TOSHIBA

SERVICE MANUAL

AIR-CONDITIONER

MULTI TYPE

RAS-2M21U2ACVG-SG RAS-3M31U2ACVG-SG RAS-3M41U2ACVG-SG

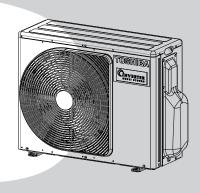












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1. SAFETY PRECAUTIONS

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 illustrated marks]

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

■ Warning indications on the air conditioner unit

	WARNING (Risk of fire)	This mark is for R32 refrigerant only. Refrigerant type is written on nameplate of outdoor unit. In case that refrigerant type is R32, this unit uses a flammable refrigerant. If refrigerant leaks and comes in contact with fire or heating part, it will create harmful gas and there is risk of fire.									
	Read the OW	ead the OWNER'S MANUAL carefully before operation.									
		onnel are required to carefully read the OWNER'S MANUAL and ON MANUAL before operation.									
i	Further inform	nation is available in the OWNER'S MANUAL, INSTALLATION d the like.									

Be sure to follow t meanings are sho	he precautions provided here to avoid safety risks. The symbols and their wn below.										
⚠ DANGER	It indicates that incorrect use of this unit can result in a high possibility of										
⚠ WARNING	It indicates that incorrect use of this unit may cause severe injury or death.										
⚠ CAUTION	It indicates that incorrect use of this unit may cause personal injury(*2), or property damage(*3).										

- *1: A severe injury refers to blindness, injury, burns (hot or cold), electrical shock, bone fracture, or poisoning that leaves after effects and requires hospitalization or extended out-patient treatment.
- *2: Personal injury means a slight accident, burn, or electrical shock which does not require admission or repeated hospital treatment.
- *3: Property damage means greater damage which affects assets or resources.

For general public use

Power supply cord of parts of appliance for outdoor use shall be at least polychloroprene sheathed flexible cord (design H07RN-F) or cord designation 60245 IEC66 (1.5 mm² or more). (Shall be installed in accordance with national wiring regulations.)

This appliance is not intended for use by person (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

A 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.

A CAUTION

NEW REFRIGERANT AIR CONDITIONER INSTALLATION

THIS AIR CONDITIONER USES THE NEW HFC REFRIGERANT (R32), WHICH DOES NOT DESTROY THE OZONE LAYER.

R32 REFRIGERANT IS APT TO BE AFFECTED BY IMPURITIES SUCH AS WATER, OXIDIZING MEMBRANES, AND OILS BECAUSE THE PRESSURE OF R32 REFRIGERANT IS APPROX. 1.6 TIMES OF REFRIGERANT R22.

AS WELL AS THE ADOPTION OF THIS NEW REFRIGERANT, REFRIGERATING MACHINE OIL HAS ALSO BEEN CHANGED. THEREFORE, DURING INSTALLATION WORK, BE SURE THAT WATER, DUST, FORMER REFRIGERANT, OR REFRIGERATING MACHINE OIL DOES NOT ENTER THE REFRIGERATION CYCLE OF A NEW-REFRIGERANT AIR CONDITIONER. TO AVOID MIXING REFRIGERANT AND REFRIGERATING MACHINE OIL, THE SIZES OF CHARGING PORT CONNECTING SECTIONS ON THE MAIN UNIT ARE DIFFERENT FROM THOSE FOR THE CONVENTIONAL REFRIGERANT, AND DIFFERENT SIZE TOOLS ARE ALSO REQUIRED. FOR CONNECTING PIPES, USE NEW AND CLEAN PIPING MATERIALS WITH HIGH PRESSURE WITHSTAND CAPABILITIES, DESIGNED FOR R32 ONLY, AND ENSURE THAT WATER OR DUST DOES NOT ENTER. MOREOVER, DO NOT USE ANY EXISTING PIPING AS ITS PRESSURE WITHSTAND MAY BE INSUFFICIENT AND MAY CONTAIN IMPURITIES.

⚠ DANGER

- THE MANUFACTURER SHALL NOT ASSUME ANY LIABILITY FOR THE DAMAGE CAUSED BY NOT OBSERVING THE DESCRIPTION OF THIS MANUAL.
- FOR USE BY QUALIFIED PERSONS ONLY.
- MEANS FOR DISCONNECTION FROM THE SUPPLY HAVING A CONTACT SEPARATION OF AT LEAST 3 MM IN ALL POLES MUST BE INCORPORATED IN THE FIXED WIRING.
- 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.
- CONNECT THE CONNECTING CABLES CORRECTLY. IF THE CONNECTING CABLES ARE CONNECTED WRONGLY, ELECTRIC PARTS MAY BE DAMAGED.
- CHECK THE EARTH WIRE THAT IT IS NOT BROKEN OR DISCONNECTED BEFORE INSTALLATION.
- DO NOT INSTALL NEAR CONCENTRATIONS OF COMBUSTIBLE GAS OR GAS VAPORS. FAILURE TO FOLLOW THIS INSTRUCTION CAN RESULT IN FIRE OR EXPLOSION.
- TO PREVENT OVERHEATING THE INDOOR UNIT AND CAUSING A FIRE HAZARD, PLACE THE UNIT WELL AWAY (MORE THAN 2 M) FROM HEAT SOURCES SUCH AS RADIATORS, HEATERS, FURNACE, STOVES, ETC.
- WHEN MOVING THE AIR CONDITIONER FOR INSTALLING IT IN ANOTHER PLACE
 AGAIN, BE VERY CAREFUL NOT TO GET THE SPECIFIED REFRIGERANT (R32)
 WITH ANY OTHER GASEOUS BODY INTO THE REFRIGERATION CYCLE. IF AIR OR
 ANY OTHER GAS IS MIXED IN THE REFRIGERANT, THE GAS PRESSURE IN THE
 REFRIGERATION CYCLE BECOMES ABNORMALLY HIGH AND IT RESULTANTLY
 CAUSES BURST OF THE PIPE AND INJURIES ON PERSONS.
- IN THE EVENT THAT THE REFRIGERANT GAS LEAKS OUT OF THE PIPE DURING THE INSTALLATION WORK, IMMEDIATELY LET FRESH AIR INTO THE ROOM. IF THE REFRIGERANT GAS IS HEATED BY FIRE OR SOMETHING ELSE, IT CAUSES GENERATION OF POISONOUS GAS.
- WHEN INSTALLING OR RE-INSTALLING THE AIR CONDITIONER, DO NOT INJECT AIR OR OTHER SUBSTANCES BESIDES THE DESIGNATED REFRIGERANT "R32" INTO THE REFRIGERATING CYCLE.
 - IF AIR OR OTHER SUBSTANCES ARE MIXED, AN ABNORMAL PRESSURE CAN OCCUR IN THE REFRIGERATING CYCLE, AND THIS CAN CAUSE AN INJURY DUE TO A PIPE RUPTURE.

MARNING

About the refrigerant

- · This product contains fluorinated greenhouse gases.
- · Do not vent gases to the atmosphere.
- 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).
- Do not pierce or burn refrigerant cycle parts.
- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- · Be aware that refrigerants may not contain an odour.
- The refrigerant inside the unit is flammable. If the refrigerant leaks in the room and comes in contact with fire from a burner, a heater, or a cooker, it may result in fire or the formation of a harmful gas.
- Turn off any combustible heating devices, ventilate the room, and contact the dealer from which you purchased the unit.
- Do not use the unit until a service person confirms that the portion from which the refrigerant leaked is repaired.
- When installing, relocating, or servicing the air conditioner, use only the specified refrigerant (R32) to charge the refrigerant lines. Do not mix it with any other refrigerant and do not allow air to remain in the lines.
- Pipe-work shall be protected from physical damage.
- Compliance with national gas regulations shall be observed.

MARNING

- 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.
- Installation work must be requested from the supplying retail dealership or professional vendors. Self-installation may cause water leakage, electrical shock, or fire as a result of improper installation.
- Specified tools and pipe parts for model R32 are required, and installation work must be done in accordance with the manual. HFC type refrigerant R32 has 1.6 Times more pressure than that of conventional refrigerant (R22). Use the specified pipe parts, and ensure correct installation, otherwise damage and/or injury may be caused. At the same time, water leakage, electrical shock, and fire may occur.
- Be sure to install the unit in a place which can sufficiently bear its weight. If the load bearing of the unit is not enough, or installation of the unit is improper, the unit may fall and result in injury.
- Electrical work must be performed by a qualified electrical engineer in accordance with the code governing such installation work, internal wiring regulations, and the manual.
 A dedicated circuit and the rated voltage must be used. Insufficient power supply or improper installation may cause electrical shock or fire.
- Use a cabtyre cable to connect wires in the indoor/outdoor units. Midway connection, stranded wire, and single-wire connections are not allowed. Improper connection or fixing may cause a fire.
- Wiring between the indoor unit and outdoor units must be well shaped so that the cover can be firmly placed. Improper cover installation may cause increased heat, fire, or electrical shock at the terminal area.
- Be sure to use only approved accessories or the specified parts. Failure to do so may cause the unit to fall, water leakage, fire or electrical shock.
- After the installation work, ensure that there is no leakage of refrigerant gas. If the refrigerant gas leaks out of the pipe into the room and is heated by fire or something else from a fan heater, stove or gas range, it causes generation of poisonous gas.
- Make sure the equipment is properly earthed. Do not connect the earth wire to a gas pipe, water pipe, lightning conductor, or telephone earth wire. Improper earth work may be the cause of electrical shock.
- Do not install the unit where flammable gas may leak. If there is any gas leakage or accumulation around the unit, it can cause a fire.
- Do not select a location for installation where there may be excessive water or humidity, such as a bathroom. Deterioration of insulation may cause electrical shock or fire.

⚠ WARNING

- Installation work must be performed following the instructions in this installation manual.
 Improper installation may cause water leakage, electrical shock or fire. Check the following items before operating the unit.
 - Be sure that the pipe connection is well placed and there are no leaks.
 - Check that the service valve is open. If the service valve is closed, it may cause overpressure and result in compressor damage. At the same time, if there is a leak in the connection part, it may cause air suction and overpressure, resulting in burst or injury.
- The installation of pipe work shall be kept to a minimum.
- The following must be certainly done during pump down.
 - Do not incorporate air into the refrigeration cycle.
 - Close the 2 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.
- Do not modify the power cable, connect the cable midway, or use a multiple outlet extension cable. Doing so may cause contact failure, insulation failure, or excess current, resulting in fire or electrical shock.
- If you detect any damage, do not install the unit. Contact your supplying dealer immediately.
- Never modify this unit by removing any of the safety guards or bypassing any of the safety interlock switches.
- Do not wash air conditioners with pressure washers. Electric leaks may cause electric shocks or fires.
- 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.)
- When installing the air conditioner in a small room, provide appropriate measures to
 ensure that the concentration of refrigerant leakage occur in the room does not exceed
 the critical level. It is not dangerous refrigerant; it has not toxicity.
 However, a concentration above 0.3 kg/m³ as criterion still causes suffocation. The volume
 - of refrigerant charged to the multi system air conditioner is more than the volume charged to a conventional individual system.
- Before operating the air conditioner after having completed the work, check that the
 electrical parts control box cover of the indoor unit and valve cover of the outdoor unit are
 closed, and set the circuit breaker to the ON position. You may receive an electric shock
 etc. if the power is turned on without first conducting these checks.
- Make sure drain hose insulation if cooling operation is used at sub-zero ambient temperature.

A CAUTION

- Please read this installation manual carefully before installing the unit. It contains further important instructions for proper installation.
- Exposure of unit to water or other moisture before installation could result in electric shock. Do not store it in a wet basement or expose to rain or water.
- After unpacking the unit, examine it carefully for possible damage.
- 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 and discharged air might disturb neighbours.
- This appliance must be connected to the main power supply by means of a circuit breaker depending on the place where the unit is installed. Failure to do so may cause electrical shock.
- Follow the instructions in this installation manual to arrange the drain pipe for proper drainage from the unit. Ensure that drained water is discharged. Improper drainage can result in water leakage, causing water damage to furniture.
- Tighten the flare nut with a torque wrench using the prescribed method. Do not apply
 excess torque. Otherwise, the nut may crack after a long period of usage and it may
 cause the leakage of refrigerant.
- Wear gloves (heavy gloves such as cotton gloves) for installation work. Failure to do so may cause personal injury when handling parts with sharp edges.
- Do not touch the air intake section or the aluminium fins of the outdoor unit. It may cause injury.
- Do not install the outdoor unit in a place which can be a nest for small animals. Small animals could enter and contact internal electrical parts, causing a failure or fire.
- Request the user to keep the place around the unit tidy and clean.
- Make sure to conduct a test run after the installation work, and explain how to use and maintain the unit to the customer in accordance with the manual. Ask the customer to keep the operation manual along with the installation manual.
- Do not climb onto or place objects on top of the outdoor unit. You may fall or the objects may fall off the outdoor unit and result in injury.

Requirement of report to the local power supplier

Please make absolutely sure that the installation of this appliance is reported to the local power supplier before installation. If you experience any problems or if the installation is not accepted by the supplier, the service agency will take adequate countermeasures.

■ Important information regarding the refrigerant used

This product contains fluorinated greenhouse gases.

Do not vent gases into the atmosphere.

Refrigerant type: R32

GWP⁽¹⁾ value: **675** * (ex. R32 ref. AR4)

(1)GWP = global warming potential

The refrigerant quantity is indicated on the unit name plate.

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

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

Туре	Outdoor unit	Combinations of indoor unit models that can be connected
Cooling only	RAS-2M21U2ACVG-SG	Refer to page 11.
Cooling only	RAS-3M31U2ACVG-SG	Refer to page 12.
Cooling only	RAS-3M41U2ACVG-SG	Refer to page 13.

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

<Cooling only models>

RAS-2M21U2ACVG-SG, RAS-3M31U2ACVG-SG and RAS-3M41U2ACVG-SG

Indoor unit connecting of below performance spec. RAS-MIOUZKCVC-SGI x3 RAS-MIOUXKCVC-SGI x4 RAS-MIOUXKCVC-SGI x4 RAS-MIOUXKCVC	Unit models	Outdoor units			RAS-2M21U2ACVG-SG	RAS-3M31U2ACVG-SG	RAS-3M41U2ACVG-SG
Cooling capacity (range)		Indoor unit conn	ecting of below performance	spec.	RAS-M10U2KCVG-SG1 x2	RAS-M10U2KCVG-SG1 x3	RAS-M10U2KCVG-SG1 x3
COP	Cooing capacity (rated)			(kW)	4.50	6.00	4.30
Power supply	Cooling capacity (range)			(kW)	2.25 - 5.50	2.50 - 7.50	2.15 - 7.50
characteristics Power consumption (W) 925 1235 754 Running current (A) 4.45/4.30/4.00 6.005.70/5.50 3.68/3.54/3.38 Power factor (%) 94 94 93 Starting current (A) 4.45/4.30/4.00 6.005.70/5.50 3.68 Outdoor unit operating noise Sound pressure ≥ √√√√√ (dBA) 51 53 52 Characteristic Sound power level (dBA) 66 68 67 Characteristic and component parts spec. Model - DX136A1T-40N DX151A1T-30N DX136A1T-40N Fan motor Model - DX136A1T-40N DX151A1T-30N DX136A1T-40N Fan motor Model - INFC-340-A70-1	COP			-	4.86	4.86	5.70
Running current	Electrical	Power supply			220-240V., 50Hz.	220-240V., 50Hz.	220-240V., 50Hz.
Power factor	characteristics	Power consump	tion	(W)	925	1235	754
Starting current		Running current		(A)	4.45/4.30/4.00	6.00/5.70/5.50	3.68/3.54/3.38
Outdoor unit operating noise Sound pressure level (dBA) 51 53 52 Characteristic and component parts spec. Compressor Model - DX136A1T-40N DX156A1T-30N DX136A1T-40N Fan motor Model - DX136A1T-40N DX156A1T-30N DX136A1T-40N Fan motor Model - LCF-340-A70-1 ICF-340-A70-1 ICF-340-A70-1 ICF-340-A70-1 Fan motor Model - ICF-340-A70-1		Power factor		(%)	94	94	93
Sound power level (dBA) 66 68 67		Starting current		(A)	4.45	6.00	3.68
Compressor Model	Outdoor unit operating noise	Sound pressure	level	(dBA)	51	53	52
Type		Sound power lev	rel	(dBA)	66	68	67
Output	Characteristic	Compressor	Model	-	DX136A1T-40N	DX151A1T-30N	DX136A1T-40N
Fan motor Model - ICF-340-A70-1 ICF-	and component parts spec.		Туре	-	Twin rota	ary with DC-inverter variable spee	d control
Type			Output	(W)	1100	1100	1100
Output		Fan motor	Model	-	ICF-340-A70-1	ICF-340-A70-1	ICF-340-A70-1
Airflow rate			Туре	-	DC r	notor with variable speed control o	sircuit
Refrigerant			Output	(W)	70W	70W	70W
Weight charging Kg. 1.00		Airflow rate		(m ³ /h)	2570	2920	2920
Unit dimension		Refrigerant	Туре	-	R32	R32	R32
Width (mm.) 800 800 800 800			Weight charging	(kg.)	1.00	1.40	1.40
Depth (mm.) 300		Unit dimension	Height	(mm.)	630	630	630
Net weight Key Key			Width	(mm.)	800	800	800
Piping connection			Depth	(mm.)			300
Diameter		Net weight		(kg.)	45	47	48
Unit B (liquid / gas side) (mm.) 6.35 / 9.52 6.35 /	Piping connection	Connecting meth	nod	-	Flare connection	Flare connection	Flare connection
Unit C (liquid / gas side) (mm.) - 6.35 / 9.52 6.35 / 9.52		Diameter	Unit A (liquid / gas side)	(mm.)	6.35 / 9.52	6.35 / 12.7	6.35 / 12.7
Maximum length (each unit) (mm.) 20 25 25 Maximum length (total) (mm.) 30 50 50 Maximum length (chargless) (mm.) 30 50 50 Maximum height different (mm.) 10 10 10 Wiring connection Main power supply - 3wires included earth 3wires included earth 3wires included earth 4wires included earth 4wires included earth 4wires included earth 4wires included earth Usable temperature range (outside) (°C) 10 - 46 °C 10 - 46 °C 10 - 46 °C 10 - 46 °C			Unit B (liquid / gas side)	(mm.)	6.35 / 9.52	6.35 / 9.52	6.35 / 9.52
Maximum length (total) (mm.) 30 50 50 Maximum length (chargless) (mm.) 30 50 50 Maximum height different (mm.) 10 10 10 Wiring connection Main power supply - 3wires included earth 3wires included earth 3wires included earth 4wires included earth 4wires included earth 4wires included earth 4wires included earth 10 - 46 °C <			Unit C (liquid / gas side)	(mm.)	-		6.35 / 9.52
Maximum length (chargless) (mm.) 30 50 50 Maximum height different (mm.) 10 10 10 Wiring connection Main power supply - 3wires included earth 3wires included earth 3wires included earth 4wires included earth 4wires included earth 4wires included earth 4wires included earth 10 - 46 °C 10 - 46 °C <td< td=""><td></td><td>Maximum length</td><td>(each unit)</td><td>(mm.)</td><td>20</td><td>25</td><td>25</td></td<>		Maximum length	(each unit)	(mm.)	20	25	25
Maximum height different (mm.) 10 10 10 Wiring connection Main power supply - 3wires included earth 3wires included earth 10 Usable temperature range (outside) - 10 - 46 °C 10 - 46 °C 10 - 46 °C		Maximum length	(total)	(mm.)	30	50	50
Wiring connection Main power supply Inter connection (each room) - 4wires included earth 4wires included earth Usable temperature range (outside) - 3wires included earth 4wires included earth 4wires included earth 10 - 46 °C 10 - 46 °C 10 - 46 °C		Maximum length	(chargless)	(mm.)	30	50	50
Inter connection (each room) - 4wires included earth 4wires included earth Usable temperature range (outside) (°C) 10 - 46 °C 10 - 46 °C 10 - 46 °C		Maximum height	different	(mm.)	10	10	10
Usable temperature range (outside) (°C) 10 - 46 °C 10 - 46 °C 10 - 46 °C	Wiring connection	Main power supp	oly	-	3wires included earth	3wires included earth	3wires included earth
(4) 10 10 0		Inter connection	(each room)	-	4wires included earth	4wires included earth	4wires included earth
Outdoor unit accessory -	Usable temperature range (out	tside)		(°C)	10 - 46 °C	10 - 46 °C	10 - 46 ^O C
	Outdoor unit accessory			-			

[•] Performance specification with others Indoor unit combine are refer to combination table.

 $[\]dot{}$ The specifications may be subject to change without notice for purpose of improvement.

2-2. Performance with Indoor unit maximum combination

RAS-2M21U2ACVG-SG

Operation mode : Cooling

Current limit : none, 11.0A and 8.5A Power supply voltage: 220V

Operating		Indo	or unit		Unit capacity			Cooling capacity (kW)			Power consumption (W)			Opera	Rated		
status	Α	В	С	ΣkBTU	Α	В	С	Min	Rated	Max	Min	Rated	Max	Min	Rated	Max	EER
2 Units	10	10	-	20	2.25	2.25	-	2.25	4.50	5.50	375	925	1350	2.20	4.50	6.40	4.86
	13	10	-	23	2.60	1.90	-	2.25	4.50	5.50	375	915	1350	2.20	4.45	6.40	4.92
	18	10	-	28	2.81	1.69	-	2.25	4.50	5.50	375	905	1350	2.20	4.40	6.40	4.97
	13	13	-	26	2.25	2.25	-	2.25	4.50	5.50	375	905	1350	2.20	4.40	6.40	4.97
	18	13	-	31	2.47	2.03	-	2.25	4.50	5.50	375	895	1350	2.20	4.35	6.40	5.03
	18	18	-	36	2.25	2.25	-	2.25	4.50	5.50	375	885	1350	2.20	4.30	6.40	5.08

Power supply voltage: 230V

Operating		Indo	or unit		Unit capacity			Cooling capacity (kW)			Power consumption (W)			Opera	Rated		
status	Α	В	С	ΣkBTU	Α	В	С	Min	Rated	Max	Min	Rated	Max	Min	Rated	Max	EER
2 Units	10	10	-	20	2.25	2.25	-	2.25	4.50	5.50	375	925	1350	2.10	4.30	6.10	4.86
	13	10	-	23	2.60	1.90	-	2.25	4.50	5.50	375	915	1350	2.10	4.25	6.10	4.92
	18	10	-	28	2.81	1.69	-	2.25	4.50	5.50	375	905	1350	2.10	4.20	6.10	4.97
	13	13	-	26	2.25	2.25	-	2.25	4.50	5.50	375	905	1350	2.10	4.20	6.10	4.97
	18	13	-	31	2.47	2.03	-	2.25	4.50	5.50	375	895	1350	2.10	4.15	6.10	5.03
	18	18	-	36	2.25	2.25	-	2.25	4.50	5.50	375	885	1350	2.10	4.10	6.10	5.08

Power supply voltage: 240V

Operating		Indo	or unit		Unit capacity			Cooling capacity (kW)			Power	consump	tion (W)	Opera	Rated		
status	Α	В	С	ΣkBTU	Α	В	С	Min	Rated	Max	Min	Rated	Max	Min	Rated	Max	EER
2 Units	10	10	-	20	2.25	2.25	-	2.25	4.50	5.50	375	925	1350	2.00	4.10	5.85	4.86
	13	10	-	23	2.60	1.90	-	2.25	4.50	5.50	375	915	1350	2.00	4.05	5.85	4.92
	18	10	-	28	2.81	1.69	-	2.25	4.50	5.50	375	905	1350	2.00	4.00	5.85	4.97
	13	13	-	26	2.25	2.25	-	2.25	4.50	5.50	375	905	1350	2.00	4.00	5.85	4.97
	18	13	-	31	2.47	2.03	-	2.25	4.50	5.50	375	895	1350	2.00	3.95	5.85	5.03
	18	18	-	36	2.25	2.25	-	2.25	4.50	5.50	375	885	1350	2.00	3.90	5.85	5.08

RAS-3M31U2ACVG-SG

Operation mode : Cooling

Current limit : none and 11.0A

Power supply voltage: 220V

Operating		Indo	or unit		Unit capacity			Cooling capacity (kW)			Power	consump	tion (W)	Opera	Rated		
status	Α	В	С	ΣkBTU	Α	В	С	Min	Rated	Max	Min	Rated	Max	Min	Rated	Max	EER
3 Units	10	10	10	30	2.00	2.00	2.00	2.5	6.0	7.5	415	1235	2055	2.45	6.00	9.85	4.86
	13	10	10	33	2.44	1.78	1.78	2.5	6.0	7.5	400	1225	2055	2.35	5.95	9.85	4.90
	18	10	10	38	2.73	1.64	1.64	2.5	6.0	7.5	400	1215	2055	2.35	5.90	9.85	4.94
	13	13	10	36	2.20	2.20	1.60	2.5	6.0	7.5	400	1225	2055	2.35	5.95	9.85	4.90
	18	13	10	41	2.47	2.04	1.50	2.5	6.0	7.5	400	1210	2055	2.35	5.85	9.85	4.96
	13	13	13	39	2.00	2.00	2.00	2.5	6.0	7.5	400	1215	2055	2.35	5.90	9.85	4.94

Power supply voltage: 230V

Operating		Indoor unit				Unit capacity			Cooling capacity (kW)			Power consumption (W)			Operating current (A)			
status	Α	В	С	ΣkBTU	Α	В	С	Min	Rated	Max	Min	Rated	Max	Min	Rated	Max	EER	
3 Units	10	10	10	30	2.00	2.00	2.00	2.5	6.0	7.5	415	1235	2055	2.35	5.70	9.45	4.86	
	13	10	10	33	2.44	1.78	1.78	2.5	6.0	7.5	400	1225	2055	2.25	5.65	9.40	4.90	
	18	10	10	38	2.73	1.64	1.64	2.5	6.0	7.5	400	1215	2055	2.25	5.60	9.40	4.94	
	13	13	10	36	2.20	2.20	1.60	2.5	6.0	7.5	400	1225	2055	2.25	5.65	9.40	4.90	
	18	13	10	41	2.47	2.04	1.50	2.5	6.0	7.5	400	1210	2055	2.25	5.60	9.40	4.96	
	13	13	13	39	2.00	2.00	2.00	2.5	6.0	7.5	400	1215	2055	2.25	5.60	9.40	4.94	

Power supply voltage: 240V

Operating		Indo	or unit		Unit capacity			Cooling capacity (kW)			Power consumption (W)			Opera	Rated		
status	Α	В	С	ΣkBTU	Α	В	С	Min	Rated	Max	Min	Rated	Max	Min	Rated	Max	EER
3 Units	10	10	10	30	2.00	2.00	2.00	2.5	6.0	7.5	415	1235	2055	2.25	5.50	9.05	4.86
	13	10	10	33	2.44	1.78	1.78	2.5	6.0	7.5	400	1225	2055	2.15	5.40	9.00	4.90
	18	10	10	38	2.73	1.64	1.64	2.5	6.0	7.5	400	1215	2055	2.15	5.40	9.00	4.94
	13	13	10	36	2.20	2.20	1.60	2.5	6.0	7.5	400	1225	2055	2.15	5.45	9.00	4.90
	18	13	10	41	2.47	2.04	1.50	2.5	6.0	7.5	400	1210	2055	2.15	5.35	9.00	4.96
	13	13	13	39	2.00	2.00	2.00	2.5	6.0	7.5	400	1215	2055	2.15	5.40	9.00	4.94

Current limit : 8.5A

Power supply voltage: 220V

Operating		Indo	or unit		Unit capacity		Cooling capacity (kW)			Power	consump	tion (W)	Opera	ating curre	ent (A)	Rated	
status	Α	В	С	ΣkBTU	Α	В	С	Min	Rated	Max	Min	Rated	Max	Min	Rated	Max	EER
3 Units	10	10	10	30	2.00	2.00	2.00	2.5	6.0	7.0	415	1235	1775	2.45	6.00	8.50	4.86
	13	10	10	33	2.44	1.78	1.78	2.5	6.0	7.0	400	1225	1770	2.35	5.95	8.50	4.90
	18	10	10	38	2.73	1.64	1.64	2.5	6.0	7.0	400	1215	1770	2.35	5.90	8.50	4.94
	13	13	10	36	2.20	2.20	1.60	2.5	6.0	7.0	400	1225	1770	2.35	5.95	8.50	4.90
	18	13	10	41	2.47	2.04	1.50	2.5	6.0	7.0	400	1210	1770	2.35	5.85	8.50	4.96
	13	13	13	39	2.00	2.00	2.00	2.5	6.0	7.0	400	1215	1770	2.35	5.90	8.50	4.94

Power supply voltage: 230V

Operating		Indo	or unit		Unit capacity		Cooling capacity (kW)			Power	consump	tion (W)	Opera	ating curre	ent (A)	Rated	
status	Α	В	С	ΣkBTU	Α	В	С	Min	Rated	Max	Min	Rated	Max	Min	Rated	Max	EER
3 Units	10	10	10	30	2.00	2.00	2.00	2.5	6.0	7.1	415	1235	1855	2.35	5.70	8.50	4.86
	13	10	10	33	2.44	1.78	1.78	2.5	6.0	7.1	400	1225	1850	2.25	5.65	8.50	4.90
	18	10	10	38	2.73	1.64	1.64	2.5	6.0	7.1	400	1215	1850	2.25	5.60	8.50	4.94
	13	13	10	36	2.20	2.20	1.60	2.5	6.0	7.1	400	1225	1850	2.25	5.65	8.50	4.90
	18	13	10	41	2.47	2.04	1.50	2.5	6.0	7.1	400	1210	1850	2.25	5.60	8.50	4.96
	13	13	13	39	2.00	2.00	2.00	2.5	6.0	7.1	400	1215	1850	2.25	5.60	8.50	4.94

Power supply voltage: 240V

Operating		Indoor unit			Unit capacity		Cooling capacity (kW)			Power	consump	tion (W)	Opera	ating curre	ent (A)	Rated	
status	Α	В	С	ΣkBTU	Α	В	С	Min	Rated	Max	Min	Rated	Max	Min	Rated	Max	EER
3 Units	10	10	10	30	2.00	2.00	2.00	2.5	6.0	7.2	415	1235	1935	2.25	5.50	8.50	4.86
	13	10	10	33	2.44	1.78	1.78	2.5	6.0	7.2	400	1225	1930	2.15	5.40	8.50	4.90
	18	10	10	38	2.73	1.64	1.64	2.5	6.0	7.2	400	1215	1930	2.15	5.40	8.50	4.94
	13	13	10	36	2.20	2.20	1.60	2.5	6.0	7.2	400	1225	1930	2.15	5.45	8.50	4.90
	18	13	10	41	2.47	2.04	1.50	2.5	6.0	7.2	400	1210	1930	2.15	5.35	8.50	4.96
	13	13	13	39	2.00	2.00	2.00	2.5	6.0	7.2	400	1215	1930	2.15	5.40	8.50	4.94

RAS-3M41U2ACVG-SG

Operation mode : Cooling
Current limit : none, 11.0A and 8.5A
Power supply voltage: 220V

Operating		Indoo	or unit		Unit capacity			Cooling capacity (kW)			Power	consumpt	tion (W)	Opera	ating curre	ent (A)	EER
status	Α	В	С	ΣkBTU	Α	В	С	Min	Rated	Max	Min	Rated	Max	Min	Rated	Max	Rated
3 Units	10	10	10	30	1.44	1.43	1.43	2.15	4.30	7.50	356	754	1800	2.14	3.68	8.50	5.70
	13	10	10	33	1.70	1.30	1.30	2.15	4.30	7.50	356	752	1795	2.14	3.68	8.47	5.72
	18	10	10	38	1.92	1.19	1.19	2.15	4.30	7.50	356	752	1790	2.14	3.68	8.45	5.72
	13	13	10	36	1.55	1.55	1.20	2.15	4.30	7.50	356	752	1795	2.14	3.68	8.47	5.72
	18	13	10	41	1.77	1.43	1.10	2.15	4.30	7.50	356	752	1790	2.14	3.68	8.45	5.72
	13	13	13	39	1.44	1.43	1.43	2.15	4.30	7.50	356	752	1790	2.14	3.68	8.45	5.72

Power supply voltage: 230V

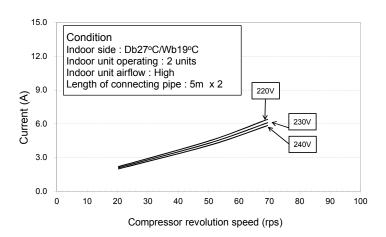
Operating		Indoo	or unit		Unit capacity			Cooling capacity (kW)			Power	consump	tion (W)	Opera	ating curre	ent (A)	EER
status	Α	В	С	ΣkBTU	Α	В	С	Min	Rated	Max	Min	Rated	Max	Min	Rated	Max	Rated
3 Units	10	10	10	30	1.44	1.43	1.43	2.15	4.30	7.50	356	754	1800	2.05	3.54	8.13	5.70
	13	10	10	33	1.70	1.30	1.30	2.15	4.30	7.50	356	752	1795	2.04	3.53	8.13	5.72
	18	10	10	38	1.92	1.19	1.19	2.15	4.30	7.50	356	752	1790	2.04	3.53	8.10	5.72
	13	13	10	36	1.55	1.55	1.20	2.15	4.30	7.50	356	752	1795	2.04	3.53	8.13	5.72
	18	13	10	41	1.77	1.43	1.10	2.15	4.30	7.50	356	752	1790	2.04	3.53	8.10	5.72
	13	13	13	39	1.44	1.43	1.43	2.15	4.30	7.50	356	752	1790	2.04	3.53	8.10	5.72

Power supply voltage: 240V

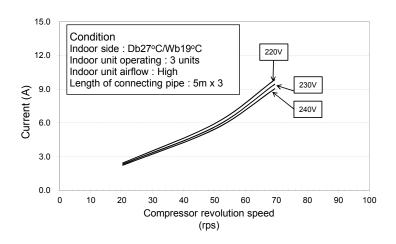
Operating		Indoo	or unit		Unit capacity			Cooling capacity (kW)			Power	consump	tion (W)	Opera	ating curre	ent (A)	EER
status	Α	В	С	ΣkBTU	Α	В	С	Min	Rated	Max	Min	Rated	Max	Min	Rated	Max	Rated
3 Units	10	10	10	30	1.44	1.43	1.43	2.15	4.30	7.50	356	754	1800	1.96	3.38	7.79	5.70
	13	10	10	33	1.70	1.30	1.30	2.15	4.30	7.50	356	752	1795	1.96	3.37	7.78	5.72
	18	10	10	38	1.92	1.19	1.19	2.15	4.30	7.50	356	752	1790	1.96	3.37	7.75	5.72
	13	13	10	36	1.55	1.55	1.20	2.15	4.30	7.50	356	752	1795	1.96	3.37	7.78	5.72
	18	13	10	41	1.77	1.43	1.10	2.15	4.30	7.50	356	752	1790	1.96	3.37	7.75	5.72
	13	13	13	39	1.44	1.43	1.43	2.15	4.30	7.50	356	752	1790	1.96	3.37	7.75	5.72

2-2-1. Operation Characteristic Curve <Cooling>

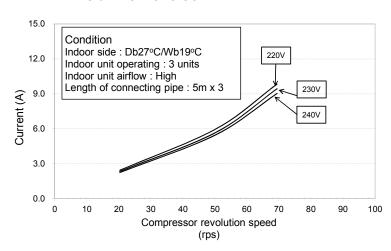
RAS-2M21U2ACVG-SG



RAS-3M31U2ACVG-SG

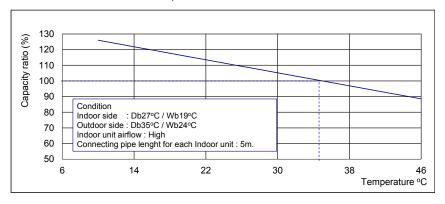


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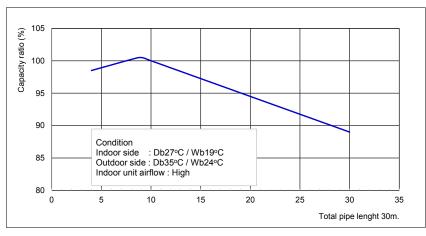
2-2-2. Capacity Variation Ratio According to outdoor Temperature <Cooling>

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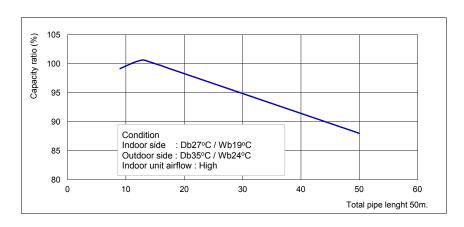


2-2-3. Capacity Variation Ratio according to Pipe Length <Cooling>

RAS-2M21U2ACVG-SG



RAS-3M31U2ACVG-SG and RAS-3M41U2ACVG-SG



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.

- 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.

- 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.
- 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.
- 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.
- 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

		Thickne	ss (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.

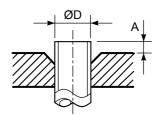


Fig. 3-2-1 Flare processing dimensions

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

	Ocators		A (mm)							
Nominal diameter	Outer diameter	Thickness (mm)	Flare tool for R32	Convention	nal flare tool					
	(mm)	, ,	clutch type	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

	01			A (mm)							
Nominal diameter	Outer diameter	Thickness (mm)	Flare tool for R22	Convention	al flare tool						
	(mm)	,	clutch type	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	Outer diameter	Thickness		imensi	on (mm	1)	Flare nut width
diameter	(mm)	(mm)	A	В	С	D	(mm)
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	Outer diameter	Thickness	С	imensi	on (mm	1)	Flare nut width
diameter	(mm)	(mm)	Α	В	С	D	(mm)
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

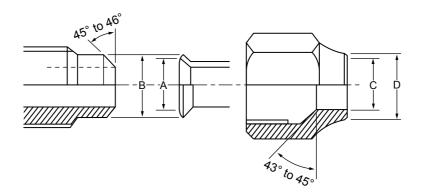


Fig. 3-2-2 Relations between flare nut and flare seal surface

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

				R410A) pump installation	Conventional air-water heat pump installation
No.	Used tool	Usage	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)	0
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	Yes	×	×
5	Charge hose	charge, run check, etc.	res	^	^
6	Vacuum pump adapter	Vacuum evacuating	Yes	×	0
7	Electronic balance for refrigerant charging	Refrigerant charge	Yes	×	0
8	Leakage detector	Gas leakage check	Yes	×	0

(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.

- 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

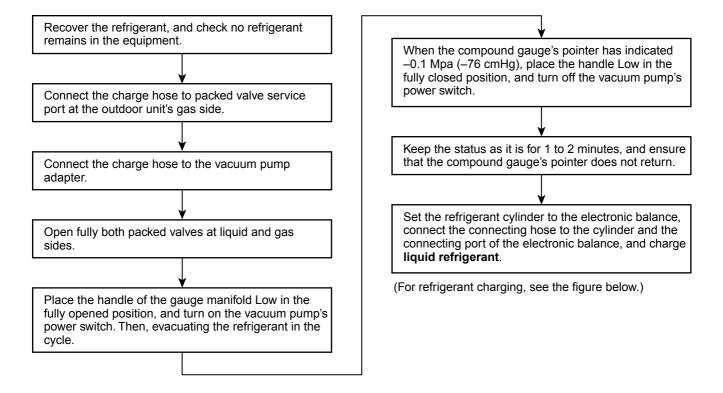
3. Insulation resistance tester

2. Thermometer

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.



- 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.

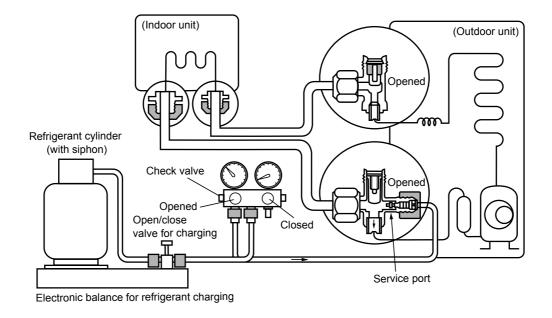


Fig. 3-4-1 Configuration of refrigerant charging

- 1. Be sure to make setting so that liquid can be charged.
- 2. When using a cylinder equipped with a siphon, liquid can be charged without turning it upside down.

Accordingly, when charging refrigerant from the refrigerant cylinder to the equipment, charge it turning the cylinder upside down if cylinder is not equipped with siphon.

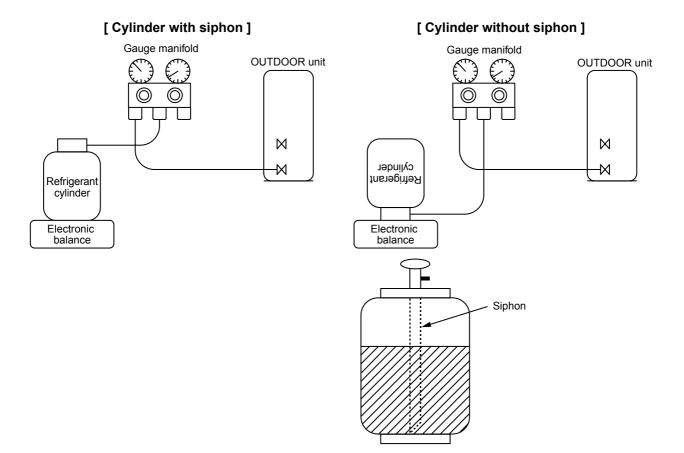


Fig. 3-4-2

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.

- 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.
- 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.
- 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 m³/Hr or 0.02 MPa (0.2kgf/cm²) 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.

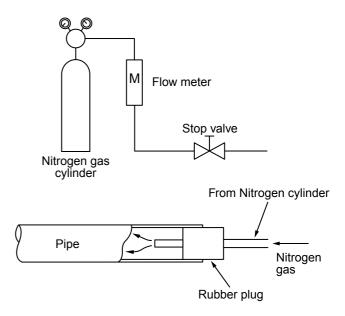
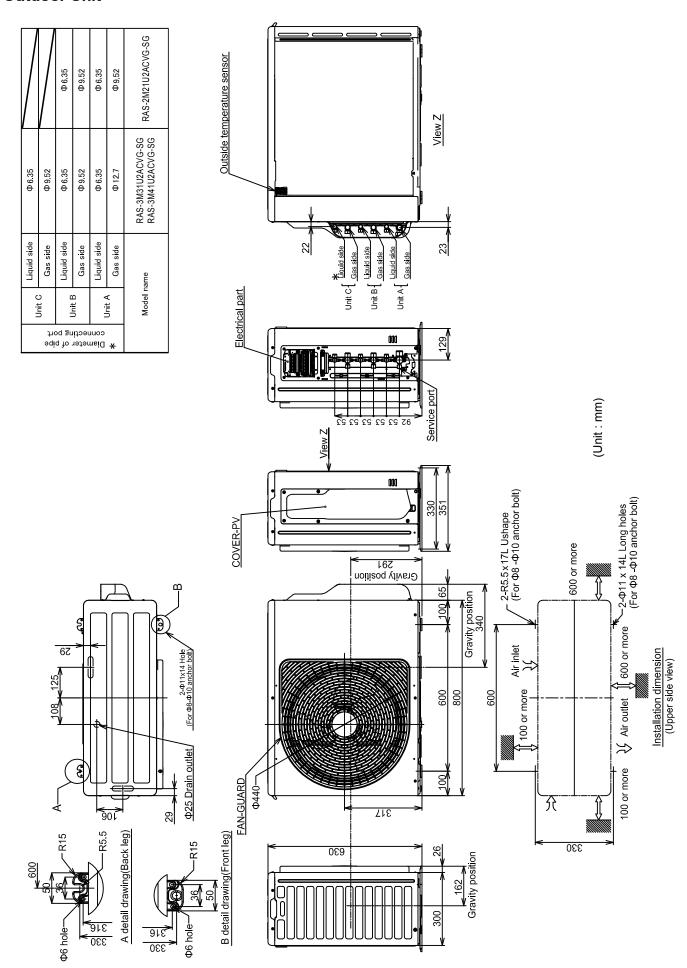


Fig. 3-5-1 Prevention of oxidation during brazing

4. CONSTRUCTION VIEWS

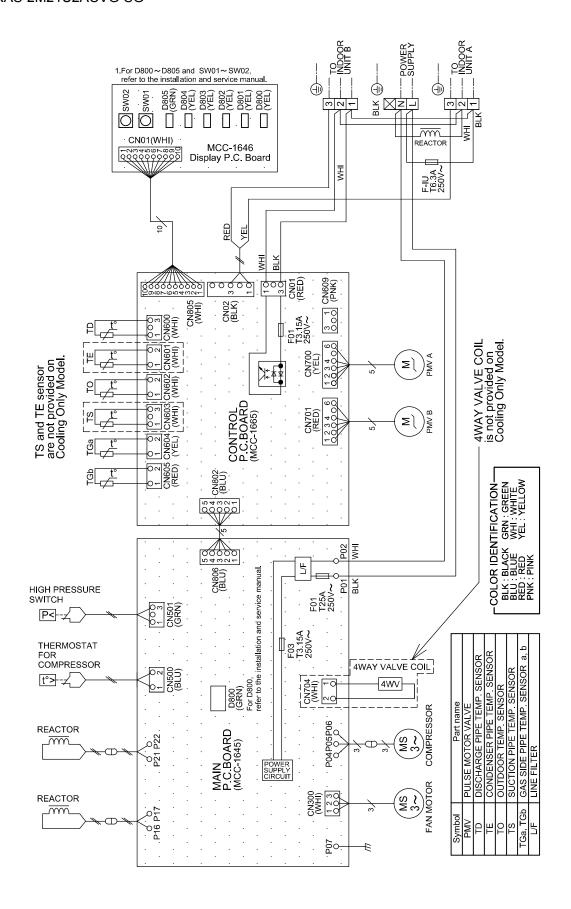
Outdoor Unit



5. WIRING DIAGRAM

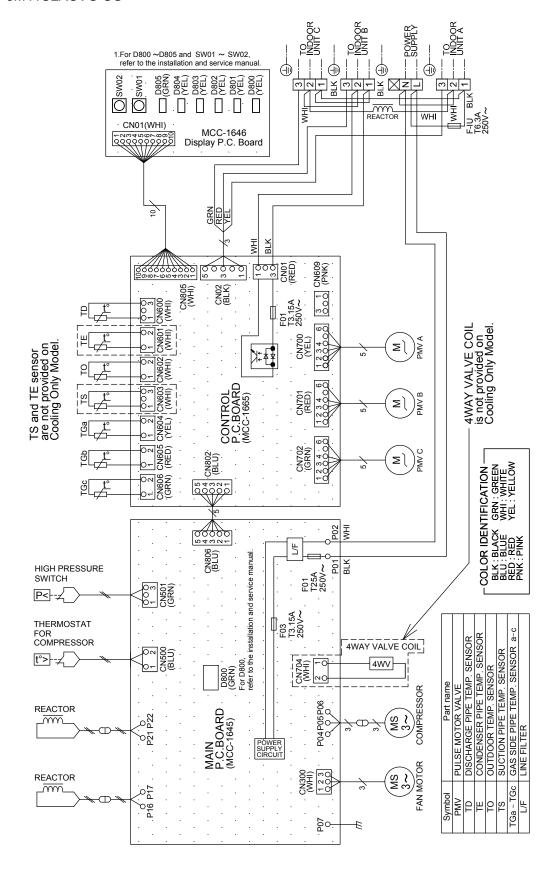
Outdoor Unit

RAS-2M21U2ACVG-SG



Outdoor Unit

RAS-3M31U2ACVG-SG RAS-3M41U2ACVG-SG



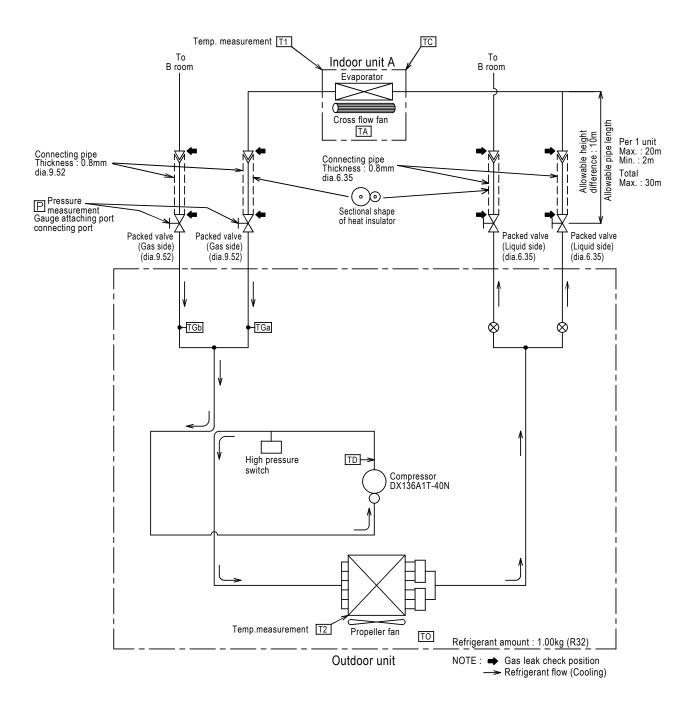
6. SPECIFICATIONS OF ELECTRICAL PARTS

Outdoor Unit

No.	Parts name		Model name	Rating		
1	Compressor	2M21,3M41 series	DX136A1T-40N	3-Phases (4-Poles);1100W		
		3M31 series	DX151A1T-30N	3-Phases (4-Poles);1100W		
2	Outdoor fan motor		ICF-340-A70-1	Output 70W		
3	Reactor		CH-57-WL	10mH、16A		
4	Reactor		CH-76-VK	9.9mH、1A		
5	PMV coil		PQ-M10012-000313	DC12V		
6	P.C. board(Main PCB)		MCC-1645	AC220-240V		
7	P.C. board(Control PCB)		MCC-1665	DC 5V		
8	P.C. board(Display PCB)		MCC-1646	DC 5V		
9	Fuse (Mounted on P.C. boar	d MCC-1645)	_	AC250V、25A		
10	Fuse		_	AC250V、6.3A		
11	Fuse (Mounted on P.C. board MCC-1665)	MCC-1645、	_	AC250V、3.15A		
12	Outdoor temp. sensor (TO se	ensor)	_	10kΩ (25°C)		
13	Discharge temp. sensor (TD	sensor)	_	50kΩ (25°C)		
14	Temp. sensor at A room gas sensor)	side (TGA-	_	10kΩ (25°C)		
15	Temp. sensor at B room gas sensor)	side (TGB-	_	10kΩ (25°C)		
16	Temp. sensor at C room gas sensor) *only 3M series	side (TGC-	_	10kΩ (25°C)		
17	Compressor thermo.		CS-12AL	ON:90°C、OFF:125°C		
18	Terminal block (3P) *only 2M series		_	AC250V、20A		
19	Terminal block (6P)		_	AC600V、30A		
20	High-pressure SW		ACB-1UB177W	OFF:4.5MPa		

7. REFRIGERANT CYCLE DIAGRAM

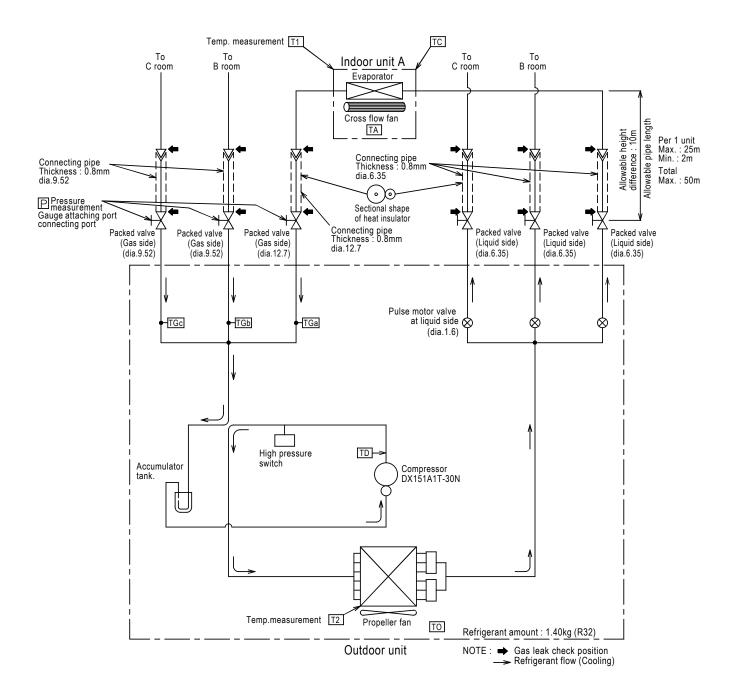
7-1. Refrigerant Cycle Diagram RAS-2M21U2ACVG-SG



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.

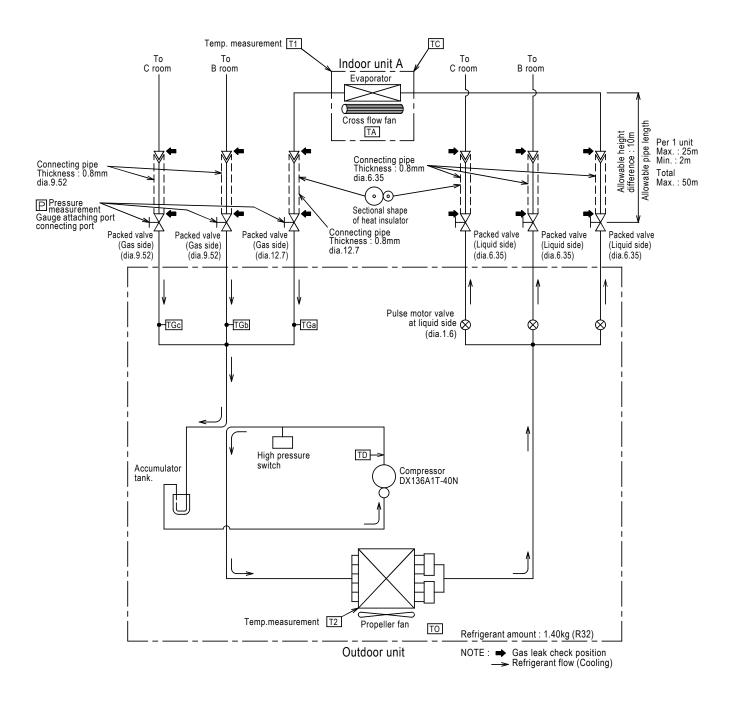
RAS-3M31U2ACVG-SG



NOTE:

- You need not add refrigerant if the piping length is 50m or less.
- Connection of only one indoor unit is unavailable. Two indoor units should be connected.

RAS-3M41U2ACVG-SG



NOTE:

- You need not add refrigerant if the piping length is 50m or less.
- Connection of only one indoor unit is unavailable. Two indoor units should be connected.

7-2. Operation Data

Outdoor Unit: RAS-2M21U2ACVG-SG

<Cooling>

Temperature condition		No.of operating		Indoor unit			Standard pressure	Heat exchanger pipe temperature		Indoor	Compressor revolution	
Indoor	Outdoor	units	Α	В	С	D	E	P(MPa)	T1(°C)	T2(°C)	fan	(rps)
			10	-	-	-	-	0.8 to 1.0	12 to 14	38 to 44	High	19.0
		1 unit	13	-	-	-	-	0.8 to 1.0	12 to 14	38 to 44	High	31.0
			18	-	-	-	-	0.8 to 1.0	12 to 14	38 to 44	High	40.0
27/19	35/-	2 units	10	10	-	-	-	1.3 to 1.3	15 to 17	42 to 44	High	44.9
21/19	33/- 2		2 units	13	10	-	-	-	1.3 to 1.3	15 to 17	42 to 44	High
			18	10	-	-	-	1.3 to 1.3	15 to 17	42 to 44	High	44.9
			18	13	-	-	-	1.3 to 1.3	15 to 17	42 to 44	High	44.9
			18	18	-	-	-	1.3 to 1.3	15 to 17	42 to 44	High	44.9

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-3M31U2ACVG-SG

<Cooling>

	erature dition	No.of operating			door ι	unit		Standard pressure	Heat exchanger pipe temperature		Indoor fan	Compressor revolution
Indoor	Outdoor	units	Α	В	С	D	Е	P(MPa)	T1(°C)	T2(°C)	IaII	(rps)
			10	-	-	-	-	0.8 to 1.0	12 to 14	38 to 44	High	19.0
		1 unit 3 units	13	-	-	-	•	0.8 to 1.0	12 to 14	38 to 44	High	31.0
			18	-	-	-	•	0.8 to 1.0	12 to 14	38 to 44	High	40.0
27/19	35/-		10	10	10	i	ı	1.1 to 1.3	16 to 18	46 to 48	High	50.5
21/13	33/-		13	10	10	-	•	1.1 to 1.3	16 to 18	46 to 48	High	50.5
			18	10	10	-	-	1.1 to 1.3	16 to 18	46 to 48	High	50.5
			13	13	10	-	•	1.1 to 1.3	16 to 18	46 to 48	High	50.5
			18	13	10	-	-	1.1 to 1.3	16 to 18	46 to 48	High	50.5
			13	13	13	-	-	1.1 to 1.3	16 to 18	46 to 48	High	50.5

NOTES:

- 1.Measure surface temperature of heat exchanger pipe around of heat exchanger path U bent.(Thermistor thermometer).
- 2. Connecting piping condition: 5 meters × 3 units(5m/each indoor unit).

Outdoor Unit: RAS-3M41U2ACVG-SG

<Cooling>

	erature dition	No.of operating	Indoor unit			Standard pressure	Heat exchanger pipe temperature		Indoor fan	Compressor revolution		
Indoor	Outdoor	units	Α	В	С	D	Е	P(MPa)	T1(°C)	T2(°C)	IaII	(rps)
			10	-	-	-	-	0.8 to 1.0	12 to 14	38 to 44	High	19.0
		1 unit	13	-	-	•	-	0.8 to 1.0	12 to 14	38 to 44	High	31.0
			18	-	-	•	-	0.8 to 1.0	12 to 14	38 to 44	High	40.0
27/19	35/-	3 units	10	10	10	ı	ı	1.2 to 1.4	18 to 20	42 to 44	High	37.0
21/13	33/-		13	10	10	-	-	1.2 to 1.4	18 to 20	42 to 44	High	37.0
			18	10	10	•	-	1.2 to 1.4	18 to 20	42 to 44	High	37.0
			13	13	10	ı	•	1.2 to 1.4	18 to 20	42 to 44	High	37.0
			18	13	10	-	-	1.2 to 1.4	18 to 20	42 to 44	High	37.0
			13	13	13	-	-	1.2 to 1.4	18 to 20	42 to 44	High	37.0

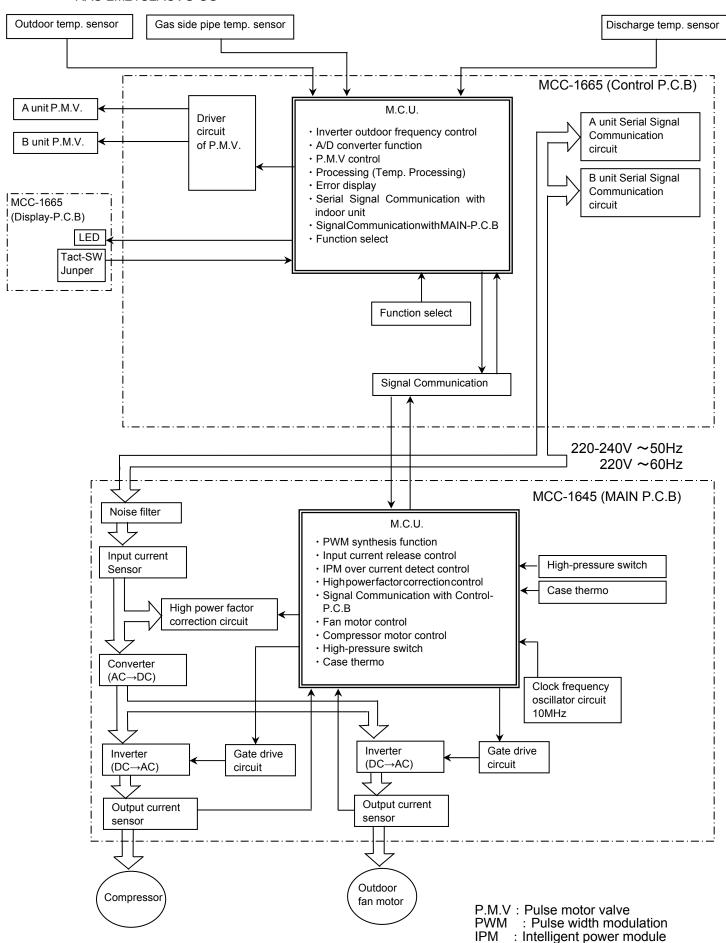
NOTES:

- 1. Measure surface temperature of heat exchanger pipe around of heat exchanger path U bent. (Thermistor thermometer).
- 2. Connecting piping condition : 5 meters \times 3 units(5m/each indoor unit).

8. CONTROL BLOCK DIAGRAM

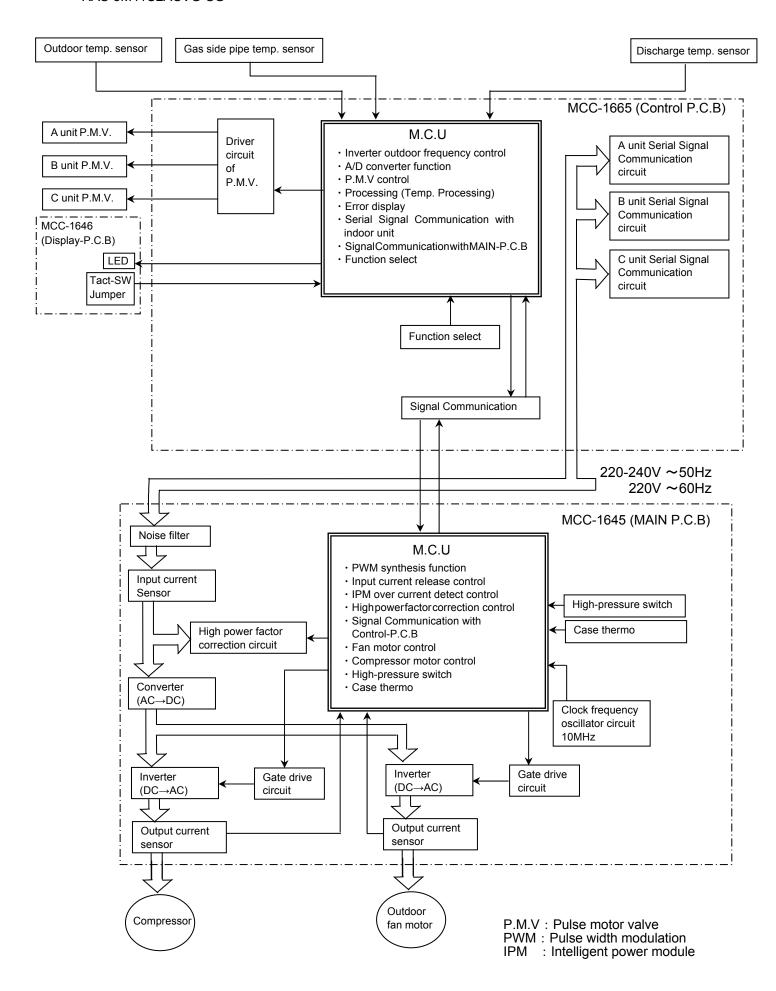
Outdoor Unit (Inverter Assembly)

RAS-2M21U2ACVG-SG



Outdoor Unit (Inverter Assembly)

RAS-3M31U2ACVG-SG RAS-3M41U2ACVG-SG



9. OPERATION DESCRIPTION

9-1. Outline of Air Conditioner Control

This air conditioner is a capacity-variable type air conditioner. Its system can control the speed of compressor motor according to load. The drive circuit for the indoor motor is mounted in the indoor unit. The drive circuits for outdoor motor and compressor are mounted in 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. Moreover, it also determines required speed of compressor motor and then transfers the operation command to the outdoor unit controller.

The outdoor unit controller erceives operation command from the indoor unit and controls revolution speed of the compressor motor.

The outdoor unit controller controls speed of compressor motor be controlling output voltage of the inverter and switching timing of supply power (current transfer timing), so that compressor motor operates according to the operation command. And then, the outdoor unit controller transfers the operating status back to 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) from the outdoor unit and judgment/display of error

2. Role of outdoor unit controller

Receiving the operation command signal (Serial signal) from the indoor unit controller, the outdoor unit performs compressor operation control as 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

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.

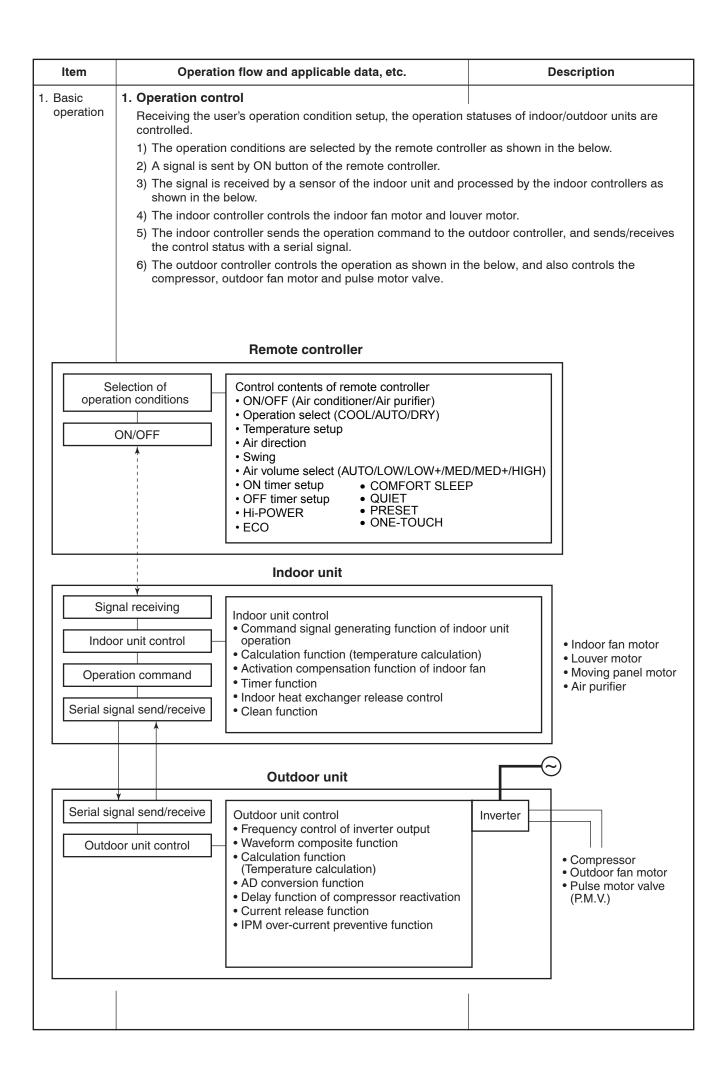
- · The current operation mode
- · The current compressor revolution
- · Outdoor temperature
- Existence of protective circuit operation
 For transferring of these signals, the indoor unit controller monitors the contents of signals, and judges existence of trouble occurrence.

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

	1.	Basic operation	36
		1. Operation control	36
	2.	Outdoor fan motor control	37
	3.	Capacity control	38
	4.	Current release control	38
	5.	Compressor protective control	38
	6.	Discharge temperature control	39
	7.	Pulse motor valve (PMV) control	39
	8.	High-pressure switch/Compressor case thermostat control	39
9-3.	Service	ce switch (SW01, SW02) operation	40



Item Operation flow and applicable data, etc. Description 2. Outdoor fan The blowing air volume at the outdoor unit side is controlled. 1) The operation command sent motor control from the remote controller is Receiving the operation command from the controller of indoor processed by the indoor unit unit, the controller of outdoor unit controls fan speed. controller and transferred to the * For the fan motor, a DC motor with non-stage variable speed controller of the outdoor unit. system is used. 2) When strong wind blows at However, it is limited to 8 stages for reasons of controlling. outdoor side, the operation of air Air conditioner ON conditioner continues with the fan (Remote controller) motor stopped. 3) Whether the fan is locked or not is detected, and the operation of Indoor unit controller air conditioner stops and an alarm is displayed if the fan is locked. 1) Outdoor unit operation command (Outdoor fan control) 4) According to each operation mode, by the conditions of outdoor temperature (To) and compressor revolution, the speed YES OFF status of 2) Fan speed ≥ 400 of the outdoor fan shown in the when the motor stopped. fan motor continues. table is selected. NO Fan motor ON YES Air conditioner Alarm 3) Fan lock display NO

			Co	mpressor r	evolution (r	ps)
			~ 20	~ 33	~ 42	~ 43
	Normal operation	To ≥ 38 ⁰ C	350	630	800	800
Ö		28 <u><</u> To < 38 ^O C	350	550	630	800
ဟ		15 <u><</u> To < 28 ⁰ C	300	550	550	630
Š		10 <u><</u> To < 15 ^O C	300	470	470	550
12A		5 <u><</u> To < 10 ^O C	300	350	350	470
210		0 <u><</u> To < 5 ⁰ C	300	300	300	350
RAS-2M21U2ACVG-SG		To < 0	0	0~300	0~300	0~300
ĄS-	Sleep or Quiet	To ≥ 38°C	350*	550*	630*	800*
α.	operation	To < 38	300*	470*	550*	630*
	To is abnormal		300~350	300~550	300~630	300~720
	Normal operation	To ≥ 38°C	400	800	900	900
Ö		28 <u><</u> To < 38 ⁰ C	400	700	800	900
98-9		28 <u><</u> To < 38°C 15 <u><</u> To < 28°C	400 350	700 620	800 700	900 800
CVG-SG		_				
J2ACVG-SG		15 <u><</u> To < 28 °C	350	620	700	800
31U2ACVG-SG		15 <u><</u> To < 28 °C 10 <u><</u> To < 15 °C	350 350	620 530	700 530	800 700
3M31U2ACVG-SG		$15 \le \text{To} < 28^{\circ}\text{C}$ $10 \le \text{To} < 15^{\circ}\text{C}$ $5 \le \text{To} < 10^{\circ}\text{C}$	350 350 350	620 530 400	700 530 400	800 700 470
AS-3M31U2ACVG-SG	Sleep or Quiet	$-15 \le To < 28^{\circ}C$ $10 \le To < 15^{\circ}C$ $5 \le To < 10^{\circ}C$ $0 \le To < 5^{\circ}C$	350 350 350 350	620 530 400 350	700 530 400 350	800 700 470 400
RAS-3M31U2ACVG-SG	Sleep or Quiet operation	$ \begin{array}{c} $	350 350 350 350 0	620 530 400 350 0~400	700 530 400 350 0~400	800 700 470 400 0~400

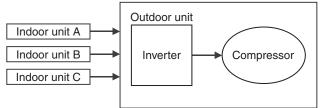
4) Motor operates as shown in the table below.

			Co	mpressor r	evolution (r	ps)
_			~ 16	~ 18	~ 36	~ 37
	Normal operation	To <u>></u> 38 ^O C	400	800	900	900
Ō		28 <u><</u> To < 38 ^O C	400	700	800	900
လှ		15 <u><</u> To < 28 ⁰ C	350	600	700	800
Š		10 <u><</u> To < 15 ^O C	350	530	530	700
I2A		5 <u><</u> To < 10 ⁰ C	350	400	400	470
41C		0 <u><</u> To < 5 ⁰ C	350	350	350	400
3M.		To < 0	0	0~400	0~400	0~400
RAS-3M41U2ACVG-SG	Sleep or Quiet	To <u>></u> 38 ^O C	400*	700*	800*	900*
잪	operation	To < 38	350*	470*	700*	800*
	To is abnormal		350~400	350~400	350~800	350~900

*Maximum revolution To : Outdoor temp. sensor

Item Operation flow and applicable data, etc. 3. Capacity control

- 1) Three indoor units from A to C 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.

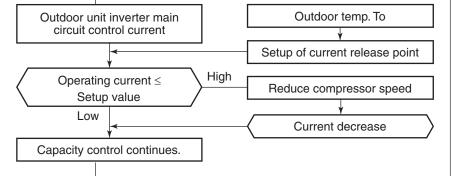


		RAS-2M21U2	2ACVG-SG	RAS-3M31U	2ACVG-SG	RAS-3M41U2ACVG-SG		
Operation	No.of	Combination	Compressor	Combination	Compressor	Combination	Compressor	
mode	operating	of indoor units	revolution	of indoor units	revolution	of indoor units	revolution	
	unit	(kBTU)	(rps)	(kBTU)	(rps)	(kBTU)	(rps)	
COOL	1 unit	10	15~46	10	15~39	10	15~46	
		13	15~70	13	15~54	13	15~70	
		18	15~78	18	15~62	18	15~78	
	2 units	*	25~58	*	25~80	*	25~58	
	3 units	*	-	*	25~69	*	25~80	
	Sleep or Quiet	-	~38	38	~38	38	~38	
	operation							

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.

Description

- 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.

		m	Cod	Cooling current release value				
	utdoor te	mp.	RAS-2M21U2ACVG-SG	RAS-3M31U2ACVG-SG	RAS-3M41U2ACVG-SG			
45°C	1 1							
40°C	\sum	\ 44°C	8.5 A	6.8 A	6.8 A			
		39°C	8.5 A	8.5 A	8.5 A			
			10.5 A	10.5 A	10.5 A			

- 5. Compressor protective control
- 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.

Item Operation flow and applicable data, etc. Description 6. Discharge 1. Purpose temperature This function detects error on the control refrigerating cycle or error on the compressor, and performs protective control. Td value **Control operation** 2. Operation Judges as an error and stops the compressor. 120°C Control of the compressor speed Reduce the compressor speed. The speed control is performed as 115°C described in the left table based upon Reduce slowly compressor speed. 111°C the discharge temperature. Keeps the compressor speed. 108°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. 101°C Operates with speed commanded by the serial signal. 7. Pulse motor This function controls throttle amount of the 1) When starting the operation, move the valve (PMV) valve once until it fits to the stopper. refrigerant in the refrigerating cycle. control (Initialize) According to operating status of the air conditioner, this function also controls the open degree of valve * In this time, "Click" sound may be heard. with an expansion valve with pulse motor. 2) Adjust the open degree of valve by super heat amount. (SH control) Starting up 3) If the discharge temperature was excessively up, adjust the open degree of Initialize valve so that it is in the range of set temperature. (Discharge temp. control) Move to initial position Compressor ON * SH control TD release control * PMV open degree control Stop by Thermo. OFF Defrost ** remote controller Setup value Setup value Setup value Power OFF * SH (Super Heat amount) = TG (Gas side pipe temperature) -Tc (Heat exchanger temperature of indoor unit) * PMV: Pulse Motor Valve * * Defrost is only for Heat-pump models. 8. High-pressure When the high-pressure switch or the compressor case thermostat operates, the operation of switch/ the compressor is terminated. Compressor 2) The compressor restarts after 2 minutes 30 seconds using [1] as an error count. case After restart, the error count is cleared when operation continues for 10 minutes or more. thermostat control 3) An error is confirmed with the error count [10]. 4) For the indicated contents of error, confirm using the check code table.

9-3. 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.

9-3-1. 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)

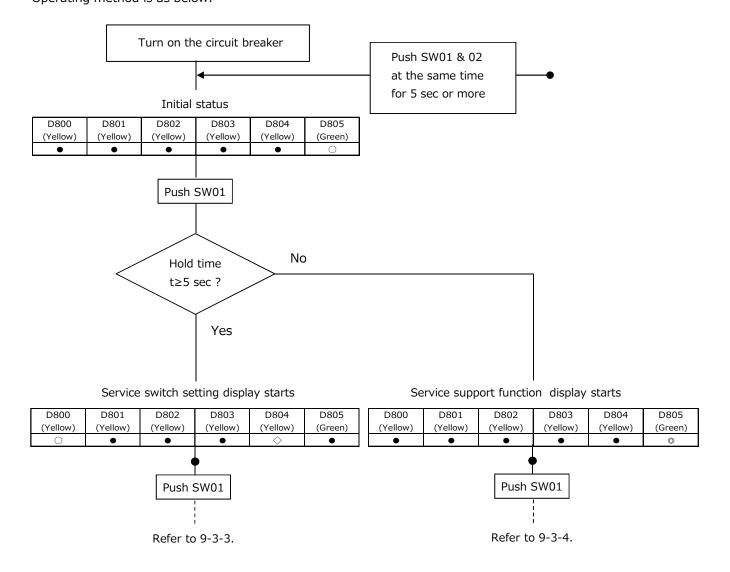
D800	D801	D802	D803	D804	D805
(Yellow)	(Yellow)	(Yellow)	(Yellow)	(Yellow)	(Green)
●/○ ^(*) /◎	•/○ ^(*) /◎	•/○ ^(*) /◎	●/○ ^(*) /◎	●/○ ^(*) /◎/◇	•/O/©/ ◇

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

Normai						Error occurr	ing				
D800	D801	D802	D803	D804	D805	D800	D801	D802	D803	D804	D805
(Yellow)	(Yellow)	(Yellow)	(Yellow)	(Yellow)	(Green)	(Yellow)	(Yellow)	(Yellow)	(Yellow)	(Yellow)	(Green)
•	•	•	•	•	0	●/○*	●/○*	●/○*	●/○*	●/○*	0
				С	:ON ●:OFF			0:0	N ○*: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.

9-3-2. Service switch setting and service support function You can choose service switch setting and service support function. Operating method is as below.



9-3-3. 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.

O:ON (O*:3 sec ON/0.5 sec OFF) ●:OFF

				Display	у]	○:ON (○*:3 sec ON/0.5 sec OFF)●:OFF ○:Rapid Flashing(5 times/sec) ◇:Slow Flashing(1 time/sec)
No.	D800 (YL)	D801 (YL)	D802	D803	D804	D805	Item	Control contents
1	0	•	•	(YL)	(YL)	(GN)	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
2	•	•	0	•			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 D801 D802 D803 D804 D805 (Yellow) (Yellow) (Yellow) (Green)
3	0	•	0	•			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
4	•	0	0	•		•/○*1 or •/◎*2	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 D801 D802 D803 D804 D805 (Yellow) (Yellow) (Yellow) (Green) (Yellow) O O O O O O
5	•	0	•	0			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 D801 D802 D803 D804 D805 (Yellow) (Yellow) (Yellow) (Green)
6	0	0	•	0			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

^{*1.} Item and setting is displaying.

^{*2.} Item and setting is selecting.

9-3-4. 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.

O:ON (○*:3 sec ON/0.5 sec OFF) ●:OFF

				icplay			1	O:ON (○*:3 sec ON/0.5 sec OFF) ●:OFF Rapid Flashing(5 times/sec) ◇:Slow Flashing(1 time/sec)
No	D800	D801		isplay D803	D804	D805		
No.	(YL)	(YL)	(YL)	(YL)	(YL)	(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	0	•	•	•	•		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	•	0	•	•	•		Miswiring (mispiping) display	You can check the room judged as error by operating the miswiring (mispiping) check. (Refer to table C)
3	0	0	•	•	•		Discharge temperature sensor (TD) display	The detected value of the discharge temperature (TD) is displayed. (Refer to table C)
4	•	0	0	•	•		Outside temperature sensor (TO) display	The detected value of the outside temperature sensor (TO) is displayed. (Refer to table C)
5	0	0	0	•	•		Current display	The current value which flows to the outdoor unit is displayed. (Refer to table C)
6	•	•	•	0	•		Compressor operation frequency display	The operation frequency of the compressor is displayed. (Refer to table C)
7	0	•	•	0	•		PMV opening display (unit A)	The opening of PMV (Electronic expansion valve) is displayed. (Refer to table C)
8	•	0	•	0	•		PMV opening display (unitB)	The opening of PMV (Electronic expansion valve) is displayed. (Refer to table C)
9	0	0	•	0	•	0	PMV opening display (unit C)	The opening of PMV (Electronic expansion valve) is displayed. (Refer to table C)
10	•	0	0	0	•		Gas temperature sensor (TG) display (unit A)	The detected value of the gas temperature sensor (TG) is displayed. (Refer to table C)
11	0	0	0	0	•		Gas temperature sensor (TG) display (unit B)	The detected value of the gas temperature sensor (TG) is displayed. (Refer to table C)
12	•	•	•	•	0		Gas temperature sensor (TG) display (unit C)	The detected value of the gas temperature sensor (TG) is displayed. (Refer to table C)
13	0	0	•	•	0		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	•	•	0	•	0		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	0	•	0	•	0		Indoor suction temperature sensor (TA) display (unit C)	The detected value of the indoor suction temperature sensor (TA) is displayed. (Refer to table C)
16	•	•	•	0	0		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)
17	0	•	•	0	0		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)
18	•	0	•	0	0		Indoor heat exchanger temperature sensor (TC/TCJ) display (unit C)	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

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

Display								ipid riasning(s times/sec) <>:slow riasning(1 time/sec)
D80 (YL)	-		D802 (YL)	D803 (YL)	D804 (YL)	D805 (GN)	Indoor check code	Description
•	•		•	•	•		-	Normal operation (no error)
0*	•		•	•	•		1C	Compressor case thermostat error
•	0*		•	•	•		21	High pressure switch error
0*	- 0*		•	•	•		1C	Compressor system error
•	•		^*	•	•		1d	Compressor lock
0*	•		O*	•	•		1F	Compressor breakdown
•	0*		^*	•	•		14	Driving element short circuit
0*	- (*		0*	•	•		16	Position detection circuit error
•	•		•	0*	•		17	Current detection circuit error
0*	•		•	0*	•		1C	Communication error between MCU
•	0*		•	0*	•		1A	Fan system error
0*	- 0*		•	0*	•		1E	Discharge temperature error
•	•		^*	0*	•	0	19	Discharge temperature sensor (TD) error
0*	•		O*	0*	•		1b	Outdoor air temperature sensor (TO) error
•	•		•	•	0*		1C	Gas pipe (unit A) temperature sensor (TGa) error
0*	•		•	•	0*		1C	Gas pipe (unit B) temperature sensor (TGb) error
•	0*		•	•	O*		1C	Gas pipe (unit C) temperature sensor (TGc) error
0*	•		0*	•	0*		-	PMV error (SH≥20)
•	0*		0*	•	0*		-	PMV error (SH≤-8)
•	•		•	0*	0*		20	PMV leakage error (unit A)
0*	•		•	O*	O*		20	PMV leakage error (unit B)
•	0*		•	0*	0*		20	PMV leakage error (unit C)
0*	•		O*	0*	0*		-	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.

Display

0

0

•

0

0

•

0

0

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

 $\bigcirc : ON \ (*:3 sec \ ON/0.5 sec \ OFF) \bullet : OFF \\ @ : Rapid \ Flashing(5 times/sec) \\ \diamondsuit : Slow \ Flashing(1 time/sec)$

Indoor D800 D801 D802 D803 D804 D805 Description check code (YL) (YL) (YL) (YL) (YL) (GN) • • • • • Normal operation (no error) 0 • • 1C Compressor case thermostat error • • High pressure switch error 0 • • • 21 • 0 0 • • 1C Compressor system error • • • • 1d Compressor lock 0 • 0 • • 1F Compressor breakdown 0 14 • 0 • • Driving element short circuit 16 0 0 • • Position detection circuit error • • • 0 • 17 Current detection circuit error Communication error between MCU 0 • • 0 • 1C 0 1A • 0 • • Fan system error 0 0 • 0 • 1E Discharge temperature error 19 • • 0 0 • Discharge temperature sensor (TD) error 0 1b Outdoor air temperature sensor (TO) error 0 0 0 1C Gas pipe (unit A) temperature sensor (TGa) error • • • 0 1C Gas pipe (unit B) temperature sensor (TGb) error 0 1C Gas pipe (unit C) temperature sensor (TGc) error • 0 • • 0 0 PMV error (SH≥20) • 0 • 0 0 • 0 PMV error (SH≤-8) • • • 0 0 20 PMV leakage error (unit A) 0 • • 0 0 20 PMV leakage error (unit B)

PMV leakage error (unit C)

Miswiring (mispiping) check error

20

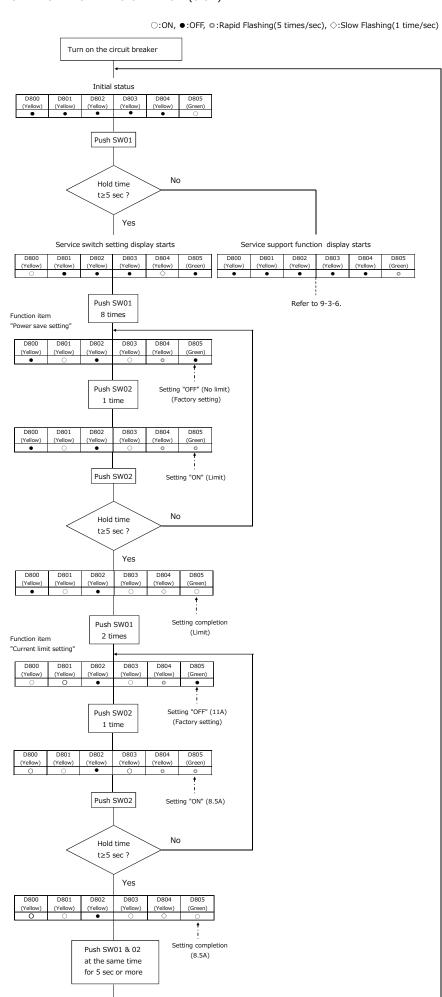
C. Sensor, current, compressor operation frequency, PMV opening, Miswiring (mispiping) check display Using the service display function, you can check a variety of information.

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

									:Rapid Flashing	g(5 times/sec) <	⇒:Slow Flashing(1 time/sec)
			_	splay					Conte		
No.	D800	D801	D802		D804	D805	Temp. sensor	Current	Compressor	PMV opening	Miswiring
140.	(YL)	(YL)	(YL)	(YL)	(YL)	(GN)	(°C)	(A)	frequency (rps)	(pls)	(mispiping) check
0	•	•	•	•	•		-26 or less	0~0.9	0~4.9	0~19	No error
1	0	•	•	•	•		-25~-21	1~1.9	5~9.9	20~39	Trouble in unit A
2	•	0	•	•	•		-20~-16	2~2.9	10~14.9	40~59	Trouble in unit B
3	0	0	•	•	•		-15~-11	3~3.9	15~19.9	60~79	Trouble in unit A and B
4	•	•	0	•	•		-10~-6	4~4.9	20~24.9	80~99	Trouble in unit C
5	0	•	0	•	•		-5~-1	5~5.9	25~29.9	100~119	Trouble in unit A and C
6	•	0	0	•	•		0~4	6~6.9	30~34.9	120~139	Trouble in unit B and C
7	0	0	0	•	•		5~9	7~7.9	35~39.9	140~159	Trouble in unit A,B and C
8	•	•	•	0	•		10~14	8~8.9	40~44.9	160~179	-
9	0	•	•	0	•		15~19	9~9.9	45~49.9	180~199	-
10	•	0	•	0	•		20~24	10~10.9	50~54.9	200~219	-
11	0	0	•	0	•		25~29	11~11.9	55~59.9	220~239	-
12	•	•	0	0	•		30~34	12~12.9	60~64.9	240~259	-
13	0	•	0	0	•		35~39	13~13.9	65~69.9	260~279	-
14	•	0	0	0	•		40~44	14~14.9	70~74.9	280~299	-
15	0	0	0	0	•	\Diamond	45~49	15~15.9	75~79.9	300~319	-
16	•	•	•	•	0	~	50~54	16~16.9	80~84.9	320~339	-
17	0	•	•	•	0		55~59	17~17.9	85~89.9	340~359	-
18	•	0	•	•	0		60~64	18~18.9	90~94.9	360~379	-
19	0	0	•	•	0		65~69	19~19.9	95~99.9	380~399	-
20	•	•	0	•	0		70~74	20~20.9	100~104.9	400~419	-
21	0	•	0	•	0		75~79	21~21.9	105~109.9	420~439	-
22	•	0	0	•	0		80~84	22~22.9	110~114.9	440~459	-
23	0	0	0	•	0		85~89	23~23.9	115~119.9	460~479	-
24	•	•	•	0	0		90~94	24~24.9	120~124.9	480~499	-
25	0	•	•	0	0		95~99	25~25.9	125~129.9	500	-
26	•	0	•	0	0		100~104	26~26.9	130~134.9	-	-
27	0	0	•	0	0		105~109	27~27.9	135~139.9	=	-
28	•	•	0	0	0		110~114	28~28.9	140~144.9	-	-
29	0	•	0	0	0		115~119	29~29.9	145~149.9	-	-
30	•	0	0	0	0		120 or more	30~30.9	150~154.9	-	-
31	0	0	0	0	0		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.

If you want to set the "POWER SAVE SETTING OFF \Rightarrow ON (8.5A) " .



D800

(Yellow)

Compressor ON

Push SW01

Hold time
t≥5 sec ?

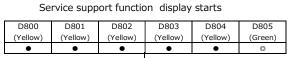
Yes

Service switch setting display starts

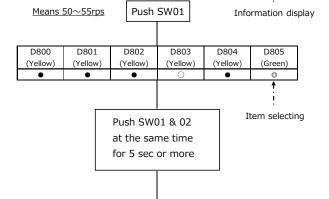
Service support functio

				,	
D800	D801	D802	D803	D804	D805
(Yellow)	(Yellow)	(Yellow)	(Yellow)	(Yellow)	(Green)
0	•	•	•	\Diamond	•

Refer to 9-3-5.



Push SW01 8 times Support function item "Compressor operation frequency " D802 D800 D801 D803 D804 D805 (Yellow) (Yellow) (Yellow) (Yellow) (Yellow) (Green) Push SW02 Item selecting 1 time D800 D801 D802 D803 D804 D805 (Yellow) (Yellow) (Yellow) (Yellow) (Yellow) (Green)



% "Á=BGH5 @@5H=CB'DFC7981 F9

%\$!%" =bghU`Unjcb#GYfj]Wjb[Hcc`g

7\ Ub[Yg"]b"h\ Y"dfcXi Wh"UbX"Wca dcbYbhg

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New tools for R32 (R410A)

New tools for R32 (R410A)	Applica	ble 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	×	000	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	0		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)	×	3	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)	0	1	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	0		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	
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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)

*1 If the air conditioner is used in conditions other than the above, the safety protection functions may be activated.

^{*} Example of indoor unit class: RAS-M10U2KCVG is abbreviated as "10".

		Standard connecting pipe diameter				
	Indoor unit class	RAS-2M21U2ACVG-SG	RAS-3M31U2ACVG-SG, RAS-3M41U2ACVG-SG			
Unit C	10 or 13	_	6.35, 9.52 mm			
Unit B	10 or 13 or 18	6.35, 9.52 mm	6.35, 9.52 mm ^{*3}			
Unit A	10 or 13 or 18	6.35, 9.52 mm	6.35, 12.7 mm ⁻²			
	36 (RAS-2M21U2ACVG-SG)					
Total	41 (RAS-3M31U2ACVG-SG) 41 (RAS-3M41U2ACVG-SG)	_	-			

All combinations that do not exceed the "Total" number can be installed.

2 or more indoor units must be connected to an outdoor unit.

When 2 indoor units are connected to an outdoor unit, note that some combinations of indoor units are not compatible.

For the further details, refer to the catalogue.

· Locally procured.

Parts name		Q'ty			
Refrigerant piping ⁴	Indoor unit (abbreviation)	Liquid side (O.D.)	Gas side (O.D.)		
	10, 13	6.35 mm	9.52 mm	1 ea.	
	18	6.35 mm	12.7 mm	1	
Putty, PVC tapes		1 ea.			

^{*4} Refrigerant piping covered with insulating material (Polyethylene foam, 6 mm thick) When duct-type or cassette-type unit is to be installed, it shall be covered with thicker insulating material (Polyethylene foam, 10 mm thick)

^{*2} Need the reducer (10, 13 class 12.7 to 9.52 mm).

^{*3} Need the expander (18 class 9.52 to 12.7 mm).

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 sulfide 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.



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.

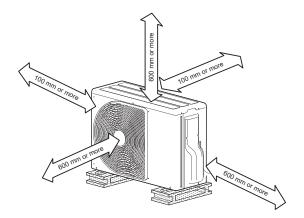
■ Precautions for Installation

- 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 sufficient 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 first, and then to make connections to the outdoor units.

However, if outdoor work is difficult, you can change the procedure. For example, by making adjustments to the wiring and piping lengths on the inside (rather than the outside).

Necessary Space for Installation

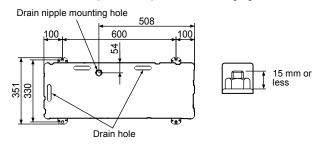
If you need to install the outdoor unit in a location where there are some obstructions or a wall, secure sufficient space as shown in the figure below. The cooling/heating effect may be reduced by 10%.

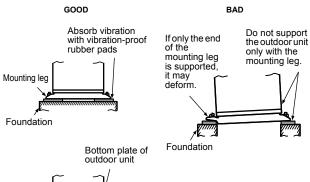


Fixing the Outdoor Unit

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 fixing legs.





The state of the s

Foundation

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

10-2-6. Refrigerant piping

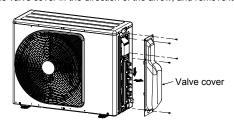
A CAUTION

Install in rooms that are 5 m³ or larger. If a leak of refrigerant gas occurs inside the room, an oxygen deficiency may occur.

■ Detaching the Valve cover

Remove the 5 screws.

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



■ Refrigerant Piping Connection

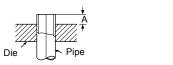
Flaring

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 the
- 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		В	Flare Nut		i		
Outside diameter	Thickness	Rigid (clutch type) R32 tool	Imperial (wing nut type) R32 tool		Width across flat		nten que
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
12.7	0.8	0 to 0.5	2.0 to 2.5	16.6	26	50 to 62	5.0 to 6.2

ACAUTION

- 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.
- 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 to C.
 - 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

ACAUTION

KEEP IMPORTANT 6 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 refabricated.

■ Air Purge

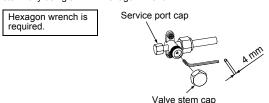
From the sake of environmental protection, use a vacuum pump to extract the air during installation.

- * 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 flare nut of the at the gas end a little to make sure that air is taken in, then tighten the nut.
 - If you find 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.
- Disconnect the charge hose from the service port, then open the valve stem fully using a 4 mm hexagon wrench.



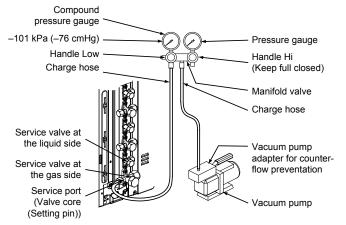
5. Tighten the service valve stem cap and service port cap securely.

⚠ CAUTION

Use a torque wrench and tighten the nut at the specified torque value.

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

Service valve		Tighten torque				
		Valve stem cap		Service port cap		
Туре	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	
	12.7	33 to 42	3.3 to 4.2	14 to 18	1.4 to 1.8	



■ Insulation of the Refrigerant Pipes

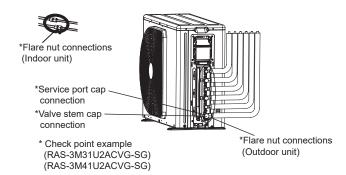
· Insulate the refrigerant pipes for liquid and gas separately.



Heat-proof bubble polyethylene

■ Gas Leak Inspection

- Perform a gas leak inspection for the flarenutconnections, 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.
- Perform additional installation referring to the procedure from "Refrigerant Piping Connection" on the previous page.

10-2-7. 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 fire.
- 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

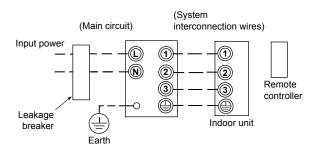
- Incorrect/incomplete wiring will cause electrical fires or smoke.
- Prepare the power source for exclusive use with the air conditioner.
- This product can be connected to the main power.

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

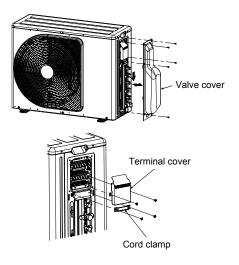
· The dash lines show on-site wiring.



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

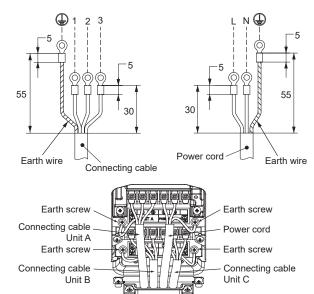
Model	RAS-2M21U2ACVG-SG	RAS-3M31U2ACVG-SG, RAS-3M41U2ACVG-SG		
Power supply	1ph, 50Hz, 220-240V			
Maximum running current	11.2A	11.5A		
Circuit breaker rating	15A (All types can be used)			
Power cord	H07RN-F or 60245 IEC 66 3-core 2.5 mm ²			
Connecting cable	H07RN-F or 60245 IEC 66 4-core 1.5 mm ²			

- 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
- 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



■ Important instruction

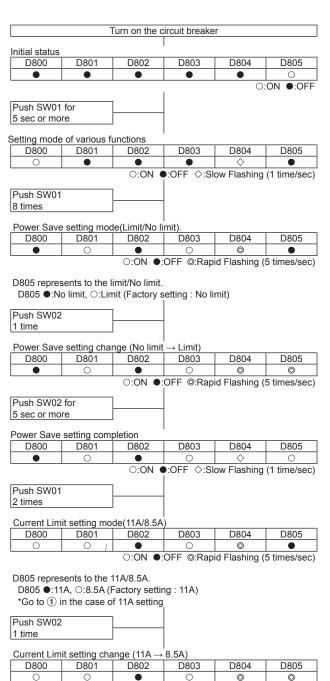
To all installers

Please be reminded that all air conditioners installed at HDB flats are subjected to a current restriction of 11A or 8.5A.

It is the installer's responsibility to have to current release control set correctly for the type of HDB flat which the IMS unit is installed.

The setting method is the following.

For details refer also to the service manual.



<Cancellation method of Power Save setting >

D800	D801	D802	D803	D804	D805
•	•	•	•	•	0
			1	0:	ON •:OF
Push SW01	for	1			
5 sec or more	е		1		
Setting mode	of various t	unctions	l		
D800	D801	D802	D803	D804	D805
0	•	•	•	\Diamond	•
		O:ON (:OFF <:SI	ow Flashing	(1 time/se
Push SW01		1			
8 times]		
Power Save	setting mo	de(Limit/No I	l imit).		
D800	D801	D802	D803	D804	D805
2000		_		0	

D805 represents to the limit/No limit.

D805 ●:N	o limit, O:Lin	nit (Factory s	etting : No li	mit)		
Push SW02						
1 time						
Power Save	setting char	nge (Limit →	No limit)			
D800	D801	D802	D803	D804	D805	
•	0	•	0	0	•	
		O: ON ●:	OFF ©:Rap	id Flashing (5 times/sec)	
Push SW02	for					
5 sec or mo	re					
Power Save setting completion						
D800	D801	D802	D803	D804	D805	
•	0	•	0	\Diamond	•	

D800	D801	D802	D803	D804	D805
•	0	•	0	\Diamond	•
		O:ON	:OFF <:SI	ow Flashing	(1 time/sec)
		i			
Push SW01	and SW02				
for 5 sec or more					
Function setting completion (return to the initial status)					

Function set	tting complet	ion (return to	the initial st	tatus)	
D800	D801	D802	D803	D804	D805
•	•	•	•	•	0
				0:	ON O:OFF

Notice

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 initial status.

① Push SW01 and SW02 for 5 sec or more

Current Limit setting completion

D801

Push SW02 for 5 sec or more

D800

D802

D800	D801	D802	D803	D804	D805		
					0		
O:ON ●:OFF							

O:ON ●:OFF ©:Rapid Flashing (5 times/sec)

O:ON ●:OFF ♦:Slow Flashing (1 time/sec)

D804

D805

D803

10-2-8. 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.

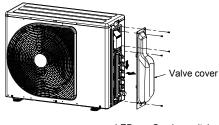
10-2-9. Test run

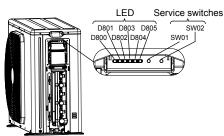
■ Wiring/Piping Check

C C

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.





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.)

			⋄ . 01	ow i lastillig	(1 tillio/300.)
D800	D801	D802	D803	D804	D805
•	•	•	•	•	0

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 flashing (1 time/sec.).

D800	D801	D802	D803	D804	D805
0	•	•	•	\Diamond	•

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

D800	D801	D802	D803	D804	D805
•	•	0	•	0	•

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

D800	D801	D802	D803	D804	D805
•	•	0	•	0	0

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
•	•	0	•	\Diamond	0

 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
•	•	•	•	•	0

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

D800	D801	D802	D803	D804	D805
0*	0*	0*	0*	0*	0

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
•	0	•	•	•	0

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	D800 D801 D802 D803 D				D805	Description					
•	• • • • •				\Diamond	Normal operation (no error)					
0	0 • • • •				\Diamond	Trouble in unit A					
•	• 0 • •		•	•	\Diamond	Trouble in unit B					
•	•	0	•	•	\Diamond	Trouble in unit C					
0	0	•	•	•	\Diamond	Trouble in unit A and B					
0	•	0	•	•	\Diamond	Trouble in unit A and C					
• 0 0 •		•	\Diamond	Trouble in unit B and C							
0	0	0	•	•	\Diamond	Trouble in unit A, B and C					

- · The D800 LED represents unit A.
- · The D801 LED represents unit B.
- The D802 LED represents unit C.
- 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 low.
 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

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 the cooling mode.
- You can perform the test run in the cooling mode by utilizing the thermo sensor of the indoor unit.
 - Cooling mode: Warm the thermo sensor using an appliance such as a hair dryer.

■ 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 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 optimized control.

10-2-10. Pump-down Operation

■ Pump-down Operation (Recovering refrigerant)



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

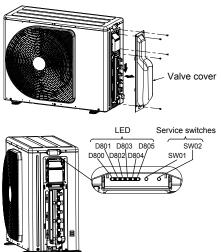


Electric current is applied on the control board. Beware of electric shock.

- 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.



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.)

			♦ : SI	ow Flashing	(1 time/sec.)
D800	D801	D802	D803	D804	D805
•	•	•	•	•	0

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 flashing (1 time/sec.).

D800	D801	D802	D803	D804	D805
0	•	•	•	\Diamond	•

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

D800	D801	D802	D803	D804	D805
0	•	•	•	0	•

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

D800	D801	D802	D803	D804	D805
0	•	•	•	0	0

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
0	•	•	•	\Diamond	0

- 8. Close the valve stem of the service valve at the liquid end.
- Make sure that the compound pressure gauge reading is –101 kPa (–76 cmHq)
- 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.

10-2-11. 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

 \bigcirc : ON (\bigcirc * : 3 sec ON/0.5 sec OFF), \bullet : OFF

		Dis	olay			Indoor	
D800 (YL)	D801 (YL)	D802 (YL)	D803 (YL)	D804 (YL)	D805 (GN)	check code	Description
•	•	•	•	•		-	Normal operation (no error)
O*	•	•	•	•		1C	Compressor case thermostat error
•	0*	•	•	•		21	High pressure switch error
0*	0*	•	•	•		1C	Compressor system error
•	•	0*	•	•		1D	Compressor lock
0*	•	0*	•	•		1F	Compressor breakdown
•	0*	0*	•	•		14	Driving element short circuit
0*	0*	0*	•	•		16	Position detection circuit error
•	•	•	0*	•		17	Current detection circuit error
O*	•	•	0*	•		1C	Communication error between MCU
•	0*	•	O*	•		1A	Fan system error
O*	0*	•	0*	•		1E	Discharge temperature error
•	•	O*	0*	•	0	19	Discharge temperature sensor (TD) error
O*	•	0*	0*	•		1B	Outdoor air temperature sensor (TO) error
•	•	•	•	O*		1C	Gas pipe (unit A) temperature sensor (TGa) error
O*	•	•	•	O*		1C	Gas pipe (unit B) temperature sensor (TGb) error
•	0*	•	•	0*		1C	Gas pipe (unit C) temperature sensor (TGc) error
O*	•	0*	•	0*]	-	PMV error (SH≥20)
•	0*	0*	•	0*	1	-	PMV error (SH≤-8)
•	•	•	0*	0*		20	PMV leakage error (unit A)
O*	•	•	O*	0*		20	PMV leakage error (unit B)
•	0*	•	O*	0*		20	PMV leakage error (unit C)
0*	•	0*	0*	0*		-	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	58			
2	Primary Judgment	59			
3	Judgment by Flashing LED of Indoor Unit	59			
4	4 Self-Diagnosis by Remote Controller (Check Code)				
5	5 Judgment of Trouble by Symptom				
6	Trouble Diagnosis by Outdoor LED	69			
7	7 Inspection of the Main Parts				
8	Outdoor Unit	77			
9	How to Simply Judge Whether Outdoor Fan Motor is Good or Bad	78			

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>

Connect the discharge resistance (approx. $100 \Omega/40W$) or plug of the soldering iron to voltage between + and - of CO8 on the main P.C. board MCC-1645, and then perform discharging.

Discharge position + and - of CO8

(Discharging period: 10 seconds or more)



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 $\pm 10\%$. 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.

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.

Item Check code **Block display Description for self-diagnosis** Indoor indication OPERATION (Green) Power failure lamp flashes. Α Flashing display (1 Hz) (when power is ON) OPERATION (Green) Protective circuit operation Which lamp В Flashing display (5 Hz) for indoor P.C. board does flash? OPERATION (Green) Protective circuit operation TIMER (Orange) C for connecting cable and Flashing display (5 Hz) serial signal system OPERATION (Green) Protective circuit operation D Flashing display (5 Hz) for outdoor P.C. board OPERATION (Green) Protective circuit operation for others E TIMER (Orange) (including compressor) Flashing display (5 Hz)

Table 11-3-1

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

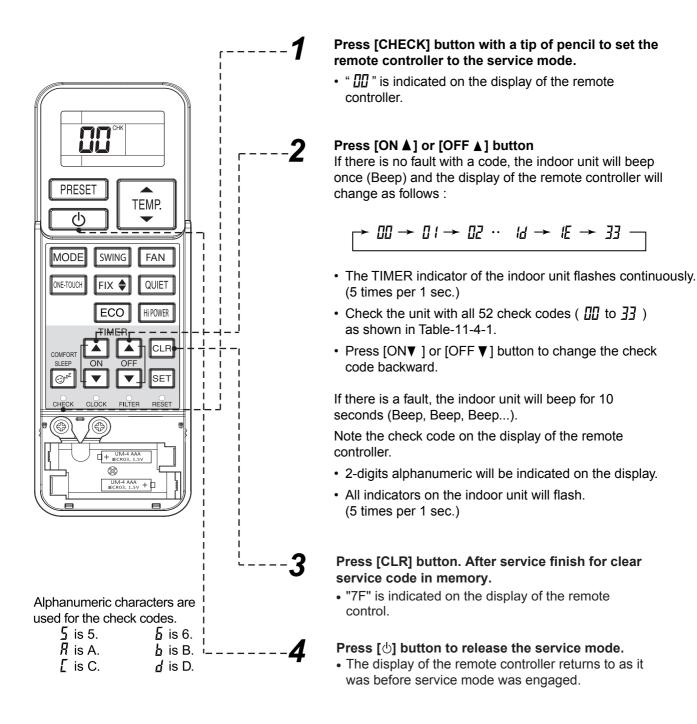


Fig. 11-4-1

11-4-2. Caution at Servicing

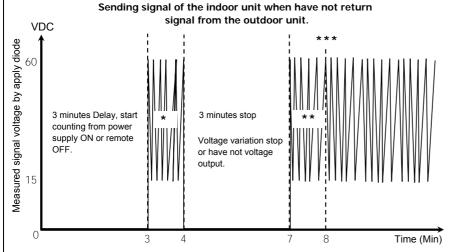
- 1. After using the service mode of remote controller finished, press the [\oplus] button to reset the remote controller to normal function.
- 2. After finished the diagnosis by the remote controller, turn OFF power supply and turn its ON again to reset the air conditioner to normal operation. However, 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 diagnosi	s function		
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	Action and Judgment
	Indoor		TA sensor; The room temperature sensor is short-Circuit or disconnection.	Operation continues.	Flashes when error is detected.	Check the sensor TA and connection. In case of the sensor and its connection is normal, check the P.C. board.
			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.	Check the sensor TC and connection. In case of the sensor and its connection is normal, check the P.C. board.
	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.	Replace P.C. board.

Block distinction			Operation of diagno	osis function		
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	
1711	Serial signal	170 1	1) Defective wiring of the	Indoor unit	Flashes when	1) t
i_i i	and connecting	 j_i	connecting cable or	operates	error is detected.	c
	cable.		miss-wiring.	continue.	Flashing stop	• (
			2) Operation signal has not	Outdoor unit	and outdoor unit	i
			send from the indoor unit	stop.	start to operate	• (
			when operation start.		when the return	• (
			3) Outdoor unit has not		signal from the	F
			send return signal to the		outdoor unit is	• (
			indoor unit when operation		normal.	ι
			started.			á
			4) Return signal from the			t
			outdoor unit is stop during			ı
			operation.			r
			Some protector			ı
			(hardware, if exist) of the			F
			outdoor unit open			4)
			circuit of signal.			5
			Signal circuit of indoor			•1
			P.C. board or outdoor			(
			P.C. board is failure			• (
			in some period.			a
						1
						• (
l	1	1	1	ı	1	

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



- * 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.

) to 3) The outdoor unit never operate. • Check connecting cable and correct

Action and Judgment

- 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.
- 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.

Bloc	k distinction		Operation of diagnos	sis function		
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	Action and Judgment
	Outdoor	<u> </u>	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.)
		15	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.
			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.
			TE or TS sensor; abnormal. Out of place, disconnection, shortage, or misconnected to TS connector, TS sensor is connected to TE sensor connector) TE sensor; Outdoor heat exchanger temperature sensor TS sensor; Suction pipe temperature sensor	All OFF	Flashes after error is detected 4 times*.	1. Check sensors, TE, TS 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 TE, TS detected temperature relationship are different from normal operation, "18" might be detected.
		<u> </u>	TD sensor; Discharge pipe temperature sensor is disconnection or shortage.	All OFF	Flashes after error is detected 4 times*.	Check sensors TD and connection. In case of the sensor and its connection is normal, check the inverter P.C. board.
		117	Outdoor fan failure or its drive-circuit on the inverter P.C. board failure.	All OFF	Flashes after error is detected 8 times*.	Check the motor, measure winding resistance, shortage or lock rotor. Check the inverter P.C. board.
		造	TO sensor; The outdoor temperature sensor is disconnection or shortage.	Operation continues.	Record error after detected 4 times*. But does not flash display.	Check sensors TO and connection. In case of the sensor and its connection is normal, check the inverter P.C. board.

Block distinction Operation of diagnosis fur			s function			
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	Action and Judgment
	(Relation of vand frequence Overloading compressor over-charge P.M.V. failte Compressor current). TE or TS sensore TS connected connected connected connector) TE sensor; exchanger sensor TS sensor; TS sensor;		TE or TS sensor; abnormal. Out of place, disconnection, shortage, or misconnection (TE sensor is connected to TS connector, TS sensor is connected to TE sensor connector) TE sensor; Outdoor heat exchanger temperature	All OFF	Flashes after error is detected 8 times*.	 Check installation conditions such as packed valve opening, refrigerant amount and power supply (rate ±10%, both of operation and non operation condition). (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.) Observe any possibility cause which may affect operation load of compressor. Operate again. If compressor operation is failure when 20 seconds passed (count time from operation starting of compressor), replace compressor. Check sensors, TE, TS connection. In case of sensors and it's connection is normal, check the inverter P.C. board. Check 4way valve operation/position. In case TE, TS detected temperature relationship are different from normal operation, "1C" might be detected.
	After re-st When erro	tarting opera or count con	is detected, error is count as 1 timestion within 6 minutes, if same error errors 4, 8, 11 or 18 times, record errors air conditioner can operate more to the error 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.	or is detected, e	rror count is add (co	re-started. punt become 2 times) ting operation, if no

Block distinction			Operation of diagno			
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	Action and Judgment
	The others (including compressor)		Compressor does not rotate. Because of missed wiring, missed phase or shortage.	All OFF	Flashes after error is detected 8 times*.	 Remove connecting lead wire of the compressor, and operate again. If outdoor fan does not operate or operation but stop after some period, replace the inverter P.C. board. If outdoor fan operates normally, measure 3-Phase output of inverter P.C. board (150-270VAC) at the connecting lead wire of compressor. If 3-Phase output is abnormal, replace inverter P.C.Board. If 3-Phase output is normal, measure resistance of compressor winding. If winding is shortage, replace the compressor.
		E	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.
		#F	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.

Block distinction			Operation of diagnos			
Check code	I Block I		Cause of operation	Air conditioner status	Display flashing error	Action and Judgment
	The others (including compressor)	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. TE, TC high tmperature TE for cooling operation TC for heating operation. (TE only exists in the Heat Pump system) TE or TS sensor; abnormal. Out of place, disconnection, shortage, or misconnection (TE sensor is connected to TS connector, TS sensor is connected to TE sensor connector) TE sensor; Outdoor heat exchanger temperature sensor TS 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.	 Check power supply (Rate ±10%) 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. 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. Check and clean heat exchanger area Indoor and Outdoor unit. Check sensors, TE, TS connection. In case of sensors and it's connection is normal, check the inverter P.C. board. Check 4way valve operation/position. In case TE, TS detected temperature relationship are different from normal operation, "21" might be detected.
	After r	re-starting of When error	·	ne error is dete	ected, error count in the check code. But a	is add (count become 2 fter re-starting operation,

11-5. Judgment of Trouble by Symptom

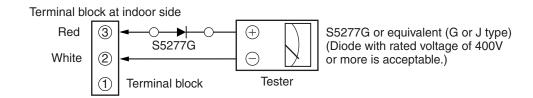
11-5-1. Wiring Failure (Interconnecting and Serial Signal Wire)

(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.



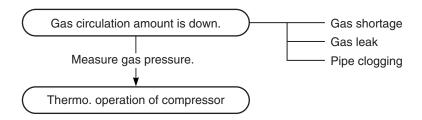
Normal time : Voltage swings between DC15 and 60V.Inverter Assembly check

Abnormal time: Voltage does not vary.

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

<Check procedure> Select phenomena described below.

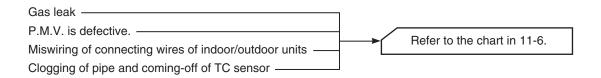
1) The outdoor unit stops 10 to 20 minutes after operation started, and 10 minutes or more are required to restart the unit.



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

To item of Outdoor unit does not operate.

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 (SWO1, O2) on the outdoor P.C. board (Display PCB).

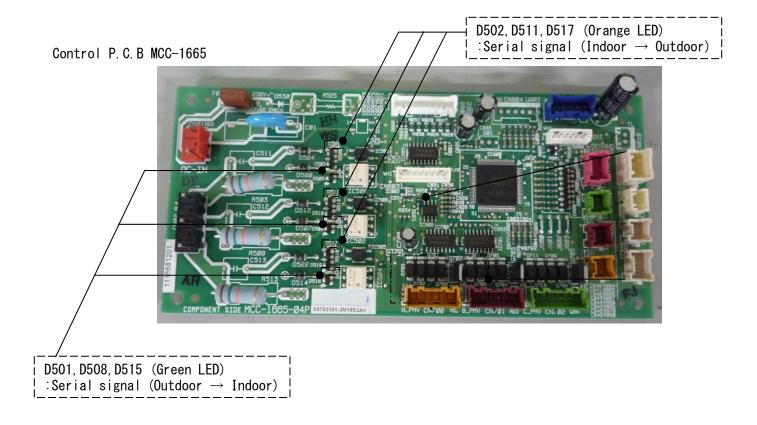
Operation part and Display part on MCC-1646 (Display PCB)

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.
D801 to D804	Yellow LED	(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 P.69) (3) Specific operation display When SW01 or SW02 is pushed and a specific operation is operated, some LEDs go on or flash.

Display part on MCC-1665 (Control PCB)

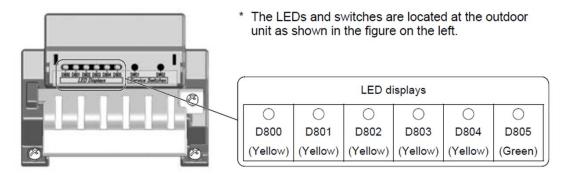
Part No.	Specifications	Operation contents
D502, D511, D517	Orange LED	Indoor/Outdoor communication (Serial communication) signal display (Receive signal from indoor signal)
D501, D508, D515	Green LED	Indoor/Outdoor communication (Serial communication) signal display (Send signal from outdoor signal)

^{*} Every LED is colorless when it goes off.



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	D801	D802	D803	D804	D805
(Yellow)	(Yellow)	(Yellow)	(Yellow)	(Yellow)	(Green)
•	•	•	•	•	0
				С	:ON ●:OFF

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

O:ON O*:3 sec ON/0.5 sec OFF ●:OFF

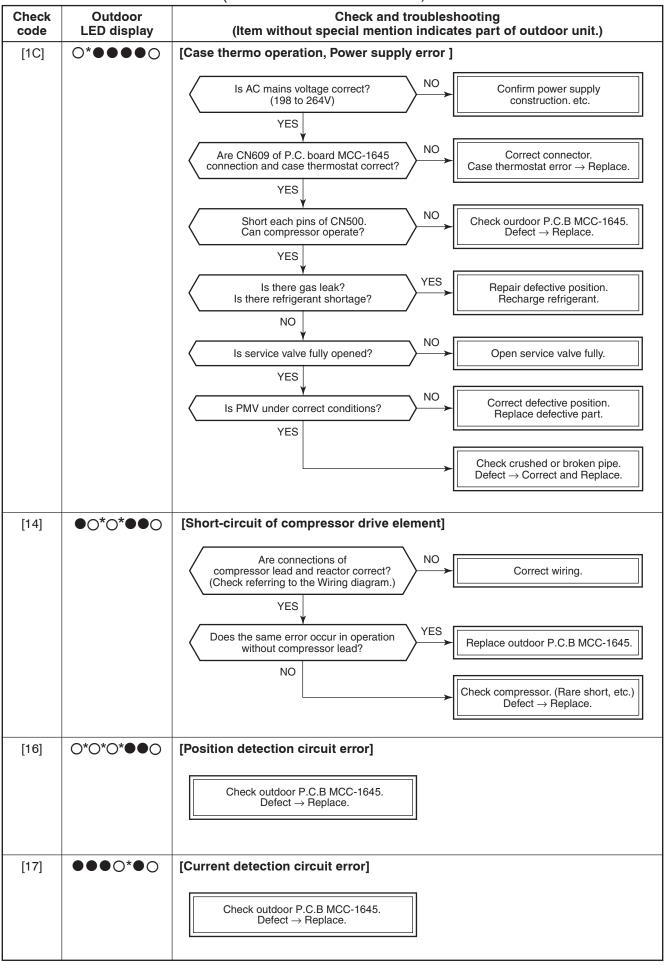
- 2. If there is an error, Yellow LED are lighted according to the error as described in the below table.
- 3. When there are two or more errors, LEDs flash cyclically.
- 4. When D804 or D805 are flashing (rapid or slow), push and hold SW01 and SW02 simultaneously for 5 seconds or more. (Display returns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

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

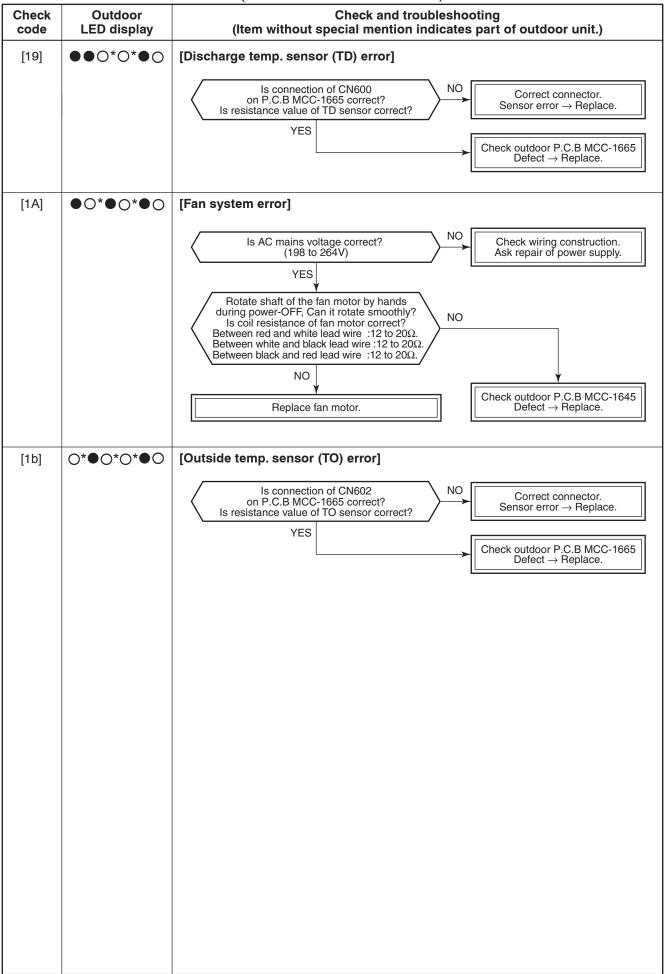
							©:Ra	pid Flashing(5 times/sec) ◇:Slow Flashing(1 time/sec
Display							Indoor	Description
D80	0 D80	1	D802	D803	D804	D805	check code	
(YL) (YL		(YL)	(YL)	(YL)	(GN)		
•	•		•	•	•		-	Normal operation (no error)
0*	•		•	•	•		1C	Compressor case thermostat error
•	0*		•	•	•		21	High pressure switch error
0*	* 0*		•	•	•		1C	Compressor system error
•	•		0*	•	•		1d	Compressor lock
0*	•		0*	•	•		1F	Compressor breakdown
•	0*		0*	•	•		14	Driving element short circuit
0*	* 0*		0*	•	•		16	Position detection circuit error
•	•		•	0*	•		17	Current detection circuit error
0*	•		•	0*	•		1C	Communication error between MCU
•	0*		•	0*	•		1A	Fan system error
0*	* 0*		•	O*	•		1E	Discharge temperature error
•	•		0*	0*	•	0	19	Discharge temperature sensor (TD) error
0*	•		0*	0*	•		1b	Outdoor air temperature sensor (TO) error
•	•		•	•	0*		1C	Gas pipe (unit A) temperature sensor (TGa) error
0*	•		•	•	0*		1C	Gas pipe (unit B) temperature sensor (TGb) error
•	0*		•	•	O*		1C	Gas pipe (unit C) temperature sensor (TGc) error
0*	•		O*	•	O*		1	PMV error (SH≥20)
•	0*		0*	•	0*		-	PMV error (SH≤-8)
•	•	I	•	0*	0*		20	PMV leakage error (unit A)
0*	•		•	0*	0*		20	PMV leakage error (unit B)
•	0*		•	0*	0*		20	PMV leakage error (unit C)
0*	•	T	O*	0*	0*		-	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.

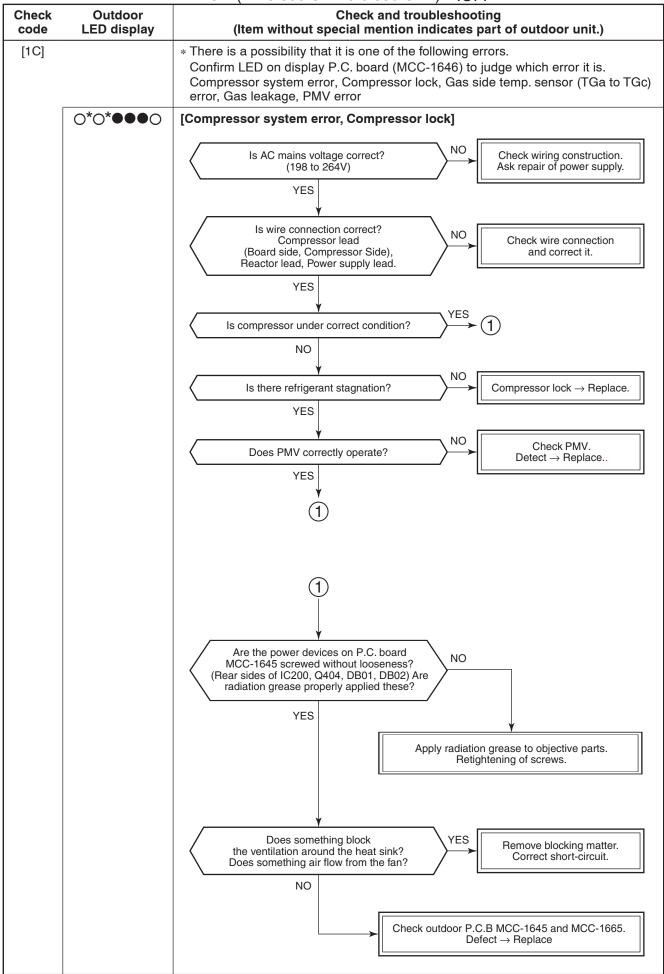
O:ON (O*:3 sec ON / 0.5 sec OFF) ●:OFF



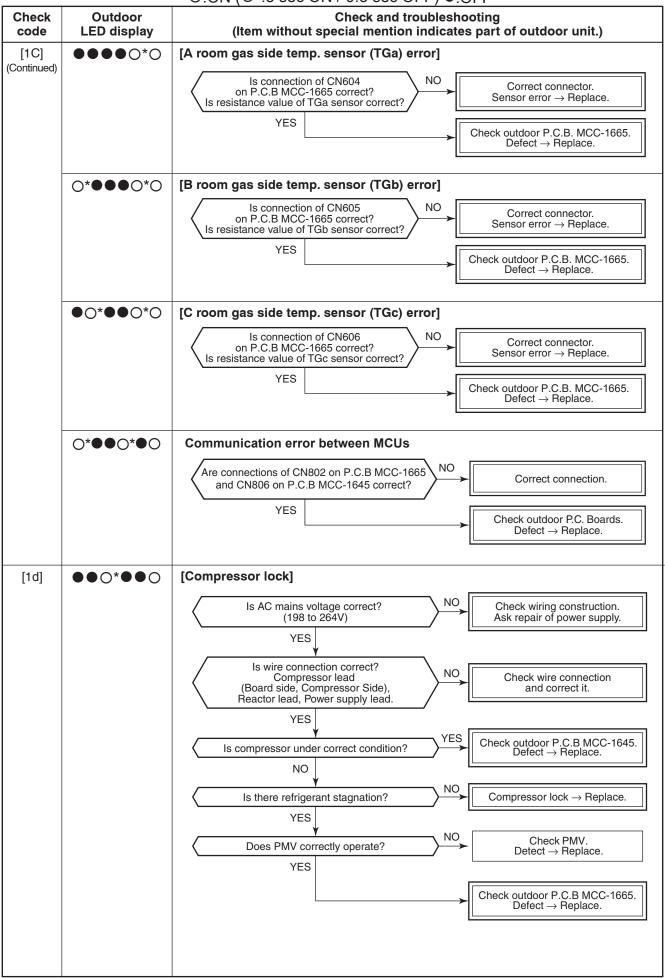
O:ON (O*:3 sec ON / 0.5 sec OFF) ●:OFF



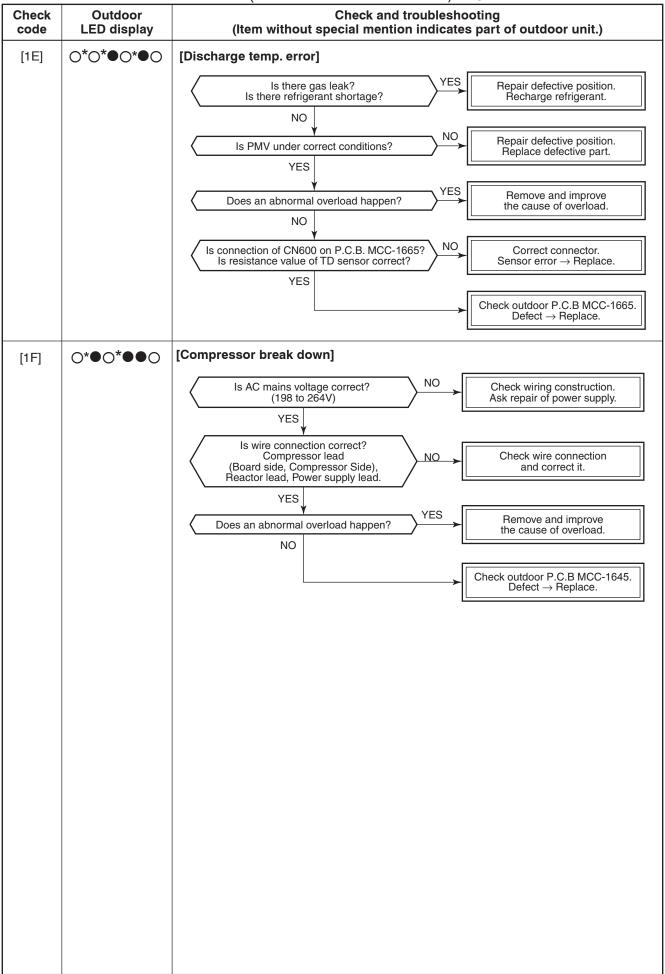
O:ON (O*:3 sec ON / 0.5 sec OFF) ●:OFF



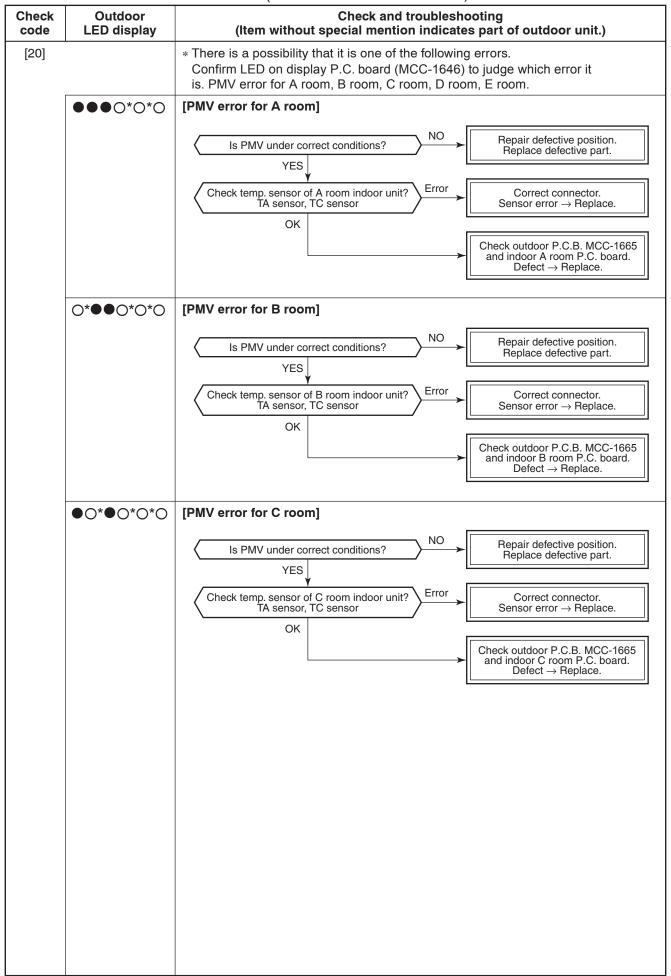
O:ON (O*:3 sec ON / 0.5 sec OFF) ●:OFF

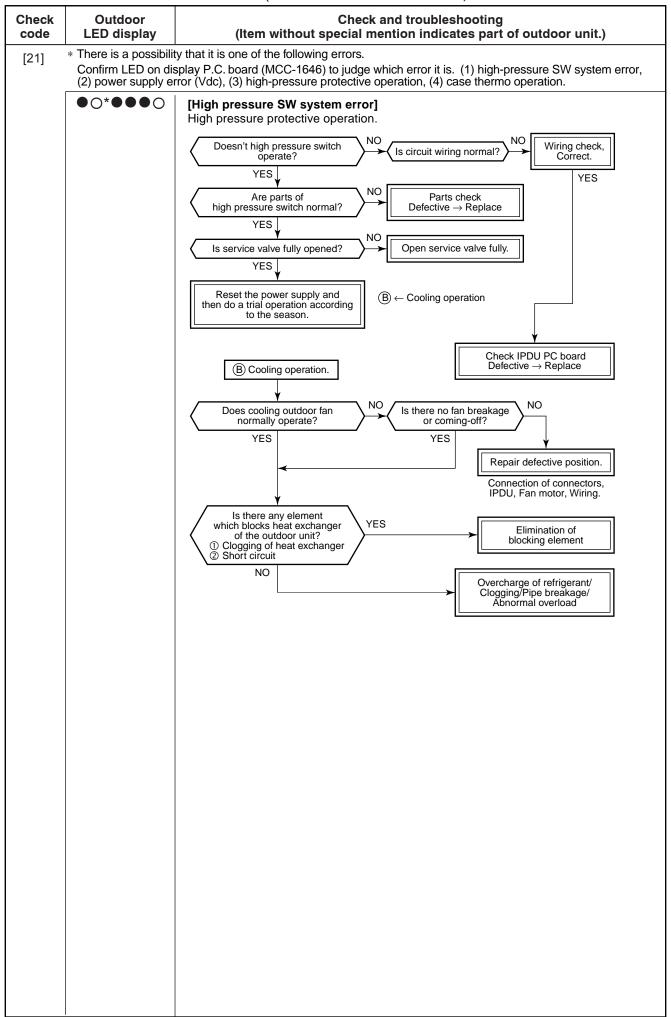


O:ON (O*:3 sec ON / 0.5 sec OFF) ●:OFF



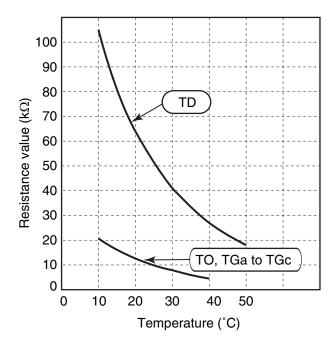
O:ON (O*:3 sec ON / 0.5 sec OFF) ●:OFF





11-7. Inspection of the Main Parts

[1] Sensor characteristic table



TD : Discharge temp. sensor
TO : Outdoor temp. sensor
TGa to TGc : Gas side temp. sensor

11-8. Outdoor Unit

No.	Part name	Checking procedure							
1	Compressor	Measure the resistance value of each winding by using the tester.							
	2M21, 3M41 : DX136A1T-40N	36A1T-40N		The Rosis		Position Resistance value			
	3M31 : DX151A1T-30N		Position		X136A1T-	40N	DX151A	1T-30N	
		(coo lee)	Red - White White - Black	_	1.31Ω		1.1	Ω	
		White Black	Black - Red	d					
								at 20°C	
2	Outdoor fan motor	nce value o	of wind	ling by u	sing th	e tester.			
	(Model : ICF-340-A70-1)	Red		Р	osition	R	esistance	value	
				Re	d - White)			
		(60 (600)		Whi	ite - Blac	k	18.80 ±	2Ω	
		White		Bla	ick - Red	l			
		Writte						at 20°C	
3	Compressor thermo. Bimetal type (Model : CS-12AL)	Check conduction b	y using the	tester					
4	High pressure switch (Model : ACB-1UB177W)	Check conduction b	y using the	tester					
5	Outdoor temperature sensor (TO), pipe temperature sensor (TGa, TGb, TGc),	Disconnect the conn (Normal temperatur		neasur	e resista	nce val	ue with th	e tester.	
	discharge temperature sensor (TD).	Tem Sensor	perature .	10°C	20°C	25°C	40°C	50°C	
		TD (kΩ)		105	64	51	27	18	
		TO (kΩ)		20.6	12.6	10.0	5.1	3.4	
		TGa to TGc	(kΩ)	20.0	12.5	10.0	5.3	3.6	

11-9. 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.

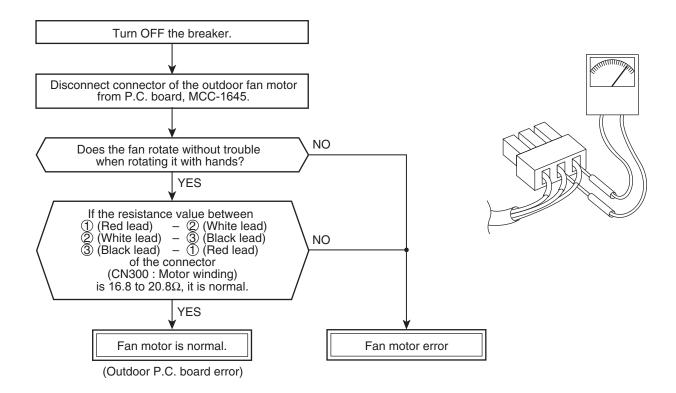
Remote controller check code "02: Outdoor block, 1A: Outdoor fan drive system error"

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.

12. HOW TO REPLACE THE MAIN PARTS

12-1. 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.	Upper cabinet Water proof cover
	 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. (ST1TØ4×10L 5pcs.) 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 terminal cover. (ST1TØ4×10L 2pcs.) 5) Remove the cord clamp. (ST2TØ4×10L 2pcs.) 6) Remove the power supply cord and the indoor/outdoor connecting cable from terminal. 	Valve cover Terminal cover
	 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 terminal cover. (ST1TØ4×10L 2pcs.) 4) Attach the water-proof cover. NOTE)	This part of water-proof cover bend and put into cabinet
	The water-proof cover must be attached without fail in order to prevent rain water, etc. from entering inside the out door unit.	This part of water-proof cover cover cabinet How to mount the water-proof cover
	 5) Attach the upper cabinet. (ST1TØ4×10L 5pcs.) 6) Attach the valve cover. (ST1TØ4×10L 5pcs.) 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. (ST1TØ4×10L 2pcs.: fix to motor base) (ST1TØ4×10L 1pc.: fix to inverter cover) (ST1TØ4×10L 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. 	Front cabinet (right)
		 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. 	Square hole Craw Square hole Craw

Remarks Part name Procedure 1) Perform works 1 of (1) and (2). Inverter assembly 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 2pcs.: fix to motor base) (ST1TØ $4\times10L$ 1pc. : fix to partition) 3) Remove the cover under inverter box. (ST1TØ4×10L 1pc.) Cover under inverter box 4) Disconnect the leads connected to the other parts from the inverter assembly. • Lead connected to compressor (3P: white) • Lead connected to reactor (2P×2 : white) 5) Cut the banding band (3pcs.) 6) Remove the black color lead wire. $(ST2TØ4 \times 8L 1pc.)$ 7) Remove the duct cover of inverter box. (ST1TØ4×10L 2pcs.) Band 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 Inverter cover Black color lead wire Duct cover Inverter box

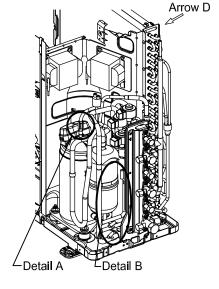
No Part name	Procedure	Pomarks
No. Part name (3) Inverter assembly (continued)	Procedure 10) Disconnect the leads connected to the other parts from the P.C. assembly. NOTE) These connectors have the lock. The lock must be released before they are disconnected. Main P.C. board CN300: Outdoor fan motor (3P: white) CN500: Thermostat for compressor (2P: blue) CN501: High pressure switch (3P: green) Control P.C. board CN01: AC-IN (2P: Red) CN02: Serial communication (3P: Black) CN600: TD sensor (3P: white) CN604: TGa sensor (2P: white) CN605: TGb sensor (2P: yellow) CN606: TGc sensor (2P: green) CN700: PMV A (6P: yellow) CN701: PMV B (6P: red) CN702: PMV C (6P: green) CN805: Display P.C. board (10P: white)	CN806 CN300 CN501 CN704 CN500 Main P.C. board CN609 CN603 CN602 CN601 CN600 CN606 CN605 CN604 CN702 CN701 CN700 CN700 CN700 CN700 CN700 CN701 CN700 CN700
	Connected connector of main and control CN806 and CN802 (5P: blue) 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.	Heatsink

No.	Part name	Procedure	Remarks
4	Side cabinet	1.Side cabinet (right)	1 1
		1) Perform works 1 of ① and ②. 2) Remove screws. (ST1TØ4×10L 2pcs.: fix to inverter assembly) (ST1TØ4×10L 4pcs.: fix to valve plate) (ST1TØ4×10L 2pcs.: fix to base plate)	
		2.Side cabinet (left)	
		 Perform works 1 of ① and ②. Remove screws. 	Α
		(ST1TØ4×10L 2 pc s .: fix to heat exchanger) (ST1TØ4×10L 1 pc.: fix to base plate)	B
	De	etail A Detail B	Detail C
5	Fan motor	 Perform works 1 of ① and ②. Remove the flange nut and the propeller fan. Flange nut is loosened by turning clockwise. (To tighten the flange nut, turn counterclockwise.) Disconnect the connector of fan motor from the inverter. Remove screws. (ST2TØ4×20L 4pcs.) Hold by hands so that the motor does not fall. Precautions when assembling the propeller fan. Tighten the flange nut using a tightening torque of 4.9 N•m. 	Propeller fan Fan motor Flange nut

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

No.	Part name	Procedure	Remarks
	PMV coil	1. Detachment	,
		 Perform step 1 in ②, all the steps in ③ and 1 in ④. Turn the coil by 180 degrees then remove by pull it upward. 	
		Insert the coil at position which perpendicular with pipe of PMV then turn the coil by 180 degrees.	Rotate 180°
		Make sure that lead wire of coil is opposite with pipe of PMV	BODY-PMV
			COIL-PMV
9	Fan guard	1.Detachment	
	G	 Perform works ① and ②. Remove the front cabinet, and put it down so that fan guard side directs downward. 	Minus screwdriver Hooking claw
		Perform work on a corrugated cardboard, cloth, etc. to prevent flaw to the product.	
		 Remove the hooking claws by pushing minus screwdriver according to the arrow mark in the right figure, and remove the fan guard. 	
		2. Attachment1) 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.	

No. Part name Procedure 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. TO sensor (Outside air temperature sensor) • Attachment Insert the outdoor air temperature sensor into the holder, and install the holder onto the heat exchanger.

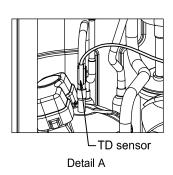


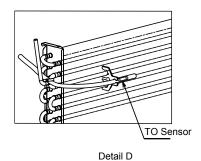
Remarks

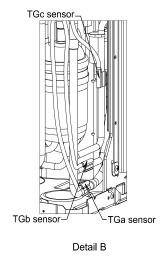
(12) TGa/TGb/TGc sensor (Gas side pipe temperature sensor)

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, and TGc is green.







^

CAUTION

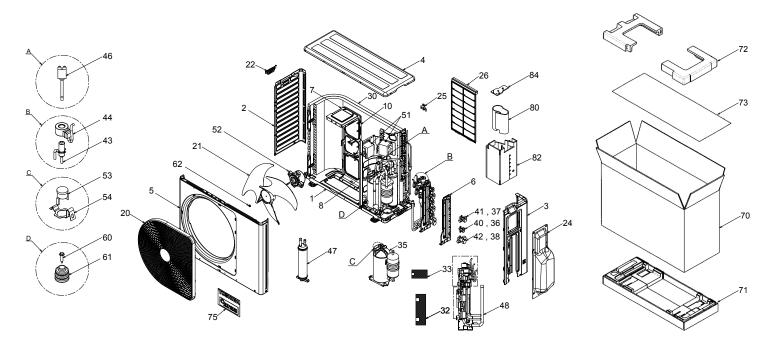
During the installation work (and on its completion), take care not to damage the coverings of the sensor leads on the edges of the metal plates or other parts. It is dangerous for these coverings to be damaged since damage may cause electric shocks and/or a fire.

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.

Nο	Part name	Procedure	Remarks
	Part name High pressure switch	Procedure 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, 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.	Remarks Sound - insulation material Sound - insulation material
		Adjust the temperature of the hight pressure switch to below 100°C during the brazing. Use the wet towel for cooling. Use the protective plate for the brazing.	Protective plate High pressure switch Wet towel
14)	Plate Fix Packed-Valve & Body-PMV	1) Perform works from ① to ⑤. 2) Recover the refrigerant gas from the outdoor unit. 3) Remove screw 2pcs. (ST1TØ4×10L) from Plate fix Packed-Valve 4) Remove Plate fix Packed-Valve by brazing 2 points. • Take care to keep the PMV, coil-PMV, and Packed-Valve away naked flames. Brazing 2 points	Screw

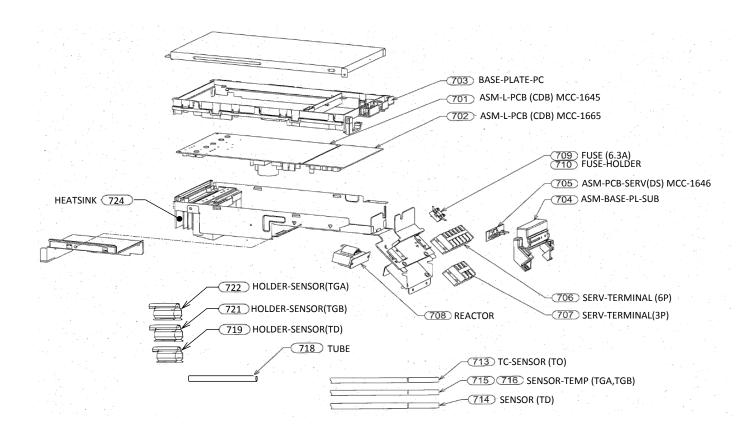
13. EXPLODED VIEWS AND PARTS LIST

13-1. Outdoor Unit



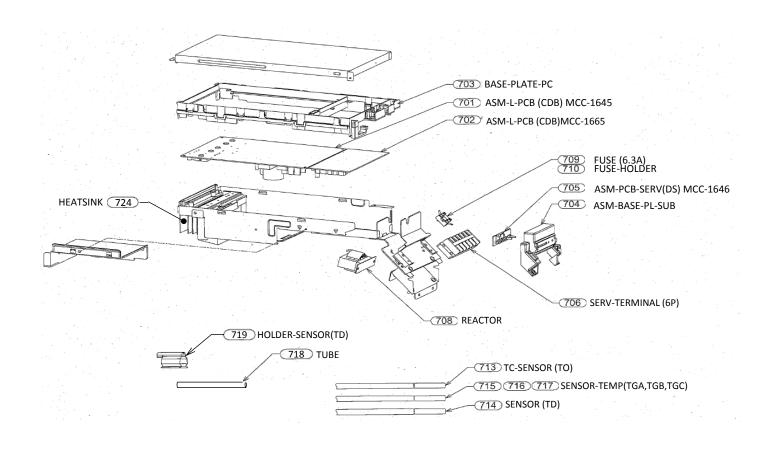
Location	Part		Location	Part	
No.	No.	Description	No.	No.	Description
1	43T42345	BASE PLATE ASSEMBLY	40	43T46358	VALVE;PACKED 6.35 DIA
2	43T00676	LEFT CABINET	41	43T46366	VALVE;PACKED 9.52 DIA
3	43T00674	RIGHT SIDE CABINET ASSEMBLY	42	43T46374	VALVE;PACKED 12.7 DIA
4	43T00561	UPPER CABINET			(FOR RAS-3M31,3M41U2ACVG-SG)
5	43T00750	FRONT CABINET ASSEMBLY	43	43T46469	BODY PMV
6	43T02304	FIXING PLATE VALVE ASSEMBLY	44	43T63360	COIL PMV
7	43T39363	MOTOR BASE CONNECTION PLATE	46	43T63375	SWITCH, PRESSURE
8	43T04343	PARTITION ASSEMBLY	47	43T48323	ACCUMULATOR ASSEMBLY
10	43T39374	MOTOR BASE			(FOR RAS-3M31,3M41U2ACVG-SG)
20	43T19371	FAN GUARD	48	43T45311	GENERAL ASSY PLATE FIXING
21	43T20331	PROPELLER FAN			(FOR RAS-3M41U2ACVG-SG)
22	43T19350	HANDLE	48	43T45313	GENERAL ASSY PLATE FIXING
24	43T00673	PACKED VALVE COVER ASSEMBLY			(FOR RAS-2M21U2ACVG-SG)
25	43T63376	HOLDER, SENSOR	48	43T45314	GENERAL ASSY PLATE FIXING
26	43T19351	FIN GUARD			(FOR RAS-3M31U2ACVG-SG)
30	43T43583	CONDENSER ASSEMBLY	51	43T58327	REACTOR
		(FOR RAS-2M21,3M31U2ACVG-SG)	52	4302C103	MOTOR-FAN
30	43T43607	CONDENSER ASSEMBLY	53	43T54319	BIMETAL-THERMO
		(FOR RAS-3M41U2ACVG-SG)	54	43T50307	HOLDER-THERMO
32	43T49379	BUTYL-RUBBER	60	43T97001	NUT
33	43T49380	BUTYL RUBBER	61	43T49335	RUBBER CUSHION
		(FOR RAS-3M41U2ACVG-SG)	62	43T47001	NUT FLANGE
33	43T49386	BUTYL RUBBER	70	43T91336	CARTON-BOX
		(FOR RAS-2M21,3M31U2ACVG-SG)	71	43T91348	FIBERBOARD UNDER ASSEMBLY
35	43T41523	COMPRESSOR	72	43T91337	CUSHION PACKING UPPER
		(FOR RAS-3M31U2ACVG-SG)	73	43T91301	PE SHEET
35	43T41534	COMPRESSOR	75	43T85591	MARK-T
		(FOR RAS-2M21,3M41U2ACVG-SG)	80	43T04413	SOUND INSULATION(IS)
36	43T47403	BONNET, 6.35 DIA	82	43T04418	SOUND INSULATION(OS)
37	43T47404	BONNET, 9.52 DIA	84	43T04358	SOUND INSULATION(UP)
38	43T47405	BONNET, 12.7 DIA			
		(FOR RAS-3M31,3M41U2ACVG-SG)			
					<u> </u>

13-2. Inverter Assembly RAS-2M21U2ACVG-SG, RAS-3M31U2ACVG-SG



Location	Part	Description	Location	Part	Description
No.	No.	Description	No.	No.	Description
701	43T6W416	ASM-L-PCB (FOR RAS-3M31U2ACVG-SG)	709	43T60426	FUSE
701	43T6W417	ASM-L-PCB (FOR RAS-2M21U2ACVG-SG)	710	43T60425	FUSE HOLDER
702	43T6W418	PCB BOARD ASSY	713	43T50360	TC-SENSOR(TO)
		(FOR RAS-3M31U2ACVG-SG)	714	43T50334	TEMPERATURE SENSOR
702	43T6W419	PCB BOARD ASSY	715	43T50361	SENSOR-TEMP
		(FOR RAS-2M21U2ACVG-SG)	716	43T50362	SENSOR-TEMP
703	43T61325	BASE,PC BORAD	717	43T50363	SENSOR-TEMP
704	43T61320	BASE, PC BOARD			(FOR RAS-3M31U2ACVG-SG)
705	43T6V418	PC BOARD ASSY	718	43T62377	TUBE
706	43T60423	SERV-TERMINAL	719	43T63317	HOLDER,SENSOR
707	43T60427	TERMINAL BLOCK	721	43T63316	HOLDER,SENSOR
		(FOR RAS-2M21U2ACVG-SG)	722	43T63323	HOLDER,SENSOR
708	43T58326	REACTOR,CH-76	724	43T62371	HEAT-SINK

RAS-3M41U2ACVG-SG



Location	Part	Description	Location	Part	Description
No.	No.	Description	No.	No.	Description
701	43T6W473	ASM-L-PCB	713	43T50360	TC-SENSOR(TO)
702	43T6W474	PCB BOARD ASSY	714	43T50334	TEMPERATURE SENSOR
703	43T61325	BASE,PC BORAD	715	43T50361	SENSOR-TEMP
704	43T61320	BASE, PC BOARD	716	43T50362	SENSOR-TEMP
705	43T6V418	PC BOARD ASSY	717	43T50363	SENSOR-TEMP
706	43T60423	SERV-TERMINAL	718	43T62377	TUBE
708	43T58326	REACTOR,CH-76	719	43T63317	HOLDER,SENSOR
709	43T60426	FUSE	724	43T62371	HEAT-SINK
710	43T60425	FUSE HOLDER			

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