Internal Use Only

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MULTI V™ PLUS II System Outdoor Unit R410A

SERVICE MANUAL R410A

MODEL : ARUN Series

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.

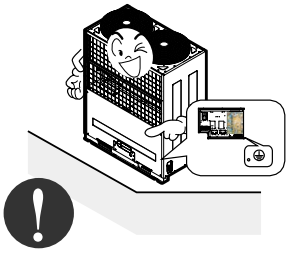
- If the power source capacity is inadequate or electric work is performed improperly, electric shock or fire may result.

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.

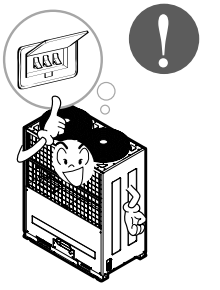
Always ground the product.

- 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.

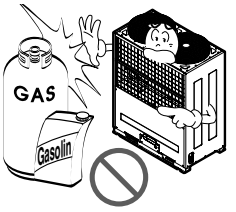
• There is risk of fire, electric shock, explosion, or injury.

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

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

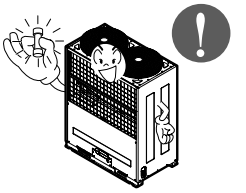
Do not store or use flammable gas or combustibles near the air conditioner.

• There is risk of fire or failure of product.



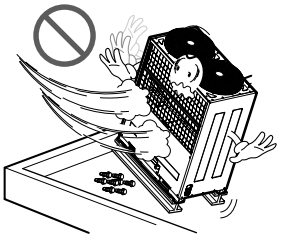
Use the correctly rated breaker or fuse.

• There is risk of fire or electric shock.



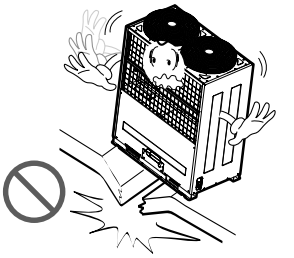
Prepare for strong wind or earthquake and install the unit at the specified place.

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



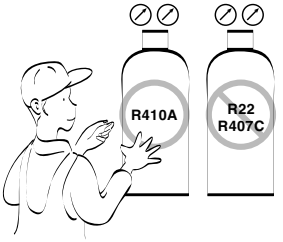
Do not install the product on a defective installation stand.

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



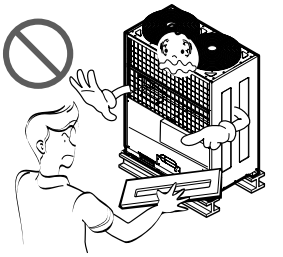
When installing and moving the air conditioner to another site, do not charge it with a different refrigerant from the refrigerant specified on the unit.

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



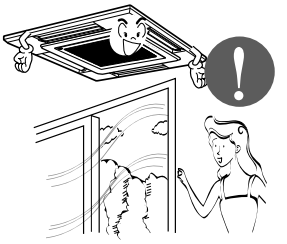
Do not reconstruct to change the settings of the protection devices.

• 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.



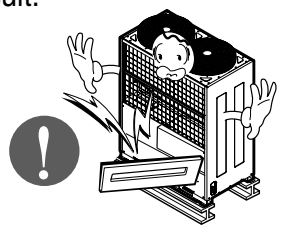
Ventilate before operating air conditioner when gas leaked out.

• 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.



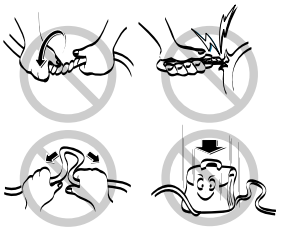
If the air conditioner is installed in a small room, measures must be taken to prevent the refrigerant concentration from exceeding the safety limit when the refrigerant leaks.

• 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

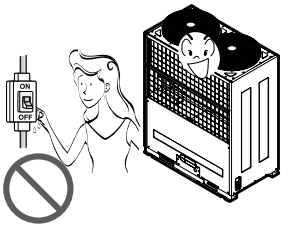
Do not damage or use an unspecified power cord.

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



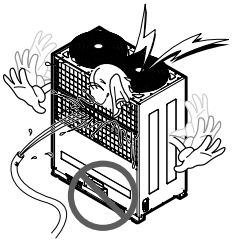
Use a dedicated outlet for this appliance.

• There is risk of fire or electrical shock.



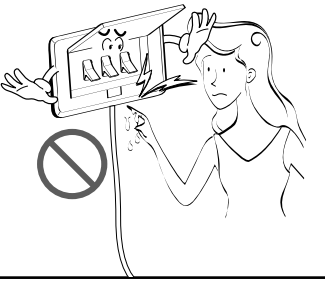
Be cautious that water could not enter the product.

• 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.

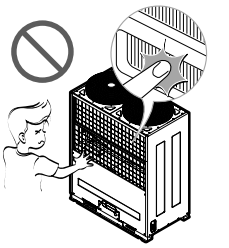


When the product is soaked (flooded or submerged), contact an Authorized Service Center.

• There is risk of fire or electric shock.

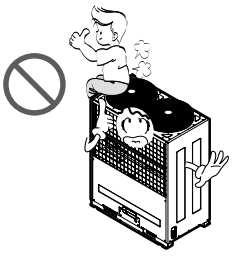
Be cautious not to touch the sharp edges when installing.

• It may cause injury.



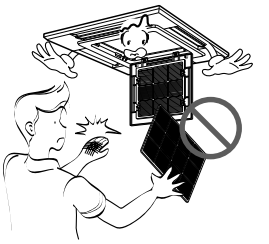
Take care to ensure that nobody could step on or fall onto the outdoor unit.

• This could result in personal injury and product damage.



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

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

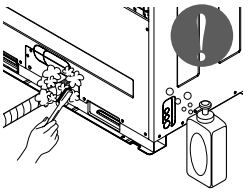


⚠CAUTION

■ Installation

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

• Low refrigerant levels may cause failure of product.

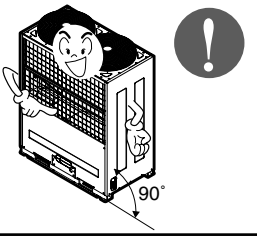


Do not install the product where the noise or hot air from the outdoor unit could damage the neighborhoods.

• It may cause a problem for your neighbors.

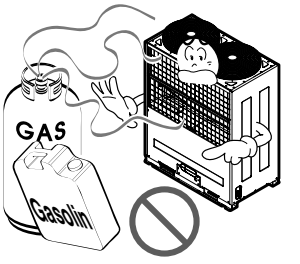
Keep level even when installing the product.

• To avoid vibration or water leakage.



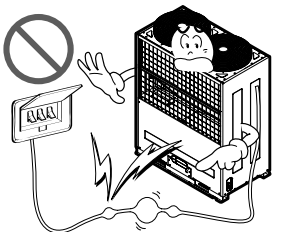
Do not install the unit where combustible gas may leak.

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



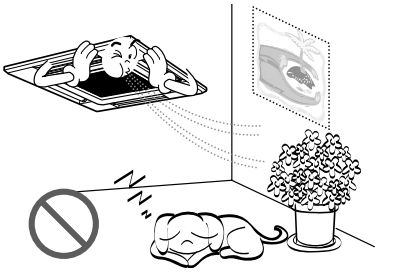
Use power cables of sufficient current carrying capacity and rating.

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



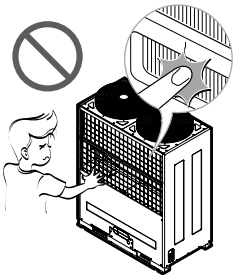
Do not use the product for special purposes, such as preserving foods, works of art, etc. It is a consumer air conditioner, not a precision refrigeration system.

• There is risk of damage or loss of property.



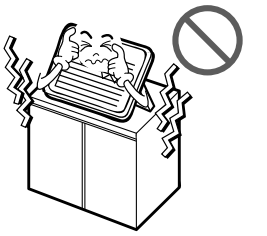
Keep the unit away from children. The heat exchanger is very sharp.

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



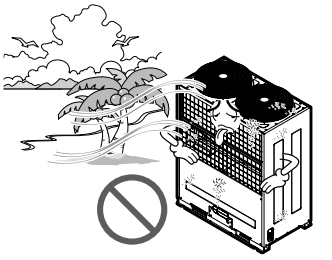
When installting the unit in a hospital, communication station, or similar place, provide sufficient protection against noise.

• 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.

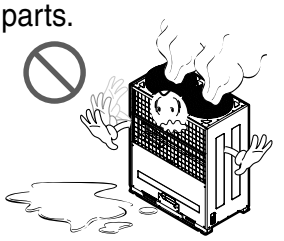
• It may cause corrosion on the product. Corrosion, particularly on the condenser and evaporator fins, could cause product malfunction or inefficient operation.



■ Operation

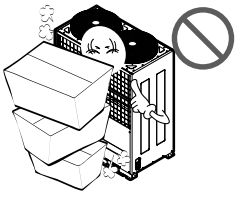
Do not use the air conditioner in special environments.

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



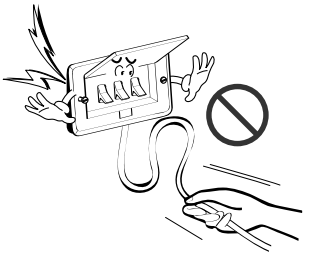
Do not block the inlet or outlet.

- It may cause failure of appliance or accident.



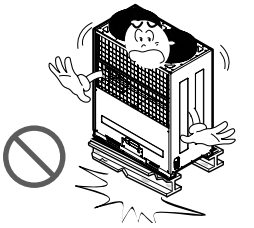
Make the connections securely so that the outside force of the cable may not be applied to the terminals.

- 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.

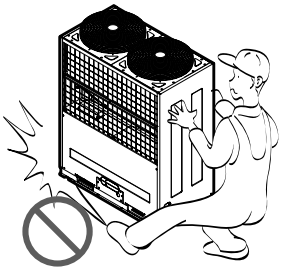


Install and insulate the drain hose to ensure that water is drained away properly based on the installation manual.

- 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.
- 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.

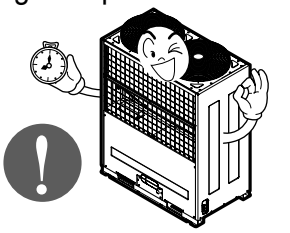


Safely dispose of the packing materials.

- 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.

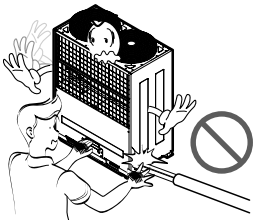
Turn on the power at least 6 hours before starting operation.

- 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.

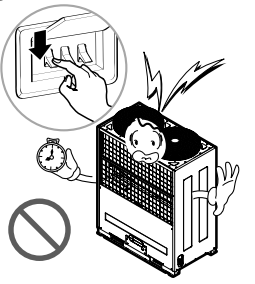


Do not operate the air conditioner with the panels or guards removed.

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

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

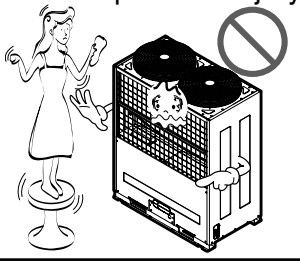
- Wait at least 5 minutes before turning off the main power switch. Otherwise it may result in water leakage or other problems.



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.

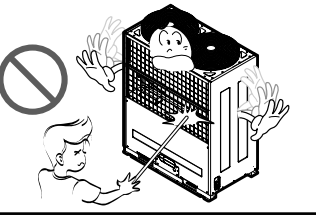
Use a firm stool or ladder when cleaning or maintaining the air conditioner.

- 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

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   4.2 Outdoor Unit 17

1. Model Names

1.1 Indoor Unit

Category		Chassis Name	Capacity(MBh (kW))											
			7 (2.2)	9 (2.8)	12 (3.6)	15 (4.5)	18 (5.6)	24 (7.1)	28 (8.2)	36 (10.6)	42 (12.3)	48 (14.1)	76 (22.4)	96 (28)
Wall Mounted (General)		SE	ARNU073 SE*2	ARNU093 SE*2	ARNU123 SE*2	ARNU153 SE*2								
		S5					ARNU183 S5*2	ARNU243 S5*2						
ART COOL	Mirror	SE	ARNU073 SE*2	ARNU093 SE*2	ARNU123 SE*2	ARNU153 SE*2								
		S3					ARNU183 S3*2	ARNU243 S3*2						
	ART Cool Gallery	SF	ARNU073 SF*2	ARNU093 SF*2	ARNU123 SF*2									
Ceiling Cassette	1 Way	TJ	ARNU073 TJ*2	ARNU093 TJ*2	ARNU123 TJ*2									
	2 Way	TL					ARNU183 TL*2	ARNU243 TL*2						
	4 Way	TE	ARNU073 TE*2	ARNU093 TE*2	ARNU123 TE*2	ARNU153 TE*2	ARNU183 TE*2							
		TP						ARNU243 TP*2	ARNU283 TP*2					
		TN								ARNU363 TN*2				
		TM									ARNU423 TM*2	ARNU483 TM*2		
Ceiling Concealed Duct	High Static	BH	ARNU073 BHA2	ARNU093 BHA2	ARNU123 BHA2	ARNU153 BHA2	ARNU183 BHA2	ARNU243 BHA2						
		BG							ARNU283 BGA2	ARNU363 BGA2	ARNU423 BGA2			
		BR										ARNU483 BRA2		
		B8											URNU76 3B8A2	URNU96 3B8A2
	Low Static	B1	ARNU073 B1G2	ARNU093 B1G2	ARNU123 B1G2	ARNU153 B1G2								
		B2					ARNU183 B2G2	ARNU243 B2G2						
	Built In	B3	ARNU073 B3G2	ARNU093 B3G2	ARNU123 B3G2	ARNU153 B3G2								
		B4					ARNU183 B4G2	ARNU243 B4G2						
Ceiling & Floor		VE		ARNU093 VEA2	ARNU123 VEA2									
Ceiling Suspended		VJ					ARNU183 VJA2	ARNU243 VJA2						
Floor Standing	With Case	CE	ARNU073 CEA2	ARNU093 CEA2	ARNU123 CEA2	ARNU153 CEA2								
		CF					ARNU183 CFA2	ARNU243 CFA2						
	Without Case	CE	ARNU073 CEU2	ARNU093 CEU2	ARNU123 CEU2	ARNU153 CEU2								
		CF					ARNU183 CFU2	ARNU243 CFU2						

※ *ART COOL- B: Blue, M:Metal, D:Wood, R:Mirror, W:White Wood, V:Silver, E:Red, G:Gold, 1: Kiss (Photo changeable)
*Wall Mounted- A: Basic, L:Plasma, *Ceiling Cassette- A: Basic, C:Plasma

1.2 Outdoor Unit

Power Supply	8HP	10HP	12HP	14HP	16HP	18HP	20HP	22HP	24HP
	6.5ton	8.0ton	9.5ton	11.0ton	12.5ton	14.5ton	16.0ton	17.5ton	19.0ton
3Ø, 460V, 60Hz	076DT2	096DT2	115DT2	134DT2	154DT2	173DT2	192DT2	211DT2	230DT2
3Ø, 208/230V , 60Hz	076BT2	096BT2	115BT2	-	154BT2	173BT2	192BT2	211BT2	230BT2

Power Supply	26HP	28HP	30HP	32HP
	20.5ton	22.5ton	24.0ton	25.5ton
3Ø, 460V, 60Hz	250DT2	270DT2	290DT2	310DT2

Heat Pump	ARUN

2. External Appearance

2.1 Indoor Units

Ceiling Cassette- 1Way

ARNU073TJ*2
ARNU093TJ*2
ARNU123TJ*2

* A:Basic, C:Plasma

Ceiling Cassette -2Way

ARNU183TL*2
ARNU243TL*2

* A:Basic, C:Plasma

Ceiling Cassette- 4Way

ARNU073TE*2 ARNU243TP*2
ARNU093TE*2 ARNU283TP*2
ARNU123TE*2 ARNU363TN*2
ARNU153TE*2 ARNU423TM*2
ARNU183TE*2 ARNU483TM*2

* A:Basic, C:Plasma

Ceiling Concealed Duct - High Static

ARNU073BHA2 ARNU363BGA2
ARNU093BHA2 ARNU423BGA2
ARNU123BHA2 ARNU483BRA2
ARNU153BHA2 URNU763B8A2
ARNU183BHA2 URNU963B8A2
ARNU243BHA2
ARNU283BGA2

Ceiling Concealed Duct - Low Static

ARNU073B1G2 ARNU153B1G2
ARNU093B1G2 ARNU183B2G2
ARNU123B1G2 ARNU243B2G2

Wall Mounted

ARNU073SE*2 ARNU153SE*2
ARNU093SE*2 ARNU183S5*2
ARNU123SE*2 ARNU243S5*2

* A:Basic, L:Plasma

Ceiling Concealed Duct – Built-in

ARNU073B3G2 ARNU153B3G2
ARNU093B3G2 ARNU183B4G2
ARNU123B3G2 ARNU243B4G2

ART COOL Gallery

ARNU073SF*2
ARNU093SF*2
ARNU123SF*2

* E:Red V:Silver
G:Gold 1: Kiss (Photo changeable)

ART COOL Mirror

ARNU073SE*2
ARNU093SE*2
ARNU123SE*2
ARNU153SE*2
ARNU183S3*2
ARNU243S3*2

S3: * B : Blue
M : Metal
D : Wood
R : Mirror
W:White Wood

SE: * R:Mirror
V:Silver
B : Blue

Ceiling & Floor

ARNU093VEA2
ARNU123VEA2

Ceiling Suspended

ARNU183VJA2
ARNU243VJA2

Floor Standing With case

ARNU073CEA2
ARNU093CEA2
ARNU123CEA2
ARNU153CEA2
ARNU183CFA2
ARNU243CFA2

Without case

ARNU073CEU2
ARNU093CEU2
ARNU123CEU2
ARNU153CEU2
ARNU183CFU2
ARNU243CFU2

※ These are model names of the basic function.

2.2 Outdoor Units(460V)

ARUN076DT2
ARUN096DT2
ARUN115DT2
ARUN134DT2
ARUN154DT2

ARUN173DT2
ARUN192DT2
ARUN211DT2
ARUN230DT2
ARUN250DT2
ARUN270DT2
ARUN290DT2
ARUN310DT2

2.2 Outdoor Units(208/230V)

ARUN076BT2
ARUN096BT2
ARUN115BT2

ARUN154BT2
ARUN173BT2
ARUN192BT2
ARUN211BT2
ARUN230BT2

3. Combination of Outdoor Units

3.1 460V

System Capacity	Number of Units 60Hz	Module				
		8	10	12	14	16
8HP(6.5ton)	1	1	-	-	-	-
10HP(8.0ton)	1	-	1	-	-	-
12HP(9.5ton)	1	-	-	1	-	-
14HP(11.0ton)	1	-	-	-	1	-
16HP(12.5ton)	1	-	-	-	-	1
18HP(14.5ton)	2	1	1	-	-	-
20HP(16.0ton)	2	1	-	1	-	-
22HP(17.5ton)	2	1	-	-	1	-
24HP(19.0ton)	2	1	-	-	-	1
26HP(20.5ton)	2	-	-	1	1	-
28HP(22.5ton)	2	-	-	-	2	-
30HP(24.0ton)	2	-	-	-	1	1
32HP(25.5ton)	2	-	-	-	-	2

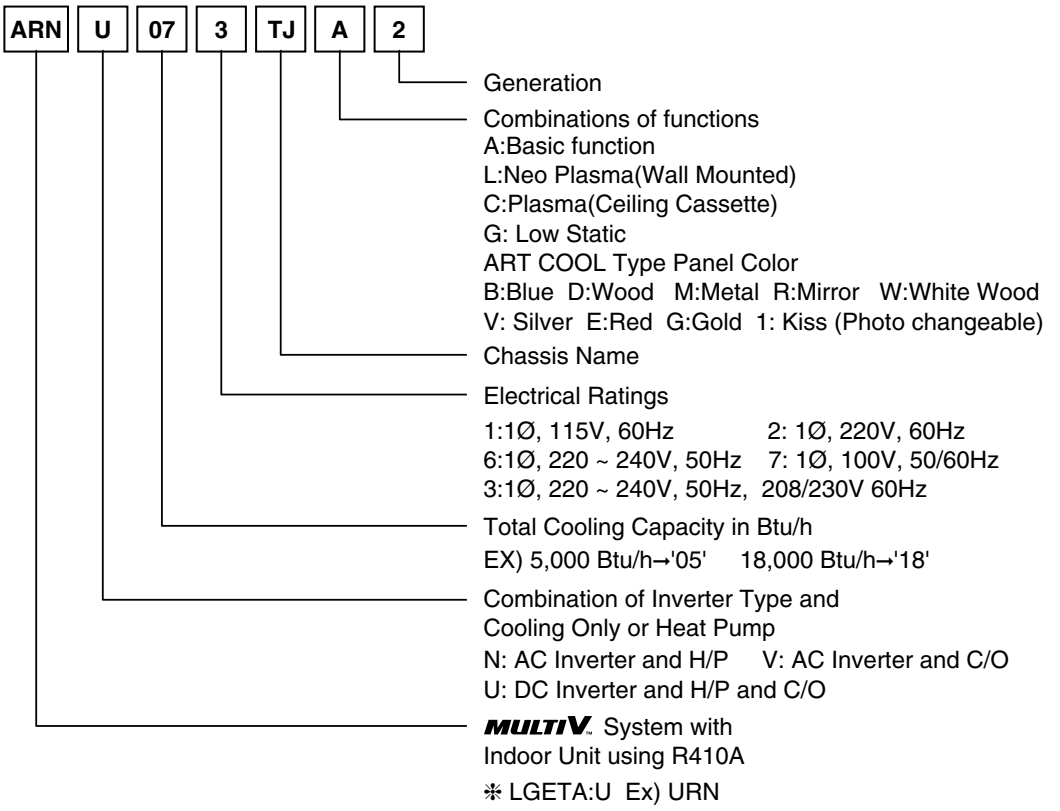
■ A maximum of 32HP can be obtained by combining 8, 10, 12, 14 and 16HP

3.2 208/230V

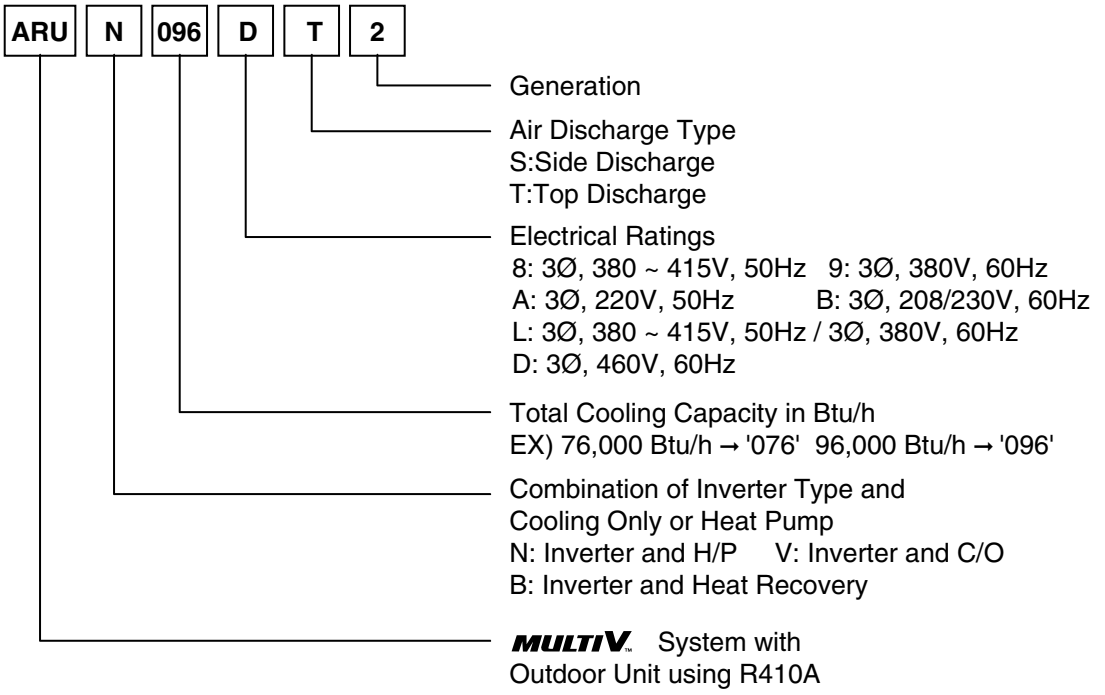
System Capacity	Number of Units 60Hz	Module		
		8	10	12
8HP(6.5ton)	1	1	-	-
10HP(8.0ton)	1	-	1	-
12HP(9.5ton)	1	-	-	1
16HP(12.5ton)	2	2	-	-
18HP(14.5ton)	2	1	1	-
20HP(16.0ton)	2	-	2	-
22HP(17.5ton)	2	-	1	1
24HP(19.0ton)	2	-	-	2

4. Nomenclature

4.1 Indoor Unit



4.2 Outdoor Unit



Part 2
Outdoor Units

ARUN Series

- **Function 21**
- **Replacement procedure for Compressor 57**

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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	Before 15 min. : Max. pulse After 15 min. : Min. pulse
4 way valve	Off	On	After 60 min. : Off
Subcooling EEV	Fuzzy control	• Normal : minimum pulse • Avoiding control of high discharge temperature	Before 15 min. : Max. pulse After 15 min. : Min. pulse
Indoor Unit EEV	Superheat fuzzy control	Subcooling fuzzy control	Before 10 min. : Min. pulse After 10 min. : Max. pulse

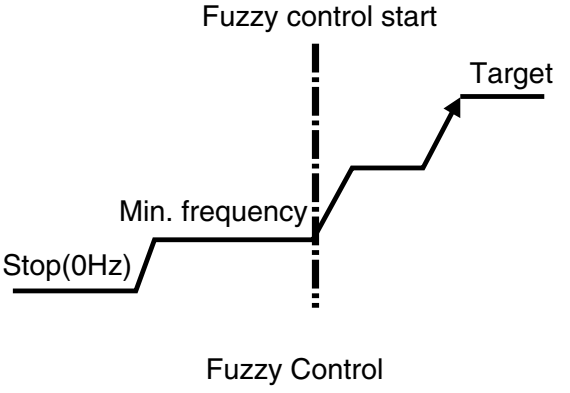
Note : Heating operation is not functional at an outdoor air temperature of 27°C(80°F) or more.
Cooling operation is not functional at an outdoor air temperature of 2°C(36°F) or less with indoor unit combination of 10% or less

1.2 Compressor control

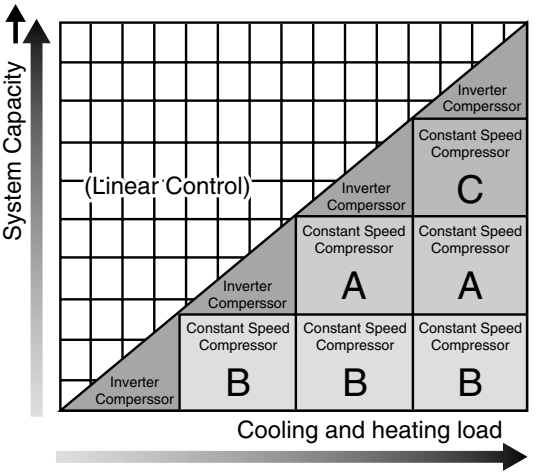
Fuzzy control : Maintain evaporating temperature(Te) to be constant on cooling mode and condensing temperature(Tc) on heating mode by Fuzzy control to ensure the stable system performance.
[Tc:47~51°C(117~124°F), Te:2~5°C(36~41°F)]
(1) Cooling mode
Te can be set by initial dip switch setting. (Normal mode, capacity up mode, and energy save mode)

(2) Heating mode
Tc can be set by initial dip switch setting. (Normal mode, capacity up mode, and energy save mode)

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



Fuzzy Control



Inverter linear control as cooling and heating load increasing

1.3 Master and slave Unit's EEV control

(1) Main EEV control
Main EEV operates with fuzzy control rules to keep the degree of super Heat(Superheat) (about 3°C)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/58°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 = Tcondensation - Tliquid
Tliquid : temperature at outlet of subcooler(°C/°F)
Tcondensation : condensation temperature equivalent to high pressure(°C/°F)

(3) Avoiding excessive high discharge temperature : when main EEV opens some given opening (R410A : 800 pls) and discharge temperature is above 85°C(185°F) in heating operation, subcooling EEV may control the "subcooling out temperature-evaporating temperature" to be some given difference.

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
Inv Compressor	25Hz	Setting Value	40Hz
Constant Speed Compressor	OFF	ON	OFF
FAN	Normal control	Normal control	Normal control
Main EEV	Max. pulse	Max. pulse	Max. pulse
Subcooling EEV	Normal control	Main. pluse	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	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: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
Inv Compressor	25Hz	Setting Value	25Hz
Constant Speed Compressor	OFF	ON	OFF
FAN	Normal control	Normal control	Normal control
Main EEV	Max. pulse	Max. pulse	Max. pulse
Subcooling EEV	Normal control	Min. pulse	100 pulse
4way valve	OFF	ON	ON
Hot gas bypass valve	Normal control	Normal control	Normal control

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
Inv Compressor	25Hz	Setting Value	25Hz
Constant Speed Compressor	OFF	ON	OFF
FAN	Stop	High pressure control	50Hz
Main EEV	Normal control	Max. pulse	200 pulse
Subcooling EEV	Min. pulse	Min. pulse	Min. pulse
4way valve	On → OFF	OFF	ON
Hot gas bypass valve	Normal control	Normal control	Normal control

Indoor Unit

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

■ Ending condition

1) All heat exchanger pipe temperature are above 15°C(58°F)(UY2) or 20°C(68°F)(UW1) 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
Inv Compressor	0Hz	-
Constant Speed Compressor	OFF	-
FAN	Stop	-
Main EEV	Max. pulse	After 15 min. (Before 15 min. : Min. pulse)
Subcooling EEV	Max. pulse	After 15 min. (Before 15 min. : 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
Inv Compressor	0Hz	-
Constant Speed Compressor	OFF	-
FAN	Stop	-
Main EEV	Max. pulse	After 15 min. (Before 15 min. : Min. pulse)
Subcooling EEV	Max. pulse	After 15 min. (Before 15 min. : Min. pulse)
4way valve	OFF	After 60 min.
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	Compressor	Fan	Hot_gas
$P_d \geq$ 4003 kPa (580.6 psi)	Stop	Stop	-
$P_d >$ 3676 kPa (533.2 psi)	-5Hz/4sec.	+100RPM/4sec.	
$P_d \geq$ 3448 kPa (500.1 psi)	Frequency holding	Normal control	
$P_d <$ 3284 kPa (476.3 psi)	Normal control		-

■ **Low pressure control**

Pressure Range	Compressor	Fan	Hot_gas
$P_s \leq$ 229 kPa (33.2 psi) after 1min	Stop	Stop	On
$P_s \leq$ 229 kPa (33.2 psi) 1min	-5Hz/4sec.	-100RPM/4sec.	
$P_s \leq$ 242 kPa (35.1 psi)	Normal control	Normal control	
$P_s \geq$ 399 kPa (57.9 psi)	Normal control		Off

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

3.1.2 Pressure control on heating mode

■ **High pressure control**

Pressure Range	Compressor	Fan	Hot_gas
$P_d \geq$ 4003 kPa (580.6 psi)	Stop	Stop	On
$P_d >$ 3676 kPa (533.2 psi)	-5Hz/4sec.[1)]	-50RPM/4sec.	On
$P_d \leq$ 3448 kPa (500.1 psi)	Normal control	Normal control	
$P_d \leq$ Target press	Normal control		off

■ **Low pressure control**

Pressure Range	Compressor	Fan	Hot_gas
① $P_s \leq$ 229 kPa (33.2 psi) after 1min	Stop	Stop	On
② $P_s \leq$ 229 kPa (33.2 psi) 1min	-5Hz/4sec.	+100RPM/4sec.	
③ $P_s \leq$ 242 kPa (35.1 psi)	Frequency holding	Normal control	
$P_s \leq$ 268 kPa (38.9 psi)	Normal control		
$P_s >$ 307 kPa (44.5 psi)			Off

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

3.2 Discharge temperature control

■ **Outdoor unit control**

Temperature range	Compressor	Liquid injection	Subcooling EEV
Tdis > 115°C(239°F)	System stop		
105°C(221°F) < Tdis ≤ 112°C(234°F)	Frequency down + const. Comp off	On	Max. limit 490 pulse
98°C(208°F) < Tdis ≤ 103°C(217°F)	Liquid injection on No frequency up	Keep state OFF (below 20°C(212°F))	Max. limit 490 pulse
Tdis ≤ 98°C(208°F)	Pressure control	Off	Max. limit 300 pulse
Tdis > 95°C(203°F)	Pressure control	Off	10 pulse open /10sec

■ **Indoor unit control**

Temperature range	EEV
Tdis > 115°C(239°F)	System stop
103°C(217°F) < Tdis ≤ 112°C(234°F)	Emergency SH control
98°C(208°F) < Tdis ≤ 103°C(217°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	18A or less	18A or more	20A or more
Compressor Current	28A or less	28A or more	30A or more

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

3.4 Liquid back control

■ **Cooling mode**

Discharge temperature	Indoor unit's EEV
Tdis < Tc + 12°C(54°F)	SH increasing control
Tdis > Tc + 16°C(60°F)	Normal SH control

■ **Heating mode**

Discharge temperature	Outdoor unit's EEV
Tdis < Tc + 17°C(62°F)	SH increasing control
Tdis > Tc + 18°C(64°F)	Normal SH control

※ The logic starts after 9 min. on heating mode and 4 min. on cooling mode from the compressor running.

3.5 Phase detection

■ Main unit

If a phase is missed, 7-segment displays 50* on main PCB.
If phases are reversed, 7-segment displays 54* on main PCB.

3.6 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.

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	
Master model code is displayed (3sec)	
Slave model code is displayed (3sec)	
Total capacity including sub units is displayed (2sec)	
Heat pump : Display 2 is default value Cooling only : no display	
Factory setting(25 is normal)	
Refrigerant display	

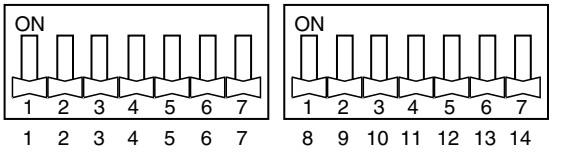
2) Step 2 : Communication check
- If all model code is displayed in 7 segment including all Slave unit, communication between outdoor units is normal.
- If 104* is displayed in 7-segment, check communication wires between outdoor units and Dip switch setting.

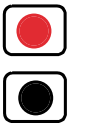
3) Step 3 : PCB error check
- After 40 sec, error check begins.

■ Master/ Slave unit
- All errors of units including Slave units are displayed in 7 segment.
- If communication between main PCB and inverter PCB isn't normal, 52* is displayed in 7-segment
  If communication between main PCB and fan PCB isn't normal, 105* 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.

Push address(red) button for 6 sec.





6 sec.

Auto address starts

Auto address is in progress (max. 15 min.)

The number of indoor units is displayed for 30 sec.

(35 indoor units found)

Auto address process is finished.
Every indoor unit displays its address on wired remote controller and the 7 segment of main PCB is off.

4.2 Emergency operation

- If a compressor is out of order, the system can be run except the defective compressor by backup function.

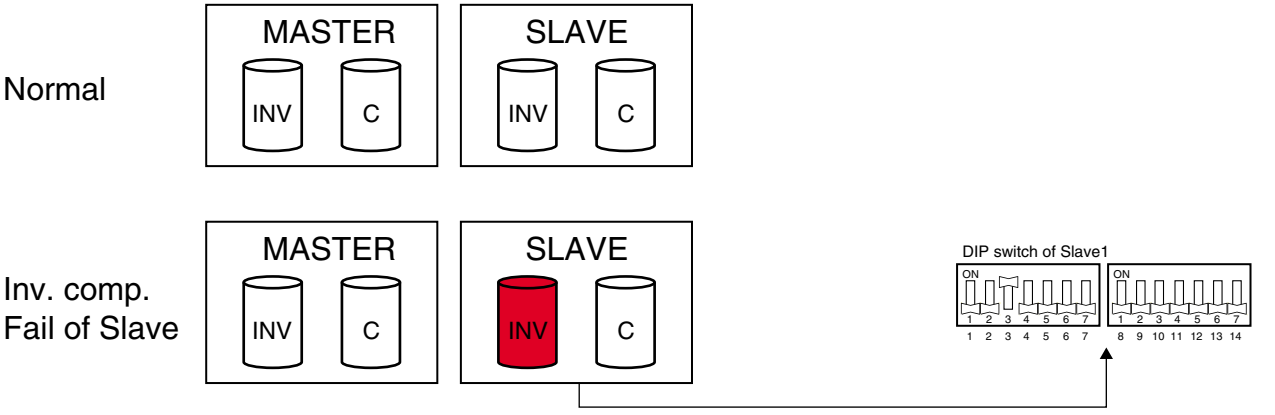
■ Automatic emergency operation(automatic back up function)

If outdoor unit detect comp defect during operation,, automatic back up mode is set.

1) Inverter compressor automatic emergency operation(refer to ** page)
2) Constant compressor automatic emergency operation(refer to ** page)

■ Manual emergency operation(Manual back up function)

1) Check which compressor is broken.(refer to °∞Trouble Shooting Guide°±)
2) Turn off the power.
3) Set the dip S/W of defective outdoor unit.
   - Inverter compressor defect : dip S/W No.3
   - Unit defect : dip S/W No.4
4) Turn on the power.



CAUTION

Emergency operation with inverter compressor failure should not last 48 hours. → It causes other compressor failure.

During the emergency operation, cooling/heating capacity may be lower.

Note 1)

4.3 Sensor checking function

Sensor checking function judges whether the current temperature of indoor and outdoor unit sensors is right or not. It checks 3 indoor temperature sensors, 9 outdoor temperature sensors, 2 outdoor pressure sensors.

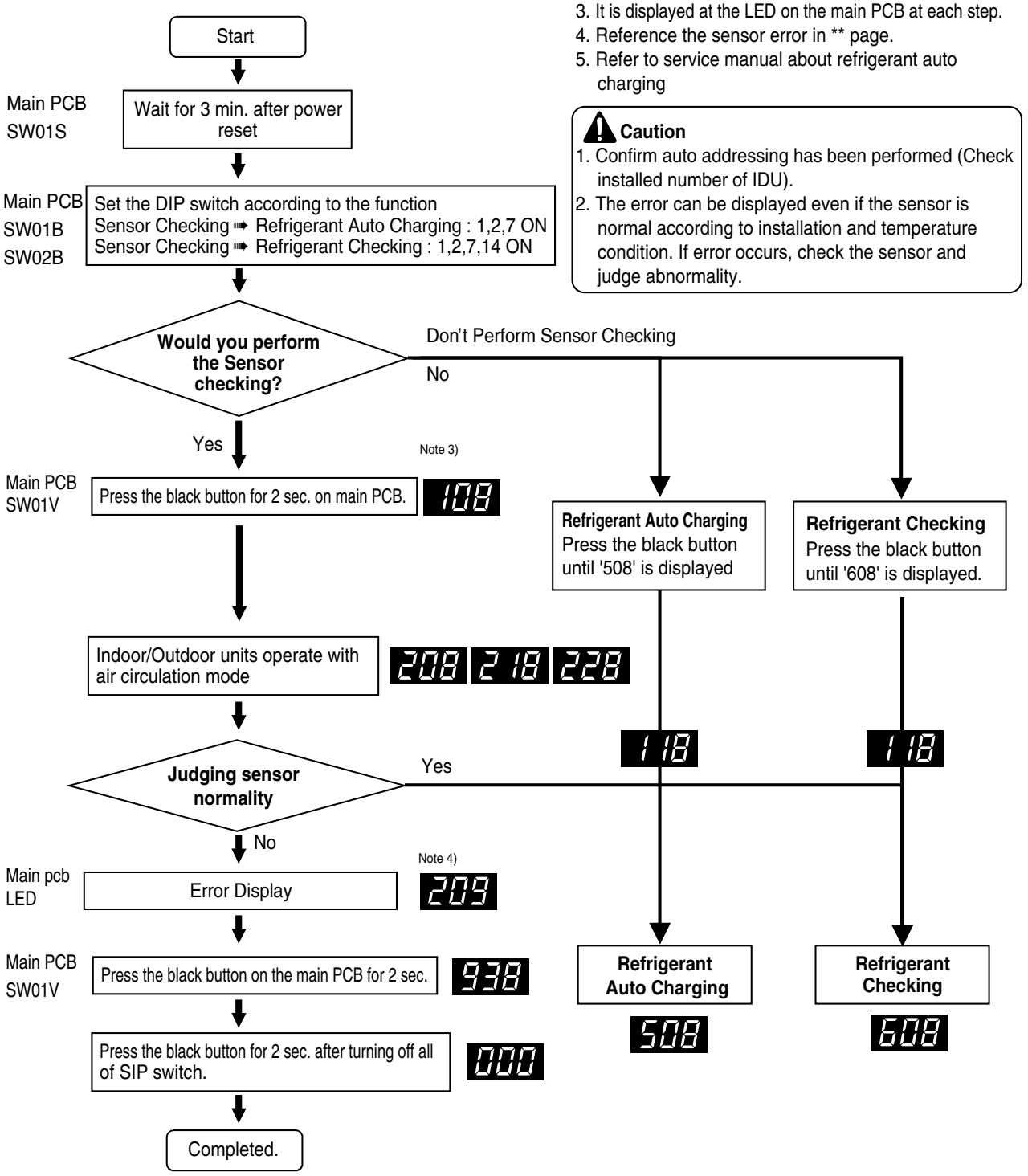
It is used for judging sensor abnormality. Note 2)

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. Reference the sensor error in ** page.
5. Refer to service manual about refrigerant auto charging

Caution

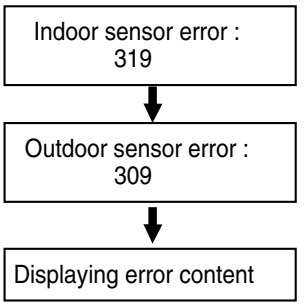
1. Confirm auto addressing has been performed (Check installed number of IDU).
2. The error can be displayed even if the sensor is normal according to installation and temperature condition. If error occurs, check the sensor and judge abnormality.



■ 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 master outdoor unit.



* 5 number of errors is displayed continuously and repeatedly.

Displaying error content

■ Indoor unit error display

1.1st and 2nd number represents indoor unit 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.

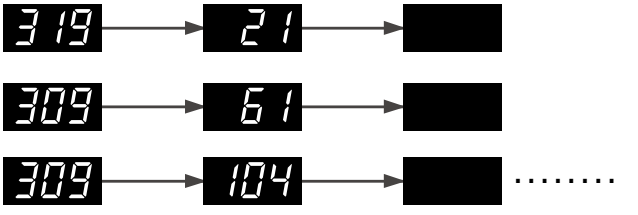
1 : Master
2 : Slave 1
3 : Slave 2
4 : Slave 3

ex) Outdoor master unit liquid pipe temperature sensor error

* Indoor unit number follows auto addressing 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) IDU No.2 pipe inlet temperature sensor error and master ODU suction temperature sensor, slave 3 high pressure sensor error

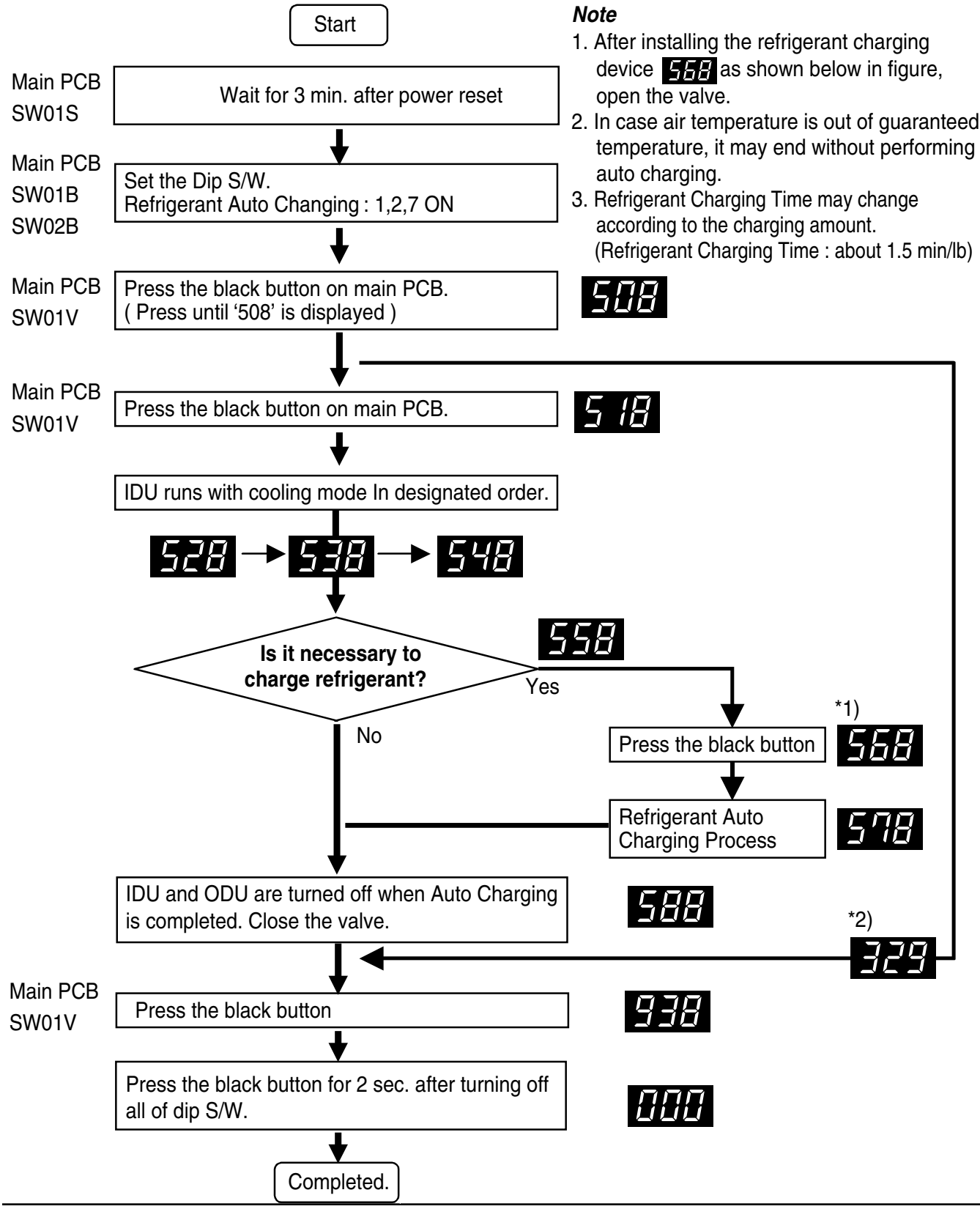


Caution

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 air circulation mode.

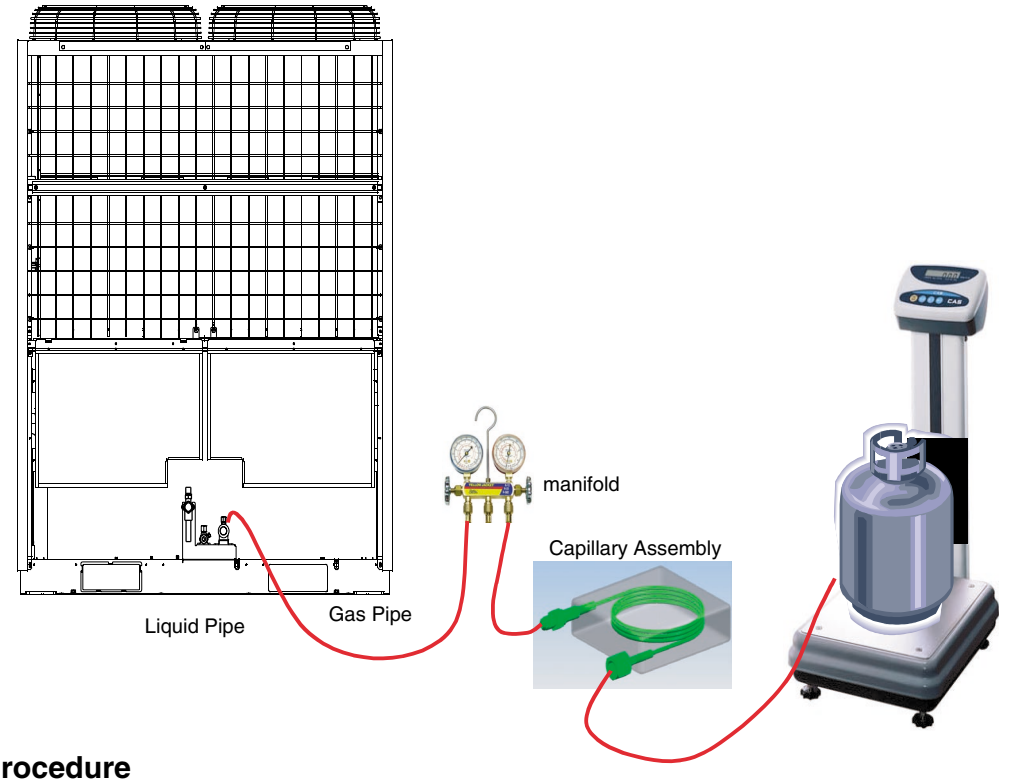
4.4 Refrigerant Auto Charging

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 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  **Is displayed, open the valve and charge the refrigerant**

■ Error contents about auto refrigerant charging function

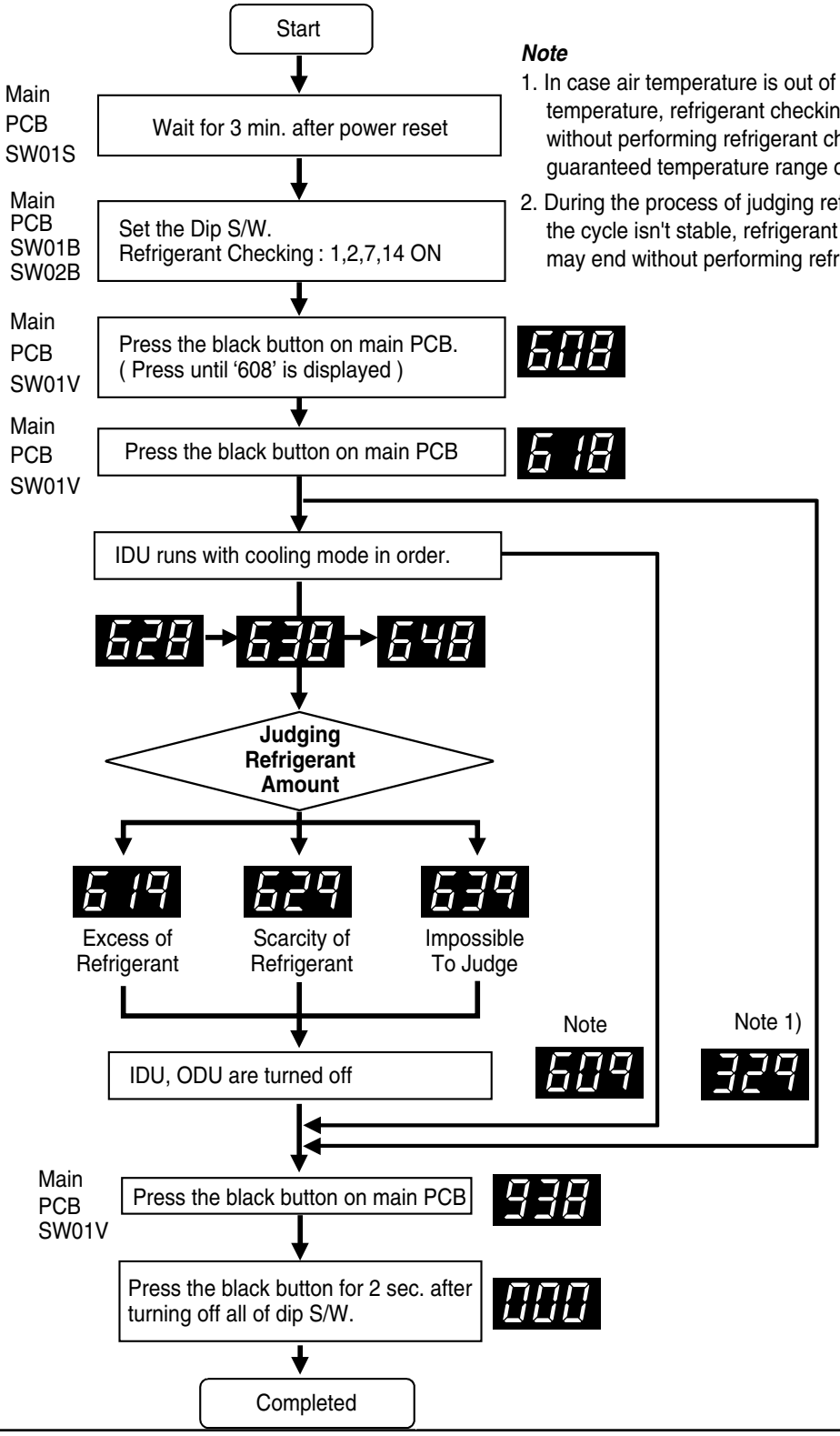
1.  : Temperature Range Error (In case that IDU or ODU is out of range)
2.  : Low Pressure Descent Error (In case the system runs at low pressure limit for over 10 minutes)
3.  : Judging rapid refrigerant inflow (In case the liquid refrigerant flows in because of not using designated Capillary Assembly)
4.  : 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°C(68°F) ~ 32°C(90°F)
ODU : 0°C(32°F) ~ 43°C (77°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.

4.5 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°C(68°F) ~ 32°C(90°F) (buffer ±2°F)
   ODU : 10°C(50°F) ~38°C(100°F) (buffer ±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. 339 : System Unstable Error (In case, After 45 min operating the system, it does not be stable)

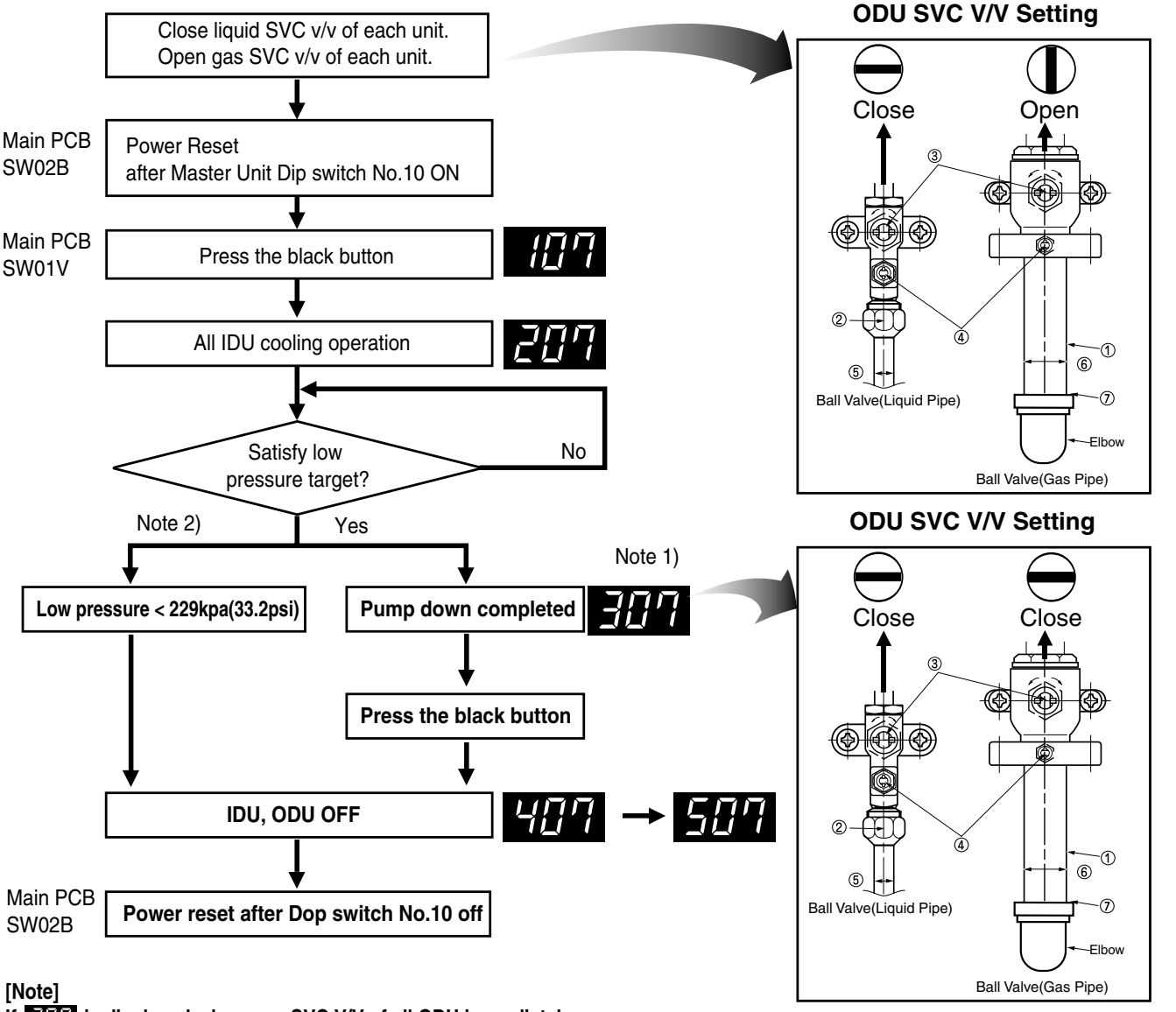
How to Cope with Result of Refrigerant checking

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.

4.6 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]

If 307 is displayed, close gas SVC V/V of all ODU immediately.

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

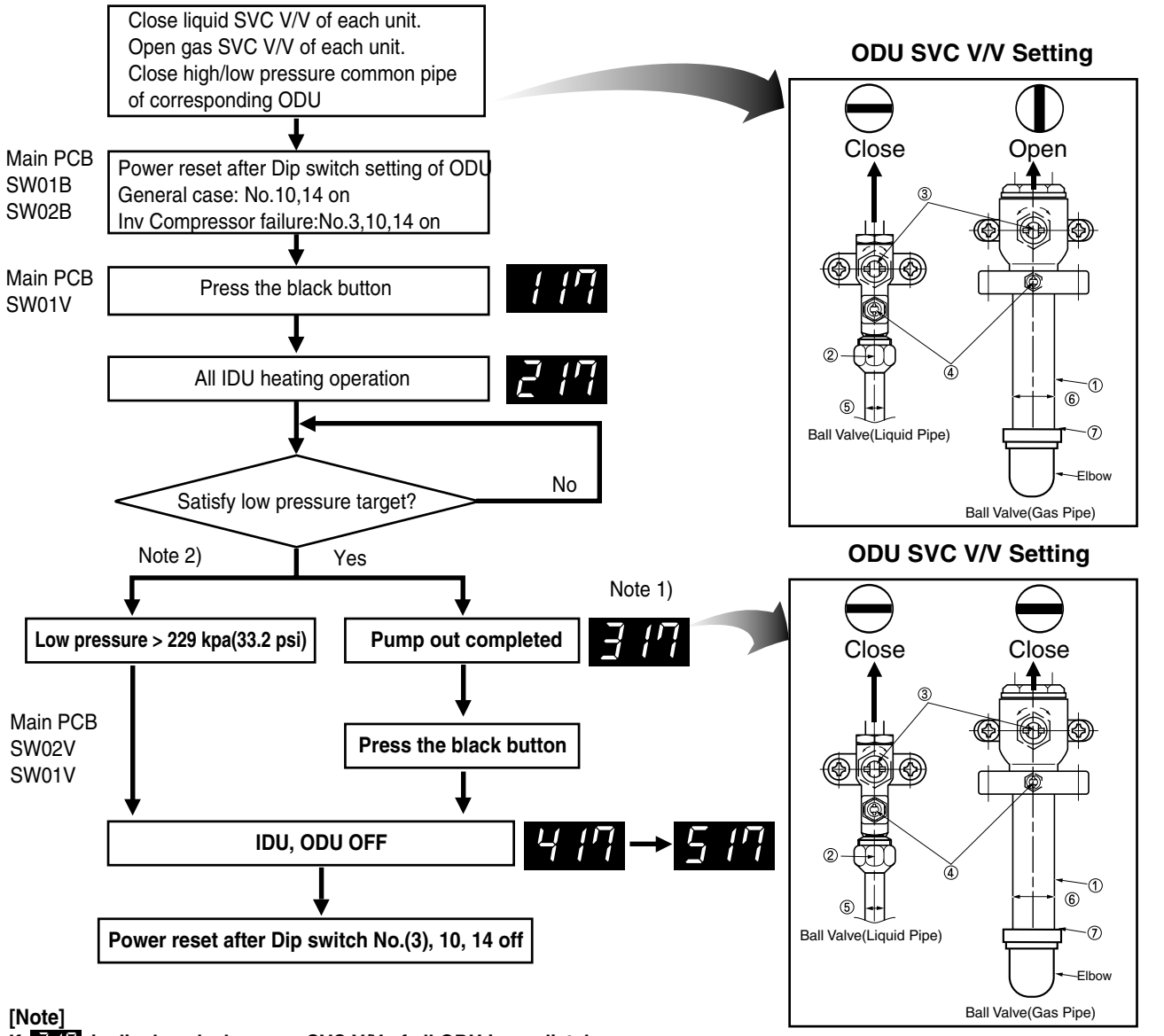
⚠ Caution

1.Use pump down function within guaranteed temperature range
   IDU : 20°C(68°F) ~ 32°C(90°F)
   ODU : 5°C(41°F) ~ 40°C(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)
   407 → 507

4.7 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]

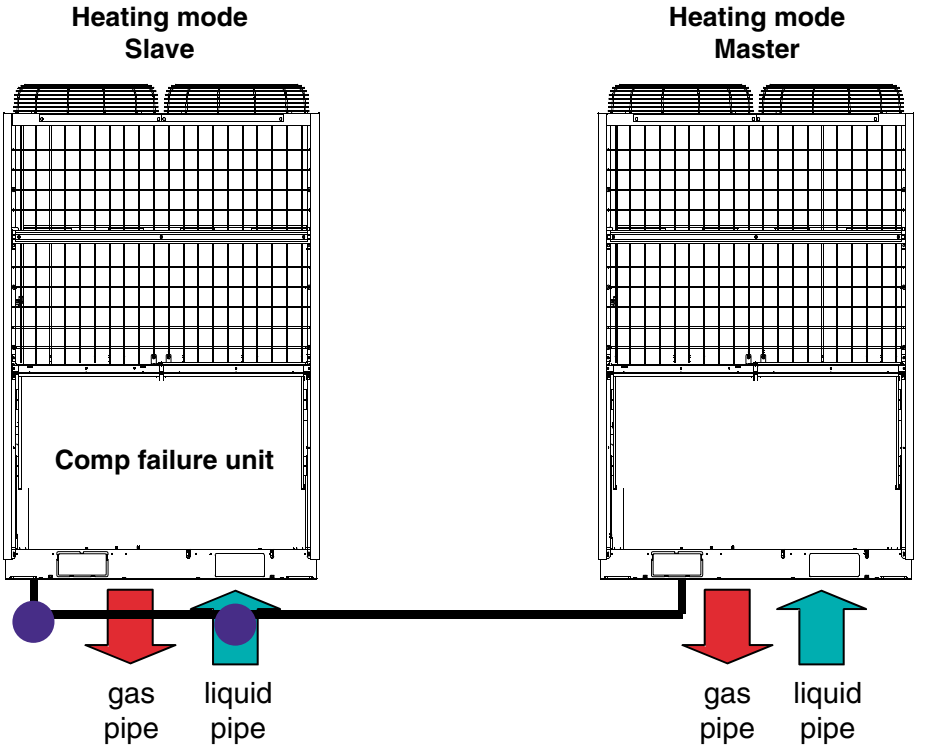
If 317 is displayed, close gas SVC V/V of all ODU immediately.

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

⚠ Caution

1.Use pump out function within guaranteed temperature range
IDU : 10°C(50°F) ~ 30°C(86°F)
ODU : 5°C(41°F) ~ 40°C(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)
417 → 517

■ Example. Slave ODU Inv Comp failure

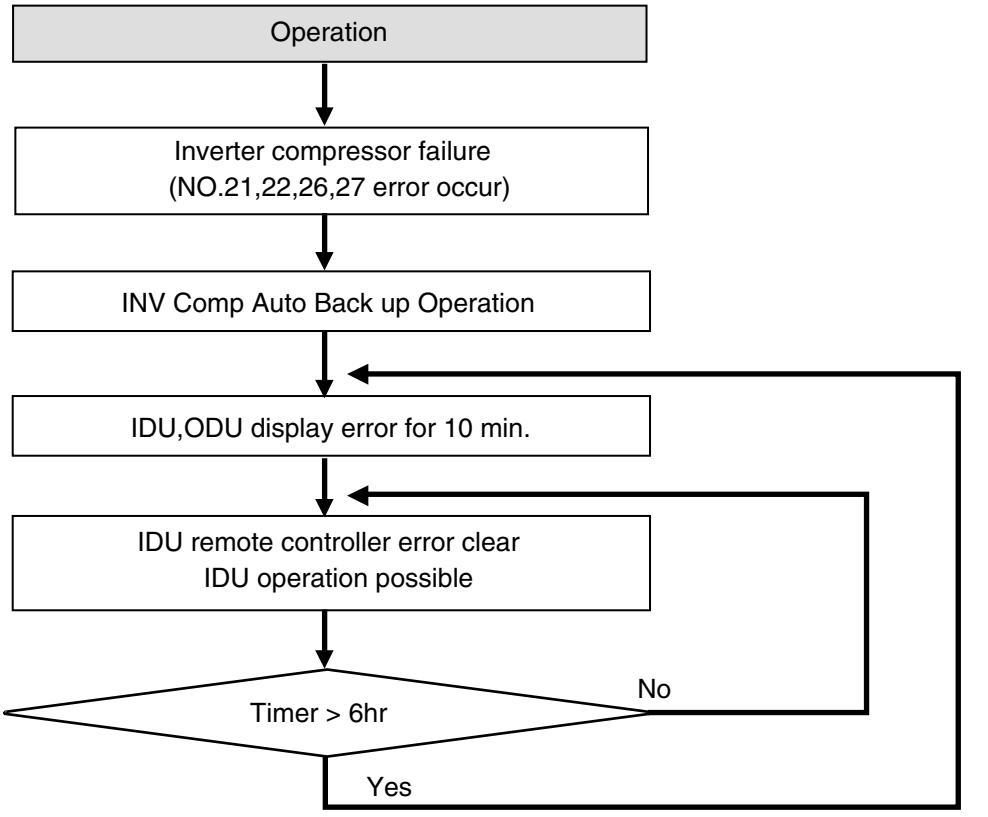


1. Close liquid pipe and common pipe of the unit for pump out operation.
2. Operate pump out
3. Close gas pipe of unit after completion
4. End pump out
5. Close common pipe
6. Eliminate refrigerant in common pipe after opening the common pipe of corresponding ODU. Replace compressor and perform vacuum.
7. Add the refrigerant with auto charging function

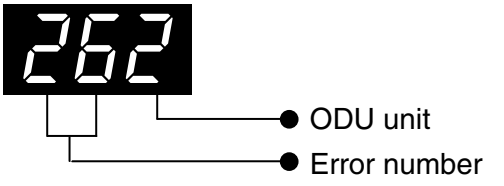
4.8 Auto Back Up Function_Inverter compressor

This function allows the system to operate in case of inverter compressor failure by backing up compressor automatically.

SVC can be asked by displaying error to the customer every 6 hours.



Example) Slave1 Unit INV Comp start failure error occur

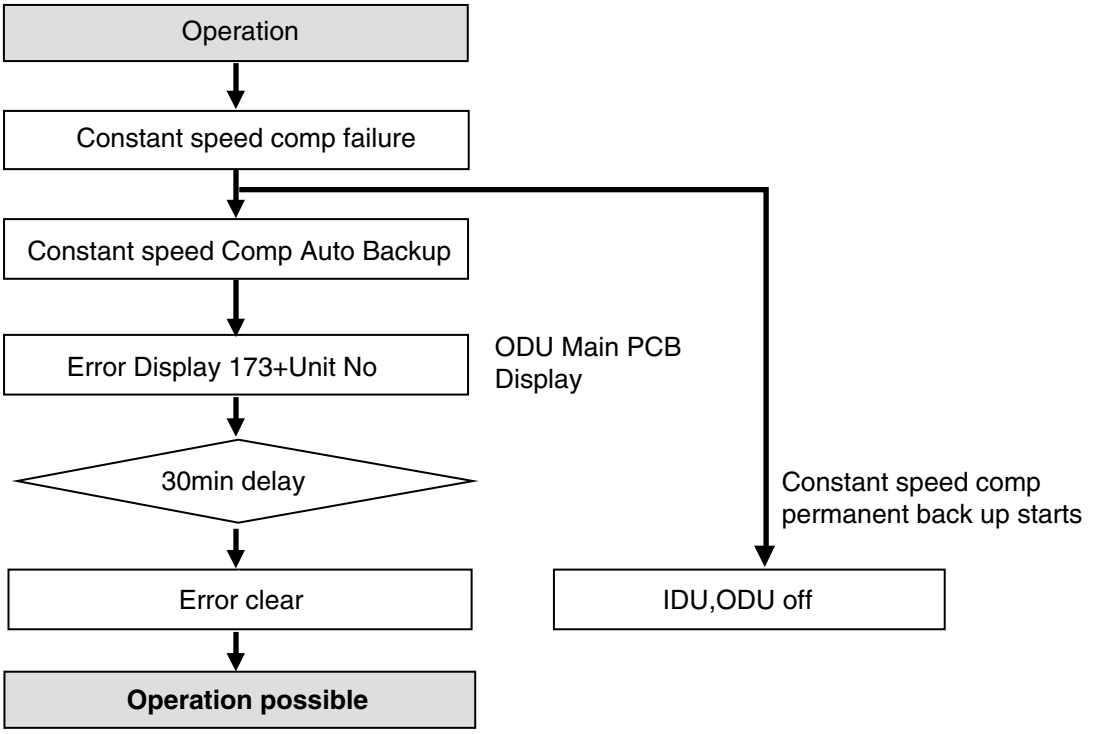


Caution

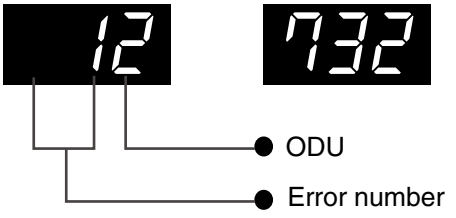
1. Request SVC immediately if error occurs.
2. Auto back up is set up to 1 inverter Comp
3. If Inverter Comp Auto Back up starts, error displays for 10 min. every 6 hours.
4. Error displays continuously at the corresponding ODU.

4.9 Auto Back Up Function_constant speed compressor

This function allows the system to operate in case of constant speed compressor failure by backing up compressor automatically.



Example) Slave1 Unit constant speed Comp failure(No.173)

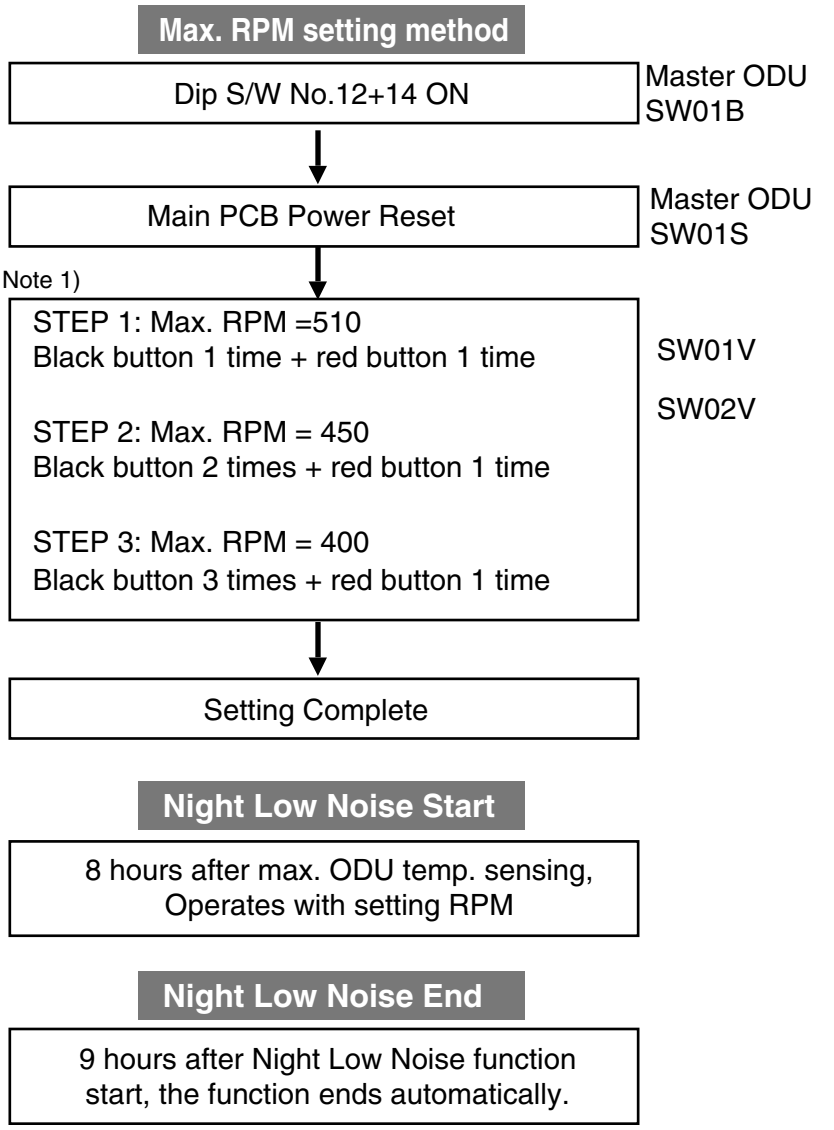


⚠ Caution

1. Request SVC immediately if error occurs

4.10 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.



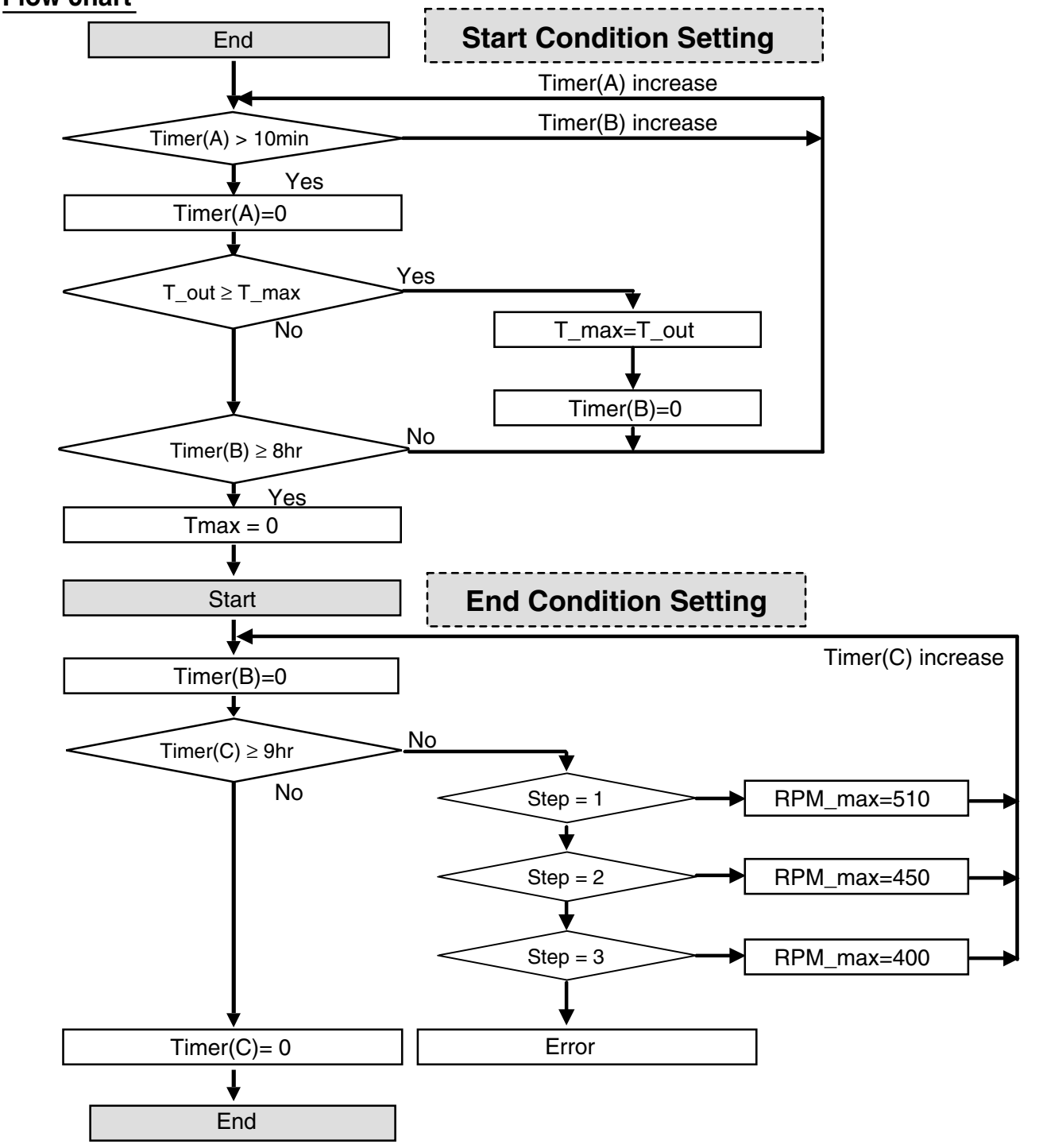
Caution

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

[Note]

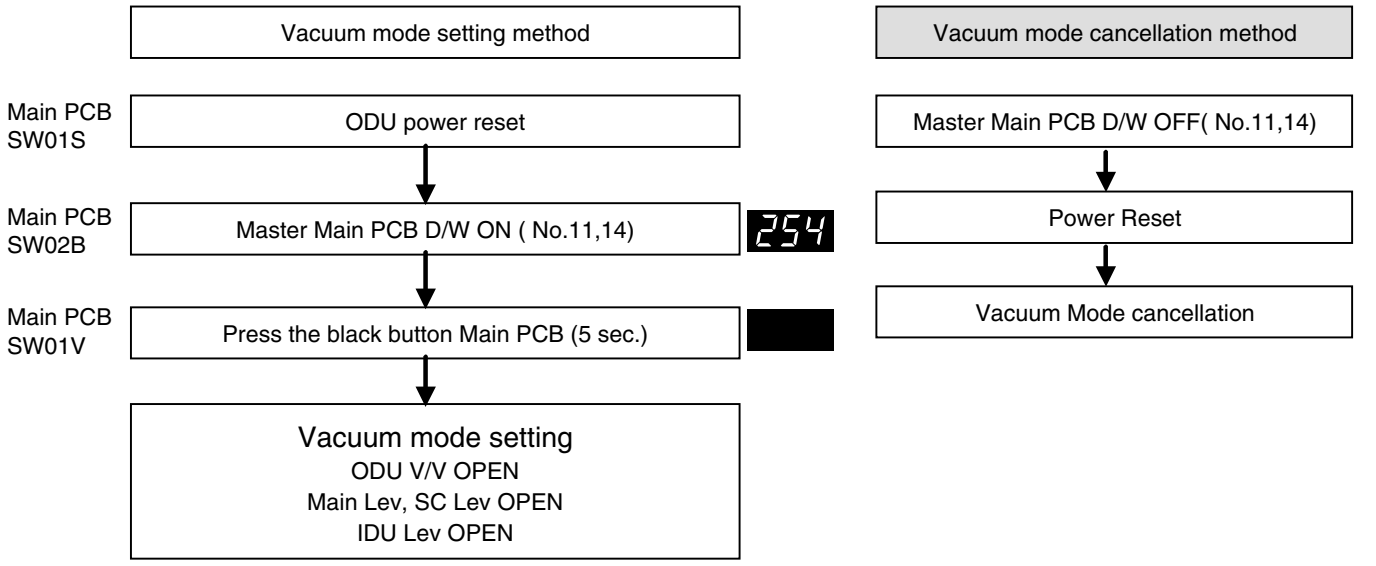
1. Select appropriate RPM referencing noise table.

Flow chart



4.11 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.

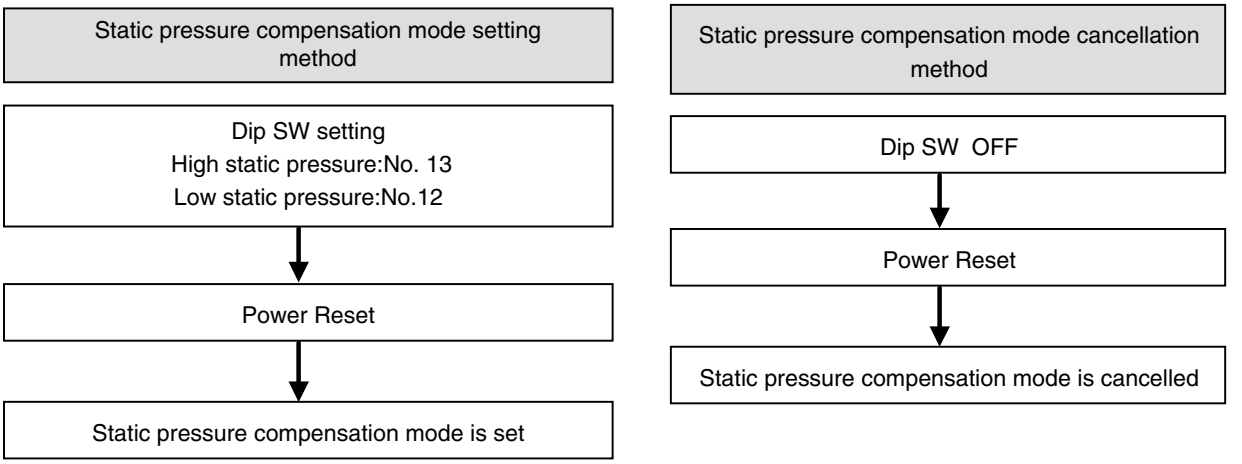
4.12 Static pressure compensation mode

This function secures the air flow rate of ODU, in case static pressure has been applied like using duct at fan discharge of ODU.

■ Static pressure compensation dip S/W setting method

High static pressure mode (Max. RPM 930) : Master ODU Main PCB SW02B NO.13 Dip S/W

Low static pressure mode (Max. RPM 900) : Master ODU Main PCB SW02B NO.12 Dip S/W



4.13 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 (5 sec.)

↓

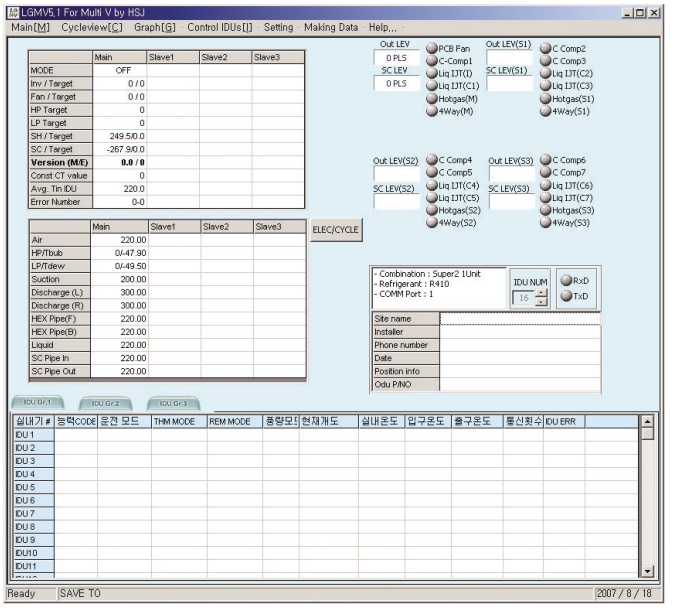
EEPROM ➠ Main Micom data Loading

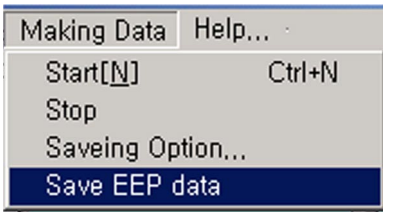
Yellow LED(LED01C) stops when data is loading
After completion, it is starts blinking (about 20 sec.).

↓

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 2.0 MΩ or more between power supply terminal block and ground. Do not operate in the case of 2.0 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, turning on the main power supply and energizing the crankcase heater for more than 6 hours will cause the refrigerant to evaporate, increasing the insulation resistance.
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. Troubleshooting

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	R-S-T misconnection	Check compressor R-S-T 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

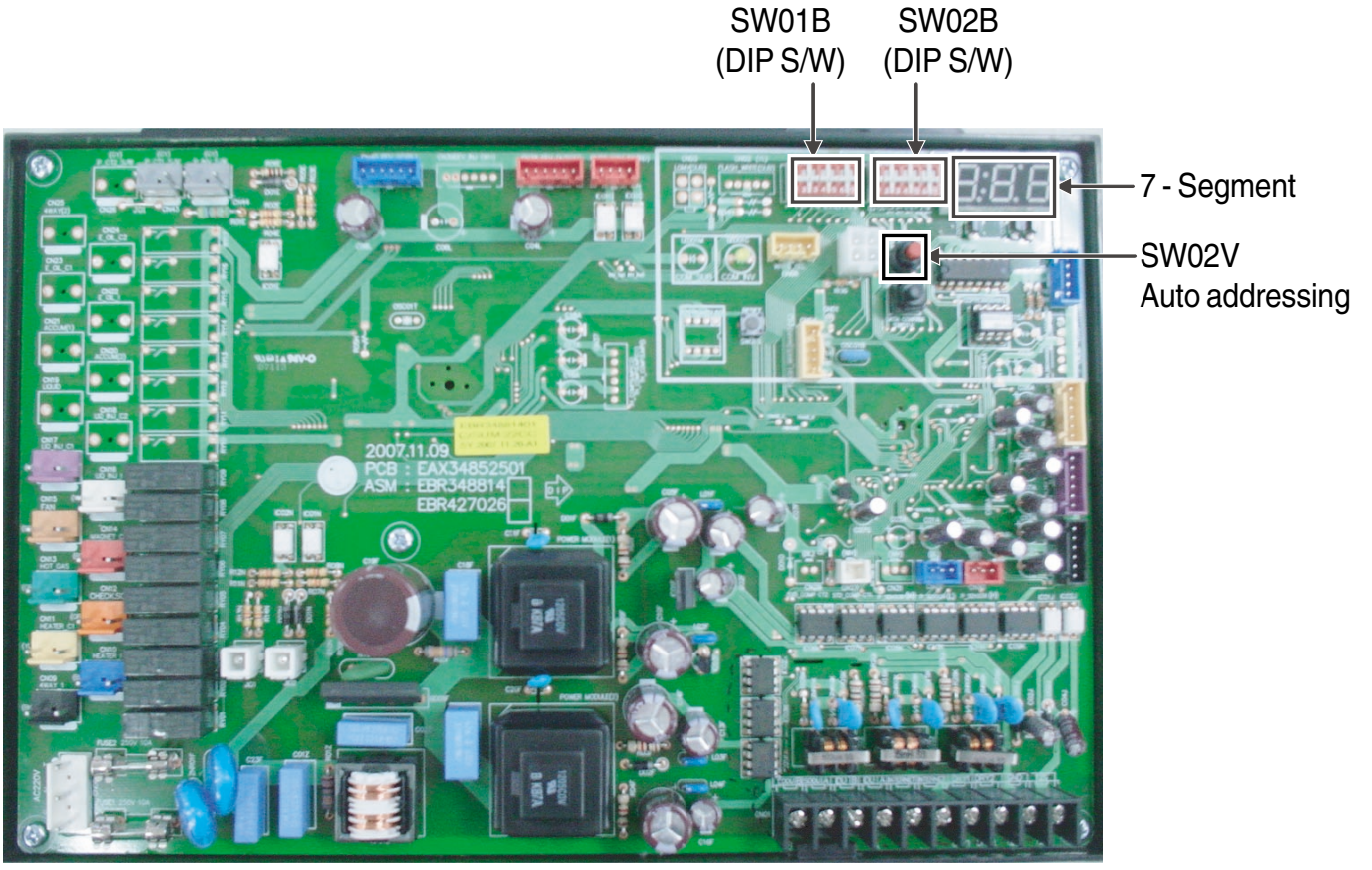
When system fault occurs, the error code is displayed at indoor unit display or remote control display, the trouble shooting guide is in the service manual

• 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 Master 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 Master unit

The number is sequentially appeared at the 7 segment in 5 seconds after applying the power. This number represents the setting condition.(For example, represents 3Ø 208/230V 20HP heat pump)
Master model code ➔ Slave1 model code ➔ total capacity ➔ 2 ➔ 25 ➔ 140

1 ~255 : Master model code
1 ~255 : Slave1 model code } Refer to table code
1 ~255 : Slave2 model code
8~32HP : HP number(sum of master capacity and slave capacity)
No display : cooling only 2 : heat pump 3 : Sync
25 : Nomal
140 : 3Ø 208/230V 160 : 3Ø 460V

Example) 3Ø 208/230V 20HP heat pump
151 ➔ 151 ➔ 20 ➔ 2 ➔ 25 ➔ 140

CAUTION

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

Model Code

3Ø 208/230V

Model Code	Unit (HP)
150	8
151	10
152	12

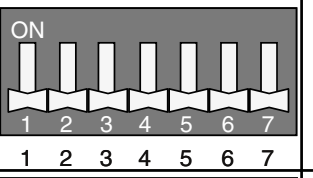
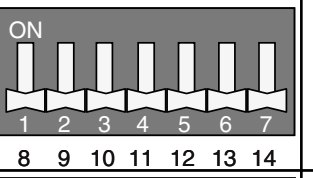
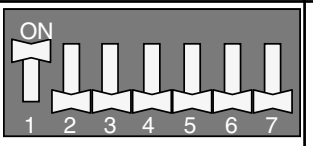
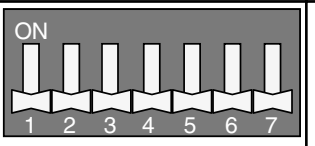
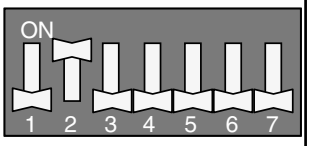
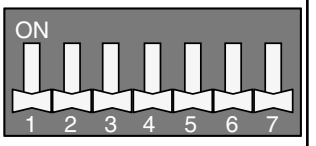
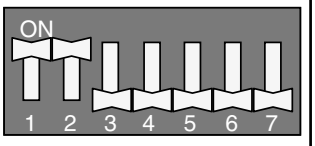
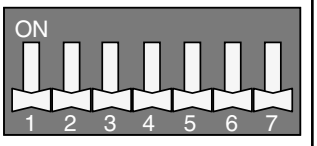
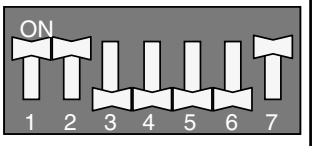
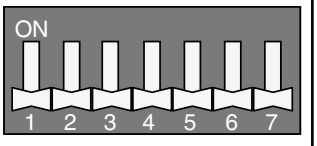
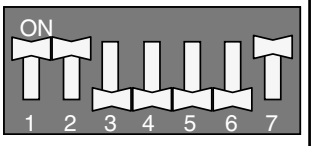
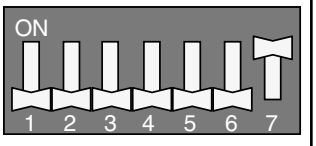
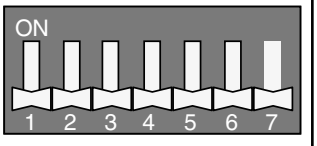
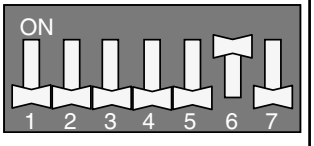
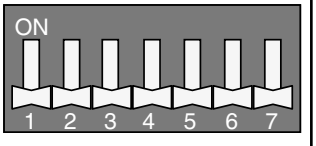
3Ø 460V

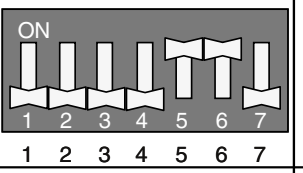
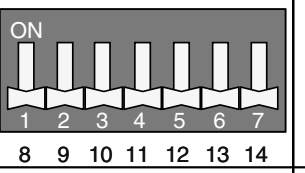
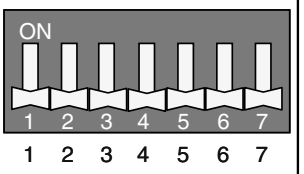
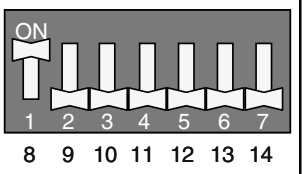
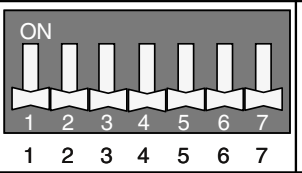
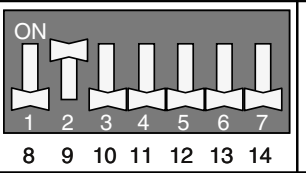
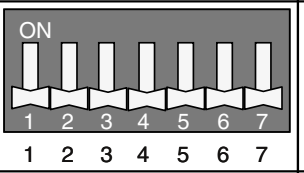
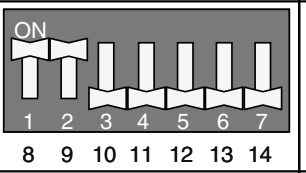
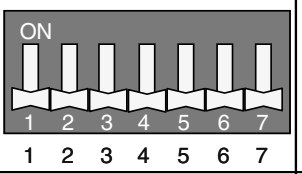
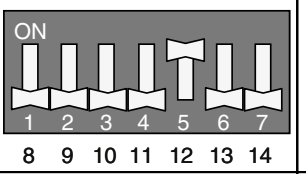
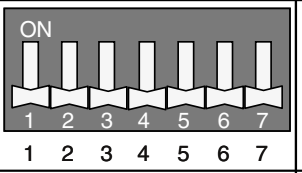
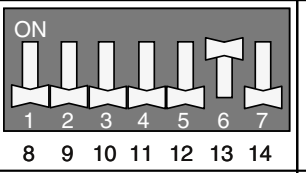
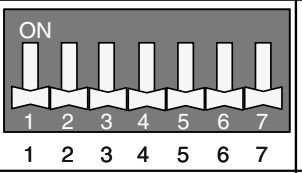
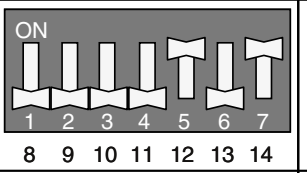
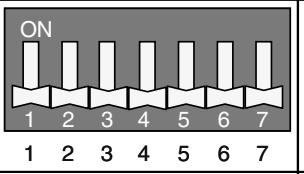
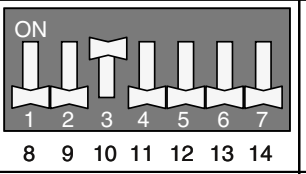
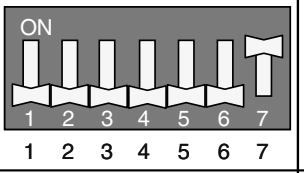
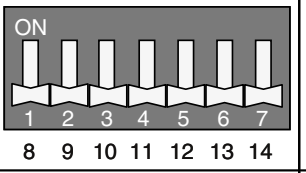
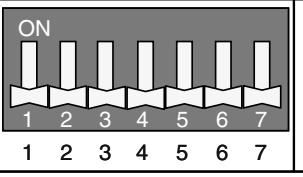
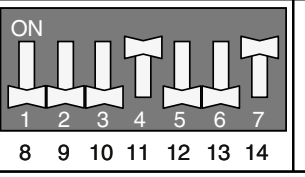
Model Code	Unit (HP)
171	8
172	10
173	12
174	14
175	16

■ Setting the DIP switch (SW03M)

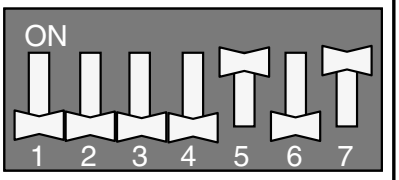
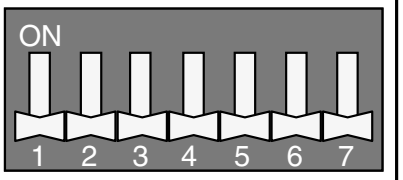
- Set the dip switch with the power turned off. If you change the setting when the power is on, the changed setting is not applied immediately. The changed setting is applied at the moment that the power is on.
- Instant indoor unit checking, data display mode, and forced oil collecting operation are 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 main outdoor unit

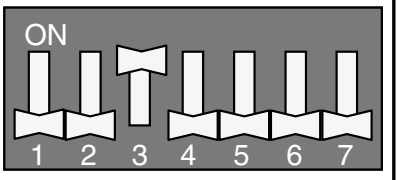
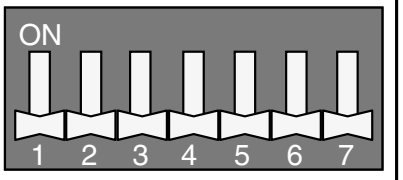
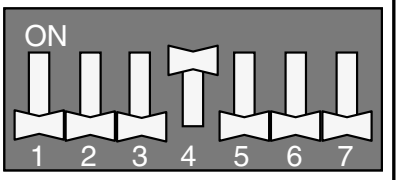
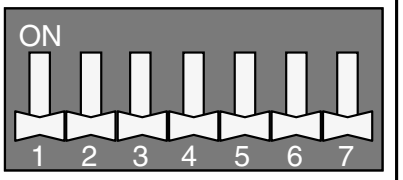
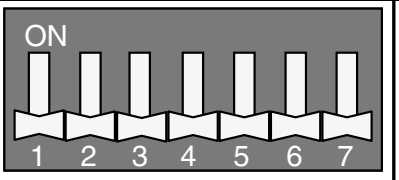
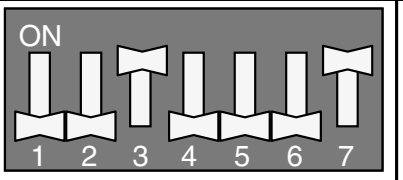
Function	SW01B Setting	SW02B Setting	Remarks
Standard			
Short Pipe Length			
Long Pipe Length			
Longest Pipe Length			
Refrigerant Auto Charging			
Refrigerant Checking			
Indoor Unit Forced Operation (Cooling)			
Indoor Unit Forced Operation (Heating)			

Function	SW01B Setting	SW02B Setting	Remarks
Dry Contact			
Snow			
Forced Defrosting			
Snow + Forced Defrosting			
Outdoor Unit Fan Low Static Pressure Compensation			
Outdoor Unit Fan High Static Pressure Compensation			
Night Low Noise			
Pump Down			
Forced Oil Return			
Vacuum Mode			

2. Settings of slave outdoor unit

Function	SW01B Setting	SW02B Setting	Remarks
Slave	 1 2 3 4 5 6 7	 8 9 10 11 12 13 14	

3. Settings of corresponding outdoor unit

Function	SW01B Setting	SW02B Setting	Remarks
Inv Back Up	 1 2 3 4 5 6 7	 8 9 10 11 12 13 14	
Unit Back Up	 1 2 3 4 5 6 7	 8 9 10 11 12 13 14	
Pump Out	 1 2 3 4 5 6 7	 8 9 10 11 12 13 14	

Replacement procedure for Compressor

1. Replacement procedure for Compressor.....58
1.1 Replacement procedure.....58

Replacement procedure for Compressor

1) Collect the refrigerant by using refrigerant recovery unit
(Since the setting on outdoor unit PCB is required for refrigerant recovery, refer to the warming plate "Precautions in service work" attached on the switch box cover)

2) Remove the sound insulator mat 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 collected completely.

4) Remove equalizing pipe nut.

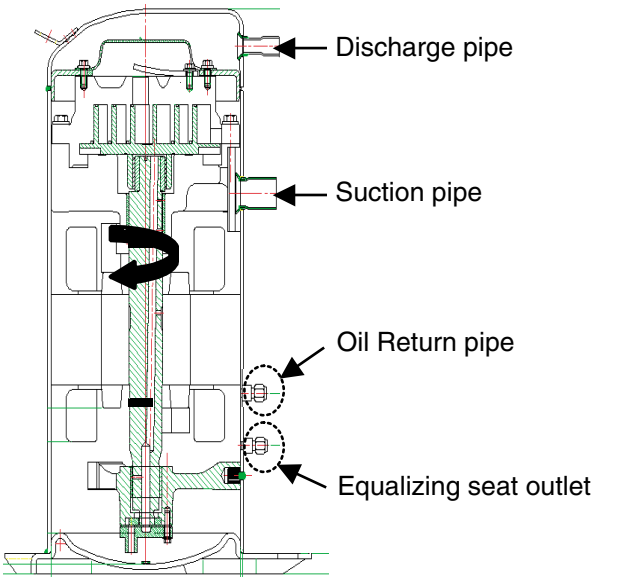
5) Remove three bolts at cushion rubber section to take out the faulty compressor outside the unit.

6) Install the new compressor in the unit.(Be sure to insert the cushion rubbers before tightening the fixing bolts of compressor.)

7) Remove the rubber caps put on the suction and discharge pipe of the new compressor to release.the sealing nitrogen gas.(Take note that oil may spout due to the pipe inside pressure if the plug put on the equalizing seat is removed before removing of rubber cap.)

8) Fasten equalizing pipe with nut.(10.3 ~ 13.3 lbf.ft)

9) Braze the suction and discharge pipe with brazing torch to the compressor.



Cut section

10) Conduct air tight test to check the piping system is free from leakage.

11) Connect power cable to the terminal board of compressor and cover the compressor with sound insulator mat.

12) Conduct vacuum drying.(Since the setting on outdoor unit PCB is required for vacuum drying, refer to the warning plate recautions in service work" attached on the switch box cover.)

13) Charge refrigerant after the completion of vacuum drying, and check the function of compressor with cooling or heating operation.

Part 4
Trouble shooting guide

Trouble shooting guide

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2.8 Other 71

3. Self-diagnosis function 72

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	R-S-T misconnection	Check compressor R-S-T 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 resistance between terminals
	No operation sound after switching ON the power supply	Coil failure	Service necessary
	Heating failure, frozen outdoor heat exchanger part	EEV clogged	Service necessary
	Low pressure error or discharge temperature error	EEV clogged	

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 Fompornents

2.1 Compressor

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

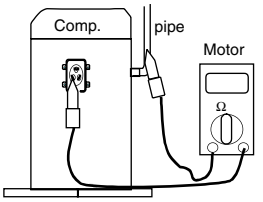
<table>
<tr><th>No.</th><th>Checking Item</th><th>Symptom</th><th>Countermeasure</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Is how long power on during operation?</td><td>1) Power on for 12 hours or more</td><td>* Go to No.2.</td></tr>
<tr><td>2) Power on for 12 hours or less</td><td>* Go to No.2 after applying power for designated time (12 hours).</td></tr>
<tr><td rowspan="3">2</td><td>Does failure appears again when starting operation?</td><td>1) The compressor stops andsame error appears again.</td><td>* Check IMP may fail.</td></tr>
<tr><td>Method to measure insulation resistance
 

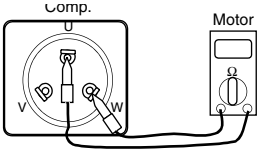
Figure 1.
Method to measure coil resistance
 

Figure 2.</td><td>2) If output voltage of the inverter is stably output. *1</td><td>* Check coil resistor and insulation resistor. If normal, restart the unit. If same symptom occurs, replace the compressor.
* Insulation resistor: 2MW or more
Coil resistor:
<table><tr><th></th><th colspan="2">3Ø208/230V</th><th colspan="2">3Ø460V</th></tr><tr><th></th><th>Inverter</th><th>Constant</th><th>Inverter</th><th>Constant</th></tr><tr><td>U-V</td><td>0.39±7%Ω</td><td>0.44±7%Ω</td><td>0.35±7%Ω</td><td>1.96±7%Ω</td></tr><tr><td>V-W</td><td>0.38±7%Ω</td><td>0.42±7%Ω</td><td>0.34±7%Ω</td><td>1.91±7%Ω</td></tr><tr><td>W-U</td><td>0.39±7%Ω</td><td>0.40±7%Ω</td><td>0.35±7%Ω</td><td>1.99±7%Ω</td></tr></table></td></tr>
<tr><td>3) If output voltage of the inverter is unstable or it is 0V.
(When incapable of using a digital tester)</td><td>* Check the IPM.
If the IPM is normal, replace the inverter board.
* Check coil resistor and insulation resistor.</td></tr>
</table>

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

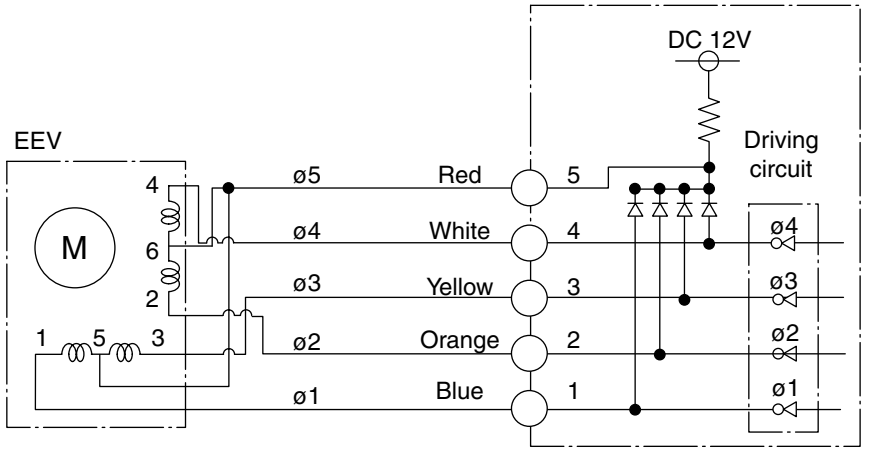
Measuring values may differ depending on measuring tools and measuring circuits since voltage, current in the power supply or output side of the inverter has no since waveform.
Especially, output voltage changes when output voltage of the inverter has a pattern of pulse wave.
In addition, measuring values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

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. 16.8±5%Ω
	4) For defective fuse 5) For failure of circuit board	* Replace the fuse if there is defect (Fuse 800V 30A). 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

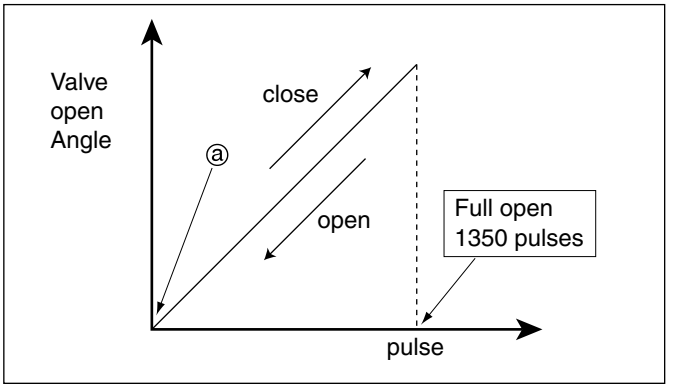
Output(ø) No.	Output state										
	1	2	3	4	5	6	7	8	9	10	11
ø1	ON	ON	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
ø2	ON	ON	ON	ON	OFF	OFF	OFF	ON	ON	ON	OFF
ø3	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
ø4	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	OFF

• Output pulse sequence

- In valve close state: 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 10 → 11 → 1
- In valve open state: 11 → 10 → 9→ 8 → 7 → 6 → 5 → 4 → 3 → 2 → 1 → 11

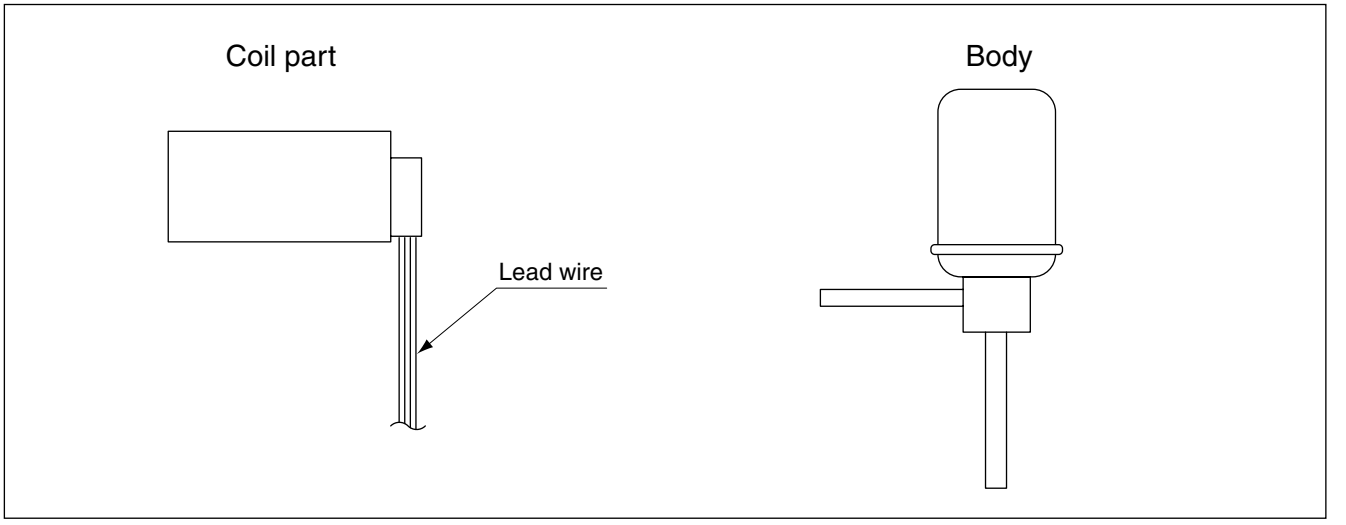
* 1. If EEV open angle does not change, all of output phase will be OFF
2. If output phase is different or continuously in the ON state, motor will not operate smoothly and start vibrating.

• EEV valve operation

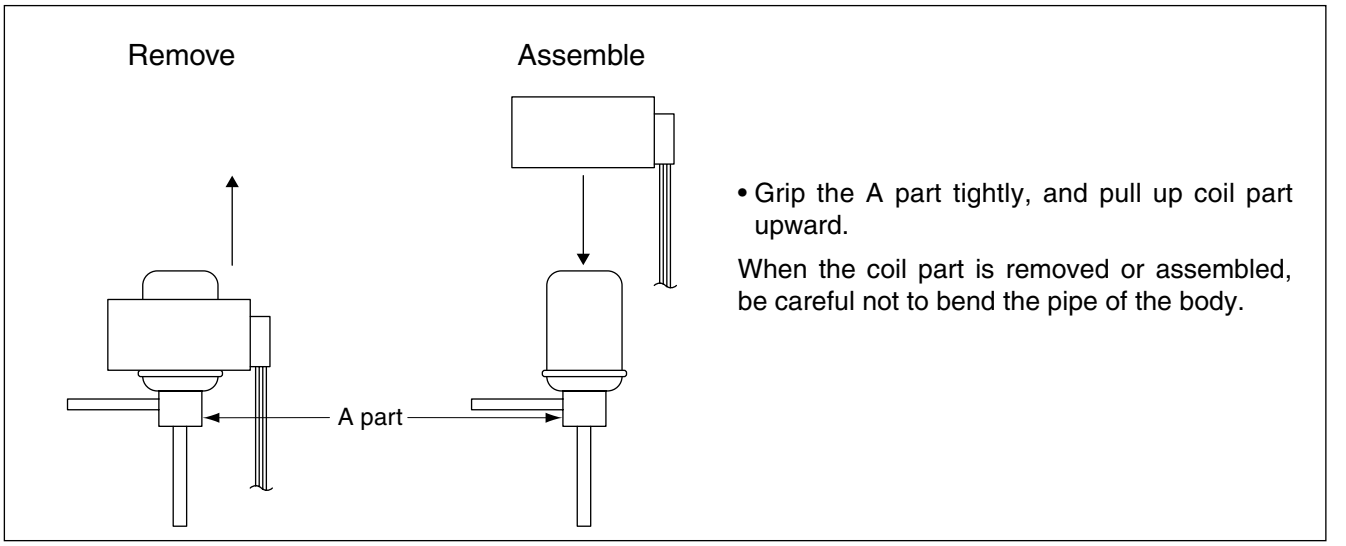


- At power ON, open angle signal of 1400 pulses output and valve position is set to ⓐ
  If valve operates smoothly, no noise and vibration occurs and if valve is closed. noise occurs.
- Noise from EEV can be confirmed by touching the EEV surface with a screw driver and listening the EEV noise.
- If liquid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

• EEV Coil and body(Outdoor unit)



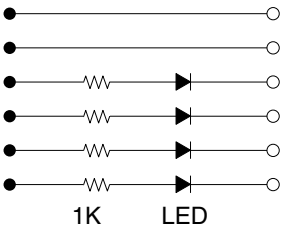
• Remove and assemble the coil



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

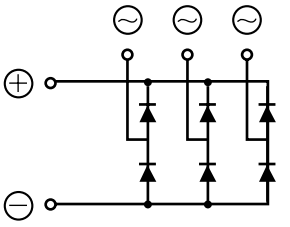
When the coil part is removed or assembled, be careful not to bend the pipe of the body.

- **EEV failure check method**

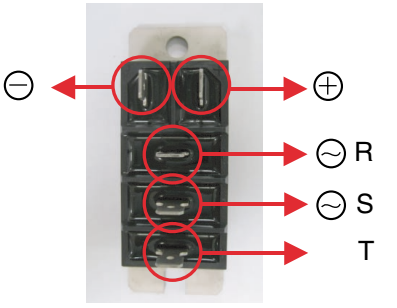
Failure mode	Diagnosis	Repair process	Unit
Microcomputer Driving circuit failure	1.Disconnect the EEV connector form control board and connect testing LED  2. Main power ON, pulse signal is out from EEV for 17 sec. If LEDs do not turn on, or are in on state continuously, then driving circuit is abnormal	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 Phase Bridge Diode Checking Method

Internal circuit diagram



Appearance



1. Wait until inverter PCB DC voltage gets discharged, after the main power switch off.
2. Pull out all the connectors connected with 3 phase bridge diode.
3. Set multi tester in diode mode.
4. Measured value should be 0.4~0.7V measuring as below table.
5. In case the measured value is different from the table, set multi tester to resistance mode and measure. If the value is small (0 Ω) or high (hundreds M Ω), PCB needs to be replaced.
6. In case that bridge diode is damaged, check if inverter PCB assembly(IPM) is needed to be replaced.

Diode terminal / Tester terminal	+ terminal: black(-)	- terminal: red(+)
R(~) : red(+)	0.4 V ~ 0.7 V	-
S(~) : red(+)	0.4 V ~ 0.7 V	-
T(~) : red(+)	0.4 V ~ 0.7 V	-
R(~) : black(-)	-	0.4 V ~ 0.7 V
S(~) : black(-)	-	0.4 V ~ 0.7 V
T(~) : black(-)	-	0.4 V ~ 0.7 V

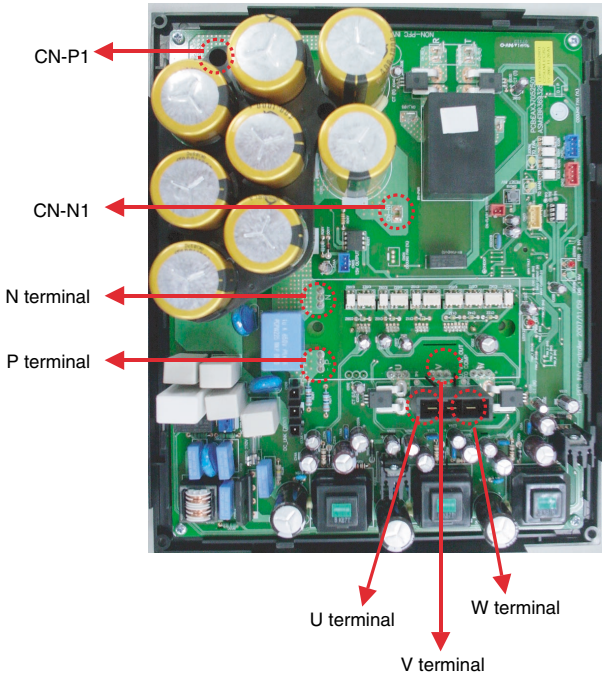
✻ Red(+) and black(-) are the measuring terminals of multi tester.

Caution

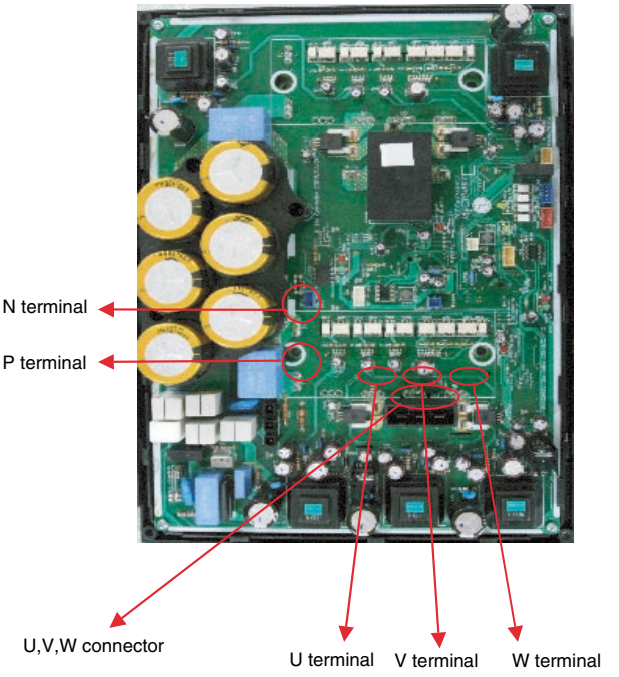
- **Check the electric parts of c/box, 10 minutes after switching off the main supply and checking DC voltage is discharged. Otherwise, there is chance of getting electric shock.**
- **There is chance of electric shock by charged voltage.**

2.5 Inverter IPM Checking Method

3Ø 460V



3Ø 208/230V



1. Wait until inverter PCB DC voltage is discharged after main power off.
2. Pull out CN-P1, CN-N1 connectors and U,V,W COMP connector connected with the inverter PCB.
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. In the measured value with resistance mode should be within 28K Ω ±10%.
6. In case measured value is different from the table, PCB needs to be replaced.(PCB damaged).

	P terminal : black (-)	**N terminal : red (-)**
U terminal : red(+)	28K Ω ± 10%	Open
V terminal : red(+)	28K Ω ± 10%	Open
W terminal : red(+)	28K Ω ± 10%	Open
	P terminal : red(+)	**N terminal : red (+)**
U terminal : black(-)	Open	28K Ω ± 10%
V terminal : black(-)	Open	28K Ω ± 10%
W terminal : black(-)	Open	28K Ω ± 10%

✻ Red(+) and black(-) are the measuring terminals of multi tester.

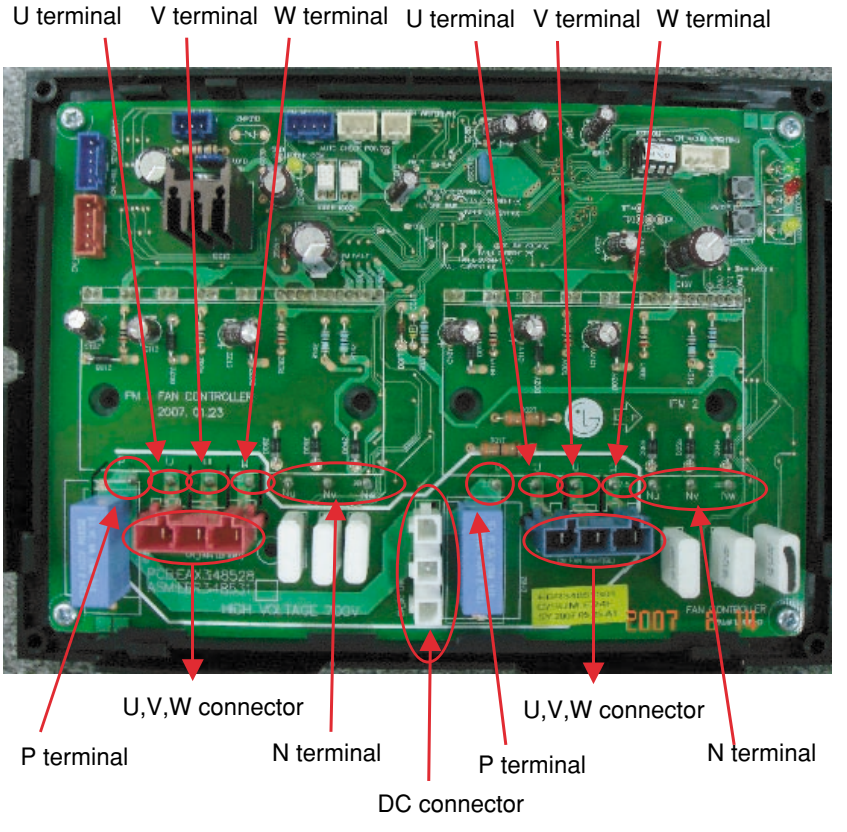
2.6 Fan IPM Checking Method

1. Wait until inverter PCB DC voltage gets discharged after the main power switch off.
2. Pull out DC connector and U,V,W fan motor connector connected with fan PCB
3. Set multi tester in resistance mode .
4. If the value between P and N terminal of IPM is small (0Ω) or tens KΩ, PCB needs to be replaced (IPM damaged).
5. In case the measured value is open(hundreds KΩ), measure resistance mode, and the value should be within 35 KΩ ±10% as shown below table.
6. If the measured value is different from the value given in the table, PCB is needs to be replaced.

	P terminal : black (-)	**N terminal : red (-)**
U terminal : red(+)	35K Ω ± 10%	Open
V terminal : red(+)	35K Ω ± 10%	Open
W terminal : red(+)	35K Ω ± 10%	Open
	P terminal : red(+)	**N terminal : red (+)**
U terminal : black(-)	Open	35K Ω ± 10%
V terminal : black(-)	Open	35K Ω ± 10%
W terminal : black(-)	Open	35K Ω ± 10%

✻ Red(+) and black(-) are the measuring terminals of multi tester.

2.7 UW1 chassis(2 Fan)



2.8 Other

Electrolytic capacitor and resistor for voltage distribution

1) Disconnect an terminal of voltage distribution resistor from each DC link electrolytic capacitor
2) Set the multi meter to resistance mode, connect the probe to +,- terminal of the capacitor. If the estimated resistance value is increase continuously without short(value is 0), then the resistor is normal
3) Set the multi meter to resistance mode, confirm that the resistance value of the resistor is around 270 kOhm

Check and replace inferior components

Caution **In case that the control box is opened and before checking electrical parts, it should be checked that the LED 01Y turned off (wait 3 minutes after main power OFF), otherwise it may cause electrical shock.**

3. Self-diagnosis function

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.

Ex) 211 : No.21 error of master unit
213 : No.21 error of slave2
011 → 051 : No.105 error of master unit

	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	-	Communication 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	-	Communication 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	-	Communication 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	Master Outdoor Unit Inverter Compressor IPM Fault	Master Outdoor Unit Inverter Compressor Drive IPM Fault
			2	Slave Outdoor Unit Inverter Compressor IPM Fault	Slave Outdoor Unit Inverter Compressor Drive IPM Fault
	2	2	1	Inverter Board Input Over Current(RMS) of Master Outdoor Unit	Master Outdoor Unit Inverter Board Input Current excess (RMS)
			2	Inverter Board Input Over Current(RMS) of Slave Outdoor Unit	Slave Outdoor Unit Inverter Board Input Current excess (RMS)
	2	3	1	Master Outdoor Unit Inverter Compressor DC link Low Voltage	DC charging is not performed at Master outdoor unit after starting relay turn on.
			2	Slave Outdoor Unit Inverter Compressor DC link Low Voltage	DC charging is not performed at Slave outdoor unit after starting relay turn on.
	2	4	1	Master Outdoor Unit High Pressure Switch	System is turned off by Master outdoor unit high pressure switch.
			2	Slave Outdoor Unit High Pressure Switch	System is turned off by Slave outdoor unit high pressure switch.

	Display			Title	Cause of Error
Outdoor unit related error	2	5	1	Master Outdoor Unit Input Voltage High/ Low Voltage	Master Outdoor Unit input voltage is over 487V or below 270V
			2	Slave Outdoor Unit Input Voltage High/ Low Voltage	Slave Outdoor Unit input voltage is over 487V or below 270V
	2	6	1	Master Outdoor Unit Inverter Compressor Start Failure	The First Start Failure by Master Outdoor Unit Inverter Compressor Abnormality
			2	Slave Outdoor Unit Inverter Compressor Start Failure	The First Start Failure by Slave Outdoor Unit Inverter Compressor Abnormality
	2	7	1	Master Outdoor Unit PFC IPM Fault error	System is turned off by Master Outdoor unit PFC IPM Fault Signal
			2	Slave 1 Outdoor Unit PFC IPM Fault error	System is turned off by Slave 1 Outdoor unit PFC IPM Fault Signal
	2	8	1	Master Outdoor Unit Inverter DC link High Voltage	System is turned off by Master outdoor unit DC Voltage Over Charging
			2	Slave Outdoor Unit Inverter DC link High Voltage	System is turned off by Slave Outdoor unit DC Voltage Over Charging
	2	9	1	Master Outdoor Unit Inverter Compressor Over Current	Master Outdoor Unit Inverter Compressor Fault OR Drive Fault
			2	Slave Outdoor Unit Inverter Compressor Over Current	Slave Outdoor Unit Inverter Compressor Fault OR Drive Fault
	3	2	1	Master Outdoor Unit Inverter Compressor High Discharge Temperature	System is turned off by Master outdoor unit Inverter Compressor High Discharge Temperature
			2	Slave Outdoor Unit Inverter Compressor High Discharge Temperature	System is turned off by Slave Outdoor unit Inverter Compressor High Discharge Temperature
	3	3	1	Master Outdoor Unit Constant Speed Compressor High Discharge Temperature	System is turned off by Master Outdoor Uunit Constant Speed High Discharge Temperature
			2	Slave Outdoor Unit Constant Speed Compressor High Discharge Temperature	System is turned off by Slave Outdoor Unit Constant Speed High Discharge Temperature
	3	4	1	High Pressure of Master Outdoor Unit	System is turned off by excessive increase of high pressure of Master outdoor unit
			2	High Pressure of Slave Outdoor Unit	System is turned off by excessive increase of high pressure of Slave outdoor unit
	3	5	1	Low Pressure of Master Outdoor Unit	System is turned off by excessive decrease of low pressure of Master outdoor unit
			2	Low Pressure of Slave Outdoor Unit	System is turned off by excessive decrease of low pressure of Slave outdoor unit
	3	8	1	Transmission error : Inverter ➠ Converter	Failing to receiver the Inverter signal at converter
			2	Transmission error : Inverter ➠ Converter	System is turned off by Slave 1 Outdoor unit PFC IPM Fault Signal

	Display			Title	Cause of Error
Outdoor unit related error	4	0	1	Master Outdoor Unit Inverter Compressor CT Sensor Fault	Master Outdoor Unit Inverter Compressor CT Sensor open or short
			2	Slave Outdoor Unit Inverter Compressor CT Sensor Fault	Slave Outdoor Unit Inverter Compressor CT Sensor open or short
	4	1	1	Master Outdoor Unit Inverter Compressor Discharge Temperature Sensor Fault	Master Outdoor Unit Inverter Compressor Discharge Temperature Sensor open or short
			2	Slave Outdoor Unit Inverter Compressor Discharge Temperature Sensor Fault	Slave Outdoor Unit Inverter Compressor Discharge Temperature Sensor open or short
	4	2	1	Master Outdoor Unit Low Pressure Sensor Fault	Master Outdoor Unit Low Pressure Sensor open or short
			2	Slave Outdoor Unit Low Pressure Sensor Fault	Slave Outdoor Unit Low Pressure Sensor open or short
	4	3	1	Master Outdoor Unit High Pressure Sensor Fault	Master Outdoor Unit High Pressure Sensor open or short
			2	Slave Outdoor Unit High Pressure Sensor Fault	Slave Outdoor Unit High Pressure Sensor open or short
	4	4	1	Master Outdoor Unit Air Temperature Sensor Fault	Master Outdoor Unit Air Temperature Sensor open or short
			2	Slave Outdoor Unit Air Temperature Sensor Fault	Slave Outdoor Unit Air Temperature Sensor open or short
	4	5	1	Master Outdoor Unit Heat Exchanger Temperature Sensor(A) Fault	Master Outdoor Unit Heat Exchanger Temperature Sensor(A) Open or Short
			2	Slave Outdoor Unit Heat Exchanger Temperature Sensor(A) Fault	Slave Outdoor Unit Heat Exchanger Temperature Sensor(A) Open or Short
	4	6	1	Master Outdoor Unit Suction Temperature Sensor Fault	Master Outdoor Unit Suction Temperature Sensor Open or Short
			2	Slave Outdoor Unit Suction Temperature Sensor Fault	Slave Outdoor Unit Suction Temperature Sensor Open or Short
	4	7	1	Master Outdoor Unit Constant Speed Compressor Discharge Temperature Sensor Fault	Master Outdoor Unit Constant Speed Compressor Discharge Temperature Sensor Open or Short
			2	Slave Outdoor Unit Constant Speed Compressor Discharge Temperature Sensor Fault	Slave Outdoor Unit Constant Speed Compressor Discharge Temperature Sensor Open or Short
	4	8	1	Master Outdoor Unit Heat Exchanger Temperature Sensor(B) Fault	Master Outdoor Unit Heat Exchanger Temperature Sensor(B) Open or Short
			2	Slave Outdoor Unit Heat Exchanger Temperature Sensor(B) Fault	Slave Outdoor Unit Heat Exchanger Temperature Sensor(B) Open or Short

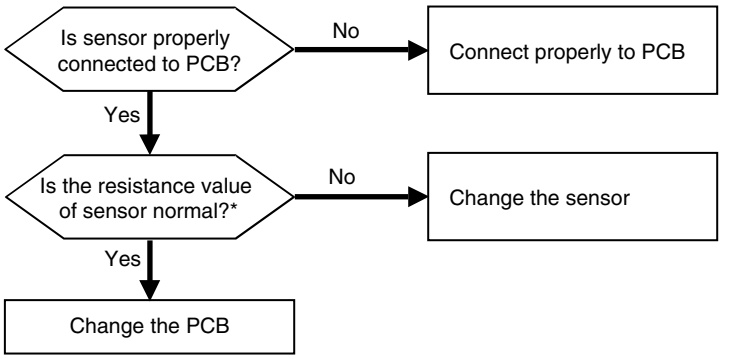
	Display			Title	Cause of Error
Outdoor unit related error	5	0	1	Omitting connection of R, S, T power of Master Outdoor unit	Omitting connection of Master outdoor unit
			2	Omitting connection of R, S, T power of Slave outdoor unit	Omitting connection of Slave outdoor unit
	5	1	1	Excessive capacity of indoor units	Excessive connection of indoor units compared to capacity of outdoor unit
	5	2	1	Communication error : inverter PCB → Main PCB	Failing to receive inverter signal at main PCB of Master Outdoor Unit
			2	Communication error : inverter PCB → Main PCB	Failing to receive inverter signal at main PCB of Slave Outdoor Unit
	5	3	1	Communication error : indoor unit → main PCB of outdoor unit	Failing to receive indoor unit signal at main PCB of outdoor Unit.
	5	4	1	Reverse connection of R, S, T power of Master Outdoor unit	Reverse connection or omitting connection of R, S, T power of Master outdoor unit
			2	Reverse connection of R, S, T power of Slave outdoor unit	Reverse connection or omitting connection of R, S, T power of Slave outdoor unit
	5	9	1	Mixing Installation of Sub Outdoor Unit	Mixing Installation of Old Sub outdoor unit and New Slave Outdoor Unit
	6	0	1	Inverter PCB EEPROM Error of Master Outdoor Unit	Access Error of Inverter PCB of Master Outdoor Unit
			2	Inverter PCB EEPROM Error of Slave Unit	Access Error of Inverter PCB of Slave Outdoor Unit
	6	7	1	Master Outdoor Unit Fan Lock	Restriction of Master Outdoor Unit
			2	Slave Outdoor Unit Fan Lock	Restriction of Slave Outdoor Unit
	7	0	1	Constant CT Sensor Error of Master Outdoor Unit	Constant CT Sensor open or short of Master Outdoor Unit
			2	Constant CT Sensor Error of Slave Outdoor Unit	Constant CT Sensor open or short of Slave Outdoor Unit
	7	1	1	PFC CT Sensor Error of Master Outdoor Unit	Master Outdoor Unit PFC CT Sensor open or short
			2	PFC CT Sensor Error of Slave Outdoor Unit	Slave Outdoor Unit PFC CT Sensor open or short
	7	3	1	Instant Over Current(Peak) of Master Outdoor Unit PFC	Instant Over Current(Peak) of Master Outdoor Unit PFC
			2	Instant Over Current(Peak) of Slave Outdoor Unit PFC	Instant Over Current(Peak) of Slave Outdoor Unit PFC
	7	4	1	Master Outdoor Unit 3 Phase Power unbalance	Master Outdoor Unit R-T Phase Difference is over 5A
			2	Slave Outdoor Unit 3 Phase Power unbalance	~~Slave Outdoor Unit R-T Phase Difference is over 5A~~
	7	5	1	Master Outdoor Unit Fan CT Sensor Error	Master Outdoor Unit Fan CT Sensor open or short
			2	Slave Outdoor Unit Fan CT Sensor Error	Slave Outdoor Unit Fan CT Sensor open or short

	Display			Title	Cause of Error
Outdoor unit related error	7	6	1	Master Outdoor Unit Fan DC Link High Voltage Error	Master Outdoor Unit Fan DC Link High Voltage Error
			2	Slave Outdoor Unit Fan DC Link High Voltage Error	Slave Outdoor Unit Fan DC Link High Voltage Error
	7	7	1	Master Outdoor Unit Fan Over Current Error	Master Outdoor Unit Fan Current is over 5A
			2	Slave Outdoor Unit Fan Over Current Error	Slave Outdoor Unit Fan is over 5A
	7	8	1	Master Outdoor Unit Fan Hall Sensor Error	Master Outdoor Unit Fan Hall Sensor open or Short
			2	Slave Outdoor Unit Fan Hall Sensor Error	Slave Outdoor Unit Fan Hall Sensor open or Short
	7	9	1	Master Outdoor Unit Fan Start Failure Error	Master Outdoor Unit Fan First Position Sensing Failure
			2	Slave Outdoor Unit Fan Start Failure Error	Slave Outdoor Unit Fan First Position Sensing Failure
	8	6	1	Master Outdoor Unit Main PCB EEPROM Error	Communication Fail Between Master Outdoor Unit Main MICOM and EEPROM or omitting EEPROM
			2	Slave Outdoor Unit Main PCB EEPROM Error	Communication Fail Between Slave Outdoor Unit Main MICOM and EEPROM or omitting EEPROM
	8	7	1	Master Outdoor Unit Fan PCB EEPROM Error	Communication Fail Between Master Outdoor Unit Fan MICOM and EEPROM or omitting EEPROM
			2	Slave Outdoor Unit Fan PCB EEPROM Error	Communication Fail Between Slave Outdoor Unit Fan MICOM and EEPROM or omitting EEPROM
	8	8	1	Master Outdoor Unit PFC EEPROM Error	Communication fail between Master Outdoor unit PFC MICOM and EEPROM or omitting EEPROM
			2	Slave 1 Outdoor Unit PFC EEPROM Error	Communication fail between Slave 1 Outdoor unit PFC MICOM and EEPROM or omitting EEPROM
	1	0	4	1	Communication Error Between Master Outdoor Unit and Other Outdoor Unit	Failing to receive Slave Unit signal at main PCB of Master outdoor unit
				2	Communication Error Between Slave Outdoor Unit and Other Outdoor Unit	Failing to receive master and other Slave Unit signal at main PCB of Slave outdoor unit
	1	0	5	1	Master Outdoor Unit Fan PCB Communication Error	Failing to receive fan signal at main PCB of master unit.
				2	Slave Outdoor Unit Fan PCB Communication Error	Failing to receive fan signal at main PCB of Slave unit.
	1	0	6	1	Master Outdoor Unit FAN IPM Fault Error	~~Instant Over Current at Master Outdoor Unit Fan IPM~~
				2	Slave Outdoor Unit FAN IPM Fault Error	~~Instant Over Current at Slave Outdoor Unit Fan IPM~~

	Display				Title	Cause of Error
Outdoor unit related error	1	0	7	1	Master Outdoor Unit Fan DC Link Low Voltage Error	Master Outdoor Unit Fan DC Link Input Voltage is under 380V
				2	Slave Outdoor Unit Fan DC Link Low Voltage Error	Slave Outdoor Unit Fan DC Link Input Voltage is under 380V
	1	1	3	1	Master Outdoor Unit Liquid pipe Temperature Sensor Error	Liquid pipe temperature sensor of Master outdoor unit is open or short
				2	Slave Outdoor Unit Liquid pipe Temperature Sensor Error	Liquid pipe temperature sensor of Slave outdoor unit is open or short
	1	1	4	1	Master Outdoor Unit Subcooling Inlet Temperature Sensor Error	Master Outdoor Unit Subcooling Inlet Temperature Sensor open or short
				2	Slave Outdoor Unit Subcooling Inlet Temperature Sensor Error	Slave Outdoor Unit Subcooling Inlet Temperature Sensor open or short
	1	1	5	1	Master Outdoor Unit Subcooling Outlet Temperature Sensor Error	Master Outdoor Unit Subcooling Outlet Temperature Sensor open or short
				2	Slave Outdoor Unit Subcooling Outlet Temperature Sensor Error	Slave Outdoor Unit Subcooling Outlet Temperature Sensor open or short
	1	5	1	1	Failure of operation mode conversion at Master Outdoor Unit	Pressure unbalance between outdoor units
				2	Failure of operation mode conversion at Slave Outdoor Unit	Pressure unbalance between outdoor units
	1	7	3	1	Master Outdoor Unit Constant Speed Compressor Fault	Comp locking, Check Valve leakage, comp dielectric break down at Master Outdoor Unit
				2	Slave Outdoor Unit Constant Speed Compressor Fault	Comp locking, Check Valve leakage, comp dielectric at Slave Outdoor Unit
	1	9	3	1	Excessive increase of Master Outdoor Unit Fan PCB Heat Sink Temperature	Master Outdoor Unit Fan Inverter PCB Temperature is Over 95°C
				2	Excessive increase of Slave Outdoor Unit Fan PCB Heat Sink Temperature	Slave Outdoor Unit Fan Inverter PCB Temperature is Over 95°C
	1	9	4	1	Master Outdoor Unit Fan PCB Heat Sink Temperature Sensor Error	Master Outdoor Unit Fan PCB Heat Sink Temperature Sensor open or short
				2	Slave Outdoor Unit Fan PCB Heat Sink Temperature Sensor Error	Slave Outdoor Unit Fan PCB Heat Sink Temperature Sensor open or short

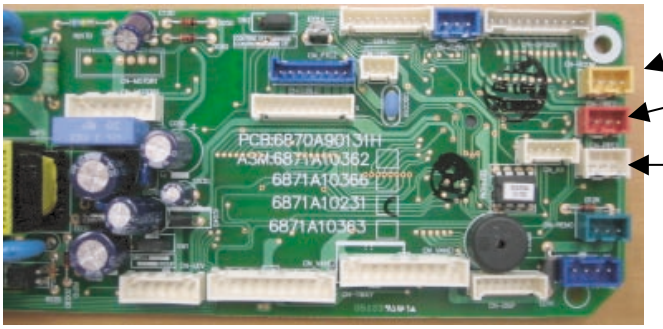
Error No.	Error Type	Error Point	Main Reasons
01	Indoor unit air sensor error	Indoor unit sensor is open/short	1. Indoor unit PCB wrong connection 2. Indoor unit PCB failure 3. Sensor problem (main reason)
02	Indoor unit pipe inlet sensor error		
06	Indoor unit pipe outlet sensor error		

■ 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) = 20.7 kΩ, 25°C(76°F) = 10 kΩ, 50°C(122°F) = 3.4 kΩ
Pipe temp sensor: 10°C(50°F) = 10 kΩ, 25°C(76°F) = 5 kΩ, 50°C(122°F) = 1.8 kΩ



CN-ROOM : Indoor air temp sensor

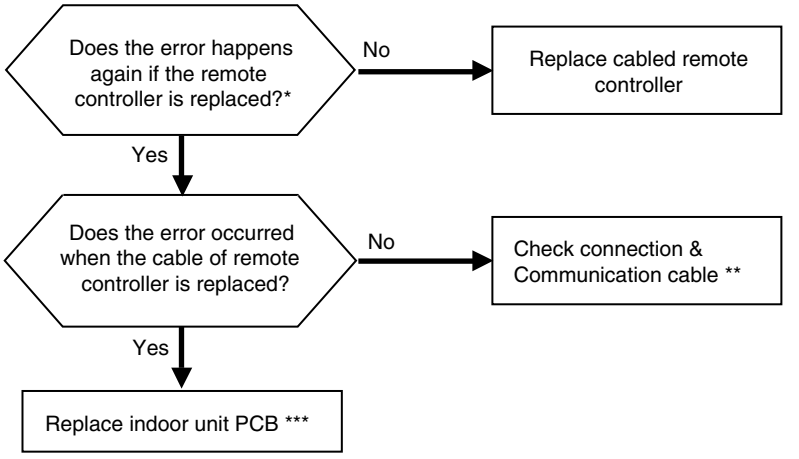
CN-PIPE2 : Pipe outlet temp sensor

CN-PIPE1 : Pipe inlet temp sensor

Measure the resistance of outlet pipe temp sensor.

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

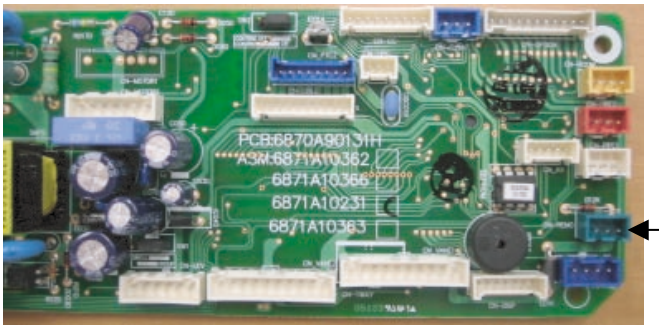
■ Error diagnosis and countermeasure flow chart



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

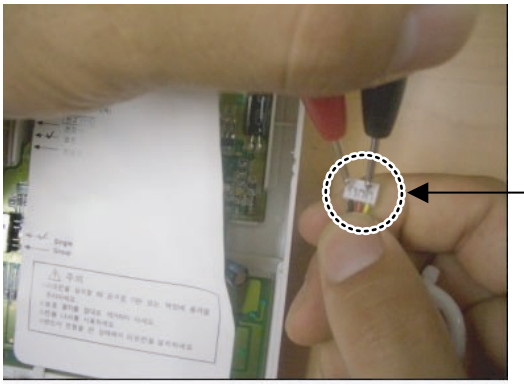
** Check cable : Contact failure of connected portion or extension of cable are main cause
Check any surrounded noise (check the distance with main power cable)
➔ make safe distance from the devices generate electromagnetic wave

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



CN-REMO : Remote controller connection

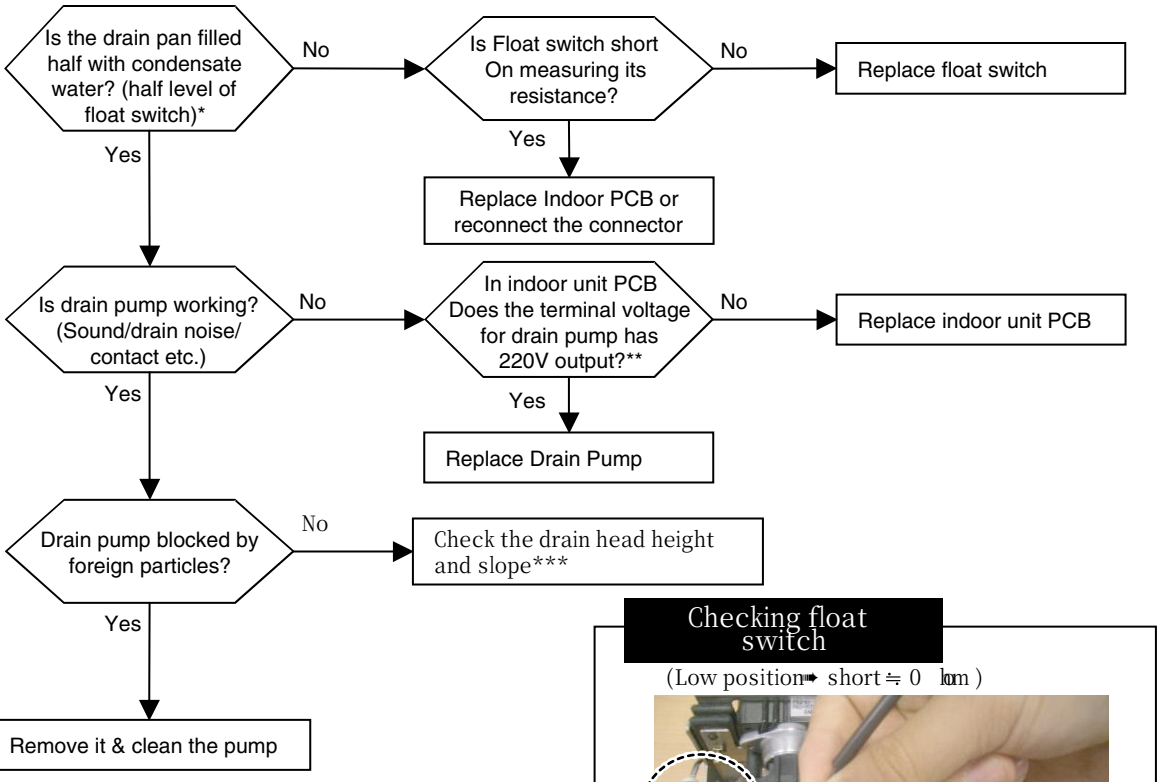
※ The PCB can differ from model to model.
Check from the right source.



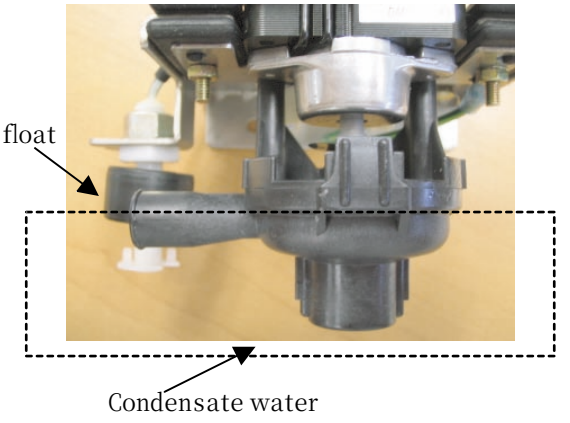
Checking communication cable connection status

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

■ Error diagnosis and countermeasure flow chart



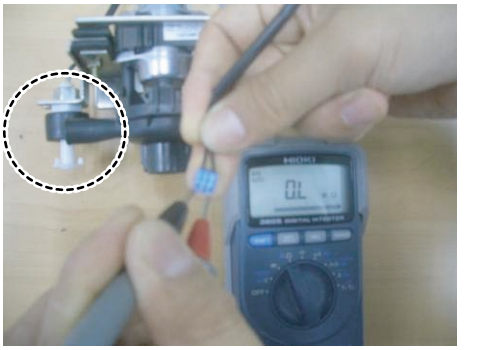
* If the float goes up higher than a half of float switch then the circuit is open & the unit is stopped automatically.

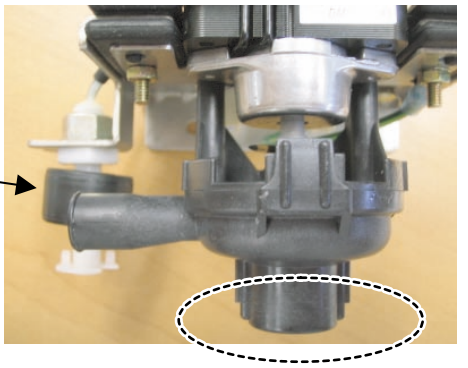


Checking float switch

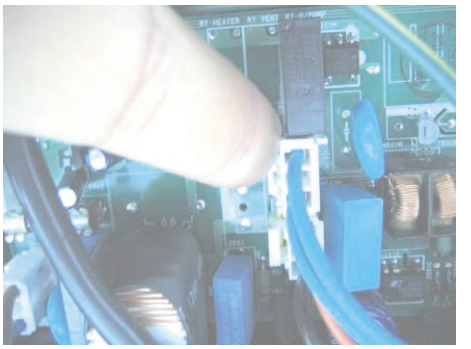
(Low position ➡ short ≒ 0 Ω)

(High position ➡ Open)





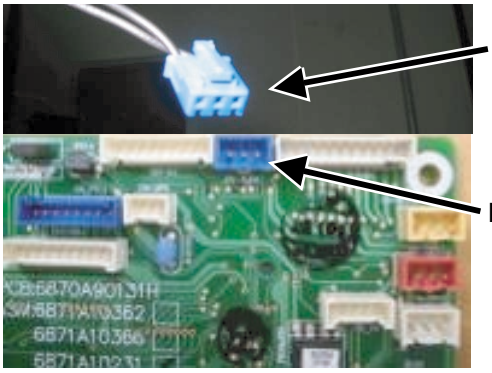
A:Point to check rotating



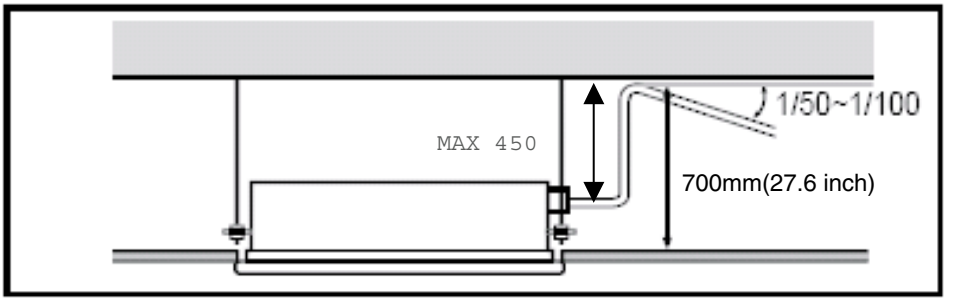
*** Indoor PCB drain pump connector

(Check input of 220V)

(Marked as **CN-DPUMP)**

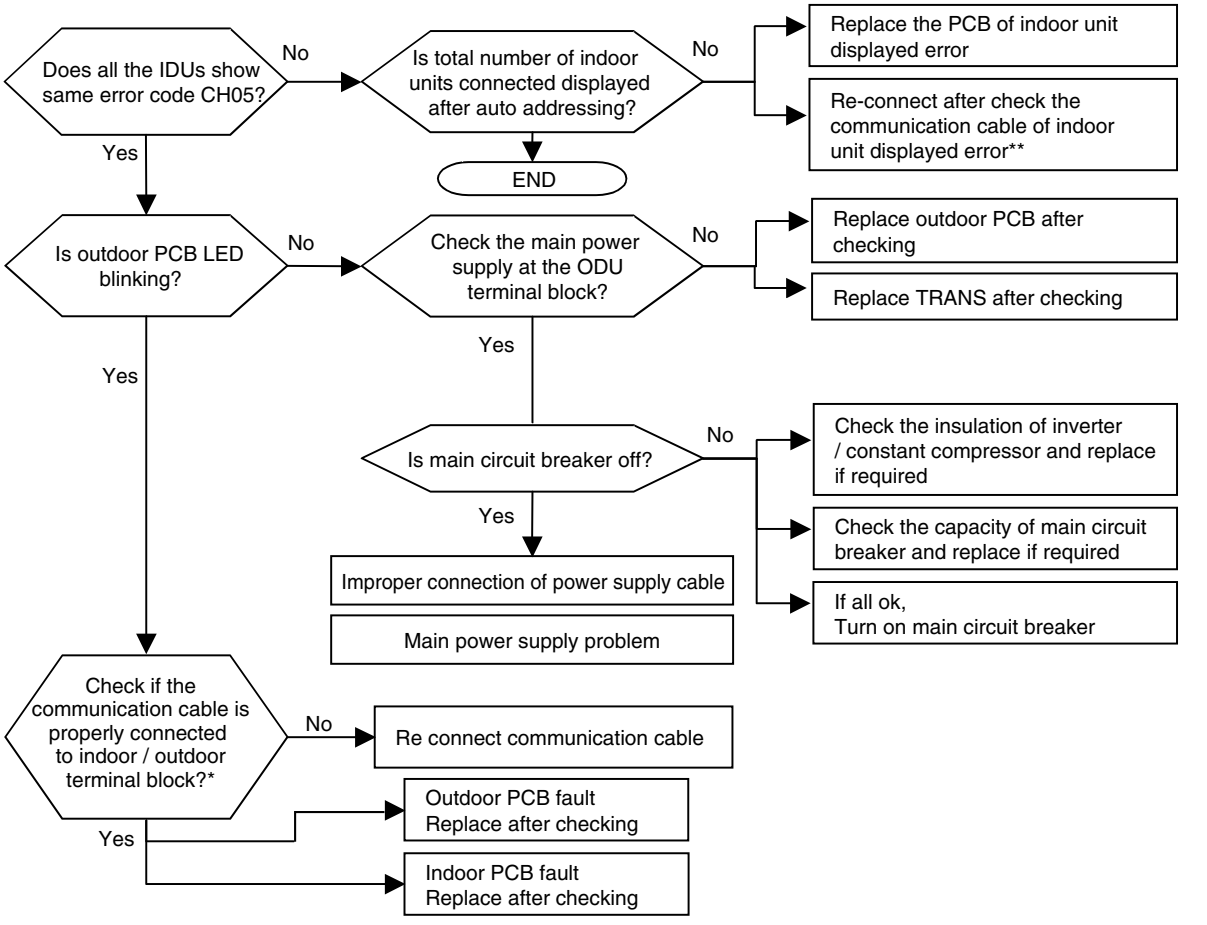


[***] Standard of drain pipe head height / slope

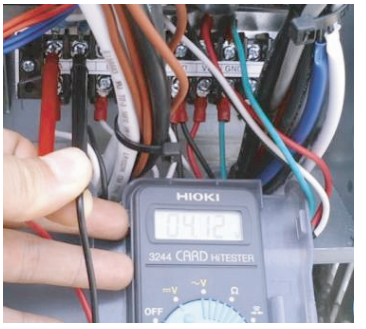


Error No.	Error Type	Error Point	Main Reasons
05	Indoor & Outdoor unit communication error	No signal communication between indoor & outdoor units.	1. Auto addressing is not done 2. Communication cable is not connected 3. Short circuit of communication cable 4. Indoor unit communication circuit fault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

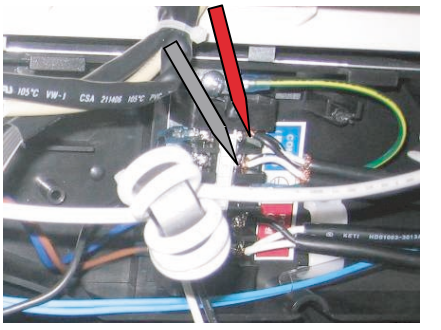
■ Error diagnosis and countermeasure flow chart



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



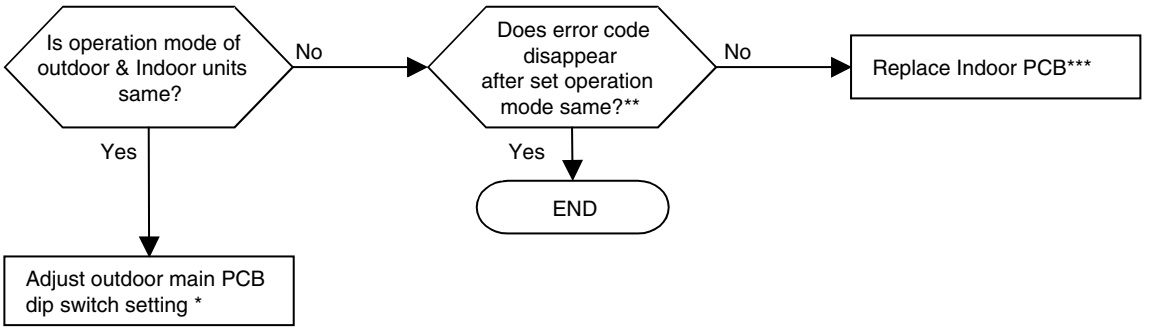
* If the DC voltage between communication terminal A, B of indoor unit is fluctuate within (-9V~+9V) then communication from outdoor unit is normal



Error No.	Error Type	Error Point	Main Reasons
06	Indoor unit outlet pipe temperature sensor error	Indoor unit outlet pipe temperature sensor open or short	Refer to CH02

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.

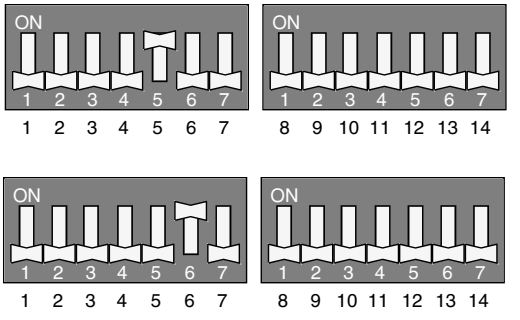
■ Error diagnosis and countermeasure flow chart



* Check mode selection setting of wired remote controller.

** Outdoor main PCB dip switch no.5 (Cooling) or no.6 (heating) is in On, different mode operation error may occur because the operation mode is fixed by dip switch setting.

♦ Dip switch Setting ♦



*** Dissolution method CH07 with remote controller

1) Error removal method : Turn off remote controller by pressing the On/Off button on the cabled remote controller. The error code will be removed automatically after few seconds.
With cableless remote controller: Turn off indoor unit, and then turn on by changing the operation mode. The error will disappear.

**** 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.

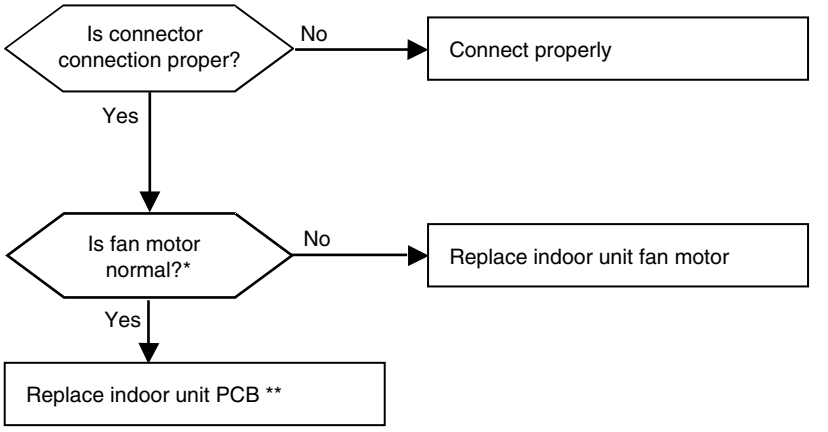
Error No.	Error Type	Error Point	Main Reasons
09	Indoor unit EEPROM error		1. Error developed in transmission between the micro- processor and the EEPROM on the surface of the PCB. 2. ERROR due to the EEPROM damage

■ Error diagnosis and countermeasure flow chart

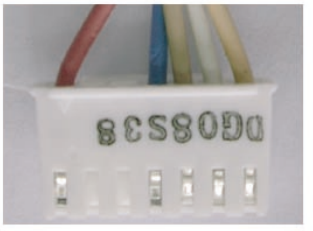
- Replace the indoor unit PCB, and then make sure to perform Auto addressing and input the address of central control

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



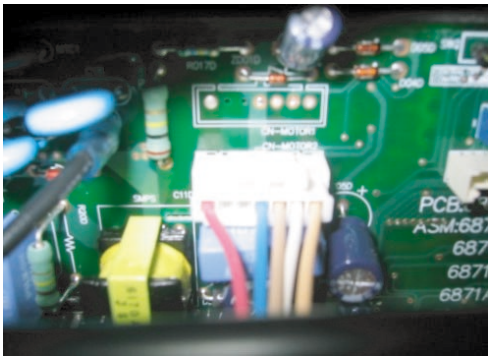
* It is normal when check hall sensor of indoor fan motor as shown below



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

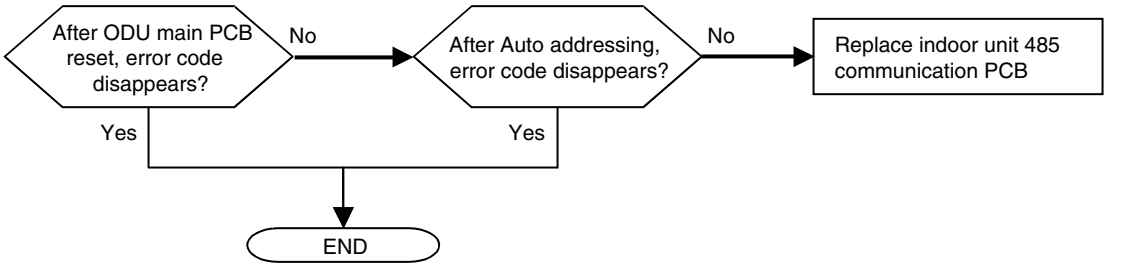
<Checking connection state of fan motor connector>



** 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)

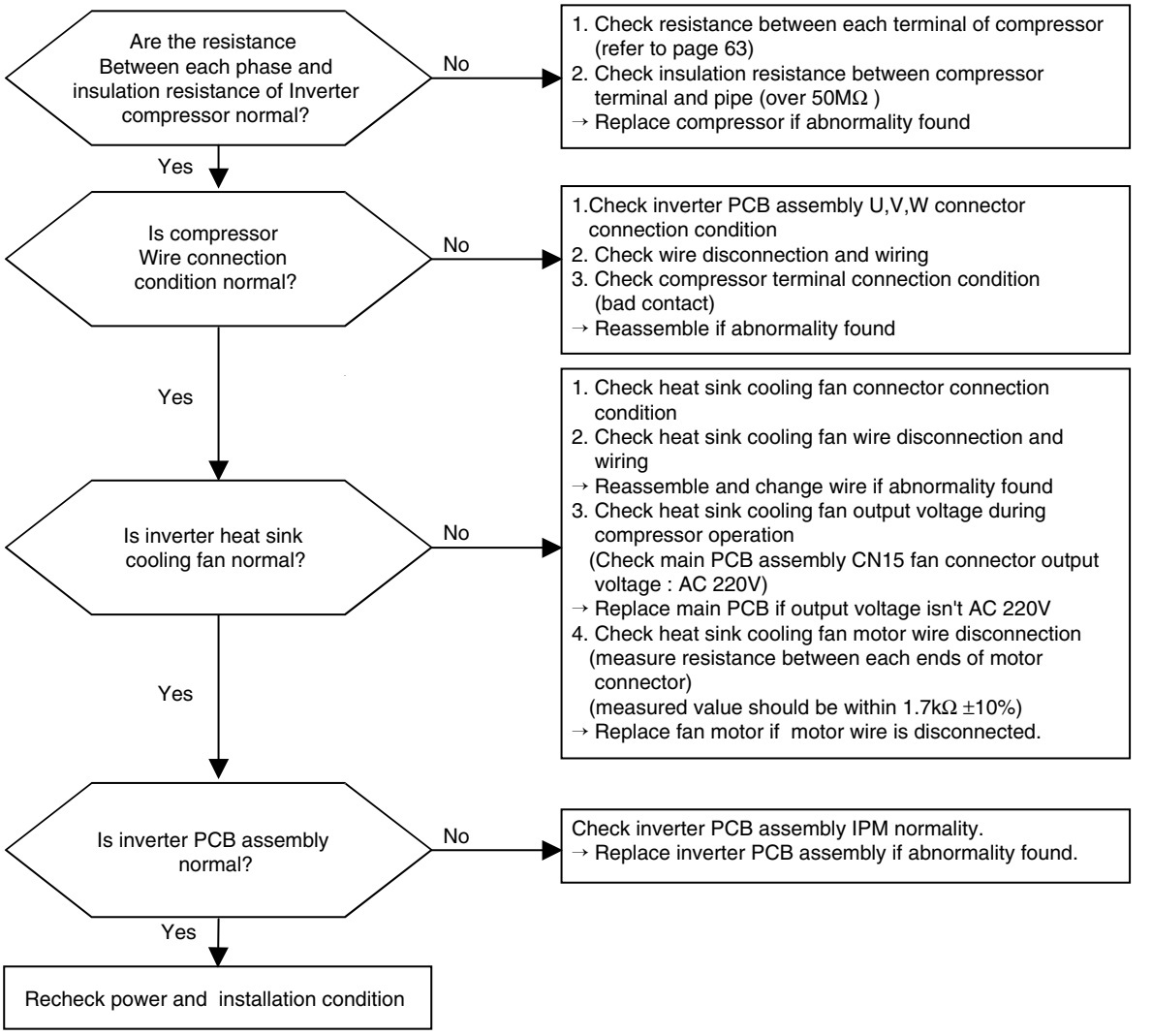
Error No.	Error Type	Error Point	Main Reasons
11	Indoor unit communication error	Indoor unit doesn't get signal from ODU for 3 minutes continuously	1. Indoor 485 communication PCB fault 2. After PCB replacing, auto addressing was not done

■ Error diagnosis and countermeasure flow chart



Error No.	Error Type	Error Point	Main Reasons
21* Master 211 Slave 212	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

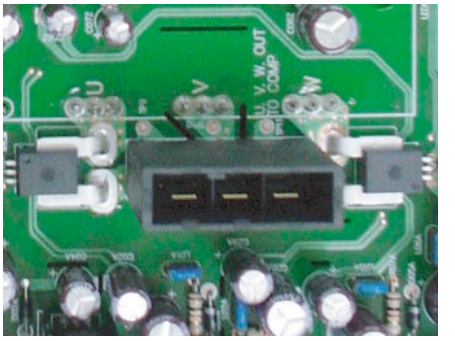
■ Error diagnosis and countermeasure flow chart



* Measuring resistance between each terminal of compressor

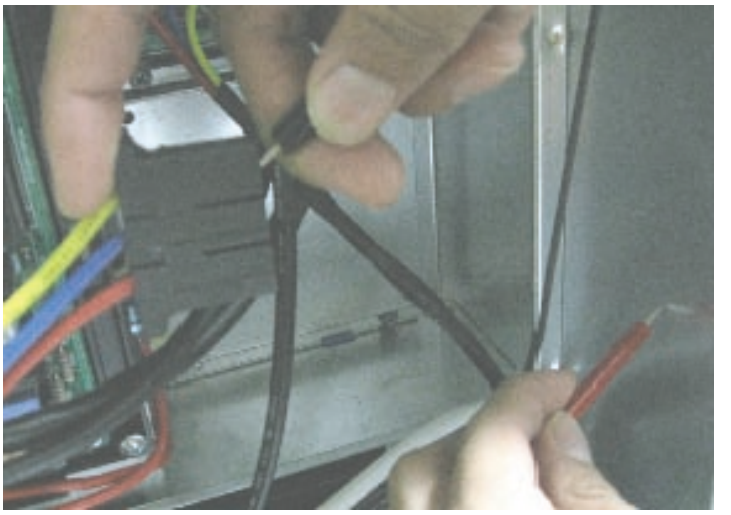
* Heat sink cooling fan connector

* Compressor wire connector connection point

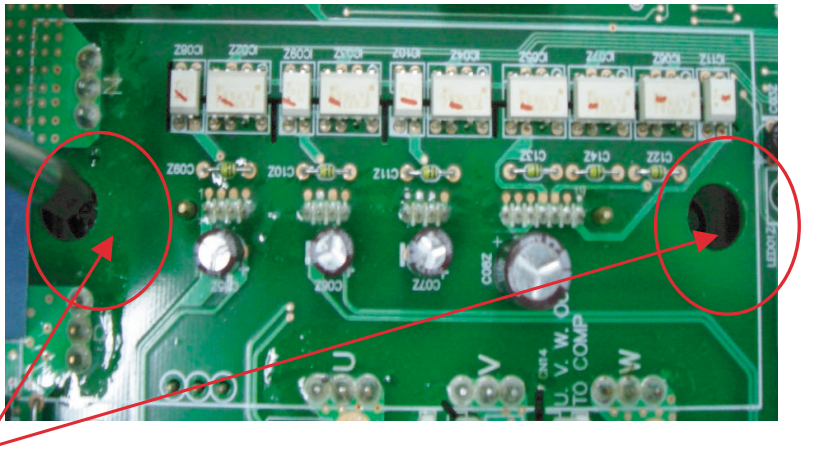


* Heat sink cooling fan

* Measuring insulation resistance between Comp output terminal and chassis



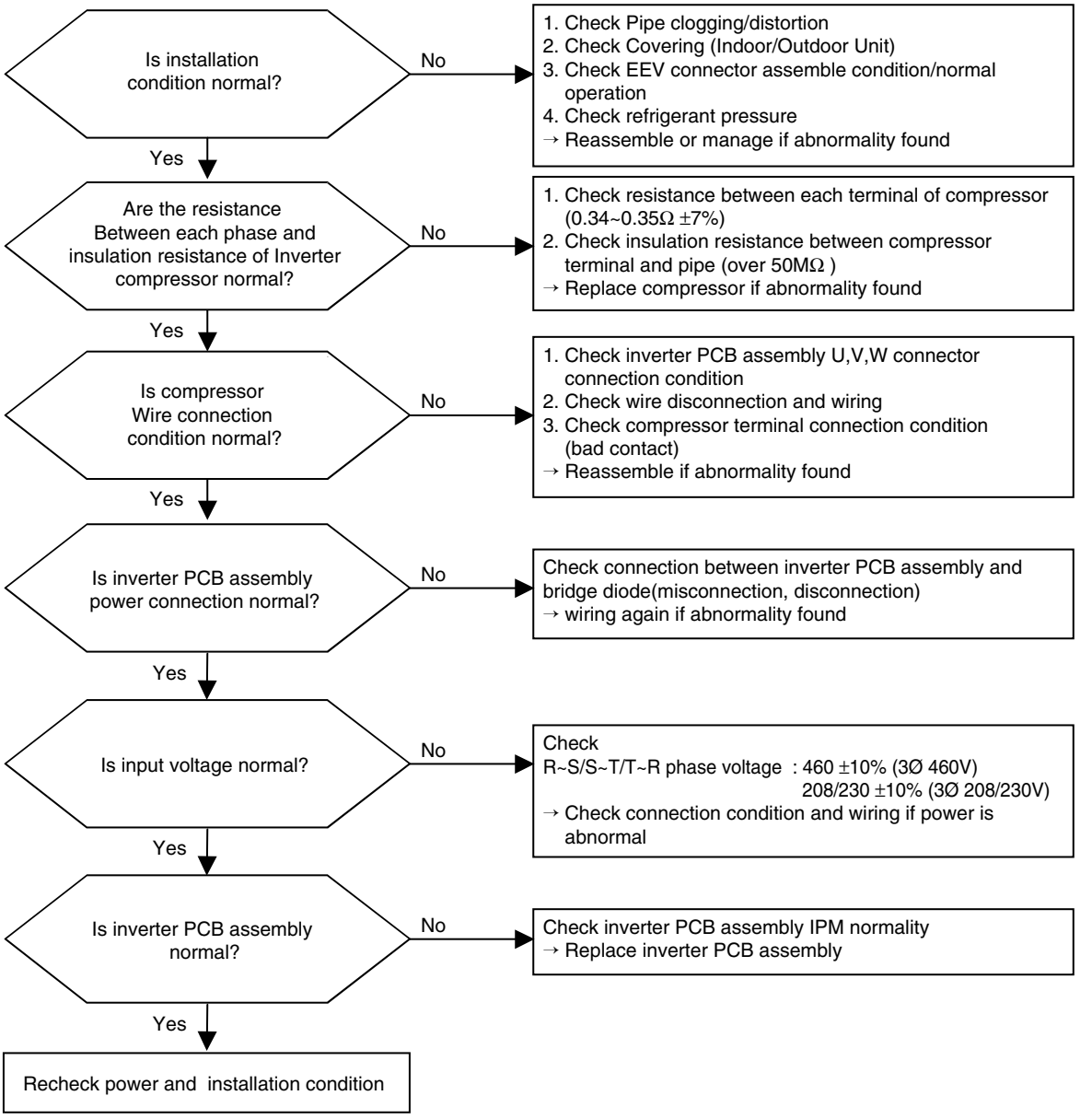
* IPM joining point



Check joining conditon

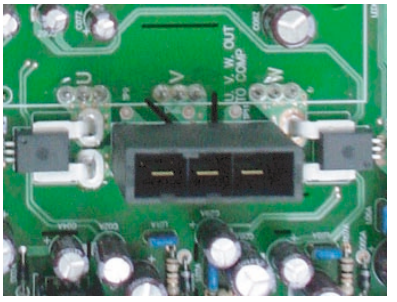
Error No.	Error Type	Error Point	Main Reasons
22* Master 221 Slave 222	AC Input Current Over Error	Inverter PCB Assembly input 3 phase power current is over limited value(22A)	1. Overload operation (Pipe clogging/Covering/EEV defect/Ref. overcharge) 2. Compressor damage(Insulation damage/Motor damage) 3. Input voltage low 4. Power Line Misconnection 5. Inverter PCB Assembly damage (Input current sensing part)

■ Error Diagnosis and Countermeasure Flow Chart

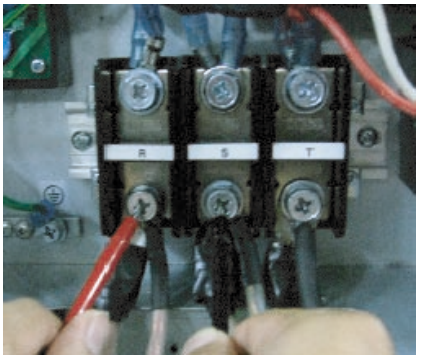


* Measuring resistance between each terminal of compressor

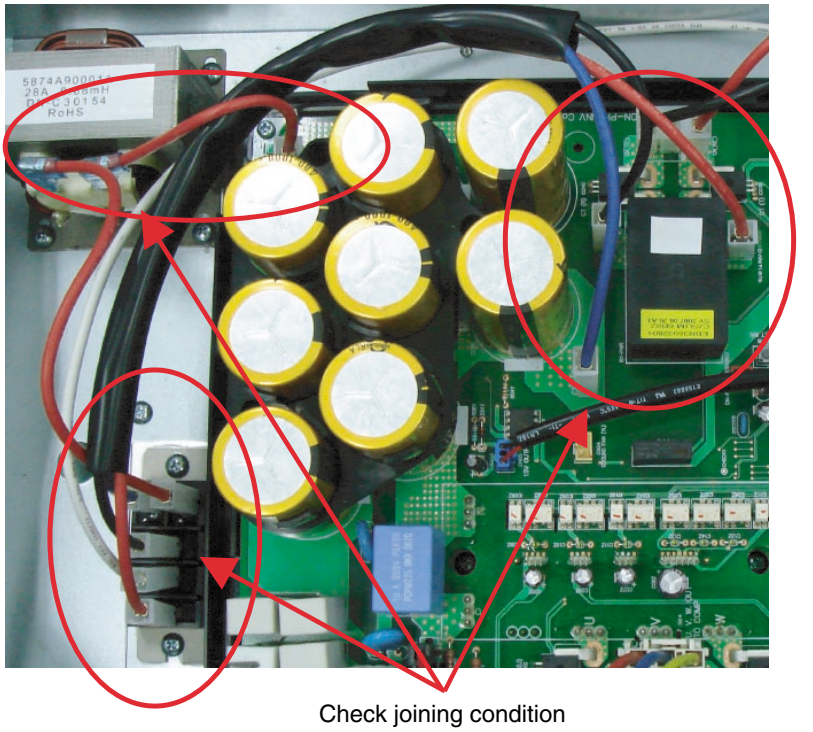
* Compressor wire connector connection



* Measuring input voltage



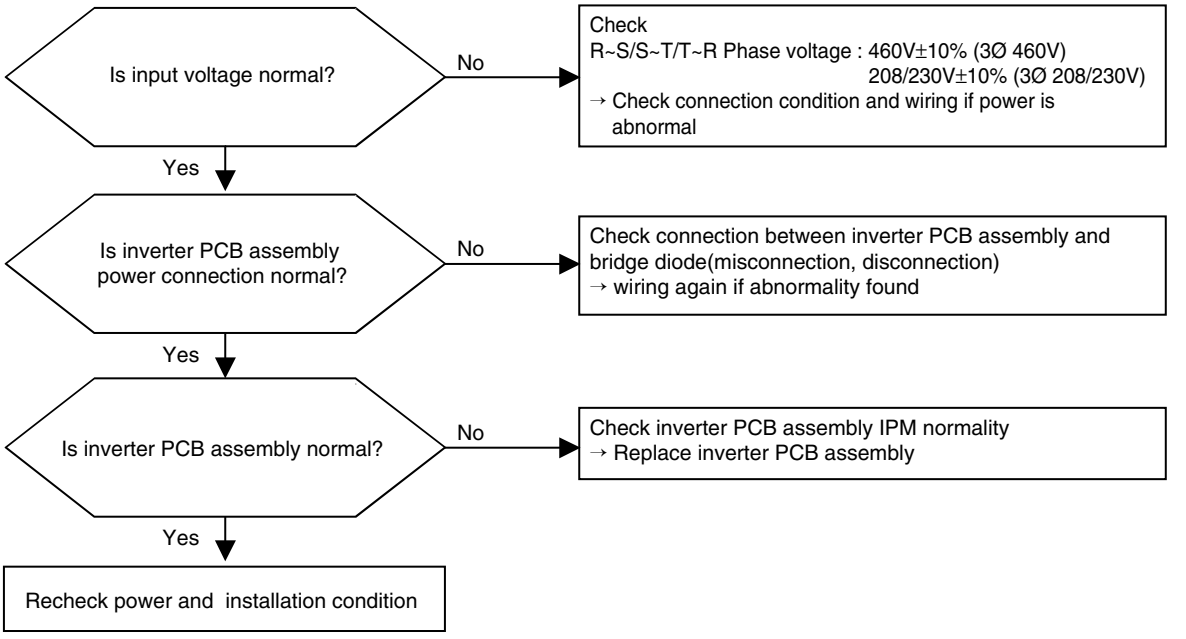
* Inverter PCB & bridge diode wiring(3Ø 460V)



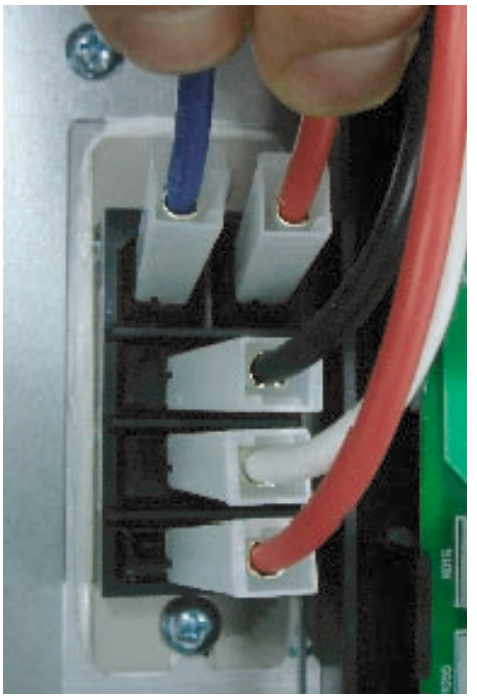
Check joining condition

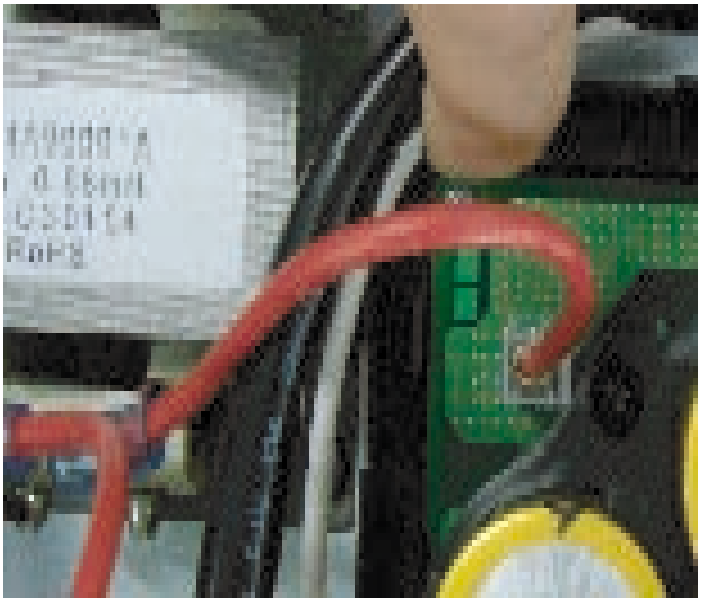
Error No.	Error Type	Error Point	Main Reasons
23* Master 231 Slave 232	Inverter Compressor DC Link Low Voltage	DC Voltage isn't charged after starting relay on	1. DC Link terminal misconnection/terminal contact fault 2. Starting relay damage 3. Condenser damage 4. Inverter PCB assembly damage (DC Link voltage sensing part) 5. Input voltage low

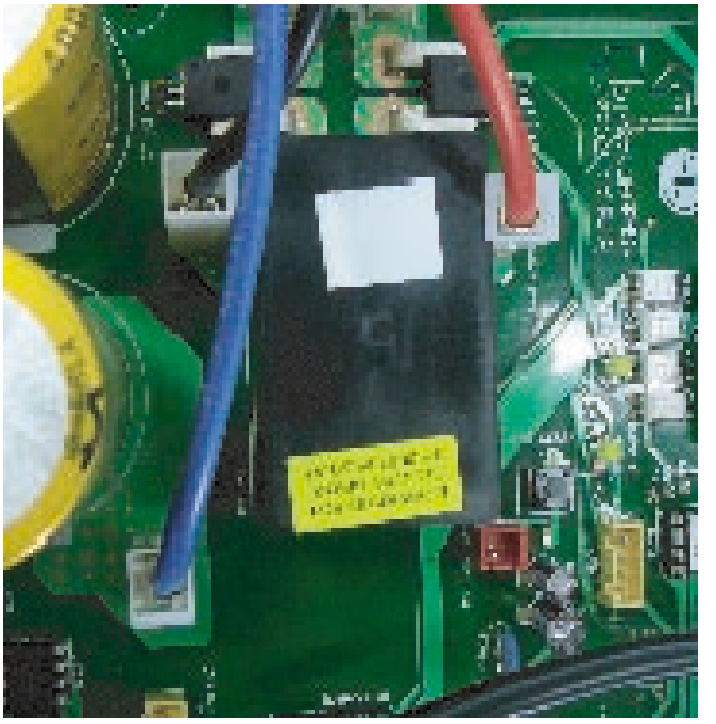
■ Error Diagnosis and Countermeasure Flow Chart



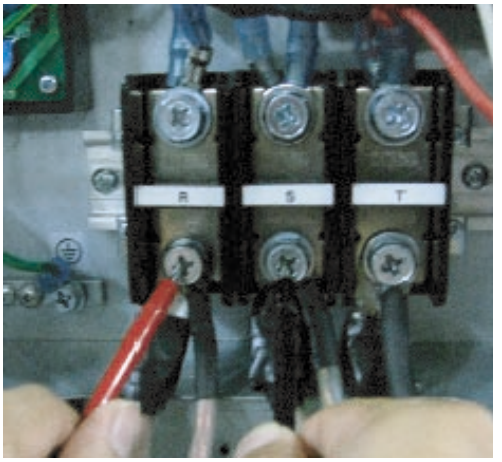
* Inverter PCB & bridge diode wiring(3Ø 460V)





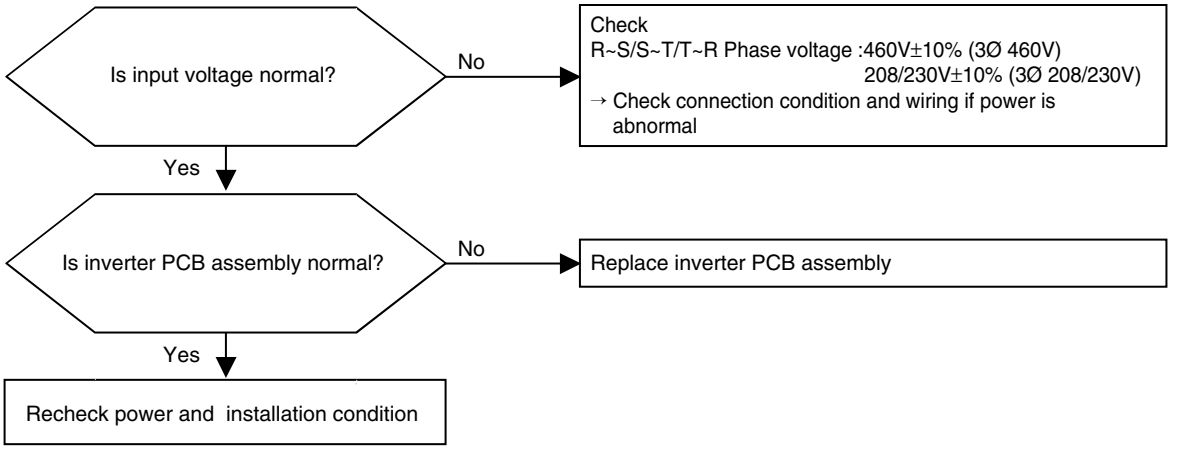


* Measuring input voltage

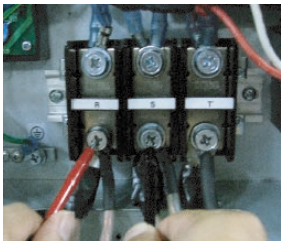


Error No.	Error Type	Error Point	Main Reasons
25* Master 251 Slave 252	Input Voltage high/low	Input voltage is over limited value of the product (173V or less, 289V or more)	1. Input voltage abnormal (R~S/S~T/T~R) 2. Outdoor unit inverter PCB assembly damage (input voltage sensing part)

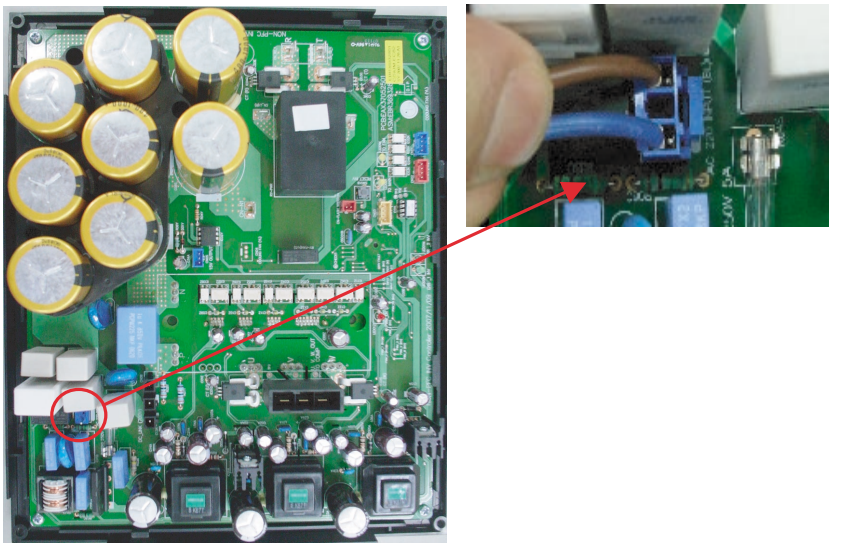
■ Error Diagnosis and Countermeasure Flow Chart



* Measuring input voltage

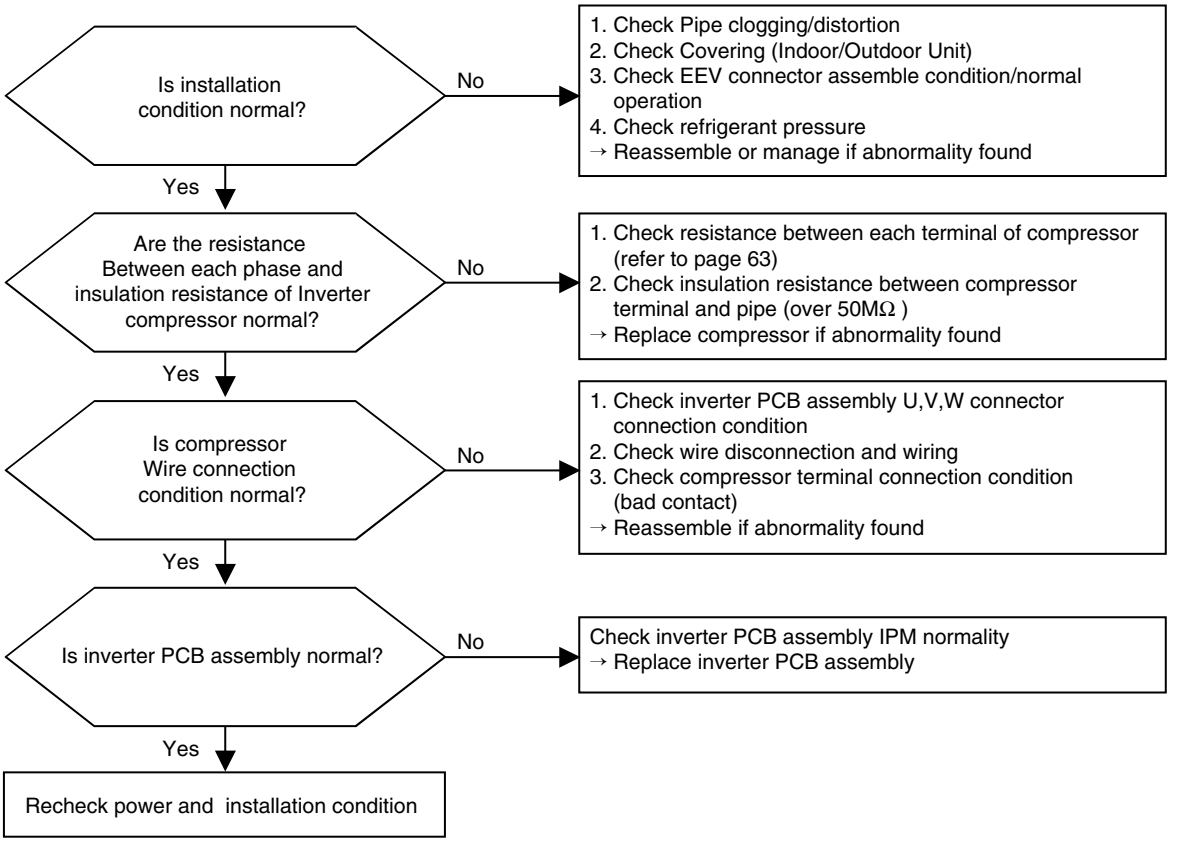


* Inverter PCB assembly power wiring



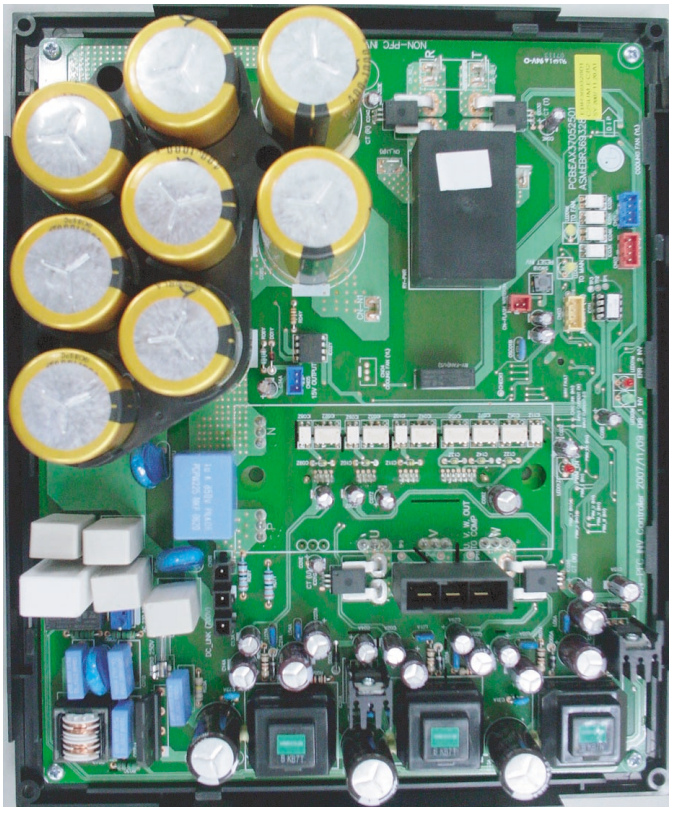
Error No.	Error Type	Error Point	Main Reasons
26* Master 261 Slave 262	Inverter compressor starting failure Error	Starting failure because of compressor abnormality	1. Overload operation (Pipe clogging/Covering/EEV defect/Ref. overcharge) 2. Compressor damage (Insulation damage/Motor damage) 3. Compressor wiring fault 4. ODU inverter PCB damage (CT)

■ Error Diagnosis and Countermeasure Flow Chart



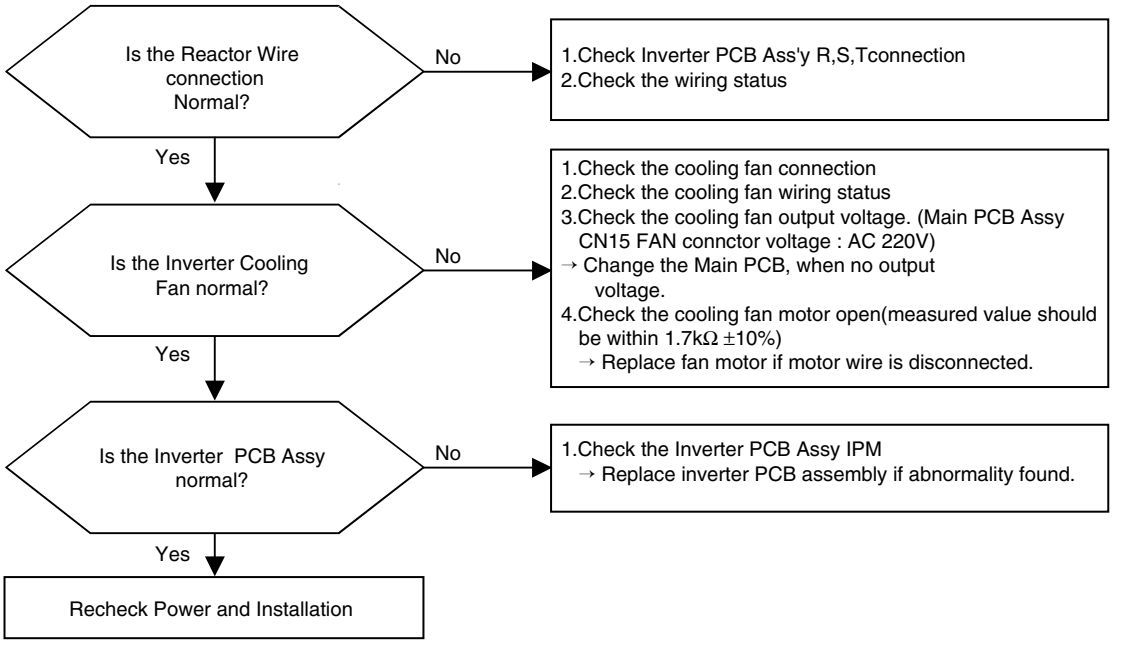
* Measuring resistance between each terminal of compressor

* Compressor wire connection



Error No.	Error Type	Error Point	Main Reasons
27* Master 271 Slave 272	Inverter compressor starting failure Error	Overcurrent on the IPM	1.Overcurrent on the PFC IPM (R,S,T) 2.IPM Overheat (Cooling Fan failure/Cooling Fan connector disconnecte /Heat sink dis-assembled) 3.Reactor connector disconnected or loose 4.Inveter PCB Assy failure 5.Low power input voltage to the outdoor unit

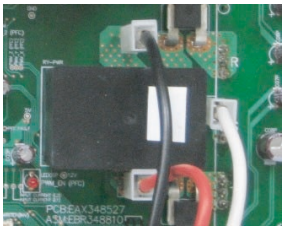
■ Error Diagnosis and Countermeasure Flow Chart



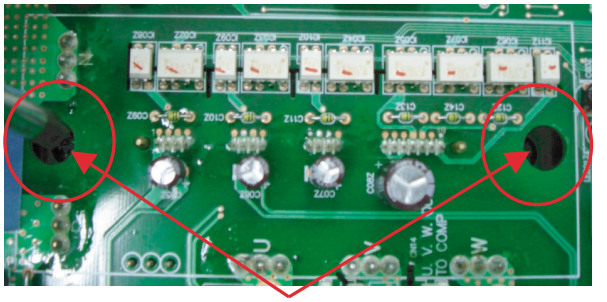
Cooling Fan

Cooling Fan connector

Reactor Wire connector



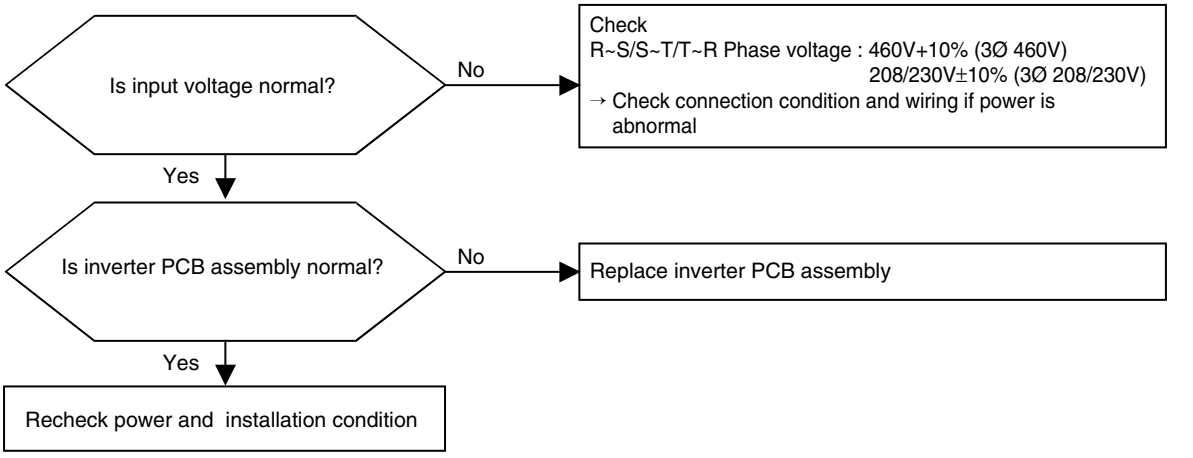
IPMjoing point



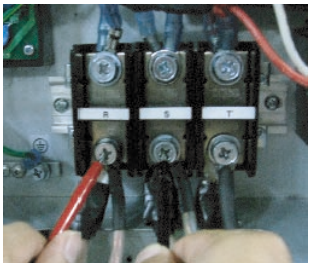
Check joining condition

Error No.	Error Type	Error Point	Main Reasons
28* Master 281 Slave 282	Inverter DC link high voltage error	Inv PCB DC link voltage supplied over 780V	1. Input voltage abnormal (R,S,T) 2. ODU inverter PCB damage (DC Link voltage sensing part)

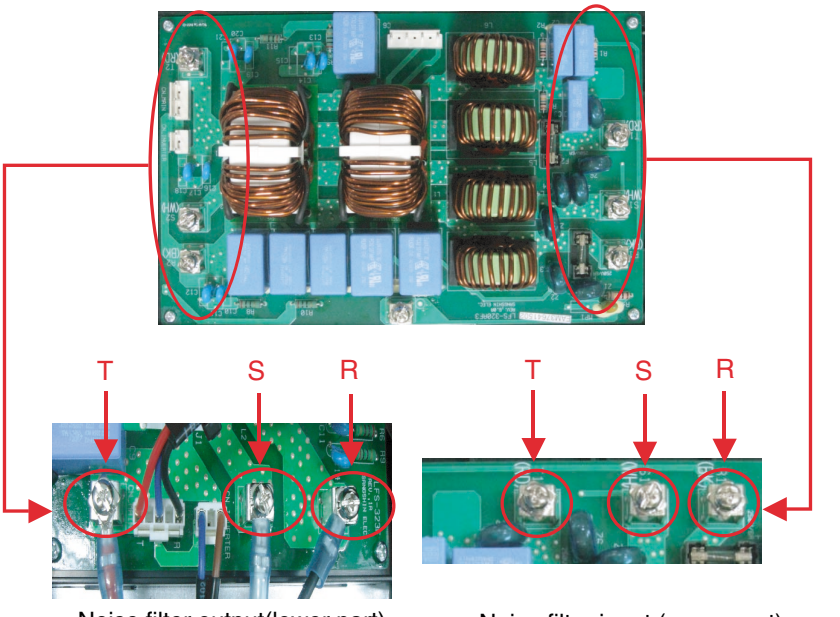
■ Error Diagnosis and Countermeasure Flow Chart



* Measuring input voltage



* Noise filter wiring

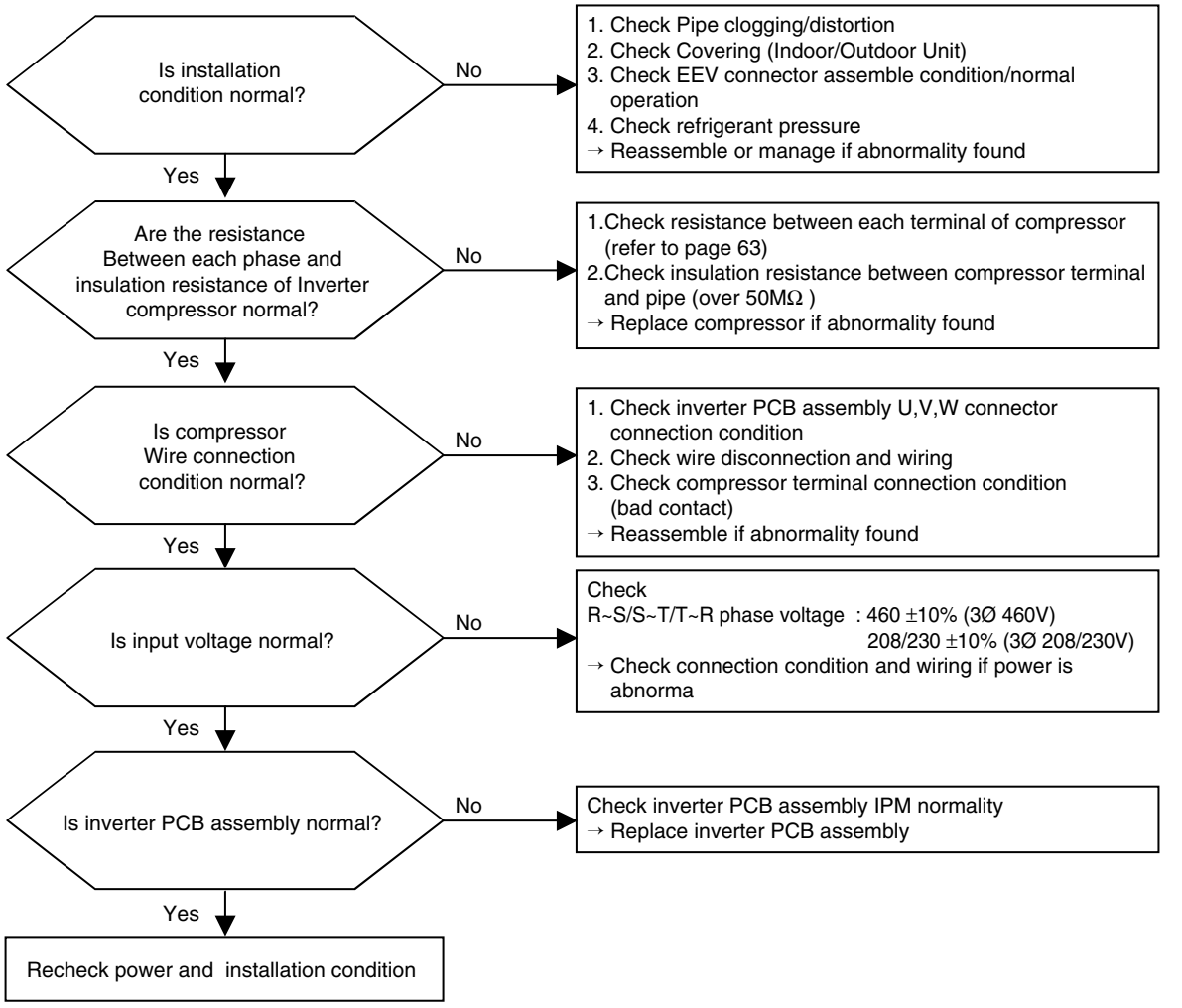


Noise filter output(lower part)

Noise filter input (upper part)

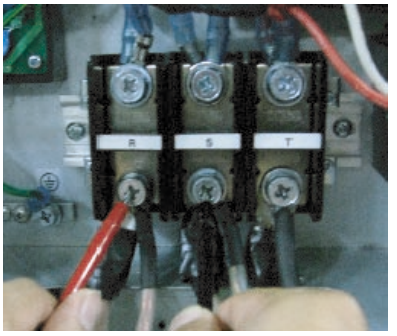
Error No.	Error Type	Error Point	Main Reasons
29* Master 291 Slave 292	Inverter compressor over current	Inverter compressor input current is over 30A	1. Overload operation (Pipe clogging/Covering/EEV defect/Ref. overcharge) 2. Compressor damage(Insulation damage/Motor damage) 3. Input voltage low 4. ODU inverter PCB assembly damage

■ Error Diagnosis and Countermeasure Flow Chart

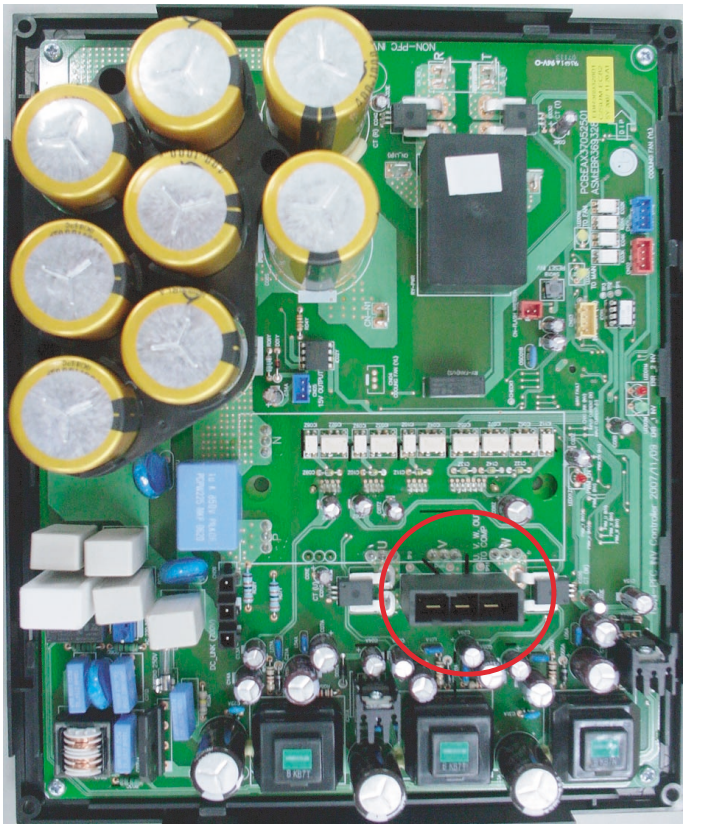


*** Measuring resistance between each terminal of compressor**

*** Measuring input voltage**

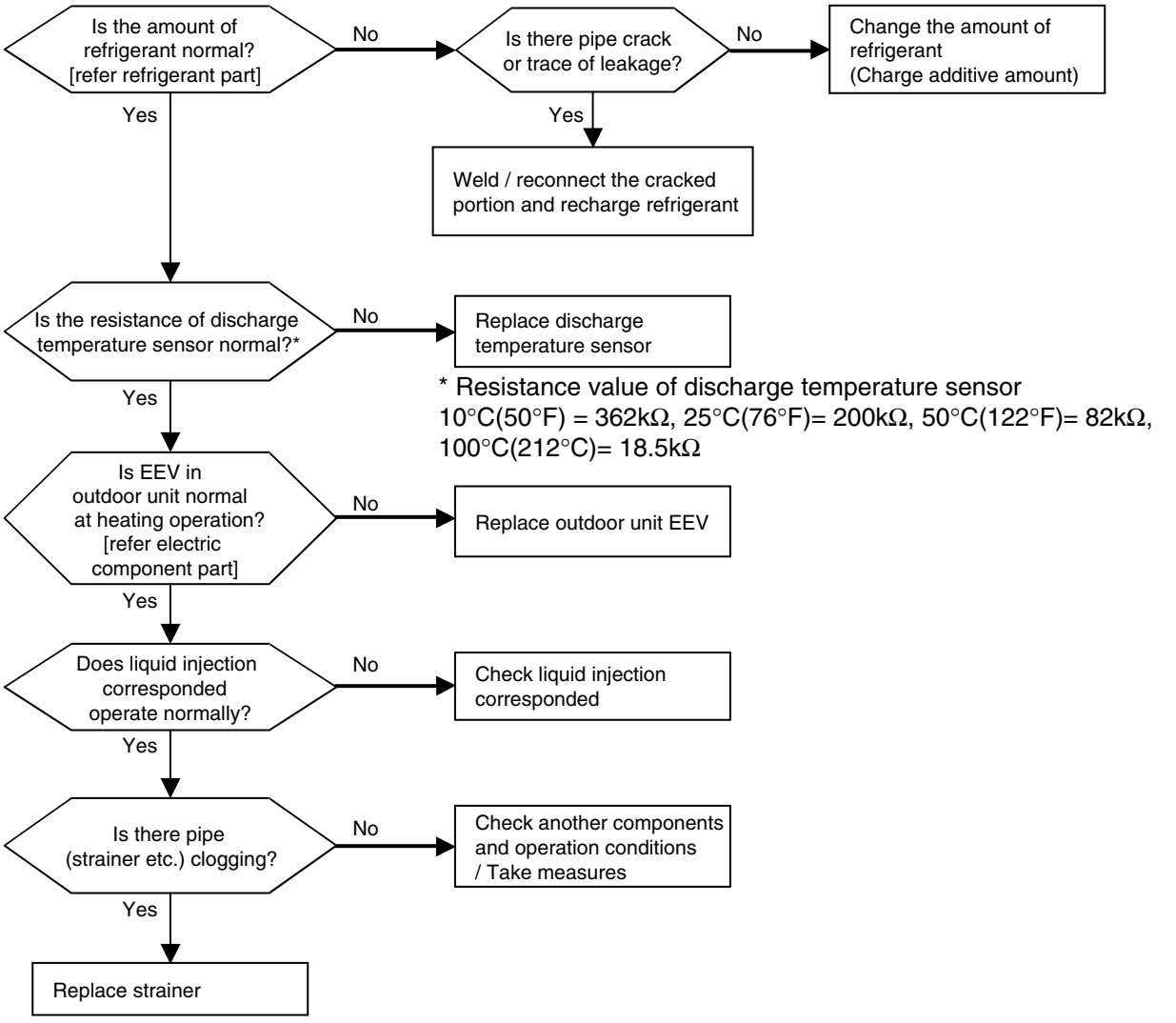


*** Compressor wire connection**



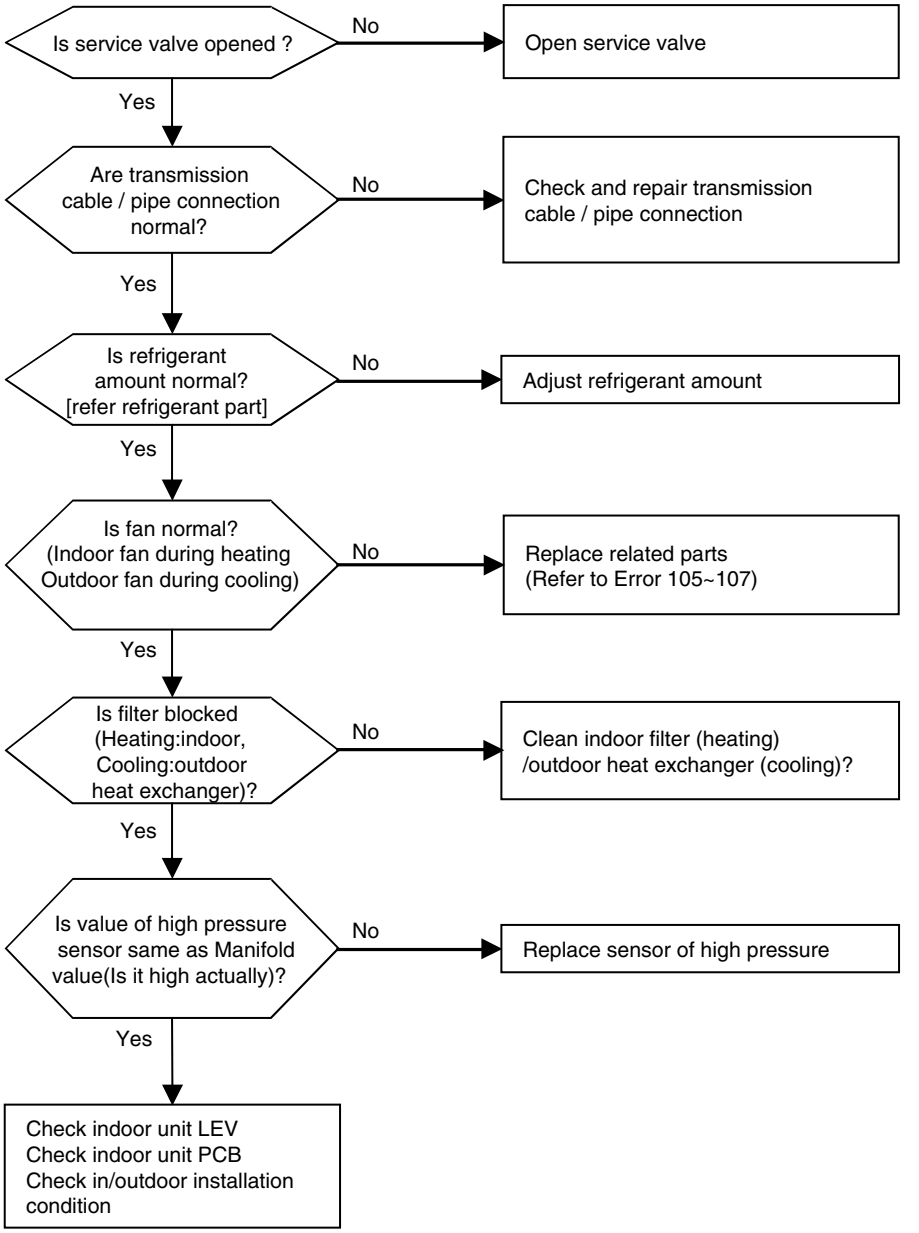
Error No.	Error Type	Error Point	Main Reasons
32* Master 321 Slave 322	Over-increase discharge temperature of inverter compressor at main outdoor unit	Compressor is off because of over-increase discharge temperature of inverter compressor	1. Temperature sensor defect of inverter compressor discharge pipe 2. Refrigerant shortage / leak 3. EEV defect 4. Liquid injection valve defect
33* Master 331 Slave 332	Over-increase discharge temperature of constant compressor at main constant outdoor and sub constant outdoor unit	Compressor is off because of over-increase discharge temperature of constant compressor at main and sub outdoor unit	1. Temperature sensor defect of constant compressor discharge pipe? 2. Refrigerant shortage/leak 3. EEV defect 4. Liquid injection valve defect

■ Error diagnosis and countermeasure flow chart



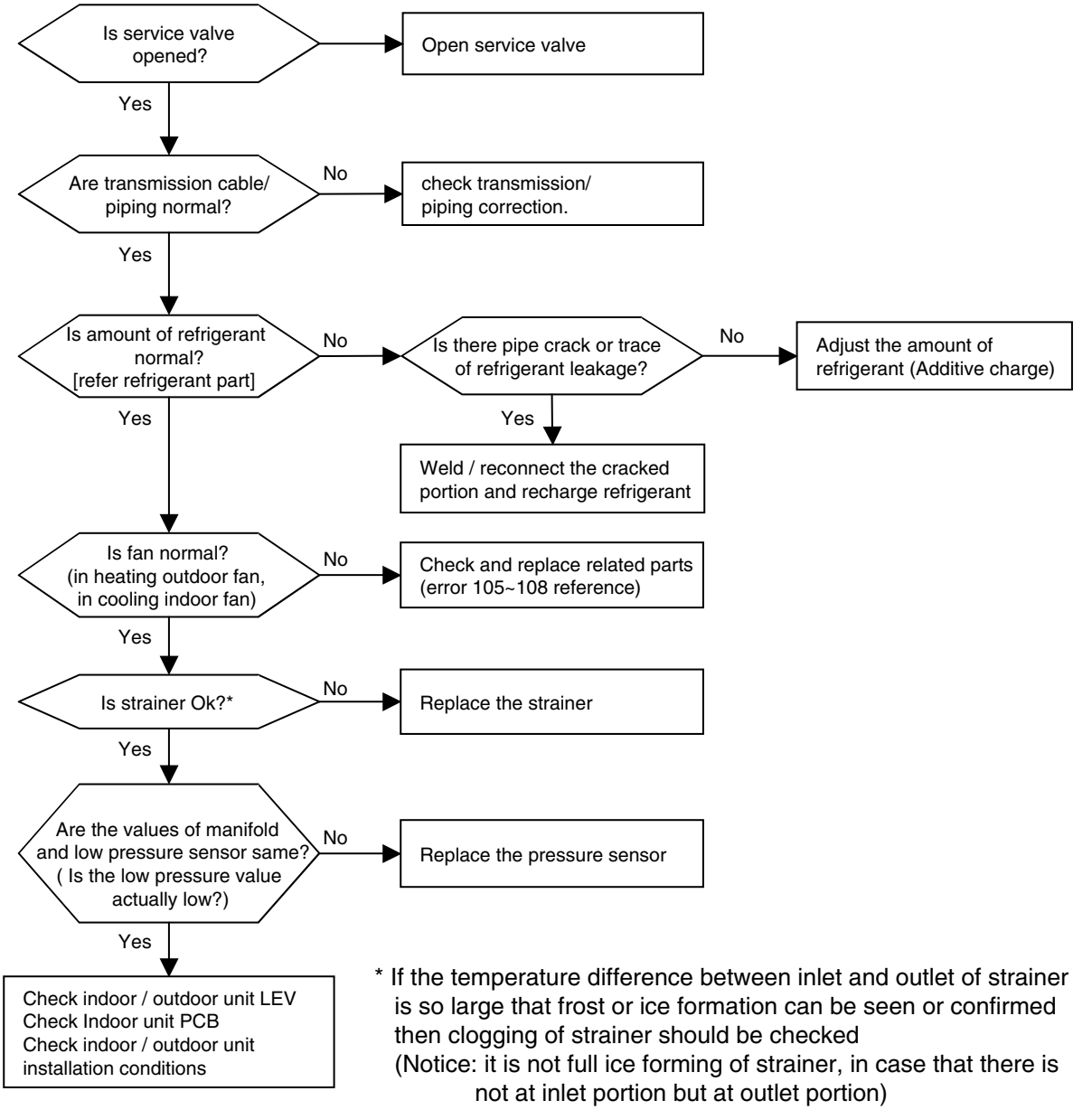
Error No.	Error Type	Error Point	Main Reasons
34* Master 341 Slave 342	Over-increase of discharge pressure of compressor	Error happens because of 3 times successive compressor off due to over-increase of high pressure by high pressure sensor	1. Defect of high pressure sensor 2. Defect of indoor or outdoor 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* Master 351 Slave 352	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

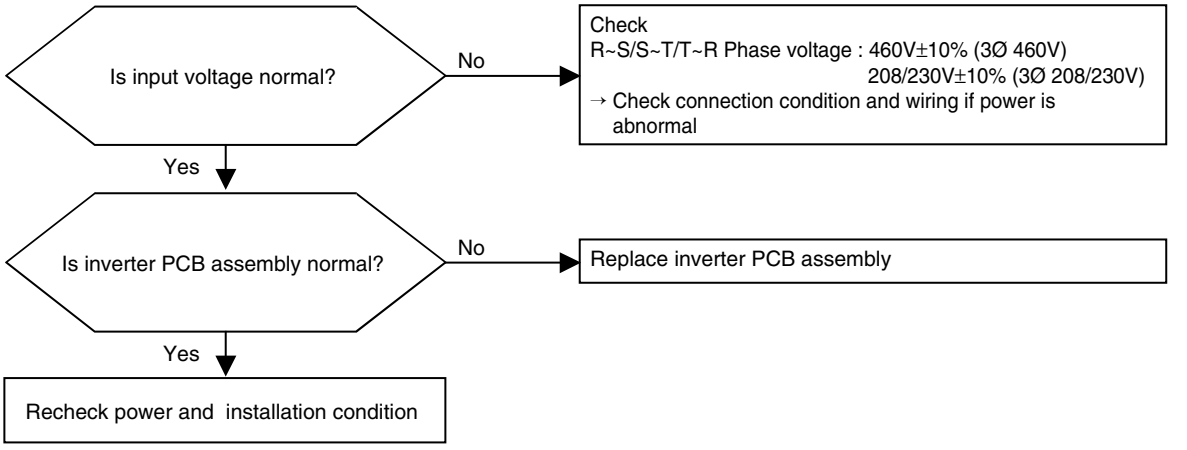
■ Error diagnosis and countermeasure flow chart



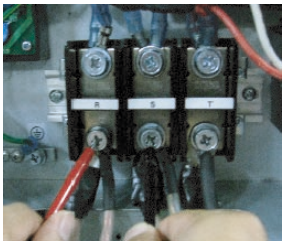
* If the temperature difference between inlet and outlet of strainer is so large that frost or ice formation can be seen or confirmed then clogging of strainer should be checked
(Notice: it is not full ice forming of strainer, in case that there is not at inlet portion but at outlet portion)

Error No.	Error Type	Error Point	Main Reasons
40* Master 401 Slave 402	Inverter compressor CT sensor error	Micom input voltage isn't within 2.5V ±0.3V at initial state of power supply	1. Input voltage abnormal (R~S/S~T/T~R) 2. ODU inverter PCB damage (CT sensing part)

■ Error Diagnosis and Countermeasure Flow Chart

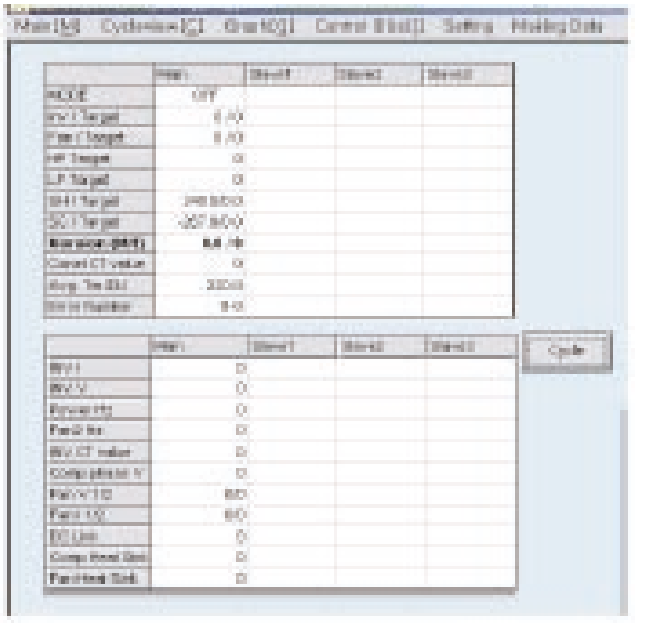


* Measuring input voltage



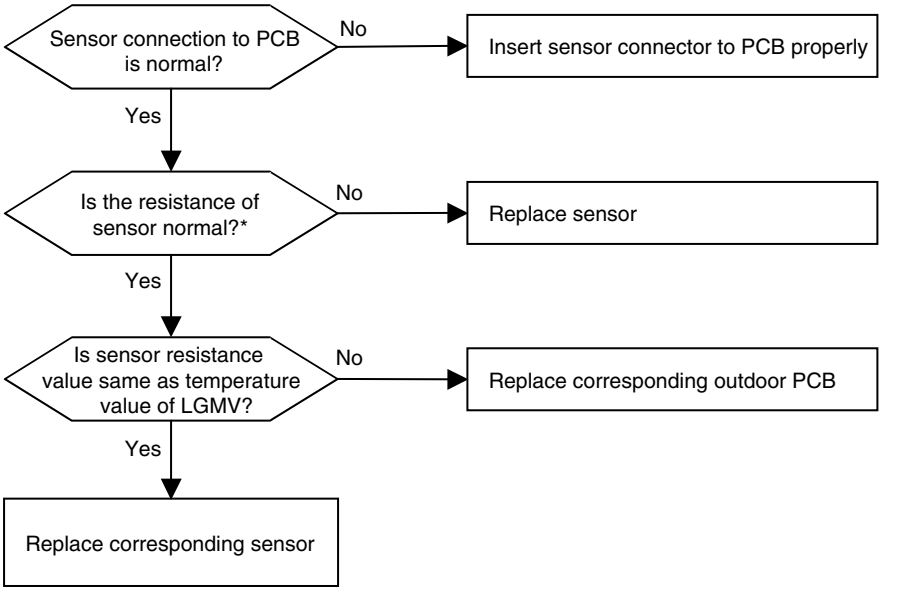
* Inverter PCB assembly

* LGMV Part



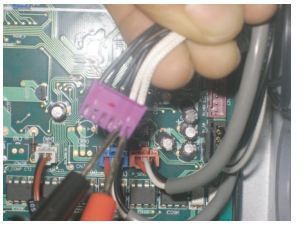
Error No.	Error Type	Error Point	Main Reasons
41* (Inverter) Master 411 Slave 412 47* (Constant) Master 471 Slave 472	Compressor discharge pipe temperature sensor error	Sensor measurement valve is abnormal (Open/Short)	1. Defective connection of the compressor discharge pipe temperature sensor 2. Defective discharge pipe compressor sensor of the compressor (open/short) 3. Defective outdoor PCB

■ Error diagnosis and countermeasure flow chart

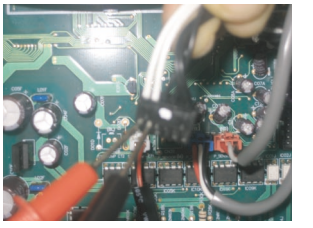


* Error is generated if the resistance is more than 5MΩ(open) and less than 2kΩ (short)

Note: Standard values of resistance of sensors at different temperatures (±5% variation)
10°C(50°F) = 362kΩ, 25°C(76°F)= 200kΩ, 50°C(122°F)= 82kΩ, 100°C(212°C)= 18.5kΩ



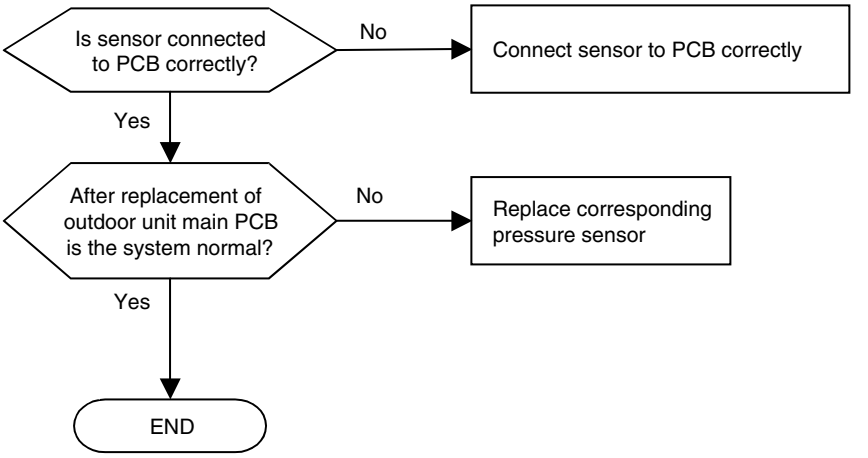
Check the resistance inverter compressor discharge temperature sensor

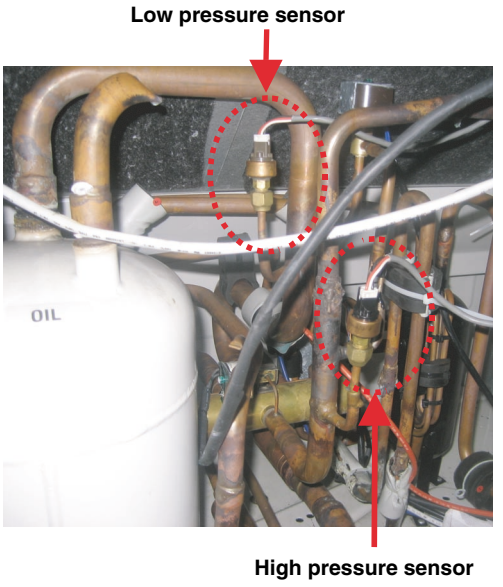


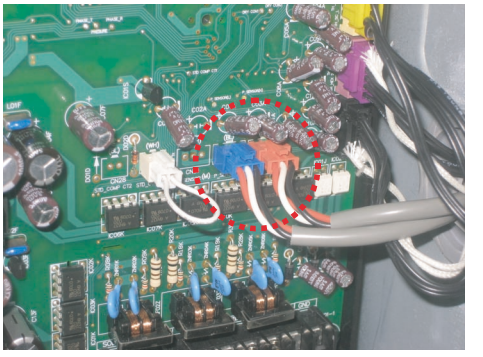
Check the resistance of constant compressor discharge temperature sensor

Error No.	Error Type	Error Point	Main Reasons
42* Master 421 Slave 422	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* Master 431 Slave 432	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

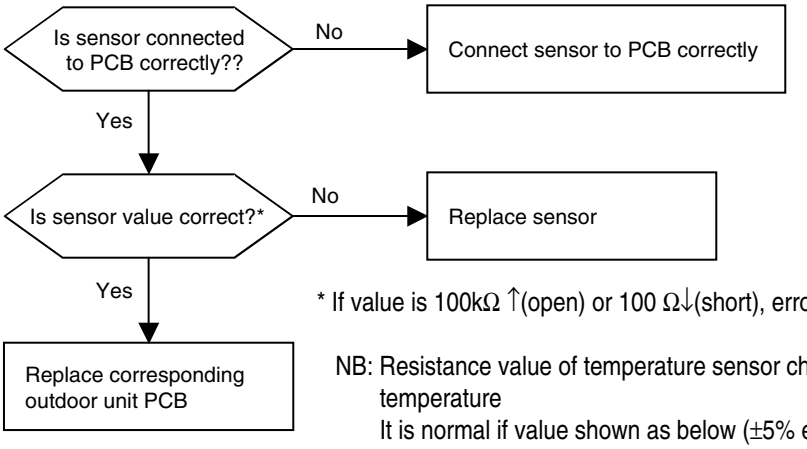






Error No.	Error Type	Error Point	Main Reasons
44* Master 441 Slave 442	Sensor error of outdoor air temperature	Abnormal value of sensor (Open/Short)	1. Bad connection of air temperature connector 2. Defect of air temperature connector(Open/Short) 3. Defect of outdoor PCB
45* Master 451 Slave 452 48* Master 481 Slave 482	Piping temperature sensor error of heat exchanger in master & slave outdoor unit heat exchanger (A,B)	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* Master 461 Slave 462	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



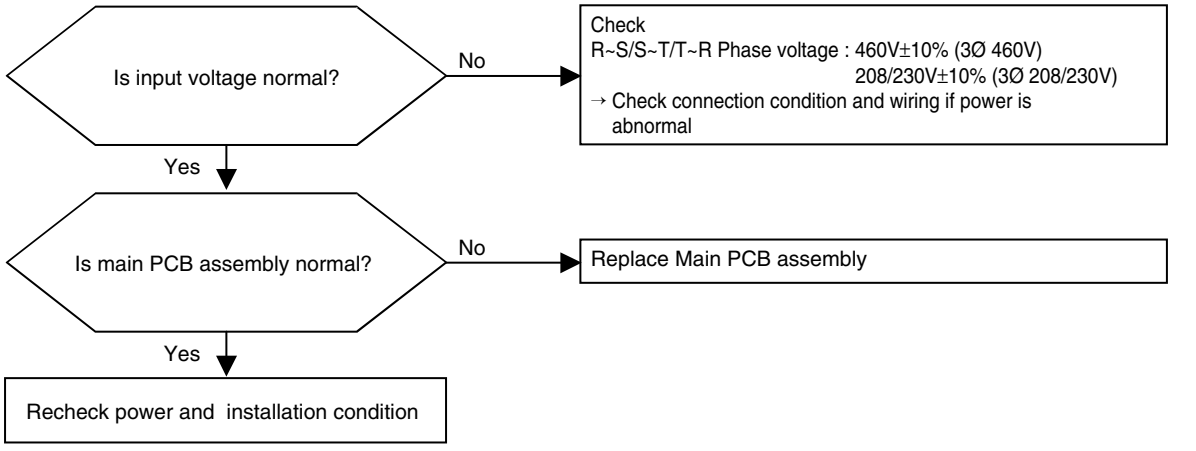
* If value is 100kΩ ↑(open) or 100 Ω↓(short), error occurs

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(76°F) = 100kΩ, 50°C(122°F) = 3.4kΩ
Sensor of piping temperature: 10°C(50°F) = 10kΩ, 25°C(76°F) = 5Ω, 50°C(122°F)=1.8kΩ

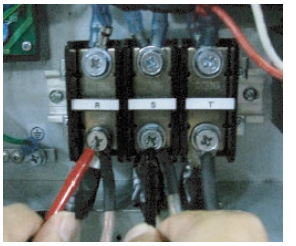
Error No.	Error Type	Error Point	Main Reasons
47* Master 471 Slave 472	Discharge piping temperature sensor error of constant compressor	Abnormal value of sensor (Open/Short)	Refer to CH41
48* Master 481 Slave 482	Piping temperature sensor error of heat Exchanger in master & slave outdoor unit heat exchanger (B)	Abnormal value of sensor (Open/Short)	Refer to CH45

Error No.	Error Type	Error Point	Main Reasons
50* Master 501 Slave 502	ODU 3phase power omission error	Omitting one or more of R,S,T input power	1. Input Voltage abnormal (R,S,T) 2. Check power Line connection condition 3. Main PCB damage

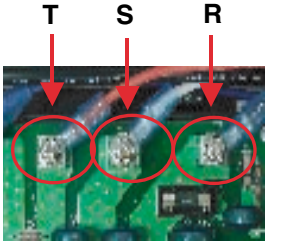
■ Error Diagnosis and Countermeasure Flow Chart

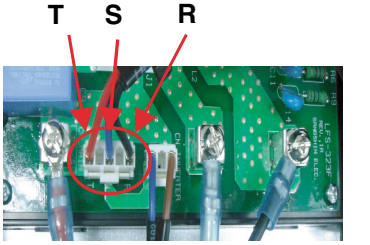


* Measuring input voltage

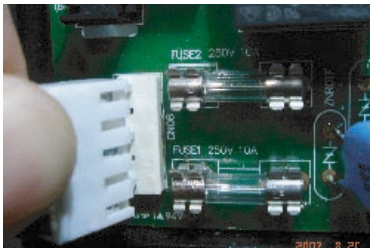


* Noise filter wiring



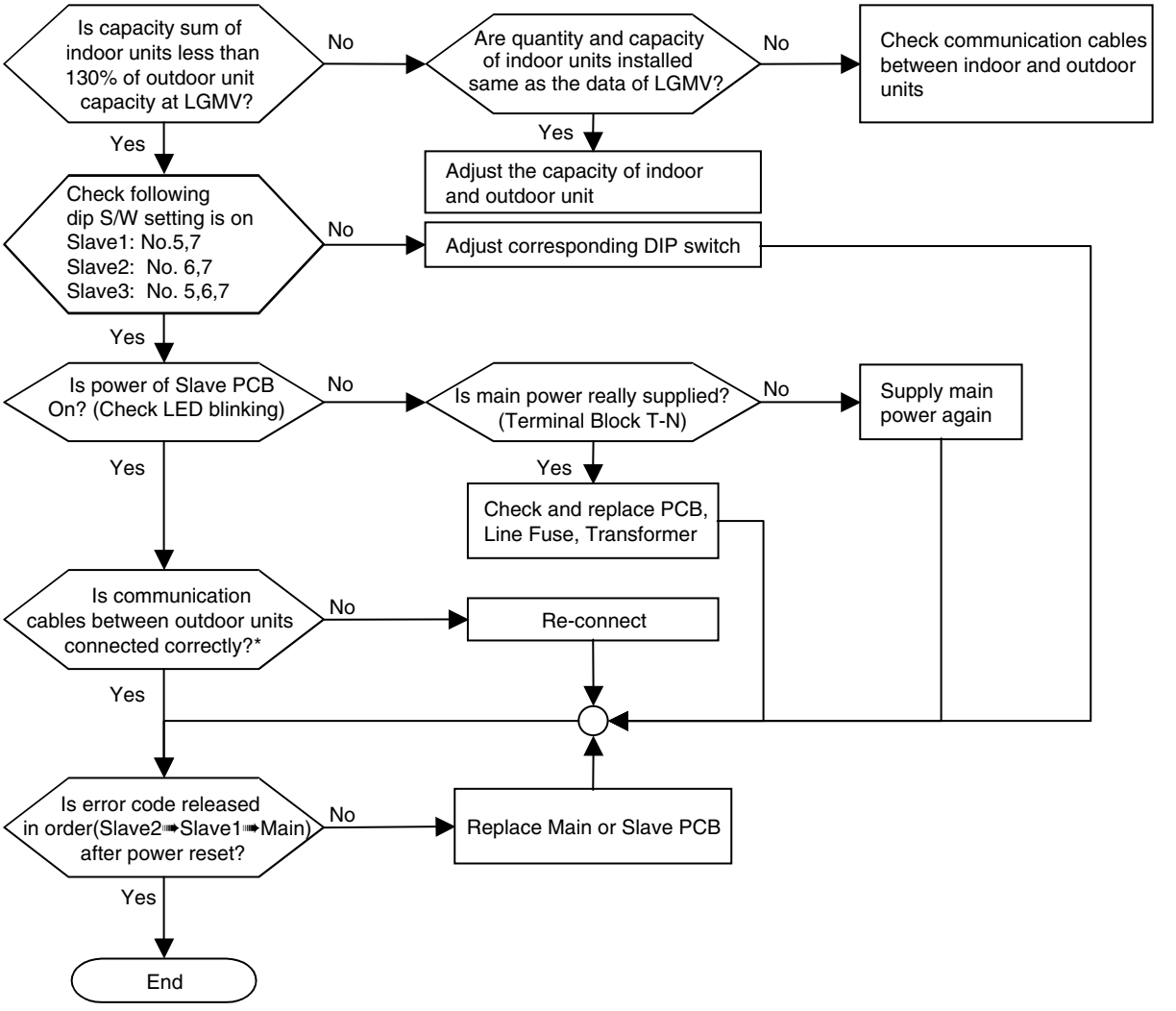


* Main PCB power connection



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 communication cable/piping 3. Control error of slave outdoor unit Dip switch 4. Power supply defect of slave unit PCB 5. Defect of outdoor unit PCB

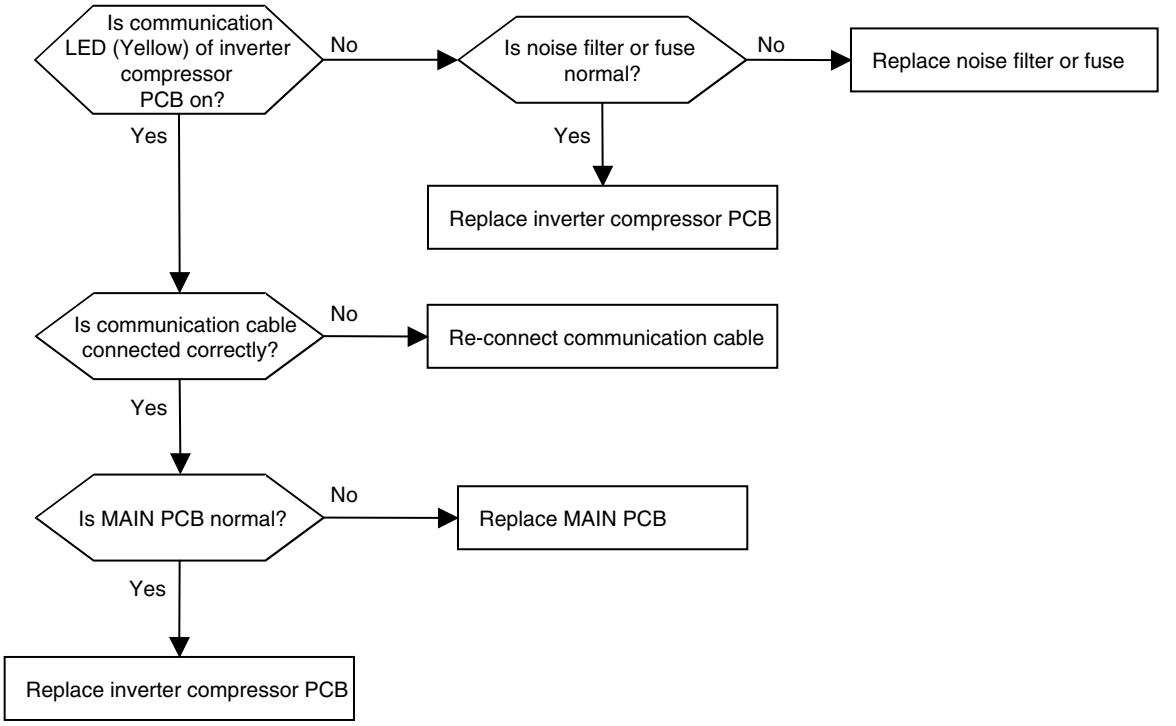
■ Error diagnosis and countermeasure flow chart



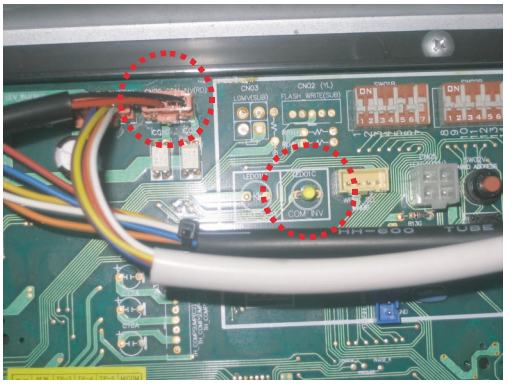
* In order to check communication cables between outdoor units, check in order as below
: PCB connectors ➡ terminal block ➡ communication cables

Error No.	Error Type	Error Point	Main Reasons
52* Master 521 Slave 522	Communication error between (Inverter PCB ➔ Main PCB)	Main controller of Master unit of Master unit can't receive signal from inverter controller	1. Power cable or communication cable is not connected 2. Defect of outdoor Main fuse/Noise Filter 3. Defect of outdoor Main / inverter PCB

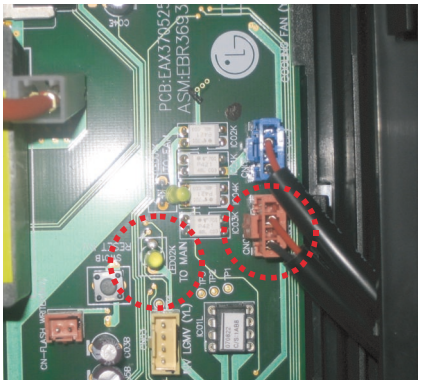
■ Error diagnosis and countermeasure flow chart



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



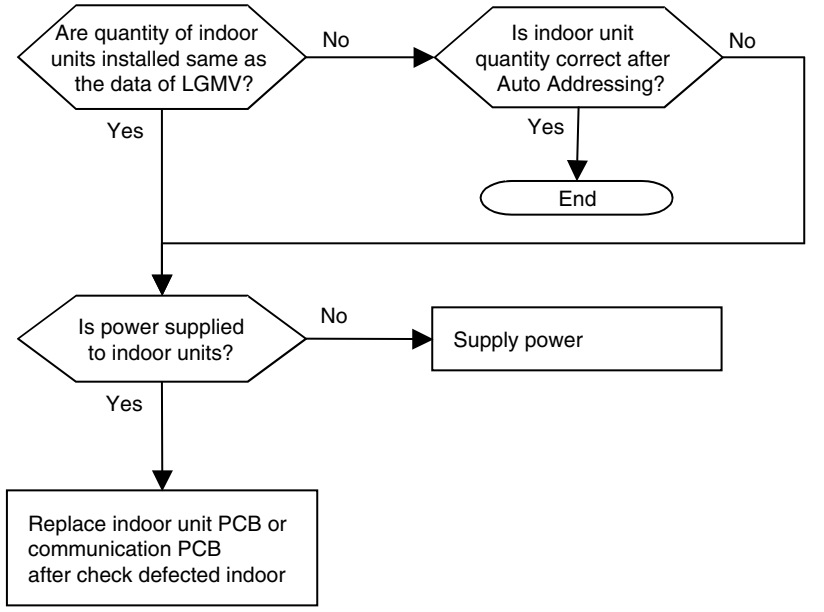
Communication connector & LED in MAIN PCB



Communication connector & LED in inverter compressor PCB

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

■ Error diagnosis and countermeasure flow chart



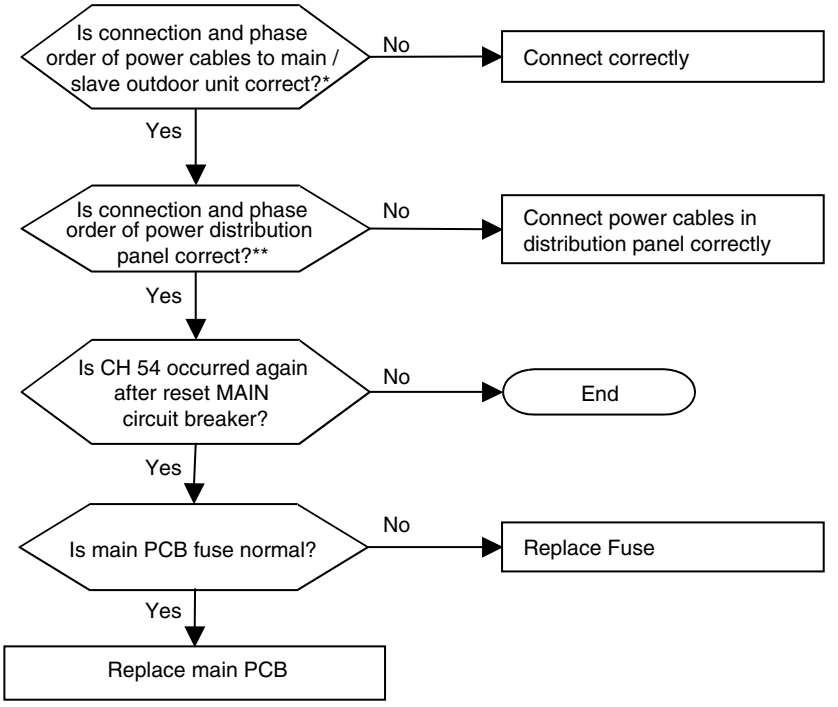
In case of CH53, almost happened with CH05, the indoor units not operated actually are normal so check with same method of CH05. and additionally check as shown as below and above flow chart

- Although the quantity of indoor units installed is same as LGMV data there may be a few indoor units with which the number of communication is not increased with LGMV
- Although the quantity of indoor units installed is not same as LGMV data, and if communication 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 communication cable or power cable
  ② fault of power / PCB / communication cable
  ③ duplication of indoor unit number
- If communication 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 communication PCB is replaced above process is not needed

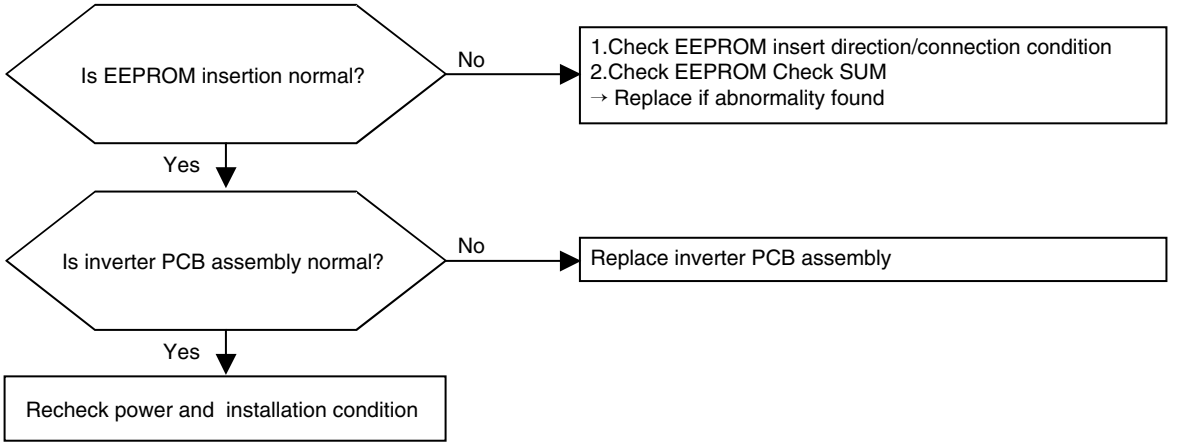
Error No.	Error Type	Error Point	Main Reasons
54* Master 541 Slave 542	Wrong connection of 3Ø power supply cable (Reverse direction / missing a phase)	Wrong connection of 3Ø power supply cable (Reverse direction / missing a phase)	1. Main PCB defect 2. No power of R,S,T supplied 3. Wring connection of R,S,T cables 4. Main Pcb Fuse failure

■ Error diagnosis and countermeasure flow chart

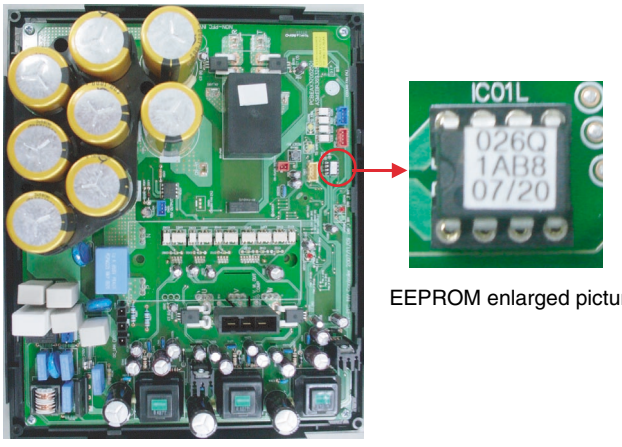


Error No.	Error Type	Error Point	Main Reasons
60* Master 601 Slave 602	Inverter PCB EEPROM error	EEPROM Access error and Check SUM error	1. EEPROM contact defect/wrong insertion 2. Different EEPROM Version 3. ODU inverter PCB assembly damage

■ Error Diagnosis and Countermeasure Flow Chart

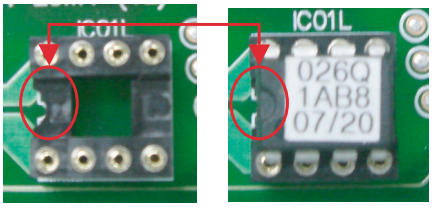


* Inverter EEPROM inserting point(3Ø 460V)



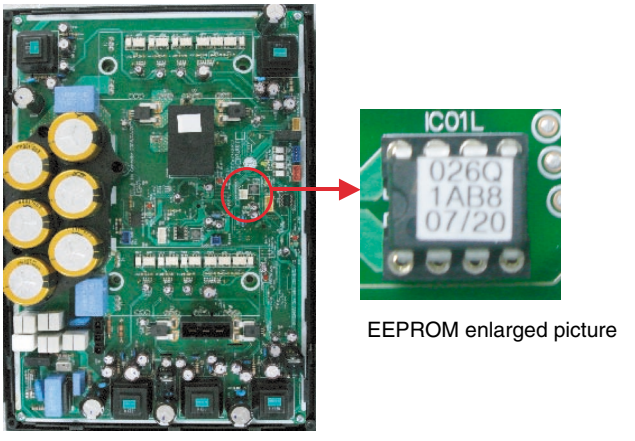
EEPROM enlarged picture

* Right inserting direction of inverter EEPROM



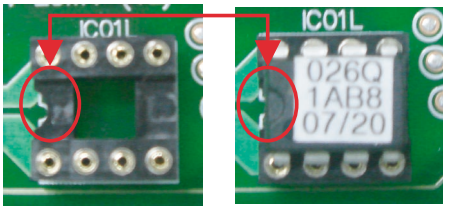
※ Note : Replace after power off

* Inverter EEPROM inserting point(3Ø 208/230V)



EEPROM enlarged picture

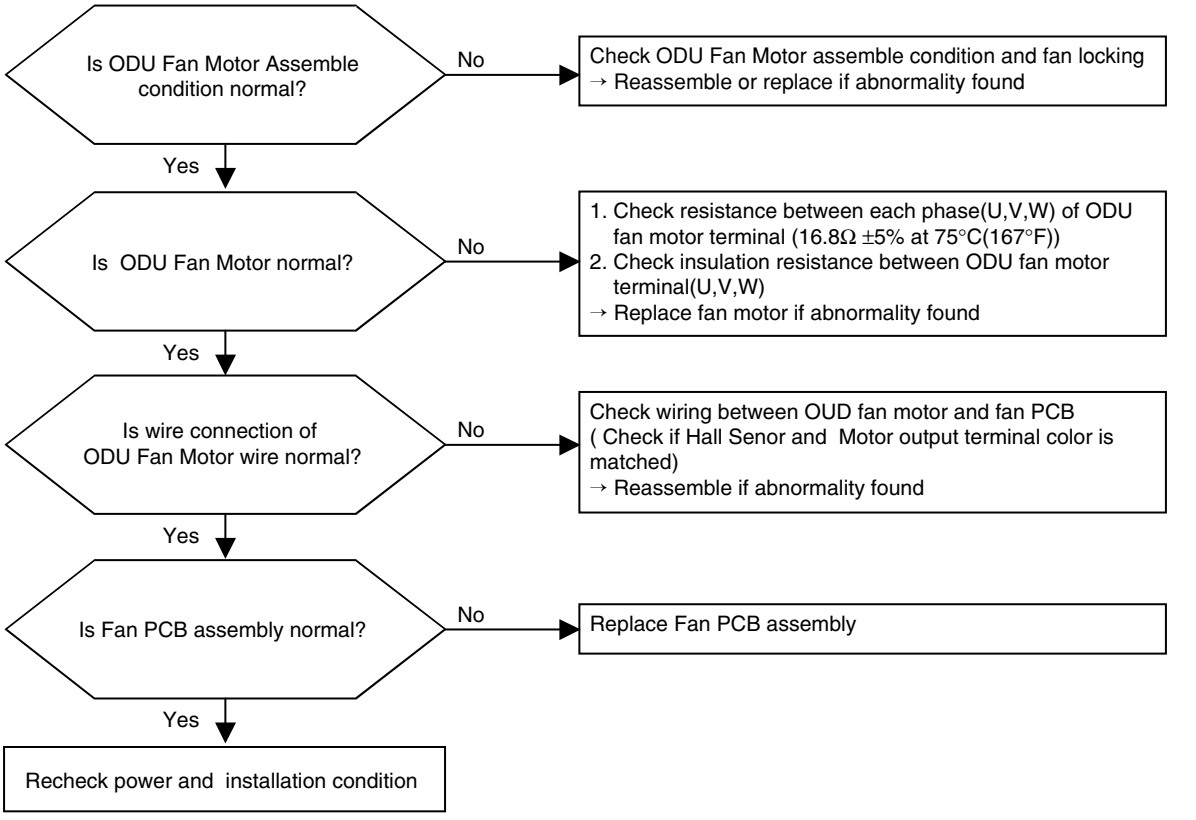
* Right inserting direction of inverter EEPROM



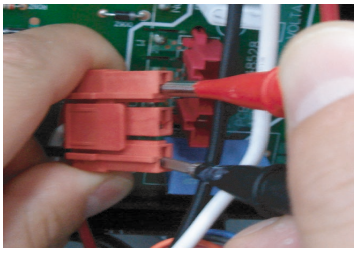
※ Note : Replace after power off

Error No.	Error Type	Error Point	Main Reasons
67* Master 671 Slave 672	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 (Hall sensor, U,V,W output) 3. Reversing rotation after RPM target apply 4. Fan PCB assembly defect

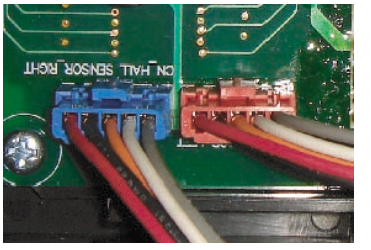
■ Error Diagnosis and Countermeasure Flow Chart



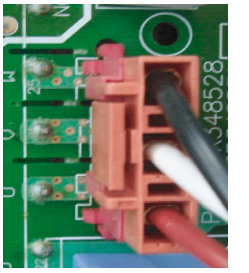
* Fan Motor resistance measuring between each phase

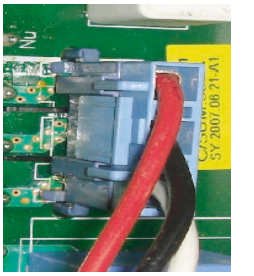


* Hall Sensor connector



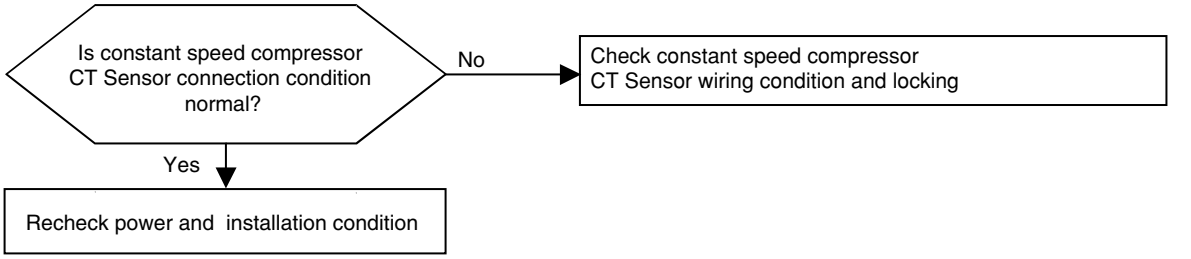
* Fan Motor Wire connection





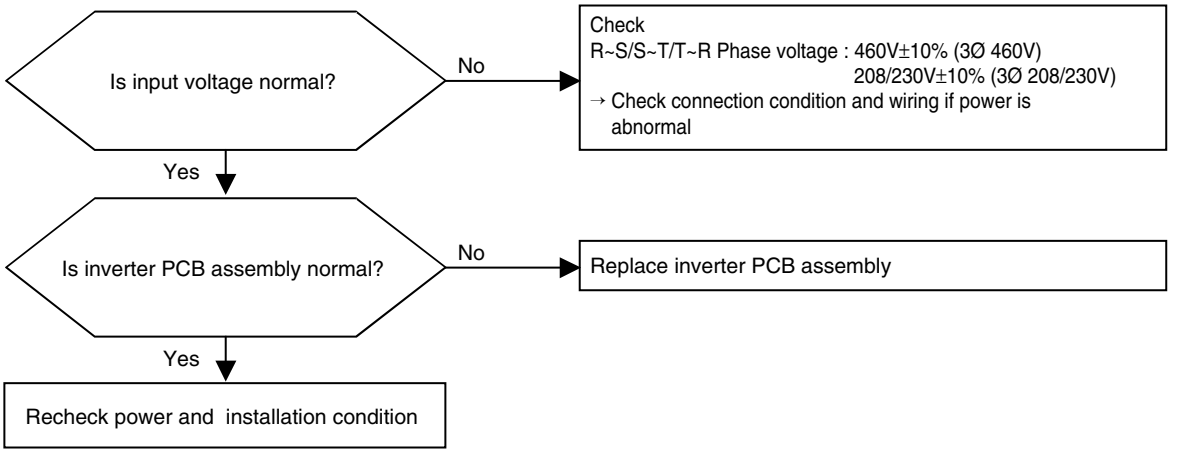
Error No.	Error Type	Error Point	Main Reasons
70* Master 701 Slave 702	Constant Speed Compressor CT Sensor Error	Constant Speed Compressor CT Sensor Open/short	1. Constant Speed Compressor CT Sensor defect

■ Error Diagnosis and Countermeasure Flow Chart

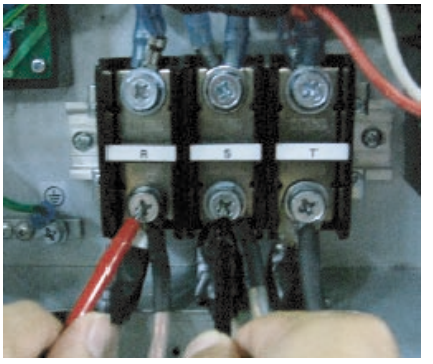


Error No.	Error Type	Error Point	Main Reasons
71* Master 711 Slave 712	Inverter input current CT sensor error	Micom input voltage isn't within 2.5V ±0.3V at initial state of power supply	1. Input voltage abnormal 2. ODU inverter PCB damage (CT sensing part)

■ Error Diagnosis and Countermeasure Flow Chart

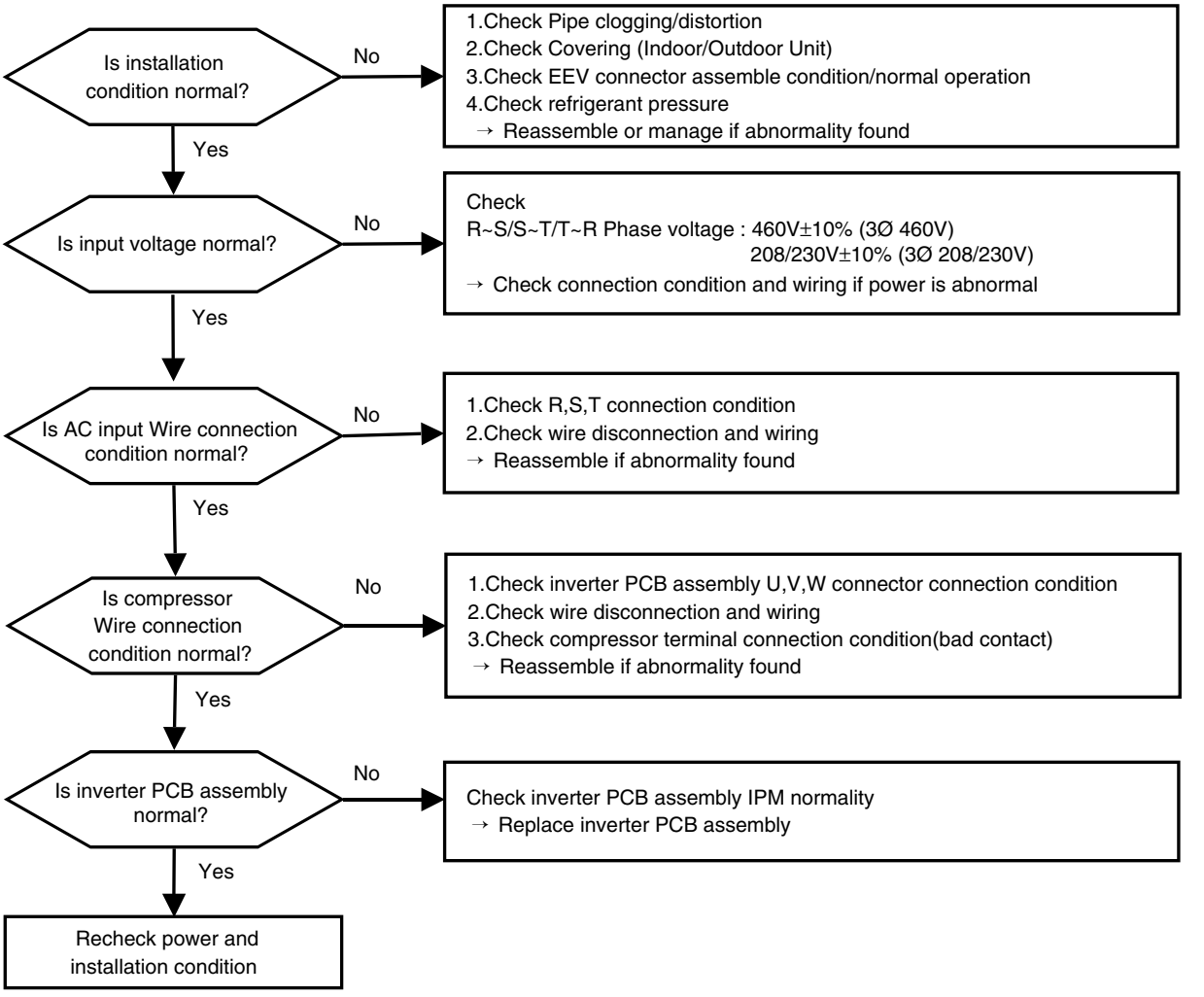


* Measuring input voltage

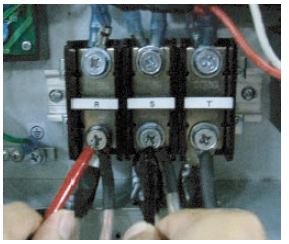


Error No.	Error Type	Error Point	Main Reasons
73* Master 731 Slave 732	AC input instant over current error (Matter of software)	Inverter PCB input 3 phase power current is over 50A(peak) for 2ms	1.Overload operation (Pipe clogging/Covering/EEV defect/Ref. overcharge) 2.Compressor damage(Insulation damage/Motor damage) 3.Input voltage abnormal(R,S,T) 4.Power line assemble condition abnormal 5.Inverter PCB assembly damage(input current sensing part)

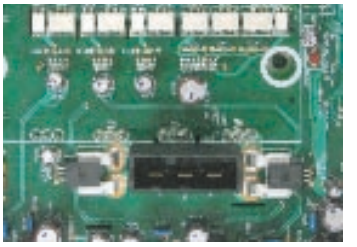
■ Error Diagnosis and Countermeasure Flow Chart



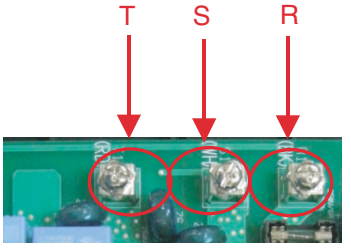
Measuring input voltage



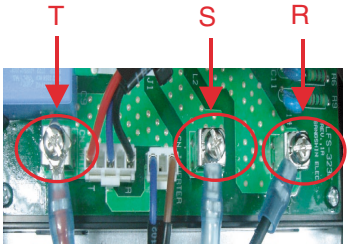
Compressor Wire Connection



Noise filter wiring

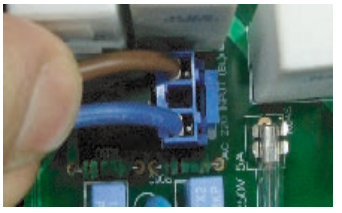


Noise filter input (upper part)



Noise filter output(lower part)

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

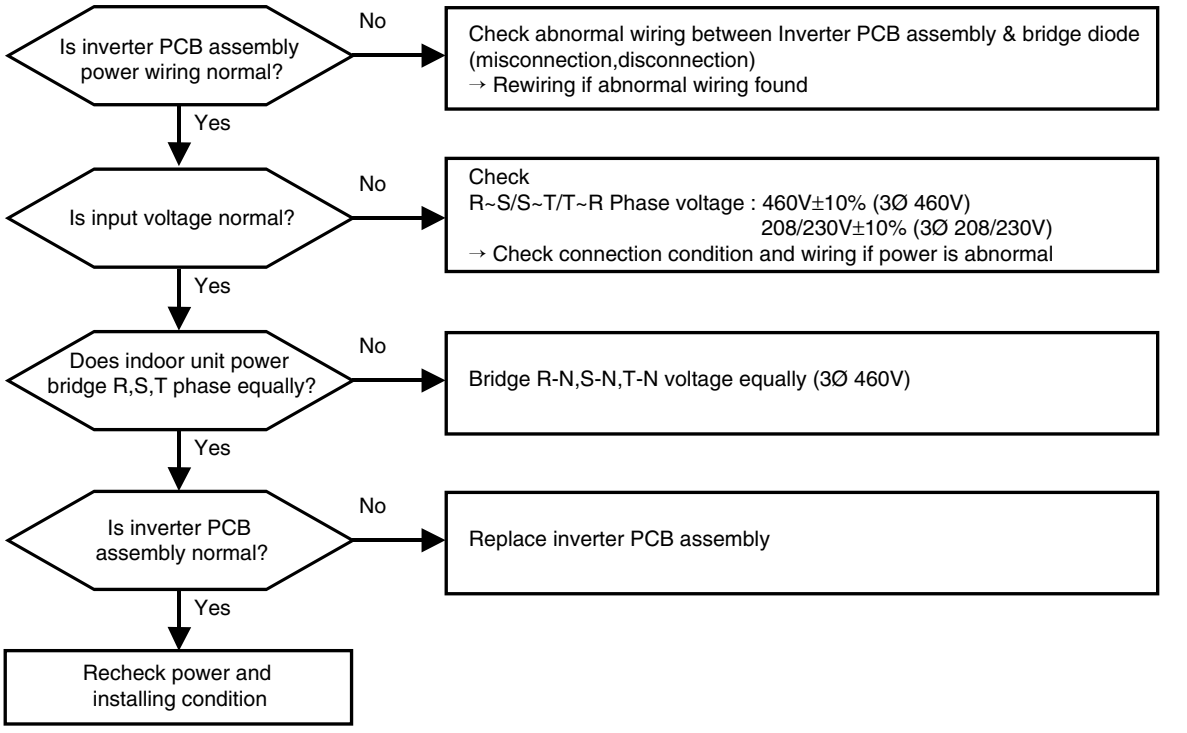


Inverter PCB assembly power connection

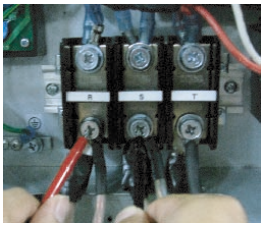
Noise filter power connection

Error No.	Error Type	Error Point	Main Reasons
74* Master 741 Slave 742	3 Phase Power Unbalance	During operation(compressor frequency is over 50Hz), difference between R & T phase is 5A for 10 seconds.	1. CT sensor defect 2. Capacity over of AVR

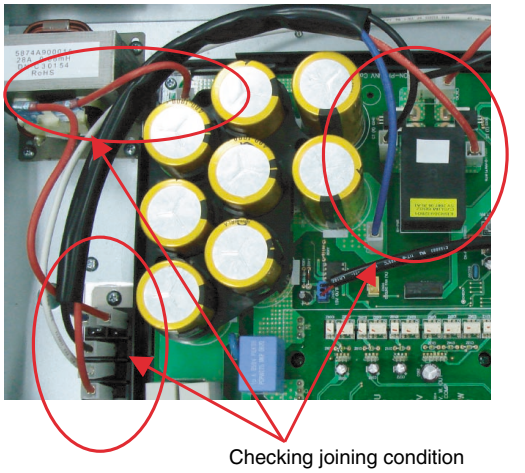
■ Error Diagnosis and Countermeasure Flow Chart

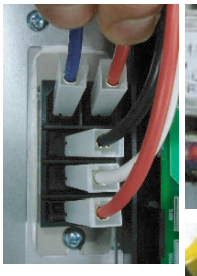


Measuring input voltage



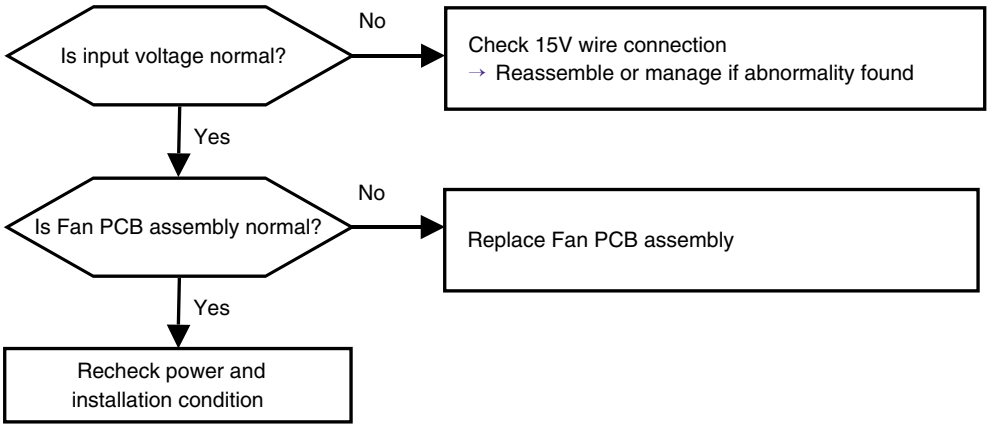
Inverter PCB & Bridge Diode wiring



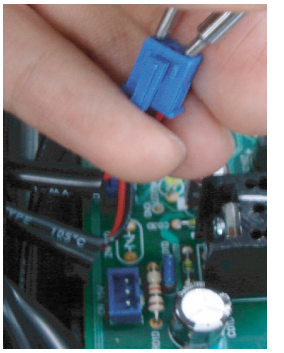


Error No.	Error Type	Error Point	Main Reasons
75* Master 751 Slave 752	Fan CT sensor error	Offset of micom which senses the fan motor phase current is not 2.5V	1.Input voltage is abnormal(not 15V) 2.Fan PCB assembly defect

■ Error Diagnosis and Countermeasure Flow Chart

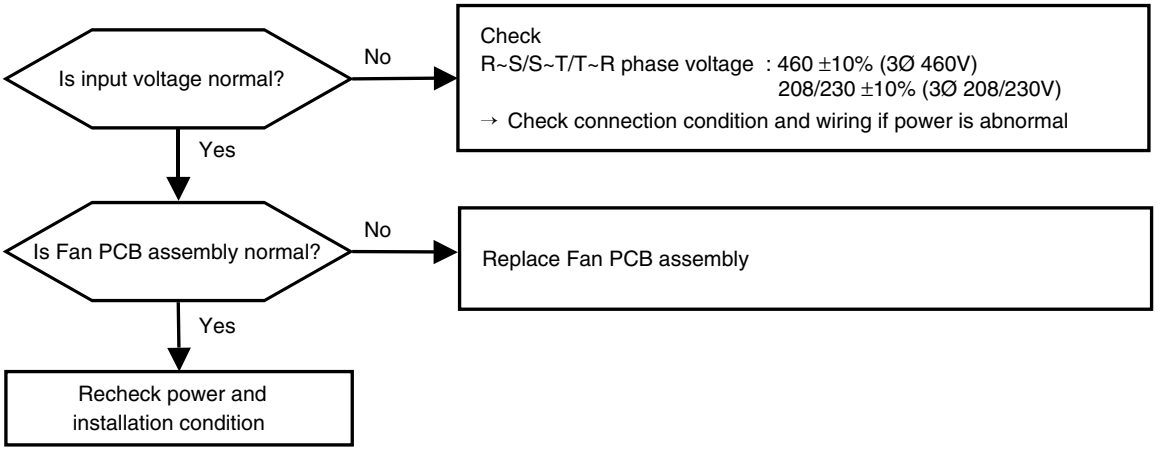


Checking 15V

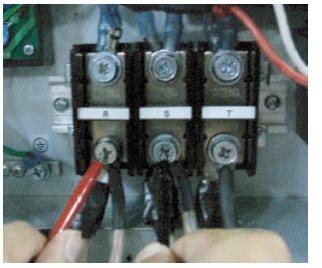


Error No.	Error Type	Error Point	Main Reasons
76* Master 761 Slave 762	Fan DC Link High Voltage Error	Fan PCB DC link voltage supplied over 780V\	1.Input power abnormal 2.Fan PCB assembly defect

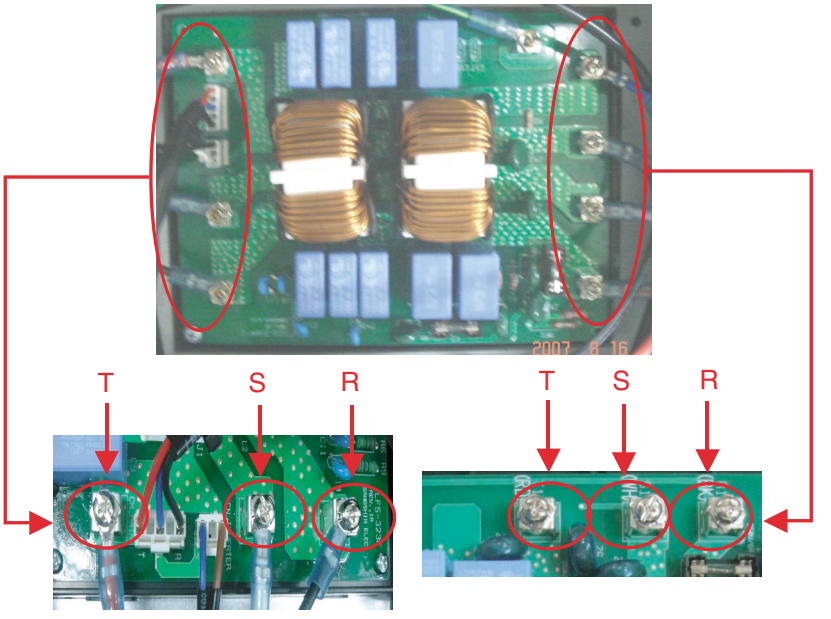
■ Error Diagnosis and Countermeasure Flow Chart



Measuring input voltage



Noise filter wiring

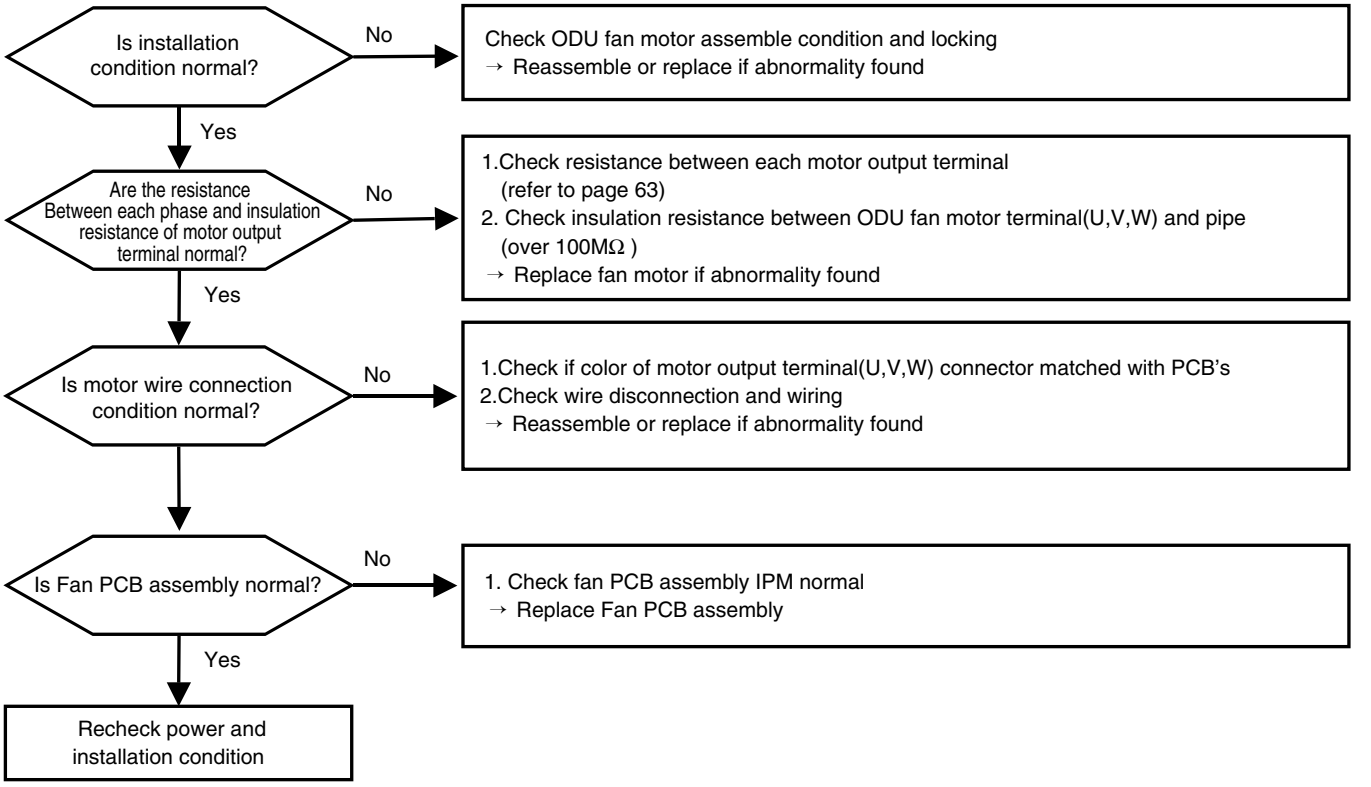


Noise filter output(lower part)

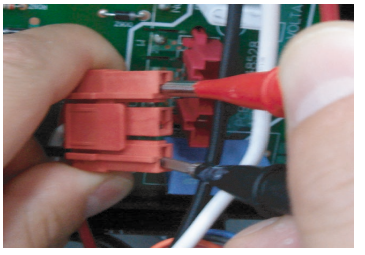
Noise filter input (upper part)

Error No.	Error Type	Error Point	Main Reasons
77* Master 771 Slave 772	Fan Over Current Error	Output current is over 5A for 40ms	1.Overload operation 2.Fan Motor defect 3.Fan PCB assembly defect

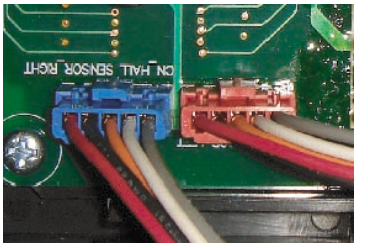
■ Error Diagnosis and Countermeasure Flow Chart



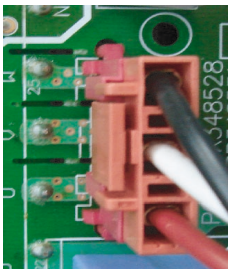
Measuring fan motor phase resistance

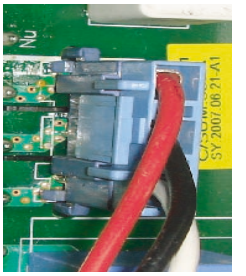


Hall Sensor connection



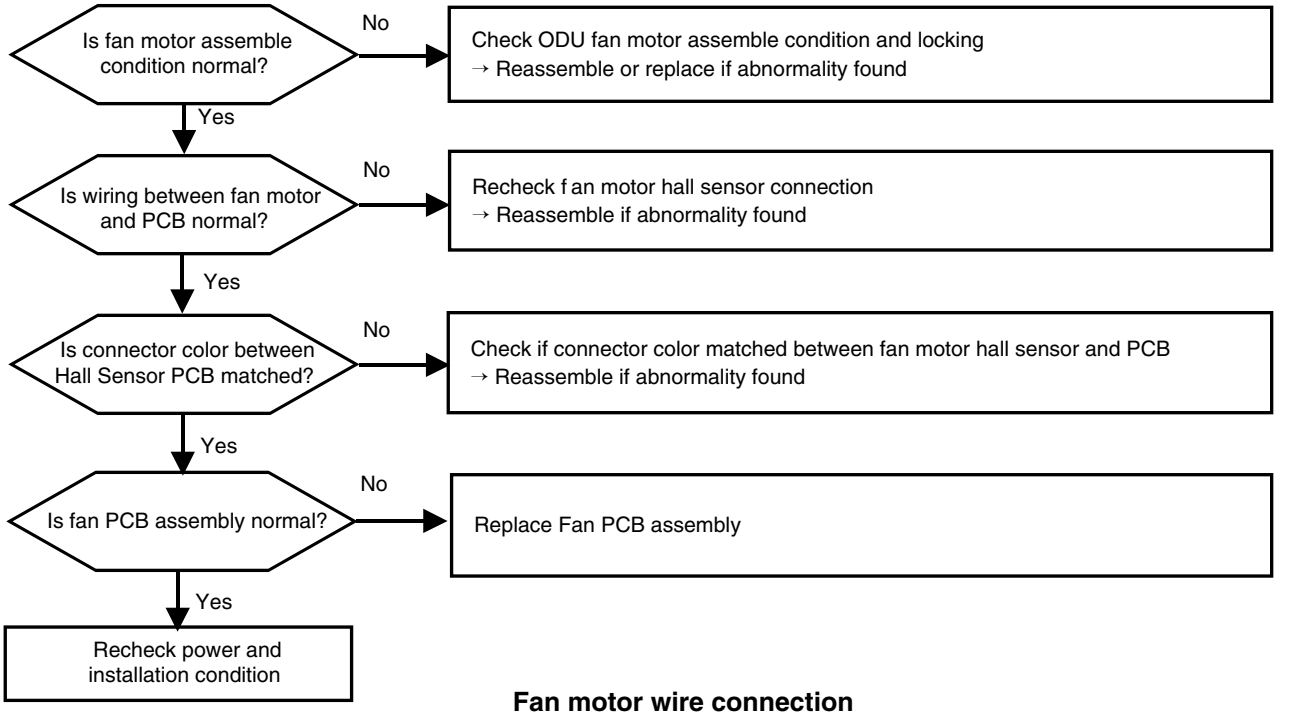
Fan motor wire connection



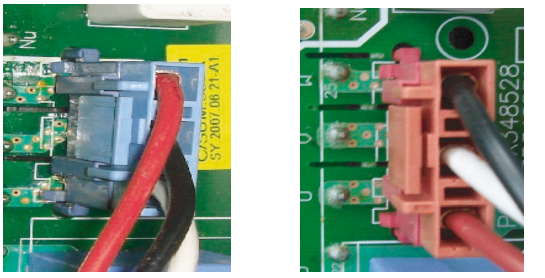


Error No.	Error Type	Error Point	Main Reasons
78* Master 781 Slave 782	Fan Motor Hall Sensor Error	Fan Motor Hall Sensor short/open	1.Fan motor hall sensor defect 2.ODU fan motor hall sensor disconnection 3.ODU Fan Motor Hall Sensor wrong insertion 4.Fan PCB assembly defect

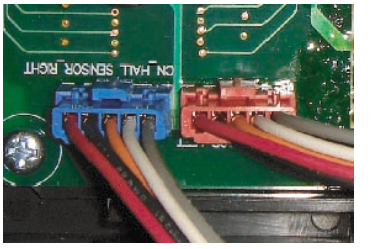
■ Error Diagnosis and Countermeasure Flow Chart



Fan motor wire connection



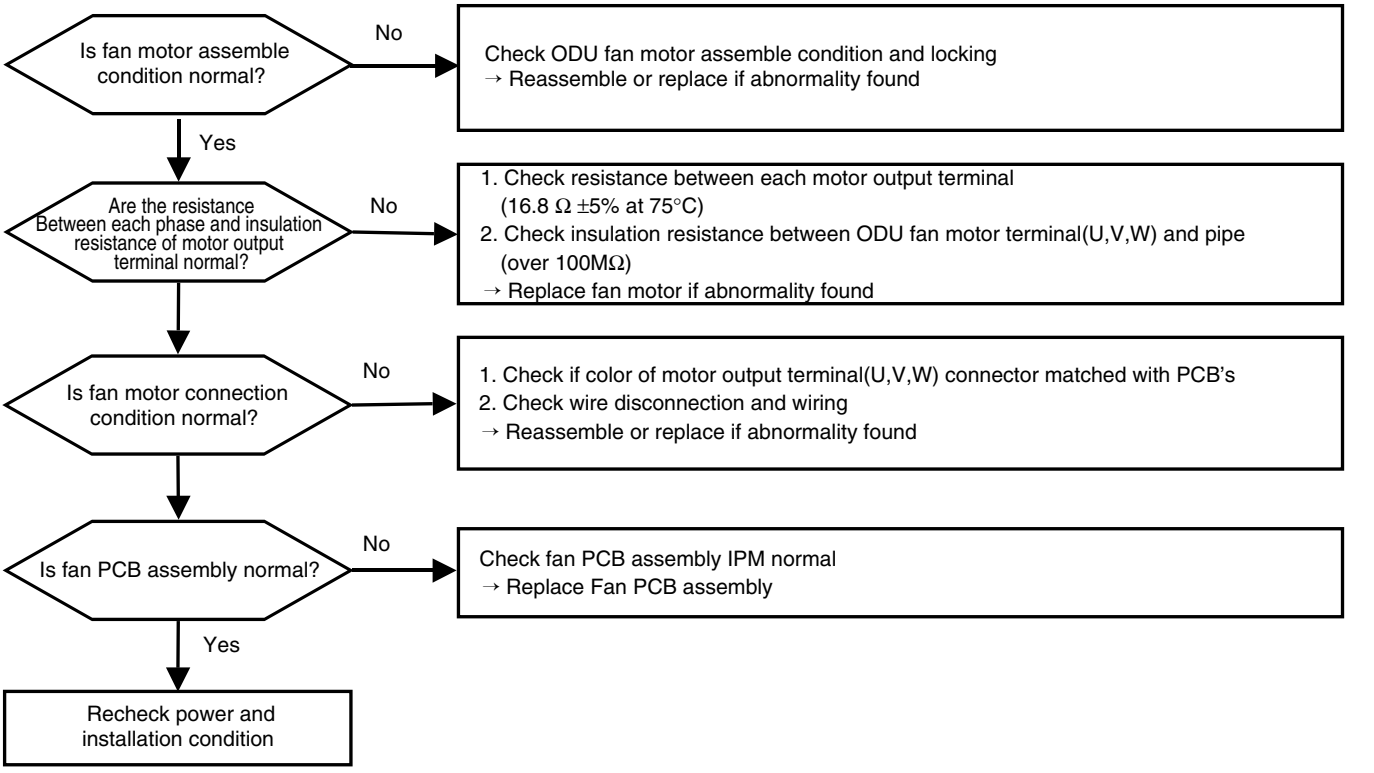
Hall sensor connection



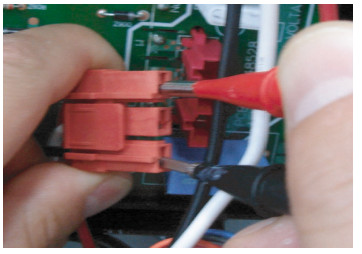
❉ Note : If LED is blinking oppositely after connecting Hall Sensor connector, U.V.W output terminal oppositely, replace the motor.
If LED is not blinking oppositely,replace fan PCB assembly.

Error No.	Error Type	Error Point	Main Reasons
79* Master 791 Slave 792	Fan Starting Failure Error	Fan Motor initial starting failure	1.Fan motor defect/ assemble condition abnormal 2.Fan motor connector misconnection(Hall sensor, U,V,W ouput) 3.Fan PCB defect

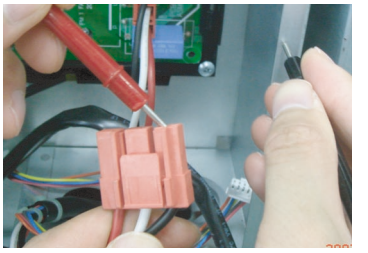
■ Error Diagnosis and Countermeasure Flow Chart



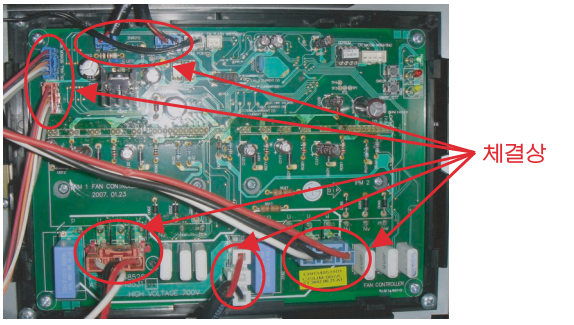
Measuring fan motor phase resistance



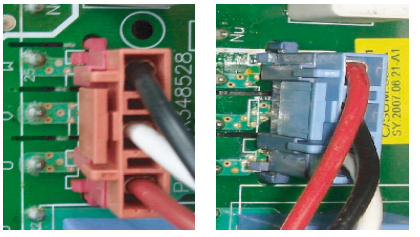
Measuring insulation resistance between fan terminal & chassis



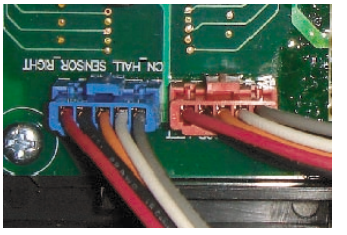
Fan wire wiring



Fan motor wire connection

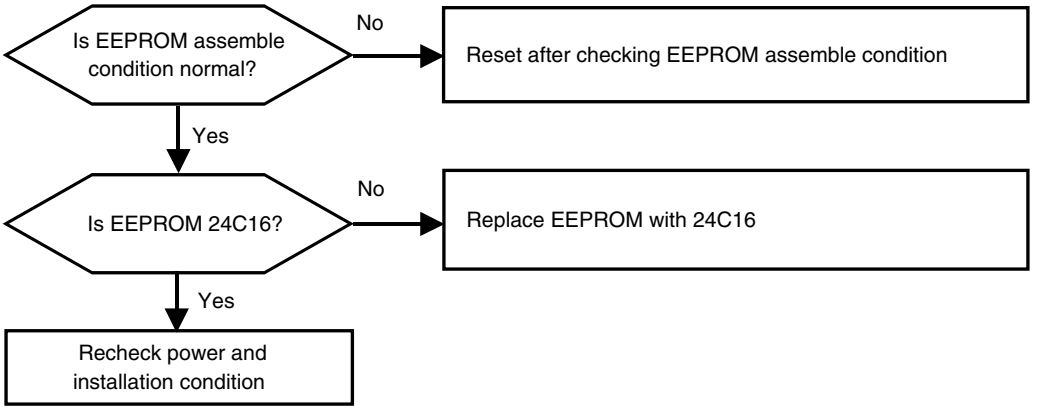


Hall Sensor connection



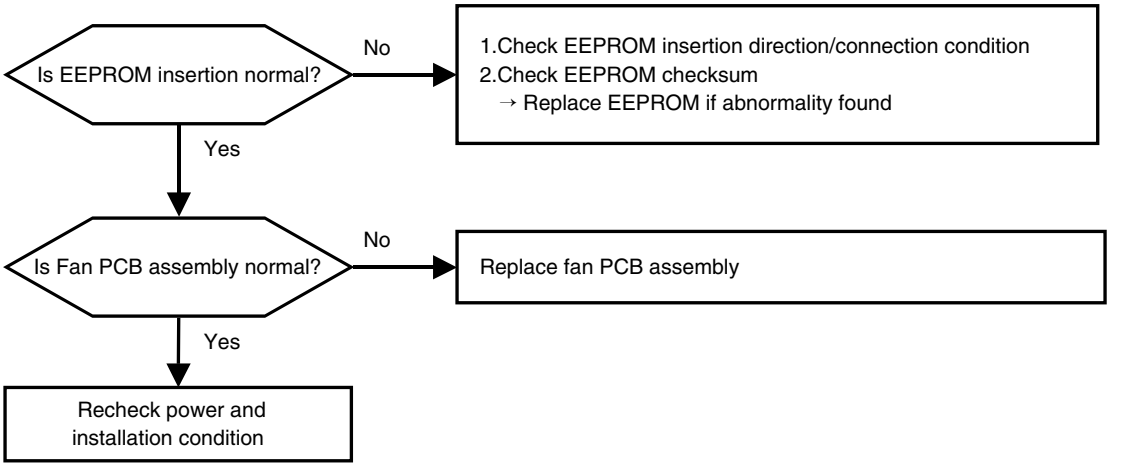
Error No.	Error Type	Error Point	Main Reasons
86* Master 861 Slave 862	Main PCB EEPROM Error	EEPROM Access Error	1. No EEPROM 2. EEPROM wrong insertion

■ Error Diagnosis and Countermeasure Flow Chart

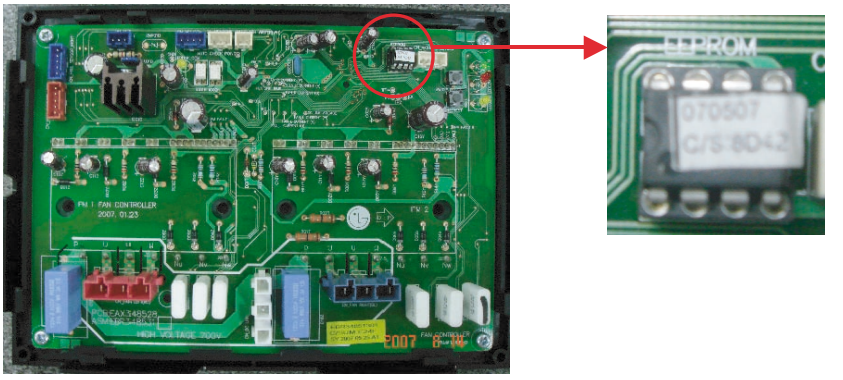


Error No.	Error Type	Error Point	Main Reasons
87* Master 871 Slave 872	Fan PCB EEPROM Error	Error occurs when checking the EEPROM checksum as initializing after power is supplied	1.EEPROM bad contact/wrong insertion 2.EEPROM Version is different 3.ODU fan PCB assembly damage

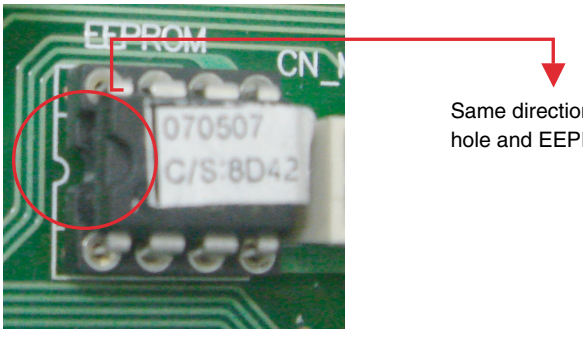
■ Error Diagnosis and Countermeasure Flow Chart



Fan EEPROM insertion



Inverter EEPROM insertion direction

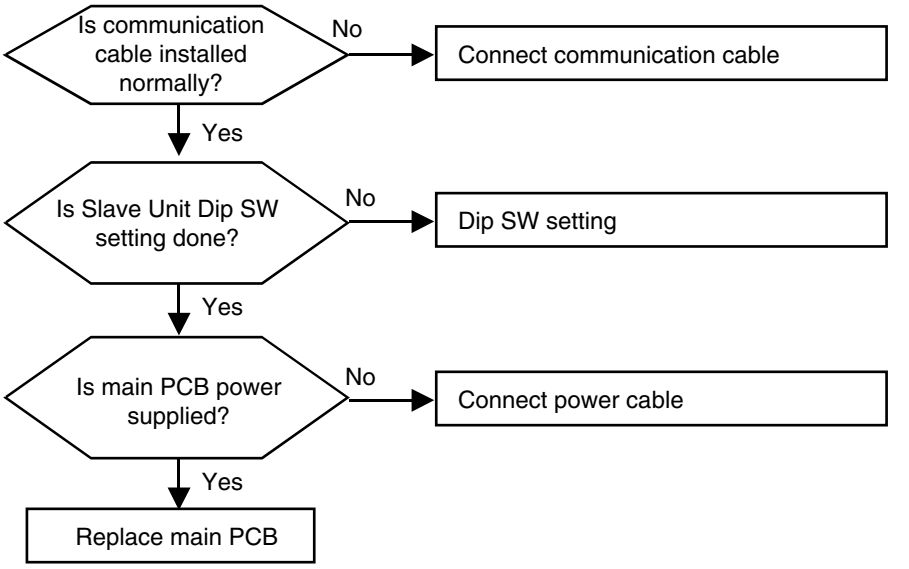


Same direction both socket hole and EEPROM hole

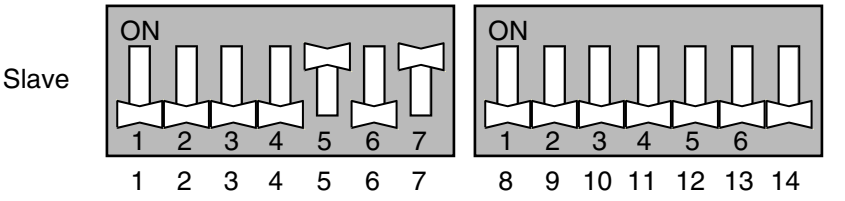
❉ Note : Replace after power off

Error No.	Error Type	Error Point	Main Reasons
104* Master 11 → 041 Slave 12 → 042	Transmission Error Between Outdoors	Master displays ODU number which is not communicated. Slave displays own error number	1.Loose connection of power cable/communication cable(Open/Short) 2.Defect of each outdoor unit PCB

■ Error Diagnosis and Countermeasure Flow Chart

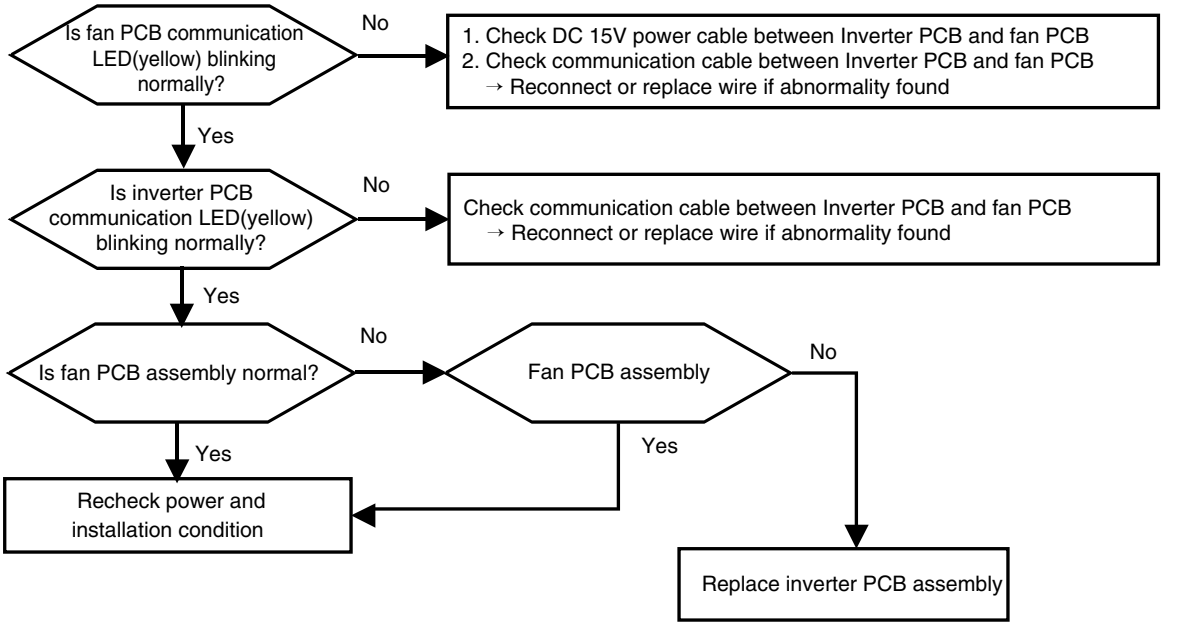


* Slave Unit Dip SW

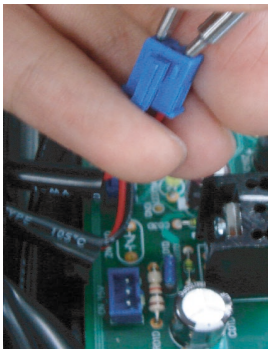


Error No.	Error Type	Error Point	Main Reasons
105* Master 11 → 051 Slave 12 → 052	Transmission error (Fan PCB ↔ Inverter PCB)	Fan controller didn't receive signal from inverter controller	1. Wrong connection between Inverter and Fan PCB 2. Fan PCB power not supplied 3. ODU Inv/Fan PCB defect

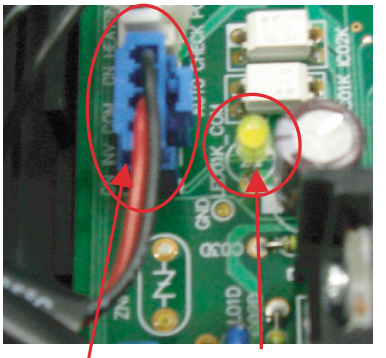
■ Error Diagnosis and Countermeasure Flow Chart



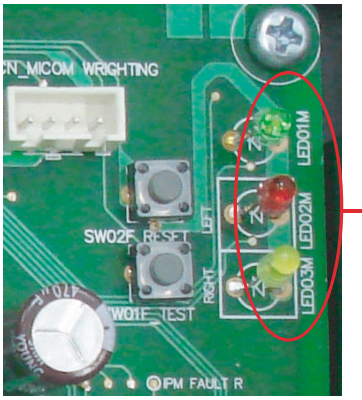
Checking 15V input



Fan communication connection



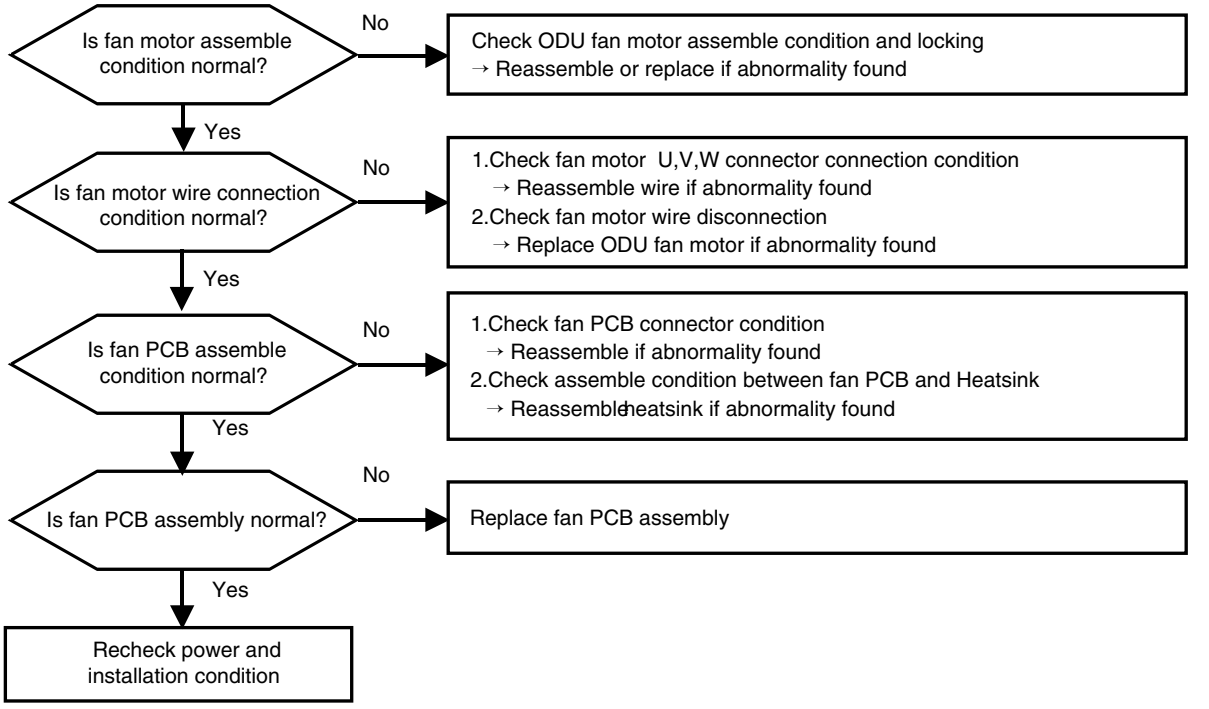
Fan Error LED



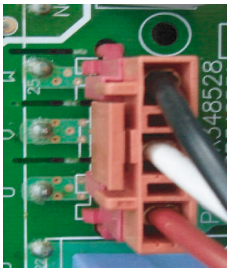
❉ Note : Check fan PCB assembly Error LED blinking (Check 108π⁻ Error)

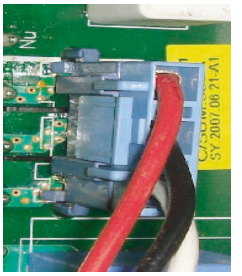
Error No.	Error Type	Error Point	Main Reasons
106* Master 11 → 061 Slave 12 → 062	ODU Fan PCB IPM Fault	IPM protection circuit activation (over current / overheating)	1. Overload operation (Pipe clogging/Covering/EEV defect/Ref. overcharge 2. ODU fan motor assemble condition abnormal (Coil disconnection/Short/Insulation damage) 3. Fan PCB heatsink assemble condition abnormal 4. Fan PCB assembly defect

■ Error Diagnosis and Countermeasure Flow Chart

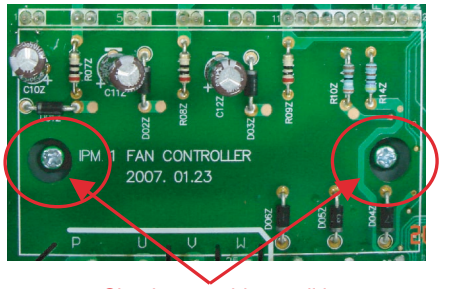


Fan Motor Wire connection



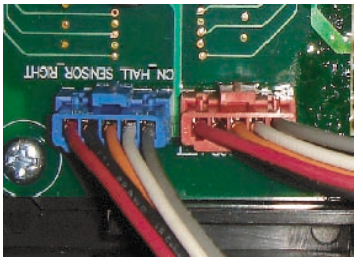


Fan IPM assemble position



Check assemble condition

Hall Sensor connection

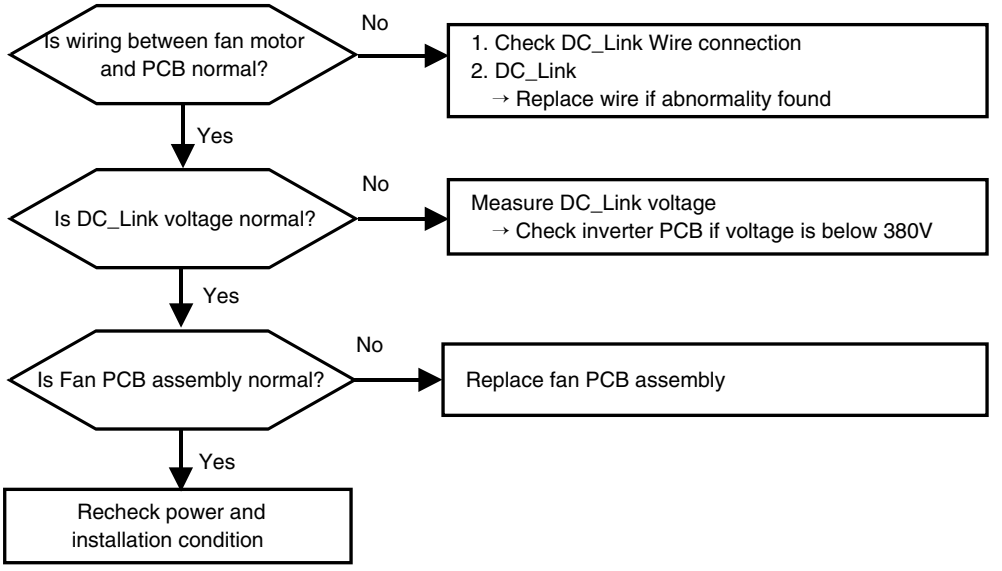


Fan Heatsink assemble position

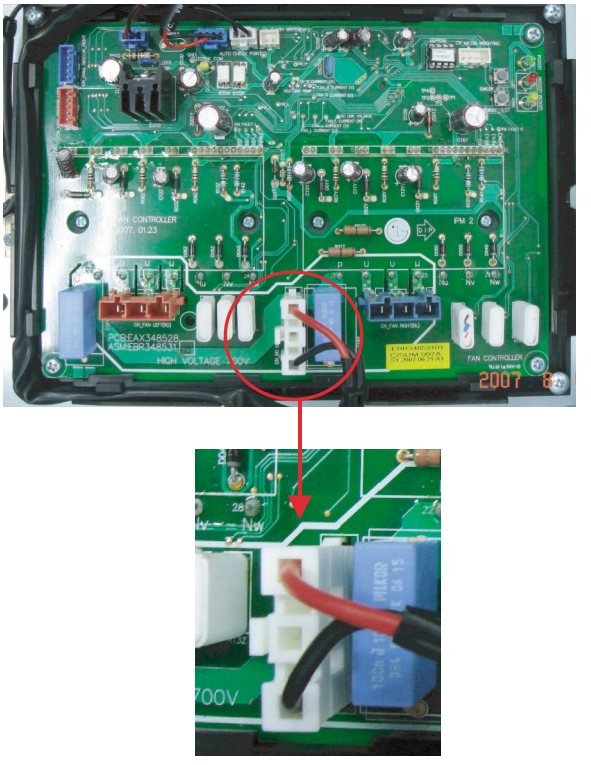
Check assemble condition

Error No.	Error Type	Error Point	Main Reasons
107* Master 11 → 071 Slave 12 → 072	Fan DC Link Low Voltage Error	Fan PCB DC link voltage supplied below 380V	1. Wrong wiring between inverter PCB and Fan PCB 2. Fan PCB assembly defect

■ Error Diagnosis and Countermeasure Flow Chart



DC voltage connection

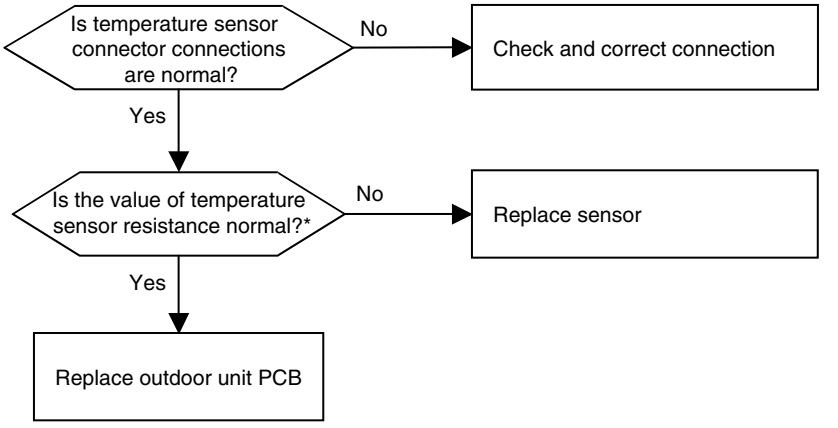


DC Volt connected

Error No.	Error Type	Error Point	Main Reasons
113* Master 11 → 131 Slave 12 → 132	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* Master 11 → 141 Slave 12 → 142	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

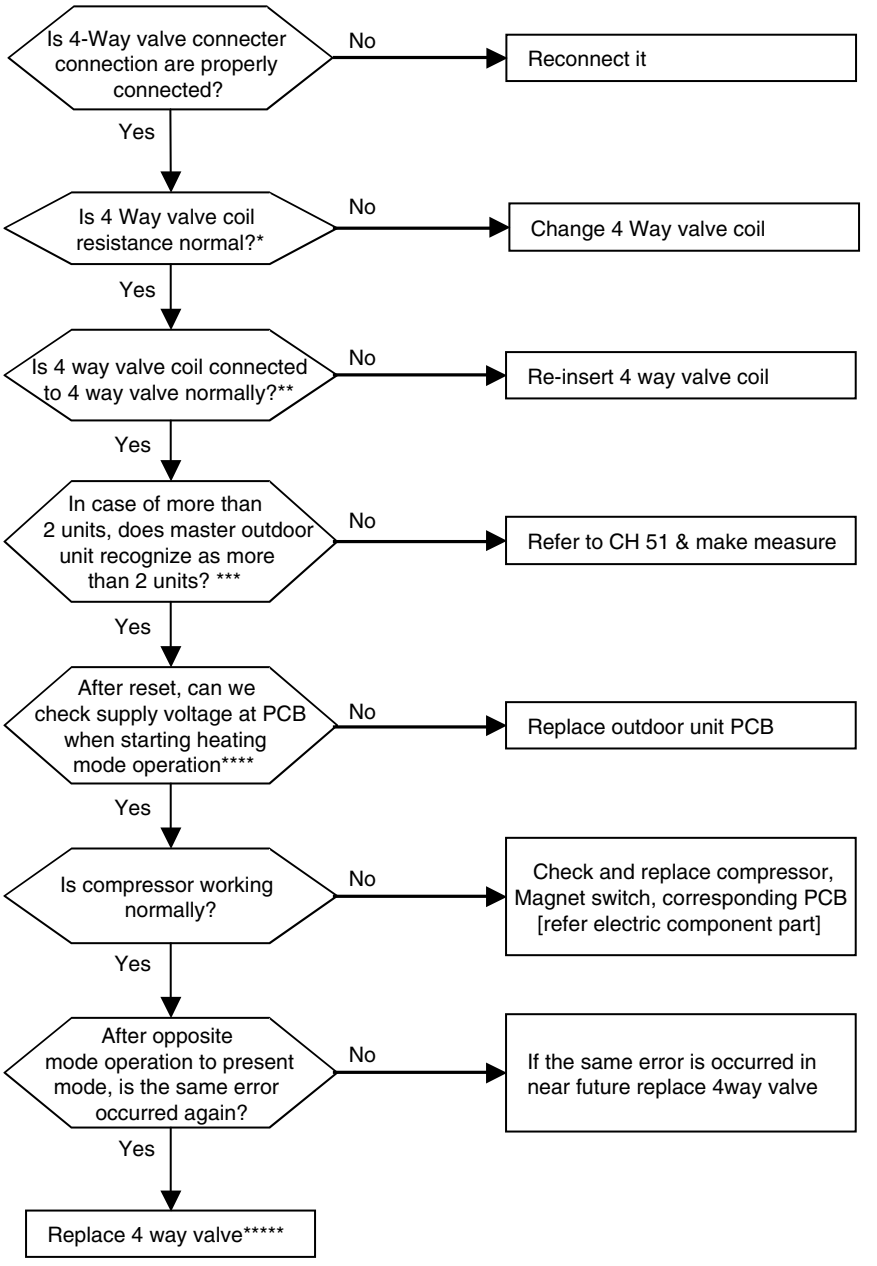


* Sensor resistance 100 kΩover (open) or 100 Ω below (short) will generate error

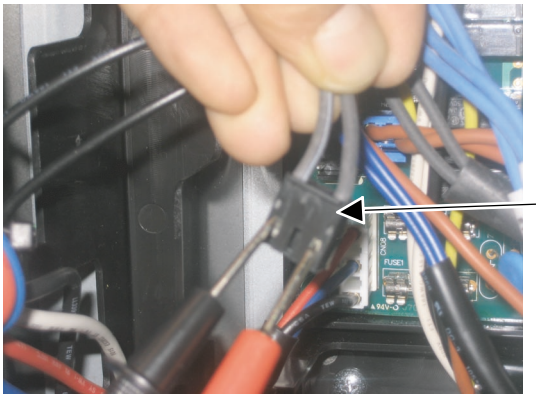
Note: Temperate sensor resistance vary with temperature, So compare temperature sensor resistance value according to outdoor unit temperature by referring below table (±5% tolerance)
Air temperature sensor: 10°C(50°F) = 20.7 kΩ, 25°C(76°F) = 10 kΩ, 50°C(122°F) = 3.4 kΩ
Pipe temperature sensor: 10°C(50°F) = 10 kΩ, 25°C(76°F) = 5 kΩ, 50°C(122°F) = 1.8 kΩ

Error No.	Error Type	Error Point	Main Reasons
151* Master 11→511 Slave 12→512	Function error of outdoor 4way (reversing valve)	Function error of 4way (reversing valve) in Main or Slave outdoor units	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

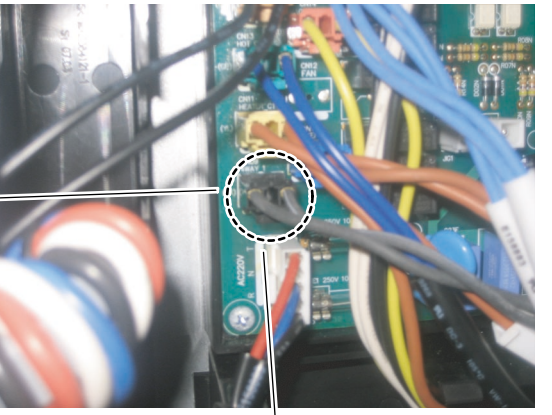
■ Error diagnosis and countermeasure flow chart



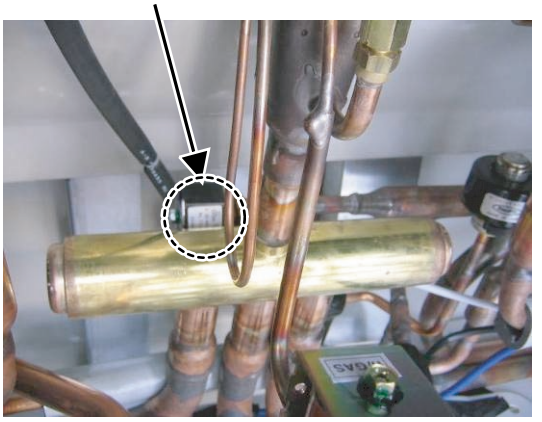
* Measure the resistance of 4way valve



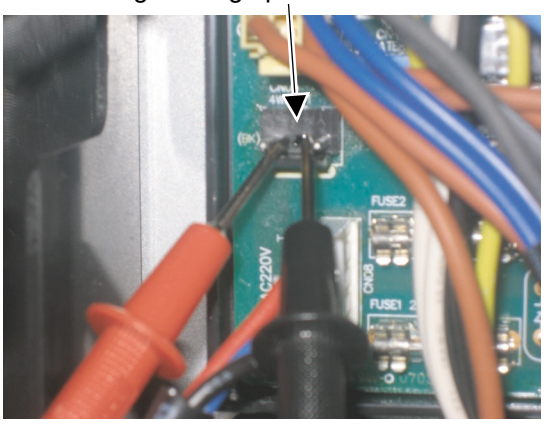
Location of 4way valve connector on Main PCB(marked as 4way,CN09)



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



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

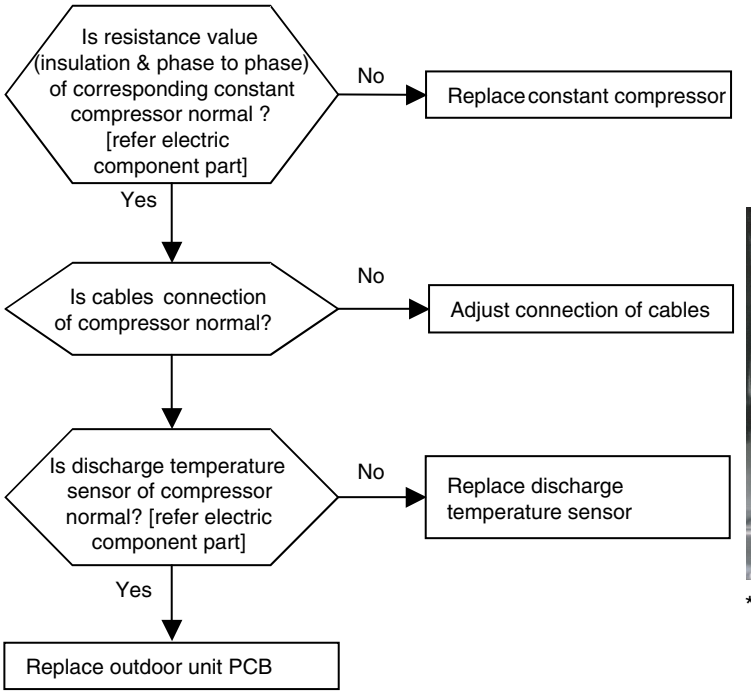


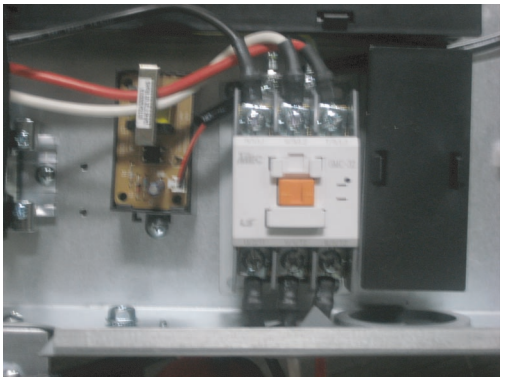
*** When power is supplied in order as follow
(Slave → Mater)
ODU information is displayed one after the other at main PCB 7-segment
1. Model ID
2. Total Capacity
   → Displayed with HP
3. ODU Type
   → HEAT PUMP : 2, Sync : 3
4. Normal mode : 25
5. Refrigerant
   → 3Ø 208/230V : 140, 3Ø 460V : 160

***** Checking method for outdoor unit of 3unit system
(Master + Slave)
① Close all the SVC valves of high / low pressure common pipe
② Operate system
③ Check the difference of high and low pressure with LGMV for each unit (Master, Slave)
④ If there is a unit in which the difference is not increased then the 4way valve of that unit is defective

Error No.	Error Type	Error Point	Main Reasons
173* Master 11 → 731 Slave 12 → 732	Constant compressor defect	Defect according to constant compressor damage or locking, over current	1. Constant compressor damage 2. Constant compressor input over current 3. Discharge temperature sensor defect

■ Error diagnosis and countermeasure flow chart

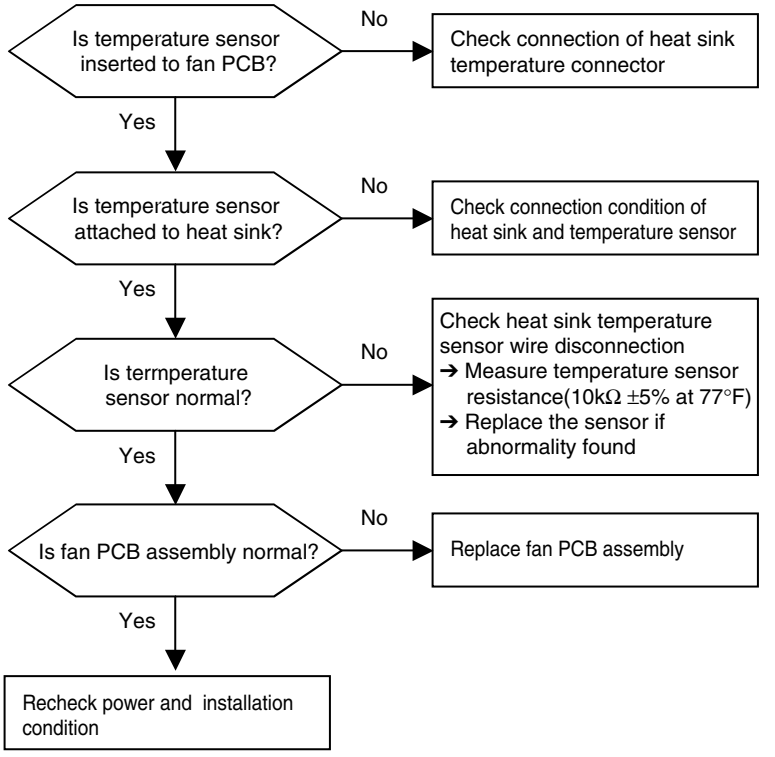




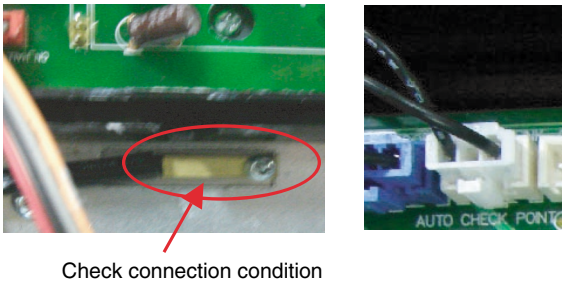
* cables connection between constant compressor and magnetic switch

Error No.	Error Type	Error Point	Main Reasons
193* Master 11 → 931 Slave 12 → 932	Fan PCB heatsink temperature high	Heat sink temperature is over 95°C	1. Heatsink temperature sensor defect 2. Fan PCB assembly defect
194* Master 11 → 941 Slave 12 → 942	Fan PCB heatsink temperature sensor error	Heatsink temperature sensor abnormal	1. Heatsink temperature sensor defect(Open/Short) 2. Wrong connection of temperature sensor connector 3. Fan PCB assembly defect

■ Error diagnosis and countermeasure flow chart

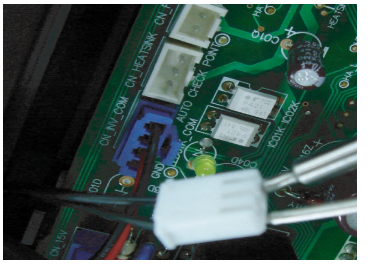


Fan heat sink connection



Check connection condition

Checking temperature sensor disconnection



P/NO : MFL50459503

MAY, 2008