Internal Use Only

http://biz.lgservice.com

MULTI V™ MINI System

SVC MANUAL

MODEL: ARUN Series
(1Ø, 208/230V, 60Hz)

CAUTION

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

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Safety Precautions

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.

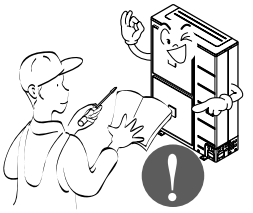
⃠	**Be sure not to do.**
❗	**Be sure to follow the instruction.**

⚠WARNING

■ Installation

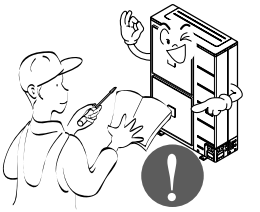
Have all electric work done by a licensed electrician according to "Electric Facility Engineering Standard" and "Interior Wire Regulations" and the instructions given in this manual and always use a special circuit.

- If the power source capacity is inadequate or electric work is performed improperly, electric shock or fire may result.



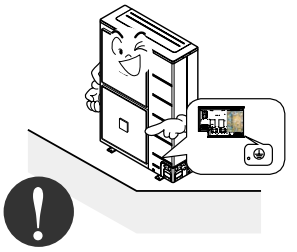
Ask the dealer or an authorized technician to install the air conditioner.

- Improper installation by the user may result in water leakage, electric shock, or fire.



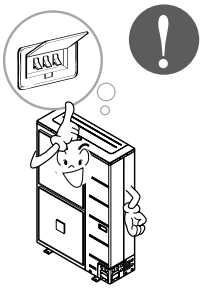
Always ground the product.

- There is risk of fire or electric shock.



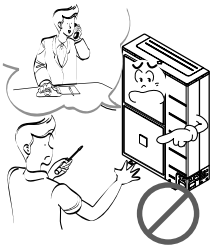
Always intstall a dedicated circuit and breaker.

- Improper wiring or installation may cause fire or electric shock.



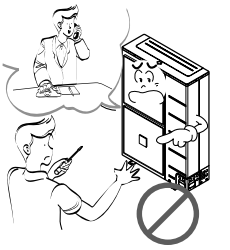
For re-installation of the installed product, always contact a dealer or an Authorized Service Center.

- There is risk of fire, electric shock, explosion, or injury.



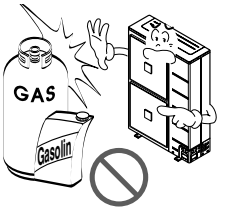
Do not install, remove, or re-install the unit by yourself (customer).

- There is risk of fire, electric shock, explosion, or injury.



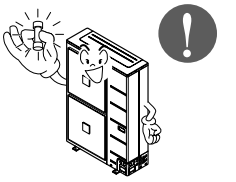
Do not store or use flammable gas or combustibles near the air conditioner.

- There is risk of fire or failure of product.



Use the correctly rated breaker or fuse.

- There is risk of fire or electric shock.

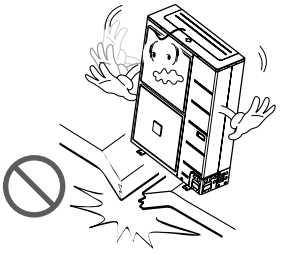


Prepare for strong wind or earthquake and install the unit at the specified place.

- Improper installation may cause the unit to topple and result in injury.

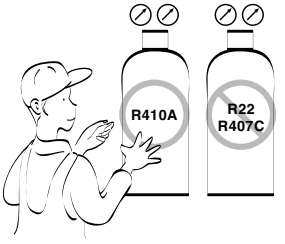
Do not install the product on a defective installation stand.

- It may cause injury, accident, or damage to the product.



When installing and moving the air conditioner to another site, do not charge it with a different refrigerant from the refrigerant specified on the unit.

- If a different refrigerant or air is mixed with the original refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.

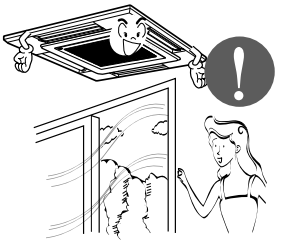


Do not reconstruct to change the settings of the protection devices.

- If the pressure switch, thermal switch, or other protection device is shorted and operated forcibly, or parts other than those specified by LGE are used, fire or explosion may result.

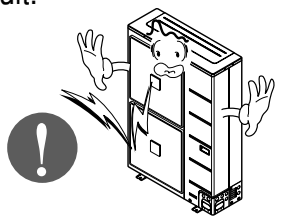
Ventilate before operating air conditioner when gas leaked out.

- It may cause explosion, fire, and burn.



Securely install the cover of control box and the panel.

- If the cover and panel are not installed securely, dust or water may enter the outdoor unit and fire or electric shock may result.



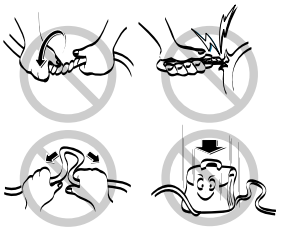
If the air conditioner is installed in a small room, measures must be taken to prevent the refrigerant concentration from exceeding the safety limit when the refrigerant leaks.

- Consult the dealer regarding the appropriate measures to prevent the safety limit from being exceeded. Should the refrigerant leak and cause the safety limit to be exceeded, harzards due to lack of oxygen in the room could result.

■ Operation

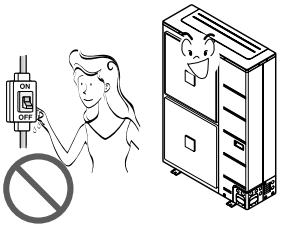
Do not damage or use an unspecified power cord.

- There is risk of fire, electric shock, explosion, or injury.



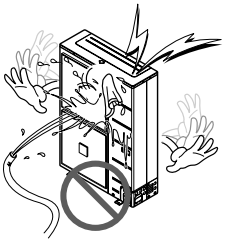
Use a dedicated outlet for this appliance.

- There is risk of fire or electrical shock.



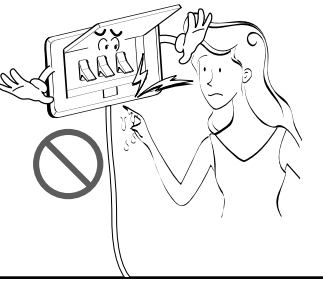
Be cautious that water could not enter the product.

- There is risk of fire, electric shock, or product damage.



Do not touch the power switch with wet hands.

- There is risk of fire, electric shock, explosion, or injury.



When the product is soaked (flooded or submerged), contact an Authorized Service Center.

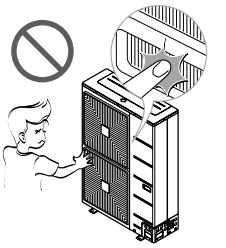
- There is risk of fire or electric shock.

Take care to ensure that nobody could step on or fall onto the outdoor unit.

- This could result in personal injury and product damage.

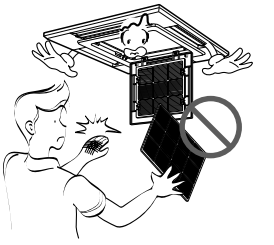
Be cautious not to touch the sharp edges when installing.

- It may cause injury.



Do not open the inlet grille of the product during operation. (Do not touch the electro-static filter, if the unit is so equipped.)

- There is risk of physical injury, electric shock, or product failure.

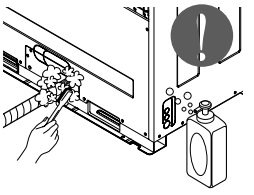


⚠ CAUTION

■ Installation

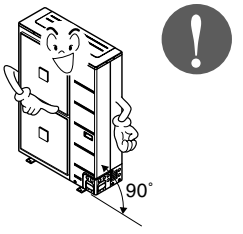
Always check for gas (refrigerant) leakage after installation or repair of product.

- Low refrigerant levels may cause failure of product.



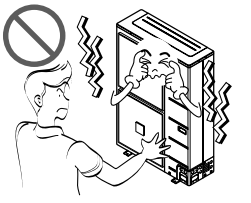
Keep level even when installing the product.

- To avoid vibration or water leakage.



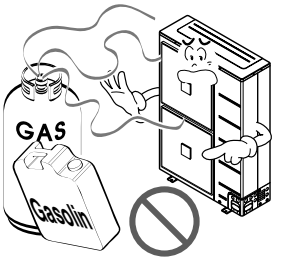
Do not install the product where the noise or hot air from the outdoor unit could damage the neighborhoods.

- It may cause a problem for your neighbors.



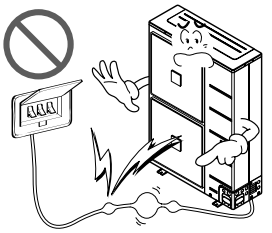
Do not install the unit where combustible gas may leak.

- If the gas leaks and accumulates around the unit, an explosion may result.



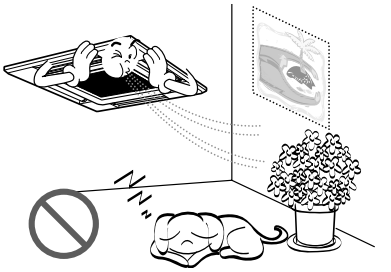
Use power cables of sufficient current carrying capacity and rating.

- Cables that are too small may leak, generate heat, and cause a fire.



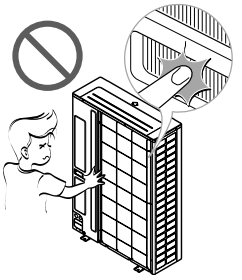
Do not use the product for special purposes, such as preserving foods, works of art, etc. It is a consumer air conditioner, not a precision refrigeration system.

- There is risk of damage or loss of property.



Keep the unit away from children. The heat exchanger is very sharp.

- It can cause the injury, such as cutting the finger. Also the damaged fin may result in degradation of capacity.

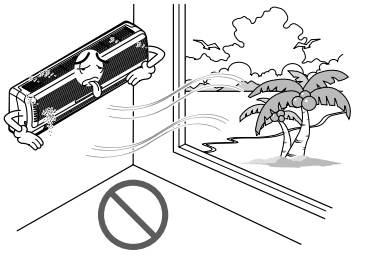


When installting the unit in a hospital, communication station, or similar place, provide sufficient protection against noise.

- The inverter equipment, private power generator, high-frequency medical equipment, or radio communication equipment may cause the air conditioner to operate erroneously, or fail to operate. On the other hand, the air conditioner may affect such equipment by creating noise that disturbs medical treatment or image broadcasting.

Do not install the product where it is exposed to sea wind (salt spray) directly.

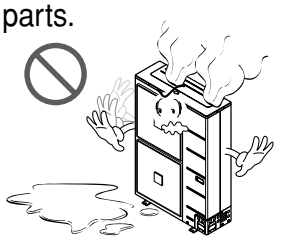
- It may cause corrosion on the product. Corrosion, particularly on the condenser and evaporator fins, could cause product malfunction or inefficient operation.



■ Operation

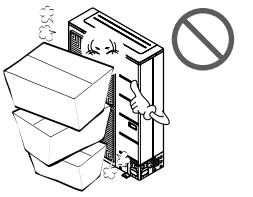
Do not use the air conditioner in special environments.

- Oil, steam, sulfuric smoke, etc. can significantly reduce the performance of the air conditioner or damage its parts.



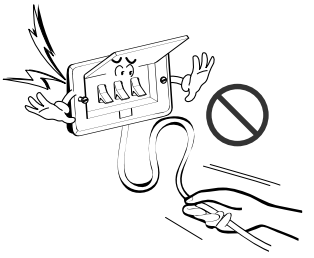
Do not block the inlet or outlet.

- It may cause failure of appliance or accident.



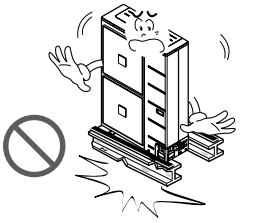
Make the connections securely so that the outside force of the cable may not be applied to the terminals.

- Inadequate connection and fastening may generate heat and cause a fire.



Be sure the installation area does not deteriorate with age.

- If the base collapses, the air conditioner could fall with it, causing property damage, product failure, or personal injury.



Install and insulate the drain hose to ensure that water is drained away properly based on the installation manual.

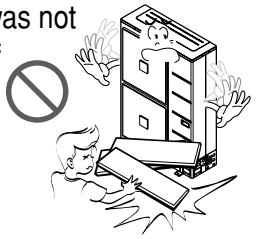
- A bad connection may cause water leakage.

Be very careful about product transportation.

- Only one person should not carry the product if it weighs more than 20 kg (44 lbs).
- Some products use PP bands for packaging. Do not use any PP bands for a means of transportation. It is dangerous.
- Do not touch the heat exchanger fins. Doing so may cut your fingers.
- When transporting the outdoor unit, suspending it at the specified positions on the unit base. Also support the outdoor unit at four points so that it cannot slip sideways.

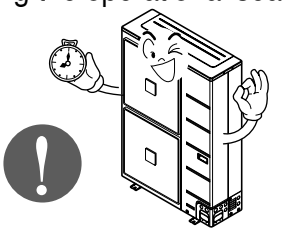
Safely dispose of the packing materials.

- Packing materials, such as nails and other metal or wooden parts, may cause stabs or other injuries.
- Tear apart and throw away plastic packaging bags so that children may not play with them. If children play with a plastic bag which was not torn apart, they face the risk of suffocation.



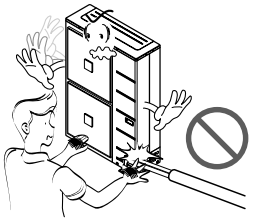
Turn on the power at least 6 hours before starting operation.

- Starting operation immediately after turning on the main power switch can result in severe damage to internal parts. Keep the power switch turned on during the operational season.



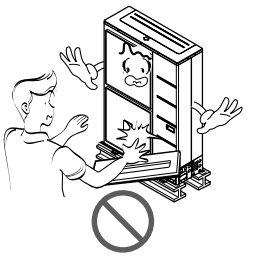
Do not touch any of the refrigerant piping during and after operation.

- It can cause a burn or frostbite.



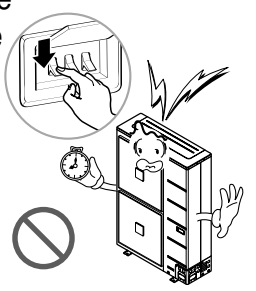
Do not operate the air conditioner with the panels or guards removed.

- Rotating, hot, or high-voltage parts can cause injuries.

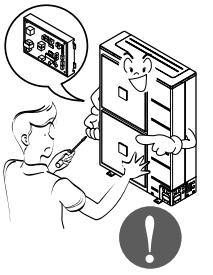


Do not directly turn off the main power switch after stopping operation.

- Wait at least 5 minutes before turning off the main power switch. Otherwise it may result in water leakage or other problems.



Auto-addressing should be done in condition of connecting the power of all indoor and outdoour units. Auto-addressing should also be done in case of changing the indoor unit PCB.

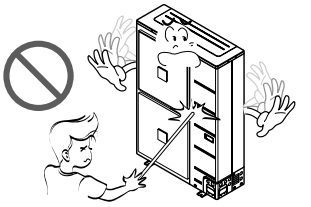


Use a firm stool or ladder when cleaning or maintaining the air conditioner.

- Be careful and avoid personal injury.

Do not insert hands or other objects through the air inlet or outlet while the air conditioner is plugged in.

- There are sharp and moving parts that could cause personal injury.



Part 1
General Information

1. Model Names

Outdoor Unit

Power Supply	4HP	5HP
1Ø, 208~230V, 60Hz	038GS2	048GS2

Heat Pump	ARUN

2. External Appearance

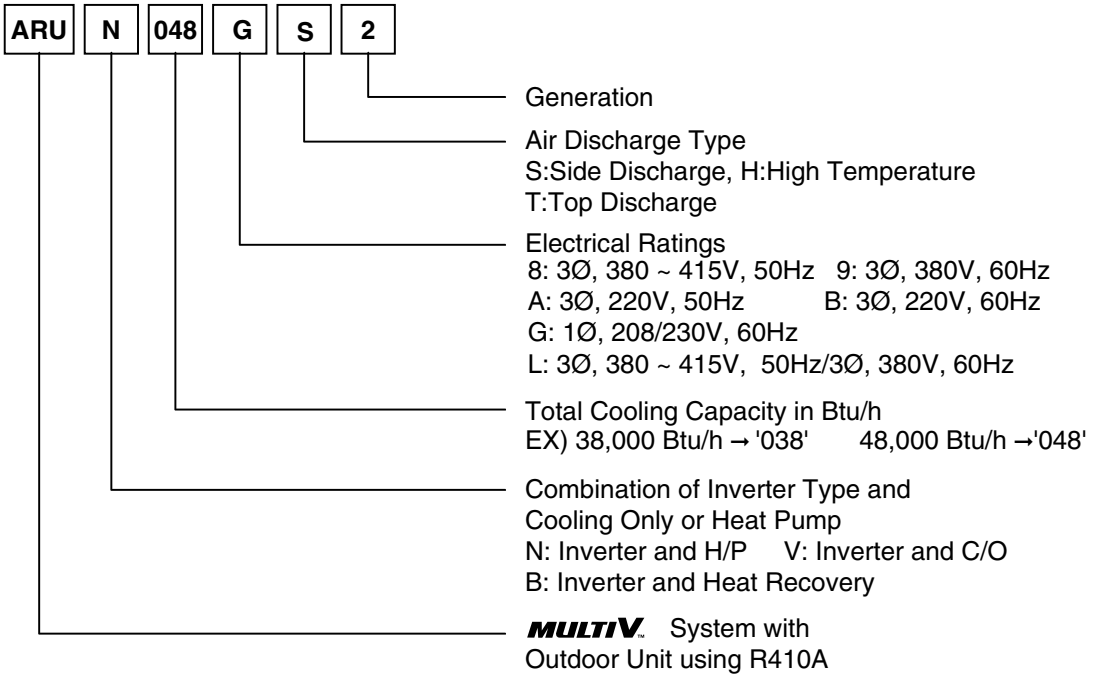
Outdoor Units

ARUN038GS2
ARUN048GS2

4, 5 HP

3. Nomenclature

3.1 Outdoor Unit



Part 2
Outdoor Units

ARUN Series

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1. Basic Control

1.1 Normal operation

Actuator	Cooling operation	Heating operation	Stop state
Compressor	Fuzzy control	Fuzzy control	Stop
Fan	Fuzzy control	Fuzzy control	Stop
Main EEV	Full open	Fuzzy control	Close
4 way valve	OFF	ON	1 hour after stop & outdoor temp. < 27˚C(81˚F) ➡ OFF
Subcooling EEV	Fuzzy control	Fuzzy control	Close
Indoor Unit EEV	Superheat fuzzy control	Subcooling fuzzy control	Before 10 min. : Min. pulse After 10 min. : Max. pulse

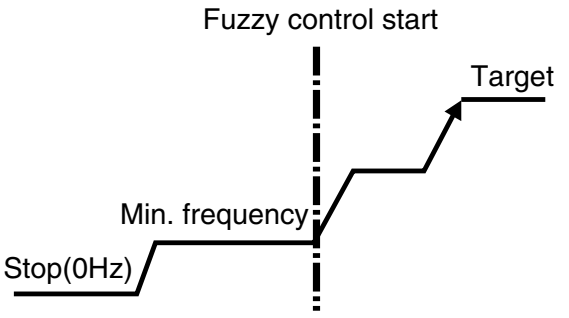
Note : Heating operation is not functional at an outdoor air temperature of 27°C(81°F) or more.

1.2 Compressor control

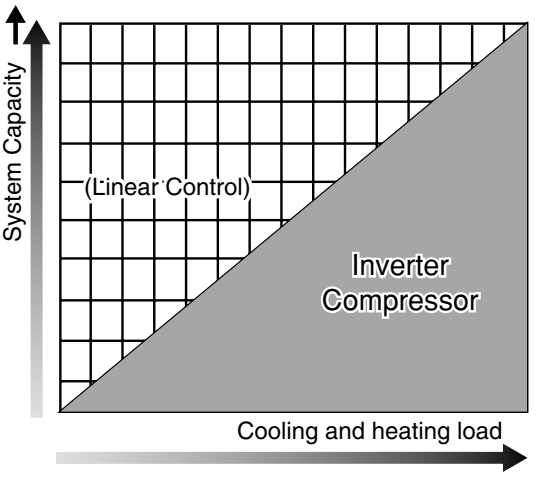
Fuzzy control : Maintain evaporating temperature(Te) to be constant on cooling mode and condensing temperature(Tc) on heating mode by Fuzzy control to ensure the stable system performance.
(Tc:47 ~51°C(117~124°F), Te:2 ~ 5°C(36~41°F)
(1) Cooling mode
Te can be set by initial DIP switch setting. (Standard, Long pipe)

(2) Heating mode
Tc can be set by initial DIP switch setting. (Standard, Long pipe)

Note: By setting DIP switch, Te and Tc are decided simultaneously.



Fuzzy Control



Inverter linear control as cooling and heating load increasing

1.3 EEV control

(1) EEV control
EEV operates with fuzzy control rules to keep the degree of super Heat(Superheat) (about 3°C(6°F)at the evaporator outlet stable during heating mode
The degree of Superheat = Tsuction - Tevaporation
Tsuction : temperature at suction pipe sensor(°C/°F)
Tevaporation : evaporation temperature equivalent to low pressure(°C/°F)

(2) Subcooling EEV control(about 15°C(27°F))
Subcooling EEV works with fuzzy rules to keep the degree of Subcool at the outlet of subcooler during cooling mode
The degree of Subcool = Tsubcool_out - Tevaporation
Tsubcool_out : temperatrue at outlet of subcooler(°C/°F)
Tevaporation : evaporation temperature equivalent to low pressure(°C/°F)

2. Special Control

2.1 Oil return control

2.1.1 Oil return control on cooling mode

Oil return operation recovers oil amount in compressor by collecting oil accumulated in pipe.
Each cycle component operates as following table during oil return operation.

Outdoor Unit

Component	Starting	Running	Ending
Inverter compressor	30Hz	Setting Value	40Hz
Fan	Normal control	Normal control	Normal control
Main EEV	Max. pulse	Max. pulse	Max. pulse
Subcooling EEV	Min. pulse	Min. pulse	100 pulse
4way valve	OFF	OFF	OFF
Hot gas bypass valve	Normal control	Normal control	Normal control

Indoor Unit

Component	Starting	Running	Ending
Fan	Normal control	Normal control	Normal control
Thermo on unit EEV	Normal control	1200 pulse	Normal control
Thermo off unit EEV	Min. pulse	1200 pulse	Min. pulse
Oil return signal	OFF	ON	OFF

- Oil return operation time : 6 min. for running step
- Starting condition:every 6 hours operate
- Oil return process ends if compressor protection control starts

2.1.2 Oil return control on heating mode

Outdoor Unit

Component	Starting	Running	Ending
Inverter compressor	30Hz	Setting Value	30Hz
Fan	Normal control	0Hz → Normal control → 700 RPM	Normal control
Main EEV	Normal control	Max. pulse	200 pulse
Subcooling EEV	Normal control	Normal control	Normal control
4way valve	ON	ON → OFF → ON	ON
Hot gas bypass valve	ON	ON	ON

Indoor Unit

Component	Starting	Running	Ending
Fan	Normal control	OFF	Normal control
Thermo on unit EEV	Normal control	1200 pulse	Normal control
Thermo off unit EEV	Min. pulse	1200 pulse	Min. pulse
Oil return signal	OFF	ON	OFF

- Oil return operation time : 3 min. for running step
- Starting condition:same as cooling mode
- Oil return process ends if compressor protection control starts

2.2 Defrost

Defrost operation eliminates ice attached on heat exchanger, recovering performance of heat exchanger.
Each cycle component operates as following table during defrost operation.

Outdoor Unit

Component	Starting	Running	Ending
Inverter compressor	30Hz	Setting Value	30Hz
Fan	Normal control	0Hz → Normal control → 700 RPM	Normal control
Main EEV	Normal control	Max. pulse	200 pulse
Subcooling EEV	Normal control	Normal control	Normal control
4way valve	ON	ON → OFF → ON	ON
Hot gas bypass valve	ON	ON	ON

Indoor Unit

Component	Starting	Running	Ending
Fan	Normal control	OFF	Normal control
Thermo on unit EEV	Normal control	1200 pulse	Normal control
Thermo off unit EEV	Min. pulse	1200 pulse	Min. pulse
Oil return signal	OFF	ON	OFF

■ Ending condition

1) All heat exchanger pipe temperature are above 15°C(59°F)(U3) for 30 sec.
2) The running time of defrost operation is over 30% of the total heating time
3) If compressor protection control starts by high discharge temperature of compressor etc.

2.3 Stopping operation

2.3.1 Stopping operation on cooling mode

Component	Operation	Note
Inverter compressor	0Hz	-
Fan	Stop	-
Main EEV	Min. pulse	-
Subcooling EEV	Min. pulse	-
4way valve	OFF	-
Hot gas bypass valve	OFF	After 15 min. (Before 15 min. : ON)

2.3.2 Stopping operation on heating mode

Component	Operation	Note
Inverter compressor	0Hz	-
Fan	Stop	-
Main EEV	Min. pulse	-
Subcooling EEV	Min. pulse	-
4way valve	OFF	1 hour after stop & outdoor temp. < 27˚C(81˚F) ➡ OFF
Hot gas bypass valve	OFF	After 15 min. (Before 15 min. : ON)

3. Protection control

3.1 Pressure protection control

3.1.1 Pressure control on cooling mode

■ **High pressure control**

Pressure range, kPa(psi)	Compressor	Fan	Hot gas
$P_h \geq 4003$ (580.6)	Stop	Stop	-
$P_h > 3448$ (500.1)	-5Hz/4sec.	+100RPM/4sec.	-
$P_h \geq 3219$ (466.9)	Frequency holding	Normal control	-
$P_h < 3219$ (466.9)	Normal control		-

P_h : high pressure

■ **Low pressure control**

Pressure range, kPa(psi)	Compressor	Fan	Hot gas
$P_l \leq 190$ (27.6) after 1min.	Stop	Stop	ON
$P_l \leq 190$ (27.6) before 1min.	-5Hz/4sec.	-100RPM/4sec.	
$P_l \leq 229$ (33.2)	Normal control	Frequency holding	
$P_l \geq 399$ (49.2)	Normal control		OFF

P_l : low pressure

❈ Frequency holding : frequency (or RPM) is not increasing (can decrease)

3.1.2 Pressure control on heating mode

■ High pressure control

Pressure range, kPa(psi)	Compressor	Fan	Hot gas
$P_h \geq 4003$ (580.6)	Stop	Stop	ON
$P_h > 3807$ (552.2)	-5Hz/4sec.	-50RPM/4sec.	
$P_h \geq 3644$ (528.5)	Normal control	Normal control	
$P_h \geq 3448$ (500.1)	Normal control	Frequency holding	
$P_h <$ Target Pressure	Normal control		OFF

P_h : high pressure

■ Low pressure control

Pressure range, kPa(psi)	Compressor	Fan	Hot gas
$P_l \leq 190$ (27.6) after 1min.	Stop	Stop	
$P_l \leq 190$ (27.6) before 1min.	-5Hz/4sec.	+100RPM/4sec.	ON
$P_l \leq 229$ (33.2)	Frequency holding	Normal control	
$P_l \leq 268$ (38.9)	Normal control		
$P_l > 307$ (44.5)			OFF

P_l : low pressure

❊ Frequency holding : frequency (or RPM) is not increasing (can decrease)

3.2 Discharge temperature control

■ **Outdoor unit control**

Temperature range	Compressor	Subcooling EEV
Tdis > 115˚C (239˚F)	System stop	
105˚C (221˚F) < Tdis ≤ 112˚C (234˚F)	Frequency down	Max. limit 490 pulse
Tdis ≤98˚C(208˚F)	Pressure control	Max. limit 300 pulse
Tdis >95˚C(203˚F)	Pressure control	10 pulse open /10sec

■ **Indoor unit control**

Temperature range	EEV
Tdis > 115˚C (239˚F)	System stop
103˚C (221˚F) < Tdis ≤ 115˚C (239˚F)	Emergency SH control
98˚C (208˚F) < Tdis ≤ 103˚C (221˚F)	Keep current control
Tdis ≤ 98˚C (208˚F)	SH control

3.3 Inverter protection control

	Normal operation	Frequency down	System stop
AC input current	26A or less	27A or more	29A or more
Compressor current	31A or less	31A or more	32A or more

❊ AC input current is inverter input current except constant speed compressor current(Noise filter passed current)

3.4 Pressure switch

- Main has pressure sensing switch in series between compressor and power relay.
- The state of pressure sensing switch is normally on. It has small electric current from 220V AC. Never touch the connecting terminal with hand nor short two wires directly.

4. Other Control

4.1 Initial Setup

There are 4 initial setup steps before running.
All DIP switch setting must be completed before initial setup.

EX) 5HP

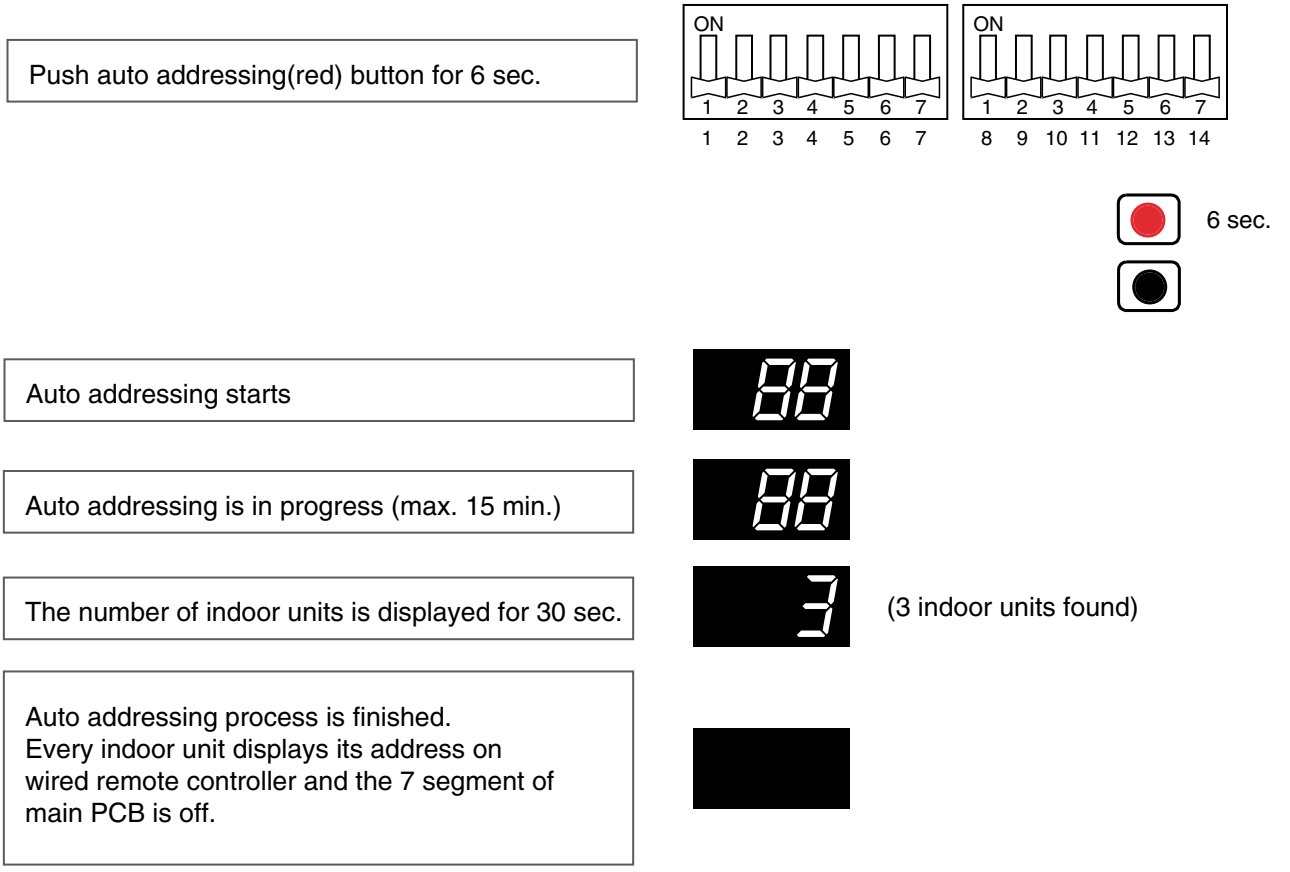
1) Step 1 : factory setting value display
   Factory setting value is displayed in 7 segment on PCB for 24sec.
   All DIP switches must be set properly before step 1.

Power is on	
Outdoor Model code is displayed (3sec)	121
Total capacity including sub units is displayed (2sec)	5
Heat pump : Display 2 is default value Cooling only : no display	2
Factory setting(25 is normal)	25
Model type	120

2) Step 2 : Communication check
- If all model code is displayed in 7 segment, communication between outdoor units is normal.

3) Step 3 : PCB error check
- After 40 sec, error check begins.
- All errors of units are displayed in 7 segment.
- If communication between main PCB and inverter PCB isn't normal, 521 is displayed in 7-segment. If error is displayed, check corresponding wires.

4) Step 4 : Auto addressing of indoor units
- Auto addressing begins when address(red) button in Main PCB is pressed for 6 sec.
- During auto addressing, 7 segment on main PCB displays "88"
- After auto addressing, the number of indoor units is displayed in 7 segment for 30 sec. The address of each indoor unit is displayed on each wired remote controller.

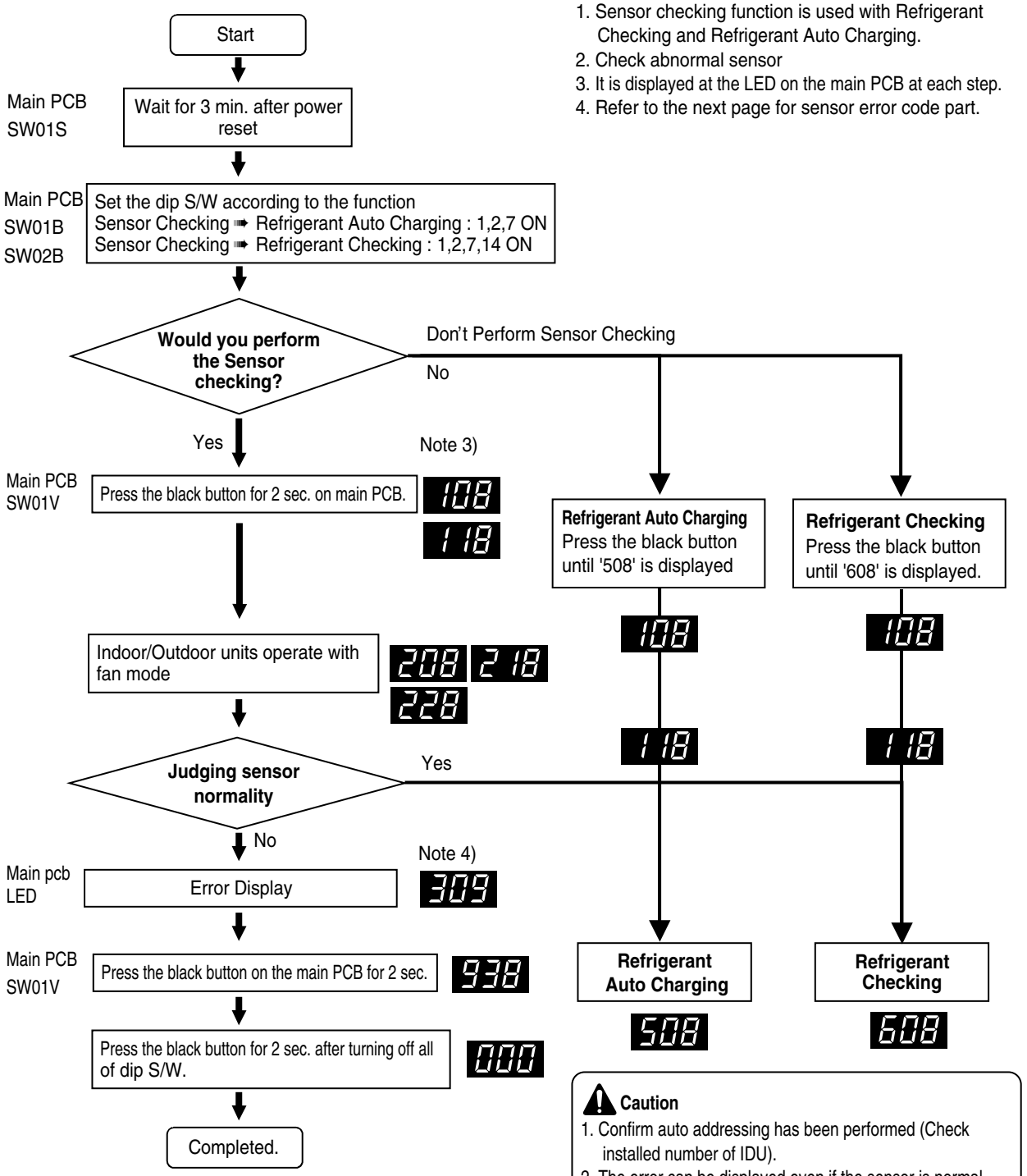


4.2 Sensor Checking Function Note 1)

Sensor checking function judges whether the current temperature of indoor and outdoor unit sensors is right or not. Sensor checking checks 3 indoor temperature sensors, 9 outdoor temperature sensors, 2 outdoor pressure sensors. It is used for judging sensor abnormality. Note 2)

Note

1. Sensor checking function is used with Refrigerant Checking and Refrigerant Auto Charging.
2. Check abnormal sensor
3. It is displayed at the LED on the main PCB at each step.
4. Refer to the next page for sensor error code part.



Caution

1. Confirm auto addressing has been performed (Check installed number of IDU).
2. The error can be displayed even if the sensor is normal according to installation and temperature condition. If error occurs, check the sensor and judge abnormality.

4.2.1 Sensor Check Error Code Display

In case error occurs during sensor checking process, error display is as shown below.

Following contents are displayed one after the other on the main PCB of outdoor unit.

Indoor sensor error : 319

↓

Outdoor sensor error : 309

↓

Displaying error content

Displaying error content

■ Indoor unit error display

1. 1st and 2nd number represents indoor unit number.
   Indoor unit number follows auto addressing number.
2. Last number represents sensor.

1	Pipe inlet temperature sensor
2	Pipe outlet temperature sensor
3	Air temperature sensor

ex) Indoor unit No. 2 pipe inlet temperature sensor error

■ Displaying outdoor unit error

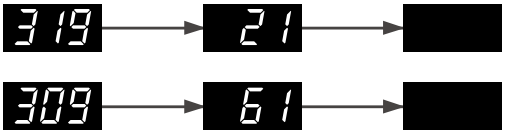
1.1st and 2nd number represents error content(code).

2.Last number represents outdoor unit number.

1	Outdoor Air Temperature
2	Heat Exchanger 1
3	Heat Exchanger 2
4	Inverter Compressor Discharge Temperature
5	Constant Speed Compressor Discharge Temperature
6	Suction Temperature
7	Liquid Pipe Temperature
8	SC pipe in
9	SC pipe out
10	High Pressure Sensor
11	Low Pressure Sensor

ex) Outdoor unit liquid pipe temperature sensor error

ex) Indoor unit No.2 pipe inlet temperature sensor error and outdoor unitsuction temperature sensor error



Caution

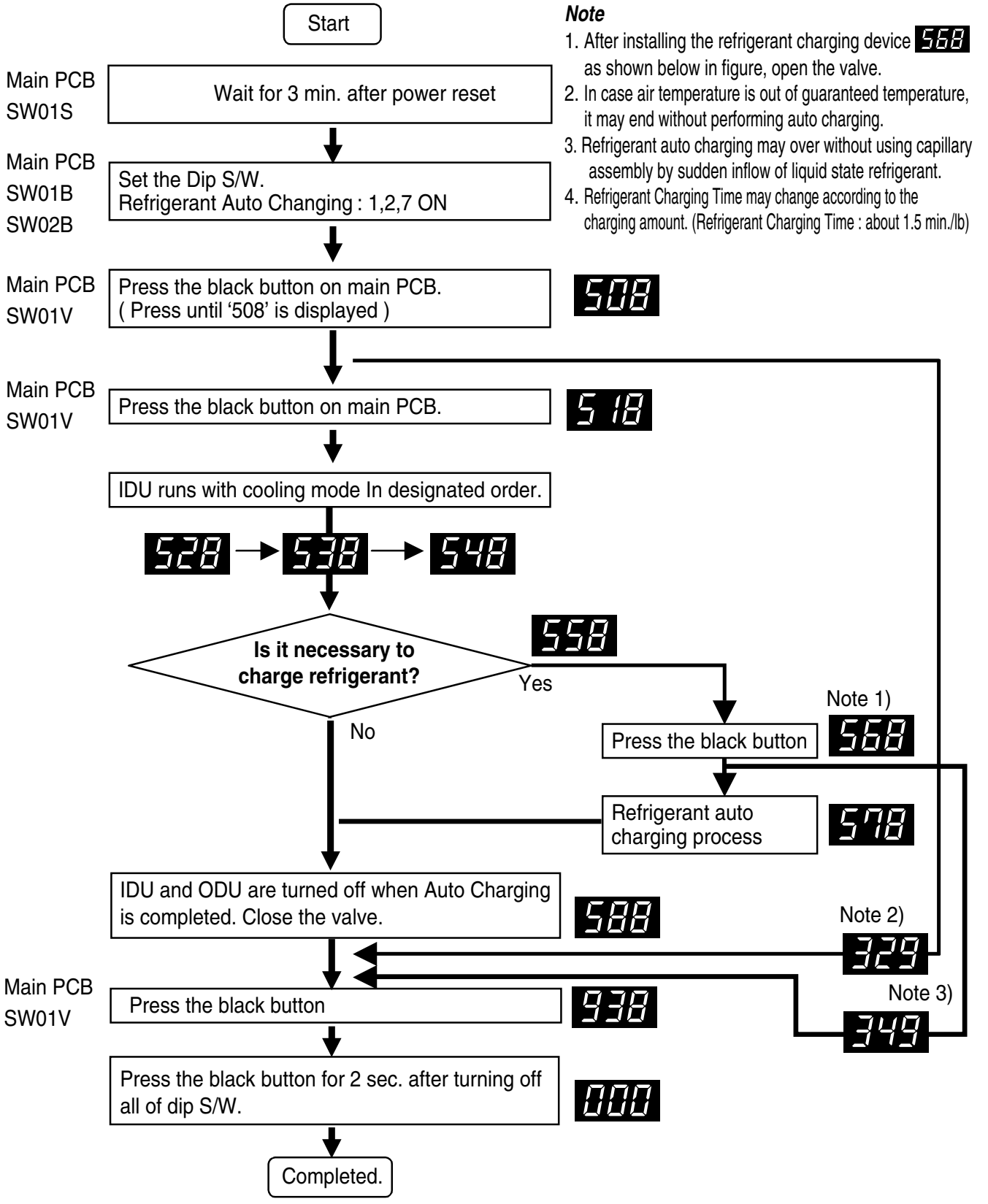
1. Up to 5 number of errors is displayed continuously and repeatedly. In case 5 number of errors occurs, again perform sensor checking after solving errors.
2. IDU in which error occurred operates fan mode.

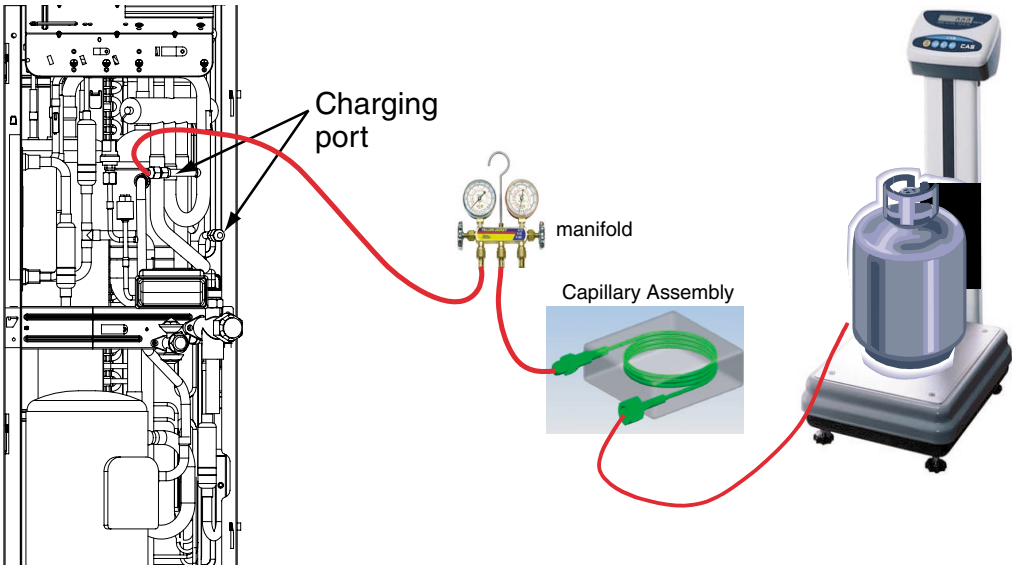
4.3 Refrigerant Auto Charging

This function charges appropriate amount of refrigerant automatically through cycle operation. It can be used when refrigerant amount isn't certain because of SVC and leakage.

Note

1. After installing the refrigerant charging device 568 as shown below in figure, open the valve.
2. In case air temperature is out of guaranteed temperature, it may end without performing auto charging.
3. Refrigerant auto charging may over without using capillary assembly by sudden inflow of liquid state refrigerant.
4. Refrigerant Charging Time may change according to the charging amount. (Refrigerant Charging Time : about 1.5 min./lb)





Procedure

1. **Arrange manifold,capillary assembly, refrigerant vessel and scale**
2. **Connect manifold to the gas pipe service valve of ODU as shown in the figure.**
3. **Connect manifold and Capillary tube.**
   Use designated capillary assembly only.
   If designated capillary assembly isn't used, the system may get damaged.
4. **Connect capillary and refrigerant vessel.**
5. **Purge hose and manifold.**
6. **After 568 Is displayed, open the valve and charge the refrigerant**

■ Error contents about auto refrigerant charging function

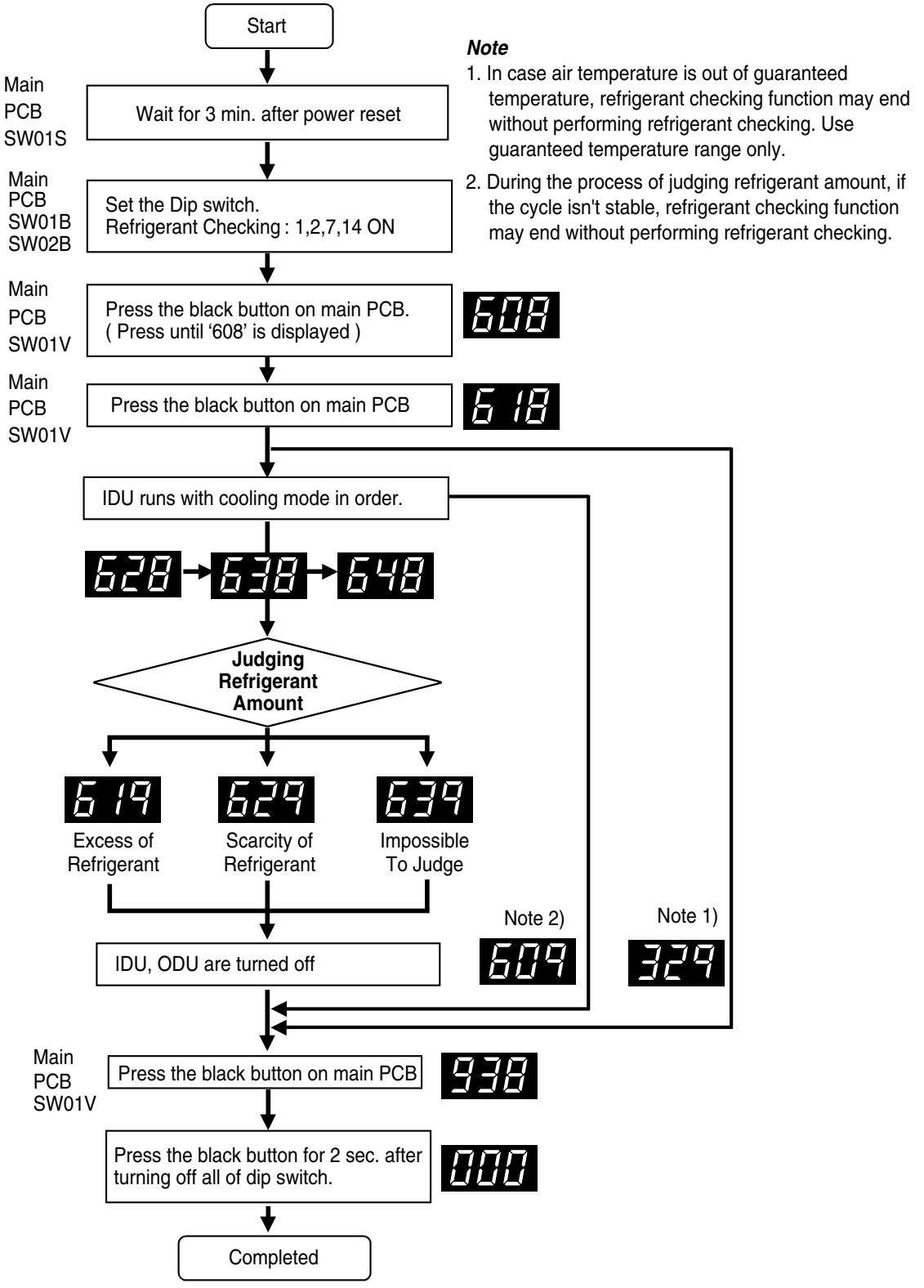
1. 329 : Temperature Range Error (In case that IDU or ODU is out of range)
2. 339 : Low Pressure Descent Error (In case the system runs at low pressure limit for over 10 minutes)
3. 349 : Judging rapid refrigerant inflow (In case the liquid refrigerant flows in because of not using designated Capillary Assembly)
4. 359 : Instability Error(In case the high/low pressure target doesn't get satisfied for some time after the starting operation)

CAUTION

1. **Guaranteed temperature range (Error will occur if temperature is out of range)**
   IDU : 20~32°C (68~90°F)
   ODU : 0~43°C (32~109°F)
2. **For refrigerant charging, use designated device only. (Capillary Assem Set)**
3. **Set the IDU wired remote controller temperature sensing mode as IDU**
4. **Be careful that IDU should not be thermo off.**

4.4 Refrigerant Checking Function

1. This function charges appropriate amount of refrigerant automatically through cycle operation.
2. This function judges refrigerant leakage and overcharging.
3. It can be used with refrigerant auto charging function.



Note

1. In case air temperature is out of guaranteed temperature, refrigerant checking function may end without performing refrigerant checking. Use guaranteed temperature range only.
2. During the process of judging refrigerant amount, if the cycle isn't stable, refrigerant checking function may end without performing refrigerant checking.

CAUTION

1. **Guaranteed Temperature range(Error occurs out of guaranteed temperature range)**
   IDU : 20(68)~32°C(90°F) (buffer ±1°C(2°F))
   ODU : 10(50)~38°C(100°F) (buffer ±1°C(2°F))
2. **Set IDU wired remote controller temperature sensor setting as 'IDU'.**
3. **Make certain that IDU doesn't run with thermo off mode during operation.**

[Error contents about auto refrigerant charging function]

1. 329 : Temperature Range Error (In case that IDU or ODU is out of range)
2. 609 : System Unstable Error (In case, After 45 min. operating the system, it does not be stable)

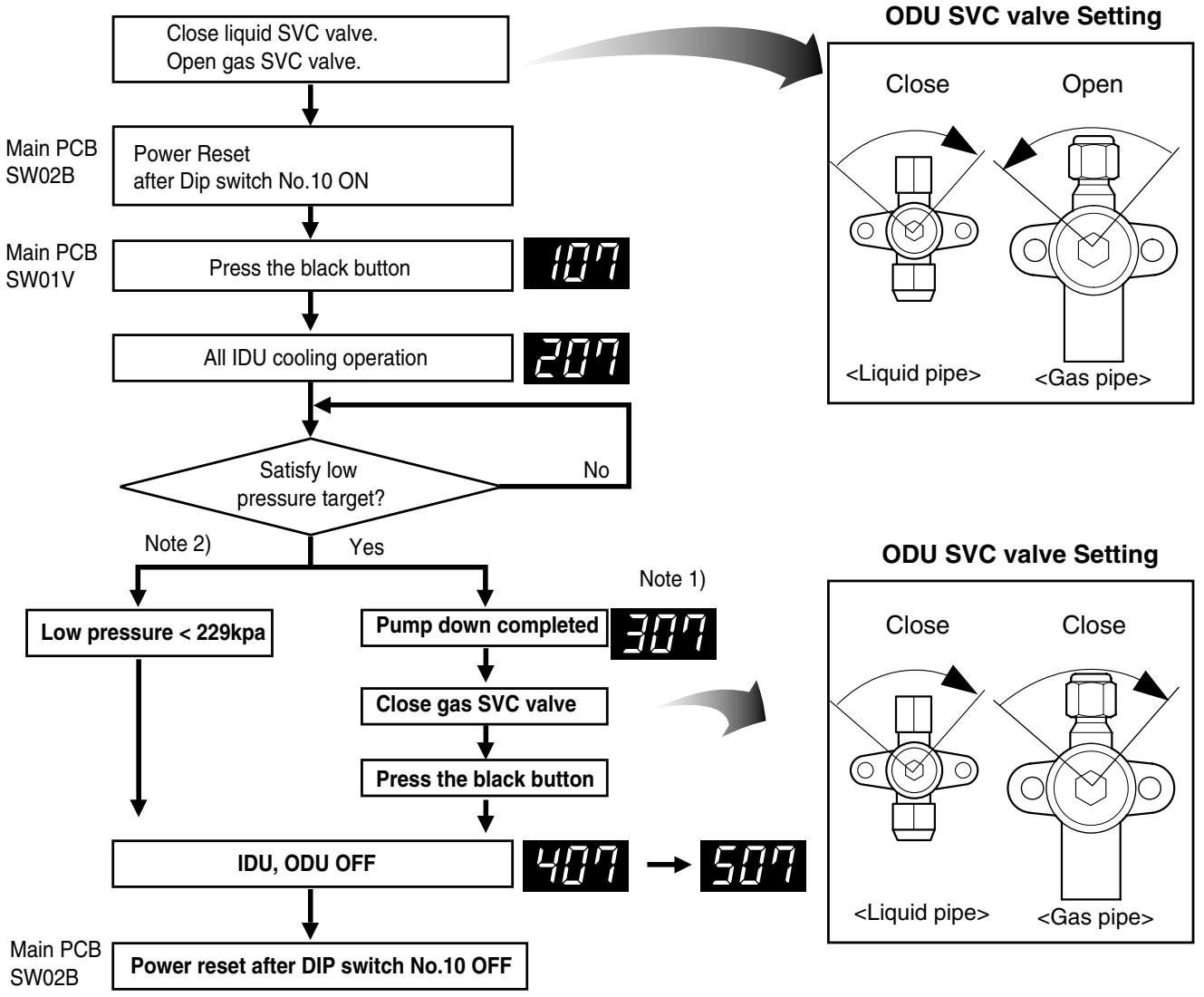
How to Cope with Result of Refrigerant checking

1. If the temperature is not in guaranteed Temperature range, the system will not execute Refrigerant checking and the system will be OFF.
2. **Excess of Refrigerant(619)**
   After remove the 20% of calculated total refrigerant, recharge the refrigerant by using Refrigerant Auto Charging Function.
3. **Scarcity of Refrigerant(629)**
   Charge the refrigerant by using Refrigerant Auto Charging Function.
4. **Impossible to Judge(639)**
   IF the system is not in order, check the other problem except refrigerant.

4.5 Pump Down

This function gathers the refrigerant present in the system to ODU

Use this function to store refrigerant of system in ODU for leakage or IDU replacement.



Note

1. If 30 is displayed, close gas SVC valve of all ODU immediately.

2. If low pressure descends below 229 kPa(33.2psi), the system turns off automatically. Close the gas SVC valve immediately.

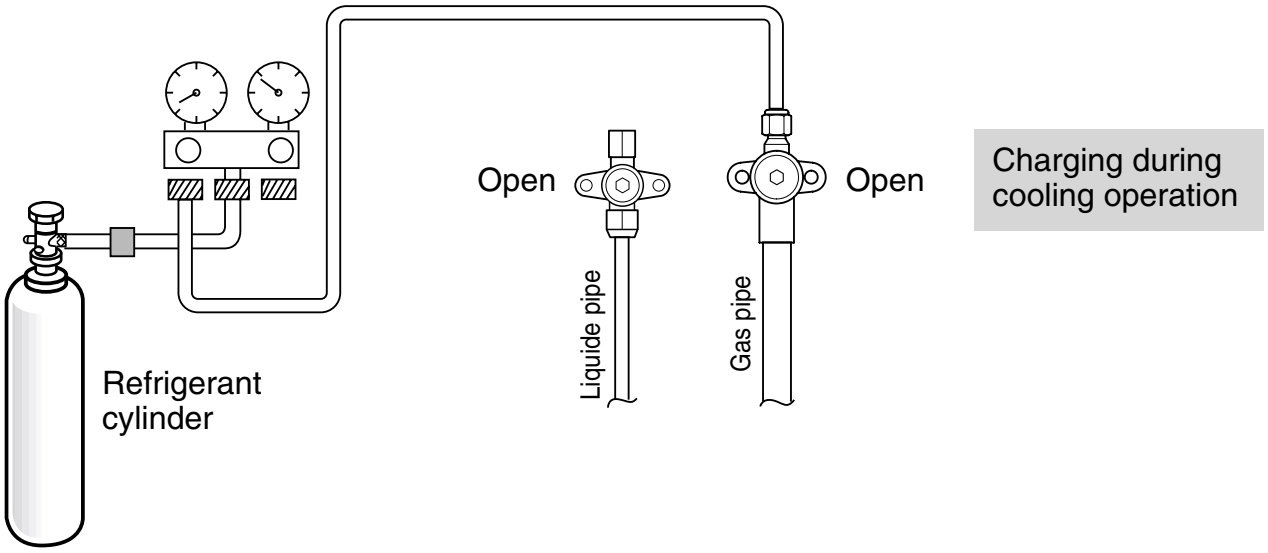
⚠ Caution

1.Use pump down function within guaranteed temperature range
   IDU : 20~32°C (68~90°F)
   ODU : 5~40°C (41~104°F)
2. Make certain that IDU doesn't run with thermo off mode during operation
3. Maximum operation time of pump down function is 30 min.
   (in case low pressure doesn't go down)
4. Press black+red button during operation to end pump down.(IDU,ODU off)
   40 → 50

Refrigerant charging procedure after pump down

Always follow following procedure to charge the refrigerant after pump down.

1. Open all service valves
2. Run the unit with cooling mode
3. Charging the refrigerant to gas service valve during operation.



CAUTION

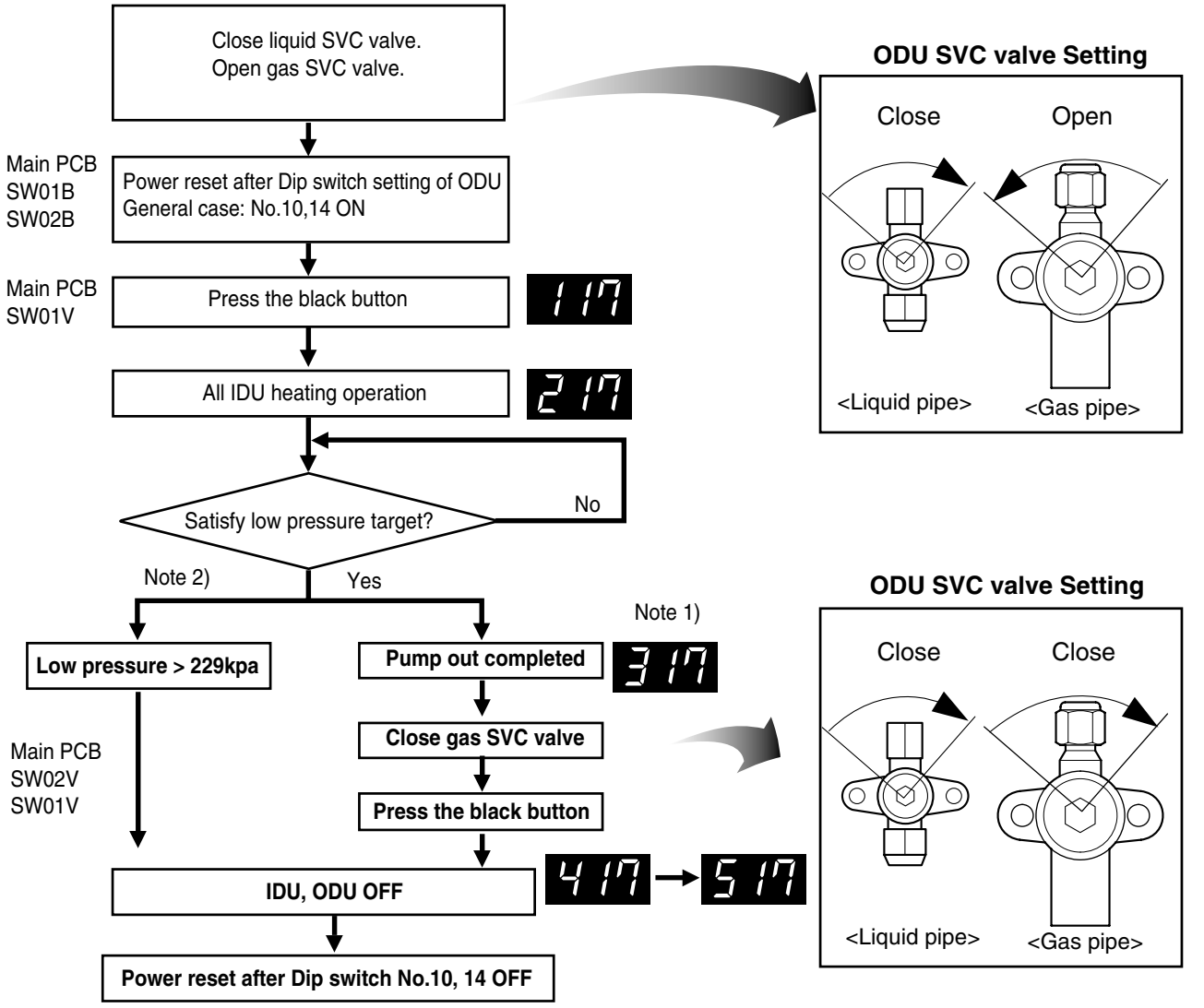
Never charge the refrigerant with service valves closed and unit stopped.

If charging is carried out with service valves closed and unit stopped after pump down, the compressor will be damaged when unit starts to run, and eventually compressor will be broken.

4.6 Pump Out

This function gathers the refrigerant to other ODU and IDU.

Use this function in case of compressor failure, ODU parts defect, leakage.



Note

1. If 3 17 is displayed, close gas SVC valve of all ODU immediately.

2. If low pressure descends below 229 kPa (33.2psi), the system turns off automatically. Close gas SVC valve immediately.

⚠ Caution

1.Use pump out function within guaranteed temperature range
IDU : 10~30°C (50~86°F)
ODU : 5~40°C (41~104°F)

2. Make certain that IDU doesn't run with thermo off mode during operation

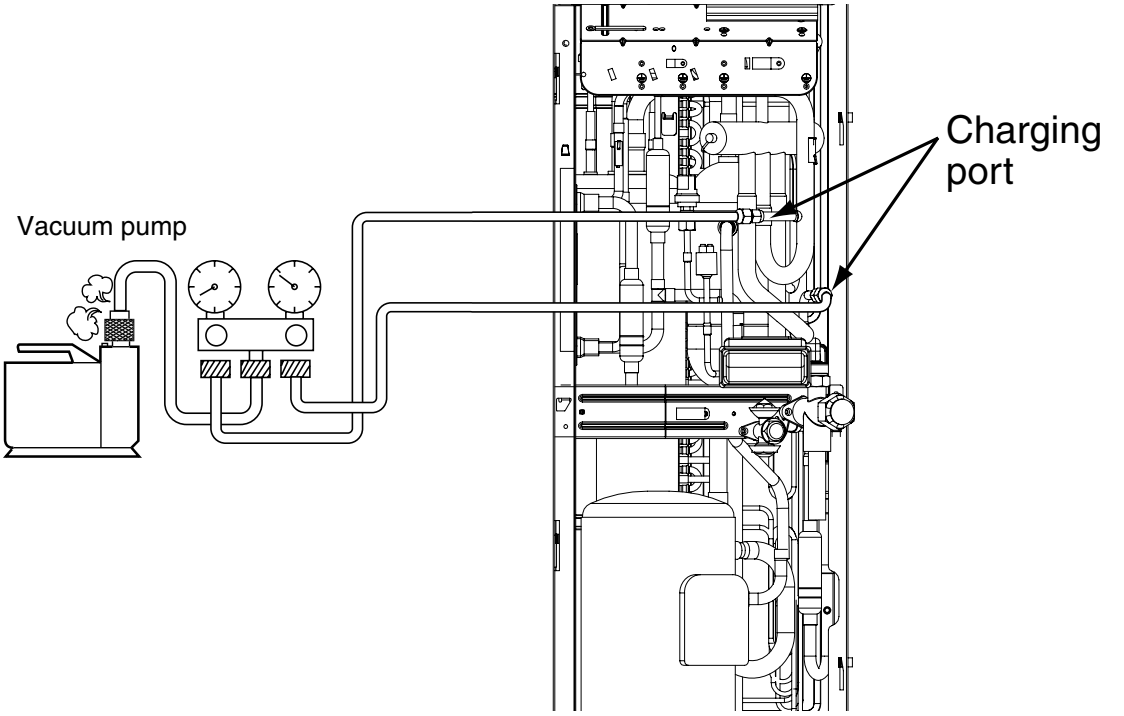
3. Pump out function takes 2~5 min. after compressor start.
Make certain that IDU doesn't run with thermo off mode during operation
(in case low pressure doesn't go down)

4. Press black+red button during operation to end pump out.(IDU,ODU OFF)

4 17 → 5 17

How to vacuum outdoor unit after pump out

To vacuum outdoor unit after pump out and servicing, use charging ports as shown figure below.



4.7 Night Low Noise Function

In cooling mode, this function makes the ODU fan operate at low RPM to reduce the fan noise of ODU at night which has low cooling load.

Max. RPM setting method

DIP switch No.12+14 ON — ODU SW01B

↓

Main PCB power reset — ODU SW01S

↓

STEP 1: Max. RPM =420
Black button 1 time + Red button 1 time

STEP 2: Max. RPM = 370
Black button 2 times + Red button 1 time

STEP 3: Max. RPM = 320
Black button 3 times + Red button 1 time

— SW01V, SW02V

↓

Setting complete

Night Low Noise Function Start

8 hours after max. ODU temp. sensing, operates with setting RPM

Night Low Noise Function End

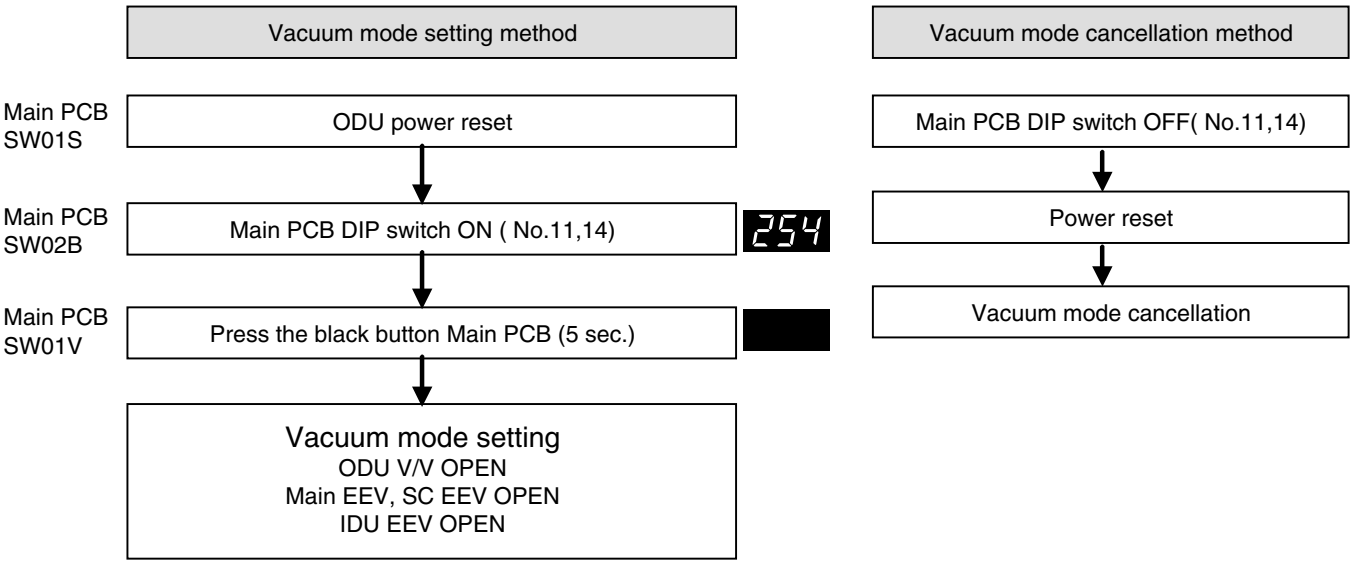
9 hours after night low noise function start, the function ends automatically.

Caution

1. Request installer to set the function during installation.
2. In case the function is not used, set the DIP switch OFF and reset the power.
3. If ODU RPM changes, cooling capacity may go down.

4.8 Vacuum Mode

This function is used for creating vacuum in the system after compressor replacement, ODU parts replacement or IDU addition/replacement.



Caution

ODU operation stops during vacuum mode. Compressor can't operate.

4.9 Black Box Function

This function saves data immediately before the error occurs in ODU main PCB, and thus making error analysis cause possible.

Data Loading Method

IDU, ODU stop

↓

Press the black button (10 sec.)

↓

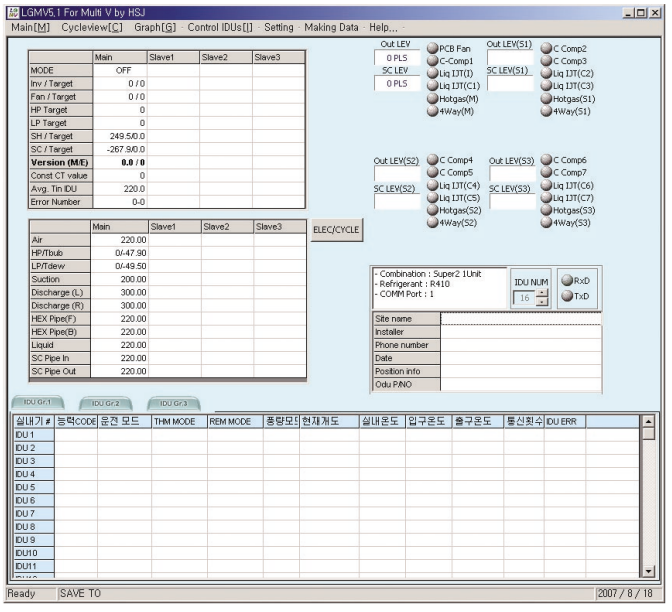
EEPROM ➠ Main micom data loading

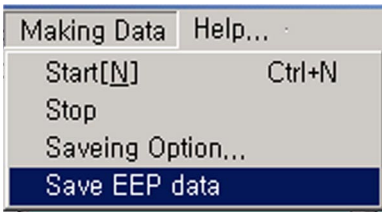
Yellow LED(LED01C) stops when data is loading
After completion, it is starts blinking (about 20 sec.).

↓

EEPROM data save to PC by using
<Save EEP data> in LGMV

■ Saving process : Making Data ➠ Save EEP data ➠ Data saving place select ➠ File save





Part 3
PCB Setting and Test Run

Test Run

1. Checks before Test Run

1	Check to see whether there is any refrigerant leakage, and slack of power or transmission cable.
2	Confirm that 500 V megger shows 2 MΩ or more between power supply terminal block and ground. Do not operate in the case of 2 MΩ or less. NOTE: Never carry out megaohm check over terminal control board. Otherwise the control board would be broken. Immediately after mounting the unit or after leaving it turned off for an extended length of time, the resistance of the insulation between the power supply terminal board and the ground may decrease to approx. 2 MΩ as a result of refrigerant accumulating in the internal compressor. If the insulation resistance is less than 2 MΩ, turn on the main power supply for more than 6 hours. That will make refrigerant evaporate so that makes insulation resistance increase.
3	Check if high/low pressure common pipe, liquid pipe and gas pipe valves are fully opened. NOTE: Be sure to tighten caps.
4	Check if there are any problems in automatic addressing or not: Check and confirm that there are no error messages in the display of indoor units or remote controls and LED in outdoor units.

CAUTION

When cutting main power of the Multi V

- **Always apply main power of the outdoor unit during use of product (cooling season/heating season).**
- **Always apply power before 6 hours to heat the crank case heater where performing test run after installation of product. It may result in burning out of the compressor if not preheating the crank case with the electrical heater for more than 6 hours.(In case of the outdoor temperature below 10°C(50°F))**
- **When operating the unit after powering off, automatically run into in the preheat mode for 3 hours and "PH" is indicated on the outdoor unit 7-Segment.**

CAUTION

Preheat of compressor

- **Start preheat operation for 3 hours after supplying main power.**
- **In case that the outdoor temperature is low, be sure to supply power 6 hours before operation so that the heater is heated(insufficient heating may cause damage of the compressor.)**

2. How to cope with Test Run Abnormality

The phenomena from main component failure

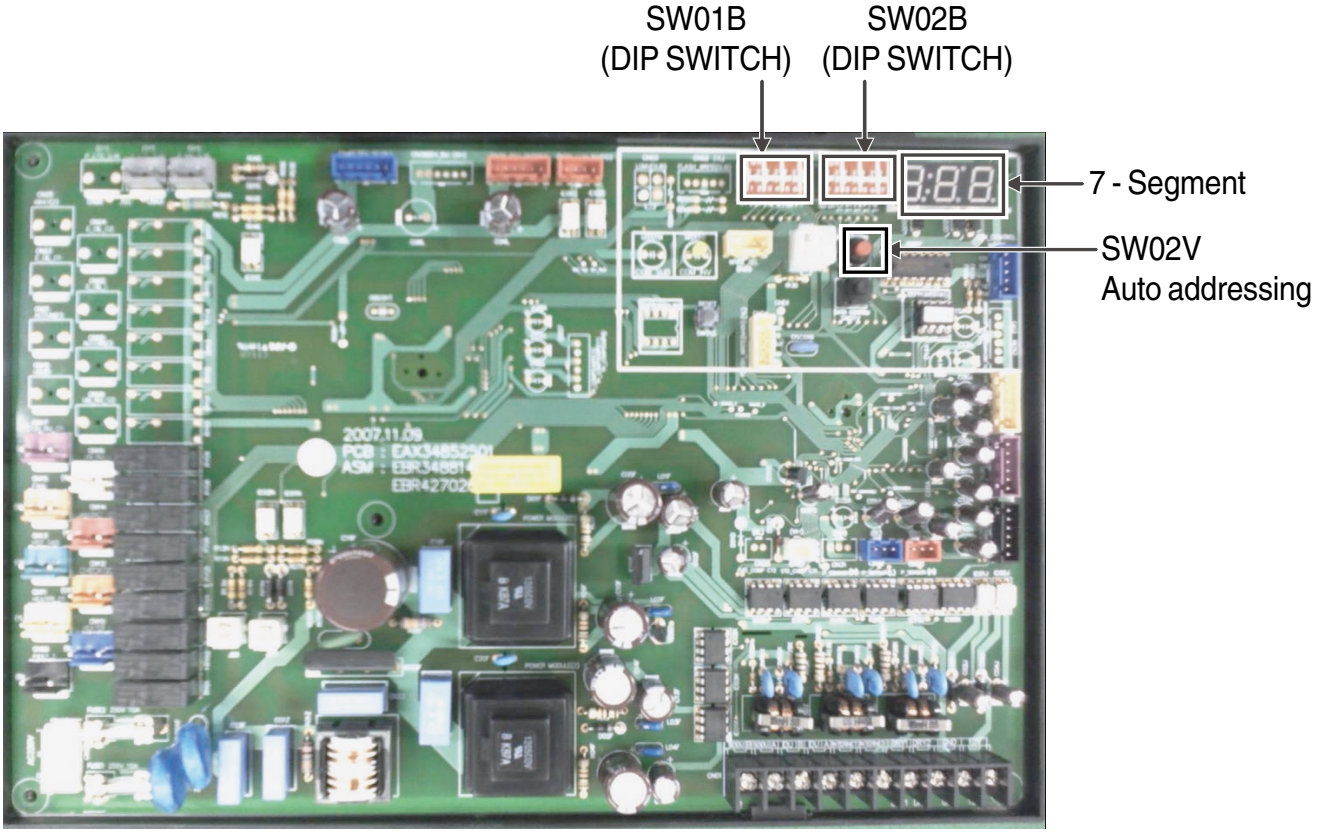
Component	Phenomenon	Cause	Check method and Trouble shooting
Compressor	Not operating	Motor insulation broken	Check resistance between terminals and chassis
		Strainer clogged	Change strainer
		Oil leakage	Check oil amount after opening oil port
	Stop during running	Motor insulation failure	Check resistance between terminals and chassis
	Abnormal noise during running	U-V-W misconnection	Check compressor U-V-W connection
Outdoor fan	High pressure error at cooling	Motor failure, bad ventilation around outdoor heat exchanger	Check the outdoor fan operation after being turned the outdoor units off for some time. Remove obstacles around the outdoor units
Outdoor EEV	Heating failure, frequent defrosting	Bad connector contact	Check connector
	No operating sound at applying power	Coil failure	Check resistance between terminals
	Heating failure, frozen outdoor heat exchanger part	EEV clogged	Service necessary
	Low pressure error or discharge temperature error	EEV clogged	Service necessary

- When system fault occurs, the error code is displayed at indoor unit display or remote control display. Reference the trouble shooting guide in the service manual.
- When CH05/53/11 ERROR occurs, check if auto-addressing has done and communication wiring is ok.

3. DIP Switch Setting

3.1 Location of Setting Switch

Main PCB



■ Checking according to DIP switch setting

1. You can check the setting values of the outdoor unit from the 7 segment LED.
   The DIP switch setting should be changed when the power is OFF.
2. It checks whether the input is properly performed without the bad contact of the DIP switch or not

■ Checking the setting of the unit

The number is sequentially appeared at the 7 segment in 5 seconds after applying the power. This number represents the setting condition. & model code ➔ total capacity ➔ 2 ➔ 25 ➔ model type

1 Model code

Model Code	Unit (HP)
120	4
121	5

2 4~5HP : HP numbers
3 No display : cooling only 2 : heat pump
4 25 : normal
5 120 : Model type(Mini, 1Ø 208/230V) 121 : Model type(Mini, 3Ø 380V)

Example) 5HP
121 ➔ 5 ➔ 2 ➔ 25 ➔ 120
1 2 3 4 5

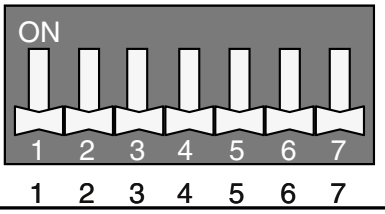
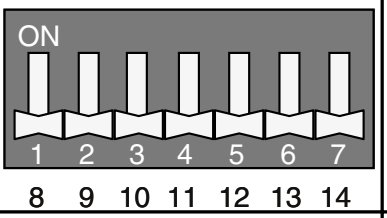
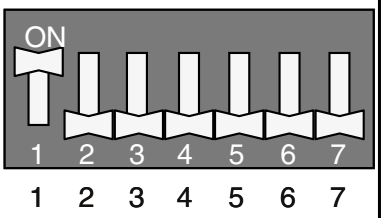
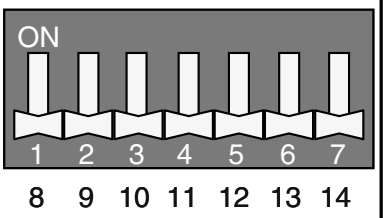
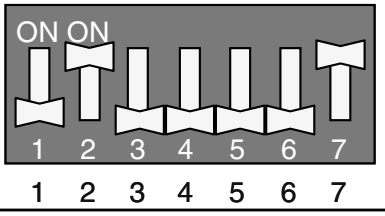
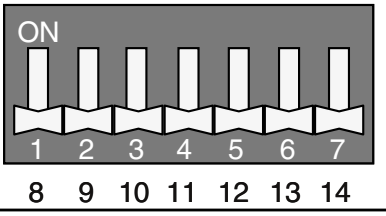
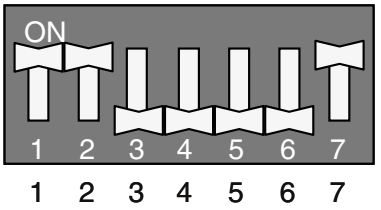
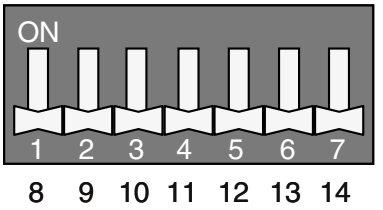
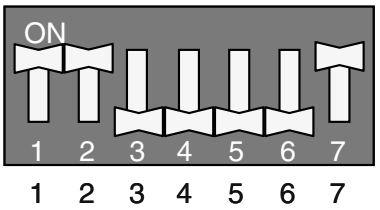
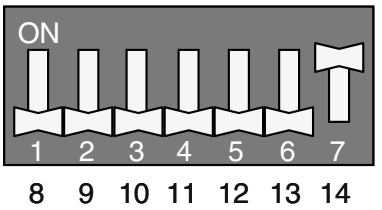
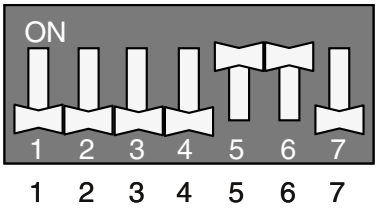
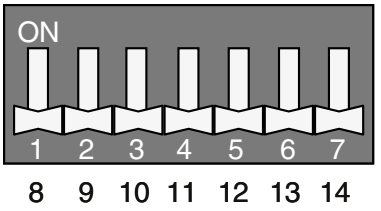
CAUTION

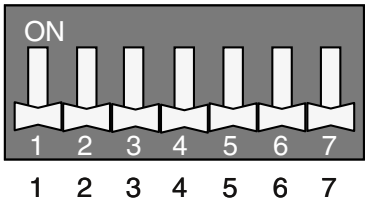
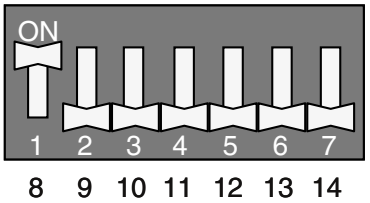
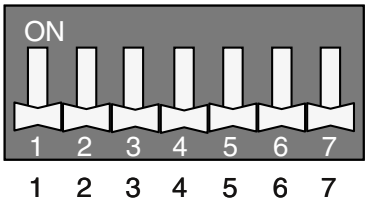
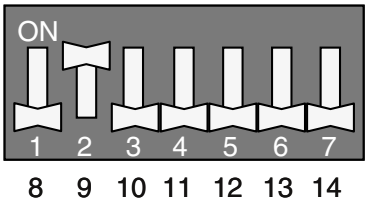
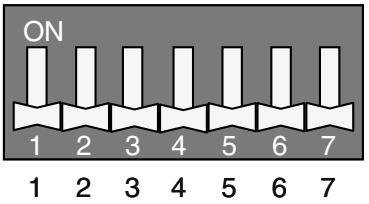
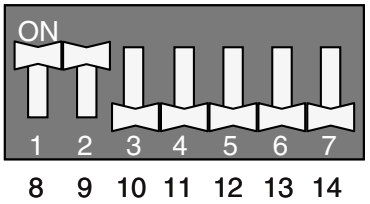
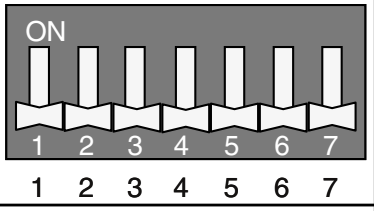
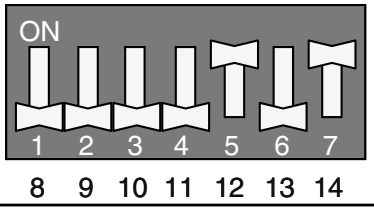
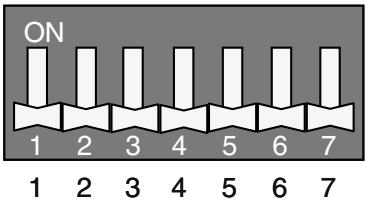
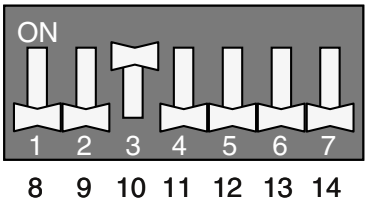
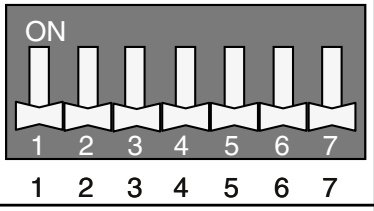
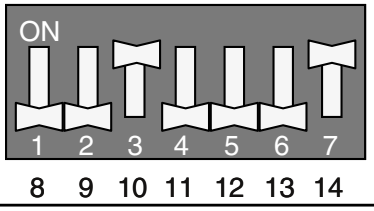
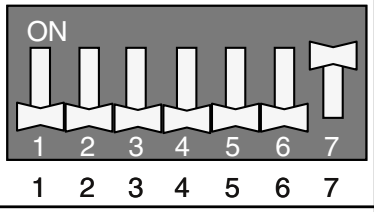
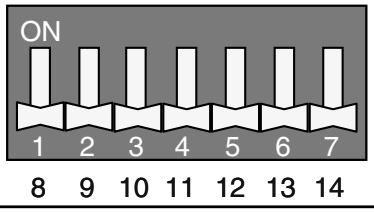
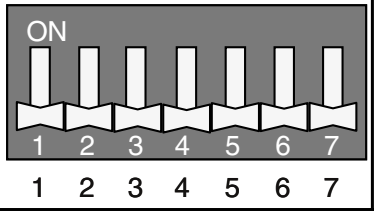
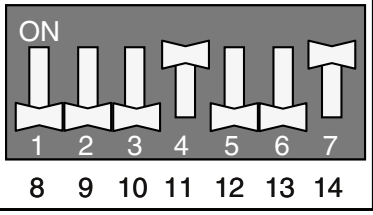
Product may not properly operate if the relevant DIP switch is not properly setup.

■ Setting the DIP switch

- Set the Dip switch with the power turned off. If you change the setting when the power is on, the changed setting is not applied immediately. The changed setting is applied at the moment that the power is on.
- Instant indoor unit checking, data display mode, and forced oil collecting operation are used when theunits are running. If you don't have to use those functions after using them, restore the Dip switch setting.

1. Settings of outdoor unit

Function	SW01B Setting	SW02B Setting	Remarks
Standard			- Factory Shipping Setting
Short Pipe Length			- Set this function in case of installing short pipe length
Long Pipe Length			- Set this function in case of installing long pipe length
Refrigerant Auto Charging			- Set this function to operate Refrigerant auto charging mode
Refrigerant Checking			- Set this function to operate Refrigerant checking mode
Cool/Heat Selector			- Set this function to operate indoor unit only heating or cooling mode with cool/heat selector

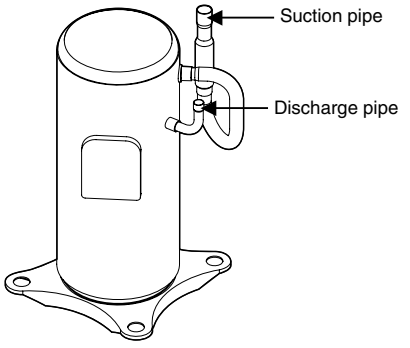
Function	SW01B Setting	SW02B Setting	Remarks
Snow			- Set this function to prevent snowfall on outdoor unit.
Forced Defrosting			- Set this function to defrost heat exchanger of outdoor unit manually.
Snow + Forced Defrosting			- Set this function to defrost heat exchanger of outdoor unit and blow away snow fallen on outdoor unit.
Night Silent Operation			- Set this function to reduce the noise at night.
Pump Down			- Set this function to perform pump down to gather to outdoor unit for service.
Pump Out			- Set this function to perform pump out to gather refrigerant out of one unit which is needed to be serviced.
Forced Oil Return			- Set this function to perform oil return to gather to outdoor unit for service.
Vacuum Mode			- Set this function to vacuum the system with vacuum pump after service.

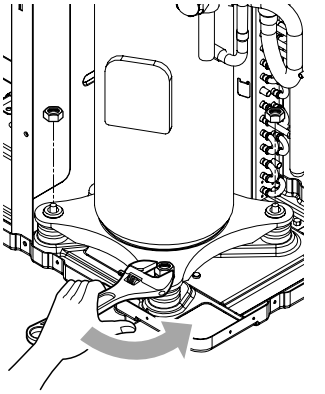
Replacement Procedure

1. Replacement Procedure for Compressor 47
2. Replacement Procedure for INV PCB 48
3. Caution for Assembling Outdoor Panels after Test Run 49

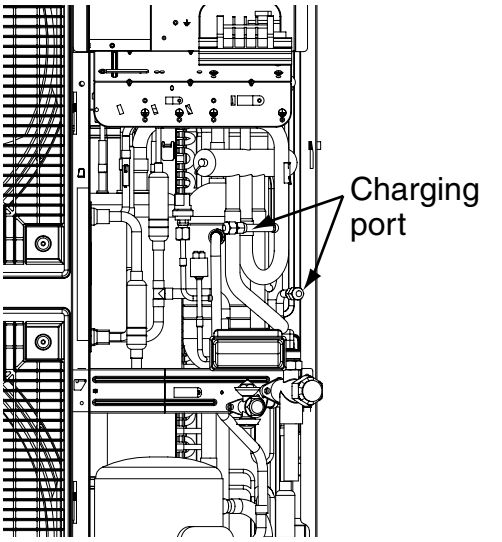
Replacement procedure for Compressor

1. Carry out "Pump Out" function to accumulate refrigerant outside of outdoor unit or collect refrigerant by using refrigerant recovery unit. (Refer to DIP switch setting for Pump Out)
2. Remove the sound proof covering the faulty compressor, and disconnect the power
3. Disconnect the brazing sections of suction pipe and discharge pipe by using brazing torch after the refrigerant has been pumped out or collected completely.
4. Remove three nuts at cushion rubber section to take out the faulty compressor outside the unit. <Figure 1>
5. Install the new compressor in the unit.(Be sure to insert the cushion rubbers before tightening the fixing nut of compressor.)
6. Remove the rubber caps put on the suction and discharge pipe of the new compressor to release the sealing nitrogen gas.
7. Braze the suction and discharge pipe with brazing torch to the compressor.
8. If pump out is carried out, connect manifold to the charging port. <Figure 2>
9. Conduct air tight test to check the piping system is free from leakage.
10. Connect power cable to the terminal board of compressor and cover the compressor with sound proof. <Figure 3>
11. Conduct vacuum. (Refer to DIP switch setting for vacuum mode)
12. After completion of vacuum, if pump out is carried out, open the service valves. If recovery unit is used, charge refrigerant.
13. Carry out "Refrigerant Checking" function to check if amount of refrigerant is appropriate.

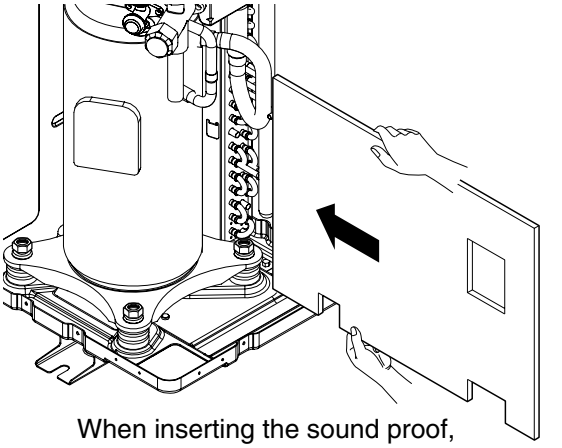




<Figure 1>



<Figure 2>

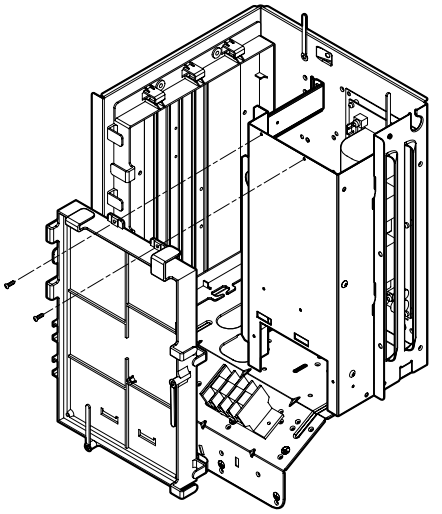


When inserting the sound proof, be sure to insert counter-clockwise.

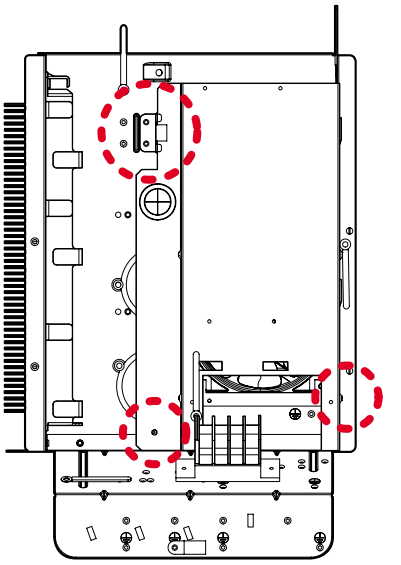
<Figure 3>

Replacement Procedure for INV PCB

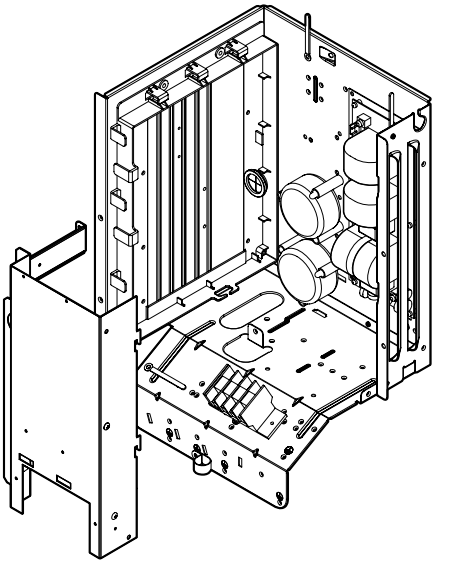
1. Disassemble main PCB by unscrewing 2 screws. (Figure 1.)
2. Disassemble panel assembly (with cooling fan) by unscrewing 4 screws. (Figure 2.)
3. Replace INV PCB assembly. (Figure 3.)
   When assemble INV PCB assembly with control case, make sure that PCB case is inserted surely in the slit of control case.
4. Assemble panel assembly and main PCB.



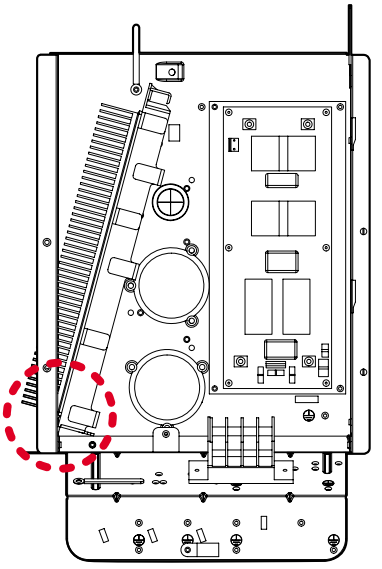
< Figure 1. >



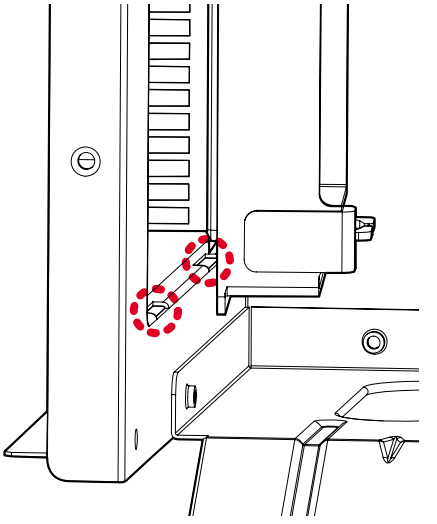
< Figure 2-1. >



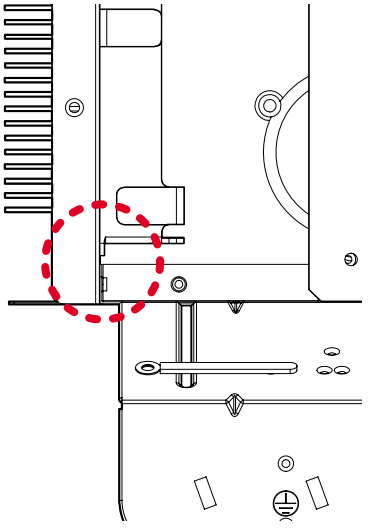
< Figure 2-2. >



< Figure 3-1. >



< Figure 3-2. >



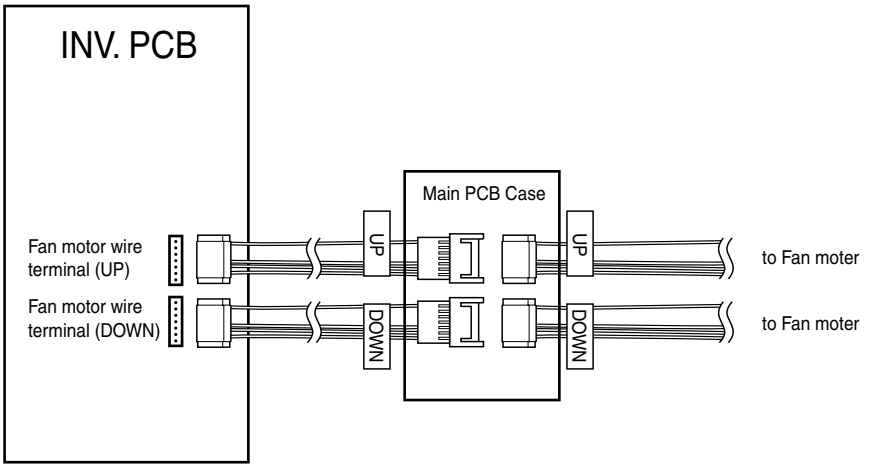
< Figure 4. >

CAUTION

Be sure that INV PCB assembly is firmly assembled with control case.
Confirm that there is no gap between INV PCB case and control case.(Figure 4.)
If any gap is present, it will cause product malfunction.

CAUTION

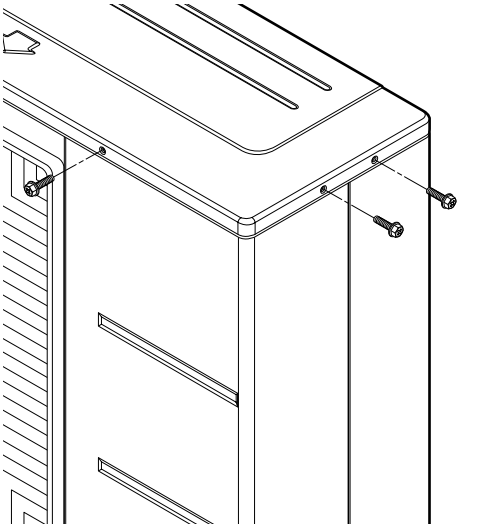
After replace the INV PCB assembly, make sure that connection of fan motor wires is correct.



If the connection between wires is incorrect, performance of the unit would be decreased.

Caution for Assembling Outdoor Panels after Test Run

When assemble the outdoor panels after replacement, make sure that screws of top panel are assembled as shown figure below.
If screws are not assembled, it allows rain come into control box causing defect of unit.



Part 4
Trouble Shooting Guide

Trouble Shooting Guide

1. The phenomena from main component failure 53

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2.2 Fan Motor 55

2.3 Electronic Expansion Valve.....56

2.4 Inverter IPM Checking Method 59

2.5 Self-Diagnosis Function.....60

1. The Phenomena from Main Component Failure

The phenomena from main component failure

Component	Phenomenon	Cause	Check method and Trouble shooting
Compressor	Not operating	Motor insulation broken	Check resistance between terminals and chassis
		Strainer clogged	Change strainer
		Oil leakage	Check oil amount after opening oil port
	Stop during running	Motor insulation failure	Check resistance between terminals and chassis
	Abnormal noise during running	U-V-W misconnection	Check compressor U-V-W connection
Outdoor fan	High pressure error in cooling mode operation	Motor failure, bad ventilation around outdoor heat exchanger	Check the fan operation to confirm proper motor functioning. Switch OFF the outdoor unit and remove obstacles, if any, around the HEX. Check connector
Outdoor EEV	Heating failure, frequent defrosting	Bad connector contact	Check connector
	No operation sound after switching ON the power supply	Coil failure	Check resistance between terminals
	Heating failure, frozen outdoor heat exchanger part	EEV clogged	Service necessary
	Low pressure error or discharge temperature error	EEV clogged	Service necessary

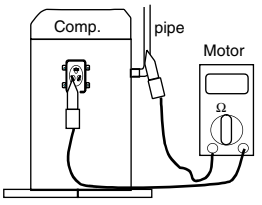
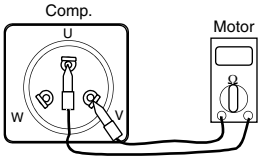
When system fault occurs, the error code is displayed on the indoor unit display or remote control display. The trouble shooting guide is available in the service manual.

• When CH05/53/11 ERROR occurs, check if auto-addressing has done and communication wiring is ok.

2. Checking Method for Key Components

2.1 Compressor

Check and ensure in following order when error related with the compressor or error related with power occurs during operation:

No.	Checking Item	Symptom	Countermeasure
1	Is how long power on during operation?	1) Power on for 12 hours or more	• Go to No.2.
		2) Power on for 12 hours or less	• Go to No.2 after applying power for designated time (12 hours).
2	Does failure appears again when starting operation?	1) The compressor stops andsame error appears again.	• Check IPM may fail.
	Method to measure insulation resistance  Figure 1. Method to measure coil resistance  Figure 2.	2) If output voltage of the inverter is stably output. Note1)	• Check coil resistor and insulation resistor. If normal, restart the unit. If same symptom occurs, replace the compressor. • Insulation resistor: 2㏁ or more • Coil resistor: at 20°C Inverter (ANB42FBDMT) U-V: 0.188±7% V-W: 0.188±7% W-U: 0.188±7%
		3) If output voltage of the inverter is unstable or it is 0V. (When incapable of using a digital tester)	• Check the IPM. If the IPM is normal, replace the inverter board. • Check coil resistor and insulation resistor.

[Cautions when measuring voltage and current of inverter power circuit]

Measuring values may differ depending on measuring tools and measuring circuits since voltage, current in the power supply or output side of the inverter has no since waveform.
Especially, output voltage changes when output voltage of the inverter has a pattern of pulse wave.
In addition, measuring values appear largely differently depending on measuring tools.
Note

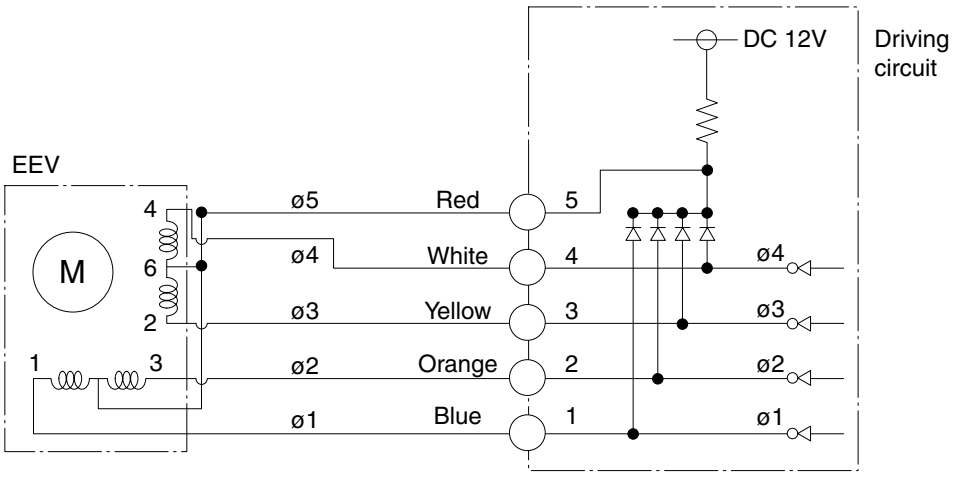
1) If using a movable tester when checking that output voltage of the inverter is constant (when comparing relative voltage between lines), always use an analog tester. Especially exercise particular caution if the output frequency of the inverter is low, when using a movable tester, where change of measured voltage values is large between other lines, when virtually same values appear actually or where there is danger to determine that failure of the inverter occurred.

2) You can use rectification voltmeter (→|-) if using commercial frequency tester when measuring output values of the inverter (when measuring absolute values). Accurate measuring values cannot be obtained with a general movable tester (For analog and digital mode).

2.2 Fan Motor

Checking Item	Symptom	Countermeasure
(1) The fan motor does not operate. Does failure appears again when starting operation? (2) Vibration of the fan motor is large.	1) When power supply is abnormal	• Modify connection status in front of or at the rear of the breaker, or if the power terminal console is at frosting condition.
		• Modify the power supply voltage is beyond specified scope.
	2) For wrong wiring	• For following wiring. 1. Check connection status. 2. Check contact of the connector. 3. Check that parts are firmly secured by tightening screws. 4. Check connection of polarity. 5. Check short circuit and grounding.
	3) For failure of motor	• Measure winding resistance of the motor coils.
	4) For failure of circuit board	Replace the circuit board in following procedures if problems occur again when powering on and if there are no matters equivalent to items as specified in above 1) through 4). (Carefully check both connector and grounding wires when replacing the circuit board.) 1. Replace only fan control boards. If starting is done, it means that the fan control board has defect. 2. Replace both fan control board and the main board. If starting is done, it means that the main board has defect. 3. If problems continue to occur even after countermeasure of No.1 and No.2, it means that both boards has defect.

2.3 Electronic Expansion Valve



• Pulse signal output value and valve operation

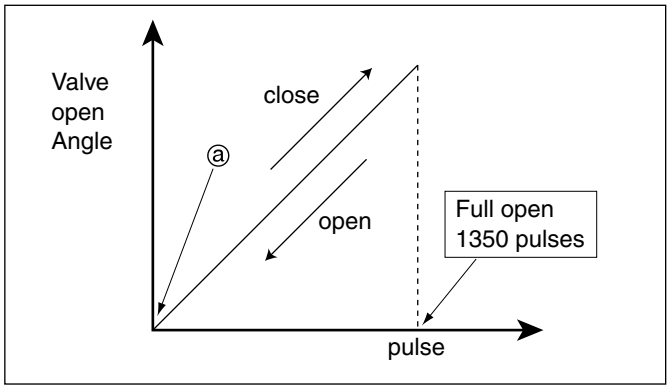
Output(ø) No.	Output state							
	1	2	3	4	5	6	7	8
ø1	ON	OFF	OFF	OFF	OFF	OFF	ON	ON
ø2	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
ø3	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
ø4	OFF	OFF	OFF	OFF	ON	ON	ON	OFF

• Output pulse sequence

- In valve close state: 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 1
- In valve open state: 8 → 7 → 6 → 5 → 4 → 3 → 2 → 1 → 8

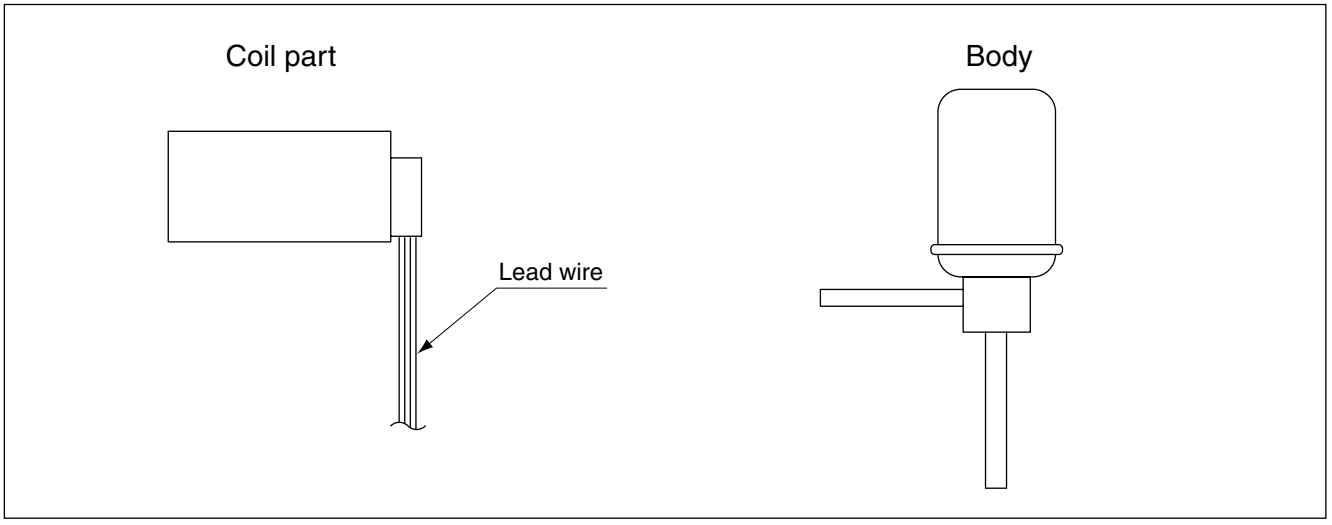
1. If EEV open angle does not change, all of output phase will be OFF
2. If output phase is different or continuously in the ON state, motor will not operate smoothly and start vibrating.

• EEV valve operation

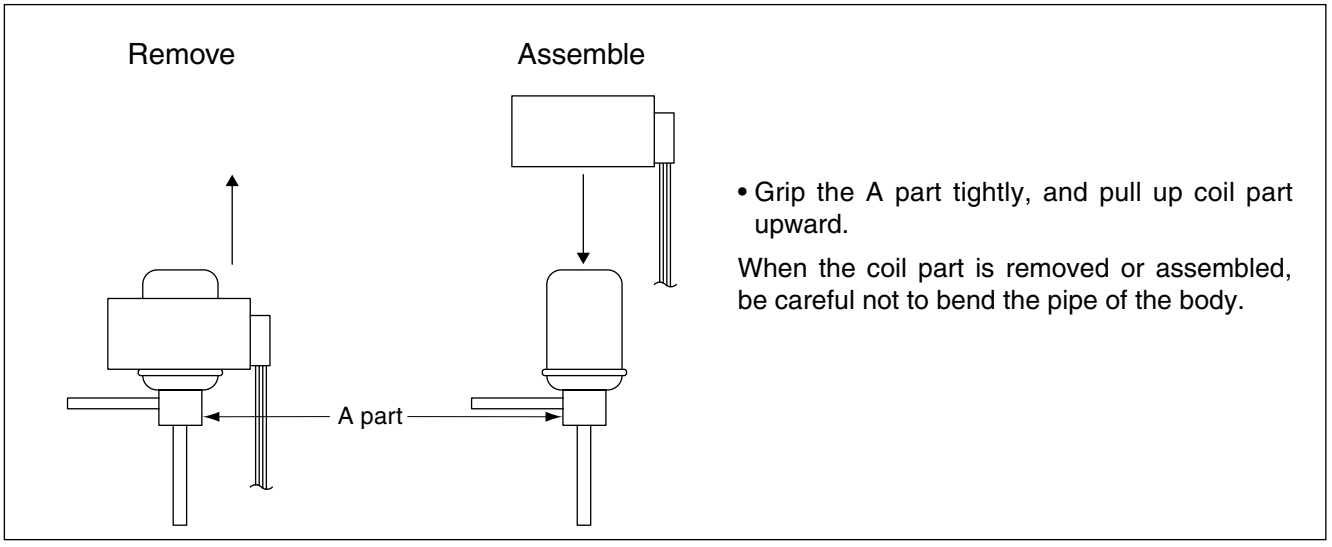


- At power ON, open angle signal of 1400 pulses output and valve position is set to ⓐ
  If valve operates smoothly, no noise and vibration occurs and if valve is closed. noise occurs.
- Noise from EEV can be confirmed by touching the EEV surface with a screw driver and listening the EEV noise.
- If liquid refrigerant is in EEV, the noise is lower.

• EEV Coil and body(Outdoor unit)



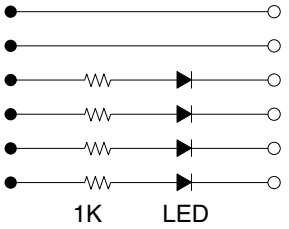
• Remove and assemble the coil



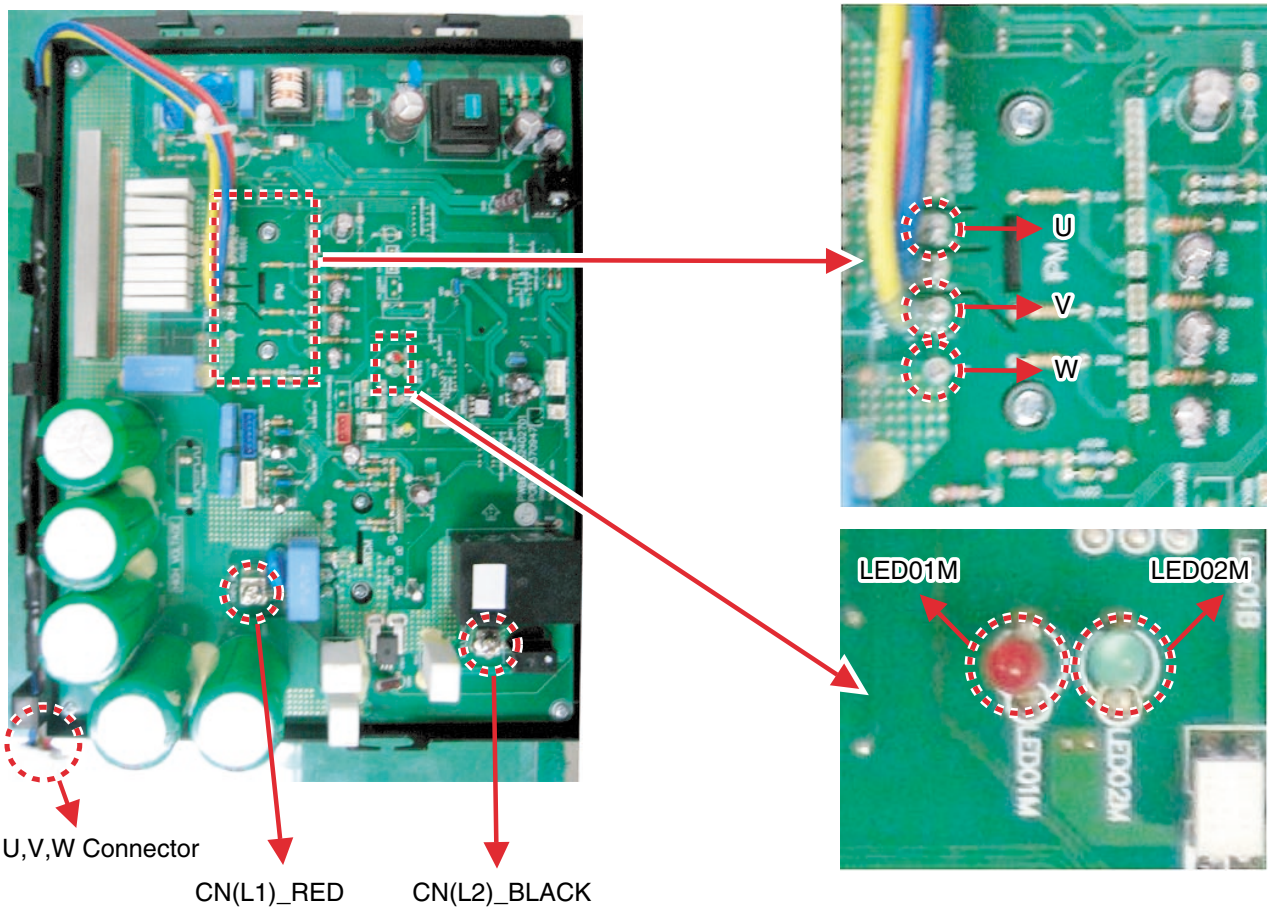
- Grip the A part tightly, and pull up coil part upward.

When the coil part is removed or assembled, be careful not to bend the pipe of the body.

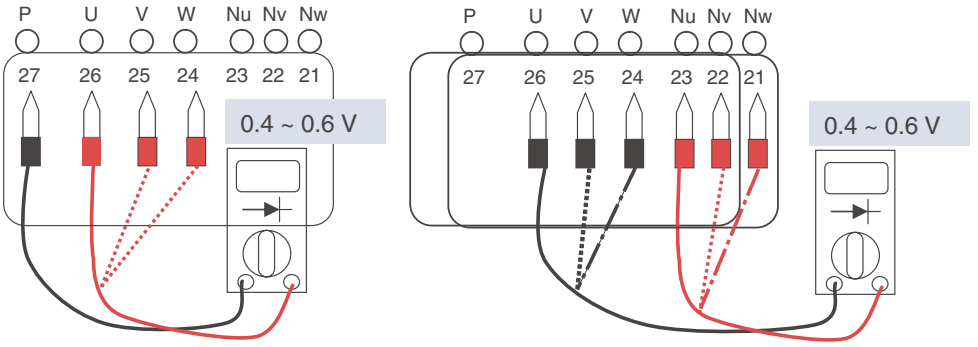
- **EEV failure check method**

Failure mode	Diagnosis	Repair process	Unit
Microcomputer Driving circuit failure	1.Disconnect the EEV connector form control board and connect testing LED  2. Main power ON, pulse signal is out from EEV for 17 sec. If LEDs do not turn on, or are in on state continuously, then driving circuit is abnormal	Check and replace Indoor unit control board	Indoor unit
EEV locking	1.If EEV is locked, in no load state, the driving motor rotate, and clicking sound always occurs	Replace EEV	Indoor / Outdoor unit
EEV Motor coil short or misconnection	1. Check the resistance between coil terminal (red-white, red-yellow, red-orange, red-blue) 2. If the estimated resistance value is in 52 ± 3Ω then the EEV is normal	Replace EEV	Outdoor unit
	1. Check the resistance between coil terminal (brown-white, brown-yellow, brown-orange, brown-blue) 2. If the estimated resistance value is in 150 ± 10Ω then the EEV is normal	Replace EEV	Indoor unit
Full closing (valve leakage)	1. Operate indoor unit with FAN mode and operate another indoor unit with COOLING mode 2. Check indoor unit(FAN mode) liquid pipe temperature (from operation monitor of outdoor unit control board) 3. When fan rotate and EEV is fully closed, if there is any leakage, then the temperature is down If estimated temperature is very low in comparison with suction temperature which is displayed at remote controller then the valve is not fully closed	If the amount of leakage is much, Replace EEV	Indoor unit

2.4 Inverter IPM Checking Method



1. Wait until inverter PCB DC voltage is discharged after main power off.
2. Pull out CN(L), CN(N) connectors and U,V,W COMP Connector.
3. Set multi tester to resistance mode.
4. If the value between P and N terminal of IPM is short(0Ω) or open(hundreds MΩ), PCB needs to be replaced.(IPM damaged)
5. Set the multi tester to diode mode.
6. In case measured value is different from the table, PCB needs to be replaced.(PCB damaged).



CAUTION

In case that the control box is opend and before checking electrical parts, it should be checked that the LED 01M, 02M turned off(wait 7 minutes after main power OFF), otherwise it may cause electrical shock.

2.5 Self-Diagnosis Function

Error Indicator

- This function indicates types of failure in self-diagnosis and occurrence of failure for air condition.
- Error mark is displayed on display window of indoor units and wired remote controller, and 7-segment LED of outdoor unit control board as shown in the table.
- If more than two troubles occur simultaneously, lower number of error code is first displayed.
- After error occurrence, if error is released, error LED is also released simultaneously.

Error Display

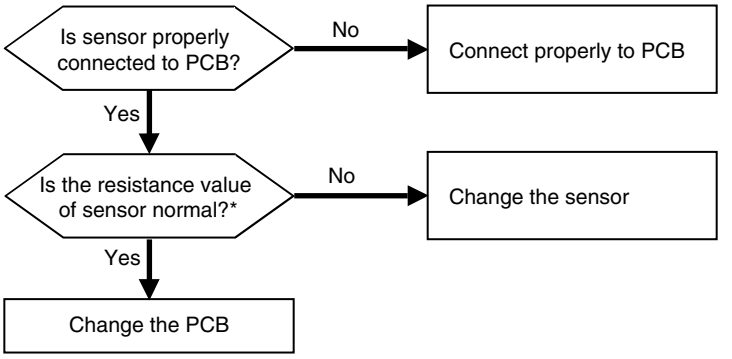
1st,2nd LED of 7-segment indicates error number, 3rd LED indicates unit number.

	Display			Title	Cause of Error
Indoor unit related error	0	1	-	Air temperature sensor of indoor unit	Air temperature sensor of indoor unit is open or short
	0	2	-	Inlet pipe temperature sensor of indoor unit	Inlet pipe temperature sensor of indoor unit is open or short
	0	3	-	Transmission error : wired remote controller ↔ indoor unit	Failing to receive wired remote controller signal in indoor unit PCB
	0	4	-	Drain pump	Malfunction of drain pump
	0	5	-	Transmission error : outdoor unit ↔ indoor unit	Failing to receive outdoor unit signal in indoor unit PCB
	0	6	-	Outlet pipe temperature sensor of indoor unit	Outlet pipe temperature sensor of indoor unit is open or short
	0	7	-	Different operation mode	Operation mode between indoor unit and outdoor unit is different
	0	9	-	Serial No.	In case when the serial number marked on EEPROM of Indoor unit is 0 or FFFFFF
	1	0	-	Poor fan motor operation	Disconnecting the fan motor connector/Failure of indoor fan motor lock
	1	1	-	Transmission error: indoor unit → main PCB of outdoor.	When the addressing signal doesn't respond for 3mins. suddenly, while the indoor unit gets the calling signal from the outdoor unit,
Outdoor unit related error	2	1	1	Outdoor Unit Inverter Compressor IPM Fault	Outdoor Unit Inverter Compressor Drive IPM Fault
	2	2	1	Inverter Board Input Over Current(RMS) of Outdoor Unit	Outdoor Unit Inverter Board Input Current excess (RMS)
	2	3	1	Outdoor Unit Inverter Compressor DC link Low Voltage	DC charging is not performed at outdoor unit after starting relay turn on.
	2	4	1	Outdoor Unit High Pressure Switch	System is turned off by outdoor unit high pressure switch.
	2	5	1	Outdoor Unit Input Voltage High/ Low Voltage	Outdoor Unit input voltage is out of range.
	2	6	1	Outdoor Unit Inverter Compressor Start Failure	The First Start Failure by Outdoor Unit Inverter Compressor Abnormality
	2	7	1	PSC/PFC Fault error	When over current flows instantly at PSC/PFC
	2	8	1	Outdoor Unit Inverter DC link High Voltage	System is turned off by outdoor unit DC Voltage Over Charging
	2	9	1	Outdoor Unit Inverter Compressor Over Current	Outdoor Unit Inverter Compressor Fault OR Drive Fault

	Display	Title	Cause of Error
Outdoor unit related error	3 2 1	Outdoor Unit Inverter Compressor High Discharge Temperature	System is turned off by outdoor unit Inverter Compressor High Discharge Temperature
	3 4 1	High Pressure of Outdoor Unit	System is turned off by excessive increase of high pressure of outdoor unit
	3 5 1	Low Pressure of Outdoor Unit	System is turned off by excessive decrease of low pressure of outdoor unit
	4 0 1	Outdoor Unit Inverter Compressor CT Sensor Fault	Outdoor Unit Inverter Compressor CT Sensor open or short
	4 1 1	Outdoor Unit Inverter Compressor Discharge Temperature Sensor Fault	Outdoor Unit Inverter Compressor Discharge Temperature Sensor open or short
	4 2 1	Outdoor Unit Low Pressure Sensor Fault	Outdoor Unit Low Pressure Sensor open or short
	4 3 1	Outdoor Unit High Pressure Sensor Fault	Outdoor Unit High Pressure Sensor open or short
	4 4 1	Outdoor Unit Air Temperature Sensor Fault	Outdoor Unit Air Temperature Sensor open or short
	4 5 1	Outdoor unit Heat Exchanger Temperature Sensor Fault	Outdoor Unit Heat Exchanger Temperature Sensor open or short
	4 6 1	Outdoor Unit Suction Temperature Sensor Fault	Outdoor Unit Suction Temperature Sensor open or short
	5 1 1	Excessive capacity of indoor units	Excessive connection of indoor units compared to capacity of outdoor unit
	5 2 1	Transmission error : inverter PCB → Main PCB	Failing to receive inverter signal at main PCB of Outdoor Unit
	5 3 1	Transmission error : indoor unit → main PCB of outdoor unit	Failing to receive indoor unit signal at main PCB of outdoor Unit.
	6 0 1	Inverter PCB EEPROM error	Check EEPROM checksum error when resetting power
	6 2 1	Heat sink temperature high error	When Heat sink temperature is above setting value
	6 5 1	Heat sink temperature sensor error	When the temperature sensor value is too high
	6 7 1	Fan lock	Fan operation fail at starting or during operation
	7 3 1	Instant Over Current(Peak) of Outdoor Unit PFC	Instant Over Current(Peak) of Outdoor Unit PFC
	8 6 1	Outdoor Unit Main PCB EEPROM Error	Communication Fail Between Outdoor Unit Fan MICOM and EEPROM or omitting EEPROM
	1 1 3 1	Outdoor Unit Liquid pipe Temperature Sensor Error	Liquid pipe temperature sensor of outdoor unit is open or short
	1 1 4 1	Outdoor Unit Subcooling Inlet Temperature Sensor Error	Outdoor Unit Subcooling Inlet Temperature Sensor open or short
	1 1 5 1	Outdoor Unit Subcooling Outlet Temperature Sensor Error	Outdoor Unit Subcooling Outlet Temperature Sensor open or short
	1 5 1 1	Failure of operation mode conversion at Outdoor Unit	Pressure unbalance between outdoor units

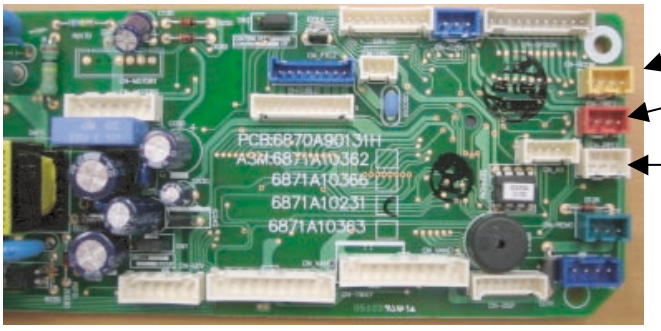
Error No.	Error Type	Error Point	Main Reasons
01	Indoor unit air sensor error	Indoor unit sensor is open/short	1. Indoor unit PCB wrong connection 2. Indoor unit PCB failure 3. Sensor problem (main reason)
02	Indoor unit pipe inlet sensor error		
06	Indoor unit pipe outlet sensor error		

■ Error diagnosis and countermeasure flow chart



* In case the value is more than 100kΩ (open) or less than 100Ω (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(50°F) = 20.7kΩ : 25°C(77°F)= 10kΩ : 50°C(122°F)= 3.4kΩ
Pipe temp sensor: 10°C(50°F) = 10kΩ : 25°C(77°F)= 5kΩ : 50°C(122°F)= 1.8kΩ



CN-ROOM : Indoor air temp sensor

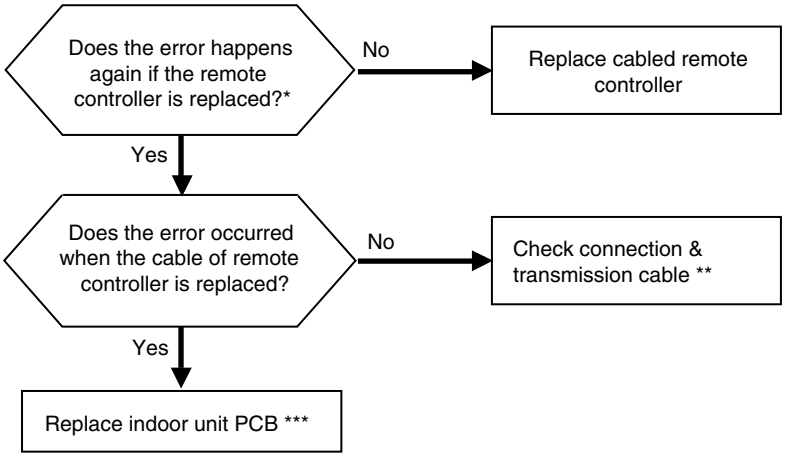
CN-PIPE2 : Pipe outlet temp sensor

CN-PIPE1 : Pipe inlet temp sensor

Measure the resistance of outlet pipe temp sensor.

Error No.	Error Type	Error Point	Main Reasons
03	No transmission 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. transmission cable problem

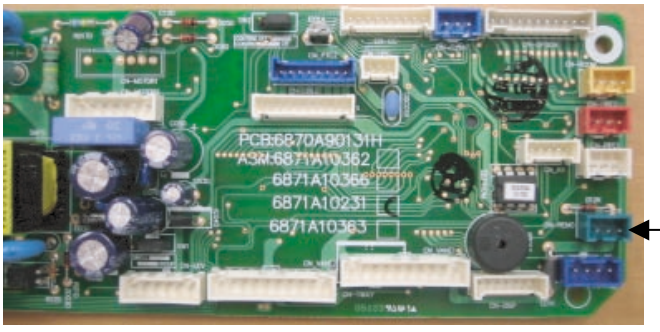
■ Error diagnosis and countermeasure flow chart



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

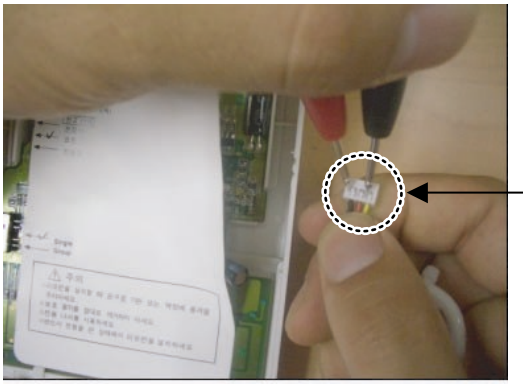
** Check cable : Contact failure of connected portion or extension of cable are main cause
Check any surrounded noise (check the distance with main power cable)
➔ make safe distance from the devices generate electromagnetic wave

*** 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

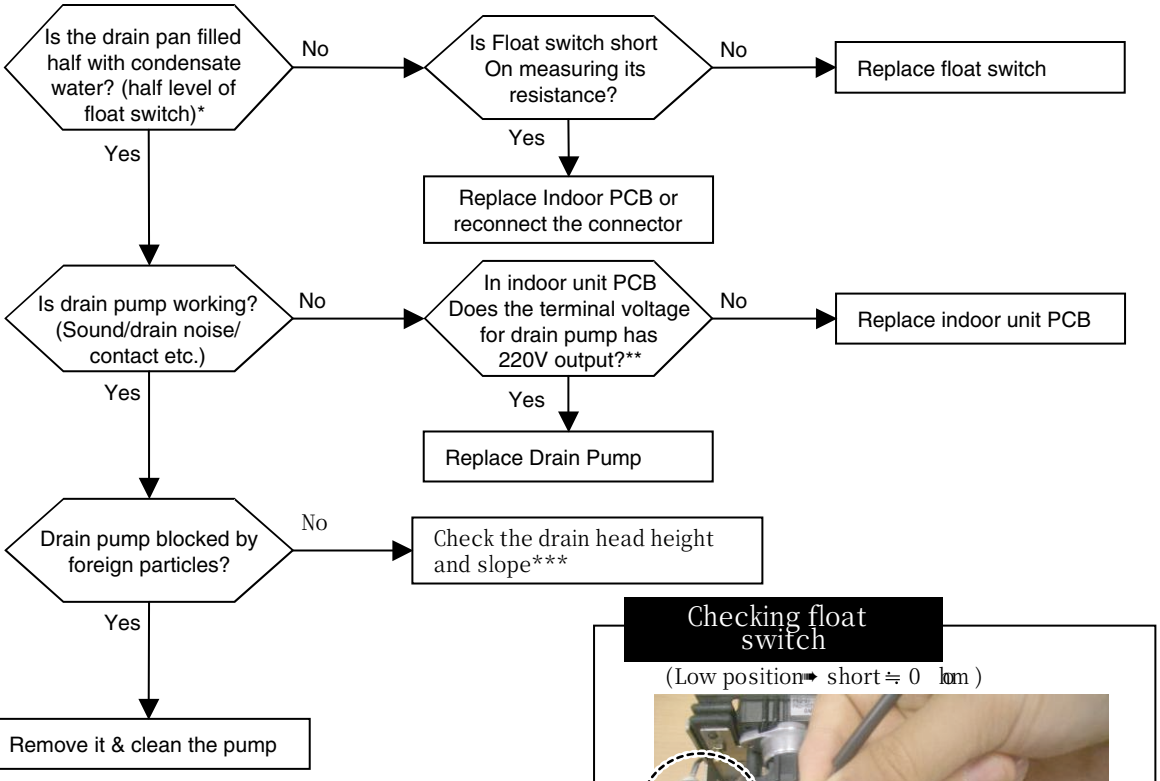
※ The PCB can differ from model to model.
Check from the right source.



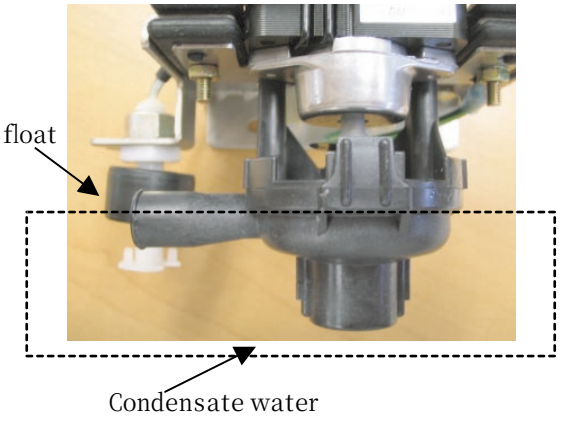
Checking transmission cable connection status

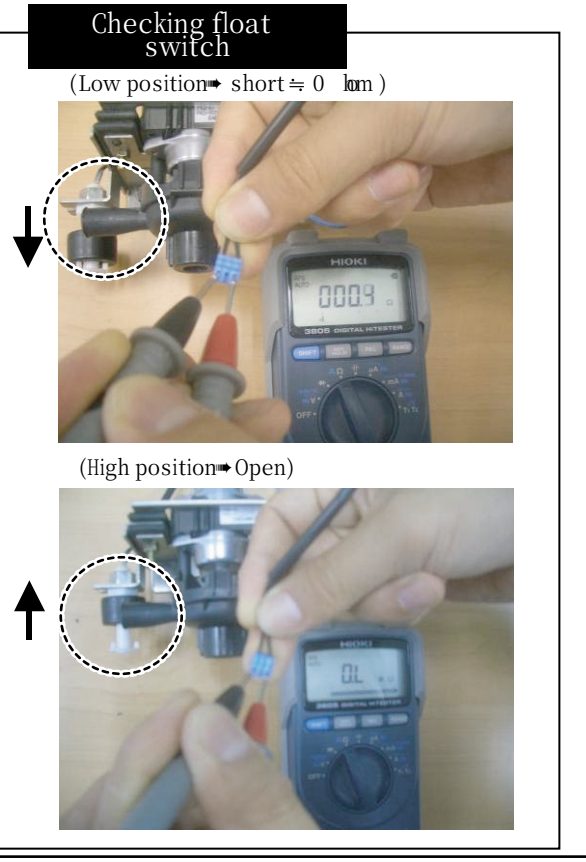
Error No.	Error Type	Error Point	Main Reasons
04	Drain pump error	Float switch is open due to rising of condensate water level because of drain pump fault or drain pipe clogging	1. Drain pump/float switch fault 2. Improper drain pipe location, clogging of drain pipe 3. Indoor unit PCB fault

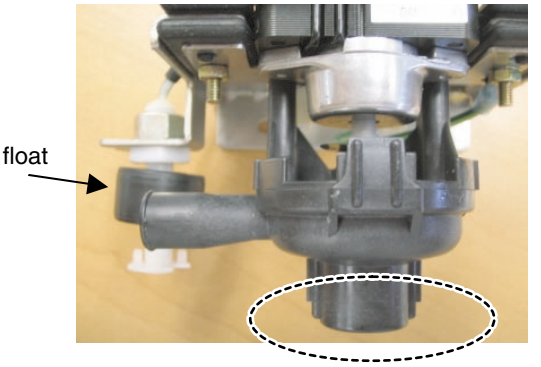
■ Error diagnosis and countermeasure flow chart



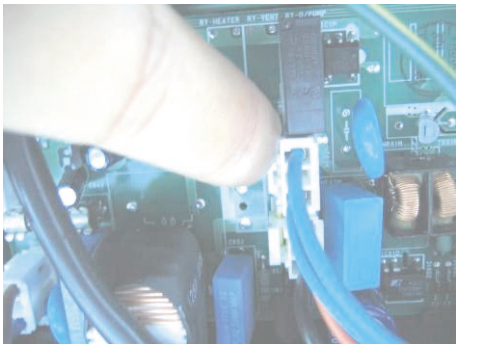
* If the float goes up higher than a half of float switch then the circuit is open & the unit is stopped automatically.







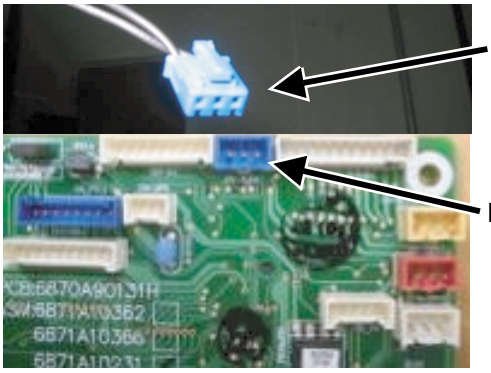
A:Point to check rotating



** Indoor PCB drain pump connector

(Check input of 208/230V)

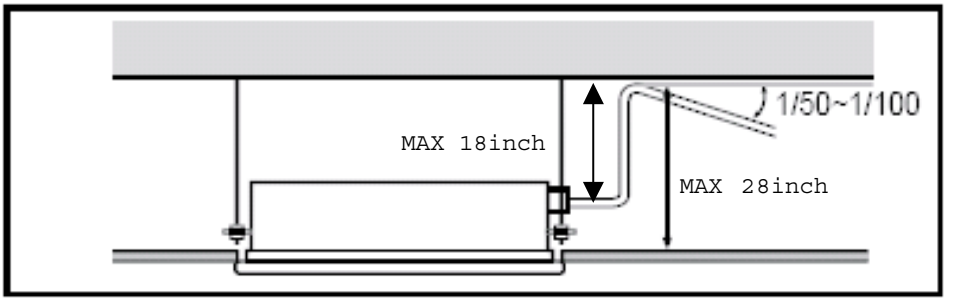
(Marked as **CN-DPUMP)**



Float switch connector

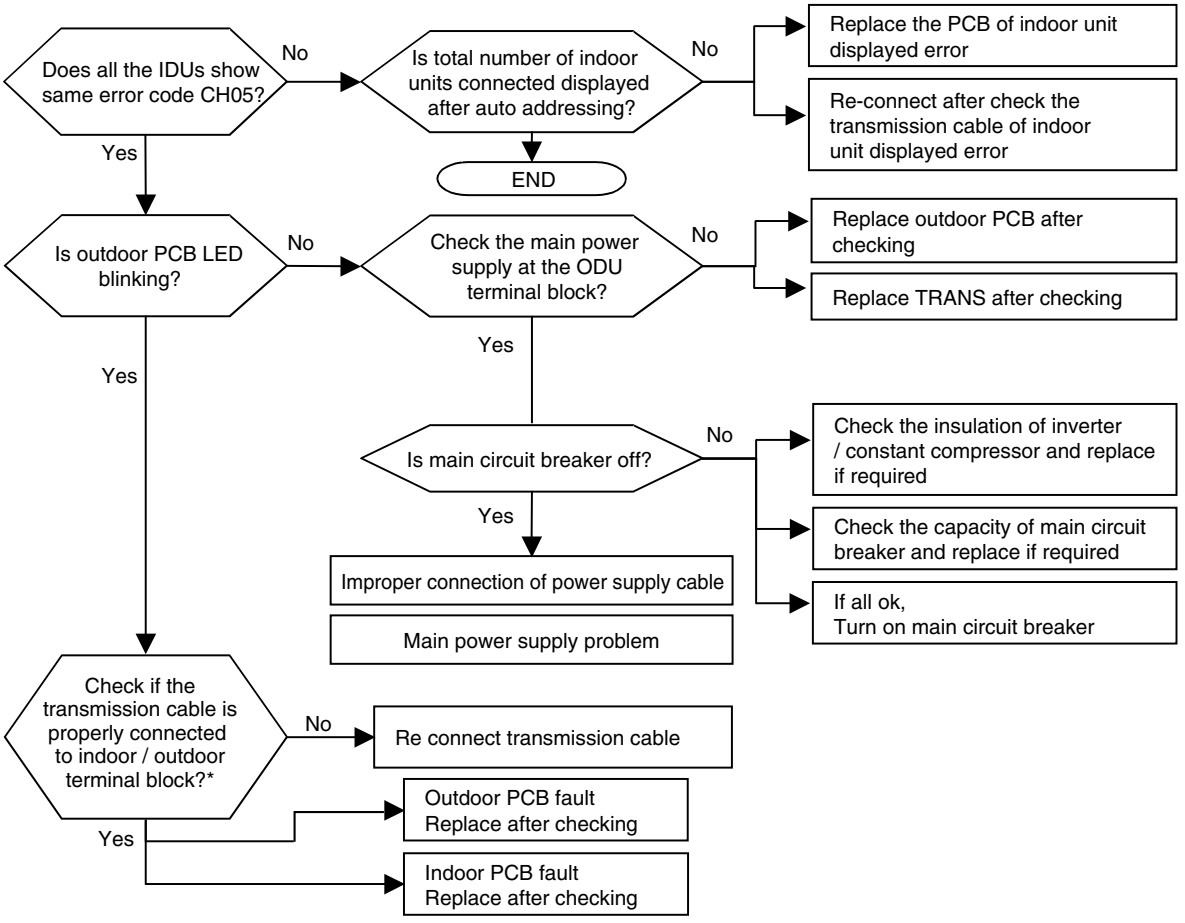
Float switch Housing (**CN-FLOAT**)

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

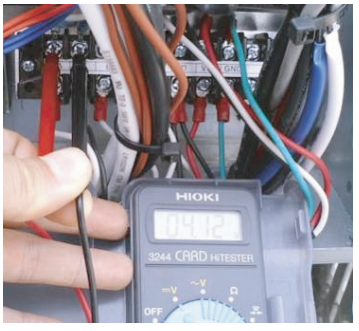


Error No.	Error Type	Error Point	Main Reasons
05	Indoor & Outdoor unit transmission error	No signal transmission between indoor & outdoor units.	1. Auto addressing is not done 2. transmission cable is not connected 3. Short circuit of transmission cable 4. Indoor unit transmission circuit fault 5. Outdoor unit transmission circuit fault 6. Not enough distance between power and transmission cable?

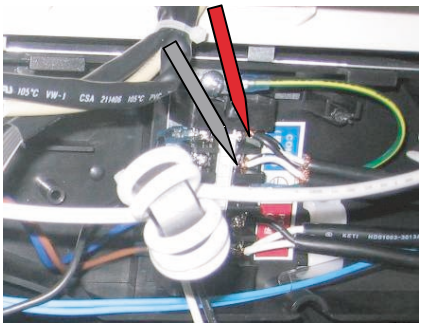
■ Error diagnosis and countermeasure flow chart



* (Note1) Transmission from IDU is normal if voltage fluctuation(-9V ~ +9V) exists when checking DC voltage of communication terminal between IDU and ODU

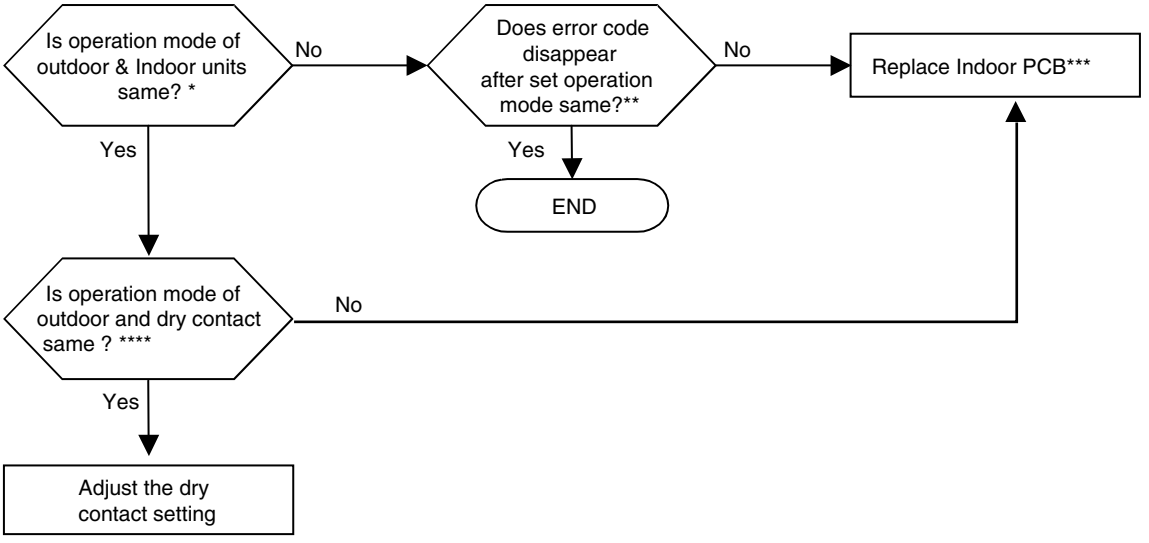


* If the DC voltage between transmission terminal A, B of indoor unit is fluctuate within (-9V~+9V) then transmission from outdoor unit is normal



Error No.	Error Type	Error Point	Main Reasons
07	All Indoor units are not running in same mode	The Indoor units started later are operated in different mode from earlier one.	1. Indoor units are in different mode 2. PCB fault 3. cabled remote controller fault ※ Checking ch07 method IDU doesn't operate as Operation mode is flickering at IDU wired remote controller and IDU display window.

■ Error diagnosis and countermeasure flow chart



* Check mode selection setting of wired remote controller.

** Error(CH07) removal method with remote controller

1. With wired remote controller
   Turn off the indoor unit by pressing the ON/OFF button.
   The error code will be removed automatically after few seconds.
2. With wireless remote controller
   Turn off indoor unit and then turn on by changing operation mode.
   The error code will be removed automatically after few seconds.

**** After replacing the indoor unit PCB, make sure to be done to do Auto addressing and input the address of central control

***** If ODU Dry Contact function is set , different mode operation error may be occurred because the operation mode is fixed.

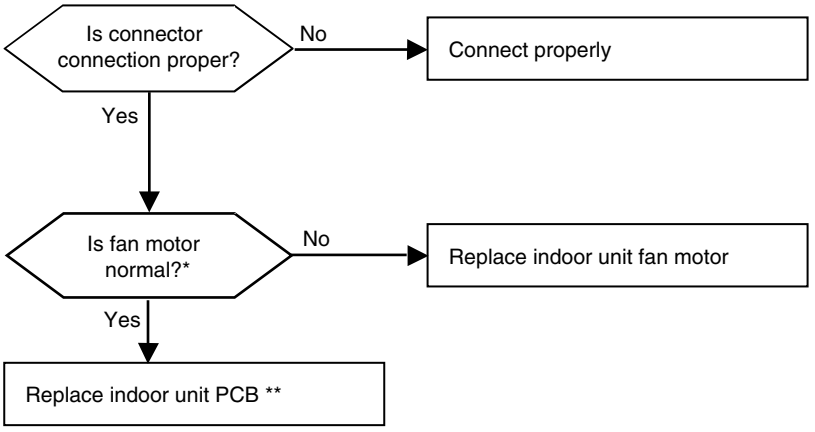
Error No.	Error Type	Error Point	Main Reasons
09	Indoor unit EEPROM error		1. Error developed in transmission between the micro- processor and the EEPROM on the surface of the PCB. 2. ERROR due to the EEPROM damage

■ Error diagnosis and countermeasure flow chart

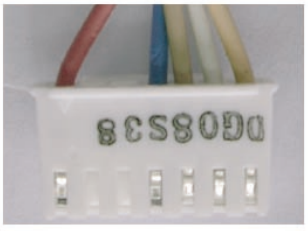
- Replace the indoor unit PCB, and then make sure to perform Auto addressing and input the address of central control

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 sec.)	1. Motor connector connection fault 2. Indoor PCB fault 3. Motor fault

■ Error diagnosis and countermeasure flow chart



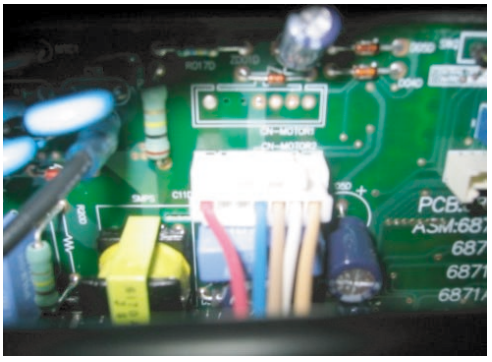
* It is normal when check hall sensor of indoor fan motor as shown below



Each termainl with the tester

Tester		Normal resistance(±10%)	
+	-	TH chassis	TD chassis
①	④	∞	∞
⑤	④	hundreds kΩ	hundreds kΩ
⑥	④	∞	∞
⑦	④	hundreds kΩ	hundreds kΩ

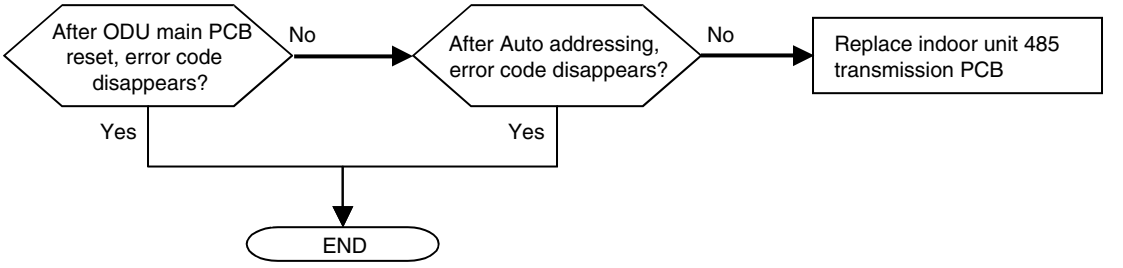
<Checking connection state of fan motor connector>



** 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)

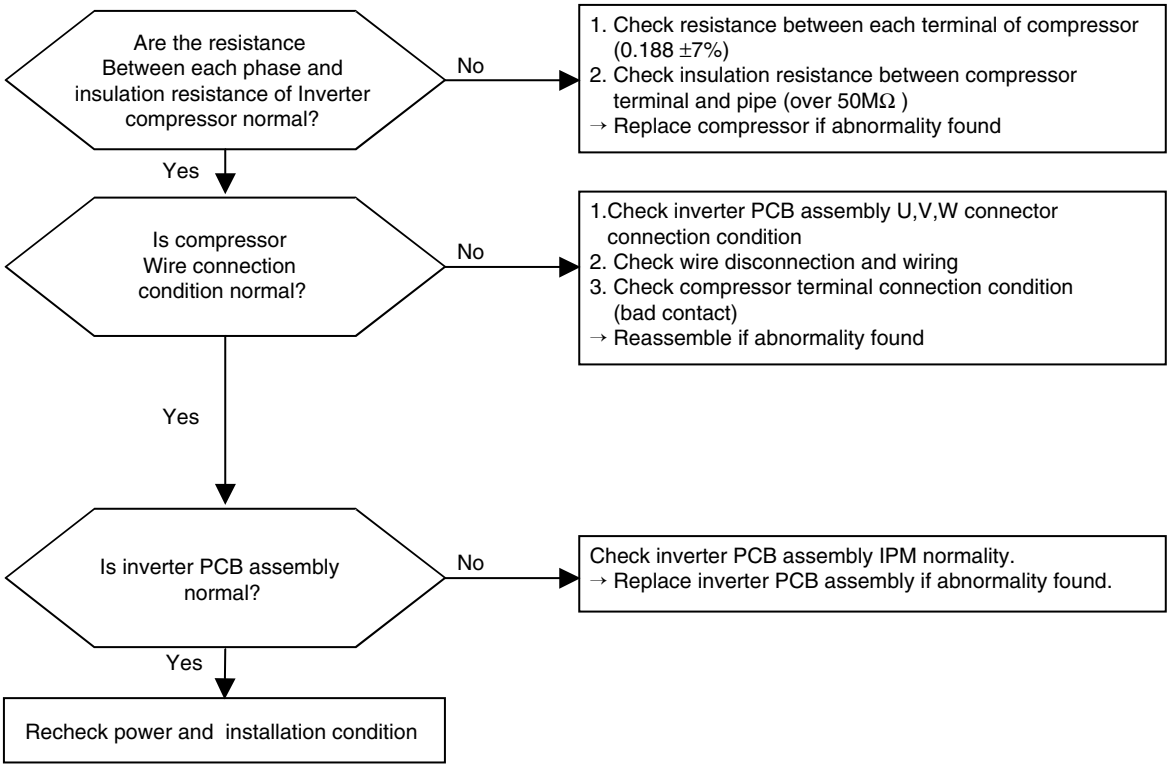
Error No.	Error Type	Error Point	Main Reasons
11	Indoor unit transmission error	Indoor unit doesn't get signal from ODU for 3 minutes continuously	1. Indoor 485 transmission PCB fault 2. After PCB replacing, auto addressing was not done

■ Error diagnosis and countermeasure flow chart



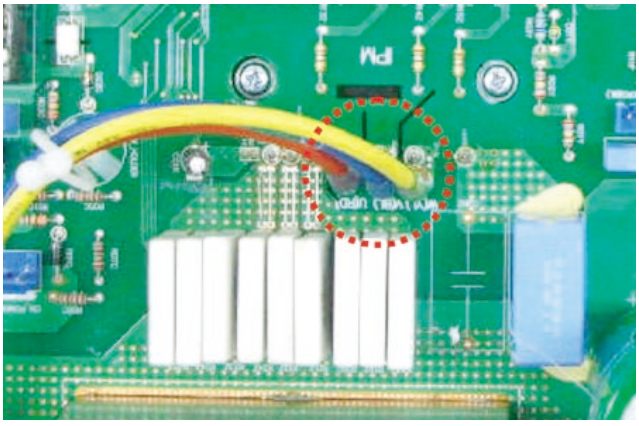
Error No.	Error Type	Error Point	Main Reasons
21	Inverter PCB Assy IPM Fault occur	IPM self protection circuit activation (Overcurrent/IPM overheating/Vcc low voltage)	1.Over current detection at Inverter compressor(U,V,W) 2.Compressor damaged (insulation damaged/Motor damaged) 3.IPM overheating (Heat sink fan damaged/Heat sink fan connector disconnected/Heat sink disassembled) 4.Inverter compressor terminal disconnected or loose 5.Inverter PCB assembly damaged 6.ODU input current low

■ Error diagnosis and countermeasure flow chart

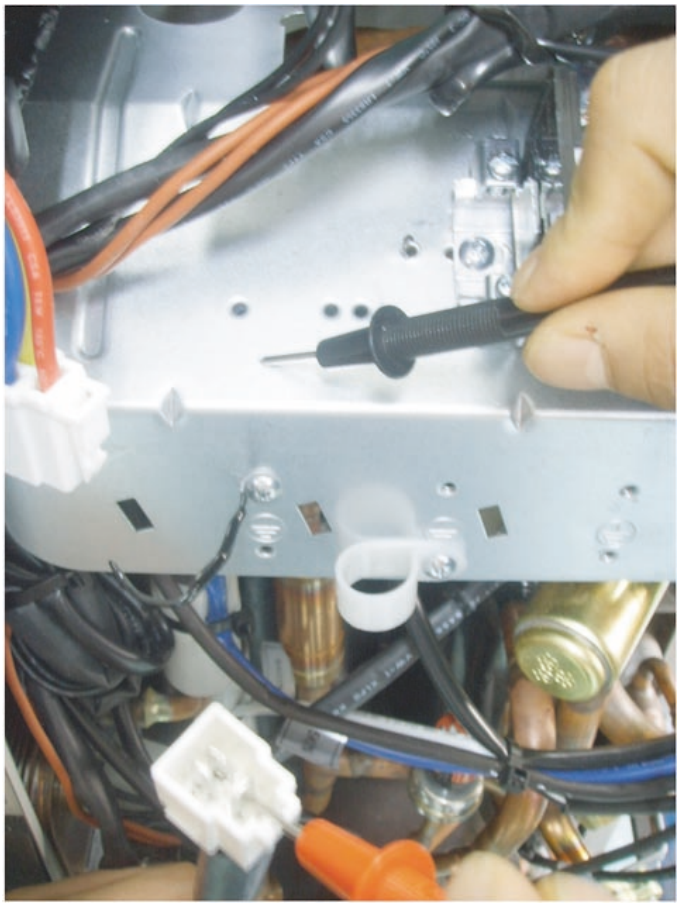


Measuring resistance between each terminal of compressor

Compressor output terminal joining position

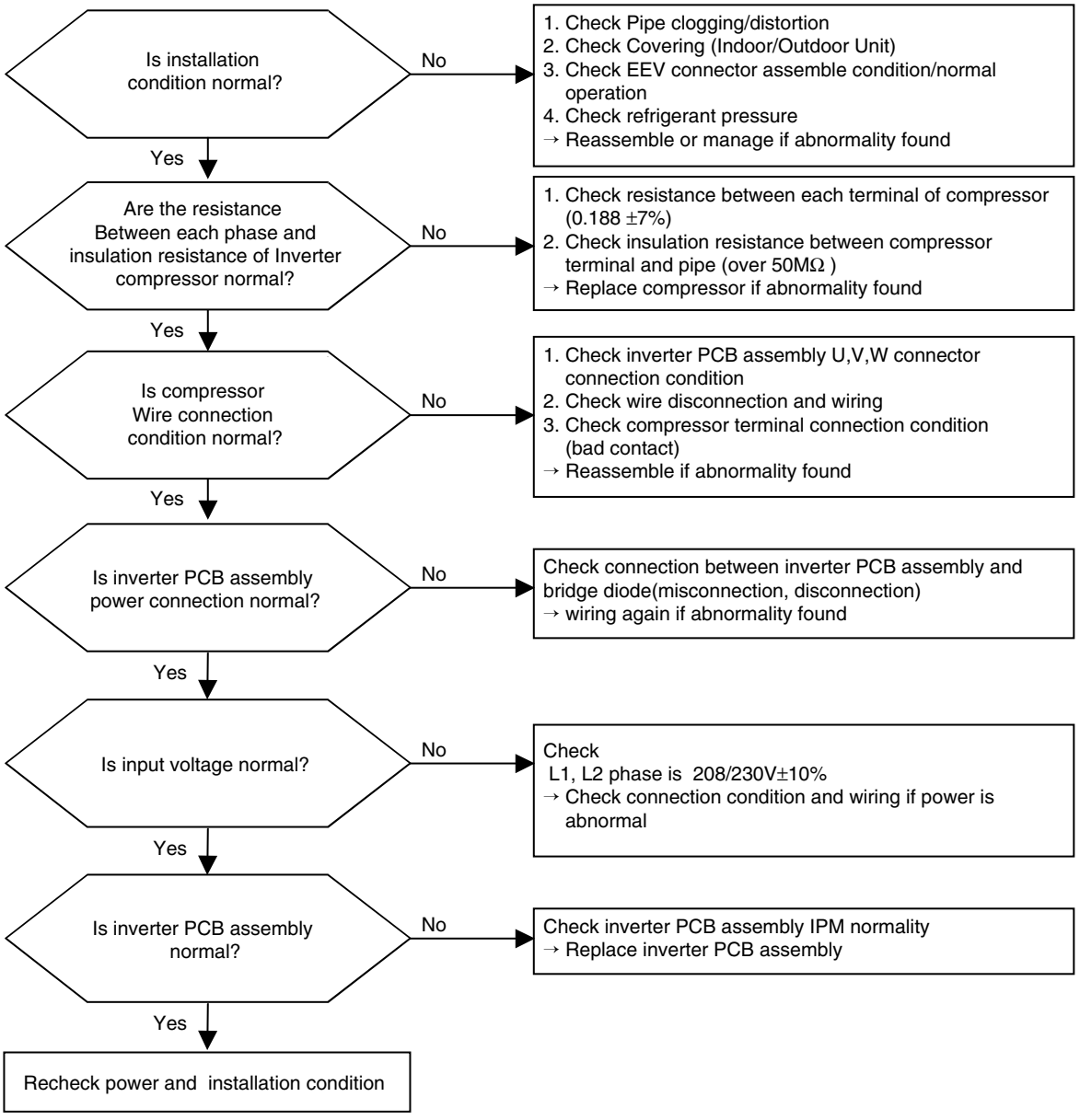


Measuring insulation resistance between Comp output terminal and chassis



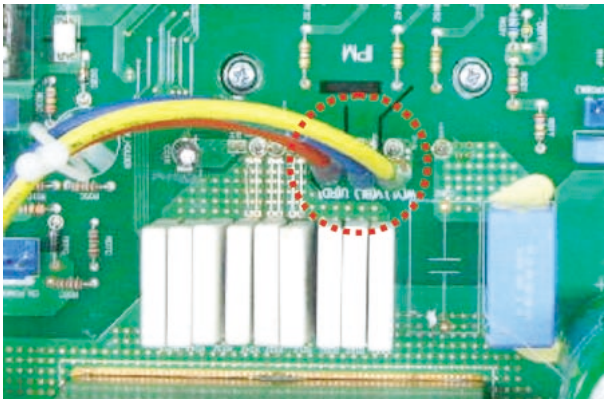
Error No.	Error Type	Error Point	Main Reasons
22	AC Input Current Over Error	Inverter PCB Assembly input power current is over limited value(29A)	1. Overload operation (Pipe clogging/Covering/EEV defect/Ref. overcharge) 2. Compressor damage(Insulation damage/Motor damage) 3. Input voltage low 4. Power Line Misconnection 5. Inverter PCB Assembly damage (Input current sensing part)

■ Error Diagnosis and Countermeasure Flow Chart

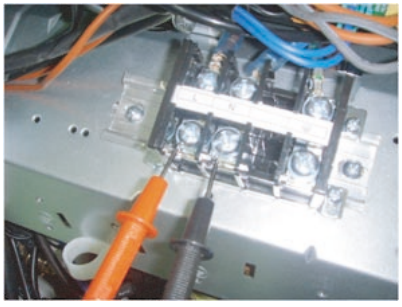


Measuring resistance between each terminal of compressor

Compressor output terminal joining position

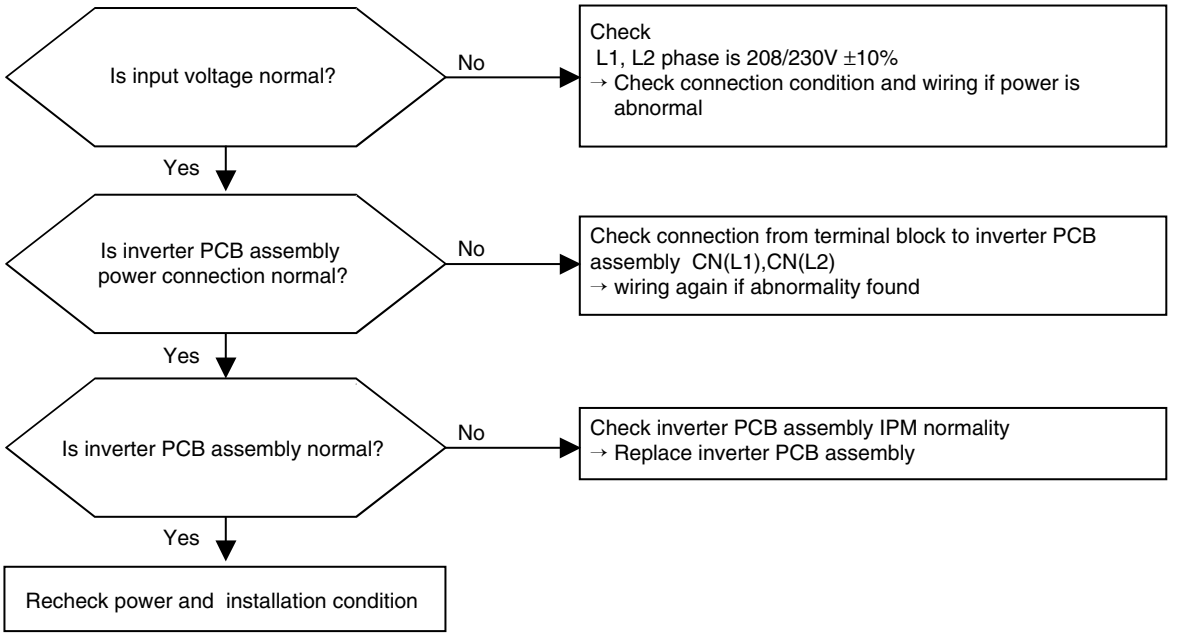


Measuring input voltage



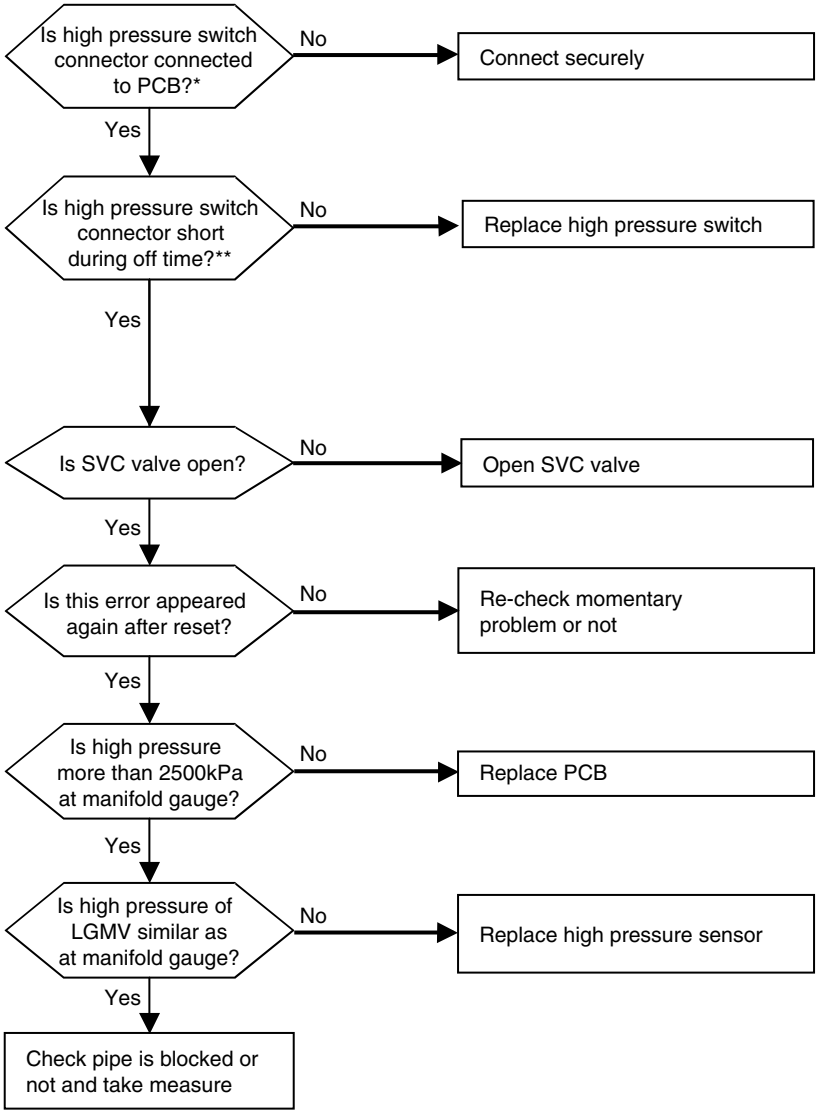
Error No.	Error Type	Error Point	Main Reasons
23	Inverter Compressor DC Link Low Voltage	DC Voltage isn't charged after starting relay on	1. DC Link terminal misconnection/terminal contact fault 2. Starting relay damage 3. Condenser damage 4. Inverter PCB assembly damage (DC Link voltage sensing part) 5. Input voltage low

■ Error Diagnosis and Countermeasure Flow Chart



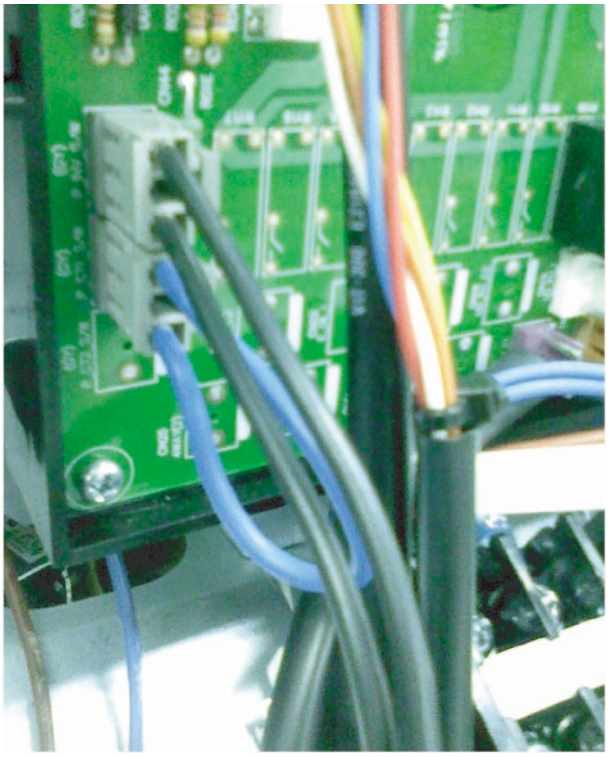
Error No.	Error Type	Error Point	Main Reasons
24	Excessive rise of discharge pressure in outdoor compressor	Compressor off due to the high pressure switch in outdoor unit	1. Defective high pressure switch 2. Defective fan of indoor unit or outdoor unit 3. Check valve of compressor clogged 4. Pipe distortion 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

■ Error diagnosis and countermeasure flow chart

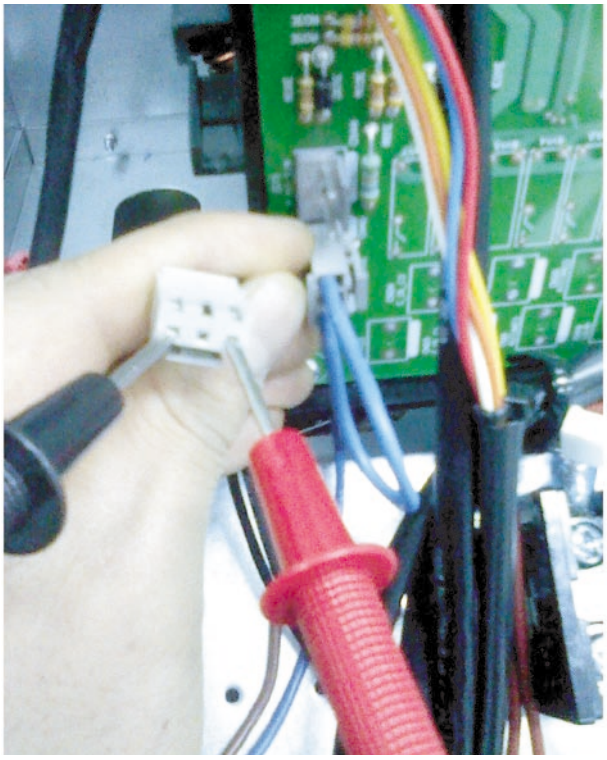


* Connector location of high pressure switch at PCB

Main PCB

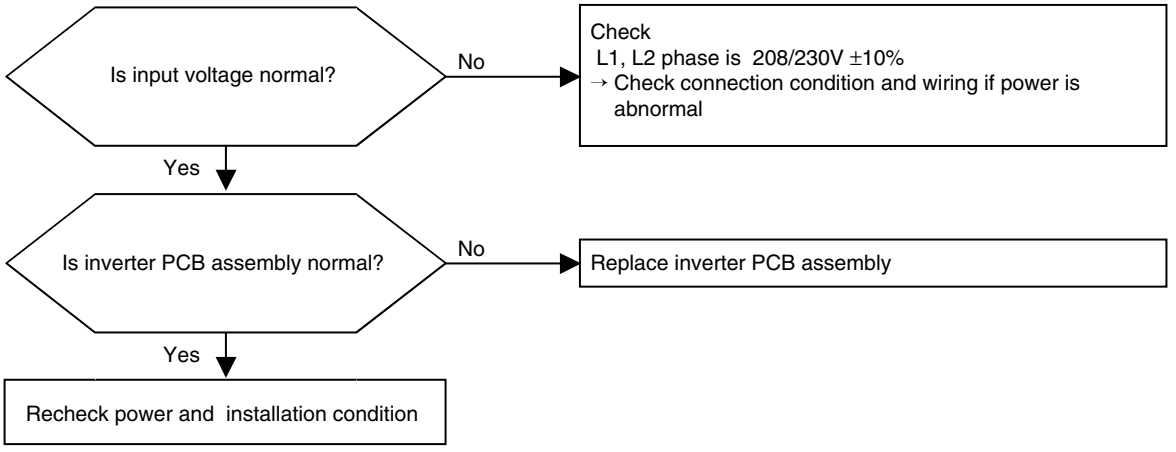


** Checking short or not at connector of high pressure switch

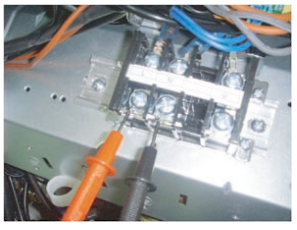


Error No.	Error Type	Error Point	Main Reasons
25	Input Voltage high/low	Input voltage is over limited value of the product (173V or less, 289V or more)	1. Input voltage abnormal (L1,L2) 2. Outdoor unit inverter PCB assembly damage (input voltage sensing part)

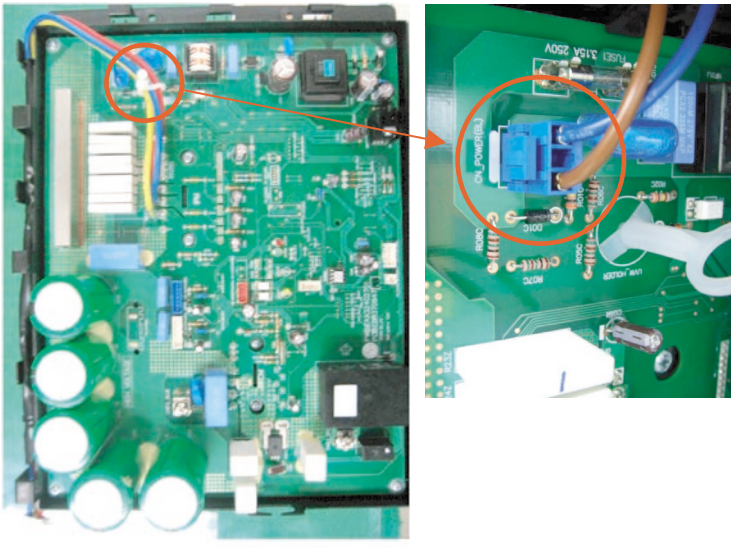
■ Error Diagnosis and Countermeasure Flow Chart



Measuring input voltage

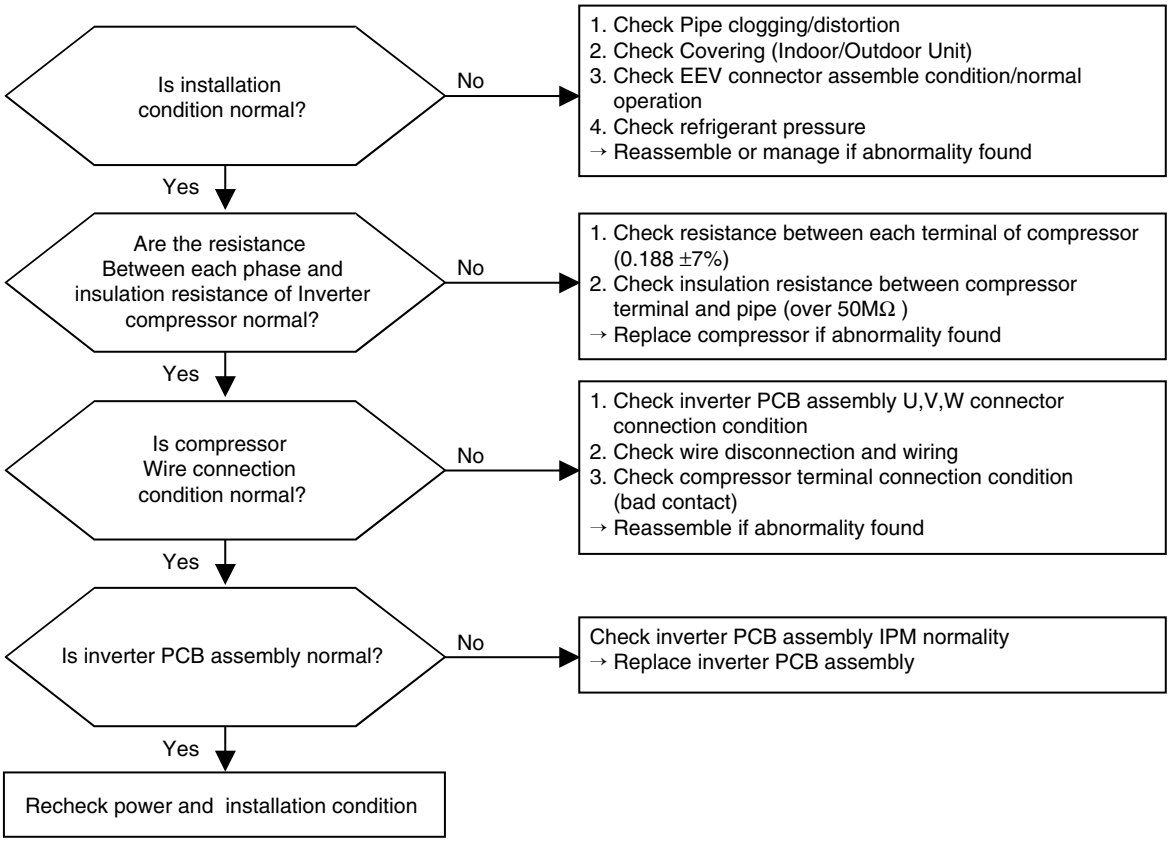


Inverter PCB assembly power wiring



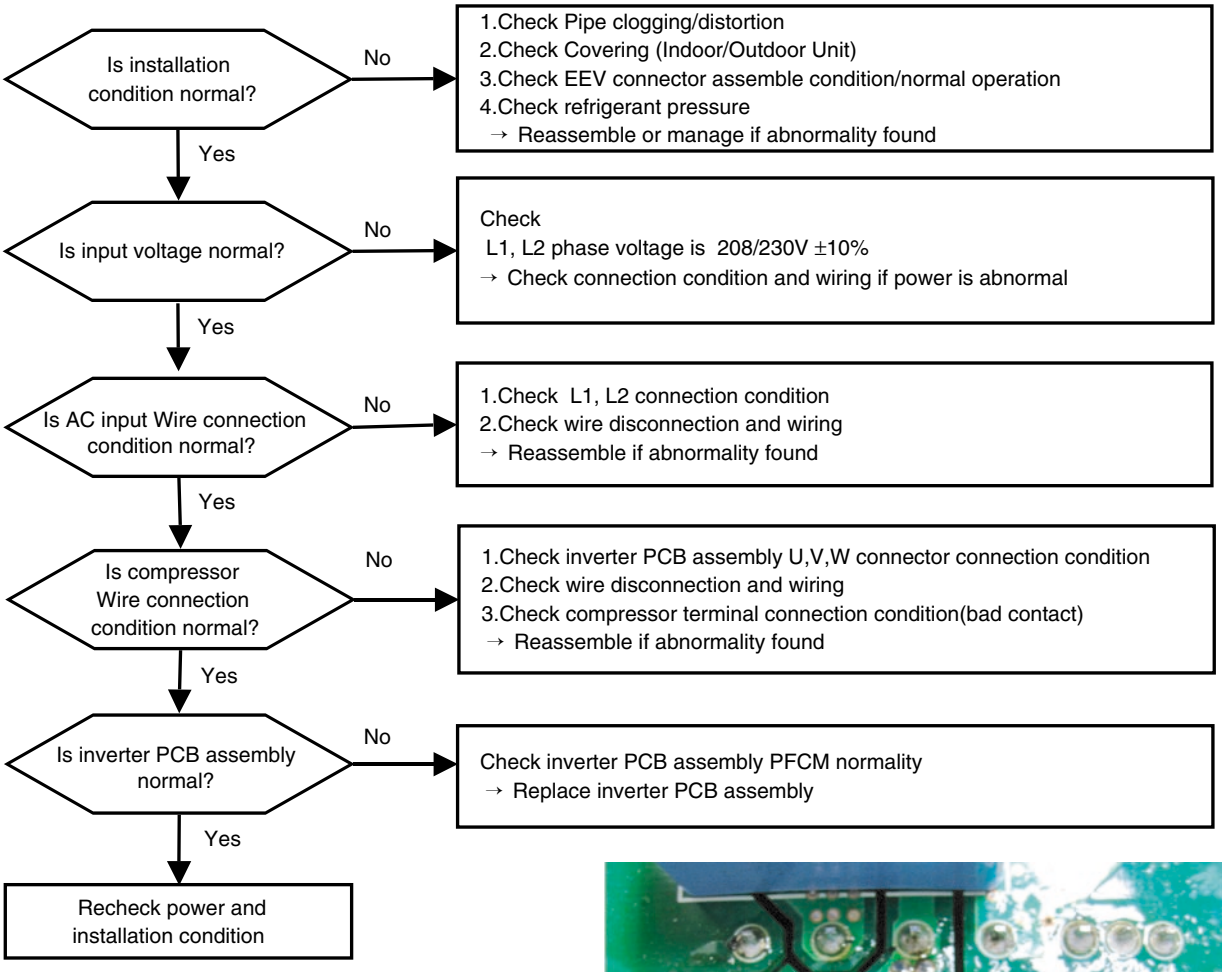
Error No.	Error Type	Error Point	Main Reasons
26	Inverter compressor starting failure Error	Starting failure because of compressor abnormality	1. Overload operation (Pipe clogging/Covering/EEV defect/Ref. overcharge) 2. Compressor damage (Insulation damage/Motor damage) 3. Compressor wiring fault 4. ODU inverter PCB damage (CT)

■ Error Diagnosis and Countermeasure Flow Chart



Error No.	Error Type	Error Point	Main Reasons
27	AC input instant over current error	Inverter PCB input 1 phase power current is over 100A(peak) for 2us	1.Overload operation (Pipe clogging/ Covering/EEV defect/Ref. overcharge) 2.Compressor damage (Insulation damage/Motor damage) 3.Input voltage abnormal (L1,L2) 4.Power line assemble condition abnormal 5.Inverter PCB assembly Damage (input current sensing part)

■ Error Diagnosis and Countermeasure Flow Chart

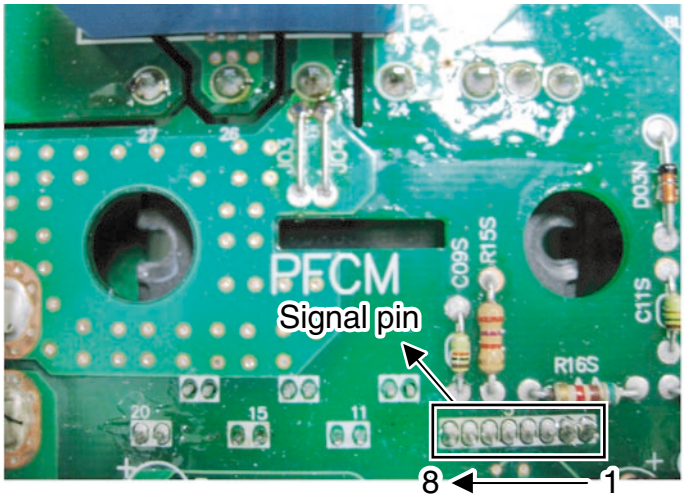


※ PFCM Moudle checking method

① Set the multi tester to diode mode.

② Check short between input signal pin which are placed below PFC Module

③ Replace PCB assembly if it is short between pins except No.4,5 pins.

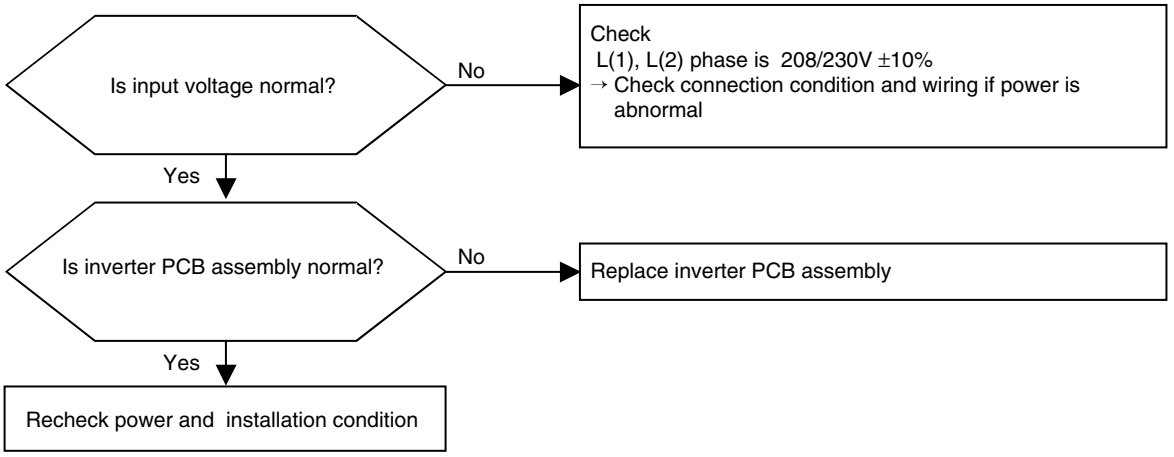


CAUTION

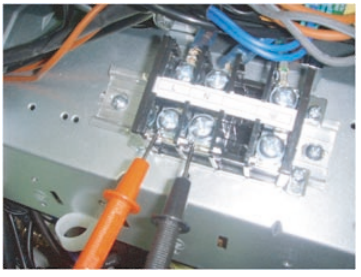
PFCM module No.4,5 pins are internal short state.

Error No.	Error Type	Error Point	Main Reasons
28	Inverter DC link high voltage error	Inv PCB DC link voltage supplied over 780V	1. Input voltage abnormal (L(1),L(2)) 2. ODU inverter PCB damage (DC Link voltage sensing part)

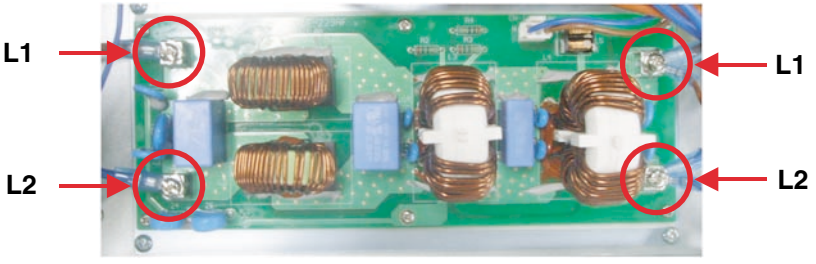
■ Error Diagnosis and Countermeasure Flow Chart



Measuring input voltage

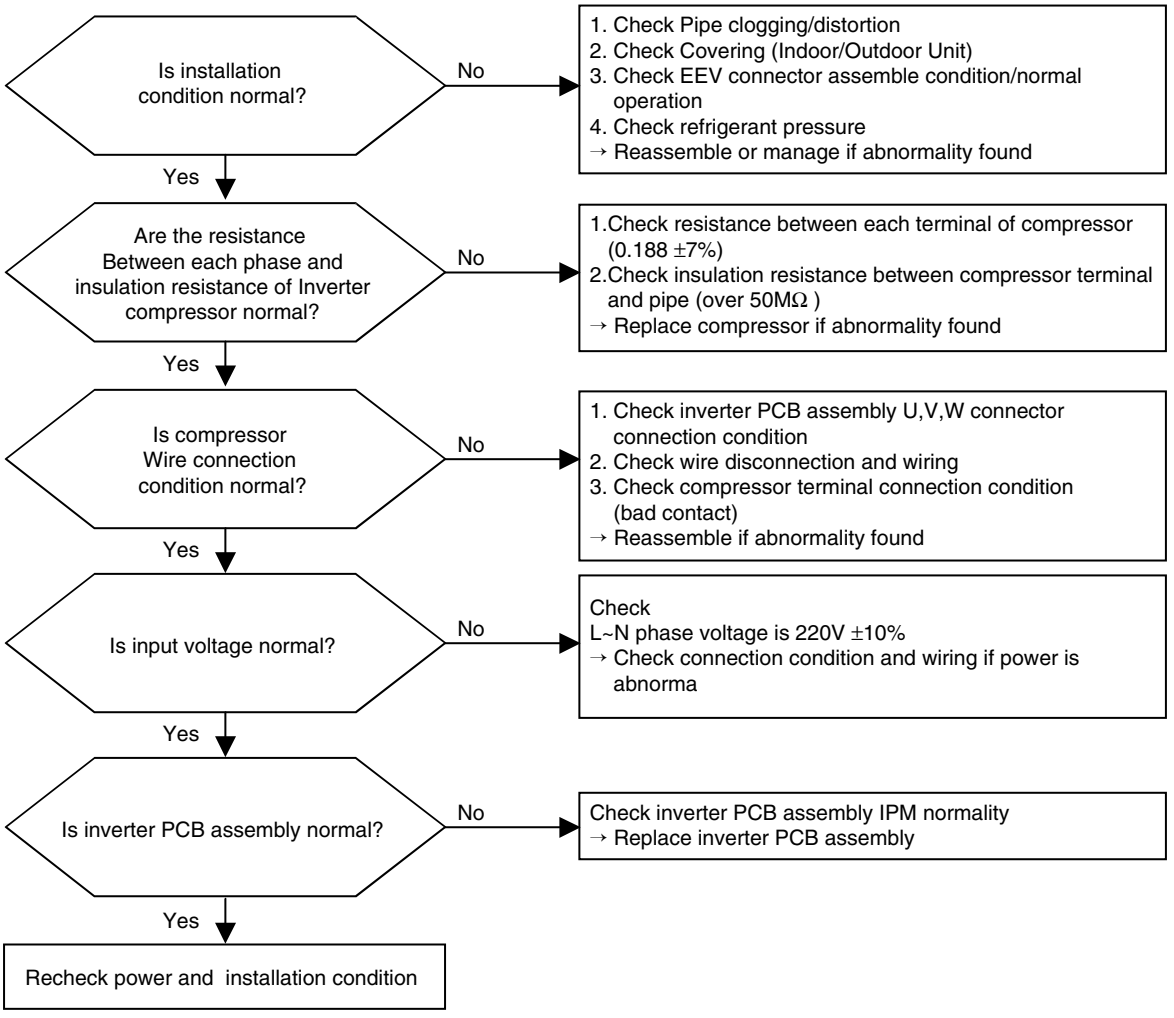


Noise filter wiring



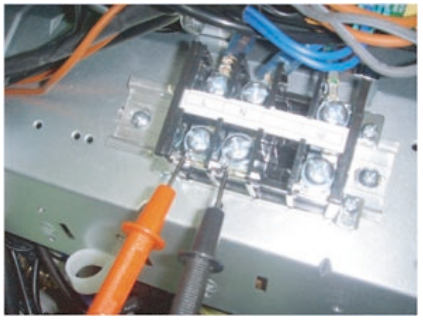
Error No.	Error Type	Error Point	Main Reasons
29	Inverter compressor over current	Inverter compressor input current is over 30A	1. Overload operation (Pipe clogging/Covering/EEV defect/Ref. overcharge) 2. Compressor damage(Insulation damage/Motor damage) 3. Input voltage low 4. ODU inverter PCB assembly damage

■ Error Diagnosis and Countermeasure Flow Chart

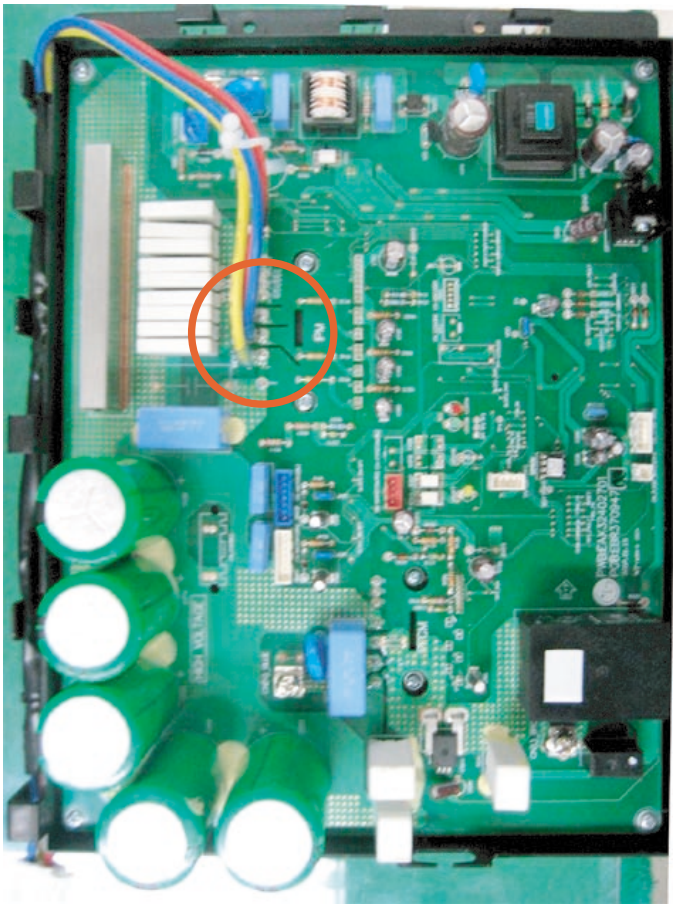


Measuring resistance between each terminal of compressor

Measuring input voltage

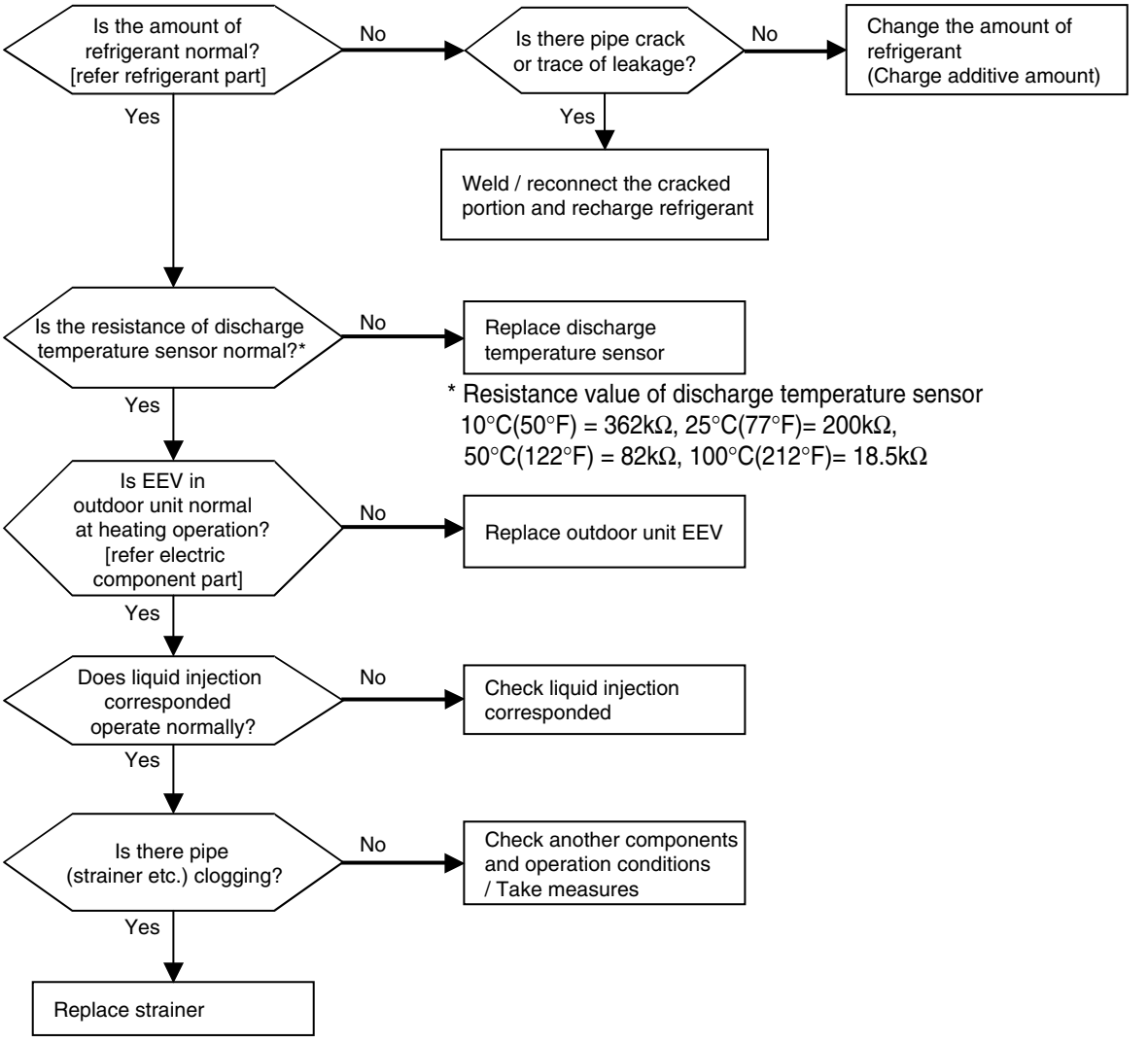


Compressor output terminal joining position



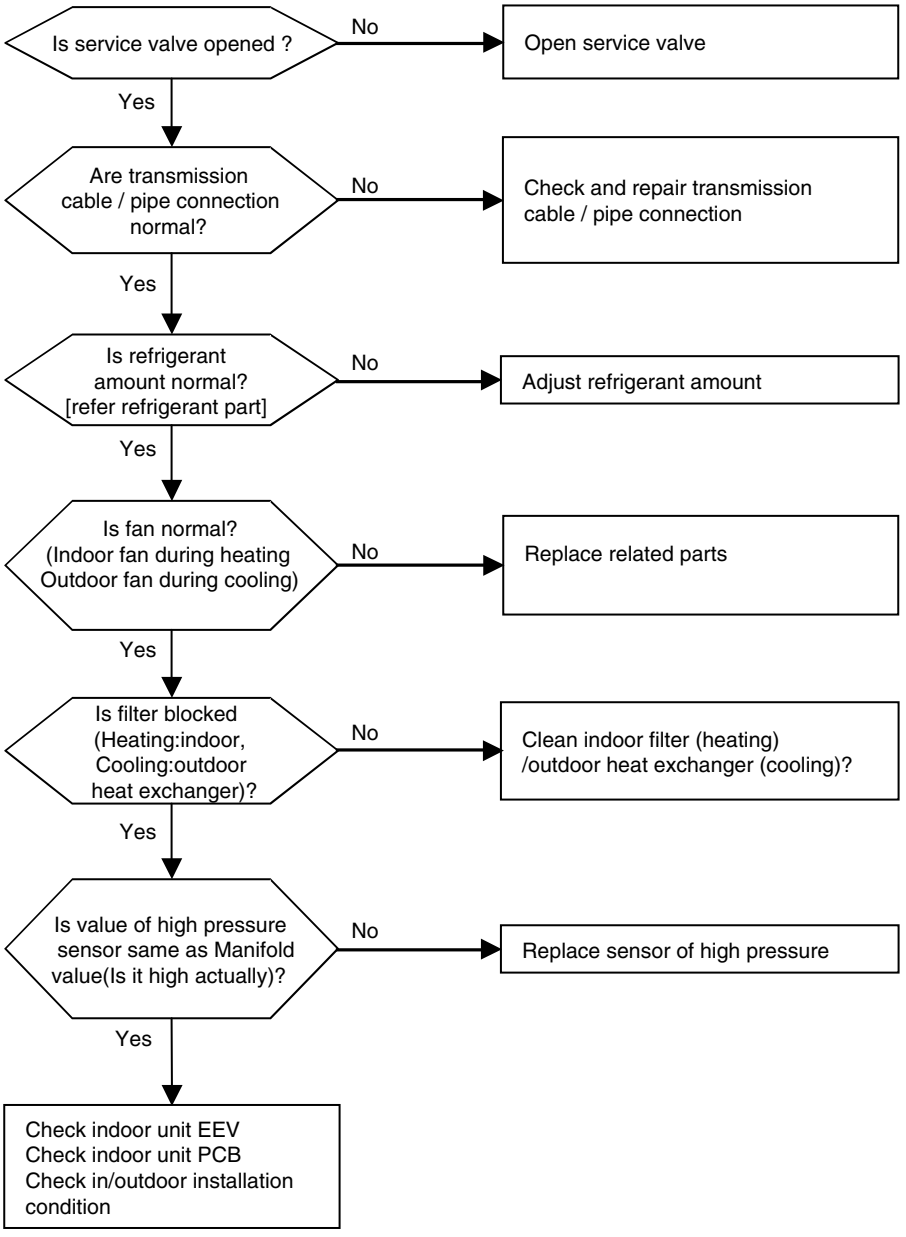
Error No.	Error Type	Error Point	Main Reasons
32	Over-increase discharge temperature of inverter compressor at main outdoor unit	Compressor is off because of over-increase discharge temperature of inverter compressor	1. Temperature sensor defect of inverter compressor discharge pipe 2. Refrigerant shortage / leak 3. EEV defect 4. Liquid injection valve defect

■ Error diagnosis and countermeasure flow chart



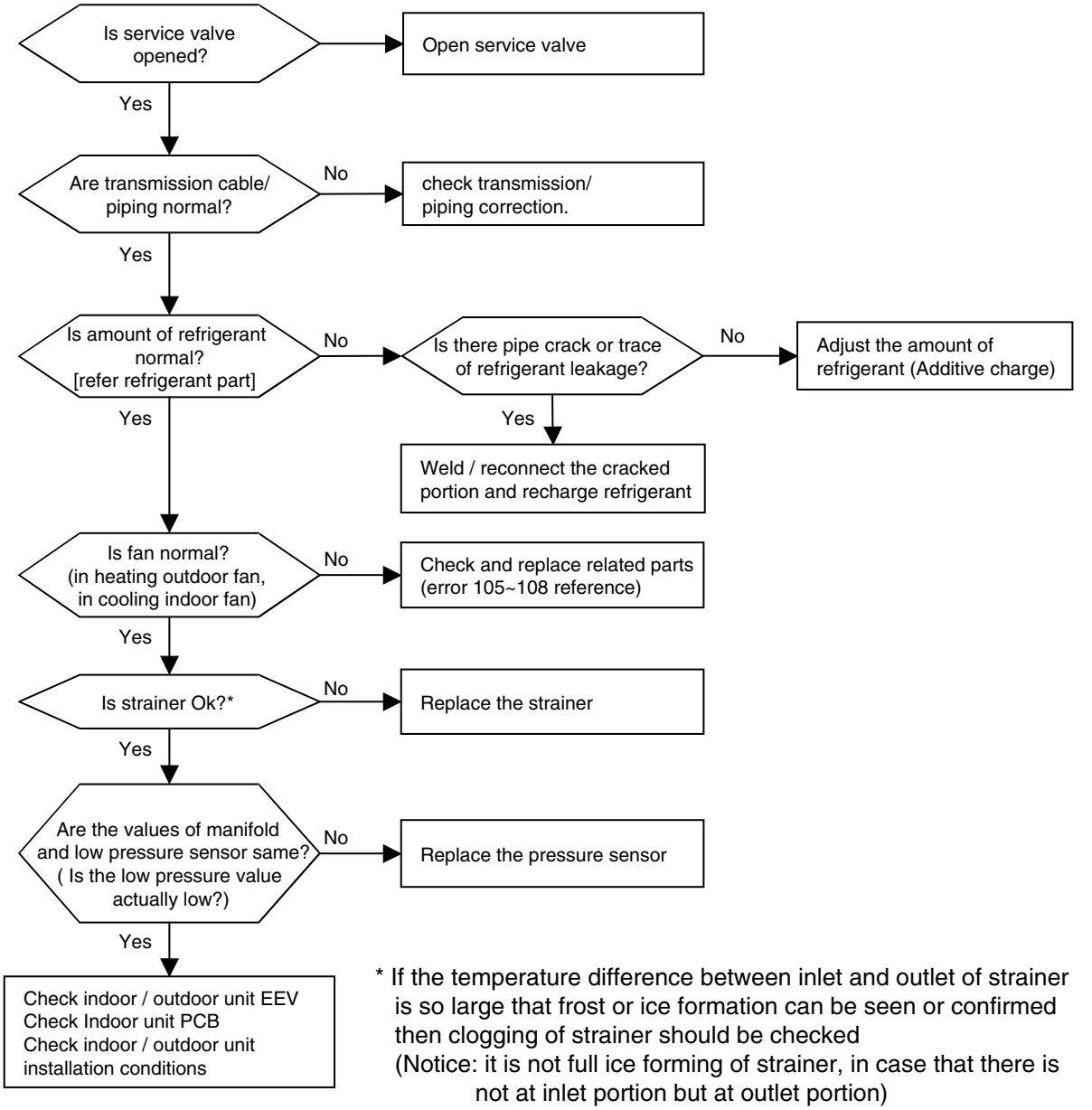
Error No.	Error Type	Error Point	Main Reasons
34	Over-increase of discharge pressure of compressor	Error happens because of 3 times successive compressor off due to over-increase of high pressure by high pressure sensor	1. Defect of high pressure sensor 2. Defect of indoor or outdoor unit fan 3. Deformation because of damage of refrigerant pipe 4. Over-charged refrigerant 5. Defective indoor / outdoor unit EEV 6. When blocked - Outdoor unit is blocked during cooling - Indoor unit filter is blocked during heating 7. SVC valve is clogged 8. PCB defect of outdoor unit 10. Indoor unit pipe temperature sensor defect

■ Error diagnosis and countermeasure flow chart



Error No.	Error Type	Error Point	Main Reasons
35	Excessive drop of discharge pressure of compressor	Error happens because of 3 times successive compressor off due to excessive drop of low pressure by the low pressure sensor	1. Defective low pressure sensor 2. Defective outdoor/indoor unit fan 3. Refrigerant shortage/leakage 4. Deformation because of damage of refrigerant pipe 5. Defective indoor / outdoor unit EEV 6. Covering / clogging (outdoor unit covering during the cooling mode/ indoor unit filter clogging during heating mode) 7. SVC valve clogging 8. Defective outdoor unit PCB 9. Defective indoor unit pipe sensor

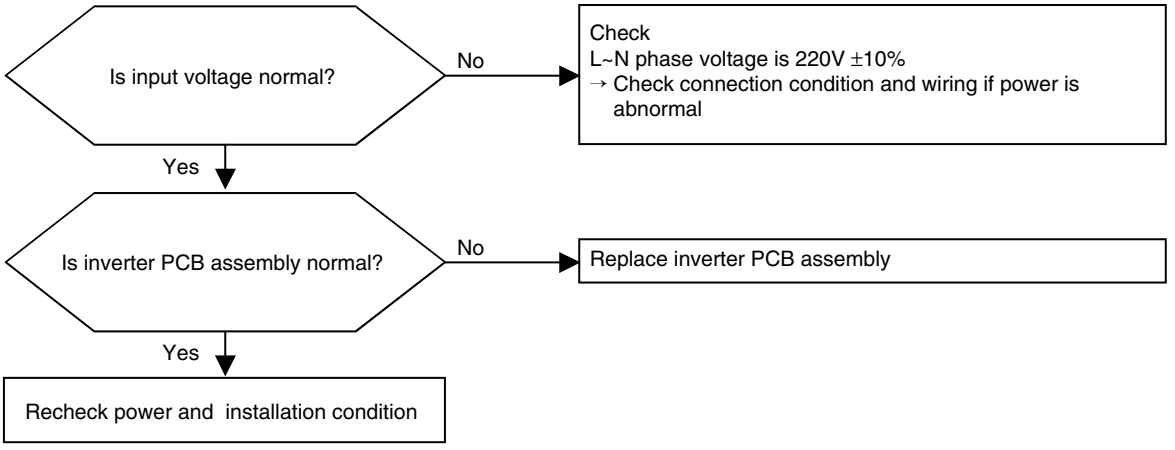
■ Error diagnosis and countermeasure flow chart



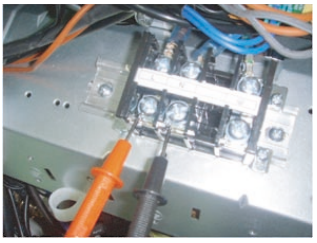
* If the temperature difference between inlet and outlet of strainer is so large that frost or ice formation can be seen or confirmed then clogging of strainer should be checked
(Notice: it is not full ice forming of strainer, in case that there is not at inlet portion but at outlet portion)

Error No.	Error Type	Error Point	Main Reasons
40	CT sensor error	Micom input voltage isn't within 2.5V ±0.3V at initial state of power supply	1. Input voltage abnormal (T-N) 2. ODU inverter PCB damage (CT sensing part)

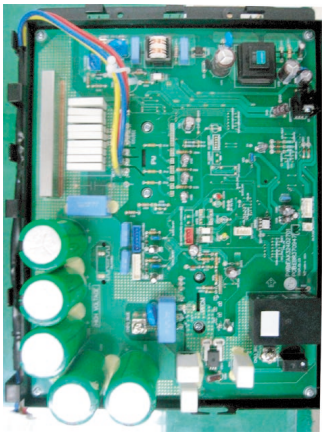
■ Error Diagnosis and Countermeasure Flow Chart



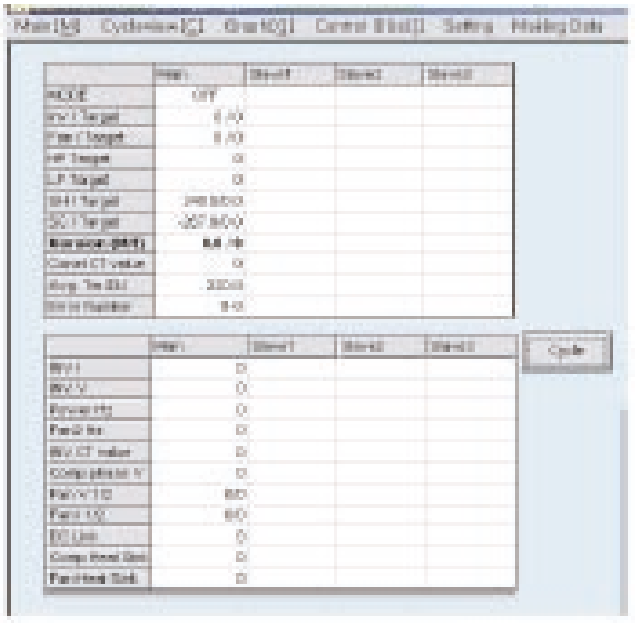
Measuring input voltage



Inverter PCB assembly

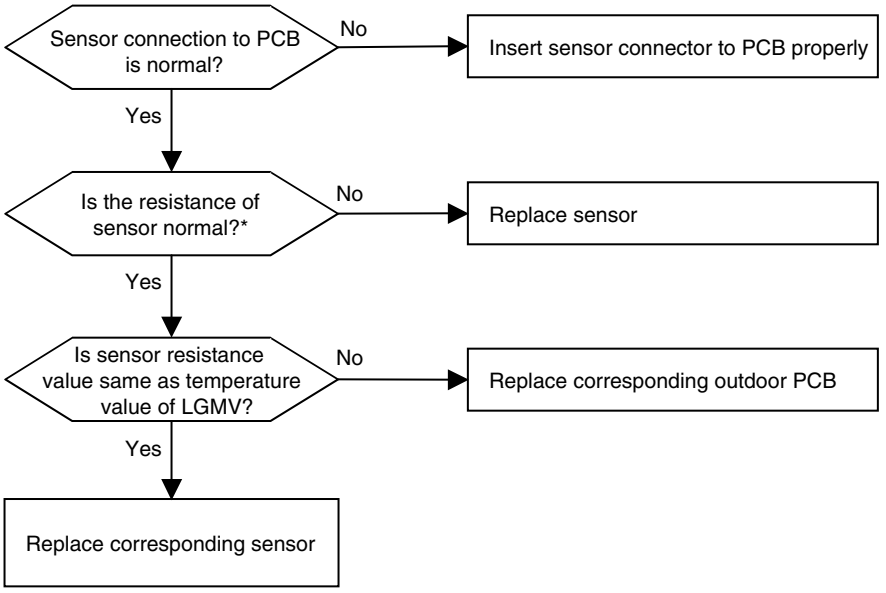


LGMV Part



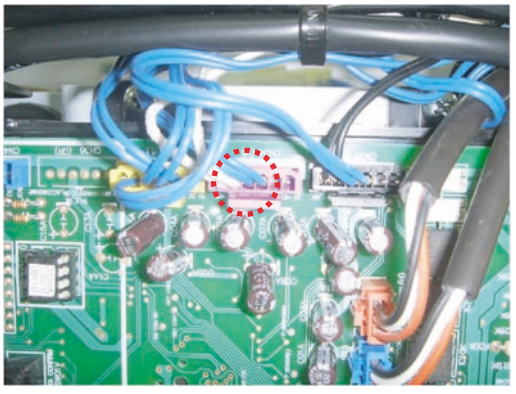
Error No.	Error Type	Error Point	Main Reasons
41	Compressor discharge pipe temperature sensor error	Sensor measurement valve is abnormal (Open/Short)	1. Defective connection of the compressor discharge pipe temperature sensor 2. Defective discharge pipe compressor sensor of the compressor (open/short) 3. Defective outdoor PCB

■ Error diagnosis and countermeasure flow chart



* Error is generated if the resistance is more than 5MΩ(open) and less than 2kΩ (short)

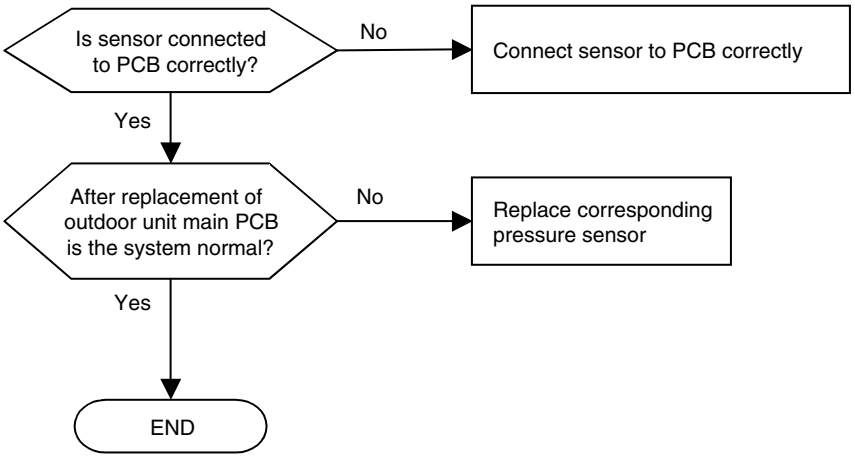
Note: Standard values of resistance of sensors at different temperatures (±5% variation)
10°C(50°F) = 362kΩ : 25°C(77°F)= 200kΩ : 50°C(122°F)= 82kΩ : 100°C(212°F)= 18.5kΩ

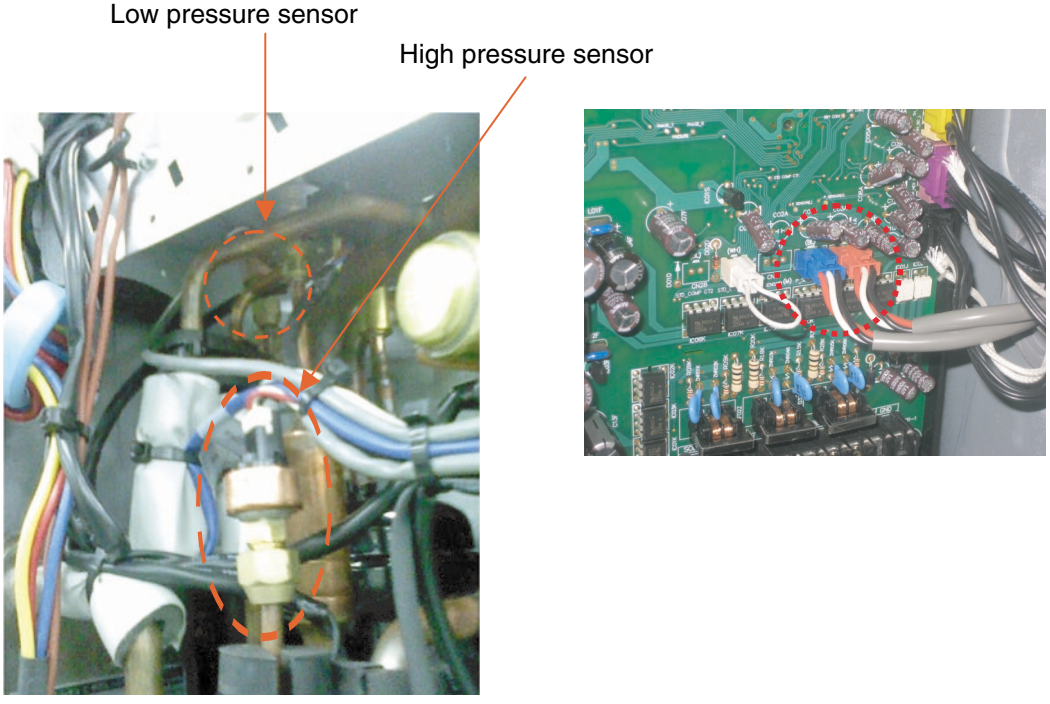


Check the resistance inverter compressor discharge temperature sensor

Error No.	Error Type	Error Point	Main Reasons
42	Sensor error of low pressure	Abnormal value of sensor (Open/Short)	1. Bad connection of low pressure connector 2. Defect of low pressure connector (Open/Short) 3. Defect of outdoor PCB
43	Sensor error of high pressure	Abnormal value of sensor (Open/Short)	1. Bad connection of high pressure connector 2. Defect of high pressure connector (Open/Short) 3. Defect of outdoor PCB

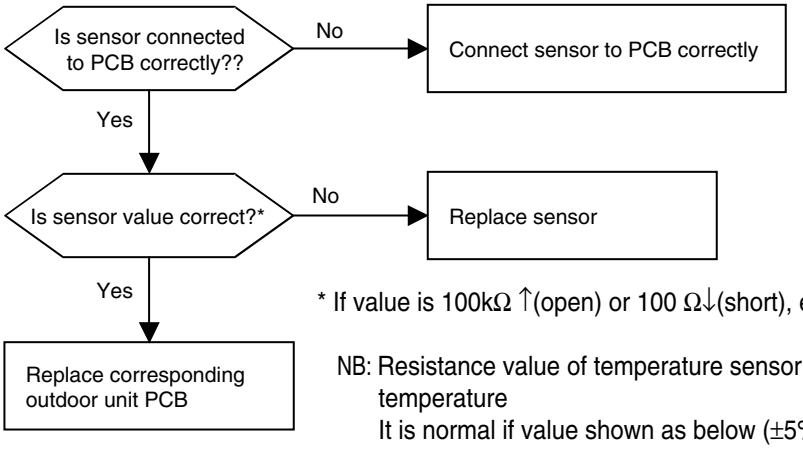
■ Error diagnosis and countermeasure flow chart





Error No.	Error Type	Error Point	Main Reasons
44	Sensor error of outdoor air temperature	Abnormal value of sensor (Open/Short)	1. Bad connection of air temperature connector 2. Defect of air temperature connector(Open/Short) 3. Defect of outdoor PCB
45	Outdoor unit heat exchanger temperature sensor error	Abnormal value of sensor (Open/Short)	1. Bad connection of air temperature connector 2. Defect of air temperature connector(Open/Short) 3. Defect of outdoor PCB
46	Compressor suction temperature sensor error	Abnormal value of sensor (Open/Short)	1. Bad connection of air temperature connector 2. Defect of air temperature connector(Open/Short) 3. Defect of outdoor PCB

■ Error diagnosis and countermeasure flow chart

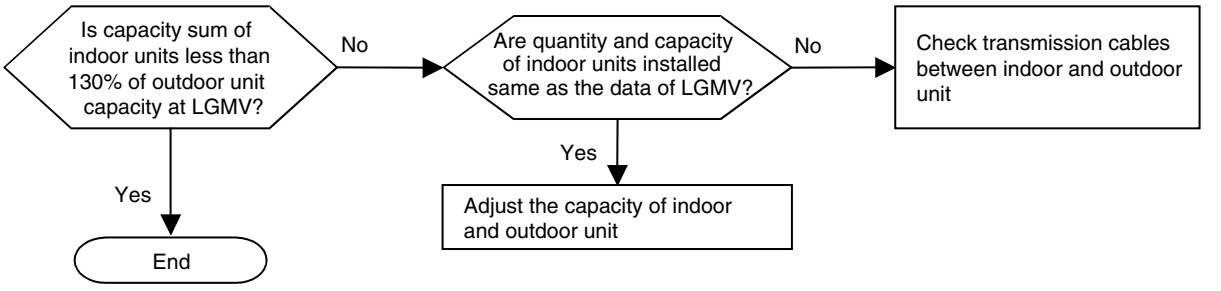


* If value is 100kΩ ↑(open) or 100 Ω↓(short), error occurs

NB: Resistance value of temperature sensor change according to temperature
It is normal if value shown as below (±5% error)
Sensor of air temperature: 10°C(50°F) = 20.7kΩ : 25°C(77°F)= 10kΩ : 50°C(122°F)= 3.4kΩ
Sensor of piping temperature: 10°C(50°F) = 10kΩ : 25°C(77°F)= 5kΩ : 50°C(122°F)= 1.8kΩ

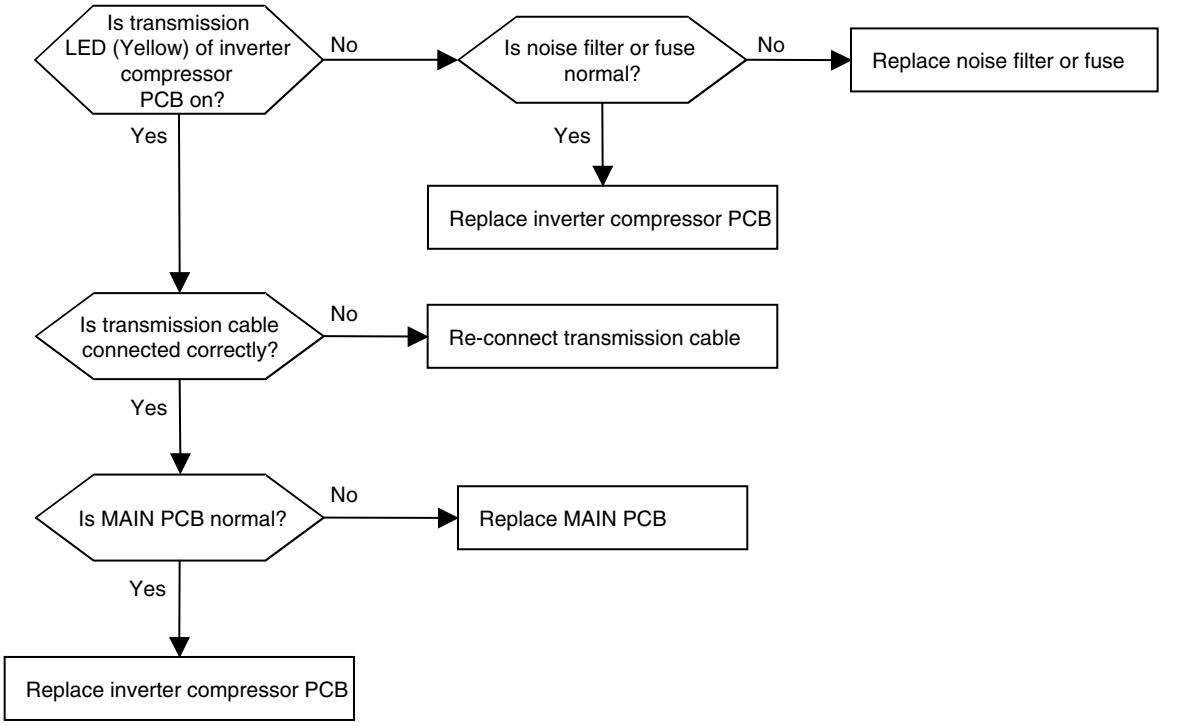
Error No.	Error Type	Error Point	Main Reasons
51	Over-Capacity (Sum of indoor unit capacity is more than outdoor capacity)	Sum of indoor unit capacity exceed outdoor unit capacity specification	1. 130% more than outdoor unit rated capacity 2. Wrong connection of transmission cable/piping 3. Defect of outdoor unit PCB

■ Error diagnosis and countermeasure flow chart

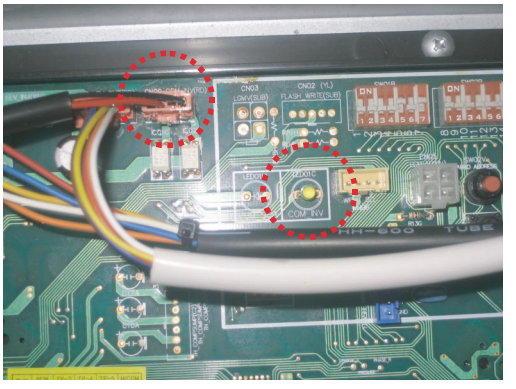


Error No.	Error Type	Error Point	Main Reasons
52	Transmission error between (Inverter PCB ➔ Main PCB)	Main controller can't receive signal from inverter controller	1. Power cable or transmission cable is not connected 2. Defect of outdoor Main fuse/Noise Filter 3. Defect of outdoor Main / inverter PCB

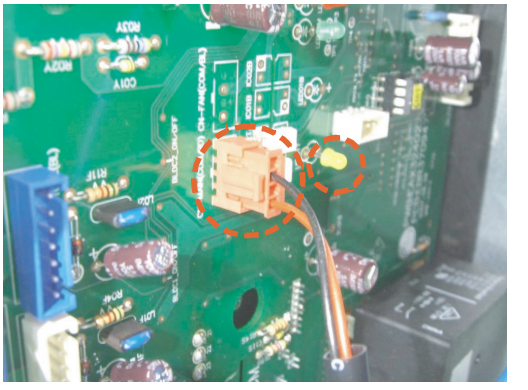
■ Error diagnosis and countermeasure flow chart



The method of checking MAIN PCB and inverter compressor PCB (If normal, transmission LED blinks)



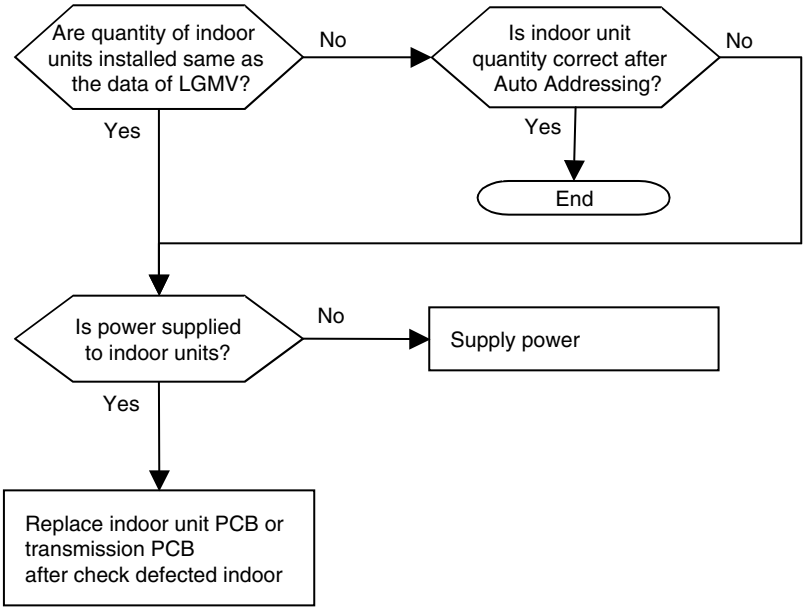
Transmission connector & LED in MAIN PCB



Transmission connector & LED in inverter compressor PCB

Error No.	Error Type	Error Point	Main Reasons
53	Transmission error (Indoor unit ➔ Main PCB)	In case Main PCB can't receive signal from indoor unit	1. Transmission cables are not connected 2. Transmission cables are short / open 3. Defect of outdoor Main / indoor PCB

■ Error diagnosis and countermeasure flow chart



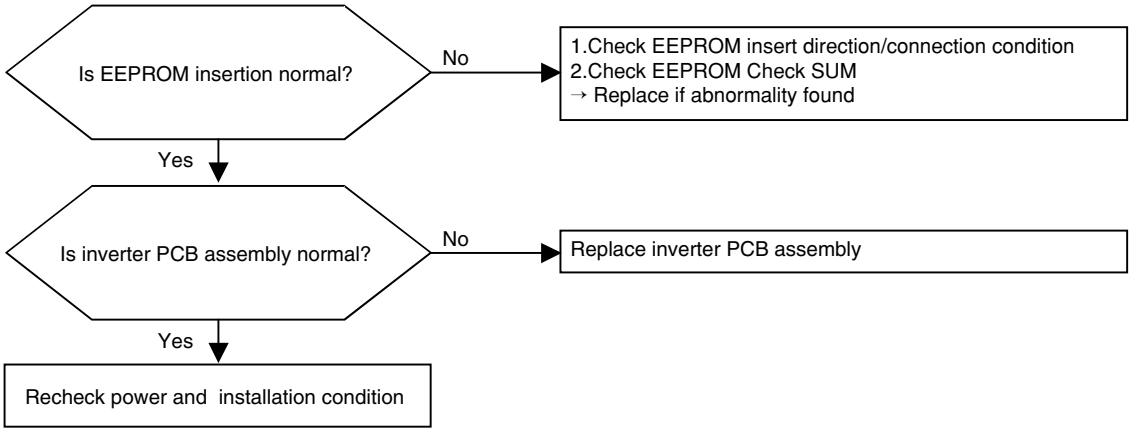
In case of CH53, almost happened with CH05, the indoor units not operated actually are normal so check with same method of CH05. and additionally check as shown as below and above flow chart

- Although the quantity of indoor units installed is same as LGMV data there may be a few indoor units with which the number of transmission is not increased with LGMV
- Although the quantity of indoor units installed is not same as LGMV data, and if transmission of the indoor unit displayed at LGMV is done well then the indoor unit suspected to have some problem (and is not appear at LGMV) may have following problems
  ① wrong connection of transmission cable or power cable
  ② fault of power / PCB / transmission cable
  ③ duplication of indoor unit number
- If transmission is not doing well wholly then the Auto Addressing is not done
- The case that CH53 appear at indoor unit also Auto Addressing is not done so indoor unit address may be duplicated

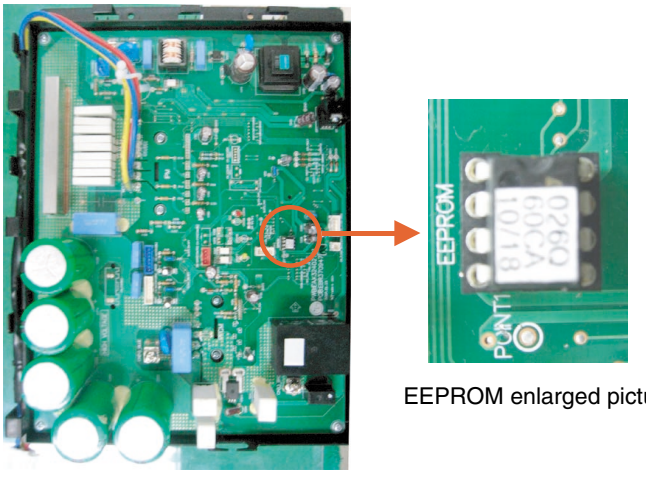
- After replacement of indoor unit PCB, Auto Addressing should be done, if central controller is installed then the central control address also should be input.
  In case that only transmission PCB is replaced above process is not needed

Error No.	Error Type	Error Point	Main Reasons
60	Inverter PCB EEPROM error	EEPROM Access error and Check SUM error	1. EEPROM contact defect/wrong insertion 2. Different EEPROM Version 3. ODU inverter PCB assembly damage

■ Error Diagnosis and Countermeasure Flow Chart

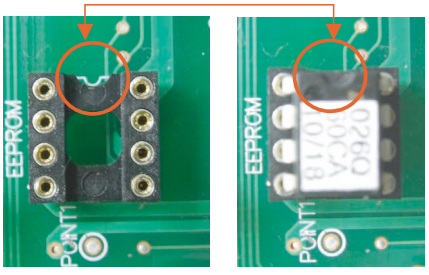


Inverter EEPROM inserting point



EEPROM enlarged picture

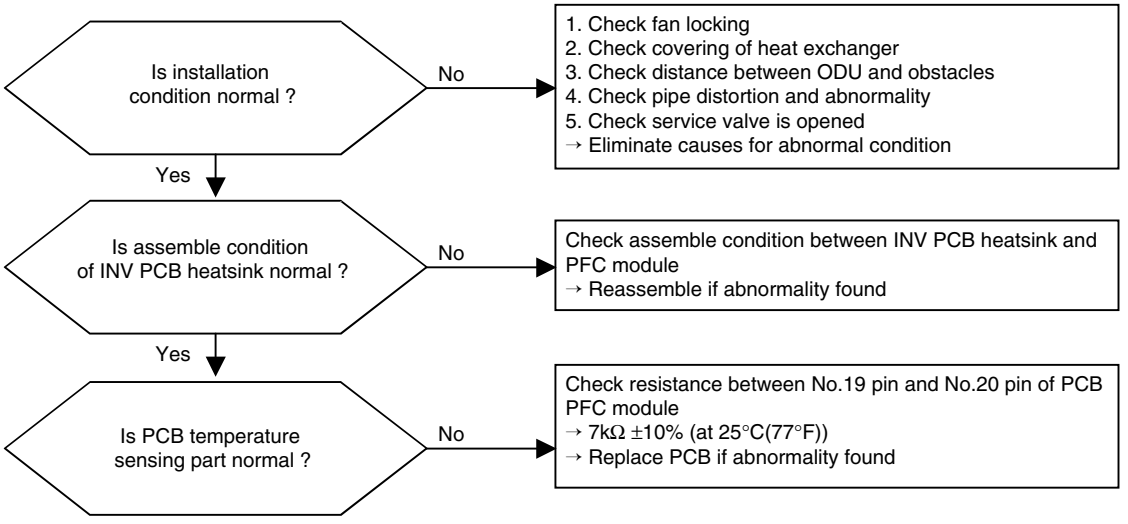
Right inserting direction of inverter EEPROM



※ Note : Replace after power off

Error No.	Error Type	Error Point	Main Reasons
62	Heatsink High error	Inverter PCB heatsink temperature is over 95˚C(203˚F)	1.Overload operation (Pipe clogging/ Covering/EEV defect/Ref. overcharge) 2. ODU fan locking 3. Heatsink assembly of INV PCB assemble condition abnormal 4. Defect of temperature sensing circuit part defect of INV PCB

■ Error Diagnosis and Countermeasure Flow Chart



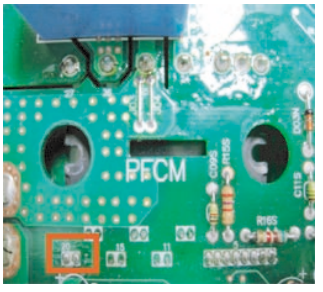
❊ PFCM Module checking method

① Set the multi tester to diode mode.

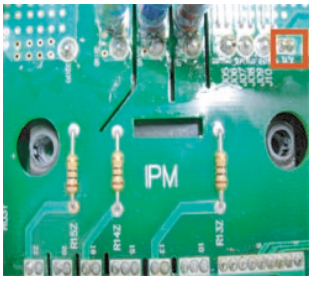
② Check resistance between No.19 pin and No.20 pin of PCB PFC module

③ Resistance value should be in 7kΩ ±10%. (at 25°C(77°F)).

PFCM :
Measuring resistance between No.19,20 pin

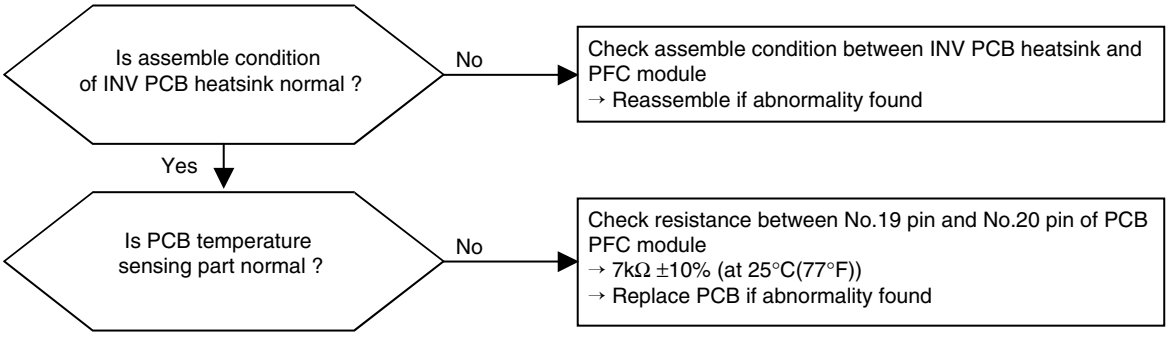


IPM :
Measuring resistance between No.19,20 pin



Error No.	Error Type	Error Point	Main Reasons
65	Heatsink High error	Inverter PCB heatsink sensor is open or short	1. Heatsink assembly of INV PCB assemble condition abnormal 2. Defect of temperature sensing circuit part defect of INV PCB

■ Error Diagnosis and Countermeasure Flow Chart



❊ PFCM Module checking method

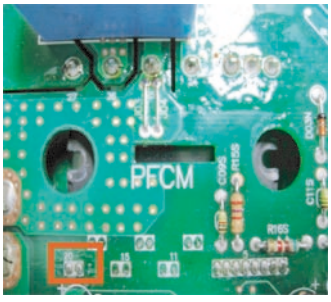
① Set the multi tester to diode mode.

② Check resistance between No.19 pin and No.20 pin of PCB PFC module

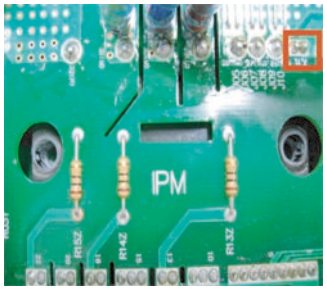
③ Resistance value should be in 7kΩ ±10%. (at 25°C(77°F)).

④ Check PFC Module No.19,20 and IPM Module Pin soldering condition

PFCM :
Measuring resistance between No.19,20 pin

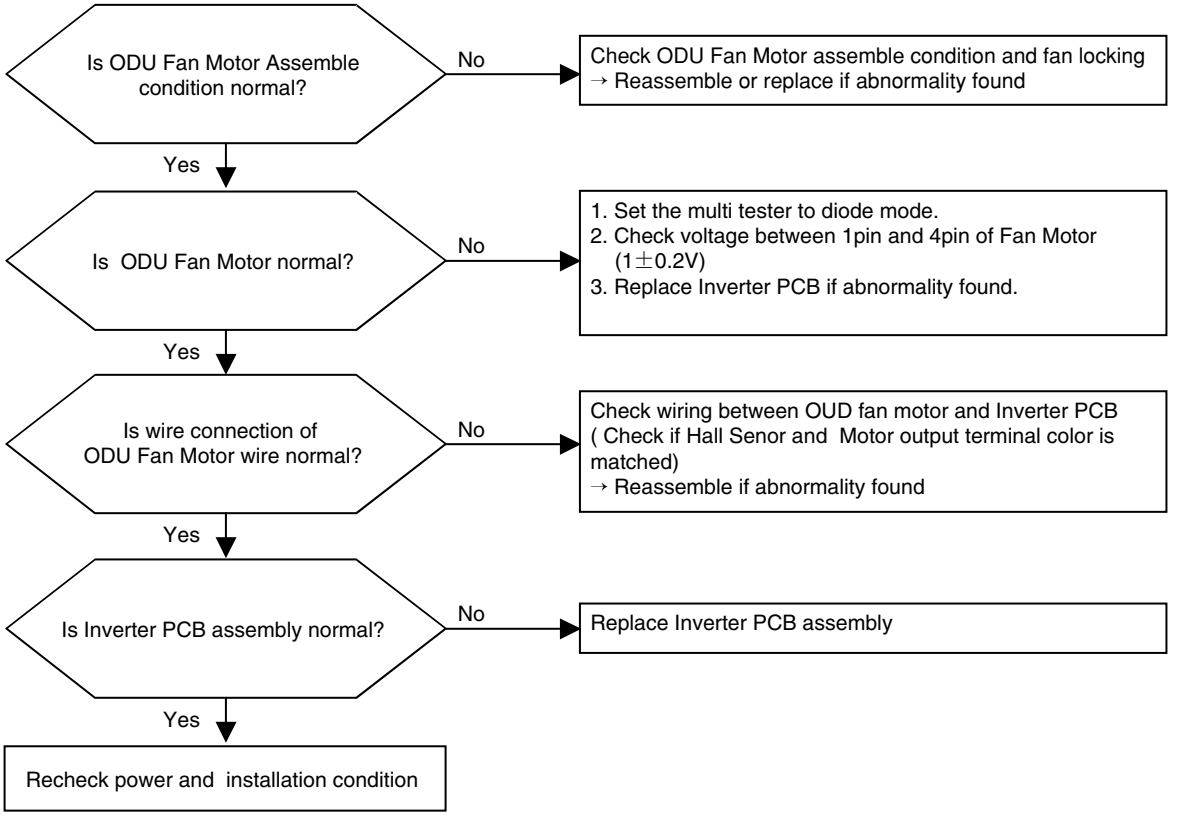


IPM :
Measuring resistance between No.19,20 pin

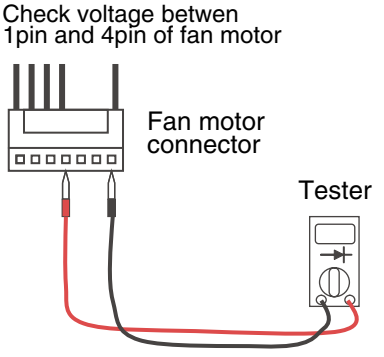


Error No.	Error Type	Error Point	Main Reasons
67	Fan Lock Error	Fan RPM is 10RPM or less for 5 sec. when ODU fan starts or 40 RPM or less after fan starting.	1. Fan motor defect / assembly condition abnormal 2. Wrong connection of fan motor connector 3. Reversing rotation after RPM target apply 4. Inverter PCB assembly defect

■ Error Diagnosis and Countermeasure Flow Chart

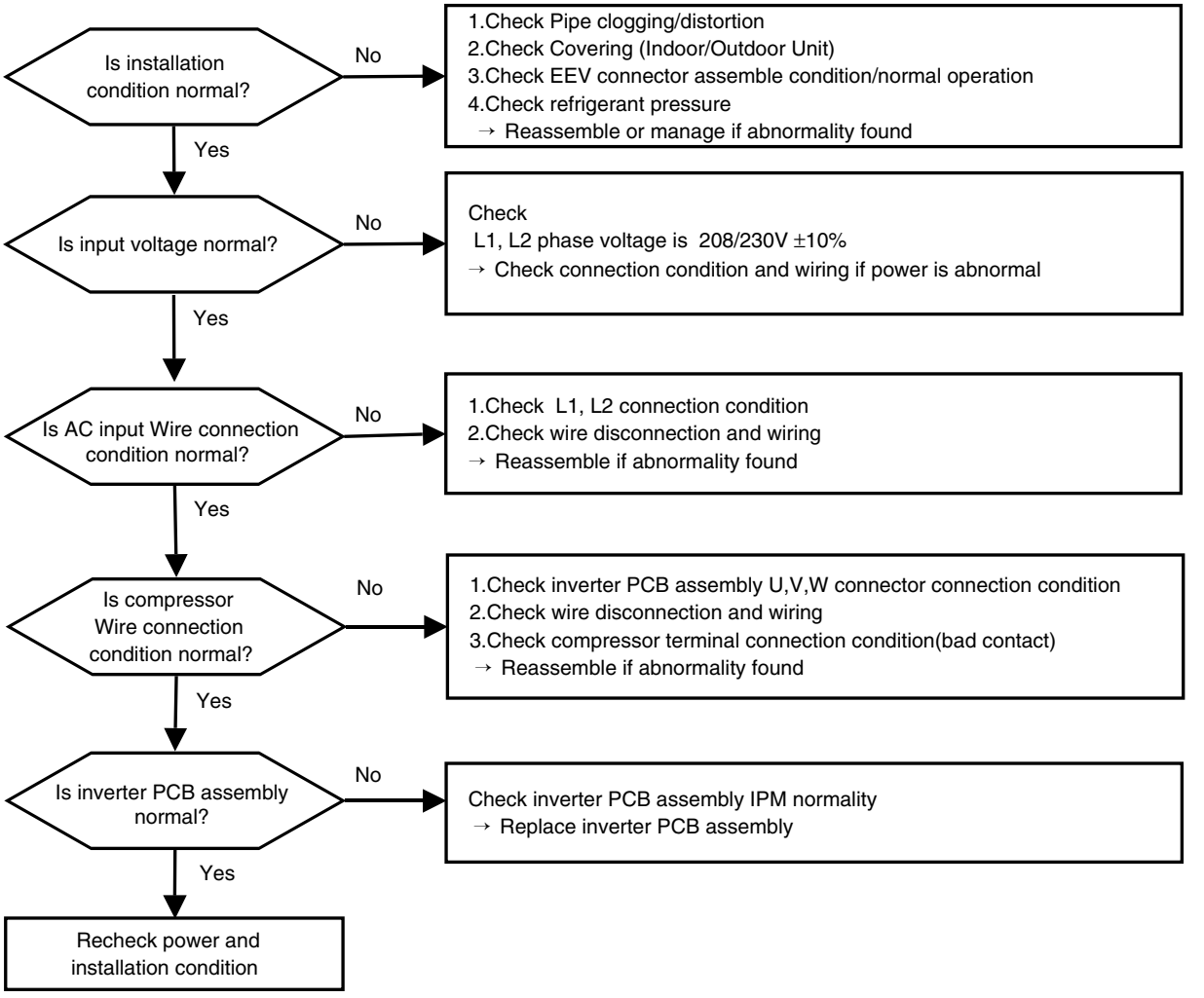


• Fan Motor resistance measuring between each phase

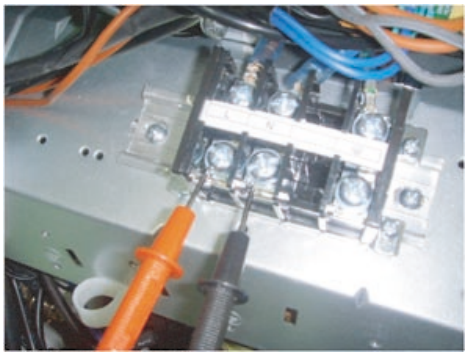


Error No.	Error Type	Error Point	Main Reasons
73	AC input instant over current error (Matter of software)	Inverter PCB input power current is over 48A(peak) for 2ms	1.Overload operation (Pipe clogging/Covering/EEV defect/Ref. overcharge) 2.Compressor damage(Insulation damage/Motor damage) 3.Input voltage abnormal (L1,L2) 4.Power line assemble condition abnormal 5.Inverter PCB assembly damage(input current sensing part)

■ Error Diagnosis and Countermeasure Flow Chart

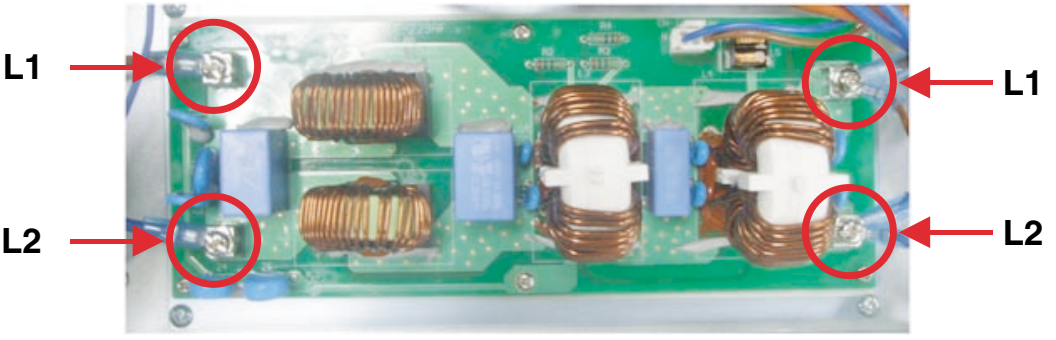


Measuring input voltage

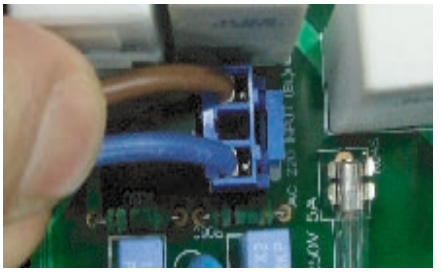


Compressor Wire Connection

Noise filter wiring



Inverter PCB assembly/Wiring power to inverter PCB on Noise filter

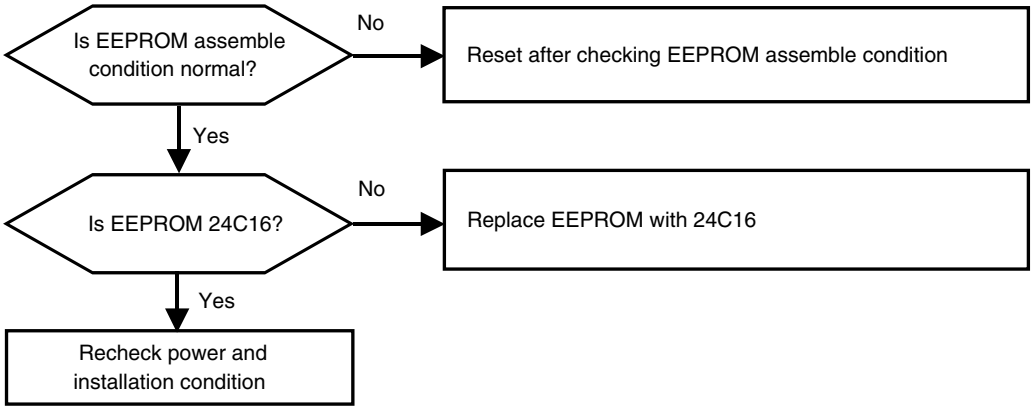


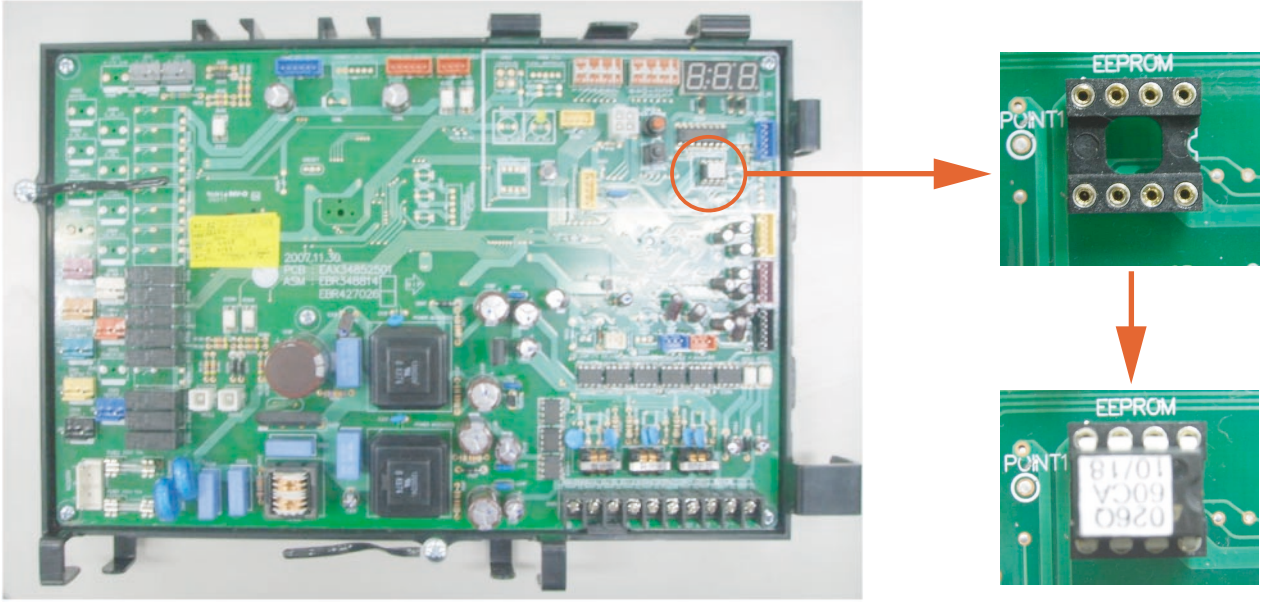
Inverter PCB assembly power connection

Noise filter power connection

Error No.	Error Type	Error Point	Main Reasons
86	Main PCB EEPROM Error	EEPROM Access Error	1. No EEPROM 2. EEPROM wrong insertion

■ Error Diagnosis and Countermeasure Flow Chart



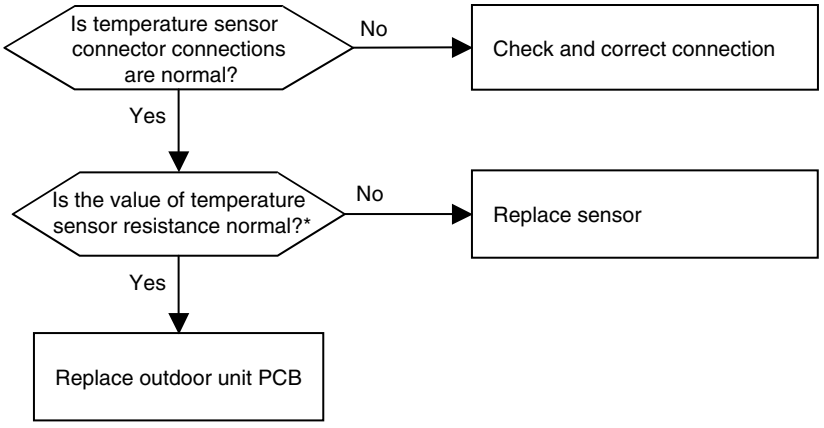


Note : Replace after power off.

Error No.	Error Type	Error Point	Main Reasons
113	Outdoor unit liquid pipe (condenser) temperature sensor error	Abnormal sensor resistance value (Open/Short)	1. Defective temperature sensor connection 2. Defective temperature sensor (Open / Short) 3. Defective outdoor unit PCB

Error No.	Error Type	Error Point	Main Reasons
114	Outdoor unit sub-cooling inlet / outlet temperature sensor error	Abnormal sensor resistance value (Open/Short)	1. Defective temperature sensor connecter connection 2. Defective temperature sensor (Open/Short) 3. Defective outdoor PCB

■ Error diagnosis and countermeasure flow chart

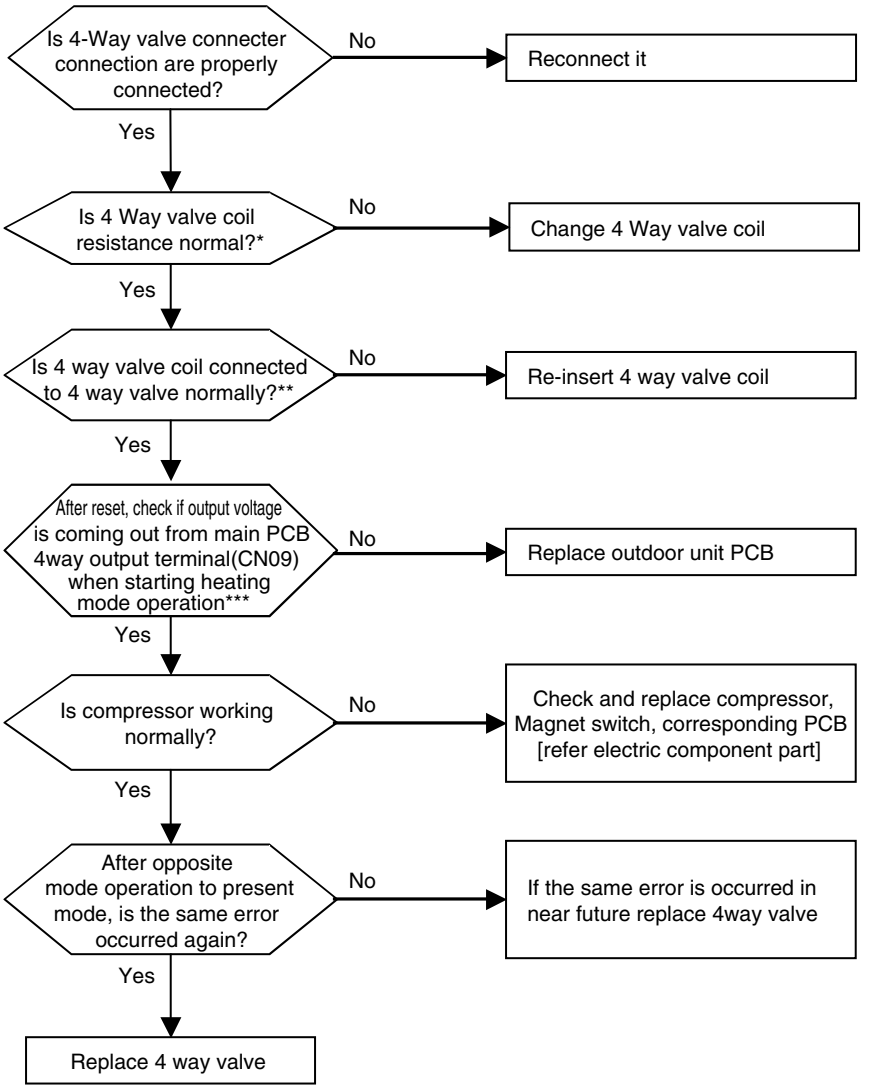


* Sensor resistance 100 kΩ over (open) or 100 Ω below (short) will generate error

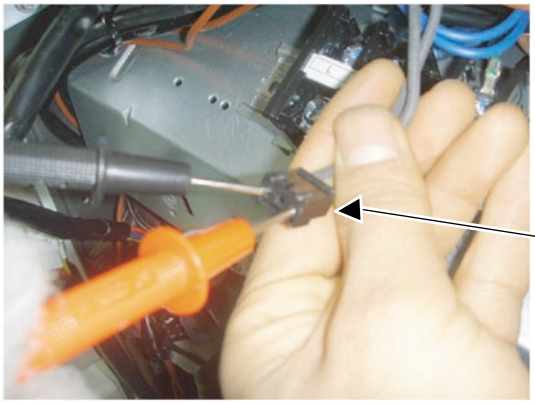
Note: Temperate sensor resistance vary with temperature, So compare temperature sensor resistance value according to outdoor unit temperature by referring below table (±5% tolerance)
Air temperature sensor: 10°C(50°F) = 20.7kΩ : 25°C(77°F) = 10kΩ : 50°C(122°F)= 3.4kΩ
Pipe temperature sensor: 10°C(50°F) = 10kΩ : 25°C(77°F) = 5kΩ : 50°C(122°F)= 1.8kΩ

Error No.	Error Type	Error Point	Main Reasons
151	Function error of outdoor 4way (reversing valve)	Function error of 4way (reversing valve) in Main	1. Wrong operation of 4way valve because of sludge etc. inflow 2. No pressure difference because of compressor fault 3. Wrong installation of In/outdoor common pipe 4. Defect of 4way valve

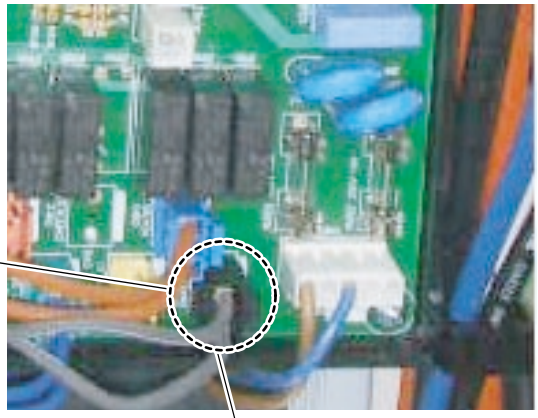
■ Error diagnosis and countermeasure flow chart



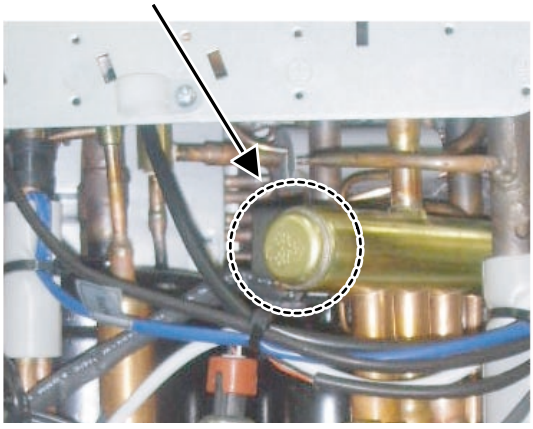
* Measure the resistance of 4way valve



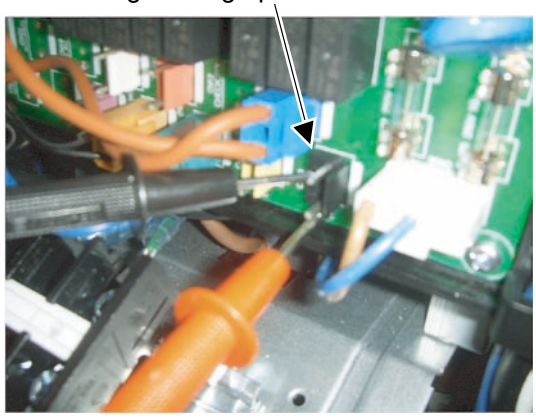
Location of 4way valve connector on Main PCB(marked as 4way,CN09)



** Confirm the 4way valve coil is inserted to the end



*** Check the output voltage of terminal socket during heating operation



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