LG
Life's Good

SERVICE MANUAL

AIR-TO-WATER HEAT PUMP

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

GENERAL

THERMA V™

P/NO : MFL68682003

www.lg.com/common

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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

- 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.
- Take care to ensure that nobody could step on or fall onto the outdoor unit.
  - This could result in personal injury and product damage.
- 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.

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.

⚠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.

Part 1
General Information

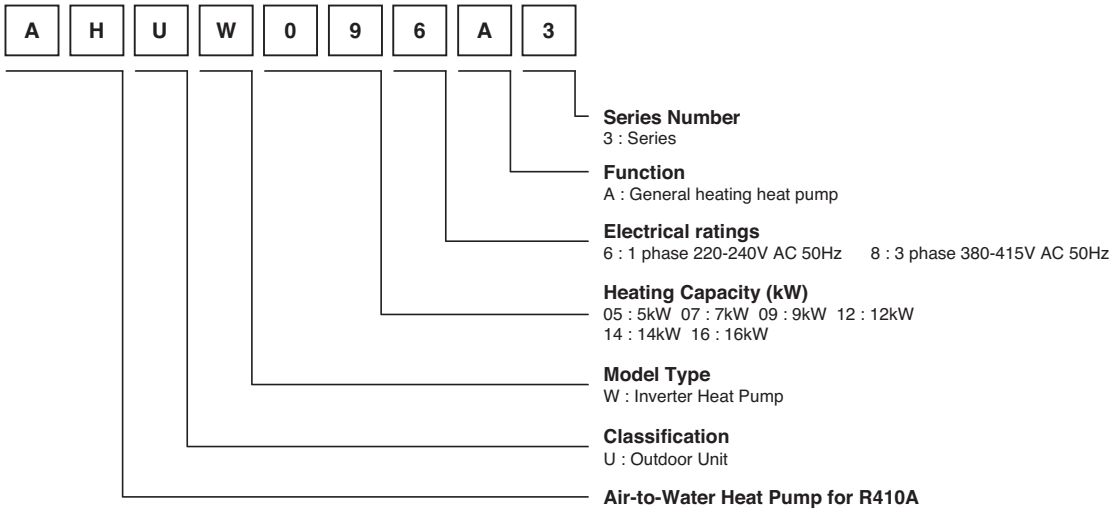
1. Model Information

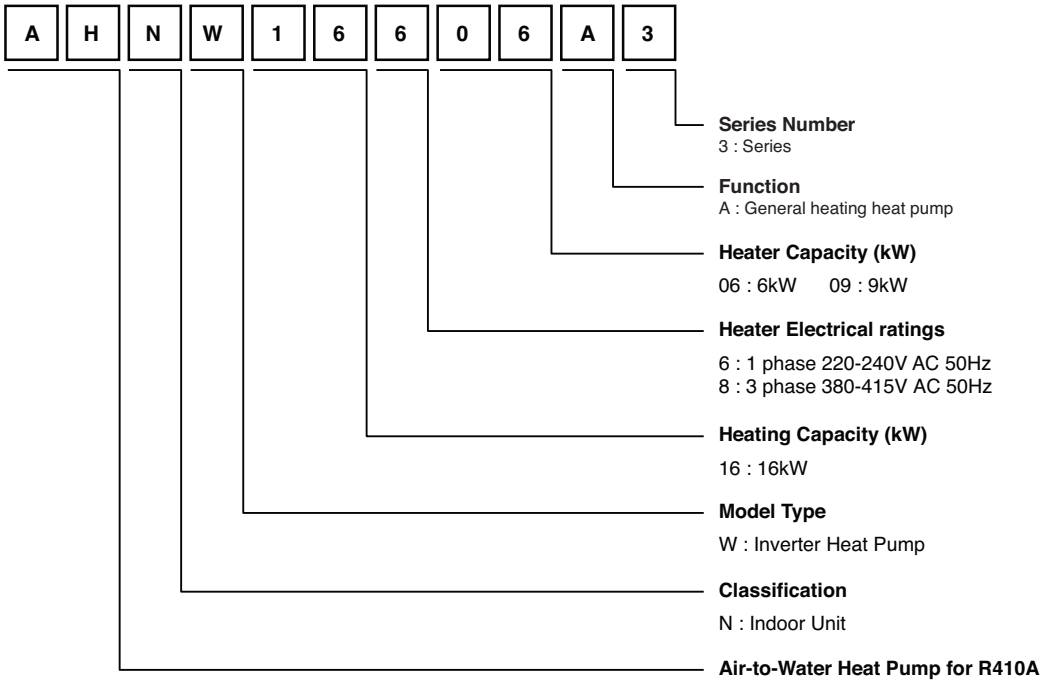
With advanced inverter technology, THERMA V™ is suitable for applications like under floor heating, under floor cooling, and hot water generation. By Interfacing to various accessories user can customize the range of the application.

In this chapter, general information of THERMA V™ is presented to identify the installation procedure. Before beginning installation, read this chapter carefully and find helpful information on installation.

1. Model Information

Model number nomenclature





Model name and related information

Model Name		Built-In Electric Heater(kW)	Power Source (Electric Heater)	Capacity		Power Source (Unit)
Outdoor Unit	Indoor Unit			Heating(kW)*1	Cooling(kW)*2	
AHUW056A3	AHNW16606A3	6(3+3)	220-240 V ~ 50 Hz	5.0	5.0	220-240 V ~ 50 Hz
AHUW076A3				7.0	7.0	
AHUW096A3				9.0	9.0	
AHUW126A3				12.0	10.4	
AHUW146A3				14.0	12.0	
AHUW166A3				16.0	13.0	
AHUW128A3	AHNW16809A3	9(3+3+3)	380-415 V ~ 50 Hz	12.0	10.4	380-415 V ~ 50 Hz
AHUW148A3				14.0	12.0	
AHUW168A3				16.0	13.0	

*1 : tested under Eurovent Heating condition (water temperature 30°C → 35°C at outdoor ambient temperature 7°C / 6°C)

*2 : tested under Eurovent Cooling condition (water temperature 23°C → 18°C at outdoor ambient temperature 35°C / 24°C)

2. Specification

Indoor

Indoor unit			AHNW16606A3		AHNW16809A3
Combination Outdoor Units			AHUW096A3	AHUW166A3	AHUW168A3
			AHUW076A3	AHUW146A3	AHUW148A3
			AHUW056A3	AHUW126A3	AHUW128A3
Operation Range (Min.~Max.) Leaving Water Temperature	Cooling(Fan coil unit)	°C	6~30		6~30
	Cooling(Under floor)	°C	16~30		16~30
	Heating(Fan coil unit or Radiator)	°C	15~57(*20~55)		15~57(*20~55)
	Heating(Under floor)	°C	15~57(*20~55)		15~57(*20~55)
Pump	Type	-	Non-Self-Priming Type of DC Pump		Non-Self-Priming Type of DC Pump
	Water Flowrate Limit	LPM	46.0		46.0
Heat Exchanger	Type	-	Brazed Plate HEX		Brazed Plate HEX
	Number of Plate	EA	76		76
	Quantity	EA	1		1
Expansion Vessel	Volume	liter	8		8
	Water Pressure(Max.)	bar	3		3
	Water Pressure(Pre)	bar	1		1
Strainer	Mesh Size	mm	1 × 0.9		1 × 0.9
	Material	-	Stainless steel		Stainless steel
Electric Heater	Type	-	Sheath		Sheath
	Number of Heating Coil	EA	2		3
	Capacity Combination	kW	3 + 3		3 + 3 + 3
	Operation	-	Automatic		Automatic
	Heating Steps	step	2		2
	Power Supply	Ø / V / Hz	1 / 240 / 50		3 / 400 / 50
	Rated Current	A	25		13
	Maximum Current	A	32		16.3
Water Circuit	Safety Valve	bar	3		3
	Entering Side Diameter	inch	Male PT 1		Male PT 1
	Leaving Side Diameter	inch	Male PT 1		Male PT 1
	Manometer	-	O		O
	Drain Valve / Fill Valve	-	O		O
	Shut Off Valve	-	O		O
	Air Vent	-	O		O
Refrigerant Circuit	Gas Side Diameter	mm(inch)	15.88 (5/8)		15.88 (5/8)
	Liquid Side Diameter	mm(inch)	9.52 (3/8)		9.52 (3/8)
Dimensions	Unit(W x H x D)	mm	850 x 490 x 315		850 x 490 x 315
	Packed Unit(W x H x D)	mm	1082 x563 x 375		1082 x 563 x 375
Weight (Without water)	Unit	kg	43		45
	Packed Unit	kg	51		52.5
*DHW Tank (Field Supply)	Type	-	Indirect heating(+Electric heater)		Indirect heating(+Electric heater)
	Heater Capacity	kW	Max. 3		Max. 3
	Power Supply	Ø / V / Hz	1 / 230 / 50		1 / 230 / 50
	Power Supply Type	-	Separated Power Source		Separated Power Source
	Thermal Protector Range	°C	Max. 90		Max. 90
	Relay Contactor	-	Needed		Needed
	ELB	A	40		40
	Sensor Adaptor Diameter	mm(inch)	12.7 (1/2)		12.7 (1/2)
	Accessory Kit	-	LG Supply		LG Supply
	MCCB	A	32		32

Note : 1. The specification may be subject to change without prior notice for purpose of improvement.
2. * : This information is given as a guideline about the connection of DHW tank
3. ** : This specification is data when electric heater is not used.

Outdoor

Outdoor Units			AHUW056A3	AHUW076A3	AHUW096A3
Combination Indoor Units			AHNW16606A3	AHNW16606A3	AHNW16606A3
Power Supply		Ø / V / Hz	1 / 220-240 / 50	1 / 220-240 / 50	1 / 220-240 / 50
Maximum Running Current	Cooling	A	19	19	19
	Heating	A	19	19	19
Wiring Connections	For Power Supply (Included Earth)	Number of wires	3	3	3
	For Connection with Indoor Unit (Included Earth)	Number of wires	4	4	4
* Capacity	Cooling(Under floor)	kW	5.0	7.0	9.0
	Heating(Under floor)	kW	5.0	7.0	9.0
* Power Input	Cooling(Under floor)	kW	1.09	1.56	2.37
	Heating(Under floor)	kW	1.01	1.47	2.05
* EER	Cooling(Under floor)	W/W	4.60	4.50	3.80
* COP	Heating(Under floor)	W/W	4.93	4.75	4.40
Operation Range (Min.~Max.) Outdoor Temperature	Cooling	°C	5 ~ 48	5 ~ 48	5 ~ 48
	Heating	°C	-20 ~ 30	-20 ~ 30	-20 ~ 30
Compressor	Type	-	Hermetic Motor	Hermetic Motor	Hermetic Motor
	Model	-	GJT240MAA	GJT240MAA	GJT240MAA
	Quantity	EA	1	1	1
	Displacement	cm^3/Rev.	24	24	24
	Capacity	kW	7.41	7.41	7.41
Compressor Motor	Type	-	Brushless	Brushless	Brushless
	Quantity	EA	1	1	1
	Rated Output	W	2 137	2 137	2 137
Refrigerant	Type	-	R410A	R410A	R410A
	Charge	g	1 800	1 800	1 800
	Control	-	EEV	EEV	EEV
Refrigerant Oil	Type	-	FVC68D	FVC68D	FVC68D
	Charged Volume	cc	900	900	900
Heat Exchanger	Quantity	EA	1	1	1
	Rows	EA	2	2	2
	Columns	EA	38	38	38
	FPI	Fins/inch	14	14	14
Fan	Type	-	Propeller	Propeller	Propeller
	Quantity	EA	1	1	1
	Air Flow Rate	CMM(l/s)	58	58	58
Fan Motor	Model	-	BLDC	BLDC	BLDC
	Quantity	EA	1	1	1
	Output	W	124	124	124
Sound Power Level	Heating	dB(A)	65	65	65
Liquid Piping Connection	Type	-	Flare	Flare	Flare
	Outer Diameter	mm(inch)	Ø 9.52 (3/8)	Ø 9.52 (3/8)	Ø 9.52 (3/8)
Gas Piping Connection	Type	-	Flare	Flare	Flare
	Outer Diameter	mm(inch)	Ø 15.88 (5/8)	Ø 15.88 (5/8)	Ø 15.88 (5/8)
Piping Length (Outdoor Unit ~ Indoor Unit)	Minimum	m	3	3	3
	Standard	m	7.5	7.5	7.5
	Maximum	m	50	50	50
Height Difference (Outdoor Unit ~ Indoor Unit)	Maximum	m	30	30	30
Additional Refrigerant Charge		g/m	40	40	40
Dimensions	Unit(W x H x D)	mm	950 x 834 x 330	950 x 834 x 330	950 x 834 x 330
	Packed Unit(W x H x D)	mm	1065 x 918 x 461	1065 x 918 x 461	1065 x 918 x 461
Weight	Unit	kg	59	59	59
	Packed Unit	kg	65	65	65
**Rated water flow rate		LPM	17	20	26

Note :

1. Capacities and power inputs are based on the following conditions:
   * : Cooling conditions - Indoor Water Temperature 23°C/18°C; Outdoor Air Temperature 35°CDB/24°CWB
   Heating conditions - Indoor Water Temperature 30°C/35°C; Outdoor Air Temperature 7°CDB/6°CWB
   Standard piping length 7.5m
2. Wiring cable size must comply with the applicable local and national code.
3. The specification may be subject to change without prior notice for purpose of improvement.
4. ** Indoor unit Rated water flow rate.

Outdoor Units			AHUW126A3	AHUW146A3	AHUW166A3
Combination Indoor Units			AHNW16606A3	AHNW16606A3	AHNW16606A3
Power Supply		Ø / V / Hz	1 / 220-240 / 50	1 / 220-240 / 50	1 / 220-240 / 50
Maximum Running Current	Cooling	A	25	25	25
	Heating	A	25	25	25
Wiring Connections	For Power Supply (Included Earth)	Number of wires	3	3	3
	For Connection with Indoor Unit (Included Earth)	Number of wires	4	4	4
* Capacity	Cooling(Under floor)	kW	10.4	12.0	13.0
	Heating(Under floor)	kW	12.0	14.0	16.0
* Power Input	Cooling(Under floor)	kW	2.60	3.08	3.60
	Heating(Under floor)	kW	2.64	3.18	3.76
* EER	Cooling(Under floor)	W/W	4.00	3.90	3.61
* COP	Heating(Under floor)	W/W	4.55	4.41	4.26
Operation Range (Min.~Max.) Outdoor Temperature	Cooling	°C	5 ~ 48	5 ~ 48	5 ~ 48
	Heating	°C	-20 ~ 30	-20 ~ 30	-20 ~ 30
Compressor	Type	-	Hermetic Motor	Hermetic Motor	Hermetic Motor
	Model	-	GPT442MAA	GPT442MAA	GPT442MAA
	Quantity	EA	1	1	1
	Displacement	cm^3/Rev.	44.2	44.2	44.2
	Capacity	kW	13.92	13.92	13.92
Compressor Motor	Type	-	Brushless	Brushless	Brushless
	Quantity	EA	1	1	1
	Rated Output	W	4 000	4 000	4 000
Refrigerant	Type	-	R410A	R410A	R410A
	Charge	g	2 300	2 300	2 300
	Control	-	EEV	EEV	EEV
Refrigerant Oil	Type	-	FVC68D	FVC68D	FVC68D
	Charged Volume	cc	1 300	1 300	1 300
Heat Exchanger	Quantity	EA	2	2	2
	Rows	EA	2	2	2
	Columns	EA	32	32	32
	FPI	Fins/inch	14	14	14
Fan	Type	-	Propeller	Propeller	Propeller
	Quantity	EA	2	2	2
	Air Flow Rate	CMM(l/s)	55	55	55
Fan Motor	Model	-	BLDC	BLDC	BLDC
	Quantity	EA	2	2	2
	Output	W	124	124	124
Sound Power Level	Heating	dB(A)	66	66	66
Liquid Piping Connection	Type	-	Flare	Flare	Flare
	Outer Diameter	mm(inch)	Ø 9.52 (3/8)	Ø 9.52 (3/8)	Ø 9.52 (3/8)
Gas Piping Connection	Type	-	Flare	Flare	Flare
	Outer Diameter	mm(inch)	Ø 15.88 (5/8)	Ø 15.88 (5/8)	Ø 15.88 (5/8)
Piping Length (Outdoor Unit ~ Indoor Unit)	Minimum	m	3	3	3
	Standard	m	7.5	7.5	7.5
	Maximum	m	50	50	50
Height Difference (Outdoor Unit ~ Indoor Unit)	Maximum	m	30	30	30
Additional Refrigerant Charge		g/m	40	40	40
Dimensions	Unit(W x H x D)	mm	950 x 1 380 x 330	950 x 1 380 x 330	950 x 1 380 x 330
	Packed Unit(W x H x D)	mm	1 140 x 1 462 x 461	1 140 x 1 462 x 461	1 140 x 1 462 x 461
Weight	Unit	kg	94	94	94
	Packed Unit	kg	107	107	107
**Rated water flow rate		LPM	34	40	46

Note :

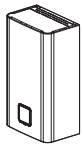
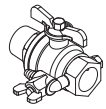
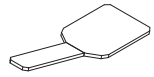
1. Capacities and power inputs are based on the following conditions:
   * : Cooling conditions - Indoor Water Temperature 23°C/18°C; Outdoor Air Temperature 35°CDB/24°CWB
   Heating conditions - Indoor Water Temperature 30°C/35°C; Outdoor Air Temperature 7°CDB/6°CWB
   Standard piping length 7.5m
2. Wiring cable size must comply with the applicable local and national code.
3. The specification may be subject to change without prior notice for purpose of improvement.
4. ** Indoor unit Rated water flow rate.

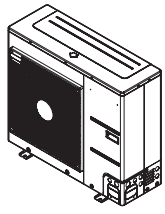
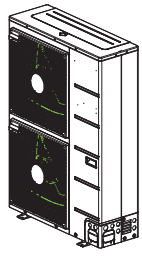
Outdoor Units			AHUW128A3	AHUW148A3	AHUW168A3
Combination Indoor Units			AHNW16809A3	AHNW16809A3	AHNW16809A3
Power Supply		Ø / V / Hz	3 / 380-415 / 50	3 / 380-415 / 50	3 / 380-415 / 50
Maximum Running Current	Cooling	A	16.1	16.1	16.1
	Heating	A	16.1	16.1	16.1
Wiring Connections	For Power Supply (Included Earth)	Number of wires	5	5	5
	For Connection with Indoor Unit (Included Earth)	Number of wires	4	4	4
* Capacity	Cooling(Under floor)	kW	10.4	12.0	13.0
	Heating(Under floor)	kW	12.0	14.0	16.0
* Power Input	Cooling(Under floor)	kW	2.60	3.08	3.60
	Heating(Under floor)	kW	2.64	3.18	3.76
* EER	Cooling(Under floor)	W/W	4.00	3.90	3.61
* COP	Heating(Under floor)	W/W	4.55	4.41	4.26
Operation Range (Min.~Max.) Outdoor Temperature	Cooling	°C	5 ~ 48	5 ~ 48	5 ~ 48
	Heating	°C	-20 ~ 30	-20 ~ 30	-20 ~ 30
Compressor	Type	-	Hermetic Motor	Hermetic Motor	Hermetic Motor
	Model	-	GPT442MAA	GPT442MAA	GPT442MAA
	Quantity	EA	1	1	1
	Displacement	cm^3/Rev.	44.2	44.2	44.2
	Capacity	kW	13.92	13.92	13.92
Compressor Motor	Type	-	Brushless	Brushless	Brushless
	Quantity	EA	1	1	1
	Rated Output	W	4 000	4 000	4 000
Refrigerant	Type	-	R410A	R410A	R410A
	Charge	g	2 300	2 300	2 300
	Control	-	EEV	EEV	EEV
Refrigerant Oil	Type	-	FVC68D	FVC68D	FVC68D
	Charged Volume	cc	1 300	1 300	1 300
Heat Exchanger	Quantity	EA	2	2	2
	Rows	EA	2	2	2
	Columns	EA	32	32	32
	FPI	Fins/inch	14	14	14
Fan	Type	-	Propeller	Propeller	Propeller
	Quantity	EA	2	2	2
	Air Flow Rate	CMM(l/s)	55	55	55
Fan Motor	Model	-	BLDC	BLDC	BLDC
	Quantity	EA	2	2	2
	Output	W	124	124	124
Sound Power Level	Heating	dB(A)	66	66	66
Liquid Piping Connection	Type	-	Flare	Flare	Flare
	Outer Diameter	mm(inch)	Ø 9.52 (3/8)	Ø 9.52 (3/8)	Ø 9.52 (3/8)
Gas Piping Connection	Type	-	Flare	Flare	Flare
	Outer Diameter	mm(inch)	Ø 15.88 (5/8)	Ø 15.88 (5/8)	Ø 15.88 (5/8)
Piping Length (Outdoor Unit ~ Indoor Unit)	Minimum	m	3	3	3
	Standard	m	7.5	7.5	7.5
	Maximum	m	50	50	50
Height Difference (Outdoor Unit ~ Indoor Unit)	Maximum	m	30	30	30
Additional Refrigerant Charge		g/m	40	40	40
Dimensions	Unit(W x H x D)	mm	950 x 1 380 x 330	950 x 1 380 x 330	950 x 1 380 x 330
	Packed Unit(W x H x D)	mm	1 140 x 1 462 x 461	1 140 x 1 462 x 461	1 140 x 1 462 x 461
Weight	Unit	kg	94	94	94
	Packed Unit	kg	107	107	107
**Rated water flow rate		LPM	34	40	46

Note :

1. Capacities and power inputs are based on the following conditions:
   * : Cooling conditions - Indoor Water Temperature 23°C/18°C; Outdoor Air Temperature 35°CDB/24°CWB
     Heating conditions - Indoor Water Temperature 30°C/35°C; Outdoor Air Temperature 7°CDB/6°CWB
     Standard piping length 7.5m
2. Wiring cable size must comply with the applicable local and national code.
3. The specification may be subject to change without prior notice for purpose of improvement.
4. ** Indoor unit Rated water flow rate.

2. External Apprearance

INDOOR UNIT BOX					
Item	Image	Quantity	Item	Image	Quantity
Indoor unit		1	Shut-off valve		2
Installation Manual		1	Installation Sheet		1
Owner's Manual		1	Remote controller remover		1

OUTDOOR UNIT BOX		
Item	Image	Quantity
Outdoor Unit U4 Chassis (Product heating capacity : 5 kW, 7 kW, 9 kW)		1
Outdoor Unit U3 Chassis (Product heating capacity : 12 kW, 14 kW, 16 kW)		1

Part 2
Features & Controls

1. List of Function

Category	Functions	AHNW16606A3	AHNW16809A3
Installation	Drain pump	X	X
	E.S.P. control	X	X
	Electric heater	O	O
	High ceiling operation	X	X
	Auto Elevation Grille	X	X
Reliability	Hot start	X	X
	Self diagnosis	O	O
	Soft dry operation	X	X
Convenience	Auto changeover	X	X
	Auto cleaning	X	X
	Auto operation(artificial intelligence)	X	X
	Auto Restart	O	O
	Child lock	O	O
	Forced operation	X	X
	Group control	X	X
	Sleep mode	O	O
	Timer(on/off)	O	O
	Timer(weekly)	O	O
	Two thermistor control	X	X
Individual control	Standard Wired remote controller	O	O
	Deluxe wired remote controller	X	X
	Simple wired remote controller	X	X
	Simple Wired remote controller(for hotel use)	X	X
	Wireless remote controller	X	X
Network function	General central controller (Non LGAP)	X	X
	Network Solution(LGAP)	X	X
	Dry contact	PDRYCB500	PDRYCB500
	PI 485(for Indoor Unit)	X	X
Special function kit	Zone controller	X	X
	CTI(Communication transfer interface)	X	X
	Electronic thermostat	X	X
Others	Remote temperature sensor	PQRSTA0	PQRSTA0
	Group control wrie	X	X
	Telecom shelter controller	X	X
Air to Water Heat Pump Functions	Anti-condensation on floor(cooling)	O	O
	Water pump on / off Control	O	O
	Flow switch control	O	O
	Thermostat interface (230V AC)	O	O
	Thermostat interface (24V AC)	X	X
	DHW tank heating (Install kit)	PHLTA	PHLTC
	Solar-thermal interface with DHW tank (Solar thermal kit)	PHLLA	PHLLA
	PHEX anti-freezing control	O	O
	Water pump foeced operation	O	O
	Autosetting according to ambient temperature	O	O
	Slient operation (with scheduler)	O	O
	Anti-overheating of water pipe	O	O
	Emergency operation	O	O
	Scheduler(DHW Tank Heating / DHW Tank Heater)	O	O
	Timer(DHW Tank Heating / DHW Tank Heater)	O	O
	Quick DHW tank Heating	O	O
	Electric Heater Capacity Control	O	O
	Screed drying mode	O	O
	Sump Heater	O	O
	Dry Contact (Main PCB)	O	O

Notes

1. * : These functions need to connect the wired remote controller.
O : Applied, X : Not applied

Accessory model name : Installed at field, ordered and purchased separately by the corresponding model name, supplied with separate package.

Category	Functions	AHNW16606A3	AHNW16809A3
Reliability	Defrost / Deicing	O	O
	High pressure switch	X	X
	Low pressure switch	X	X
	Phase protection	X	X
	Restart delay (3-minutes)	O	O
	Self diagnosis	O	O
	Soft start	X	X
Convenience	Test function	O	O
	Night Silent Operation	X	X
	Wiring Error Check	X	X
	Peak Control	X	X
	Mode Lock	X	X
	Forced Cooling Operation (Outdoor Unit)	X	X
Network function	Network soluation(LGAP)	X	X

Notes

1. * : These functions need to connect the wired remote controller.

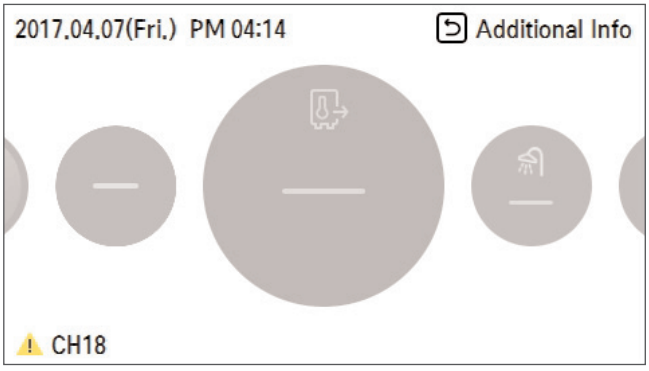
O : Applied, X : Not applied

Accessory model name : Installed at field, ordered and purchased separately by the corresponding model name, supplied with separate package.

2. Feature & Controls

1. Summarized Features

1.1 Emergency Control



Easy checking of system failure

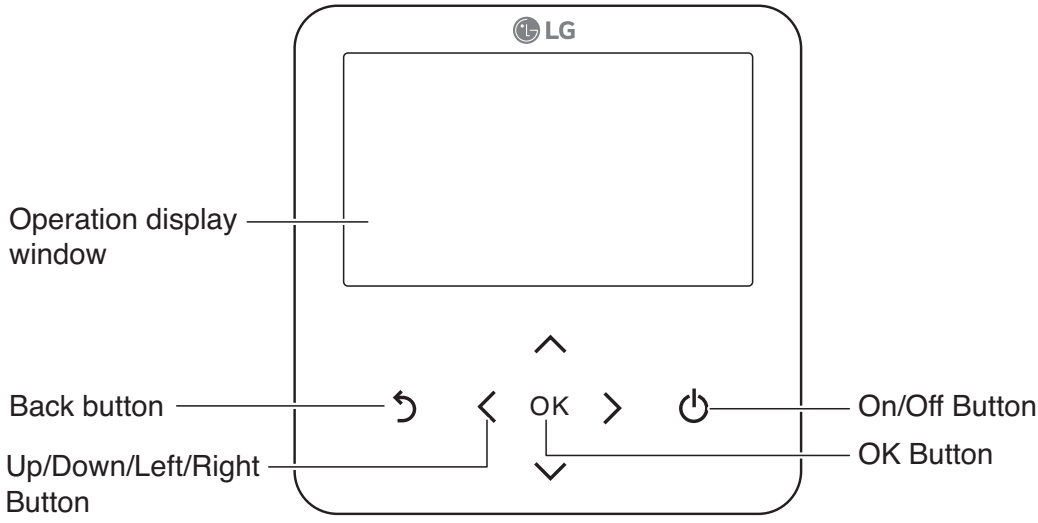
- Slight / Heavy trouble

Emergency operating

- Heavy trouble
- Electric heater ON
- Secure at least heating before A/S

1.2 Remote controller

• Controller Configuration



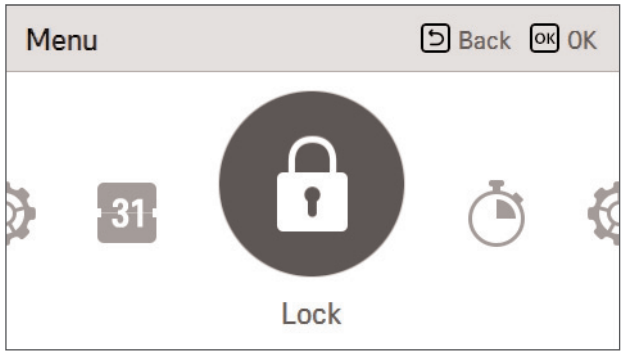
Operation display window	Operation and Settings status display
Back button	When you move to the previous stage from the menu's setting stage
Up/down/left/right button	When you change the menu's setting value
OK button	When you save the menu's setting value
On/Off button	When you turn ON/OFF the air conditioner

2. Special Function

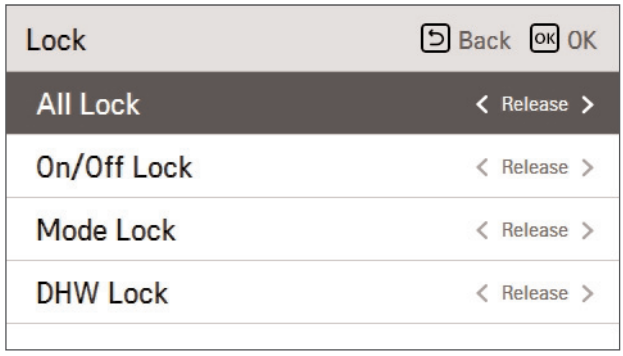
Lock setting – all, on/off, mode, DHW lock

- It is the function to lock the button operation of the remote controller so that children or other persons cannot use it without permission.
- It is the function to limit the desired temperature range that can be set in the wired remote controller.

1 In the menu screen, press [<, > (left/right)] button to select “lock setting” category, and press [OK] button to move to the lock setting list screen.



2 In the lock setting list, if you press [∧ , ∨ (up/down)] button, you can turn on/off the corresponding lock function.



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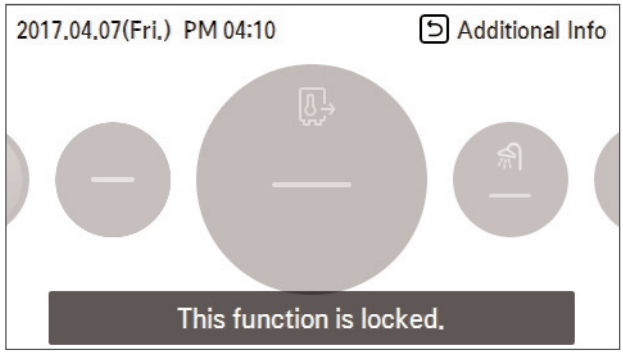
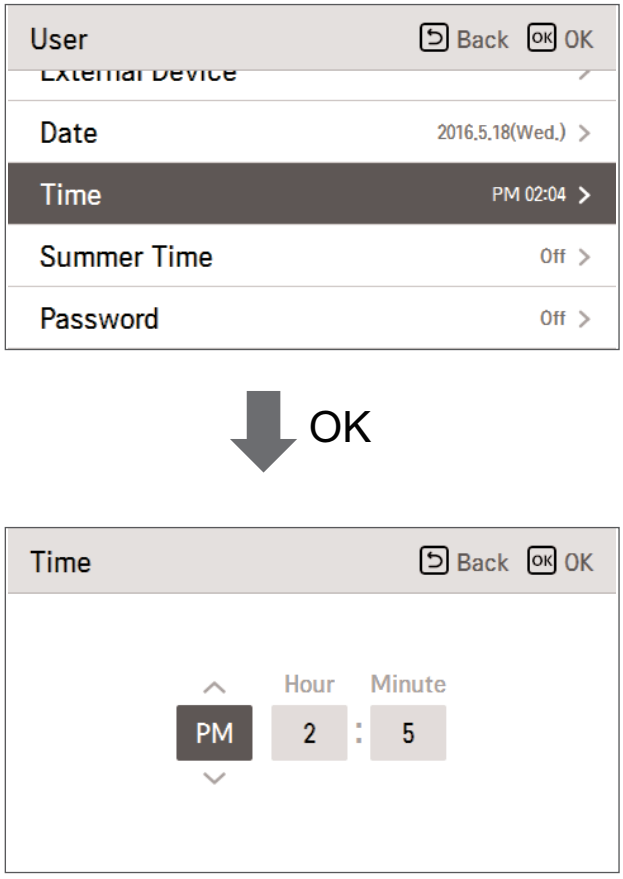


Timer Setting

Set the time displayed on the remote controller.

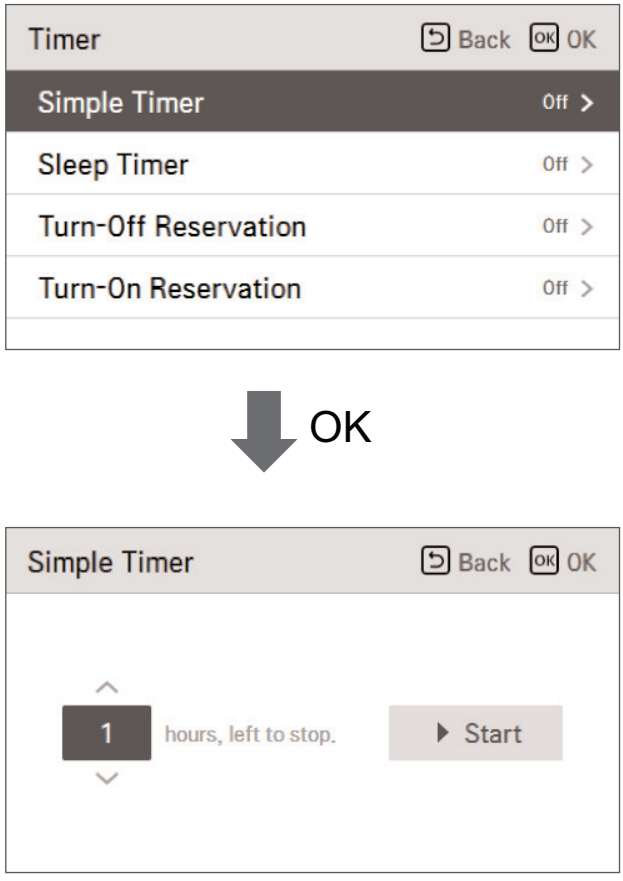
• In the user setting list, select the time category, and press [OK] button to move to the detail screen.

• After the setting, if you press [OK] button, the setting is saved and moves to the previous screen.



Simple timer

You can easily set the timer in the range of 1~7 hours in the units of 1 hour.

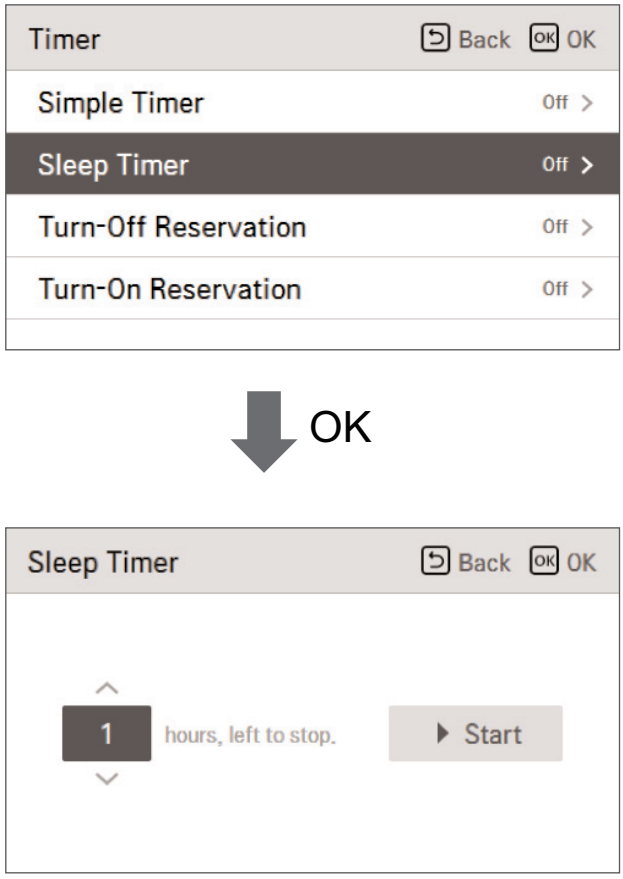


NOTICE

If the product operation is On, the easy timer turns off the operation after the corresponding time.
If the product operation is Off, the easy timer turns on the operation after the corresponding time.
If the easy timer operation is turned On/Off before the timer operation, the set timer will be cleared.

Sleep timer

Sleep timer is the function to operate the air conditioner in sleep mode before going to sleep for certain hours and stop the operation.

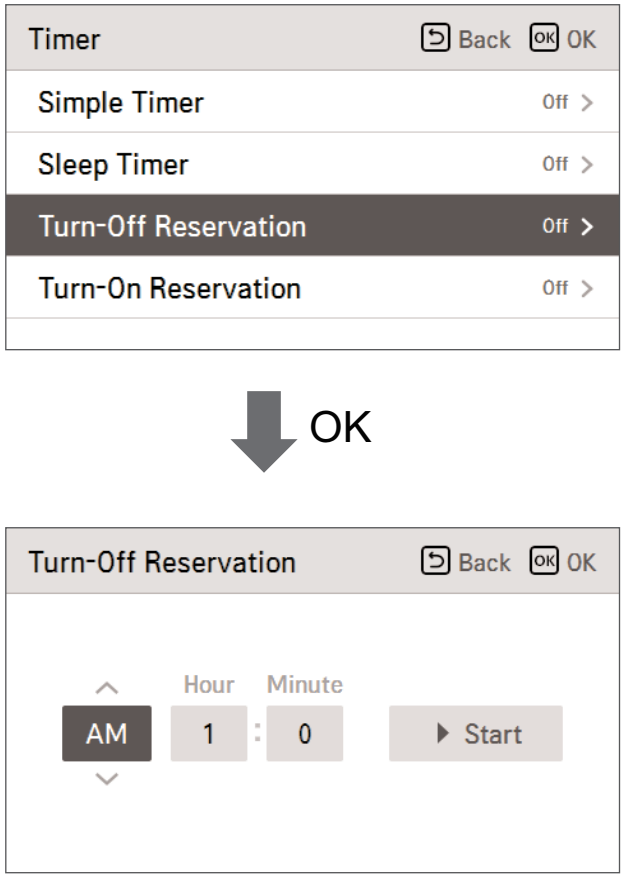


NOTICE

You can set the sleep timer while the product is in operation.
If the sleep timer operation is turned On before the timer operation, the set timer will be cleared.

Turn-off Reservation

The product is automatically turned Off at the set timer time.

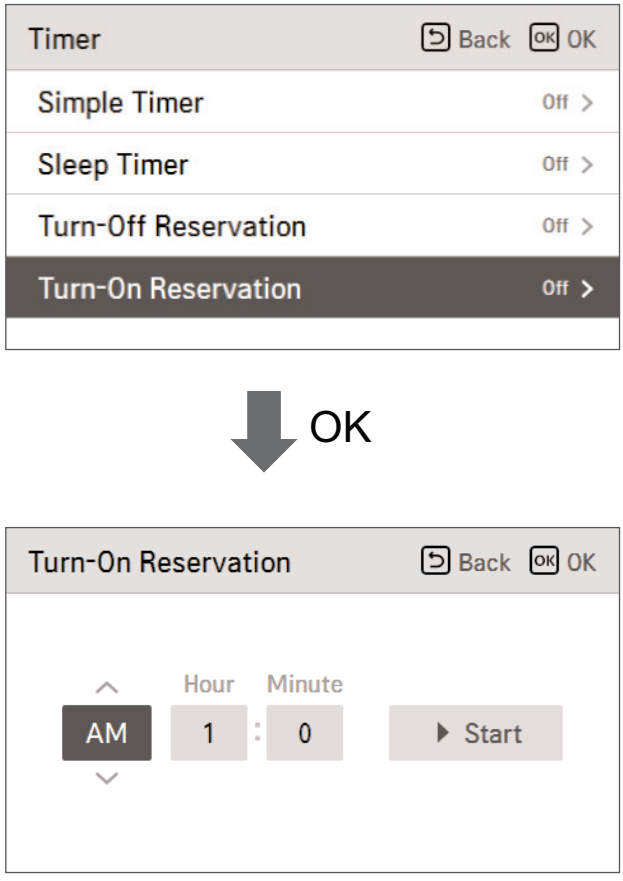


NOTICE

Even if the Turn-off Reservation operation is turned On/Off after the setting and before the timer operation, the set timer is not cleared.

Turn-on Reservation

The product is automatically turned On at the set timer time.



NOTICE

Even if the Turn-on Reseravation operation is turned On/Off after the setting and before the timer operation, the set timer is not cleared.

Schedule Setting

Daily Schedule

It is the function that can check the status of the timer (schedule) saved in the remote controller.

- In the schedule list, select the daily schedule status category, and press [OK] button to move to the detail daily schedule status screen.
- You can use the remote controller's [<, > (left/right)] button to check the timer information of other dates.
- You can use the remote controller's [∧ , ∨ (up/down)] button to check the corresponding date's other timer information.
- Select the timer information, and press [OK] button to move to the corresponding timer's edit screen.

Schedules & Edit

It is the function that can check the status of the timer (schedule) saved in the remote controller.

- In the schedule list, select the daily schedule status category, and press [OK] button to move to the daily schedule status detail screen.
- You can use the remote controller's [<, > (left/right)] button to check other date's timer information.
- You can edit the saved schedule's timer information.
  - Select the schedule to edit using [∧ , ∨ (up/down)] button, and press [OK] button to move to the edit screen.
- Select the timer information, and press [OK] button to move to the corresponding timer's edit screen.

Schedules & Edit – Add schedule

Description of each stage in Add schedule

In 'Stage 1', it sets the period to perform the timer.

In 'Stage 2', it sets the day of week to perform the timer.

- You can select 'Everyday / Weekend / Weekdays / Individual selection'.
  In 'Stage 3', it sets the start time for the timer.
  In 'Stage 4', it sets the timer operation information.
- If 'Stop' is selected, you cannot set the mode / temperature / fan speed.
  When stages 1~4 are completed, along with the message of 'schedule is added', it moves to View and edit schedule screen.

Exception day

It is the function to automatically stop the operation on the set timer day.

- In the schedule list, select the exception day category, and press [OK] button to move to the Exception day designation detail screen.
- In the exception day, you can check, and add/change/delete the exception day information saved in the remote controller.
  - To add an exception day, in the Exception day registration detail screen, designate year/month/day, and press [OK] button to save the Exception day.
  - Select the Exception day to edit using [∧ , ∨ (up/down)] button, and press [OK] button to move to the edit screen.
  - In the exception day edit screen, you can check, delete/change the corresponding exception day's setting contents.
  - When you change the exception day information, you need to save it after the change.

DHW Tank Heating & DHW Tank Heater Operation

This function is schedule programming about DHW tank heating and DHW tank heater operation.

Two schedule programming for DHW tank heating and another Two schedule programming for DHW tank heater operation are possible. Scheduled programming will be operated everyday.

Low noise mode operation

If necessary, enable or disable of silent mode can be programmed according to user's specific time.

Screed drying

- If necessary, enable or disable of screed drying can be programmed according to user's setting.
- While the screed drying mode is operating, "Dry" is displayed.

3. System Set-up

As THERMA V is designed to satisfy various installation environment, it is important to set up system correctly. If not configured correctly, improper operation or degrade of performance can be expected.

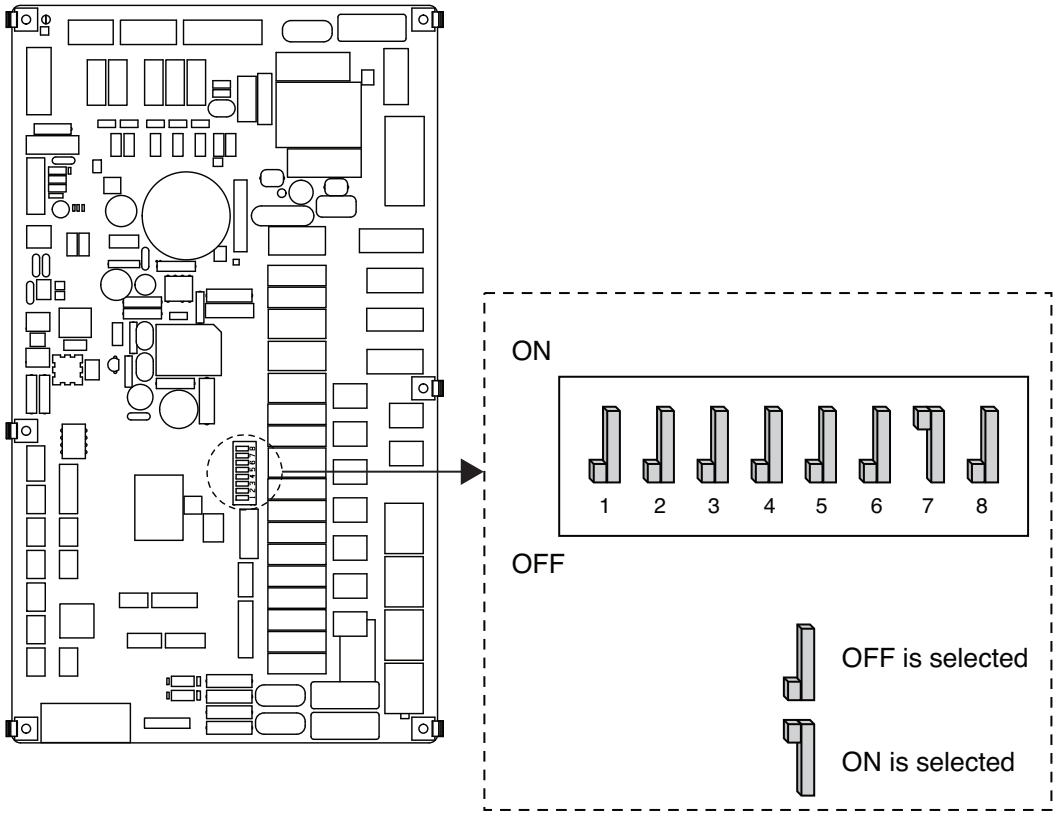
3.1 DIP Switch Setting

⚠CAUTION

Turn off electric power supply before setting DIP switch

• Whenever adjusting DIP switch, turn off electric power supply to avoid electric shock.

General Information



DIP switch information

• If you set Dip switch when power is on, the changed setting will not be applied immediately.
The changed setting will be enabled only when Power is reset or by pressing Reset button.

Description	Setting	1	2	3	4	5	6	7	8
Role when central controller is equipped.	As Master	X							
	As slave	●							
Accessory installation information	Unit only		X	X					
	Unit + DHW tank is installed.		X	●					
	Unit + DHW tank + Solar thermal system is installed.		●	X					
Emergency operation Level.	High temperature cycle				X				
	Low temperature cycle				●				
External water pump installation information.	External water pump is NOT installed.					X			
	External water pump is installed.					●			
Selecting electric heater capacity.	Step 2 capacity is used.						X	X	
	Step 1 capacity is used.						X	●	
	Electric heater is not used.						●	X	
Thermostat installation information.	Thermostat is NOT installed.								X
	Thermostat is installed.								●
Default		X	X	X	X	X	X	●	X

CAUTION

1. "X" mark means dip switch must be off. Otherwise the function may not operates correctly.
2. If each dip switch doesn't set correctly, unit will operate abnormally.

NOTICE

Emergency operation

• **Definition of terms**

- **Trouble :** a problem which can stop system operation, and can be resumed temporally under limited operation without certificated professional's assist.
- **Error :** problem which can stop system operation, and can be resumed ONLY after certificated professional's check.
- **Emergency mode :** temporary heating operation while system met trouble.

• **Objective of introducing 'trouble'**

- Not like airconditioning unit, Air-to-Water heat pump is generally operating in whole winter season without any system stopping.
- If system found some problem, which is not critical to system operating for yielding heating energy, the system can temporarily continue in emergency mode operation with end user's decision.

• **Classified trouble**

- Trouble is classified two levels according to the seriousness of the problem : Slight Trouble and heavy trouble
- **Slight trouble :** Sensor trouble.
- **Heavy trouble :** Compressor cycle trouble.
- **Option trouble :** a problem is found for option operation such as water tank heating. In this trouble, the troubled option is assumed as if it is not installed at the system.

• **Emergency operation level**

- When system met trouble, it stops operation and wait for user's decision : Calling service center or starting emergency operation.
- To start emergency operation, user simply push ON / OFF button once more.
- Two different levels are prepared for emergency operation : High temperature cycle and low temperature cycle.
- In emergency operation mode, user can not adjust target temperature.

※ It can not be operated, if the electric heater accessory is not installed.

	Dip Switch (#4)	Target Leaving Water Temperature	Target Room Air Temperature	Target DHW Temperature
High temperature cycle	OFF	50 °C	24 °C	80 °C
Low temperature cycle	ON	30 °C	19 °C	50 °C

• **Duplicated trouble : Option trouble with slight or heavy trouble**
If option trouble is occurred with slight (or heavy) trouble at the same time, the system puts higher priority to slight (or heavy) trouble and operates as if slight (or heavy) trouble is occurred.
Therefore, sometimes DHW heating can be impossible in emergency operation mode. When DHW is not warming up while emergency operation, please check whether the DHW sensor and related wiring are connected well or not.

• **Emergency operation is not automatically restarted after main electricity power is reset.**
In normal condition, the unit operating information is restored and automatically restarted after main electricity power is reset.
But in emergency operation, automatic re-start is prohibited to protect the unit.
Therefore, user must restart the unit after power reset when emergency operation has been running.

3.2 Control Panel Setting

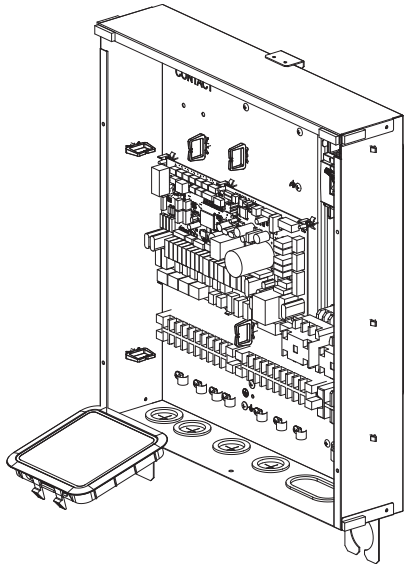
How to enter installer setting mode

⚠CAUTION

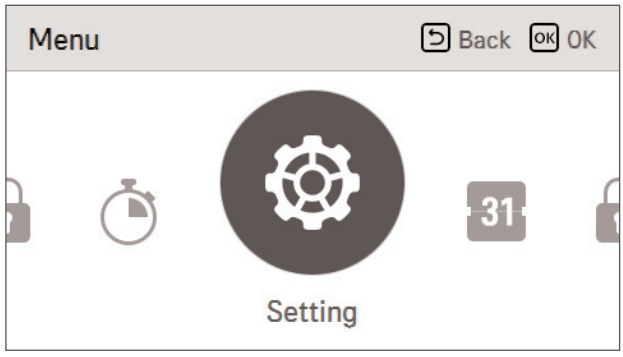
Installer setting mode is to set the detail function of the remote controller.
If the installer setting mode is not set correctly, it could cause problems to the unit, user injury or property damage.
This must be set by an certificated installer, and any installation or change that is carried out by a non-certificated person should be responsible for the results. In this case, free service cannot be provided.

❊ Installer setting password
Main screen → menu → setting → service → RMC version information → SW Version
Example) SW version : 1.00.1 a
In the above case, the password is 1001.

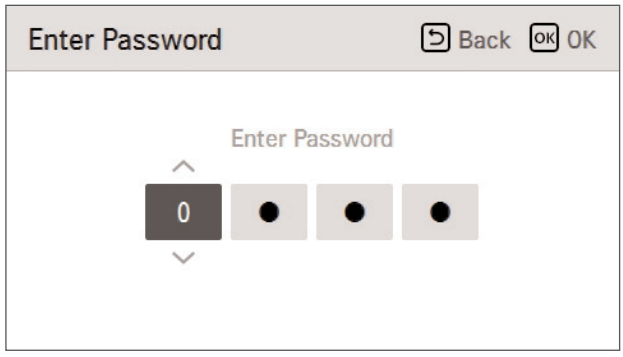
❊ Remote controler should be hanged botton of control box in service



1 In the menu screen, press [<,>(left/right)] button to select the setting category, and press [∧ (up)] button for 3 seconds to enter the password input screen for the installer setting.



2 Input the password and press [OK] button to move to the installer setting list.



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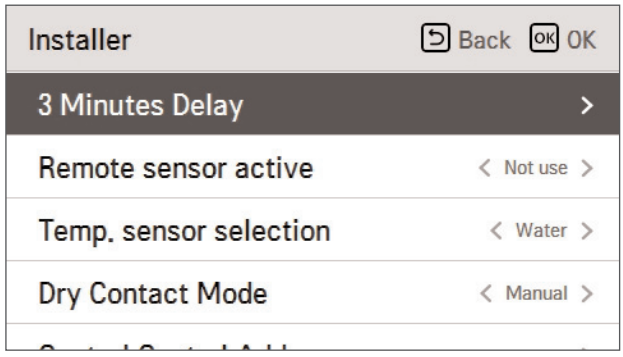


Summary

• You can set the product user functions.

• Some functions may not be displayed/operated in some product types.

Test	Description
Disable 3 minute Delay	Factory use only
Remote sensor active	Connection information about remote air sensor
Celsius / Fahrenheit Switching	Display temperature in Celsius or Fahrenheit
Temp. sensor selection	Selection for setting temperature as air temperature or leaving water temperature
Dry Contact Mode	Setting dry contact auto start option.
Air cooling set temp.	Adjusting range of 'Setting Air Temperature' in cooling mode
Water cooling set temp	Adjusting range of 'Setting Leaving Water Temperature' in cooling mode
Air heating set temp.	Adjusting range of 'Setting Air Temperature' in heating mode
Water heating set temp	Adjusting range of 'Setting Heating Flow Temperature' in heating mode
DHW set temp.	Adjusting range of 'Setting DHW tank Heating Flow Temperature' in domestic hot water tank heating mode
Screed drying mode	After installing water pipes for under floor heating, user can select screed drying mode for curing the cement
Heater on temperature	Setting for using Step 1 or 2 capacity of electric heater
Water supply off temp. during cooling	Determine leaving water temperature when the unit is turned off. This funtion is used for preventing condensation on the floor in cooling mode
min. and max. of outdoor temp. for auto mode	Setting outdoor Min/Max temperature for auto mode
min. and max. of Indoor air temp. for auto mode	Setting indoor Min/Max temperature for auto mode
min. and max. of LWT for auto mode	Setting heating flow Min/Max temperature for auto mode
Tank disinfection setting 1	Setting start/maintain time for pasteurisation
Tank disinfection setting 2	Setting pasteurisation temperature
Tank setting 1	Setting start temperature for operation
Tank setting 2	Setting maintain temperature for operation
Heater priority	Determine electric heater and water heater on and off
DHW time setting	Determine follow time duration : operation time of domestic hot water tank heating, stop time of domestic hot water tank heating, and delay time of DHW tank heater operating

Common setting

• **3 Minutes Delay**
Factory use only.

• **Remote sensor active**
If user connects remote air sensor to control the unit by room air temperature, the connection information should be notified to the unit.

Note : If remote air sensor is connected but this function code is not set correctly, the unit can not be controlled by room air temperature.

• **Celsius / Fahrenheit switching**
Temperature is displayed in Celsius or Fahrenheit.

• **Temp. sensor selection**
The unit can be operated according to air temperature or leaving water temperature. The selection for setting temperature as air temperature or leaving water temperature is determined.

Note : Air temperature as setting temperature is ONLY available when remote air sensor connection is enabled and Remote air sensor connection is set as 02.

• **Dry Contact Mode**
This function allows the dry contact operate under auto run mode or manual mode with remote controller.

Temperature range setting

• **Air cooling set temp.**

Determine cooling setting temperature range when air temperature is selected as setting temperature.

NOTICE

Only available when remote air temperature sensor is connected.

- Accessory PQRSTA0 should be installed.
- Also, Remote air sensor connection should be set properly.

• **Water cooling set temp**

Determine cooling setting temperature range when leaving water temperature is selected as setting temperature.

NOTICE

Water condensation on the floor

- While cooling operation, it is very important to keep leaving water temperature higher than 16 °C. Otherwise, dew condensation can be occurred on the floor.
- If floor is in humid environment, do not set leaving water temperature below 18 °C.

NOTICE

Water condensation on the radiator

- While cooling operation, cold water may not flow to the radiator. If cold water enters to the radiator, dew generation on the surface of the radiator can be occurred.

• **Air heating set temp.**

Determine heating setting temperature range when air temperature is selected as setting temperature.

CAUTION

Only available when remote air temperature sensor is connected.

- Accessory PQRSTA0 should be installed.
- Also, Remote air sensor connection should be set properly.

• **Water heating set temp**

Determine heating setting temperature range when leaving water temperature is selected as setting temperature.

• **DHW set temp.**

Determine heating setting temperature range of water tank leaving water.

NOTICE

Only available when DHW tank feature is installed.

- DHW tank and DHW tank kit should be installed.
- DIP switch No. 2 and 3 should be set properly.

• **Screed drying mode**

After installing water pipes for under floor heating, user can select screed drying mode for curing the cement.

Temperature control parameter setting and etc

• **Heater on temperature**

Using Step 1 capacity of electric heater : when DIP switch No. 6 and 7 is set as 'OFF-ON' :

- Heater on temperature : outdoor air temperature where Step 1 capacity of electric heater starts operation.
- Not used.
- Example : If Heater on temperature is set as '-1' and DIP switch No 6. and 7 is set as 'OFF-ON', then Step 1 capacity of electric heater will start operation when outdoor air temperature is below -1 °C and current leaving water temperature or room air temperature is much belower than target leaving water temperature or target room air temperature.

- Heater on temperature
- Not used.
- Example : If Heater on temperature is set as '-1' and DIP switch No 6. and 7 is set as 'OFF-OFF', then step2 capacity of electric heater will start operation when outdoor air temperature is below -1 °C and current leaving water temperature or room air temperature is much belower than target leaving water temperature or target room air temperature.

• **Water supply off temp. during cooling**

Determine leaving water temperature when the unit is turned off. This function is used fr preventing condensation on the floor in cooling mode.

- Stop temp. : cut-off temperature. Stop temp. is valid when FCU is installed.
- FCU : determines if FCU is installed or not.
- Example : If Stop temp. is set as '10' and FCU is 'Use' and actually FCU is NOT installed in the water loop, the unit stop operation in cooling mode when the leaving water temperature is below 10 °C.
- Example : If Stop temp. is set as '10' and FCU is 'Not use' and actually FCU is installed in the water loop, the Stop temp. is not used and the unit do NOT stop operation in cooling mode when the leaving water temperature is below 10 °C.

NOTICE

FCU Installation

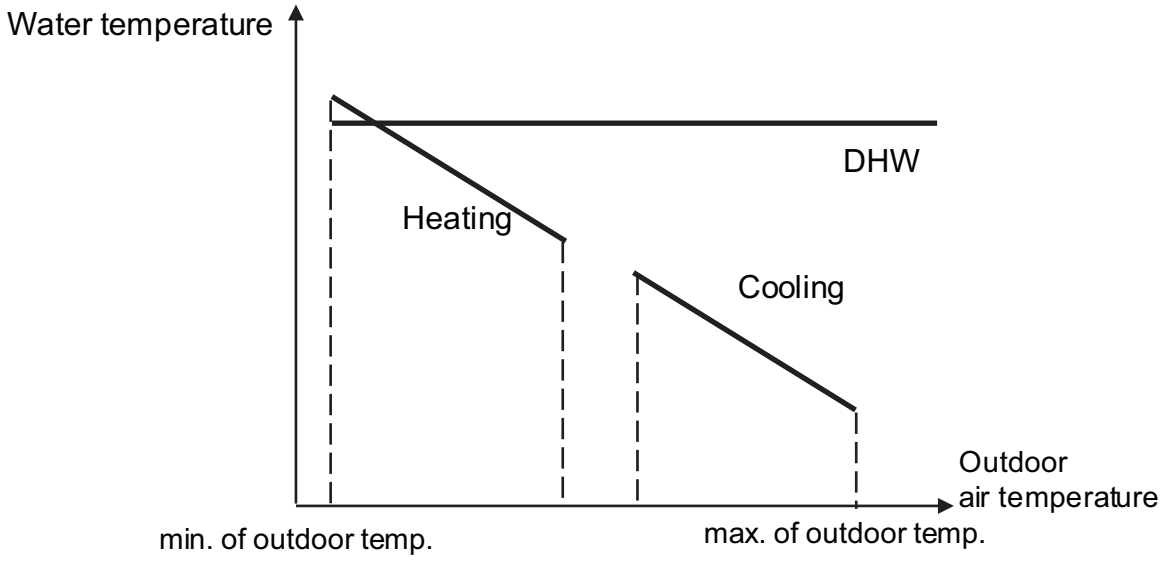
• If FCU is used, related 2way valve should be installed and connected to the Main PCB assembly 1.

• If FCU is set as 'Not use' but FCU or 2way valve is NOT installed, the unit can do abnormal operation.

• **Seasonal auto mode**

Weather dependent mode in heating and cooling, auto change over in heating, cooling and DHW only depending on the pre-set interval of temperature.

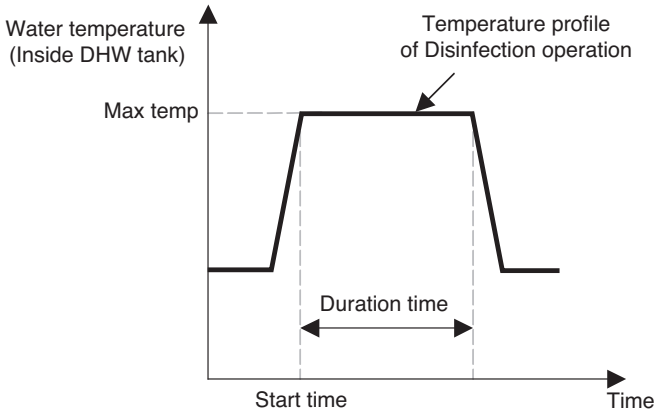
- Change the mode to auto mode Priority in scheduler (In scheduling, it could be to change mode)
- 4 outdoor temp. set points, 4 Room1 Temp. set points, 4 Room2 temp. set points
- It could be controlled by 11 steps (-5~+5)



• **Tank disinfection setting 1, 2**

Disinfection operation is special DHW tank operation mode to kill and to prevent growth of viruses inside the tank.

- Disinfection active : Selecting enable or disable of disinfection operation.
- Start date : Determining the date when the disinfection mode is running.
- Start time : Determining the time when the disinfection mode is running.
- Max temp. : Target temperature of disinfection mode.
- Duration time : Duration of disinfection mode.



NOTICE

Vales of Tank disinfection setting

- If Disinfection active is set as ' Not use', that is 'disable disinfection mode', Start date and Start time is not used.
- When Disinfection active is set as 'Use', that is 'enable disinfection mode', Start date is displayed at the position of Disinfection active and Start time is displayed at the position of Start date.

NOTICE

DHW heating should be enable.

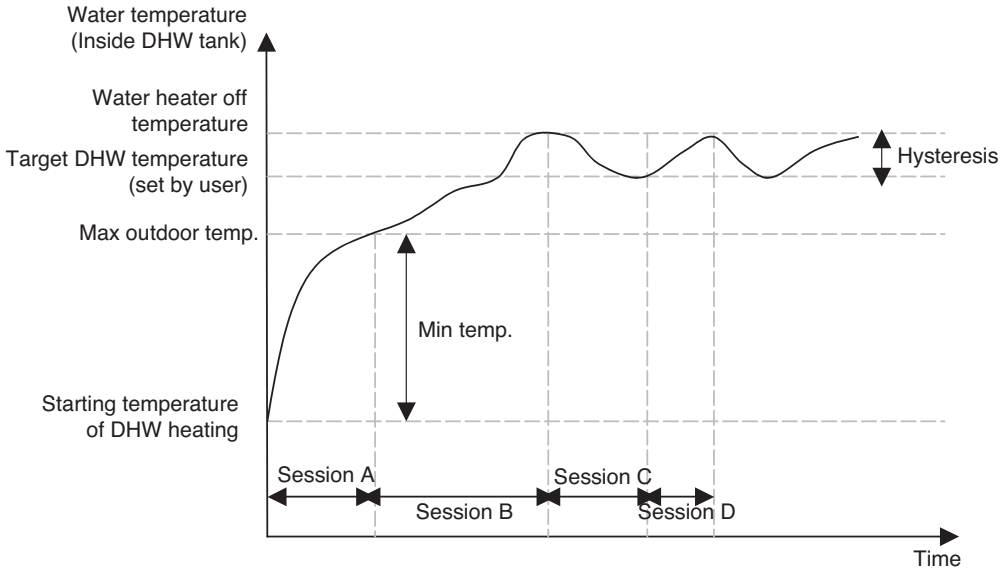
- If DHW heating is disable, the disinfection mode will not be operated although Disinfection active is set as 'Use'.
- To use disinfection mode, DHW heating should be enable. (by button input or scheduler programming)

• **Tank setting 1, 2**

Descriptions for each parameters are as following.

- Min temp. : temperature gap from Max outdoor temp.
- Max outdoor temp. : maximum temperature generated by AWHP compressor cycle.
- Example : If Min temp. is set as '5' and Max outdoor temp. is set as '48', then Session A (see the graph) will be started when the water tank temperature is below 45 °C…. If temperature is above 48 °C…, then Session B will be started.

- Hysteresis : temperature gap from target DHW temperature. This value is required to frequent On and Off of water tank heater.
- Heating priority : Determining heating demand priority between DHW tank heating and under floor heating.
- Example : If user's target temperature is set as '70' and Hysteresis is set as '3', then the water tank heater will be turned off when the water temperature is above 73 °C. The water tank heater will be turned on when the water temperature is below 70 °C.
- Example : If Heating priority is set as 'DHW', that means heating priority is on DHW heating, DHW is heated by AWHP compressor cycle and water heater. In this case the under floor can not be heated while DHW heating. On the other hand, if the Heating priority is set as 'Floor heating', that means heating priority is on under floor heating, DHW tank is ONLY heated by water heater. In this case the under floor heating is not stopped while DHW is heated.



Session A : Heating by AWHP compressor cycle and water heater
Session B : Heating by water heater
Session C : No heating (Water heater is Off)
Session D : Heating by water heater

NOTICE

DHW heating does not operate when it is disabled.

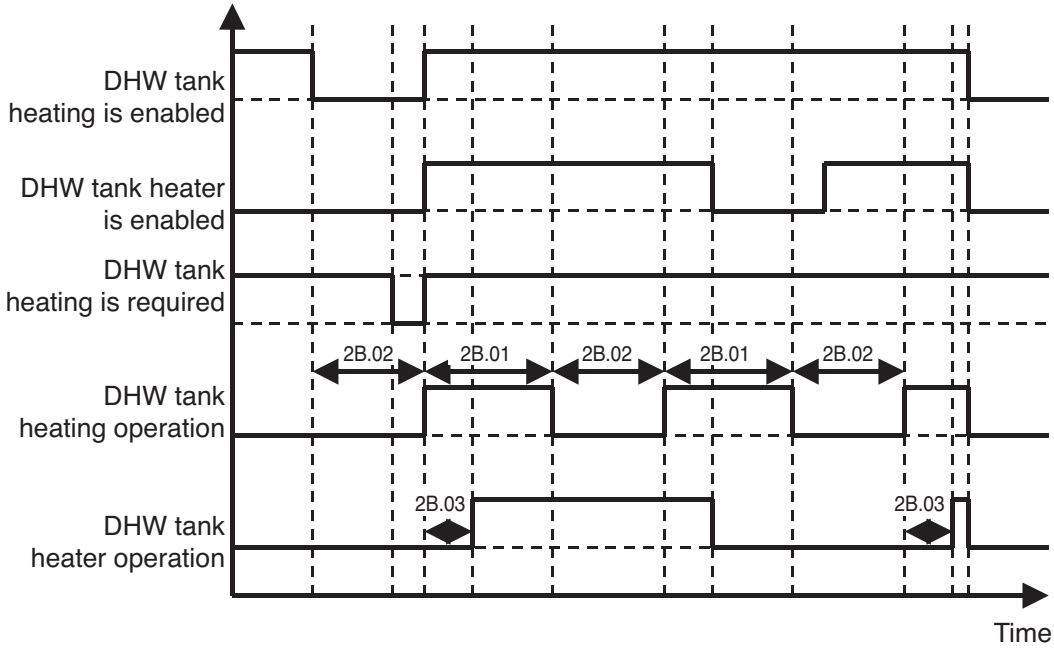
• **Heater priority**

- Heater priority : determine electric heater and sanitary tank heater on and off..
- Example : If Heater priority is set as 'Main+Boost heater ON', then electric heater and DHW tank heater are on and off according to control logic. If Heater priority is set as 'Boost heater only ON', then electric heater is never turned on and only water heater is on and off according to control logic.

• **DHW time setting**

Determine following time duration : operation time of DHW tank heating, stop time of DHW tank heating, and delay time of DHW tank heater operating.

- Active time : This time duration defines how long time DHW tank heating can be continued.
- Stop time : This time duration defines how long time DHW tank heating can be stopped. It is also regarded as time gap between DHW tank heating cycle.
- Boost heater delay time : This time duration defines how long time DHW tank heater will not be turned on in DHW heating operation.
- Example of timing chart :



Part 3
Basic Control

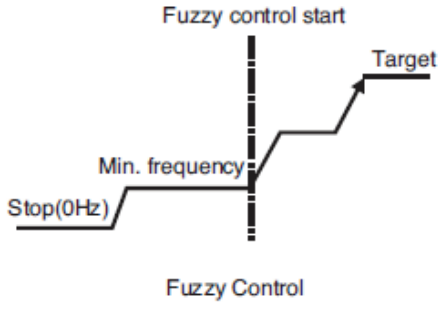
1. Normal operation

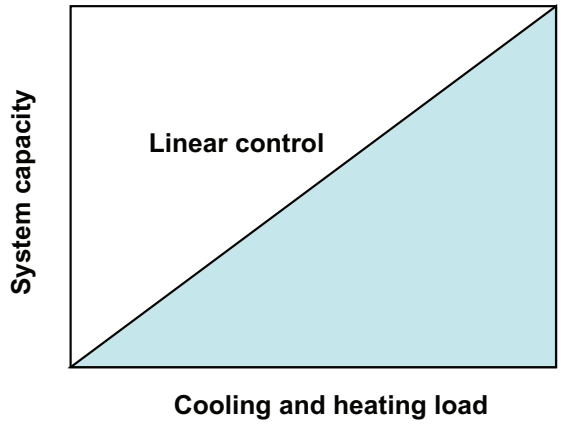
Basic principle is to control the rpm of the motor by changing the working frequency of the compressor.
Three phase voltage is supplied to the motor and the time for which the voltage will supplied is controlled by IPM (intelligent power module).
Switching speed of IPM defines the variable frequency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

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

2. Compressor control

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





Inverter linear control as cooling and heating load increasing

3. EEV(Electronic Expansion Valve) control

EEV operates with fuzzy control rules to keep The degree of superheat (2~3°C) or the target temperature of discharge pipe.

* Cooling mode

The degree of superheat = Tsuction – Tevaporator

Tsuction : temperature at suction pipe sensor(°C)

Tevaporator : evaporation temperature (°C)

* Heating mode

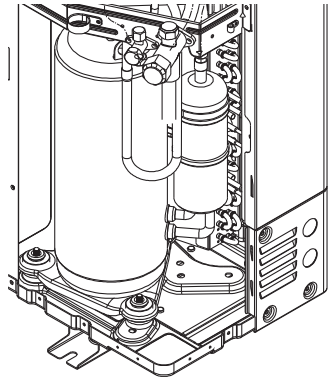
the target temperature of discharge pipe = T condenser + α

T condenser : condenser temperature (°C)

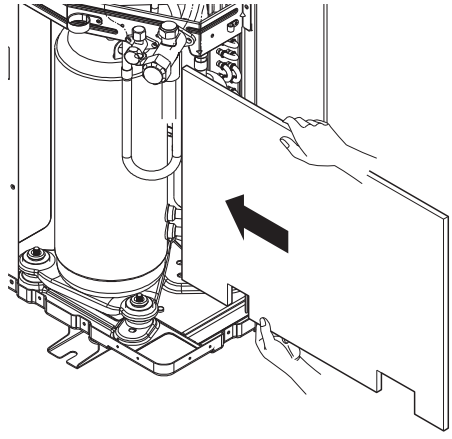
Part 3
Replacement

1. Replacement Procedure for Compressor

1. Remove the sound proof covering the faulty compressor, and disconnect the power
2. Disconnect the brazing sections of suction pipe and discharge pipe by using brazing torch after the refrigerant has been pumped out or collected completely.
3. Remove three nuts at cushion rubber section to take out the faulty compressor outside the unit. <Figure 1>
4. Install the new compressor in the unit.(Be sure to insert the cushion rubbers before tightening the fixing nut of compressor.)
5. Remove the rubber caps put on the suction and discharge pipe of the new compressor to release the sealing nitrogen gas.
6. Braze the suction and discharge pipe with brazing torch to the compressor.
7. Conduct air tight test to check the piping system is free from leakage.
8. Connect power cable to the terminal board of compressor and cover the compressor with sound proof. <Figure 2>
9. Conduct vacuum.
10. After completion of vacuum, open the service valves. If recovery unit is used, charge refrigerant.

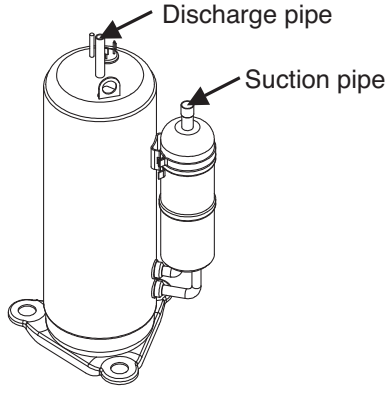


< Figure 1 >



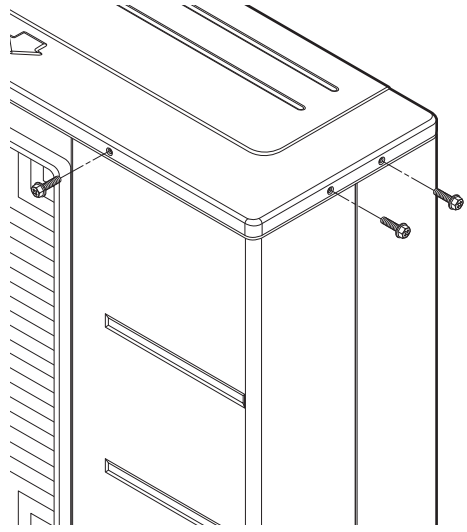
When inserting the sound proof, be sure to insert counter-clockwise.

< Figure 2 >



2. Caution for Assembling Outdoor Panels after Test Run

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

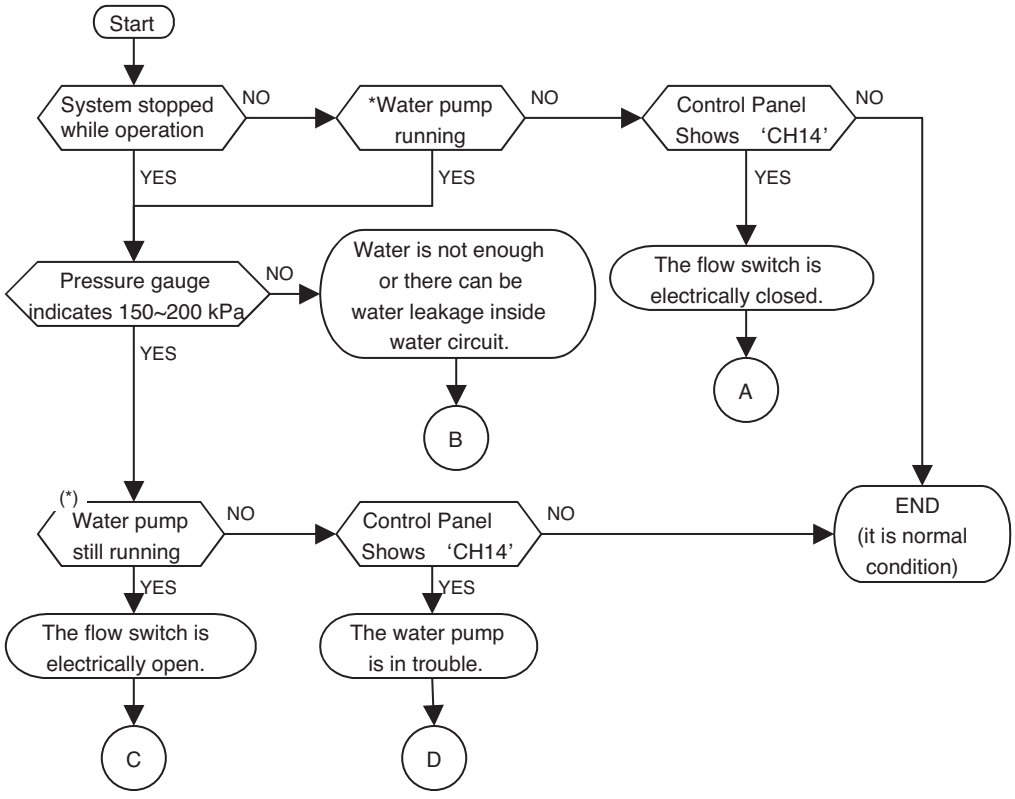


Part 5
Trouble Shooting

Trouble Shooting

1. Checking Key Components of Unit

1.1 Flow Switch



*: How to identify? - Touch the terminal box (black plastic box at the water pump) of water pump and feel if the water pump is vibrating. If no vibration, the water pump is not operating. Also, you can see 'Water Pump Operating' at control panel.

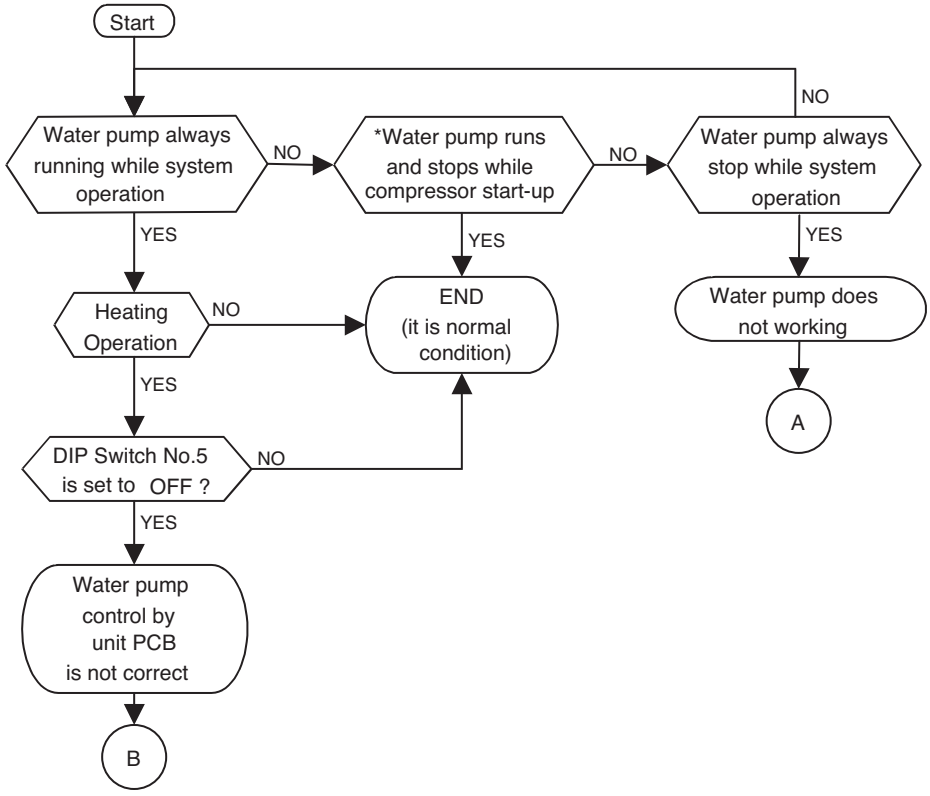
A
- Although there is not water flow inside water circuit, the flow switch detects as if water is flowing. It is due to electrically closed (or short) of flow switch or the contact of flow switch is mechanically stuck.
- Contact official After Service Center and replace the flow switch.
- Check the air vent. If there is air in the unit, it can display "CH14". Please remove the air by using the air vent.

B
- Check if water inside water circuit is fully charged. Pressure gauge at the unit should indicate 150~200 kPa.
- Also, as the hand of the pressure gauge is not react so fast according to water charging, check the pressure gauge again.
- Otherwise, there can be water leakage inside water circuit. Examine if water circuit is completely sealed.

C
- Although water is well flowing, the flow switch can not detect water flow. It is due to electrically open of flow switch or the contact of flow switch is mechanically broken.
- Contact official After Service Center and replace the flow switch.

D
- Read 'Checking Key Components of Unit – Water Pump' carefully to get more detail information.
- Contact official After Service Center and replace the water pump.
- Also, check the water quality if there are particles that can yield locking at the shaft of the water pump.
- Check the air vent. If there is air in the unit, it can display "CH14". Please remove the air by using the air vent.

1.2 Water Pump



* : It is normal condition that water pump runs or stops during system operation (including compressor start-up) due to specific control logic.

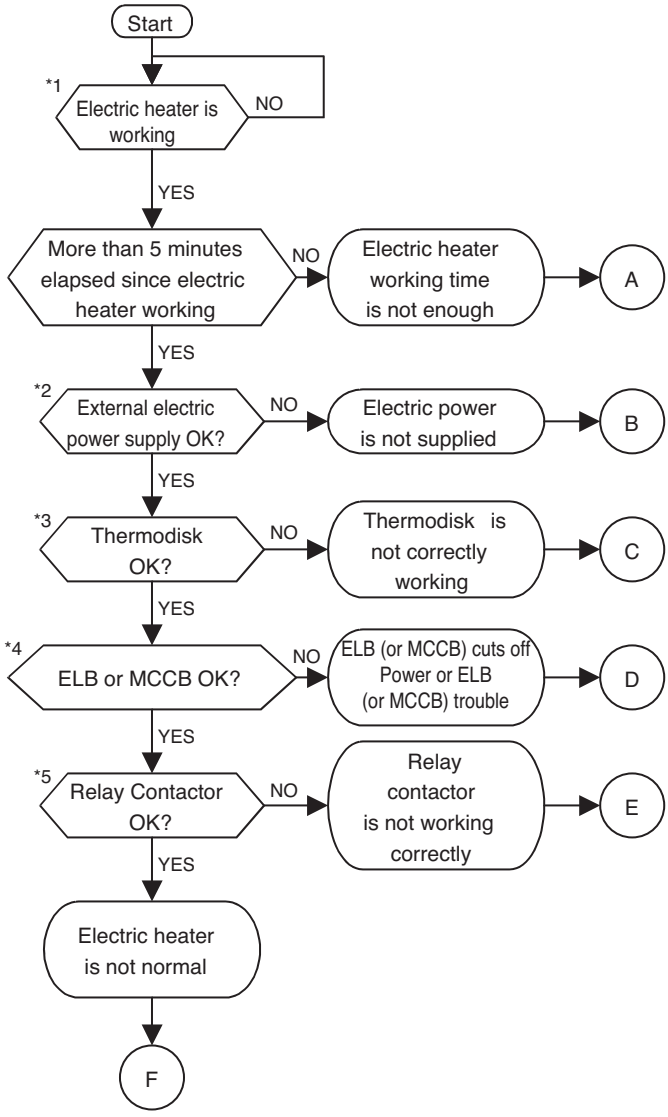
A

- Water pump does not because of mechanical defects of water pump or wrong wiring at the water pump.
- To correct mechanical defects, contact official After Service Center and replace the water pump.
- To correct wrong wiring, check if wires 'CN_MOTOR1' connector on the unit PCB and water pump terminal box (black plastic box at the water pump) are connected firmly. Also, check wires are electrically connected by measuring resistance of each wires (if electrically connected exactly, resistance should be 0 ohm).

B

- Unit PCB can not make control signal or wrong wiring at the water pump.
- To correct unit PCB's making control signal, first check the signal level. Use electric voltage meter and measure voltage at 'CN_MOTOR1' connector on the unit PCB. If measured value is not 220 V ~ 240 V AC while 'Water Pump Operating' is displayed at control panel, the unit PCB is in trouble. In this case, contact official After Service Center and replace the unit PCB.
- To correct wrong wiring, please refer Ⓐ.

1.3 Electric Heater



*1 : When electric heater is working, 'Electric Heater Operating' is displayed at control panel

*2 : For single-phase model : Measure electric voltage at port 3 (Live) and port 4 (Neutral) of Terminal Block 3 with voltage meter. The measured value should be 220-240 V~ AC. To identify the location of Terminal Block 3, please refer circuit diagram of unit at 'Installation Manual' or backside of front cover of the unit.

*2 : For three-phase model : Measure electric voltage at two port of 3 (R), 4 (S), and 5 (T) of Terminal Block 3 with voltage meter. The measured value should be 220-240 V~ AC or 380-415 V~ AC. To identify the location of Terminal Block 3, please refer circuit diagram of unit at 'Installation Manual' or backside of front cover of the unit.

*3 : For single-phase model : Find cover of thermodisk which is located beside air vent. Air vent is on the top of the electric heater tank. Uncover the cover by unscrewing bolts. Find two copper leads located both left and right side of the thermodisk core. Check resistance of both leads. The measured resistance should be 0 ohm. After then, check if voltage is transmitted to the thermodisk correctly. Measure electric voltage between one of the lead (Live) of the thermodisk and port 3 (Neutral) of ELB (A). The measured value should be 220-240 V~ AC.

*3 : For three-phase model : Find cover of thermodisk which is located side of electric heater tank.Uncover the cover by unscrewing bolts. Find two copper leads located both left and right side of two thermodisk core. Check resistance of both leads of each thermodisks. The measured resistance should be 0 ohm.

While uncovering the cover of the thermodisk, be careful for electric shock.

*4 : For single-phase model : Resistance between port 1 and port 2 should be 0 ohm. Also, port 3 and port 4 should be 0 ohm, too. Finally, measure electric voltage at port 2 (Live) and port 4 (Neutral) with voltage meter. The measured value should be 220V~240V AC.

*4 : For three-phase model : Resistance between port 1-to-port 2, port 3-to-port 4, and port 5-to-port 6 of MCCB (A) should be 0 ohm. Port number and location of MCCB (A) can be found circuit diagram of the unit(back side of front cover).

*5 : For single-phase model : At Relay Contactor (A), measure electric voltage at port 2 (Live) and port 6 (Neutral) with voltage meter. The measured value should be 220V~240V AC. Also, at Relay Contactor (B), measure electric voltage at port 2 (Live) and port 6 (Neutral) with voltage meter. The measured value should be 220V~240V AC.

*5 : For three-phase model : At Magnet Contact (C) or Magnet Contact (B), resistance between port L1-to-port T1, port L2-to-port T2, and port L3-to-port T3 should be 0 ohm.

A
- Wait for 5 minutes to heat water inside electric heater tank. If capacity of electric heater is 6kW, at least 2 centigrade will be increased.

B
- For single-phase model : Check if external electricity power supply is breakout. If not, check wiring between external electricity power supply and port 3 and port 4 of Terminal Block 3. You can identify the location of Terminal Block 3 at the circuit diagram of unit.
- For three-phase model : Check if external electricity power supply is breakout. If not, check wiring between external electricity power supply and port 3, port 4, and port 5 of Terminal Block 3. You can identify the location of Terminal Block 3 at the circuit diagram of unit.

C
- Thermodisk is mechanically defected. In this case, contact official After Service Center and replace the thermodisk.

D
- Check the insulation resistance of Electric Heater.
- If the insulation resistance has improper, remove the cause of the problem and then reset the ELB (or MCCB).
- Replace the ELB (or MCCB) when the insulation resistance is suitable.

E
- Relay contactor is is mechanically defected. In this case, contact official After Service Center and replace the relay contactor.

F
- Heating coil of electric heater can be damaged or wiring inside the electric heater is problem. Before replacing the electric heater, in this case, contact official After Service Center and do diagnosis about electric heater and related parts including the capacity of external electric power source. If the reason of malfunction is clearly proved as the defect of the electric heater itself, then replace it with new one.

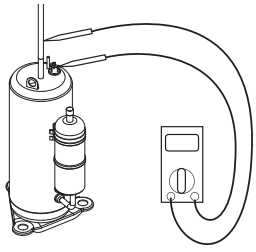
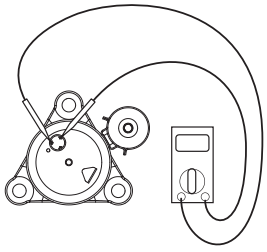
1.4 Remote Controller

To solve various troubles while using control panel, please read following FAQ (Frequently Asked Questions).
For your convenience, all questions are classified according to topics.

No	Topic	Question	Answer
1	Power button does not bright	System installation is finished. Also, all wirings including power connection is all right. But when the power button in front of the control panel is pushed, it does not bright.	• There can be a problem in wiring between PCB and control panel. Open control box and find 'CN_REMO' connector at the PCB. If the connector is empty or nothing is connected, please connect it with end of wire which is from control panel then restart the system. • Check if external controller is connected like thermostat. If thermostat is connected to the system and it is configured exactly, you can see 'Thermostat' text at the display of the control panel. It is normal condition that power button of control panel does not work when thermostat is installed.
2	Some texts are displayed automatically	Although nobody touched control panel, someties it displays specific texts and the system operates automatically.	• It is normal condition. Basically, two features can be operated without user's decision – one is system protective operation, the other is 'background water tank heating operation', which is heating inside the water tank while space heating is not used or the system is not working. System protective operation is, as letter says, for the purpose of securing the system from worse condition. Anti-freezing operation, for example, is one of the protective operation. It is essential to start protective operation to prevent potential malfunction and to keep possible accidents. On the other hand, background water tank heating operation is not protective operation but to supply warm water to end-user. The background water tank heating operation is only started when the water tank temperature is under the specific temperature.
3	Water tank heating or related features are not permitted	Setting water tank temperature is not permitted although the water tank is installed.	Following two conditions should be satisfied. • Check if 'Water tank enable/disable' is correctly displayed or not. To use water tank, end-user must push On/Off button focused on hot. • Also, check if DIP switch setting is correct or not. To identify the DIP switch setting, open the control box inside the unit. Unless 2nd and 3rd pin of DIP switch setting is 01(OFF-ON) or 10(ON-OFF), the water tank heating will not be configured.

1.5 Compressor

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

No.	Checking Item	Symptom	Countermeasure
1	Is how long power on during operation?	1) Power on for 12 hours or more	• Go to No.2.
		2) Power on for 12 hours or less	• Go to No.2 after applying power for designated time (12 hours).
2	Does failure appears again when starting operation?	1) The compressor stops andsame error appears again.	• Check IPM may fail.
	Method to measure insulation resistance  Method to measure coil resistance 	2) If output voltage of the inverter is stable.	• Check coil resistor and insulation resistor. If normal, restart the unit. If same symptom occurs, replace the compressor. • Insulation resistor: 2 MΩ or more • Coil resistor: Please refer to Page 68
		3) If output voltage of the inverter is unstable or it is 0 V. (When incapable of using a digital tester)	• Check the IPM. If the IPM is normal, replace the inverter board. • Check coil resistor and insulation resistor.

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

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

Note

1) If using a portable tester when checking the 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 portaable tester (For analog and digital mode).

1.6 Fan Motor

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

2. Self-Diagnosis Feature

2.1 Concept of 'Classified Trouble'

- **Definition of terms**
  - Trouble : a problem which can stop system operation, and can be resumed temporarily under limited operation without certificated professional's assist.
  - Error : a problem which can stop system operation, and can be resumed ONLY after certificated professional's check.
  - Emergency mode : temporary heating operation while system met Trouble

- **Objective of introducing 'Trouble'**
  - Not like airconditioning product, Air-to-Water heat pump is generally operating in whole winter season without any system stopping.
  - If system found some problem, which is not critical to system operating for yielding heating energy, the system can temporarily continue operating in emergency mode with enduser's decision.

- **Classified trouble**
  - Trouble is classified two levels according to the seriousness of the problem : Slight trouble and heavy trouble
  - Slight trouble : In most case, this trouble is concerned with sensor problems. The outdoor unit is operating under emergency mode operation condition which is configured by DIP switch No. 4 of the Main PCB Assembly 1.
  - Heavy trouble : As the outdoor unit has problem, the emergency mode operation is performed by electric heater.
  - Option trouble : a problem is found for option operation such as water tank heating. In this trouble, the troubled option is assumed as if it is not installed at the system.

- **Emergency operation is not automatically restarted after main electricity power is reset.**
  - In normal condition, the product operating information is restored and automatically restarted after main electricity power is reset.
  - But in emergency operation, automatic re-start is prohibited to protect the product.
  - Therefore, user must restart the product after power reset when emergency operation has been running.

2.2 Error Code List

Main PCB assembly(Heater)

Error Code	Description	Main Reasons
01 *	Problem in Remote Room Air sensor	Remote room air sensor disconnection or short circuit
02 **	Problem in Refrigerant (Inlet side) sensor	Refrigerant Inlet side sensor disconnection or short circuit
03 ****	Bad communication between control panel and unit	Connector connection error or connection wire break
05 ****	Bad communication between Indoor unit and Main PCB assembly(Inverter) and Main PCB assembly(Heater)	PCB(Heater) Unit does not receive signal from PCB(Inverter)
06 **	Problem in Refrigerant (Outlet side) sensor	Refrigerant Outlet side sensor disconnection or short circuit
08 ***	Problem in Water Tank sensor	Water tank sensor disconnection or short circuit
09 ****	PCB Program (EEPROM) Fault	Electrical or mechanical damage at the EEPROM
10****	BLDC Water pump Lock	Restriction of BLDC Water pump
13 ***	Problem in Solar-thermal sensor	Solar-thermal sensor disconnection or short circuit
14 ****	Problem in Flow Switch	Folw switch is open while internal water pump is working
15 ****	Water pipe overheated	Leaving water temperature is above 57°C
16 ****	Problems in sensors	An error cord 17,18,19 error has occurred at the same time.
17 *	Problem in Water-inlet sensor	Water-Inlet sensor disconnection or short circuit
18 *	Problem in Water-outlet sensor	Water-outlet sensor disconnection or short circuit
19 *	Problem in Water-interlim sensor	Water-interlim sensor disconnection or short circuit
20 ****	Electric heater overheated	Leaving water temperature is above 80°C

- **Notice of error code**
  - Slight / Heavy / Option Troubles : lowercases ‘ch’ + code no.
  - Errors : capital letters ‘CH’ + code no.
  - Slight Trouble: *
  - Heavy Trouble: **
  - Option Trouble: ***
  - Error: ****

CAUTION

Precaution in service or check

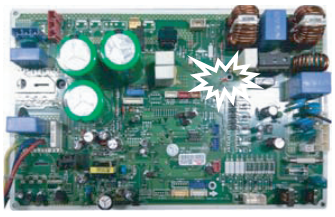
Even after stopping the operation of product, it takes some time to discharge the remaining electricity of the electrolytic capacitor that was charged early. Before conducting a checking or repairing job, pull out the plug out of the outlet and make sure that the lamp on the control board outdoor unit is off.

Main PCB assembly(Inverter)

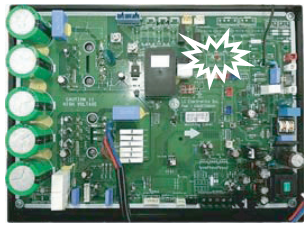
- Red LED means error no. 10's digit, and green LED means 1's digit, and when red and green simultaneously blink, it means 100's unit.

  Ex) Inverter compressor IPM defect Error : error number 21

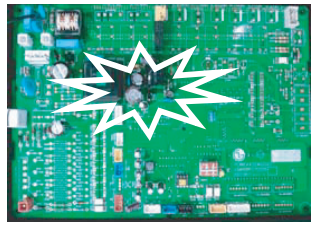
Error Code	Description	LED 1 (Red)	LED 2 (Green)
21	Inverter compressor IPM defect	2times ◑	1time ◑



AHUW056A3
AHUW076A3
AHUW096A3



AHUW126A3
AHUW146A3
AHUW166A3



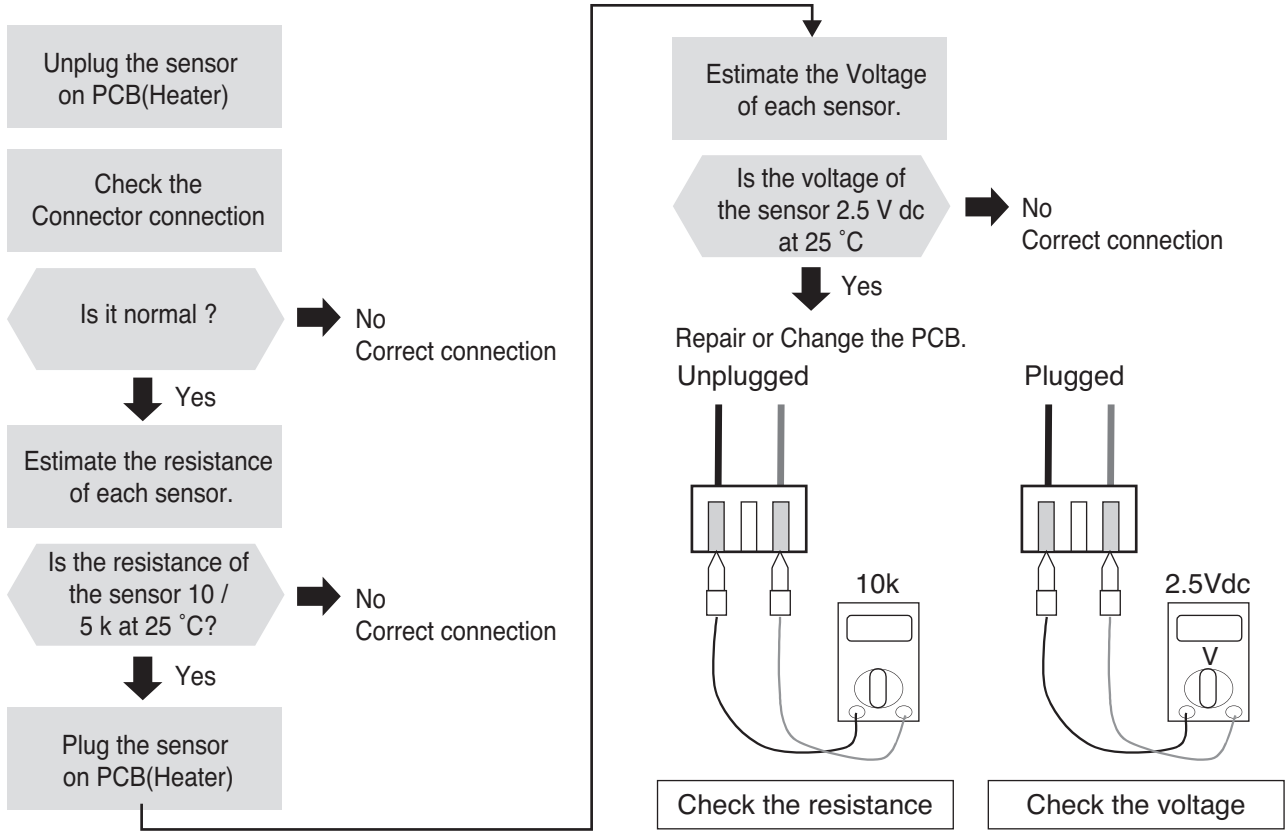
AHUW128A3
AHUW148A3
AHUW168A3

Error Code	Description	Main Reasons
21**	DC Peak(IPM Fault)	Inverter compressor drive IPM defect / inverter compressor defect
22**	Max. CT(CT2)	Increase of inverter compressor CT value
23**	DC Link Low Volt.	After inverter activation relay is ON, DC voltage recharge defect
26**	DC Comp Position Error	Inverter compressor error, causing initial activation failure
27**	PFC Fault Error	Error by overcurrent at inverter input
29**	Comp Over Current	Inverter compressor activation failure or increase of CT value
32**	D-Pipe High(Inv.)	Excessive rise of inverter compressor discharge temperature, causing compressor OFF
35**	Low Pressure Error	Excessive decrease of low pressure
41**	Inv. D-Pipe Th Error(Open/Short)	Inverter compressor discharge temperature sensor disconnection or short circuit
43**	High Pressure Sensor(Open/Short)	High pressure sensor disconnection or short circuit of inverter compressor
44**	Outdoor air Th Error(Open/Short)	Air temperature sensor disconnection or short circuit
45**	Cond. Middle Pipe Th Error (Open/Short)	Condenser Middle Pipe sensor disconnection or short circuit
46**	Suction Pipe Th Error(Open/Short)	Inverter compressor suction temperature sensor disconnection or short circuit
48**	Cond. Out-Pipe Th Error(Open/Short)	Condenser Out-Pipe sensor disconnection or short circuit
52****	PCB Communication Error	Checking the communication state between Main PCB and Inverter PCB
53**	Communication Error(PCB(Heater) ↔ PCB(Inverter))	PCB(Heater) unit does not receive signal from PCB(Inverter)
54*	Open and Reverse Phase Error	Prevention of phase unbalance and prevention of reverse rotation of constant-rate compressor
60**	EEPROM Error(Outdoor)	PCB(Inverter) EEPROM error
61**	Cond. Middle Pipe High	EEV connector diplaced/poor EEV assembly
62**	Heatsink Error(High)	PCB(Inverter) heat generation, causing the rise of heatsink temperature
73**	Overcurrent (Peak) detected at inverter input	Error by overcur'rent detection at inverter input
67***	Fan Lock Error	Restriction of Fan motor

3. Trouble shooting Guide

Display code	Title	Cause of error	Check point & Normal condition
01	Remote room air sensor	• Connector connection error • Faulty PCB(Heater) • Faulty sensor (Open / Short)	Normal resistor : 10 KΩ / at 25 ˚C (Unplugged) Normal voltage : 2.5 V dc / at 25 ˚C (Plugged) Refer to sensor resistance table.
02	Refrigerant inlet pipe sensor	• Connector connection error • Faulty PCB(Heater) • Faulty sensor (Open / Short)	Normal resistor : 5 KΩ / at 25 ˚C(Unplugged) Normal voltage : 2.5 V dc / at 25 ˚C(Plugged) Refer to sensor resistance table.
06	Refrigerant outlet pipe sensor	• Connector connection error • Faulty PCB(Heater) • Faulty sensor (Open / Short)	Normal resistor : 5 KΩ / at 25 ˚C (Unplugged) Normal voltage : 2.5 V dc / at 25 ˚C (Plugged) Refer to sensor resistance table.

Check Flow Chart

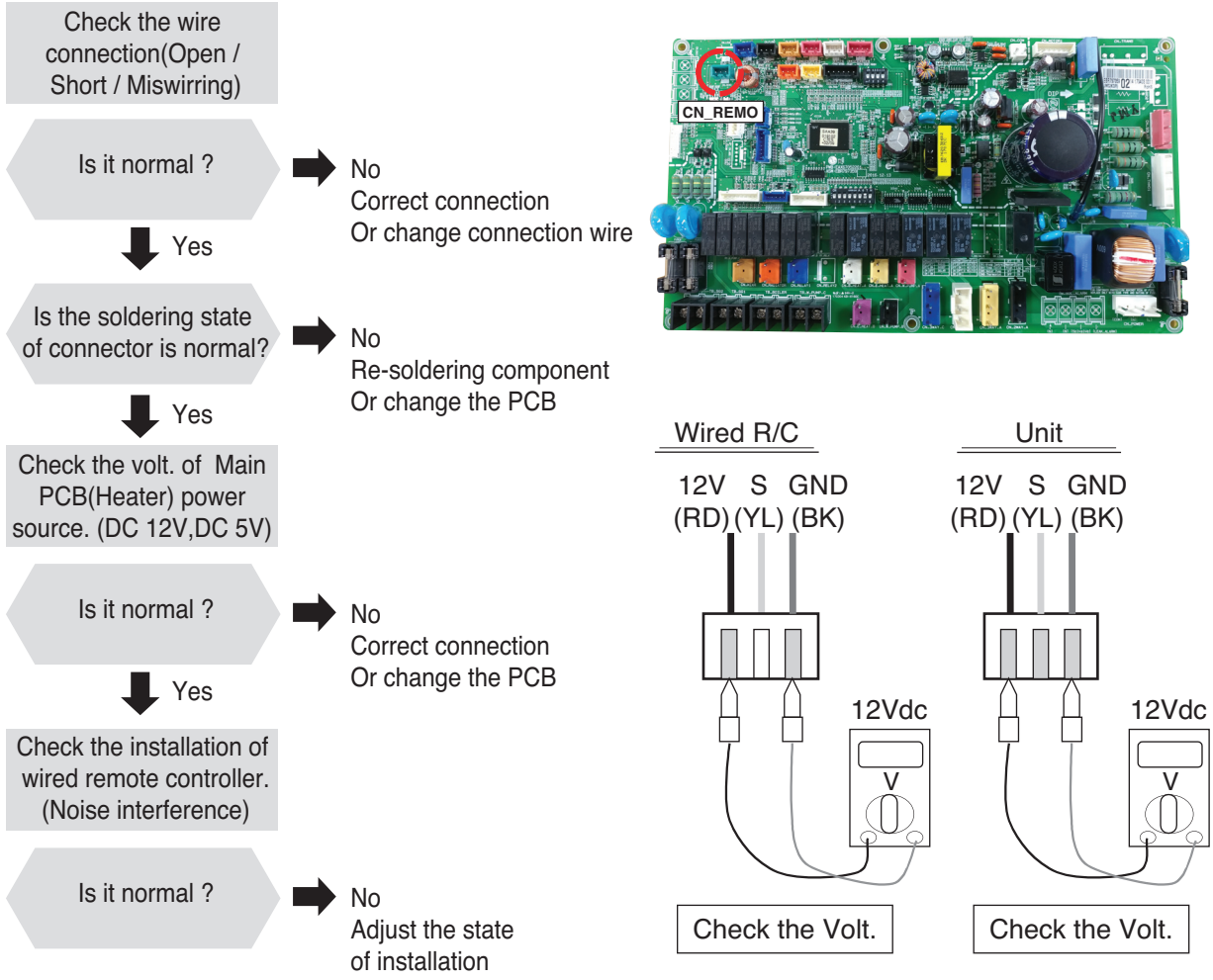


Check Point

1. Unplug the sensor on PCB(Heater).
2. Estimate the resistance of each sensor.
3. If the resistance of the sensor is 10 KΩ / 5 KΩ at 25°C, then sensor is normal.
4. If the resistance of the sensor is 0 KΩ or ∞, then sensor is abnormal. → Change the sensor.
5. Plug the sensor on PCB(Heater) and Power ON.
6. Estimate the voltage of each sensor.
7. If the voltage of the sensor is 2.5Vdc at 25°C, then sensor is normal.
8. If the resistance of the sensor is 0 or 5Vdc, then sensor is abnormal. → Repair or Change the PCB(Heater).

Display code	Title	Cause of error	Check point & Normal condition
03	Communication Error (Wired remote controller)	• Connector connection error • Faulty PCB(Heater) / Remote controller • Connection wire break	• Connection of wire • Main PCB(Heater) Volt. DC 12 V • Noise interference

Check Flow Chart

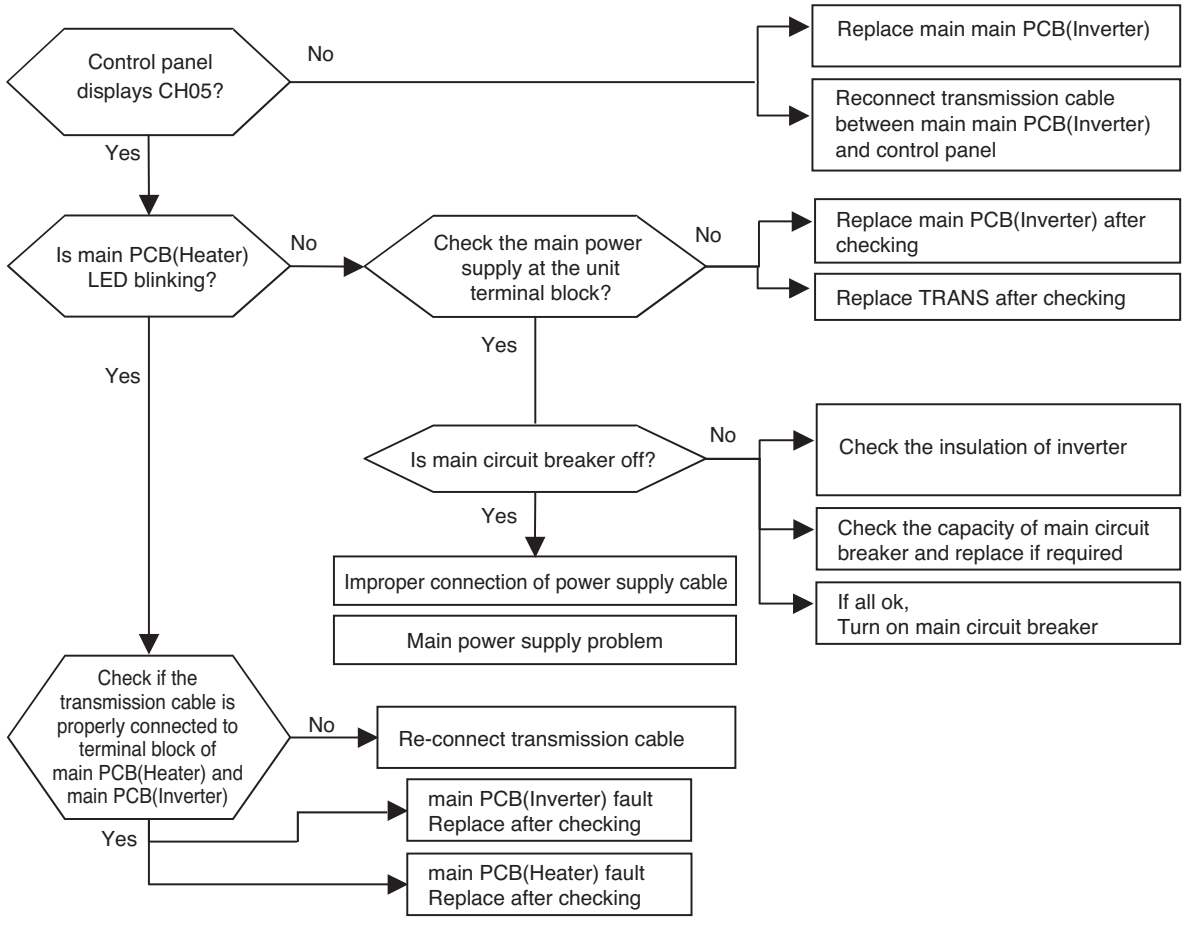


Check Point

1. Check the wire connection. (Open / Short) → Repair the connection
2. Check the soldering state of connector. (Soldered poorly) → Repair or Change the PCB(Heater).
3. Check the volt. Of Main PCB(Heater) power source. (DC 12 V) → Repair or Change the Main PCB(Heater).
4. Check the installation of wired remote controller. (Noise interference) → Adjust the state of installation

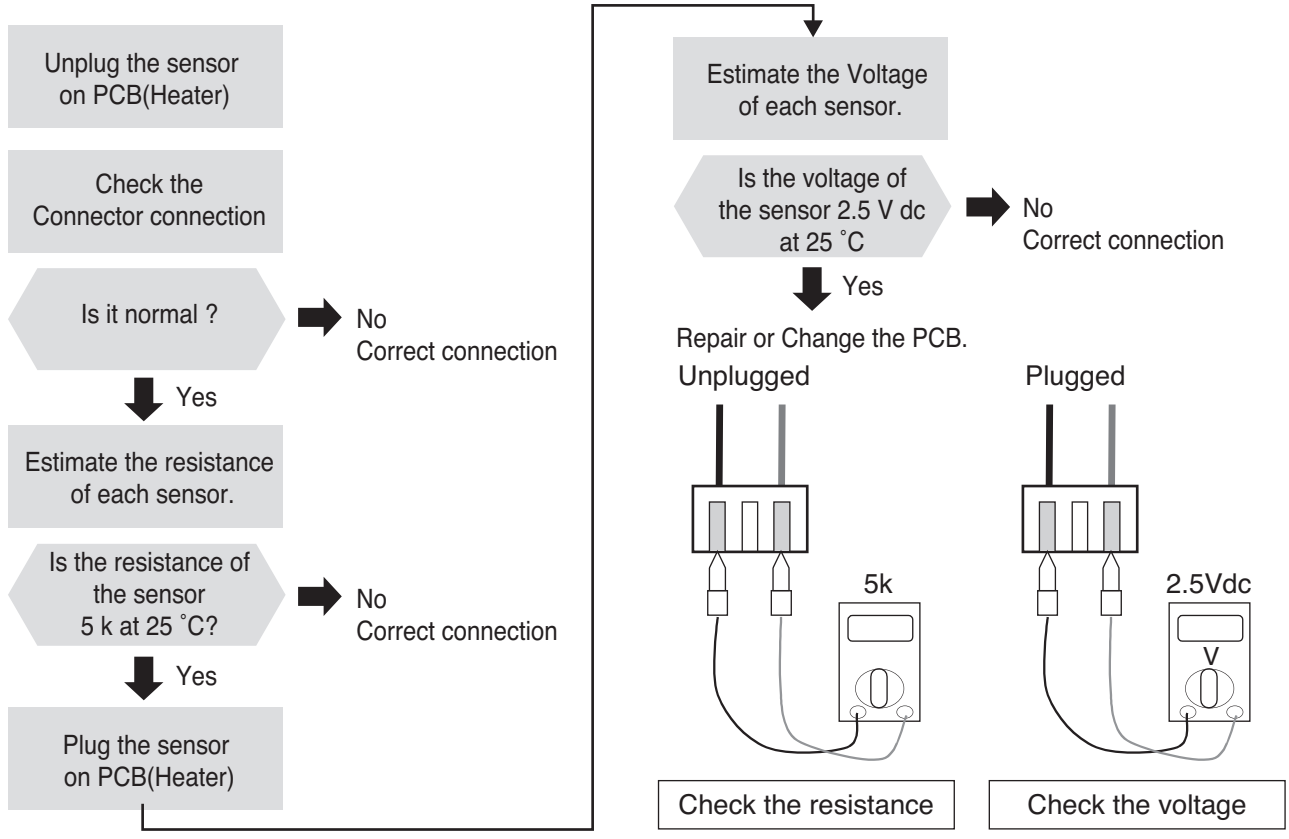
Code No.	Description	Cause	Normal Condition
05 53	Bad communication between main PCB assembly(Inverter) and main PCB assembly(Heater)	• The connector for transmission is disconnected • The connecting wires are misconnected • The communication line is broken • main PCB(Heater) is abnormal • main PCB(Inverter) is abnormal	• Wire connection between control panel and main PCB 2 should be tight

■ Error diagnosis and countermeasure flow chart



Display code	Title	Cause of error	Check point & Normal condition
08	Problem in Water Tank sensor	• Connector connection error • Faulty PCB(Heater) • Faulty sensor (Open / Short)	Normal resistor : 5 KΩ / at 25 ˚C (Unplugged) Normal voltage : 2.5 V dc / at 25 ˚C (Plugged) Refer to sensor resistance table.
13	Problem in Solar-thermal sensor	• Connector connection error • Faulty PCB(Heater) • Faulty sensor (Open / Short)	Normal resistor : 5 KΩ / at 25 ˚C (Unplugged) Normal voltage : 2.5 V dc / at 25 ˚C (Plugged) Refer to sensor resistance table

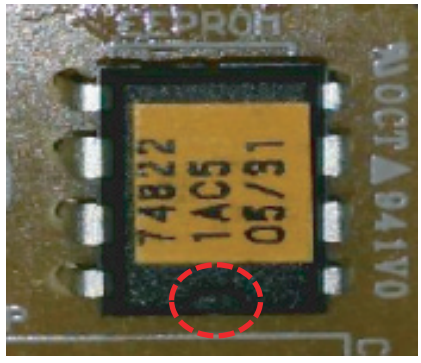
Check Flow Chart



Check Point

1. Unplug the sensor on PCB(Heater).
2. Estimate the resistance of each sensor.
3. If the resistance of the sensor is 5 KΩ at 25°C, then sensor is normal.
4. If the resistance of the sensor is 0 KΩ or ∞, then sensor is abnormal. → Change the sensor.
5. Plug the sensor on PCB(Heater) and Power ON.
6. Estimate the voltage of each sensor.
7. If the voltage of the sensor is 2.5Vdc at 25°C, then sensor is normal.
8. If the resistance of the sensor is 0 or 5Vdc, then sensor is abnormal. → Repair or Change the PCB.

Code No.	Description	Cause	Normal Condition
09	PCB(Heater) EEPROM Check Sum Error	• Check sum error	1. Check the poor soldering 2. Check the insertion condition of the EEPROM 3. Check the PCB Connection



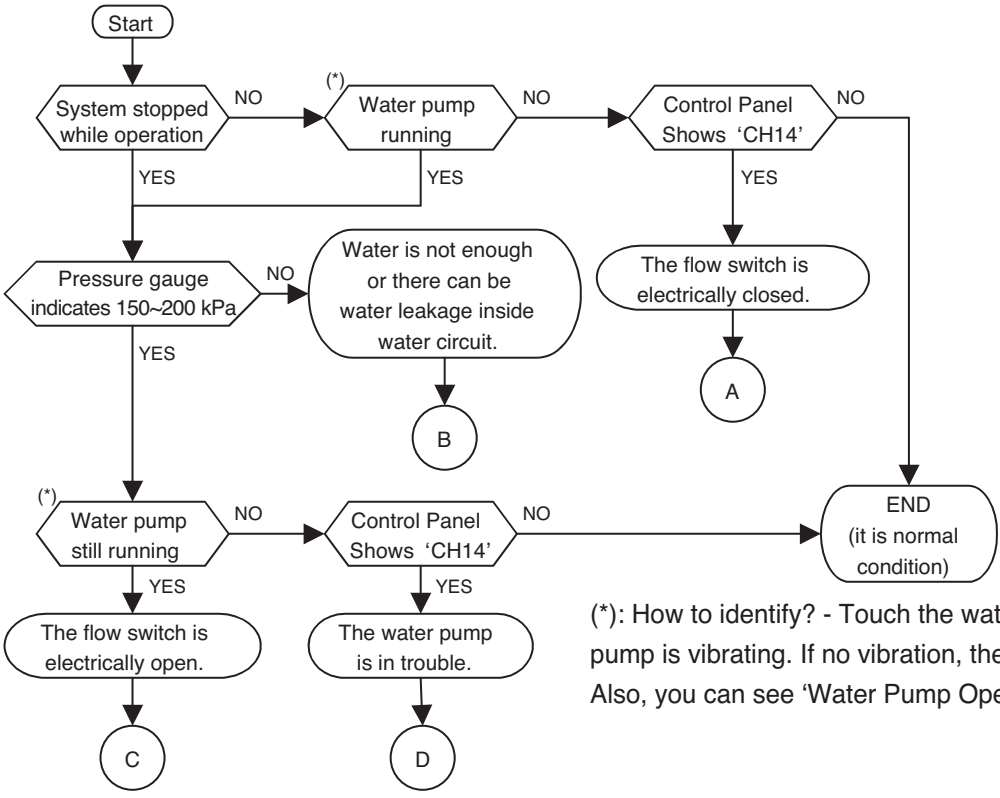
<EEPROM Direction Check Point>

Check Point

1. Check the EEPROM Direction
2. If the EEPROM value & the Program value are not matched, the Code is Displayed
3. After Checking the connection and Insertion, replace the PCB or Option PCB

Code No.	Description	Cause	Normal Condition
14	Problem in Flow Switch	• Flow switch is open while internal water pump is working • Flow switch is closed while internal water pump is not working • Flow switch is open while DIP switch No. 5 of main PCB(Heater) is set as ON	• Flow switch should be closed while internal water pump is working or DIP switch No. 5 of main PCB(Heater) is set as ON • Flow switch should be open while internal water pump is not working

■ Error diagnosis and countermeasure flow chart



(*): How to identify? - Touch the water pump and feel if the water pump is vibrating. If no vibration, the water pump is not operating. Also, you can see 'Water Pump Operating' at control panel.

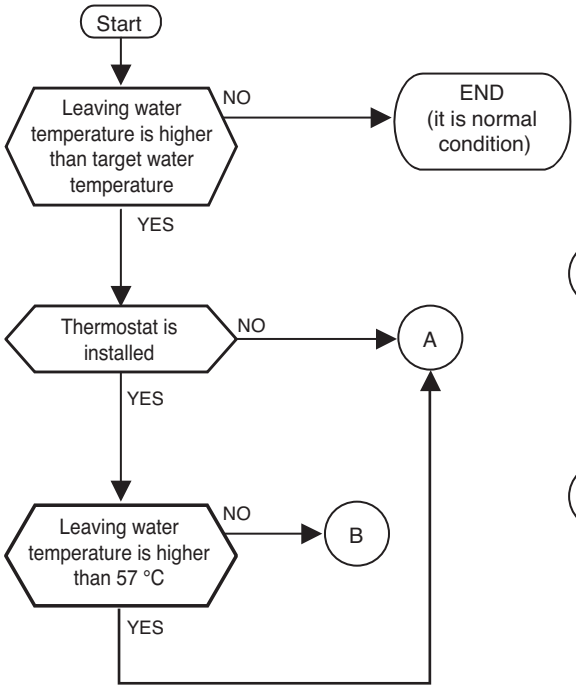
A
- Although there is not water flow inside water circuit, the flow switch detects as if water is flowing. It is due to electrically closed (or short) of flow switch or the contact of flow switch is mechanically stuck.
- Contact official After Service Center and replace the flow switch.
- Check the air vent. If there is air in the unit, it can display "CH14". Please remove the air by using the air vent.

B
- Check if water inside water circuit is fully charged. Pressure gauge at the unit should indicate 150~200 kPa.
- Also, as the hand of the pressure gauge is not react so fast according to water charging, check the pressure gauge again.
- Otherwise, there can be water leakage inside water circuit. Examine if water circuit is completely sealed.

C
- Although water is well flowing, the flow switch can not detect water flow. It is due to electrically open of flow switch or the contact of flow switch is mechanically broken.
- Contact official After Service Center and replace the flow switch.

D
- Read 'Checking Key Components of unit – Water Pump' carefully to get more detail information.
- Contact official After Service Center and replace the water pump.
- Also, check the water quality if there are particles that can yield locking at the shaft of the water pump.
- Check the air vent. If there is air in the unit, it can display "CH14". Please remove the air by using the air vent.

Code No.	Description	Cause	Normal Condition
15	Water pipe overheated	• Abnormal operation of electric heater • Leaving water temperature is above 57 °C	• Possible maximum leaving water temperature is 57 °C.



A
- This is unexpected case.
- Turn off the system and call service center.
- If the system is not turned off before it yields error code (CH15), very hot leaving water will be generated and it is harmful to human.

B
- Room air is not fully heated by under floor heating.
- Wait while room air is heated by target temperature of thermostat.

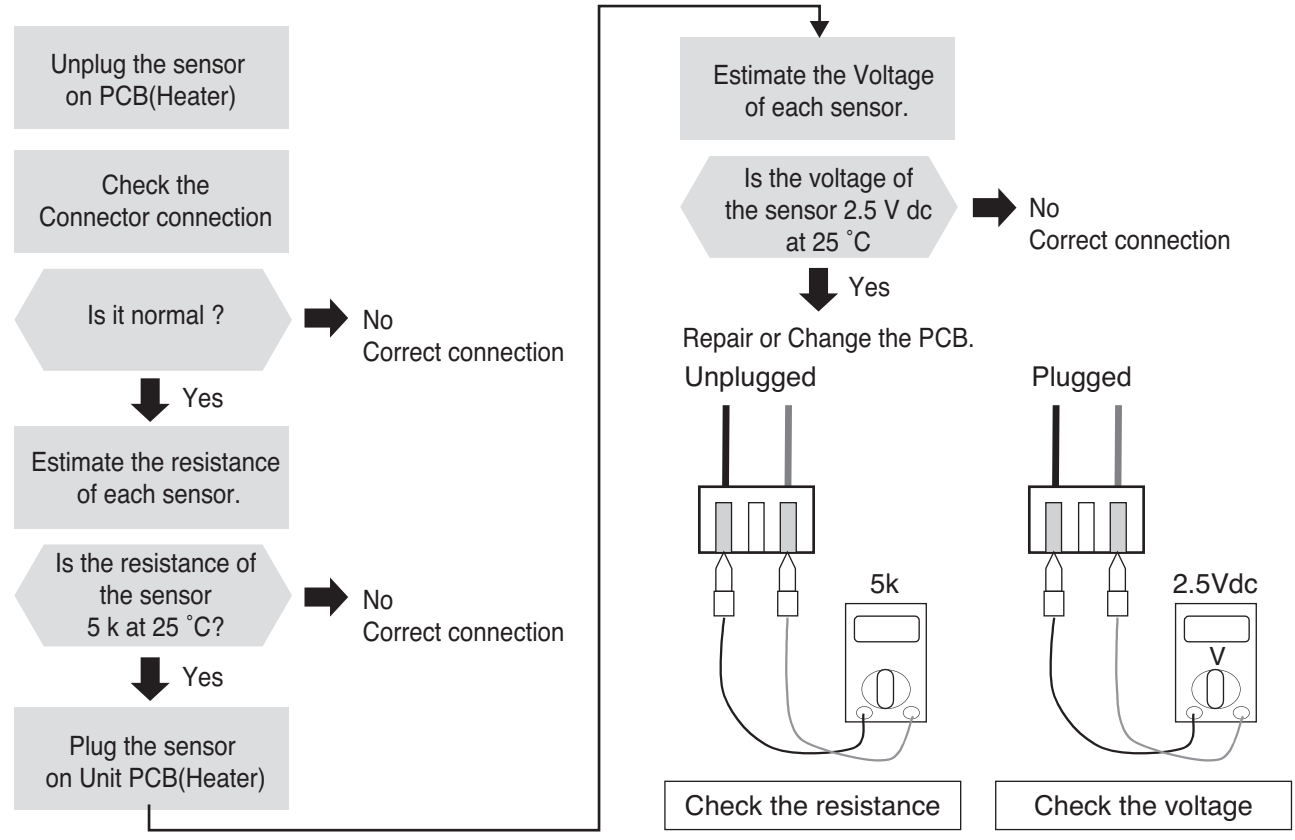
Code No.	Description	Cause	Normal Condition
16	Problem in Sensors	• It is occur when error 17,18,19 is happend at the same time.	• It is't occur when error 17,18,19 is happend at the same time.

■ Error diagnosis and countermeasure flow chart

- Refer to error code 17/18/19 Trouble shooting Guide.

Display code	Title	Cause of error	Check point & Normal condition
17	Problem in Water-inlet sensor	• Connector connection error • Faulty PCB(Heater) • Faulty sensor (Open / Short)	Normal resistor : 5 KΩ / at 25 ˚C (Unplugged) Normal voltage : 2.5 V dc / at 25 ˚C (Plugged) Refer to sensor resistance table.
18	Problem in Water-outlet sensor	• Connector connection error • Faulty PCB(Heater) • Faulty sensor (Open / Short)	Normal resistor : 5 KΩ / at 25 ˚C(Unplugged) Normal voltage : 2.5 V dc / at 25 ˚C(Plugged) Refer to sensor resistance table
19	Problem in Water-interlim sensor	• Connector connection error • Faulty PCB(Heater) • Faulty sensor (Open / Short)	Normal resistor : 5 KΩ / at 25 ˚C (Unplugged) Normal voltage : 2.5 V dc / at 25 ˚C (Plugged) Refer to sensor resistance table.

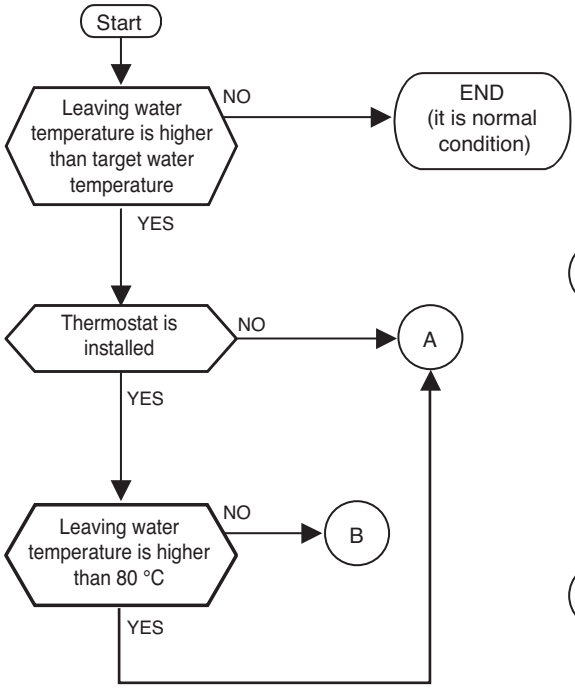
Check Flow Chart



Check Point

1. Unplug the sensor on PCB(Heater).
2. Estimate the resistance of each sensor.
3. If the resistance of the sensor is 5KΩ at 25°C, then sensor is normal.
4. If the resistance of the sensor is 0 KΩ or ∞, then sensor is abnormal. → Change the sensor.
5. Plug the sensor on PCB(Heater) and Power ON.
6. Estimate the voltage of each sensor.
7. If the voltage of the sensor is 2.5Vdc at 25°C, then sensor is normal.
8. If the resistance of the sensor is 0 or 5Vdc, then sensor is abnormal. → Repair or Change the PCB.

Code No.	Description	Cause	Normal Condition
20	Electric Heater Overheated	• Abnormal operation of electric heater • Leaving water temperature is above 80 °C	• If there is no problem in electric heater control, possible maximum leaving water temperature is 80 °C.



A
- This is unexpected case.
- Turn off the system and call service center.
- If the system is not turned off before it yields error code (CH20), very hot leaving water will be generated and it is harmful to human.
- If Error Code (CH20) is occurred, please check thermostat, electric heater, power supply and others. Also, it is recommended to check air vent which is located on the top of the electric heater tank.

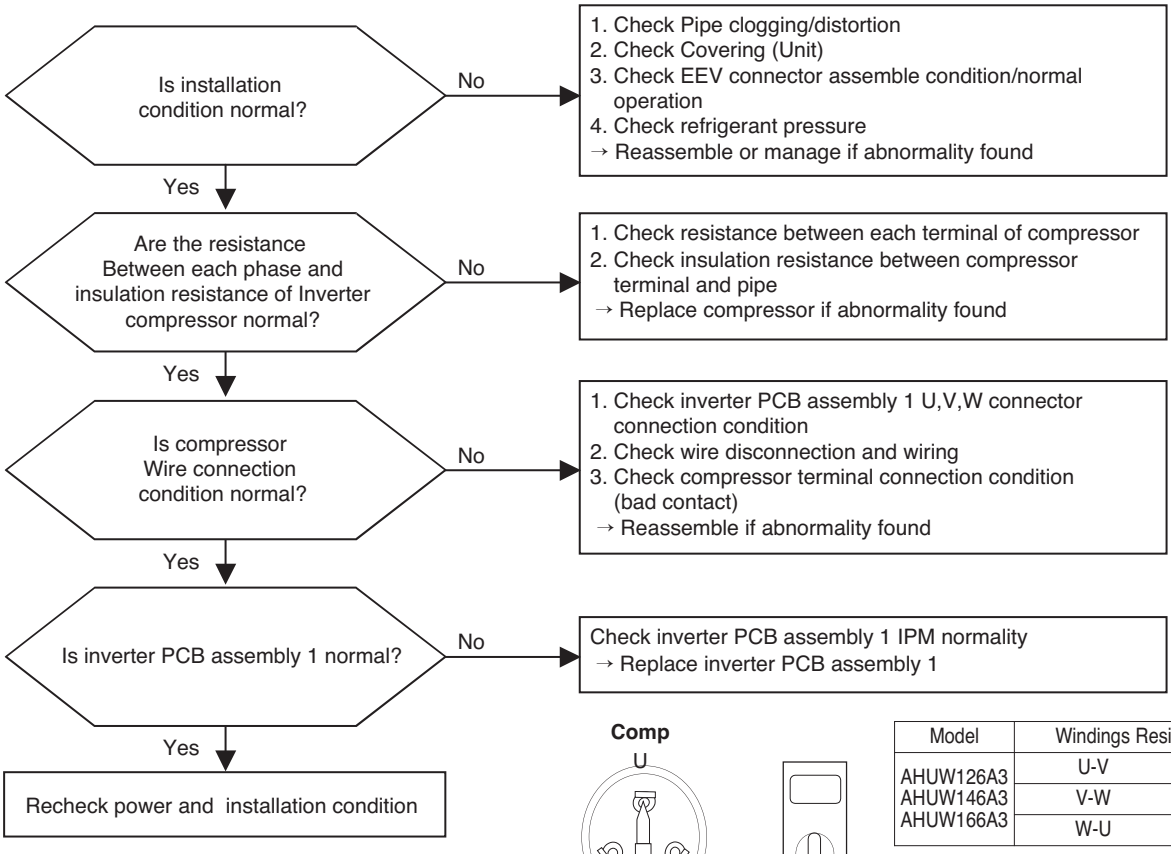
B
- Room air is not fully heated by under floor heating.
- Wait while room air is heated by target temperature of thermostat.

Display code	Title	Cause of error	Check point & Normal condition
21	DC PEAK (IPM Fault)	• Instant over current • Over Rated current • Poor insulation of IPM	• An instant over current in the U,V,W phase - Comp lock - The abnormal connection of U,V,W • Over load condition - Overcharging of refrigerant Pipe length. Outdoor Fan is stop • Poor insulation of compressor

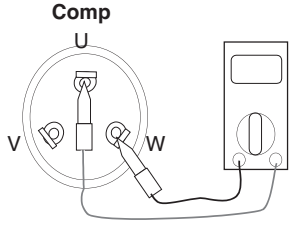
⚠ WARNING

Before checking PCB(Inverter) or each outdoor electric parts, wait for 3 minutes after the power is off. When measuring at standby state of power supply, after checking the measurement mode of the meter, be careful of the short-circuits with other parts.

■ Error Diagnosis and Countermeasure Flow Chart

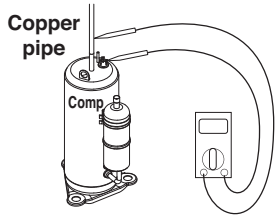


■ Comp checking method

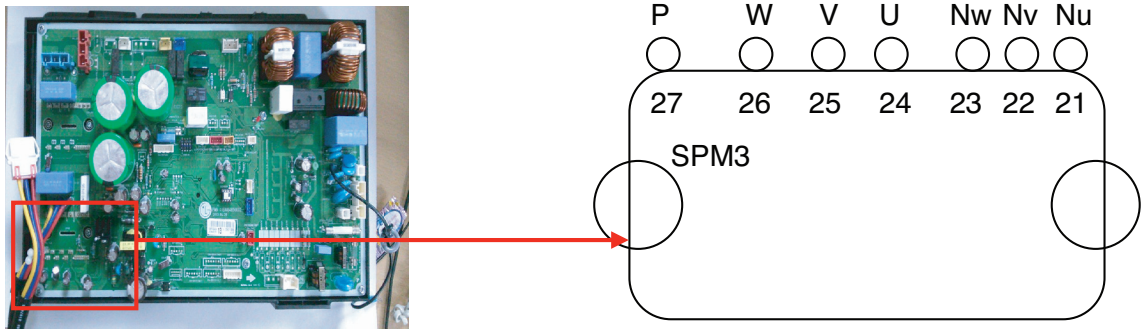


Model	Windings Resistance (at 75 °C)	
AHUW126A3 AHUW146A3 AHUW166A3	U-V	0.845 Ohms
	V-W	0.859 Ohms
	W-U	0.864 Ohms

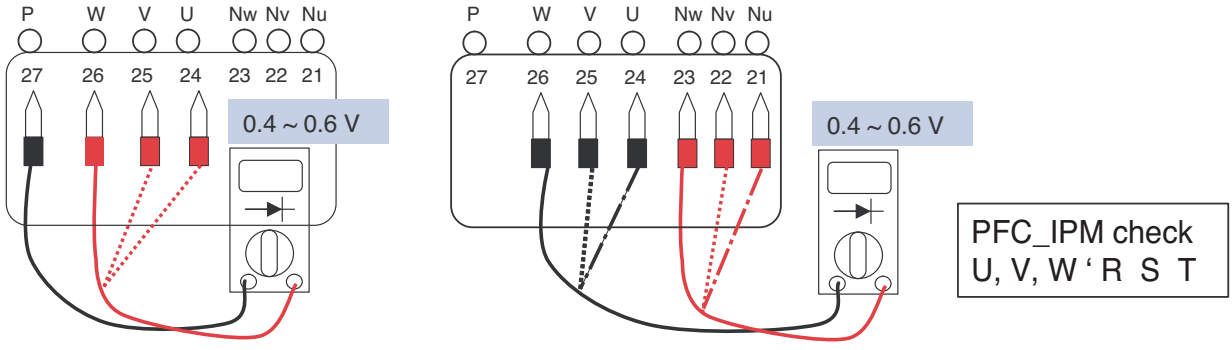
Terminal	Insulation Resistance
U-panel	≥ 10MΩ
V-panel	≥ 10MΩ
W-panel	≥ 10MΩ



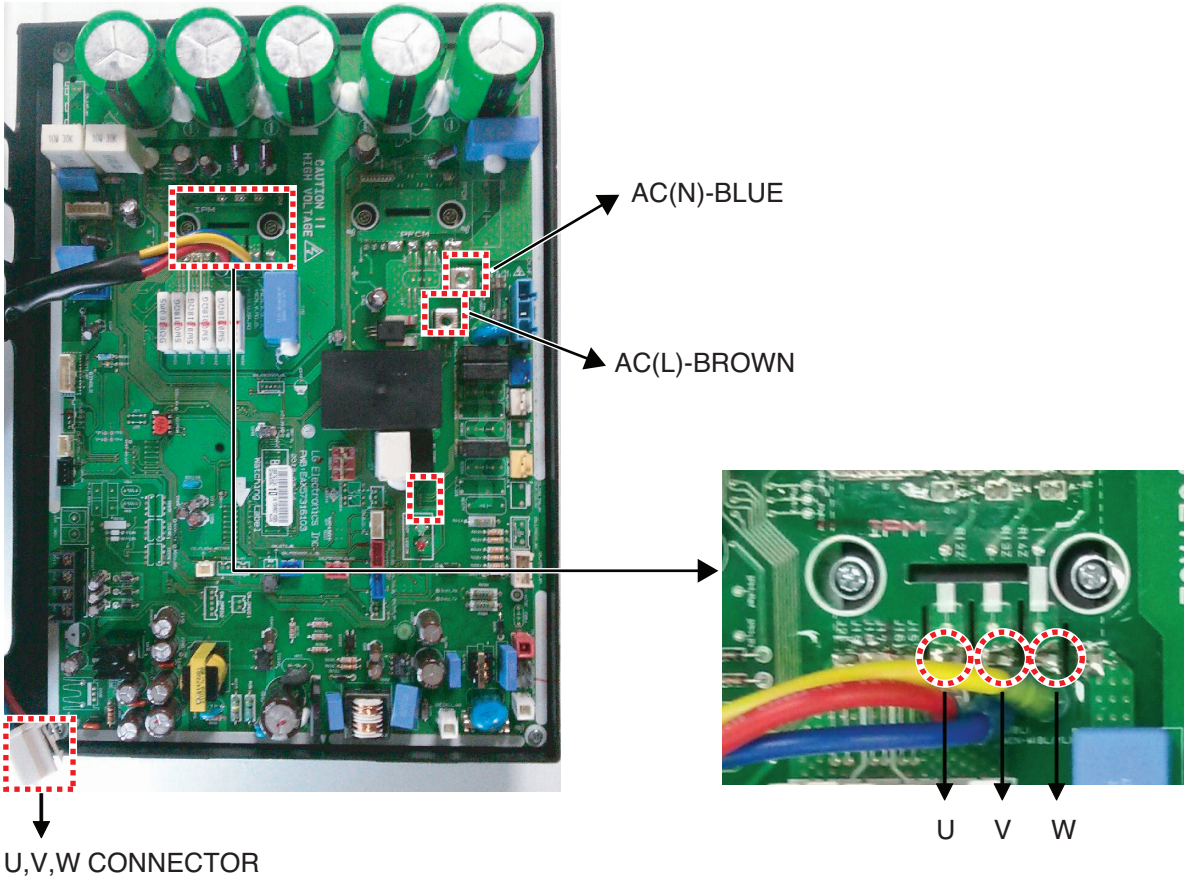
▶ AHUW056A3/AHUW076A3/AHUW096A3



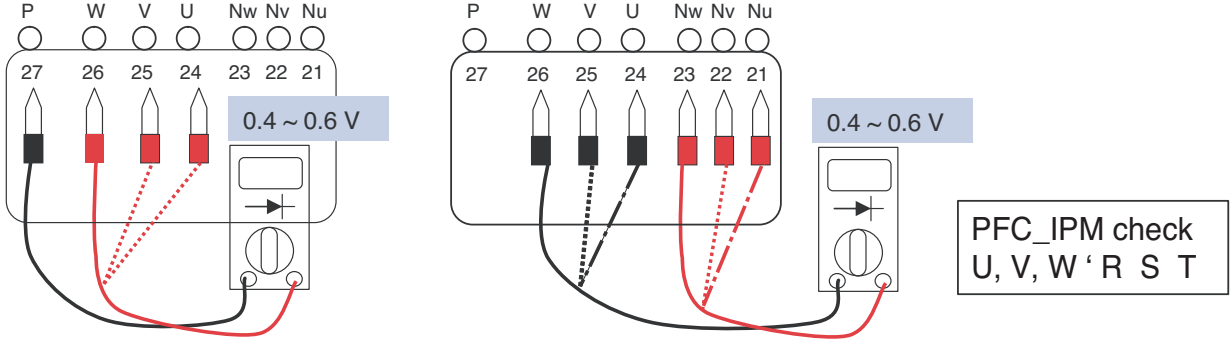
1. Wait PCB(Inverter) DC voltage is discharged after main power off.
2. Pull out V, V, W COMP connector.
3. Set multi tester to resistance mode.
4. If the value between P and N terminal of IPM is short(0Ω) or open(hundreds MΩ), PCB(Inverter) needs to be replaced.(IPM damaged)
5. Set the multi tester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



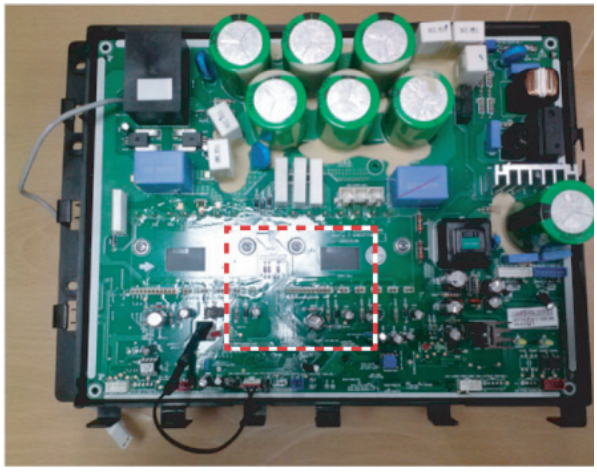
▶ AHUW126A3/AHUW146A3/AHUW166A3

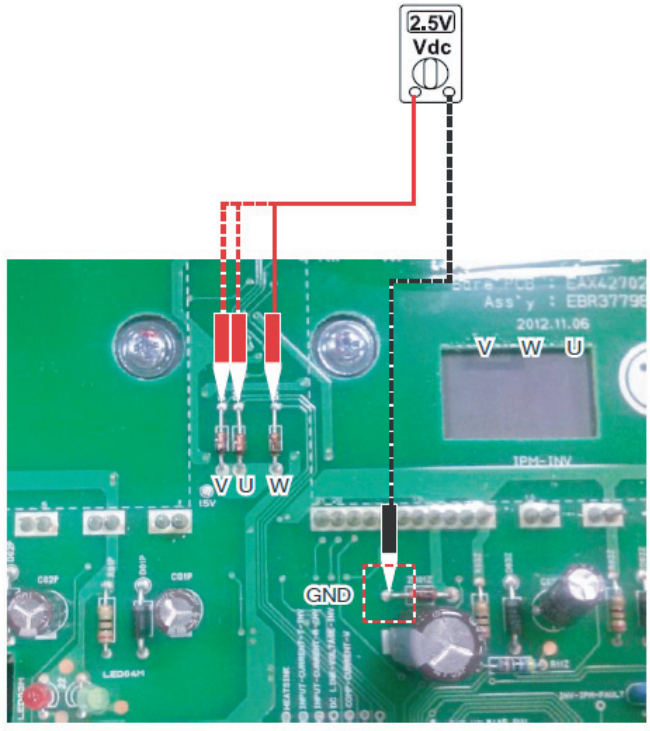


1. Wait PCB(Inverter) DC voltage is discharged after main power off.
2. Pull out AC(L), AC(N) connectors and U,V,W COMP Connector.
3. Set multi tester to resistance mode.
4. If the value between P and N terminal of IPM is short(0Ω) or open(hundreds MΩ), PCB needs to be replaced.(IPM damaged)
5. Set the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

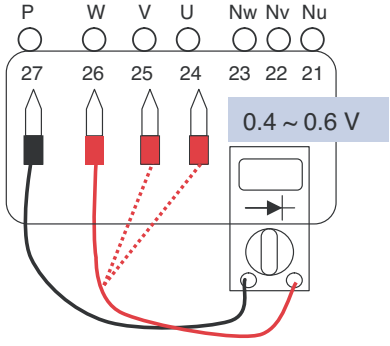


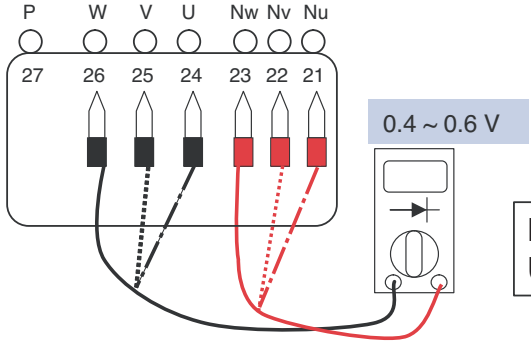
▶ AHUW128A3/AHUW148A3/AHUW168A3





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





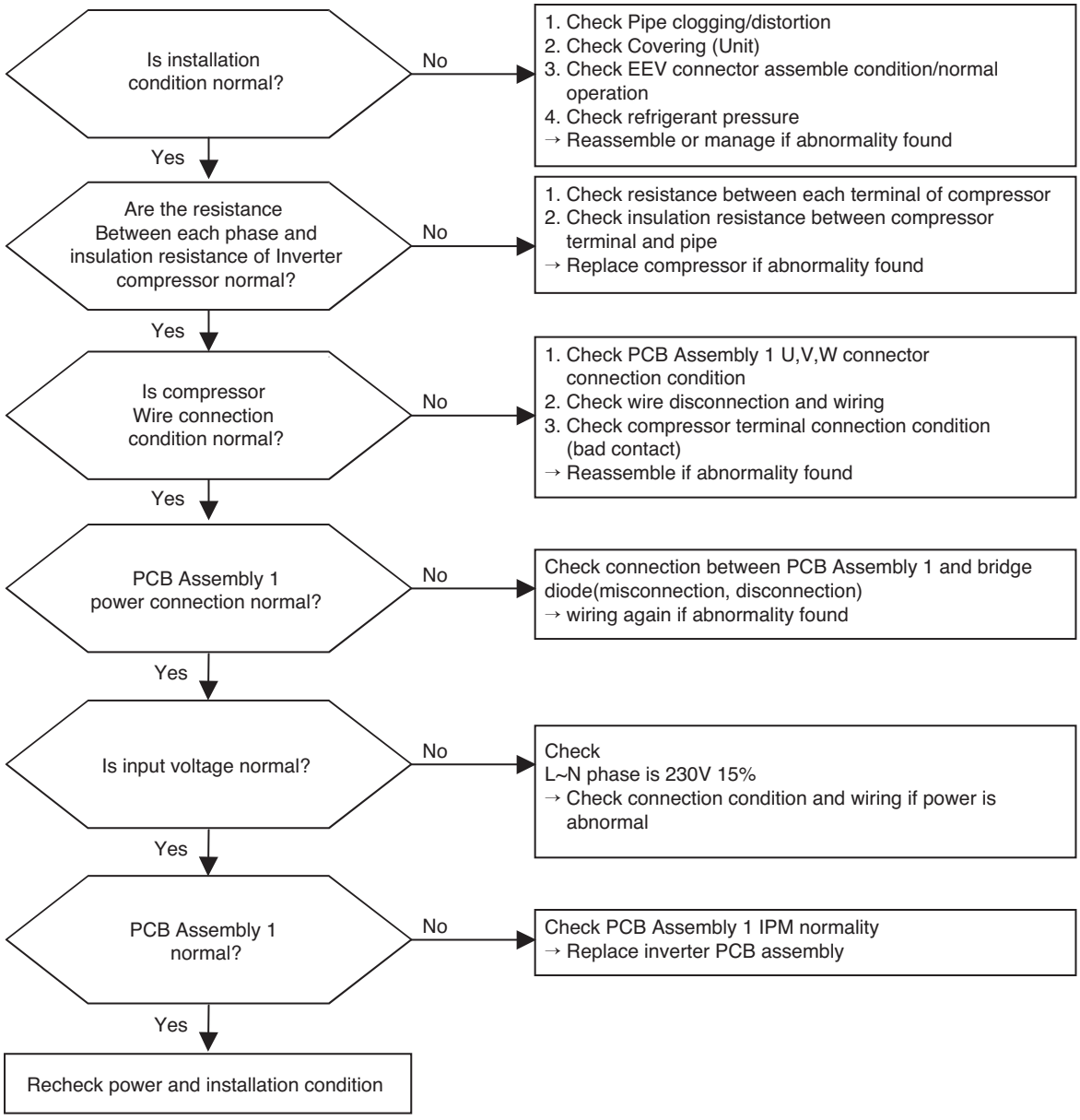
PFC_IPM check
U, V, W ‘ R S T

Display code	Title	Cause of error	Check point & Normal condition
22	Max. C/T	Input Over Current	1. Malfunction of Compressor 2. Blocking of Pipe 3. Low Voltage Input 4. Refrigerant, Pipe length, Blocked...

⚠ WARNING

Before checking PCB(Inverter) or each outdoor electric parts, wait for 3 minutes after the power is off. When measuring at standby state of power supply, after checking the measurement mode of the meter, be careful of the short-circuits with other parts.

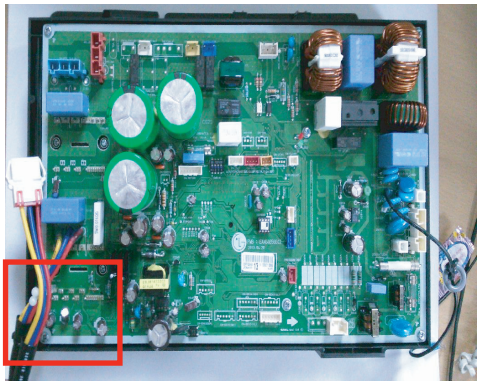
■ Error Diagnosis and Countermeasure Flow Chart

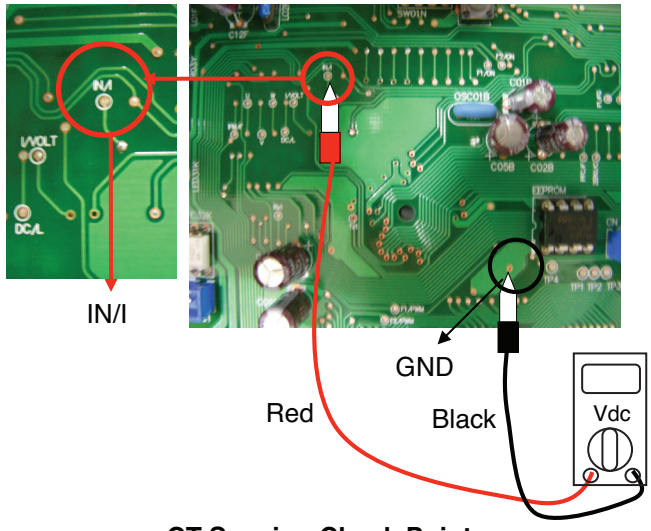


Check Point

1. Check the power source.(230V ±15%)
2. Check the fan operation is right.
3. Check the current.
4. Check the install condition.
5. Check the CT Sensor Output signal
   (AHUW056A3/AHUW076A3/AHUW096A3 - Check output the CT Sensor : DC 2.5±0.2V
   AHUW126A3/AHUW146A3/AHUW166A3 - Check output pin 2.3 of the CT Sensor : DC 2.5±0.2V
   AHUW128A3/AHUW148A3/AHUW168A3 - Check input_current_T_PFC and R_PFC of the CT sensor : DC 2.5±0.2V)

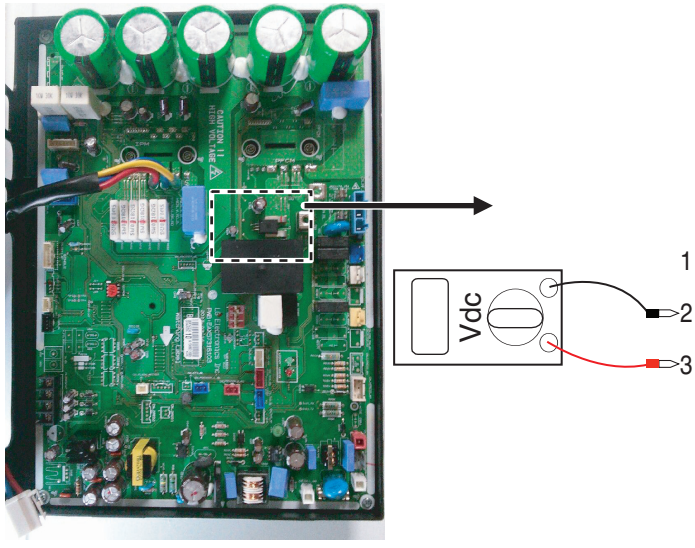
▶ AHUW056A3/AHUW076A3/AHUW096A3



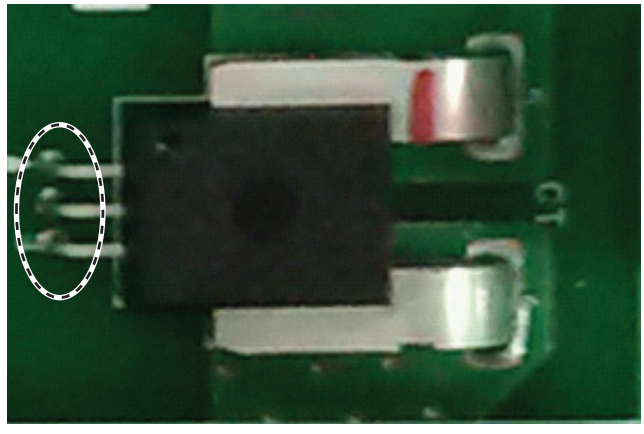


<CT Sensing Check Point>

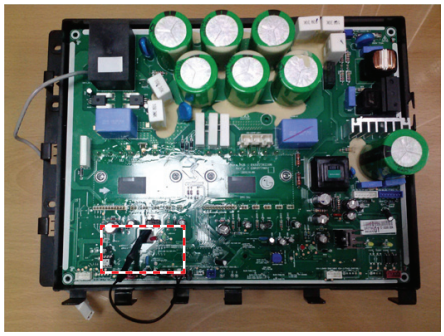
▶ AHUW126A2/AHUW146A2/AHUW166A2



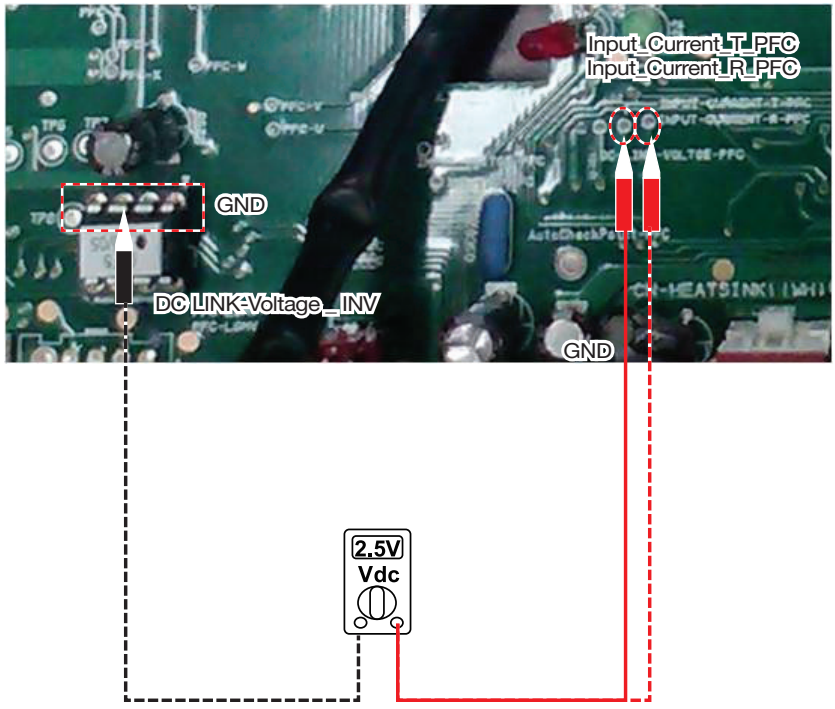
< Inverter PCB>



<CT Sensing Check Point>

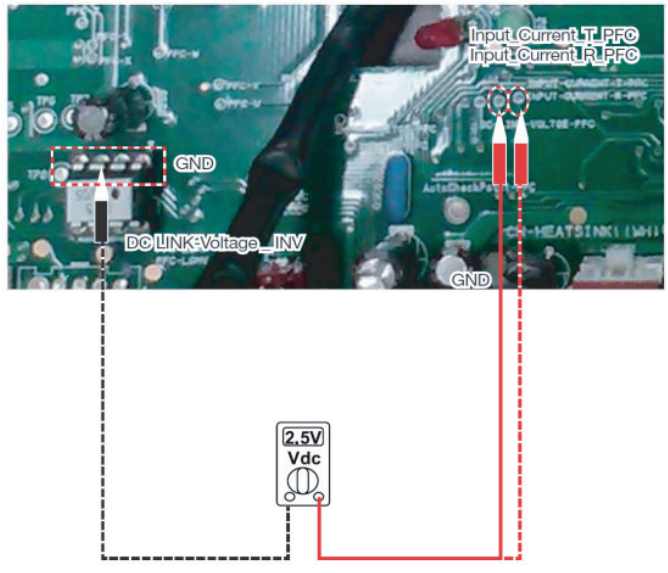


4kW



▶ AHUW128A3/AHUW148A3/AHUW168A3

<Inverter PCB>



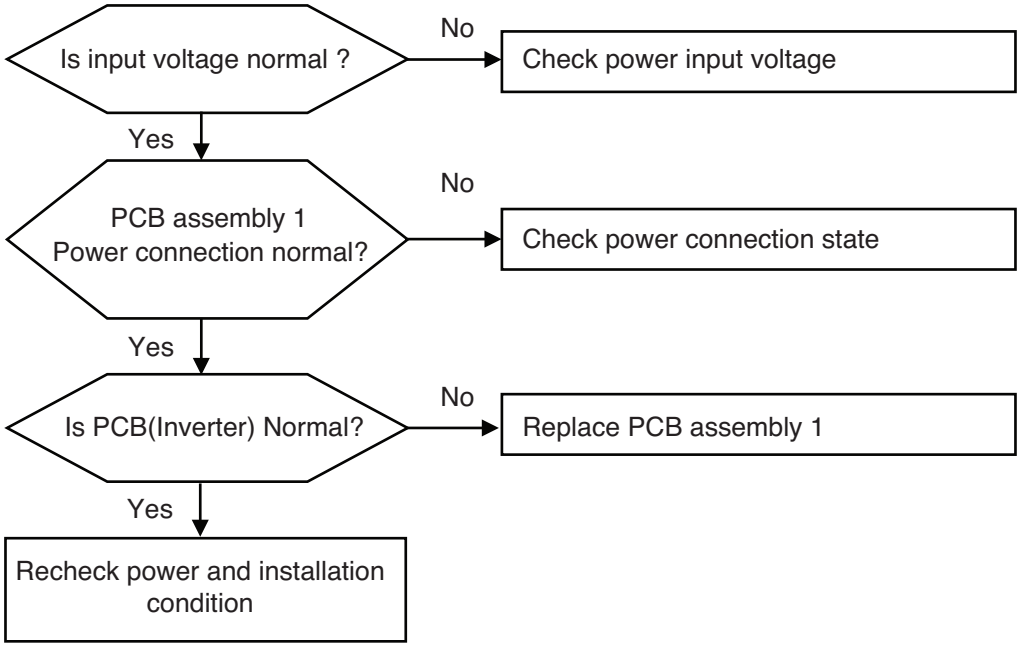
<CT Sensing Check Point >

Display code	Title	Cause of error	Check point & Normal condition
23	DC Link High / Low Volt	• DC Link Voltage is above 420 V DC • DC Link Voltage is below 140 V DC	• Check CN_(L), CN_(N) Connection • Check Input Voltage • Check PCB DC Link voltage sensor parts

WARNING

Before checking PCB(Inverter) or each outdoor electric parts, wait for 3 minutes after the power is off. When measuring at standby state of power supply, after checking the measurement mode of the meter, be careful of the short-circuits with other parts.

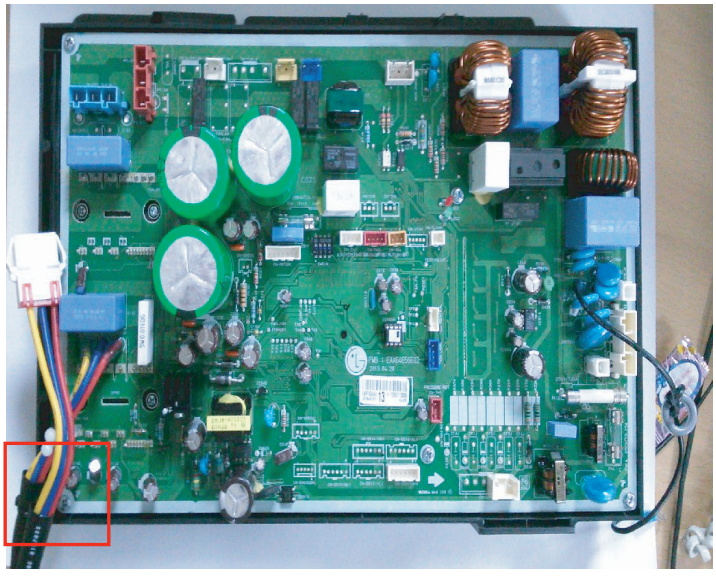
■ Error Diagnosis and Countermeasure Flow Chart

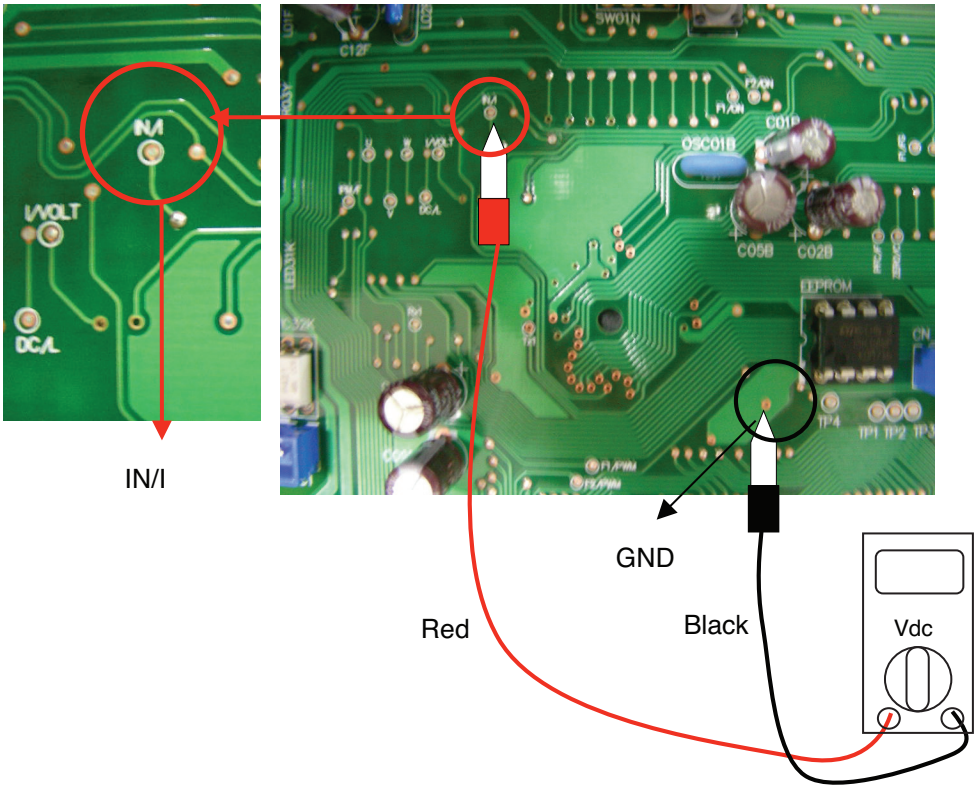


Check Point

1. Check the WCN_P(L),P(N) Connection condition at the main PCB(Heater). (Refer to wiring diagram)
2. Check the DC Link voltage at not operating(280V ↑)
3. Check the DC Link voltage at Comp operating(340V ↑)
4. Check DC Link Sensing Signal(AHNW**6A3) :2.4~2.8V (Refer the Picture)
5. Check DC Link Sensing Signal(AHNW**8A3) :0.4~0.6V (Refer the Picture)

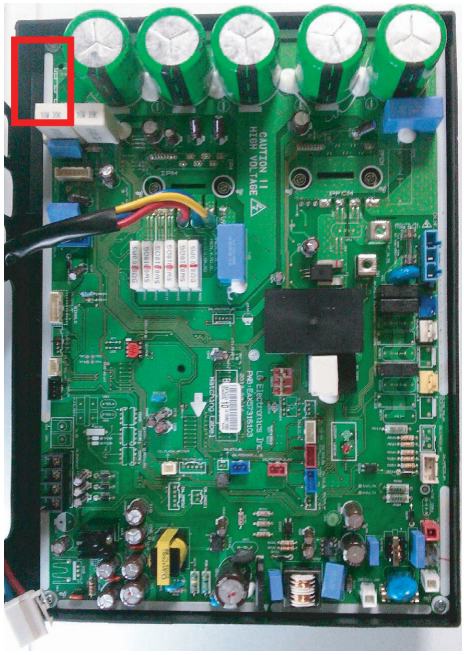
* AHUW056A3/AHUW076A3/AHUW096A3

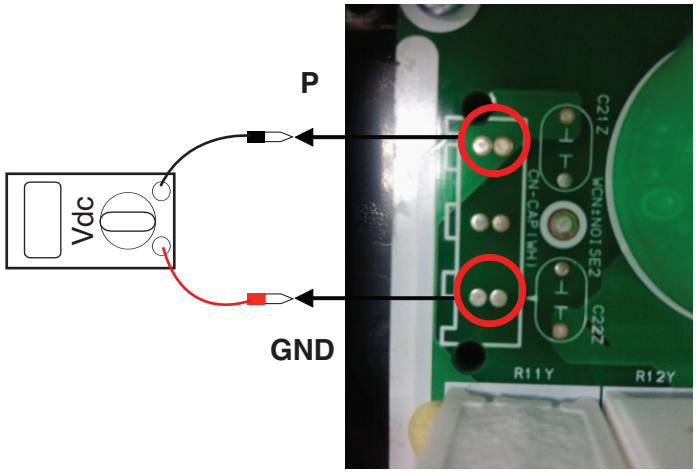




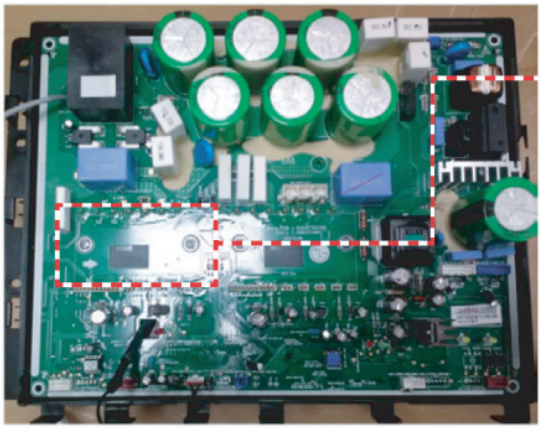
<CT Sensing Check Point>

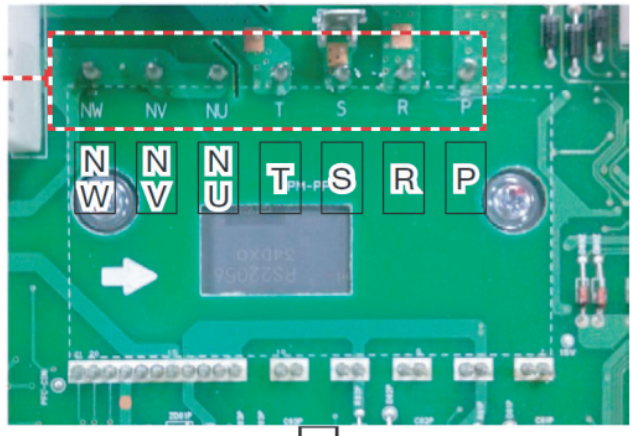
▶ AHUW126A3/AHUW146A3/AHUW166A3

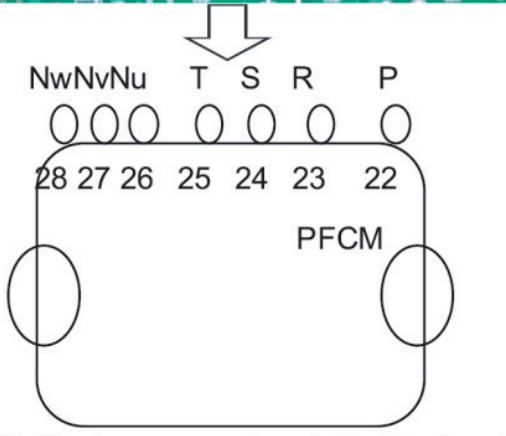




▶ AHUW128A3/AHUW148A3/AHUW168A3







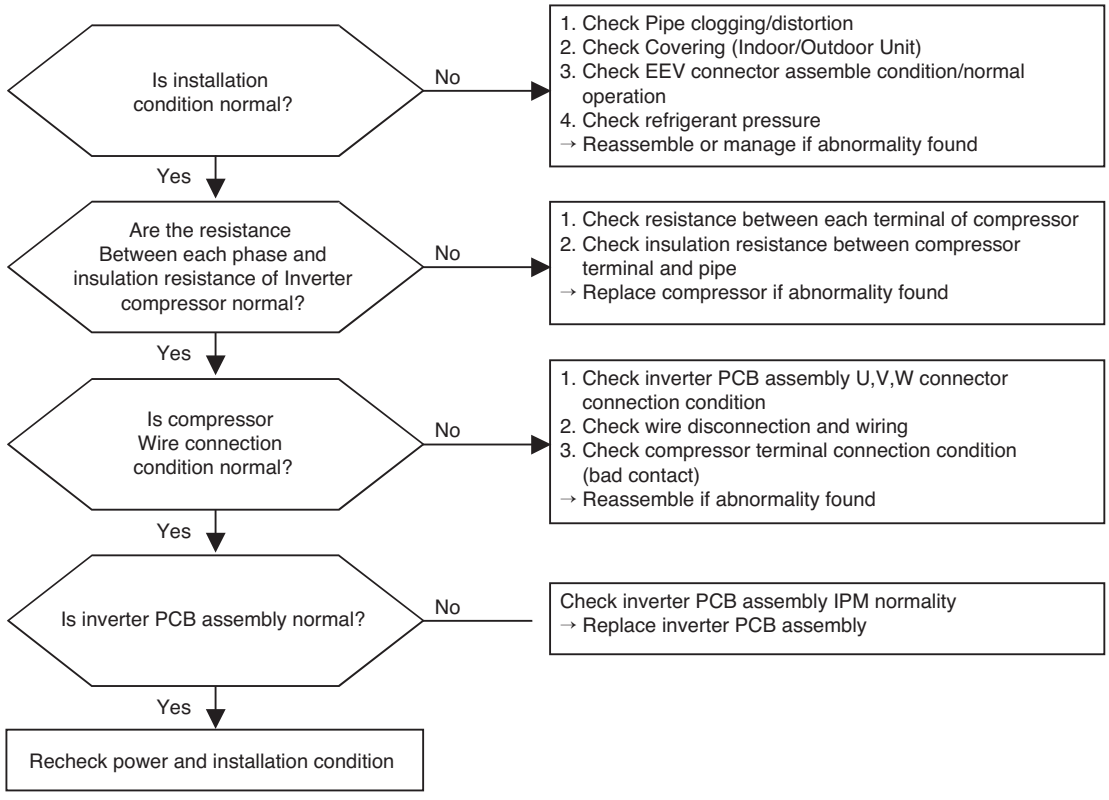
[PFCM Pin Arrangement and Pin Numbers]

Display code	Title	Cause of error	Check point & Normal condition
26	DC Compressor Position	• Compressor Starting fail error	• Check the connection of comp wire “U,V,W” • Malfunction of compressor • Check the component of “IPM”, detection parts.

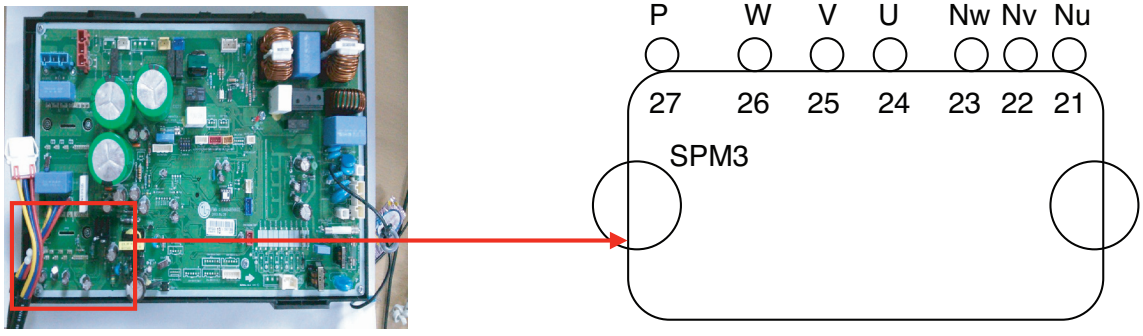
WARNING

Before checking PCB(Inverter) or each outdoor electric parts, wait for 3 minutes after the power is off. When measuring at standby state of power supply, after checking the measurement mode of the meter, be careful of the short-circuits with other parts.

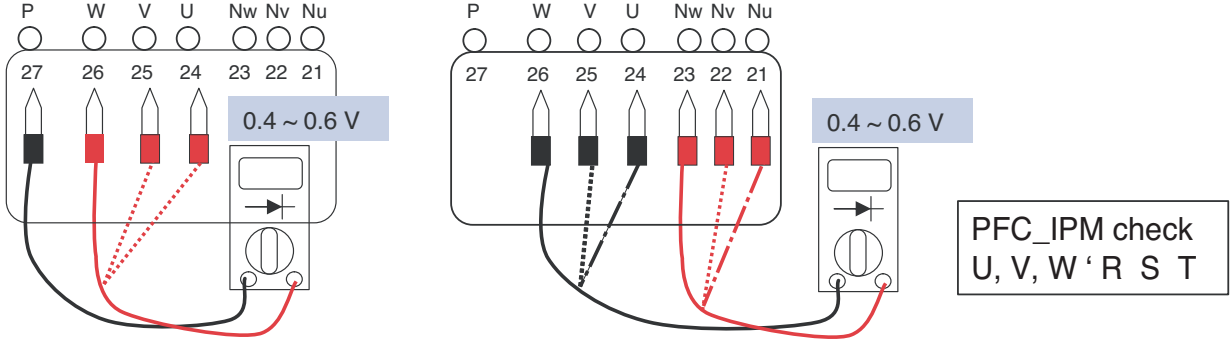
■ Error Diagnosis and Countermeasure Flow Chart



1. IPM Check



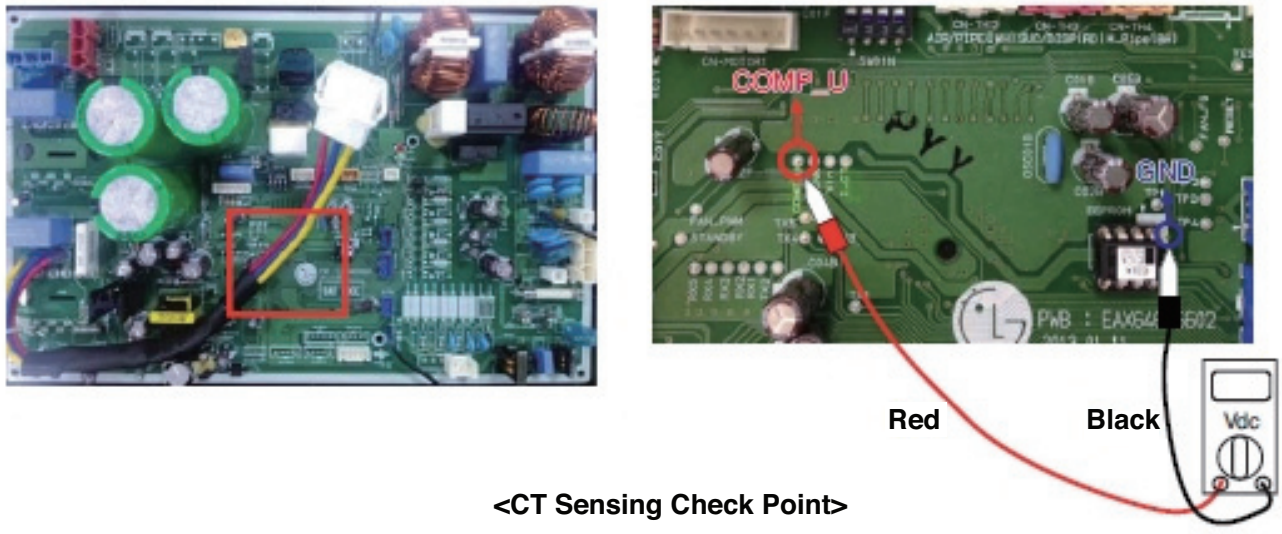
1. Wait PCB DC voltage is discharged after main power off.
2. Pull out V, V, W COMP connector.
3. Set multi tester to resistance mode.
4. If the value between P and N terminal of IPM is short(0Ω) or open(hundreds MΩ), PCB needs to be replaced.(IPM damaged)
5. Set the multi tester to diode mode.
6. In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



2. CT Sensing Check

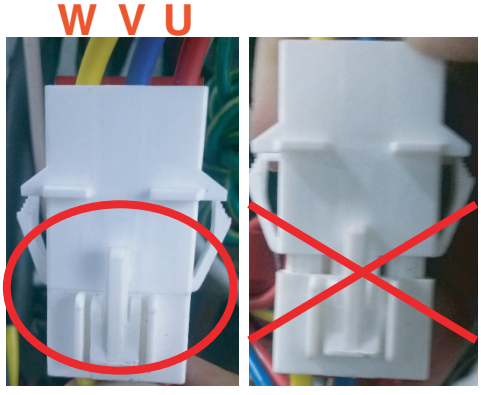
• Inspecting PCB phase current sensing circuit

1. Set Multi-tester DC voltage measurement mode.
2. Mesure the below mesureing point DC voltages at Power-on standby state.
3. If the measurements are outside DC 2.5V ± 0.2V, the parts are decided as burned.



<CT Sensing Check Point>

3. Connector Check



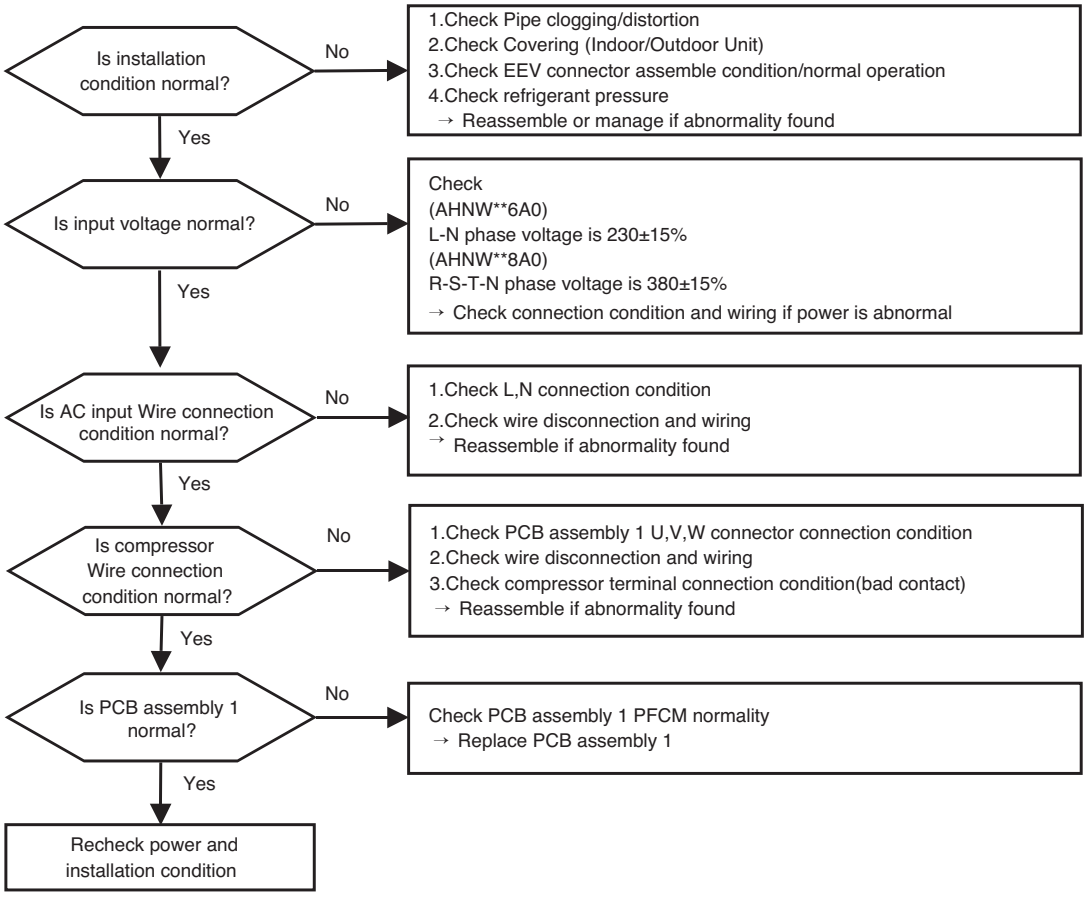
<WVC connector check>

Display code	Title	Cause of error	Check point & Normal condition
27	AC Input Instant over Current Error	PCB(Inverter) input current is over 100A(peak) for 2us	1. Overload operation (Pipe clogging/Covering/EEV defect/Ref. overcharge) 2. Compressor damage (Insulation damage/Motor damage) 3. Input voltage abnormal (L,N) 4. Power line assemble condition abnormal 5. PCB assembly 1 Damage (input current sensing part)

WARNING

Before checking PCB(Inverter) or each outdoor electric parts, wait for 3 minutes after the power is off. When measuring at standby state of power supply, after checking the measurement mode of the meter, be careful of the short-circuits with other parts.

■ Error Diagnosis and Countermeasure Flow Chart



❊ PFCM Moudle checking method

① Set the multi tester to diode mode.

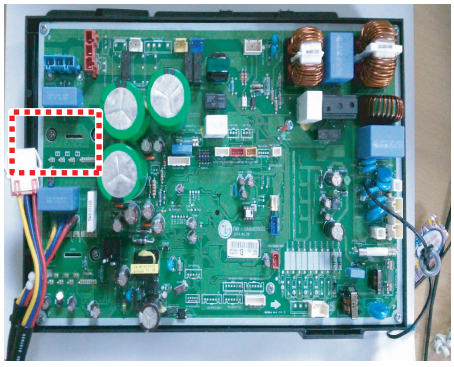
② Check short between input signal pin which are placed below PFC Module

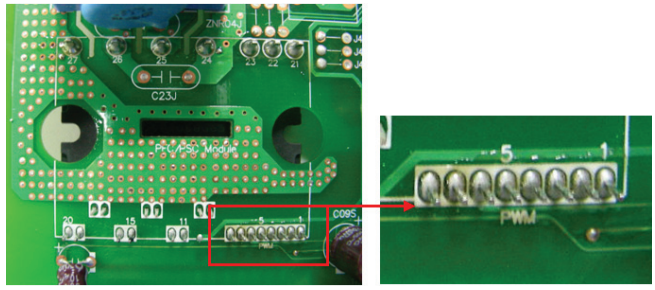
③ Replace PCB assembly 1 if it is short between pins except No.4,5 pins.

CAUTION

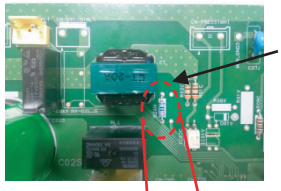
PFCM module No.4,5 pins are internal short state.

▶ AHUW056A3/AHUW076A3/AHUW096A3

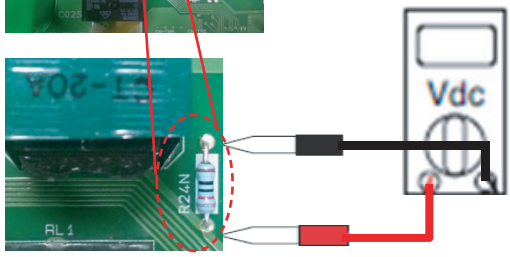




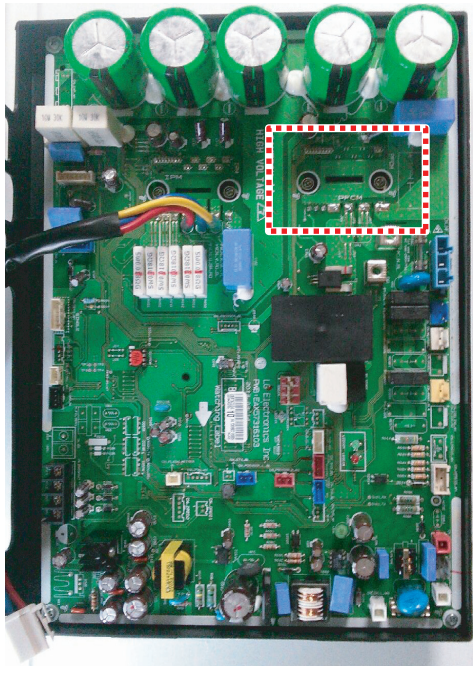
<Short Check Point>

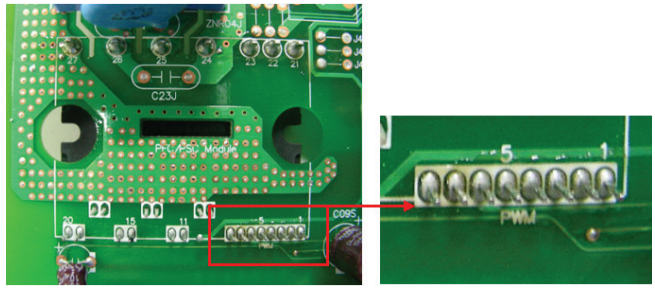


After turning off the main power R24N between the ends of the resistance will be measured 620~670Ω.



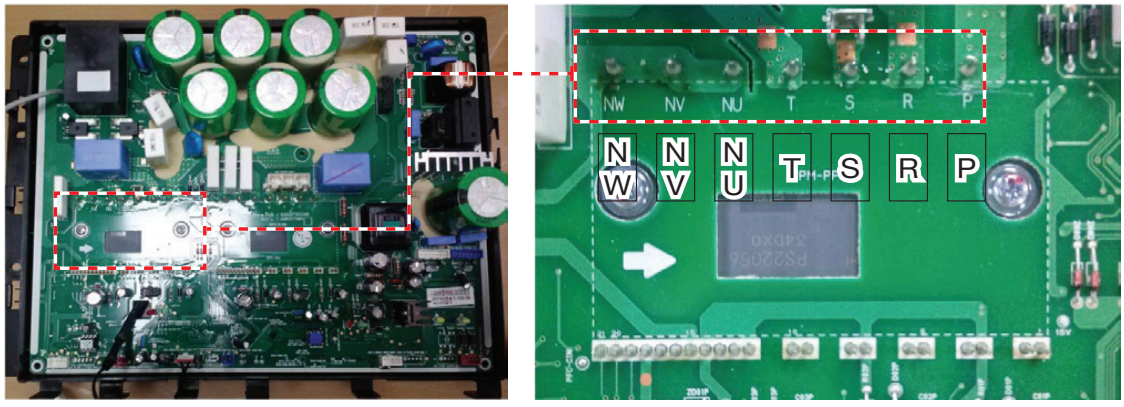
▶ AHUW126A3/AHUW146A3/AHUW166A3





<Short Check Point>

▶ AHUW128A3/AHUW148A3/AHUW168A3



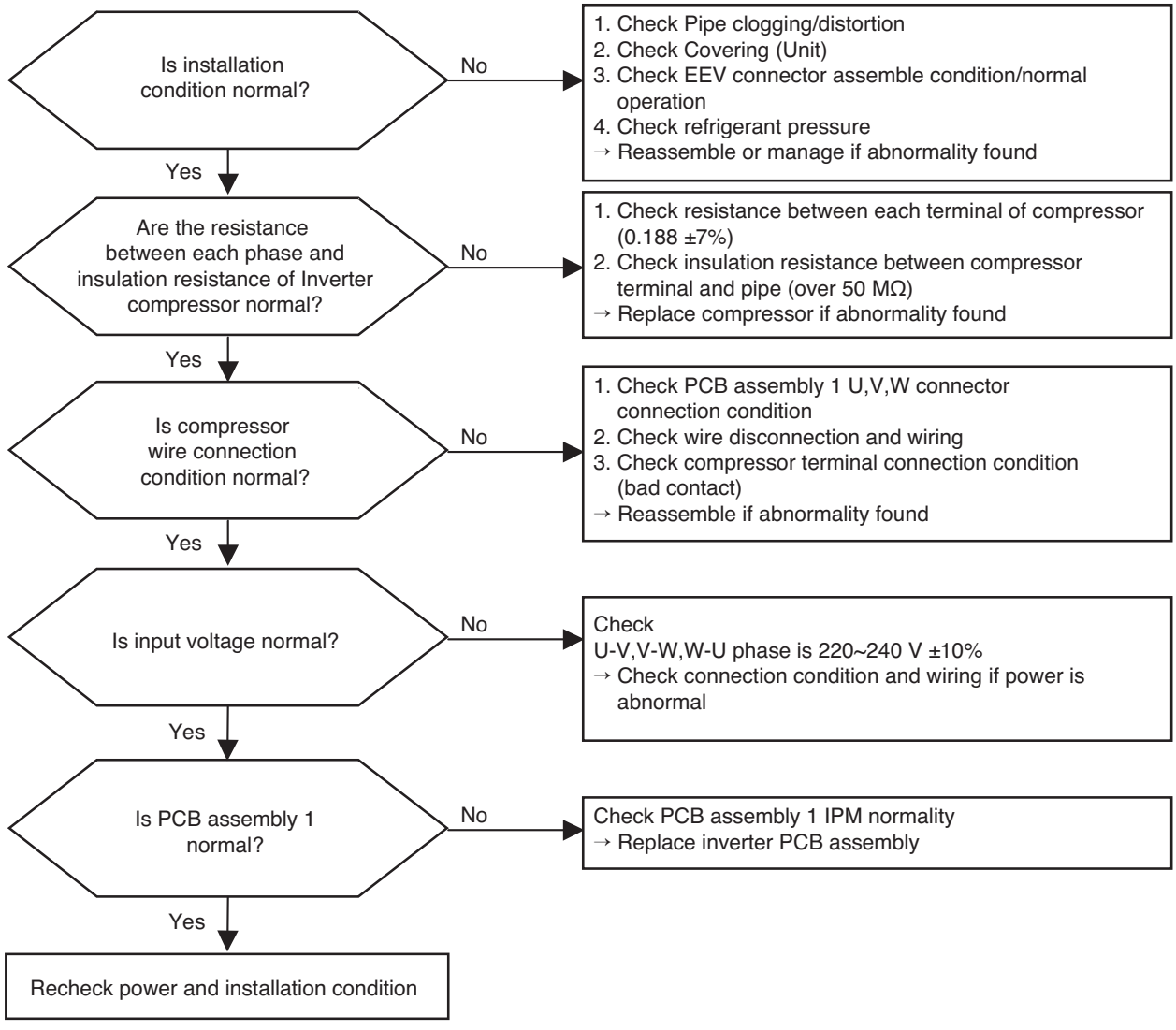
Display code	Title	Cause of error	Check point & Normal condition
29	Inverter compressor over current	(AHNW**6A3) Inverter Compressor input current is 30A. (AHNW**8A3) Inverter Compressor input current is 24A.	1. Overload operation (Pipe clogging/Covering/EEV defect/Ref. overcharge) 2. Compressor damage(Insulation damage/Motor damage) 3. Input voltage low 4. ODU PCB assembly 1 damage

WARNING

Before checking PCB(Inverter) or each outdoor electric parts, wait for 3 minutes after the power is off. When measuring at standby state of power supply, after checking the measurement mode of the meter, be careful of the short-circuits with other parts.

■ Error Diagnosis and Countermeasure Flow Chart

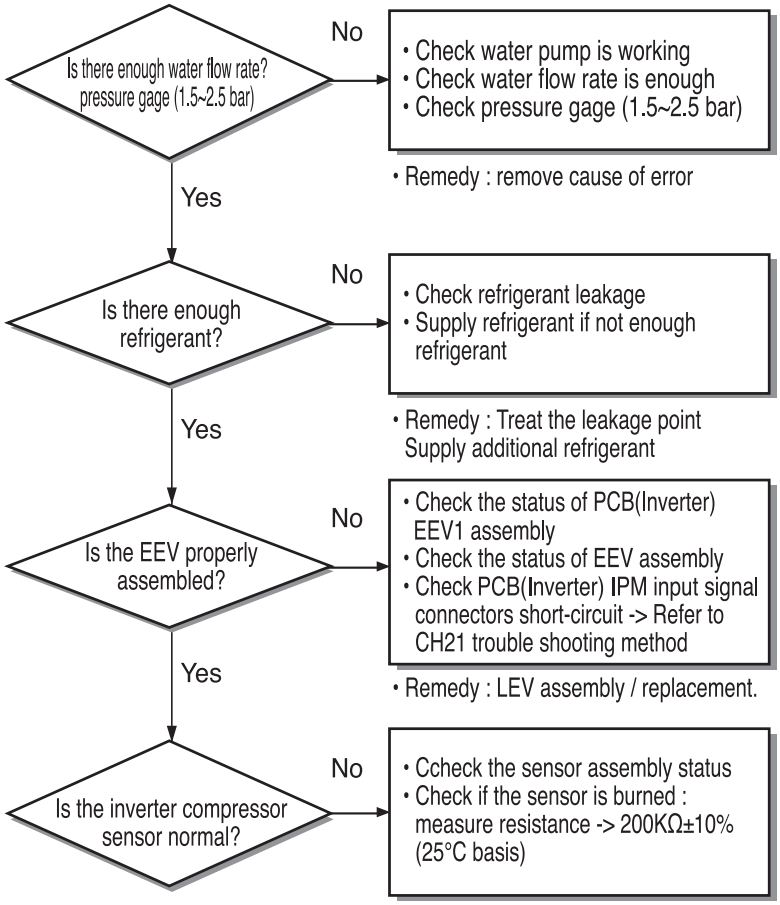
Check Flow Chart



Display code	Title	Cause of error	Check point & Normal condition
32	High temperature in Discharge pipe of the inverter compressor	• Overload operation (Outdoor fan constraint, screened, blocked) • Refrigerant leakage (insufficient) • Poor INV Comp Discharge sensor • LEV connector displaced / poor LEV assembly	• Check outdoor fan constraint/ screened/ flow structure • Check refrigerant leakage • Check if the sensor is normal • Check the status of EEV assembly

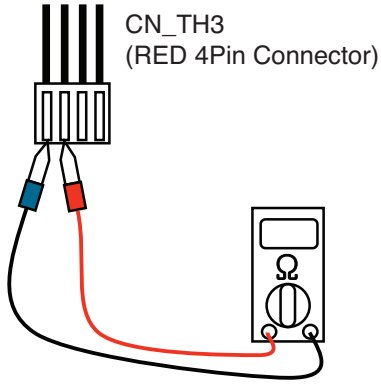
WARNING

Before checking PCB(Inverter) or each outdoor electric parts, wait for 3 minutes after the power is off. When measuring at standby state of power supply, after checking the measurement mode of the meter, be careful of the short-circuits with other parts.



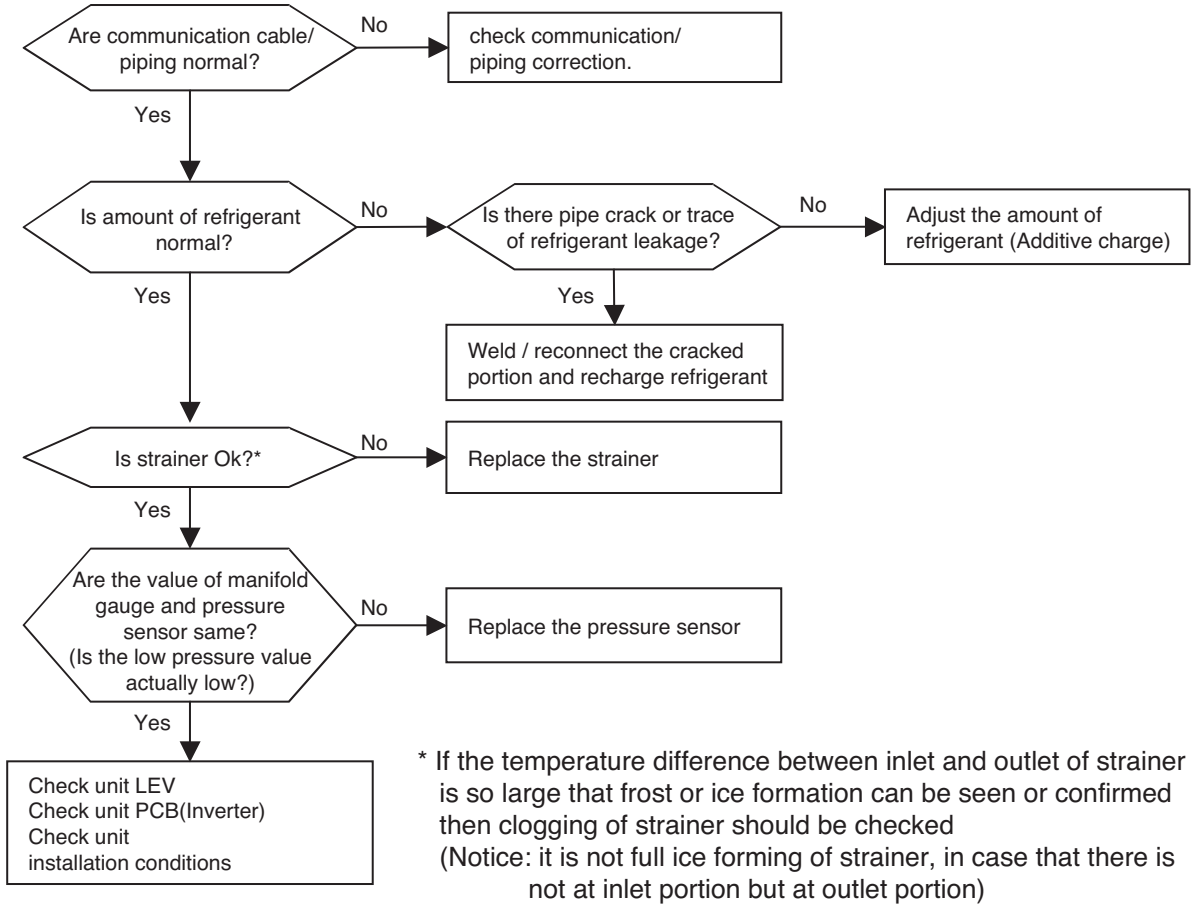
- **Inspecting Inverter Compressor Discharge Sensor**

1. Set Multi-tester as resistance measurement mode.
2. Measure the resistance between inverter discharge sensor connector pins.
3. Measure resistance value of 200KΩ±10%, 25°C basis
4. Check if the sensor insulation is damaged. -> measure the resistance between sensor connector pin and unit assembly pipe. (1MΩ or more)



Display code	Title	Cause of error	Check point & Normal condition
35	Low Presser Error	Excessive decrease of low pressure	• Defective low pressure sensor • Defective unit fan • Refrigerant shortage/leakage • Deformation because of damage of refrigerant pipe • Defective unit EEV • Covering / clogging (unit covering during the cooling mode / unit filter clogging during heating mode) • SVC valve clogging • Defective unit PCB(Inverter) • Defective unit pipe sensor

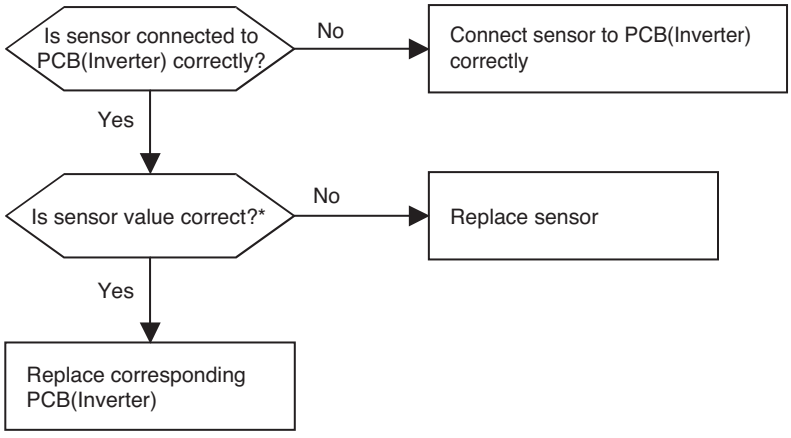
■ Error diagnosis and countermeasure flow chart

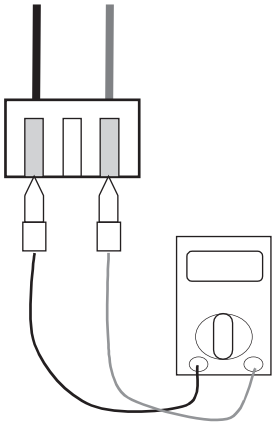


* If the temperature difference between inlet and outlet of strainer is so large that frost or ice formation can be seen or confirmed then clogging of strainer should be checked
(Notice: it is not full ice forming of strainer, in case that there is not at inlet portion but at outlet portion)

Display code	Title	Cause of error	Check point & Normal condition
41	D-pipe sensor (Inverter)	• Open / Short • Soldered poorly • Internal circuit error	1. Bad connection of thermistor connector 2. Defect of thermistor connector (Open/Short) 3. Defect of outdoor PCB(Inverter)
44	Air sensor	• Open / Short • Soldered poorly • Internal circuit error	1. Bad connection of thermistor connector 2. Defect of thermistor connector (Open/Short) 3. Defect of outdoor PCB(Inverter)
45	Condenser Mid pipe sensor	• Open / Short • Soldered poorly • Internal circuit error	1. Bad connection of thermistor connector 2. Defect of thermistor connector (Open/Short) 3. Defect of outdoor PCB(Inverter)
46	Suction Pipe sensor	• Open / Short • Soldered poorly • Internal circuit error	1. Bad connection of thermistor connector 2. Defect of thermistor connector (Open/Short) 3. Defect of outdoor PCB(Inverter)
48	Condenser Out-pipe sensor	• Open / Short • Soldered poorly • Internal circuit error	1. Bad connection of thermistor connector 2. Defect of thermistor connector (Open/Short) 3. Defect of outdoor PCB(Inverter)

■ Error Diagnosis and Countermeasure Flow Chart

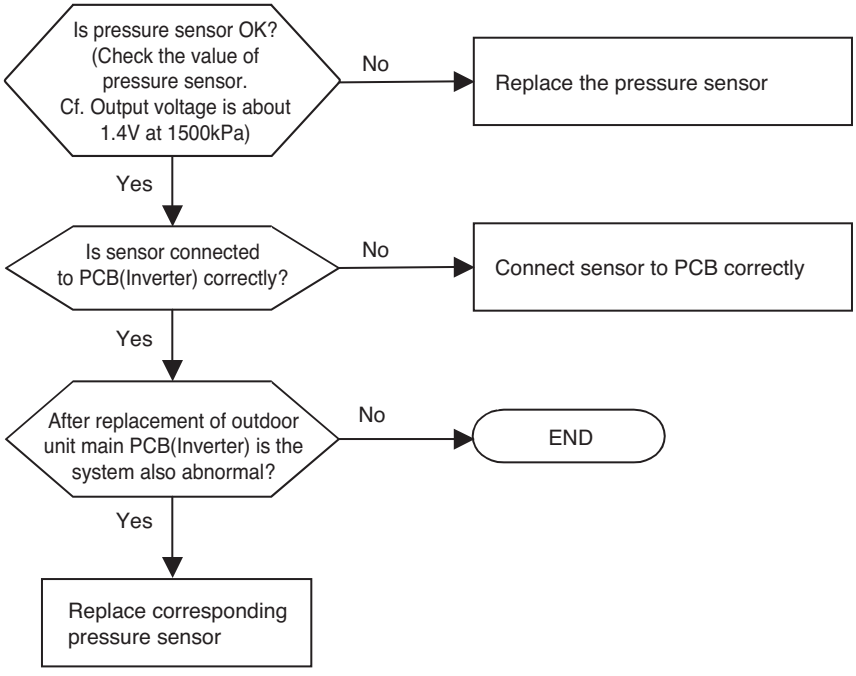




Check Point

1. Estimate the resistance of each sensor.(Unplugged)
2. Check the value of the resistor of thermistor.
   - D-pipe sensor (Inverter) : Normal Value of the resistor is 200kΩ at 25°C
   - Air sensor : Normal Value of the resistor is 10kΩ at 25°C
   - Cond. Mid-pipe sensor : Normal Value of the resistor is 5kΩ at 25°C
   - Suction pipe sensor : Normal Value of the resistor is 5kΩ at 25°C
   - Condenser Out-pipe sensor : Normal Value of the resistor is 5kΩ at 25°C

Display code	Title	Cause of error	Check point & Normal condition
43	Sensor error of high pressure	Abnormal value of sensor (Open/Short)	• Bad connection of connector PCB(Inverter) • Bad connection high pressure connector • Defect of high pressure connector (Open/Short) • Defect of connector PCB(Inverter) (Open/Short) • Defect of PCB(Inverter)

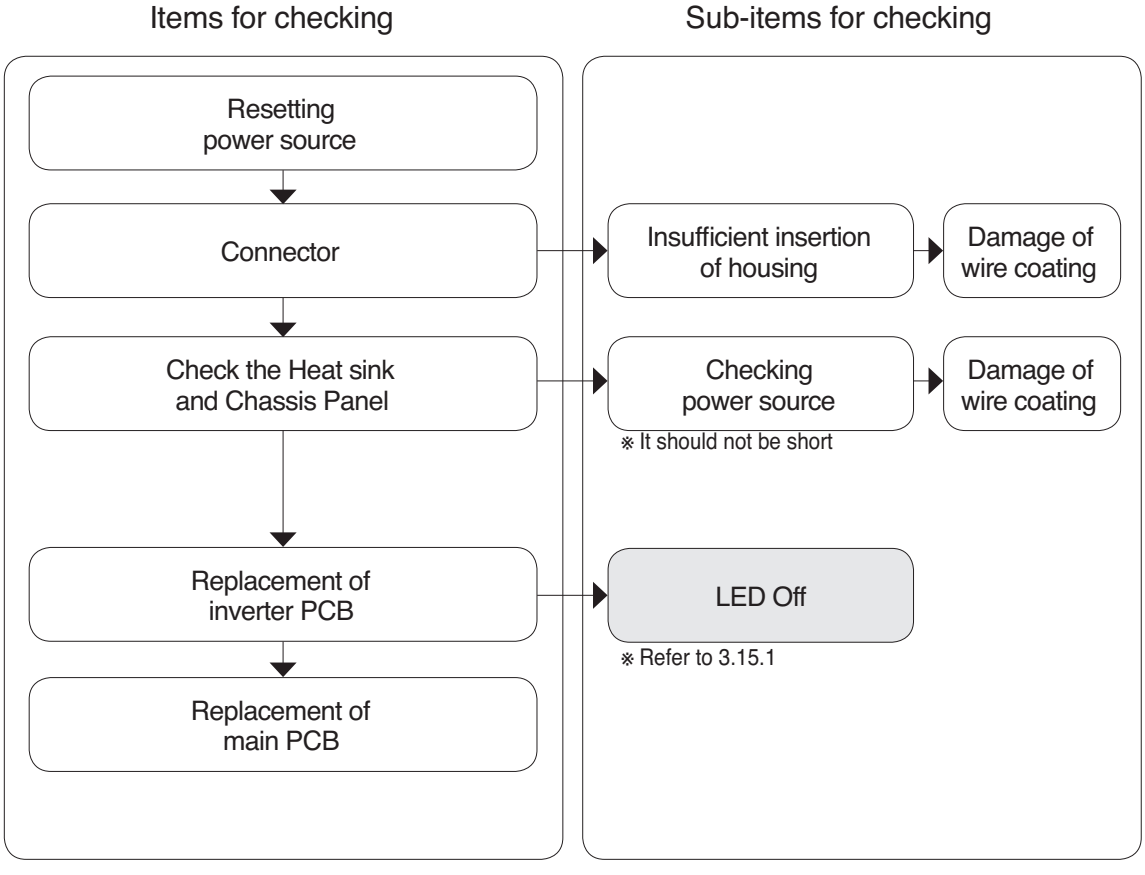


Display code	Title	Cause of error	Check point & Normal condition
52	PCB Communication Error	Checking the communication state between Main PCB and Inverter PCB	• Generation of noise source interfering with communication

WARNING

Before checking PCB(Inverter) or each outdoor electric parts, wait for 3 minutes after the power is off. When measuring at standby state of power supply, after checking the measurement mode of the meter, be careful of the short-circuits with other parts.

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



▶ AHUW128A3/AHUW148A3/AHUW168A3

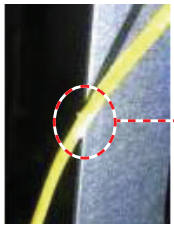
Purpose	Installation environment interfering the communication	Items for checking	Checking method of afulty points

① Insufficient insertion of wires

OK

NG

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



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

Display code	Title	Cause of error	Check point & Normal condition
53	Title Communication (PCB(Heater) → PCB(Inverter))	• Communication poorly	• Power input AC 230V. • The connector for transmission is disconnected. • The connecting wires are misconnected. • The communication line is shorted at GND. • Transmission circuit of PCB(Inverter) is abnormal. • Transmission circuit of PCB(Heater) is abnormal.

WARNING

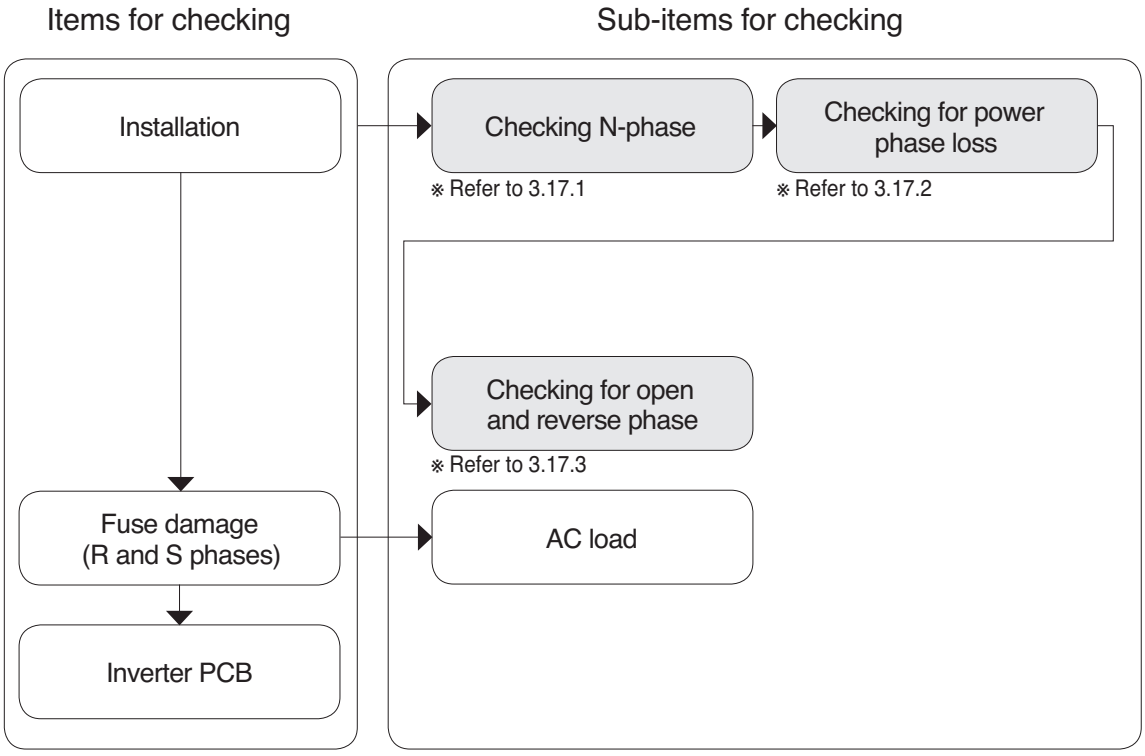
Before checking PCB(Inverter) or each outdoor electric parts, wait for 3 minutes after the power is off. When measuring at standby state of power supply, after checking the measurement mode of the meter, be careful of the short-circuits with other parts.

Check Point

1. Check the input power AC 230 V.
2. Check the communication wires are correctly connected.
   Adjust the connection of wire Confirm the wire of "Live", "Neutral"
3. Check the resistance between communication line and GND. (Normal : Over 2MΩ)
4. Check the connector for communication is correctly connected.
5. Make sure you have connected to the communication line soldering
   (If you do not connect by soldering, a communication error(CH05/CH53) occurs by noise)

Display code	Title	Cause of error	Check point & Normal condition
54	Open and Reverse Phase Error	Prevention of phase unbalance and prevention of reverse rotation of constant-rate compressor	Main power wiring fault

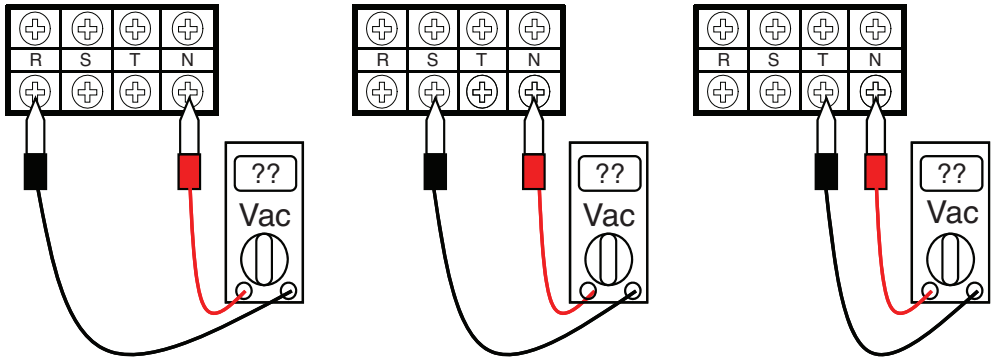
■ Error diagnosis and countermeasure flow chart



▶ AHUW128A3/AHUW148A3/AHUW168A3

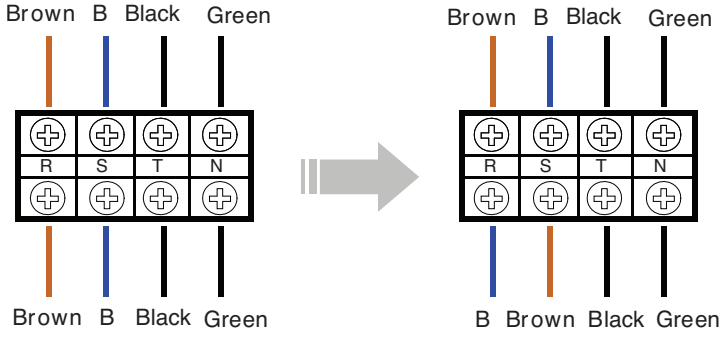
■ Judgment Method of R,S,T phase loss

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



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

- Operation with replacement of R and S phases only

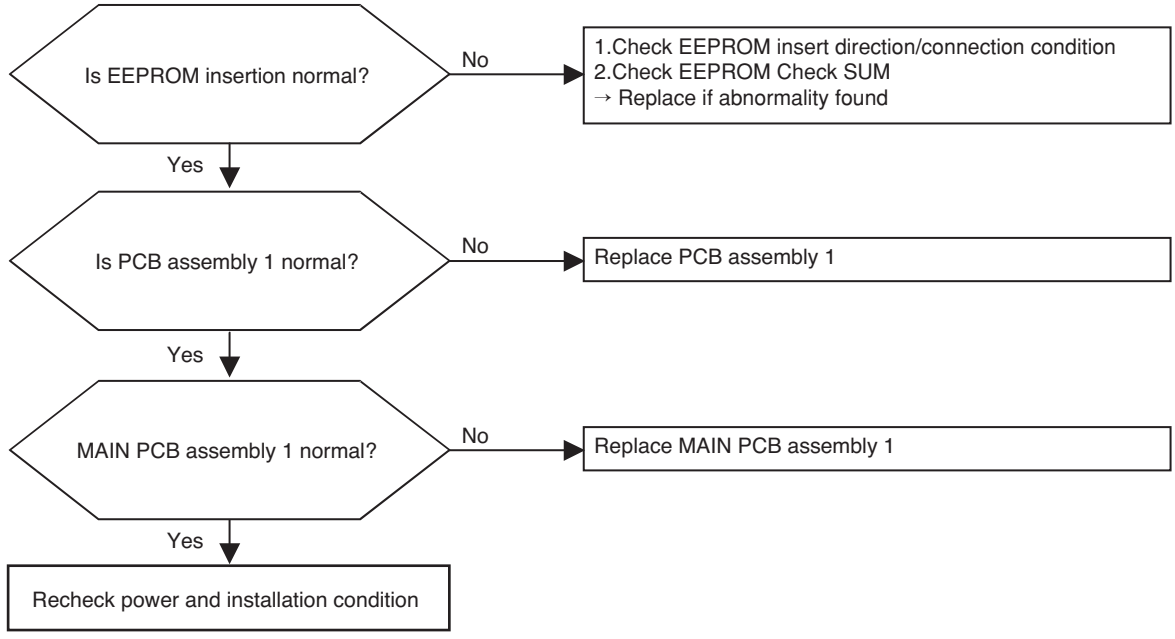


Display code	Title	Cause of error	Check point & Normal condition
60	PCB(Inverter) & Main EEPROM check sum error	EEPROM Access error and Check SUM error	1. EEPROM contact defect/wrong insertion 2. Different EEPROM Version 3. ODU Inverter & Main PCB assembly 1 damage

WARNING

Before checking PCB(Inverter) or each outdoor electric parts, wait for 3 minutes after the power is off. When measuring at standby state of power supply, after checking the measurement mode of the meter, be careful of the short-circuits with other parts.

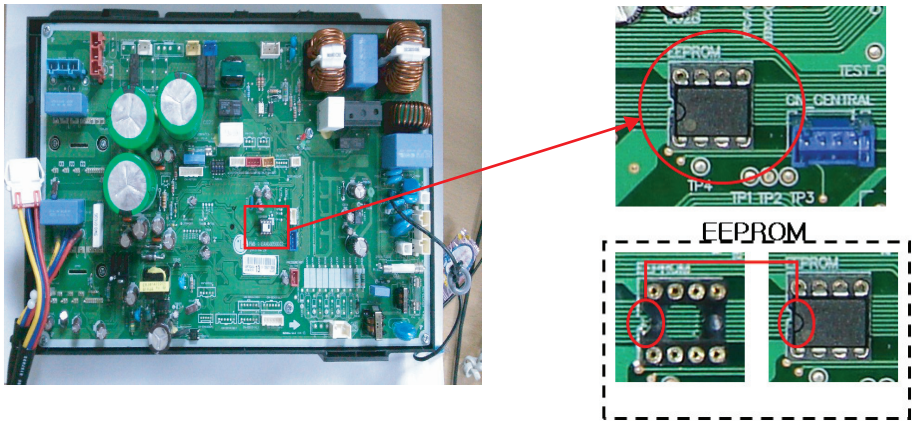
■ Error Diagnosis and Countermeasure Flow Chart



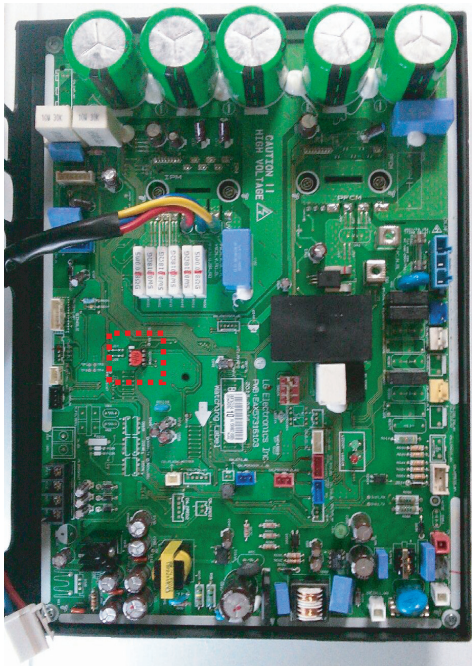
Check Point

- Check the EEPROM Check sum & Direction

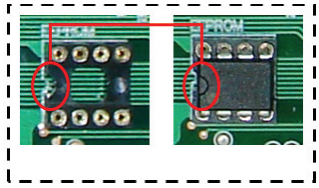
▶ AHUW056A3/AHUW076A3/AHUW096A3



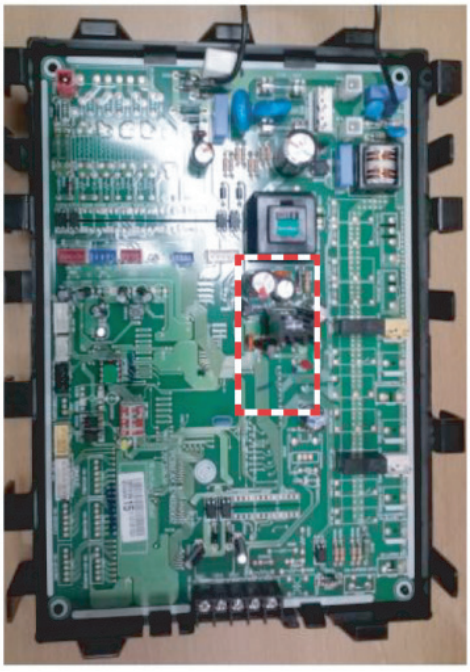
▶ AHUW126A3/AHUW146A3/AHUW166A3



EEPROM



▶ AHUW128A3/AHUW148A3/AHUW168A3

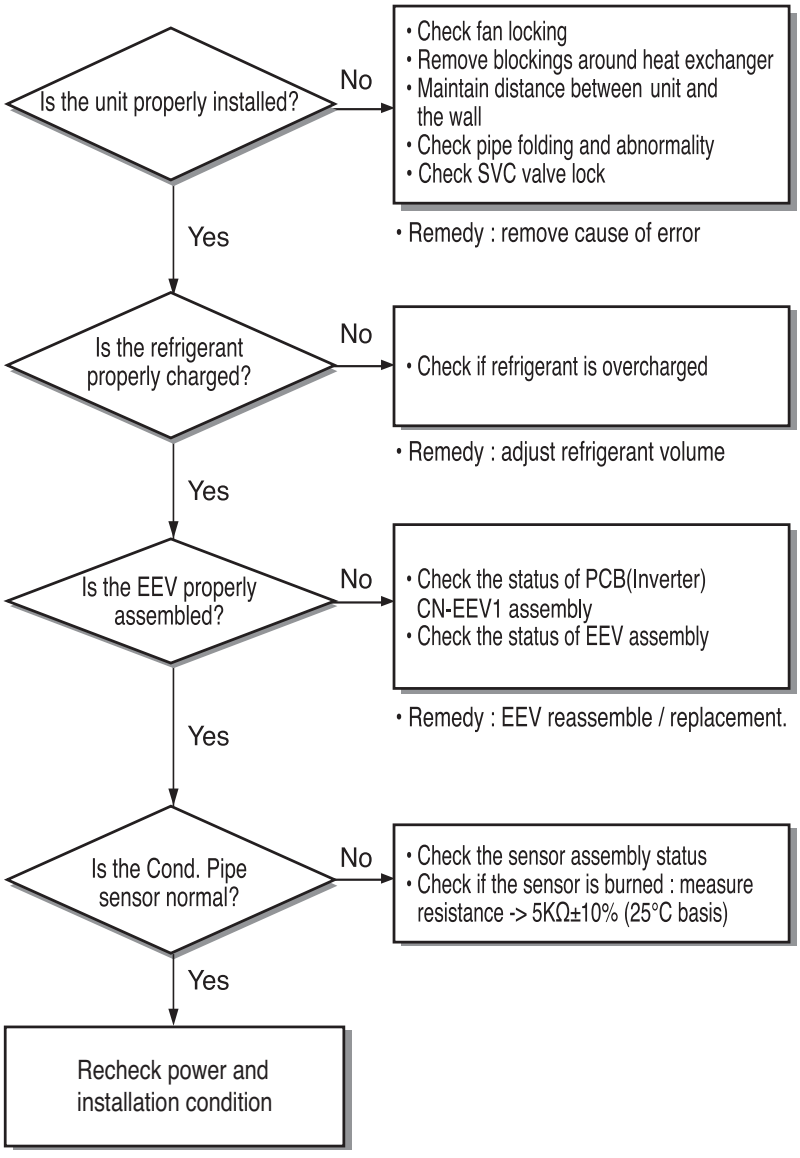


EEPROM

Display code	Title	Cause of error	Check point & Normal condition
61	High temperature in Cond. Pipe	• Overload operation (Outdoor fan constraint, screened, blocked) • Unit heat exchanger contaminated • EEV connector displaced / poor EEV assembly • Poor Cond. Pipe sensor assembly / burned	• Check outdoor fan constraint / screened / flow structure • Check if refrigerant overcharged • Check the status of EEV assembly • Check the status of sensor assembly / burn

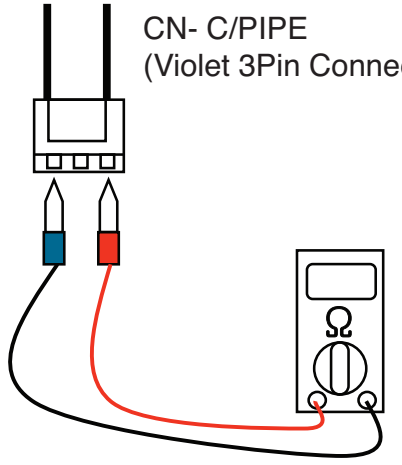
WARNING

Before checking PCB(Inverter) or each outdoor electric parts, wait for 3 minutes after the power is off. When measuring at standby state of power supply, after checking the measurement mode of the meter, be careful of the short-circuits with other parts.



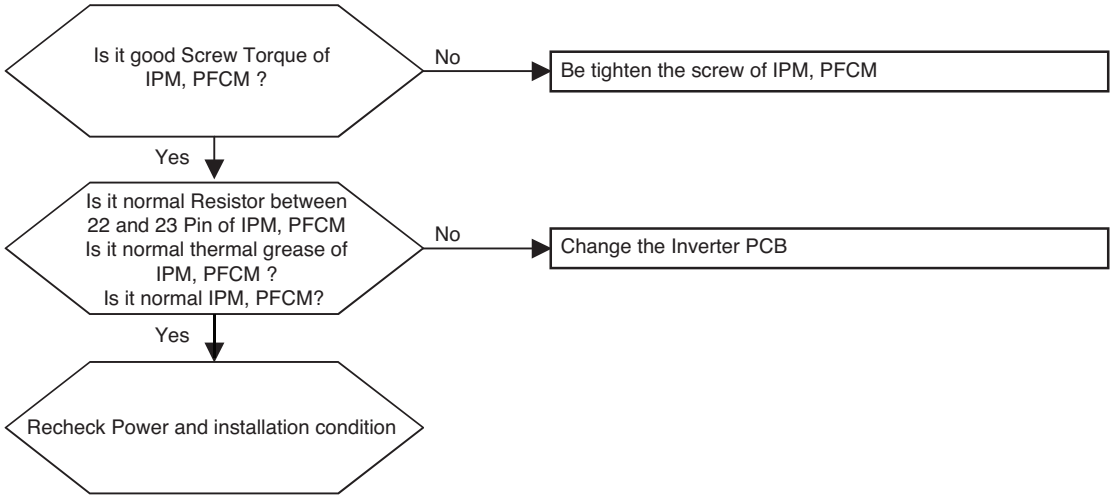
• Inspecting Cond. Pipe Sensor

1. Set Multi-tester as resistance measurement mode.
2. Measure the resistance between rated speed Comp Discharge sensor connector pins.
3. Measure resistance value of 5kΩ±10%, 25°C basis
4. Check if the sensor insulation is damaged. -> measure the resistance between sensor connector pin and unit assembly pipe. (1MΩ or more)



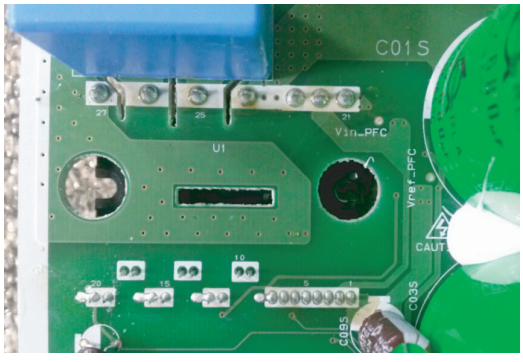
Display code	Title	Cause of error	Check point & Normal condition
62	Heat sink Temp, High error	Heatsink sensor detected high temp.(85°C)	1. Part no. : EBR37798101~09 - Check the heatsink sensor : 10kΩ/at 25°C(Unplugged) - Check the outdoor fan is driving rightly 2. Part no. : EBR37798112~21 - Check the soldered condition in the 22,23 pin of IPM, PFCM - Check the screw torque of IPM, PFCM - Check the spreadable condition of thermal grease on IPM, PFCM - Check the outdoor fan is driving rightly

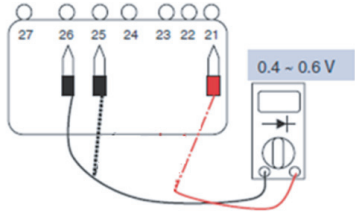
■ Error Diagnosis and Countermeasure Flow Chart



Check Point

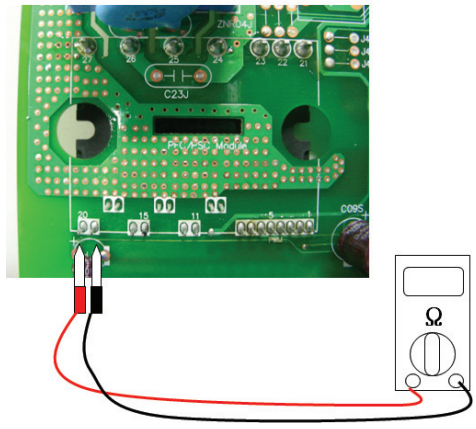
1. Check resistance between No.19 pin and NO.20 pin of PCB PFC module
2. Resistance value should be in 7kΩ ±10%.(at 25°C).





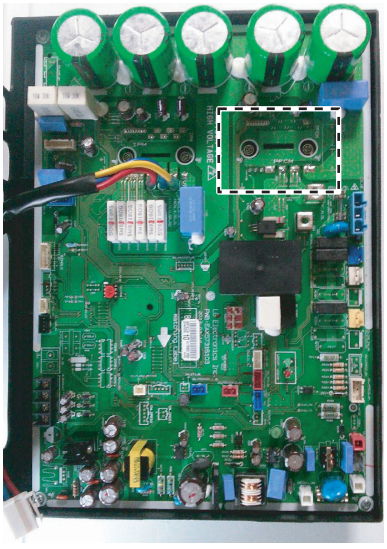
<Check the PFCM>

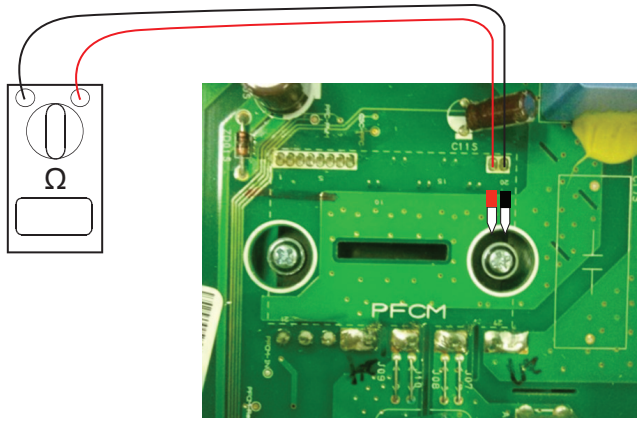
▶ AHUW056A3/AHUW076A3/AHUW096A3



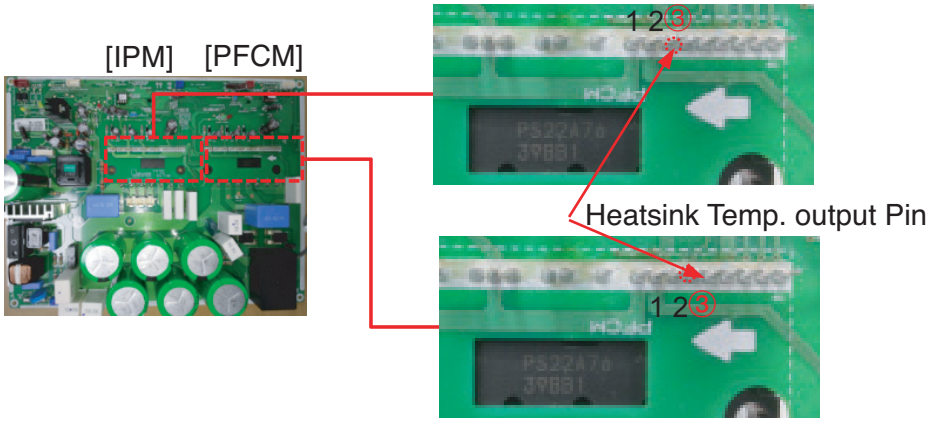
PFCM:
Measuring resistance
between No.19,20 pin

▶ AHUW126A3/AHUW146A3/AHUW166A3



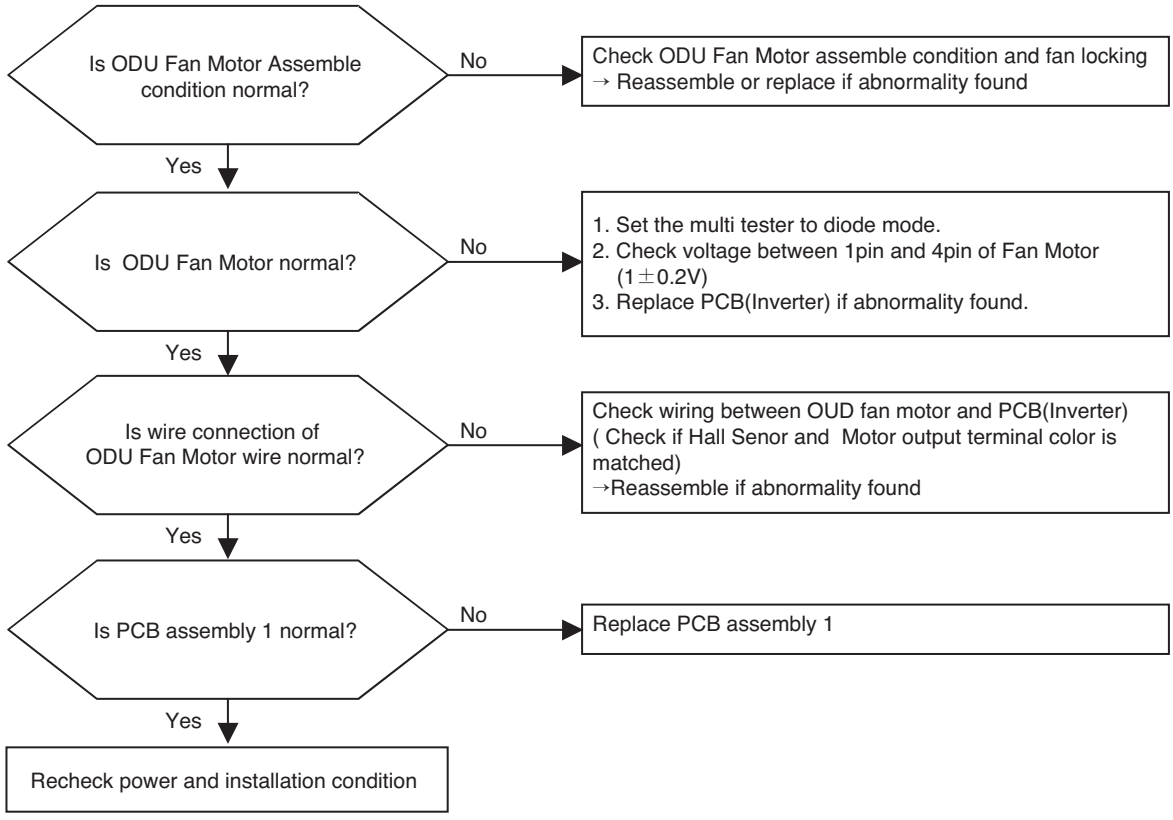


▶ AHUW128A3/AHUW148A3/AHUW168A3



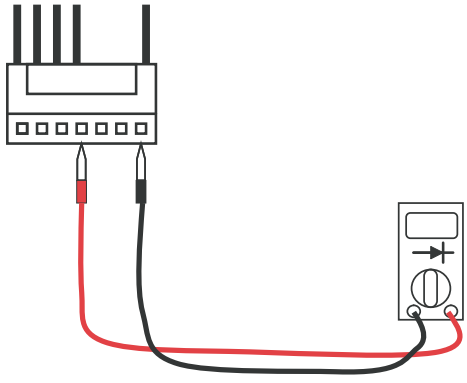
Display code	Title	Cause of error	Check point & Normal condition
67	Fan Lock Error	Fan RPM is 10RPM or less for 5 sec. when ODU fan starts or 40 RPM or less after fan starting.	1. ODU fan locking 2. Heatsink assembly of PCB assembly 1 condition abnormal 3. Defect of temperature sensing circuit part defect of PCB(Inverter)

■ Error Diagnosis and Countermeasure Flow Chart

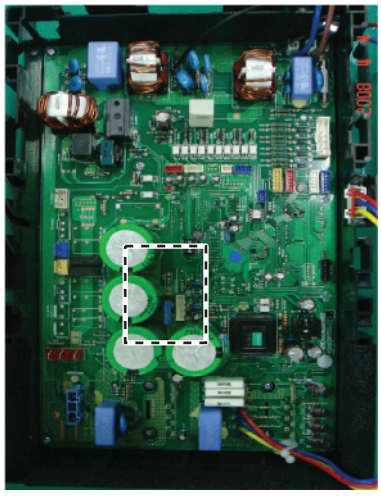


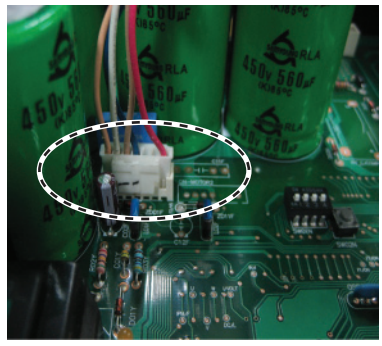
Check Point

1. Check voltage between 1pin and 4pin of Fan Mortor connector (Tester diode mode)
2. Voltage value should be in 1V ±0.2V.
3. Do not replacing all of fan motor and 220-240 V~ at once.
   Check error code again, after replacing the abnormal part (Fan Motor or PCB) first.

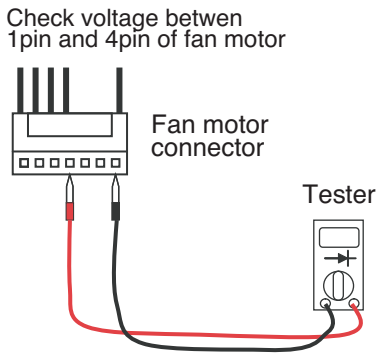


▶ AHUW056A3/AHUW076A3/AHUW096A3

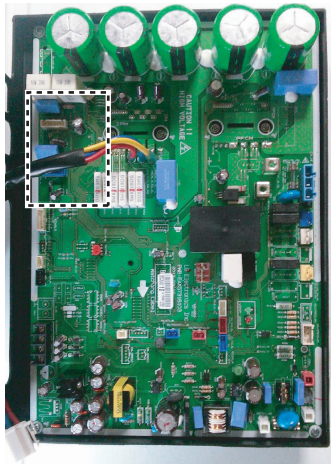


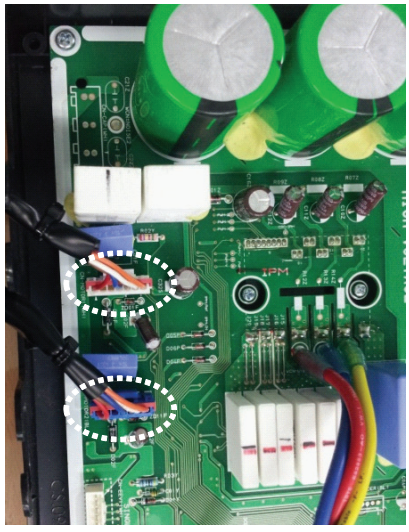


<Main PCB>

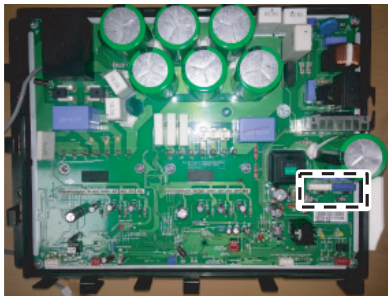


▶ AHUW126A3/AHUW146A3/AHUW166A3



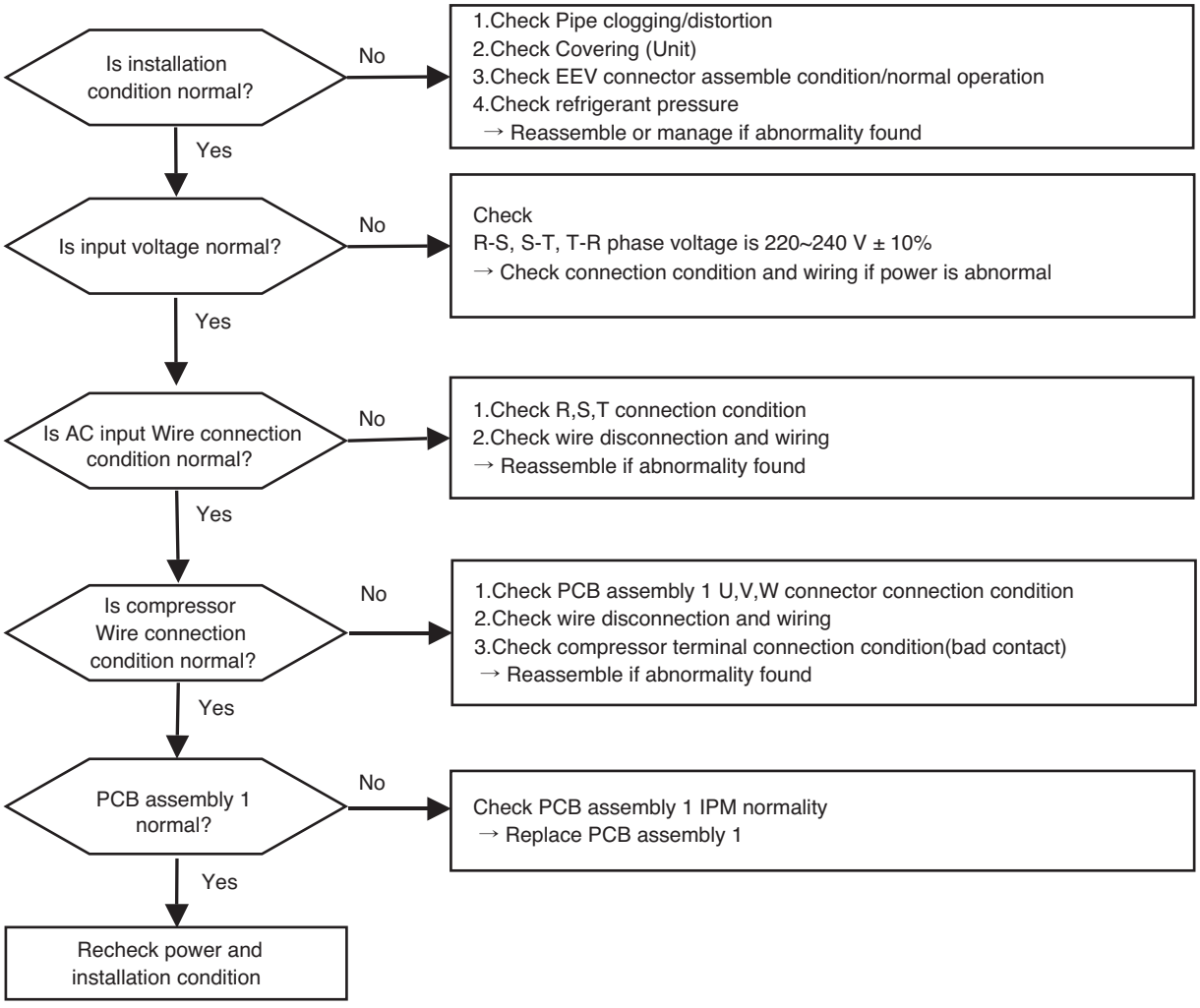


▶ AHUW128A3/AHUW148A3/AHUW168A3

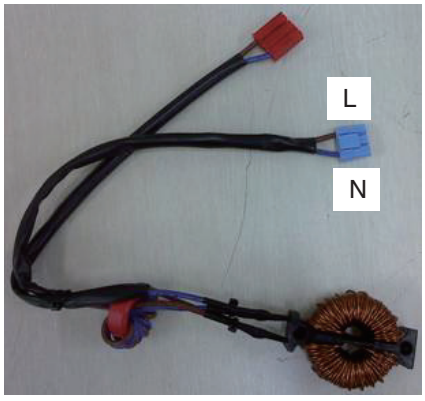


Display code	Title	Cause of error	Check point & Normal condition
73	AC input instant over current error (Matter of software)	(AHNW**6A3) PCB(Inverter) input power current is over 48A(Peak) for 2ms. (AHNW**8A3) PCB(Inverter) input power current is over 27A(Peak) for 2ms.	1. Overload operation (Pipe clogging/Covering/EEV defect/Ref.overcharge) 2. Compressor damage (Insulation damage/Motor damage) 3. Input voltage abnormal 4. Power line assemble condition abnormal 5. PCB assembly 1 damage (input current sensing part)

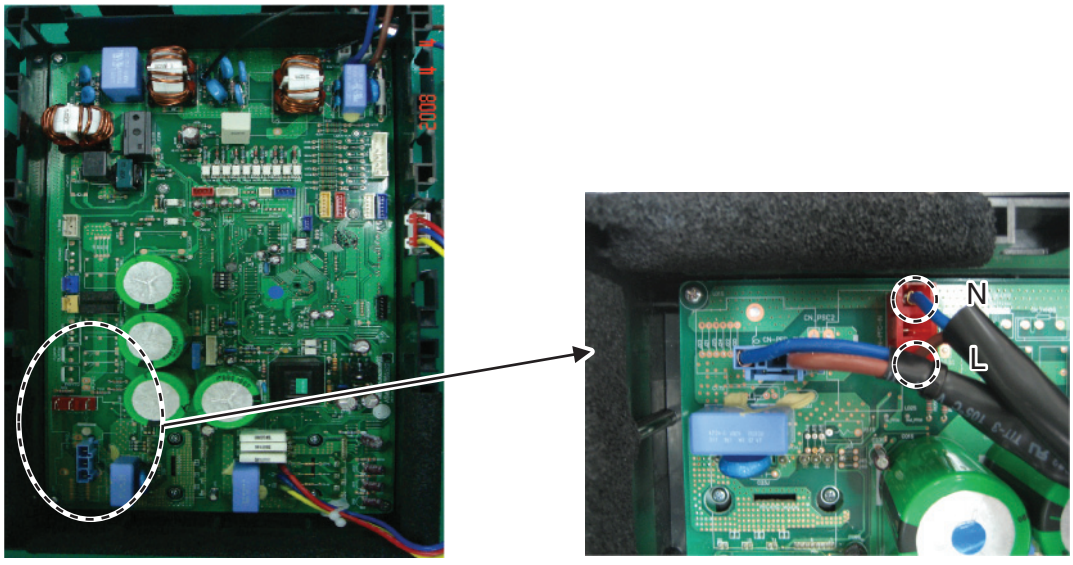
■ Error Diagnosis and Countermeasure Flow Chart



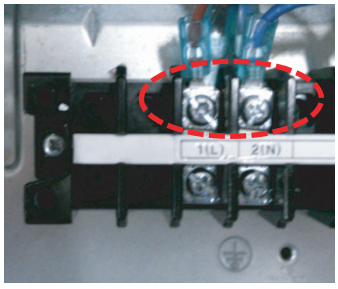
▶ AHUW056A3/AHUW076A3/AHUW096A3



< Noise Filter wiring Check Point >

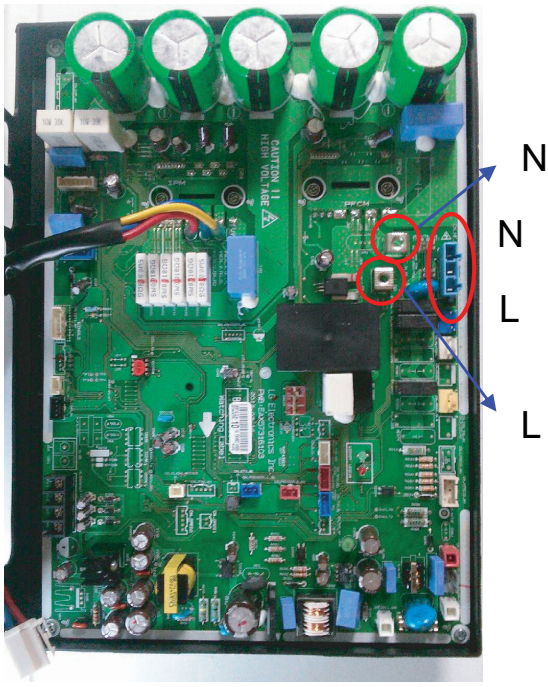


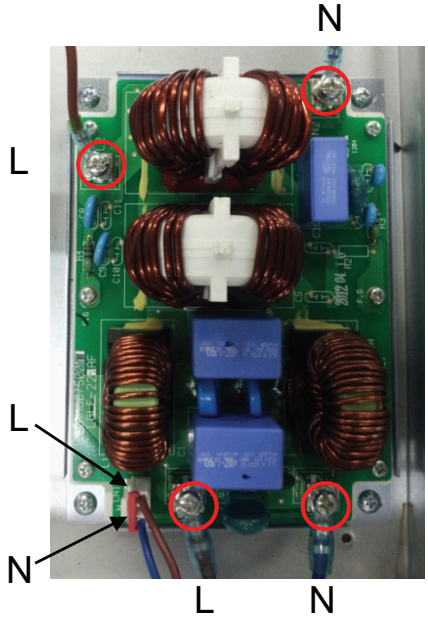
< Main PCB wiring Check Point >

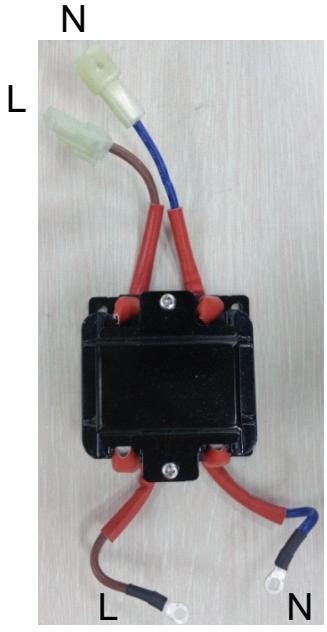


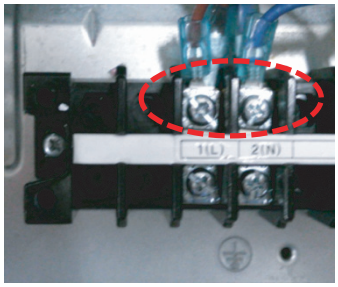
< Input Power Source Check Point >

▶ AHUW126A3/AHUW146A3/AHUW166A3

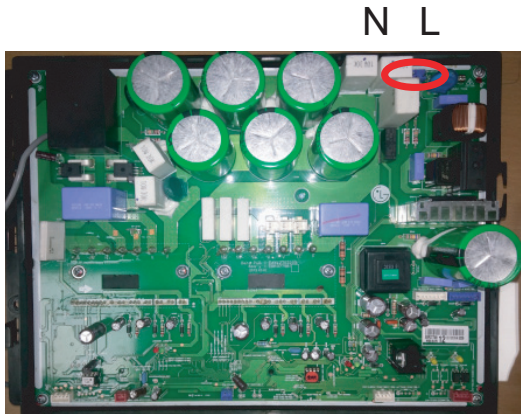


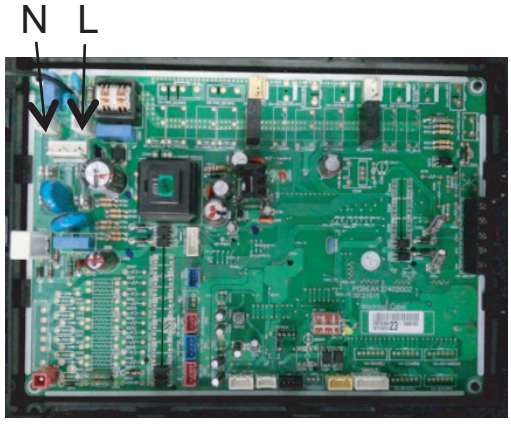


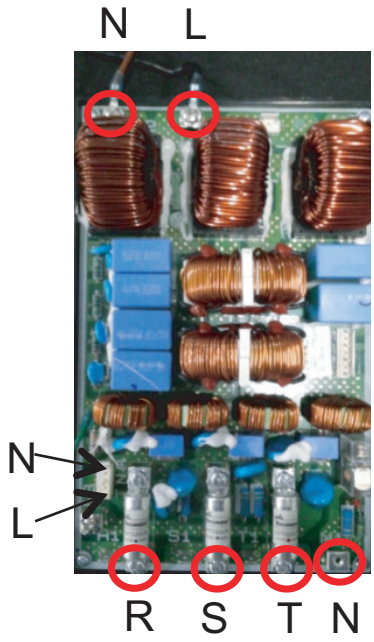




▶ AHUW128A3/AHUW148A3/AHUW168A3







Sensor resistance table

Pipe Temp

B Constant	3977	
Std Temp	25	
Resistance	5	
Temp	Resistance	Volt
-30	102.17	4.714
-25	73.49	4.611
-20	53.55	4.481
-15	39.5	4.322
-10	29.48	4.131
-5	22.24	3.91
0	16.95	3.661
5	13.05	3.389
10	10.14	3.102
15	7.94	2.808
20	6.28	2.515
25	5	2.232
30	4.01	1.965
35	3.24	1.717
40	2.64	1.493
45	2.16	1.293
50	1.78	1.116
55	1.48	0.962
60	1.23	0.828
65	1.03	0.714
70	0.87	0.615
75	0.74	0.531
80	0.63	0.459
85	0.54	0.397
90	0.46	0.345
95	0.4	0.3
100	0.34	0.262

Air Temp

B Constant	3977	
Std Temp	25	
Resistance	10	
Temp	Resistance	Volt
-30	204.35	4.72
-25	146.97	4.62
-20	107.09	4.492
-15	79	4.336
-10	58.95	4.149
-5	44.47	3.931
0	33.9	3.685
5	26.09	3.416
10	20.27	3.131
15	15.89	2.838
20	12.55	2.546
25	10	2.262
30	8.03	1.994
35	6.49	1.745
40	5.28	1.519
45	4.32	1.316
50	3.56	1.137
55	2.95	0.981
60	2.46	0.846
65	2.06	0.729
70	1.74	0.628
75	1.47	0.542
80	1.25	0.469
85	1.07	0.406
90	0.92	0.353
95	0.79	0.307
100	0.68	0.268

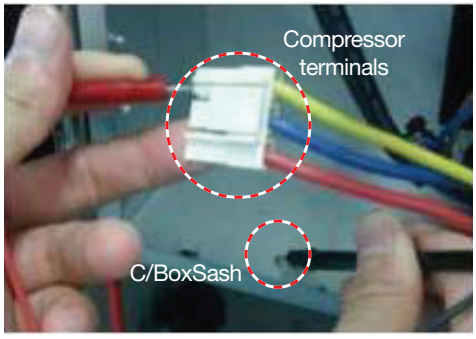
Heatsink Temp

B Constant	3970	
Std Temp	25	
Resistance	10	
Temp	Resistance	Volt
-30	102.17	4.71
-25	73.49	4.61
-20	53.55	4.48
-15	39.5	4.32
-10	29.48	4.13
-5	22.24	3.91
0	16.95	3.66
5	26.05	4.73
10	20.25	4.66
15	15.87	4.57
20	12.55	4.47
25	10	4.35
30	8.03	4.21
35	6.49	4.06
40	5.28	3.89
45	4.33	3.71
50	3.57	3.52
55	2.96	3.32
60	2.47	3.11
65	2.07	2.9
70	1.74	2.69
75	1.48	2.48
80	1.26	2.28
85	1.07	2.09
90	0.92	1.9
95	0.8	1.73
100	0.69	1.57

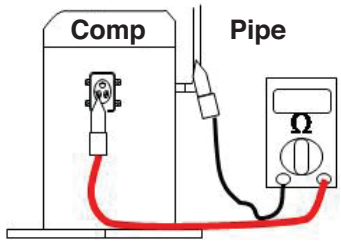
D-Pipe Temp

B Constant	3500	
Std Temp	25	
Resistance	200	
Temp	Resistance	Volt
-30	2845.99	4.969
0	585.66	4.851
5	465.17	4.814
10	372.49	4.77
15	300.58	4.717
20	244.33	4.657
25	200	4.587
30	164.79	4.508
35	136.64	4.418
40	113.98	4.318
45	95.62	4.208
50	80.65	4.088
55	68.38	3.958
60	58.27	3.82
65	49.88	3.674
70	42.9	3.522
75	37.05	3.365
80	32.14	3.205
85	27.99	3.043
90	24.46	2.88
95	21.46	2.719
100	18.89	2.561
110	14.79	2.255
120	11.72	1.972
130	9.4	1.716
140	7.62	1.487
150	6.24	1.287

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



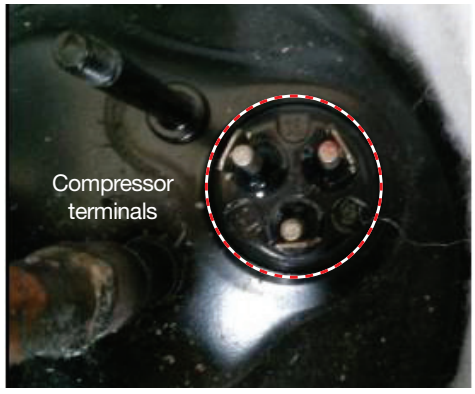
Measure the resistance between a compressor terminal and panel.



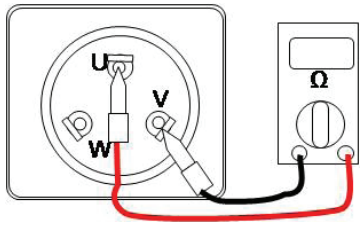
Terminal	Insulation Resistance
U-panel	≥ 10MΩ
V-panel	≥ 10MΩ
W-panel	≥ 10MΩ

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

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



Measure the line resistance between the compressor terminals.



Model		GKT141MAC	GKT176MAB	GJT240MAA
Windings Resistance (at 25°C)	U-V	1.040 ±7% Ω	1.125±7% Ω	0.628 ±7% Ω
	V-W	1.040 ±7% Ω	1.125±7% Ω	0.628 ±7% Ω
	W-U	1.040 ±7% Ω	1.125±7% Ω	0.628 ±7% Ω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