CONFIDENTIAL

SINGLE CAC
Air Conditioner
SERVICE MANUAL(General)

CAUTION

Before Servicing the unit, read the safety precautions in General SVC manual.
Only for authorized service personnel.

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Part 1 General Information

1. Safety Precautions

	Read the precautions in this manual carefully before operating the unit.		This appliance is filled with flammable refrigerant (R32)
	This symbol indicates that the Operation Manual should be read carefully.		This symbol indicates that a service personnel should be handling this equipment with reference to the Installation Manual.

To prevent injury to the user or other people and property damage, the following instructions must be followed.

■ Incorrect operation due to ignoring instruction will cause harm or damage. The seriousness is classified by the following indications.

⚠WARNING	This symbol indicates the possibility of death or serious injury.
⚠CAUTION	This symbol indicates the possibility of injury or damage to properties only.

■ Meanings of symbols used in this manual are as shown below.

	**Be sure not to do.**
	**Be sure to follow the instruction.**
	**Dangerous Voltage**

1.1 Safety Precautions in Repair

⚠WARNING	
Be sure to disconnect all remote electric power supplies before servicing. Internal components and circuit boards are at main potential when the equipment is connected to the power cables. This voltage is extremely dangerous and may cause death or severe injury if come in contact with it.	
Do not touch the discharging refrigerant gas during the repair work. The refrigerant gas can cause frostbite.	
Release the refrigerant gas completely at a well-ventilated place first. Otherwise, when the pipe is disconnected, refrigerant gas or refrigerating machine oil discharges and it can cause injury.	
When the refrigerant gas leaks during work, execute ventilation. If the refrigerant gas touches to a fire, poisonous gas generates. A case of leakage of the refrigerant and the closed room full with gas is dangerous because a shortage of oxygen occurs. Be sure to execute ventilation.	
When removing the front panel or cabinet, execute short-circuit and discharge between high voltage capacitor terminals. If discharge is not executed, an electric shock is caused by high voltage resulted in a death or injury.	
Be sure to provide the grounding when repairing the equipment in a humid or wet place, to avoid electrical shocks.	

Do not use a defective or underrated circuit breaker. Use the correctly rated breaker and fuse. Otherwise there is a risk of fire or electric shock.	
Install the panel and the cover of control box securely. Otherwise there is risk of fire or electric shock due to dust, water etc.	
Indoor/outdoor wiring connections must be secured tightly and the cable should be routed properly so that there is no force pulling the cable from the connection terminals. Improper or loose connections can cause heat generation or fire.	
Do not touch, operate, or repaire the product with wet hands. Hoding the plug by hand when taking out. Otherwise there is risk of electric shock or fire.	
Use a vacuum pump or Inert (nitrogen) gas when doing leakage test or air purge. Do not compress air or Oxygen and Do not use Flammable gases. Otherwise, it may cause fire or explosion. - There is the risk of death, injury, fire or explosion.	
Do not turn on the breaker or power under condition that front panel, cabinet, top cover, control box cover are removed or opened. Otherwise, it may cause fire, electric shock, explosion or death.	
The appliance shall be stored so as to prevent mechanical damage from occurring.	
Any 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 authorises their competence to handle refrigerants safely in accordance with an industry recognised 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.	
Keep any required ventilation openings clear of obstruction	
• The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).	
• The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation	
• Compliance with national gas regulations shall be observed	

• Refrigerant tubing shall be protected or enclosed to avoid damage.	
• The installation of pipe-work shall be kept to a minimum • When flared joints are reused indoors, the flare part shall be re-fabricated. • When mechanical connectors are reused indoors, sealing parts shall be renewed.	
• Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer. • Do not pierce or burn. • Be aware that refrigerants may not contain an odour. • Ducts connected to an appliance shall not contain an ignition source. • Two or more people must lift and transport the product. Avoid personal injury. • Periodic (more than once/year) cleaning of the dust or salt particles stuck on the heat exchanger by using water. • Dismantling the unit, treatment of the refrigerant oil and eventual parts should be done in accordance with local and national standards.	
• Mechanical connections shall be accessible for maintenance purposes. • Ducts connected to an appliance shall not contain an ignition source. • The appliance shall be disconnected from its power source during service and when replacing parts.	
Pipe-work shall be protected from physical damage.	
Checks to the area 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 following precautions shall be complied with prior to conducting work on the system.	
Work procedure Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapour being present while the work is being performed.	
General work area All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided. The area around the workspace shall be sectioned off. Ensure that the conditions within the area have been made safe by control of flammable material.	
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.	
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 to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.	

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. 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.	
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.	
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 actual refrigerant charge 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 suitably protected against being so corroded.	
Checks to electrical devices Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. 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. This shall be reported to the owner of the equipment so all parties are advised.	

Initial safety checks shall include - Capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking. - No live electrical components and wiring are exposed While charging, recovering or purging the system. - Continuity of earth bonding	
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 can inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.	
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. Other parts may result in the ignition of refrigerant in the atmosphere from a leak	
Cabling Check 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 ageing or continual vibration from sources such as compressors or fans.	
Detection of flammable refrigerants Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.	

Leak detection methods

The following leak detection methods are deemed acceptable for systems containing flammable refrigerants. 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.

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.

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 minimise 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 overfill the refrigeration system. Prior to recharging the system it shall be pressure tested with OFN. 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.

Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. 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 overfill 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.

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.	
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. Empty 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.	

⚠CAUTION	
Be sure to earth the air conditioner with an earthing conductor connected to the earthing terminal.	
Conduct repair works after checking that the refrigerating cycle section has cooled down sufficiently. Otherwise, working on the unit, the hot refrigerating cycle section can cause burns.	
Do not tilt the unit when removing panels. Otherwise, the water inside the unit can spill and wet floor.	

⚠CAUTION	
Do not use the welder in a well-ventilated place. Using the welder in an enclosed room can cause oxygen deficiency.	
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.	

1.2 Inspections after Repair

⚠WARNING	
Check to see if the terminal block is not dirty or loose. If terminal block is dust or loose it can cause an electrical shock or fire.	
Do not use a joined power cable or extension cable, or share the same power outlet with other electrical appliances. otherwise, it can cause an electrical shock, excessive heat generation or fire.	
Do not insert hands or other objects through the air inlet or outlet while the product is operating. There are sharp and moving parts that could cause personal injury.	
Do not block the inlet or outlet of air flow. It may cause product failure	

⚠CAUTION	
Check to see if the parts are mounted correctly and wires are connected. Improper installation and connections can cause an electric shock or an injury.	
Check the installation platform or frame has corroded. Corroded installation platform or frame can cause the unit to fall, resulting in injury.	
Be sure to check the earth wire is correctly connected.	
After the work has finished, be sure to do an insulation tset to check the resistance is 2[Mohm] or more between the charge section and the non-charge metal section (Earth position). If the resistance value is low, a disaster such as a leak or electric shock is caused at user's side.	
Check the drainage of the indoor unit after the repair. If drainage is faulty the water to enter the room and wet floor.	

2. Model Line Up

2.1 Indoor units

Category		Chassis Name	Grade	Capacity Index [kW (kBtu/h)]								
				2.5 (9)	3.4 (12)	5.0 (18)	6.8 (24)	7.5 (30)	9.5 (36)	12.0 (42)	13.4 (48)	14.6 (60)
Ceiling Cassette	4-Way	TR	Standard Compact	CT09F	CT12F							
		TQ	Standard Compact			CT18F NQ0						
			High	UT09FH	UT12FH							
		TP-B	Standard Compact				CT24F	UT30F				
			High			UT18FH						
		TM-A	Standard Compact						UT36F	UT42F	UT48F	UT60F
			High				UT24FH	UT30FH	UT36FH	UT42FH	UT48FH	UT60FH
	Round	TY	Standard						UT36F		UT48F	
Ceiling Concealed Duct	Low Static Pressure	L5	Standard Compact	CL09F	CL12F							
			High		UL12FH							
		L6	Standard Compact			CL18F						
		L3	Standard Compact				CL24F					
			High			UL18FH						
	Mid Static Pressure	M1	Standard Compact			CM18F	CM24F	UM30F				
			High		UM12FH	UM18FH						
		M2	Standard Compact						UM36F	UM42F		
			High				UM24FH	UM30FH				
		M3	Standard Compact								UM48F	UM60F
			High						UM36FH	UM42FH	UM48FH	
Ceiling Suspended		VM1	Standard Compact			UV18F	UV24F	UV30F				
			High			UV18FH						
		VM2	Standard Compact						UV36F	UV42F	UV48F	UV60F
			High				UV24FH	UV30FH	UV36FH	UV42FH		
Console		QA	Standard Compact	UQ09F	UQ12F	UQ18F						

Category	Chassis Name	Grade	Capacity Index [kW (kBtu/h)]								
			2.5 (9)	3.4 (12)	5.0 (18)	6.8 (24)	7.5 (30)	9.5 (36)	12.0 (42)	13.4 (48)	14.6 (60)
Wall Mounted	SJ	Standard	MJ09PC	MJ12PC							
	SK	Standard			MJ18PC	MJ24PC					
	SR	Standard Compact					US30F	US36F			

2.2 Outdoor units

Model Name	Chassis Name	Capacity index of connectable indoor units [kW(kBtu/h)]	Power Supply	Syncro Availability	PCB composition	Driver [kW]
UUA1	UL2	2.5 (9) 3.4 (12) 5.0 (18)	1 ϕ , 220-240 V~, 50Hz	-	(1 Part) Main PCB	2
UUB1	U24A	5.0 (18) 6.8 (24) 7.5 (30)	1 ϕ , 220-240 V~, 50Hz	-	(1 Part) Main PCB	3
UUC1	U4	6.8 (24) 7.5 (30) 9.5 (36)	1 ϕ , 220-240 V~, 50Hz	-	(1 Part) Main PCB	4.5
UUD1	U3	9.5 (36) 12.0 (42) 13.4 (48) 14.6 (60)	1 ϕ , 220-240 V~, 50Hz	O	(4 Parts) Cycle PCB Inverter PCB Fan PCB Noise Filter	6
UUD3	U3	9.5 (36) 12.0 (42) 13.4 (48) 14.6 (60)	3 ϕ , 380-415 V~, 50Hz	O	(4 Parts) Cycle PCB Inverter PCB Fan PCB Noise Filter	7

2.2 Outdoor units

1) Single Combination

- High

Capacity [kW(kBtu/h)]	Outdoor Unit Chassis	Indoor Unit					
		Ceiling Cassette	Ceiling Concealed Duct		Ceiling Suspended	Console	Wall Mounted
			Low Static Pressure	Mid Static Pressure			
2.5 (9)	UUA1	UT09FH					
3.4 (12)		UT12FH	UL12FH	UM12FH			
5.0 (18)	UUB1	UT18FH	UL18FH	UM18FH	UV18FH		
6.8 (24)	UUC1	UT24FH		UM24FH	UV24FH		
7.5 (30)		UT30FH		UM30FH	UV30FH		
9.5 (36)	UUD1 / UUD3	UT36FH		UM36FH	UV36FH		
12.0 (42)		UT42FH		UM42FH	UV42FH		
13.4 (48)		UT48FH		UM48FH			
14.6 (60)		UT60FH					

- Standard

Capacity [kW(kBtu/h)]	Outdoor Unit	Indoor Unit					
		Ceiling Cassette	Ceiling Concealed Duct		Ceiling Suspended	Console	Wall Mounted
			Low Static Pressure	Mid Static Pressure			
2.5 (9)	UUA1	CT09F	CL09F			UQ09F	MJ09PC
3.4 (12)		CT12F	CL12F			UQ12F	MJ12PC
5.0 (18)	UUB1	CT18F	CL18F	CM18F	UV18F	UQ18F	MJ18PC
6.8 (24)	UUC1	CT24F	CL24F	CM24F	UV24F		MJ24PC
7.5 (30)		UT30F		UM30F	UV30F		US30F
9.5 (36)	UUD1 / UUD3	UT36F		UM36F	UV36F		US36F
12.0 (42)		UT42F		UM42F	UV42F		
13.4 (48)		UT48F		UM48F	UV48F		
14.6 (60)		UT60F		UM60F	UV60F		

- Compact

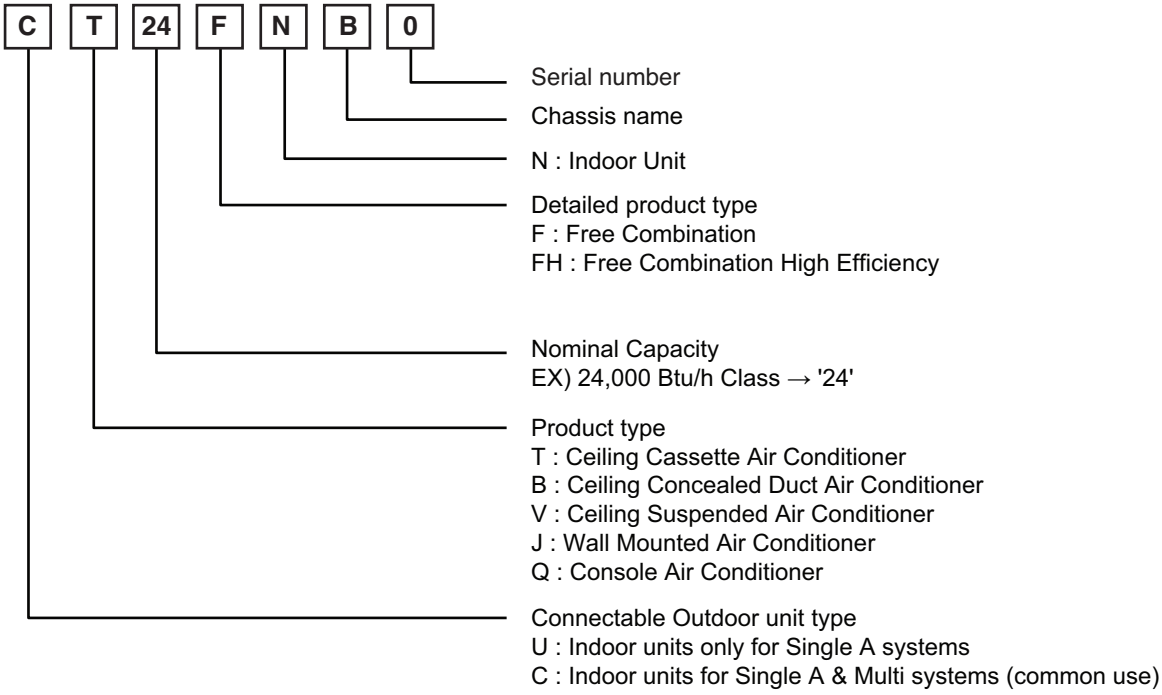
Capacity [kW(kBtu/h)]	Outdoor Unit	Indoor Unit					
		Ceiling Cassette	Ceiling Concealed Duct		Ceiling Suspended	Console	Wall Mounted
			Low Static Pressure	Mid Static Pressure			
5.0 (18)	UUA1	CT18F	CL18F	CM18F	UV18F		
6.8 (24)	UUB1	CT24F	CL24F	CM24F	UV24F		
7.5 (30)		UT30F		UM30F	UV30F		US30F
9.5 (36)	UUC1	UT36F		UM36F	UV36F		US36F

2) Synchro

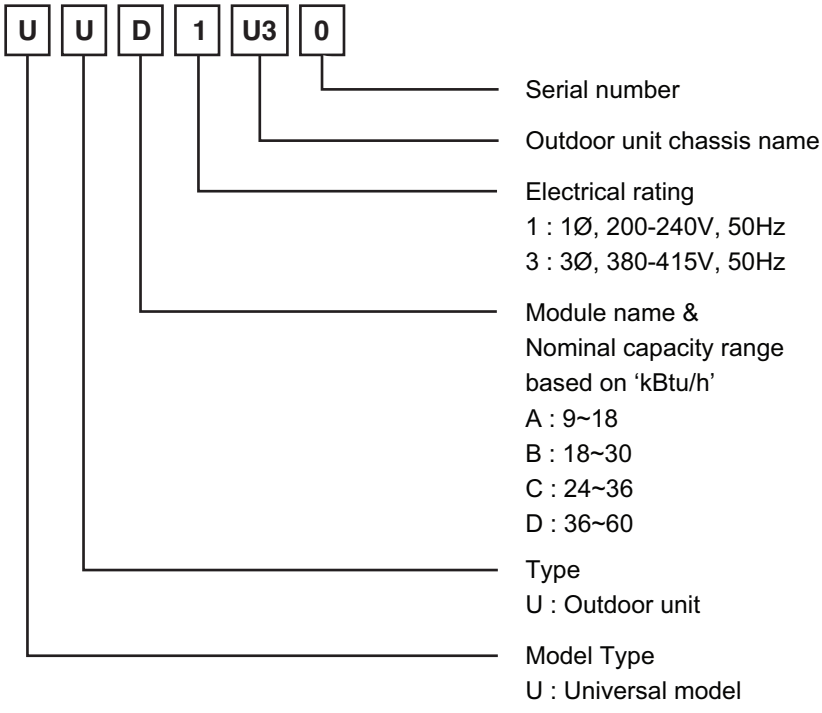
Outdoor Unit Model Name	Indoor Unit Model	IDU Quantity		
		Duo	Trio	Quartet
UUD1 / UUD3	CT12F		●	●
	CT18F	●	●	
	CT24F	●		
	UT30F	●		
	CL12F		●	●
	CM18F	●	●	
	CM24F	●		
	UM30F	●		

3. Nomenclature

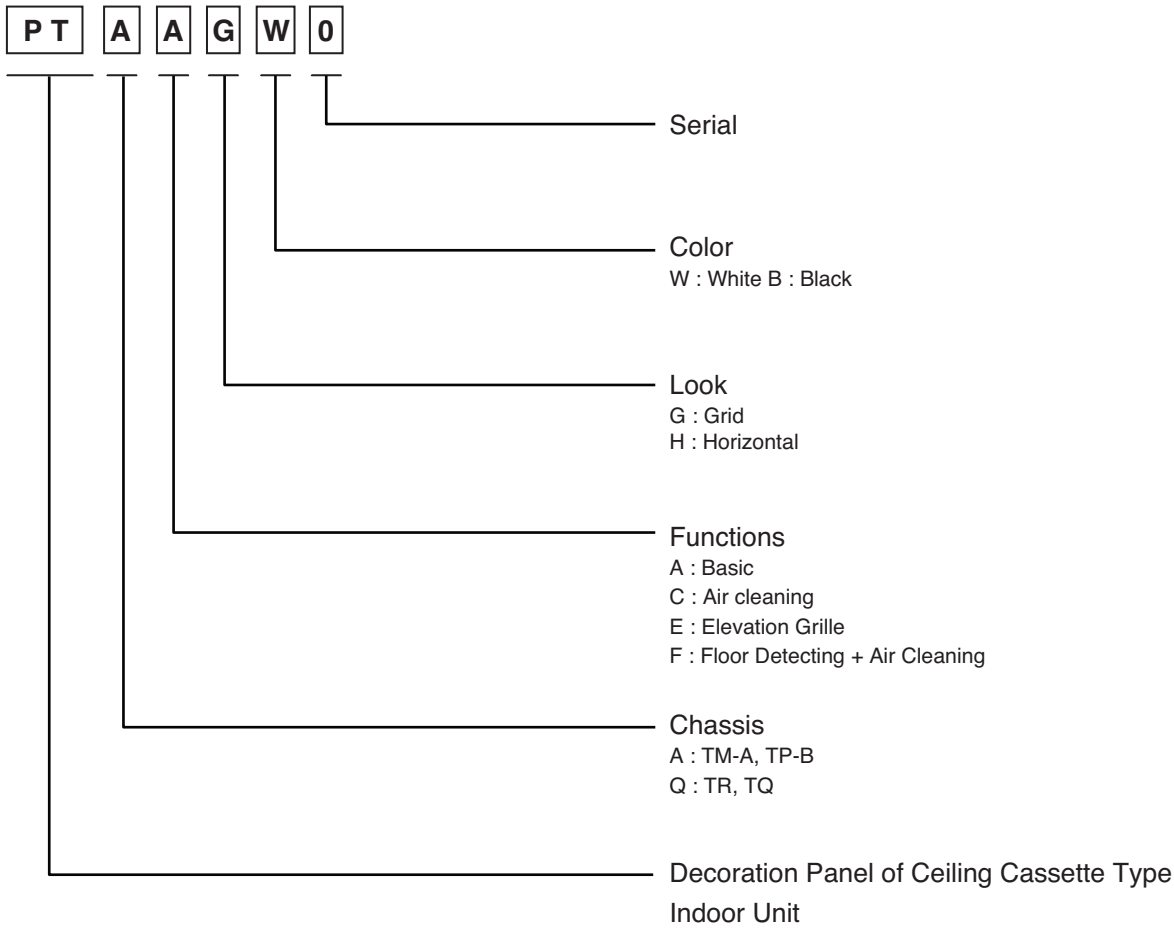
3.1 Indoor Unit



3.2 Outdoor Unit



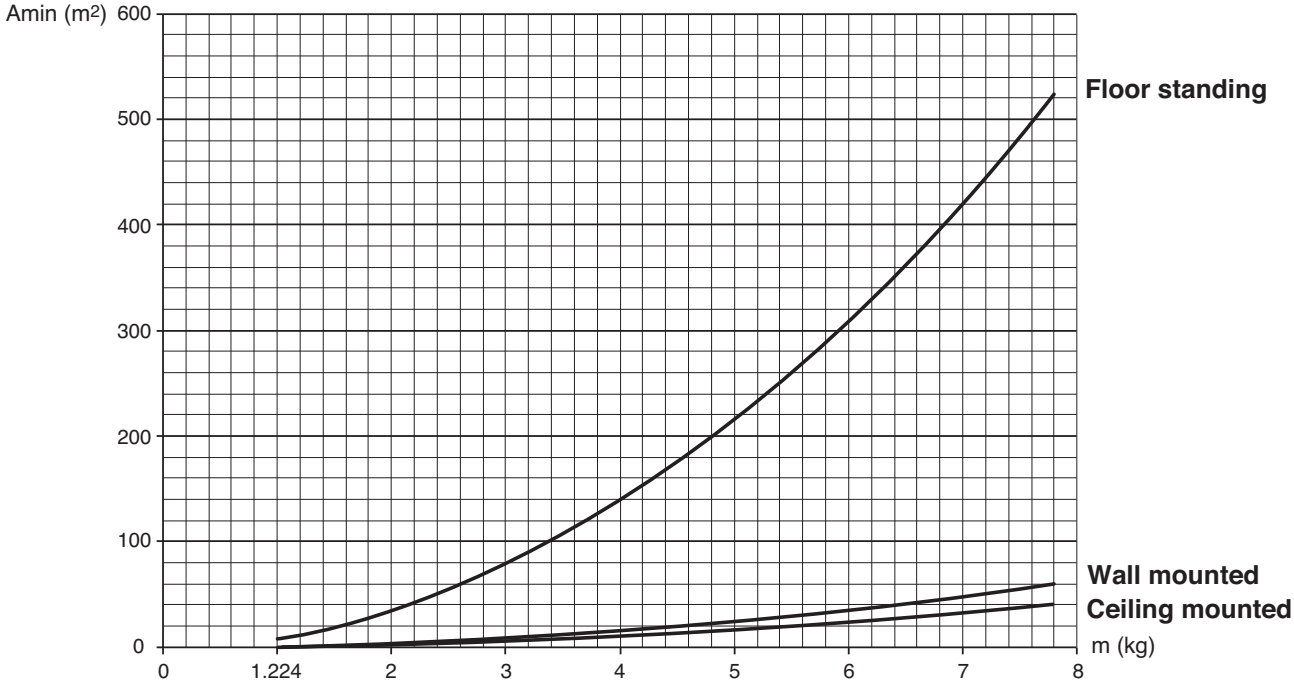
3.3 Decoration panel(For ceiling cassette models)



Minimum floor area

• The appliance shall be installed, operated and stored in a room with a floor area larger than the minimum area.

• Use the graph of table to determine the minimum area.



• m : Total refrigerant amount in the system

• Total refrigerant amount : factory refrigerant charge + additional refrigerant amount

• Amin : minimum area for installation

Floor standing	
m (kg)	Amin (m^2)
< 1.224	-
1.224	12.9
1.4	16.82
1.6	21.97
1.8	27.80
2	34.32
2.2	41.53
2.4	49.42
2.6	58.00
2.8	67.27
3	77.22
3.2	87.86
3.4	99.19
3.6	111.20
3.8	123.90
4	137.29
4.2	151.36
4.4	166.12

Floor location	
m (kg)	Amin (m^2)
4.6	181.56
4.8	197.70
5	214.51
5.2	232.02
5.4	250.21
5.6	269.09
5.8	288.65
6	308.90
6.2	329.84
6.4	351.46
6.6	373.77
6.8	396.76
7	420.45
7.2	444.81
7.4	469.87
7.6	495.61
7.8	522.04

Wall mounted	
m (kg)	Amin (m^2)
< 1.224	-
1.224	1.43
1.4	1.87
1.6	2.44
1.8	3.09
2	3.81
2.2	4.61
2.4	5.49
2.6	6.44
2.8	7.47
3	8.58
3.2	9.76
3.4	11.02
3.6	12.36
3.8	13.77
4	15.25
4.2	16.82
4.4	18.46

Wall mounted	
m (kg)	Amin (m^2)
4.6	20.17
4.8	21.97
5	23.83
5.2	25.78
5.4	27.80
5.6	29.90
5.8	32.07
6	34.32
6.2	36.65
6.4	39.05
6.6	41.53
6.8	44.08
7	46.72
7.2	49.42
7.4	52.21
7.6	55.07
7.8	58.00

Ceiling Mounted	
m (kg)	Amin (m^2)
< 1.224	-
1.224	0.956
1.4	1.25
1.6	1.63
1.8	2.07
2	2.55
2.2	3.09
2.4	3.68
2.6	4.31
2.8	5.00
3	5.74
3.2	6.54
3.4	7.38
3.6	8.27
3.8	9.22
4	10.21
4.2	11.26
4.4	12.36

Ceiling Mounted	
m (kg)	Amin (m^2)
4.6	13.50
4.8	14.70
5	15.96
5.2	17.26
5.4	18.61
5.6	20.01
5.8	21.47
6	22.98
6.2	24.53
6.4	26.14
6.6	27.80
6.8	29.51
7	31.27
7.2	33.09
7.4	34.95
7.6	36.86
7.8	38.83

Part 2 Functions & Controls

1. List of Functions & Accessory

1. 4-Way Ceiling Cassette Indoor

Category	Functions	TM-A / TP-B	TQ / TR	TY
Air flow	Air supply outlet	4	4	Round
	Airflow direction control (left & right)	X	X	X
	Airflow direction control (up & down)	Auto	Auto	O
	Auto swing (left & right)	X	X	X
	Auto swing (up & down)	O	O	O
	Airflow steps (fan/cool/heat)	4 / 5 / 5	4 / 5 / 5	4 / 5 / 4
	Chaos wind(auto wind)	X	X	X
	Jet cool/heat	O / O	O / O	O / X
	Swirl wind	O	O	O
	Refresh Mode***	O	X	X
	Smart Mode***	O	X	X
	Indirect Wind	O	X	X
	Direct wind	O	X	X
Air purification	Triple filter (Deodorizing)	X	X	X
	Air purify (Plasma)	O	X	X
	Air purify (Ionizer)	X	X	X
	Allergy Safe filter	X	X	X
	Long-life prefilter (washable)	O	O	O
Installation	Drain pump	O	O	O
	E.S.P. control*	X	X	X
	Electric heater	X	X	X
	High ceiling operation*	O	O	O
Reliability	Hot start	O	O	O
	Self diagnosis	O	O	O
Convenience	Auto changeover	O (Single Only)	O (Single Only)	O
	Auto cleaning	O	O	O
	Auto operation(artificial intelligence)	O(Multi Only)	O(Multi Only)	X
	Auto Restart	O	O	O
	Child lock*	O	O	O
	Forced operation	O	O	O
	Group control*	O	O	O
	Sleep mode	O	O	O
	Timer(on/off)	O	O	O
	Timer(weekly)*	O	O	O
	Two thermistor control*	O	O	O
Special Functions	Wi-Fi	O (Accessory)	O (Accessory)	O (Accessory)
	Comfort Coolng (Humidity Control)	O	X	O
Wireless Remote Controller		O (Accessory)	O (Accessory)	O (Accessory)
Wired Remote Controller		O (Accessory)	O (Accessory)	O (Accessory)
Network Solution(LGAP)		O	O	O

Note

1. O : Applied, X : Not applied
   Accessory : Ordered and purchased separately the accessory package referring to the model name provided and install at field.
   Accessory line-ups varies by region, so check your local catalogue or local sales material.
2. Some functions can be limited by remote controller.
3. Selecting a wireless remote controller in case of ducted type indoor units requires either a connection to the wired remote controller (RS2) or an IR receiver accessory to be connected to the duct in order to receive the signal.
4. * : These functions need to connect to the wired remote controller.
5. ** : It is included by default when the product is manufactured.
6. *** : This functions need to connect to the Standard III wired remote controller.

Category		Product	Remark	TM-A / TP-B	TQ / TR	TY
Wireless Remote Controller		PQWRHQ0FDB	Heat Pump	O	O	O
		PWLSSB2H	Cool/Heat Pump	O	O	O
Wired Remote Controller	Simple	PQRCVCL0Q(W)	Simple	O	O	O
		PQRCHCA0Q(W)	for Hotel	O	O	O
	Standard	PREMTB001	Standard II (White)	O	O	O
		PREMTBB01	Standard II (Black)	O	O	O
		PREMTB100**	Standard III (White)	O	O	O
		PREMTBB10**	Standard III (Black)	O	O	O
	Premium	PREMTA000(A/B)	Premium	O	O	O
Dry contact	Simple Contact	PDRYCB000	Simple Dry Contact	O	O	O
	Communication type	PDRYCB400	2 Points Dry Contact (For Setback)	O	O	O
		PDRYCB300	For 3rd Party Thermostat	O	O	O
		PDRYCB320	For 3rd Party Thermostat (Analog Input)	O	O	O
		PDRYCB500	For Modbus	O	O	O
Gateway	IDU PI485	PHNFP14A0	Without case	X	X	X
		PSNFP14A0	With case	X	X	X
ETC	Remote temperature sensor	PQRSTA0	-	X	O	O
	Zone controller	ABZCA	-	X	X	X
	CO2 Sensor	PES-C0RV0	For ERV, ERV DX Indoor units	X	X	X
	Group control wire	PZCWRCG3	0.25m	O	O	O
	2-Remo Control Wire	PZCWRC2	0.25m	O	O	X
	Extension Wire	PZCWRC1	10m	O	O	O
	Wi-Fi Controller*	PWFMDD200	-	O	O	O
	Human detecting sensor	PTVSMA0	-	O	X	X
	Drain pump	ABDPG	-	X	X	X

Note

1. O: Possible, X: Impossible, - : Not applicable, Embedded : Included with product.
2. * : Some advanced functions controlled by individual controller cannot be operated.
3. ** : It could not be operated some functions.
4. *** : Selecting a wireless remote controller in case of ducted type indoor units requires either a connection to the wired remote controller (RS2) or an IR receiver accessory to be connected to the duct in order to receive the signal.
5. If you need more detail, please refer to the BECON PDB or the manual of product. (http://partner.lge.com/global : Home> Doc.Library> Product >Control(BECON))

2. Ceiling Concealed Duct Indoor

Category	Functions	Mid Static Pressure		Low Static Pressure
		Standarad Compact	High	
Air flow	Air supply outlet	1	1	1
	Airflow direction control (left & right)	X	X	X
	Airflow direction control (up & down)	X	X	X
	Auto swing (left & right)	X	X	X
	Auto swing (up & down)	X	X	X
	Airflow steps (fan/cool/heat)	3 / 3 / 3	3 / 3 / 3	3 / 3 / 3
	Chaos wind(auto wind)	X	X	X
	Jet cool/heat	X / X	X / X	X / X
	Swirl wind	X	X	X
	Refresh Mode***	X	X	X
	Smart Mode***	X	X	X
	Indirect Wind	X	X	X
	Direct wind	X	X	X
Air purification	Triple filter (Deodorizing)	X	X	X
	Air purify (Plasma)	X	X	X
	Air purify (Ionizer)	X	X	X
	Allergy Safe filter	X	X	X
	Long-life prefilter (washable)	O	O	O
Installation	Drain pump	X	O	O
	E.S.P. control*	O	O	O
	Electric heater	X	X	X
	High ceiling operation*	X	X	X
Reliability	Hot start	O	O	O
	Self diagnosis	O	O	O
Convenience	Auto changeover	O (Single Only)	O (Single Only)	O (Single Only)
	Auto cleaning	O	O	O
	Auto operation(artificial intelligence)	O(Multi Only)	O(Multi Only)	O(Multi Only)
	Auto Restart	O	O	O
	Child lock*	O	O	O
	Forced operation	X	X	X
	Group control*	O	O	O
	Sleep mode	O	O	O
	Timer(on/off)	O	O	O
	Timer(weekly)*	O	O	O
	Two thermistor control*	O	O	O
Special Functions	Wi-Fi	O (Accessory)	O (Accessory)	O (Accessory)
	Comfort Coolng (Humidity Control)	X	X	X
Wireless Remote Controller		O (Accessory)	O (Accessory)	O (Accessory)
Wired Remote Controller		O (Accessory)	O (Accessory)	O (Accessory)
Network Solution(LGAP)		O	O	O

Note

1. O : Applied, X : Not applied
   Accessory : Ordered and purchased separately the accessory package referring to the model name provided and install at field.
   Accessory line-ups varies by region, so check your local catalogue or local sales material.
2. Some functions can be limited by remote controller.
3. Selecting a wireless remote controller in case of ducted type indoor units requires either a connection to the wired remote controller (RS2) or an IR receiver accessory to be connected to the duct in order to receive the signal.
4. * : These functions need to connect to the wired remote controller.
5. ** : It is included by default when the product is manufactured.
6. *** : This functions need to connect to the Standard III wired remote controller.

Category		Product	Remark	Mid Static Pressure		Low Static Pressure
				Standarad Compact	High	
Wireless Remote Controller		PQWRHQ0FDB	Heat Pump	O***	O***	O***
		PWLSSB2H	Cool/Heat Pump	O***	O***	O***
Wired Remote Controller	Simple	PQRCVCL0Q(W)	Simple	O	O	O
		PQRCHCA0Q(W)	for Hotel	O	O	O
	Standard	PREMTB001	Standard II (White)	O	O	O
		PREMTBB01	Standard II (Black)	O	O	O
		PREMTB100**	Standard III (White)	O	O	O
		PREMTBB10**	Standard III (Black)	O	O	O
	Premium	PREMTA000(A/B)	Premium	O	O	O
Dry contact	Simple Contact	PDRYCB000	Simple Dry Contact	O	O	O
	Communication type	PDRYCB400	2 Points Dry Contact (For Setback)	O	O	O
		PDRYCB300	For 3rd Party Thermostat	O	O	O
		PDRYCB500	For Modbus	O	O	O
Gateway	IDU PI485	PHNFP14A0	Without case	X	X	X
		PSNFP14A0	With case	X	X	X
ETC	Remote temperature sensor	PQRSTA0	-	O	O	O
	Zone controller	ABZCA	-	O	O	O
	CO2 Sensor	PES-C0RV0	For ERV, ERV DX Indoor units	X	X	X
	Group control wire	PZCWRCG3	0.25m	O	O	O
	2-Remo Control Wire	PZCWRC2	0.25m	O	O	O
	Extension Wire	PZCWRC1	10m	O	O	O
	Wi-Fi Controller*	PWFMDD200	-	O	O	O
	Human detecting sensor	PTVSMA0	-	X	X	X
	Drain pump	ABDPG	-	O	Embedded	Embedded

Note

1. O: Possible, X: Impossible, - : Not applicable, Embedded : Included with product.
2. * : Some advanced functions controlled by individual controller cannot be operated.
3. ** : It could not be operated some functions.
4. *** : Selecting a wireless remote controller in case of ducted type indoor units requires either a connection to the wired remote controller (RS2)
   or an IR receiver accessory to be connected to the duct in order to receive the signal.
5. If you need more detail, please refer to the BECON PDB or the manual of product. (http://partner.lge.com/global : Home> Doc.Library> Product >Control(BECON))

3. Ceiling Suspended Indoor

Category	Functions	Standarad Compact	High
Air flow	Air supply outlet	1	1
	Airflow direction control (left & right)	X	X
	Airflow direction control (up & down)	Auto	Auto
	Auto swing (left & right)	X	X
	Auto swing (up & down)	O	O
	Airflow steps (fan/cool/heat)	4 / 5 / 5	4 / 5 / 5
	Chaos wind(auto wind)	X	X
	Jet cool/heat	O / O	O / O
	Swirl wind	X	X
	Refresh Mode***	X	X
	Smart Mode***	X	X
	Indirect Wind	X	X
	Direct wind	X	X
Air purification	Triple filter (Deodorizing)	X	X
	Air purify (Plasma)	X	X
	Air purify (Ionizer)	X	X
	Allergy Safe filter	X	X
	Long-life prefilter (washable)	O	O
Installation	Drain pump	X	O
	E.S.P. control*	X	X
	Electric heater	X	X
	High ceiling operation*	X	X
Reliability	Hot start	O	O
	Self diagnosis	O	O
Convenience	Auto changeover	O	O
	Auto cleaning	O	O
	Auto operation(artificial intelligence)	X	X
	Auto Restart	O	O
	Child lock*	O	O
	Forced operation	O	O
	Group control*	O	O
	Sleep mode	O	O
	Timer(on/off)	O	O
	Timer(weekly)*	O	O
	Two thermistor control*	O	O
Special Functions	Wi-Fi	O (Accessory)	O (Accessory)
	Comfort Coolng (Humidity Control)	O	O
Wireless Remote Controller		O	O
Wired Remote Controller		O (Accessory)	O (Accessory)
Network Solution(LGAP)		O	O

Note

1. O : Applied, X : Not applied
   Accessory : Ordered and purchased separately the accessory package referring to the model name provided and install at field.
   Accessory line-ups varies by region, so check your local catalogue or local sales material.
2. Some functions can be limited by remote controller.
3. Selecting a wireless remote controller in case of ducted type indoor units requires either a connection to the wired remote controller (RS2) or an IR receiver accessory to be connected to the duct in order to receive the signal.
4. * : These functions need to connect to the wired remote controller.
5. ** : It is included by default when the product is manufactured.
6. *** : This functions need to connect to the Standard III wired remote controller.

Category		Product	Remark	Standarad Compact	High
Wireless Remote Controller		PQWRHQ0FDB	Heat Pump	O	O
		PWLSSB2H	Cool/Heat Pump	O	O
Wired Remote Controller	Simple	PQRCVCL0Q(W)	Simple	X	X
		PQRCHCA0Q(W)	for Hotel	X	X
	Standard	PREMTB001	Standard II (White)	O	O
		PREMTBB01	Standard II (Black)	O	O
		PREMTB100**	Standard III (White)	O	O
		PREMTBB10**	Standard III (Black)	O	O
	Premium	PREMTA000(A/B)	Premium	O	O
Dry contact	Simple Contact	PDRYCB000	Simple Dry Contact	O	O
	Communication type	PDRYCB400	2 Points Dry Contact (For Setback)	O	O
		PDRYCB300	For 3rd Party Thermostat	O	O
		PDRYCB500	For Modbus	O	O
Gateway	IDU PI485	PHNFP14A0	Without case	X	X
		PSNFP14A0	With case	X	X
ETC	Remote temperature sensor	PQRSTA0	-	O	O
	Zone controller	ABZCA	-	X	X
	CO2 Sensor	PES-C0RV0	For ERV, ERV DX Indoor units	X	X
	Group control wire	PZCWRCG3	0.25m	O	O
	2-Remo Control Wire	PZCWRC2	0.25m	O	O
	Extension Wire	PZCWRC1	10m	O	O
	Wi-Fi Controller*	PWFMDD200	-	O	O
	Human detecting sensor	PTVSMA0	-	X	X
	Drain pump	ABDPG	-	X	X

Note

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2. * : Some advanced functions controlled by individual controller cannot be operated.
3. ** : It could not be operated some functions.
4. *** : Selecting a wireless remote controller in case of ducted type indoor units requires either a connection to the wired remote controller (RS2) or an IR receiver accessory to be connected to the duct in order to receive the signal.
5. If you need more detail, please refer to the BECON PDB or the manual of product. (http://partner.lge.com/global : Home> Doc.Library> Product >Control(BECON))

4. Console

Category	Functions	Console
Air flow	Air supply outlet	2
	Airflow direction control (left & right)	Manual
	Airflow direction control (up & down)	Auto
	Auto swing (left & right)	X
	Auto swing (up & down)	O
	Airflow steps (fan/cool/heat)	4 / 5 / 4
	Chaos wind(auto wind)	X
	Jet cool/heat	O / X
	Swirl wind	X
	Refresh Mode***	X
	Smart Mode***	X
	Indirect Wind	X
	Direct wind	X
Air purification	Triple filter (Deodorizing)	X
	Air purify (Plasma)	X
	Air purify (Ionizer)	O
	Allergy Safe filter	O
	Long-life prefilter (washable)	O
Installation	Drain pump	X
	E.S.P. control*	X
	Electric heater	X
	High ceiling operation*	X
Reliability	Hot start	O
	Self diagnosis	O
Convenience	Auto changeover	O
	Auto cleaning	O
	Auto operation(artificial intelligence)	X
	Auto Restart	O
	Child lock*	O
	Forced operation	O
	Group control*	O
	Sleep mode	O
	Timer(on/off)	O
	Timer(weekly)*	O
	Two thermistor control*	O
Special Functions	Wi-Fi	O (Accessory)
	Comfort Coolng (Humidity Control)	O
Wireless Remote Controller		O
Wired Remote Controller		O (Accessory)
Network Solution(LGAP)		O

Note

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2. Some functions can be limited by remote controller.
3. Selecting a wireless remote controller in case of ducted type indoor units requires either a connection to the wired remote controller (RS2) or an IR receiver accessory to be connected to the duct in order to receive the signal.
4. * : These functions need to connect to the wired remote controller.
5. ** : It is included by default when the product is manufactured.
6. *** : This functions need to connect to the Standard III wired remote controller.

Category		Product	Remark	Console
Wireless Remote Controller		PQWRHQ0FDB	Heat Pump	○
		PWLSSB2H	Cool/Heat Pump	○
Wired Remote Controller	Simple	PQRCVCL0Q(W)	Simple	○
		PQRCHCA0Q(W)	for Hotel	○
	Standard	PREMTB001	Standard II (White)	○
		PREMTBB01	Standard II (Black)	○
		PREMTB100**	Standard III (White)	○
		PREMTBB10**	Standard III (Black)	○
	Premium	PREMTA000(A/B)	Premium	○
Dry contact	Simple Contact	PDRYCB000	Simple Dry Contact	○
	Communication type	PDRYCB400	2 Points Dry Contact (For Setback)	○
		PDRYCB300	For 3rd Party Thermostat	○
		PDRYCB500	For Modbus	○
Gateway	IDU PI485	PHNFP14A0	Without case	X
		PSNFP14A0	With case	X
ETC	Remote temperature sensor	PQRSTA0	-	○
	Zone controller	ABZCA	-	X
	CO2 Sensor	PES-C0RV0	For ERV, ERV DX Indoor units	X
	Group control wire	PZCWRCG3	0.25m	○
	2-Remo Control Wire	PZCWRC2	0.25m	○
	Extension Wire	PZCWRC1	10m	○
	Wi-Fi Controller*	PWFMDD200	-	○
	Human detecting sensor	PTVSMA0	-	X
	Drain pump	ABDPG	-	X

Note

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2. * : Some advanced functions controlled by individual controller cannot be operated.
3. ** : It could not be operated some functions.
4. *** : Selecting a wireless remote controller in case of ducted type indoor units requires either a connection to the wired remote controller (RS2) or an IR receiver accessory to be connected to the duct in order to receive the signal.
5. If you need more detail, please refer to the BECON PDB or the manual of product. (http://partner.lge.com/global : Home> Doc.Library> Product >Control(BECON))

5. Wall Mounted

Category	Functions	Wall Mounted
Air flow	Air supply outlet	1
	Airflow direction control (left & right)	O (5 Steps)
	Airflow direction control (up & down)	O (6 Steps)
	Auto swing (left & right)	O
	Auto swing (up & down)	O
	Airflow steps (fan/cool/heat)	6 / 6 / 6
	Chaos wind(auto wind)	O
	Jet cool/heat	O / O
	Swirl wind	X
	Refresh Mode***	X
	Smart Mode***	X
	Indirect Wind	X
	Direct wind	X
Air purification	Triple filter (Deodorizing)	X
	Air purify (Plasma)	X
	Air purify (Ionizer)	O
	Allergy Safe filter	X
	Long-life prefilter (washable)	O
Installation	Drain pump	X
	E.S.P. control*	X
	Electric heater	X
	High ceiling operation*	X
Reliability	Hot start	O
	Self diagnosis	O
Convenience	Auto changeover	O
	Auto cleaning	O
	Auto operation(artificial intelligence)	X
	Auto Restart	O
	Child lock*	O
	Forced operation	O
	Group control*	X
	Sleep mode	O (7Hr)
	Timer(on/off)	O
	Timer(weekly)*	O
	Two thermistor control*	O
Special Functions	Wi-Fi	O
	Comfort Coolng (Humidity Control)	X
Wireless Remote Controller		O
Wired Remote Controller		O (Accessory)
Network Solution(LGAP)		O

Note

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   Accessory : Ordered and purchased separately the accessory package referring to the model name provided and install at field.
   Accessory line-ups varies by region, so check your local catalogue or local sales material.
2. Some functions can be limited by remote controller.
3. Selecting a wireless remote controller in case of ducted type indoor units requires either a connection to the wired remote controller (RS2) or an IR receiver accessory to be connected to the duct in order to receive the signal.
4. * : These functions need to connect to the wired remote controller.
5. ** : It is included by default when the product is manufactured.
6. *** : This functions need to connect to the Standard III wired remote controller.

Category		Product	Remark	Wall Mounted
Wireless Remote Controller		PQWRHQ0FDB	Heat Pump	○
		PWLSSB2H	Cool/Heat Pump	○
Wired Remote Controller	Simple	PQRCVCL0Q(W)	Simple	○
		PQRCHCA0Q(W)	for Hotel	○
	Standard	PREMTB001	Standard II (White)	○
		PREMTBB01	Standard II (Black)	○
		PREMTB100**	Standard III (White)	○
		PREMTBB10**	Standard III (Black)	○
	Premium	PREMTA000(A/B)	Premium	○
Dry contact	Simple Contact	PDRYCB000	Simple Dry Contact	○
	Communication type	PDRYCB400	2 Points Dry Contact (For Setback)	○
		PDRYCB300	For 3rd Party Thermostat	○
		PDRYCB500	For Modbus	○
Gateway	IDU PI485	PHNFP14A0	Without case	X
		PSNFP14A0	With case	X
ETC	Remote temperature sensor	PQRSTA0	-	X
	Zone controller	ABZCA	-	X
	CO2 Sensor	PES-C0RV0	For ERV, ERV DX Indoor units	X
	Group control wire	PZCWRCG3	0.25m	X
	2-Remo Control Wire	PZCWRC2	0.25m	X
	Extension Wire	PZCWRC1	10m	○
	Wi-Fi Controller*	PWFMDD200	-	Embedded
	Human detecting sensor	PTVSMA0	-	X
	Drain pump	ABDPG	-	X

Note
1. O: Possible, X: Impossible, - : Not applicable, Embedded : Included with product.
2. * : Some advanced functions controlled by individual controller cannot be operated.
3. ** : It could not be operated some functions.
4. *** : Selecting a wireless remote controller in case of ducted type indoor units requires either a connection to the wired remote controller (RS2) or an IR receiver accessory to be connected to the duct in order to receive the signal.
5. If you need more detail, please refer to the BECON PDB or the manual of product. (http://partner.lge.com/global : Home> Doc.Library> Product >Control(BECON))

6. Outdoor

1) List of function

Category	Functions	UUA1	UUB1/ UUC1 / UUD1	UUD3
Reliability	Defrost / Deicing	O	O	O
	High pressure switch	O	O	O
	Low pressure switch	X	X	X
	Phase protection	X	X	O
	Restart delay (3-minutes)	O	O	O
	Self diagnosis	O	O	O
	Soft start	O	O	O
Convenience	Test function	O	O	O
	Night Silent Operation	X	O	O
	Wiring Error Check	X	X	X
	Peak Control	X	O	O
	Mode Lock	X	O	O
	Forced Cooling Operation (Outdoor Unit)	X	O	O
	SLC(Smart Load Control)	X	X	X
Network function	Network solution(LGAP)	O	O	O
ODU Dry Contact		X	X	X

Note

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Accessory : Ordered and purchased separately the accessory package referring to the model name provided and install at field.
Accessory line-ups varies by region, so check your local catalogue or local sales material.

2) Accessory Compatibility List

Category		Product	Etc	UUA1	UUB1/ UUC1 / UUD1	UUD3
Central Controller	Simple	PQCSZ250S0	AC EZ	○	○	○
	AC Ez Touch	PACEZA000	AC Ez Touch	○	○	○
	AC Smart	PACS5A000	AC Smart 5	○	○	○
	ACP	PACP5A000	ACP 5	○	○	○
	AC Manager2)	PACM5A000	AC Manager 5	○	○	○
Gateway	ODU PI485	PMNFP14A1	PI 485 Gateway	○	○	○
	Low Ambient Kit	PRVC2	From MULTI V 4 series	X	X	X
	AHU Comm. Kit	PAHCMR000	Return / Room Air Control	X	○	○
		PAHCMS000	Supply Air Control by DDC	X	○	○
	BACnet	PQNFB17C0	ACP BACnet	○	○	○
	Lonworks	PLNWKB000	ACP Lonworks	○	○	○
ETC	PDI	PPWRDB000	PDI Standard	○	○	○
		PQNUD1S40	PDI Premium	○	○	○
	ACS IO Module	PEXPMB000	-	X	X	X

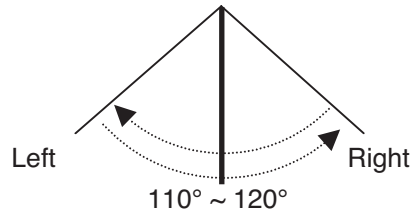
Note

1. O: Possible, X: Impossible, - : Not applicable
2. * : Some advanced functions controlled by individual controller cannot be operated.
3. 2) : ACP or AC Smart is needed.
4. Compatibility of individual controller(wireless/wired remote controller) could be found with function list on Indoor Unit's PDB.
5. If you need more detail, please refer to the BECON PDB or the manual of product. (http://partner.lge.com/global : Home> Doc.Library> Product > Control(BECON))

2. Air flow

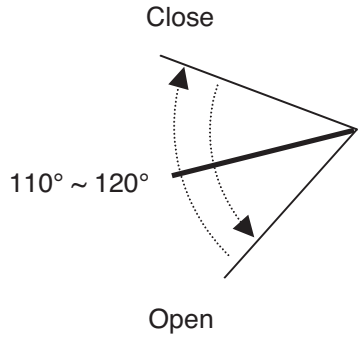
2.1 Auto swing (left & right)

• By the horizontal airflow direction control key input, the left/right louver automatically operates with the auto swing or it is fixed to the desired direction.



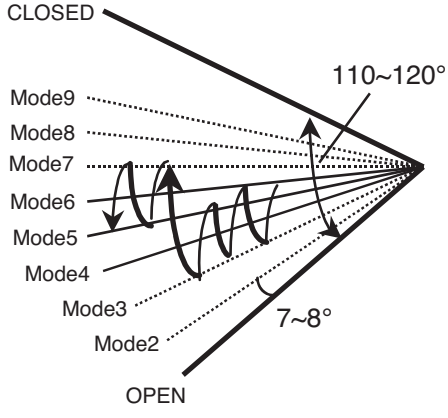
2.2 Auto swing (up & down)

• By the auto swing key input, the upper/lower vane automatically operates with the auto swing or it is fixed to the desired direction.



2.3 Chaos swing (up/down)

• By the Chaos swing key input, the upper/lower vane automatically operates with the chaos swing or it is fixed to the desired direction.



NOTE: Some Models are different by swing width and swing pattern.

2.4 Air flow step

- Indoor fan motor control have 6 steps.
- Air volume is controlled "SH", "H", "Med", Low" by remote controller.
- "LL" step is selected automatically in Hot start operation.

Step	Discription
LL	Very low, In heating mode
L	Low
M	Med
H	High
SH	Super high
Auto	Chaos wind

2.5 Chaos wind (auto wind)

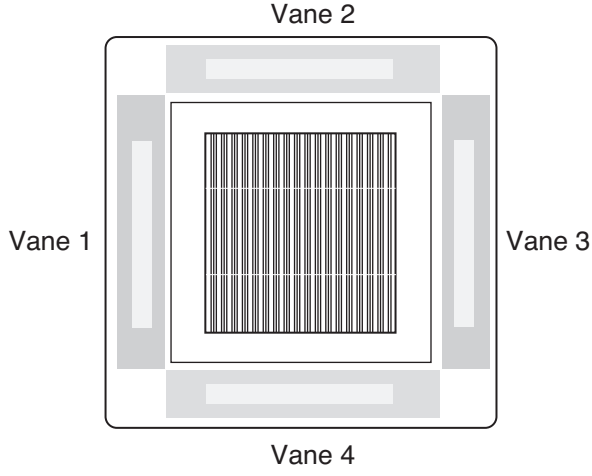
- When "Auto" step selected and then operated, the high, medium, or low speed of the airflow mode is operated for 2~15 seconds randomly by the Chaos Simulation

2.6 Jet Cool Mode Operation

- While in heating mode or Fuzzy operation, the Jet Cool key cannot be input.
  When it is input while in the other mode operation (cooling, dehumidification, ventilation), the Jet Cool mode is operated.
- In the Jet Cool mode, the indoor fan is operated at super-high speed for 30 minutes at cooling mode operation.
- In the Jet Cool mode operation, the room temperature is controlled to the setting temperature, 18 °C.
- When the sleep timer mode is input while in the Jet Cool mode operation, the Jet Cool mode has the priority.
- When the Jet Cool key is input, the upper/lower vanes are reset to those of the initial cooling mode and then operated in order that the air outflow could reach further.

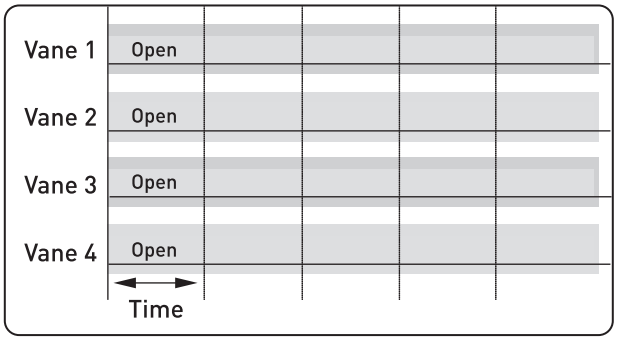
2.7 Swirl wind Swing

- It is the function for comfort cooling/heating operation.
- The diagonal two louvers are opened the more larger than the other louvers. After one minute, it is opposite.

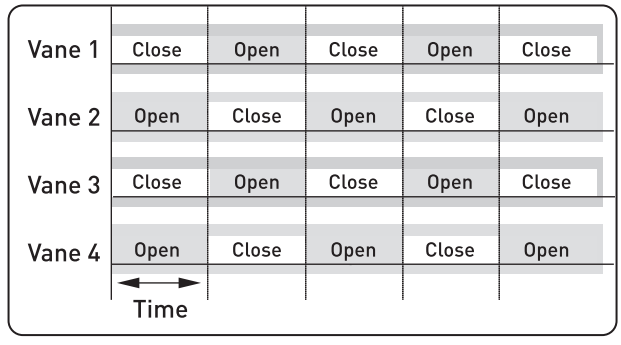


- Comparison of Air Flow Types

4-Open (conventional)



Swirl Swing (New)

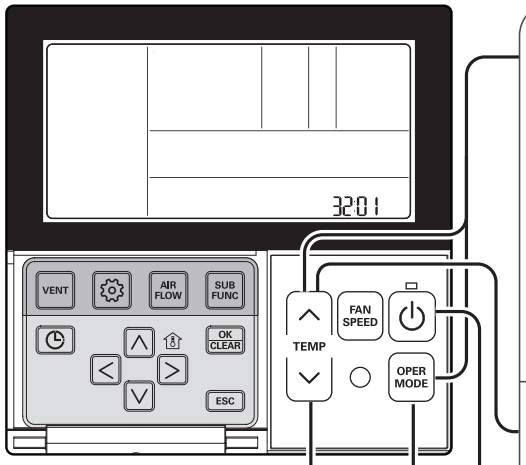


3. Installation Functions

3.1 E.S.P. (External Static Pressure) Setting

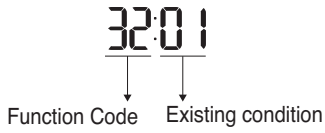
Installer Setting - Static Pressure Step Setting

This function is applied to only duct type. Setting this in other cases will cause malfunction.
This function is only available on some products.
This is the function that static pressure of the product is divided in 11 steps for setting.



1 When pressing the ^ button and OPER MODE button simultaneously for more than 3 seconds, the system will be entered into the installer setting mode.
- After entering into the installer setting mode, select the static pressure step setting code value by pressing the OPER MODE button.
  * Static pressure step setting code value : 32

2 Select the desired setting value with the temperature up(▲), down(▼) button.



00: use static pressure (code 06) set value
01~ 11: static pressure step (code 32) set value

3 When pressing ⏻ button, currently established static pressure value will be set up.

4 When pressing the v button and OPER MODE button simultaneously for more than 3 seconds after the setting has been completed, the setting mode will be released.
- If there isn't any button input for more than 25 seconds, the installer setting mode will also be released.

- Static Pressure (Code 06) setting will not be used if Static Pressure Step (Code 32) setting is being used.
- For the static pressure value for each step, refer to the next page.

Ceiling Concealed Duct – Low static

Chassis	Capacity [kBtu/h]	Grade	Step	CMM	Static Pressure [mmAq(Pa)]					
					0(0)	1(10)	2(20)	3(29)	4(39)	5(49)
					Setting Value					
					32:01	32:02	32:03	32:04	32:05	32:06
L5	9	Standard Compact	LOW	8	76	87	96	106	116	116
			MID	9.5	87	96	106	114	120	120
			HIGH	11.5	101	109	118	125	130	130
L5	12	Standard Compact	LOW	8	76	87	96	106	116	116
			MID	9.5	87	96	106	114	120	120
			HIGH	11.5	101	109	118	125	130	130
L6	18	Standard Compact	LOW	10	82	87	90	96	106	116
			MID	12.5	92	98	105	109	119	128
			HIGH	15	100	106	112	122	129	137
L3	24	Standard Compact	LOW	12	89	95	102	106	120	130
			MID	16	102	108	115	125	131	139
			HIGH	20	125	131	136	141	142	147
L5	12	High	LOW	8	76	87	96	106	116	116
			MID	9.5	87	96	106	114	120	120
			HIGH	11.5	101	109	118	125	130	130
L3	18	High	LOW	10	80	90	95	100	110	120
			MID	14	97	103	109	117	126	134
			HIGH	18	115	122	127	133	138	142

- The above table shows the correlation between the air flow rate and E.SP.
- Be sure to set the value by referring to the table above. Incorrect setting values can cause malfunction.
- The values in the table are based on electrical rated conditions. Therefore, if there is a fluctuation in voltage, the air flow rate may change.

Ceiling Concealed Duct – Mid static(1)

Chassis	Capacity [kBtu/h]	Grade	Step	CMM	Static Pressure [mmAq(Pa)]										
					2(20)	2.5(25)	3(29)	4(39)	6(59)	8(78)	10(98)	12(118)	13(127)	14(137)	15(147)
					Setting Value										
					32:01	32:02	32:03	32:04	32:05	32:06	32:07	32:08	32:09	32:10	32:11
M1	18	Standard Compact	LOW	13	73	74	77	88	93	103	111	117	120	125	128
			MID	14.5	76	77	86	91	97	107	114	121	125	128	131
			HIGH	16.5	86	87	90	94	103	110	118	125	128	131	134
M1	24	Standard Compact	LOW	14.5	76	77	86	89	97	106	114	121	124	127	130
			MID	16.5	86	87	90	94	103	111	118	125	128	131	134
			HIGH	18	90	92	95	99	108	115	122	129	132	135	138
M1	12	High	LOW	9	64	67	70	72	81	94	103	110	113	117	121
			MID	12	68	72	74	76	86	100	108	115	118	121	125
			HIGH	16	81	86	89	93	98	110	118	124	127	131	135
M1	18	High	LOW	14	76	77	86	89	97	107	114	121	124	127	130
			MID	16	86	87	90	94	103	111	118	125	128	131	134
			HIGH	17.5	90	92	95	99	108	115	122	129	132	135	138

Chassis	Capacity [kBtu/h]	Grade¡	Step	CMM	Static Pressure [mmAq(Pa)]										
					2.5(25)	4(39)	5(49)	6(59)	7(69)	8(78)	9(88)	10(98)	11(108)	13(127)	15(147)
					Setting Value										
					32:01	32:02	32:03	32:04	32:05	32:06	32:07	32:08	32:09	32:10	32:11
M1	30	Standard Compact	LOW	18	96	102	107	110	114	118	122	125	127	130	132
			MID	20	102	110	114	118	121	125	127	130	133	134	136
			HIGH	22	110	117	121	124	127	130	133	136	137	138	140
M2	24	High	LOW	21	84	88	89	90	95	96	100	105	110	112	113
			MID	24	88	92	94	95	100	101	108	113	118	118	118
			HIGH	28	92	96	99	101	105	108	115	118	124	124	124
M2	30	High	LOW	21	84	88	89	90	95	96	100	105	110	112	113
			MID	24	88	92	94	95	100	101	108	113	118	118	118
			HIGH	28	92	96	99	101	105	108	115	118	124	124	124

- The above table shows the correlation between the air flow rate and E.SP.
- Be sure to set the value by referring to the table above. Incorrect setting values can cause malfunction.
- The values in the table are based on electrical rated conditions. Therefore, if there is a fluctuation in voltage, the air flow rate may change.

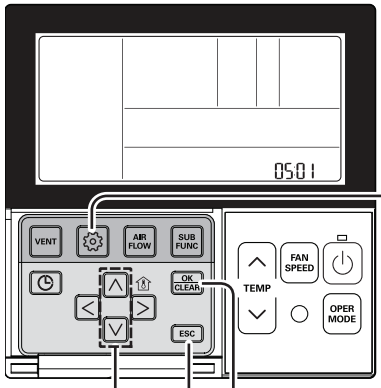
Chassis	Capacity [kBtu/h]	Grade	Step	CMM	Static Pressure [mmAq(Pa)]										
					4(39)	5(49)	6(59)	7(69)	8(78)	9(88)	10(98)	11(108)	12(118)	13(127)	15(147)
					Setting Value										
					32:01	32:02	32:03	32:04	32:05	32:06	32:07	32:08	32:09	32:10	32:11
M2	36	Standard Compact	LOW	24	88	91	95	100	101	108	113	115	118	118	118
			MID	28	93	97	101	105	108	115	118	120	124	124	124
			HIGH	32	101	105	109	112	115	119	123	126	128	128	128
M3	48	Standard Compact	LOW	28	74	76	79	82	89	92	94	96	99	102	107
			MID	34	78	82	84	89	94	96	98	101	104	106	112
			HIGH	40	83	89	92	94	98	100	102	105	108	110	116
M3	48	High	LOW	28	74	76	79	82	89	92	94	96	99	102	107
			MID	34	78	82	84	89	94	96	98	101	104	106	112
			HIGH	40	83	89	92	94	98	100	102	105	108	110	116
M3	36	High	LOW	28	74	76	79	82	89	92	94	96	99	102	107
			MID	34	78	82	84	89	94	96	98	101	104	106	112
			HIGH	40	83	89	92	94	98	100	102	105	108	110	116
M3	42	High	LOW	28	74	76	79	82	89	92	94	96	99	102	107
			MID	34	78	82	84	89	94	96	98	101	104	106	112
			HIGH	40	83	89	92	94	98	100	102	105	108	110	116
M3	60	Standard Compact	LOW	40	82	89	92	94	98	100	102	105	108	110	113
			MID	45	90	92	96	98	102	104	106	109	112	114	117
			HIGH	50	94	97	100	104	107	109	112	115	117	119	121

Chassis	Capacity [kBtu/h]	Grade	Step	CMM	Static Pressure [mmAq(Pa)]										
					5(49)	6(59)	7(69)	8(78)	9(88)	10(98)	11(108)	12(118)	13(127)	14(137)	15(147)
					Setting Value										
					32:01	32:02	32:03	32:04	32:05	32:06	32:07	32:08	32:09	32:10	32:11
M2	42	Standard Compact	LOW	28	100	103	106	110	114	118	121	125	128	133	136
			MID	33	108	111	114	118	122	125	128	131	134	138	140
			HIGH	38	117	120	124	127	130	133	135	138	140	144	147

- The above table shows the correlation between the air flow rate and E.SP.
- Be sure to set the value by referring to the table above. Incorrect setting values can cause malfunction.
- The values in the table are based on electrical rated conditions. Therefore, if there is a fluctuation in voltage, the air flow rate may change.

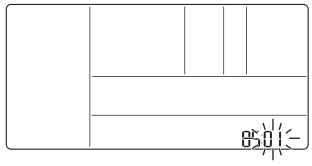
3.2 High Ceiling operation

This function is to adjust FAN Airflow rate according to ceiling height (For ceiling type product)



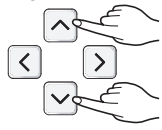
1 If pressing [⚙] button long for 3 seconds, it enters into remote controller setter setup mode.
- If pressing once shortly, it enters into user setup mode. Please press more than 3 seconds for sure.

2 If moving to ceiling height selection menu by pressing [⚙] button, it indicates as picture below.



3 Select ceiling height value by pressing [∧] [∨] button. (01:Low, 02:Medium, 03:High, 04:Very high)

05:01
Function Code Thermistor setting



4 Press [OK CLEAR] button to save.

05:01

5 Pressing [ESC] button will exit settings mode.
- ❉ After setup, it automatically gets out of setup mode if there is no button input for 25 seconds.
- ❉ When exiting without pressing set button, the manipulated value is not reflected.

<Ceiling Height Selection Table>

Ceiling Height Level		Description
01	Low	Decrease the indoor airflow rate 1 step from standard level
02	Medium	Set the indoor airflow rate as standard level
03	High	Increase indoor airflow rate 1 step from standard level
04	Very high	Increase indoor airflow rate 2 steps from standard level

- Ceiling height setting is available only for some products.
- Ceiling height of 'Very high' function may not exist depending on the indoor unit.
- Refer to the product manual for more details.

4. Reliability

1.1 Hot start

• When heating is started, the indoor fan is stopped or very slow to prevent the cold air carry out

• When the temp. of heat exchanger reach 30 °C(model by model), indoor fan is started.

4.2 Self-diagnosis Function

• The air conditioner installed can self-diagnosed its error status and then transmits the result to the central control. Therefore, a rapid countermeasure against failure of the air conditioner allows easy management and increases the usage life of air conditioner.

• Refer to trouble shooting guide.

4.3 Soft dry operation

• When the dehumidification operation input by the remote control is received, the intake air temperature is detected and the setting temp is automatically set according to the intake air temperature.

Intake air Temp.	Setting Temp.
26 °C ≤ intake air temp.	25 °C
24 °C ≤ intake air temp.< 26 °C	intake air temp. -1 °C
22 °C ≤ intake air temp. < 24 °C	intake air temp. -0.5 °C
18 °C ≤ intake air temp. < 22 °C	intake air temp.
intake air temp. < 18 °C	18 °C

• While compressor off, the indoor fan repeats low airflow speed and stop.

• While the intake air temp is between compressor on temp. and compressor off temp., 10 minutes dehumidification operation and 4 minutes compressor off repeat.

Compressor ON Temp. ➔ Setting Temp+0.5 °C
Compressor OFF Temp. ➔ Setting Temp-0.5 °C

• In 10-minute dehumidification operation, the indoor fan operates with the low airflow speed.

5. Convenience Functions & Controls

5.1 Cooling & heating Operations

5.1.1 Cooling Mode

- Operating frequency of compressor depends on the load condition, like the difference between the room temp. and the set temp., frequency restrictions.
- If the compressor operates at some frequency, the operating frequency of compressor cannot be changed within 30 seconds. (not emergency conditions)
- Compressor turned off when
  - intake air temperature is in between ±0.5 °C of the setting temp. limit for three minutes continuously.
  - intake air temperature reaches below 1.0 °C of the temperature of setting temp..
- Compressors three minutes time delay.
  - After compressor off, the compressor can restart minimum 3 minutes later.

5.1.2 Heating Mode

- Operating frequency of compressor depend on the load condition, The difference between the room temp. and set temp., frequency restrictions.
- If compressor operates at some frequency, the operating frequency of compressor cannot be changed within 30 seconds.
- Condition of compressor turned off
  - When intake air temperature reaches +4 °C above the setting temperature.
- Condition of compressor turned on
  - When intake air temperature reaches +2 °C above the setting temperature.

* Condition of indoor fan turned off
  - While in compressor on : indoor pipe temp. < 20 °C
  - While in compressor off : indoor pipe temp. < 30 °C

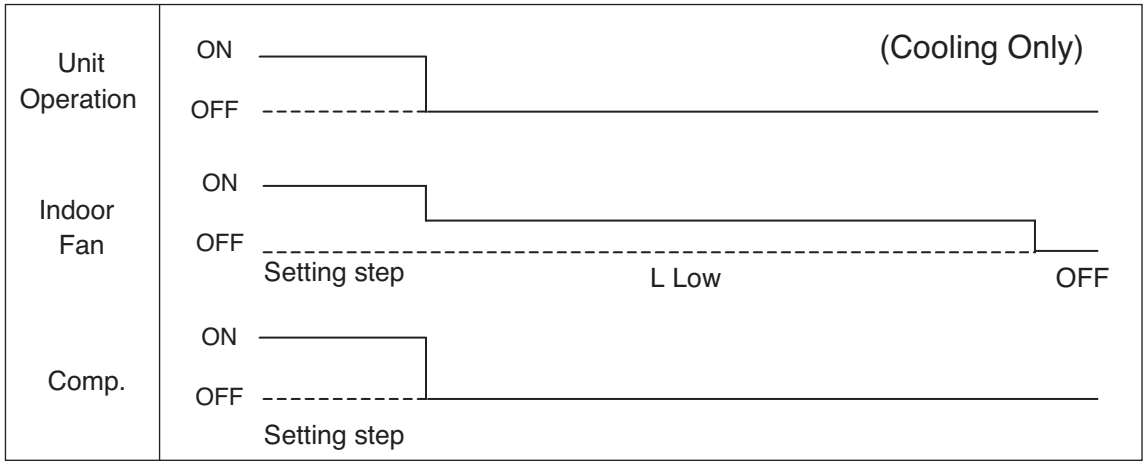
- While in defrost control, between the indoor and outdoor fans are turned off.
- Compressor 2 minutes delay
  - After compressor off, the compressor can restart minimum 2 minutes later.

NOTE: Some Models are different by temperature of thermo ON/OFF.

CST/Duct/CVT type indoor unit matched with Universal Outdoor unit	CST/ Duct/CVT type indoor unit matched with Single Outdoor unit/Multi Outdoor unit/Multi V Outdoor unit
Thermo ON : +2 °C above setting temp. Thermo OFF : +4 °C above setting temp.	Thermo ON : Setting temp. Thermo OFF : +3 °C above setting temp.

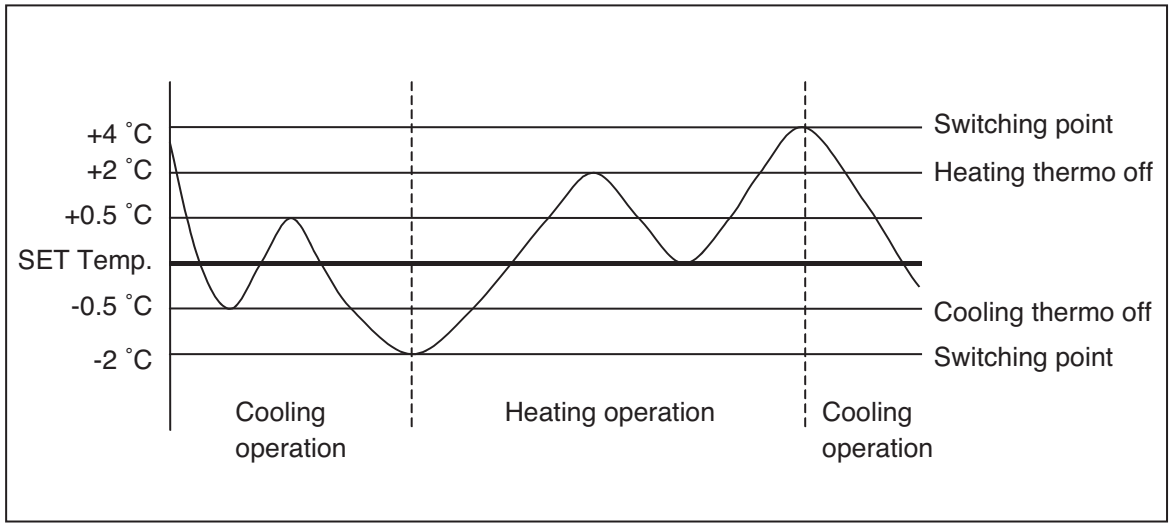
5.2 Auto cleaning operation

- Function used to perform Self Cleaning to prevent the Unit from Fungus and bad odor.
- Used after the Cooling Operation before turning the unit off, clean the Evaporator and keep it dry for the next operation.
- The function is easy to operate as it is accessed through the Remote controller.



5.3 Auto changeover operation

- The air conditioner changes the operation mode automatically to keep indoor temperature.
- When room temperature vary over ±2 °C with respect to setting temperature, air conditioner keeps the room temperature in ±2 °C with respect to setting temperature by auto change mode.

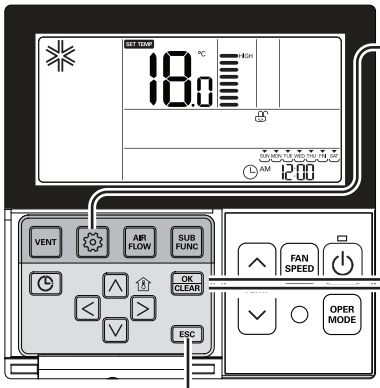


5.4 Auto restart Operation

- Whenever there is electricity failure to the unit, and after resumption of the power, unit will start in the same mode prior to the power failure. Memorized condition are on / off condition, operating mode (cooling/ heating), set temperature and fan speed. The unit will memorize the above conditions and start with same memorized condition.

5.5 Child Lock Function

It is the function to use preventing children or others from careless using.



1 Press ⚙ button repeatedly until the 🔓 is flashing.

2 If moving to 'setup' icon area by using ◁ ▷ button, 'setup' icon blinks, and child lock function is setup if pressing OK CLEAR button at that time.

3 When cancelling lock function, if moving to 'cancel' icon by pressing ◁ ▷ button and then, pressing OK CLEAR button, child lock function is cancelled.

4 Press ESC button to exit.

❉ After setup, it automatically gets out of setup mode if there is no button input for 25 seconds.

❉ When exiting without pressing set button, the manipulated value is not reflected.

5.6 Forced operation

• To operate the appliance by force in case when the remote control is lost, the forced operation selection switch is on the main unit of the appliance, and operate the appliance in the standard conditions.

• The operating condition is set according to the outdoor temp. and intake air temperature as follows.

Indoor temp.	Operating Mode	Setting temp.	Setting speed of indoor fan
over 24 °C	Cooling	22 °C	High speed
21~24 °C	Healthy Dehumidification	23 °C	
below 21 °C	Heating	24 °C	

• The unit select the last operation mode in 3 hours.

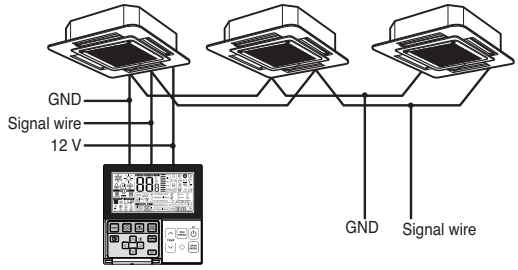
• Operating procedures when the remote control can't be used is as follows :

- The operation will be started if the ON/OFF button is pressed.
- If you want to stop operation, re-press the button.

5.7 Group Control

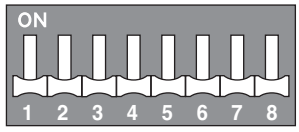
1. When installing more than 2 units of air conditioner to one wired remote controller, please connect as the right figure.

- If it is not event communication indoor unit, set the unit as slave.
- Check for event communication through the product manual.

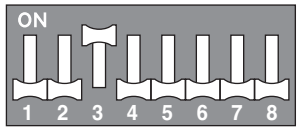


When controlling multiple indoor units with event communication function with one remote controller, you must change the master/slave setting from the indoor unit.

- Indoor units, the master/slave configuration of the product after completion of indoor unit power 'OFF' and then 'ON' the power after 1 minute elapsed sign up.
- For ceiling type cassette and duct product group, change the switch setting of the indoor PCB.



#3 switch OFF: Master
(Factory default setting)



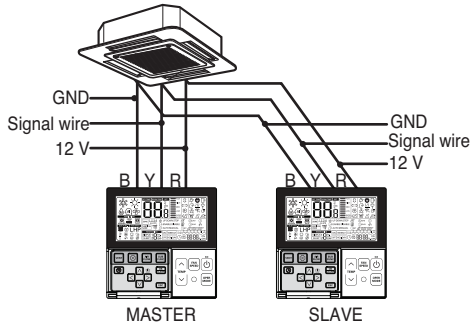
#3 switch ON: Slave

- For wall-mount type and stand type product, change the master/slave setting with the wireless remote controller. (Refer to wireless remote controller manual for detail)

❊ When installing 2 remote controllers to one indoor unit with event communication function, set the master/slave of the remote controller. (Refer to remote controller master/slave selection)
When controlling the group, some functions excluding basic operation setting, fan level Min/Mid/Max, remote controller lock setting and time setting may be limited.

2. When installing more than 2 wired remote controllers to one air conditioner, please connect as the right picture.

- When installing more than 2 units of wired remote controller to one air conditioner, set one wired remote controller as master and the others all as slaves, as shown in the right picture.
- You cannot control the group as shown in the right for some products.
- Refer to the product manual for more detail.



<When simultaneously connecting
2 sets of wired remote controller>

- When controlling in groups, set the master/slaver of the remote controller. Refer to Installer setting section on how to set master/slave for more detail.

5.8 Sleep Timer Operation

- When the sleep time is reached after <1,2,3,4,5,6,7,0(cancel) hr> is input by the remote control while in appliance operation, the operation of the appliance stops.
- While the appliance is on pause, the sleep timer mode cannot be input.
- While in cooling mode operation, 30 minutes later since the start of the sleep timer, the setting temperature increases by 1 °C. After another 30 minutes elapse, it increases by 1 °C again.
- When the sleep timer mode is input while in cooling cycle mode, the airflow speed of the indoor fan is set to the low.
- When the sleep timer mode is input while in heating cycle mode, the airflow speed of the indoor fan is set to the medium.

5.9 Timer(On/Off)

5.9.1 On-Timer Operation

- When the set time is reached after the time is input by the remote control, the appliance starts to operate.
- The timer LED is on when the on-timer is input. It is off when the time set by the timer is reached.
- If the appliance is operating at the time set by the timer, the operation continues.
  While in Fuzzy operation, the airflow speed of the indoor fan is automatically selected according to the temperature.

5.9.2 Off-Timer Operation

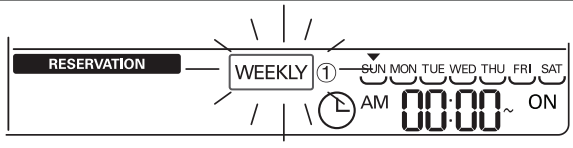
- When the set time is reached after the time is input by the remote control, the appliance stops operating.
- The timer LED is on when the off-timer is input. It is off when the time set by the timer is reached.
- If the appliance is on pause at the time set by the timer, the pause continues.

5.10 Weekly Program

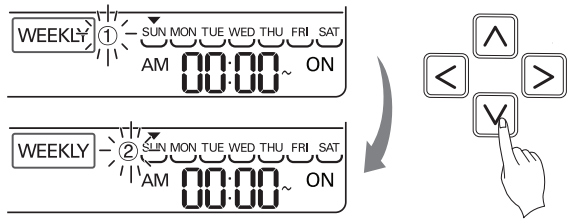
You can set the daily reservation in weekly unit.
Weekly reservation keeps operating until before you cancel it once you setup

1 Please move to reservation setup mode by pressing reservation button.
❊ You can setup two weekly reservations for one day, and up to fourteen reservations for a week.
For example, to setup (Tuesday morning 11:30 turned on ~ afternoon 12:30 turned off), you setup in order below.

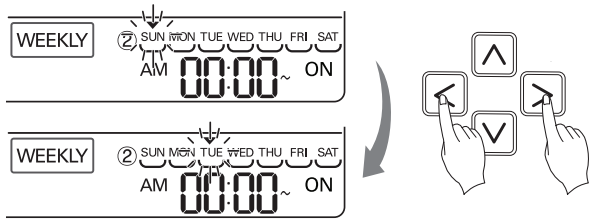
2 Please move to 'weekly' by repeatedly pressing reservation button. 'Weekly' blinks at this time.



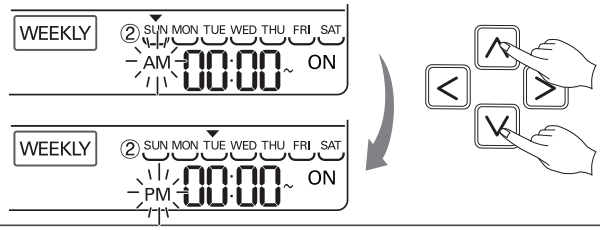
3 Please select weekly reservation or weekly reservation ①② by using ∧ ∨ button.
❊ You can setup two reservations, weekly reservation 1 and weekly reservation 2, for a day.



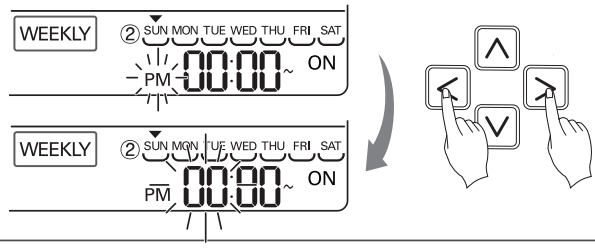
4 Please move to 'date' setup part by using < > button. If 'date' indication blinks, please setup date. You can setup date from Monday to Sunday.



5 Please move to 'AM/PM' setup part of turning on by using ∧ ∨ button.



6 Please move to 'hour' setup part of turning on by using < > button.
- It is the part to setup the time at which air-conditioner is turned on.

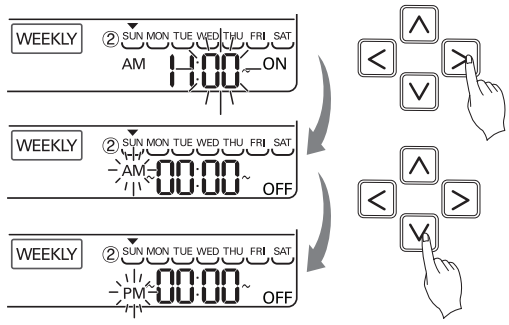


7 Please change time by using ∧ ∨ button.
- You can setup hour 0~12.

8 Please move to 'minute' setup part of turning on by using > button.

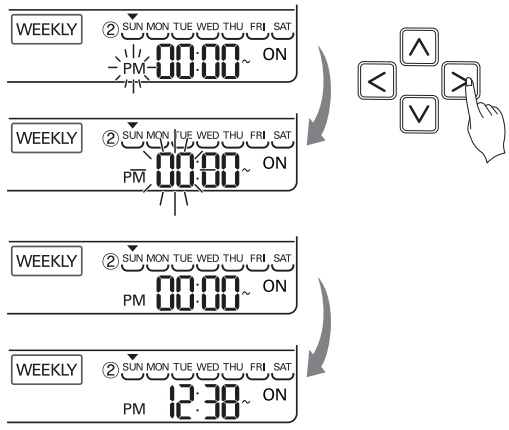
9 If 'minute' indication blinks, please setup 'minute' by using ∧ ∨ button

10 Please move to 'AM/PM' setup part of turning off by using [>] button.
- AM/PM setup is identical with turning on time setup.



11 Please move to 'hour' setup part of turning off by using Right button.
- It is the part to reserve the time at which air-conditioner is turned off.
- If 'hour' indication blinks, please setup 'hour'.

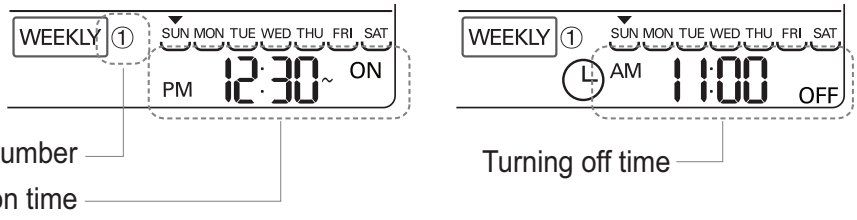
❊ Please setup 'hour' and 'minute' identically with the method to setup turning on time.



12 If finishing weekly reservation setup, please press setup/cancellation button. Weekly reservation setup for the day that you set is finished.

13 If you setup with the method identical with above by selecting the day that you'd like to setup, it operates weekly reservation.
If you setup both turning on reservation time and turning off reservation time identically, it doesn't operate reservation drive.

Weekly reservation explanation

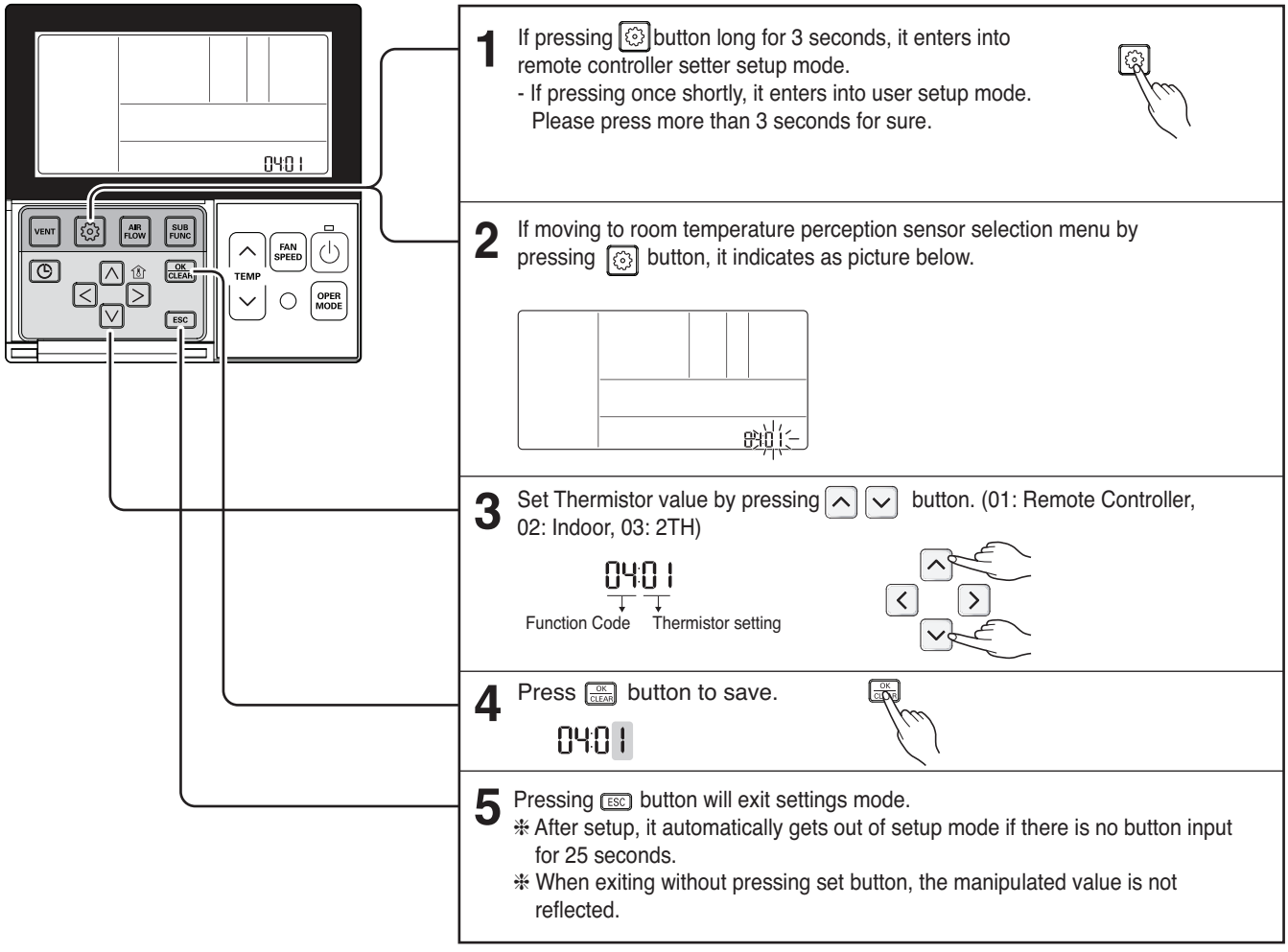


SUN MON TUE WED THU FRI SAT
Under bar: the indication that there is weekly reservation for corresponding day

* Indoor unit is turned on to desired temperature if it is configured using up/down button during preset of weekly operation time.
- When desired temperature is not set, it is turned on automatically with desired temperature of previous operation.

5.11 Two Thermistor Control

This is the function to select the temperature sensor to judge the room temperature.



<Thermistor Table>

Temperature sensor selection			Function
01	Remote controller		Operation in remote controller temperature sensor
02	Indoor unit		Operation in indoor unit temperature sensor
03	2TH	Cooling	Operation of higher temperature by comparing indoor unit's and wired remote controller's temperature. (There are products that operate at a lower temperature.)
		Heating	Operation of lower temperature by comparing indoor unit's and wired remote controller's temperature.

❉ The function of 2TH has different operation characteristics according to the product.

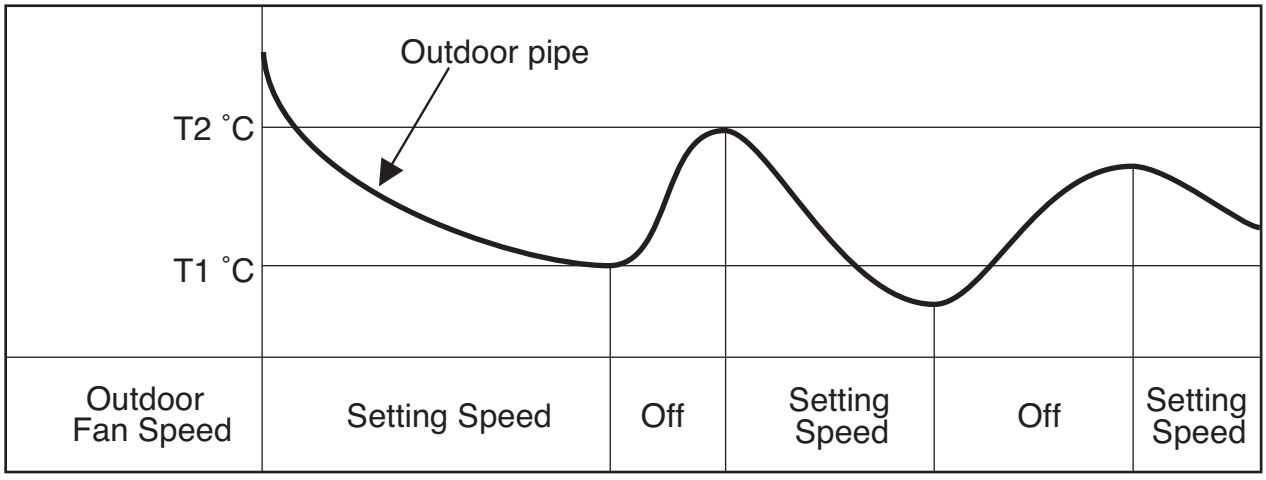
6. Special Function & KIT

6.1 Low Ambient control

• This Function is for cooling operating in outdoor low temperature .

• If outdoor temperature drops below certain temperature, liquid back is prevented by reducing outdoor fan speed.

• It can prevent frosting of evaporator and keep cooling operation



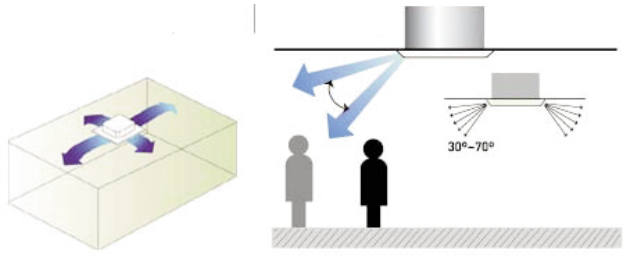
6.2 Space control

Vanes angle can be controlled by pair, considering its installation environment.

• For example direct drafts can be annoying, leading to discomfort and reduced productivity vane control helps to eliminate this problem.

• Easily controlled by wired remote control.

• Air Flow can be controlled easily regarding any space environment.



Part 3 Basic Control

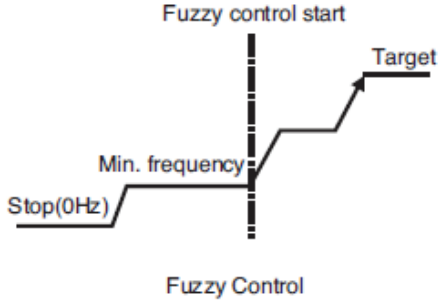
1. Normal operation

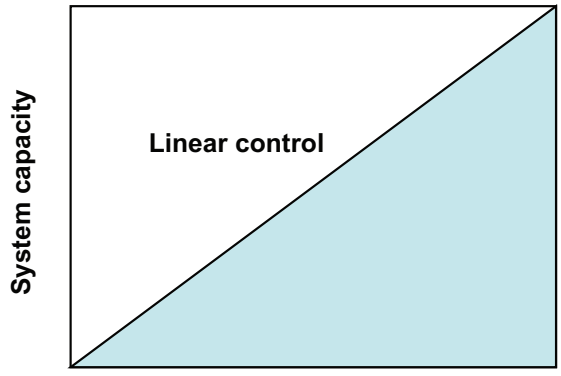
Basic principle is to control the rpm of the motor by changing the working frequency of the compressor.
Three phase voltage is supplied to the motor and the time for which the voltage will supplied is controlled by IPM (intelligent power module).
Switching speed of IPM defines the variable frequency input to the motor.

Actuator	Cooling operation	Heating operation	Stop state
Compressor	Fuzzy control	Fuzzy control	Stop
Fan	Fuzzy control	Fuzzy control	Stop
EEV	Discharge Temp. Control	Discharge Temp. Control	Min. Pulse

2. Compressor control

Fuzzy control : Maintain evaporating temperature (Te) to be constant on cooling mode and constant condensing temperature (Tc) on heating mode by fuzzy control to ensure the stable system performance.





Inverter linear control as cooling and heating load increasing

3. EEV(Electronic Expansion Valve) control

EEV operates with fuzzy control rules to keep the target temperature of discharge pipe.

* Cooling mode

* Cooling / Heating mode

The target temperature of discharge pipe : $T_d = T_1 \times \left(\frac{P_{high}}{P_{low}} \right)^{\frac{(n-1)}{n}}$

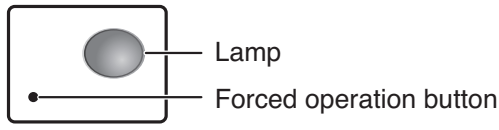
- T_d : Theoretical discharge temperature
- T_1 : T_e(current evaporating temperature) + T_{SSH} (Suction Superheating temperature)
- P_{high} : Absolute High pressure (kPa)
- P_{low} : Absolute low pressure (kPa)

Part 4 Trouble Shooting

1. Self-diagnosis Function

1.1 Error Indicator (Indoor)

Operation Indicator Lamp



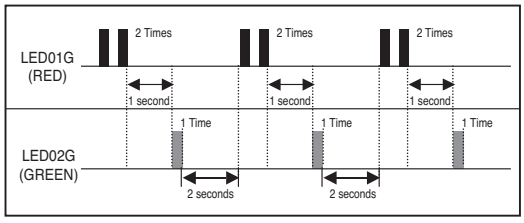
Description	Lamp Color
Cooling mode	Green
Heating mode	Green
Time to clean filter in cooling/heating Mode	Yellowish Green
Time to clean filter when product is not operating	Orange
Hot start or defrost mode before starting heating mode	Green
When reservation set on	Yellowish Green

Indoor Error

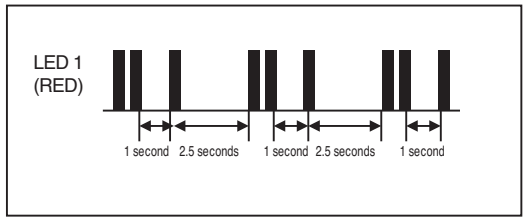
Code	Title	Cause of Error
1	Air temperature sensor of Indoor unit	Air temperature sensor of indoor unit is open or short
2	Inlet pipe temperature Sensor of indoor unit	Inlet pipe temperature sensor of indoor unit is open or short
3	Communication error : wired remote controller ↔ indoor unit	Failing to receive wired remote controller signal in indoor unit PCB
4	Drain pump	Malfunction of drain pump
5	Communication error : outdoor unit ↔ indoor unit	Failing to receive outdoor unit signal in indoor unit PCB
6	Outlet pipe temperature sensor of indoor unit	Outlet pipe temperature sensor of indoor unit is open or short
9	Indoor EEPROM Error	In case when the serial number marked on EEPROM of Indoor unit is 0 or FFFF
10	Abnormal fan motor operation	Disconnecting the fan motor connector / Failure of indoor fan motor lock

Code	Title	Operating state	Error display
-	Air purification panel fault related error	Product (operation) / air purify function (stop)	When air purify function is activated, the indoor buzzer sounds 7 times (Buzzer sounds in 3 hour units, air purify function turns off after 9 hours)

1.2 Error Indicator (Outdoor)

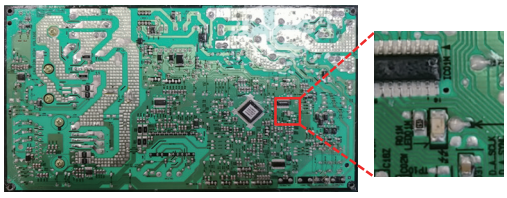


Standard Inverter :
9k/12k/24k/36k/42k/48k/60k
Compact Inverter : 18k

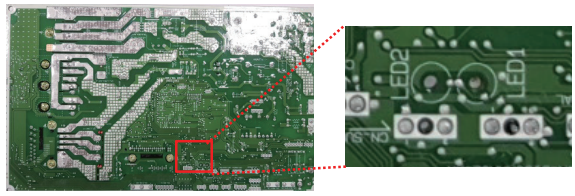


Standard Inverter : 18k
Compact Inverter : 24k/30k

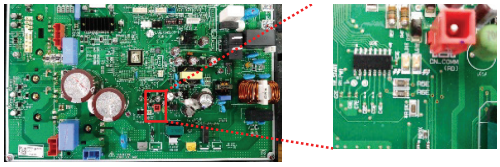
1.2 Error Indicator (Outdoor)



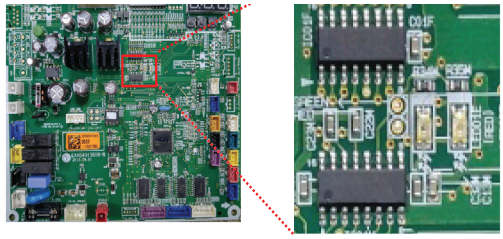
UUA1



UUB1

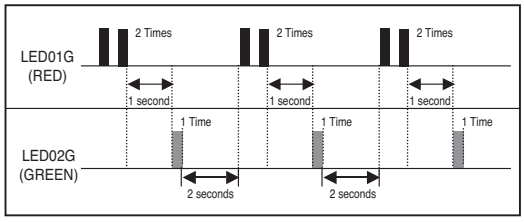


UUC1



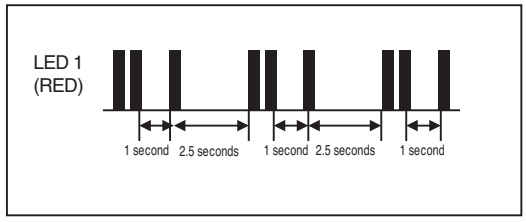
UUD1/UUD3

UUA1/UUB1



(ex) Code 21)

UUC1/UUD1



Standard Inverter : 18k
Compact Inverter : 24k/30k

Outdoor Error

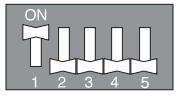
Code	Contents	Operation State	Count
21	IPM Fault Error	Stop	10 time Within 1h
22	CT 2 Error (Input of Over-Current)	Stop	Infinite restart
23	DC Link Error (High/Low DC Voltage)	Stop	Infinite restart
24	Pressure Switch High/Low Pressure Fault	Stop	10 time Within 1h
25	Input Frequency Detection Failure	Stop	1 time Within 1h
26	DC Comp Position Detection Error	Stop	10 time Within 1h
27	PSC/PFC Over-Current Error(HW)	Stop	10 time Within 1h
29	Comp Phase Over-Current Error	Stop	10 time Within 1h
32	D-Pipe Overheating Error (INV Comp)	Stop	Infinite restart
33	D-Pipe Overheating Error (Constant-rate Comp)	Stop	Infinite restart
35	Low Pressure Error of Outdoor Unit	Stop	6 time Within 1h
38	Refrigerant Leakage Error	Stop	4 time Within 1h
41	D-Pipe Sensor Error (INV. Comp.)	Stop	1 time Within 1h
43	High pressure Sensor Error	Stop	1 time Within 1h

Code	Contents	Operation State	Count
44	Outdoor Inlet Sensor Error	Stop	1 time Within 1h
45	Cond. Pipe Sensor Error	Stop	1 time Within 1h
46	Suction Pipe Sensor Error	Stop	1 time Within 1h
47	D-Pipe Sensor Error (Constantrate Comp)	Stop	1 time Within 1h
51	Over-Capacity Connection Error	Stop	1 time Within 1h
53	Communication Error between Outdoor Device Indoor Device	Stop	1 time Within 1h
54	Open and Reverse Phase Error	Stop	10 time Within 1h
60	EEPROM Check Sum Error	Stop	1 time Within 1h
61	Outdoor Device Pipe Overheating Error	Stop	Infinite restart
62	Heat-sink Overheating Error	Stop	Infinite restart
65	Heat-sink Sensor Error	Stop	1 time Within 1h
67	Outdoor BLDC Fan Lock Error	Stop	10 time Within 1h
73	PSC/PFC Over-Current Error(SW)	Stop	Infinite restart

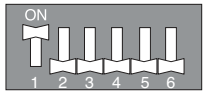
2. Pump Down

Setting Procedure

1) Set the DIP Switch as follow after shutting the power source down.



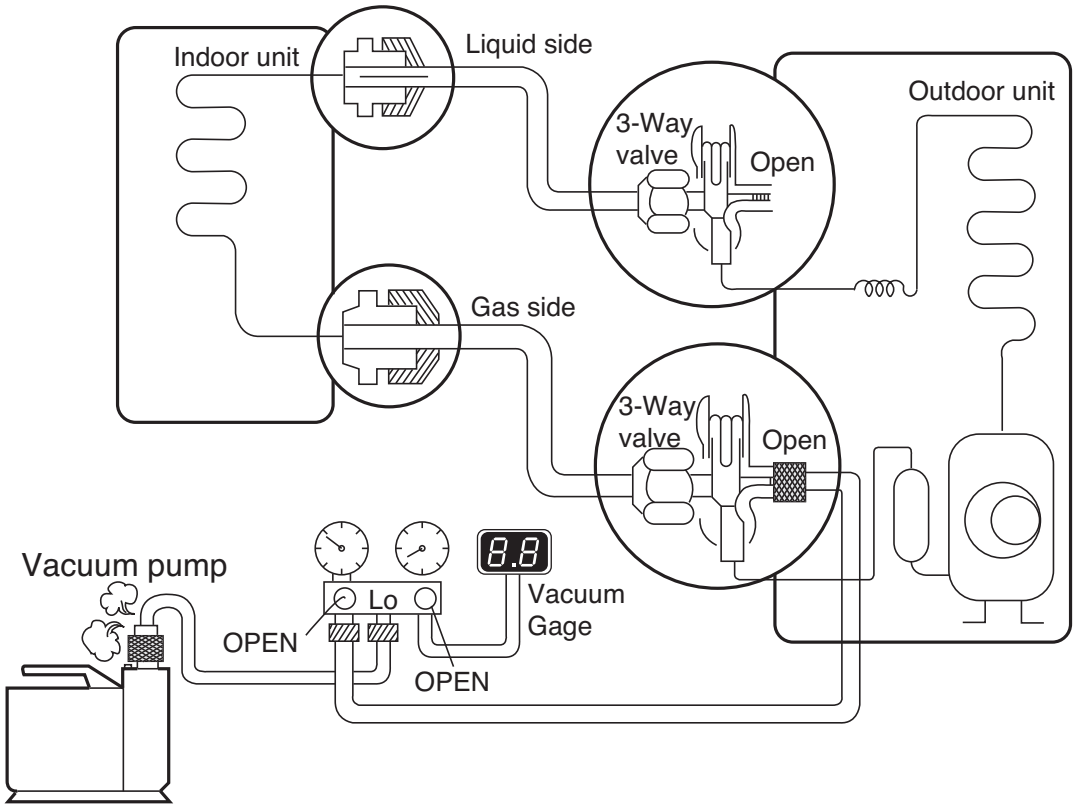
UUB1, UUC1



UUD1, UUD3

2) Reset the power.
3) Red LED and Green LED of PCB lights during work.
   (The indoor unit is operated by force.)
4) If operation is done, Red LED will be turned off.
   If operation is not done normally, Red LED will blink.
5) Close the Liquid valve only after green LED turned off (7 minutes from the start of the machine).
   Then close the gas valve after Green LED on.

3. Evacuation (All amount of refrigerant leaked)



• Procedure

(1) Connect the vacuum pump to the center hose of charge set center hose

(2) Evacuation for approximately one hour.
- Confirm that the gauge needle has moved toward 0.8 Torr.

(3) Close the valve (Lo side) on the charge set, turn off the vacuum pump, and confirm that the gauge needle does not move (approximately 5 minutes after turning off the vacuum pump).

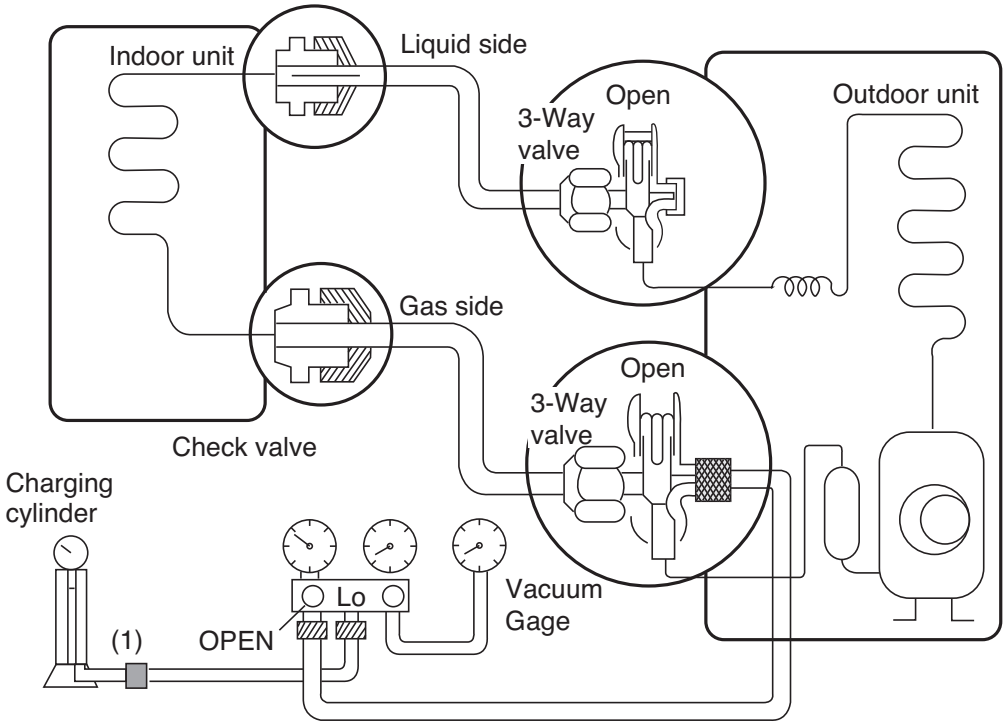
(4) Disconnect the charge hose from the vacuum pump.
- Vacuum pump oil.
  If the vacuum pump oil becomes dirty or depleted, replenish as needed.

WARNING

Use a vacuum pump or Inert (nitrogen) gas when doing leakage test or air purge. Do not compress air or Oxygen and do not use Flammable gases. Otherwise, it may cause fire or explosion.

- Otherwise, it may cause personal injury.

4. Gas Charging (After Evacuation)



• Procedure

(1) Connect the charge hose to the charging cylinder.
- Connect the charge hose which you dis-connected from the vacuum pump to the valve at the bottom of the cylinder.
- If you are using a gas cylinder, also use a scale and reverse the cylinder so that the system can be charged with liquid.

(2) Purge the air from the charge hose.
- Open the valve at the bottom of the cylinder and press the check valve on the charge set to purge the air. (Be careful of the liquid refrigerant). The procedure is the same if using a gas cylinder.

(3) Open the valve (Lo side on the charge set and charge the system with liquid refrigerant.
- If the system can not be charged with the specified amount of refrigerant, it can be charged with a little at a time (approximately 150 g each time) while operating the air conditioner in the cooling cycle; however, one time is not sufficient, wait approximately 1 minute and then repeat the procedure (pumping down-pin).

This is different from previous procedures. Because you are charging with liquid refrigerant from the gas side, absolutely do not attempt to charge with larger amounts of liquid refrigerant while operating the air conditioner.

(4) Immediately disconnect the charge hose from the 3-way valve's service port.
- Stopping partway will allow the gas to be discharged.
- If the system has been charged with liquid refrigerant while operating the air conditioner turn off the air conditioner before disconnecting the hose.

(5) Mount the valve stem nuts and the service port nut.
- Use torque wrench to tighten the service port nut to a torque of 1.8 kg.m.
- Be sure to check for gas leakage.

⚠ WARNING

When installing or relocation the unit, make sure that no substance other than the specified refrigerant(R410A) enter the refrigerant circuit.

- Any presence of foreign substance such as air can cause an abnormal pressure rise and may

5. Cycle Part

Trouble analysis

1. Check temperature difference between intake and discharge air, and check for the operating current too.

Case	Symptom	Supposed Caused
Case 1	Temp. difference : approx. 0 °C Current : less than 80 % of rated current	All amount of refrigerant leaked out. Check refrigeration cycle.
Case 2	Temp. difference : approx. 8 °C Current : less than 80 % of rated current	Refrigerant leakage Clog of refrigeration cycle Defective Compressor.
Case 3	Temp. difference : less than 8 °C Current : over the rated current	Excessive amount of refrigerant
Case 4	Temp. difference : over 8 °C	Normal

NOTICE

Temperature difference between intake and discharge air depends on room air humidity. When the room air humidity is relativery higher, temperature difference is smaller. When the room air humidity is relatively lower temperature difference is larger.

2. Check temperature and pressure of refrigeration cycle in cooling mode.

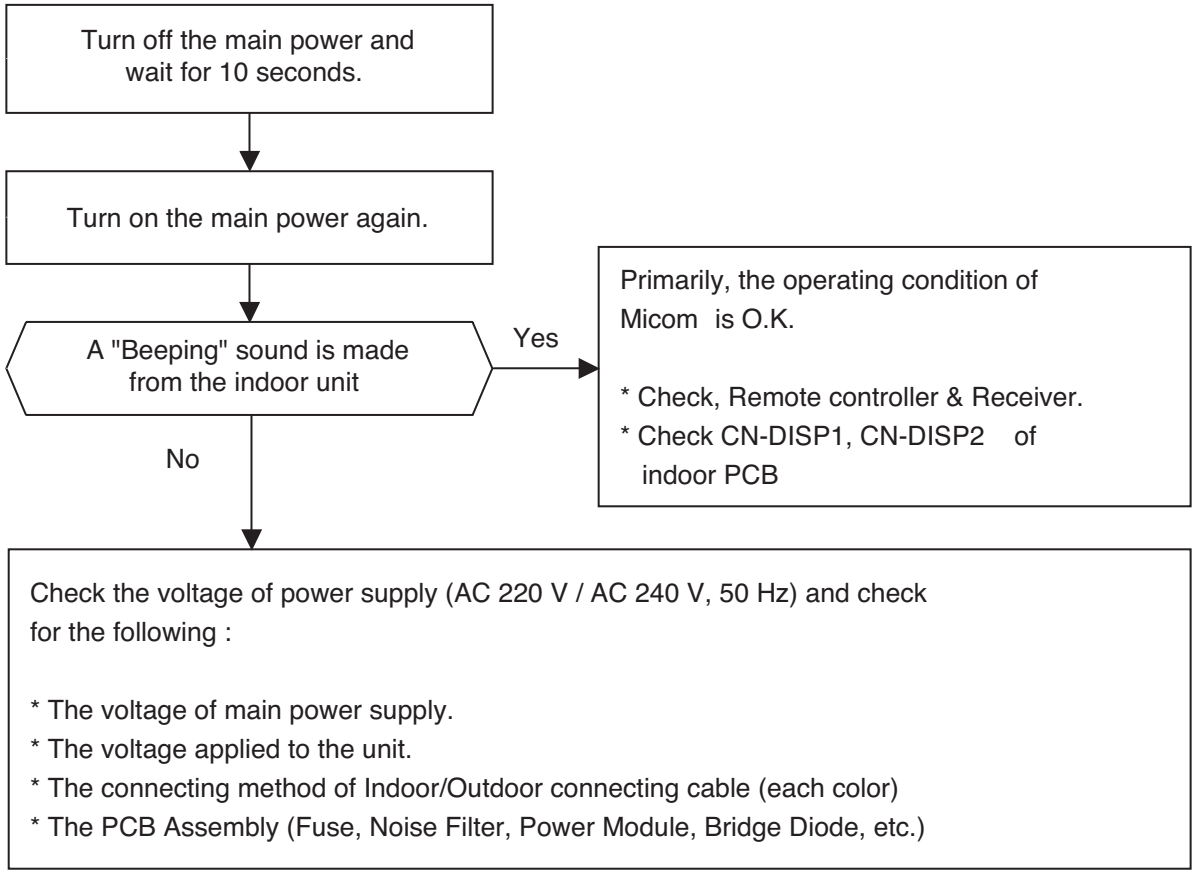
Suction pressure (Compared with the normal value)	Temperature of Discharge Air (Compared with the normal valve)	Cause of Trouble	Description
Higher	High	Defective compressor Defective 4-way reverse valve	Current is low.
	Normal	Excessive amount of refrigerant	High pressure does not quickly rise at the beginning of operation.
Lower	Higher	Insufficient amount of refrigerant (Leakage) Clogging	Current is low.

NOTICE

1. The suction pressure is usually 7.0~8.5 kg/cm^{2}G (Cooling) at normal condition. (R32)
2. The temperature can be measured by attaching the thermometer to the low pressure tubing and wrap it with putty.

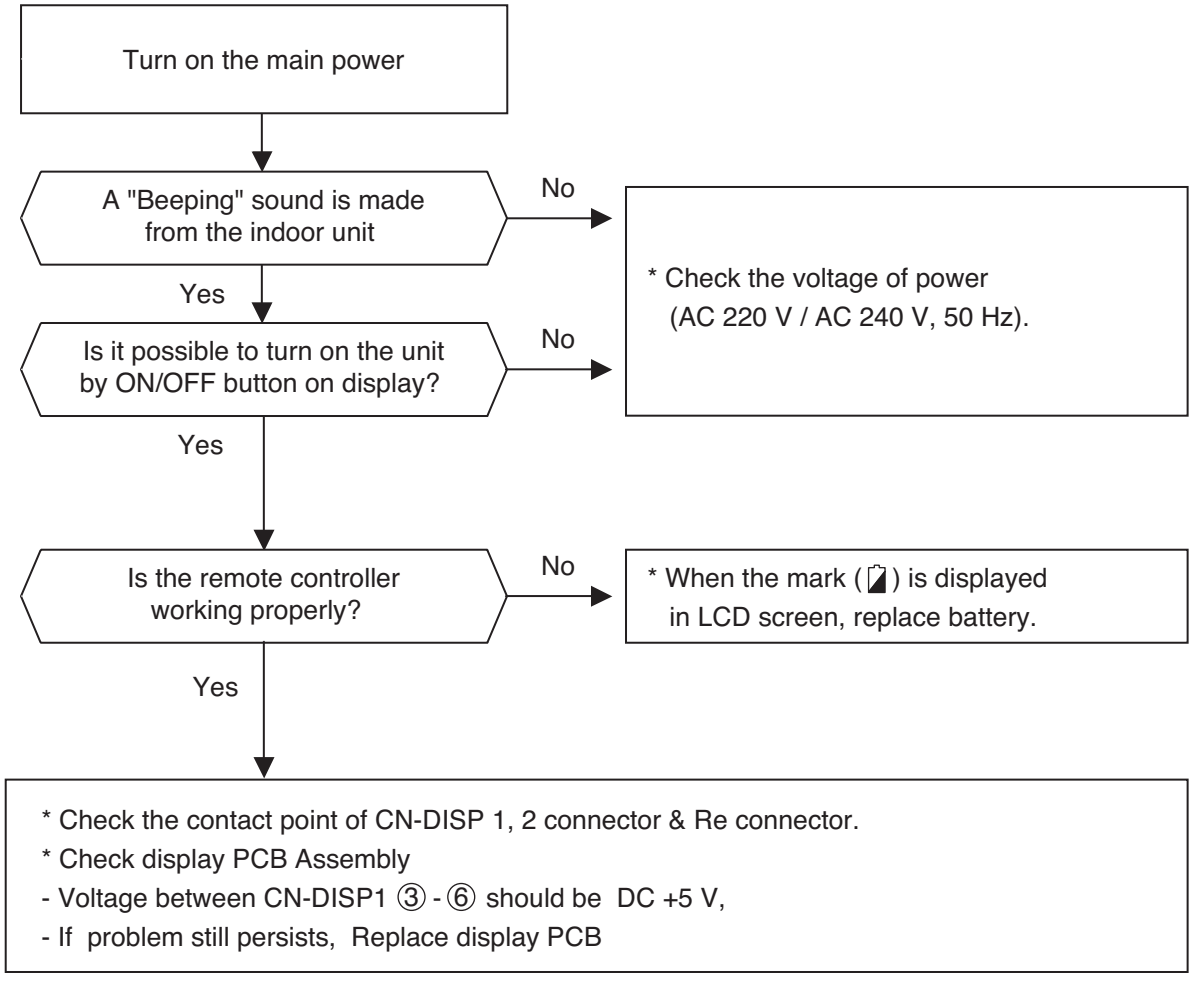
6. Electronic Parts

6.1 The Product doesn't operate at all



The operation check of the Indoor PCB Assembly		
Procedure	**Specification**	**Remedy**
1) The input voltage of power module.	1) AC 230 V ± 30 V : Check the rated voltage	1) Check the power outlet.
2) The output voltage of power module.	2) 12 V ± 3 V	2) Replace PCB Assembly
4) IC04D(7805)	4) DC 5 V	4) Replace PCB Assembly
5) IC01A(KIA7036)	5) The voltage of micom pin 19 : DC 4.5 V ↑	5) Replace PCB Assembly

6.2 The Product doesn't operate with the remote controller



6.3 The Compressor/Outdoor Fan are don't operate

Turn on the main power.

↓

Operate Cooling Mode by setting the disired temperature of the remote controller is less than one of the Indoor temperature by 1 °C at least.

↓

When in air circulation mode, compressor/outdoor fan is stopped.

↓

Check the sensor for Indoor temperature is attatched as close as to be effected by the themperature of Heat Exchange (Evaporator)

↓

When the sensor circuit for Indoor temperature and connector are in bad connection or are not engaged, Compressor/Outdoor fan is stopped.

- Check the related circuit of R02H(12.1K), R01H(1K), R04H(6.2K), R03H(1K), C01H(102), C02H(102), Micom(pin No. ⑪, ⑫).
- Check the Indoor temperature sensor is disconnected or not (about 10K at 25 °C).

↓

Check the Relay(RY-PWR, RY-START) for driving Compressor.

- Check the voltage between brown and blue cable of terminal to connect the Outdoor (About AC 220 V / 240 V).
- Check the related circuit of relay in Outdoor PCB Ass'y.

Check Point	Comp. ON	Comp. OFF
Between Micom(No. 19) and GND	DC 5 V	DC 0 V
Between IC01M(No. 10) and GND	DC 1 V ↓	DC 12 V

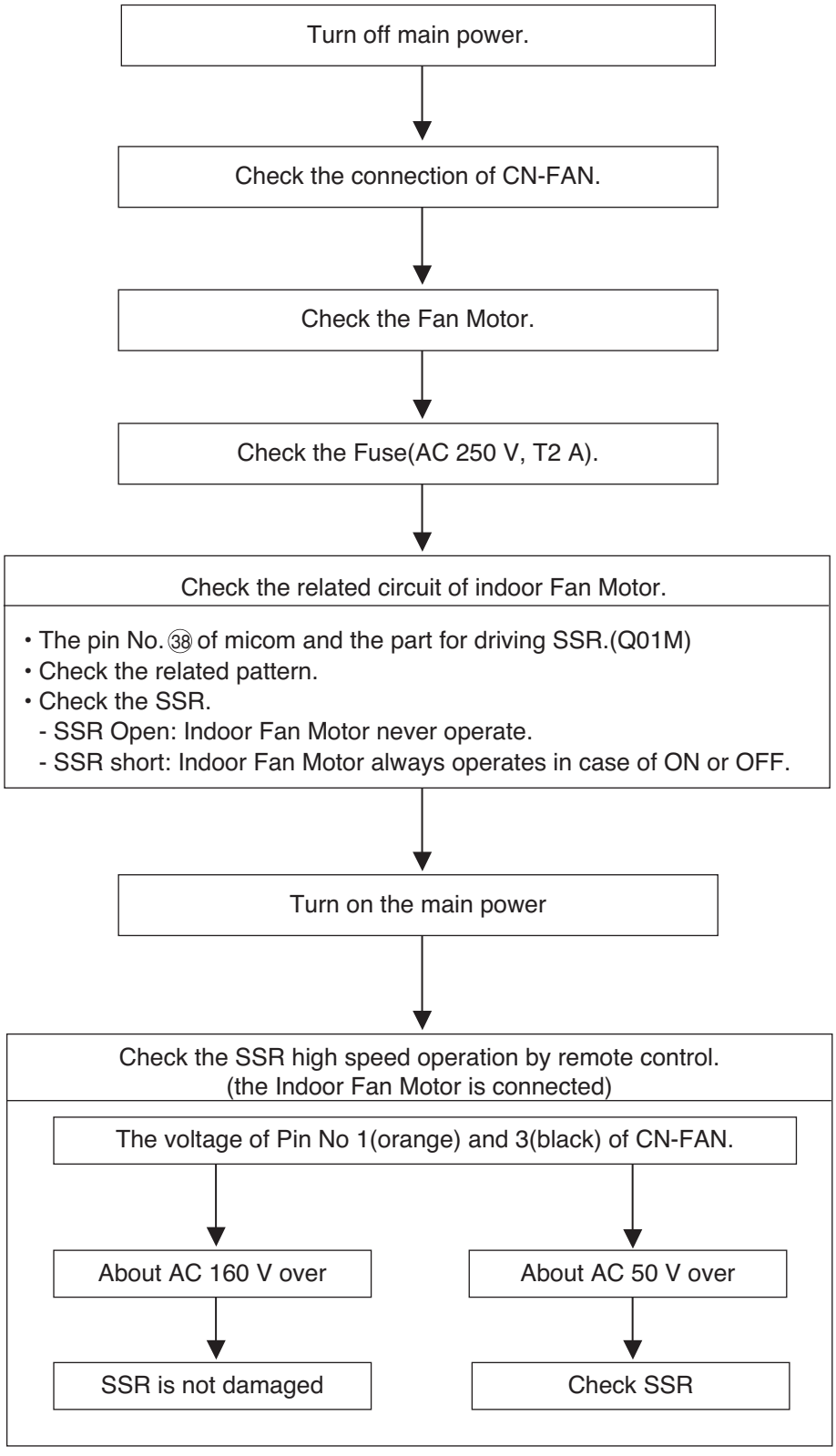
↓

Turn off main power.

↓

Check the electrical wiring diagram of Outdoor side.
Check the open or short of connecting wires between Indoor and Outdoor.

6.4 When indoor Fan does not operate.



6.5 When the louver does not operate.

• Confirm that the vertical louver is normally geared with the shaft of Stepping Motor.
• If the regular torque is detected when rotating the vertical louver with hands ⇒ Normal

↓

• Check the connecting condition of CN-U/D or CN_L/R Connector
• Check the soldering condition(on PCB) of CN-U/D or CN_L/R Connector

↓

Check the operating circuit of the vertical louver

• Confirm that there is DC +12 V between pin ① of CN-U/D, CN_L/R and GND.
• Confirm that there is a soldering short at following terminals.
  - Between ①, ②, ③ and ④ of MICOM
  - Between ⑰, ⑱, ⑲ and ⑳ of MICOM
  - Between ④, ⑤, ⑥ and ⑦ of IC01M
  - Between ⑤, ⑥, ⑦ and ⑧ of IC01M

↓

If there are no problems after above checks.

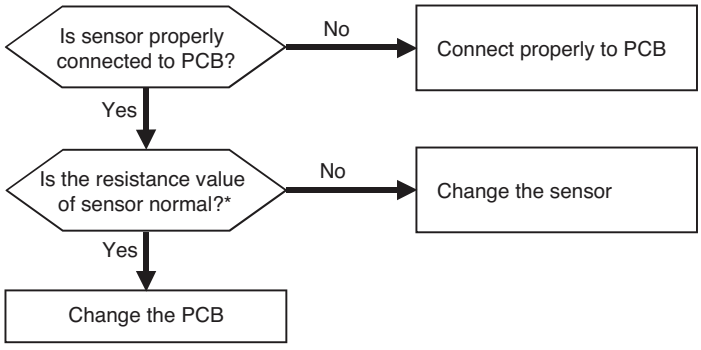
• Confirm the assembly condition that are catching and interfering parts in the link of the vertical louver

6.6 Troubleshooting Indoor Error

CH 01 (Indoor unit air sensor error)
CH 02 (Indoor unit pipe inlet sensor error)
CH 06 (Indoor unit pipe outlet sensor error)

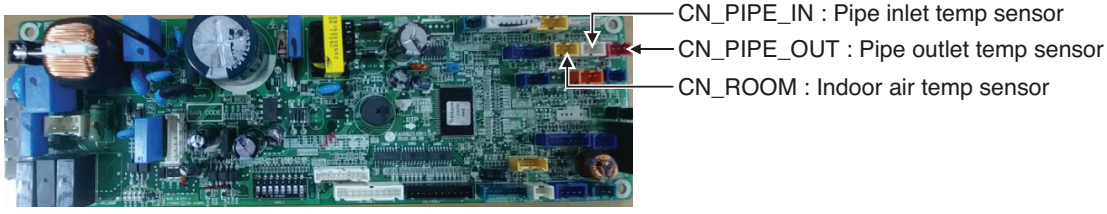
Error No.	Error Type	Error Point	Main Reasons
01	Indoor unit air sensor error	Indoor unit sensor is open/ short	1. Indoor unit PCB wrong connection 2. Indoor unit PCB failure 3. Sensor problem (main reason)
02	Indoor unit pipe inlet sensor error		
06	Indoor unit pipe outlet sensor error		

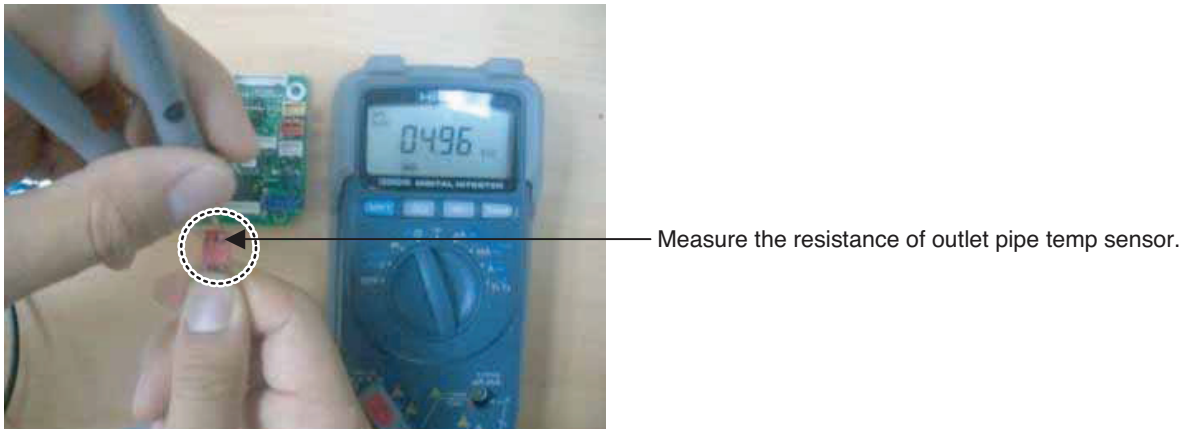
■ Error diagnosis and countermeasure flow chart



** In case the value is more than 100 kΩ (open) or less than 100 Ω (short), Error occurs

Refer: Resistance value maybe change according to temperature of temp sensor,
It shows according to criteria of current temperature(±5 % margin)➔ Normal
Air temp sensor: 10 °C = 20.7 kΩ : 25 °C= 10 kΩ : 50 °C= 3.4 kΩ
Pipe temp sensor: 10 °C = 10 kΩ : 25 °C= 5 kΩ : 50 °C= 1.8 kΩ



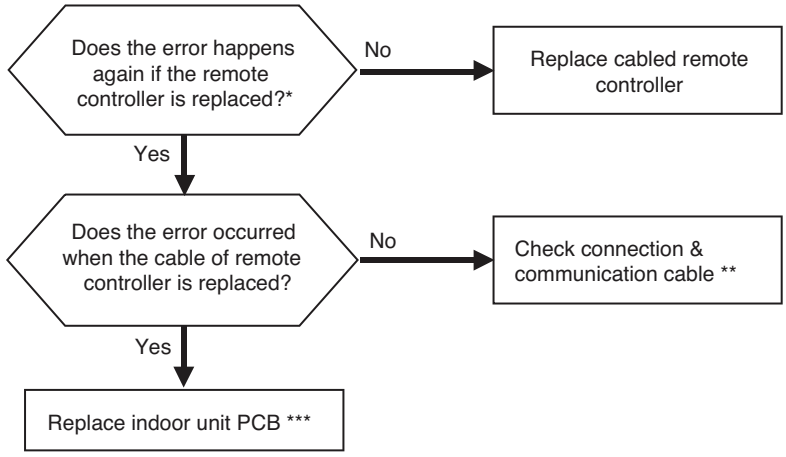


6.6 Troubleshooting Indoor Error

CH 03 (No communication between cabled remote controller & indoor unit)

Error No.	Error Type	Error Point	Main Reasons
03	No communication between cabled remote controller & indoor unit	The remote controller did not receive the signal from indoor unit during specific time	1. Remote controller fault 2. Indoor unit PCB fault 3. Connector fault, Wrong connection 4. Communication cable problem

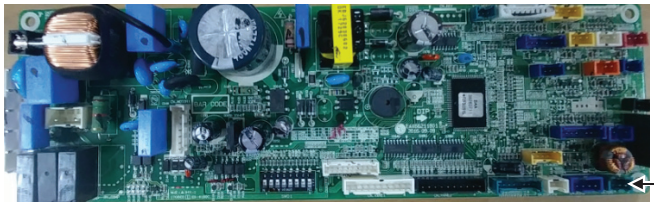
■ Error diagnosis and countermeasure flow chart



* If there is no remote controller to replace : Use another unit's remote controller doing well

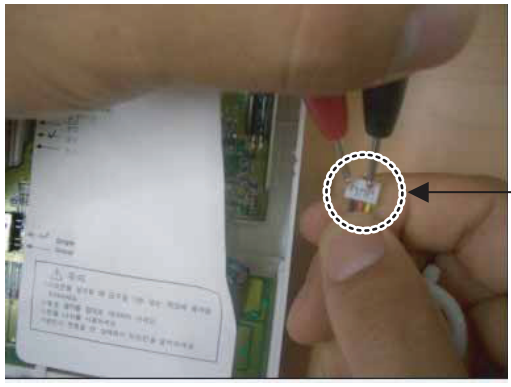
** Check cable : Contact failure of connected portion or extension of cable are main cause
Check any surrounded noise (check the distance with main power cable)
➔ make safe distance from the devices generate electromagnetic wave

*** After replacing indoor unit PCB, do Auto Addressing & input unit's address if connected to central controller.
(All the indoor units connected should be turned on before Auto Addressing)



CN_REMO : Remote controller connection

※ The PCB can differ from model to model.
Check from the right source.



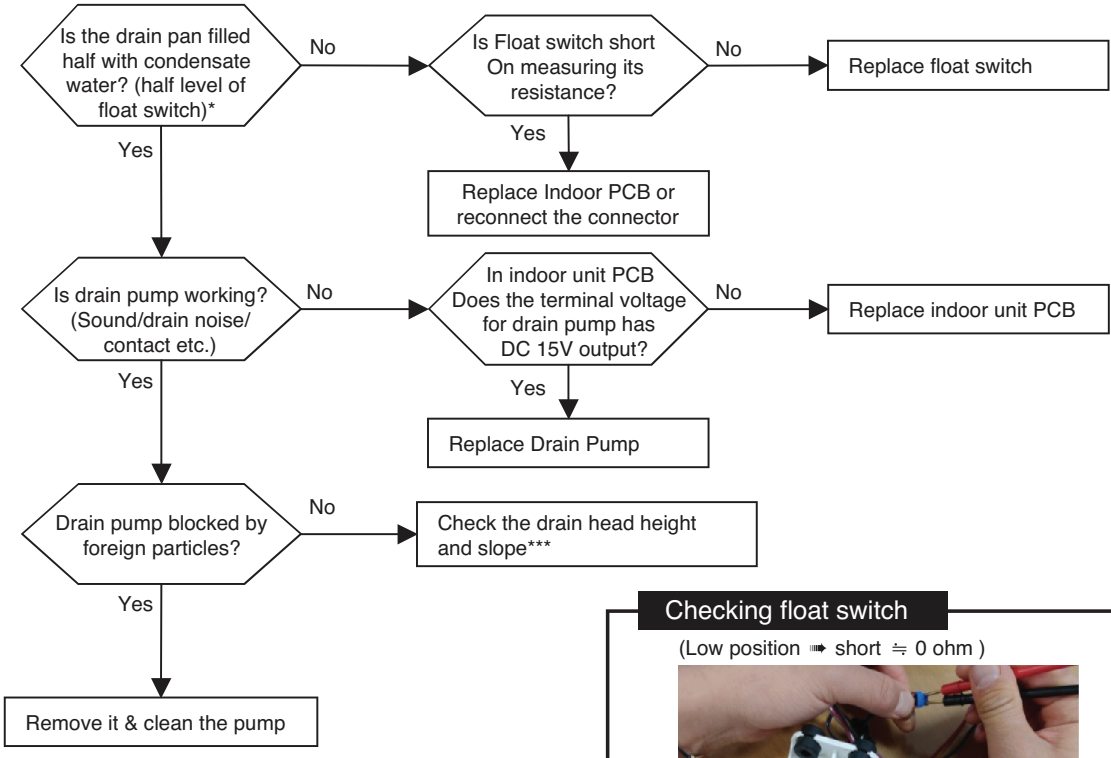
Checking communication cable connection status

6.6 Troubleshooting Indoor Error

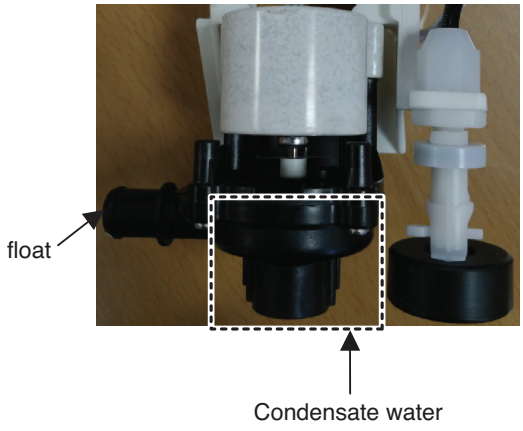
CH 04 (Drain pump error)

Error No.	Error Type	Error Point	Main Reasons
04	Drain pump error	Float switch is open due to rising of condensate water level because of drain pump fault or drain pipe clogging	1. Drain pump/float switch fault 2. Improper drain pipe location, clogging of drain pipe 3. Indoor unit PCB fault

■ Error diagnosis and countermeasure flow chart

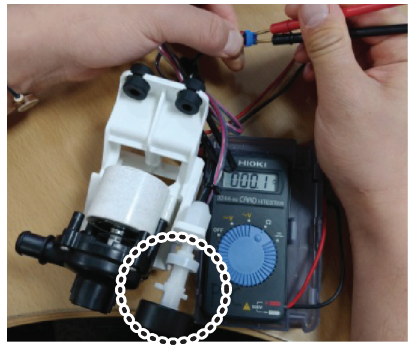


* If the float goes up higher than a half of float switch then the circuit is open & the unit is stopped automatically.

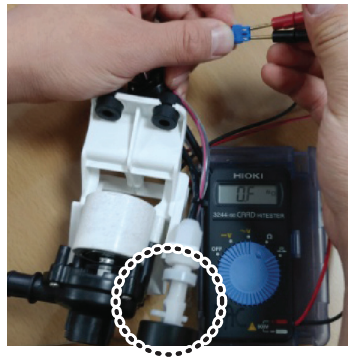


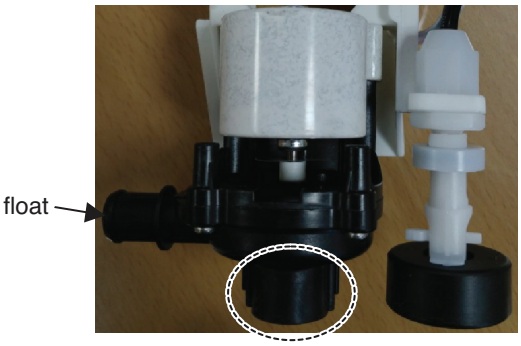
Checking float switch

(Low position ➠ short ≒ 0 ohm)



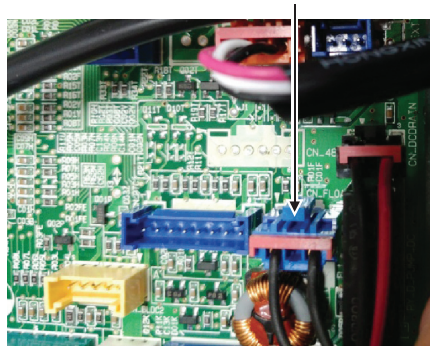
(High position ➠ Open)





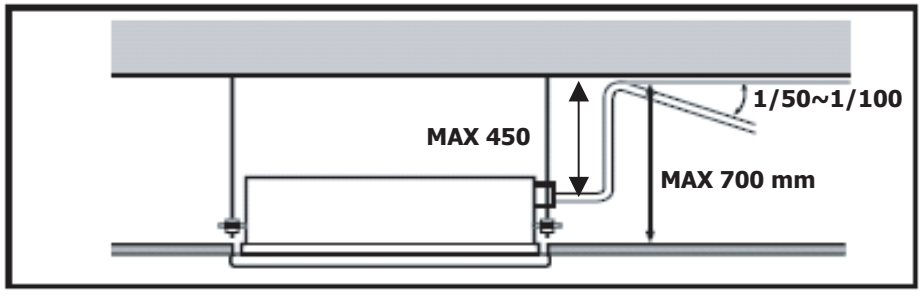
Point to check rotating

Float switch Housing (CN_FLOAT)



*** Indoor PCB drain pump connector
(Check input of DC 15 V)
(Marked as CN_DCDRAIN)

[***] Standard of drain pipe head height / slope



6.6 Troubleshooting Indoor Error

CH 09 (Indoor unit EEPROM error)

Error No.	Error Type	Error Point	Main Reasons
09	Indoor unit EEPROM error	Error occur in EEPROM of the Indoor PCB	1. Error developed in communication between the micro- processor and the EEPROM on the surface of the PCB. 2. ERROR due to the EEPROM damage

■ Error diagnosis and countermeasure flow chart

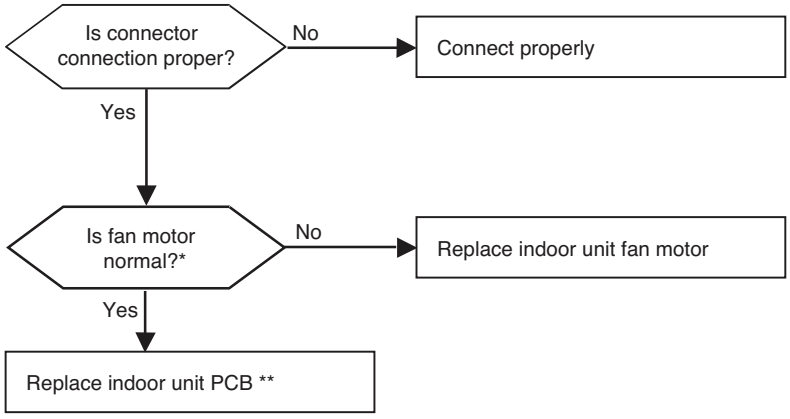
- Replace the indoor unit PCB, and then make sure to perform Auto addressing and input the address of central control

6.6 Troubleshooting Indoor Error

CH 10 (Indoor unit BLDC fan motor failure)

Error No.	Error Type	Error Point	Main Reasons
10	Indoor unit BLDC fan motor failure	Indoor BLDC fan motor feedback signal is absent (for 50 seconds)	1. Motor connector connection fault 2. Indoor PCB fault 3. Motor fault

■ Error diagnosis and countermeasure flow chart

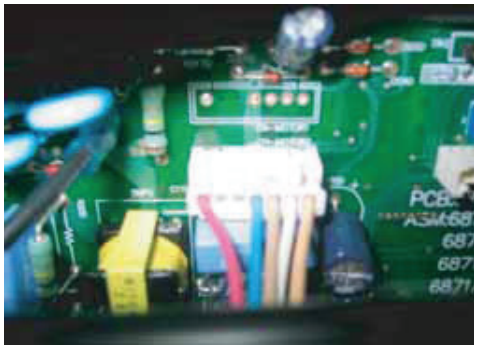


* It is normal when check hall sensor of indoor fan motor as shown below

Each termainl with the tester

Tester		Normal Resistance (±10 %)
+	-	
①	④	∞
⑤	④	hundreds kΩ
⑥	④	∞
⑦	④	hundreds kΩ

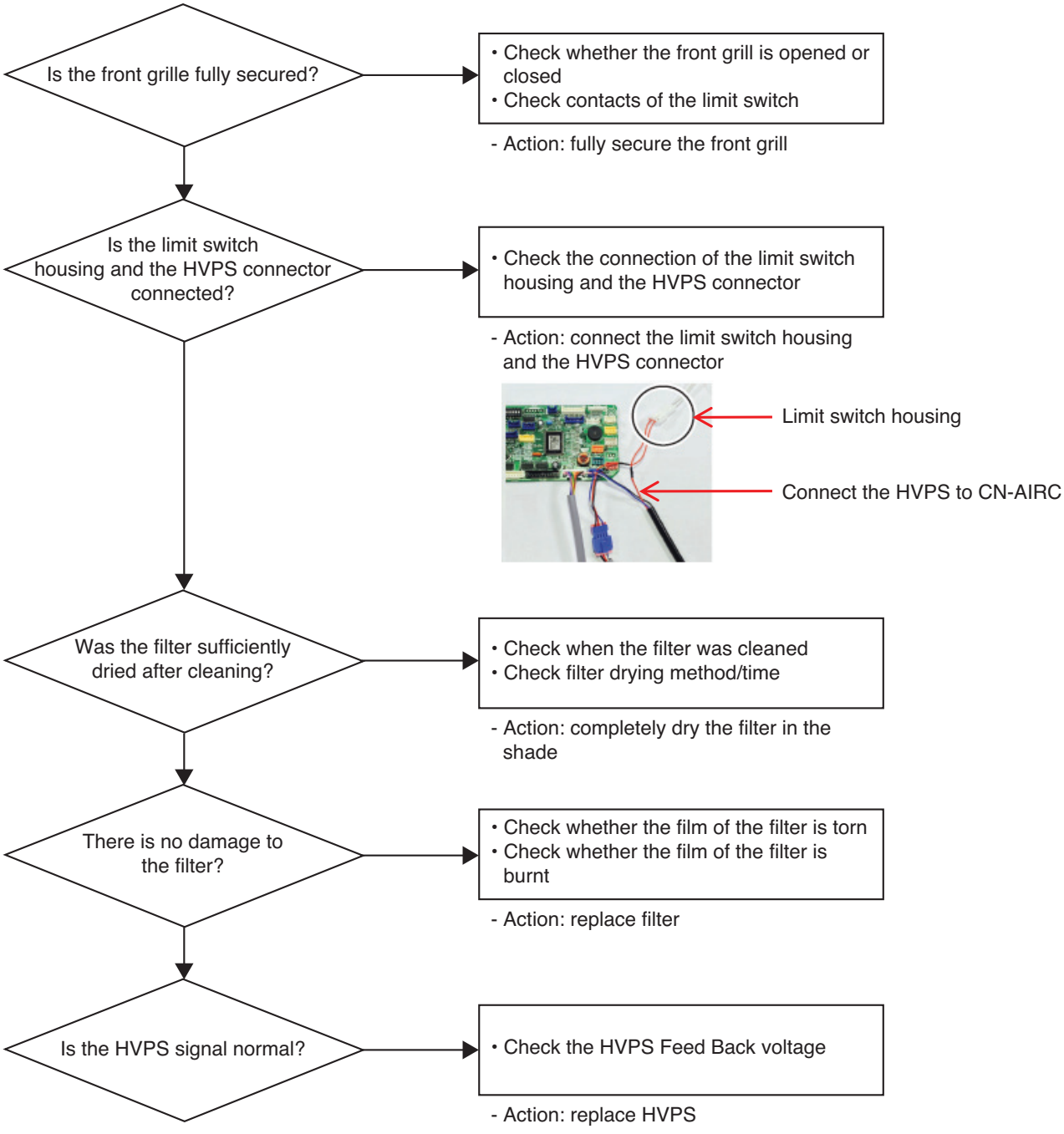
<Checking connection state of fan motor connector>



** Replace the indoor unit PCB, and then make sure to do Auto addressing and input the address of central control
(Notice: The connection of motor connector to PCB should be done under no power supplying to PCB)

Buzzer sounds seven times

Error Displayed	Inspection items	Cause of occurrence	Inspection details
Buzzer sounds seven times	Error relating to the failure of the air purifier kit	• Front grill is not completely closed • Faulty connection of the limit switch • HVPS failure • Moisture remains after cleaning the ultra-fine dust filter • The film of the ultra-fine dust filter is damaged	• Check whether the front grill is opened or closed • Check contacts and connection of the limit switch • Check HVPS signal • Check dryness of the ultra-fine dust filter • Check condition of the ultra-fine dust filter film



6.7 Troubleshooting Outdoor Error

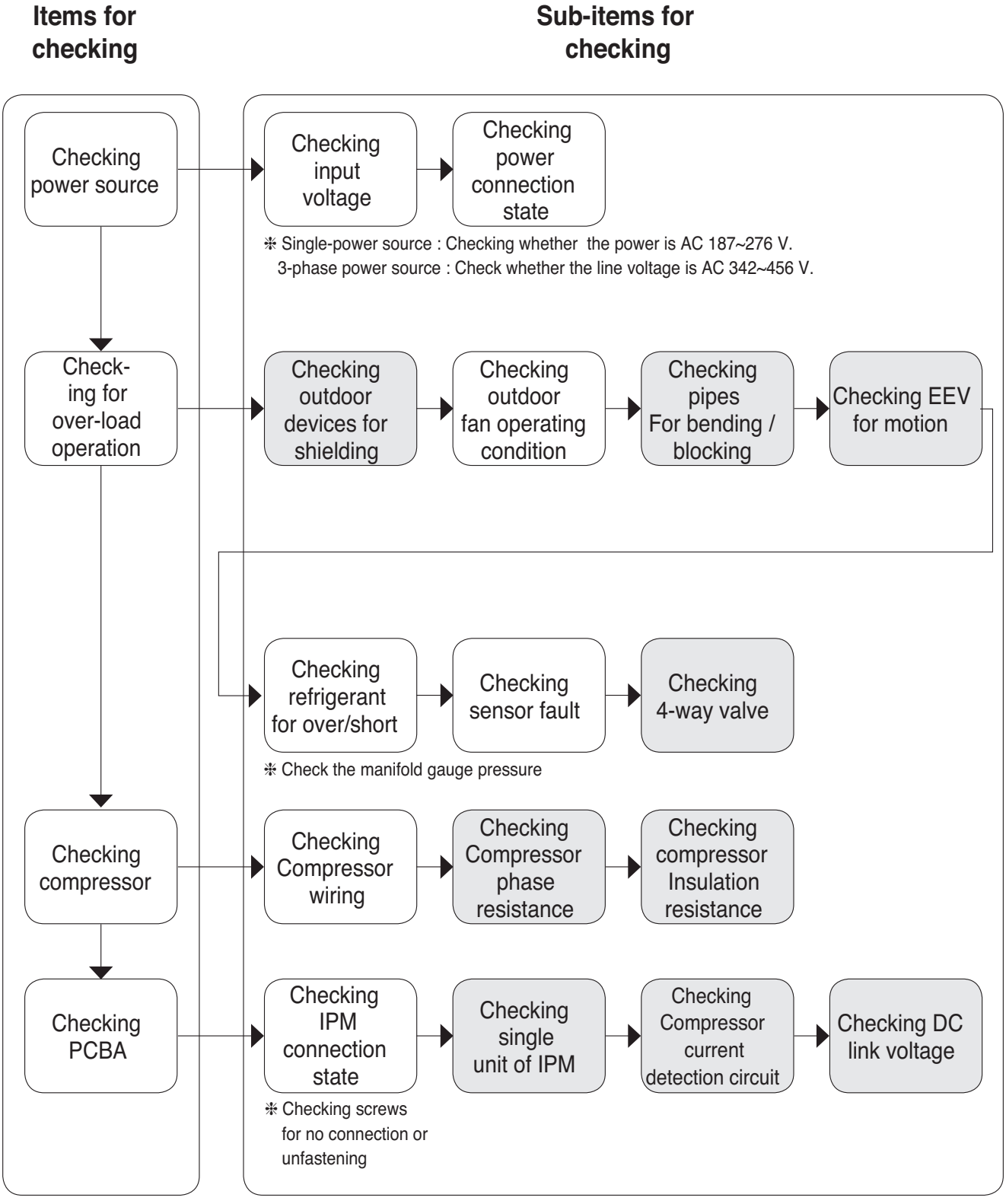
CH 21 (DC Peak / Comp IPM Fault)

Items		Contents
Purpose		Protection of the IPM parts and compressor in the PCB assembly from over-current.
Condition for Generation		Generation when over-current is detected in IPM.
Expected Causes	Installation & Overload	Outdoor device shielding, closing of a SVC valve, under/over charging of refrigerant, infiltration of water into refrigerant, outdoor fan fault, EEV (Electric Expansion Valve) fault, fault of a temperature sensor or its connection, blocking of an indoor device filter, and bending/blocking of a pipe.
	Compressor	Open/Short of the coil in the compressor, insulation breaking between the coil in the compressor and the pipe or panel, damage of compressor with abrasion, and compressor connection fault.
	PCB Assembly	IPM part fault, fault-signal detection circuit fault, compressor current detection circuit fault, and DC link detection circuit fault.
	Others	Improper power input, IPM connection fault, and insufficient distance between heat sink and control panel.

6.7 Troubleshooting Outdoor Error

CH 21 (DC Peak / Comp IPM Fault)

Flow of trouble diagnosis



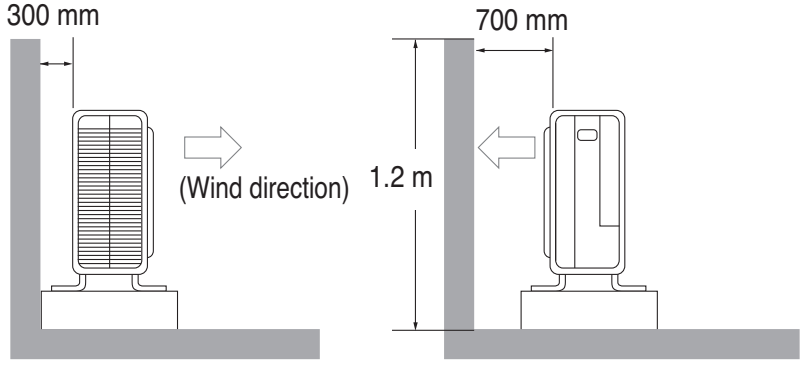
6.7 Troubleshooting Outdoor Error

CH 21 (DC Peak / Comp IPM Fault)

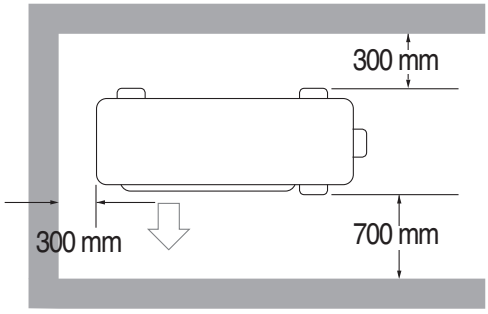
Checking outdoor devices for shielding

Cause of Trouble	Condition	Mechanism of Fault Generation
Whirlwind	Blocking of the front part of outdoor devices	Frequent turning-off of the compressor : Inflow of high-temperature air generated by outdoor fans into the air conditioner → Wrong influence to the system in over-load state
	Installation of outdoor devices in narrow space	
Shielding	Blocking of the lateral suction point on the wall of the outdoor devices Foreign substances in the heat exchanger and obstacles in the surrounding	Frequent turning-off of the compressor : Elevation of the pipe temperature due to reduced wind velocity → Wrong influence to the system in over-load state
Corrosion	Possible infiltration of moisture / highly humid area	Corrosion of heat exchanger → Reduced operation efficiency → Transfer of troubles to other parts

■ When the front/back has a wall (1 side)



■ When the front/back/left/right have walls (3 sides)



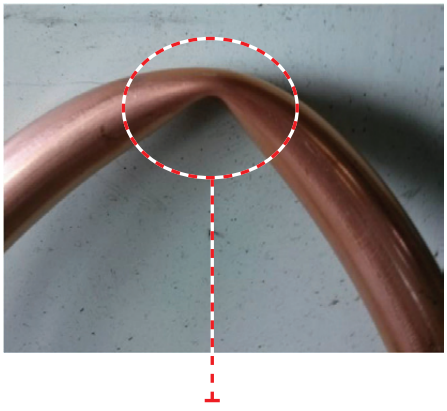
6.7 Troubleshooting Outdoor Error

CH 21 (DC Peak / Comp IPM Fault)

Generation of refrigerant flow disturbance

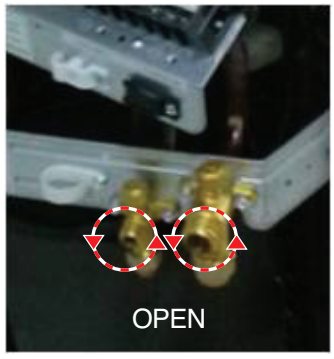
Cause of Trouble	Condition	Mechanism of Fault Generation
Generation of refrigerant flow distur-bance	Bending/Blocking of a pipe EEV fault Closing of SVC Valve	Freezing of indoor device → Reduced evaporation temperature due to excessive expansion of refrigerant. Weak heating and cooling → Insufficient flow of refrigerant Frequent turning on/off of the compressor by the high/low pressure protection logic → Accumulated refrigerant elevates the tem-perature and reduces the pressure. Wrong oil collection elevates the outlet tem-perature of the compressor and damages the compressor.

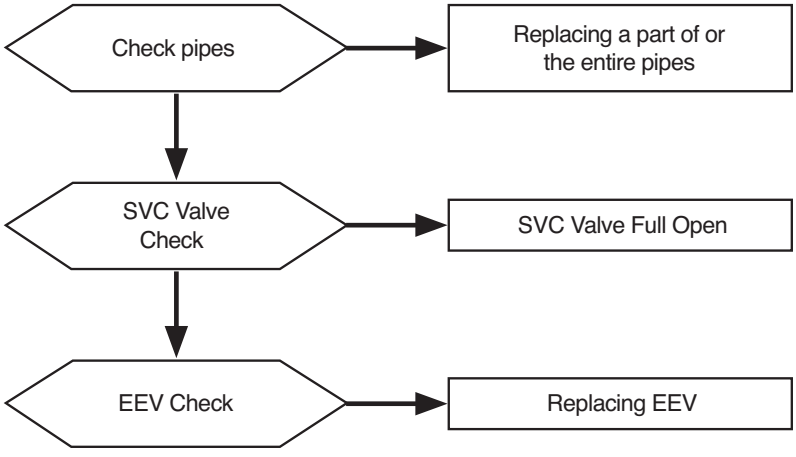
■ Bending/Blocking of a pipe



Bending of a pipe

■ Checking SVC Valve





※ EEV Checking Method :
Check the opening/closing sound of EEV when the power is applied for the first time.

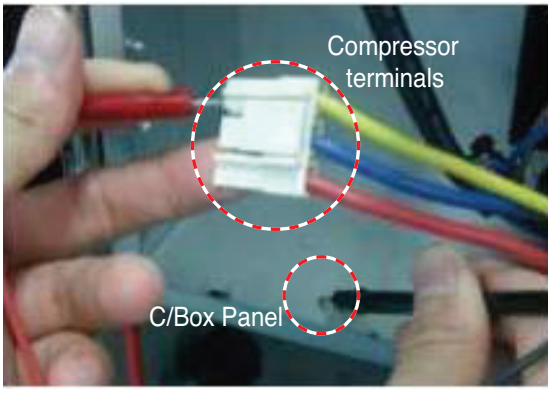
6.7 Troubleshooting Outdoor Error

CH 21 (DC Peak / Comp IPM Fault)

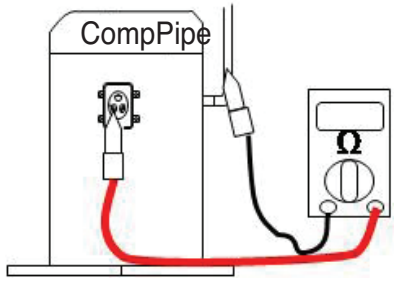
Checking compressor phase resistance

Purpose	Judgment of the fault of the compressor.	**Items for checking**	1. Measurement of insulation resistance between the compressor and panel. 2. Measurement of phase resistance. 3. Wiring Check.

■ How to check the insulation resistance between the compressor and panel



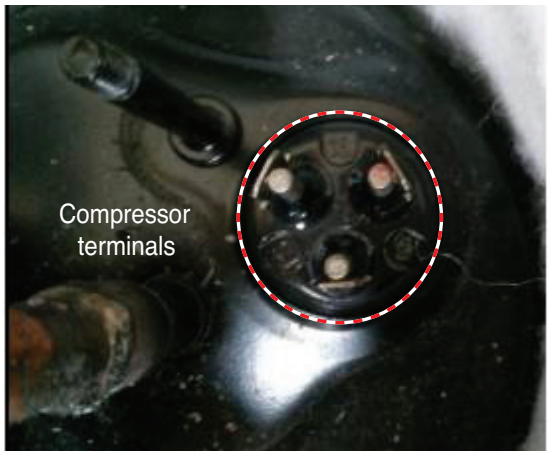
Measure the resistance between a compressor terminal and panel.



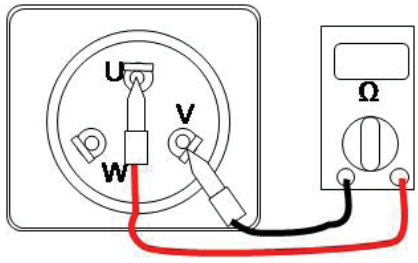
Terminal	Insulation Resistance
U-panel	≥ 10 MΩ
V-panel	≥ 10 MΩ
W-panel	≥ 10 MΩ

1. Turn the switch of the tester to “Resistance" mode and check the resistance
2. Measure the resistance between the terminals.
3. “0 Ω” means the short of compressor phase. (Replace the compressor)
4. Refer to the compressor resistance standards.
5. If any disorder is found, measure the line resistance between the terminals of the compressor as shown below.
6. If the compressor is found to be normal, any compressor connection wire may have a fault.

■ How to check the U, V, and W phase resistance



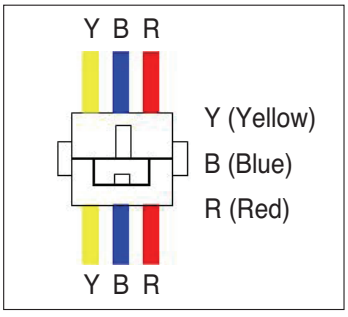
Measure the line resistance between the compressor terminals.



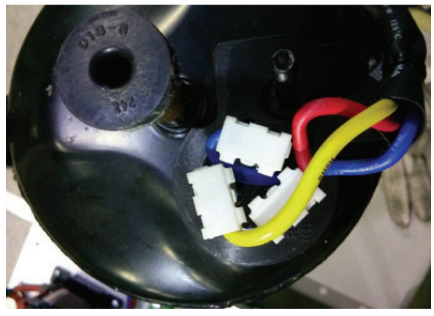
Model		DKT156MAD	DKT208MAB	RJB036MAB	DJT240MAA
Windings Resistance (at 25 °C)	U-V	1.330±7 % Ω	1.125±7 % Ω	0.529±7 % Ω	0.628±7 % Ω
	V-W	1.330±7 % Ω	1.125±7 % Ω	0.529±7 % Ω	0.628±7 % Ω
	W-U	1.330±7 % Ω	1.125±7 % Ω	0.529±7 % Ω	0.628±7 % Ω
Windings Resistance (at 75 °C)	U-V	1.620±7 % Ω	1.345±7 % Ω	0.631±7 % Ω	0.758±7 % Ω
	V-W	1.620±7 % Ω	1.345±7 % Ω	0.631±7 % Ω	0.758±7 % Ω
	W-U	1.620±7 % Ω	1.345±7 % Ω	0.631±7 % Ω	0.758±7 % Ω

Purpose	Judgment of the fault of the compressor.	Items for checking	1. Measurement of insulation resistance between the compressor and panel. 2. Measurement of phase resistance. 3. Wiring Check.

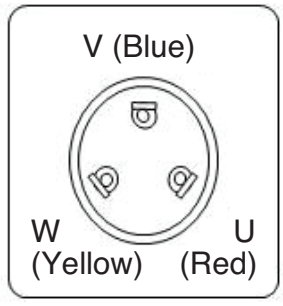
■ How to check the compressor wiring error



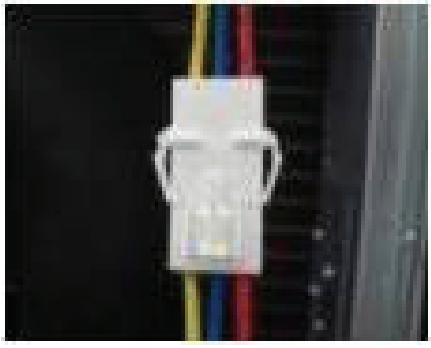
Check whether the PCB wires and compressor wires are connected in the same colors.



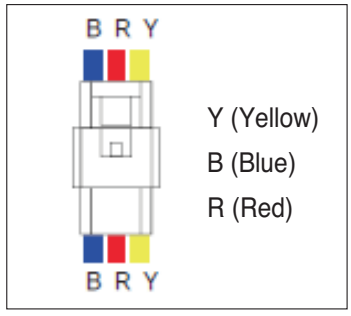
Check whether the compressor wires are properly connected with U, V, and W.



❉ The wiring direction is CCW. (counter clock wise)



[Picture of normal compressor wiring]



Check whether the PCB wires and compressor wires are connected in the same colors.

[Picture of normal compressor wiring]

6.7 Troubleshooting Outdoor Error

CH 21 (DC Peak / Comp IPM Fault)

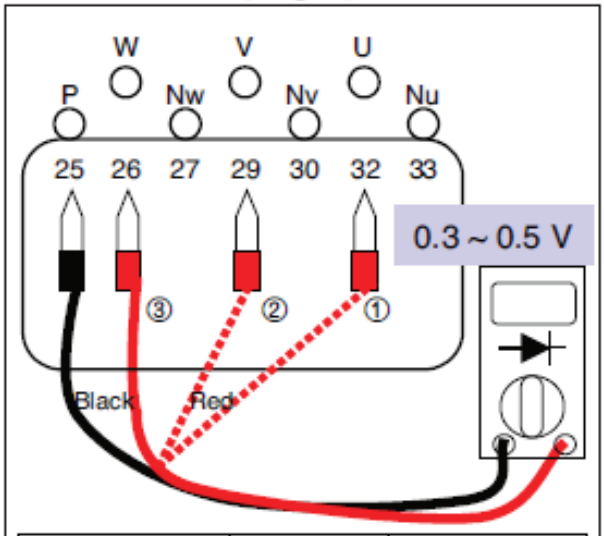
IPM Check

Purpose	Judgment of the IPM part fault of PCB assembly.	**Items for checking**	1. Judgment of damage of IGBT 2. Checking the soldering state

■ How to check IPM IGBT (Diode Mode)

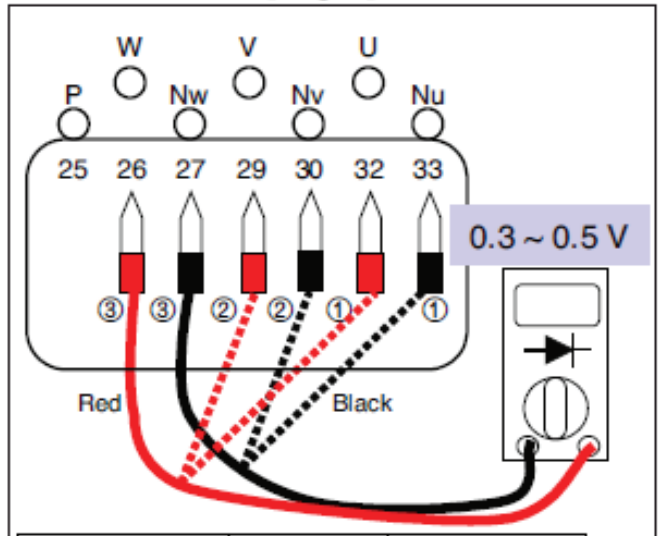
1. Remove the connector from PCB.
2. Set the Multi-Tester as Diode Voltage Measurement Mode. (⟶|)
3. Measure the voltages of P~U / P~V / P~W as shown in Fig. 1.
4. Measure the voltages of U~Nu / V~Nv / W~Nw as shown in Fig. 2.
5. If the measurements are significantly different from the levels shown in the figures, the IPM is deemed to be damaged.

[Fig.1]



Sequence of Measurement	Measurement	Normal Standards
1	P-U	0.3 V~0.5 V
2	P-V	0.3 V~0.5 V
3	P-W	0.3 V~0.5 V

[Fig.2]

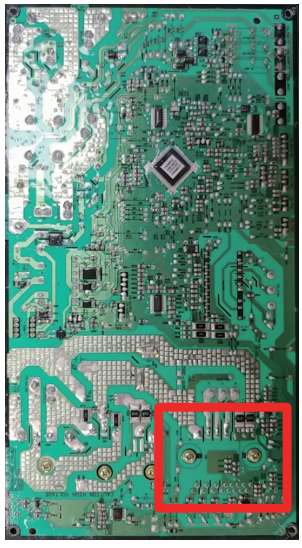
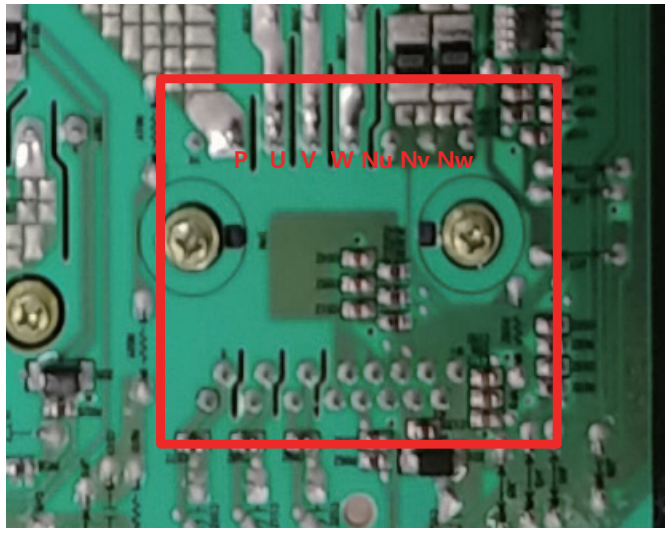
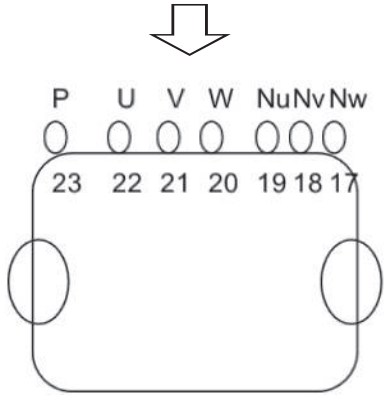


Sequence of Measurement	Measurement	Normal Standards
1	U-Nu	0.3 V~0.5 V
2	V-Nv	0.3 V~0.5 V
3	W-Nw	0.3 V~0.5 V

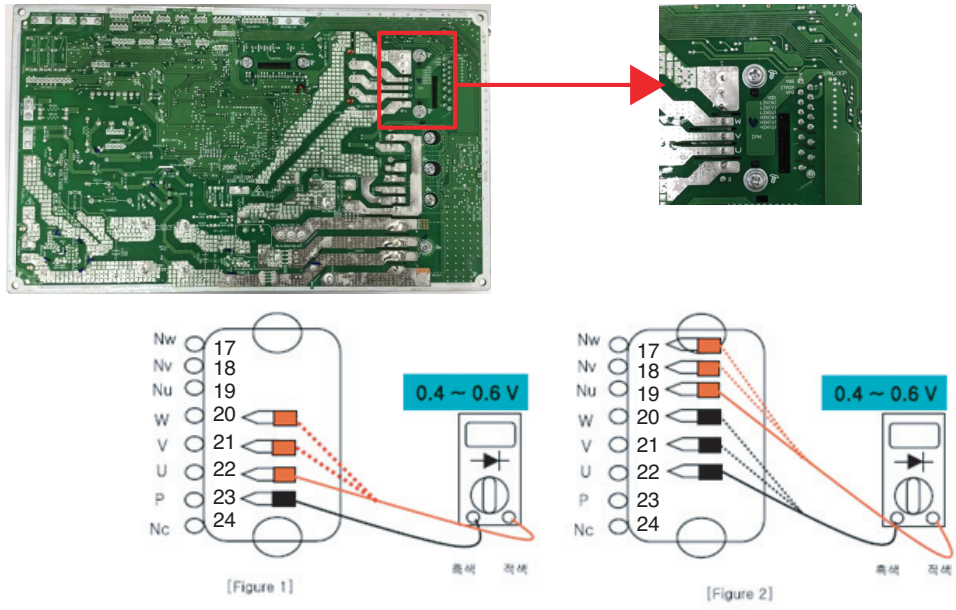
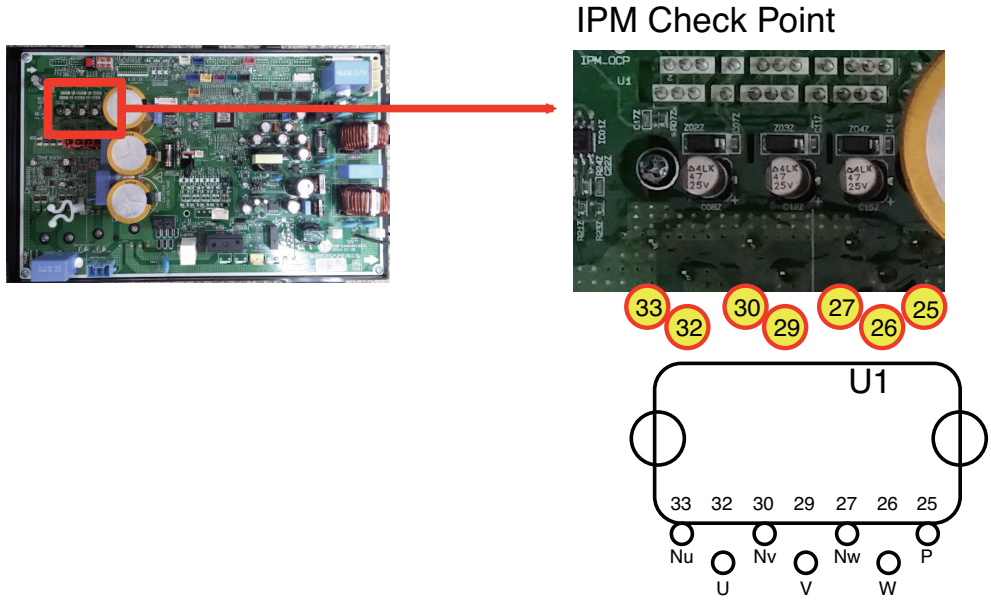
Purpose	Judgment of the IPM part fault of PCB assembly.	**Items for checking**	1. Judgment of damage of IGBT 2. Checking the soldering state

Step	Flow of Inspection
1	Turn the power off (wait until the outdoor device LED is turned off)
2	Remove compressor wires.
3	Measure the voltage as shown in the figure.
4	Check the voltage for being in the range of 0.3~0.5V
5	Judge IPM Pins for short.

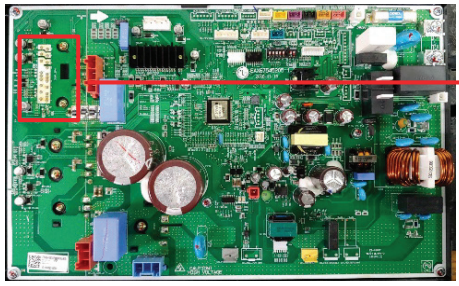
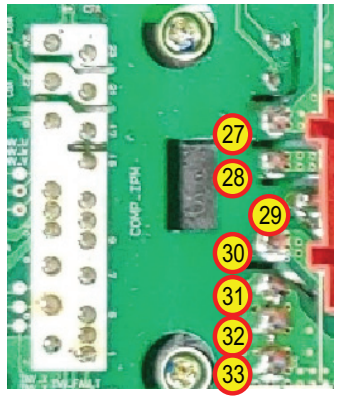
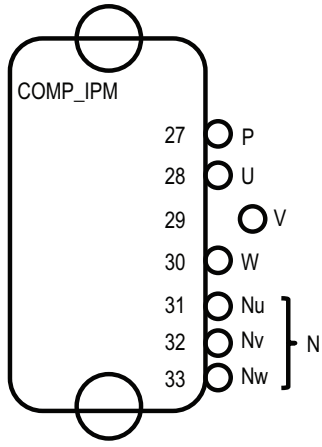
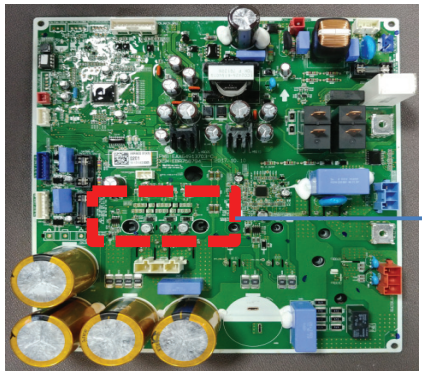
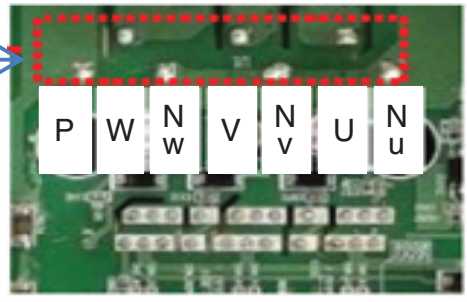
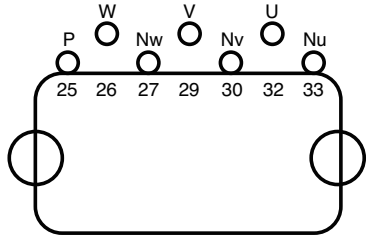
■ IPM Check Point

Division	IPM Check Point
2 kW	   [IPM Pin Arrangement and Pin Numbers]

■ IPM Check Point

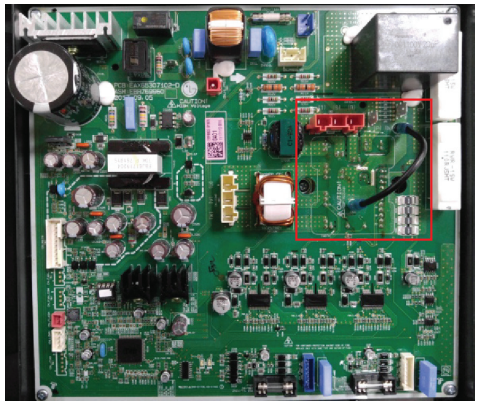
Division	IPM Check Point
3 kW	
4 kW	

■ IPM Check Point

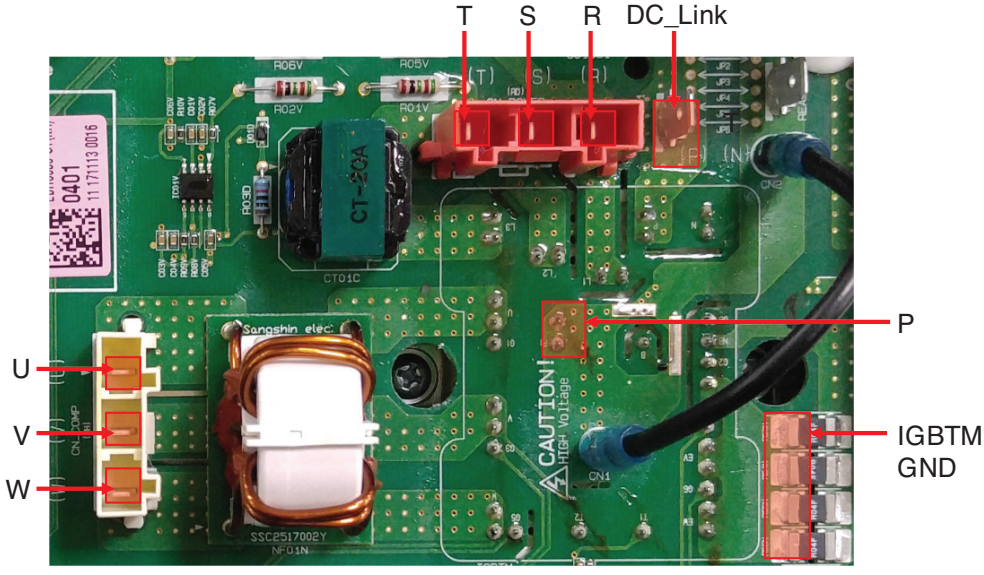
Division	IPM Check Point
4.5kW	  
6 kW	   [IPM Pin Arrangement and Pin Numbers]

■ IPM Check Point

7 kW (U3)



Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
IGBTM High side Didoe	→ |	DC_Link	R	0.35 V ~ 0.7 V	Non-normal
			S		
			T		
IGBTM Low side Didoe		R	IGBTM GND		
		S			
		T			
IGBTM Hige side IGBT		P	U		
			V		
			W		
IGBTM Low side IGBT		U	IGBTM GND		
		V			
		W			



6.7 Troubleshooting Outdoor Error

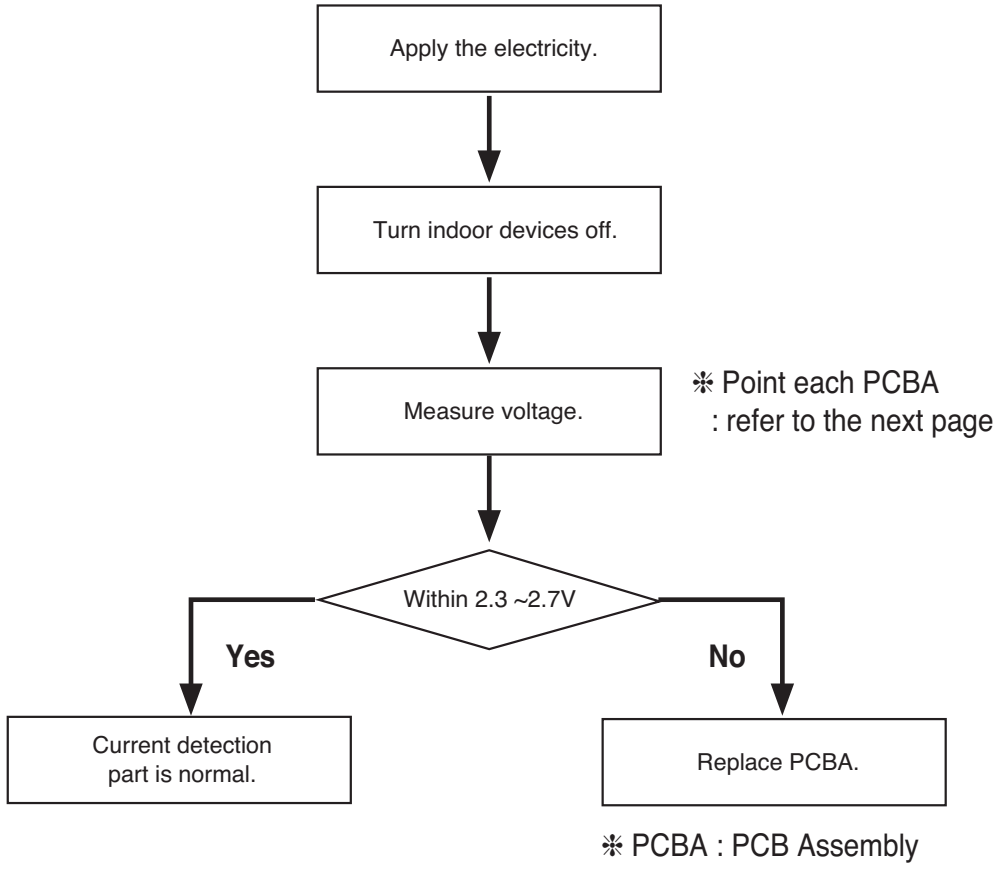
CH 21 (DC Peak / Comp IPM Fault)

Compressor Phase Current Detection Circuit

Purpose	Judgment of the IPM part fault of PCB assembly.	**Items for checking**	1. Checking for current detection error.

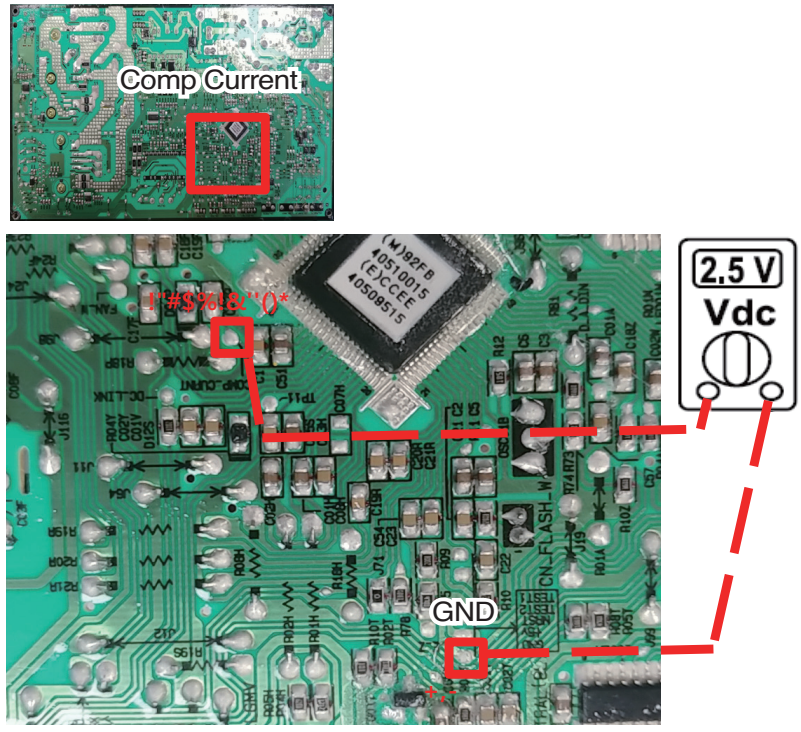
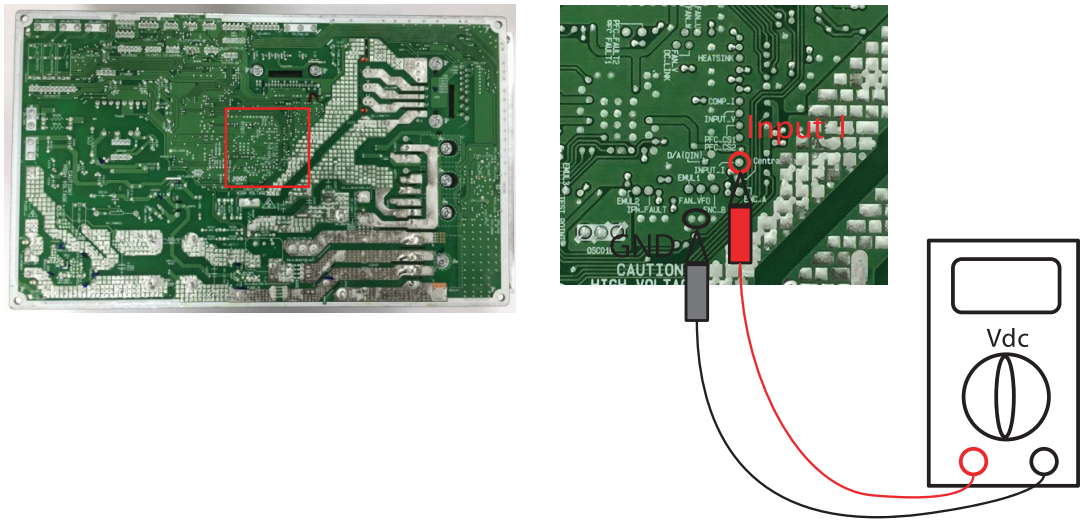
1. Set the tester in DC Voltage Mode and check the Voltage.
2. Measure the voltage of phase current detection signal – Micom GND.
3. The standard of normal voltage measurement is 2.5 V ±0.2 V.
4. If the measurement is different from the standard, replace PCBA.

Checking method

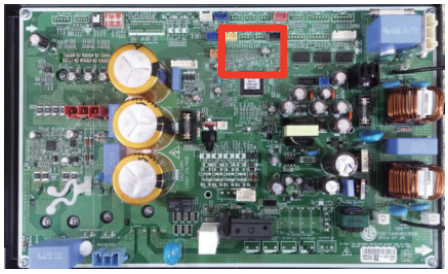
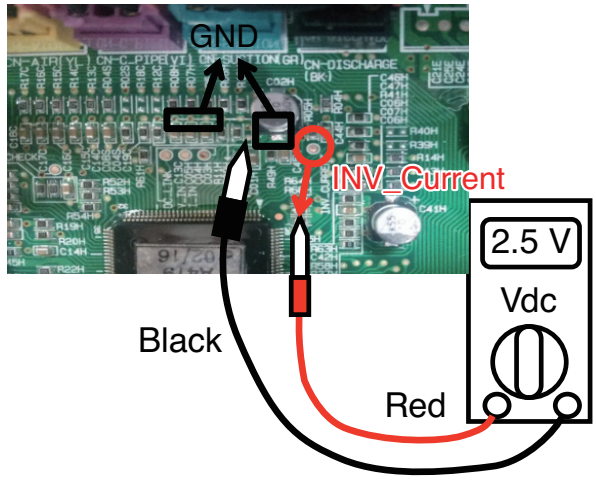


! Caution : When the measurement is made in the state that the electricity is applied, check the tester for being in the measurement mode and be careful to avoid possible short of the parts other than the measuring part.

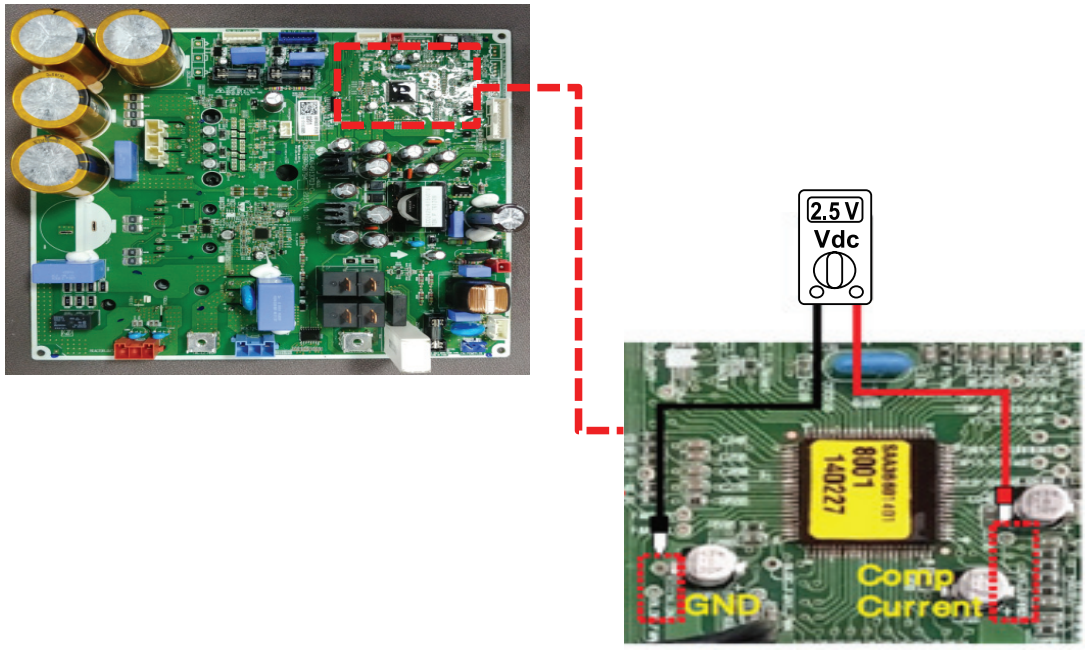
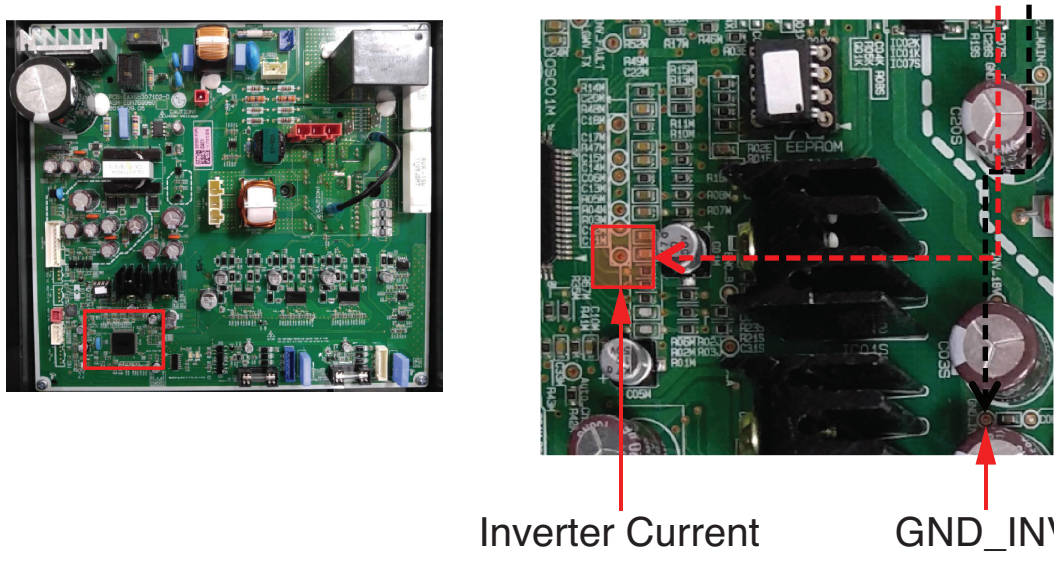
■ Current Detection Circuit Check Point

Division	Compressor Phase Current Detection
2 kW	
3 kW	

■ Current Detection Circuit Check Point

Division	Compressor Phase Current Detection
4 kW	 

■ Current Detection Circuit Check Point

Division	Compressor Phase Current Detection
6 kW	
7 kW	

6.7 Troubleshooting Outdoor Error

CH 21 (DC Peak / Comp IPM Fault)

4-Way Valve Check

Purpose	Judge whether the 4-way valve part has any fault.	**Items for checking**	1. Check the working voltage of the 4-way valve. 2. Check the 4-way valve coil resistance.

■ Checking the output voltage of CN-4way (refer to next page)

1. Set the tester in AC Voltage Mode and check the voltage.
2. Check the output voltage between both ends of CN-4Way Connector.
3. The standard of normal voltage is 220 V ±10 %.
4. If the measurement is different from the standard, replace PCBA.

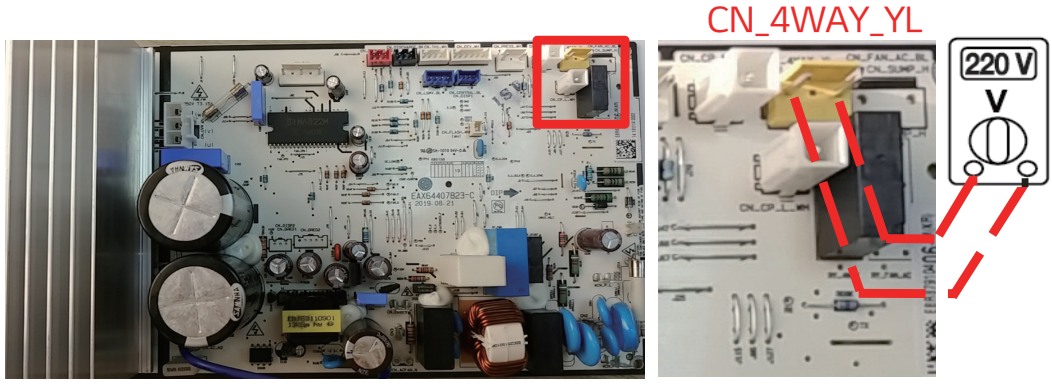
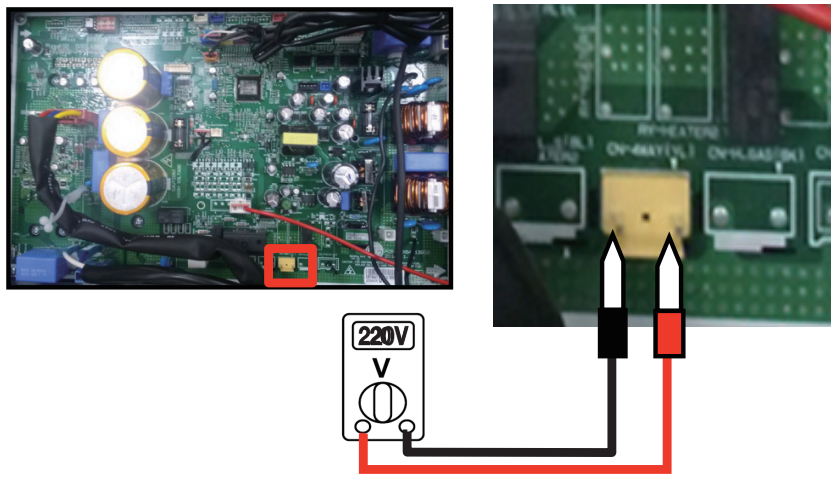
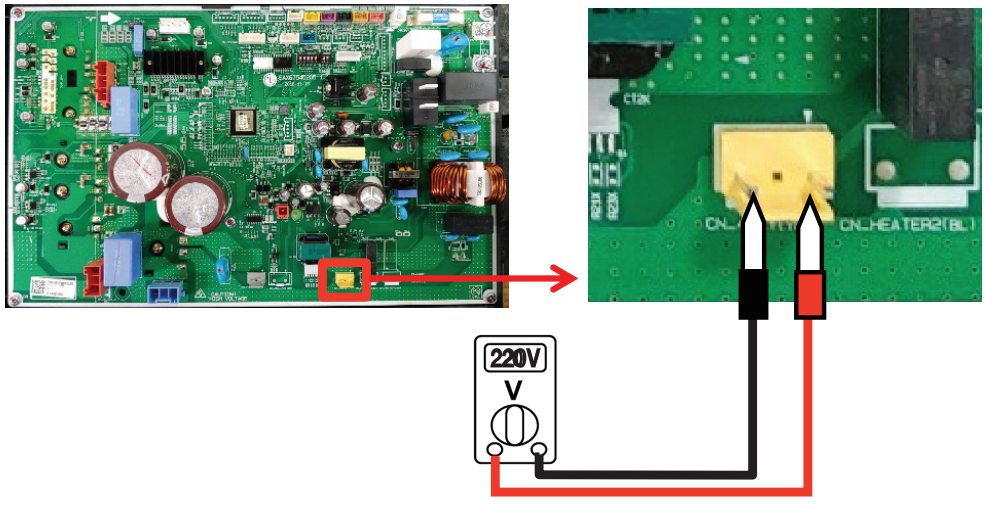
❊ The measurement should be made at the time to start heating mode operation and at the time of standby after operation.

■ Check the 4-way.valve coil resistance.

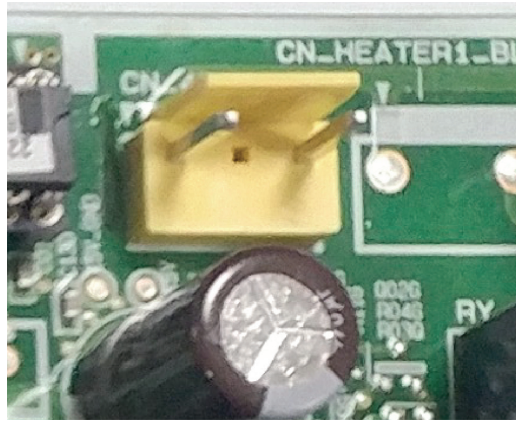
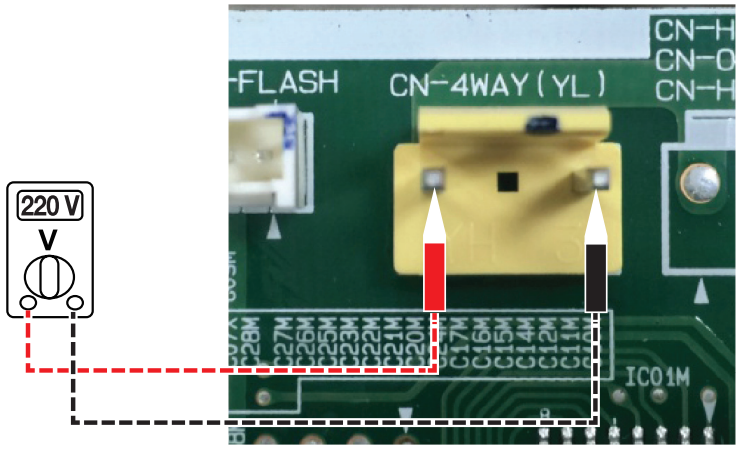
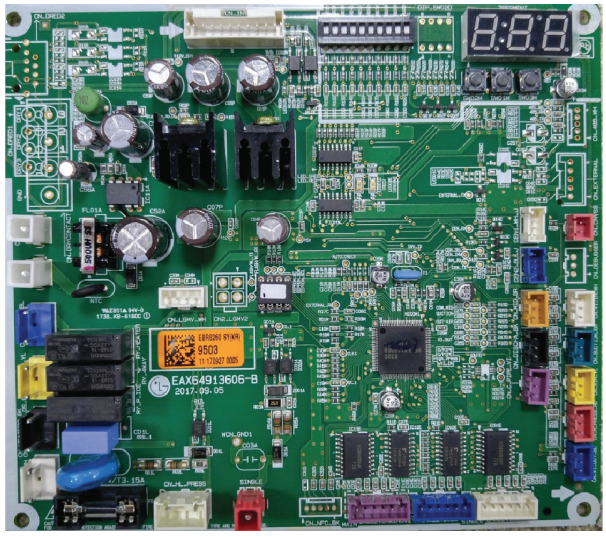
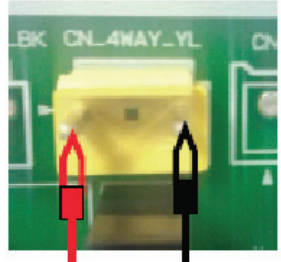
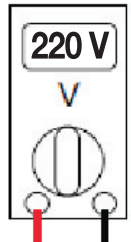
1. Set the tester in Resistance Mode and check the current.
2. Measure the resistance between the both ends of a single unit of 4-Way valve coil.
3. The standard of normal resistance is 14 kΩ ±10 %.
4. If the measurement is different from the standard, replace 4-Way valve coil.

! Caution : When the measurement is made in the state that the electricity is applied, check the tester for being in the measurement mode and be careful to avoid possible short of the parts other than the measuring part.

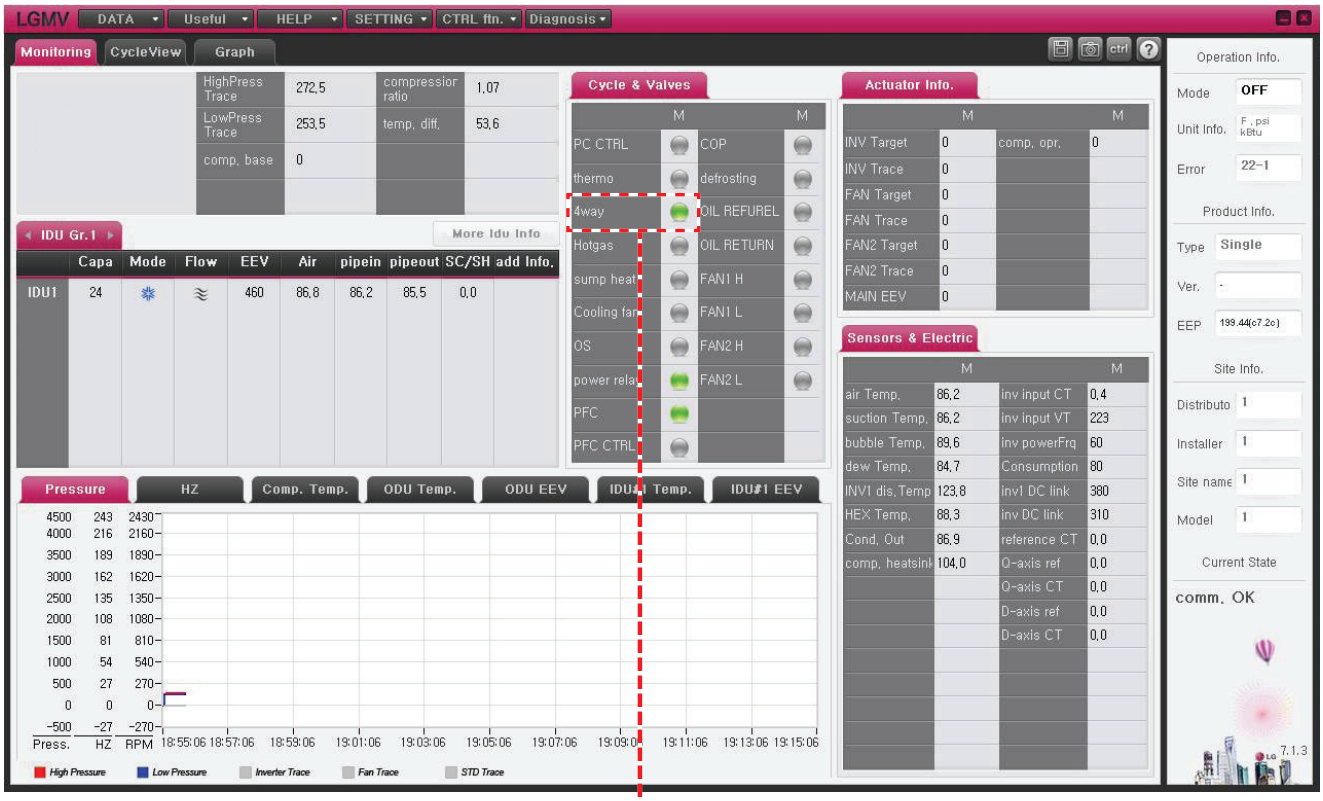
■ 4-Way Check Point

Division	4Way Check
2 kW	
4 kW	
4.5kW	

■ 4-Way Check Point

Division	4Way Check
4 kW	  
6/7 kW	  

■ LGMV Display



When Heating, LED turn on
When Cooling, LED turn off

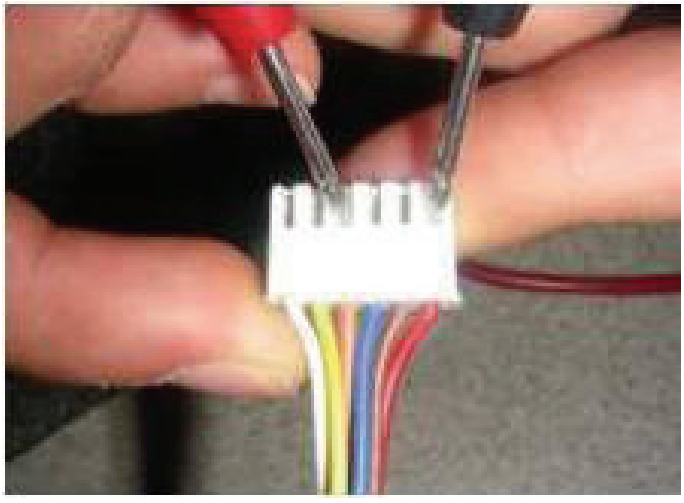
6.7 Troubleshooting Outdoor Error

CH 21 (DC Peak / Comp IPM Fault)

EEV Check

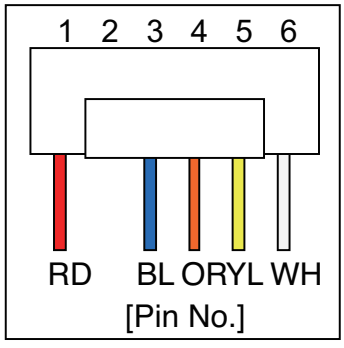
Purpose	Judging EEV part fault.	Items for checking	1. Measure EEV resistance.

■ Checking EEV resistance



1. Set the tester in Resistance Mode and check the current.
2. Measure the resistance between eth Pins of EEV Connector.
3. For the measurement method and normal standard, refer to the Table.

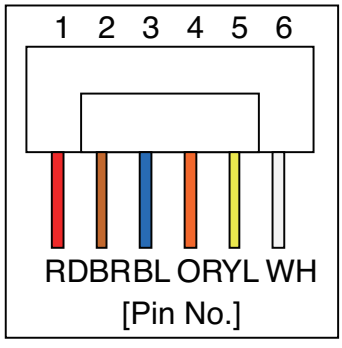
5 Pin type



[Table]

Measurement Pin	Normal Standard
1-3	45 Ω±5 Ω
1-4	45 Ω±5 Ω
1-5	45 Ω±5 Ω
1-6	45 Ω±5 Ω

6 Pin type



[Table]

Measurement Pin	Normal Standard
1-4	45 Ω±5 Ω
1-6	45 Ω±5 Ω
2-3	45 Ω±5 Ω
2-5	45 Ω±5 Ω

※ There may be the difference in the resistance depending upon the EEV Specifications.

6.7 Troubleshooting Outdoor Error

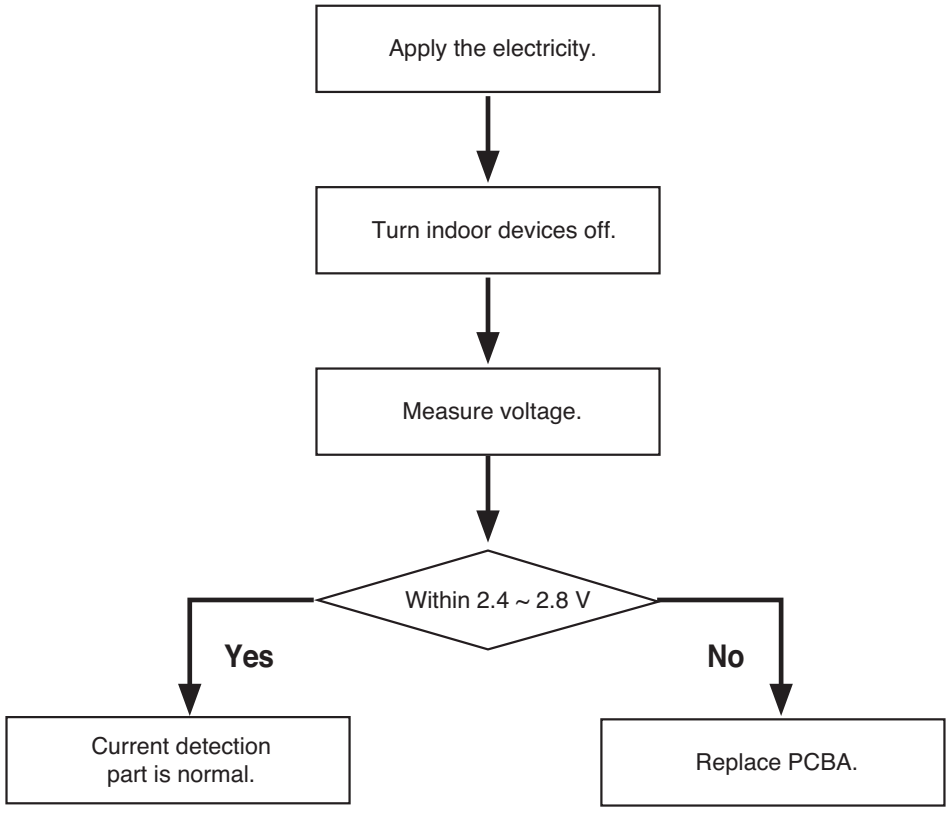
CH 21 (DC Peak / Comp IPM Fault)

DC Link Detection Circuit

Purpose	Generation of an error caused by DC link voltage detection error.	**Items for checking**	1. Checking DC link voltage detection error

1. Set the tester in DC Voltage Mode and check the voltage.
2. Checking the voltage between DC Link detection signal and Micom GND.
3. The standard of normal voltage measurement is 2.4~2.8 V.
4. If the measurement is different from the standard, replace PCBA.

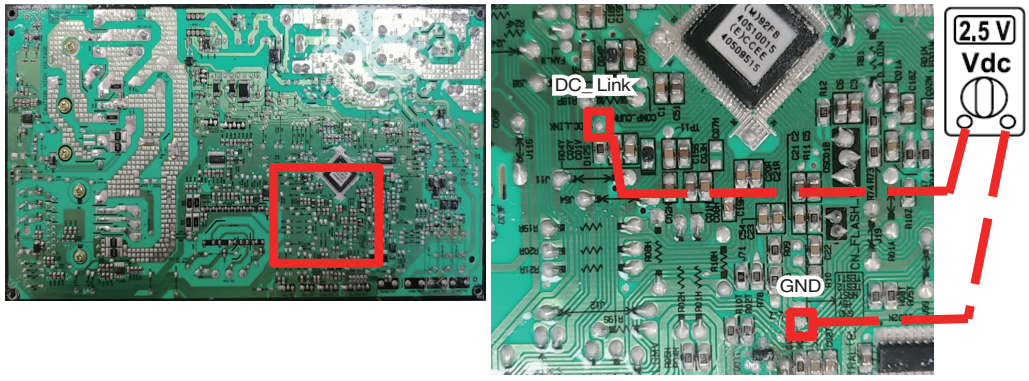
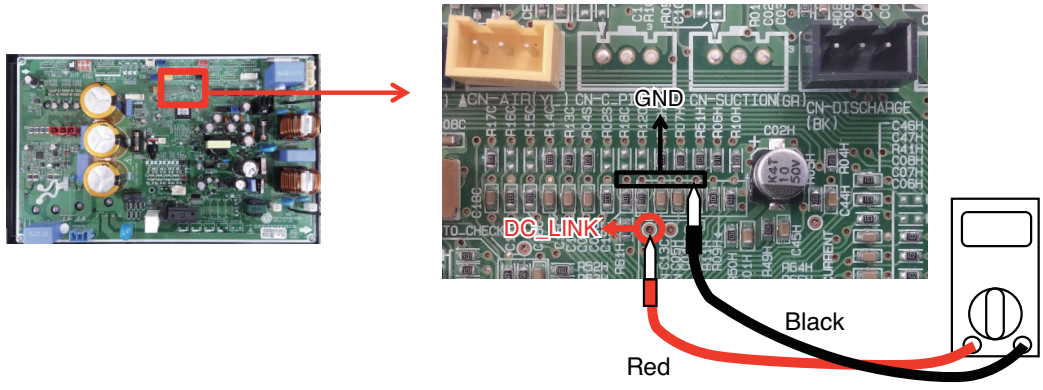
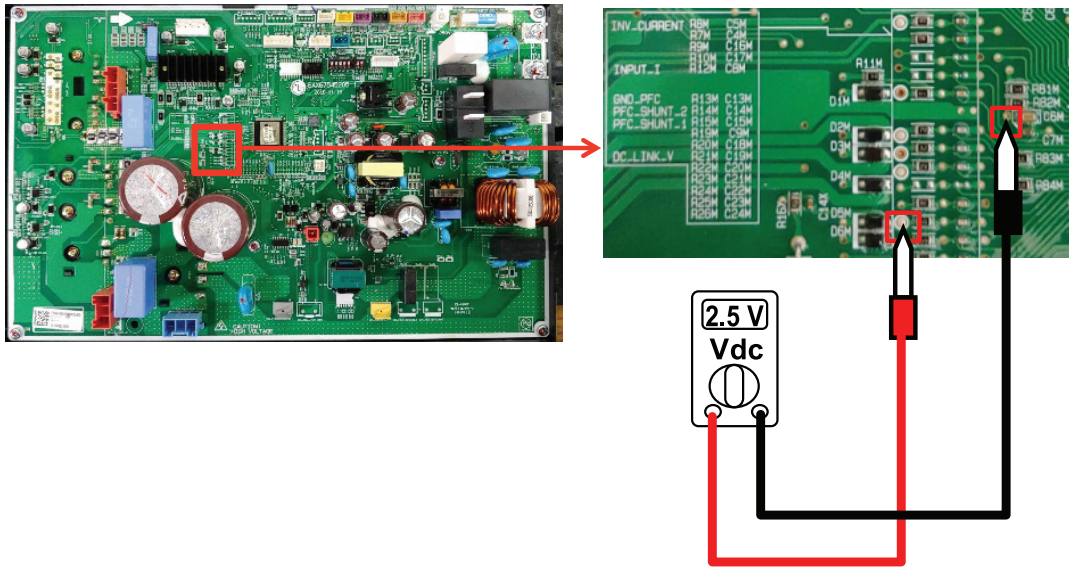
Checking method



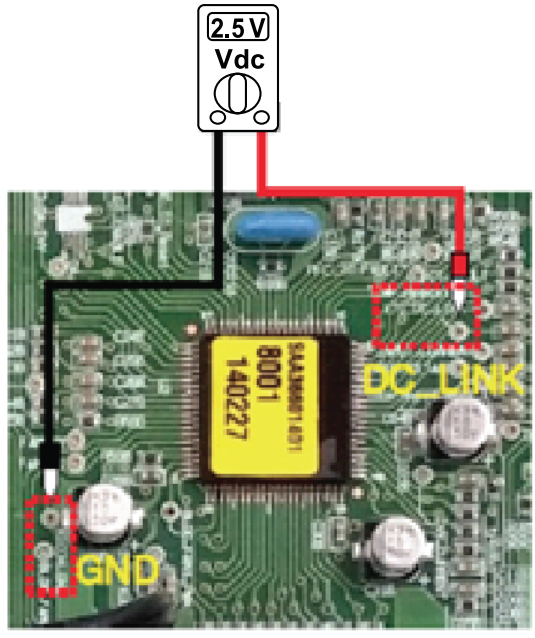
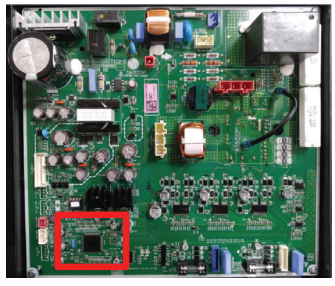
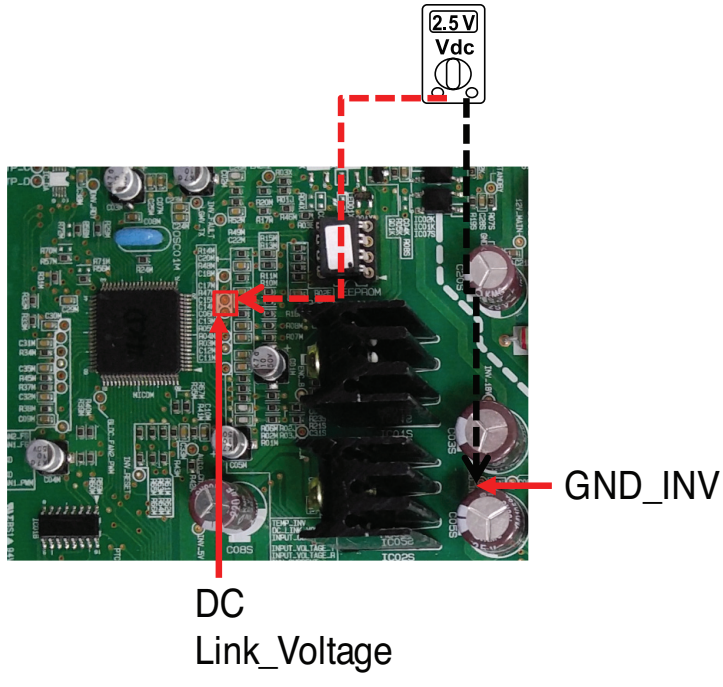
❊ PCBA : PCB Assembly

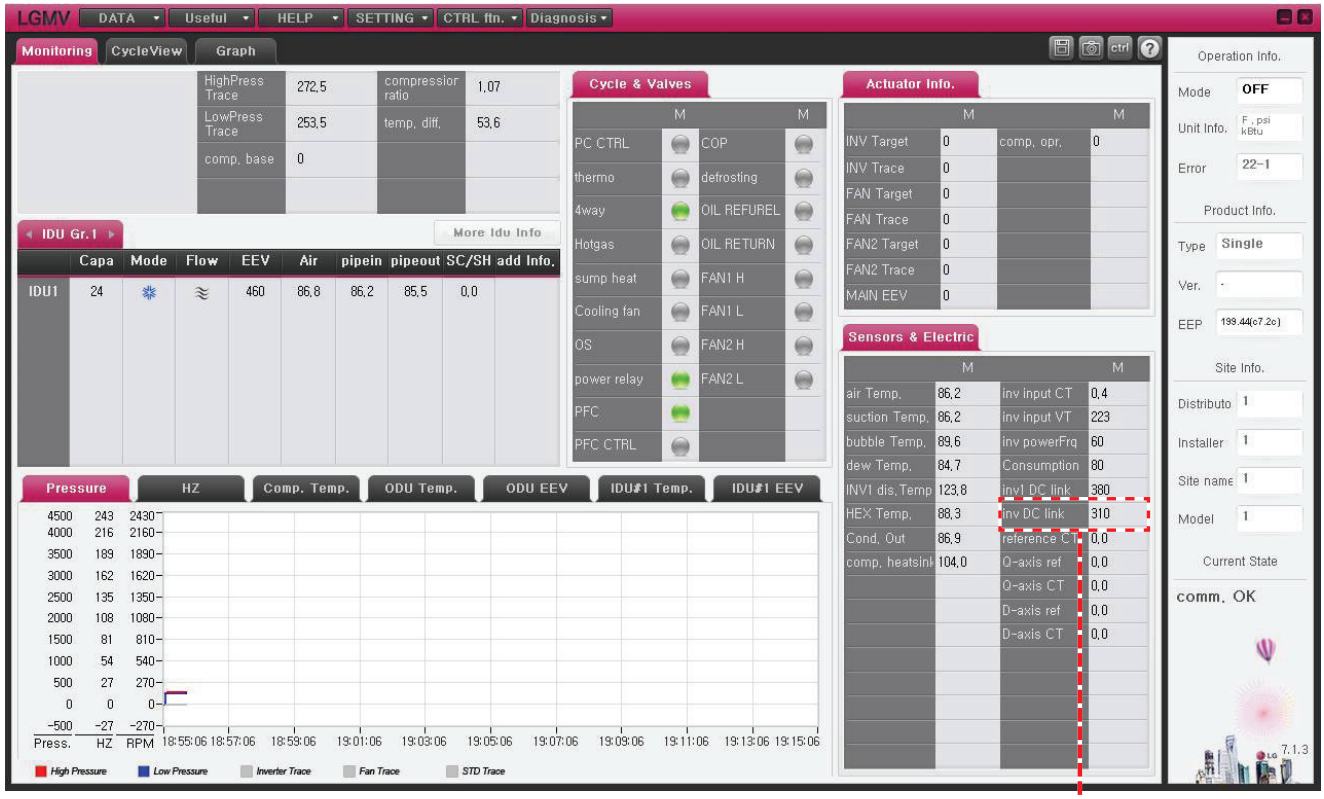
! Caution : When the measurement is made in the state that the electricity is applied, check the tester for being in the measurement mode and be careful to avoid possible short of the parts other than the measuring part.

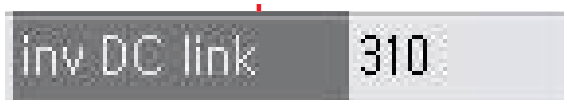
■ DC Link Detection Circuit Check Point

Division	DC Link Detection Circuit Check Point
2 kW	
4 kW	1. Check DC Link Sensing Signal measurements at Power-on standby state. (DC 2.4 ~ 2.8 V) 
4.5kW	

■ DC Link Detection Circuit Check Point

Division	DC Link Detection Circuit Check Point
6 kW	 
7 kW	 





DC Link NG Voltage level

Controller	Voltage
2~4 kW	140 V

DC Link NG Voltage level

Controller	Voltage
6 kW	140 V
7 kW	380 V

6.7 Troubleshooting Outdoor Error

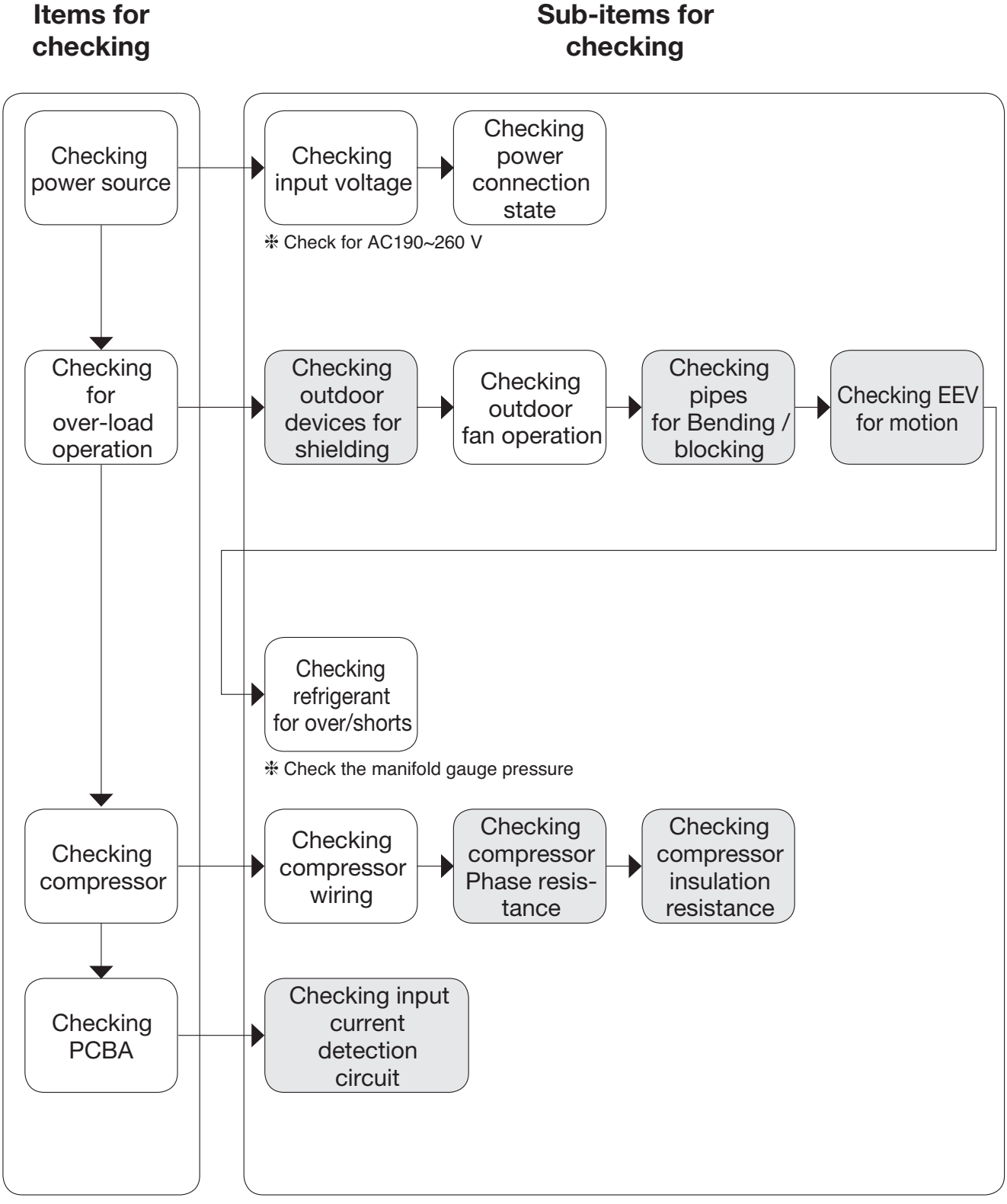
CH 22 (Input of Over Current)

Items		Contents
Purpose		Prevention of the damage of PCBA, wire, and connector caused by over-current
Condition for Generation		The detected current exceeds the standard.
Expected Causes	Installation & Overload	Installation fault, closing of SVC valve, under/over charging with refrigerant, infiltration of water into refrigerant, outdoor device shielding, outdoor fan fault, EEV valve fault, and sensor fault or assembling error.
	Compressor	Short between compressor coil and Panel, abrasion of compressor, and short/opening of compressor coil.
	PCB Assembly	Input current detection circuit fault.
	Others	Input of low-voltage.

6.7 Troubleshooting Outdoor Error

CH 22 (Input of Over Current)

Flow of trouble diagnosis



6.7 Troubleshooting Outdoor Error

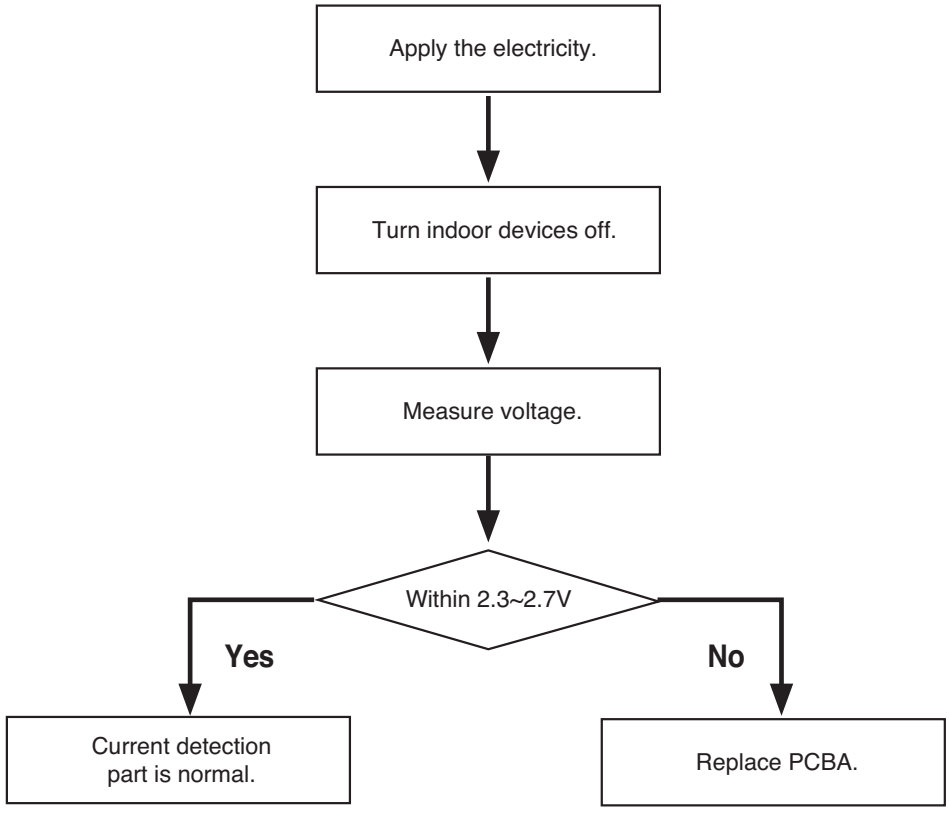
CH 22 (Input of Over Current)

Input Current Detection Circuit

Purpose	Generation of over-current caused by input current detection error.	**Items for checking**	1. Checking for current detection error

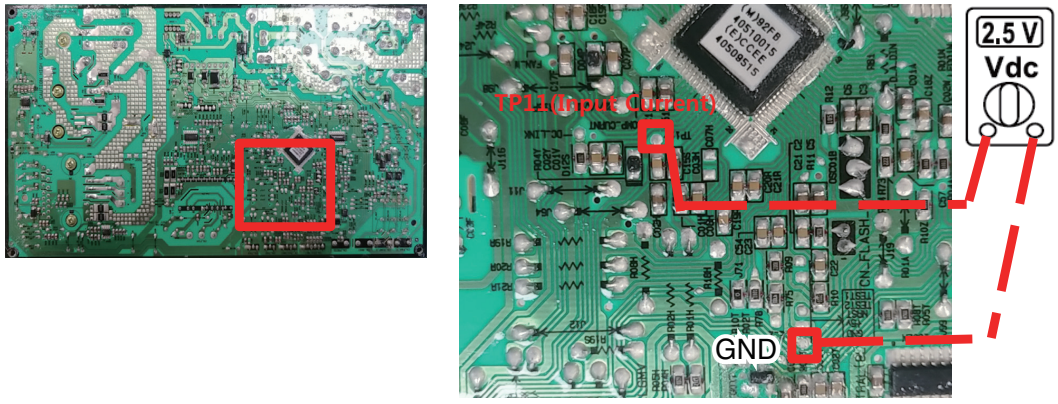
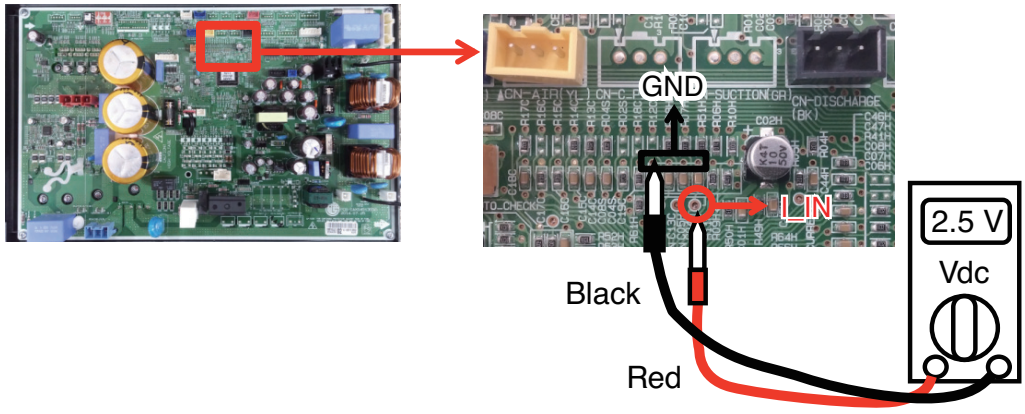
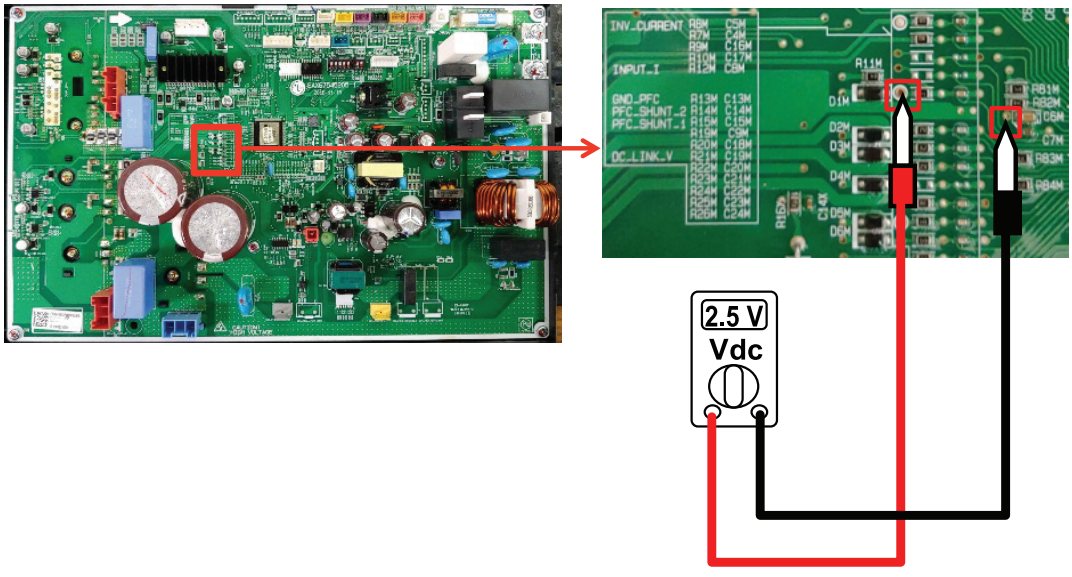
1. Set the tester in DC Voltage Mode and check the voltage.
2. Check the voltage between Input current detection signal and Micom GND.
3. The standard of normal voltage measurement is 2.5 V ±0.2 V.
4. If the measurement is different from the standard, replace PCBA.

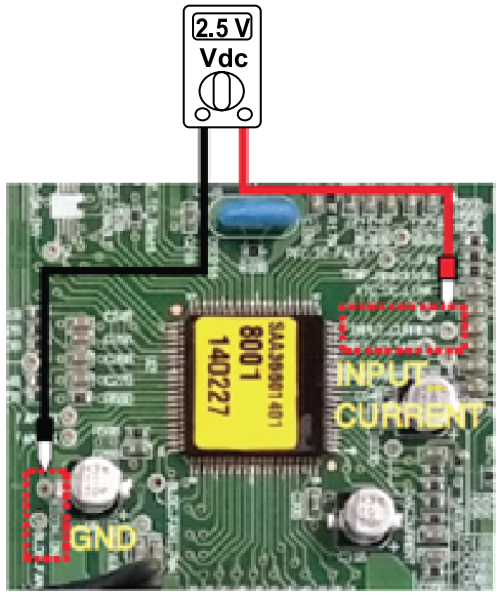
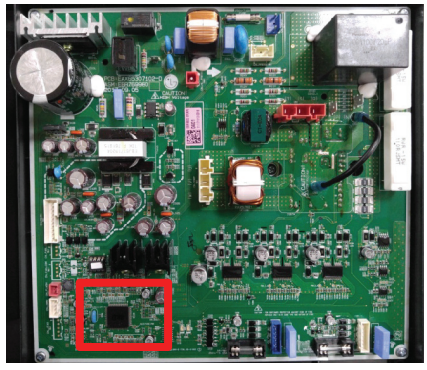
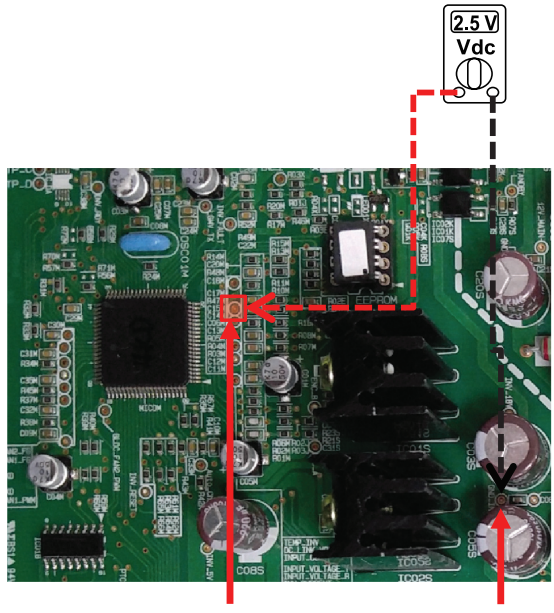
Checking method



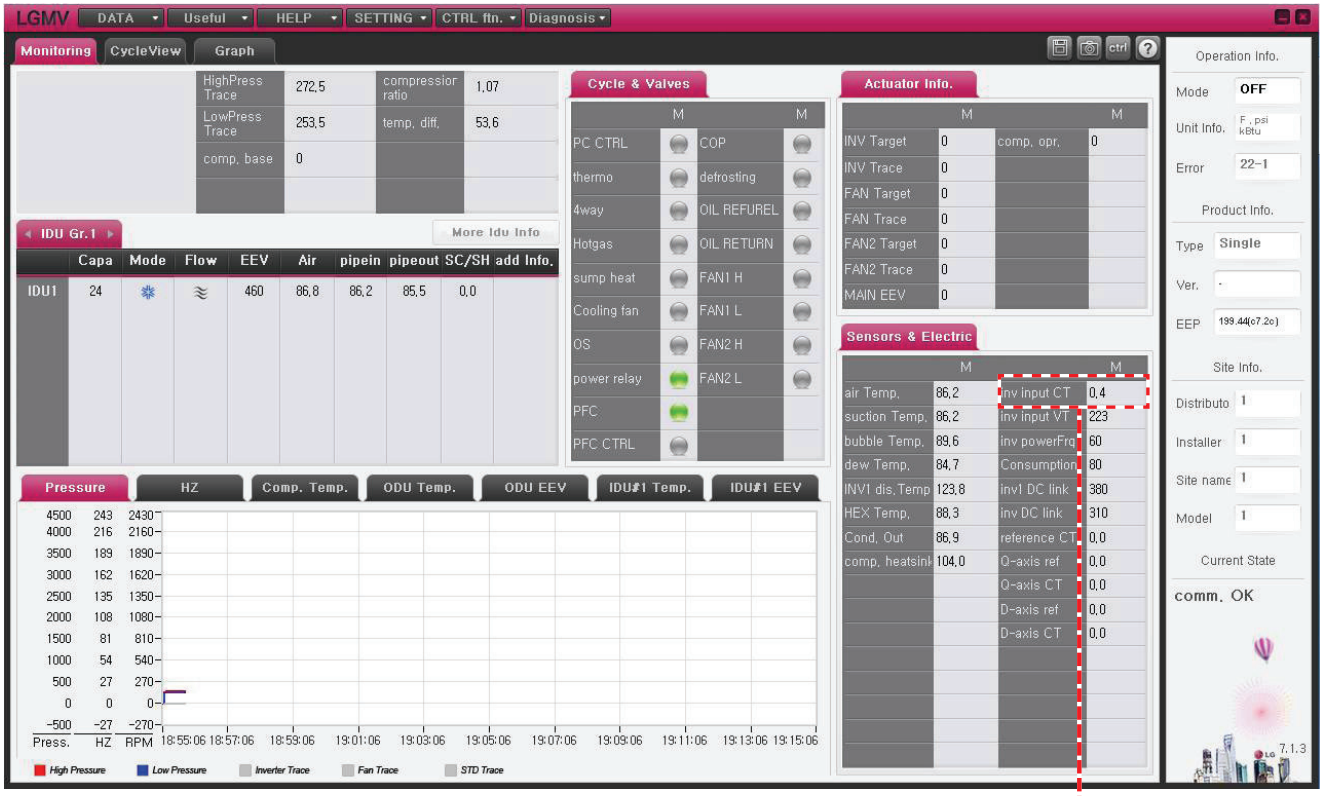
❊ PCBA : PCB Assembly

! Caution : When the measurement is made in the state that the electricity is applied, check the tester for being in the measurement mode and be careful to avoid possible short of the parts other than the measuring part.

Division	Input Current Detection Point
2 kW	
4 kW	
4.5 kW	

Division	Compressor Phase Current Detection
6 kW	 
7 kW	 

■ LGMV Display



DC Link NG Voltage level

Driver	Current Level
2kW	11A
3/4kW	16A
4.5kW	20A
6kW	29A
7kW	Cooling Mode : 12A Heating Mode : 14A

6.7 Troubleshooting Outdoor Error

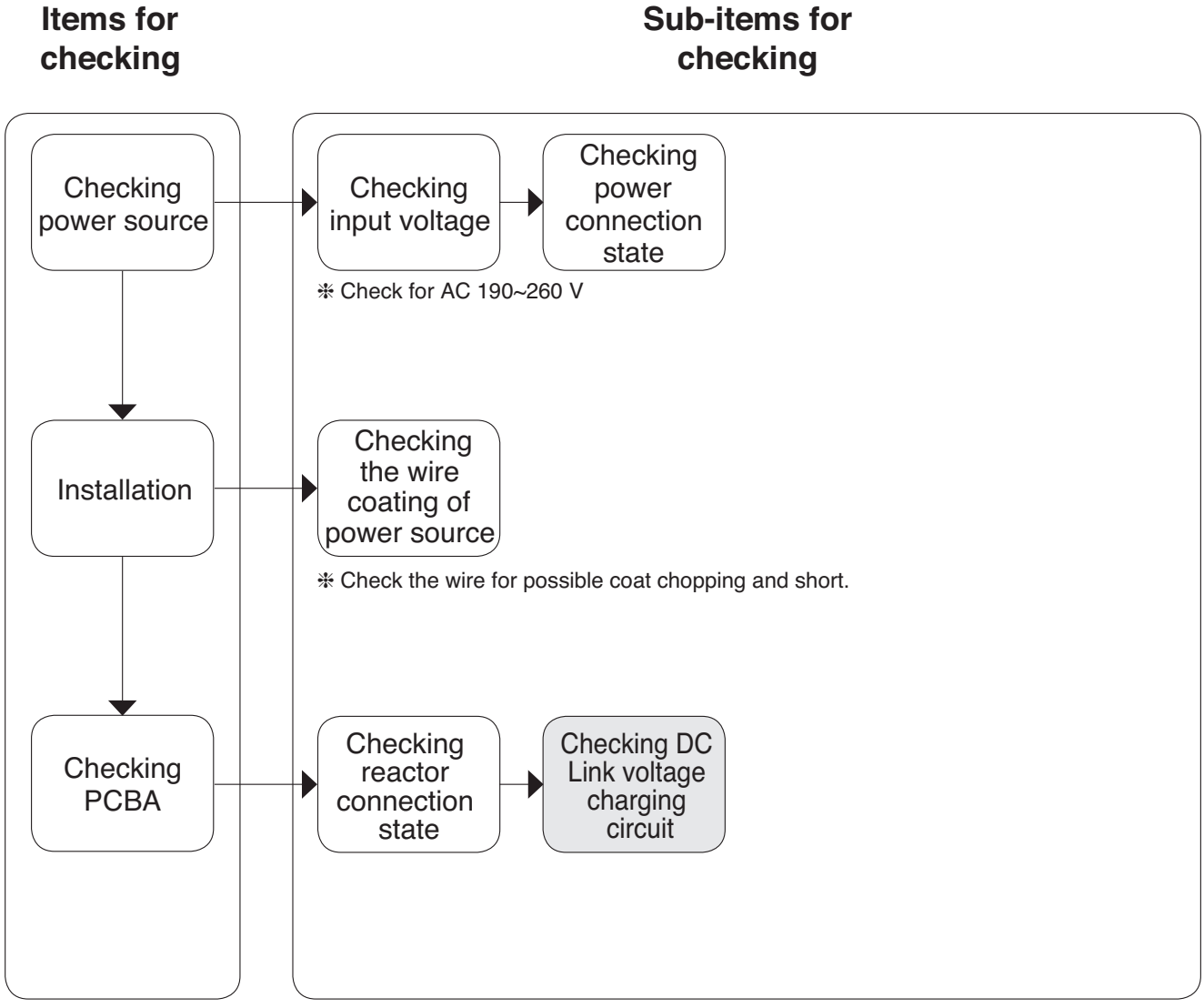
CH 23 (DC Link Voltage Low)

Items		Contents
Purpose		Securing the credibility of the compressor lifetime against the generation of over-current at the compressor part in the DC Link Low Voltage condition.
Condition for Generation		Detected DC Link Voltage is less than the standard.
Expected Causes	Installation	Installation fault and input of low-voltage power
	PCB Assembly	Damage of DC link voltage detection circuit and reactor terminal connection error

6.7 Troubleshooting Outdoor Error

CH 23 (DC Link Voltage Low)

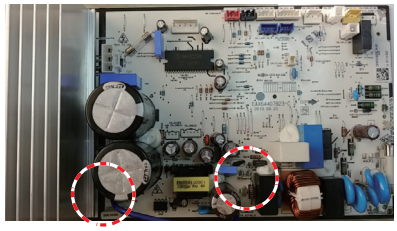
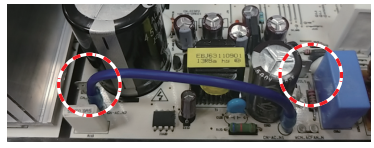
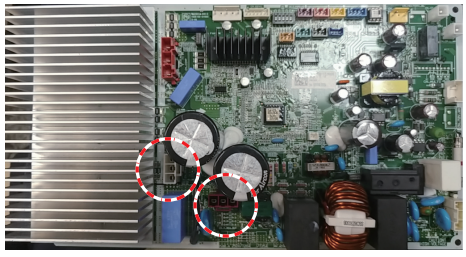
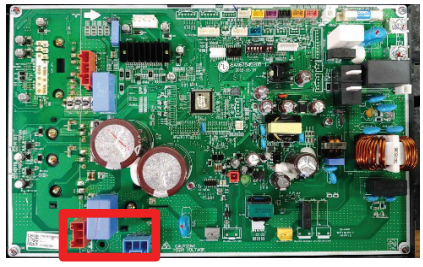
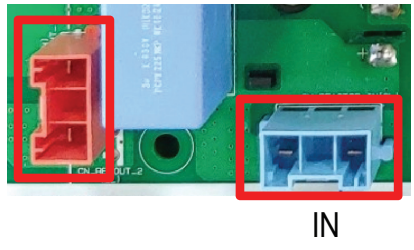
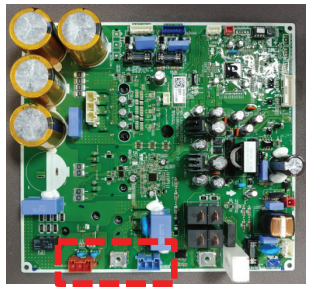
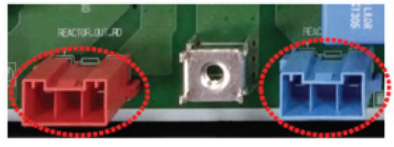
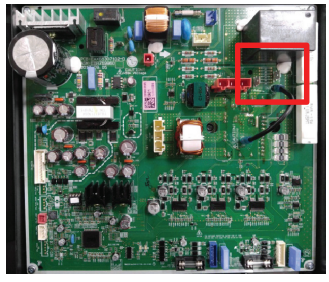
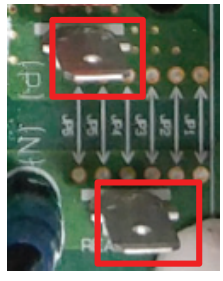
Flow of trouble diagnosis



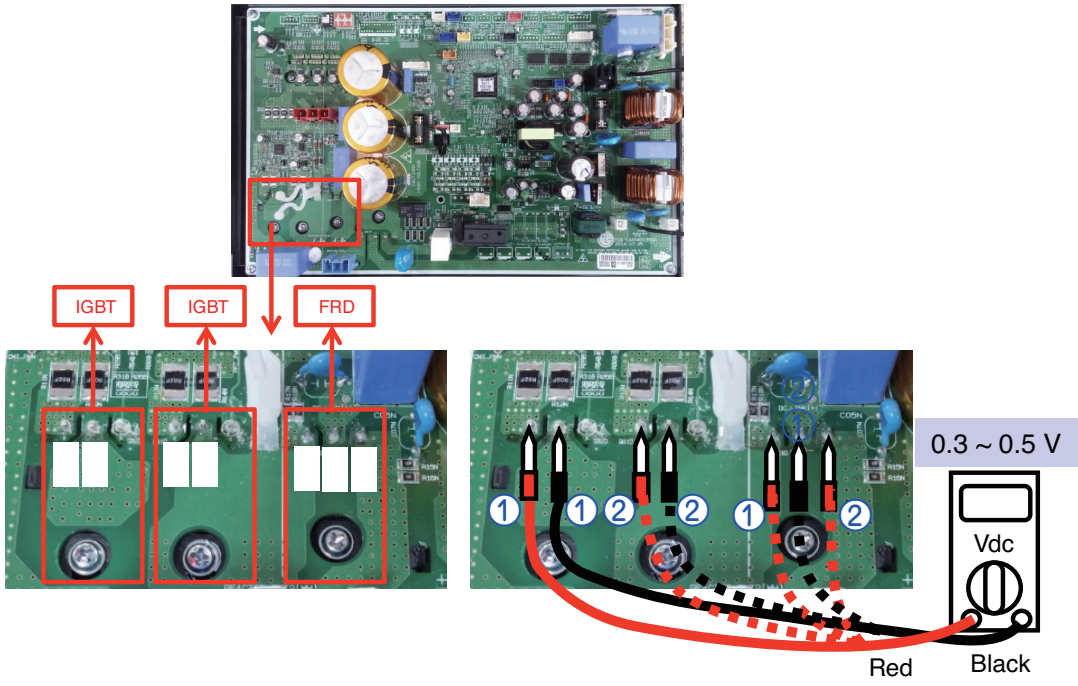
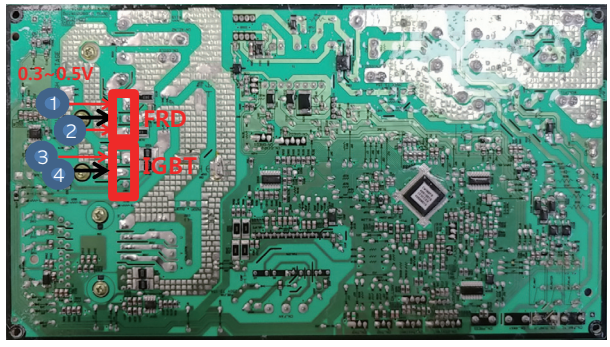
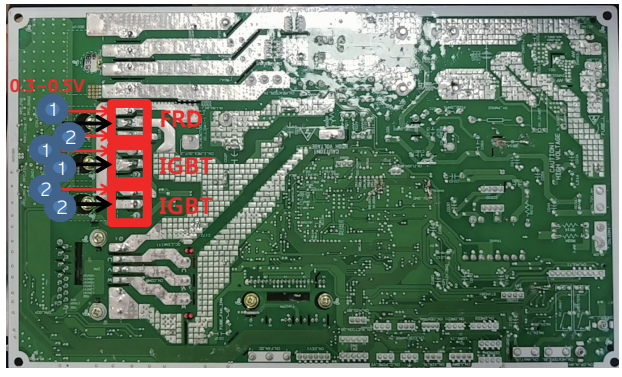
6.7 Troubleshooting Outdoor Error

CH 23 (DC Link Voltage Low)

Checking Reactor Connection

Division	Reactor Connector Point
2 kW	 
3 kW	
4.5 kW	 
6 kW	 
7 kW	 

■ PFCM Point

Division	PFCM Point
4kW	
2kW	
3kW	

< IGBT >

Sequence of Measurement	Measurement	Normal Standards
1	C – E	0.3 V~0.5 V
2	C – E	0.3 V~0.5 V

❉ C : Collector / E : Emitter

< FRD >

Sequence of Measurement	Measurement	Normal Standards
1	A – C	0.3 V~0.5 V
2	A – C	0.3 V~0.5 V

❉ A : Anode / C : Cathode

6.7 Troubleshooting Outdoor Error

CH 23 (DC Link Voltage Low)

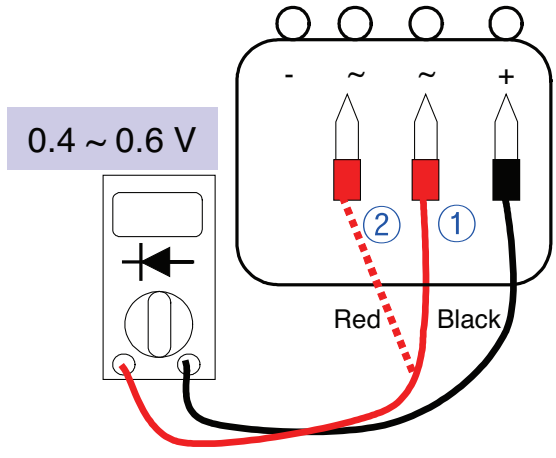
Checking Discrete PFC(PCBA: 4.5kW, 6kW)

Purpose	Checking Bride Diode parts for fault.	Items for checking	1. Checking B/D for damage

■ How to check B/D of Discrete PFC(Diode Mode)

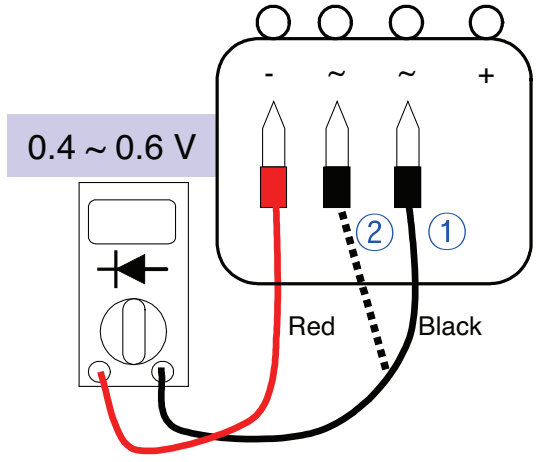
1. Remove the connector from PCB.
2. Set the Multi-Tester as Diode Voltage Measurement Mode. (⟶|–)
3. Measure the voltage as shown in Fig. 1.
4. Measure the voltage as shown in Fig. 2.
5. If the measurements are significantly different from the levels shown in the figures, the Bride Diode is deemed to be damaged.

[Fig. 1]



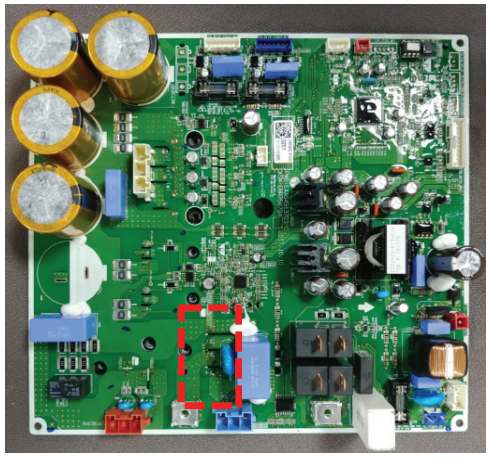
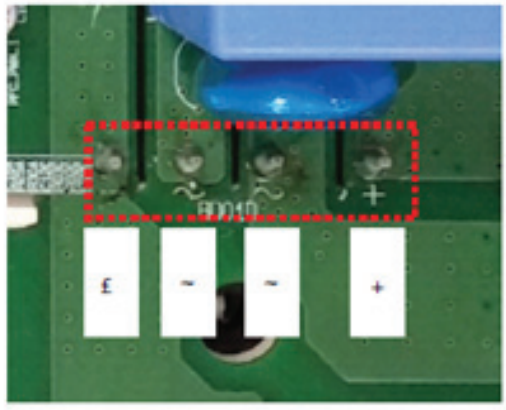
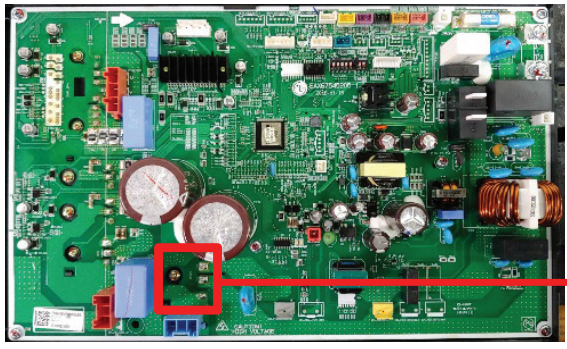
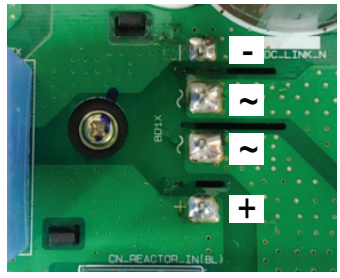
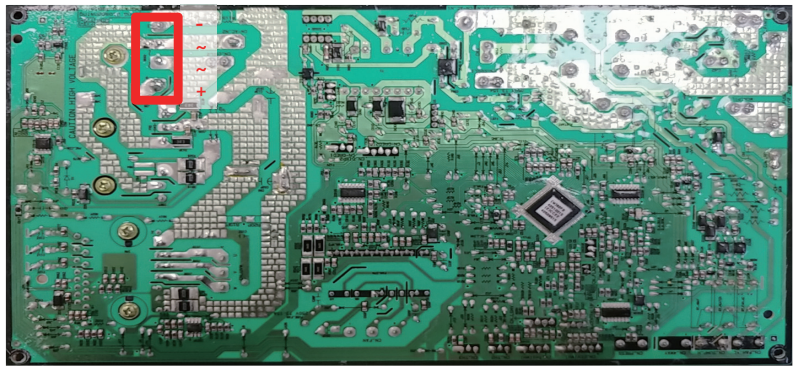
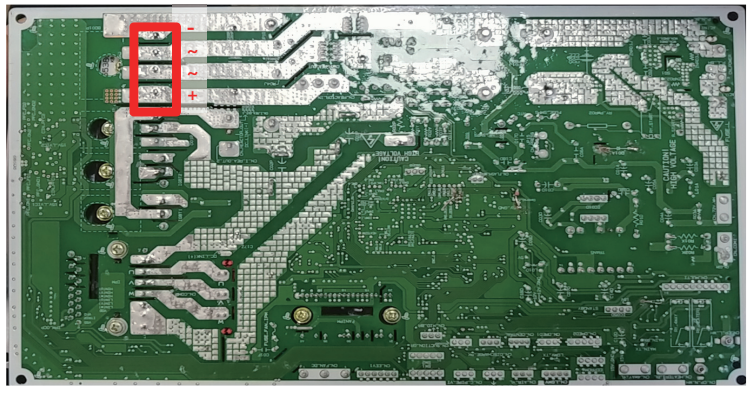
Sequence of Measurement	Measurement	Normal Standards
1	+ - ~	0.4 V~0.6 V
2	+ - ~	0.4 V~0.6 V

[Fig. 2]

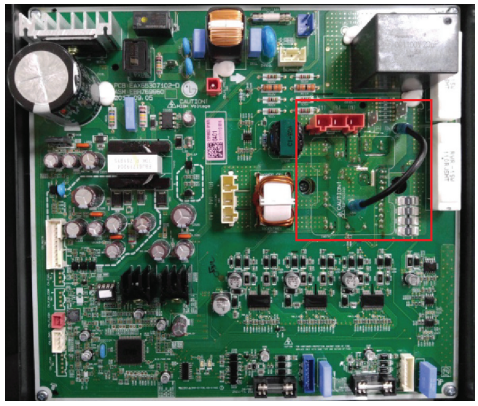


Sequence of Measurement	Measurement	Normal Standards
1	– - ~	0.4 V~0.6 V
2	– - ~	0.4 V~0.6 V

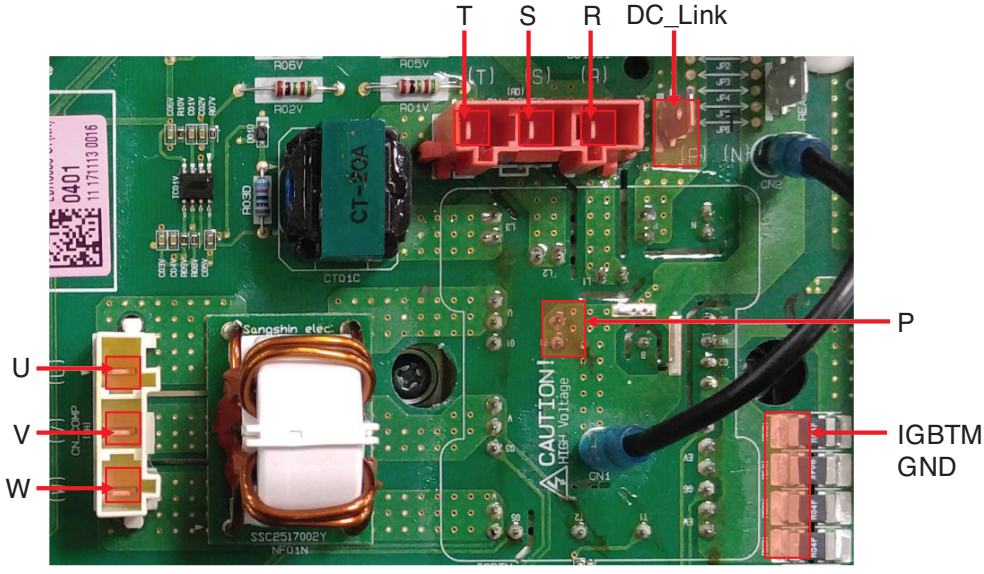
■ B/Diode of Discrete PFC Point

Division	PFCM Point
6 kW	 
4.5 kW	 
2 kW	
3 kW	

7 kW (U3)



Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
IGBTM High side Didoe	⊣◀	DC_Link	R	0.35 V ~ 0.7 V	Non-normal
			S		
			T		
IGBTM Low side Didoe		R	IGBTM GND		
		S			
		T			
IGBTM Hige side IGBT		P	U		
			V		
IGBTM Low side IGBT			W		
		U	IGBTM GND		
		V			
		W			



6.7 Troubleshooting Outdoor Error

CH 24 High pressure switch error

CH24(High pressure switch error) / System is turned off by outdoor unit high pressure switch error

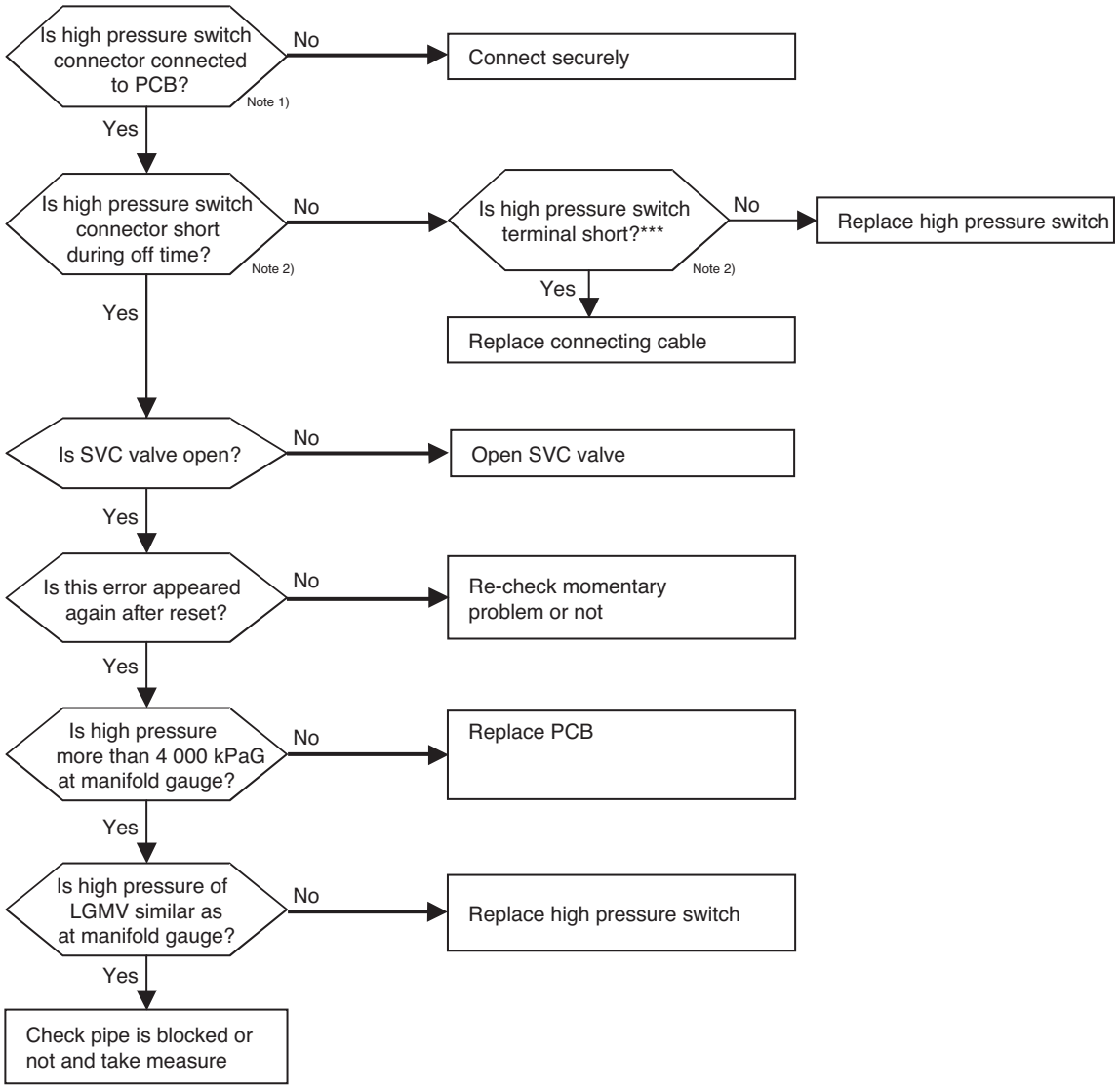
Purpose	Excessive rise of discharge pressure in outdoor compressor
Items for checking	Compressor off due to the high pressure switch in outdoor unit

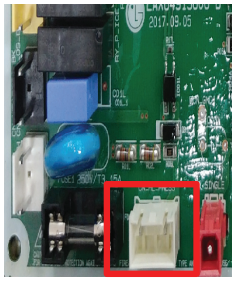
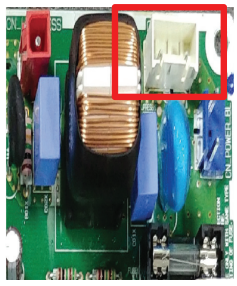
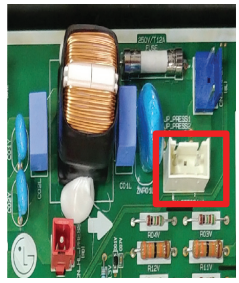
■ How to check High pressure switch error

1. Defective high pressure switch
2. Defective fan of indoor unit or outdoor unit
3. Check valve of compressor clogged
4. Pipe distortion due to the pipe damage
5. Refrigerant overcharge
6. Defective EEV at the indoor or outdoor unit
7. Covering or clogging
   (Outdoor covering during the cooling mode / Indoor unit filter clogging during the heating mode)
8. SVC valve clogging
9. Defective outdoor PCB

6.7 Troubleshooting Outdoor Error

■ Flow of trouble diagnosis



Check Point		
2 kW	3 kW	3 kW
		
6/7 kW(Main)	6 kW(Inv)	7 kW(Inv)
		

Note2	Check Point
High pressure switch	Normal : Short Abnormal : Open 

6.7 Troubleshooting Outdoor Error

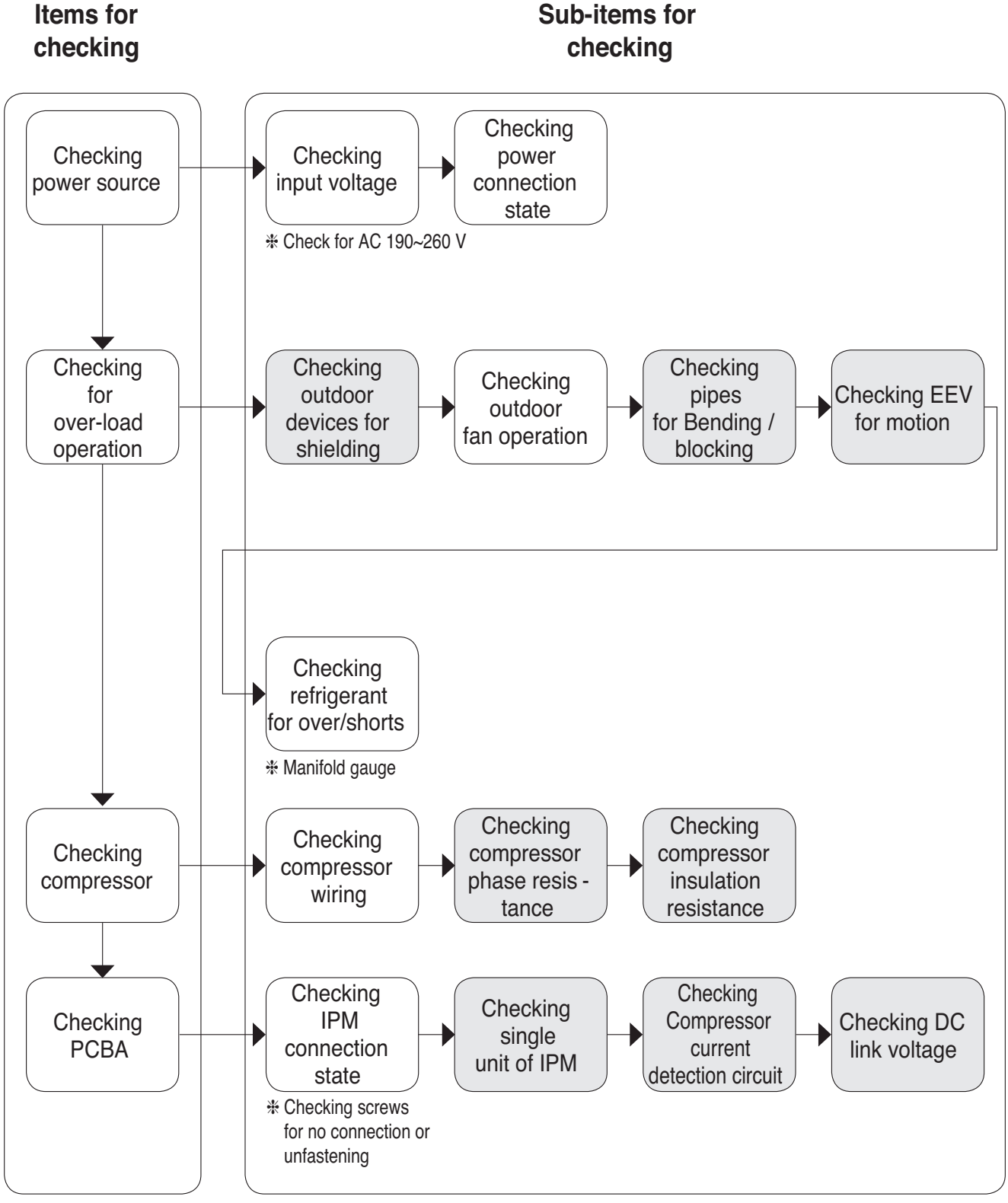
CH 26 (Compressor Starting Failure)

Items		Contents
Purpose		Restarting of the compressor when it does not properly work.
Condition for Generation		① The compressor current exceeds the standard at initial starting. ② The compressor current does not reach the standard at initial starting. ③ The compressor frequency does not reach the standard at initial starting.
Expected Causes	Installation & Overload	Closing of SVC valve, under/over charging with refrigerant, infiltration of water into refrigerant, outdoor device shielding, outdoor fan fault, EEV valve fault, and sensor fault or assembling error
	Compressor	Open/Short of the coil in the compressor, insulation breaking between the coil in the compressor and the sash, damage of compressor with abrasion, and compressor connection fault
	PCB Assembly	IPM parts fault, compressor current detection circuit fault, and DC link detection circuit fault
	Others	Input of abnormal power, IPM connection fault, and power connection fault

6.7 Troubleshooting Outdoor Error

CH 26 (Compressor Starting Failure)

Flow of trouble diagnosis



6.7 Troubleshooting Outdoor Error

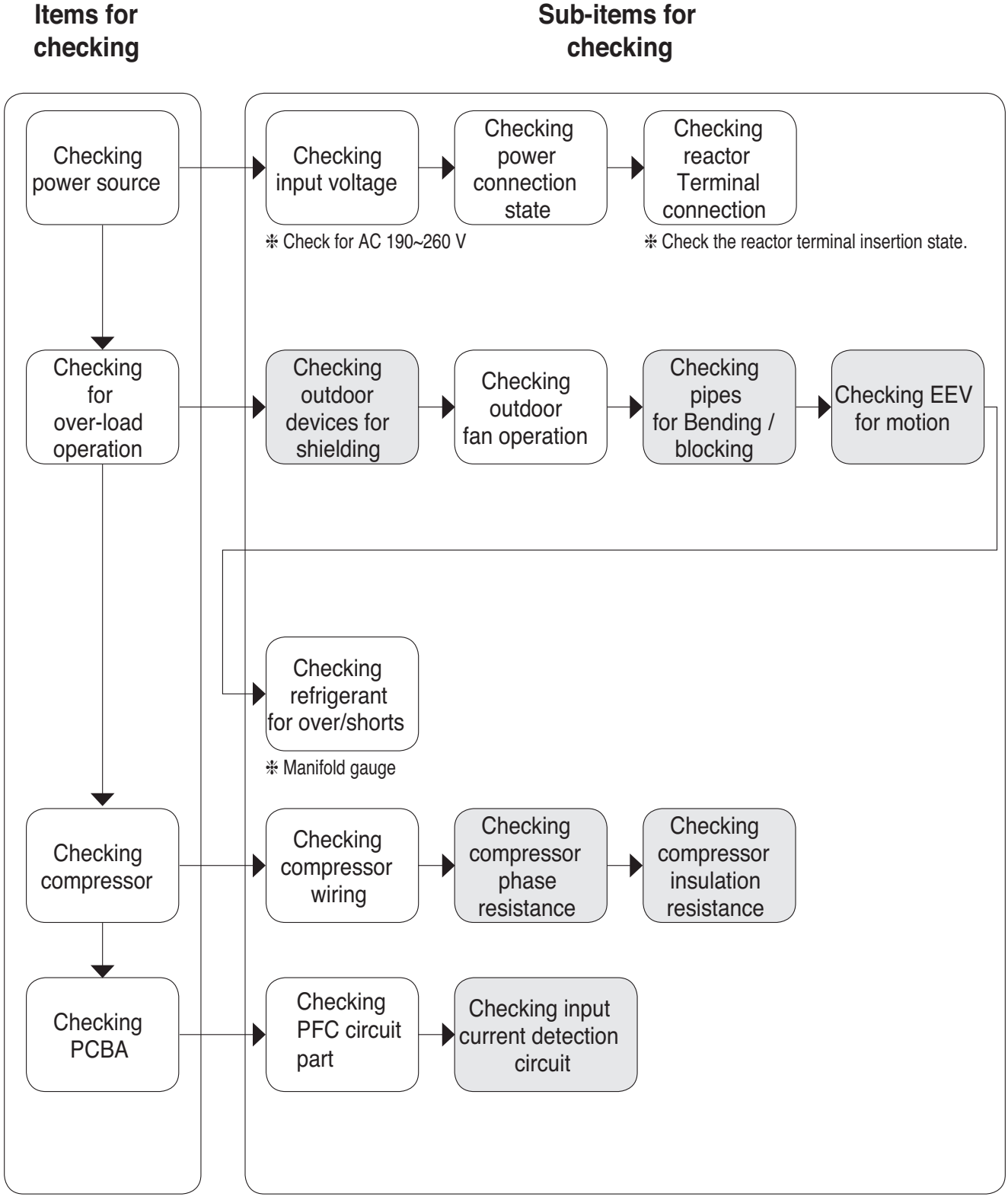
CH 27/73 (PSC/PFC Fault Error)

Items		Contents
Purpose		Prevention of the damage of PCBA, wire, and connector caused by over-current
Condition for Generation		Transfer of signals with detection of the flow of over-current in PSC/PFC
Expected Causes	Installation & Overload	Transfer of signals with detection of the flow of over-current in PSC/PFC, Outdoor device shielding
	Compressor	Open/Short of the coil in the compressor, insulation breaking between the coil in the compressor and the sash, damage of compressor with abrasion, and compressor connection fault
	PCB Assembly	Damage of PSCM/PFCM and input current detection circuit fault
	Others	Input of abnormal power, power connection fault, reactor terminal con - nection fault, and faulty distance between heatsink and sash

6.7 Troubleshooting Outdoor Error

CH 27/73 (PSC/PFC Fault Error)

Flow of trouble diagnosis



6.7 Troubleshooting Outdoor Error

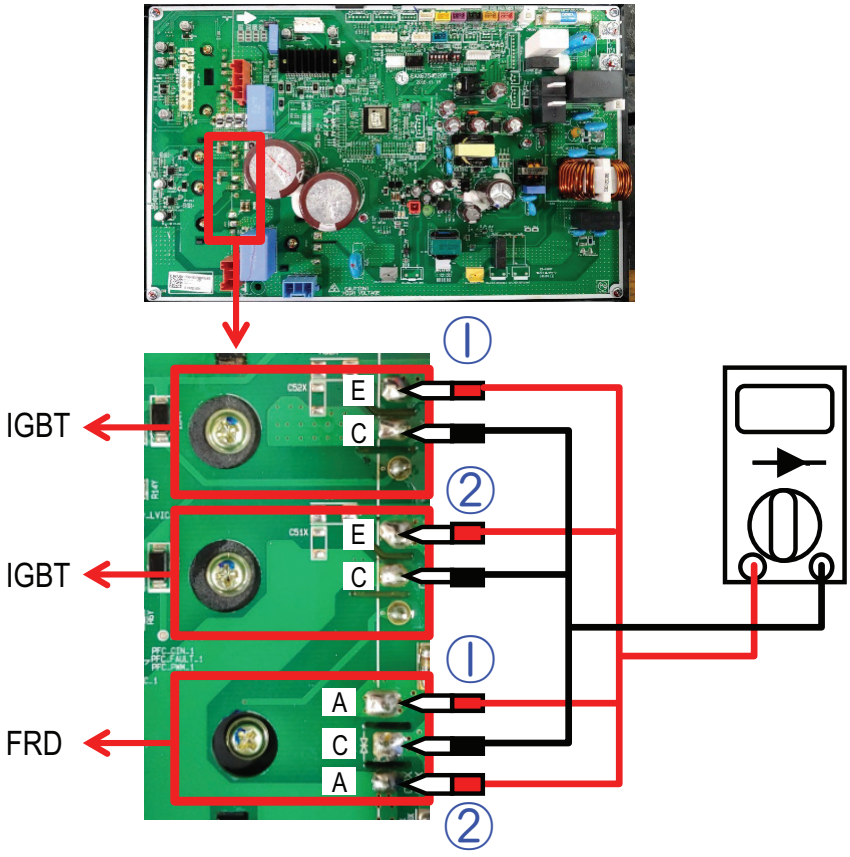
CH 27/73 (PSC/PFC Fault Error)

Checking Discrete PFC part

Purpose	Checking Discrete PFC parts for fault	Items for checking	1. Checking IGBT for damage 2. Checking FRD for damage

■ How to check IGBT, FRD (Diode Mode)

1. Remove the connector from PCB.
2. Set the Multi-Tester as Diode Voltage Measurement Mode. (⟶|–)
3. Measure the voltage as shown in Fig. 1.
4. Measure the voltage as shown in Fig. 2.
5. If the measurements are significantly different from the levels shown in the figures, the IGBT, FRD is deemed to be damaged.



< IGBT >

Sequence of Measurement	Measurement	Normal Standards
1	C – E	0.3 V~0.5 V
2	C – E	0.3 V~0.5 V

❊ C : Collector / E : Emitter

< FRD >

Sequence of Measurement	Measurement	Normal Standards
1	A – C	0.3 V~0.5 V
2	A – C	0.3 V~0.5 V

❊ A : Anode / C : Cathode

6.7 Troubleshooting Outdoor Error

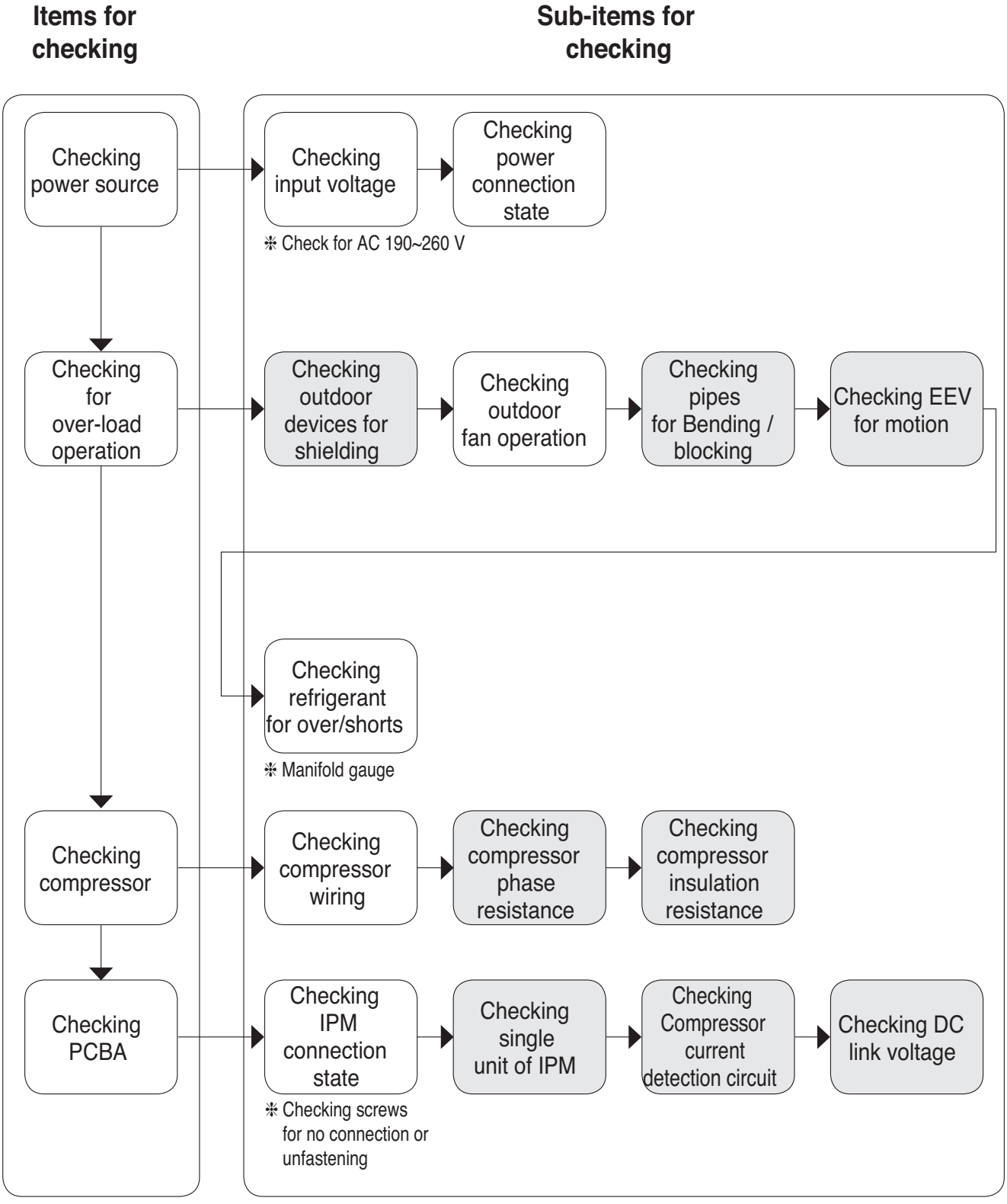
CH 29 (Compressor Over Current)

Items		Contents
Purpose		Protection of IPM and compressor in the PCB assembly from over-current.
Condition for Generation		Increased compressor current exceeding the standard.
Expected Causes	Installation & Overload	Transfer of signals with detection of the flow of over-current in PSC/PFC, blocking of a outdoor unit.
	Compressor	Open/Short of the coil in the compressor, insulation breaking between the coil in the compressor and the sash, damage of compressor with abrasion, and compressor connection fault
	PCB Assembly	Compressor current detection circuit fault, DC link detection circuit fault, and fault of single unit of IPM
	Others	Input of abnormal power and power connection fault

6.7 Troubleshooting Outdoor Error

CH 29 (Compressor Over Current)

Flow of trouble diagnosis



6.7 Troubleshooting Outdoor Error

CH 32 (Discharge pipe overheating error of Inverter)

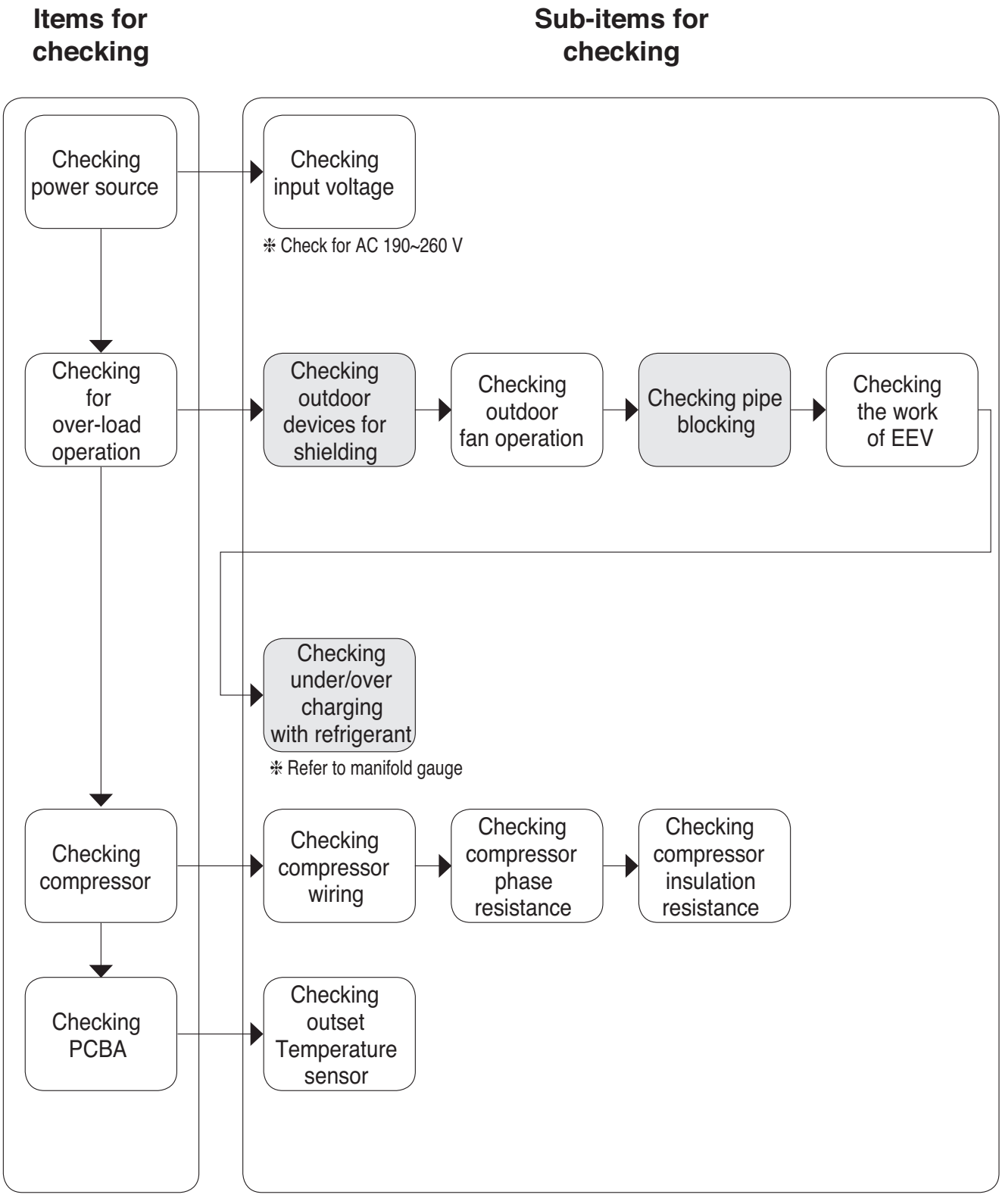
Items		Contents
Purpose		Possible damage of compressor and piping due to high discharge temperature
Condition for Generation		The discharge temperature is elevated exceeding the standard.
Expected Causes	Installation	Installation fault, closing of SVC valve, under/over charging with refrigerant, and infiltration of moisture into refrigerant
	Overload	Outdoor device shielding, outdoor fan fault, and EEV valve fault
	Compressor	Short between compressor coil and sash, abrasion of compressor, and short/opening of compressor coil
	PCB Assembly	Compressor current and DC link voltage detection circuit fault
	Sensor	Discharge temperature sensor fault

❉ IPM (Intelligent Power Module) : The part to control the inverter compressor

6.7 Troubleshooting Outdoor Error

CH 32 (Discharge pipe overheating error of Inverter)

Flow of trouble diagnosis



6.7 Troubleshooting Outdoor Error

CH 35 (Discharge pipe overheating error of Inverter)

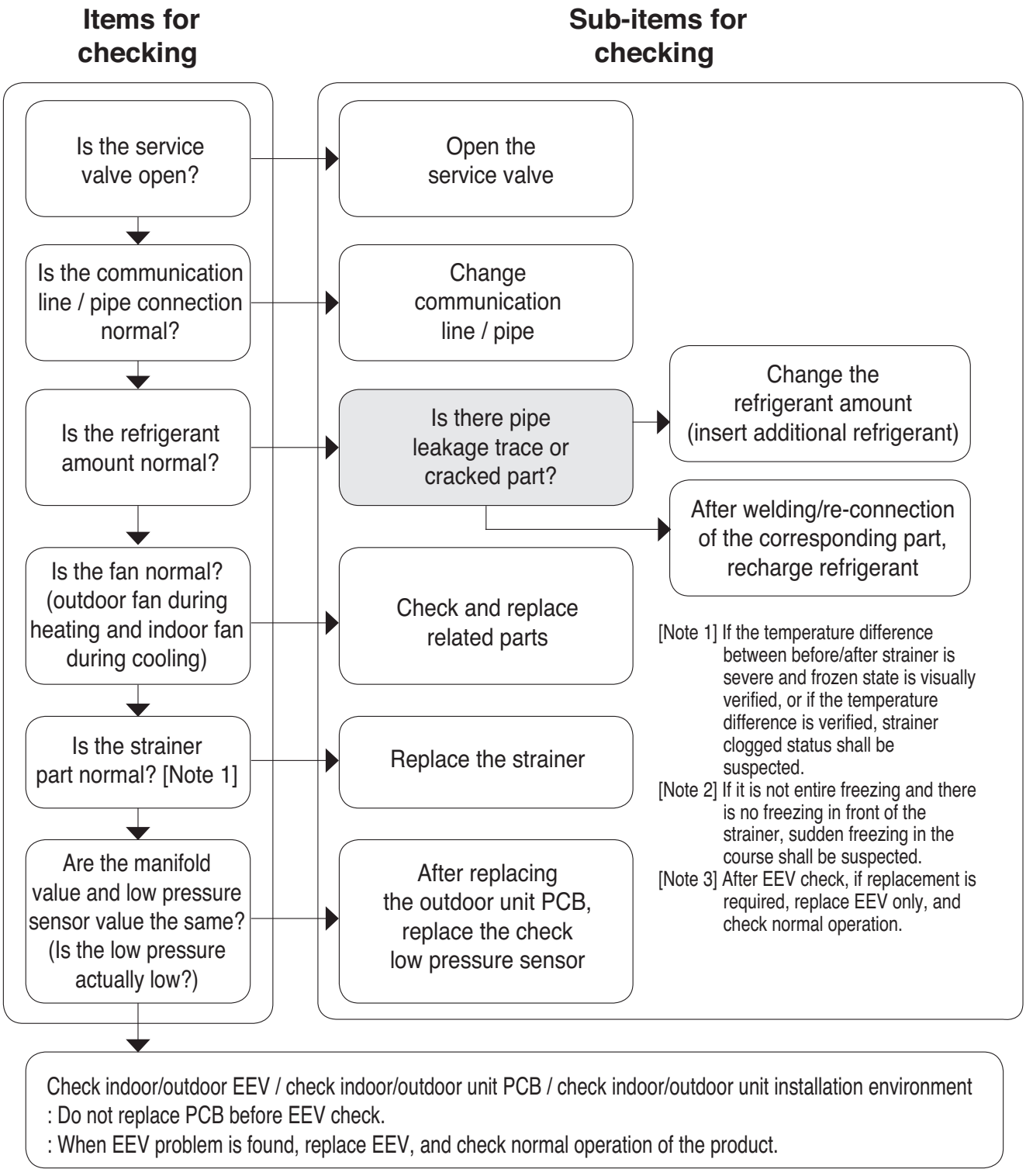
Items		Contents
Purpose		Possible damage of compressor due to excessive low pressure
Condition for Generation		The low pressure of outdoor unit is decreased excessively.
Expected Causes	Installation	Lack and leakage of refrigerant Service valve clogged in case of deformation or shielding by refrigeration pipe damage (outdoor unit shielding during heating / indoor filter clogging during cooling)
	PCB Assembly	Outdoor unit PCB defect
	Sensor	Low pressure sensor defect Indoor pipe temperature sensor defect
	Others	Indoor unit or outdoor unit fan failure EEV defect

❉ IPM (Intelligent Power Module) : The part to control the inverter compressor

6.7 Troubleshooting Outdoor Error

CH 35 (Discharge pipe overheating error of Inverter)

Flow of trouble diagnosis



! Caution : Before checking PCB or various outdoor unit electricity flowing parts, start the checking 3 minutes after power cut off. If it is measured in power supply stand by state, check the tester's measurement mode and be careful of the short circuit with parts other than the measurement part.

6.7 Troubleshooting Outdoor Error

CH 38 (Refrigerant leakage error)

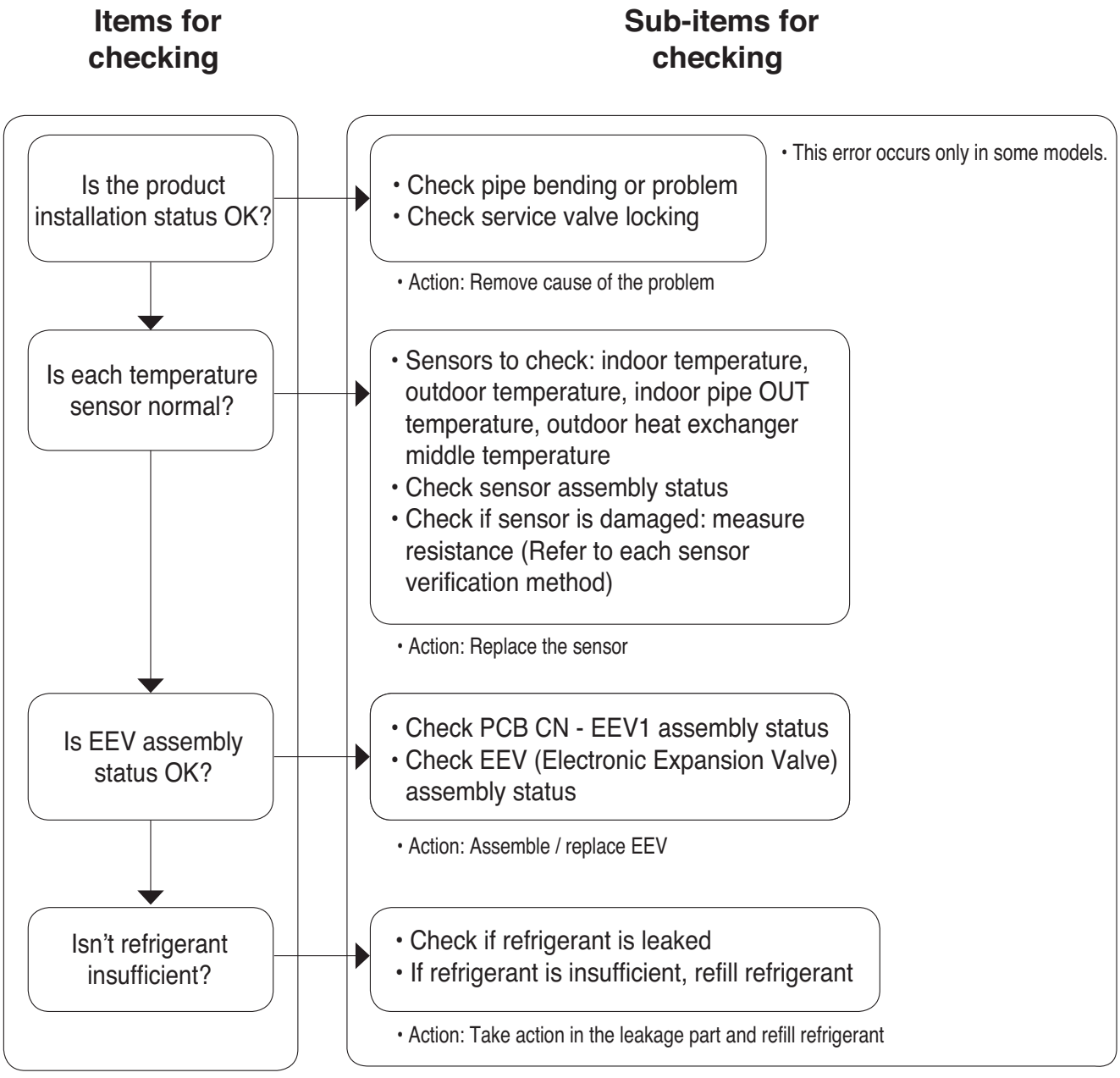
Items		Contents
Purpose		Possible damage of compressor due to refrigerant leakage or lack
Condition for Generation		If refrigerant is insufficient or if refrigerant is leaked
Expected Causes	Installation	Refrigerant leakage (insufficient) Service valve locked Pipe bending defect
	Sensor	Sensor defect
	Others	EEV connector falling off / EEV assembly defect

❉ IPM (Intelligent Power Module) : The part to control the inverter compressor

6.7 Troubleshooting Outdoor Error

CH 38 (Refrigerant leakage error)

Flow of trouble diagnosis



! Caution : Before checking PCB or various outdoor unit electricity flowing parts, start the checking 3 minutes after power cut off. If it is measured in power supply stand by state, check the tester's measurement mode and be careful of the short circuit with parts other than the measurement part.

6.7 Troubleshooting Outdoor Error

Checking Temperature Sensor Open/Short

Items	Contents
Purpose	Prevention of reception of wrong temperature value from the tempera - ture sensor
Condition for Generation	Damage of temperature sensor (Short / Open)

■ Cause of Temperature Sensor Error

Classification	Causes in Detail
PCB Assembly	Connector open, damaged insulation of sash, damage of the wire coat - ing of temperature sensors

Code No.	Details of Errors
41	Inverter Discharge temperature sensor Open/Short
43	High pressure Sensor Error
44	Outdoor air temperature sensor Open/Short
45	Outdoor piping temperature sensor Open/Short
46	Outdoor suction temperature sensor Open/Short
47	Constant rate outlet temperature sensor Open/Short

1. Uses of sensors
   : Control of compressor and cycle
2. Kinds of Sensors (See corresponding pages)
   Outlet : 200 kΩ ± 10 %
   Piping : 5 kΩ ± 10 %
   Air : 10 kΩ ± 10 %
   (Based on 25 °C of surrounding temperature)
3. Sensor insulation resistance
   : The resistance between the sash and sensor terminal should be not less than 1MΩ.

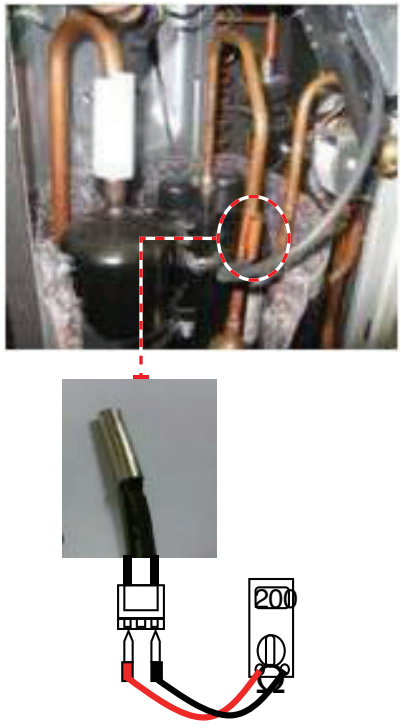
6.7 Troubleshooting Outdoor Error

Sensor Checking Methods

Purpose	Checking single units of sensors for fault	Items for checking	Measurement of the unique resistance by sensor temperature.

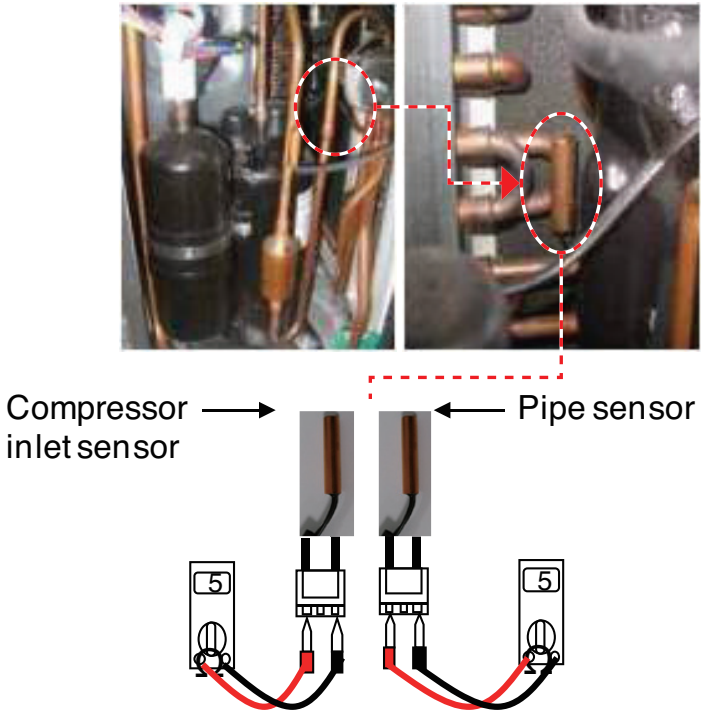
① Compressor discharge sensor

- Position : Outlet of compressor
- Sensor value : 200 kΩ ± 10 %
  (Based on 25 °C)



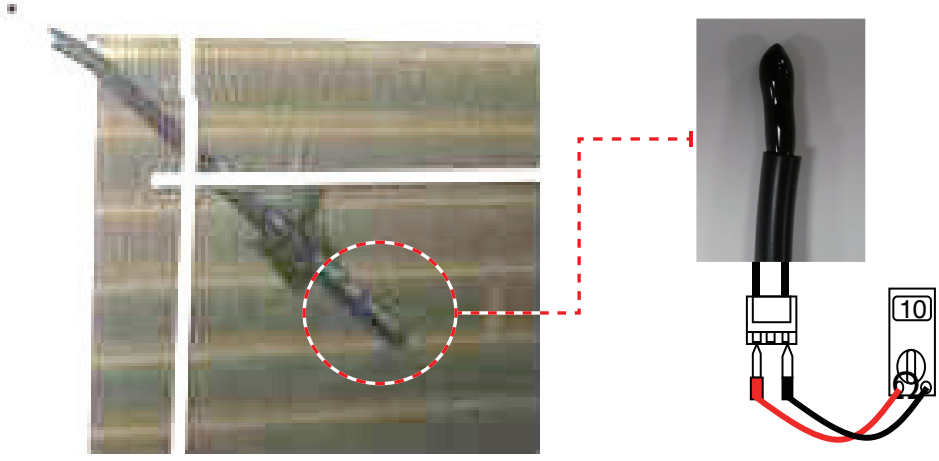
② Pipe sensor

- Position : Compressor inlet and pipe
- Sensor value : 5 kΩ ± 10 %
  (Based on 25 °C)



③ Outdoor temperature sensor

- Position : Rear part of outdoor device
- Sensor value : 10 kΩ ± 10 %
  (Based on 25 °C)

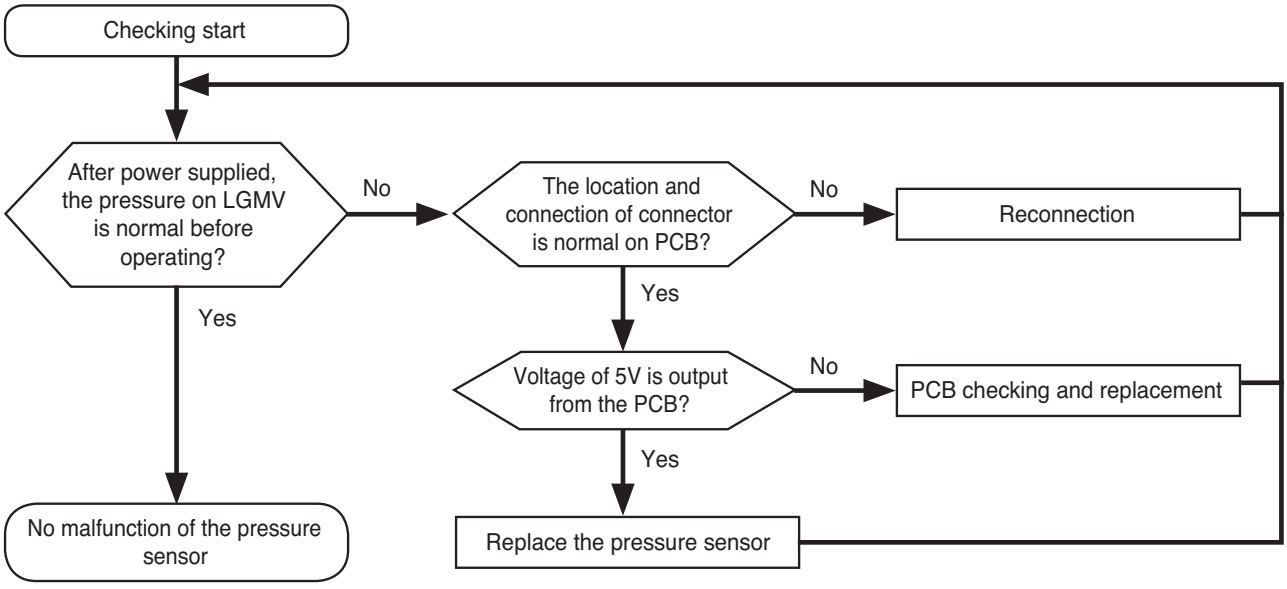


6.7 Troubleshooting Outdoor Error

Purpose	Checking single units of sensors for fault	Items for checking	Measurement of the unique resistance by sensor temperature.

④ Pressure sensor

- Position : Outlet of 4-way valve (based on cooling mode)

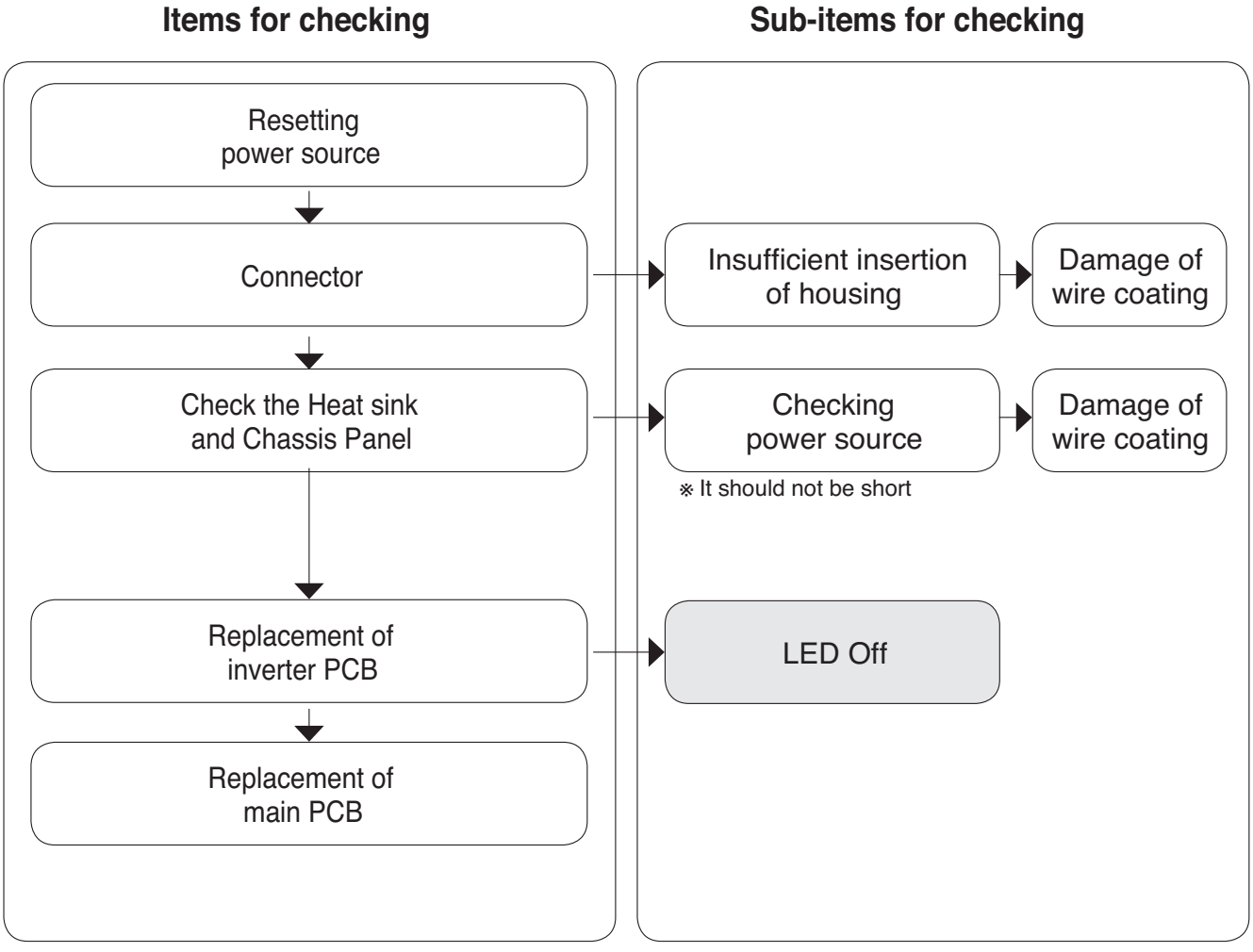


6.7 Troubleshooting Outdoor Error

CH 52 (PCB Communication Error)

Items	Contents
Purpose	Checking the communication state between Main PCB and Inverter PCB
Condition for Generation	Generation of noise source interfering with communication

Resetting power source: Wait for 3 minutes after turning the power of the product off.



6.7 Troubleshooting Outdoor Error

CH 52 (PCB Communication Error)

Environment interfering PCB communication

Purpose	Installation environment interfering the communication	Items for checking	Checking method of faulty points

① Insufficient insertion of wires

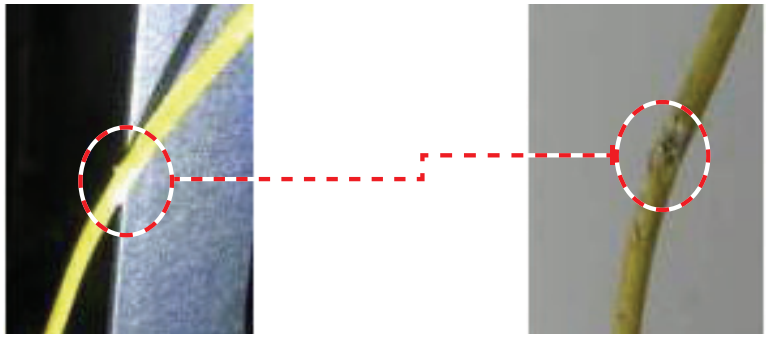
OK

NG

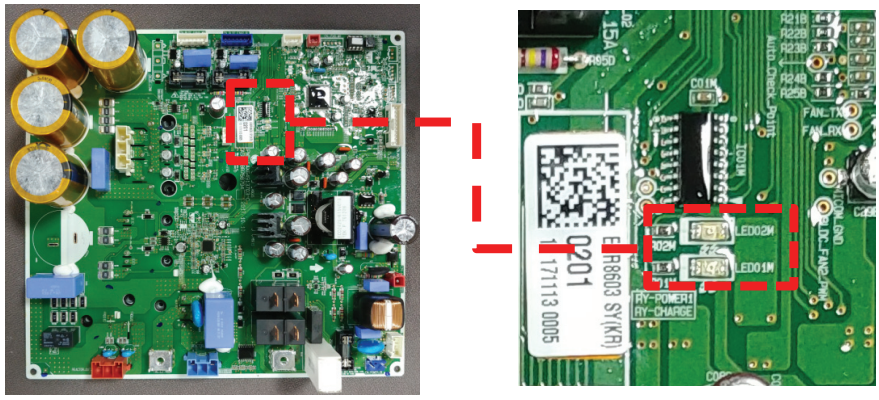
OK

NG

② Damage of wire coating
: Interference with wires or wire coating damage with chopping



③ Inverter PCB LED
: Replacement of inverter PCB during LED Off after resetting

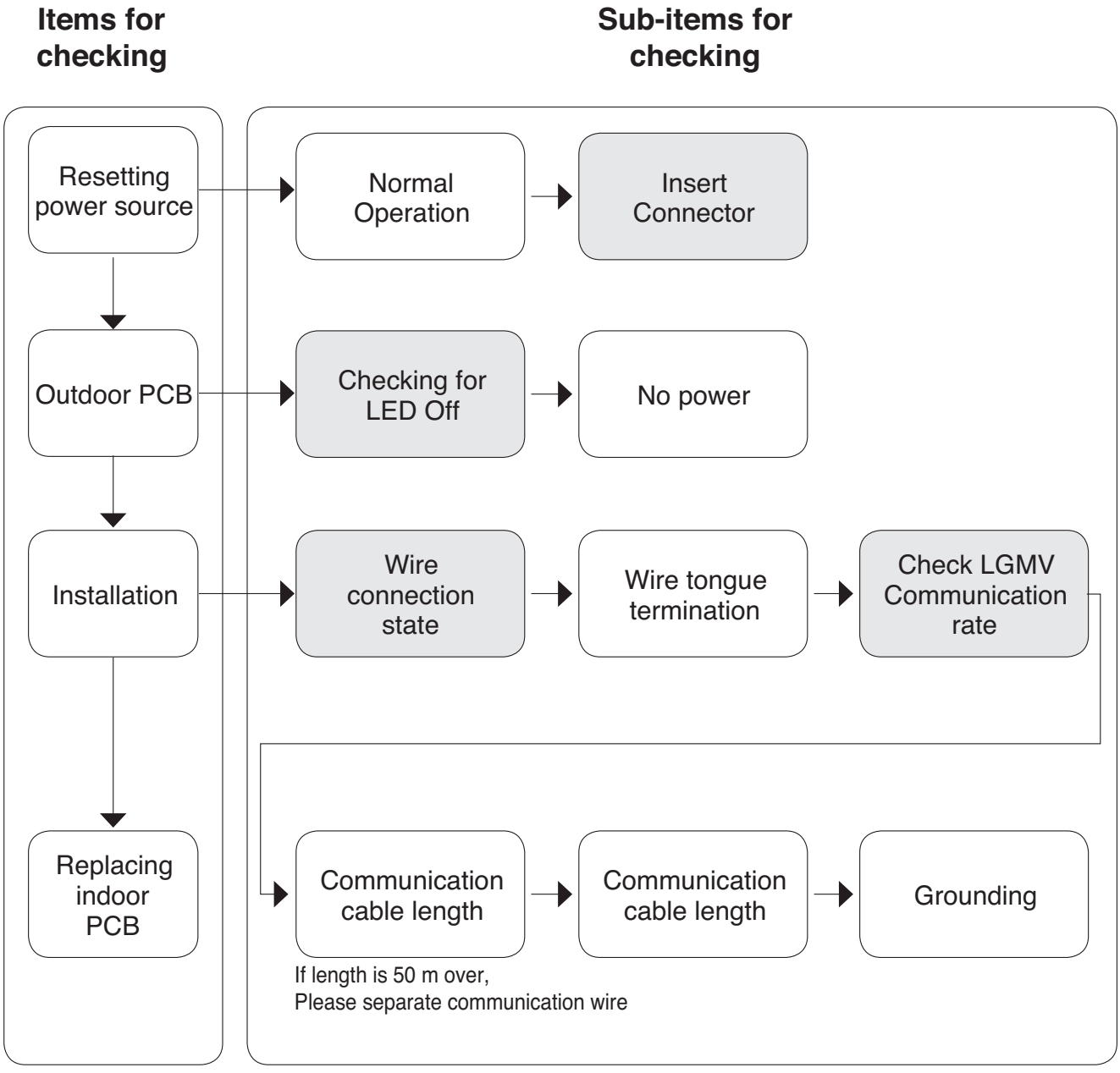


6.7 Troubleshooting Outdoor Error

CH 05/53 (Indoor/Outdoor Device Communication Error) ⟶ Detection by indoor devices

Items	Contents
Purpose	1. Damage of high pressure switch (Check the high pressure switch) 2. Damage due to incorrect installation of outdoor device PCB
Condition for Generation	Damage and installation of outdoor device PCB

Resetting power source: Wait for 3 minutes after turning the power of the product off.



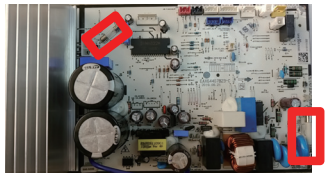
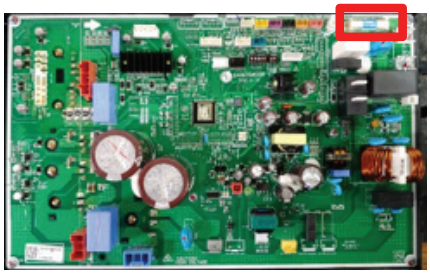
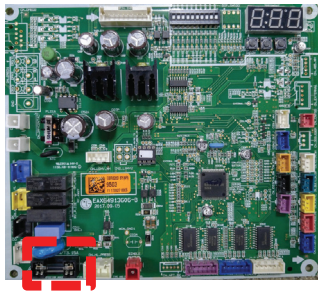
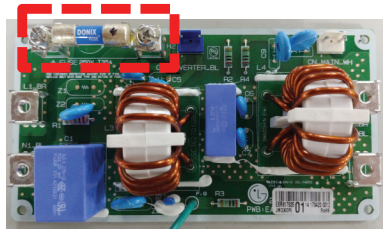
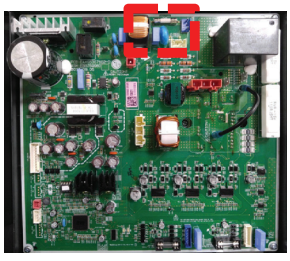
6.7 Troubleshooting Outdoor Error

CH 05/53 (Indoor/Outdoor Device Communication Error) ⟶ Detection by indoor devices

Checking Method of Outdoor PCB

Purpose	Checking whether outdoor PCB is normal	Items for checking	Lighting of LED, fuse damage, and reactor connection error

① Check reactor connection state.
② Check fuse state
③ Check whether outdoor PCB LED is lighted.

Division	Fuse Point
2 kW	
3 kW	
4.5 kW	
6 kW	 
7 kW	

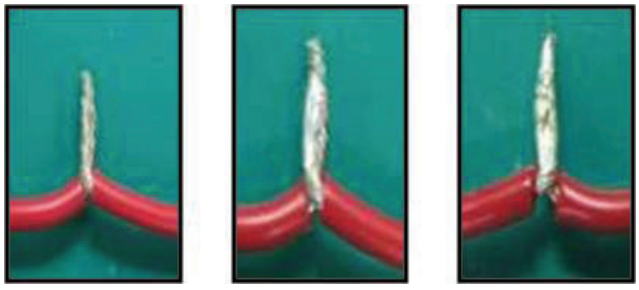
6.7 Troubleshooting Outdoor Error

CH 05/53 (Indoor/Outdoor Device Communication Error) ⟶ Detection by indoor devices

Installation environment interfering with the communication of indoor/outdoor devices

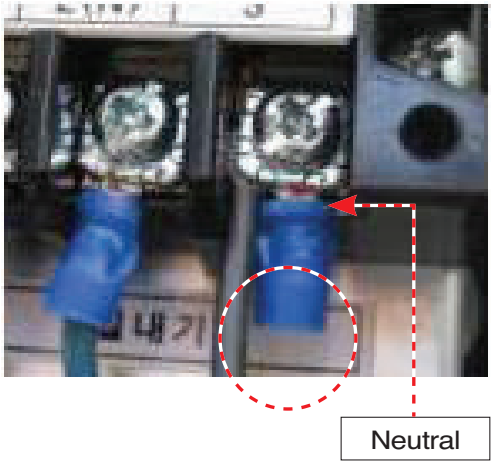
Purpose	Installation environment interfering the communication	Items for checking	Check installation error points

① The communication lines of the indoor /outdoor devices are installed by wire-to-wire ethod.
: In case of additional connection, connect the wires with soldering as shown below.

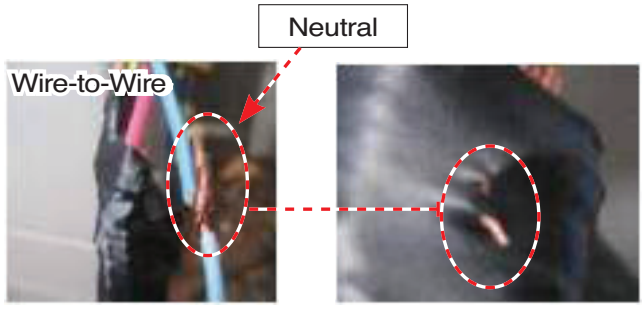


NG NG OK

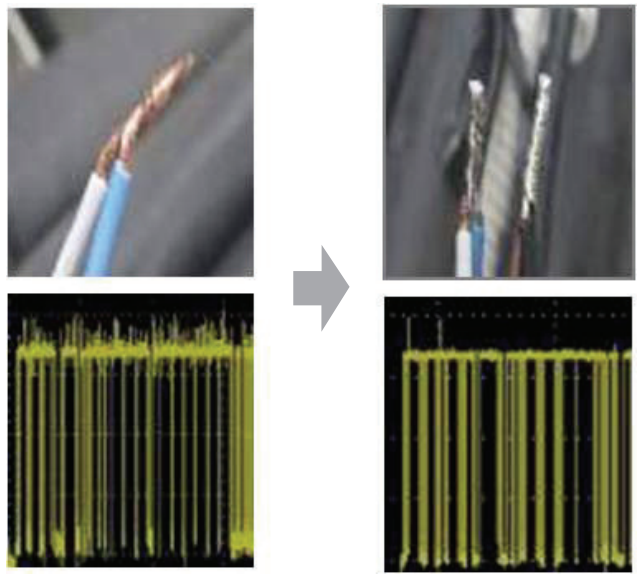
② Wire tongue-termination fault.



③ The cut section of the wire passes the insulation tape and causes a short with another wire.

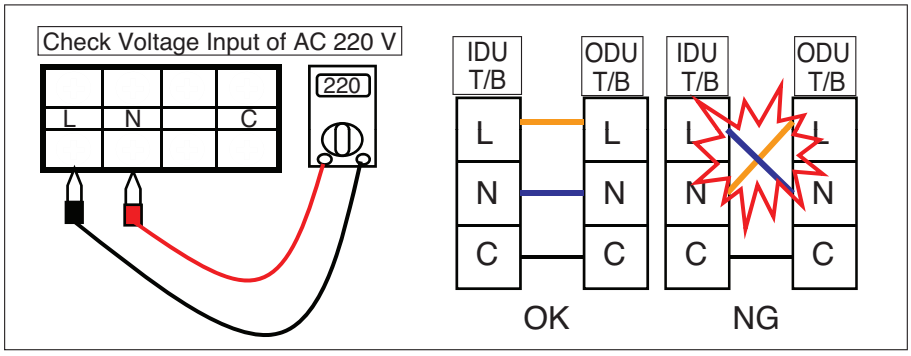


④ Communication noise by oxidized wire arrangement : Soldering is required.



1) Check Voltage Input of AC 220 V, Indoor & Outdoor Communication
When Input AC 220 V,
- Check AC 220 V Live ↔ Netural, Indoor & Outdoor
- Otherwise, arrange the Communication Wire, Check AC 220 V

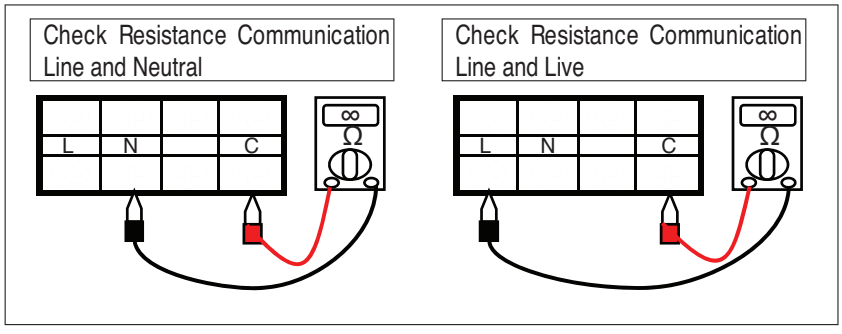
Equipment : Multi-Meter
Test Mode : AC Voltage
Indoor & Outdoor Terminal block



Equipment: Multi-Meter
Test Mode : Resistance

2) Check electric short Communication Line and Power Line

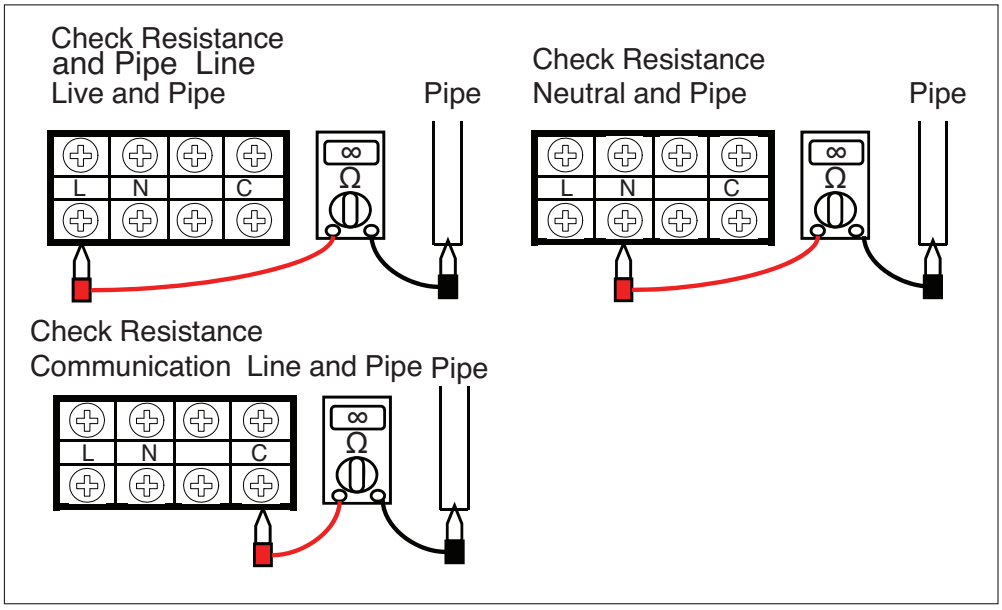
After Removing Power Line Wire and Communication Line Wire, Check the voltages
- Check resistance Communication ↔ Live should be infinite
- Check resistance Communication ↔ Netural should be infinite
- Check resistance Communication ↔ Gnd should be infinite

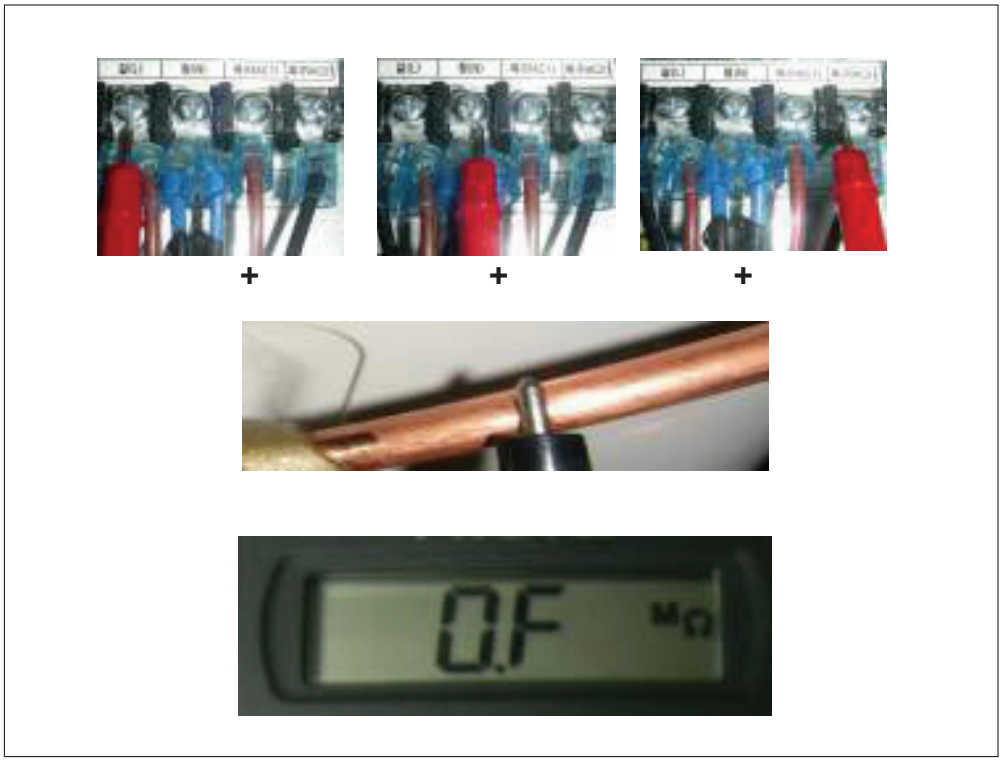


3) Check electric leakage Communication Line and Pipe

After Removing Power Line Wire and Communication Line Wire, Check the voltages

- Check Infinite Resistance between Power /Communication Line and Pipe Line

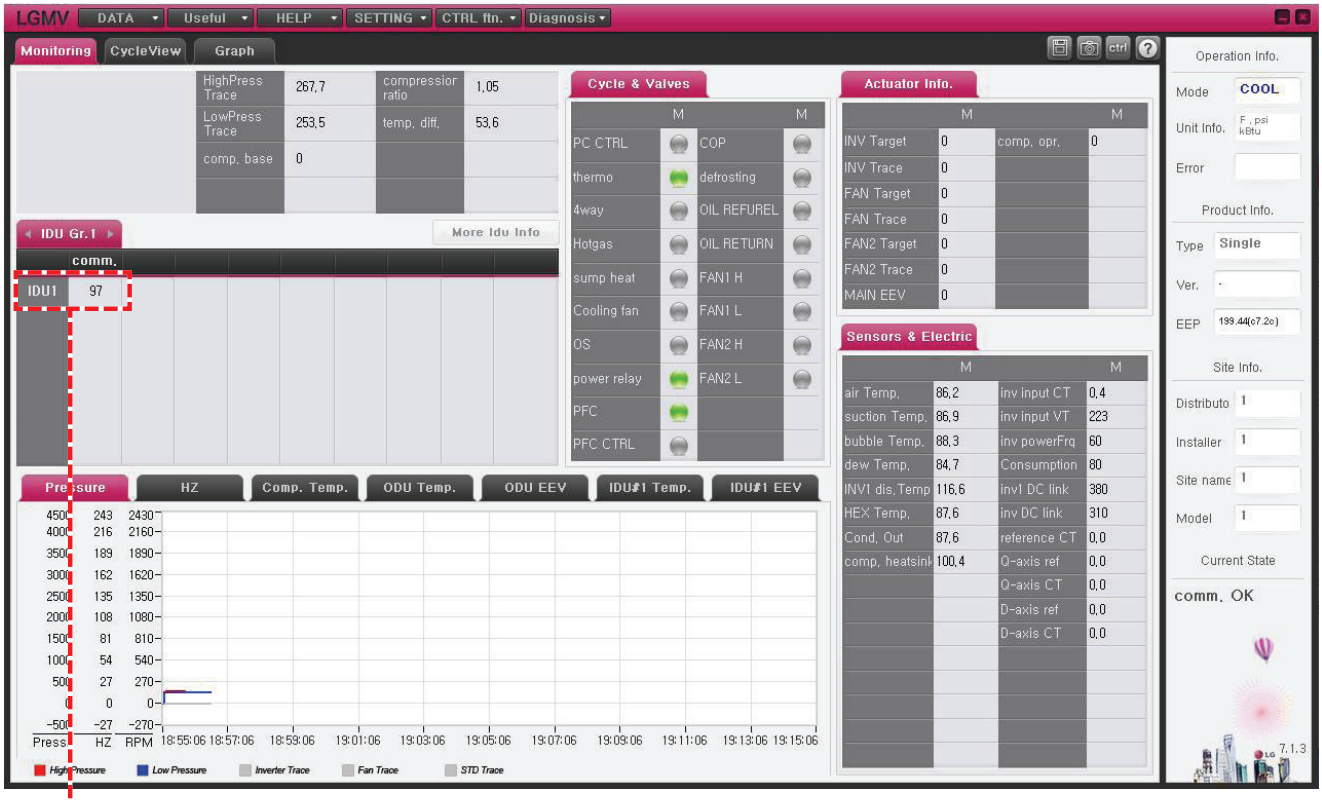




6.7 Troubleshooting Outdoor Error

CH 05/53 (Indoor/Outdoor Device Communication Error) ⟶ Detection by indoor devices

Check LGMV Communication rate



Communication rate (Normally 90 % ↑)

6.7 Troubleshooting Outdoor Error

CH 05/53 (Indoor/Outdoor Device Communication Error) → Detection by indoor devices

How to measure for Environment Noise

■ **Applied Model : Multi/Single Outdoor PCBA**
(Refer to PCB P/no of attached file)
■ **Applied S/No : ~ 301xxxxxx (~ Jan, 2013)**

1. Symptom

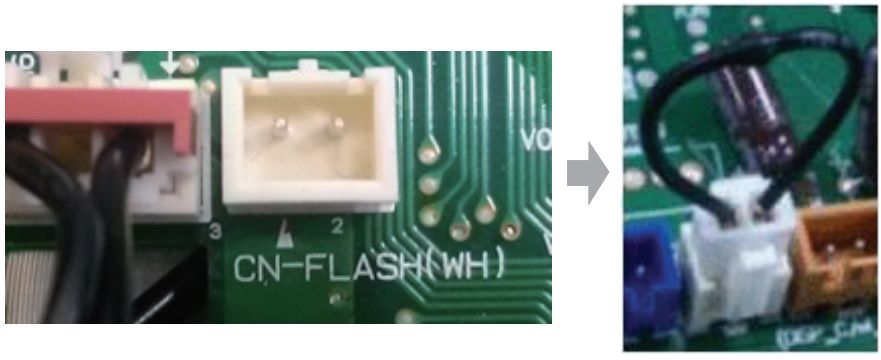
-. Outdoor unit cannot communicate with Indoor unit.
-. Outdoor reset then work normal.
: It happens intermittently
-. LEDs for showing power-on and communication status are not on or not blinking in outdoor inverter PCBA

2. Causes

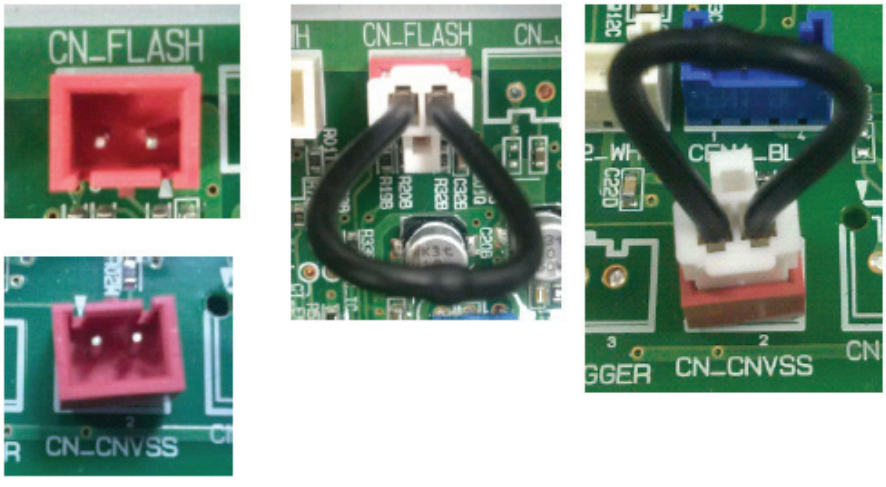
-. Noise disturb the outdoor unit communication with indoor unit

3. Improvement

-. Inserting small connector with capacitor in Inverter PCBA of Outdoor Unit
1)Connector can be applied to the list(PCBA P/No) on the next page
2)Guide where you put it on the next page
-. It helps outdoor unit communicate with indoor unit better than before and reduce the noise level



[Connector with capacitor in CN_Flash_Writer or CN_Flash]



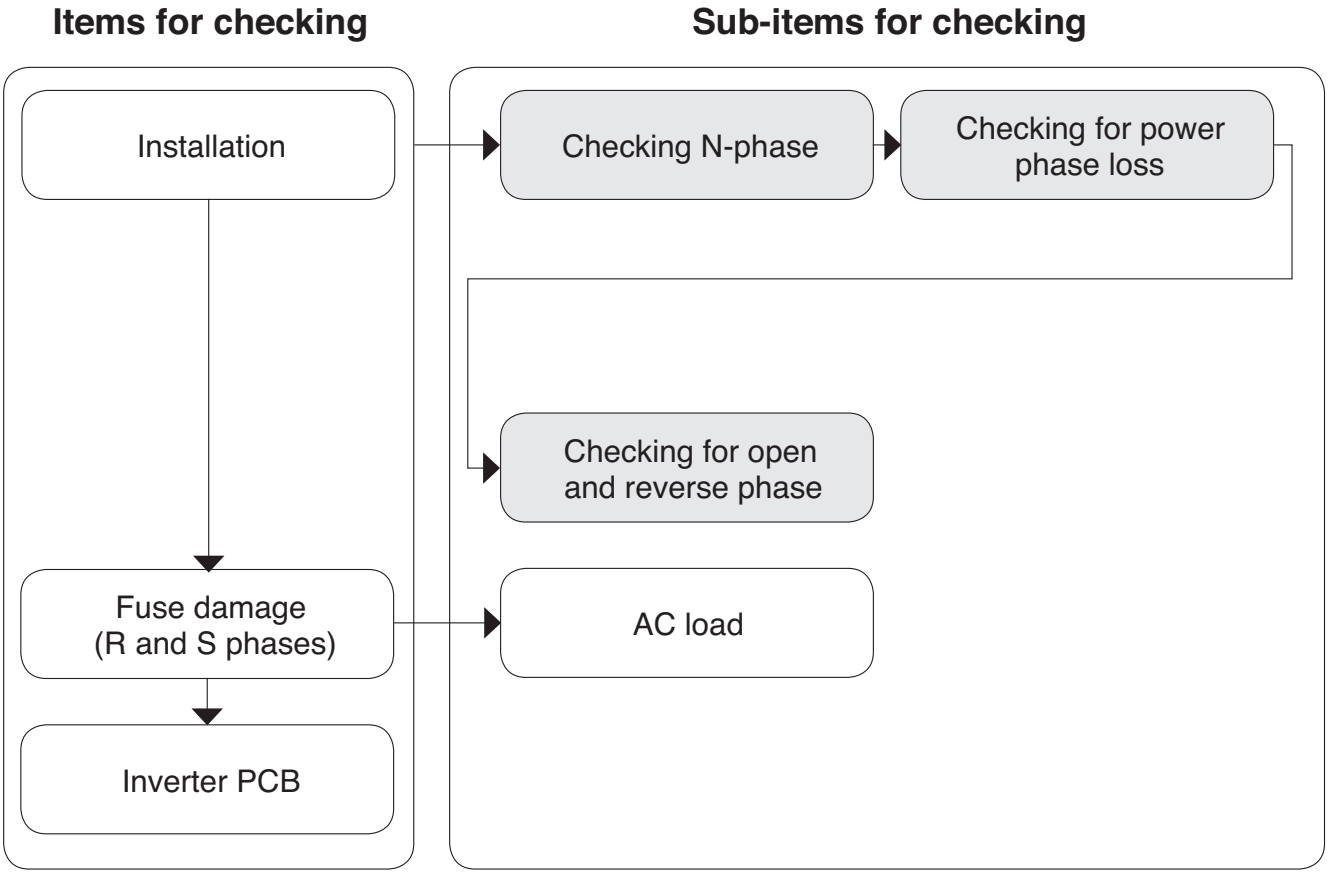
Connector with capacitor in CN_FLASH and CN_CNVSS

6.7 Troubleshooting Outdoor Error

CH 54 (Open and Reverse Phase Error)

Items	Contents
Purpose	Prevention of phase unbalance and prevention of reverse rotation of constant-rate compressor
Condition for Generation	Main power wiring fault

Resetting power source: Wait for 3 minutes after turning the power of the product off.

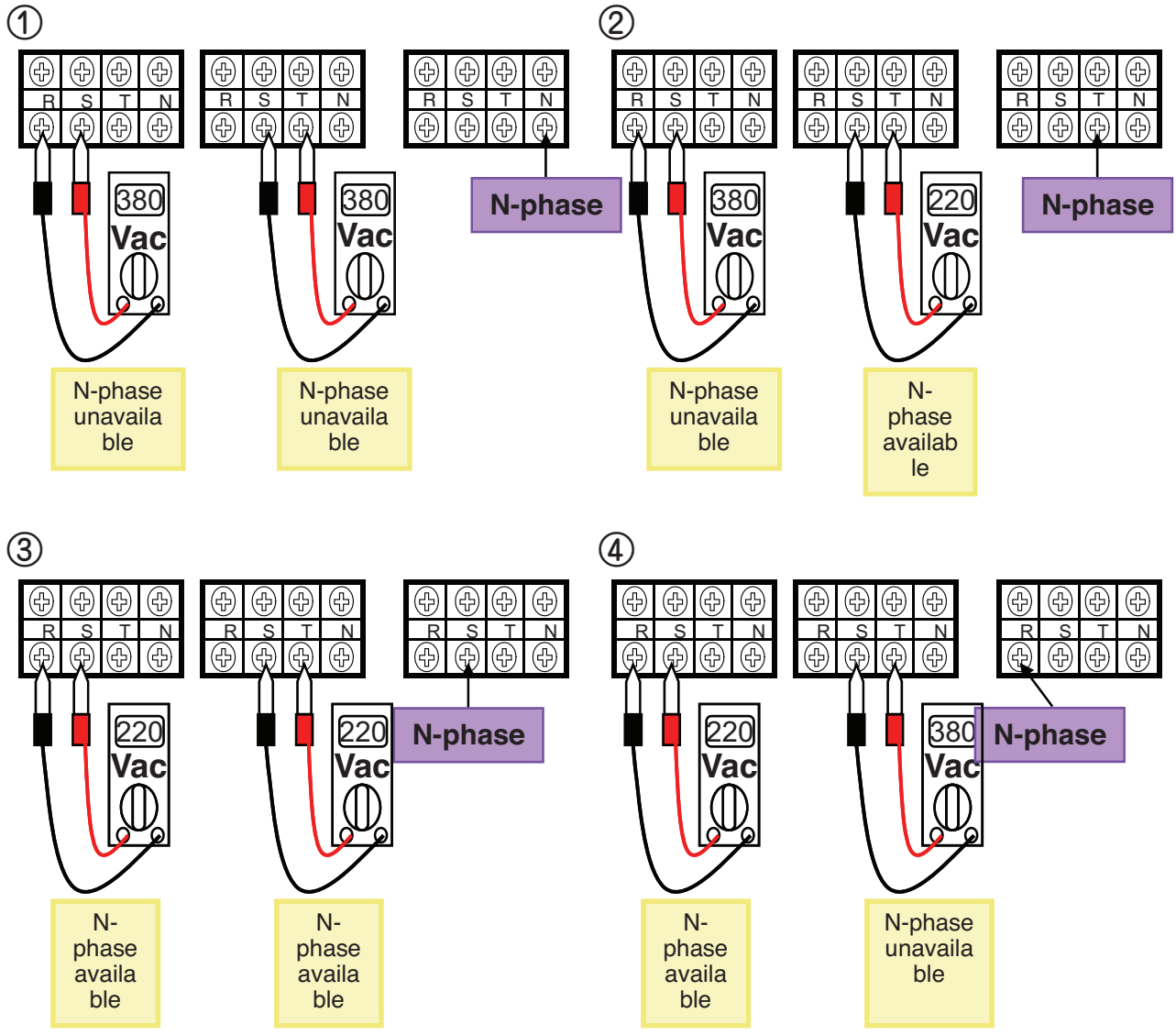


6.7 Troubleshooting Outdoor Error

CH 54 (Open and Reverse Phase Error)

Judgment method of N-phase wiring error

Set the tester in AC voltage measurement mode (The part having wave pattern)

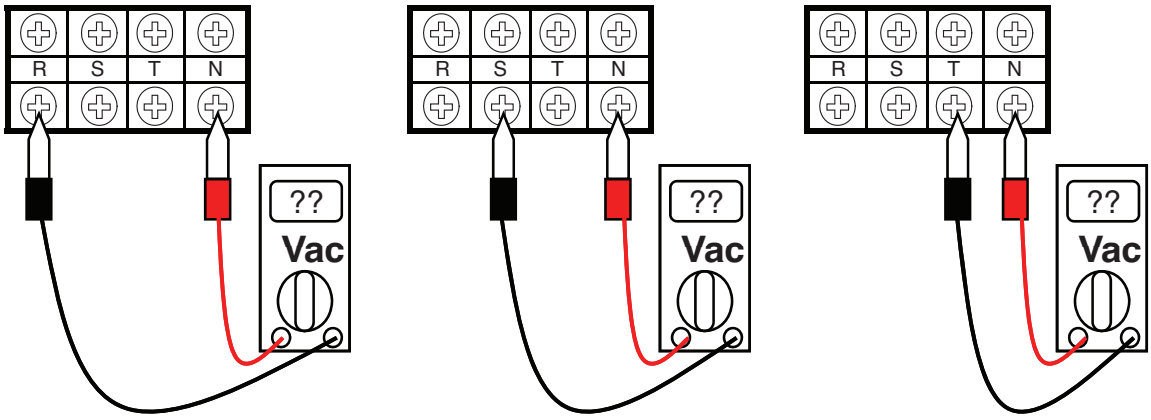


6.7 Troubleshooting Outdoor Error

CH 54 (Open and Reverse Phase Error)

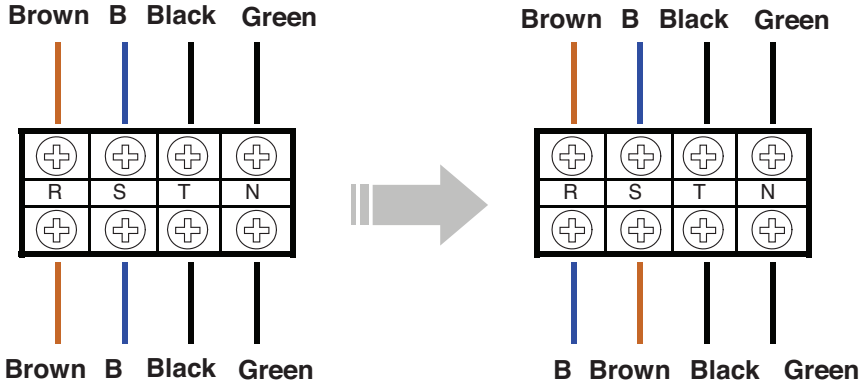
Judgment Method of R,S,T phase loss

- Set the tester in AC voltage measurement mode (The part having wave pattern)
- The part that does not generate voltage was upgraded.
- Power module requires checking..



Judgment method of open and reverse phase of R,S,T

- Operation with replacement of R and S phases only



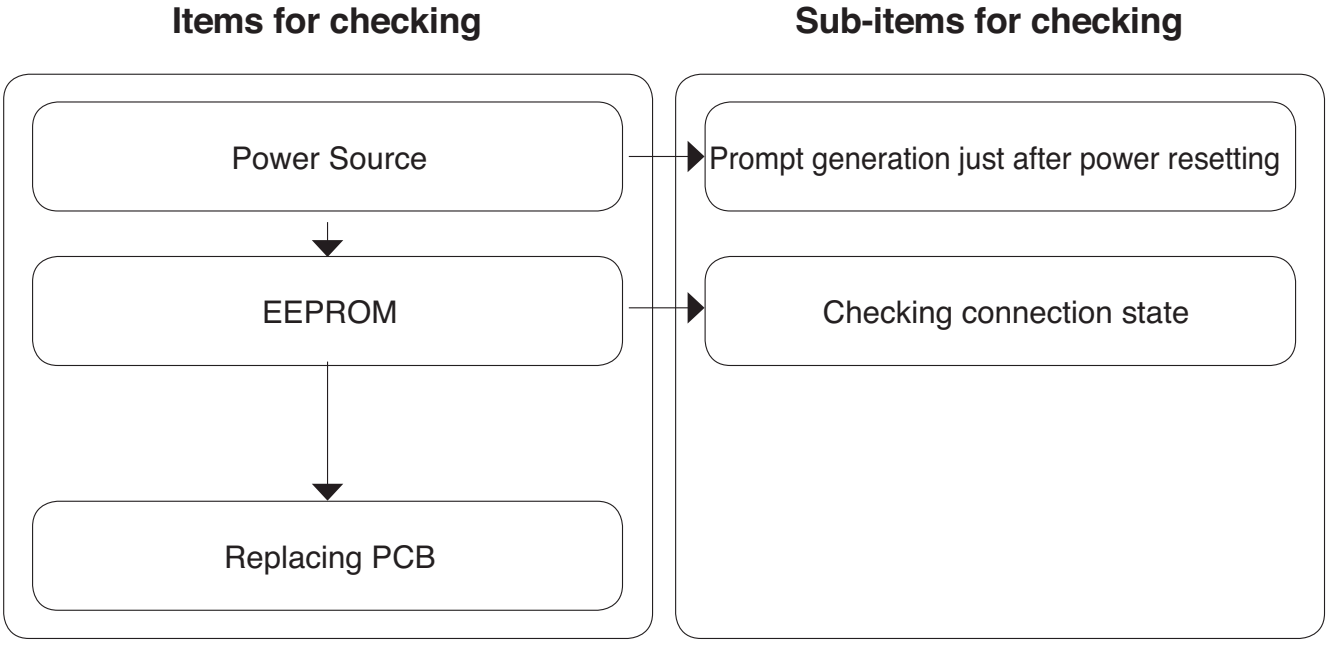
6.7 Troubleshooting Outdoor Error

CH 60 (EEPROM Fault)

- EEPROM : IC containing the operation data suitable to the product

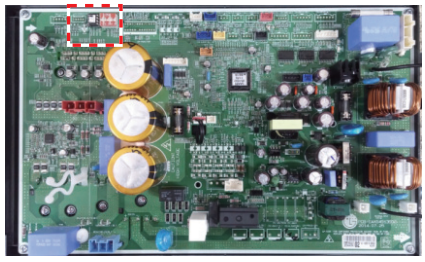
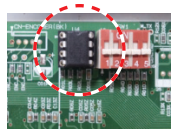
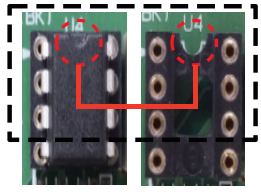
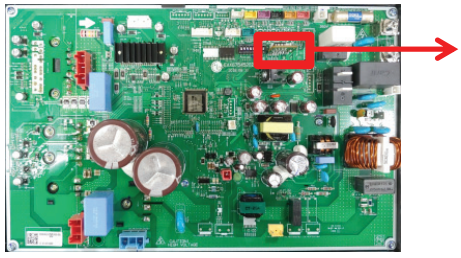
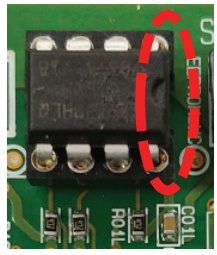
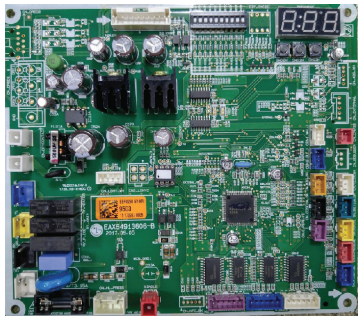
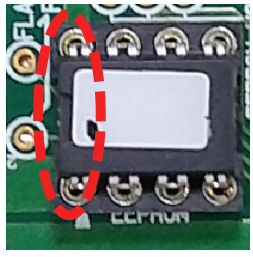
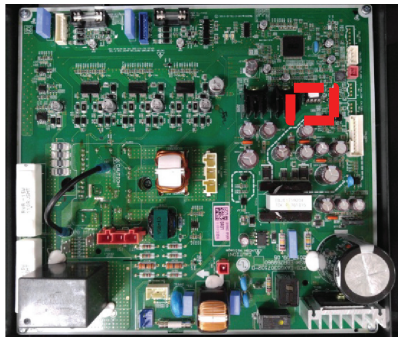
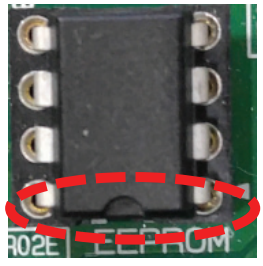
Items	Contents
Purpose	Prevention of application of wrong cycle data
Condition for Generation	Judgment of the error caused by noise and the fault of EEPROM con nection

Resetting power source: Wait for 3 minutes after turning the power of the product off.



■ How to check the EEPROM assembling state of outdoor devices

① Check the direction of EEPROM
(Shape of marking line and direction of EEPROM)
② Check whether EEPROM is perfectly adhered.
③ Check whether EEPROM lead is put out of the outlet.

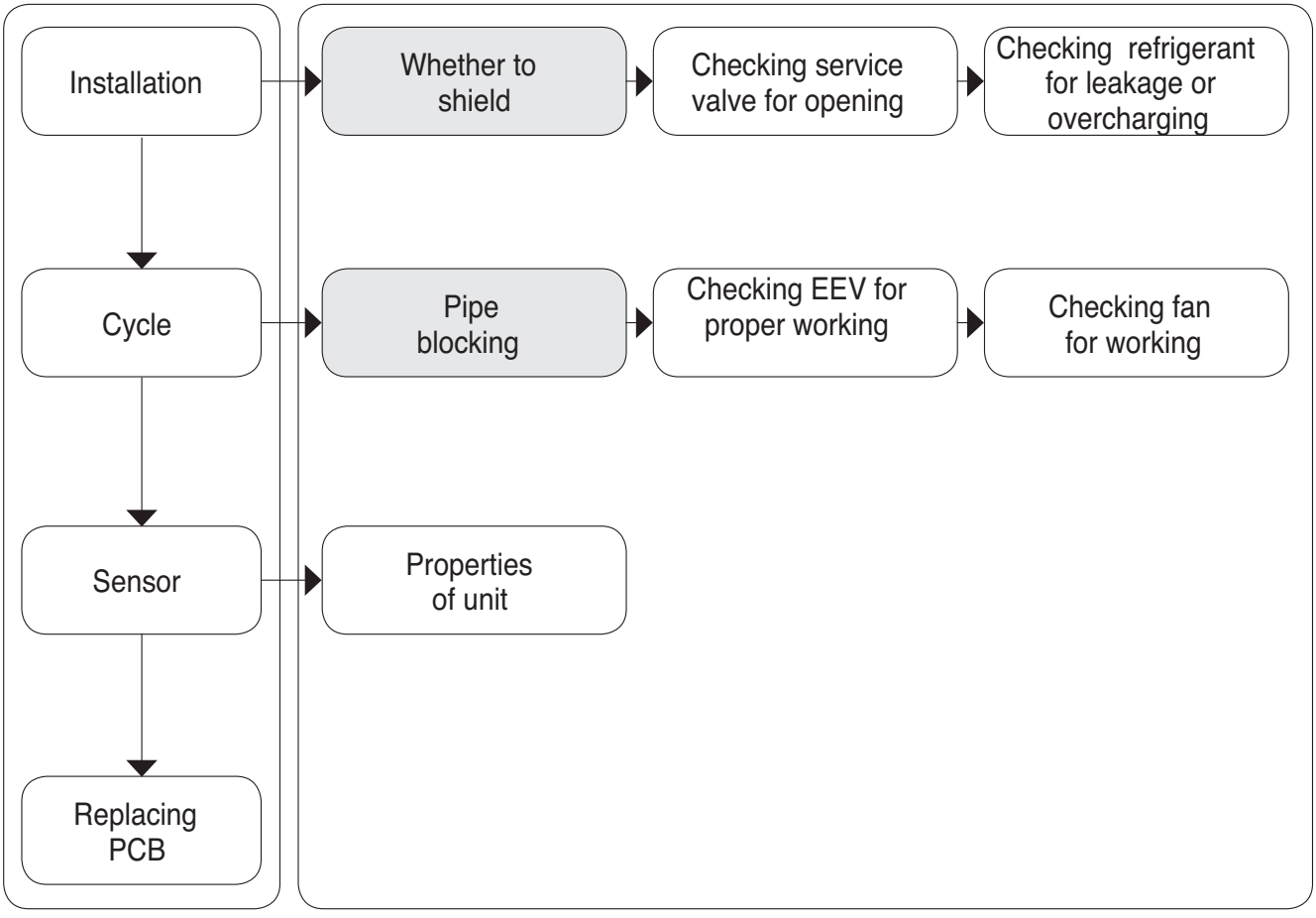
Division	EEPROM Position
4 kW	   EEPROM
4.5 kW	[Inverter PCBA]  [EEPROM PCBA] 
6 kW Inv.	 
6/7 kW Main	 
7 kW Inv.	 

6.7 Troubleshooting Outdoor Error

CH 61 (Condenser High Error)

Items	Contents
Purpose	Protection of compressor from elevated pressure and judgment whether to start defrosting
Condition for Generation	Shielding environment, cycle disorder, and sensor unit fault

Resetting power source: Wait for 3 minutes after turning the power of the product off.

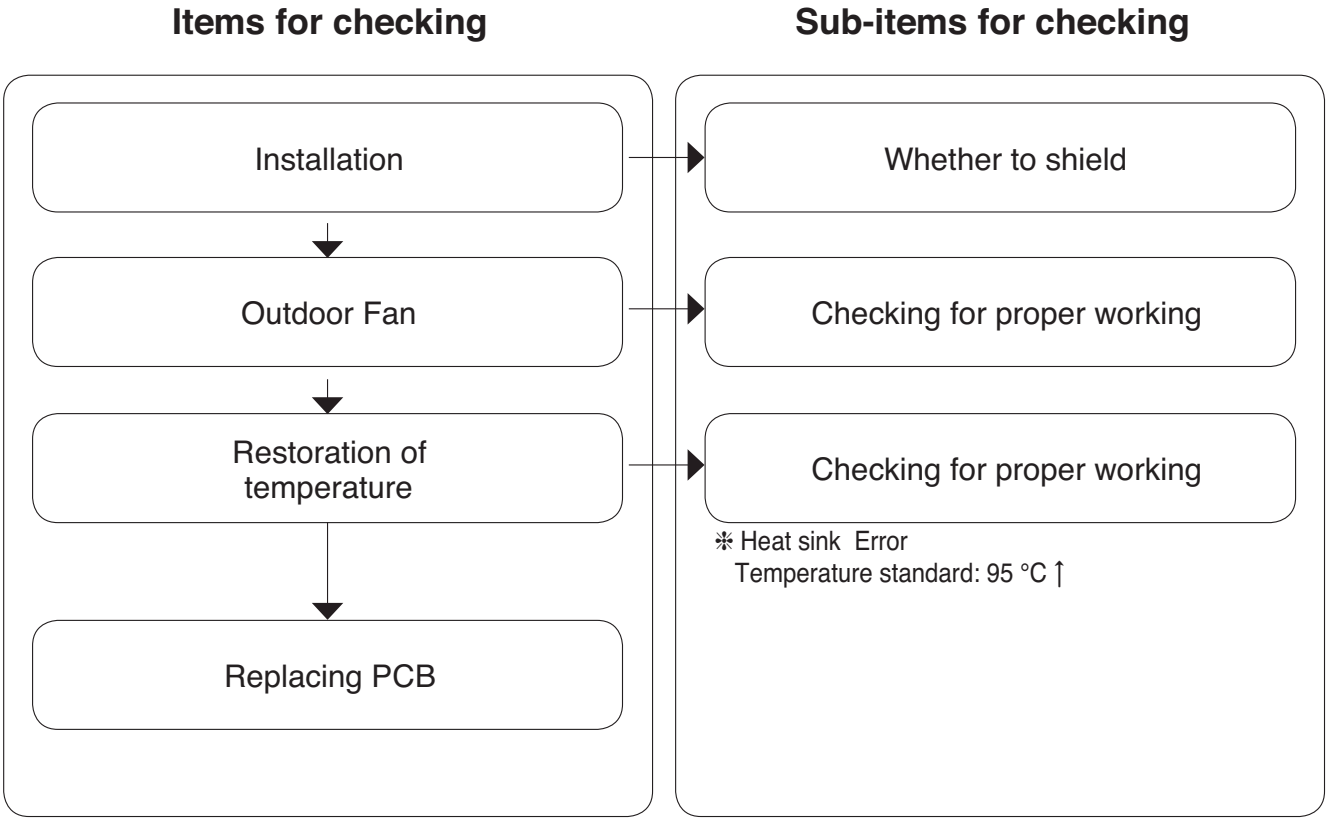


6.7 Troubleshooting Outdoor Error

CH 62 (Heat sink High Error)

Items	Contents
Purpose	Prevention of damage of IPM and PSCM/PFCM
Condition for Generation	Heat sink temperature reaches the limit level.

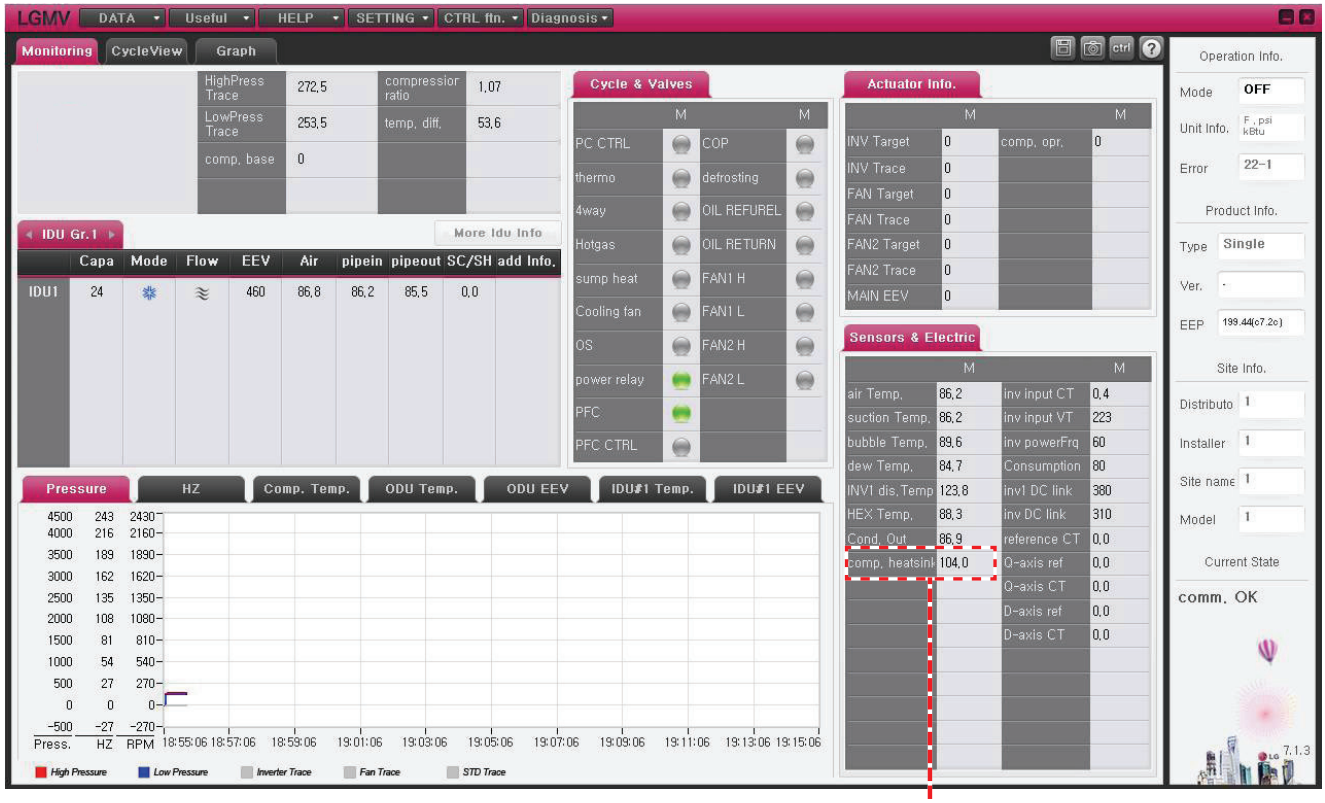
Resetting power source: Wait for 3 minutes after turning the power of the product off.



6.7 Troubleshooting Outdoor Error

CH 62 (Heat sink High Error)

Check LGMV for CH 62



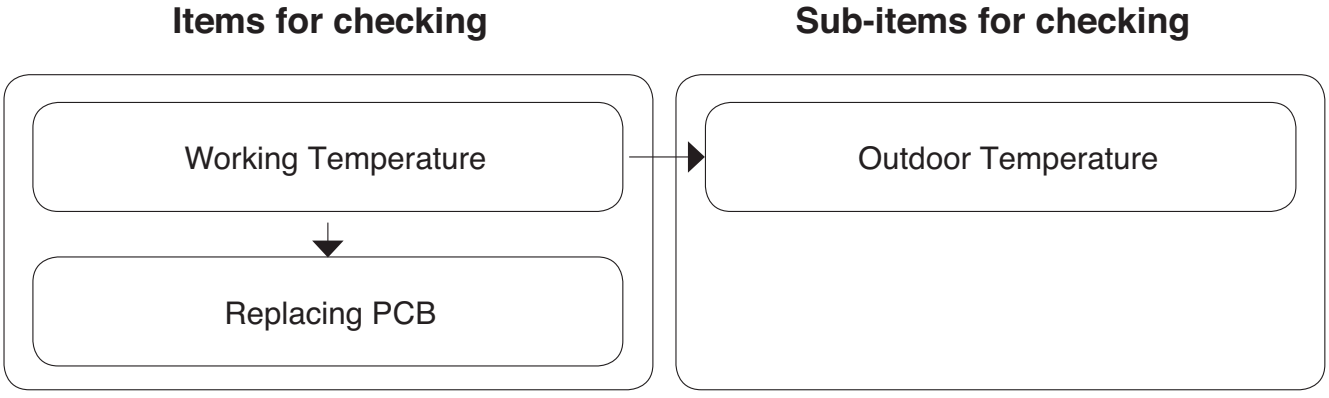
Heatsink High NG Temperature level

Controller	Temperature level
4 kW ↓	95 °C ↑
4.5 kW	95 °C ↑
6 kW	85 °C ↑
7 kW	125 °C ↑

6.7 Troubleshooting Outdoor Error

CH 65 (Heat sink Temperature Sensor Open/Short)

Items	Contents
Purpose	Prevention of damage or wrong control of PCBA (PSCM/PFCM,IPM) caused by heat sink temperature detection error
Condition for Generation	Detected temperature is ≤ -40 °C or ≥ 200 °C.



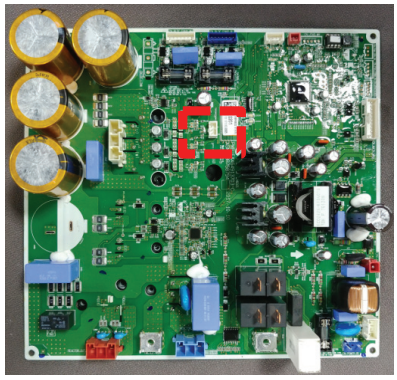
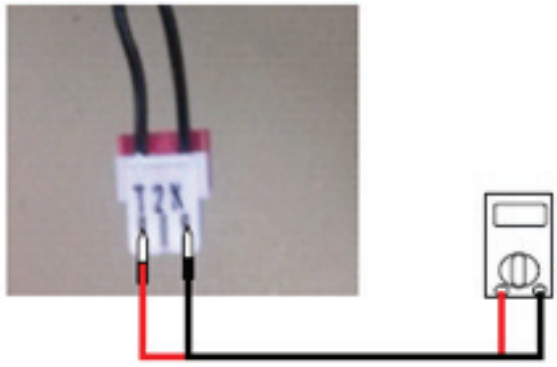
Environmental factor checking method

1) The products works when outdoor temperature is ≤ -20 °C.
2) Generation of CH65 case 10 minutes after the operation of the product

➡ If both of above-stated conditions are satisfied, environmental factor is the cause.

Sensor checking method

1. Power Off
2. Measure the resistance using a tester.
3. Measure the resistance Heat sink Temp point (Refer to the next page)
   (based on 25 °C, 10 kΩ ± 10 %)

Division	Heat sink Tempe Sensor Point
6 kW	 

6.7 Troubleshooting Outdoor Error

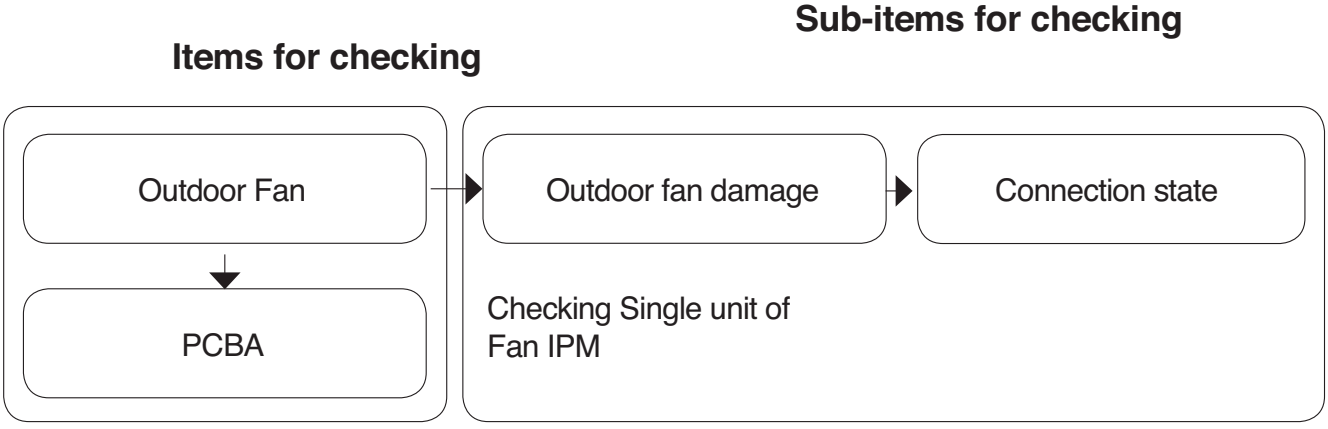
CH 67 (Fan Lock)

Items	Contents
Purpose	Detection of no proper operation of the fan.
Condition for Generation	The fan is not operated at the rpm exceeding the standard.

CH67 Cause of Generation

Classification	Causes in Detail
Fan	Fan motor damage and fan connection fault
PCB Assembly	Damage of fan motor driving circuit

Trouble Checking Flow



Cautions

1) Both the fan and PCB may be damaged when the fan connector is mounted or removed in the state that the power is supplied.
2) Both the fan and PCB may be damaged when the fan connector is inserted in reverse direction..
3) If fan motor fault is identified, PCB should be also replaced in consideration of possible damage of PCB.

6.7 Troubleshooting Outdoor Error

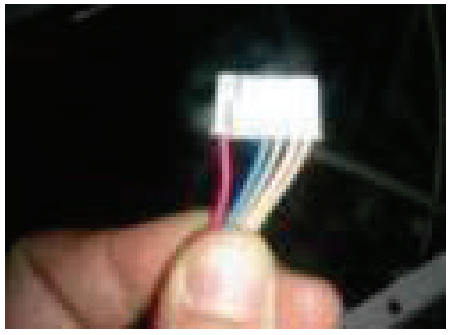
CH 67 (Fan Lock)

Checking Fan motor

1. Check alien substance in the Fan.
2. Check the imprisonment of fan → Please turn Fan, if fan is turn, ok.
3. Check the terminal.

4. Check the Motor. Refer to the below.

■ How to check the outdoor fan motor of BLDC



-. Checking wire terminals for possible short

Tester		Normal resistance (±10 %)	
①	④	∞	∞
⑤	④	Dozens kΩ ~hundreds kΩ	Dozens kΩ ~hundreds kΩ
⑥	④	∞	∞
⑦	④	Dozens kΩ ~hundreds kΩ	Dozens kΩ ~hundreds kΩ

6.7 Troubleshooting Outdoor Error

CH 67 (Fan Lock)

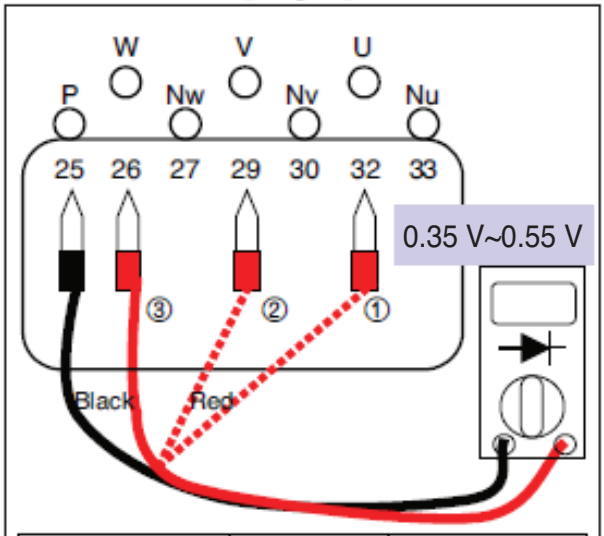
Fan IPM Check

Purpose	Judgment of the Fan IPM part fault of PCB assembly.	Items for checking	1. Judgment of damage of IGBT 2. Checking the soldering state

■ How to check Fan IPM IGBT (Diode Mode)

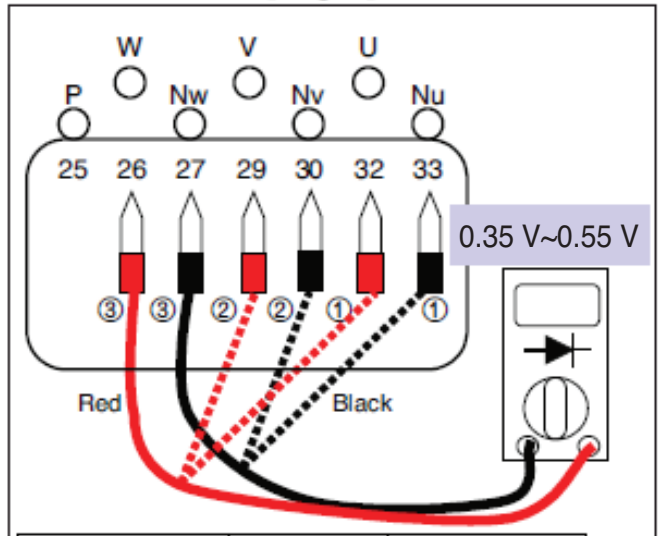
1. Remove the connector from PCB.
2. Set the Multi-Tester as Diode Voltage Measurement Mode. (→|)
3. Measure the voltages of P~U / P~V / P~W as shown in Fig. 1.
4. Measure the voltages of U~Nu / V~Nv / W~Nw as shown in Fig. 2.
5. If the measurements are significantly different from the levels shown in the figures, the IPM is deemed to be damaged.

[Fig.1]



Sequence of Measurement	Measurement	Normal Standards
1	P-U	0.35 V~0.55 V
2	P-V	0.35 V~0.55 V
3	P-W	0.35 V~0.55 V

[Fig.2]

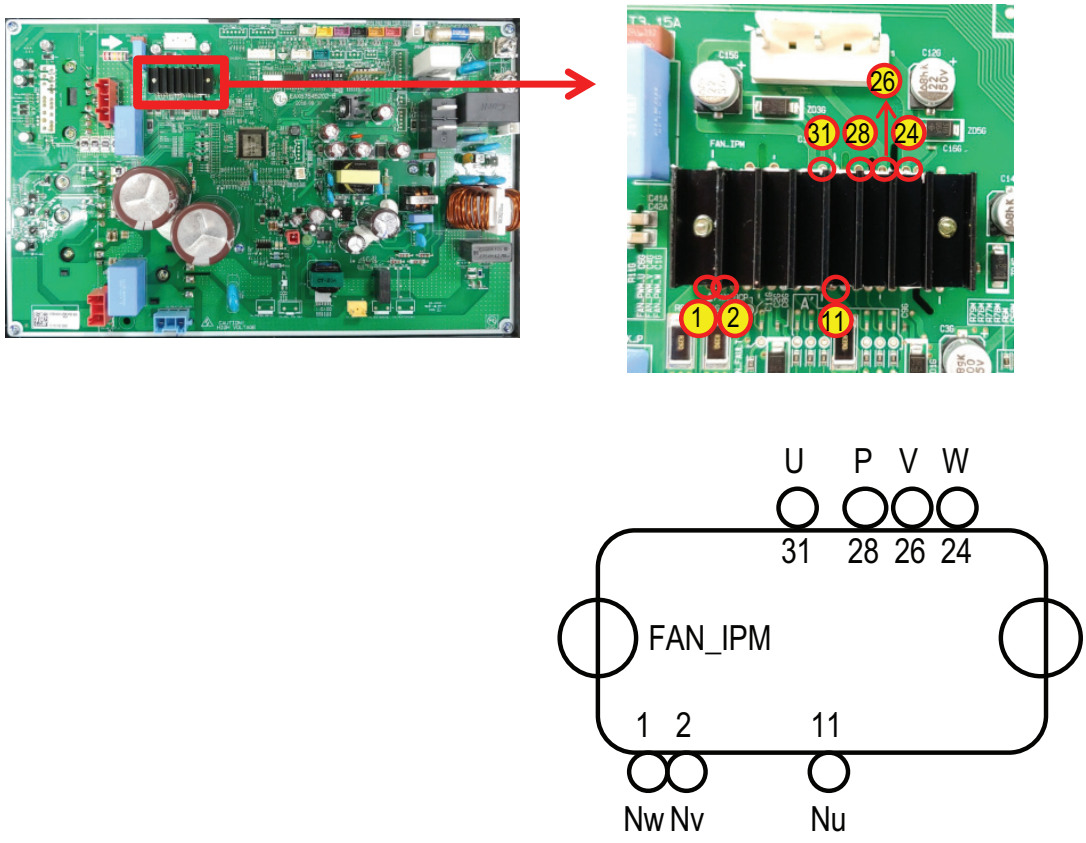


Sequence of Measurement	Measurement	Normal Standards
1	U-Nu	0.35 V~0.55 V
2	V-Nv	0.35 V~0.55 V
3	W-Nw	0.35 V~0.55 V

Purpose	Judgment of the Fan IPM part fault of PCB assembly.	**Items for checking**	1. Judgment of damage of IGBT 2. Checking the soldering state

Step	Flow of Inspection
1	Turn the power off (wait until the outdoor device LED is turned off)
2	Remove Fan wires.
3	Measure the voltage as shown in the figure.
4	Check the voltage for being in the range of 0.35 V ~ 0.55 V
5	Judge Fan IPM Pins for short.

■ Fan IPM Check Point

Division	Fan IPM Check Point
4.5 kW	

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