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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

MFL68681837
Rev.03_032624

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 ten 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.

* The feature may be vary according to the type of model.

SAFETY INSTRUCTIONS

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

The following safety guidelines are intended to prevent unforeseen risks or damage from unsafe or incorrect operation of the appliance. The guidelines are separated into 'WARNING' and 'CAUTION' as described below.

⚠ This symbol is displayed to indicate matters and operations that can cause risk. Read the part with this symbol carefully and follow the instructions in order to avoid risk.

⚠ WARNING

This indicates that the failure to follow the instructions can cause serious injury or death.

⚠ CAUTION

This indicates that the failure to follow the instructions can cause the minor injury or damage to the product.

⚠ 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 cause product damage.
- Do not touch leaked refrigerant directly.
  - There is risk of frostbite.
- 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.
- 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.
- 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.
- Flexible refrigerant connectors (such as connecting lines between the indoor and outdoor unit) that may be displaced during normal operations shall be protected against mechanical damage.
- Pipe-work shall be protected from physical damage.
- Mechanical connections (mechanical connectors or flared joints) shall be accessible for maintenance purposes.

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.
- 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.
- 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.

Repair

- Detection of flammable refrigerants
  Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks.
  A halide torch (or any other detector using a naked flame) shall not be used.
- Leak detection methods
  The following leak detection methods are deemed acceptable for systems containing flammable refrigerants.
  Electronic leak detectors shall be used to detect flammable refrigerants, but the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used.
  Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed and the appropriate percentage of gas (25 % maximum) is confirmed.
  Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Oxygen free nitrogen(OFN) shall then be purged through the system both before and during the brazing process.

- Removal and evacuation

  When breaking into the refrigerant circuit to make repairs – or for any other purpose - conventional procedures shall be used. However, it is important that best practice is followed since flammability is a consideration.

  The following procedure shall be adhered to:

  - Remove refrigerant
  - Purge the circuit with inert gas
  - Evacuate
  - Purge again with inert gas
  - Open the circuit by cutting or brazing.

  The refrigerant charge shall be recovered into the correct recovery cylinders. The system shall be "flushed" with OFN to render the unit safe.

  This process may need to be repeated several times. Compressed air or oxygen shall not be used for this task. Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum.

  This process shall be repeated until no refrigerant is within the system. When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. This operation is absolutely vital if brazing operations on the pipe-work are to take place. Ensure that the outlet for the vacuum pump is not close to any ignition sources and there is ventilation available.

- Charging procedures

  In addition to conventional charging procedures, the following requirements shall be followed.

  - Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimise the amount of refrigerant contained in them.
  - Cylinders shall be kept upright.
  - Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
  - Label the system when charging is complete (if not already).
  - Extreme care shall be taken not to overfill the refrigeration system. Prior to recharging the system it shall be pressure tested with OFN. The system shall be leak tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

- Recovery

  When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely. When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge are available.
  All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant).
  Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order.
Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.
The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Note arranged.
Do not mix refrigerants in recovery units and especially not in cylinders. If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant.
The evacuation process shall be carried out prior to returning the compressor to the suppliers.
Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

⚠ CAUTION

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.
- Do not install the unit in potentially explosive atmospheres.
- Connect the water for filling or refilling the heating system as specified by EN 1717/EN 61770 to avoid contamination of drinking water by return flow.

Operation

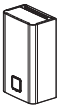
- Do not use the unit for special purposes, such as preserving foods, works of art, etc.
  - There is risk of damage or loss of property.
- Use a soft cloth to clean. Do not use harsh detergents, solvents, etc.
  - There is risk of fire, electric shock, or damage to the plastic parts of the unit.
- Do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

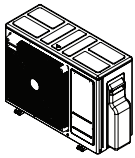
Thank you for choosing LG Electronics Air-to-Water Heat Pump THERMA V.
Before starting installation, please make it sure that all parts are found inside the product box.

INDOOR UNIT BOX

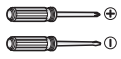
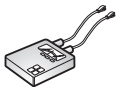
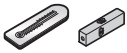
Item	Image	Quantity
Indoor unit		1
Installation Sheet		1

Item	Image	Quantity
Installation Manual		1
Owner's / Installation manual		1

OUTDOOR UNIT BOX

Item	Image	Quantity
Outdoor Unit		1
Drain Cap		5
Drain Nipple		1
Damper		4
Socket (Liquid)		1
Socket (Gas)		1

INSTALLATION TOOLS

Figure	Name	Figure	Name
	Screw driver		Ohmmeter
	Electric drill		Hexagonal wrench
	Measuring tape, Knife		Ammeter
	Hole core drill		Leak detector
	Spanner		Thermometer, Horizontal meter
	Torque wrench		Flaring tool set
	Manifold Gauge		Vacuum Pump
	Pliers	-	-

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.

Energy Labels and Product Fiches for all possible combinations can be found at https://www.lg.com/global/support/cedoc/cedoc. Search for outdoor unit name in cedoc page.

Model Information

Factory Model Name

Outdoor unit

Model	No.						
	1	2	3	4	5	6	7
Split	ZH	U	W	06	6	A	0

	Signification
1	ZH : Air-to-Water-Heat Pump for R32 AH : Air-to-Water-Heat Pump for R410A
2	Classification - U : Outdoor unit of Split
3	Model Type - W : Inverter Heat Pump
4	Heating Capacity - e.g. 06 : 6 kW
5	Electrical ratings - 6 : 1Ø, 220-240V, 50 Hz - 8 : 3Ø, 380-415V, 50 Hz
6	Function - A : General function of Split
7	Series number (Factory)

Indoor unit

Model	No.							
	1	2	3	4	5	6	7	8
Split	ZH	N	W	06	6	03	A	1

	Signification
1	ZH : Air-to-Water-Heat Pump for R32 AH : Air-to-Water-Heat Pump for R410A
2	Classification - N : Indoor unit
3	Model Type - W : Inverter Heat Pump
4	Heating Capacity - e.g. 06 : 6 kW
5	Electrical ratings - 6 : 1Ø, 220-240V, 50 Hz - 8 : 3Ø, 380-415V, 50 Hz
6	Heater Capacity - e.g. 03 : 3 kW Heater
7	Function - A : General function of Split
8	Series number (Factory)

Buyer Model Name

Outdoor unit

Type	Refrigerant	No.								
		1	2	3	4	5	6	7	8	9
Split	R32	H	U	06	1	M	R	·	U2	0

	Signification
1	Air-to-Water Heat Pump
2	Classification - U : Outdoor unit
3	Heating Capacity - e.g. 06 : 6 kW
4	Electrical ratings - 1 : 1Ø, 220-240V, 50 Hz
5	Leaving water combination - M : Medium Temperature
6	Refrigerant - R : R32
8	Chassis - U2 : U24A Chassis
9	Series number (Buyer)

Indoor unit

Type	Refrigerant	No.									
		1	2	3	4	5	6	7	8	9	10
Split	R32	H	N	06	1	3	M	·	·	NK	5

	Signification
1	Air-to-Water Heat Pump
2	Classification - N : Indoor unit
3	Heating Capacity - e.g. 06 : 6 kW
4	Electrical ratings - 1 : 1Ø, 220-240V, 50 Hz
5	Heater capacity (kW) - 3 : 3 kW Heater
6	Leaving water combination - M : Medium Temperature
9	Chassis - NK : K1 Chassis
10	Series number (Buyer) - 0 : 0 Series - 1 : 1 Series

Check the model information based on the buyer model series number.
(e.g., geometry, cycle, etc.)

Related Information

Unit												
Heat Pump											Backup Heater	
Type	Refrigerant	Outdoor Unit			Indoor Unit			Power Supply	Capacity		Capacity [kW]	Power Supply
		Series	Phase	Capacity [kW]	Series	Phase	Capacity [kW]		Heating [kW]*1	Cooling [kW]*2		
Split	R32	0	1Ø	4	5	1Ø	6	220-240 V~50 Hz	4.0	4.0	3 (1.5+1.5)	220-240 V~50 Hz
				6	5				6.0	6.0		

*1 : tested under EN14511
(water temperature 30 °C → 35 °C at outdoor ambient temperature 7 °C / 6 °C)

*2 : tested under EN14511
(water temperature 23 °C → 18 °C at outdoor ambient temperature 35 °C / 24 °C)

※ All appliances were tested at atmospheric pressure.

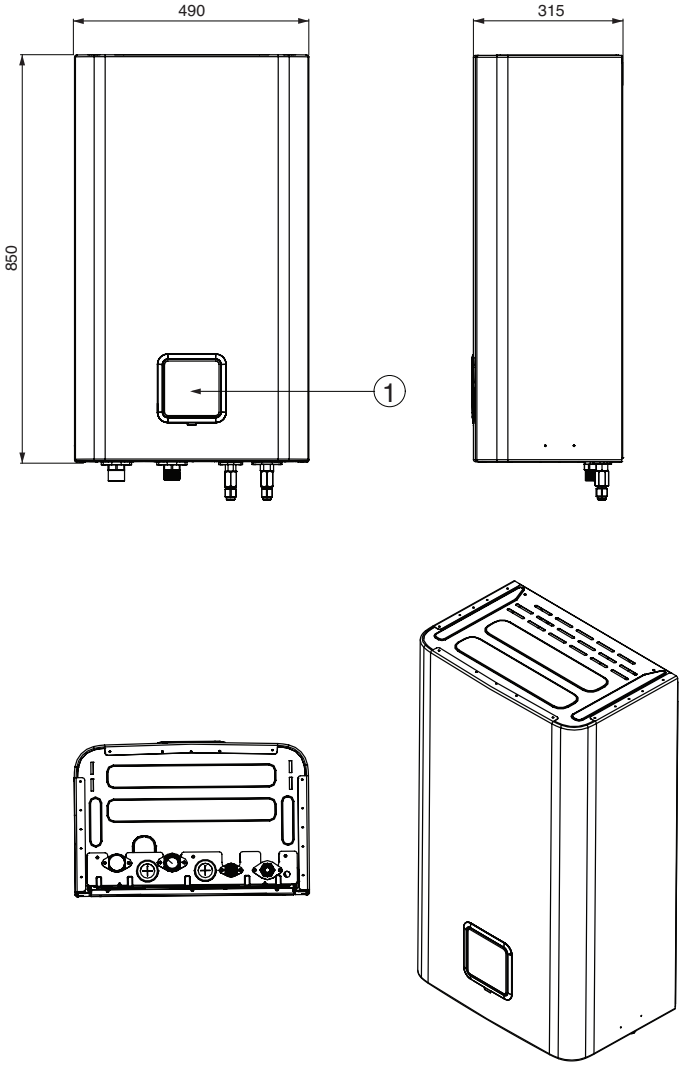
Refrigerant			R32
Max allowable pressure	High side [MPa]		4.32
	Low side [MPa]		2.4
Operating temperature of leaving water (Min. ~ Max.)	Heating [°C]	For Fan coil unit / Radiator	15 ~ 55
		For under floor	15 ~ 55
	Cooling [°C]	For Fan coil unit	5 ~ 27
		For under floor	16 ~ 27
	DHW		15 ~ 80
Inlet water pressure [MPa] (Min. ~ Max.)			0.03 ~ 0.3

- Energy Labels and Product Fiches for all possible combinations can be found at https://www.lg.com/global/support/cedoc/cedoc. Search for outdoor unit name in cedoc page.
- Additional Information : Serial number is refer to the barcode on the product.

Parts and Dimensions

Indoor unit : External

(unit : mm)



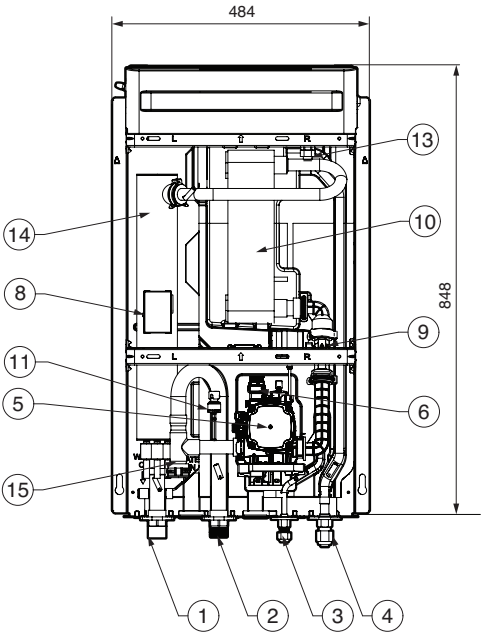
* The feature may be vary according to the type of model.

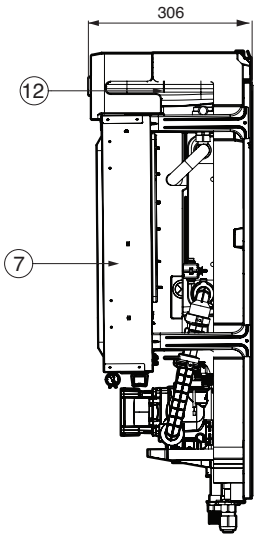
Description

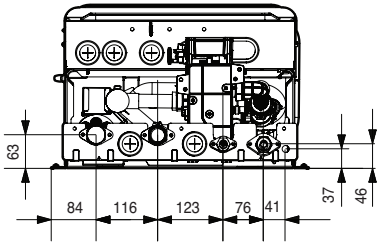
No	Name	Remark
1	Control Panel	Built-in Remote Controller

Indoor unit : Internal

(unit : mm)







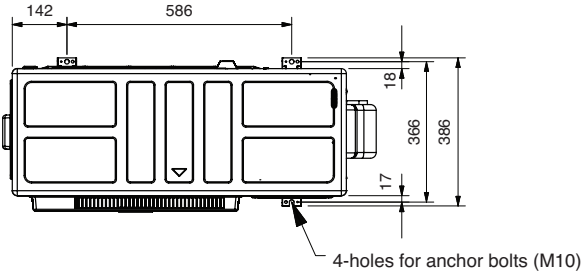
Description

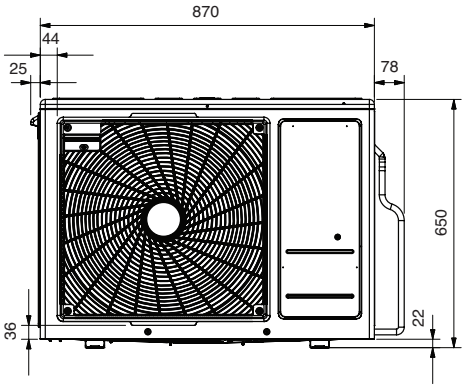
No	Name	Remark
1	Leaving Water Pipe	Male PT 1 inch
2	Entering Water Pipe	Male PT 1 inch
3	Refrigerant Pipe	Ø 6.35 mm
4	Refrigerant Pipe	Ø 12.7 mm
5	Water Pump	Max Head 9.5 / 7 / 6 m
6	Safety Valve	Open at water pressure 3 bar
7	Control Box	PCB and terminal blocks
8	Thermal switch	Cut-off power input to backup heater at 90 °C (manual return at 55 °C)
9	Flow Sensor	Range : 5 ~ 80 L/min
10	Plate Heat Exchanger	Heat exchange between refrigerant and water
11	Pressure Sensor	Detects circulating water pressure
12	Expansion Tank	Absorbing Volume change of heated water
13	Air Vent	Air purging when Charging water
14	Backup heater	Cut-off power input to backup heater at 184 °C (Not Recoverable)
15	Strainer	Filtering and stacking particles inside circulating water

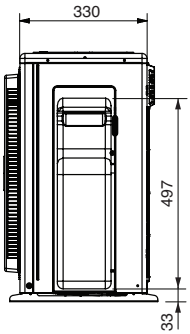
Outdoor unit : External

Chassis : U24A

(unit : mm)

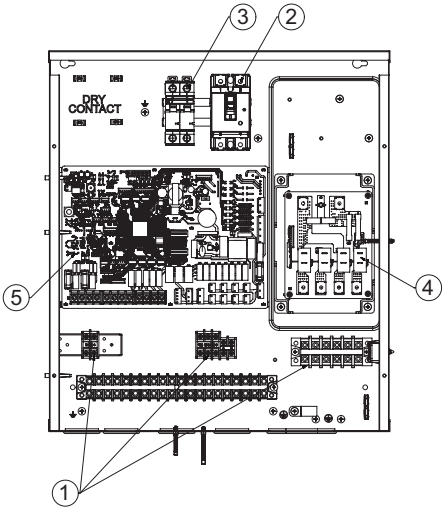






* The feature may be vary according to the type of model.

Control Parts

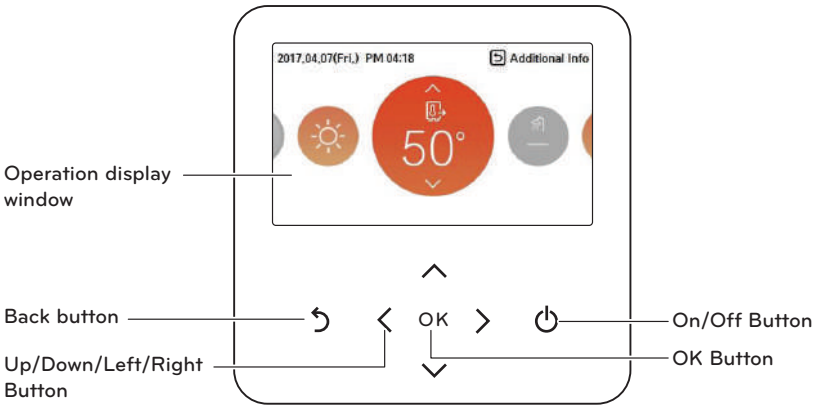


* The feature may be vary according to the type of model.

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	Booster heater ELB (optional)	The ELB protects the booster heater in DHW tank against overload or short circuit
4	Heater PCB (Relay)	Heater PCB(Printed Circuit Board) controls the functioning of the backup heater
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 AWHP

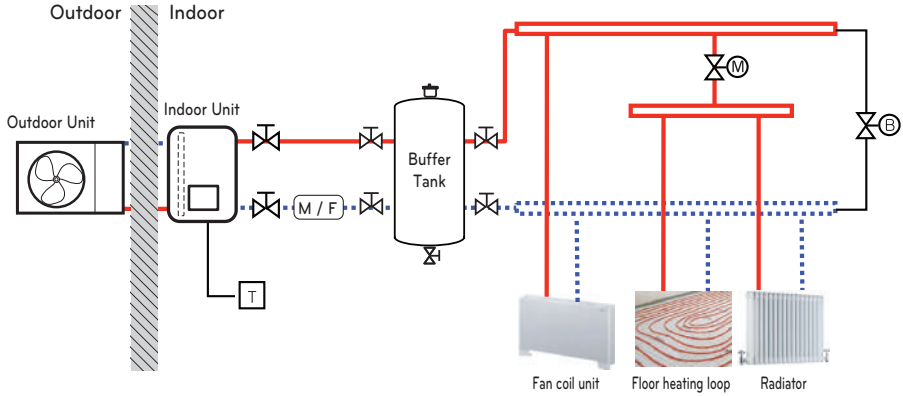
Typical Installation Example

⚠ 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 50 °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.
Note that buffer tank should be installed.

CASE 1: Connecting Heat Emitters for Heating and Cooling

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

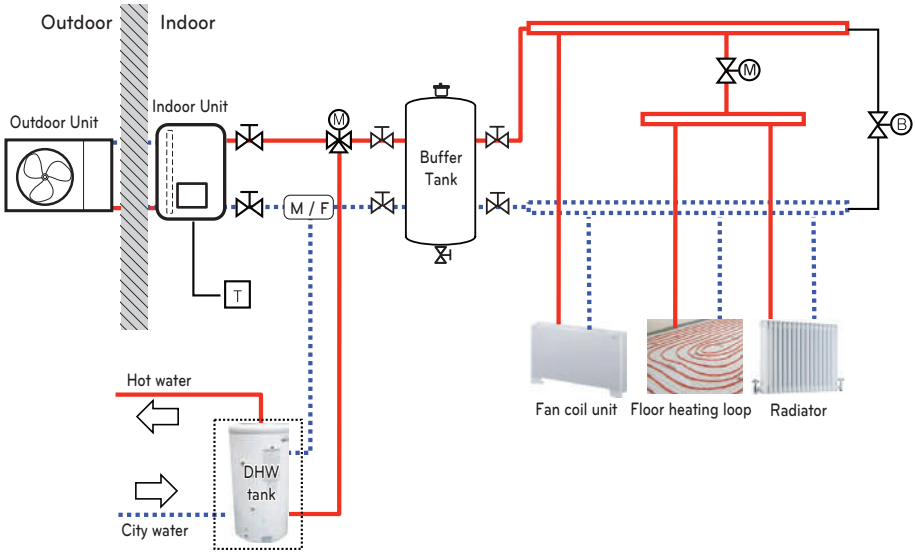


NOTE

- Room thermostat
  - Type of thermostat and specification should be complied with 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 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	2way valve (Field supply)	Shut-off valve
Low Temperature	By-pass valve (Field supply)	Room Thermostat (Field supply)
M / F Magnetic Filter (Mandatory)		

CASE 2: Connecting DHW Tank

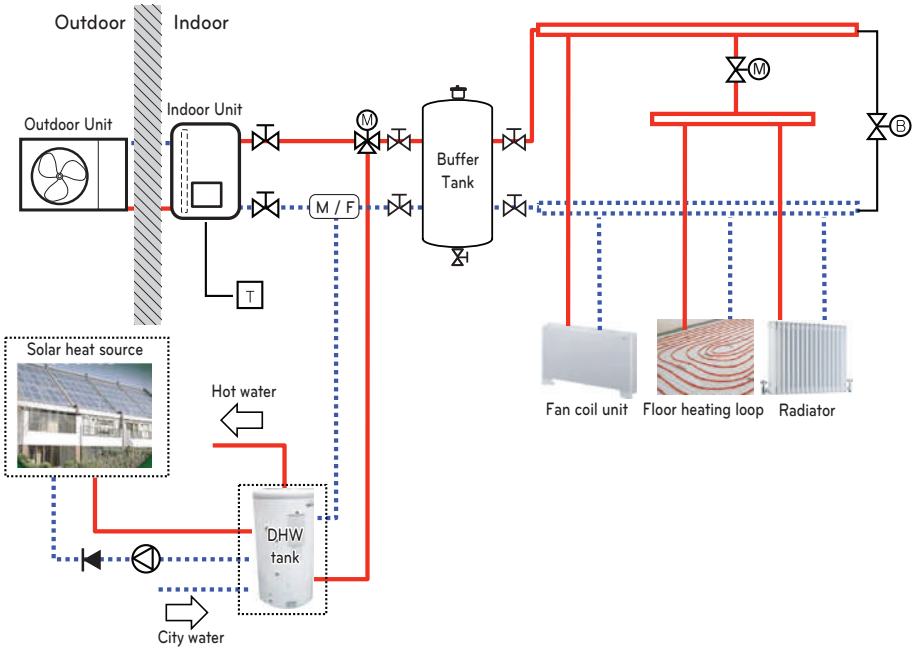


NOTE

- DHW tank
  - It should be equipped with booster 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 THERMA V installation manual.

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

CASE 3: Connecting Solar thermal system

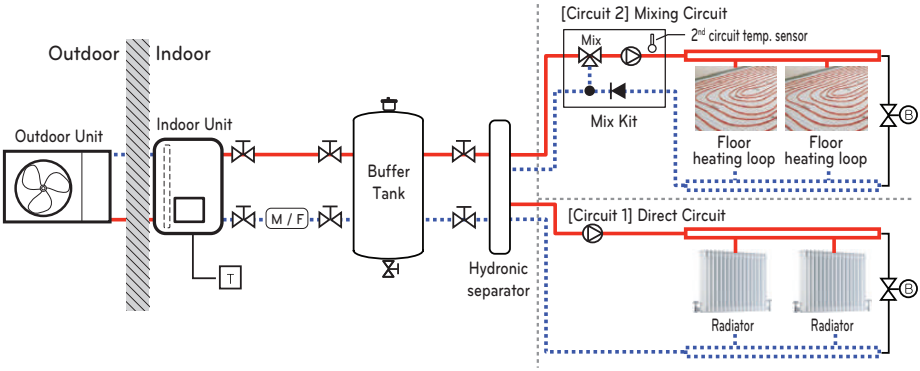


NOTE

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

High Temperature	2way valve (Field supply)	Room Thermostat (Field supply)
Low Temperature	3way valve (Field supply)	Check Valve (Backflow Preventor, Field supply)
M / F Magnetic Filter (Mandatory)	By-pass valve (Field supply)	
Shut-off valve	Pump (Field supply)	

CASE 4: Connecting 2nd Circuit

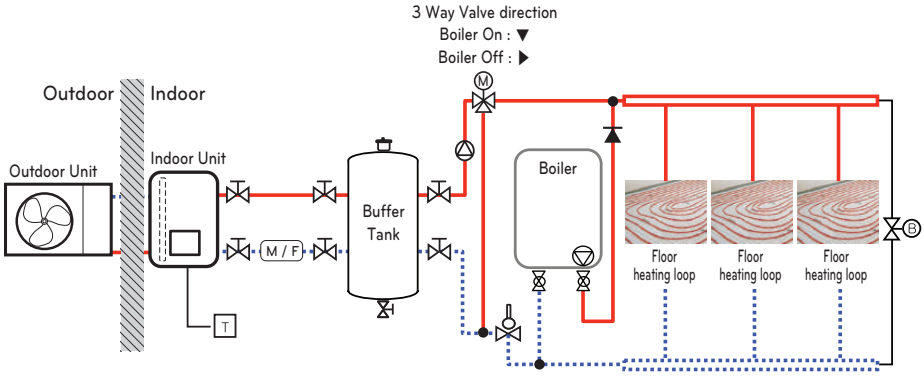


NOTE

- Mix Kit
  - You can install it when you want to set the temperature of two rooms individually
  - When heating, Circuit 2 can not be higher than Circuit 1.
  - When cooling, Circuit 2 can not be lower than Circuit 1.
  - The types and specifications of the Mix Kit are to comply with THERMA V. Installation Manual.

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

CASE 5: Connecting 3rd Party Boiler

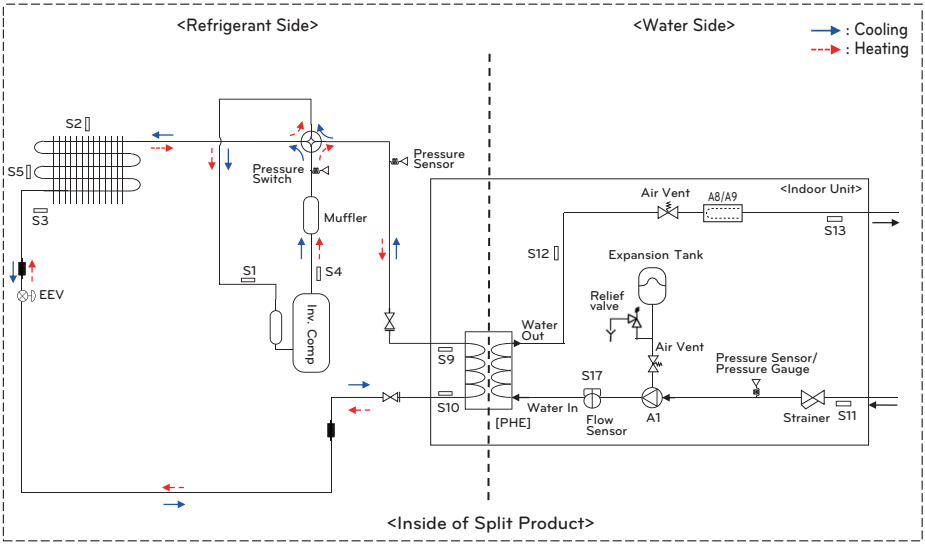


NOTE

- 3rd Party Boiler
  - 3rd party boiler can be controlled by manually via remote controller or automatically itself by means of comparing the outside air temperature and the pre-set temperature.
- 3way valve
  - Type of 3way valve and specification should be complied with THERMA V. installation manual.

High Temperature	2way valve (Field supply)	Room Thermostat (Field supply)
Low Temperature	3way valve (Field supply)	Air vent (Field supply)
Magnetic Filter (Mandatory)	By-pass valve (Field supply)	Aquastat Valve
Shut-off valve	Pump (Field supply)	Check Valve

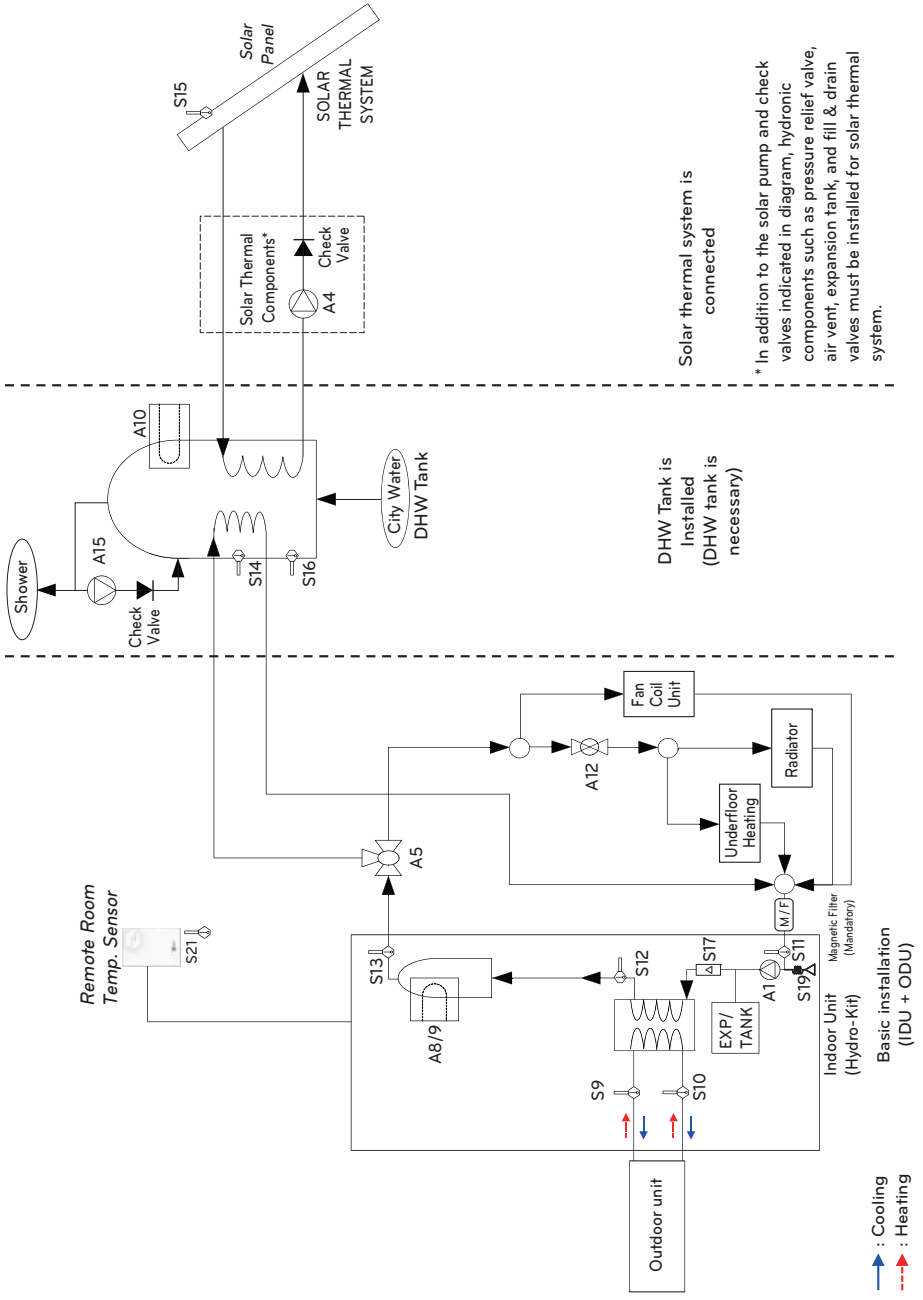
Cycle Diagram



Description

Category	Symbol	Meaning	PCB Connector
Refrigerant side	S1	Compressor-suction pipe temperature sensor	CN_SUCTION_GR
	S2	Outdoor air temperature sensor	CN_AIR_YL
	S3	Outdoor-HEX temp. sensor	CN_C_PIPE_VI
	S4	Compressor-discharge pipe temperature sensor	CN_DISCHARGE_BK
	S5	Outdoor-HEX middle temp. sensor	CN_MID_BR
	S9	PHEX gas temp. sensor	CN_PIPE/OUT
	S10	PHEX liquid temp. sensor	CN_PIPE/IN
	EEV	Electronic Expansion Valve (Heating)	CN_EEV1
Water Side	S11	Inlet water temperature sensor	CN_TH3
	S12	Outlet water temperature sensor	
	S13	Backup heater outlet sensor	
	S17	Flow sensor	CN_F_METER
	A1	Main water pump	CN_MOTOR1 CN_W_PUMP_A
	A8	Electric backup heater (Step 1)	CN_E_HEAT_A
	A9	Electric backup heater (Step 2)	CN_E_HEAT_B

Water cycle


Solar Panel
S15
SOLAR THERMAL SYSTEM
Solar Thermal Components*
Check Valve
A4
Solar thermal system is connected
* In addition to the solar pump and check valves indicated in diagram, hydronic components such as pressure relief valve, air vent, expansion tank, and fill & drain valves must be installed for solar thermal system.
A10
Shower
A15
Check Valve
S14
S16
City Water
DHW Tank
DHW Tank is Installed (DHW tank is necessary)
Fan Coil Unit
A12
Radiator
Underfloor Heating
A5
Remote Room Temp. Sensor
S21
S13
A8/9
S12
S17
A1
S19
S11
M/F
Magnetic Filter (Mandatory)
EXP/ TANK
S9
S10
Indoor Unit (Hydro-Kit)
Outdoor unit
Basic installation (IDU + ODU)
: Cooling
: Heating

Description

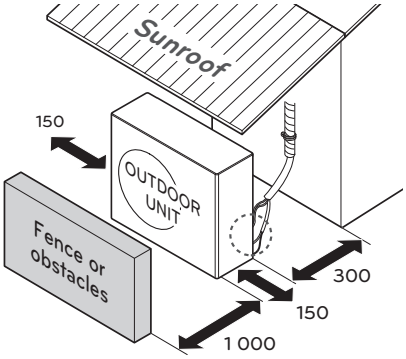
Category	Symbol	Meaning	PCB Connector	Remarks
Indoor unit / Main circuit	S9	Refrigerant temperature sensor (Gas side)	CN_PIPE_OUT	- NTC5kOhm
	S10	Refrigerant temperature sensor (Liquid side)	CN_PIPE_IN	- NTC5kOhm
	S11	Entering water temperature sensor	CN_TH3 (WATER IN)	- NTC5kOhm - S11,S12 and S13 are connected at 6-pin-type connector CN_TH3
	S12	Leaving water temperature sensor	CN_TH3 (PHEX OUT)	
	S13	Backup heater outlet temperature sensor	CN_TH3 (HEATER OUT)	
	S17	Flow Sensor	CN_F_SENSOR	- to monitor water flow rate
	S19	Entering Water Pressure sensor	CN_H2O_PRESS	- to monitor water pressure
	S20	Reserved	TB_SENSOR (AMBIENT)	
	S21	Remote room air sensor (Direct circuit)	CN_ROOM1	- Accessory: PQRSTA0 - NTC10kOhm
	A1	Internal water pump	CN_PUMP_A1 CN_MOTOR1	- Power is supplied via CN_PUMP_A1 - PWM signal is supplied via CN_MOTOR1
	A2	External pump	TB_EXT (PUMP A2)	- voltage-free contact - External water pump if head of internal pump is not sufficient or if parallel buffer tank is used
	A8 / A9	Backup heater (2 steps)	Coil 1: CN_L1, CN_N1 Coil 2: CN_L2, CN_N2 on HEATER-PCB	- Operating power(230 V AC 50 Hz) is supplied by external power source via Terminal block
	A12	2-way valve to block underfloor circuit from cooling water	CN_2WAY_A	- 3rd party accessory and Field installation (sold separately) - 2-wire NO- or NC-type 2-way valve is supported.
	EXP/TANK	Expansion vessel	-	- Absorbs volume change of eating water
	CTR/PNL	Control panel / Remote controller	CN_REMO	
	M/F	Magnetic filter	-	- 3rd party accessory and Field installation (sold separately) - It is Mandatory to install an additional filter on the heating water circuit.
Domestic hot water circuit	S14	DHW tank temperature	CN_TH4 (BOOST)	- S14 is connected at 4-pin-type connector CN_TH4 - Accessory: PHRSTA0 - S14 is a part of DHW tank kit (Model : PHLTA)
	A5	3-way valve for changing between heating (cooling) and DHW tank	CN_3WAY_A	- 3rd party accessory and Field installation (sold separately) - SPDT type 3way valve is supported.
	A10	DHW booster heater	CN_TANK_HEATER	- 3rd party accessory and Field installation (sold separately) - Operating power (230 V AC 50 Hz) is supplied by external power source via Terminal block - Accessory: PHLTA (Relay, harness and DHW sensor)
	W/TANK	Domestic hot water tank	-	- Accessory (OSHW-series) or third-party tank suitable for heat pumps
	A15	Recirculation pump	CN_PUMP A15	
	S23	Reserved	CN_RECIRC	
Solar thermal circuit	S15	Solar collector sensor	TB_SENSOR (SOLAR)	- 3rd party accessory and Field installation (sold separately) - PT1000
	S16	DHW tank temperature (Low)	CN_TH4 (SOLAR)	- S16 is connected at 4-pin-type connector CN_TH4 - Accessory : PHLLA - To control the temperature of DHW tank when using solar heating
	A4	Solar collector pump	CN_PUMP_A4	- 3rd party accessory and Field installation (sold separately)
	Solar thermal system	Solar thermal equipment such as collector, solar pump, PT1000 sensor, solar heat-exchanger	-	- 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.
- Place that can sufficiently endure the weight and vibration of the outdoor unit and where even Installation is possible.
- Place that has no direct influence of snow or rain.
- Place with no danger of snowfall or icicle drop.
- Place without weak floor of base such as decrepit part of the building or with a lot of snow accumulation.
- In places where there is a lot of snow, place the unit higher than the snow can be accumulated.



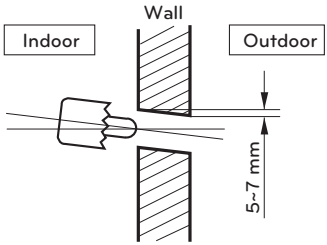
(Unit : mm)

Minimum service space

※ The feature may be vary according to the type of model.

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 Ø 70 mm hole core drill.
  Piping hole should be slightly slant to the outdoor side to prevent raindrop into indoor side.

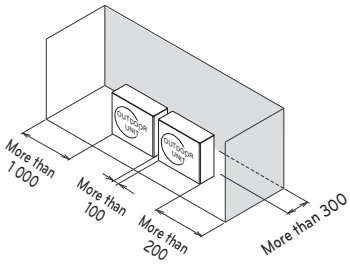


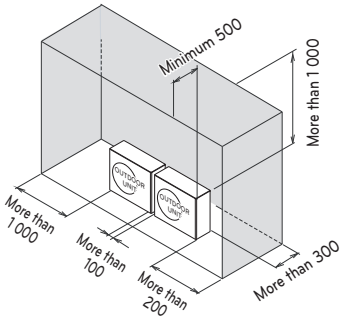
Multiple installation

When installing two or more units, please observe the installation space.

- If there is an obstruction in the intake

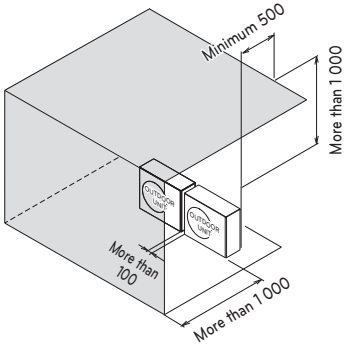
(Unit : mm)

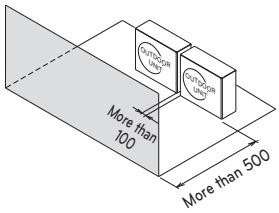




- If there is an obstruction in the discharge part

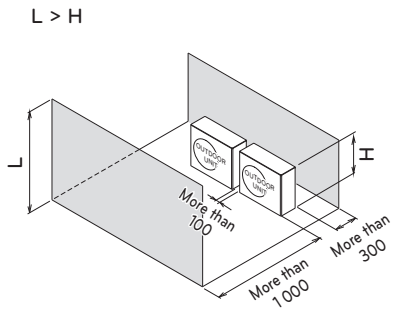
(Unit : mm)

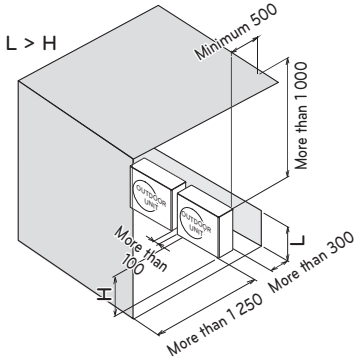


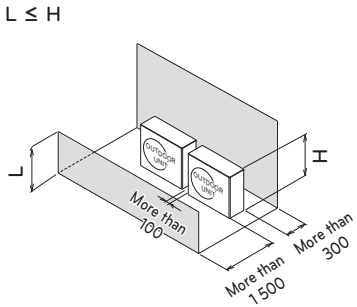


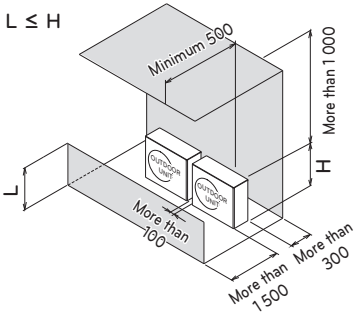
- When there is an obstacle in the suction or discharge part

(Unit : mm)



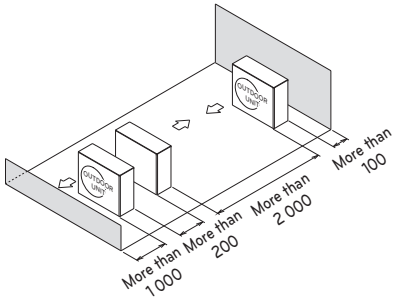


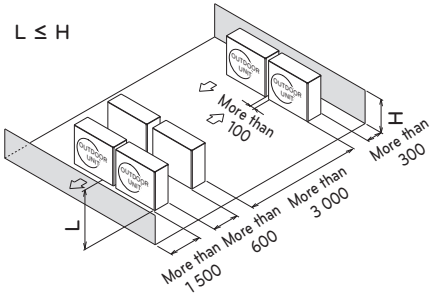




- Multiple installation on the roof

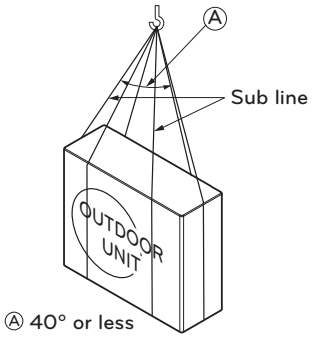
(Unit : mm)

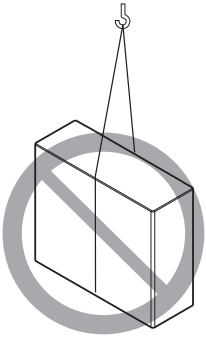


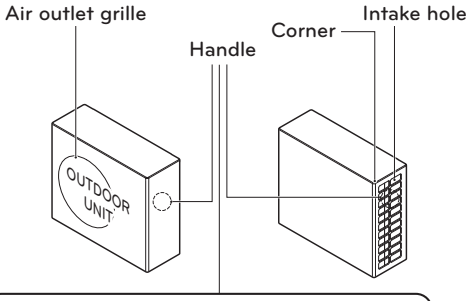


Transporting the Unit

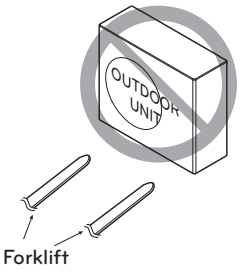
- When carrying the suspended unit, pass the ropes between legs of base panel under the unit.
- Always lift the unit with ropes attached at four points so that impact is not applied to the unit.
- Attach the ropes to the unit at an angle Ⓐ of 40° or less.
- Use only accessories and parts which are of the designated specification when installing.
- Forklift trucks are not available without a palette.
- Be careful not to damage the product when moving the forklift.







Always hold the unit by the corners, as holding it by the side intake holes on the casing may cause them to deform.



⚠ CAUTION

Be very careful while carrying the product.

- Do not have only one person carry product if it is more than 20 kg.
- PP bands are used to pack some products. Do not use them as a mean for transportation because they are dangerous.
- Do not touch heat exchanger fins with your bare hands. Otherwise you may get a cut in your hands.
- Tear plastic packaging bag and scrap it so that children cannot play with it. Otherwise plastic packaging bag may suffocate children to death.
- When carrying in Unit, be sure to support it at four points. Carrying in and lifting with 3-point support may make Outdoor Unit unstable, resulting in a fall.
- Use 2 belts of at least 8 m long.
- Place extra cloth or boards in the locations where the casing comes in contact with the sling to prevent damage.
- Hoist the unit making sure it is being lifted at its center of gravity.

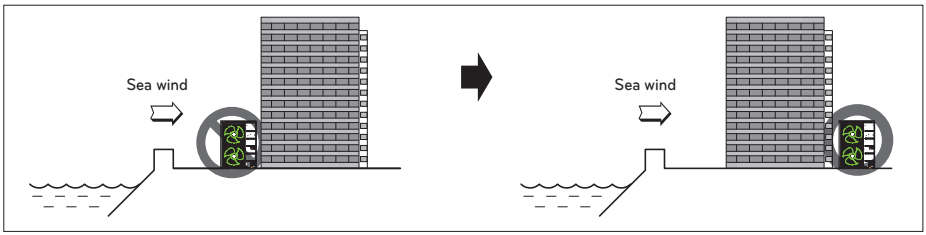
Installation at Seaside

⚠ CAUTION

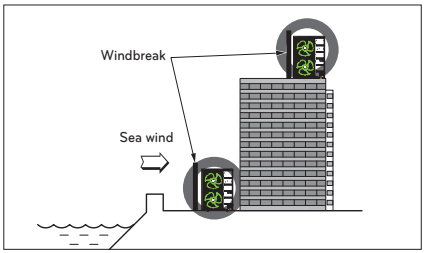
- Unit should not be installed in areas where corrosive gases, such as acid or alkaline gas, are produced.
- Do not install the product where it could be exposed to sea wind (salty wind) directly. It can result corrosion on the product. Corrosion, particularly on the condenser and evaporator fins, could 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 anti-corrosion 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.



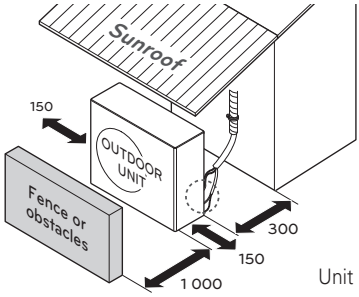
- It should be strong enough like concrete to prevent the sea wind from the sea.
- The height and width should be more than 150% of the outdoor unit.
- It should be keep more than 700 mm of space between outdoor unit and the windbreak for easy air flow.

- 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.
- If you can't meet above guide line in the seaside installation, please contact your supplier for the additional anti-corrosion treatment.

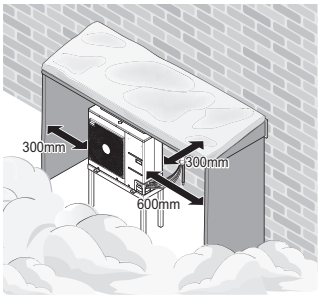
Seasonal Wind and Cautions in Winter

In areas with low ambient temperature, high humidity, or heavy snowfall, particular measures are required to ensure that the unit operates properly.

- Install the unit so that it does not come into direct contact with snow. If snow accumulates and freezes in the air inlet, the system may malfunction. When installing in an area with heavy snowfall, attach the hood to the system.
- Install the suction and discharge ducts to prevent the entry of snowfall or rainfall.
- When installing in an area with heavy snowfall, install it on an installation console which is 500mm higher than the average snowfall (annual average snowfall).
- The height of the H frame must be at least twice the amount of snowfall and its width must not exceed the width of the unit. (Snow may accumulate if the width of the frame is wider than the width of the unit.)
- If condensed water from the outdoor unit freezes around the product, the floor/ground may become slippery and cause an accident, so do not install the outdoor unit near a sidewalk. If it is unavoidable, install a water channel or drainage pipe to prevent condensed water from flowing onto the sidewalk.
- Use "Rapid Defrost Mode" in sites with snowfall or low temperatures and high humidity.
  * The Rapid Defrost Mode is a rapid defrost mode designed to prevent accumulated icing in sites with snowfall or low temperatures and high humidity. Refer to "Dip Switch Setting".
- If more than 100mm of snow has accumulated on the top of the product, be sure to remove the snow before carrying out any work on the unit.
- Do not install the inlet or outlet of the unit so that they face seasonal winds.
- Make preparations for snow and/or seasonal winter winds in all areas in which the unit is installed.



Unit : mm



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.

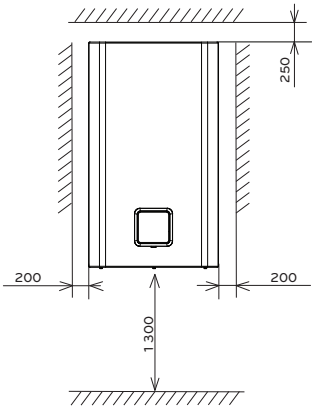
- The installation place should be free from outdoor weather conditions such as rain, snow, wind, frost, etc.
- Choose the place where is water-resistant or good drainage.
- Service space should be secured.
- No flammable materials around the indoor unit.
- Mice can not be appeared to prevent entering 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

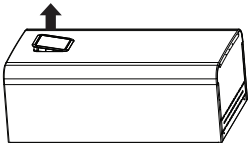
- The default setting of the product is for heating only. To use the cooling system together, DIP S / W 4 should be turned ON and additional drain pan accessory should be installed.



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.



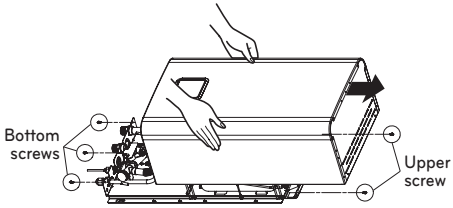
⚠ CAUTION

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

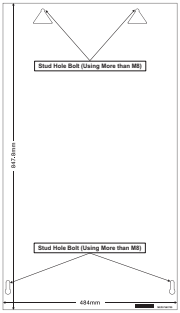
NOTE

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 attached “Installation sheet” should be level.

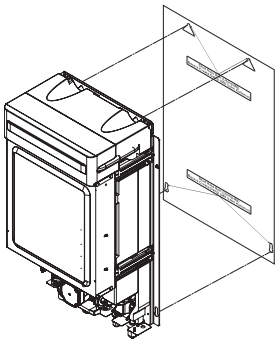
If not, the supporting plate and the indoor unit will not be mounted correctly.

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

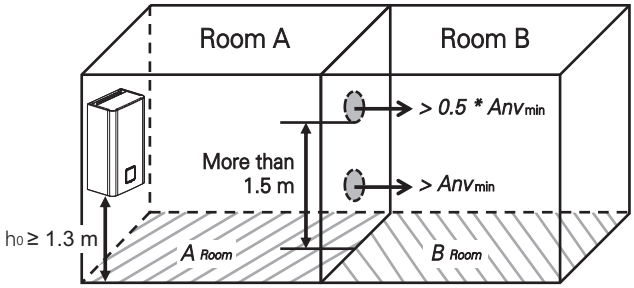
Self drilling screw can be used as alternatives of M8 ~ M11 anchor bolts. But M8 ~ M11 anchor bolts are more preferred.

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



Floor area requirement : Indoor unit

- If the total refrigerant charge (m_c) is in system ≥1.842 kg, additional minimum floor area requirements is complied in the following flow chart.



Determine :
- The total refrigerant charge in the system, m_c (kg)
- The room A area installed the appliance, A Room (m^2)

Calculate based on Table 1 :
- The maximum refrigerant charge allowed for room A_{max} (kg)

$m_{max} \geq m_c$ — No

Yes

The unit can be installed in room A without further room size or ventilation requirements.

Determine :
- The adjacent room B area, B Room (m^2)

Calculate based on Table 2 :
- The total minimum floor area required for the total refrigerant charge mc, A_{min} (m^2)

A Room + B Room ≥ A_{min} — No

Yes

Calculate based on Table 3 :
- The minimum opening area for natural ventilation between room A and room B according to the value of m_c and A Room, A_{min} (m^2)

The unit can be installed in room A when the following **ventilation requirements** are fulfilled.

please contact your local engineer / dealer.

Ventilation requirements

- Two ventilation openings, one at bottom, another at top, for ventilation purposes are made between room A and room B.
- **Bottom opening :**
  - Must comply to the minimum area requirement of Anv_{min}.
  - Opening must be located 300 mm from the floor.
  - At least 50 % of required opening area must be 200 mm from the floor.
  - The bottom of the opening shall not be higher than the point of release when the unit is installed and must be situated 100 mm above the floor.
  - Must be as close as possible to the floor and lower than h_0.
    (h_0 = Installation height)
- **Top opening :**
  - The total size of the Top opening must be more than 50 % of Anv_{min}.
  - Opening must be located 1 500 mm above the floor.
- The height of the openings between the wall and floor which connect the rooms are not less than 20 mm.
- Ventilation openings to the outside are NOT considered suitable ventilation openings (the user can block them when it is cold).

Table 1 - Maximum refrigerant charge allowed in a room

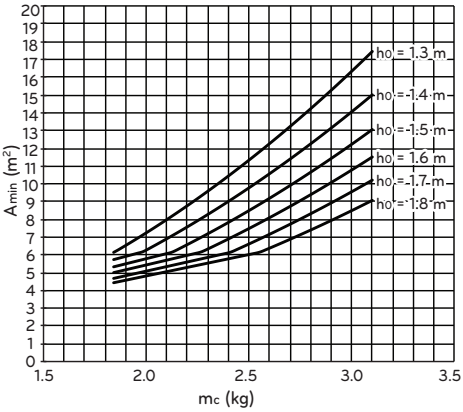
A_{room} (m^2)	Maximum refrigerant charge in a room m_{max} (kg) Based on h_0 (m)					
	1.3	1.4	1.5	1.6	1.7	1.8
1	0.30	0.32	0.35	0.37	0.39	0.41
2	0.60	0.64	0.69	0.74	0.78	0.83
3	0.90	0.97	1.04	1.11	1.17	1.24
4	1.20	1.29	1.38	1.47	1.57	1.66
5	1.50	1.61	1.73	1.84	1.96	2.07
6	1.80	1.93	2.07	2.21	2.35	2.49
7	1.96	2.12	2.27	2.42	2.57	2.72
8	2.10	2.26	2.42	2.59	2.75	2.91
9	2.23	2.40	2.57	2.74	2.91	3.09
10	2.35	2.53	2.71	2.89	3.07	3.25
11	2.46	2.65	2.84	3.03	3.22	3.41
12	2.57	2.77	2.97	3.17	3.36	3.56
13	2.68	2.88	3.09	3.30	3.50	3.71
14	2.78	2.99	3.21	3.42	3.63	3.85
15	2.88	3.10	3.32	3.54	3.76	3.98
16	2.97	3.20	3.43	3.66	3.88	4.11
17	3.06	3.30	3.53	3.77	4.00	4.24
18	3.15	3.39	3.64	3.88	4.12	4.36

NOTE

- h_0 : Installation height, height measured from the bottom of the casing to the floor
- For intermediate $A_{room\ A}$ values, the value that corresponds to the lower $A_{room\ A}$ value from the table is considered.
  (If $A_{room\ A}$=10.5 m^2, consider the value that corresponds to $A_{room\ A}$ = 10 m^2.)

Table 2 - Minimum floor area

Total Ref. Amount m_c (kg)	Minimum Floor Area A_{min} (m^2) Based on h_0 (m)					
	1.3	1.4	1.5	1.6	1.7	1.8
1.84	6.15	5.71	5.33	4.99	4.70	4.44
1.86	6.27	5.77	5.39	5.05	4.75	4.49
1.88	6.41	5.83	5.44	5.10	4.80	4.54
1.90	6.54	5.89	5.50	5.16	4.85	4.58
1.92	6.68	5.96	5.56	5.21	4.91	4.63
1.94	6.82	6.02	5.62	5.27	4.96	4.68
1.96	6.96	6.08	5.67	5.32	5.01	4.73
1.98	7.11	6.14	5.73	5.37	5.06	4.78
2.00	7.25	6.25	5.79	5.43	5.11	4.83
2.02	7.40	6.38	5.85	5.48	5.16	4.87
2.04	7.54	6.51	5.91	5.54	5.21	4.92
2.06	7.69	6.63	5.96	5.59	5.26	4.97
2.08	7.84	6.76	6.02	5.65	5.31	5.02
2.10	8.00	6.89	6.08	5.70	5.37	5.07
2.12	8.15	7.03	6.14	5.75	5.42	5.12
2.14	8.30	7.16	6.24	5.81	5.47	5.16
2.16	8.46	7.29	6.35	5.86	5.52	5.21
2.18	8.62	7.43	6.47	5.92	5.57	5.26
2.20	8.77	7.57	6.59	5.97	5.62	5.31
2.22	8.93	7.70	6.71	6.03	5.67	5.36
2.24	9.10	7.84	6.83	6.08	5.72	5.40
2.26	9.26	7.98	6.96	6.13	5.77	5.45
2.28	9.42	8.13	7.08	6.22	5.82	5.50
2.30	9.59	8.27	7.20	6.33	5.88	5.55
2.32	9.76	8.41	7.33	6.44	5.93	5.60
2.34	9.93	8.56	7.46	6.55	5.98	5.65
2.36	10.10	8.71	7.58	6.67	6.03	5.69
2.38	10.27	8.85	7.71	6.78	6.08	5.74
2.40	10.44	9.00	7.84	6.89	6.13	5.79
2.42	10.62	9.15	7.97	7.01	6.21	5.84
2.44	10.79	9.31	8.11	7.13	6.31	5.89
2.46	10.97	9.46	8.24	7.24	6.42	5.94
2.48	11.15	9.61	8.38	7.36	6.52	5.98
2.50	11.33	9.77	8.51	7.48	6.63	6.03
2.52	11.51	9.93	8.65	7.60	6.73	6.08
2.54	11.70	10.09	8.79	7.72	6.84	6.13
2.56	11.88	10.24	8.92	7.84	6.95	6.20
2.58	12.07	10.41	9.06	7.97	7.06	6.29
2.60	12.26	10.57	9.21	8.09	7.17	6.39
2.62	12.44	10.73	9.35	8.22	7.28	6.49
2.64	12.64	10.89	9.49	8.34	7.39	6.59
2.66	12.83	11.06	9.64	8.47	7.50	6.69
2.68	13.02	11.23	9.78	8.60	7.61	6.79
2.70	13.22	11.40	9.93	8.72	7.73	6.89
2.72	13.41	11.57	10.07	8.85	7.84	7.00
2.74	13.61	11.74	10.22	8.99	7.96	7.10
2.76	13.81	11.91	10.37	9.12	8.08	7.20
2.78	14.01	12.08	10.52	9.25	8.19	7.31
2.80	14.21	12.26	10.68	9.38	8.31	7.41
2.82	14.42	12.43	10.83	9.52	8.43	7.52
2.84	14.62	12.61	10.98	9.65	8.55	7.63
2.86	14.83	12.79	11.14	9.79	8.67	7.74
2.88	15.04	12.97	11.29	9.93	8.79	7.84
2.90	15.25	13.15	11.45	10.07	8.92	7.95
2.92	15.46	13.33	11.61	10.20	9.04	8.06
2.94	15.67	13.51	11.77	10.34	9.16	8.17
2.96	15.88	13.70	11.93	10.49	9.29	8.29
2.98	16.10	13.88	12.09	10.63	9.41	8.40
3.00	16.32	14.07	12.26	10.77	9.54	8.51
3.02	16.53	14.26	12.42	10.92	9.67	8.62
3.04	16.75	14.45	12.58	11.06	9.80	8.74
3.06	16.98	14.64	12.75	11.21	9.93	8.85
3.08	17.20	14.83	12.92	11.35	10.06	8.97
3.10	17.42	15.02	13.09	11.50	10.19	9.09



NOTE

- h_0 : Installation height, height measured from the bottom of the casing to the floor
- For intermediate m_c values, the value that corresponds to the higher mc value from the table is considered. (If m_c = 1.85 kg, the value that corresponds to m_c = 1.86 kg is considered.)
- Systems with total refrigerant charge lower than 1.84 kg are not subjected to any room area requirements.
- Charges above 3.10 kg are not allowed in the unit.

Table 3 - Minimum venting opening area for natural ventilation

A_{room} (m^2)	Minimum opening area Anv_{min} (cm^2) (Based on h_0 1.3 m) Total Ref. Amount m_c (kg)												
	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9
1	770	742	715	687	660	632	605	577	550	522	495	467	440
2	687	660	632	605	578	550	523	495	468	440	413	385	358
3	605	578	550	523	495	468	440	413	385	358	330	303	275
4	523	495	468	440	413	386	358	331	303	276	248	221	193
5	441	413	386	358	331	303	276	248	221	193	166	138	111
6	358	331	303	276	248	221	193	166	139	111	84	56	29
7	322	294	265	237	209	180	152	123	95	67	38	10	
8	293	264	235	205	176	147	117	88	58	29			
9	263	233	203	173	143	112	82	52	22				
10	233	202	171	140	109	78	47	16					
11	202	171	139	107	75	43	12						
12	171	139	106	74	41	9							
13	140	107	74	40	7								
14	108	75	41	7									
15	77	42	8										
16	45	10											
17	13												

A_{room} (m^2)	Minimum opening area Anv_{min} (cm^2) (Based on h_0 1.4 m) Total Ref. Amount m_c (kg)												
	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9
1	736	709	683	656	630	603	577	550	524	497	471	444	418
2	650	624	597	571	544	518	491	465	438	412	385	359	332
3	565	538	512	485	459	432	406	379	353	327	300	274	247
4	480	453	427	400	374	347	321	294	268	241	215	188	162
5	394	368	341	315	288	262	235	209	182	156	129	103	76
6	309	282	256	229	203	176	150	123	97	70	44	17	
7	269	242	214	187	160	132	105	78	50	23			
8	237	209	180	152	124	96	67	39	11				
9	204	175	146	117	88	58	29						
10	171	141	111	81	51	21							
11	137	106	76	45	14								
12	103	72	40	9									
13	69	37	5										
14	35	2											
15	1												

A_{room} (m^2)	Minimum opening area Anv_{min} (cm^2) (Based on h_0 1.5 m)												
	Total Ref. Amount m_c (kg)												
	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9
1	705	679	654	628	602	577	551	526	500	475	449	423	398
2	616	591	565	540	514	488	463	437	412	386	361	335	309
3	528	502	477	451	426	400	375	349	323	298	272	247	221
4	440	414	389	363	337	312	286	261	235	209	184	158	133
5	351	326	300	275	249	223	198	172	147	121	95	70	44
6	263	237	212	186	161	135	109	84	58	33	7	70	
7	220	194	167	141	114	88	61	35	9				
8	185	157	130	103	75	48	21						
9	149	121	93	64	36	8							
10	113	84	55	26									
11	76	47	17										
12	40	10											
13	3												

A_{room} (m^2)	Minimum opening area Anv_{min} (cm^2) (Based on h_0 1.6 m)												
	Total Ref. Amount m_c (kg)												
	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9
1	677	652	627	602	578	553	528	503	479	454	429	404	379
2	585	561	536	511	486	462	437	412	387	362	338	313	288
3	494	469	445	420	395	370	346	321	296	271	246	222	197
4	403	378	353	329	304	279	254	229	205	180	155	130	106
5	312	287	262	237	213	188	163	138	113	89	64	39	14
6	220	196	171	146	121	97	72	47	22				
7	174	149	123	98	72	46	21						
8	136	110	83	57	30	4							
9	97	70	43	16									
10	59	31	3										
11	20												

A_{room} (m^2)	Minimum opening area Anv_{min} (cm^2) (Based on h_0 1.7 m) Total Ref. Amount mc (kg)												
	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9
1	651	627	603	579	555	531	507	483	459	435	411	387	363
2	557	533	509	485	461	437	413	389	365	341	317	293	268
3	463	439	415	391	367	343	319	295	271	247	222	198	174
4	369	345	321	297	273	249	225	201	176	152	128	104	80
5	275	251	227	203	179	155	130	106	82	58	34	10	
6	181	157	133	108	84	60	36	12					
7	132	107	82	57	32	8							
8	91	65	39	14									
9	49	23											
10	8												

A_{room} (m^2)	Minimum opening area Anv_{min} (cm^2) (Based on h_0 1.8 m) Total Ref. Amount m_c (kg)												
	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9
1	627	604	581	557	534	510	487	464	440	417	394	370	347
2	530	507	484	460	437	414	390	367	344	320	297	274	250
3	434	410	387	364	340	317	294	270	247	223	200	177	153
4	337	313	290	267	243	220	197	173	150	127	103	80	57
5	240	217	193	170	147	123	100	77	53	30	6		
6	143	120	97	73	50	26	3						
7	91	67	43	19									
8	48	23											
9	4												

NOTE

- h_0 : Installation height, height measured from the bottom of the casing to the floor
- For intermediate $A_{room\ A}$ values, the value that corresponds to the lower $A_{room\ A}$ value from the table is considered.
  (If $A_{room\ A}$ = 10.5 m^2, consider the value that corresponds to $A_{room\ A}$ = 10 m^2.)
- For intermediate m_c values, the value that corresponds to the higher m_c value from the table is considered. (If m_c = 2.15 kg, the value that corresponds to m_c = 2.2 kg is considered.)

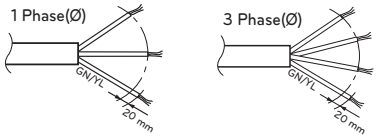
Electrical Wiring

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

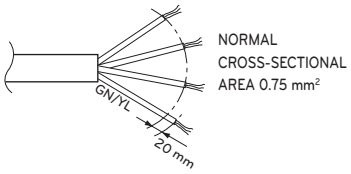
The power cord connected to the outdoor unit should be complied with IEC 60245 or HD 22.4 S4 (This equipment shall be provided with a cord set complying with the national regulation.)



NORMAL CROSS-SECTIONAL AREA

Model Name		Area (mm^2)	Cable Type
Phase (Ø)	Capacity (kW)		
1	4	2.5	H07RN-F
	6		

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.)



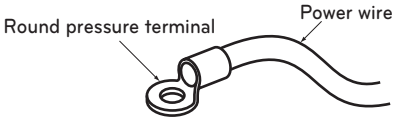
When the connection line between the indoor unit and outdoor unit is over 40 m, connect the telecommunication line and power line separately.

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 hazard.

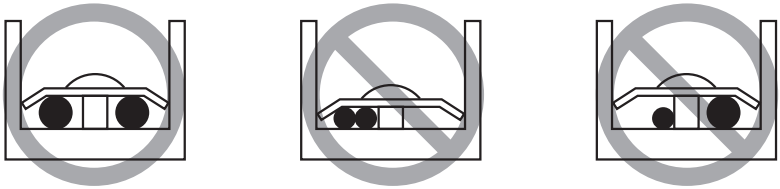
Precautions when laying power wiring

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.



- For wiring, use the designated power wire and connect firmly, then secure to prevent outside pressure being exerted on the terminal block.
- Use an appropriate manual screwdriver instead of electric screwdriver for tightening the terminal screws. A screwdriver with a small head will strip the head and make proper tightening impossible.
- Over-tightening the terminal screws may break them.

⚠ WARNING

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

Point for attention regarding quality of the public electric power supply

- 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 ≤ 75 A.
- European/International Technical Standard setting the limits for harmonic currents produced by equipment connected to public low-voltage systems with input current ≤16 A of > 75 A per phase.
- This equipment complies with IEC (EN) 61000-3-2.
- This equipment complies with IEC (EN) 61000-3-3.

Circuit Breaker Specification

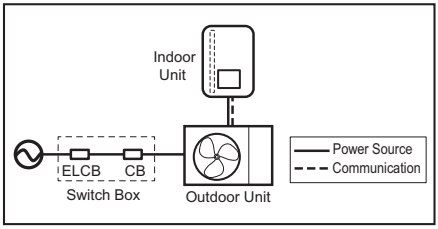
Perform the electrical wiring work according to the electrical wiring connection.

- All wiring must comply with local requirements.
- Select a power source that is capable of supplying the current required by the unit.
- 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

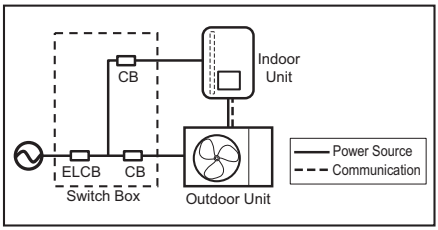
※ Pipes and wires should be purchased separately for installation of the product.

Heat Pump							Backup Heater				
Type	Refrigerant	Indoor Unit Series	Phase [Ø]	Capacity [kW]	Power Supply	Outdoor Unit CB (A)	Phase [Ø]	Capacity [kW]	Power Supply	Area [mm^2]	CB [A]
Split	R32	5	1	4	220-240 V~50 Hz	16	1	3 (1.5+1.5)	220-240 V~50 Hz	2.5	20
				6		20					

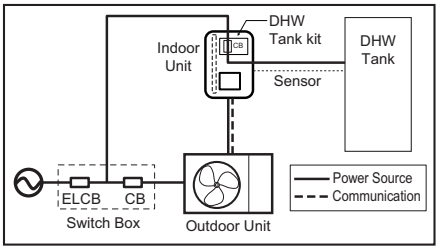
- Power Supply for Heat Pump



- Power Supply for Backup Heater



- Power Supply for DHW Booster Heater



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.

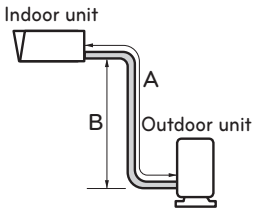
*Pipes and wires should be purchased separately for installation of the product.

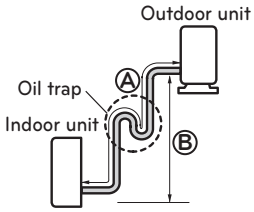
Refrigerant Piping

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

Refrigerant	Capacity (kW)	Pipe Diameter [mm(inch)]		Length A (m)		Elevation B (m)	Additional Refrigerant (g/m)
		Gas	Liquid	Standard	Max.	Max.	
R32	4/6	12.7(1/2")	6.35(1/4")	5	30	30	20





A trap is necessary when the outdoor unit is installed in a higher position than the indoor unit.

⚠ CAUTION

1 If the pipe length is longer than 10 m, additional charge of the refrigerant is required according to the table.
- Example : If R32 6 kW model is installed at a distance of 30 m, 400 g of refrigerant should be added according to following formula : (30-10) x 20 g = 400 g

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.

4 Oil trap should be installed every 10 meters, when the outdoor unit is installed in a higher position than the indoor unit.

5 Installing a refrigerant pipe that is shorter than the standard length may result in noise or abnormal operation of the product.

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)

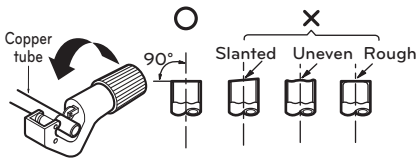
③ The total Charge (① + ②)

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.

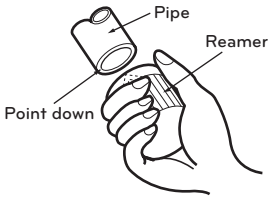
Step 1. Cut the pipes and the cable.

- 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 1.5 m longer than the pipe length.



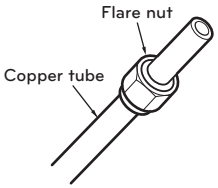
Step 2. Burrs removal

- 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

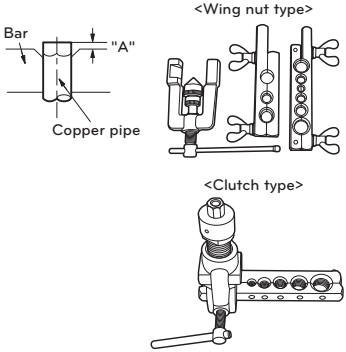
- Remove flare nuts attached to indoor and outdoor units, than put them on pipe/tube having completed burr removal. (Not possible to put them on after flaring work)



Step 4. Flaring work.

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

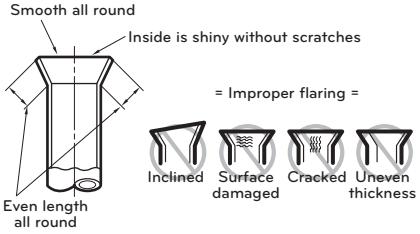
Pipe diameter [inch(mm)]	A inch (mm)	
	Wing nut type	Clutch type
1/4 (6.35)	0.04~0.05(1.1~1.3)	0~0.02 (0~0.5)
3/8 (9.52)	0.06~0.07(1.5~1.7)	
1/2 (12.7)	0.06~0.07(1.6~1.8)	
5/8 (15.88)	0.06~0.07(1.6~1.8)	
3/4 (19.05)	0.07~0.08(1.9~2.1)	



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

Step 5. Check

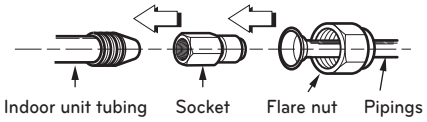
- Compare the flared work with right figure.
- If flare is seemed to be defective, cut off the flared section and do flaring work again.



Connecting Pipe to Indoor Unit

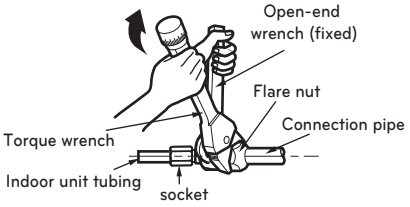
Step 1. Pre-tightening.

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



Step 2. Tightening.

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



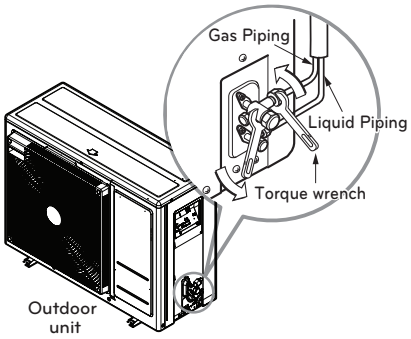
Outside diameter [mm(inch)]	Torque [kgf·m]
6.35 (1/4)	1.8 ~ 2.5
9.52 (3/8)	3.4 ~ 4.2
12.7 (1/2)	5.5 ~ 6.6
15.88 (5/8)	6.6 ~ 8.2
19.05 (3/4)	9.9 ~ 12.1

Connecting Pipe to Outdoor Unit

Step 1. 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.

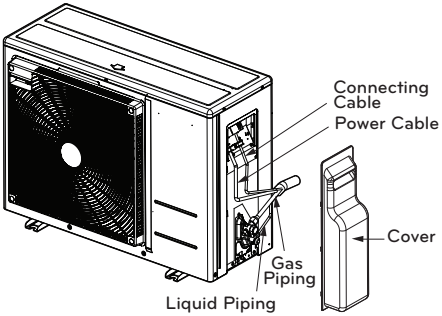
Outside diameter [mm(inch)]	Torque [kgf·m]
6.35 (1/4)	1.8 ~ 2.5
9.52 (3/8)	3.4 ~ 4.2
12.7 (1/2)	5.5 ~ 6.6
15.88 (5/8)	6.6 ~ 8.2
19.05 (3/4)	9.9 ~ 12.1



Step 2. Preventing entering of foreign objects

- 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

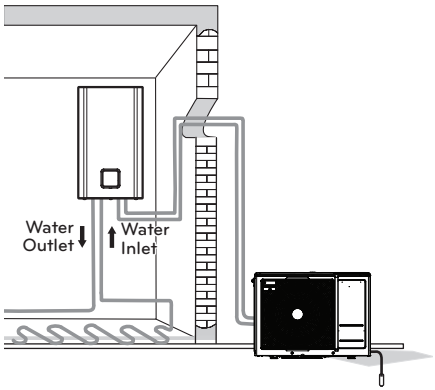


Step 1. Disassemble the cover from the outdoor unit by loosing screws.

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 2.5 mm^2 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 cover 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.

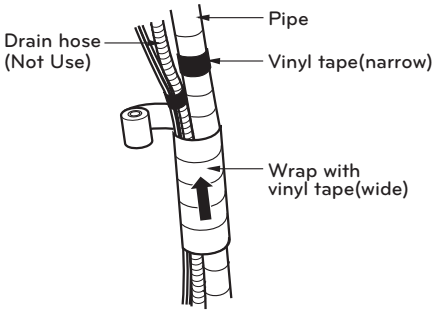
⚠ CAUTION

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

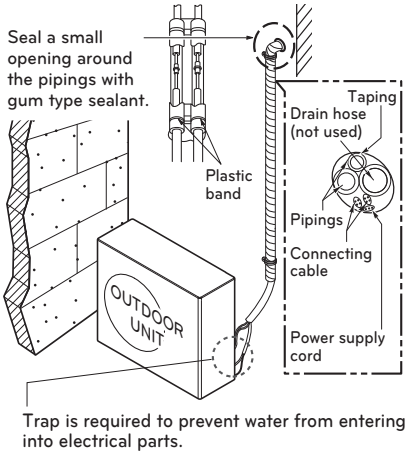


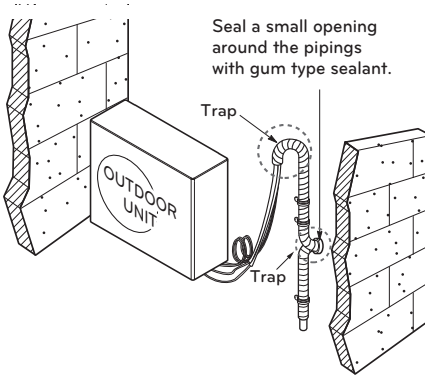
Do pipe forming by wrapping the connecting cable and refrigerant pipe (between the indoor unit and outdoor unit) with thermal insulation material and secure it with two kinds of vinyl tape.

- 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.





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 incondensable gas and moisture in the system.

Preparation

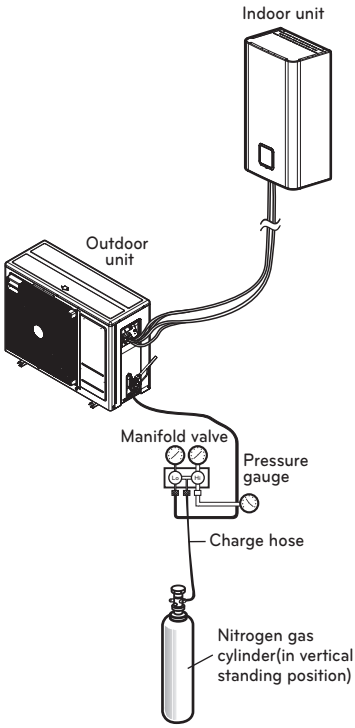
- Check that each tube(both liquid and gas side tubes) between the indoor and outdoor units have been properly connected and all wiring for the test run has been completed. Remove the service valve caps from both the gas and the liquid side on the outdoor unit. Check that both the liquid and the gas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

⚠ 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. 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.

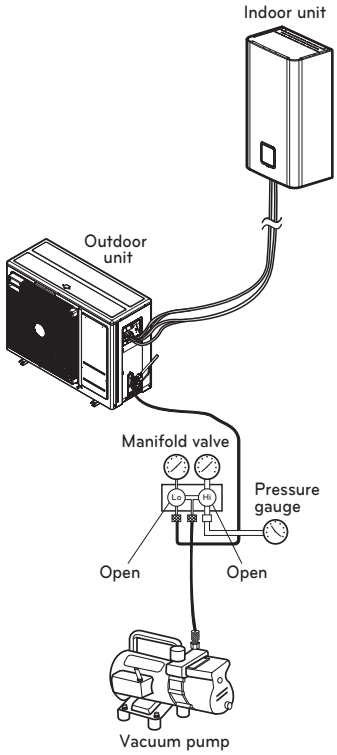


Evacuation

- 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.

THERMA V. is now ready to test run.

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

⚠ CAUTION

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.

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 operation of the safety valve, drain from condensate, and snow or rain. 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.
- In a cold climate region, water drainage must be frost-proof.

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 teflon 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.
- Maximum allowable Torque at the water piping connection is 50 N·m

⚠ WARNING

Installing shut-off valve

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.
Additional drain pan accessory should be installed to prevent dew to be formed.

Water Charging

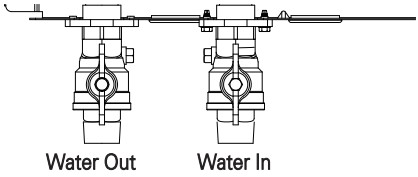
For water charging, please follow below procedures.

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.

⚠ CAUTION

No water-leakage permitted at the drain and fill valve. Leakage-proof treatment which is described in previous section should be applied.
*The configuration of the valve may vary by model type.



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

- Pressure of supplying water should be pre-adjust valueapproximately.
- For supplying water pressure, time to be taken from 0 bar to pre-adjust value 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.
- Open both the air vent in the water pipe and the air vent in the pump.

Step 4. Stop water supplying when the pressure located in remote control indicates pre-adjust value.

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.

- The pressure located in remote control indicates pre-adjust value. 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.

⚠ CAUTION

Keep the air vent of the water pipe open and keep the air vent of the pump closed.
Otherwise, the pump may make noise.

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
- Minimum insulation thickness recommendations ensure correct operation of the product, but local regulations may vary and must be followed.

Water Piping length (m)	Minimum insulation Thickness(mm)
<20	20
20~30	30
30~40	40
40~50	50

* λ = 0.04 W/mk
(Thermal conductivity of pipe insulation)

Water pump Capacity

The water pump is 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.

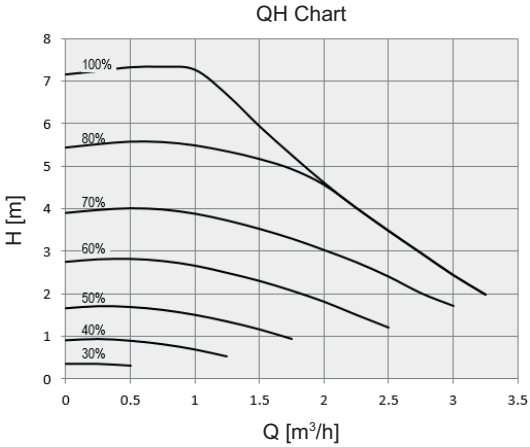
Pressure Drop

NOTE

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

Capacity [kW]	Rated flow-rate [LPM]	Pump Head [m] (at rated flow-rate)	Product pressure drop [m] (Plate heat exchanger)	Serviceable Head [m]
4	11.5	7.4	0.2	7.2
6	17.25	7.3	0.2	7.1

Performance curve



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 by antifreeze

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 %

If you use frost protection function, change DIP switch setting and input the temperature condition in Installation mode of remote controller. Refer to 'CONFIGURATION > DIP Switch Setting > DIP Switch Information > Option Switch 3' and 'INSTALLER SETTING > Antifreezing Temperature'.

⚠ 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.

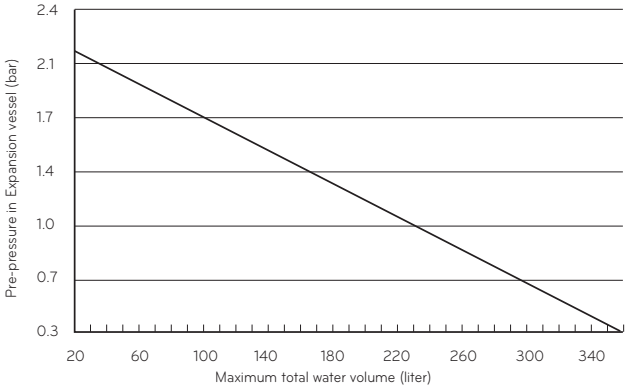
Water Volume and Expansion Vessel Pressure

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.

If	Minimum water volume
The system contains a backup heater	20 L
The system does NOT contain a backup heater	80 L

* The internal water volume of the outdoor unit is NOT included

- 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] = (0.1 x H + 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 < 7 m	Case B	Case A
H ≥ 7 m	Case A	Case C

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

Electrical Wiring

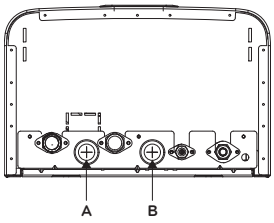
General Consideration

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.)



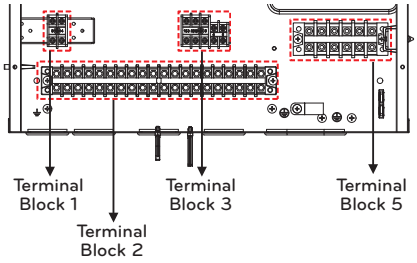
Hole A : For DC line (wire which is connected to the PCB of the control box)

Hole B : For AC line (wire which is connected to the terminal block 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 ~ 3

Connection for 3rd Party controller (5 V DC)

21	22
A	B
3rd PARTY CONTROLLER (5V DC)	

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

23	24	25	26	27
L	N	L1	L2	L3
THERMOSTAT (Default : 230 V AC)				

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
L	N	L	N	L	N	L	N	L1	L2	N	L	L1	N	L1	L2	N	1(L)	2(N)	3
WATER TANK HEATER		WATER PUMP (C)		WATER PUMP (B)		MIX PUMP		MIX VALVE			3WAY VALVE (A)			2WAY VALVE (A)			OUTDOOR UNIT		

- Turn on or off booster heater
- Energizing water pump for DHW-recirculation
- Energizing water pump for solar thermal system
- Power supply for 2nd heating kit
- Water flow switching between under floor heating and DHW tank heating
- Opening or closing water flow for FCU cooling
- Power supply for Indoor unit and communication

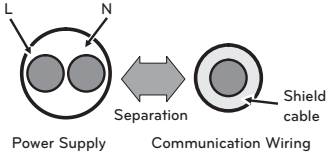
Terminal Block 5

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

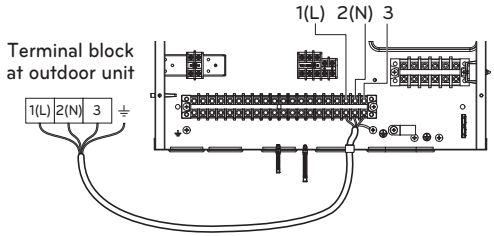
- connecting external electric power supply for booster heater
- connecting external electric power supply for backup heater

CAUTION

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



Connecting with Outdoor Unit

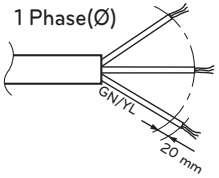


* The feature may be changed according to the type of model.

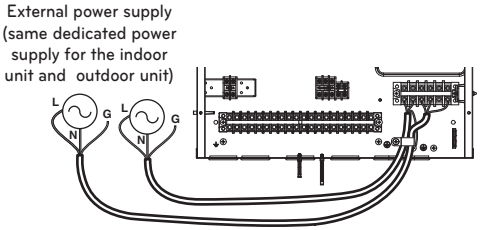
Electric Heater Wiring

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.



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 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	PDRYCB000
	Dry Contact For Thermostat	PDRYCB320
Thermistor for Solar thermal	To control the temperature of DHW tank when using solar heating.	PHLLA
DHW Tank	To generate and store hot water	OSHW-200F : 200 L, Single Heating Coil, 1Ø 230 V 50 Hz 2.4 kW Booster heater OSHW-300F : 300 L, Single Heating Coil, 1Ø 230 V 50 Hz 2.4 kW Booster heater OSHW-500F : 500 L, Single Heating Coil, 1Ø 230 V 50 Hz 2.4 kW Booster heater OSHW-300FD : 300 L, Double Heating Coil, 1Ø 230 V 50 Hz 2.4 kW Booster heater
Thermistor for DHW Tank	To control hot water temperature of DHW tank	PHRSTA0
Drain Pan	To prevent drain water drop	PHDPC
Meter Interface	To measure production / consumption power	PENKTH000
Central Controller	Multiple installed products into one central control	AC EZ Touch (PACEZA000) AC Smart IV (PACS4B000) AC Smart 5 (PACS5A000) ACP 5 (PACP5A000) AC Manager 5 (PACM5A000)

Item	Purpose	Model
PI485	To use Central Controller	PP485A00T
Cloud Gateway	To use Becon cloud	PWFMDB200
Wi-Fi Modem	To enable remote system operation from smartphone	PWFMDD200
Extension cable for Wi-Fi Modem	To connect with Wi-Fi modem to the USB cable	PWYREW000
Thermistor for 2nd Circuit or E/Heater	To interlock with 2nd circuit operation and control temperature of main zone or To interlock with 3rd party E/Heater and control temperature of water out3rd party E/Heater.	PRSTAT5K10
Extension wire	To connect remote controller with Indoor PCB for communication	PZCWRC1
Cover Plate	To relocate remote controller from indoor unit	PDC-HK10
ESS	To control the operation mode according to the energy storage state	HOME 8 (PCS) : D008KE1N211 HOME10 (PCS) : D010KE1N211 HB7H (Battery) : BLGRESU7H HB10H (Battery) : BLGRESU10H
RS3 remote controller	To control unit with 2 remote controllers	PREMTW101
2-Remo Control Wire	The wire for 2 remo control	PZCWRC2

⚠ CAUTION

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

Accessories supported by 3rd party Companies

Item	Purpose	Specification
Solar Heating System	To generate auxiliary heating energy for water tank	• Solar collector • Solar pump • Solar Thermal Sensor : PT1000
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	• Mixing valve • Mix pump
3rd Party Boiler	To use auxiliary boiler.	
3rd Party Controller	To connect external controller using modbus protocol	
3way valve and actuator	(A) : To control water flow for hot water heating or floor heating / To control water flow when installing 3rd party boiler	3 wire, SPDT (Single Pole Double Throw) type, 230 V AC
2way valve and actuator	To block underfloor heating coil from cooling water	2 wire,NO(Normal Open) or NC(Normal Closed) type, 230 V AC
External Pump	To control the water flow at the rear of the buffer tank	
Smart Grid	To control operation mode depending on input signal from provider	
3rd Party ESS	To control the operation mode according to the energy storage state	
Antifreeze valve	To protect the pipes against freezing	
DHW Recirculation Pump	To control the water flow of DHW recirculation pump	

Before Installation

⚠ WARNING

Followings should be kept before installation
- Main power must be turned off during installing 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.

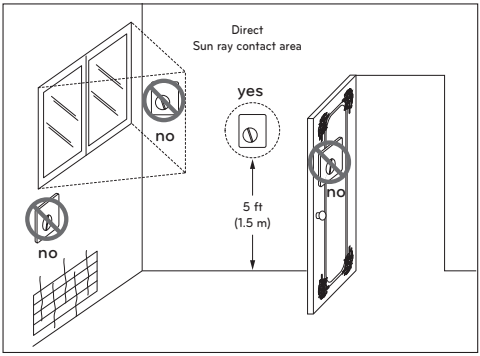
Installation condition

⚠ 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

General Information

The Heat Pump supports following thermostats.

Type	Power	Operating Mode	Supported
Mechanical (1)	230 V~	Heating Only (3)	Yes
		Heating / Cooling (4)	
		Heating / Cooling / DHW Heating (5)	
Electrical (2)	230 V~	Heating Only (3)	Yes
		Heating / Cooling (4)	
		Heating / Cooling / DHW Heating (5)	

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

(5) Thermostat generates "Heating ON or Heating OFF", "Cooling ON or Cooling OFF", "DHW Heating ON or DHW Heating OFF" signal according to user's heating, cooling and DHW heating 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.

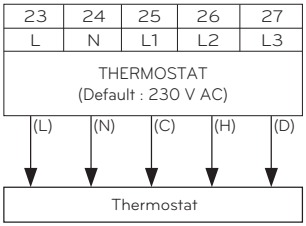
How to wire Heating / Cooling / DHW Heating thermostat

Follow below procedures Step 1 ~ Step 3.

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. Find terminal block and connect wire as below.



(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
(D) : DHW Heating signal from thermostat to PCB

⚠ 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.

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.
  - Only the water temperature setting is available and the other button input is prohibited.
  - In case of Heating / Cooling / DHW Heating thermostat, select 'Heat&Cool / DHW' as the Thermostat Control Type in the remote controller installer settings.
  - The product operates according to Thermo On / Off conditions of the thermostat and remote controller.

Thermo On / Off Condition		Product
Thermostat	Remote Controller	
Thermo Off	Thermo Off	Thermo Off
Thermo Off	Thermo On	Thermo Off
Thermo On	Thermo Off	Thermo Off
Thermo On	Thermo On	Thermo On

2nd Circuit

The 2nd circuit is a function that can separately control the circuit1 requiring high temperature and the circuit 2 requiring medium temperature, you need to prepare a separate Mix Kit. The mix kit must be installed in the circuit 2.

[Install Guide 2nd Circuit Heating]

Circuit 1 \ Circuit 2	Floor (35°C)	Convector (FCU, 45 °C)	Radiator (45 °C)	Radiator (55 °C)
Floor (35 °C)	O	O	O	O
Convector (FCU, 45 °C)	O	O	O	O
Radiator (45 °C)	O	O	O	O
Radiator (55 °C)	O	O	O	O

[Install Guide 2nd Circuit Cooling]

Circuit 1 \ Circuit 2	Floor (18 °C)	Convector (FCU, 5 °C)
Floor (18 °C)	O	O
Convector (FCU, 5 °C)	O	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.

※ For detailed 2nd circuit remote control settings, refer to 'Mixing Circuit' under [Chapter 9]

NOTE

Circuit 1 = Direct circuit : Zone where the water temperature is Highest when heating

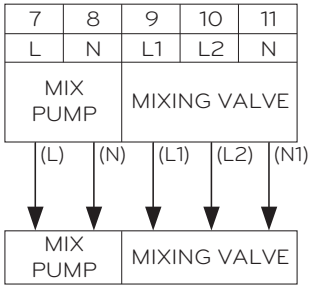
Circuit 2 = Mixing circuit : The other zone

How to Wire Mix Pump, Mixing Valve and Thermistor for 2nd Circuit

Follow below procedures Step 1 ~ Step 3.

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

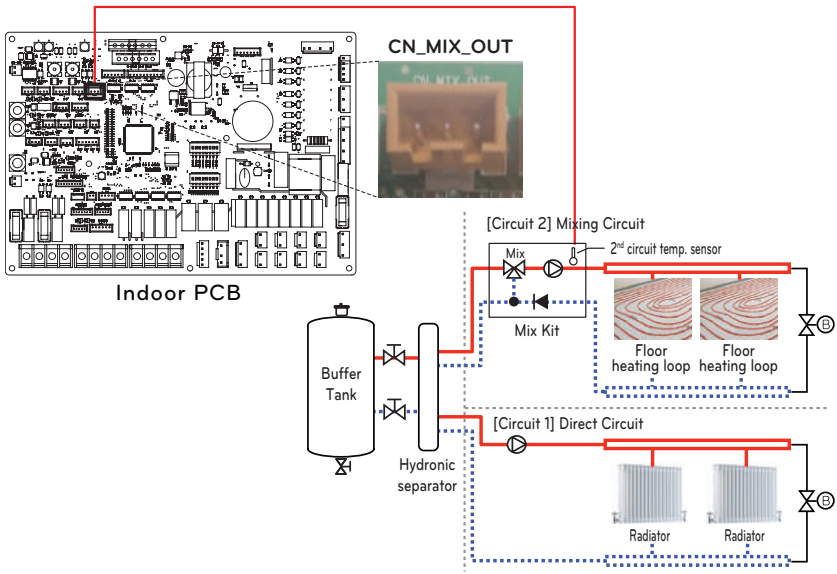
(L1) : Live signal (for Normal* Closed type) from PCB to mixing valve

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

(N1) : Neutral signal from PCB to mixing valve

*Closed = NOT Mixed

Step 3. Insert the temperature sensor to 'CN_MIX_OUT' (Brown) of the main PCB as shown below. The sensor should be mounted correctly to outlet pipe of mix kit water pump as shown below.



NOTE

2nd circuit temp. sensor is an accessory. (Model: PRSTAT5K10)

⚠ CAUTION

When connecting a pump of 1.05A or higher, its output must be used as a signal line only.

3rd Party Boiler

The product can be used by connecting an Auxiliary boiler. 3rd party boiler can be controlled by manually via remote controller or automatically itself by means of comparing the outside air temperature and the pre-set temperature.

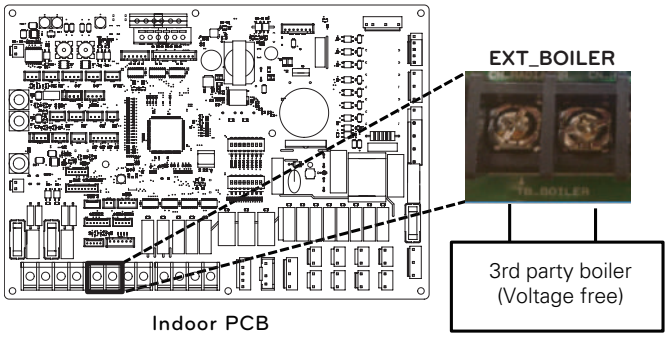
How to wire 3rd party boiler

Follow below procedures step 1 ~ step 3.

Step 1. Check if the power of the unit is turned off.

Step 2. Disassemble front panels and Distinguish terminal block in Indoor PCB.

Step 3. Connect Power cable to terminal block (TB_BOILER) fully.



3rd Party Controller

The product can also be linked to 3rd party controller. 3rd party boiler can be controlled by manually via RS3 remote controller or automatically itself by means of comparing the outside air temperature and the pre-set temperature.

How to wire 3rd party controller

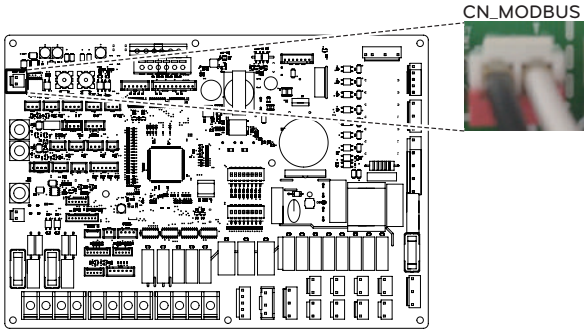
Follow below procedures step 1 ~ step 4.

Step 1. Check if the power of the unit is turned off.

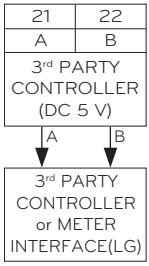
Step 2. Disassemble front panels and distinguish control box(Indoor) of the unit.

Step 3. Check if the harness(White) is inserted fully to the indoor unit PCB (CN_COM).

Step 4. Connect the 3rd party controller to terminal block 4(21/22) completely. (including Meter interface module)



Indoor PCB

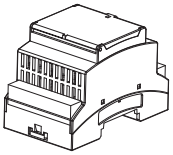


Meter Interface

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 controller. The meter interface module lets you know the amount of power generated by the product.

How to install Meter Interface

[Parts of Meter interface]



Meter interface body

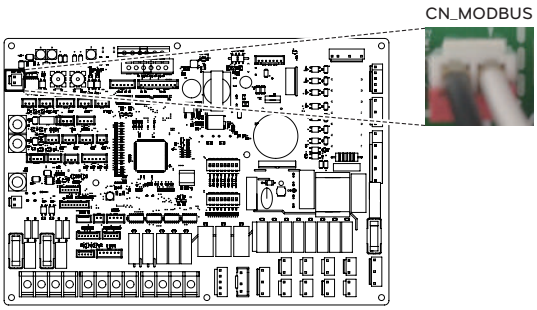
Follow below procedures step 1 ~ step 4.

Step 1. Check if the power of the unit is turned off.

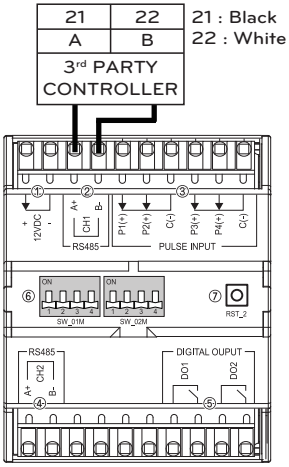
Step 2. Disassemble front panels and Distinguish control box(Indoor) of the unit.

Step 3. Check if the harness(White) is inserted fully to the indoor unit PCB (CN_COM).

Step 4. Connect the external pump to terminal block 4(21/22).



Indoor PCB



Meter interface

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 Install Central Controller

To use central controller, you need to establish an environment for mutual communication between central controller and the THERMA V and register the corresponding devices through the functions of central controller. To use central controller, it shall be installed in the following order.

Step 1. Installation environment inspection and device address setting
Before installing central controller, check the network for any interfacing devices and assign non overlapping addresses to the connected devices.

Step 2. PI485 setting
Install PI485 and set the DIP switch accordingly.

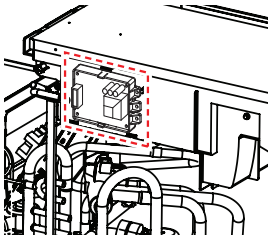
Step 3. Connections
Connect PI485 and central controller through RS-485 cable.

Step 4. Access and Device Registration
Log in to central controller and register device with address set.
Consult a qualified engineer/ technician for the installation of central controller. If you have any installation queries, contact the LG service center or LG Electronics.

How to Installation PI485

Fix the PI485 PCB as shown in below images.

For detailed installation method refer to PI485 Installation Manual



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

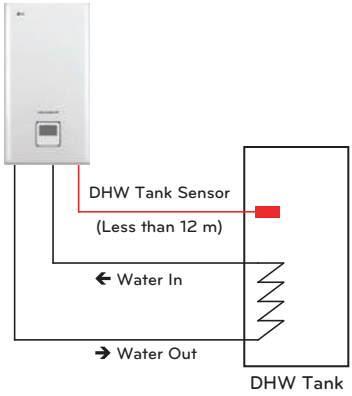
DHW Tank

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 DHW tank following considerations :

- DHW 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 DHW tank after installation. It ensures generating clean hot water.
- Near the DHW tank there should be water supply and water drain to easy access and maintenance.
- Set the maximum value of the temperature control device of DHW tank.



※ Water In / Water Out installation scene may vary depending on the model.

General Information

THERMA V. supports following 3way valve.

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

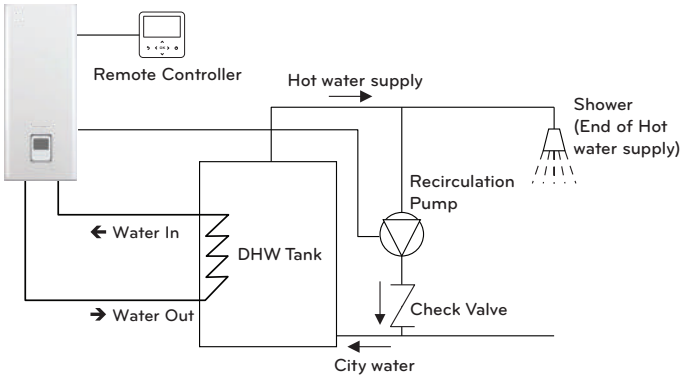
2) : 'Flow A' means water flow from the unit to under floor water circuit.

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

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 / R
  k : 1.2 ~ 1.5 is recommended. (If distance between pump and tank is far, then choose high number)
  V : Volume of DHW 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 DHW demand.



※ Water In / Water Out installation scene may vary depending on the model.

How to wire recirculation pump

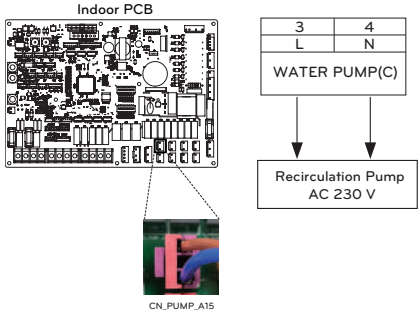
Follow below procedures step 1 ~ step 4.

Step 1. Check if the power of the unit is turned off.

Step 2. Disassemble front panels and distinguish control box(Indoor) of the unit.

Step 3. Check if the harness(Violet) is inserted fully to the indoor unit PCB (CN_PUMP_A15).

Step 4. Connect the DHW recirculation pump to terminal block 1(3/4).



⚠ CAUTION

When connecting a pump of 1.05A or higher, its output must be used as a signal line only.

How to Wire Booster 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.

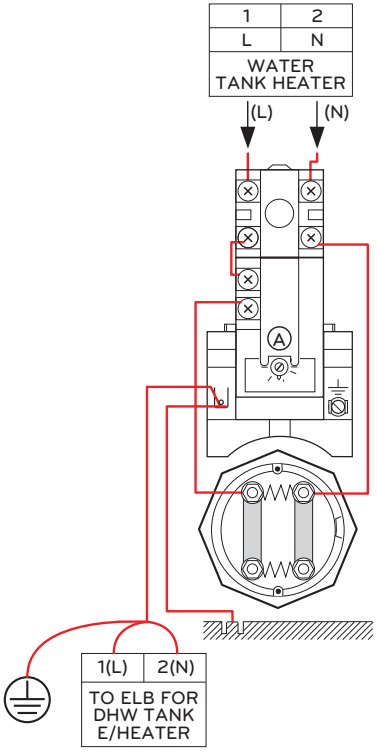
⚠ WARNING

Wire specification

- Cross-sectional area of the wire should be 6 mm^2.

Adjusting thermostat temperature

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

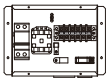


DHW Tank Kit

This product can be used by connecting the DHW tank kit in the field. It can be utilized hot water heated by booster heater in DHW tank.

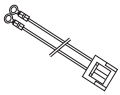
How to install DHW tank kit

[Parts of DHW Tank Kit]



Tank kit body

Sensor



Multi harness

Temperature sensor for DHW tank is used to control hot water temperature of DHW tank. If sensor will be defective, you can purchase it separately.(Model name : PHRSTA0)

Follow below procedures step 1 ~ step 4.

Step 1. Uncover DHW tank kit and locate it on the wall.

Step 2. Connect Harness of Main PCB assembly(TB1(6/7)) to 'CN_B_Heat_A' of the Main PCB like following fig. 1.

Step 3. Insert DHW tank sensor to 'CN_TH4' (Red) of the Main PCB refer as below.

Step 4. Connect power supply to the DHW tank kit as shown fig. 1.

❊ The sensor should be mounted correctly to the sensor hole of DHW water tank like below fig. 1.

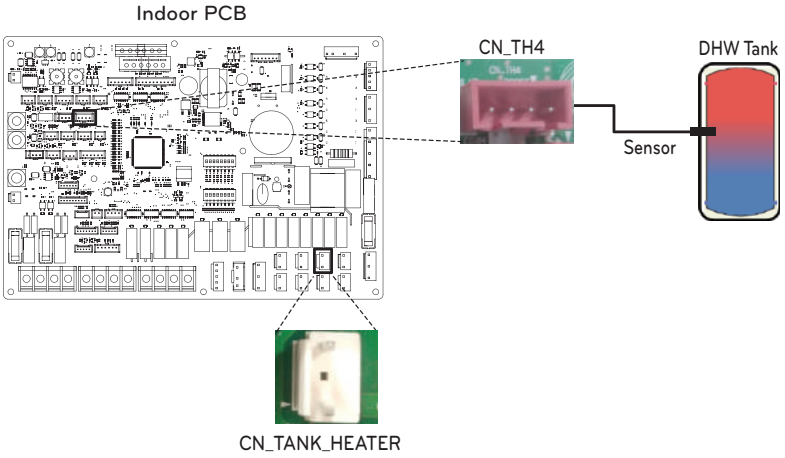
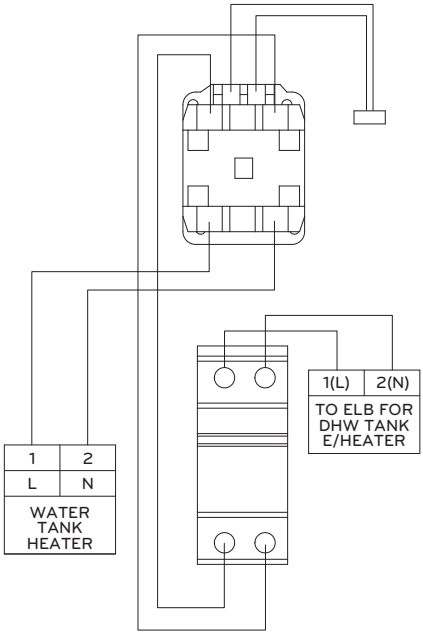
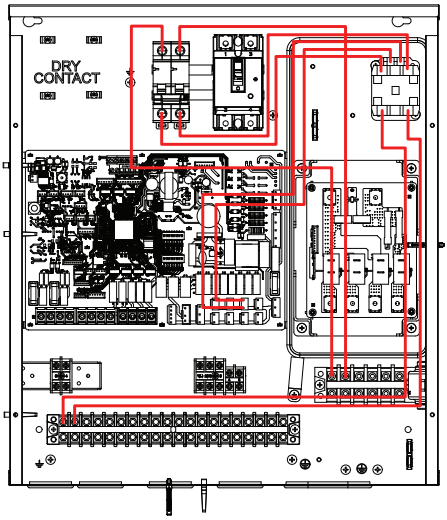


Fig. 1

Check Polarity





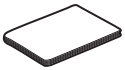
Solar Thermal Kit

This product can be used by connecting the solar thermal kit in the field. It can be utilized hot water heated by solar thermal system. End-user must be install solar thermal kit accessory(PHLLA) provided by LG.

How to Install Solar Thermal Kit

[Parts of Solar Thermal Kit]

Solar Thermal Sensor



Installation Manual

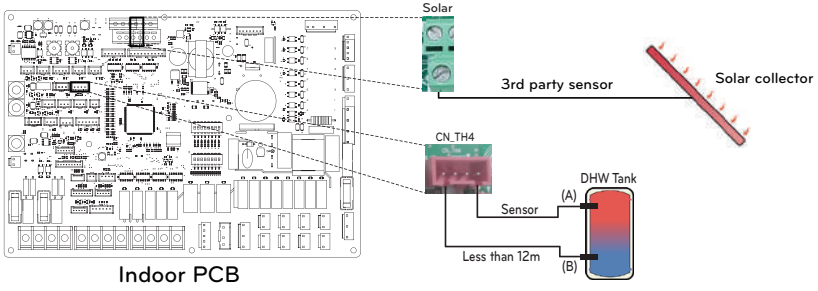
Follow below procedures step 1 ~ step 3.

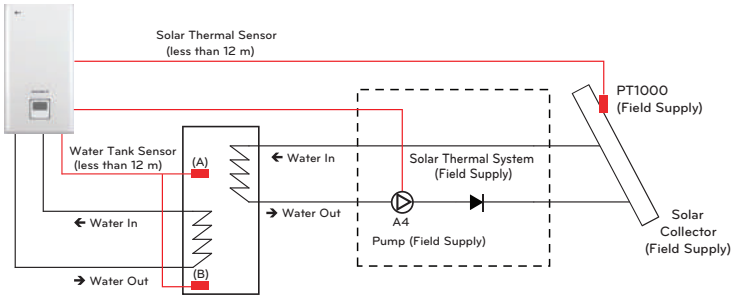
Step 1. Check if the power of the unit is turned off

Step 2. Disassemble front panels and distinguish control box(Indoor) of the unit.

Step 3. Insert harness into PCB fully and fix the thermal sensor.

❊ If the DHW tank sensor is connected, disconnect the sensor from PCB first.
Solar Thermal Sensor : PT1000 (Field Supply)





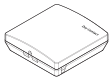
※ Water In / Water Out installation scene may vary depending on the model.

Dry Contact

Dry Contact is a solution for automatic control of HVAC system at the owner's best. In simple words, it's a switch which can be used to turn the unit On/Off after getting the signal from external sources.

How to install dry contact

[Parts of Dry contact]



Dry Contact body

Cable (for connecting with IDU)

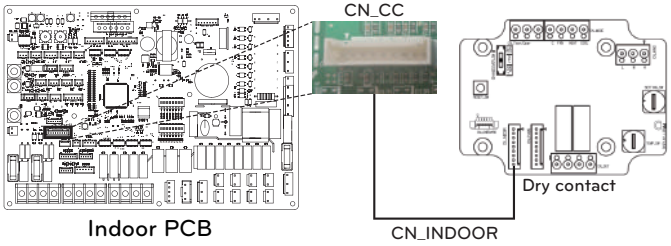
Follow below procedures step 1 ~ step 4.

Step 1. Check if the power of the unit is turned off.

Step 2. Disassemble front panels and distinguish terminal block in Indoor PCB.

Step 3. Connect cable to the unit PCB(CN_CC) fully.

Step 4. Then, Insert harness to the dry contact PCB(CN_INDOOR) firmly as shown below.

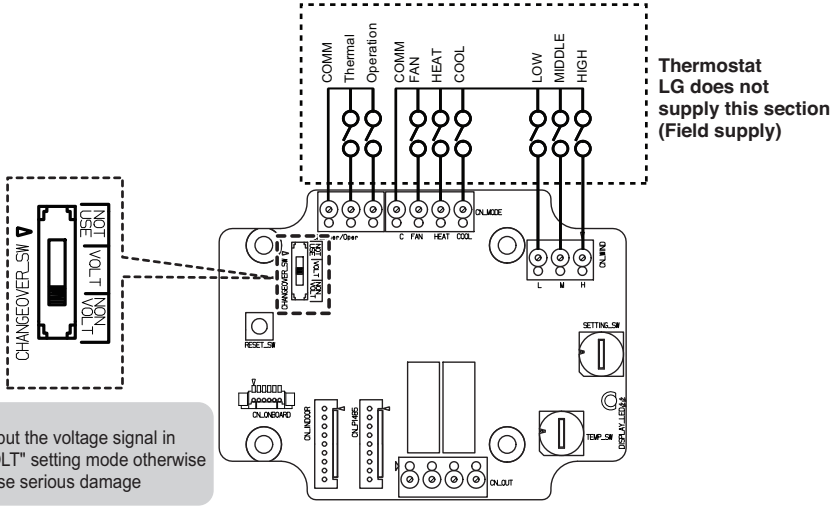


NOTE

- For more information about installing Dry Contact, Please refer installation manual provided with Dry Contact.
- For more settings about Dry Contact, Please refer to "Dry Contact Mode / CN_CC / CN_EXT" that installer setting part.

[Setting of Contact Signal Input]

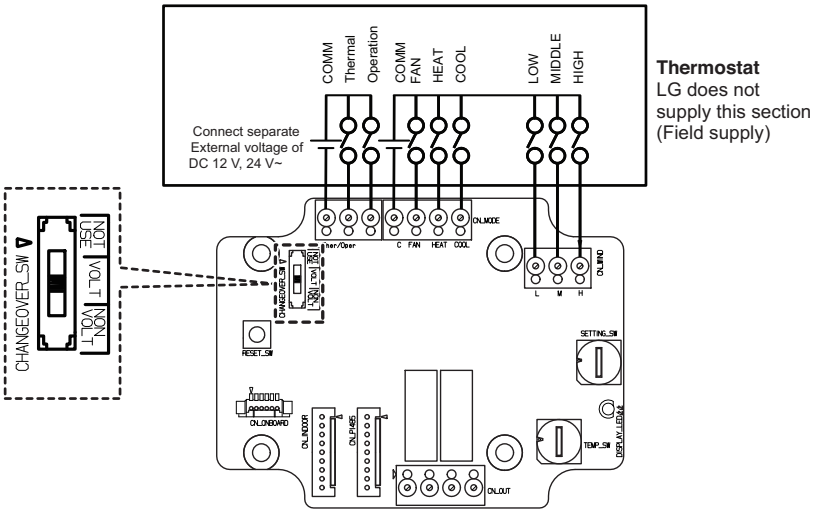
• For input contact closure only(No power input)



Notes

Do not input the voltage signal in "NON VOLT" setting mode otherwise it will cause serious damage

• For input contact voltage : DC 12 V, 24 V~



Setting_SW Setting

- Normal (0) : Possible to be controlled by the remote controller.
- Forced (1) : Not possible to be controlled by the remote controller.
- There is no OPER_SW setting that each input signal is disabled.

External Controller - Setting up programmable digital input operation

If you require to control depending on external digital input(ON/OFF), connect cable to indoor PCB(CN_EXT).

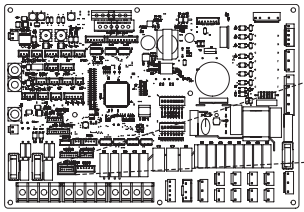
Follow below procedures step 1 ~ step 4.

Step 1. Check if the power of the unit is turned off.

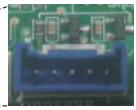
Step 2. Disassemble front panels and distinguish control box(Indoor) of the unit

Step 3. Connect the external controller to PCB(CN_EXT) completely.

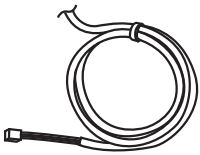
Step 4. Connect the cable and field installation part.



Indoor PCB

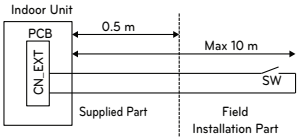


CN_EXT



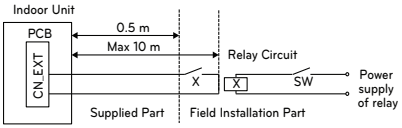
Adapter Cable

Installation example #1



- SW : Single pole switch
  - Select a part with contacts for extremely low amperage
  - DC 5 V ~ 12 V is used at the contact point
  - Switch load is approximately 0.5 ~ 1 mA
- Control cable
  - Cable size : 22 to 26 AWG
  - Don't extend the cable more than 10 meters

Installation example #2



- X : Relay (a point of contact, fixed DC 0.5 ~ 1 mA)
- SW : Distance ON/OFF switch
- Control cable (Indoor unit to Relay Circuit)
  - Cable size : 22 to 26 AWG
  - Don't extend the cable more than 10 meters

Remote Temperature Sensor

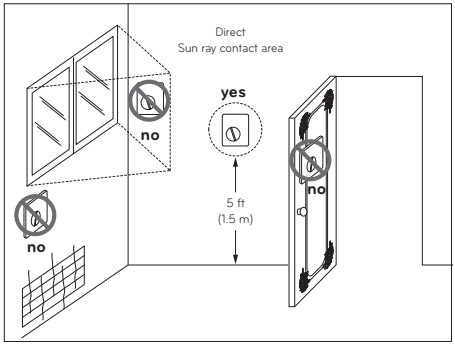
Remote temperature sensor can be installed any place a user wants to detect the temperature.

- The function is not available for some products.

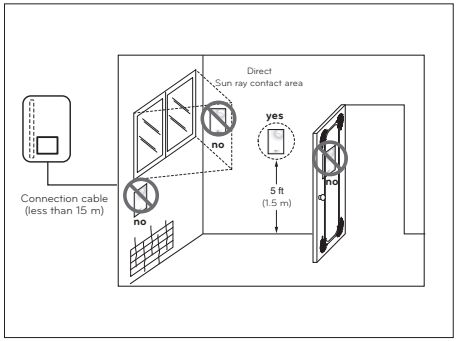
Installation condition

Role and constraint while installation of remote air temperature sensor is very similar to that of thermostat.

- Distance between the unit and the remote air temperature sensor should be less than 15 m due to length of the connection cable of remote air temperature sensor.
- For other constraints, please refer to previous page where constraints about thermostat is described.



Thermostat



Remote Air Temperature Sensor

How to Install Remote Temperature Sensor

[Parts of Remote Temperature Sensor]

Cable

Screw(to fix remote sensor)

Installation Manual

Follow below procedures step 1 ~ step 6.

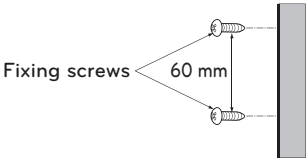
Step 1. Decide where the remote temperature sensor is Installed. Then, Determine the location and height of the fixing screws in fig. 1 (Interval between the screws : 60 mm)

Step 2. Check if the power of the unit is turned off.

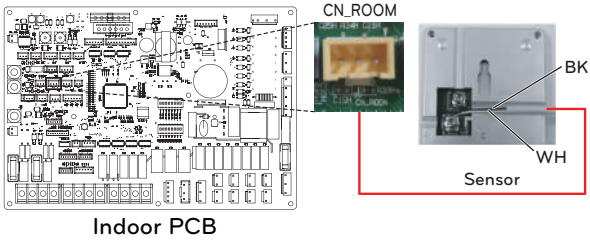
Step 3. Disassemble front panels and distinguish control box(Indoor) of the unit.

Step 4. Insert temperature sensor into PCB(CN_ROOM) and fix the sensor firmly in fig. 2.

Step 5. The Connection wire does not matter if you change the color of the wire because of nonpolar.

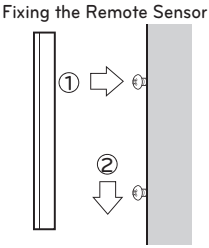


[fig. 1]



[fig. 2]

Step 6. Integrate the remote temperature sensor with the screws as the order of arrows.



⚠ CAUTION

- Choose the place where the average temperature can be measured for the unit operates.
- Avoid direct sunlight.
- Choose the place where the cooling/heating devices do not affect the remote sensor.
- Choose the place where the outlet of the cooling fan do not affect the remote sensor.
- Choose the place where the remote sensor isn't affected when door is open.

NOTE

- For more information about installing Remote Temperature Sensor, Please refer installation manual provided with Remote Temperature Sensor.
- For more settings about Remote Temperature Sensor, Please refer to 'Select Temperature Sensor / Air cooling set temp. / Air heating set temp. / TH on/off Variable, heating air / TH on/off Variable, cooling air' that 'installer setting' part.
- Set DIP switch No. 5 of option switch 2 to ‘ON’ in order to use remote temperature sensor.

LG Electronics Inc. Single Point of Contact (EU/UK) :
LG Electronics European Shared Service Center B.V.
Krijgsman 1, 1186 DM Amstelveen, The Netherlands

Manufacturer :
LG Electronics Inc.
84, Wanam-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, KOREA

LG Electronics Tianjin Appliances Co.,Ltd.
No. 9 Jin Wei Road, Bei Chen District, Tianjin, 300402, P.R. China

UK Importer :
LG Electronics U.K. Ltd
Velocity 2, Brooklands Drive, Weybridge, KT13 0SL

Eco design requirement

- The information for Eco design is available on the following free access website.
  https://www.lg.com/global/support/cedoc/cedoc