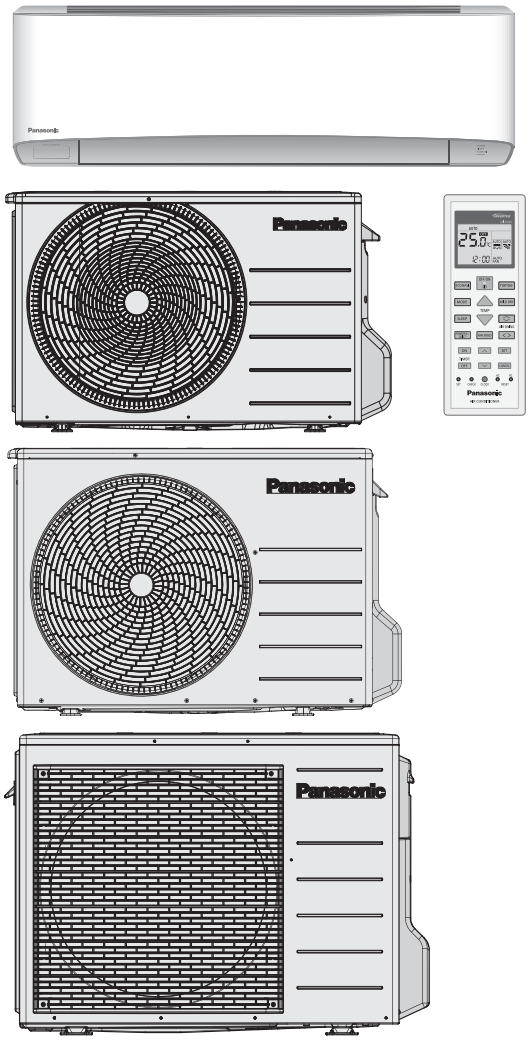
Order No: PAPAMY1603014CE

Service Manual

Air Conditioner



Indoor Unit	Outdoor Unit
CS-Z7SKEW	CU-Z7SKE
CS-Z9SKEW	CU-Z9SKE
CS-Z12SKEW	CU-Z12SKE
CS-Z15SKEW	CU-Z15SKE
CS-Z18SKEW	CU-Z18SKE

Destination
EU
E.Europe
L.America
Turkey
Croatia

⚠WARNING

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

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are marked by ⚠ in the Schematic Diagrams, Circuit Board Diagrams, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire or other hazards. Do not modify the original design without permission of manufacturer.

⚠ PRECAUTION OF LOW TEMPERATURE

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

Panasonic®

⚠ CAUTION

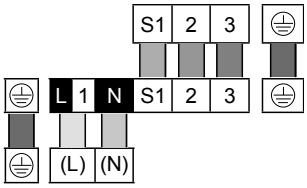
Before performing any of the electrical installation works, please verify on which of the intended connection use. Generally there are 2 types of indoor-outdoor connections:

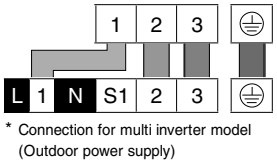
Ⓐ Single Connection (Single Indoor Unit connects with Single Outdoor Unit)

Ⓑ Multiple Connection (Multiple Indoor Unit connect with Single Outdoor Unit)

Both connections have different connecting methods. Any mismatch connections will result in malfunctions.
The following illustration demonstrates the correct electrical works for both type.

Ⓐ (Single Connection)	Ⓑ (Multiple Connection)
Terminals on the outdoor unit Colour of wires (connection cable) Terminals on the indoor unit (Power supply cord) Terminals on the isolating devices (Disconnecting means)	Terminals on the outdoor unit Colour of wires (connection cable) Terminals on the indoor unit (Power supply cord) Terminals on the isolating devices (Disconnecting means)





* Connection for multi inverter model (Outdoor power supply)

Please refer to the provided Installation Instructions for the detailed procedures for connecting cables to Indoor Unit.

TABLE OF CONTENTS

1. Safety Precautions

- Read the following “SAFETY PRECAUTIONS” carefully before installation.
- Electrical work must be installed by a licensed electrician. Be sure to use the correct rating of the power plug and main circuit for the model to be installed.
- The caution items stated here must be followed because these important contents are related to safety. The meaning of each indication used is as below. Incorrect installation due to ignoring of the instruction will cause harm or damage, and the seriousness is classified by the following indications.

⚠ **WARNING**	This indication shows the possibility of causing death or serious injury.
⚠ **CAUTION**	This indication shows the possibility of causing injury or damage to properties only.

- The items to be followed are classified by the symbols:

⃠	Symbol with white background denotes item that is PROHIBITED.
❗ ⏚	Symbol with dark background denotes item that must be carried out.

- Carry out test running to confirm that no abnormality occurs after the installation. Then, explain to user the operation, care and maintenance as stated in instructions. Please remind the customer to keep the operating instructions for future reference.
- This appliance is not intended for accessibility by the general public.

	⚠ **WARNING**	
1.	Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer. Any unfit method or using incompatible material may cause product damage, burst and serious injury.	⃠
2.	Do not install outdoor unit near handrail of veranda. When installing air-conditioner unit on veranda of a high rise building, child may climb up to outdoor unit and cross over the handrail causing an accident.	⃠
3.	Do not use unspecified cord, modified cord, joint cord or extension cord for power supply cord. Do not share the single outlet with other electrical appliances. Poor contact, poor insulation or over current will cause electrical shock or fire.	⃠
4.	The appliance shall be stored in a well ventilated room with indoor floor area larger than A_{min} (m^2) [refer Table A] and without any continuously operating ignition source. Keep away from open flames, any operating gas appliances or any operating electric heater. Else, it may explode and cause injury or death.	⃠
5.	Do not tie up the power supply cord into a bundle by band. Abnormal temperature rise on power supply cord may happen.	⃠
6.	Do not insert your fingers or other objects into the unit, high speed rotating fan may cause injury.	⃠
7.	Do not sit or step on the unit, you may fall down accidentally.	⃠
8.	The appliance shall be installed, and/or operated in a room with floor area larger than A_{min} (m^2) [refer Table A] and keep away from ignition sources, such as heat/sparks/open flame or hazardous areas such as gas appliances, gas cooking, reticulated gas supply systems or electric cooking appliances, etc.	⃠
9.	Keep plastic bag (packaging material) away from small children, it may cling to nose and mouth and prevent breathing.	⃠
10.	When installing or relocating air conditioner, do not let any substance other than the specified refrigerant, eg. air etc mix into refrigeration cycle (piping). Mixing of air etc. will cause abnormal high pressure in refrigeration cycle and result in explosion, injury etc.	⃠
11.	Do not pierce or burn as the appliance is pressurized. Do not expose the appliance to heat, flame, sparks, or other sources of ignition. Else, it may explode and cause injury or death.	⃠
12.	Do not add or replace refrigerant other than specified type. It may cause product damage, burst and injury etc.	⃠
13.	Do not perform flare connection inside a building or dwelling or room, when joining the heat exchanger of indoor unit with interconnecting piping. Refrigerant connection inside a building or dwelling or room must be made by brazing or welding. Joint connection of indoor unit by flaring method can only be made at outdoor or at outside of a building or dwelling or room. Flare connection may cause gas leak and flammable atmosphere.	⃠
14.	• For R32 model, use piping, flare nut and tools which is specified for R32 refrigerant. Using of existing (R22) piping, flare nut and tools may cause abnormally high pressure in the refrigerant cycle (piping), and possibly result in explosion and injury. • Thickness for copper pipes used with R32 must be more than 0.8 mm. Never use copper pipes thinner than 0.8 mm. • It is desirable that the amount of residual oil less than 40 mg/10 m.	
15.	Engage authorized dealer or specialist for installation. If installation done by the user is incorrect, it will cause water leakage, electrical shock or fire.	
16.	For refrigeration system work, install according to this installation instructions strictly. If installation is defective, it will cause water leakage, electrical shock or fire.	

	⚠ WARNING
17.	Use the attached accessories parts and specified parts for installation. Otherwise, it will cause the set to fall, water leakage, fire or electrical shock.
18.	Install at a strong and firm location which is able to withstand weight of the set. If the strength is not enough or installation is not properly done, the set will drop and cause injury.
19.	For electrical work, follow the national regulation, legislation and this installation instructions. An independent circuit and single outlet must be used. If electrical circuit capacity is not enough or defect found in the electrical work, it will cause electrical shock or fire.
20.	Do not use joint cable for indoor/outdoor connection cable. Use the specified indoor/outdoor connection cable, refer to instruction **CONNECT THE CABLE TO THE INDOOR UNIT** and connect tightly for indoor/outdoor connection. Clamp the cable so that no external force will have impact on the terminal. If connection or fixing is not perfect, it will cause heat up or fire at the connection.
21.	Wire routing must be properly arranged so that control board cover is fixed properly. If control board cover is not fixed perfectly, it will cause fire or electrical shock.
22.	This equipment is strongly recommended to be installed with Earth Leakage Circuit Breaker (ELCB) or Residual Current Device (RCD), with sensitivity of 30mA at 0.1 sec or less. Otherwise, it may cause electrical shock and fire in case of equipment breakdown or insulation breakdown.
23.	During installation, install the refrigerant piping properly before running the compressor. Operation of compressor without fixing refrigeration piping and valves at opened position will cause suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc.
24.	During pump down operation, stop the compressor before removing the refrigeration piping. Removal of refrigeration piping while compressor is operating and valves are opened will cause suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc.
25.	Tighten the flare nut with torque wrench according to specified method. If the flare nut is over-tightened, after a long period, the flare may break and cause refrigerant gas leakage.
26.	After completion of installation, confirm there is no leakage of refrigerant gas. It may generate toxic gas when the refrigerant contacts with fire.
27.	Ventilate if there is refrigerant gas leakage during operation. It may cause toxic gas when the refrigerant contacts with fire.
28.	Be aware that refrigerants may not contain an odour.
29.	This equipment must be properly earthed. Earth line must not be connected to gas pipe, water pipe, earth of lightning rod and telephone. Otherwise, it may cause electrical shock in case of equipment breakdown or insulation breakdown.

	⚠ CAUTION
1.	Do not install the unit in a place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire.
2.	Prevent liquid or vapor from entering sumps or sewers since vapor is heavier than air and may form suffocating atmospheres.
3.	Do not release refrigerant during piping work for installation, re-installation and during repairing refrigeration parts. Take care of the liquid refrigerant, it may cause frostbite.
4.	Do not install this appliance in a laundry room or other location where water may drip from the ceiling, etc.
5.	Do not touch the sharp aluminium fin, sharp parts may cause injury.
6.	Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, water may enter the room and damage the furniture.
7.	Select an installation location which is easy for maintenance. Incorrect installation, service or repair of this air conditioner may increase the risk of rupture and this may result in loss damage or injury and/or property.
8.	Power supply connection to the room air conditioner. Use power supply cord 3 x 1.5 mm^2 (3/4 ~ 1.75HP), 3 x 2.5 mm^2 (2.0HP) type designation 60245 IEC 57 or heavier cord. Connect the power supply cord of the air conditioner to the mains using one of the following method. Power supply point should be in easily accessible place for power disconnection in case of emergency. In some countries, permanent connection of this air conditioner to the power supply is prohibited. 1) Power supply connection to the receptacle using power plug. Use an approved 15/16A (3/4 ~ 1.75HP), 16A (2.0HP) power plug with earth pin for the connection to the socket. 2) Power supply connection to a circuit breaker for the permanent connection. Use an approved 16A (3/4 ~ 2.0HP) circuit breaker for the permanent connection. It must be a double pole switch with a minimum 3.0 mm contact gap.
9.	Installation work. It may need two people to carry out the installation work.

2. Precaution for Using R32 Refrigerant

- The basic installation work procedures are the same as conventional refrigerant (R410A, R22) models. However, pay careful attention to the following points:

	⚠ WARNING
1.	Since the working pressure is higher than that of refrigerant R22 models, some of the piping and installation and service tools are special. (See "2.1. Special tools for R32 (R410A)".) Especially, when replacing a refrigerant R22 model with a new refrigerant R32 model, always replace the conventional piping and flare nuts with the R32 and R410A piping and flare nuts on the outdoor unit side. For R32 and R410A, the same flare nut on the outdoor unit side and pipe can be used.
2.	Models that use refrigerant R32 and R410A have a different charging port thread diameter to prevent erroneous charging with refrigerant R22 and for safety. Therefore, check beforehand. [The charging port thread diameter for R32 and R410A is 12.7 mm (1/2 inch).]
3.	Be more careful than R22 so that foreign matter (oil, water, etc.) does not enter the piping. Also, when storing the piping, securely seal the opening by pinching, taping, etc. (Handling of R32 is similar to R410A.)

	⚠ CAUTION
1.	Installation (Space) • Must ensure the installation of pipe-work shall be kept to a minimum. Avoid use dented pipe and do not allow acute bending. • Must ensure that pipe-work shall be protected from physical damage. • Must comply with national gas regulations, state municipal rules and legislation. Notify relevant authorities in accordance with all applicable regulations. • Must ensure mechanical connections be accessible for maintenance purposes. • In cases that require mechanical ventilation, ventilation openings shall be kept clear of obstruction. • When disposal of the product, do follow to the precautions in #12 and comply with national regulations. Always contact to local municipal offices for proper handling. • Interconnecting refrigerant pipework, i.e. pipework external to the unitary components, should be marked with a Class label (see Figure 9.1 of Code of Practice) every two metres where the pipework is visible. This includes pipework located in a ceiling space or any void which a person may access for maintenance or repair work within that space.
2.	Servicing 2-1. Service personnel • Any qualified person who is involved with working on or breaking into a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accordance with an industry recognized assessment specification. • Servicing shall only be performed as recommended by the equipment manufacturer. Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants. • Servicing shall be performed only as recommended by the manufacturer. 2-2. Work • Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimised. For repair to the refrigerating system, the precautions in #2-2 to #2-8 must be followed before conducting work on the system. • Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapour being present while the work is being performed. • All maintenance staff and others working in the local area shall be instructed and supervised on the nature of work being carried out. • Avoid working in confined spaces. • Wear appropriate protective equipment, including respiratory protection, as conditions warrant. • Ensure that the conditions within the area have been made safe by limit of use of any flammable material. Keep all sources of ignition and hot metal surfaces away. 2-3. Checking for presence of refrigerant • The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially flammable atmospheres. • Ensure that the leak detection equipment being used is suitable for use with flammable refrigerants, i.e. non sparking, adequately sealed or intrinsically safe. • In case of leakage/spillage happened, immediately ventilate area and stay upwind and away from spill/release. • In case of leakage/spillage happened, do notify persons downwind of the leaking/spill, isolate immediate hazard area and keep unauthorized personnel out. 2-4. Presence of fire extinguisher • If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available at hand. • Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

⚠ CAUTION

2-5. No ignition sources

- No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. He/She must not be smoking when carrying out such work.
- All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which flammable refrigerant can possibly be released to the surrounding space.
- Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks.
- "No Smoking" signs shall be displayed.

2-6. Ventilated area

- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work.
- A degree of ventilation shall continue during the period that the work is carried out.
- The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

2-7. Checks to the refrigeration equipment

- Where electrical components are being changed, they shall be fit for the purpose and to the correct specification.
- At all times the manufacturer's maintenance and service guidelines shall be followed.
- If in doubt consult the manufacturer's technical department for assistance.
- The following checks shall be applied to installations using flammable refrigerants.
  - The charge size is in accordance with the room size within which the refrigerant containing parts are installed.
  - The ventilation machinery and outlets are operating adequately and are not obstructed.
  - If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.
  - Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.
  - Refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are properly protected against being so corroded.

2-8. Checks to electrical devices

- Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures.
- Initial safety checks shall include but not limit to:-
  - That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking.
  - That there is no live electrical components and wiring are exposed while charging, recovering or purging the system.
  - That there is continuity of earth bonding.
- At all times the manufacturer's maintenance and service guidelines shall be followed.
- If in doubt consult the manufacturer's technical department for assistance.
- If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with.
- If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used.
- The owner of the equipment must be informed or reported so all parties are advised thereinafter.

3. Repairs to sealed components

- During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc.
- If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.
- Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.
- Ensure that apparatus is mounted securely.
- Ensure that seals or sealing materials have not degraded such that they no longer serve the purpose of preventing the ingress of flammable atmospheres.
- Replacement parts shall be in accordance with the manufacturer's specifications.

NOTE:	The use of silicon sealant may inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

4. Repair to intrinsically safe components

- Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.
- Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere.
- The test apparatus shall be at the correct rating.
- Replace components only with parts specified by the manufacturer. Unspecified parts by manufacturer may result ignition of refrigerant in the atmosphere from a leak.

5. Cabling

- Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects.
- The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

6. Detection of flammable refrigerants

- Under no circumstances shall potential sources of ignition be used in the searching or detection of refrigerant leaks.
- A halide torch (or any other detector using a naked flame) shall not be used.

⚠ CAUTION

7.

Leak detection methods

- Electronic leak detectors shall be used to detect flammable refrigerants, but the sensitivity may not be adequate, or may need re-calibration.
  (Detection equipment shall be calibrated in a refrigerant-free area.)
- Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used.
- Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed and the appropriate percentage of gas (25 % maximum) is confirmed.
- Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.
- If a leak is suspected, all naked flames shall be removed/extinguished.
- If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

8.

Removal and evacuation

- When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, it is important that best practice is followed since flammability is a consideration.
  The following procedure shall be adhered to:

> • remove refrigerant -> • purge the circuit with inert gas -> • evacuate -> • purge again with inert gas ->
> • open the circuit by cutting or brazing

- The refrigerant charge shall be recovered into the correct recovery cylinders.
- The system shall be “flushed” with OFN to render the unit safe.
- This process may need to be repeated several times.
- Compressed air or oxygen shall not be used for this task.
- Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum.
- This process shall be repeated until no refrigerant is within the system.
- When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.
- This operation is absolutely vital if brazing operations on the pipe work are to take place.
- Ensure that the outlet for the vacuum pump is not close to any ignition sources and there is ventilation available.

9.

Charging procedures

- In addition to conventional charging procedures, the following requirements shall be followed.
  - Ensure that contamination of different refrigerants does not occur when using charging equipment.
  - Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
  - Cylinders shall be kept upright.
  - Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
  - Label the system when charging is complete (if not already).
  - Extreme care shall be taken not to over fill the refrigeration system.
- Prior to recharging the system it shall be pressure tested with OFN (refer to #7).
- The system shall be leak tested on completion of charging but prior to commissioning.
- A follow up leak test shall be carried out prior to leaving the site.
- Electrostatic charge may accumulate and create a hazardous condition when charging and discharging the refrigerant.
  To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before charging/discharging.

10.

Decommissioning

- Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its details.
- It is recommended good practice that all refrigerants are recovered safely.
- Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of reclaimed refrigerant.
- It is essential that electrical power is available before the task is commenced.
  a) Become familiar with the equipment and its operation.
  b) Isolate system electrically.
  c) Before attempting the procedure ensure that:

> • mechanical handling equipment is available, if required, for handling refrigerant cylinders;
> • all personal protective equipment is available and being used correctly;
> • the recovery process is supervised at all times by a competent person;
> • recovery equipment and cylinders conform to the appropriate standards.

  d) Pump down refrigerant system, if possible.
  e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
  f) Make sure that cylinder is situated on the scales before recovery takes place.
  g) Start the recovery machine and operate in accordance with manufacturer’s instructions.
  h) Do not over fill cylinders. (No more than 80 % volume liquid charge).
  i) Do not exceed the maximum working pressure of the cylinder, even temporarily.
  j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
  k) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.
- Electrostatic charge may accumulate and create a hazardous condition when charging or discharging the refrigerant.
  To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before charging/discharging.

	⚠ CAUTION
11.	Labelling • Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. • The label shall be dated and signed. • Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.
12.	Recovery • When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely. • When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. • Ensure that the correct number of cylinders for holding the total system charge are available. • All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). • Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order. • Recovery cylinders are evacuated and, if possible, cooled before recovery occurs. • The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of flammable refrigerants. • In addition, a set of calibrated weighing scales shall be available and in good working order. • Hoses shall be complete with leak-free disconnect couplings and in good condition. • Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt. • The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Note arranged. • Do not mix refrigerants in recovery units and especially not in cylinders. • If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. • The evacuation process shall be carried out prior to returning the compressor to the suppliers. • Only electric heating to the compressor body shall be employed to accelerate this process. • When oil is drained from a system, it shall be carried out safely.

3. Specifications

Model			Indoor	CS-Z7SKEW			CS-Z9SKEW		
			Outdoor	CU-Z7SKE			CU-Z9SKE		
Performance Test Condition				EUROVENT			EUROVENT		
Power Supply			Phase, Hz	Single, 50			Single, 50		
			V	230			230		
				Min.	Mid.	Max.	Min.	Mid.	Max.
Cooling	Capacity		kW	0.75	2.05	2.40	0.85	2.50	3.00
			BTU/h	2560	6990	8180	2900	8530	10200
			Kcal/h	650	1760	2060	730	2150	2580
	Running Current		A	–	2.15	–	–	2.50	–
	Input Power		W	240	450	555	240	525	715
	Annual Consumption		kWh	–	225	–	–	263	–
	EER		W/W	3.13	4.56	4.32	3.54	4.76	4.20
			BTU/hW	10.67	15.53	14.74	12.08	16.25	14.27
			Kcal/hW	2.71	3.91	3.71	3.04	4.10	3.61
	ErP	Pdesign	kW	2.1			2.5		
		SEER	(W/W)	7.5			8.5		
		Annual Consumption	kWh	98			103		
		Class		A++			A+++		
	Power Factor		%	–	91	–	–	91	–
	Indoor Noise (H / L / QLo)		dB-A	37 / 24 / 19			39 / 25 / 19		
			Power Level dB	53 / –			55 / –		
	Outdoor Noise (H / L)		dB-A	45 / –			46 / –		
			Power Level dB	60 / –			61 / –		
Heating	Capacity		kW	0.70	2.80	4.00	0.80	3.40	5.00
			BTU/h	2390	9550	13600	2730	11600	17100
			Kcal/h	600	2410	3440	690	2920	4300
	Running Current		A	–	2.80	–	–	3.30	–
	Input Power		W	180	620	990	180	720	1.27k
	COP		W/W	3.89	4.52	4.04	4.44	4.72	3.94
			BTU/hW	13.28	15.40	13.74	15.17	16.11	13.46
			Kcal/hW	3.33	3.89	3.47	3.83	4.06	3.39
	ErP	Pdesign	kW	2.1			2.7		
		Tbivalent	°C	-10			-10		
		SCOP	(W/W)	4.7			4.9		
		Annual Consumption	kWh	626			771		
		Class		A++			A++		
	Power Factor		%	–	96	–	–	95	–
	Indoor Noise (H / L / QLo)		dB-A	38 / 25 / 19			40 / 27 / 19		
			Power Level dB	54 / –			56 / –		
	Outdoor Noise (H / L)		dB-A	46 / –			47 / –		
			Power Level dB	61 / –			62 / –		
Low Temp. : Capacity (kW) / I.Power (W) / COP				2.90 / 870 / 3.33			3.62 / 1.12k / 3.23		
Extr Low Temp. : Capacity (kW) / I.Power (W) / COP				2.38 / 880 / 2.70			2.95 / 1.15k / 2.57		
Max Current (A) / Max Input Power (W)				4.40 / 990			5.6 / 1.27k		
Starting Current (A)				2.80			3.30		

Model				Indoor	CS-Z7SKEW	CS-Z9SKEW
				Outdoor	CU-Z7SKE	CU-Z9SKE
Compressor	Type				Hermetic Motor (Rotary)	Hermetic Motor (Rotary)
	Motor Type				Brushless (6 poles)	Brushless (6 poles)
	Output Power			W	650	700
Indoor Fan	Type				Cross-Flow Fan	Cross-Flow Fan
	Material				ASG20K1	ASG20K1
	Motor Type				DC / Transistor (8-poles)	DC / Transistor (8-poles)
	Input Power			W	44.9	44.9
	Output Power			W	40	40
	Speed	QLo	Cool	rpm	610	600
			Heat	rpm	610	620
		Lo	Cool	rpm	700	720
			Heat	rpm	800	860
		Me	Cool	rpm	880	930
			Heat	rpm	970	1070
		Hi	Cool	rpm	1060	1140
			Heat	rpm	1140	1280
		SHi	Cool	rpm	1090	1170
			Heat	rpm	1170	1330
Outdoor Fan	Type				Propeller Fan	Propeller Fan
	Material				PP	PP
	Motor Type				DC (8-poles)	DC (8-poles)
	Input Power			W	–	–
	Output Power			W	40	40
	Speed	Hi	Cool	rpm	780	820
			Heat	rpm	720	780
Moisture Removal				L/h (Pt/h)	1.3 (2.7)	1.5 (3.2)
Indoor Airflow		QLo	Cool	m^3/min (ft^3/min)	5.05 (178)	4.85 (171)
			Heat	m^3/min (ft^3/min)	5.05 (178)	5.03 (178)
		Lo	Cool	m^3/min (ft^3/min)	6.02 (213)	6.00 (212)
			Heat	m^3/min (ft^3/min)	7.12 (251)	7.31 (258)
		Me	Cool	m^3/min (ft^3/min)	7.96 (281)	7.99 (282)
			Heat	m^3/min (ft^3/min)	8.97 (317)	9.30 (328)
		Hi	Cool	m^3/min (ft^3/min)	9.90 (350)	10.00 (355)
			Heat	m^3/min (ft^3/min)	10.80 (380)	11.30 (400)
		SHi	Cool	m^3/min (ft^3/min)	10.22 (361)	10.28 (363)
			Heat	m^3/min (ft^3/min)	11.13 (393)	11.77 (416)
Outdoor Airflow		Hi	Cool	m^3/min (ft^3/min)	26.9 (950)	28.7 (1015)
			Heat	m^3/min (ft^3/min)	26.9 (950)	28.7 (1015)
Refrigeration Cycle	Control Device				Expansion Valve	Expansion Valve
	Refrigerant Oil			cm^3	FW50S (320)	FW50S (320)
	Refrigerant Type			g (oz)	R32, 760 (26.8)	R32, 850 (30.0)
F-Gas	GWP				675	675
	CO2eq (ton) (Precharged Amount / Maximum Charged Amount)				0.513 / 0.564	0.574 / 0.624
Dimension	Height (I/D / O/D)			mm (inch)	295 (11-5/8) / 542 (21-11/32)	295 (11-5/8) / 542 (21-11/32)
	Width (I/D / O/D)			mm (inch)	919 (36-3/16) / 780 (30-23/32)	919 (36-3/16) / 780 (30-23/32)
	Depth (I/D / O/D)			mm (inch)	194 (7-21/32) / 289 (11-13/32)	194 (7-21/32) / 289 (11-13/32)
Weight	Net (I/D / O/D)			kg (lb)	9 (20) / 30 (66)	10 (22) / 33 (73)

Model			Indoor	CS-Z7SKEW		CS-Z9SKEW	
			Outdoor	CU-Z7SKE		CU-Z9SKE	
Piping	Pipe Diameter (Liquid / Gas)		mm (inch)	6.35 (1/4) / 9.52 (3/8)		6.35 (1/4) / 9.52 (3/8)	
	Standard length		m (ft)	5.0 (16.4)		5.0 (16.4)	
	Length range (min – max)		m (ft)	3 (9.8) ~ 15 (49.2)		3 (9.8) ~ 15 (49.2)	
	I/D & O/D Height different		m (ft)	15.0 (49.2)		15.0 (49.2)	
	Additional Gas Amount		g/m (oz/ft)	10 (0.1)		10 (0.1)	
	Length for Additional Gas		m (ft)	7.5 (24.6)		7.5 (24.6)	
Drain Hose	Inner Diameter		mm	16.7		16.7	
	Length		mm	650		650	
Indoor Heat Exchanger	Fin Material			Aluminium (Pre Coat)		Aluminium (Pre Coat)	
	Fin Type			Slit Fin		Slit Fin	
	Row × Stage × FPI			2 × 15 × 21		2 × 15 × 21	
	Size (W × H × L)		mm	610 × 315 × 25.4		610 × 315 × 25.4	
Outdoor Heat Exchanger	Fin Material			Aluminium		Aluminium	
	Fin Type			Corrugated Fin		Corrugated Fin	
	Row × Stage × FPI			2 × 24 × 17		2 × 24 × 19	
	Size (W × H × L)		mm	36.4 × 504 × 713:684		36.4 × 504 × 824.2:793.7	
Air Filter	Material			Polypropelene		Polypropelene	
	Type			One-touch		One-touch	
Power Supply				Indoor		Indoor	
Power Supply Cord			A	Nil		Nil	
Thermostat				Electronic Contol		Electronic Contol	
Protection Device				Electronic Contol		Electronic Contol	
				Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb
Indoor Operation Range	Cooling		Maximum °C	32	23	32	23
			Minimum °C	16	11	16	11
	Heating		Maximum °C	30	–	30	–
			Minimum °C	16	–	16	–
Outdoor Operation Range	Cooling		Maximum °C	43	26	43	26
			Minimum °C	-10	–	-10	–
	Heating		Maximum °C	24	18	24	18
			Minimum °C	-15	-16	-15	-16

1. Cooling capacities are based on indoor temperature of 27°C Dry Bulb (80.6°F Dry Bulb), 19.0°C Wet Bulb (66.2°F Wet Bulb) and outdoor air temperature of 35°C DRY BULB (95°F Dry Bulb), 24°C Wet Bulb (75.2°F Wet Bulb)
2. Heating capacities are based on indoor temperature of 20°C Dry Bulb (68°F Dry Bulb) and outdoor air temperature of 7°C Dry Bulb (44.6°F Dry Bulb), 6°C Wet Bulb (42.8°F Wet Bulb)
3. Heating low temperature capacity, Input Power and COP measured at 230 V, indoor temperature 20°C, outdoor 2/1°C
4. Heating extreme low temperature capacity, Input Power and COP measured at 230 V, indoor temperature 20°C, outdoor -7/-8°C
5. Standby power consumption ≤10.0w (when switched OFF by remote control, except under self protection control).
6. Specifications are subjected to change without prior notice for further improvement.

Model			Indoor	CS-Z12SKEW			CS-Z15SKEW		
			Outdoor	CU-Z12SKE			CU-Z15SKE		
Performance Test Condition				EUROVENT			EUROVENT		
Power Supply			Phase, Hz	Single, 50			Single, 50		
			V	230			230		
				Min.	Mid.	Max.	Min.	Mid.	Max.
Cooling	Capacity		kW	0.85	3.50	4.00	0.85	4.20	5.00
			BTU/h	2900	11900	13600	2900	14300	17100
			Kcal/h	730	3010	3440	730	3610	4300
	Running Current		A	–	3.95	–	–	5.50	–
	Input Power		W	240	840	1.06k	260	1.24k	1.57k
	Annual Consumption		kWh	–	420	–	–	620	–
	EER		W/W	3.54	4.17	3.77	3.27	3.39	3.18
			BTU/hW	12.08	14.17	12.83	11.15	11.53	10.89
			Kcal/hW	3.04	3.58	3.25	2.81	2.91	2.74
	ErP	Pdesign	kW	3.5			4.2		
		SEER	(W/W)	8.5			6.9		
		Annual Consumption	kWh	144			213		
		Class		A+++			A++		
	Power Factor		%	–	92	–	–	98	–
	Indoor Noise (H / L / QLo)		dB-A	42 / 28 / 19			43 / 31 / 25		
			Power Level dB	58 / –			59 / –		
	Outdoor Noise (H / L)		dB-A	48 / –			49 / –		
			Power Level dB	63 / –			64 / –		
Heating	Capacity		kW	0.80	4.00	5.80	0.80	5.30	6.80
			BTU/h	2730	13600	19800	2730	18100	23200
			Kcal/h	690	3440	4990	690	4560	5850
	Running Current		A	–	4.40	–	–	6.40	–
	Input Power		W	180	920	1.52k	190	1.44k	1.94k
	COP		W/W	4.44	4.35	3.82	4.21	3.68	3.51
			BTU/hW	15.17	14.78	13.03	14.37	12.57	11.96
			Kcal/hW	3.83	3.74	3.28	3.63	3.17	3.02
	ErP	Pdesign	kW	3.2			3.6		
		Tbivalent	°C	-10			-10		
		SCOP	(W/W)	4.9			4.0		
		Annual Consumption	kWh	914			1260		
		Class		A++			A+		
	Power Factor		%	–	91	–	–	98	–
	Indoor Noise (H / L / QLo)		dB-A	42 / 33 / 19			43 / 35 / 29		
			Power Level dB	58 / –			59 / –		
	Outdoor Noise (H / L)		dB-A	50 / –			51 / –		
			Power Level dB	65 / –			66 / –		
Low Temp. : Capacity (kW) / I.Power (W) / COP				4.20 / 1.35k / 3.11			4.93 / 1.72k / 2.87		
Extr Low Temp. : Capacity (kW) / I.Power (W) / COP				3.40 / 1.40k / 2.43			4.11 / 1.73k / 2.38		
Max Current (A) / Max Input Power (W)				7.8 / 1.52k			8.5 / 1.94k		
Starting Current (A)				4.40			6.40		

Model				Indoor	CS-Z12SKEW	CS-Z15SKEW
				Outdoor	CU-Z12SKE	CU-Z15SKE
Compressor	Type				Hermetic Motor (Rotary)	Hermetic Motor (Rotary)
	Motor Type				Brushless (6 poles)	Brushless (6 poles)
	Output Power			W	700	700
Indoor Fan	Type				Cross-Flow Fan	Cross-Flow Fan
	Material				ASG20K1	ASG20K1
	Motor Type				DC / Transistor (8-poles)	DC / Transistor (8-poles)
	Input Power			W	44.9	44.9
	Output Power			W	40	40
	Speed	QLo	Cool	rpm	600	720
			Heat	rpm	620	890
		Lo	Cool	rpm	800	870
			Heat	rpm	1020	1080
		Me	Cool	rpm	1010	1070
			Heat	rpm	1180	1220
		Hi	Cool	rpm	1220	1270
			Heat	rpm	1350	1370
		SHi	Cool	rpm	1270	1320
			Heat	rpm	1400	1420
Outdoor Fan	Type				Propeller Fan	Propeller Fan
	Material				PP	PP
	Motor Type				DC (8-poles)	DC (8-poles)
	Input Power			W	–	–
	Output Power			W	40	40
	Speed	Hi	Cool	rpm	870	900
			Heat	rpm	890	910
Moisture Removal				L/h (Pt/h)	2.0 (4.2)	2.4 (5.1)
Indoor Airflow		QLo	Cool	m^3/min (ft^3/min)	4.83 (171)	5.98 (211)
			Heat	m^3/min (ft^3/min)	5.05 (178)	7.62 (269)
		Lo	Cool	m^3/min (ft^3/min)	6.72 (237)	7.40 (261)
			Heat	m^3/min (ft^3/min)	8.86 (313)	9.44 (333)
		Me	Cool	m^3/min (ft^3/min)	8.71 (308)	9.30 (328)
			Heat	m^3/min (ft^3/min)	10.42 (368)	10.81 (382)
		Hi	Cool	m^3/min (ft^3/min)	10.70 (380)	11.20 (395)
			Heat	m^3/min (ft^3/min)	12.00 (425)	12.20 (430)
		SHi	Cool	m^3/min (ft^3/min)	11.17 (394)	11.68 (412)
			Heat	m^3/min (ft^3/min)	12.48 (441)	12.68 (448)
Outdoor Airflow		Hi	Cool	m^3/min (ft^3/min)	34.4 (1215)	33.3 (1175)
			Heat	m^3/min (ft^3/min)	35.6 (1255)	33.7 (1190)
Refrigeration Cycle	Control Device				Expansion Valve	Expansion Valve
	Refrigerant Oil			cm^3	FW50S (320)	FW50S (320)
	Refrigerant Type			g (oz)	R32, 910 (32.1)	R32, 870 (30.7)
F-Gas	GWP				675	675
	CO2eq (ton) (Precharged Amount / Maximum Charged Amount)				0.614 / 0.665	0.587 / 0.638
Dimension	Height (I/D / O/D)			mm (inch)	295 (11-5/8) / 619 (24-3/8)	295 (11-5/8) / 619 (24-3/8)
	Width (I/D / O/D)			mm (inch)	919 (36-3/16) / 824 (32-15/32)	919 (36-3/16) / 824 (32-15/32)
	Depth (I/D / O/D)			mm (inch)	194 (7-21/32) / 299 (11-25/32)	194 (7-21/32) / 299 (11-25/32)
Weight	Net (I/D / O/D)			kg (lb)	10 (22) / 35 (77)	10 (22) / 32 (71)

Model			Indoor	CS-Z12SKEW		CS-Z15SKEW	
			Outdoor	CU-Z12SKE		CU-Z15SKE	
Piping	Pipe Diameter (Liquid / Gas)		mm (inch)	6.35 (1/4) / 9.52 (3/8)		6.35 (1/4) / 12.70 (1/2)	
	Standard length		m (ft)	5.0 (16.4)		5.0 (16.4)	
	Length range (min – max)		m (ft)	3 (9.8) ~ 15 (49.2)		3 (9.8) ~ 15 (49.2)	
	I/D & O/D Height different		m (ft)	15.0 (49.2)		15.0 (49.2)	
	Additional Gas Amount		g/m (oz/ft)	10 (0.1)		10 (0.1)	
	Length for Additional Gas		m (ft)	7.5 (24.6)		7.5 (24.6)	
Drain Hose	Inner Diameter		mm	16.7		16.7	
	Length		mm	650		650	
Indoor Heat Exchanger	Fin Material			Aluminium (Pre Coat)		Aluminium (Pre Coat)	
	Fin Type			Slit Fin		Slit Fin	
	Row × Stage × FPI			2 × 15 × 21		2 × 15 × 21	
	Size (W × H × L)		mm	610 × 315 × 25.4		610 × 315 × 25.4	
Outdoor Heat Exchanger	Fin Material			Aluminium		Aluminium	
	Fin Type			Corrugated Fin		Corrugated Fin	
	Row × Stage × FPI			2 × 28 × 17		2 × 28 × 17	
	Size (W × H × L)		mm	36.38 × 588 × 856.3:827.7		36.38 × 588 × 606.6	
Air Filter	Material			Polypropelene		Polypropelene	
	Type			One-touch		One-touch	
Power Supply				Indoor		Indoor	
Power Supply Cord			A	Nil		Nil	
Thermostat				Electronic Contol		Electronic Contol	
Protection Device				Electronic Contol		Electronic Contol	
				Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb
Indoor Operation Range	Cooling		Maximum °C	32	23	32	23
			Minimum °C	16	11	16	11
	Heating		Maximum °C	30	–	30	–
			Minimum °C	16	–	16	–
Outdoor Operation Range	Cooling		Maximum °C	43	26	43	26
			Minimum °C	-10	–	-10	–
	Heating		Maximum °C	24	18	24	18
			Minimum °C	-15	-16	-15	-16

1. Cooling capacities are based on indoor temperature of 27°C Dry Bulb (80.6°F Dry Bulb), 19.0°C Wet Bulb (66.2°F Wet Bulb) and outdoor air temperature of 35°C DRY BULB (95°F Dry Bulb), 24°C Wet Bulb (75.2°F Wet Bulb)
2. Heating capacities are based on indoor temperature of 20°C Dry Bulb (68°F Dry Bulb) and outdoor air temperature of 7°C Dry Bulb (44.6°F Dry Bulb), 6°C Wet Bulb (42.8°F Wet Bulb)
3. Heating low temperature capacity, Input Power and COP measured at 230 V, indoor temperature 20°C, outdoor 2/1°C
4. Heating extreme low temperature capacity, Input Power and COP measured at 230 V, indoor temperature 20°C, outdoor -7/-8°C
5. Standby power consumption ≤10.0w (when switched OFF by remote control, except under self protection control).
6. Specifications are subjected to change without prior notice for further improvement.

Model			Indoor	CS-Z18SKEW		
			Outdoor	CU-Z18SKE		
Performance Test Condition				EUROVENT		
Power Supply			Phase, Hz	Single, 50		
			V	230		
				Min.	Mid.	Max.
Cooling	Capacity		kW	0.98	5.00	5.60
			BTU/h	3340	17100	19100
			Kcal/h	840	4300	4820
	Running Current		A	–	6.70	–
	Input Power		W	280	1.50k	1.72k
	Annual Consumption		kWh	–	750	–
	EER		W/W	3.50	3.33	3.26
			BTU/hW	11.93	11.40	11.10
			Kcal/hW	3.00	2.87	2.80
	ErP	Pdesign	kW	5.0		
		SEER	(W/W)	7.3		
		Annual Consumption	kWh	240		
		Class		A++		
	Power Factor		%	–	97	–
	Indoor Noise (H / L / QLo)		dB-A	44 / 37 / 34		
			Power Level dB	60 / –		
	Outdoor Noise (H / L)		dB-A	47 / –		
			Power Level dB	61 / –		
Heating	Capacity		kW	0.98	5.80	7.50
			BTU/h	3340	19800	25600
			Kcal/h	840	4990	6450
	Running Current		A	–	7.60	–
	Input Power		W	340	1.70k	2.35k
	COP		W/W	2.88	3.41	3.19
			BTU/hW	9.82	11.65	10.89
			Kcal/hW	2.47	2.94	2.74
	ErP	Pdesign	kW	4.2		
		Tbivalent	°C	-10		
		SCOP	(W/W)	4.4		
		Annual Consumption	kWh	1336		
		Class		A+		
	Power Factor		%	–	97	–
	Indoor Noise (H / L / QLo)		dB-A	44 / 37 / 34		
			Power Level dB	60 / –		
	Outdoor Noise (H / L)		dB-A	47 / –		
			Power Level dB	61 / –		
Low Temp. : Capacity (kW) / I.Power (W) / COP				5.43 / 2.08k / 2.61		
Extr Low Temp. : Capacity (kW) / I.Power (W) / COP				4.66 / 2.19k / 2.13		
Max Current (A) / Max Input Power (W)				10.4 / 2.35k		
Starting Current (A)				7.60		

Model				Indoor	CS-Z18SKEW
				Outdoor	CU-Z18SKE
Compressor	Type				Hermetic Motor (Rotary)
	Motor Type				Brushless (4 poles)
	Output Power			W	900
Indoor Fan	Type				Cross-Flow Fan
	Material				ASG20K1
	Motor Type				DC / Transistor (8-poles)
	Input Power			W	44.9
	Output Power			W	40
	Speed	QLo	Cool	rpm	950
			Heat	rpm	1030
		Lo	Cool	rpm	1040
			Heat	rpm	1140
		Me	Cool	rpm	1180
			Heat	rpm	1270
		Hi	Cool	rpm	1320
			Heat	rpm	1400
		SHi	Cool	rpm	1370
			Heat	rpm	1430
Outdoor Fan	Type				Propeller Fan
	Material				PP
	Motor Type				DC (8-poles)
	Input Power			W	–
	Output Power			W	40
	Speed	Hi	Cool	rpm	640
			Heat	rpm	600
Moisture Removal				L/h (Pt/h)	2.8 (5.9)
Indoor Airflow		QLo	Cool	m^3/min (ft^3/min)	8.17 (288)
			Heat	m^3/min (ft^3/min)	8.89 (314)
		Lo	Cool	m^3/min (ft^3/min)	9.04 (319)
			Heat	m^3/min (ft^3/min)	9.94 (351)
		Me	Cool	m^3/min (ft^3/min)	10.37 (366)
			Heat	m^3/min (ft^3/min)	11.16 (394)
		Hi	Cool	m^3/min (ft^3/min)	11.70 (415)
			Heat	m^3/min (ft^3/min)	12.40 (440)
		SHi	Cool	m^3/min (ft^3/min)	12.17 (430)
			Heat	m^3/min (ft^3/min)	12.72 (449)
Outdoor Airflow		Hi	Cool	m^3/min (ft^3/min)	39.2 (1385)
			Heat	m^3/min (ft^3/min)	37.9 (1340)
Refrigeration Cycle	Control Device				Expansion Valve
	Refrigerant Oil			cm^3	FW50S (450)
	Refrigerant Type			g (oz)	R32, 1.03k (36.4)
F-Gas	GWP				675
	CO2eq (ton) (Precharged Amount / Maximum Charged Amount)				0.695 / 0.822
Dimension	Height (I/D / O/D)			mm (inch)	295 (11-5/8) / 695 (27-3/8)
	Width (I/D / O/D)			mm (inch)	919 (36-3/16) / 875 (34-15/32)
	Depth (I/D / O/D)			mm (inch)	194 (7-21/32) / 320 (12-5/8)
Weight	Net (I/D / O/D)			kg (lb)	10 (22) / 46 (101)

Model			Indoor	CS-Z18SKEW	
			Outdoor	CU-Z18SKE	
Piping	Pipe Diameter (Liquid / Gas)		mm (inch)	6.35 (1/4) / 12.70 (1/2)	
	Standard length		m (ft)	5.0 (16.4)	
	Length range (min – max)		m (ft)	3 (9.8) ~ 20 (65.6)	
	I/D & O/D Height different		m (ft)	15.0 (49.2)	
	Additional Gas Amount		g/m (oz/ft)	15 (0.2)	
	Length for Additional Gas		m (ft)	7.5 (24.6)	
Drain Hose	Inner Diameter		mm	16.7	
	Length		mm	650	
Indoor Heat Exchanger	Fin Material			Aluminium (Pre Coat)	
	Fin Type			Slit Fin	
	Row × Stage × FPI			2 × 15 × 21	
	Size (W × H × L)		mm	610 × 315 × 25.4	
Outdoor Heat Exchanger	Fin Material			Aluminium	
	Fin Type			Corrugated Fin (Pre Coat)	
	Row × Stage × FPI			2 × 31 × 19	
	Size (W × H × L)		mm	36.4 × 651 × 854.5:824.5	
Air Filter	Material			Polypropelene	
	Type			One-touch	
Power Supply				Indoor	
Power Supply Cord			A	Nil	
Thermostat				Electronic Contol	
Protection Device				Electronic Contol	
				Dry Bulb	Wet Bulb
Indoor Operation Range	Cooling		Maximum °C	32	23
			Minimum °C	16	11
	Heating		Maximum °C	30	–
			Minimum °C	16	–
Outdoor Operation Range	Cooling		Maximum °C	43	26
			Minimum °C	-10	–
	Heating		Maximum °C	24	18
			Minimum °C	-15	-16

1. Cooling capacities are based on indoor temperature of 27°C Dry Bulb (80.6°F Dry Bulb), 19.0°C Wet Bulb (66.2°F Wet Bulb) and outdoor air temperature of 35°C DRY BULB (95°F Dry Bulb), 24°C Wet Bulb (75.2°F Wet Bulb)
2. Heating capacities are based on indoor temperature of 20°C Dry Bulb (68°F Dry Bulb) and outdoor air temperature of 7°C Dry Bulb (44.6°F Dry Bulb), 6°C Wet Bulb (42.8°F Wet Bulb)
3. Heating low temperature capacity, Input Power and COP measured at 230 V, indoor temperature 20°C, outdoor 2/1°C
4. Heating extreme low temperature capacity, Input Power and COP measured at 230 V, indoor temperature 20°C, outdoor -7/-8°C
5. Standby power consumption ≤10.0w (when switched OFF by remote control, except under self protection control).
6. Specifications are subjected to change without prior notice for further improvement.

- **Multi Split Combination Possibility:**
  - A single outdoor unit enables air conditioning of up to two separate rooms for CU-2E12SBE, CU-2E15SBE, CU-2E18SBE.
  - A single outdoor unit enables air conditioning of up to three separate rooms for CU-3E23SBE.

CONNECTABLE INDOOR UNIT			CU-2E12SBE		CU-2E15SBE		CU-2E18SBE		CU-3E23SBE		
ROOM			A	B	A	B	A	B	A	B	C
Wall	1.6kW	CS-MZ5SKE CS-MZ5SKE-M	●	●	●	●	●	●	●	●	●
	2.0kW	CS-Z7SKEW CS-E7SKEW CS-XE7SKEW CS-Z7SKEW-M CS-XZ7SKEW CS-E7SKEW-M	●	●	●	●	●	●	●	●	●
	2.5kW	CS-Z9SKEW CS-E9SKEW CS-XE9SKEW CS-XZ9SKEW CS-Z9SKEW-M CS-E9SKEW-M	●	●	●	●	●	●	●	●	●
	3.2kW	CS-Z12SKEW CS-E12SKEW CS-XE12SKEW CS-XZ12SKEW CS-Z12SKEW-M CS-E12SKEW-M	–	–	–	–	●	●	●	●	●
	4.0kW	CS-Z15SKEW CS-E15SKEW CS-Z15SKEW-M CS-E15SKEW-M	–	–	–	–	–	–	–	●	●
	5.0kW	CS-Z18SKEW CS-E18SKEW CS-XE18SKEW CS-XZ18SKEW CS-Z18SKEW-M CS-E18SKEW-M	–	–	–	–	–	–	–	●	●
Capacity range of connectable units			From 3.2kW to 5.6kW		From 3.2kW to 5.6kW		From 3.2kW to 7.5kW		From 4.8kW to 10.0kW		
Pipe length	1 room maximum pipe length (m)		20		20		20		25		
	Allowable elevation (m)		10		10		10		15		
	Total allowable pipe length (m)		30		30		30		60		
	Total pipe length for maximum chargeless length (m)		20		20		20		30		
	Additional gas amount over chargeless length (g/m)		15		15		15		20		

Note: "●" : Available

Remarks for CU-2E12SBE / CU-2E15SBE / CU-2E18SBE

1. At least two indoor units must be connected.
2. The total nominal cooling capacity of indoor unit that will be connected to outdoor unit must be within connectable capacity range of indoor unit. (as shown in the table above)
   Example: The indoor units' combination below is possible to connect to CU-2E15SBE. (Total nominal capacity of indoor units is between 3.2kW to 5.6kW)
   1) Two CS-Z7SKEW only. (Total nominal cooling capacity is 4.0kW)
   2) One CS-Z7SKEW and one CS-Z9SKEW. (Total nominal cooling capacity is 4.5kW)

Remarks for CU-3E23SBE

1. At least two indoor units must be connected.
2. The total nominal cooling capacity of indoor unit that will be connected to outdoor unit must be within connectable capacity range of indoor unit. (as shown in the table above)
   Example: The indoor units' combination below is possible to connect to CU-3E23SBE. (Total nominal capacity of indoor units is between 4.8kW to 10.0kW)
   1) Two CS-Z9SKEW only. (Total nominal cooling capacity is 5.0kW)
   2) Three CS-Z12SKEW. (Total nominal cooling capacity is 9.6kW)

- **Multi Split Combination Possibility:**
  - A single outdoor unit enables air conditioning of up to four separate rooms for CU-4E23PBE, CU-4E27PBE.
  - A single outdoor unit enables air conditioning of up to five separate rooms for CU-5E34PBE.

CONNECTABLE INDOOR UNIT			CU-4E23PBE				CU-4E27PBE				CU-5E34PBE				
ROOM			A	B	C	D	A	B	C	D	A	B	C	D	E
Wall	1.6kW	CS-MZ5SKE CS-MZ5SKE-M	●	●	●	●	●	●	●	●	●	●	●	●	●
	2.0kW	CS-Z7SKEW CS-E7SKEW CS-XE7SKEW CS-Z7SKEW-M CS-XZ7SKEW CS-E7SKEW-M	●	●	●	●	●	●	●	●	●	●	●	●	●
	2.5kW	CS-Z9SKEW CS-E9SKEW CS-XE9SKEW CS-XZ9SKEW CS-Z9SKEW-M CS-E9SKEW-M	●	●	●	●	●	●	●	●	●	●	●	●	●
	3.2kW	CS-Z12SKEW CS-E12SKEW CS-XE12SKEW CS-XZ12SKEW CS-Z12SKEW-M CS-E12SKEW-M	–	●	●	●	●	●	●	●	●	●	●	●	●
	4.0kW	CS-Z15SKEW CS-E15SKEW CS-Z15SKEW-M CS-E15SKEW-M	–	–	●	●	–	●	●	●	–	●	●	●	●
	5.0kW	CS-Z18SKEW CS-E18SKEW CS-XE18SKEW CS-XZ18SKEW CS-Z18SKEW-M CS-E18SKEW-M	–	–	●	●	–	–	●	●	–	–	●	●	●
Capacity range of connectable units			From 4.8kW to 11.0kW				From 4.8kW to 13.6kW				From 4.8kW to 17.5kW				
Pipe length	1 room maximum pipe length (m)		25				25				25				
	Allowable elevation (m)		15				15				15				
	Total allowable pipe length (m)		70				70				80				
	Total pipe length for maximum chargeless length (m)		40				45				45				
	Additional gas amount over chargeless length (g/m)		20				20				20				

Note: "●" : Available

Remarks for CU-4E23PBE / CU-4E27PBE / CU-5E34PBE

1. At least two indoor units must be connected.
2. The total nominal cooling capacity of indoor unit that will be connected to outdoor unit must be within connectable capacity range of indoor unit. (as shown in the table above)
   Example: The indoor units' combination below is possible to connect to CU-4E27PBE. (Total nominal capacity of indoor units is between 4.5kW to 13.6kW)
   1) Two CS-Z9SKEW only. (Total nominal cooling capacity is 5.0kW)
   2) Three CS-Z12SKEW. (Total nominal cooling capacity is 9.6kW)

4. Features

- **Inverter Technology**
  - Wider output power range
  - Energy saving
  - Quick Cooling
  - Quick Heating
  - More precise temperature control

- **Environment Protection**
  - Non-ozone depletion substances refrigerant (R32)

- **Long Installation Piping**
  - Long piping up to 15 meters (0.75 ~ 2.0HP) and 20 meters (2.25HP) during single split connection only

- **Easy to use remote control**

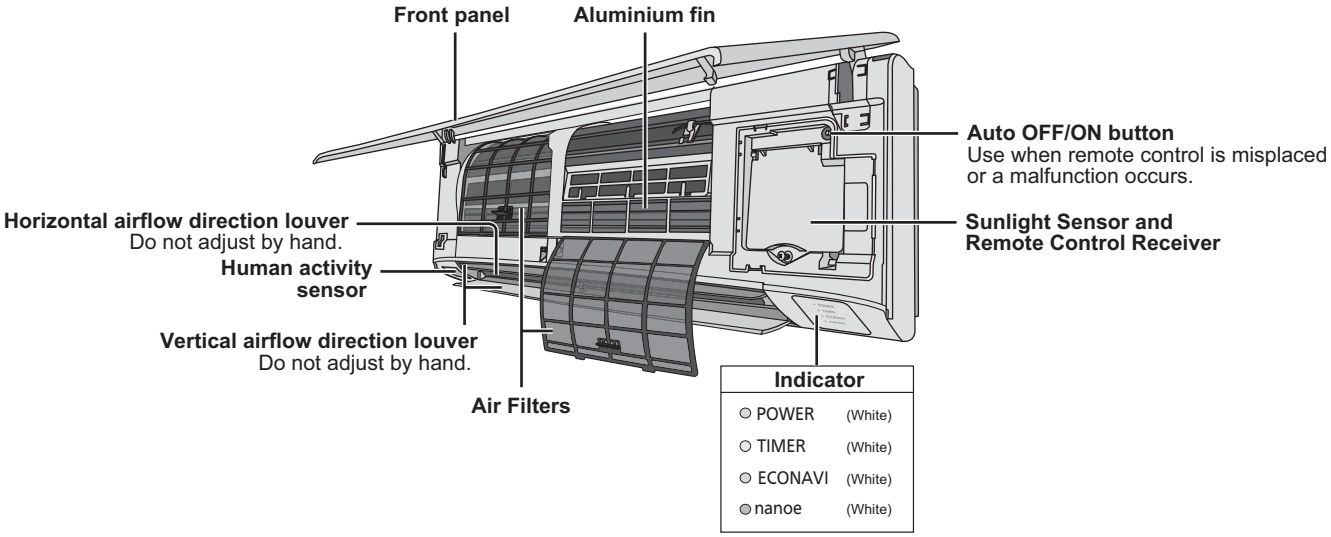
- **Quality Improvement**
  - Random auto restart after power failure for safety restart operation
  - Gas leakage protection
  - Prevent compressor reverse cycle
  - Inner protector to protect compressor
  - Noise prevention during soft dry operation

- **Operation Improvement**
  - Quiet mode to reduce the indoor unit operating sound
  - Powerful mode to reach the desired room temperature quickly
  - 24-hour timer setting

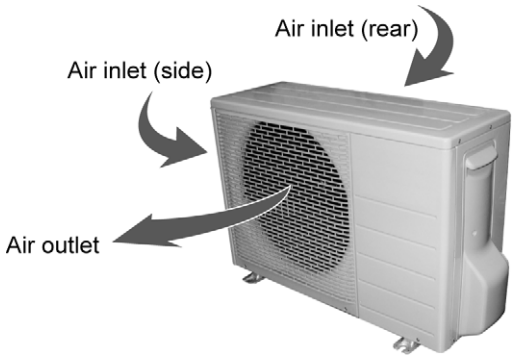
- **Serviceability Feature**
  - Activation and Deactivation Method for Heating Only Mode
  - Breakdown Self Diagnosis function

5. Location of Controls and Components

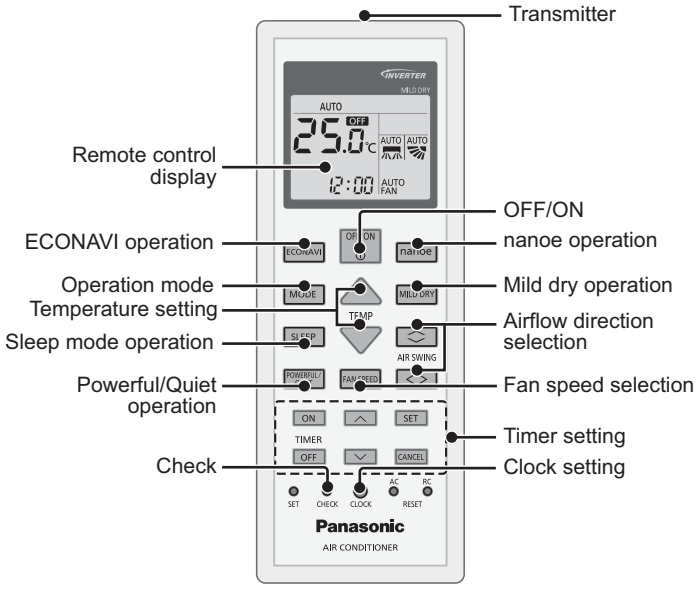
5.1 Indoor Unit



5.2 Outdoor Unit



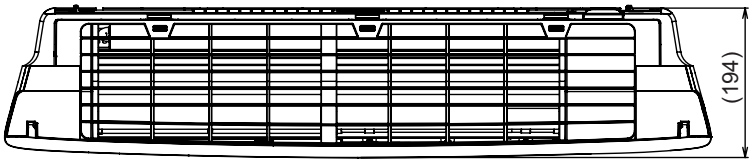
5.3 Remote Control



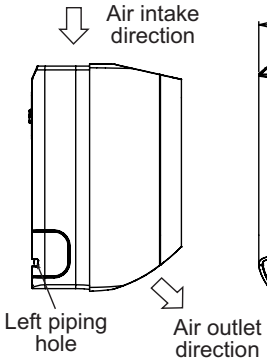
6. Dimensions

6.1 Indoor Unit

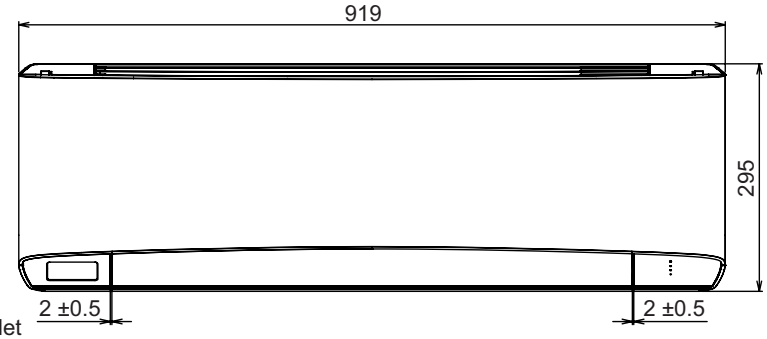
<Top View>



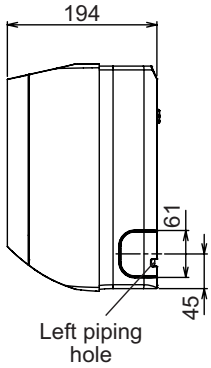
<Side View>



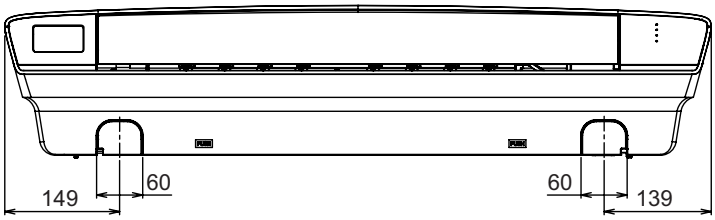
<Front View>



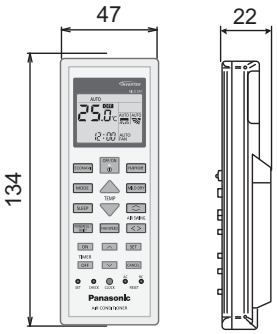
<Side View>



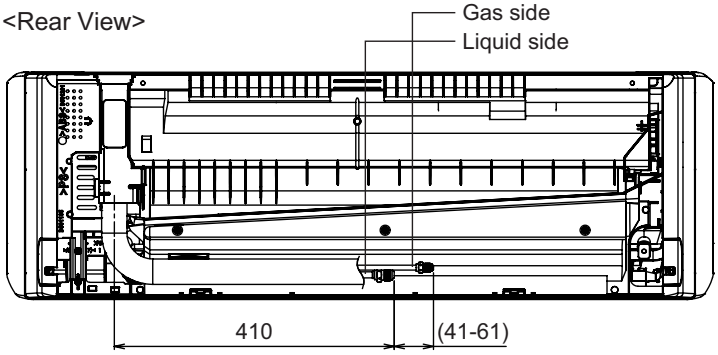
<Bottom View>



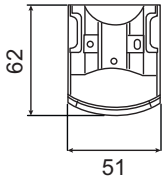
<Remote Control>



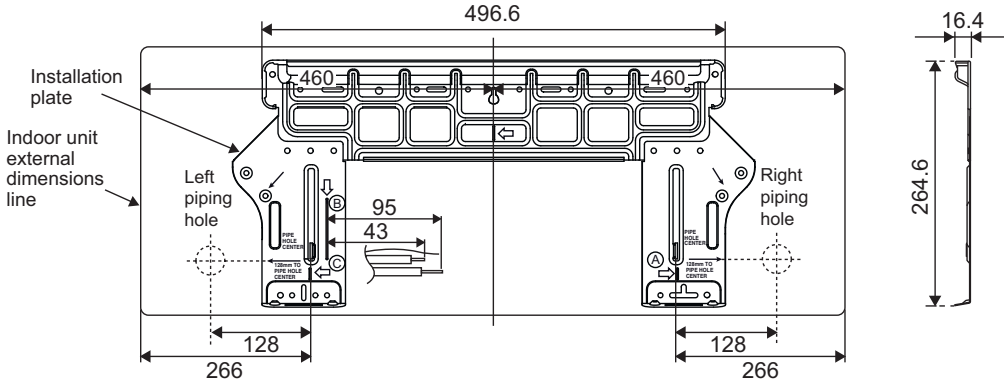
<Rear View>



<Remote Control Holder>



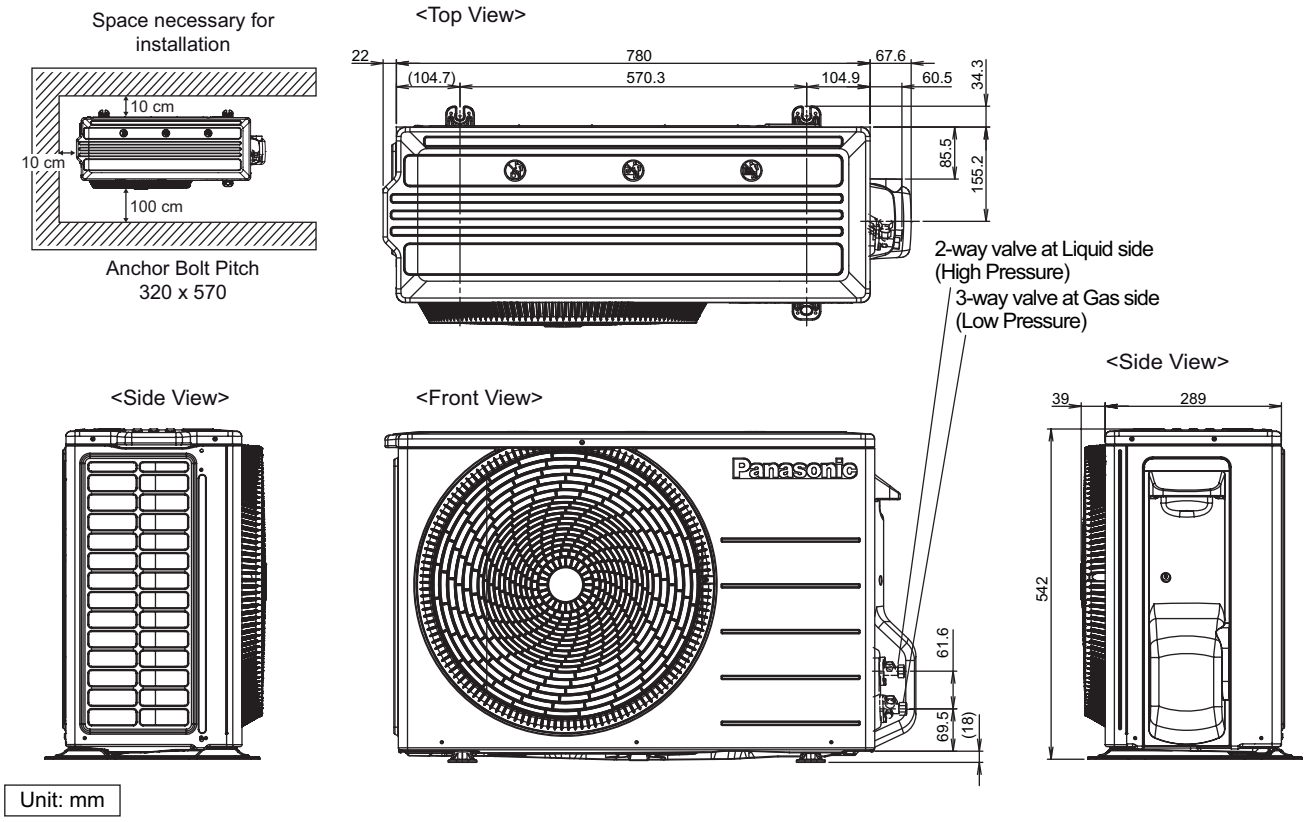
Relative position between the indoor unit and the installation plate <Front View>



Unit: mm

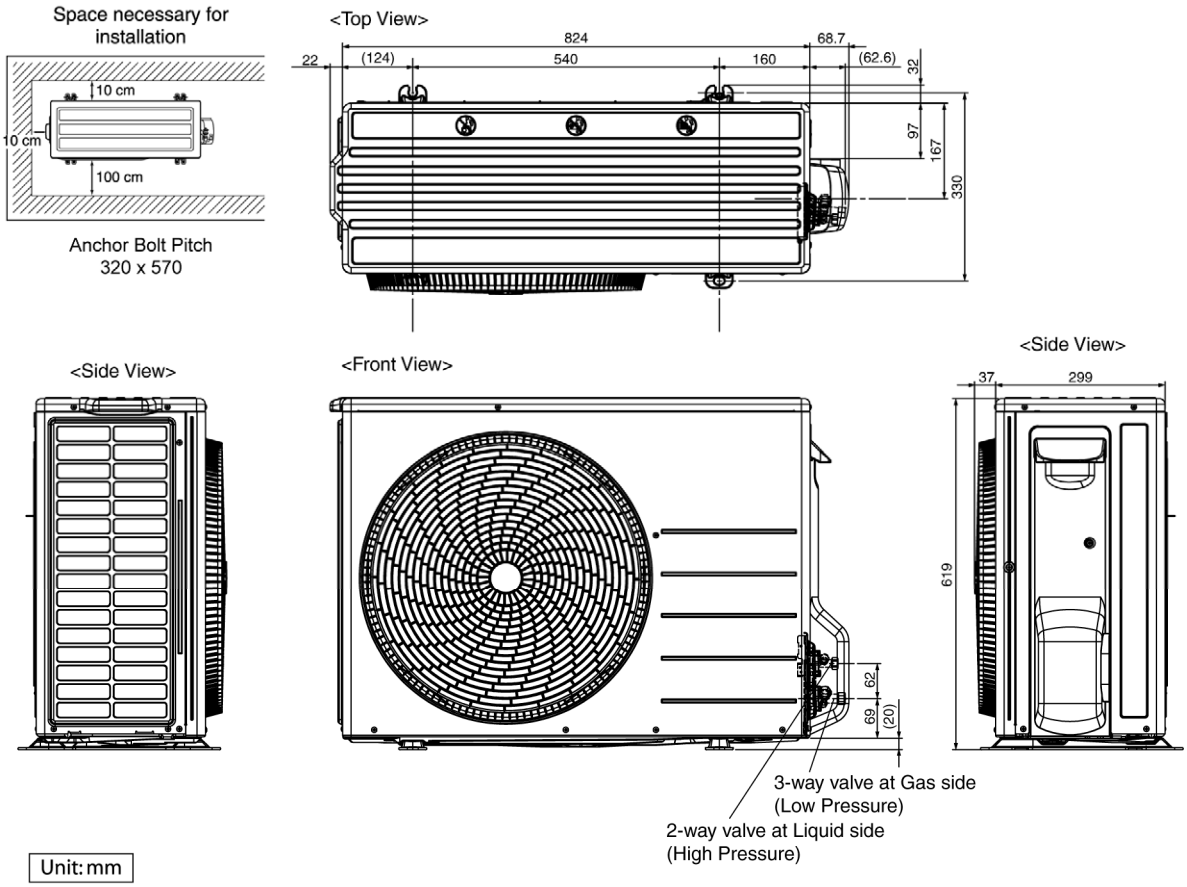
6.2 Outdoor Unit

6.2.1 CU-Z7SKE CU-Z9SKE



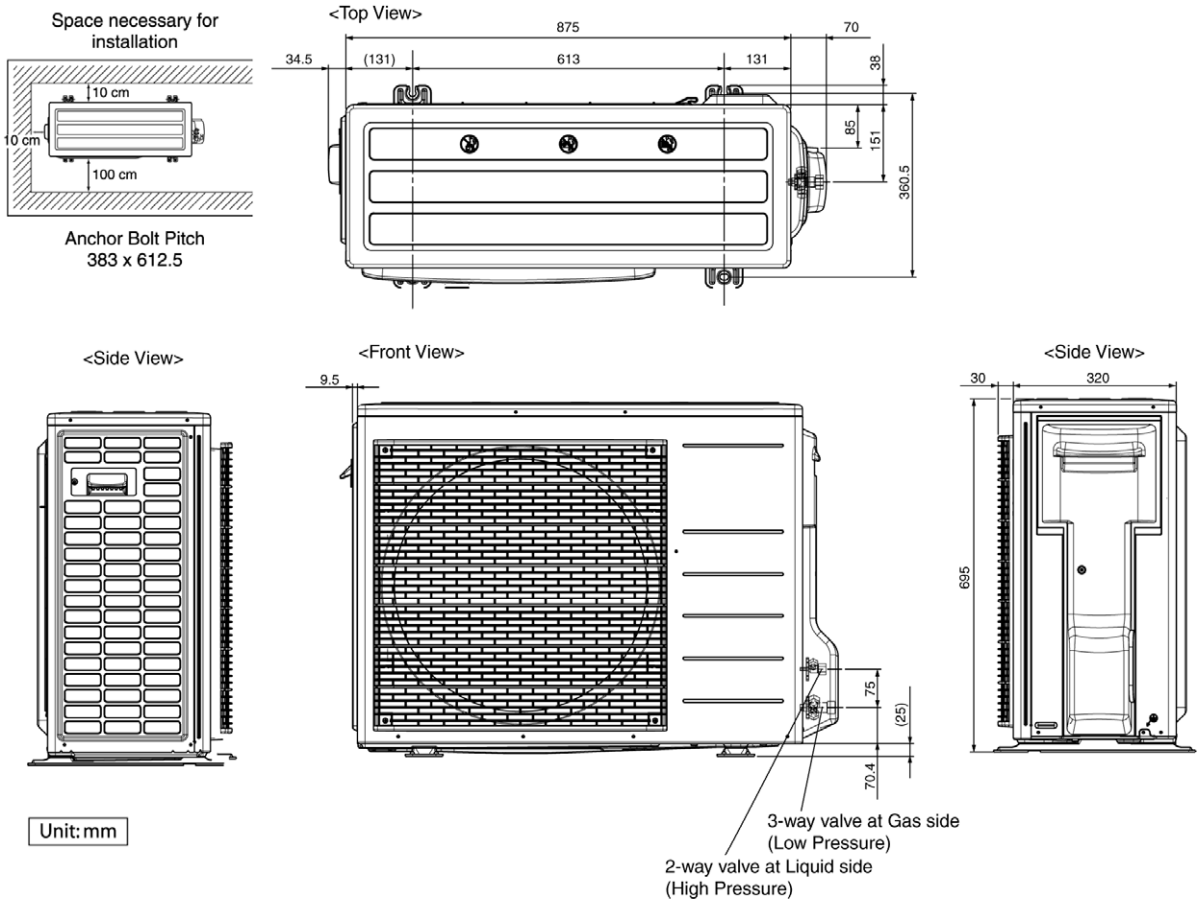
Unit: mm

6.2.2 CU-Z12SKE CU-Z15SKE



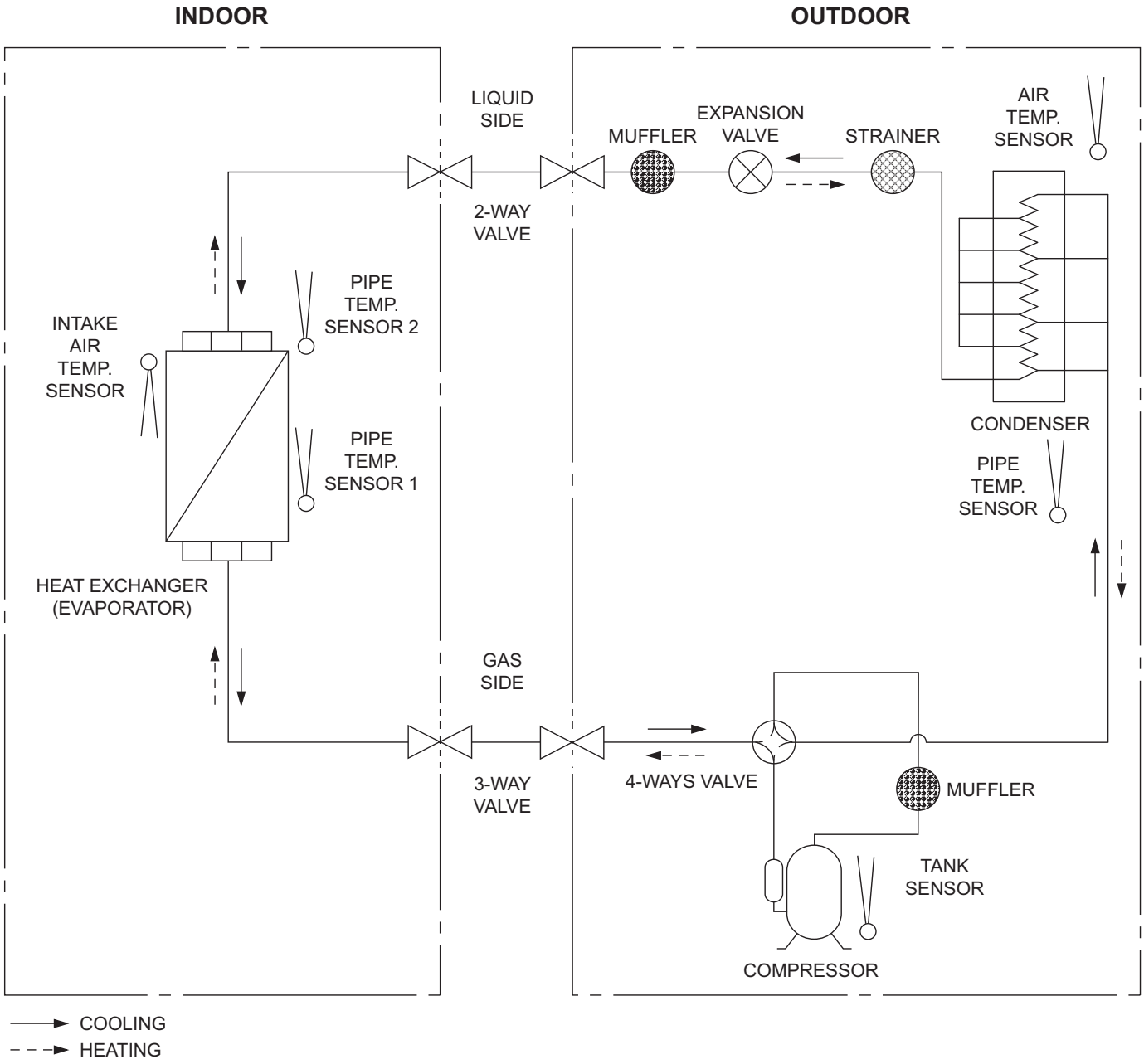
Unit: mm

6.2.3 CU-Z18SKE

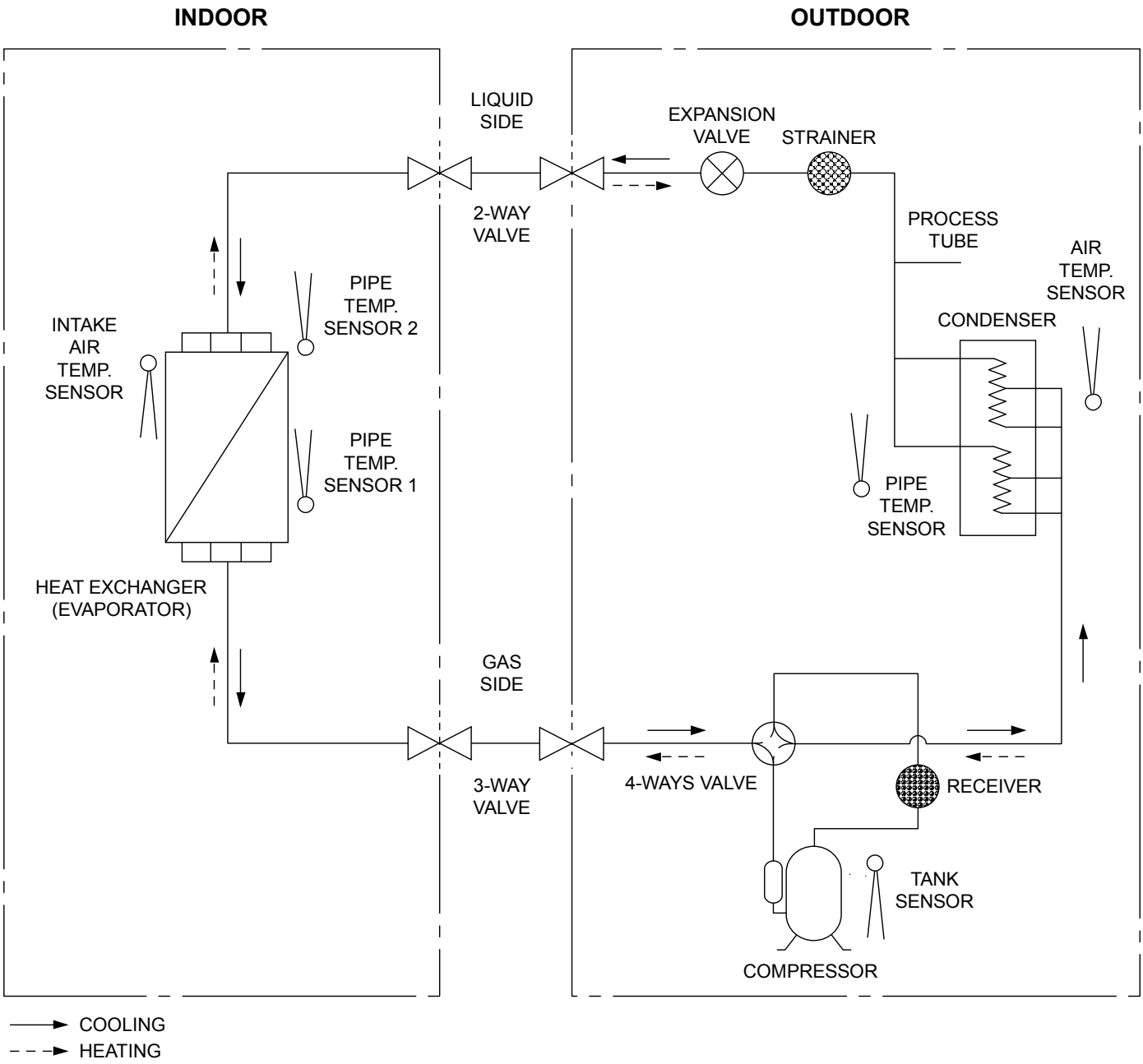


7. Refrigeration Cycle Diagram

7.1 CU-Z7SKE CU-Z9SKE CU-Z12SKE CU-Z15SKE

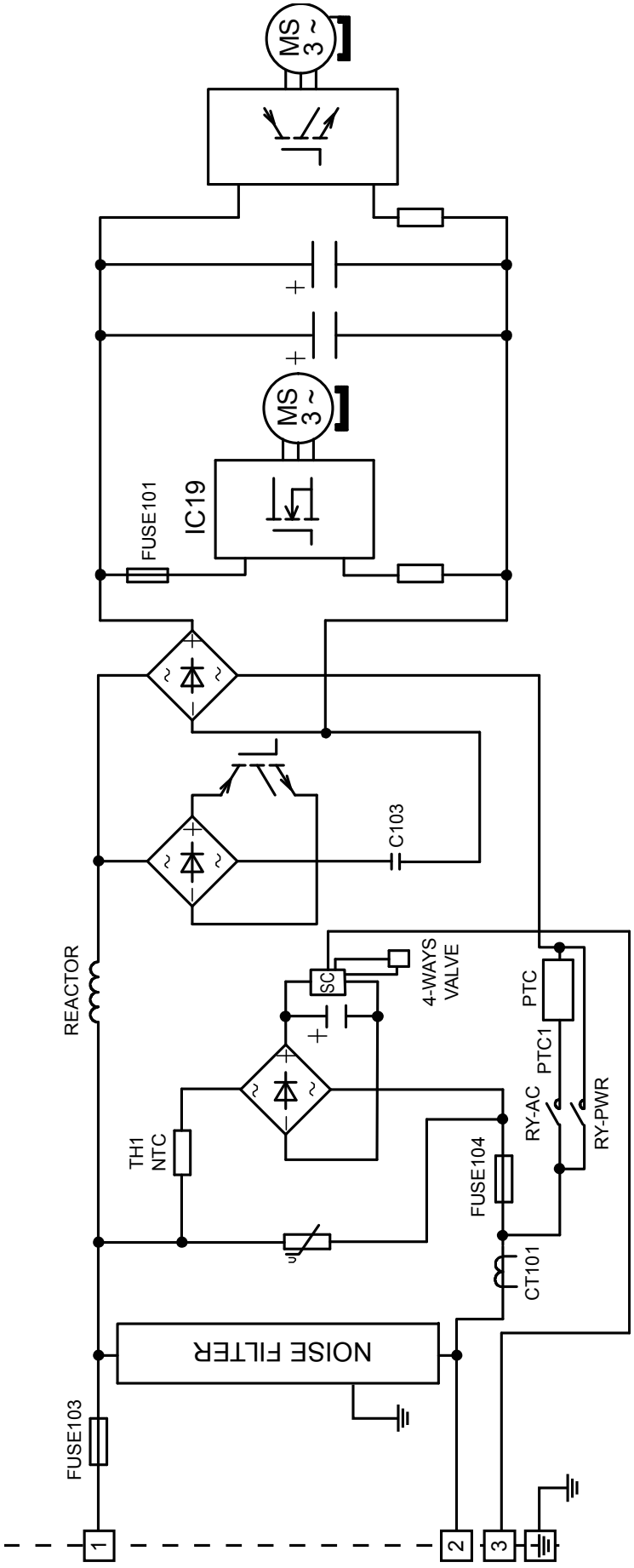


7.2 CU-Z18SKE

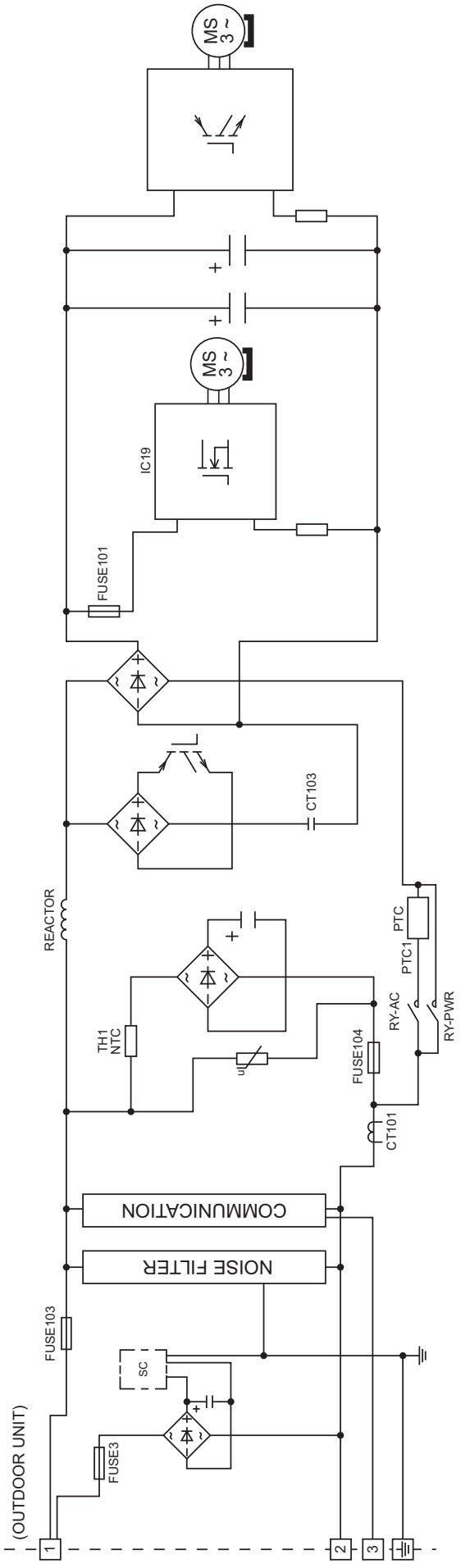

INDOOR
OUTDOOR
LIQUID SIDE
EXPANSION VALVE
STRAINER
2-WAY VALVE
PROCESS TUBE
AIR TEMP. SENSOR
CONDENSER
PIPE TEMP. SENSOR 2
INTAKE AIR TEMP. SENSOR
PIPE TEMP. SENSOR 1
PIPE TEMP. SENSOR
HEAT EXCHANGER (EVAPORATOR)
GAS SIDE
3-WAY VALVE
4-WAYS VALVE
RECEIVER
TANK SENSOR
COMPRESSOR
COOLING
HEATING

8. Block Diagram

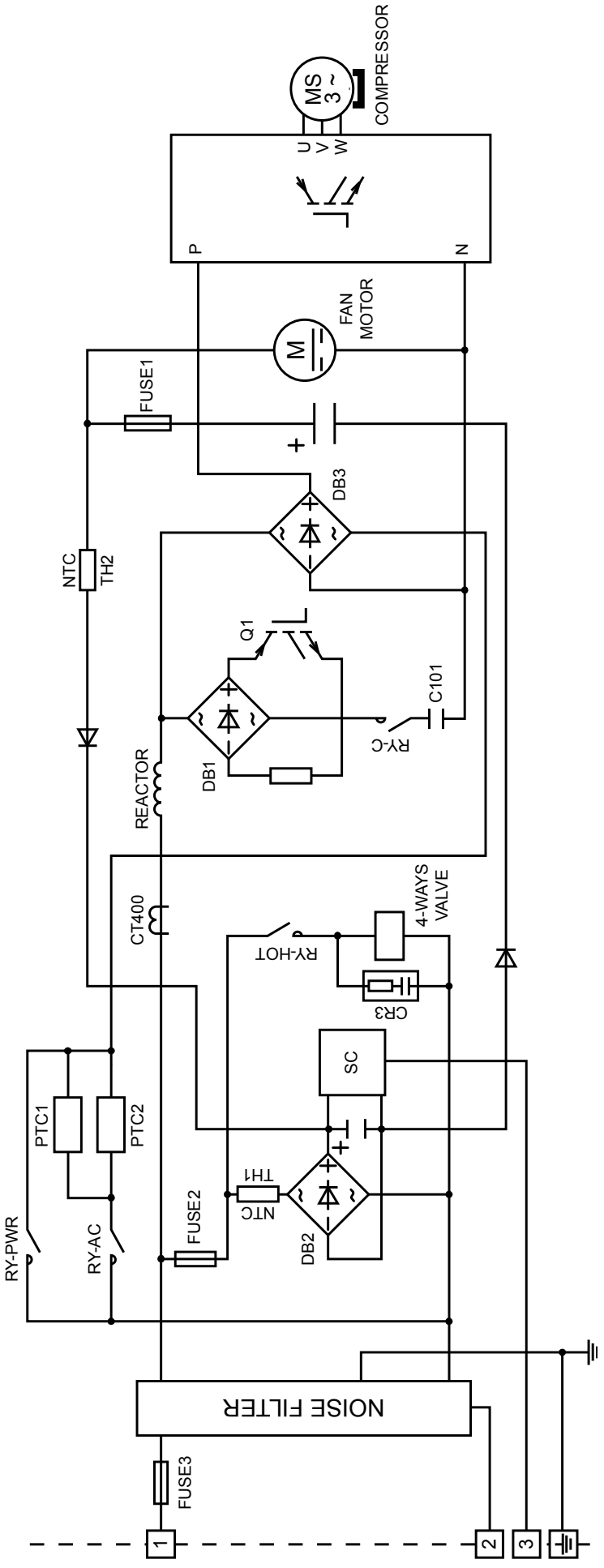
8.1 CU-Z7SKE CU-Z9SKE



8.2 CU-Z12SKE CU-Z15SKE

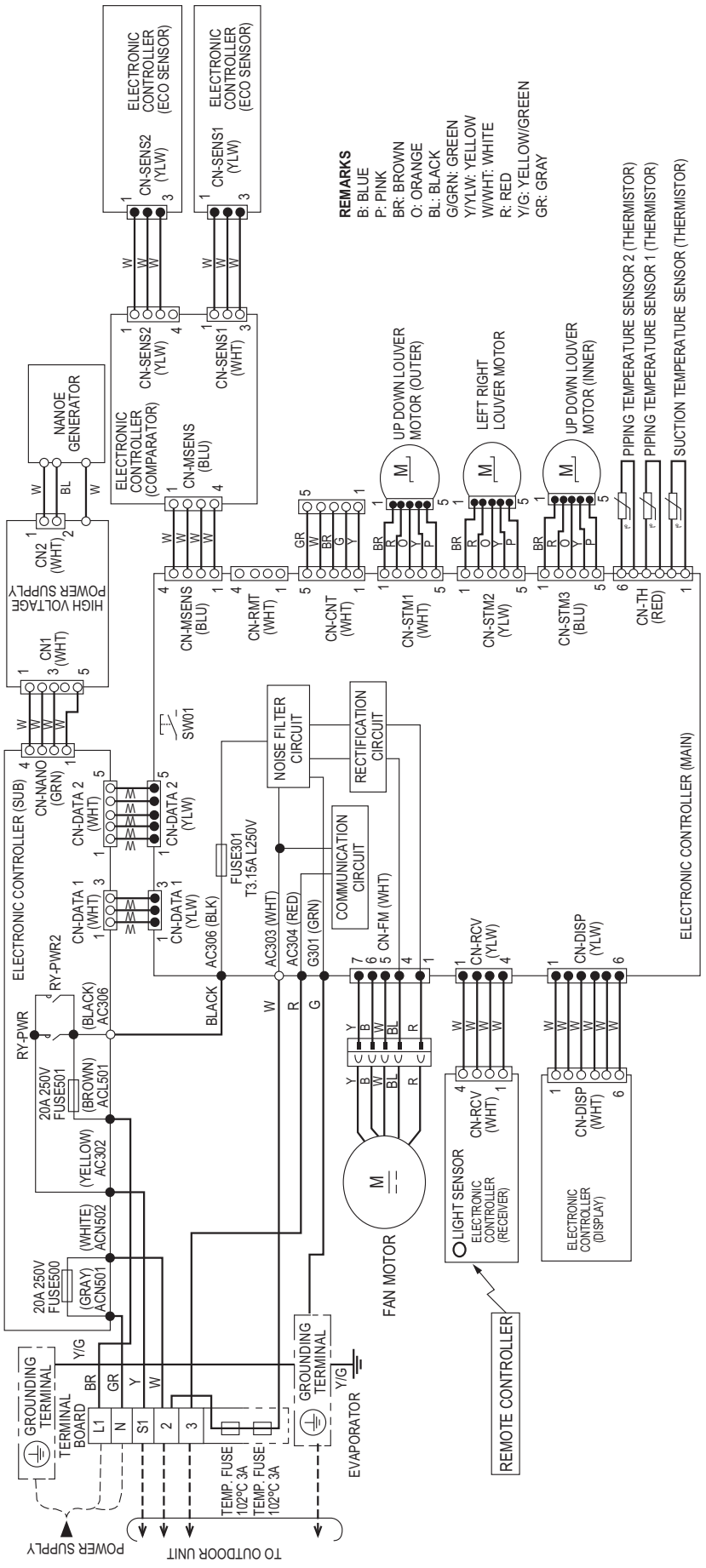


8.3 CU-Z18SKE


COMPRESSOR
MS 3~
U
V
W
P
N
FAN MOTOR
M
FUSE1
DB3
NTC TH2
Q1
C101
RY-C
DB1
REACTOR
CT400
4-WAYS VALVE
RY-HOT
CR3
SC
PTC1
PTC2
TH1
NTC
FUSE2
DB2
RY-PWR
RY-AC
NOISE FILTER
FUSE3
1
2
3

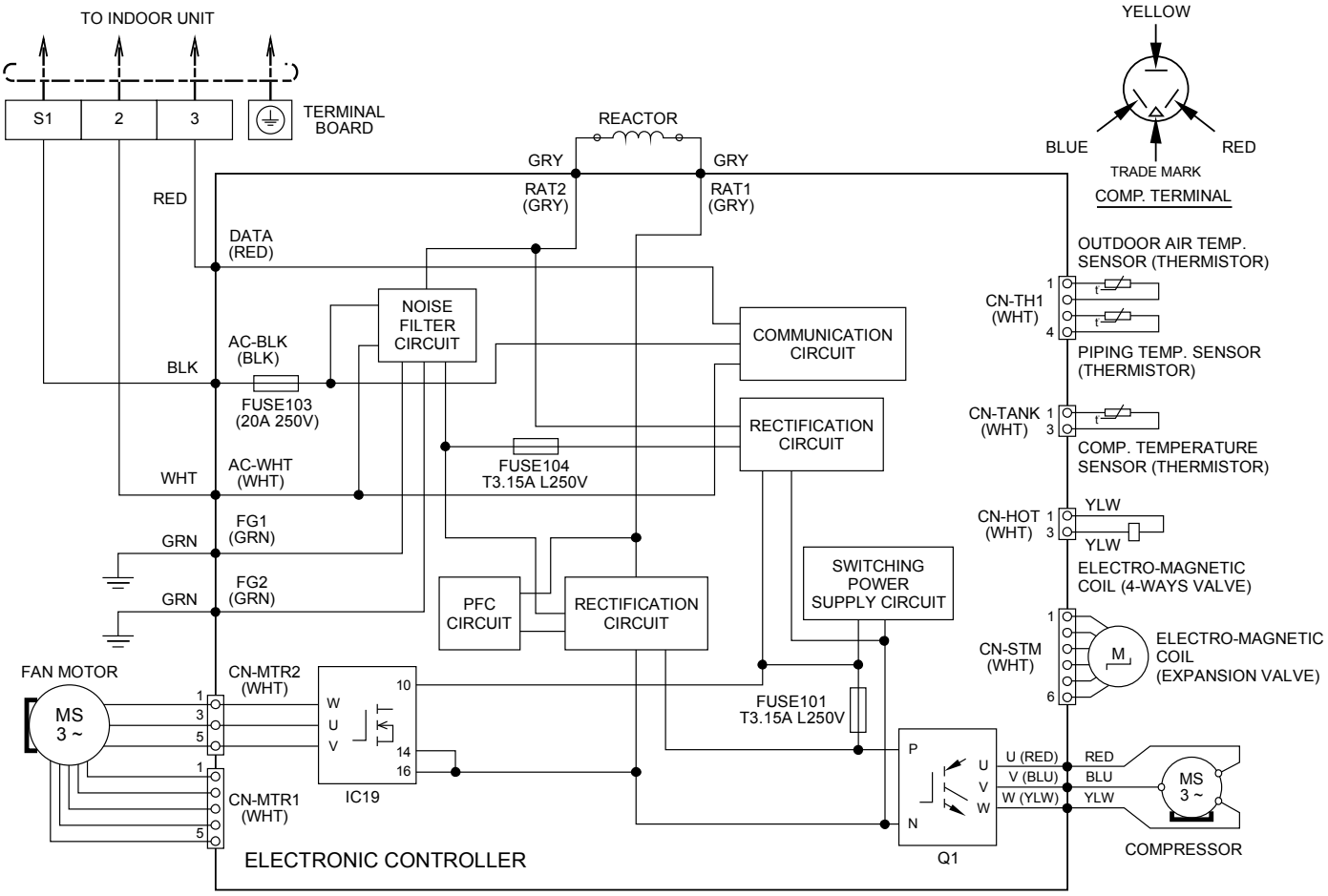
9. Wiring Connection Diagram

9.1 Indoor Unit



9.2 Outdoor Unit

9.2.1 CU-Z7SKE CU-Z9SKE



REMARKS
BLUE: (BLU) BLACK: (BLK) WHITE: (WHT) RED: (RED)
YELLOW: (YLW) GRAY: (GRY) GREEN: (GRN) ORANGE: (ORG)

Resistance of Compressor Windings

MODEL	CU-Z7SKE
CONNECTION	9RS092XAA21 (Ω)
U-V	1.152
U-W	1.152
V-W	1.152

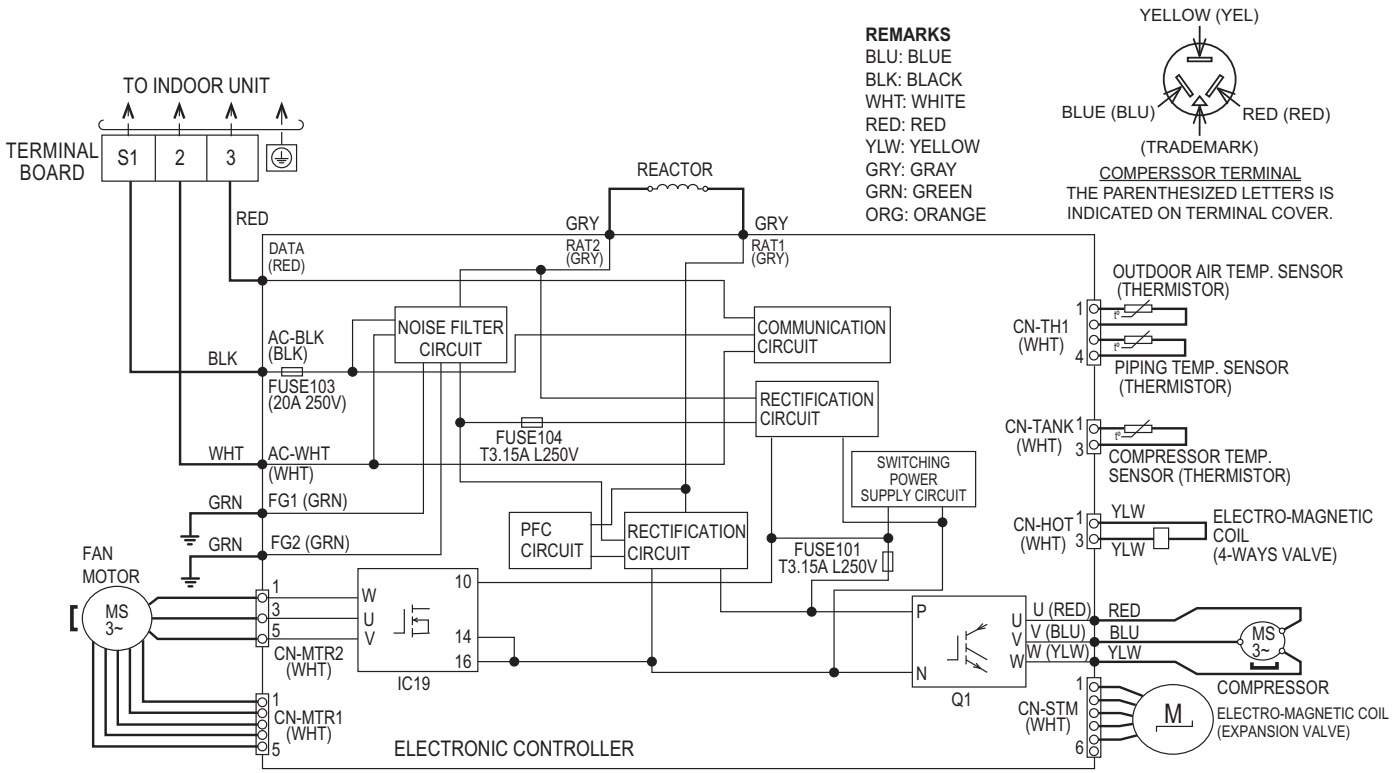
Note: Resistance at 20°C of ambient temperature.

Resistance of Compressor Windings

MODEL	CU-Z9SKE
CONNECTION	9RS102XEA21 (Ω)
U-V	1.211
U-W	1.211
V-W	1.211

Note: Resistance at 20°C of ambient temperature.

9.2.2 CU-Z12SKE

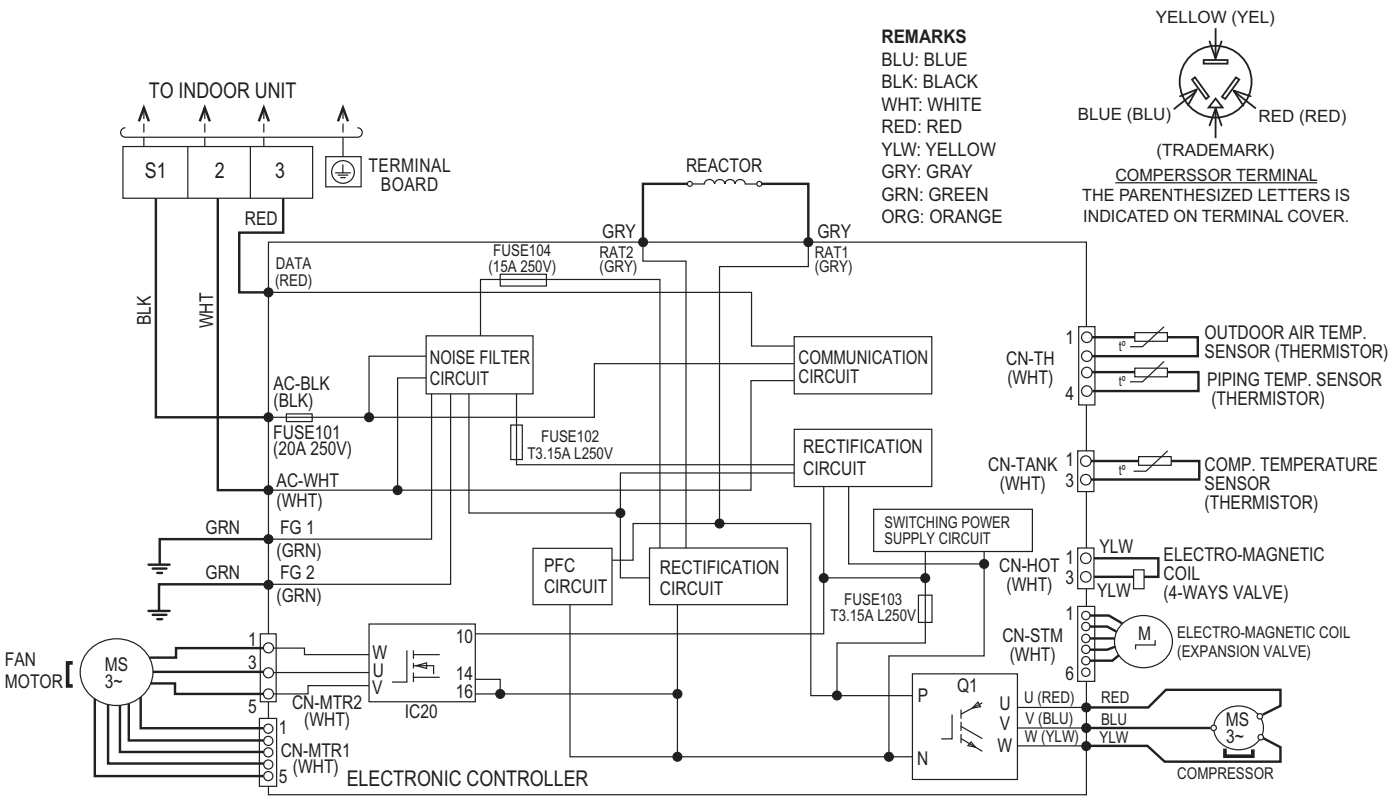


Resistance of Compressor Windings

MODEL	CU-Z12SKE
CONNECTION	9RS102XEA21 (Ω)
U-V	1.211
U-W	1.211
V-W	1.211

Note: Resistance at 20°C of ambient temperature.

9.2.3 CU-Z15SKE

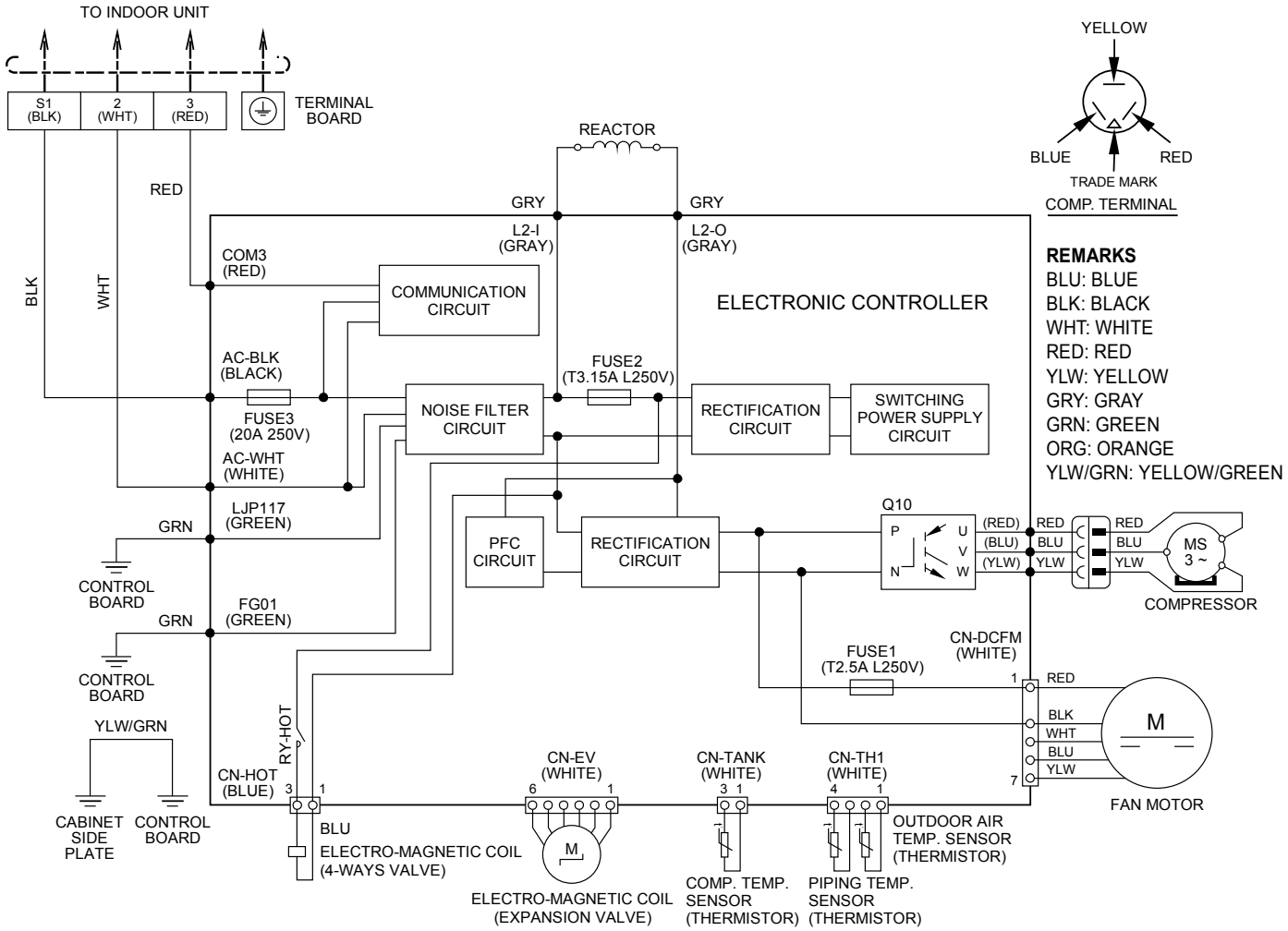


Resistance of Compressor Windings

MODEL	CU-Z15SKE
CONNECTION	9RS102XEA21 (Ω)
U-V	1.211
U-W	1.211
V-W	1.211

Note: Resistance at 20°C of ambient temperature.

9.2.4 CU-Z18SKE



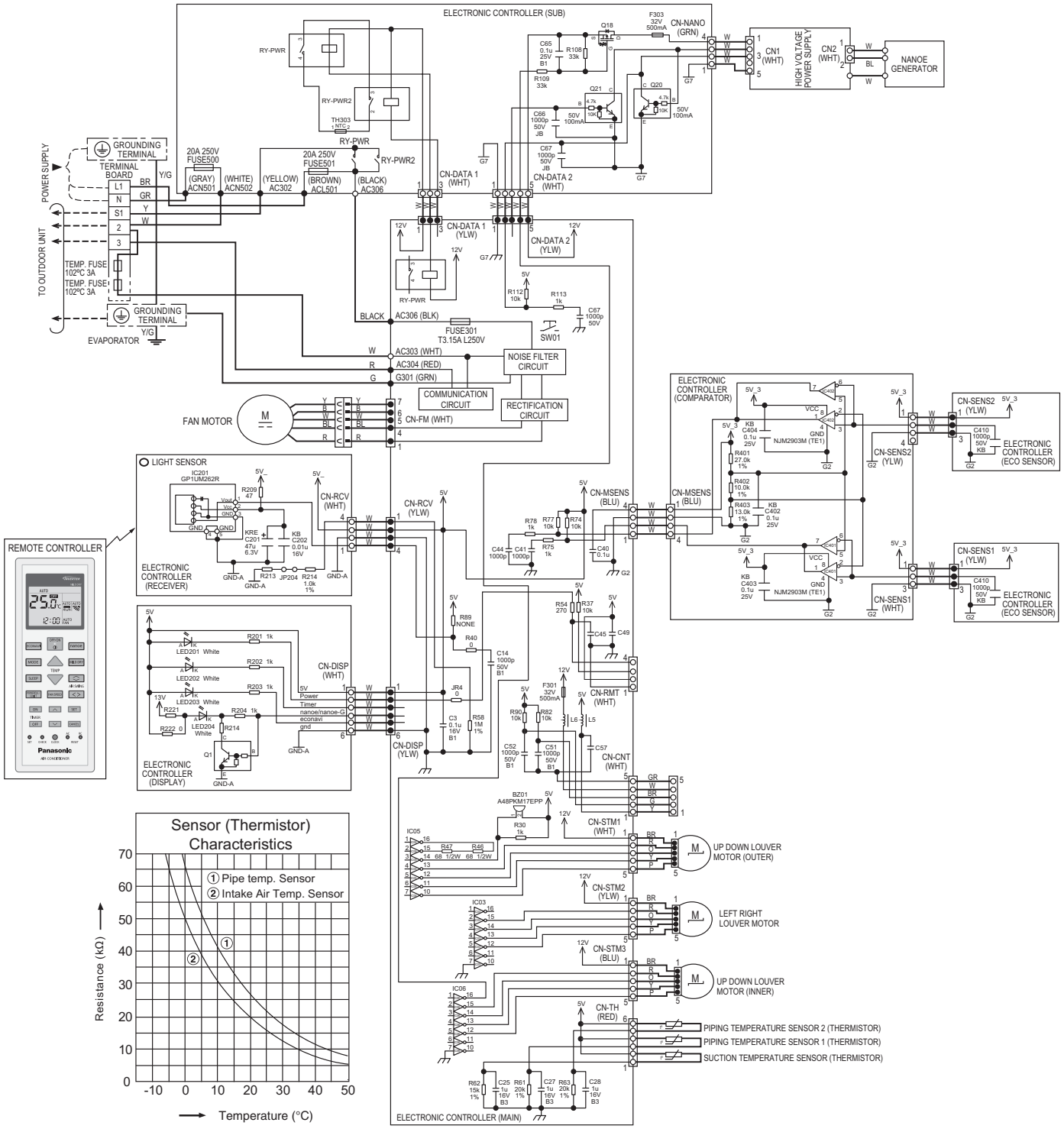
Resistance of Compressor Windings

MODEL	CU-Z18SKE
CONNECTION	9RD132XAA21 (Ω)
U-V	1.897
U-W	1.907
V-W	1.882

Note: Resistance at 20°C of ambient temperature.

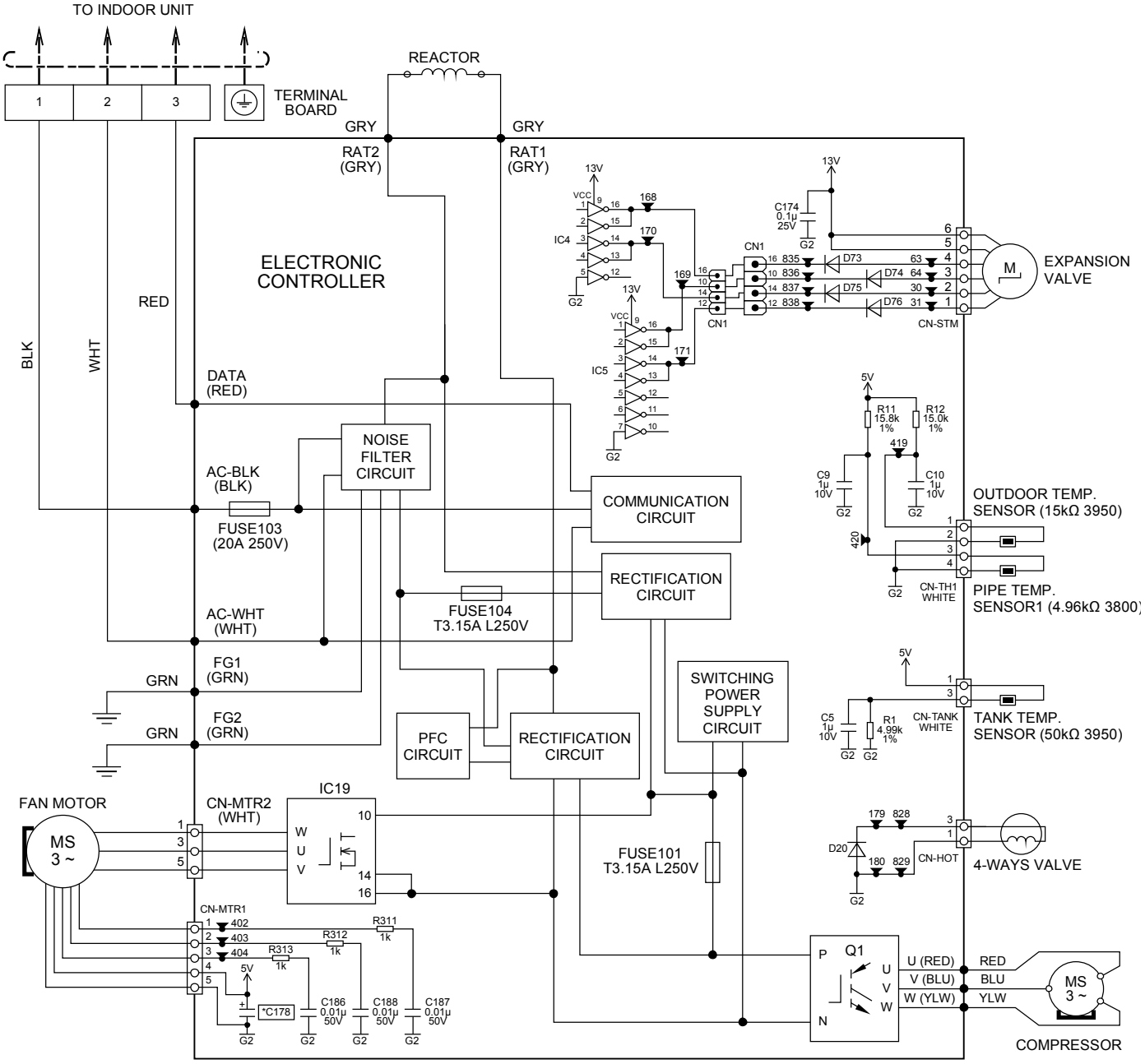
10. Electronic Circuit Diagram

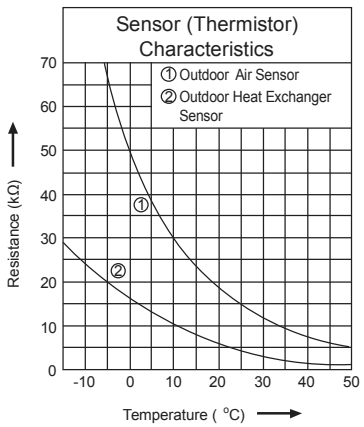
10.1 Indoor Unit

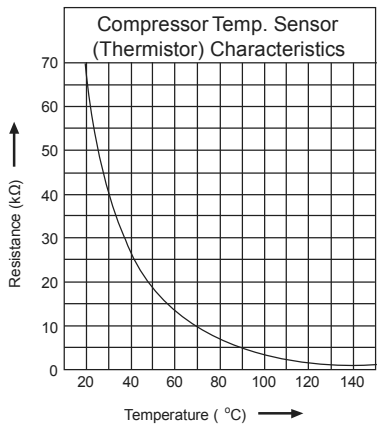


10.2 Outdoor Unit

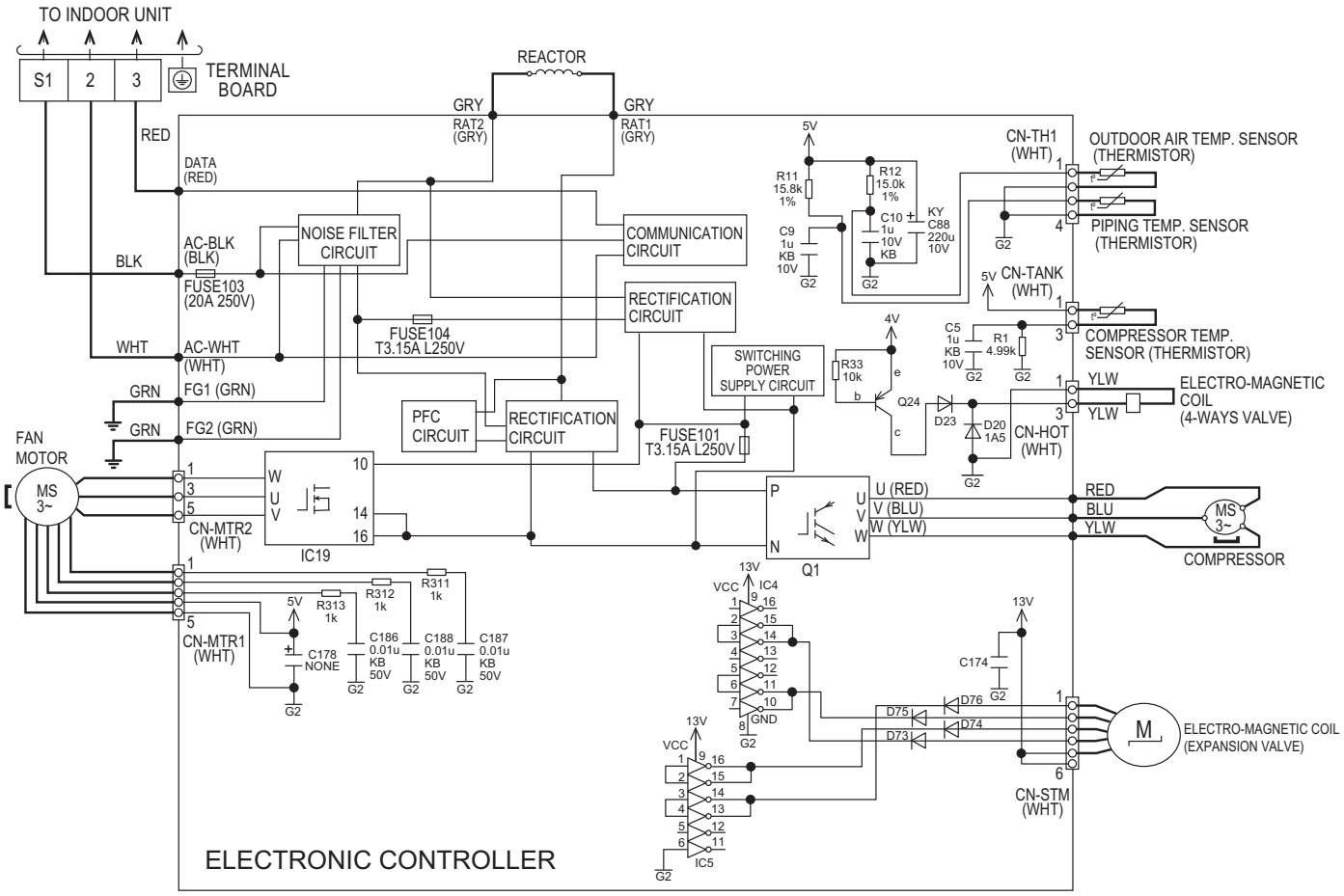
10.2.1 CU-Z7SKE CU-Z9SKE

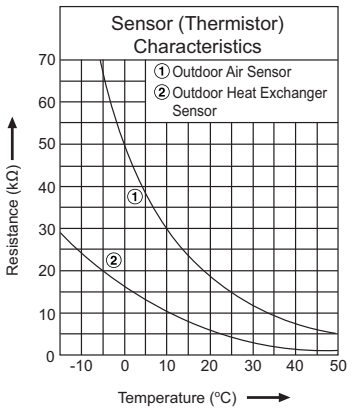


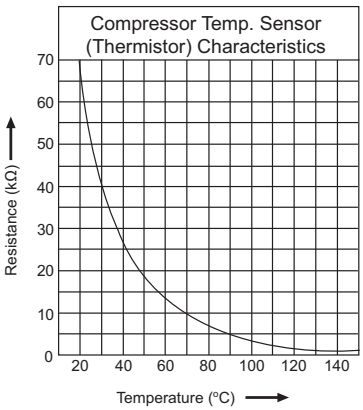




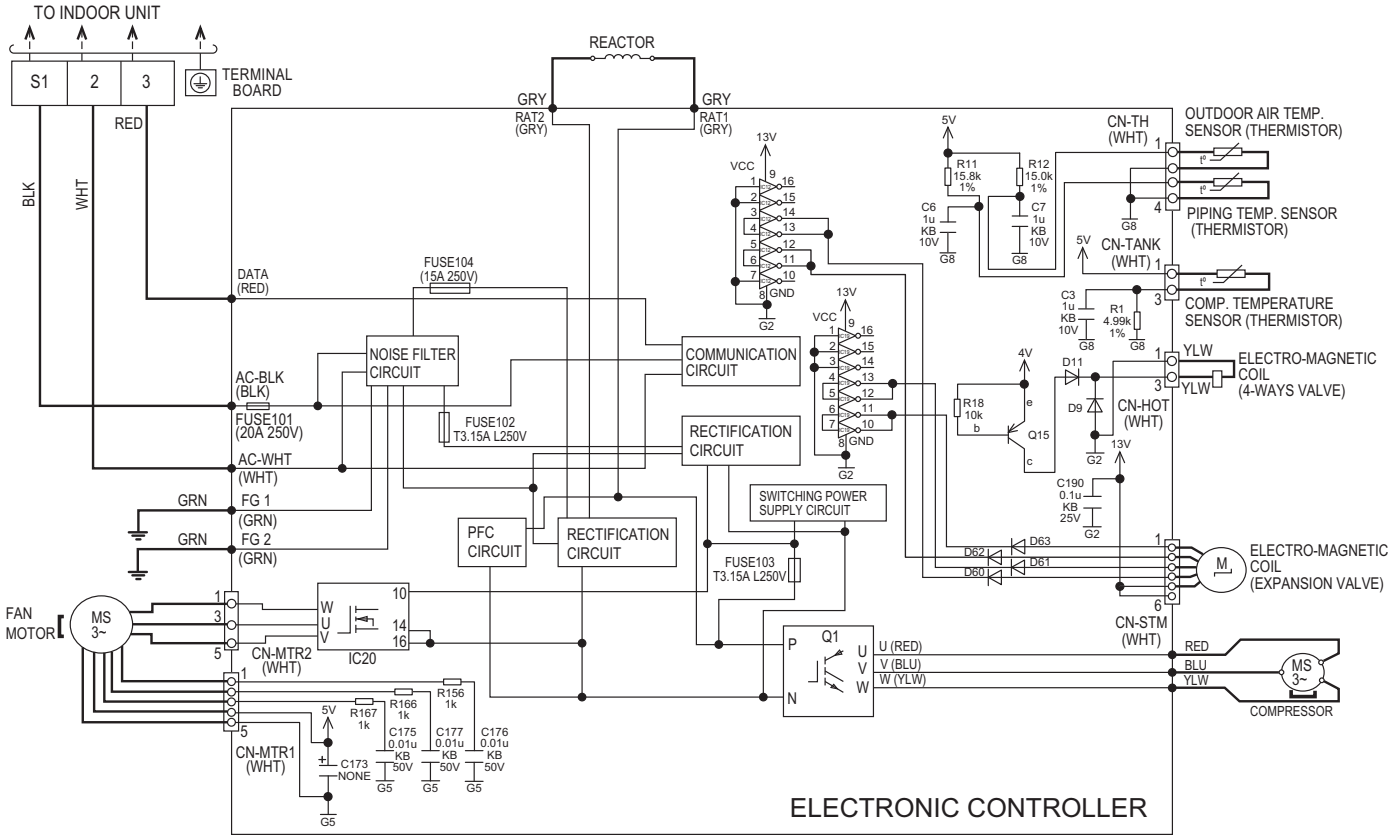
10.2.2 CU-Z12SKE

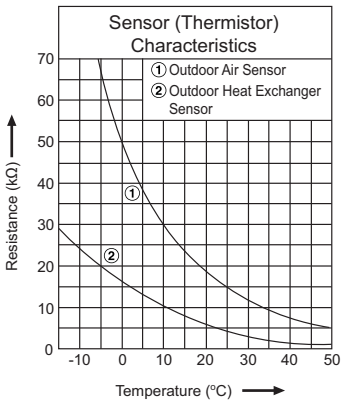


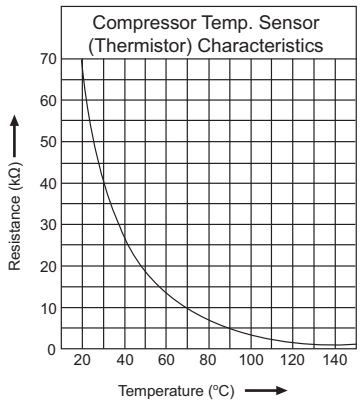




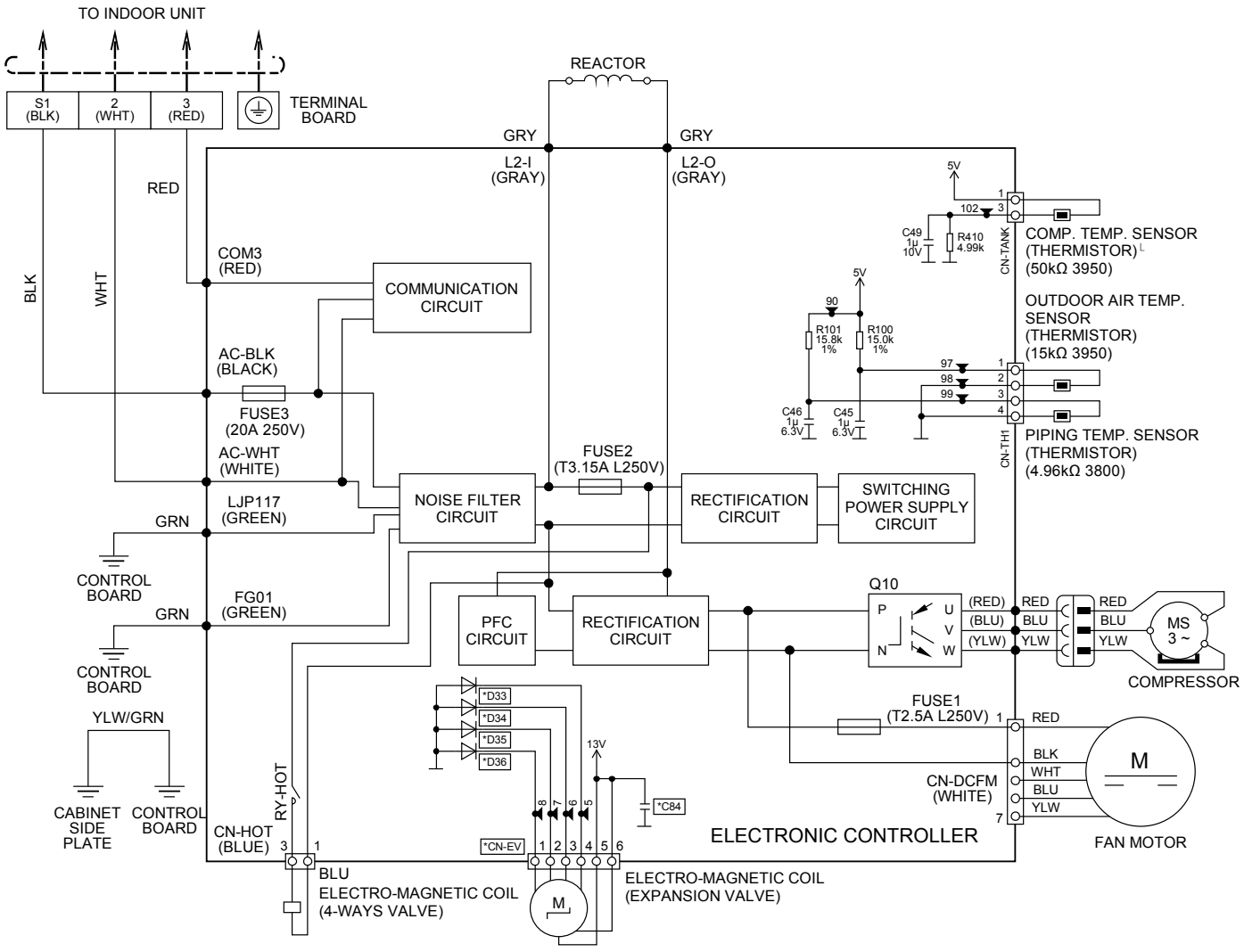
10.2.3 CU-Z15SKE

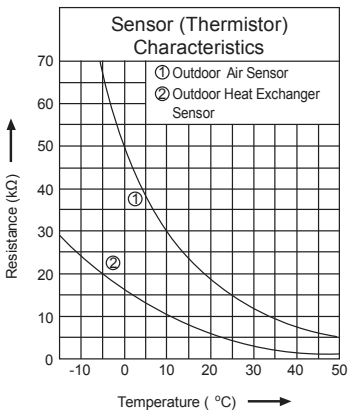


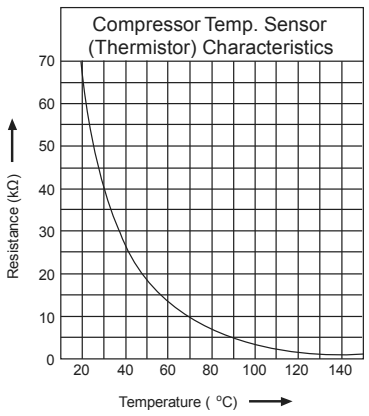




10.2.4 CU-Z18SKE



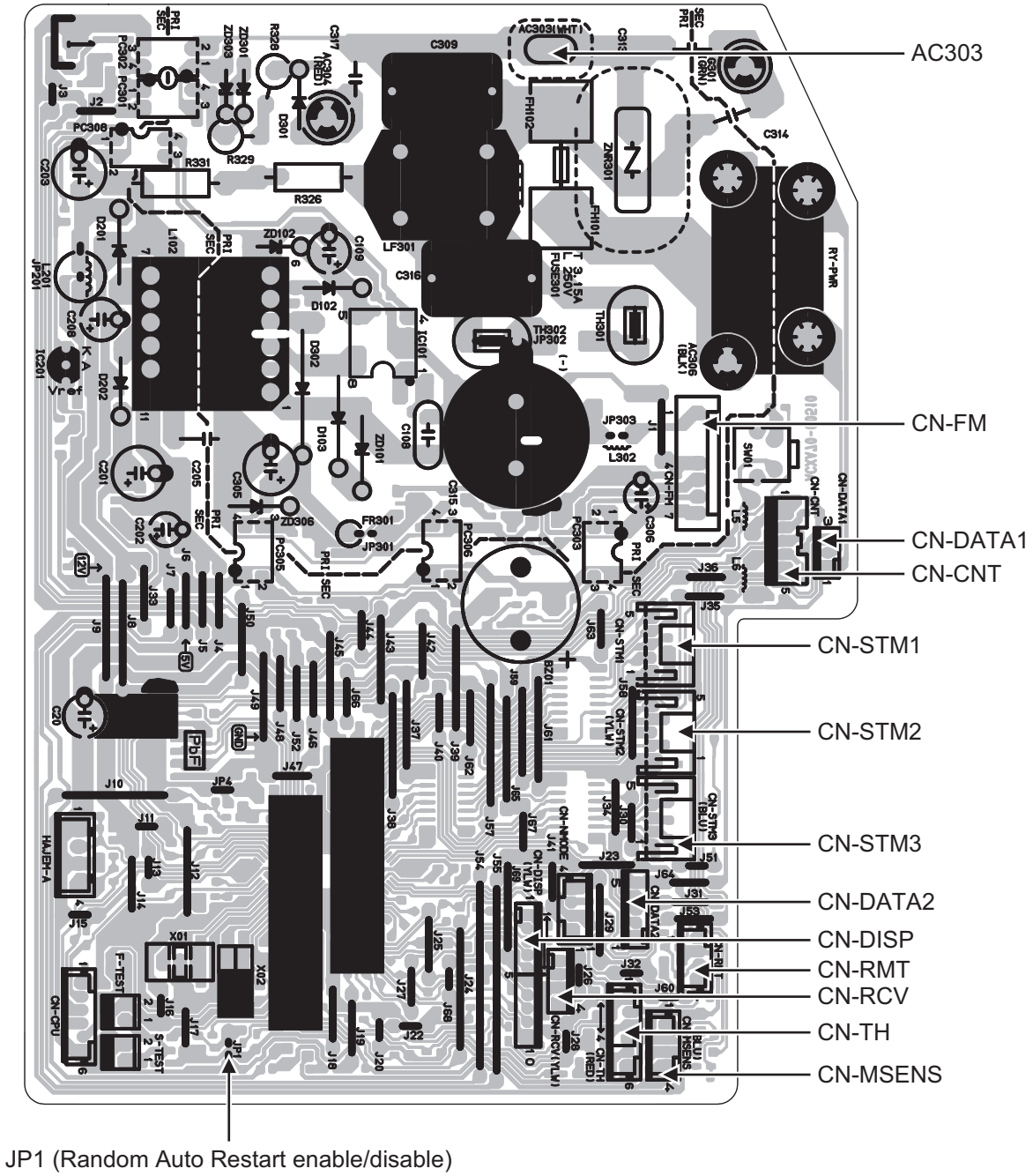




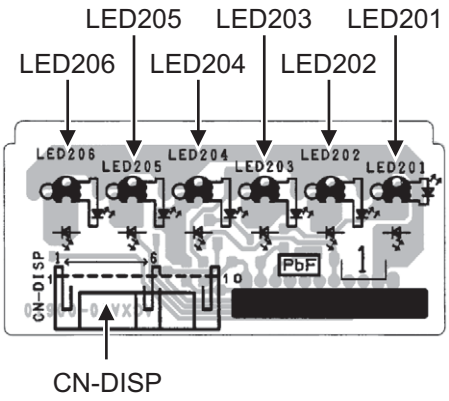
11. Printed Circuit Board

11.1 Indoor Unit

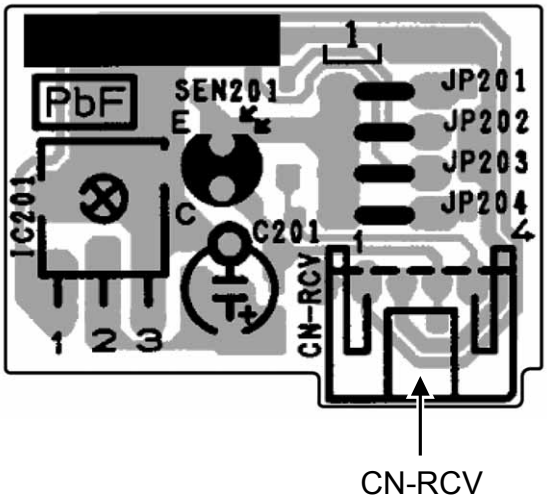
11.1.1 Main Printed Circuit Board



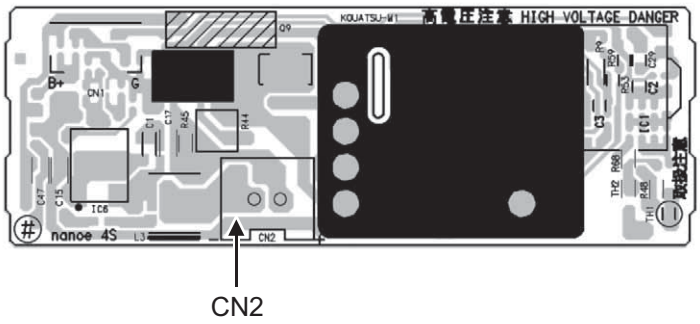
11.1.2 Indicator Printed Circuit Board



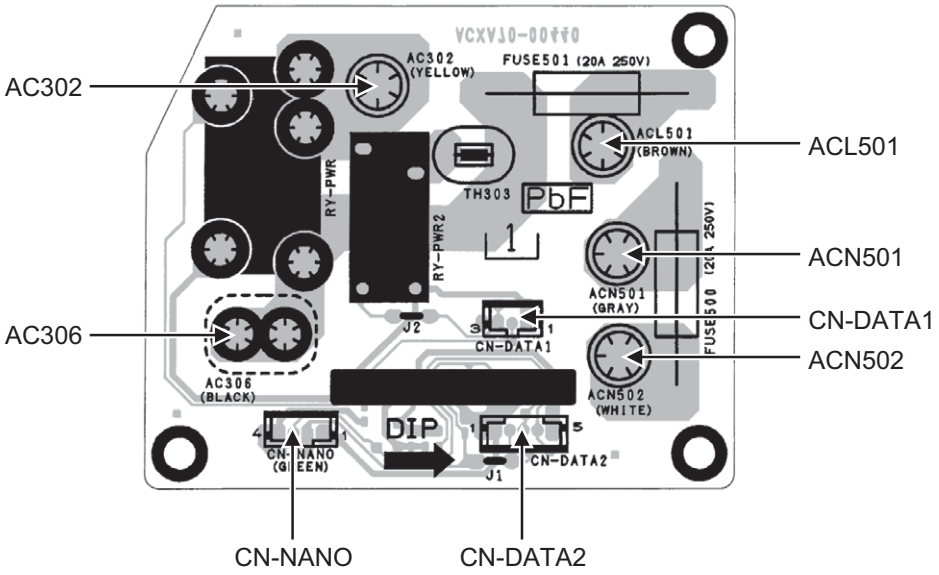
11.1.3 Receiver Printed Circuit Board



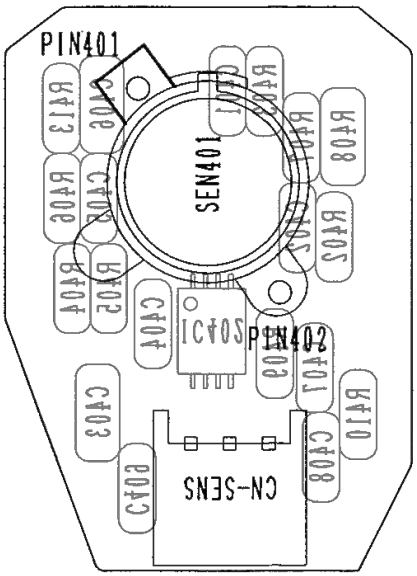
11.1.4 High Voltage Power Supply Printed Circuit Board



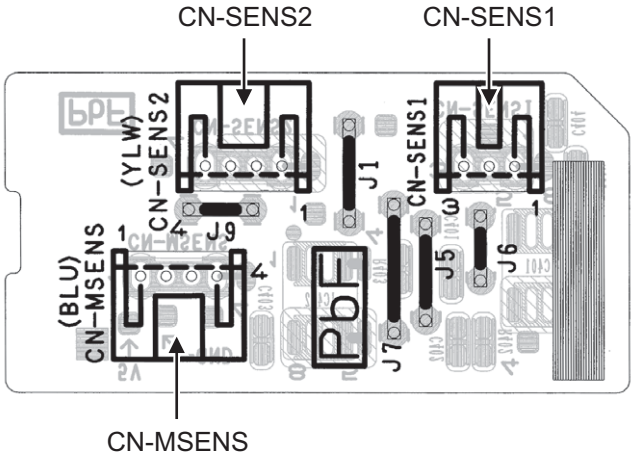
11.1.5 Sub Printed Circuit Board



11.1.6 Human Activity Sensor Printed Circuit Board

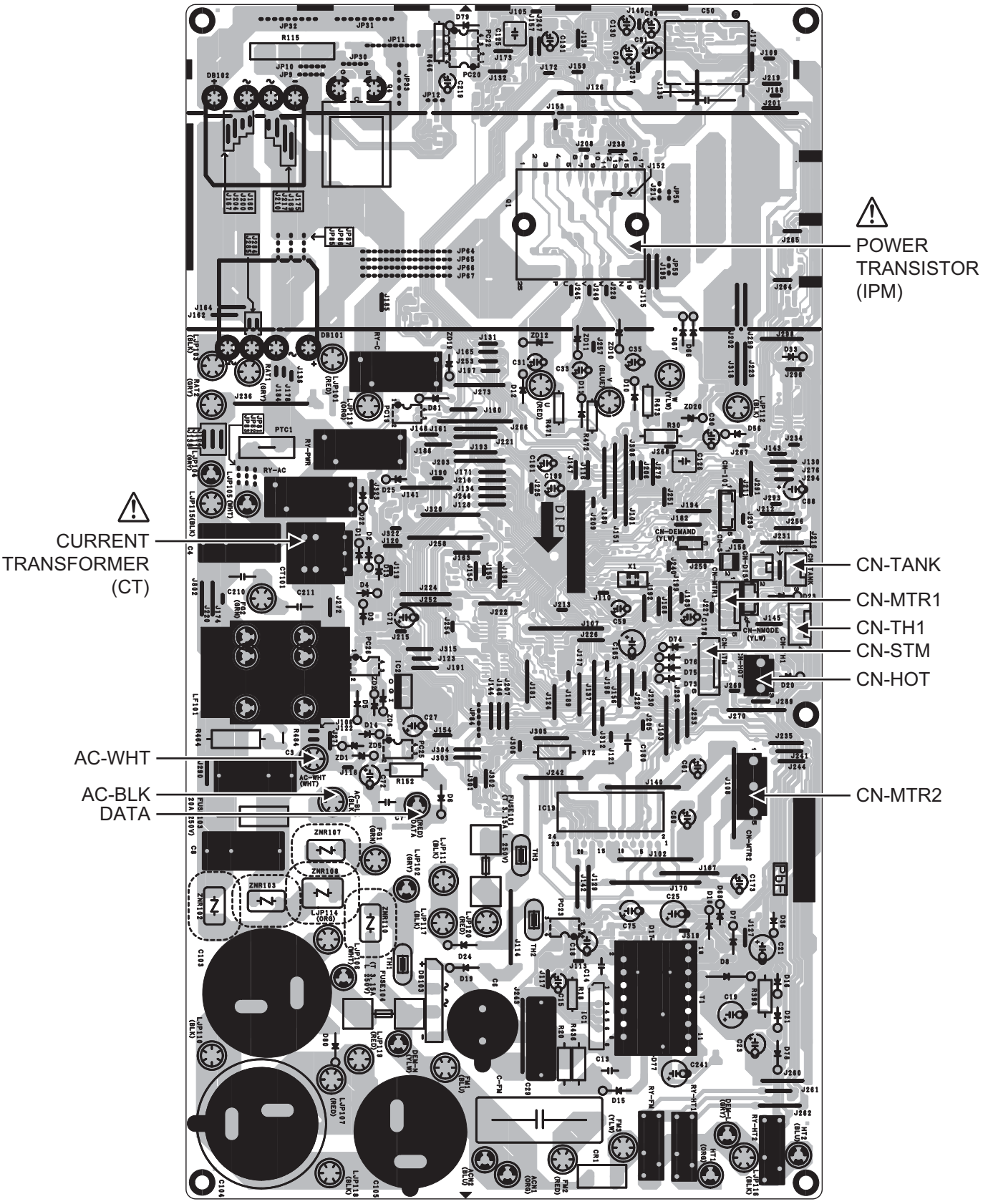


11.1.7 Comparator Printed Circuit Board

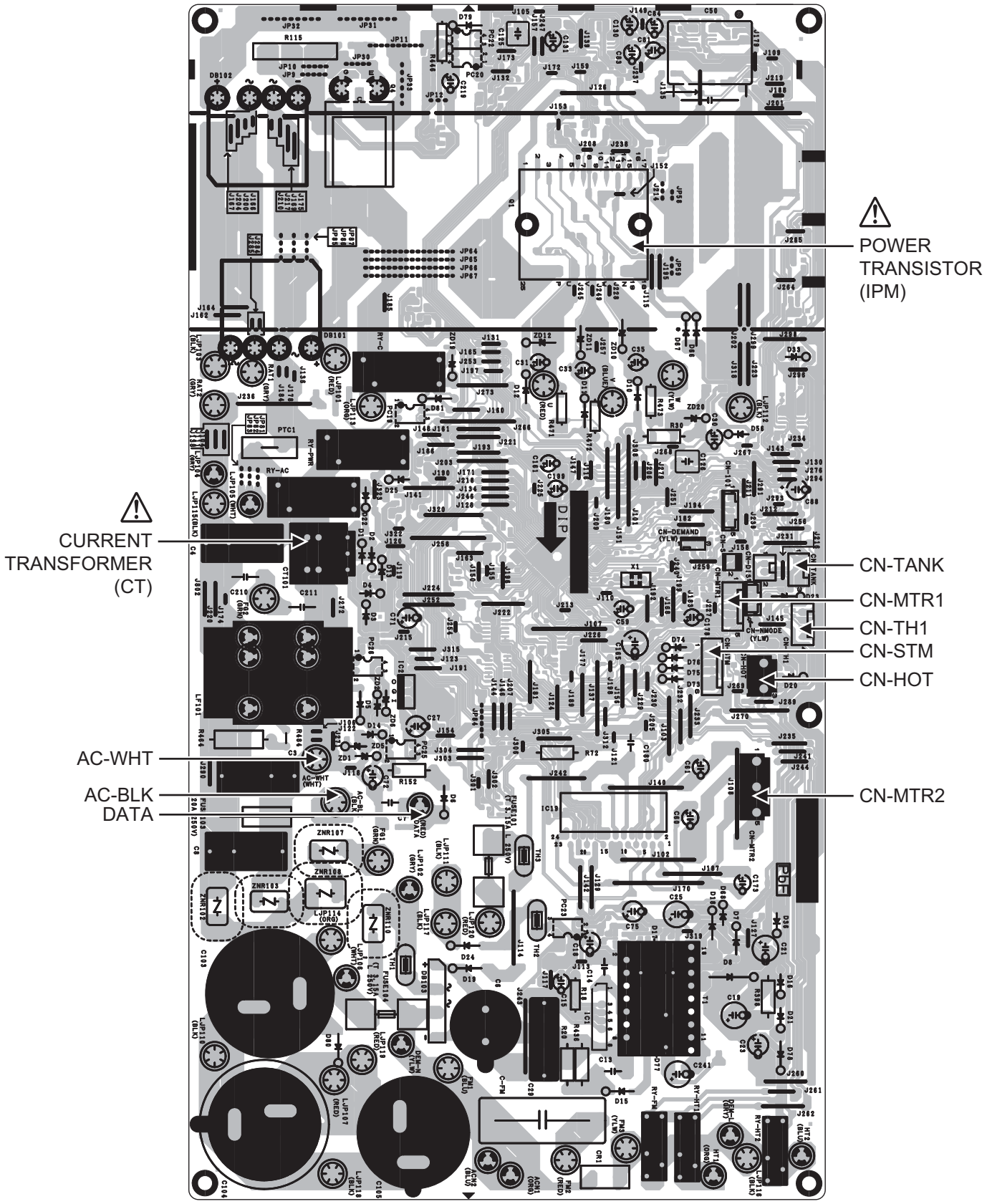


11.2 Outdoor Unit

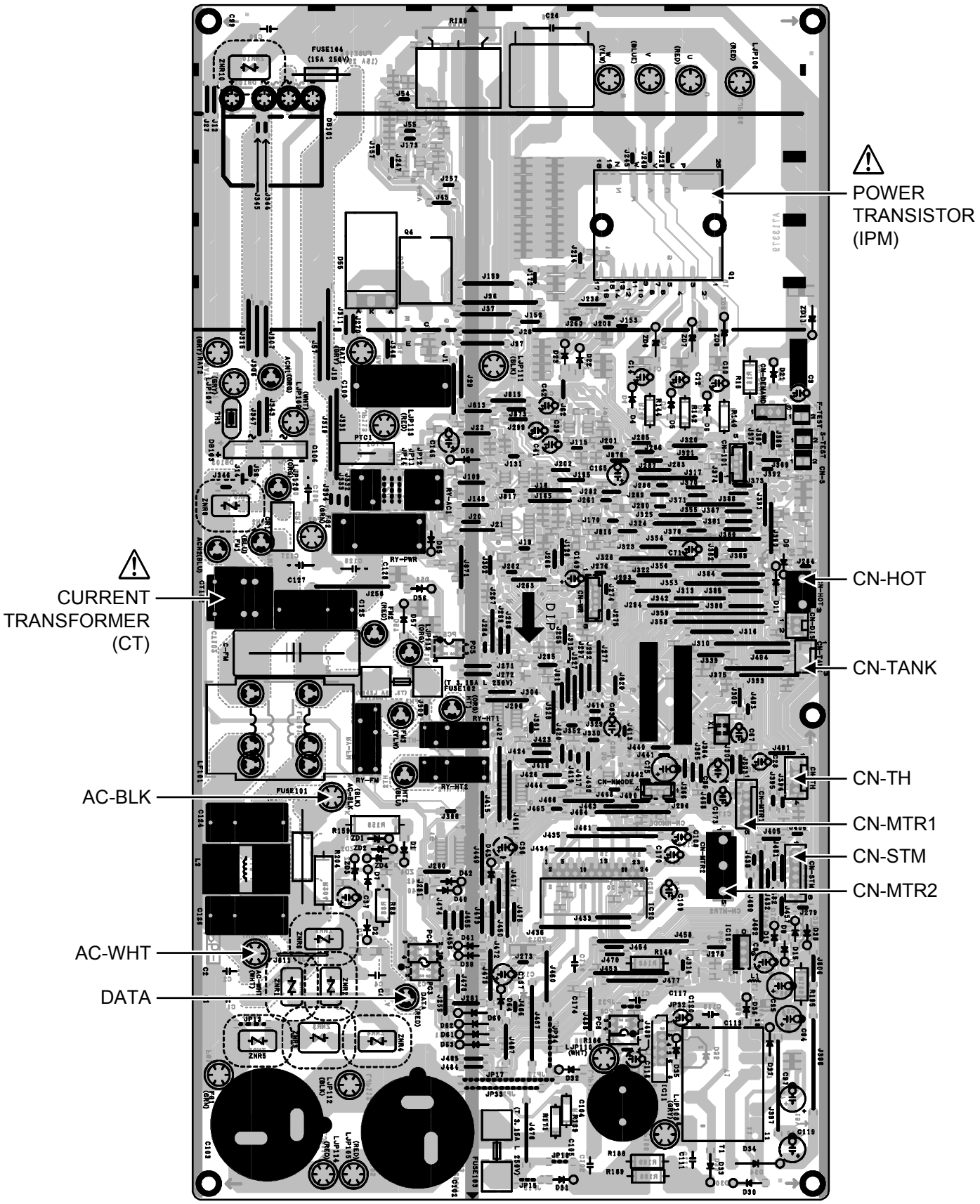
11.2.1 CU-Z7SKE CU-Z9SKE



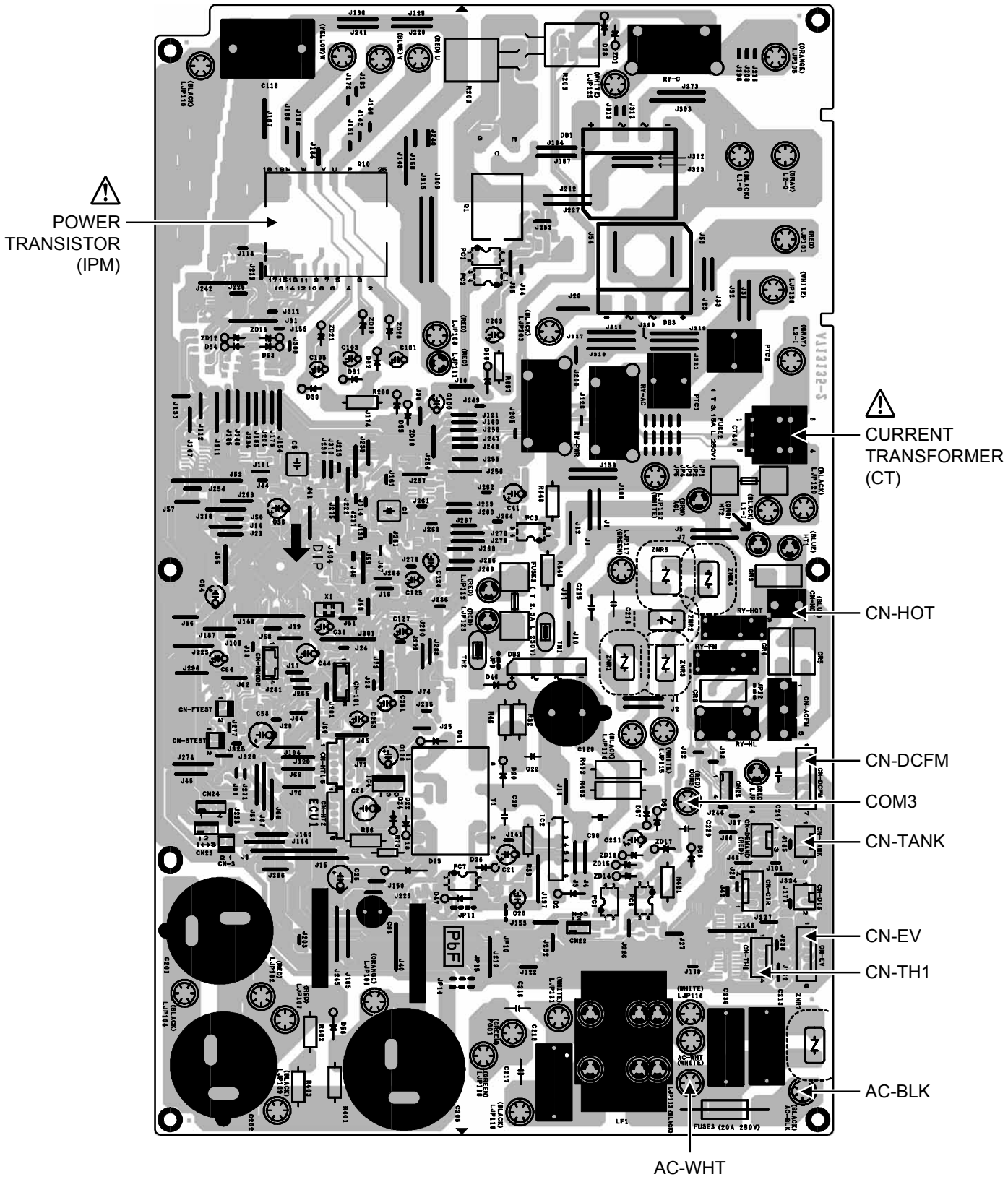
11.2.2 CU-Z12SKE



11.2.3 CU-Z15SKE



11.2.4 CU-Z18SKE



12. Installation Instruction

12.1 Select the Best Location

12.1.1 Indoor Unit

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

12.1.2 Outdoor Unit

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

Table A

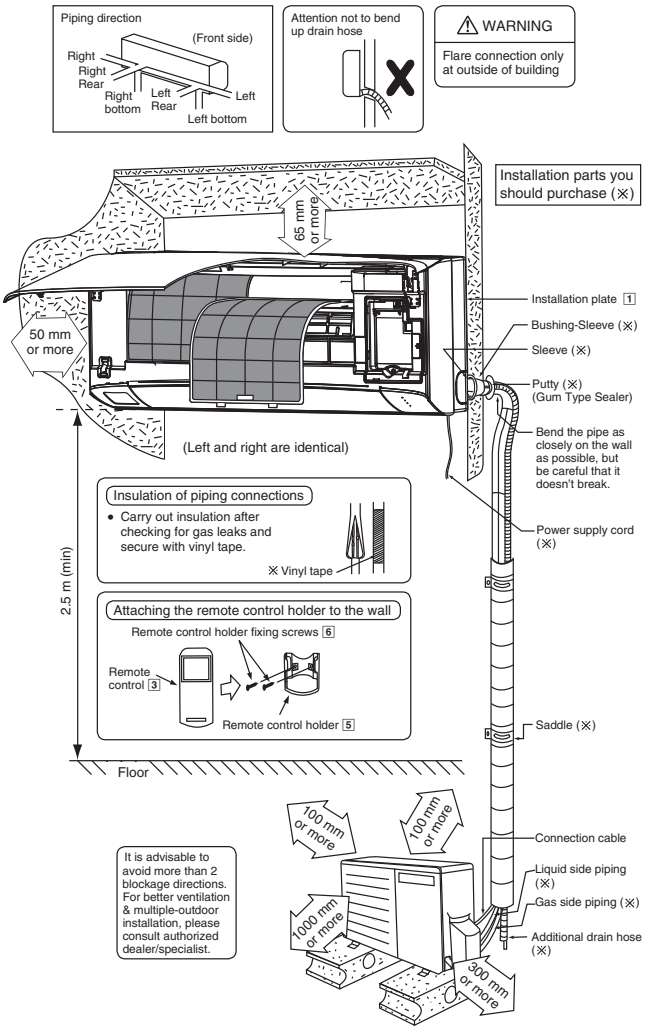
Model	Capacity W (HP)	Piping size		Std. Length (m)	Max Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)	Piping Length for add. gas (m)	Indoor A_{min} (m^2)
		Gas	Liquid							
Z7***, XZ7***	3/4HP	9.52 mm (3/8")	6.35 mm (1/4")	5	15	3	15	10	7.5	0.66
Z9***, XZ9***	1.0HP				15	3	15	10	7.5	0.82
Z12***, XZ12***	1.5HP				15	3	15	10	7.5	0.93
Z15***	1.75HP	12.7 mm (1/2")			15	3	15	10	7.5	0.85
Z18***, XZ18***	2.0HP				15	3	20	15	7.5	1.41

Example: For Z9***
If the unit is installed at 10 m distance, the quantity of additional refrigerant should be 25 g .... (10-7.5) m x 10 g/m = 25 g.

$$A_{min} = (M / (2.5 \times (LFL)^{(5/4)} \times h_0))^2$$

A_{min} = Required minimum room area, in m^2
M = Refrigerant charge amount in appliance, in kg
LFL = Lower flammable limit (0.306 kg/m^3)
h_0 = Installation height of the appliance (1.8 m for wall mounted)

12.1.3 Indoor/Outdoor Unit Installation Diagram

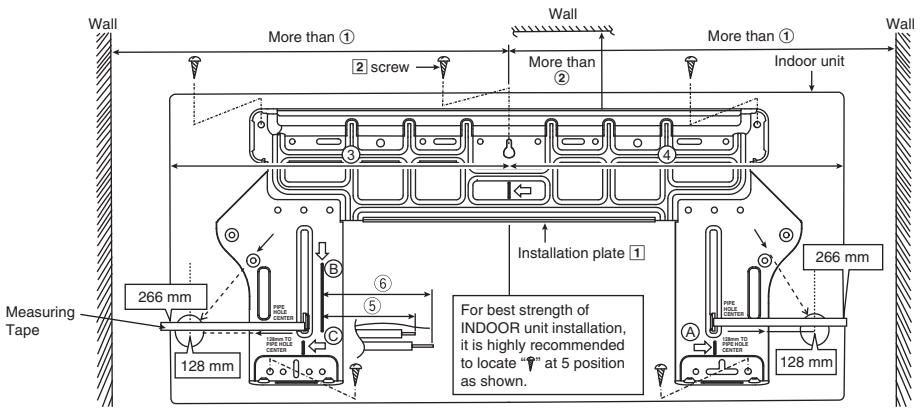


- This illustration is for explanation purposes only. The indoor unit will actually face a different way.

12.2 Indoor Unit

12.2.1 How to Fix Installation Plate

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



Model	Dimension					
	①	②	③	④	⑤	⑥
Z7***, XZ7***, Z9***, XZ9*** Z12***, XZ12***, Z15*** Z18***, XZ18***	515 mm	82 mm	460 mm	460 mm	43 mm	95 mm

The center of installation plate should be at more than ① at right and left of the wall.
The distance from installation plate edge to ceiling should more than ②.
From installation plate center to unit's left side is ③.
From installation plate center to unit's right side is ④.

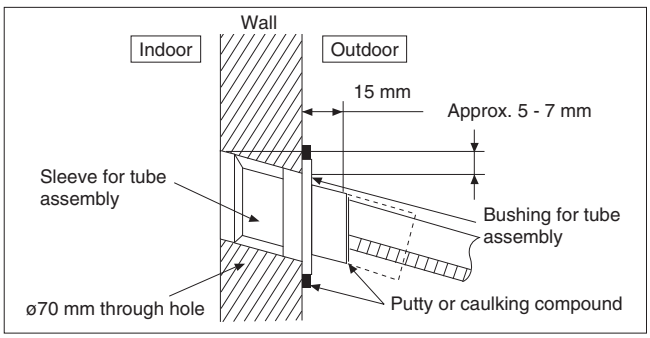
Ⓑ : For left side piping, piping connection for liquid should be about ⑤ from this line.
: For left side piping, piping connection for gas should be about ⑥ from this line.

1 Mount the installation plate on the wall with 5 screws or more (at least 5 screws).
(If mounting the unit on the concrete wall, consider using anchor bolts.)
   - Always mount the installation plate horizontally by aligning the marking-off line with the thread and using a level gauge.

2 Drill the piping plate hole with ø70 mm hole-core drill.
   - Line according to the left and right side of the installation plate. The meeting point of the extended line is the center of the hole. Another method is by putting measuring tape at position as shown in the diagram above. The hole center is obtained by measuring the distance namely 128 mm for left and right hole respectively.
   - Drill the piping hole at either the right or the left and the hole should be slightly slanting to the outdoor side.

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

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



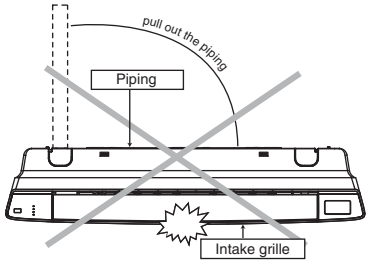
⚠ CAUTION

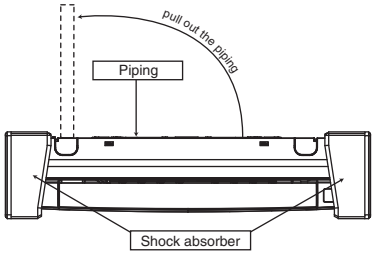
When the wall is hollow, please be sure to use the sleeve for tube assembly to prevent dangers caused by mice biting the connection cable.

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

12.2.3 Indoor Unit Installation

- Do not turn over the unit without it's shock absorber during pull out the piping. It may cause intake grille damage.
- Use shock absorber during pull out the piping to protect the intake grille from damage.





12.2.3.1 For the Right Rear Piping

Step-1 Pull out the Indoor piping

Step-2 Install the Indoor Unit

Step-3 Secure the Indoor Unit

Step-4 Insert the power supply cord and connection cable

- Insert the cables from bottom of the unit through the control board hole until terminal board area.

12.2.3.2 For the Right and Right Bottom Piping

Step-1 Pull out the Indoor piping

Step-2 Install the Indoor Unit

Step-3 Insert the power supply cord and connection cable

- Insert the cables from bottom of the unit through the control board hole until terminal board area.

Step-4 Secure the Indoor Unit

12.2.3.3 For the Embedded Piping

Step-1 Replace the drain hose

Step-2 Bend the embedded piping

- Use a spring bender or equivalent to bend the piping so that the piping is not crushed.

Step-3 Pull the connection cable into Indoor Unit

- The power supply cord and indoor unit and outdoor unit connection cable can be connected without removing the front grille.

Step-4 Cut and flare the embedded piping

- When determining the dimensions of the piping, slide the unit all the way to the left on the installation plate.
- Refer to the section "Cutting and flaring the piping".

Step-5 Install the Indoor Unit

Step-6 Connect the piping

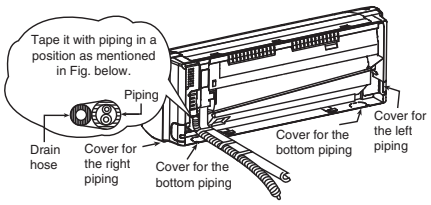
- Please refer to "Connecting the piping" column in outdoor unit section. (Below steps are done after connecting the outdoor piping and gas-leakage confirmation.)

Step-7 Insulate and finish the piping

- Please refer to "Insulation of piping connection" column as mentioned in indoor/outdoor unit installation.

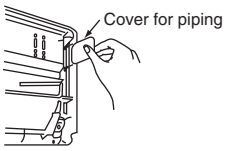
Step-8 Secure the Indoor Unit

Right Rear piping

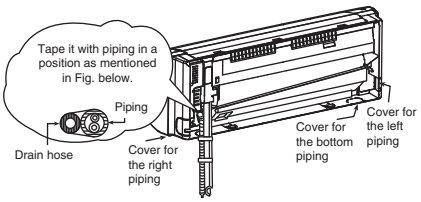


How to keep the cover

In case of the cover is cut, keep the cover at the rear of chassis as shown in the illustration for future reinstallation.
(Left, right and 2 bottom covers for piping.)

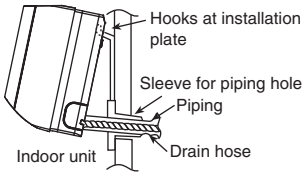


Right and Right Bottom piping



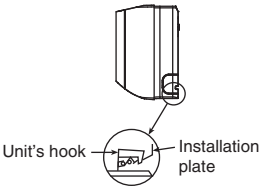
Install the indoor unit

Hook the indoor unit onto the upper portion of installation plate. (Engage the indoor unit with the upper edge of the installation plate). Ensure the hooks are properly seated on the installation plate by moving it in left and right.

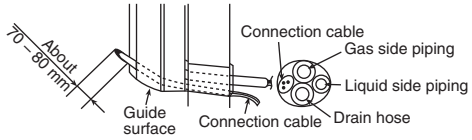


Secure the Indoor Unit

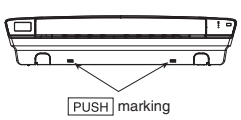
Press the lower left and right side of the unit against the installation plate until hooks engages with their slot (sound click).



Insert the connection cable



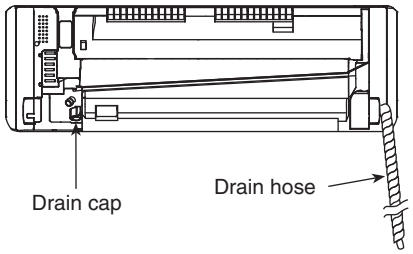
To take out the unit, push the [PUSH] marking at the bottom unit, and pull it slightly towards you to disengage the hooks from the unit.

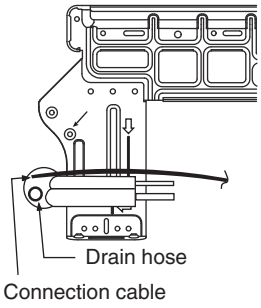


(This can be used for left rear piping and left bottom piping also.)

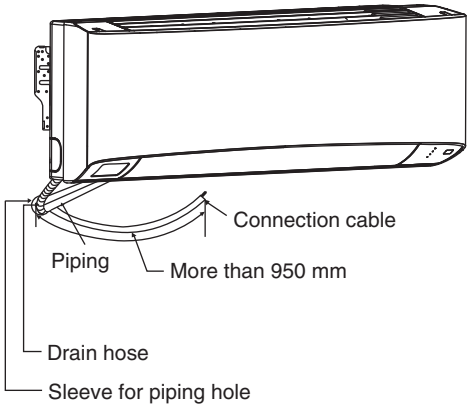
Exchange the drain hose and the cap

Rear view for left piping installation

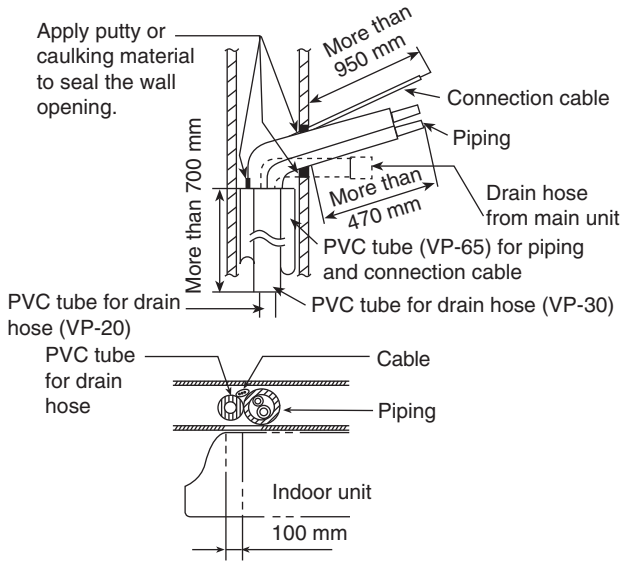




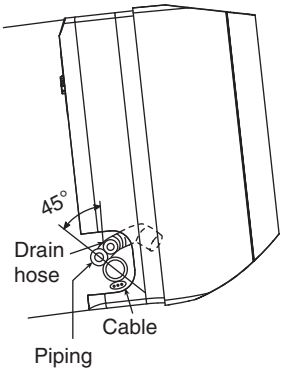
Adjust the piping slightly downwards.



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



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



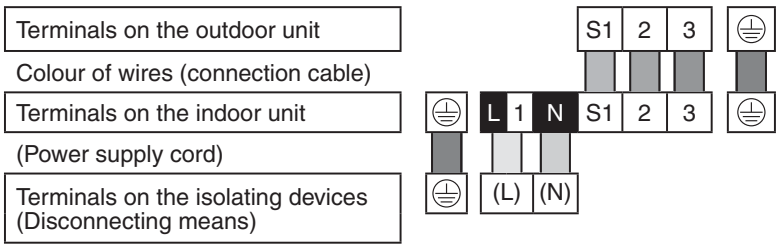
(For the right piping, follow the same procedure)

12.2.4 Connect the Cable to the Indoor Unit

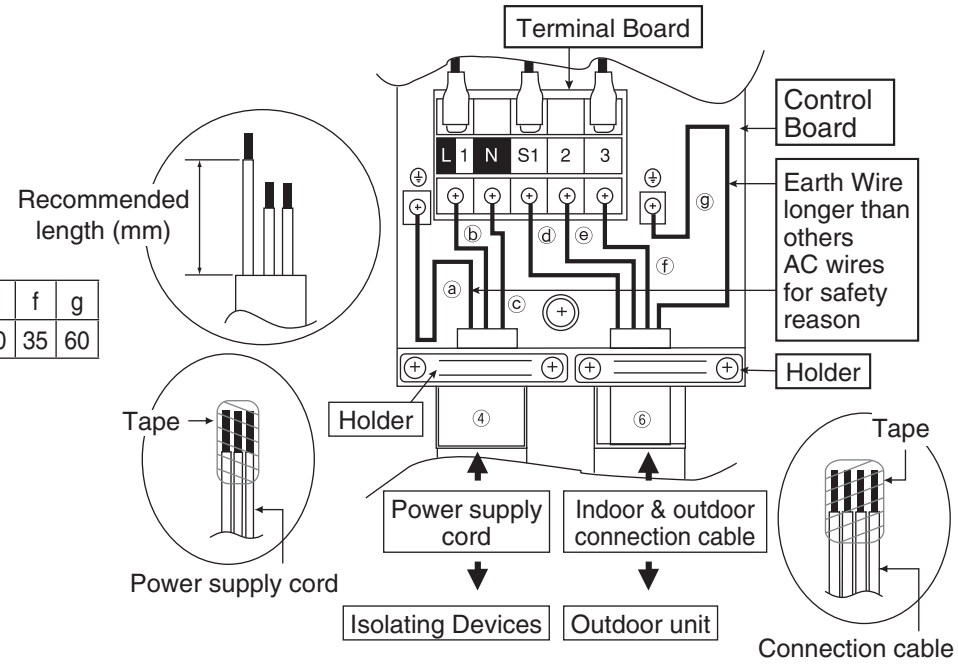
The power supply cord, indoor and outdoor unit connection cable can be connected without removing the front grille.

1 Install the indoor unit on the installing holder that mounted on the wall.
2 Open the front panel and grille door by loosening the screw.
3 Cable connection to the power supply through Isolating Devices (Disconnecting means).
   - Connect the approved polychloroprene sheathed **power supply cord** 3 x 1.5 mm^2 (3/4 ~ 1.75HP) or 3 x 2.5 mm^2 (2.0HP), type designation 60245 IEC 57 or heavier cord to the terminal board, and connect the other end of the cable to Isolating Devices (Disconnecting means).
   - Do not use joint power supply cord. Replace the wire if the existing wire (from concealed wiring, or otherwise) is too short.
   - In unavoidable case, joining of power supply cord between isolating devices and terminal board of air conditioner shall be done by using approved socket and plug rated 15/16A (3/4 ~ 1.75HP) or 16A (2.0HP). Wiring work to both socket and plug must follow to national wiring standard.
4 Bind all the power supply cord lead wire with tape and route the power supply cord via the left escapement.
5 **Connection cable** between indoor unit and outdoor unit shall be approved polychloroprene sheathed 4 x 1.5 mm^2 (3/4 ~ 1.75HP) or 4 x 2.5 mm^2 (2.0HP) flexible cord, type designation 60245 IEC 57 or heavier cord.
6 Bind all the indoor and outdoor connection cable with tape and route the connection cable via the right escapement.

7 Remove the tapes and connect the power supply cord and connection cable between indoor unit and outdoor unit according to the diagram below.



8 Secure the power supply cord and connection cable onto the control board with the holder.
9 Close grille door by tighten with screw and close the front panel.



Recommended length (mm)	a	b	c	d	e	f	g
	55	35	35	50	40	35	60

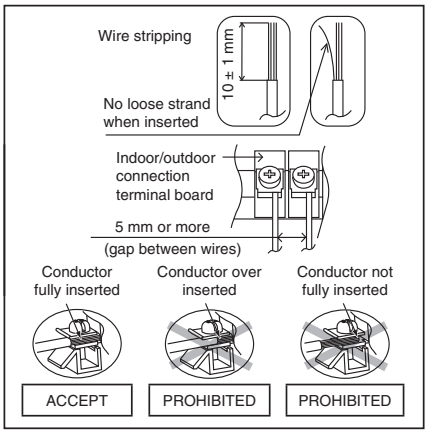
⚠ WARNING

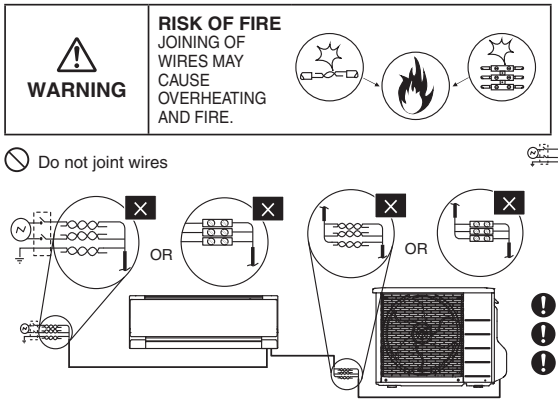
⏚ This equipment must be properly earthed.

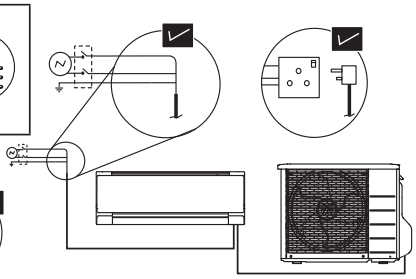
Note:

- Isolating Devices (Disconnecting means) should have minimum 3.0 mm contact gap.
- Ensure the colour of wires of outdoor unit and the terminal Nos. are the same to the indoor's respectively.
- Earth wire shall be Yellow/Green (Y/G) in colour and longer than other AC wires as shown in the figure for the electrical safety in case of the slipping out of the cord from the anchorage.

12.2.4.1 Wire Stripping Connecting and Requirement





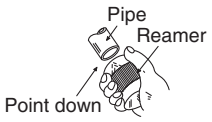


- Use complete wire without joining.
- Use approved socket and plug with earth pin.
- Wire connection in this area must follow to national wiring rules.

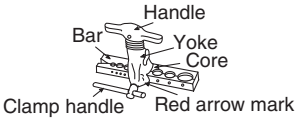
12.2.4.2 Cutting and Flaring the Piping

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

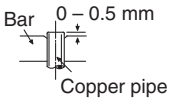
1. To cut

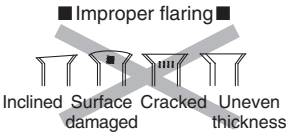


2. To remove burrs



3. To flare



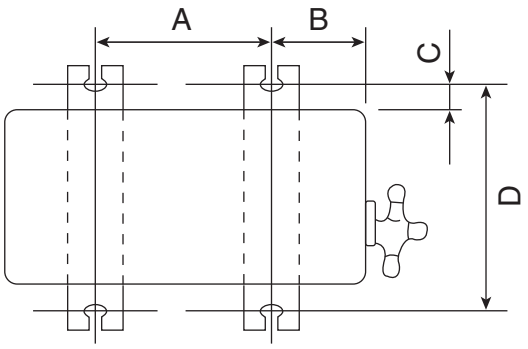


When properly flared, the internal surface of the flare will evenly shine and be of even thickness. Since the flare part comes into contact with the connections, carefully check the flare finish.

12.3 Outdoor Unit

12.3.1 Install the Outdoor Unit

- After selecting the best location, start installation to Indoor/Outdoor Unit Installation Diagram.
  1 Fix the unit on concrete or rigid frame firmly and horizontally by bolt nut (ø10 mm).
  2 When installing at roof, please consider strong wind and earthquake.
  Please fasten the installation stand firmly with bolt, screws or nails.



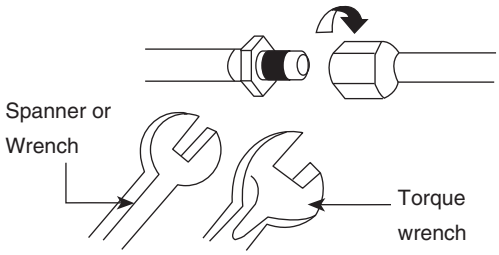
Model	A	B	C	D
Z7***, XZ7***	570 mm	105 mm	18.5 mm	320 mm
Z9***, XZ9***				
Z12***, XZ12***	540 mm	160 mm	18.5 mm	330 mm
Z15***				
Z18***, XZ18***	613 mm	131 mm	16 mm	360.5 mm

12.3.2 Connect the Piping

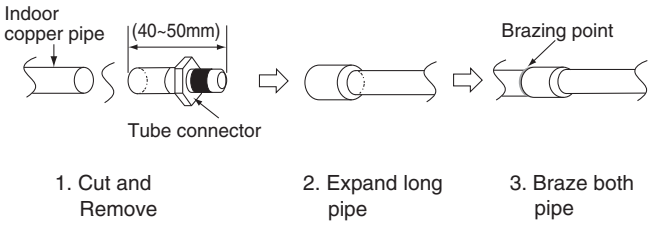
12.3.2.1 Connecting the Piping to Indoor

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

Connect the piping
- Align the center of piping and sufficiently tighten the flare nut with fingers.
- Further tighten the flare nut with torque wrench in specified torque as stated in the table.



For connection joint location at inside building
- Decide the length.
- Cut and remove the tube connectors at indoor copper pipings (both gas and liquid piping) by using pipe cutter. Remove burrs from cut edge.
- Use pipe expander to expand the end of long piping.
- Align the center of piping and braze the piping joints.



12.3.2.2 Connecting the Piping to Outdoor

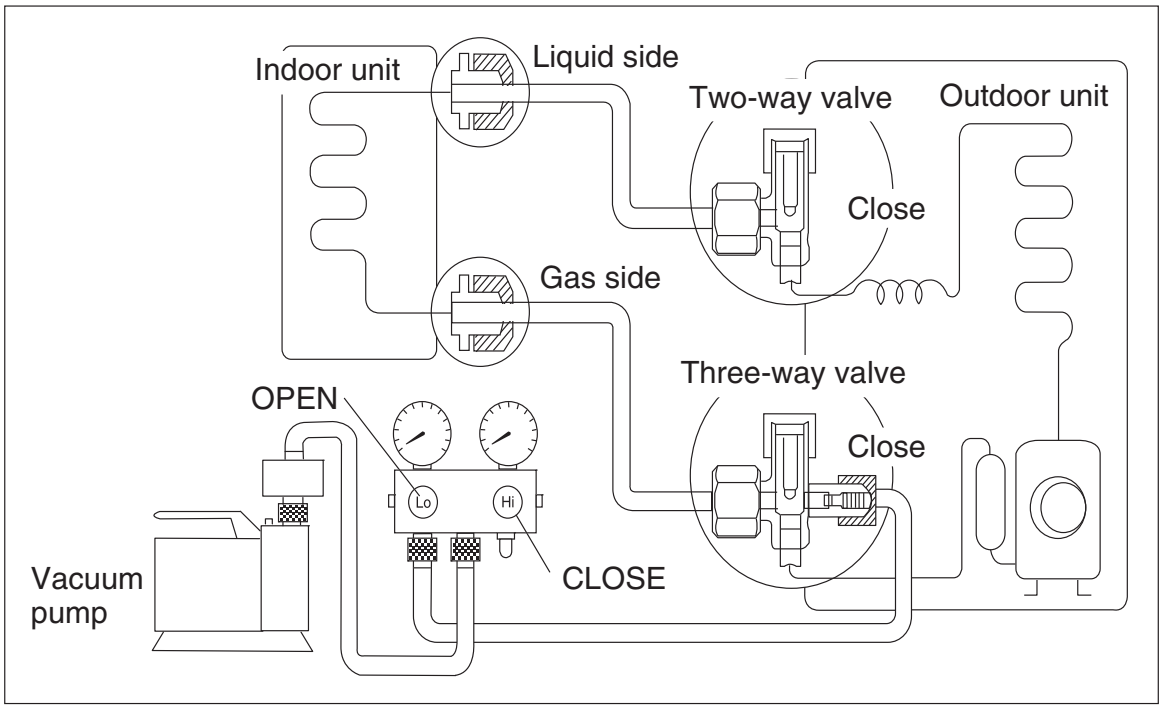
Decide piping length and then cut by using pipe cutter. Remove burrs from cut edge.
Make flare after inserting the flare nut (locate at valve) onto the copper pipe.
Align center of piping to valve and then tighten with torque wrench to the specified torque as stated in the table.

Do not overtighten, overtightening may cause gas leakage	
Piping size	Torque
6.35 mm (1/4")	[18 N•m (1.8 kgf•m)]
9.52 mm (3/8")	[42 N•m (4.3 kgf•m)]
12.7 mm (1/2")	[55 N•m (5.6 kgf•m)]
15.88 mm (5/8")	[65 N•m (6.6 kgf•m)]
19.05 mm (3/4")	[100 N•m (10.2 kgf•m)]

12.3.3 Evacuation of the Equipment

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

⃠	Do not purge the air with refrigerants but use a vacuum pump to vacuum the installation.
❗	There is no extra refrigerant in the outdoor unit for air purging.

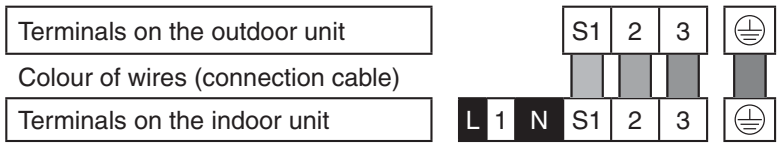


1 Connect a charging hose with a push pin to the Low side of a charging set and the service port of the 3-way valve.
   - Be sure to connect the end of the charging hose with the push pin to the service port.
2 Connect the center hose of the charging set to a vacuum pump.
3 Turn on the power switch of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

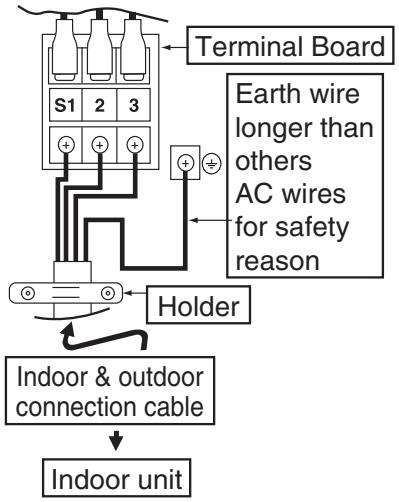
- If gauge needle does not move from 0 cmHg (0 MPa) to -76 cmHg (-0.1 MPa), in step ③ above take the following measure:
- If the leak stops when the piping connections are tightened further, continue working from step ③.
- If the leak does not stop when the connections are retightened, repair location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

12.3.4 Connect the Cable to the Outdoor Unit

1 Remove the control board cover from the unit by loosening the screw.
2 **Connection cable** between indoor unit and outdoor unit shall be approved polychloroprene sheathed 4 x 1.5 mm^2 (3/4 ~ 1.75HP) or 4 x 2.5 mm^2 (2.0HP) flexible cord, type designation 60245 IEC 57 or heavier cord. Do not use joint connection cable. Replace the wire if the existing wire (from concealed wiring, or otherwise) is too short.



3 Secure the cable onto the control board with the holder (clamper).
4 Attach the control board cover back to the original position with screw.
5 For wire stripping and connection requirement, refer to instruction 11.2.4 of indoor unit.



⚠ WARNING
This equipment must be properly earthed.

- Earth wire shall be Yellow/Green (Y/G) in colour and longer than other AC wires for safety reason.

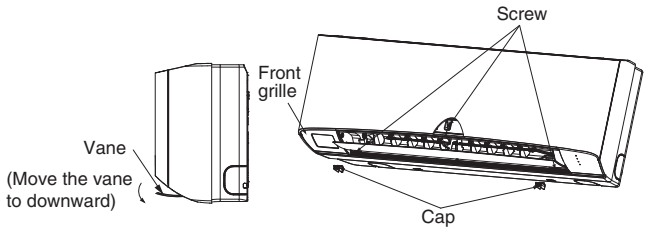
12.3.5 Piping Insulation

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

12.3.6 How to Take Out Front Grille

Please follow the steps below to take out front grille if necessary such as when servicing.

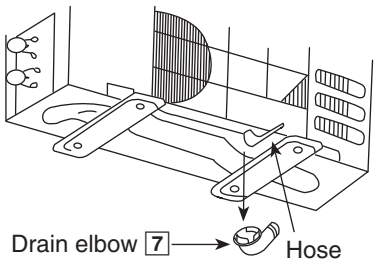
1 Set the vertical airflow direction louvers to the horizontal position.
2 Remove the 2 caps on the front grille as shown in the illustration at right, and then remove the 3 mounting screws.
3 Pull the lower section of the front grille towards you to remove the front grille.



When reinstalling the front grille, carry out above step 2 - 3 in the reverse order.

12.3.7 Disposal of Outdoor Unit Drain Water

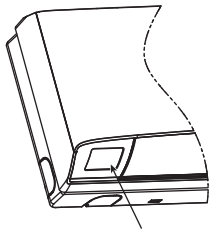
- If a drain elbow is used, the unit should be placed on a stand which is taller than 3 cm.
- If the unit is used in an area where temperature falls below 0°C for 2 or 3 days in succession, it is recommended not to use a drain elbow, for the drain water freezes and the fan will not rotate.



Install the hose at an angle so that the water smoothly flows out.

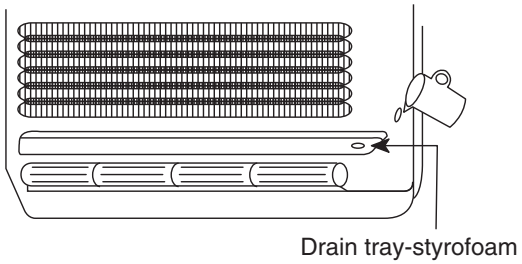
12.3.8 Eco Sensor

- Do not hit or violently press the sensor. This can lead to damage and malfunction.
- Do not place large objects near the sensor and keep heating units or humidifiers away from the sensors detection area. This may lead to sensor malfunction.



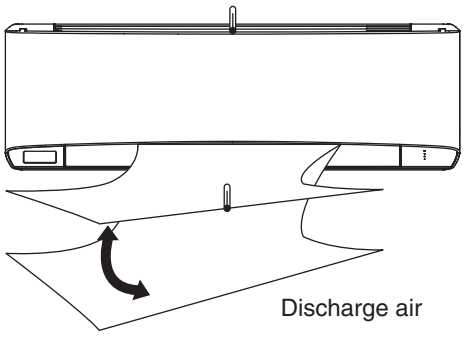
12.3.9 Check the Drainage

- Open front panel and remove air filters. (Drainage checking can be carried out without removing the front grille.)
- Pour a glass of water into the drain tray-styrofoam.
- Ensure that water flows out from drain hose of the indoor unit.



12.3.10 Evaluation of the Performance

- Operate the unit at cooling/heating operation mode for fifteen minutes or more.
- Measure the temperature of the intake and discharge air.
- Ensure the difference between the intake temperature and the discharge is more than 8°C during Cooling operation or more than 14°C during Heating operation.



13. Installation and Servicing Air Conditioner using R32

13.1 About R32 Refrigerant

For air conditioning refrigerants such as R410A, the refrigerants were collected back in order to prevent their air dissipation, to curbe the global warming impact, in case they were released into the atmosphere. In the “4th Environmental Basic Plan”, 80% reduction of greenhouse gas emissions by 2050 is required, and due to this requirement, further reduction in the emission of high greenhouse effect gas, such as CFCs, is required. Therefore, the conversion of air conditioning refrigerant into the ones who has smaller greenhouse effect, even if it is dissipated into the atmosphere, became our responsibility.

Nevertheless, in case of air conditioning refrigerant, it would be the best if there is a refrigerant which has smaller impact on global warming, but ensures good energy efficiency and performance, and is safe; however, there is no such refrigerant which satisfies all these conditions. As a result, we have been considering the practical usage, within the safety frame-work, of R32 refrigerant which has short lifetime in the atmosphere, and has smaller effect of global warming, but is slightly flammable.

In 2004, due to the revision of air conditioner safety standards by the International Electro-safety Commission (IEC), the safety standards of air conditioners using slightly flammable refrigerant was issued. In 2010, the regulations of American Society of Heating, Refrigerating and Air-Conditioning Engineers in the United States (ANSI/ASHRAE34) was issued adopting the grades for refrigerants which are difficult to inflame due to their slow burning rates, and as a result have smaller damages in cases of fire. The burning rate of R32 is lower by 10cm / per second, and safety standardization for various usage is now being processed.

13.2 Characteristics of R32 Refrigerant

1. Chemical Characteristics

R32 is one of the refrigerants used in R410A, has almost no toxicity, and chemically stable compound formed by hydrogen, carbon and fluorine.

R32 has short lifetime of 4 to 9 years in case of being released into the atmosphere; therefore, it has smaller greenhouse gas effect but has slight inflammability because of the large proportion of hydrogen.

Chemical Characteristic Table of R32, R410A and R22.

	R32	R410A	R22
Chemical Formula	CH2F2	CH2F2 / CHF2CF3	CHCLF2
Composition (mixture ratio wt.%)	Single Composition	R32 / R125A (50 / 50 wt.%)	Single Composition
Boiling Point (°C)	-51.7	-51.5	-40.8
Pressure (physical) *1	3.14	3.07	1.94
Capacity (physical) *2	160	141	100
COP (physical) *3	95	91	100
Ozone Depletion Potential (ODP)	0	0	0.055
Global Warming Potential (GWP) *4	675	2090	1810
Inflammability *5	Slightly Inflammable (A2L)	Non-inflammable (A1)	Non-inflammable (A1)
Toxicity	None	None	None

*1：Physical property of temperature condition 50°C
*2：Relative value of temperature condition 0/50°C, providing R22=100
*3：Te/Tc/SC/SH=5/50/3/0°C
*4：GWP=Global Warming Potential, each figure is based on “4th IPCC4 Report”
*5：Based on ANSI / ASHRAE std. 34-2010

2. Characteristic of Pressure

As shown in Table 2, R32 does not have much difference in vapor pressure at the same refrigerant temperature comparing to R410A, but comparing to R22, it is higher at 1.6 times more. Thus, the same as in case of R410A, it is necessary to do installation and service using high-pressure tools and components.

Table 2. Saturated vapor pressure comparison table

(Unit: MPa)

Temperature	Refrigerant		
	R32	R410A	R22
-20	0.30	0.30	0.14
0	0.71	0.70	0.40
20	1.37	1.35	0.81
40	2.38	2.32	1.43
60	3.84	3.73	2.33
65	4.29	4.17	2.60

Reference： Thermal properties table of Japan Society of Refrigerating and Air Conditioning Engineers (60, 65°C)
NIST REFPROP V8.0 (-20 ~ 40°C)

13.3 Refrigerant piping installation • Tools used in services

13.3.1 Required Tools

R32 refrigerant air conditioners use the common parts as R410A air conditioners for two-way valves and three-way valves (diameters of service ports); thus, they maintain commonality in the maintenance of the compressive strength, the size of pipe flaring, and the size of flare nuts as R410A. Therefore, for refrigerant pipe installation and services, you can use tools for R410A.

However, mixing of refrigerants is not allowed, so that you have to separate the cylinders for the recovery of refrigerants.

Tools used for installation • relocation • replacement of air conditioning units

Works	R32	R410A	R22
Flaring	Flare tools for R410A (clutch type)		Flare tools for R22 (clutch type)
Connection of pipes	Torque wrench (diameter 1/4 3/8)		
	Torque wrench (diameter 1/2 5/8) *1		Toque wrench (diameter 1/2 5/8)
Manifold gauge charging hose	R32 & R410A Common (As at November 2013)		R22 Only
Air purging	Vacuum pump + Reducer / expander		Vacuum pump
Gas leakage test	Detection liquid or soup water, HFC detector		

*1. Nut diameters of 1/2 5/8, the size of torque wrench common with R410A
For other installation, you can use general tools such as screw drivers (+, -), metal saws, electric drills, long-nose pliers, hole core drills (ø70 or ø65), linen tape, levels, temperature gauges, clamp meters, electric knives, nippers, pipe cutters, reamers or scrapers, spring benders, (diameters 1/4 3/8 1/2 5/8), monkey wrenches, fixing wrenches (17 or 12 mm), feeler gauges, hexagon wrenches (4 mm), testers, megohm testers, etc.

Tools used for services

Works	R32	R410A	R22
Insertion of refrigerant	Digital scale for refrigerant charging, refrigerant cylinders, cylinder adopters and packing *a		
Recovery of refrigerant	Refrigerant recovery devices, refrigerant cylinders, manifold gauges, charging hoses *b		

*a. Use cylinder for each refrigerant, cylinder adopter and packing.
*b. Use refrigerant recovery cylinder separately for each refrigerant **(no mixture of refrigerant allowed)**. Please be aware that there are some refrigerant collection devices which do not have self-certification.

13.3.2 Tools for R32 (common with R410A)

1. Flare gauges
Use flare gauges when you perform flaring with flare tools (crutch type). Flare gauges are used to set the pipe ends at 0.5 ~ 1.5 mm from clump bars of flare tools.

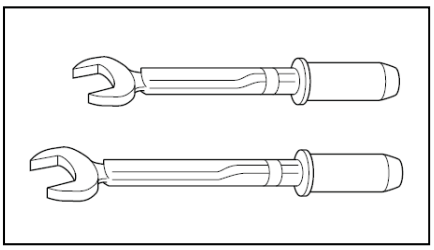
Flare gauges

2. Flare tools (clutch type)
Flare tools have larger holes of clump bars in order to set the pipe end at 0 ~ 0.5 mm, and have stronger springs inside to ensure solid flaring torques. These flare tools can be used commonly for R22.

Flare tools (clutch type)

3. Torque wrenches (diameters 1/2, 5/8)
In order to strengthen the compressive strength, the diameters of wrenches change depending on the flare nut sizes.

Torque wrenches



Differences in torque wrenches

	R32 (common R410A)	R22
1/2 (diameter × torque)	26 mm × 55 N•m (550 kgf•m)	24 mm × 55 N•m (550 kgf•m)
5/8 (diameter × torque)	29 mm × 65 N•m (650 kgf•m)	27 mm × 65 N•m (650 kgf•m)

4. Manifold gauges
R22 gauges cannot be used because of the high pressures.

Each port of manifold has different shapes in order to prevent inserting wrong refrigerant.
*However, the port shape for R410A and R32 is the same; therefore, attention need to be paid not to insert wrong refrigerant.

Differences in high/low pressure gauges

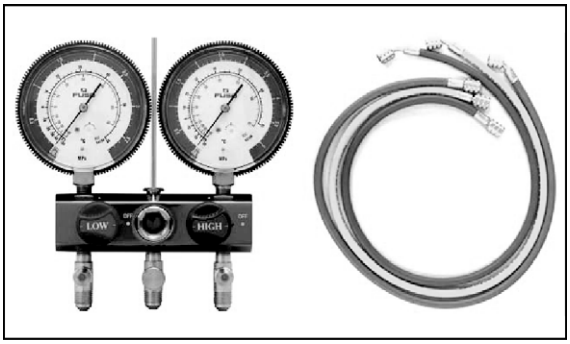
	R32 (common R410A)	R22
High pressure gauges (red)	-0.1 ~ 5.3 MPa -76 cmHg ~ 53 kgf / cm^2	-76 cmHg ~ 35 kgf / cm^2
Low pressure gauges (blue)	-0.1 ~ 3.8 MPa -76 cmHg ~ 38 kgf / cm^2	-76 cmHg ~ 17 kgf / cm^2

Difference in manifold port sizes

	R32 (common R410A)	R22
Port sizes	1/2 UNF20	7/16 UNF20

5. Charging hoses
The pressure resistance of charge hoses is increased. At the same time, the material is changed to HFC resistant, and the size of each manifold adopter is changed, as the port size of manifold gauge itself. Further, some hoses are with anti-gas pressure backflow valves placed near the adopters. (hoses with the valves recommended)

Manifold gauges / Charging hoses

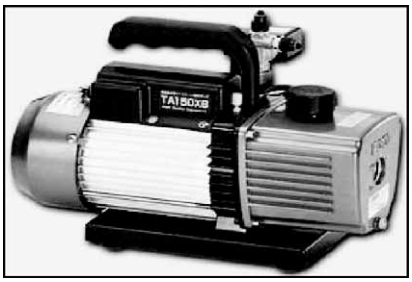


Differences in charging hoses

		R32 (common R410A)	R22
Pressure Resistance	Normal operation pressure	5.1 MPa (52 kgf / cm^2)	3.4 MPa (35 kgf / cm^2)
	Burst pressure	27.4 MPa (280 kgf / cm^2)	17.2 MPa (175 kgf / cm^2)
Material		HNBR rubber Internal nylon coating	NBR rubber

6. Vacuum pump and Vacuum pump adopter
When using a vacuum pump, it is necessary to set a solenoid valve in order to prevent backflow of vacuum pump oil into the charge hoses, and use a vacuum pump with oil backflow prevention function, or use the vacuum pump with vacuum pump adopter.
If vacuum pump oil（mineral oil-based）mixes with R410A (R32), it may cause damage to the machine.

Vacuum pump



Vacuum pump adopter

7. HFC refrigerant_Electric gas leakage tester
R32 refrigerant is often used for other mixed refrigerant (R410A, R404A, R407C etc.). Therefore, the usage of existing HFC detectors is possible, but in order to detect more accurately, we recommend to use detectors specially set and adjusted for R32 detection.

HFC refrigerant_Electric gas leakage tester

8. Digital scale for refrigerant charging
R32 and R410A have high pressure level and their evaporation speed is high.
Thus, if you recover the refrigerant by cylinder charging method, the refrigerant evaporates within the weighing scale glass, which makes reading the scale difficult, rather than liquidating the refrigerant into the cylinder. (Charging cylinders for R22 have different pressure resistance, scale, connection port size; therefore, they are not usable) At the same time, the digital scale for refrigerant charging is strengthened by receiving the weight of the refrigerant cylinders with four pillars at the corners. The connection ports of charging hoses have two separate ports for R22 (7/16 UNF20) and R32/R410A (1/2 UNF20) therefore, they can be used for the insertion of the existing refrigerants.

Digital scale for refrigerant charging

9. Refrigerant cylinders
Refrigerant cylinders for R410A are painted in pink, and the ones for R32 are painted in other colors that might subject to change according to the international standards. R32 is a single refrigerant, so that both liquid and gas insertion are possible. Additional charging is also possible.
(R410A is a mixed refrigerant, so only liquid insertion is possible)

Refrigerant cylinders

10. Connection ports of refrigerant cylinders and packing
Charging ports which fit to the charging hose connection port size (1/2 UNF20) is needed. At the same time, the packing has to be of HFC resistant materials.

Connection ports and packing

11. Tools used for refrigerant piping installations and services

	Tools for R410A	Common with R32	Possibility of usage for R22
1.	Pipe cutters, reamers or scrapers	○	○
2.	Flare tools (clutch type)	○	○
3.	Torque wrench (1/4, 3/8)	○	○
4.	Torque wrench (1/2, 5/8)	○	×
5.	Manifold gauges・charging hoses	○	×
6.	Vacuum pumps, vacuum pump adopters	○ Connection 5/16	○ Connection 1/4
7.	Electric gas leakage testers for HFC *1	○	△
8.	Digital scale for refrigerant charging	○	○
9.	HCF recovery devices (connection port 5/16) *2	○ Connection 5/16	○ Connection 1/4
10.	Refrigerant cylinders (pressure resistant: FC3)	Same specs ×	×
11.	Refrigerant cylinders (pink)	Other (colors that might subject to change according to the international standards).	×
12.	Refrigerant cylinder connection ports and packing	○	×
13.	Allen wrench (4 mm) Electric knives	○	○

*1 Those testers only for HCFC22 (R22), but not for HCF32 (R32) and HCF410A (R410A) cannot be for common use.

*2 Recovery devices which are self-certified for each HCF type can be used.

[Knowledge for the common usage of tools for R410A & R32]

- R410A and R32 machines use different compressor oils.
- If unregulated compressor oil gets mixed into, it may cause damage to the machine function.
- Careful pump down will ensure the recovery of compressor oil, and it will minimize the remaining amount of the oil in the manifold gauge and charging hose.
- If you only perform the recovery of refrigerant and not be able to perform pump down, you have to dispose the compressor oil in the charging hose.

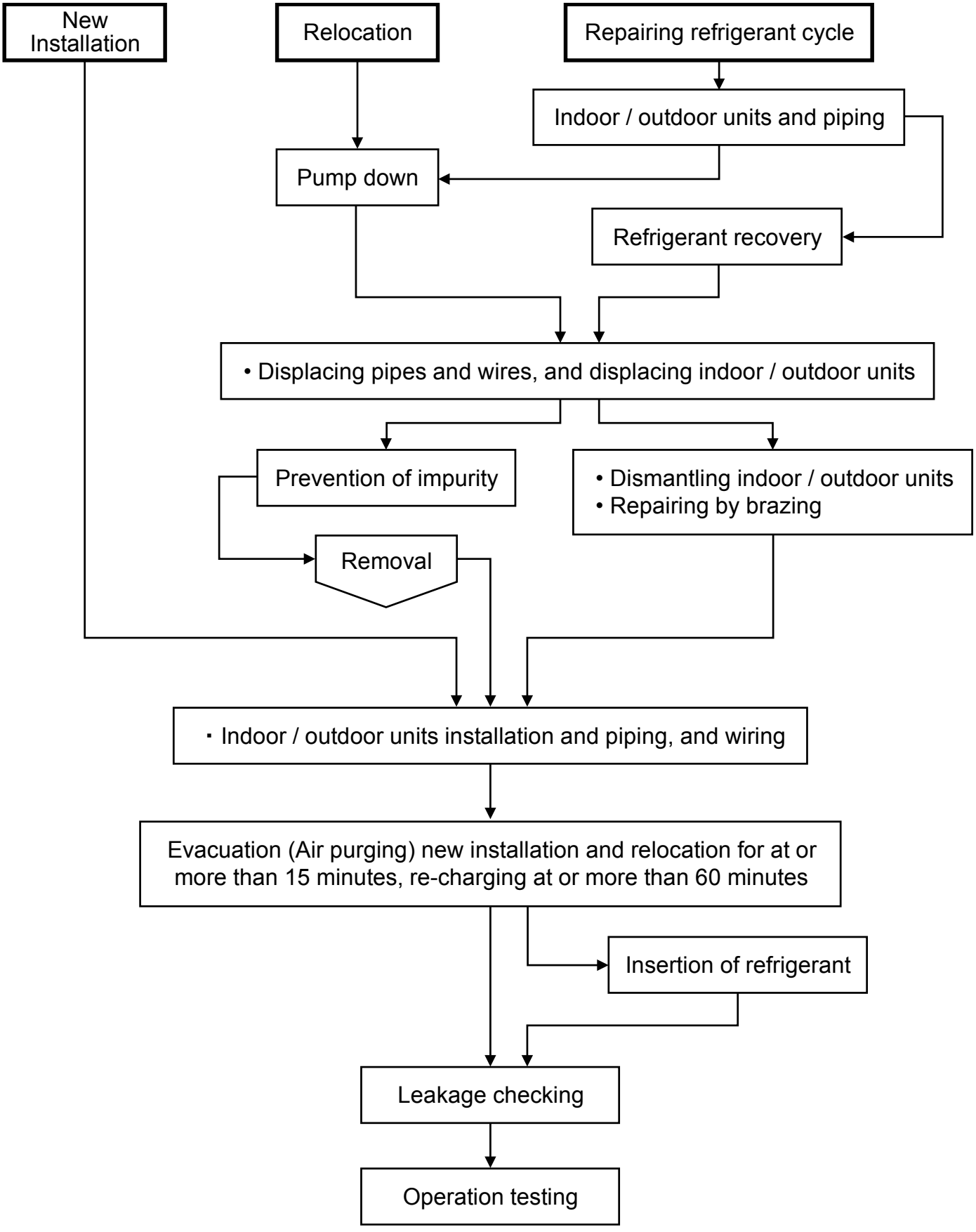
[Precaution of repairing refrigerant cycle]

- In the brazing, open 2-way and 3-way valves, and make sure the refrigerant is completely recovered back and not remaining the system.
- When repairing outside, make sure no refrigerant is in the air, ensure good air flow, and perform the brazing.

[Inserting wrong refrigerant]

- It may cause “not cooling” and “not heating” customer claims because each component (expansion valve, compressor, PCB) of the refrigeration cycle is specially adjusted for R32.
- At the same time, it is not subject to product warranty, if wrong refrigerant was inserted into the system.

13.4 New installation, Relocation, Repairing of Refrigerant Cycle System The Procedures



13.5 Piping installation of R32

13.5.1 Pipe materials used and flaring

Copper pipes are used for refrigerant piping. Pipes which comply with JIS Regulations need to be used. Room air conditioners which use R410A and R32 have higher pressure; thus, using pipes which comply with the Regulations is important.
The pipe thickness is regulated by revised JIS B 8607 “Flaring and brazing fittings for refrigerant” and the pipe thickness for R410A, R32 is shown in the table.

Pipe thickness

O and OL materials		Thickness (mm)		
Diameter	Diameter (mm)	R410A	R32	R22
1/4	6.35	0.80		
3/8	9.52	0.80		
1/2	12.70	0.80		
5/8	15.88	1.00		

Caution

- For connection piping, use copper phosphate seamless pipes (1220T) as regulated in “JIS H 3300” and the pipe thickness is 0.8 mm.
- In the market, there are some pipes of 0.7 mm thickness, but do not use these pipes (0.8 mm thickness has to be strictly followed).
- It is recommended to use pipes whose adhesion amount of oil is at or less than 40 mg / 10 m.
  At the same time, do not use pipes with dent, de-shape, and color change (especially inside).

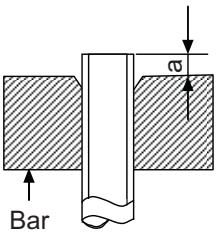
13.5.2 Processing and connection of pipes

For refrigerant pipe installation, be aware of moisture and dirt do not get into the pipes, and make sure of no refrigerant leakage.

◎ The procedure of flaring and precautions

a) Cutting of pipes：use pipe cutter and cut the pipe slowly not to de-shape the pipe.
b) Removal of burrs on the edge of pipe (reamer or scraper)
   If the condition of pipe edge after the deburring is no good or if burrs attaches on the flaring, it may cause refrigerant leakage. Turn the pipe end down and perform deburring carefully.
c) Insert the flare nut (use the nut which is a part of the CZ parts)
d) Flaring
   Ensure the cleanliness of clump bar and pipe, and perform flaring carefully.
   Use the existing flare tools or flare tools for R410A. Be aware that the sizes and dimensions of flaring is different in each flaring tool. If you use the existing flaring tools, use flaring gauge to measure the length of the flaring part.

Piping size (mm)	Dimensions “a” (mm) R22			Dimensions “a” (mm) R410A/R32		
	Flare tools		Flare tools for R410A	Flare tools		Flare tools for R410A
	Clutch type	Wing nut type	Clutch type	Clutch type	Wing nut type	Clutch type
6.35 (1/4")	0.5 ~ 1.0	1.0 ~ 1.5	0 ~ 0.5	1.0 ~ 1.5	1.5 ~ 2.0	0 ~ 0.5
9.52 (3/8")	0.5 ~ 1.0	1.0 ~ 1.5	0 ~ 0.5	1.0 ~ 1.5	1.5 ~ 2.0	0 ~ 0.5
12.70 (1/2")	0.5 ~ 1.0	1.5 ~ 2.0	0 ~ 0.5	1.0 ~ 1.5	2.0 ~ 2.5	0 ~ 0.5
15.88 (5/8")	0.5 ~ 1.0	1.5 ~ 2.0	0 ~ 0.5	1.0 ~ 1.5	2.0 ~ 2.5	0 ~ 0.5



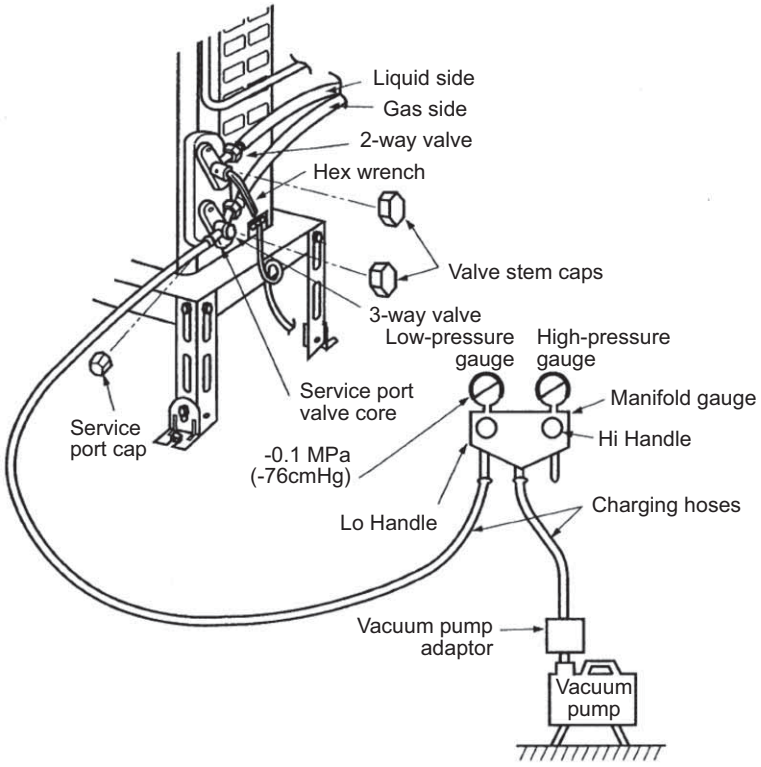
Nut outer diameter (mm)	
R22	R410A
	R32
17	17
22	22
24	26
27	29

13.6 Installation, Relocation, and Service

13.6.1 Air purge and gas leak test for new installation (using new refrigerant pipes) using vacuum pump

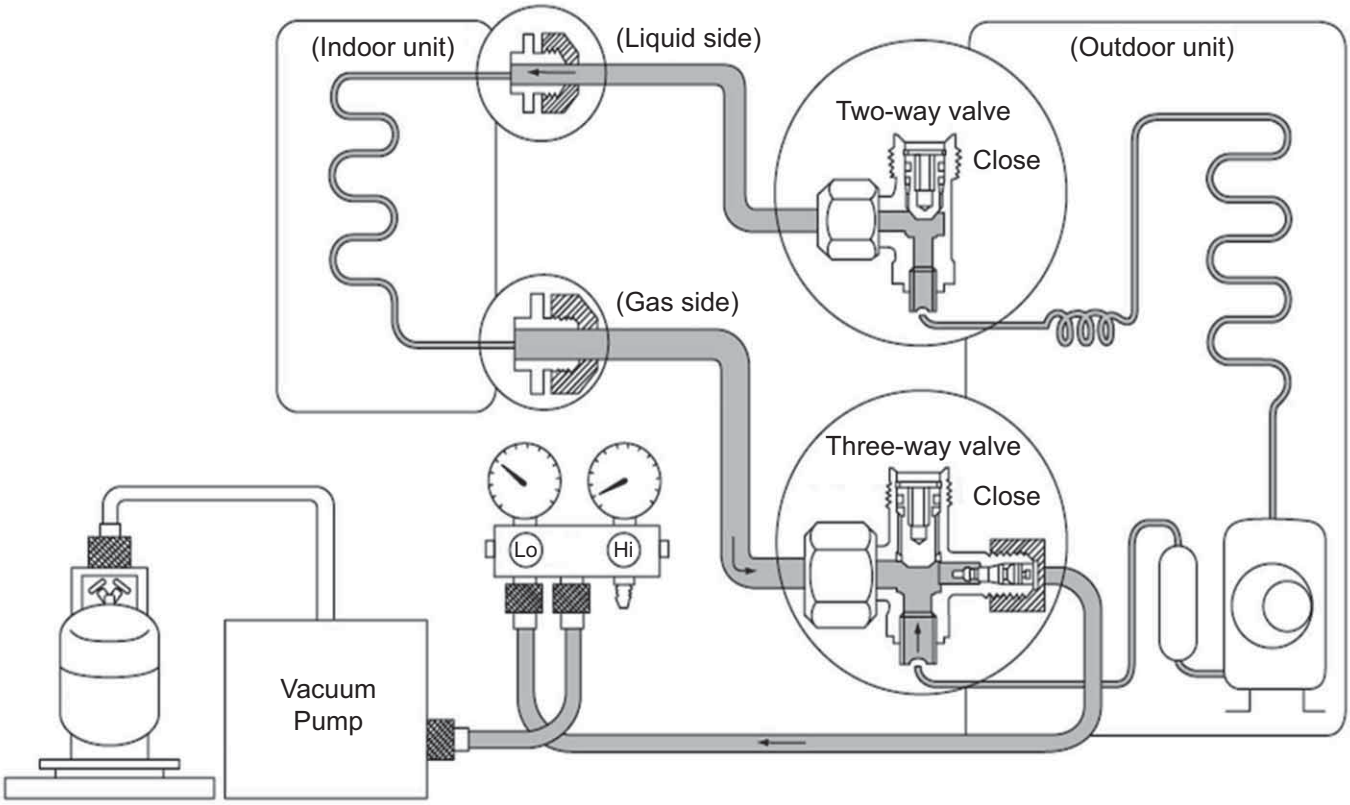
(From the point of view of global environment protection, do not release CFCs into the atmosphere during installation work)

1. Connect the charging hose of manifold gauge to the service port of 3-way valve (pushing insect pin).
2. Fully open the handle Lo of manifold gauge and operate vacuum pump.
   (If the needle of the low-pressure gauge reaches the vacuum immediately, check 1 procedure again)
3. Perform vacuuming 15 minutes or more, and make sure low pressure gauge reaches to －0.1 MPa (-76cmHg).
   When the vacuuming completes, fully open the handle Lo of manifold gauge and stop the operation of vacuum pump, and leave it for 1 ~ 2 minutes. Then, remove the connection side of the charging hose of vacuum pump adopter after checking the needle of manifold gauge does not turn back.
4. Open the stem of 2-way valve to 90° in anti-clock wise, and close the 2-way valve after 10 seconds, and perform gas leakage test.
5. Remove the charge hose from the service port of 3-way valve, and open the stems of 2-way and 3-way valves (open the valves to anti-clock wise carefully, do not use full strength to open)
6. Tighten the service port cap with torque wrench 18 N•m (1.8 kgf•m)
   Tighten the caps of 2-way and 3-way valves with torque wrench 18 N•m (1.8kg f•m)
7. After the tightening of each cap, check gas leakage around the cap.



13.6.2 Process of refrigerant recovery

1. Connect the center charging hose of manifold gauge to the in-let side of recovery device.
2. Connect the valves of the discharge side of recovery device and liquid side of refrigerant cylinder with red hose (charging hose).
3. Connect the yellow float switch cable of the recovery device to the refrigerant cylinder.
4. Open the low pressure side valve of manifold gauge.
5. Slightly loosen the charging hose of in-let connecting side of recovery device and perform air purge.
6. Open the liquid valve of refrigerant cylinder and slightly loosen the charging hose in discharging side of recovery device, and perform air purge (the recovery cylinder needs slight inside pressure).
7. Insert electric plug of recovery device into electrical outlet (the fan operation starts).
8. Turn the valve 1 and 2 of recovery device to pressure equalization point.
9. After a few seconds, turn back the valve 1 and 2 to the original position.
10. Turn the switch of the recovery device to “ON”. (the compressor operation starts)
11. When the low pressure of manifold gauge is close to “0”, close the low pressure side valve, turn “OFF” the recovery device switch.
12. Remove the center charging hose of manifold gauge from the recovery device.



13.6.3 Relocation

1. Removing the air conditioning unit
   a) Recovery of outdoor unit refrigerant by pumping down
      Press “forced cooling button” (as a general rule, since 1998 the name of cooling testing button is changed, and this name is unified within the air conditioning industry), and then you are able to start cooling operation in which the room temperature is low, and you can recover the refrigerant from the outdoor unit.

      1. Check the valve stems of two-way and three-way valves are open by being turned to anti-clockwise (Remove the caps, and confirm the bars are fully open. Use hexagon wrench <4 mm> to open and close the valves).
      2. Press the “Emergency Operation” button of the indoor units for five seconds and release [Forced cooling operation] (for old models, press “forced cooling” button). Then, operate the air conditioning unit for about 10 minutes.
      3. Turn the stem of the two-way valve to the clock-wise and close the valve.
      4. After about 2 ~ 3 minutes, turn the stem of the three-way valve quickly to the clock-wise, and stop the operation.

Caution: In the pump down operation, stop the compressor before removing the refrigerant pipes.

If you do not stop the compressor operation, and if the valve is open and remove the refrigerant pipes, the air may be sucked into the system and causes extreme high temperature in the refrigerant cycle. This may result in rupture or injury, etc.

      5. Attach and tighten the caps of two-way and three-way valves with torque wrench.
      6. Remove the connecting pipes (liquid side and gas side).

   b) Removal of indoor and outdoor units

      1. Remove the connecting pipes and wires between the indoor and outdoor units.
      2. Attach capping flare nuts on the edges of the pipes, connecting the indoor and outdoor units, in order to prevent dust and moisture get into the pipes.
      3. Remove the indoor and outdoor units.

2. Unit installation

Use new refrigerant pipes for the installation, and perform air purging using vacuum pump and gas leakage testing stated in 14.5.1.

13.6.4 Replacement of air conditioning units and evacuation (when re-using the existing pipes)

When replacing the air conditioning units, you might use the existing pipes, but it is recommended to perform flaring again. In case of unit replacement, even if the unit is new refrigerant air conditioner, if the refrigerant oil is different, it may cause problem. Further, when re-using the existing refrigerant pipes, it is recommended to evacuate the pipes as much as possible, due to the reason that much refrigerant oil may be attached on the surface of the pipes. If the pipes are used without evacuation, the remaining refrigerant oil may cause under-performance and abnormal refrigerant cycle caused by non-compatibility of those oils.

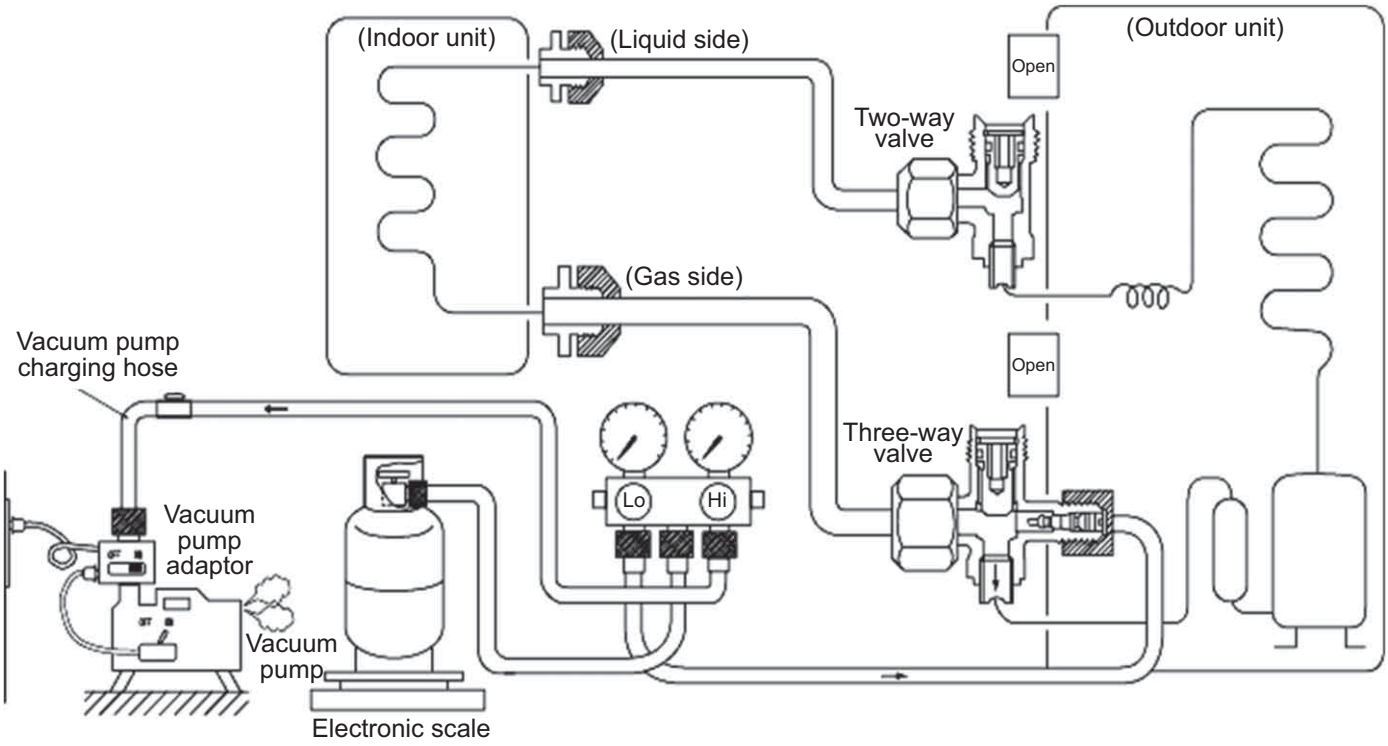
13.6.5 Inter-changeability of refrigerant

Do not operate air conditioning units inserting wrong (or mixed) refrigerant (R22, R410A, R32). It may cause mal-function of the units, and at the same time, may cause serious incident such as rupture of the refrigerant cycle.

13.6.6 Re-insertion of refrigerant in service

When re-insertion is needed, follow the procedures to ensure the insertion of new refrigerant at correct amount.

1. Attach charging hose (blue) to the service port of the outdoor unit.
2. Attach charging hose (red) to the vacuum pump. Fully open the 2-way and 3-way valves.
3. Place the refrigerant cylinder on the digital scale for refrigerant charging and connect the charge hose (yellow) to the connection port of the vacuum pump and the digital scale. Leave the cylinder valve fully open.
4. Fully open the handles Lo and Hi of the manifold gauge, and switch on the vacuum pump, and then perform evacuation for at or more than one hour.
5. Confirm the compound gauge of -0.1 MPa (-76cmHg) and fully open the handles of Lo and Hi, and switch off the vacuum pump. Leave it for about 1 ~ 2 minutes and confirm the needle of the compound gauge does not turn back.
   Refer to the picture below to follow the procedures below.
6. Remove the charging hose (red) of the manifold gauge from the vacuum pump adopter.
7. After adjusting the digital scale to zero, open the cylinder valve and the valve Lo of the manifold gauge, and insert the refrigerant.
8. If it is not possible to insert the refrigerant at regulated amount at once, operate the cooling mode and gradually insert the refrigerant (recommended amount approx. 150 g / 1 time)
   *Do not insert much refrigerant at once.
9. Close the open/close valve and insert the refrigerant in the charging hose to the outdoor unit.
   *Perform this procedure during operating cooling operation. Close the stem of the two-way valve, and when the pressure of the manifold gauge becomes zero (0), quickly remove the charging hose (blue). Immediately open the 2-way valve, and stop the cooling operation.
10. Final checking • • • Confirm the 2-way and 3-way valves are fully open.
    Attach the caps of the service port and control valve, and then check the gas leakage around the caps.



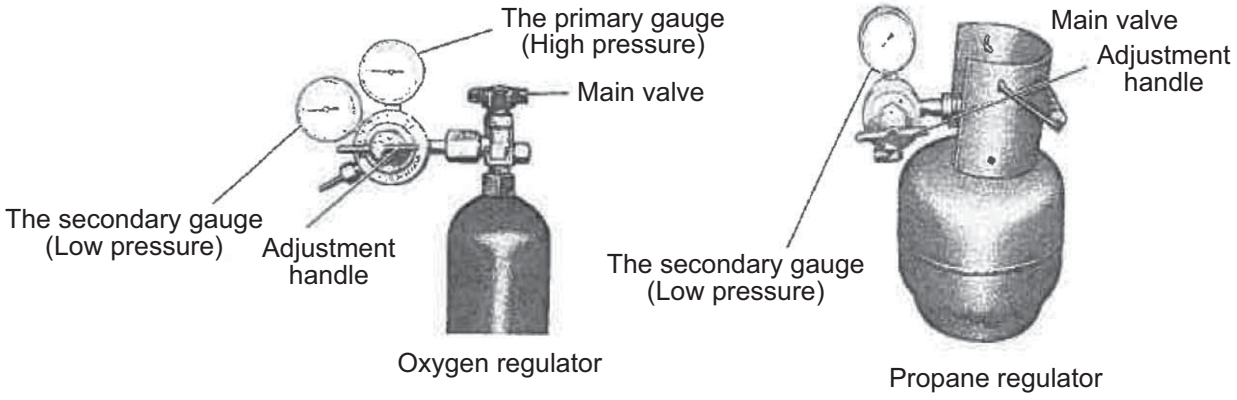
13.7 Repairing of refrigerant cycle / Brazing point

13.7.1 Preparation for repairing of refrigerant cycle / brazing

Brazing which is a technique needed for repairing refrigerant cycle requires advanced technique and experience, and this brazing procedure can only be performed by the workers who completed “Gas Welding Skill Training” regulated by the Occupational Safety and Health Act, and went through the training programs of refrigerant operations. Dismantling and re-connecting (assembling) refrigerant system requires working space, and the space has to ensure good air flow and fire prevention (water bucket and fire extinguisher). Moreover, the worker has to ensure the wearing of goggles, grabs, safety shoes, and long sleeve shirts, and be aware of work safety and attempt to prevent secondary defect (quality assurance of products). For brazing the indoor / outdoor unit structural components (heat exchangers, compressors, expansion valves, four-way valve blocks), after the recovery of all refrigerant, confirm that no refrigerant remains in the system, and fully open the 2-way and 3-way valves. When the brazing is conducted outside, check and make sure no refrigerant is contained in the air (be careful with vaporized refrigerant). Furthermore, protect the compressor terminal with metal plates, and heat but use wet clothes to cool down (releasing the heat) the expansion valves, and four way valves (prevent destruction of parts). In brazing, it is important to pour the brazing material without melting the base metal based on capillary action principle. In case of holes and oxidizing caused by overheating, do not perform re-brazing or alteration but replace the parts.

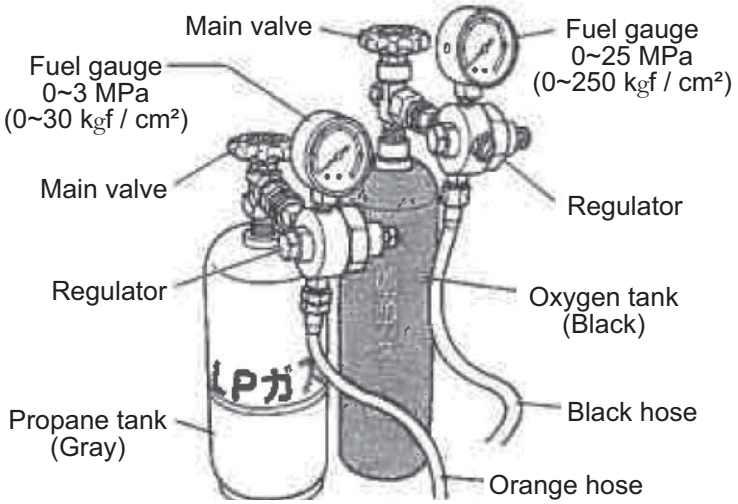
13.7.2 Adjustment of vacuum pump pressure

1. Cylinder with adjustment handle
    1. Check and confirm the adjustment handle of the 1st pressure adjuster is loosen (anticlockwise). If cylinder valve is opened when the 1st gauge pressure adjust handle is closed, the 2nd gauge might get broken.



    2. Open the cylinder valve, and check the remaining amount with the first t side pressure gauge.
    3. Check the pressure of 2nd gauge and turn the adjustment handle to clock-wise direction to adjust the pressure.
        ◎ Oxygen 2nd side gauge pressure · · · · · · · · · · 0.5 MPa (5.0 kgf / cm^2)
        ◎ Propane 2nd side gauge pressure · · · · · · · 0.05 MPa (0.5 kgf / cm^2)

2. Cylinder without adjustment valve
   2nd side gauge pressure is adjusted by the adjuster.
   Check the both side valves of the torch and open the cylinder valve to check the remaining refrigerant in the cylinder.
   Caution: Do not attach oil component on the connection port of the adjuster.
   Especially, use an oxygen cylinder adjuster which is no oil substance type. Do not dismantle or repair the adjuster and pressure gauge.



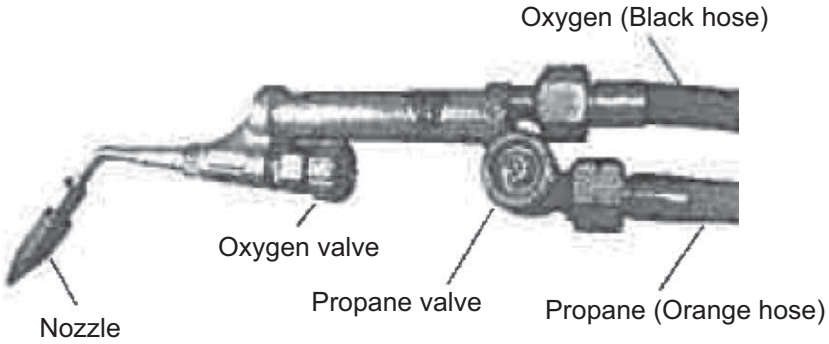
13.7.3 Checking of gas provision

Checking there is no fire around the torch, and then confirm the provision of gas.

1. Slightly open the “propane valve” of the torch, and make sure the gas comes out from the torch crater and then close the “propane valve”.
2. Slightly open the “oxygen valve” of the torch and make sure the gas comes out from the torch crater and then close the “oxygen valve”.
   Check there is no gas leakage around the hose connection.

13.7.4 Adjustment of flame

1. Slightly open the “propane valve” of the torch and lit with spark lighter.
   This moment, the flame is only by propane and the color is red.
2. Gradually open the “oxygen valve” of the torch to mix oxygen, and adjust the amount of propane and oxygen with the valve to make the flame suitable for brazing work.
   If the white core flame splits into two, the torch crater might be clogged. In this case, remove the crater from the torch and check.



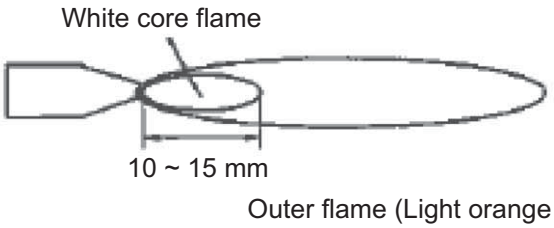
13.7.5 Types of flame

Types of flame change based on the proportion of propane and oxygen.

[Neutral Flame]

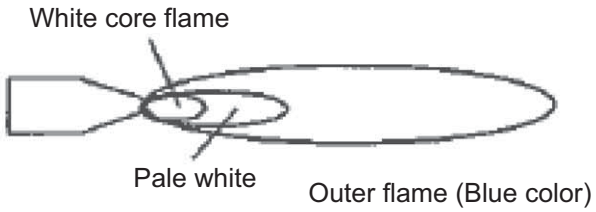
Perform brazing with this flame

(This is a flame when oxygen and propane are mixed at proper proportion, and has lesser effect on the brazed metals)



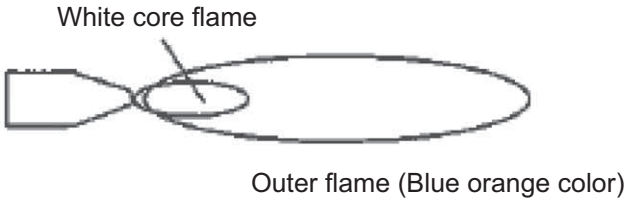
[Carbide Flame]

When propane is excessive, the flame has white color flame in between the white core flame and outer flame.
(This is due to the lack of oxygen and the proportion of unburned propane is excessive.
The black carbon created during the brazing work may contaminate the surface of the brazed metal).



[Oxidizing Flame]

Oxygen is more compared to the neutral flame. Although the flame size is small, this has the highest flame heat. However, due to the excessive oxygen contained in the flame, the brazing point gets oxidized. (This flame may cause holes, due to the high heat. The pipe may get melt）



13.7.6 Closing the flame

[In case of short break]

1. Close the “propane valve” of the torch.
2. Close the “oxygen valve” of the torch.

[In case of finishing work]

1. As above, close the flame following the procedure of “In case of short break”.
2. Completely close the valves of oxygen and propane cylinders.
3. Release the remaining gas inside the hose by opening the “oxygen valve” and “propane valve” of the torch.

Confirm the 1st and 2nd side gauge pressures of “oxygen” and “propane” cylinder pressure adopter are “zero”.

13.7.7 Selection of brazing material

Use BAg brazing material (silver solder) to increase the welding performance.

Category	JIS Standard Number	Composition of ingredients (%)						Temperature (°C)			Tensile strength (Reference)		Characteristics and applications
		Ag	Cu	Zu	Cd	Ni	P	Solidus	Liquidus	Brazing temp	$Kgf•cm^2$	Base material	
BAg	BAg • 1A	49.0 ~ 51.0	14.5 ~ 16.5	14.5 ~ 18.5	17.0 ~ 19.0	—	—	approx. 625	approx. 635	635 ~ 760	45.5	S20C	Liquidity is good at low temperature, it is preferable to a small junction of the gap in the universal form.
	BAg • 1	44.0 ~ 56.0	14.0 ~ 16.0	14.0 ~ 18.0	23.0 ~ 25.0	—	—	approx. 605	approx. 620	620 ~ 760	45.5	S20C	It has similar performance to the BAg • 1A, and suitable for every base material except the light weight metal.
	BAg • 2	34.0 ~ 36.0	25.0 ~ 27.0	19.0 ~ 23.0	17.0 ~ 19.0	—	—	approx. 605	approx. 700	700 ~ 845	45.5	S20C	It is a brazing filler metal in universal form, suitable for a slightly larger gap junction.
	BAg • 3	48.0 ~ 51.0	14.5 ~ 16.5	13.5 ~ 17.5	15.0 ~ 17.0	2.5 ~ 3.5	—	approx. 630	approx. 690	690 ~ 815	35 ~ 70	SS ~ SUS	It has good corrosion resistance in stainless steel-based brazing, suitable for brazing tungsten carbide, aluminum bronze and copper.
BCuP	BCuP-2	—	remain	—	—	—	6.8 ~ 7.5	approx. 710	approx. 785	690 ~ 815	21 ~ 24.5	Cu	Good liquidity, suitable for brazing copper tube.
	BCuP-3	4.8 ~ 5.2	remain	—	—	—	5.8 ~ 6.7	approx. 645	approx. 815	720 ~ 815	21 ~ 24.5	Cu	Suitable for brazing when the joint spacing is not constant
	BCuP-5	14.5 ~ 15.5	remain	—	—	—	4.8 ~ 5.3	approx. 645	approx. 800	705 ~ 815	21 ~ 24.5	Cu	When brazing of copper and copper, it is used without a flux, but not possible for brazing basic materials

Caution
BCuP (phosphorus copper wax) is easy to react with sulfur, and makes a brittle compound water soluble, and causes gas leakage. In hot spring areas, use other brazing materials or paint the surface for protection.

13.7.8 Need of flux

Use flux to protect the base materials.

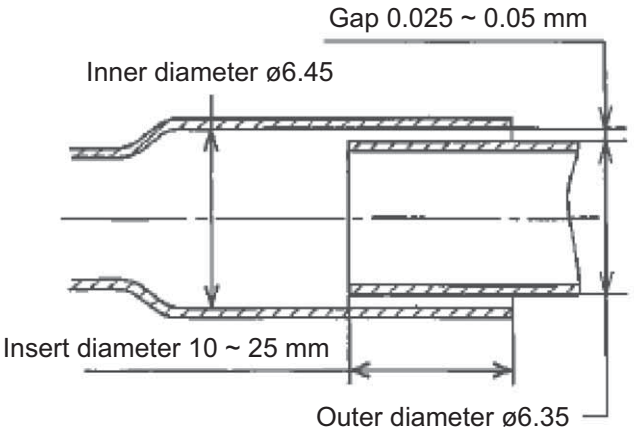
1. Remove impurity and oxide film on the metal base, and improve the flow of the brazing material.
2. Prevent oxidation of the metal surface in brazing.
3. Reduce the surface tension of the brazing material.

13.7.9 Need of nitrogen gas

In order to prevent oxidation in the pipe, perform the brazing operation in nitrogen gas flow.
Flow rate 0.05 m^3 / h, or pressure reducing valve at 0.02 MPa (0.2kgf / cm^2) below.

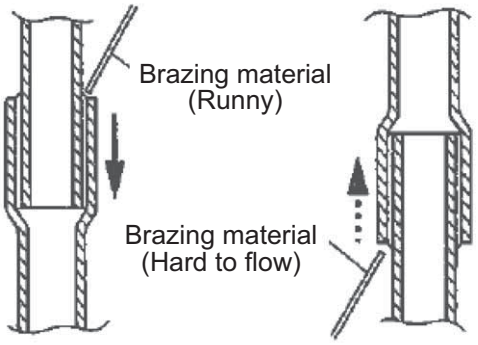
13.7.10 Checking of brazing (insert) points

1. No impurity on the brazing point
   If dirt or oil is attached on the brazing point, the brazing filler metal does not reach to junction, and it may cause poor welding.

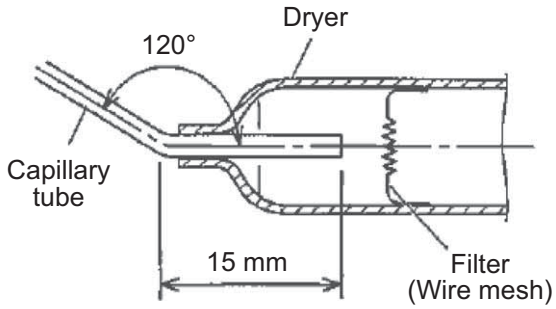


2. Adequate gap space in the brazing point
   The advantage of capillary current situation is used in brazing. If the gap space is too large, this phenomenon may not occur and it may cause poor welding because brazing filler metal does not flow to join the front part.

3. Appropriate size for insertion
   The guideline for pipe insertion dimensions is to three times the diameter of the base material, but you need to decide the insertion size in consideration of the clogging of the brazing material. Generally, for thin pipes, you need to increase the insert size, and for thick pipe vice versa.

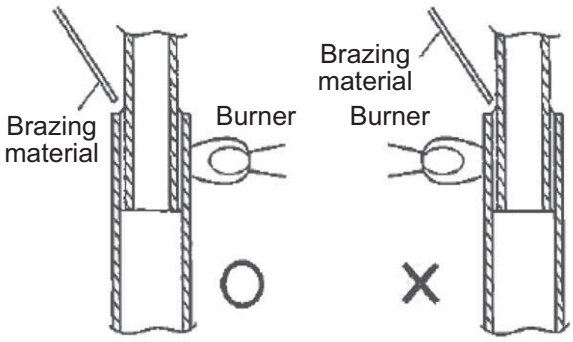


4. Brazing material to flow from top to bottom
   Brazing filler metal will easily flow to the connecting portion by capillary action.
   Further, by bending the brazing portion of [dryer side] of the capillary tube at 15 mm from the tube top to the angle of about 120°, you can prevent the damage of dryer inside and the clogging of brazing material caused by the excessive insertion of capillary tube.



13.7.11 Brazing and heating

1. Place the flame to a pipe which has more heat capacity in order to let the brazing material melt by the pipe heat. Heat the pipe up to the melting temperature of the brazing material, but when it is overheating, assess the temperature by pipe color in order not to melt the pipe.



The pre-heating is to heat the base material until the melting temperature, and requires certain training to distinguish the color of the heated base material in order not to melt the material.
The color and temperature of copper tube

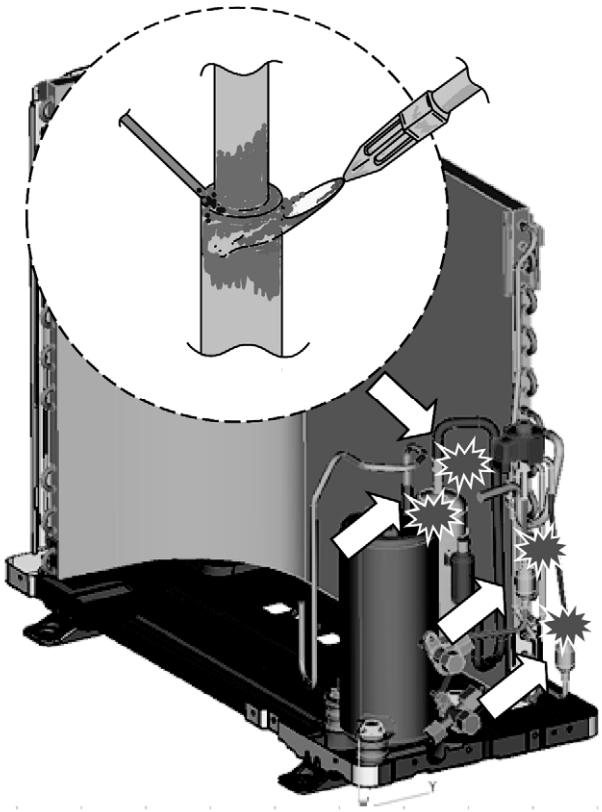
- Becoming red color • • • • • • • 480°C
- Dull red • • • • • • • 650°C
- Cherish red • • • • • • • 760°C
- Brightening cherish red • • • • • • • 870°C

(Reference)
Melting temperature of copper • • • • • • • Approx. 1083°C
Maximum temperature obtained in propane and oxygen • • • • • • • Approx. 1083°C
The important point is to heat the bonding part uniformly within a short period of time until reaching to the brazing temperature in the following manner.

2. Apply the flame on to the side with better heat transmission. If the pipe thickness is consistent, by heating like 30% iron and 70% copper, the copper pipe inside reaches to brazing temperature.
   Iron pipes have low heat transmission and only the part the flame is applied get high temperature, and this causes oxidization of the pipe. The flow of the brazing filler is affected negatively.

3. Apply the flame on to the side of larger heat capacity.
   When brazing a thin tubes such as capillary tube and dryer, etc., caution has to be taken to apply the flame to the dryer side (thick pipe side), in order to prevent burn out by the heat.

4. When brazing the compressor connection pipes (suction and discharge), remove the sound insulation plate and the fan, and place the compressor stand vertically (to prevent the leakage of compressor refrigerating machine oil), and apply the flame from the compressor body side.



13.7.12 Terminologies of brazing

Pin holes → Small holes are generated on the surface of the brazing metal.
Wet temperature → Liquidus temperature at which the brazing material starts flowing out by heating, generally it is the liquidus-line temperature.
Blow holes → Hollows made by gas in the brazing material of brazing portion (gas reservoirs).
Pits → As a result of blow holes, small dents generated on the outside surface of welding.
Voids → The blazing material does not reach completely to the brazing part. It cannot be identified from outside.

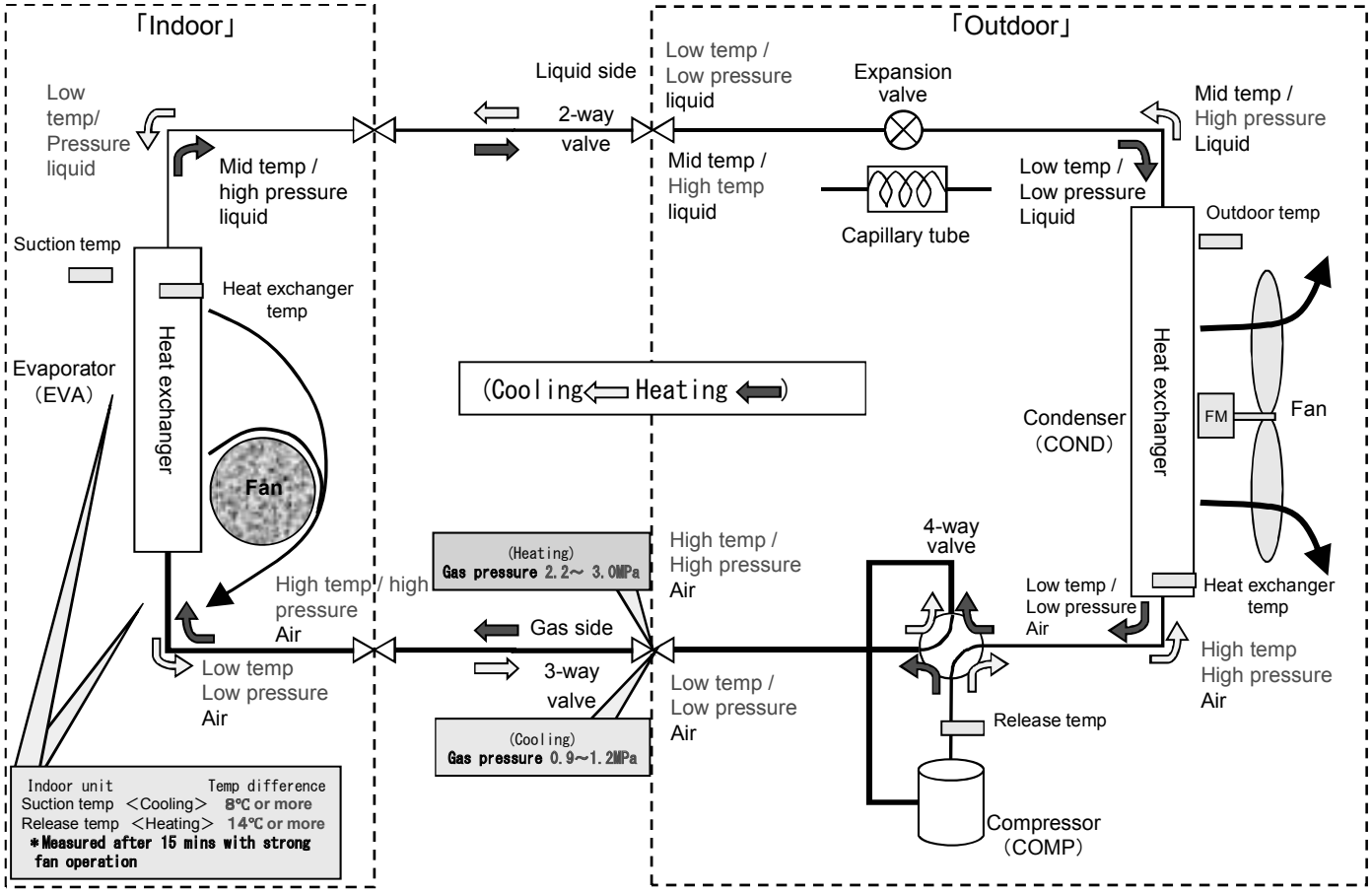
13.8 <Reference> Analysis method for no error code, no cooling / no warming

13.8.1 Preparation for appropriate diagnosis

In order to obtain appropriate operation characteristics, minimum 15 minutes or more operation time [testing operation (rated operation)] is required.

1. Method of rated operation (rated operation)
   For the models which have two buttons of “emergency operation and forced cooling operation”, press forced cooling button once. For the models which have only emergency operation button, press the button once for 5 seconds and when hear “beep” sound, release the button. Then, cooling operation starts.
2. Checking the mal-functions of indoor / outdoor units
   1) Any obstacles against heat release and air suction? (short circuit)
      (Forget to remove the outdoor unit cover or fallen leaves blocking the outdoor unit)
   2) Are the indoor unit air filters clean? (obstructing heat suction)
   3) Is the setting temperature on the remote controller correct? (is the setting temperature set at lower/higher than the room temperature?)

13.8.2 Understanding and verification of refrigerant cycle



1. Measuring temperature
   1) Indoor unit suction temperature, release temperature, temperature difference, → Measure by thermometer
   2) 2-way valve pipe temperature in cooling mode is low temperature (benchmark：5 ~ 10°C), in heating mode is medium temperature (benchmark：25 ~ 35°C).
   3) 3-way valve pipe temperature in cooling mode is low temperature (benchmark：7 ~ 15°C) in heating mode is high temperature (benchmark：38 ~ 50°C).
2. Measuring electric current
   - Measuring electric current in operation → check by clump meter (refer to table of technical characteristic guideline)
3. Meauring pressure
   - Measuring gas pressure → check the pressure by manifold gauge (refer to table of technical characteristic guideline)
4. Any sound from the expansion valve?
   (when starting the operation and the outdoor unit is turned on, the expansion valve is re-set, check if there is any edged sound or clack sound)

13.8.3 Guidance for diagnosis of refrigerant cycle

Comparison with normal operation	Cooling mode	
	High	Low
Refrigerant pressure	Excess insertion of refrigerant	Clogged capillary, expansion valve malfunction
	Heat releasing obstruction	Clog by moisture
	Dirty condenser, attachment of impurity	Lack of refrigerant gas
	Compressor malfunction	
Operation electric current	Excess insertion of refrigerant	Lack of refrigerant gas
	Heat releasing obstruction	Compressor malfunction
	Dirty condenser, impurity	Mixture of air
		(Insufficient evacuation)
2-way valve temperature	Excess insertion of refrigerant	Clogged capillary, expansion valve malfunction
	Compressor malfunction	Lack of refrigerant gas
3-way valve temperature	Lack of refrigerant gas • Compressor malfunction	Excess insertion of refrigerant
	Clogged capillary, expansion valve malfunction	

Suction temperature & Release air temperature	Temperature difference at or less than 8°C in cooling operation • • • Causes		
	• Heat releasing obstruction	• Dirty condenser	• Attachment of impurity
	• Lack of refrigerant gas	• Excess insertion of refrigerant	
	• Mixture of air	• Mixture of moisture	
	• Clogged capillary	• Expansion valve malfunction	• Compressor malfunction

◎ Above all are based on the condition that the installation work is properly performed (no issues in indoor / outdoor pipe connections, etc.)

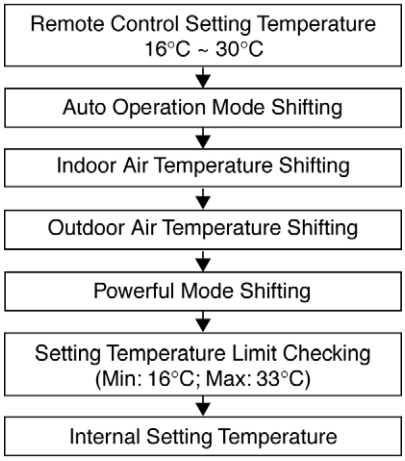
14. Operation Control

14.1 Basic Function

Inverter control, which equipped with a microcomputer in determining the most suitable operating mode as time passes, automatically adjusts output power for maximum comfort always. In order to achieve the suitable operating mode, the microcomputer maintains the set temperature by measuring the temperature of the environment and performing temperature shifting. The compressor at outdoor unit is operating following the frequency instructed by the microcomputer at indoor unit that judging the condition according to internal setting temperature and intake air temperature.

14.1.1 Internal Setting Temperature

Once the operation starts, remote control setting temperature will be taken as base value for temperature shifting processes. These shifting processes are depending on the air conditioner settings and the operation environment. The final shifted value will be used as internal setting temperature and it is updated continuously whenever the electrical power is supplied to the unit.



14.1.2 Cooling Operation

14.1.2.1 Thermostat control

- Compressor is OFF when Intake Air Temperature - Internal Setting Temperature < -1.5°C continue for 3 minutes.
- When compressor is OFF (Thermostat OFF) and AUTO FAN is set, the fan will stop periodically.
- Compressor is ON after waiting for 3 minutes, if the Intake Air Temperature - Internal Setting Temperature > Compressor OFF point.

14.1.3 Soft Dry Operation

14.1.3.1 Thermostat control

- Compressor is OFF when Intake Air Temperature - Internal Setting Temperature < -2.0°C continue for 3 minutes.
- When compressor is OFF (Thermostat OFF) and AUTO FAN is set, the fan will stop periodically.
- Compressor is ON after waiting for 3 minutes, if the Intake Air Temperature - Internal Setting Temperature > Compressor OFF point.

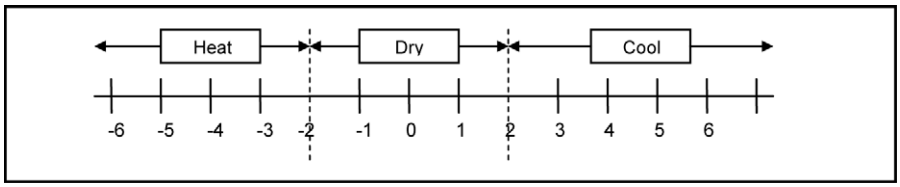
14.1.4 Heating Operation

14.1.4.1 Thermostat control

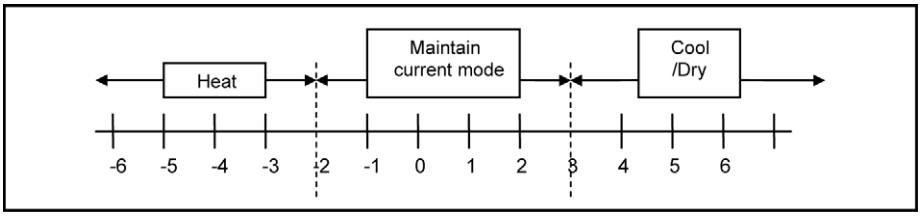
- Compressor is OFF when Intake Air Temperature - Internal Setting Temperature > +2.0°C continue for 3 minutes.
- Compressor is ON after waiting for 3 minutes, if the Intake Air Temperature - Internal Setting Temperature < Compressor OFF point.

14.1.5 Automatic Operation

- This mode can be set using remote control and the operation is decided by remote control setting temperature, remote control operation mode and indoor intake air temperature.
- During operation mode judgment, indoor fan motor (with speed of Lo-) is running for 30 seconds to detect the indoor intake air temperature.
- Every 10 minutes, the indoor temperature is judged.
- For the 1st judgment
  - If indoor intake temperature - remote control setting temperature ≥ 2°C, COOL mode is decided.
  - If -2°C ≤ indoor intake temperature - remote control setting temperature < 2°C, DRY mode is decided.
  - If indoor intake temperature - remote control setting temperature < -2°C, HEAT mode is decided.



- For the 2nd judgment onwards
  - If indoor intake temperature - remote control setting temperature ≥ 3°C, if previous operate in DRY mode, then continue in DRY mode. otherwise COOL mode is decided.
  - If -2°C ≤ indoor intake temperature - remote control setting temperature < 3°C, maintain with previous mode.
  - If indoor intake temperature - remote control setting temperature < -2°C, HEAT mode is decided.



14.2 Indoor Fan Motor Operation

14.2.1 Basic Rotation Speed (rpm)

A. Basic Rotation Speed (rpm)

i. Manual Fan Speed

[Cooling, Dry]

- Fan motor's number of rotation is determined according to remote control setting.

Remote control	○	○	○	○	○
Tab	Hi	Me+	Me	Me-	Lo

[Heating]

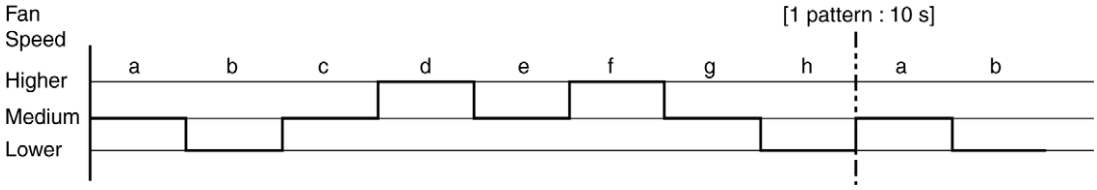
- Fan motor's number of rotation is determined according to remote control setting.

Remote control	○	○	○	○	○
Tab	SHi	Me+	Me	Me-	Lo

ii Auto Fan Speed

[Cooling, Dry]

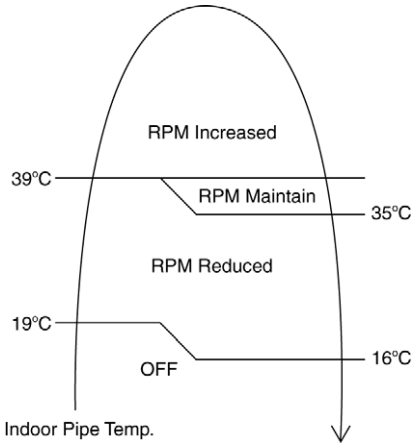
- According to room temperature and setting temperature, indoor fan speed is determined automatically.
- When set temperature is not achieved, the indoor fan will operate according to pattern below.



- When set temperature achieved, the indoor fan speed will be fixed. When thermostat off, the fan stop periodically.

[Heating]

- According to indoor pipe temperature, automatic heating fan speed is determined as follows.

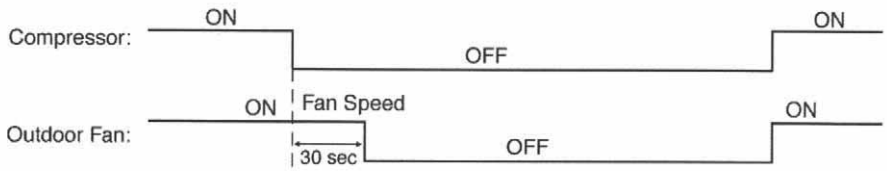


B. Feedback control

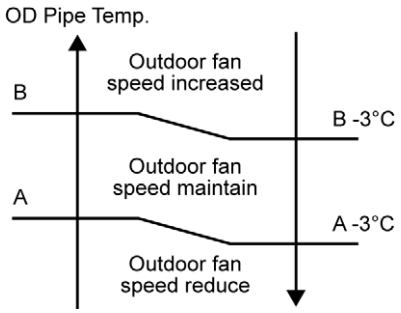
- Immediately after the fan motor started, feedback control is performed once every second.
- During fan motor on, if fan motor feedback ≥ 2550 rpm or < 50 rpm continue for 10 seconds, then fan motor error counter increase, fan motor is then stop and restart. If the fan motor counter becomes 7 times, then H19 - fan motor error is detected. Operation stops and cannot on back.

14.3 Outdoor Fan Motor Operation

- It starts when compressor starts operation and it stops 30 seconds after compressor stops operation.

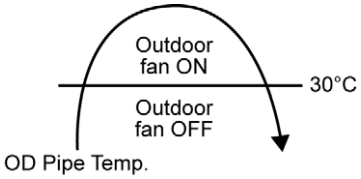


- During cooling operation, and outdoor ambient temperature is below 8°C, outdoor fan speed will be controlled according to outdoor piping temperature as following:



	OD Pipe Temperature
A	26°C
B	33°C

- During above condition, when indoor heat exchanger temperature is below 5°C, the outdoor fan will stop according to outdoor piping temperature as following:



14.4 Airflow Direction

- There are two types of airflow, vertical airflow (directed by horizontal vane) and horizontal airflow (directed by vertical vanes).
- Control of airflow direction can be automatic (angles of direction is determined by operation mode, heat exchanger temperature and intake air temperature) and manual (angles of direction can be adjusted using remote control).

14.4.1 Vertical Airflow

Operation			Up-and-down inner vane				
			Step 1	Step 2	Step 3	Step 4	Step 5
Cooling	Auto	Usual (Ventilation)	[110] degrees – [65] degrees				
		Control with dew	[110] degrees – [65] degrees				
	Manual	Usual (Ventilation)	[110°]	110°	90°	70°	[65°]
		Control with dew	[110°]	110°	90°	70°	[65°]
Dry	Auto	Usual	[110] degrees – [65] degrees				
		Control with dew	[110] degrees – [65] degrees				
	Manual	Usual	[110°]	110°	90°	70°	[65°]
		Control with dew	[110°]	110°	90°	70°	[65°]
Heating	Manual		[110°]	110°	100°	90°	[80°]
	Auto	A zone	[110°]				
		B zone	[90°]				
		C zone	[110°]				

Operation			Up-and-down outer vane				
			Step 1	Step 2	Step 3	Step 4	Step 5
Cooling	Auto	Usual (Ventilation)	[55] degrees – [85] degrees				
		Control with dew	[55] degrees – [85] degrees				
	Manual	Usual (Ventilation)	[55°]	62°	72°	83°	[85°]
		Control with dew	[55°]	62°	72°	83°	[85°]
Dry	Auto	Usual	[55] degrees – [85] degrees				
		Control with dew	[55] degrees – [85] degrees				
	Manual	Usual	[55°]	[55°]	[55°]	[55°]	[55°]
		Control with dew	[55°]	[55°]	[55°]	[55°]	[55°]
Heating	Manual		[55°]	62°	72°	83°	[90°]
	Auto	A zone	[55°]				
		B zone	[83°]				
		C zone	[62°]				

1. Automatic vertical airflow direction can be set using remote control; the vane swings up and down within the angles as stated above. For heating mode operation, the angle of the vane depends on the indoor heat exchanger temperature as Figure 1 below. It does not swing during fan motor stop. When the air conditioner is stopped using remote control, the vane will shift to close position.
2. Manual vertical airflow direction can be set using remote control; the angles of the vane are as stated above and the positions of the vane are as Figure 2 below. When the air conditioner is stopped using remote control, the vane will shift to close position.

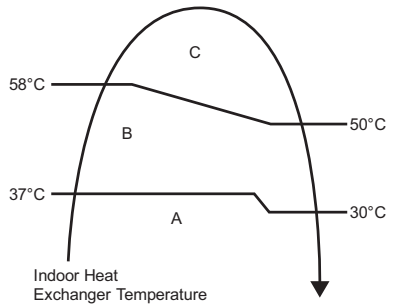
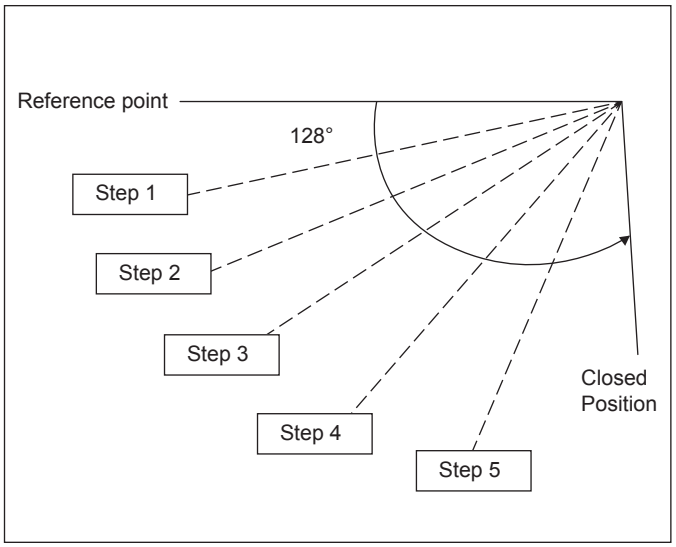


Figure 1



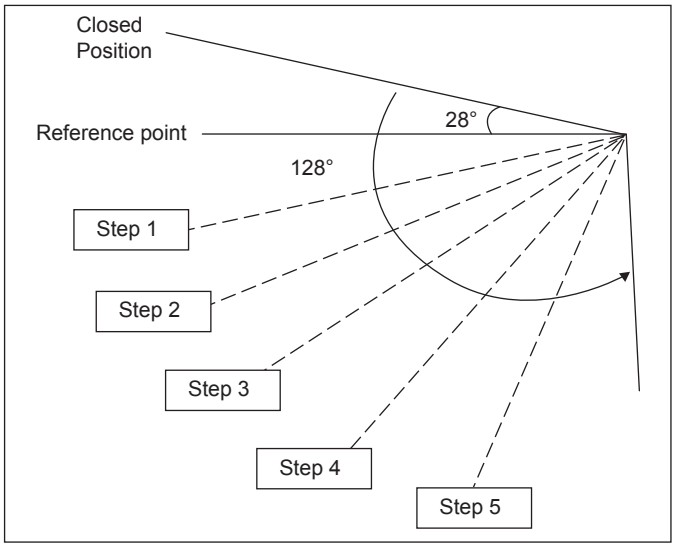


Figure 2

14.4.2 Horizontal Airflow

- Automatic horizontal airflow direction can be set using remote control; the vane swings left and right within the angles as stated below. For heating mode operation, the angle of the vane depends on the indoor heat exchanger temperature as Figure 1 below. It does not swing during fan motor stop.

Operation Mode		Vane Angle (°)
Heating, with heat exchanger temperature	A	65 ~115
	B	90
Cooling and soft dry		65 ~115

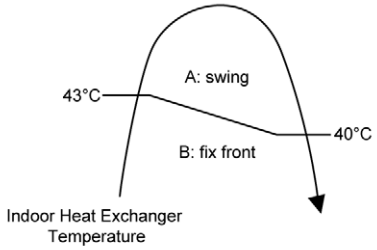


Figure 1

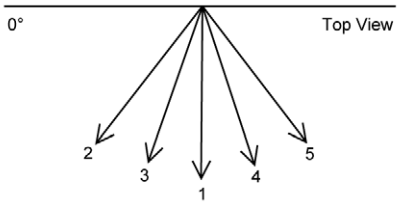


Figure 2

- Manual horizontal airflow direction can be set using remote control; the angles of the vane are as stated below and the positions of the vane are as Figure 2 above.

Operation			Left and Right Vane				
			1	2	3	4	5
Cooling, Heating, Ventilation, Dry	Automatic	Swing	(Wind direction 2 to 5)				
	Manual operation	[X_HNADS_LR_CNML]	90°	65°	77.5°	102.5°	115°
Wind direction position image							

14.5 Quiet Operation (Cooling Mode/Cooling Area of Dry Mode)

- Purpose
  - To provide quiet cooling operation compare to normal operation.

- Control condition
  - Quiet operation start condition
    - When “POWERFUL/QUIET” button at remote control is pressed twice.
      QUIET will be shown on remote control display.

  - Quiet operation stop condition
    - When one of the following conditions is satisfied, quiet operation stops:
      - POWERFUL/QUIET button is pressed again.
      - Stop by OFF/ON switch.
      - Timer “off” activates.
      - ECONAVI button is pressed.
      - Mild Dry Cooling button is pressed.
    - When quiet operation is stopped, operation is shifted to normal operation with previous setting.
    - When operation mode is changed, quiet operation is shifted to quiet operation of the new mode.
    - During quiet operation, if timer “on” activates, quiet operation maintains.
    - After off, when on back, quiet operation is not memorised.

- Control contents
  - Fan speed is changed to Lo-.

14.6 Quiet Operation (Heating)

- Purpose
  - To provide quiet heating operation compare to normal operation.

- Control condition
  - Quiet operation start condition
    - When “POWERFUL/QUIET” button at remote control is pressed twice.
      QUIET will be shown on remote control display.

  - Quiet operation stop condition
    - When one of the following conditions is satisfied, quiet operation stops:
      - POWERFUL/QUIET button is pressed again.
      - Stop by OFF/ON switch.
      - Timer “off” activates.
      - ECONAVI button is pressed.
      - Mild Dry Cooling button is pressed.
    - When quiet operation is stopped, operation is shifted to normal operation with previous setting.
    - When operation mode is changed, quiet operation is shifted to quiet operation of the new mode, except fan mode only.
    - During quiet operation, if timer “on” activates, quiet operation maintains.
    - After off, when on back, quiet operation is not memorised.

- Control contents
  - Fan speed manual
    - Fan speed is changed to Lo-.
  - Fan Speed Auto
    - Fan speed is changed to Lo-.

14.7 Powerful Mode Operation

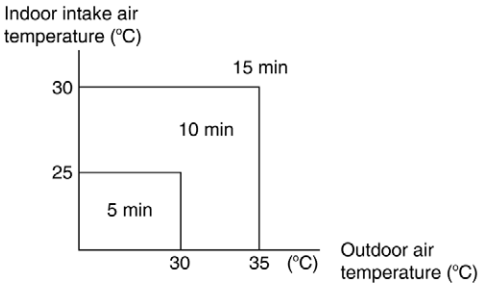
- When the powerful mode is selected, the internal setting temperature will shift lower up to 2°C (for Cooling/Soft Dry) or higher up to 3.5°C (for Heating) than remote control setting temperature for 20 minutes to achieve the setting temperature quickly.

14.8 Timer Control

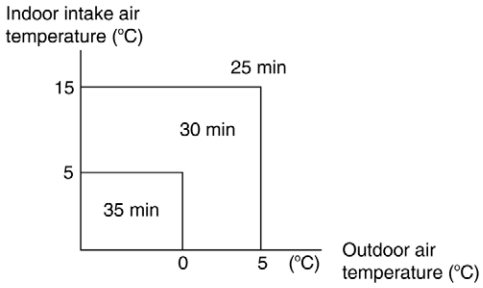
- There are 2 sets of ON and OFF timer available to turn the unit ON or OFF at different preset time.
- If more than one timer had been set, the upcoming timer will be displayed and will activate in sequence.

14.8.1 ON Timer Control

- ON timer 1 and ON timer 2 can be set using remote control, the unit with timer set will start operate earlier than the setting time.
  This is to provide a comfortable environment when reaching the set ON time.
- 60 minutes before the set time, indoor (at fan speed of Lo-) and outdoor fan motor start operate for 30 seconds to determine the indoor intake air temperature and outdoor air temperature in order to judge the operation starting time.
- From the above judgment, the decided operation will start operate earlier than the set time as shown below.



Cooling/Soft Dry



Heating

14.8.2 OFF Timer Control

OFF timer 1 and OFF timer 2 can be set using remote control, the unit with timer set will stop operate at set time.

14.9 Sleep Mode Operation

SLEEP To maximise comfort while sleeping

- This operation provides you with a comfortable environment while sleeping. It will automatically adjust the sleep pattern temperature during the activation period.
- The indoor unit indicator will dim when this operation is activated. This is not applicable if the indicator brightness has been manually dimmed.
- This operation is incorporated with the activation timer (0.5, 1, 2, 3, 4, 5, 6, 7, 8 or 9 hours).
- This operation can be set together with single timer or twin timer. Sleep operation has the priority over OFF timer.
- This operation can be cancelled by pressing the respective button when the sleep timer reaches 0.0h.

14.10 Auto Restart Control

- When the power supply is cut off during the operation of air conditioner, the compressor will re-operate within three to four minutes (there are 10 patterns between 2 minutes 58 seconds and 3 minutes 52 seconds to be selected randomly) after power supply resumes.
- This type of control is not applicable during ON/OFF Timer setting.
- This control can be omitted by open the circuit of JP1 at indoor unit printed circuit board.

14.11 Indication Panel

LED	POWER	TIMER	nanoe	ECONAVI
Color	White	White	White	White
Light ON	Operation ON	Timer Setting ON	nanoe ON	ECONAVI ON
Light OFF	Operation OFF	Timer Setting OFF	nanoe OFF	ECONAVI OFF

Note:
- If POWER LED is blinking, the possible operation of the unit are Hot Start, during Deice operation, operation mode judgment, or ON timer sampling.
- If Timer LED is blinking, there is an abnormality operation occurs.

14.12 nanoe Operation
- This operation provides clean air by producing great amount of negative ions and distribute through the discharge airflow to capture or deactivate molds, bacteria or viruses.
- Generate nanoe (water wrapped ion particle) to moisturize skin.

- nanoe operation start condition
  - During unit running at any operation mode, if nanoe operation is activated, combination operation (operation mode + nanoe operation) starts.
  - During unit is OFF, if nanoe operation is activated, nanoe individual operation starts.

- nanoe operation stop condition
  - When OFF/ON button is pressed to stop the operation.
  - When nanoe button is pressed.
  - When OFF Timer activates.

- nanoe operation pause condition
  - When indoor fan stop (during deice, odor cut control, thermostat off, etc.). nanoe operation resume after indoor fan restarts.
  - When indoor intake temperature ≥ 35°C and < 5°C. nanoe operation resume after indoor intake temperature < 35°C or ≥ 5°C continuously for 6 minutes.

- Indoor fan control
  - During any operation mode combines with nanoe operation, fan speed follows respective operation mode. However, nanoe system enabled when fan speed ≥ 470 rpm to ensure proper negative ion distribution, nanoe system disabled when fan speed < 470 rpm.
  - During nanoe individual operation, only Auto Fan Speed and no Powerful operation is allowed. Even if Fan Speed button is pressed, no signal is sent to the unit and no change on remote control display. Auto Fan Speed for nanoe individual operation is cooling medium fan.

- Airflow direction control
  - During any operation mode combines with nanoe operation, airflow direction follows respective operation mode.
  - During nanoe individual operation, only Auto Air Swing is allowed. Even if Air Swing button is pressed, no signal is sent to the unit and no change on remote control display.

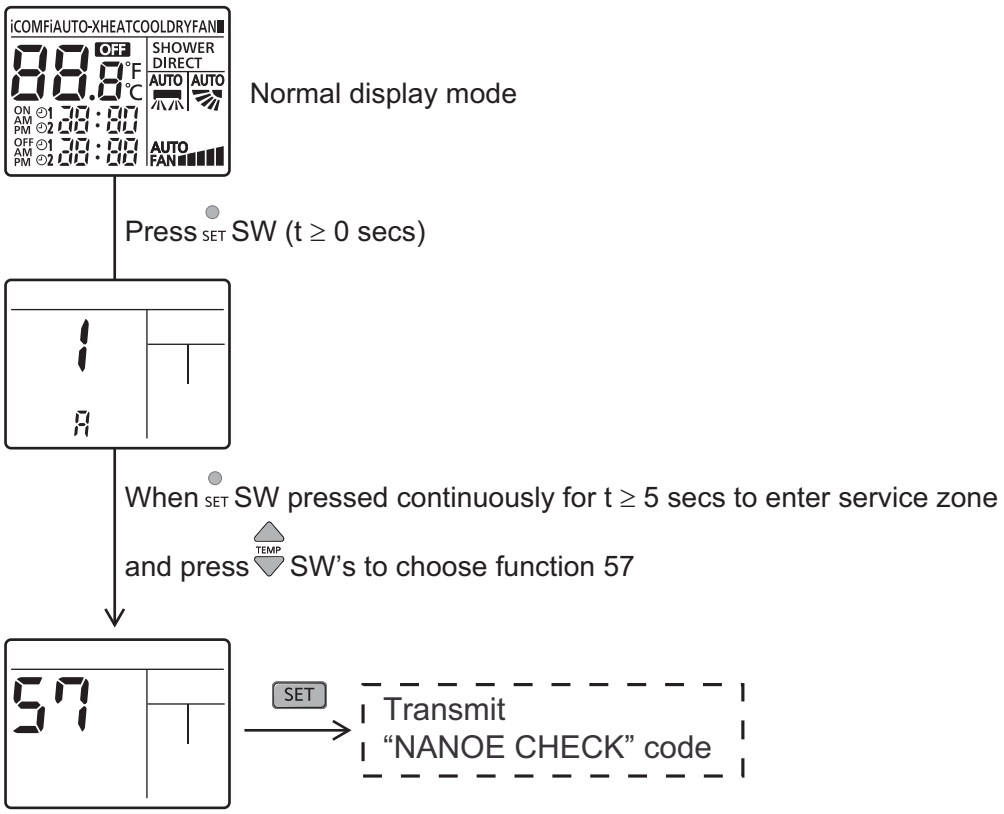
- Timer control
  - When ON Timer activates when unit stops, previous operation resumes and restored last saved nanoe operation status.
  - When ON Timer activates during any operation, no change on current operation.
  - When OFF Timer activates during any operation, all operation stops and the latest nanoe operation status is saved.

- Indicator
  - When nanoe starts, nanoe indicator ON.

- Remote Control Receiving Sound
  - Normal Operation ➔ nanoe Operation : Beep
  - nanoe Operation ➔ Normal Operation : Beep
  - Stop ➔ nanoe individual Operation : Beep
  - nanoe individual Operation ➔ Stop : Long Beep

- Power failure
  - During nanoe individual operation, if power failure occurs, after power resumes, nanoe individual operation resumes immediately.
  - During combination operation, if power failure occurs, after power resumes, combination operation resume immediately.

- nanoe check mode
  - To enable nanoe check mode, during nanoe operation ON:



  - During nanoe check mode, H67 is judged when disconnection detected. Timer LED blinks.

- nanoe Abnormal Detection
  - Disconnection Abnormality
    - Abnormal detection condition
      - Start from 1 sec after nanoe power ON, 6 secs has passed and in this 6 secs period, abnormal signal is detected continuously for 5.9 secs.
    - Action after abnormal detection condition fulfilled
      - Disconnection counters +1, nanoe power OFF for 5 minutes and then restart. However, according to action mode and disconnection counter, below will be implemented:
        - During nanoe Check Mode: Disconnection abnormality will judged when disconnection counter ≥ 1. Abnormal code: H67 will memorized in EEPROM, Timer LED blinking and nanoe LED Off.
        - Other Than Above: Disconnection abnormality will judged when disconnection counter ≥ 3. Abnormal code: H67 will memorized in EEPROM and nanoe LED OFF, Timer LED not blinking.
    - Disconnection counters clear condition >
      - Disconnection counter will be cleared when operation stop. (Not nanoe Check Mode)

- nanoe Discharge Abnormality
  - Abnormal detection condition
    - After 30 minutes nanoe power ON, abnormal signal is being detected continuously for 5s.
  - Action after abnormal detection condition fulfilled
    - Abnormal discharge counter +1, nanoe power OFF for 30 minutes and then restart. When abnormal discharge counter ≥ 12, abnormal code: H67 in analyze area (Area where abnormal code not displayed) will be memorized.
  - Abnormal discharge counters clear condition
    - Discharge counter will be cleared when operation become normal for 50 mins above or when operations stop.

14.13 Mild Dry Cooling Operation

- This operation helps to prevent decreases in room humidity while maintaining the setting temperature.
- During unit running at Cooling operation mode, if “Mild Dry Cooling” button is pressed, Mild Dry Cooling operation starts and Mild Dry Cooling indicators turns ON at remote control display.
- Mild dry cooling operation is unavailable when the unit is operating Auto mode and Soft Dry model operation.
- Mild dry cooling operation is cancelled when the unit turned OFF, Mild Dry Cooling button is pressed again or when the operation mode changed from Cooling to other mode.
- ECONAVI, Powerful, Quiet and Mild Dry Cooling mode cannot function at the same time, the unit will follows the operation according to the last signal received.
- During this operation, the compressor frequency changes according to operating condition to prevent room humidity decreases and when AUTO AIR SWING is set, the vertical airflow direction fixed at lower limit position.

14.14 ECONAVI Operation

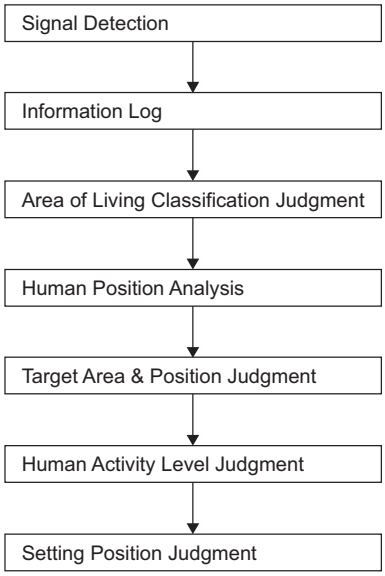
- Area of human availability, activity level and absent is judged based on pulses by using 2 infrared sensors. The internal setting temperature shift, fan speed and horizontal airflow direction are adjusted in order to provide comfort environment while maintain the energy saving level.

- ECONAVI start condition:
  - When ECONAVI button is pressed.

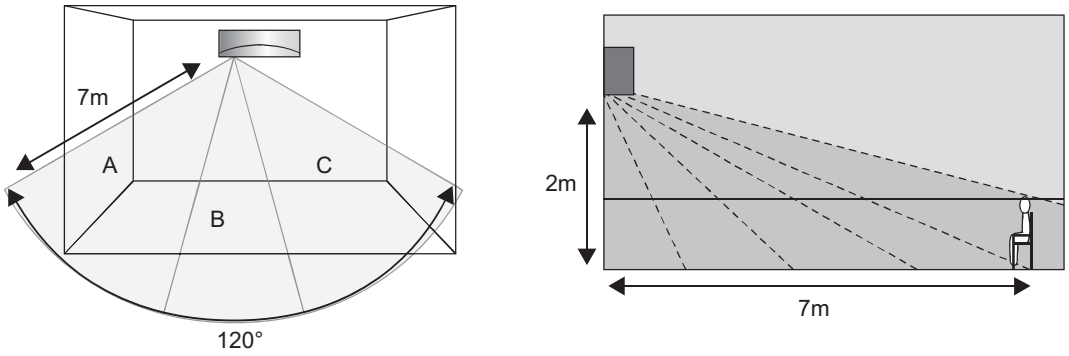
- ECONAVI stop conditions:
  - When ECONAVI button is pressed again.
  - When unit is OFF by OFF/ON button.
  - When unit is OFF when OFF TIMER activates.
  - When unit is OFF by AUTO OFF/ON button at indoor unit.
  - When QUIET operation activates.
  - When < > button is pressed.
  - When POWERFUL operation is selected.

14.14.1 Human Activity Sensor

- Area of human availability, activity level and absent is judged based on pulses by using 2 infrared sensors. The internal setting temperature shift, fan speed and horizontal airflow direction are adjusted in order to provide comfort environment while maintain the energy saving level.
- Human activity judgment is as following



14.14.1.1 Signal Detection



- Human Activity sensor will turns on according to infrared sensors signal detection.

Signal detection		Possible detected human position area
Sensor 1	Sensor 2	
1	0	C
0	1	A
1	1	B
		A & C
		B & C
		A & C
		A, B & C
0	0	–

14.14.1.2 Information Log

- The signal from Infrared sensors will be log to human activity database for further analysis.

14.14.1.3 Area of Living Classification Judgment

- The system is able to judge area of living according to human activity database, classified as following:
  - Living Area – In front of television, dining table, etc.
  - Walkway – Human detection is relatively less.
  - Non-Living Area – near windows, wall, etc.

14.14.1.4 Human Position Analysis

- According to Area of Living, frequency of activity and indoor unit intake temperature, the system will analyze the human position away from the indoor unit.

14.14.1.5 Target Area and Position Judgment

- The system will judge the indoor unit installation position according to human activity Non-Living Area:
  - Non-Living Area at Position A – Indoor unit installed at left side of the room.
  - Non-Living Area at Position C – Indoor unit installed at right side of the room.
  - Other than above – Indoor unit installed at center of the room.
- Every 4 hours, the Target Area and Position Judgment will restart.

14.14.1.6 Human Activity Level Judgment

- Human Activity Level is judged based on the frequency of pulses detected by the infrared sensors within a timeframe. The activity level will be categorized into High, Normal, Low level.
- When a pulse is detected within this timeframe, the status of human presence is judged.
- When there is no signal detection continues for 20 minutes or more, the status of human absence is judged.

14.14.1.7 Setting Position Judgment

- According to installation position when there is only one activity area detected, the horizontal airflow direction louver position is fixed according to chart below:

Target area	Horizontal airflow direction louver position		
	Left installation	Center installation	Right installation
A	3	2	2
B	1	1	1
C	5	5	4

- Louver position refer to horizontal airflow direction control.
- When 2 activity areas have been detected, according to Human Activity Level, the timing of horizontal airflow direction louver steps at the targeted activity areas is judged.

Operation mode	Activity level difference	Louver stop time
Cooling	1 level	Higher Activity level ≈ 60 seconds Lower Activity level ≈ 30 seconds
	2 levels	Higher Activity level ≈ 60 seconds Lower Activity level ≈ 8 seconds
Cooling	1 level	Higher Activity level ≈ 8 seconds Lower Activity level ≈ 30 seconds
	2 levels	Higher Activity level ≈ 8 seconds Lower Activity level ≈ 60 seconds

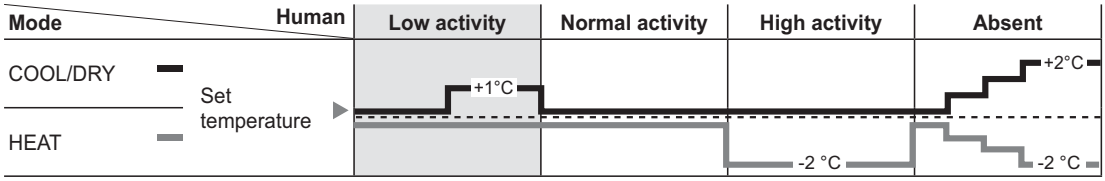
- When 3 activity areas have been detected, according to Human Activity Level the timing of horizontal airflow louver steps at the targeted activity areas is judged.

Operation mode	Activity level	Louver stop time
Cooling	Hi Me Lo	≈ 45 seconds ≈ 30 seconds ≈ 20 seconds
Heating	Hi Me Lo	≈ 20 seconds ≈ 30 seconds ≈ 45 seconds

- When 3 activity areas have same activity level, the horizontal airflow direction louver will swing left and right.

14.14.1.8 Setting Temperature and Fan Speed Shift

ECONAVI ; Detecting human presence and activity, the unit controls room temperature to save energy.



14.14.1.9 Rhythmic Temperature Wave Operation

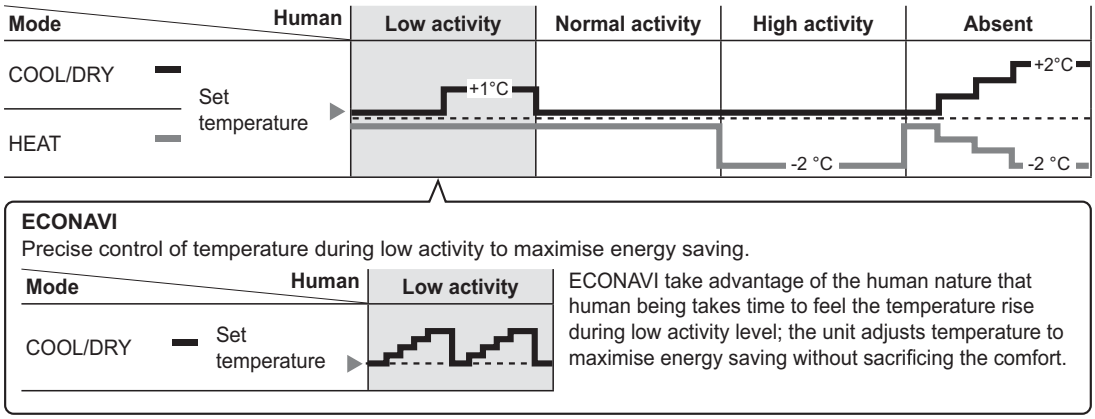
- To further maximize the energy saving during ECONAVI operates at low activity level.

- Start condition
  - The unit is operates in Cool or Dry mode under ECONAVI operation, and
  - Human activity sensor detects low activity level continuously for 60 minutes, and

- Stop condition
  - Unit is off, or
  - ECONAVI is off, or
  - Human activity sensor detects high activity level or absent, or

- Control contents
  - When all start conditions complied, set temperature will shift accordingly as following:

ECONAVI ; Detecting human presence and activity, the unit controls room temperature to save energy.



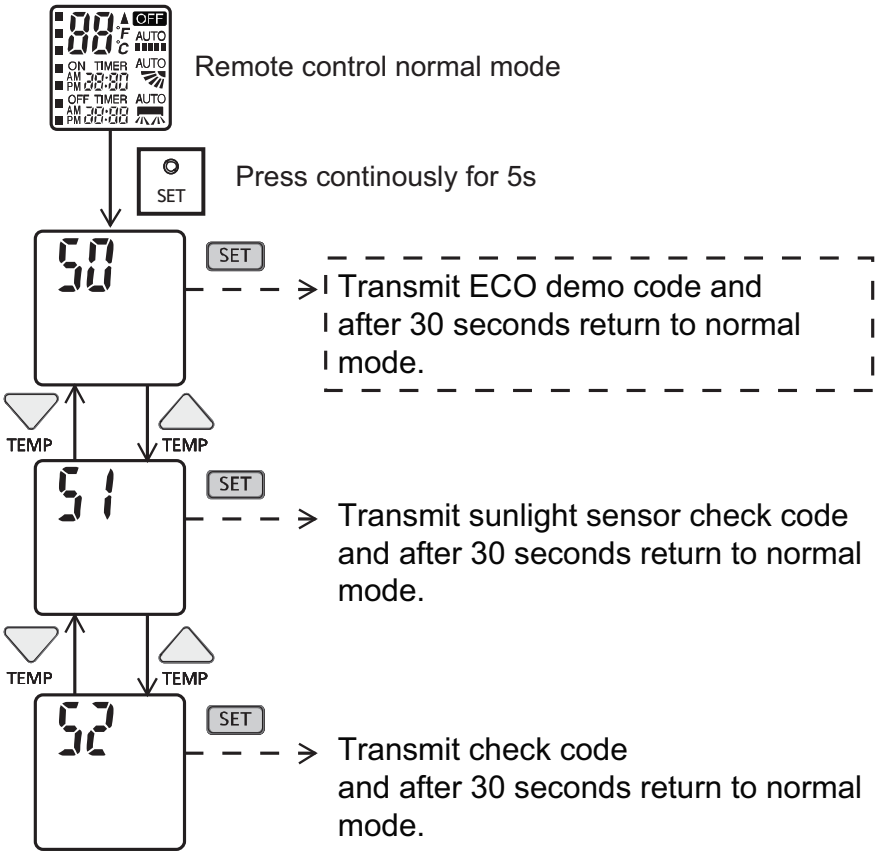
ECONAVI

Precise control of temperature during low activity to maximise energy saving.

ECONAVI take advantage of the human nature that human being takes time to feel the temperature rise during low activity level; the unit adjusts temperature to maximise energy saving without sacrificing the comfort.

14.14.1.10 ECONAVI Demo Mode

- To enable ECO DEMO mode, during unit is OFF (power standby):



- To disable ECO Demo MODE:
  - Transmit ECO Demo signal again.

- Operation details

Infrared sensor		Vane position	Fan speed
Sensor 1	Sensor 2		
1	0	5	HI
1	1	Auto Swing	HI
0	1	2	HI
0	0	Auto Swing	LO

- The target area will maintain for 5 seconds before changeover to next detection.
- If no activity detection, the last action will maintain for 30 seconds before changeover to human absence status.

14.14.1.11 Human Activity Sensor Abnormality

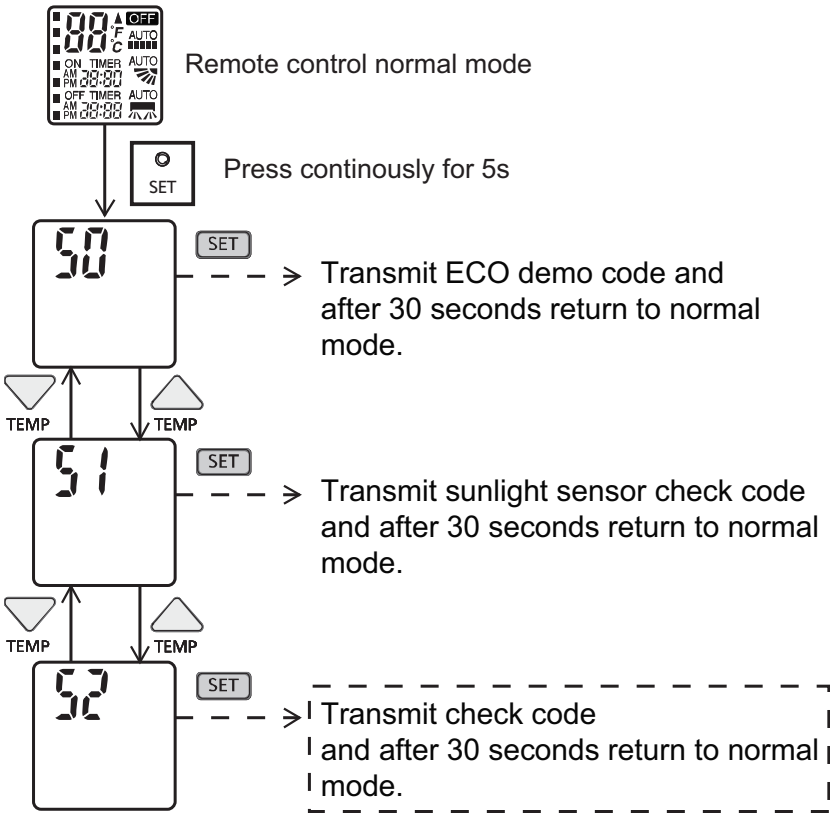
- Abnormality detection:
  - Connector disconnection / Wire cut abnormality
    - Sensor judge Hi level continuously for 25 seconds
  - Circuit abnormality
    - 70 seconds after power ON, if human activity sensor judge Lo level continuously for 25 seconds

- Error Code judgment
  - When abnormality happened, internal counter increase by 1 time.
  - Human activity sensor power OFF, retry after 5 seconds.
  - When the human activity sensor maintains normal condition for 120 seconds, the counter reset or AC reset.
  - When abnormality counter reached 4 times, H59 occurred – No TIMER indicator blinking.

- When error code happened, the unit is able to operate without ECONAVI.

14.14.1.12 Human Activity Sensor Check Mode

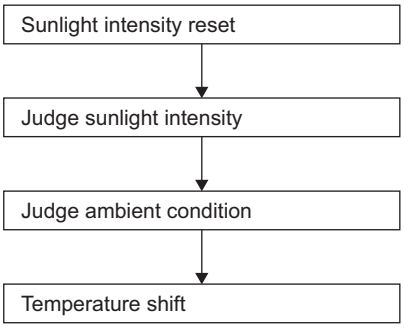
- To enable Human Activity sensor abnormality check mode, during ECONAVI operation ON:



- During ECONAVI is ON, when CHECK signal received, if either sensors has abnormality, the 4 times abnormality counter is ignored, ECONAVI Indicator will blink immediately and error code is memorized.
- The unit could operate without ECONAVI.
- The ECONAVI indicator blinking could be cancelled by pressing ECONAVI button again.
- If the human activity sensor has no abnormality, the CHECK process will end and continue with normal operation.

14.14.2 Sunlight Sensor

- During ECONAVI operation, the sunlight sensor detects sunlight intensity coming through windows and differentiates between sunny and cloudy or night to further optimize energy saving by adjusting the temperature.
- Sunlight judgment is as following

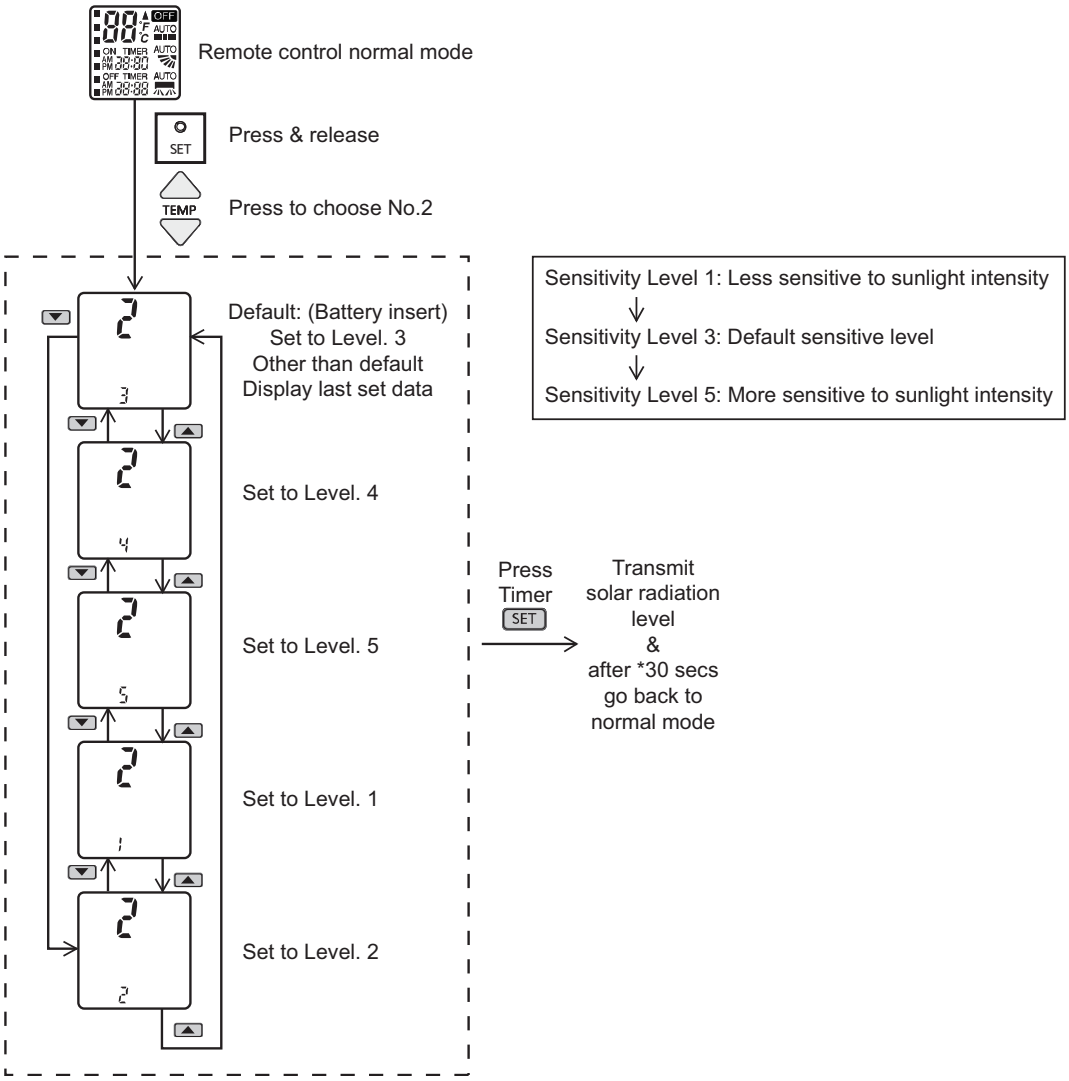


14.14.2.1 Sunlight Intensity Reset

- The sunlight intensity will reset to zero (no sunlight condition) when
  - Each time ECONAVI is activated.
  - Setting temperature is changed.
  - Operation mode is changed.

14.14.2.2 Judge Sunlight Intensity

- Based on sunlight sensor output voltage, the sunlight intensity value will be computed and logged to sunlight intensity database.
- The sunlight sensor sensitivity could be adjusted:

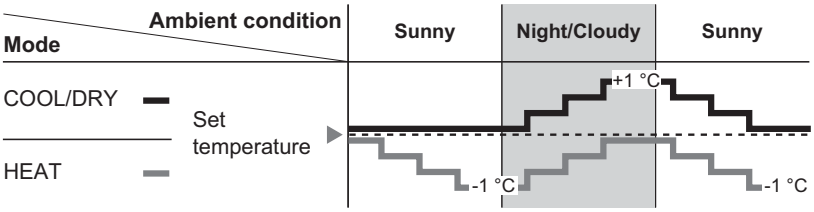


14.14.2.3 Judge Ambient Condition

- According to sunlight intensity over a period of time, the system will analyze the ambient condition is sunny, cloudy or night.

14.14.2.4 Temperature Shift

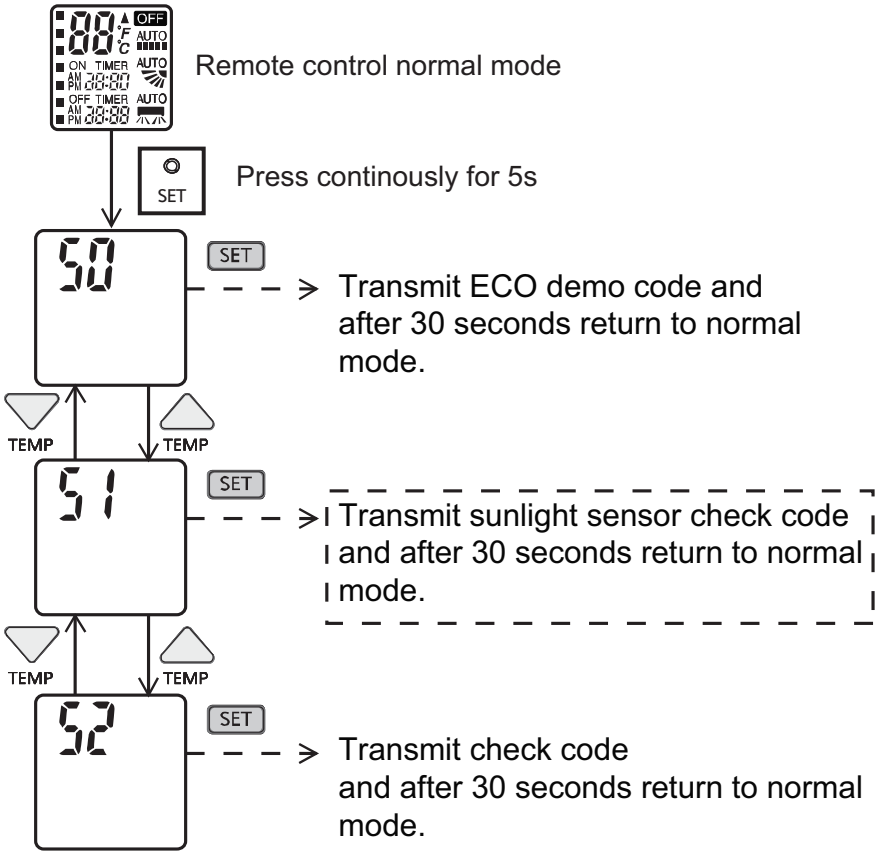
ECONAVI ; Detecting sunlight intensity, the unit adjust temperature to save energy.



- In a room without window or with thick curtain, the sunlight sensor will judge as cloudy/night.

14.14.2.5 Sunlight Sensor Check Mode

- To enable sunlight sensor check mode, during unit is OFF (power standby):



- Operation details
  - The sunlight sensor check mode will be operated for 5 minutes.
  - During check mode, the ON and OFF timer will be memorized but it operation be ignored.
  - During check mode, if the sunlight sensor check code is retransmitted, the 5 minutes counter will be reset.
  - During check mode, if sunlight sensor detected the sunlight intensity value above minimum level, the ECONAVI indicator turns ON. Else if sunlight sensor detected sunlight intensity value below minimum level, the ECONAVI indicator is OFF.
- To disable sunlight sensor check mode
  - After check mode is ended (5 minutes counter elapsed), press AUTO OFF/ON button at indoor unit.
  - If the sunlight sensor detected sunlight intensity is at abnormal range, the check mode will be ended. Please check for error code.

14.14.2.6 Sunlight Sensor Abnormality

- Abnormality detection:
  - When ECONAVI is ON, if the sunlight intensity value below minimum level continuously for 24 hours, the sunlight sensor disconnection error counter will increase by 1 time. If the ECONAVI is OFF, the 24 hours timer will be reset, but the sunlight sensor disconnection error counter will not be reset.
- Error Code judgment
  - When sunlight sensor disconnection error counter reached 15 times. H70 occurred.
  - No TIMER indicator or ECONAVI indicator blink.
- When error code happened, the unit is able to operate without sunlight sensor.

15. Operation Control (For Multi Split Connection)

During multi split connection, indoor unit's operation controls are same with single split connection unless specified in this chapter.

15.1 Cooling operation

15.1.1 Thermostat control

- Capability supply to indoor unit is OFF (Expansion valve closed) when Intake Air Temperature — Internal setting temperature < -2.0°C.
- Capability resume supply to indoor unit after waiting for 3 minutes, if the Intake Air temperature — Internal setting temperature > Capability supply OFF point.

15.2 Soft Dry Operation

15.2.1 Thermostat control

- Capability supply to indoor unit is OFF (Expansion valve closed) when Intake Air Temperature — Internal setting temperature < -3.0°C.
- Capability resume to indoor unit after waiting for 3 minutes, if the Intake Air temperature — Internal setting temperature > Capability supply OFF point.

15.3 Heating Operation

15.3.1 Thermostat control

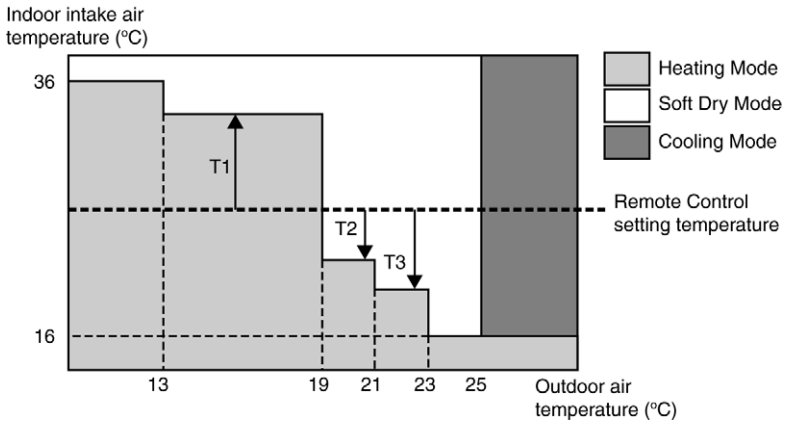
- Capability supply to indoor unit is OFF (Expansion valve closed) when Intake Air Temperature — Internal setting temperature > +1.0°C.
- During this condition, the indoor fan is stopped if compressor is ON.
- Capability resume supply to indoor unit after waiting for 3 minutes, if the Intake Air Temperature — Internal setting temperature < Capability supply OFF point.

15.3.2 Temperature Sampling Control

- Temperature sampling is controlled by outdoor unit where room temperature for all power supply ON indoor unit could be obtained.
- When capability supply to the indoor unit is OFF and the compressor is ON, the indoor fan motor is stopped. During this condition, 15 seconds after sampling signal from outdoor unit is received, the indoor fan start operation at low fan speed.
- However, within first 4 minutes of capability stopped supply to the indoor unit, even sampling signal is received, the sampling control is cancelled.

15.4 Automatic Operation

- This mode can be set using remote control and the operation is decided by remote control setting temperature, remote control operation mode, indoor intake and outdoor air temperature.
- During operation mode judgment, indoor fan motor (with speed of -Lo) and outdoor fan motor are running for 30 seconds to detect the indoor intake and outdoor air temperature. The operation mode is decided based on below chart.



- Every 180 minutes, the indoor and outdoor temperature is judge. Based on remote control setting temperature, the value of T1 will increase up to 10°C, T2 will decrease by 3°C and T3 will decrease up to 8°C.

15.5 Indoor Fan Motor Operation

15.5.1 Residual Heat Removal Control

- To prevent high pressure at indoor unit, when heating mode thermostat-off condition or power supply OFF, indoor fan continue to operate at controlled fan speed for maximum 30 seconds then stop.

15.6 Powerful Mode Operation

- When the power mode is selected, the internal setting temperature will shift lower up to 4°C for Cooling/Soft Dry or higher up to 6°C for heating than remote control setting temperature, the powerful operation continue until user cancel the Powerful operation by pressing powerful button again.

15.7 Auto Restart Control

- When the power supply is cut off during the operation of air conditioner, the compressor will re-operate between three to four minutes (10 patterns to be selected randomly) after power resume.
- During multi split connection, Indoor unit will resume previous mode, include unit standby mode.

15.8 Indication Panel

LED	POWER	TIMER	nanoe	ECONAVI
Color	White	White	White	White
Light ON	Operation ON	Timer Setting ON	nanoe ON	ECONAVI ON
Light OFF	Operation OFF	Timer Setting OFF	nanoe OFF	ECONAVI OFF

Note:

- If POWER LED is blinking (0.5 seconds ON, 0.5 second OFF), the possible operation of the unit are during Indoor Residual Heat Removal, Hot Start, during Deice operation, operation mode judgment, or ON timer sampling.
- If POWER LED is blinking (2.5 seconds ON, 0.5 second OFF), the unit is in standby mode.
- If TIMER LED is blinking, there is an abnormality operation occurs.

15.9 Mild Dry Cooling Operation

- During multi split connection, Mild Dry Cooling Operation is disabled.

16. Protection Control

16.1 Protection Control for All Operations

16.1.1 Restart Control (Time Delay Safety Control)

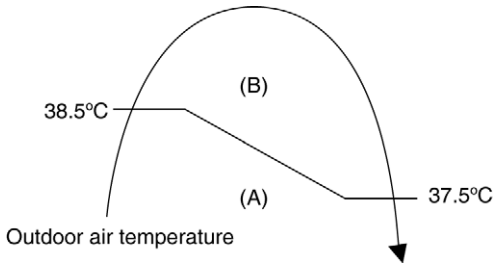
- The Compressor will not turn on within 3 minutes from the moment operation stops, although the unit is turned on again by pressing OFF/ON button at remote control within this period.
- This control is not applicable if the power supply is cut off and on again.
- This phenomenon is to balance the pressure inside the refrigerant cycle.

16.1.2 Total Running Current

1 When the outdoor unit total running current (AC) exceeds X value, the frequency instructed for compressor operation will be decreased.
2 If the running current does not exceed X value for 5 seconds, the frequency instructed will be increased.
3 However, if total outdoor unit running current exceeds Y value, compressor will be stopped immediately for 3 minutes.

Model	Z7SKE		Z9SKE		Z12SKE		Z15SKE		Z18SKE	
Operation Mode	X (A)	Y (A)	X (A)	Y (A)	X (A)	Y (A)	X (A)	Y (A)	X (A)	Y (A)
Cooling / Soft Dry (A)	3.69	14.98	4.54	14.98	6.42	14.98	8.09	15.02	10.55	14.67
Cooling / Soft Dry (B)	3.24		4.03		5.94		7.57		10.07	
Cooling / Soft Dry (C)	3.24		4.03		5.94		7.57		10.07	
Heating	3.86		5.10		7.23		8.31		10.15	

4 The first 30 minutes of cooling operation, (A) will be applied.



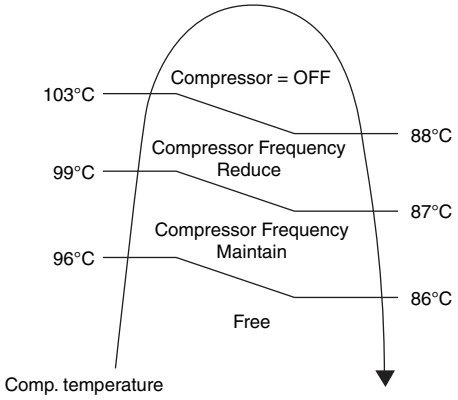
16.1.3 IPM (Power transistor) Prevention Control

- Overheating Prevention Control
  1 When the IPM temperature rises to 120°C (Z7/9/12/15SK), compressor operation will stop immediately.
  2 Compressor operation restarts after 3 minutes the temperature decreases to 110°C.
  3 If this condition repeats continuously 4 times within 20 minutes, timer LED will be blinking (“F96” is indicated).

- DC Peak Current Control
  1 When electric current to IPM exceeds set value of 16.0 ± 2.0A (Z7/9/12/15SK) and 30.0 ± 3.0A (Z18SK), the compressor will stop operate. Then, operation will restart after 3 minutes.
  2 If the set value is exceeded again more than 30 seconds after the compressor starts, the operation will restart after 1 minute.
  3 If the set value exceeded again within 30 seconds after the compressor starts, the operation will restart after 1 minute. If this condition repeats continuously for 7 times, all indoor and outdoor relays will be cut off, timer LED will be blinking (“F99” is indicated).

16.1.4 Compressor Overheating Prevention Control

- Instructed frequency for compressor operation will be regulated by compressor temperature. The changes of frequency are as below.
- If compressor temperature exceeds 103°C, compressor will be stopped, occurs 4 times per 20 minutes, timer LED will be blinking. (“F97” is indicated.)



16.1.5 Low Pressure Prevention Control (Gas Leakage Detection)

- Control start conditions
  - For 5 minutes, the compressor continuously operates and outdoor total current is between 0.75A and 0.95A (Z7/9/12/15SK), 1.38A and 1.65A (Z18SK).
  - During Cooling and Soft Dry operations:
    Indoor suction temperature - indoor piping temperature is below 4°C.
  - During Heating operations :
    Indoor piping temperature - indoor suction is under 5°C.
- Control contents
  - Compressor stops (and restart after 3 minutes).
  - If the conditions above happen 2 times within 20 minutes, the unit will:
    - Stop operation
    - Timer LED blinks and “F91” indicated.

16.1.6 Low Frequency Protection Control 1

- When the compressor operate at frequency lower than 24 Hz continued for 20 minutes, the operation frequency will be changed to 23 Hz for 2 minutes.

16.1.7 Low Frequency Protection Control 2

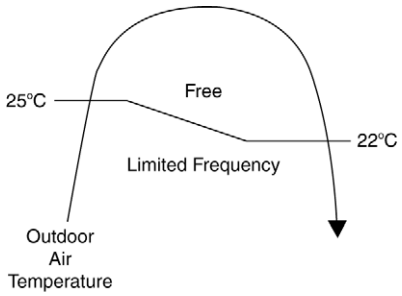
- When all the below conditions comply, the compressor frequency will change to lower frequency.

Temperature, T, for:	Cooling/Soft Dry	Heating
Indoor intake air (°C)	T < 14 or T ≥ 30	T < 14 or T ≥ 28
Outdoor air (°C)	T < 13 or T ≥ 38	T < 4 or T ≥ 24
Indoor heat exchanger (°C)	T < 30	T ≥ 0

16.2 Protection Control for Cooling & Soft Dry Operation

16.2.1 Outdoor Air Temperature Control

- The compressor operating frequency is regulated in accordance to the outdoor air temperature as shown in the diagram below.
- This control will begin 1 minute after the compressor starts.
- Compressor frequency will adjust base on outdoor air temperature.



16.2.2 Cooling Overload Control

- Detects the Outdoor pipe temperature and carry out below restriction/limitation (Limit the compressor Operation frequency).
- The compressor stop if outdoor pipe temperature exceeds 60°C.
- If the compressor stops 4 times in 20 minutes, Timer LED blinking (F95 indicated: outdoor high pressure rise protection).

16.2.3 Freeze Prevention Control 1

- When indoor heat exchanger temperature is lower than 0°C continuously for 6 minutes, compressor will stop operating.
- Compressor will resume its operation 3 minutes after the indoor heat exchanger is higher than 5°C.
- At the same time, indoor fan speed will be higher than during its normal operation.
- If indoor heat exchanger temperature is higher than 5°C for 5 minutes, the fan speed will return to its normal operation.

16.2.4 Freeze Prevention Control 2

- Control start conditions
  - During Cooling operation and soft dry operation
    - During thermo OFF condition, indoor intake temperature is less than 10°C or
    - Compressor stops for freeze prevention control
  - Either one of the conditions above occurs 5 times in 60 minutes.
- Control contents
  - Operation stops
  - Timer LED blinks and “H99” indicated

16.2.5 Dew Prevention Control 1

- To prevent dew formation at indoor unit discharge area.
- This control will be activated if:
  - Outdoor air temperature and Indoor pipe temperature judgment by microcontroller is fulfilled.
  - When Cooling or Dry mode is operated more than 20 minutes or more.
- This control stopped if:
  - Compressor stopped.
  - Remote control setting changed (fan speed / temperature).
  - Outdoor air temperature and indoor intake temperature changed.
- Fan speed will be adjusted accordingly in this control.

16.2.6 Odor Cut Control

- To reduce the odor released from the unit.
  - Start Condition
    - AUTO FAN Speed is selected during COOL or DRY operation.
    - During freeze prevention control and timer preliminary operation, this control is not applicable.
  - Control content
    - Depends on compressor conditions:
      1. Compressor OFF → Compressor ON.
         The indoor unit fan stops temporarily and then starts to blow at minimum airflow for 30 seconds.
      2. Compressor ON → Compressor OFF.
         The indoor unit fan stops for 90 seconds and then blows at minimum airflow for 20 seconds.

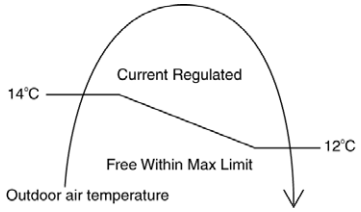
16.3 Protection Control for Heating Operation

16.3.1 Intake Air Temperature Control

Compressor will operate at limited freq., if indoor intake air temperature is 30°C or above.

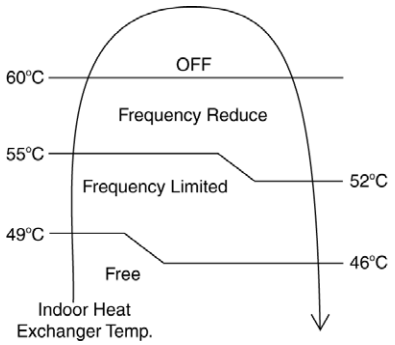
16.3.2 Outdoor Air Temperature Control

- The Max current value is regulated when the outdoor air temperature rise above 14°C (Z7/9/12/15SK) and 14°C (Z18SK) in order to avoid compressor overloading.



16.3.3 Overload Protection Control

- The compressor operating frequency is regulated in accordance to indoor heat exchanger temperature as shown below.
- If the heat exchanger temperature exceeds 60°C, compressor will stop.



16.3.4 Low Temperature Compressor Oil Return Control

- In heating operation, if the outdoor temperature falls below -10°C when compressor starts, the compressor frequency will be regulated up to 600 seconds.

16.3.5 Cold Draught Prevention Control

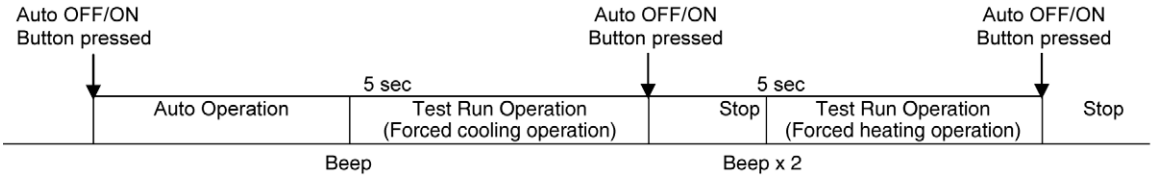
- When indoor pipe temperature is low, cold draught operation starts where indoor fan speed will be reduced.

16.3.6 Deice Operation

- When outdoor pipe temperature and outdoor air temperature is low, deice operation start where indoor fan motor and outdoor fan motor stop and operation LED blinks.

17. Servicing Mode

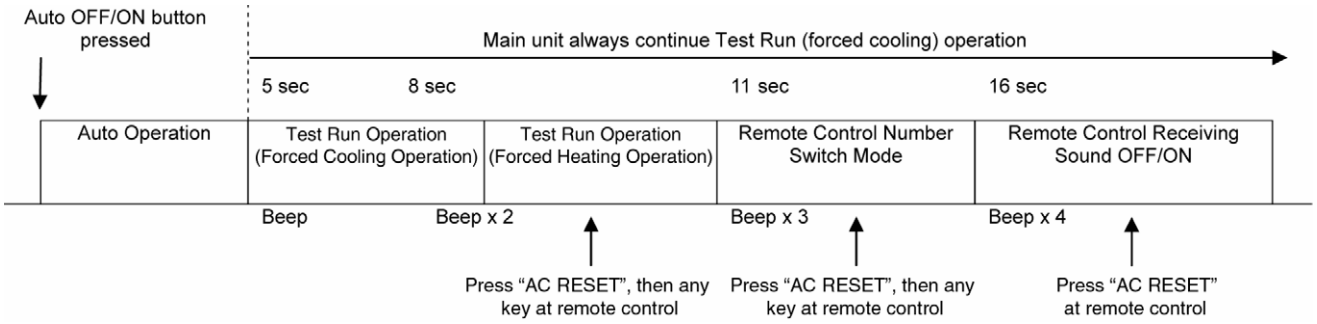
17.1 Auto OFF/ON Button



1 AUTO OPERATION MODE
The Auto operation will be activated immediately once the Auto OFF/ON button is pressed. This operation can be used to operate air conditioner with limited function if remote control is misplaced or malfunction.

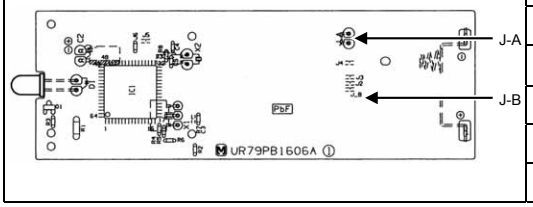
2 TEST RUN OPERATION (FOR PUMP DOWN/SERVICING PURPOSE)
The Test Run operation will be activated if the Auto OFF/ON button is pressed continuously for more than 5 seconds. A “beep” sound will heard at the fifth seconds, in order to identify the starting of Test Run operation (Forced cooling operation). Within 5 minutes after Forced cooling operation start, the Auto OFF/ON button is pressed for more than 5 seconds. A 2 “beep” sounds will heard at the fifth seconds, in order to identify the starting of Forced heating operation.

The Auto OFF/ON button may be used together with remote control to set / change the advance setting of air conditioner operation.



3 REMOTE CONTROL NUMBER SWITCH MODE
The Remote Control Number Switch Mode will be activated if the Auto OFF/ON button is pressed continuously for more than 11 seconds (3 “beep” sounds will occur at 11th seconds to identify the Remote Control Number Switch Mode is in standby condition) and press “AC RESET” button and then press any button at remote control to transmit and store the desired transmission code to the EEPROM.

There are 4 types of remote control transmission code could be selected and stored in EEPROM of indoor unit. The indoor unit will only operate when received signal with same transmission code from remote control. This could prevent signal interference when there are 2 or more indoor units installed nearby together.
To change remote control transmission code, short or open jumpers at the remote control printed circuit board.



Remote Control Printed Circuit Board		
Jumper A (J-A)	Jumper B (J-B)	Remote Control No.
Short	Open	A (Default)
Open	Open	B
Short	Short	C
Open	Short	D

- During Remote Control Number Switch Mode, press any button at remote control to transmit and store the transmission code to the EEPROM.

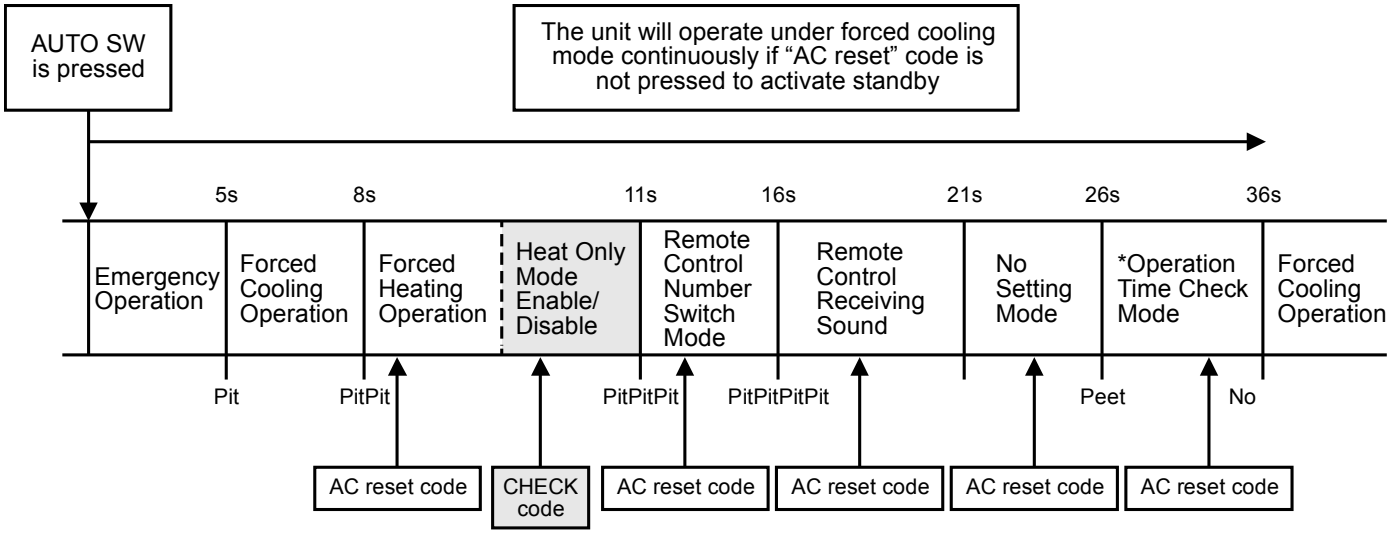
4 REMOTE CONTROL RECEIVING SOUND OFF/ON MODE
The Remote Control Receiving Sound OFF/ON Mode will be activated if the Auto OFF/ON button is pressed continuously for more than 16 seconds (4 “beep” sounds will occur at 16th seconds to identify the Remote Control Receiving Sound Off/On Mode is in standby condition) and press “AC Reset” button at remote control.

Press “Auto OFF/ON button” to toggle remote control receiving sound.
- Short “beep”: Turn OFF remote control receiving sound.
- Long “beep”: Turn ON remote control receiving sound.

After Auto OFF/ON Button is pressed, the 20 seconds counter for Remote Control Receiving Sound OFF/ON Mode is restarted.

17.2 Heat Only Operation

17.2.1 How to Activate/Deactivate Heat only Operation



- To enable the “Heat Only” mode, press the AUTO OFF/ON SW for more than 8s and less than 11s, “Pit Pit" sound will be heard, then release the AUTO OFF/ON SW and press remote controller CHECK button. A short “Pit” sound will be heard. “Heat Only” mode is now enable.
- To disable the “Heat Only” mode, press the AUTO OFF/ON SW for more than 8s and less than 11s, “Pit Pit” sound will be heard, then release the AUTO OFF/ON SW and press remote controller CHECK button. A long “Pit” sound will be heard. “Heat Only” mode is now disable.
- To pump down the unit during Heat Only Operation press AUTO switch for 5 seconds.

17.2.2 Operation mode during Heating Only Operation

- The table below shows the operation mode comparison when Heating Only Operation Mode Activated and Deactivated.

Operation Mode	Heating Only Operation Mode Activated	Heating Only Operation Mode Deactivated
AUTO	After 30s sampling, regardless of the indoor intake or outdoor intake temperature judgment, the unit will run Heating operation.	After 30s sampling, the unit will judge the operation mode base on remote controller temperature setting and Indoor Intake Sensor (New Auto Mode) or Outdoor Intake Sensor (Old Auto Mode).
HEAT	The unit will run Heating operation.	The unit will run Heating operation.
COOL	The unit will stop and Power LED blinking.	The unit will run Cooling operation.
DRY	The unit will stop and Power LED blinking.	The unit will run Cooling Dry operation.
NANOE-G Stand-alone	The unit will stop and Power LED blinking.	The unit will run Nanoe-G Stand-alone operation.
Force Cooling	The unit will run Force Cooling Operation for X_CTRYTM [15] minutes	The unit will run Force Cooling operation.
Force Heating	The unit will run Force Heating operation.	The unit will run Force Heating operation.
AUTO (with Timer)	The unit will turn ON by the timer and run Auto Operation. After 30s sampling, regardless of the indoor intake or outdoor intake temperature judgment, the unit will run Heating operation.	The unit will turn ON by the timer and run Auto Operation. After 30s sampling, the unit will judge the operation mode base on remote controller temperature setting and Indoor Intake Sensor (New Auto Mode) or Outdoor Intake Sensor (Old Auto Mode).
HEAT (with Timer)	The unit will turn ON by the timer and run Heating Operation.	The unit will turn ON by the timer and run Heating Operation.
COOL (with Timer)	The unit will not turn ON by the timer. Power LED blinking.	The unit will turn ON by the timer and run Cooling Operation.
DRY (with Timer)	The unit will not turn ON by the timer. Power LED blinking.	The unit will turn ON by the timer and run Cooling Dry Operation.
Cooling Test Mode	The unit will stop and Power LED blinking.	The unit will operate according to specify Cooling test mode operation parameter.
Heating Test Mode	The unit will operate according to specify Heating test mode operation parameter.	The unit will operate according to specify Heating test mode operation parameter.

17.3 Remote Control Button

17.3.1 SET Button

- To check remote control transmission code and store the transmission code to EEPROM:
  - Press “Set” button continuously for 10 seconds by using pointer.
  - Press “Timer Set” button until a “beep” sound is heard as confirmation of transmission code changed.

17.3.2 RESET (RC)

- To clear and restore the remote control setting to factory default.
  - Press once to clear the memory.

17.3.3 RESET (AC)

- To restore the unit’s setting to factory default.
  - Press once to restore the unit’s setting.

17.3.4 TIMER ▲

- To change indoor unit indicator’s LED intensity.
  - Press continuously for 5 seconds.

17.3.5 TIMER ▼

- To change remote control display from Degree Celsius (°C) to Degree Fahrenheit (°F).
  - Press continuously for 10 seconds.

18. Troubleshooting Guide

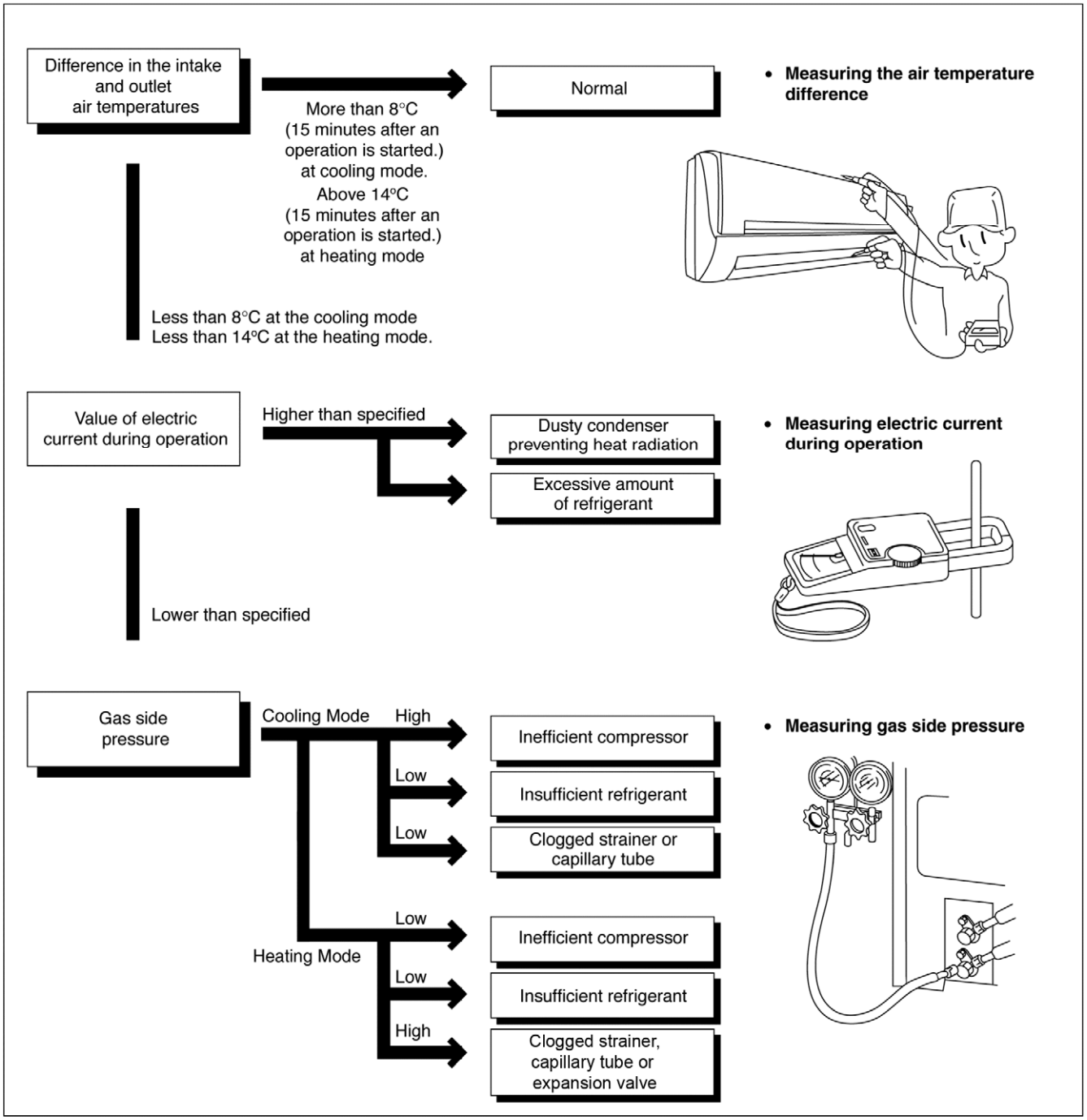
18.1 Refrigeration Cycle System

In order to diagnose malfunctions, make sure that there are no electrical problems before inspecting the refrigeration cycle. Such problems include insufficient insulation, problem with the power source, malfunction of a compressor and a fan.
The normal outlet air temperature and pressure of the refrigeration cycle depends on various conditions, the standard values for them are shown in the table on the right.

Normal Pressure and Outlet Air Temperature (Standard)

	Gas Pressure MPa (kg/cm^2G)	Outlet air Temperature (°C)
Cooling Mode	0.9 ~ 1.2 (9 ~ 12)	12 ~ 16
Heating Mode	2.3 ~ 2.9 (23 ~ 29)	36 ~ 45

*Condition: • Indoor fan speed = High
• Outdoor temperature 35°C at the cooling mode and 7°C at the heating mode
• Compressor operates at rated frequency



18.1.1 Relationship Between the Condition of the Air Conditioner and Pressure and Electric Current

Condition of the air conditioner	Cooling Mode			Heating Mode		
	Low Pressure	High Pressure	Electric current during operation	Low Pressure	High Pressure	Electric current during operation
Insufficient refrigerant (gas leakage)	↘	↘	↘	↘	↘	↘
Clogged capillary tube or Strainer	↘	↘	↘	↗	↗	↗
Short circuit in the indoor unit	↘	↘	↘	↗	↗	↗
Heat radiation deficiency of the outdoor unit	↗	↗	↗	↘	↘	↘
Inefficient compression	↗	↘	↘	↗	↘	↘

• Carry out the measurement of pressure, electric current, and temperature fifteen minutes after an operation is started.

18.2 Breakdown Self Diagnosis Function

18.2.1 Self Diagnosis Function (Three Digits Alphanumeric Code)

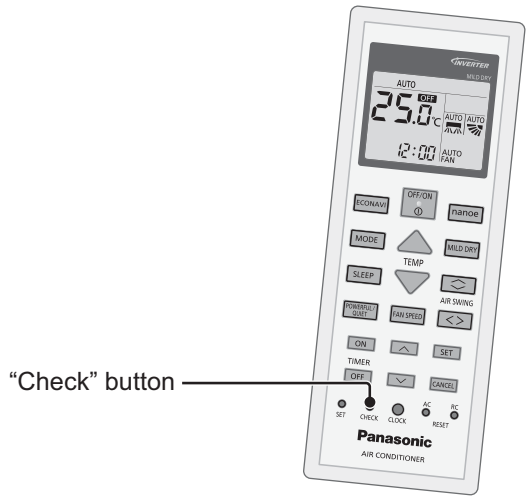
- Once abnormality has occurred during operation, the unit will stop its operation, and Timer LED blinks.
- Although Timer LED goes off when power supply is turned off, if the unit is operated under a breakdown condition, the LED will light up again.
- In operation after breakdown repair, the Timer LED will no more blink. The last error code (abnormality) will be stored in IC memory.

18.2.2 To Make a Diagnosis

1 Timer LED start to blink and the unit automatically stops the operation.
2 Press the CHECK button on the remote controller continuously for 5 seconds.
3 "- -" will be displayed on the remote controller display.
Note: Display only for "- -". (No transmitting signal, no receiving sound and no Power LED blinking.)
4 Press the "TIMER" ▲ or ▼ button on the remote controller. The code "H00" (no abnormality) will be displayed and signal will be transmitted to the main unit.
5 Every press of the button (up or down) will increase abnormality numbers and transmit abnormality code signal to the main unit.
6 When the latest abnormality code on the main unit and code transmitted from the remote controller are matched, power LED will light up for 30 seconds and a beep sound (continuously for 4 seconds) will be heard. If no codes are matched, power LED will light up for 0.5 seconds and no sound will be heard.
7 The breakdown diagnosis mode will be canceled unless pressing the CHECK button continuously for 5 seconds or operating the unit for 30 seconds.
8 The LED will be off if the unit is turned off or the RESET button on the main unit is pressed.

18.2.3 To Display Memorized Error Code (Protective Operation)

1 Turn power on.
2 Press the CHECK button on the remote controller continuously for 5 seconds.
3 "- -" will be displayed on the remote controller display.
Note: Display only for "- -". (No transmitting signal, no receiving sound and no Power LED blinking.)
4 Press the "TIMER" ▲ or ▼ button on the remote controller. The code "H00" (no abnormality) will be displayed and signal will be transmitted to the main unit. The power LED lights up. If no abnormality is stored in the memory, three beeps sound will be heard.
5 Every press of the button (up or down) will increase abnormality numbers and transmit abnormality code signal to the main unit.
6 When the latest abnormality code on the main unit and code transmitted from the remote controller are matched, power LED will light up for 30 seconds and a beep sound (continuously for 4 seconds) will be heard. If no codes are matched, power LED will light up for 0.5 seconds and no sound will be heard.
7 The breakdown diagnosis mode will be canceled unless pressing the CHECK button continuously for 5 seconds or operating the unit for 30 seconds.
8 The same diagnosis can be repeated by turning power on again.



18.2.4 To Clear Memorized Error Code after Repair (Protective Operation)

1 Turn power on (in standby condition).
2 Press the AUTO button for 5 seconds (A beep receiving sound) on the main unit to operate the unit at Forced Cooling Operation modes.
3 Press the CHECK button on the remote controller for about 1 second with a pointed object to transmit signal to main unit. A beep sound is heard from main unit and the data is cleared.

18.2.5 Temporary Operation (Depending On Breakdown Status)

1 Press the AUTO button (A beep receiving sound) on the main unit to operate the unit. (Remote control will become possible.)
2 The unit can temporarily be used until repaired.

18.3 Error Codes Table

Diagnosis display	Abnormality / Protection control	Abnormality Judgment	Protection Operation	Problem	Check location
H00	No memory of failure	—	Normal operation	—	—
H11	Indoor/outdoor abnormal communication	After operation for 1 minute	Indoor fan only operation can start by entering into force cooling operation	Indoor/outdoor communication not establish	• Indoor/outdoor wire terminal • Indoor/outdoor PCB • Indoor/outdoor connection wire
H12	Indoor unit capacity unmatched	90s after power supply	—	Total indoor capability more than maximum limit or less than minimum limit, or number of indoor unit less than two	• Indoor/outdoor connection wire • Indoor/outdoor PCB • Specification and combination table in catalogue
H14	Indoor intake air temperature sensor abnormality	Continuous for 5s	—	Indoor intake air temperature sensor open or short circuit	• Indoor intake air temperature sensor lead wire and connector
H15	Compressor temperature sensor abnormality	Continuous for 5s	—	Compressor temperature sensor open or short circuit	• Compressor temperature sensor lead wire and connector
H16	Outdoor current transformer (CT) abnormality	—	—	Current transformer faulty or compressor faulty	• Outdoor PCB faulty or compressor faulty
H19	Indoor fan motor merchanism lock	Continuous happen for 7 times	—	Indoor fan motor lock or feedback abnormal	• Fan motor lead wire and connector • Fan motor lock or block
H23	Indoor heat exchanger temperature sensor abnormality	Continuous for 5s	—	Indoor heat exchanger temperature sensor open or short circuit	• Indoor heat exchanger temperature sensor lead wire and connector
H24	Indoor heat exchanger temperature sensor 2 abnormality	Continuous for 5s	—	Indoor heat exchanger temperature sensor 2 open or short circuit	• Indoor heat exchanger temperature sensor 2 lead wire and connector
H25	Indoor ion device abnormality	Port is ON for 10s during ion device off	—	—	• ion device PCB
H27	Outdoor air temperature sensor abnormality	Continuous for 5s	—	Outdoor air temperature sensor open or short circuit	• Outdoor air temperature sensor lead wire and connector
H28	Outdoor heat exchanger temperature sensor 1 abnormality	Continuous for 5s	—	Outdoor heat exchanger temperature sensor 1 open or short circuit	• Outdoor heat exchanger temperature sensor 1 lead wire and connector
H30	Outdoor discharge pipe temperature sensor abnormality	Continuous for 5s	—	Outdoor discharge pipe temperature sensor open or short circuit	• Outdoor discharge pipe temperature sensor lead wire and connector
H32	Outdoor heat exchanger temperature sensor 2 abnormality	Continuous for 5s	—	Outdoor heat exchanger temperature sensor 2 open or short circuit	• Outdoor heat exchanger temperature sensor 2 lead wire and connector
H33	Indoor / outdoor misconnection abnormality	—	—	Indoor and outdoor rated voltage different	• Indoor and outdoor units check
H34	Outdoor heat sink temperature sensor abnormality	Continuous for 2s	—	Outdoor heat sink temperature sensor open or short circuit	• Outdoor heat sink sensor
H36	Outdoor gas pipe temperature sensor abnormality	Continuous for 5s	Heating protection operation only	Outdoor gas pipe temperature sensor open or short circuit	• Outdoor gas pipe temperature sensor lead wire and connector
H37	Outdoor liquid pipe temperature sensor abnormality	Continuous for 5s	Cooling protection operation only	Outdoor liquid pipe temperature sensor open or short circuit	• Outdoor liquid pipe temperature sensor lead wire and connector
H38	Indoor/Outdoor mismatch (brand code)	—	—	Brand code not match	• Check indoor unit and outdoor unit
H39	Abnormal indoor operating unit or standby units	3 times happen within 40 minutes	—	Wrong wiring and connecting pipe, expansion valve abnormality, indoor heat exchanger sensor open circuit	• Check indoor/outdoor connection wire and connection pipe • Indoor heat exchanger sensor lead wire and connector • Expansion valve and lead wire and connector

Diagnosis display	Abnormality / Protection control	Abnormality Judgment	Protection Operation	Problem	Check location
H41	Abnormal wiring or piping connection	—	—	Wrong wiring and connecting pipe, expansion valve abnormality	• Check indoor/outdoor connection wire and connection pipe • Expansion valve and lead wire and connector
H59	ECONAVI sensor abnormality	Continuous for 25s	—	ECONAVI sensor open or short circuit	• ECONAVI sensor (defective or disconnected) • ECONAVI PCB
H64	Outdoor high pressure sensor abnormality	Continuous for 1 minutes	—	High pressure sensor open circuit during compressor stop	• High pressure sensor • Lead wire and connector
H67	Nanoe abnormality	Nanoe stop for 5 minutes for 3 times	—	Nanoe faulty	• PCB • Nanoe system • High voltage
H70	Light sensor abnormality	Continuous for 24 hours, 15 days	—	Light sensor open or short circuit	• Light sensor (defective or disconnect)
H97	Outdoor fan motor mechanism lock	2 times happen within 30 minutes	—	Outdoor fan motor lock or feedback abnormal	• Outdoor fan motor lead wire and connector • Fan motor lock or block
H98	Indoor high pressure protection	—	—	Indoor high pressure protection (Heating)	• Check indoor heat exchanger • Air filter dirty • Air circulation short circuit
H99	Indoor operating unit freeze protection	—	—	Indoor freeze protection (Cooling)	• Check indoor heat exchanger • Air filter dirty • Air circulation short circuit
F11	4-way valve switching abnormality	4 times happen within 30 minutes	—	4-way valve switching abnormal	• 4-way valve • Lead wire and connector
F17	Indoor standby units freezing abnormality	3 times happen within 40 minutes	—	Wrong wiring and connecting pipe, expansion valve leakage, indoor heat exchanger sensor open circuit	• Check indoor/outdoor connection wire and pipe • Indoor heat exchanger sensor lead wire and connector • Expansion valve lead wire and connector
F90	Power factor correction (PFC) circuit protection	4 times happen within 10 minutes	—	Power factor correction circuit abnormal	• Outdoor PCB faulty
F91	Refrigeration cycle abnormality	2 times happen within 20 minutes	—	Refrigeration cycle abnormal	• Insufficient refrigerant or valve close
F93	Compressor abnormal revolution	4 times happen within 20 minutes	—	Compressor abnormal revolution	• Power transistor module faulty or compressor lock
F94	Compressor discharge overshoot protection	4 times happen within 30 minutes	—	Compressor discharge pressure overshoot	• Check refrigeration system
F95	Outdoor cooling high pressure protection	4 times happen within 20 minutes	—	Cooling high pressure protection	• Check refrigeration system • Outdoor air circuit
F96	Power transistor module overheating protection	4 times happen within 30 minutes	—	Power transistor module overheat	• PCB faulty • Outdoor air circuit (fan motor)
F97	Compressor overheating protection	3 times happen within 30 minutes	—	Compressor overheat	• Insufficient refrigerant
F98	Total running current protection	3 times happen within 20 minutes	—	Total current protection	• Check refrigeration system • Power source or compressor lock
F99	Outdoor direct current (DC) peak detection	Continuous happen for 7 times	—	Power transistor module current protection	• Power transistor module faulty or compressor lock

18.4 Self-diagnosis Method

18.4.1 H11 (Indoor/Outdoor Abnormal Communication)

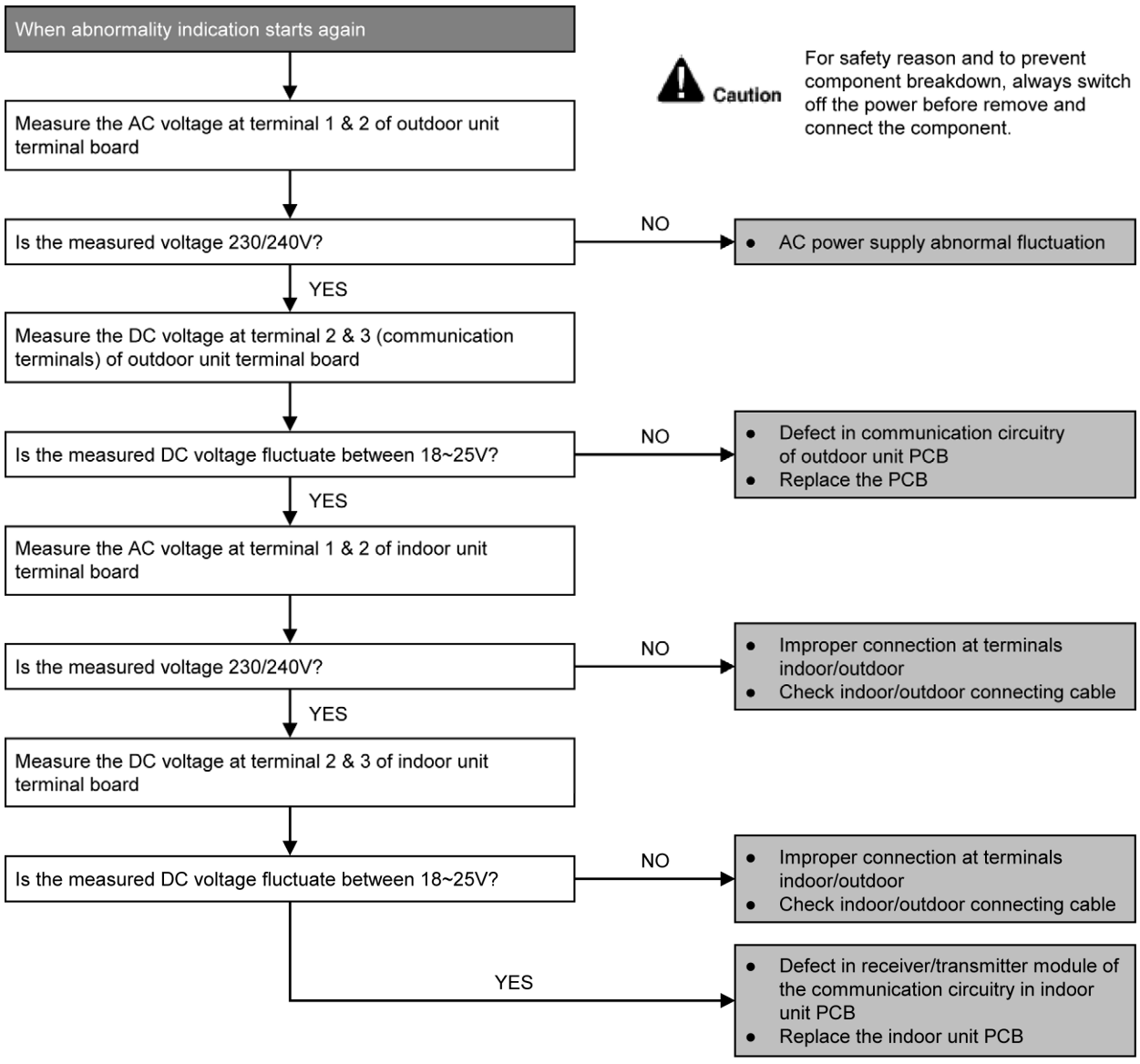
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the data received from outdoor unit in indoor unit signal transmission is checked whether it is normal.

Malfunction Caused

- Faulty indoor unit PCB.
- Faulty outdoor unit PCB.
- Indoor unit-outdoor unit signal transmission error due to wiring error.
- Indoor unit-outdoor unit signal transmission error due to breaking of wire in the connection wires between the indoor and outdoor units.

Troubleshooting



18.4.2 H12 (Indoor/Outdoor Capacity Rank Mismatched)

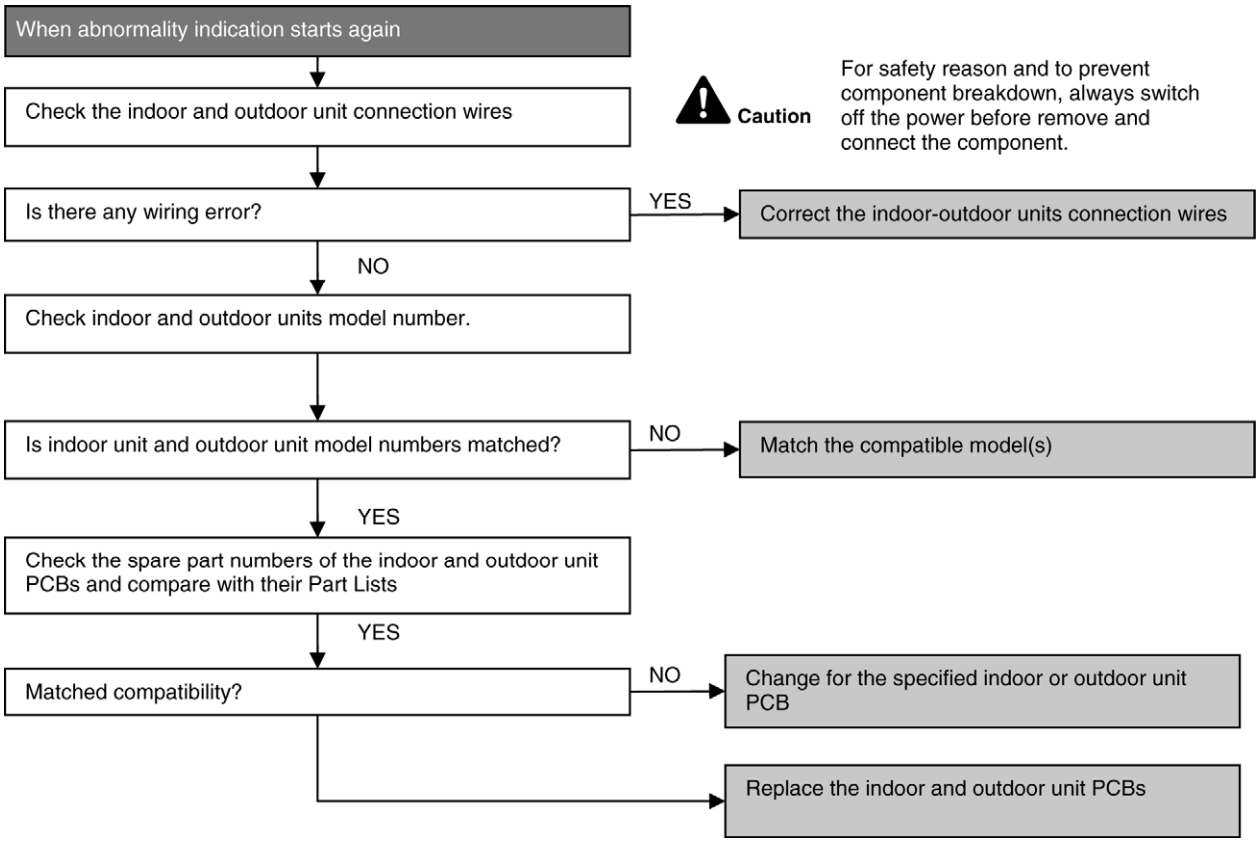
Malfunction Decision Conditions

- During startup, error code appears when different types of indoor and outdoor units are interconnected.

Malfunction Caused

- Wrong models interconnected.
- Wrong indoor unit or outdoor unit PCBs mounted.
- Indoor unit or outdoor unit PCBs defective.
- Indoor-outdoor unit signal transmission error due to wrong wiring.
- Indoor-outdoor unit signal transmission error due to breaking of wire 3 in the connection wires between the indoor and outdoor units.

Troubleshooting



18.4.3 H14 (Indoor Intake Air Temperature Sensor Abnormality)

Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the indoor intake air temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting

When abnormality indication starts again

Check the connector connection:
- Turn off the power
- Check the connector connection

Caution For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

Is the connector connection normal?

NO
- Connector poor contact
- Correct the connection

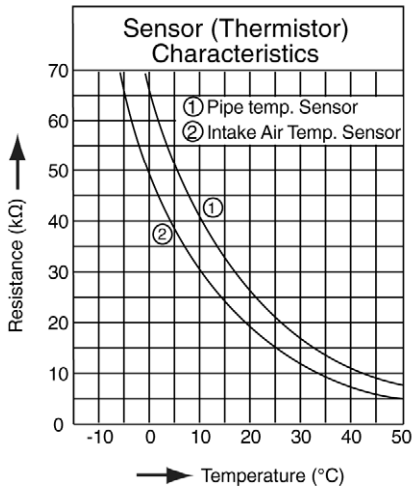
YES

Check the indoor intake air temperature sensor:
- Plug out connector from the indoor unit PCB
- Measure the resistance of the indoor intake air temperature sensor

Is the measured resistance of the indoor intake air temperature sensor matches the value specified in its characteristic chart?

NO
- Defect in indoor intake air temperature sensor
- Replace the indoor intake air temperature sensor

YES
- Defect in indoor unit PCB
- Replace the indoor unit PCB



18.4.4 H15 (Compressor Temperature Sensor Abnormality)

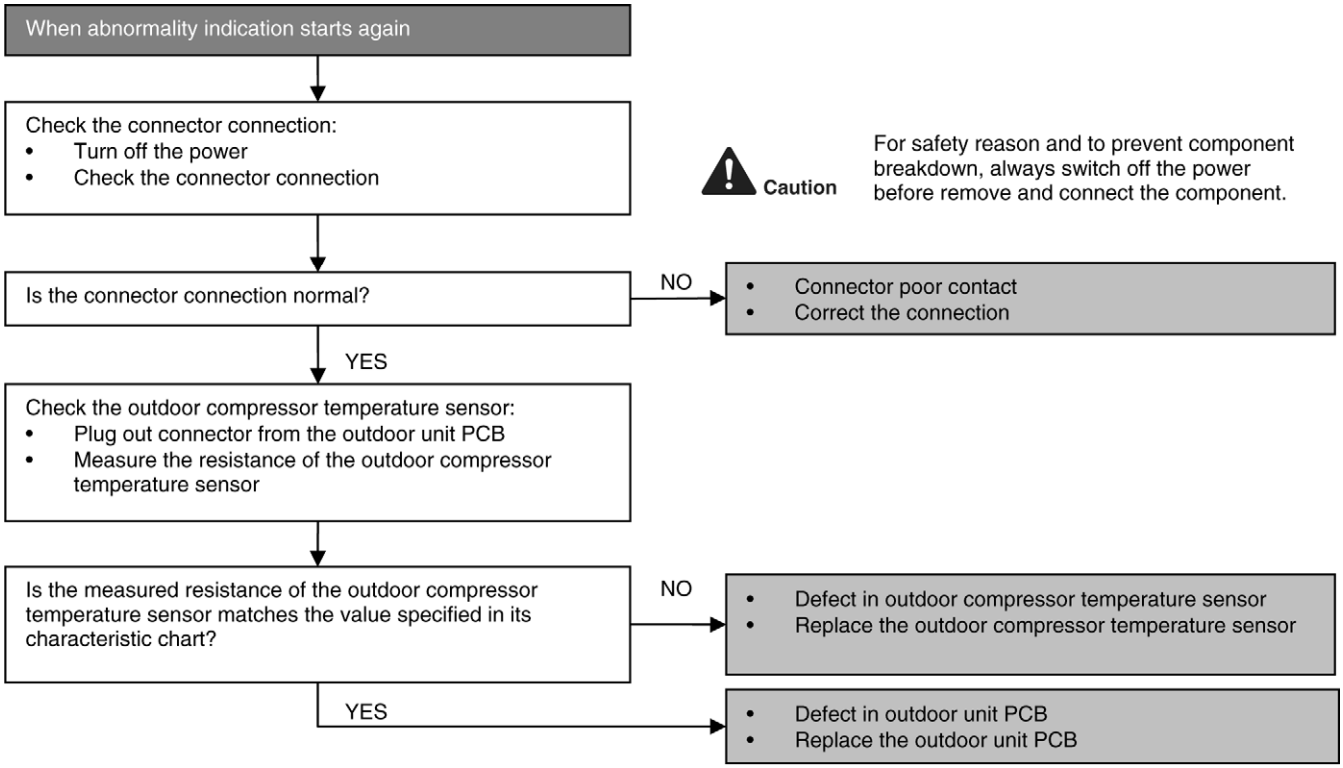
Malfunction Decision Conditions

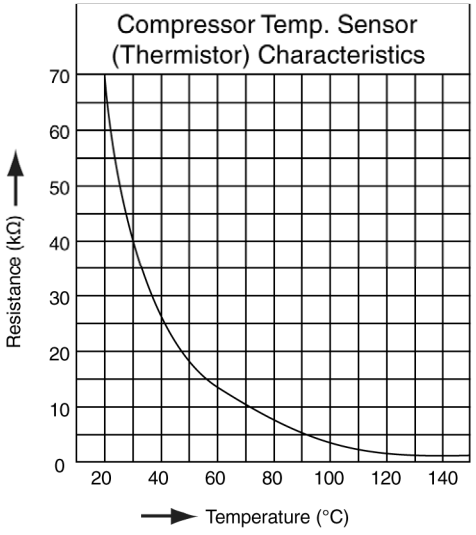
- During startup and operation of cooling and heating, the temperatures detected by the outdoor compressor temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting





18.4.5 H16 (Outdoor Current Transformer)

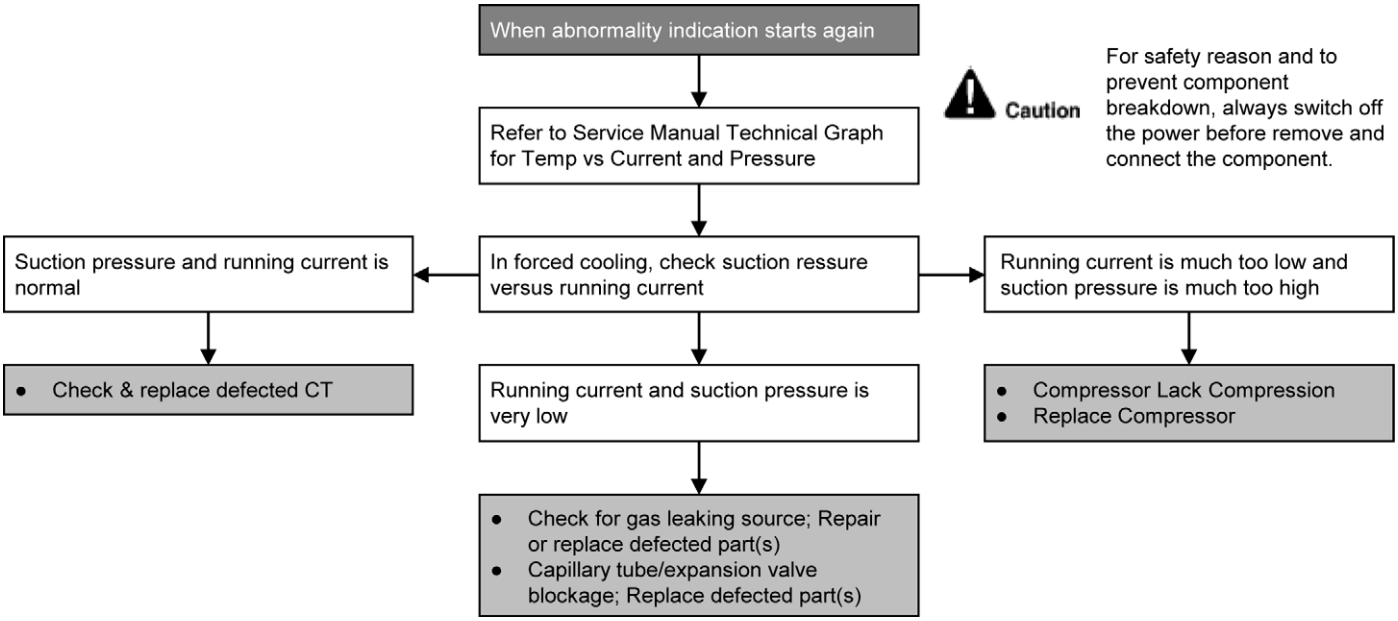
Malfunction Decision Conditions

- An input current, detected by Current Transformer CT, is below threshold value when the compressor is operating at certain frequency value for 3 minutes.

Malfunction Caused

- Lack of gas
- Broken CT (current transformer)
- Broken Outdoor PCB

Troubleshooting



18.4.6 H19 (Indoor Fan Motor – DC Motor Mechanism Locked)

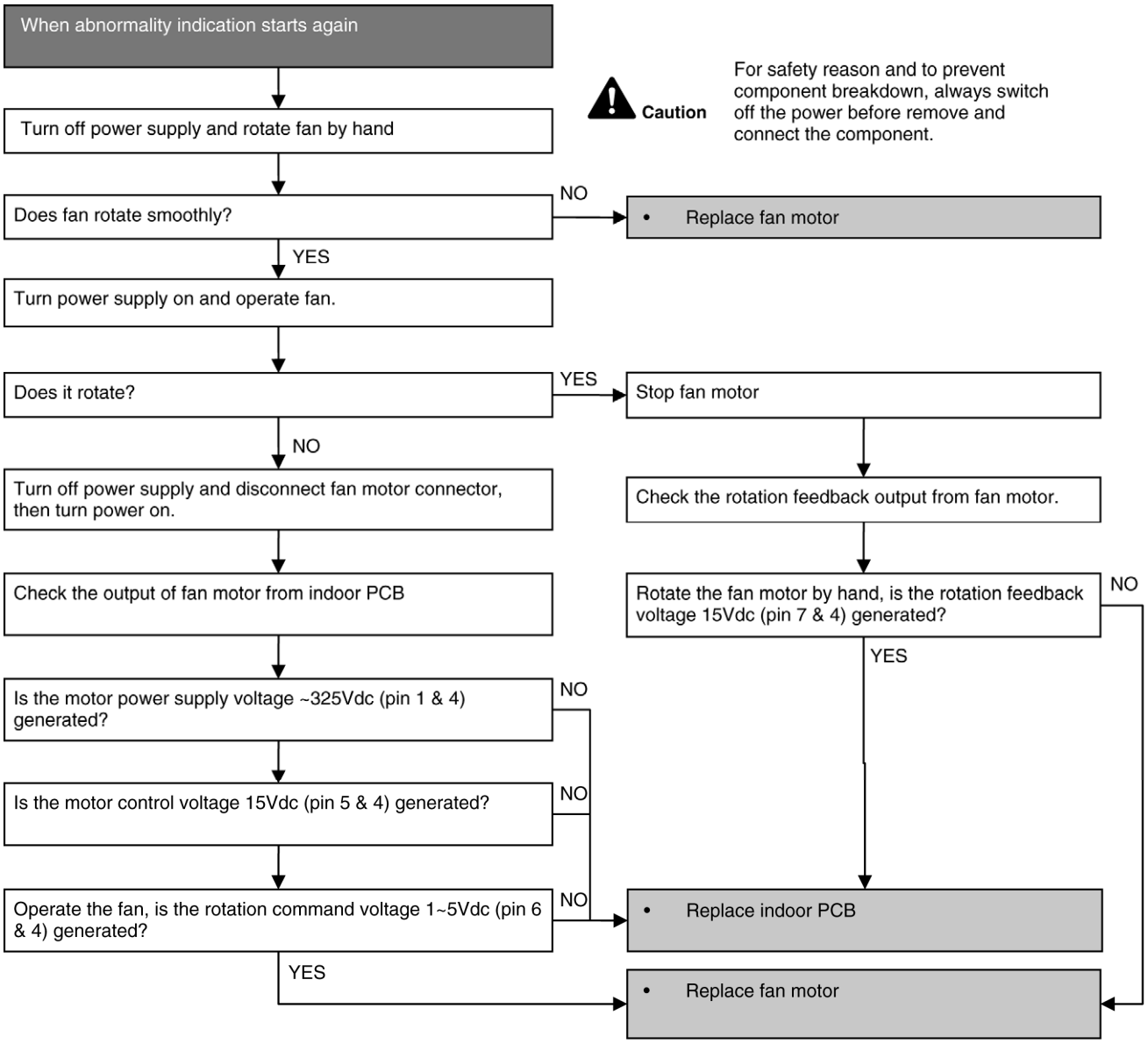
Malfunction Decision Conditions

- The rotation speed detected by the Hall IC during fan motor operation is used to determine abnormal fan motor (feedback of rotation > 2550 rpm or < 50 rpm)

Malfunction Caused

- Operation stops due to short circuit inside the fan motor winding.
- Operation stops due to breaking of wire inside the fan motor.
- Operation stops due to breaking of fan motor lead wires.
- Operation stops due to Hall IC malfunction.
- Operation error due to faulty indoor unit PCB.

Troubleshooting



18.4.7 H23 (Indoor Pipe Temperature Sensor Abnormality)

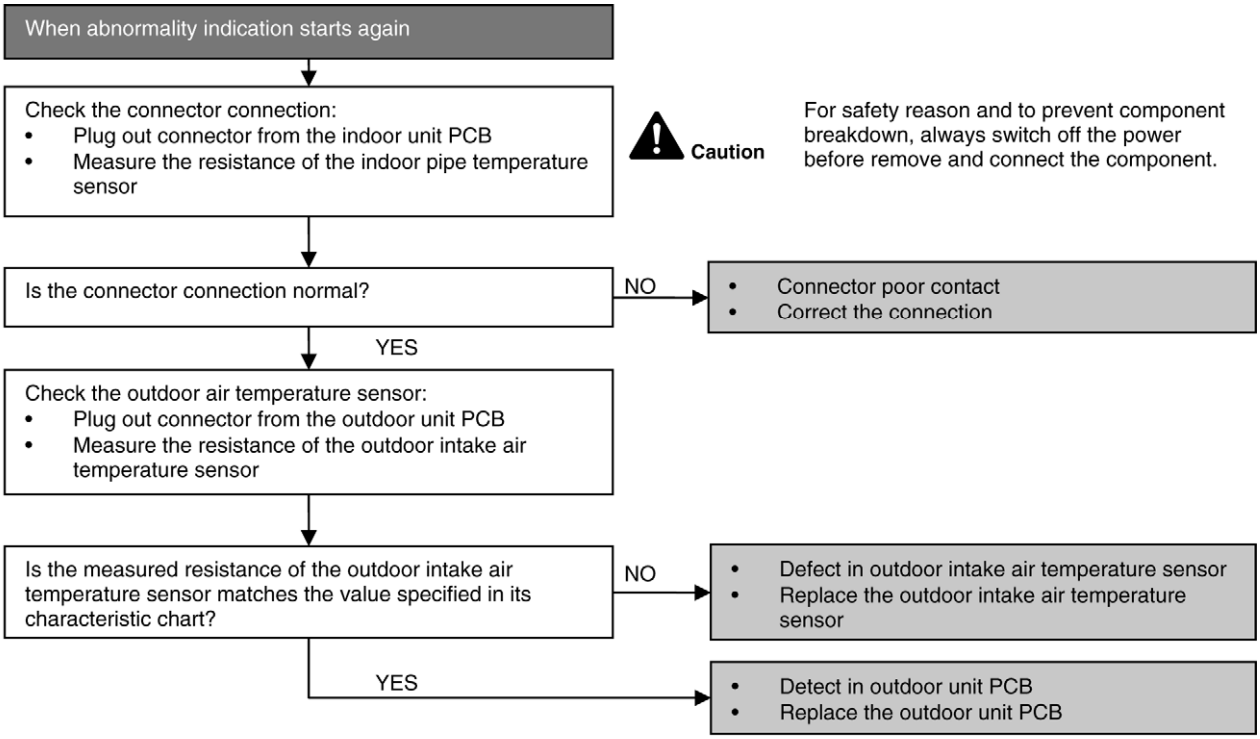
Malfunction Decision Conditions

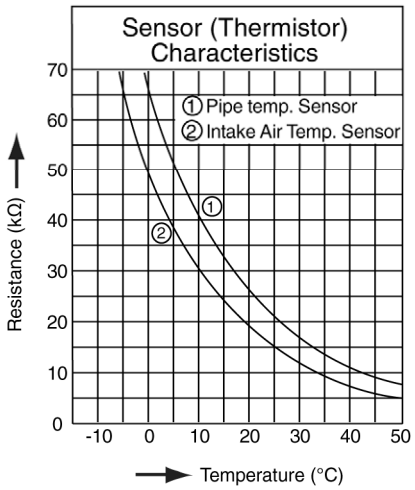
- During startup and operation of cooling and heating, the temperatures detected by the indoor heat exchanger temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting





18.4.8 H27 (Outdoor Air Temperature Sensor Abnormality)

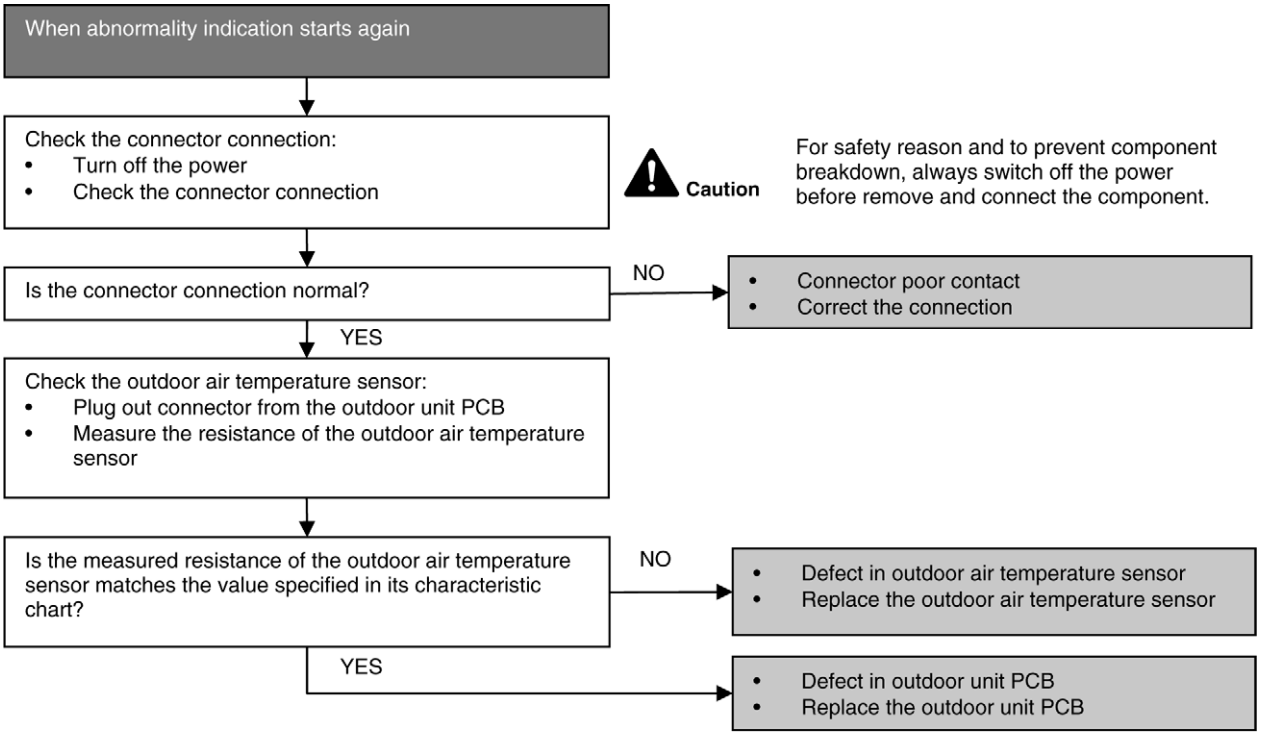
Malfunction Decision Conditions

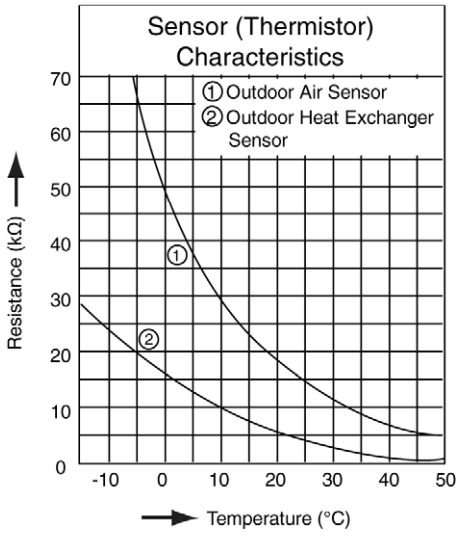
- During startup and operation of cooling and heating, the temperatures detected by the outdoor air temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting





18.4.9 H28 (Outdoor Pipe Temperature Sensor Abnormality)

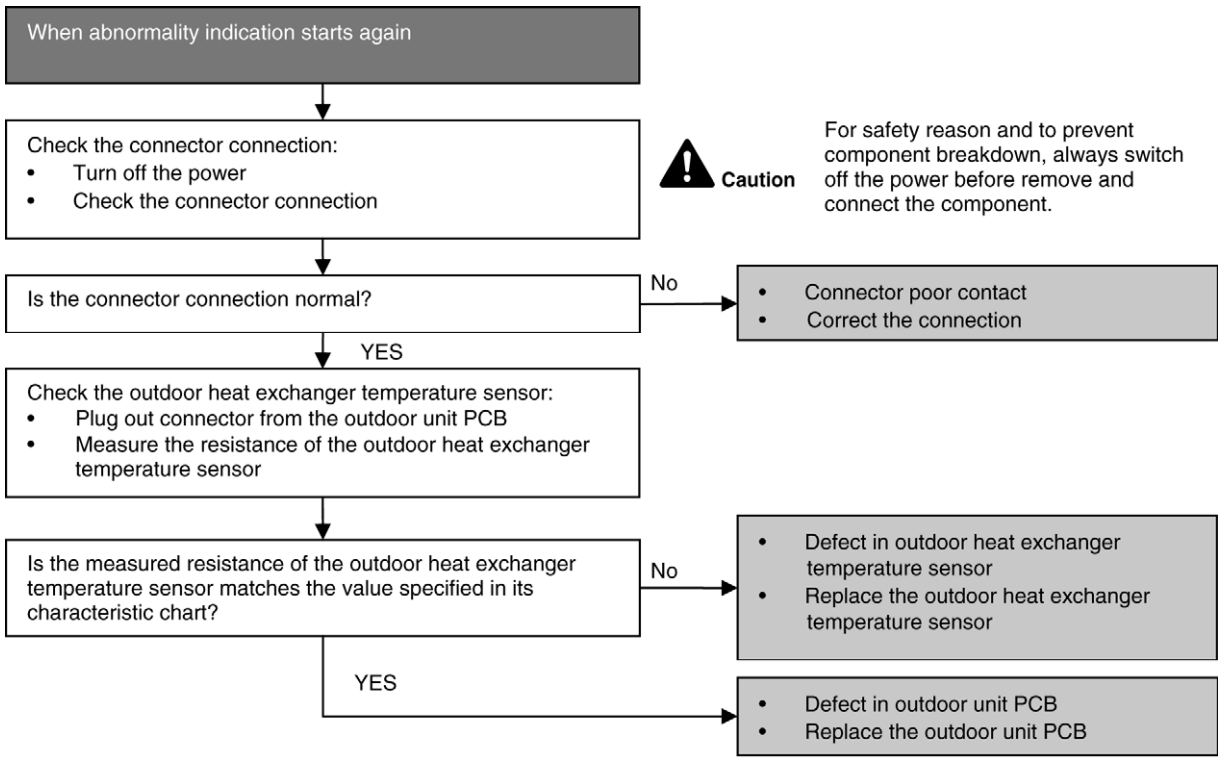
Malfunction Decision Conditions

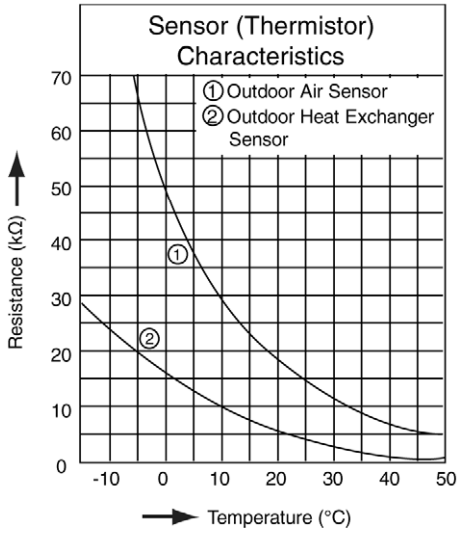
- During startup and operation of cooling and heating, the temperatures detected by the outdoor pipe temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting





18.4.10 H30 (Compressor Discharge Temperature Sensor Abnormality)

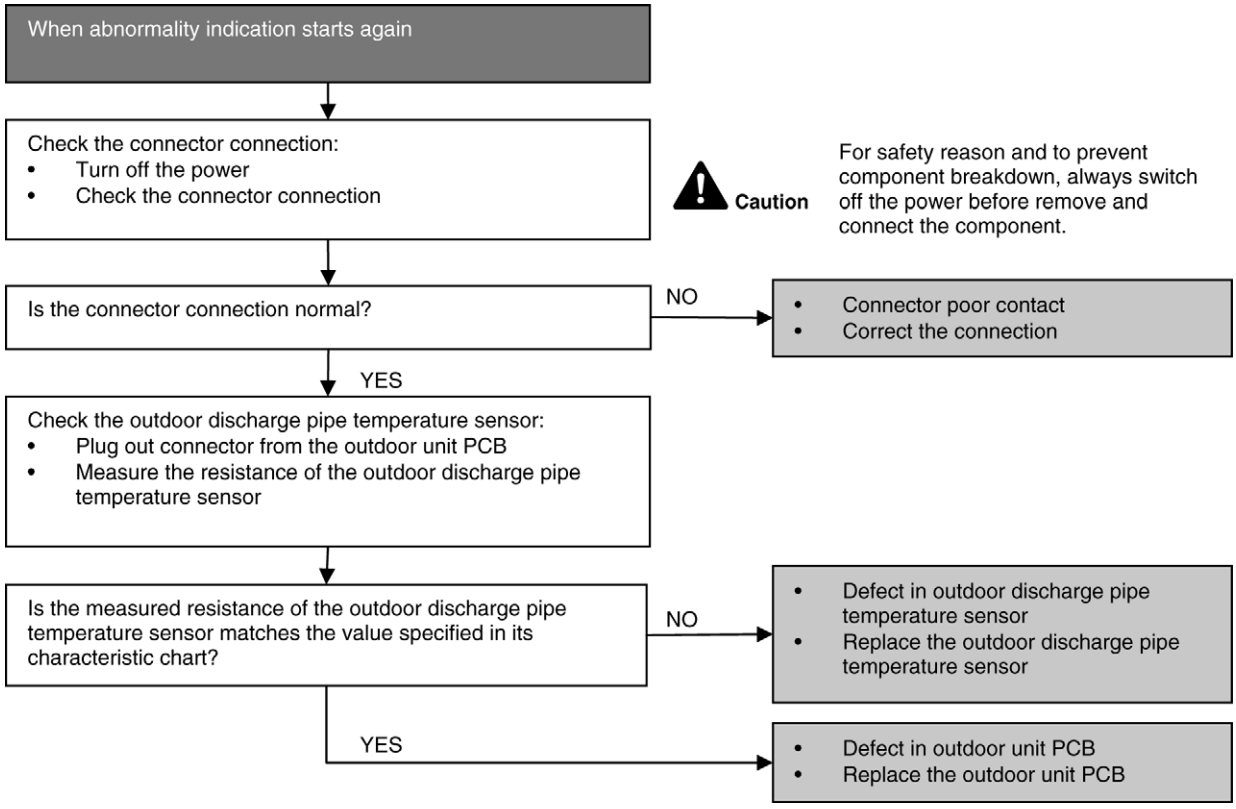
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor discharge pipe temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting



18.4.11 H32 (Outdoor Heat Exchanger Temperature Sensor 2 Abnormality)

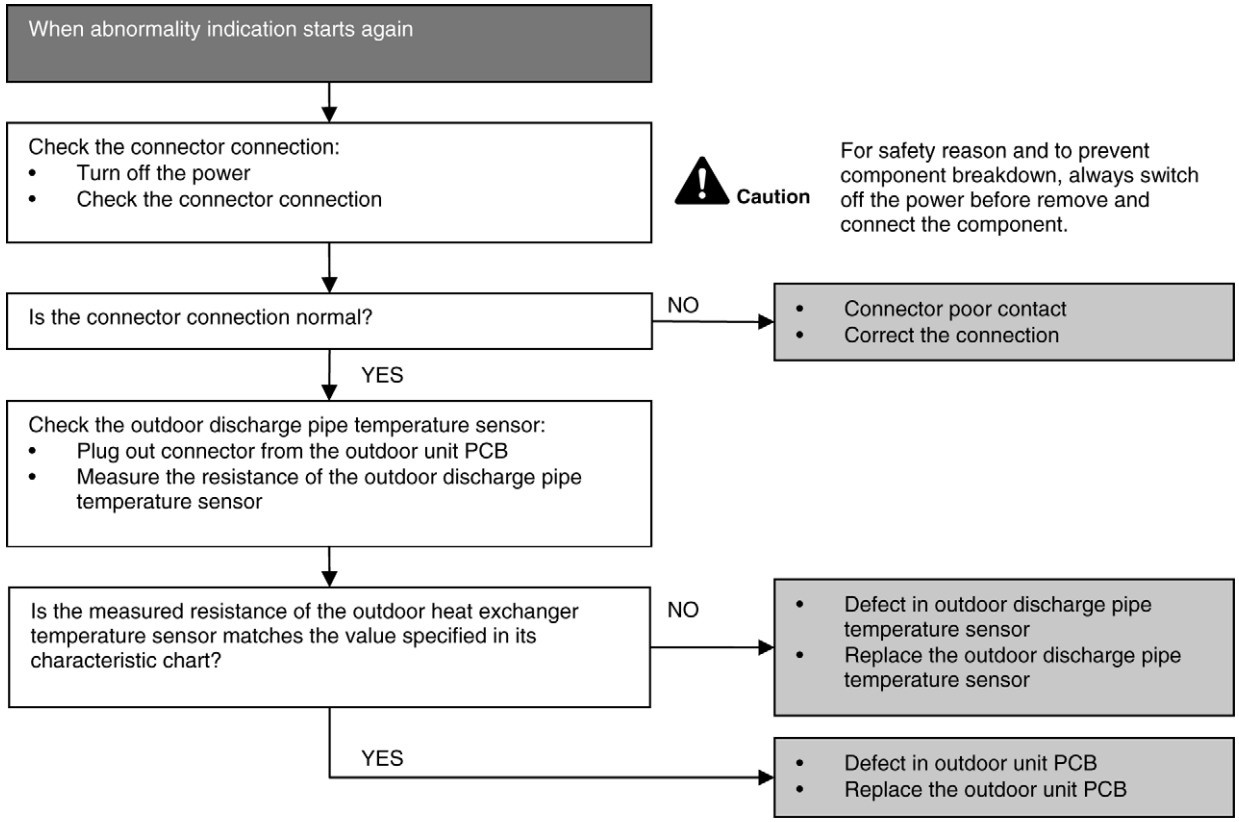
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor heat exchanger temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting



18.4.12 H33 (Unspecified Voltage between Indoor and Outdoor)

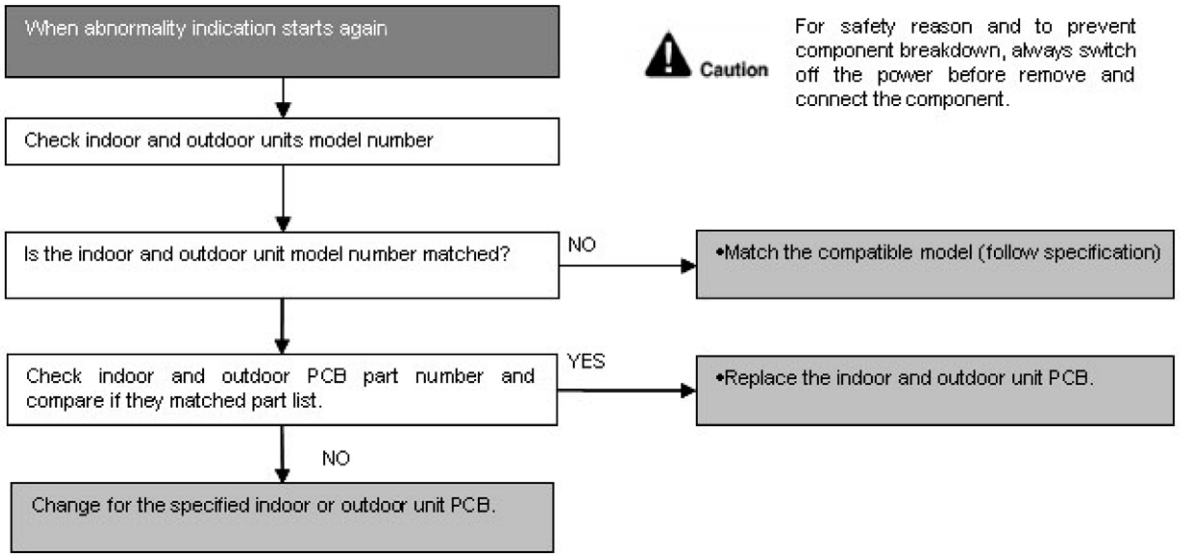
Malfunction Decision Conditions

- The supply power is detected for its requirement by the indoor/outdoor transmission.

Malfunction Caused

- Wrong models interconnected.
- Wrong indoor unit and outdoor unit PCBs used.
- Indoor unit or outdoor unit PCB defective.

Troubleshooting



18.4.13 H34 (Outdoor Heat Sink Temperature Sensor Abnormality)

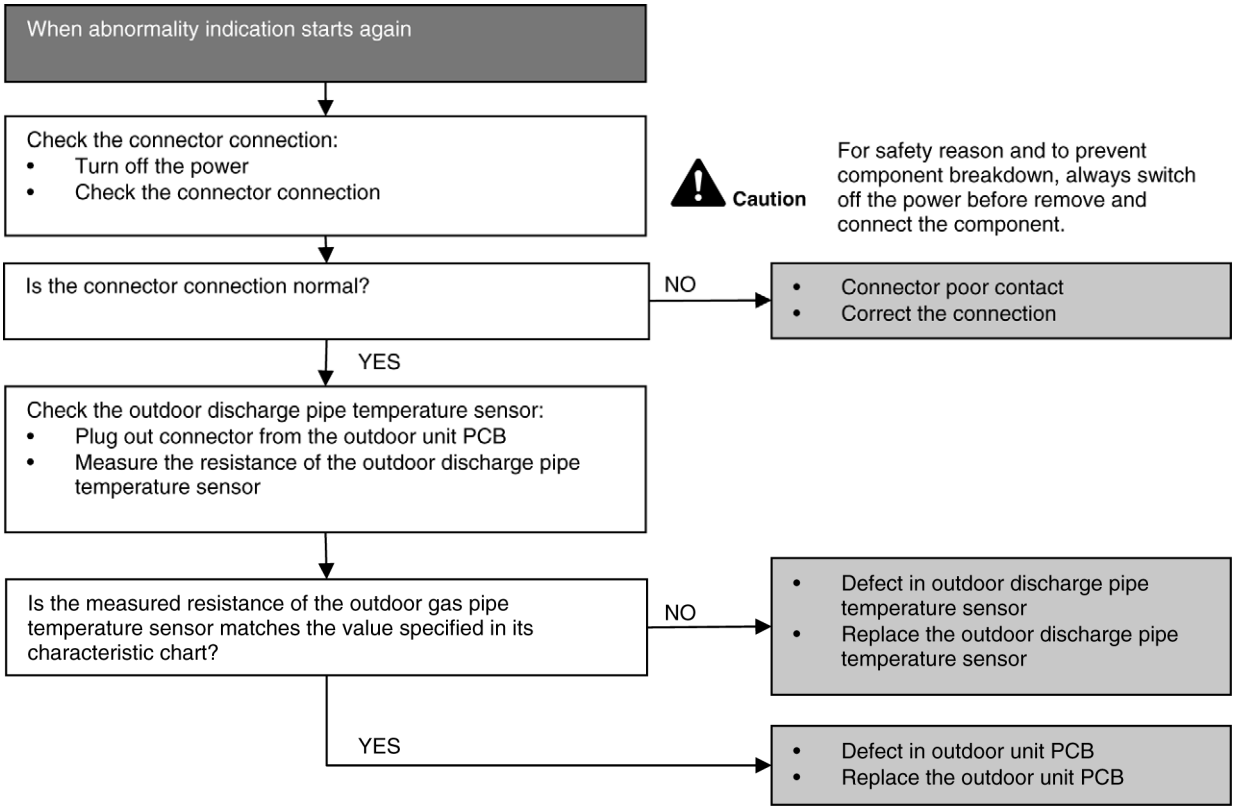
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor heat sink temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting



18.4.14 H36 (Outdoor Gas Pipe Sensor Abnormality)

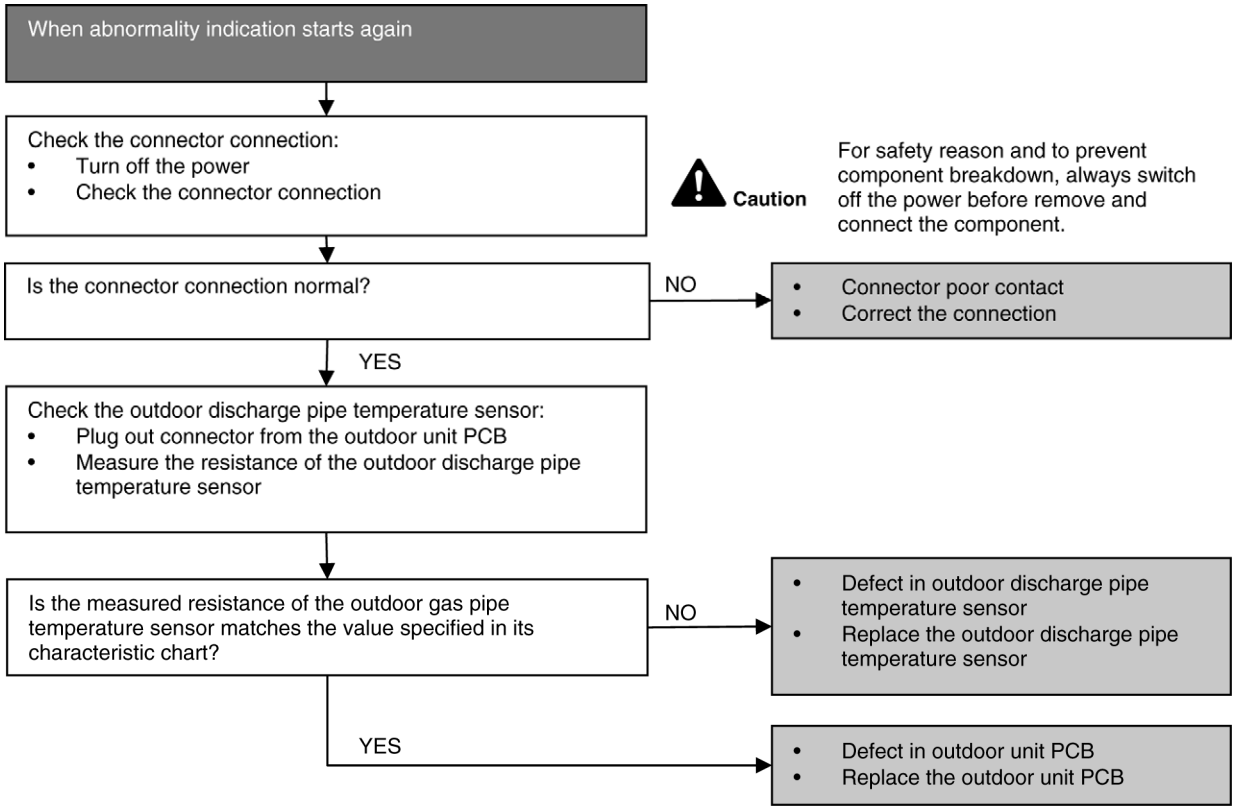
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor gas pipe temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting



18.4.15 H37 (Outdoor Liquid Pipe Temperature Sensor Abnormality)

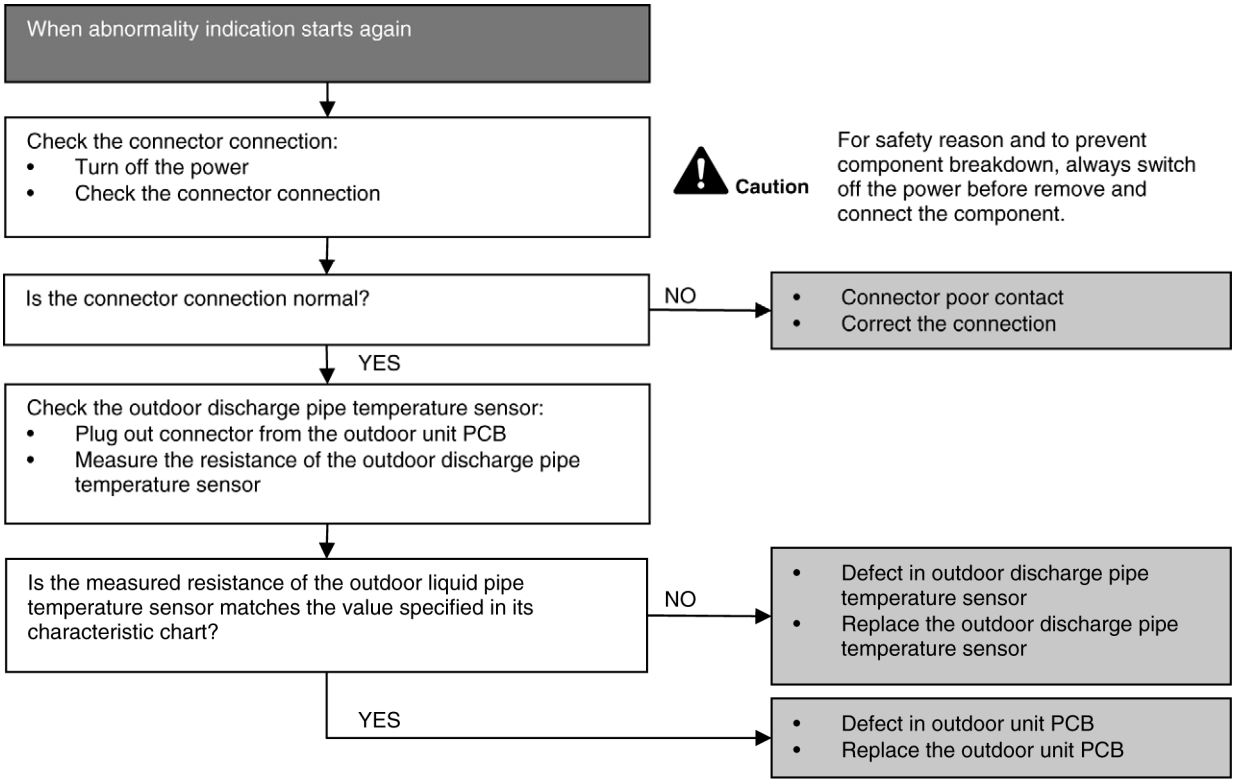
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor liquid pipe temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting



18.4.16 H97 (Outdoor Fan Motor – DC Motor Mechanism Locked) (Z7/9/12/15SKE)

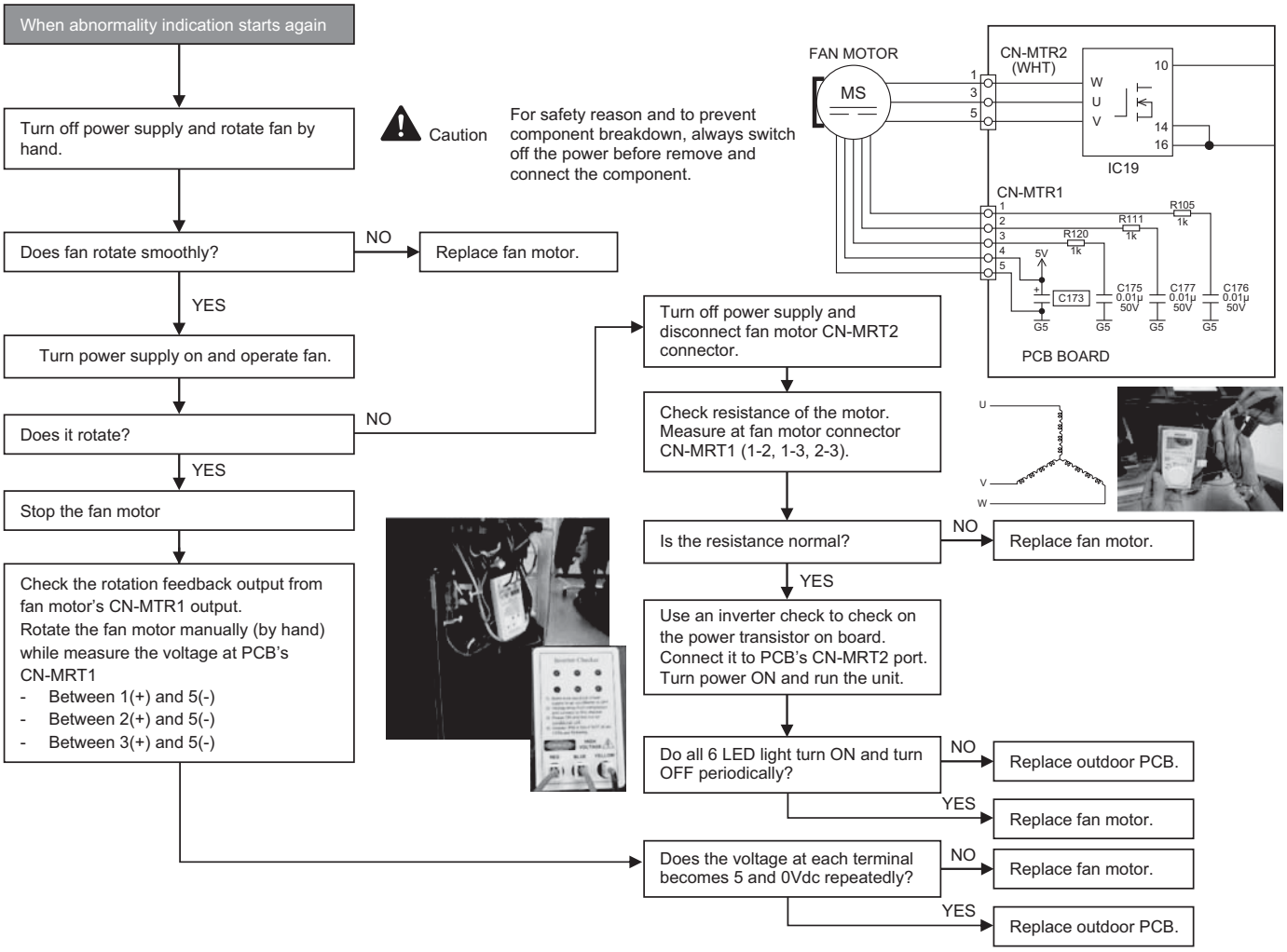
Malfunction Decision Conditions

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

Malfunction Caused

- Operation stops due to short circuit inside the fan motor winding.
- Operation stops due to breaking of wire inside the fan motor.
- Operation stops due to breaking of fan motor lead wires.
- Operation stops due to Hall IC malfunction.
- Operation error due to faulty outdoor unit PCB.

Troubleshooting



18.4.17 H97 (Outdoor Fan Motor – DC Motor Mechanism Locked) (Z18SKE)

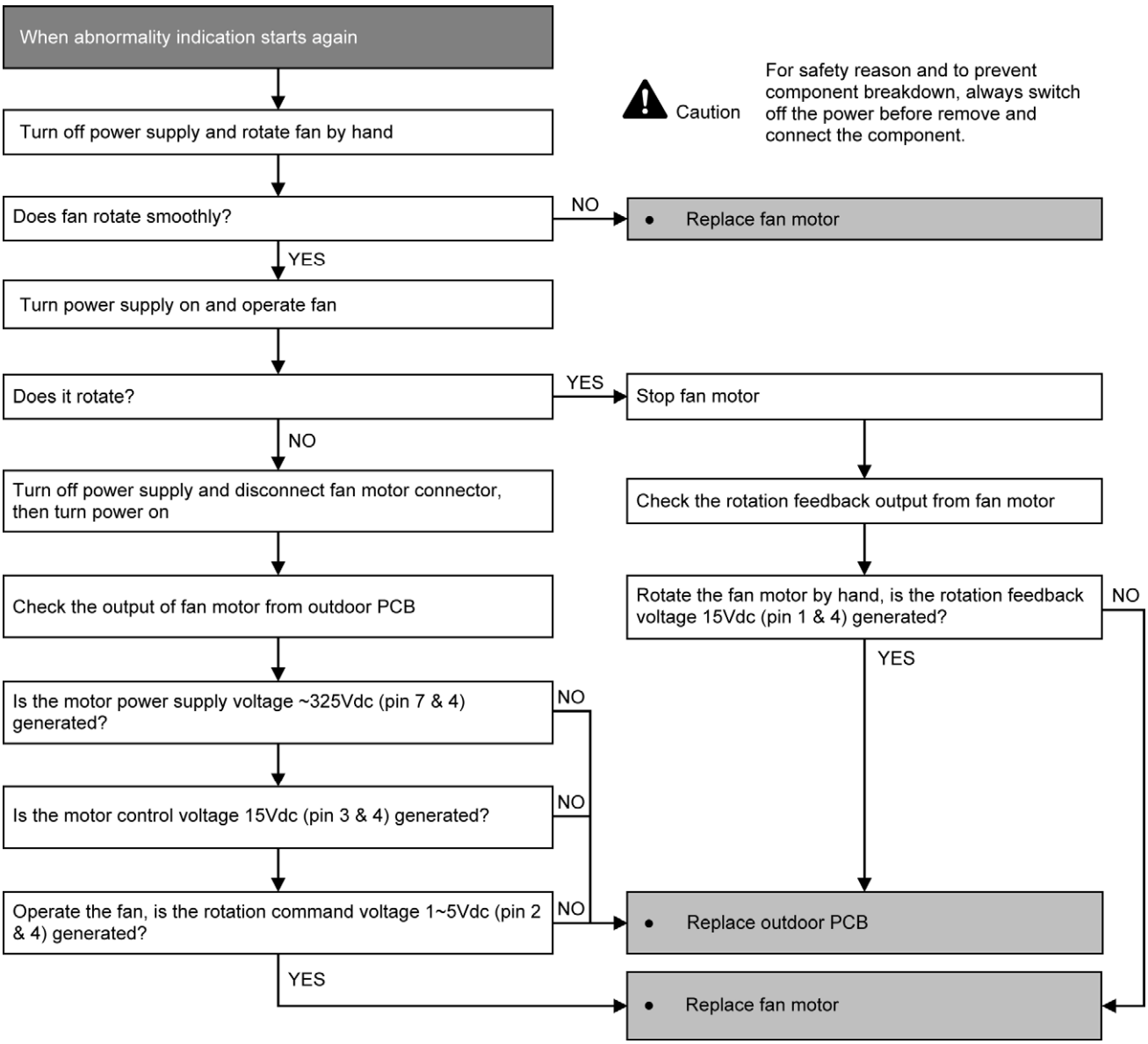
Malfunction Decision Conditions

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

Malfunction Caused

- Operation stops due to short circuit inside the fan motor winding.
- Operation stops due to breaking of wire inside the fan motor.
- Operation stops due to breaking of fan motor lead wires.
- Operation stops due to Hall IC malfunction.
- Operation error due to faulty outdoor unit PCB.

Troubleshooting



18.4.18 H98 (Error Code Stored in Memory and no alarm is triggered / no TIMER LED flashing)

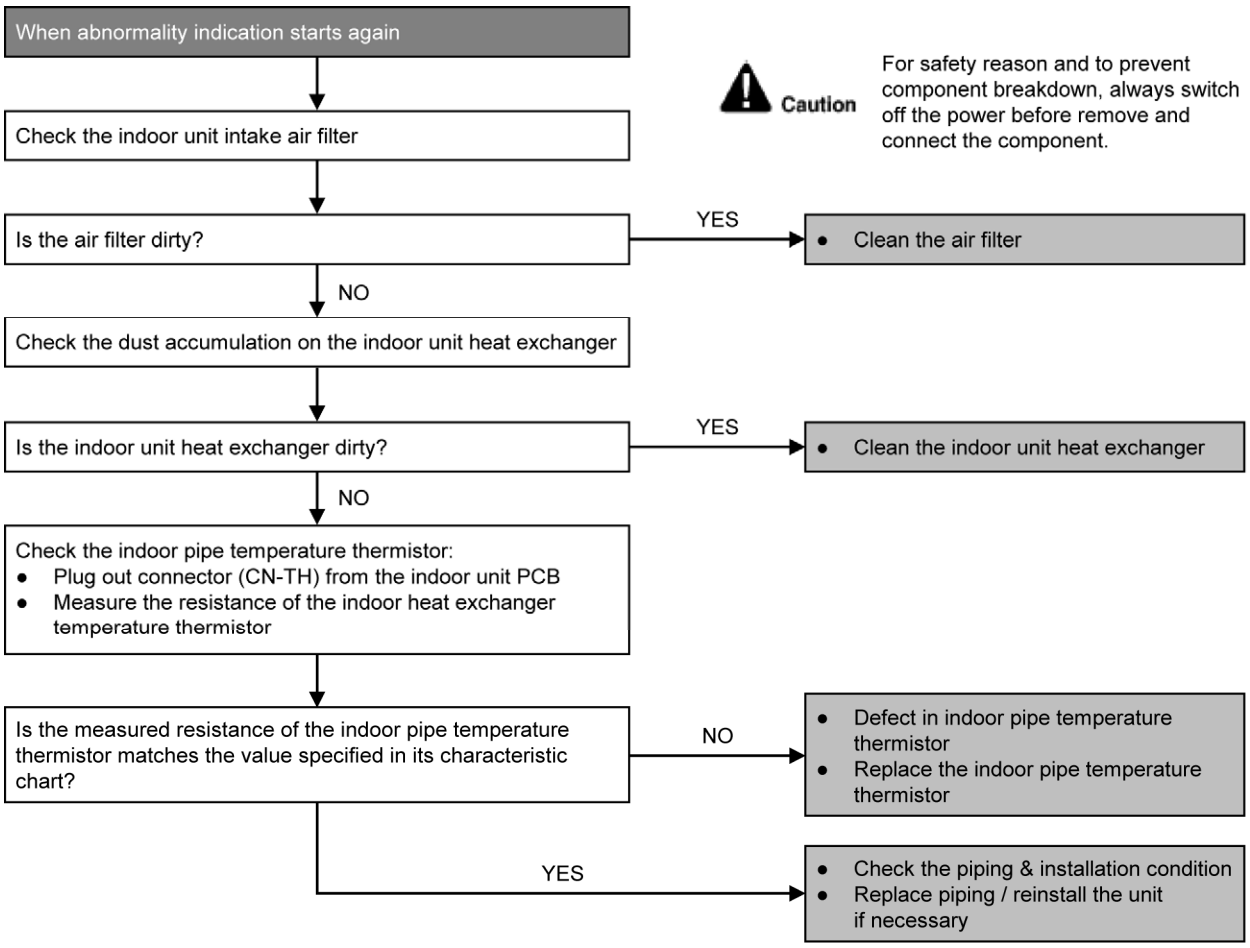
Malfunction Decision Conditions

- Indoor high pressure is detected when indoor heat exchanger is detecting very high temperature when the unit is operating in heating operation.
- Phenomena: unit is stopping and re-starting very often in heating mode

Malfunction Caused

- Indoor heat exchanger thermistor
- Clogged air filter or heat exchanger
- Over-bent pipe (liquid side)

Troubleshooting



18.4.19 H99 (Indoor Freeze Prevention Protection: Cooling or Soft Dry)

Error Code will not display (no Timer LED blinking) but store in EEPROM

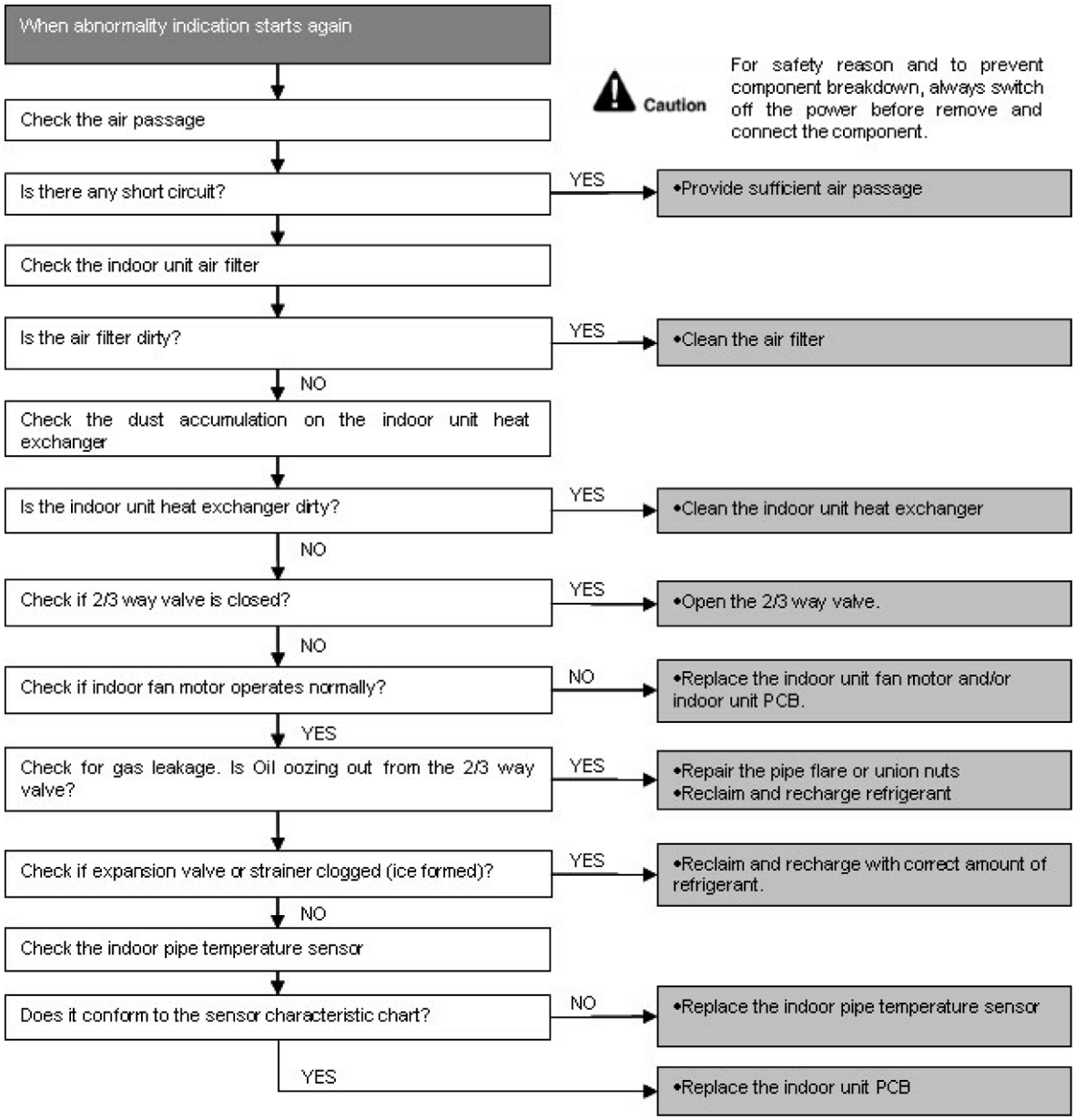
Malfunction Decision Conditions

- Freeze prevention control takes place (when indoor pipe temperature is lower than 2°C)

Malfunction Caused

- Air short circuit at indoor unit
- Clogged indoor unit air filter
- Dust accumulation on the indoor unit heat exchanger
- 2/3 way valve closed
- Faulty indoor unit fan motor
- Refrigerant shortage (refrigerant leakage)
- Clogged expansion valve or strainer
- Faulty indoor pipe temperature sensor
- Faulty indoor unit PCB

Troubleshooting



18.4.20 F11 (4-way Valve Switching Failure)

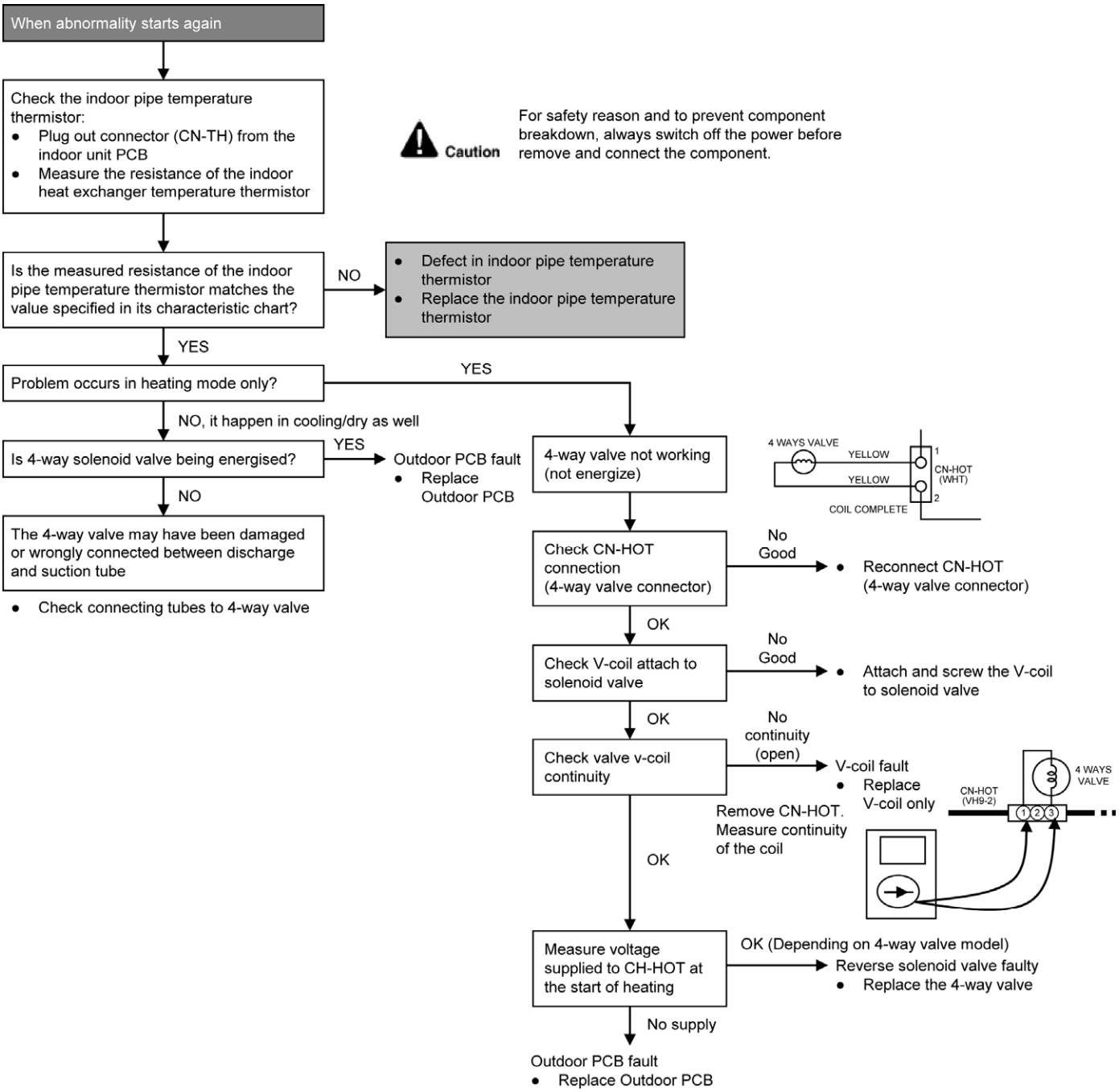
Malfunction Decision Conditions

- When indoor heat exchanger is cold during heating (except deice) or when indoor heat exchanger is hot during cooling and compressor operating, the 4-way valve is detected as malfunction.

Malfunction Caused

- Indoor heat exchanger (pipe) thermistor
- 4-way valve malfunction

Troubleshooting



* Check gas side pipe – for hot gas flow in cooling mode

18.4.21 F17 (Indoor Standby Units Freezing Abnormality)

Malfunction Decision Conditions

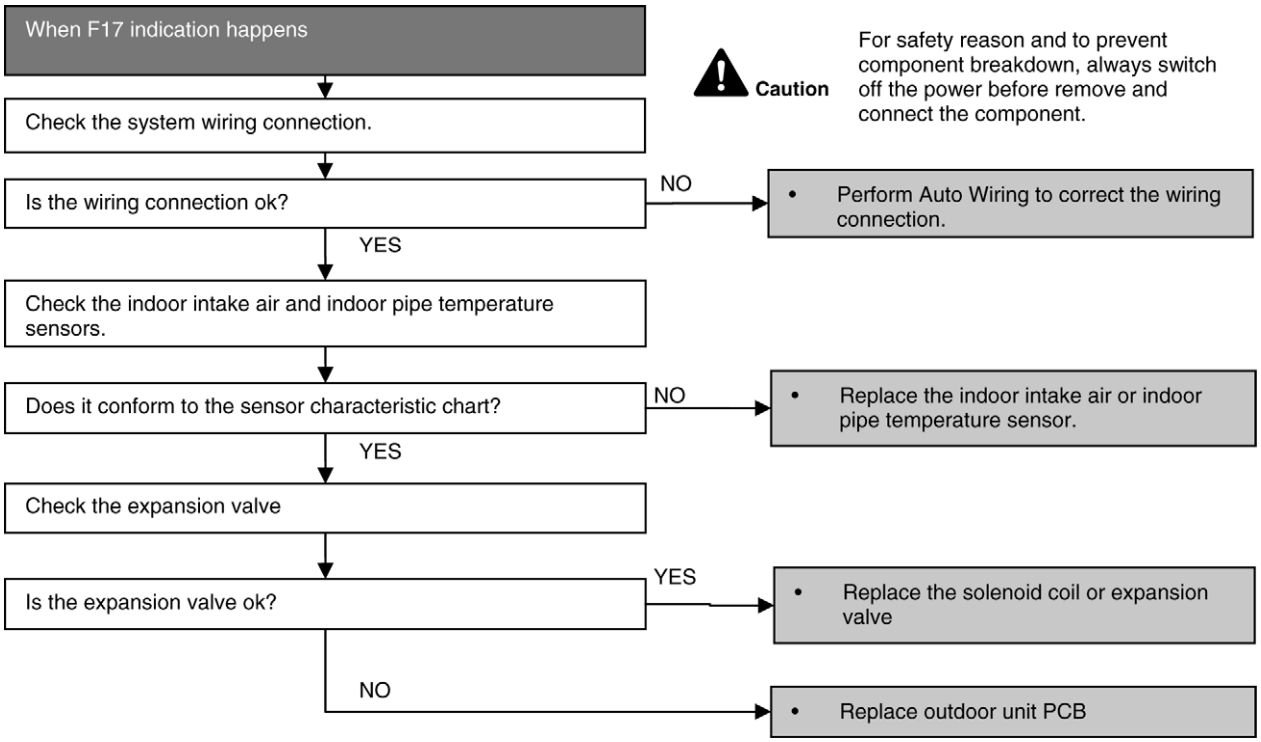
- When the different between indoor intake air temperature and indoor pipe temperature is above 10°C or indoor pipe temperature is below -1.0°C.

  Remark:
  When the indoor standby unit is freezing, the outdoor unit transfers F17 error code to the corresponding indoor unit and H39 to other indoor unit(s).

Malfunction Caused

- Wrong wiring connection
- Faulty sensor
- Faulty expansion valve

Troubleshooting



18.4.22 F90 (Power Factor Correction Protection)

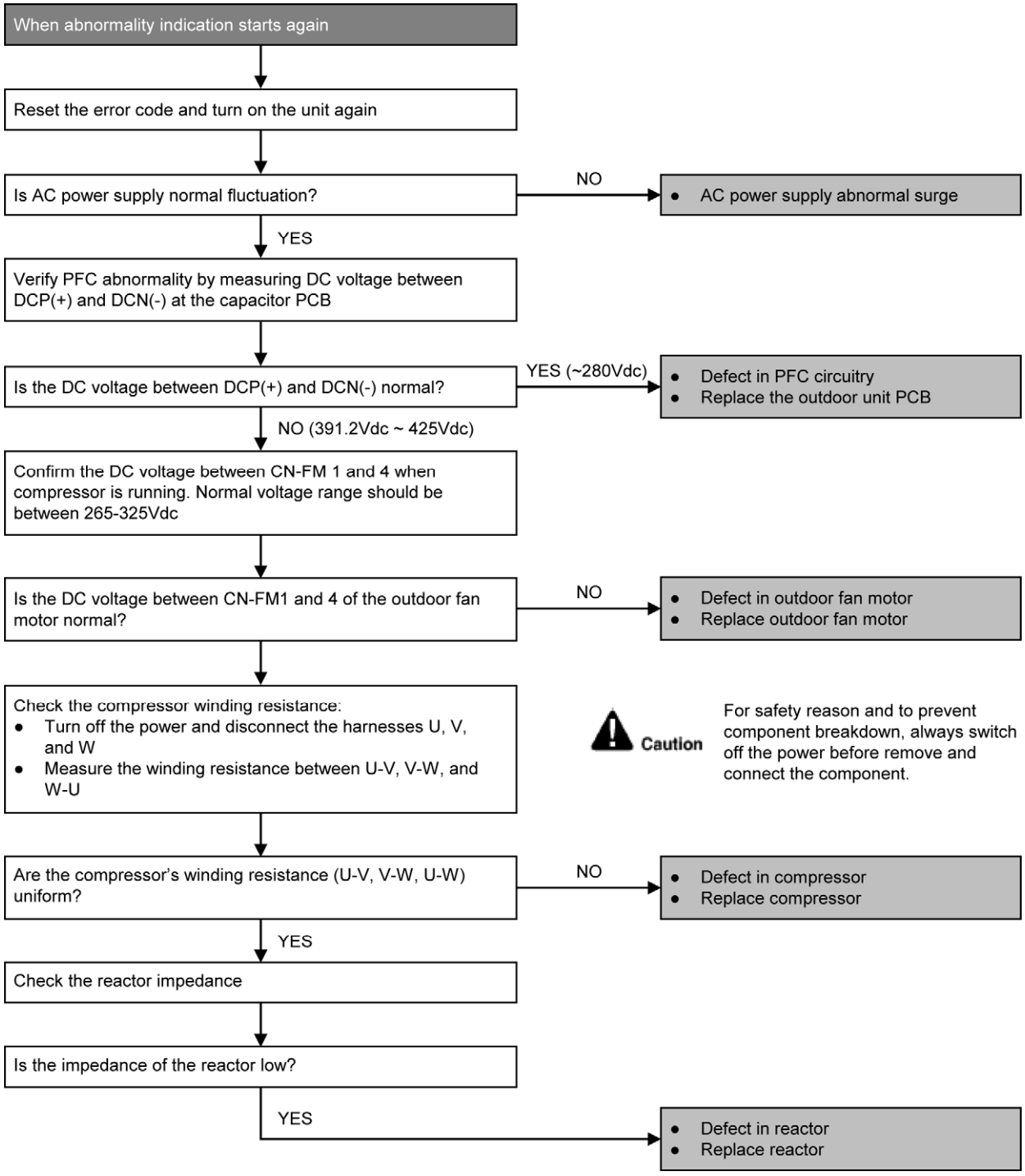
Malfunction Decision Conditions

- To maintain DC voltage level supply to power transistor.
- To detect high DC voltage level after rectification.

Malfunction Caused

- During startup and operation of cooling and heating, when Power Factor Correction (PFC) protection circuitry at the outdoor unit main PCB senses abnormal DC voltage level for power transistors.
- When DC voltage detected is LOW, transistor switching will turn ON by controller to push-up the DC level.
- When DC voltage detected is HIGH (391Vdc – 425Vdc), active LOW signal will send by the controller to turn OFF relay RY-C.

Troubleshooting



18.4.23 F91 (Refrigeration Cycle Abnormality)

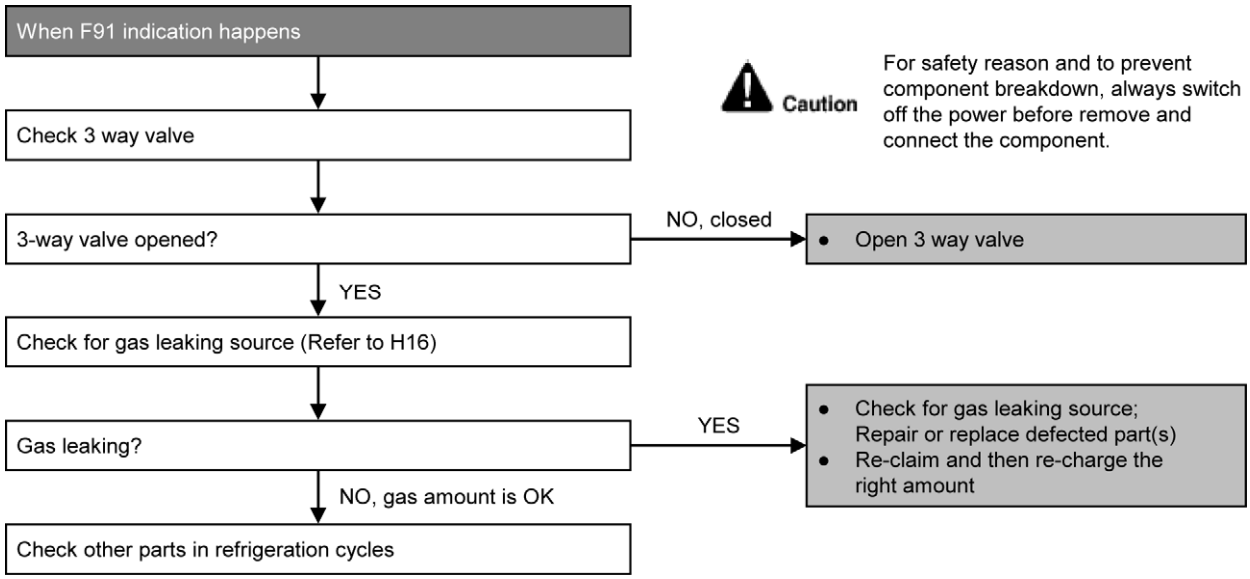
Malfunction Decision Conditions

- The input current is low while the compressor is running at higher than the setting frequency.

Malfunction Caused

- Lack of gas.
- 3-way valve close.

Troubleshooting



18.4.24 F93 (Compressor Rotation Failure)

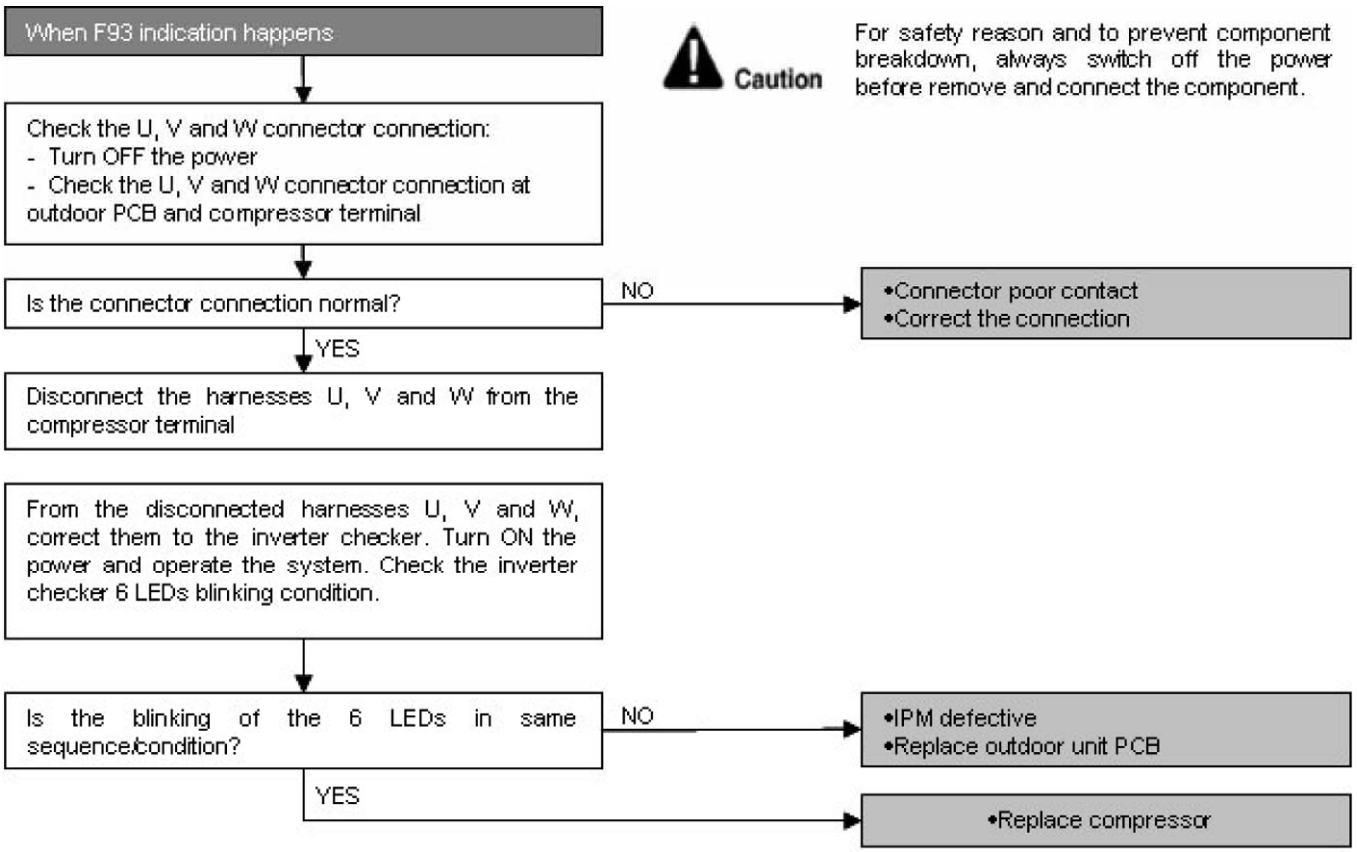
Malfunction Decision Conditions

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

Malfunction Caused

- Compressor terminal disconnect
- Faulty Outdoor PCB
- Faulty compressor

Troubleshooting



18.4.25 F95 (Outdoor High Pressure Protection: Cooling or Soft Dry)

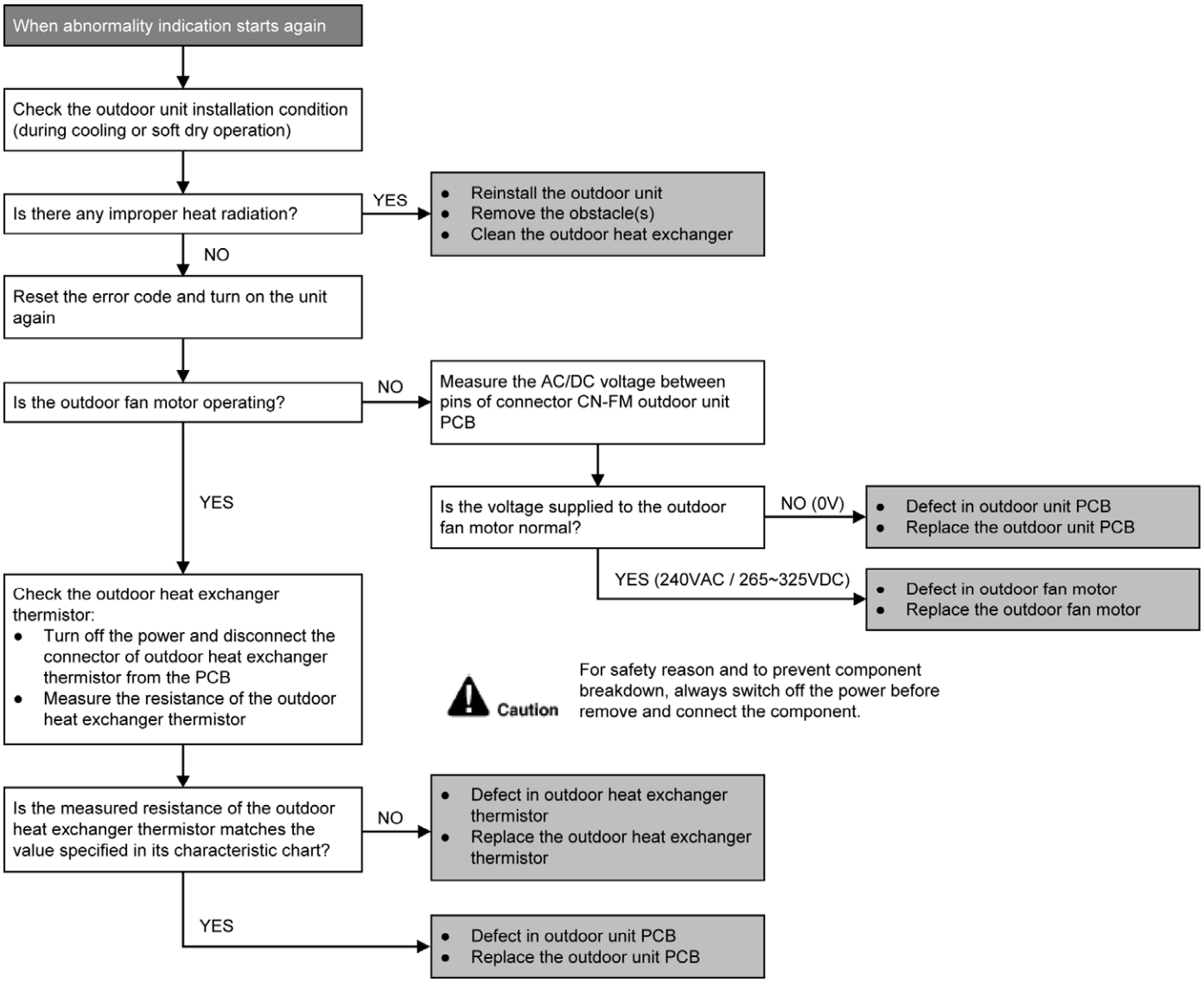
Malfunction Decision Conditions

- During operation of cooling or soft dry, when outdoor unit heat exchanger high temperature data is detected by the outdoor unit heat exchanger thermistor.

Malfunction Caused

- Outdoor heat exchanger temperature rise due to short-circuit of hot discharge air flow.
- Outdoor heat exchanger temperature rise due to defective of outdoor fan motor.
- Outdoor heat exchange temperature rise due to defective outdoor heat exchanger thermistor.
- Outdoor heat exchanger temperature rise due to defective of outdoor unit PCB.

Troubleshooting



18.4.26 F96 (IPM Overheating)

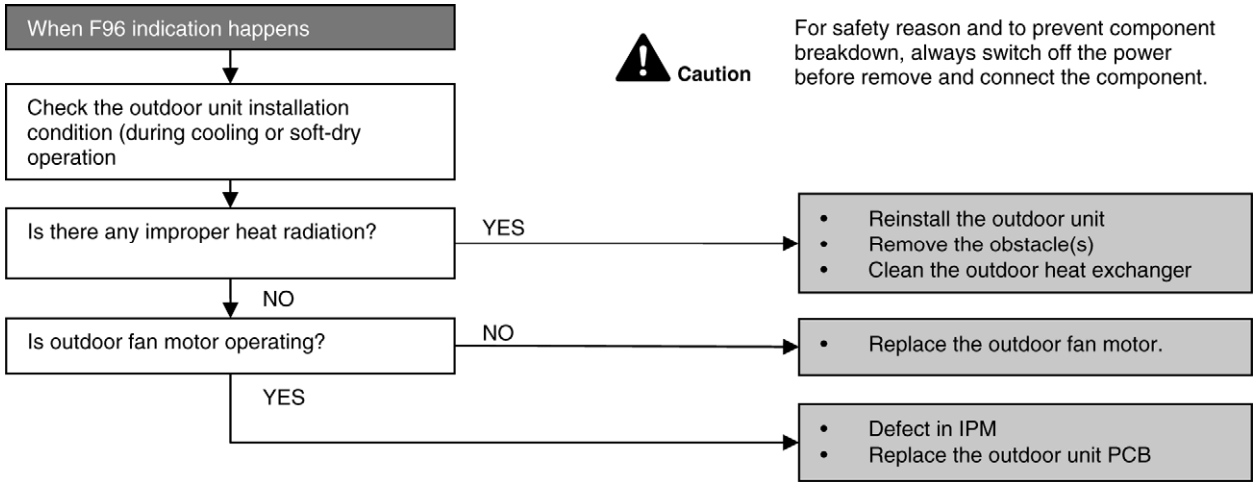
Malfunction Decision Conditions

- During operating of cooling and heating, when IPM temperature data (100°C) is detected by the IPM temperature sensor.
  Multi Models only
  - Compressor Overheating: During operation of cooling and heating, when the compressor OL is activated.
  - Heat Sink Overheating: During operation of cooling and heating, when heat sink temperature data (90°C) is detected by the heat sink temperature sensor.

Malfunction Caused

- IPM overheats due to short circuit of hot discharge air flow.
- IPM overheats due to defective of outdoor fan motor.
- IPM overheats due to defective of internal circuitry of IPM.
- IPM overheats due to defective IPM temperature sensor.
  Multi Models Only
  - Compressor OL connector poor contact.
  - Compressor OL faulty.

Troubleshooting



18.4.27 F97 (Compressor Overheating)

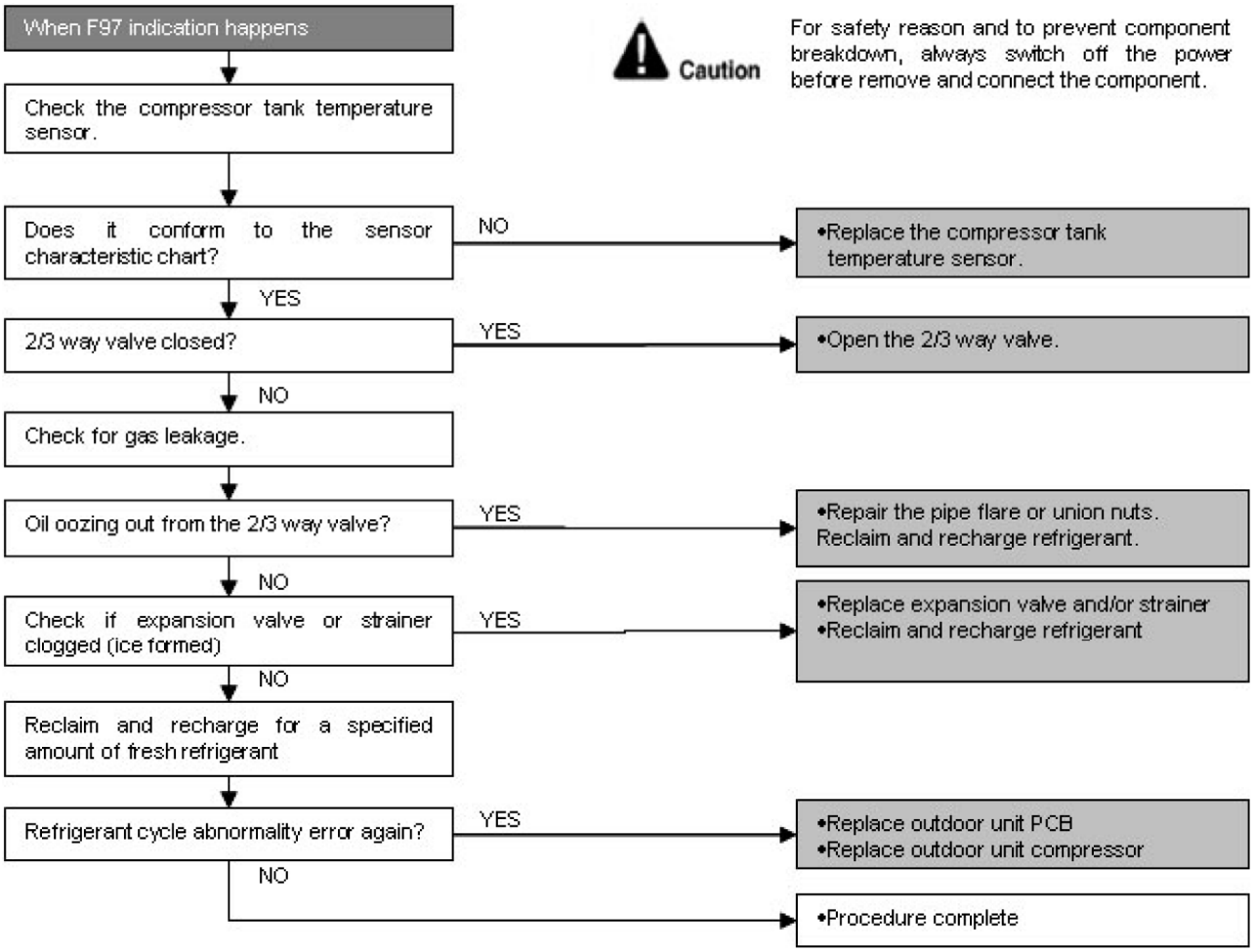
Malfunction Decision Conditions

- During operation of cooling and heating, when compressor tank temperature data (112°C) is detected by the compressor tank temperature sensor.

Malfunction Caused

- Faulty compressor tank temperature sensor
- 2/3 way valve closed
- Refrigerant shortage (refrigerant leakage)
- Faulty outdoor unit PCB
- Faulty compressor

Troubleshooting



18.4.28 F98 (Input Over Current Detection)

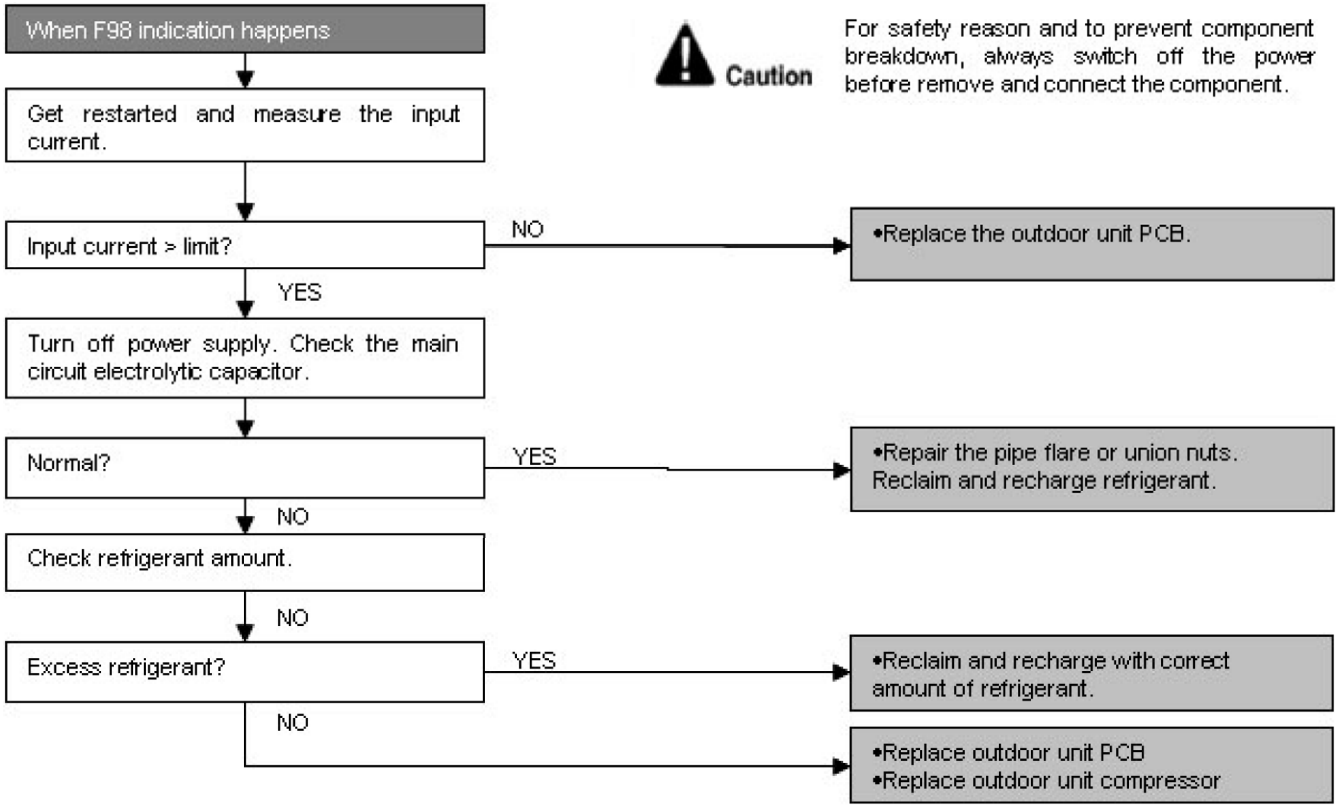
Malfunction Decision Conditions

- During operation of cooling and heating, when an input over-current (X value in Total Running Current Control) is detected by checking the input current value being detected by current transformer (CT) with the compressor running.

Malfunction Caused

- Excessive refrigerant.
- Faulty outdoor unit PCB.

Troubleshooting



18.4.29 F99 (DC Peak Detection)

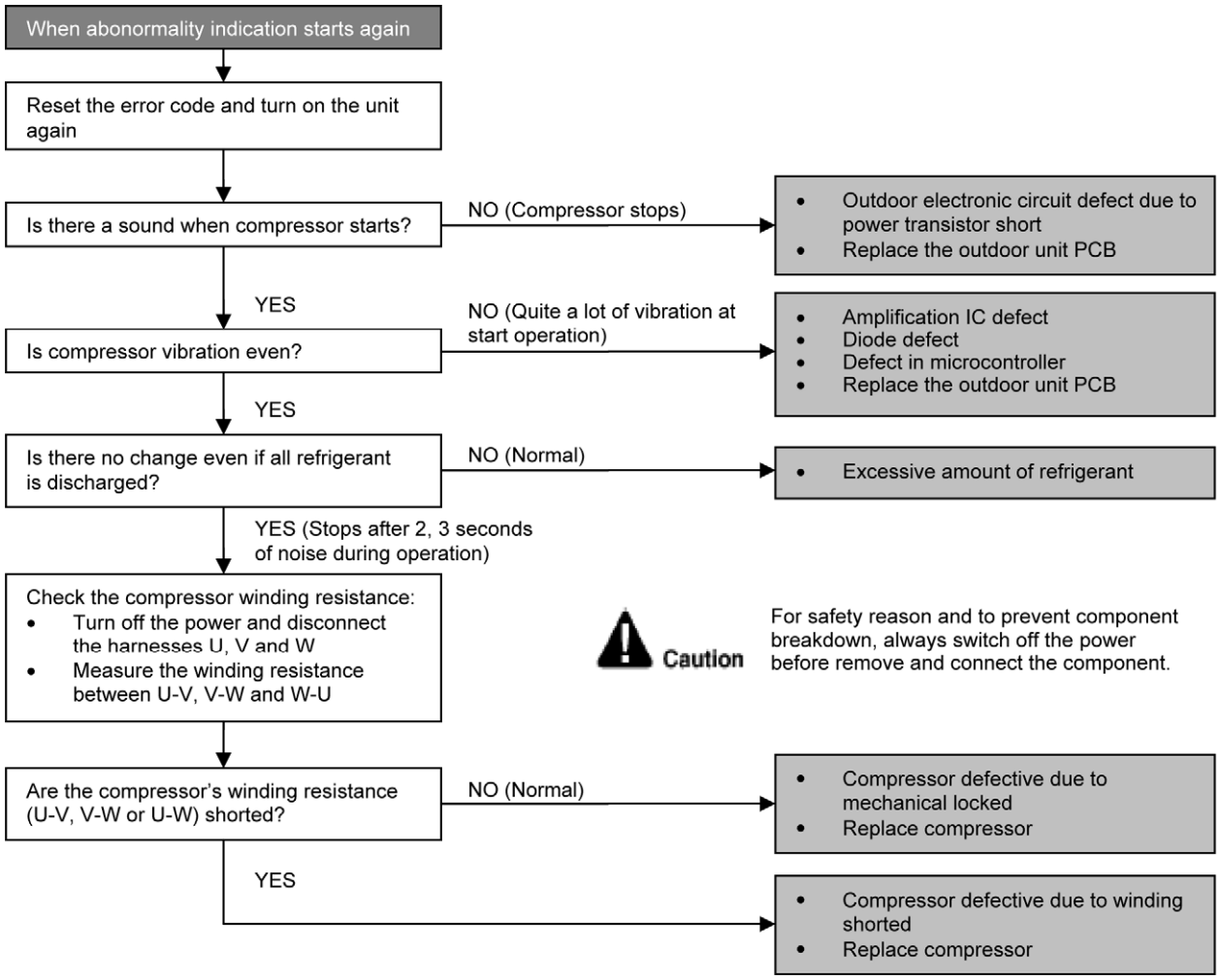
Malfunction Decision Conditions

During startup and operation of cooling and heating, when inverter DC peak data is received by the outdoor internal DC Peak sensing circuitry.

Malfunction Caused

- DC current peak due to compressor failure.
- DC current peak due to defective power transistor(s).
- DC current peak due to defective outdoor unit PCB.
- DC current peak due to short circuit.

Troubleshooting



19. Disassembly and Assembly Instructions

⚠ WARNING

High Voltage is generated in the electrical parts area by the capacitor. Ensure that the capacitor has discharged sufficiently before proceeding with repair work. Failure to heed this caution may result in electric shocks.

19.1 Indoor Electronic Controllers, Cross Flow Fan and Indoor Fan Motor Removal Procedures

19.1.1 To Remove Front Grille

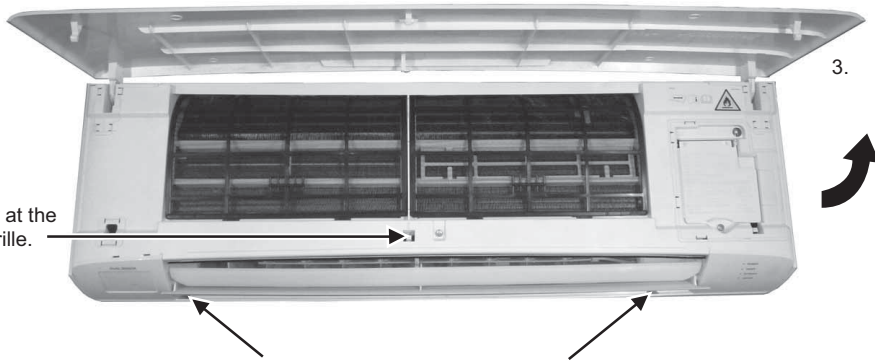
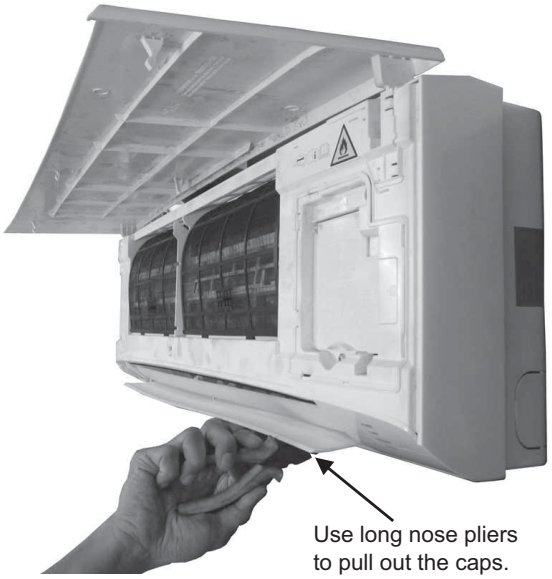
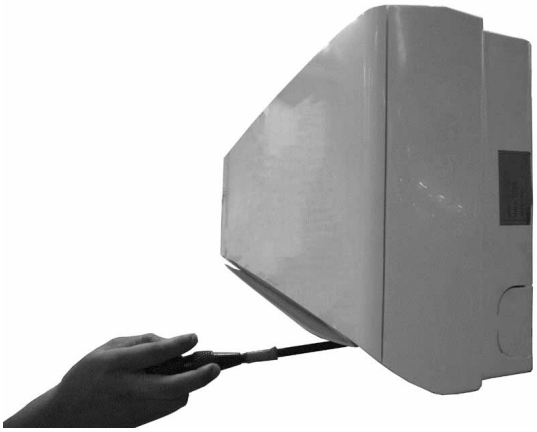


Figure 1

19.1.1.1 Caps Removal





⚠ CAUTION

a. Use a manual screw driver with at least 150 mm shaft length. Do not use a hand drill type.
b. Slightly tilt the screw driver handle downward so that the shaft does not touch the flap. Be careful not to scratch the flap while undoing the screws.

19.1.2 To Remove Electronic Controller

Figure 2

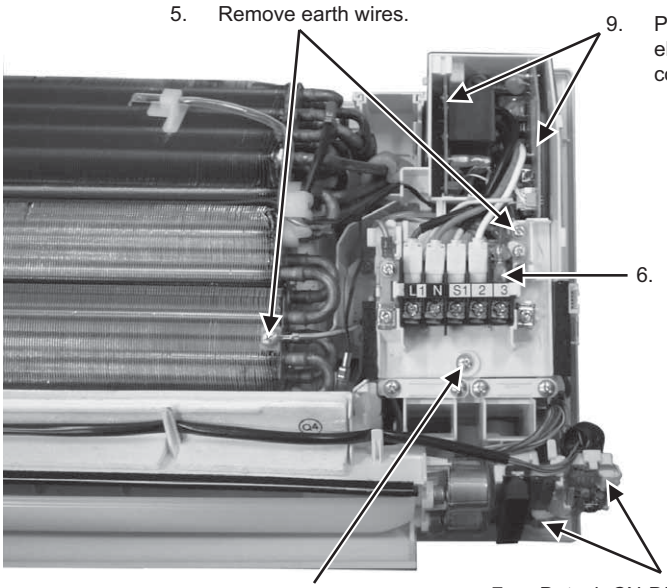


Figure 3

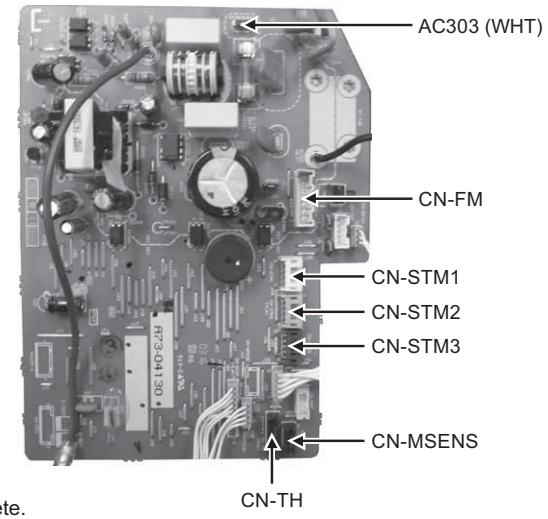


Figure 4

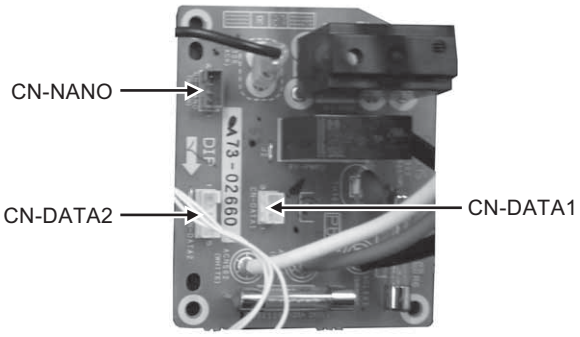
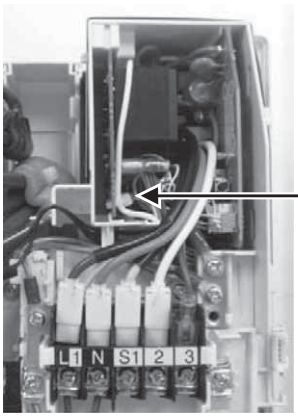


Figure 5



⚠ CAUTION

During assembly of PCB, tie connector CN-303 (WHT) together with the PCB.

19.1.3 To Remove Discharge Grille

11. Remove the screw and pull out the HVU unit.

HVU unit

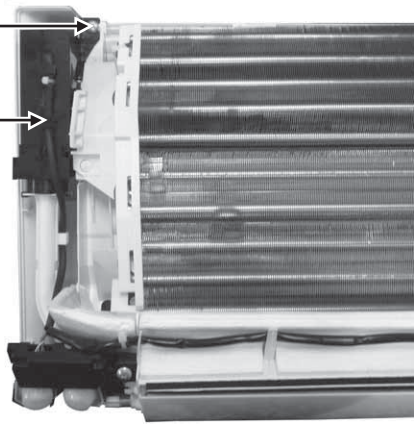
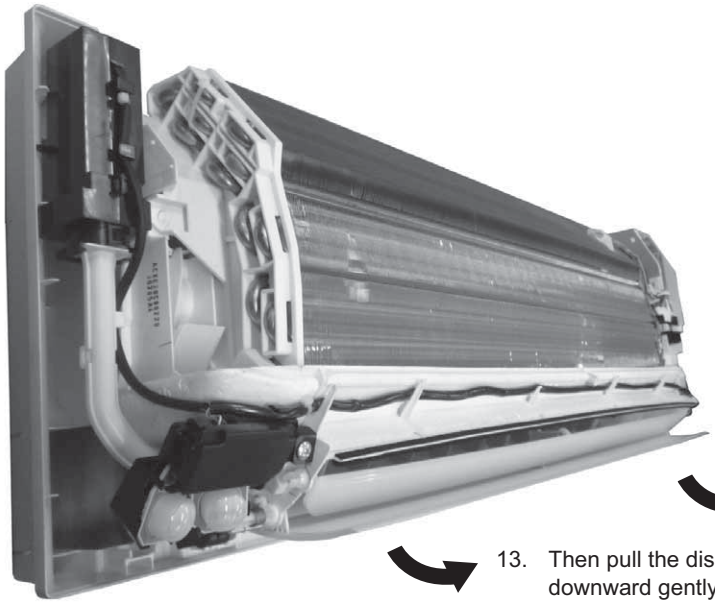


Figure 6

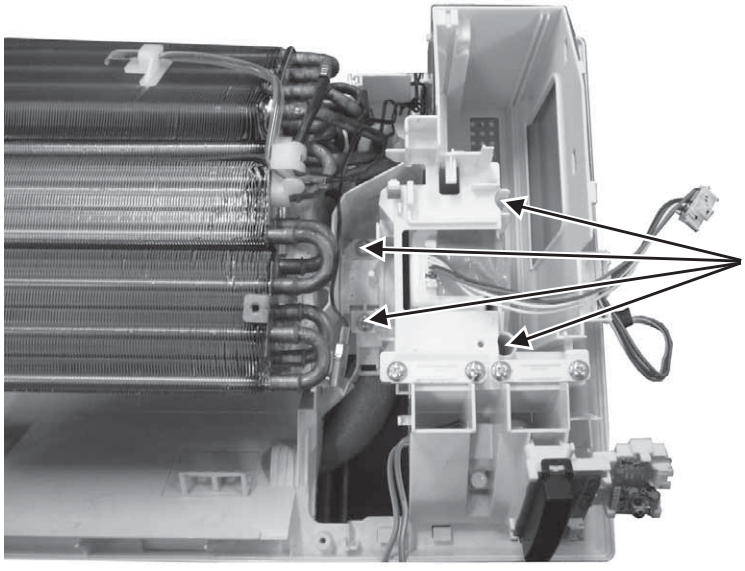


12. Pull out and remove the drain hose from the discharge grille.

13. Then pull the discharge grille downward gently to dismantle it.

Figure 7

19.1.4 To Remove Control Board



14. Remove the 4 screws holding the control board, then pull out the control board.

Figure 8

19.1.5 To Remove Cross Flow Fan and Indoor Fan Motor

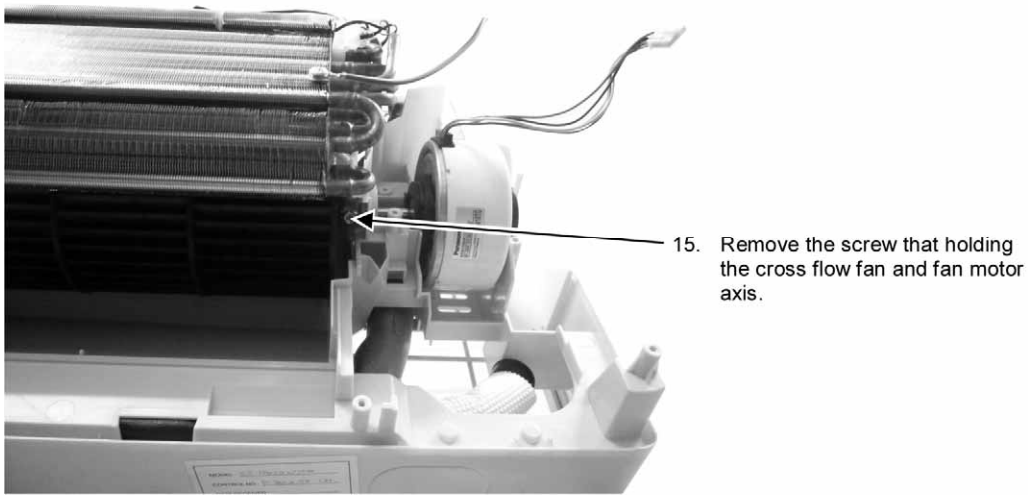


Figure 9

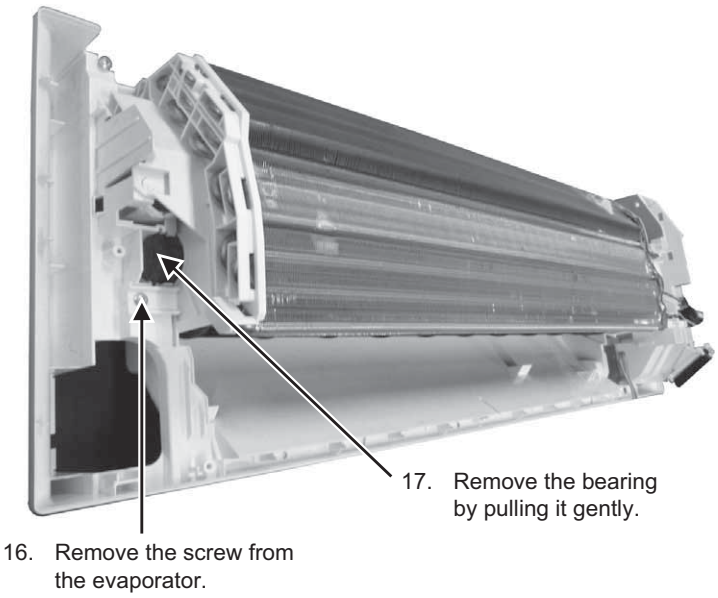
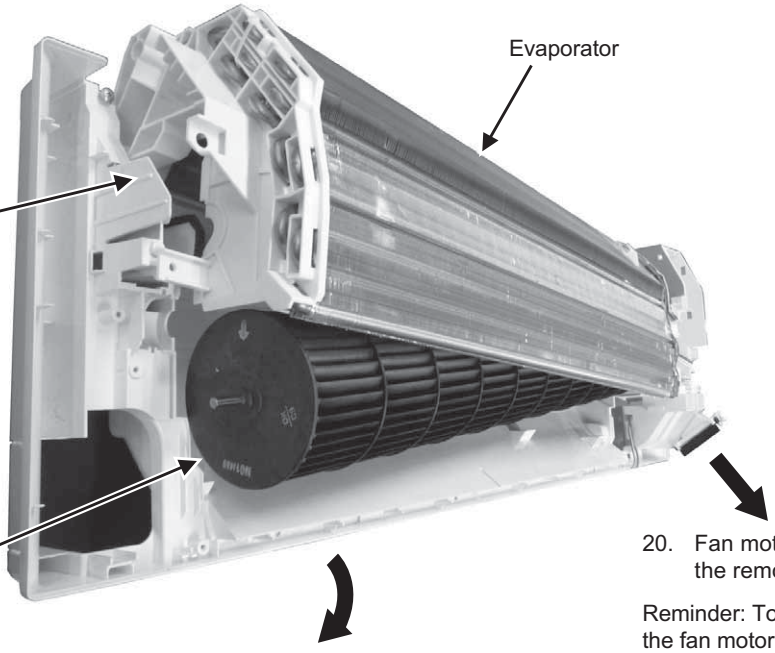


Figure 10



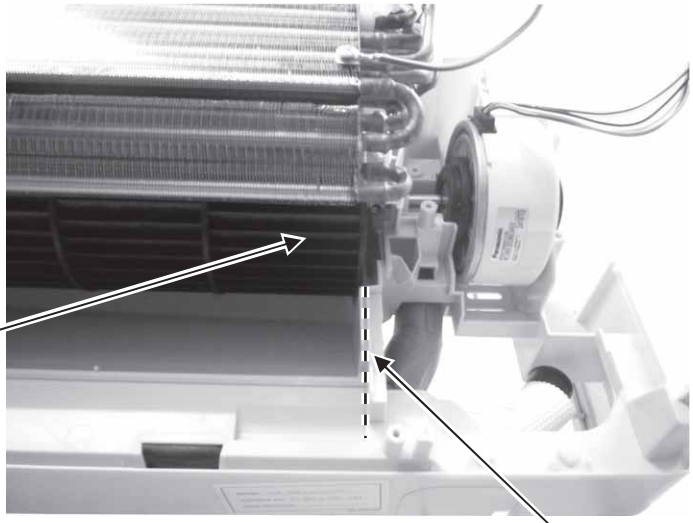
18. Push the holdfast to the left and lift up the evaporator.

19. Remove the cross flow fan from the unit by pulling it to the left and downward.

20. Fan motor can be removed after the removal of the cross flow fan.

Reminder: To reinstall the fan motor, adjust the fan motor connector to 90° towards you before fixing control board.

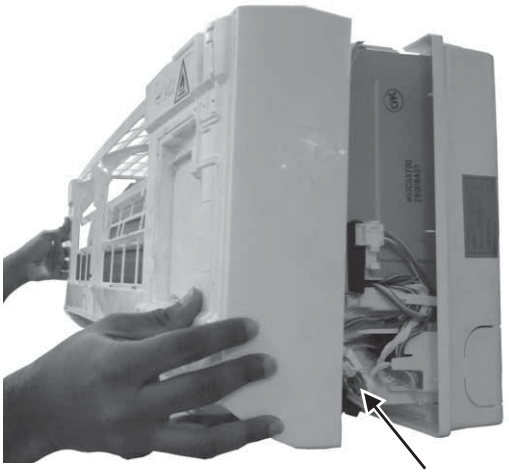
Figure 11



Reminder: To reinstall the cross flow fan, ensure cross flow fan is in line as shown in figure 12.

Figure 12

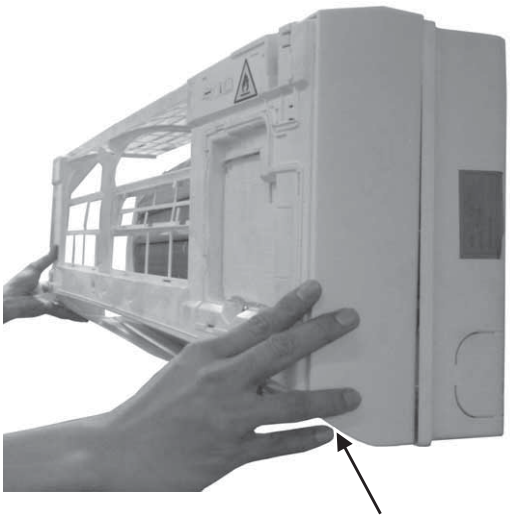
19.1.6 To Assemble the Front Grille



⚠ CAUTION

Do not directly fix the front grille complete, to avoid hitting the Receiver PCB.

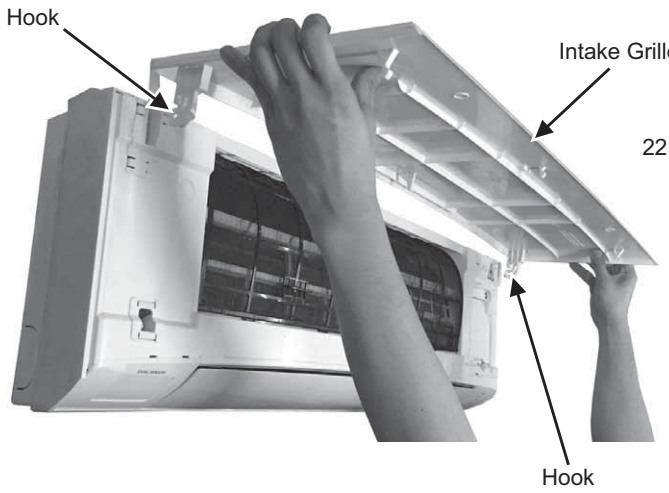
Figure 13



21. Gently assemble the right side of the front grille first then fix the left side.

Figure 14

19.1.7 To Assemble the Intake Grille



22. Align the intake grille hooks into the slot.

23. Place in the hook to the slot.

24. Then slightly bend the intake grille and push in the hooks into the slot.

Figure 15

19.2 Outdoor Electronic Controller Removal Procedure

19.2.1 CU-Z7SKE CU-Z9SKE

⚠ Caution! When handling electronic controller, be careful of electrostatic discharge.

1 Remove the 5 screws of the Top Panel.

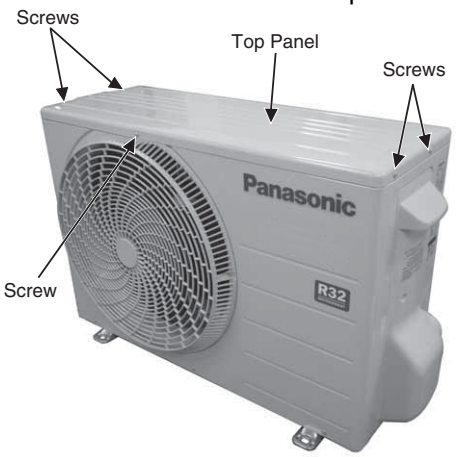


Fig. 1

2 Remove the 6 screws of the Front Panel.

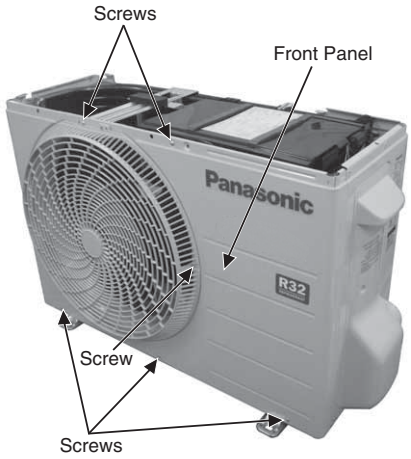


Fig. 2

3 Remove the screw of the Terminal Board Cover.

4 Remove the Top Cover of the Control Board by 4 hooks.

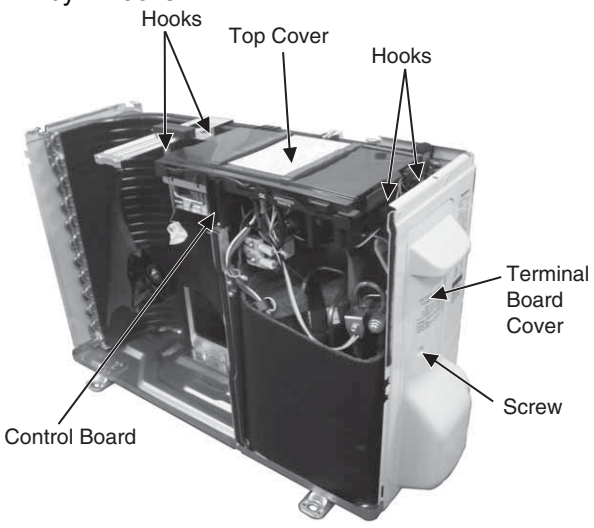


Fig. 3

5 Remove the Control Board as follows:

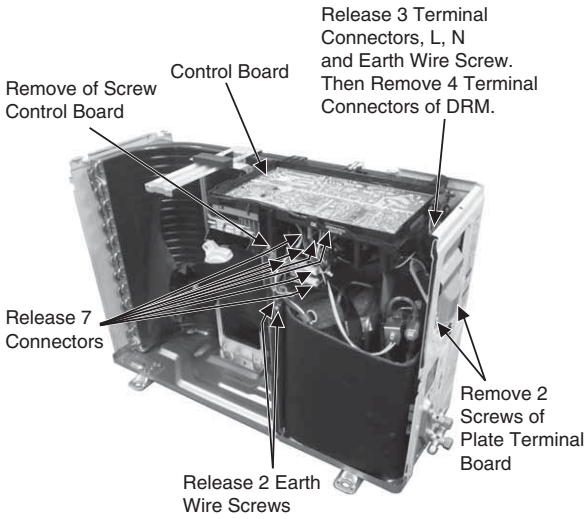


Fig. 4

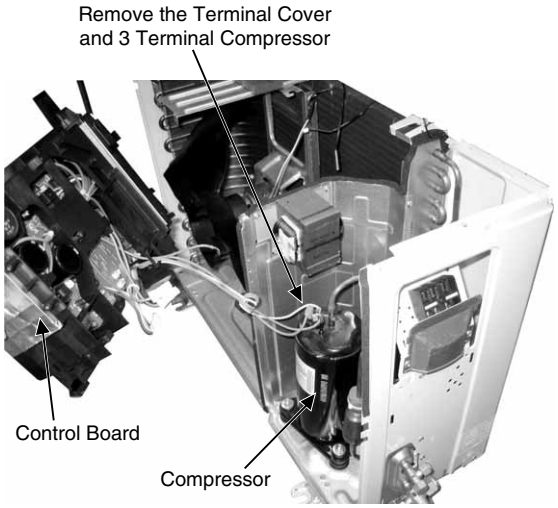


Fig. 5

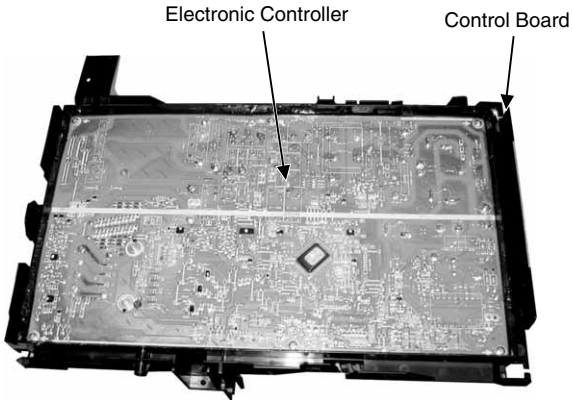


Fig. 6

19.2.2 CU-Z12SKE CU-Z15SKE

⚠ Caution! When handling electronic controller, be careful of electrostatic discharge.

1 Remove the 5 screws of the Top Panel.

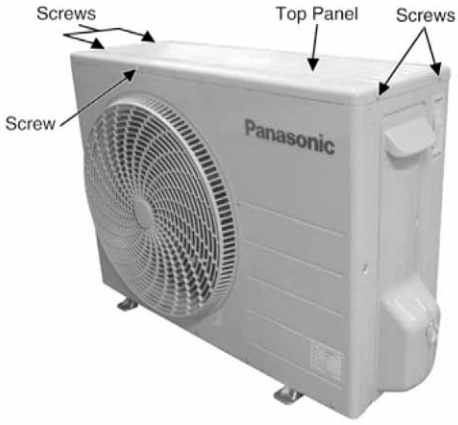


Fig. 1

2 Remove the 8 screws of the Front Panel.

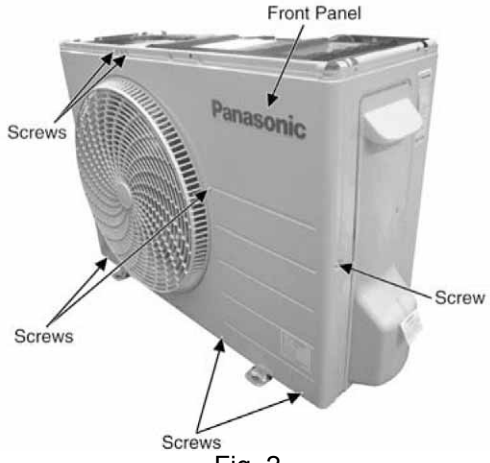


Fig. 2

3 Remove the screw of the Terminal Board Cover.

4 Remove the Top Cover of the Control Board by 4 hooks.

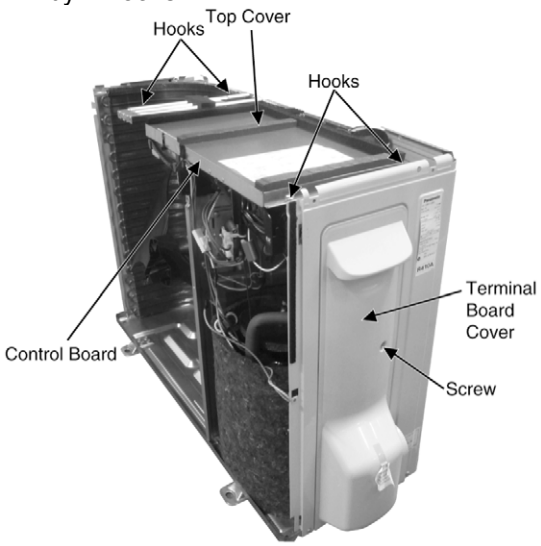


Fig. 3

5 Remove the Control Board as follows:

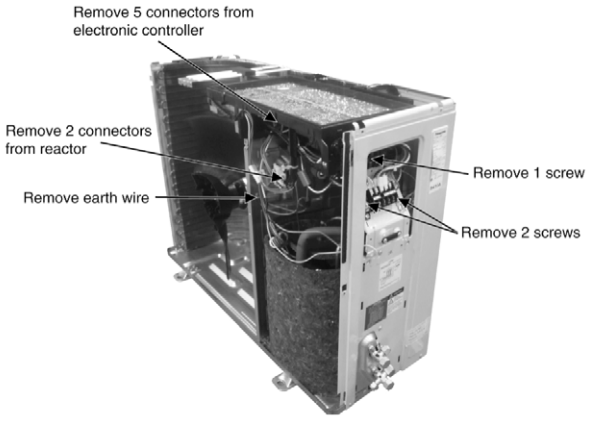


Fig. 4

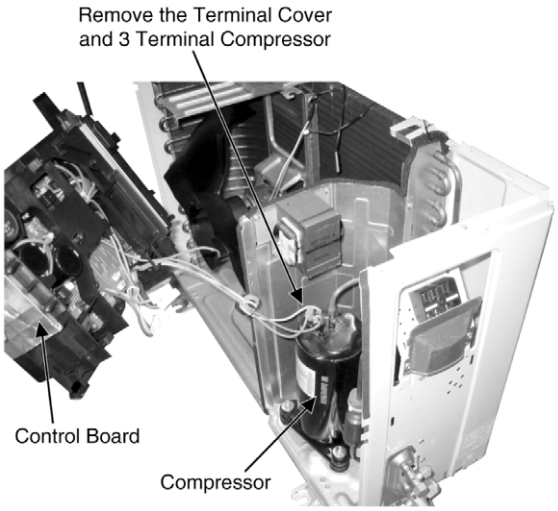


Fig. 5

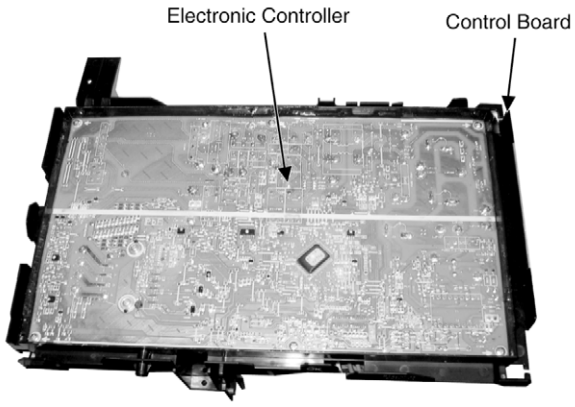


Fig. 6

19.2.3 CU-Z18SKE

⚠ Caution! When handling electronic controller, be careful of electrostatic discharge.

1 Remove the 8 screws of the Top Panel.

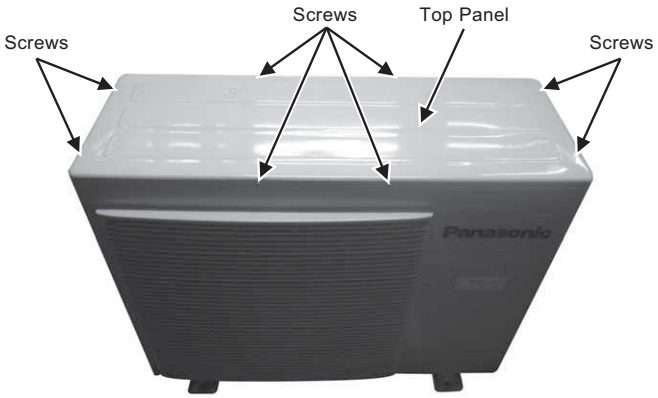


Fig. 1

2 Remove the 8 screws of the Front Panel.

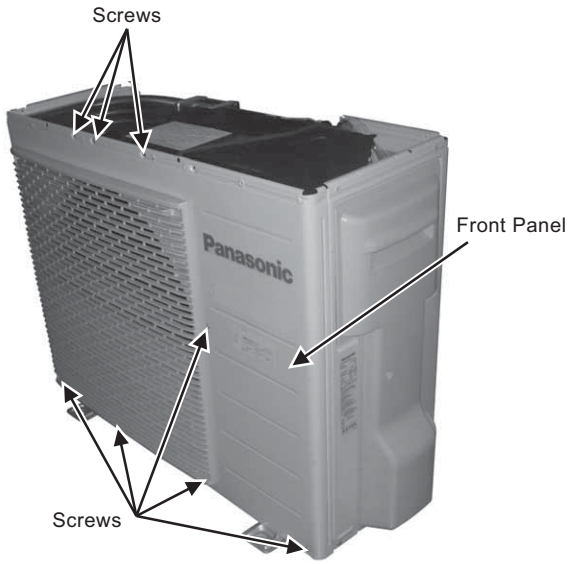


Fig. 2

3 Remove the Top Cover of the Electronic Controller.

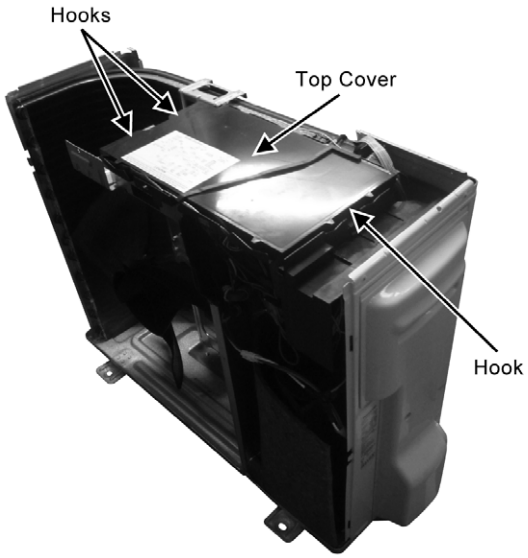


Fig. 3

4 Remove the Control Board.

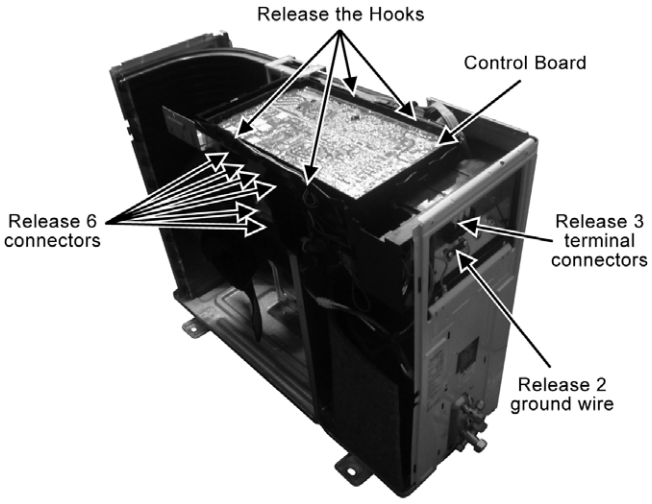


Fig. 4

5 Remove the 6 screws of the Electronic Controller.

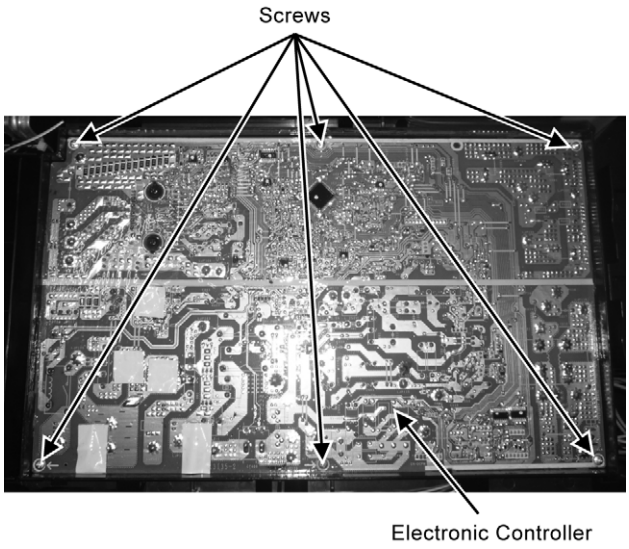


Fig. 5

⚠ Caution! When handling electronic controller, be careful of electrostatic discharge.

20. Technical Data

Technical data provided are based on the air conditioner running under free frequency.

1.1 Cool Mode Performance Data

Unit setting: Standard piping length, Hi Fan, Cool mode at 16°C
Voltage: 230V

1.1.1 CS-Z7SKEW/CU-Z7SKE

Indoor (°C)		Outdoor DB (°C)																				
DB	WB	-10			-7			0			5			16			25			35		
		TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP
27	19.0	2284	2077	330	2294	2090	328	2304	2059	330	2238	2072	384	2519	2236	262	2349	2186	348	2050	2017	450
	22.0	2519	1671	334	2479	1669	363	2491	1665	353	2591	1708	306	2775	1816	251	2574	1716	344	2295	1609	452
23	15.7	2040	2020	353	2055	2047	338	2035	2028	369	2047	2027	360	2270	2247	271	2105	2095	351	1862	1844	450
	18.4	2255	1657	330	2271	1654	319	2287	1665	330	2201	1636	376	2413	1732	264	2297	1709	349	2065	1603	450
20	13.3	1812	1794	404	1795	1898	338	1938	2015	353	1880	1945	369	2135	2114	277	1939	2043	353	1730	1713	449
	15.8	2058	1635	353	2052	1632	334	2040	1612	371	2001	1589	388	2245	1722	271	2092	1656	351	1876	1557	450

(Dry bulb value based on 46% humidity)

1.1.2 CS-Z9SKEW/CU-Z9SKE

Indoor (°C)		Outdoor DB (°C)																				
DB	WB	-10			-7			0			5			16			25			35		
		TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP
27	19.0	2785	2352	385	2798	2366	383	2809	2332	385	2729	2346	448	3072	2532	306	2864	2475	406	2500	2284	525
	22.0	3072	1892	390	3023	1890	424	3038	1886	412	3160	1934	357	3384	2057	293	3139	1944	401	2799	1822	527
23	15.7	2488	2463	412	2506	2481	394	2481	2456	431	2496	2471	420	2768	2741	316	2568	2542	410	2271	2249	525
	18.4	2751	1877	385	2770	1873	373	2789	1885	385	2684	1852	439	2942	1961	308	2801	1935	407	2518	1815	526
20	13.3	2209	2187	471	2189	2167	394	2363	2340	412	2293	2270	430	2604	2578	323	2365	2341	412	2110	2089	524
	15.8	2510	1852	411	2503	1848	390	2488	1825	433	2440	1799	452	2738	1950	316	2551	1876	409	2288	1763	525

(Dry bulb value based on 46% humidity)

1.1.3 CS-Z12SKEW/CU-Z12SKE

Indoor (°C)		Outdoor DB (°C)																				
DB	WB	-10			-7			0			5			16			25			35		
		TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP
27	19.0	3899	2789	616	3917	2807	613	3933	2766	616	3821	2782	717	4301	3003	490	4010	2936	650	3500	2709	840
	22.0	4301	2244	623	4232	2242	678	4253	2237	659	4424	2294	571	4738	2439	469	4394	2305	642	3918	2161	843
23	15.7	3483	2761	659	3509	2750	630	3474	2724	690	3495	2704	672	3876	2903	506	3595	2813	656	3180	2695	840
	18.4	3851	2226	616	3878	2222	596	3904	2236	617	3757	2197	702	4119	2326	494	3921	2296	651	3525	2153	841
20	13.3	3093	2583	754	3065	2549	630	3309	2706	660	3210	2612	688	3646	2900	517	3311	2744	659	2954	2571	838
	15.8	3513	2196	658	3504	2192	624	3483	2165	693	3416	2134	723	3834	2313	505	3571	2225	655	3204	2091	841

(Dry bulb value based on 46% humidity)

1.1.4 CS-Z15SKEW/CU-Z15SKE

Indoor (°C)		Outdoor DB (°C)																				
DB	WB	-10			-7			0			5			16			25			35		
		TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP
27	19.0	4679	3204	910	4701	3225	904	4720	3178	910	4586	3196	1059	5162	3450	723	4812	3373	959	4200	3112	1240
	22.0	5161	2578	920	5079	2576	1000	5104	2570	973	5308	2635	843	5685	2803	692	5273	2648	948	4702	2483	1245
23	15.7	4179	3172	974	4210	3159	930	4168	3129	1018	4194	3106	993	4651	3336	747	4314	3232	968	3816	3096	1240
	18.4	4621	2557	910	4654	2552	880	4685	2569	910	4509	2524	1037	4943	2673	729	4706	2637	961	4230	2474	1241
20	13.3	3712	2967	1113	3678	2928	931	3970	3109	974	3852	3001	1016	4375	3332	763	3973	3152	972	3544	2953	1237
	15.8	4216	2523	972	4205	2518	921	4180	2487	1022	4100	2452	1068	4600	2657	745	4285	2556	967	3844	2403	1241

(Dry bulb value based on 46% humidity)

1.1.5 CS-Z18SKEW/CU-Z18SKE

Indoor (°C)		Outdoor DB (°C)																				
DB	WB	-10			-7			0			5			16			25			35		
		TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP
27	19.0	5570	3710	1100	5596	3733	1094	5619	3679	1100	5459	3701	1281	6145	3995	874	5729	3905	1161	5000	3603	1500
	22.0	6144	2985	1113	6046	2982	1210	6076	2975	1177	6319	3051	1020	6768	3244	837	6277	3066	1147	5597	2874	1506
23	15.7	4975	3672	1178	5012	3657	1125	4962	3623	1231	4993	3596	1201	5537	3862	903	5135	3742	1171	4542	3584	1500
	18.4	5501	2960	1101	5540	2955	1065	5578	2974	1101	5367	2922	1254	5884	3094	881	5602	3053	1162	5035	2864	1502
20	13.3	4419	3435	1347	4379	3390	1126	4727	3600	1178	4586	3474	1229	5208	3857	923	4730	3649	1176	4219	3419	1497
	15.8	5019	2921	1175	5006	2915	1115	4976	2879	1237	4881	2838	1292	5477	3076	902	5102	2959	1170	4577	2781	1501

(Dry bulb value based on 46% humidity)

TC - Total Cooling Capacity (W)
SHC - Sensible Heat Capacity (W)
IP - Input Power (W)

1.2 Heat Mode Performance Data

Unit setting: Standard piping length, Hi Fan, Heat mode at 30°C
Voltage: 230V

1.2.1 CS-Z7SKEW/CU-Z7SKE

Indoor (°C)	Outdoor WB (°C)									
DB	-15		-7		2		7		12	
	TC	IP	TC	IP	TC	IP	TC	IP	TC	IP
24	1963	883	2166	886	2817	850	2615	621	2783	618
20	1966	835	2380	880	2900	870	2800	620	2896	618
16	1853	790	2455	842	2919	828	2989	619	3069	617

1.2.2 CS-Z9SKEW/CU-Z9SKE

Indoor (°C)	Outdoor WB (°C)									
DB	-15		-7		2		7		12	
	TC	IP	TC	IP	TC	IP	TC	IP	TC	IP
24	2620	1152	2685	1157	3516	1094	3175	721	3380	717
20	2624	1090	2950	1150	3620	1120	3400	720	3516	717
16	2473	1032	3042	1101	3643	1066	3630	719	3727	716

1.2.3 CS-Z12SKEW/CU-Z12SKE

Indoor (°C)	Outdoor WB (°C)									
DB	-15		-7		2		7		12	
	TC	IP	TC	IP	TC	IP	TC	IP	TC	IP
24	2758	1205	3095	1409	4080	1319	3735	921	3976	917
20	2762	1140	3400	1400	4200	1350	4000	920	4137	917
16	2603	1079	3507	1340	4227	1285	4270	919	4384	915

1.2.4 CS-Z15SKEW/CU-Z15SKE

Indoor (°C)	Outdoor WB (°C)									
DB	-15		-7		2		7		12	
	TC	IP	TC	IP	TC	IP	TC	IP	TC	IP
24	3422	1590	3741	1741	4789	1680	4950	1442	5269	1435
20	3427	1504	4110	1730	4930	1720	5300	1440	5481	1435
16	3230	1424	4239	1656	4962	1637	5658	1439	5809	1432

1.2.5 CS-Z18SKEW/CU-Z18SKE

Indoor (°C)	Outdoor WB (°C)									
DB	-10		-7		2		7		12	
	TC	IP	TC	IP	TC	IP	TC	IP	TC	IP
24	4114	2341	4241	2204	5275	2032	5416	1703	5766	1694
20	4120	2215	4660	2190	5430	2080	5800	1700	5998	1694
16	3883	2096	4806	2097	5465	1980	6192	1698	6357	1691

TC - Total Cooling Capacity (W)
SHC - Sensible Heat Capacity (W)
IP - Input Power (W)

21. Service Data

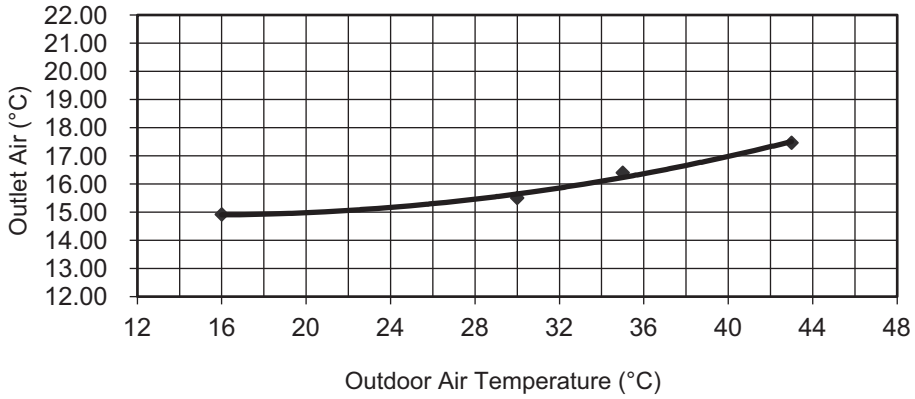
Service data provided are based on the air conditioner running under rated frequency during forced cooling / forced heating mode.

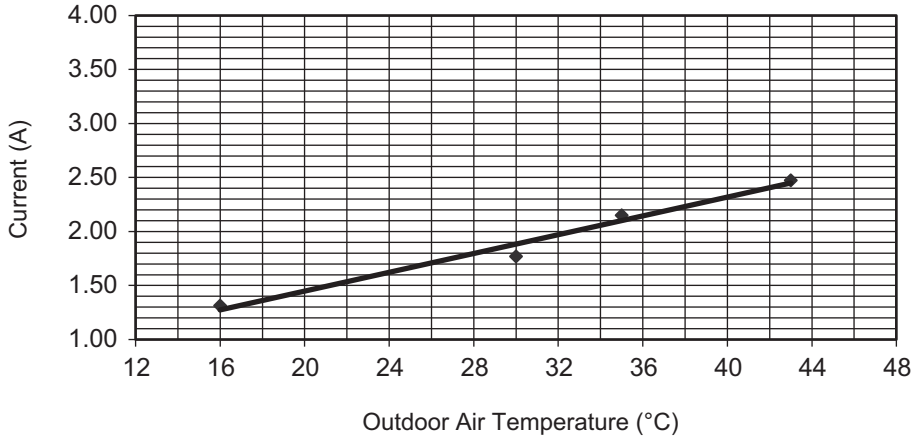
21.1 Cool Mode Outdoor Air Temperature Characteristic

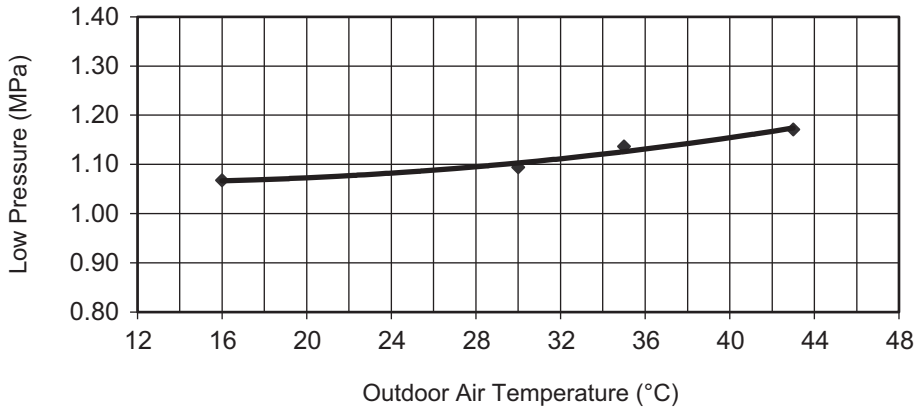
Condition

- Indoor room temperature: 27°C Dry Bulb/19°C Wet Bulb
- Unit setting: Standard piping length, forced cooling at 16°C, Hi fan
- Compressor frequency: Rated for cooling operation
- Piping length: 5m
- Voltage: 230V

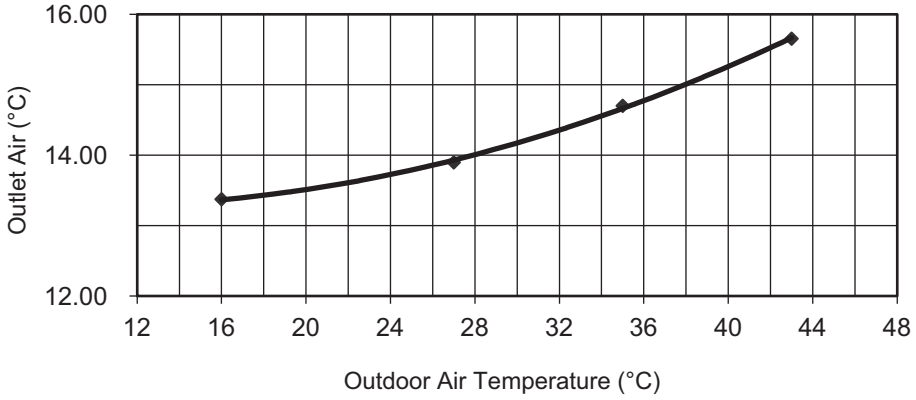
21.1.1 CS-Z7SKEW CU-Z7SKE

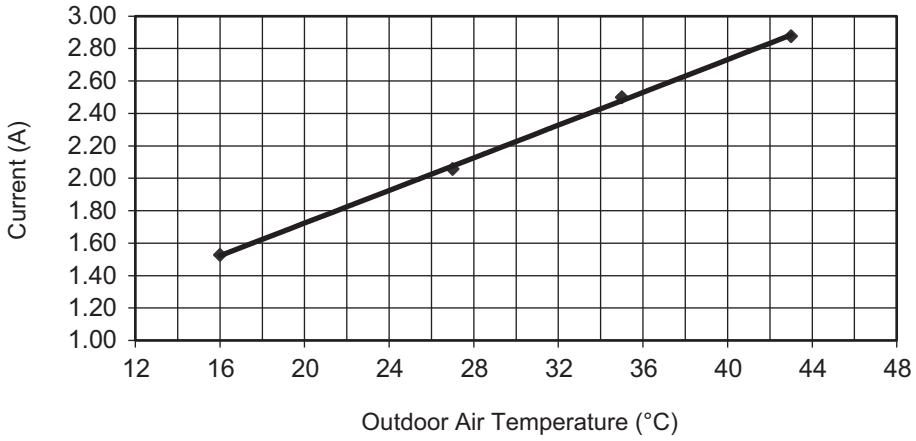


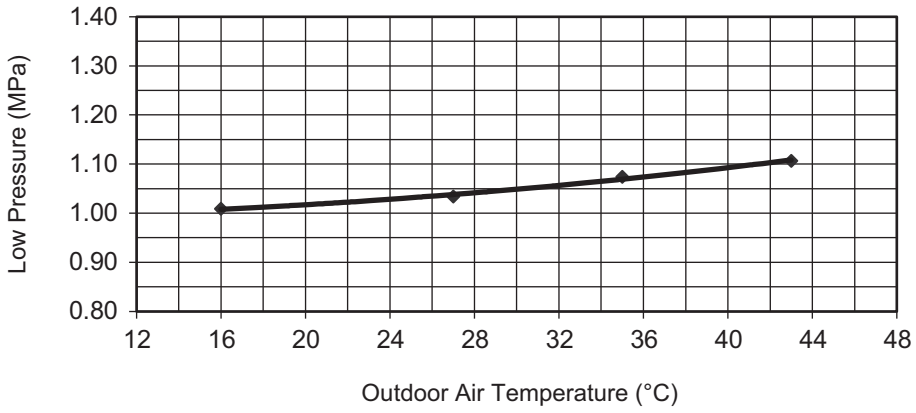




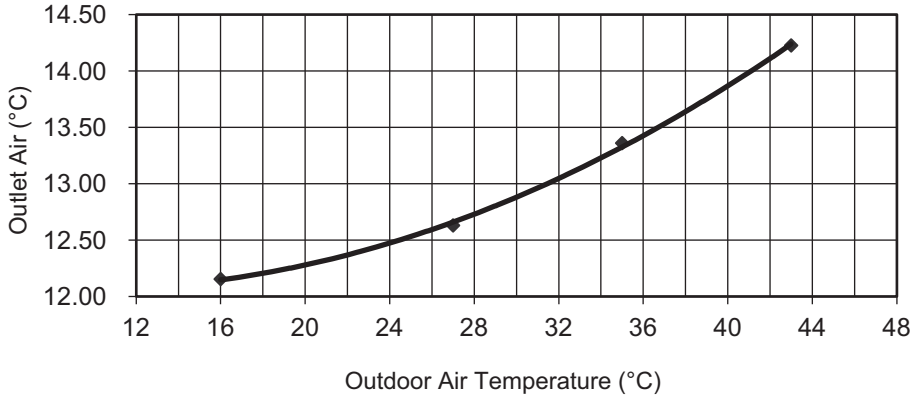
21.1.2 CS-Z9SKEW CU-Z9SKE

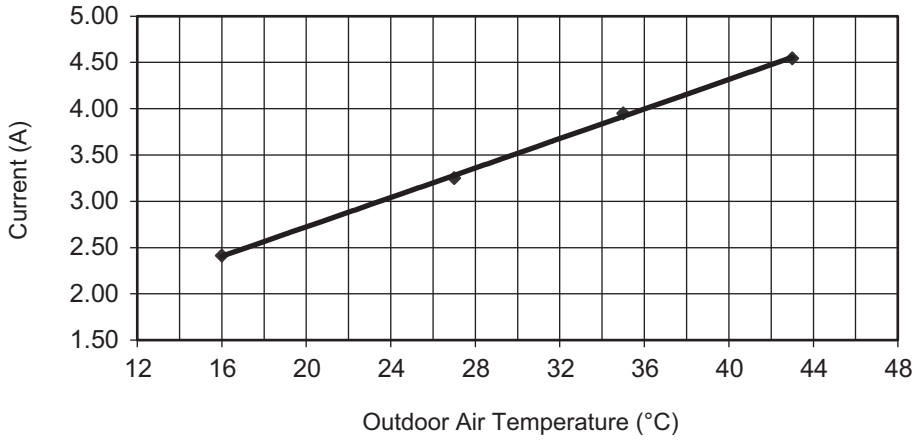


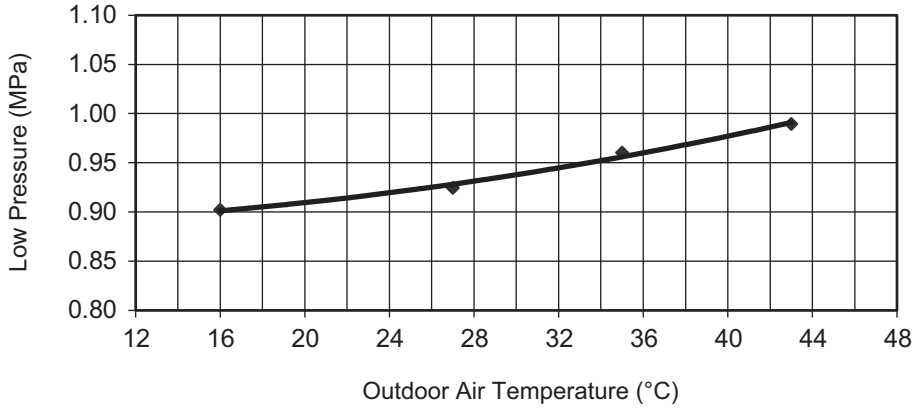




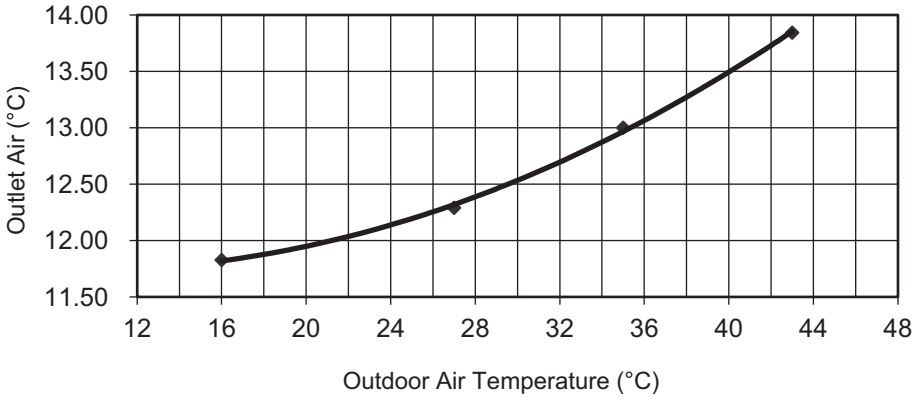
21.1.3 CS-Z12SKEW CU-Z12SKE

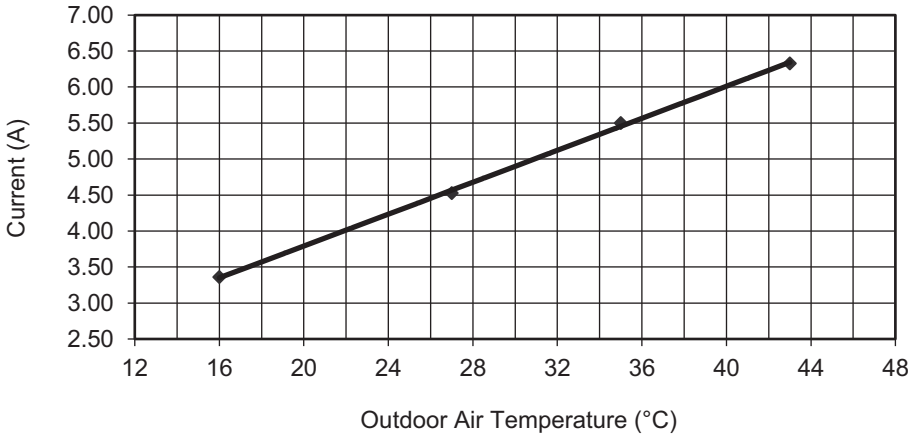


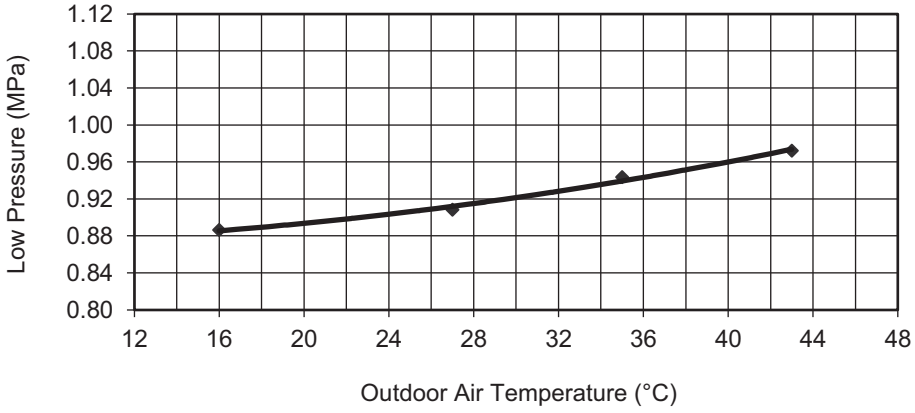




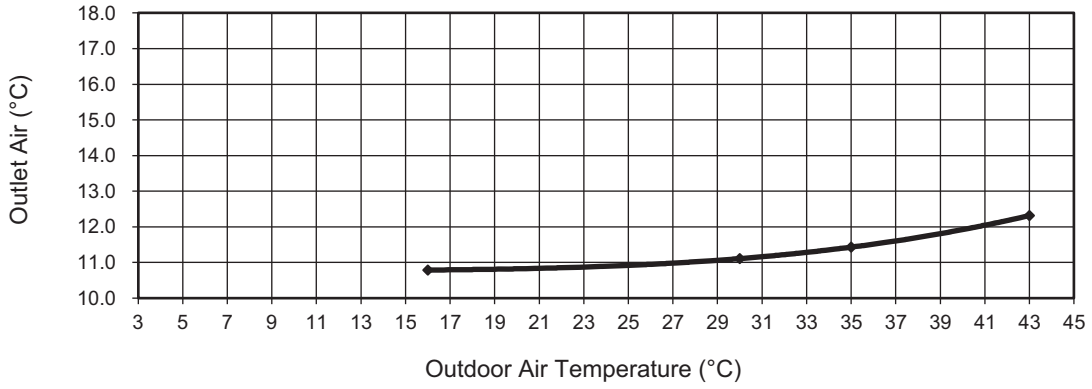
21.1.4 CS-Z15SKEW CU-Z15SKE

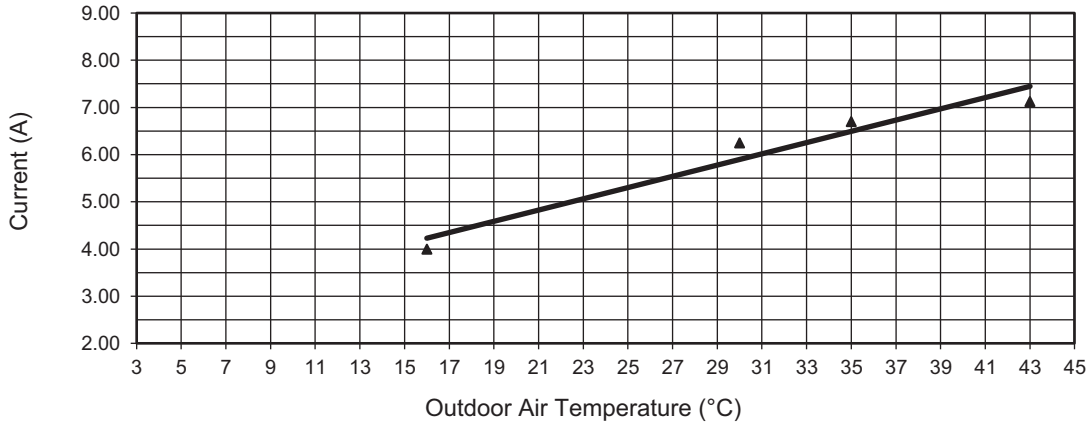


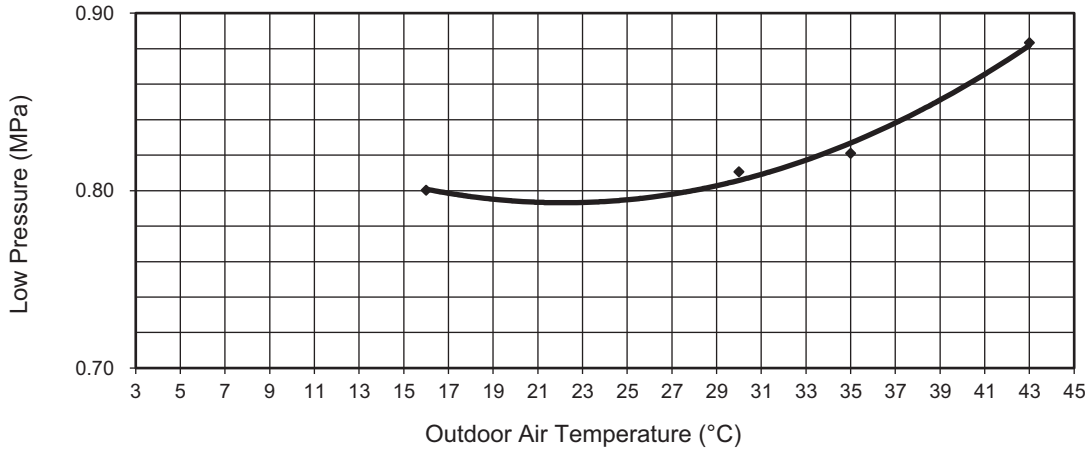




21.1.5 CS-Z18SKEW CU-Z18SKE





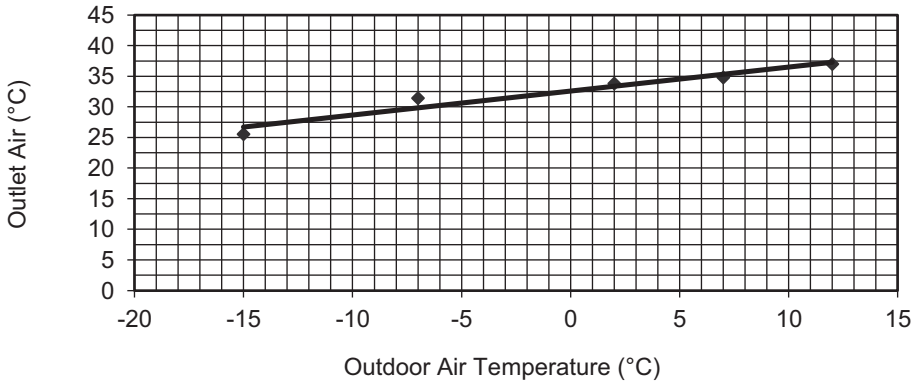


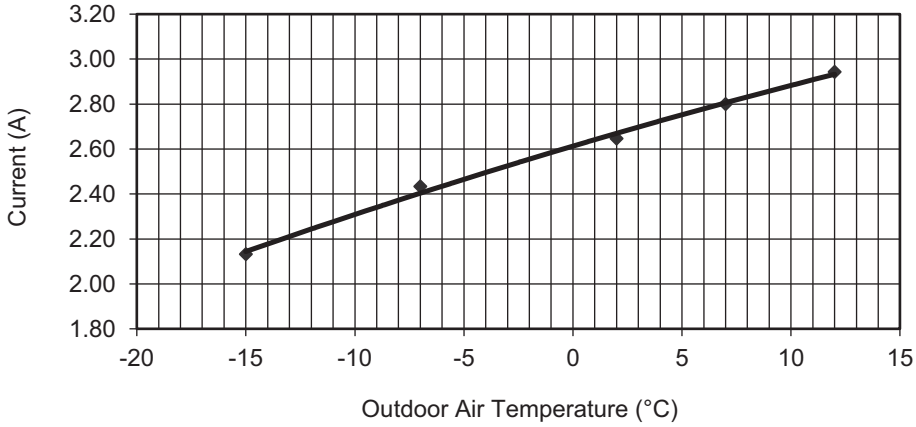
21.2 Heat Mode Outdoor Air Temperature Characteristic

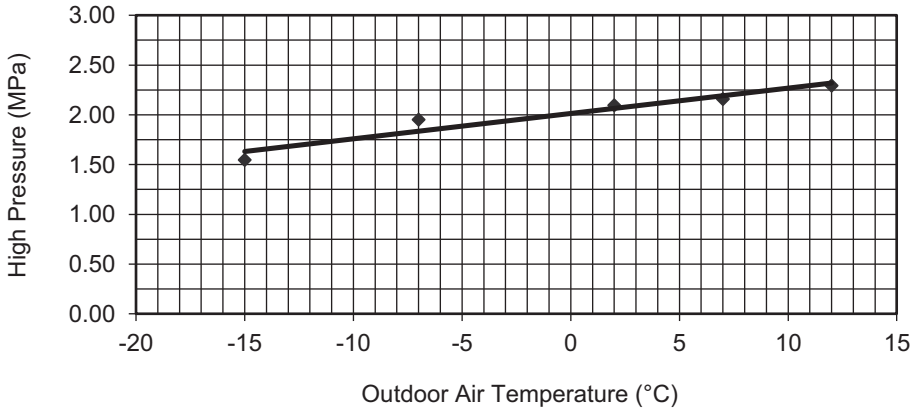
Condition

- Indoor room temperature: 20°C Dry Bulb/ -°C Wet Bulb
- Unit setting: Standard piping length, forced heating at 30°C, Hi fan
- Compressor frequency: Rated for Heating operation
- Piping length: 5m
- Voltage: 230V

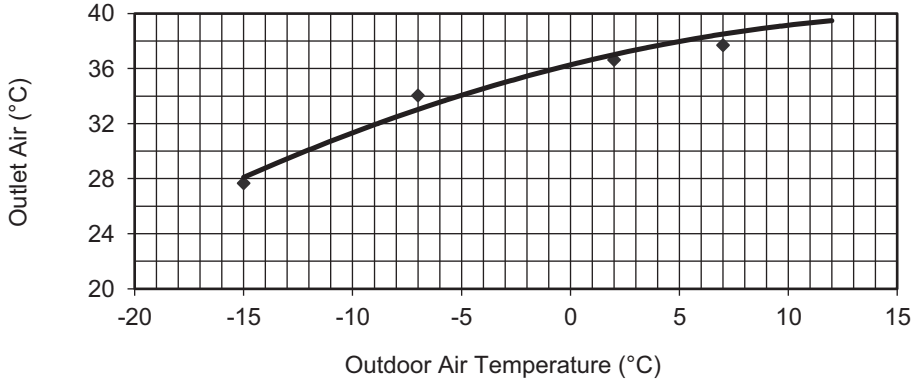
21.2.1 CS-Z7SKEW CU-Z7SKE

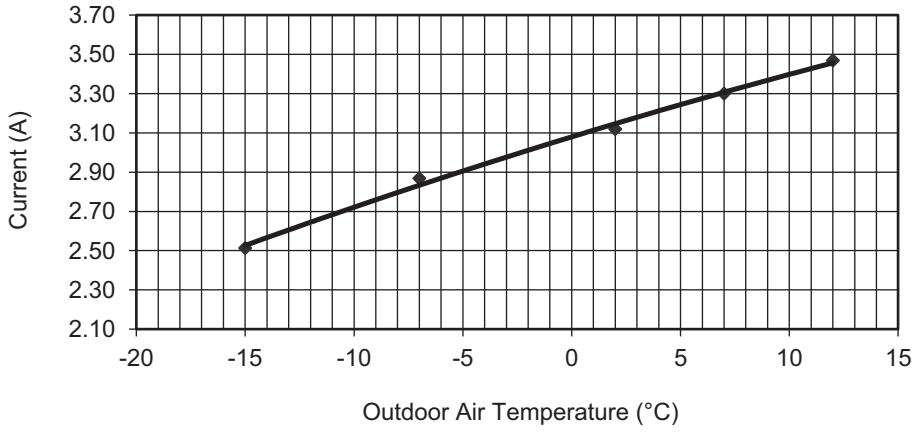


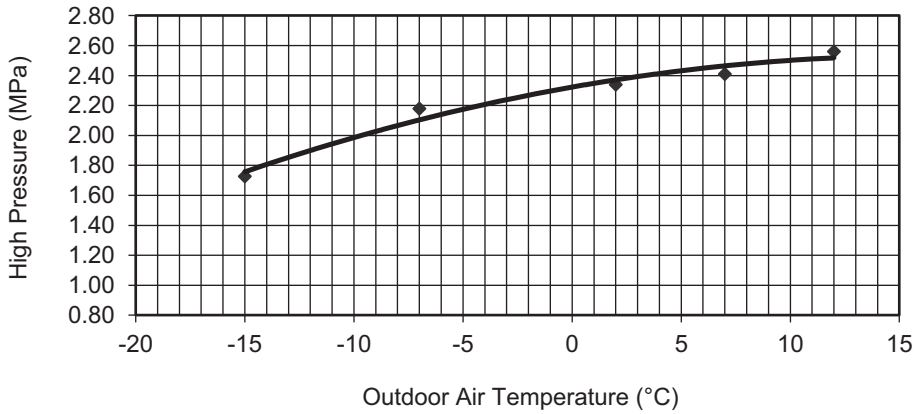




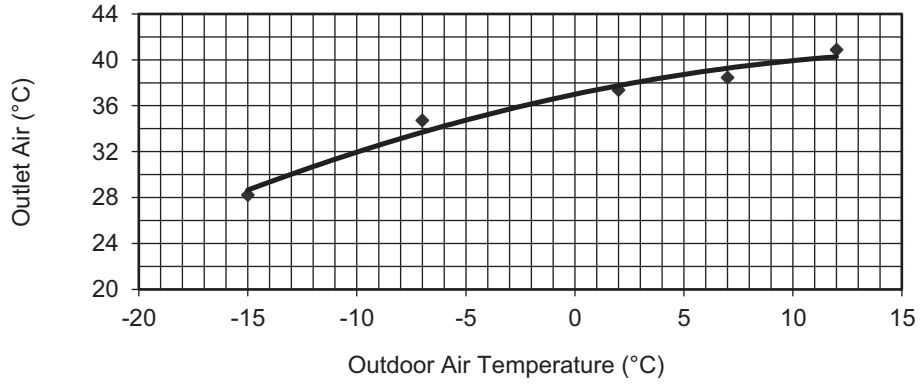
21.2.2 CS-Z9SKEW CU-Z9SKE

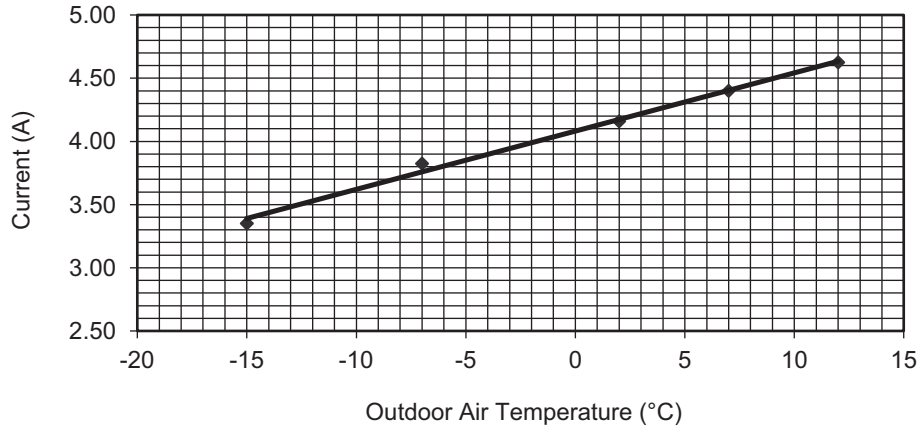


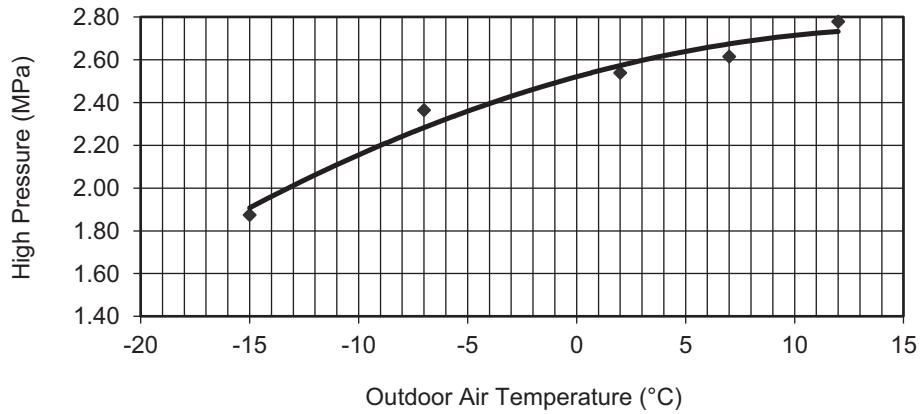




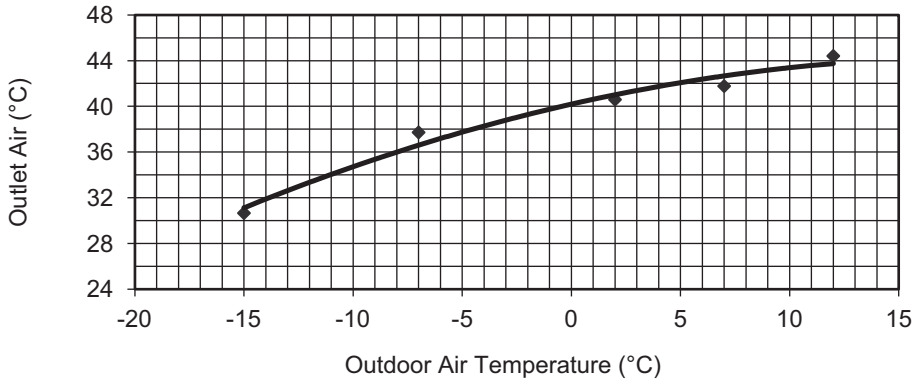
21.2.3 CS-Z12SKEW CU-Z12SKE

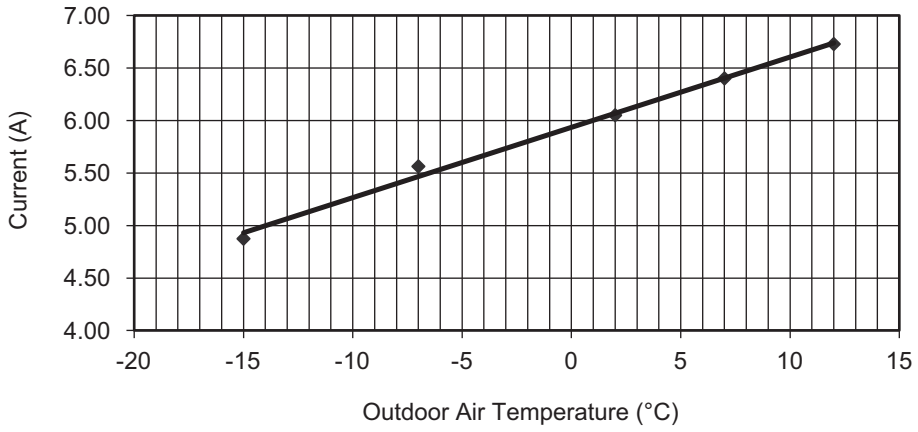


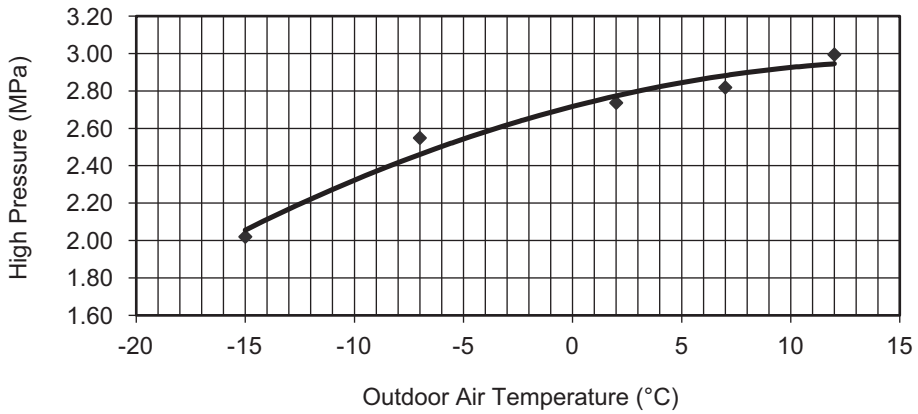




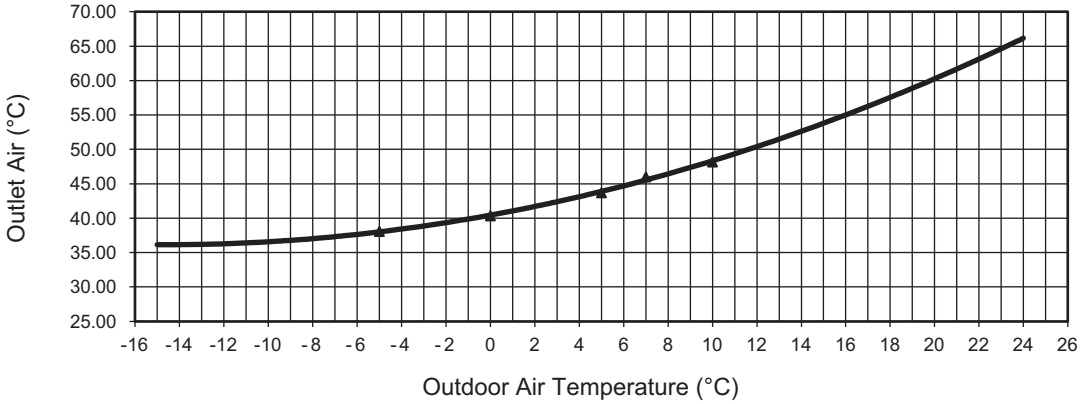
21.2.4 CS-Z15SKEW CU-Z15SKE

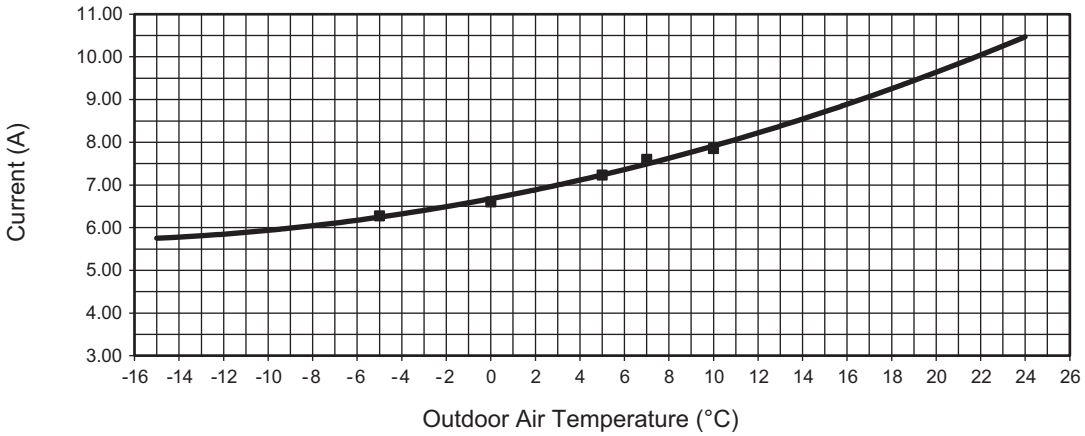


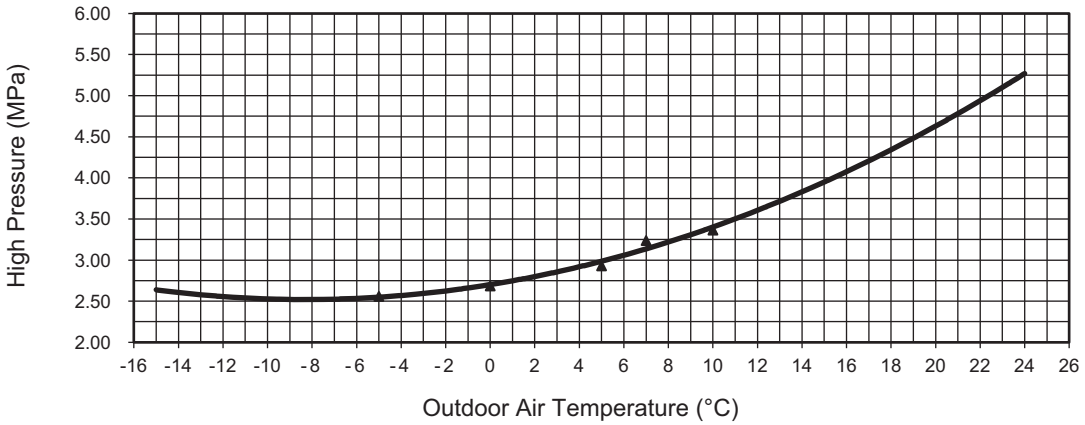




21.2.5 CS-Z18SKEW CU-Z18SKE



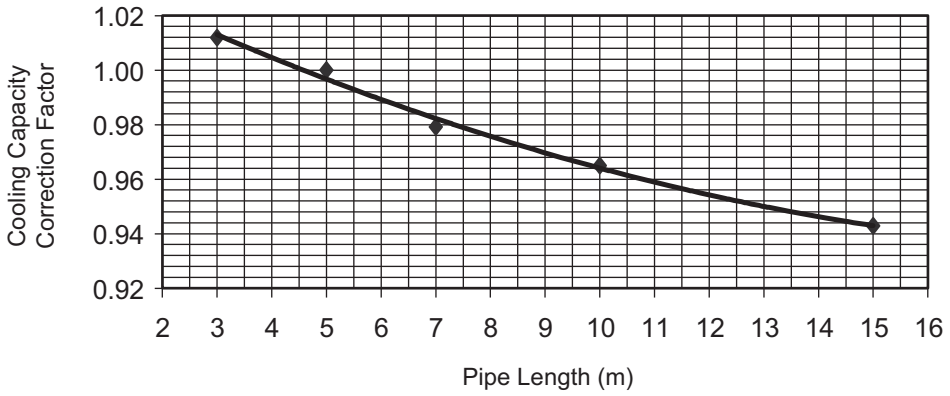


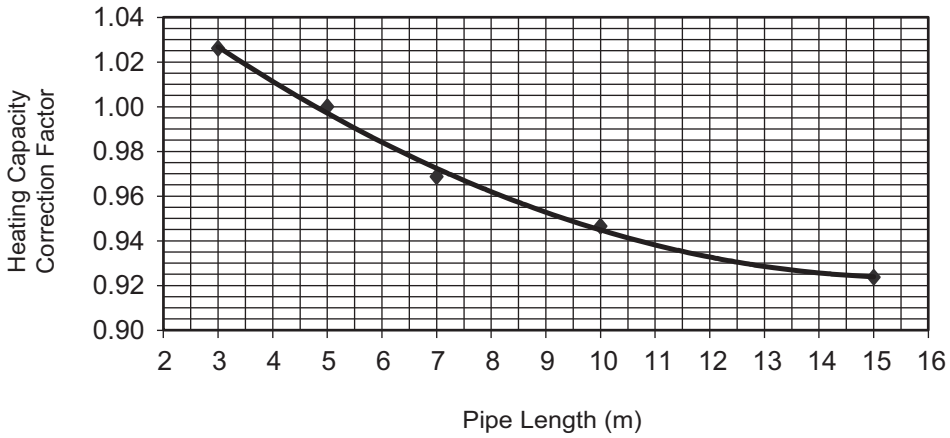


21.3 Piping Length Correction Factor

The characteristic of the unit has to be corrected in accordance with the piping length.

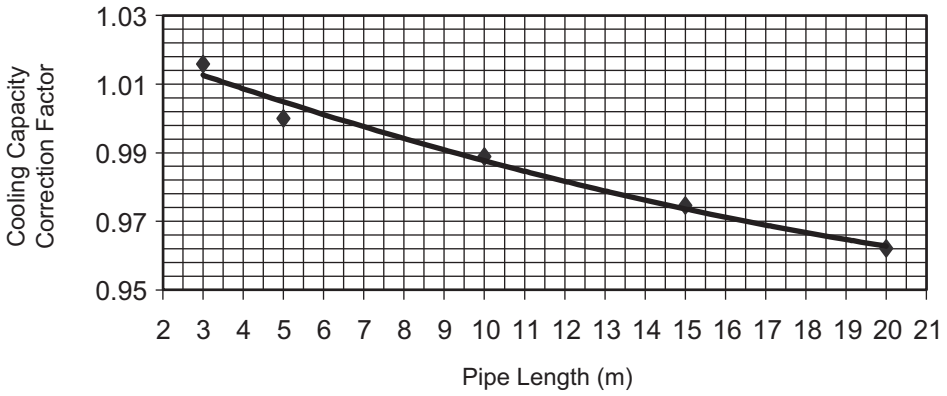
21.3.1 CS-Z7SKEW CU-Z7SKE CS-Z9SKEW CU-Z9SKE CS-Z12SKEW CU-Z12SKE CS-Z15SKEW CU-Z15SKE

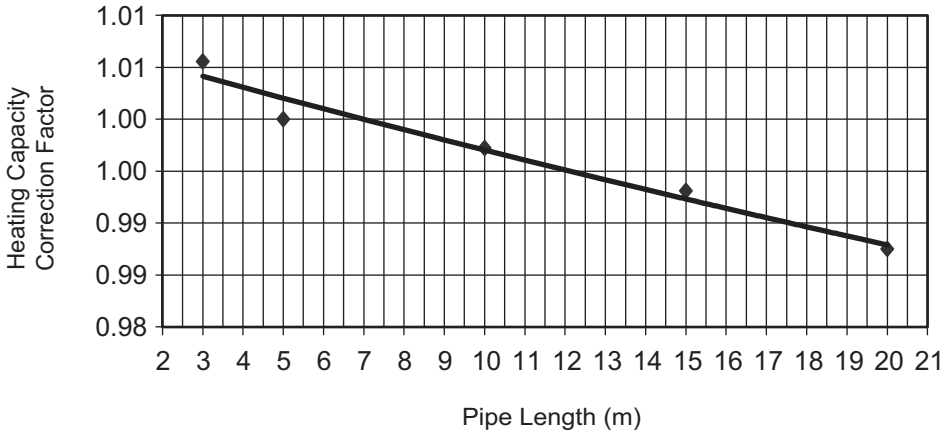




Note: The graphs show the factor after added right amount of additional refrigerant.

21.3.2 CS-Z18SKEW CU-Z18SKE

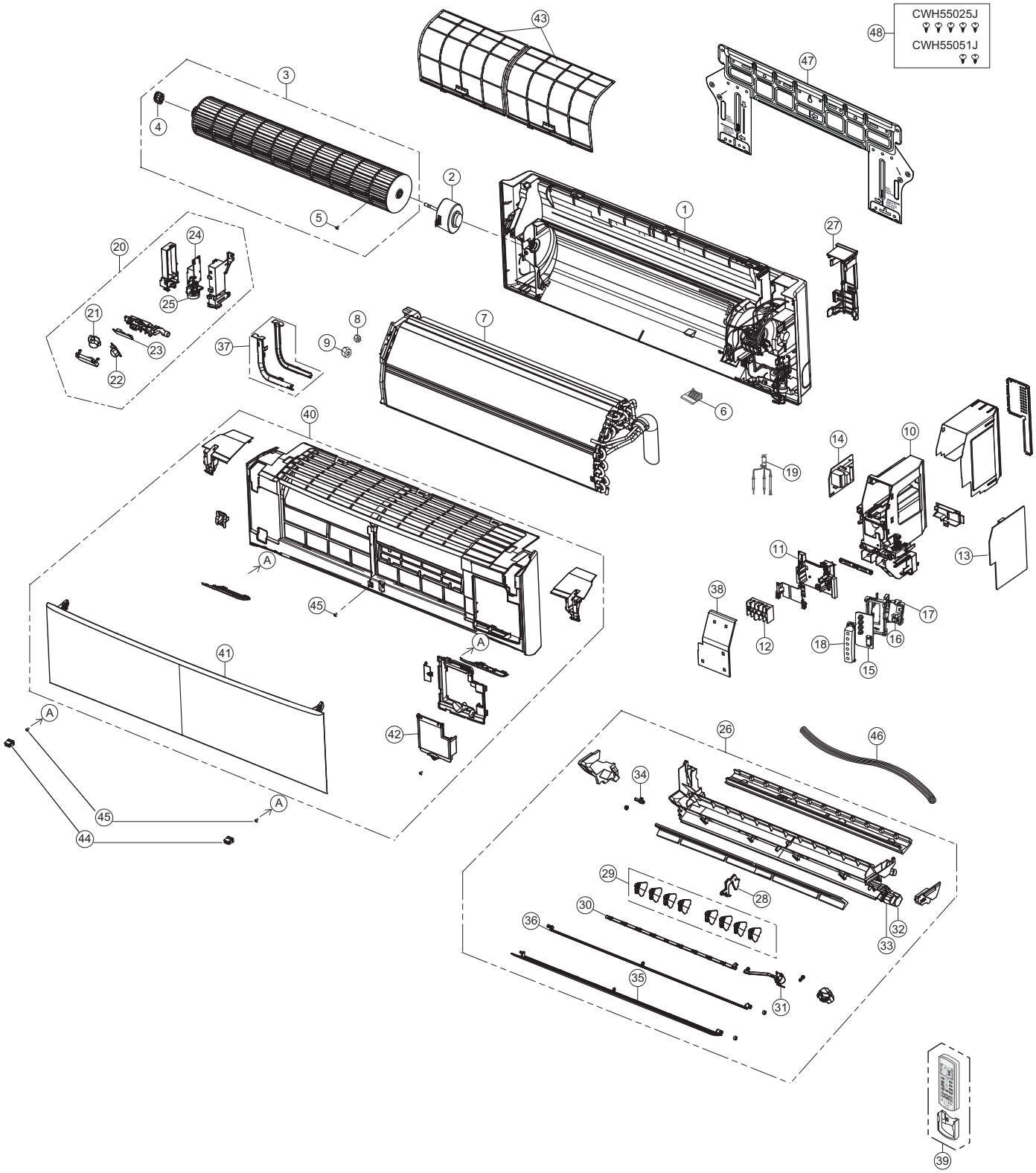




Note: The graphs show the factor after added right amount of additional refrigerant.

22. Exploded View and Replacement Parts List

22.1 Indoor Unit



Note
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

SAFETY	REF. NO.	PART NAME & DESCRIPTION	QTY.	CS-Z7SKEW	CS-Z9SKEW	REMARK
	1	CHASSIS COMPLETE	1	ACXD50C00200	←	
⚠	2	FAN MOTOR	1	L6CBYYYL0037	←	O
	3	CROSS-FLOW FAN COMPLETE	1	CWH02C1076	←	
	4	BEARING ASSY	1	CWH64K1010	←	
	5	SCREW - CROSS-FLOW FAN	1	CWH551146	←	
	6	PARTICULAR PIECE	1	CWD933067B	←	
	7	EVAPORATOR	1	CWB30C4659	ACXB30C00920	
	8	FLARE NUT (LIQUID)	1	CWT251030	←	
	9	FLARE NUT (GAS)	1	CWT251031	←	
	10	CONTROL BOARD CASING	1	ACXH10-00200	←	
	11	PARTICULAR PIECE	1	CWD933138	←	
⚠	12	TERMINAL BOARD COMPLETE	1	CWA28C2594	←	O
⚠	13	ELECTRONIC CONTROLLER - MAIN	1	ACXA73C05510	ACXA73C06000	O
⚠	14	ELECTRONIC CONTROLLER - POWER	1	ACXA73-02660	←	O
⚠	15	ELECTRONIC CONTROLLER - INDICATOR	1	ACXA73-02670	←	O
⚠	16	ELECTRONIC CONTROLLER - RECEIVER	1	CWA746916	←	O
	17	HOLDER - RECEIVER	1	ACXD93-00700	←	
	18	INDICATOR HOLDER	1	ACXD93-00930	←	
	19	SENSOR COMPLETE	1	CWA50C2664	←	O
	20	SENSOR COMPLETE (ECO)	1	ACXA50C00350	←	O
⚠	21	ELECTRONIC CONTROLLER (ECO SENSOR)	1	CWA745791	←	O
⚠	22	ELECTRONIC CONTROLLER (ECO SENSOR)	1	CWA746206	←	O
⚠	23	ELECTRONIC CONTROLLER (COMPARATOR)	1	CWA747891	←	O
⚠	24	ELECTRONIC CONTROLLER - HVU	1	N0GE1E000006	←	O
	25	GENERATOR COMPLETE	1	CWH94C0056	←	
	26	DISCHARGE GRILLE COMPLETE	1	ACXE20C00220	←	
	27	BACK COVER CHASSIS	1	CWD933233C	←	
	28	FULCRUM	1	ACXH62-00040	←	
	29	VERTICAL VANE	8	CWE241457	←	
	30	CONNECTING BAR	1	CWE261314	←	
⚠	31	AIR SWING MOTOR	1	ACXA98K00020	←	O
⚠	32	AIR SWING MOTOR	1	CWA981241	←	O
⚠	33	AIR SWING MOTOR	1	CWA981299	←	O
	34	CAP - DRAIN TRAY	1	CWH521259	←	
	35	HORIZONTAL VANE COMPLETE	1	ACXE24C00240	←	
	36	HORIZONTAL VANE COMPLETE	1	CWE24C1531	←	
	37	DUCT - COMPLETE	1	ACXD22C00030	←	
	38	CONTROL BOARD COVER - COMPLETE	1	ACXH13C00070	←	
	39	REMOTE CONTROL COMPLETE	1	ACXA75C00270	←	O
	40	FRONT GRILLE COMPLETE	1	ACXE10C01240	ACXE10C00950	O
	41	INTAKE GRILLE COMPLETE	1	ACXE22K00090	←	
	42	GRILLE DOOR COMPLETE	1	CWE14C1090	←	
	43	AIR FILTER	2	CWD001279	←	O
	44	CAP - FRONT GRILLE	2	ACXH52-00020	←	
	45	SCREW - FRONT GRILLE	3	XTT4+16CFJ	←	
	46	DRAIN HOSE	1	CWH851173	←	
	47	INSTALLATION PLATE	1	CWH361147	←	
	48	BAG COMPLETE - INSTALLATION SCREW	1	CWH82C1705	←	

(NOTE)

- All parts are supplied from PAPAMY, Malaysia (Vendor Code: 00029488).
- “O” marked parts are recommended to be kept in stock.

SAFETY	REF. NO.	PART NAME & DESCRIPTION	QTY.	CS-Z12SKEW	CS-Z15SKEW	REMARK
	1	CHASSIS COMPLETE	1	ACXD50C00200	←	
⚠	2	FAN MOTOR	1	L6CBYYYL0037	←	O
	3	CROSS-FLOW FAN COMPLETE	1	CWH02C1076	←	
	4	BEARING ASSY	1	CWH64K1010	←	
	5	SCREW - CROSS-FLOW FAN	1	CWH551146	←	
	6	PARTICULAR PIECE	1	CWD933067B	←	
	7	EVAPORATOR	1	ACXB30C00920	ACXB30C01160	
	8	FLARE NUT (LIQUID)	1	CWT251030	←	
	9	FLARE NUT (GAS)	1	CWT251031	CWT251032	
	10	CONTROL BOARD CASING	1	ACXH10-00200	←	
	11	PARTICULAR PIECE	1	CWD933138	←	
⚠	12	TERMINAL BOARD COMPLETE	1	CWA28C2594	←	O
⚠	13	ELECTRONIC CONTROLLER - MAIN	1	ACXA73C06010	ACXA73C06020	O
⚠	14	ELECTRONIC CONTROLLER - POWER	1	ACXA73-02660	←	O
⚠	15	ELECTRONIC CONTROLLER - INDICATOR	1	ACXA73-02670	←	O
⚠	16	ELECTRONIC CONTROLLER - RECEIVER	1	CWA746916	←	O
	17	HOLDER - RECEIVER	1	ACXD93-00700	←	
	18	INDICATOR HOLDER	1	ACXD93-00930	←	
	19	SENSOR COMPLETE	1	CWA50C2664	←	O
	20	SENSOR COMPLETE (ECO)	1	ACXA50C00350	←	O
⚠	21	ELECTRONIC CONTROLLER (ECO SENSOR)	1	CWA745791	←	
⚠	22	ELECTRONIC CONTROLLER (ECO SENSOR)	1	CWA746206	←	
⚠	23	ELECTRONIC CONTROLLER (COMPARATOR)	1	CWA747891	←	
⚠	24	ELECTRONIC CONTROLLER - HVU	1	N0GE1E000006	←	
	25	GENERATOR COMPLETE	1	CWH94C0056	←	
	26	DISCHARGE GRILLE COMPLETE	1	ACXE20C00220	←	
	27	BACK COVER CHASSIS	1	CWD933233C	←	
	28	FULCRUM	1	ACXH62-00040	←	
	29	VERTICAL VANE	8	CWE241457	←	
	30	CONNECTING BAR	1	CWE261314	←	
⚠	31	AIR SWING MOTOR	1	ACXA98K00020	←	O
⚠	32	AIR SWING MOTOR	1	CWA981241	←	O
⚠	33	AIR SWING MOTOR	1	CWA981299	←	O
	34	CAP - DRAIN TRAY	1	CWH521259	←	
	35	HORIZONTAL VANE COMPLETE	1	ACXE24C00240	←	
	36	HORIZONTAL VANE COMPLETE	1	CWE24C1531	←	
	37	DUCT - COMPLETE	1	ACXD22C00030	←	
	38	CONTROL BOARD COVER - COMPLETE	1	ACXH13C00070	←	
	39	REMOTE CONTROL COMPLETE	1	ACXA75C00270	←	O
	40	FRONT GRILLE COMPLETE	1	ACXE10C00950	←	O
	41	INTAKE GRILLE COMPLETE	1	ACXE22K00090	←	
	42	GRILLE DOOR COMPLETE	1	CWE14C1090	←	
	43	AIR FILTER	2	CWD001279	←	O
	44	CAP - FRONT GRILLE	2	ACXH52-00020	←	
	45	SCREW - FRONT GRILLE	3	XTT4+16CFJ	←	
	46	DRAIN HOSE	1	CWH851173	←	
	47	INSTALLATION PLATE	1	CWH361147	←	
	48	BAG COMPLETE - INSTALLATION SCREW	1	CWH82C1705	←	

(NOTE)

- All parts are supplied from PAPAMY, Malaysia (Vendor Code: 00029488).
- “O” marked parts are recommended to be kept in stock.

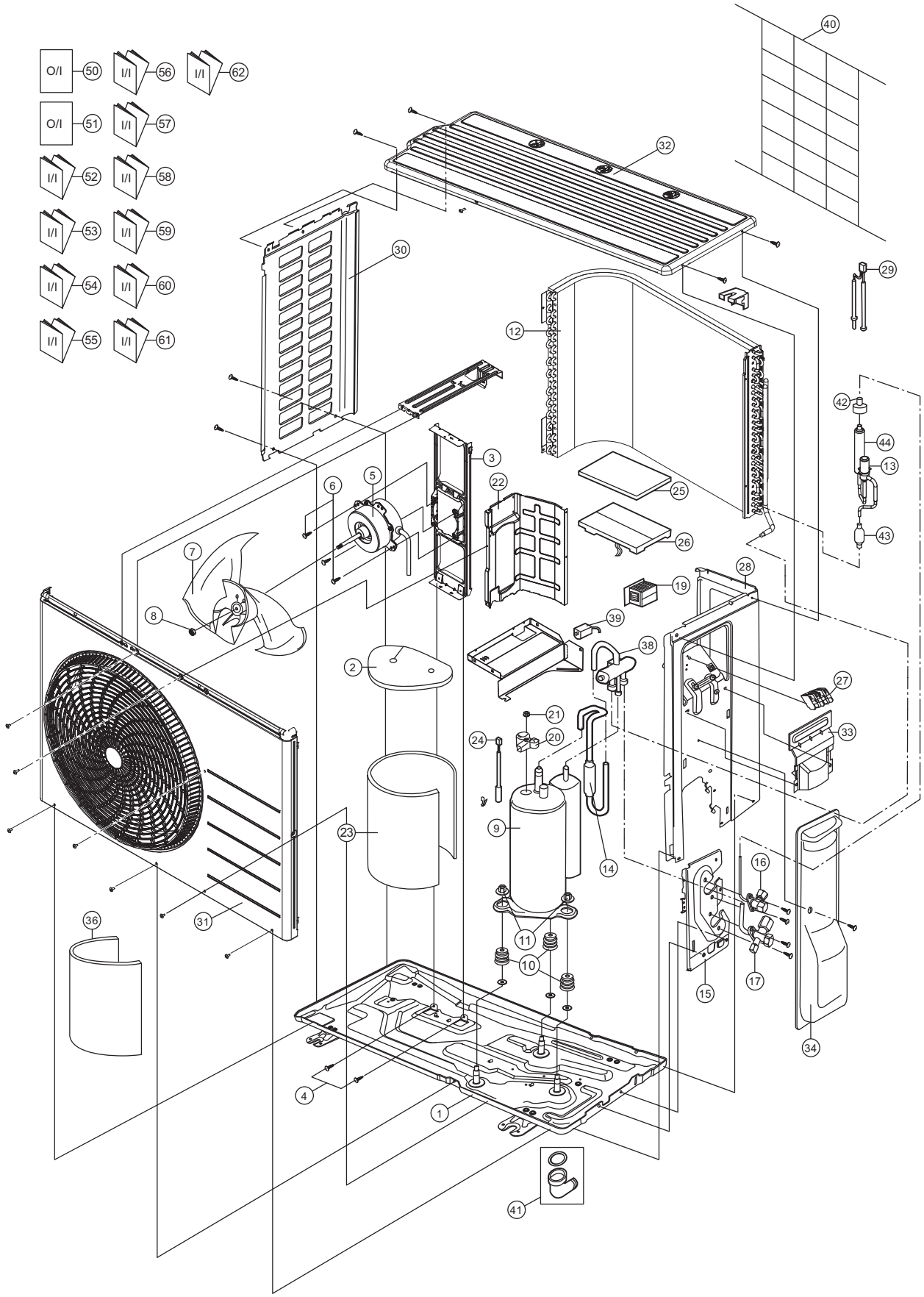
SAFETY	REF. NO.	PART NAME & DESCRIPTION	QTY.	CS-Z18SKEW	REMARK
	1	CHASSIS COMPLETE	1	ACXD50C00200	
⚠	2	FAN MOTOR	1	L6CBYYYL0037	O
	3	CROSS-FLOW FAN COMPLETE	1	CWH02C1076	
	4	BEARING ASSY	1	CWH64K1010	
	5	SCREW - CROSS-FLOW FAN	1	CWH551146	
	6	PARTICULAR PIECE	1	CWD933067B	
	7	EVAPORATOR	1	ACXB30C01160	
	8	FLARE NUT (LIQUID)	1	CWT251030	
	9	FLARE NUT (GAS)	1	CWT251032	
	10	CONTROL BOARD CASING	1	ACXH10-00200	
	11	PARTICULAR PIECE	1	CWD933138	
⚠	12	TERMINAL BOARD COMPLETE	1	CWA28C2594	O
⚠	13	ELECTRONIC CONTROLLER - MAIN	1	ACXA73C06030	O
⚠	14	ELECTRONIC CONTROLLER - POWER	1	ACXA73-02660	O
⚠	15	ELECTRONIC CONTROLLER - INDICATOR	1	ACXA73-02670	O
⚠	16	ELECTRONIC CONTROLLER - RECEIVER	1	CWA746916	O
	17	HOLDER - RECEIVER	1	ACXD93-00700	
	18	INDICATOR HOLDER	1	ACXD93-00930	
	19	SENSOR COMPLETE	1	CWA50C2664	O
	20	SENSOR COMPLETE (ECO)	1	ACXA50C00350	O
⚠	21	ELECTRONIC CONTROLLER (ECO SENSOR)	1	CWA745791	
⚠	22	ELECTRONIC CONTROLLER (ECO SENSOR)	1	CWA746206	
⚠	23	ELECTRONIC CONTROLLER (COMPARATOR)	1	CWA747891	
⚠	24	ELECTRONIC CONTROLLER - HVU	1	N0GE1E000006	
	25	GENERATOR COMPLETE	1	CWH94C0056	
	26	DISCHARGE GRILLE COMPLETE	1	ACXE20C00220	
	27	BACK COVER CHASSIS	1	CWD933233C	
	28	FULCRUM	1	ACXH62-00040	
	29	VERTICAL VANE	8	CWE241457	
	30	CONNECTING BAR	1	CWE261314	
⚠	31	AIR SWING MOTOR	1	ACXA98K00020	O
⚠	32	AIR SWING MOTOR	1	CWA981241	O
⚠	33	AIR SWING MOTOR	1	CWA981299	O
	34	CAP - DRAIN TRAY	1	CWH521259	
	35	HORIZONTAL VANE COMPLETE	1	ACXE24C00240	
	36	HORIZONTAL VANE COMPLETE	1	CWE24C1531	
	37	DUCT - COMPLETE	1	ACXD22C00030	
	38	CONTROL BOARD COVER - COMPLETE	1	ACXH13C00070	
	39	REMOTE CONTROL COMPLETE	1	ACXA75C00270	O
	40	FRONT GRILLE COMPLETE	1	ACXE10C00950	O
	41	INTAKE GRILLE COMPLETE	1	ACXE22K00090	
	42	GRILLE DOOR COMPLETE	1	CWE14C1090	
	43	AIR FILTER	2	CWD001279	O
	44	CAP - FRONT GRILLE	2	ACXH52-00020	
	45	SCREW - FRONT GRILLE	3	XTT4+16CFJ	
	46	DRAIN HOSE	1	CWH851173	
	47	INSTALLATION PLATE	1	CWH361147	
	48	BAG COMPLETE - INSTALLATION SCREW	1	CWH82C1705	

(NOTE)

- All parts are supplied from PAPAMY, Malaysia (Vendor Code: 00029488).
- “O” marked parts are recommended to be kept in stock.

22.2 Outdoor Unit

22.2.1 CU-Z7SKE CU-Z9SKE



Note
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

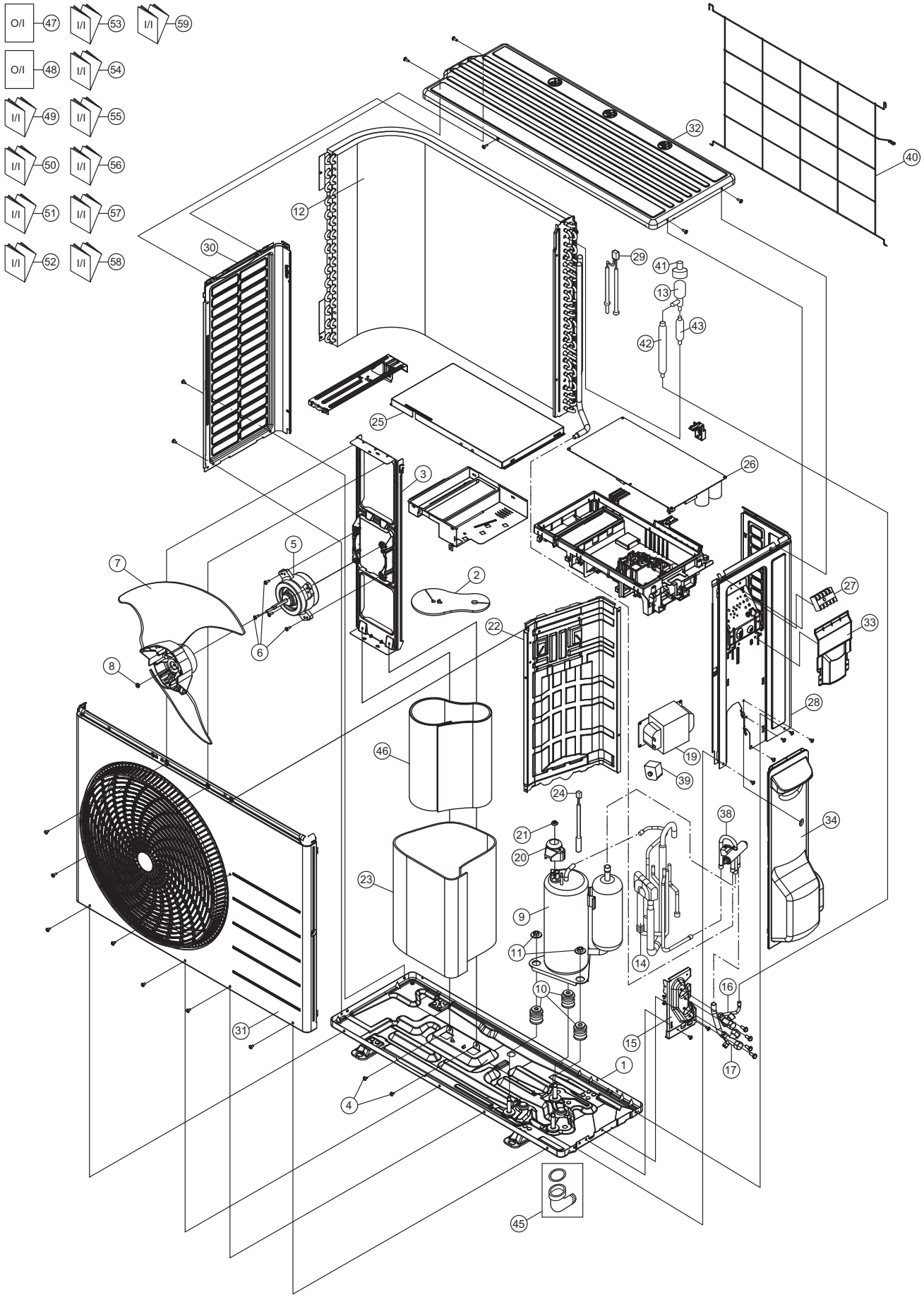
SAFETY	REF. NO.	PART NAME & DESCRIPTION	QTY.	CU-Z7SKE	CU-Z9SKE	REMARK
	1	CHASSIS COMPLETE	1	CWD52K1399	←	
	2	SOUND PROOF MATERIAL (TOP)	1	CWG302314	←	
	3	FAN MOTOR BRACKET	1	CWD541157	←	
	4	SCREW - FAN MOTOR BRACKET	2	CWH551217	←	
⚠	5	FAN MOTOR	1	ARS6411AC	←	O
	6	SCREW - FAN MOTOR MOUNT	4	CWH55252J	←	
	7	PROPELLER FAN ASSY	1	CWH03K1100	←	
	8	NUT - PROPELLER FAN	1	CWH56053J	←	
⚠	9	COMPRESSOR	1	9RS092XAA21	9RS102XEA21	O
	10	ANTI - VIBRATION BUSHING	3	CWH50077	←	
	11	NUT - COMPRESSOR MOUNT	3	CWH561096	←	
	12	CONDENSER	1	CWB32C3797	ACXB32C00760	
	13	EXPANSION VALVE	1	CWB051055	CWB051078	
	14	DISCHARGE MUFFLER (4 W.VALVE)	1	CWB121010	←	
	15	HOLDER COUPLING	1	CWH351233	←	
	16	2-WAYS VALVE (LIQUID)	1	CWB021589	CWB021180J	O
	17	3-WAY VALVE (GAS)	1	CWB011374	←	O
⚠	19	REACTOR	1	G0C193J00023	←	O
	20	TERMINAL COVER	1	CWH171039A	←	
	21	NUT - TERMINAL COVER	1	CWH7080300J	←	
	22	SOUND PROOF BOARD	1	CWH151427	CWH151428	
	23	SOUND PROOF MATERIAL	1	CWG302948	←	
	24	SENSOR CO - COMP TEMP	1	CWA50C2205	←	O
	25	CONTROL BOARD COVER - TOP	1	CWH131264	←	
⚠	26	ELECTRONIC CONTROLLER - MAIN	1	ACXA73C06250R	ACXA73C06260R	O
⚠	27	TERMINAL BOARD ASSY	1	CWA28K1298	←	O
	28	CABINET SIDE PLATE CO.	1	ACXE04C00200	CWE04C1587	
	29	SENSOR CO - AIR TEMP AND PIPE TEMP	1	CWA50C3080	←	O
	30	CABINET SIDE PLATE (LEFT)	1	CWE041858A	←	
	31	CABINET FRONT PLATE CO.	1	CWE06C1566	←	
	32	CABINET TOP PLATE	1	CWE031230A	←	
	33	PLATE - C. B. COVER TERMINAL	1	CWH131301	←	
	34	CONTROL BOARD COVER CO.	1	CWH13C1359	←	
	36	SOUND PROOF MATERIAL	1	CWG302316	←	
	38	4-WAYS VALVE	1	ACXB00-00130	←	O
⚠	39	V-COIL COMPLETE (4-WAY VALVE)	1	ACXA43C00250	←	O
	40	WIRE NET	1	ACXD04-00040A	←	
	41	BAG - COMPLETE	1	CWG87C900	←	
⚠	42	V-COIL COMPLETE (EXP. VALVE)	1	CWA43C2603	←	O
	43	STRAINER	1	CWB11094	←	
	44	DISCHARGE MUFFLER	1	CWB121021	←	
	50	OPERATING INSTRUCTION	1	ACXF55-01470	←	
	51	OPERATING INSTRUCTION	1	ACXF55-01480	←	
	52	INSTALLATION INSTRUCTION	1	ACXF60-01930	←	
	53	INSTALLATION INSTRUCTION	1	ACXF60-01940	←	
	54	INSTALLATION INSTRUCTION	1	ACXF60-01950	←	
	55	INSTALLATION INSTRUCTION	1	ACXF60-01960	←	

SAFETY	REF. NO.	PART NAME & DESCRIPTION	QTY.	CU-Z7SKE	CU-Z9SKE	REMARK
	56	INSTALLATION INSTRUCTION	1	ACXF60-01970	←	
	57	INSTALLATION INSTRUCTION	1	ACXF60-01980	←	
	58	INSTALLATION INSTRUCTION	1	ACXF60-01990	←	
	59	INSTALLATION INSTRUCTION	1	ACXF60-02000	←	
	60	INSTALLATION INSTRUCTION	1	ACXF60-02010	←	
	61	INSTALLATION INSTRUCTION	1	ACXF60-02020	←	
	62	INSTALLATION INSTRUCTION	1	ACXF60-02030	←	

(NOTE)

- All parts are supplied from PAPAMY, Malaysia (Vendor Code: 00029488).
- “O” marked parts are recommended to be kept in stock.

22.2.2 CU-Z12SKE CU-Z15SKE



Note
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

SAFETY	REF. NO.	PART NAME & DESCRIPTION	QTY.	CU-Z12SKE	CU-Z15SKE	REMARK
	1	CHASSIS COMPLETE	1	CWD52K1277	←	
	2	SOUND PROOF MATERIAL (TOP)	1	CWG302719	←	
	3	FAN MOTOR BRACKET	1	CWD541167	←	
	4	SCREW - FAN MOTOR BRACKET	2	CWH551217	←	
⚠	5	FAN MOTOR	1	ARS6411AC	←	O
	6	SCREW - FAN MOTOR MOUNT	4	CWH55252J	←	
	7	PROPELLER FAN ASSY	1	CWH03K1066	←	
	8	NUT - PROPELLER FAN	1	CWH56053J	←	
⚠	9	COMPRESSOR	1	9RS102XEA21	←	O
	10	ANTI - VIBRATION BUSHING	3	CWH50077	←	
	11	NUT - COMPRESSOR MOUNT	3	CWH561096	←	
	12	CONDENSER	1	CWB32C3547	CWB32C3681	
	13	EXPANSION VALVE	1	CWB051078	←	
	14	DISCHARGE MUFFLER (4 W.VALVE)	1	CWB121010	←	
	15	HOLDER COUPLING	1	CWH351233	←	
	16	2-WAYS VALVE (LIQUID)	1	CWB021180J	CWB021589	O
	17	3-WAY VALVE (GAS)	1	CWB011374	CWB011367	O
⚠	19	REACTOR	1	G0C193J00004	G0C103J00013	O
	20	TERMINAL COVER	1	CWH171039A	←	
	21	NUT - TERMINAL COVER	1	CWH7080300J	←	
	22	SOUND PROOF BOARD	1	CWH151273	CWH151274	
	23	SOUND PROOF MATERIAL (BODY)	1	CWG302949	←	
	24	SENSOR CO - COMP TEMP	1	CWA50C2894	←	O
	25	CONTROL BOARD COVER - TOP	1	CWH131473	←	
⚠	26	ELECTRONIC CONTROLLER - MAIN	1	ACXA73C06270R	ACXA73C06280R	O
⚠	27	TERMINAL BOARD ASSY	1	CWA28K1298	←	O
	28	CABINET SIDE PLATE CO. (RIGHT)	1	CWE04C1411	CWE04C1296	
	29	SENSOR CO - AIR TEMP AND PIPE TEMP	1	CWA50C3078	CWA50C3079	O
	30	CABINET SIDE PLATE	1	CWE041579A	CWE041580A	
	31	CABINET FRONT PLATE CO.	1	CWE06C1360	←	
	32	CABINET TOP PLATE	1	CWE031148A	←	
	33	PLATE - C. B. COVER TERMINAL	1	CWH131470	←	
	34	CONTROL BOARD COVER CO.	1	CWH13C1253	←	
	38	4-WAYS VALVE	1	ACXB00-00130	←	O
⚠	39	V-COIL COMPLETE	1	ACXA43C00250	←	O
	40	WIRE NET	1	CWD041200A	←	
⚠	41	V-COIL COMPLETE	1	CWA43C2603	←	O
	42	DISCHARGE MUFFLER	1	CWB121021	←	
	43	STRAINER	1	CWB11094	←	
	45	BAG - COMPLETE	1	CWG87C900	←	
	46	SOUND PROOF MATERIAL	1	CWG302701	←	
	47	OPERATING INSTRUCTION	1	ACXF55-01470	←	
	48	OPERATING INSTRUCTION	1	ACXF55-01480	←	
	49	INSTALLATION INSTRUCTION	1	ACXF60-01930	←	
	50	INSTALLATION INSTRUCTION	1	ACXF60-01940	←	
	51	INSTALLATION INSTRUCTION	1	ACXF60-01950	←	
	52	INSTALLATION INSTRUCTION	1	ACXF60-01960	←	

SAFETY	REF. NO.	PART NAME & DESCRIPTION	QTY.	CU-Z12SKE	CU-Z15SKE	REMARK
	53	INSTALLATION INSTRUCTION	1	ACXF60-01970	←	
	54	INSTALLATION INSTRUCTION	1	ACXF60-01980	←	
	55	INSTALLATION INSTRUCTION	1	ACXF60-01990	←	
	56	INSTALLATION INSTRUCTION	1	ACXF60-02000	←	
	57	INSTALLATION INSTRUCTION	1	ACXF60-02010	←	
	58	INSTALLATION INSTRUCTION	1	ACXF60-02020	←	
	59	INSTALLATION INSTRUCTION	1	ACXF60-02030	←	

(NOTE)

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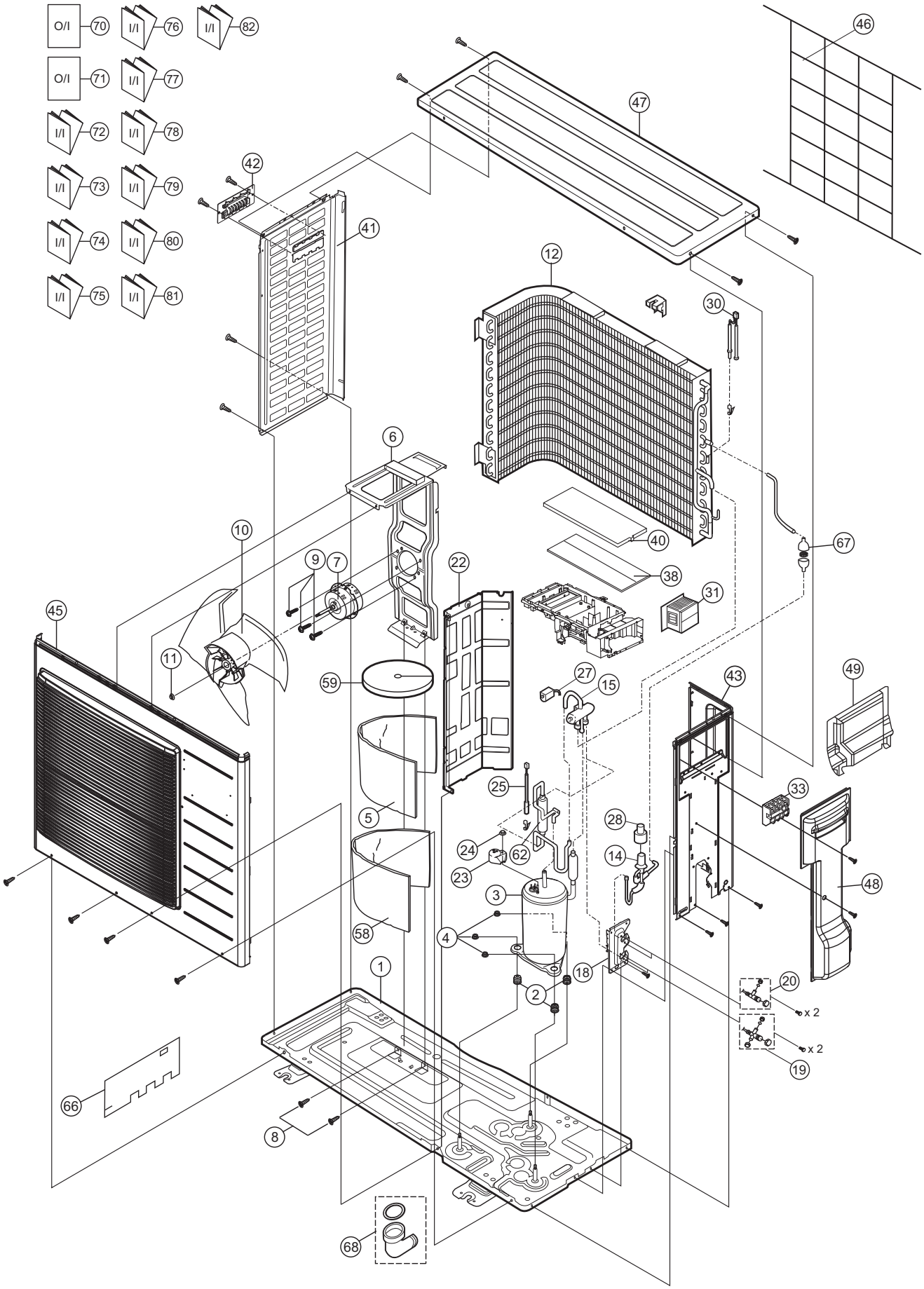
22.2.3 CU-Z18SKE



Note
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

SAFETY	REF. NO.	PART NAME & DESCRIPTION	QTY.	CU-Z18SKE	REMARK
	1	CHASSIS COMPLETE	1	CWD52K1261	
	2	ANTI - VIBRATION BUSHING	3	CWH50077	
⚠	3	COMPRESSOR	1	9RD132XAA21	O
	4	NUT - COMPRESSOR MOUNT	3	CWH561096	
	5	SOUND PROOF MATERIAL	1	CWG302744	
	6	FAN MOTOR BRACKET	1	CWD541153	
⚠	7	FAN MOTOR	1	ARW8401AC	O
	8	SCREW - FAN MOTOR BRACKET	2	CWH551217	
	9	SCREW - FAN MOTOR MOUNT	4	CWH551106J	
	10	PROPELLER FAN ASSY	1	CWH03K1065	
	11	NUT - PROPELLER FAN	1	CWH56053J	
	12	CONDENSER	1	CWB32C3371	
	14	EXPANSION VALVE	1	CWB051078	
	15	4-WAYS VALVE	1	CWB001026J	O
	18	HOLDER COUPLING	1	CWH351227	
	19	3-WAY VALVE (GAS)	1	CWB011338	O
	20	2-WAYS VALVE (LIQUID)	1	CWB021454	O
	22	SOUND PROOF BOARD	1	CWH151257	
	23	TERMINAL COVER	1	CWH171039A	
	24	NUT - TERMINAL COVER	1	CWH7080300J	
	25	SENSOR CO - CN-TANK	1	CWA50C2185	O
⚠	27	V-COIL COMPLETE (4-WAY VALVE)	1	CWA43C2169J	O
⚠	28	V-COIL COMPLETE (EXP. VALVE)	1	CWA43C2603	O
	30	SENSOR - COMPLETE	1	CWA50C2517	
⚠	31	REACTOR	1	G0C203J00003	O
⚠	33	TERMINAL BOARD ASSY	1	CWA28K1298	O
⚠	38	ELECTRONIC CONTROLLER - MAIN	1	ACXA73C06170R	O
	40	CONTROL BOARD COVER - TOP	1	CWH131333	
	41	CABINET SIDE PLATE (LEFT)	1	CWE041520A	
	42	HANDLE	1	CWE161010	
	43	CABINET SIDE PLATE (RIGHT)	1	CWE041555A	
	45	CABINET FRONT PLATE CO.	1	CWE06K1077	
	46	WIRE NET	1	CWD041155A	
	47	CABINET TOP PLATE	1	CWE031083A	
	48	CONTROL BOARD COVER - COMPLETE	1	CWH13C1238	
	49	CONTROL BOARD COVER	1	CWH131409	
	58	SOUND PROOF MATERIAL	1	CWG302636	
	59	SOUND PROOF MATERIAL	1	CWG302630	
	62	RECEIVER	1	CWB14011	
	66	SOUND PROOF MATERIAL	1	CWG302632	
	67	STRAINER	1	CWB11094	
	68	BAG - COMPLETE	1	CWG87C900	
	70	OPERATING INSTRUCTION	1	ACXF55-01470	
	71	OPERATING INSTRUCTION	1	ACXF55-01480	
	72	INSTALLATION INSTRUCTION	1	ACXF60-01930	
	73	INSTALLATION INSTRUCTION	1	ACXF60-01940	
	74	INSTALLATION INSTRUCTION	1	ACXF60-01950	

SAFETY	REF. NO.	PART NAME & DESCRIPTION	QTY.	CU-Z18SKE	REMARK
	75	INSTALLATION INSTRUCTION	1	ACXF60-01960	
	76	INSTALLATION INSTRUCTION	1	ACXF60-01970	
	77	INSTALLATION INSTRUCTION	1	ACXF60-01980	
	78	INSTALLATION INSTRUCTION	1	ACXF60-01990	
	79	INSTALLATION INSTRUCTION	1	ACXF60-02000	
	80	INSTALLATION INSTRUCTION	1	ACXF60-02010	
	81	INSTALLATION INSTRUCTION	1	ACXF60-02020	
	82	INSTALLATION INSTRUCTION	1	ACXF60-02030	

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