FILE NO. SVM-22112-4

TOSHIBA

SERVICE MANUAL

AIR-CONDITIONER

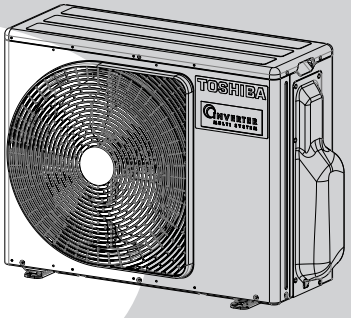
MULTI TYPE

RAS-2M10G3AVG-E

RAS-2M14G3AVG-E

RAS-2M10G3AVG-TR

RAS-2M14G3AVG-TR



R32

INVERTER

Revised on Apr, 2024

CONTENTS

1. SAFETY PRECAUTIONS

The important contents concerned to the safety are described on the product itself and on this Service Manual.

Please read this Service Manual after understanding the described items thoroughly in the following contents (Indications/Illustrated marks), and keep them.

[Explanation of indications]

Indication	Explanation
⚠ DANGER	Indicates contents assumed that an imminent danger causing a death or serious injury of the repair engineers and the third parties when an incorrect work has been executed.
⚠ WARNING	Indicates possibilities assumed that a danger causing a death or serious injury of the repair engineers, the third parties, and the users due to troubles of the product after work when an incorrect work has been executed.
⚠ CAUTION	Indicates contents assumed that an injury or property damage (*) may be caused on the repair engineers, the third parties, and the users due to troubles of the product after work when an incorrect work has been executed.

* Property damage : Enlarged damage concerned to property, furniture, and domestic animal/pet

[Explanation of illustrated marks]

Mark	Explanation
	Indicates prohibited items (Forbidden items to do) The sentences near an illustrated mark describe the concrete prohibited contents.
	Indicates mandatory items (Compulsory items to do) The sentences near an illustrated mark describe the concrete mandatory contents.
	Indicates cautions (including danger/warning) The sentences or illustration near or in an illustrated mark describe the concrete cautious contents.

	Read the precautions in this manual carefully before operating the unit.		This appliance is filled with R32. (Flammable Material)
	Information included in the Operation Manual and/or Installation Manual.		Service personnel should be handing this equipment with reference to the Installation Manual.

Warning indication	Description
	**CAUTION** **BURST HAZARD** Open the service valves before the operation, otherwise there might be the burst.

For general public use

Power supply cord of outdoor unit shall be more than 1.5 mm² (H07RN-F or 60245IEC66) polychloroprene sheathed flexible cord.

- Read this “SAFETY PRECAUTIONS” carefully before servicing.
- The precautions described below include the important items regarding safety. Observe them without fail.
- After the servicing work, perform a trial operation to check for any problem.
- Turn off the main power supply switch (or breaker) before the unit maintenance.

■ **Important information regarding the refrigerant used**

This product contains fluorinated greenhouse gases covered by the Kyoto Protocol. Do not vent gases into the atmosphere. Refrigerant type: **R32**

GWP(1) value: **675***

(1)GWP = global warming potential

The refrigerant quantity is in dicated on the unit name plate.

* This value is based on F gas regulation 517/2014

⚠ CAUTION

New Refrigerant Air Conditioner Installation

- **THIS AIR CONDITIONER ADOPTS THE NEW HFC REFRIGERANT (R32 WHICH DOES NOT DESTROY OZONE LAYER.**

  R32 refrigerant is apt to be affected by impurities such as water, oxidizing membrane, and oils because the working pressure of R32 refrigerant is approx. 1.6 times of refrigerant R22. Accompanied with the adoption of the new refrigerant, the refrigeration machine oil has also been changed. Therefore, during installation work, be sure that water, dust, former refrigerant, or refrigeration machine oil does not enter into the new type refrigerant R32 air conditioner circuit.

  To prevent mixing of refrigerant or refrigerating machine oil, the sizes of connecting sections of charging port on main unit and installation tools are different from those used for the conventional refrigerant units. Accordingly, special tools are required for the new refrigerant (R32) units. For connecting pipes, use new and clean piping materials with high pressure fittings made for R32 only, so that water and/or dust does not enter. Moreover, do not use the existing piping because there are some problems with pressure fittings and possible impurities in existing piping.

⚠ CAUTION

TO DISCONNECT THE APPLIANCE FROM THE MAIN POWER SUPPLY

This appliance must be connected to the main power supply by means of a circuit breaker or a switch with a contact separation of at least 3 mm in all poles.

⚠ DANGER

- **The manufacturer shall not assume any liability for the damage caused by not observing the description of this manual.**
- **Ask an authorized dealer or qualified installation professional to install/maintain the air conditioner.**

  INAPPROPRIATE SERVICING MAY RESULT IN WATER LEAKAGE, ELECTRIC SHOCK OR FIRE.
- TURN OFF MAIN POWER SUPPLY BEFORE ATTEMPTING ANY ELECTRICAL WORK.
  MAKE SURE ALL POWER SWITCHES ARE OFF. FAILURE TO DO SO MAY CAUSE ELECTRIC SHOCK.

⚠ DANGER: HIGH VOLTAGE

The high voltage circuit is incorporated. Be careful to do the check service, as the electric shock may be caused in case of touching parts on the P.C. board by hand.

- CORRECTLY CONNECT THE CONNECTING CABLE. IF THE CONNECTING CABLE IS INCORRECTLY CONNECTED, ELECTRIC PARTS MAY BE DAMAGED.
- CHECK THAT THE EARTH WIRE IS NOT BROKEN OR DISCONNECTED BEFORE SERVICE AND INSTALLATION. FAILURE TO DO SO MAY CAUSE ELECTRIC SHOCK.
- DO NOT INSTALL NEAR CONCENTRATIONS OF COMBUSTIBLE GAS OR GAS VAPORS. FAILURE TO FOLLOW THIS INSTRUCTION CAN RESULT IN FIRE OR EXPLOSION.
- TO PREVENT THE INDOOR UNIT FROM OVERHEATING AND CAUSING A FIRE HAZARD, PLACE THE UNIT WELL AWAY (MORE THAN 2 M) FROM HEAT SOURCES SUCH AS RADIATORS, HEAT RESISTORS, FURNACE, STOVES, ETC.
- WHEN MOVING THE AIR-CONDITIONER FOR INSTALLATION IN ANOTHER PLACE, BE VERY CAREFUL NOT TO ALLOW THE SPECIFIED REFRIGERANT (R410A) TO BECOME MIXED WITH ANY OTHER GASEOUS BODY INTO THE REFRIGERATION CIRCUIT. IF AIR OR ANY OTHER GAS IS MIXED IN THE REFRIGERANT, THE GAS PRESSURE IN THE REFRIGERATION CIRCUIT WILL BECOME ABNORMALLY HIGH AND IT MAY RESULT IN THE PIPE BURSTING AND POSSIBLE PERSONNEL INJURIES.
- IN THE EVENT THAT THE REFRIGERANT GAS LEAKS OUT OF THE PIPE DURING THE SERVICE WORK AND THE INSTALLATION WORK, IMMEDIATELY LET FRESH AIR INTO THE ROOM. IF THE REFRIGERANT GAS IS HEATED, SUCH AS BY FIRE, GENERATION OF POISONOUS GAS MAY RESULT.

⚠WARNING

- Never modify this unit by removing any of the safety guards or bypassing any of the safety interlock switches.
- Do not install in a place which cannot bear the weight of the unit. Personal injury and property damage can result if the unit falls.
- Before doing the electrical work, attach an approved plug to the power supply cord. Also, make sure the equipment is properly earthed.
- Appliance shall be installed in accordance with national wiring regulations. If you detect any damage, do not install the unit. Contact your dealer immediately.
- Do not use any refrigerant different from the one specified for complement or replacement. Otherwise, abnormally high pressure may be generated in the refrigeration cycle, which may result in a failure or explosion of the product or an injury to your body.
- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).
- Be aware that refrigerants may not contain an odour.
- Do not pierce or burn as the appliance is pressurized. Do not expose the appliance to heat, flame, sparks, or other sources or ignition. Else, it may explode and cause injury or death.
- For R32 model, use pipes, flare nut and tools which is specified for R32 refrigerant. Using of existing (R22) piping, flare nut and tools may cause abnormally high pressure in the refrigerant cycle (piping), and possibly result in explosion and injury.
- Thickness of copper pipes used R32 must be more than 0.8mm. Never use copper pipes thinner than 0.8mm.
- Do not perform flare connection inside a building or dwelling or room, when joining the heat exchanger of indoor unit with interconnection piping. Refrigerant connection inside a building or dwelling or room must be made by brazing or welding. Joint connection of indoor unit by flaring method can only be made at outdoor or at outside of building or dwelling or room. Flare connection may cause gas leak and flammable atmosphere.
- After completion of installation or service, confi rm there is no leakage of refrigerant gas. It may generate toxic gas when the refrigerant contacts with fire.
- Appliance and pipe-work shall be installed, operated and stored in a room with a floor area larger than A_{min} m^2. How to get A_{min} m^2 : $A_{min} = (M / (2.5 \times 0.22759 \times h_0))^2$
  M is the refrigerant charge amount in appliance in kg. h_0 is the installation height of the appliance in m: 0.6 m for floor standing/1.8 m for wall mounted/1.0 m for window mounted/2.2 m for ceiling mounted (For these units recommend installation height 2.5 m.).
- Comply with national gas regulations.

⚠ WARNING

- **After installation work, make sure below before operation.**
  - Connection pipes are connected properly and no leakage.
  - Packed valves are fully open.
  Running compressor without open packed valves may cause abnormal high pressure and parts failure.
  Leakage at connection piping may suck air and make further high pressure cause burst and injure.
- **During pump down work make sure below process.**
  - Don't mix air into the refrigerant cycle.
  - Stop the compressor before removing piping after packed valves are fully closed.
  Removing piping under the compressor running and packed valves open, air might be sucked and refrigeration cycle pressure becomes abnormally high, and it causes burst or injury on persons.

⚠ CAUTION

- Exposure of unit to water or other moisture before installation may result in an electrical short.
  Do not store in a wet basement or expose to rain or water.
- Do not install in a place that can increase the vibration of the unit. Do not install in a place that can amplify the noise level of the unit or where noise or discharged air might disturb neighbors.
- To avoid personal injury, be careful when handling parts with sharp edges.
- **Perform the specified installation work to guard against an earthquake.**
  If the air conditioner is not installed appropriately, accidents may occur due to the falling unit.
- Please read this installation manual carefully before installing the unit.It contains further important instructions for proper installation ,Improper installation may cause fire, burst, electric shock, injury and water leakage.

⚠ CAUTION

- Exposure of unit to water or other moisture before installation may result in an electrical short. Do not store in a wet basement or expose to rain or water.
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2. SPECIFICATIONS

The indoor and outdoor units that can be used in combination are shown in the tables below.

Table of models that can be used in combination

Type	Outdoor unit	Combinations of indoor unit models that can be connected
Heat pump	RAS-2M10G3AVG-E,-TR	Refer to page 9 to 10
Heat pump	RAS-2M14G3AVG-E,-TR	Refer to page 11 to 12

NOTES

A 1-room connection is not an option for the indoor units (you cannot connect only one indoor unit).
Be sure to connect indoor unit in two or more.

2-1. Specifications

<Heat Pump Models>

RAS-2M10G3AVG-E, -TR

Unit model	Outdoor			RAS-	2M10G3AVG-E,-TR
	Connection indoor unit of this specification			RAS-	B10G3KVSG-E, -TR (×2)
Cooling Capacity				(kW)	3.30
Cooling Capacity range				(kW)	1.20 to 4.10
Heating Capacity				(kW)	4.0
Heating Capacity range				(kW)	1.00 to 4.90
Power supply					1Ph,220-240V,50Hz
Electric characteristics	Total	Operation mode			Cooling / Heating
		Running current		(A)	3.30 / 3.15 / 3.05 / 4.47 / 4.30 / 4.12
		Power consumption		(W)	670 / 850
		Power factor		(%)	92 / 86
		Starting current		(A)	-
COP (Cooling/Heating)					4.93 / 4.71
Operating noise	Outdoor (Cooling/Heating)	Sound pressure level		(dBA)	47 / 51
		Sound power level		(dBA)	60 / 64
Outdoor unit	Dimension	Height		(mm)	550
		Width		(mm)	780
		Depth		(mm)	290
	Net weight			(kg)	31
	Compressor	Motor output		(W)	715
		Type			Single rotary type with DC-inverter variable speed control
		Model			KSK89D53UFZ
	Fan motor output			(W)	43
	Air flow rate (Cooling/Heating)			(m³/h)	2100 / 2100
	Type				Flare connection
	Name of refirigerant				R32
	Weight of refigerant			(kg)	0.80
Piping connection	Outdoor unit	A unit liquid side/gas side			φ6.35 / φ9.52
		B unit liquid side/gas side			φ6.35 / φ9.52
		C unit liquid side/gas side			-
	Maximum length (per unit)			(m)	15
	Maximum length (total)			(m)	20
	Maximum chargeless length			(m)	20
	Maximum height difference			(m)	10
Wiring connection	Power supply / interconnection				3 Wires : includes earth / 4 Wires : includes earth
Usable temperature range	Outdoor (Cooling/Heating)			(℃)	-10 to 46℃ / -20 to 24℃
Accessory Outdoor unit	Installation manual				1

- For performance when each indoor unit is combined with other unit, refer to the separate table.
- The specifications may be subject to change without notice for purpose of improvement.

RAS-2M14G3AVG-E, -TR

Unit model	Outdoor		RAS-	2M14G3AVG-E,-TR	
	Connection indoor unit of this specification		RAS-	B13G3KVSG-E, -TR (×2)	
Cooling Capacity (*1)			(kW)	4.0	
Cooling Capacity range			(kW)	1.50 to 4.9 *	
Heating Capacity (*1)			(kW)	4.4	
Heating Capacity range			(kW)	1.0 to 5.20 *	
Power supply				1Ph,220-240V,50Hz	
Electric characteristics	Total	Operation mode		Cooling	Heating
		Running current	(A)	4.40 / 4.20 / 4.02	4.61 / 4.40 / 4.20
		Power consumption	(W)	850	900
		Power factor	(%)	88	89
		Starting current	(A)	-	
COP (Cooling/Heating)				4.71 / 4.89	
Operating noise	Outdoor (Cooling/Heating)	Sound pressure level	(dBA)	46 / 52	
		Sound power level	(dBA)	59 / 65	
Outdoor unit	Dimension	Height	(mm)	550	
		Width	(mm)	780	
		Depth	(mm)	290	
	Net weight		(kg)	35	
	Compressor	Motor output	(W)	1050	
		Type		Single rotary type with DC-inverter variable speed control	
		Model		KTN130D3UFZ	
	Fan motor output		(W)	43	
	Air flow rate (Cooling/Heating)		(m³/h)	1800 / 2250	
	Type			Flare connection	
	Name of refirigerant			R32	
	Weight of refigerant		(kg)	0.95	
Piping connection	Outdoor unit	A unit liquid side/gas side		φ6.35 / φ9.52	
		B unit liquid side/gas side		φ6.35 / φ9.52	
		C unit liquid side/gas side		-	
	Maximum length (per unit)		(m)	20	
	Maximum length (total)		(m)	30	
	Maximum chargeless length		(m)	30	
	Maximum height difference		(m)	10	
Wiring connection	Power supply / interconnection			3 Wires : includes earth / 4 Wires : includes earth	
Usable temperature range	Outdoor (Cooling/Heating)		(℃)	-10 to 46℃ / -20 to 24℃	
Accessory Outdoor unit	Installation manual			1	

* Values listed for above combination only. For capacity range for other Indoor unit combinations please see separate table
The specifications may be subject to change without notice for purposes of improvement.

(*1) Rated conditions
Cooling : Capacity test condition, inside : 27 °C (Db) / 19 °C (Wb), outside : 35 °C (Db) / 24 °C (Wb)
Heating : Capacity test condition, inside : 20 °C (Db), outside : 7 °C (Db) / 6°C (Wb)
Piping length : 5 m per Indoor Unit.

2-2. Specifications of Performance When Each Indoor Units is Combined with Other Unit

Combination of indoor units

Outdoor unit : RAS-2M10G3AVG-E, -TR

Operation mode : Cooling Power supply voltage : 220V

Operating	Indoor unit			Unit capacity (kW)		Cooling capacity (kW)			Power consumption (W)			Operating current (A)			EER	SEER	Energy Grade
status	A	B	ΣkBTU	A	B	Min	Rate	Max	Min	Rate	Max	Min	Rate	Max	Rate		
1 unit	05	—	05	1.50	—	1.0	1.5	2.0	230	360	500	1.37	2.10	2.86	4.14	-	-
	07	—	07	2.00	—	1.0	2.0	2.9	230	490	890	1.37	2.80	4.33	4.11	-	-
	10	—	10	2.50	—	1.0	2.5	3.2	230	660	1140	1.37	3.43	5.50	3.78	-	-
2 units	05	05	10	1.50	1.50	1.2	3.0	4.0	200	610	1040	1.19	3.32	5.03	4.93	8.00	A++
	07	05	12	1.89	1.41	1.2	3.3	4.1	200	700	1050	1.19	3.54	5.08	4.73	8.20	A++
	10	05	15	2.06	1.24	1.2	3.3	4.1	200	700	1050	1.19	3.54	5.08	4.73	8.20	A++
	07	07	14	1.65	1.65	1.2	3.3	4.1	200	670	1050	1.19	3.46	5.08	4.93	8.60	A+++
	10	07	17	1.83	1.47	1.2	3.3	4.1	200	670	1050	1.19	3.46	5.08	4.93	8.60	A+++
	10	10	20	1.65	1.65	1.2	3.3	4.1	200	670	1050	1.19	3.46	5.08	4.93	8.60	A+++

Operation mode : Cooling Power supply voltage : 230V

Operating	Indoor unit			Unit capacity (kW)		Cooling capacity (kW)			Power consumption (W)			Operating current (A)			EER	SEER	Energy Grade
status	A	B	ΣkBTU	A	B	Min	Rate	Max	Min	Rate	Max	Min	Rate	Max	Rate		
1 unit	05	—	05	1.50	—	1.0	1.5	2.0	230	360	500	1.31	2.01	2.73	4.14	-	-
	07	—	07	2.00	—	1.0	2.0	2.9	230	490	890	1.31	2.68	4.14	4.11	-	-
	10	—	10	2.50	—	1.0	2.5	3.2	230	660	1140	1.31	3.29	5.26	3.78	-	-
2 units	05	05	10	1.50	1.50	1.2	3.0	4.0	200	610	1040	1.14	3.18	4.81	4.93	8.00	A++
	07	05	12	1.89	1.41	1.2	3.3	4.1	200	700	1050	1.14	3.39	4.86	4.73	8.20	A++
	10	05	15	2.06	1.24	1.2	3.3	4.1	200	700	1050	1.14	3.39	4.86	4.73	8.20	A++
	07	07	14	1.65	1.65	1.2	3.3	4.1	200	670	1050	1.14	3.31	4.86	4.93	8.60	A+++
	10	07	17	1.83	1.47	1.2	3.3	4.1	200	670	1050	1.14	3.31	4.86	4.93	8.60	A+++
	10	10	20	1.65	1.65	1.2	3.3	4.1	200	670	1050	1.14	3.31	4.86	4.93	8.60	A+++

Operation mode : Cooling Power supply voltage : 240V

Operating	Indoor unit			Unit capacity (kW)		Cooling capacity (kW)			Power consumption (W)			Operating current (A)			EER	SEER	Energy Grade
status	A	B	ΣkBTU	A	B	Min	Rate	Max	Min	Rate	Max	Min	Rate	Max	Rate		
1 unit	05	—	05	1.50	—	1.0	1.5	2.0	230	360	500	1.25	1.93	2.62	4.14	-	-
	07	—	07	2.00	—	1.0	2.0	2.9	230	490	890	1.25	2.57	3.97	4.11	-	-
	10	—	10	2.50	—	1.0	2.5	3.2	230	660	1140	1.25	3.15	5.04	3.78	-	-
2 units	05	05	10	1.50	1.50	1.2	3.0	4.0	200	610	1040	1.09	3.05	4.61	4.93	8.00	A++
	07	05	12	1.89	1.41	1.2	3.3	4.1	200	700	1050	1.09	3.25	4.66	4.73	8.20	A++
	10	05	15	2.06	1.24	1.2	3.3	4.1	200	700	1050	1.09	3.25	4.66	4.73	8.20	A++
	07	07	14	1.65	1.65	1.2	3.3	4.1	200	670	1050	1.09	3.17	4.66	4.93	8.60	A+++
	10	07	17	1.83	1.47	1.2	3.3	4.1	200	670	1050	1.09	3.17	4.66	4.93	8.60	A+++
	10	10	20	1.65	1.65	1.2	3.3	4.1	200	670	1050	1.09	3.17	4.66	4.93	8.60	A+++

Combination of indoor units

Outdoor unit : RAS-2M10G3AVG-E, -TR

Operation mode : Heating Power supply voltage : 220V

Operating	Indoor unit			Unit capacity (kW)		Cooling capacity (kW)			Power consumption (W)			Operating current (A)			EER	SCOP		Energy Grade	
status	A	B	ΣkBTU	A	B	Min	Rate	Max	Min	Rate	Max	Min	Rate	Max	Rate	Average	Warmer	Average	Warmer
1 unit	05	—	05	2.00	—	0.9	2.0	2.5	210	460	690	1.25	2.65	3.52	4.35	-	-	-	-
	07	—	07	2.50	—	0.9	2.5	3.6	190	520	920	1.13	2.96	4.47	4.81	-	-	-	-
	10	—	10	3.20	—	0.9	3.2	4.8	190	740	1460	1.13	3.62	6.99	4.32	-	-	-	-
2 units	05	05	10	2.00	2.00	1.0	4.0	4.9	180	960	1240	1.07	4.66	5.97	4.17	4.60	5.70	A++	A+++
	07	05	12	2.22	1.78	1.0	4.0	4.9	170	880	1140	1.01	4.28	5.50	4.55	4.60	5.60	A++	A+++
	10	05	15	2.46	1.54	1.0	4.0	4.9	170	880	1140	1.01	4.28	5.50	4.55	4.60	5.60	A++	A+++
	07	07	14	2.00	2.00	1.0	4.0	4.9	170	850	1100	1.01	4.14	5.31	4.71	4.70	5.80	A++	A+++
	10	07	17	2.25	1.75	1.0	4.0	4.9	170	850	1100	1.01	4.14	5.31	4.71	4.70	5.80	A++	A+++
	10	10	20	2.00	2.00	1.0	4.0	4.9	170	850	1100	1.01	4.14	5.31	4.71	4.70	5.80	A++	A+++

Operation mode : Heating Power supply voltage : 230V

Operating	Indoor unit			Unit capacity (kW)		Cooling capacity (kW)			Power consumption (W)			Operating current (A)			EER	SCOP		Energy Grade	
status	A	B	ΣkBTU	A	B	Min	Rate	Max	Min	Rate	Max	Min	Rate	Max	Rate	Average	Warmer	Average	Warmer
1 unit	05	—	05	2.00	—	0.9	2.0	2.5	210	460	690	1.19	2.53	3.36	4.35	-	-	-	-
	07	—	07	2.50	—	0.9	2.5	3.6	190	520	920	1.08	2.83	4.27	4.81	-	-	-	-
	10	—	10	3.20	—	0.9	3.2	4.8	190	740	1460	1.08	3.46	6.68	4.32	-	-	-	-
2 units	05	05	10	2.00	2.00	1.0	4.0	4.9	180	960	1240	1.03	4.45	5.71	4.17	4.60	5.70	A++	A+++
	07	05	12	2.22	1.78	1.0	4.0	4.9	170	880	1140	0.97	4.09	5.26	4.55	4.60	5.60	A++	A+++
	10	05	15	2.46	1.54	1.0	4.0	4.9	170	880	1140	0.97	4.09	5.26	4.55	4.60	5.60	A++	A+++
	07	07	14	2.00	2.00	1.0	4.0	4.9	170	850	1100	0.97	3.96	5.08	4.71	4.70	5.80	A++	A+++
	10	07	17	2.25	1.75	1.0	4.0	4.9	170	850	1100	0.97	3.96	5.08	4.71	4.70	5.80	A++	A+++
	10	10	20	2.00	2.00	1.0	4.0	4.9	170	850	1100	0.97	3.96	5.08	4.71	4.70	5.80	A++	A+++

Operation mode : Heating Power supply voltage : 240V

Operating	Indoor unit			Unit capacity (kW)		Cooling capacity (kW)			Power consumption (W)			Operating current (A)			EER	SCOP		Energy Grade	
status	A	B	ΣkBTU	A	B	Min	Rate	Max	Min	Rate	Max	Min	Rate	Max	Rate	Average	Warmer	Average	Warmer
1 unit	05	—	05	2.00	—	0.9	2.0	2.5	210	460	690	1.14	2.43	3.22	4.35	-	-	-	-
	07	—	07	2.50	—	0.9	2.5	3.6	190	520	920	1.04	2.71	4.10	4.81	-	-	-	-
	10	—	10	3.20	—	0.9	3.2	4.8	190	740	1460	1.04	3.31	6.41	4.32	-	-	-	-
2 units	05	05	10	2.00	2.00	1.0	4.0	4.9	180	960	1240	0.98	4.27	5.47	4.17	4.60	5.70	A++	A+++
	07	05	12	2.22	1.78	1.0	4.0	4.9	170	880	1140	0.93	3.92	5.04	4.55	4.60	5.60	A++	A+++
	10	05	15	2.46	1.54	1.0	4.0	4.9	170	880	1140	0.93	3.92	5.04	4.55	4.60	5.60	A++	A+++
	07	07	14	2.00	2.00	1.0	4.0	4.9	170	850	1100	0.93	3.79	4.87	4.71	4.70	5.80	A++	A+++
	10	07	17	2.25	1.75	1.0	4.0	4.9	170	850	1100	0.93	3.79	4.87	4.71	4.70	5.80	A++	A+++
	10	10	20	2.00	2.00	1.0	4.0	4.9	170	850	1100	0.93	3.79	4.87	4.71	4.70	5.80	A++	A+++

Combination of indoor units

Outdoor unit : RAS-2M14G3AVG-E, -TR

Operation mode : Cooling Power supply voltage : 220V

Operating	Indoor unit			Unit capacity (kW)		Cooling capacity (kW)			Power consumption (W)			Operating current (A)			EER	SEER	Energy Grade
status	A	B	ΣkBTU	A	B	Min	Rate	Max	Min	Rate	Max	Min	Rate	Max	Rate		
1 unit	05	—	05	1.50	—	1.1	1.5	2.0	260	360	470	1.54	2.10	2.70	4.21	-	-
	07	—	07	2.00	—	1.2	2.0	2.9	260	440	710	1.54	2.54	3.58	4.53	-	-
	10	—	10	2.50	—	1.2	2.5	3.2	260	600	870	1.54	3.31	4.23	4.24	-	-
	13	—	13	3.50	—	1.3	3.5	4.1	260	990	1300	1.54	4.80	6.25	3.58	-	-
2 units	05	05	10	1.50	1.50	1.4	3.0	4.7	240	650	1250	1.42	3.41	6.01	4.63	8.10	A++
	07	05	12	2.00	1.50	1.4	3.5	4.9	240	780	1250	1.42	3.81	6.01	4.47	8.30	A++
	10	05	15	2.50	1.50	1.4	4.0	4.9	240	950	1250	1.42	4.61	6.01	4.23	7.60	A++
	13	05	18	2.80	1.20	1.5	4.0	4.9	230	910	1200	1.37	4.42	5.78	4.39	8.10	A++
	07	07	14	2.00	2.00	1.5	4.0	4.9	230	920	1250	1.37	4.47	6.01	4.33	7.90	A++
	10	07	17	2.22	1.78	1.5	4.0	4.9	230	920	1200	1.37	4.47	5.78	4.33	7.90	A++
	13	07	20	2.55	1.45	1.5	4.0	4.9	230	890	1180	1.37	4.33	5.69	4.51	8.20	A++
	10	10	20	2.00	2.00	1.5	4.0	4.9	230	920	1200	1.37	4.47	5.78	4.33	7.90	A++
	13	10	23	2.33	1.67	1.5	4.0	4.9	230	890	1150	1.37	4.33	5.55	4.51	8.20	A++
	13	13	26	2.00	2.00	1.5	4.0	4.9	230	850	1150	1.37	4.14	5.55	4.71	8.70	A+++

Operation mode : Cooling Power supply voltage : 230V

Operating	Indoor unit			Unit capacity (kW)		Cooling capacity (kW)			Power consumption (W)			Operating current (A)			EER	SEER	Energy Grade
status	A	B	ΣkBTU	A	B	Min	Rate	Max	Min	Rate	Max	Min	Rate	Max	Rate		
1 unit	05	—	05	1.50	—	1.1	1.5	2.0	260	360	470	1.47	2.01	2.58	4.21	-	-
	07	—	07	2.00	—	1.2	2.0	2.9	260	440	710	1.47	2.43	3.42	4.53	-	-
	10	—	10	2.50	—	1.2	2.5	3.2	260	600	870	1.47	3.16	4.05	4.24	-	-
	13	—	13	3.50	—	1.3	3.5	4.1	260	990	1300	1.47	4.59	5.97	3.58	-	-
2 units	05	05	10	1.50	1.50	1.4	3.0	4.7	240	650	1250	1.36	3.26	5.75	4.63	8.10	A++
	07	05	12	2.00	1.50	1.4	3.5	4.9	240	780	1250	1.36	3.64	5.75	4.47	8.30	A++
	10	05	15	2.50	1.50	1.4	4.0	4.9	240	950	1250	1.36	4.41	5.75	4.23	7.60	A++
	13	05	18	2.80	1.20	1.5	4.0	4.9	230	910	1200	1.31	4.23	5.53	4.39	8.10	A++
	07	07	14	2.00	2.00	1.5	4.0	4.9	230	920	1250	1.31	4.27	5.75	4.33	7.90	A++
	10	07	17	2.22	1.78	1.5	4.0	4.9	230	920	1200	1.31	4.27	5.53	4.33	7.90	A++
	13	07	20	2.55	1.45	1.5	4.0	4.9	230	890	1180	1.31	4.14	5.44	4.51	8.20	A++
	10	10	20	2.00	2.00	1.5	4.0	4.9	230	920	1200	1.31	4.27	5.53	4.33	7.90	A++
	13	10	23	2.33	1.67	1.5	4.0	4.9	230	890	1150	1.31	4.14	5.31	4.51	8.20	A++
	13	13	26	2.00	2.00	1.5	4.0	4.9	230	850	1150	1.31	3.96	5.31	4.71	8.70	A+++

Operation mode : Cooling Power supply voltage : 240V

Operating	Indoor unit			Unit capacity (kW)		Cooling capacity (kW)			Power consumption (W)			Operating current (A)			EER	SEER	Energy Grade
status	A	B	ΣkBTU	A	B	Min	Rate	Max	Min	Rate	Max	Min	Rate	Max	Rate		
1 unit	05	—	05	1.50	—	1.1	1.5	2.0	260	360	470	1.41	1.93	2.47	4.21	-	-
	07	—	07	2.00	—	1.2	2.0	2.9	260	440	710	1.41	2.33	3.28	4.53	-	-
	10	—	10	2.50	—	1.2	2.5	3.2	260	600	870	1.41	3.03	3.88	4.24	-	-
	13	—	13	3.50	—	1.3	3.5	4.1	260	990	1300	1.41	4.40	5.73	3.58	-	-
2 units	05	05	10	1.50	1.50	1.4	3.0	4.7	240	650	1250	1.30	3.13	5.51	4.63	8.10	A++
	07	05	12	2.00	1.50	1.4	3.5	4.9	240	780	1250	1.30	3.49	5.51	4.47	8.30	A++
	10	05	15	2.50	1.50	1.4	4.0	4.9	240	950	1250	1.30	4.23	5.51	4.23	7.60	A++
	13	05	18	2.80	1.20	1.5	4.0	4.9	230	910	1200	1.25	4.05	5.30	4.39	8.10	A++
	07	07	14	2.00	2.00	1.5	4.0	4.9	230	920	1250	1.25	4.10	5.51	4.33	7.90	A++
	10	07	17	2.22	1.78	1.5	4.0	4.9	230	920	1200	1.25	4.10	5.30	4.33	7.90	A++
	13	07	20	2.55	1.45	1.5	4.0	4.9	230	890	1180	1.25	3.97	5.21	4.51	8.20	A++
	10	10	20	2.00	2.00	1.5	4.0	4.9	230	920	1200	1.25	4.10	5.30	4.33	7.90	A++
	13	10	23	2.33	1.67	1.5	4.0	4.9	230	890	1150	1.25	3.97	5.08	4.51	8.20	A++
	13	13	26	2.00	2.00	1.5	4.0	4.9	230	850	1150	1.25	3.79	5.08	4.71	8.70	A+++

Combination of indoor units

Outdoor unit : RAS-2M14G3AVG-E, -TR

Operation mode : Heating Power supply voltage : 220V

Operating	Indoor unit			Unit capacity (kW)		Cooling capacity (kW)			Power consumption (W)			Operating current (A)			EER	SCOP		Energy Grade	
status	A	B	ΣkBTU	A	B	Min	Rate	Max	Min	Rate	Max	Min	Rate	Max	Rate	Average	Warmer	Average	Warmer
1 unit	05	—	05	2.00	—	1.0	2.0	2.5	230	510	680	1.37	2.91	3.49	3.92	-	-	-	-
	07	—	07	2.50	—	1.0	2.5	3.6	230	680	950	1.37	3.49	4.61	3.68	-	-	-	-
	10	—	10	3.20	—	1.0	3.2	4.8	230	1010	1490	1.37	4.89	7.13	3.17	-	-	-	-
	13	—	13	4.20	—	1.0	4.2	5.2	230	1400	1610	1.37	6.71	7.68	3.00	-	-	-	-
2 units	05	05	10	2.00	2.00	1.0	4.0	5.1	200	960	1300	1.19	4.66	6.25	4.17	4.50	5.60	A+	A+++
	07	05	12	2.44	1.96	1.0	4.4	5.2	200	1090	1300	1.19	5.27	6.25	4.04	4.50	5.70	A+	A+++
	10	05	15	2.71	1.69	1.0	4.4	5.2	200	1090	1300	1.19	5.27	6.25	4.04	4.60	5.80	A++	A+++
	13	05	18	2.98	1.42	1.0	4.4	5.2	200	1010	1280	1.19	4.89	6.15	4.36	4.60	5.80	A++	A+++
	07	07	14	2.20	2.20	1.0	4.4	5.2	200	1020	1300	1.19	4.94	6.25	4.31	4.60	5.70	A++	A+++
	10	07	17	2.47	1.93	1.0	4.4	5.2	200	1020	1280	1.19	4.94	6.15	4.31	4.60	5.80	A++	A+++
	13	07	20	2.76	1.64	1.0	4.4	5.2	200	940	1280	1.19	4.56	6.15	4.68	4.70	5.80	A++	A+++
	10	10	20	2.20	2.20	1.0	4.4	5.2	200	1020	1250	1.19	4.94	6.01	4.31	4.60	5.70	A++	A+++
	13	10	23	2.50	1.90	1.0	4.4	5.2	200	940	1250	1.19	4.56	6.01	4.68	4.70	5.90	A++	A+++
	13	13	26	2.20	2.20	1.0	4.4	5.2	200	900	1220	1.19	4.37	5.87	4.89	4.80	5.90	A++	A+++

Operation mode : Heating Power supply voltage : 230V

Operating	Indoor unit			Unit capacity (kW)		Cooling capacity (kW)			Power consumption (W)			Operating current (A)			EER	SCOP		Energy Grade	
status	A	B	ΣkBTU	A	B	Min	Rate	Max	Min	Rate	Max	Min	Rate	Max	Rate	Average	Warmer	Average	Warmer
1 unit	05	—	05	2.00	—	1.0	2.0	2.5	230	510	680	1.31	2.78	3.34	3.92	-	-	-	-
	07	—	07	2.50	—	1.0	2.5	3.6	230	680	950	1.31	3.34	4.41	3.68	-	-	-	-
	10	—	10	3.20	—	1.0	3.2	4.8	230	1010	1490	1.31	4.68	6.82	3.17	-	-	-	-
	13	—	13	4.20	—	1.0	4.2	5.2	230	1400	1610	1.31	6.42	7.35	3.00	-	-	-	-
2 units	05	05	10	2.00	2.00	1.0	4.0	5.1	200	960	1300	1.14	4.45	5.97	4.17	4.50	5.60	A+	A+++
	07	05	12	2.44	1.96	1.0	4.4	5.2	200	1090	1300	1.14	5.04	5.97	4.04	4.50	5.70	A+	A+++
	10	05	15	2.71	1.69	1.0	4.4	5.2	200	1090	1300	1.14	5.04	5.97	4.04	4.60	5.80	A++	A+++
	13	05	18	2.98	1.42	1.0	4.4	5.2	200	1010	1280	1.14	4.68	5.89	4.36	4.60	5.80	A++	A+++
	07	07	14	2.20	2.20	1.0	4.4	5.2	200	1020	1300	1.14	4.72	5.97	4.31	4.60	5.70	A++	A+++
	10	07	17	2.47	1.93	1.0	4.4	5.2	200	1020	1280	1.14	4.72	5.89	4.31	4.60	5.80	A++	A+++
	13	07	20	2.76	1.64	1.0	4.4	5.2	200	940	1280	1.14	4.36	5.89	4.68	4.70	5.80	A++	A+++
	10	10	20	2.20	2.20	1.0	4.4	5.2	200	1020	1250	1.14	4.72	5.75	4.31	4.60	5.70	A++	A+++
	13	10	23	2.50	1.90	1.0	4.4	5.2	200	940	1250	1.14	4.36	5.75	4.68	4.70	5.90	A++	A+++
	13	13	26	2.20	2.20	1.0	4.4	5.2	200	900	1220	1.14	4.18	5.62	4.89	4.80	5.90	A++	A+++

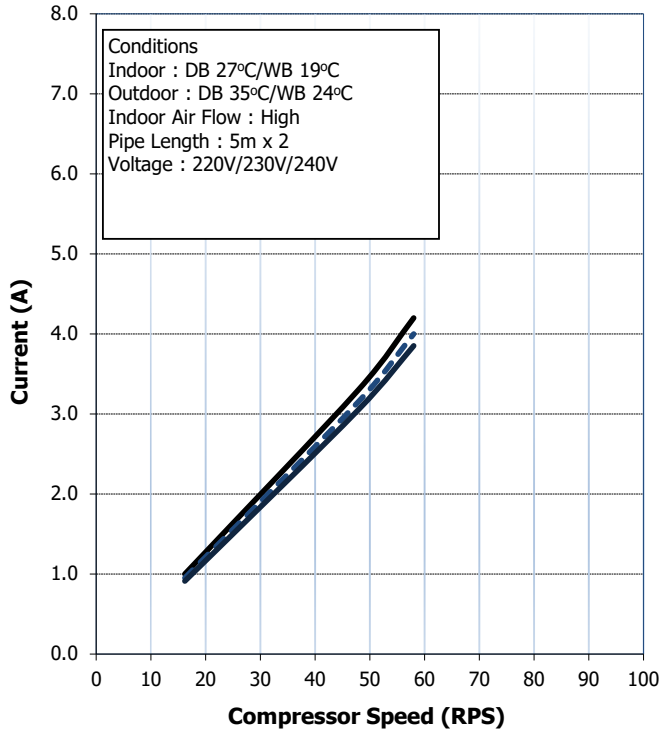
Operation mode : Heating Power supply voltage : 240V

Operating	Indoor unit			Unit capacity (kW)		Cooling capacity (kW)			Power consumption (W)			Operating current (A)			EER	SCOP		Energy Grade	
status	A	B	ΣkBTU	A	B	Min	Rate	Max	Min	Rate	Max	Min	Rate	Max	Rate	Average	Warmer	Average	Warmer
1 unit	05	—	05	2.00	—	1.0	2.0	2.5	230	510	680	1.25	2.67	3.20	3.92	-	-	-	-
	07	—	07	2.50	—	1.0	2.5	3.6	230	680	950	1.25	3.20	4.23	3.68	-	-	-	-
	10	—	10	3.20	—	1.0	3.2	4.8	230	1010	1490	1.25	4.48	6.53	3.17	-	-	-	-
	13	—	13	4.20	—	1.0	4.2	5.2	230	1400	1610	1.25	6.15	7.04	3.00	-	-	-	-
2 units	05	05	10	2.00	2.00	1.0	4.0	5.1	200	960	1300	1.09	4.27	5.73	4.17	4.50	5.60	A+	A+++
	07	05	12	2.44	1.96	1.0	4.4	5.2	200	1090	1300	1.09	4.83	5.73	4.04	4.50	5.70	A+	A+++
	10	05	15	2.71	1.69	1.0	4.4	5.2	200	1090	1300	1.09	4.83	5.73	4.04	4.60	5.80	A++	A+++
	13	05	18	2.98	1.42	1.0	4.4	5.2	200	1010	1280	1.09	4.48	5.64	4.36	4.60	5.80	A++	A+++
	07	07	14	2.20	2.20	1.0	4.4	5.2	200	1020	1300	1.09	4.53	5.73	4.31	4.60	5.70	A++	A+++
	10	07	17	2.47	1.93	1.0	4.4	5.2	200	1020	1280	1.09	4.53	5.64	4.31	4.60	5.80	A++	A+++
	13	07	20	2.76	1.64	1.0	4.4	5.2	200	940	1280	1.09	4.18	5.64	4.68	4.70	5.80	A++	A+++
	10	10	20	2.20	2.20	1.0	4.4	5.2	200	1020	1250	1.09	4.53	5.51	4.31	4.60	5.70	A++	A+++
	13	10	23	2.50	1.90	1.0	4.4	5.2	200	940	1250	1.09	4.18	5.51	4.68	4.70	5.90	A++	A+++
	13	13	26	2.20	2.20	1.0	4.4	5.2	200	900	1220	1.09	4.01	5.38	4.89	4.80	5.90	A++	A+++

Operation Characteristic Curve

RAS-2M10G3AVG-E, -TR

<Cooling>



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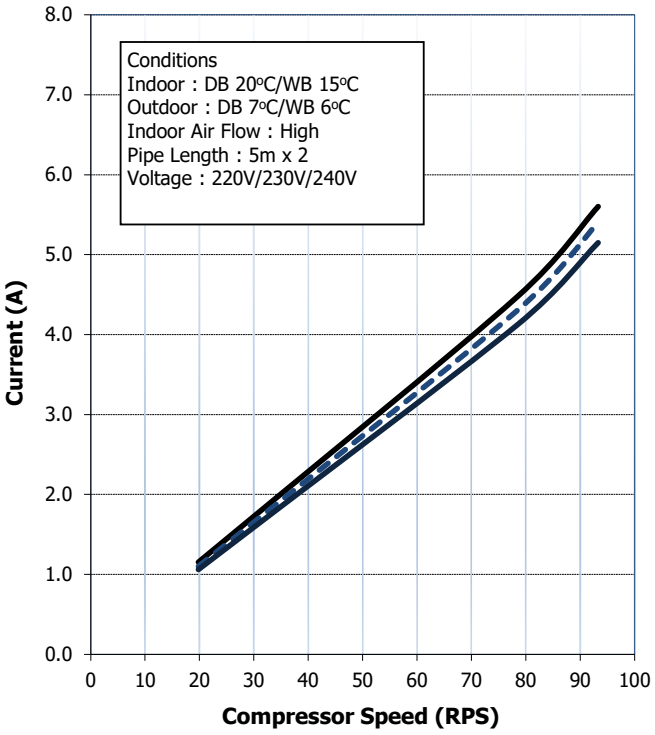

Capacity Variation ratio According to Temperature.

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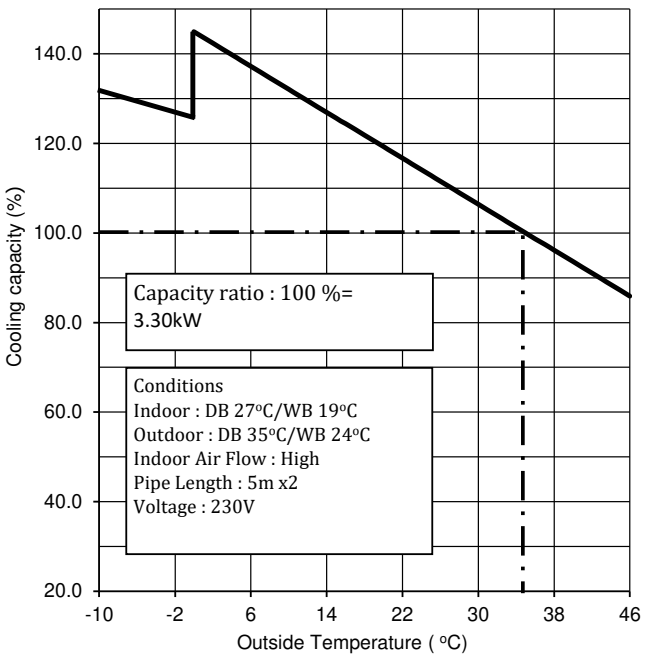

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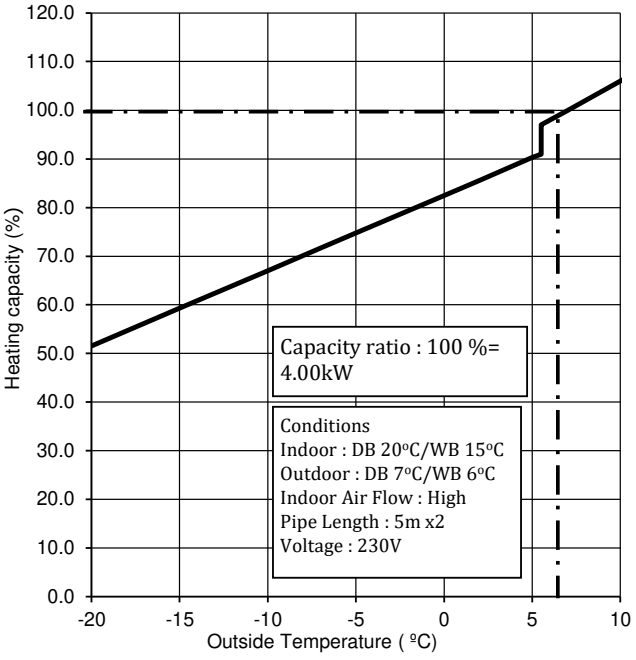
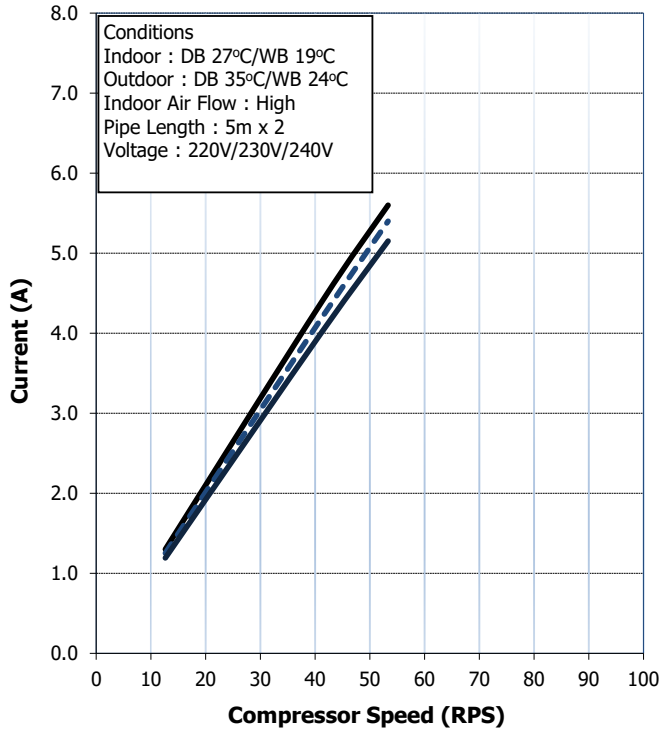


Operation Characteristic Curve

RAS-2M14G3AVG-E, -TR

<Cooling>



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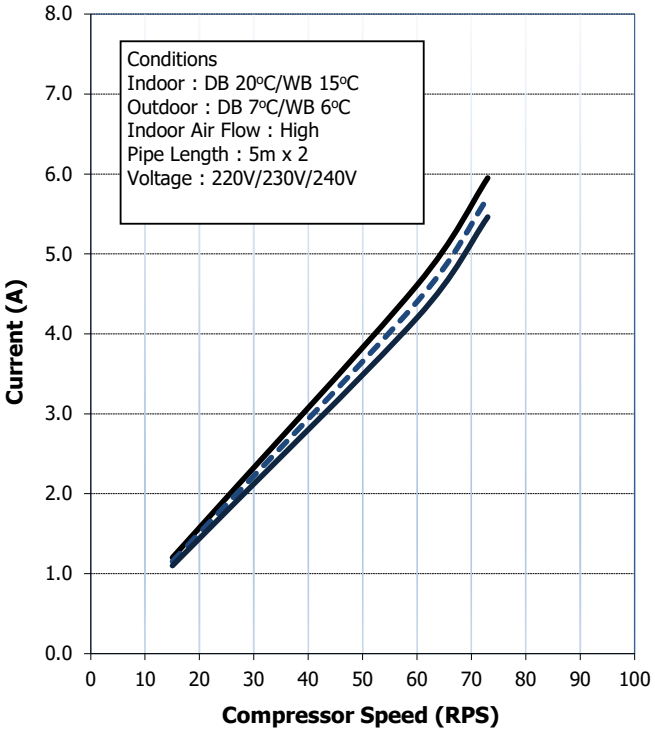
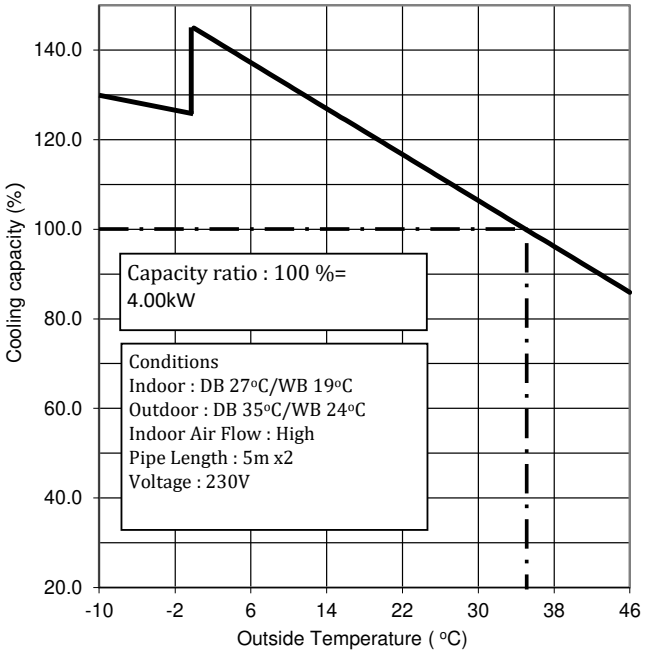


Capacity Variation ratio According to Temperature.

<Cooling>



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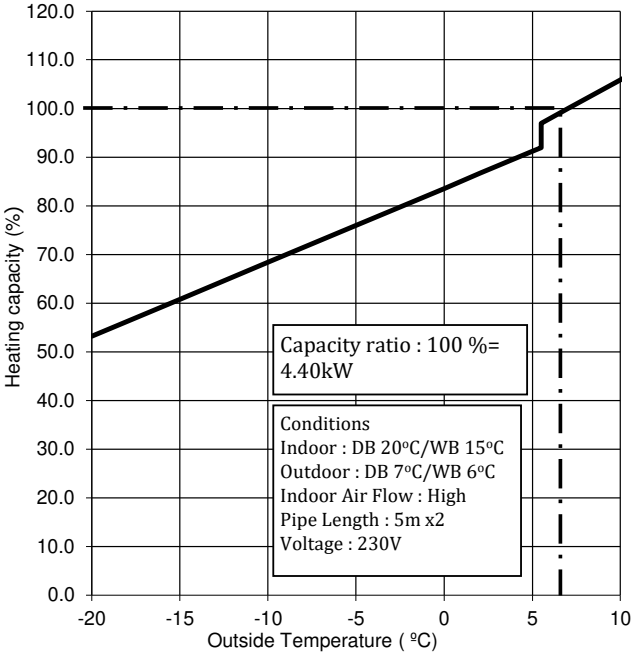


3. REFRIGERANT R32

This air conditioner adopts the new refrigerant HFC (R32) which does not damage the ozone layer.

The next section describes the precautions for air conditioner using the new refrigerant. Conforming to contents of the next section together with the general cautions included in this manual, perform the correct and safe work.

3-1. Safety During Installation/Servicing

The basic installation servicing work procedures are the same as conventional R410A models.
As R32's pressure is about 1.6 times higher than that of R22, improper installation/servicing may cause a serious trouble. By using tools and materi-als exclusive for R32, it is necessary to carry out installation/ servicing safely while taking the following precautions into consideration.

1. Never use refrigerant other than R32 in an air conditioner which is designed to operate with R32. If other refrigerant than R32 is mixed, pressure in the refrigeration cycle becomes abnormally high, and it may cause personal injury, etc. by a rupture.
2. Confirm the used refrigerant name, and use tools and materials exclusive for the refrigerant. The refrigerant name R32 is indicated on the visible place of the outdoor unit of the air conditioner using R32 as refrigerant. To prevent mischarging, the diameter of the service port differs from that of R22. R32 and other HFCs are heavier than air, and therefore they are inclined to settle near the floor surface.
   If the gas fills up the room or the bottom part of a room, it may also cause oxygen deficiency and may reach its combustion concentration.
   In order to prevent oxygen deficiency and R32 combustion, keep the room well-ventilated for a healthy work environment.
   In particular, using HFCs in a basement room or confined area creates a higher risk; be sure to furnish the room with local exhaust ventilation.
   If a refrigerant leak is confirmed in a room an inadequately ventilated location, do not use a flame until the area has been ventilated appropriately and the work environment has been improved.
   The same applies in case of brazing, ensure appropriate ventilation to prevent oxygen deficiency and R32 combustion.
   Check that there are no dangerous or combustible items nearby, and ensure a fire extinguisher is close at hand.
   Keep a sufficient distance away from causes of fire (ignition sources) such as gas-burning equipment and electric heaters in places where installation, repairs, or similar work on air-conditioning equipment is performed.
3. If a refrigeration gas leakage occurs during installation/servicing, be sure to ventilate fully. If the refrigerant gas comes into contact with fire, a poisonous gas may occur.
4. When installing or removing an air conditioner, do not allow air moisture dust or oil to remain in the refrigeration cycle. Otherwise, pressure in the refrigeration cycle may become abnormally high so that a rupture or personal injury may be caused.
5. After completion of installation work, check to make sure that there is no refrigeration gas leakage. If the refrigerant gas leaks into the room, coming into contact with fire in the fan-driven heater, space heater, etc., a poisonous gas may occur
6. When an air conditioning system charged with a large volume of refrigerant is installed in a small room, it is necessary to exercise care so that, even when refrigerant leaks, its concentration does not exceed the marginal level.
   If the refrigerant gas leakage occurs and its concentration exceeds the marginal level, an oxygen starvation accident may result.
7. Be sure to carry out installation or removal according to the installation manual.
   Improper installation may cause refrigeration trouble, water leakage, electric shock, fire, etc.
8. Unauthorized modifications to the air conditioner may be dangerous. If a breakdown occurs please call a qualified air conditioner technician or electrician.
   Improper repair's may result in water leakage, electric shock and fire, etc.

3-2. Refrigerant Piping Installation

3-2-1. Piping Materials and Joints Used

For the refrigerant piping installation, copper pipes and joints are mainly used. Copper pipes and joints suitable for the refrigerant must be chosen and installed. Furthermore, it is necessary to use clean copper pipes and joints whose interior surfaces are less affected by contaminants.

1. Copper Pipes

It is necessary to use seamless copper pipes which are made of either copper or copper alloy and it is desirable that the amount of residual oil is less than 40 mg/10 m. Do not use copper pipes having a collapsed, deformed or discolored portion (especially on the interior surface).

Otherwise, the expansion valve or capillary tube may become blocked with contaminants.

As an air conditioner using R32 incurs pres-sure higher than when using R22, it is necessary to choose adequate materials.

Thicknesses of copper pipes used with R32 are as shown in Table 3-2-1. Never use copper pipes thinner than 0.8 mm even when it is available on the market.

Table 3-2-1 Thicknesses of annealed copper pipes

		Thickness (mm)	
Nominal diameter	**Outer diameter (mm)**	**R32(R410A)**	R22
1/4	6.35	0.80	0.80
3/8	9.52	0.80	0.80
1/2	12.70	0.80	0.80
5/8	15.88	1.00	1.00

2. Joints

For copper pipes, flare joints or socket joints are used. Prior to use, be sure to remove all contaminants.

a) Flare Joints

Flare joints used to connect the copper pipes cannot be used for pipings whose outer diameter exceeds 20 mm. In such a case, socket joints can be used.

Sizes of flare pipe ends, flare joint ends and flare nuts are as shown in Tables 3-2-3 to 3-2-6 below.

b) Socket Joints

Socket joints are such that they are brazed for connections, and used mainly for thick pipings whose diameter is larger than 20 mm.

Thicknesses of socket joints are as shown in Table 3-2-2.

Table 3-2-2 Minimum thicknesses of socket joints

Nominal diameter	Reference outer diameter of copper pipe jointed (mm)	Minimum joint thickness (mm)
1/4	6.35	0.50
3/8	9.52	0.60
1/2	12.70	0.70
5/8	15.88	0.80

3-2-2. Processing of Piping Materials

When performing the refrigerant piping installation, care should be taken to ensure that water or dust does not enter the pipe interior, that no other oil than lubricating oils used in the installed air-water heat pump is used, and that refrigerant does not leak. When using lubricating oils in the piping processing, use such lubricating oils whose water content has been removed. When stored, be sure to seal the container with an airtight cap or any other cover.

1. Flare processing procedures and precautions

a) Cutting the Pipe

By means of a pipe cutter, slowly cut the pipe so that it is not deformed.

b) Removing Burrs and Chips

If the flared section has chips or burrs, refrigerant leakage may occur.
Carefully remove all burrs and clean the cut surface before installation.

c) Insertion of Flare Nut

d) Flare Processing

Make certain that a clamp bar and copper pipe have been cleaned.

By means of the clamp bar, perform the flare processing correctly.

Use either a flare tool for R32 or conventional flare tool.

Flare processing dimensions differ according to the type of flare tool. When using a conventional flare tool, be sure to secure “dimension A” by using a gauge for size adjustment.

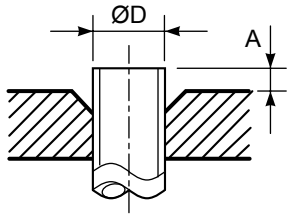


Fig. 3-2-1 Flare processing dimensions

Table 3-2-3 Dimensions related to flare processing for R32(R410A)

Nominal diameter	Outer diameter (mm)	Thickness (mm)	A (mm)		
			Flare tool for R32 clutch type	Conventional flare tool	
				Clutch type	Wing nut type
1/4	6.35	0.8	0 to 0.5	1.0 to 1.5	1.5 to 2.0
3/8	9.52	0.8	0 to 0.5	1.0 to 1.5	1.5 to 2.0
1/2	12.70	0.8	0 to 0.5	1.0 to 1.5	2.0 to 2.5
5/8	15.88	1.0	0 to 0.5	1.0 to 1.5	2.0 to 2.5

Table 3-2-4 Dimensions related to flare processing for R22

Nominal diameter	Outer diameter (mm)	Thickness (mm)	A (mm)		
			Flare tool for R22 clutch type	Conventional flare tool	
				Clutch type	Wing nut type
1/4	6.35	0.8	0 to 0.5	0.5 to 1.0	1.0 to 1.5
3/8	9.52	0.8	0 to 0.5	0.5 to 1.0	1.0 to 1.5
1/2	12.70	0.8	0 to 0.5	0.5 to 1.0	1.5 to 2.0
5/8	15.88	1.0	0 to 0.5	0.5 to 1.0	1.5 to 2.0

Table 3-2-5 Flare and flare nut dimensions for R32(R410A)

Nominal diameter	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width (mm)
			A	B	C	D	
1/4	6.35	0.8	9.1	9.2	6.5	13	17
3/8	9.52	0.8	13.2	13.5	9.7	20	22
1/2	12.70	0.8	16.6	16.0	12.9	23	26
5/8	15.88	1.0	19.7	19.0	16.0	25	29

Table 3-2-6 Flare and flare nut dimensions for R22

Nominal diameter	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width (mm)
			A	B	C	D	
1/4	6.35	0.8	9.0	9.2	6.5	13	17
3/8	9.52	0.8	13.0	13.5	9.7	20	22
1/2	12.70	0.8	16.2	16.0	12.9	20	24
5/8	15.88	1.0	19.7	19.0	16.0	23	27
3/4	19.05	1.0	23.3	24.0	19.2	34	36

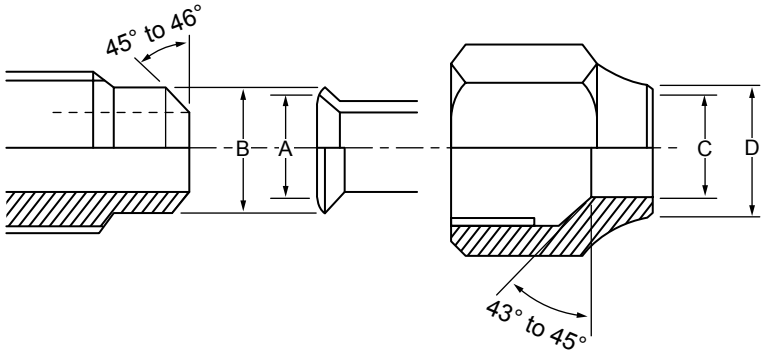


Fig. 3-2-2 Relations between flare nut and flare seal surface

2. Flare Connecting Procedures and Precautions

a) Make sure that the flare and union portions do not have any scar or dust, etc.

b) Correctly align the processed flare surface with the union axis.

c) Tighten the flare with designated torque by means of a torque wrench. The tightening torque for R32 is the same as that for conventional R22. Incidentally, when the torque is weak, the gas leakage may occur. When it is strong, the flare nut may crack and may be made non-removable. When choosing the tightening torque, comply with values designated by manufacturers. Table 3-2-7 shows reference values.

NOTE :

When applying oil to the flare surface, be sure to use oil designated by the manufacturer.
If any other oil is used, the lubricating oils may deteriorate and cause the compressor to burn out.

Table 3-2-7 Tightening torque of flare for R32(R410A) [Reference values]

Nominal diameter	Outer diameter (mm)	Tightening torque N•m (kgf•cm)	Tightening torque of torque wrenches available on the market N•m (kgf•cm)
1/4	6.35	14 to 18 (140 to 180)	16 (160), 18 (180)
3/8	9.52	33 to 42 (330 to 420)	42 (420)
1/2	12.70	50 to 62 (500 to 620)	55 (550)
5/8	15.88	63 to 77 (630 to 770)	65 (650)

3-3. Tools

3-3-1. Required Tools

The service port diameter of packed valve of the outdoor unit in the air-water heat pump using R32 is changed to prevent mixing of other refrigerant. To reinforce the pressure-resisting strength, flare processing dimensions and opposite side dimension of flare nut (For Ø12.7 copper pipe) of the refrigerant piping are lengthened.

The used refrigerating oil is changed, and mixing of oil may cause a trouble such as generation of sludge, clogging of capillary, etc. Accordingly, the tools to be used are classified into the following three types.

1. Tools exclusive for R32 (Those which cannot be used for conventional refrigerant (R22))
2. Tools exclusive for R32, but can be also used for conventional refrigerant (R22)
3. Tools commonly used for R32 and for conventional refrigerant (R22)

The table below shows the tools exclusive for R32 and their interchangeability.

Tools exclusive for R32 (The following tools for R410A are required.)

Tools whose specifications are changed for R32 and their interchangeability

No.	Used tool	Usage	R32(R410A) air-water heat pump installation		Conventional air-water heat pump installation
			Existence of new equipment for R32	Whether conventional equipment can be used	Whether new equipment can be used with conventional refrigerant
1	Flare tool	Pipe flaring	Yes	***(Note 1)**	○
2	Copper pipe gauge for adjusting projection margin	Flaring by conventional flare tool	Yes	***(Note 1)**	***(Note 1)**
3	Torque wrench (For Ø12.7)	Connection of flare nut	Yes	×	×
4	Gauge manifold	Evacuating, refrigerant charge, run check, etc.	Yes	×	×
5	Charge hose				
6	Vacuum pump adapter	Vacuum evacuating	Yes	×	○
7	Electronic balance for refrigerant charging	Refrigerant charge	Yes	×	○
8	Leakage detector	Gas leakage check	Yes	×	○

(Note 1) When flaring is carried out for R32(R410A) using the conventional flare tools, adjustment of projection margin is necessary. For this adjustment, a copper pipe gauge, etc. are necessary.

General tools (Conventional tools can be used.)

In addition to the above exclusive tools, the following equipments which serve also for R22 are necessary as the general tools.

1. Vacuum pump
   Use vacuum pump by attaching vacuum pump adapter.
2. Torque wrench (For Ø6.35, Ø9.52)
3. Pipe cutter
4. Reamer
5. Pipe bender
6. Level vial
7. Screwdriver (+, –)
8. Spanner or Monkey wrench
9. Hole core drill (Ø65)
10. Hexagon wrench (Opposite side 4mm)
11. Tape measure
12. Metal saw

Also prepare the following equipments for other installation method and run check.

1. Clamp meter
2. Thermometer
3. Insulation resistance tester
4. Electroscope

3-4. Recharging of Refrigerant

When it is necessary to recharge refrigerant, charge the specified amount of new refrigerant according to the following steps.

Recover the refrigerant, and check no refrigerant remains in the equipment.

↓

Connect the charge hose to packed valve service port at the outdoor unit's gas side.

↓

Connect the charge hose to the vacuum pump adapter.

↓

Open fully both packed valves at liquid and gas sides.

↓

Place the handle of the gauge manifold Low in the fully opened position, and turn on the vacuum pump's power switch. Then, evacuating the refrigerant in the cycle.

↓

When the compound gauge's pointer has indicated –0.1 Mpa (–76 cmHg), place the handle Low in the fully closed position, and turn off the vacuum pump's power switch.

↓

Keep the status as it is for 1 to 2 minutes, and ensure that the compound gauge's pointer does not return.

↓

Set the refrigerant cylinder to the electronic balance, connect the connecting hose to the cylinder and the connecting port of the electronic balance.

(For refrigerant charging, see the figure below.)

1. Never charge refrigerant exceeding the specified amount.
2. If the specified amount of refrigerant cannot be charged, charge refrigerant **bit by bit** in COOL mode.
3. Do not carry out additional charging.
   When additional charging is carried out if refrigerant leaks, the refrigerant composition changes in the refrigeration cycle, that is characteristics of the air conditioner changes, refrigerant exceeding the specified amount is charged, and working pressure in the refrigeration cycle becomes abnormally high pressure, and may cause a rupture or personal injury.

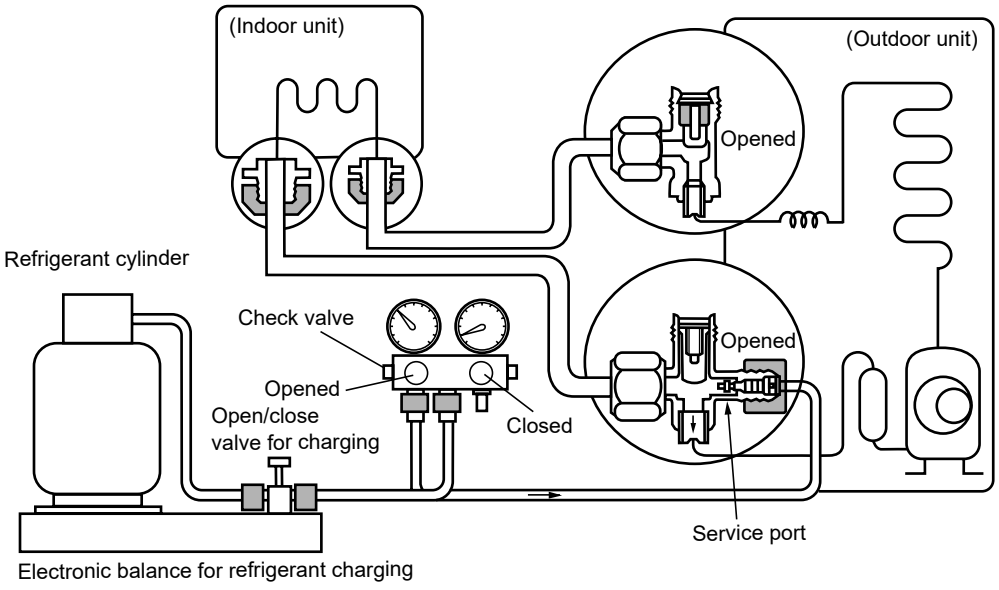


Fig. 3-4-1 Configuration of refrigerant charging

3-5. Brazing of Pipes

3-5-1. Materials for Brazing

1. Silver brazing filler

Silver brazing filler is an alloy mainly composed of silver and copper. It is used to join iron, copper or copper alloy, and is relatively expensive though it excels in solderability.

2. Phosphor bronze brazing filler

Phosphor bronze brazing filler is generally used to join copper or copper alloy.

3. Low temperature brazing filler

Low temperature brazing filler is generally called solder, and is an alloy of tin and lead. Since it is weak in adhesive strength, do not use it for refrigerant pipes.

1. Phosphor bronze brazing filler tends to react with sulfur and produce a fragile compound water solution, which may cause a gas leakage. Therefore, use any other type of brazing filler at a hot spring resort, etc., and coat the surface with a paint.
2. When performing brazing again at time of servicing, use the same type of brazing filler.

3-5-2. Flux

1. Reason why flux is necessary

- By removing the oxide film and any foreign matter on the metal surface, it assists the flow of brazing filler.
- In the brazing process, it prevents the metal surface from being oxidized.
- By reducing the brazing filler's surface tension, the brazing filler adheres better to the treated metal.

2. Characteristics required for flux

- Activated temperature of flux coincides with the brazing temperature.
- Due to a wide effective temperature range, flux is hard to carbonize.
- It is easy to remove slag after brazing.
- The corrosive action to the treated metal and brazing filler is minimum.
- It excels in coating performance and is harmless to the human body.

As the flux works in a complicated manner as described above, it is necessary to select an adequate type of flux according to the type and shape of treated metal, type of brazing filler and brazing method, etc.

3. Types of flux

- **Noncorrosive flux**

  Generally, it is a compound of borax and boric acid.
  It is effective in case where the brazing temperature is higher than 800°C.

- **Activated flux**

  Most of fluxes generally used for silver brazing are this type.
  It features an increased oxide film removing capability due to the addition of compounds such as potassium fluoride, potassium chloride and sodium fluoride to the borax-boric acid compound.

4. Piping materials for brazing and used brazing filler/flux

Piping material	Used brazing filler	Used flux
Copper - Copper	Phosphor copper	Do not use
Copper - Iron	Silver	Paste flux
Iron - Iron	Silver	Vapor flux

1. Do not enter flux into the refrigeration cycle.
2. When chlorine contained in the flux remains within the pipe, the lubricating oil deteriorates. Therefore, use a flux which does not contain chlorine.
3. When adding water to the flux, use water which does not contain chlorine (e.g. distilled water or ion-exchange water).
4. Remove the flux after brazing.

3-5-3. Brazing

As brazing work requires sophisticated techniques, experiences based upon a theoretical knowledge, it must be performed by a person qualified.

In order to prevent the oxide film from occurring in the pipe interior during brazing, it is effective to proceed with brazing while letting dry Nitrogen gas (N2) flow.

Never use gas other than Nitrogen gas.

1. Brazing method to prevent oxidation

1) Attach a reducing valve and a flow-meter to the Nitrogen gas cylinder.
2) Use a copper pipe to direct the piping material, and attach a flow-meter to the cylinder.
3) Apply a seal onto the clearance between the piping material and inserted copper pipe for Nitrogen in order to prevent backflow of the Nitrogen gas.
4) When the Nitrogen gas is flowing, be sure to keep the piping end open.
5) Adjust the flow rate of Nitrogen gas so that it is lower than 0.05 m^3/Hr or 0.02 MPa (0.2kgf/cm^2) by means of the reducing valve.
6) After performing the steps above, keep the Nitrogen gas flowing until the pipe cools down to a certain extent (temperature at which pipes are touchable with hands).
7) Remove the flux completely after brazing.

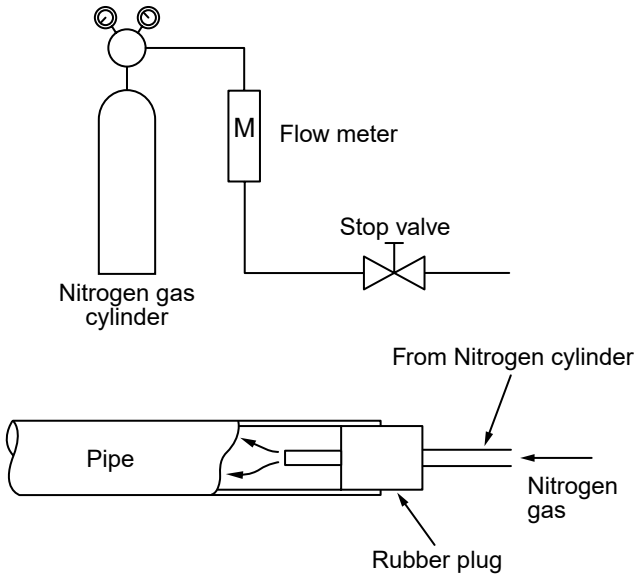
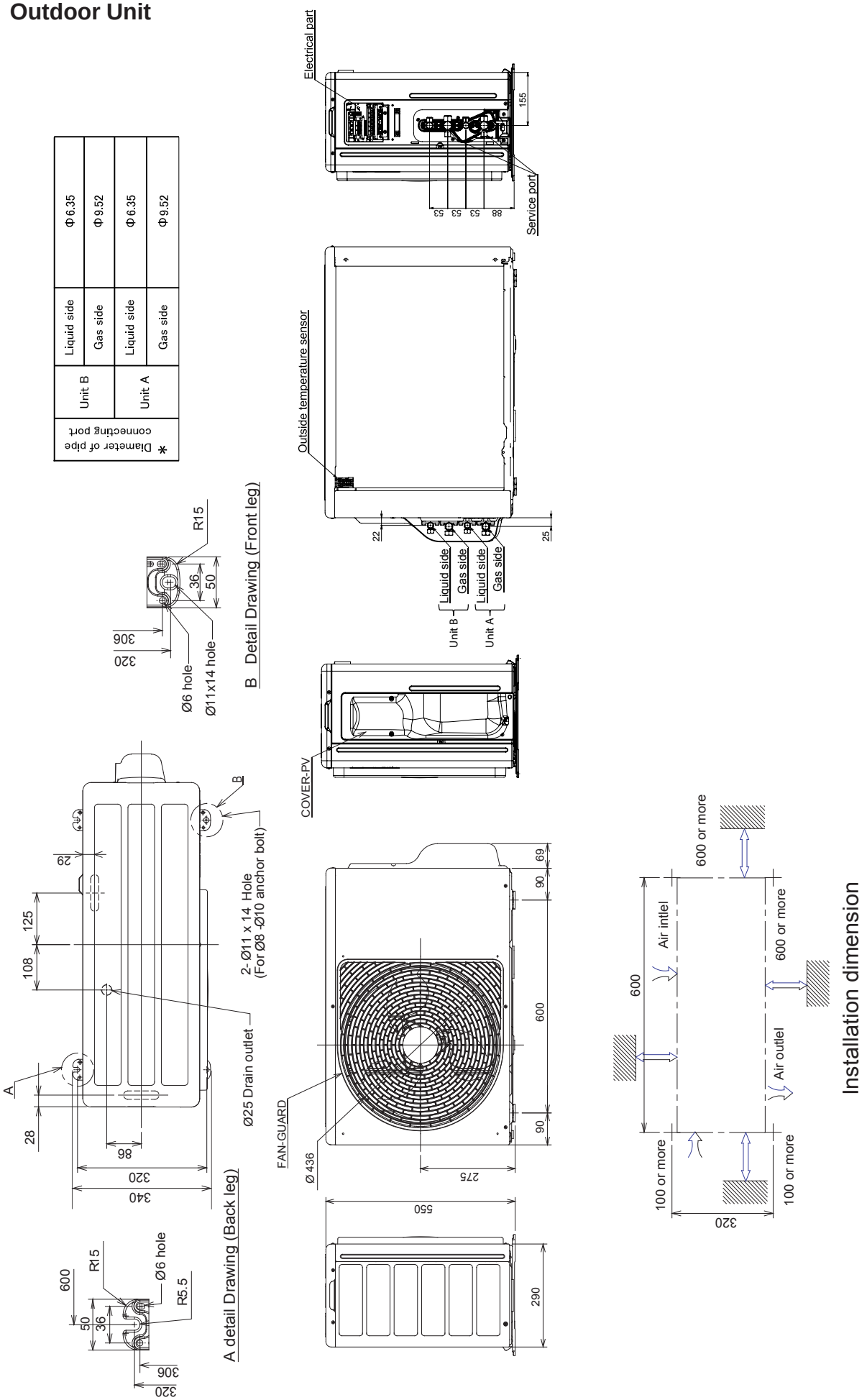


Fig. 3-5-1 Prevention of oxidation during brazing

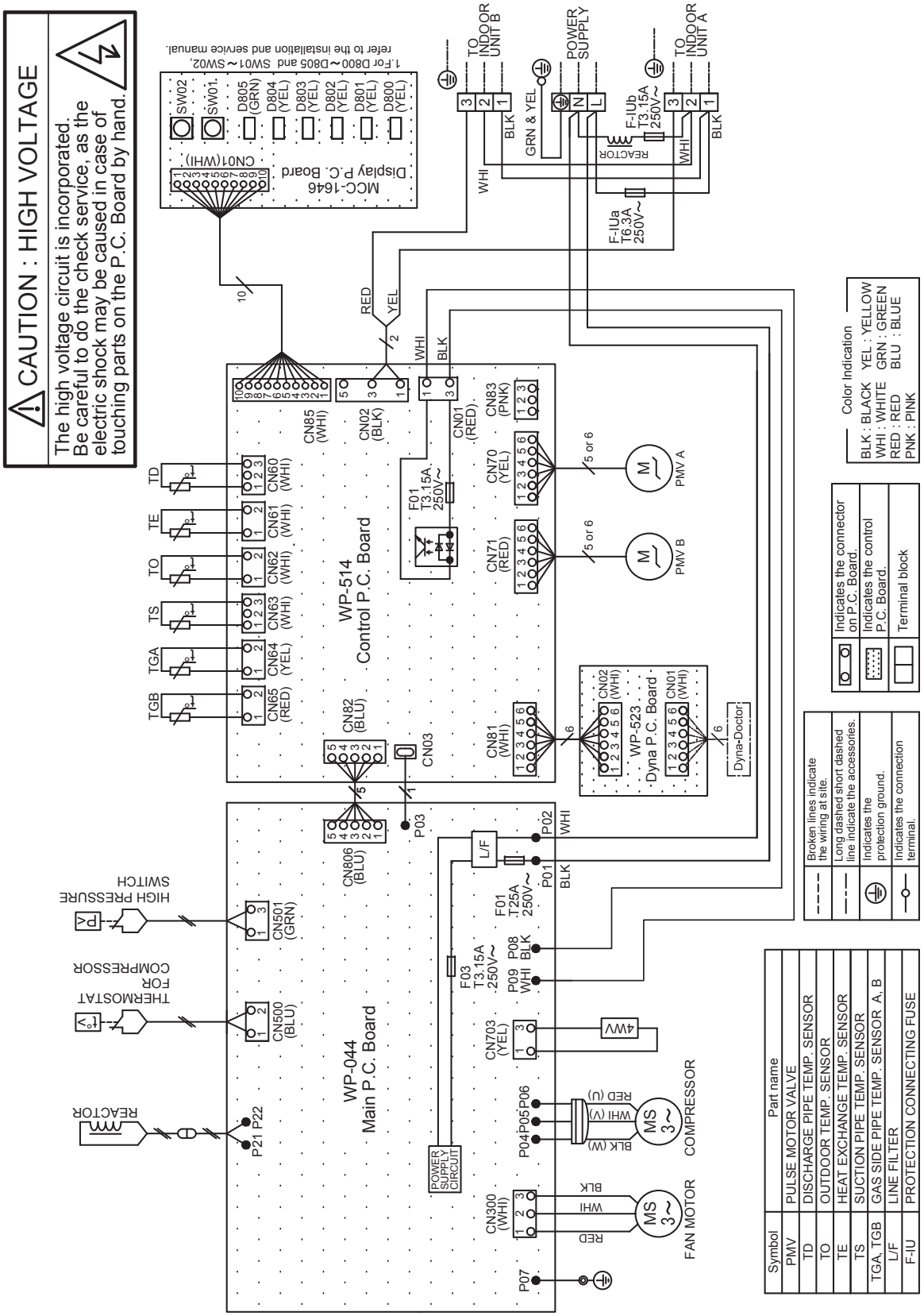
4. CONSTRUCTION VIEWS

4-1. Outdoor Unit



5. WIRING DIAGRAM

Outdoor Unit



6. SPECIFICATIONS OF ELECTRICAL PARTS

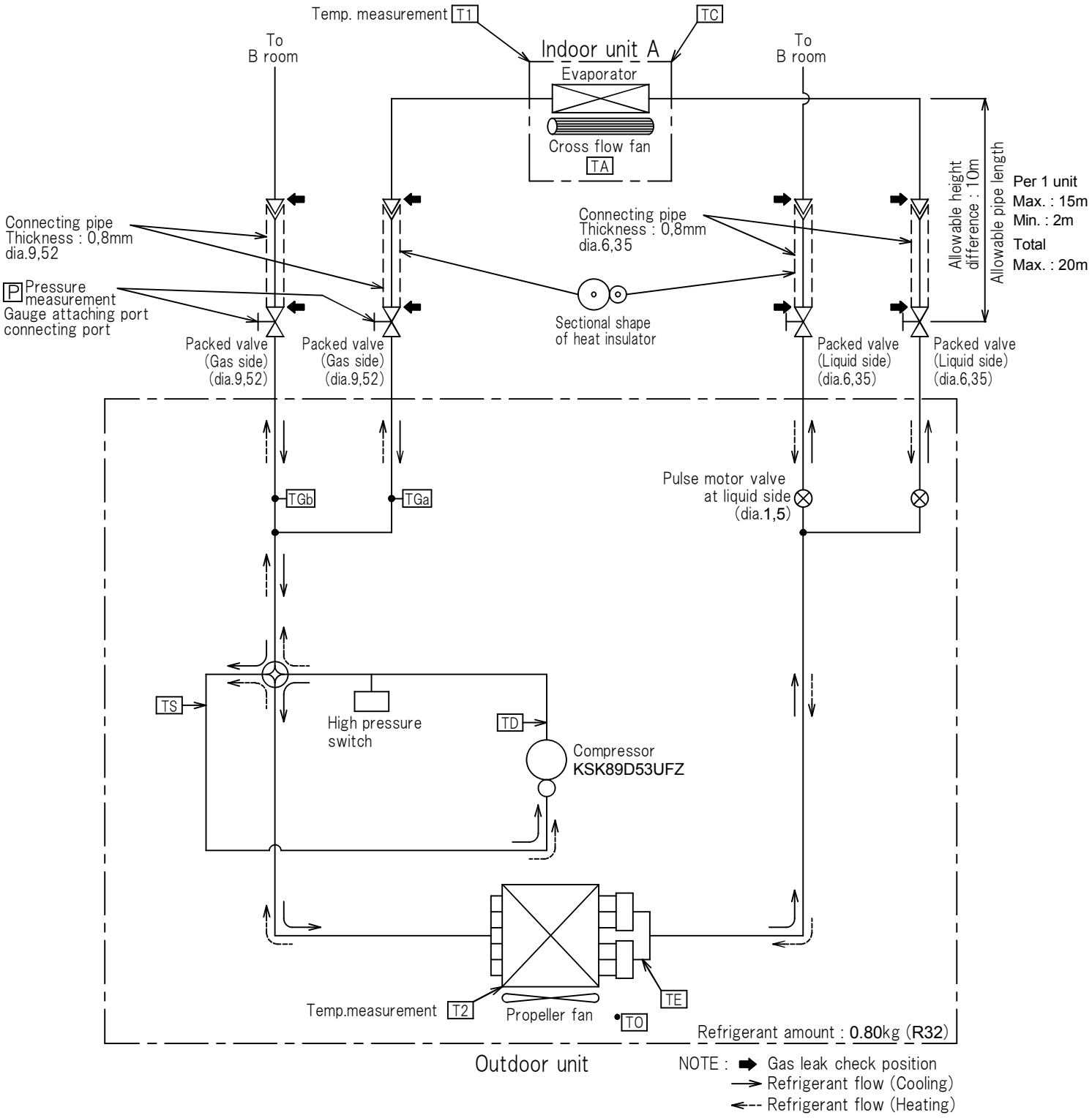
6-1. Outdoor Unit

No.	Parts name		Model name	Rating
1	Compressor	2M10	KSK89D53UFZ	3-Phases(6-Poles);715W
		2M14	KTN130D30UFZ	3-Phases (6-Poles);1075W
2	Outdoor fan motor		WDF-340-A43-1	Output 43W
3	Reactor		CH-69-Z-T	L=19mH、10A
4	Reactor		CH-76	9.9mH、1A
5	4-way valve coil		SQ-A2522G-000352	AC220-240V
6	PMV coil		PQ-M10012-001382	DC12V
7	P.C. board (Main PCB)		WP-044	AC220-240V
8	P.C. board (Control PCB)		WP-514	AC220-240V
9	P.C. board(Display PCB)		MCC-1646	DC5V
10	Fuse (Mounted on P.C. board WP-044)		—	AC250V、25A
11	Fuse		—	AC250V、3.15A、6.3A
12	Fuse (Mounted on P.C. board WP-044, WP-514)		—	AC250V、3.15A
13	Outdoor temp. sensor (TO sensor)		—	10kΩ (25℃)
14	Evaporator temp. sensor (Te sensor)		—	10kΩ (25℃)
15	Discharge temp. sensor (Td sensor)		—	50kΩ (25℃)
16	Suction temp. sensor (Ts sensor)		—	10kΩ (25℃)
17	Temp. sensor at A room gas side (TGA-sensor)		—	10kΩ (25℃)
18	Temp. sensor at B room gas side (TGB-sensor)		—	10kΩ (25℃)
19	Terminal block (6P)		—	AC600V、30A
20	Terminal block (3P)		—	AC250V、20A
21	High-pressure SW		ACB-1UB177W	OFF:4.50MPa

7. REFRIGERANT CYCLE DIAGRAM

7-1. Refrigerant cycle diagram

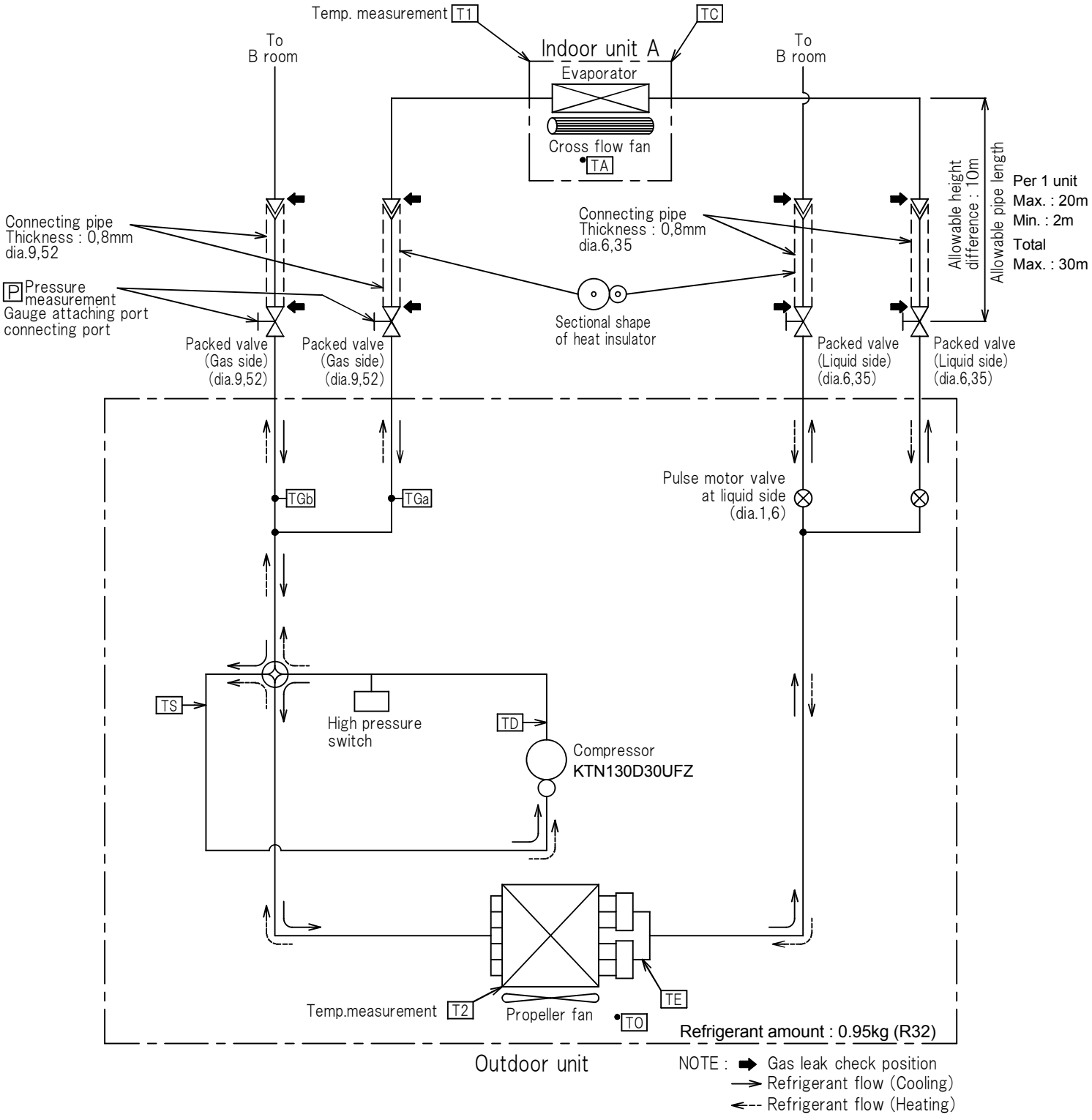
RAS-2M10G3AVG-E, -TR



NOTE :

- You need not add refrigerant if the piping length is 20m or less.
- Connection of only one indoor unit is unavailable. Two indoor units should be connected.

RAS-2M14G3AVG-E, -TR



NOTE :

- You need not add refrigerant if the piping length is 30m or less.
- Connection of only one indoor unit is unavailable. Two indoor units should be connected.

7-2. Operation Data

Outdoor Unit : RAS-2M10G3AVG-E,-TR

<Cooling>

Temperature condition		No.of operating units	Indoor unit					Standard pressure	Heat exchanger pipe temperature		Indoor fan	Compressor revolution
Indoor	Outdoor		A	B	C	D	E	P(MP)	T1(℃)	T2(℃)		(rps)
27/19	35/-	1 FCU	05	—	—	—	—	1.0 to 1.2	14 to 16	39 to 41	High	25
			07	—	—	—	—	0.9 to 1.1	12 to 14	40 to 42	High	35
			10	—	—	—	—	0.8 to 1.0	9 to 11	42 to 44	High	47
		2 FCUs	05	05	—	—	—	1.0 to 1.2	15 to 17	42 to 44	High	44
			07	05	—	—	—	1.0 to 1.2	14 to 16	43 to 45	High	49
			10	05	—	—	—	1.0 to 1.2	14 to 16	43 to 45	High	49
			07	07	—	—	—	1.0 to 1.2	15 to 17	43 to 45	High	47
			10	07	—	—	—	1.0 to 1.2	15 to 17	43 to 45	High	47
			10	10	—	—	—	1.0 to 1.2	15 to 17	43 to 45	High	47

Notes:

1.Measure surface temperature of heat exchanger pipe around of heat exchanger path U bent.(Thermistor thermometer)
2.Connecting piping condition : 5 meters × 2 units(5m/each indoor unit)

Outdoor Unit : RAS-2M10G3AVG-E, -TR

<Heating>

Temperature condition		No.of operating units	Indoor unit					Standard pressure	Heat exchanger pipe temperature		Indoor fan	Compressor revolution
Indoor	Outdoor		A	B	C	D	E	P(MP)	T1(℃)	T2(℃)		(rps)
20/15	7/-	1 unit	05	—	—	—	—	2.3 to 2.5	39 to 41	3 to 5	High	41
			07	—	—	—	—	2.5 to 2.7	42 to 44	2 to 4	High	47
			10	—	—	—	—	3.0 to 3.2	49 to 51	1 to 3	High	61
		2 units	05	05	—	—	—	2.5 to 2.7	42 to 44	0 to 2	High	83
			07	05	—	—	—	2.4 to 2.6	40 to 42	0 to 2	High	80
			10	05	—	—	—	2.4 to 2.6	40 to 42	0 to 2	High	80
			07	07	—	—	—	2.3 to 2.5	38 to 40	0 to 2	High	79
			10	07	—	—	—	2.3 to 2.5	38 to 40	0 to 2	High	79
			10	10	—	—	—	2.3 to 2.5	38 to 40	0 to 2	High	79

Notes:

1.Measure surface temperature of heat exchanger pipe around of heat exchanger path U bent.(Thermistor thermometer)
2.Connecting piping condition : 5 meters × 2 units(5m/each indoor unit)

Outdoor Unit : RAS-2M14G3AVG-E,-TR

<Cooling>

Temperature condition		No.of operating	Indoor unit					Standard pressure	Heat exchanger pipe temperature		Indoor fan	Compressor revolution
Indoor	Outdoor	units	A	B	C	D	E	P(MP)	T1(℃)	T2(℃)		(rps)
27/19	35/-	1 FCU	05	—	—	—	—	1.1 to 1.3	16 to 18	38 to 40	High	19
			07	—	—	—	—	1.0 to 1.2	15 to 17	39 to 41	High	23
			10	—	—	—	—	0.9 to 1.1	13 to 15	40 to 42	High	32
			13	—	—	—	—	0.8 to 1.0	10 to 12	43 to 45	High	50
		2 FCUs	05	05	—	—	—	1.1 to 1.3	17 to 19	40 to 42	High	33
			07	05	—	—	—	1.1 to 1.3	16 to 18	41 to 43	High	39
			10	05	—	—	—	1.0 to 1.2	15 to 17	42 to 44	High	46
			13	05	—	—	—	1.1 to 1.3	15 to 17	42 to 44	High	44
			07	07	—	—	—	1.1 to 1.3	15 to 17	42 to 44	High	45
			10	07	—	—	—	1.1 to 1.3	15 to 17	42 to 44	High	45
			13	07	—	—	—	1.1 to 1.3	16 to 18	42 to 44	High	43
			10	10	—	—	—	1.1 to 1.3	15 to 17	42 to 44	High	45
			13	10	—	—	—	1.1 to 1.3	16 to 18	42 to 44	High	43
			13	13	—	—	—	1.1 to 1.3	17 to 19	42 to 44	High	41

Notes:

1.Measure surface temperature of heat exchanger pipe around of heat exchanger path U bent.(Thermistor thermometer)
2.Connecting piping condition : 5 meters × 2 units(5m/each indoor unit)

Outdoor Unit : RAS-2M14G3AVG-E, -TR

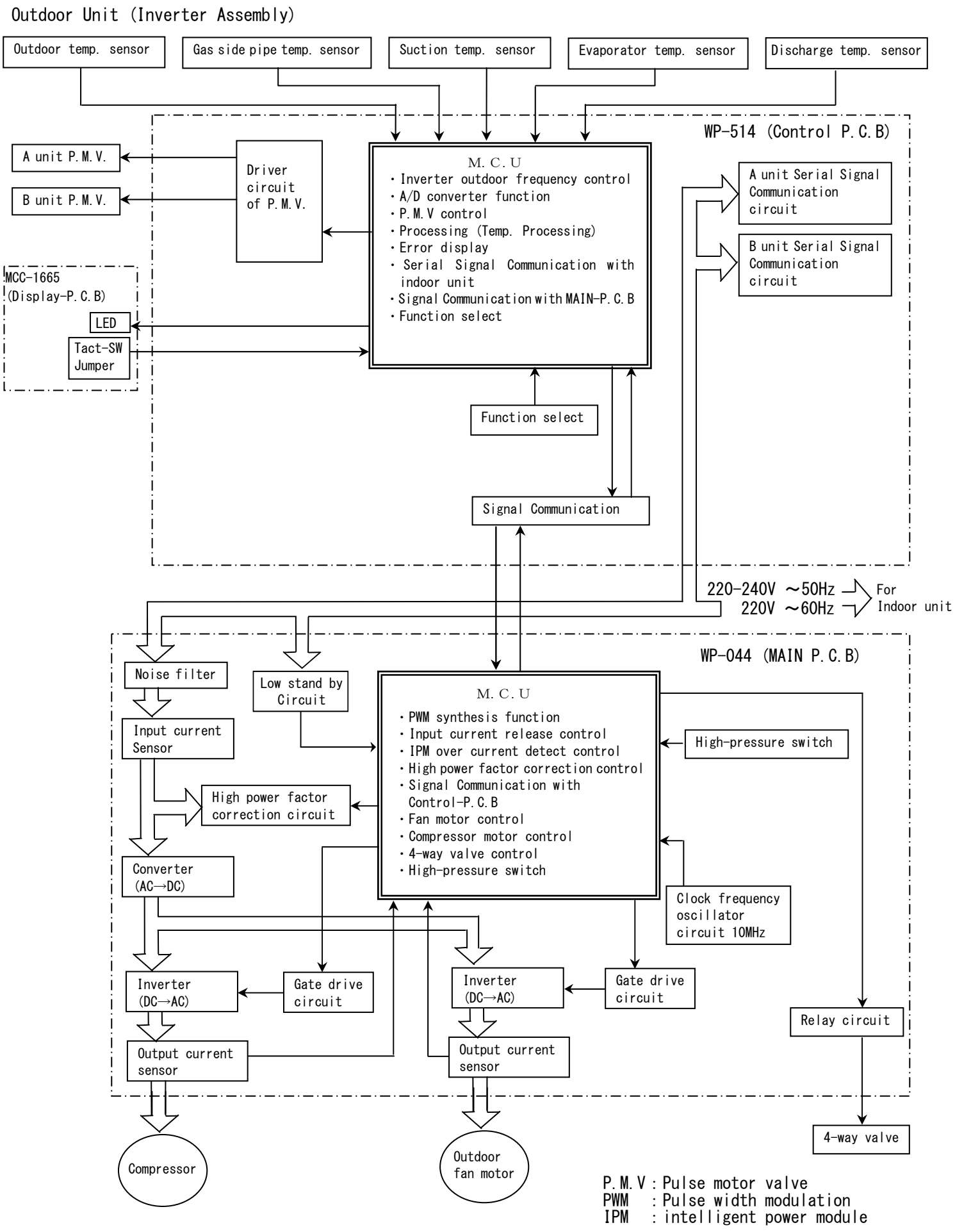
<Heating>

Temperature condition		No.of operating	Indoor unit					Standard pressure	Heat exchanger pipe temperature		Indoor fan	Compressor revolution
Indoor	Outdoor	units	A	B	C	D	E	P(MP)	T1(℃)	T2(℃)		(rps)
20/15	7/-	1 unit	05	—	—	—	—	1.8 to 2.0	31 to 33	4 to 6	High	26
			07	—	—	—	—	2.0 to 2.2	34 to 36	3 to 5	High	32
			10	—	—	—	—	2.3 to 2.5	39 to 41	3 to 5	High	42
			13	—	—	—	—	2.8 to 3.0	47 to 49	1 to 3	High	61
		2 units	05	05	—	—	—	2.0 to 2.2	34 to 36	1 to 3	High	55
			07	05	—	—	—	2.0 to 2.2	35 to 37	1 to 3	High	62
			10	05	—	—	—	2.0 to 2.2	35 to 37	1 to 3	High	62
			13	05	—	—	—	2.0 to 2.2	33 to 35	1 to 3	High	61
			07	07	—	—	—	2.0 to 2.2	34 to 36	1 to 3	High	61
			10	07	—	—	—	2.0 to 2.2	34 to 36	1 to 3	High	61
			13	07	—	—	—	1.9 to 2.1	32 to 34	1 to 3	High	61
			10	10	—	—	—	2.0 to 2.2	34 to 36	1 to 3	High	61
			13	10	—	—	—	1.9 to 2.1	32 to 34	1 to 3	High	61
			13	13	—	—	—	1.8 to 2.0	31 to 33	1 to 3	High	59

Notes:

1.Measure surface temperature of heat exchanger pipe around of heat exchanger path U bent.(Thermistor thermometer)
2.Connecting piping condition : 5 meters × 2 units(5m/each indoor unit)

8. CONTROL BLOCK DIAGRAM



9. OPERATION DESCRIPTION

9-1. Outline of Air Conditioner Control

This air conditioner is a capacity-variable type air conditioner, which uses DC motor for the indoor fan motor and the outdoor fan motor. And the capacity-proportional control compressor which can change the motor speed in the range from 13 to 110 rps is mounted. The DC motor drive circuit is mounted to the indoor unit. The compressor and the inverter to control fan motor are mounted to the outdoor unit.
The entire air conditioner is mainly controlled by the indoor unit controller.
The indoor unit controller drives the indoor fan motor based upon command sent from the remote controller, and transfers the operation command to the outdoor unit controller.
The outdoor unit controller receives operation command from the indoor unit side, and controls the outdoor fan and the pulse motor valve. (PMV)
Besides, detecting revolution position of the compressor motor, the outdoor unit controller controls speed of the compressor motor by controlling output voltage of the inverter and switching timing of the supply power (current transfer timing) so that motors drive according to the operation command.
And then, the outdoor unit controller transfers reversely the operating status information of the outdoor unit to control the indoor unit controller.

As the compressor adopts four-pole brushless DC motor, the frequency of the supply power from inverter to compressor is two-times cycles of the actual number of revolution.

1. Role of indoor unit controller

The indoor unit controller judges the operation commands from the remote controller and assumes the following functions.

- Judgment of suction air temperature of the indoor heat exchanger by using the indoor temp. sensor. (TA sensor)
- Judgment of the indoor heat exchanger temperature by using heat exchanger sensor (TC sensor) (Prevent-freezing control, etc.)
- Louver motor control
- Indoor fan motor operation control
- LED (Light Emitting Diode) display control
- Transferring of operation command signal (Serial signal) to the outdoor unit
- Reception of information of operation status (Serial signal including outside temp. data) to the outdoor unit and judgment/display of error
- Air purifier operation control

2. Role of outdoor unit controller

Receiving the operation command signal (Serial signal) from the indoor unit controller, the outdoor unit performs its role.

- Compressor operation control
- Operation control of outdoor fan motor
- P.M.V. control
- 4-way valve control

} Operations followed to judgment of serial signal from indoor side.

- Detection of inverter input current and current release operation
- Over-current detection and prevention operation to IGBT module (Compressor stop function)
- Compressor and outdoor fan stop function when serial signal is off (when the serial signal does not reach the board assembly of outdoor control by trouble of the signal system)
- Transferring of operation information (Serial signal) from outdoor unit controller to indoor unit controller
- Detection of outdoor temperature and operation revolution control
- Defrost control in heating operation (Temp. measurement by outdoor heat exchanger and control for 4-way valve and outdoor fan)

3. Contents of operation command signal (Serial signal) from indoor unit controller to outdoor unit controller

The following three types of signals are sent from the indoor unit controller.

- Operation mode set on the remote controller
- Compressor revolution command signal defined by indoor temperature and set temperature (Correction along with variation of room temperature and correction of indoor heat exchanger temperature are added.)
- Temperature of indoor heat exchanger
- For these signals ([Operation mode] and [Compressor revolution] indoor heat exchanger temperature), the outdoor unit controller monitors the input current to the inverter, and performs the followed operation within the range that current does not exceed the allowable value.

4. Contents of operation command signal (Serial signal) from outdoor unit controller to indoor unit controller

The following signals are sent from the outdoor unit controller.

- The current operation mode
- The current compressor revolution
- Outdoor temperature
- Existence of protective circuit operation

  For transferring of these signals, the indoor unit controller monitors the contents of signals, and judges existence of trouble occurrence.

  Contents of judgment are described below.
  - Whether distinction of the current operation status meets to the operation command signal
  - Whether protective circuit operates

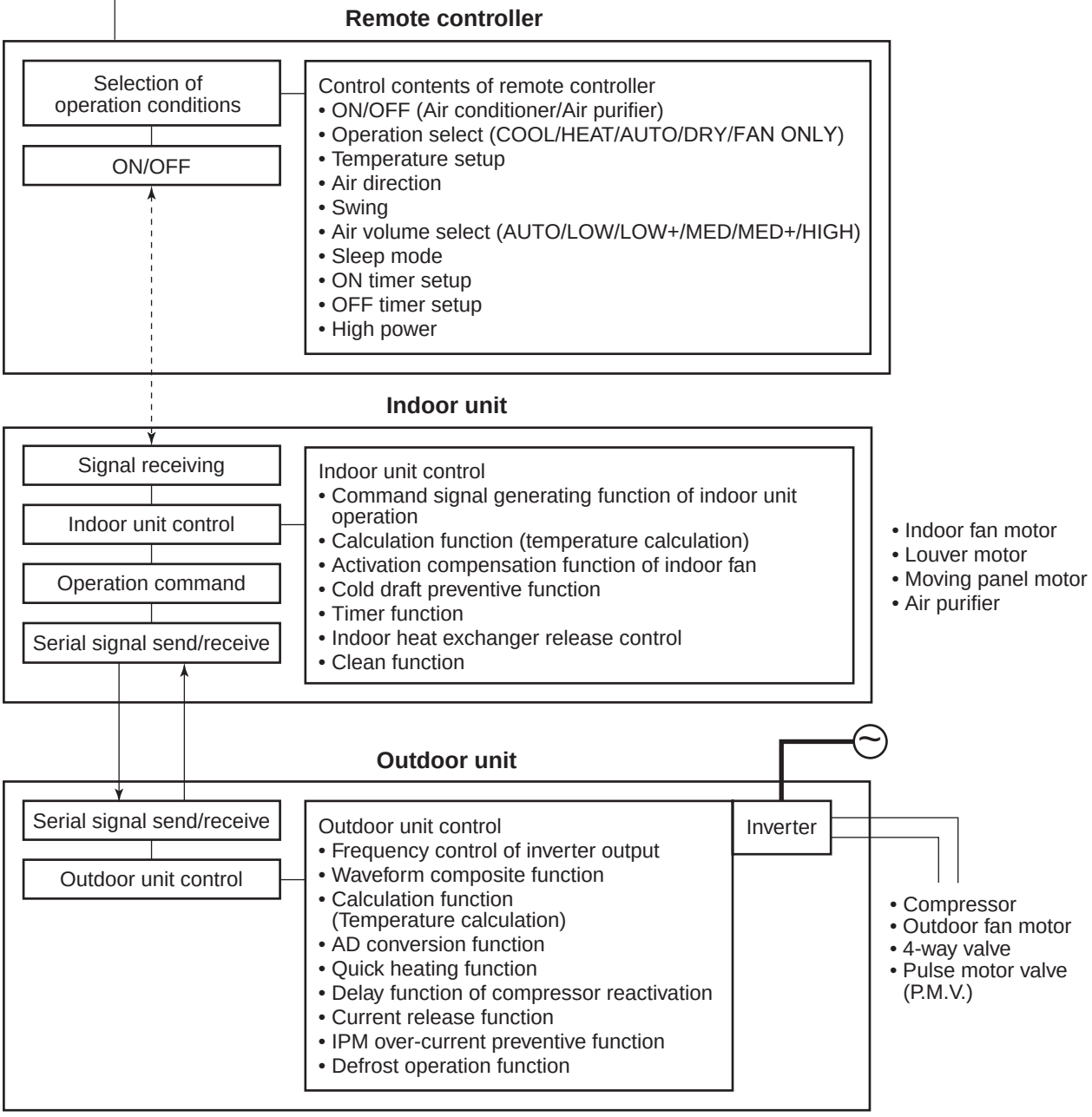
    When no signal is received from the outdoor unit controller, it is assumed as a trouble.

9-2. Operation Description

Item	Operation flow and applicable data, etc.	Description
1. Basic operation	**1. Operation control**	

Receiving the user's operation condition setup, the operation statuses of indoor/outdoor units are controlled.

1) The operation conditions are selected by the remote controller as shown in the below.
2) A signal is sent by ON button of the remote controller.
3) The signal is received by a sensor of the indoor unit and processed by the indoor controllers as shown in the below.
4) The indoor controller controls the indoor fan motor and louver motor.
5) The indoor controller sends the operation command to the outdoor controller, and sends/receives the control status with a serial signal.
6) The outdoor controller controls the operation as shown in the below, and also controls the compressor, outdoor fan motor, 4-way valve and pulse motor valve.



Item	Operation flow and applicable data, etc.	Description
1. Basic operation		

2. Operating mode selection when performing 2-room operation

1) The outdoor unit operating mode conforms to the instructions of the indoor unit that was pushed first.
2) When combined operation consisting of cooling (dry) and heating, fan (air purification) and heating, or cleaning operation and heating is performed, operation conforms to the instructions of the indoor unit that was pushed first as shown in the following table.
3) The indoor fan stops for the indoor unit that was pushed last and which instructions are ignored.
4) When three or four indoor units are operated concurrently, the priority is also given to operating mode of the indoor unit which was pushed first as same as the case when two indoor units are operated concurrently.

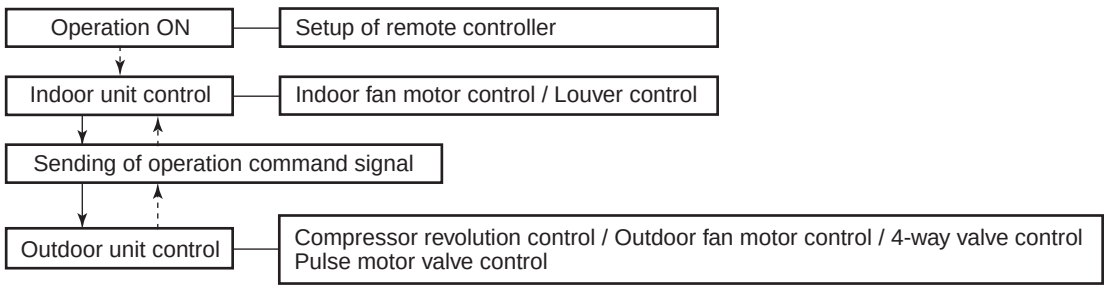
No.	Indoor unit	Set operating mode	Actual indoor unit operation	Actual outdoor unit operation
1	Pushed first	Cooling (dry)	Cooling (dry)	Cooling
	Pushed last	Cooling (dry)	Cooling (dry)	
2	Pushed first	Heating	Heating	Heating
	Pushed last	Heating	Heating	
3	Pushed first	Fan (solo air purification)	Fan (solo air purification)	Stopped
	Pushed last	Fan (solo air purification)	Fan (solo air purification)	
4	Pushed first	Fan (solo air purification)	Fan (solo air purification)	Cooling
	Pushed last	Cooling (dry)	Cooling (dry)	
5	Pushed first	Cooling (dry)	Cooling (dry)	Cooling
	Pushed last	Fan (solo air purification)	Fan (solo air purification)	
6	Pushed first	Cooling (dry)	Cooling (dry)	Cooling
	Pushed last	Heating	Fan stopped	
7	Pushed first	Heating	Heating	Heating
	Pushed last	Cooling (dry)	Fan stopped	
8	Pushed first	Fan (solo air purification)	Fan (solo air purification)	Stopped
	Pushed last	Heating	Fan stopped	
9	Pushed first	Heating	Heating	Heating
	Pushed last	Fan (solo air purification)	Fan stopped	
10	Pushed first	Cleaning operation	Cleaning operation	Stopped
	Pushed last	Cleaning operation	Cleaning operation	
11	Pushed first	Cleaning operation	Cleaning operation	Cooling
	Pushed last	Cooling (dry)	Cooling (dry)	
12	Pushed first	Cooling (dry)	Cooling (dry)	Cooling
	Pushed last	Cleaning operation	Cleaning operation	
13	Pushed first	Cleaning operation	Cleaning operation	Stopped
	Pushed last	Fan (solo air purification)	Fan (solo air purification)	
14	Pushed first	Fan (solo air purification)	Fan (solo air purification)	Stopped
	Pushed last	Cleaning operation	Cleaning operation	
15	Pushed first	Cleaning operation	Cleaning operation	Stopped
	Pushed last	Heating	Fan stopped	
16	Pushed first	Heating	Heating	Heating
	Pushed last	Cleaning operation	Fan stopped	

3. Cooling/Heating operation

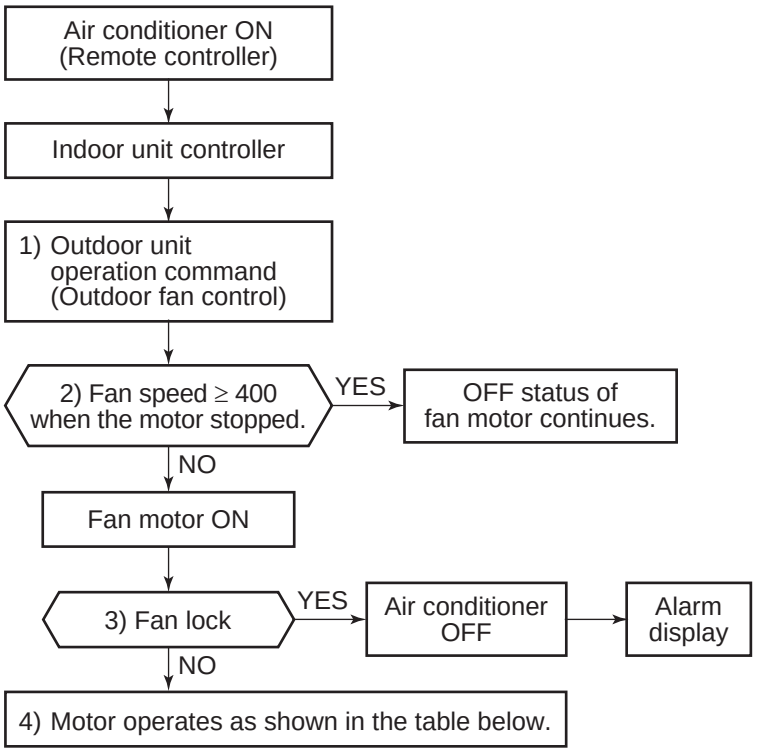
The operations are performed in the following parts by controls according to cooling/heating conditions.

1) Receiving the operation ON signal of the remote controller, the cooling or heating operation signal starts being transferred from the indoor controller to the outdoor unit.
2) At the indoor unit side, the indoor fan is operated according to the contents of "**2. Indoor fan motor control**" and the louver according to the contents of "**Louver control**", respectively.
3) The outdoor unit controls the outdoor fan motor, compressor, pulse motor valve (PMV) and 4-way valve according to the operation signal sent from the indoor unit.

∗1. The relay of 4-way valve is turned on, for a few seconds when 4-way valve is driven.



Item	Operation flow and applicable data, etc.	Description
2. Outdoor fan motor control	The blowing air volume at the outdoor unit side is controlled. Receiving the operation command from the controller of indoor unit, the controller of outdoor unit controls fan speed. ∗ For the fan motor, a DC motor with non-stage variable speed system is used. However, it is limited to 8 stages for reasons of controlling.	1) The operation command sent from the remote controller is processed by the indoor unit controller and transferred to the controller of the outdoor unit. 2) When strong wind blows at outdoor side, the operation of air conditioner continues with the fan 3) motor stopped. Whether the fan is locked or not is detected, and the operation of air conditioner stops and an 4) alarm is displayed if the fan is locked. According to each operation mode, by the conditions of outdoor temperature (To) and compressor revolution, the speed of the outdoor fan shown in the table is selected.



Cooling operation, dry operation

Compressor revolution (rps)			～20	～42	～55	56～
Outdoor temp. sensor To	Normal operation	To≧38℃	350	630	700	800
		28≦To＜38℃	350	550	630	700
		15≦To＜28℃	300	550	550	630
		10≦To＜15℃	300	470	470	550
		5≦To＜10℃	300	350	350	470
		0≦To＜5℃	300	300	300	350
		To＜0℃	0	0～300	0～300	0～300
	Sleep or quiet operation	To≧38℃	350*	550*	630*	700*
		To＜38℃	300*	470*	550*	630*
	To is abnormal		300～350	300～550	300～630	300～700

*Maximum revolution

To : Outdoor temp. sensor

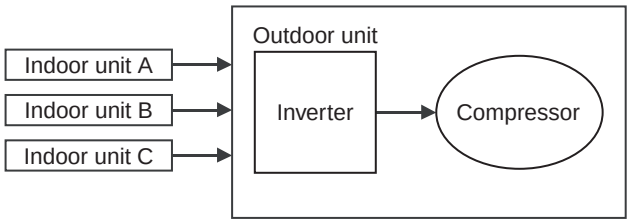
Heating operation

Compressor revolution (rps)			～31	～46	47～
Outdoor temp. sensor To	Normal operation	To≧10℃	420	470	550
		0≦To＜10℃	470	550	630
		-5≦To＜0℃	680	680	680
		To＜-5℃	680	680	680
	Sleep or quiet operation	To≧10℃	420*	420*	470*
		0≦To＜10℃	470*	470*	550*
		-5≦To＜0℃	550*	550*	550*
		To＜-5℃	550*	550*	550*
	To is abnormal		550	550	630

*Maximum revolution

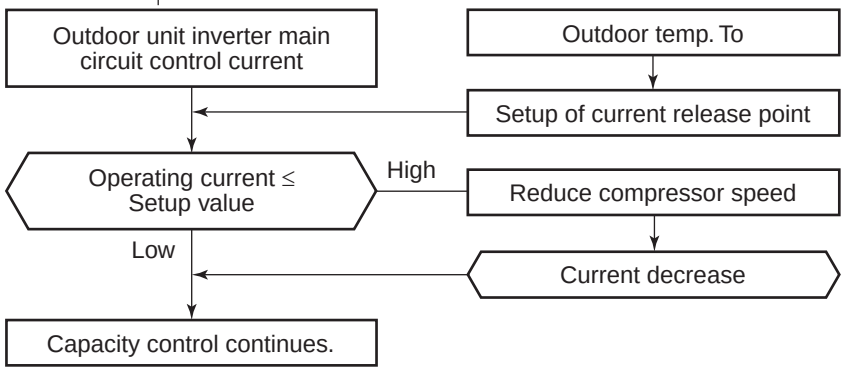
To : Outdoor temp. sensor

Item	Operation flow and applicable data, etc.	Description
3. Capacity control	1) Four indoor units from A to E determine the respective instruction revolutions from the difference between the remote controller setting temperature (Ts) and the indoor temperature (Ta), and transmit this to the outdoor unit. 2) The outdoor unit receives the instructions from the indoor units, and the inverter operates the compressor at the calculated revolutions. 3) The compressor operation range in each operating mode is shown in the left table.	
4. Current release control	This function prevents troubles on the electronic parts of the compressor driving inverter. This function also controls drive circuit of the compressor speed so that electric power of the compressor drive circuit does not exceed the specified value.	1) The input current of the outdoor unit is detected in the inverter section of the outdoor unit. 2) According to the detected outdoor temperature, the specified value of the current is selected. 3) Whether the current value exceeds the specified value or not is judged. 4) If the current value exceeds the specified value, this function reduces the compressor speed and controls speed up to the closest one commanded from the indoor unit within the range which does not exceed the specified value.

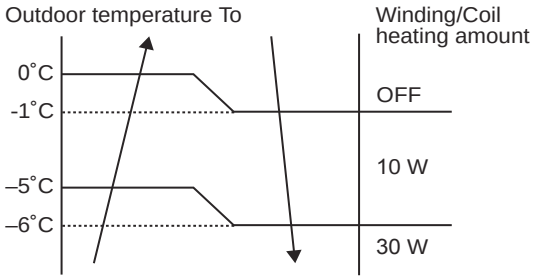
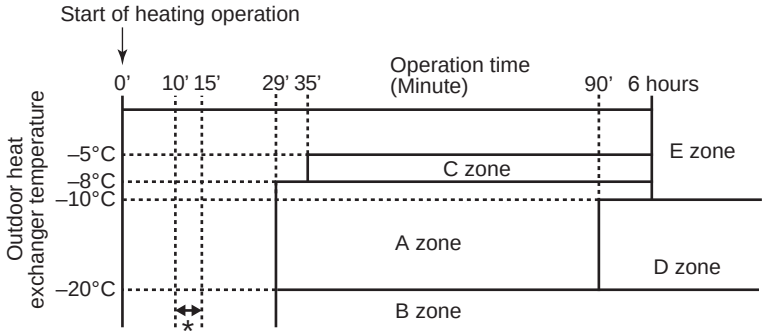


Operation mode	No.of operating unit	Combination of indoor units (kBTU)	Compressor revolution (rps)	Operation mode	No.of operating unit	Combination of indoor units (kBTU)	Compressor revolution (rps)
COOL	1 unit	05	20～50	HEAT	1 unit	05	20～60
		07	20～55			07	20～70
		10	20～55			10	20～70
	2 units	*	20～68		2 units	*	20～92
	Sleep or quiet operation	-	～33		Sleep or quiet operation	-	～38

* In case that any multiple indoor units are combined.



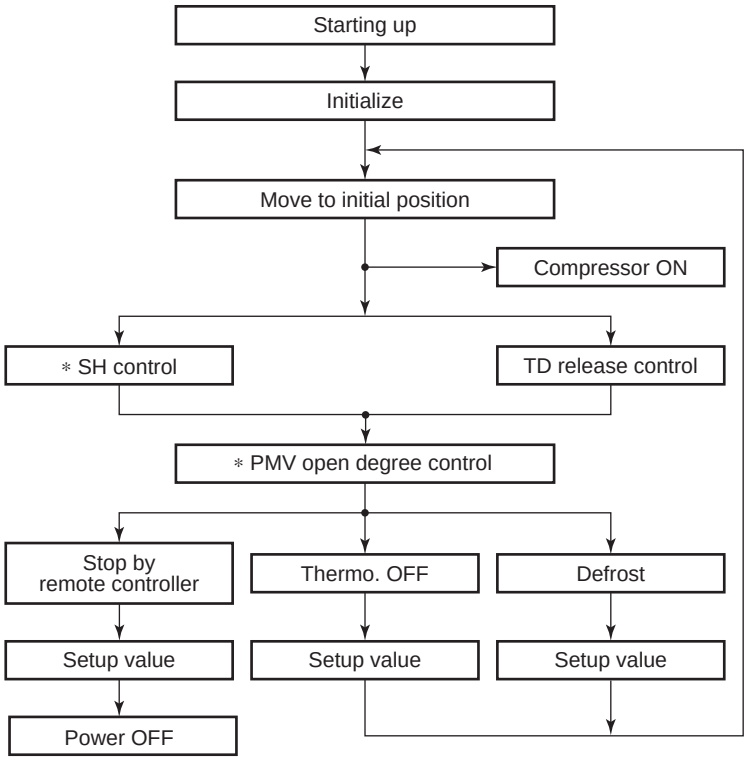
Outdoor temp.		Cooling current release value	Heating current release value
45˚C			
40˚C	44˚C	7.6 A	8.2 A
16˚C	39˚C	7.6 A	
11˚C	15.5˚C	7.6 A	
	10.5˚C		8.2 A
			8.2 A

<table>
<tr><th>Item</th><th>Operation flow and applicable data, etc.</th><th>Description</th></tr>
<tr><td>5. Winding/Coil heating control</td><td>When the outdoor temperature is low, the windings/coils are heated to ensure compressor reliability.
 
</td><td>Winding/Coil heating is performed when the following conditions are met.
Condition 1 :
When the discharge sensor temperature (Td) is less than 30°C.
Condition 2 :
When the outdoor sensor temperature (To) is as shown in the left figure.</td></tr>
<tr><td>6. Defrost control (Only in heating operation)</td><td>(This function removes frost adhered to the outdoor heat exchanger.)
The temperature sensor of the outdoor heat exchanger (Te sensor) judges the frosting status of the outdoor heat exchanger and the defrost operation is performed with 4-way valve reverse defrost system.
 

* The minimum value of Te sensor 10 to 15 minutes after start of operation is stored in memory as Te0 and Te1. (–10°C < Te1 ≤ 10°C)
Table 1
<table>
<tr><td>A zone</td><td>When Te0 - TE ≥ 2.5 continued for 2 minutes in A zone, defrost operation starts.</td></tr>
<tr><td>B zone</td><td>When the operation continued for 2 minutes in B zone, defrost operation starts.</td></tr>
<tr><td>C zone</td><td>When Te0 - TE ≥ 3 continued for 2 minutes in C zone, defrost operation starts.</td></tr>
<tr><td>D zone</td><td>When the operation continued for 2 minutes in D zone, defrost operation starts.</td></tr>
<tr><td>E zone</td><td>When Te1 - TE ≥ 1 continued for 2 minutes in E zone, defrost operation starts.</td></tr>
</table></td><td>The necessity of defrost operation is detected by the outdoor heat exchanger temperature. The conditions to detect the necessity of defrost operation differ in A, B, C, D or E zone each. (Table 1)
<Defrost operation>
• Defrost operation in A to E zones
1) Stop operation of the compressor for 30 seconds.
2) Invert (OFF) 4-way valve 10 seconds after stop of the compressor.
3) The outdoor fan stops at the same time when the compressor stops.
4) When temperature of the indoor heat exchanger becomes 38°C or lower, stop the indoor fan.
<Finish of defrost operation>
• Returning conditions from defrost operation to heating operation
1) Temperature of outdoor heat exchanger rises to +8°C or higher.
2) Temperature of outdoor heat exchanger is kept at +5°C or higher for 80 seconds.
3) Defrost operation continues for 10 minutes.
<Returning from defrost operation>
1) Stop operation of the compressor for approx. 60 seconds.
2) Invert (ON) 4-way valve approx. 40 seconds after stop of the compressor.
3) The outdoor fan starts rotating at the same time when the compressor starts.</td></tr>
<tr><td>7. Compressor protective control</td><td colspan="2">1) This control purposes to raise the operation frequency until 45Hz for 2 minutes in order to protect the compressor (Prevention of oil accumulation in the refrigerating cycle) when the status that the operation frequency is 45Hz or less has continued for 10 hours was calculated.
The operation frequency follows the normal indoor command after controlling.
2) Although the compressor may stop by THERMO-OFF control when the room temperature varies and then attains the set temperature by this control, it is not abnormal.
3) During this control works, it stopping the operation by the remote controller, the operation does not continue.</td></tr>
</table>

Item	Operation flow and applicable data, etc.	Description
8. Discharge temperature control		**1. Purpose** This function detects error on the refrigerating cycle or error on the compressor, and performs protective control. **2. Operation** • Control of the compressor speed The speed control is performed as described in the left table based upon the discharge temperature.
9. Pulse motor valve (PMV) control	This function controls throttle amount of the refrigerant in the refrigerating cycle. According to operating status of the air conditioner, this function also controls the open degree of valve with an expansion valve with pulse motor.	1) When starting the operation, move the valve once until it fits to the stopper. (Initialize) ∗ In this time, “Click” sound may be heard. 2) Adjust the open degree of valve by super heat amount. (SH control) 3) If the discharge temperature was excessively up, adjust the open degree of valve so that it is in the range of set temperature. (Discharge temp. control) 4) When defrost operation is performed, the open degree of PMV is adjusted according to each setup conditions during preparation for defrost and during defrost operation (4-way valve is inversed.). 5) When turning off the compressor by thermo. OFF or STOP by remote controller, the open degree of the PMV is adjusted to the setup value.
10. High-pressure switch/ Compressor case thermostat control	1) When the high-pressure switch or the compressor case thermostat operates, the operation of the compressor is terminated. 2) The compressor restarts after 2 minutes 30 seconds using [1] as an error count. After restart, the error count is cleared when operation continues for 10 minutes or more. 3) An error is confirmed with the error count [10]. 4) For the indicated contents of error, confirm using the check code table.	

Td value	Control operation
120°C	Judges as an error and stops the compressor.
115°C	Reduce the compressor speed.
111°C	Reduce slowly compressor speed.
108°C	Keeps the compressor speed.
101°C	If the operation is performed with lower speed than one commanded by the serial signal, speed is slowly raised up to the commanded speed.
	Operates with speed commanded by the serial signal.



∗ SH (Super Heat amount) =
Ts (Temperature of suction pipe of the compressor) –
Tc or Te (Heat exchanger temperature at evaporation side)

∗ PMV: Pulse Motor Valve

9-3. Intermittent Operation Control for Indoor Fans of the Indoor Unit at Thermo-off Side in Heating Operation

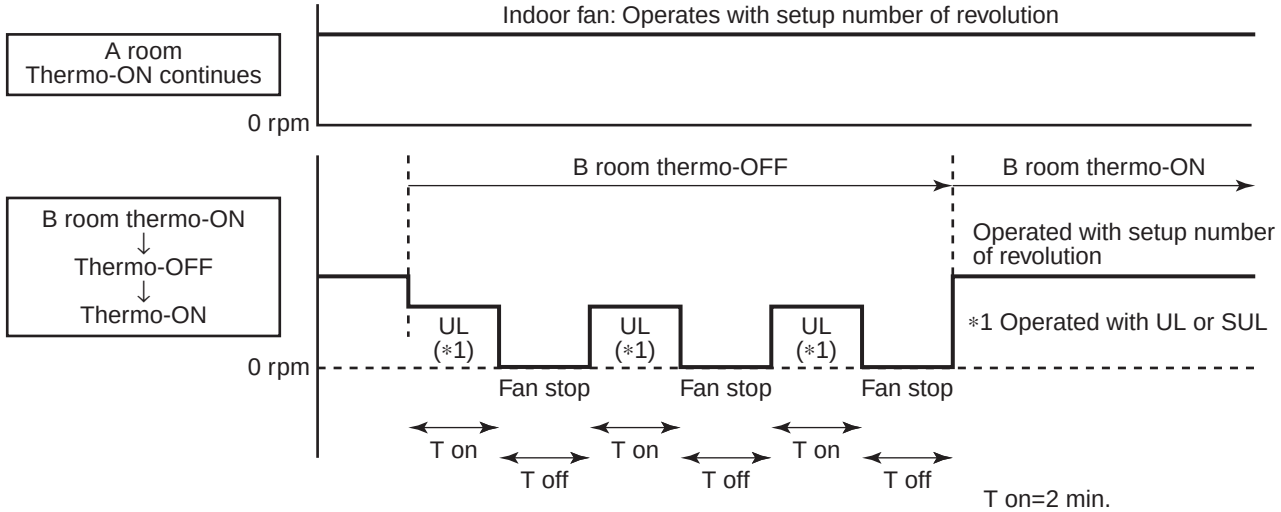
While heating operation is executed in two rooms, if room temperature reached the setup temperature in one room and thermo-off occurred, the following operations start. (Refer to the figure below.)

1. The indoor unit of the room (A room) in which thermo-off did not occur starts a continuous operation with the setup number of revolution.
2. The indoor unit of the room (B room) in which thermo-off occurred starts intermittent operation of the indoor fan.

   The indoor fan operates with number of revolution of UL or SUL. Fan-ON time is 2 minutes and Fan-OFF time is 2 to 4 minutes.

   However if temperature of the indoor heat exchanger becomes over 55°C or more in B room, the indoor fan stops the intermittent operation and starts continuous operation.

While heating operation is executed in 2 rooms, if room temperature reached the setup temperature in both rooms and thermo-off occurred, both indoor units start intermittent operation of the indoor fan.



∗ In case which Tc sensor temperature exceeds 55˚C in B room, the fan stops intermittent operation and starts continuous operation with UL or SUL (∗1).

T on=2 min.

T off time	
To < 5˚C	2 min.
5 ≤ To < 10	3 min.
10 ≤ To	4 min.

9-4. Service switch (SW01, SW02) operations

Various displays and various operations are enabled by push buttons (service) switches and LED on the outdoor control P.C. board.

9-4-1. LED display

5 patterns are provided for LED display.

○:ON (○*:3 sec ON/0.5 sec OFF), ●:OFF, ◎:Rapid Flashing(5 times/sec), ◇:Slow Flashing(1 time/sec)

D800 (Yellow)	D801 (Yellow)	D802 (Yellow)	D803 (Yellow)	D804 (Yellow)	D805 (Green)
●/○(*)/◎	●/○(*)/◎	●/○(*)/◎	●/○(*)/◎	●/○(*)/◎/◇	●/○/◎/◇

In the initial status of LED display, D805 is ON as below.

Normal

D800 (Yellow)	D801 (Yellow)	D802 (Yellow)	D803 (Yellow)	D804 (Yellow)	D805 (Green)
●	●	●	●	●	○

○:ON ●:OFF

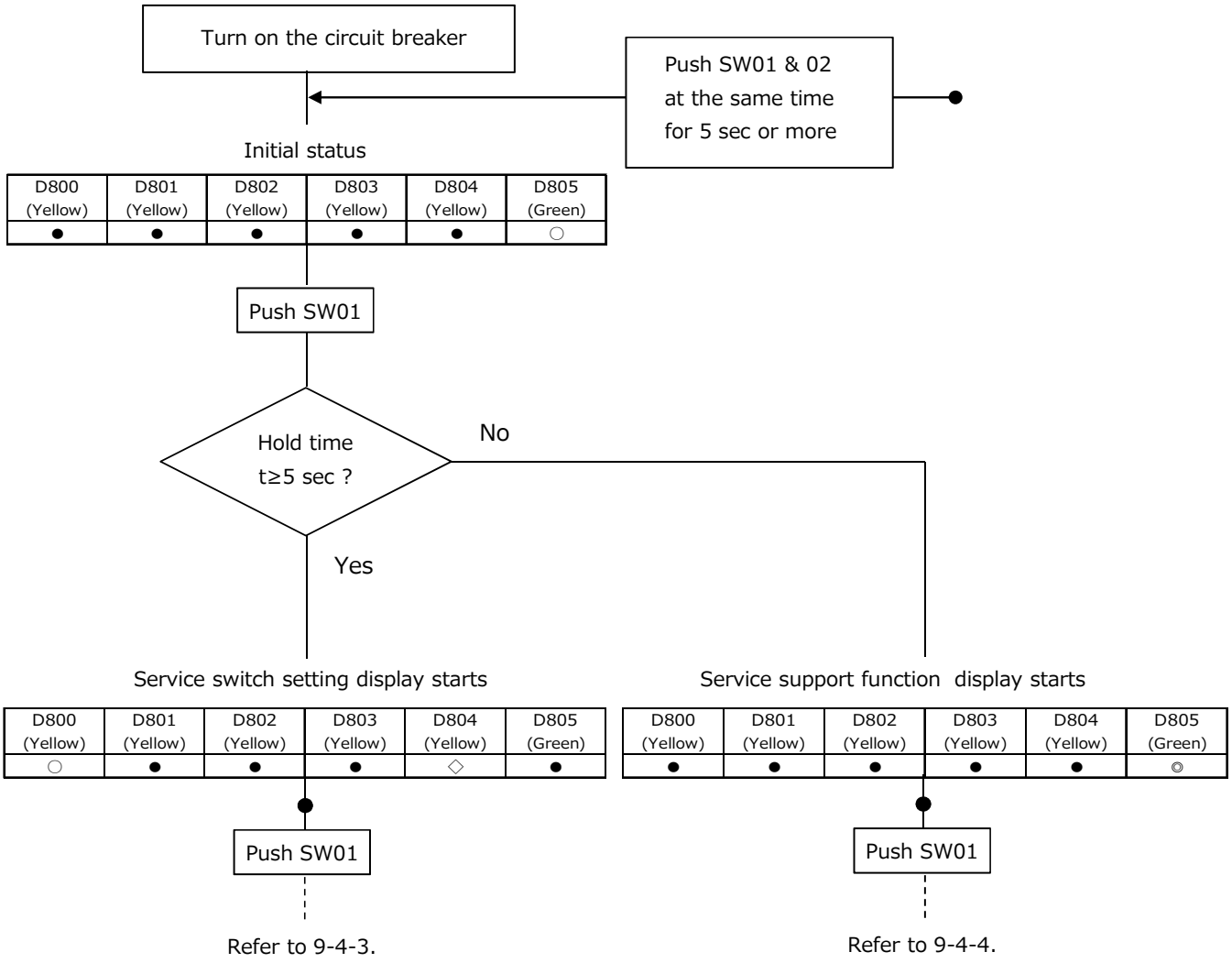
Error occurring

D800 (Yellow)	D801 (Yellow)	D802 (Yellow)	D803 (Yellow)	D804 (Yellow)	D805 (Green)
●/○*	●/○*	●/○*	●/○*	●/○*	○

○:ON ○*:3 sec ON/0.5 sec OFF ●:OFF

When the initial status does not appear (in case of flashing of D804 or D805), LED display can be returned to the initial status by pushing and holding the service switches SW01 and SW02 for 5 seconds or more simultaneously.

9-4-2. Service switch setting and service support function
You can choose service switch setting and service support function.
Operating method is as below.



9-4-3. Service switch setting
Various settings are available by setting service switches.

[Operating method]
1) Check LED display is the initial status. If it is not so, set the initial status.
2) Push and hold SW01 for 5 seconds or more and then check D804 flashes slowly (1 times/sec).
3) Push SW01 several times and then stop it at the LED display of function item to be set up.
4) Push SW02 and then D805 will flash rapidly (5 times/sec). (D805 is turned off by pressing the SW02 again.)
5) Push and hold SW02 for 5 seconds or more. D804 changes to slow flashing, D805 changes to lighting and then various settings are validated.
6) When you want to continue the settings, moreover repeat items from 3) to 5).
7) To invalidate various settings, execute items 1) to 3), push SW02 and then D805 will turn off.
8) Push and hold SW02 for 5 seconds or more. D804 changes to slow flashing, D805 is turned off and then various settings are invalidated.

* If an unknown point generated on the way of the operation, push and hold SW01 and SW02 for 5 seconds or more simultaneously. You can return to the item 1).

[Confirmation method of various settings]

You can confirm that various settings are validated.

1) Check LED displays are in the initial status. If it are not so, return them to the initial status.
2) Push and hold SW01 for 5 seconds or more. D804 changes to slow flashing.
3) Push SW01 several times and then stop it at the point where LED display (D800 to D804) to be checked. If the setting became valid, D804 and D805 flash rapidly. (When the setup was invalid, D804 flashes rapidly and D805 goes off.)
4) Push SW01 and SW02 for 5 seconds or more simultaneously to return LED display to the initial status.

○:ON (○*:3 sec ON/0.5 sec OFF) ●:OFF
◎:Rapid Flashing(5 times/sec) ◇:Slow Flashing(1 time/sec)

No.	Display D800 (YL)	D801 (YL)	D802 (YL)	D803 (YL)	D804 (YL)	D805 (GN)	Item	Control contents
1	○	●	●	●	◇*1 or ◎*2	●/○*1 or ●/◎*2	Refrigerant collection operation At shipment from factory (default): D805 (Green) ●	The outdoor unit performs cooling operation. As the indoor unit does not operate by this switch setting only, carry out the operation beforehand. (Before switch setting, you have to operate in cooling mode of all indoor units.) During the check, the display is kept as below. *Operation is up to 10 minutes. *After the collection is finished, promptly stop the operation of all the indoor unit. (There are cases that the compressor restarts.) D800 (Yellow) ○ / D801 (Yellow) ● / D802 (Yellow) ● / D803 (Yellow) ● / D804 (Yellow) ◇ / D805 (Green) ○
2	●	●	○	●			Miswiring (mispiping) check At shipment from factory (default): D805 (Green) ●	The outdoor unit performs cooling operation. As the indoor unit does not operate by this switch setting only, carry out the operation beforehand. (Before switch setting, you have to operate in cooling mode of all indoor units.) During the check, the display is kept as below. *Operation is up to 30 minutes. *You cannot check wiring/piping when the external temperature is 5℃ or less. *During the check, the compressor and the fun of the outdoor/indoor unit repeat ON/OFF. D800 (Yellow) ● / D801 (Yellow) ● / D802 (Yellow) ○ / D803 (Yellow) ● / D804 (Yellow) ◇ / D805 (Green) ○
3	○	●	○	●			Fan motor operation check At shipment from factory (default): D805 (Green) ●	Operate the fan motor forcedly. The motor rotates at 500rpm and operation is 2 minutes. During the check, the display is kept as below. D800 (Yellow) ○ / D801 (Yellow) ● / D802 (Yellow) ○ / D803 (Yellow) ● / D804 (Yellow) ◇ / D805 (Green) ○
4	●	○	○	●			PMV operation check At shipment from factory (default): D805 (Green) ●	PMV is initialized to order from unit A. (only one time) Checking its operation sound and you can see that it is operating. During the check, the display is kept as below. D800 (Yellow) ● / D801 (Yellow) ○ / D802 (Yellow) ○ / D803 (Yellow) ● / D804 (Yellow) ◇ / D805 (Green) ○
5	○	○	○	●			Cooling only setting At shipment from factory (default): D805 (Green) ●	When using the air conditioner as a cooling-only conditioner, set the switch. (If the heating mode is selected by remote controll, outdoor unit will remain stop. If mixed with indoor unit cooling and heating, outdoor unit performs cooling operation.) When the setting is finished, the display is as below. D800 (Yellow) ○ / D801 (Yellow) ○ / D802 (Yellow) ○ / D803 (Yellow) ● / D804 (Yellow) ◇ / D805 (Green) ○
6	●	●	●	○			Heating only setting At shipment from factory (default): D805 (Green) ●	When using the air conditioner as a heating-only conditioner, set the switch. (If the cooling mode is selected by remote controll, outdoor unit will remain stop. If mixed with indoor unit cooling and heating, outdoor unit performs heating operation.) When the setting is finished, the display is as below. D800 (Yellow) ● / D801 (Yellow) ● / D802 (Yellow) ● / D803 (Yellow) ○ / D804 (Yellow) ◇ / D805 (Green) ○
7	●	○	●	○			Power save function At shipment from factory (default): D805 (Green) ●	When using the power save function, set the switch. The current limit is enabled. When the setting is finished, the display is as below. D800 (Yellow) ● / D801 (Yellow) ○ / D802 (Yellow) ● / D803 (Yellow) ○ / D804 (Yellow) ◇ / D805 (Green) ○
8	○	○	●	○			Select current limit At shipment from factory (default): D805 (Green) ●	If you enabled the power save function, you have to choose two of the current limit value. When the setting is finished, the display is as below. (1)8.5A D800 (Yellow) ○ / D801 (Yellow) ○ / D802 (Yellow) ● / D803 (Yellow) ○ / D804 (Yellow) ◇ / D805 (Green) ○ (2)11.0A D800 (Yellow) ○ / D801 (Yellow) ○ / D802 (Yellow) ● / D803 (Yellow) ○ / D804 (Yellow) ◇ / D805 (Green) ●

*1. Item and setting is displaying.
*2. Item and setting is selecting.

9-4-4. Service support function
Various displays are available by setting service switches.

[Operating method]
1) Check LED display is the initial status. If it is not so, set the initial status.
2) Push SW01 several times and stop it at the item that you want to check.

○:ON (○*:3 sec ON/0.5 sec OFF)●:OFF
◎:Rapid Flashing(5 times/sec) ◇:Slow Flashing(1 time/sec)

No.	Display D800 (YL)	D801 (YL)	D802 (YL)	D803 (YL)	D804 (YL)	D805 (GN)	Item	Description
0	●	●	●	●	●		Error display (Error which is occurring at present)	The error which is occurring at present is displayed. LED goes off while an error does not occur. (Refer to table A)
1	○	●	●	●	●		Error display (The latest error: The latest error including this moment)	After error status was eliminated, if you want to check the error which occurred before, call this setting and check it. (Even after turning off the power supply once, you can recheck it.) * This error display displays only the errors related to compressor stop. * In the case that an error occurred at present, the same contents as that at present is displayed. (Refer to table B)
2	●	○	●	●	●		Miswiring (mispiping) display	You can check the room judged as error by operating the miswiring (mispiping) check. (Refer to table C)
3	○	○	●	●	●		Discharge temperature sensor (TD) display	The detected value of the discharge temperature (TD) is displayed. (Refer to table C)
4	●	●	○	●	●		Outdoor heat exchanger temperature sensor (TE) display	The detected value of the outdoor heat exchanger temperature sensor (TE) is displayed. (Refer to table C)
5	○	●	○	●	●		Suction temperature sensor (TS) display	The detected value of the suction temperature sensor (TS) is displayed. (Refer to table C)
6	●	○	○	●	●		Outside temperature sensor (TO) display	The detected value of the outside temperature sensor (TO) is displayed. (Refer to table C)
7	○	○	○	●	●		Current display	The current value which flows to the outdoor unit is displayed. (Refer to table C)
8	●	●	●	○	●	◎	Compressor operation frequency display	The operation frequency of the compressor is displayed. (Refer to table C)
9	○	●	●	○	●		PMV opening display (unit A)	The opening of PMV (Electronic expansion valve) is displayed. (Refer to table C)
10	●	○	●	○	●		PMV opening display (unitB)	The opening of PMV (Electronic expansion valve) is displayed. (Refer to table C)
11	●	○	○	○	●		Gas temperature sensor (TG) display (unit A)	The detected value of the gas temperature sensor (TG) is displayed. (Refer to table C)
12	○	○	○	○	●		Gas temperature sensor (TG) display (unit B)	The detected value of the gas temperature sensor (TG) is displayed. (Refer to table C)
13	○	○	●	●	○		Indoor suction temperature sensor (TA) display (unit A)	The detected value of the indoor suction temperature sensor (TA) is displayed. (Refer to table C)
14	●	●	○	●	○		Indoor suction temperature sensor (TA) display (unit B)	The detected value of the indoor suction temperature sensor (TA) is displayed. (Refer to table C)
15	●	●	●	○	○		Indoor heat exchanger temperature sensor (TC/TCJ) display (unit A)	The detected value of the indoor heat exchanger temperature sensor (TC) is displayed. Only while you press the SW02, the detected value of the indoor heat exchanger temperature sensor (TCJ) is displayed. (Refer to table C)
16	○	●	●	○	○		Indoor heat exchanger temperature sensor (TC/TCJ) display (unit B)	The detected value of the indoor heat exchanger temperature sensor (TC) is displayed. Only while you press the SW02, the detected value of the indoor heat exchanger temperature sensor (TCJ) is displayed. (Refer to table C)

3) Pushing SW02, the display changes to next item. To see other display contents, repeat that.
4) To finish LED display, be sure to execute item 1) to return LED to the initial status (error display of current occurrence) and then finish LED display.

[Error display]
The error which is occurring at present and the latest error (including error that is occurring now) can be confirmed by checking display on the outdoor control P.C. board.

A. Error display which occurs at present

○:ON (○*:3 sec ON/0.5 sec OFF) ●:OFF
◎:Rapid Flashing(5 times/sec) ◇:Slow Flashing(1 time/sec)

	Display						Indoor check code	Description
	D800 (YL)	D801 (YL)	D802 (YL)	D803 (YL)	D804 (YL)	D805 (GN)		
	●	●	●	●	●		-	Normal operation (no error)
	○*	●	●	●	●		1C	Compressor case thermostat error
	●	○*	●	●	●		21	High pressure switch error
	○*	○*	●	●	●		1C	Compressor system error
	●	●	○*	●	●		1D	Compressor lock
	○*	●	○*	●	●		1F	Compressor breakdown
	●	○*	○*	●	●		14	Driving element short circuit
	○*	○*	○*	●	●		16	Position detection circuit error
	●	●	●	○*	●		17	Current detection circuit error
	○*	●	●	○*	●		1C	Communication error between MCU
	●	○*	●	○*	●		1A	Fan system error
	○*	○*	●	○*	●		1E	Discharge temperature error
	●	●	○*	○*	●	○	19	Discharge temperature sensor (TD) error
*1	○*	●	○*	○*	●		1B	Outdoor air temperature sensor (TO) error
	●	○*	○*	○*	●		18	Suction temperature sensor (TS) error
	○*	○*	○*	○*	●		18	Heat exchanger temperature sensor (TE) error
*2	●	●	●	●	○*		1C	Gas pipe (unit A) temperature sensor (TGa) error
*2	○*	●	●	●	○*		1C	Gas pipe (unit B) temperature sensor (TGb) error
	○*	●	○*	●	○*		-	PMV error (SH≥20)
	●	○*	○*	●	○*		-	PMV error (SH≤−8)
	●	●	●	○*	○*		20	PMV leakage error (unit A)
	○*	●	●	○*	○*		20	PMV leakage error (unit B)
	○*	●	○*	○*	○*		-	Miswiring (mispiping) check error

*1: Back-up operation is performed without error display of the indoor unit.
*2: Operated normally when the air conditioners in other rooms are driven.

B. Error display of the latest error (including error which occurs at present)

○:ON (*:3 sec ON/0.5 sec OFF) ●:OFF
◎:Rapid Flashing(5 times/sec) ◇:Slow Flashing(1 time/sec)

Display						Indoor check code	Description
D800 (YL)	D801 (YL)	D802 (YL)	D803 (YL)	D804 (YL)	D805 (GN)		
●	●	●	●	●		-	Normal operation (no error)
◎	●	●	●	●		1C	Compressor case thermostat error
●	◎	●	●	●		21	High pressure switch error
◎	◎	●	●	●		1C	Compressor system error
●	●	◎	●	●		1D	Compressor lock
◎	●	◎	●	●		1F	Compressor breakdown
●	◎	◎	●	●		14	Driving element short circuit
◎	◎	◎	●	●		16	Position detection circuit error
●	●	●	◎	●		17	Current detection circuit error
◎	●	●	◎	●		1C	Communication error between MCU
●	◎	●	◎	●	◇	1A	Fan system error
◎	◎	●	◎	●		1E	Discharge temperature error
●	●	◎	◎	●		19	Discharge temperature sensor (TD) error
◎	●	◎	◎	●		1B	Outdoor air temperature sensor (TO) error
●	◎	◎	◎	●		18	Suction temperature sensor (TS) error
◎	◎	◎	◎	●		18	Heat exchanger temperature sensor (TE) error
●	●	●	●	◎		1C	Gas pipe (unit A) temperature sensor (TGa) error
◎	●	●	●	◎		1C	Gas pipe (unit B) temperature sensor (TGb) error
◎	●	◎	●	◎		-	PMV error (SH≥20)
●	◎	◎	●	◎		-	PMV error (SH≤−8)
●	●	●	◎	◎		20	PMV leakage error (unit A)
◎	●	●	◎	◎		20	PMV leakage error (unit B)
◎	●	◎	◎	◎		-	Miswiring (mispiping) check error

C. Sensor, current, compressor operation frequency, PMV opening, Miswiring (mispiping) check display

Using the service display function, you can check a variety of information.

○:ON (○*:3 sec ON/0.5 sec OFF)●:OFF

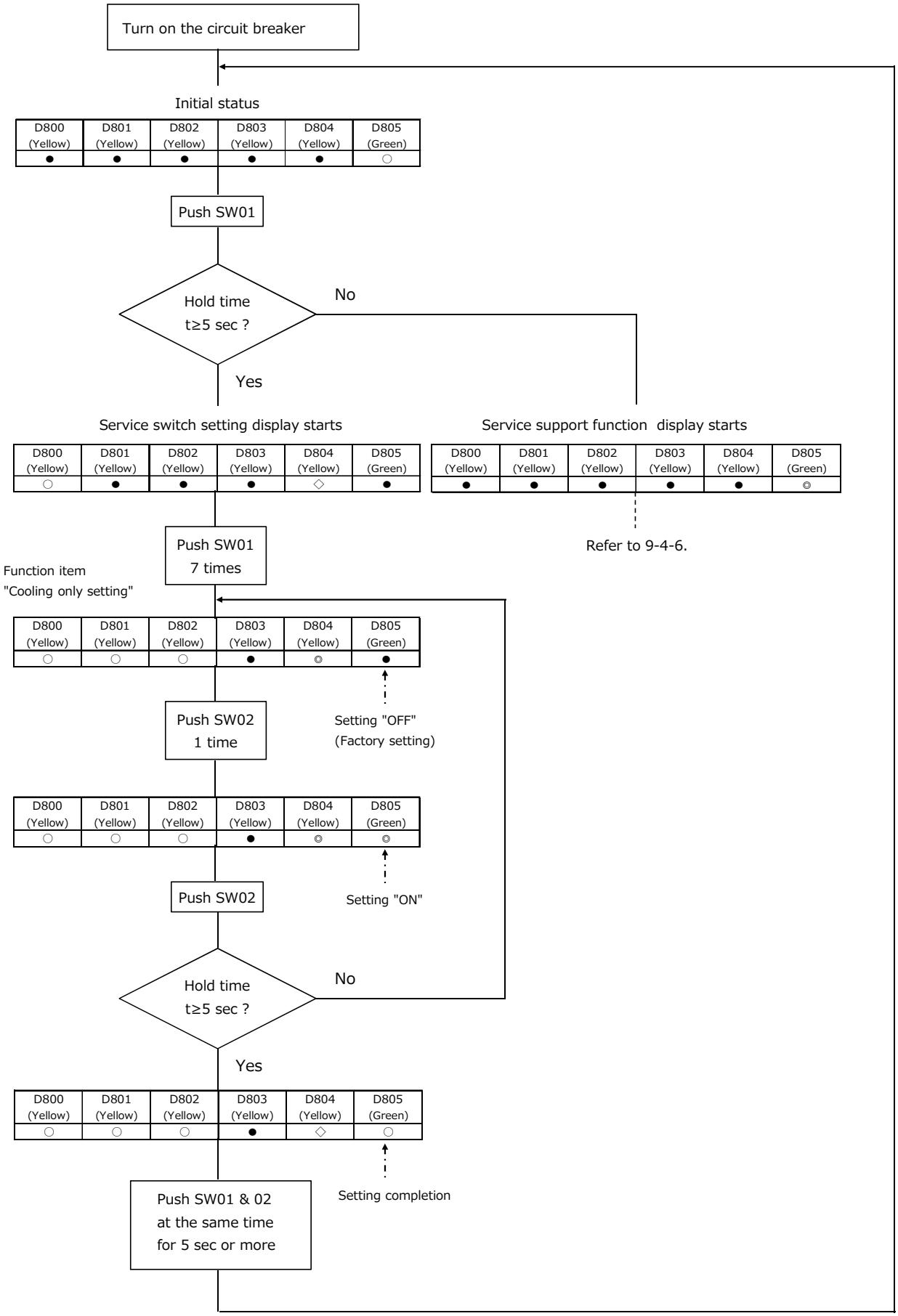
◎:Rapid Flashing(5 times/sec) ◇:Slow Flashing(1 time/sec)

	display						Contents				
No.	D800 (YL)	D801 (YL)	D802 (YL)	D803 (YL)	D804 (YL)	D805 (GN)	Temp. sensor (˚C)	Current (A)	Compressor frequency (rps)	PMV opening (pls)	Miswiring (mispiping) check
0	●	●	●	●	●		-26 or less	0～0.9	0～4.9	0～19	No error
1	○	●	●	●	●		-25～-21	1～1.9	5～9.9	20～39	Trouble in unit A
2	●	○	●	●	●		-20～-16	2～2.9	10～14.9	40～59	Trouble in unit B
3	○	○	●	●	●		-15～-11	3～3.9	15～19.9	60～79	Trouble in unit A and B
4	●	●	●	○	●		10～14	8～8.9	40～44.9	160～179	-
5	○	●	●	○	●		15～19	9～9.9	45～49.9	180～199	-
6	●	○	●	○	●		20～24	10～10.9	50～54.9	200～219	-
7	○	○	●	○	●		25～29	11～11.9	55～59.9	220～239	-
8	●	●	○	○	●		30～34	12～12.9	60～64.9	240～259	-
9	○	●	○	○	●		35～39	13～13.9	65～69.9	260～279	-
10	●	○	○	○	●		40～44	14～14.9	70～74.9	280～299	-
11	○	○	○	○	●		45～49	15～15.9	75～79.9	300～319	-
12	●	●	●	●	○	◇	50～54	16～16.9	80～84.9	320～339	-
13	○	●	●	●	○		55～59	17～17.9	85～89.9	340～359	-
14	●	○	●	●	○		60～64	18～18.9	90～94.9	360～379	-
15	○	○	●	●	○		65～69	19～19.9	95～99.9	380～399	-
16	●	●	○	●	○		70～74	20～20.9	100～104.9	400～419	-
17	○	●	○	●	○		75～79	21～21.9	105～109.9	420～439	-
18	●	○	○	●	○		80～84	22～22.9	110～114.9	440～459	-
19	○	○	○	●	○		85～89	23～23.9	115～119.9	460～479	-
20	●	●	●	○	○		90～94	24～24.9	120～124.9	480～499	-
21	○	●	●	○	○		95～99	25～25.9	125～129.9	500	-
22	●	○	●	○	○		100～104	26～26.9	130～134.9	-	-
23	○	○	●	○	○		105～109	27～27.9	135～139.9	-	-
24	●	●	○	○	○		110～114	28～28.9	140～144.9	-	-
25	○	●	○	○	○		115～119	29～29.9	145～149.9	-	-
26	●	○	○	○	○		120 or more	30～30.9	150～154.9	-	-
27	○	○	○	○	○		Sensor error	31 or more	155～ or more	-	-

(Note 1) Basically carry out the service switch settings while the machine stops. If carry out during the operation, the pressure may change suddenly and a danger may grow.

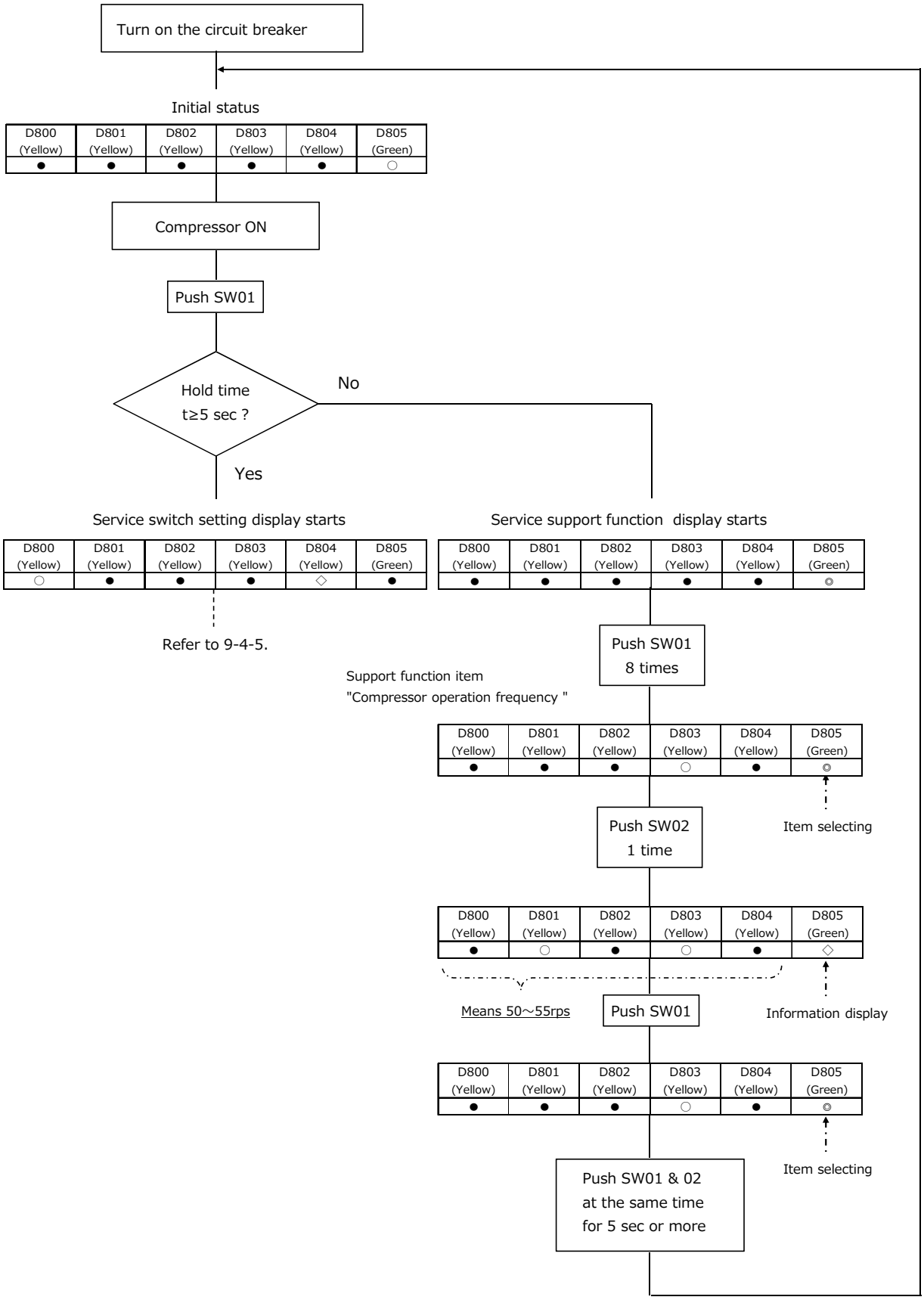
9-4-5. How to set the SERVICE SWITCH SETTING.
If you want to set the "COOLING ONLY SETTING OFF ⇒ ON" .

○:ON, ●:OFF, ◎:Rapid Flashing(5 times/sec), ◇:Slow Flashing(1 time/sec)



9-4-6. How to set the SERVICE SUPPORT FUNCTION.
If you want to check the "COMPRESSOR FREQUENCY" .

○:ON, ●:OFF, ◎:Rapid Flashing(5 times/sec), ◇:Slow Flashing(1 time/sec)



10. INSTALLATION PROCEDURE

10-1. Installation/Servicing Tools

Changes in the product and components

In the case of an air conditioner using R32, in order to prevent any other refrigerant from being charged accidentally, the service port diameter of the outdoor unit control valve has been changed.(1/2 UNF 20 threads per inch)

- In order to increase the pressure resisting strength of the refrigerant piping flare processing diameter and size of opposite side of flare nuts has been changed. (for copper pipes with nominal dimensions 1/2 and 5/8)

New tools for R32 (R410A)

New tools for R32 (R410A)	Applicable to R22 model		Changes
Gauge manifold	×		As pressure is high, it is impossible to measure by means of conventional gauge. In order to prevent any other refrigerant from being charged, each port diameter has been changed.
Charge hose	×		In order to increase pressure resisting strength, hose materials and port size have been changed (to 1/2 UNF 20 threads per inch). When purchasing a charge hose, be sure to confirm the port size.
Electronic balance for refrigerant charging	○		As pressure is high and gasification speed is fast, it is difficult to read the indicated value by means of charging cylinder, as air bubbles occur.
Torque wrench (nominal diam. 1/2, 5/8)	×		The size of opposite sides of flare nuts have been increased. Incidentally, a common wrench is used for nominal diameters 1/4 and 3/8.
Flare tool (clutch type)	○		By increasing the clamp bar's receiving hole, strength of spring in the tool has been improved.
Gauge for projection adjustment	—	—	Used when flare is made by using conventional flare tool.
Vacuum pump adapter	○		Connected to conventional vacuum pump. It is necessary to use an adapter to prevent vacuum pump oil from flowing back to the charge hose. The charge hose connecting part has two ports-one for conventional refrigerant (7/16 UNF 20 threads per inch) and one for R32 (R410A). If the vacuum pump oil (mineral) mixes with R32 (R410A) a sludge may occur and damage the equipment.
Gas leakage detector	×		Exclusive for HFC refrigerant.

- Incidentally, the "refrigerant cylinder" comes with the refrigerant designation R32 (R410A) and protector coating in the U. S's ARI specified rose color (ARI color code: PMS 507).
- Also, the "charge port and packing for refrigerant cylinder" require 1/2 UNF 20 threads per inch corresponding to the charge hose's port size.

⚠ CAUTION

- Incorrect wiring connection may cause electrical parts to burn out.
- Be sure to comply with local regulations/codes when running the wire from outdoor unit to indoor unit. (Size of wire and wiring method etc.)
- Every wire must be securely connected.
- If incorrect or incomplete wiring is carried out, fire or smoke may result.
- Prepare the power supply for the exclusive use of the air conditioner.

10-2. Outdoor Unit

10-2-1. Accessory and Installation Parts

Installation manual	1		Rubber cap (Water-proof)	2		CD-ROM (Installation manual) ∗1	1	
F-GAS label	1		Drain nipple	1		Product specif cation	1	

∗1 Part that do not exist in RAS-2M10G3AVG-TR, RAS-2M14G3AVG-TR

10-2-2. Refrigerant Piping

- Piping kit used for the conventional refrigerant cannot be used.
- **Use copper pipe with 0.8 mm or more thickness.**
- Flare nut and flare works are also different from those of the conventional refrigerant. Take out the flare nut attached to the main unit of the air conditioner, and use it.

10-2-3. Installation Place

- A place which provides the spaces around the outdoor unit.
- A place where the operation noise and discharged air do not disturb your neighbors.
- A place which is not exposed to a strong wind.
- A place which does not block a passageway.
- When the outdoor unit is to be installed in an elevated position, be sure to secure its feet.
- There must be sufficient spaces for carrying the unit into and out of the site.
- A place where the drain water does not raise any problem.
- A place which can bear the weight of the outdoor unit and does not allow an increase in noise level and vibration.

10-2-4. Installation Parts (Local Supply)

Parts name	Parts name			Q'ty
	Indoor unit (abbreviation)	Liquid side (O.D.)	Gas side (O.D.)	
Refrigerant piping ∗1	05, 07, 10, 13	6.35 mm	9.52 mm	1 ea.
Putty, PVC tapes				1 ea.

∗1 Refrigerant piping covered with insulating material (Polyetylene form, 6 mm thick).
When duct-type or cassette-type unit is to be installed, it shall be covered with thicker insulating material (Polyetylene form, 10 mm thick).

* Example of indoor unit class: RAS-B10J2VSG-E is abbreviated as "10".

Indoor unit class		Standard connecting pipe diameter	
		2M10	2M14
Unit B	05 or 07 or 10 or 13	6.35, 9.52 mm	6.35, 9.52 mm*3
Unit A	05 or 07 or 10 or 13	6.35, 9.52 mm	6.35, 9.52 mm*3
Total	20 (2M10)	—	
	26 (2M14)		

10-2-5. Installation

■ Installation Location

- A place which can bear the weight of the outdoor unit and does not cause an increase in noise level and vibration.
- A place where the operation noise and air discharge do not disturb neighbours.
- A place which is not exposed to strong wind.
- A place free of combustible gas.
- A place which does not block a passageway.
- A place where the drain water does not cause any problems.
- A place where there are no obstructions near its air intake or air discharge.

Installation in the following places may result in trouble:
- A place with a lot of machine oil.
- A place with saline-rich atmosphere such as a coastal area.
- A place with high level of sulf de gas.
- A place where high-frequency waves are likely to be generated, such as from audio equipment, welders, or medical equipment.

Do not install the unit in such places.

⚠ CAUTION

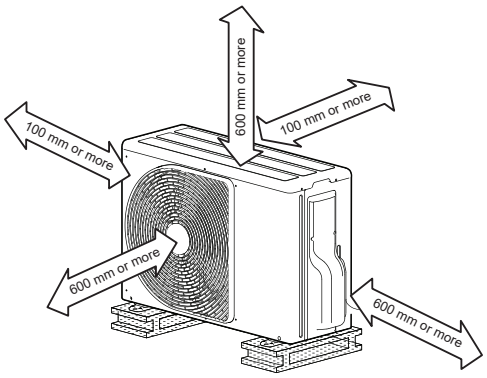
When the outdoor unit is installed in a place where the drain water might cause any problems, Seal the water leakage point tightly using a silicone adhesive or caulking compound.

■ Precautions for Installation

- When the outdoor unit is to be installed in an elevated position, be sure to secure its feet.
- If the outdoor unit is to be mounted on a wall, make sure the base plate supporting it is sturdy enough.
- The base plate should be designed and manufactured to maintain its strength over a long period of time, and suff cient consideration should be given to ensure that the outdoor unit will not fall.
- When the outdoor unit is installed in a place that is always exposed to strong wind such as a coastal area or on a high story of a building, secure the normal fan operation using a duct or a wind shield.
- Especially in windy areas, install the unit in such a way as to prevent the admission of wind.
- When the outdoor unit is to be mounted high on a wall, take particular care to ensure that parts do not fall, and that the installer is protected.
- When doing installation work at ground level, it is usual to make wiring and pipe connections to the indoor units f rst, and then to make connections to the outdoor units.
  However, if outdoor work is diff cult, you can change the procedure.
  For example, by making adjustments to the wiring and piping lengths on the inside (rather than the outside).
- When using an air conditioner under low outside temperature conditions (Outside temp: -5 °C or lower) In COOL mode, prepare a duct or wind shield so that it is not affected by the wind.

Necessary Space for Installation

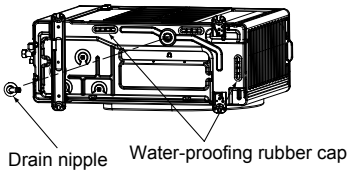
If you need to install the outdoor unit in a location where there are some obstructions or a wall, secure sufficient space as shown in the figure below. The cooling/heating effect may be reduced by 10%.



Draining Off the Water from the Outdoor Unit

Install 2 waterproof rubber caps and the drain nipple to drain off the water from the outdoor unit.

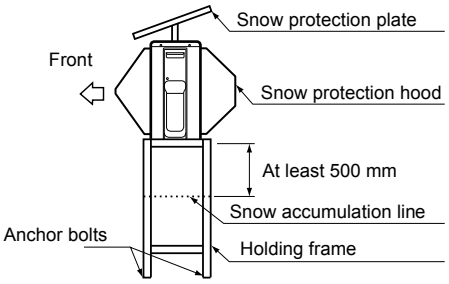
- Seal the knock-out holes and screw/thread areas tightly using a silicon adhesive or a caulking compound.
- Use a drain pan to apply a centralized drain.



Installation in Regions with Snowfall and Cold Temperatures

Do not use waterproof rubber caps or a drain nipple.

- If you need to install the outdoor unit in a location where there is a possibility of the drain freezing, pay close attention so that the drain does not become frozen.
- To protect the outdoor unit from snow, install the outdoor unit on a holding frame, and attach a snow protection hood and plate.
- Keep the outdoor unit at least 500 mm above the snow accumulation line.

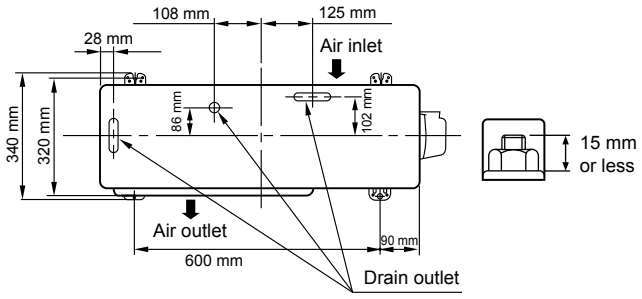


Fixing the Outdoor Unit

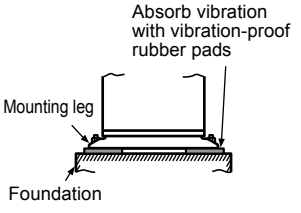
Fix the outdoor unit using attachment bolts.

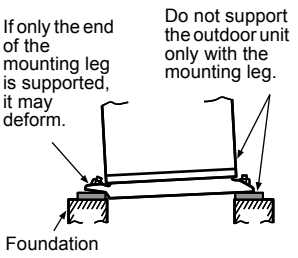
- Use 8 mm or 10 mm anchor bolts and nuts.
- Do not allow the attachment bolts to protrude by more than 15 mm.
- Install the outdoor unit at ground level.
- Attach the vibration-proof rubber pads under the f xing legs.

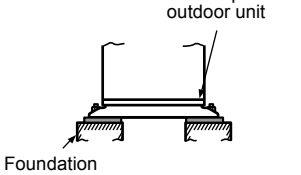
Drain nipple mounting hole



GOOD **BAD**







Support the bottom surface of the mounting leg that is in contact with and underneath the bottom plate of the outdoor unit.

◆ Refrigerant piping

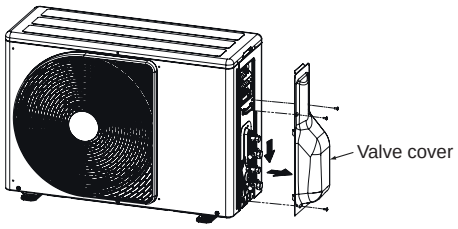
⚠ CAUTION

Install in rooms that are 5 m^3 or larger. If a leak of refrigerant gas occurs inside the room, an oxygen def ciency may occur.

■ Detaching the Valve cover

Remove the 3 screws.

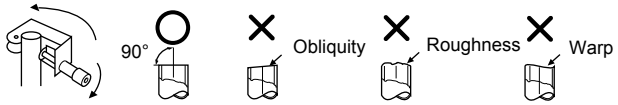
- Pull the valve cover in the direction of the arrow, and remove it.



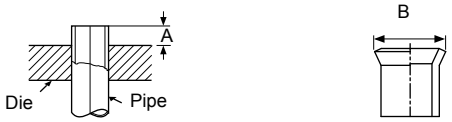
■ Refrigerant Piping Connection

Flaring

1. Cut the pipe with a pipe cutter.



2. Remove the burr inside of the pipe.
   When removing the burr, be careful so that chips do not fall into the pipe.
3. Remove the flare nuts attached to the outdoor/indoor unit, then insert them into each of the pipes.
4. Flare the pipes.
   See the following table for the projection margin (A) and flaring size (B).



Pipe		A		B	Flare Nut		
Outside diameter	Thickness	Rigid (clutch type) R32 tool	Imperial (wing nut type) R32 tool		Width across flat	Tighten torque	
mm	mm	mm	mm	mm	mm	N•m	kgf•m
6.35	0.8	0 to 0.5	1.5 to 2.0	9.1	17	14 to 18	1.4 to 1.8
9.52	0.8	0 to 0.5	1.5 to 2.0	13.2	22	33 to 42	3.3 to 4.2

⚠ CAUTION

- Do not scratch the inner surface of the flared part when removing burrs.
- Flare processing under the condition of scratches on the inner surface of flare processing part will cause refrigerant gas leak.

Pipe connection

1. Make wire and pipe connections for each indoor unit separately.
2. Align the centres of the connecting pipes and tighten the flare nut as much as possible with your fingers, then tighten the nut using a torque wrench. Be sure to tighten the nut at the specified torque value.
   - If you use one outdoor unit for several indoor units of a different class, connect the largest one first A,then connect the rest in the order B.
   - Do not remove the flare nuts for any ports you are not going to use for connection.
   - Do not leave the flare nut unattached for a long period of time.
   - Use a different-diameter joint if the diameters of the connection port and connection piping are different.
   - Mount the different-diameter joint on the connection port of the outdoor unit.

⚠ CAUTION

- **KEEP IMPORTANT 7 POINTS FOR PIPING WORK.**
  (1) Take away dust and moisture (inside of the connecting pipes).
  (2) Tighten the connections (between pipes and unit).
  (3) Evacuate the air in the connecting pipes using a VACUUM PUMP.
  (4) Check gas leak (connected points).
  (5) Be sure to fully open the packed valves before operation.
  (6) Reusable mechanical connectors and flared joints are not allowed indoors. When mechanical connectors are reused indoors, sealing parts shall be renewed. When flared joints are reused indoors, the flare part shall be re fabricated.
  (7) Don't operate air conditioner in case no refrigerant in the system.

<Pump down process>

1. Turn off the Air Conditioner system.
2. Connect the charge hose from the manifold valve to the service port of the packed valve at gas side.
3. Turn on the Air Conditioner system in cooling operation more than 10 minutes.
4. Check the operating pressure of the system should be normal value. (Ref. with product specification)
5. Release the valve rod cap of both service valves.
6. Use the Hexagon wrench to turning the valve rod of Liquid side fully close.
   (*Make sure no entering air into the system)
7. Continue operate Air Conditioner system until the gauge of manifold dropped into the range of 0.5 - 0 kgf/cm^2
8. Use the Hexagon wrench to turning the valve rod of Gas side fully close. And turn off the Air Conditioner system immediately thereafter.
9. Remove the gauge manifold from the service port of the packed valve.
10. Securely tighten the valve rod cap to the both service valves.

⚠ CAUTION

Should be check the compressor operating condition while pumping down process. It must not any abnormal sound, more vibration. It is abnormal condition appears and must turn off the Air Conditioner immediately.

■ Air Purge

From the sake of environmental protection, use a vacuum pump to extract the air during installation.
* Prepare a 4 mm hexagon wrench.

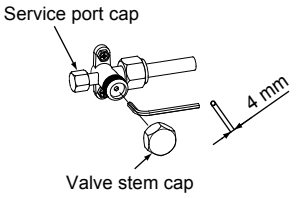
1. Connect a charge hose.
   - Make sure that the Handle Hi of the gauge manifold valve is closed fully.
   - Connect the port of the gauge manifold valve and the service port (Valve core (Setting Pin)) using the charge hose.

   NOTE

   If a control valve or charge valve is attached to the charge hose, leak of R32 refrigerant can be avoided.

2. Open the Handle Low of the gauge manifold valve fully, then operate the vacuum pump.
   - Loosen the f are nut of the at the gas end a little to make sure that air is taken in, then tighten the nut.
   - If you f nd air is not taken in, make sure that the charge hose is connected to the port(s) securely.
   - Perform extraction for about 15 or more minutes and make sure that the compound pressure gauge reading is –101 kPa (–76 cmHg).
   - If the compound pressure gauge reading is not –101 kPa (–76 cmHg), there is a possibility air is being taken in from the port(s).
   - Make sure that the charge hose is connected to the port(s) securely.
3. Close the Handle Low of the gauge manifold valve fully, then stop operating the vacuum pump.
   - Leave the gauge and pump as they are for 1 or 2 minutes, then make sure that the compound pressure gauge reading stays at –101 kPa (–76 cmHg).
   - You need not add refrigerant.
4. Disconnect the charge hose from the service port, then open the valve stem fully using a 4 mm hexagon wrench.

Hexagon wrench is required.



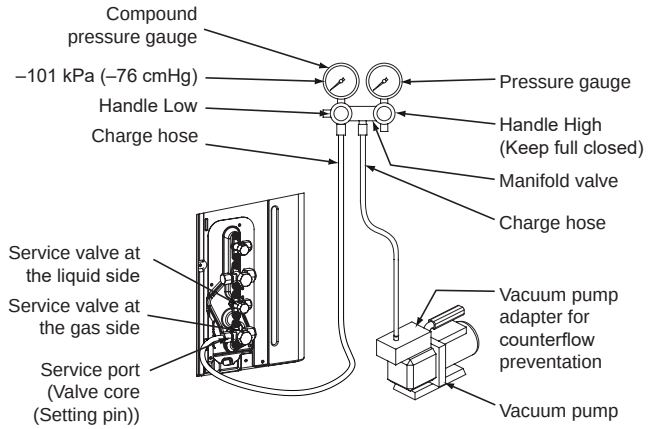
5. Tighten the service valve stem cap and service port cap securely.

⚠ CAUTION

Use a torque wrench and tighten the nut at the specif ed torque value.

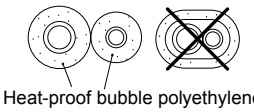
6. Tighten all the caps on the valves securely, then perform a gas leak inspection.

Service valve		Tighten torque			
		Valve stem cap		Service port cap	
Type	mm	N•m	kgf•m	N•m	kgf•m
Liquid side	6.35	14 to 18	1.4 to 1.8	—	—
Gas side	9.52	14 to 18	1.4 to 1.8	14 to 18	1.4 to 1.8



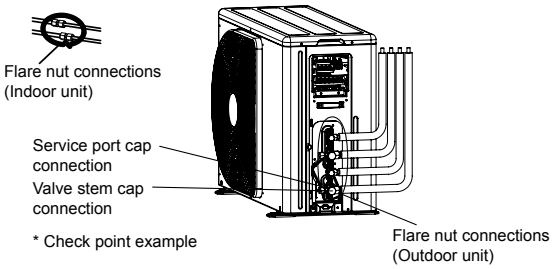
■ Insulation of the Refrigerant Pipes

- Insulate the refrigerant pipes for liquid and gas separately.



■ Gas Leak Inspection

- Perform a gas leak inspection for the f arenut connections, valve stem connection, and service port cap without fail.
- Use a leak detector exclusively manufactured for R32.



■ Performing Additional Installation of an Indoor Unit

1. Collect refrigerant from the outdoor unit.
2. Turn off the circuit breaker.
3. Perform additional installation referring to the procedure from “Refrigerant Piping Connection” on the previous page.

Electrical work

⚠ WARNING

- Be sure to comply with local regulations/codes when running the wire from the outdoor unit to the indoor unit. (Size of wire and wiring method etc.)
- A lack of electrical capacitance or incorrect wiring may cause an electric shock or a flre.
- To make sure that the wiring connection are secure, use designated cables.
- Fix the cables securely so that no external force applied to the cables may effect the terminals.
- If wiring connections are incomplete or cables are not fixed securely, it may cause a fire.
- Be sure to ground the outdoor unit.
- Incomplete grounding may lead to an electric shock.

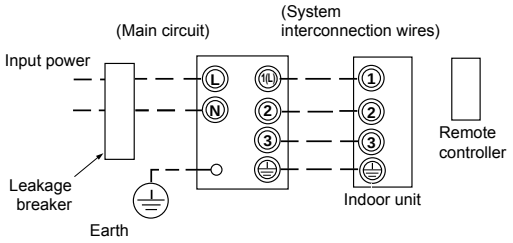
⚠ CAUTION

- Incorrect/incomplete wiring will cause electrical fires or smoke.
- Prepare the power source for exclusive use with the air conditioner.
- This product can be connected to the main power.
  Fixed wire connections:
  A switch that disconnects all poles and has a contact separation of at least 3 mm must be incorporated into the fixed wiring.

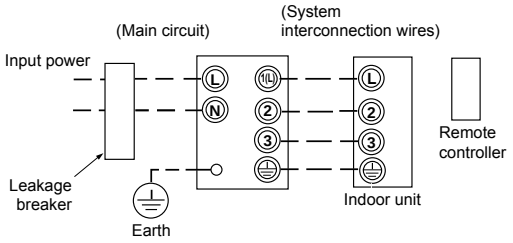
■ Wire Connection

- The dash lines show on-site wiring.

For indoor unit RAS-M series.



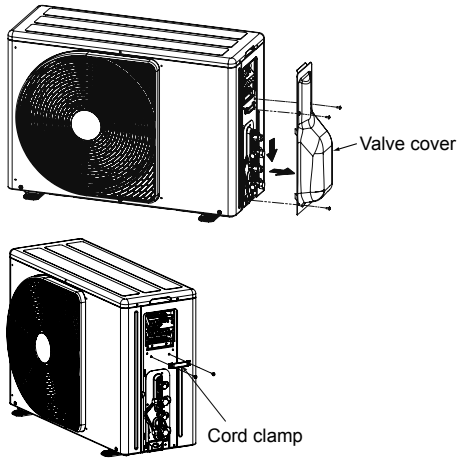
For indoor unit RAS-B series.



- Connect the indoor/outdoor connecting cables to the identical terminal numbers on the terminal block of each unit.
- Incorrect connection may cause a failure.

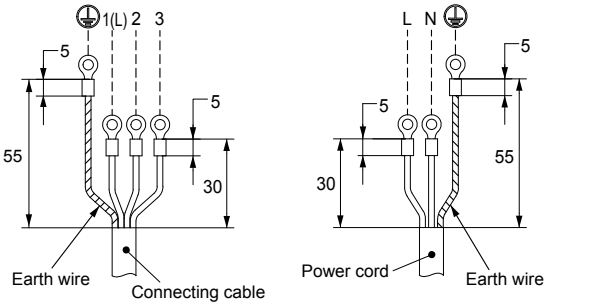
Model	RAS-2M10G3AVG-E, TR	RAS-2M14G3AVG-E, TR
Power supply	1ph, 50Hz, 220-240V	
Maximum running current	9.50A	10.50A
Circuit breaker rating	15A	
Power cord	H07RN-F or 60245 IEC 66 3-core 1.5 mm²	
Connecting cable	H07RN-F or 60245 IEC 66 4-core 0.75 mm²	

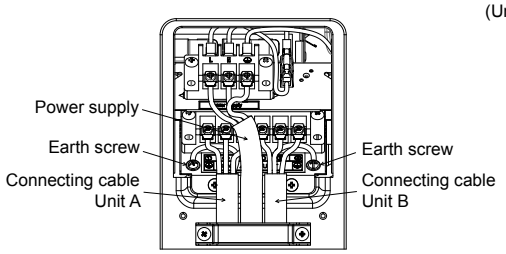
1. Remove the valve cover screws.
2. Pull the valve cover in the direction of arrow, and remove it.
3. Remove the cord clamp and the terminal cover.



4. Connect the wires for the power source and each indoor unit.
   - Connect the connecting cable to the terminal as identified by the matching numbers on the terminal block of the indoor and the outdoor unit.
5. Fix the wiring connections for the power source and each indoor unit securely using a cord clamp.
6. Attach the terminal cover and the valve cover.

Stripping Length of connecting cable for outdoor unit





◆ Grounding

This air conditioner must be grounded without fail.

- Grounding is necessary not only to safeguard against the possibility
  of receiving an electric shock but also to absorb both static, which is generated by high frequencies and held in the surface of the outdoor unit, and noise since the air conditioner incorporates a frequency conversion device (called an inverter) in the outdoor unit.
- If the air conditioner is not grounded, users may receive an electric shock if they touch the surface of the outdoor unit and that unit is charged with static.

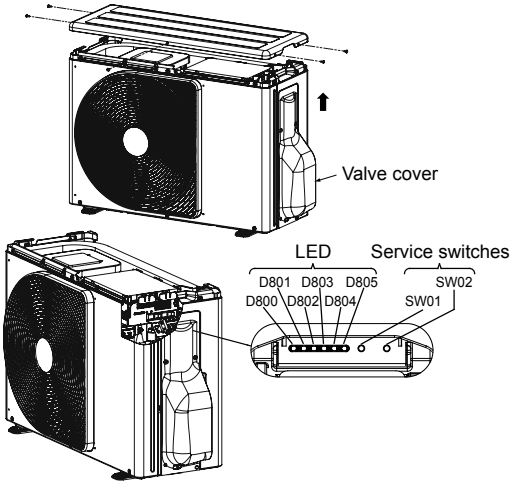
◆ Test run

■ Wiring/Piping Check

⚠ CAUTION

Electric current is applied on the control board. Beware of electric shock.

1. Remove the valve cover screws.
2. Pull the valve cover in the direction of arrow, and remove it.



3. Turn on the circuit breaker to supply electricity.
   In the initial LED display status, D805 is lighted as below.

   ○ : ON, ● : OFF, ◎ : Rapid Flashing (5 times/sec.), ◇ : Slow Flashing (1 time/sec.)

D800	D801	D802	D803	D804	D805
●	●	●	●	●	○

   Start running all the indoor units connected to the outdoor unit in the cooling mode.
   (The indoor unit in the room that doesn't operate the cooling mode cannot be checked.)

4. After 5 minutes, hold down SW01 for at least 5 seconds, and check that D800 is lighted and D804 light is f ashing (1 time/sec.).

D800	D801	D802	D803	D804	D805
○	●	●	●	◇	●

5. Press the SW01 4 times until the LED is displayed as below.

D800	D801	D802	D803	D804	D805
●	●	○	●	◎	●

6. Press SW02 for 1 times. Then D805 light is flashing (5 times/sec.).

D800	D801	D802	D803	D804	D805
●	●	○	●	◎	◎

7. Hold down SW02 for at least 5 seconds. Then the wiring/piping check starts automatically. (The LED display is lighted for a moment.)

D800	D801	D802	D803	D804	D805
●	●	○	●	◇	○

   • If no problems are detected, the checking operation returns to the normal operation automatically. The LED is displayed as below.

D800	D801	D802	D803	D804	D805
●	●	●	●	●	○

8. The below is displayed when the error is detected.
   (* Repetition of 3 sec ON / 0.5 sec OFF)

D800	D801	D802	D803	D804	D805
○*	○*	○*	○*	○*	○

   Press the SW01 3 times until the LED is displayed as below, to check the room judged as error.

D800	D801	D802	D803	D804	D805
●	○	●	●	●	◎

   Incorrect wiring/piping can be checked by pressing SWO2. The Led is displayed as below. Turn off the circuit breaker, then check wiring/piping again.

Check result						
D800	D801	D802	D803	D804	D805	Description
●	●	●	●	●	◇	Normal operation (no error)
○	●	●	●	●	◇	Trouble in unit A
●	○	●	●	●	◇	Trouble in unit B
○	○	●	●	●	◇	Trouble in unit A and B

   • The D800 LED represents unit A.
   • The D801 LED represents unit B.

9. When you want to start over the operation of the SW01 and SW02, press the SW01 and the SW02 at the same time for 5 sec. (The procedure will set back to step 3.) However, do not execute the operation during the check. If by any chance the check is stopped by the operation, start over the check after turning off the power once.

10. Notes
   • It sometimes takes about 30 minutes maximum for the check.
   • During the check, the compressor and the fan of the outdoor/indoor unit repeat ON/OFF.
   • You cannot check wiring/piping when the external temperature is 5°C or less. Also, there is a possibility to misjudge if the indoor temperature becomes too low by cooling operation. In that case, execute the cooling operation for per room and check if the connection is normal.

■ Gas Leak Inspection

Refer to the "■ Gas Leak Inspection".

■ Test run

1. If you perform the test run in summer, start running in the cooling mode f rst to decrease the temperature of the room, then run in the heating mode.
   (Heating mode: Set the temperature to 30°C.)
   • If you perform the test run in winter, start running in the heating mode f rst to increase the temperature of the room, then run in the cooling mode.
   (Cooling mode: Set the temperature to 17°C.)
2. For the test run, be sure to satisfy the following conditions below:
   - Perform the test run for each indoor unit respectively.
   - Perform the test run for about 10 minutes in both the cooling mode and the heating mode.
   • You can perform the test run in the cooling/heating mode by utilizing the thermo sensor of the indoor unit.
   Cooling mode: Warm the thermo sensor using an appliance such as a hair dryer.
   Heating mode: Put a cold towel on the thermo sensor.

■ Instructions for the Customers

• Explain to the customers the proper operation procedure and let them operate the air conditioner along with the supplied instruction manual.
• When multiple indoor units are connected to the outdoor unit, the cooling mode and the heating mode are not available at the same time.
When multiple indoor units are running at the same time, the operation mode of the unit which starts running f rst is applied to the other units.
• When you start running the indoor unit or change the operation mode, the unit starts running after 3 minutes. This is due to the protection function of the unit, not a malfunction.
• When the external temperature becomes low, the pre-heating of the compressor starts to protect it. Keep the circuit breaker on for use.
The electricity consumption during pre-heating is about 30 W.
If the circuit breaker is turned off, the indoor unit may not start running for about 10 minutes or more.
• Electronic expansion valves are used for the outdoor unit.
When you turn on the power, the outdoor unit starts clattering every 1 or 2 months. This clattering is not a malfunction, but occurs when the unit is returning to the default setting for optimised control.
• While an indoor unit is running in the heating mode, the outdoor unit supplies refrigerant to the other indoor units which are not running.
Therefore, noise may come from the other indoor units or the exterior of them may become warm.

◆ Pump-down Operation

■ Pump-down Operation (Recovering refrigerant)

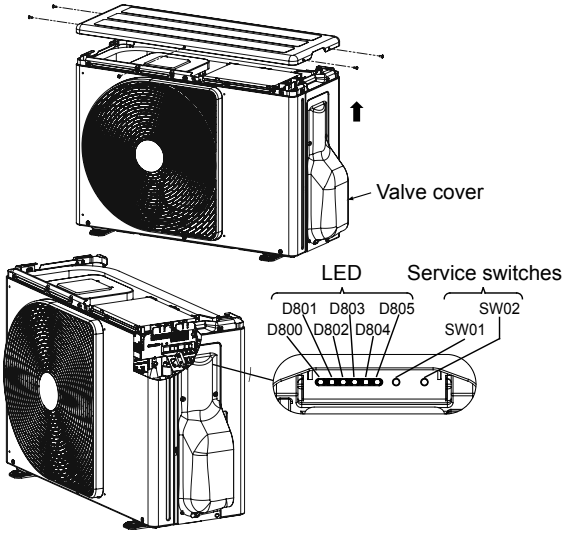
⚠ CAUTION

Since the forcible running for collecting refrigerant stops automatically after 10 minutes, finish collecting refrigerant within 10 minutes.

Electric current is applied on the control board. Beware of electric shock.

- **The following must be certainly done during pump down.**
  - **Do not incorporate air into the refrigeration cycle.**
  - **Close the service valves. Stop the compressor and remove the refrigerant pipe.**
    If the refrigerant pipe is removed when the compressor is operating and service valves are opened, the refrigerant cycle will inhale unwanted matter such as air and the pressure in the cycle becomes abnormally elevated. It may cause a burst or injury.

1. Remove the valve cover screws.
2. Pull the valve cover in the direction of arrow, and remove it.



3. Turn on the circuit breaker to supply electricity.
   In the initial LED display status, D805 is lighted as below.

○ : ON, ● : OFF, ◎ : Rapid Flashing (5 times/sec.), ◇ : Slow Flashing (1 time/sec.)

D800	D801	D802	D803	D804	D805
●	●	●	●	●	○

Start running all the indoor units connected to the outdoor unit in the cooling mode.
The checking procedure cannot be completed if the cooling mode is not operated in every indoor units.

4. Hold down SW01 for at least 5 seconds, and check that D800 is lighted and D804 light is f ashing (1 time/sec.).

D800	D801	D802	D803	D804	D805
○	●	●	●	◇	●

5. Press SW01 for 1 time. Then D804 light is f ashing (5 times/sec.).

D800	D801	D802	D803	D804	D805
○	●	●	●	◎	●

6. Press SW02 for 1 time. Then D805 light is f ashing (5 times/sec.).

D800	D801	D802	D803	D804	D805
○	●	●	●	◎	◎

7. Hold down SW02 for at least 5 seconds. Then outdoor unit start cooling mode.
   (The display is kept during the refrigerants collection operation.)

D800	D801	D802	D803	D804	D805
○	●	●	●	◇	○

8. Close the valve stem of the service valve at the liquid end.
9. Make sure that the compound pressure gauge reading is –101 kPa (–76 cmHg)
10. Close the valve stem of the service valve at the gas end.
11. The refrigerants collection operation is finished in maximum 10 minutes. After the collection is finished, promptly stop the operation of all the indoor unit.
    (There are cases that the compressor restarts.)
12. When you want to start over the operation of the SW01 and SW02, press the SW01 and SW02 at the same time for 5 sec. (It back to the initial condition of 3.) However, do not execute the operation during the refrigerants collection. If by any chance the collection is stopped by the operation, start over the refrigerants collection operation.

◆ Troubleshooting

You can perform fault diagnosis of the outdoor unit with the LEDs on the P.C. board of the outdoor unit in addition to using the check codes displayed on the remote controller of the indoor unit.
Use the LEDs and check codes for various checks. Details of the check codes displayed on the remote controller of the indoor unit are described in the Installation Manual of the indoor unit.

LED displays and check codes

○ : ON (○* : 3 sec ON/0.5 sec OFF), ● : OFF

Display						Indoor check code	Description
D800 (YL)	D801 (YL)	D802 (YL)	D803 (YL)	D804 (YL)	D805 (GN)		
●	●	●	●	●		-	Normal operation (no error)
○*	●	●	●	●		1C	Compressor case thermostat error
●	○*	●	●	●		21	High pressure switch error
○*	○*	●	●	●		1C	Compressor system error
●	●	○*	●	●		1D	Compressor lock
○*	●	○*	●	●		1F	Compressor breakdown
●	○*	○*	●	●		14	Driving element short circuit
○*	○*	○*	●	●		16	Position detection circuit error
●	●	●	○*	●		17	Current detection circuit error
○*	●	●	○*	●		1C	Communication error between MCU
●	○*	●	○*	●		1A	Fan system error
○*	○*	●	○*	●		1E	Discharge temperature error
●	●	○*	○*	●		19	Discharge temperature sensor (TD) error
○*	●	○*	○*	●	○	1B	Outdoor air temperature sensor (TO) error
●	○*	○*	○*	●		18	Suction temperature sensor (TS) error
○*	○*	○*	○*	●		18	Heat exchanger temperature sensor (TE) error
●	●	●	●	○*		1C	Gas pipe (unit A) temperature sensor (TGa) error
○*	●	●	●	○*		1C	Gas pipe (unit B) temperature sensor (TGb) error
○*	●	○*	●	○*		-	PMV error (SH≥20)
●	○*	○*	●	○*		-	PMV error (SH≤–8)
●	●	●	○*	○*		20	PMV leakage error (unit A)
○*	●	●	○*	○*		20	PMV leakage error (unit B)
○*	●	○*	○*	○*		-	Miswiring (mispiping) check error

11. HOW TO DIAGNOSE THE TROUBLE

The pulse modulating circuits are mounted to both indoor and outdoor units.

Therefore, diagnose troubles according to the trouble diagnosis procedure as described below.
(Refer to the check points in servicing written on the wiring diagrams attached to the indoor/outdoor units.)

Table 11-1

No.	Troubleshooting Procedure	Page
1	First Confirmation	56
2	Primary Judgment	57
3	Judgment by Flashing LED of Indoor Unit	57
4	Self-Diagnosis by Remote Controller (Check Code)	58
5	Judgment of Trouble by Symptom	65
6	Trouble Diagnosis by Outdoor LED	67
7	Inspection of the Main Parts	75
8	How to Simply Judge Whether Outdoor Fan Motor is Good or Bad	76

NOTE

A large-capacity electrolytic capacitor is used in the outdoor unit controller (inverter). Therefore, if the power supply is turned off, charge (charging voltage DC280V to 373V) remains and discharging takes a lot of time (for more than 5 minutes). After turning off the power source, if touching the charging section before discharging, an electrical shock may be caused.

Discharge the electrolytic capacitor completely by using solder iron, etc.

⚠ WARNING

The electrolytic capacitor may not normally discharge according to error contents and the voltage may remain.

Therefore, be sure to discharge the capacitor.

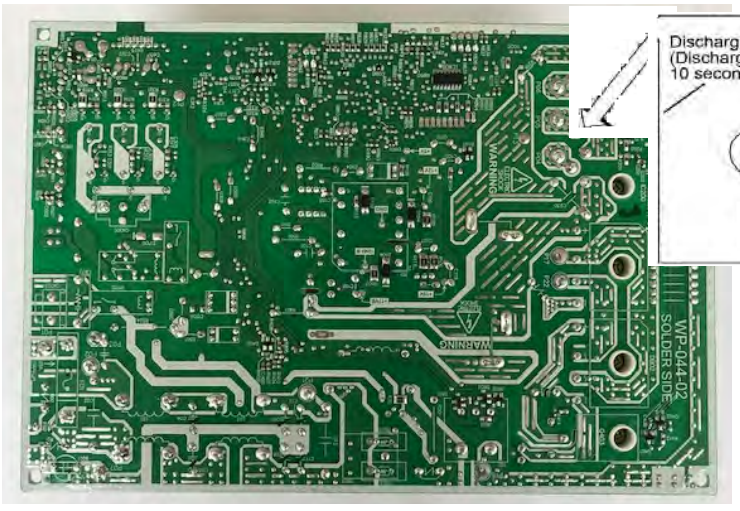
⚠ WARNING

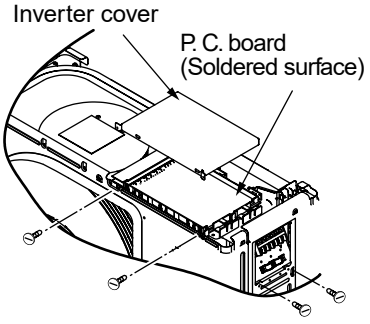
For discharging, never use a screwdriver and others for short-circuiting between + and – electrodes,

As the electrolytic capacitor is one with a large capacity, it is very dangerous because a large electric spark will occur.

< Discharging method >

1. Remove the inverter cover (plating) by opening four mounting claws.
2. As shown below, connect the discharge resistance (approx. 100Ω40W) or plug of the soldering iron to voltage between + – terminals of the C09, C10 (“WARNING ELECTRIC SHOCK” is indicated.) electrolytic capacitor (760μF/400V) on P.C. board, and then perform discharging.





11-1. First Confirmation

11-1-1. Confirmation of Power Supply

Confirm that the power breaker operates (ON) normally.

11-1-2. Confirmation of Power Voltage

Confirm that power voltage is AC 220–240 ±10%.

If power voltage is not in this range, the unit may not operate normally.

11-1-3. Operation Which is not a Trouble (Program Operation)

For controlling the air conditioner, the program operations are built in the microcomputer as described in the following table.

If a claim is made for running operation, check whether or not it meets to the contents in the following table.

When it does, we inform you that it is not trouble of equipment, but it is indispensable for controlling and maintaining of air conditioner.

Table 11-1-1

No.	Operation of air conditioner	Description
1	When power breaker is turned “ON”, the operation lamp (Green) of the indoor unit flashes.	The OPERATION lamp of the indoor unit flashes when power source is turned on. If “START/STOP” button is operated once, flashing stops. (Flashes also in power failure)
2	Compressor may not operate even if the room temperature is within range of compressor-ON.	The compressor does not operate while compressor restart delay timer (3-minutes timer) operates. The same phenomenon is found after power source has been turned on because 3-minutes timer operates.
3	In DRY and SLEEP MODE, FAN (air flow) display does not change even though FAN (air flow select) button is operated.	The air flow indication is fixed to [AUTO].
4	Increasing of compressor motor speed stops approx. 30 seconds after operation started, and then compressor motor speed increases again approx. 30 seconds after.	For smooth operation of the compressor, the compressor motor speed is restricted to Max. 33 rps for 2 minutes and Max. 57 rps for 2 minutes to 4 minutes, respectively after the operation has started.
5	The set value of the remote control should be below the room temperature.	If the set value is above the room temperature, Cooling operation is not performed. And check whether battery of the remote control is consumed or not.
6	In AUTO mode, the operation mode is changed.	After selecting Cool or Heat mode, select an operation mode again if the compressor keeps stop status for 15 minutes.
7	In HEAT mode, the compressor motor speed does not increase up to the maximum speed or decreases before the temperature arrives at the set temperature.	The compressor motor speed may decrease by high-temp. release control (Release protective operation by temp.-up of the indoor heat exchanger) or current release control.
8	Cool, Dry, or Heat operation cannot be performed.	When the unit in other room operates previously in different mode, Fan Only operation is performed because of first-push priority control. (Cool operation and Dry operation can be concurrently performed.)

11-2. Primary Judgment

To diagnose the troubles, use the following methods.

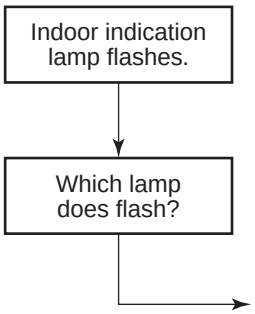
1) Judgment by flashing LED of indoor unit
2) Self-diagnosis by service check remote controller
3) Judgment of trouble by every symptom

Firstly use the method (1) for diagnosis. Then, use the method (2) or (3) to diagnose the details of troubles.
For any trouble occurred at the outdoor unit side, detailed diagnosis is possible by 6-serial LED on the Display P.C. board.

11-3. Judgment by Flashing LED of Indoor Unit

While the indoor unit monitors the operation status of the air conditioner, if the protective circuit operates, the contents of self-diagnosis are displayed with block on the indoor unit indication section.

Table 11-3-1



Item	Check code	Block display	Description for self-diagnosis
A	—	OPERATION (Green) Flashing display (1 Hz)	Power failure (when power is ON)
B	00	OPERATION (Green) Flashing display (5 Hz)	Protective circuit operation for indoor P.C. board
C	01	OPERATION (Green) TIMER (Orange) Flashing display (5 Hz)	Protective circuit operation for connecting cable and serial signal system
D	02	OPERATION (Green) Flashing display (5 Hz)	Protective circuit operation for outdoor P.C. board
E	03	OPERATION (Green) TIMER (Orange) Flashing display (5 Hz)	Protective circuit operation for others (including compressor)

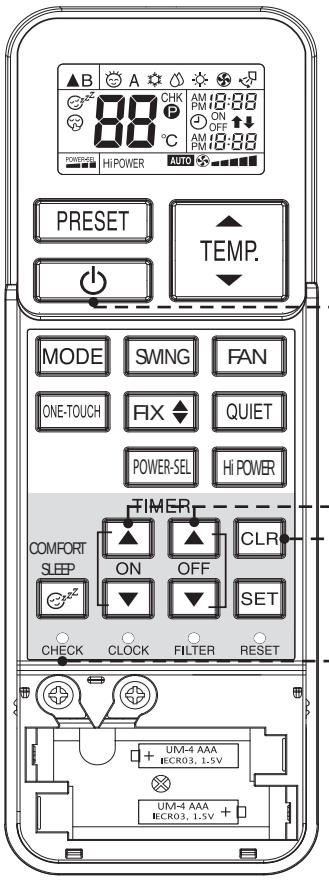
NOTE

- The contents of items B and C and a part of item E are displayed when air conditioner operates.
- When item B and C, and item B and a part of item E occur concurrently, priority is given to the block of item B.
- The check codes can be confirmed on the remote controller for servicing.

11-4. Self-Diagnosis by Remote Controller (Check Code)

1. If the lamps are indicated as shown B to E in Table 11-3-1, execute the self-diagnosis by the remote controller.
2. When the remote controller is set to the service mode, the indoor controller diagnoses the operation condition and indicates the information of the self-diagnosis on the display of the remote controller with the check codes. If a fault is detected, all lamps on the indoor unit will flash at 5Hz and it will beep for 10 seconds (Beep, Beep, Beep ...). The timer lamp usually flashes (5Hz) during self-diagnosis.

11-4-1. How to Use Remote Controller in Service Mode



Alphanumeric characters are used for the check codes.

5 is 5. 6 is 6.
A is A. b is B.
C is C. d is D.

1 **Press [CHECK] button with a tip of pencil to set the remote controller to the service mode.**

- " 00 " is indicated on the display of the remote controller.

2 **Press [ON ▲] or [OFF ▲] button**

If there is no fault with a code, the indoor unit will beep once (Beep) and the display of the remote controller will change as follows :

00 → 01 → 02 ··· 1d → 1E → 33

- The TIMER indicator of the indoor unit flashes continuously. (5 times per 1 sec.)
- Check the unit with all 52 check codes (00 to 33) as shown in Table-11-3-1.
- Press [ON▼] or [OFF ▼] button to change the check code backward.

If there is a fault, the indoor unit will beep for 10 seconds (Beep, Beep, Beep...).

Note the check code on the display of the remote controller.

- 2-digits alphanumeric will be indicated on the display.
- All indicators on the indoor unit will flash. (5 times per 1 sec.)

3 **Press [CLR] button. After service finish for clear** service code in memory.

- "7F" is indicated on the display of the remote control.

4 **Press [⏻] button to release the service mode.**

- The display of the remote controller returns to as it was before service mode was engaged.

Fig. 11-4-1

11-4-2. Caution at Servicing

1. After using the service mode of remote controller finished, press the [⏻] button to reset the remote controller to normal function.
2. After finished the diagnosis by the remote controller, turn OFF power supply and turn its ON again to reset the air conditioner to normal operation. However, the check codes are not deleted from memory of the microcomputer.
3. After servicing finished, press [CLR] button of remote controller under service mode status to send code "7F" to the indoor unit. The check code stored in memory is cleared.

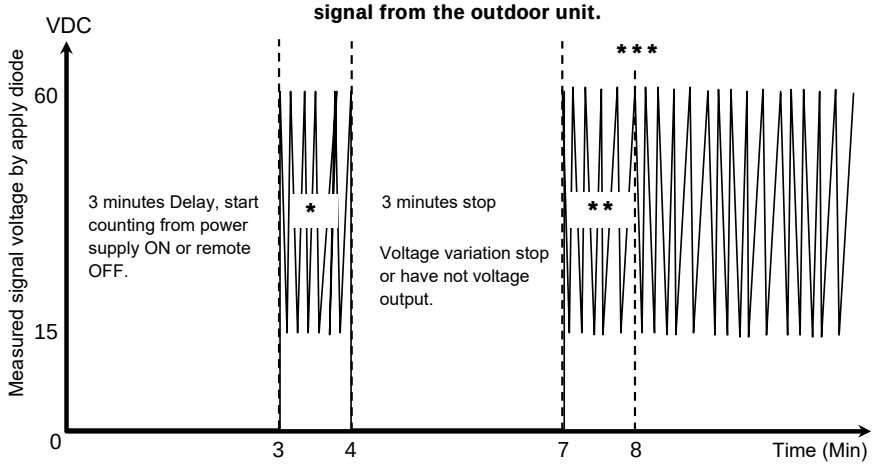
Table 11-4-1

Block distinction		Operation of diagnosis function				Action and Judgment
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	
00	Indoor P.C. board.	0C	TA sensor ; The room temperature sensor is short-Circuit or disconnection.	Operation continues.	Flashes when error is detected.	1. Check the sensor TA and connection. 2. In case of the sensor and its connection is normal, check the P.C. board.
		0d	TC sensor ; The heat exchanger temperature sensor of the indoor unit is out of place, disconnection, short-circuit or migration.	Operation continues.	Flashes when error is detected.	1. Check the sensor TC and connection. 2. In case of the sensor and its connection is normal, check the P.C. board.
		0E	Gas detector sensor failure	Outdoor Unit "OFF" Indoor Unit continue fan only operation for 250 minute or "OFF".	Flashes when error is detected.	1. Check Gas sensor shortage / open. 2. Check Gas sensor disconnect.
		11	Fan motor of the indoor unit is failure, lock-rotor, short-circuit, disconnection, etc. Or its circuit on P.C. board has problem.	All OFF	Flashes when error is detected.	1. Check the fan motor and connection. 2. In case of the motor and its connection is normal, check the P.C. board.
		12	Other trouble on the indoor P.C. board.	Depend on cause of failure.	Depend on cause of failure.	1. Reset power supply. 2. Replace P.C. board.
		26	Gas detector sensor life time	Operation continues.	Flashes when error is detected.	Replace new sensor.

Block distinction		Operation of diagnosis function				Action and Judgment
Check code	**Block**	**Check code**	**Cause of operation**	**Air conditioner status**	**Display flashing error**	
01	Serial signal and connecting cable.	04	1) Defective wiring of the connecting cable or miss-wiring. 2) Operation signal has not send from the indoor unit when operation start. 3) Outdoor unit has not send return signal to the indoor unit when operation started. 4) Return signal from the outdoor unit is stop during operation. • Some protector (hardware, if exist) of the outdoor unit open circuit of signal. • Signal circuit of indoor P.C. board or outdoor P.C. board is failure in some period.	Indoor unit operates continue. Outdoor unit stop.	Flashes when error is detected. Flashing stop and outdoor unit start to operate when the return signal from the outdoor unit is normal.	1) to 3) The outdoor unit never operate. • Check connecting cable and correct if defective wiring. • Check 25A fuse of inverter P.C. board. • Check 3.15A fuse of inverter P.C. board. • Check operation signal of the indoor unit by using diode. Measure voltage at terminal block of the indoor unit between No.2 and No.3 (or L2 and S) If signal is varied 15-60V continuously, replace inverter P.C. board. If signal is not varied, replace indoor P.C. board. 4) The outdoor unit abnormal stop at some time. • If the other check codes are found concurrently, check them together. • Check protector (hardware) such as Hi-Pressure switch, Thermal-Relay, etc. • Check refrigerant amount or any possibility case which may caused high temperature or high pressure. • Check operation signal of the indoor unit by using diode. Measure voltage at terminal block of the indoor unit between No.2 and No.3 (or L2 and S) If signal is varied 15-60V continuously, replace inverter P.C. board. If signal is not varied, replace indoor P.C. board.

Note : Operation signal of the indoor unit shall be measured in the sending period as picture below.

Sending signal of the indoor unit when have not return signal from the outdoor unit.



* Signal send only 1 minute and stop. Because of return signal from outdoor unit has not received.

** Signal resend again after 3 minutes stop. And the signal will send continuously.

*** 1 minute after resending, the indoor unit display flashes error.

Block distinction		Operation of diagnosis function				Action and Judgment
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	
02	Outdoor	14	Current on inverter circuit is over limit in short time. ● Inverter P.C. board is failure, IGBT shortage, etc. ● Compressor current is higher than limitation, lock rotor, etc.	All OFF	Flashes after error is detected 8 times*.	1. Remove connecting lead wire of the compressor, and operate again. 2. If outdoor fan does not operate or operate but stop after some period, replace the inverter P.C. board. 3. If outdoor fan operates normally, measure 3-Phase output of inverter P.C. board (150-270VAC) at the connecting lead wire of compressor. 4. If 3-Phase output is abnormal, replace inverter P.C.Board. 5. If 3-Phase output is normal, replace compressor. (lock rotor, etc.)
		16	Compressor position-detect circuit error or short-circuit between winding of compressor.	All OFF	Flashes after error is detected 8 times*.	1. Remove connecting lead wire of the compressor, and operate again. 2. If outdoor fan does not operate or operation but stop after some period, replace the inverter P.C. board. 3. If outdoor fan operates normally, measure resistance of compressor winding. If circuit is shortage, replace the compressor.
		17	Current-detect circuit of inverter P.C. board error.	All OFF	Flashes after error is detected 4 times*.	Even if trying to operate again, all operations stop, replace inverter P.C. board.
		18	TG sensor; abnormal. Out of place, disconnection, shortage, or mis connection (TG sensor is connected to TG connector, TG sensor is connected to TG sensor connector) TG sensor; Outdoor heat exchanger temperature sensor TG sensor; Suction pipe temperature sensor	All OFF	Flashes after error is detected 4 times*.	1. Check sensors, TG connection. In case of sensors and it's connection is normal, check the inverter P.C. board 2. Check 4way valve operation/position. In case TG detected temperature relationship are different from normal operation, "18" might be detected.
		19	TD sensor ; Discharge pipe temperature sensor is disconnection or shortage.	All OFF	Flashes after error is detected 4 times*.	1. Check sensors TD and connection. 2. In case of the sensor and its connection is normal, check the inverter P.C. board.
		1A	Outdoor fan failure or its drive-circuit on the inverter P.C. board failure.	All OFF	Flashes after error is detected 8 times*.	1. Check the motor, measure winding resistance, shortage or lock rotor. 2. Check the inverter P.C. board.
		1b	TO sensor ; The outdoor temperature sensor is disconnection or shortage.	Operation continues.	Record error after detected 4 times*. But does not flash display.	1. Check sensors TO and connection. 2. In case of the sensor and its connection is normal, check the inverter P.C. board.

Block distinction		Operation of diagnosis function				Action and Judgment
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	
02	Outdoor	1C	Compressor drive output error. (Relation of voltage, current and frequency is abnormal) ● Overloading operation of compressor caused by over-charge refrigerant, P.M.V. failure, etc. ● Compressor failure (High current). ● TG sensor; abnormal. Out of place, disconnection, shortage, or mis connection (TG sensor is connected to TG connector, TG sensor is connected to TG sensor connector) TG sensor; Outdoor heat exchanger temperature sensor TG sensor; Suction pipe temperature sensor	All OFF	Flashes after error is detected 8 times*.	1. Check installation conditions such as packed valve opening, refrigerant amount and power supply (rate ±10%, both of operation and non operation condition). 2. (In case of P.M.V. exists) Check P.M.V. by measure the resistance of the coil and confirm its operation (sound of initial operation, etc.) 3. Observe any possibility cause which may affect operation load of compressor. 4. Operate again. If compressor operation is failure when 20 seconds passed (count time from operation starting of compressor), replace compressor. 5. Check sensors, TG connection. In case of sensors and it's connection is normal, check the inverter P.C. board. 6. Check 4way valve operation/position. In case TG detected temperature relationship are different from normal operation, "1C" might be detected.
	* 4 or 8 times ; When first error is detected, error is count as 1 time, then once operation is stop and re-started. After re-starting operation within 6 minutes, if same error is detected, error count is add (count become 2 times) When error count comes 4, 8, 11 or 18 times, record error to check code. But after re-starting operation, if no error is detected and air conditioner can operate more than 6 minutes, error count is cleared.					
03	The others (including compressor)	07	Return signal of the outdoor unit has been sent when operation start. But after that, signal is stop some time. ● Instantaneous power failure. ● Some protector (hardware) of the outdoor unit open circuit of signal. ● Signal circuit of indoor P.C. board or outdoor P.C. board is failure in some period.	Indoor unit operates continue. Outdoor unit stop.	Flashes when error is detected. Flashing stop and outdoor unit start to operate when the return signal from the outdoor unit is normal.	1. Check power supply (Rate ± 10%) 2. If the air conditioner repeat operates and stop with interval of approx. 10 to 40 minutes. ● (In case of these exist) Check protector (hardware) such as Hi-Pressure switch, Thermal-Relay, etc. ● Check refrigerant amount, packed valve opening and any possibility cause which may affect high temperature or high pressure. 3. Check operation signal of the indoor unit by using diode. Measure voltage at terminal block of the indoor unit between No.2 and No.3 (or L2 and S) If signal is varied 15-60V continuously, replace inverter P.C. board. If signal is not varied, replace indoor P.C. board.

Block distinction		Operation of diagnosis function				Action and Judgment
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	
03	The others (including compressor)	1d	Compressor does not rotate. Because of missed wiring, missed phase or shortage.	All OFF	Flashes after error is detected 8 times*.	1. Remove connecting lead wire of the compressor, and operate again. 2. If outdoor fan does not operate or operation but stop after some period, replace the inverter P.C. board. 3. If outdoor fan operates normally, measure 3-Phase output of inverter P.C. board (150-270VAC) at the connecting lead wire of compressor. 4. If 3-Phase output is abnormal, replace inverter P.C.Board. 5. If 3-Phase output is normal, measure resistance of compressor winding. 6. If winding is shortage, replace the compressor.
		1E	Discharge temperature exceeded 117°C.	All OFF	Flashes after error is detected 4 times*.	1. Check sensors TD. 2. Check refrigerant amount. 3. (In case of P.M.V. exists) Check P.M.V. by measure the resistance of the coil and confirm its operation (sound of initial operation, etc.) 4. Observe any possibility cause which may affect high temperature of compressor.
		1F	Compressor is high current though operation Hz is decreased to minimum limit. ● Installation problem. ● Instantaneous power failure. ● Refrigeration cycle problem. ● Compressor break down. ● Compressor failure (High current).operation, etc.)	All OFF	Flashes after error is detected 8 times*.	1. Check installation conditions such as packed valve opening, refrigerant amount and power supply (rate ±10%, both of operation and non operation condition). 2. (In case of P.M.V. exists) Check P.M.V. by measure the resistance of the coil and confirm its operation (sound of initial operation, etc.) 3. Observe any possibility cause which may affect high current of compressor. 4. If 1, 2 and 3 are normal, replace compressor.
		20	PMV error	All OFF	Displayed when error is detected.	1. Check LED (D800-D805) on inverter P.C.board. 2. Check connection of PMV wiring. 3. Start operation. (Excluding error room) 4. If the same error is occurred. Replace PMV

Block distinction		Operation of diagnosis function				Action and Judgment
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	
03	The others (including compressor)	21	Return signal of the outdoor unit has been sent when operation start. But after that, signal is stop some time. ● Instantaneous power failure. ● Some protector (hardware) of the outdoor unit open circuit of signal. ● Signal circuit of indoor P.C.board of outdo P.C.board is failure some period. ● TE, TC high temperature TE for cooling operation TC for heating operation. (TE only exists in the Heat Pump system) ● TE of TG sensor; abnormal. Out of place, disconnection, shortage, or mis connection (TE sensor is connected to TS connector, TG sensor is connected to TE sensor connector) TE sensor; Outdoor heat exchanger temperature sensor TG sensor; Suction pipe temperature sensor	Indoor unit operates continue. Outdoor unit stop.	Flashes when error is detected 11 times*. Flashing stop and outdoor unit start to operate when the return signal from the outdoor unit is normal.	1. Check power supply (Rate ±10%) 2. If the air conditioner repeat operat and stop with interval of approx. 10 to 40 minutes. ● (In case of these exist) Check protector (hardware) such as Hi-Pressure switch, Thermal-Relay, etc. ● Check refrigerant amount, packed valve opening and any possibility cause which may affect high temperature or high pressure. 3. Check operation signal of the indoor unit by using diode. Measure voltage at terminal block of the indoor unit between No.2 and No.3 (or L2 and S) If signal is varied 15-60V continuously, replace inverter P.C. board. If signal is not varied, replace indoor P.C. board. 4. Check and clean heat exchanger area Indoor and Outdoor unit. 5. Check sensors, TE, TG connection. In case of sensors and it's connection is normal, check the inverter P.C. board. 6. Check 4way valve operation/position. In case TE, TG detected temperature relationship are different from normal operation, "21" might be detected.

* 4, 8 or 11 times ; When first error is detected, error is count as 1 time, then once operation is stop and re-started. After re-starting operation within 6 minutes, if same error is detected, error count is add (count become 2 times) When error count comes 4, 8, 11 or 18 times, record error to check code. But after re-starting operation, if no error is detected and air conditioner can operate more than 6 minutes, error count is cleared.

11-5. Judgment of Trouble by Symptom

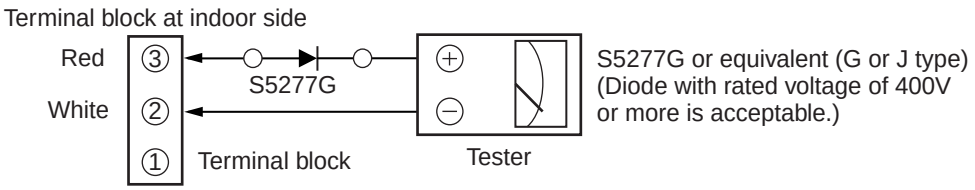
11-5-1. Wiring Failure (Interconnecting and Serial Signal Wire)

(1) Outdoor unit does not operate

1) Is the voltage between ② and ③ of the indoor terminal block varied?
2) Confirm that transmission from indoor unit to outdoor unit is correctly performed based upon the following diagram.

NOTE

- Measurement should be performed 2 minutes and 30 seconds after starting of the operation.
- Be sure to prepare a diode for judgment.

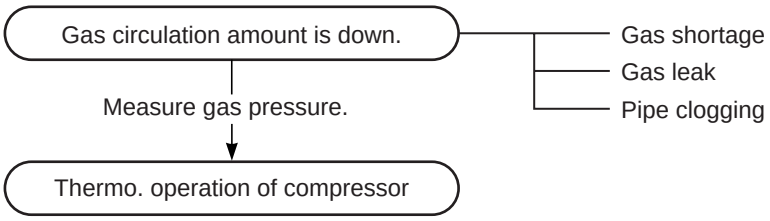


Normal time : Voltage swings between DC15 and 60V. ..... Inverter Assembly check
Abnormal time : Voltage does not vary.

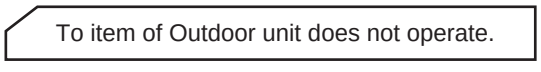
(2) Outdoor unit stops in a little while after operation started

<Check procedure> Select phenomena described below.

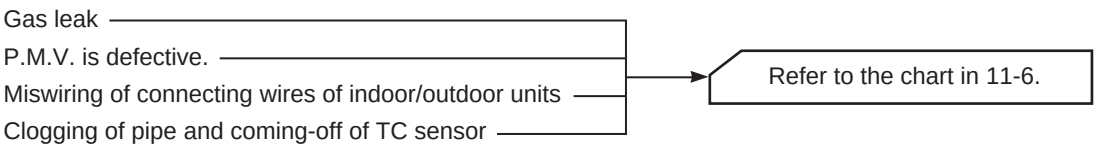
1) The outdoor unit stops 10 to 20 minutes after operation started, and 10 minutes or more are required to restart the unit.



2) If the unit stops once, it does not operate until the power will be turned on again.



3) The outdoor unit stops 10 minutes to 1 hour after operation started, and an alarm is displayed. (Discharge temp. error check code 03, 1E Sensor temp. error check code 02, 1C)



Service Support Function (LED Display, Switch Operation)

1. Outline

A various setup and operation check can be performed by the pushdown button switches (SW01, 02) on the outdoor P.C. board (Display PCB).

Operation part and Display part on MCC-1646 (Display PCB)

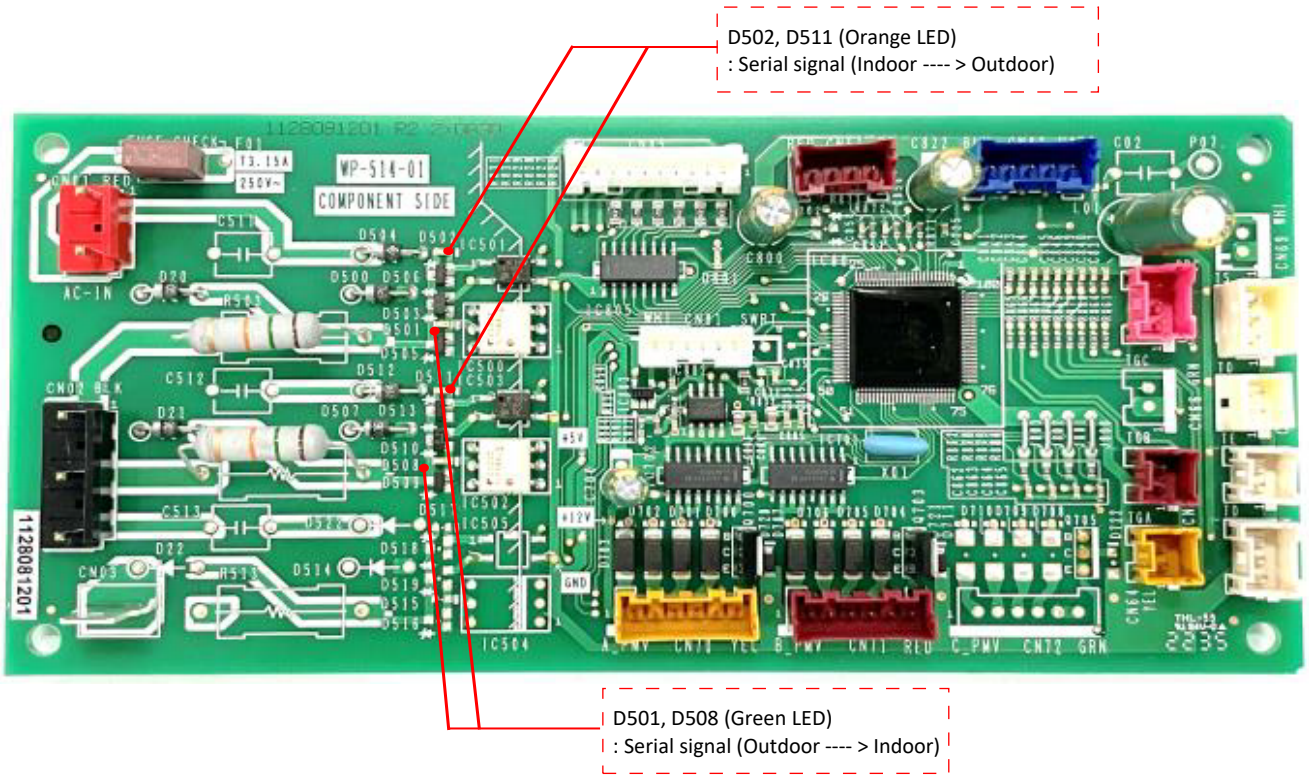
Part No.	Specifications	Operation contents
SW01,02	Pushdown button switch	Performs the specific operation to check maintenance and various initial settings.
D805	Green LED	(1) Power-ON display When the power of the outdoor unit is turned on, D805 LED goes on. (2) Error display When the outdoor controller detects some errors, some LEDs go on or flash according to the error as described in Error display table. (Refer to ---) (3) Specific operation display When SW01 or SW02 is pushed and a specific operation is operated, some LEDs go on or flash.
D801 to D804	Yellow LED	

Display part on MCC-1665(Control PCB)

Part No.	Specifications	Operation contents
D502, D511, D517	Orange LED	Indoor/Outdoor communication (Serial communication) signal display (Receive signal from indoor signal)
D501, D508, D515	Green LED	Indoor/Outdoor communication (Serial communication) signal display (Send signal from outdoor signal)

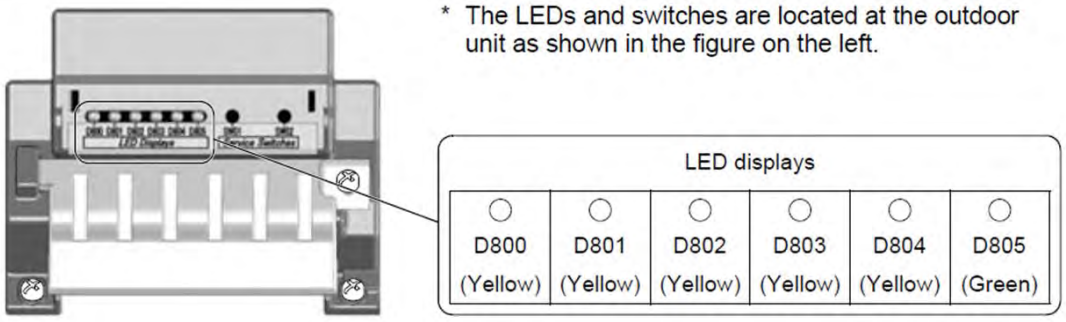
* Every LED is colorless when it goes off.

Control P.C.B WP-514



11-6. Trouble Diagnosis by Outdoor LED

For the outdoor unit, the self-diagnosis is possible by LED (Green) and five LEDs (Yellow).
Green LED (D805) and Yellow LEDs (D800 to D804) are provided on the display P.C. board MCC-1646.



1. In the initial LED display status, Green LED(D805) is lighted as below.

Normal

D800 (Yellow)	D801 (Yellow)	D802 (Yellow)	D803 (Yellow)	D804 (Yellow)	D805 (Green)
●	●	●	●	●	○

○:ON ●:OFF

Error occurring

D800 (Yellow)	D801 (Yellow)	D802 (Yellow)	D803 (Yellow)	D804 (Yellow)	D805 (Green)
●/○*	●/○*	●/○*	●/○*	●/○*	○

○:ON ○*:3 sec ON/0.5 sec OFF ●:OFF

2. If there is an error, Yellow LED are lighted according to the error as described in the below table.
3. When there are two or more errors, LEDs flash cyclically.
4. When D804 or D805 are flashing (rapid or slow), push and hold SW01 and SW02 simultaneously for 5 seconds or more. (Display returns to the error display.)

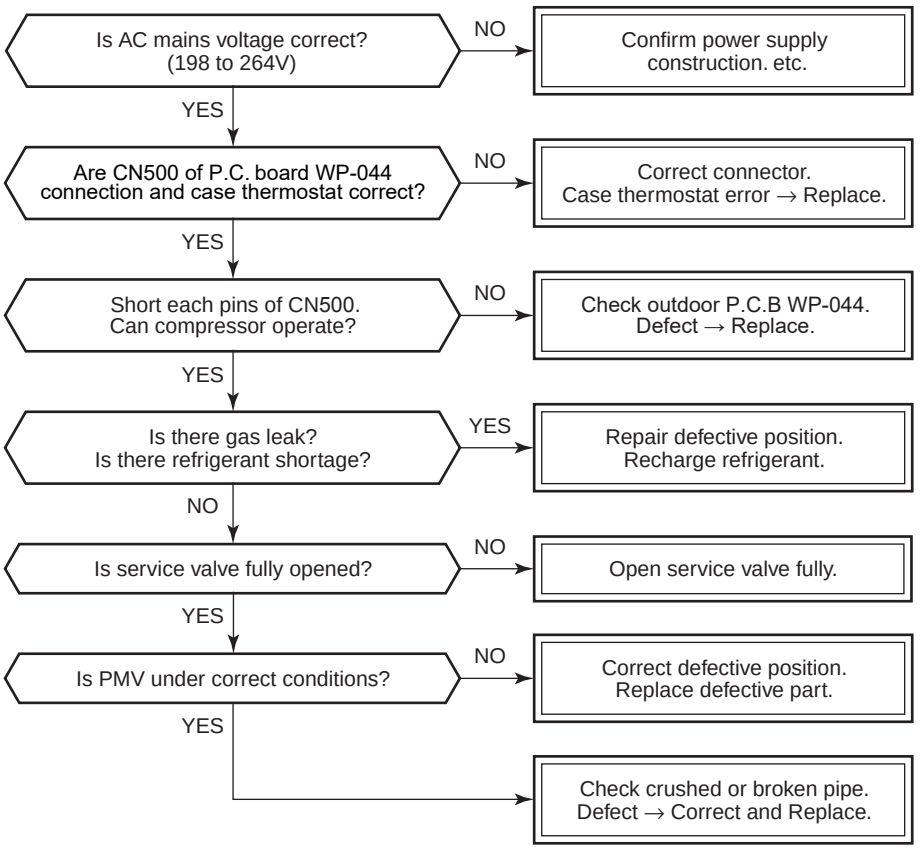
○:ON (○*:3 sec ON/0.5 sec OFF)●:OFF
◎:Rapid Flashing(5 times/sec) ◇:Slow Flashing(1 time/sec)

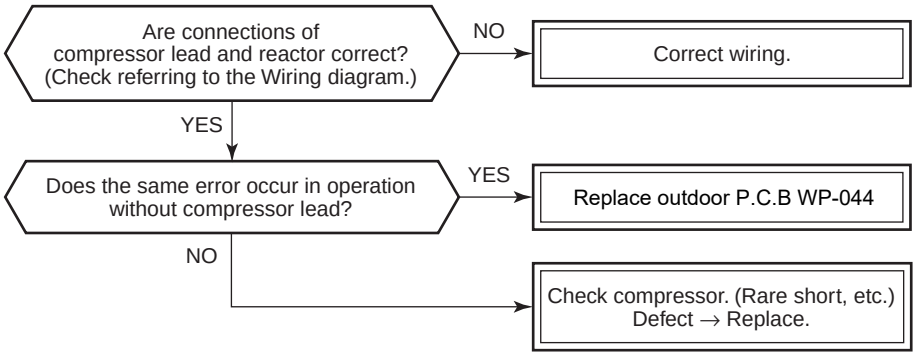
	Display						Indoor check code	Description
	D800 (YL)	D801 (YL)	D802 (YL)	D803 (YL)	D804 (YL)	D805 (GN)		
	●	●	●	●	●		-	Normal operation (no error)
	○*	●	●	●	●		1C	Compressor case thermostat error
	●	○*	●	●	●		21	High pressure switch error
	○*	○*	●	●	●		1C	Compressor system error
	●	●	○*	●	●		1D	Compressor lock
	○*	●	○*	●	●		1F	Compressor breakdown
	●	○*	○*	●	●		14	Driving element short circuit
	○*	○*	○*	●	●		16	Position detection circuit error
	●	●	●	○*	●		17	Current detection circuit error
	○*	●	●	○*	●		1C	Communication error between MCU
	●	○*	●	○*	●		1A	Fan system error
	○*	○*	●	○*	●		1E	Discharge temperature error
	●	●	○*	○*	●	○	19	Discharge temperature sensor (TD) error
*1	○*	●	○*	○*	●		1B	Outdoor air temperature sensor (TO) error
	●	○*	○*	○*	●		18	Suction temperature sensor (TS) error
	○*	○*	○*	○*	●		18	Heat exchanger temperature sensor (TE) error
*2	●	●	●	●	○*		1C	Gas pipe (unit A) temperature sensor (TGa) error
*2	○*	●	●	●	○*		1C	Gas pipe (unit B) temperature sensor (TGb) error
	○*	●	○*	●	○*		-	PMV error (SH≥20)
	●	○*	○*	●	○*		-	PMV error (SH≤−8)
	●	●	●	○*	○*		20	PMV leakage error (unit A)
	○*	●	●	○*	○*		20	PMV leakage error (unit B)
	○*	●	○*	○*	○*		-	Miswiring (mispiping) check error

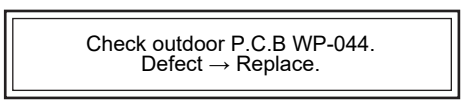
∗1: Back-up operation is performed without error display of the indoor unit.
∗2: Operated normally when the air conditioners in other rooms are driven.

○:ON (○*:3 sec ON / 0.5 sec OFF) ●:OFF

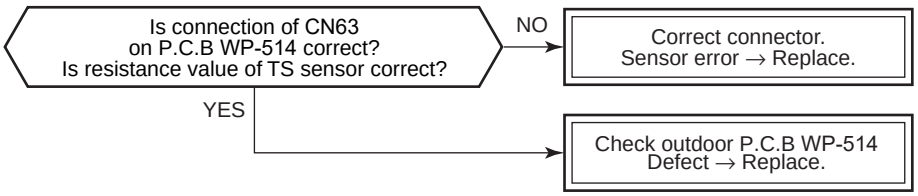
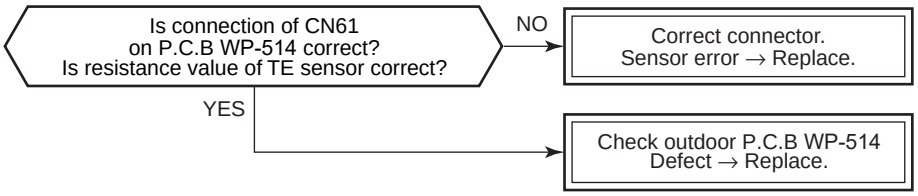
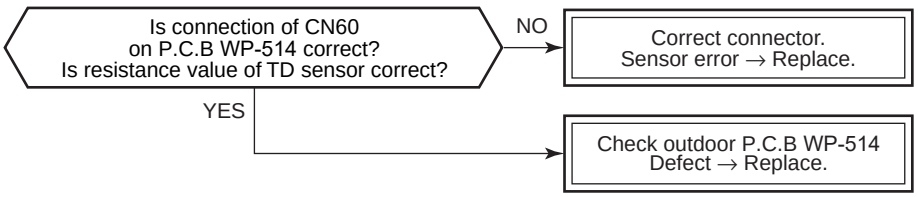
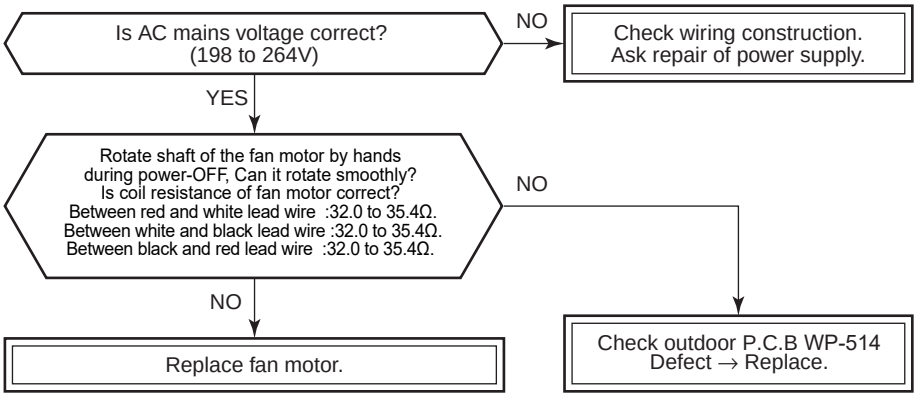
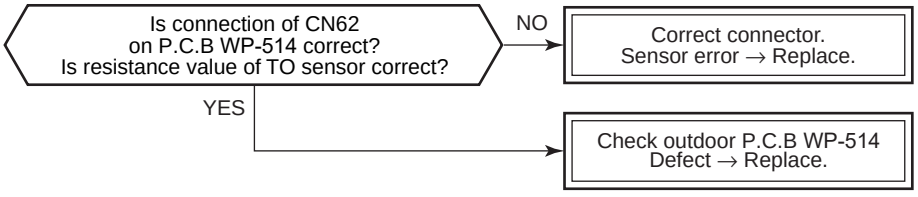
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention indicates part of outdoor unit.)
[1C]	○*●●●●○	**[Case thermo operation, Power supply error]**
[14]	●○*○*●●○	**[Short-circuit of compressor drive element]**
[16]	○*○*○*●●○	**[Position detection circuit error]**
[17]	●●●○*●○	**[Current detection circuit error]**





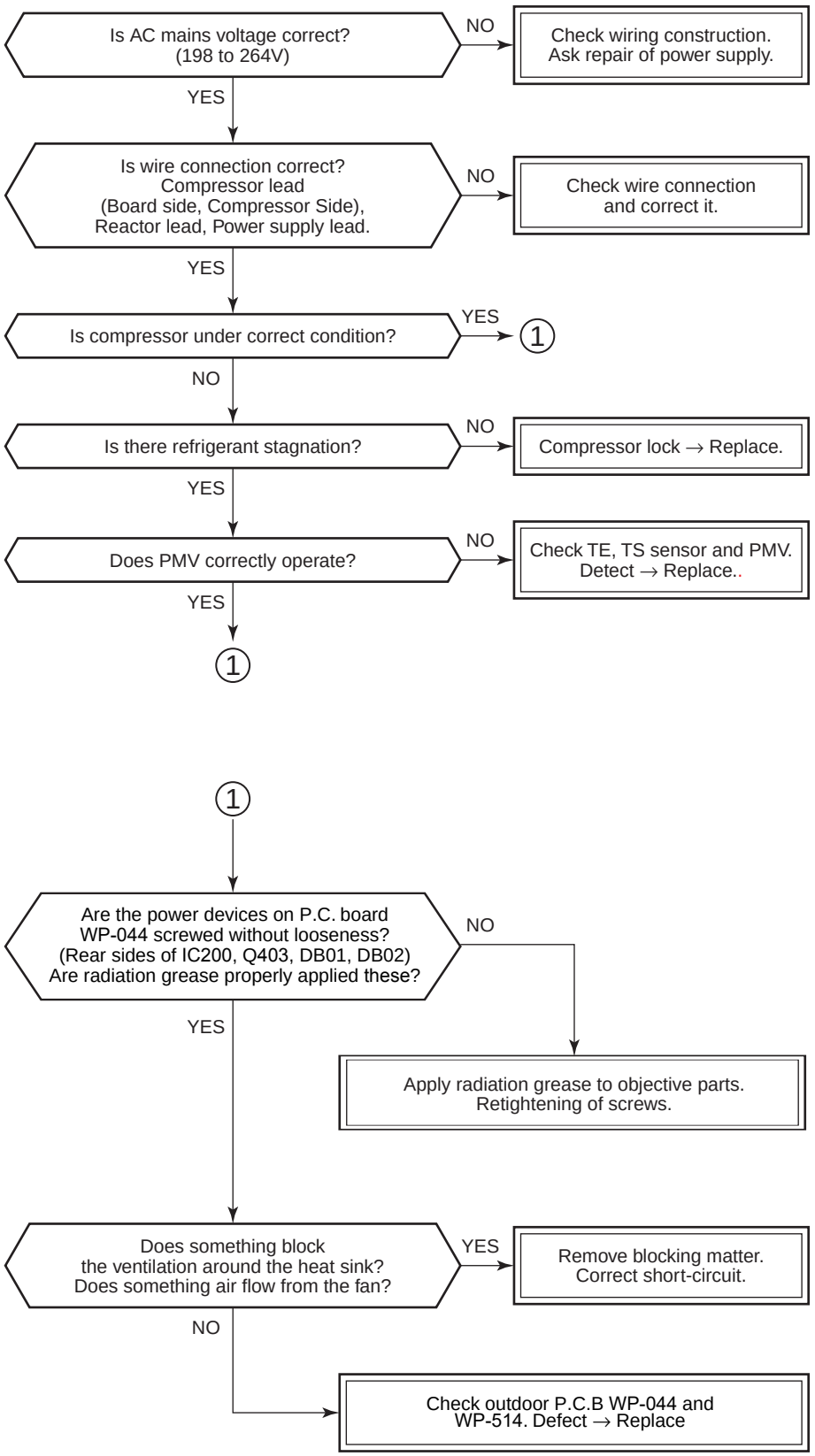


○:ON (○*:3 sec ON / 0.5 sec OFF) ●:OFF

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention indicates part of outdoor unit.)
[18]		∗ There is a possibility that it is one of the following errors. Confirm LED on display P.C. board (MCC-1646)to judge which error it is. Heat exchanger temp. sensor (TE) error, Suction temp. sensor (TS) error
	●○*○*○*●○	**[Suction temp. sensor (TS) error]** 
	○*○*○*○*●○	**[Heat exchanger temp. sensor (TE) error]** 
[19]	●●○*○*●○	**[Discharge temp. sensor (TD) error]** 
[1A]	●○*●○*●○	**[Fan system error]** 
[1B]	○*●○*○*●○	**[Outside temp. sensor (TO) error]** 

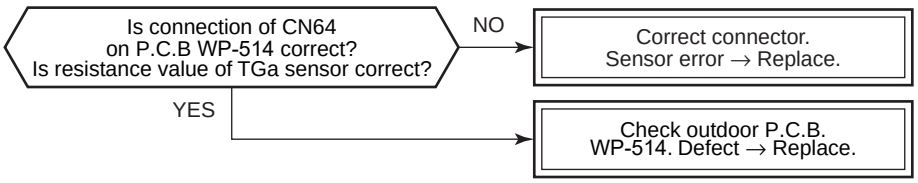
○:ON (○*:3 sec ON / 0.5 sec OFF) ●:OFF

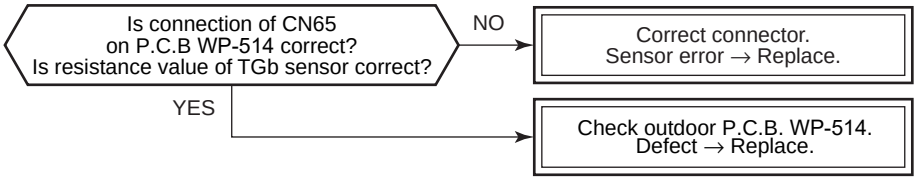
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention indicates part of outdoor unit.)
[1C]		∗ There is a possibility that it is one of the following errors. Confirm LED on display P.C. board (MCC-1646) to judge which error it is. Compressor system error, Compressor lock, Gas side temp. sensor (TGa to TGb) error, Gas leakage, PMV error
	○*○*●●●○	**[Compressor system error, Compressor lock]**

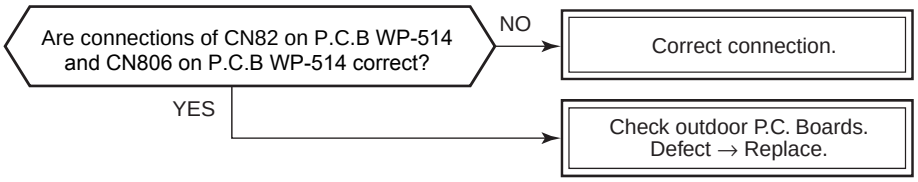


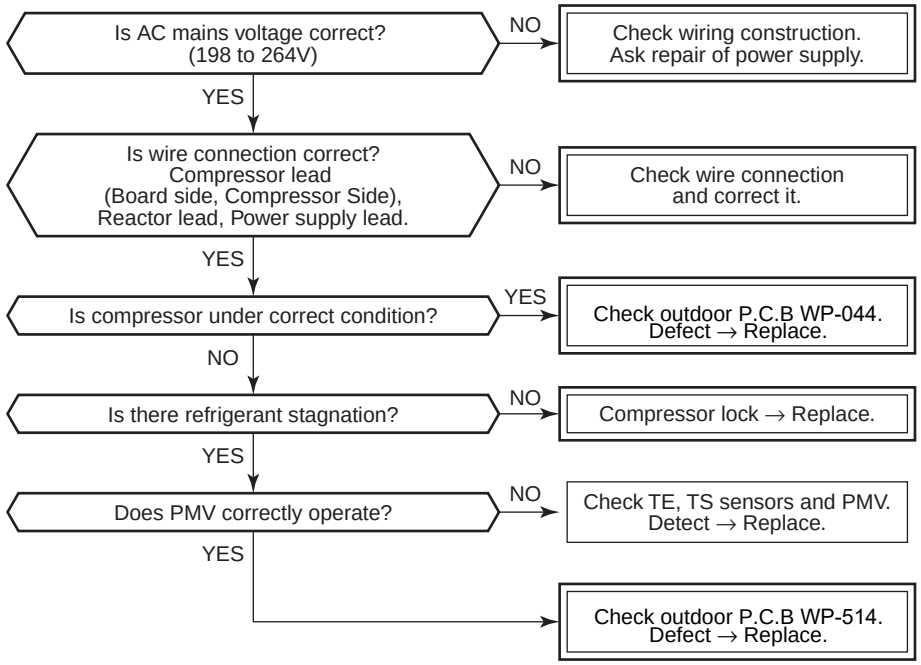
○:ON (○*:3 sec ON / 0.5 sec OFF) ●:OFF

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention indicates part of outdoor unit.)
[1C] (Continued)	●●●●○*○	**[A room gas side temp. sensor (TGa) error]**
	○*●●●○*○	**[B room gas side temp. sensor (TGb) error]**
	○*●●○*●○	**Communication error between MCUs**
[1D]	●●○*●●○	**[Compressor lock]**



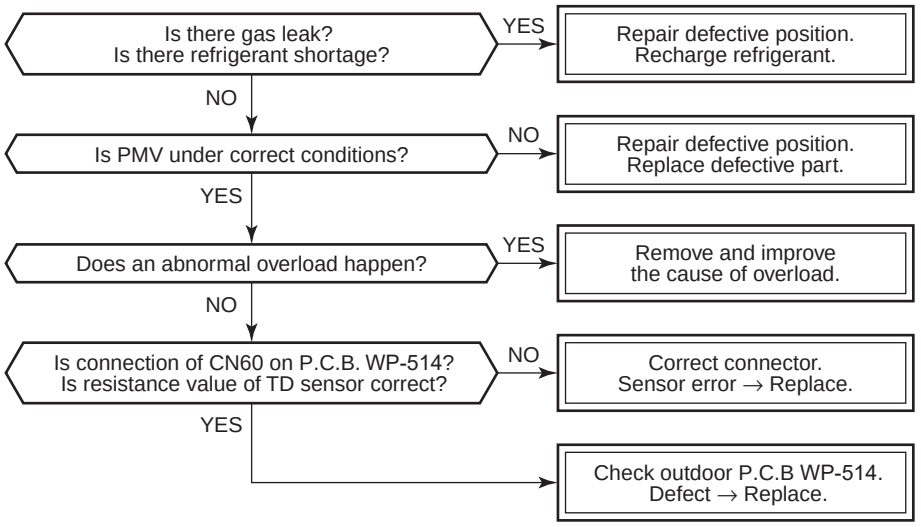


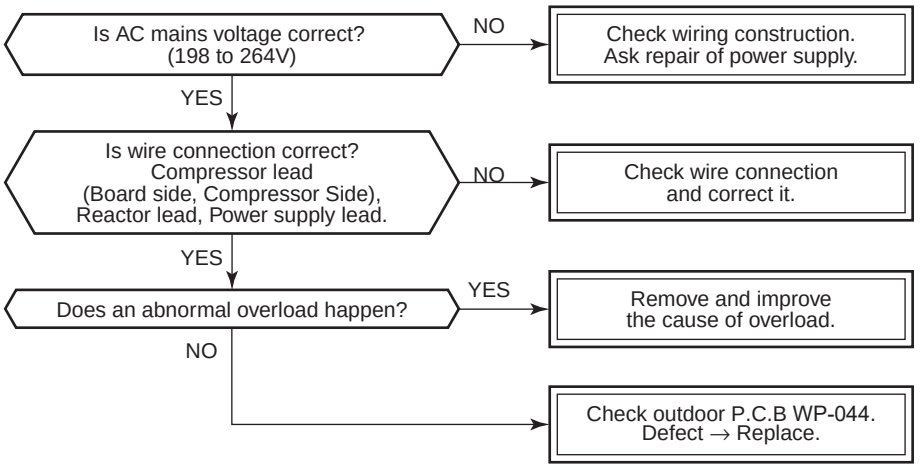




○:ON (○*:3 sec ON / 0.5 sec OFF) ●:OFF

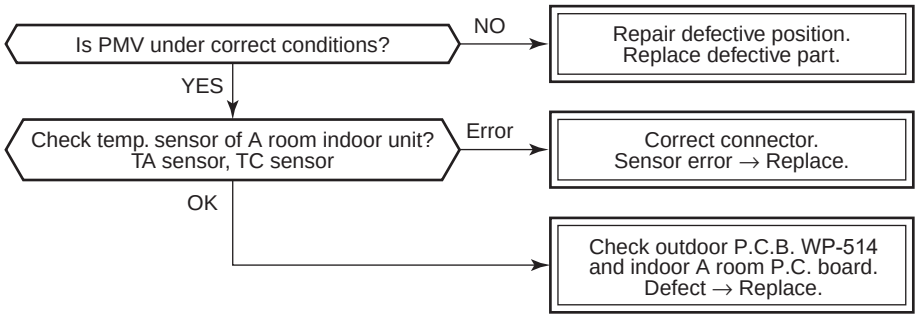
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention indicates part of outdoor unit.)
[1E]	○*○*●○*●○	**[Discharge temp. error]**
[1F]	○*●○*●●○	**[Compressor break down]**

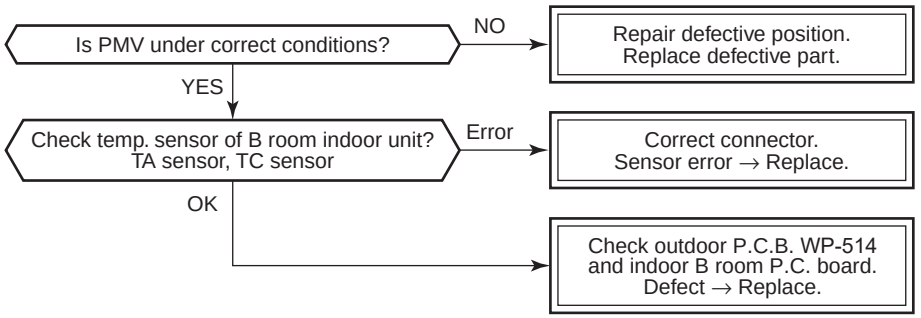




○:ON (○*:3 sec ON / 0.5 sec OFF) ●:OFF

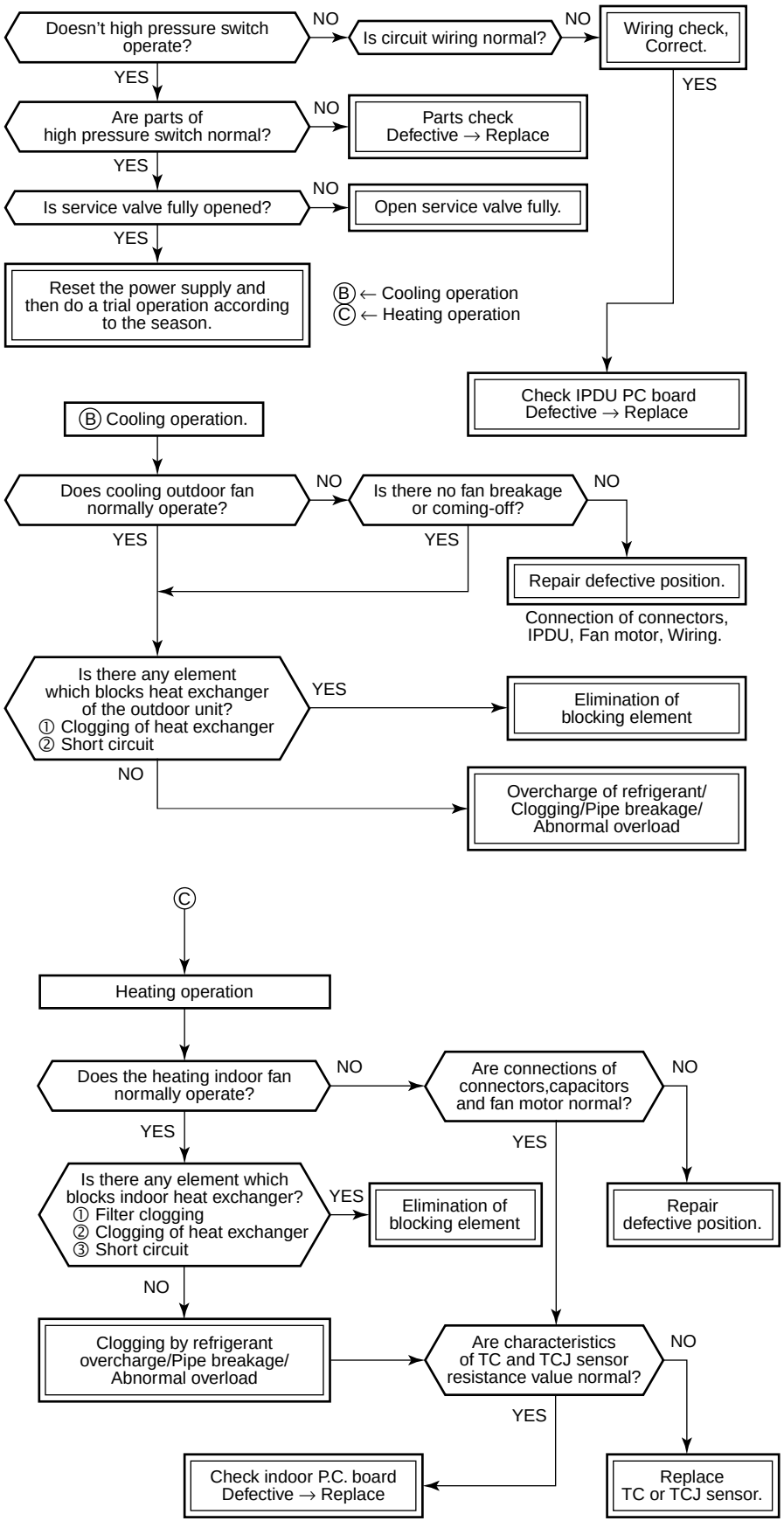
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention indicates part of outdoor unit.)
[20]		∗ There is a possibility that it is one of the following errors. Confirm LED on display P.C. board (MCC-1646) to judge which error it is. PMV error for A room, B room.
	●●●○*○*○	**[PMV error for A room]**
	○*●●○*○*○	**[PMV error for B room]**





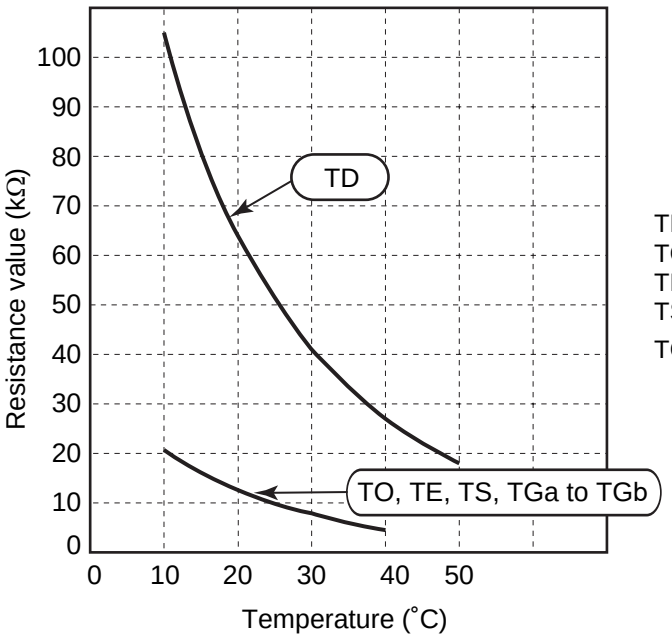
○:ON (○*:3 sec ON / 0.5 sec OFF) ●:OFF

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention indicates part of outdoor unit.)
[21]		* There is a possibility that it is one of the following errors. Confirm LED on display P.C. board (MCC-1646) to judge which error it is. (1) high-pressure SW system error, (2) power supply error (Vdc), (3) high-pressure protective operation, (4) case thermo operation.
	●○*●●●○	**[High pressure SW system error]** High pressure protective operation.



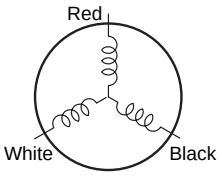
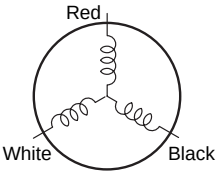
11-7. Inspection of the Main Parts

[1] Sensor characteristic table



TD : Discharge temp. sensor
TO : Outdoor temp. sensor
TE : Outdoor heat exchanger temp. sensor
TS : Suction temp. sensor
TGa to TGb : Gas side temp. sensor

Outdoor Unit

No.	Part name	Checking procedure
1	Compressor RAS-2M10G3AVG-E,-TR (Model : KSK89D53UFZ) RAS-2M14G3AVG-E,-TR (Model : KTN130D30UFZ)	Measure the resistance value of each winding by using the tester.  Position: Red - White / White - Black / Black - Red Resistance value: KSK89D53UFZ: 1.02Ω; KTN130D30UFZ: 2.35Ω Under 20°C
2	Outdoor fan motor (Model : WDF-340-A43-1)	Measure the resistance value of winding by using the tester.  Position: Red - White / White - Black / Black - Red Resistance value: 33.7 ± 1.7Ω For details, refer to Section 11-8.
3	Compressor thermo. Bimetal type (Model : S104CT4C800)	Check conduction by using the tester.
4	High pressure switch (Model : ACB-1UB177W)	Check conduction by using the tester.
5	Outdoor temperature sensor (TO), pipe temperature sensor (TGa, TGb), discharge temperature sensor (TD), suction temperature sensor (TS), evaporator temperature sensor (TE),	Disconnect the connector, and measure resistance value with the tester.(Normal temperature)

Sensor \ Temperature	10°C	20°C	25°C	40°C	50°C
TD (kΩ)	105	64	51	27	18
TO, TE, TS (kΩ)	20.6	12.6	10.0	5.1	3.4
TGa to TGb (kΩ)	20.0	12.5	10.0	5.3	3.6

11-8. How to Simply Judge Whether Outdoor Fan Motor is Good or Bad

1. Symptom

- Outdoor fan motor does not rotate.
- Outdoor fan motor stops within several tens seconds though it started rotating.
- Outdoor fan motor rotates or does not rotate according to the position where the fan stopped, etc.

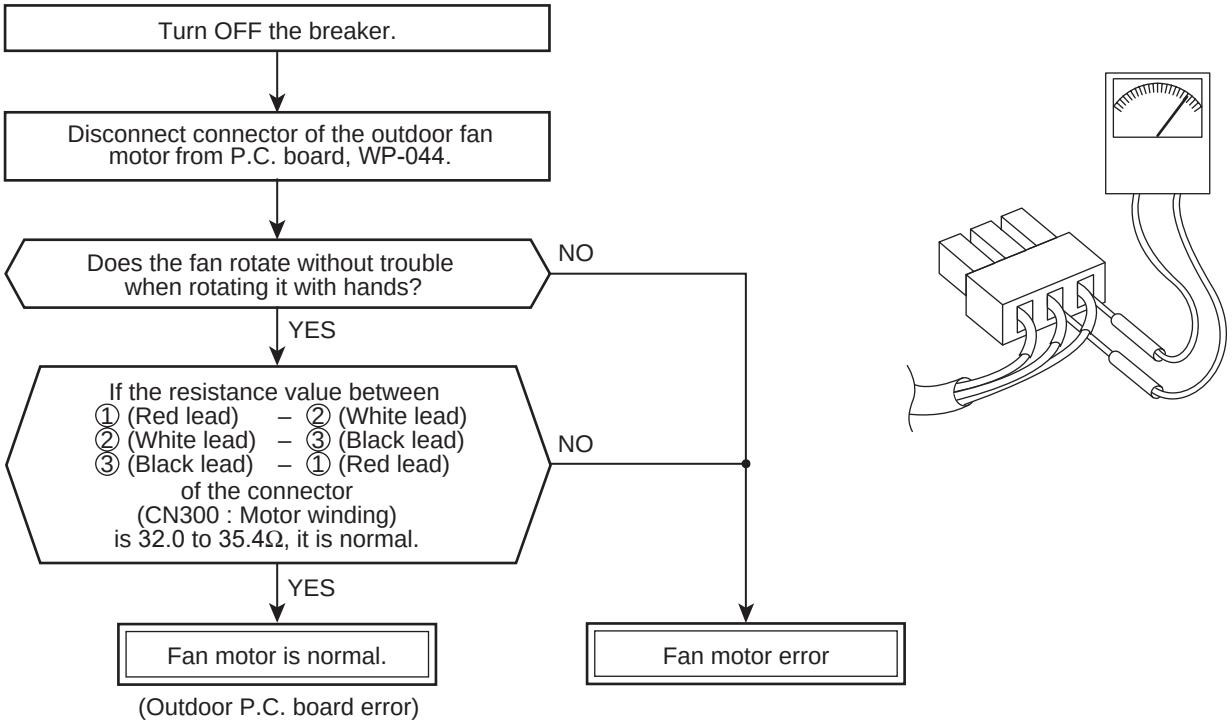
Remote controller check code “02 : Outdoor block, 1A : Outdoor fan drive system error”

2. Cause

The following causes are considered when the outdoor fan motor does not normally rotate.

1) Mechanical lock of the outdoor fan motor
2) Winding error of the outdoor fan motor
3) Position-detect circuit error inside of the outdoor fan motor
4) Motor drive circuit error of the outdoor P.C. board

3. How to simply judge whether outdoor fan motor is good or bad

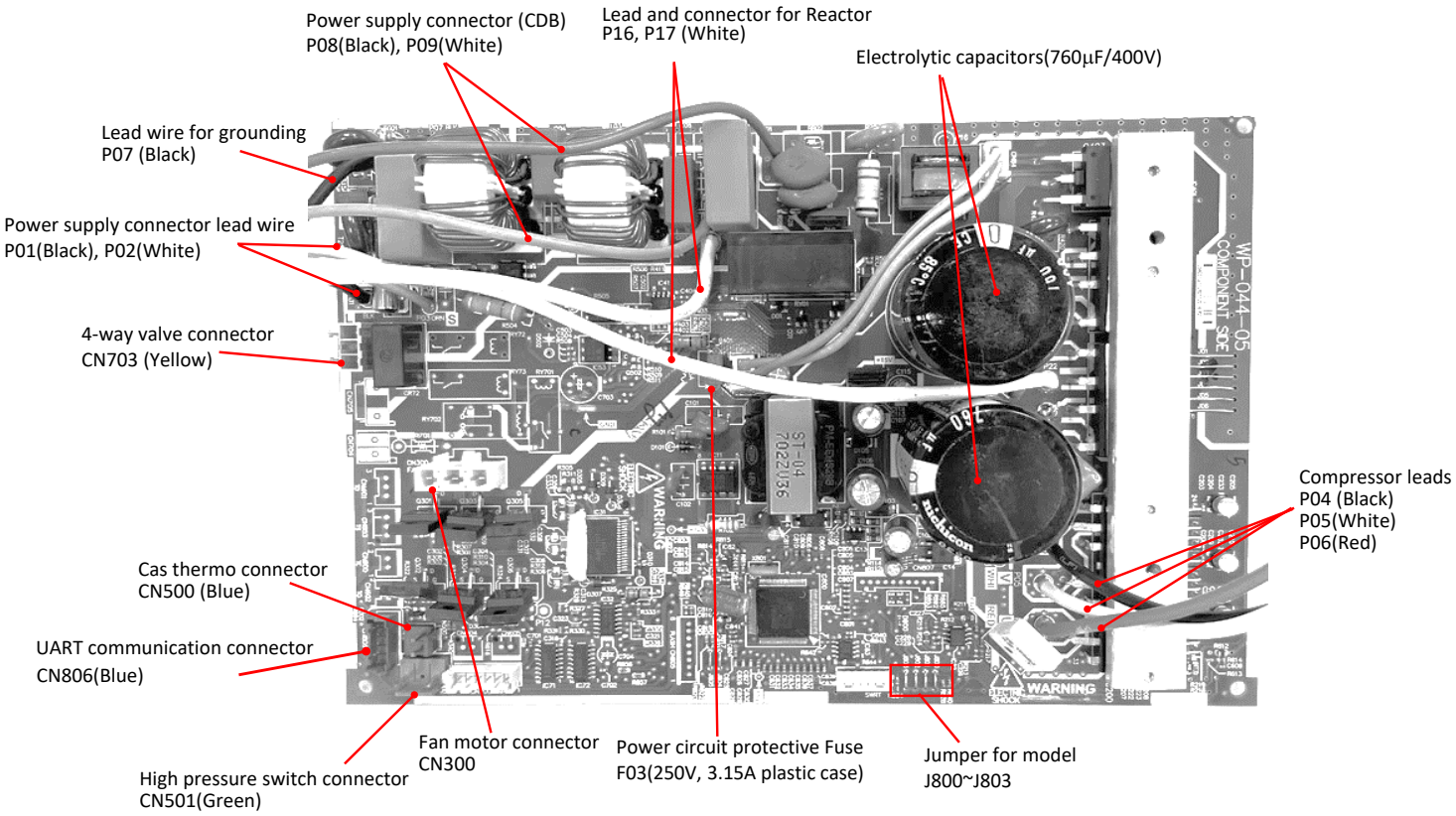


NOTE

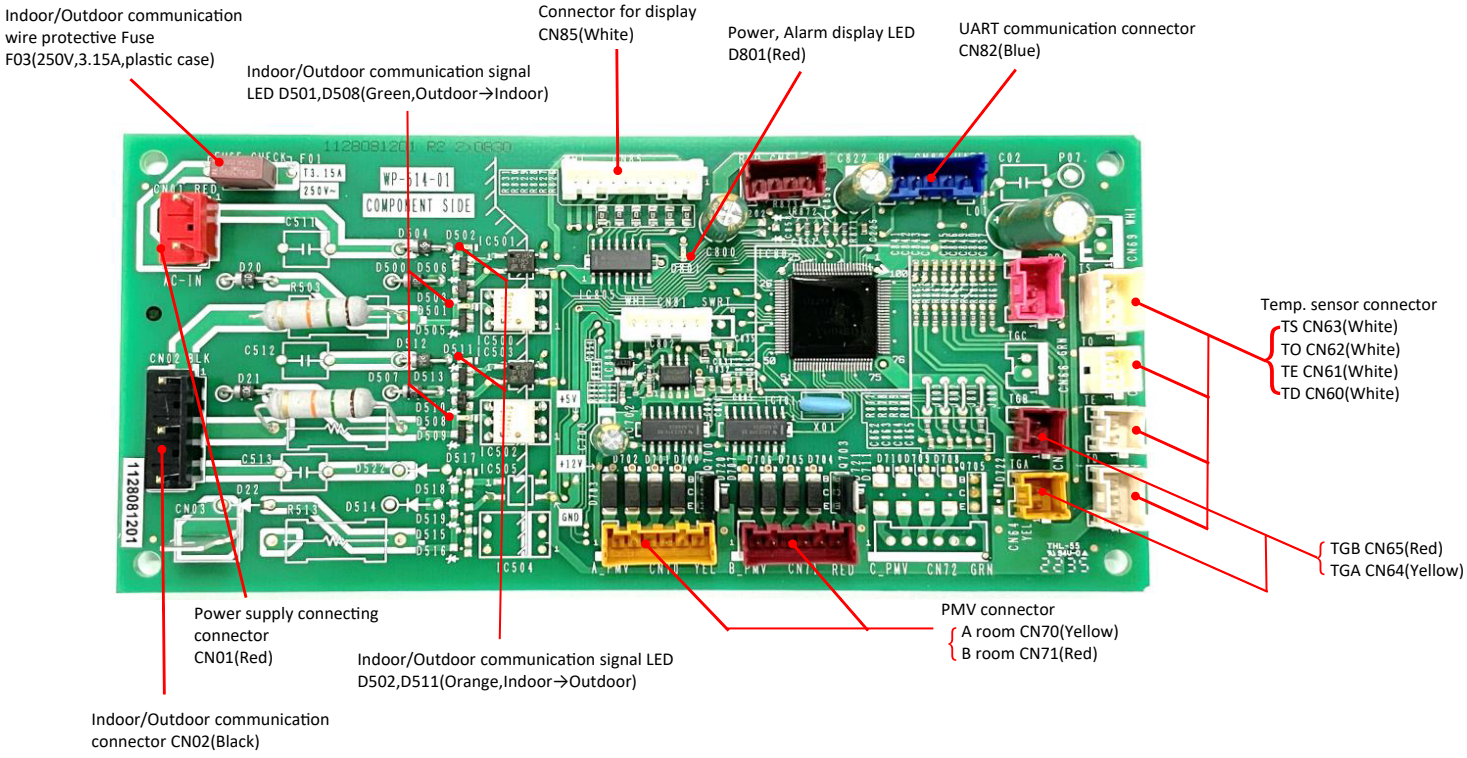
However, GND circuit error inside of the motor may be accepted in some cases when the above check is performed.

When the fan motor does not become normal even if P.C. board is replaced, replace the outdoor fan motor.

<WP-044>

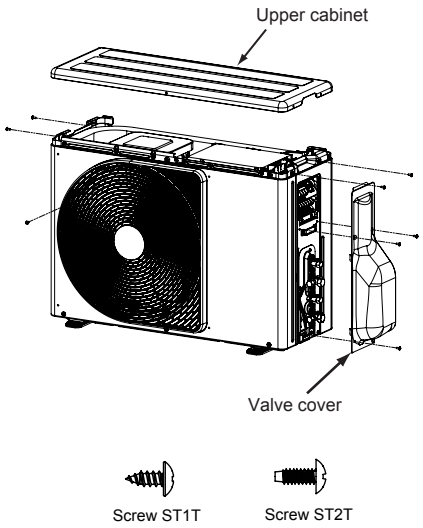
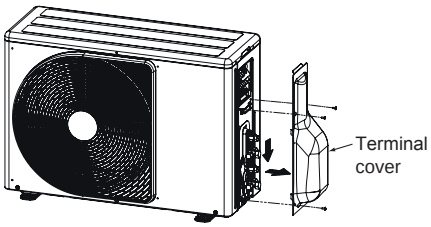
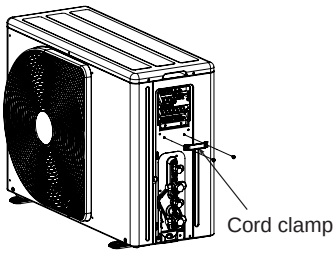

Power supply connector (CDB)
P08(Black), P09(White)
Lead and connector for Reactor
P16, P17 (White)
Electrolytic capacitors(760μF/400V)
Lead wire for grounding
P07 (Black)
Power supply connector lead wire
P01(Black), P02(White)
4-way valve connector
CN703 (Yellow)
Compressor leads
P04 (Black)
P05(White)
P06(Red)
Cas thermo connector
CN500 (Blue)
UART communication connector
CN806(Blue)
High pressure switch connector
CN501(Green)
Fan motor connector
CN300
Power circuit protective Fuse
F03(250V, 3.15A plastic case)
Jumper for model
J800~J803

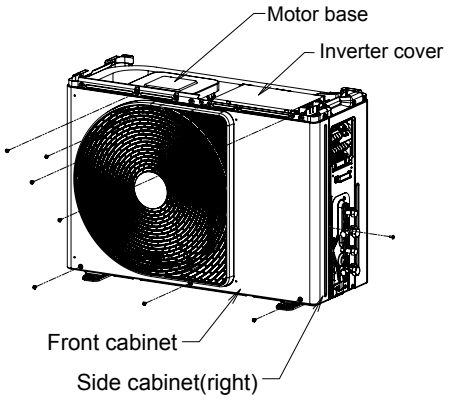
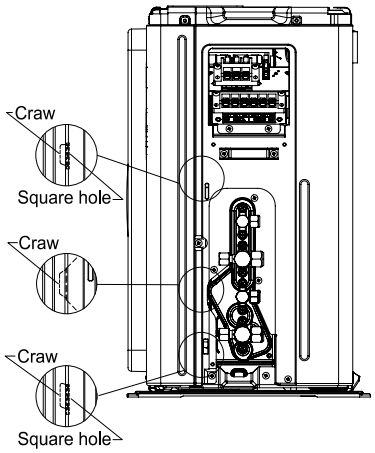
<WP-514>


Indoor/Outdoor communication
wire protective Fuse
F03(250V,3.15A,plastic case)
Indoor/Outdoor communication signal
LED D501,D508(Green,Outdoor→Indoor)
Connector for display
CN85(White)
Power, Alarm display LED
D801(Red)
UART communication connector
CN82(Blue)
Temp. sensor connector
TS CN63(White)
TO CN62(White)
TE CN61(White)
TD CN60(White)
TGB CN65(Red)
TGA CN64(Yellow)
PMV connector
A room CN70(Yellow)
B room CN71(Red)
Power supply connecting
connector
CN01(Red)
Indoor/Outdoor communication signal LED
D502,D511(Orange,Indoor→Outdoor)
Indoor/Outdoor communication
connector CN02(Black)

12. HOW TO REPLACE THE MAIN PARTS

Outdoor Unit

No.	Part name	Procedure	Remarks
①	Common procedure	**⚠ CUATION** Never forget to put on the gloves at working time; otherwise an injury will be caused by the parts etc. **1.Detachment** 1) Stop operation of the air conditioner, and turn off the main switch of the breaker for air conditioner. 2) Remove the valve cover. (ST2TØ4×10L 3pcs.) • After removing screw, remove the valve cover pulling it downward. 3) Remove the upper cabinet. (ST1TØ4×10L 5pcs.) • After removing screws, remove the upper cabinet pulling it upward. 4) Remove the cord clamp. (ST2TØ4×10L 2pcs.) 5) Remove the power supply cord and the indoor/outdoor connecting cable from terminal. **2.Attachment** 1) Attach the power supply cord and the indoor/outdoor connecting cable to terminal. 2) Attach the cord clamp. (ST2TØ4×10L 2pcs.) 3) Attach the upper cabinet. (ST1TØ4×10L 5pcs.) 4) Attach the valve cover. (ST2TØ4×10L 3pcs.) ・Set hook claws of the valve cover to square holes (at 3 positions) of the main unit, and attach it pushing upward.	  

No.	Part name	Procedure	Remarks
②	Front cabinet	**1.Detachment** 1) Perform work 1 of ①. 2) Remove the front cabinet. (ST2TØ4×10L 2pcs. : fix to motor base) (ST2TØ4×10L 2pcs. : fix to inverter cover) (ST2TØ4×10L 4pcs. : fix to base plate) • The front cabinet is fitted into the side cabinet (left) at the front left side so pull up the top of the front cabinet to remove it.	
		2.Attachment 1) Insert the claw on the front left side into the side into the side cabinet (left). 2) Hook the bottom part of the front right side onto the concave section of the base plate. Insert the claw of the side cabinet (right) into the square hole in the front cabinet. 3) Return the screws that were removed above to their original positions, and attach them.	

No.	Part name	Procedure	Remarks
③	Inverter assembly	1) Perform works 1 of ① and ②.	

⚠ WARNING

Never disassemble the inverter until 1minute after the power supply was turned off because there is a fear that an electric shock may occur.

NOTE)

When working, be sure to use the insulate tools and put on the insulated gloves.

2) Remove screws.
(ST1TØ4×10L 2pcs. : fix to side cabinet (right))
(ST1TØ4×10L 1pc. : fix to partition)

3) Remove the cover under inverter box.
(ST2Ø4×10L 1pc.)

4) Disconnect the leads connected to the other parts from the inverter assembly.
- Lead connected to compressor (3P : white)
- Lead connected to reactor (1P×2 : white)

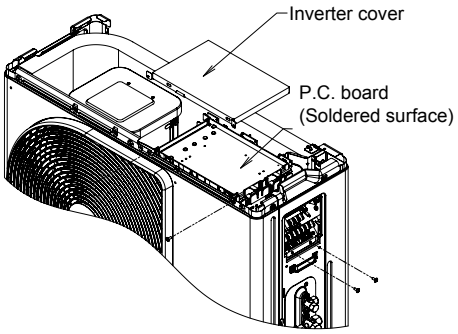
5) Cut the banding cable-tie (5pcs.)

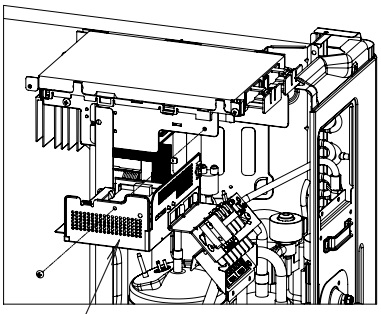
6) Remove the screw lead wire.
(ST2TØ4×8L 1pc.)

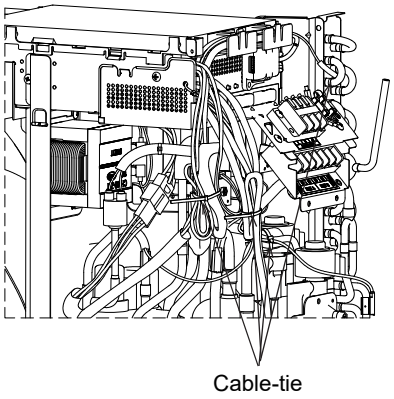
7) Remove the duct cover of inverter box.
(ST1TØ4×10L 2pcs.)

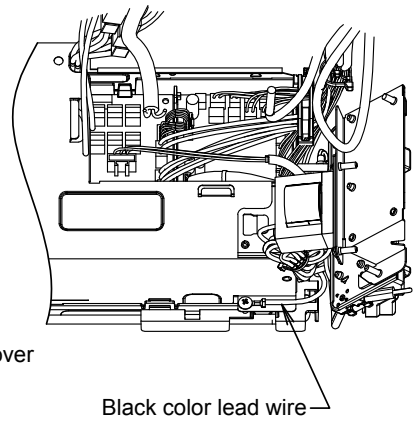
8) Remove the inverter box and inverter cover.

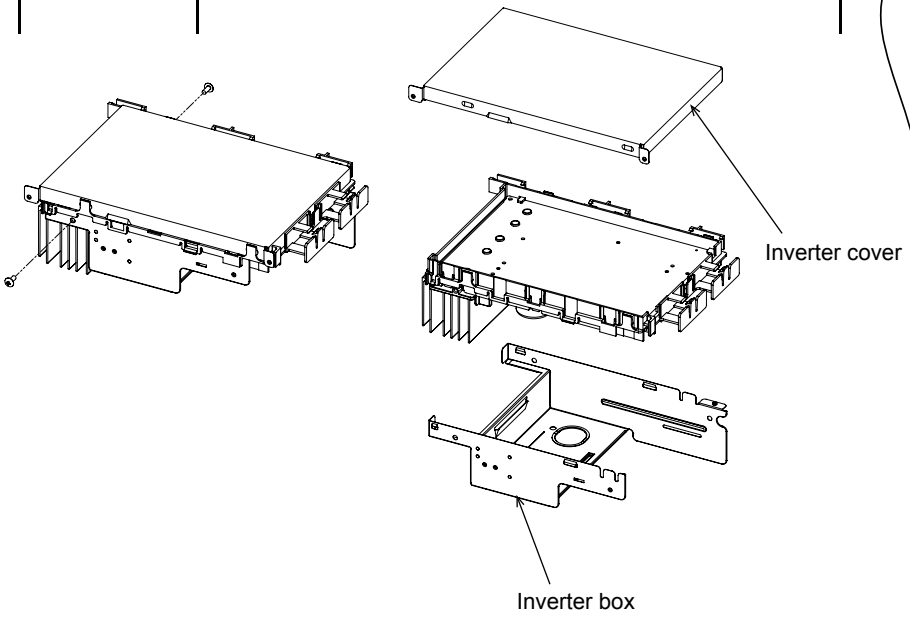
9) Remove the power supply cable from the power supply terminal block.
- Power supply lead L : black
- Power supply lead N : white

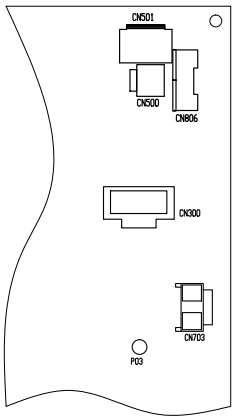
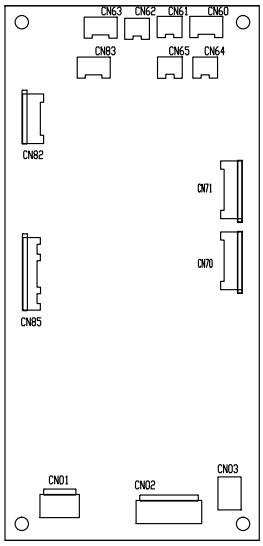
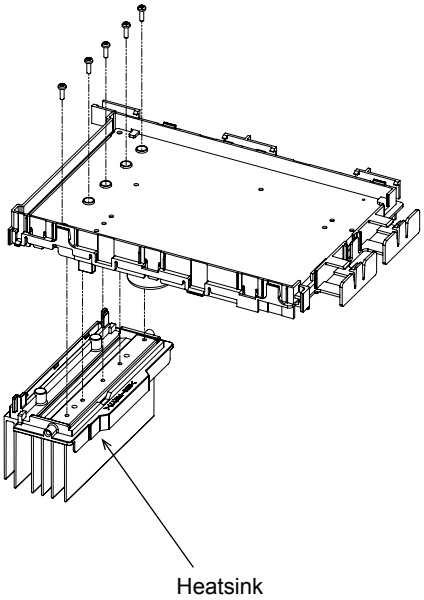


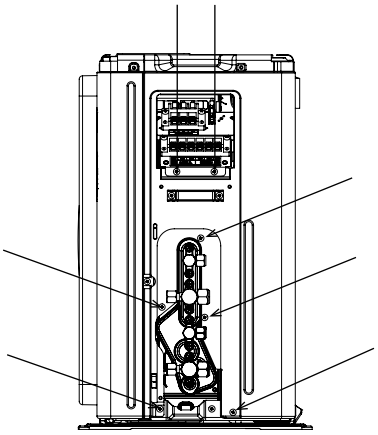
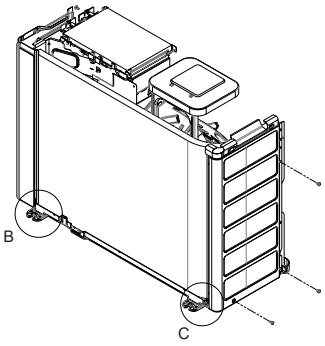
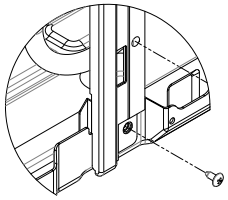
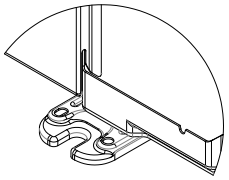
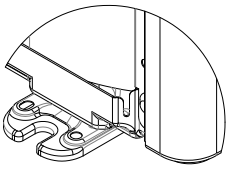
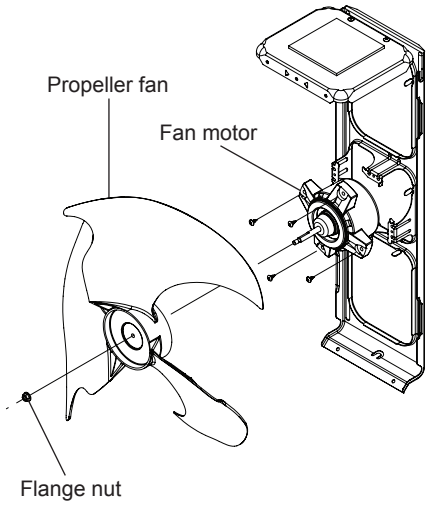


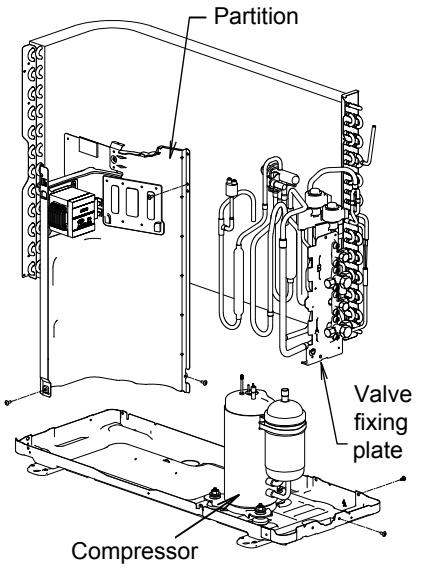
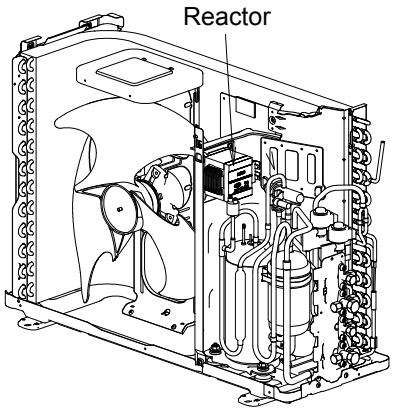


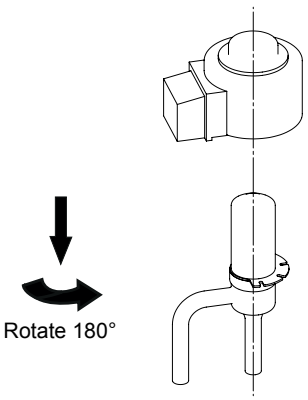
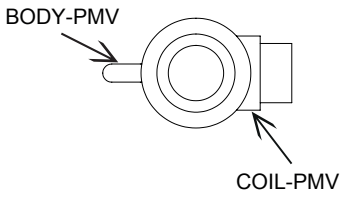
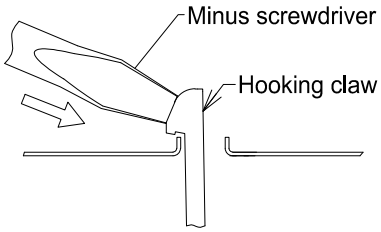


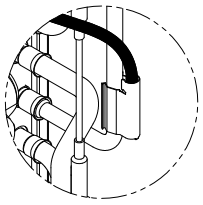
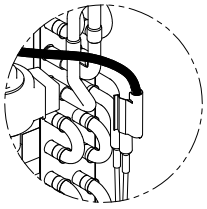
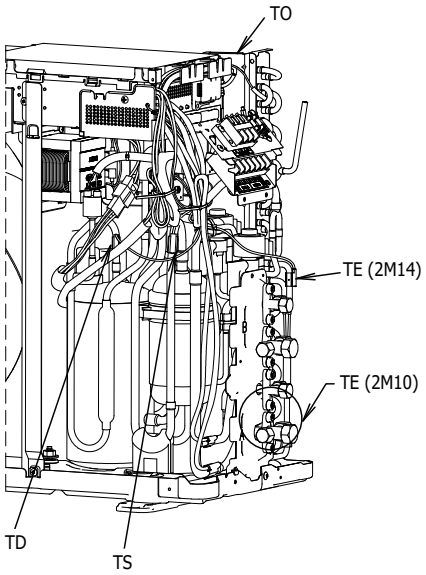
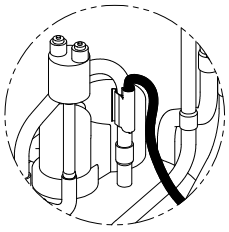
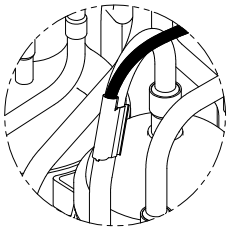
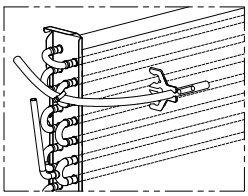
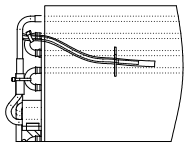
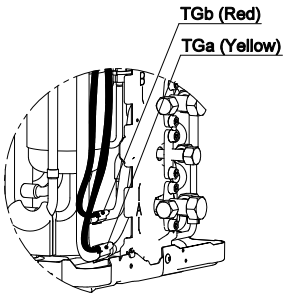


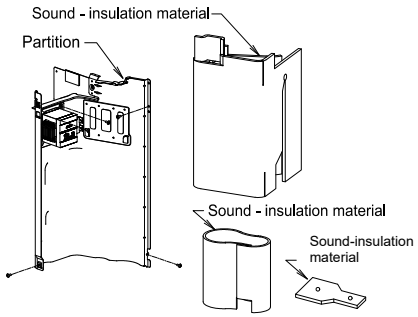
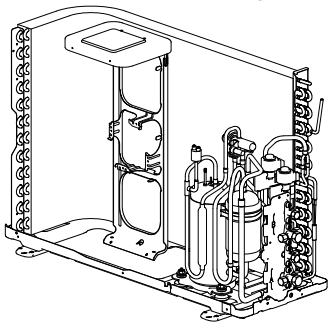
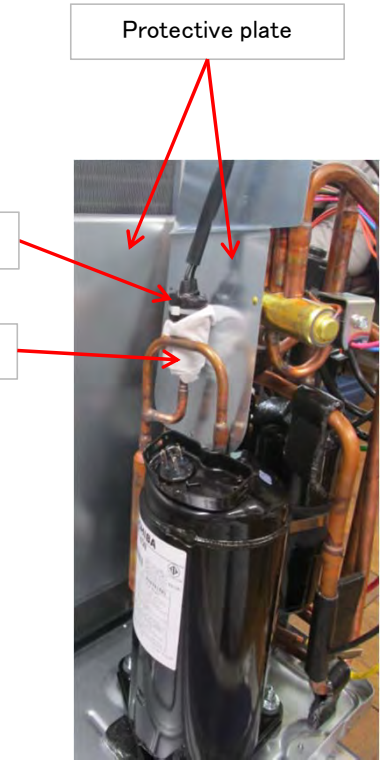
No.	Part name	Procedure	Remarks
③	Inverter assembly (continued)	10) Disconnect the leads connected to the other parts from the P.C. assembly. **NOTE)** These connectors have the lock. The lock must be released before they are disconnected. **Main P.C. board** CN300 : Outdoor fan motor (3P : white) CN500 : Thermostat for compressor (2P : blue) CN501 : High pressure switch (2P : green) CN703 : 4 way valve coil (3P : yellow) **Control P.C. board** CN01 : AC-IN (2P : Red) CN02 : Serial communication (5P : Black) CN03 : Serial communication (Low stand by circuit) CN60 : TD sensor (3P : white) CN61 : TE sensor (2P : white) CN62 : TO sensor (2P : white) CN63 : TS sensor (3P : white) CN64 : TGa sensor (2P : yellow) CN65 : TGb sensor (2P : red) CN70 : PMV A (6P : yellow) CN71 : PMV B (6P : red) CN85 : Display P.C. board (10P : white) **Connected connector of main and control** CN806 and CN82 (5P : blue) P03 (Lead wire : orange) and CN03 11) Remove the heatsink. (ST2TØ3×12L 5pcs.) 12) Remove the PCB base. **NOTE)** When mounting the new control board assembly, ensure that the P.C. board is inserted properly into the P.C. board support groove.	 Main P.C. board  Control P.C. board 

No.	Part name	Procedure	Remarks
④	Side cabinet	**1.Side cabinet (right)** 1) Perform works 1 of ① and ②. 2) Remove screws. (ST2TØ4×10L 2pcs. : fix to inverter assembly) (ST2TØ4×10L 3pcs. : fix to valve plate) (ST2TØ4×10L 2pcs. : fix to base plate) **2. Side cabinet (left)** 1) Perform step 1 in ②. 2) Remove the fixing screw (S 2TØ4 × 10L 1 pc.) used to secure the side cabinet (left) onto the heat exchanger. 3) Remove the fixing screw (S 2TØ4 × 10L 2 pcs.) used for securing the side cabinet to the bottom plate and heat exchanger.	  The back body section hooked onto the bottom plate here.
		 Detail A  Detail B  Detail C	
⑤	Fan motor	1) Perform work of item 1 of ① and ②. 2) Remove the fl ange nut fi xing the fan mot and the propeller. • Flange nut is loosened by turning clockwise. (To tighten the flange nut, tur counterclockwise.) 3) Remove the propeller fan. 4) Disconnect the connector for fan motor from the inverter. 5) Remove the fi xing screws 3 pcs.) holding by hands so that the fan motor does not fall. * Precautions when assembling the fan motor Tighten the flange nut using a tightenin torque of 4.9 N•m.	

No.	Part name	Procedure	Remarks
⑥	Compressor	1) Perform works from ① to ⑤. 2) Recover the refrigerant gas form the outdoor unit. 3) Remove partition. (ST1TØ4×10L 3pcs.) 4) Remove the sound-insulation material. 5) Remove terminal cover of the compressor, and disconnect lead wire of the compressor and the comp. thermo. assembly. 6) Remove pipe connected to the compressor with a burner. • Take care to keep the 4 way valve away from naked flames. (Otherwise, it may malfunction.) 7) Remove screws. (ST1TØ4×10L 1pc. : fix to heat exchange) (ST1TØ4×10L 1pc. : fix to valve fixing plate) 8) Pull upward the refrigeration cycle. 9) Remove NUT (3 pcs.) fixing the compressor. ・Precautions when assembling the compressor. Tighten the compressor nuts using a tightening torque of 9 N•m.	
⑦	Reactor	1) Perform works from ① to ③. 2) Remove reactors. (ST1TØ4×10L 2pcs.)	

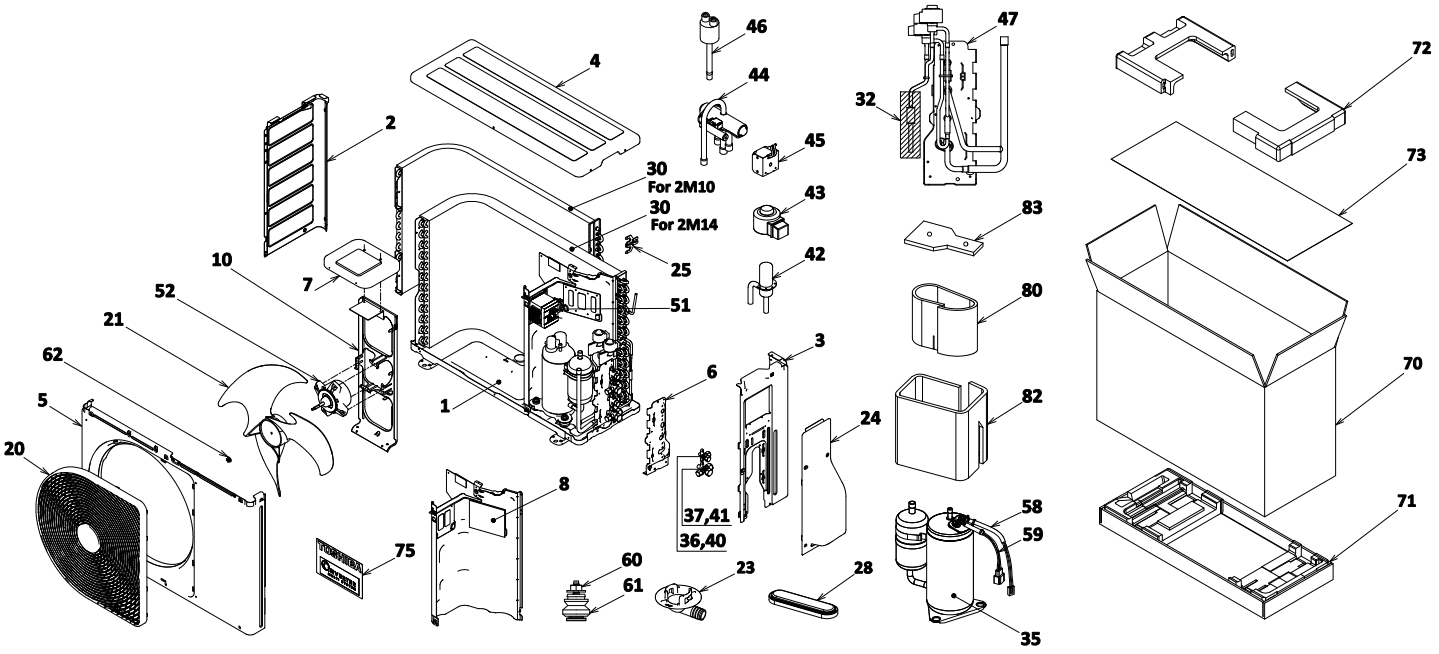
No.	Part name	Procedure	Remarks
⑧	Electronic expansion valve coil	**1. Detachment** 1) Perform step 1 in ②, all the steps in ③ and 1 in ④. 2) Turn the coil by 180 degrees then remove by pull it upward. **2. Attachment** 1) Insert the coil at position which perpendicular with pipe of PMV then turn the coil by 180 degrees. **Make sure that lead wire of coil is opposite with pipe of PMV**	 
⑨	Fan guard	**1.Detachment** 1) Perform works ① and ②. 2) Remove the front cabinet, and put it down so that fan guard side directs downward. **Perform work on a corrugated cardboard, cloth, etc. to prevent flaw to the product.** 3) Remove the hooking claws by pushing minus screwdriver according to the arrow mark in the right figure, and remove the fan guard. **2. Attachment** 1) Insert claws of the fan guard in the holes of the front cabinet. Push the hooking claws (9 positions) by hands and fix the claws. **All the attaching works have completed. Check that all the hooking claws are fixed to the specified positions.** **<Handling precaution>** When handling the parts, do not pull the leads. When removing the coil from the valve body, use your hand to secure the body in order to prevent the pipe from being bent out of shape.	

No.	Part name	Procedure	Remarks
⑩	TE sensor (outdoor heat exchanging temperature sensor) • **Attachment** With the sensor leads pointing in the direction shown in the figure, install the sensor onto the condenser output pipe.  Fixing method of TE sensor For 2M10  Fixing method of TE sensor For 2M14		
⑪	TS sensor (Suction pipe temperature sensor) • **Attachment** With its leads pointing in the direction shown in the figure and install sensor onto the suction pipe.		
⑫	TD sensor (Discharge pipe temperature sensor) • **Attachment** With its leads pointed in the direction shown in the figure, install the sensor facing downward onto the vertical straight pipe part of the discharge pipe.		
⑬	TO sensor (Outside air temperature sensor) • **Attachment** Insert the outdoor air temperature sensor into the holder, and install the holder onto the heat exchanger.		
⑭	TGa/TGb sensor (Gas side pipe temperature sensor) • **Attachment** With its leads pointing in the direction shown in the figure, and install the sensor onto the straight pipe part of gas side pipe. Match the sensor protective tube colors with the pipe marking colors and install the sensors. TGa is yellow,TGb is red.  Fixing method of TD sensor  Fixing method of TS sensor  Fixing method of TO sensor For 2M14  Fixing method of TO sensor For 2M10  Fixing method of TGa, TGb sensor **⚠ CAUTION** **During the installation work (and on its completion), take care not to damage the coverings of the sensor leads on the edges of the metal plates or other parts. It is dangerous for these coverings to be damaged since damage may cause electric shocks and/or a fire.** After replacing the parts, check whether the positions where the sensors were installed are the proper positions as instructed. The product will not be controlled properly and trouble will result if the sensors have not been installed in their proper positions.		

No.	Part name	Procedure	Remarks
⑮	High pressure switch	**1.Detachment** 1) Perform work of ①. 2) Recover the refrigerant gas form the outdoor unit. 3) Perform work of ②, ③, ④ and ⑤. 4) Remove the sound-insulation material and partition. 5) Remove the high pressure switch by the burner. **NOTE)** Take care that the electric parts, 4 way valve, butyle, compressor, accum tank, heat exchanger, and etc. are not caught by flame. (Otherwise pperation trouble may occur.) **1.Attachment** ・Be sure not to burn lead wire of the high pressure switch. **NOTE)** Adjust the temperature of the hight pressure switch to below 100℃ during the brazing. Use the wet towel for cooling. Use the protective plate for the brazing.	  

13. EXPLODED VIEWS AND PARTS LIST

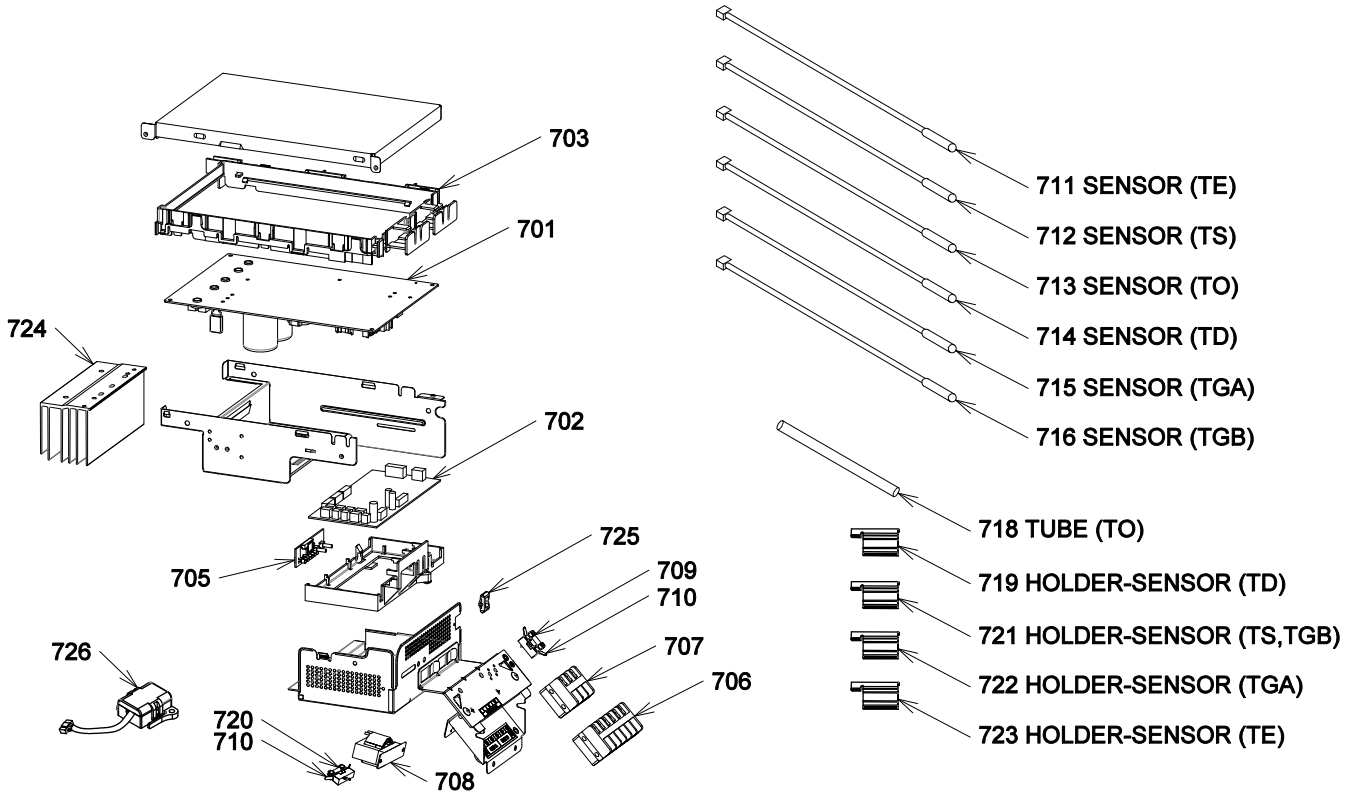
13-1. Outdoor Unit



Location No.	Part No.	Description
1	43T42382	BASE PLATE ASSEMBLY
2	43T00459	LEFT CABINET
3	43T00772	RIGHT CABINET ASSEMBLY
4	43T00735	UPPER CABINET ASSEMBLY
5	43T00688	FRONT CABINET ASSEMBLY
6	43T00773	FIXING PLATE VALVE
7	43T39333	MOTOR BASE CONNECTION PLATE
8	43T04367	GUIDE WIND PARTITION ASSEMBLY (FOR RAS-2M14G3AVG-E,-TR)
8	43T04496	GUIDE WIND PARTITION ASSEMBLY (FOR RAS-2M10G3AVG-E,-TR)
10	43T39393	MOTOR BASE
20	43T19364	FAN GUARD
21	43T20319	PROPELLER FAN
23	43T79325	DRAIN NIPPLE
24	43T19348	PACKED VALVE COVER
25	43T63376	HOLDER, SENSOR
28	43089160	CAP, WATERPROOF
30	43T43680	CONDENSER ASSEMBLY (FOR RAS-2M10G3AVG-E,-TR)
30	43T43681	CONDENSER ASSEMBLY (FOR RAS-2M14G3AVG-E,-TR)
32	43T49400	BUTYL-RUBBER
35	43T41572	COMPRESSOR (FOR RAS-2M14G3AVG-E,-TR)
35	43T41585	COMPRESSOR (FOR RAS-2M10G3AVG-E,-TR)

Location No.	Part No.	Description
36	43T47403	BONNET, 6.35 DIA
37	43T47404	BONNET, 9.52 DIA
40	43T46358	VALVE;PACKED 6.35 DIA
41	43T46366	VALVE;PACKED 9.52 DIA
42	43T46534	BODY-PMV
43	43T46535	COIL-PMV
44	43T46367	4 WAY VALVE
45	43T63327	COIL-4WAY
46	43T63381	HIGH PRESSURE SWITCH ASSEMBLY
47	43T45321	GENERAL ASSY PLATE FIXING
51	43T58309	REACTOR
52	43T21493	MOTOR FAN ASSEMBLY
58	43T50438	TEMPERATURE SENSOR
59	43T60497	LEAD ASSY, COMPRESSOR
60	43T97001	NUT
61	43T49327	CUSHION,RUBBER
62	43T47001	NUT FLANGE
70	43T91312	CARTON BOX
71	43T91309	ASM-FBBRD-UD
72	43T91314	CUSHION-PKG-UPR
73	43T91301	PE SHEET
75	43T85591	MARK-T
80	43T04402	INSULATION SOUND INSIDE
82	43T04401	INSULATION SOUND OUTSIDE
83	43T04416	SOUND INSULATION(UP)

13-2. Inverter Assembly



Location No.	Part No.	Description
701	43TN9833	ASM-L-PCB
		(FOR RAS-2M10G3AVG-E,-TR)
701	43TN9834	ASM-L-PCB
		(FOR RAS-2M14G3AVG-E,-TR)
702	43TNV353	PC BOARD ASSY
		(FOR RAS-2M10G3AVG-E,-TR)
702	43TNV354	PC BOARD ASSY
		(FOR RAS-2M14G3AVG-E,-TR)
703	43T62313	PC PLATE BASE
705	43TN9875	PC BOARD ASSY(LED)
706	43T60423	SERV-TERMINAL
707	43T60354	TERMINAL;BLOCK 3P
708	43T58341	REACTOR
709	43T60426	FUSE
710	43T60564	HOLDER-FUSE

Location No.	Part No.	Description
711	43T50352	TEMPERATURE SENSOR
712	43T50336	TEMPERATURE SENSOR
713	43T50360	TC-SENSOR(TO)
714	43T50334	TEMPERATURE SENSOR
715	43T50361	SENSOR-TEMP
716	43T50362	SENSOR-TEMP
718	43T62401	TUBE
719	43T63317	HOLDER,SENSOR
720	43T60361	FUSE
721	43T63316	HOLDER,SENSOR
722	43T63323	HOLDER,SENSOR
723	43T63318	HOLDER SENSOR
724	43T67315	HEAT SINK
725	43T62015	PROTECTOR; CORD
726	43T61366	ASM-DYNA

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