FILE NO. SVM-24058

TOSHIBA

Carrier

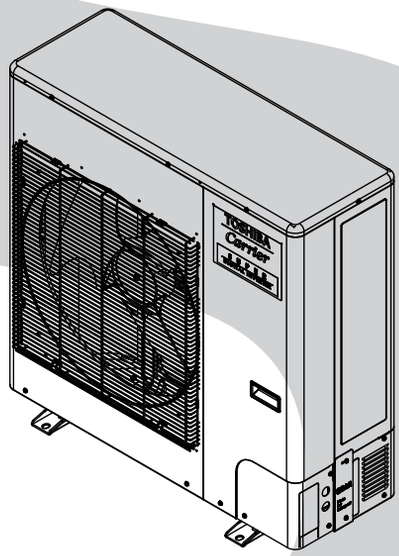
SERVICE MANUAL

AIR-CONDITIONER

(SPLIT TYPE)

OUTDOOR UNIT
<SUPER DIGITAL INVERTER>

RAV-BP241AT2P-UL



R454B

Puron ADVANCE™

November, 2024

Adoption of R454B Refrigerant

This Air Conditioner is a new type which adopts a new refrigerant HFC (R454B) instead of the conventional in order to prevent destruction of the ozone layer.

CONTENTS

SAFETY CAUTION

Please read carefully through these instructions that contain important information and ensure that you understand them.

Generic Denomination: Air Conditioner

Definition of Qualified Installer or Qualified Service Person

The air conditioner must be installed, maintained, repaired and removed by a qualified installer or qualified service person.

When any of these jobs is to be done, ask a qualified installer or qualified service person to do them for you.

A qualified installer or qualified service person is an agent who has the qualifications and knowledge described in the table below.

Agent	Qualifications and knowledge which the agent must have
Qualified installer (∗1)	• The qualified installer is a person who installs, maintains, relocates and removes the air conditioners. He or she has been trained to install, maintain, relocate and remove the air conditioners he or she has been instructed in such operations by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to these operations. • The qualified installer who is allowed to do the electrical work involved in installation, relocation and removal has the qualifications pertaining to this electrical work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to electrical work on the air conditioners he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified installer who is allowed to do the refrigerant handling and piping work involved in installation, relocation and removal has the qualifications pertaining to this refrigerant handling and piping work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to refrigerant handling and piping work on the air conditioners he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified installer who is allowed to work at heights has been trained in matters relating to working at heights with the air conditioners he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work.
Qualified service person (∗1)	• The qualified service person is a person who installs, repairs, maintains, relocates and removes the air conditioners. He or she has been trained to install, repair, maintain, relocate and remove the air conditioners he or she has been instructed in such operations by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to these operations. • The qualified service person who is allowed to do the electrical work involved in installation, repair, relocation and removal has the qualifications pertaining to this electrical work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to electrical work on the air conditioners he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified service person who is allowed to do the refrigerant handling and piping work involved in installation, repair, relocation and removal has the qualifications pertaining to this refrigerant handling and piping work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to refrigerant handling and piping work on the air conditioners he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified service person who is allowed to work at heights has been trained in matters relating to working at heights with the air conditioners he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work.

Definition of Protective Gear

When the air conditioner is to be transported, installed, maintained, repaired or removed, wear protective gloves and “safety” work clothing.

In addition to such normal protective gear, wear the protective gear described below when undertaking the special work detailed in the table below.

Failure to wear the proper protective gear is dangerous because you will be more susceptible to injury, burns, electric shocks and other injuries.

Work undertaken	Protective gear worn
All types of work	Protective gloves “Safety” working clothing
Electrical-related work	Gloves to provide protection for electricians Insulating shoes Clothing to provide protection from electric shock
Work done at heights (1'7"(50cm) or more)	Helmets for use in industry
Transportation of heavy objects	Shoes with additional protective toe cap
Repair of outdoor unit	Gloves to provide protection for electricians

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

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

[Explanation of indications]

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

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

[Explanation of illustrated marks]

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

Warning Indications on the Air Conditioner Unit

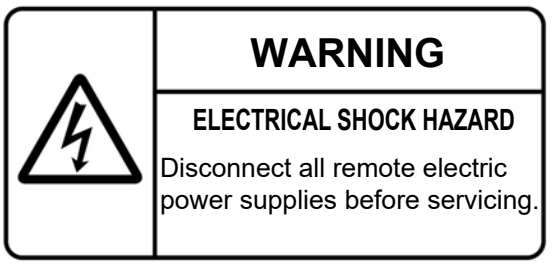
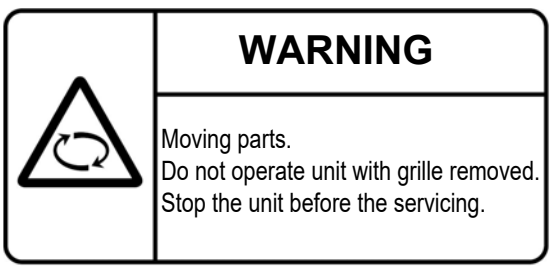
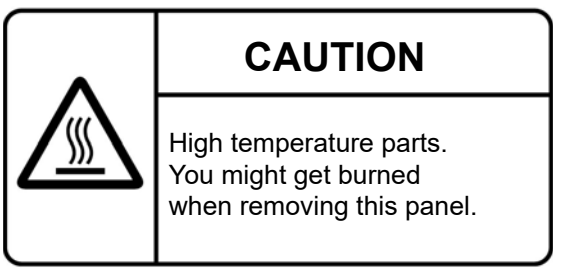
[Confirmation of warning label on the main unit]

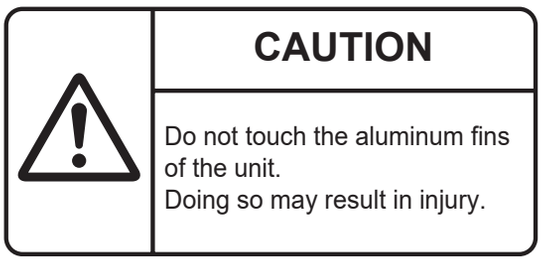
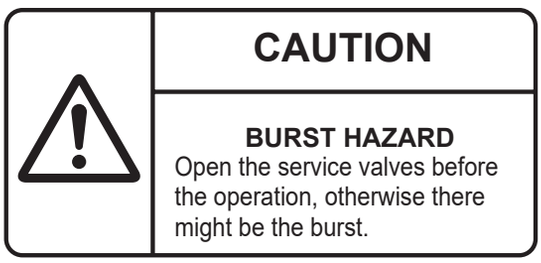
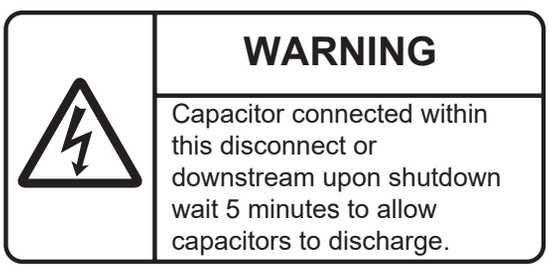
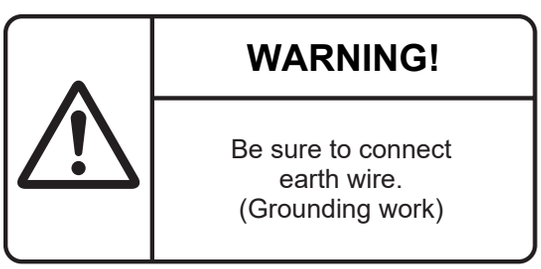
Confirm that labels are indicated on the specified positions

If removing the label during parts replace, stick it as the original.

MEANINGS OF SYMBOLS DISPLAYED ON THE UNIT

	**WARNING (Risk of fire)**	This mark is for R454B refrigerant only. Refrigerant type is written on nameplate of outdoor unit. In case that refrigerant type is R454B, 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 OWNER'S MANUAL carefully before operation.	
	Service personnel are required to carefully read the OWNER'S MANUAL and INSTALLATION MANUAL before operation.	
	Further information is available in the OWNER'S MANUAL, INSTALLATION MANUAL, and the like.	

Warning indication	Description
	**WARNING** **ELECTRICAL SHOCK HAZARD** Disconnect all remote electric power supplies before servicing.
	**WARNING** Moving parts. Do not operate unit with grille removed. Stop the unit before the servicing.
	**CAUTION** High temperature parts. You might get burned when removing this panel.

	**CAUTION** Do not touch the aluminum fins of the unit. Doing so may result in injury.
	**CAUTION** **BURST HAZARD** Open the service valves before the operation, otherwise there might be the burst.
	**WARNING** Open the service valves before the operation, otherwise there might be the burst.
	**WARNING** Be sure to connect earth wire. (Grounding work) Incomplete grounding causes an electric shock.

Precaution for Safety

The manufacturer shall not assume any liability for the damage caused by not observing the description of this manual.

⚠ DANGER

 Turn off breaker.	Before carrying out the installation, maintenance, repair or removal work, be sure to set the circuit breaker to the OFF position. Otherwise, electric shocks may result.
	Before opening the intake grille of the indoor unit or service panel or valve cover of the outdoor unit, set the circuit breaker to the OFF position. Failure to set the circuit breaker to the OFF position may result in electric shocks through contact with the interior parts. Only a qualified installer (∗1) or qualified service person (∗1) is allowed to remove the intake grille of the indoor unit or service panel of the outdoor unit and do the work required.
	Before starting to repair the outdoor unit fan or fan guard, be absolutely sure to set the circuit breaker to the OFF position, and place a “Work in progress” sign on the circuit breaker before proceeding with the work.
	When cleaning the filter or other parts of the indoor unit, set the circuit breaker to OFF without fail, and place a “Work in progress” sign near the circuit breaker before proceeding with the work.
 Electric shock hazard	When you access inside of the service panel to repair electric parts, wait for about five minutes after turning off the breaker. Do not start repairing immediately. Otherwise you may get electric shock by touching terminals of high-voltage capacitors. Natural discharge of the capacitor takes about five minutes.
	Before operating the air conditioner after having completed the work, check that the electrical parts box cover of the indoor unit and service panel or 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.
 Execute discharge between terminals.	Even if the circuit breaker has been set to the OFF position before the service panel is removed and the electrical parts are repaired, you will still risk receiving an electric shock. For this reason, short-circuit the high-voltage capacitor terminals to discharge the voltage before proceeding with the repair work. For details on the short-circuiting procedure, refer to the Service Manual. You may receive an electric shock if the voltage stored in the capacitors has not been sufficiently discharged.
 Prohibition	Place a “Work in progress” sign near the circuit breaker while the installation, maintenance, repair or removal work is being carried out. There is a danger of electric shocks if the circuit breaker is set to ON by mistake.
	When checking the electric parts, removing the cover of the electric parts box of Indoor Unit and/or front panel of Outdoor Unit inevitably to determine the failure, put a sign “Do not enter” around the site before the work. Failure to do this may result in third person getting electric shock.
 Stay on protection	If, in the course of carrying out repairs, it becomes absolutely necessary to check out the electrical parts with the electrical parts box cover of one or more of the indoor units and the service panel of the outdoor unit removed in order to find out exactly where the trouble lies, wear insulated heat-resistant gloves, insulated boots and insulated work overalls, and take care to avoid touching any live parts. You may receive an electric shock if you fail to heed this warning. Only qualified service person (∗1) is allowed to do this kind of work.

⚠ WARNING

 General	Before starting to repair the air conditioner, read carefully through the Service Manual, and repair the air conditioner by following its instructions.
	Only qualified service person (∗1) is allowed to repair the air conditioner. Repair of the air conditioner by unqualified person may give rise to a fire, electric shocks, injury, water leaks and/or other problems.
	Only a qualified installer (∗1) or qualified service person (∗1) is allowed to carry out the electrical work of the air conditioner. Under no circumstances must this work be done by an unqualified individual since failure to carry out the work properly may result in electric shocks and/or electrical leaks.
	Wear protective gloves and safety work clothing during installation, servicing and removal.

⚠ WARNING

General	Use wiring that meets the specifications in the Installation Manual and the stipulations in the local regulations and laws. Use of wiring which does not meet the specifications may give rise to electric shocks, electrical leakage, smoking and/or a fire.
	The appliance shall be installed in accordance with national wiring regulations. Capacity shortages of the power circuit or an incomplete installation may cause an electric shock or fire.
	Only a qualified installer (*1) or qualified service person (*1) is allowed to undertake work at heights using a stand of 50 cm or more.
	When working at heights, use a ladder which complies with the ISO 14122 standard, and follow the procedure in the ladder's instructions. Also wear a helmet for use in industry as protective gear to undertake the work.
	When working at heights, put a sign in place so that no-one will approach the work location, before proceeding with the work. Parts and other objects may fall from above, possibly injuring a person below.
	Do not touch the aluminum fin of the outdoor unit. You may injure yourself if you do so. If the fin must be touched for some reason, first put on protective gloves and safety work clothing, and then proceed.
	Do not climb onto or place objects on top of the outdoor unit. You may fall or the objects may fall off of the outdoor unit and result in injury.
	When transporting the air conditioner, wear shoes with additional protective toe caps.
	When transporting the air conditioner, do not take hold of the bands around the packing carton. You may injure yourself if the bands should break.
	When transporting the air conditioner, use a forklift and when moving the air conditioner by hand, move the unit with 2 people, or move the unit with 4 people.
	Do not customize the product. Doing so may result in electric shock or other failure.
	This air conditioner has passed the pressure test as specified in UL 60335-2-40 Annex EE.
Check earth wires.	Before troubleshooting or repair work, check the earth wire is connected to the earth terminals of the main unit, otherwise an electric shock is caused when a leak occurs. If the earth wire is not correctly connected, contact an electric engineer for rework.
	After completing the repair or relocation work, check that the ground wires are connected properly.
	Be sure to connect earth wire. (Grounding work) Incomplete grounding causes an electric shock. Do not connect ground wires to gas pipes, water pipes, and lightning rods or ground wires for telephone wires.
Prohibition of modification.	Do not modify the products. Do not also disassemble or modify the parts. It may cause a fire, electric shock or injury.
Use specified parts.	When any of the electrical parts are to be replaced, ensure that the replacement parts satisfy the specifications given in the Service Manual (or use the parts contained on the parts list in the Service Manual). Use of any parts which do not satisfy the required specifications may give rise to electric shocks, smoking and/or a fire.
Do not bring a child close to the equipment.	If, in the course of carrying out repairs, it becomes absolutely necessary to check out the electrical parts with the electrical parts box cover of one or more of the indoor units and the service panel of the outdoor unit removed in order to find out exactly where the trouble lies, place "Keep out" signs around the work site before proceeding. Third-party individuals may enter the work site and receive electric shocks if this warning is not heeded.
Insulating measures	Connect the cut-off lead wires with crimp contact, etc, put the closed end side upward and then apply a water-cut method, otherwise a leak or production of fire is caused at the users' side.
No fire	When performing repairs using a gas burner, replace the refrigerant with nitrogen gas because the oil that coats the pipes may otherwise burn.
	When repairing the refrigerating cycle, take the following measures. 1)Be attentive to fire around the cycle. When using a gas stove, etc, be sure to put out fire before work; otherwise the oil mixed with refrigerant gas may catch fire. 2)Do not use a welder in the closed room. When using it without ventilation, carbon monoxide poisoning may be caused. 3)Do not bring inflammables close to the refrigerant cycle, otherwise fire of the welder may catch the inflammables.

Refrigerant	The refrigerant used by this air conditioner is the R454B.
	Check the used refrigerant name and use tools and materials of the parts which match with it. For the products which use R454B refrigerant, the refrigerant name is indicated at a position on the outdoor unit where is easy to see.
	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.
	For an air conditioner which uses R454B, never use other refrigerant than R454B. If different types of refrigerant are mixed, abnormal high pressure generates in the refrigerating cycle and an injury due to breakage may be caused.
	Do not charge refrigerant additionally. If charging refrigerant additionally when refrigerant gas leaks, the refrigerant composition in the refrigerating cycle changes resulted in change of air conditioner characteristics or refrigerant over the specified standard amount is charged and an abnormal high pressure is applied to the inside of the refrigerating cycle resulted in cause of breakage or injury. Therefore if the refrigerant gas leaks, recover the refrigerant in the air conditioner, execute vacuuming, and then newly recharge the specified amount of liquid refrigerant. In this time, never charge the refrigerant over the specified amount.
	When recharging the refrigerant in the refrigerating cycle, do not mix the refrigerant or air other than R454B into the specified refrigerant. If air or others is mixed with the refrigerant, abnormal high pressure generates in the refrigerating cycle resulted in cause of injury due to breakage.
	After the installation work, confirm that refrigerant gas does not leak. If refrigerant gas leaks into the room and flows near a fire source, such as a cooking range, noxious gas may be generated.
	Never recover the refrigerant into the outdoor unit. When the equipment is moved or repaired, be sure to recover the refrigerant with recovering device. The refrigerant cannot be recovered in the outdoor unit; otherwise a serious accident such as breakage or injury is caused.
Assembly/ Cabling	After repair work, surely assemble the disassembled parts, and connect and lead the removed wires as before. Perform the work so that the cabinet or panel does not catch the inner wires. If incorrect assembly or incorrect wire connection was done, a disaster such as a leak or fire is caused at user's side.
Insulator check	After the work has finished, be sure to use an insulation tester set (500V Megger) to check the resistance is 1MΩ or more between the charge section and the non-charge metal section (Earth position). If the resistance value is low, a disaster such as a leak or electric shock is caused at user's side.
Ventilation	When the refrigerant gas leaks during work, execute ventilation. If the refrigerant gas touches to a fire, poisonous gas generates. A case of leakage of the refrigerant and the closed room full with gas is dangerous because a shortage of oxygen occurs. Be sure to execute ventilation.
	If refrigerant gas has leaked during the installation work, ventilate the room immediately. If the leaked refrigerant gas comes in contact with fire, noxious gas may be generated.
	After the installation work, confirm that refrigerant gas does not leak. If refrigerant gas leaks into the room and flows near a fire source, such as a cooking range, noxious gas may be generated.
Compulsion	When the refrigerant gas leaks, find up the leaked position and repair it surely. If the leaked position cannot be found up and the repair work is interrupted, pump-down and tighten the service valve, otherwise the refrigerant gas may leak into the room. The poisonous gas generates when gas touches to fire such as fan heater, stove or cocking stove though the refrigerant gas itself is innocuous. When installing equipment which includes a large amount of charged refrigerant such as a multi air conditioner in a sub-room, it is necessary that the density does not the limit even if the refrigerant leaks. If the refrigerant leaks and exceeds the limit density, an accident of shortage of oxygen is caused.
	Tighten the flare nut with a torque wrench in the specified manner. Excessive tighten of the flare nut may cause a crack in the flare nut after a long period, which may result in refrigerant leakage.
	Nitrogen gas must be used for the airtight test.
	The charge hose must be connected in such a way that it is not slack.
	For the installation/moving/reinstallation work, follow to the Installation Manual. If an incorrect installation is done, a trouble of the refrigerating cycle, water leak, electric shock or fire is caused.

 Check after repair	Once the repair work has been completed, check for refrigerant leaks, and check the insulation resistance and water drainage. Then perform a trial run to check that the air conditioner is running properly.
	After repair work has finished, check there is no trouble. If check is not executed, a fire, electric shock or injury may be caused. For a check, turn off the power breaker.
	After repair work (installation of front panel and cabinet) has finished, execute a test run to check there is no generation of smoke or abnormal sound. If check is not executed, a fire or an electric shock is caused. Before test run, install the front panel and cabinet.
 Do not operate the unit with the valve closed.	Check the following matters before a test run after repairing piping. • Connect the pipes surely and there is no leak of refrigerant. • The valve is opened. Running the compressor under condition that the valve closes causes an abnormal high pressure resulted in damage of the parts of the compressor and etc. and moreover if there is leak of refrigerant at connecting section of pipes, the air is suctioned and causes further abnormal high pressure resulted in burst or injury.
 Check after reinstallation	Only a qualified installer (∗1) or qualified service person (∗1) is allowed to relocate the air conditioner. It is dangerous for the air conditioner to be relocated by an unqualified individual since a fire, electric shocks, injury, water leakage, noise and/or vibration may result.
	Check the following items after reinstallation. 1) The earth wire is correctly connected. 2) The power cord is not caught in the product. 3) There is no inclination or unsteadiness and the installation is stable. If check is not executed, a fire, an electric shock or an injury is caused.
	When carrying out the pump-down work shut down the compressor before disconnecting the refrigerant pipe. Disconnecting the refrigerant pipe with the service valve left open and the compressor still operating will cause air, etc. to be sucked in, raising the pressure inside the refrigeration cycle to an abnormally high level, and possibly resulting in reputing, injury, etc.
 Cooling check	When the service panel of the outdoor unit is to be opened in order for the compressor or the area around this part to be repaired immediately after the air conditioner has been shut down, set the circuit breaker to the OFF position, and then wait at least 10 minutes before opening the service panel. If you fail to heed this warning, you will run the risk of burning yourself because the compressor pipes and other parts will be very hot to the touch. In addition, before proceeding with the repair work, wear the heat-resistant gloves.
	When the service panel of the outdoor unit is to be opened in order for the fan motor, reactor, inverter or the areas around these parts to be repaired immediately after the air conditioner has been shut down, set the circuit breaker to the OFF position, and then wait at least 10 minutes before opening the service panel. If you fail to heed this warning, you will run the risk of burning yourself because the fan motor, reactor, inverter heat sink and other parts will be very hot to the touch. In addition, before proceeding with the repair work, wear the heat-resistant gloves.
 Installation	Only a qualified installer (∗1) or qualified service person (∗1) is allowed to install the air conditioner. If the air conditioner is installed by an unqualified individual, a fire, electric shocks, injury, water leakage, noise and/or vibration may result.
	Before starting to install the air conditioner, read carefully through the Installation Manual, and follow its instructions to install the air conditioner.
	Do not install the air conditioner in a location that may be subject to a risk of expire to a combustible gas. If a combustible gas leaks and becomes concentrated around the unit, a fire may occur.
	Install a circuit breaker that meets the specifications in the installation manual and the stipulations in the local regulations and laws.
	Install the circuit breaker where it can be easily accessed by the agent.
	Do not place any combustion appliance in a place where it is directly exposed to the wind of air conditioner, otherwise it may cause imperfect combustion.

Explanations given to user

- If you have discovered that the fan grille is damaged, do not approach the outdoor unit but set the circuit breaker to the OFF position, and contact a qualified service person to have the repairs done.
  Do not set the circuit breaker to the ON position until the repairs are completed.

Relocation

- Only a qualified installer (∗1) or qualified service person (∗1) is allowed to relocate the air conditioner.
  It is dangerous for the air conditioner to be relocated by an unqualified individual since a fire, electric shocks, injury, water leakage, noise and/or vibration may result.
- When carrying out the pump-down work shut down the compressor before disconnecting the refrigerant pipe.
  Disconnecting the refrigerant pipe with the service valve left open and the compressor still operating will cause air, etc. to be sucked in, raising the pressure inside the refrigeration cycle to an abnormally high level, and possibly resulting in reputing, injury, etc.

(∗1) Refer to the “Definition of Qualified Installer or Qualified Service Person.”

Refrigerant (R454B)

This air conditioner adopts HFC type refrigerant (R454B) which does not deplete the ozone layer.

1. Safety Caution Concerned to Refrigerant

The pressure of R454B is higher than of that of the former refrigerant (R22), (R410A).
Accompanied with change of refrigerant, the refrigerating oil has been also changed.
Therefore, be sure that water, dust, the former refrigerant or the former refrigerating oil is not mixed into the refrigerating cycle of the air conditioner with refrigerant during installation work or service work.
If an incorrect work or incorrect service is performed, there is a possibility to cause a serious accident. Use the tools and materials exclusive to R454B to purpose a safe work.

2. Cautions on Installation/Service

1) Do not mix the other refrigerant or refrigerating oil.
   For the tools exclusive to R454B, shapes of all the joints including the service port differ from those of the former refrigerant in order to prevent mixture of them.
2) As the use pressure of the refrigerant is high, use material thickness of the pipe and tools which are specified for R454B.
3) In the installation time, use clean pipe materials and work with great attention so that water and others do not mix in because pipes are affected by impurities such as water, oxide scales, oil, etc.
   Use the clean pipes.
   Be sure to brazing with flowing nitrogen gas. (Never use gas other than nitrogen gas.)
4) For the earth protection, use a vacuum pump for air purge.
5) R454B refrigerant is azeotropic mixture type refrigerant.
   Therefore use liquid type to charge the refrigerant. (If using gas for charging, composition of the refrigerant changes and then characteristics of the air conditioner change.)

3. Pipe Materials

For the refrigerant pipes, copper pipe and joints are mainly used.
It is necessary to select the most appropriate pipes to conform to the standard.
Use clean material in which impurities adhere inside of pipe or joint to a minimum.

1) Copper pipe

<Piping>
The pipe thickness, flare finishing size, flare nut and others differ according to a refrigerant type.
When using a long copper pipe for R454B, it is recommended to select “Copper or copper-base pipe without seam” and one with bonded oil amount 40mg/10m or less.
Also do not use crushed, deformed, discolored (especially inside) pipes.
(Impurities cause clogging of expansion valves and capillary tubes.)

<Flare nut>
Use the flare nuts which are attached to the air conditioner unit.

2) Joint

The flare joint and socket joint are used for joints of the copper pipe.
The joints are rarely used for installation of the air conditioner. However clear impurities when using them.

4. Tools

1. Required Tools for R454B
   Mixing of different types 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 R454B (Those which cannot be used for conventional refrigerant (R22), (R410A))
   2) Tools exclusive for R454B, but can be also used for conventional refrigerant (R22), (R410A)
   3) Tools commonly used for R454B and for conventional refrigerant (R22), (R410A)

   The table below shows the tools exclusive for R454B and their interchangeability.

Tools exclusive for R454B (The following tools for R454B are required.)

Tools whose specifications are changed for R454B and their interchangeability

No.	Used tool	Usage	R454B air conditioner installation		Conventional air conditioner installation
			Existence of new equipment for R454B	Whether conventional equipment can be used	Whether conventional equipment can be used
①	Flare tool (Double Flare tooling)	Pipe flaring	Yes	∗(Note)	Yes
②	Copper pipe gauge for adjusting projection margin	Flaring by conventional flare tool	Yes	∗(Note)	∗(Note)
③	Torque wrench	Tightening of flare nut	Yes	No	No
④	Gauge manifold	Evacuating, refrigerant charge, run check, etc.	Yes	No	No
⑤	Charge hose				
⑥	Vacuum pump adapter	Vacuum evacuating	Yes	No	Yes
⑦	Electronic balance for refrigerant charging	Refrigerant charge	Yes	Yes	Yes
⑧	Leakage detector	Gas leakage check	Yes	No	Yes
⑨	Refrigerant cylinder	Refrigerant charge	Yes	No	No

(Note) When flaring is carried out for R454B 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, R410A are necessary as the general tools.

1) Vacuum pump. Use vacuum pump by attaching vacuum pump adapter.
2) Torque wrench
3) Pipe cutter
4) Reamer
5) Pipe bender
6) Level vial
7) Screwdriver (+, –)
8) Spanner or Monkey wrench
9) Hole core drill
10) Hexagon wrench (Opposite side 0.2"(4mm))
11) Tape measure
12) Metal saw

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

1) Clamp meter
2) Thermometer
3) Insulation resistance tester (Megger)
4) Electroscope

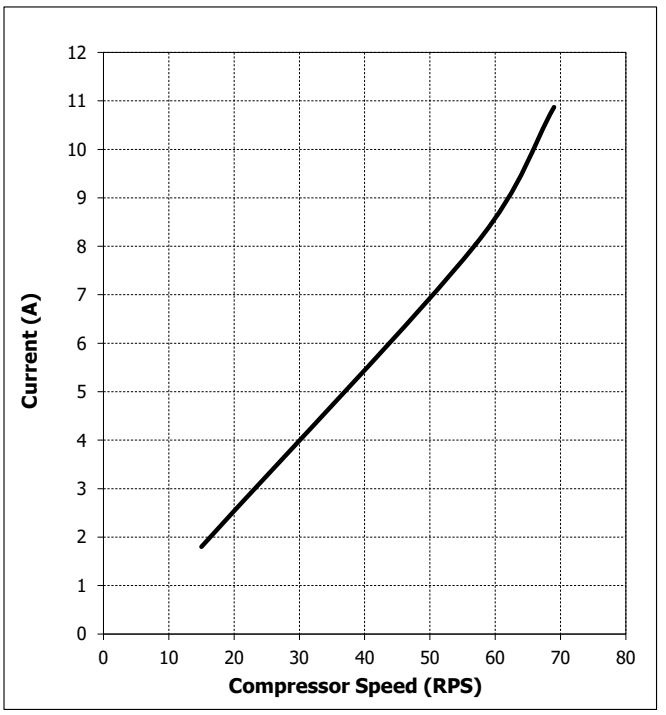
1. SPECIFICATIONS

1-1. Outdoor Unit

System	Capacity Rank			024
	Outdoor Model			RAV-BP241AT2P-UL
Operating Range	Cooling	Indoor Min - Max DB (^{o}F)		70 to 89
		Outdoor Min - Max DB (^{o}F)		5 to 115
		Outdoor Min - Max DB (^{o}F) with wind buffels		5 to 115
	Heating	Indoor Min - Max DB (^{o}F)		59 to 86
		Outdoor Min - Max DB (^{o}F)		-13 to 59
Piping	Standard Piping Length		(ft)	24'7''
	Min. Piping Length		(ft)	16'5"
	Max. Piping Length		(ft)	164'1"
	Lift (Outdoor below Indoor)		(ft)	98'5"
	Lift (Outdoor above Indoor)		(ft)	98'5"
	Gas Pipe (size/connection type)			5/8"
	Liquid Pipe (size/connection type)			3/8"
	Additional refrigerant charge under long piping connection			0.376oz/ft (98'5" to 164'1")
Electrical	Voltage			1Ph, 208V/230V ~ 60Hz.
	Minimum Current Amps		(A)	17
	Maximum Overcurrent Protection Device Amps		(A)	25
Outdoor	Dimensions	Height	(in)	35.0
		Width	(in)	35.4
		Depth	(in)	12.6
	Weight-Net/Gross		(lbs)	133/144
	Refrigerant charged		(lbs)	4.63
	Sound Pressure		(dBA)	52/54

1-2. Operation Characteristic Curve

<Cooling>



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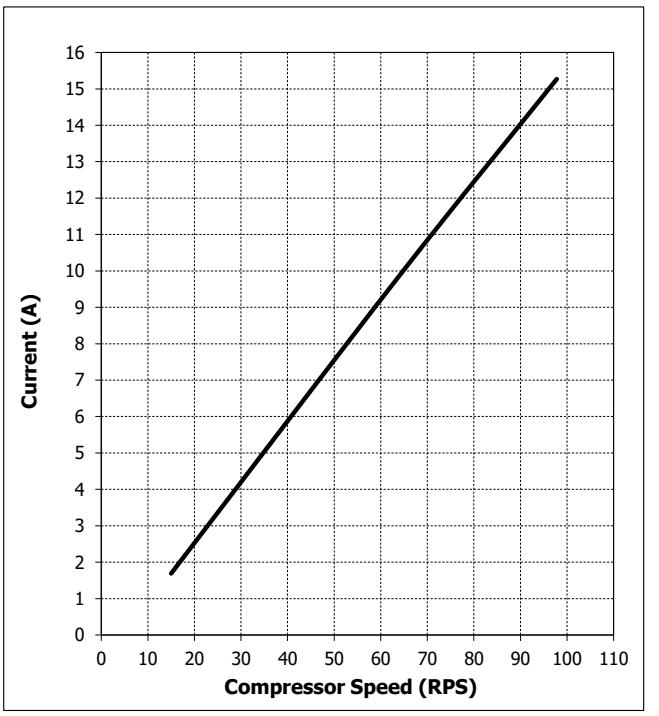
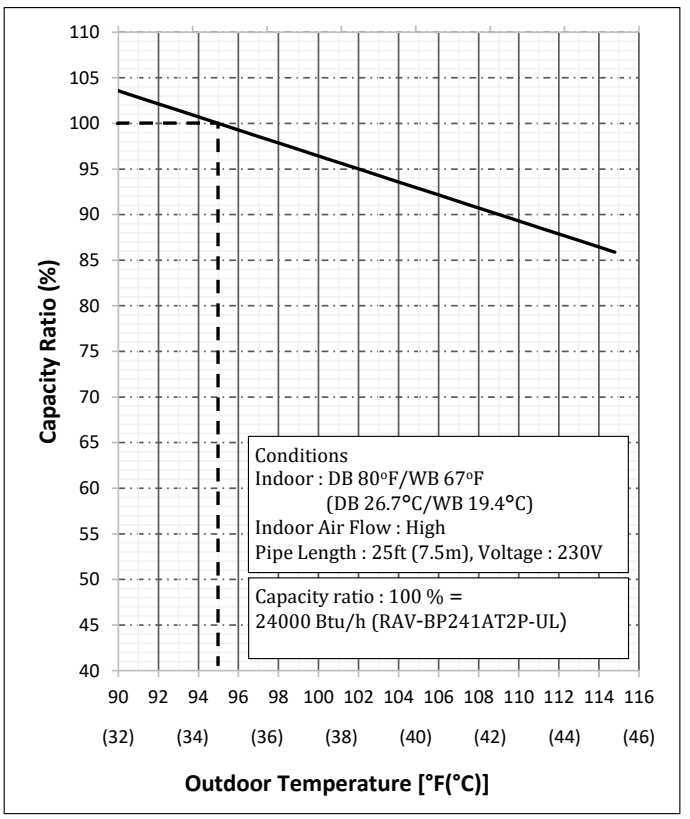


Capacity Variation ratio According to Temperature

<Cooling>



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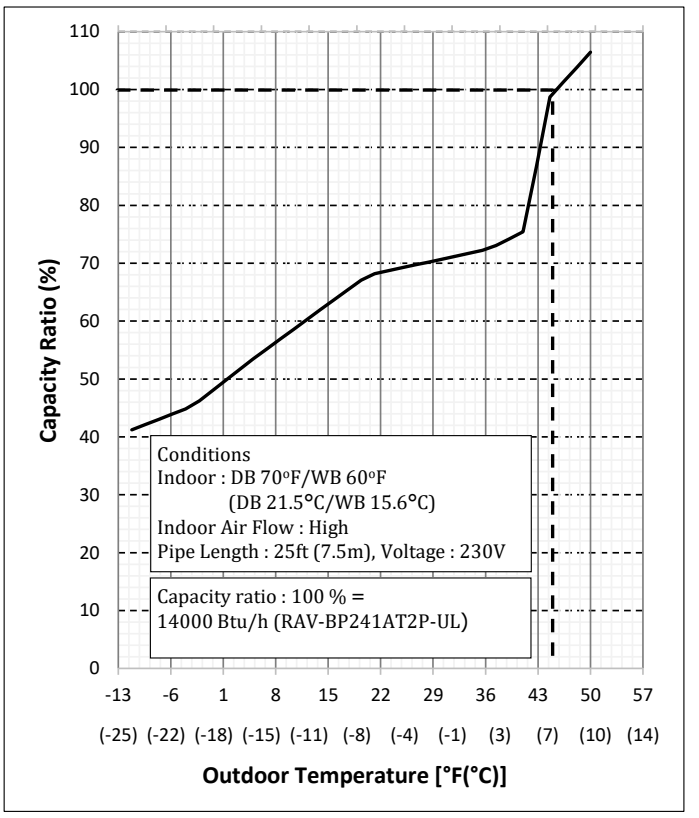
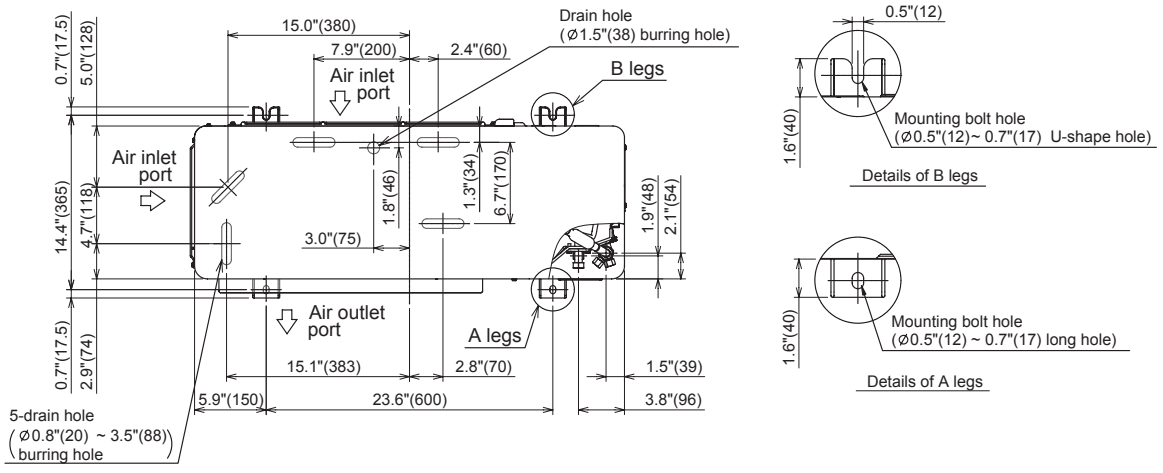
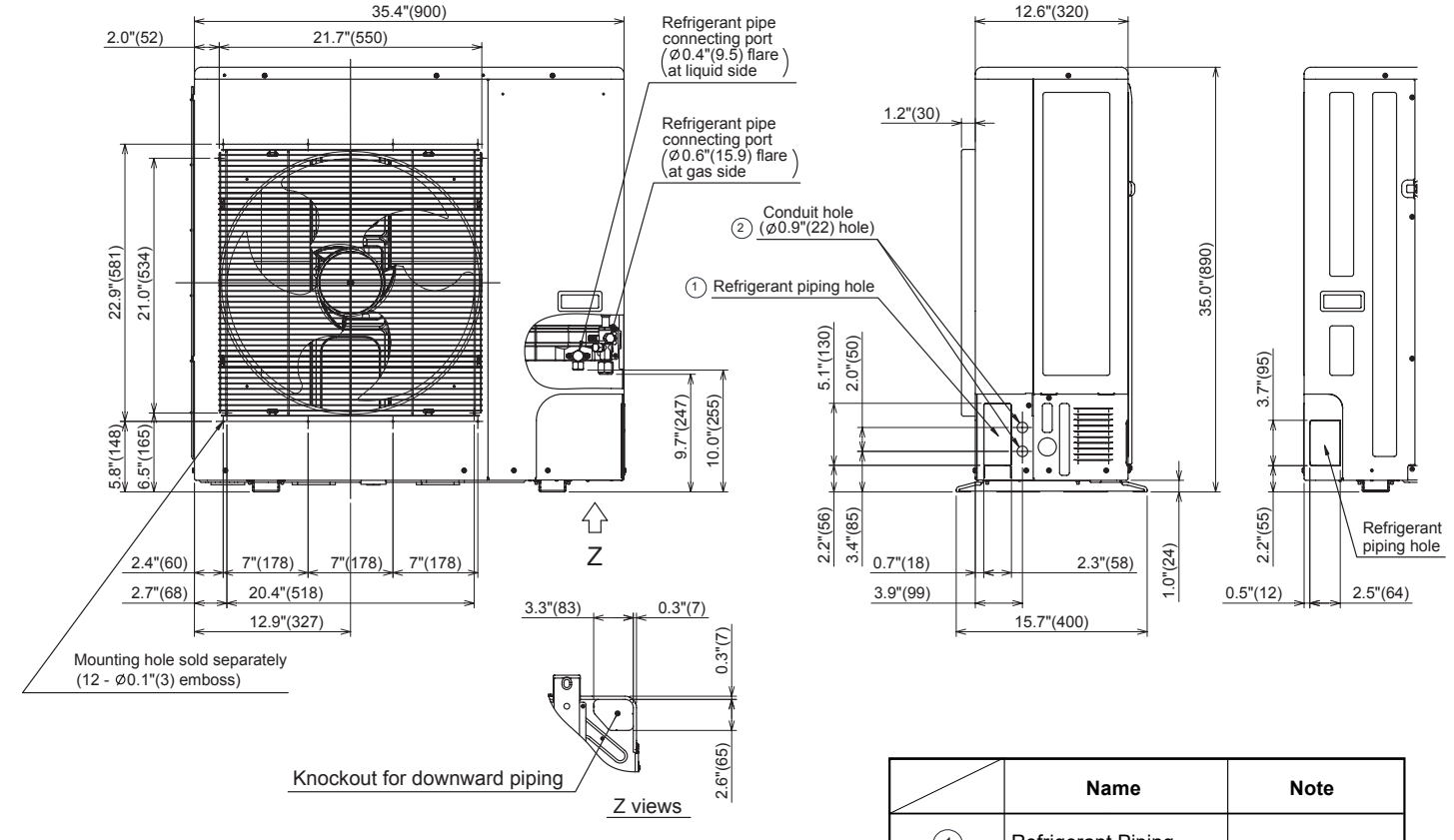


2. DIMENSIONAL DRAWING



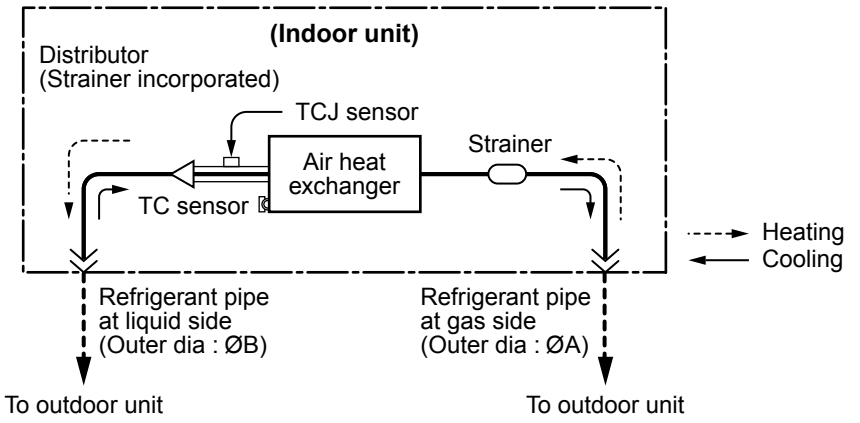


	Name	Note
①	Refrigerant Piping	-
②	Conduit hole	Ø0.9" (22) hole

3. SYSTEMATIC REFRIGERATING CYCLE DIAGRAM

3-1. Indoor Unit

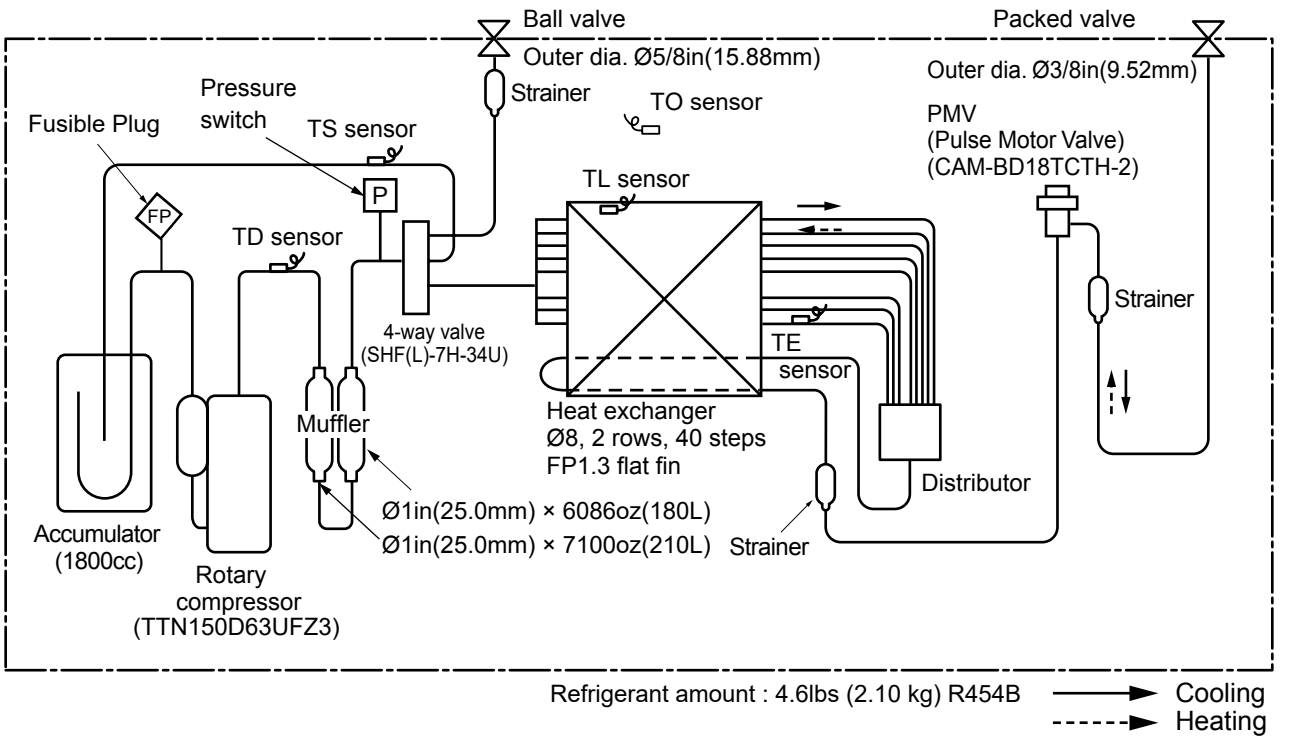
- **Single type (Combination of 1 indoor unit and 1 outdoor unit)**



Dimension table

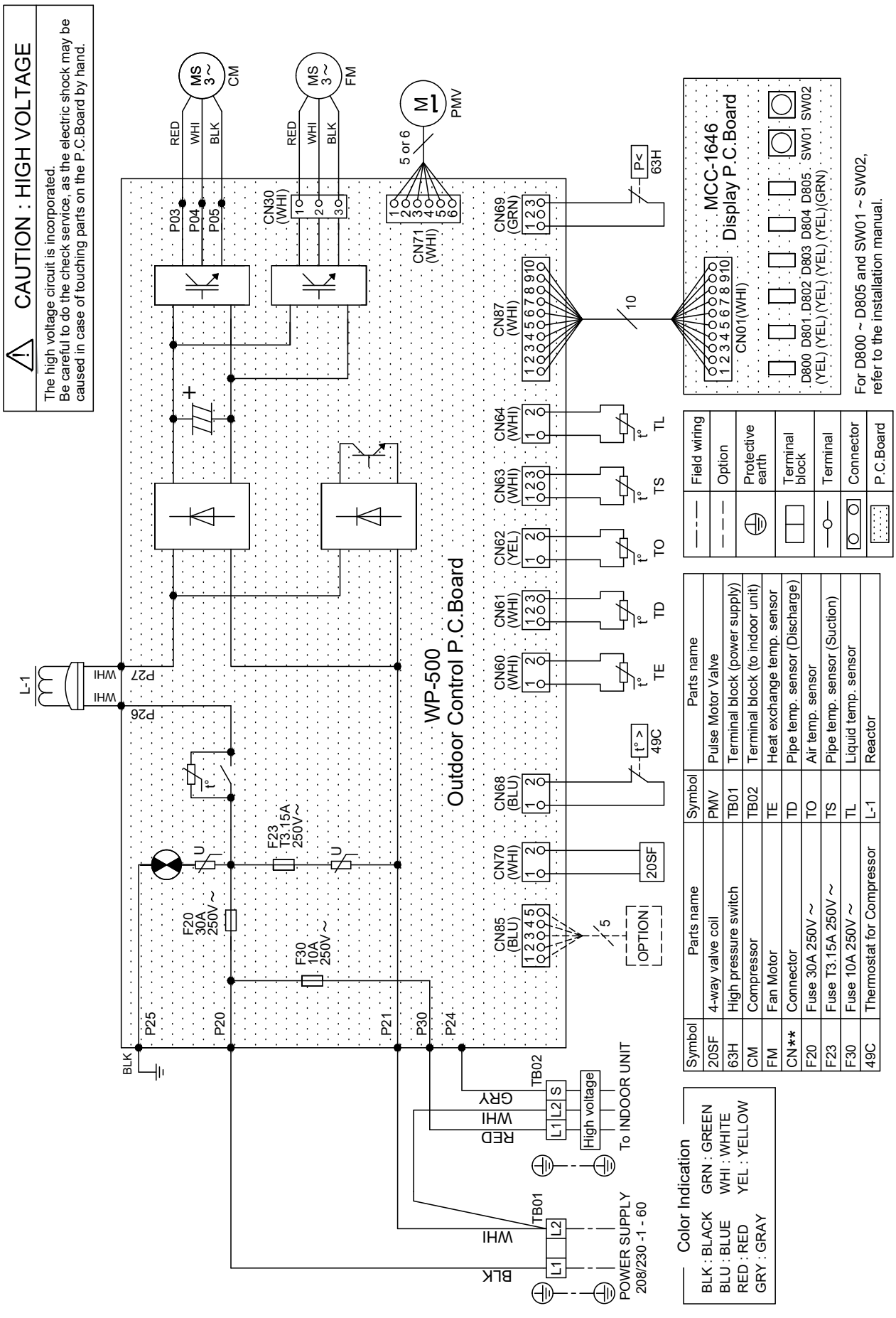
Indoor unit	Outer diameter of refrigerant pipe	
	Gas side ØA	Liquid side ØB
HB241 type	5/8'' (15.9)	3/8'' (9.5)

3-2. Outdoor Unit



		Pressure PSI (Mpa)		Pipe surface temperature ˚F(˚C)				Comp. Hz	Temp. ˚F(˚C)	
		Pd	Ps	TD	TS	TC	TE		In	Out
Cooling	Standard	366(2.530)	138(0.955)	158(70)	50(10)	51(11)	102(39)	60	80(27)	95(35)
	Over load	444(3.064)	177(1.223)	158(70)	66(19)	64(18)	123(51)	45	89(32)	115(46)
	Low temp.	291(2.008)	143(0.991)	123(51)	55(13)	50(10)	80(27)	21	64(18)	5(-15)
Heating	Standard	396(2.737)	101(0.703)	168(76)	35(2)	114(46)	35(2)	64	68(20)	44(7)
	Over load	467(3.220)	157(1.087)	172(78)	59(15)	129(54)	57(14)	49	80(27)	75(24)
	Low temp.	185(1.280)	37(0.256)	86(30)	-14(-26)	60(16)	-11(-24)	97	59(15)	-13(-25)

4. WIRING DIAGRAM



Symbol	Parts name
20SF	4-way valve coil
63H	High pressure switch
CM	Compressor
FM	Fan Motor
CN**	Connector
F20	Fuse 30A 250V ~
F23	Fuse T3.15A 250V ~
F30	Fuse 10A 250V ~
49C	Thermostat for Compressor

Symbol	Parts name
PMV	Pulse Motor Valve
TB01	Terminal block (power supply)
TB02	Terminal block (to indoor unit)
TE	Heat exchange temp. sensor
TD	Pipe temp. sensor (Discharge)
TO	Air temp. sensor
TS	Pipe temp. sensor (Suction)
TL	Liquid temp. sensor
L-1	Reactor

5. SPECIFICATIONS OF ELECTRICAL PARTS

No.	Parts name	Type	Specification
1	Compressor	MTD226RKQF8LV8C	3 phase, 6P, 1500W
2	Fan motor	SDM-340-60	Output 60 W
3	4-way valve coil	SQ-D27012-000752	-
4	PMV coil	CAM-MD12TF-18	-
5	High-pressure SW	ACB-4UB166W	OFF : 4.5MPa, ON : 3.5MPa
6	Reactor	CH-56-3Z-T	5.46~6.14mH, 18.5A
7	P.C. board	WP-500	-
8	Fuse (Mounted on P.C. board)	-	AC250 V, 30 A
9	Fuse	-	AC250 V, 10 A
10	Fuse (Mounted on P.C. board)	-	AC250 V, 3.15 A
11	Outdoor temp. sensor (TO sensor)	-	10 kΩ at 25°C
12	Heat exchanger temp. sensor (TE sensor)	-	10 kΩ at 25°C
13	Suction temp. sensor (TS sensor)	-	10 kΩ at 25°C
14	Discharge temp. sensor (TD sensor)	-	50 kΩ at 25°C
15	Heat exchanger temp. sensor (TL sensor)	-	50 kΩ at 25°C
16	Compressor thermo. (Protection)	CS-12AL	OFF: 125 ± 4°C, ON: 90 ± 5°C

6. REFRIGERANT R454B

This air conditioner adopted the refrigerant HFC (R454B which does not damage the ozone layer.

The working pressure of the refrigerant R454B is 1.6 times higher than conventional refrigerant (R22), (R410A). The refrigerating oil is also changed in accordance with change of refrigerant, so be careful that water, dust, and existing refrigerant or refrigerating oil are not entered in the refrigerant cycle of the air conditioner using the refrigerant during installation work or servicing time.

The next section describes the precautions for air conditioner using the refrigerant.

Conforming to contents of the next section together with the general cautions included in this manual, perform the correct and safe work.

6-1. Safety During Installation/Servicing

As R454B's pressure is about 1.6 times higher than that of R22, R410A improper installation/servicing may cause a serious trouble. By using tools and materials exclusive for R454B, it is necessary to carry out installation/servicing safely while taking the following precautions into consideration.

1. Never use refrigerant other than RR454B in an air conditioner which is designed to operate with R454B.
   If other refrigerant than R454B 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 R454B. The refrigerant name R454B is indicated on the visible place of the outdoor unit of the air conditioner using R454B as refrigerant.
   To prevent mischancing, the diameter of the service port differs from that of R22, R410A.
3. If a refrigeration gas leakage occurs during installation/servicing, be sure to ventilate fully. If the refrigerant gas comes into contact with fire, a poisonous gas may occur.
4. When installing or removing an air conditioner, do not allow air or moisture to remain in the refrigeration cycle.
   Otherwise, pressure in the refrigeration cycle may become abnormally high so that a rupture or personal injury may be caused.
5. After completion of installation work, check to make sure that there is no refrigeration gas leakage.
   If the refrigerant gas leaks into the room, coming into contact with fire in the fan-driven heater, space heater, etc., a poisonous gas may occur.
6. When an air conditioning system charged with a large volume of refrigerant is installed in a small room, it is necessary to exercise care so that, even when refrigerant leaks, its concentration does not exceed the marginal level.
   If the refrigerant gas leakage occurs and its concentration exceeds the marginal level, an oxygen starvation accident may result.
7. Be sure to carry out installation or removal according to the installation manual.
   Improper installation may cause refrigeration trouble, water leakage, electric shock, fire, etc.
8. Unauthorized modifications to the air conditioner may be dangerous. If a breakdown occurs please call a qualified air conditioner technician or electrician.
   Improper repair may result in water leakage, electric shock and fire, etc.

6-2. Refrigerant Piping Installation

6-2-1. 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 R454B incurs pressure higher than when using R22, R410A it is necessary to choose adequate materials.
   Thicknesses of copper pipes used with R454B are as shown in Table 6-2-1. Never use copper pipes thinner than 0.03"(0.8mm) even when it is avail-able on the market.

NOTE:

Refer to the "**6-6. Instructions for Re-use Piping of R22, R410A or R407C**".

Table 6-2-1 Thicknesses of annealed copper pipes

	Thickness (In (mm))
Outer diameter (In (mm))	R454B
1/4” (6.4)	0.03” (0.80)
3/8” (9.5)	0.03” (0.80)
1/2” (12.7)	0.03” (0.80)
5/8” (15.9)	0.04” (1.00)

1. 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 0.79"(20mm). 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 6-2-3 to 6-2-4 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 0.79"(20mm). Thicknesses of socket joints are as shown in Table 6-2-2.

Table 6-2-2 Minimum thicknesses of socket joints

Reference outer diameter of copper pipe jointed (In (mm))	Minimum joint thickness (In (mm))
1/4” (6.4)	0.02” (0.50)
3/8” (9.5)	0.02” (0.60)
1/2” (12.7)	0.03” (0.70)
5/8” (15.9)	0.03” (0.80)

6-2-2. 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 other than lubricating oils used in the installed air conditioner 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 (Double Flare tooling)**

   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 R454B 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.

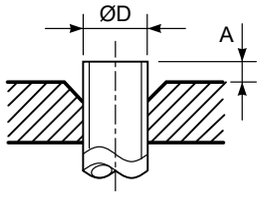


Fig. 6-2-1 Flare processing dimensions

Table 6-2-3 Dimensions related to flare processing for R454B

Outer diameter (In (mm))	Thickness (In (mm))	A (In (mm))		
		Flare tool for R454B clutch type	Conventional flare tool (R454B)	
			Clutch type	Wing nut type
1/4” (6.4)	0.03” (0.8)	0 – 0.02” (0 – 0.5)	0.04” – 0.06” (1.0 – 1.5)	0.06” – 0.08” (1.5 – 2.0)
3/8” (9.5)	0.03” (0.8)	0 – 0.02” (0 – 0.5)	0.04” – 0.06” (1.0 – 1.5)	0.06” – 0.08” (1.5 – 2.0)
1/2” (12.7)	0.03” (0.8)	0 – 0.02” (0 – 0.5)	0.04” – 0.06” (1.0 – 1.5)	0.08” – 0.10” (2.0 – 2.5)
5/8” (15.9)	0.04” (1.0)	0 – 0.02” (0 – 0.5)	0.04” – 0.06” (1.0 – 1.5)	0.08” – 0.10” (2.0 – 2.5)

Table 6-2-4 Flare and flare nut dimensions for R454B

Outer diameter (In (mm))	Thickness (In (mm))	Dimension (In (mm))				Flare nut width (In (mm))
		A	B	C	D	
1/4” (6.4)	0.03” (0.8)	0.36” (9.1)	0.36” (9.2)	0.26” (6.5)	0.51” (13)	0.67” (17)
3/8” (9.5)	0.03” (0.8)	0.52” (13.2)	0.53” (13.5)	0.38” (9.7)	0.79” (20)	0.87” (22)
1/2” (12.7)	0.03” (0.8)	0.65” (16.6)	0.63” (16.0)	0.51” (12.9)	0.91” (23)	1.02” (26)
5/8” (15.9)	0.04” (1.0)	0.78” (19.7)	0.75” (19.0)	0.63” (16.0)	0.98” (25)	1.14” (29)

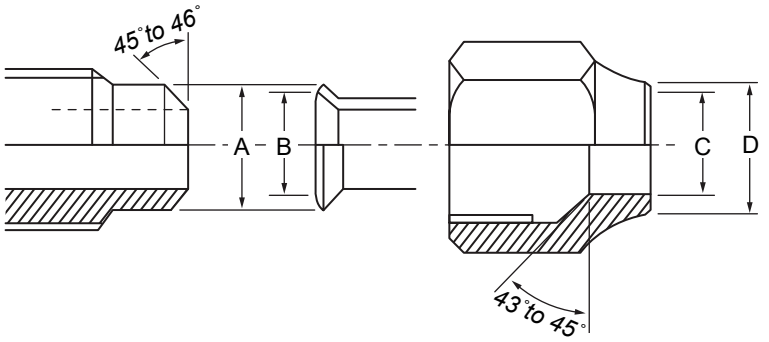


Fig. 6-2-2 Relations between flare nut and flare seal surface

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 R454B is the same as that for conventional R22, R410A.
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 6-2-5 shows reference values.

d) Joint preparation are recommend to double-flare fitting accordance to ASHRAE15 requirements.

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 6-2-5 Tightening torque of flare for R454B [Reference values]

Outer diameter (In (mm))	Tightening torque (ft • lbs (N • m))
1/4” (6.4)	10 – 13 (14 – 18)
3/8” (9.5)	24 – 31 (33 – 42)
1/2” (12.7)	37 – 46 (50 – 62)
5/8” (15.9)	50 – 60 (68 – 82)

6-3. Tools

6-3-1.Required Tools

Refer to the **“4. Tools”** (Page 13)

6-4. Recharging of Refrigerant

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

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

↓

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

↓

Connect the charge hose of the vacuum pump adapter.

↓

Open fully both packed valves at liquid and gas sides.

↓

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

↓

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

↓

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

↓

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

(For refrigerant charging, see the figure below.)

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

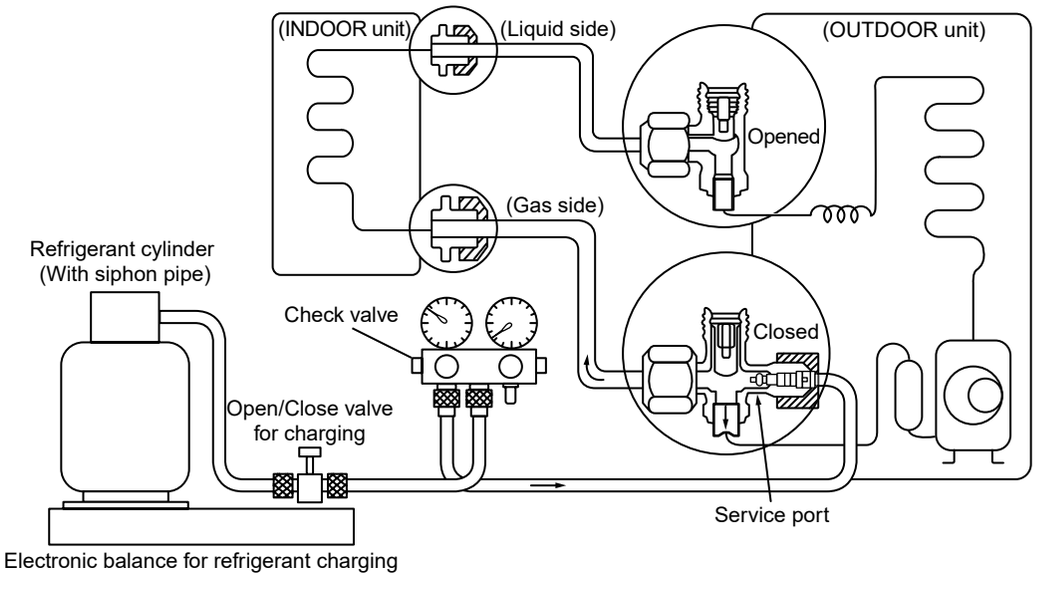
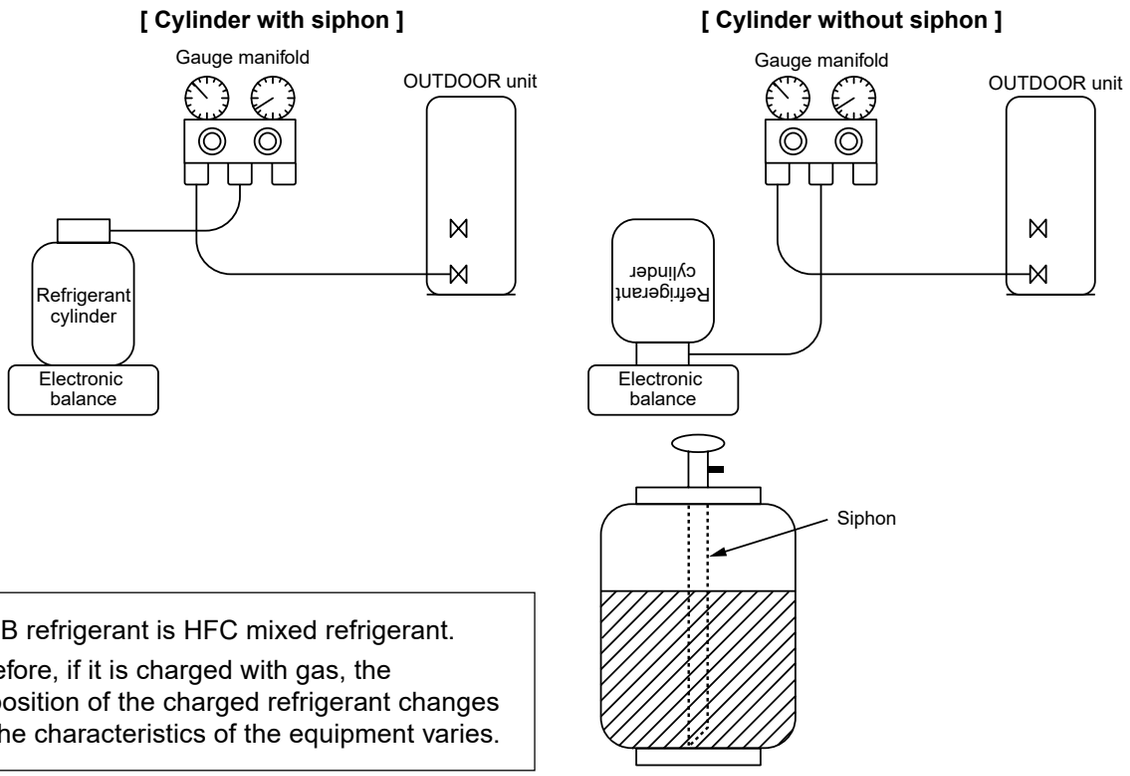


Fig. 6-4-1 Configuration of refrigerant charging

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.

It is necessary for charging refrigerant under condition of liquid because R454B is mixed type of refrigerant.
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.



R454B refrigerant is HFC mixed refrigerant.
Therefore, if it is charged with gas, the composition of the charged refrigerant changes and the characteristics of the equipment varies.

Fig. 6-4-2

6-5. Brazing of Pipes

6-5-1. Materials for Brazing

1. Silver brazing filler

Silver brazing filler is an alloy mainly composed of silver and copper.

It is used to join iron, copper or copper alloy, and is relatively expensive though it excels in solderability.

2. Phosphor bronze brazing filler

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

3. Low temperature brazing filler

Low temperature brazing filler is generally called solder, and is an alloy of tin and lead.

Since it is weak in adhesive strength, do not use it for refrigerant pipes.

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

6-5-2. 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 1,472°F (800°C).
- **Activated flux**
  Most of fluxes generally used for silver brazing are this type.
  It features an increased oxide film removing capability due to the addition of compounds such as potassium fluoride, potassium chloride and sodium fluoride to the borax-boric acid compound.

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

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

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

6-5-3. 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 flow.

Never use gas other than Nitrogen gas.

1. Brazing method to prevent oxidation

1) Attach a reducing valve and a flow-meter to the Nitrogen gas cylinder.
2) Use a copper pipe to direct the piping material, and attach a flow-meter to the cylinder.
3) Apply a seal onto the clearance between the piping material and inserted copper pipe for Nitrogen in order to prevent backflow of the Nitrogen gas.
4) When the Nitrogen gas is flowing, be sure to keep the piping end open.
5) Adjust the flow rate of Nitrogen gas so that it is lower than 0.05 m³/Hr or 2.9 psi (0.02 MPa) 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.

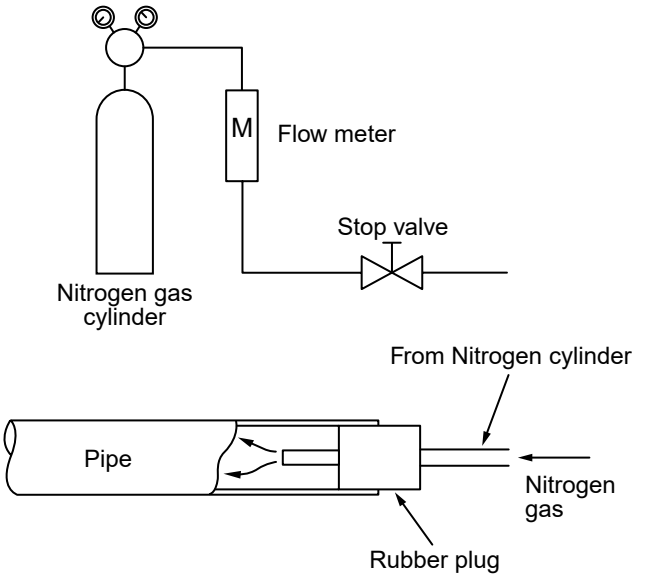


Fig. 6-5-1 Prevention of oxidation during brazing

6-6. Replenishing refrigerant

In order to assure the reliability of the appliance, the amount of refrigerant to be replenished shall be subject to the following restrictions. Follow the margin of excess replenished refrigerant, which is equivalent to the current R22, R410A. Otherwise, abnormally high pressure may be generated in the refrigeration cycle, which may result in failure, explosion of the product, or personal injury.

[Possible gas leakage]

Recharging refrigerant is allowed only if it is confirmed that the amount of leakage (e.g. slow leakage upon installation) is within the additional margin specified below
The amount of leakage is not certain if the product does not function properly (e.g. insufficient cooling / heating performance). In such case, recover the refrigerant and replenish the refrigerant.

[Restrictions for the amount of additional charging]

a. The amount of refrigerant additionally charged shall not exceed 10% of that specified. If the situation is no solved with such amount, recover the refrigerant completely and charge the specified amount
b. In case of slow leakage upon installation and the pipe connection length of not over 15m, further tighten the flare nut or take other effective measures. Do not recharge the refrigerant

[Cautions for recharging with refrigerant]

a. Use a scale with an accuracy of at least 10g to recharge the refrigerant. Do not use a bathroom scale.
b. If the refrigerant leaks, identify the source and make sure to repair it. The refrigerant gas is not hazardous, but if it touches a heat source (e.g. fan heater, stove), a poisonous gas may be generated.
c. Use liquid refrigerant for replenishment. Replenish the refrigerant carefully and slowly.

6-6-1. Pump down process

1. Turn off the Air Conditioner system.
2. Connect the charge hose from the manifold valve to the service port of the packed valve at gas side.
3. Turn on the Air Conditioner system in cooling operation more than 10 minutes.
4. Check the operating pressure of the system should be normal value. (Ref. with product specification)
5. Release the valve rod cap of both service valves.
6. Use the Hexagon wrench to turning the valve rod of Liquid side fully close.
   (*Make sure no entering air into the system)
7. Continue operate Air Conditioner system until and the gauge of manifold dropped into the range of 0.5 - 0 kgf/cm2.
8. Use the Hexagon wrench to turning the valve rod of Gas side fully close. And turn off the Air Conditioner system immediately thereafter.
9. Remove the gauge manifold from the service port of the packed valve.
10. Securely tighten the valve rod cap to the both service valves.

CAUTION

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

7. OUTDOOR CONTROL CIRCUIT

7-1. Outline of Main Controls

1. Pulse Modulating Valve (PMV) control

1) For PMV : 30 to 500 pulses during operation, respectively.
2) In cooling operation, PMV is controlled with the temperature difference between TS sensor and TC sensor.
3) In heating operation, PMV is controlled with the temperature difference between TS sensor and TE sensor.
4) For the temperature difference in items 2) and 3), -1 to 5K is aimed as the target in both cooling and heating operations.
5) When the cycle excessively rose in both cooling and heating operations, PMV is controlled by TD sensor.
   The aimed value is usually : 194.00°F(91°C) in both cooling and heating operations.

REQUIREMENT

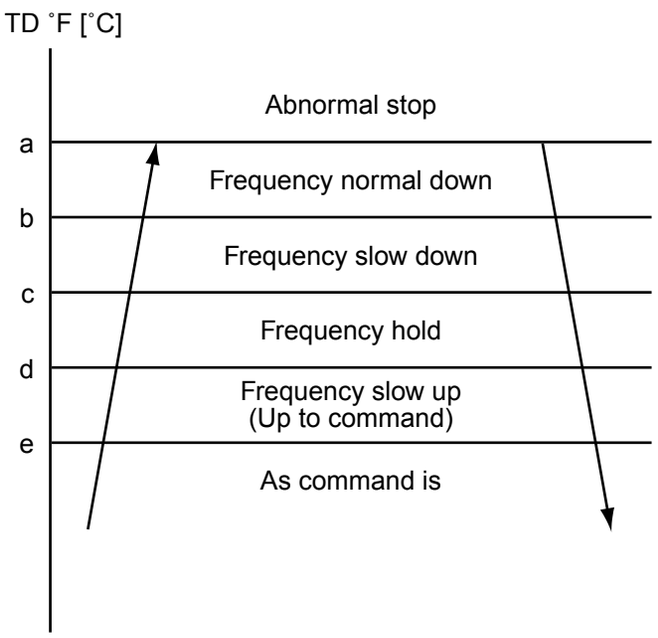
A sensor trouble may cause a liquid back-flow or abnormal overheat resulting in excessive shortening of the compressor life. In a case of trouble on the compressor, be sure to check there is no error in the resistance value an the refrigerating cycle of each sensor after repair and then start the operation.

2. Discharge temperature release control

1) When the discharge temperature did not fall or the discharge temperature rapidly went up by PMV control, this control lowers the compressor frequency. It subdivides the frequency control up to 0.6Hz to stabilize the cycle.
2) When the discharge temperature detected an abnormal stop zone, the compressor stops and then restarts after 2 minutes 30 seconds.

   The error counting is cleared when the operation continued for 10 minutes. If the error is detected by 4 times without clearing, the error is determined and restarting is not performed.

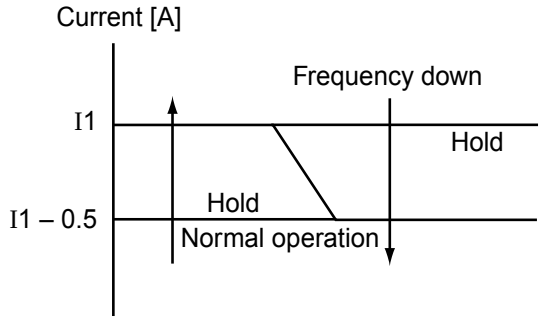
   ∗ The cause is considered as excessively little amount of refrigerant, PMV error or clogging of the cycle.
3) For displayed contents of error, confirm on the check code list.



a	b	c	d	e
232(111)	228(109)	223(106)	217(103)	205(96)

3. Current release control

The output frequency and the output voltage are controlled by AC current value detected by current transformer on the outdoor P.C. board so that input current of the inverter does not exceed the specified value.



Model	BP241	
	COOL	HEAT
I1 value [A]	14.8	16.0

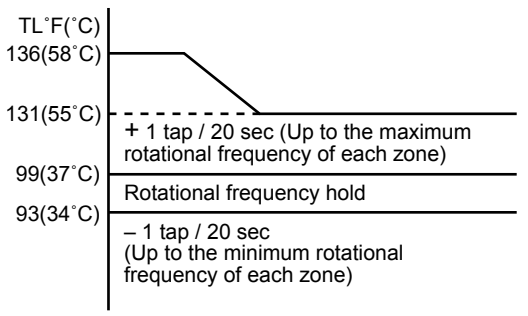
4. Outdoor fan control

Allocations of fan tap revolutions [rpm]

Model	W1	W2	W3	W4	W5	W6	W7	W8	W9	WA	WB	WC	WD	WE	WF
BP241	200	210	250	310	380	440	480	520	560	600	660	740	800	830	830

4-1. Cooling fan control

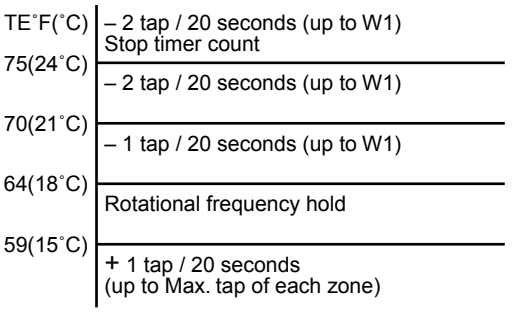
1) An outdoor fan is controlled by TL sensor, TO sensor and compressor frequency. An outdoor fan is controlled at 1-tap interval of DC fan control.
2) At the start time, the fan is fixed for 60 seconds only with the maximum fan tap corresponded to the zone in the following table but it is controlled with TL sensor temperature after then.



Temp. range	BP241	21.0Hz or lower		21.0Hz to 52.2Hz		52.2Hz or higher	
		Min.	Max.	Min.	Max.	Min.	Max.
100(38°C) ≤ TO		W6	WC	W8	WE	WA	WE
84(29°C) ≤ TO < 100(38°C)		W5	WB	W7	WC	W9	WD
59(15°C) ≤ TO < 84(29°C)		W3	W7	W5	W9	W7	WB
41(5°C) ≤ TO < 59(15°C)		W2	W5	W4	W7	W6	W9
32(0°C) ≤ TO < 49(5°C)		W1	W3	W3	W5	W4	W7
25(–4°C) ≤ TO < 32(0°C)		W1	W2	W2	W4	W3	W5
TO < 25(–4°C)		OFF	W2	OFF	W4	OFF	W4
TO error		OFF	WD	OFF	WE	OFF	WE

4-2. Heating fan control

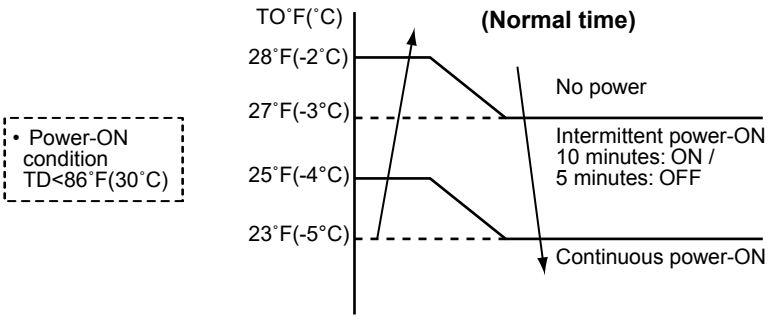
1) An outdoor fan is controlled by TE sensor, TO sensor and compressor frequency. (It is controlled with W1 for minimum and the maximum is controlled according to the following table.)
2) At the start time, the fan is fixed for 3 minutes only with the maximum fan tap corresponded to the zone in the following table but it is controlled with TE sensor temperature after then.
3) When a status TE ≥ 75°F(24°C) continues for 5 minutes, the operation stops. In this case, no error display appears and the status is same as the normal thermo-OFF. The can restarts after approx. 2 minutes 30 seconds and this continuous operation is not an error.
4) When the above status as 3) occurs frequently, it is considered that filter of the suction part of the indoor unit is dirty. Clean the filter and restart the operation.

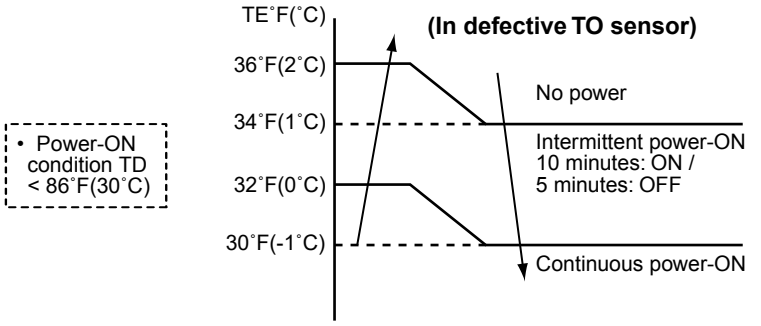


Temp. range \ BP241	20.4 Hz or lower	20.4Hz to 45.0Hz	45.0Hz or higher
	Max.	Max.	Max.
50(10°C) ≤ TO	W7	W8	W9
41(5°C) ≤ TO < 50(10°C)	W9	WB	WE
27(-3°C) ≤ TO 41< (5°C)	WE	WE	WE
14(-10°C) ≤ TO < 27(-3°C)	WE	WE	WE
TO < 14(–10°C)	WE	WE	WE
TO error	WE	WE	WE

5. Coil heating control

1) This control function heats the compressor by turning on the stopped compressor instead of a case heater. It purposes to prevent stagnation of the refrigerant inside of the compressor.
2) As usual, turn on power of the compressor for the specified time before a test run after installation; otherwise a trouble of the compressor may be caused.
   As same as a test run, it is recommended to turn on power of the compressor beforehand when starting operation after power of the compressor has been interrupted and left as it is for a long time.
3) A judgment for electricity is performed by TD and TO sensors.
   If TO sensor is defective, a backup control is automatically performed by TE sensor.
   For a case of defective TO sensor, judge it with outdoor LED display.
4) For every model, the power is turned off when TD is 86˚F(30˚C) or more.





	BP241
Output power	50W

REQUIREMENT

While heating the coil, the power sound may be heard. However it is not a trouble.

6. Short intermittent operation preventive control

1) For 3 to 10 minutes after operation start, in some cases, the compressor does not stop to protect the compressor even if receiving the thermostat-OFF signal from indoor.
   However it is not abnormal status. (The operation continuance differs according to the operation status.)
2) When the operation stops by the remote controller, the operation does not continue.

7. Current release value shift control

1) This control purposes to prevent troubles of the electronic parts such as the compressor driving elements and the compressor during cooling operation.
2) The current release control value (I1) is selected from the following table according to TO sensor value.

Current release control value (I1)

[A]

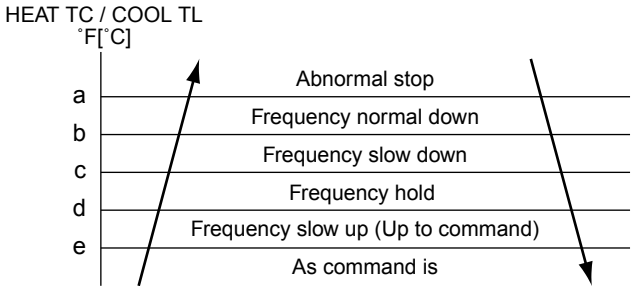
Temperature range	BP241
116(6.5°C) ≤ TO	7.5
109(43°C) ≤ TO < 116(46.5°C)	10.5
100(38°C) ≤ TO < 109(43°C)	11.7
TO error	7.5

8. Over-current protective control

1) When the over-current protective circuit detected an abnormal current, stop the compressor.
2) The compressor restarts after 2 minutes 30 seconds setting [1] as an error count.
3) When the error count [8] was found, determine an error and restart operation is not performed.
4) For the error display contents, confirm on the check code list.

9. High-pressure release control

1) The operation frequency is controlled to restrain abnormal rising of high pressure by TL sensor in cooling operation and TC sensor in heating operation.
2) When TL sensor in cooling operation or TC sensor in heating operation detects abnormal temperature of the stop zone, stop the compressor and the error count becomes +1.
3) When the compressor stopped with 2), the operation restarts from the point of the normal operation zone (e point or lower) where it returned after 2 minutes 30 seconds.
4) The error count when the compressor stopped with 2) is cleared after the operation continued for 10 minutes.
   If the error count becomes [10] without clearing, the error is determined and reactivation is not performed.
5) For the error display contents, confirm on the check code list.



°F[°C]

	BP241	
	HEAT	COOL
	TC	TL
a	144(62°C)	145(63°C)
b	135(57°C)	144(62°C)
c	131(55°C)	140(60°C)
d	127(53°C)	136(58°C)
e	120(49°C)	129(54°C)

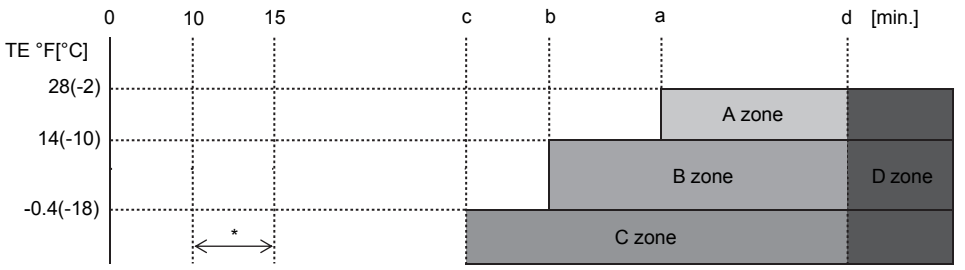
10. Defrost control

① In heating operation, defrost operation is performed when TE sensor temperature satisfies any condition in A zone to D zone.

② The defrost operation is immediately finished if TE sensor temperature has become 54°F(12°C) continuing for 3 seconds or more, or it also is finished when condition of 45°F(7°C) < TE < 54°F(12°C) has continued for 1 minute. The defrost operation is also finished when defrost operation has continued for 10 minutes even if TE sensor temperature has become 45°F(7°C) or lower.

③ After defrost operation has finished, the compressor and the outdoor fan start heating operation after stopped for approx. 40 seconds.

Start of heating operation



* From 10 minutes to 15 minutes after a heating operation started, the minimum value of TE is stored in memory as TEO and the minimum temperature of TO as ToO.

	At normal TO	At error TO
A zone	When status of [(TEO – TE) – (ToO – TO) ≥ 37(3°C)] continued for 20 seconds	When status of [(TEO – TE) ≥ 37(3°C)] continued for 20 seconds
B zone	When status of [(TEO – TE) – (ToO – TO) ≥ 36(2°C)] continued for 20 seconds	When status of [(TEO – TE) ≥ 36(2°C)] continued for 20 seconds
C zone	When status of [TE ≤ –0.4(–18°C)] continued for 20 seconds	
D zone	When compressor operation status with TE < 28(– 2°C) is added by d times	

	BP241
a	55
b	45
c	39
d	150

11. High-pressure switch

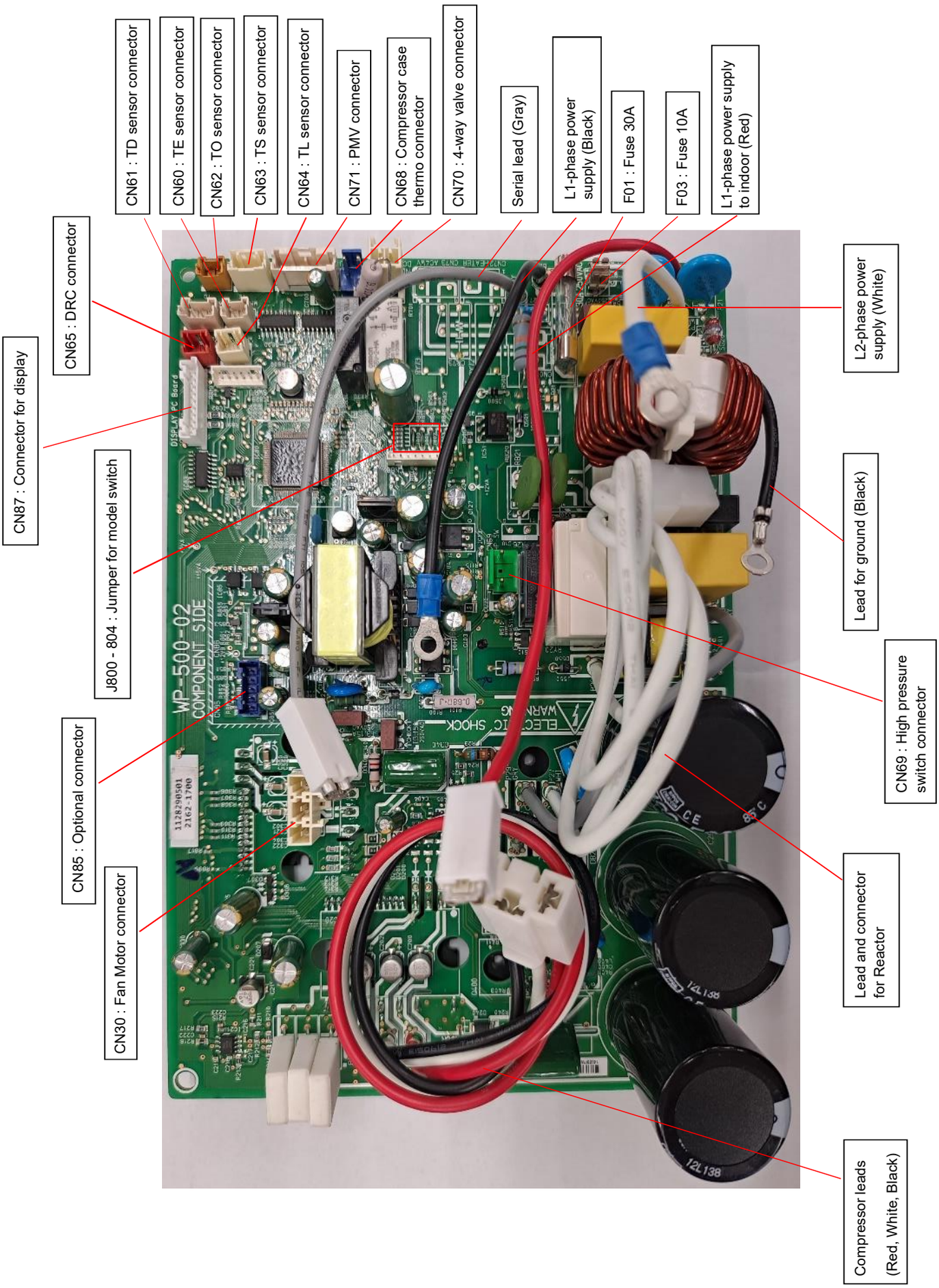
1) When the high-pressure switch operates, the operation of the compressor is terminated.
2) The compressor restarts after 5 minutes using [1] as an error count.
   After restart, the error count is cleared when operation continues for 10 minutes or more.
3) An error is confirmed with the error count [10].
4) For the indicated contents of error, confirm using the check code table.

12. Control of compressor case thermo

1) The compressor stops when the case thermo of the compressor operated.
2) When the case thermo operated for approx. 80 seconds, H04 error code is displayed on the wired remote controller. → Refer to the Check Code.
3) When the case thermo is reset, the operation restarts.

7-2. Outdoor Print Circuit Board

<WP-500>



8. TROUBLESHOOTING

8-1. Summary of Troubleshooting

<Wired remote controller type>

1. Before troubleshooting

1) Required tools/instruments
   - ⊕ and ⊖ screwdrivers, spanners, radio cutting pliers, nippers, push pins for reset switch
   - Tester, thermometer, pressure gauge, etc.
2) Confirmation the following points before check
   a) The following operations are normal.
      1. Compressor does not operate.
         - When 3-minutes delay (3 minutes after compressor OFF)
         - When the outdoor unit is in standby mode due to the room temperature reached the setup temperature
         - When the timer is operating
         - When indoor fan only operation mode
         - When an overflow error is detected in the indoor unit
         - When outside high-temperature operation controlled is in heating operation
         - When Thermo-OFF setting by Application Control Kit (TCB-PCOS1UL)
      2. Indoor fan does not rotate.
         - When cool air discharge prevention control is working in heating operation
      3. Outdoor fan does not rotate or air volume changes.
         - When high-temperature release operation control is working in heating operation
         - When outside low-temperature operation control is working in cooling operation
         - When defrost operation is being performed
      4. ON/OFF operation cannot be performed from remote controller.
         - When the control operation is being performed from outside/remote side
         - When automatic address is being set up
           (When the power is turned on at the first time or when indoor unit address setting is changed, the operation will be performed after power-ON in 5 minutes or before.)
         - When the test run is being performed by operation of the outdoor controller
3) Did you return the cabling to the initial positions?
4) Are indoor unit and remote controller connected correctly?

2. Troubleshooting procedure

When a trouble occurred, check the parts along with the following procedure.

Trouble → **Confirmation of check code display** → **Check defective position and parts.**

NOTE

Microcomputer misdiagnosis may also be caused by power condition problem and outer noise other than the checked items. If there is any noise source, change the cables of the remote controller to shield cables.

<Wireless remote controller type>

1. Before troubleshooting

1) Required tools/instruments
   - ⊕ and ⊖ screwdrivers, spanners, radio cutting pliers, nippers, etc.
   - Tester, thermometer, pressure gauge, etc.

2) Confirmation the following points before check
   a) The following operations are normal.
      1. Compressor does not operate.
         - When 3-minutes delay (3 minutes after compressor OFF)
         - When the outdoor unit in standby status due to the room temperature reached the setup temperature
         - When the timer is operating
         - When indoor fan only operation mode
         - When an overflow error is detected on the indoor unit
         - When outside high-temperature operation controlled is in heating operation
         - When Thermo-OFF setting by Application Control Kit (TCB-PCOS1UL)
      2. Indoor fan does not rotate.
         - Does not cool air discharge preventive control work in heating operation?
      3. Outdoor fan does not rotate or air volume changes.
         - When high-temperature release operation control is working in heating operation
         - When outside low-temperature operation control is working in cooling operation
         - When defrost operation is being performed
      4. ON/OFF operation cannot be performed from remote controller.
         - When forced operation is being performed
         - When the control operation is being performed from outside/remote side
         - When automatic address being set up
         - When the test run is being performed by operation of the outdoor controller

         a) Did you return the cabling to the initial positions?

         b) Are connecting cables between indoor unit and receiving unit correct?

2. Troubleshooting procedure

(When the power is turned on at the first time or when indoor unit address setting is changed, the operation will be performed after power-ON in 5 minutes or before.)
When a trouble occurred, check the parts along with the following procedure.

Trouble	→	Confirmation of lamp display (EX : When 4-way air discharge cassette type wireless remote controller is connected)	→	Check defective position and parts.

1) Outline of judgment
   The primary judgment to check where a trouble occurred in indoor unit or outdoor unit is performed with the following method.

The errors can be identified by lamp indication of indoor unit (sensors of the receiving unit

The indoor unit monitors operating status of the air conditioner, and the blocked contents of self-diagnosis are displayed restricted to the following cases if a protective circuit works.

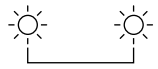
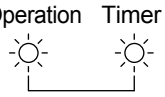
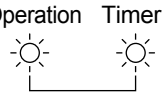
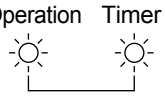
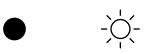
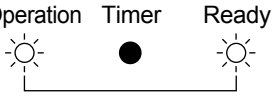
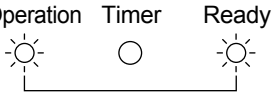
8-2. Troubleshooting

8-2-1. Outline of judgment

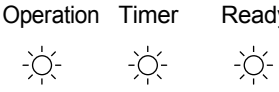
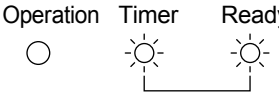
The following method can be done to check whether the problem occurred in indoor or outdoor unit.
The error is indicated by indication lamp on the display of the indoor unit. (sensors of the receiving part)
The indoor unit monitors the operating status of the air conditioner, and the blocked contents of self-diagnosis are displayed restricted to the following cases if a protective circuit works.

● : OFF, ○ : ON, ☼ : Flash (0.5 sec.)

Lamp indication	Check code	Cause of trouble
Operation ● Timer ● Ready ● No indication at all	—	Power supply OFF or miswiring between receiving unit and indoor unit
Operation ☼ Timer ● Ready ● Flash	E01	Receiving error } Receiving unit } Miswiring or wire connection error between receiving unit and indoor unit
	E02	Sending error
	E03	Communication stop
	E08	Duplicated indoor unit No. } Setup error
	E09	Duplicated header units of remote controller
	E10	Communication error between CPUs on indoor unit P.C. board
	E11	Communication error between Application control kit and indoor unit P.C. board
	E18	Wire connection error between indoor units, Indoor power OFF (Communication stop between indoor master and follower or between main and sub indoor twin)
Operation ● Timer ● Ready ☼ Flash	E04	Miswiring between indoor unit and outdoor unit or connection erorr (Communication stop between indoor and outdoor units)
Operation ● Timer ☼ Ready ☼ Alternate flash	P10	Overflow was detected. } Protective device of indoor unit worked.
	P12	Indoor DC fan error
Operation ☼ Timer ● Ready ☼ Alternate flash	P03	Outdoor unit discharge temp. sensor error } Protective device of outdoor unit worked.
	P04	Case thermostat operation, High pressure protective operation, High pressure SW system error, Power supply error,
	P05	Power supply error
	P07	Heat sink overheat error
	P15	Gas leak detection
	P19	4-way valve inverse error (Indoor or outdoor unit detected)
	P20	High pressure protective operation } Protective device of outdoor unit worked.
	P22	Outdoor unit fan system error
	P26	Short-circuit of compressor drive element
	P29	Position detection circuit error
	P31	Stopped because of error of other indoor units in a group (Check codes of E03/L03/L07/L08)

Lamp indication	Check code	Cause of trouble occurrence
Operation Timer Ready  Alternate flash	F01	Heat exchanger sensor (TCJ) error Heat exchanger sensor (TC) error Heat exchanger sensor (TA) error } Indoor unit sensor error
	F02	
	F10	
Operation Timer Ready  Alternate flash	F04	Discharge temp. sensor (TD) error Temp. sensor (TE, TS, TL) error Heat exchanger temp. sensor (TL) error Outside air temp. sensor (TO) error Suction temp. sensor (TS) error Heat sink temp. sensor (TH) error Miss-mounting of temp. sensor (TE, TS) } Sensor error of outdoor unit
	F06	
	F07	
	F08	
	F12	
	F13	
	F15	
Operation Timer Ready  Simultaneous flash	F29	Indoor EEPROM error
Operation Timer Ready  Simultaneous flash	F31	Outdoor EEPROM error
Operation Timer Ready  Flash	H01	Compressor break down } Outdoor compressor system error
	H02	Compressor lock
	H03	Outdoor unit current detection circuit error
	H04	Case thermostat operation
Operation Timer Ready  Simultaneous flash	L03	Duplicated header indoor units There is indoor unit of group connection in individual indoor unit. } → AUTO address * If group construction and address are not normal power supply turned on, automatically goes to address setup mode.
	L07	
	L08	Unsetting of group address
	L09	Missed setting (Unset indoor capacity)
Operation Timer Ready  Simultaneous flash	L10	Outdoor unit unset model type of service P.C. board
	L20	Duplicated indoor central addresses
	L29	Outdoor P.C. board part error was detected (EEPROM error, Heat sink temp. sensor (TH) error) Outdoor unit unset model type of service P.C. board. Outdoor Heat sink overheat error, Gas leak detection, or 4-way valve system error.
	L30	Outside interlock error

8-2-2. Others (Other than Check Code)

Lamp indication	Check code	Cause of trouble occurrence
Operation Timer Ready  Simultaneous flash	—	During test run
Operation Timer Ready  Alternate flash	—	Disagreement of cool/heat (Automatic cool/heat setting to automatic cool/heat prohibited model, or setting of heating to cooling-only model)

8-2-3. Monitor Function of Remote Controller Switch

■ Calling of sensor temperature display

The sensor temperature or operational status of indoor unit, outdoor unit, or remote controller can be monitored.

1 **Push [☰ Menu] to open the “Menu”.**

2 **Push and hold [☰ Menu] and [∨] at the same time to open “Field setting menu”.**

• Push and hold 4 secon .

3 **Push [∧] and [∨] to select “Monitor function”, and then push [▭ Set/Fix].**

→ In a group connection, after a selection in the unit selection screen, move to the “Monitor function” screen.

4 **Push [<] to black highlight the code (DN), and then push [∧] and [∨] to change to CODE No. of the item to monitor. Refer to the next page for CODE No..**

5 **Push [⮌ Return]**

→ Return to the “Field setting menu” screen.

Indoor unit data	
Code	**Data name**
01	Room temperature (remote controller)
02	Indoor unit intake air temperature (TA)
03	Indoor unit heat exchanger (coil) temperature (TCJ)
04	Indoor unit heat exchanger (coil) temperature (TC)
F3	Indoor unit fan cumulative operating hours (x1 h)
E2	Indoor unit refrigerant leak detection sensor output*

Outdoor unit data	
Code	**Data name**
60	Outdoor unit heat exchanger (coil) temperature (TE)
61	Outside air temperature (TO)
62	Compressor discharge temperature (TD)
63	Compressor suction temperature (TS)
65	Heatsink temperature (THS)
6A	Operating current (x1/10)
6D	Outdoor heat exchange (coil) temperature (TL)
F1	Compressor cumulative operating hours (x100 h)

* Display and the contents

- - - - : Sensor function is not available.
0000 : Normal
0001 : Sensor has been used for 5 years.
0002 : Sensor trouble or exceeding the life of the product for sensor
0003 : Sensor is detecting refrigerant leak

8-2-4. Check Code List (Outdoor)

○ : ON, ◎ : Flash, ● : OFF

ALT (Alternate): Alternate flashing when there are two flashing LED/SIM (Simultaneous): Simultaneous flashing when there are two flashing LED

Central Control indication	Remote Controller indication	Sensor lamp part				Defected position	Detection	Explanation of error contents	Automatic Reset	Operation continuation
		Block indication								
		Operation	Timer	Ready	Flash					
19	F04	◎	◎	○	ALT	Outdoor unit Discharge temp. sensor (TD) error	Outdoor	Disconnection, short of discharge temp. sensor (TD) was detected	×	×
18	F06	◎	◎	○	ALT	Outdoor unit heat exchanger temp. sensor (TE) error	Outdoor	Disconnection, short of outdoor unit heat exchanger temp. sensor (TE) was detected.	×	×
18	F07	◎	◎	○	ALT	Outdoor unit Heat exchanger temp. sensor (TL) error	Outdoor	Disconnection, short of outside heat exchanger temp. Sensor (TL) was detected.	×	×
1b	F08	◎	◎	○	ALT	Outdoor unit Outside air temp. sensor (TO) error	Outdoor	Disconnection, short of outside air temp. Sensor (TO) was detected.	○	○
A2	F12	◎	◎	○	ALT	Outdoor unit Suction temp. sensor (TS) error	Outdoor	Disconnection, short of suction temp. Sensor (TS) was detected.	×	×
43	F13	◎	◎	○	ALT	Outdoor unit Heat sink temp. sensor (TH) error	Outdoor	Disconnection, short of heat sink temp. Sensor (TH) (P.C. board installed) was detected.	×	×
18	F15	◎	◎	○	ALT	Outdoor unit Miss-mounting of temp. sensor (TE, TS)	Outdoor	Miss-mounting of outdoor heat exchanger temp. sensor (TE) and suction temp. sensor(TS) was detected.	×	×
1F	H01	●	◎	●		Outdoor unit Compressor break down	Outdoor	Reached release point at min-Hz during compressor operating. Short-circuited current (Idc) was detected after DC excitation.	×	×
1d	H02	●	◎	●		Outdoor unit Compressor lock	Outdoor	Compressor lock was detected.	×	×
17	H03	●	◎	●		Outdoor unit Current detection circuit error	Outdoor	Current detection circuit error.	×	×
44	H04	●	◎	●		Outdoor unit case thermostat operated	Outdoor	Case thermostat operated.	×	×
88	L10	◎	○	◎	SIM	Outdoor unit Unset model type of service P.C. board	Outdoor	When outdoor service P.C .board was used, model type select jumper setting was inappropriate.	×	×
1C	L29	◎	○	◎	SIM	Outdoor unit error	Outdoor	1) Outdoor P.C. board part error was detected (EEPROM error, Heat sink temp. sensor (TH) error) 2) Outdoor unit Unset model type of service P.C. board. 3) Outdoor Heat sink overheat error, Gas leak detection, or 4-way valve system error.	×	×
1E	P03	◎	●	◎	ALT	Outdoor unit Discharge temp. error	Outdoor	Error was detected by discharge temp, release control.	×	×
21	P04	◎	●	◎	ALT	Outdoor unit High pressure SW system error	Outdoor	High pressure protection switch operated.	×	×
AF	P05	◎	●	◎	ALT	Power supply error	Outdoor	Power supply voltage error.	×	×
1C	P07	◎	●	◎	ALT	Outdoor unit Heat sink overheat error	Outdoor	Abnormal overheat was detected by outdoor heat sink temp. sensor (TH).	×	×
AE	P15	◎	●	◎	ALT	Gas leak detection	Outdoor	Abnormal overheat of discharge temp. sensor (TD) or suction temp. sensor (TS) was detected.	×	×
22	P20	◎	●	◎	ALT	Outdoor High pressure protective operation	Outdoor	Error was detected by high pressure release control from indoor / outdoor heat exchanger temp. sensor.	×	×
1A	P22	◎	●	◎	ALT	Outdoor unit Outdoor fan system error	Outdoor	Error (Over-current, lock, etc.) was detected on outdoor fan drive circuit.	×	×
14	P26	◎	●	◎	ALT	Outdoor unit Short-circuit of compressor drive element	Outdoor	Short-circuited protective operation of compressor drive circuit element (G-Tr / IGBT) operated.	×	×
16	P29	◎	●	◎	ALT	Outdoor unit Position detection circuit error	Outdoor	Position detection error of compressor motor was detected.	×	×
97	E01	◎	●	●		No remote controller master unit Remote controller communication error	Remote controller	Signal was not received from indoor unit. Main remote controller was not set. (including 2 remote controllers)	–	–
–	E02	◎	●	●		Remote controller send error	Remote controller	Signal cannot be sent to indoor unit.	–	–
97	E03	◎	●	●		Regular communication error between indoor and remote controller	Indoor	No communication from remote controller and network adapter	○	×
04	E04	●	●	◎		Indoor/Outdoor serial error	Indoor	Serial communication error between indoor and outdoor	○	×
96	E08	◎	●	●		Duplicated indoor addresses ◇	Indoor	Same address as yours was detected.	○	×
99	E09	◎	●	●		Duplicated main remote controllers	Remote controller	In 2-remote controller control, both were set as master. (Indoor master unit stops warning and follower unit continues operation.)	×	×
CF	E10	◎	●	●		Communication error between CPU	Indoor	MCU communication error between main motor and micro computer	○	△

Central Control indication	Remote Controller indication	Sensor lamp part		Defected position	Detection	Explanation of error contents	Automatic Reset	Operation continuation
		Block indication						
		Operation Timer Ready	Flash					
4B	E11	◎ ● ●		Communication error between Application control kit and indoor unit	Indoor	Communication error between Application control kit and indoor unit P.C. board	○	×
97,99	E18	◎ ● ●		Regular communication error between master and follower indoor units	Indoor	Regular communication cannot be performed between master and follower indoor units. Communication between twin master (Main unit) and follower (sub unit) cannot be performed.	○	×
96	L03	◎ ● ◎	SIM	Duplicated indoor master units ◇	Indoor	There are multiple master units in a group.	×	×
99	L07	◎ ● ◎	SIM	There is group cable in individual indoor unit. ◇	Indoor	When even one group connection indoor unit exists in individual indoor unit	×	×
99	L08	◎ ● ◎	SIM	Unset indoor group address ◇	Indoor	Indoor address group was unset.	×	×
46	L09	◎ ● ◎	SIM	Unset indoor capacity	Indoor	Capacity of indoor unit was unset.	×	×
66	L30	◎ ○ ◎	SIM	Outside error input to indoor unit (Interlock)	Indoor	Abnormal stop by CN80 outside error input	×	×
08	P19	◎ ● ◎	ALT	4-way valve inverse error	Indoor Outdoor	In heating operation, error was detected by temp. down of indoor heat exchanger or temp. up of TE, TS.	○	×

◇ When this warning was detected before group construction/address check finish at power supply was turned on, the mode shifts automatically to AUTO address setup mode.

Error mode detected by indoor unit

Operation of diagnostic function				Judgment and measures
Check code	Cause of errors	Status of air conditioner	Condition	
E03	No communication from remote controller (including wireless) and communication adapter	Stop (Automatically reset)	Displayed when error is detected	1. Check cables of remote controller and communication adapters. • Remote controller LCD display OFF (Disconnection) • Central remote controller [97] check code
E04	The serial signal is not output from outdoor unit to indoor unit. • Miswiring of inter-unit wire • Defective serial sending circuit on outdoor P.C. board • Defective serial receiving circuit on indoor P.C. board	Stop (Automatically reset)	Displayed when error is detected	1. Outdoor unit does not completely operate. • Inter-unit wire check, correction of misswiring • Check outdoor P.C. board. Correct wiring of P.C. board. 2. When outdoor unit normally operates Check P.C. board (Indoor receiving / Outdoor sending).
E08	Duplicated indoor unit address	Stop	Displayed when error is detected	1. Check whether remote controller connection (Group/Individual) was changed or not after power supply turned on (Finish of group construction/Address check). * If group construction and address are not normal when the power has been turned on, the mode automatically shifts to address setup mode. (Resetting of address)
L03	Duplicated indoor master unit			
L07	There is group wire in individual indoor unit.			
L08	Unset indoor group address			
L09	Unset indoor capacity	Stop	Displayed when error is detected	1. Set indoor capacity (CODE No. (DN) = 11)
L30	Abnormal input of outside interlock	Stop	Displayed when error is detected	1. Check outside devices. 2. Check indoor P.C. board.
P10	Float switch operation •Float circuit, Disconnection, Coming-off, Float switch contact error	Stop	Displayed when error is detected	1. Trouble of drain pump 2. Clogging of drain pump 3. Check float switch. 4. Check indoor P.C. board. 5. Check Application control kit of indoor unit
P12	Indoor DC fan error	Stop	Displayed when error is detected	1. Position detection error 2. Over-current protective circuit of indoor fan driving unit operated. 3. Indoor fan locked. 4. Check indoor P.C. board.
P19	4-way valve system error • After heating operation has started, indoor heat exchangers temp. is down.	Stop (Automatically reset)	Displayed when error is detected	1. Check 4-way valve. 2. Check PMV 3. Check indoor heat exchanger (TC/TCJ). 4. Check indoor P.C. board.
P31	Own unit stops while warning is output to other indoor units.	Stop (Follower unit) (Automatically reset)	Displayed when error is detected	1. Judge follower unit while header unit is [E03], [L03], [L07] or [L08]. 2. Check indoor P.C. board.
F01	Coming-off, disconnection or short of indoor heat exchanger temp. sensor (TCJ)	Stop (Automatically reset)	Displayed when error is detected	1. Check indoor heat exchanger temp. sensor (TCJ). 2. Check indoor P.C. board.
F02	Coming-off, disconnection or short of indoor heat exchanger temp. sensor (TC)	Stop (Automatically reset)	Displayed when error is detected	1. Check indoor heat exchanger temp. sensor (TC). 2. Check indoor P.C. board.
F10	Coming-off, disconnection or short of indoor heat exchanger temp. sensor (TA)	Stop (Automatically reset)	Displayed when error is detected	1. Check indoor heat exchanger temp. sensor (TA). 2. Check indoor P.C. board.
F29	Indoor EEPROM error • EEPROM access error	Stop (Automatically reset)	Displayed when error is detected	1. Check indoor EEPROM. (including socket insertion) 2. Check indoor P.C. board.
E10	Communication error between indoor MCU •Communication error between fan driving MCU and main MCU	Stop (Automatically reset)	Displayed when error is detected	1. Check indoor P.C. board.
E11	Communication error between Application and indoor unit	Stop (Automatically reset)	Displayed when error is detected	1. Check power supply / communication harness 2. Check indoor P.C. board
E18	Regular communication error between indoor master and follower units and between main and sub units	Stop (Automatically reset)	Displayed when error is detected	1. Check remote controller wiring. 2. Check indoor power supply wiring. 3. Check indoor P.C. board.

Error mode detected by outdoor unit

Operation of diagnostic function				Judgment and measures
Check code / Indoor unit	Cause of errors	Status of air conditioner	Condition	
F04	Disconnection, short of discharge temp. sensor (TD)	Stop	Displayed when error is detected	1. Check discharge temp. sensor (TD). 2. Check outdoor P.C. board
F06	Disconnection, short of heat exchanger temp. sensor (TE)	Stop	Displayed when error is detected	1. Check heat exchanger temp. sensor (TE). 2. Check outdoor P.C. board .
F07	Disconnection, short of heat exchanger temp. sensor (TL)	Stop	Displayed when error is detected	1. Check heat exchanger temp. sensor (TL). 2. Check outdoor P.C. board .
F12	Disconnection, short of suction temp. sensor (TS)	Stop	Displayed when error is detected	1. Check suction temp. sensor (TS). 2. Check outdoor P.C. board.
F15	Miss-mounting of outdoor temp. sensor (TE, TS)	Stop	Displayed when error is detected	1. Check temp. sensor (TE, TS). 2. Check outdoor P.C. board.
F08	Disconnection, short of outside air temp. sensor (TO)	Continue	Displayed when error is detected	1. Check outside air temp. sensor (TO). 2. Check outdoor P.C. board.
F13	Disconnection, short of heat sink temp. sensor (TH)	Stop	Displayed when error is detected	1. Check outdoor P.C. board
F31	Outdoor EEPROM error	Stop	Displayed when error is detected	1. Check outdoor P.C. board.
L10	Unset model type of service P.C. board	Stop	Displayed when error is detected	1. Outdoor service P.C. board. Check model type setting jumper wire.
P07	Heat sink overheat error * Heat sink temp. sensor detected over specified temperature.	Stop	Displayed when error is detected	1. Check screw tightening between P.C. board and heat sink and check radiator grease. 2. Check heat sink blast path.
P15	Detection of gas leak * Discharge temp. sensor (TD), Suction temp. sensor (TS) detected temperature over specified temp.	Stop	Displayed when error is detected	1. Check gas leak, recharge 2. Check full open of service valve. 3. Check PMV (Pulse Motor Valve). 4. Check broken pipe. 5. Check discharge temp. sensor (TD), suction temp. sensor (TS).
P19	4-way valve inverse error * After heating operation has started, indoor heat exchanger temp. drops under the specified temp. * After heating operation has started, outdoor heat exchanger / suction temp. rises over the specified temp.	Stop	Displayed when error is detected	1. Check operation of 4-way valve. 2. Check outdoor heat exchanger (TE), suction temp. sensor (TS). 3. Check indoor heat exchanger sensor (TC). 4. Check 4-way valve coil. 5. Check PMV (Pulse Motor Valve).
H01	Compressor break down * Although operation has started, operation frequency decreases and operation stops.	Stop	Displayed when error is detected	1. Check power supply voltage. (60 Hz : AC198 to 242V) 2. Overload operation of refrigerating cycle
H02	Compressor lock * Over-current detection after compressor start-up	Stop	Displayed when error is detected	1. Compressor problem (Lock, etc.): Replace compressor. 2. Compressor wiring error (Open phase)

Operation of diagnostic function				Judgment and measures
Check code / Indoor unit	Cause of errors	Status of air conditioner	Condition	
H03	Current detection circuit error	Stop	Displayed when error is detected	1. Check outdoor P.C. board. (AC current detection circuit)
H04	Case thermostat operation *Abnormal overheat of compressor	Stop	Displayed when error is detected	1. Check case thermostat and its connector 2. Check gas leak, recharge 3. Check full open of service valve 4. Check PMV (Pulse Motor Valve) 5. Check broken pipe
P03	Discharge temp. error * Discharge temp. (TD) over specified value was detected.	Stop	Displayed when error is detected	1. Check refrigerating cycle (Gas leak) 2. Check PMV (Pulse Motor Valve) 3. Check discharge temp. sensor (TD).
P04	High pressure SW system error	Stop	Displayed when error is detected	1. Check service valves are fully opened. (Gas side, Liquid side) 2. Check outdoor fan operation. 3. Check motor error of outdoor fan. 4. Check clogging of outdoor PMV. 5. Check clogging of heat exchanger in indoor/outdoor units. 6. Short-circuit of suction/discharge air in outdoor unit. 7. Check outdoor P.C. board error. 8. Check fan system error (Cause of air volume drop) at indoor side. 9. Check PMV opening status in indoor unit.
P05	Power supply voltage error	Stop	Displayed when error is detected	1. Check power supply voltage. 60 Hz : AC 198 to 242 V
P20	High pressure protective operation • During cooling operation, outdoor temp. sensor (TL) detected temperature over specified temp. • During heating operation, indoor temp. sensor (TC, TCJ) detected temperature over specified temp.	Stop	Displayed when error is detected	1. Check outdoor heat exchanger sensor (TL). 2. Check indoor heat exchanger sensor (TC, TCJ). 3. Check full open of service valve. 4. Check indoor/outdoor fan. 5. Check PMV (Pulse Motor Valve). 6. Check clogging and short circuit of indoor/outdoor heat exchanger. 7. Overcharge of refrigerant. Recharge
P22	Outdoor fan system error	Stop	Displayed when error is detected	1. Check lock of fan motor. 2. Check power supply voltage. (60 Hz : AC198 to 242V) 3. Check outdoor P.C. board.
P26	Short-circuit error of compressor driving element	Stop	Displayed when error is detected	1. When performing operation while taking-off compressor wire. If P26 error occurs, check control P.C. board. 2. When performing operation while taking-off compressor wire. If an error does not occurs, compressor is layer short.
P29	Position detection circuit error	Stop	Displayed when error is detected	1. Check control P.C. board.

Error mode detected by remote controller or central controller (TCC-LINK)

Operation of diagnostic function				Judgment and measures
Check code	**Cause of errors**	**Status of air conditioner**	**Condition**	
Not displayed at all (Operation on remote controller cannot be operated.)	No communication with master indoor unit • Remote controller wiring is not correct. • Power of indoor unit is not turned on. • Automatic address cannot be completed.	Stop	—	Power supply error of remote controller, Indoor EEPROM error 1. Check remote controller inter-unit wiring. 2. Check remote controller. 3. Check indoor power wiring. 4. Check indoor P.C. board. 5. Check indoor EEPROM. (including socket insertion) → Automatic address repeating phenomenon generates.
E01 ∗1	No communication with master indoor unit • Disconnection of inter-unit wire between remote controller and master indoor unit (Detected by remote controller side)	Stop (Automatically reset) ∗ If center exists, operation continues.	Displayed when error is detected	Receiving error from remote controller 1. Check remote controller inter-unit wiring. 2. Check remote controller. 3. Check indoor power wiring. 4. Check indoor P.C. board.
E02	Signal send error to indoor unit (Detected by remote controller side)	Stop (Automatically reset) ∗ If center exists, operation continues.	Displayed when error is detected	Error sending of remote controller 1. Check sending circuit inside the remote controller. → Replace remote controller.
E09	There are multiple main remote controllers. (Detected by remote controller side)	Stop (Sub unit continues operation.)	Displayed when error is detected	1. In 2-remote controllers (including wireless), there are multiple main units. Check that there are 1 main remote controller and other sub remote controllers.
L20 Central controller L20	Duplicated indoor central addresses on communication of central control system (Detected by indoor/central controller side)	Stop (Automatically reset)	Displayed when error is detected	1. Check setting of central control system network address. (Network adapter SW01) 2. Check network adapter P.C. board.
— ∗2 Central controller (Send) C05 (Receive) C06	Communication circuit error of central control system (Detected by central controller side)	Continues (By remote controller)	Displayed when error is detected	1. Check communication wire / miswiring 2. Check communication (U3, U4 terminals) 3. Check network adapter P.C. board. 4. Check central controller (such as central control remote controller, etc.) 5. Check terminal resistance. (TCC-LINK)
— Central controller P30	Indoor Gr sub unit error (Detected by central controller side)	Continuation/Stop (According to each case)	Displayed when error is detected	Check the check code of the corresponding unit from remote controller.

∗1 The check code cannot be displayed by the wired remote controller. (Usual operation of air conditioner becomes unavailable.)

For the wireless models, an error is notified by indication lamp.

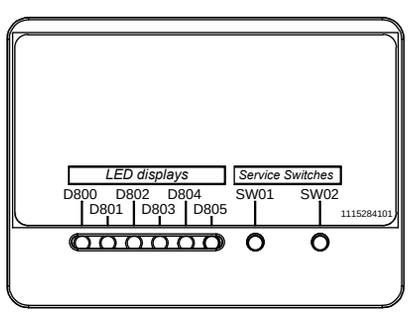
∗2 This trouble is related to communication of remote controller (A, B), central system (TCC-LINK U3, U4), and [E01], [E02], [E03], [E09] or [E18] is displayed or no check display on the remote controller according to the contents.

TROUBLESHOOTING

* When the errors were overlapped, the latest error is displayed.
* When D800 to D804 are slowly flashing or D805 is flashing, push and hold SW01 and SW02 simultaneously for 5 seconds or more. The error display changes to the error which is generated.

No.	Error	Display					
		D800	D801	D802	D803	D804	D805
1	Normal	●	●	●	●	●	○
2	Discharge temperature sensor (TD) error	◎	●	●	●	●	○
3	Heat exchanger temperature sensor (TE) error	●	◎	●	●	●	○
4	Liquid temperature sensor (TL) error	◎	◎	●	●	●	○
5	Outside temperature sensor (TO) error	●	●	◎	●	●	○
6	Suction temperature sensor (TS) error	◎	●	◎	●	●	○
7	Heat sink temperature sensor (TH) error	●	◎	◎	●	●	○
8	Miss-mounting of sensor (TE, TS)	◎	◎	◎	●	●	○
9	EEPROM error	●	◎	●	◎	●	○
10	Compressor breakdown	◎	◎	●	◎	●	○
11	Compressor lock	●	●	◎	◎	●	○
12	Current detection circuit error	◎	●	◎	◎	●	○
13	Case thermostat activated	●	◎	◎	◎	●	○
14	Unset model type	●	●	●	●	◎	○
15	Communication error between MCUs	◎	●	●	●	◎	○
16	Discharge temperature sensor error	●	◎	●	●	◎	○
17	High pressure SW error	◎	◎	●	●	◎	○
18	Power supply voltage error	●	●	◎	●	◎	○
19	Heatsink overheating error	●	◎	◎	●	◎	○
20	Gas leak detected	◎	◎	◎	●	◎	○
21	4-way valve reversal error	●	●	●	◎	◎	○
22	High pressure protective activated	◎	●	●	◎	◎	○
23	Fan system error	●	◎	●	◎	◎	○
24	Compressor driver device short circuit	◎	◎	●	◎	◎	○
25	Position detection circuit error	●	●	◎	◎	◎	○

○ : ON, ● : OFF, ◎ : Rapid flashing (5 times/sec.)



* The LEDs and switches are located at the Sub P.C.Board of the outdoor unit as shown in the figure on the left.

LED displays

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

8-2-5. Diagnostic Procedure for Each Check Code (Outdoor Unit)

1) This section describes the diagnostic method for each check code displayed on the wired remote controller.
2) In some cases, a check code indicates multiple symptoms.
   In this case, confirm LED display on the outdoor unit to narrow the contents to be confirmed.
3) The check code on the wired remote controller is displayed only when the same error occurred continuously by multiple times while LED of the outdoor unit displays even an error which occurred once.
   Therefore the display on the wired remote controller may differ from that of LED.

LED display on outdoor unit

Operation method of the service SW

[Display of error which is generating]

• When even one of D800 to D804 rapid flashing, it indicates that an error occurred. When D800 to D801 indicate slow flashing or when D805 flashes, push and hold SW01 and SW02 for 5 seconds or more simultaneously. The error display exchanges to display of the error under occurrence at present.

[Example of discharge temp. sensor error]

(No error)

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

○ : ON, ● : OFF, ◎ : Rapid flashing (5 times /second)

(Error occurred)

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

○ : ON, ● : OFF, ◎ : Rapid flashing (5 times /second)

Display of the latest error

• The latest error is displayed by the following action. As the memory is kept, it is confirmed even after the power supply was turned off once. (Except outside air temp. sensor (TO) error)

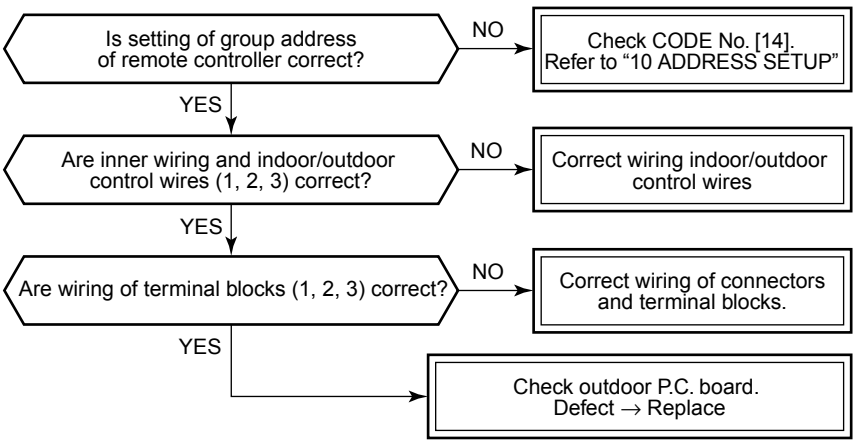
1) Check D800 to D804 are turned off (or rapid flashing) and D805 is turned on. When D800 to D804 are slowly flashing or D805 flashes, push and hold SW01 and SW02 for 5 seconds or more simultaneously. D800 to D804 will be turned off (or rapid flashing) and D805 flashes.
2) Push SW01, D805 changes to rapid flashing.
3) Push SW01 several times and change LED display (D800 to D804) to [Display of latest error (Including the present error)].
4) Push SW02. The latest error is displayed.
5) When finishing the work, be sure to execute item 1) to return LED to the initial status (Display of on occurring error).

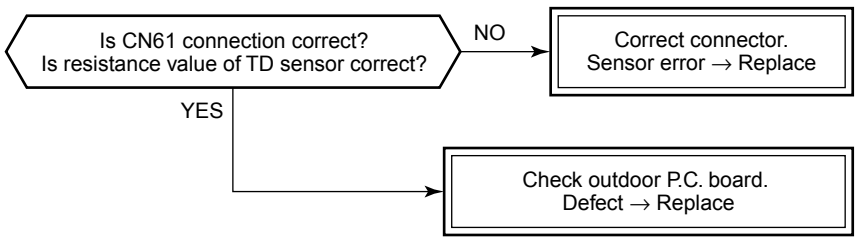
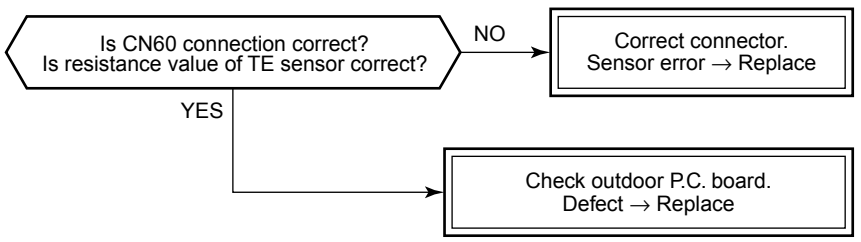
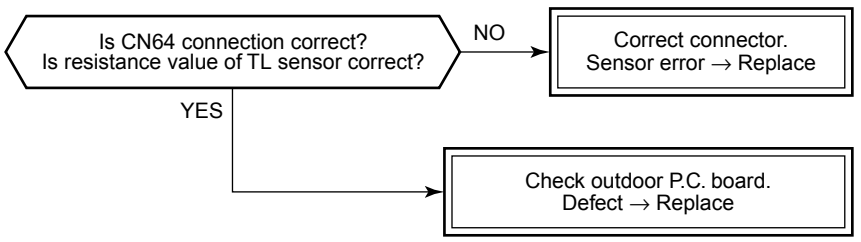
Display of latest error
(Including the present error)

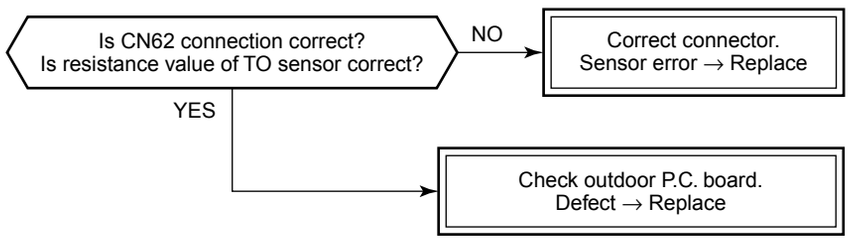
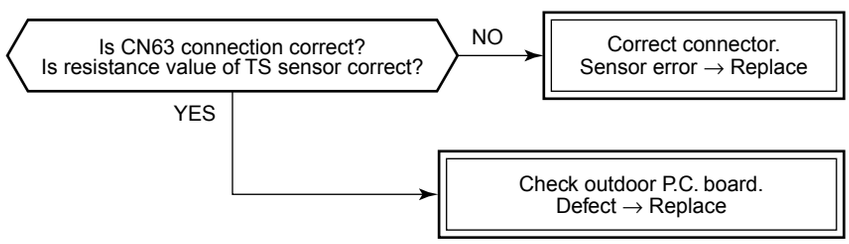
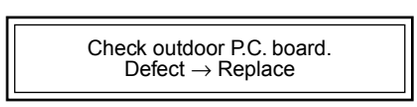
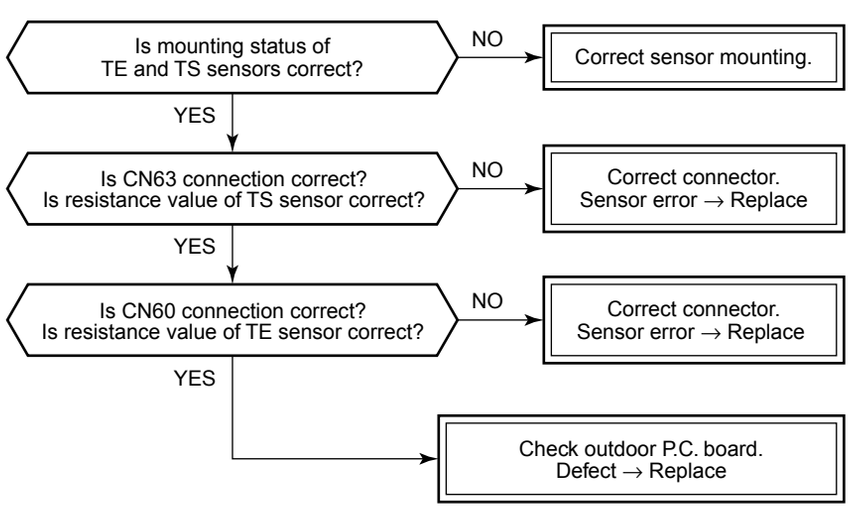
○	●	●	●	●	◎
D800 (Yellow)	D801 (Yellow)	D802 (Yellow)	D803 (Yellow)	D804 (Yellow)	D805 (Green)

○ : ON, ● : OFF, ◎ : Rapid flashing (5 times /second)

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[E04]	—	[Indoor/Outdoor communication error]



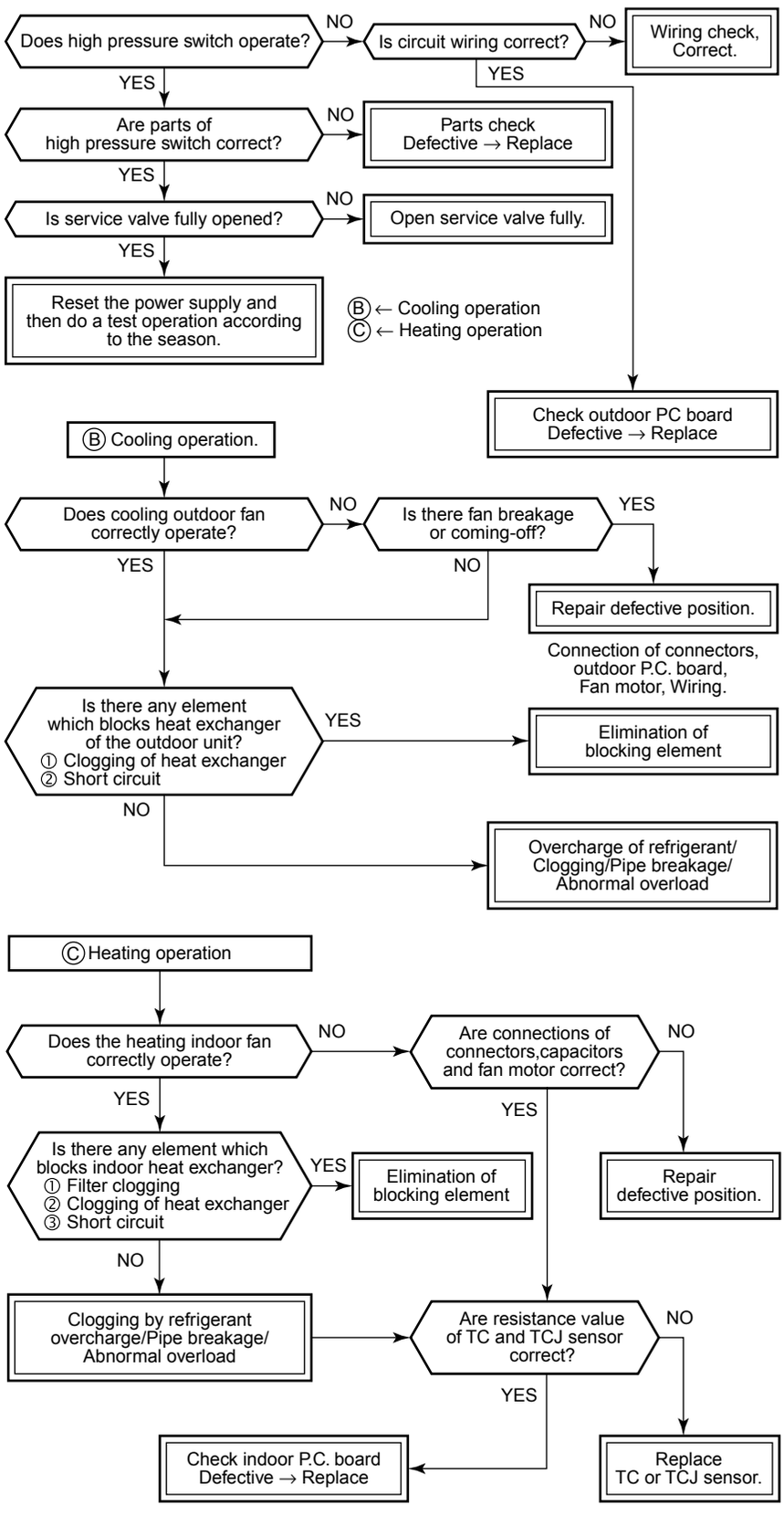
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[F04]	◎ ● ● ● ● ○	**[Discharge temp. sensor (TD) error]** 
[F06]	● ◎ ● ● ● ○	**Heat exchanger temp. sensor (TE) error]** 
[F07]	◎ ◎ ● ● ● ○	**[Heat exchanger temp. sensor (TL) error]** 

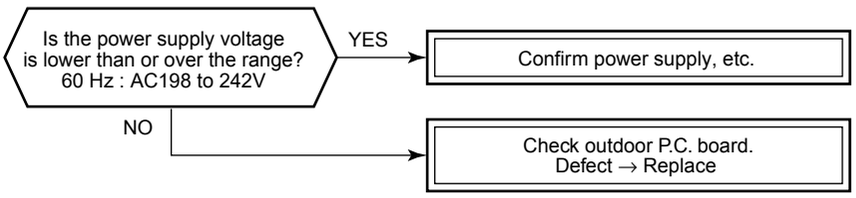
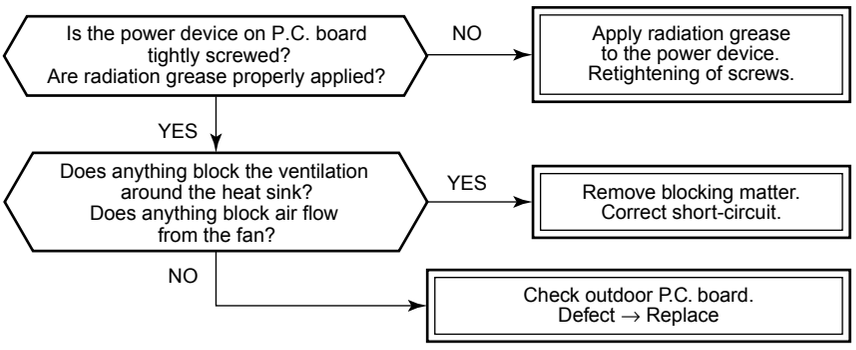
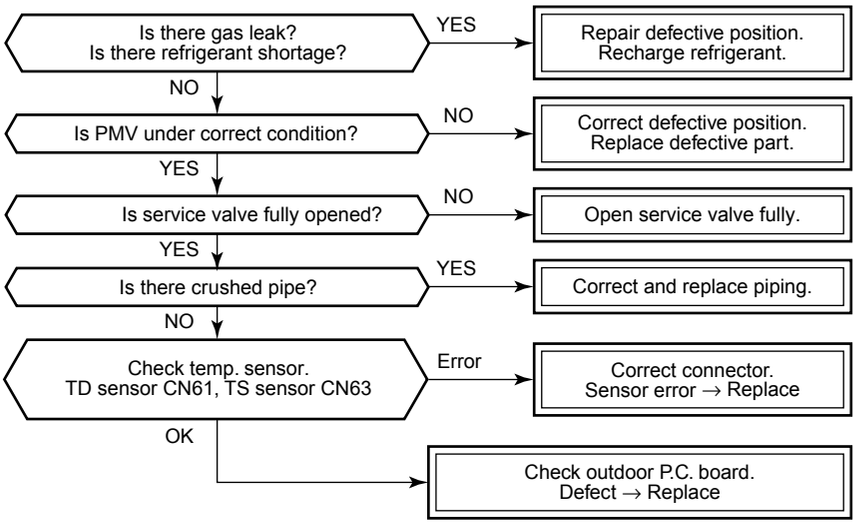
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[F08]	● ● ◎ ● ● ○	**[Outside air temp. sensor (TO) error]** 
[F12]	◎ ● ◎ ● ● ○	**[Suction temp. sensor (TS) error]** 
[F13]	● ◎ ◎ ● ● ○	**[Heat sink temp. sensor (TH) error]** 
[F15]	◎ ◎ ◎ ● ● ○	**[Miss-mounting of outdoor temp. sensor (TE)** 

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[F31]	● ◎ ● ◎ ● ○	**[EEPROM error]** Check outdoor P.C. board. Defect → Replace
[H01]	◎ ◎ ● ◎ ● ○	**[Compressor break down]** Is power supply voltage correct? 60 Hz : AC198 to 242V — NO → Correct power supply line. YES Is wire connection correct? Compressor lead (P.C. board side, Compressor side), Reactor lead, Power supply lead — NO → Check wire connection and correct it. YES Does an abnormal overload happen? — YES → Remove and improve the cause of overload. NO Check outdoor P.C. board. Defect → Replace
[H02]	● ● ◎ ◎ ● ○	**[Compressor lock]** Is power supply voltage correct 60 Hz : AC198 to 242V — NO → Correct power supply line. YES Is wire connection correct? Compressor lead (P.C. board side, Compressor side), Reactor lead, Power supply lead — NO → Check wire connection and correct it. YES Is compressor under correct condition? — YES → Check outdoor P.C. board. Defect → Replace NO Is there refrigerant stagnation? — NO → Compressor lock → Replace YES Does PMV correctly operate? — NO → Check TE, TS sensors and PMV. Defect → Replace YES Check outdoor P.C. board. Defect → Replace

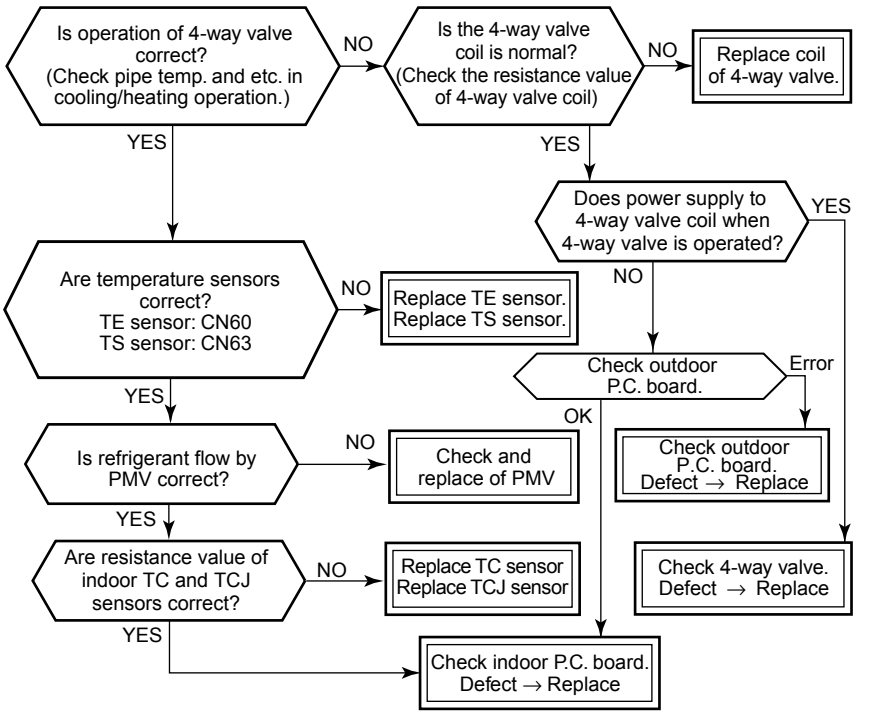
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[H03]	◎ ● ◎ ◎ ● ○	**[Current detection circuit error]** Check outdoor P.C. board. Defect → Replace
[H04]	● ◎ ◎ ◎ ● ○	**[Case thermostat operation]** Are CN68 connection and case thermostat correct? NO → Correct connector. Case thermostat error → Replace YES ↓ Short each pins of CN500. Can compressor operate? NO → Check outdoor P.C. board. Defect → Replace YES ↓ Is there gas leak? Is there refrigerant shortage? YES → Repair defectives position. Recharge refrigerant. NO ↓ Is service valve fully opened? NO → Open service valve fully. YES ↓ Is PMV under correct conditions? NO → Correct defective position. Replace defective part. YES ↓ Check crushed or broken pipe. Defect → Correct and Replace
[L10]	● ● ● ● ◎ ○	**[Unset model type] :** Only when service P.C. board is used Cut jumper line according to the explanation sheet packaged with the service P.C. board.
[P03]	● ◎ ● ● ◎ ○	**[Discharge temp. error]** Is there gas leak? Is there refrigerant shortage? YES → Repair defective position. Recharge refrigerant. NO ↓ Is PMV under correct condition NO → Repair defective position. Replace defective part. YES ↓ Does an abnormal overload happen YES → Remove and improve the cause of overload. NO ↓ Is CN61 connection correct? Is resistance value of TD sensor correct? NO → Correct connector. Sensor error → Replace YES ↓ Check outdoor P.C. board. Defect → Replace

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P04]	◎◎●●◎○	**[High pressure SW system error]**



Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P05]	● ● ◎ ● ◎ ○	**[Power supply error]** 
[P07]	● ◎ ◎ ● ◎ ○	**[Heat sink overheat error]** 
[P15]	◎ ◎ ◎ ● ◎ ○	**[Gas leak detection]** 

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P19]	● ● ● ◎ ◎ ○	**[4-way valve inverse error]**



4-way valve maintenance check operation (SW01 and SW02 operations)

You can confirm 4-way valve operation by handling service switches SW01 and SW02. Use this method to check whether there is trouble or not on the 4-way valve.

[Method]

(1) Check D800 to D804 are turned off (or rapid flashing) and D805 is turned on. When D800 to D804 flash slowly or D805 flashes, push and hold SW01 and SW02 for 5 seconds or more simultaneously. In the result, D800 to D804 are turned off (or rapid flashing) and D805 changes from flashing to lighting.

(2) Push and hold SW01 for 5 seconds or more. D804 changes to slow flashing.

(3) Push SW01 several time and stop it at LED display of the following "Self-preservation valve operation"

	D800	D801	D802	D803	D804	
Self-preservation valve suck operation	○	●	○	○	◎	switch to heating cycle This function is operated only by ten seconds, and turned off afterwards.
Self-preservation valve secession operation	●	○	○	○	◎	switch to cooling cycle This function is operated only by ten seconds, and turned off afterwards.

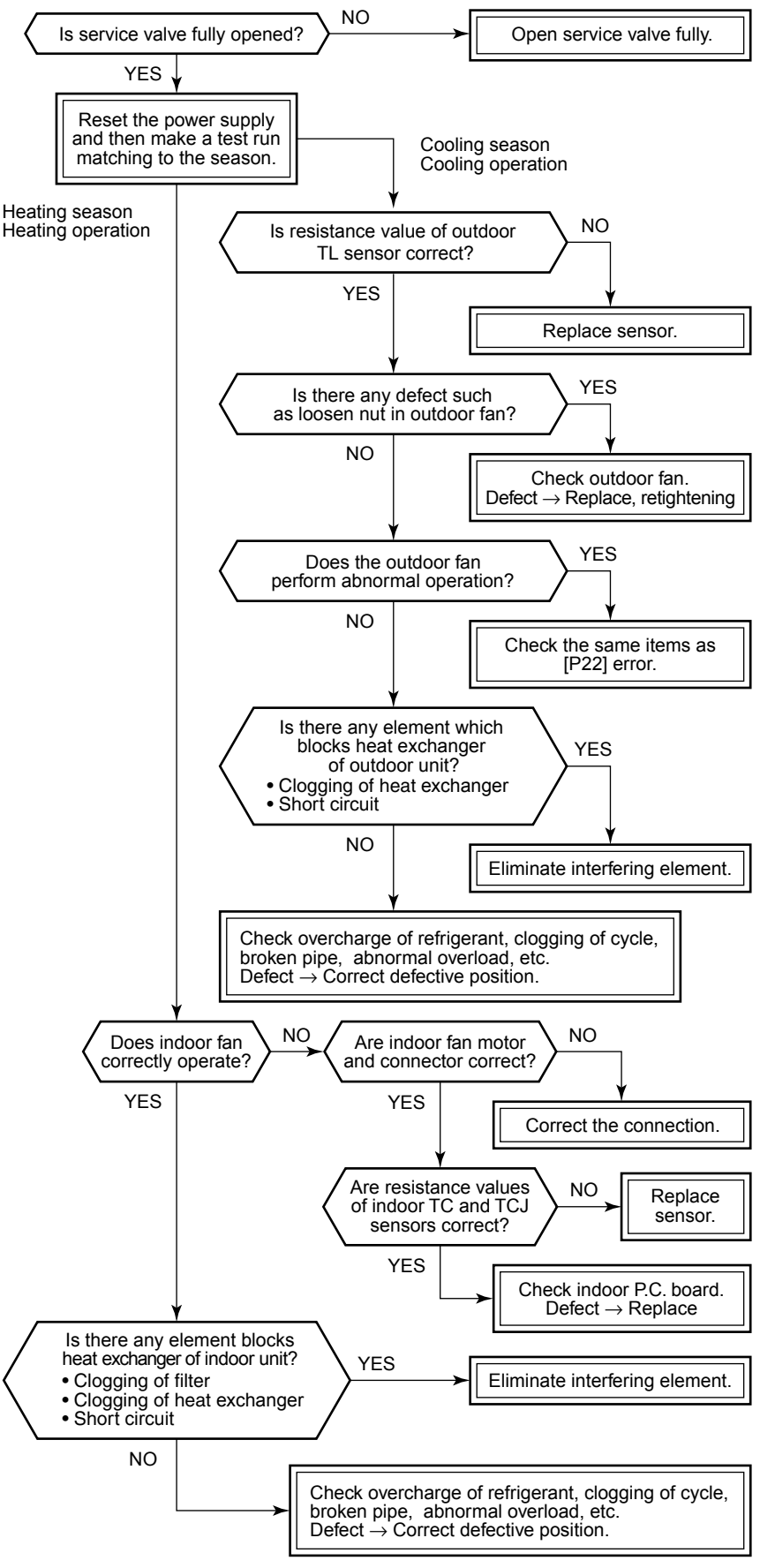
○ : ON, ● : OFF, ◎: Rapid flashing (5 times/second)

(4) Push SW02 and then stop it at LED display of D805 flashes rapidly.

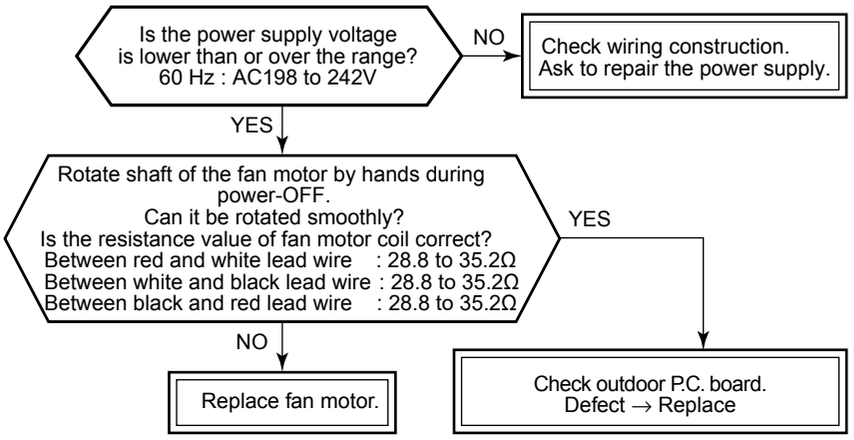
(5) Push and hold SW02 for 5 seconds or more. In the result, D804 changes to slow flashing, D805 changes to lighting and the 4-way valve is operated.

* 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).

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P20]	◎ ● ● ◎ ◎ ○	**[High pressure protective operation]**



Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P22]	● ◎ ● ◎ ◎ ○	**[Fan system error]**



Single operation check for outdoor fan

A single operation of the outdoor fan can be confirmed by handling the service switches SW01 and SW02. Use this method to check whether there is trouble on the fan or not.

[**Method]**

(1) Check D800 to D804 are turned off (or rapid flashing) and D805 is turned on. When D800 to D804 flash slowly or D805 flashes, push and hold SW01 and SW02 for 5 seconds or more simultaneously. As a D800 to D804 are turned off (or rapid flashing) and D805 changes from flashing to lighting.

(2) Push and hold SW01 for 5 seconds or more. D804 changes to slow flashing.

(3) Push SW01 several times until the LED displays as the following “Outdoor fan single operation”.

	D800	D801	D802	D803	D804
Outdoor fan single operation	○	○	●	○	◎

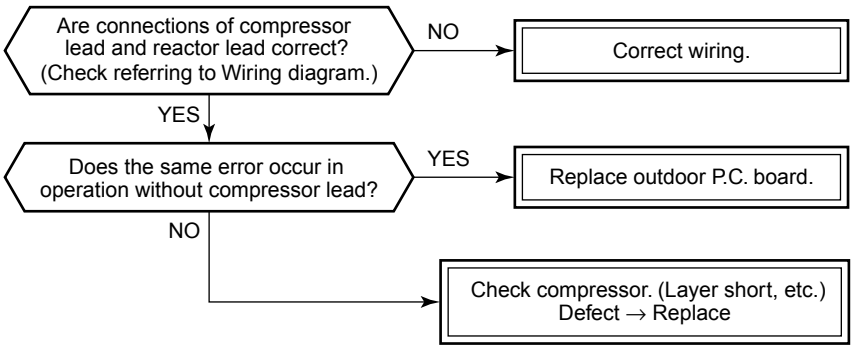
○ : ON, ● : OFF ◎ : Rapid flashing

(4) Push SW02 several times until D805 rapidly flashes rapidly.

(5) Push and hold SW02 for 5 seconds or more. As a result, D804 changes to slow flashing, D805 changes to lighting and the fan rotates.

(6) The fan stops when pushing long SW01 and SW02 for 5 seconds or more simultaneously or when 2 minutes passed.

* If lost tracking on the operation, push and hold SW01 and SW02 for 5 seconds or more simultaneously to return to the item (1).

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P26]	◎ ◎ ● ◎ ◎ ○	**[Short-circuit of compressor driving elements]** 
[P29]	● ● ◎ ◎ ◎ ○	**[Position detection circuit error]** 
— No code	◎ ● ◎ ◎ ◎ ○	**[Other]** Compressor disorder due to sudden change of load, etc. ∗ Although the display of outdoor LED outputs, the unit automatically restarts and error is not determined. ∗ A code may appear when an open phase of compressor, coming-out of wires or power relay trouble occurred.

8-2-6. Diagnostic Procedure for Each Check Code (Outdoor Unit)

Temperature sensor **Temperature – Resistance value characteristic table**

TA, TC, TCJ, TE, TS, TO sensors

Representative value

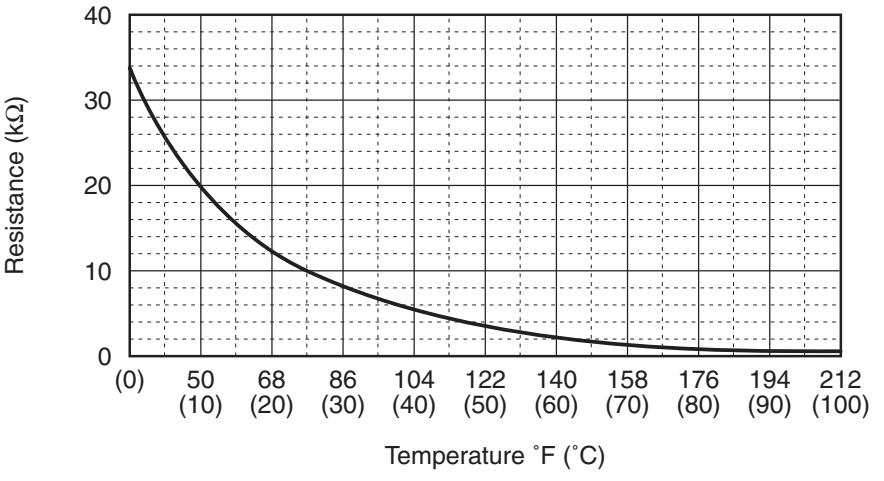
Temperature °F (°C)	Resistance value (kΩ)		
	(Minimum value)	(Standard value)	(Maximum value)
32 (0)	32.33	33.80	35.30
50 (10)	19.63	20.35	21.09
68 (20)	12.23	12.59	12.95
77 (25)	9.75	10.00	10.25
86 (30)	7.764	7.990	8.218
104 (40)	5.013	5.192	5.375
122 (50)	3.312	3.451	3.594
140 (60)	2.236	2.343	2.454
158 (70)	1.540	1.623	1.709
176 (80)	1.082	1.146	1.213
194 (90)	0.7740	0.8237	0.8761
212 (100)	0.5634	0.6023	0.6434

TD, TL sensors

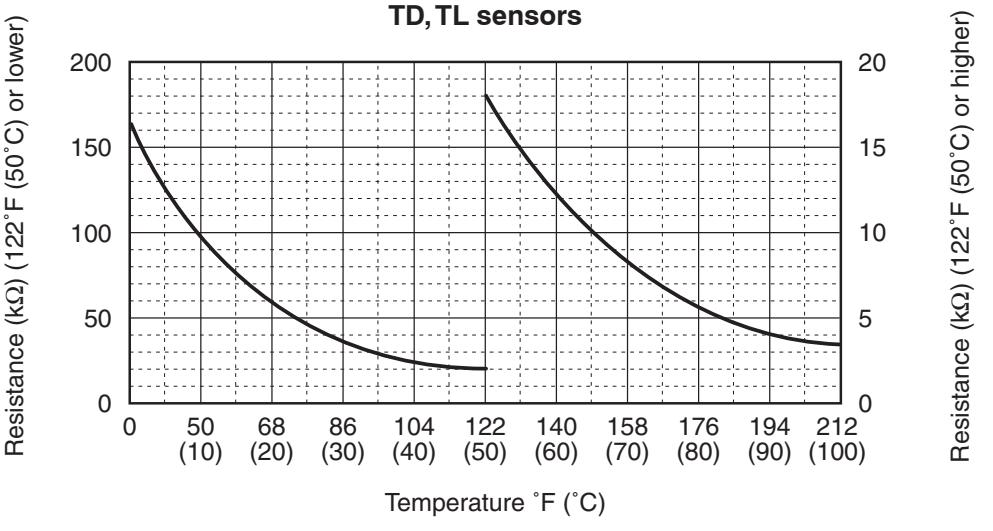
Representative value

Temperature °F (°C)	Resistance value (kΩ)		
	(Minimum value)	(Standard value)	(Maximum value)
32 (0)	150.5	161.3	172.7
50 (10)	92.76	99.05	105.6
68 (20)	58.61	62.36	66.26
77 (25)	47.01	49.93	52.97
86 (30)	37.93	40.22	42.59
104 (40)	25.12	26.55	28.03
122 (50)	17.00	17.92	18.86
140 (60)	11.74	12.34	12.95
158 (70)	8.269	8.668	9.074
176 (80)	5.925	6.195	6.470
194 (90)	4.321	4.507	4.696
212 (100)	3.205	3.336	3.468

TA, TC, TCJ, TE, TS, TO sensors

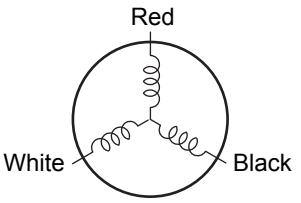


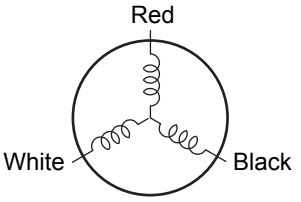
TD, TL sensors

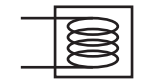


* As TH sensor (Outdoor unit heat sink temp. sensor) is incorporated in the outdoor control P.C. board, the resistance value cannot be measured.

8-3. Table Inspection of outdoor unit main parts

<table>
<tr><th>No.</th><th>Parts name</th><th>Checking procedure</th></tr>
<tr><td>1</td><td>Compressor
(Model : MTD226RKQF8LV8C)</td><td>Measure the resistance value of each winding by using the tester.
 

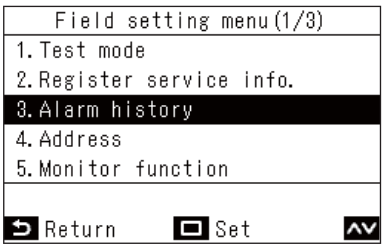
<table>
<tr><th>Position</th><th>Resistance value</th></tr>
<tr><td>Red – White</td><td rowspan="3">1.22 Ω</td></tr>
<tr><td>White – Black</td></tr>
<tr><td>Black – Red</td></tr>
</table>
Under 68°F(20°C)</td></tr>
<tr><td>2</td><td>Fan motor
(Model : SDM-340-60)</td><td>Measure the resistance value of each winding by using the tester.
 

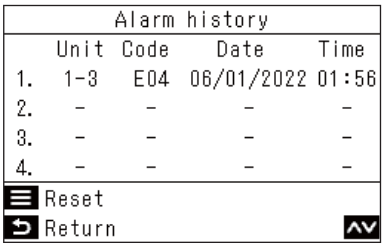
<table>
<tr><th>Position</th><th>Resistance value</th></tr>
<tr><td>Red – White</td><td rowspan="3">32.0 ± 3.2 Ω</td></tr>
<tr><td>White – Black</td></tr>
<tr><td>Black – Red</td></tr>
</table>
Under 68°F(20°C)</td></tr>
<tr><td>3</td><td>3-way valve coil
(Cooling/heating switching)
(Model : SQ-D27012-000752)</td><td>Measure the resistance value of each winding by using the tester.
 
Connector : White
<table>
<tr><th>Resistance value</th></tr>
<tr><td>7.0 ± 0.7 Ω</td></tr>
</table>
Under 68°F(20°C)</td></tr>
</table>

9. SETUP AT LOCAL SITE AND OTHERS

9-1. Calling of Error History

Displays the last 10 check codes, and at which unit and when they occurred.





1 **In the “Field setting menu” screen, press [ ] and [ ] to select “Alarm history”, and then press [Set/Fix]**

NOTE

- The check code history data shows a history of 10 occurrences. If the occurrences exceed 10, the oldest data is deleted.
- If the same check code occurs repeatedly, the date of the first occurrence is displayed.

Deleting check code history

1 **Press [Menu] while the “Alarm history” screen is displayed**
→“Reset all alarm data.” is displayed.

2 **Press [Set/Fix]**

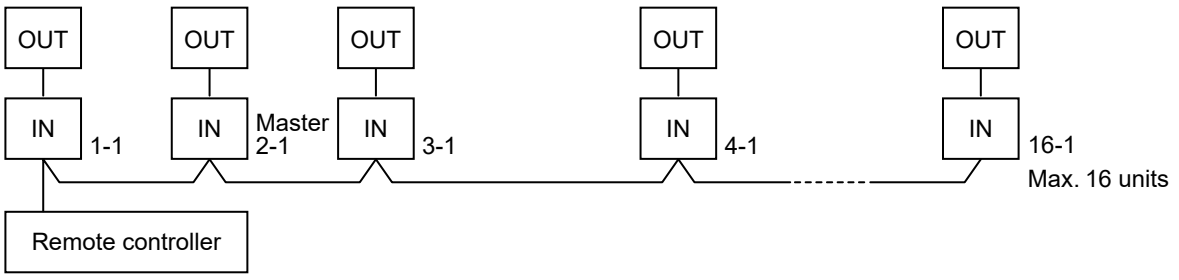
REQUIREMENT

If you are using 2 remote controllers, delete the history at each remote controller.

9-2. Group Control Operation

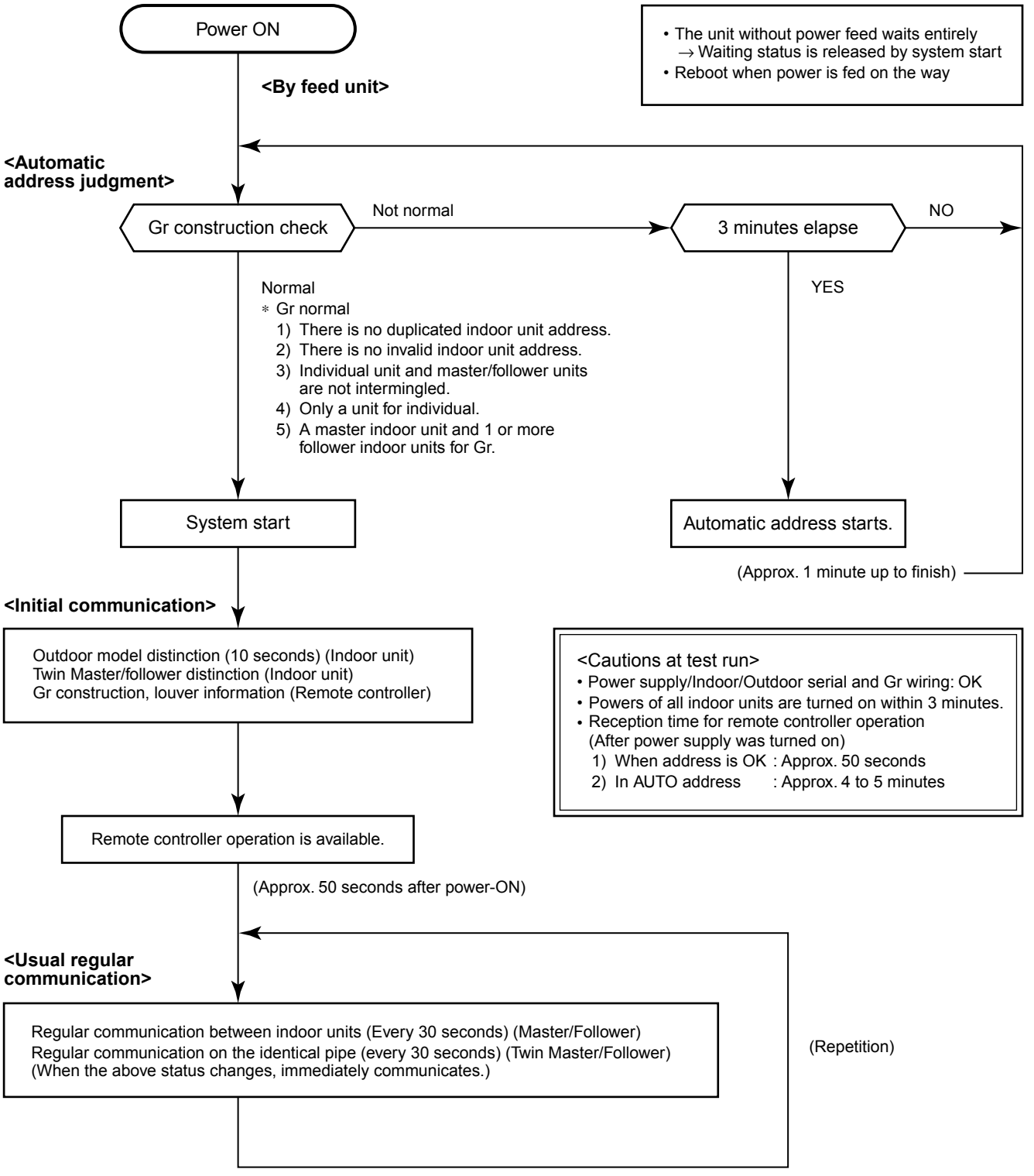
In a group control, operation of maximum 16 indoor units can be controlled by a remote controller.
The indoor unit connected with outdoor unit (Individual/Master of twin) controls room temperature according to setting on the remote controller.

<System example>



1. Display range on remote controller
   The setup range (Operation mode/Air volume select/Setup temp) of the indoor unit which was set to the master unit is reflected on the remote controller.
2. Address setup
   Turn on power of the indoor unit to be controlled in a group within 3 minutes after setting of automatic address. If power of the indoor unit is not turned on within 3 minutes (completion of automatic address setting), the system is rebooted and the automatic address setting will be judged again.
   1) Connect 3 In/Out cables surely.
   2) Check line address/indoor address/group address of the unit one by one.
   3) The unit No. (line/indoor gout address) which have been set once keep the present status as a rule if the unit No. is not duplicated with one of another unit.

■ Indoor unit power-ON sequence



In a group operation, if the indoor unit which was fed power after judgment of automatic address cannot receive regular communication from the master unit and regular communication on identical pipe within 120 seconds after power was turned on, it reboots (system reset).

→ The operation starts from judgment of automatic address (Gr construction check) again.
(If the address of the master unit was determined in the previous time, the power fed to the master unit and reboot works, the master unit may change though the indoor unit line address is not changed.)

9-3. Outdoor Unit

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

Service switch (SW01, SW02) operations

LED display

• 4 patterns are provided for LED display.

○ : ON, ● : OFF, ◎ : Rapid flashing (5 times/second), ◇ : Slow flashing (Once/second)

• In the initial status of LED display, D805 is ON as the right figure.

When the initial status does not appear (in case of flashing of 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.

LED display : initial status

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

9-3-1. Refrigerant recovery control

HFC refrigerant is “Ozone layer destructive coefficient = 0”. However the discharge regulation is established for HFC refrigerant as it is greenhouse gas.

For this Model, a switch is mounted for refrigerant recovery operation (pump down) by the outdoor unit so that this Model can easily react to the environment when it will be reinstalled or scrapped.

[Operating method]

1) Set fan operation to the indoor unit.
2) Check LED display is the initial status. If it is not so, set the initial status.
3) Push and hold SW01 for 5 seconds or more and then check D804 flashes slowly.
4) Push SW01 several times and then stop it at the point where LED display (D800 to D804) is indicated as the following table.

D800	D801	D802	D803	D804
○	●	●	●	◎

○ : ON, ● : OFF, ◎ : Rapid flashing (5 times/second)

5) Push SW02 so that D805 flashes rapidly.
6) Push and hold SW02 for 5 seconds or more. The forced cooling operation starts if D804 flashes slowly and D805 is turned on. (Max. 10 minutes)
7) After operation for 3 minutes or more, close the valve at liquid side.
8) After recovery of refrigerant, close the valve at gas side.
9) Push and hold SW01 and SW02 for 5 seconds or more simultaneously. The LED returns to the initial status, the cooling operation stops and the indoor fan operation stops.
10) Turn off the power supply.

* 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 2).

9-3-2. Various settings on outdoor unit (Existing piping etc.)

(1) 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.
3) Push SW01 several times and then stop it at the LED display of function item to be set up.

<table>
<tr><th>Function</th><th>LED display</th><th>Control contents</th></tr>
<tr><td>Existing pipes setting</td><td>D800 ● D801 ● D802 ○ D803 ● D804 ◎</td><td>When the existing piping uses 3/4"(19.1mm) pipe, this function is validated. In this case, the heating capacity may drop due to outside temp. and indoor temp. in heating time.</td></tr>
<tr><td>Snow-break fan control</td><td>D800 ● D801 ○ D802 ● D803 ● D804 ◎</td><td>This function validates the control to prevent occurrence of motor lock by the accumulated snow entered from clearance of the fan guard or heat exchanger into blast route. Even when the compressor stops, the outdoor fan is operated with W5 when the outside temperature is under 39°F(4°C).</td></tr>
<tr><td>Max. frequency change</td><td>D800 ● D801 ● D802 ● D803 ○ D804 ◎</td><td>This function is validated if the max. value of compressor frequency is required to lower. It lowers the max. frequency in cooling/heating time. In this case, the max. capacity lowers.
Max. compressor frequency (rps)
<table>
<tr><th rowspan="2">Model</th><th colspan="2">BP241</th></tr>
<tr><th>Cool</th><th>Heat</th></tr>
<tr><td>Standard status</td><td>66.6</td><td>85.8</td></tr>
<tr><td>When setting is valid</td><td>68.4</td><td>68.4</td></tr>
</table>
</td></tr>
</table>

○ : ON, ● : OFF, ◎ : Rapid flashing (5 times/second)

4) Push SW02 so that D805 will flash rapidly.
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 turn off D805.
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.

In the case to return the setting to one at shipment from factory

When to return the setting to one at shipment from the factory due to reinstallation and so on, the setting can be returned in the following procedure.

1) Check LED display is the initial status. If it is not the initial status, return the setting to the initial status.
2) Push and hold SW01 for 5 seconds or more and then check D804 flashes slowly.
3) Push SW01 several times to make LED display status to “LED display to return the setting at shipment from the factory” in the right table.
4) Push and hold SW02 for 5 seconds or more and then check D804 flashes slowly.
5) Push and hold SW01 and SW02 simultaneously to return the LED display to the initial status.

LED display to return the setting at shipment from the factory

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

○: ON, ●: OFF,
◎: Rapid flashing (5 times/second)

(2) Operation mode for cooling only/heating only

As for the indoor unit, the mode for cooling only/heating only is applied from the Ceiling 7 series.

When a group operates and twin operating, the indoor unit (master unit) connected with the outdoor unit is set to the header unit.

▼ Functions

The heating only (cooling only) mode can be selected by the sub P.C. board of outdoor unit.

<table>
<tr><th>State</th><th>Details of Processing</th></tr>
<tr><td>(Factory default)</td><td>
<table>
<tr><td>Operation mode</td><td>Operation State</td><td>Remote control</td></tr>
<tr><td>Normal</td><td>AUTO, COOL, DRY, HEAT, FAN ONLY or can be selected</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Sub P.C. board setting</td><td>
The heating only (cooling only) mode can be selected by the sub P.C. board of outdoor unit.
<table>
<tr><td>P.C. board selection mode</td><td colspan="2">Remote control operation/display</td></tr>
<tr><td>Normal</td><td>AUTO, COOL, DRY, HEAT, FAN ONLY or can be selected</td><td>-</td></tr>
<tr><td>Cooling only</td><td>COOL, DRY, FAN ONLY or can be selected</td><td rowspan="2">When using the remote control,  (Operation mode controlled) indicator might be lit displayed.</td></tr>
<tr><td>Heating only</td><td>HEAT, FAN ONLY or can be selected</td></tr>
</table>
• The remote controller display becomes “AUTO”, “COOL”, “Dry”, “HEAT”, and “FAN ONLY” according to the connection and the indoor unit even if it sets for heating only. The compressor is a stop though the indoor fan works when “AUTO-cooling”, “COOL”, and “Dry” are selected.
</td></tr>
</table>

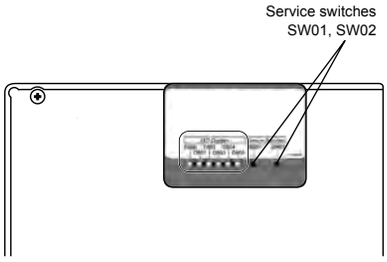
Setting/cancel method of operation mode for cooling only/heating only

The setting/cancel are done by operating the switch (SW01 and SW02) on the sub P.C. board of outdoor unit.

LED displays

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

• There are four LEDs display pattems.
○: ON
●: OFF
◎: Rapid flashing (5 times/sec.)
◇: Slow flashing (1 time/sec.)



■Setting method

1. Check the LED display is an initial state. (Fig. 1)
   If the initial status is not established (if D805 is flashing), hold down the SW01 and SW02 service switches simultaneously for at least 5 seconds to return the LED displays to the initial status.
2. Hold down SW01 for at least 5 seconds, and check that D804 flashes slowly. (Fig. 2)
3. Several times press SW01 to set the LED displays of the selection mode shown below. (Fig. 3)
4. Press SW02, D805 is rapid flashing. (Fig. 4)
5. Hold down SW02 for at least 5 seconds, and when D804 flashes slowly and D805 lights, and the setting is completed. (Fig. 5)

※If there is any trouble, hold down SW01 and SW02 simultaneously for at least 5 seconds to return to the initial status, and then repeat the steps.

There are four LEDs display patterns. ○: ON, ●: OFF, ◎: Rapid flashing (5 times/sec.)
◇: Slow flashing (1 time/sec.)

(Fig. 1)

LED display initial status					
D800	D801	D802	D803	D804	D805
● or ◎	● or ◎	● or ◎	● or ◎	● or ◎	○
OFF or Rapid flashing	OFF or Rapid flashing	OFF or Rapid flashing	OFF or Rapid flashing	OFF or Rapid flashing	ON

(Fig. 2)

Procedure 2. LED display					
D800	D801	D802	D803	D804	D805
○	●	●	●	◇	●
ON	OFF	OFF	OFF	Slow flashing	OFF

(Fig. 3)

Selection mode	Procedure 3. LED display					
	D800	D801	D802	D803	D804	D805
Cooling only	○	○	●	●	◎	●
	ON	ON	OFF	OFF	Rapid flashing	OFF
Heating only	○	○	○	○	◎	●
	ON	ON	ON	ON	Rapid flashing	OFF

(Fig. 4)

Selection mode	Procedure 4. LED display					
	D800	D801	D802	D803	D804	D805
Cooling only	○	○	●	●	◎	◎
	ON	ON	OFF	OFF	Rapid flashing	Rapid flashing
Heating only	○	○	○	○	◎	◎
	ON	ON	ON	ON	Rapid flashing	Rapid flashing

(Fig. 5)

Selection mode	Procedure 5. LED display					
	D800	D801	D802	D803	D804	D805
Cooling only	○	○	●	●	◇	○
	ON	ON	OFF	OFF	Slow flashing	ON
Heating only	○	○	○	○	◇	○
	ON	ON	ON	ON	Slow flashing	ON

■Cancel

1. 1. and 2. of the setting methods are executed.
2. Several times press SW01 to set the LED displays of the selection mode shown below. (Fig. 6)
3. Press SW02, D805 is turned off. (Fig. 7)
4. Hold down SW02 for at least 5 seconds, and when D804 flashes slowly and D805 lights, and the setting is completed. (Fig. 8)

(Fig. 6)

Selection mode	Procedure 2. LED display					
	D800	D801	D802	D803	D804	D805
Cooling only	○	○	●	●	◎	◎
	ON	ON	OFF	OFF	Rapid flashing	Rapid flashing
Heating only	○	○	○	○	◎	◎
	ON	ON	ON	ON	Rapid flashing	Rapid flashing

(Fig. 7)

Selection mode	Procedure 3. LED display					
	D800	D801	D802	D803	D804	D805
Cooling only	○	○	●	●	◎	●
	ON	ON	OFF	OFF	Rapid flashing	OFF
Heating only	○	○	○	○	◎	●
	ON	ON	ON	ON	Rapid flashing	OFF

(Fig. 8)

Selection mode	Procedure 4. LED display					
	D800	D801	D802	D803	D804	D805
Cooling only	○	○	●	●	◇	●
	ON	ON	OFF	OFF	Slow flashing	OFF
Heating only	○	○	○	○	◇	●
	ON	ON	ON	ON	Slow flashing	OFF

9-3-3. Service support function (LED display, service switch operating method)

1. LED display switching

1-1. Display switching list

The displayed contents of LED D800 to D805 on the outdoor P.C. board can be switched by handling the service switches SW01 and SW02.

[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 then stop it at the point where LED display to be indicated.

LED display	Control contents
D800 D801 D802 D803 D804 D805 ● ● ● ● ● ◎	Trouble display (Trouble which is occurring at present) The trouble which is occurring at present is displayed. LED goes off while an trouble does not occur. (Refer to table A)
D800 D801 D802 D803 D804 D805 ○ ● ● ● ● ◎	Trouble display (The latest trouble: The latest trouble including this moment) After trouble status was eliminated, if you want to check the trouble which occurred before, call this setting and check it. (Even after turning off the power supply once, you can recheck it.) * In the case that an trouble occurred at present, the same contents as that at present is displayed. * TO sensor trouble only is not displayed in this setting. (Check setting which is occurring at present.) (Refer to table B)
D800 D801 D802 D803 D804 D805 ● ○ ● ● ● ◎	Discharge temperature sensor (TD) display Detected value of the discharge temperature (TD) is displayed. (Refer to table C)
D800 D801 D802 D803 D804 D805 ○ ○ ● ● ● ◎	Outdoor heat exchanger temperature sensor (TE) display Detected value of the outdoor heat exchanger temperature sensor (TE) is displayed. (Refer to table C)
D800 D801 D802 D803 D804 D805 ● ○ ○ ● ● ◎	Liquid temperature sensor (TL) display The detected value of the liquid temperature sensor (TL) is displayed. (Refer to table C)
D800 D801 D802 D803 D804 D805 ● ● ○ ● ● ◎	Suction temperature sensor (TS) display Detected value of the suction temperature sensor (TS) is displayed. (Refer to table C)
D800 D801 D802 D803 D804 D805 ○ ● ○ ● ● ◎	Outside temperature sensor (TO) display Detected value of the outside temperature sensor (TO) is displayed. (Refer to table C)
D800 D801 D802 D803 D804 D805 ○ ○ ○ ● ● ◎	Heat sink temperature sensor (TH) display Detected value of the heat sink temperature sensor (TH) is displayed. (Refer to table C)
D800 D801 D802 D803 D804 D805 ○ ● ● ○ ● ◎	Current display The current value which flows to the outdoor unit is displayed. (Refer to table C)
D800 D801 D802 D803 D804 D805 ● ○ ● ○ ● ◎	Compressor operation frequency display The operation frequency of the compressor is displayed. (Refer to table C)
D800 D801 D802 D803 D804 D805 ○ ○ ● ○ ● ◎	PMV opening display The opening of PMV (Electronic expansion valve) is displayed. (Refer to table C)
D800 D801 D802 D803 D804 D805 ● ● ○ ○ ● ◎	Indoor suction temperature sensor (TA) display The detected value of the indoor suction temperature sensor (TA) is displayed. (Refer to table C)
D800 D801 D802 D803 D804 D805 ○ ● ○ ○ ● ◎	Indoor heat exchanger temperature sensor (TC) display The detected value of the indoor heat exchanger temperature sensor (TC) is displayed. (Refer to table C)
D800 D801 D802 D803 D804 D805 ○ ● ○ ○ ● ◎	Indoor heat exchanger temperature (TCJ) display The detected value of the indoor heat exchanger temperature sensor (TCJ) is displayed. (Refer to table C)

○ : ON, ● : OFF, ◎ : Rapid flashing (5 times/second)

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

1-2. Trouble display

The error which is occurring at present and the latest error (the latest error data including one which is occur-ring now) can be confirmed by lighting LED D800 to D805 on the outdoor control P.C. board.

A. Trouble display which occurs at present

LED display						Error name	Wired remote controller error code
D800	D801	D802	D803	D804	D805		
●	●	●	●	●	○	Normal	–
◎	●	●	●	●	○	Discharge temperature sensor (TD) error	F04
●	◎	●	●	●	○	Heat exchanger temperature sensor (TE) error	F06
◎	◎	●	●	●	○	Liquid temperature sensor (TL) error	F07
●	●	◎	●	●	○	Outside temperature sensor (TO) error	F08
◎	●	◎	●	●	○	Suction temperature sensor (TS) error	F12
●	◎	◎	●	●	○	Heat sink temperature sensor (TH) error	F13
◎	◎	◎	●	●	○	Miss-mounting of sensor (TE, TS)	F15
●	◎	●	◎	●	○	EEPROM error	F31
◎	◎	●	◎	●	○	Compressor breakdown	H01
●	●	◎	◎	●	○	Compressor lock	H02
●	◎	◎	◎	●	○	Case thermostat activated	H04
●	●	●	●	◎	○	Unset model type	L10
●	◎	●	●	◎	○	Discharge temperature sensor error	P03
◎	◎	●	●	◎	○	High pressure SW error	P04
◎	●	◎	◎	●	○	Current detection circuit error	H03
◎	●	◎	●	◎	○	Power supply voltage error	P05
●	◎	◎	●	◎	○	Heatsink overheating error	P07
◎	◎	◎	●	◎	○	Gas leak detected	P15
●	●	●	◎	◎	○	4-way valve reversal error	P19
◎	●	●	◎	◎	○	High pressure protective activated	P20
●	◎	●	◎	◎	○	Fan system error	P22
◎	◎	●	◎	◎	○	Compressor driver device short circuit	P26
●	●	◎	◎	◎	○	Position detection circuit error	P29
◎	●	◎	◎	◎	○	Others (No determination)	L31

○ : ON, ● : OFF, ◎ : Rapid flashing (5 times/second)

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

LED display						Error name
D800	D801	D802	D803	D804	D805	
●	●	●	●	●	◇	Normal
◎	●	●	●	●	◇	Discharge temperature sensor (TD) error
●	◎	●	●	●	◇	Heat exchanger temperature sensor (TE) error
◎	◎	●	●	●	◇	Liquid temperature sensor (TL) error
◎	●	◎	●	●	◇	Suction temperature sensor (TS) error
●	◎	◎	●	●	◇	Heat sink temperature sensor (TH) error
◎	◎	◎	●	●	◇	Miss-mounting of sensor (TE, TS)
●	◎	●	◎	●	◇	EEPROM error
◎	◎	●	◎	●	◇	Compressor breakdown
●	●	◎	◎	●	◇	Compressor lock
●	◎	◎	◎	●	◇	Case thermostat activated
●	●	●	●	◎	◇	Unset model type
●	◎	●	●	◎	◇	Discharge temperature sensor error
◎	◎	●	●	◎	◇	High-pressure SW error
◎	●	◎	◎	●	◇	Current detection circuit error
◎	●	◎	●	◎	◇	Power supply voltage error
●	◎	◎	●	◎	◇	Heatsink overheating error
◎	◎	◎	●	◎	◇	Gas leak detection
●	●	●	◎	◎	◇	4-way valve reversal error
◎	●	●	◎	◎	◇	High pressure protective activated
●	◎	●	◎	◎	◇	Fan system error
◎	◎	●	◎	◎	◇	Compressor driver device short circuit
●	●	◎	◎	◎	◇	Position detection circuit error
◎	●	◎	◎	◎	◇	Others (No determination)

○ : ON, ● : OFF, ◎ : Rapid flashing (5 times/second), ◇ : Slow flashing (Once/second)

C. Sensor, current, compressor operation frequency, PMV opening display

The values, such as the temperature sensor or the current value, which the controller detects are easily confirmed.

* Temperature sensor: TD, TE, TL, TS, TO, TH, TA, TC, TCJ

LED display						Temp. sensor ˚F(˚C)	Current (A)	Compressor frequency (rps)	PMV opening (pls)
D800	D801	D802	D803	D804	D805				
●	●	●	●	●	◇	–13(– 25) or less	0 ~	0 ~	0 ~ 19
○	●	●	●	●	◇	–13(– 25) ~	1 ~	5 ~	20 ~ 39
●	○	●	●	●	◇	– 4(– 20) ~	2 ~	10 ~	40 ~ 59
○	○	●	●	●	◇	5(– 15) ~	3 ~	15 ~	60 ~ 79
●	●	○	●	●	◇	14(– 10) ~	4 ~	20 ~	80 ~ 99
○	●	○	●	●	◇	23(– 5) ~	5 ~	25 ~	100 ~ 119
●	○	○	●	●	◇	32(0) ~	6 ~	30 ~	120 ~ 139
○	○	○	●	●	◇	41(5) ~	7 ~	35 ~	140 ~ 159
●	●	●	○	●	◇	50(10) ~	8 ~	40 ~	160 ~ 179
○	●	●	○	●	◇	59(15) ~	9 ~	45 ~	180 ~ 199
●	○	●	○	●	◇	68(20) ~	10 ~	50 ~	200 ~ 219
○	○	●	○	●	◇	77(25) ~	11 ~	55 ~	220 ~ 239
●	●	○	○	●	◇	86(30) ~	12 ~	60 ~	240 ~ 259
○	●	○	○	●	◇	95(35) ~	13 ~	65 ~	260 ~ 279
●	○	○	○	●	◇	104(40) ~	14 ~	70 ~	280 ~ 299
○	○	○	○	●	◇	113(45) ~	15 ~	75 ~	300 ~ 319
●	●	●	●	○	◇	122(50) ~	16 ~	80 ~	320 ~ 339
○	●	●	●	○	◇	131(55) ~	17 ~	85 ~	340 ~359
●	○	●	●	○	◇	140(60) ~	18 ~	90 ~	360 ~ 379
○	○	●	●	○	◇	149(65) ~	19 ~	95 ~	380 ~ 399
●	●	○	●	○	◇	158(70) ~	20 ~	100 ~	400 ~ 419
○	●	○	●	○	◇	167(75) ~	21 ~	105 ~	420 ~439
●	○	○	●	○	◇	176(80) ~	22 ~	110 ~	440 ~ 459
○	○	○	●	○	◇	185(85) ~	23 ~	115 ~	460 ~ 479
●	●	●	○	○	◇	194(90) ~	24 ~	120 ~	480 ~ 499
○	●	●	○	○	◇	203(95) ~	25 ~	125 ~	500
●	○	●	○	○	◇	212(100) ~	26 ~	130 ~	–
○	○	●	○	○	◇	221(105) ~	27 ~	135 ~	–
●	●	○	○	○	◇	230(110) ~	28 ~	140 ~	–
○	●	○	○	○	◇	239(115) ~	29 ~	145 ~	–
●	○	○	○	○	◇	248(120) or more	30 ~	150 ~	–
○	○	○	○	○	◇	Sensor error	31 or more	155 or more	–

○ : ON, ● : OFF, ◇ : Slow flashing (Once/second)

2. Special operation for maintenance check (SW01 and SW02 operations)

The following special operations for maintenance check can be performed by handling the service switches SW01 and SW02.

[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.
3) Push SW01 and then stop it at the LED display of the function item to be set.

Special operation	LED display					Control contents
Refrigerant recovery operation	D800	D801	D802	D803	D804	The outdoor unit performs cooling operation. As the indoor unit does not operate by this operation only, carry out the fan operation beforehand. (Refer to 9-3-1.)
	○	●	●	●	◎	
PMV full open operation	D800	D801	D802	D803	D804	Open PMV (Electronic expansion valve) fully. Execute the following item 6) or the control returns to normal operation after 2 minutes. (Refer Note 1)
	○	●	○	●	◎	
PMV full close operation	D800	D801	D802	D803	D804	Close PMV (Electronic expansion valve) completely. Execute the following item 6) or the control returns to normal operation after 2 minutes. (Refer Note 1)
	●	○	○	●	◎	
PMV middle opening operation	D800	D801	D802	D803	D804	Open PMV (Electronic expansion valve) to middle position (250 pulses). Execute the following item 6) or the control returns to normal operation after 2 minutes. (Refer Note 1)
	○	○	○	●	◎	
Indoor heating trial operation command	D800	D801	D802	D803	D804	Carry out a trial heating operation. The operation returns to the normal control by executing the following item 6). (Refer Note 2)
	○	●	●	○	◎	
Indoor cooling trial operation command	D800	D801	D802	D803	D804	Carry out a trial cooling operation. The operation returns to the normal control by executing the following item 6). (Refer Note 2)
	●	○	●	○	◎	
Fan motor forced operation	D800	D801	D802	D803	D804	Operate the fan motor forcedly. Execute the following item 6) or the control returns to normal operation after 2 minutes. (Refer Note 1)
	○	○	●	○	◎	
Self-preservation valve suck operation	D800	D801	D802	D803	D804	switch to heating cycle This function is operated only by ten seconds, and turned off afterwards.
	○	●	○	○	◎	
Self-preservation valve secession operation	D800	D801	D802	D803	D804	switch to cooling cycle This function is operated only by ten seconds, and turned off afterwards.
	●	○	○	○	◎	

○ : ON, ● : OFF, ◎ : Rapid flashing (5 times/second)

(Note 1) Although these special operations are available even operating time, basically carry out these operations while the machine stops. If carrying out these operations, the pressure may change suddenly and a danger may grow.

(Note 2) Indoor trial cooling operation request / Indoor trial heating operation request

Cooling/heating trial operations are available from the outdoor unit only in combination with the indoor units.

Note) The forced trial operation in this setting cannot be cleared by the indoor remote controller. Be sure to clear it by operation of the outdoor unit (6 below).

4) Push SW02 and then stop it at point where D805 becomes rapid flashing.
5) Push and hold SW02 for 5 seconds or more. D804 changes to slow flashing, D805 changes lighting and then the special operation becomes valid.
6) To invalidate various settings, push and hold SW01 and SW02 for 5 seconds or more simultaneously. D800 to D804 go off (or rapid flashing), D805 goes on (Initial status: Display of error which is occurring at present), and then the special operation becomes invalid (normal control).

* 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).

9-4. Applicable Control of Outdoor unit

The following controls are enabled by connecting the part “Application control kit” (TCB-PCOS1UL) sold separately.

(1) Power peak cut control

* The capacity of the outdoor unit is saved by the Demand signal from outside and corresponds to the temporary peak cut.
* The capacity save is switched to 3 stages, 75%, 50% and operation stop.

(2) Night operation (Sound reduction)

* Input a timer on the market (Arranged at site). The capacity is lowered regardless of load and the operation noise is reduced until 45dB. However the normal control is carried out if the outside temperature (TO sensor value) is 104°F(40°C) or more.

(3) Compressor operation output

* When the compressor drives, turn on the contact output of no voltage.

10. REPLACEMENT OF THE SERVICE P.C. BOARD(MCC-1646)

⚠ WARNING

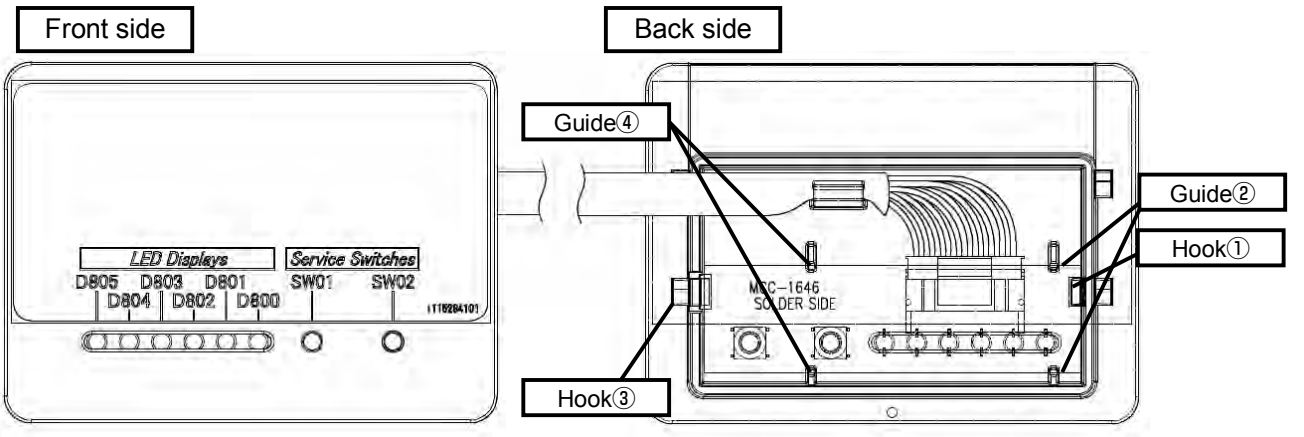
Don't open the inverter cover before 1 minute after power has been turned off because an electric shock may be occurred.

Assembly steps:

1 LED side of P.C.Board (MCC-1646) shall be inserted to hook① along the guide② of mold.

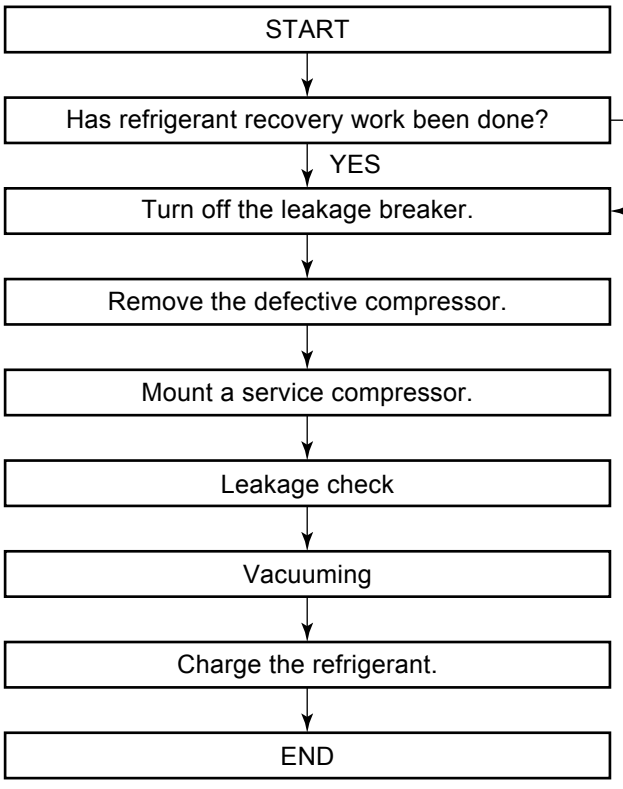
2 Switch side of P.C.Board (MCC-1646) shall be pressed to hook③ along guide④ of mold.

3 After assembly, push SW01 and SW02 to check that switches can be click (sound or feeling of click).



11. HOW TO REPLACE COMPRESSOR

11-1. Replacement Procedure of Compressor (Outline)



Never recover the refrigerant to the outdoor unit.

For the refrigerant recovery work during reinstallation of repair work, be sure to use the refrigerant recovery unit.

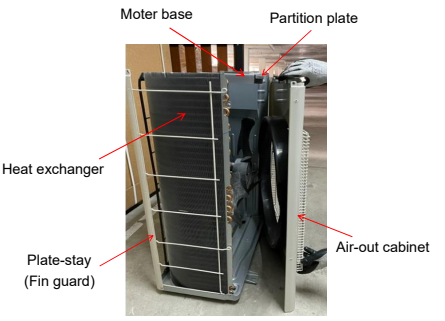
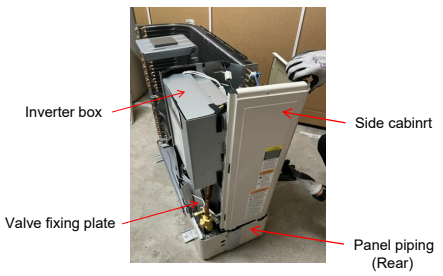
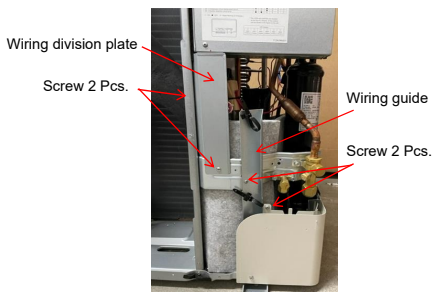
Recovery of refrigerant to the outdoor unit is unavailable; otherwise a serious accident such as explosion or injury may be caused.

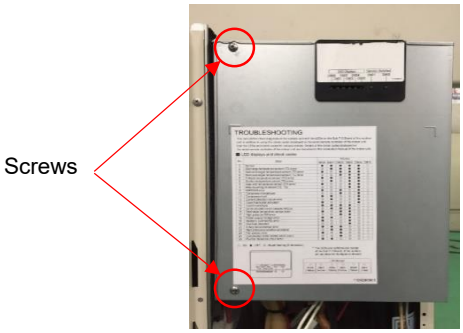
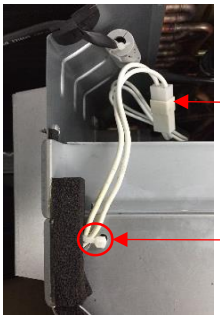
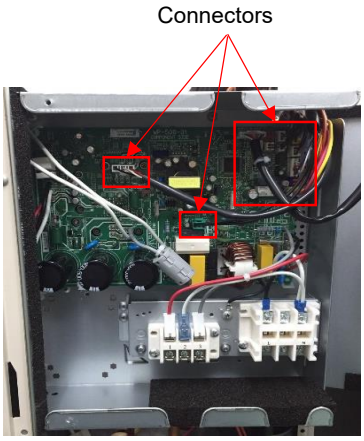
11-2. Replacement of Compressor

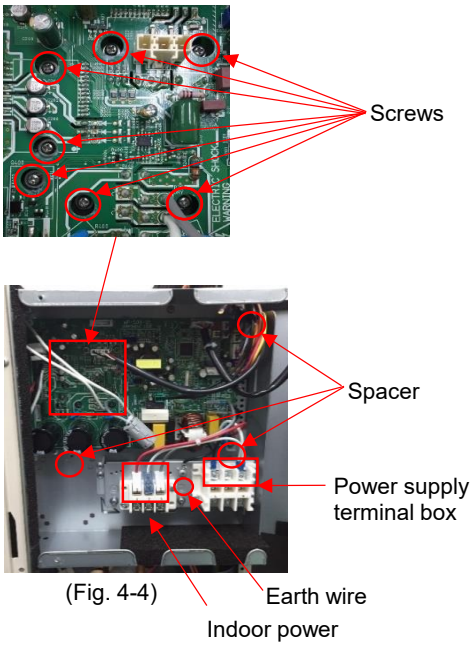
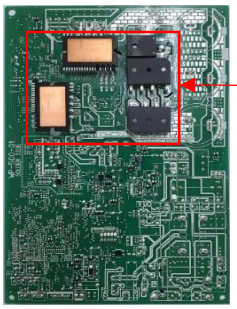
For replacement of compressors, refer to (11) Compressor in Section of **12. Detachments.**

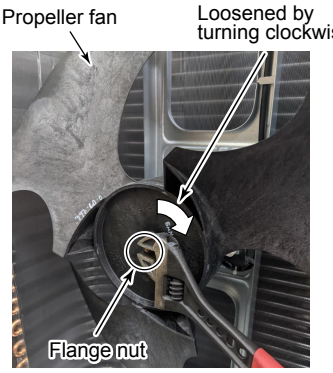
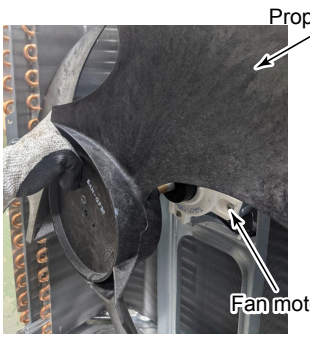
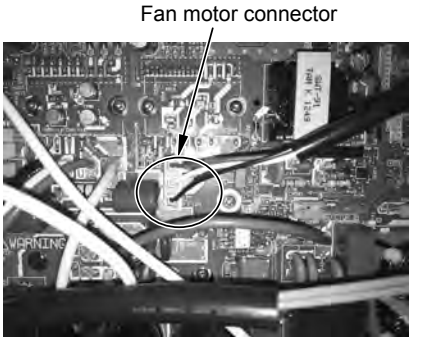
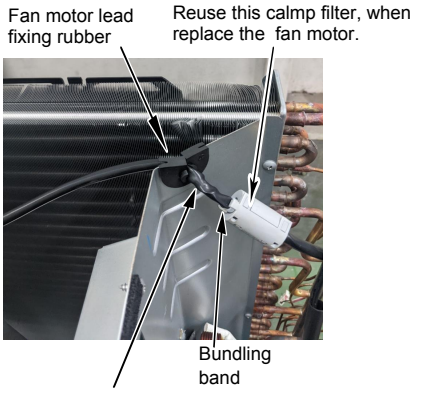
12. DETACHMENTS

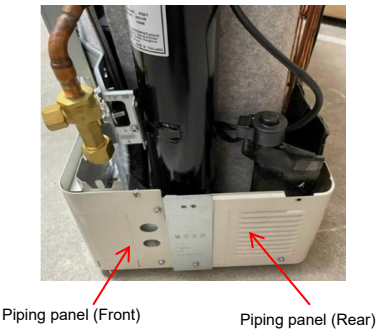
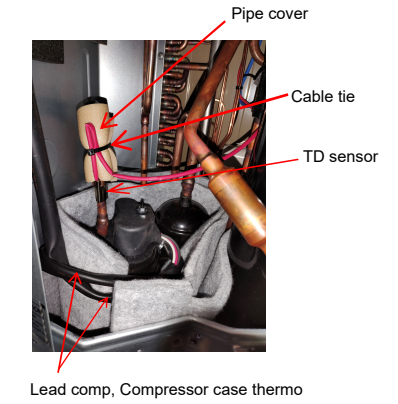
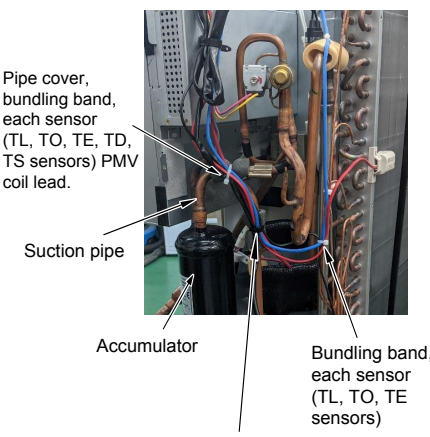
No.	Part name	Procedure	Remarks
①	Common procedure Top cover Front panel	**CAUTION** Be sure to put on the gloves at working time; otherwise an injury may be caused by a part, etc. **1. Detachment** 1) Stop operation of the air conditioner and then turn off switch of the breaker. 2) Remove the top plate. (Hexagonal screw Ø4 × 10, 6 pcs.) 3) Remove the power wire and indoor/outdoor connecting wire from the cord clamp and the terminals. 4) Remove the front panel. (Hexagonal screw Ø4 × 10, 1 pcs.) * After removing screws, remove the front panel while pulling it downward. **2. Attachment** 1) Attach the top plate. (Hexagonal screw Ø4 × 10, 5 pcs.) In this time, insert the fin guard of rear side between the top plate and the heat exchanger (Rear side). 2) Connect the power supply wire and the indoor/outdoor connecting wire to the terminal and fix it with cord clamp. **CAUTION** Using bundling band on the market, be sure to fix the power wire and indoor/outdoor connecting wire along the crossover pipe so that they do not come to contact with the compressor, valve at gas side, pipe at gas side and discharge pipe. 3) Attach the front panel. (Hexagonal screw Ø4 × 10, 2 pcs.)	Top plate   Front plate Insert the fin guard of rear side between the top plate and the heat exchanger (at rear side). 

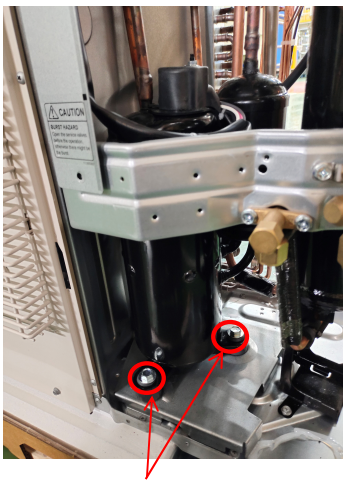
No.	Part name	Procedure	Remarks
②	Discharge port cabinet	**1. Detachment** 1) Carry out work of 1 of ①. 2) Remove screws for the discharge port cabinet and the partition plate. (ST1T Ø4 × 8, 3 pcs.) 3) Remove screws for the discharge port cabinet and the bottom plate. (Hexagonal screw Ø4 × 10, 2 pcs.) 4) Remove screws of the discharge port cabinet and the motor base. (ST1T Ø4 × 8, 2 pcs.) 5) Remove screws of the discharge port cabinet and the heat exchanger. (ST1T Ø4 × 8, 1 pc.) 6) Remove screws of the discharge port cabinet and the fin guard. (Hexagonal screw Ø4 × 10, 2 pcs.)	
③	Side cabinet	**1. Detachment** 1) Carry out work of 1 of ①. 2) Remove screws which fix the inverter assembly and the side cabinet. (ST1T Ø4 × 8, 2 pcs.) 3) Remove screws of the side cabinet and the valve fixing plate. (ST1T Ø4 × 8, 2 pcs.) 4 Remove screws of the side cabinet and the pipe panel (Rear). (Hexagonal screw Ø4 × 10, 2 pcs.) 5) Remove screws of the side cabinet and the bottom plate. (Hexagonal screw Ø4 × 10, 1 pc.) 6) Remove screws of the side cabinet and the heat exchanger. (Hexagonal screw Ø4 × 10, 3 pcs.) 7) Slide the side cabinet upward and then remove it.(Hook of inverter) 8) Remove screw of wiring guide (Ø4 × 10, 2 pcs.) and Remove screw of wiring division plate (Ø4 × 10, 2 pcs.)	 

No.	Part name	Procedure	Remarks
4	Exchange of electric parts	**⚠ WARNING** **Do not detach the inverter for 5 minutes after turning off the beaker as doing so may cause electric shocks.** **⚠ CAUTION** **Wear glove when working on it.** **Failure to observe this precaution may cause injury due to components, etc.** **1. Detachment** 1) Remove the screw of cover invertor. (Screw:M4x10, 2pcs.) (Fig. 4-1) 2) Cut the binding band and remove Reactor connector. (Fig. 4-2) 3) Cut the binding band and remove Compressor connector. (Fig. 4-3) 4) Remove the all connectors from the P.C. board (Fig. 4-4) **⚠ CAUTION** **Disengage the lock on the housing to unplug the connector.** CN60 … TE sensor (2P : white) CN61 … TD sensor (3P : white) CN62 … TO sensor (2P : yellow) CN63 … TS sensor (3P : white) CN64 … TL sensor (2P : white) CN68 … Thermostat (2P : blue) CN69 … High pressure SW (2P : green) CN70 … DC 4-way valve (2P : white) CN71 … PMV coil (6P : white) CN87 … Display P.C. board (10P : white) CN30 … Connection with fan motor (white)	 (Fig. 4-1)  (Fig. 4-2)  (Fig. 4-3)  (Fig. 4-4)

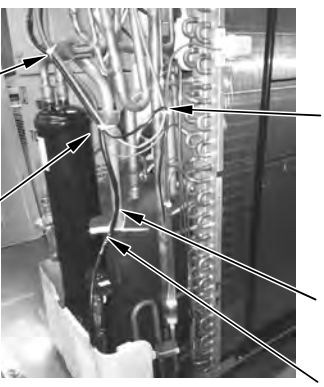
No.	Part name	Procedure	Remarks
4	Exchange of electric parts (Continued)	5) Remove the screw of the P.C. board (Screw:M3x14, 7pcs.) (Fig. 4-4) 6) Remove the screw of the earth wire (Screw:M4x8, 1pc.) (Fig. 4-4) 7) Remove the screw of power supply terminal box (Fig. 4-4) 8) Remove the lead wires of indoor power supply (Fig. 4-4) 9) Remove the P.C. board of support spacer 3 position (Fig. 4-4) 10) Cut the binding band and remove clamp filter. (Fig. 4-5) **2. Attachment** 1) Install it in the reverse of the procedure to remove it. 2) Apply heat silicones to E-parts. (Fig. 4-6)	 (Fig. 4-4)  (Fig. 4-5)  (Fig. 4-6)

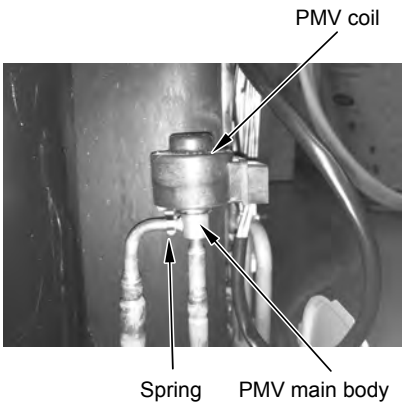
No.	Part name	Procedure	Remarks
⑤	Fan motor	1) Carry out works of 1 of ① and ②. 2) Remove the flange nut fixing the fan motor and the propeller fan. ∗ The flange nut is loosened by turning clockwise. (To tighten it, turn it counterclockwise.) 3) Remove the propeller fan. 4) Remove the connector for fan motor from the inverter. 5) Remove the fan motor lead from the fan motor lead fixing rubber of the penetrated part of the partition plate. 6) Remove the fixing screws (4 pcs. each) while supporting the fan motor so that it does not fall. **∗ Cautions when assembling the fan motor** ∗ Tighten the flange nut with 4.95N•m (50kgf.cm). ∗ Adjust length on the fan motor lead fixing rubber so that the fan motor lead does not slacken in order not to put the fan motor lead into contact with the propeller fan. Attach the fan motor lead fixing rubber to the partition plate so that projection directs to the refrigerating cycle side. ∗ Be sure that the rector body does not come to contact with the fan motor lead. ∗ Be sure to bind the removed bundling band with the bundling band on the market. **⚠ CAUTION** Use the metal band of the motor base to fix the fan motor lead on the motor base so that the fan motor lead does not come to contact with the propeller fan. **NOTE:** Please reuse the clamp filter when replace the fun motor.	    

No.	Part name	Procedure	Remarks
⑥	Compressor Compressor lead	**1. Removal of Failed compressor** 1) Recover the refrigerant gas. 2) Carry out works of 1 of ① and ②, ③. 3) Remove the piping panel (Front). Remove screws of the piping panel (Front) and the bottom plate. (Hexagonal screw Ø4 × 10, 2 pcs.) Remove screws of the piping panel (Front) and the piping panel (Rear). (Hexagonal screw Ø4 × 10, 1 pc.) 4) Remove the piping panel (Rear). Remove screws of the piping panel (Rear) and the bottom plate. (Hexagonal screw Ø4 × 10, 2 pcs.) 5) Remove the valve fixing plate. Remove bolts of the valve. (Hexagonal screw Ø6 × 16, 4 pcs.) Remove screws of the valve fixing plate and the partition plate. (ST1T Ø4 × 10, 1 pc.) Remove screws of the valve fixing plate and the accumulator. (Hexagonal screw Ø4 × 10, 1 pc.) Cut off the CABEL-TIE for the discharge pipe and the suction pipe and then remove each sensor and coil lead of PMV. 6) Remove the soundproof plate. (Upper side, outer winding, inner winding) 7) Remove terminal cover from the compressor and then remove the compressor lead and also the compressor case thermo. 8) Remove TD sensor fixed to the discharge pipe. 9) Remove the compressor lead. (Leave the ferrite core attached to the electric parts box as it is.)	  

No.	Part name	Procedure	Remarks
⑥	Compressor Compressor lead (Continued)	10) Using a burner, remove the discharge pipe and the suction pipe connected to the compressor. **⚠ WARNING** In case of removing the piping by broiling the welded part with a burner, if the piping includes oil, it may burst into flames at the moment when wax melted, so take sufficient care. **⚠ CAUTION** Note so that the flame does not catch the 4-way valve and PMV. (An operation may become an error.) 11) Pull off the discharge pipe and the suction pipe of the refrigerating cycle upward. 12) Remove the compressor bolts which fix the compressor to the bottom plate. (3 pcs.) 13) Pull out the compressor toward you. **⚠ CAUTION** The weight of the compressor is 15kg or more, so handle it by 2 workers.	 Compressor bolt (3 Pcs.)

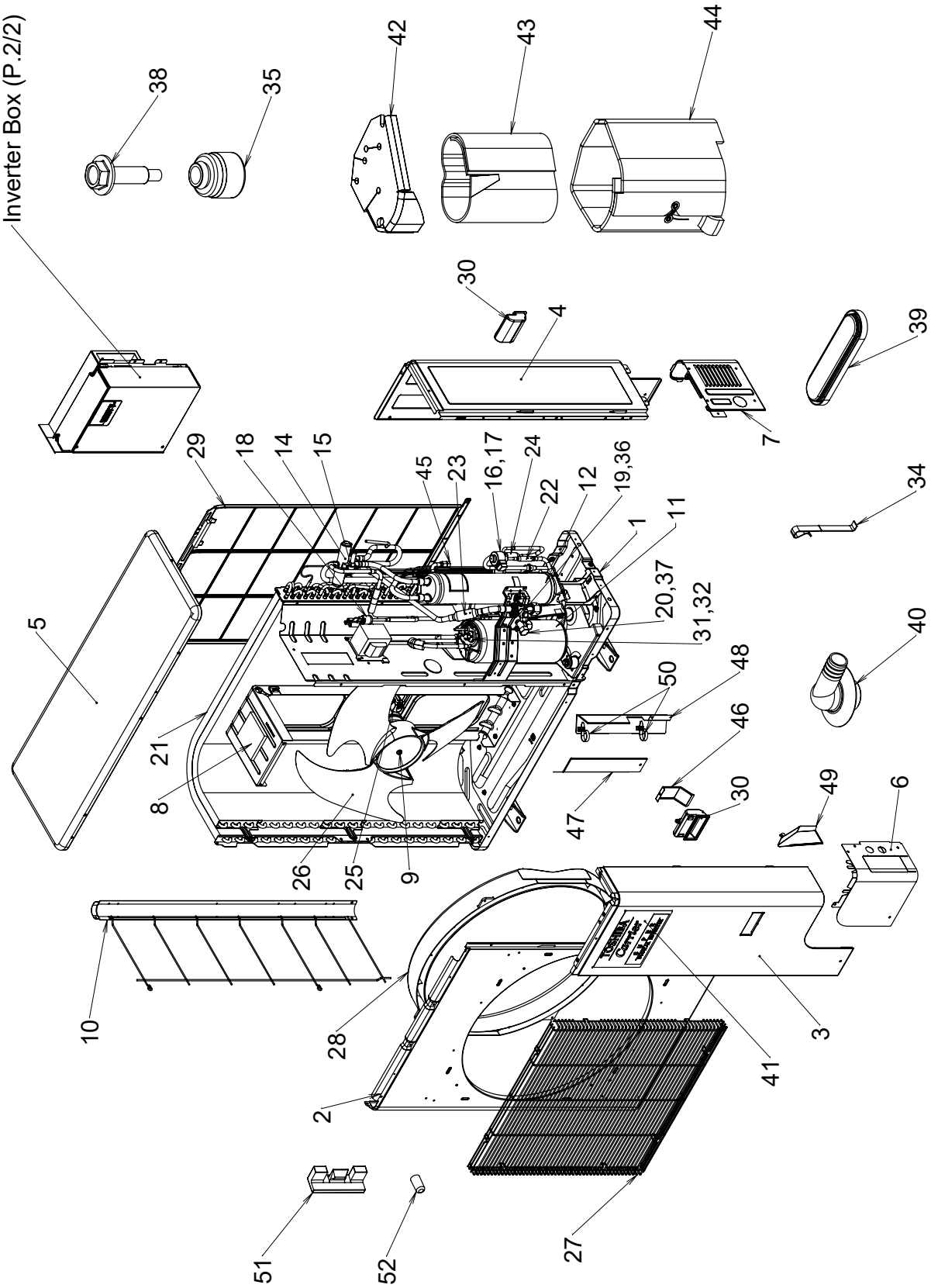
No.	Part name	Procedure	Remarks
⑥	Compressor Compressor lead (Continued)	**2. Mounting of compressor** 1) Mount the compressor in the reverse procedure of removal. **NOTES:** ∗ After exchange of the compressor, be sure to exchange the compressor lead. (Repair part code of compressor lead: 43T60443) ∗ Fix the removed each sensor and PMV coil lead wire to the discharge pipe and the suction pipe with the bundling band via the pipe cover. In this time, take note that each sensor and PMV coil lead wire do not come to contact with the discharge pipe and the reactor. (For fixing to the discharge pipe, use the black heat-proof pipe cover and the bundling band for heat-proof which is sold on the market.) ∗ As shown in the right figure, mount the soundproof plate (inner winding, outer winding) by inserting between the compressor and the piping, and between piping and the partition plate. ∗ Put the compressor lead wire and the compressor case thermo between inner winding and outer winding of the soundproof as if dropping them in.	 



No.	Part name	Procedure	Remarks
⑥	Compressor Compressor lead (Continued)	**3. Vacuuming** 1) Connect the vacuum pump to the charge port of the gas pipe valve and then drive the vacuum pump. 2) Carry out vacuuming until the vacuum low pressure gauge indicates 1 (mmHg). **NOTE:** Before vacuuming, open PMV fully. If PMV is closed, vacuuming may be impossible between the liquid pipe valve and PMV of the outdoor unit. **Forced full-opening method of PMV** Please refer to "9. SETUP AT LOCAL SITE AND OTHERS" (9-3-3.2) **4. Refrigerant charging** 1) Add the quantity of refrigerant specified by the pipe length into the charge port of the valve.	
⑦	PMV coil	**1. Detachment** 1) Carry out works of 1 of ① and ③. 2) While pulling the coil upward and removing the spring which pinches the copper pipe, remove the coil from PMV main body. **2. Attachment** 1) Match the spring to the copper pipe and fix it.	

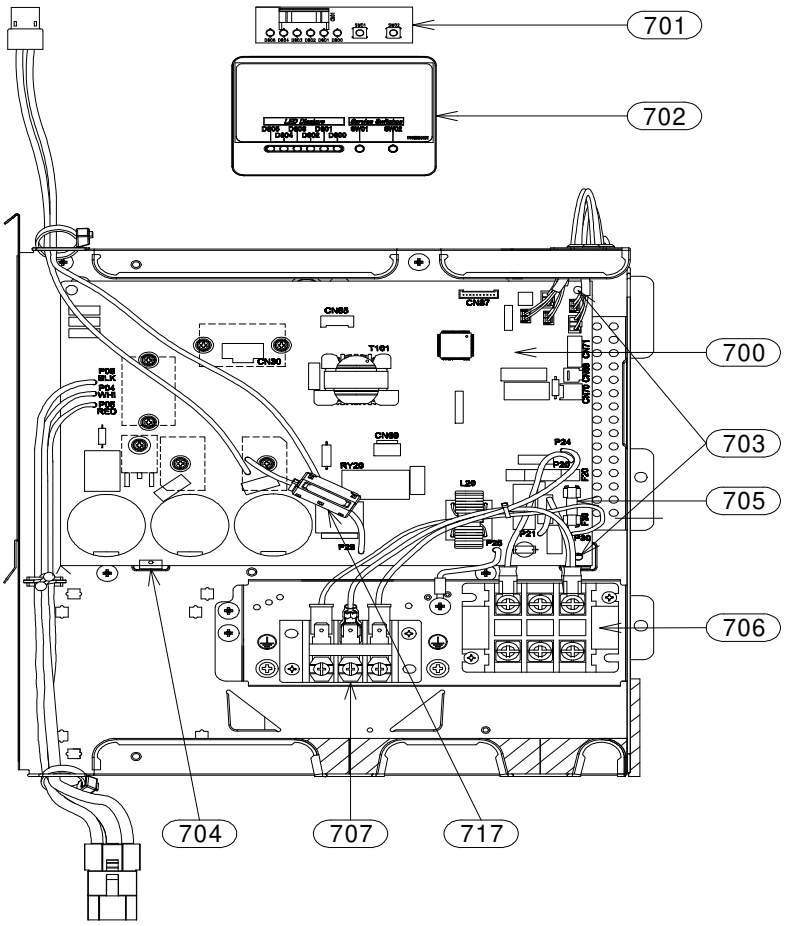
No.	Part name	Procedure	Remarks
⑧	Fan guard	**1. Detachment** 1) Perform works of Detachment 1 of ① and ②. **REQUIREMENT** To prevent scratch on the product, carry out the work on cardboard cloth, etc. 2) Remove the discharge port cabinet and then put on it so that the fan guard side directs downward. 3) Remove the guard stopper. (8 positions x 2) **2. Attachment** 1) Insert the guard stopper to fix the fan guard. (8 positions x 2) **REQUIREMENT** Check that all the guard stopper are fixed at the specified positions.	Discharge port cabinet Fan guard  Bell mouth Fan guard stopper  Hooking claw 

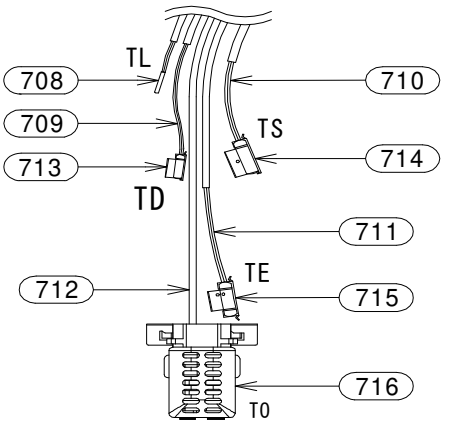
13. EXPLODED VIEWS AND PARTS LIST



Location No.	Part No.	Description	Model name
			RAV-BP241AT2P-UL
1	43T42395	BASE PLATE ASSEMBLY	1
2	43T00606	ASM-COAT-C-A-T	1
3	43T00601	ASM-PANEL-FRONT	1
4	43T00847	RIGHT PANEL CABINET ASSEMBLY	1
5	43T00803	UPPER CABINET ASSEMBLY	1
6	43T00868	FRONT PANEL PIPING COATING ASSEEMBLY	1
7	43T00609	ASM-COAT-P-P-BK	1
8	43T39399	MOTOR BASE ASSEMBLY	1
9	43047669	NUT, FLANGE	1
10	43T19346	FIN GUARD ASSEMBLY	1
11	43T41616	COMPRESSOR (MTD226RKQF8LV8C)	1
12	43T48321	ACCUMULATOR ASSEMBLY	1
14	43T46424	4 WAY VALVE	1
15	43046571	COIL-V-3WAY	1
16	43T46389	BODY-PMV	1
17	43T63351	COIL-PMV	1
18	43T63373	SWITCH PRESSURE	1
19	43T46576	VALVE; PACKED 15.88 DIA	1
20	43T46503	VALVE ; PACKED 9.52 DIA	1
21	43T43589	CONDENSER ASSEMBLY	1
22	43T47418	STRAINER	1
23	43T47372	STRAINER	1
24	43T47373	STRAINER	1
25	43T60566	MOTOR SERVICE ASSEMBLY	1
26	43T20352	FAN-PR(PB522)	1
27	43T19398	GUARD FAN	1
28	43T22313	BELLMOUTH	1
29	43T19345	FIN GUARD	1
30	43T71305	HANDLE	1
31	43T60443	ASM-LEAD-COMP	1
32	43T60522	TEMPERATURE SENSOR	1
34	43T19333	HOLDER, SENSOR	1
35	43T49335	RUBBER CUSHION	3
36	43T47410	BONNET (15.9D)	1
37	43T47404	BONNET, 9.52 DIA	1
38	43T47354	BOLT COMPRESSOR (M6)	3
39	43089160	CAP, WATERPROOF	5
40	43T79325	DRAIN NIPPLE	1
41	43T01337	MARK-T(TC-SDI)	1
42	43T04433	SOUND-INSU(UP)	1
43	43T04472	SOUND INSULATION INSIDE	1
44	43T04466	INSULATION SOUND OUTSIDE	1
45	43T49338	FUSIBLE PLUG	1
46	43T00869	PLATE FIX HANGER	1
47	43T00876	SEPARATE WIRING	1
48	43T00874	VERTICAL WIRING GUIDE	1
49	43T00875	CONDUIT PLATE	1
50	43T83320	CABLE CLAMP	1
51	43T19002	GUARD-STOPPER	1
52	43T83319	SCREW CAP	1

<Inverter assembly>





Location No.	Part No.	Description	Model name
			RAV-BP241AT2P-UL
700	43TNV560	PC BOARD ASSY, WP-500	1
701	43T6V418	PC BOARD ASSY(MCC-1646)-LED	1
702	43T61321	BASE, PC BOARD	1
703	43T95301	SUPPORT, SPACER	2
704	43T95302	SPACER(EDGE)	1
705	43T60413	FUSE	1
706	43T60586	TERMINAL BLOCK	1
707	43T60402	TERMINAL:3P	1
708	43T50335	TEMPERATURE SENSOR	1
709	43T50346	TEMPERATURE SENSOR	1
710	43T50336	TEMPERATURE SENSOR	1
711	43T50338	TEMPERATURE SENSOR	1
712	43T50337	TEMPERATURE SENSOR,TO	1
713	43T63317	HOLDER,SENSOR	1
714	43T63323	HOLDER,SENSOR	1
715	43T63318	HOLDER SENSOR	1
716	43T63335	SENSOR HOLDER	1
717	43T60037	FILTER; CLAMP	1

WARNINGS ON REFRIGERANT LEAKAGE

Check of Concentration Limit

The room in which the air conditioner is to be installed requires a design that in the event of refrigerant gas leaking out, its concentration will not exceed a set limit.

The refrigerant R454B which is used in the air conditioner is safe, without the toxicity or combustibility of ammonia, and is not restricted by laws to be imposed which protect the ozone layer. However, since it contains more than air, it poses the risk of suffocation if its concentration should rise excessively. Suffocation from leakage of R454B is almost non-existent.

If a conditioner system is to be installed in a small room, select a suitable model and installation procedure so that if the refrigerant accidentally leaks out, its concentration does not reach the limit (and in the event of an emergency, measures can be made before injury can occur).
In a room where the concentration may exceed the limit, create an opening with adjacent rooms, or install mechanical ventilation combined with a gas leak detection device.

The concentration is as given below.

$$\frac{\text{Total amount of refrigerant (kg)}}{\text{Min. volume of the indoor unit installed room (m}^3\text{)}} \leq \text{Concentration limit (kg/m}^3\text{)}$$

Refrigerant Concentration limit shall be in accordance with local regulation.

Air conditioner installation work check items

After finishing installation work, check items below and hand this sheet to user to keep it in a safe place together with Owner and installation manuals

Model name	
Check date	
Checked by	

Note : Please put a mark "✓" in the box you checked.

■Piping work

Check items	Symptom	Result
Connecting pipes are cleaned and no dent	Insufficient Air conditioner capacity Compressor malfunction Compressor rupture or Burst	
Use vacuum pump for completed vacuuming		
No any gas leakage or clogging is found		
Packed valves are fully open before operation		

■Wiring work

Check items	Symptom	Result
Electrical wires are connected correctly	Burnt out, No operation	
Use breaker to connect to main power supply	Burnt out, No abnormal protection	
Wiring insulators are in good condition	Burnt out, Electrical leakage	
Use the specified size/rating wires	Burnt out	
Ground wire must be Installation per manufacturing Installation Manual	Electrical leakage or shock	

■Drainage work

Check items	Symptom	Result
Drain hose is properly connected.	Water leakage or dropping	
Drain hose is well insulated.	Water or dew dropping	

Remark) All check items, please refer procedure from manufacturing Installation Manual

CARRIER AIR CONDITIONING (THAILAND) CO., LTD.

144/9 MOO 5, BANGKADI INDUSTRIAL PARK, TIVANON ROAD, TAMBOL BANGKADI,
AMPHUR MUANGPATHUMTHANI, PATHUMTHANI 12000, THAILAND