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INSTALLATION MANUAL

AIR-TO-WATER HEAT PUMP

Please read this installation manual completely before installing the product. Installation work must be performed in accordance with the national wiring standards by authorized personnel only. Please retain this installation manual for future reference after reading it thoroughly.

THERMA V™

Original instruction

MFL68681810
Rev.04_062218

www.lg.com

ENGLISH

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PREFACE

This installation manual is to present information and guide about understanding, installing, and checking THERMA V.
Your careful reading before installation is highly appreciated to make no mistake and to prevent potential risks. The manual is divided into nine chapters. These chapters are classified according to installation procedure. See the table below to get summarized information.

Chapters	Contents
Chapter 1	• Warning and Caution concerned with safety. • This chapter is directly related with human safety. We strongly recommend reading this chapter carefully.
Chapter 2	• Items Inside product Box • Before starting installation, please make it sure that all parts are found inside the product box.
Chapter 3	• Fundamental knowledge about THERMA V. • Model identification, accessories information, refrigerant and water cycle diagram, parts and dimensions, electrical wiring diagrams, etc. • This chapter is important to understand THERMA V.
Chapter 4	• Installation about the outdoor unit. • Installation location, constraints on installation site, etc
Chapter 5	• Installation about the indoor unit. • Installation location, constraints on installation site, etc • Constrains when accessories are installed
Chapter 6	• How to perform piping (for refrigerant) and wiring at the outdoor unit. • Refrigerant pipe connection between the indoor unit and the outdoor unit. • Electrical wiring at the outdoor unit.
Chapter 7	• How to perform piping (for water) and wiring at the indoor unit. • Water pipe connection between the indoor unit and pre-built under floor water loop pipe. • Electrical wiring at the indoor unit. • System set-up and configuration. • As many control parameters of THERMA V. is adjustable by control panel, deep understanding about this chapter is required to secure the operation flexibility of THERMA V. • For more detailed information, please read the separate operation manual to use control panel and adjust control parameters.
Chapter 8	• Information about supported accessories • Specification, Constraints, and wiring are described. • Before purchasing accessories, please find supported specification to buy proper one.
Chapter 9	• Test operation and check point while test running.
Chapter 10	• Check points before starting operation are explained. • Troubleshooting, maintenance, and error code list are presented to correct problems.

REMARK : ALL CONTENTS OF THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE.
TO GET THE LATEST INFORMATION, PLEASE VISIT LG ELECTRONICS WEB SITE.

IMPORTANT SAFETY INSTRUCTIONS

	Read the precautions in this manual carefully before operating the unit.
	This symbol indicates that the Operation Manual should be read carefully.
	This symbol indicates that a service personnel should be handling this equipment with reference to the Installation Manual.

READ ALL INSTRUCTIONS BEFORE USING THE APPLIANCE.

Always comply with the following precautions to avoid dangerous situations and ensure peak performance of your product

⚠ WARNING

It can result in serious injury or death when the directions are ignored

⚠ CAUTION

It can result in minor injury or product damage when the directions are ignored

⚠ WARNING

Installation

- Do not use a defective or underrated circuit breaker. Use this appliance on a dedicated circuit.
  - There is risk of fire or electric shock.
- For electrical work, contact the dealer, seller, a qualified electrician, or an Authorized Service Center.
  - There is risk of fire or electric shock.
- Always ground the unit.
  - There is risk of fire or electric shock.
- Install the panel and the cover of control box securely.
  - There is risk of fire or electric shock.

- Always install a dedicated circuit and breaker.
  - Improper wiring or installation may cause fire or electric shock
- Use the correctly rated breaker or fuse.
  - There is risk of fire or electric
- Do not modify or extend the power cable.
  - There is risk of fire or electric shock.
- Do not install, remove, or reinstall the unit by yourself (customer).
  - There is risk of fire, electric shock, explosion, or injury
- For antifreeze, always contact the dealer or an authorized service center.
  - Almost the antifreeze is a toxic product.
- For installation, always contact the dealer or an authorized Service Center.
  - There is risk of fire, electric shock, explosion, or injury.
- Do not install the unit on a defective installation stand.
  - It may cause injury, accident, or damage to the unit.
- Be sure the installation area does not deteriorate with age.
  - If the base collapses, the unit could fall with it, causing property damage, unit failure, and personal injury.
- Do not install the water pipe system as Open loop type.
  - It may cause failure of unit.
- Use a vacuum pump or inert (nitrogen) gas when doing leakage test or purging air. Do not compress air or oxygen and do not use flammable gases.
  - There is the risk of death, injury, fire or explosion.
- Make sure the connected condition of connector in product after maintenance.
  - Otherwise, it may causeproduct damage
- Do not touch leaked refrigerant directly.
  - There is risk of frostbite.
- Compliance with national gas regulations shall be observed.
- Refrigerant tubing shall be protected or enclosed to avoid damage.
- The installation of pipe-work shall be kept to a minimum.

- A brazed, welded, or mechanical connection shall be made before opening the valves to permit refrigerant to flow between the refrigerating system parts. A vacuum valve shall be provided to evacuate the interconnecting pipe and/or any uncharged refrigerating system part.
- Any person who is involved with working on or breaking into a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorises their competence to handle refrigerants safely in accordance with an industry recognised assessment specification.
- Pipe-work shall be protected from physical damage and shall not be installed in an unventilated space, if that space is smaller than
  1) The minimum floor area : 49.4 m^2
  2) The maximum refrigerant charge amount : 2.4 kg
- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odour.
- Dismantling the unit, treatment of the refrigerant oil and eventual parts should be done in accordance with local and national standards.
- Ducts connected to an appliance shall not contain an ignition source.
- Copper in contact with refrigerants shall be oxygen-free or deoxidized, for example Cu-DHP as specified in EN 12735-1 and EN 12735-2.

Operation

- Take care to ensure that power cable could not be pulled out or damaged during operation.
  - There is risk of fire or electric shock.
- Do not place anything on the power cable.
  - There is risk of fire or electric shock.
- Do not plug or unplug the power supply plug during operation.
  - There is risk of fire or electric shock.

- Do not touch (operate) the unit with wet hands.
  - There is risk of fire or electric shock.
- Do not place a heater or other appliances near the power cable.
  - There is risk of fire or electric shock.
- Do not allow water to run into electric parts.
  - There is risk of fire, failure of the unit, or electric shock.
- Do not store or use flammable gas or combustibles near the unit.
  - There is risk of fire or failure of unit.
- Do not use the unit in a tightly closed space for a long time.
  - It may cause damage to the unit. When flammable gas
- leaks, turn off the gas and open a window for ventilation before turning the unit on.
  - There is risk of explosion or fire.
- If strange sounds, or smell or smoke comes from unit, turn the breaker off or disconnect the power supply cable.
  - There is risk of electric shock or fire.
- Stop operation and close the window in storm or hurricane. If possible, remove the unit from the window before the hurricane arrives.
  - There is risk of property damage, failure of unit, or electric shock.
- Do not open the front cover of the unit while operation. (Do not touch the electrostatic filter, if the unit is so equipped.)
  - There is risk of physical injury, electric shock, or unit failure.
- Do not touch any electric part with wet hands. you should be power off before touching electric part.
  - There is risk of electric shock or fire.
- Do not touch refrigerant pipe and water pipe or any internal parts while the unit is operating or immediately after operation.
  - There is risk of burns or frostbite, personal injury.
- If you touch the pipe or internal parts, you should be wear protection or wait time to return to normal temperature.
  - Otherwise , it may cause burns or frostbite, personal injury.

- Turn the main power on 6 hours ago before the product starting operation.
  - Otherwise, it may cause compressor damage.
- Do not touch electric parts for 10 minutes after main power off.
  - There is risk of physical injury, electric shock.
- The inside heater of product may operate during stop mode. It is intended to protect the product.
- Be careful that some part of the control box are hot.
  - There is risk of physical injury or burns.
- When the unit is soaked (flooded or submerged), contact an Authorized Service Center.
  - There is risk of fire or electric shock.
- Be cautious that water could not be poured to the unit directly.
  - There is risk of fire, electric shock, or unit damage.
- Ventilate the unit from time to time when operating it together with a stove, etc.
  - There is risk of fire or electric shock.
- Turn the main power off when cleaning or maintaining the unit.
  - There is risk of electric shock.
- Take care to ensure that nobody could step on or fall onto the unit.
  - This could result in personal injury and unit damage.
- For installation, always contact the dealer or an Authorized Service Center.
  - There is risk of fire, electric shock, explosion, or injury.
- If the unit is not used for long time, we strongly recommend not to switch off the power supply to the unit.
  - There is risk of water freezing.
- The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.
- The appliance shall be stored in a room without continuously operating open flames (for example an operating gas appliance) and ignition sources (for example an operating electric heater).

- The appliance shall be stored so as to prevent mechanical damage from occurring.
- Servicing shall only be performed as recommended by the equipment manufacturer. Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants.
- When mechanical connectors are reused indoors, sealing parts shall be renewed. When flared joints are reused indoors, the flare part shall be re-fabricated.
- Be aware that refrigerants may not contain an odor.
- Periodic(more than once/year) cleaning of the dust or salt particles stuck on the heat exchangers by using water.
- Keep any required ventilation openings clear of obstruction.

⚠ CAUTION

Installation

- Always check for gas (refrigerant) leakage after installation or repair of unit.
  - Low refrigerant levels may cause failure of unit.
- Keep level even when installing the unit.
  - To avoid vibration or water leakage.
- Use two or more people to lift and transport the unit.
  - Avoid personal injury.

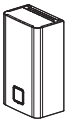
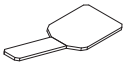
Operation

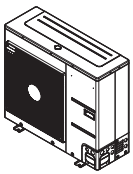
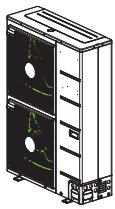
- Do not use the unit for special purposes, such as preserving foods, works of art, etc.
  - There is risk of damage or loss of property.
- Use a soft cloth to clean. Do not use harsh detergents, solvents, etc.
  - There is risk of fire, electric shock, or damage to the plastic parts of the unit.
- Do not step on or put anything on the unit.
  - There is risk of personal injury and failure of unit.

- Use a firm stool or ladder when cleaning or maintaining the unit.
  - Be careful and avoid personal injury.
- Do not turn on the breaker or power under condition that front panel cabinet, top cover, control box cover are removed or opened.
  - Otherwise it may cause fire, electric shock, explosion or death.
- The appliance shall be disconnected from its power source during service and when replacing parts.
- Means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.
- The Installation kit supplied with the appliance are to be used and that old Installation kit should not be reused.
- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard. Installation work must be performed in accordance with the national wiring standards by authorized personnel only.
- This equipment shall be provided with a supply conductor complying with the national regulation.
- The instructions for service to be done by specialized personnel, mandated by the manufacturer or the authorized representative may be supplied in only one Community language which the specialized personnel understand.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

INSTALLATION PART

Thank you for choosing LG Electronics Air-to-Water Heat Pump THERMA V.
Before starting installation, please make it sure that all parts are found inside the product box.

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

OUTDOOR UNIT BOX		
Item	Image	Quantity
Outdoor Unit U4 Chassis (Product heating capacity : 5kW, 7kW, 9kW)		1
Outdoor Unit U3 Chassis (Product heating capacity : 12kW, 14kW, 16kW)		1
Drain Cap		2
Drain Nippl		1

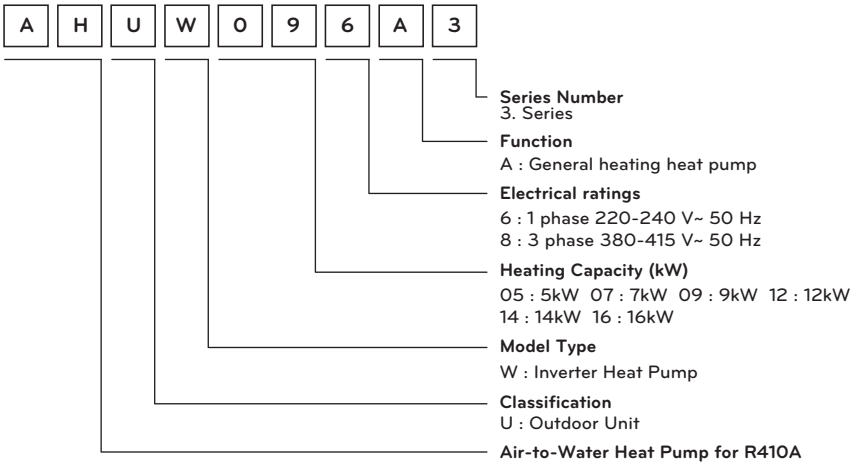
GENERAL INFORMATION

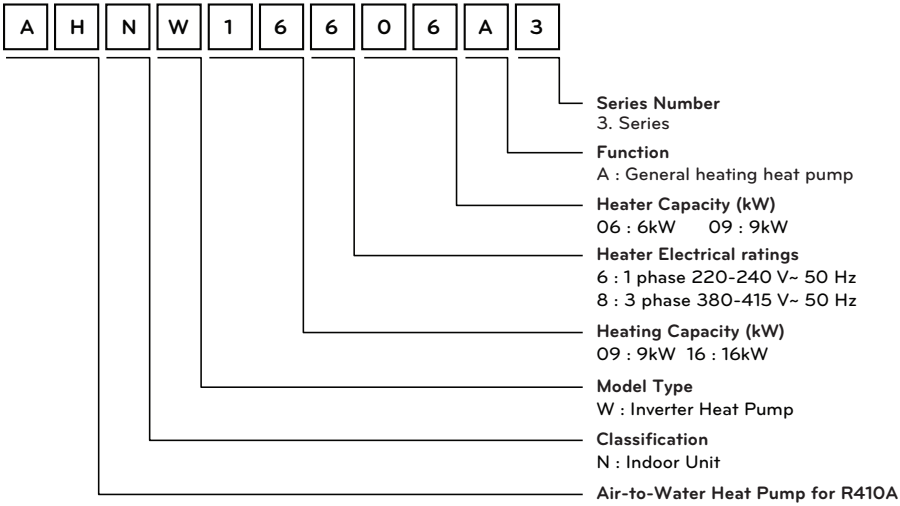
With advanced inverter technology, THERMA V is suitable for applications like under floor heating, under floor cooling, and hot water generation. By Interfacing to various accessories user can customize the range of the application.

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.

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	
Phase	Capacity	Phase	Capacity					
1Ø	5 kW	1Ø	16 kW	6 (3+3)	220-240 V~ 50 Hz	5.0	5.0	220-240 V~ 50 Hz
	7 kW					7.0	7.0	
	9 kW					9.0	9.0	
	12 kW					12.0	10.4	
	14 kW					14.0	12.0	
	16 kW					16.0	13.0	
3Ø	12 kW	3Ø		9 (3+3+3)	380-415 V~ 50 Hz	12.0	10.4	380-415 V~ 50 Hz
	14 kW					14.0	12.0	
	16 kW					16.0	13.0	

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

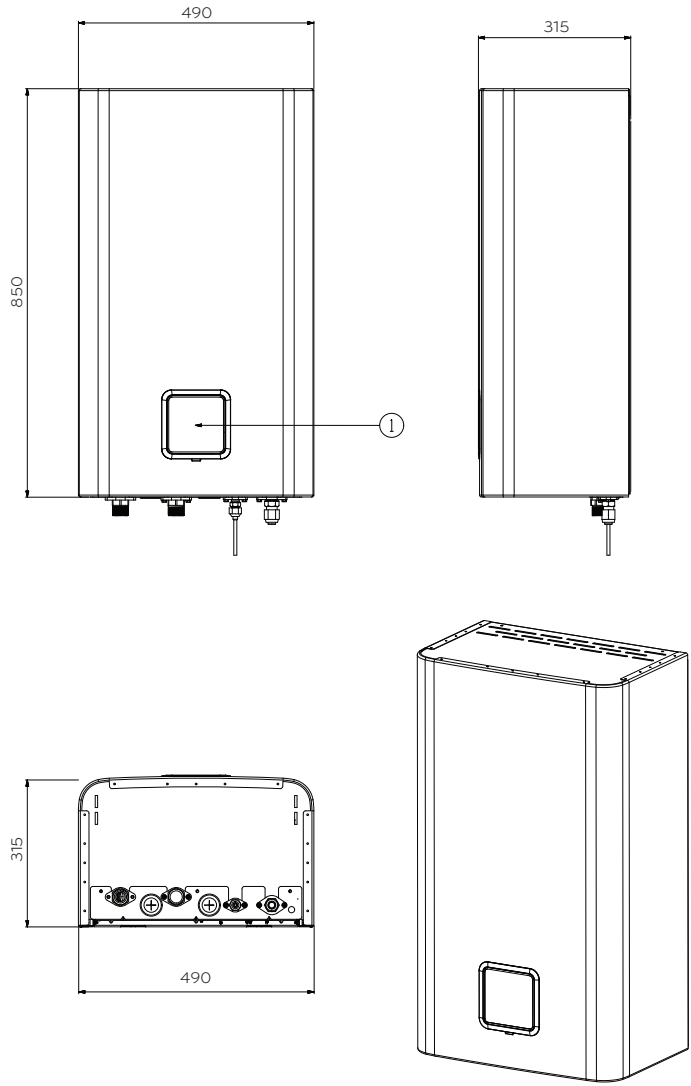
*2 : tested under Eurovent Cooling condition
(water temperature 23°C → 18°C at outdoor ambient temperature 35°C / 24°C)

3 : All appliances were tested at atmospheric pressure.

Parts and Dimensions

Indoor unit(External)

(unit : mm)

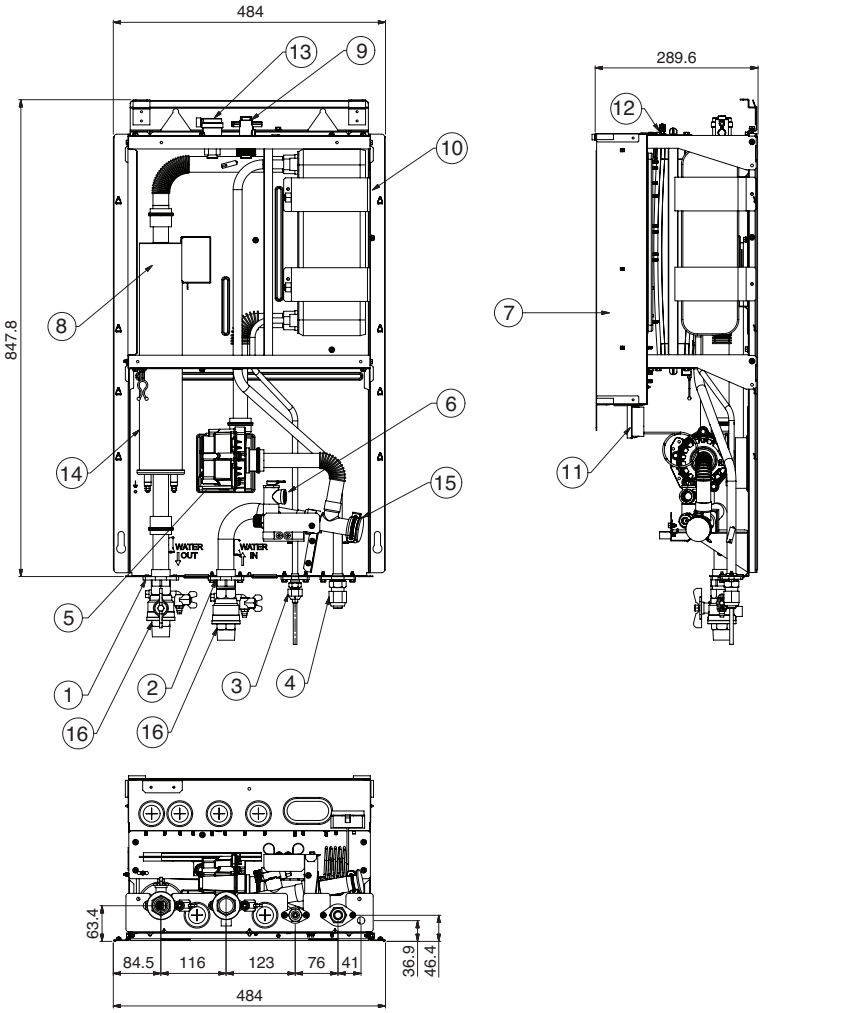


Description

No	Name	Remark
1	Control Panel	Built-in Remote Controller

Indoor unit(Internal)

(unit : mm)



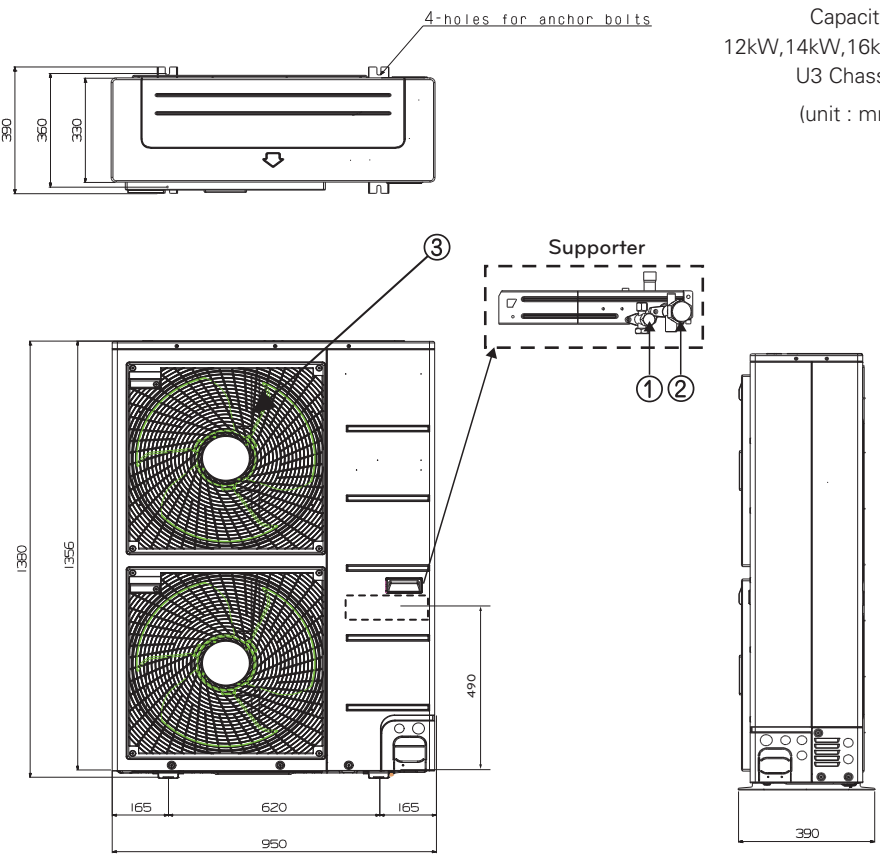
Description

No	Name	Remark
1	Leaving Water Pipe	Male PT 1 inch
2	Entering Water Pipe	Male PT 1 inch
3	Refrigerant Pipe	Ø9.52mm
4	Refrigerant Pipe	Ø15.88mm
5	Water Pump	Max Head 9.5 / 7 / 6 m
6	Safety Valve	Open at water pressure 3 bar
7	Control Box	PCB and terminal blocks
8	Thermal switch	Cut-off power input to electric heater at 90 °C (manual return at 55C)
9	Flow Switch	Minimum operation range at 15 LPM.
10	Plate Heat Exchanger	Heat exchange between refrigerant and water
11	Pressure Gage	Indicates circulating water pressure
12	Expansion Tank	Absorbing Volume change of heated water
13	Air Vent	Air purging when Charging water
14	Electric Heater	Please refer to the below Page 'Model name and related information'
15	Strainer	Filtering and stacking particles inside circulating water
16	Shut-off valve	To drain or to block water when pipe connecting

Outdoor unit(External)

Product Heating Capacity : 12kW,14kW,16kW U3 Chassis

(unit : mm)

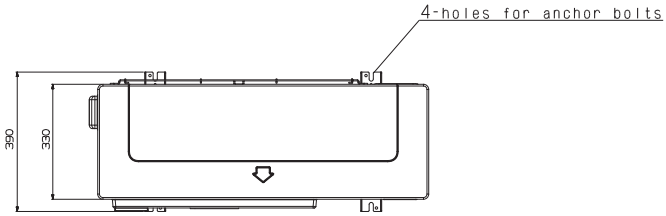


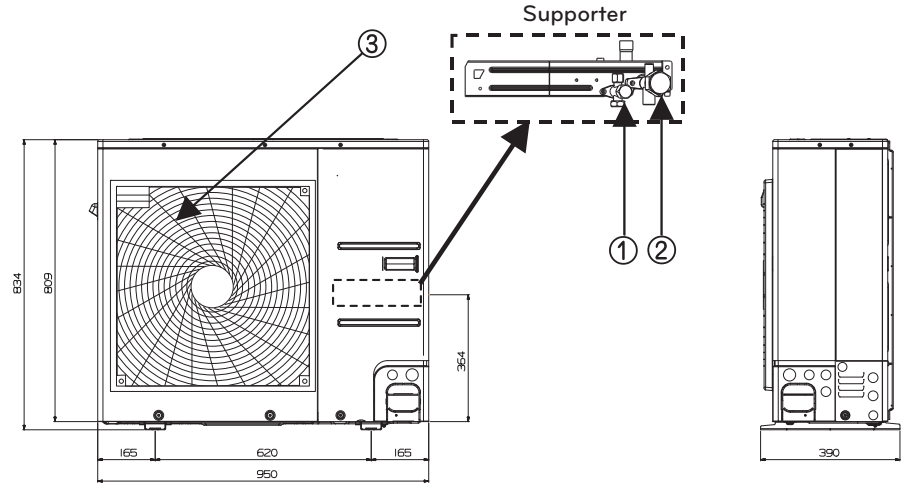
Description

No	Name
1	Liquid-side Service Valve
2	Gas-side Service Valve
3	Air discharge Grill

Product Heating Capacity : 5kW,7kW,9kW U4 Chassis

(unit : mm)





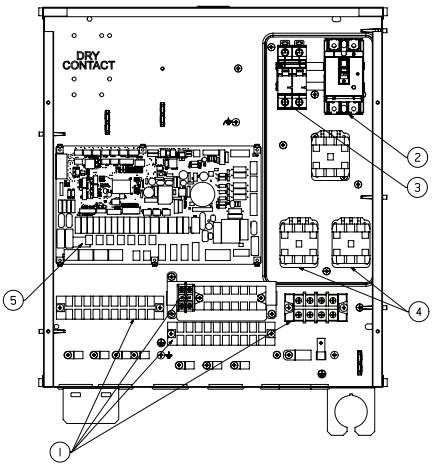
Description

No	Name
1	Liquid-side Service Valve
2	Gas-side Service Valve
3	Air discharge Grill

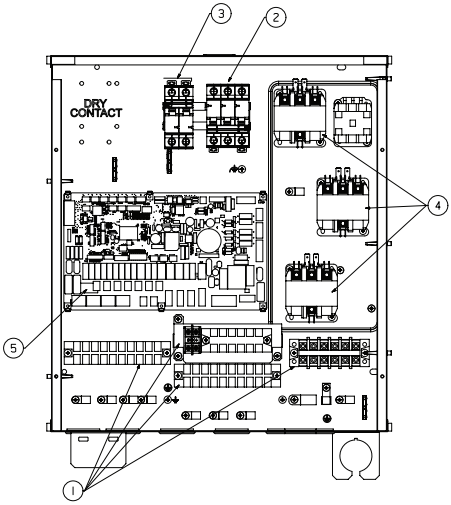
Control Parts

Control Box : Indoor Unit

1Ø Electric Heater Model



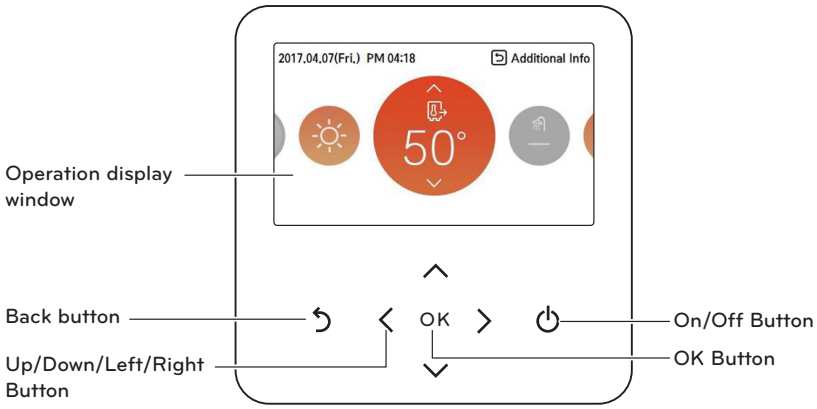
3Ø Electric Heater Model



Description

No	Name	Remark
1	Terminal blocks	The terminal blocks allow easy connection of field wiring
2	Unit ELB	The ELB protects the unit against overload or short circuit
3	Water tank heater ELB(optional)	The ELB protects the water tank heater in sanitary water tank against overload or short circuit
4	Magnetic switch	-
5	Main PCB	The main PCB(Printed Circuit Board) controls the functioning of the unit

Control Panel



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

Wiring Diagram : Indoor Unit

- Refer to the wiring diagram inside the control box.

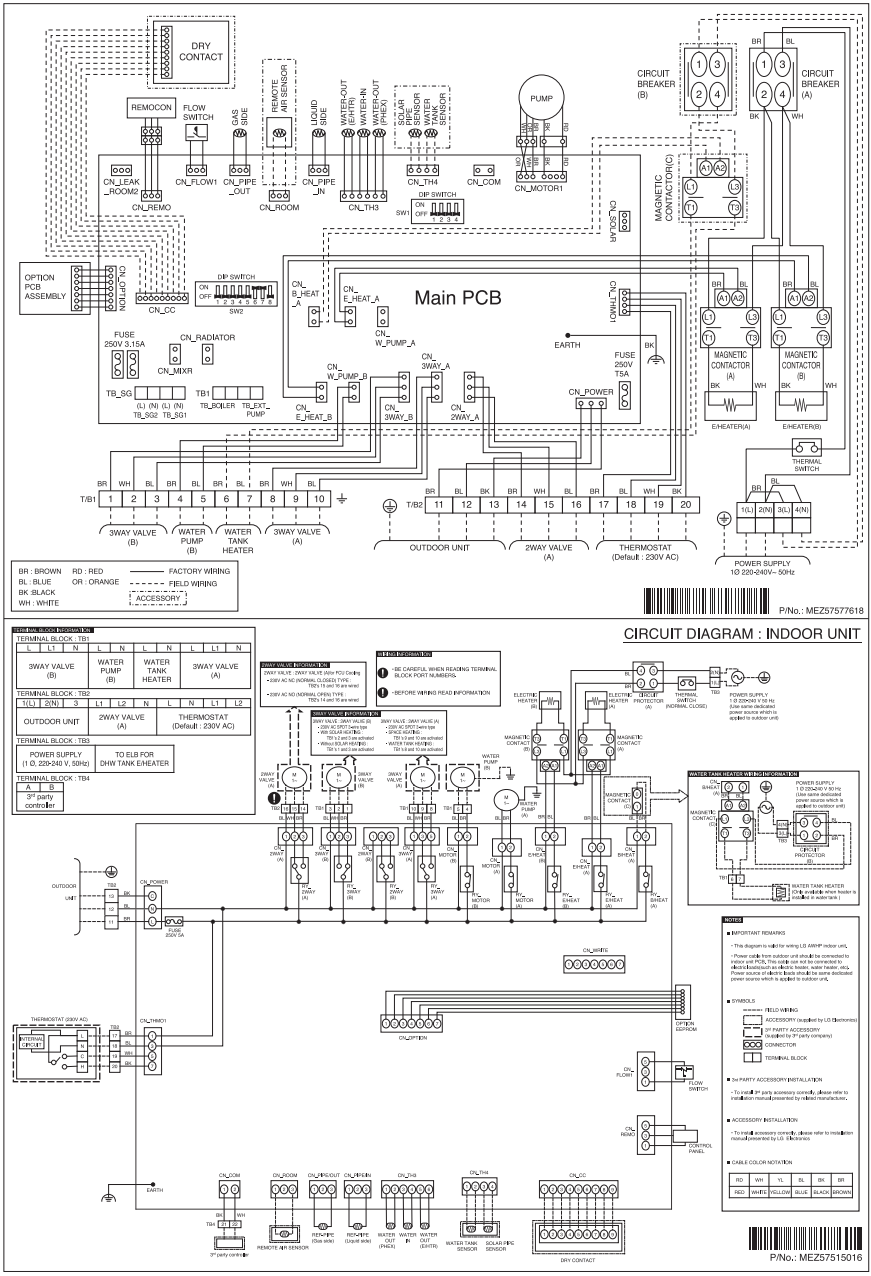
Circuit Diagram : Indoor Unit

- Refer to the circuit diagram inside the front panel.

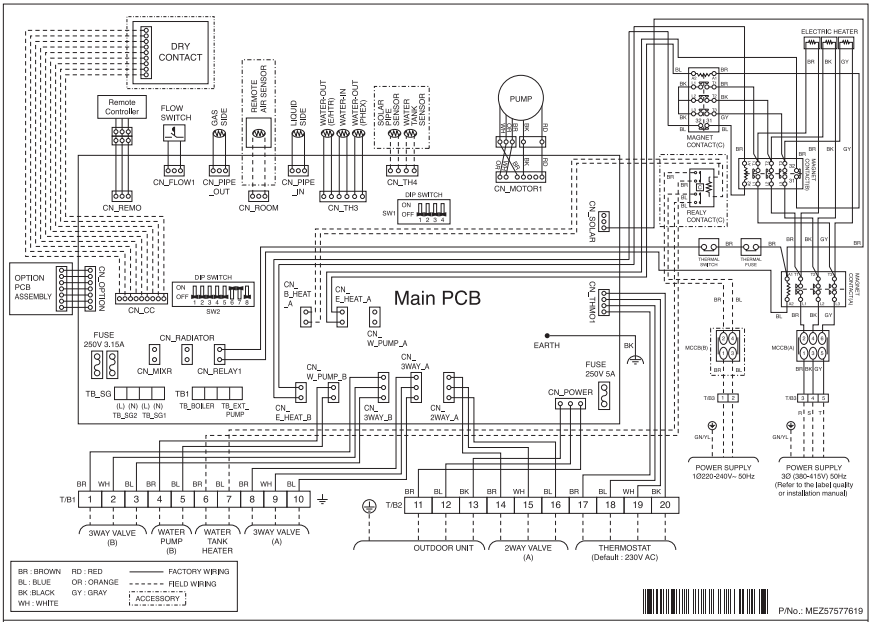
Wiring Diagram : Outdoor Unit

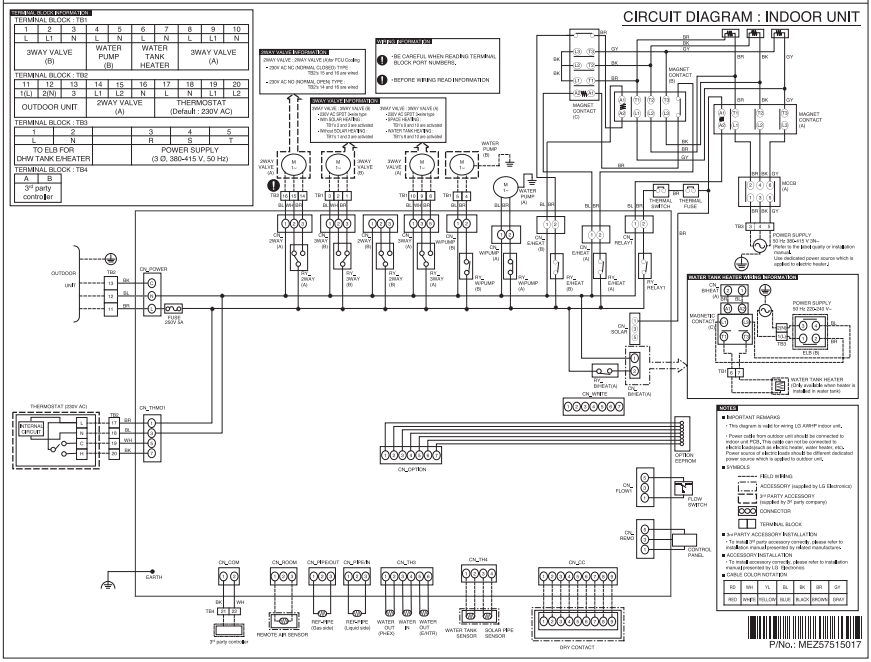
- Refer to the attached wiring diagram in the outdoor unit.

Wiring Diagram : Indoor and Outdoor Unit(Including Field wiring)
(Indoor : Electric Heater 1Ø, Outdoor : 1Ø)



Wiring Diagram : Indoor and Outdoor Unit(Including Field wiring)
(Indoor : Electric Heater 3Ø, Outdoor : 3Ø)





Typical Installation Example

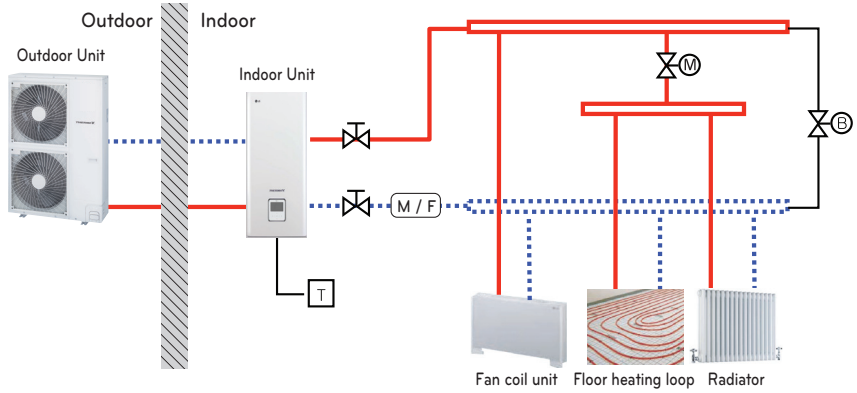
CAUTION

If THERMA V. is installed with pre-existing boiler, the boiler and THERMA V. should not be operated together. If entering water temperature of THERMA V. is above 55°C, the system will stop operation to prevent mechanical damage of the product. For detailed electric wiring and water piping, please contact authorized installer.
Some installation scenes are presented for example. As these scenes are conceptual figures, installer should optimize the installation scene according to the installation conditions.

Some installation scenes are presented for example. As these scenes are conceptual figures, installer should optimize the installation scene according to the installation conditions.

CASE 1: Connecting Heat Emitters for Heating and Cooling

(Under floor loop, Fan Coil Unit, and Radiator)

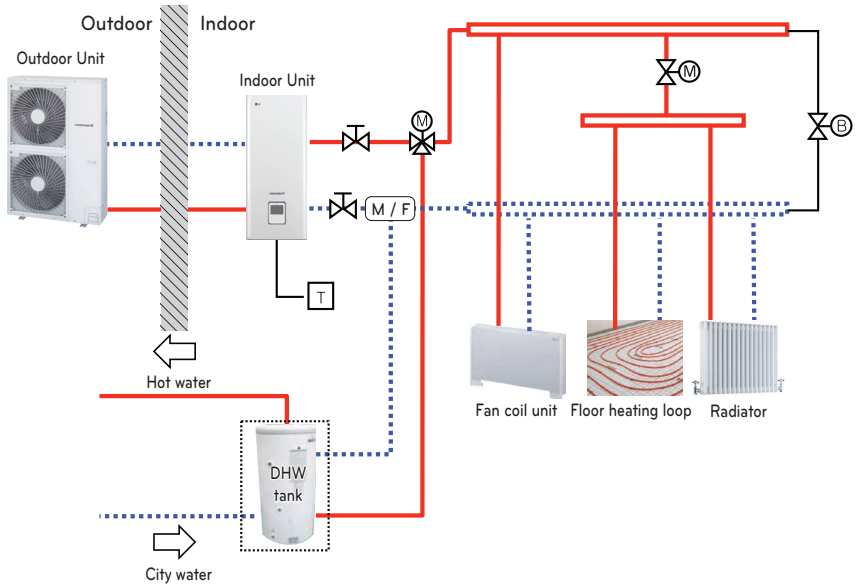


NOTE

- Room thermostat
  - Type of thermostat and specification should be complied with chapter 4 and chapter 7 of THERMA V. installation manual.
- 2way valve
  - It is important to install 2way valve to prevent dew condensation on the floor and radiator while cooling mode.
  - Type of 2way control valve and specification should be complied with chapter 4 and chapter 7 of THERMA V. installation manual.
  - 2way valve should be installed at the supply side of the collector.
- By-pass valve
  - To secure enough water flow rate, by-pass valve should be installed at the collector.
  - By-pass valve should guarantee minimum water flow rate in any case. Minimum water flow rate is described in water pump characteristics curve.

High Temperature
Low Temperature
M / F Magnetic Filter (Recommended, Field supply)
T Room Thermostat(Field supply)
M 2way valve (Field supply)
Shut-off valve
B By-pass valve(Field supply)

CASE 2: Connecting DHW Tank

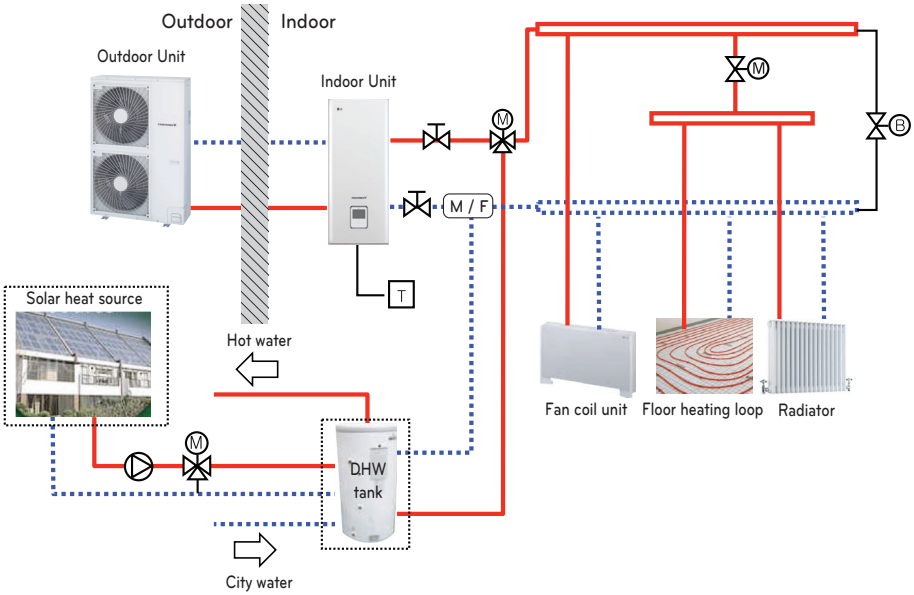


NOTE

- DHW tank
  - It should be equipped with internal electric heater to generate sufficient heat energy in very cold season.
  - DHW : Domestic Hot Water
- 3way valve
  - Type of 3way valve and specification should be complied with chapter 4 and chapter 7 of THERMA V. installation manual.

High Temperature	T Room Thermostat(Field supply)	M 3way valve (Field supply)
Low Temperature	M 2way valve (Field supply)	
Shut-off valve	B By-pass valve(Field supply)	
M / F Magnetic Filter (Recommended)		

CASE 3: Connecting Solar thermal system

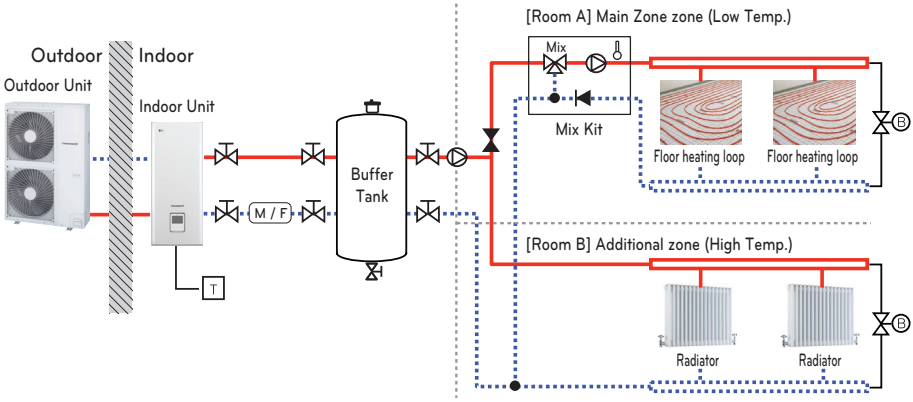


NOTE

- DHW tank
  - It should be equipped with internal electric heater to generate sufficient heat energy in very cold season.
  - DHW : Domestic Hot Water
- Pump
  - Maximum power consumption of pump should be less than 0.25kW.

High Temperature	Room Thermostat(Field supply)	
Low Temperature	2way valve (Field supply)	3way valve (Field supply)
Shut-off valve	By-pass valve(Field supply)	Pump(Field supply)
M / F Magnetic Filter (Recommended)		

CASE 4: Connecting 2nd Circuit

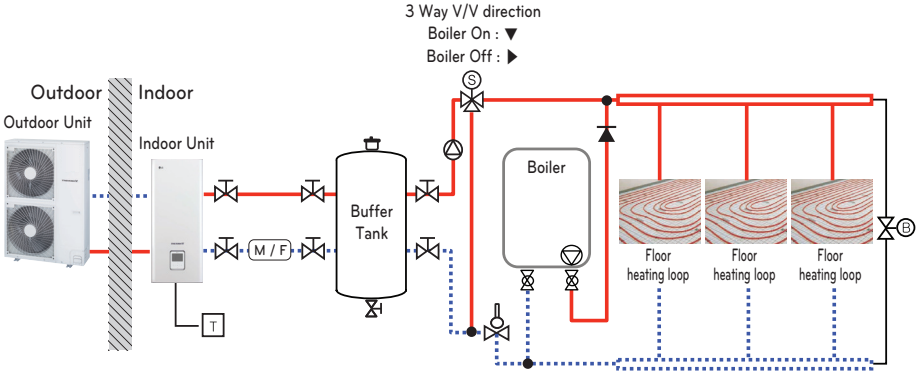


NOTE

- Mix Kit
  - You can install it when you want to set the temperature of two rooms individually
  - When heating, Main Zone can not be higher than Add Zone.
  - When cooling, Main Zone can not be lower than Add Zone.
  - The types and specifications of the Mix Kit are to comply with Chapters 4 and 7 of the THERMA V Installation Manual.

High Temperature	Room Thermostat(Field supply)	
Low Temperature	2way valve (Field supply)	3way valve (Field supply)
Shut-off valve	By-pass valve(Field supply)	Pump(Field supply)
M / F Magnetic Filter (Recommended)	Air vent (Field supply)	Mix Kit (Field supply)
Pressure Regulation valve (Field supply)		

CASE 5: Connecting 3rd Party

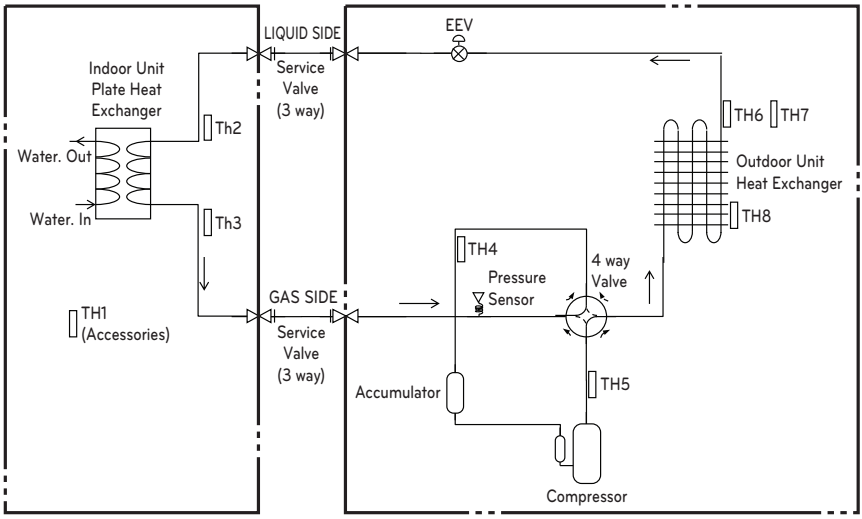


NOTE

- DHW tank
  - 3rd Party Boiler
  - You can control the boiler automatically and manually by comparing the outside temperature and the set temperature.
- 3way valve
  - It is a valve for DHW use.
  - Not installed when installing Buffer Tank
  - Type of 3way valve and specification should be complied with chapter 4 and chapter 7 of installation manual.

High Temperature	Room Thermostat(Field supply)	
Low Temperature	2way valve (Field supply)	3way valve (Field supply)
Shut-off valve	By-pass valve(Field supply)	Pump(Field supply)
M / F Magnetic Filter (Recommended)	Air vent (Field supply)	Aquastat V/V
Reverse check valve		

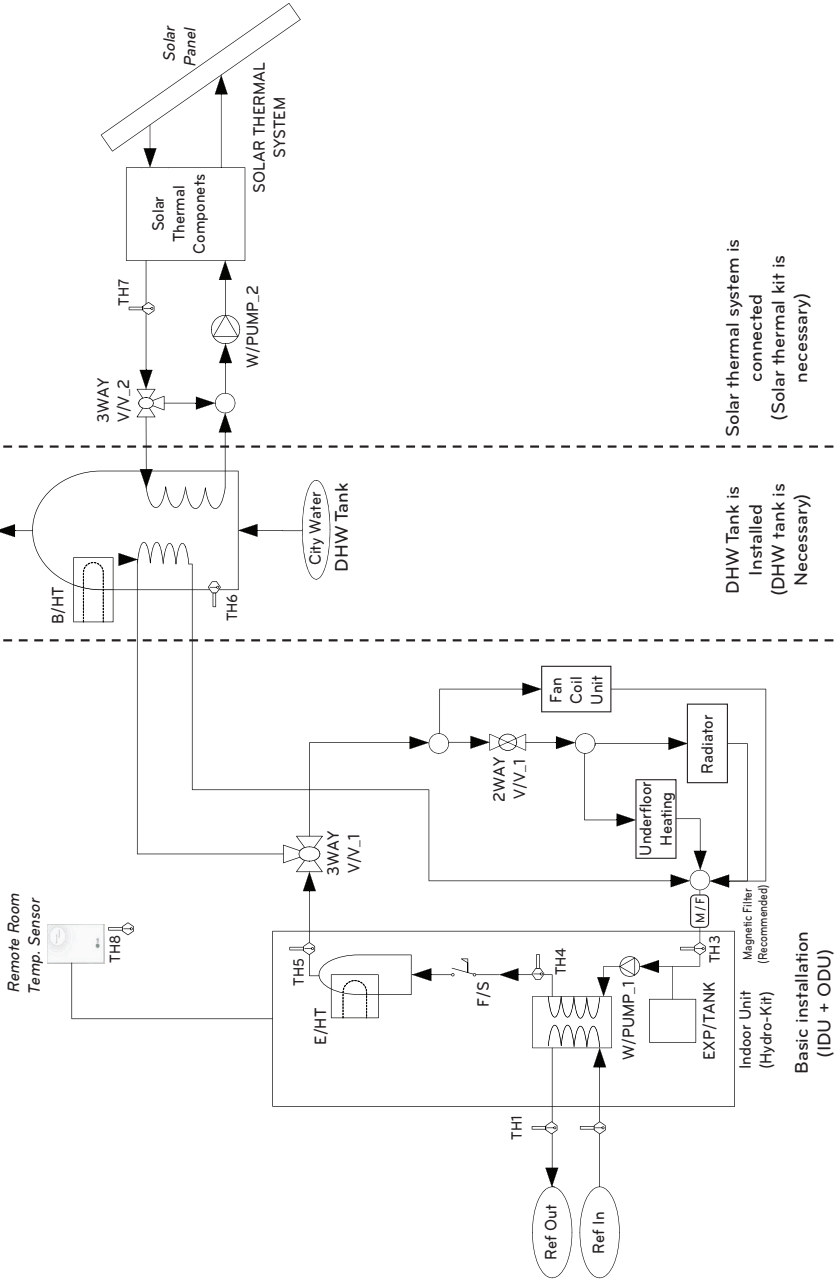
Cycle Diagram



Description

Category	Symbol	Meaning	PCB Connector	Remarks
Indoor Unit	Th1	Remote air temperature sensor	CN_ROOM	- Optional accessory (being sold separately) - Not shown in diagram
	Th2	Inlet evaporator temperature sensor	CN_PIPE_IN	- Meaning is expressed based on Cooling mode.
	Th3	Outlet evaporator temperature sensor	CN_PIPE_OUT	
Outdoor Unit	Th4	Compressor-suction pipe temperature sensor	CN_SUCTION	
	Th5	Compressor-discharge pipe temperature sensor	CN_DISCHA	
	Th6	Condenser temperature sensor	CN_C_PIPE	- Description is expressed based on Cooling mode.
	Th7	Outdoor air temperature sensor	CN_AIR	
	Th8	Condenser middle temperature sensor	CN_MID	
	EEV	Electronic Expansion Valve	CN_LEV1	

Water cycle


Solar Panel
SOLAR THERMAL SYSTEM
Solar Thermal Componets
TH7
W/PUMP_2
3WAY V/V_2
Solar thermal system is connected (Solar thermal kit is necessary)
Shower
City Water
DHW Tank
B/HT
TH6
DHW Tank is Installed (DHW tank is Necessary)
Fan Coil Unit
Radiator
2WAY V/V_1
Underfloor Heating
3WAY V/V_1
M/F
Magnetic Filter (Recommended)
Remote Room Temp. Sensor
TH8
TH5
TH4
TH3
E/HT
F/S
W/PUMP_1
EXP/TANK
Indoor Unit (Hydro-Kit)
Basic installation (IDU + ODU)
TH1
Ref Out
Ref In

Description

Category	Symbol	Meaning	PCB Connector	Remarks
Indoor Unit	TH1	Refrigerant temperature sensor (Gas side)	CN_PIPE_OUT	- Meaning is expressed based on Cooling mode.
	TH2	Refrigerant temperature sensor (Liquid side)	CN_PIPE_IN	
	TH3	Entering Water temperature sensor	CN_TH3	- TH3, TH4, and TH5 are connected at 6 pin type connector CN_TH3.
	TH4	Interim Water temperature sensor		
	TH5	Leaving Water temperature sensor		
	F/S	Flow Switch	CN_FLOW1	
	E/HT	Electric Heater	CN_E/HEAT(A) CN_E/HEAT(B)	- Heating capacity is divided into two level : partial capacity by E/HEAT(A) and full capacity by E/HEAT(A) + E/HEAT(B). - Operating power(230 V AC 50 Hz) of E/HEAT(A) and E/HEAT(B) are supplied by external power source via relay connector and ELB.
	W_PUMP1	Internal Water Pump	CN_MOTOR1	- Water Pump is connected at CN_MOTOR1
	EXP/TANK	Expansion Tank	(no connector)	- Absorb volume change of heated water,
	TH8	Remote Air temperature sensor	CN_ROOM	- Optional accessory (sold separately) - Model : PQRSTA0
	CTR/PNL	Control Panel (or 'Remote Controller')	CN_REMO	- Pre built-in at indoor unit
	2WAY V/V_1	To control water flow for Fan Coil Unit	CN_2WAY(A)	- 3rd party accessory and Field installation (sold separately) - 2 wire NO or NC type 2way valve is supported.
	M / F	Magnetic Filter	(No connector)	- 3rd party accessory and Field installation (sold separately) - It is strongly recommended to install an additional filter on the heating water circuit.
Water Heating	W/TANK	DHW Tank	(No connector)	- 3rd party accessory and Field installation (sold separately) - Generating and storing DHW by AWHP or built-in electric heater
	B/HT	Electric Heater	CN_B/HEAT(A)	- 3rd party accessory and Field installation (usually built-in at W/TANK) - Supplying additional water heating capacity.
	3WAY V/V_1	- Flow control for water which is leaving from indoor unit. - Flow direction switching between underfloor and water tank	CN_3WAY(A)	- 3rd party accessory and Field installation (sold separately) - SPDT type 3way valve is supported.
	CITY WATER	Water to be heated by Indoor unit and B/HT of W/TANK	(no connector)	- Field installation
	SHOWER	Water supplied to end-user	(no connector)	- Field installation
	TH6	W/TANK water temperature sensor	CN_TH4	- TH6 and TH7 are connected at 4 pin type connector CN_TH4. - TH6 is a part of DHW tank kit.(Model:PHLTA) - TH7 is a part of solar thermal kit (Model:PHLLA)
Solar Heating	TH7	Solar-heated water temperature sensor		
	3WAY V/V_2	- Flow control for water which is heated and circulated by SOLAR THERMAL SYSTEM. - Flow direction switching between SOLAR THERMAL SYSTEM and W/TANK	CN_3WAY(B)	- 3rd party accessory and Field installation (sold separately) - SPDT type 3way valve is supported.
	W_PUMP/2	External Water Pump	CN_W/PUMP(B)	- 3rd party accessory and Field installation (sold separately) - If water pump of SOLAR THERMAL SYSTEM is incapable of circulation,external water pump can be used.
	SOLAR THERMAL SYSTEM	- This system can include following components : Solar panel, Sensors, Thermostats, Interim heat exchanger, Water pump, etc. - To utilized hot water heated by SOLAR THERMAL SYSTEM, end-user must by LG AWHP Solar-Kit.	(no connector)	- 3rd party accessory and Field installation (sold separately)

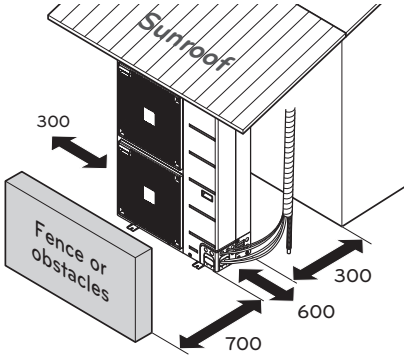
INSTALLATION OF OUTDOOR UNIT

The outdoor unit of THERMA V is installed outside to exchange heat with ambient air. Therefore, it is important to secure proper space around the outdoor unit and care for specific external conditions.

This chapter presents a guide to install the outdoor unit, make a route to connect with the indoor, and what to do when installed around seaside.

Conditions where Outdoor Unit is Installed

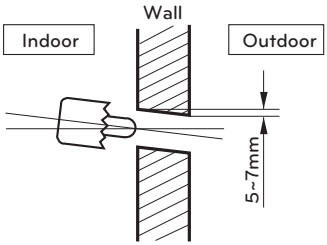
- If a sunroof is built over the unit to prevent direct sunlight or rain exposure, make sure that heat radiation from the heat exchanger is not restricted.
- Ensure that the spaces indicated by arrows around front, back and side of the unit.
- Do not place animals and plants in the path of the warm air.
- Take the weight of the outdoor unit into account and select a place where noise and vibration are minimum.
- Select a place so that the warm air and noise from the outdoor unit do not disturb neighbors.



Minimum service space
(unit : mm)

Drill a Hole in the Wall

- If making a hole to the wall is required to connect pipe between the indoor unit and the outdoor unit, please follow below descriptions.
  Drill the piping hole with a ø70mm hole core drill.
  Piping hole should be slightly slant to the outdoor side to prevent raindrop into indoor side.



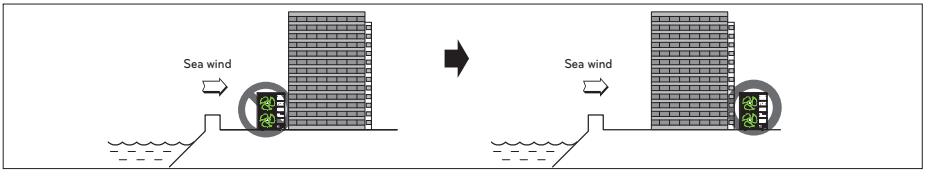
Installation at Seaside

CAUTION

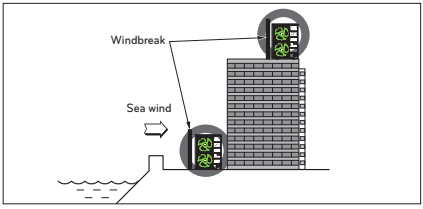
- Air conditioners should not be installed in areas where corrosive gases, such as acid or alkaline gas, are produced.
- Do not install the product where it could be exposed to sea wind (salty wind) directly. It can result corrosion on the product. Corrosion, particularly on the condenser and evaporator fins, could cause product malfunction or inefficient performance.
- If outdoor unit is installed close to the seaside, it should avoid direct exposure to the sea wind. Otherwise it needs additional anticorrosion treatment on the heat exchanger.

Selecting the location(Outdoor Unit)

- If the outdoor unit is to be installed close to the seaside, direct exposure to the sea wind should be avoided. Install the outdoor unit on the opposite side of the sea wind direction.



- In case, to install the outdoor unit on the seaside, set up a windbreak not to be exposed to the sea wind.



- It should be strong enough like concrete to prevent the sea wind from the sea.
- The height and width should be more than 150% of the outdoor unit.
- It should be keep more than 700 mm of space between outdoor unit and the windbreak for easy air flow.

- Select a well-drained place.
  Periodic (more than once/year) cleaning of the dust or salt particles stuck on the heat exchanger by using water

Seasonal wind and cautions in winter

- Sufficient measures are required in a snow area or severe cold area in winter so that product can be operated well.
- Get ready for seasonal wind or snow in winter even in other areas.
- Install a suction and discharge duct not to let in snow or rain.
- Install the outdoor unit not to come in contact with snow directly. If snow piles up and freezes on the air suction hole, the system may malfunction. If it is installed at snowy area, attach the hood to the system.
- Install the outdoor unit at the higher installation console by 500 mm than the average snowfall (annual average snowfall) if it is installed at the area with much snowfall.
- Where snow accumulated on the upper part of the Outdoor Unit by more than 100 mm, always remove snow for operation.
  - The height of H frame must be more than 2 times the snowfall and its width shall not exceed the width of the product. (If width of the frame is wider than that of the product, snow may accumulate)
  - Don't install the suction hole and discharge hole of the Outdoor Unit facing the seasonal wind.

INSTALLATION OF INDOOR UNIT

The indoor unit of THERMA V is installed inside where terminal of under floor water pipe cycle and refrigerant pipe from the outdoor unit are accessible at the same time.

In this chapter conditions for installation place is described. In addition, considerations when installing accessories or 3rd party accessories are described, too.

Conditions where Indoor Unit is Installed

Specific conditions are required for installation place such as service space, wall mounting, water pipe length and height, total volume of water, adjusting expansion vessel, and water quality.

General Considerations

Followings are should be considered before the installation of the indoor unit.

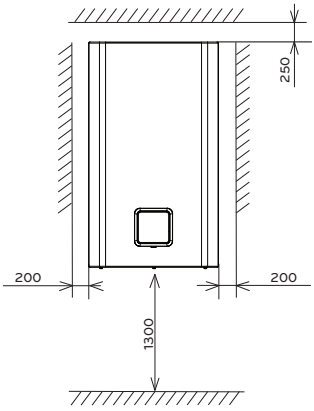
- The installation place should be free from outdoor weather conditions such as rain, snow, wind, frost, etc.
- Choose the place where is water-resistant or good drainage.
- Service space should be secured.
- No flammable materials around the indoor unit.
- Mice can not be appeared to prevent entering the indoor unit or attacking wires.
- Do not place anything in front of the indoor unit to ensure air circulation around the indoor unit.
- Do not locate anything under the indoor unit to be free from unexpected water out.
- In case of water pressure increasing to 3 bar, water drainage should be treated when water is drained by safety valve.

Service Space

- Ensure that the spaces indicated by arrows around bottom, side, and top side.
- Wider spaces are preferred for easy maintenance and piping.
- If minimum service space is not secured, air circulation can be troubled and internal parts of the indoor unit can be damaged by overheating.

NOTE

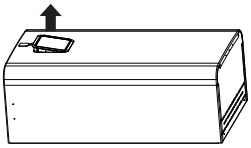
- The default setting of the product is for heating only. To use the cooling system together, DIP S / W 4 should be turned ON and additional drain pan accessory should be installed.



Minimum service space
(unit : mm)

Mounting to Wall

Step 1. Disconnect the remote control case from the front panel and disconnect the remote control cable.



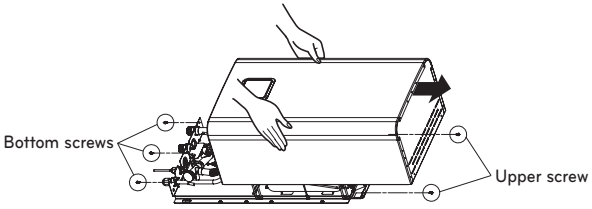
CAUTION

After installation is completed, return the remote control to its original state.

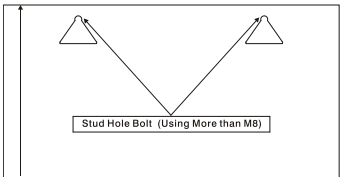
NOTE

Use a flat-blade screwdriver or a coin to remove the remote control case.

Step 2. After releasing five screws, detach front cover from the indoor unit. While detaching the front cover, grab the left and right sides of the front cover. Then pull into upward direction.



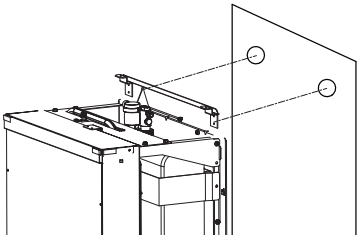
Step 3. Attach "Installation Sheet" to the wall and mark the location of bolts. This sheet helps to find correct location to the bolts.



CAUTION

The sheet should be attached level. If not, the supporting plate and the indoor unit will not be mounted correctly.

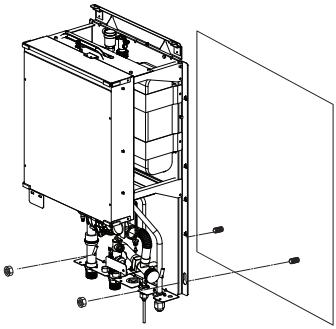
Step 4. Detach the Installation sheet. Screw bolts at the hole marks on the wall.
When screwing bolts, use M8 ~ M11 anchor bolts to secure hanging the indoor unit.



NOTE

Self drilling screw can be used as alternatives of M8 ~ M11 anchor bolts. But M8 ~ M11 anchor bolts are more preferred.

Step 5. Hang the indoor unit at the supporting plate.



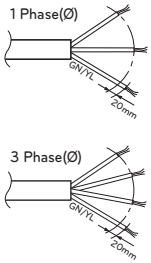
Electrical Wiring

Two kind of cables should be connected to the outdoor unit : One is 'Power cable', the other one is 'Connecting cable'. Power cable is a cable which is used to supply external electricity to the outdoor unit. This cable is generally connected between external power source (such as main electric power distribution panel of user's house) and the outdoor unit. Connecting cable is, on the other hand, used to connect between the outdoor unit and the indoor unit to supply electric power to the indoor unit and to establish the communication between the outdoor unit and the indoor unit.

Procedure for wiring to the outdoor unit is four steps. Before starting wiring, check if wire specification is suitable and read following directions and cautions VERY carefully.

CAUTION

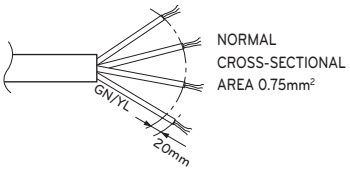
The power cord connected to the outdoor unit should be complied with IEC 60245 or HD 22.4 S4 (This equipment shall be provided with a cord set complying with the national regulation.)



NORMAL CROSS-SECTIONAL AREA

Model Name		Area (mm^2)
Phase	Capacity	
1Ø	5 kW	4
	7 kW	
	9 kW	
	12 kW	6
	14 kW	
	16 kW	
3Ø	12 kW	2.5
	14 kW	
	16 kW	

The connecting cable connected to the outdoor unit should be complied with IEC 60245 or HD 22.4 S4 (This equipment shall be provided with a cord set complying with the national regulation.)



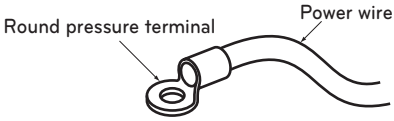
When the connection line between the indoor unit and outdooor unit is over 40m, connect the telecommunication line and power line separately.

In order to avoid a hazard due to inadvertent resetting of the thermal cut-out, this appliance must not be supplied through an external switching device, such as a timer, or connected to a circuit that is regularly switched on and off by the utility.

If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazrd.

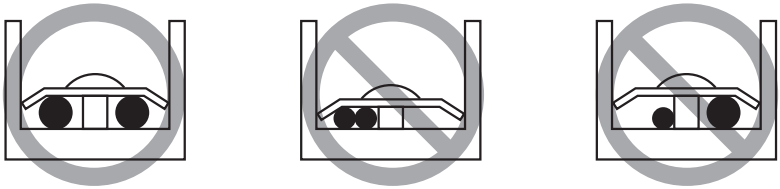
Precautions when laying power wiring

Use round pressure terminals for connections to the power terminal block.



When none are available, follow the instructions below.

- Do not connect wiring of different thicknesses to the power terminal block. (Slack in the power wiring may cause abnormal heat.)
- When connecting wiring which is the same thickness, do as shown in the figure below.



WARNING

Make sure that the screws of the terminal are free from looseness.

Point for attention regarding quality of the public electric power supply

This equipment complies with respectively:

- EN/IEC 61000-3-12 (1) provided that the short-circuit power Ssc is greater than or equal to the minimum Ssc value at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with respectively: Ssc greater than or equal to the minimum Ssc value.

Model Name		Minimum Ssc Value
Phase	Capacity	
1Ø	5 kW	3,142
	7 kW	
	9 kW	
	12 kW	
	14 kW	
	16 kW	

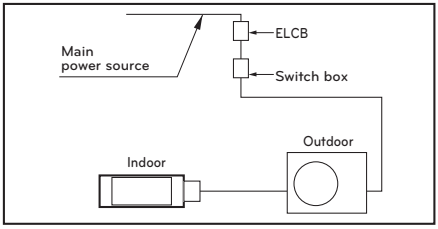
Model Name		Minimum Ssc Value
Phase	Capacity	
3Ø	12 kW	2,348
	14 kW	
	16 kW	

- European/International Technical Standard setting the limits for voltage changes, voltage fluctuations and flicker in public low-voltage supply systems for equipment with rated current ≤ 75A.
- European/International Technical Standard setting the limits for harmonic currents produced by equipment connected to public low-voltage systems with input current ≤16A of > 75A per phase.

Circuit Breaker Specification

Perform the electrical wiring work according to the electrical wiring connection.

- All wiring must comply with local requirements.
- Select a power source that is capable of supplying the current required by the air conditioner.
- Use a recognized ELCB(Electric Leakage Circuit Breaker) between the power source and the unit. A disconnection device to adequately disconnect all supply lines must be fitted.



- Model of circuit breaker recommended by authorized personnel only

Model Name		ELCB
Phase	Capacity	
1Ø	5 kW	30A
	7 kW	
	9 kW	
	12 kW	40A
	14 kW	
	16 kW	
3Ø	12 kW	20A
	14 kW	
	16 kW	

PIPING AND WIRING FOR OUTDOOR UNIT

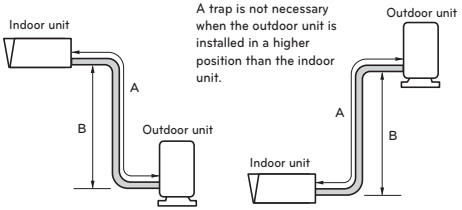
Procedures about refrigerant piping and electric wiring at the outdoor are described in this chapter. Most of procedures are similar to those of LG Air Conditioner.

Refrigerant Piping

Before starting refrigerant piping, constraints in pipe length and elevation should be examined. After resolving all constraints, some preparations are required to proceed. Then connecting pipe to the outdoor and the indoor unit is beginning.

Constraints in Pipe Length and Elevation

Capacity	Pipe Size (mm : inch) (Diameter : Ø)		Length A (m)		Elevation B (m)		*Additional Refrigerant (g/m)
	Gas	Liquid	Standard	Max.	Standard	Max.	
5kW	15.88(5/8")	9.52(3/8")	7.5	50	0	30	40
7kW							
9kW							
12kW							
14kW							
16kW							



⚠ CAUTION

1 Standard pipe length is 7.5m If the pipe length is longer than 7.5m, additional charge of the refrigerant is required according to the table.
   • Example : If 16kW model is installed at a distance of 50m, 1,700g of refrigerant should be added according to following formula : (50-7.5) x 40g = 1,700g
2 Rated capacity of the product is based on standard length and maximum allowable length is based on the product reliability in the operation.
3 Improper refrigerant charge may result in abnormal operation.

! NOTE

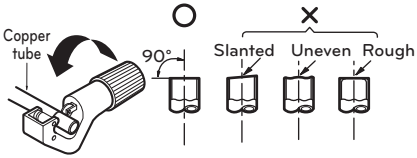
Fill in the f-gas Label attached on outdoor about the quantity of the fluorinated greenhouse gases (This note about f-gas label may not apply depending on your product type or market.)
① Manufacturing site (See Model Name label)
② Installation site (If possible being placed adjacent to the service points for the addition or removal of refrigerant)
③ The total Charge (① + ②)

Preparation for Piping

- Main cause of gas leakage is defect in flaring work. Carry out correct flaring work in the following procedure.
- Use the de-oxidised copper as piping materials to install.

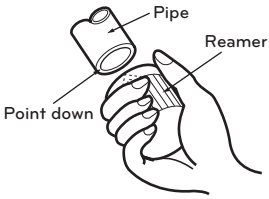
Step 1. Cut the pipes and the cable.

- Use the accessory piping kit or the pipes purchased locally.
- Measure the distance between the indoor unit and the outdoor unit.
- Cut the pipes a little longer than measured distance.
- Cut the cable 1.5m longer than the pipe length.



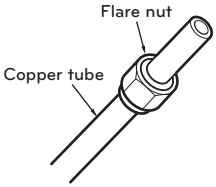
Step 2. Burrs removal

- Completely remove all burrs from the cut cross section of pipe/tube.
- Put the end of the copper tube/pipe to downward direction as you remove burrs in order to avoid to let burrs drop in the tubing.



Step 3. Putting nut on

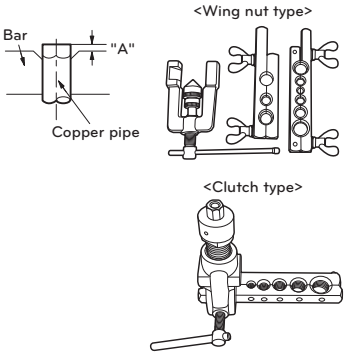
- Remove flare nuts attached to indoor and outdoor units, than put them on pipe/tube having completed burr removal. (Not possible to put them on after flaring work)



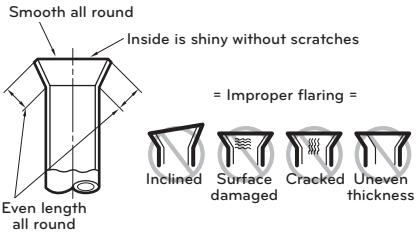
Step 4. Flaring work.

- Carry out flaring work using dedicated flaring tool for R-410A refrigerant as shown below.

Pipe diameter Inch (mm)	A inch (mm)	
	Wing nut type	Clutch type
Ø1/4 (Ø6.35)	0.04~0.07 (1.1~1.8)	0~0.02 (0~0.5)
Ø3/8 (Ø9.52)		
Ø1/2 (Ø12.7)		
Ø5/8 (Ø15.88)		



- Firmly hold copper tube in a bar(or die) as indicated dimension in the table above.



Step 5. Check

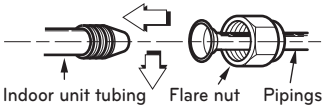
- Compare the flared work with right figure.
- If flare is seemed to be defective, cut off the flared section and do flaring work again.

Connecting Pipe to Indoor Unit

Connecting pipe to the indoor unit is two steps. Read following directions carefully.

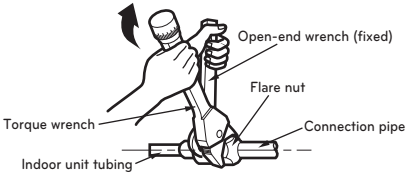
Step 1. Pre-tightening.

- Align the center of the pipes and sufficiently tighten the flare nut by hand.



Step 2. Tightening.

- Tighten the flare nut with a wrench.
- Tightening torque is as following.



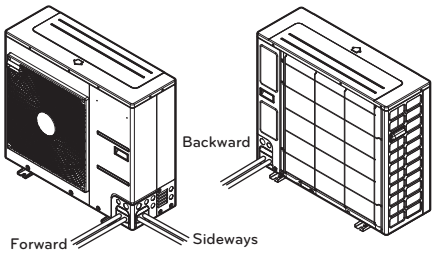
Outside diameter		Torque
mm	inch	kgf·m
6.35	1/4	1.8 ~ 2.5
9.52	3/8	3.4 ~ 4.2
12.7	1/2	5.5 ~ 6.6
15.88	5/8	6.6 ~ 8.2
19.05	3/4	9.9 ~ 12.1

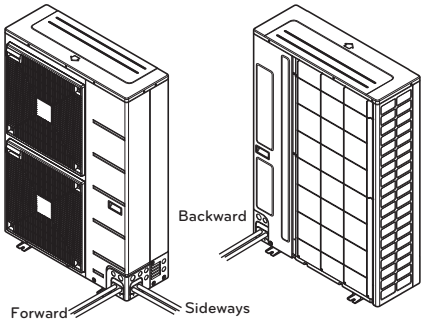
Connecting Pipe to Outdoor Unit

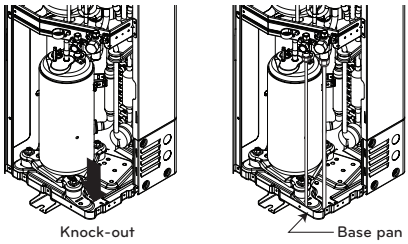
Connecting pipe to the outdoor unit is five steps including PCB setting.

Step 1. Determine direction of pipes.

- The pipes can be connetable in three directions.
- The directions are expressed in below figure.
- When connecting in a downward direction, knock out the knock-out hole of the base pan.



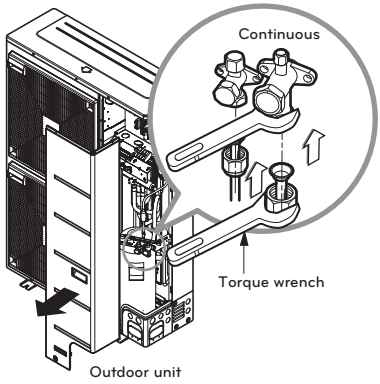




Step 2. Tightening

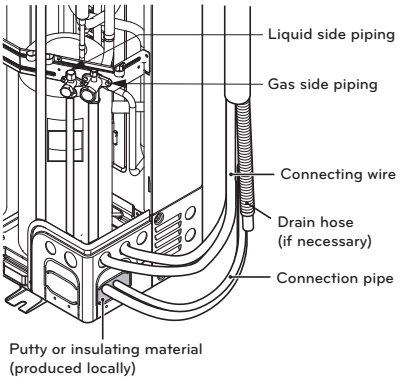
- Align the center of the pipes and sufficiently tighten the flare nut by hand.
- Tighten the flare nut with a wrench until the wrench clicks
- Tightening torque is as following.

Outside diameter		Torque
mm	inch	kgf·m
6.35	1/4	1.8 ~ 2.5
9.52	3/8	3.4 ~ 4.2
12.7	1/2	5.5 ~ 6.6
15.88	5/8	6.6 ~ 8.2
19.05	3/4	9.9 ~ 12.1



Step 3. Preventing entering of foreign objects

- Plug the pipe through-holes with putty or insulation material (procured locally) to fill up all gaps as shown in right figure.
- If insects or small animals enter the outdoor unit, it may cause a short circuit in the electrical box.
- Finally, form the pipes by wrapping the connecting portion of the indoor unit with insulation material and secure it with two kinds of vinyl tape. Ensuring thermal insulation is very important.



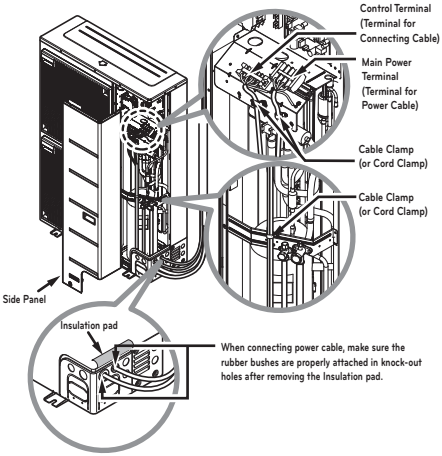
Wiring Procedure for Power Cable and Connecting Cable

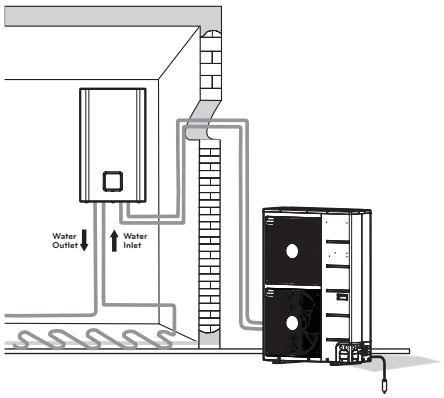
Step 1. : Disassemble the side panel from the outdoor unit by loosing screws.

Step 2. : Connect Power cable to Main Power Terminal and Connecting cable to Control Terminal, respectively.
See below figure for detailed information. When connecting earth cable, the diameter of cable should be bigger than 1.6mm2 to secure safety. The earth cable is connected to the terminal block where earth symbol ⏚ is marked.

Step 3. : Use cable clamps (or cord clamps) to prevent unintended move of Power cable and Connecting cable.

Step 4. : Reassemble the side panel to the outdoor unit by fastening screws.





⚠ CAUTION

After checking and confirming following conditions, start wiring work.

- Secure dedicated power source for the Air-to-Water heat pump. The wiring diagram (attached inside the control box of the indoor unit) is presenting related information.
- Provide a circuit breaker switch between power source and the outdoor unit.
- Although it is very rare case, sometimes the screws used to fasten internal wires can be loosen due to the vibration while product transportation. Check these screws and make it sure if they are all fastened tightly. If not tightened, burn-out of the wire can be occurred.
- Check the specification of power source such as phase, voltage, frequency, etc.
- Confirm that electrical capacity is sufficient.
- Be sure that the starting voltage is maintained at more than 90 percent of the rated voltage marked on the name plate.
- Confirm that the cable thickness is as specified in the power sources specification. (Particularly note the relation between cable length and thickness.)
- Provide an ELB(electric leakage breaker) when the installation place is wet or moist.
- The following troubles would be caused by abnormal voltage supply such as sudden voltage increasing or voltage drop-down.
  - Chattering of a magnetic switch (frequent on and off operation)
  - Physical damage of parts where magnetic switch is contacted
  - Break of fuse
  - Malfunction of overload protection parts or related control algorithms.
  - Failure of compressor start up
- Ground wire to ground outdoor unit to prevent electrical shock.

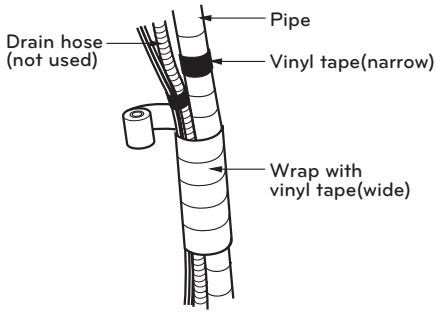
CAUTION

The Power cord connected to the unit should be selected according to the following specifications.

Finalizing

After pipes are connected and electric cables are wired, pipe forming and some tests are remained. Especially, careful attention is required while proceeding leakage test because the leakage of the refrigerant effects degrade of performance directly. Also, it is very hard to find leaked point after all installation procedures are finished.

Pipe Forming

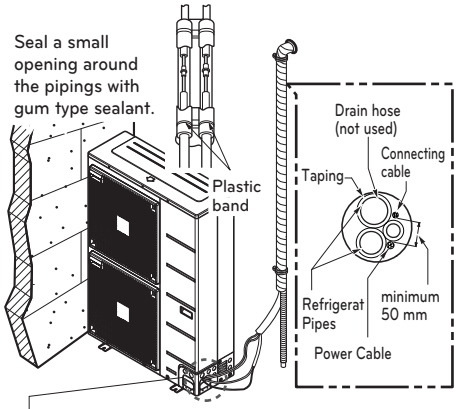


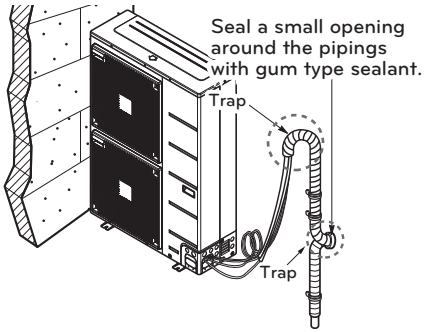
Do pipe forming by wrapping the connecting cable and refrigerant pipe (between the indoor unit and outdoor unit) with thermal insulation material and secure it with two kinds of vinyl tape.

- Tape the refrigerant pipe, power cable and connecting cable from down to up.
- Secure the taped pipe is along with the exterior wall. Form a trap to prevent water entering the room and electrical part.
- Fix the taped pipe onto the wall by saddle or equivalent.

Taping Procedure

- Tape the pipes, connecting cable and power cable from down to up. If taping direction is up to down, rain drop may be sinking into the pipes or cables.
- Secure the taped pipe along the exterior wall using saddle or equivalent.
- Trap is required to prevent water from entering into electrical parts.





• Trap is required to prevent water from entering into electrical parts.

Leakage test and Evacuation

Air and moisture remaining in the refrigerant system have undesirable effects as indicated below.

- Pressure in the system rises.
- Operating current rises.
- Cooling(or heating) efficiency drops.
- Moisture in the refrigerant circuit may freeze and block capillary tubing.
- Water may lead to corrosion of parts in the refrigeration system.

Therefore, the indoor/outdoor unit and connecting tube must be checked for leak tight, and vacuumed to remove incondensible gas and moisture in the system.

Preparation

- Check that each tube(both liquid and gas side tubes) between the indoor and outdoor units have been properly connected and all wiring for the test run has been completed. Remove the service valve caps from both the gas and the liquid side on the outdoor unit. Check that both the liquid and the gas side service valves on the outdoor unit are kept closed at this stage.

Leakage test

- Connect the manifold valve(with pressure gauges) and dry nitrogen gas cylinder to this service port with charge hoses.

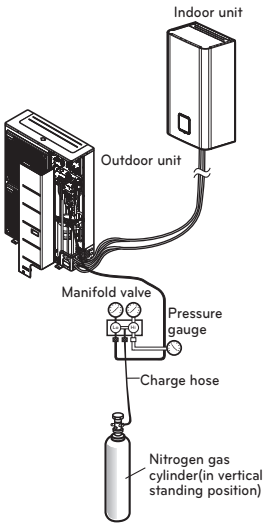
⚠ CAUTION

Be sure to use a manifold valve for leakage test. If it is not available, use a stop valve for this purpose. The "Hi" knob of the manifold valve must always be kept close.

- Pressurize the system to no more than 3.0 Mpa with dry nitrogen gas and close the cylinder valve when the gauge reading reached 3.0 Mpa Next, test for leaks with liquid soap.

To avoid nitrogen entering the refrigerant system in a liquid state, the top of the cylinder must be higher than its bottom when you pressurize the system. Usually, the cylinder is used in a vertical standing position.

- Do a leakage test of all joints of the tubing(both indoor and outdoor) and both gas and liquid side service valves. Bubbles indicate a leak. Be sure to wipe off the soap with a clean cloth
- After the system is found to be free of leaks, relieve the nitrogen pressure by loosening the charge hose connector at the nitrogen cylinder. When the system pressure is reduced to normal, disconnect the hose from the cylinder.

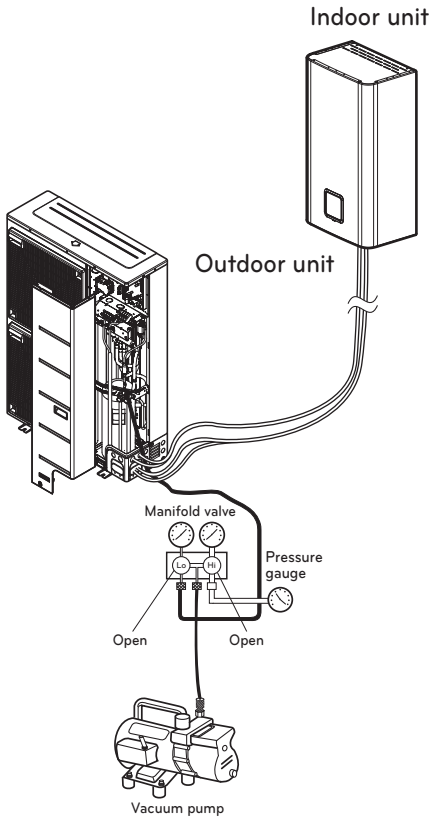


Evacuation

- Connect the charge hose end described in the preceding steps to the vacuum pump to evacuate the tubing and indoor unit. Confirm the "Lo and Hi" knob of the manifold valve is open. Then, run the vacuum pump. The operation time for evacuation varies with tubing length and capacity of the pump. The following table shows the time required for evacuation.

Required time for evacuation when 30 gal/h vacuum pump is used	
If tubing length is less than 10 m(33 ft)	If tubing length is longer than 10 m(33 ft)
30 min. or more	60 min. or more
0.8 torr or less	

- When the desired vacuum is reached, close the "Lo and Hi" knob of the manifold valve and stop the vacuum pump.



Finishing the job

- With a service valve wrench, turn the valve stem of liquid side valve counter-clockwise to fully open the valve.
- Turn the valve stem of gas side valve counter-clockwise to fully open the valve.
- Loosen the charge hose connected to the gas side service port slightly to release the pressure, then remove the hose.
- Replace the flare nut and its bonnet on the gas side service port and fasten the flare nut securely with an adjustable wrench. This process is very important to prevent leakage from the system.
- Replace the valve caps at both gas and liquid side service valves and fasten them tight. This completes air purging with a vacuum pump.
  The air conditioner is now ready to test run.

Electrical Wiring

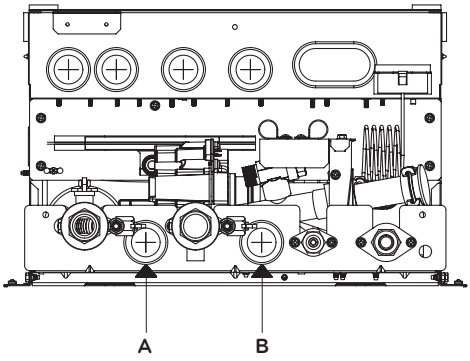
General Consideration

Followings are should be considered before beginning indoor unit wiring.

- Field-supplied electrical components such as power switches, circuit breakers, wires, terminal boxes, etc should be properly chosen with compliance with national electrical legislation or regulation.
- Make it sure that supplied electricity is enough to operate the product including outdoor unit, electric heater, water tank heater, etc. The capacity of fuse also selected according to the power consumption.
- The main electricity supply should be dedicated line. Sharing main electricity supply with other devices such as washing machine or vacuum cleaner is not permitted.

⚠ CAUTION

- Before starting wiring job, the main electricity supply should be turned off until wiring is completed.
- When adjusting or changing wiring, the main electricity supply should be turned off and ground wire should be connected securely.
- Installation place should be free from the attack of wild animal. For example, mice's wire attacking or frog's entering into the indoor unit may cause critical electrical accident.
- All power connections should be protected from dew condensation by thermal insulation.
- All electrical wiring should comply with national or local electrical legislation or regulation.
- The ground should be connected exactly. Do not earth the product to the copper pipe, steel fence at the veranda, city water outlet pipe, or any other conductivity materials.
- Fix all cable using cord clamp tightly. (When cable is not fixed with cord clamp, use additionally supplied cable ties.)



Hole A : for AC line (wire which is connected to the terminal block of the control box)

Hole B : for DC line (wire which is connected to the PCB of the control box)

Terminal Block Information

Symbols used below pictures are as follows :

- L, L1, L2 : Live (230 V AC)
- N : Neutral (230 V AC)
- BR : Brown , WH : White , BL : Blue , BK : Black

Terminal Block 1

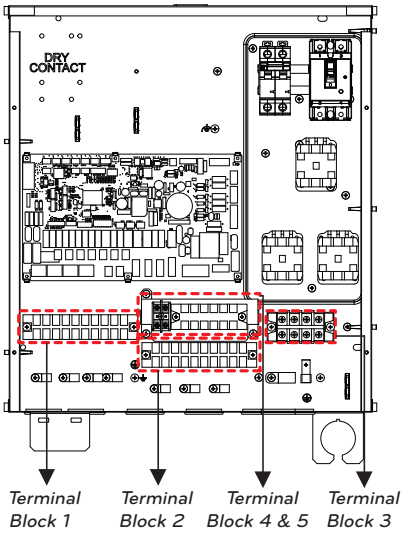
energizing water pump for solar thermal system

water flow switching between under floor heating and DHW tank heating

1	2	3	4	5	6	7	8	9	10
L	L1	N	L	N	L	N	L	L1	N
3WAY VALVE (B)			WATER PUMP (B)		WATER TANK HEATER		3WAY VALVE (A)		

water flow switching between using solar thermal heating and skipping solar thermal heating

turn on or off DHW tank heater



Terminal Block 2

opening or closing water flow for FCU cooling

11	12	13	14	15	16	17	18	19	20
1(L)	2(N)	3	L1	L2	N	L	N	L1	L2
OUTDOOR UNIT			2WAY VALVE (A)			THERMOSTAT (Default : 230 V AC)			

Power supply for Indoor unit and communication

Connection for thermostat (230 V AC)
Supporting type : Heating only or Heating/Cooling

Terminal Block 3 (1Ø Electric Heater)

connecting external electric power supply for DHW tank electric heater

1(L)	2(N)	3(L)	4(N)
POWER SUPPLY (1 Ø, 220-240 V, 50 Hz)		TO ELB FOR DHW TANK E/HEATER	

connecting external electric power supply for internal electric heater

Terminal Block 3 (3Ø Electric Heater)

connecting external electric power supply for DHW tank electric heater

1	2		3	4	5
L	N		R	S	T
TO ELB FOR DHW TANK E/HEATER			POWER SUPPLY (3 Ø, 380-415 V, 50 Hz)		

connecting external electric power supply for DHW tank electric heater

Terminal Block 4 & 5

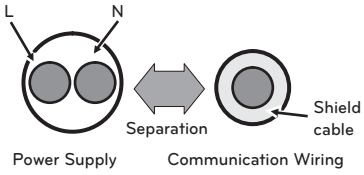
21	22		23	24	25	26	27
1(L)	2(N)						
3rd PARTY CONTROLLER (DC 5 V)			Mix Pump		Mix Valve		

Connection for 3rd Party controller (5 V DC)

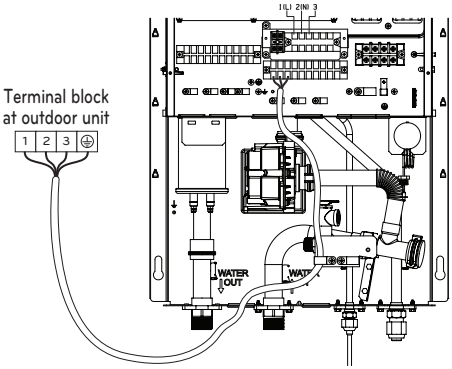
Power supply for 2nd heating kit

CAUTION

You should separate the communication wiring, in case of communication wiring length is over 40M



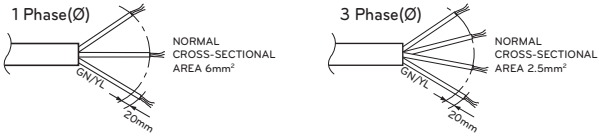
Connecting with Outdoor Unit



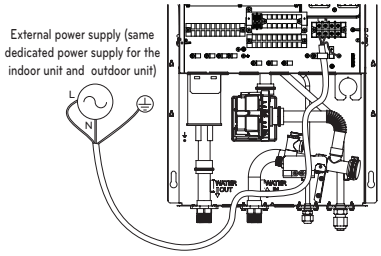
Electric Heater Wiring

CAUTION

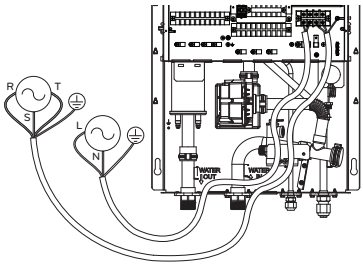
Power Cable Specification : The power cord connected to the outdoor unit should be complied with IEC 60245 or HD 22.4 S4(Rubber insulated cord, type 60245 IEC 66 or H07RN-F)



If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.



1Ø Electric Heater



3Ø Electric Heater

PIPING AND WIRING FOR INDOOR UNIT

Procedures about water piping and electric wiring at the indoor unit are described in this chapter. Water piping and water circuit connection, water charging, pipe insulations will be shown for water piping procedures. For wiring, terminal block connection, connecting with the outdoor unit, electric heater wiring will be introduced. Accessories connection, such as sanitary water tank, thermostat, 3way or 2way valves, etc will be dealt in separated chapter.

Water Piping and Water Circuit Connection

General Considerations

Followings are should be considered before beginning water circuit connection.

- Service space should be secured.
- Water pipes and connections should be cleaned using water.
- Space for installing external water pump should be provided if internal water pump capacity is not enough for installation field.
- Never connect electric power while proceeding water charging.

Water Piping and Water Circuit Connection

Definition of terms are as follow :

- Water piping : Installing pipes where water is flowing inside the pipe.
- Water circuit connecting : Making connection between the product and water pipes or between pipes and pipes. Connecting valves or elbows are, for example, in this category.

Configuration of water circuit is shown in Chapter 2. All connections should be complied with presented diagram.

While installing water pipes, followings should be considered :

- While inserting or putting water pipes, close the end of the pipe with pipe cap to avoid dust entering.
- When cutting or welding the pipe, always be careful that inner section of the pipe should not be defective. For example, no weldments or no burrs are found inside the pipe.
- Drain piping should be provided in case of water discharge by the operation of the safety valve. This situation can be happened when the internal pressure is over 3.0 bar and water inside the indoor unit will be discharged to drain hose.

While connecting water pipes, followings should be considered.

- Pipe fittings (e.g. L-shape elbow, T-shape tee, diameter reducer, etc) should be tightened strongly to be free from water leakage.
- Connected sections should be leakage-proof treatment by applying tefron tape, rubber bushing, sealant solution, etc.
- Appropriate tools and tooling methods should be applied to prevent mechanical breakage of the connections.
- Operation time of flow control valve(e.g. 3way valve or 2way valve) should be less than 90 seconds.
- Drain hose should be connected with drain piping.

⚠ WARNING

Installing shut-off valve

- While assembling two shut-off valves, that are found inside 'AWHP Installation Kit (AET69364401)', pop sound will be heard when valve is open or close by rotating handles. It is normal condition because the sound is due to leakage of charged nitrogen gas inside the valve. The nitrogen gas is applied to secure quality assurance.
- Before starting water charging, these two shut-off valves should be assembled with water inlet and outlet pipe of the indoor unit.

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.

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.

Drainage treatment

While cooling operation, condensed dew can drop down to the bottom of the indoor unit. In this case, prepare drainage treatment (for example, vessel to contain condensed dew) to avoid water drop.

Water Charging

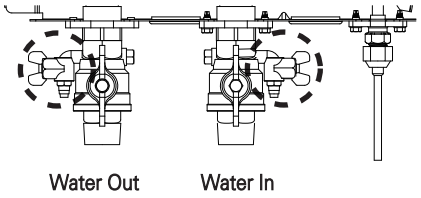
For water charging, please follow below procedures.

Step 1. Open all valves of whole water circuit. Supplied water should be charged not only inside the indoor unit, but also in the under floor water circuit, sanitary water tank circuit, FCU water circuit, and any other water circuits controlled by the product.

Step 2. Connect supply water into drain valve and fill valve located at the side of the shut-off valve.

CAUTION

No water-leakage permitted at the drain and fill valve. Leakage-proof treatment which is described in previous section should be applied.



Step 3. Start to supply water. While supplying water, following should be kept.

- Pressure of supplying water should be 2.0 bar approximately.
- For supplying water pressure, time to be taken from 0 bar to 2.0 bar should be more than 1 minute. Sudden water supply can yield water drain through safety valve.
- Fully open the cap of air vent to assure air purging. If air is exist inside the water circuit, then performance degrade, noise at the water pipe, mechanical damage at the surface of electric heater coil.

Step 4. Stop water supplying when the pressure gage located in front of the control panel indicates 2.0 bar.

Step 5. Close drain valve and fill valve. Then wait for 20~30 seconds to observe water pressure being stabilized.

Step 6. If following conditions are satisfactory, then go to step 7(pipe insulation). Otherwise, go to step 3.

- Pressure gage indicates 2.0 bar. Note that sometimes pressure in decreased after step 5 due to water charging inside expansion vessel.
- No air purging sound is heard or no water drop are popping out from air vent.

Pipe Insulation

Purpose of water pipe insulation is :

- To prevent heat loss to external environment
- To prevent dew generation on the surface of the pipe in cooling operation

Water pump Capacity

The water pump us variable type which is capable to change flow rate, so it may be required to change default water pump capacity in case of noise by water flow. In most case, however, it is strongly recommended to set capacity as Maximum.

NOTE

- To secure enough water flow rate, do not set water pump capacity as Minimum. It can lead unexpected flow rate error CH14.

Pressure Drop

NOTE

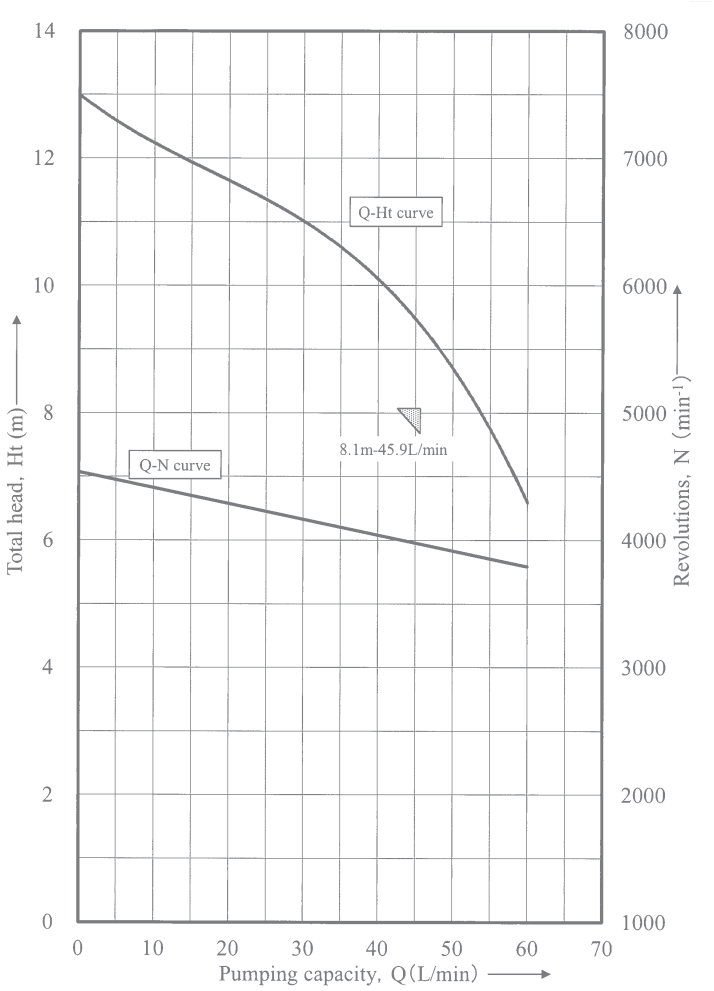
When installing the product, install additional pump in consideration of the pressure loss and pump performance.
If flow-rate is low, overloading of product can occur.

Capacity	Rated flow-rate [LPM]	Pump Head [m] (at rated flow-rate)	Product pressure drop [m] (Plate heat exchanger)	Serviceable Head [m]
16kW	46.0	9.5	1.4	8.1
14kW	40.0	10.0	1.1	8.9
12kW	34.0	10.7	0.8	9.9
9kW	26.0	11.3	0.4	10.9
7kW	20.0	11.6	0.3	11.3
5kW	17.0	11.8	0.2	11.6

Performance curve

Indoor : Electric Heater 1Ø, Indoor : Electric Heater 3Ø

Pump model : PY-122NDDD3



Performance test based on standard ISO 9906 with pre-pressure 2.0bar and liquid temperature 20°C.

WARNING

Selecting a water flowrate outside the curves can cause damage to or malfunction of the unit.

Water Quality

Water quality should be complied with EN 98/83 EC Directives.
Detailed water quality condition can be found in EN 98/83 EC Directives.

CAUTION

- If the product is installed at existing hydraulic water loop, it is important to clean hydraulic pipes to remove sludge and scale.
- Installing sludge strainer in the water loop is very important to prevent performance degrade.
- Chemical treatment to prevent rust should be performed by installer.
- It is strongly recommended to install an additional filter on the heating water circuit. Especially to remove metallic particles from the heating piping, it is advised to use a magnetic or cyclone filter, which can remove small particles. Small particles may damage the unit and will NOT be removed by the standard filter of the heat pump system.

Frost protection

In areas of the country where entering water temperatures drop below 0 °C, the water pipe must be protected by using an approved antifreeze solution. Consult your AWHP unit supplier for locally approved solutions in your area. Calculate the approximate volume of water in the system. (Except the AWHP unit.) And add six liters to this total volume to allow for the water contained in AWHP unit.

Antifreeze type	Antifreeze mixing ratio					
	0°C	-5°C	-10°C	-15°C	-20°C	-25°C
Ethylene glycol	0%	12%	20%	30%	-	-
Propylene glycol	0%	17%	25%	33%	-	-
Methanol	0%	6%	12%	16%	24%	30%

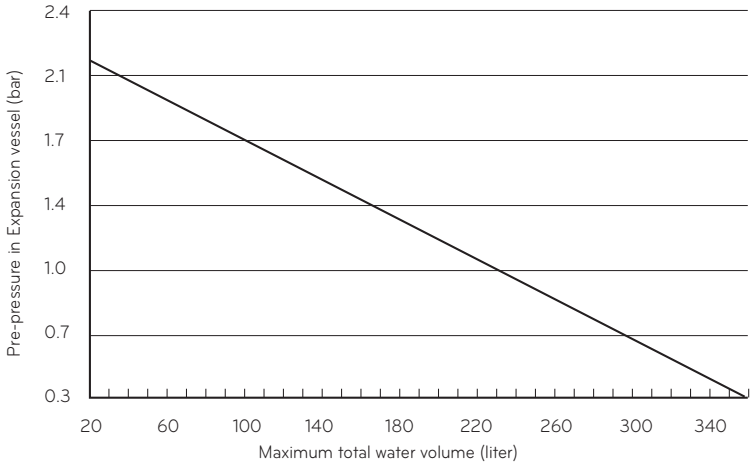
CAUTION

- Use only one of the above antifreeze.
- If a antifreeze is used, pressure drop and capability degradation of the system can be occurred.
- If one of antifreezes is used, corrosion can be occurred. So please add corrosion inhibitor.
- Please check the concentration of the antifreeze periodically to keep same concentration.
- When the antifreeze is used (for installation or operation), take care to ensure that antifreeze must not be touched.
- Ensure to respect all laws and norms of your country about Anti-freeze usage.

Water Volume and Expansion Vessel Pressure

Inside expansion vessel is included which is 8 liter capacity with 1 bar pre-pressure. That means, according to the volume-pressure graph, total water volume of 230 liter is supported as default. If total water volume is changed because of installation condition, the pre-pressure should be adjusted to secure proper operation.

- Minimum total water volume is 20 liter.
- Pre-pressure is adjusted by the total water volume. If the indoor is located at the highest position of the water circuit, adjustment is not required.
- To adjust pre-pressure, use nitrogen gas by certificated installer.



Adjusting pre-pressure of expansion vessel is as following :

Step 1. Refer "Volume-Height" table.
If installation scene is belong to Case A, go to Step 2.
Otherwise, if it is Case B, do nothing. (pre-pressure adjustment is not required.)
Otherwise, if it is Case C, go to Step 3.

Step 2. Adjust pre-pressure by following equation.
Pre-pressure [bar] = (0.1xH+0.3) [bar]
where H : difference between unit and the highest water pipe
0.3 : minimum water pressure to secure product operation

Step 3. Volume of expansion vessel is less than installation scene.
Please install additional expansion vessel at the external water circuit.

Volume-Height Table

	V < 230 liter	V ≥ 230 liter
H < 7m	Case B	Case A
H ≥ 7m	Case A	Case C

H : difference between unit and the highest water pipe
V : total water volume of installation scene

ACCESSORIES INSTALLATION

THERMA V can interface to various accessories to extend its functionality and to improve user convenience. In this chapter, specifications about supported 3rd party accessories and how to connect to THERMA V is introduced.

It is noted that this chapter only deal with 3rd party accessories. For accessories supported by LG Electronics, please refer to installation manual of each accessories.

Accessories supported by LG Electronics

Item	Purpose	Model
DHW Tank Install Kit	To operate with DHW tank	PHLTA : 1Ø PHLTC : 3Ø
Remote Air Sensor	To control by air temperature	PQRSTA0
Dry Contact	To receive on & off external signal	PDRYCB500
	Dry Contact For Thermostat	PDRYCB300
Solar Heating Kit	To operate with solar heating system	PHLLA(Limit temperature : 96°C)
DHW Tank	To generate and store hot water	PHS02060310 : 200 liter, Single Heating Coil, 1Ø 230 V 50 Hz 3kW Electric Heater PHS02060320 : 200 liter, Double Heating Coil, 1Ø 230 V 50 Hz 3kW Electric Heater PHS03060310 : 300 liter, Single Heating Coil, 1Ø 230 V 50 Hz 3kW Electric Heater PHS03060320 : 300 liter, Double Heating Coil, 1Ø 230 V 50 Hz 3kW Electric Heater
Drain Pan	To prevent drain water drop	PHDPB
Meter Interface	To measure production / consumption power	PENKTH000
Central Controller	Multiple installed products into one central control	

⚠ CAUTION

- Install the drain fan when cooling.
- If not installed, water may form.
- Please refer to separate installation manual when installing drain fan.

Accessories supported by 3rd party Companies

Item	Purpose	Specification
Solar Heating System	To generate auxiliary heating energy for water tank	
Thermostat	To control by air temperature	Heating-Only type (230 V AC) Cooling/Heating type (230 V AC with Mode selection switch)
Mix Kit	To use 2nd Circuit	
3rd Party Boiler	To use auxiliary boiler.	
3way valve and actuator	To control water flow for hot water heating or floor heating	3 wire, SPDT (Single Pole Double Throw) type, 230 V AC
2way valve and actuator	To control water flow for Fan Coil Unit	2 wire,NO(Normal Open) or NC(Normal Closed) type, 230 V AC

Before Installation

WARNING

Followings should be kept before installation
- Main power must be turned off during installing 3rd party accessories.
- 3rd party accessories should be comply with supported specification.
- Proper tools should be chosen for installation.
- Never do installation with wet hands.

Thermostat

Thermostat is generally used to control the product by air temperature. When thermostat is connected to the product, the product operation is controlled by the thermostat.

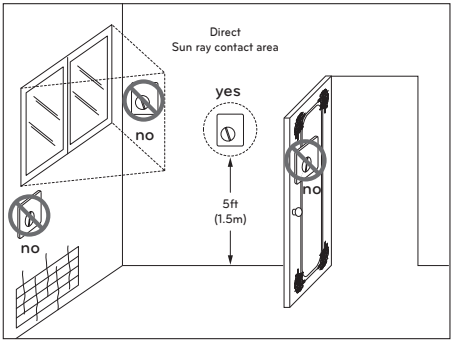
Installation condition

CAUTION

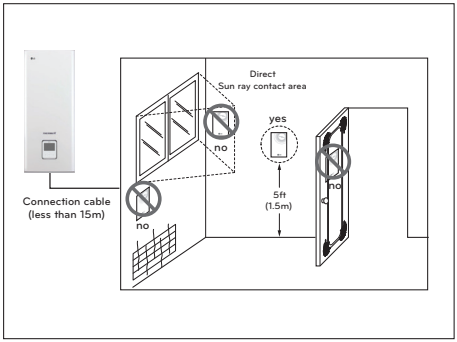
- USE 220-240 V~ Thermostat
- Some electro-mechanical type thermostat has internal delay time to protect compressor. In that case, mode change can takes time more than user's expectation. Please read thermostat manual carefully if the unit does not response quickly.
- Setting temperature range by thermostat can be different with that of the unit. The heating or cooling set temperature should be chosen within the setting temperature range of the unit.
- It is highly recommended that the thermostat should be installed where space heating is mainly applied.

Following location should be avoid to secure proper operation :

- Height from floor is approximately 1.5 m.
- Thermostat can not be located where the area may be hidden when door is open.
- Thermostat can not be located where external thermal influence may be applied. (such as above heating radiator or open window)



Thermostat



Remote Air Temperature Sensor

General Information

The Heat Pump supports following thermostats.

Type	Power	Operating Mode	Supported
Mechanical (1)	230 V~	Heating Only (3)	Yes
		Heating / Cooling (4)	Yes
Electrical (2)	230 V~	Heating Only (3)	Yes
		Heating / Cooling (4)	Yes

(1) There is no electric circuit inside the thermostat and electric power supply to the thermostat is not required.

(2) Electric circuit such as display, LED, buzzer, etc is included in the thermostat and electric power supply is required.

(3) Thermostat generates "Heating ON or Heating OFF" signal according to user"s heating target temperature.

(4) hermostat generates both "Heating ON or Heating OFF" and "Cooling ON or Cooling OFF" signal according to user"s heating and cooling target temperature.

⚠ CAUTION

Choosing heating / cooling thermostat

- Heating / cooling thermostat must have "Mode Selection" feature to distinguish operation mode.
- Heating / cooling thermostat must be able to assign heating target temperature and cooling target temperature differently.
- If above conditions are not kept, the unit can not operation properly.
- Heating / cooling thermostat must send cooling or heating signal immediately when temperature condition is satisfied. No delay time while sending cooling or heating signal is permitted.

How to wire thermostat

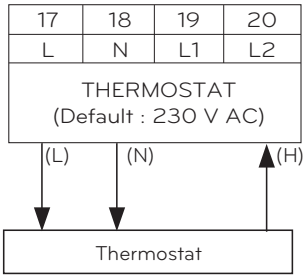
Follow below procedures Step 1 ~ Step 5.

Step 1. Uncover front cover of the unit and open the control box.

Step 2. Identify the power specification of the thermostat. If it is 220-240 V~, go to Step 3.

Step 3. If it is Heating only thermostat, go to step 4. Otherwise, if it is Heating / cooling thermostat, go to step 5.

Step 4. Find terminal block and connect wire as below. After connecting, go to step 5.



WARNING

Mechanical type thermostat

Do not connect wire (N) as mechanical type thermostat does not require electric power supply.

CAUTION

Do not connect external electric loads.

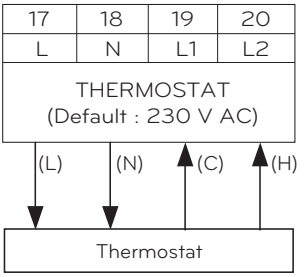
Wire (L) and (N) should be used only for operation electric type thermostat.
Never connect external electric loads such as valves, fan coil units, etc. If connected, Main PCB (Heater) can be seriously damaged.

(L) : Live signal from PCB to thermostat

(N) : Neutral signal from PCB to thermostat

(H) : Heating signal from thermostat to PCB

Step 5. Find terminal block and connect wire as below.



WARNING

Mechanical type thermostat

Do not connect wire (N) as mechanical type thermostat does not require electric power supply.

CAUTION

Do not connect external electric loads.

Wire (L) and (N) should be used only for operation Electric type thermostat.

Never connect external electric loads such as valves, fan coil units, etc. If connected, Main PCB (Heater) can be seriously damaged.

(L) : Live signal from PCB to thermostat

(N) : Neutral signal from PCB to thermostat

(C) : Cooling signal from thermostat to PCB

(H) : Heating signal from thermostat to PCB

Final check

- DIP switch setting :
  Set DIP switch No. 8 to 'ON'. Otherwise, the unit can not recognize the thermostat.
- Remote Controller :
  - 'Thermostat' text is displayed on the remote controller.
  - Button input is prohibited.

2nd Circuit

The 2nd circuit is generally used to control the temperature of 2 rooms differently. To use the 2nd Circuit, you need to prepare a separate Mix Kit. The mix kit must be installed in the main zone.

- Main Zone : zone where the water temperature is lowest when heating.
- Add. Zone : The other zone

[Install Guide 2nd Circuit Heating]

Main Zone / Add. Zone	Floor (35°C)	Convector (FCU, 45 °C)	Radiator (45 °C)	Radiator (55 °C)
Floor (35°C)	O	X	X	X
Convector (FCU, 45 °C)	O	O	O	X
Radiator (45°C)	O	O	O	O
Radiator (55 °C)	O	O	O	O

[Install Guide 2nd Circuit Cooling]

Main Zone / Add. Zone	Floor (18 °C)	Radiator(18 °C)	Convector (FCU, 5 °C)
Floor (18 °C)	O	O	X
Radiator(18 °C)	O	O	X
Convector (FCU, 5 °C)	X	X	O

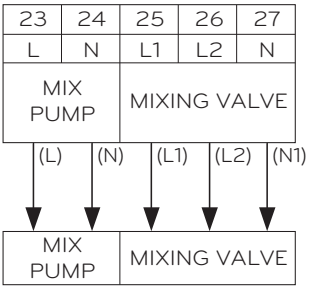
※ To use a floor combination during cooling operation, the flow through the floor of the flow must be blocked by the 2 way valve.

How to Wire 2nd Circuit

Follow below procedures Step 1 ~ Step 2.

Step 1. Uncover front cover of the unit.

Step 2. Find terminal block and connect wire as below



(L) : Live signal from PCB to mix pump

(N) : Neutral signal from PCB to mix pump

(L1) : Live signal (for Normal Closed type) from PCB to mixing valve

(L2) : Live signal (for Normal Open type) from PCB to mixing valve

(N1) Neutral signal from PCB to mixing valve

- For detailed installation instructions, refer to the manual included in the accessories.

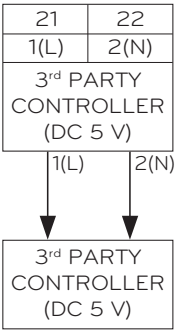
Meter Interface

This product can be used by connecting the meter interface module supplied in the field. The meter interface module can communicate with the wired remote control. The meter interface module lets you know the amount of power generated by the product

- DIP switch setting :
  Set Option DIP switch No. 1 to 'OFF'. Otherwise, the unit can not recognize the meter interface module
- For detailed installation instructions, refer to the manual included in the accessories.

3rd Party Boiler

The product can be used by connecting an Auxiliary boiler. You can control the boiler automatically and manually by comparing the outside temperature and the set temperature. For more information on how to install, please read Chapter 3 (TYPICAL INSTALLATION EXAMPLE Case 5)



1(L) : Live signal from PCB to 3rd Party

2(N) : Neutral signal from PCB 3rd Party

- For detailed installation instructions, refer to the manual included in the accessories.

Central Controller

The product can communicate and control through the central controller. The following functions can be controlled in the central control linked state (Operation/Stop, Desired temperature, Hot water operation / stop, Warm water temperature, Full lock, Etc)

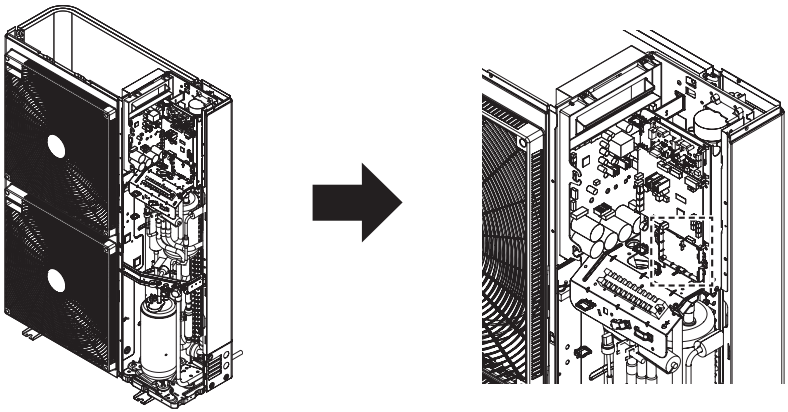
How to Installation PI485

Fix the PI485 PCB as shown in below images.

For detailed installation method refer to PI485 Installation Manual

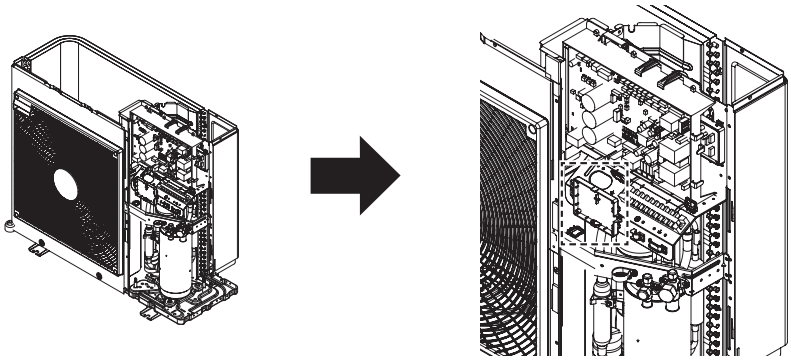
Product Heating Capacity : 12 kW, 14 kW, 16 kW

U3 Chassis



Product Heating Capacity : 5 kW, 7 kW, 9 kW

U4 Chassis



- For detailed installation instructions, refer to the manual included in the accessories.

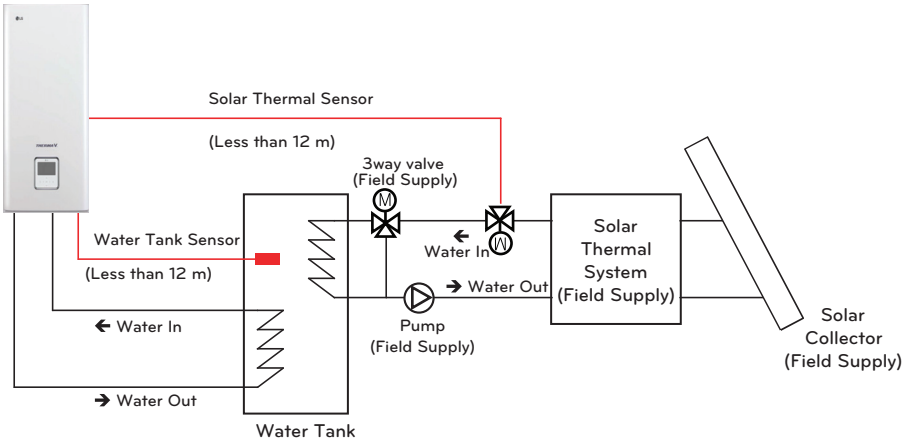
DHW Tank and DHW Tank Kit/Solar Thermal Kit

To establish DHW circuit, 3way valve and DHW tank kit is required. If solar thermal system is pre-installed at the installation field, solar thermal kit is required to interface solar thermal system – to – DHW tank – to – THERMA V.

Installation condition

Installing sanitary water tank requires following considerations :

- Sanitary water tank should be located at the flat place.
- Water quality should be complied with EN 98/83 EC directives.
- As this water tank is sanitary water tank (indirect heat exchange), do not use anti water-freezing treatment like ethylene grycol.
- It is highly recommend to wash out inside of the sanitary water tank after installation. It ensures generating clean hot water.
- Near the sanitary water tank there should be water supply and water drain to easy access and maintenance.
- Set the maximum value of the temperature control device of sanitary tank.



General Information

THERMA V supports following 3way valve.

Type	Power	Operating Mode	Supported
SPDT 3-wire (1)	230 V AC	Selecting "Flow A" between "Flow A" and "Flow B" (2)	Yes
		Selecting "Flow B" between "Flow A" and "Flow B" (3)	Yes

(1) : SPDT = Single Pole Double Throw. Three wires consist of Live1 (for selecting Flow A), Live 2 (for selecting Flow B), and Neutral (for common).

(2) : 'Flow A' means water flow from the unit to under floor water circuit.

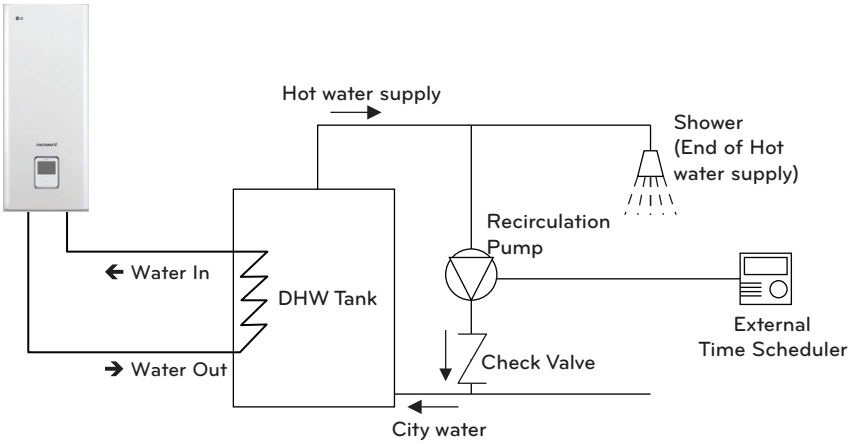
(3) : 'Flow B' means water flow from the unit to DHW tank.

WARNING

Installing recirculation pump

When THERMA V is used with DHW tank, it is STRONGLY recommended to install recirculation pump to prevent flooding out cold water at the end of hot water supply and to stabilize the water temperature inside DHW tank

- The recirculation pump should be operated when DHW demand is not required. Therefore, external time scheduler to determine when the recirculation pump should turn on and turn off is required.
- The operating duration time of the recirculation pump is calculated as follow :
  Duration time [minute] = k x V x R
  k : 1.2 ~ 1.5 is recommended. (If distance between pump and tank is far, then choose high number)
  V : Volume of sanitary water tank [liter]
  R : Water flow rate of pump [liter per minute], which is determined by pump performance curve
- The pump operating start time should be prior to the sanitary water demand.



How to Wire DHW Tank Heater

Step 1. Uncover heater cover of the DHW tank. It is located side of the tank.

Step 2. Find terminal block and connect wires as below. Wires are field-supplied item.

(L) : Live signal from PCB to Heater

(N) : Neutral signal from PCB to Heater

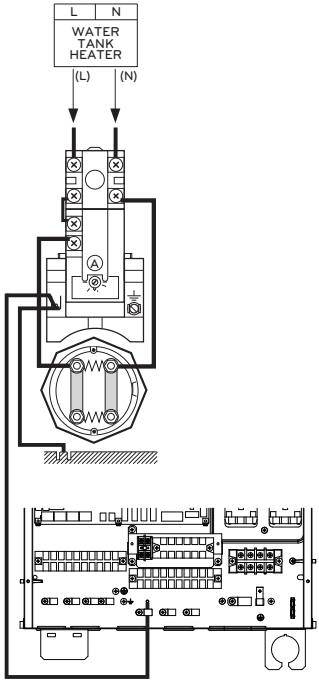
WARNING

Wire specification

- Cross-sectional area of the wire should be 6mm2.

Adjusting thermostat temperature

- To guarantee proper operation, it is recommended to set temperature of thermostat to maximum temperature (symbol at the picture).
- 1Ø Electric Heater Model and 3Ø Electric Heater Model are set by same method as below.



How to install DHW tank kit

Fellow bellow procedures Spet 1 ~ Step 6

Step 1. Find magnetic switch and ELB(MCCB) in the kit. Fit them into the indoor unit control box with enclosed a braket and screws.(symbol Ⓐ at picture)

Step 2. Contact 'CN_B/HEAT(A)'(white connector)of the indoor unit PCB with magnetic switch contact using encolsed cable(symbol Ⓑ at the picture). Connect magnetic switch contactor port no. A1 and A2.

Step 3. Connect magnetic switch contactor port no.L1 and L3 with ELB(MCCB) port no. 2 and 4(symbol Ⓒ at the picture).

⚠ CAUTION

Check Poarity

- Connect magnetic switch contact port no. L1 to ELB(MCCB) port no.2
- Connect magnetic switch contact port no. L3 to ELB(MCCB) port no.4

Step 4. Connect magnetic switch contactor port no. T1 and T3 with terminal block 1 port 6 and 7(symbol Ⓓ at the picture).

Check Polarity

- Connect magnetic switch contact port no. T1 to terminal block 1 port 6
- Connect magnetic switch contact port no. T3 to terminal block 1 port 7

Step 5. Connect ELB(MCCB) to Terminal Block.

1Ø Electric Heater Model

⟶ Connect ELB(MCCB) port no.1 and 3 with terminal block 3 port 3 and 4(symbol Ⓔ at the picture).

3Ø Electric Heater Model

⟶ Connect ELB(MCCB) port no.1 and 3 with terminal block 3 port 1 and 2 (symbol Ⓔ at the picture).

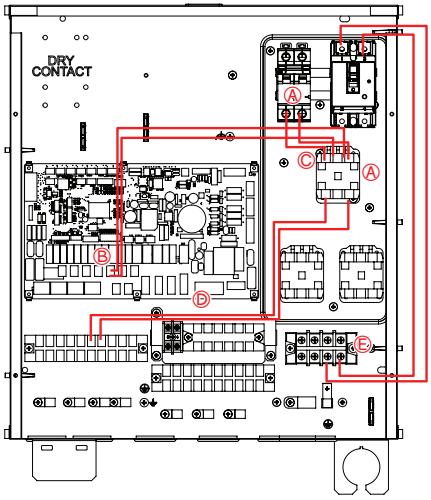
Check Polarity

1Ø Electric Heater Model

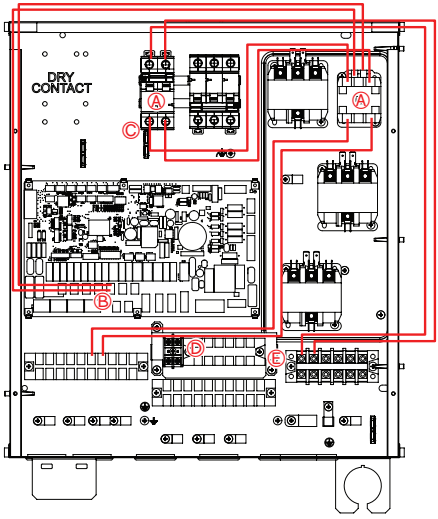
- Connect ELB(MCCB) port no. 1 to terminal block 3 port 3
- Connect ELB(MCCB) port no. 3 to terminal block 3 port 4

3Ø Electric Heater Model

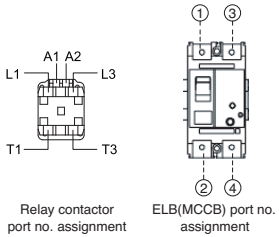
- Connect ELB(MCCB) port no. 1 to terminal block 3 port 1
- Connect ELB(MCCB) port no. 3 to terminal block 3 port 2



1Ø Electric Heater Model



3Ø Electric Heater Model



Relay contactor port no. assignment

ELB(MCCB) port no. assignment

NOTE

Some models are using MCCB instead of ELB

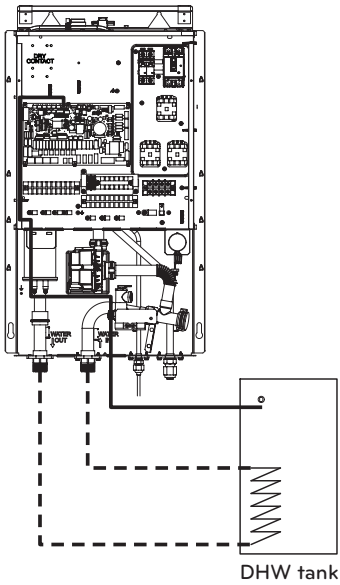
Step 6. Find DHW tank sensor. Connect it to 'CN_TH4' (Red Connector) of the unit PCB (symbol Ⓐ at the picture). The sensor wire should be passed through holes for sensor (symbol Ⓑ and Ⓒ at the picture). The sensor should be mounted correctly to the sensor hole of DHW tank.

CAUTION

Sensor mounting

Insert sensor into sensor socket and bolt it tightly.

- Heater Model are mounted by same method as below.



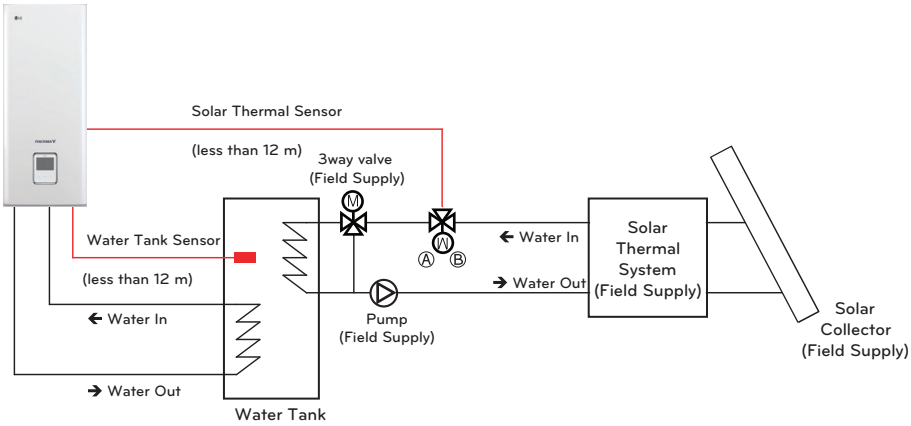
How to Install Solar Thermal Kit

Step 1. Check the diameter of pre-installed pipes. (symbol Ⓐ and Ⓑ)

Step 2. If the diameter of pre-installed pipes is different from diameter of solar thermal kit, it is necessary to reduce or extend of pipe's diameter.

Step 3. After Step 2., connect the pipe and solar thermal kit.

Step 4. Connect solar thermal sensor to 'CN_TH4'(Red connector) of the unit PCB.
If the DHW tank sensor is connected, disconnect the sensor from PCB first.



Dry Contact

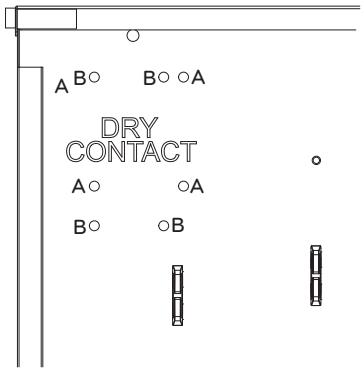
LG Dry Contact is a solution for automatic control of AWHP at the owner's behest. In simple words, it's a switch which can be used to turn the unit On/Off after getting the signal from external sources like key-in lock, door or window switch etc specially used in Hotel rooms.

How to Install Dry Contact

Connect the PCB by inserting the holder in the accessory box as below.

A : PDRYCB300 Model

B : PDRYCB500 Model



NOTE

- For more information about installing Dry Contact, Please refer installation manual provided with Dry Contact.
- For system set-up, please read chapter 8.(Especially function code No.6)

2Way Valve

2way valve is required to control water flow while cooling operation. Role of 2way valve is to cut off water flow into under floor loop in cooling mode when fan coil unit is equipped for cooling operation.

General Information

THERMA V supports following 2way valve.

Type	Power	Operating Mode	Supported
NO 2-wire (1)	230 V AC	Closing water flow	Yes
		Opening water flow	Yes
NC 2-wire (2)	230 V AC	Closing water flow	Yes
		Opening water flow	Yes

(1) : Normal Open type. When electric power is NOT supplied, the valve is open. (When electric power is supplied, the valve is closed.)

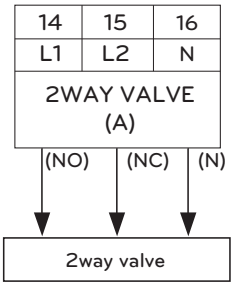
(2) : Normal Closed type. When electric power is NOT supplied, the valve is closed. (When electric power is supplied, the valve is open.)

How to Wire 2Way Valve

Follow below procedures Step 1 ~ Step 2.

Step 1. Uncover front cover of the unit.

Step 2. Find terminal block and connect wire as below.



CAUTION

Dew Condensation

- Wrong wiring can yield dew condensation on the floor. If radiator is connected at the under floor water loop, dew condensation can be occurred on the surface of the radiator.

WARNING

Wiring

- Normal Open type should be connected to wire (NO) and wire (N) for valve opening in cooling mode.
- Normal closed type should be connected to wire (NC) and wire (N) for valve closing in cooling mode.

(NO) : Live signal (for Normal Open type) from PCB to 2way valve

(NC) : Live signal (for Normal Closed type) from PCB to 2way valve

(N) : Neutral signal from PCB to 2way valve

Final Check

- Flow direction :
  - Water should not flow into under floor loop in cooling mode.
  - To verify the flow direction, check temperature at the water inlet of the under floor loop.
  - If correctly wired, this temperatures should not be approached to 6°C in cooling mode.

3Way Valve

3way valve is required to operate sanitary water tank. Role of 3way valve is flow switching between under floor heating loop and water tank heating loop.

General Information

THERMA V. supports following 3way valve.

Type	Power	Operating Mode	Supported
SPDT 3-wire (1)	220-240 V~	Selecting "Flow A" between "Flow A" and "Flow B" (2)	Yes
		Selecting "Flow B" between "Flow A" and "Flow B" (3)	Yes

(1) : SPDT = Single Pole Double Throw. Three wires consist of Live1 (for selecting Flow A), Live 2 (for selecting Flow B), and Neutral (for common).

(2) : Flow A means 'water flow from the unit to under floor water circuit.'

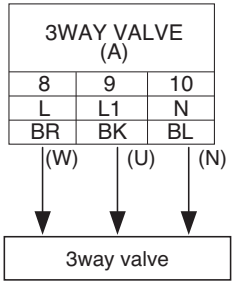
(3) : Flow B means 'water flow from the unit to sanitary water tank.'

How to wire 3way valve

Follow below procedures Step 1 ~ Step 2.

Step 1. Uncover front cover of the unit.

Step 2. Find terminal block and connect wire as below.



WARNING

- 3way valve should select water tank loop when electric power is supplied to wire (W) and wire (N).
- 3way valve should select under floor loop when electric power is supplied to wire (U) and wire (N).

(W) : Live signal (Water tank heating) from PCB to 3way valve

(U) : Live signal (Under floor heating) from PCB to 3way valve

(N) : Neutral signal from PCB to 3way valve

Final check

- Flow direction :
  - Water should flow from water outlet of the unit to sanitary tank water inlet when sanitary tank heating is selected.
  - To verify the flow direction, check temperature at the water outlet of the unit and water inlet of sanitary water tank.
  - If correctly wired, these temperatures should be almost equivalent if thermal insulation of water pipe is well performed.

- Noise or water pipe vibration while 3way valve operation
  - Due to surging effect or cavitation effect, noise or water pipe vibration can be occurred while 3way valve is operating.
  - In that case, check followings :
- Is water circuit (both under floor water loop and sanitary water tank loop) fully charged? If not, additional water charging is required.
- Fast valve operation yields noise and vibration. Appropriated valve operating time is 60~90 seconds.

Air-Vent

- For correct operation of the unit, all air in the system must be exhausted by manual air-vent. (located at pump and PHE output)
  - It is easy to exhaust air during charging water into the system.
- Also, air can be exhausted by additional automatic air-vent.
  (Additional air-vent must be located highest level of water pipe system.)

Final check

No.	Check point	Description
1	Connection of Water Inlet/Outlet	- Check if the shut-off valves should be assembled with Water inlet and outlet pipe of the unit - Check the location of the water inlet/outlet water pipe
2	Hydraulic pressure	- Check the pressure of supplying water by using pressure gage inside the unit - Pressure of Supplying water should be Under 3.0 bar approximately
3	Water pump capacity	- To secure enough water flow rate, do not set water pump capacity as Minimum. - It can lead unexpected flow rate error CH14. (Refer to Chapter 4 'Water Piping and Water Circuit Connection')
4	Transmission line and power source wiring	- Check if Transmission line and power source wiring are separated from each other. - If it is not, electronic noise may occur from the power source.
5	The power cord specifications	- Check the power cord specifications (Refer to Chapter 4 'Connecting Cables')
6	3Way Valve	- Water should flow from Water outlet of the unit to sanitary tank Water inlet when sanitary tank heating is selected. - To verify the flow direction, Make sure that the water outlet temperature of the unit and water inlet temperature of sanitary Water tank are similar
7	2Way Valve	- Water should not flow into under floor loop in cooling mode. - To verify the flow direction, check temperature at the water inlet of the under floor loop. - If correctly wired, this temperatures should not be approached to 6 °C in cooling mode.
8	Air Vent	- Air-vent must be located highest level of Water pipe system - It should be installed at the point which is easy to service. - It takes some times to remove air in the water system if air purge is not performed sufficiently it may occur CH14 error. (refer to Chapter 4 'Water Charging')

CONFIGURATION

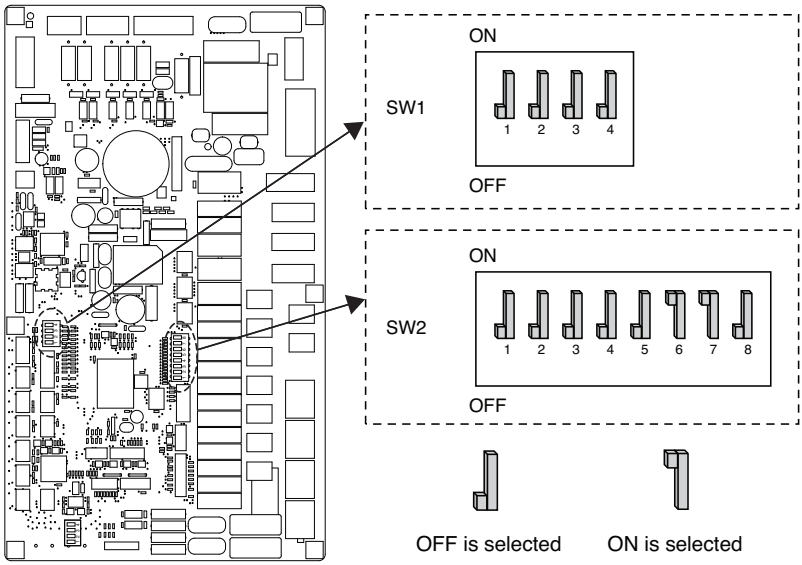
As THERMA V. is designed to satisfy various installation environment, it is important to set up system correctly. If not configured correctly, improper operation or degrade of performance can be expected.

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

Indoor PCB



DIP Switch Information

Description	Setting		Default
Role when central controller is equipped		As Master	
		As Slave	
Accessory installation information		Unit + Outdoor unit is installed	
		Unit + Outdoor unit + DHW tank is installed	
		Unit + Outdoor unit + DHW tank + Solar thermal system is installed	
		DHW tank is installed	
Cycle		Heating Only	
		Heating & Cooling	
Flow Switch Detection		Always	
		While water pump is on	
Selecting electric heater capacity		Electric heater is not used	
		1Ø model : Half capacity is used 3Ø model : 1/3 capacity is used	
		Unused	
		Full capacity is used	
Thermostat installation information		Thermostat is NOT installed	
		Thermostat is installed	

Option Switch 1

Description	Setting		Default
MODBUS	1	As Master	1
	1	As Slave	
MODBUS Function	2	Common 3rd party	2
	2	SIEMENS	
Reserved	3 3	Reserved	3
Reserved	4 4	Reserved	4

NOTE

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 product, Air-to-Water heat pump is generally operation 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 : a problem is found inside the unit. 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 unit PCB.
- Heavy trouble : a problem is found inside the outdoor unit. As the outdoor unit has problem, the emergency mode operation is performed by electric heater located in the unit.
- 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.

• When the AWHP has any trouble,

(1) If there is not a function to judge possibility of operation :

Once an error occurs mainly in indoor unit, AWHP stops. On the other hand, Remocon allows the product to activate On/ Off operation. (On : emergency operation)

- Slight / Heavy trouble : Heating Operable only
- Critical trouble : Full stop
- Treatment priority : Critical>Heavy>Slight

(2) If there is a function to judge possibility of operation :

Depending on the status of slight / heavy / critical trouble, pop-up phrase is guided separately on display.

- Slight trouble : Heating/Cooling Operable
- Heavy trouble : Heating Operable only
- Critical trouble : Service center request

AWHP operates when user pressed OK button on pop-up window.

NOTE

- 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 if DHW sensor and related wiring are all Ok.

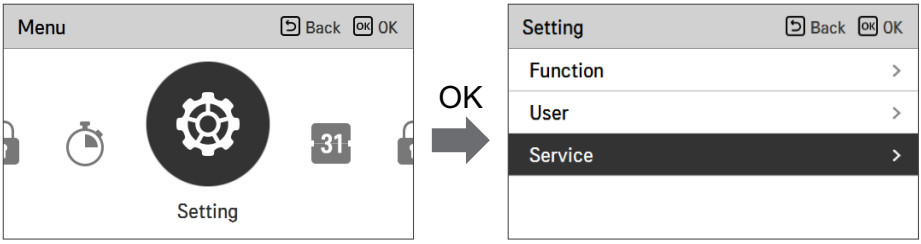
- Emergency operation is not automatically restarted after main electricity power is reset.
  - In normal condition, the product operating information is restored and automatically restarted after main electricity power is reset.
  - But in emergency operation, automatic re-start is prohibited to protect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

SERVICE SETTING

How to enter service setting

To enter the menu displayed at the bottom, you need to enter the service setting menu as follows.

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



Service setting

- You can set the product service functions.
- Some functions may not be displayed/operated in some product types.

Menu	Description
Service contact	Check and input the service center phone number that you can call when there is service issue.
Model information	View product and capacity information
RMC Version Information	Check the remote controller model name and software version.
Open Source License	View the remote controller's open source license.

Service contact

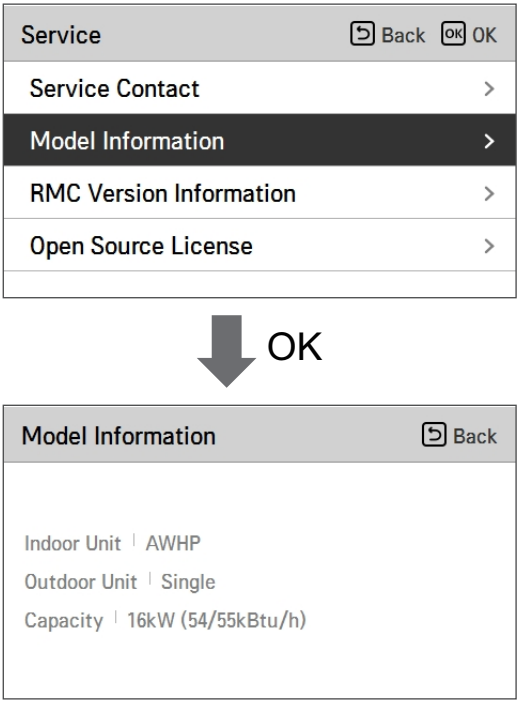
Check and input the service center phone number that you can call when there is service issue.

- In the service setting list, select the service contact point and press [OK] button to move to the detail screen.
- While “edit” button is selected, press [OK] button to move to the edit screen, change it, and press [OK] button to change the service contact point.

Model information

Check product and capacity information to which the remote controller is connected.

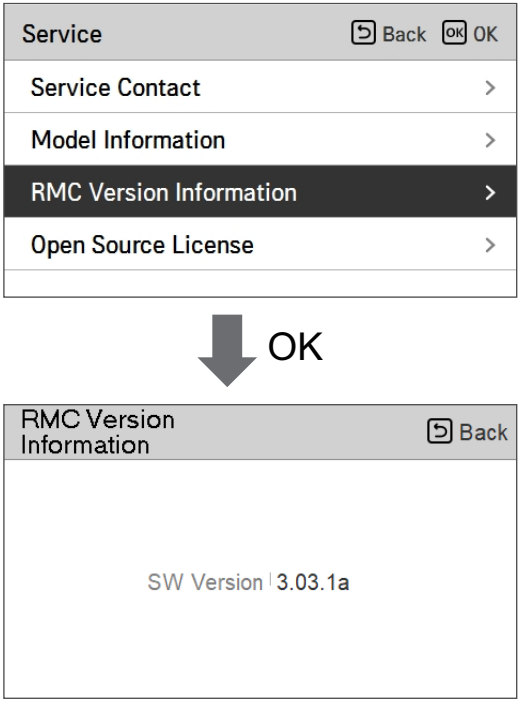
- In the service setting list, select model information category, and press [OK] button to move to the detail screen.
- The unit capacity
  - 1kWh = 1kBtu * 0.29307
    kWh is the result calculated based on Btu, There may be a small difference between calculated and actual capacity.
    Ex) If the unit capacity is 18kBtu, it is displayed as 5kWh.



RMC version Information

View the remote controller software version.

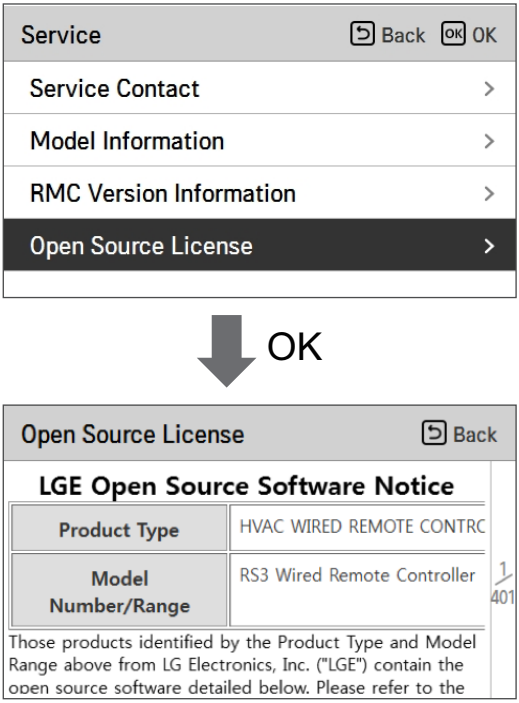
- In the service setting list, select the RMC version information and press [OK] button to move to the detail screen



Open source license

View the remote controller's open source license.

- In the service setting list, select the open source license category, and press [OK] button to move to the detail screen.



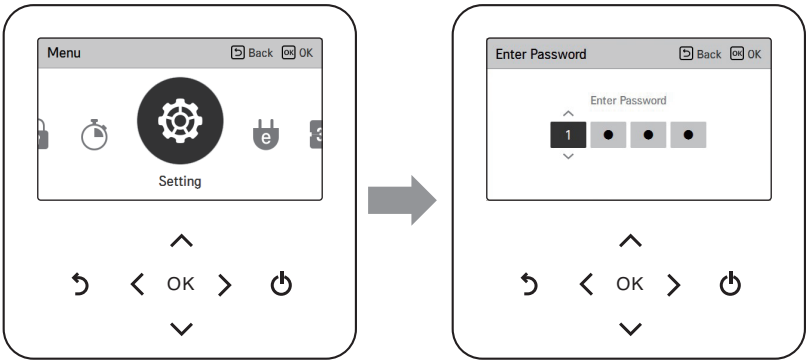
INSTALLER SETTING

How to enter installer setting

CAUTION

The installer setting mode is the mode to set the remote controller's detail function. If the installer setting mode is incorrectly set, it may cause product failure, user's injury, or property damage. It must be set by the installation specialist with the installation license, and if it is installed or changed without installation license, all problems caused will be the responsibility of the installer, and may void the LG warrenty.

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



※ 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.

NOTE

Some categories of the installer setting menu may not be available depending on the product function or the menu name may be different.

Installer setting

- You can set the product user functions.
- Some functions may not be displayed/operated in some product types.

Function	Description
3 Minutes Delay	Factory use only
Select Temperature Sensor	Selection for setting temperature as air temperature or leaving water temperature or air+leaving water temperature
Dry Contact Mode setting	Dry contact function is the function that can be used only when the dry contact devices is separately purchased and installed.
Central Control address	When connecting the central control, set the central control address of the unit.
Pump Test run	Water pump test run
Air cooling set temp. setting	Adjusting range of 'Setting Air Temperature' in cooling mode
Water cooling set temp. setting	Adjusting range of 'Setting Leaving Water Temperature' in cooling mode
Air heating set temp. setting	Adjusting range of 'Setting Air Temperature' in heating mode
Water heating set temp. setting	Adjusting range of 'Setting Heating Flow Temperature' in heating mode
DHW Set Temp.setting	Setting DHW set temperature
Screed drying setting	Setting for using Step 1 or 2 capacity of electric
Heater on temperature	Setting outdoor air temperature where half capacity of electric heater starts operation.
Water supply off temp. during cooling setting	Determine leaving water temperature when the unit is turned off. This function is used for preventing condensation on the floor in cooling 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
TH on/off Variable, heating air setting	Heating air temperature TH On / Off Type setting
TH on/off Variable, heating Water setting	Heating Water Outlet Temperature TH On / Off Type

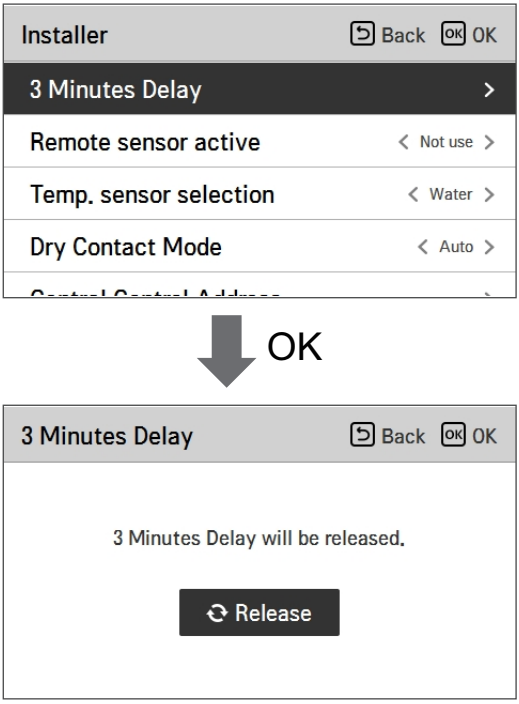
Function	Description
TH on/off Variable, cooling air setting	Cooling air temperature TH On / Off Type setting
TH on/off Variable, cooling Water setting	Cooling Water Outlet Temperature TH On / Off Type
Pump setting in heating	Set water pump on / off delay option in heating mode
Pump setting in cooling	Set water pump on / off delay option in cooling mode
Forced operation	Water pump off After 20 consecutive hours, disable / enable the logic that drives the water pump by itself
CN_CC setting	It is the function to set whether to install (use) Dry Contact. (It is not a function for Dry Contact installation, but it is a function to set the usage of the unit's CN_CC port.)
Pump frequency setting(RPM)	Function to change Water Pump RPM
Smart Grid(SG) setting	Select whether to use or not use the SG Mode function of the product, set the operation option value in SG1 step.
Seasonal auto temp setting	Set the operating temperature in Seasonal Auto mode
Modbus Address	It is function to set the address of the Modbus device that is externally linked to the product. Modbus address setting function is available from indoor unit.
CN_EXT	Function to set external input and output control according to DI / DO set by customer using dry contact port of indoor unit. Determine the use of the contact port (CN_EXT) mounted on the indoor unit PCB
Anti-freezing Temperature	This function prevents the product from freezing.
Add Zone	Install additional valve in product to control additional operation area
Use External Pump	Set up to control an external water pump
3rd Party Boiler	Configuration to control 3rd party boiler
Meter Interface	When installing the meter interface to measure energy / calorie in the product, set unit spec for each port
Pump Prerun/Overrun	Set to reach the optimum flow rate by circulating the heating water with the water pump before heat exchange. After the operation stop, additional water pump is activated to circulate the heating water.
Data logging setting	Display error history of connected unit
Password Initialization setting	It is the function to initialize (0000) the password when you forgot the password set in the remote controller.

3 Minutes Delay

Temporarily eliminates the 3-minute delay function of the outdoor unit Comp

- Factory use only

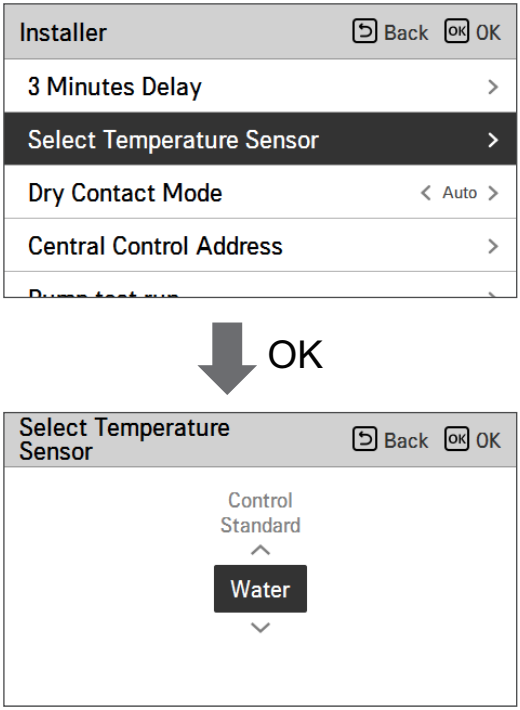
• In the installer setting list, select 3 Minutes Delay category, and press [OK] button to move to the detail screen.



Select Temperature Sensor

The product 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.

- In the installer setting list, Select Temperature Sensor category, and press [OK] button to move to the detail screen.



Value		
Water	Air	Air+Water

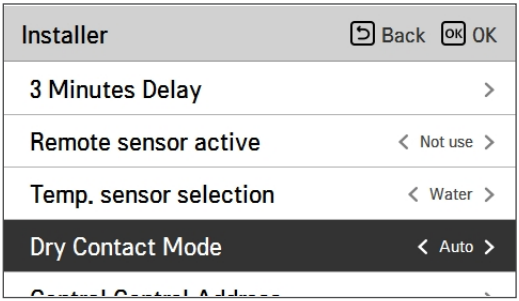
NOTE

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

Dry contact function is the function that can be used only when the dry contact devices is separately purchased and installed.

• Change setting values using [<,>(left/right)] button.



Value
Auto
manual

NOTE

For dry contact mode related detail functions, refer to the individual dry contact manual.

What is dry contact?

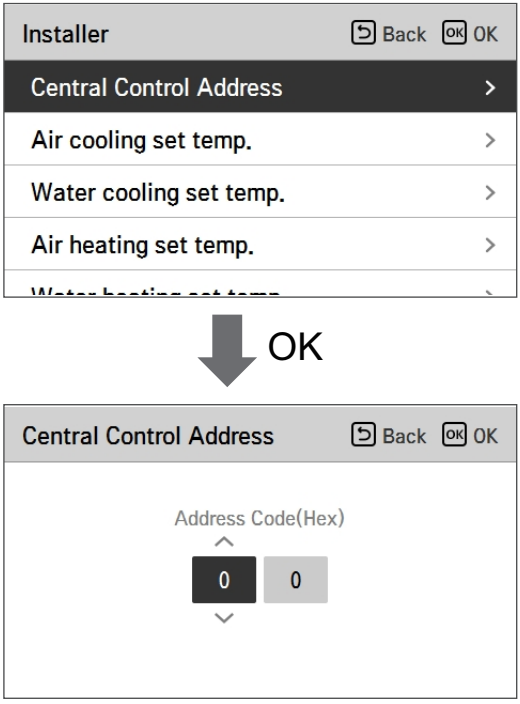
It means the contact point signal input when the hotel card key, human body detection sensor, etc. are interfacing with the air conditioner.

Added system functionality by using external inputs (dry contacts and wet contacts).

Central Control Address

When connecting the central control, set the central control address of the unit.

- In the installer setting list, select Central Control Address category, and press [OK] button to move to the detail screen.



NOTE

Enter address code as hexadecimal value
Front: Central Control Gr. No.
Back side: Central control indoor the number

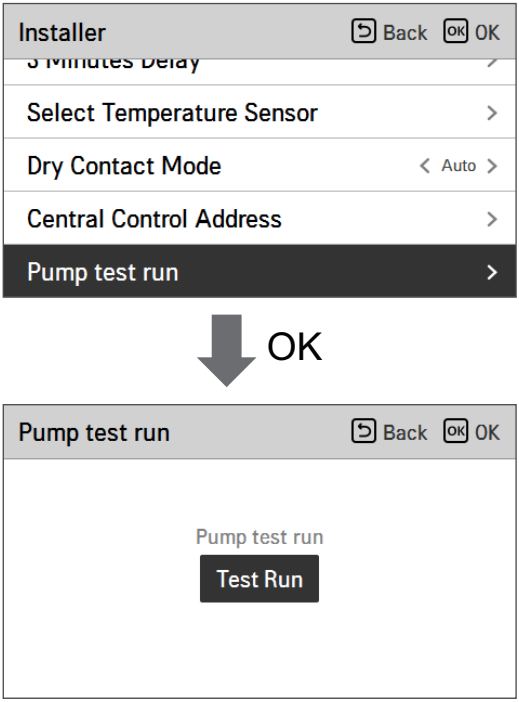
NOTE

This function is not available for monobloc

Pump test run

The pump test run is the function to test run by operating the water pump. This function can be used for air vents / flow sensors and others.

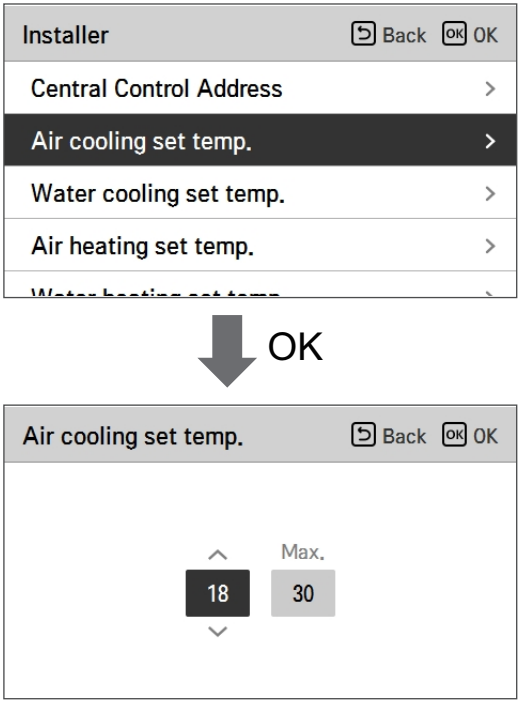
- In the installer setting list, Pump Test run category, and press [OK] button to move to the detail screen.



Air cooling set temp.

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

- In the installer setting list, select Air cooling set temp category, and press [OK] button to move to the detail screen.



Value	Default	Range
Max.	30	30~24
Min.	18	22~16

* Upper / lower limit / default value is in °C

NOTE

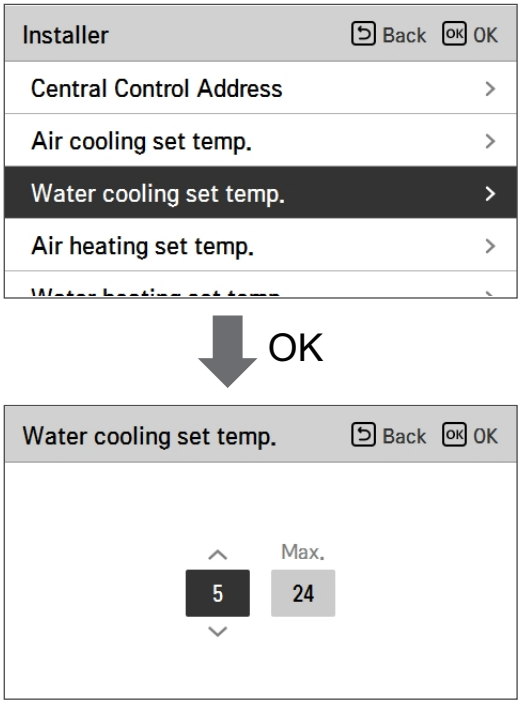
Only available when remote air temperature sensor is connected.

- 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.

- In the installer setting list, select water cooling set temp category, and press [OK] button to move to the detail screen.



Value	Default	Range
Max.	24	27~22
Min.	18	20~5

* Upper / lower limit / default value is in °C

NOTE

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.

NOTE

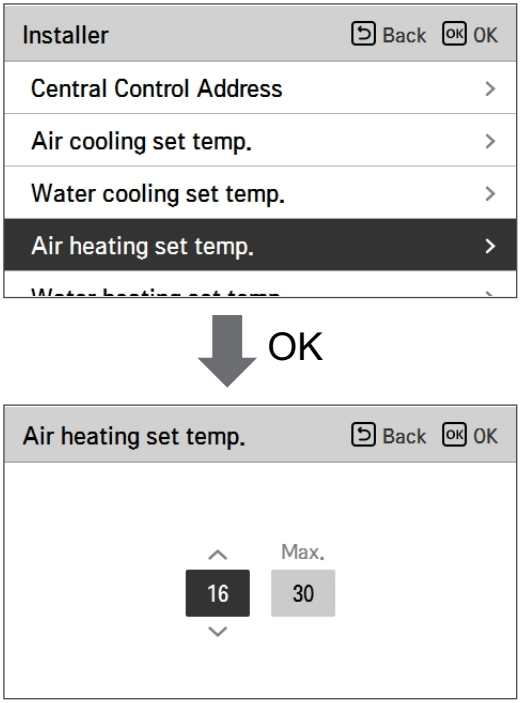
Water condensation on the radiator

- 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

- In the installer setting list, select Air heating set temp. category, and press [OK] button to move to the detail screen.



Value	Default	Range
Max.	30	30~24
Min.	16	22~16

* Upper / lower limit / default value is in °C

⚠ CAUTION

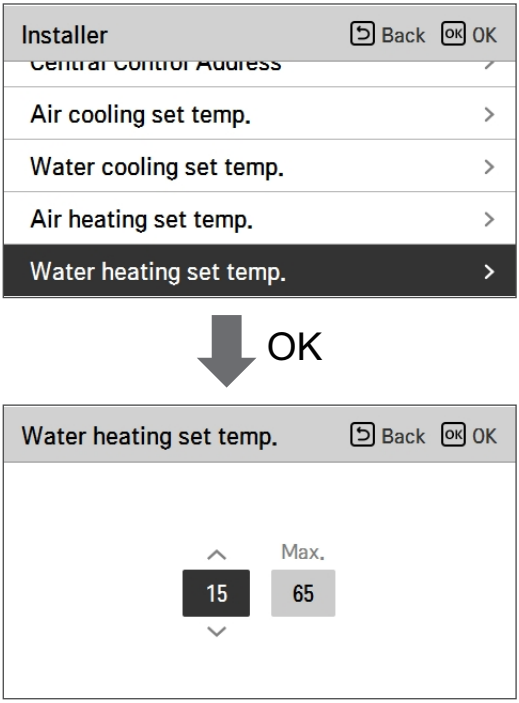
Only available when remote air temperature sensor is connected.

- 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

- In the installer setting list, select Water heating set temp. category, and press [OK] button to move to the detail screen.



Value	Default	Range
Max.	57	57~35
Min.	15	34~15

* Upper / lower limit / default value is in °C

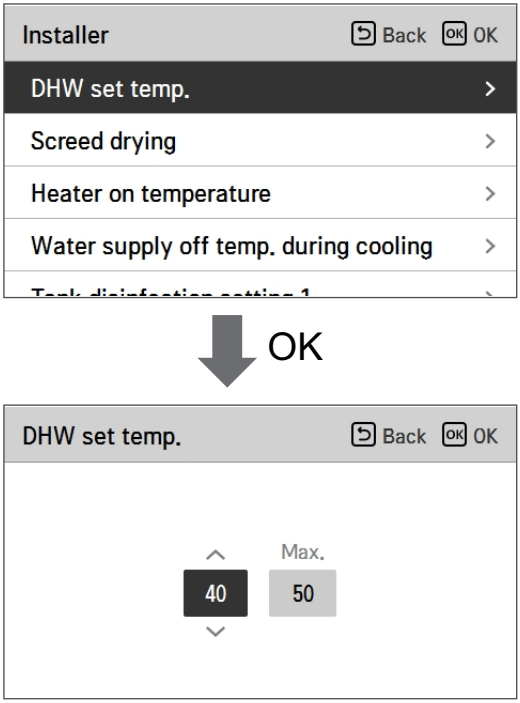
NOTE

- When the E/heater is not used, the minimum temperature of the water temperature can be set from 34 °C to 20 °C

DHW set temp

Determine heating setting temperature range when DHW temperature is selected as setting temperature

- In the installer setting list, select DHW set temp. category, and press [OK] button to move to the detail screen.



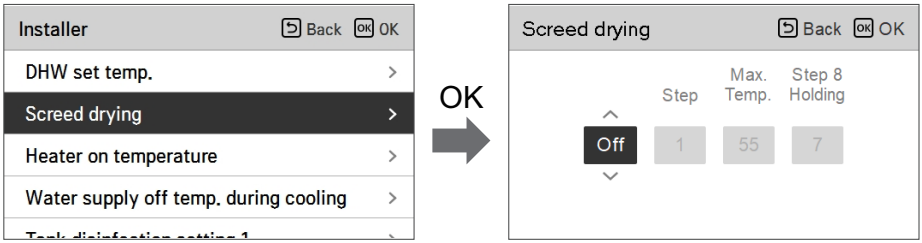
Value	Range
Max.	80~50
Min.	40~30

* Upper / lower limit / default value is in °C

Screed drying

This function is a unique feature of AWHP that, when AWHP is installed in a new concrete structure, controls the specific temperature floor heating out temperature for a certain period of time to cure the floor cement.

- In the installer setting list, select Screed drying category, and press [OK] button to move to the detail screen.



How to display

Main Screen - Displays 'Screed drying' on the desired temperature display. The step in progress at the bottom of the display is displayed.

Setting value

- Start-up step: 1 ~ 11
- Maximum temperature : 35 °C ~ 55 °C
- Step 8 Holding time : 1 days ~ 30 days

Function operation

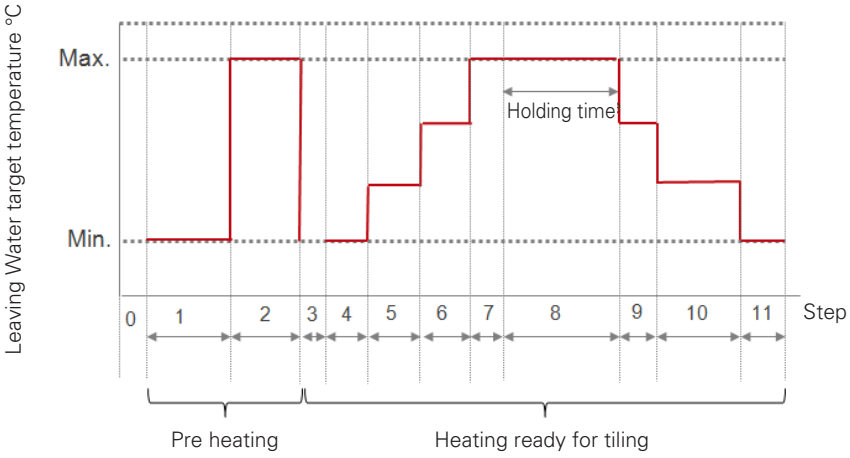
- It is performed by the following procedure from the selected starting step.
- After all steps are completed, turn off the cement curing operation.

Step	1	2	3	4	5	6	7	8	9	10	11
Leaving Water target temperature[°C]	25	Max.T	Off	25	35	45	Max.T	Max.T	45	35	25
Duration [hours]	72	96	72	24	24	24	24	Holding time	72	72	72

※ If the upper limit setting value of the heating LW temperature is 55 °C or lower, it is set to 55 °C forcibly.
If the lower limit setting value of the heating LW temperature is 25 °C or higher, it is set to 25 °C forcibly.

NOTE

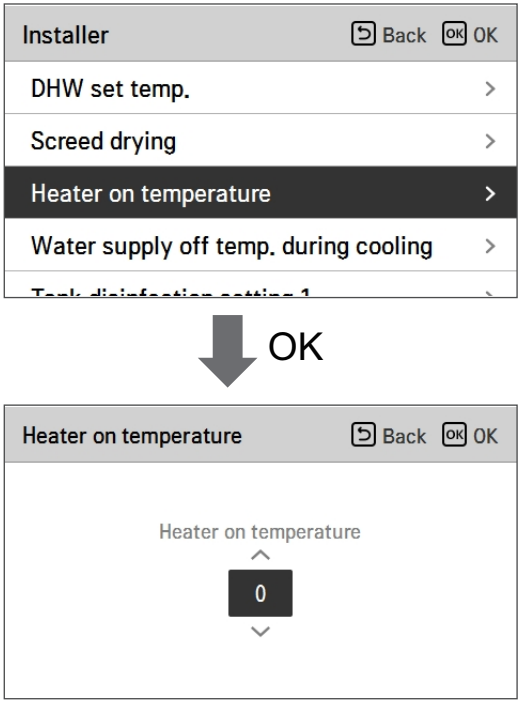
- During Screed drying operation, button input except for installer function and temperature display is restricted.
- When the power is applied again after a power outage during product operation, the product operation state before power failure is remembered and the product is automatically operated.
- Screed drying operation stops when an error occurs / When error is cleared, restart cement Screed drying. (However, if the wired remote control is reset to the error occurrence state, it is compensated in the unit of one day)
- Upon releasing after an error, Screed drying operation may take up to 1 minute of waiting time after boot up. (The Screed drying operation status is judged as 1 minute cycle.)
- During Screed drying operation, installer function Screed drying operation is selectable.
- During Screed drying operation, starting operation, low noise mode off, low noise time setting off, hot water off, solar heat off.
- During Screed drying operation, simple, sleep, on, off, weekly, holiday, heater does not execute reservation operation.



Heater on temperature

Depending on local climatic conditions, it is necessary to change the temperature condition in which electric heater turns on / off.

- In the installer setting list, Heater on temperature category, and press [OK] button to move to the detail screen.



	Default	Range
Split	-5	18~-15
Mono	-5	18~-25

* Upper / lower limit / default value is in °C

NOTE

• Heater on temperature

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

- Example : If Heater on temperature is set as '-1' and DIP switch No 6. and 7 is set as 'OFF-ON', then half 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.

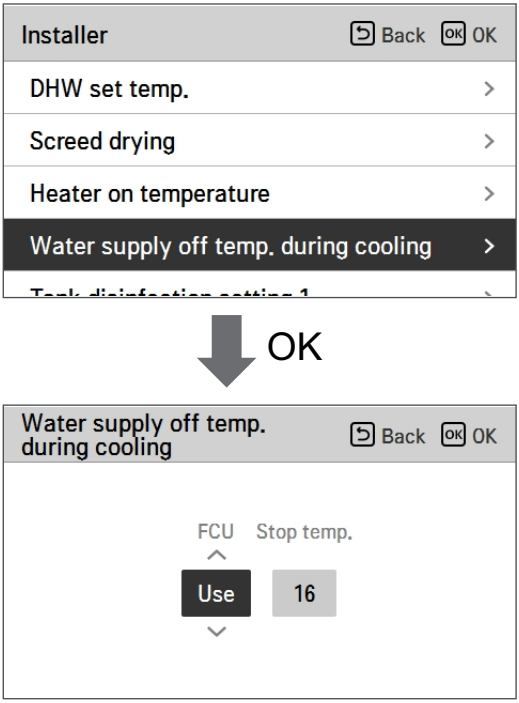
Using Full capacity of electric heater : when DIP Switch No. 6 and 7 is set as 'OFF-OFF' :

- Example : If Heater on temperature is set as '-1' and DIP switch No 6. and 7 is set as 'OFF-OFF', then full 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 for preventing condensation on the floor in cooling mode

- In the installer setting list, select Water supply off temp. during cooling category, and press [OK] button to move to the detail screen.



Function	Value	Default	Setting Rang
cooling water temperature	Water supply off temperature	16	25~16
	FCU Use/ not use	use	Use / Not Use

- 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.

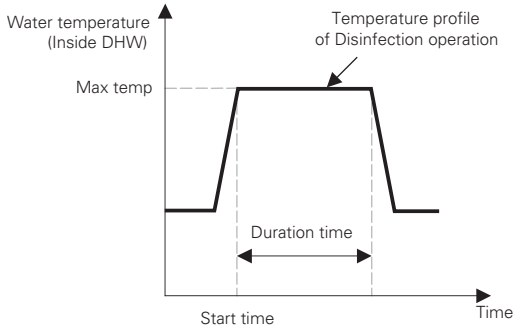
⚠ CAUTION

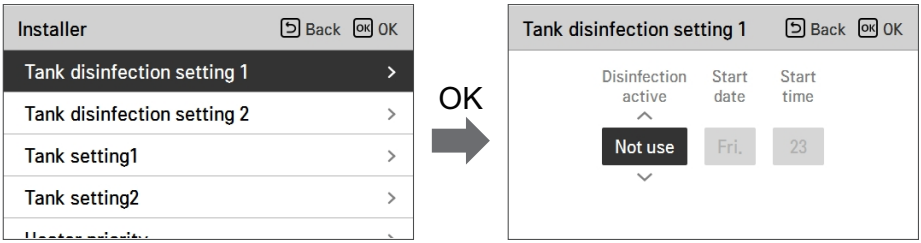
FCU Installation

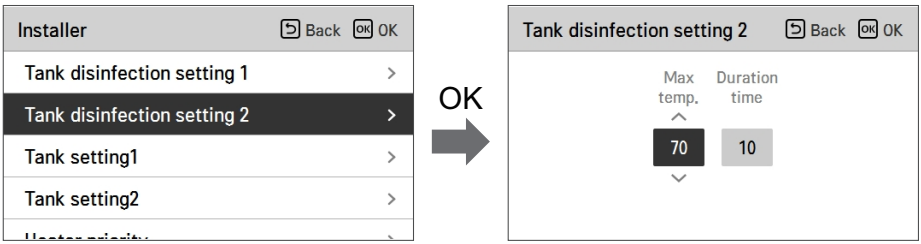
- If FCU is used, related 2way valve should be installed and connected to the unit PCB.
- If FCU is set as 'Not use' but FCU or 2way valve is NOT installed, the unit can do abnormal operation.

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.







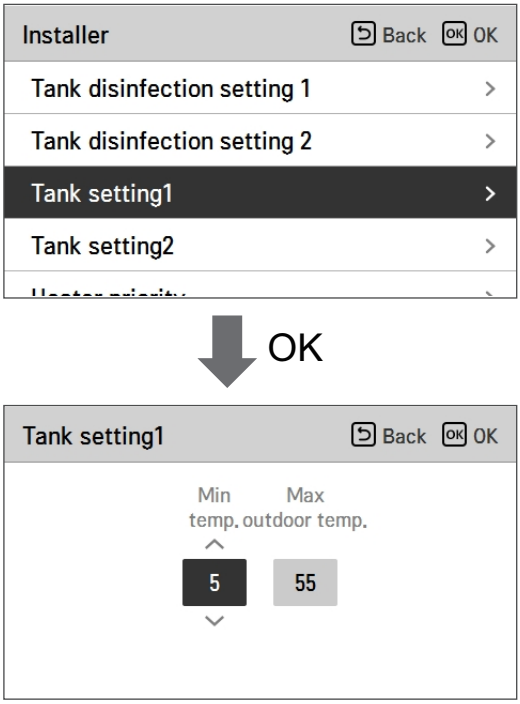
NOTE

DHW heating should be enable

- If Disinfection active is set as ' Not use', that is 'disable disinfection mode', Start date and Start time is not used.

Tank setting 1

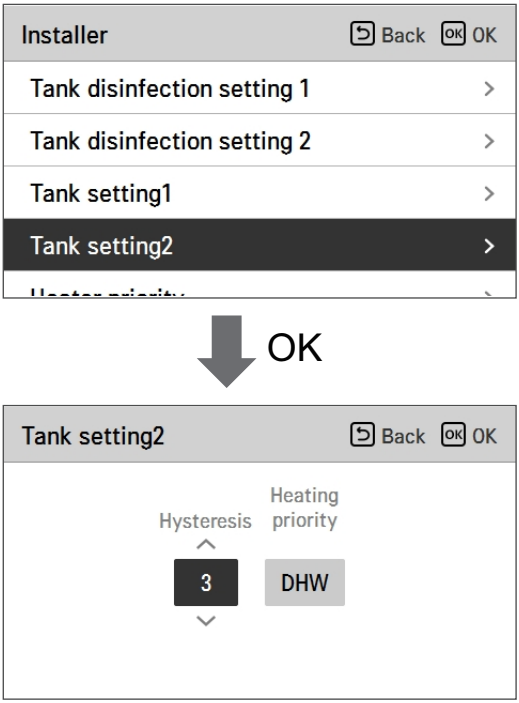
- In the installer setting list, select tank setting 1 category, and press [OK] button to move to the detail screen.



Value	Range
Max outdoor temp	55~40
Min temp	30~1

Tank setting 2

- In the installer setting list, select tank setting 2 category, and press [OK] button to move to the detail screen.



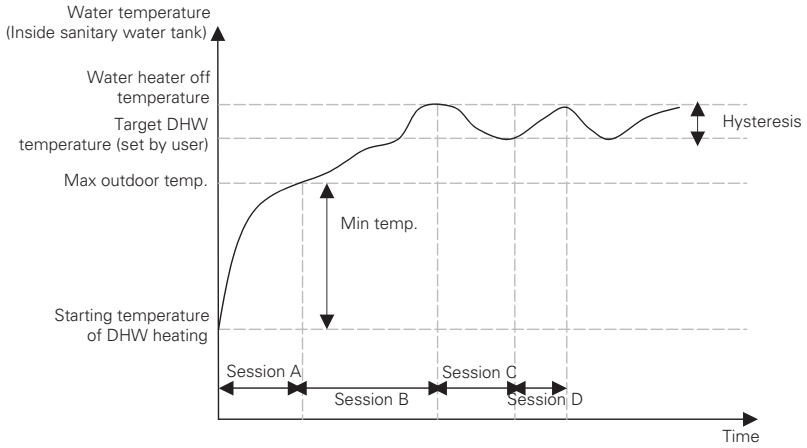
Value	Range
Hysteresis	4~2
Heating priority	Floor heating / DHW

• 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.



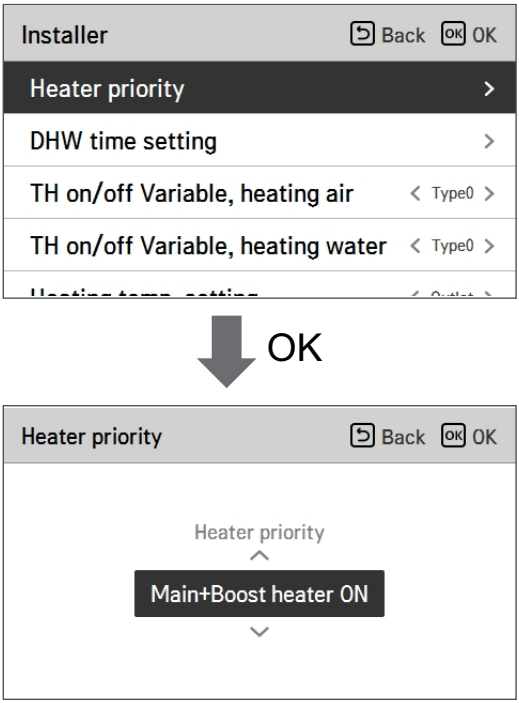
Session A : Heating by AWHP compressor cycle and water heater
Session B : Heating by water heater
Session C : No heating (Water heater is Off)
Session D : Heating by water heater

NOTE

DHW heating does not operate when it is disabled.

Heater priority

- Heater priority : determine electric heater and DHW 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 DHW tank heater is on and off according to control logic.
- In the installer setting list, heater priority category, and press [OK] button to move to the detail screen.

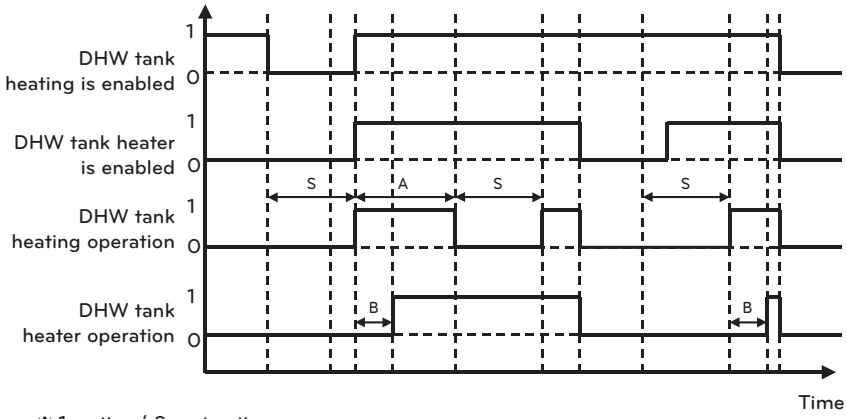


Value	
Boost heater only ON	Main+Boost heater ON

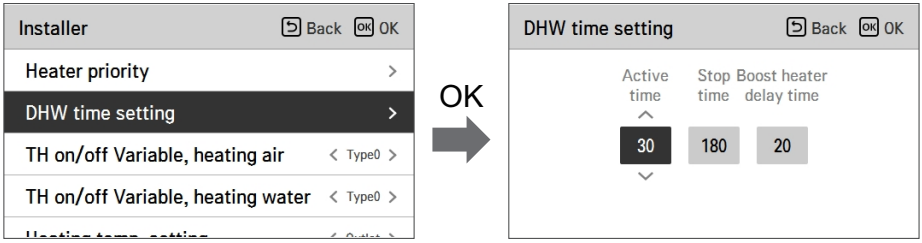
DHW time setting

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 :



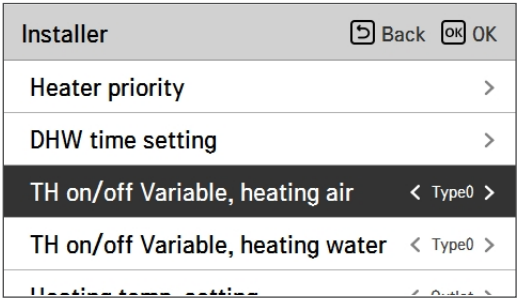
❊ 1=active / 0=not active
❊ A = Active time
❊ S = Stop time
❊ B = Boost heater delay time



TH on/off Variable, heating air

It is a function to adjust the heating air temperature Thermal On / Off temperature according to the field environment in preparation for heating or heating claim.

• You can set the following setting values using [<,>(left/right)] button.

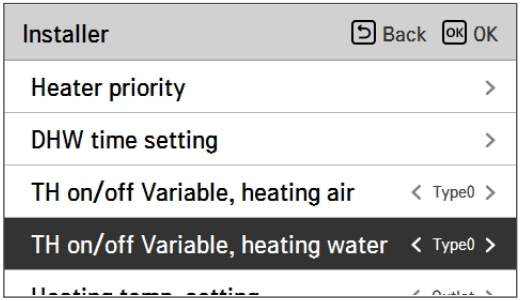


Value	Description	
	TH On	TH Off
Type0	-0.5 °C	1.5 °C
Type1	-1 °C	2 °C
Type2	-2 °C	3 °C
Type3	-3 °C	4 °C

TH on/off Variable, heating water

It is a function to adjust the heating water temperature Thermal On / Off temperature according to the field environment in preparation for heating or heating claim.

• You can set the following setting values using [<,>(left/right)] button.

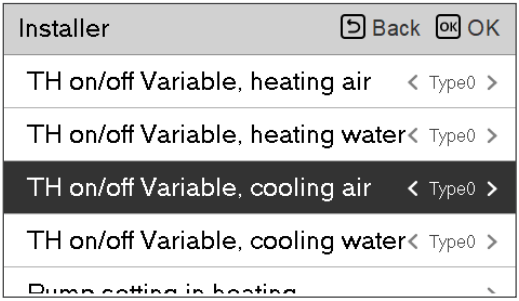


Value	Description	
	TH On	TH Off
Type0	-2 °C	2 °C
Type1	-3 °C	3 °C
Type2	-4 °C	4 °C
Type3	-1 °C	1 °C

TH on/off Variable, cooling air

It is a function to adjust the cooling air temperature Thermal On / Off temperature according to the field environment in preparation for cooling or cooling claim.

• You can set the following setting values using [<,>(left/right)] button.

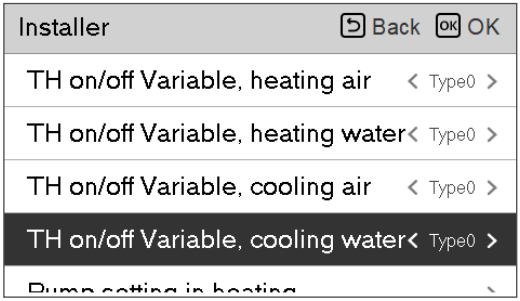


Value	Description	
	TH On	TH Off
Type0	0.5 °C	-0.5 °C
Type1	1 °C	-1 °C
Type2	2 °C	-2 °C
Type3	3 °C	-3 °C

TH on/off Variable, cooling water

It is a function to adjust the cooling water temperature Thermal On / Off temperature according to the field environment in preparation for cooling or cooling claim.

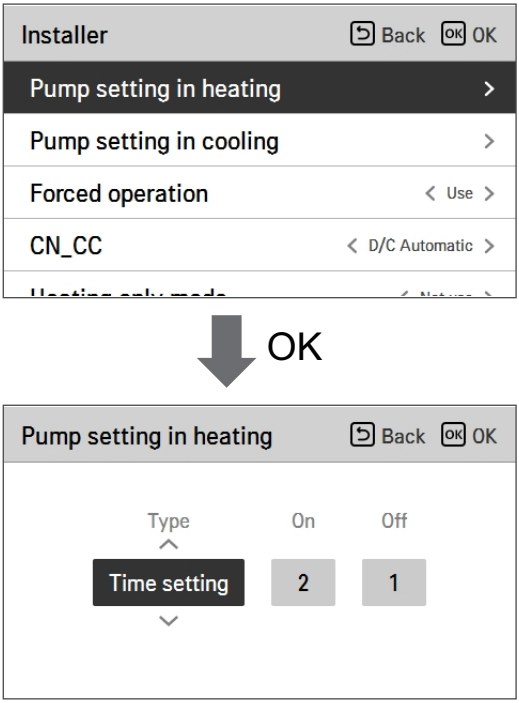
• You can set the following setting values using [<,>(left/right)] button.



Value	Description	
	TH On	TH Off
Type0	0.5 °C	-0.5 °C
Type1	1 °C	-1 °C
Type2	2 °C	-2 °C
Type3	3 °C	-3 °C

Pump setting in heating

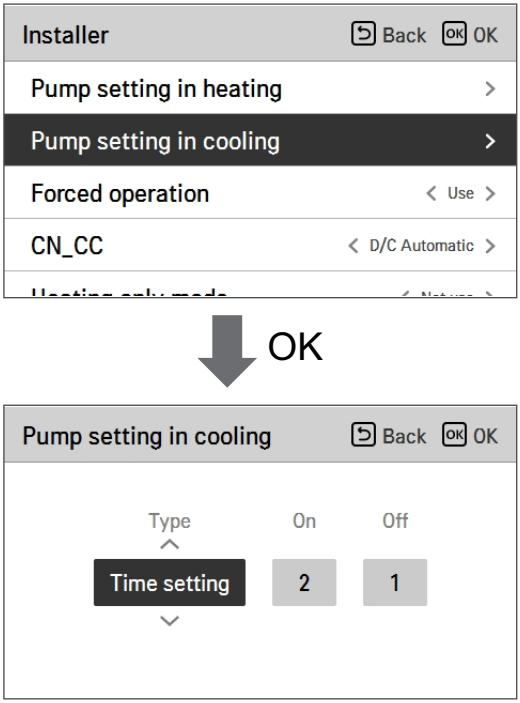
- It is a function to help the water pump's mechanical life by putting the water pump's rest time
- Installer setting function to set water pump operation / delay time option in heating mode
- In the installer setting list, select Pump setting in heating category, and press [OK] button to move to the detail screen.



Type	Time setting	Operation continue
On	1 min ~ 60 min	-
Off	1 min ~ 60 min	-

Pump setting. in cooling

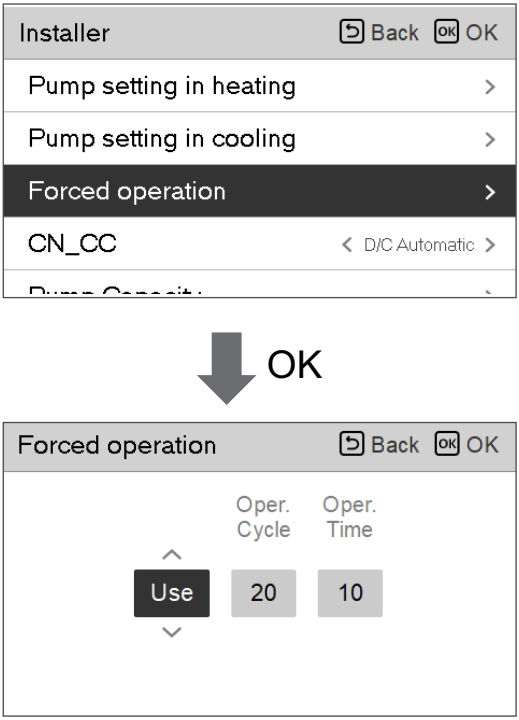
- It is a function to help the water pump's mechanical life by putting the water pump's rest time
- installer setting function to set water pump operation / delay time option in cooling mode
- In the installer setting list, select Pump setting in cooling category, and press [OK] button to move to the detail screen.



Type	Time setting	Operation continue
On	1 min ~ 60 min	-
Off	1 min ~ 60 min	-

Forced operation

- If the product is not used for a long time, the product will be forced to operate to prevent pump failure and PHEX freezing
- Water pump off After 20 consecutive hours, disable / enable the logic that drives the water pump by itself
- In the installer setting list, select Forced operation category, and press [OK] button to move to the detail screen

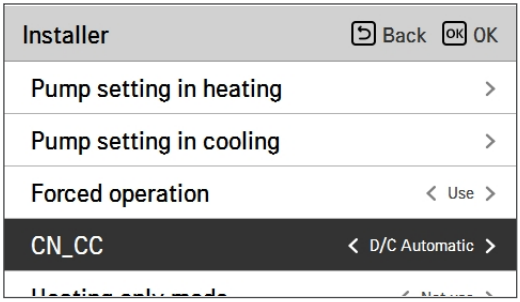


Type	Use	Not use
Oper. Cycle	20 min ~ 180 min	-
Oper. Time	1 min ~ 10 min	-

CN_CC

It is the function to set the usage of the unit's CN_CC port.

• Change setting values using [<,>(left/right)] button



Value	Description
D/C Automatic	When power is applied to the product, the unit when the contact point is on in Dry Contact installed state recognizes Dry Contact installation
D/C Not Installed	Do not use (install) Dry Contact
D/C Installed	Use (install) Dry Contact

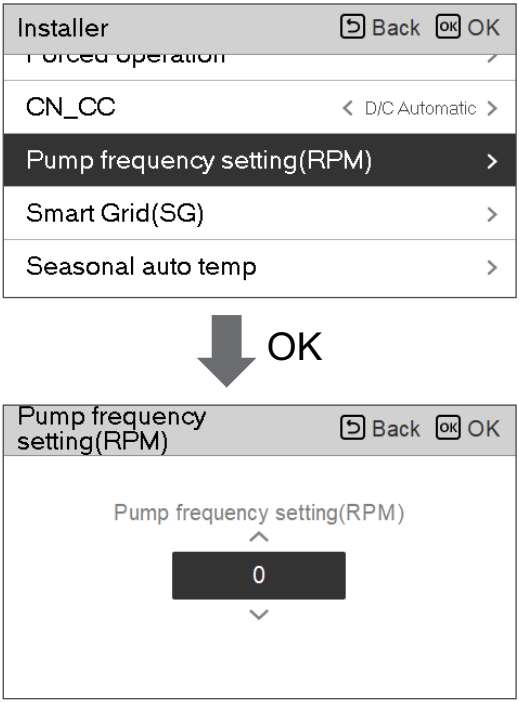
NOTE

CN_CC is the device connected to the unit to recognize and control the external contact point.

Pump frequency setting (RPM)

It is a function to enable installer to control pump RPM of BLDC pump application model.

- In the installer setting list, select Pump frequency setting(RPM) category, and press [OK] button to move to the detail screen.

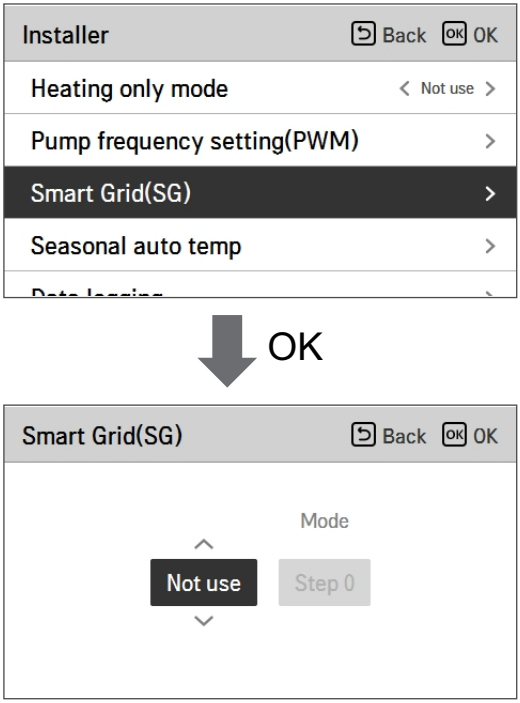


Value	Description
0 (Default)	500~3700 : RPM Change unit : 10

Smart Grid(SG)

It is the function to enable / disable the SG Ready function and to set the reference value at SG2 step.

- In the installer setting list, select Smart Grid(SG) category, and press [OK] button to move to the detail screen.

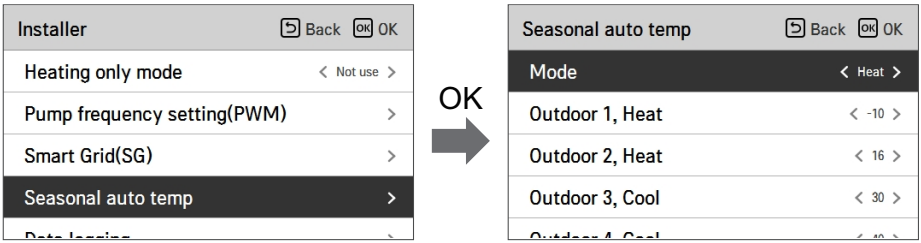


Value	Mode
Not use (Default)	-
Use	Step 0
	Step 1
	Step 2

Seasonal auto temp

It is the function to set the operation reference value in Seasonal Auto mode.

- In the installer setting list, select Seasonal auto temp category, and press [OK] button to move to the detail screen.



Function	Description	Range	Default	Boundary
Outdoor1,Heat (Out1)	Heating lower ambient temp	-25~35 °C	-10°C	Out1 ⟵ Out2-1
Outdoor2,Heat (Out2)	Heating higher ambient temp		16°C	Out2 ⟶ Out1 +1 Out2 ⟵ Out3 -5
Outdoor3,Cool (Out3)	Cooling lower ambient temp	10~46°C	30°C	Out3 ⟶ Out2 +5 Out3 ⟵ Out4 -1
Tank setting 2	Setting maintain temperature for operation		40°C	Out4 ⟶ Out3 +1
Water1,Heat (LW1)	Heating higher water temp	Use heater : LW STD : 15~65°C EW STD : 15~55°C Not use heater : LW STD : 20~65°C EW STD : 20~55°C	35°C	LW1 ⟵ LW2
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		28°C	LW1 ⟵ LW2
Water3,Cool (LW3)	Cooling higher water temp	Use FCU & 5°C IDU : LW STD : 5~27°C EW STD : 10~27°C Use FCU & 6°C IDU : LW STD : 6~27°C EW STD : 11~27°C Not use FCU : LW STD : 16~27°C EW STD : 20~27°C	20°C	LW3 ⟵ LW4
Water4,Cool (LW4)	Cooling lower water temp		16°C	LW3 ⟵ LW4

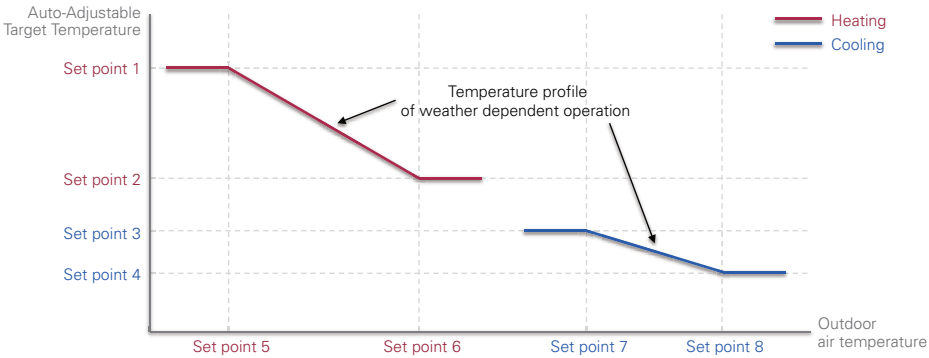
- Setting range: Celsius
- Seasonal Auto Driving mode: Heating, Heating & Cooling, Air-conditioning

* If heating mode is selected, heating & cooling or cooling can not be selected.

- Depending on the air / outflow control selection value, the water / air related setting value is displayed on the screen.

In this mode, setting temperature will follow outdoor temperature automatically. This mode adds the cooling season function to the conventional weather dependent operation mode.

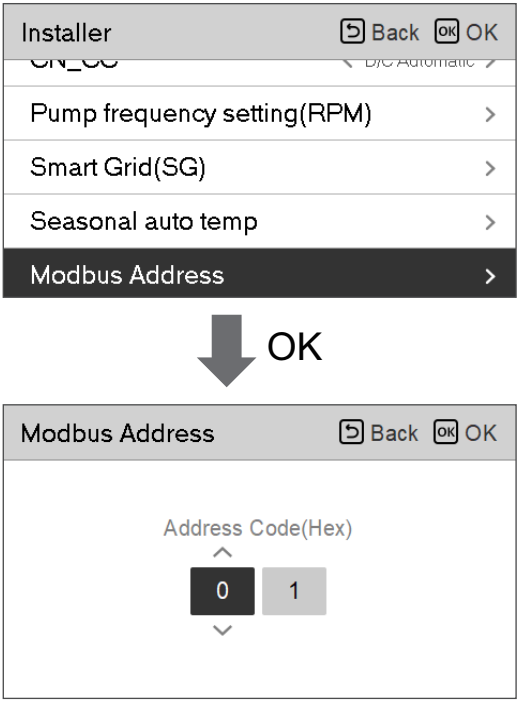
	Auto-Adjustable Target Temp.	Room Air Temp.(°C)	Leaving Water Temp.	Outdoor Air Temp.	
Heating	Set point 1	30~20	57~39	Set point 5	-20 ~ -10
	Set point 2	19~16	38~20	Set point 6	-5 ~ 5
Cooling	Set point 3	30~24	25~17	Set point 7	10 ~ 18
	Set point 4	23~18	16~6	Set point 8	22 ~ 30



Modbus Address

It is function to set the address of the Modbus device that is externally linked to the product. Modbus address setting function is available from indoor unit.

- In the installer setting list, select Modbus Address , and press [OK] button to move to the detail screen.



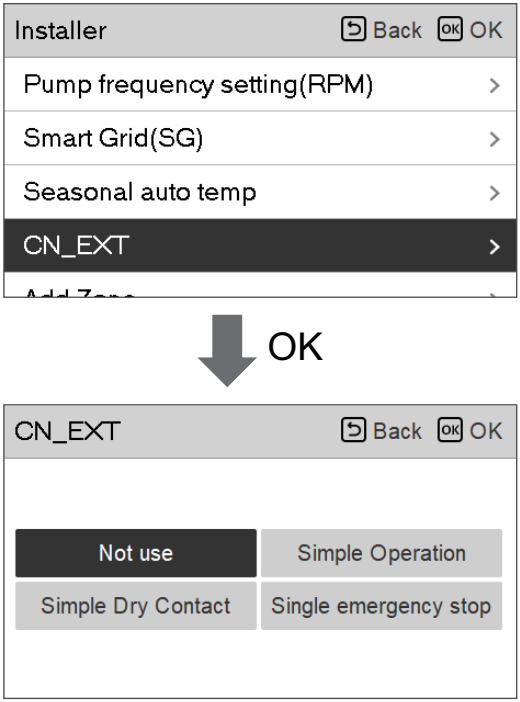
NOTE

To use this function, switch No.1 of option switch 1 must be turned ON.

CN_EXT

It is a function to control external input and output according to DI type set by customer using CN-EXT Port.

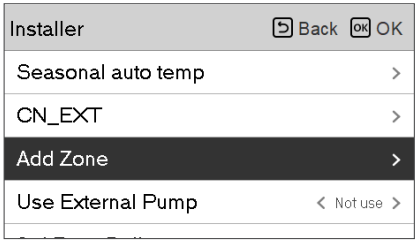
- In the installer setting list, select CN-EXT Port category, and press [OK] button to move to the detail screen.

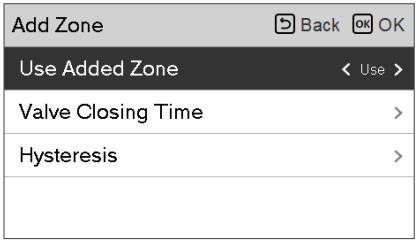


Value			
Not use	Simple Operation	Simple Dry Contact	Single emergency stop

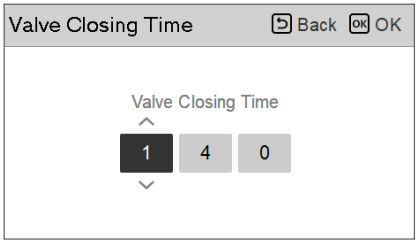
Add Zone

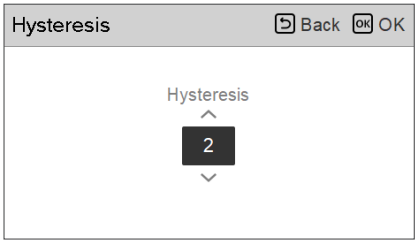
Function to set whether or not to use a installed 2nd circuit function using mixing kit.





You can set valve closing time[sec] and hysteresis temperature[°C] on screen by yourself.





Activating this function, It allows 2 zones(Room1, Room2) temperature to be controlled, separately.

- In case of heating, the temperature of Room1 can not be set higher than Room2 temperature.
- In case of cooling, the temperature of Room1 can not be set lower than Room2 temperature.

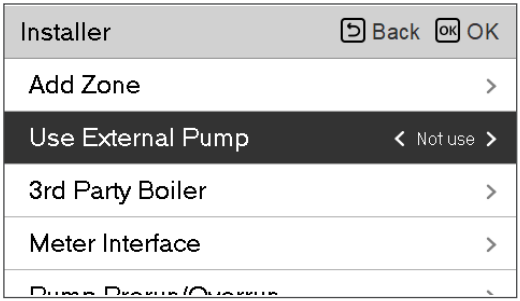
Setting range

- Add Zone (2nd Circuit function setting) : Use / Not Use
- Value Closing Time : 60 ~ 999 sec (Default: 240)
- Hysteresis (Thermal On / Off) : 1 ~ 5 °C (Default: 2)

Use External Pump

This function can be set to control the external water pump.

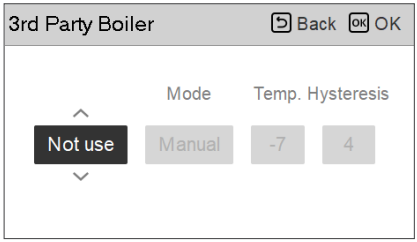
- In the installer setting list, select Use External Pump category, and press [OK] button to move to the detail screen.

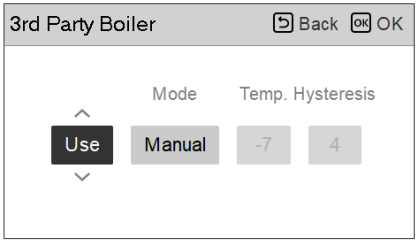


Value	
Not use	Use

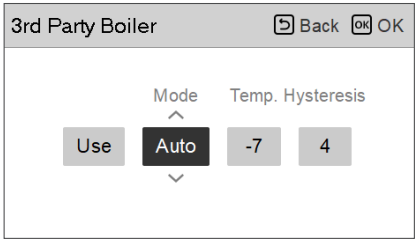
3rd Party Boiler

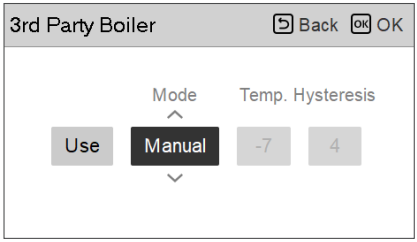
This function is to configure the 3rd party boiler to be controlled.



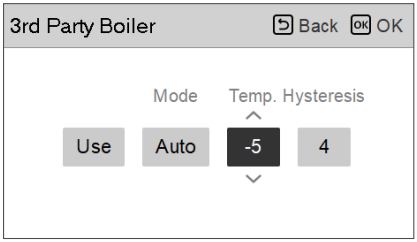


If the status of this function is “Use”, you can choose control mode of boiler, Auto or Manual.





If the mode of this function is set to “Manual”, you can set temperature of the boiler and hysteresis, respectively.



External boiler ON condition :

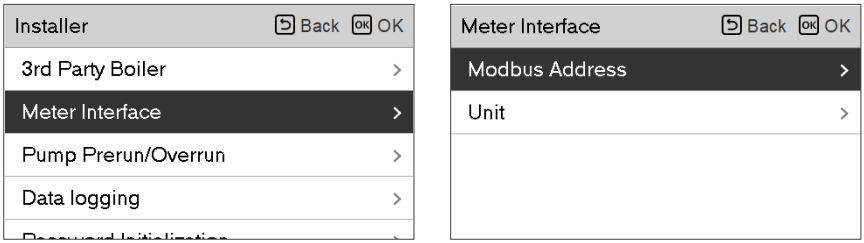
- If outdoor temperature ≤ external boiler operation temperature value (installer setting), turn off the indoor unit and operate the external boiler.

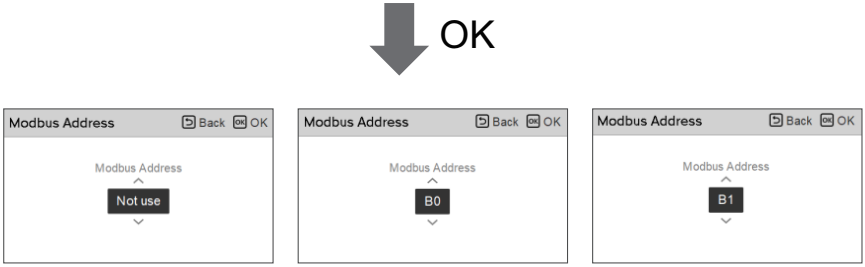
External boiler OFF condition :

- If External air temperature ≥ external boiler operation temperature value (installer setting) + Hysteresis (installer setting), turn off external boiler operation and operate indoor unit

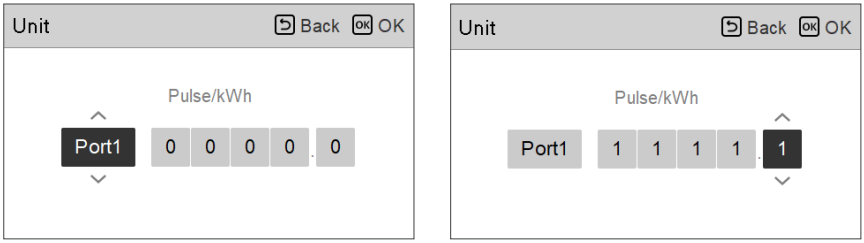
Meter Interface

It is the function that can check the status of energy and power on screen. It collects and calculates power or calorie data to create data for energy monitoring and energy warning alarm pop-ups. This function can be activated in installer mode.





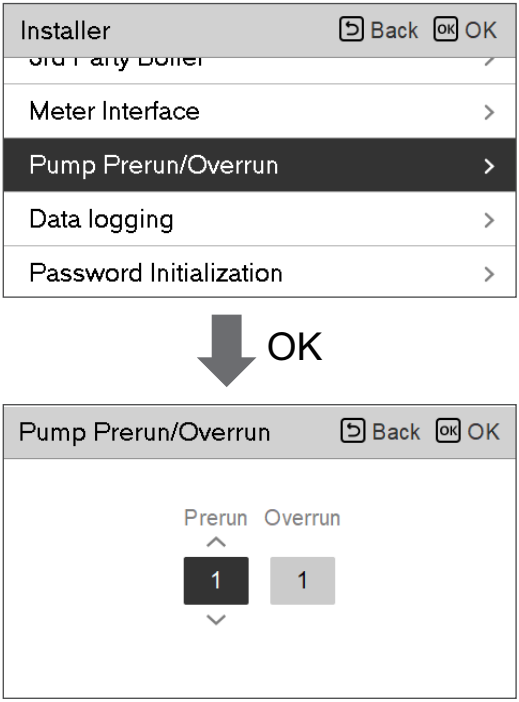
There are 2 options, modbus address and unit, in this function. Activating the modbus address option, you choose one address(B0 or B1) or don't use. Then, you set the port and specification in range of 0000.0~9999.9[pulse/kW] as shown in the figure below.



Pump Prerun/Overrun

Pump Prerun operates to ensure sufficient flow before the compressor is operated. This is a function that allows heat exchange to work smoothly.

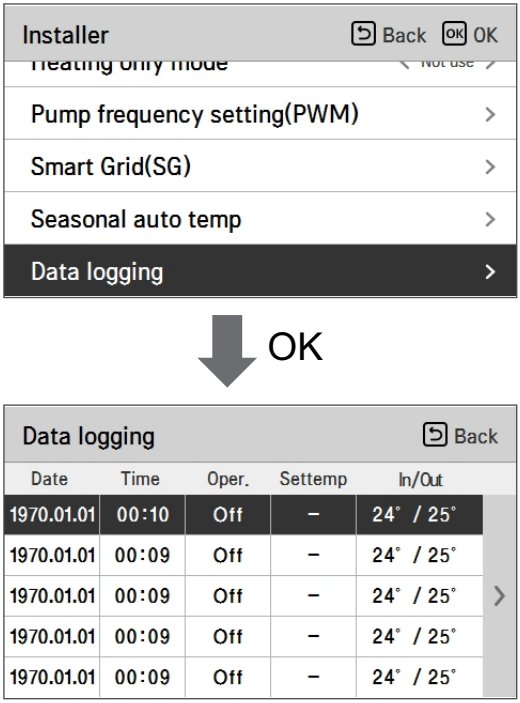
Pump Overrun is a function to prevent water pump failure and to help mechanical life. If the water pump has been off for 20 hours, Water pump will operate for the set time



Data logging

It is the function to set the operation reference value in Seasonal Auto mode.

- In the installer setting list, select Data logging category, and press [OK] button to move to the detail screen.



NOTE

Error history lookup range: 50

Error history information

Item: date, time, mode (including Off), set temperature, incoming temperature, outgoing temperature, room temperature, Hot water operation / stop, Hot water set temperature, Hot water temperature, Outdoor unit On / Off, Error code

Number of Display: Within 50

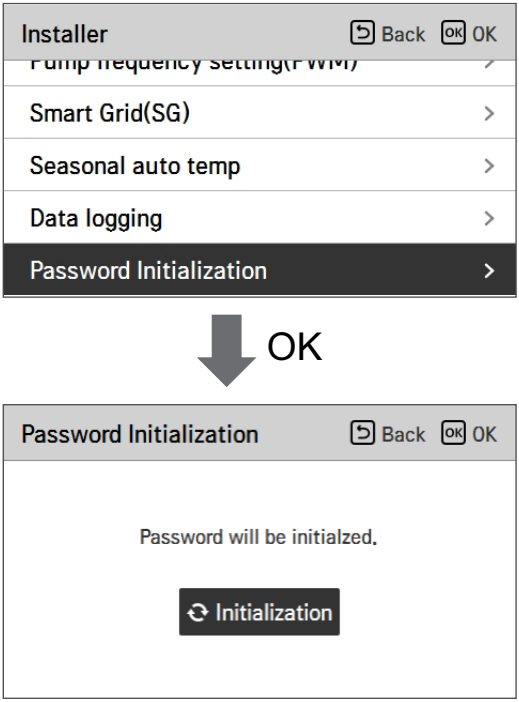
- Save criteria ν

ν Error occurred, released
ON / OFF of outdoor unit operation

Password Initialization

It is the function to initialize (0000) when you forgot the password set in the remote controller.

- In the installer setting list, select the password initialization setting category, and press [OK] button to move to the detail screen.
- When you press “initialization” button, a popup screen appears, and when you press “check” button, password initialization starts, and the user password is changed to 0000.



Power Supply Blockage (SG Ready)

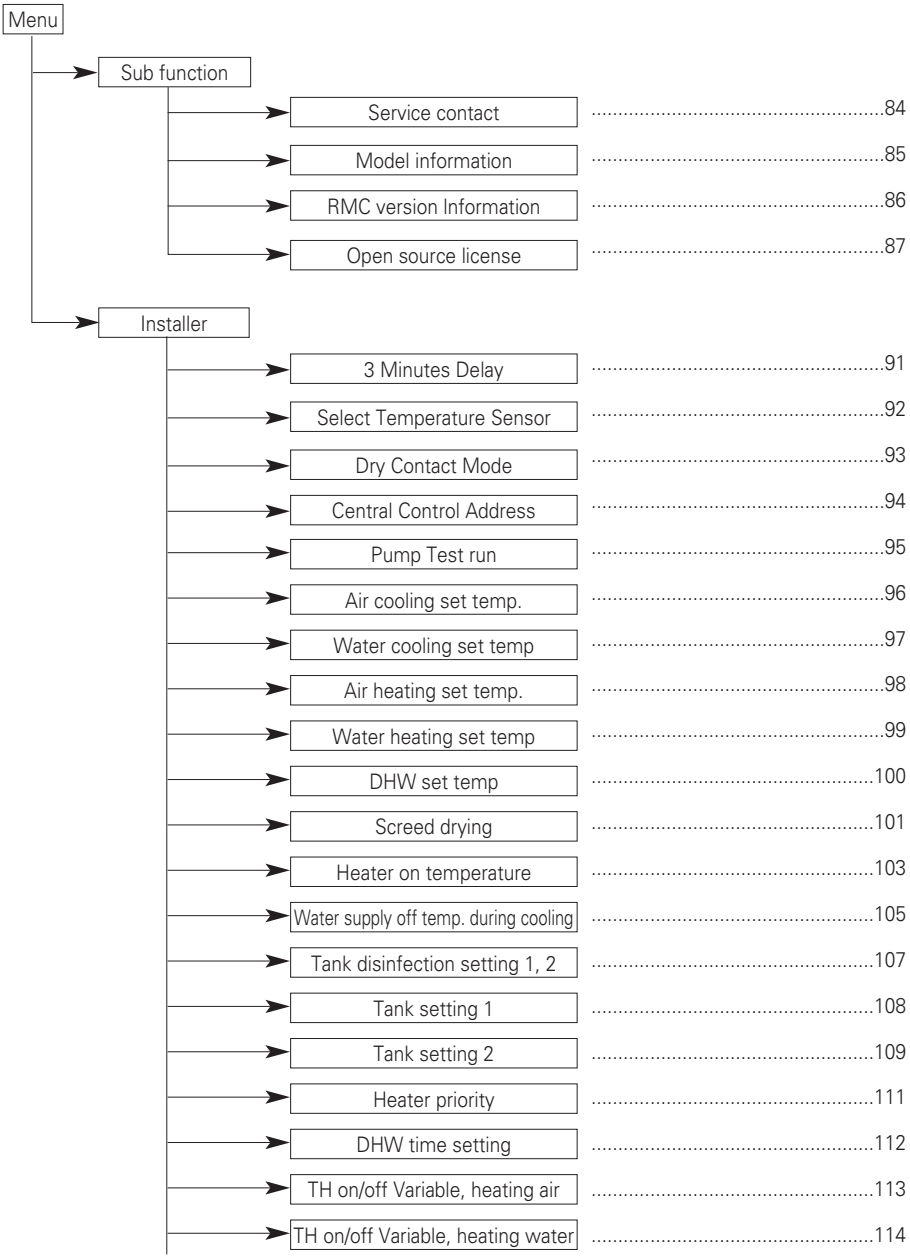
The heat pump operated automatically by the power supply status signals from power supply companies. This function can respond to European countries' special tariff for heat pump using on a smart grid.

4 modes
depending on
power supply status

Power Supply Status	Operating Mode
	**0:0 [Normal Operation]** The heat pump works at maximum efficiency.
	**1:0 [Switch-off command, Utility lock]** Deactivates the heat pump to avoid peak load. The maximum blocking time depends on the system's thermal storage capacity, but amounts to at least 2 hours 3 times a day. (No frost protection)
	**0:1 [Switch-on recommendation]** The switch-on recommendation and set value storage tank temperature is increased, depending on the parameter "Mode SG" Mode SG : set temperature + α depending on the below parameter Step 0 (DHW +5°C) Step 1 (H/P+2°C, DHW +5°C) Step 2 (H/P+5°C, DHW +7°C)
	**1:1[Switch-on command]** The command activates the compressor. Optionally, electrical booster heaters can be activated to utilize electricity surpluses

Overview settings

Menu Structure



COMMISSIONING

If everything is going well until now, it is time to start the operation and to take advantages of THERMA V.

Before starting operation, pre-check points are described in this chapter. Some comments about maintenance and how to do troubleshooting are presented.

Check List before Starting Operation

⚠ CAUTION

Turn off the power before changing wiring or handling product

No	Category	Item	Check Point
1	Electricity	Field wiring	• All switches having contacts for different poles should be wired tightly according to regional or national legislation. • Only qualified person can proceed wiring. • Wiring and local-supplied electric parts should be complied with European and regional regulations. • Wiring should be following the wiring diagram supplied with the product.
2		Protective devices	• Install ELB (earth leakage breaker) with 30mA. • ELB inside the control box of the unit should be turned on before starting operation.
3		Earth wiring	• Earth should be connected. Do not earth to gas or city water pipe, metallic section of a building, surge absorber, etc.
4		Power supply	• Use dedicated power line.
5		Terminal block wiring	• Connections on the terminal block (inside the control box of the unit) should be tightened.
6	Water	Charged water pressure	• After water charging, the pressure gage (in front of the unit) should indicate 2.0~2.5 bar. Do not exceed 3.0 bar.
7		Air purge	• During water charging, air should be taken out through the hole of the air purge. • If water does not splash out when the tip (at the top of the hole) is pressed, then air purging is not completed yet. If well purged, the water will splash out like fountain. • Be careful when testing air purge. Splashed water may make your dress wet.
8		Shut-off valve	• Two shut-off valves (located at the end of water inlet pipe and water outlet pipe of the unit) should be open.
9		By-pass valve	• By-pass valve should be installed and adjusted to secure enough water flow rate. If water flow rate is low, flow switch error (CH14) can be occurred.
10	Product Installation	Hang to the wall	• As the unit is hung on the wall, vibration or noise can be heard if the unit is not fixed tightly. • If the unit is not fixed tightly, it can fall down during operation.
11		Parts inspection	• There should be no apparently damaged parts inside the unit.
12		Refrigerant leakage	• Refrigerant leakage degrades the performance. If leakage found, contact qualified LG air conditioning installation person.
13		Drainage treatment	• While cooling operation, condensed dew can drop down to the bottom of the unit. In this case, prepare drainage treatment (for example, vessel to contain condensed dew) to avoid water drop.

To assure best performance of THERMA V., it is required to perform periodical check and maintenance. It is recommended to proceed following check list for once a year.

⚠ CAUTION

Turn off the power before proceeding maintenance

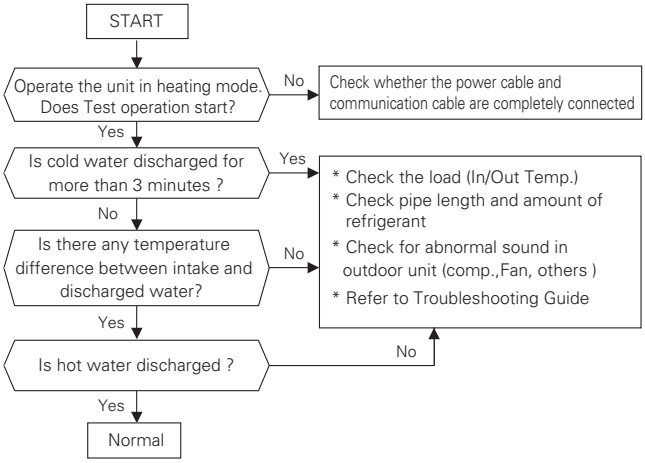
No	Category	Item	Check Point
1	Water	Water pressure	• In normal state, the pressure gage (in front of the unit) should indicate 2.0~2.5 bar. • If the pressure is less than 0.3 bar, please recharge the water.
2		Strainer(Water filter)	• Close the shut-off valves and disassemble strainer. Then wash the strainer to make it clean. • While disassembling the strainer, be careful for water flood out.
3		Safety valve	• Open the switch of the safety valve and check if water is flood out through the drain hose. • After checking, close the safety valve.
4	Electricity	Terminal block wiring	• Look and inspect if there is loosen or defected connection on the terminal block.

Starting Operation

Check before Starting Operation

1	Check to see whether there is any refrigerant leakage, and check whether the power or transmission cable is connected properly.
2	Confirm that 500 V megger shows 2.0 MΩ or more between power supply terminal block and ground. Do not operate in the case of 2.0 MΩ or less. NOTE: Never carry out mega ohm check over terminal control board. Otherwise the control board may break. Immediately after mounting the unit or after leaving it turned off for an extended length of time, the resistance of the insulation between the power supply terminal board and the ground may decrease to approx. 2.0 MΩ as a result of refrigerant accumulation in the internal compressor. If the insulation resistance is less than 2.0 MΩ, turn on the main power supply.
3	When the power is applied for the first time, operate the product after preheating for 2 hours. To protect the unit by increasing the oil temperature of the compressor.

Starting Operation flow chart



Airborne Noise Emission

The A-weighted sound pressure emitted by this product is below 70 dB.

** The noise level can vary depending on the site.

The figures quoted are emission level and are not necessarily safe working levels.

Whilst there is a correlation between the emission and exposure levels, this cannot be used reliably to determine whether or not further precautions are required.

Factor that influence the actual level of exposure of the workforce include the characteristics of the work room and the other sources of noise, i.e. the number of equipment and other adjacent processes and the length of time for which an operator exposed to the noise.

Also, the permissible exposure level can vary from country to country.

This information, however, will enable the user of the equipment to make a better evaluation of the hazard and risk.

Limiting concentration

Limiting concentration is the limit of Freon gas concentration where immediate measures can be taken without hurting human body when refrigerant leaks in the air. The limiting concentration shall be described in the unit of kg/m^3 (Freon gas weight per unit air volume) for facilitating calculation

Limiting concentration : 0.44 kg/m^3(R410A)

■ Calculate refrigerant concentration

$$\text{Refrigerant concentration} = \frac{\text{Total amount of replenished refrigerant in refrigerant facility (kg)}}{\text{Capacity of smallest room where indoor unit is installed } (m^3)}$$

Troubleshooting

If THERMA V operates not properly or it does not start operation, please check following list.

> ⚠ CAUTION
>
> Turn off the power before proceeding troubleshooting

Troubleshooting for Problem while Operation

No	Problem	Reason	Solution
1	Heating or Cooling is not satisfactory.	• Setting target temperature is not proper.	• Set target temperature correctly. • Check if temperature is water-based or air-based. See "Remote sensor active' and 'Temp. sensor selection' in Chapter6.
		• Charged water is not enough.	• Check pressure gage and charge more water until pressure gage is indication 2~2.5 Bar
		• Water flow rate is low.	• Check if strainer gathers too much partices. If so, strainer should be cleaned. • Check if pressure gage indicates above 4 Bar • Check if water pipe is getting closed due to stacked paticles or lime.
2	Although electric power supply is OK (remote controller displays information), the unit does not start working.	• Water inlet temperature is too high.	• If water inlet temperature is above 57 °C, the unit does not operated for the sake of system protection
		• Water inlet temperature is too low.	• If water inlet temperature is below 5 °C in cooling operation, the unit does not operated for the sake of system protection. Wait while unit warms up the water inlet temperature. • If water inlet temperature is below 15 °C in heating operation, the unit does not operated for the sake of system protection. Wait while unit warms up to 18 °C the water inlet temperature. • If you are not using the back up heater accessory (HA**1M E1), increase the water temperature with the external heat source (heater, boiler). If the problem persists, contact your dealer. • If you want to use the screed drying function, be sure to purchase and install back up hater accessories (HA**1M E1).
3	Water pump noise.	• Air purging is not completely finished.	• Open the cap of air purge and charge more water until pressure gage is indicating 2~2.5 Bar • If water does not splash out when the tip(at the top of the hole) is pressed, then air purging is not completed yet. If well purged, the water will splash out like fountain.
		• Water pressure is low.	• Check if pressure gage indicates above 0.3 Bar. • Check if the expanstion tank and pressure gage operates well.
4	Water is flood out through drain hose.	• Too much water is charged.	• Flood out water by opening the switch of the safety valve until pressure gage is indicating 2~2.5 Bar.
		• Expantion tank is damaged.	• Replace the expantion tank
5	DHW is not hot.	• Thermal protector of water tank heater is actived.	• Open the side panel of the DHW tank and push the reset button of the thermal protector. (for more detail information, please refer to intallation manual of DHW tank.
		• DHW Heating is disabled.	• Select DHW Heating Operation and identify if icon is displayed on the remote conrtoller.

Troubleshooting for Error Code

Code No.	Description	Cause	Normal Condition
1	Problem in remote room air sensor	• Incorrect connection between sensor and PCB(Heater). • PCB(Heater) fault • Sensor fault	• Resistance: 10 kΩ at 25 centigrade (unplugged) ⟶ for Remote room air sensor • Resistance: 5 kΩ at 25 centigrade (unplugged) ⟶ for all sensors EXCEPT remote room air sensor • Voltage: 2.5 V DC at 25 centigrade (plugged) (for all sensors) • Refer resistance-temperature table to check in different temperature
2	Problem in refrigerant (inlet side) sensor		
6	Problem in refrigerant (outlet side) sensor		
8	Problem in water tank sensor		
16	Problems in sensors		
17	Problem in water-inlet sensor		
18	Problem in water-outlet sensor		
19	Problem in water-interim sensor		
10	BLDC Water pump Lock	Restriction of BLDC Water pump	• BLDC Water pump defect / assembly condition abnormal • Fan lock by foreign material
3	Bad communication between remote controller and unit.	• Incorrect connection between sensor and PCB(Heater) • PCB(Heater) fault • Sensor fault	• Wire connection between remote controller and Main PCB assembly(Heater) should be tight • Output voltage of PCB should be 12 V DC
5	Bad communication between Main PCB assembly(Heater) and Main PCB assembly(Inverter) of the unit.	• The connector for transmission is disconnected • The connecting wires are misconnected • The communication line is broken • Main PCB assembly(Inverter) is abnormal • Main PCB assembly(Heater) is abnormal	• Wire connection between remote control panel and Main PCB assembly(Heater) should be tight.
53			
9	PCB program (EEPROM) fault	• Electrical or mechanical damage a the EEPROM	• This error can not be permitted
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 assembly(Heater) is set as on	• Flow switch should be closed while internal water pump is working or DIP switch No. 5 of Main PCB assembly(Heater) is set as on • Flow switch should be open while internal water pump is not working
15	Water pipe overheated	• Abnormal operation of electric heater • Leaving water temperature is above 57 °C	• If there is no problem in electric heater control, possible maximum leaving water temperature is 57 °C
20	Thermal fuse is damaged	• Thermal fuse is cut off by abnormal overheating of internal electric heater • Mechanical fault at thermal fuse • Wire is damaged	• This error will not be happened if temperature of electric heater tank is below 80 °C

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
22	Max. C/T	Input Over Current	1. Malfunction of Compressor 2. Blocking of Pipe 3. Low Voltage Input 4. Refrigerant, Pipe length, Blocked...
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
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.
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)
29	Inverter compressor over current	(HM**1M U*3) Inverter Compressor input current is 30A. (HM**3M U*3) 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
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
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
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)

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)
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)
52	PCB Communication Error	Checking the communication state between Main PCB and Inverter PCB	• Generation of noise source interfering with communication
54	Open and Reverse Phase Error	Prevention of phase unbalance and prevention of reverse rotation of constant-rate compressor	Main power wiring fault
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
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
62	Heat sink Temp, High error	Heatsink sensor detected high temp.(85 °C)	1. Part no. : EBR37798101~09 - Check the heatsink sensor: 10k °C / 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

Display code	Title	Cause of error	Check point & Normal condition
73	AC input instant over current error (Matter of software)	(HM**1M U*3) PCB(Inverter) input power current is over 48A(Peak) for 2ms. (HM**3M U*3) 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)

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