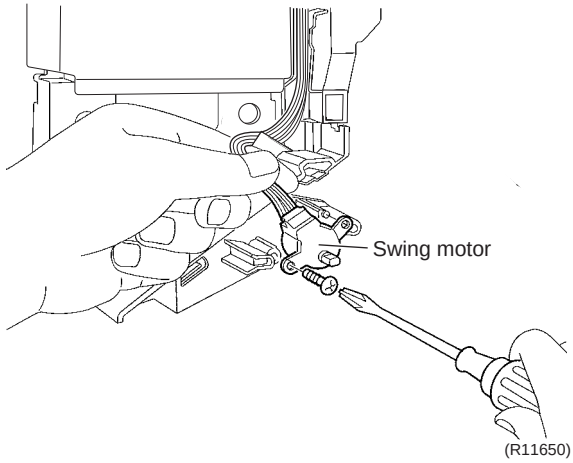
- Repeat the same procedure to remove the fan guard on the other side.
- A vertical blade assembly has 6 fins. It is impossible to replace only one fin.
- The vertical blade assembly is not marked for difference between right and left.

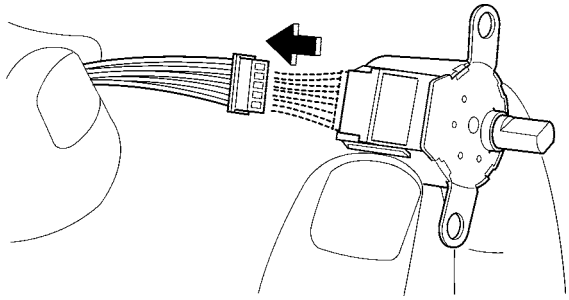
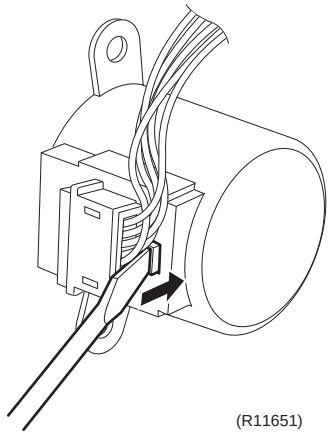
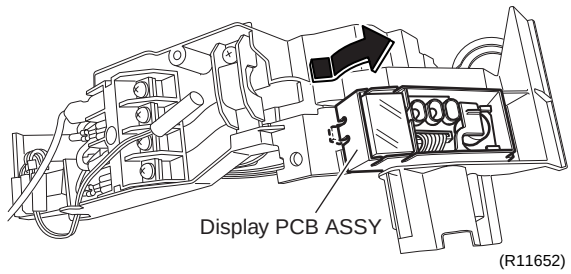
Step	Procedure		Points
4	Unfasten the 3 hooks at the shaft mounting part by pressing them with a flat screwdriver.	 (R8022)	
5	Remove the vertical blade assembly.	 (R8023)	■ Repeat the same procedure to remove the vertical blade assembly on the other side.

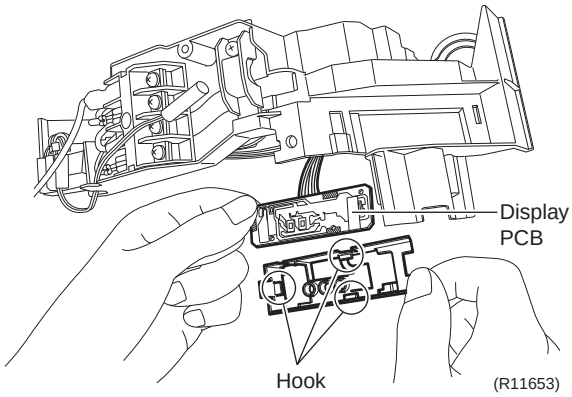
1.6 Removal of Swing Motor / PCBs

Procedure

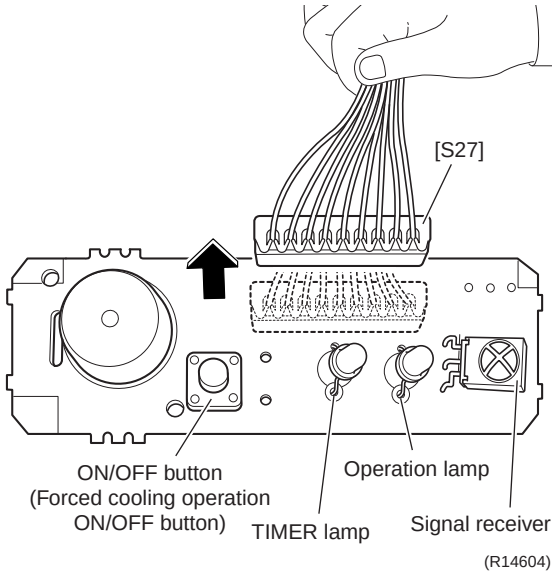
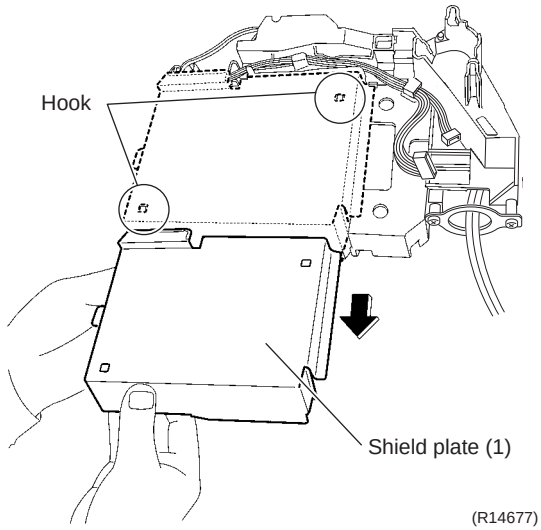
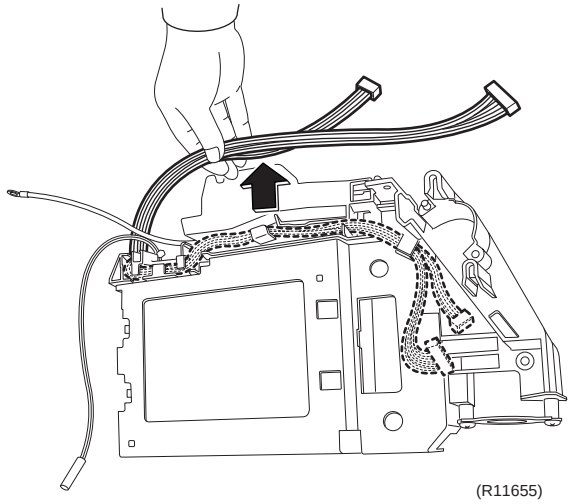
Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

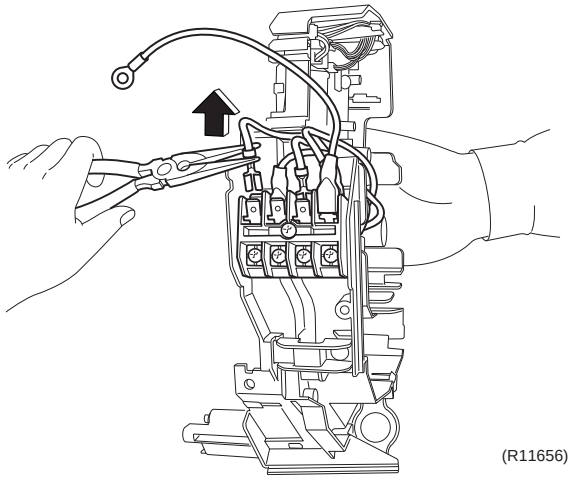
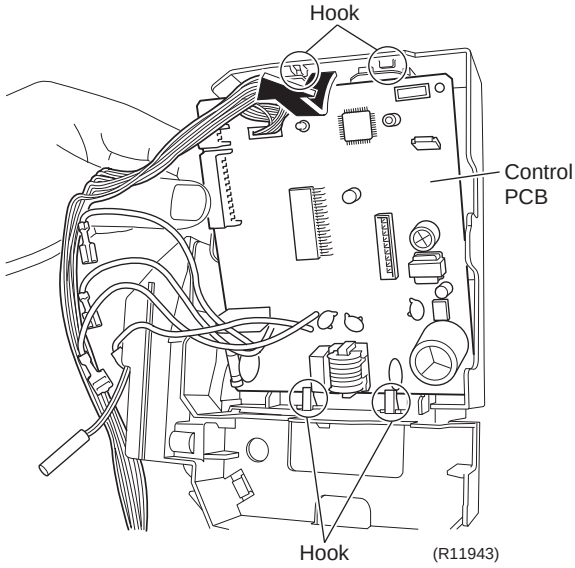
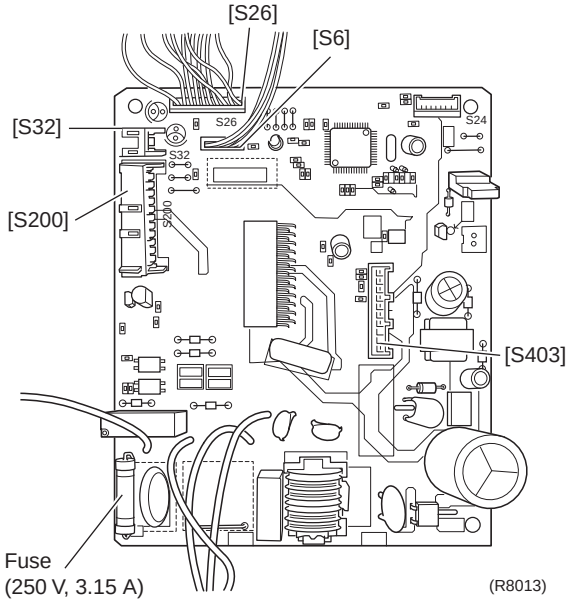
Step	Procedure	Points
1. Remove the shield plate (2).		**Preparation** ■ Remove the electrical box according to the “Removal of Electrical Box / Vertical Blades”.
1 Unfasten the hooks at the upper 2 positions of the shield plate (2).		
2 Unfasten the hook at the lower position, and remove the shield plate (2).		
2. Remove the swing motor.		
1 Remove the screw of the swing motor.		

<table>
<tr><th>Step</th><th colspan="2">Procedure</th><th>Points</th></tr>
<tr><td>2</td><td>Unfasten the hook, and disconnect the connector.</td><td> 
(R8037)</td><td>■ The connector of the swing motor has a hook.
Press the hook with a flat screwdriver to unfasten it.
 
(R11651)</td></tr>
<tr><td colspan="2">3. Remove the display PCB.</td><td rowspan="3"> 

(R11652)
 

(R11653)</td><td rowspan="3"></td></tr>
<tr><td>1</td><td>Unfasten the hook, and release the display PCB assembly.</td></tr>
<tr><td>2</td><td>Turn over the display PCB assembly, and unfasten the 3 hooks to remove the display PCB.</td></tr>
</table>

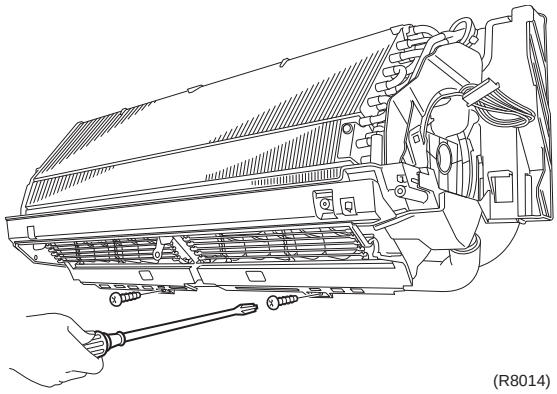
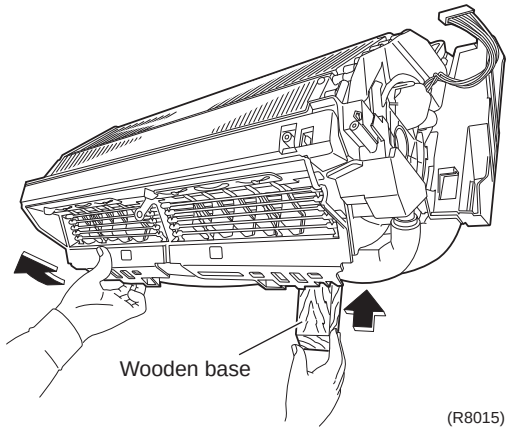
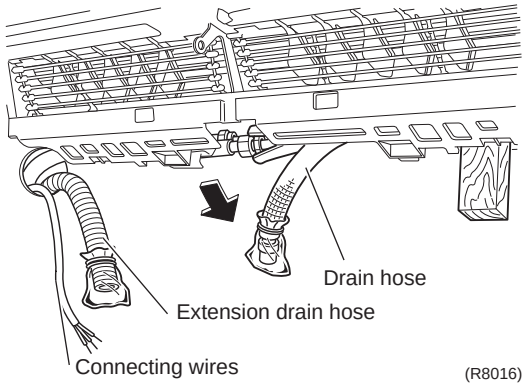
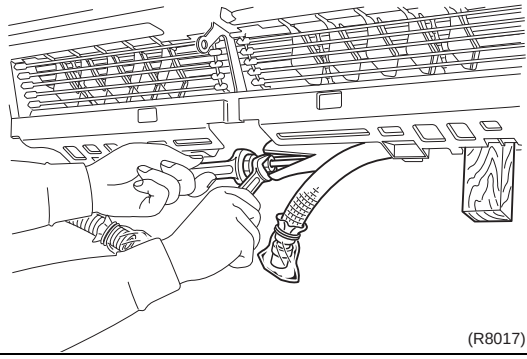
Step	Procedure		Points
3	Disconnect the connector [S27] from the display PCB.		
4	The figure shows the component parts of the display PCB.		[S27]: for control PCB
4. Remove the control PCB.			
1	Lift the shield plate (1) and unfasten the 2 hooks.		
2	Slide the shield plate (1) and remove it.		
3	Release the harnesses from the hooks.		

Step	Procedure		Points
4	Disconnect the terminals from the terminal board with pliers.	 (R11656)	1 : black, upper 2 : white, lower 3 : red, upper ⏚ : green without sleeve, upper green with sleeve, lower
5	Release the 4 hooks. Lift up the upper part of the control PCB and remove it.	 (R11943)	
6	The figure shows the control PCB.	 (R8013)	■ Refer to page 13 for detail. [S6]: swing motor [S26]: display PCB [S32]: indoor heat exchanger thermistor [S200]: fan motor [S403]: adaptor PCB (option)

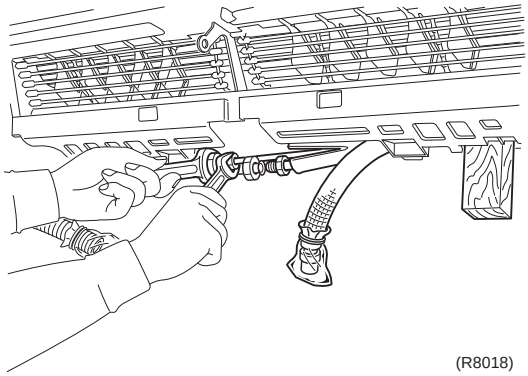
1.7 Removal of Indoor Heat Exchanger

Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

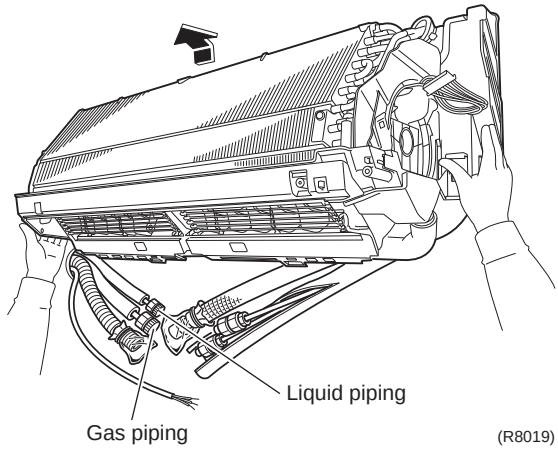
Step	Procedure	Points
1. Disconnect the refrigerant piping.		**Preparation** ■ Remove the electrical box according to the “Removal of Electrical Box / Vertical Blades”.
1 Remove the screws which fix the indoor unit to the installation plate.	 (R8014)	**Caution** **Be sure to stop the compressor before disconnecting the refrigerant pipe. If the refrigerant pipe is disconnected with the compressor running and the stop valve opened, air may be sucked in to generate an over-pressure in refrigeration cycle, thus resulting in pipe rupture or accidental injury.**
2 Lift the indoor unit with a wooden base.	 (R8015)	■ If the drain hose is embedded in the wall, disconnect the drain hose beforehand.
3 Pull out the drain hose.	 (R8016)	■ Place a plastic sheet under the drain hose as remaining drain may leak.
4 Disconnect the flare nut for gas piping with 2 wrenches.	 (R8017)	**Caution** **For global environmental protection, make sure to use a vacuum pump for air purging.** ■ When the pipings are disconnected, protect both openings from moisture entering .

Step	Procedure	Points
5	Disconnect the flare nut for liquid piping with 2 wrenches.	


(R8018)

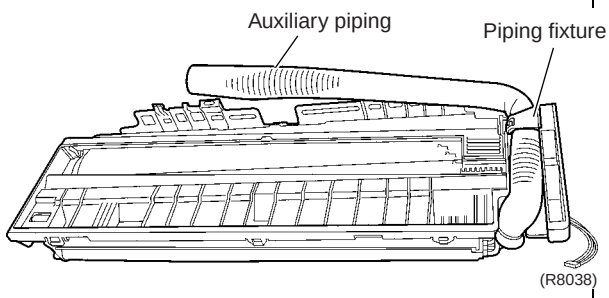
2. Remove the indoor heat exchanger.

1	Remove the indoor unit from the installation plate.	

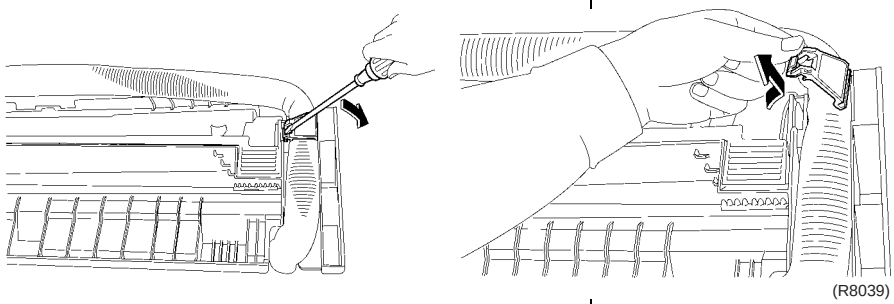


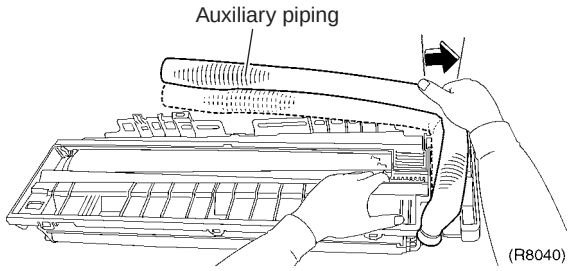
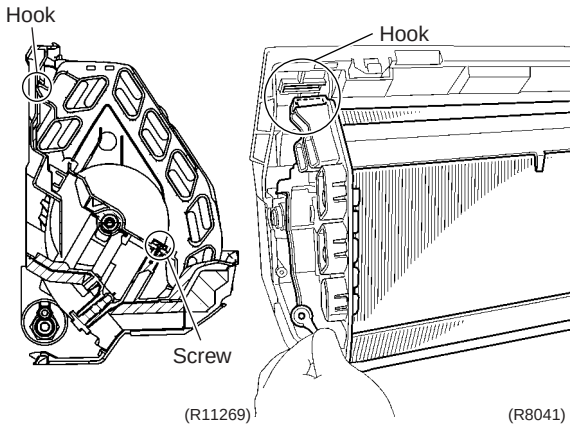
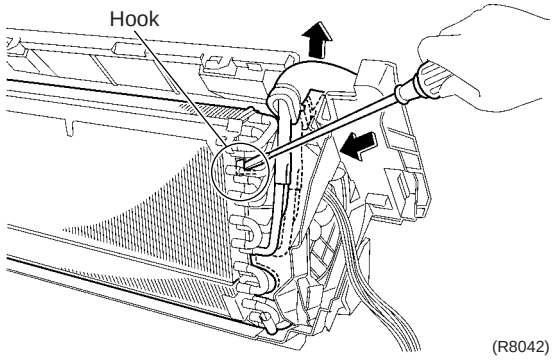
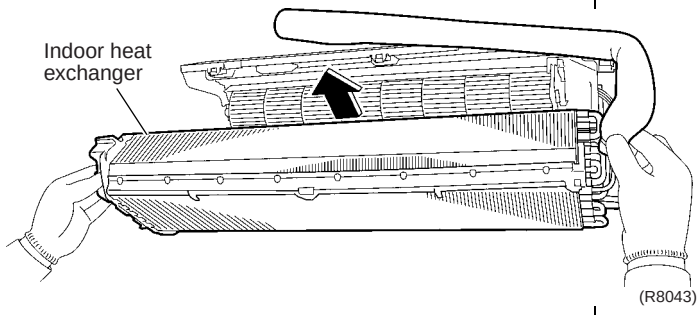
(R8019)

2	Unfasten the hook of the piping fixture on the back of the indoor unit.	



(R8038)

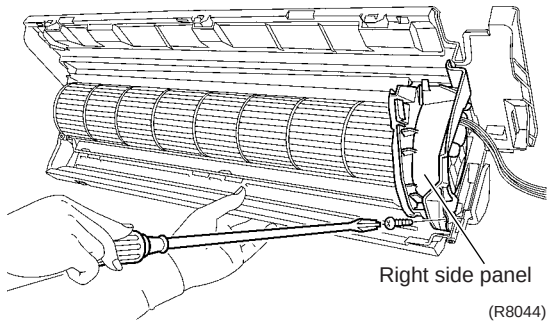
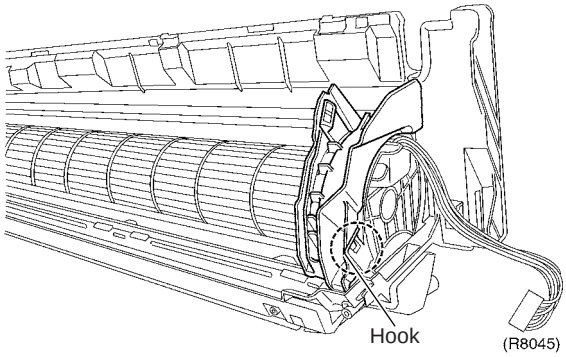
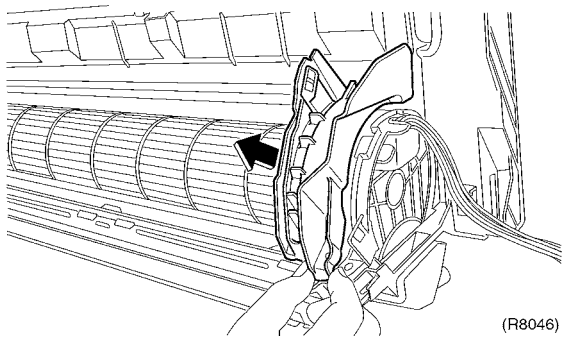

(R8039)

Step	Procedure		Points
3	Widen the auxiliary piping to the extent of 10° ~ 20°.		
4	Remove the screw on the left side and unfasten the hook on the rear side.		**Caution** **When removing or reassembling the indoor heat exchanger, be sure to wear gloves or wrap it with cloth before proceeding to work or you could be injured by the fins.**
5	Push and unfasten the hook on the right side and lift up the indoor heat exchanger.		
6	Pull the indoor heat exchanger to the front side to unfasten the hooks completely, and then remove it.		

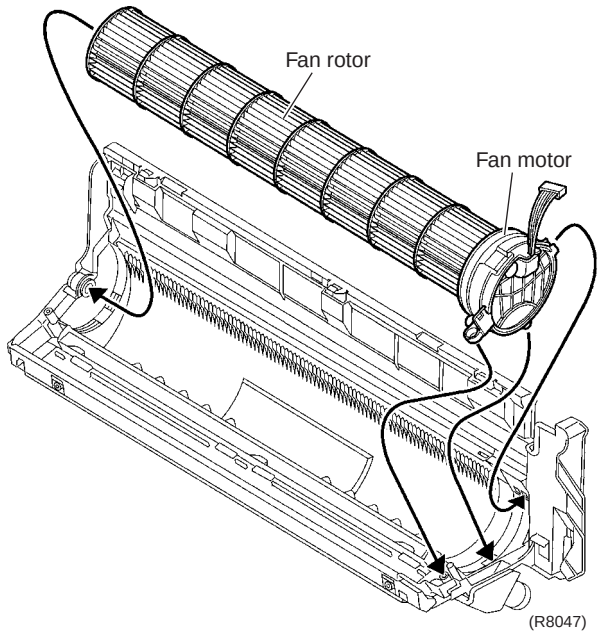
1.8 Removal of Fan Rotor / Fan Motor

Procedure

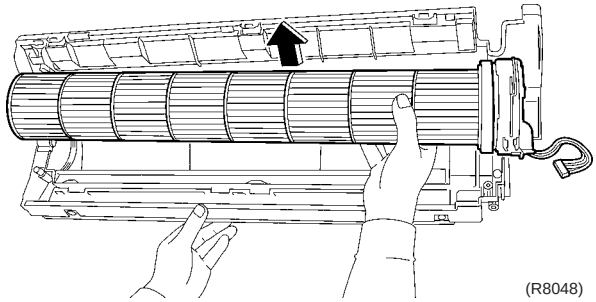
Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

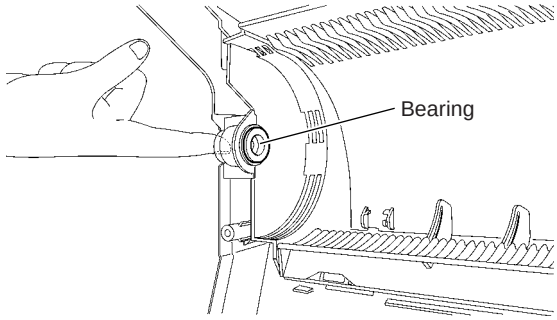
Step	Procedure		Points
1. Remove the right side panel.		 (R8044)	**Preparation** ■ Remove the indoor heat exchanger according to the “Removal of Indoor Heat Exchanger”.
1	Remove the screw of the right side panel.		
2	Unfasten the hook of the right side panel.	 (R8045)	
3	Remove the right side panel.	 (R8046)	

Step	Procedure	Points
2. Remove the fan rotor and the fan motor.		
1	The fan motor has 3 projections on the right side. The fan rotor has a rotating shaft on the left side.	
2	Remove the fan rotor.	
3	Press the bearing from outside.	
4	Remove the bearing.	

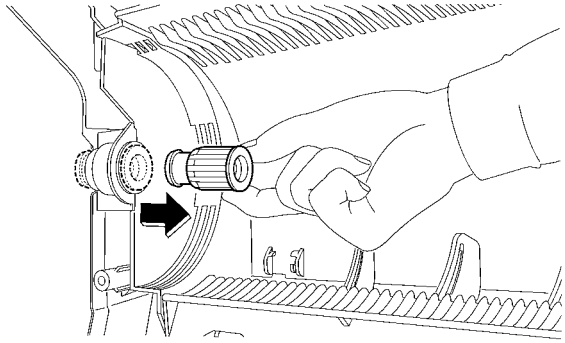


(R8047)

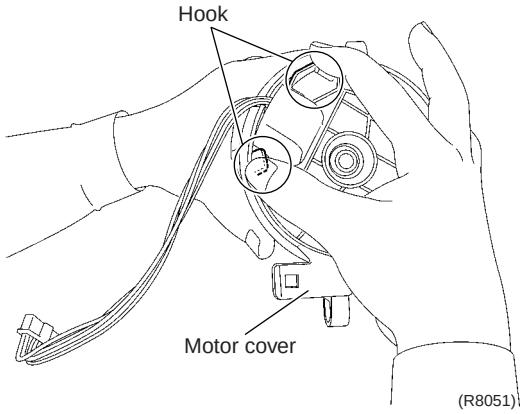

(R8048)

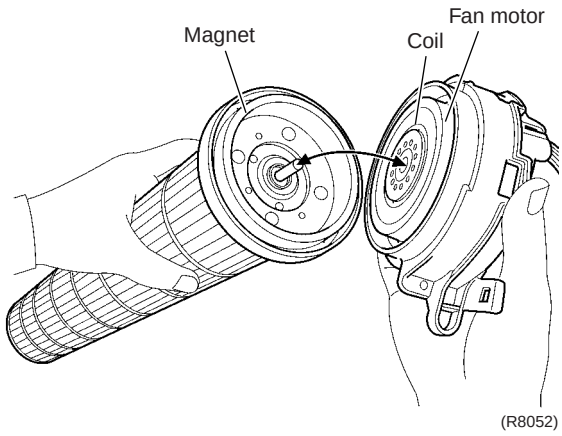


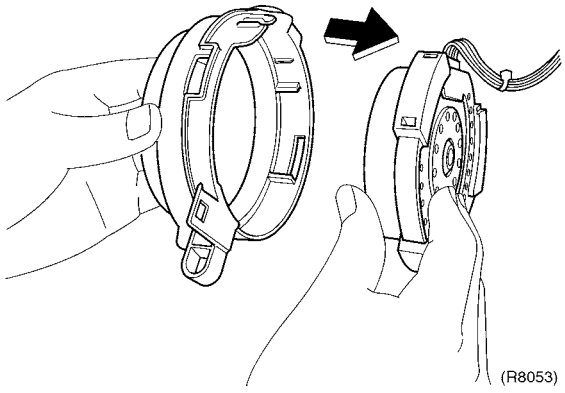
(R8049)


(R8050)

Step	Procedure	Points
5	Unfasten the 2 hooks of the motor cover.	
6	Pull out the fan motor from the fan rotor to remove.	■ The magnet of the fan motor is united with the fan rotor. Be careful not to attract metal waste to the magnet. Keep away from the materials that can be affected by magnetic force also.



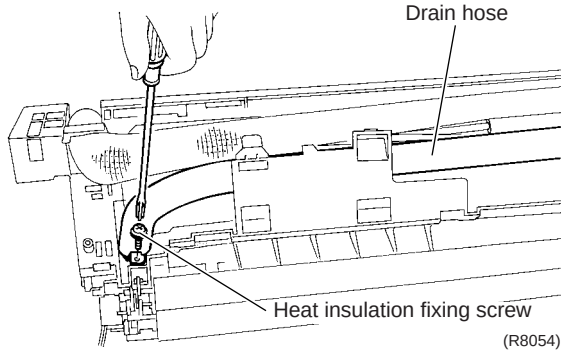
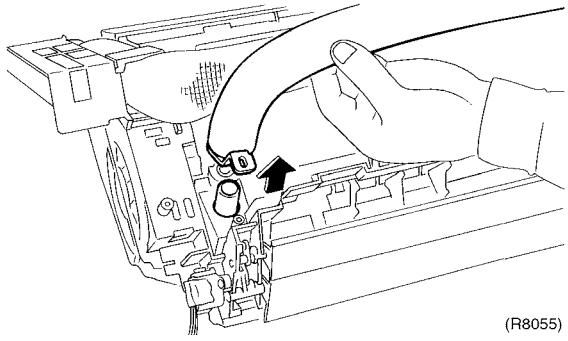
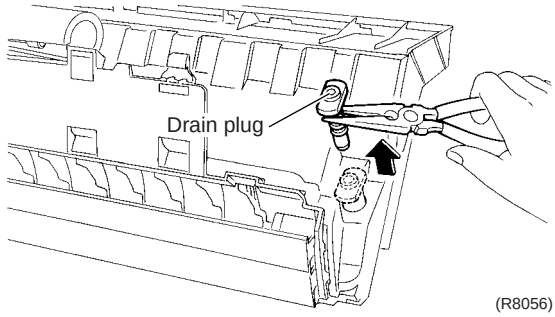
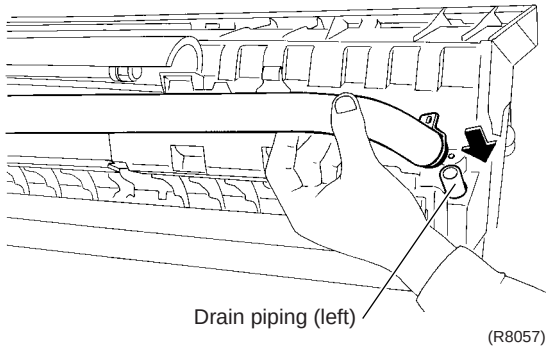




1.9 Exchange of Piping Direction (Drain Hose)

Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

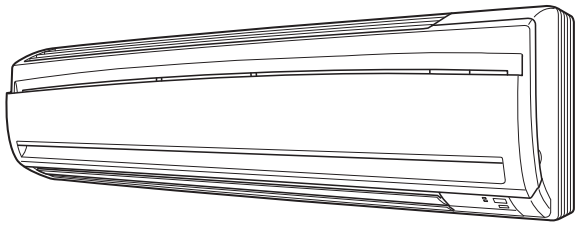
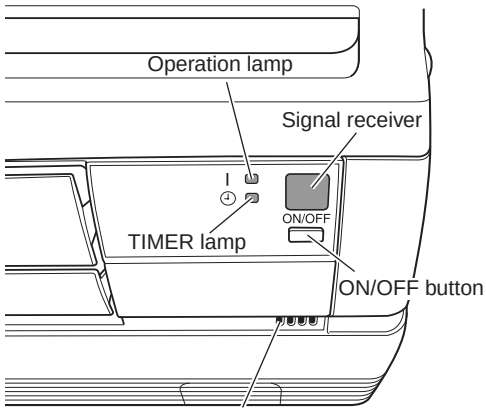
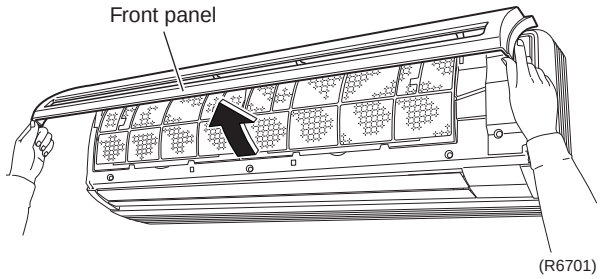
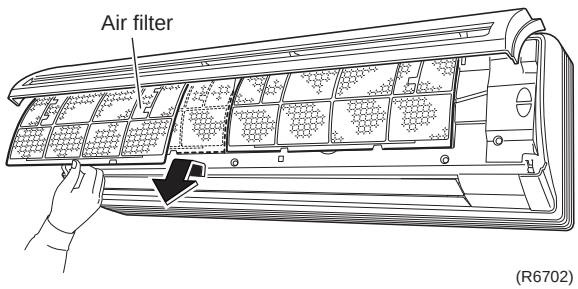
Step	Procedure		Points
1	Remove the heat insulation fixing screw on the right side and remove the drain hose.	 	
2	Remove the drain plug located at the left side with pliers and insert the removed drain plug into the right side with a hexagonal wrench 1/8" (4 mm).		
3	Insert the drain hose to the left side, and tighten it with the heat insulation fixing screw.		**Caution** **Do not thrust in the drain plug with a sharp-pointed tool like a screwdriver. The drain plug may be broken, resulting in water leakage.** ■ After removing the drain hose, to prevent water leakage, make sure to mount the heat insulation fixing screw as it was.

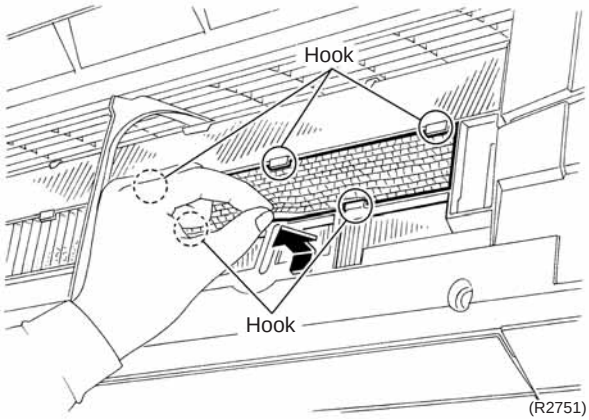
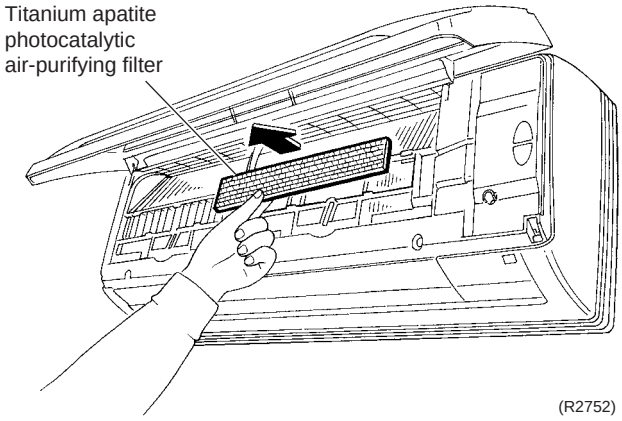
2. Indoor Unit: 15/18/24 Class

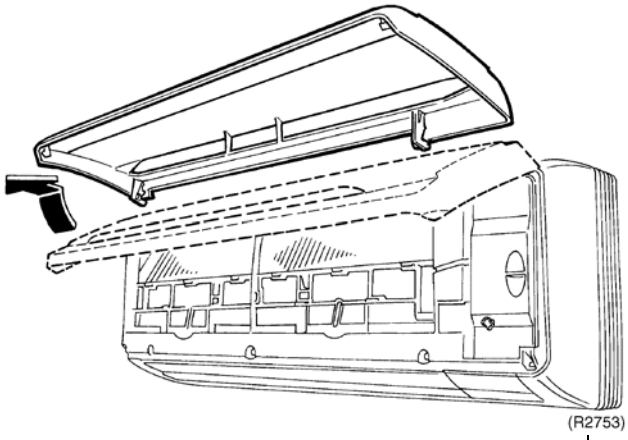
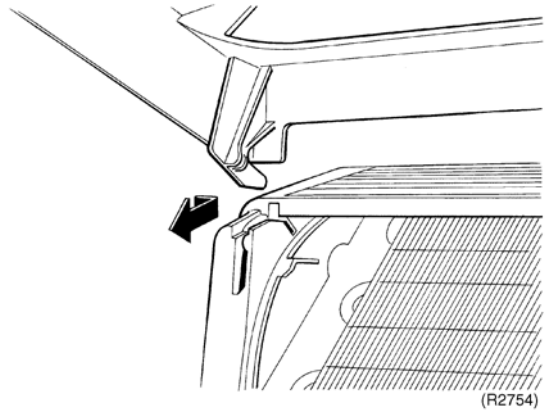
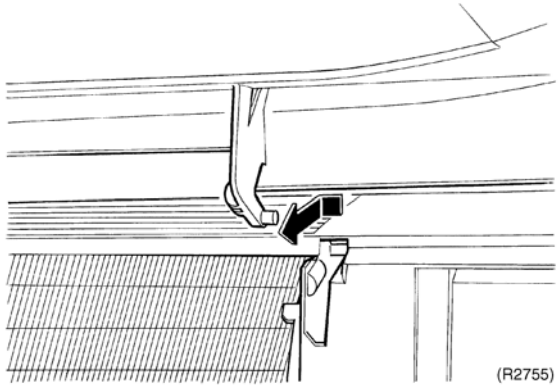
2.1 Removal of Air Filters / Front Panel

Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

Step	Procedure		Points
		 (R12786)  (R12787)	**Warning** **Dangerous: High voltage** **A high voltage is applied to all the electric circuits of this product including thermistors.** ■ When the signal receiver catches a signal from the remote controller, the receiving tone sounds and the operation lamp blinks immediately to confirm the signal reception. ■ When the ON/OFF button is kept pressed for 5 seconds, the forced cooling operation is performed for about 15 minutes.
1. Remove the air filters.			
1	Open the front panel to the position where it stops.	 (R6701)	
2	Slightly push up the center knob of the air filter and unfasten the hooks.	 (R6702)	■ The air filter is not marked for difference between the right and left sides. ■ The air filter can be set easily by inserting it along the guides. ■ Insert the air filter with the "FRONT" mark faced up. ■ Be sure to insert the hooks (at 2 lower positions) when mounting the air filter.
3	Pull out the air filter downward and remove it.		

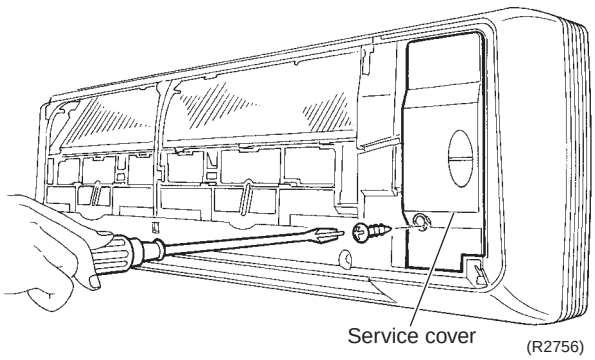
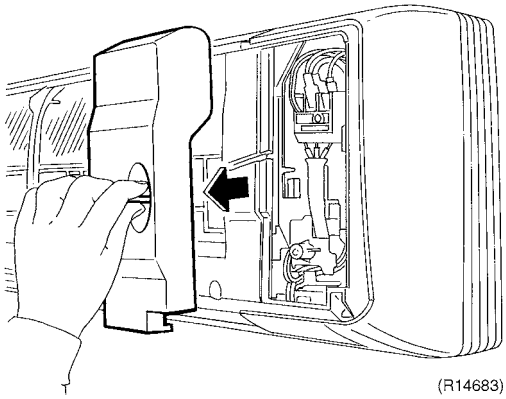
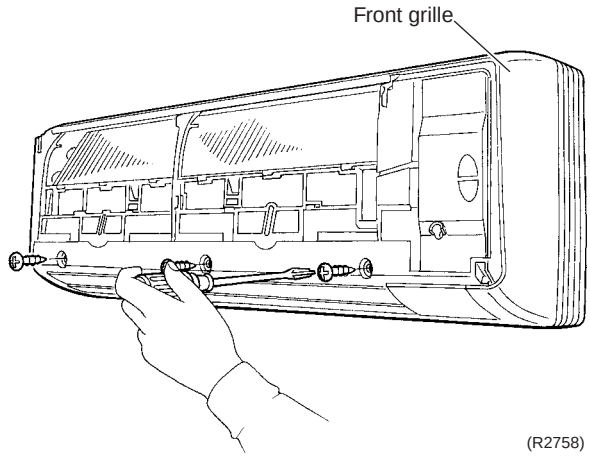
Step	Procedure	Points
2. Remove the Titanium apatite photocatalytic air-purifying filters.		
1 Push up the bottom of the Titanium apatite photocatalytic air-purifying filter to unfasten the hooks (2 on lower, 3 on upper) and take the filter out.	 (R2751)  (R2752)	■ The right and left filters are interchangeable.

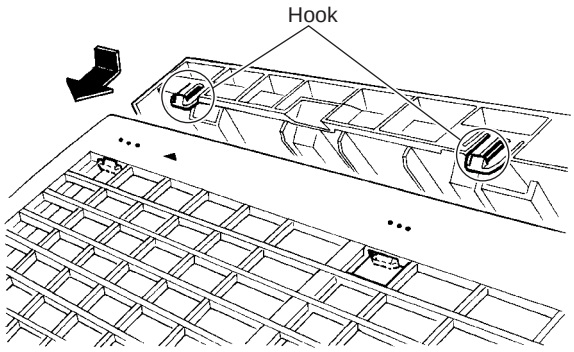
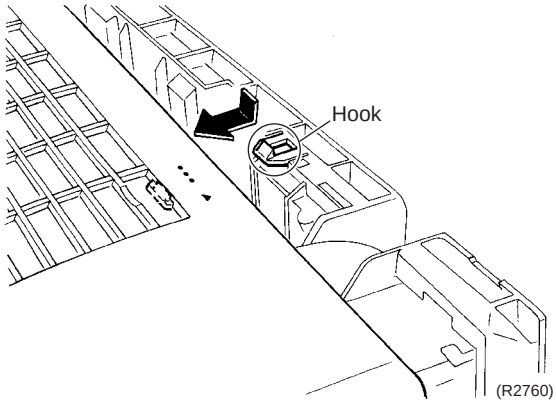
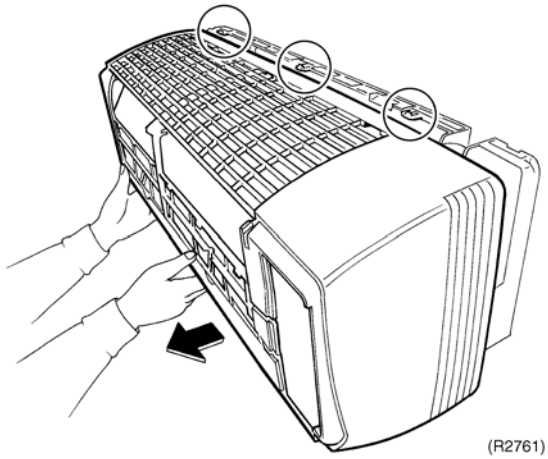
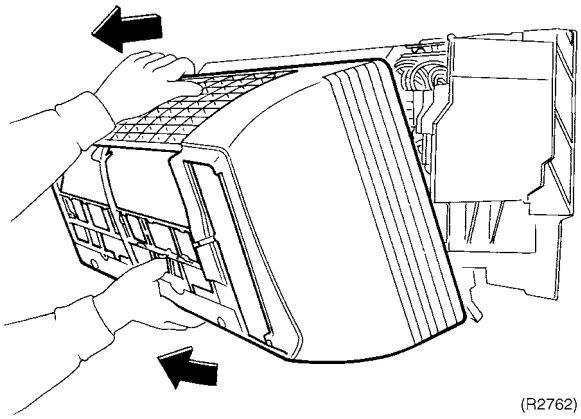
Step	Procedure	Points
3. Remove the front panel.		
1 While opening the front panel further than it stops, release both the shafts and remove the front panel.	 (R2753)  (R2754)  (R2755)	■ Slide the front panel from side to side to release each shaft. ■ When reassembling the front panel, fit the right and left rotary shafts one by one into the grooves and fully push them in position.

2.2 Removal of Front Grille

Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

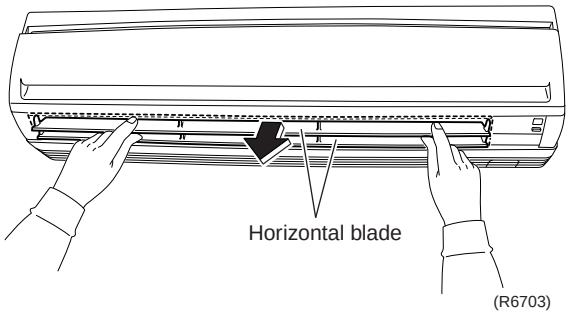
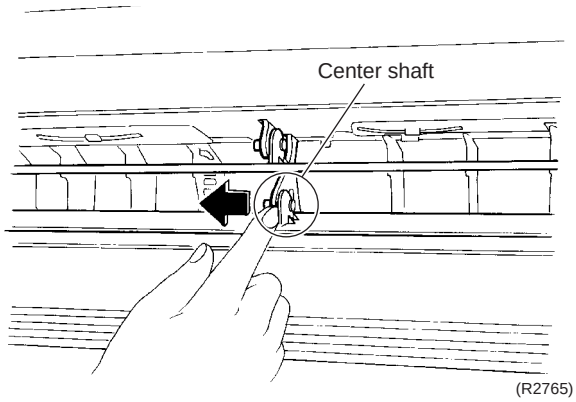
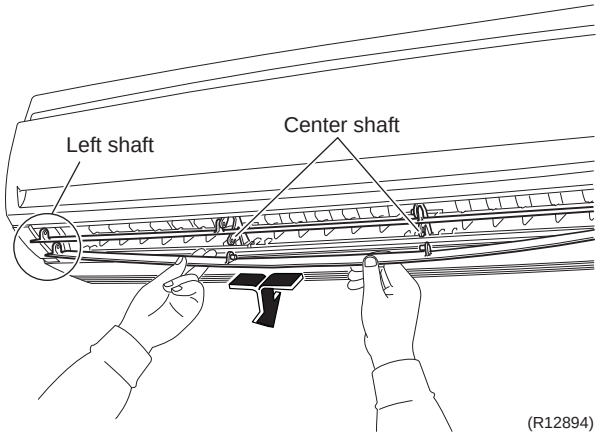
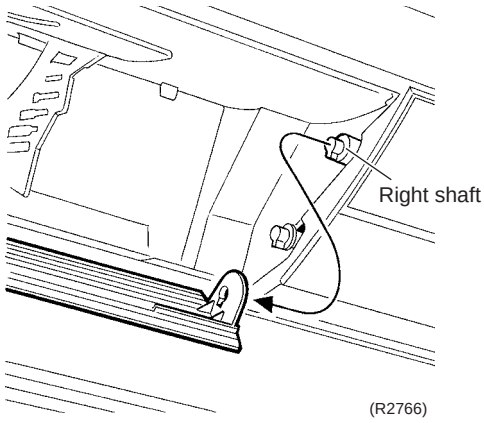
Step	Procedure		Points
1. Remove the service cover.			**Preparation** ■ Remove the front panel according to "Removal of the Air Filters / Front Panel".
1	Remove the screw and remove the service cover.		■ You can remove the front grille without detaching the service cover.
2. Remove the front grille.			
1	Remove the 3 screws of the front grille.		■ Refer to the removal procedure in a reverse way when reassembling.

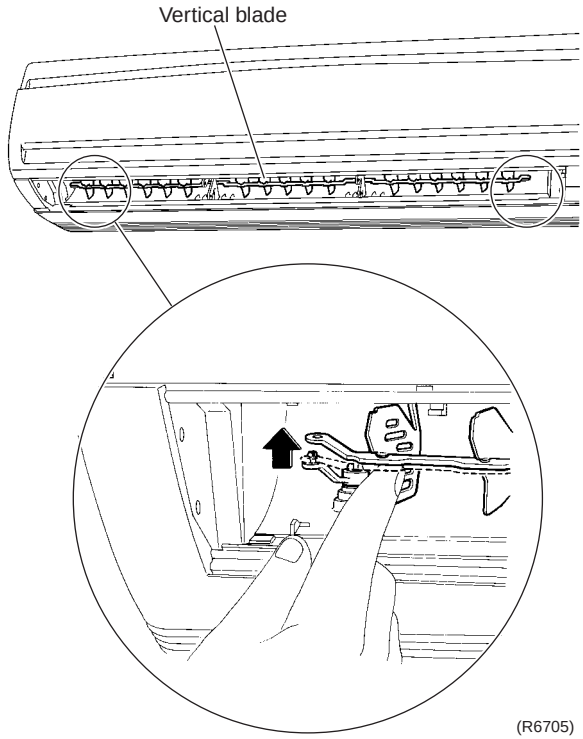
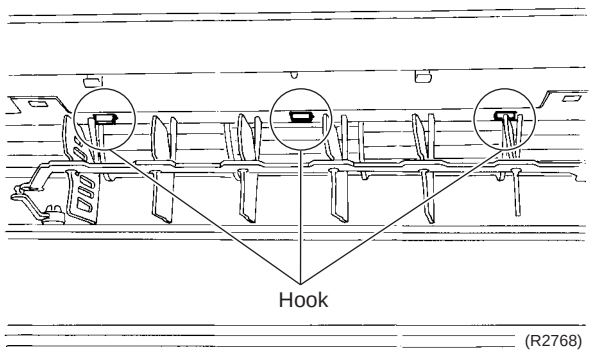
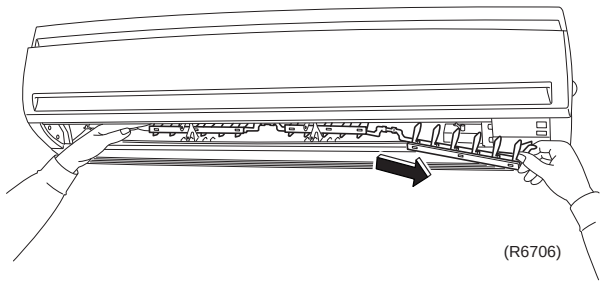
Step	Procedure		Points
2	Unfasten the 3 hooks on the top of the front grille.	 (R2759)	■ The convex marks (...) on the front panel indicate the position of the hooks.
		 (R2760)	
		 (R2761)	
3	Pull the upper part of the front grille out and lift the lower part up, and then remove the front grille.	 (R2762)	■ Make sure that all the 3 hooks are engaged securely when reassembling.

2.3 Removal of Horizontal Blades / Vertical Blades

Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

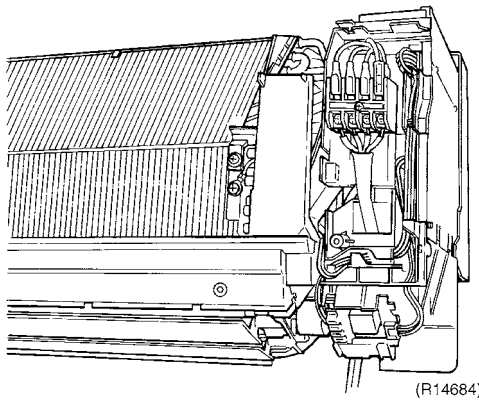
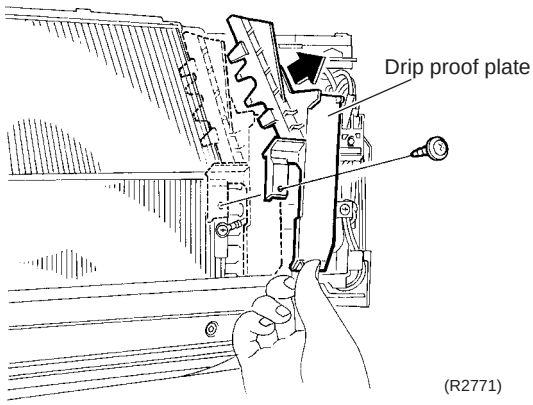
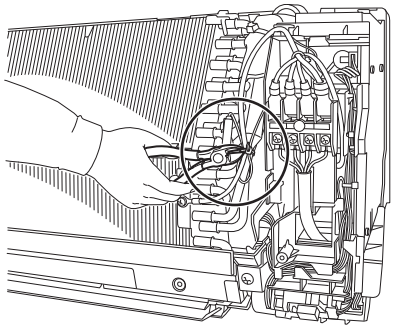
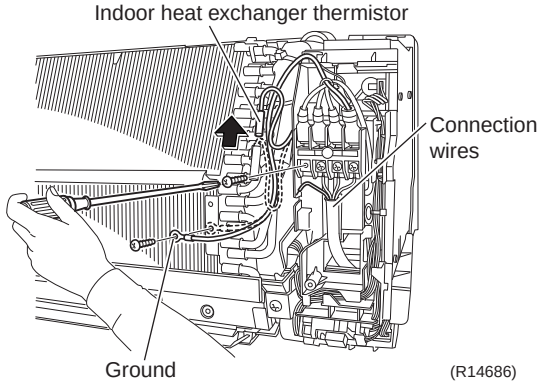
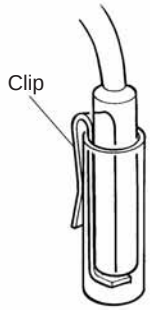
Step	Procedure		Points
1.	Remove the horizontal blades.		
1	Open the horizontal blades.		
2	Bend the horizontal blade slightly and release the center shaft. (2 locations)		■ Remove both the horizontal blades (upper and lower) in the same way.
3	Release the left shaft.		
4	Slide the horizontal blade to the left and release the right shaft.		■ Installation procedure 1. Since the key pattern hook is provided, rotate the blade and fit it to the right shaft first. 2. Fit the blade to the center and left shafts.

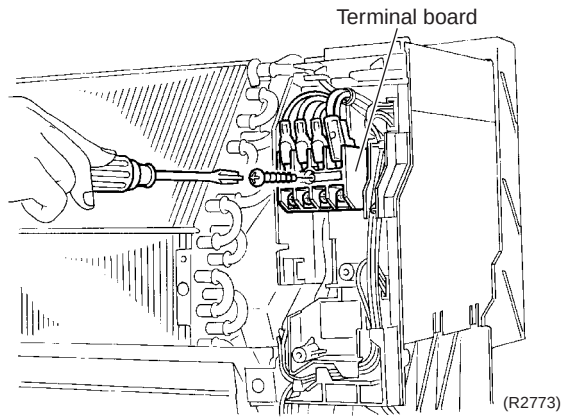
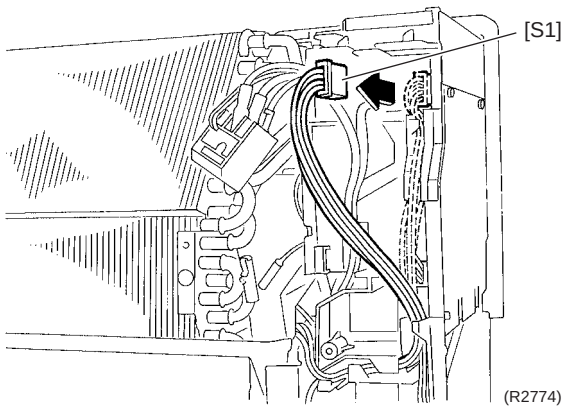
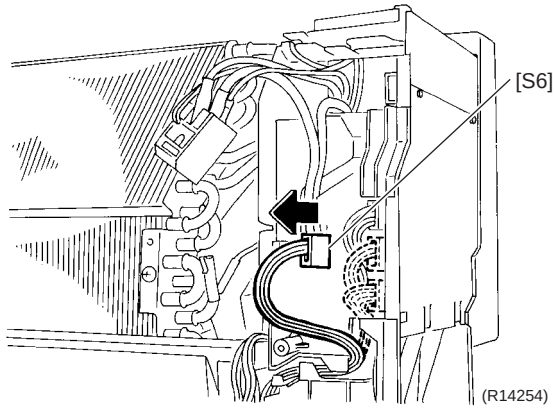
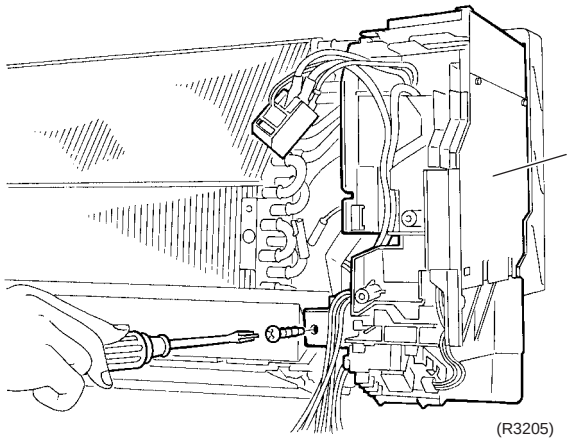
Step	Procedure	Points
2. Remove the vertical blades.		■ Remove the fan guards beforehand. ■ The unit has 3 sets of vertical blades linked one another with interlock rods.
1 Release the right and left shafts.		
2 Unfasten the 3 hooks for each set of vertical blades.		
3 Pull the vertical blades rightward and remove them.		

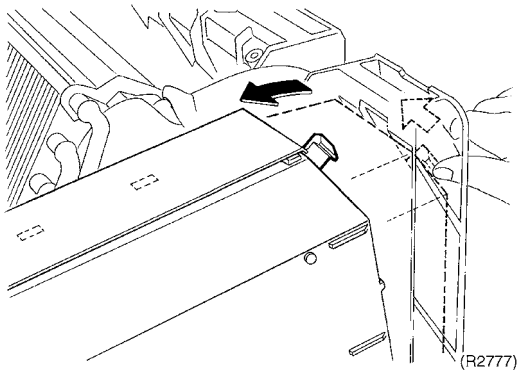
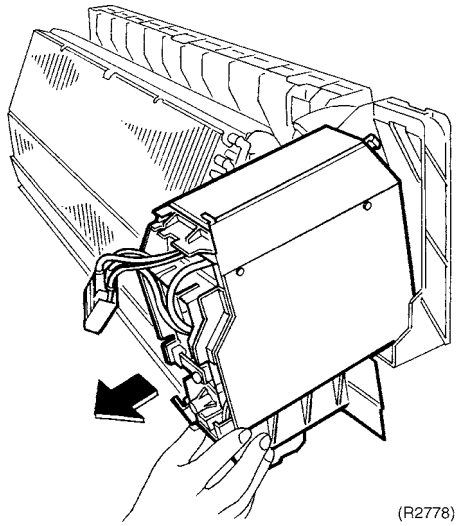
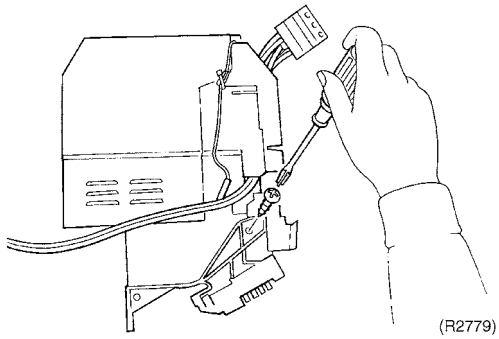
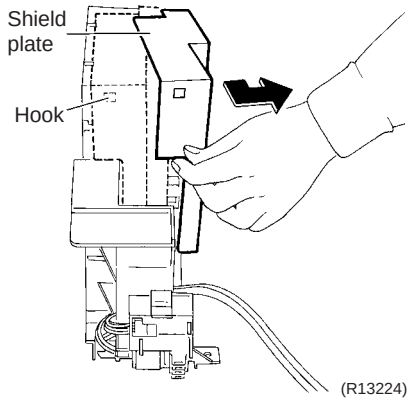
2.4 Removal of Electrical Box / PCBs / Swing Motors

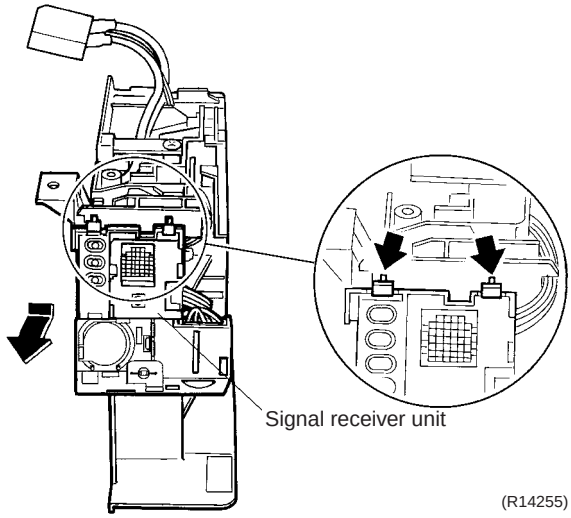
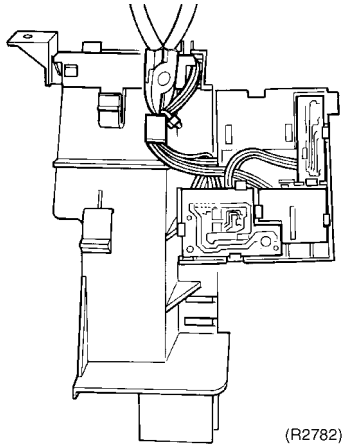
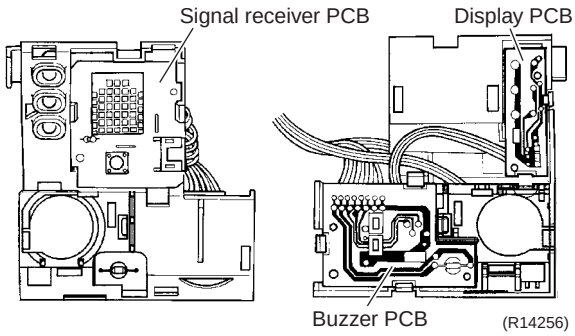
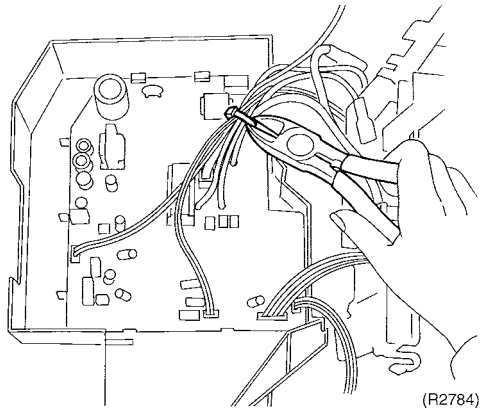
Procedure

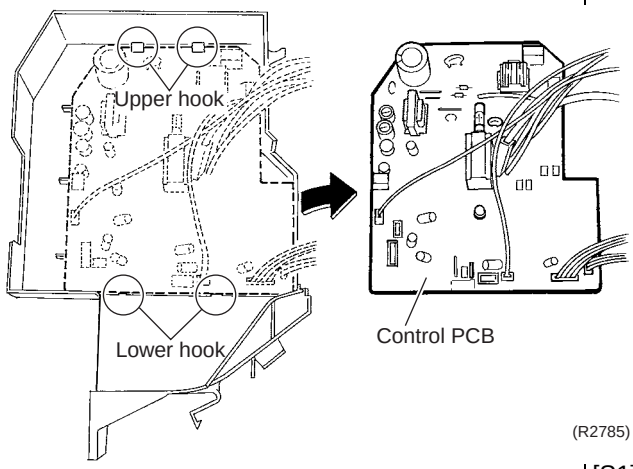
Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

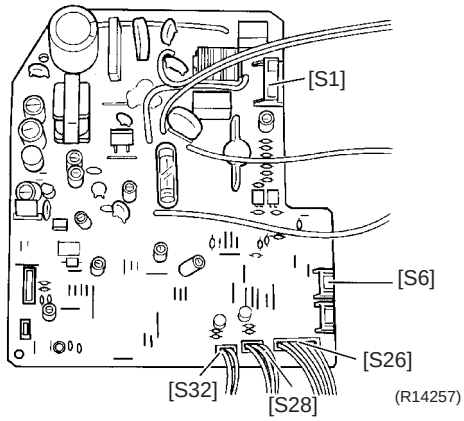
Step	Procedure		Points
1. Remove the electrical box.		 (R14684)	**Preparation** ■ Remove the front grille according to the “Removal of Front Grille”.
1	Remove the screw and remove the drip proof plate.	 (R2771)	
2	Cut the clamp.	 (R14685)	
3	Pull out the indoor heat exchanger thermistor.	 (R14686)	■ Be careful not to lose the clip for the thermistor.  (R11234)
4	Remove the screw of the ground.		
5	Remove the screws of the connection wires.		

Step	Procedure		Points
6	Remove the screw and remove the terminal board.		■ You can remove the electrical box without detaching the terminal board. ■ Screw: M4 × 30
7	Disconnect the connector for the fan motor [S1].		
8	Disconnect the connector for the swing motor [S6].		[S6]: for horizontal blades
9	Remove the screw of the electrical box.		

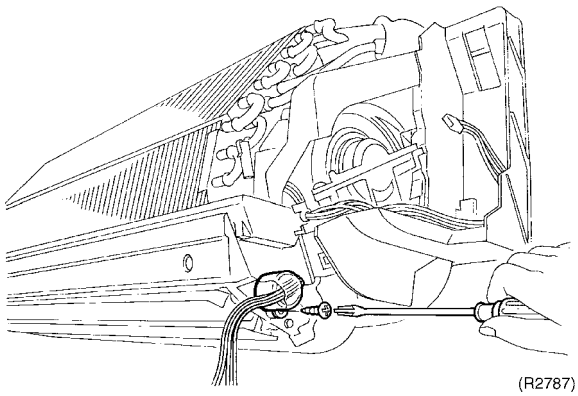
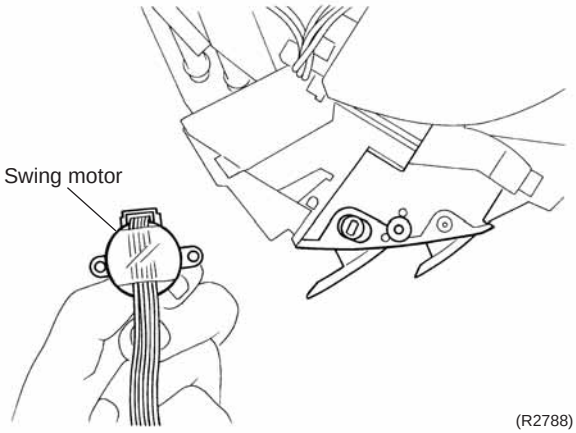
Step	Procedure		Points
10	Dislocate the electrical box to the left and unfasten the back hook.	 (R2777)	■ The electrical box has a hook on its back.
11	Pull the electrical box out.	 (R2778)	■ Catch the back hook of the electrical box when reassembling.
2. Remove the PCBs.			
1	Remove the screw on the electrical box.	 (R2779)	■ Screw: M4 × 16
2	Pull the shield plate and release the hook.	 (R13224)	■ The shield plate also has 2 hooks on the upper side.

Step	Procedure		Points
3	Press the signal receiver unit down and unfasten the hooks on the upper side, and then unfasten the hooks on the lower side.		
4	Cut the clamp.		
5	The signal receiver unit has 3 PCBs. Unfasten the hooks and remove each PCB. Disconnect every connector from each PCB.		■ Remove the signal receiver unit while pushing the hooks of connectors.
6	Cut the clamp.		

<table>
<tr><th>Step</th><th>Procedure</th><th>Points</th></tr>
<tr><td>7</td><td>Unfasten the 2 hooks on the lower side, and then the 2 hooks on the upper side.
Remove the control PCB.</td><td> 

(R2785)
 

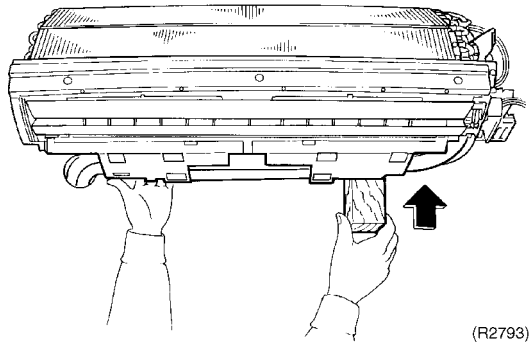
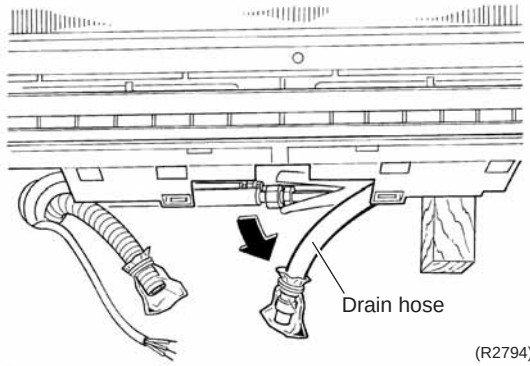
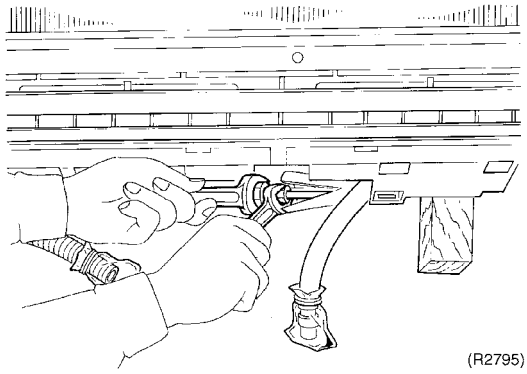
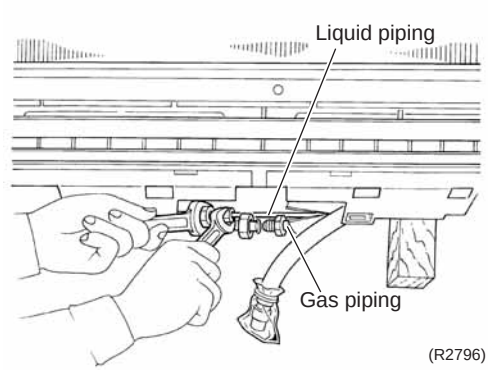
(R14257)</td><td>[S1]: DC fan motor
[S6]: swing motor for horizontal blades
[S26]: buzzer PCB
[S28]: signal receiver PCB
[S32]: indoor heat exchanger thermistor

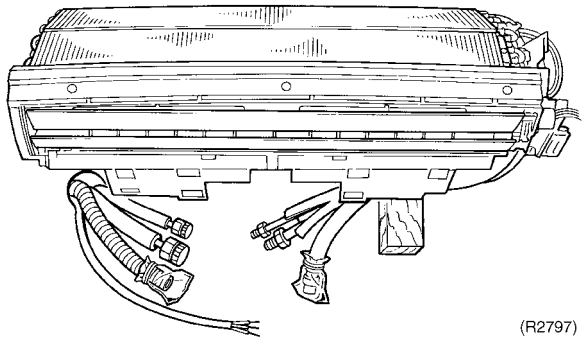
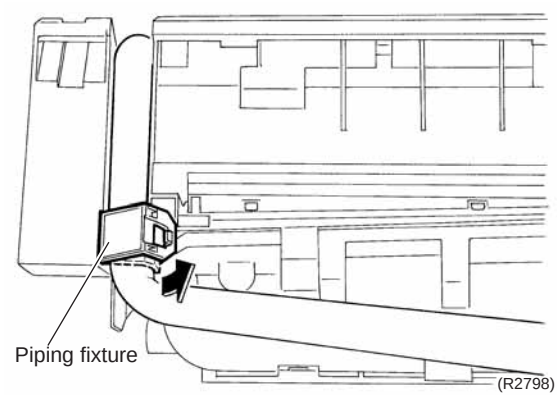
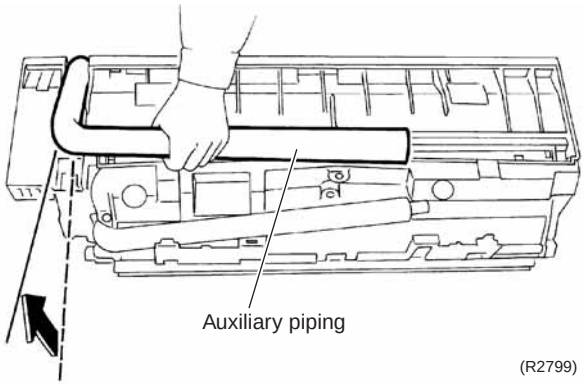
■ Refer to page 15 for detail.</td></tr>
<tr><td colspan="2">3. Remove the swing motor for horizontal blades.</td><td rowspan="3"> 
(R2787)
 

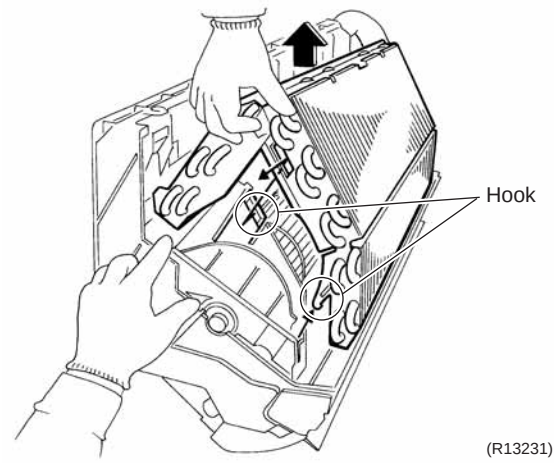
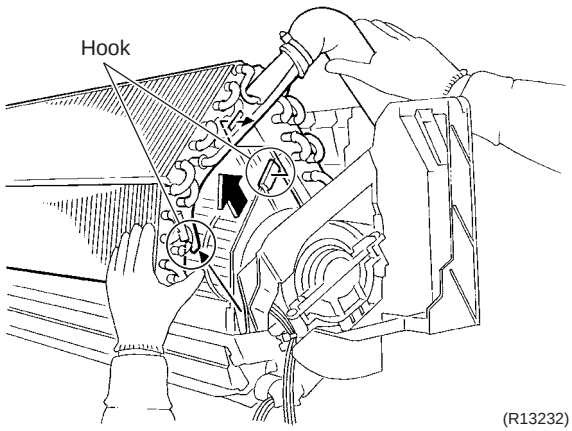
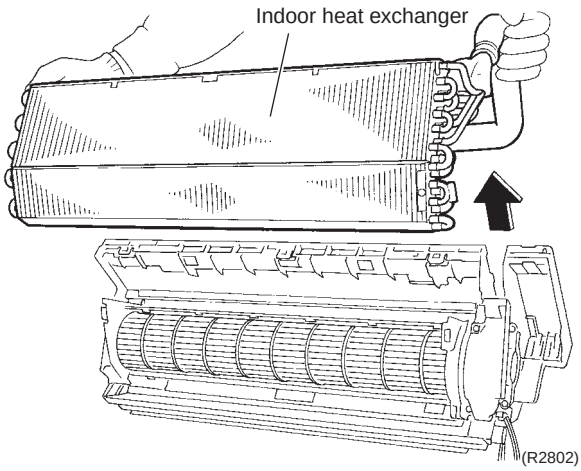
(R2788)</td><td rowspan="3"></td></tr>
<tr><td>1</td><td>Remove the screw of the swing motor.</td></tr>
<tr><td>2</td><td>Remove the swing motor.</td></tr>
</table>

2.5 Removal of Indoor Heat Exchanger

Procedure ⚠ **Warning** **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

Step	Procedure		Points
1.	Disconnect the refrigerant piping.		**Preparation** ■ Remove the electrical box according to the “Removal of Electrical Box / PCBs / Swing Motors”.
1	Hold the indoor unit up with a piece of wood etc.	 (R2793)	⚠ **Caution** **If the refrigerant leaks, repair the spot of leaking, then collect all refrigerant from the unit. After conducting vacuum drying, recharge proper amount of refrigerant.**
2	Pull out the drain hose.	 (R2794)	⚠ **Caution** **In pump-down work, be sure to stop the compressor before disconnecting the refrigerant pipe. If the refrigerant pipe is disconnected with the compressor operating and the stop valve open, air may be sucked in and may generate an over-pressure in refrigeration cycle, thus resulting in pipe rupture or accidental injury.**
3	Unscrew the flare nut for gas piping with 2 wrenches.	 (R2795)	■ Place a plastic sheet under the drain pan to prevent from wetting the floor with remaining drain. ■ If the drain hose is embedded in the wall, disconnect the drain hose beforehand. ■ Carry out the removal works with 2 wrenches. ■ When the pipings are disconnected, protect both the openings of pipe and unit from entering of moisture.
4	Unscrew the flare nut for liquid piping with 2 wrenches.	 (R2796)	

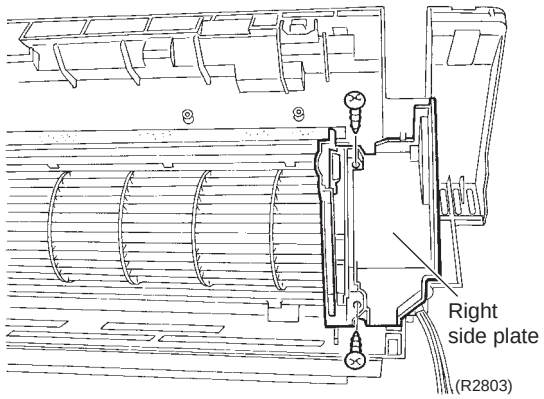
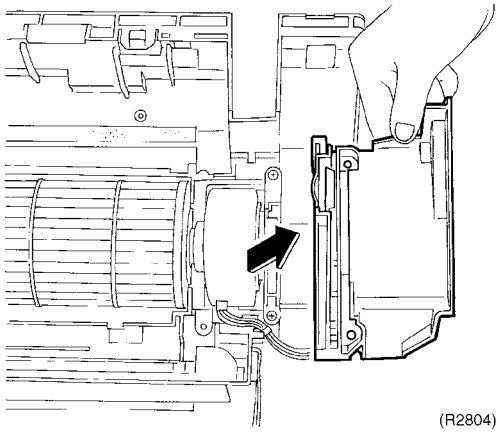
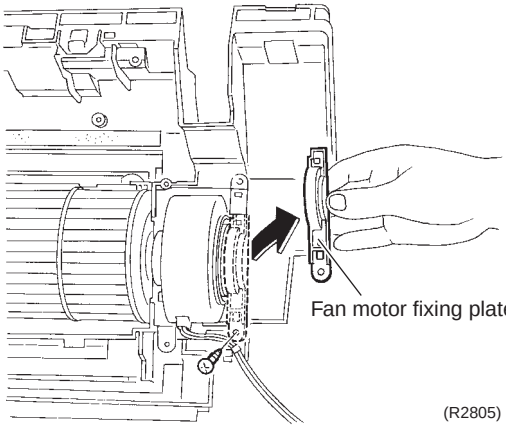
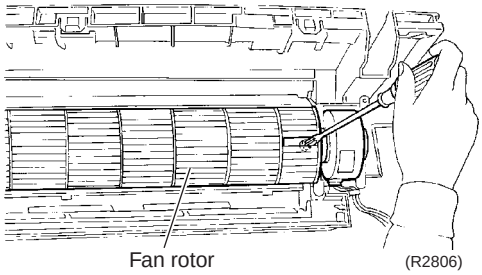
Step	Procedure	Points
2. Remove the indoor unit.		
1 Remove the indoor unit from the installation plate.	 (R2797)	
3. Remove the indoor heat exchanger.		
1 Unfasten the hook of the piping fixture at the back of the indoor unit and pull out the piping.	 (R2798)	
2 Widen the auxiliary piping to the extent of 10° ~ 20°.	 (R2799)	

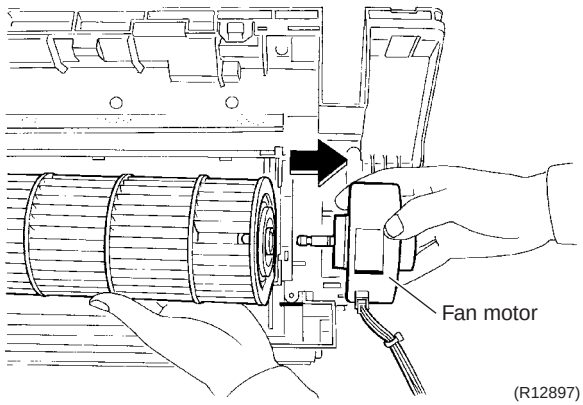
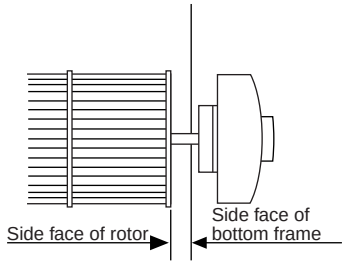
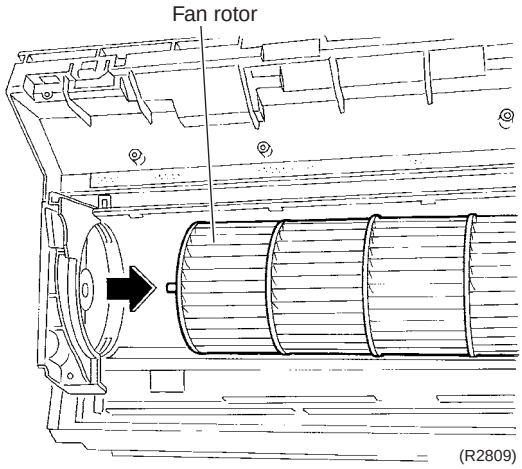
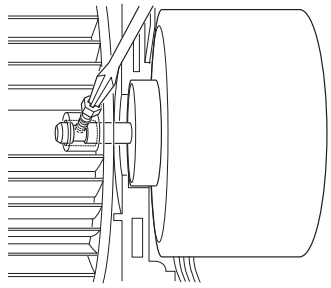
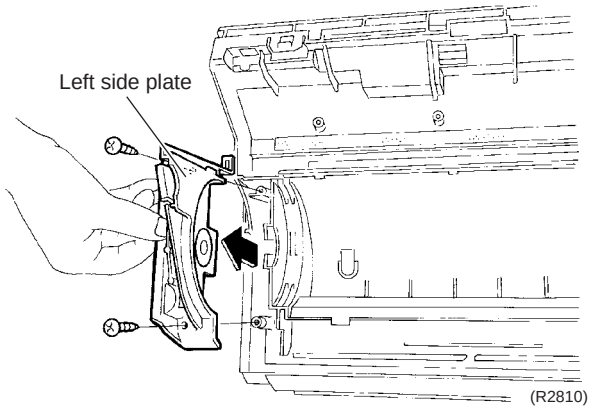
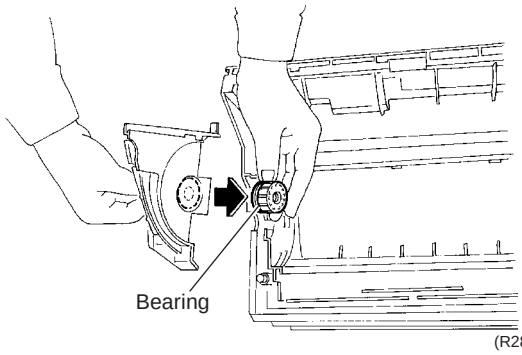
Step	Procedure		Points
3	Unfasten the hooks on the left side.		**Caution** **When removing or reassembling the indoor heat exchanger, be sure to wear protective gloves or wrap the indoor heat exchanger with cloths or you may be injured by the fins.**
4	Push the hooks on the right side and unfasten them.		
5	Pull the indoor heat exchanger to the front side and unfasten the hooks completely, and then lift it.		

2.6 Removal of Fan Motor / Fan Rotor

Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

Step	Procedure		Points
1. Remove the right side plate.		 (R2803)	■ You can remove the fan rotor without detaching the right side plate.
1	Remove the 2 screws.		
2	Lift the right side plate and remove it.	 (R2804)	
2. Remove the fan motor and rotor.			
1	Remove the screw and remove the fan motor fixing plate.	 (R2805)	
2	Remove the screw of the fan rotor.	 (R2806)	

Step	Procedure		Points
3	Remove the fan motor.	 (R12897)	■ When reassembling the fan motor and the fan rotor, provide as much as 5 mm (0.2 inch) of play between the side face of the rotor and the bottom frame.  (R14733)
4	Remove the fan rotor.	 (R2809)	 (R9582) (1) Insert the fan motor with approx. 5 mm (0.2 inch) left. (2) Tighten the screw until it stops. Then give the screw one more turn. (3) Rotate the fan rotor and confirm the fan motor and the fan rotor are installed appropriately. (4) Tighten the screw completely if appropriate. (5) If not appropriate, go back to (1).
5	Remove the 2 screws and remove the left side plate.	 (R2810)	
6	The bearing is made of rubber. Push it inward and remove it.	 (R2811)	

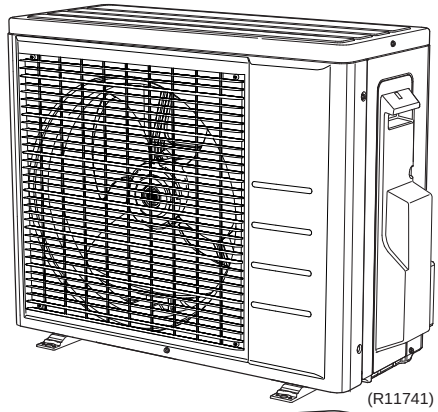
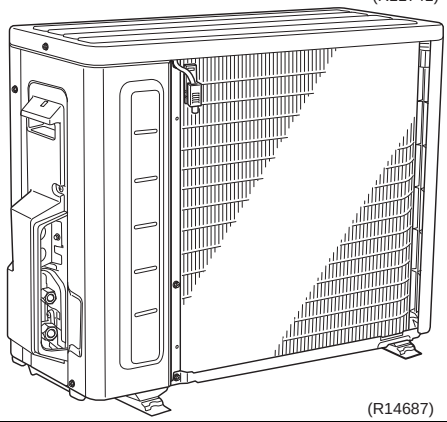
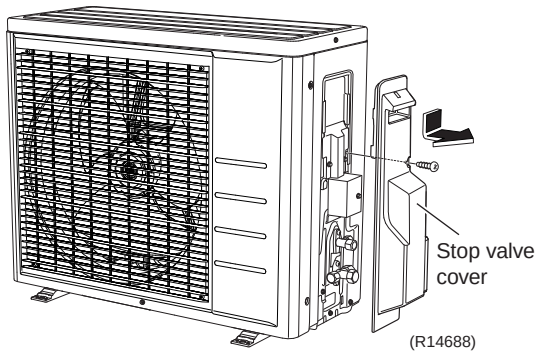
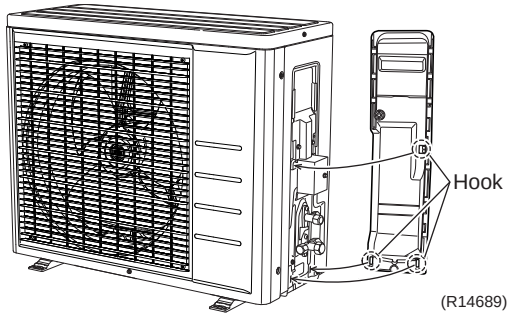
3. Outdoor Unit: 09/12 Class

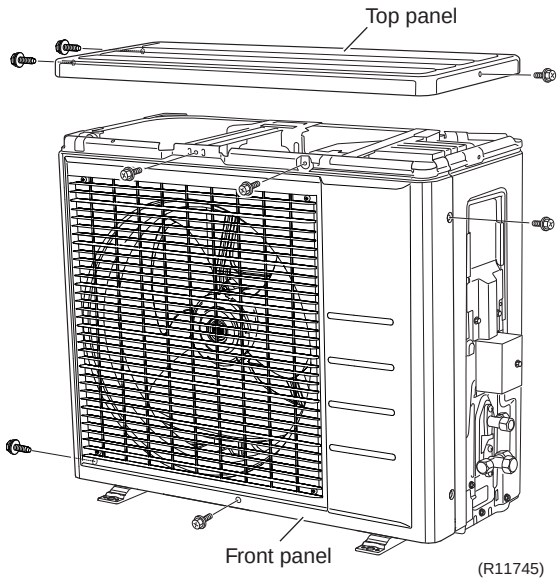
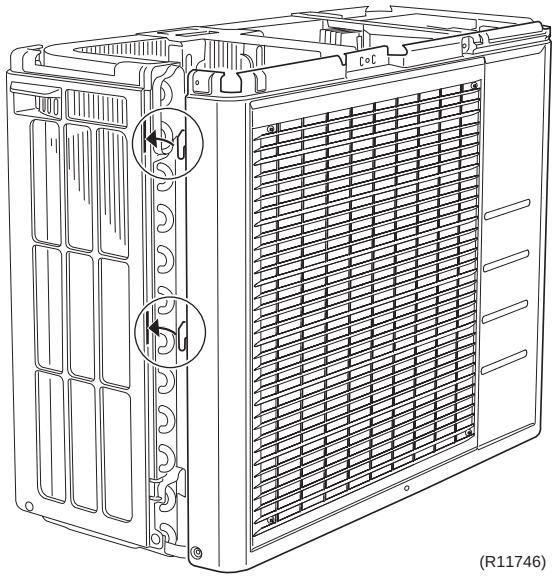
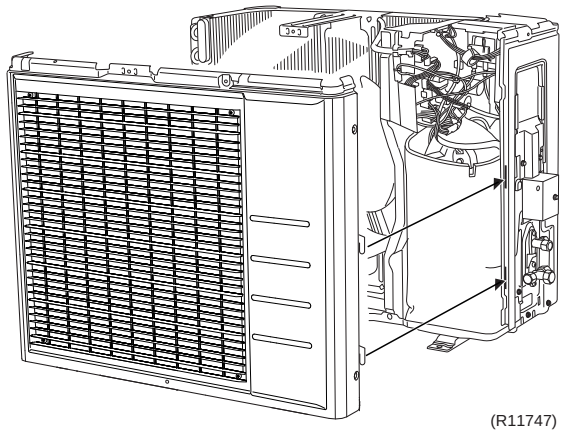
Note: The illustrations are for heat pump models as representative.

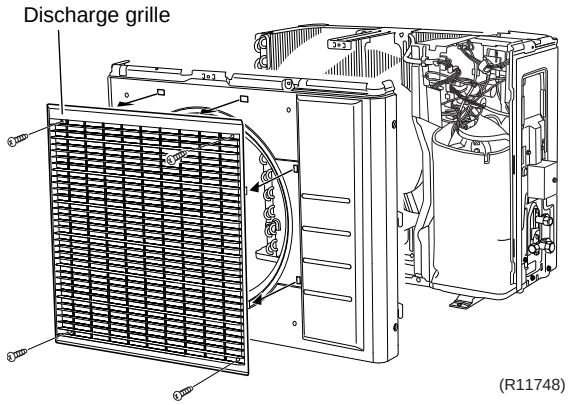
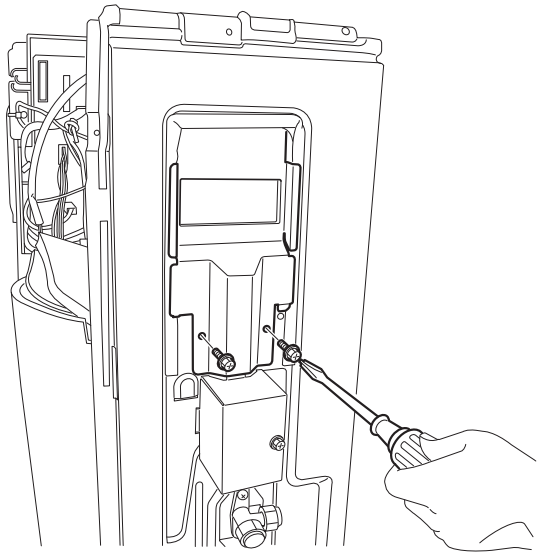
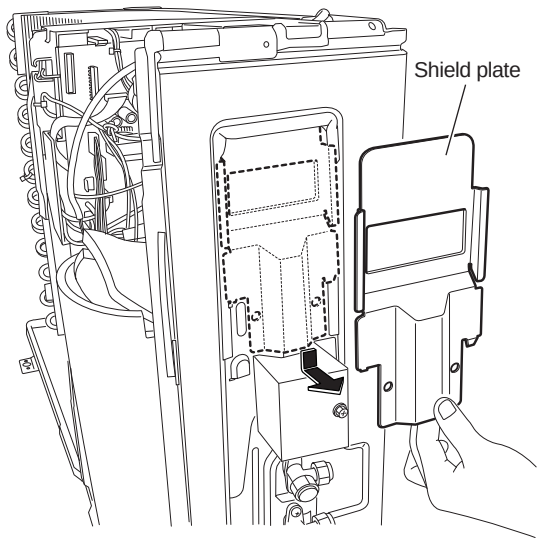
3.1 Removal of Outer Panels

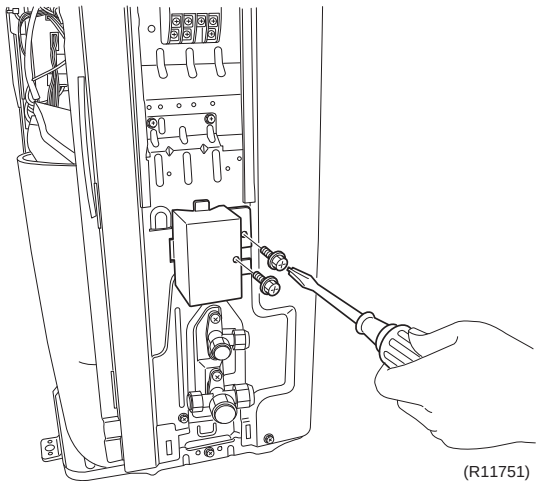
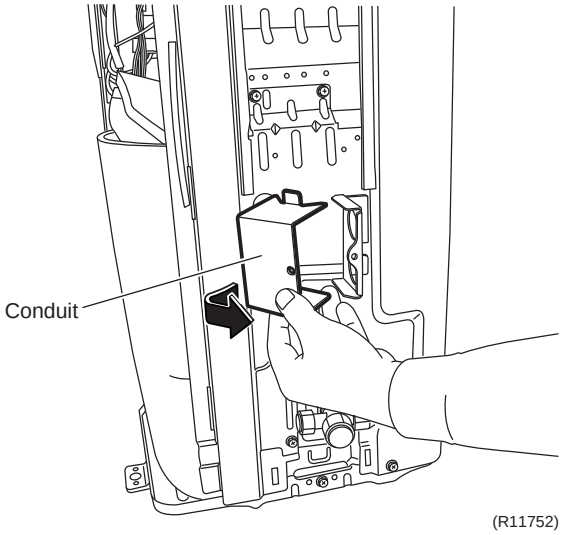
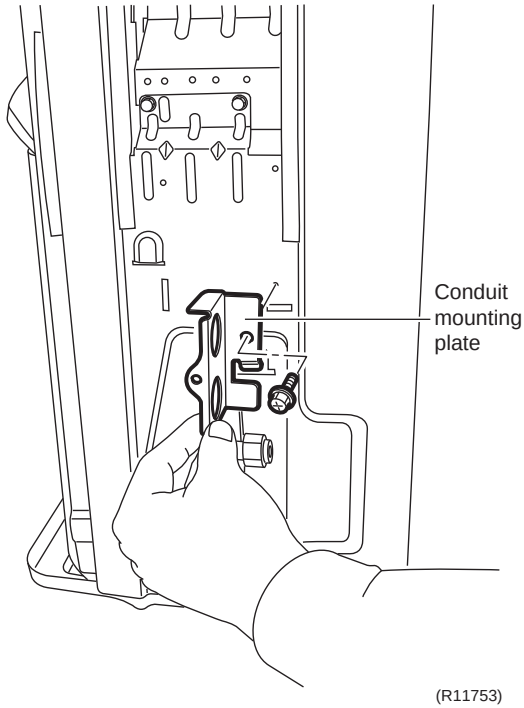
Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

Step	Procedure	Points
1. Appearance features	 (R11741)  (R14687)	■ Take care not to cut your finger by the fins of the outdoor heat exchanger.
2. Remove the panels. 1 Remove the screw of the stop valve cover. Pull down the stop valve cover and remove it.	 (R14688)  (R14689)	■ When reassembling, make sure to fit the 3 hooks.

Step	Procedure	Points
2	Remove the 3 screws (right: 1 screw, left: 2 screws) and remove the top panel.	
3	Remove the 5 screws of the front panel.	
	 (R11745)	
4	Lift up the left side and unfasten the hooks.	
	 (R11746)	
5	Release the right side hooks and remove the front panel.	
	 (R11747)	

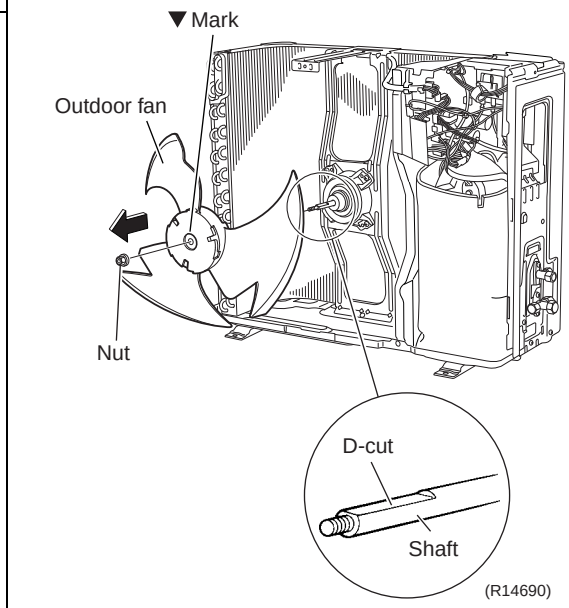
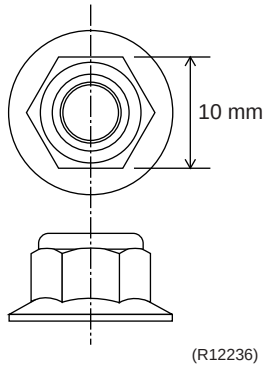
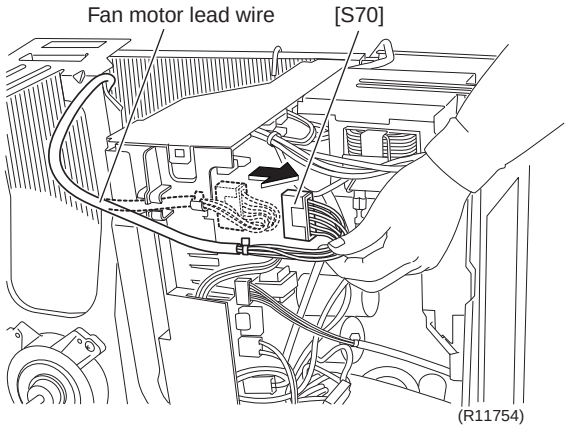
Step	Procedure	Points
6	Remove the 4 screws of the discharge grille.	 (R11748)
7	Unfasten the 6 hooks and remove the discharge grille.	
3. Remove the shield plate and the conduit.		 (R11749)
1	Remove the 2 screws.	
2	Remove the shield plate.	 (R11750)

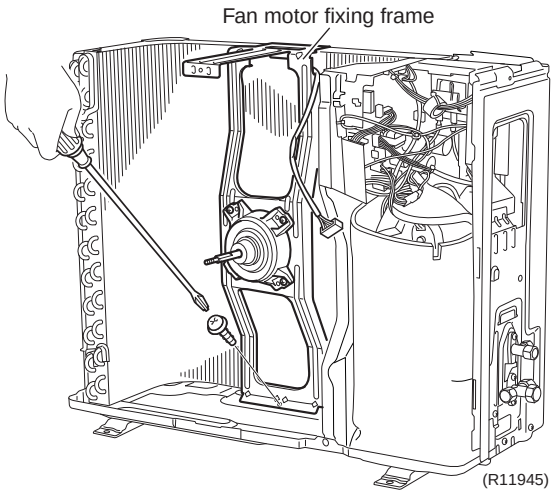
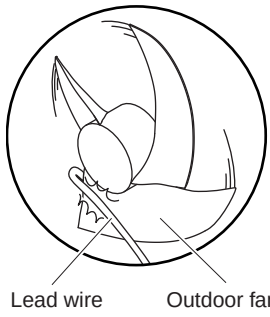
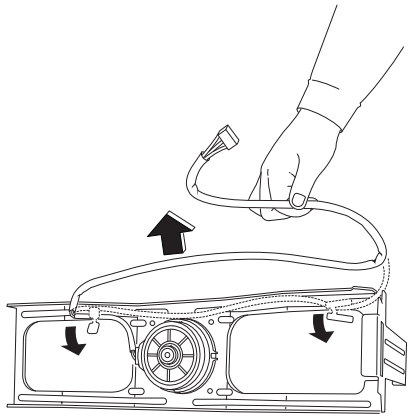
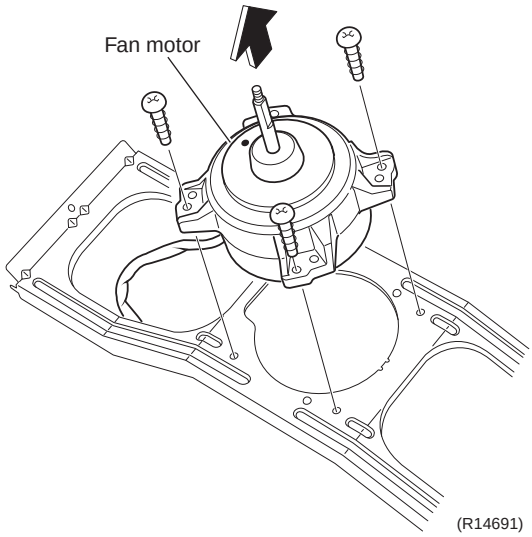
Step	Procedure	Points
3	Remove the 2 screws.  (R11751)	
4	Remove the conduit.  (R11752)	
5	Remove the conduit mounting plate.  (R11753)	

3.2 Removal of Outdoor Fan / Fan Motor

Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

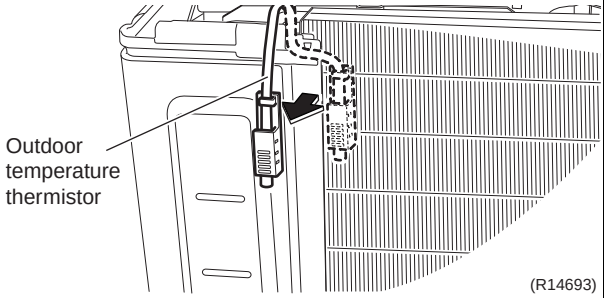
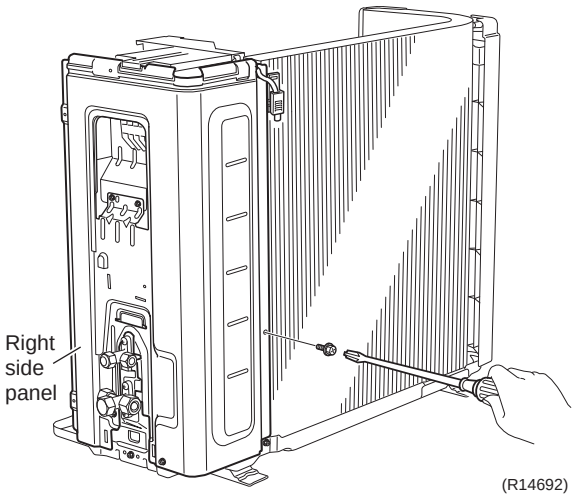
Step	Procedure		Points
1. Remove the outdoor fan.			**Preparation** ■ Remove the panels according to the “Removal of Outer Panels”. ■ Nut size: M6  ■ When reassembling, align ▼ mark of the outdoor fan with D-cut section of the motor shaft.
1	Remove the nut of the outdoor fan.		
2	Remove the outdoor fan.		
2. Remove the fan motor.			
1	Disconnect the connector for the fan motor [S70].		
2	Release the fan motor lead wire from the hooks.		

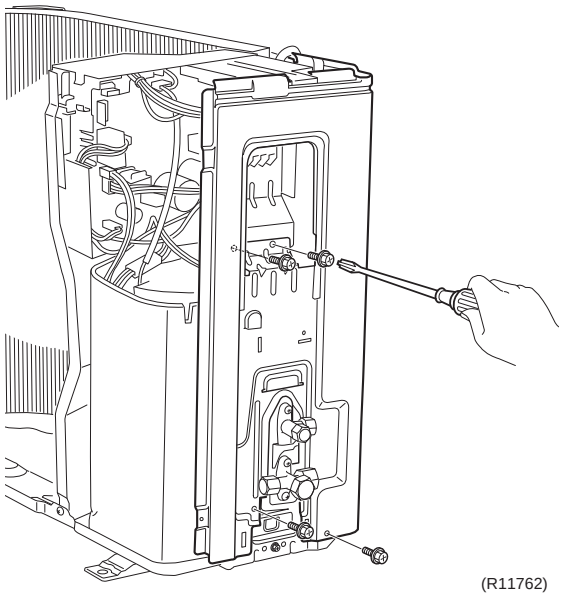
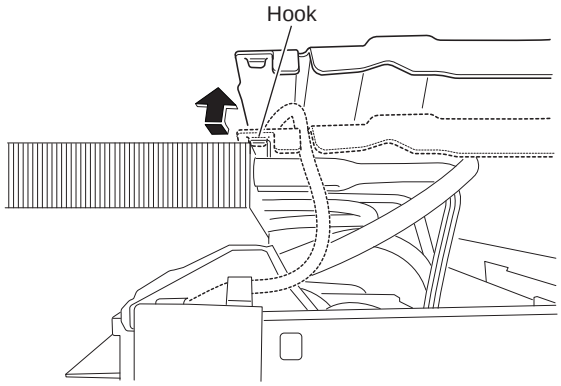
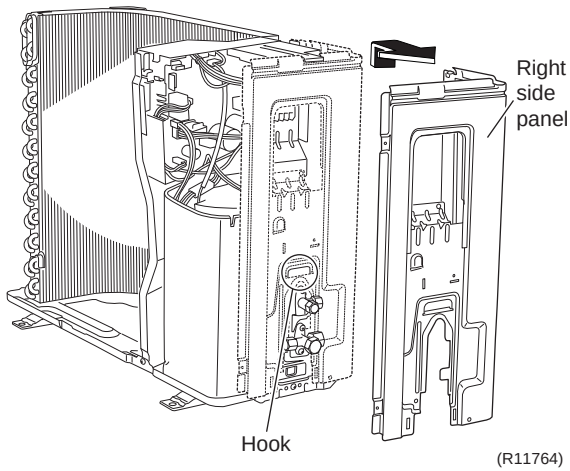
Step	Procedure		Points
3	Remove the screw and remove the fan motor fixing frame.	 (R11945)	■ When reassembling, put the fan motor lead wire through the back of the fan motor so as not to be entangled with the outdoor fan.  (R3249)
4	Release the fan motor lead wire from the hooks.	 (R14724)	
5	Remove the 3 screws and remove the fan motor.	 (R14691)	

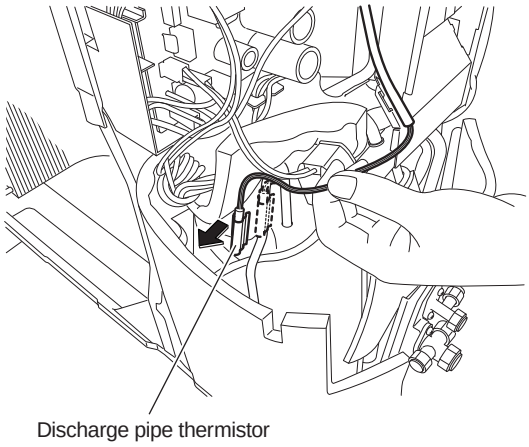
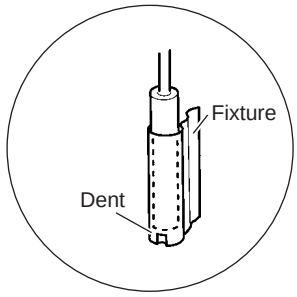
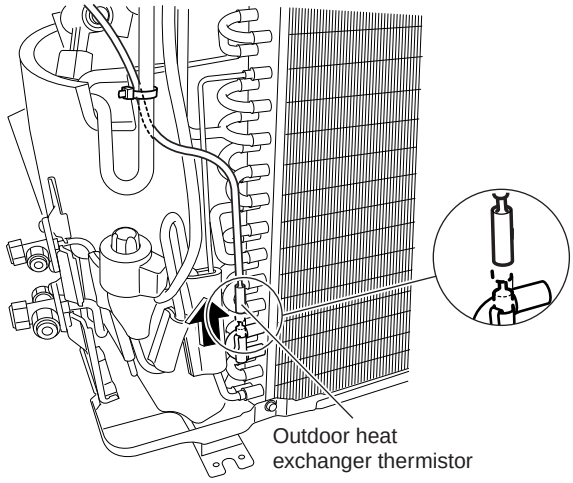
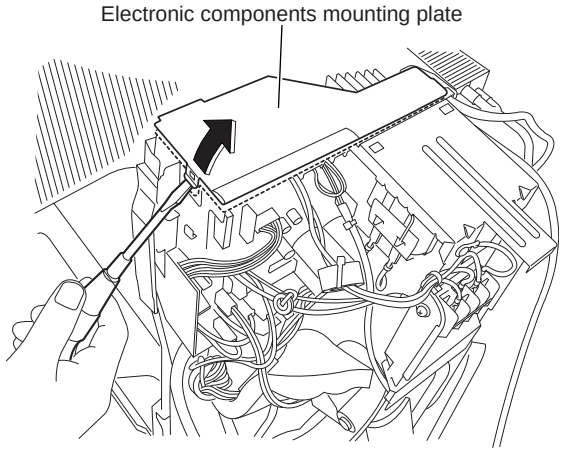
3.3 Removal of Electrical Box / PCB

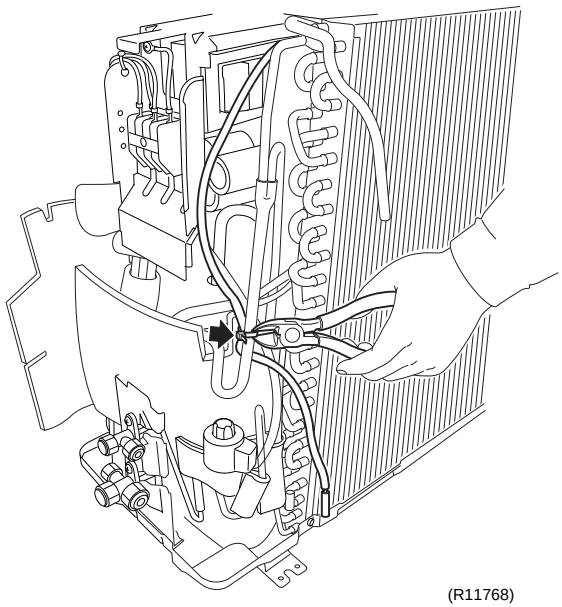
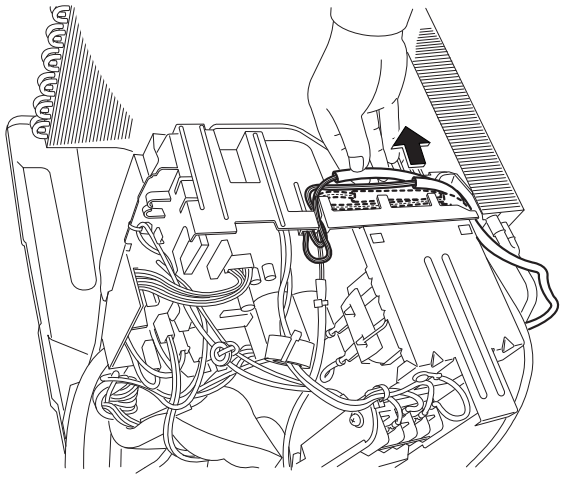
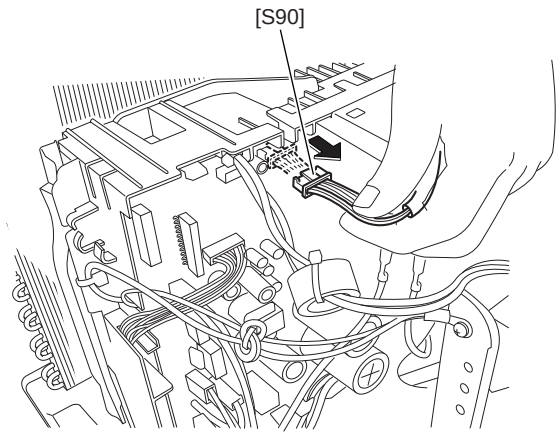
Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

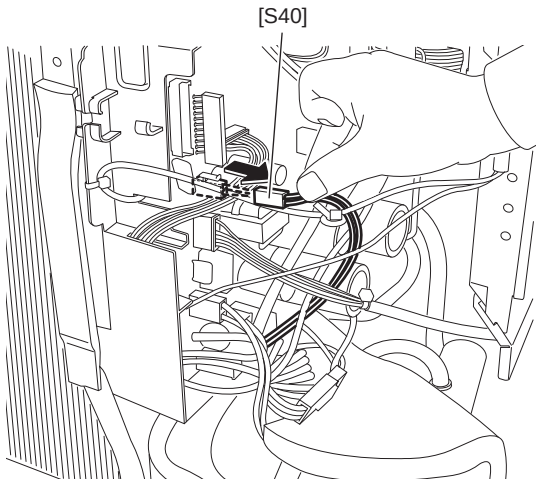
Step	Procedure		Points
1. Remove the right side panel.			**Preparation** ■ Remove the panels according to the “Removal of Outer Panels”.
1	Release the outdoor temperature thermistor from the outdoor heat exchanger.	 (R14693)	
2	Remove the screw on the rear side of the right side panel.	 (R14692)	

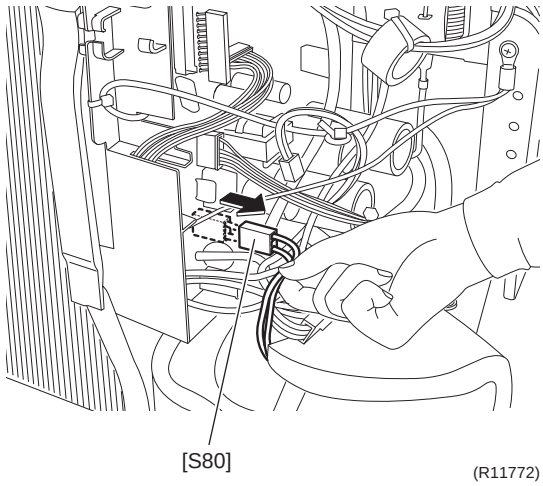
Step	Procedure	Points
3	Remove the 4 screws on the right side panel.  (R11762)	
4	Unfasten the hook on the rear side.  (R11763)	■ When reassembling, make sure to fit the hook.
5	Unfasten the hook, and remove the right side panel.  (R11764)	

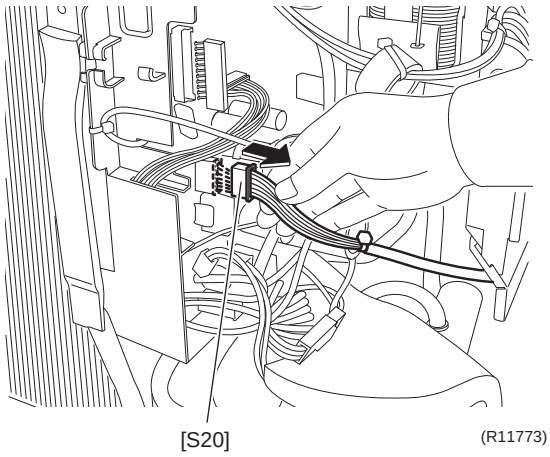
Step	Procedure	Points
2. Remove the thermistors.		
1 Release the discharge pipe thermistor.	 (R11765)	■ Pay attention so as not to lose the fixture for thermistor. ■ When reassembling, do not insert the thermistor up to the dent of fixture.  (R11740)
2 Release the outdoor heat exchanger thermistor.	 (R11766)	
3 Lift the hook with a flat screwdriver, and remove the electronic components mounting plate.	 (R11767)	

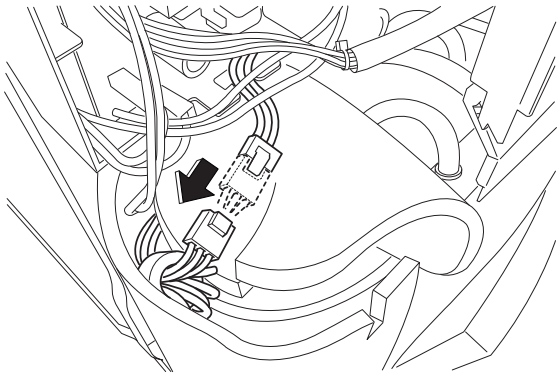
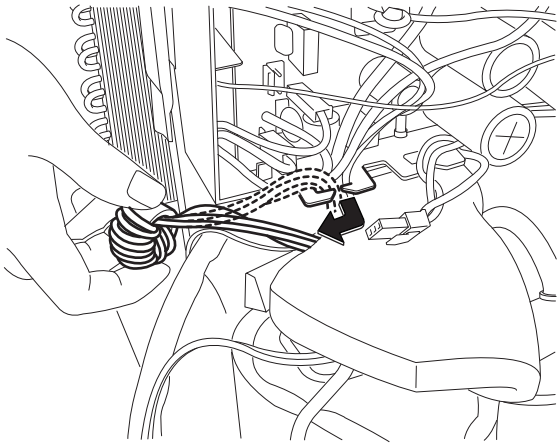
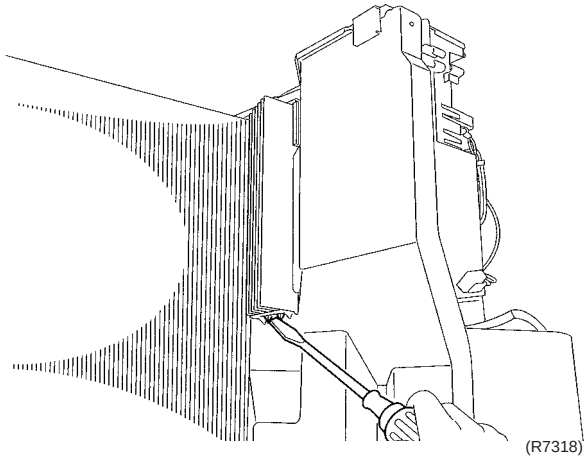
Step	Procedure		Points
4	Cut the clamp.	 (R11768)	
5	Release the harnesses.	 (R11769)	
6	Disconnect the connector for the thermistors [S90].	 [S90] (R11770)	[S90] : outdoor temperature thermistor, outdoor heat exchanger thermistor, discharge pipe thermistor
7	Remove the thermistor assembly.		

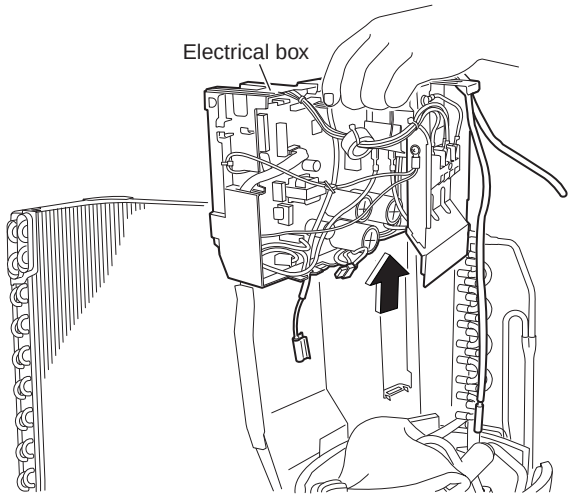
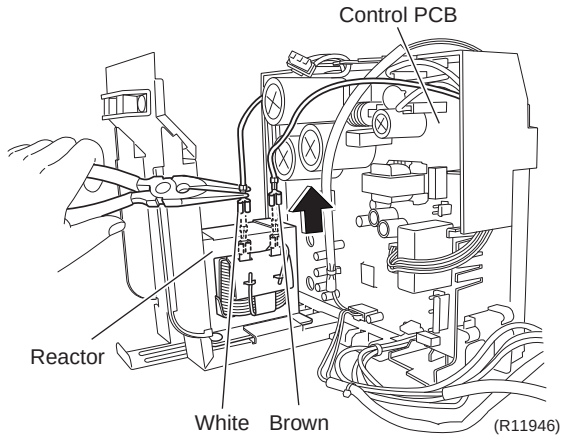
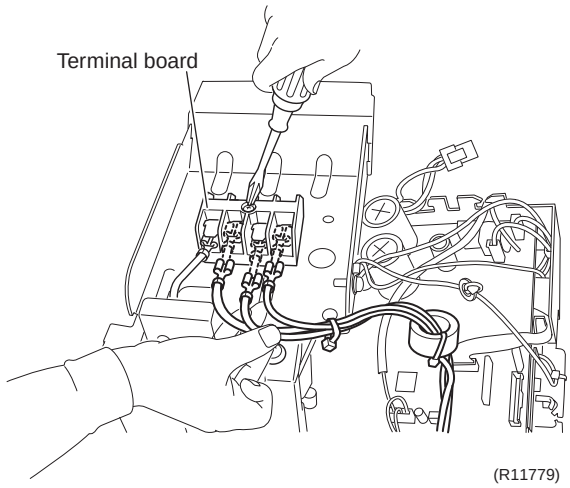
Step	Procedure	Points
3. Remove the electrical box.		
1	Disconnect the connector for the overload protector [S40].	
2	Disconnect the connector for the four-way valve coil [S80].	■ The cooling only model has no harness for [S80].
3	Disconnect the connector for the electronic expansion valve coil [S20].	

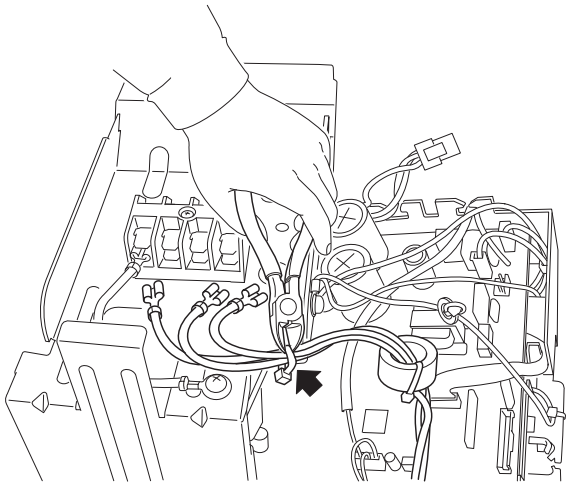
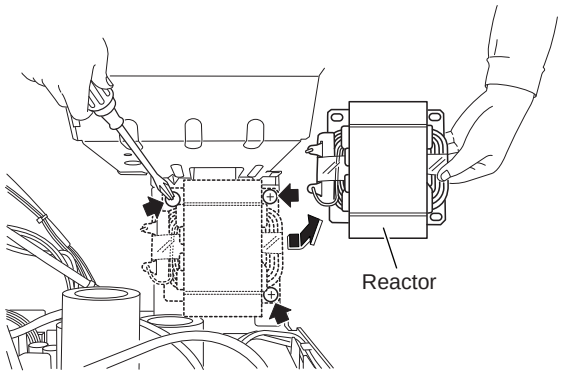
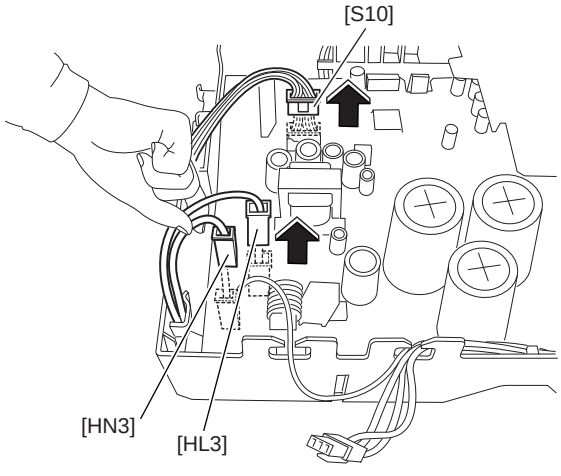


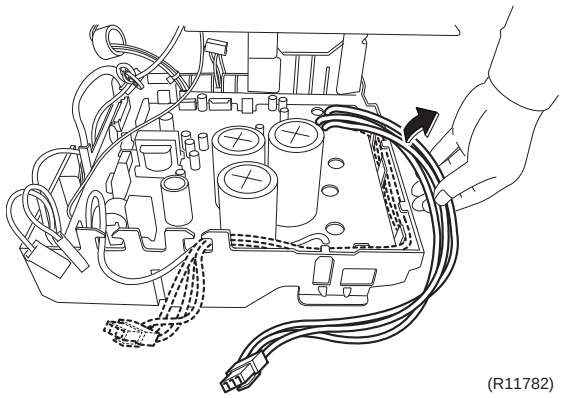
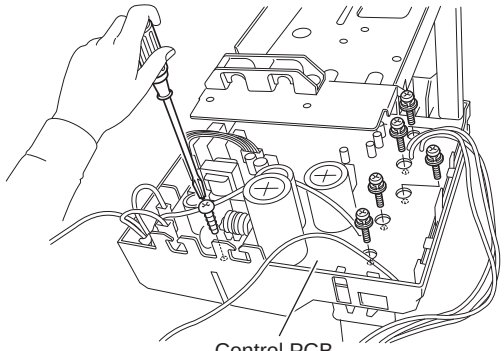
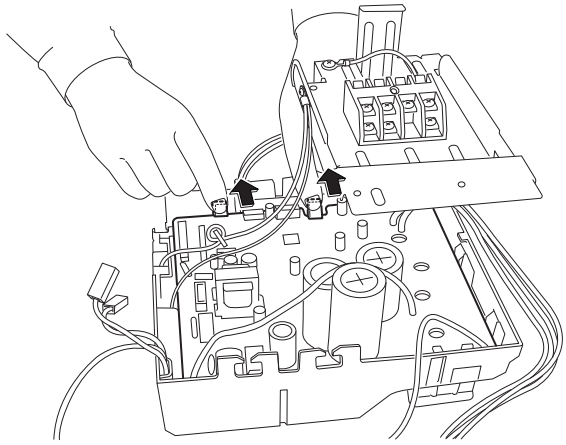


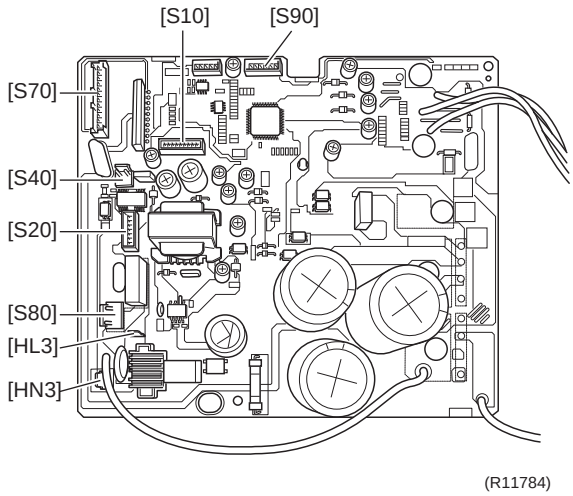


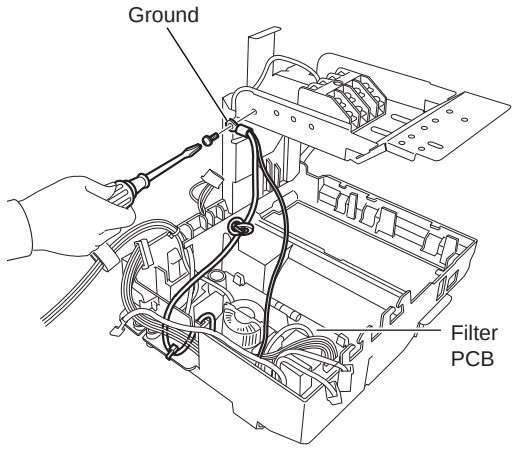
Step	Procedure		Points
4	Disconnect the relay connector for the compressor motor.	 (R11774)	
5	Release the harnesses from the hook.	 (R11775)	
6	Unfasten the hook of the electrical box from the partition plate with a flat screwdriver.	 (R7318)	■ The electrical box can be removed by lifting itself without a screwdriver.

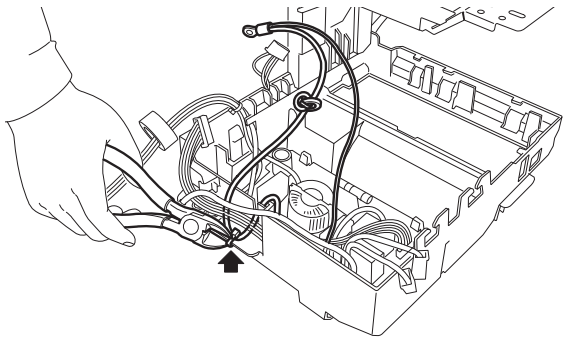
Step	Procedure		Points
7	Lift and remove the electrical box.	 (R11776)	
4. Remove the control PCB.			
1	Disconnect the 2 terminals of the reactor.	 (R11946)	
2	Remove the screw of the terminal board, and pull out the terminals.	 (R11779)	

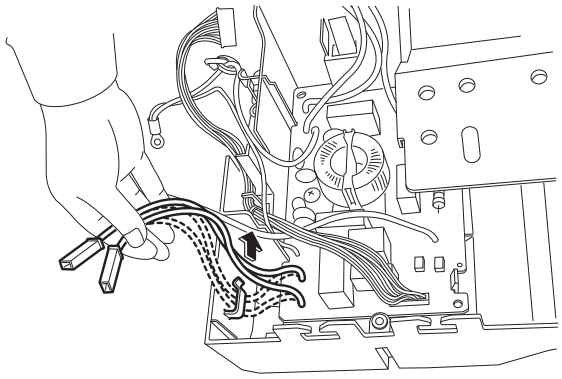
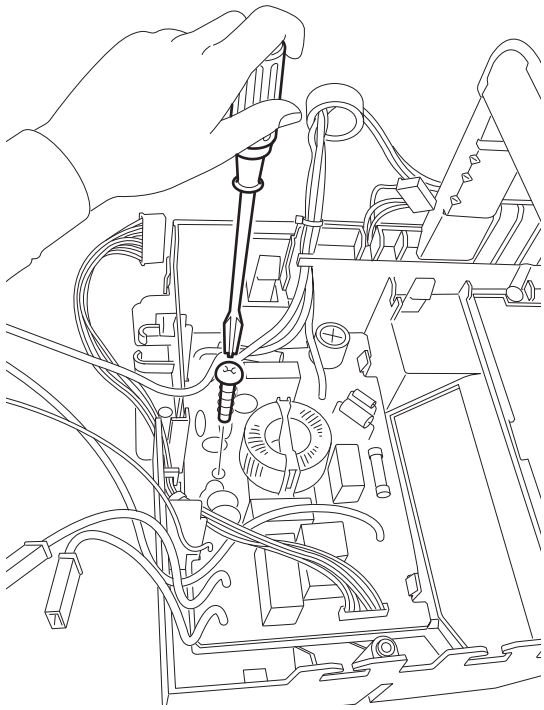
Step	Procedure		Points
3	Cut the clamp.	 (R11780)	
4	Remove the 3 screws and remove the reactor.	 (R11777)	
5	Disconnect the 3 connectors for the filter PCB [S10], [HN3], [HL3].	 (R11781)	

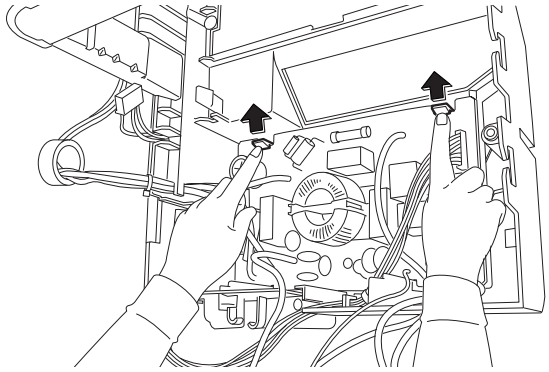
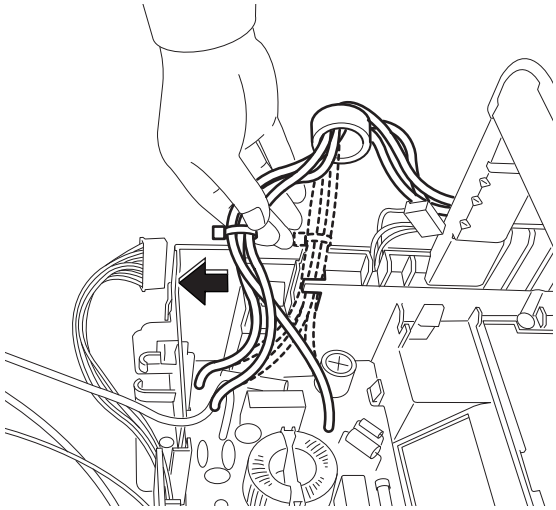
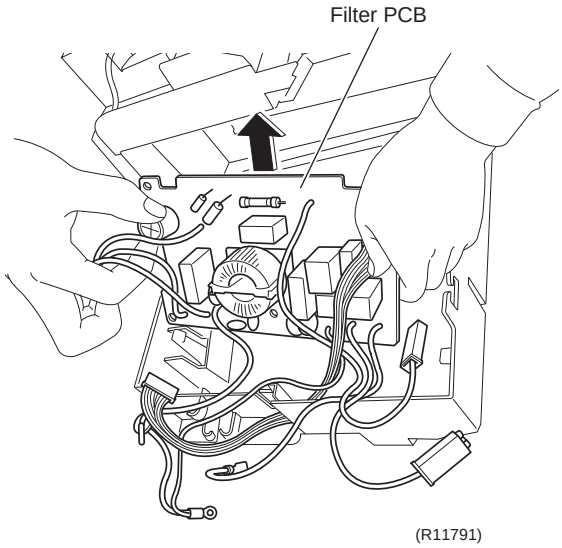
Step	Procedure	Points
6	Release the harnesses.  (R11782)	
7	Remove the 6 screws.  Control PCB (R10717)	
8	Unfasten the 2 hooks.	
9	Lift and remove the control PCB.  (R11783)	

<table>
<tr><th>Step</th><th colspan="2">Procedure</th><th>Points</th></tr>
<tr><td>10</td><td>Feature of the control PCB</td><td> 

(R11784)</td><td>[S10] [HN3] [HL3]: filter PCB
[S20]: electronic expansion valve coil
[S40]: overload protector
[S70]: fan motor
[S80]: four-way valve coil
[S90]: thermistors</td></tr>
<tr><td colspan="3">5. Remove the filter PCB.</td><td rowspan="3"></td></tr>
<tr><td>1</td><td>Remove the screw of the ground.</td><td rowspan="2"> 

(R11785)</td></tr>
<tr><td>2</td><td>Cut the clamp.</td></tr>
<tr><td colspan="3"> 
(R11786)</td></tr>
</table>

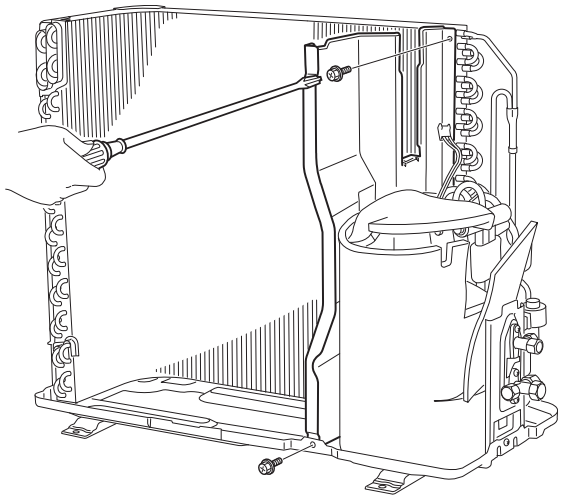
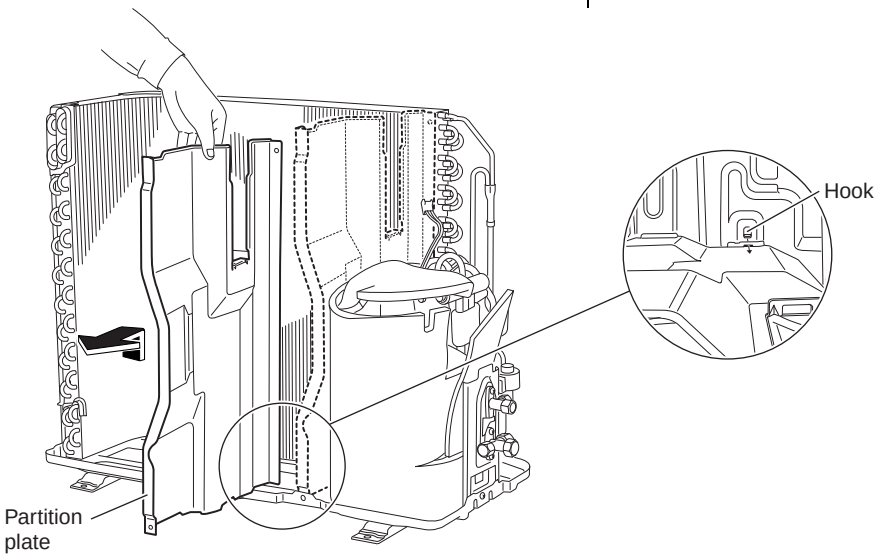
Step	Procedure	Points
3	Release the harnesses from the hook.  (R11787)	
4	Remove the screw.  (R11788)	

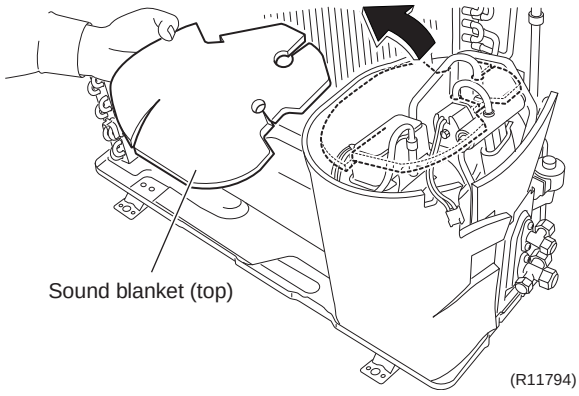
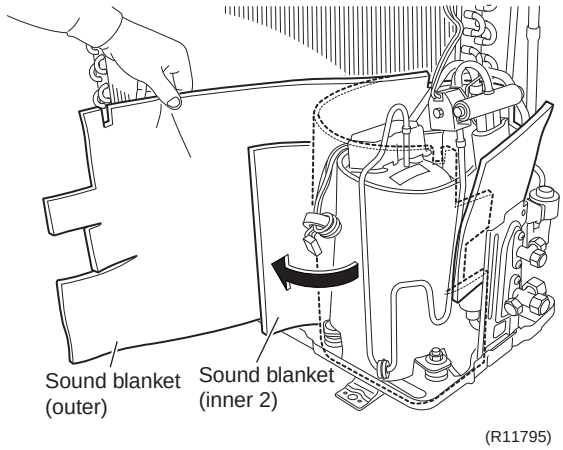
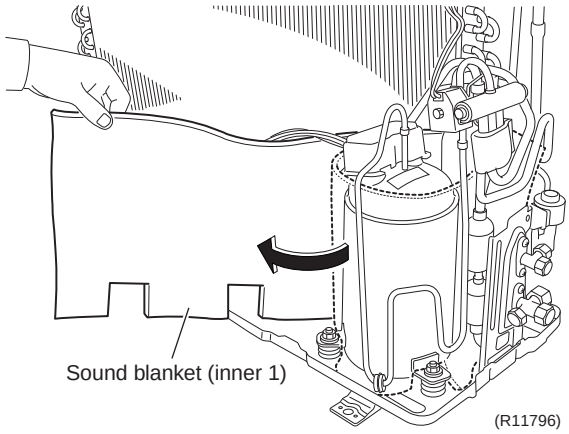
Step	Procedure		Points
5	Unfasten the 2 hooks.	 (R11789)	
6	Release the harnesses.	 (R11790)	
7	Remove the filter PCB.	 (R11791)	

3.4 Removal of Sound Blankets

Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

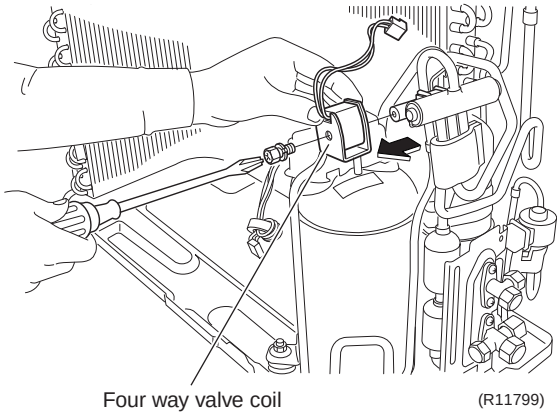
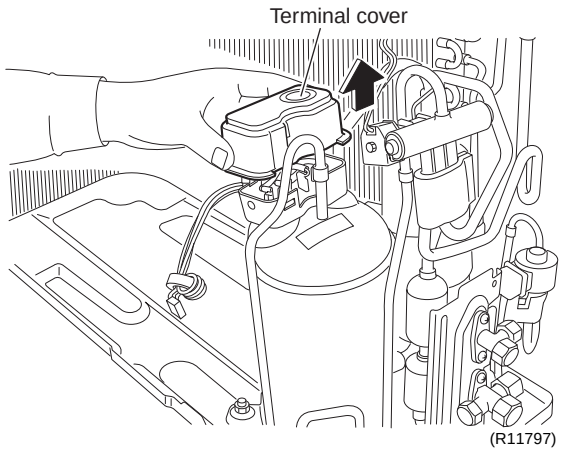
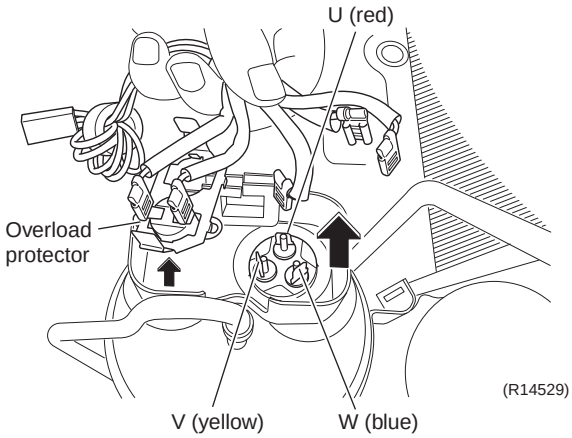
Step	Procedure	Points
1. Remove the partition plate.	 (R11792)	
1 Remove the 2 screws.		
2 The partition plate has a hook on the lower side. Lift and pull the partition plate and remove it.	 (R11793)	■ When reassembling, fit the lower hook into the bottom frame.

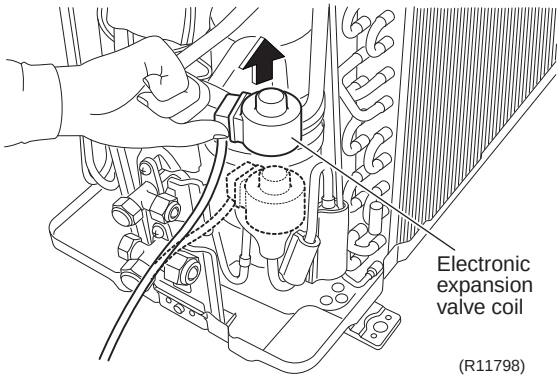
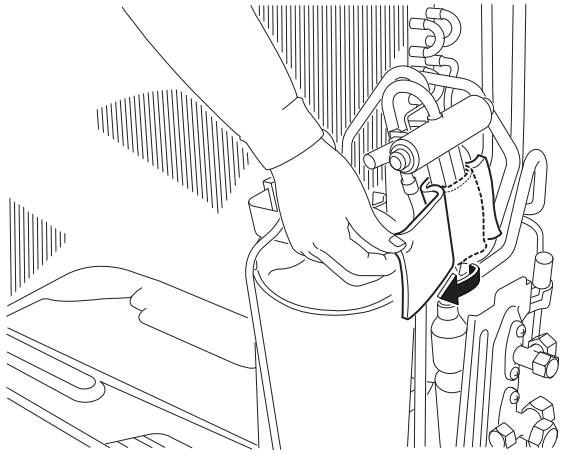
Step	Procedure	Points
2. Remove the sound blankets.		
1 Lift and remove the sound blanket (top).		■ Since the piping ports on the sound blanket are torn easily, remove the blanket carefully.
2 Pull the sound blanket (outer and inner 2) out.		
3 Pull the sound blanket (inner 1) out.		■ Since the piping ports on the sound blanket are torn easily, remove the blanket carefully.

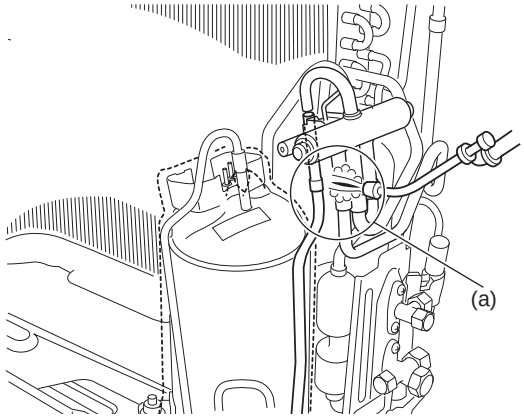
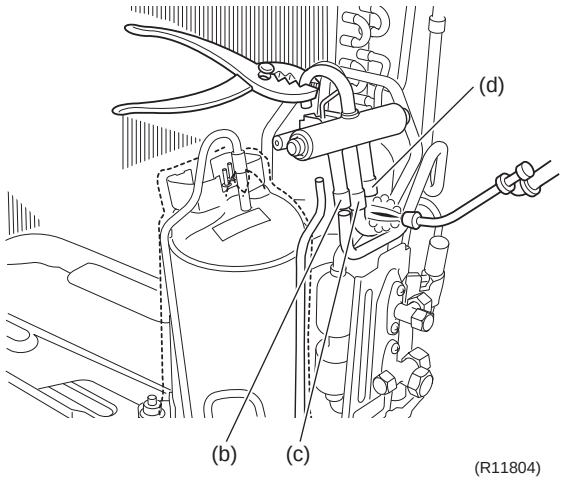
3.5 Removal of Four-Way Valve

Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

Step	Procedure	Points
1. Remove the peripheries.		■ The cooling only model has no four-way valve coil.
1 Remove the screw and remove the four-way valve coil.		
2 Remove the terminal cover.		
3 Disconnect the terminals of the compressor.		
4 Remove the overload protector.		

Step	Procedure	Points
5	Remove the electronic expansion valve coil.  (R11798)	
6	Remove the putty.  (R11800)	

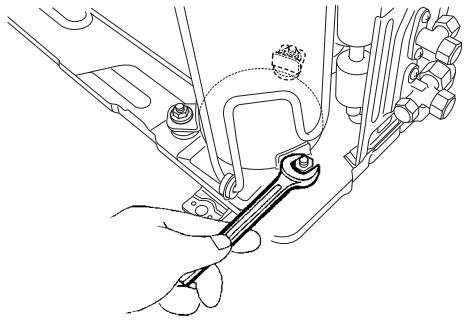
Step	Procedure	Points
■ Before working, make sure that the refrigerant gas is empty in the circuit. ■ Be sure to apply nitrogen replacement when heating up the brazed part.	 (R11802)	**Warning** **Be careful not to burn yourself with the pipes and other parts that are heated by the gas brazing machine.**
2. Remove the four-way valve.		**Warning** **If the refrigerant gas leaks during work, ventilate the room. If the refrigerant gas is exposed to flames, toxic gas may be generated.**
1 Heat up the brazed point (a) and withdraw the piping with pliers. 2 Heat up the 3 brazed points of the four-way valve. Disconnect the point (b) first. 3 Disconnect the points (c) and (d).	 (R11804)	**Caution** **For global environment protection, do not discharge the refrigerant gas in the atmosphere. Make sure to collect all the refrigerant gas.**
Note: ■ Do not use a metal saw for cutting pipes to prevent sawdust from entering the circuit. ■ When withdrawing the pipes, be careful not to pinch them firmly with pliers. The pipes may get deformed. ■ Provide a protective sheet or a steel plate so that the brazing flame cannot influence peripheries.		**Cautions for restoration** 1. Restore the piping by non-oxidation brazing. 2. It is required to prevent the carbonization of the oil inside the four-way valve and the deterioration of the gaskets affected by heat. Keep below 120°C (248°F) by wrapping the four-way valve with a wet cloth and provide water so that the cloth does not dry. **In case of difficulty with gas brazing machine** 1. Disconnect the brazed part where is easy to disconnect and restore. 2. Cut pipes on the main unit with a tube cutter in order to make it easy to disconnect.

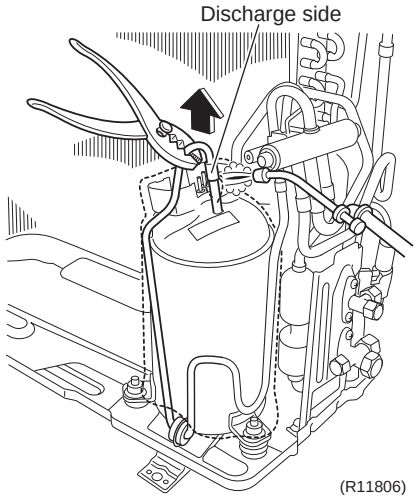
3.6 Removal of Compressor

Procedure

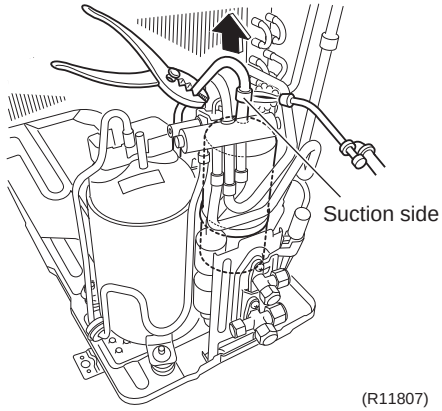
Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

Step	Procedure	Points
1	Remove the four-way valve, the terminal cover and disconnect the terminals of the compressor so as not to burn them.	**Warning** **Be careful not to burn yourself with the pipes and other parts that are heated by the gas brazing machine.**
2	Remove the 3 nuts of the compressor.	**Warning** **If the refrigerant gas leaks during work, ventilate the room. If the refrigerant gas is exposed to flames, toxic gas may be generated.**
■ Before working, make sure that the refrigerant gas is empty in the circuit. ■ Be sure to apply nitrogen replacement when heating up the brazed part.		**Warning** **Since it may happen that the refrigerant oil in the compressor catches fire, prepare a wet cloth so as to extinguish fire immediately.**
3	Heat up the brazed part of the discharge side and disconnect.	**Caution** **For environment protection, do not discharge the refrigerant gas in the atmosphere. Make sure to collect all the refrigerant gas.**
4	Heat up the brazed part of the suction side and disconnect.	**Cautions for restoration** 1. Restore the piping by non-oxidation brazing. 2. It is required to prevent the carbonization of the oil inside the four-way valve and the deterioration of the gaskets affected by heat. Keep below 120°C (248°F) by wrapping the four-way valve with a wet cloth and provide water so that the cloth does not dry.
5	Lift the compressor up and remove it.	**In case of difficulty with gas brazing machine** 1. Disconnect the brazed part where is easy to disconnect and restore. 2. Cut pipes on the main unit with a tube cutter in order to make it easy to disconnect.
Note: ■ Do not use a metal saw for cutting pipes to prevent sawdust from entering the circuit. ■ When withdrawing the pipes, be careful not to pinch them firmly with pliers. The pipes may get deformed. ■ Provide a protective sheet or a steel plate so that the brazing flame cannot influence peripheries. ■ Be careful so as not to burn the compressor terminals, the name plate, the heat exchanger fin.		

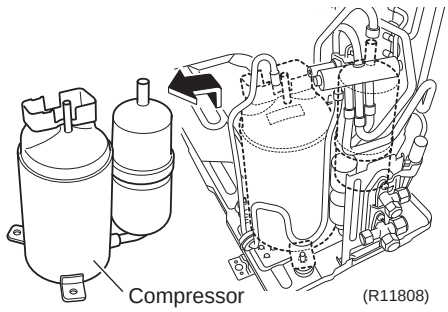

(R11805)



(R11806)



(R11807)



(R11808)

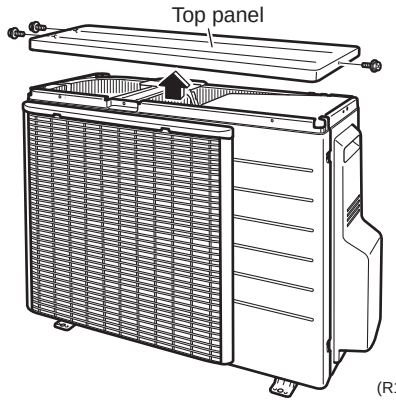
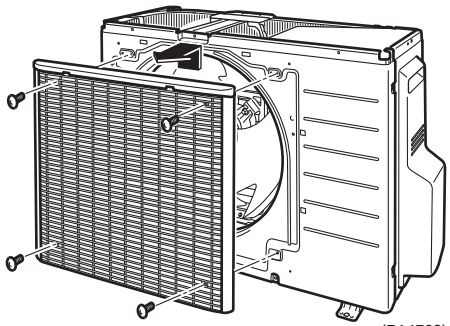
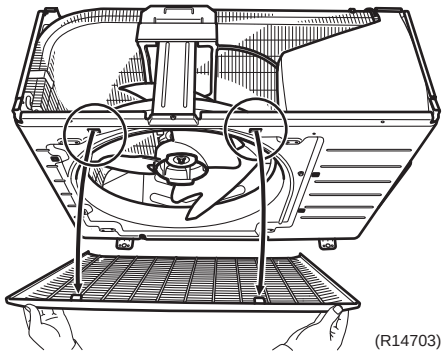
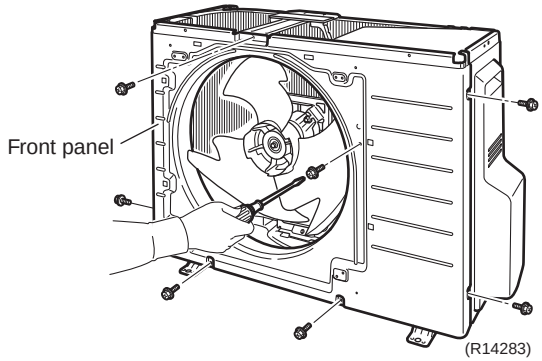
4. Outdoor Unit: 15/18/24 Class

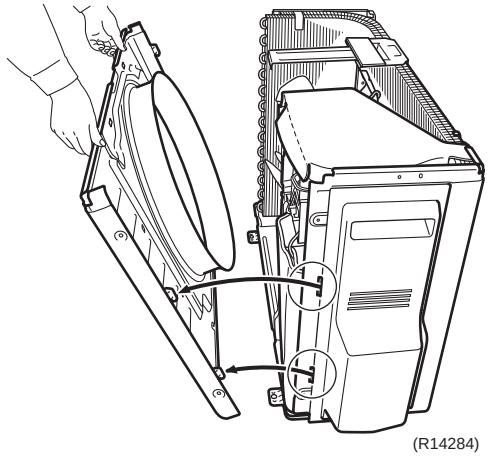
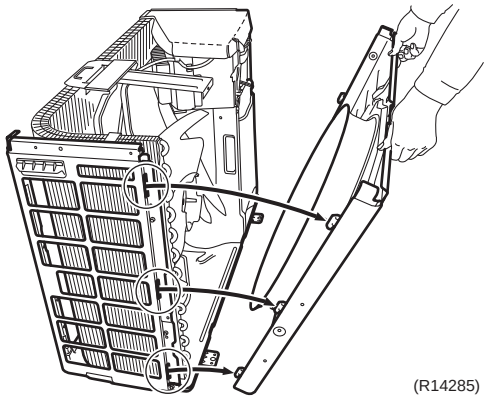
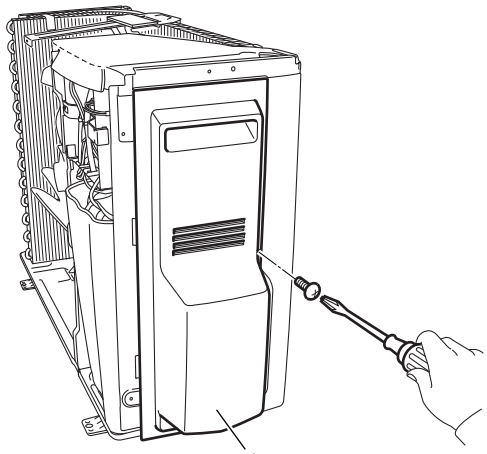
Note: The illustrations are for heat pump models as representative.

4.1 Removal of Outer Panels

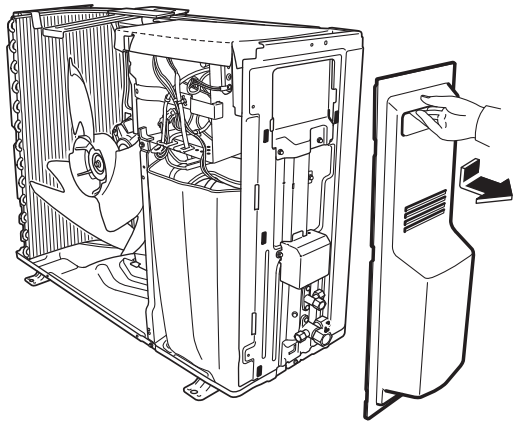
Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

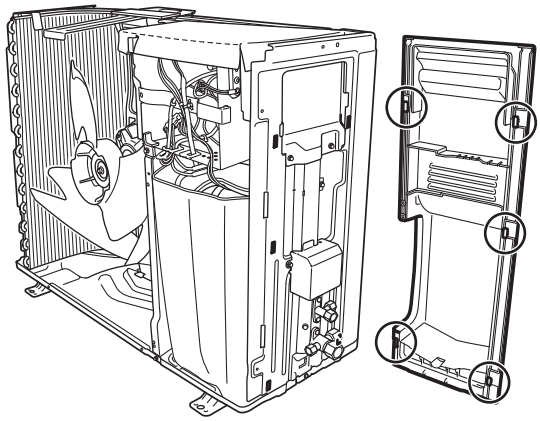
Step	Procedure		Points
1	Remove the 3 screws and lift the top panel.	 (R14281)	■ Take care not to cut your finger by the fins of the outdoor heat exchanger.
2	Remove the 4 screws and remove the discharge grille.	 (R14702)	■ Slide the discharge grille upwards and remove it.
		 (R14703)	■ The discharge grille has 2 hooks.
3	Remove the 7 screws of the front panel.	 (R14283)	

Step	Procedure		Points
4	Unfasten the right side hooks.	 (R14284)	
5	Unfasten the left side hooks. Remove the front panel.	 (R14285)	■ When reassembling, fit the left side of the front panel first.
6	Remove the screw of the stop valve cover.	 Stop valve cover (R14286)	

Step	Procedure	Points
7	Pull down the stop valve cover to unfasten the hooks and remove it.	■ The stop valve cover has 5 hooks.



(R14704)

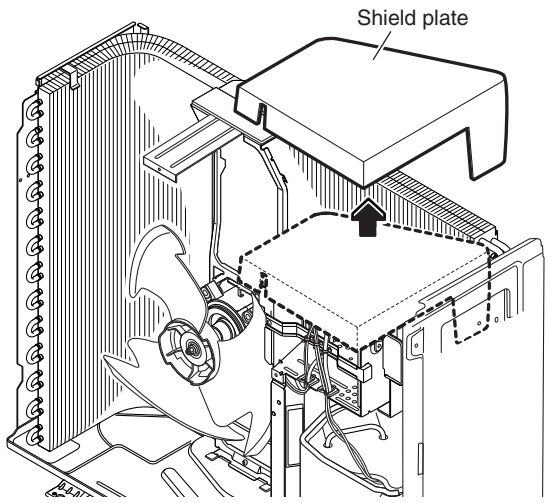
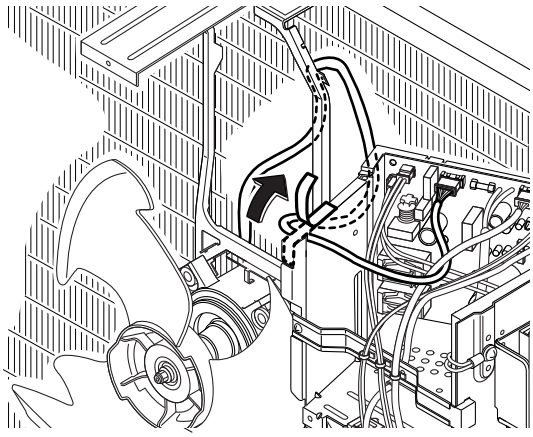
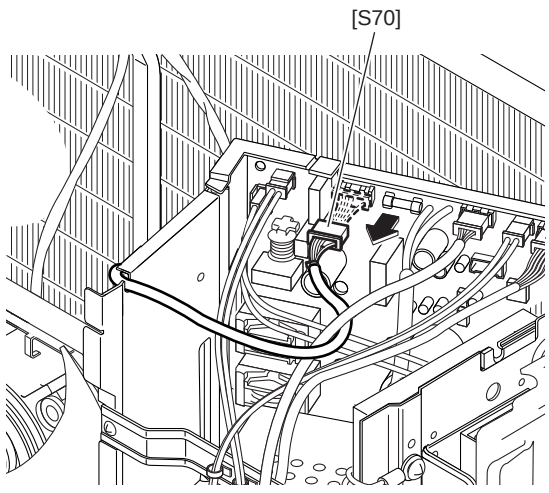


(R14705)

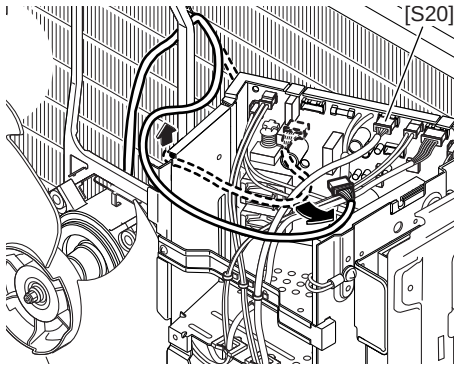
4.2 Removal of Outdoor Fan / Fan Motor

Procedure

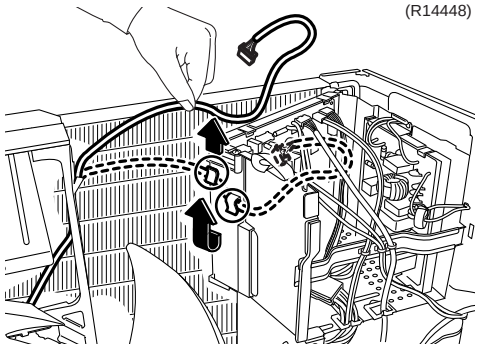
Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

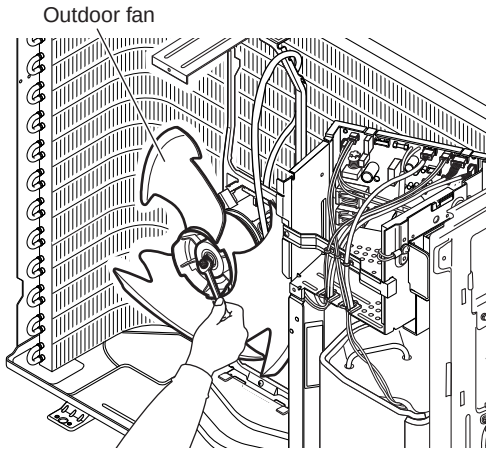
Step	Procedure		Points
1	Remove the shield plate.	 (R14287)	**Preparation** ■ Remove the top panel and the front panel according to the “Removal of Outer Panels”. ■ This procedure is not necessary to remove the outdoor fan only.
2	Peel off the filament tape.	 (R14288)	
3	Disconnect the connector for the fan motor [S70].	 (R14289)	

Step	Procedure	Points
4	Release the fan motor lead wire from the groove and the 2 hooks of the partition plate.	■ The harnesses of [S70] and [S20] cross each other.
5	Remove the nut of the outdoor fan.	■ Nut size: M6

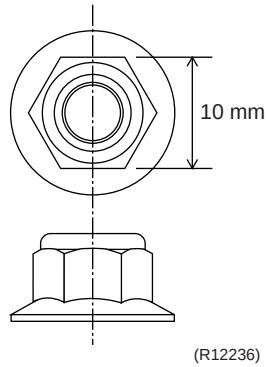


(R14448)


(R14304)

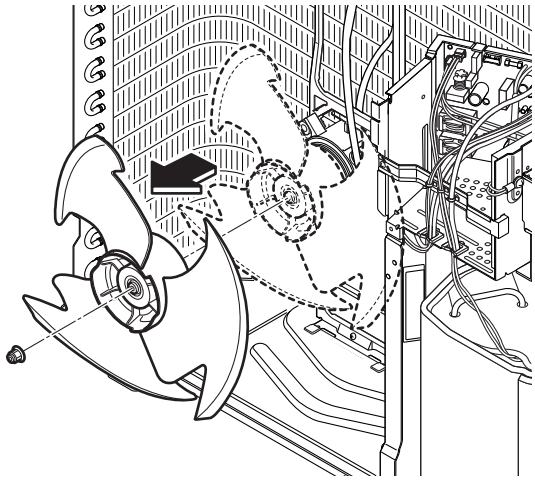


(R14291)

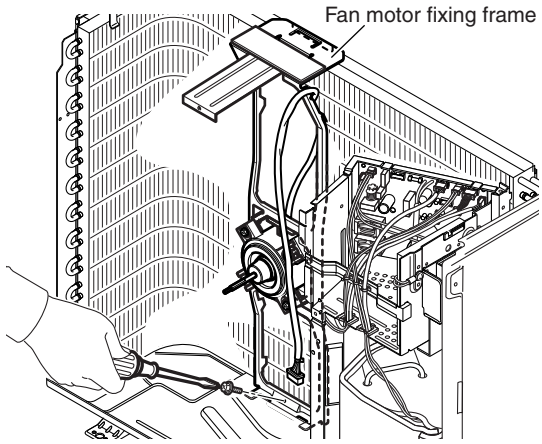


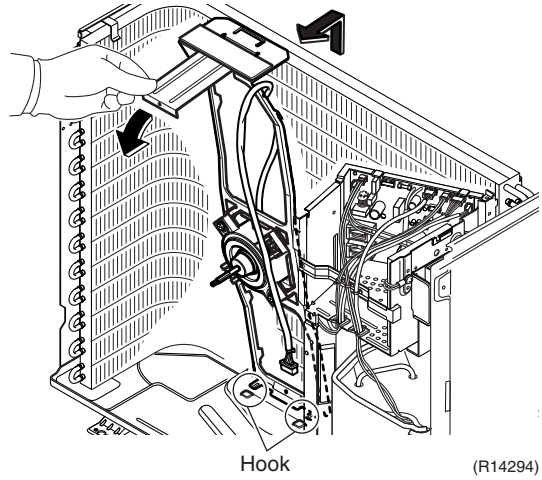
(R12236)

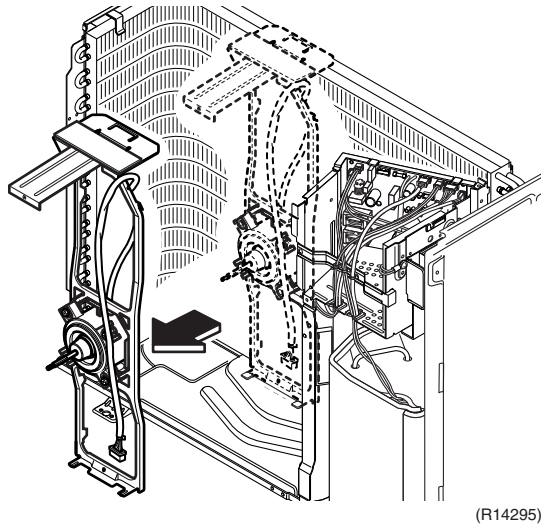
■ When reassembling, align ▼ mark of the outdoor fan with D-cut section of the motor shaft.

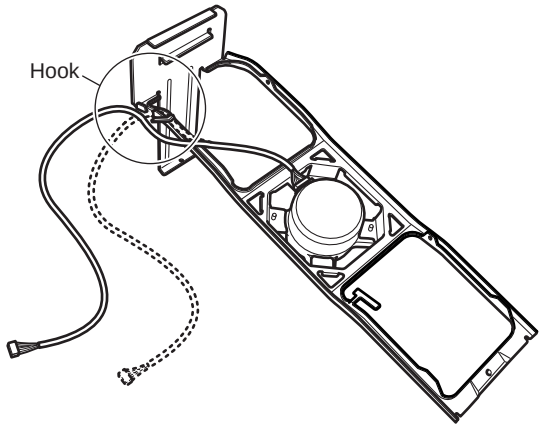
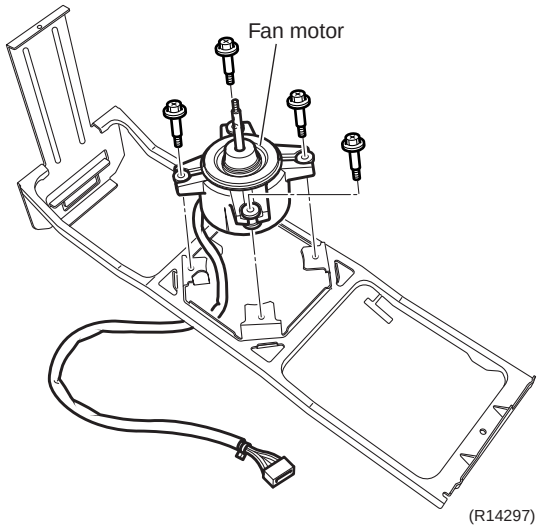

(R14292)

Step	Procedure	Points
6	Remove the screw of the fan motor fixing frame.	
7	Pull down the fan motor fixing frame to unfasten the 2 hooks at the bottom.	
8	Remove the fan motor fixing frame.	





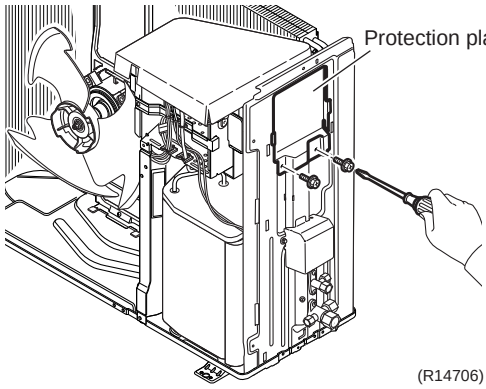
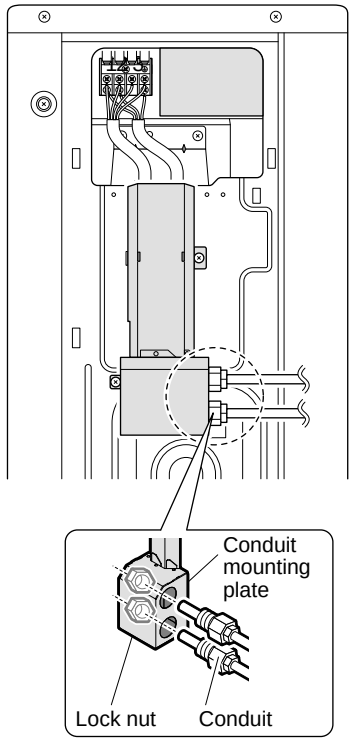
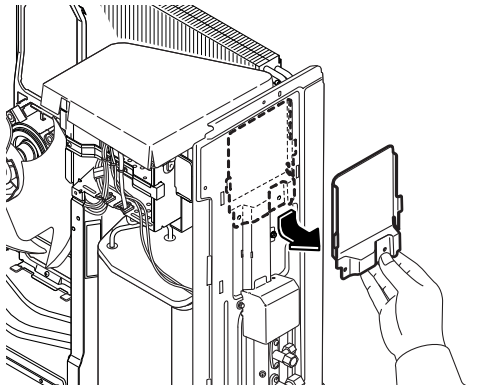
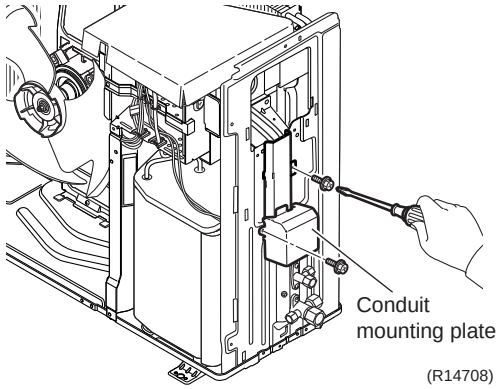
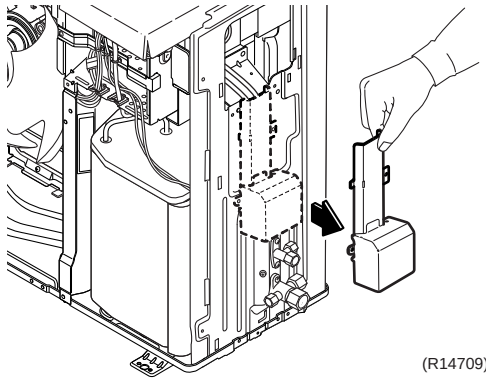


Step	Procedure		Points
9	Open the hook and release the fan motor lead wire.	 (R14296)	
10	Remove the 4 screws and remove the fan motor.	 (R14297)	

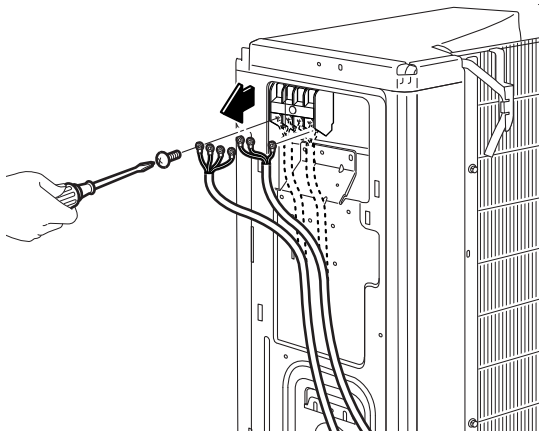
4.3 Removal of Electrical Box

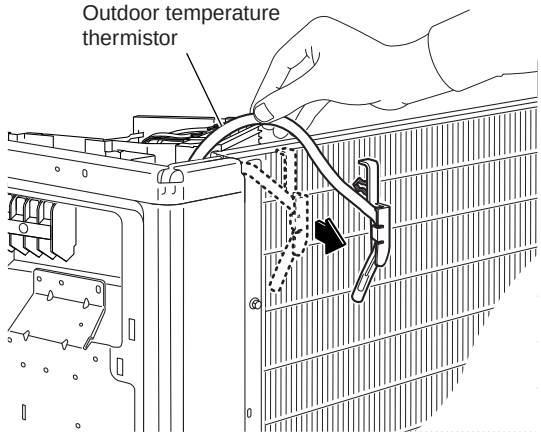
Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

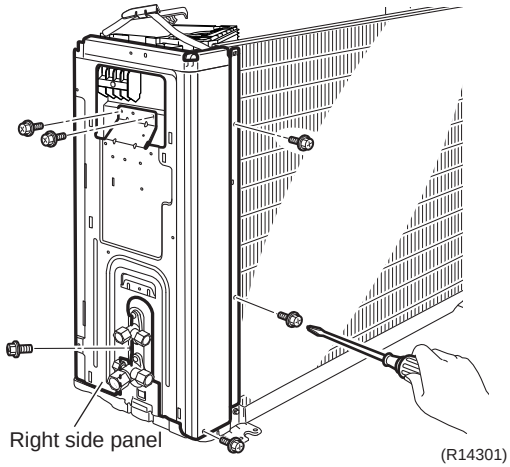
Step	Procedure		Points
1	Remove the 2 screws of the protection plate.	 (R14706)	■ When reassembling, pass the connecting wires through the conduit and secure them with a lock nut.  (R14734)
2	Remove the protection plate.	 (R14707)	
3	Remove the 2 screws of the conduit mounting plate.	 (R14708)	
4	Remove the conduit mounting plate.	 (R14709)	

Step	Procedure	Points
5	Remove the screws and remove the connecting wires.	
6	Pull out the outdoor temperature thermistor.	
7	Remove the 6 screws of the right side panel.	

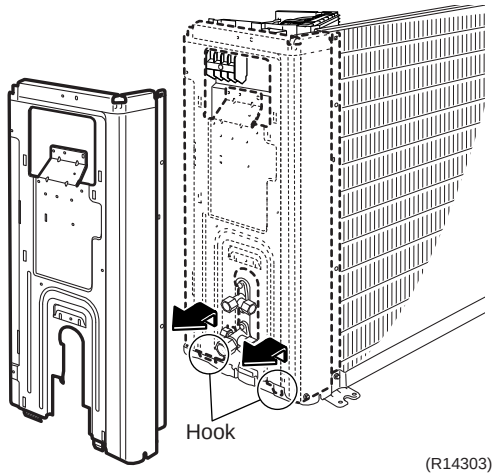
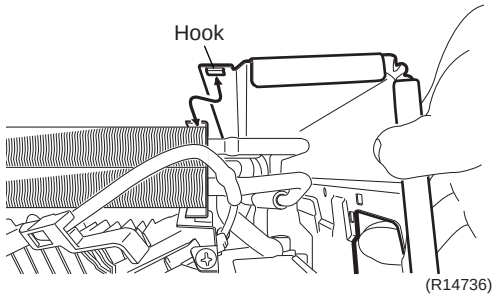
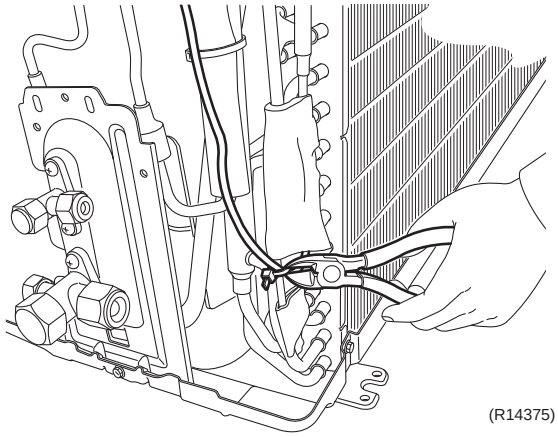
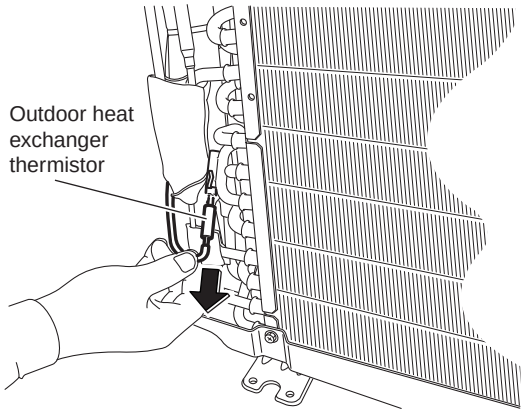

(R14299)

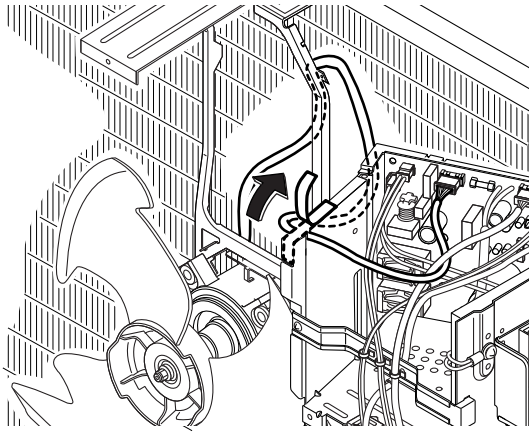
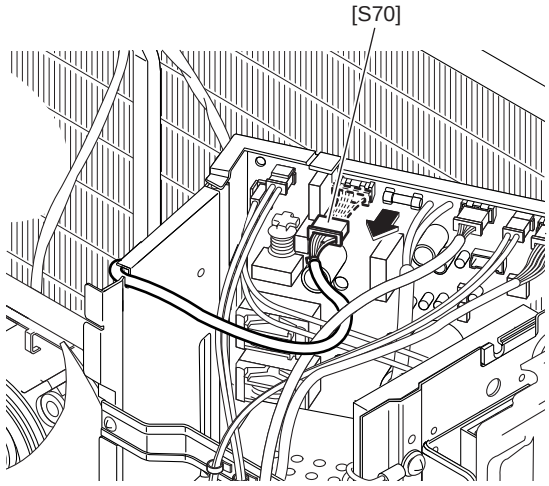
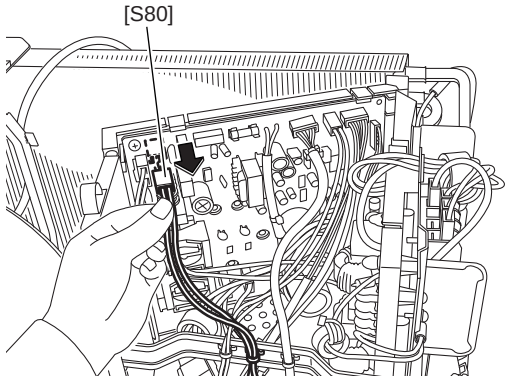


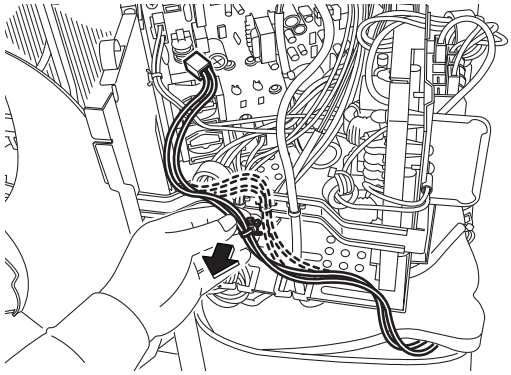
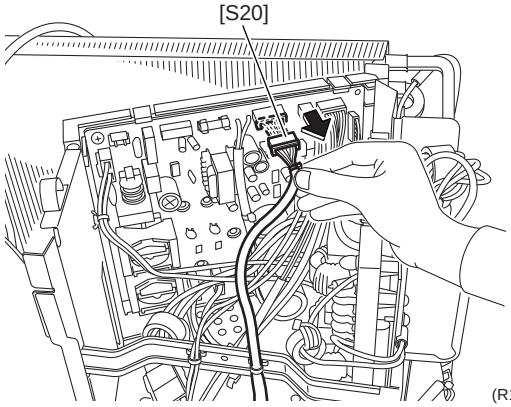
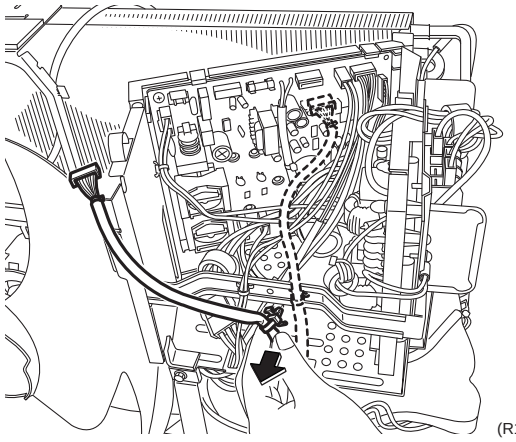
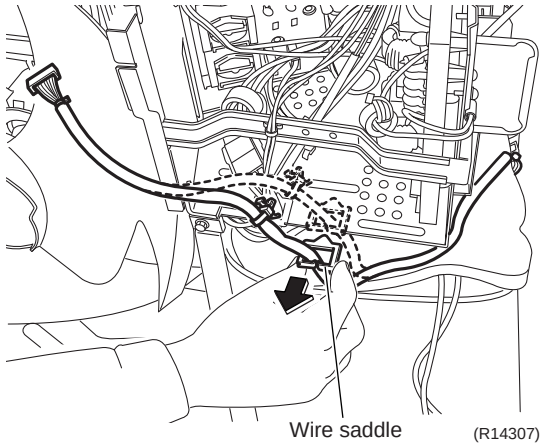
(R14300)

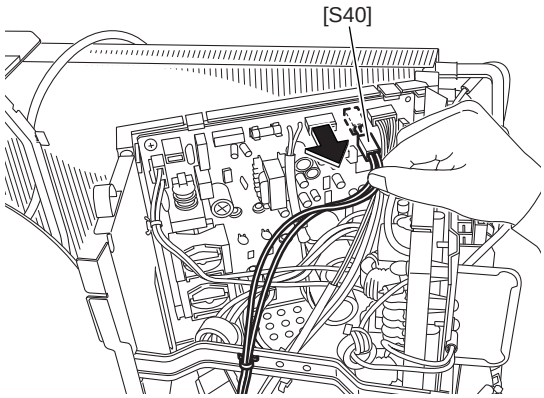
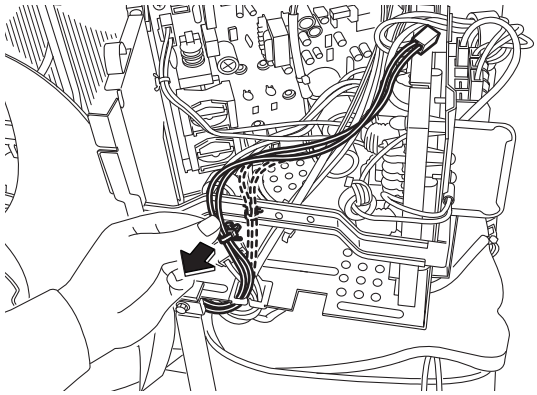
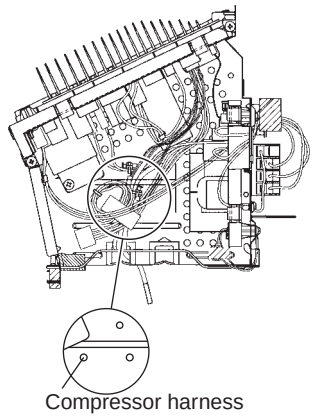
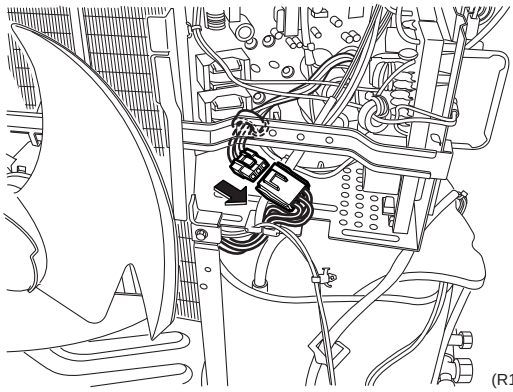
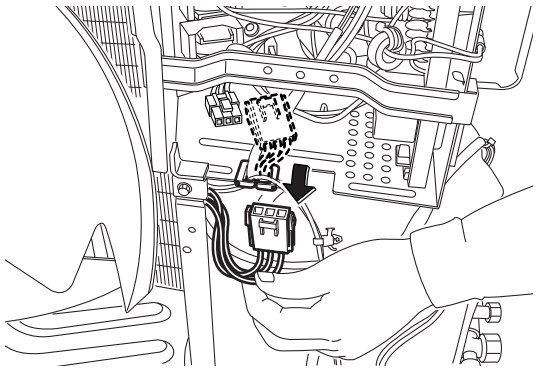


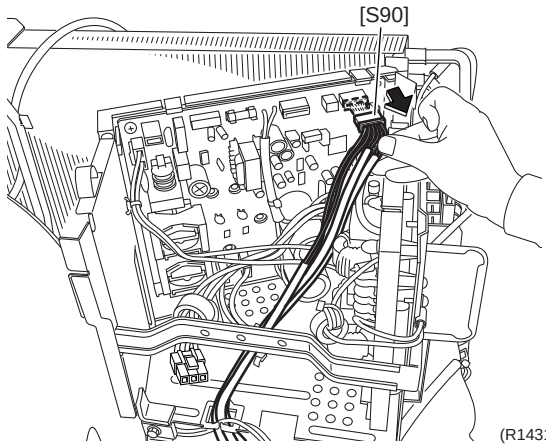
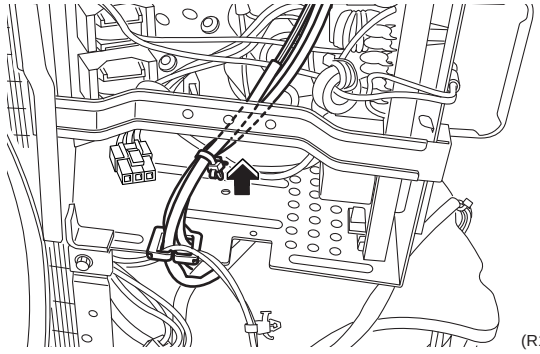
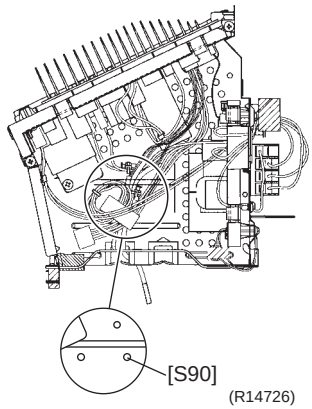
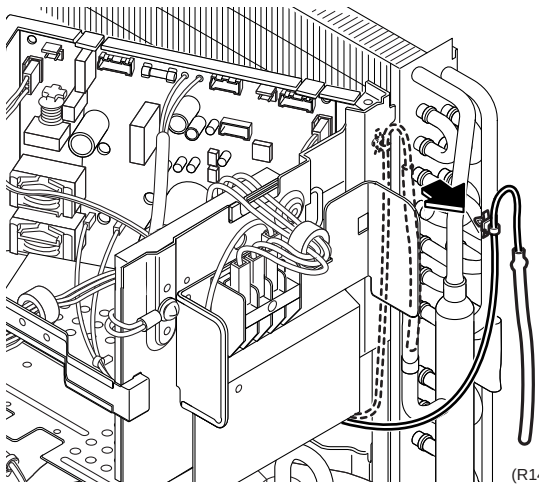
(R14301)

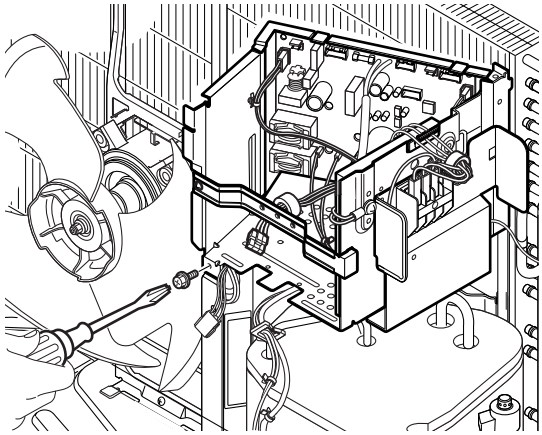
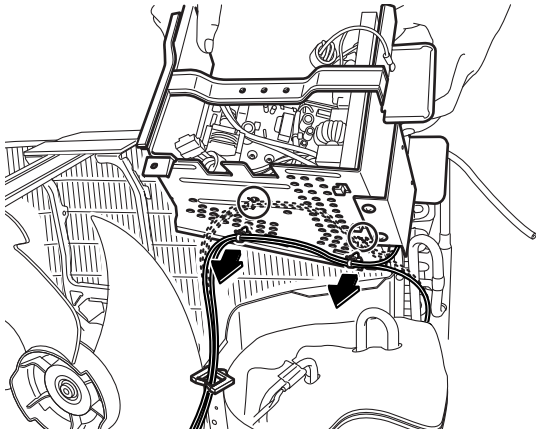
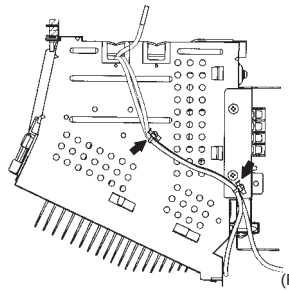
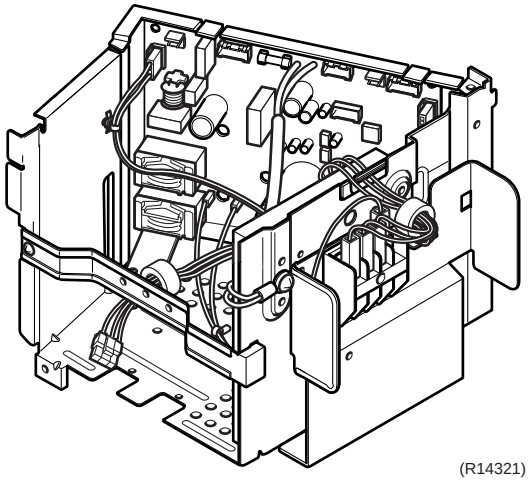
Step	Procedure		Points
8	Unfasten the 2 lower hooks and the 1 upper hook. Remove the right side panel.	 (R14303)  (R14736)	■ When reassembling, insert the 2 lower hooks and the 1 upper hook of the back.
9	Cut the clamp.	 (R14375)	
10	Pull out the outdoor heat exchanger thermistor.	 (R14376)	

Step	Procedure	Points
11	Peel off the filament tape.  (R14288)	
12	Disconnect the connector for the fan motor [S70].  (R14289)	
13	Disconnect the connector for the four-way valve coil [S80].  (R14308)	■ The cooling only models have no harness for [S80].

Step	Procedure	Points
14	Pull out the clamp.  (R14309)	
15	Disconnect the connector for the electronic expansion valve coil [S20].  (R14305)	
16	Pull out the clamp.  (R14306)	
17	Remove the wire saddle.  (R14307)	

Step	Procedure		Points
18	Disconnect the connector for the overload protector [S40].	 (R14310)	■ When reassembling, insert the clamps of harnesses as below.  (R14363) ■ When reassembling, connect the connectors in the following order. (1) [S40] (2) [S20] (3) [S80] (4) [S70]
19	Pull out the clamp.	 (R14311)	■ The compressor harness has a clamp. When reassembling, insert the clamp as below.  (R14725)
20	Disconnect the relay connector for the compressor.	 (R14312)	
21	Release the harness of the relay connector from the wire saddle.	 (R14313)	

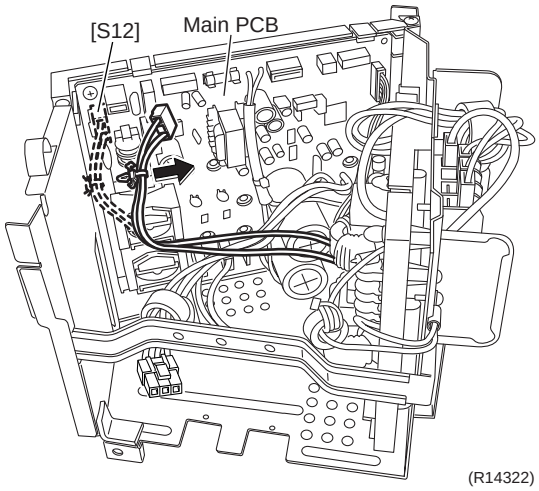
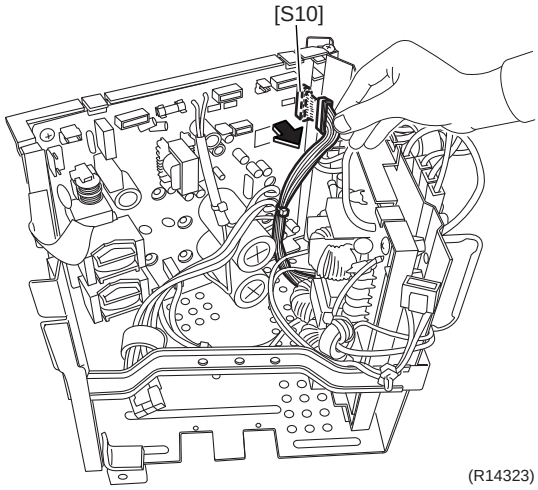
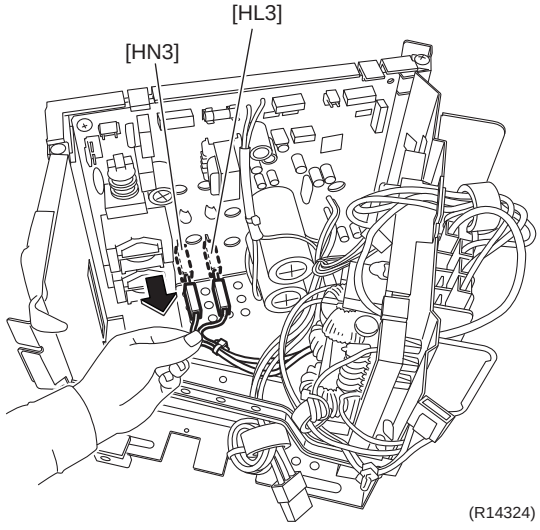
Step	Procedure	Points
22	Disconnect the connector for the thermistors [S90]. 	
23	Pull out the clamp. 	■ When reassembling, insert the clamp as below. 
24	Remove the wire saddle. 	
25	Pull out the clamp. 	

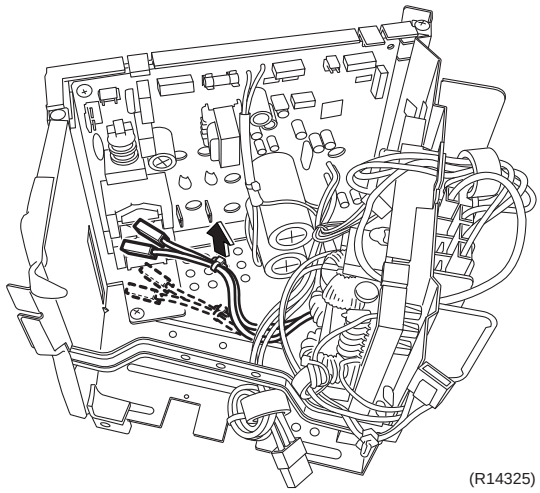
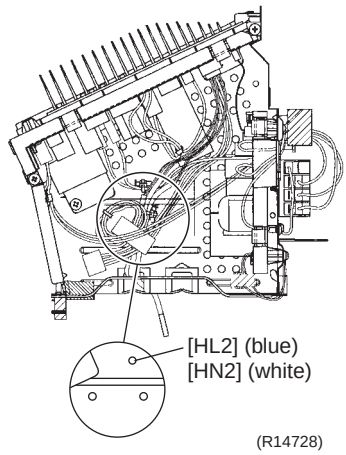
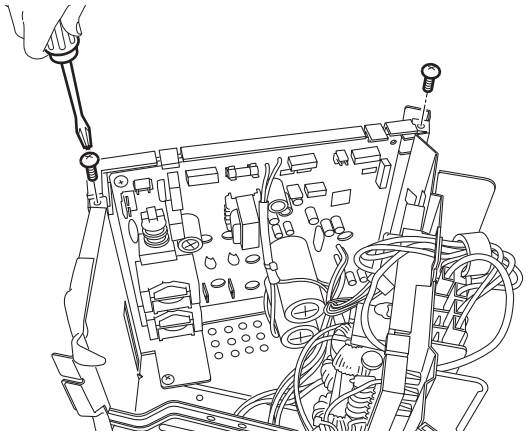
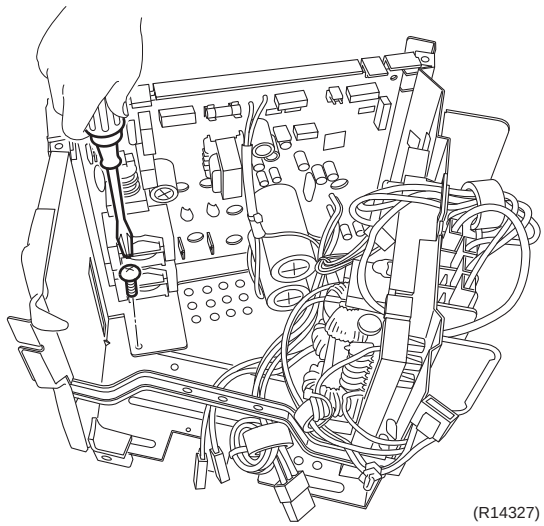
Step	Procedure	Points
26	Remove the screw.  (R14318)	
27	Pull out the 2 clamps at the bottom of the electrical box.  (R14320)	■ When reassembling, insert the 2 clamps of the thermistor assembly into the holes as below.  (R14727)
28	Remove the electrical box.  (R14321)	

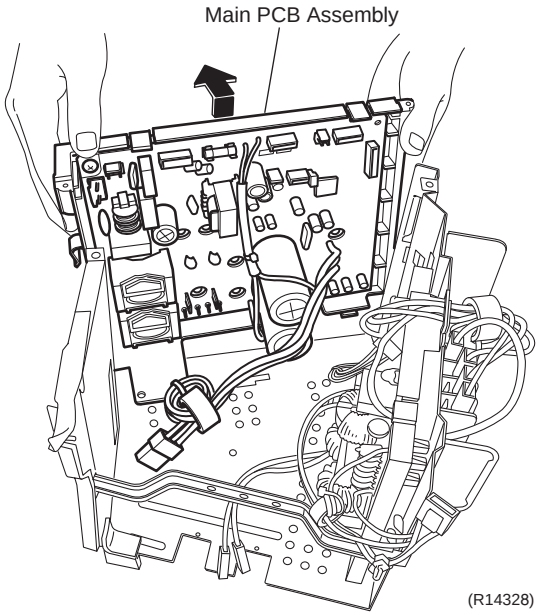
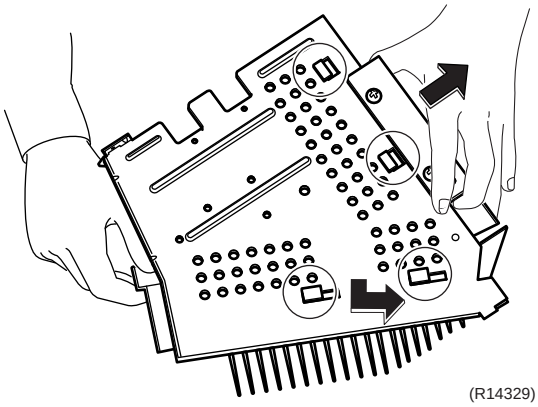
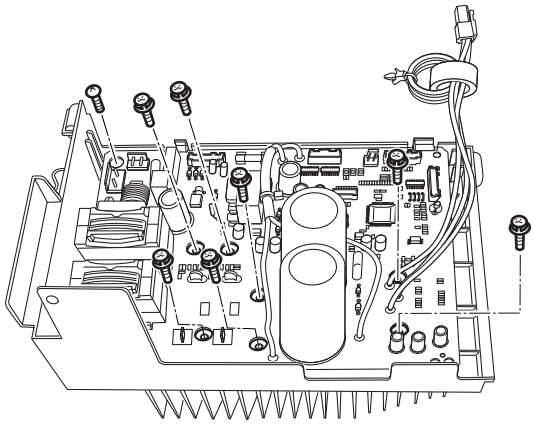
4.4 Removal of PCBs

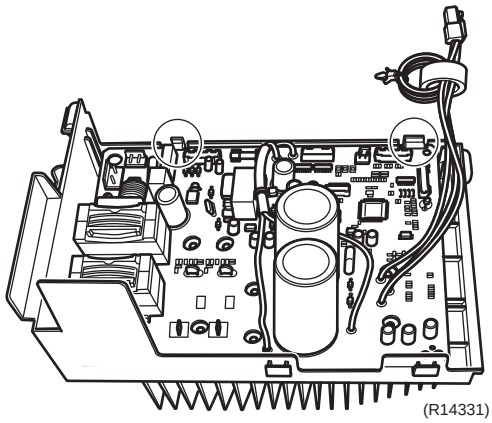
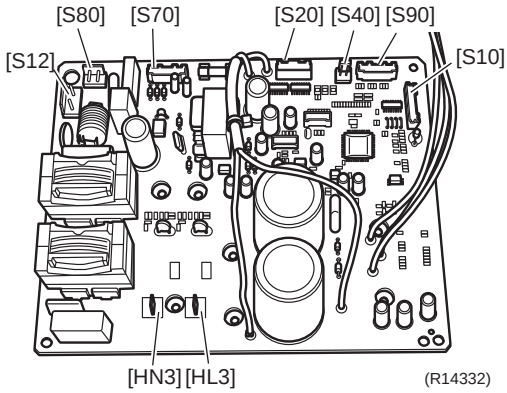
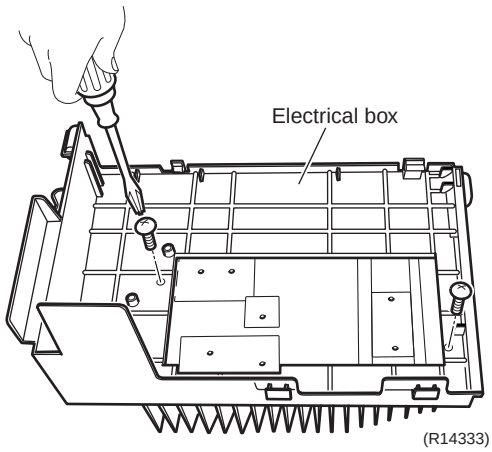
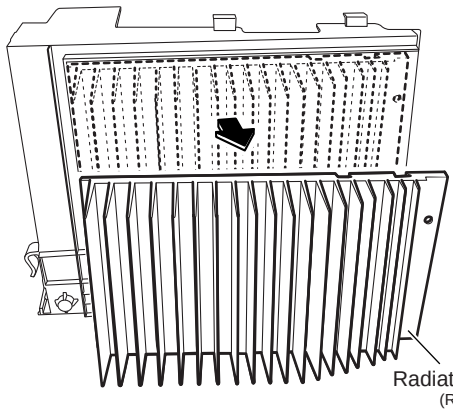
Procedure

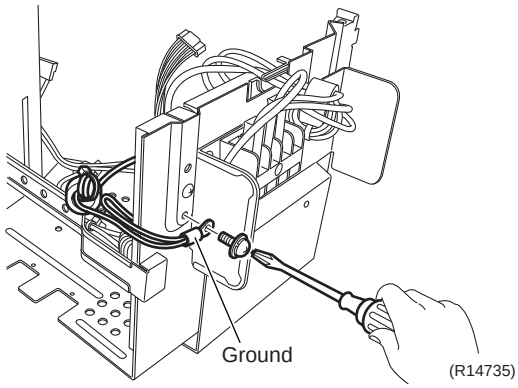
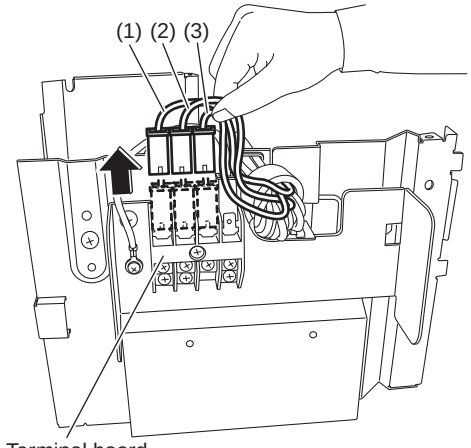
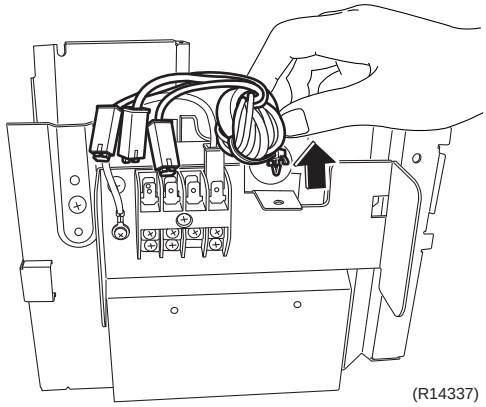
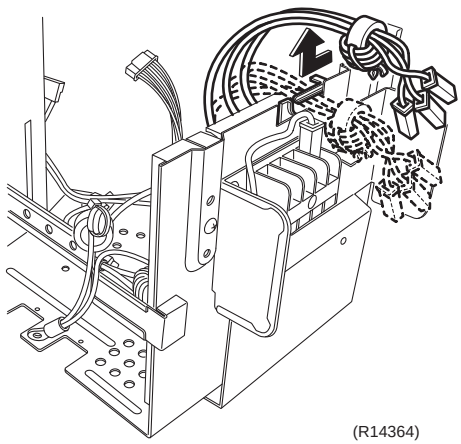
Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

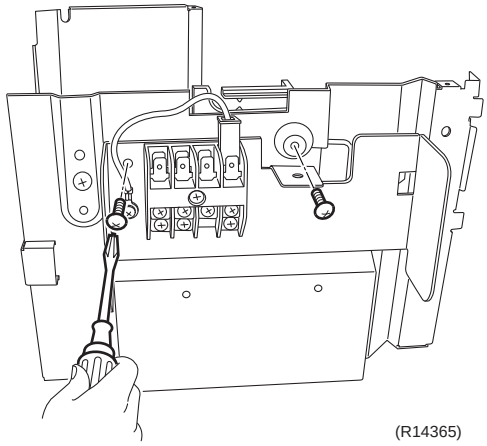
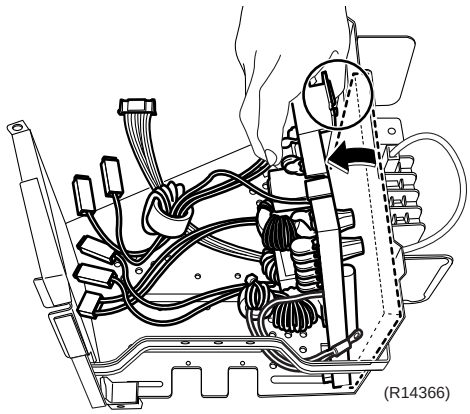
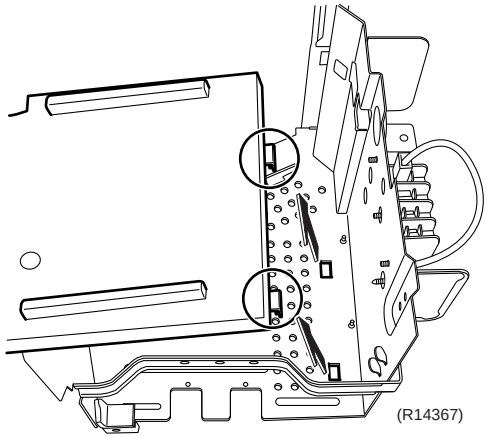
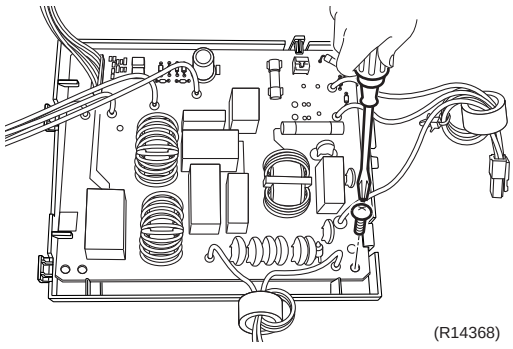
Step	Procedure		Points
1. Remove the main PCB.			[S12]: for [HL4] [HN4] on filter PCB
1	Disconnect the connector [S12] and pull out the clamp.		
2	Disconnect the connector [S10].		[S10]: for [S11] on filter PCB
3	Disconnect the connectors [HN3] [HL3].		[HL3] [HN3]: for [HL2] [HN2] on filter PCB

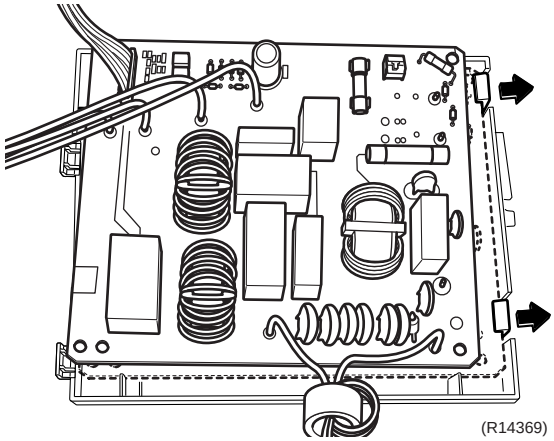
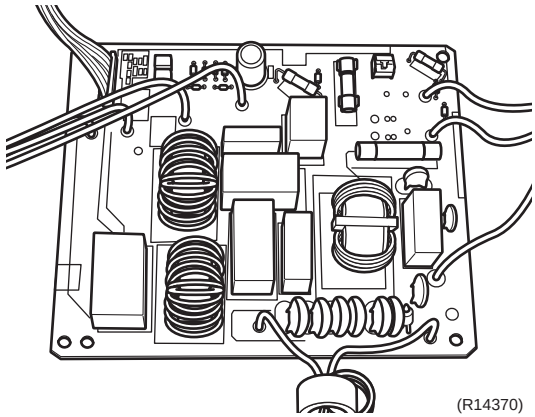
Step	Procedure		Points
4	Pull out the clamp.	 (R14325)	■ When reassembling, insert the clamp as below.  (R14728)
5	Remove the 2 upper screws.	 (R14326)	
6	Remove the 1 lower screw.	 (R14327)	

Step	Procedure		Points
7	Lift the main PCB assembly.	 (R14328)	
8	Unfasten the 4 hooks at the bottom.	 (R14329)	
9	Remove the 8 screws.	 (R14330)	

Step	Procedure		Points
10	Unfasten the 2 hooks.	 (R14331)	■ Refer to page 19 for detail.
11	Remove the main PCB.	 (R14332)	[S10]: filter PCB [S12]: filter PCB [S20]: electronic expansion valve coil [S40]: overload protector [S70]: fan motor [S80]: four-way valve coil [S90]: thermistors [HL3] [HN3]: filter PCB
2. Remove the radiation fin.			
1	Remove the 2 screws on the bottom of the electrical box.	 (R14333)	
2	Remove the radiation fin.	 (R14334)	

Step	Procedure	Points
3. Remove the filter PCB.		
1 Remove the ground screw.	 (R14735)	
2 Pull out the terminals from the terminal board.	 (R14336)	(1): black (2): white (3): red
3 Pull out the clamp.	 (R14337)	
4 Release the harnesses from the groove.	 (R14364)	

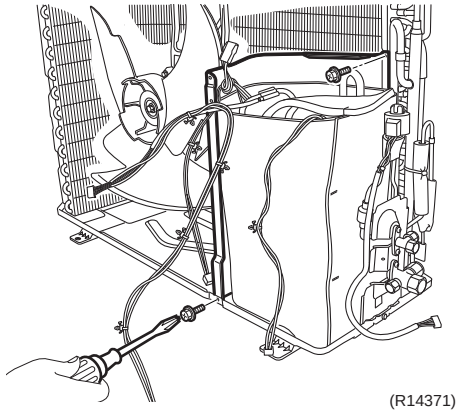
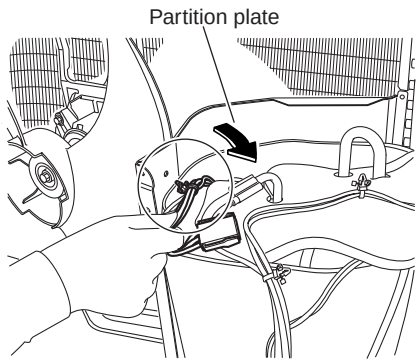
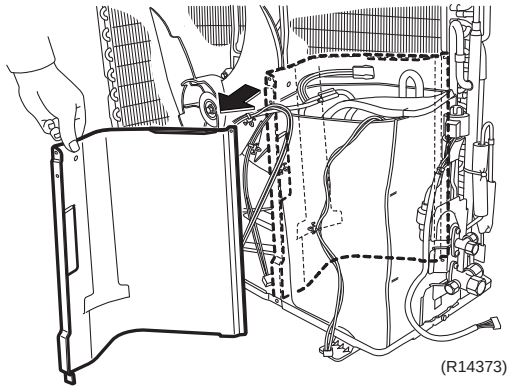
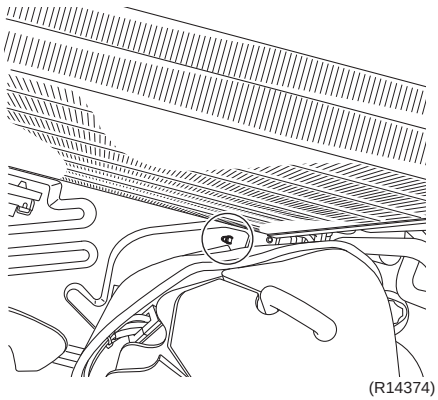
Step	Procedure	Points
5	Remove the 2 screws.  (R14365)	
6	Unfasten the 3 hooks of the filter PCB assembly.  (R14366)  (R14367)	
7	Remove the 1 screw.  (R14368)	

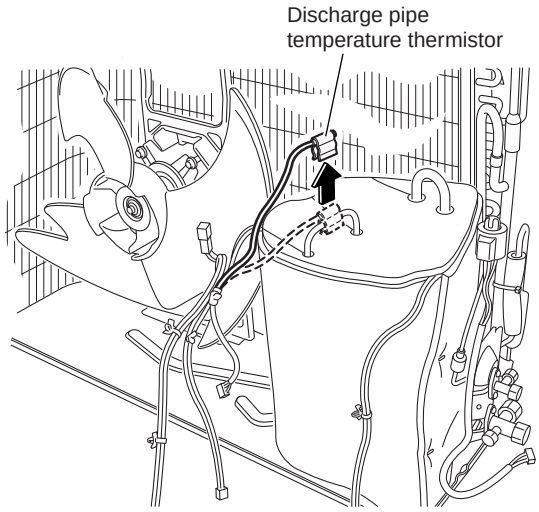
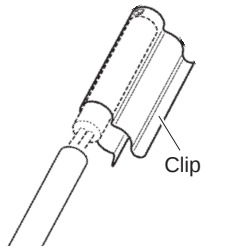
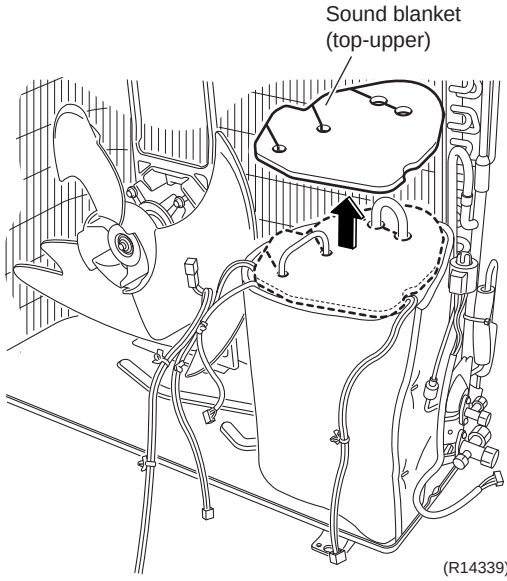
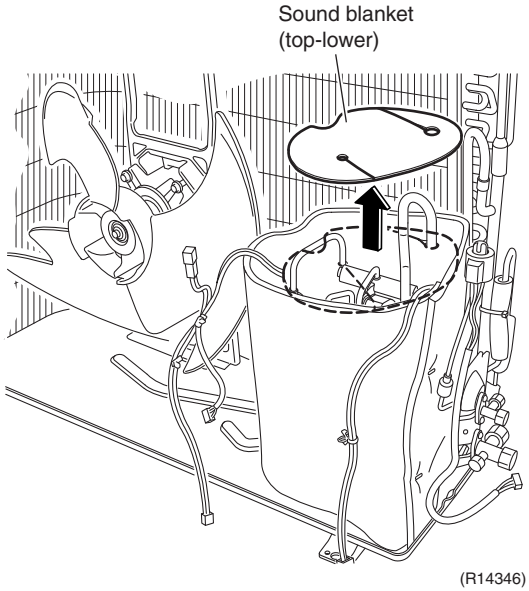
Step	Procedure		Points
8	Unfasten the 2 hooks.	 (R14369)	
9	Remove the filter PCB.	 (R14370)	■ Refer to page 19 for detail.

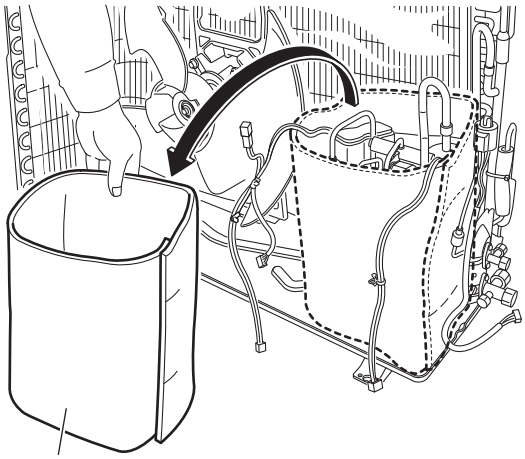
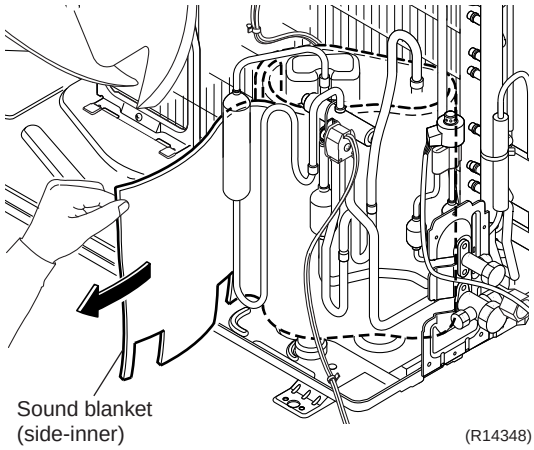
4.5 Removal of Sound Blankets

Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

Step	Procedure		Points
1. Remove the partition plate.		 (R14371)	
1	Remove the 2 screws.		
2	Pull out the clamp from the partition plate.	 (R14372)	
3	Remove the partition plate.	 (R14373)  (R14374)	■ When reassembling, insert the hook of bottom.

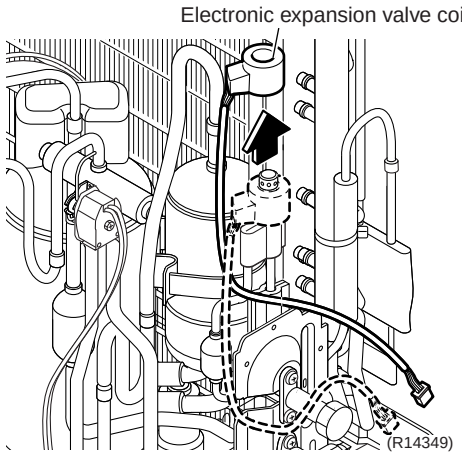
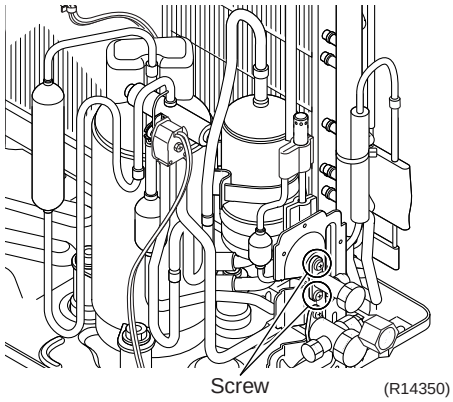
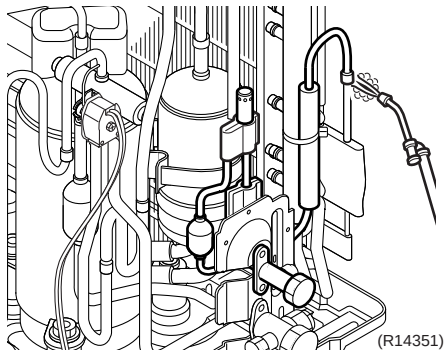
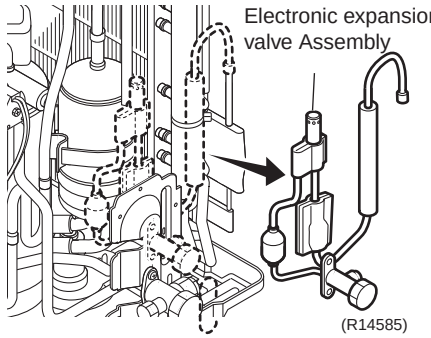
Step	Procedure	Points
2. Remove the sound blankets.	 (R14338)	■ Since the piping ports are torn easily, remove the sound blanket carefully. ■ Be careful not to lose the clip for the thermistor.  (R12287)
1 Release the discharge pipe temperature thermistor.		
2 Remove the sound blanket (top-upper).	 (R14339)	
3 Remove the sound blanket (top-lower).	 (R14346)	

Step	Procedure	Points
4	Remove the sound blanket (side-outer).  	
5	Remove the sound blanket (side-inner).  	

4.6 Removal of Electronic Expansion Valve Assembly

Procedure

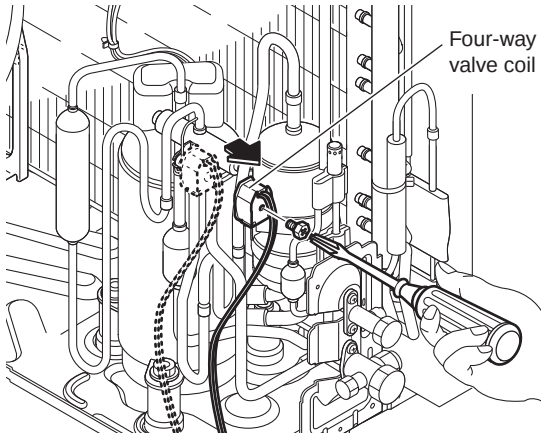
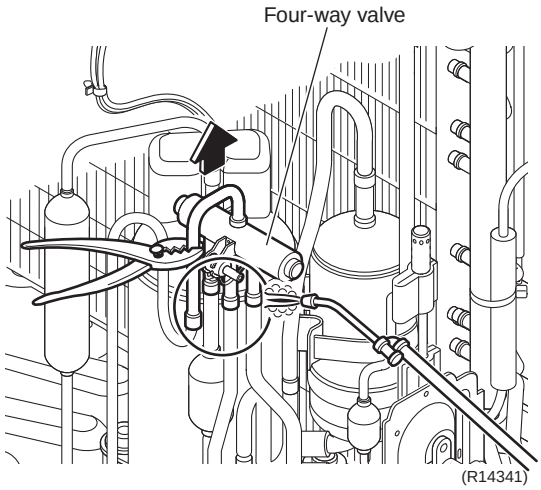
Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

Step	Procedure		Points
1	Pull out the electronic expansion valve coil.		**Caution** **Never remove the electronic expansion valve because it contains plastic parts. They may melt with heat and cause operation failure. Replace the whole assembly.**
2	Remove the 2 screws.		**Caution** **Do not directly heat the electronic expansion valve. Wrap the electronic expansion valve with a wet cloth and provide water so that the cloth does not dry. Keep below 120°C (248°F).**
■ Before working, make sure that the refrigerant gas is empty in the circuit. ■ Be sure to apply nitrogen replacement when heating up the brazed part.			**Warning** **Be careful not to burn yourself burnt with pipes and other parts that are heated by the gas brazing machine.**
3	Heat up the brazed part.		**Warning** **If the refrigerant gas leaks during work, ventilate the room. If the refrigerant gas is exposed to flames, toxic gas may be generated.**
4	Remove the electronic expansion valve assembly.		**Caution** **For global environment protection, do not discharge the refrigerant gas in the atmosphere. Make sure to collect all the refrigerant gas.**

4.7 Removal of Four-Way Valve Removal of Four Way Valve

Procedure

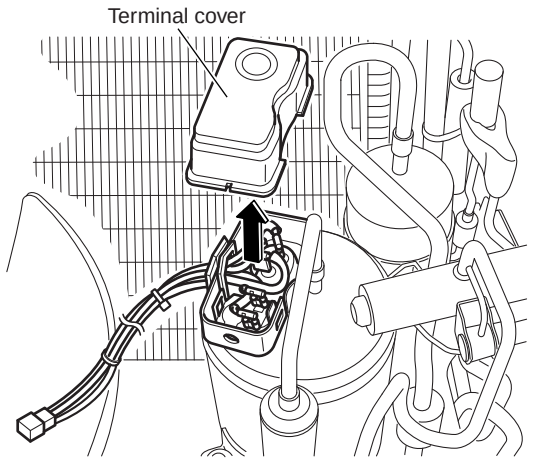
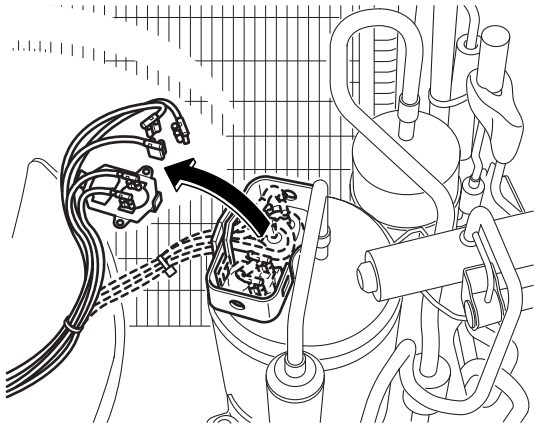
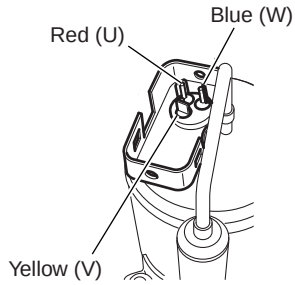
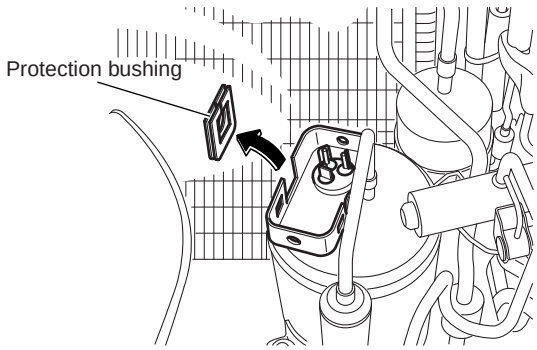
Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

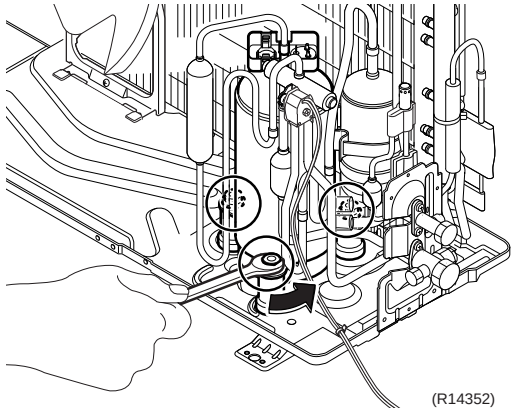
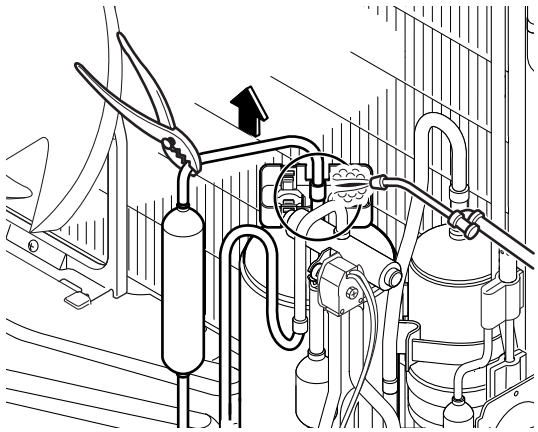
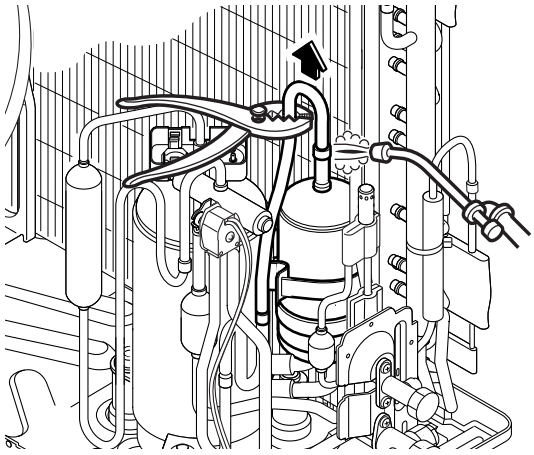
Step	Procedure		Points
1	Remove the screw and remove the four-way valve coil. ■ The cooling only model has no four-way valve coil.	 (R14340)	**Warning** **Be careful not to burn yourself with the pipes and other parts that are heated by the gas brazing machine.** **Warning** **If the refrigerant gas leaks during work, ventilate the room. If the refrigerant gas is exposed to flames, toxic gas may be generated.** **Caution** **In consideration of global environment protection, do not discharge the refrigerant gas in the atmosphere. Make sure to collect all the refrigerant gas.** **Cautions for restoration** 1. Restore the piping by non-oxidation brazing. 2. It is required to prevent the carbonization of the oil inside the four-way valve and the deterioration of the gaskets affected by heat. Keep temperature below 120°C (248°F).Wrap the four way valve with wet cloth and provide water so that the cloth does not dry. **Note:** ■ Do not use a metal saw for cutting pipes or sawdust will enter the circuit. ■ When withdrawing the pipes, be careful not to pinch them firmly with pliers to avoid deforming them. ■ Provide a protective sheet or a steel plate so that the brazing flame cannot influence peripheries.
	■ Before working, make sure that the refrigerant gas is empty in the circuit. ■ Be sure to apply nitrogen replacement when heating up the brazed part.		
2	Heat up the brazed parts of the four-way valve and disconnect.	 (R14341)	

4.8 Removal of Compressor

Procedure

Warning **Be sure to wait for 10 minutes or more after turning off all power supplies before disassembling work.**

Step	Procedure		Points
1	Remove the terminal cover.	 (R14343)	
2	Disconnect the compressor lead wires and the overload protector.	 (R14344)	 (R14377)
3	Remove the protection bushing.	 (R14345)	

Step	Procedure	Points
4	Remove the 3 nuts of the compressor.	**Cautions for restoration** 1. Restore the piping by non-oxidation brazing. 2. It is required to prevent carbonization of the oil inside the four-way valve and deterioration of the gaskets affected by heat (keep below 120°C/248°F) so wrap the four-way valve with a wet cloth and provide water to prevent it from drying out.s **In case of difficulty with gas brazing machine** 1. Disconnect the brazed part where is easy to disconnect and restore. 2. Cut pipes on the main unit with a tube cutter in order to make it easy to disconnect. **Note:** ■ Do not use a metal saw for cutting pipes or sawdust will enter the circuit. ■ When withdrawing the pipes, be careful not to pinch them too firmly with the pliers or it may deform the pipes. ■ Provide a protective sheet or a steel plate so that the brazing flame cannot influence peripheries. ■ Be careful not to burn the compressor terminals, the name plate, or the heat exchanger fin.
■ Before working, make sure that the refrigerant gas is empty in the circuit. ■ Be sure to apply nitrogen replacement when heating up the brazed part.	 (R14352)	
5 Heat up the brazed part of the discharge side and disconnect. 6 Heat up the brazed part of the suction side and disconnect. 7 Lift the compressor up and remove it.	 (R14353)	
Warning **Be careful not to burn yourself with the pipes and other parts that are heated by the gas brazing machine.** **Warning** **If the refrigerant gas leaks during work, ventilate the room. If the When refrigerant gas is exposed to flames, toxic gas may be generated.** **Warning** **The refrigerant oil in the compressor could catch fire, so prepare a wet cloth to extinguish fire immediately.** **Caution** **In consideration of global environment protection, do not discharge the refrigerant gas in the atmosphere. Make sure to collect all the refrigerant gas.**	 (R14354)	

Part 8
Trial Operation and Field Settings

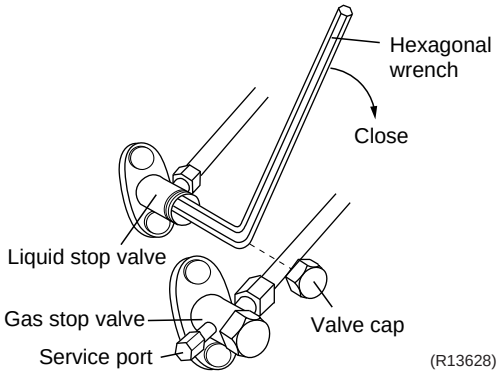
1. Pump Down Operation

Outline

In order to protect the environment, be sure to conduct pump down operation when relocating or disposing the unit.

Detail

1) Remove the valve caps from the liquid stop valve and the gas stop valve.
2) Carry out forced cooling operation.
3) After 5 to 10 minutes, close the liquid stop valve with a hexagonal wrench.
4) After 2 to 3 minutes, close the gas stop valve and stop the forced cooling operation.

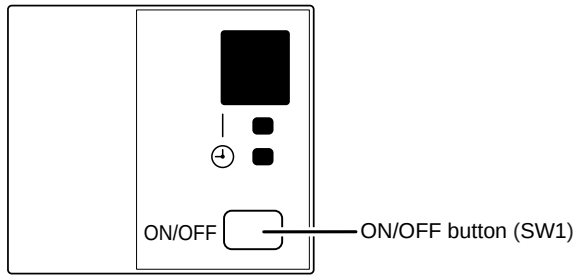


Refer to page 222 for forced cooling operation.

2. Forced Cooling Operation

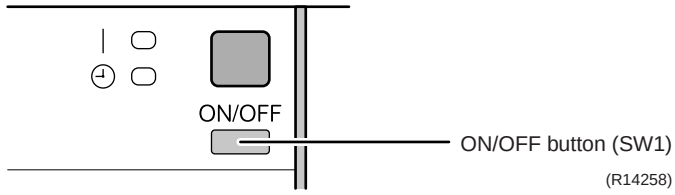
Item	Forced Cooling
Conditions	The forced cooling operation is allowed when both the following conditions are met. 1) The outdoor unit is not abnormal and not in the 3-minute standby mode. 2) The outdoor unit is not operating.
Start	The forced cooling operation starts when any of the following conditions is fulfilled. 1) Press the forced cooling operation ON/OFF button (SW1) on the indoor unit for 5 seconds. 2) Press the forced cooling operation ON/OFF switch (SW1) on the outdoor unit. (15/18/24 class only)
Command frequency	58 Hz: 09/12 class 30 Hz: 15/18/24 class
End	The forced cooling operation ends when any of the following conditions is fulfilled. 1) The operation ends automatically after 15 minutes. 2) Press the forced cooling operation ON/OFF button (SW1) on the indoor unit again. 3) Press the ON/OFF button on the remote controller. 4) Press the forced cooling operation ON/OFF switch (SW1) on the outdoor unit.
Others	The protection functions are prior to all others in the forced cooling operation.

Indoor Unit (09/12 class)



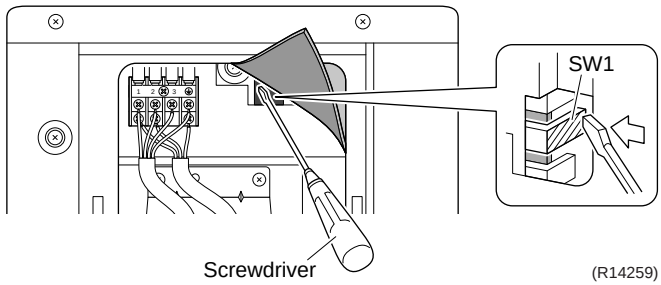
(R14578)

Indoor Unit (15/18/24 class)



(R14258)

Outdoor Unit (15/18/24 class only)



(R14259)

3. Trial Operation

Outline

1. Measure the supply voltage and make sure that it falls in the specified range.
2. Trial operation should be carried out in either cooling or heating mode.
3. Carry out the trial operation in accordance with the operation manual to ensure that all functions and parts, such as louver movement, are working properly.

- The air conditioner requires a small amount of power in its standby mode. If the system is not to be used for some time after installation, shut off the circuit breaker to eliminate unnecessary power consumption.
- If the circuit breaker trips to shut off the power to the air conditioner, the system backs up the operation mode. The system then restarts operation with the previous mode when the circuit breaker is restored.

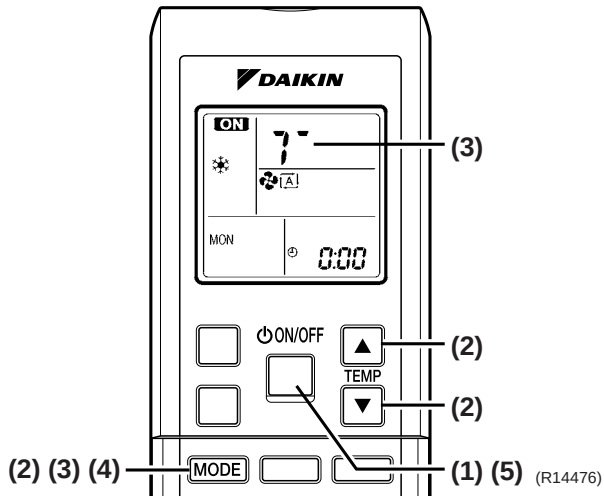
In cooling mode, select the lowest programmable temperature; in heating mode, select the highest programmable temperature.

- Trial operation may be disabled in either mode depending on the room temperature.
- After trial operation is complete, set the temperature to a normal level.
  (26 ~ 28°C (78.8 ~ 82.4°F) in cooling mode, 20 ~ 24°C (68 ~ 75.2°F) in heating mode)
- For protection, the system does not start for 3 minutes after it is turned off.

Detail

ARC452 Series

(1) Press the ON/OFF button to turn on the system.
(2) Press the both of TEMP buttons and the MODE button at the same time.
(3) Press the MODE button twice.
(T appears on the display to indicate that trial operation is selected.)
(4) Press the MODE button and select operation mode.
(5) Trial operation terminates in approx. 30 minutes and switches into normal mode. To quit a trial operation, press the ON/OFF button.

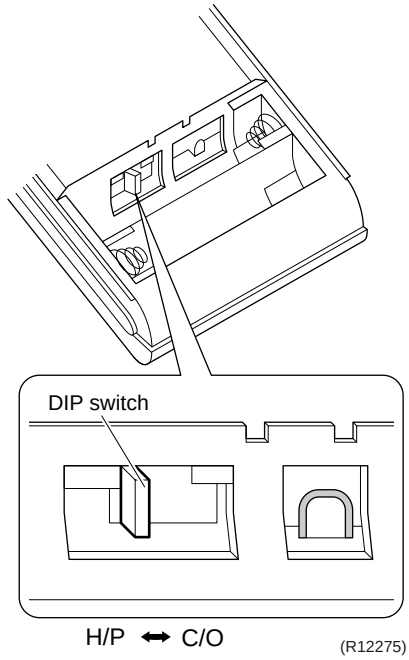


4. Field Settings

4.1 Model Type Setting

ARC452A19, 20

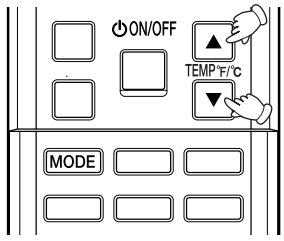
- This remote controller is common to the heat pump model and cooling only model. Use the DIP switch on the remote controller to set the heat pump model or cooling only model.
- Make the setting as shown in the illustration. (The factory set is the heat pump side.)
  - Heat pump model: Set the DIP switch to H/P.
  - Cooling only model: Set the DIP switch to C/O.



(R12275)

4.2 Temperature Display Switch

- You can select Fahrenheit or Celsius for temperature display.
- Press the TEMP▲ and ▼ buttons simultaneously for 5 seconds to change the unit of temperature display.



(R14477)

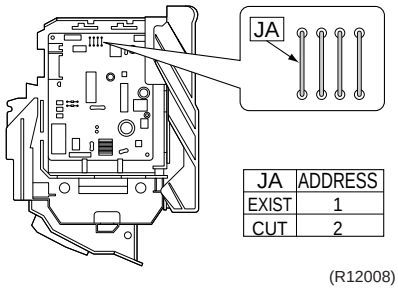
4.3 When 2 Units are Installed in 1 Room

When 2 indoor units are installed in 1 room, 1 of the 2 pairs of indoor unit and wireless remote controller can be set for different addresses.
Both the indoor unit PCB and the wireless remote controller need alteration.

Indoor Unit PCB

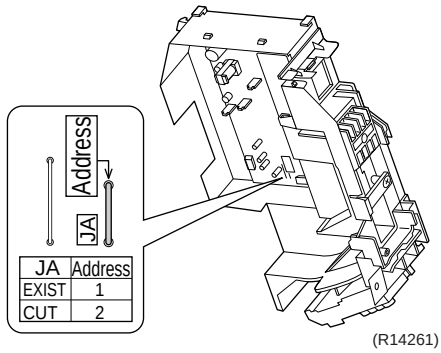
- Cut the address setting jumper JA on the control PCB.

09/12 class



(R12008)

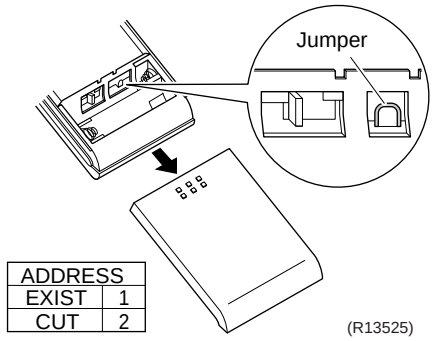
15/18/24 class



(R14261)

Wireless Remote Controller

- Cut the address setting jumper.



(R13525)

4.4 Facility Setting Switch (cooling at low outdoor temperature)

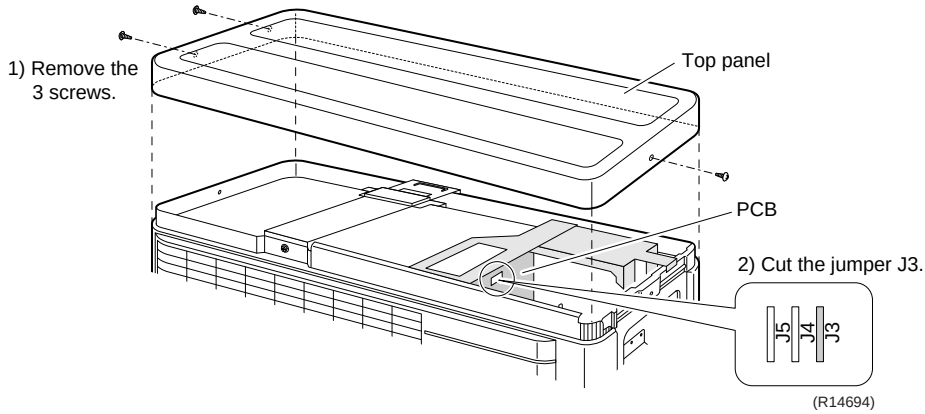
Outline

This function is limited only for facilities with air conditioning targeted toward equipment. Never use it in a residence or office where the space is occupied by people.

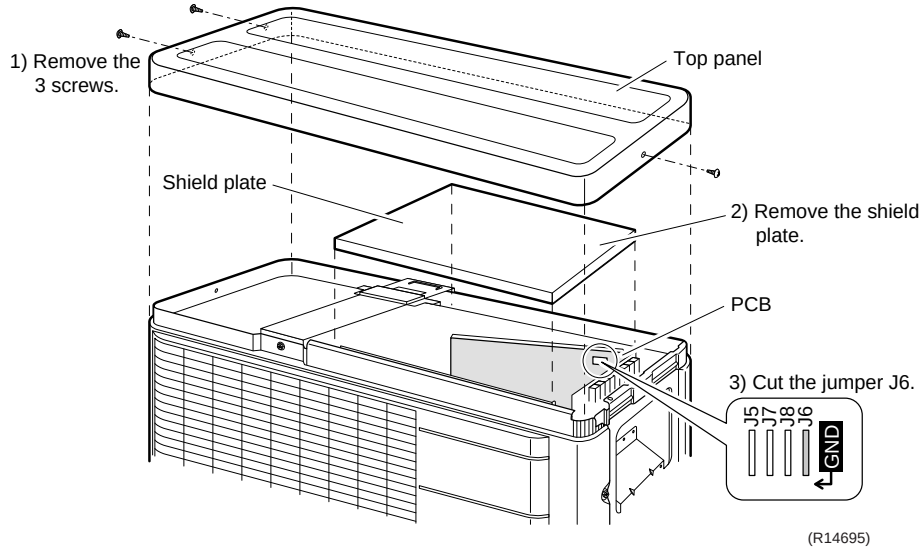
Detail

- You can expand the cooling operation range from 10°C (50°F: normal operation) to –15°C (5°F: cooling at low outdoor temperature setting) by turning on the switch (SW4-B) on the outdoor unit PCB.
- When the target fan speed determined by the control to maintain pressure difference remains under 150 ~ 250 rpm (depending on the model) for about 30 seconds, the fan is turned off to maintain the pressure difference. When the pressure difference returns to high again, the fan starts to rotate again.

09/12 class



15/18/24 class



Caution

1. If the outdoor unit is installed where the outdoor heat exchanger of the unit is exposed to direct wind, provide a windbreak wall.
2. Intermittent noises may be produced by the indoor unit due to the outdoor fan turning on and off when using facility settings.
3. Do not place humidifiers or other items which might raise the humidity in rooms where facility settings are being used.
   A humidifier might cause condensate to drip or blow from the indoor unit outlet vent.
4. Cutting jumper sets the indoor fan tap to the highest position.

4.5 Jumper Settings

Jumper	Function	When connected (factory set)	When cut
JB (on indoor unit PCB)	Fan speed setting when compressor stops for thermostat OFF. (effective only at cooling operation)	Fan speed setting; Remote controller setting	Fan rpm is set to “0” <Fan stop>
JC (on indoor unit PCB)	Power failure recovery function	Auto-restart	The unit does not resume operation after recovering from a power failure. Timer ON/OFF settings are cleared.

For the location of the jumper, refer to the following pages.
Indoor unit; page 13, 15
Outdoor unit; page 17, 19

5. Application of Silicon Grease to a Power Transistor and a Diode Bridge

Applicable Models

All outdoor units using inverter type compressor for room air conditioner.

When the printed circuit board (PCB) of an outdoor unit is replaced, it is required that silicon grease (*1) is certainly applied to the heat radiation part (the contact point to the radiation fin) of the power transistor and diode bridge.

*1: Parts number of the silicon grease – 1172698 (Drawing number 3FB03758-1)

Details

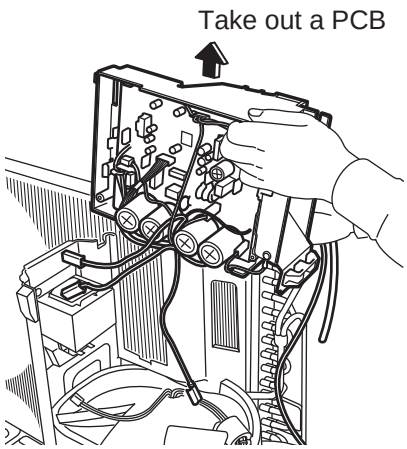
The silicon grease is an essential article for encouraging the heat radiation of the power transistor and the diode bridge. Applying the paste should be implemented in accordance with the following instruction.

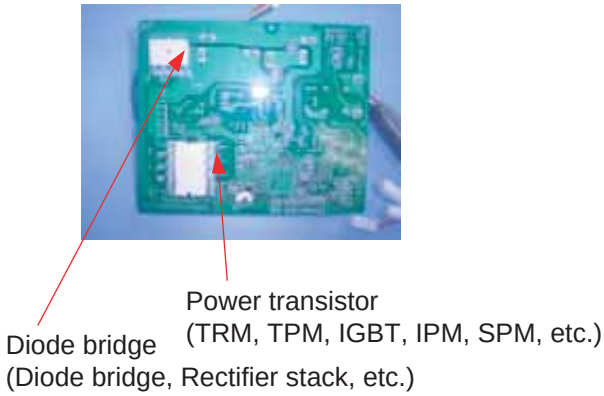
NOTE: There is the possibility of failure with smoke in case of bad heat radiation.

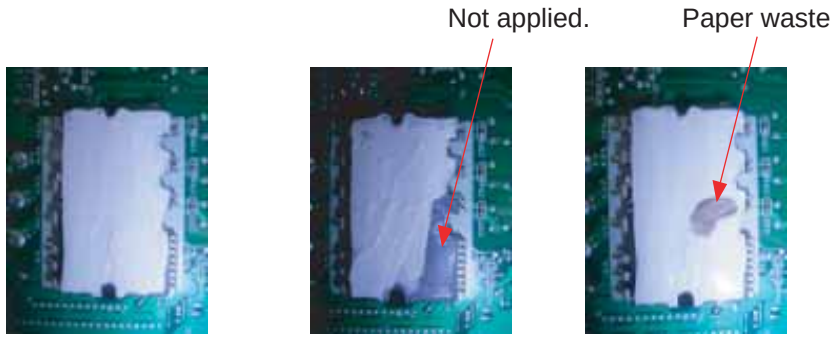
- Wipe off the old silicon grease completely on a radiation fin.
- Apply the silicon grease evenly to the whole.
- Do not leave any foreign object such as solder or paper waste between the power transistor and the radiation fin, and also the diode bridge, and the radiation fin.
- Tighten the screws of the power transistor and the diode bridge, and contact to the radiation fin without any gap.

<Example>

The shape of electrical box and PCB vary depending on the model.







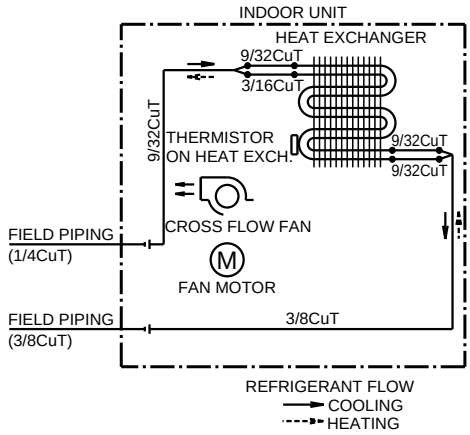
(R9056)

Part 9
Appendix

1. Piping Diagrams

1.1 Indoor unit

FTXN09/12KEVJU



4D066211A

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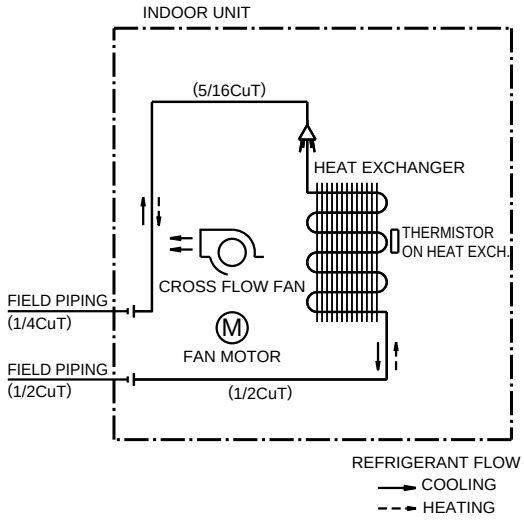
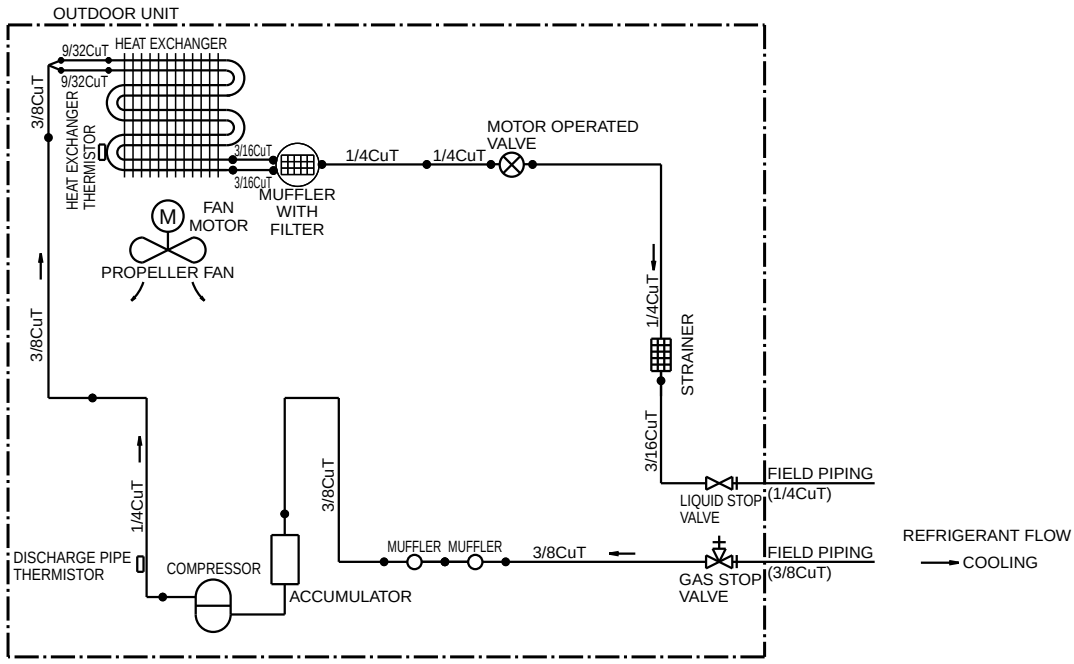


4D071084

1.2 Outdoor Unit

RKN09/12KEVJU



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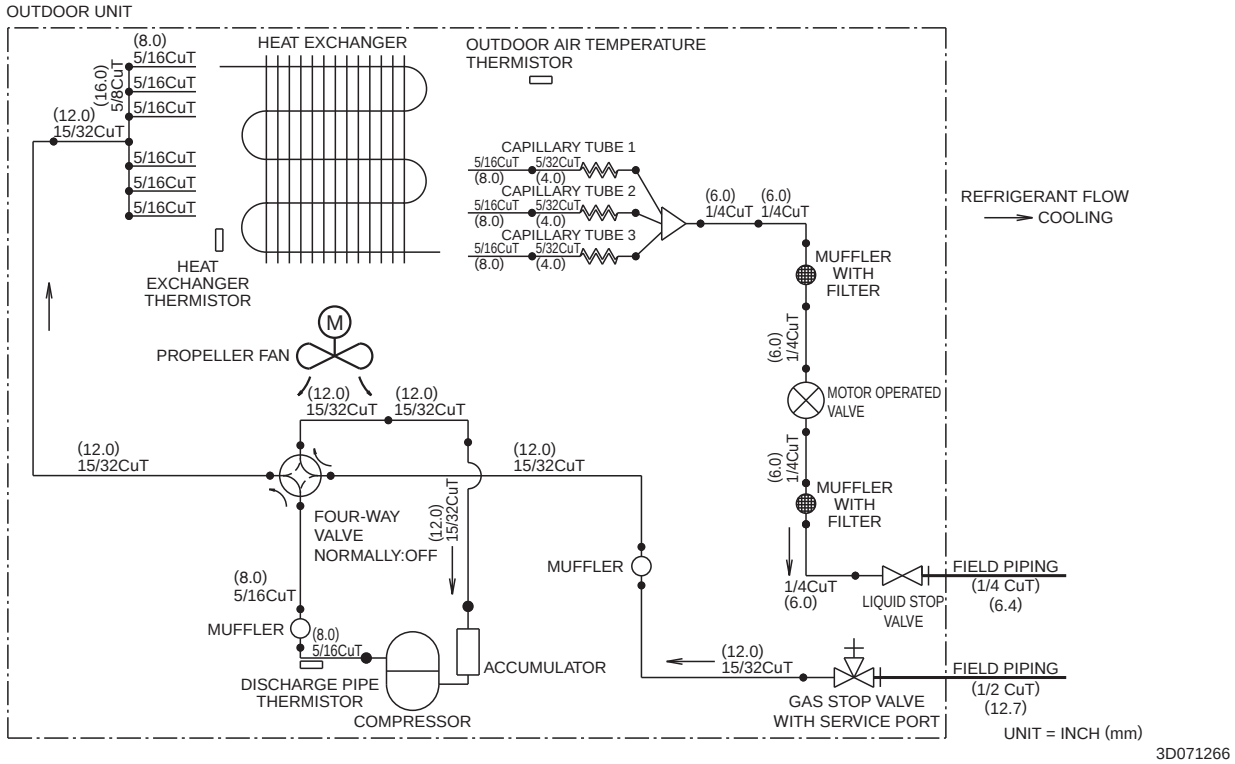
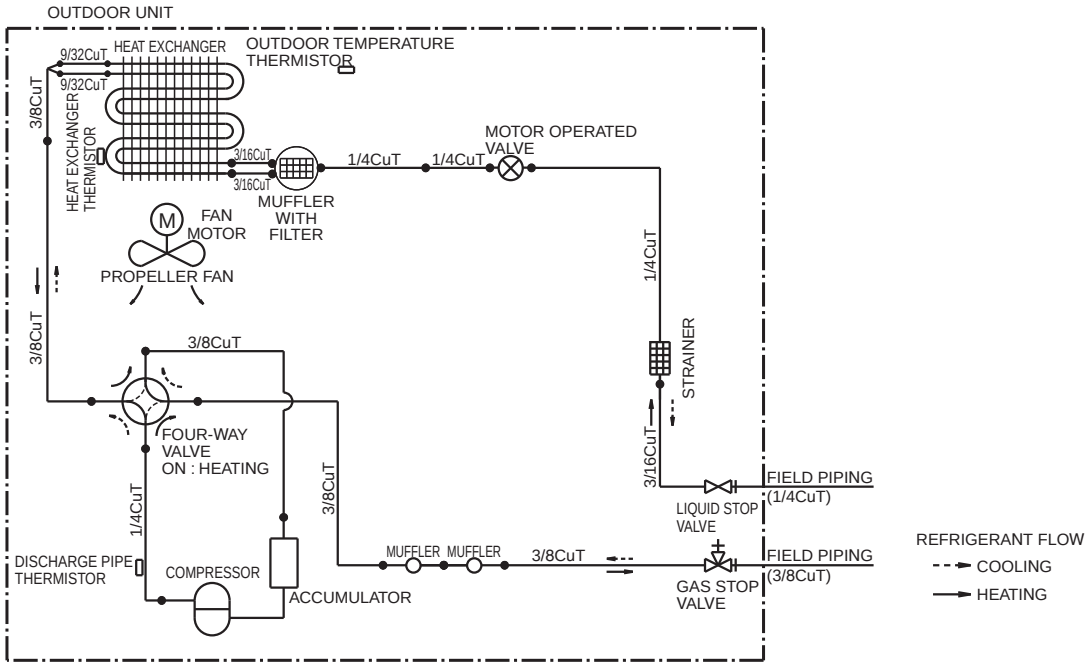
RKN15/18/24KEVJU



3D071266

RXN09/12KEVJU



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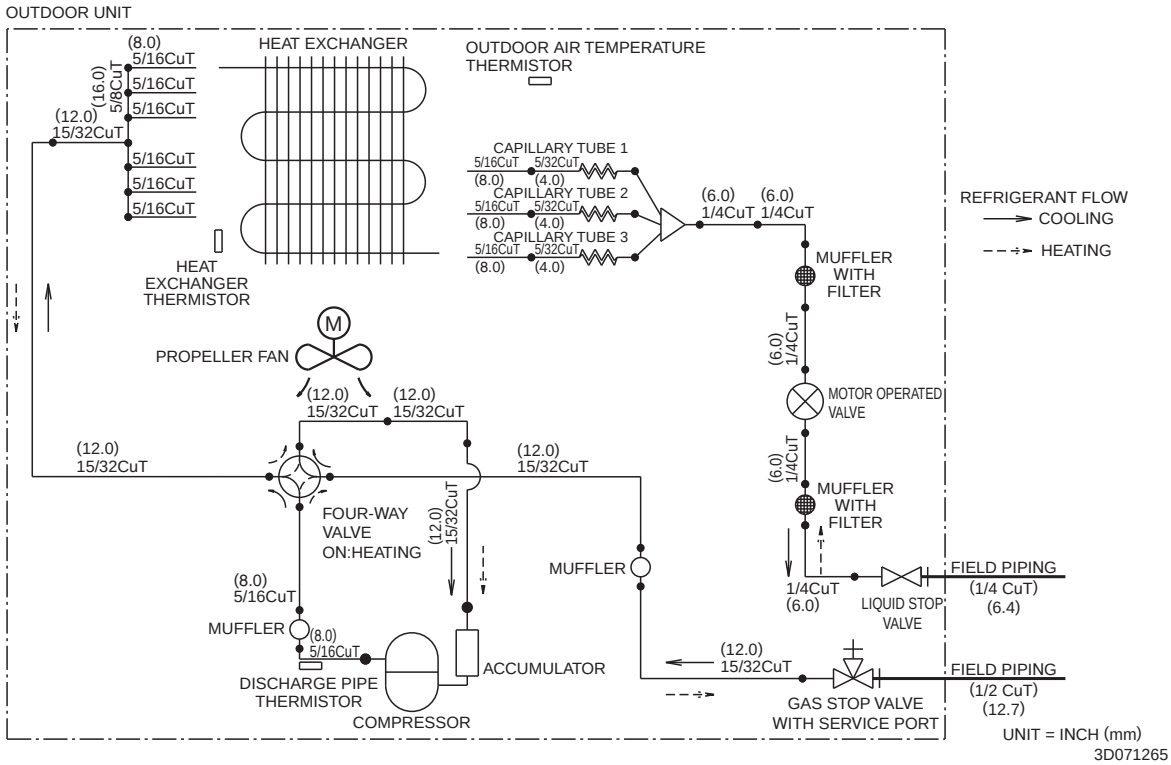
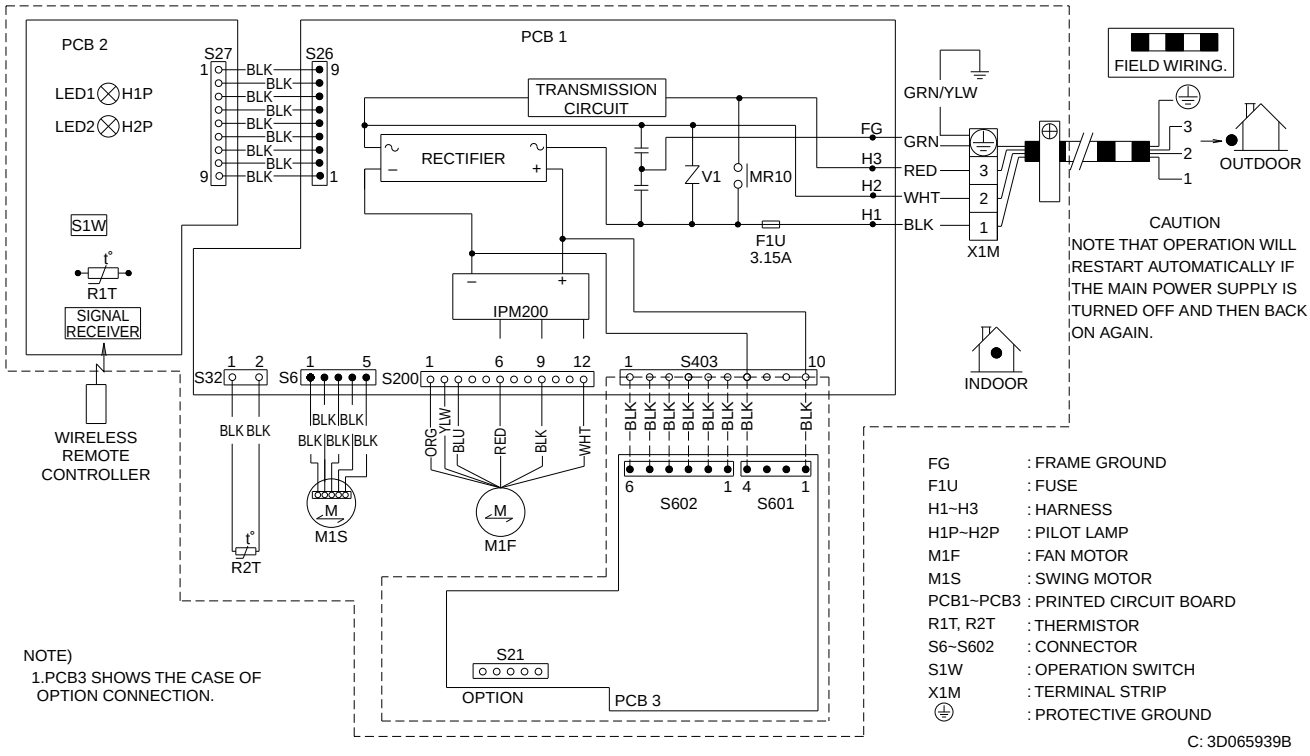


3D071265

2. Wiring Diagrams

2.1 Indoor Unit

FTXN09/12KEVJU



C: 3D065939B

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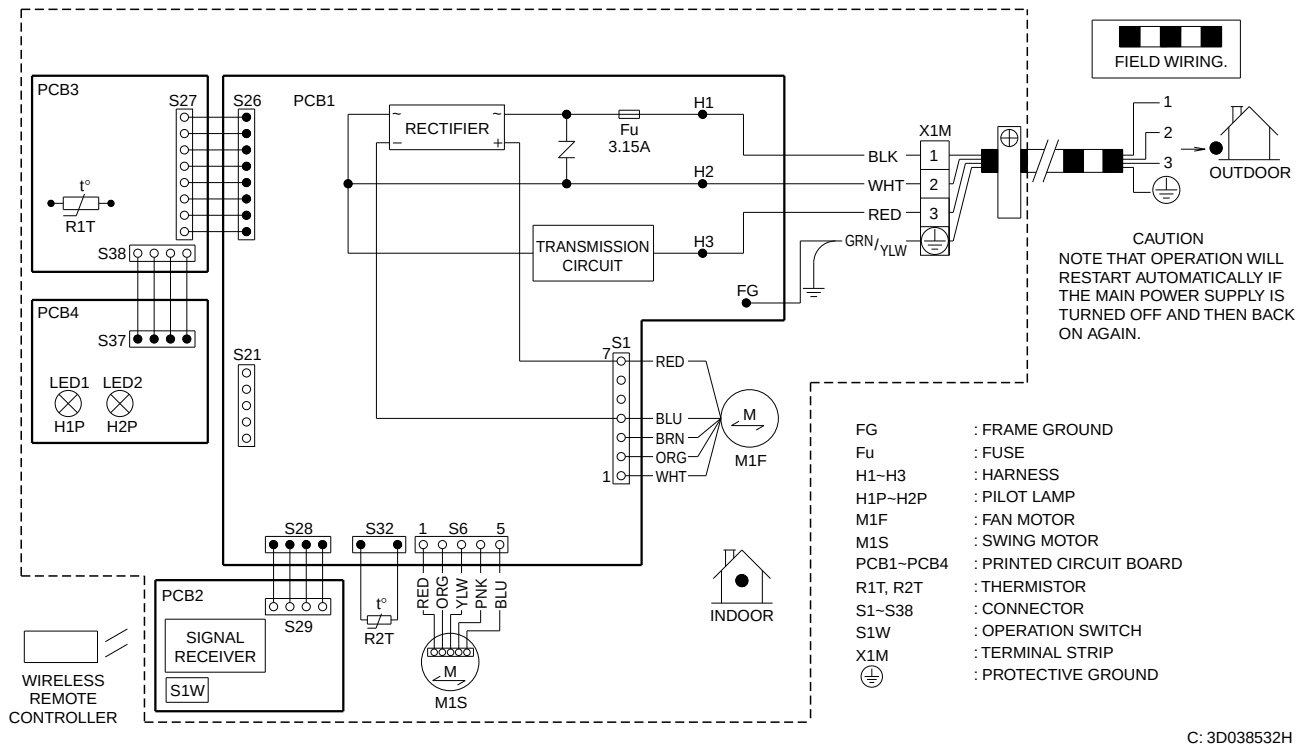
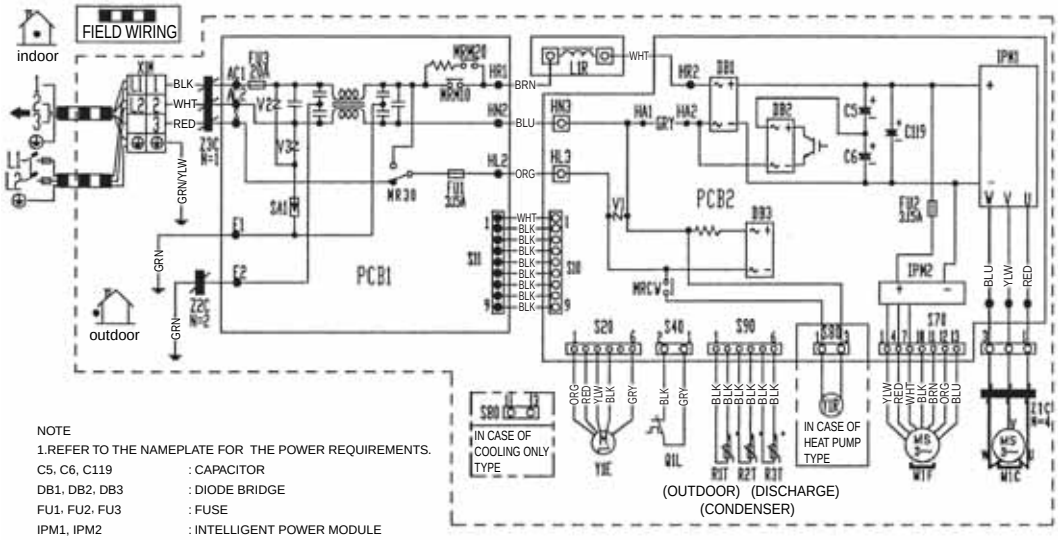


C: 3D038532H

2.2 Outdoor Unit

RKN09/12KEVJU, RXN09/12KEVJU

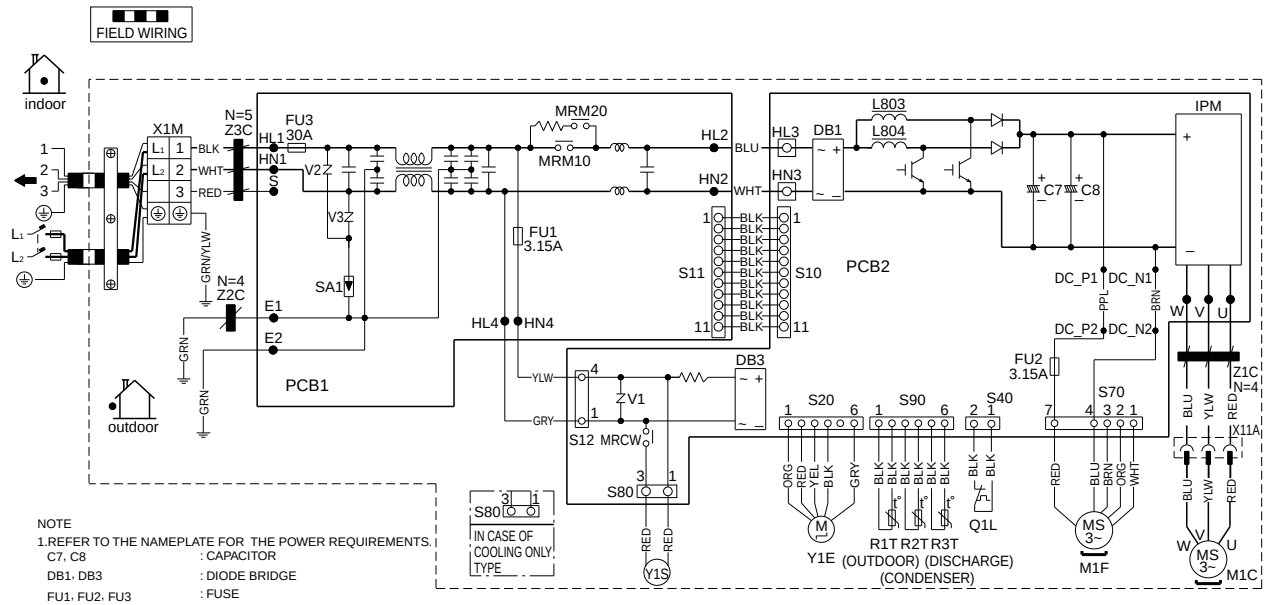


NOTE
1.REFER TO THE NAMEPLATE FOR THE POWER REQUIREMENTS.

C5, C6, C119	: CAPACITOR				
DB1, DB2, DB3	: DIODE BRIDGE				
FU1, FU2, FU3	: FUSE				
IPM1, IPM2	: INTELLIGENT POWER MODULE				
L1, L2	: LIVE				
L1R	: REACTOR	Q1L	: OVERLOAD PROTECTOR	SA1	: SURGE ABSORBER
M1C	: COMPRESSOR MOTOR	PCB1, PCB2	: PRINTED CIRCUIT BOARD	V1, V2, V3	: VARISTOR
M1F	: FAN MOTOR	S10, S11, S12, S20		X1M	: TERMINAL STRIP
MRCW, MRM30, MRM10		S40, S70, S80, S90		Y1E	: ELECTRONIC EXPANSION VALVE COIL
MRM20	: MAGNETIC RELAY	HN3	: CONNECTOR	Y1R	: REVERSING SOLENOID VALVE COIL
		R1T, R2T, R3T	: THERMISTOR	Z1C, Z2C, Z3C	: FERRITE CORE
				⏚	: PROTECTIVE GROUND

C: 3D065924E

RKN15/18/24KEVJU, RXN15/18/24KEVJU



NOTE
1.REFER TO THE NAMEPLATE FOR THE POWER REQUIREMENTS.

C7, C8	: CAPACITOR				
DB1, DB3	: DIODE BRIDGE				
FU1, FU2, FU3	: FUSE				
IPM	: INTELLIGENT POWER MODULE				
L1, L2	: LIVE	PCB1, PCB2	: PRINTED CIRCUIT BOARD	V1, V2, V3	: VARISTOR
L803, L804	: REACTOR	S10, S11, S12, S20		X1M	: TERMINAL STRIP
M1C	: COMPRESSOR MOTOR	S40, S70, S80, S90		Y1E	: ELECTRONIC EXPANSION VALVE COIL
M1F	: FAN MOTOR	HL3, HN3, X11A	: CONNECTOR	Y1S	: REVERSING SOLENOID VALVE COIL
MRCW, MRM10, MRM20	: MAGNETIC RELAY	R1T, R2T, R3T	: THERMISTOR	Z1C, Z2C, Z3C	: FERRITE CORE
Q1L	: OVERLOAD PROTECTOR	SA1	: SURGE ABSORBER	⏚	: PROTECTIVE GROUND

C: 3D070866

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