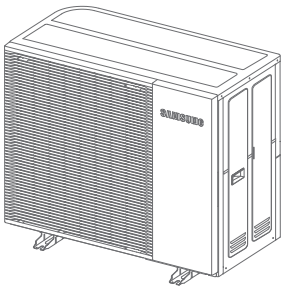
EHS

Installer Reference Guide Book

EHS Mono for Europe
(R-290, 50Hz, HP)



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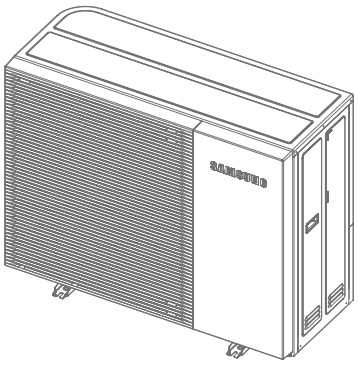
AE080CXYDEK
AE080CXYDGK



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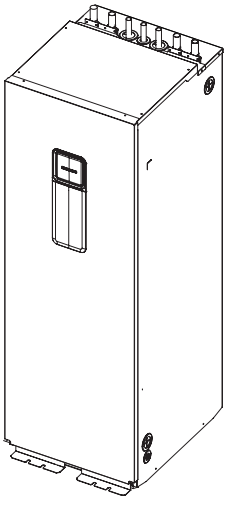

AE200CNWMEG
AE260CNWMEG
AE260CNWMGG

SAMSUNG

Version	Modification	Date	Remark
Ver.1.0	Release the EHS IRG R-290	23.09.06	
Ver.2.0	Update the Mono to some data (Safety information, FSV4013, Water quality, R-pro etc.)	23.12.13	

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1. Safety information

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1.1 General

- All instructions and installation suggestions in this manual are intended for safe installation of the equipment. Installers and service engineers shall establish appropriate health and safety practices and determine the applicability of regulatory limitations based on the following descriptions before use.
- This unit contains a high flammable refrigerant, R-290. There is a high risk of fire and or explosion in case of leakage. Be sure to follow the storage, installation, maintenance instructions.
- Always disconnect the air to water heat pump from the power supply before servicing it or accessing its internal components.
- Verify that installation and testing operations are performed by qualified personnel.
- Verify that the air to water heat pump is not installed in an easily accessible area (vandalism/ sabotage/ other harmful activities).
- Carefully read the content of this manual before installing the air to water heat pump and store the manual in a safe place in order to be able to use it as a reference after the installation.
- For maximum safety, installers shall always carefully read the following warnings.
- Store the user and installation manual in a safe location and remember to hand it over to the new owner if the air to water heat pump is sold or transferred of ownership.
- This manual explains how to install an outdoor unit and connecting it to the indoor part.
  Use of other types of devices with the control system may damage the device and void the warranty.
  The manufacturer shall not be responsible for damages arising from noncompliant units or parts.
- The manufacturer shall not be responsible for damage originating from unauthorized changes or the improper connection of electric and hydraulic lines. Failure to comply with these instructions or to comply with the requirements outlined in the “Operating limits” table included in the manual shall immediately invalidate the warranty.
- To prevent serious system damage and user injuries, precautions and other notices shall be observed.
- Failure to comply with these instructions or to comply with the requirement on the Operating Range (Heat: -25~35°C/ DHW -25~43°C/ Cool: 10~46 °C) outlined in the Product Specification shall immediately invalidate the warranty.
- Do not use the units if you see some damages on the units and recognize something problematic such as loud noise or smell of burning.
- To prevent electric shocks, fires or injuries, always stop the unit, ultimately rendering the product powerless. Contact Samsung’s technical support if the unit produces smoke, if the power cable is hot or damaged or if the unit is very noisy.
- Always remember to inspect the unit, electric connections, refrigerant pipework and protections regularly.
  These operations shall be performed by qualified personnel only.
- The unit contains moving and electrical parts, which should always be kept out of the reach of children.
- Do not attempt to repair, move, alter or reinstall the unit by unauthorized personnel. These operations may cause product damage, electric shocks, and fires.
- Do not place containers with liquids or other objects on the unit. Never sit or stand on the product.
- All the materials used for the manufacturing and packaging of the air to water heat pump are recyclable.
- The packaging material and used batteries of the remote controller (optional) must be disposed of in accordance with local regulations.
- Always make sure that the power supply is compliant with local safety standards.

- For use in Europe: This appliance can be used by children aged 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning the use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be done by children without supervision.
- 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 the appliance use by a person responsible for their safety. Children should be supervised to ensure they do not play with the appliance.
- Be sure not to perform power cable modification, extension wiring, and multiple wire connection.
  - It may cause electric shock or fire due to poor connection, poor insulation, or current limit exceedance.
  - When extension wiring is required due to power line damage, refer to “How to connect your extended power cables” in the installation manual.
- Do not use means to accelerate the defrosting operation or to clean, other than those recommended by Samsung.
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odour.
- Determine the installation location regarding the conditions cited in this reference guide and obtain the user’s approval.
- The outdoor unit must not be placed on its side or upside down, as the compressor lubrication oil will run into the cooling circuit and seriously damage the unit.
- Combine R-290 products only or an error signal appears and the products will not operate. Check with the compatibility table as provided by Samsung.
- The product contains the combustible refrigerant R-290.
  In the event of a leak, escaping refrigerant may mix with air to form a flammable atmosphere.
  There is a risk of fire and explosion.
- The product is the external part for an air-water heat pump with monoblock construction.
- Make sure to safely dispose of packaging materials. Packaging materials, such as nails and other metal or wooden pallets may cause injuries to humans and animals by unsafe disposal
- The product uses the outside air as a heat source and can be used for heating a residential building as well as for hot water production.
- The exhaust air from the product must be able to vent freely and cannot be used for other purposes.
- The product is intended exclusively for outdoor installation.
- The product is intended exclusively for use in households.
- Do not make any changes.
- Ensure that there are no ignition sources, such as plug sockets, light switches, lamps, electrical switches or other permanent ignitions sources, in the protective zone.
- Do not use any sprays or other combustible gases in the protective zone.
- Never remove, bridge or block the safety devices.
- Do not tamper with any of the safety devices.
- Do not damage or remove any tamper-proof seals on components.
- Do not make any changes:

  - The product itself.
  - To the supply lines.
  - On the drain pipework.
  - On the expansion relief valve for the heat source circuit.
- A safety zone is defined for the area close to the outdoor unit, where special restrictions apply when working. Leaked R-290 refrigerant can form a flammable or explosive atmosphere in the surrounding air.
  - Refrigerant must not flow into the building through building openings.
  - Before starting work, make sure not to generate static electricity through grounding.
- Before starting work on the refrigerant circuit, perform the following actions:
  - Check the refrigerant circuit for leaks.
  - Ensure that the floor space is well ventilated and maintain this condition while working.
  - Inform the next persons of the work to be performed in advance:
    - All maintenance personnel.
    - Everyone around the system.
  - Check if there are any inflammable materials and sources of ignition around the outdoor unit, and remove all inflammable materials and sources of ignition.
  - Before, during, and after work, use the R-290 refrigerant detector to check for refrigerant leaks around.
  - This refrigerant detector must not generate sparks and must be properly sealed.

1.2 Installing the unit

NOTE

- When installing the unit, remember to firstly connect the water pipework, then the electrical lines. Always disassemble the electric lines before the water pipework
- For safety zone details of R-290 refrigerant, see 5. Unit installation chapter.

- Upon receipt, inspect the product to verify that it has not been damaged during transport. If the product appears damaged, do not install it, as the refrigerant may leak. A leaking product should be moved to a safe outdoor place. There should be no ignition source within 6 meters. Products should be located where the refrigerant can be safely removed or professionally removed and discarded by service technicians. Immediately report the damage to the supplier of the Samsung products (distributor/retailer/ local Samsung branch office)
- After completing the installation, always carry out a functional test (commissioning, including reporting) and provide instructions on how to operate the air to water heat pump to the user.
- Do not use the air to water heat pump in environments with hazardous substances or close to equipment that releases open flames to avoid the occurrence of fires, explosions or injuries.
- While in installation or relocation of the product, do not mix the refrigerant with other gases including air or unspecified refrigerant. Failure to do so may cause pressure increase resulting in an explosion, rupture or injury.
- Do not cut or burn the refrigerant container or pipework.

- Use only suitable and clean service equipment such as the manifold gauge, vacuum pump, and charging hose of the R-290 refrigerant. Make sure that any pump and leakage detection device must be suitable for safely working with R-290 refrigerant.

WARNING

- Failing to do so, may result in fire, explosion, property damage, personal injury or death

- Installation must be carried out by qualified persons to handle the refrigerant. Additionally, refer to the regulations and laws.
- Be careful not to let foreign substances (lubricating oil, refrigerant other than R-290, water, etc.) enter the refrigerant circuit.
- Products should be installed outdoors with natural ventilation.
- For disposal of the product, follow the local laws and regulations.
- Do not work in a confined or unvented place.
- The work area must be surveyed and inspected prior to any service work, correctly vented and treated always as if the equipment is leaking. The area around the working space must be sectioned off properly.
- The product and the hydraulic system shall be installed in the position where there are no substances that may result in corrosion.
- The following checks shall be performed for installation:
  - There must be a suitable gas detector to look for refrigerant leaks.
  - Notify all workers of work contents.
  - Install “No smoking” and “Do not enter the area” signs.
  - Receive a work permit from manager and work.
  - Do not store flammable materials in the workplace.
  - There should be no sources of ignition anywhere in the workplace.
  - Appropriate fire extinguishing equipment (CO2 or drypowder type) should be located nearby and conveniently located.
  - The refrigerant discharged must be sufficiently dispersed and ventilated.
  - The work area should be appropriately ventilated before working on the refrigerant circuit, brazing, or handling electrics.
- To purge air in the refrigerant piping, be sure to use a vacuum pump suitable for handling R-290.
- Note that the refrigerant has no odour.
- The units are not explosion proof so they must be installed with no risk of explosion.
- For installation with handling the refrigerant (R-290), use dedicated tools and piping materials.
- Servicing and installation shall be performed as recommended by the manufacturer. In case other skilled persons are joined for servicing, it shall be carried out under supervision of the person who is competent in handling flammable refrigerants.
- Safety checks are required to minimize the ignition risk for servicing the units containing flammable refrigerants.

- Servicing shall be performed following the controlled procedure to minimize the risk of flammable refrigerant or gases.
- Do not install the unit where there is a risk of combustible gas leakage.
- Do not place the unit near heat sources.
- Be cautious not to generate a spark as follows:
  – Do not remove the fuses with power on.
- If the indoor unit is not R-290 compatible, an error signal appears and the unit will not operate.
- After installation, check for leakage. Toxic gas may be generated if it comes into contact with an ignition source such as the fan heater, stove, and cooker.
- In order to service the product, collect the refrigerant in vacuumed recovery cylinders.
- Never directly touch any accidental leaking refrigerant. This could result in severe wounds caused by frostbite.

1.3 Caution of Ignition sources

- Appropriate fire extinguishing equipment should always be available during any type of hot work.
- A dry powder or CO_2 fire extinguisher must be available near the charging area. Please comply with local rules and regulations regarding working with open flames. Always respect waiting times and requirements regarding the type and quantity of the extinguishing equipment.
- Make sure to store the units in a place without continuously operating ignition sources (for example, open flames, an operating gas appliance or an operating electric heater).
- The service engineers shall not use any ignition sources with the risk of fire or explosion.
- Potential ignition sources shall be kept away from the work area where the flammable refrigerant can possibly be released to the surrounding.
- The work area should be checked to ensure that there are no flammable hazards or ignition risks. The “No smoking” sign shall be attached.
- Under no circumstances shall potential sources of ignition be used while in the detection of leakage.
- Make sure that the seals or sealing materials have not degraded.
- Safe parts are the ones with which the worker can work in a flammable atmosphere. Other parts may result in ignition due to leakage.
- Replace components only with parts specified by Samsung. Other parts may result in the ignition of refrigerant in the atmosphere from a leak. In the case of electric components replacement, care should be taken to ensure that electrical terminals, including capacitor terminals, are adequately tightened and secured against loosening and that adequate insulation is provided to avoid live parts shorting together.
- Make sure that the work area is well ventilated before performing a hot work.
- Ventilation of the installation areas must be maintained during the work.
- The ventilation should safely disperse any released gases and preferably expel them into the atmosphere.

1.4 Leakage detection and refrigerant recovery

- The leakage detector shall be calibrated in a refrigerant-free area.
- Make sure that the detector is not a potential source of ignition.
- Leak detector shall be set at percentage of LFL of the refrigerant and shall be calibrated to the refrigerant employed and the appropriate percentage of the of gas (25% maximum) is confirmed.
- The use of detergents containing chlorine shall be avoided for cleaning because the chlorine may react with the refrigerant and corrode the pipings.
- If leakage is suspected, open flames must be extinguished immediately.
- If a leakage is found while in brazing, the entire refrigerant shall be recovered from the product or isolated (e.g. using shut-off valves). It shall not be directly released to the environment. Oxygen free nitrogen (OFN) shall be used for purging the system before and during the brazing process.
- The work area shall be checked with an appropriate refrigerant detector before and during work.
- Ensure that the leakage detector is appropriate for use with flammable refrigerants.

Labelling

- The parts shall be labeled to ensure that they have been decommissioned and emptied of refrigerant.
- The labels shall be dated.
- Make sure that the labels are affixed on the system to notify it contains flammable refrigerant.

Refrigerant recovery

- When removing refrigerant from the system for servicing or decommissioning, it is recommended to remove the entire refrigerant.
- When transferring refrigerant into cylinders, make sure that only the refrigerant recovery cylinders are used.
- All cylinders used for the recovered refrigerant shall be labelled.
- Cylinders shall be equipped with pressure relief valves and shut-off valves in a proper order.
- The recovery system shall operate normally according to the specified instructions and shall be suitable for refrigerant recovery.
- In addition, the calibration scales shall operate normally.
- Hoses shall be equipped with leak-free disconnect couplings.
- Before starting the recovery, check for the status of the recovery system and sealing state. Consult with the manufacturer if suspected.
- The recovered refrigerant shall be returned to the supplier in the correct recovery cylinders with the Waste transfer note attached.
- Do not mix refrigerants in the recovery units or cylinders.
- If compressors or compressor oils are to be removed, make sure that they have been evacuated to the acceptable level to ensure that flammable refrigerant does not remain in the lubricant.

1.5 Installation location requirement of indoor unit

- The unit shall be installed in an open space that is always ventilated.
- The local gas regulations shall be observed.
- For installation inside a building (this applies either to indoor or outdoor units installed inside) a minimum room floor area of space conditioned is mandatory according to IEC 60335-2-40:2018 (see the reference table into either the indoor or outdoor unit installation manual).
- To handle, purge, and dispose the refrigerant, or break into the refrigerant circuit, the worker should have a certificate from an industry-accredited authority.

1.6 Installation location requirement of outdoor unit

- Wear protective gloves to unpack, move, install, and service the unit to avoid your hands being injured by the edge of the parts.
- Do not touch the internal parts (water pipes, refrigerant pipes, heat exchangers, etc.) while running the units. And if you need to adjust and touch the units, please observe enough time for the unit to cool down and wear protective gloves.
- In case of refrigerant leakage, try to avoid getting in contact with the refrigerant because this could result in severe wounds.
- When you install the air to water heat pump in a small room, you must consider proper ventilation to prevent a leakage level within the maximum permissible limit.
  - As refrigerant is heavier than air, it may lead to suffocation by absence of oxygen.
  - Make sure to safely dispose of packing materials. Packing materials, such as nails and other metal or wooden pallets may cause injuries to humans and animals by unsafe disposal.
  - Our units shall be installed in compliance with the spaces described in the installation manual, to ensure accessibility from both sides and allow repairs or maintenance operations to be carried out. If the units installed without complying with procedures described in manual, additional expenses can be asked because special harnesses, ladders, scaffolding or any other elevation system for repair service will not be considered part of the warranty and will be charged to the end customer.
- Make sure that (thaw) water runs correctly and unhindered out of the unit at low ambient temperature. If the drainage is exposed to subzero temperatures, additional protection must be taken by the installer, such as installing heater cables in the drain piping. Failing to do so, may cause severe damage to the product and potential leakages of refrigerant into the environment.
- Install the power cable and communication cable of the indoor and outdoor unit at least 1m away from other electric appliances.
- Protect the unit from rats or small animals. If an animal makes contact with the electric parts, it can cause malfunctions, smoke or fire. Please instruct the customer to keep the area around the unit clean.
- Do not disassemble and alter the heater at your own discretion.
- Wear protective equipment (such as safety gloves, goggles, and headgear) during installation and maintenance works.
- If the installation/repair technicians are not equipped with protective equipment, injure or threat may happen.
- 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 the appliance use by a person responsible for their safety. Children should be supervised to ensure they do not play with the appliance.

- Oil shall be drained safely from the system.
- To prevent ignition, never install motor-driven equipment close to the unit.
- Empty recovery cylinders shall be evacuated and cooled before recovery.
- The applicable local, National, and European regulations shall be observed.

2. Handling the box

2. Handling the box

This chapter describes what needs to be done after the boxes with the outdoor and indoor unit are delivered on-site.

CAUTION

(Transportation)

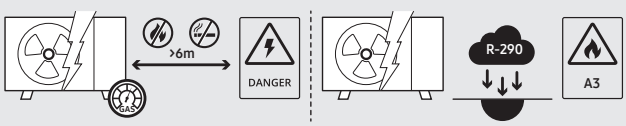
- Directly after delivery, the unit must be checked for (transport) damage. Any damage must be reported immediately to the applicable distributor of the Samsung products. After inspection, the protective wrapping and box must be put back correctly in order to protect the product.
- It is important to protect the product, therefore transport the product in the protective packaging and keep covered until final installation.
- The position of products : it is crucial to transport it upright. It must stand on dry and horizontal surface. It is especially important when you transport used equipment. Different approach may cause a permanent damage of the product.
- Assure adequate ventilation during transportation.
- Transportation is only permitted in unblemished packaging.
- Store heat pumps above ground level with a natural ventilation exit to the ambient.
- Avoid ignition sources such as sparks, smoking, etc.
- A powder fire extinguisher (>2 kg) must be carried on board.
- A gas detector is recommended to be included in each transport unit in case of consistent transporting of large volumes of heat pumps containing flammable refrigerants.

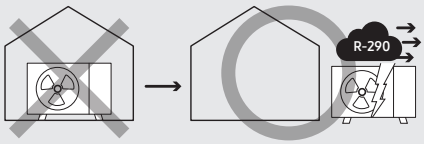
(Storage)

- The storage area must have no sources of ignition
- Store on the ground with natural ventilation
- Sufficient air must be supplied during storage.
- Store the outdoor unit only in its factory packaging.
- The maximum number of products that can be stored together in one location is subject to local regulations.

WARNING

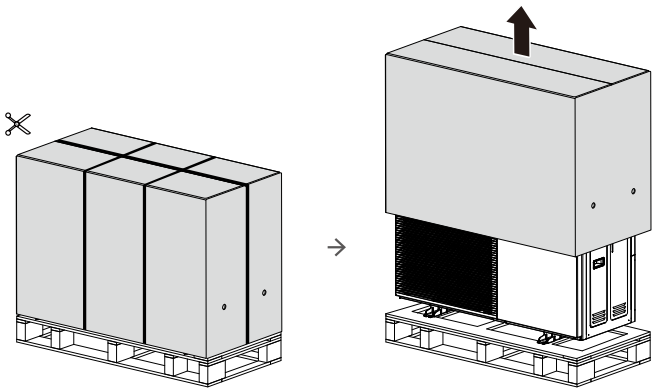
- If damage occurs during transportation, the dangerous goods must be taken immediately to a safe outdoor location. There must be no ignition sources within a distance of 6 meters. The unit must be located where the refrigerant can escape safely or be professionally emptied and disposed of by a service technician.





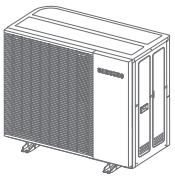
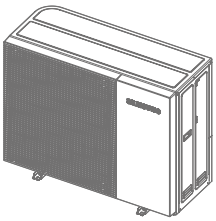
2.1 Outdoor unit

Unpacking the outdoor unit



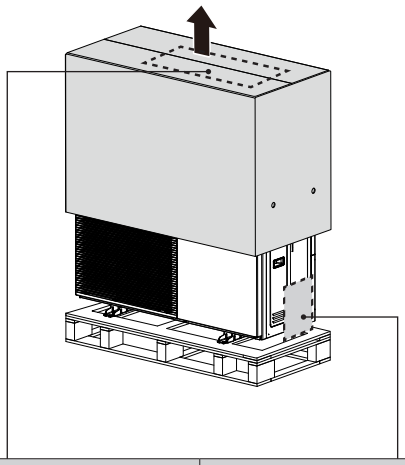
Product line-up and accessories

Product line-up

Outdoor unit		
Chassis		
Model name	AE050CXYDEK AE080CXYDEK, AE080CXYDGK	AE120CXYDEK, AE120CXYDGK AE160CXYDEK, AE160CXYDGK

Accessories

- Keep supplied accessories until the installation is finished.
- Hand the installation manual over to the customer after finishing installation.



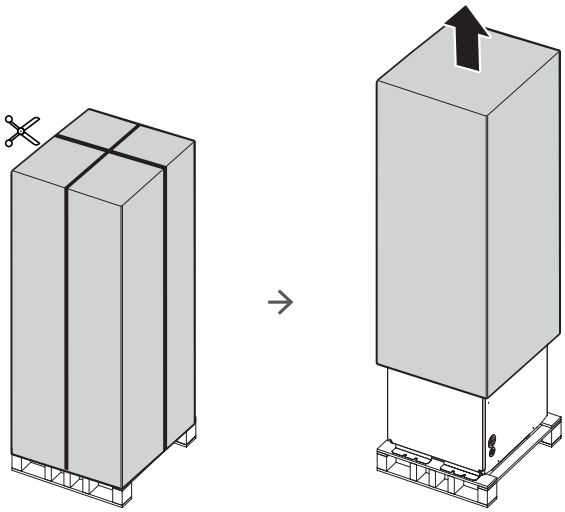
No.	Product name	Shape	Quantity
①	Installation manual		1
②	Instruction manual		1
③	Drain plug		1
④	Rubber leg		4
⑤	Drain cap		1

Hand tool sets (field supply)

No.	Product name	Shape	Quantity
①	(+) Screw driver		1
②	Adjustable wrench		1
③	(-)Screw driver		1
④	Nipper		1
⑤	Electric motion driver		1
⑥	L-Wrench		1
⑦	Torque Wrench		1
⑧	latchet Wrench		1

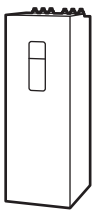
2.2 Indoor unit

Unpacking the indoor unit

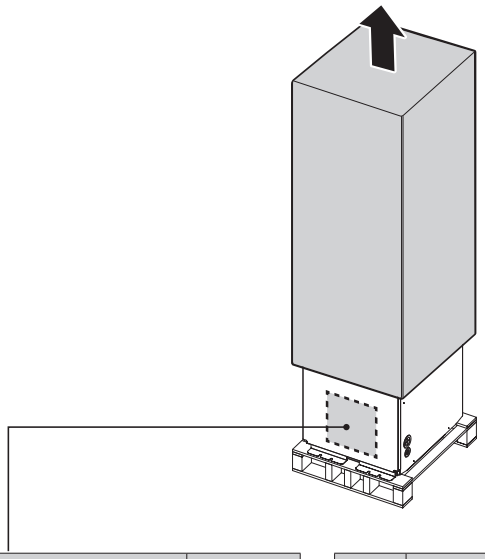


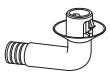
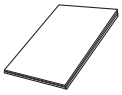
Product line-up and accessories

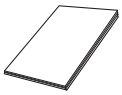
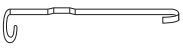
Product line-up

Indoor unit	
Tank Integrated hydro unit	
Model name	AE200CNWMEG, AE260CNWMEG, AE260CNWMGG

Accessories

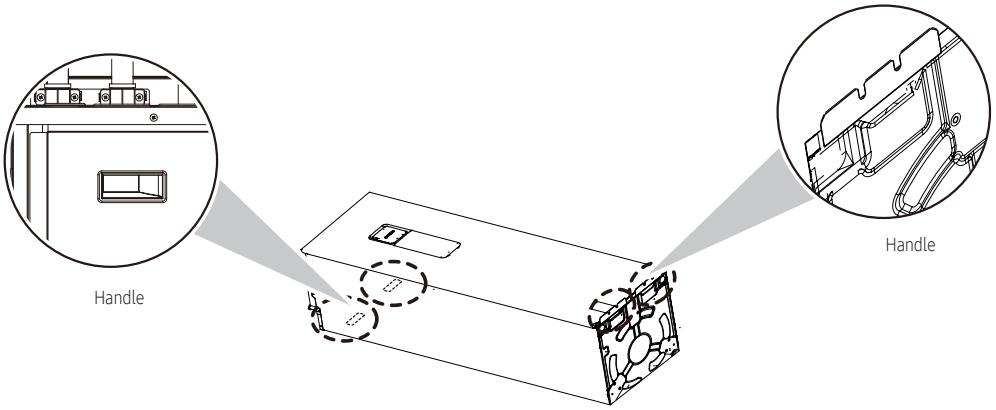


No.	Product Name	Shape	Quantity
①	Rubber tape for zone sensor and mixing valve		3
②	Insulator for zone sensor and mixing valve		3
③	Connector wire-PV Control/Peak power control (1x2 m, RED)		1
④	Tube secondary (only for 260 L Tank model)		1
⑤	Gasket (only for 260 L Tank model)		1
⑥	Drain-plug out		1
⑦	Cap-drain		2
⑧	Installation manual		1

No.	Product Name	Shape	Quantity
⑨	Instruction manual		1
⑩	Zone sensor (1x10m, WH)		2
⑪	Temperature sensor for mixing valve (1x15m, BLU)		1
⑫	Sensor holder of zone sensor and mixing valve		3
⑬	Sensor clip of zone sensor and mixing valve		3
⑭	Cable-tie for zone sensor and mixing valve		6
⑮	Aluminum tape for zone sensor and mixing valve		3

To handle the indoor unit

- Use the handles at the back and at the bottom to carry the unit



3. Unit combination

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3.1 Nomenclature

Model name

AE	080	C	X	Y	D	E	K	/	EU
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		Buyer

(1) Classification

AE	EHS
AC	CAC
AM	DVM
AJ	FJM (Free Joint Multi)

(2) Capacity

(for outdoor unit) X 1/10 kW (3 digits)
(for tank integrated hydro unit) X Liter (3 digits)

(3) Version

C	2023
B	2022
A	2021
T	2020

(4) Unit

S	SET
N	Indoor Unit
X	Outdoor Unit

(5) Product notation (Outdoor unit)

Y	Mono
E	Split
T	TDM Plus
Product notation (Indoor unit)	
W	Tank integrated hydro unit
Y	Wall mounted hydro unit
A/X	RAC wall mounted
J	Console
L	LSP Duct
M	MSP Duct

(6) Feature (Outdoor unit)

D	Deluxe
P	Premium
Feature (Indoor unit)	
M	Mono
S	Split
T	TDM Plus
D	Deluxe
P	Premium

(7) Rating voltage

E	220~240V, 50Hz, 1Φ
G	380~415V, 50Hz, 3Φ

(8) Mode

G	Heat Pump (R32)
H	Heat Pump (R410A)
K	Heat Pump (R-290)

3.2 Unit combination

Indoor unit / Outdoor unit compatibility(Mono)

				Indoor unit		
				Tank integrated hydro unit (Mono)		
				200L(1Φ)	260L(1Φ)	260L(3Φ)
Type	Power Source	Model name	Capa.	AE200CNWMEG/EU	AE260CNWMEG/EU	AE260CNWMGG/EU
Outdoor unit	1Φ	AE050CXYDEK	5kW	●		
		AE080CXYDEK	8kW	●	●	
		AE120CXYDEK	12kW	●	●	
		AE160CXYDEK	16kW	●	●	
	3Φ	AE080CXYDGK	8kW			●
		AE120CXYDGK	12kW			●
		AE160CXYDGK	16kW			●

3.3 Controller compatibility

Name		Model	Tank integrated hydro unit & R-290 Outdoor unit
Integrated Management System	DMS 2.5	MIM-D01AN	●
Centralized Control System	Touch Centralized Controller	MCM-A300N	●
	Wi-Fi Module	MIM-H04N	●
Interface Module & Gateway	PIM (Pulse Interface Module)	MIM-B16N	●
	Modbus Interface Module	MIM-B19N	●
Individual Control System	EHS Wired Remote Controller	MWR-WW10N	●
Installation/ Test run solution	S-Converter	MIM-C02N	●
Others	External Room Sensor	MRW-TA	●

4. Typical applications

SAMSUNG

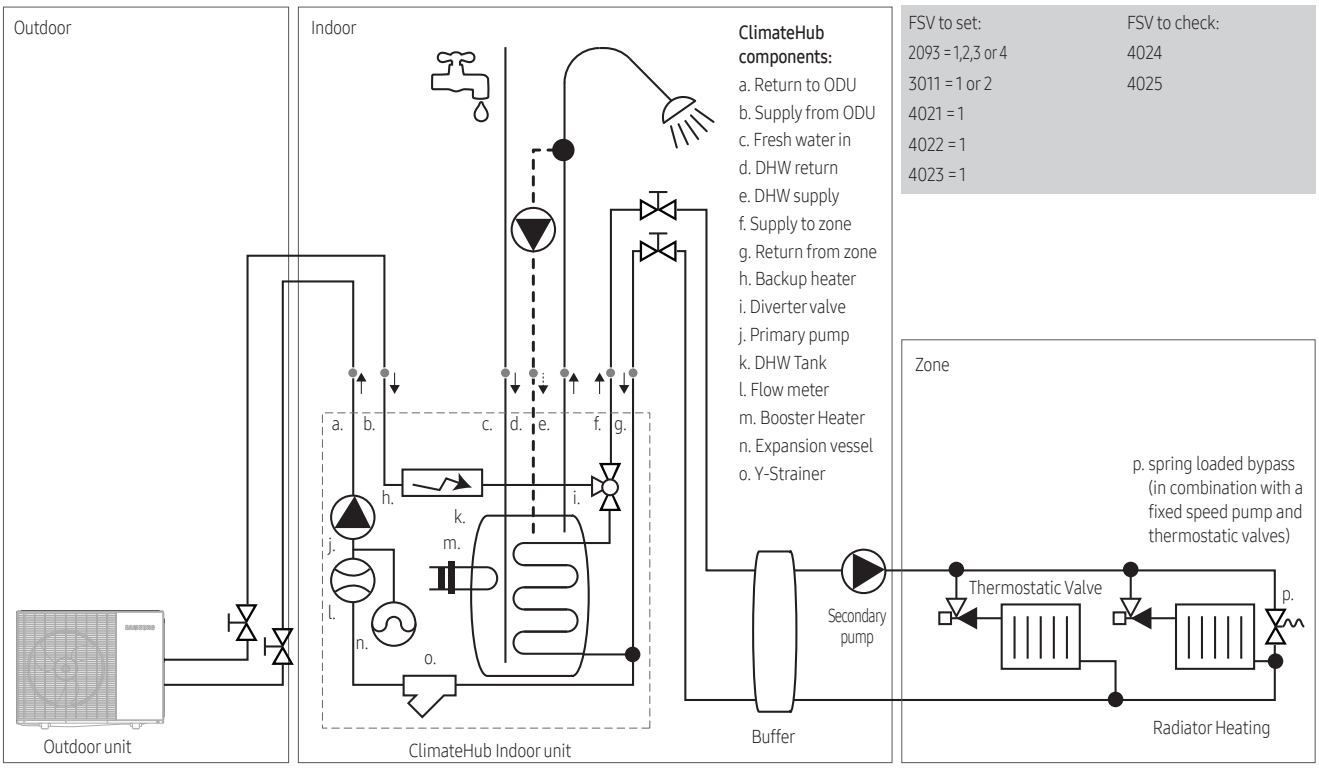
CAUTION

- The application examples given below are for illustration purposes only.
- When the Samsung air to water heat pump system is used with another heat source (e.g. gas boiler), ensure that the return water temperature does not exceed 65 °C.
- The unit is only to be used in a closed water circuit system. Application in an open water circuit can lead to excessive corrosion of the water piping.
- Samsung can not be responsible for incorrect or unsafe conditions in the water system. Make sure that the boiler, radiators, convectors, UFHs, FCUs, additional pumps, pipings, and controls in the water system are in accordance with relevant local laws and regulations under the installer's responsibility.
- Samsung shall not be held liable for any damage resulting from not observing this rule.
- Samsung does not provide specific water system components such as pressure relief valve, air vent valve, buffer tank, etc. Installers and end-users shall consider how to install the above designated components in overall water system depending on the installation condition and the system requirements. If the components are not installed in an appropriate location, the water system can not be operated as designed.

※ UFH (Under floor heating), FCU (Fan coil unit)

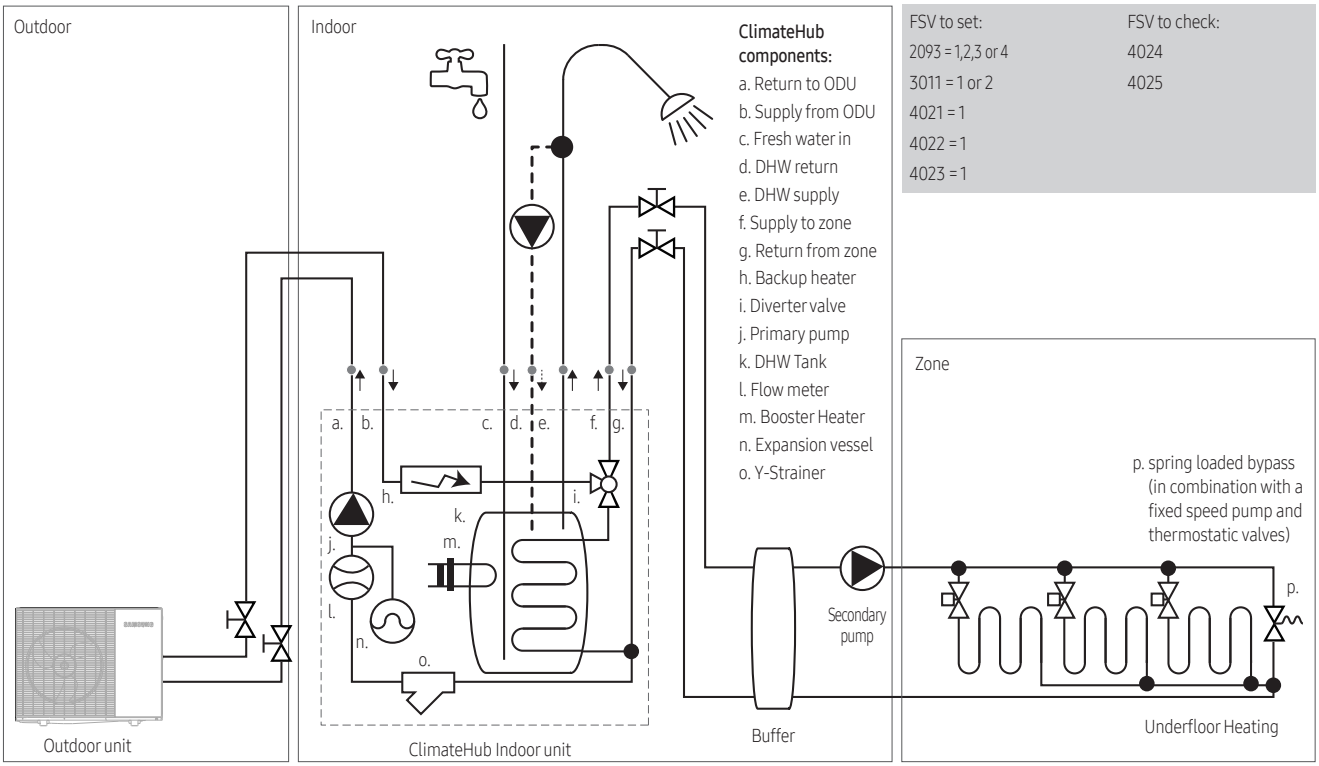
※ FSV(Field setting value), DHW (Domestic hot water)

4.1 Single zone radiator



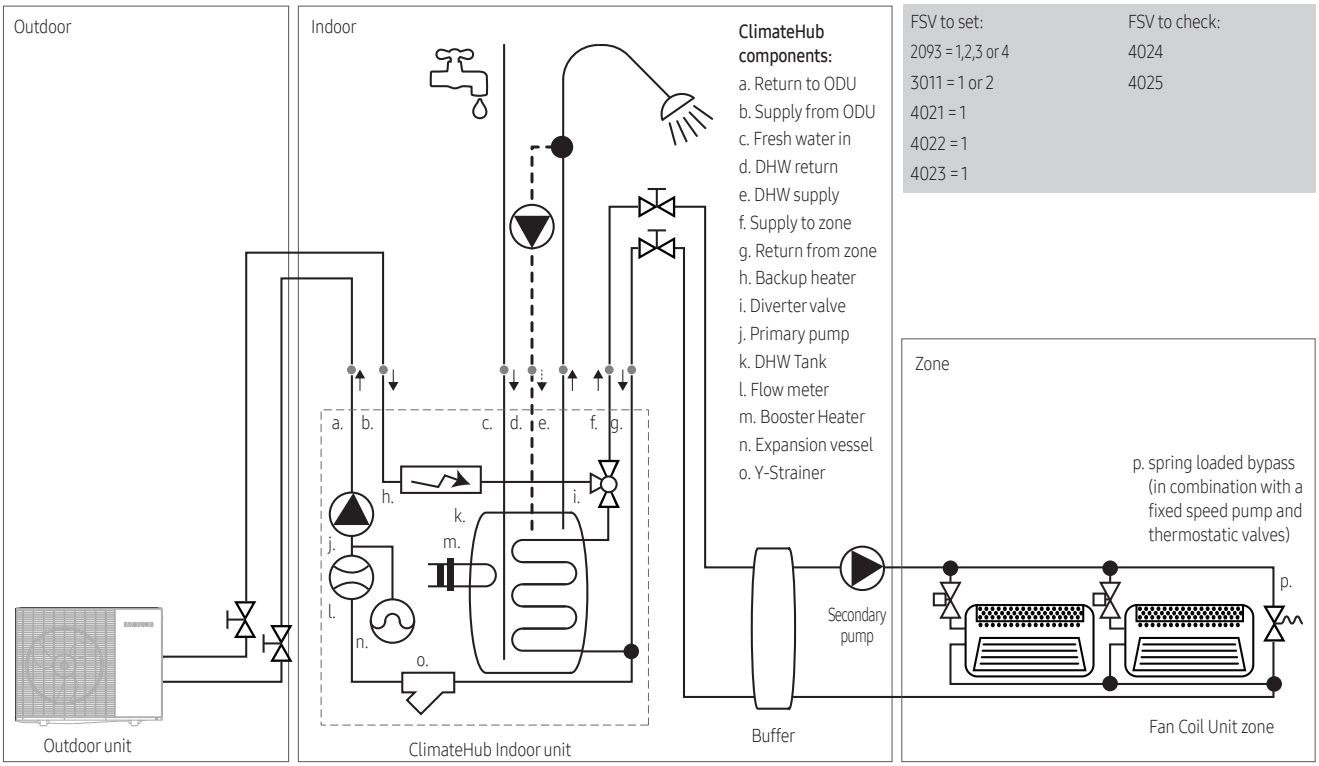
- The combination of a single radiator heating zone and DHW heating requires settings of FSVs (#2093 (Samsung wired remote) set to 1~4 and #3011 set to 1~2).

4.2 Single zone underfloor



- The combination of a single underfloor heating zone and DHW heating requires settings of FSVs (#2093 (Samsung wired remote) set to 1~4 and #3011 set to 1~2).
- To enable the backup heater as an additional heat source, please set FSV (#4021, 4022). The backup heater must be installed and operational by control logic. When ambient conditions can reach below 24°C.
- For the heating compensation at cold weather conditions and backup during defrost, please set FSV (#4023, 4024, 4025) accordingly.

4.3 Single zone fan coil units



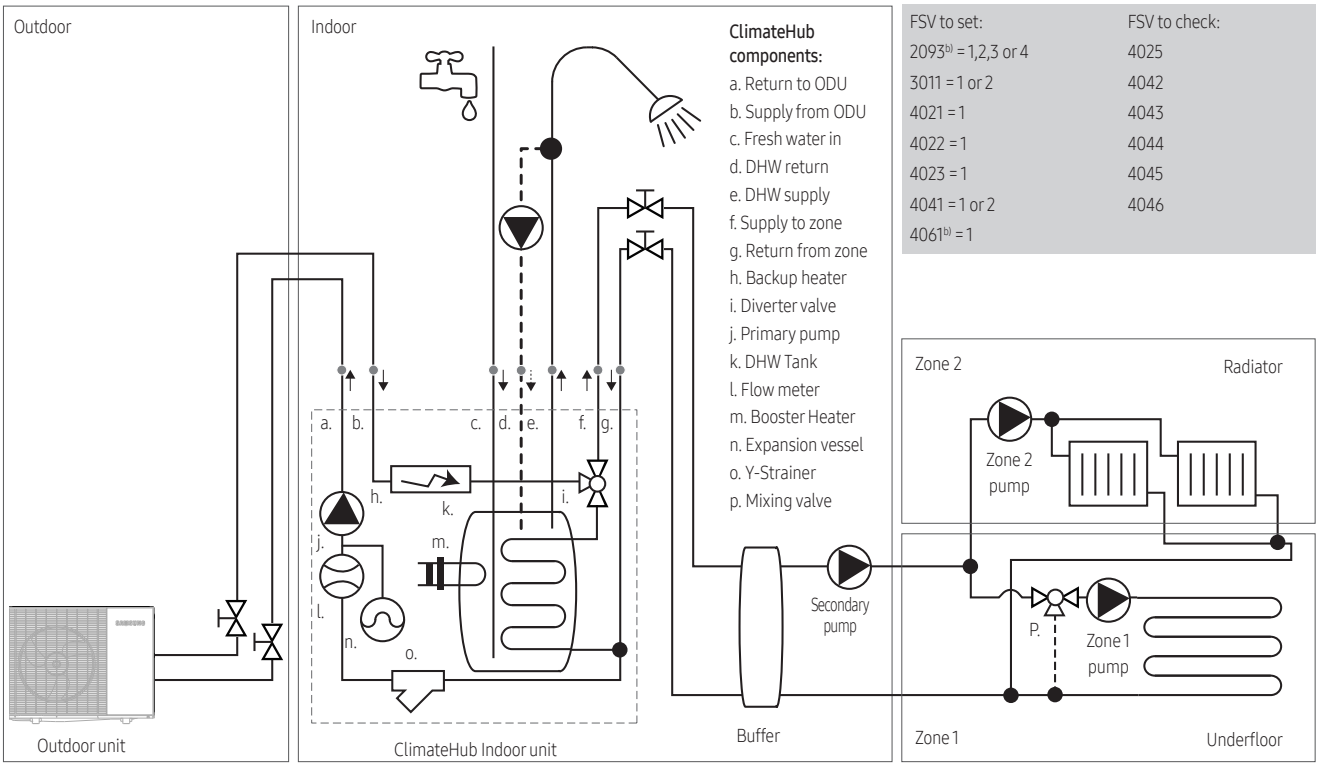
- To enable the backup heater as an additional heat source, please set FSV (#4021, 4022). The backup heater must be installed and operational by control logic. When ambient conditions can reach below 24°C.
- It is not possible to interconnect the FCU to the EHS they are working independently. Supply temperatures above 65°C are not allowed when using Samsung FCUs.

NOTE

A buffer may be required in the secondary circuit, if the active volume is too small to operate a minimum of 600 seconds during part load operation.

Especially when the devices have individual (thermostatic) valves, to control the flow over the devices.

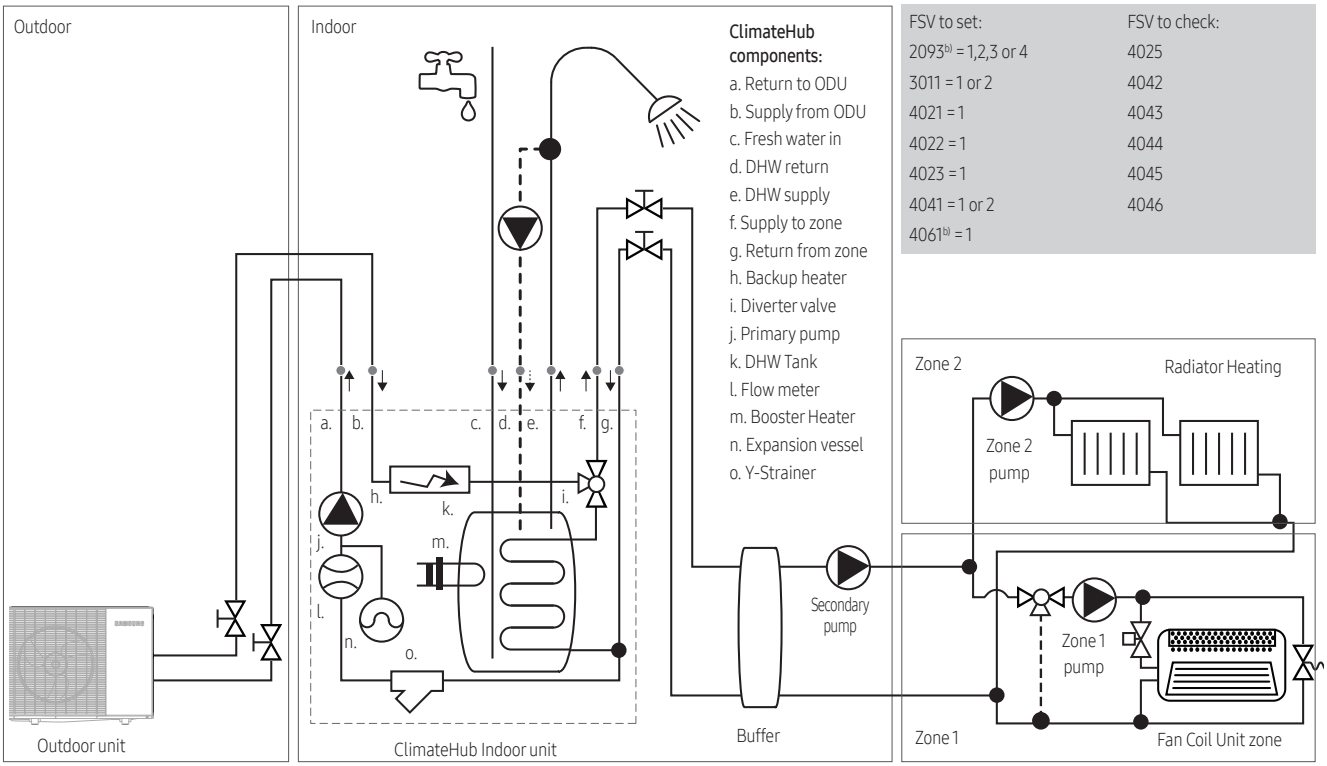
4.4 Two zones radiator and underfloor



a) External thermostat
b) Samsung wired remote controller

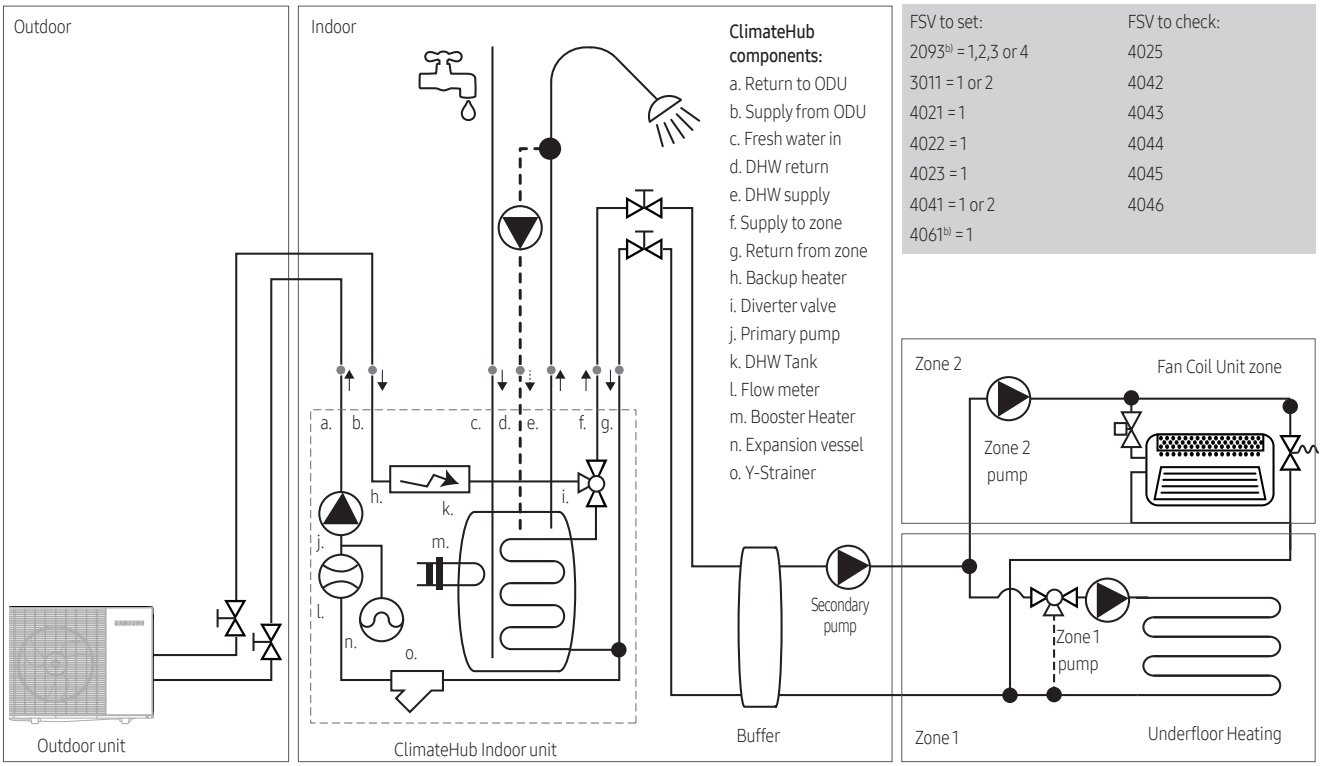
- For heating via both radiators and underfloor heating, with different temperatures, please setup a two zone control. Where the lowest temperature zone is always Zone 1. This can be done via external thermostat input or via Samsung wired remote controller (MWR-WW10N).
- The combination of heating a two zone with different temperatures requires settings of FSV (#2093 set to 1~4 and 4061 =1 (Samsung wired remote) and DHW (#3011 set to 1~2).
- To enable the backup heater as an additional heat source, please set FSV (#4021, 4022). The backup heater must be installed and operational by control logic. When ambient conditions can reach below 24°C.
- In order to you control zone1 and zone2, you should set mixing valve setting value FSV(#4041-#4046).

4.5 Two zones radiator and fan coil unit



- For heating via both radiators and fan coil unit heating, with different temperatures, please setup a two zone control. Where the lowest temperature zone is always Zone 1. This can be done via external thermostat input or via Samsung wired remote control (MWR-WW10N).
- The combination of heating a two zone with different temperatures requires settings of FSV (#2093 set to 1~4 and 4061 =1 (Samsung wired remote) and DHW (#3011 set to 1~2).
- To enable the backup heater as an additional heat source, please set FSV (#4021, 4022). The backup heater must be enabled when ambient conditions can reach below 24°C.
- In order to you control zone1 and zone2, you should set mixing valve setting value FSV(#4041-#4046).

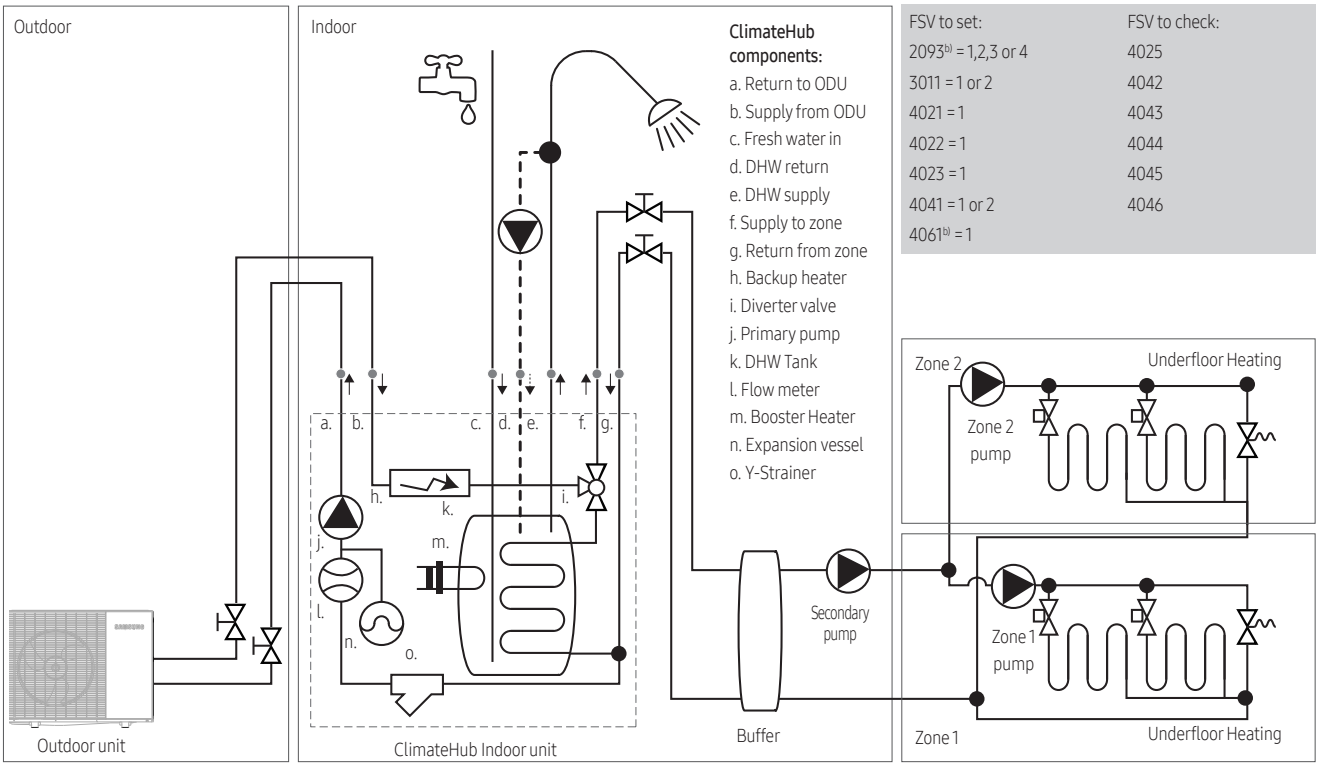
4.6 Two zones fan coil unit and underfloor



FSV to set:	FSV to check:
2093[b] = 1,2,3 or 4	4025
3011 = 1 or 2	4042
4021 = 1	4043
4022 = 1	4044
4023 = 1	4045
4041 = 1 or 2	4046
4061[b] = 1	

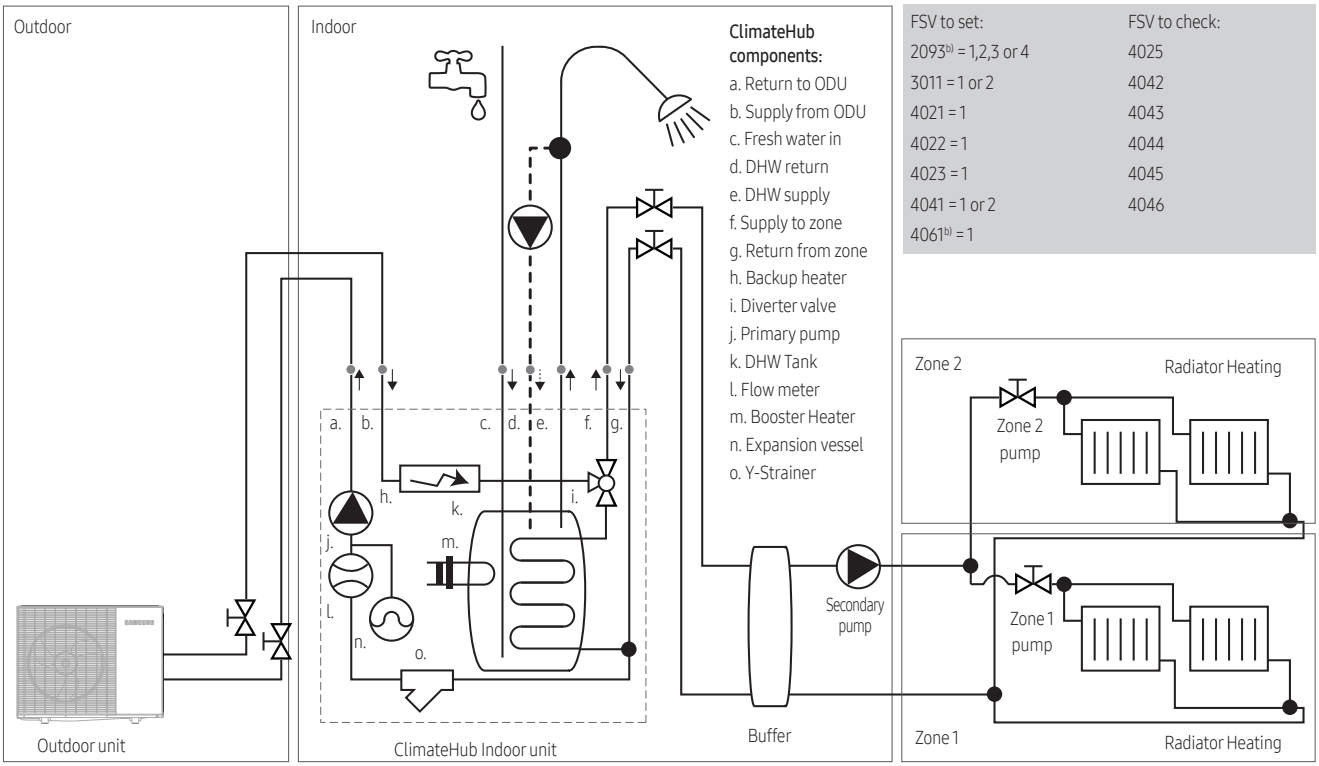
- For heating via both fan coil and underfloor heating, with different temperatures, please setup a two zone control.
- The combination of heating a two zone with different temperatures requires settings of FSV (#2093 set to 1~4 and 4061 =1 (Samsung wired remote) and DHW (#3011 set to 1~2).
- To enable the backup heater as an additional heat source, please set FSV (#4021, 4022). The backup heater must be installed and operational by control logic.
- In order to you control zone1 and zone2 , you should set mixing valve setting value FSV(#4041-#4046)
- The mixing valve is controlled based on the floor temp. a set △T (FSV #4042) or according to the floor WL value.

4.7 Two zones underfloors



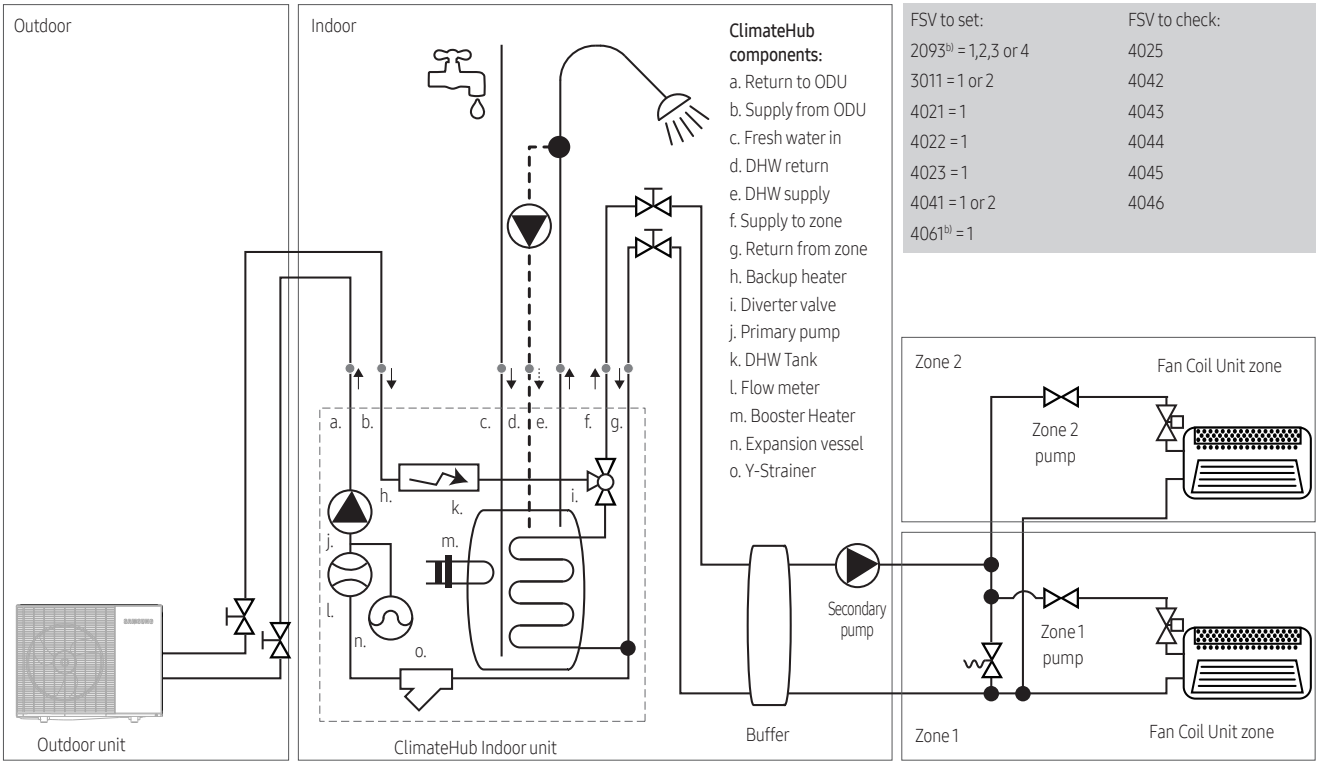
- For heating via both underfloor heating, with different temperatures, please setup a two zone control. Where the lowest temperature zone is always Zone 1.
- This can be done via external thermostat input or via Samsung wired remote control (MWR-WW10N).
- The combination of heating a two zone with different temperatures requires settings of FSV (#2093 set to 1~4 and 4061 =1 (Samsung wired remote) and DHW (#3011 set to 1~2).
- To enable the backup heater as an additional heat source, please set FSV (#4021, 4022). The backup heater must be enabled when ambient conditions can reach below 24°C.
- In order to you control zone1 and zone2, you should set mixing valve setting value FSV(#4041-#4046).

4.8 Two zones radiators



FSV to set:	FSV to check:
2093[b] = 1,2,3 or 4	4025
3011 = 1 or 2	4042
4021 = 1	4043
4022 = 1	4044
4023 = 1	4045
4041 = 1 or 2	4046
4061[b] = 1	

4.9 Two zones fan coil units

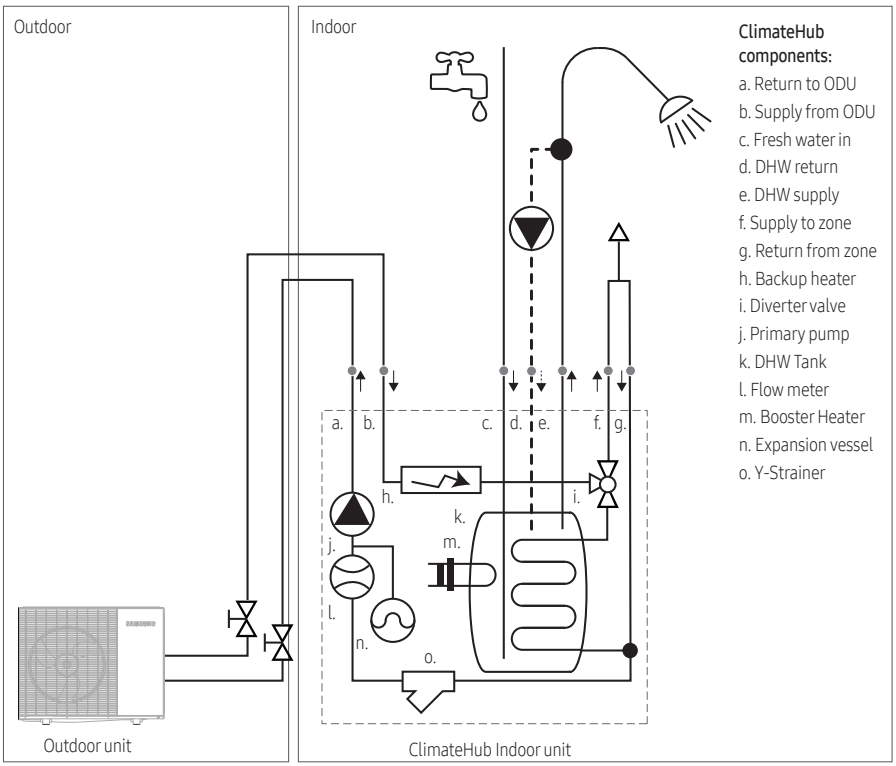


FSV to set:	FSV to check:
2093[b] = 1,2,3 or 4	4025
3011 = 1 or 2	4042
4021 = 1	4043
4022 = 1	4044
4023 = 1	4045
4041 = 1 or 2	4046
4061[b] = 1	

- For heating via both fan coil units heating, with different temperatures, please setup a two zone control. Where the lowest temperature zone is always Zone 1. This can be done via external thermostat input or via Samsung wired remote control (MWR-WW10N).

- The combination of heating a two zone with different temperatures requires settings of FSV (#2093 set to 1~4 and 4061 =1 (Samsung wired remote) and DHW (#3011 set to 1~2).
- To enable the backup heater as an additional heat source, please set FSV (#4021, 4022). The backup heater must be enabled when ambient conditions can reach below 24°C.
- In order to you control zone1 and zone2, you should set mixing valve setting value FSV(#4041-#4046).

4.10 DHW only



ClimateHub components:
a. Return to ODU
b. Supply from ODU
c. Fresh water in
d. DHW return
e. DHW supply
f. Supply to zone
g. Return from zone
h. Backup heater
i. Diverter valve
j. Primary pump
k. DHW Tank
l. Flow meter
m. Booster Heater
n. Expansion vessel
o. Y-Strainer

FSV to set:	FSV to check:
2093[b] = 1,2,3 or 4	4025
3011 = 1 or 2	4042
4021 = 1	4043
4022 = 1	4044
4023 = 1	4045
4041 = 1 or 2	4046
4061[b] = 1	

a) External thermostat
b) Samsung wired remote controller

※ AAV : Automatic air vent valve

- For only DHW heating, please interconnect the space heating supply and return pipes with using an automatic air vent valve (AAV). Accordingly set the FSV (#3011, value 1~2 and #2093 and 4061= 0). The use of the backup heater is still recommended for compressor reliability, heating and defrost support.
- To enable the backup heater as an additional heat source, please set FSV (#4021, 4022). The backup heater must be installed and operational by control logic. When ambient conditions can reach below 24°C.

5.1 Outdoor unit installation

Preparing the installation of the outdoor unit

Choose a sufficient space for carrying the unit to the installation location in advance.

Do not choose a location where a lot of dust is created such as construction work site.

WARNING

- The refrigerant inside the unit is A3- highly flammable (R-290).
- Do not install where there is a risk of combustible gas leakage or heat sources.
- To handle, purge, and dispose the refrigerant, or break into the refrigerant circuit, the worker should have a certificate from an industry-accredited authority in order to be compliant to regulations.
- Verify that the air to water heat pump is not installed in an easily accessible area (vandalism/ sabotage/ other harmful activities)

Choosing the installation location

NOTE

- Read the precautions and requirements in the part "General safety information".
- The outdoor unit is designed for outdoor installation only, and for the following ambient temperatures:
  - Space heating mode -25~35°C
  - Domestic hot water mode -25~43°C
  - Space cooling mode 10~46°C

Decide the installation location regarding the following condition and obtain the user's approval.

- Choose a location that is dry and sunny, but not exposed to direct sunlight or strong winds.
- Do not block any passageways or thoroughfares.
- Choose a location where the noise of the air to water heat pump when running and the discharged air does not disturb any neighbours.
- Choose a position that enables the pipes and cables to be easily connected to the other hydraulic system.
- Install the outdoor unit on a flat, stable surface that can support its weight and does not generate any unnecessary noise and vibration.
- Position the outdoor unit so that the air flows directly towards the open area.
- Place the outdoor unit where there are no plants and animals because they may cause malfunction of outdoor unit.
- Maintain sufficient clearance around the outdoor unit, especially from a radio, computer, stereo system.
- The outdoor unit shall be installed in an open space that is always ventilated.
- Observe the suggested safety zone.

Do not install the air to water Heat Pump in following locations:

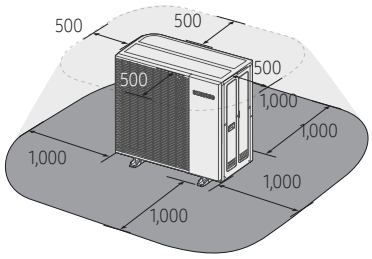
- A location where there are any potential dangerous substances like: combustible gas, carbon fiber, mineral oil, arsenic acid, flammable dust, thinner or gasoline, etc.
- A location where corrosive gas such as sulfurous acid gas generates from the vent pipe or air outlet. The copper pipe or connection pipe may corrode and refrigerant may leak.
- A location where the outdoor unit can easily overheat by solar radiation or if the ambient temperature exceeds 35°C during cooling mode. A larger installation space is required or a protection against direct solar radiation.
- A location where strong winds may affect the unit. Please also consider enough clearance to avoid issues with the exhaust air from the unit if directed at people.
- A location where air is trapped and may short circuit over the unit. Or where not enough service space is available.
- A too narrow location, as it can lead to problems and potential damage to the product. Also it can lead to the injuries during installation or service work.
- A location where not enough ventilation space exists, especially when installing multiple outdoor units. Obstacles may disturb the airflow over the unit and can potentially cause short circuiting between exhaust air and inlet air and may lead to malfunction.

Safety zone

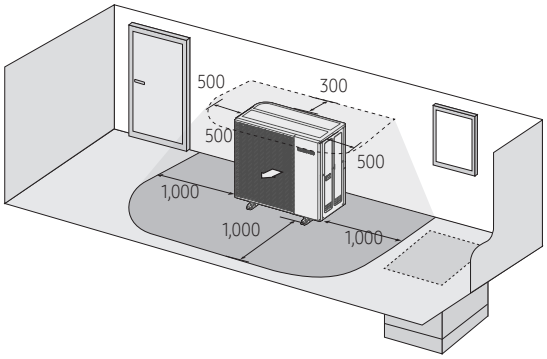
WARNING

- In case of a leakage the refrigerant must not be able to enter the indoor under any circumstances.
- The Safety Zone shall not have any building openings such as: Windows, Doors, Light wells, Flat roof windows, Air Inlet / Outlet of ventilation systems, etc.
- R-290 refrigerant is heavier than air and can be collected on the ground. There should be no sinking or deepening of the ground in the safety zone.
- The safety zone should not extend to intact buildings or public spaces.
- The safety zone cannot be modified later to violate the protection rules.

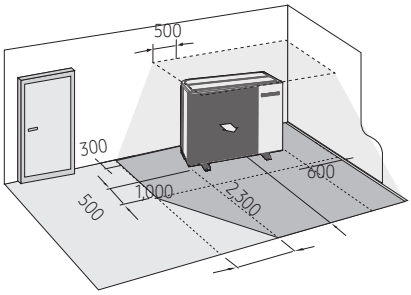
(Unit : mm)



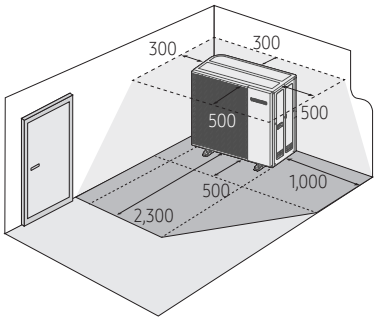
When installed on the ground
When installed in a place with a flat roof



When installed the ground on the front of the building wall



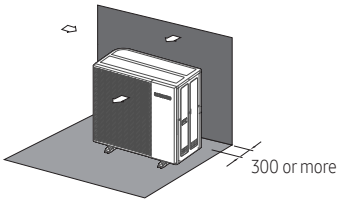
When installed at the right corner of a building



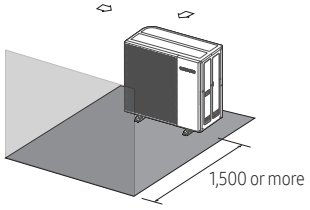
When installed at the Left corner of a building

When installing 1 outdoor unit

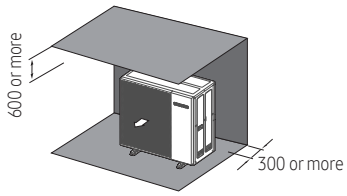
(Unit : mm)



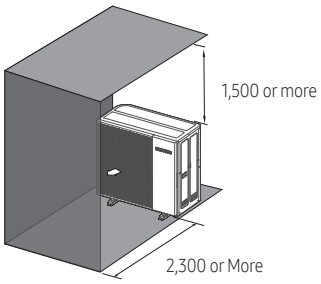
Wall on suction-side



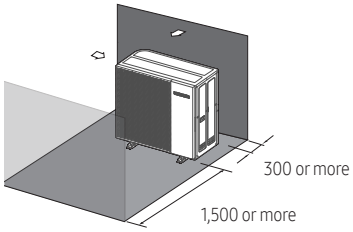
When the air outlet is towards the wall



Top-side obstacle
Wall on suction-side



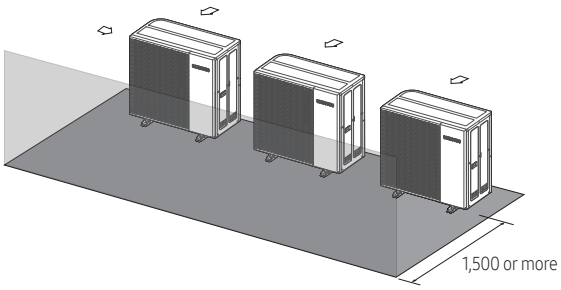
Top-side obstacle
Discharge-side obstacle
Wall on discharge-side



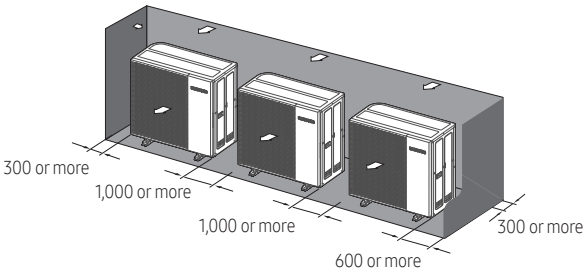
Suction-side obstacle
Wall on discharge-side

When installing more than 1 outdoor unit

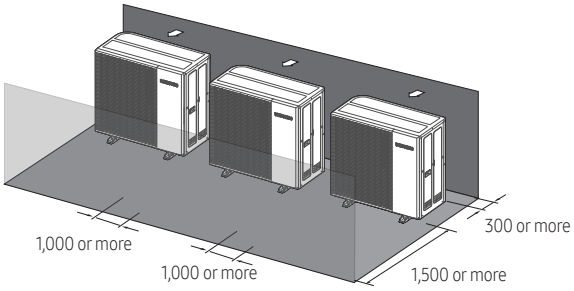
(Unit : mm)



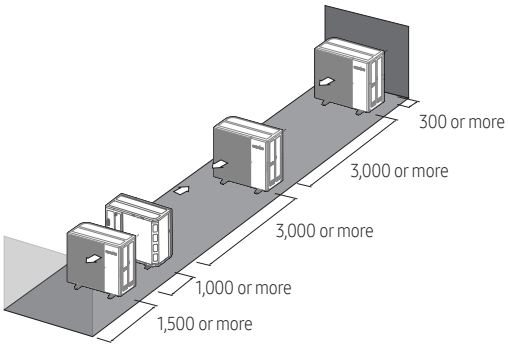
Wall on discharge-side



Suction-side obstacle (3 sides)
No top-side obstacle



Wall on suction-side
Wall on discharge-side



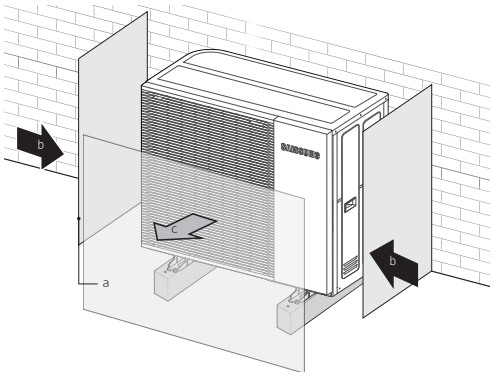
Wall on suction-side
Wall on discharge-side

CAUTION

- The units must be installed according to distances declared, in order to permit accessibility from each side, to guarantee correct operation of maintenance or repairing of the products. The unit's parts must be accessible and serviceable under safe working conditions (for people or things).

Installing the unit at a location with strong winds:

- Outdoor unit must be fixed firmly so that it can withstand the wind speed of the strong wind. If you cannot fix the outdoor unit on the base ground, fixate it sideways or use an extra support structure.
- To prevent exposure to (strong) wind, install a baffle plate on the air discharge side of the unit. (If there is a strong wind facing the outdoor air outlet, it causes a short circuit. This can lead to performance degradation, broken fan (motor), and acceleration of frost.)
- Install a wind protection shielding with anticipation of the dominant wind direction. If the direction of the air discharge part is pointing to the dominant direction of the wind, it could cause performance decrease and potential damage to the product.



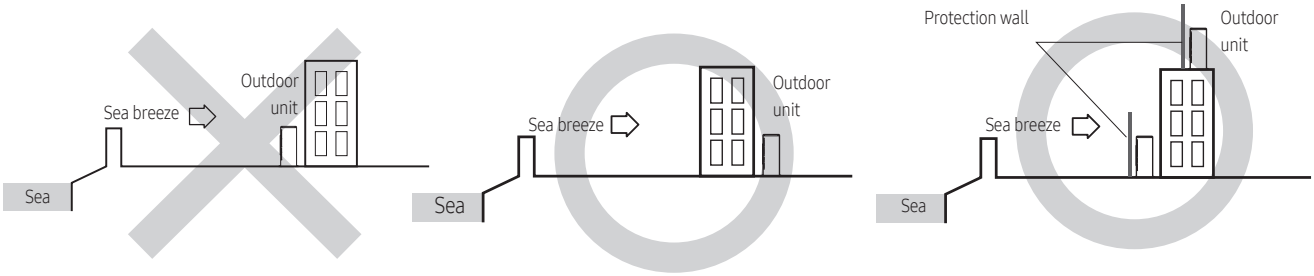
a. Baffle plate
b. prevailing wind direction
c. Air outlet

Installation guide at the seashore

Make sure to follow below guides when installing at the seashore.

1 Do not install the product in a place where it is directly exposed to sea water and sea breeze.

– Make sure to install the product behind a structure (such as building) that can block see breeze.



A protection wall should be constructed with a solid material that can block the sea breeze and the height and width of the wall should be 1.5 times larger than the size of the outdoor unit. (Please secure more than 700 mm of

space between the protection wall and the outdoor unit for air circulation.)

2 Consider that the salt particles clinging to the external panels should be sufficiently washed off.

– When a product is installed at the seashore, periodically clean it with fresh water to remove attached salt deposits.

3 Make sure that the base of the unit is installed water level and therefore has optimum drainage. Because trapped water at the bottom of the outdoor unit significantly promotes corrosion.

– Prevent blockage of the drain hole by foreign substance, by cleaning adequately.

– Make sure to clean the base plate adequately and regularly as dirt, sand and other substances stay moist and promote corrosion.

4 If the product installed within 500 m of a seashore, special anti-corrosion treatment is required.

※ Please contact your local Samsung representative for further details.

5 When product is installed at a seashore, periodically clean it with water to remove attached salinity.

6 If the (protective) coating, or galvanised steel of the product is damaged during the installation or maintenance, make sure to repair it.

7 Check the condition of the product periodically.

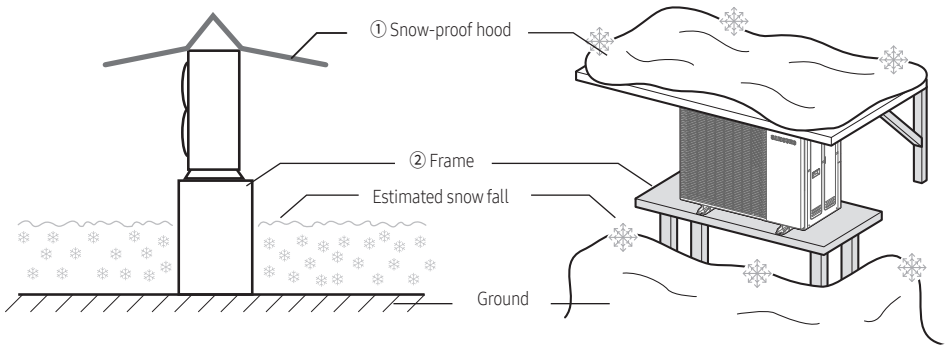
– Check the installation site every 3 months and perform anticorrosion treatment.

Selecting a location in cold climates

NOTE

- When operating the unit in a low outdoor ambient temperature, be sure to follow the instructions described below

In heavy snowfall areas it is very important to select an installation location where the snow will not affect the unit. If lateral snowfall is possible, make sure that the heat exchanger coil is not affected by the snow (If necessary construct a lateral canopy)



1 Construct a large canopy.

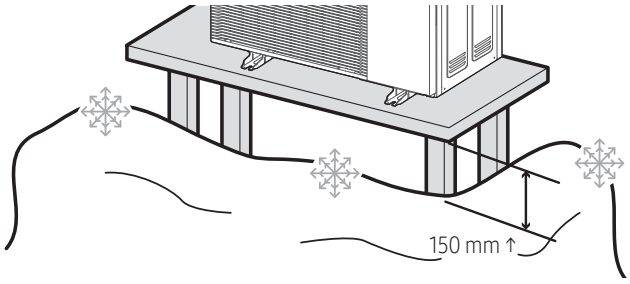
2 Construct a pedestal.

– Install the unit high enough off the ground to prevent it being buried under snow.

Heavy snow fall area

If the product is installed in a region of heavy snow, allow enough distance between the product and the ground (or piled up snow).

- In areas with heavy snow fall, piled snow could block the air intake. To avoid this, install a frame that is higher than estimated snow fall. In addition, install a snow-proof hood to avoid snow from piling on the outdoor unit.
- If ice accumulates on the base, it may cause critical damage to the product. (e.g., a lakeside in a cold area, the seashore, an alpine region, etc.)
- In a heavy snowfall area, do not install the drain plug and drain cap in the outdoor unit. And, it may cause frozen ground. Therefore, take appropriate measures to prevent it.
- Make a space more than 150 mm between the bottom of the outdoor unit and the ground for installation.
- Make sure that the product is located at least 150 mm above the maximum expected level of snow.

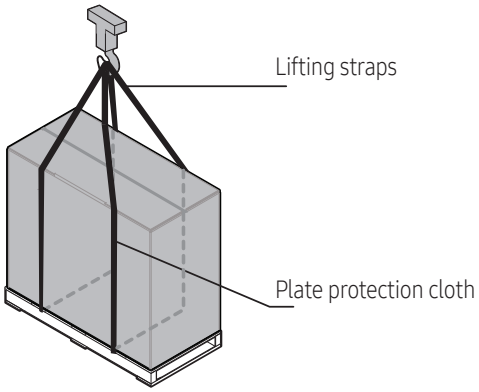


Moving the outdoor unit

- Be sure that the moving route is safe by anticipating the weight of the outdoor unit in advance.
- Do not slant the product more than 30˚ when carrying it. (always keeping the unit upright).
- The surface of the heat exchanger is sharp. Be careful not to be injured while moving and installing by wearing your personal protective equipment (gloves, etc.).

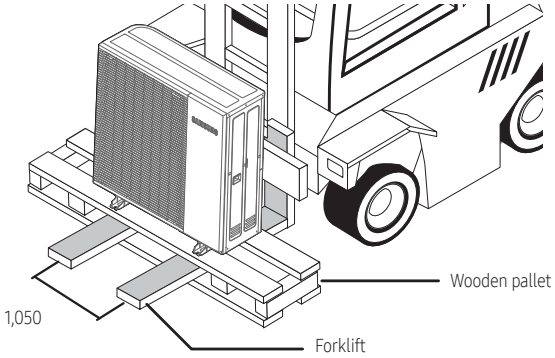
Moving the outdoor unit by hoisting

- Only hoist the product with using approved lifting straps (according to local regulations). Keep long straps to avoid damage to the panels. Always wear personal protective equipment (safety helmet) when hoisting.



Moving the outdoor unit with a forklift

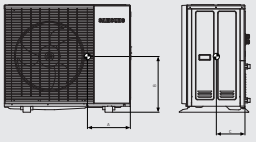
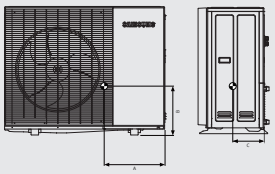
- Insert the fork into the wooden pallet at the bottom of the outdoor unit carefully. Be careful that the fork does not damage the outdoor unit. Operating a forklift may require special certification or training according to local regulations.



NOTE

- When looking at the product from the front, there is a center of gravity right from the middle of the product. Refer to the center of gravity mark attached to the product.

Units : mm

Type		Model	A	B	C
MONO		AE050CXYDEK AE080CXYD*K	340	396	227
		AE120CXYD*K AE160CXYD*K	471.6	408.3	239

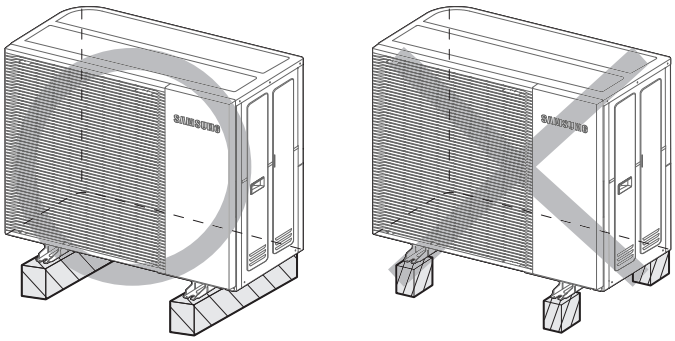
Mounting the outdoor unit

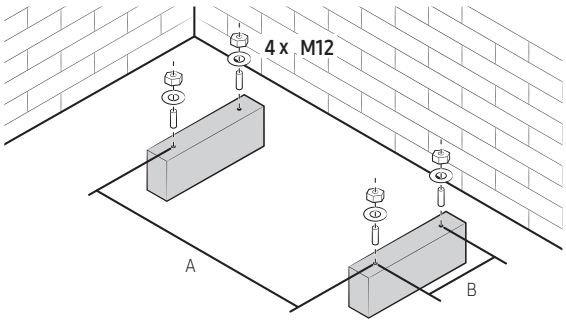
The outdoor unit must be installed on a rigid and stable base to avoid any increase in the noise level and vibration, particularly if the outdoor unit is to be installed in a location exposed to strong winds or at a height, the unit must be fixed to an appropriate support (wall or ground).

CAUTION

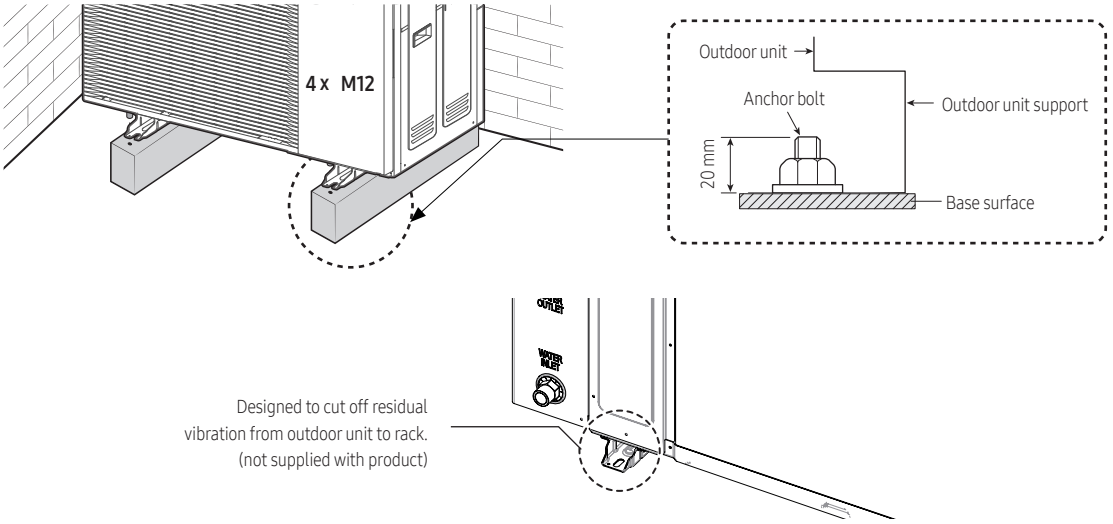
- When tightening the anchor bolt, tighten the rubber washer to prevent the outdoor unit bolt connection part from corroding.
- Make a drain outlet around the base for outdoor unit drainage.
- If the outdoor unit is installed on the roof, you have to check the ceiling strength and waterproof the unit.
- The anchor bolt must be 20mm or higher from the base surface.

※ In order to prevent freezing of water drains, additional protection such as application of a heating cable may be required.



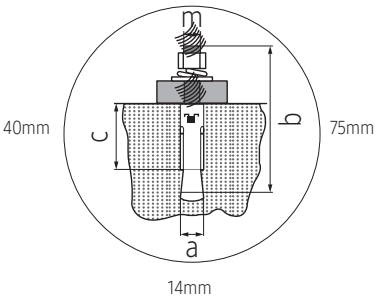


Type	Model	A	B
MONO	AE050CXYDEK AE080CXYD*K	650	500
	AE120CXYD*K AE160CXYD*K	790	530



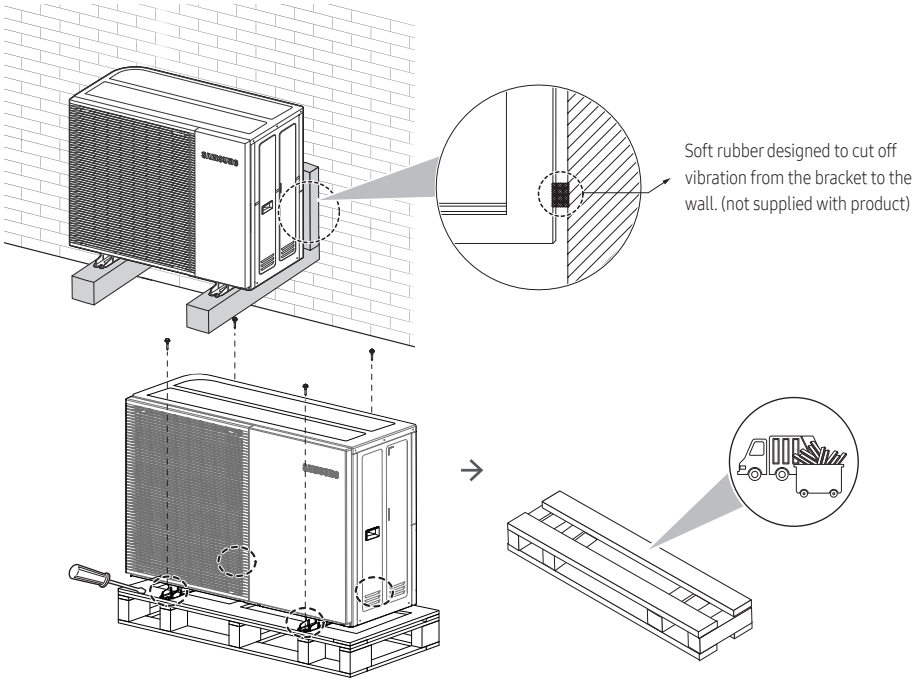
Size	Diameter of drill bit (a)	Anchor length (b)	Sleeve length (c)	Insert depth	Fastening torque
Ø10	14 mm	75 mm	40 mm	50 mm	30 N·m

※ Use the anchor bolts and nuts that is zinc plated or made of STS material.
Regular anchor bolts or nuts may get damaged by corrosion.



Outdoor unit installation on a bracket suspended from a wall

- Ensure the wall will be able to support the suspended weight of both rack and outdoor unit.
- Install the bracket close to a constructional column as much as possible.
- Install the proper grommet in order to reduce noise and residual vibration transferred by the outdoor unit towards the wall.



WARNING

- Be sure to remove the transport pallet below the bottom side of the unit base panel before fixing the bolt. Its sole purpose it to carry the product during transport, it has no installation value. Please discard the pallet in accordance to local waste regulations once the unit is correctly installed.

Outdoor unit drain work

General area

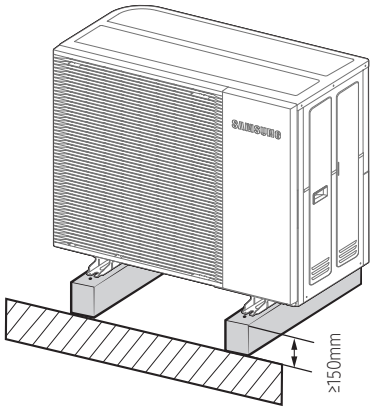
While the air to water heat pump is operating in heating mode, ice can accumulate on the surface of the condenser.

To prevent ice from growing, the system occasionally enters a defrost mode and the ice on the surface thaws off.

Water dripping from the condenser is guided through the drain holes to prevent ice formation inside the base plate at subzero temperatures.

- In case there is not enough space for natural drainage from the outdoor unit, additional drain work is required. Follow the description as per below:
  - Provide a minimum of 150 mm of free space to the floor.
  - Insert the drain plug into the hole on the bottom of the outdoor unit.
  - Connect the drain hose to the drain plug.

- Make sure dirt and debris cannot block the drain (hose). Clean the base plate whenever needed.
- For the remaining holes (that do not have the drain plug), insert the drain cap.
- Make sure that the water dripping from the drain hose runs away correctly and safely.

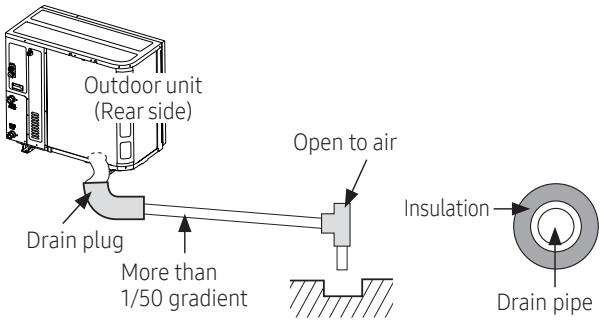


WARNING

- If the drainage is not adequate, it can lead to stagnant water and ice build-up, causing system performance issues and possible damages.

Installing the drain pipe

- When installing 1 outdoor unit

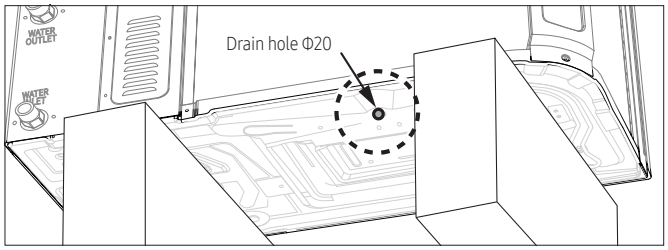


1 Open the upside of connected parts of outdoor units to prevent inner pressure.

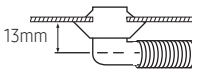
2 Do not install a trap in the drain pipe work and install with a 1/50 gradient or more.

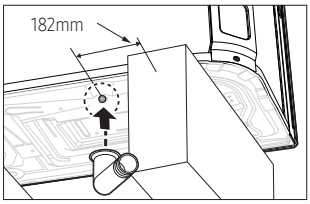
3 Insulate the drain pipe and drain plug by using the insulation over 10mm.

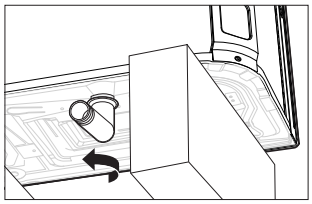
4 Install a self-regulation heat cable to prevent the drain pipe from freezing.

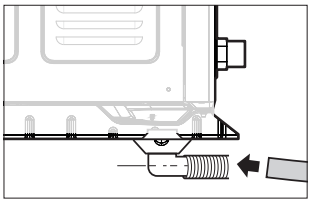


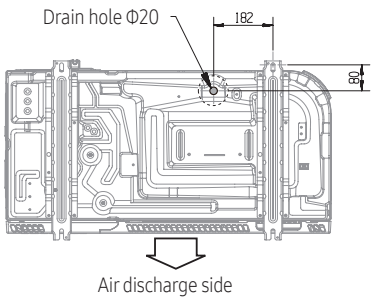
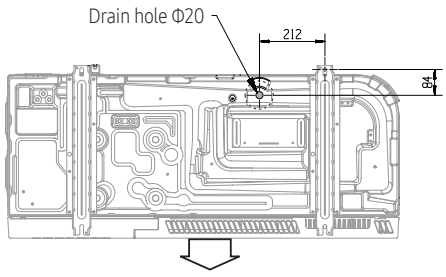

Drain plug x 1ea







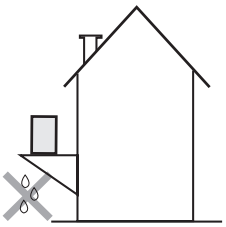


Model	AE050CXYDEK, AE080CXYD*K	AE120CXYD*K, AE160CXYD*K
Drain hole shape		
	 Drain plug x 1ea	 Drain plug x 1ea

1 Prepare a water drainage channel around the foundation, to drain waste water from around the unit.

2 If the water drainage from the unit is inadequate, please raise the unit on construction concrete blocks, etc. (the height of the construction should be at least 150 mm).

3 If you install the unit on a frame, please install a slanted waterproof plate within 150 mm of the underside of the unit to prevent water from plashing against the bottom plate from below.



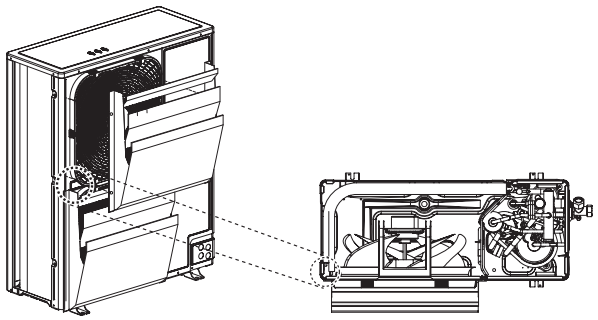
4 When installing the unit in a place frequently exposed to snow, pay special attention to elevate the foundation as high as the average snow height plus the additional required 150mm.

5 If you install the unit on a wall support bracket, please install drainage pipework. In order to avoid the drain water from dripping on the floor potentially creating a slippery surface or an ice layer under freezing conditions. (See figure)

※ Please securely mount the outdoor unit before connecting the water piping.

Caution when installing cover for heating air direction change

- Parts shown in the picture is where the copper pipe may be passing by or the external plate may be near the copper pipe. When using screw for installing the air direction changing device such as heating air cover, check and make sure that it does not damage the copper pipe.

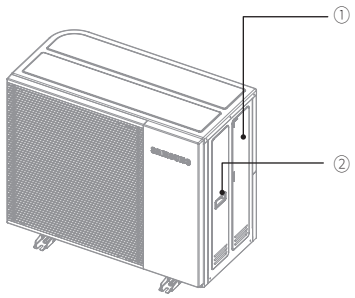


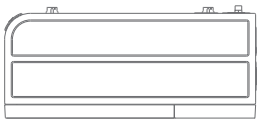
Internal view from bottom

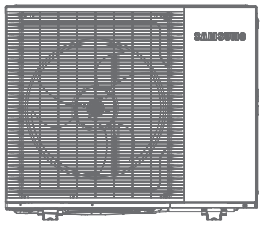
Opening the outdoor unit

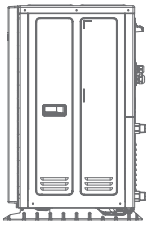
To open the outdoor unit

Overview

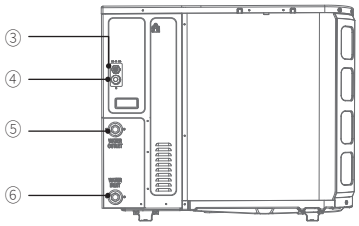








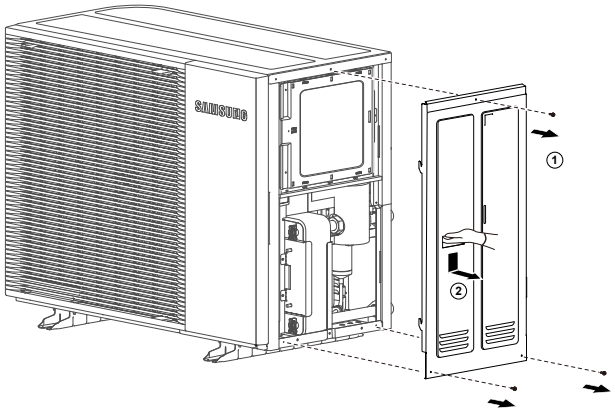
1. Side panel
2. Handle
3. Communication wiring conduit hole
4. Power wiring conduit hole
5. Water pipe (Out)
6. Water pipe (In)



Open

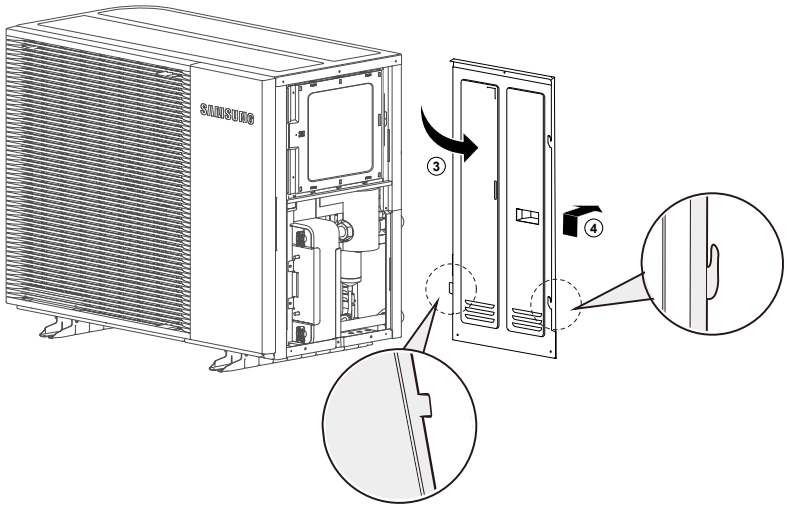
1 Remove the 3 screws of the side panel.

2 To remove the side panel, slide it down and pull it out.



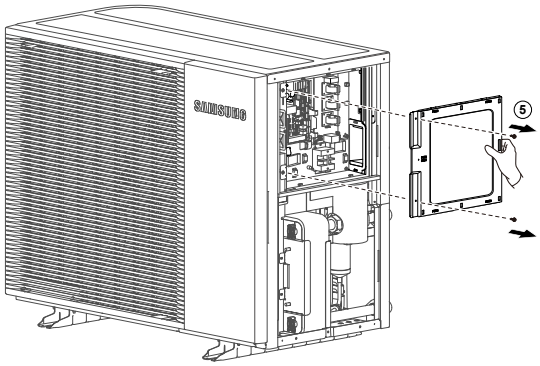
3 Check that the panel is not caught in the groove on the right.

4 Pull it forward.



5 Remove the 2 screws and remove the control box cover.

※ Remove and install only the side cover during installation.



NOTE

- When closing the outdoor unit cover, make sure that the tightening torque does not exceed 4.1 N•m.

5.2 Indoor unit installation

Preparing the installation location of the indoor unit

- The indoor unit is designed for indoor installation only and for the following room temperatures:
  - 5~35°C (heating)
  - 5~40°C (cooling)

Avoid installing against outer walls with a risk of freezing.

WARNING

- To handle, purge, and dispose the refrigerant, or opening the refrigerant circuit, the worker should have a certificate from an industry-accredited authority.

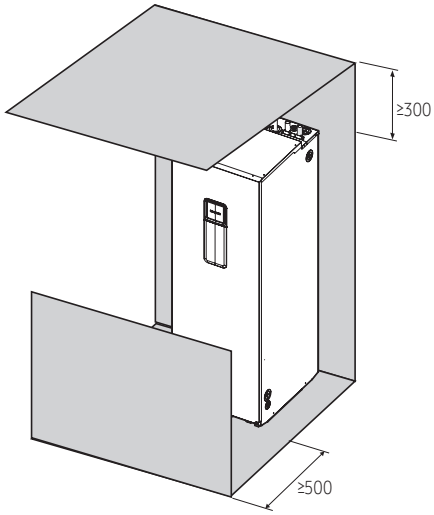
Choosing the installation site

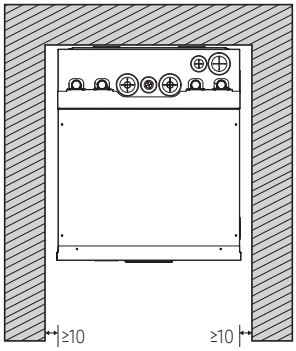
The indoor unit should be installed indoors and meet the following conditions.

- In area with suitable space for servicing.
- A place with adequate ventilation.
- The construction for installation is a flat, capable of supporting the operational weight of the unit.
- For installation inside a building (this applies either to indoor or outdoor units installed inside) a minimum room floor area of space conditioned is mandatory according to IEC 60335-2-40:2018 (see the reference table into either the indoor or outdoor unit installation manual).
- Do not install the indoor unit in the following areas:
  - Area filled with minerals, splashed oil, or steam. It will deteriorate plastic parts, causing failure or leakage.
  - Area that is close to heat sources.
  - Area that produces substances such as sulfuric gas, chlorine gas, acid, and alkali. It may cause corrosion of the pipings and brazed joints.
  - Area that can cause leakage of combustible gas and suspension of carbon fibers, flammable dust, or volatile flammables.
  - Area where refrigerant leaks and settles.
  - Area where animals may urinate on the product. Ammonia may be generated.
  - Do not use the indoor unit for preservation of food items, plants, equipment, and art works. This may cause deterioration of their quality.
  - Do not install the indoor unit if it has any drainage problem.

Space requirements for the indoor unit

- Ensure to leave the appropriate space as indicated in the drawing.
- Installation site should be secured with adequate ventilation so that the components of the tank integrated hydro unit will not be damaged by overheating.



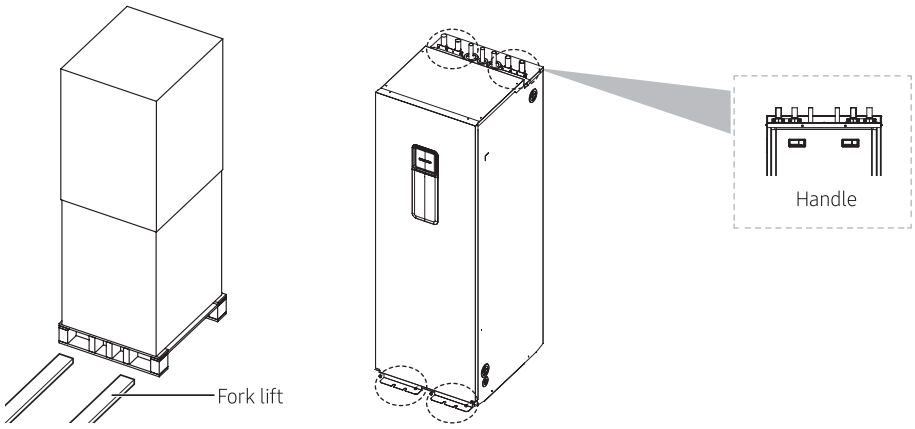


Moving the indoor unit

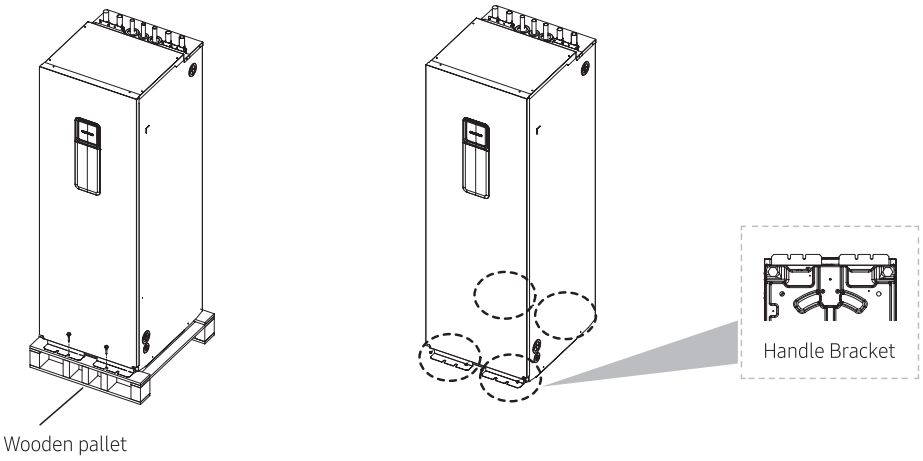
- Be sure that the moving route is safe by anticipating the weight of the indoor unit in advance.

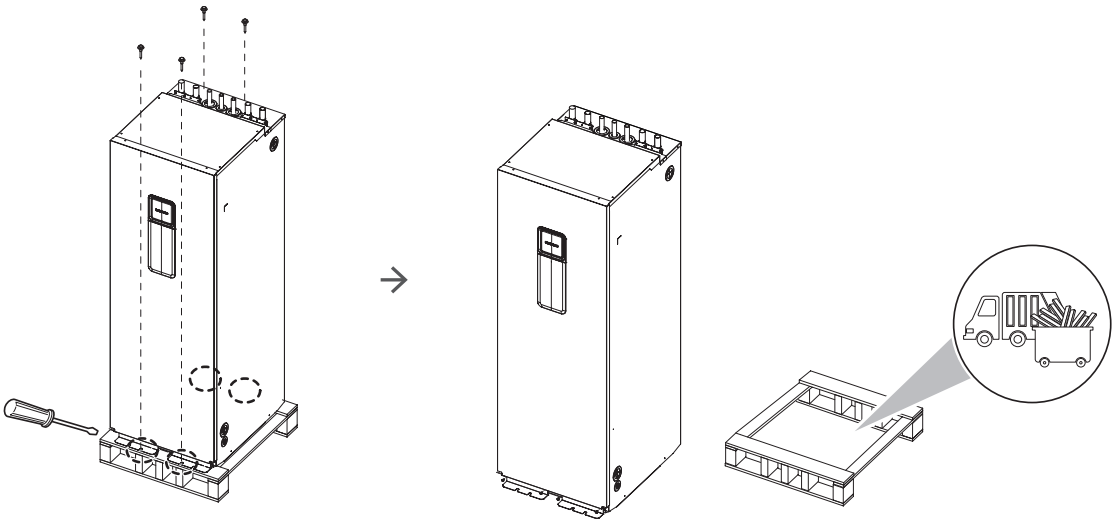
Moving the indoor unit with a forklift

- Insert the fork into the wooden pallet at the bottom of the indoor unit carefully. Be careful that the fork does not damage the indoor unit.
- When moving the indoor unit, be careful not to damage the indoor unit by impact. Do not remove the packaging until the indoor unit reaches the final installation location.
- When adjusting the exact location of the indoor unit, use the handles.
  - A minimum of two people should lift the unit by the handles. (Do not grasp the pipe)



- Remove all handle brackets and the wooden pallet when the unit is in the final installation location.



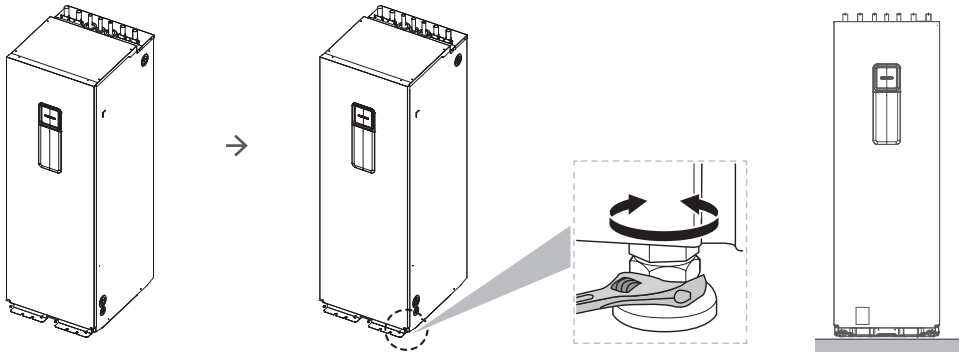


WARNING

- Be sure to remove the wood en pallet from the bottom side of the unit base panel before fixing the unit with bolts to the floor.
  Its sole purpose it to carry the product during transport, it has no installation value. Please discard the pallet in accordance to local waste regulations once the unit is correctly installed.

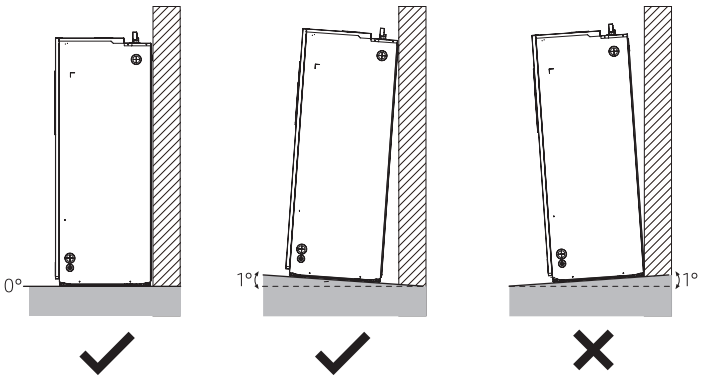
To install the indoor unit

1. Considering the vibration and weight of the tank integrated hydro unit, the structural strength of the base ground must be strong enough to prevent noise and the base ground has to be flat.
2. The base ground should be 1.5 times larger than the bottom of the tank integrated hydro unit.
3. Lift the indoor unit from the pallet and place it on the floor, be careful not to scratch the floor by sharp edges or bolts.
4. Connect the drain hose to the drain.
5. Slide the indoor unit into position.
6. Adjust the height of the leveling feet to compensate for floor irregularities.
7. When concrete construction for the tank integrated hydro unit installation is completed, install an anti-vibration pad (t = 20 mm or more) or an anti-vibration frame (vibration transmission ≤ 5%) to prevent vibration of the indoor unit from transferring to the base ground.



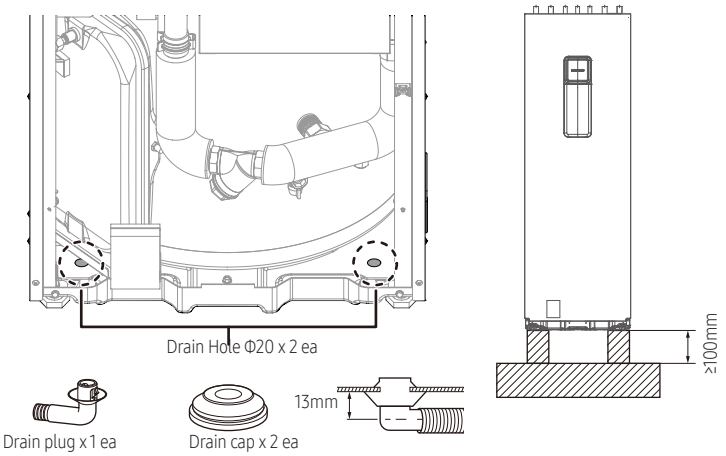
NOTE

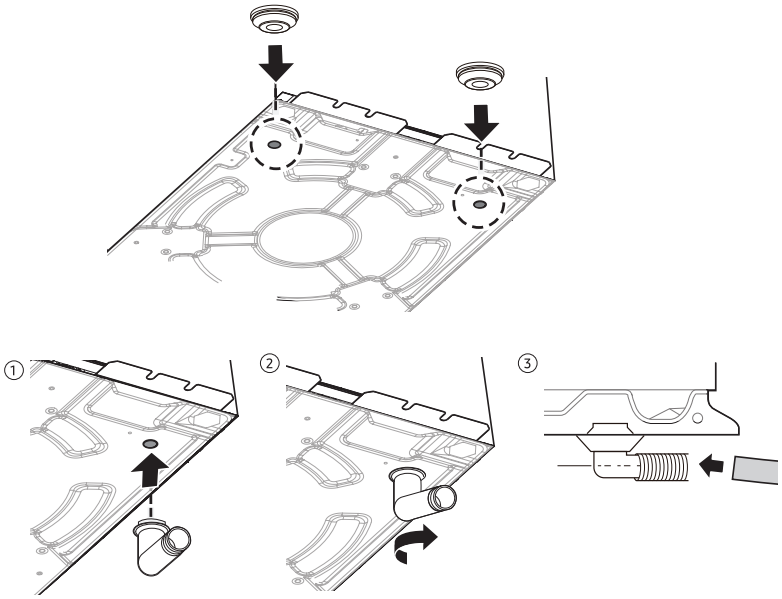
Do not tilt the unit forwards.



Indoor unit drain work

- During cooling operation, condensate may be produced from the pipes or tank.
- Produced condensate must be drained through the drain hole.
- When the drain plug is used, make sure that the indoor unit is raised a minimum of 100 mm from the floor.
- When the drain plug is used, make sure to install it at one of the positions marked in the figure below.
- When the drain plug is not used, make sure to plug it with the drain cap.





About opening the unit

Normally the unit should remain closed, except for:

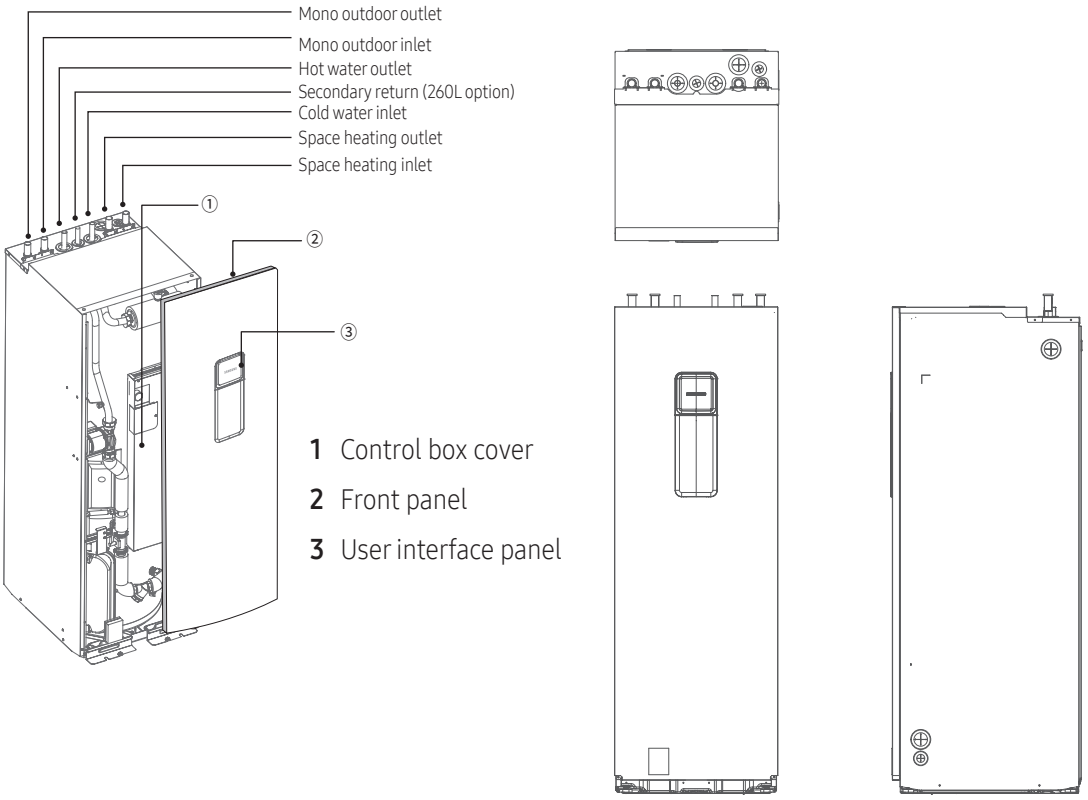
- When connecting the electrical wiring
- When maintaining or servicing the unit

WARNING

Do not leave the unit unattended when the service cover is removed.

To open the indoor unit

Overview



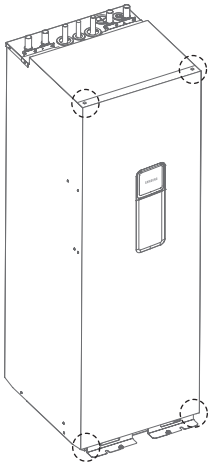
1 Control box cover

2 Front panel

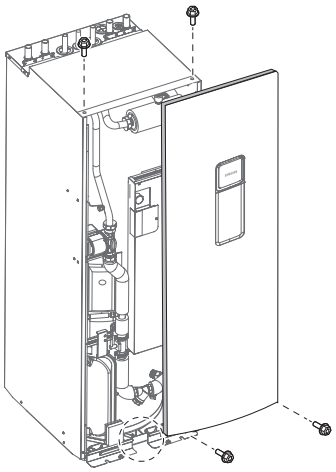
3 User interface panel

Open

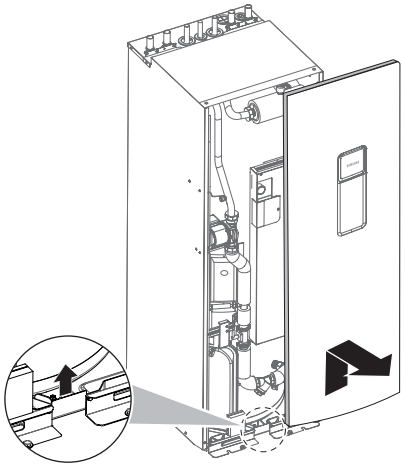
1 Locate the screws on the 4 corners.



2 Unscrew the 4 corner screws.



3 Lift the front panel up and pull it forward to remove.



NOTE

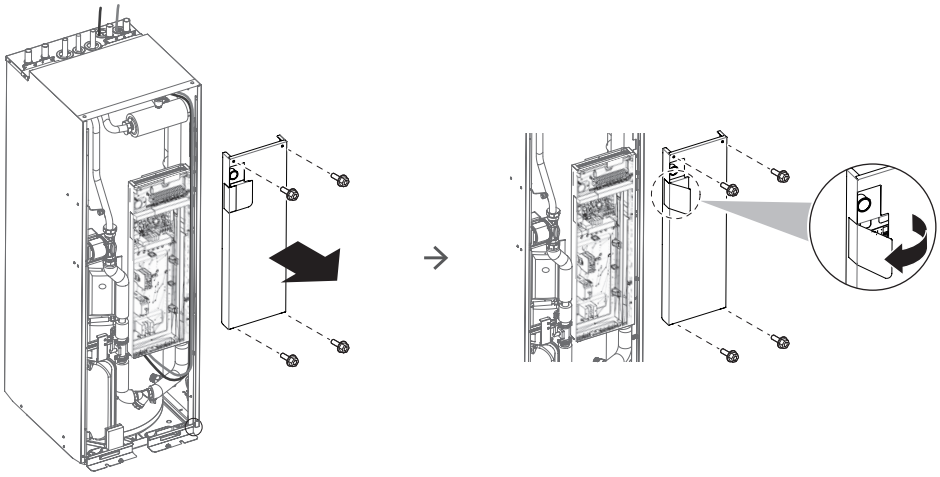
If you remove the Wired Remote Controller, also disconnect the cables from the back of the Wired Remote Controller to prevent damage.

To open, unhinge and close off the control box in the indoor unit

During the installation, access to the inside of the indoor unit is needed. For increased accessibility to parts, it is possible to unhinge the control box and move it from its mounting position for the required service space.

Prerequisite: The user interface panel and front panel have been removed.

1. Unscrew the 4 corner screws.
2. Remove the control box cover.
3. Tilt the control box to the front and lift it out of its hinges.



To close off the indoor unit

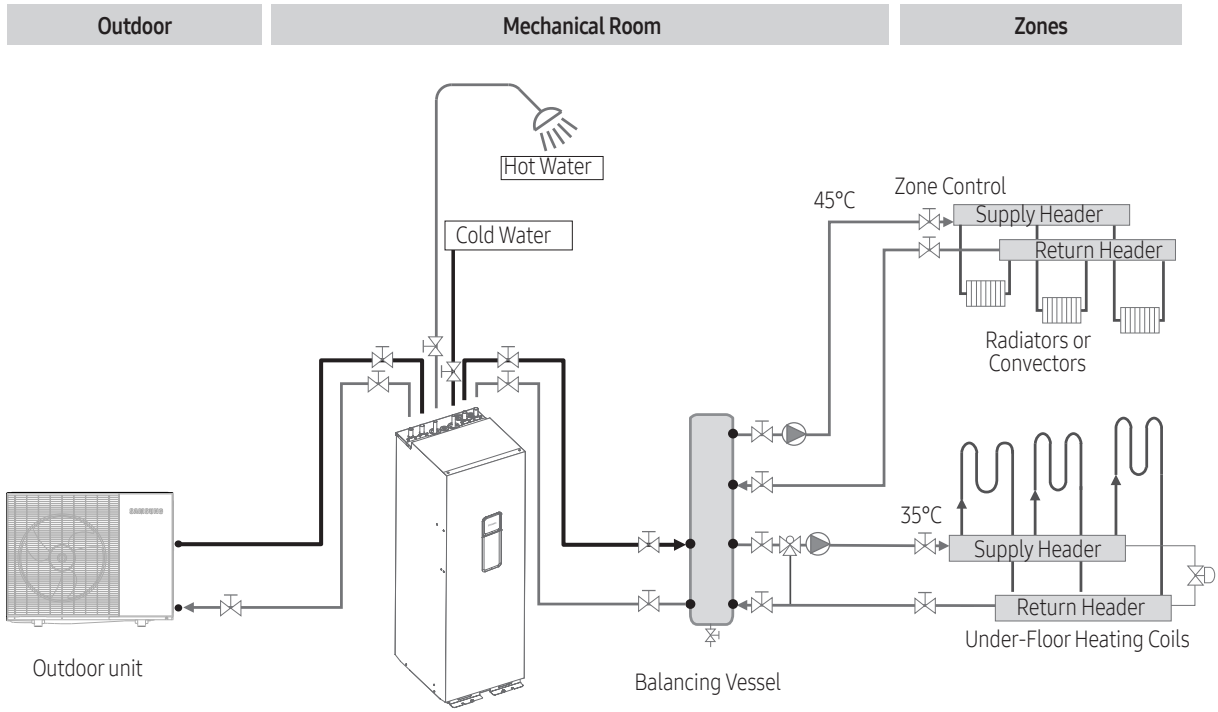
1. If unhinged, put the control box back in its hinges.
2. Put the control box cover plate back in place.
3. Close the cover of the control box with the 4 screws.
4. Reinstall the front panel with the 4 screws at the corners.
5. Reconnect the cables to the user interface panel.
6. Reinstall the user interface panel.

6.1 Preparing water piping

Water circuit requirements

Before installing the unit, make sure to check the following points:

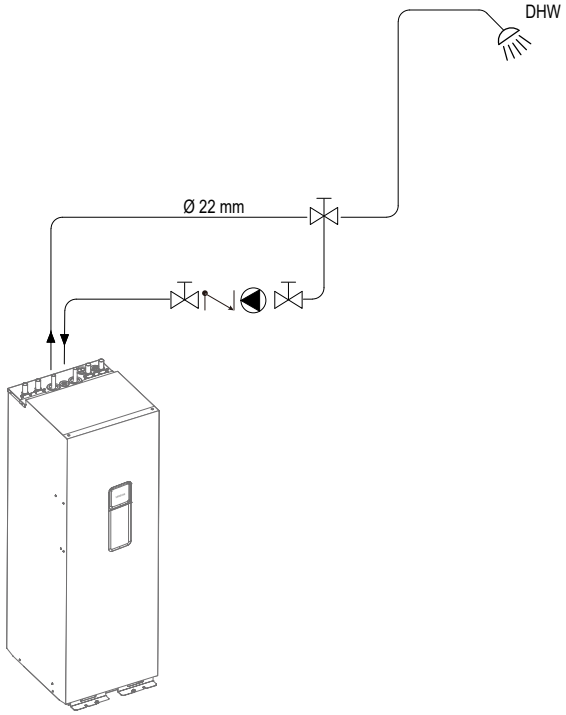
- The maximum water pressure of the unit is 3.0 bar static pressure.
- The operating range of leaving water temperature is 15~75˚C at heating conditions and 5~25˚C at cooling conditions.
- The minimum required water flow rate for operation is 7 liters/min.
  Otherwise, the unit can stop due to a lack of water and display error (E911). The design of the installation should meet with the nominal flow in order to achieve the efficiencies as declared by our TDB.
- The water quality must be according to EN directive 98/83 EC.
- If the unit and the pipes are exposed to freezing temperature, it can cause damage to the hydraulic system.
  Special care must be taken to prevent freezing of the total water system.
- The unit is designed to be used in a closed-loop system. Do not use any other components which are designed only for an open-loop system.
- Never use uncoated parts in the water circuit. Because it can cause excessive corrosion
- All hydraulic parts including field piping must be insulated to reduce heat loss and condensation.
- It is recommended to install the water inlet combination valve to feed small quantities of water to the system automatically, replacing the minor water losses and maintaining the system pressure.
- Drain taps must be provided at all low points of the system to permit complete drainage of the circuit for maintenance use.
- Make sure that the check valves are correctly installed in the system (field supply).
- Flush pipes out with clean water to remove contaminants in pipes during installation.
- The strainer (water filter) must be cleaned after flushing the pipes, and it should be cleaned periodically.
  Replace strainer when necessary.
- Charge the water higher than pressure of 1.0 bar by using make-up water assembly(Field supply). (The water pressure indicated on the manometer will vary depending on the water temperature) The nominal water pressure in the system should remain about 1.0 bar at all times to avoid air entering the water system.
- Make sure that air should be vented from the system at start-up or after installing/ servicing.
  The air vent valve must be opened during charging the water (at least 2 turns) in order to remove all air in the circuit, and an inlet combination valve allows water into the system continuously.
- Provide air vents at all high points of the system, which must also be easily accessible for servicing.
- Always use materials which are compatible with water used in the system and with the materials used on the indoor unit.
- Select piping diameter in relation to required water flow and available ESP of the pump.
- Use chemical cleaning agents (begin with acid , finish with alkali).
- Do not operate the system with closed valves because it results in damaging the heat pump.
- It is recommended to avoid long runs of piping between the DHW tank and the hot water end point (shower, bath,...) and to avoid dead ends.



- When using non-brass metallic piping, insulate the brass and non-brass properly so that they do NOT make contact with each other. This is to prevent galvanic corrosion.
- When using a 2way valve or a 3way valve in the water circuit, the maximum change-over time of the valve is 60 seconds.
- To avoid stagnation of water, it is important that the storage capacity of the DHW tank meets the daily consumption of DHW.

  Immediately after installation, the DHW tank must be flushed with fresh water. This procedure must be repeated at least once a day the first 5 consecutive days after installation.

  In cases where during longer periods of time there is no consumption of hot water, the equipment must be flushed with fresh water before usage for the disinfection function of the DHW tank must be activated in order to meet with local regulations.
- In accordance with the applicable legislation, it may be necessary to install thermostatic mixing valves.
- The installation must be in compliance with the applicable legislation and may require additional hygienic installation measures.
- In accordance with the applicable legislation, it may be required to connect a recirculation pump in between the hot water end point and the recirculation connection of the DHW tank (the necessary piping is only provided with the 260L model).



NOTE

Secondary connection is only possible with 260L

Setting the pre-pressure of the expansion vessel

Water volume

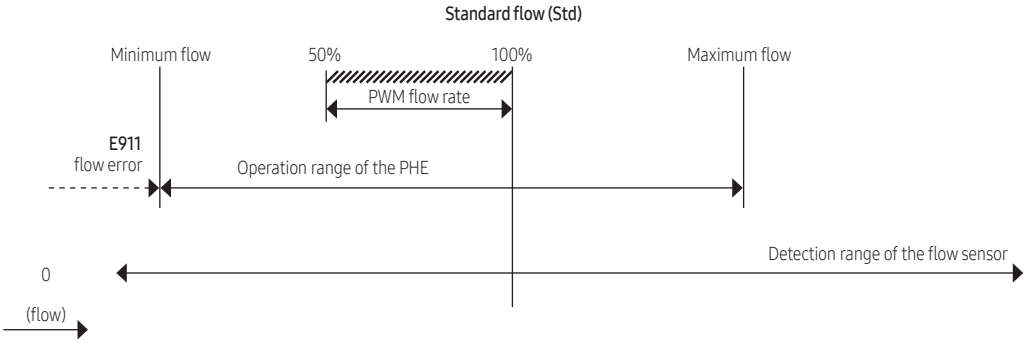
- The indoor unit has an expansion vessel of 8 liter with a factory-set pre-pressure of 1 bar.
- To make sure that the unit operates properly:
  - You might need to adjust the pre-pressure of the expansion vessel.
  - You must check the minimum and maximum water volume.

Flow rate

The heat pump delivers its rated capacity at exactly the designed flow rate (also standard or nominal flow). Therefore it is required to always meet with the designed flow rate as indicated in our product specifications. The installer is responsible to meet with the exact designed flow rate (Water Flow Rate (Std)[H/C], as stated in the applicable TDB).

- In case the flow is too high, it should be balanced out by increasing the pressure drop of a balancing (or flow regulator) valve.
- If the flow is too low, an additional pump must be installed to assist the built-in pump.

The control logic for the PWM pump can adjust the flow between 50% and 100% of the standard flow to meet with the required temperature differences in the heating and cooling processes.

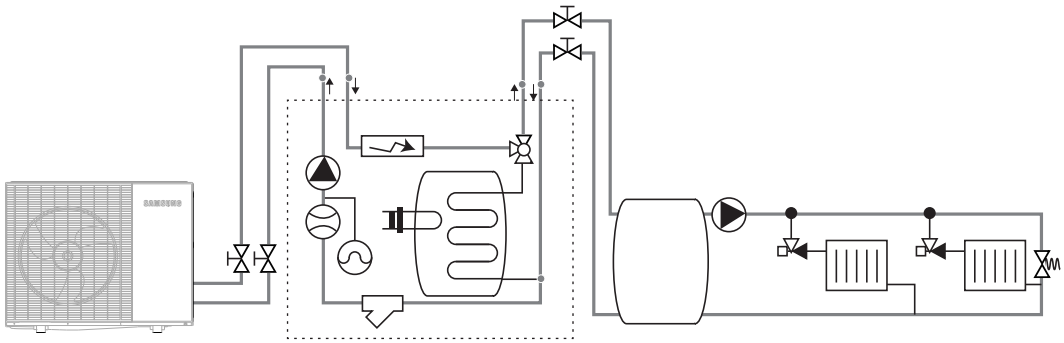


If the flow rate is too low, the generated heat might not meet with the designed capacity.

If the flow rate is too high, it may cause noise, cavitation and erosion and impact the efficiency of the product.

Minimum active water volume

The minimum active water volume of the system is the amount of water which is always pumped around, even when all valves in the system are closed. The use of a buffer tank can increase the active volume and therefore the operation time between compressor start and stop.



Active Volume (space heating)

Ideally, systems should be designed for around 10 to 15 minutes of operation, in order to meet with our declared efficiencies.

This time frame is based on a maximum of 4 On/Off cycles per hour.

The required minimum active water volume can be calculated via the below stated formula:

$$Vmin = \frac{t_{min} \times \Phi_{min}}{C_{water} \times \Delta T}$$

V*min* : Minimum active volume	[dm3]
t*min*: Minimum allowed operation time is 10 min or 600 sec per cycle)	[s, sec]
Φ*min*: minimum compressor output	[kW = kJ/s]
C*water* :specific heat of water (4,2)	[kJ/kg*K]
Δ*T*: Temperature increase (5-10 K)	[K]

CAUTION

- Water volume of total system (except tank integrated hydro unit) for reliable defrost cycles is minimum 30 Liter (AE050/080CXYD**), 50 Liter (AE160CXYD**).
- This volume is not to be mistaken for the minimum active water volume, as that serves a different purpose against short cycling of the compressor.

NOTE

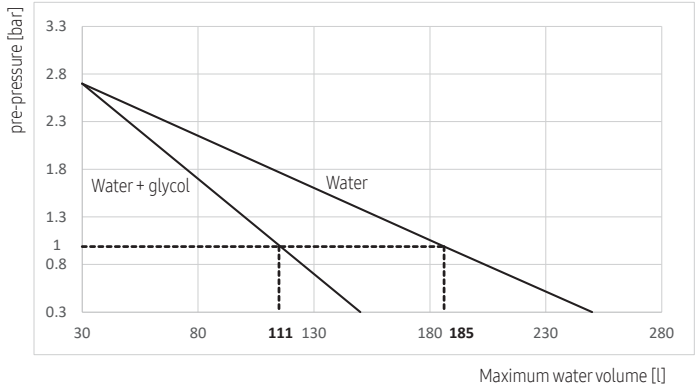
When circulation in each space heating/cooling loop is controlled by remotely controlled valves, it is important that the minimum water volume is guaranteed, even when all of the valves are closed.

Maximum water volume

NOTE

The maximum water volume depends on whether glycol is added to the water circuit. For more information on the addition of glycol.

Use the following graph to determine the maximum water volume for the calculated pre-pressure.



Installation height difference[a)]	Water volume	
	<185 liters	>185 liters
≤7 m	No pre-pressure adjustment required.	Actions required: Pre-pressure must be decreased, calculate according to "Calculating the pre-pressure of the expansion vessel". Check if the water volume is lower than maximum allowed water volume
>7 m	Actions required: Pre-pressure must be increased, calculate the appropriate value following by "Calculating the pre-pressure of the expansion vessel". Check if the water volume is lower than maximum allowed water volume	Expansion vessel of the unit too small for the installation.

a) Installation height difference: height difference(m) between the highest point of the water circuit and the indoor unit. If the indoor unit is located at the highest point of the installation, the installation height is considered 0 m.

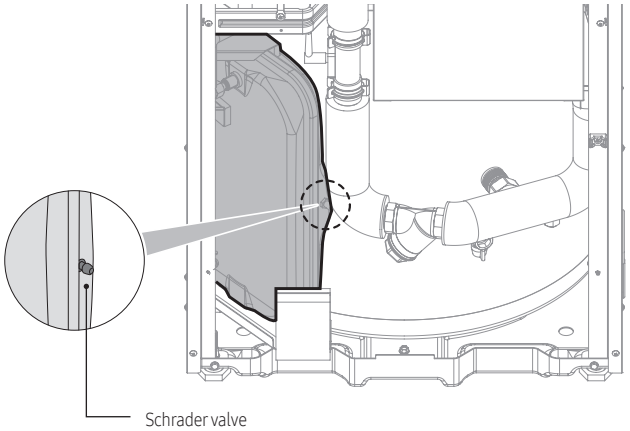
Calculating the pre-pressure of the expansion vessel

- The pre-pressure(Pg) to be set depends on the maximum installation height difference(H) and is calculated as below : Pg=(H/10+0.3) bar

When it is required to change the default pre-pressure of the expansion vessel(1 bar), keep in mind the following guidelines:

- Use only dry nitrogen to set the expansion vessel pre-pressure.
- Inappropriate setting of the expansion vessel pre-pressure will lead to malfunction of the system. Therefore, the pre-pressure should only be adjusted by an authorised installer.

Changing the pre-pressure of the expansion vessel should be done by releasing or increasing nitrogen pressure through the Schrader valve of the expansion vessel.



Section	Item	Heating System Water	DHW (fresh water)	Effects		Recommended number for water quality inspection
				Corrosion	Scale	
Standard value	pH[25 ˚C]	7.0 ~ 8.0	7.0 ~ 8.0	O	O	Once a year
	Electric conductivity [25 ˚C] (mS/m)	30 and below	30 and below	O	O	
	Chloride ion (mg Cl-/L)	50 and below	50 and below	O		
	Sulfate ion (mg SO_4^{2-}/L)	50 and below	50 and below	O		
	M alkali level [pH 4.8](mg $CaCO_3$/L)	50 and below	50 and below		O	
	Total hardness (mg $CaCO_3$/L)	70 and below	70 and below		O	
	Calcium hardness (mg $CaCO_3$/L)	50 and below	50 and below		O	
	Ionized silica (mg SiO_2/L)	30 and below	30 and below		O	
Reference	Iron (mg Fe/L)	1.0 and below	0.3 and below	O	O	
	Copper (mg Cu/L)	1.0 and below	1.0 and below	O		
	Sulfate ion(mg S^2/L)	Not to be detected	Not to be detected	O		
	Ammonium ion (mg NH_4+/L)	0.3 and below	0.1 and below	O		
	Residual chlorine (mg Cl/L)	0.25 and below	0.3 and below	O		
	Free carbon dioxide (mg CO_2/L)	0.4 and below	0.4 and below	O		
	Stability index	-	-	O	O	

NOTE

- Circle (O) marks in the chart show the factor relevant to corrosion or water scale.
- When the water temperature is over 40˚C, steels without protective coating may corrode when expose to water. Applying corrosion prevention material or degassing can be effective measure to prevent corrosion.

6.2 Connecting water piping

About the piping work

Water connections must be made in accordance with the Water Piping and Wiring diagram delivered with the unit, respecting the water inlet and outlet. If air, moisture or dust gets in the water circuit, problems may occur. Therefore, always take into account the following when connecting the water circuit:

- Use clean pipes only.
- Hold the pipe end downwards when removing burrs.
- Cover the pipe end when inserting it through a wall so that no dust and dirt enter.
- Use a good thread sealant for the sealing of the connections.
- The sealing must be able to withstand the pressures and temperatures of the system.
  When using non-brass metallic piping, make sure to insulate both materials from each other to prevent galvanic corrosion.
- Because brass is a soft material, use appropriate tooling for connecting the water circuit.
  Inappropriate tooling will cause damage to the pipes.

CAUTION

- Be careful not to deform the unit piping by using excessive force when connecting the piping. Deformation of the piping can cause the unit to malfunction.
- Always use two wrenches (spanners) for tightening or loosening the water connections, and tighten connections with a torque wrench as specified in below table. If not, connections and parts can be damaged and leak.
- The unit is only to be used in a closed water system. If applications are in open water circuit, it will generate heat exchangers fouling, corrosion, leak.

Name	Tightening torque	
BSPP1	350~380 kgf•cm	34~37N•m

Connecting the water pipes

Connecting the water piping typically follow the below procedure:

1. Connecting the water piping to the outdoor unit.
2. Connecting the water piping to the indoor unit.
3. Connecting the recirculation piping.
4. Connecting the drain hose to the drain.
5. Filling the water circuit.
6. Filling the DHW tank.
7. Insulating the water piping.

Outdoor unit

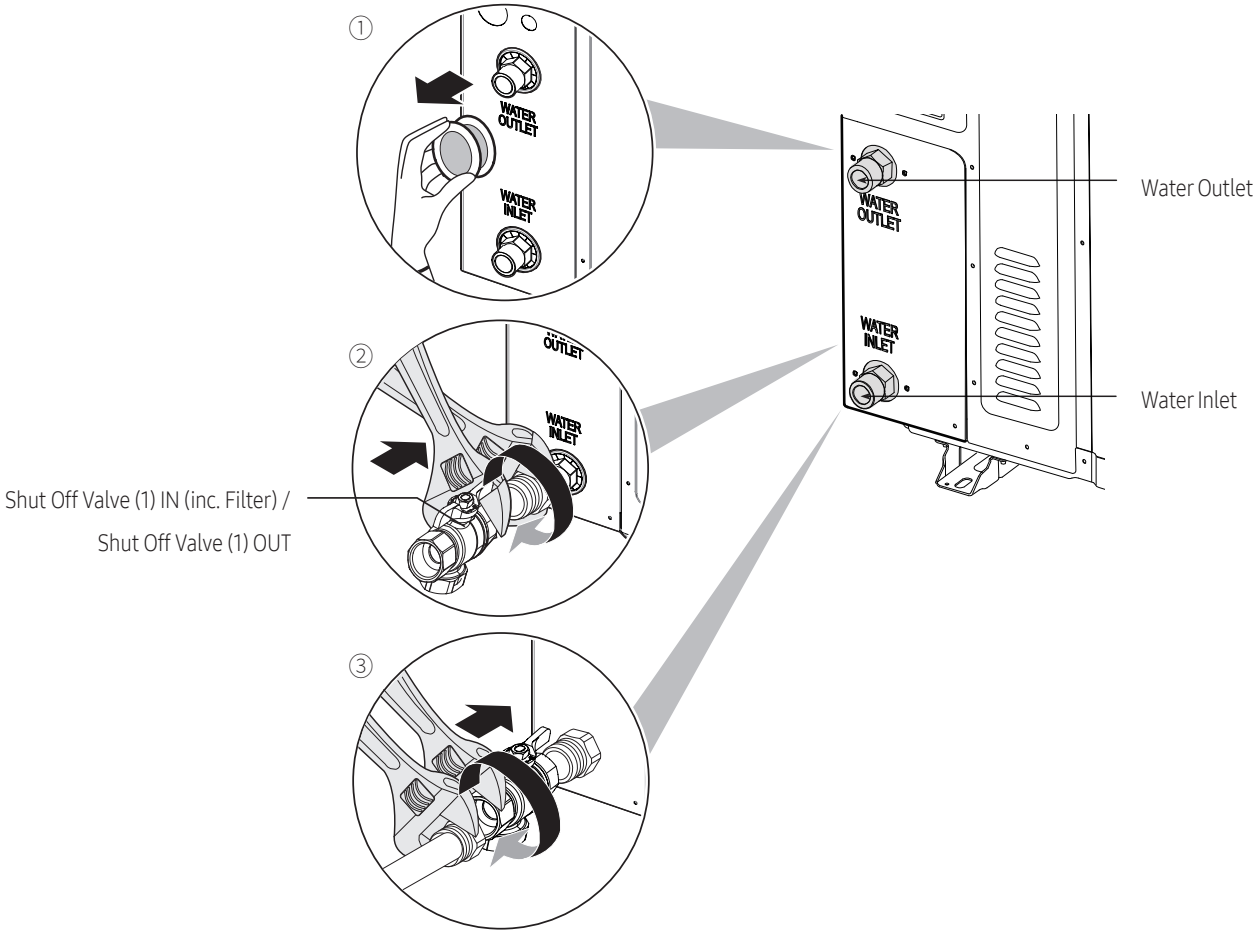
NOTE

Do not use excessive force when connecting the piping. Deformation of the piping can cause malfunctioning of the unit.

1 Connect the shut-off valve (with integrated filter) to the outdoor unit water inlet, using the thread sealant. At this time, the filter should be directed downward so that impurities can be collected.

2 Connect the field piping to the shut-off valve.

3 Connect the shut-off valve to the outdoor unit water outlet, using the thread sealant



NOTE

About the shut-off valve with integrated filter:

- The installation of the shut-off valve at the water inlet is mandatory.
- Mind the flow direction of the valve.

Indoor unit

The tank integrated hydro unit is equipped with components listed on the table below.

The hot and cold water supply connections are clearly marked on the unit with labels. And service valves are provided.

Whole water plumbing system including tank integrated hydro unit shall be installed by a qualified technician and must comply with all relevant European and national regulations.

- Allowable water pressure of tank integrated hydro unit is maximum 2.9 bar.
- An air-vent valve is integrated on the tank integrated hydro unit. Please check that air-vent valve is not over tightened so the air-vent valve can release any air out of the system during system operation.

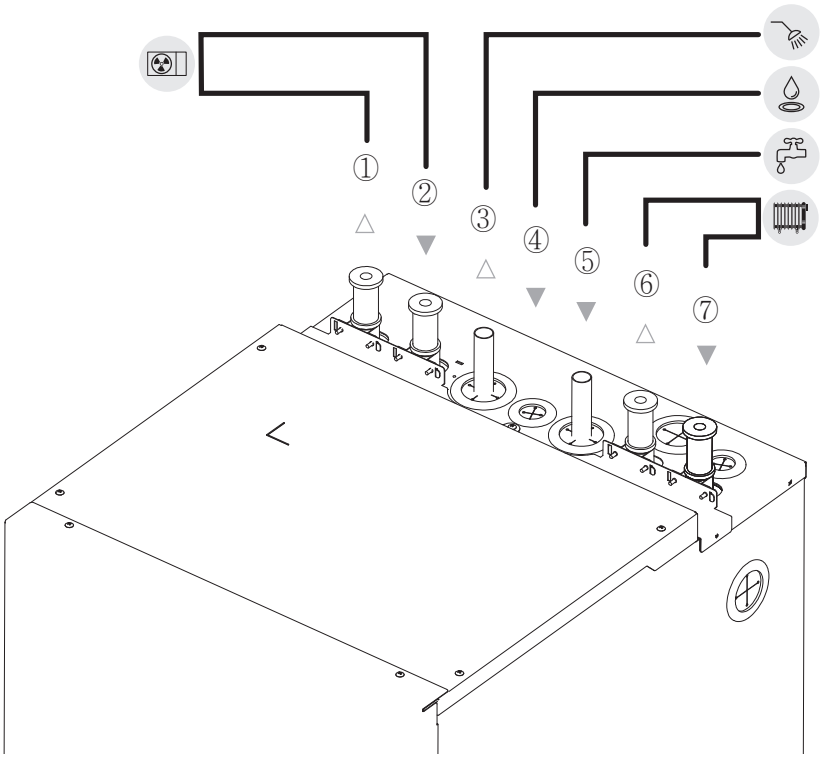
1 Connect the O-rings and shut-off valves to the outdoor unit water connection pipes of the indoor unit.

2 Connect the outdoor unit field piping to the shut-off valves.

3 Connect the O-rings and shut-off valves to the space heating/cooling water pipes of the indoor unit.

4 Connect the space heating/cooling field piping of both zones to the shut-off valves.

5 Connect the DHW inlet and outlet pipes to the indoor unit.



	No.	Name	Size	Connections
Tank integrated hydro unit	①	Outdoor outlet	ø28, T1.2, Copper	Crimp pipe fitting or welding
	②	Outdoor inlet	ø28, T1.2, Copper	
	③	Hot water outlet	ø22, T1.0, Copper	
	④	Secondary return (option)	ø22, T1.0, Copper	
	⑤	Cold water inlet	ø22, T1.0, Copper	
	⑥	Space heating/cooling outlet	ø28, T1.2, Copper	
	⑦	Space heating/cooling inlet	ø28, T1.2, Copper	

Connecting the secondary return piping (only 260l)

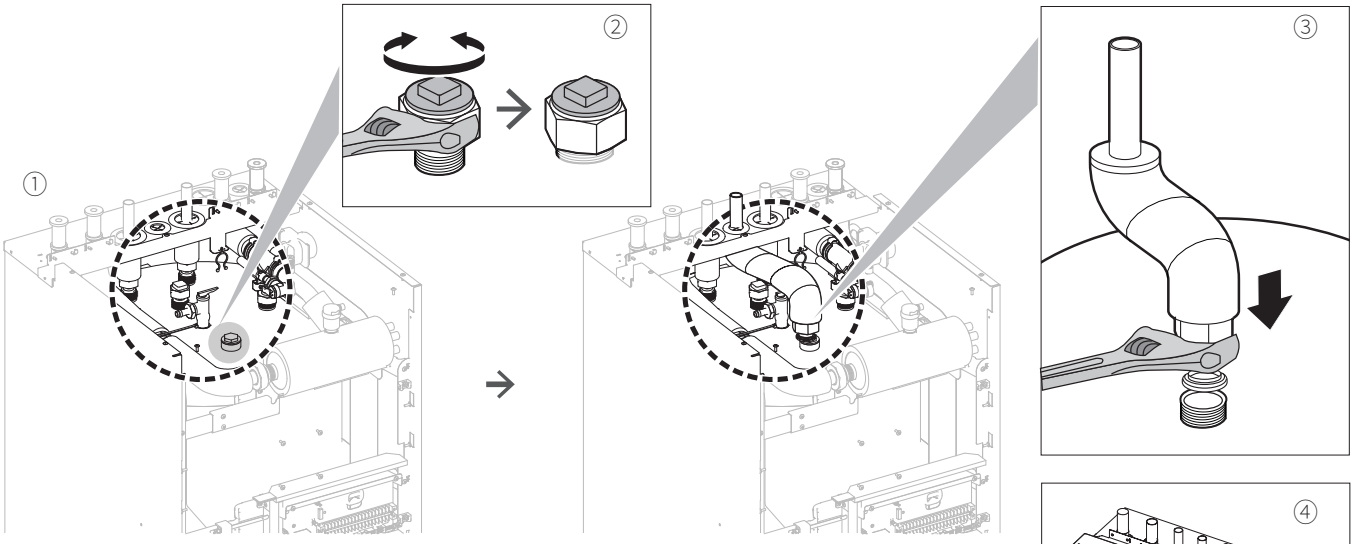
Prerequisite: Only required if you need recirculation in your system.

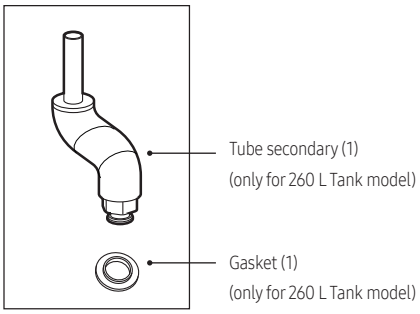
1 Remove the top panel from the unit.

2 Remove the stop by turning the screw on the top of the unit.
The recirculation connector is placed below the hole.

3 Route the recirculation piping through the grommet and connect it to the recirculation connector.

4 Reattach the top panel.



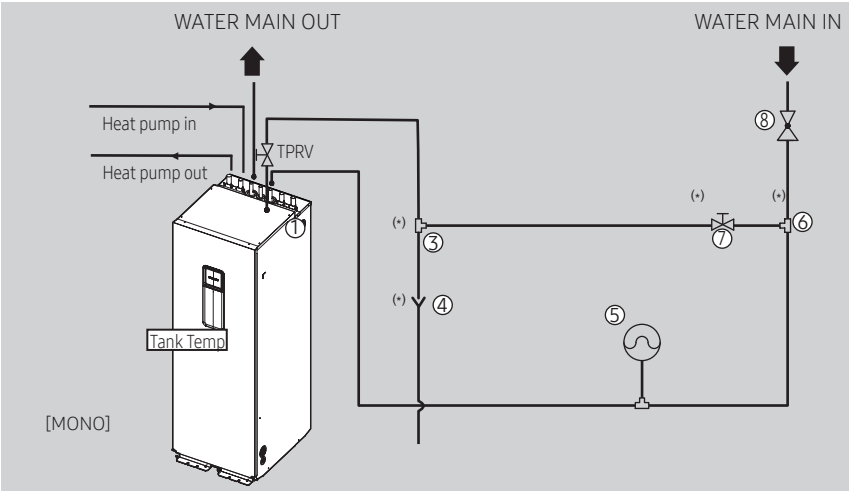


NOTE

- To avoid damage to the surroundings due to water leakage, it is recommended to close the domestic cold water inlet shut-off valves during periods of absence.
- It is recommended to install shut-off valves to domestic cold water in and DHW out connections. These shut-off valves are field supplied.

Piping diagram

Sanitary warm water Tank Diagram(Field Scope)



No.	Note	No.	Note
①	3 way diverting valve	⑥	T-Joint
②	Drain Valve	⑦	Expansion relief Valve
③	T-Joint	⑧	Pressure reducing valve with integrated check valve and strainer
④	Tundish	Tank Temp	Temperature sensor for DHW tank
⑤	Expansion vessel		

※ The table above contains the different components of the functional diagrams.

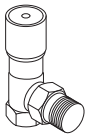
For the reliable performance and durability, all parts as listed below ,including a relief valve, an expansion vessel, a drain valve and pressure reducing valve , should be installed according to each national or regional standards. They are not supplied by Samsung.

- Pressure relief valve
- Expansion vessel
- Drain valve
- Tundish
- Expansion relief valve
- Pressure reducing valve

Overpressure bypass valve

We recommend to install the overpressure bypass valve in the space heating water circuit.

- Mind the minimum water volume when choosing the installation location of the overpressure bypass valve (at the indoor unit, or at the collector).
- Mind the minimum flow rate when adjusting the overpressure bypass valve setting.



Pressure relief valve

The MONO Unit does not have a pressure relief valve. The valve shall prevents abnormal water pressure from damaging the system by opening at 3.0 bar.

A pressure relief valve is integrated on heater vessel of tank integrated hydro unit and shall work in abnormal condition for protecting the tank integrated hydro unit.

CAUTION

Make sure that the discharged water from the drain pan does not affect other elements.

The pressure relief valve will operate releasing the pressure by flowing out some water through the drain hose.

Make certain that the discharged water out of drain pan can not contact any electrical parts.

The pressure-relief device is to be operated regularly to remove lime deposits and to verify that it is not blocked.

How the water heater can be drained.

A discharge pipe connected to the pressure-relief device is to be installed in a continuously downward direction and in a frost-free environment.

Filter/Strainer

Installation of Filter/Strainer is mandatory for water system. The Filter of Strainer shall be located in front of inlet pipe of PHE. While operating the system, some dust and foreign materials can circulate the system and can make the whole system not work well due to blockage of heat exchangers and corrosion in some components.

※ Filter mesh : #50

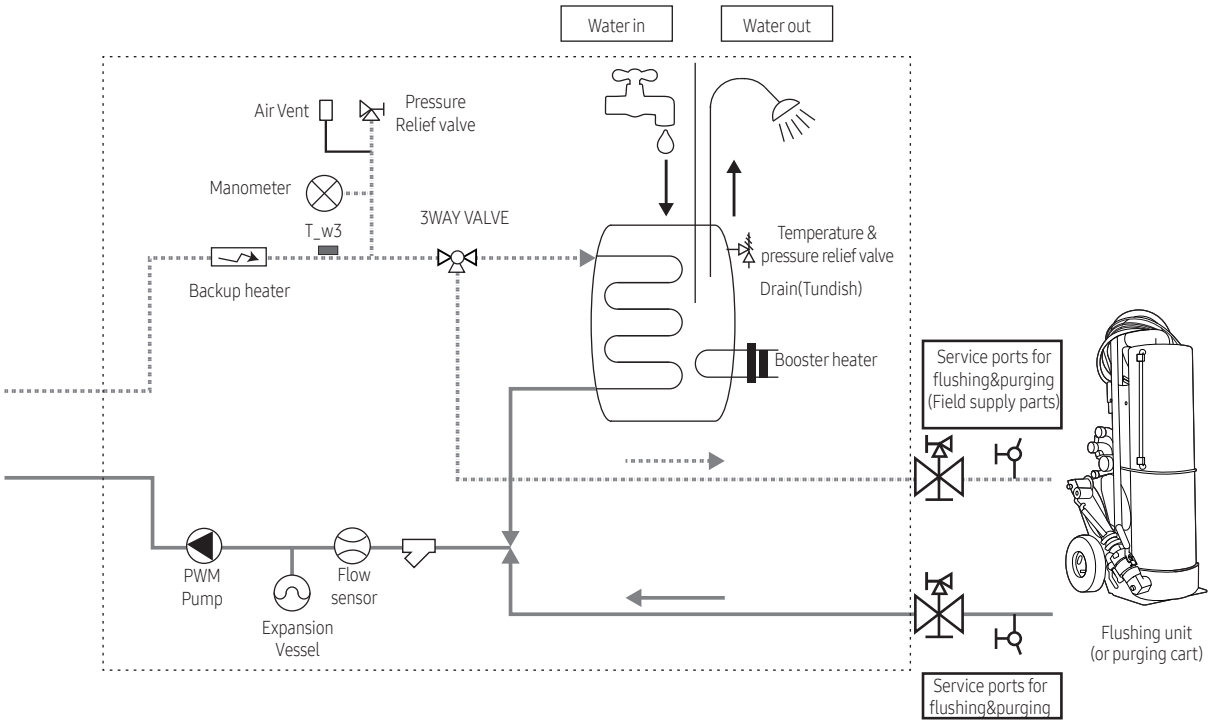
Flushing

When filling water, the following start-up procedure should be followed.

1 All system components and pipes must be tested for the presence of leaks.

2 Preparation of a make-up water assembly or flushing unit is recommended for installation and service.

3 Before connecting pipes to the outdoor unit, flush water pipes clean to remove contaminants during hours using a flushing unit or tap water pressure if it is adequate (at 2 to 3 bar)

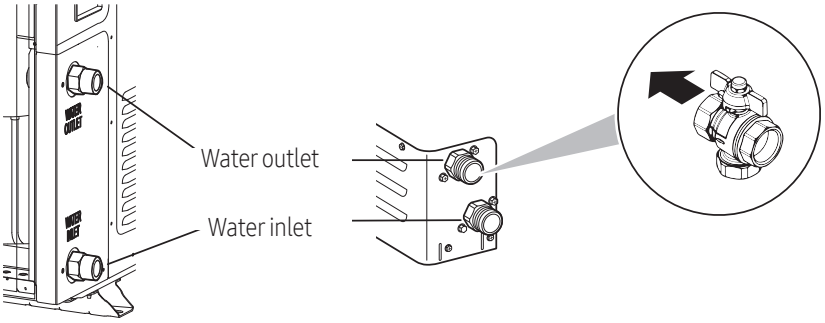


CAUTION

- Check and clean strainer periodically.
- Replace strainer when necessary.
- It's recommended that you flush the system for 4 hours minimum once per annum.
- Use chemical cleaning agents (Begin with acid, finish with alkali).
- Install air vents on the top of the system
- Pressure of entering water (over 2.0 bar)
- Water quality must be according to EN directive 98/83 EC.

Water charging

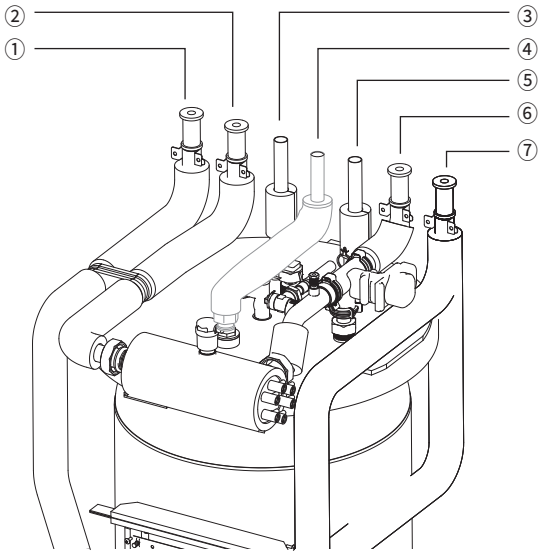
Fill water into the outdoor unit by opening shut-off & drain valve.



Charging water to the water-circuit

After installation is completed, the following procedures shall be used to charge water into the outdoor unit.

- Connect water lines to water connections of air-water heat pump.
- Air vent valve shall be open at least 2 turns so that air can be eliminated in the system.
- Open the shut-off & drain valve in the water supply connection.
- Water pressure of supply line shall be over 2.0 bar for good charging work.
- Stop water supply when the pressure gauge of the tank integrated hydro unit indicates around 2.0 bar.



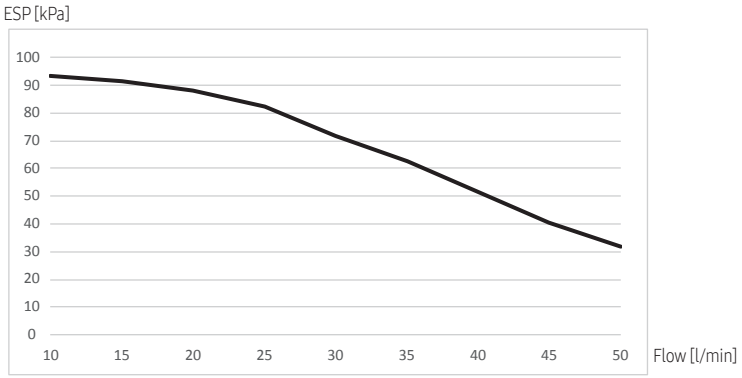
	No.	Name	Size	Conncetions
Mono tank integrated hydro unit	①	Outdoor outlet	ø28, T1.2, Copper	Crimp pipe fitting or welding
	②	Outdoor inlet	ø28, T1.2, Copper	
	③	Hot water outlet	ø22, T1.0, Copper	
	④	Sencondary return (option)	ø22, T1.0, Copper	
	⑤	Cold water inlet	ø22, T1.0, Copper	
	⑥	Space heating outlet	ø28, T1.2, Copper	
	⑦	Space heating inlet	ø28, T1.2, Copper	

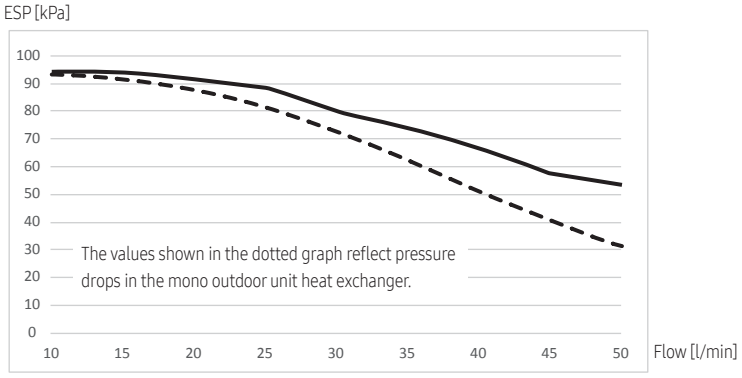
CAUTION

- Water pipe and connections shall be cleaned by using water or cleaner before operating the unit at first time.
- Considering E.S.P and water pump performance, select water plumbing specification and under floor loofs.
- Make sure to calculate the total resistance of piping system and determine the size of pipes before selecting the required head of pumps. If the pressure loss of total water system is over than designed pressure, an external water pump shall be installed on piping system in series.
- Do not connect power supply while water is charging.
- When initial installation or re-installation is required, remove air by air vent valve in water plumbings which are installed by local installers to prevent air trap in the system while charging water.
- Make sure that back flow preventer (check valves) shall be installed on main supply line to prevent from contaminating the city water.
  - It is recommended to install the make-up water assembly to prevent from contaminating the city water.
  - Check valves in the make-up water assembly can prevent running water inside Outdoor Unit from contaminating water supplies during installation or maintenance works.

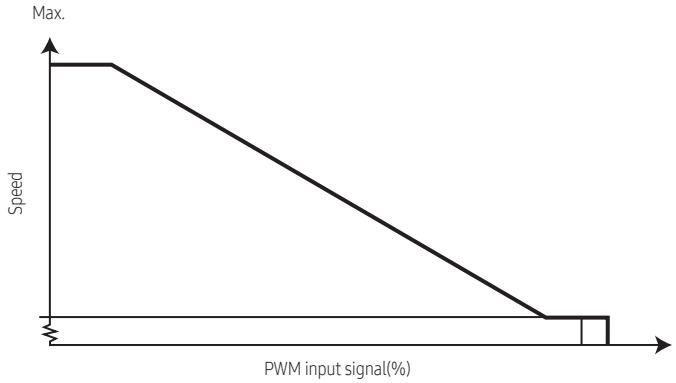
To choose a water pump

The illustration below shows the external static pressure of the unit depending on the water flow and the pump setting. When ESP is not enough, additional pump should be installed. In this case, install the PWM control external type pump (Heating type) additionally.





PWM characteristic curve



The additional pump should be the same type of product as the above graph.

Recommendation

GRUNDFOS UPMM 25-95 (Heating Type)

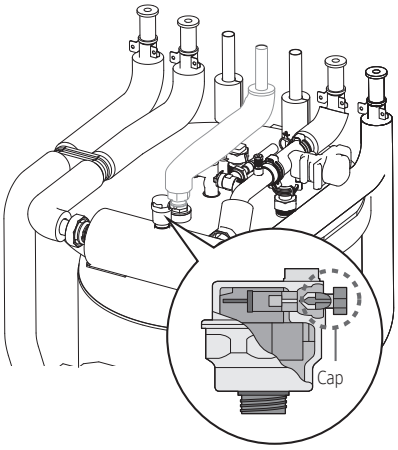
Air purging

Purge the air. (Fill with a flushing unit with sufficient capacity: avoid aerating the water)

Circulate for long enough to ensure that all air has been bled from the complete water piping system.

NOTE

Make sure both air purge valves (one on the magnetic filter and one on the backup heater) are open.
All automatic air purge valves must remain open after commissioning.



Air-vent valve

CAUTION

Unless the flushing work is performed adequately, It might result in malfunctions.

Protection the water circuit freezing

To prevent the hydraulic components from freezing, the control logic has a freezing protection function that includes activation of the pump at low temperatures.

However, in case of a power failure, this function cannot guarantee protection.

To protect water circuit from freezing, any of the following acts shall be performed.

- Add glycol to water. Glycol lowers the freezing point of water.
- Install the anti freeze valve. The anti freeze valve discharges water from the system before it freezes.

Freeze protection by glycol

Freeze protection solutions must use propylene glycol with a toxicity rating of Class 1 as listed in Clinical Toxicology of Commercial Products, 5th Edition.

WARNING

- Ethylene glycol is toxic and must not be used in the primary water circuit in case of any cross-contamination of the potable circuit.
- If you add glycol to the water, do NOT install anti freeze valve. Glycol leaking out of the anti freeze valve.
- If a anti freeze is used, pressure drop and capability degradation of the system can be occurred.

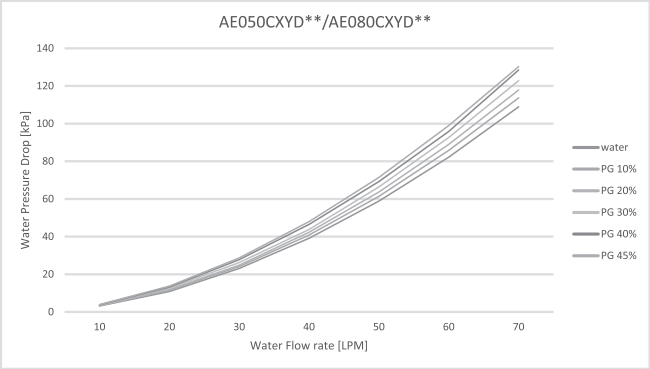
CAUTION

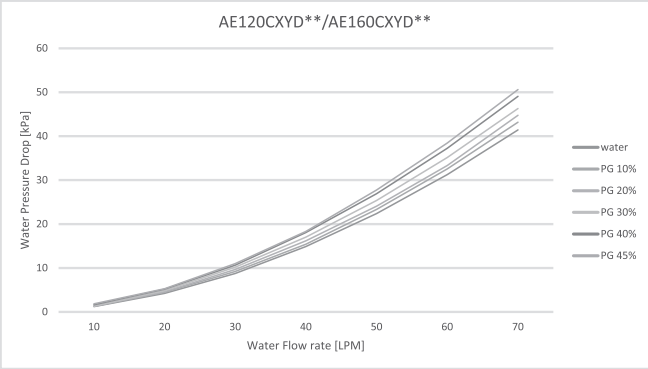
- Due to the presence of glycol, corrosion of the system is possible. Uninhibited glycol will turn acidic under the influence of oxygen. The acidic uninhibited glycol attacks metal surfaces and forms galvanic corrosion cells that cause severe damage to the system
- A glycol with corrosion inhibitors is selected to counteract acids formed by the oxidation of glycols.
- No automotive glycol is used because their corrosion inhibitors have a limited lifetime and contain silicates which can foul or plug the system.
- Galvanized pipes are NOT used in glycol systems since the presence may lead to the precipitation of certain components in the glycol's corrosion inhibitor.

Unit resistance and PHE resistance by glycol concentrate

The unit is composed of water pipes and PHE basically.

To ensure correct operation and predict the expected performance, Flow and Resistance table can be used and Flow and resistance characteristic is dependent on Glycol concentration.





Changing Glycol concentration can cause the pressure drop of the system and it can lead to make flow rate slow.
Just in case performance degradation, installer shall be careful of flow rate changes.

The required concentration of glycol depends on the lowest expected outdoor temperature, and on whether you want to protect the system from bursting or from freezing. To prevent the system from freezing, more glycol is required.

Add glycol according to the table below

Freezing Points of Propylene Glycol - Water Mixtures		
Percent Propylene Glycol [wt.%]	Freezing Point [°F]	Freezing Point [°C]
0	32	0
10	26	-3
20	20	-7
30	10	-12
36	0	-18
40	-5	-20
43	-10	-23
48	-20	-29

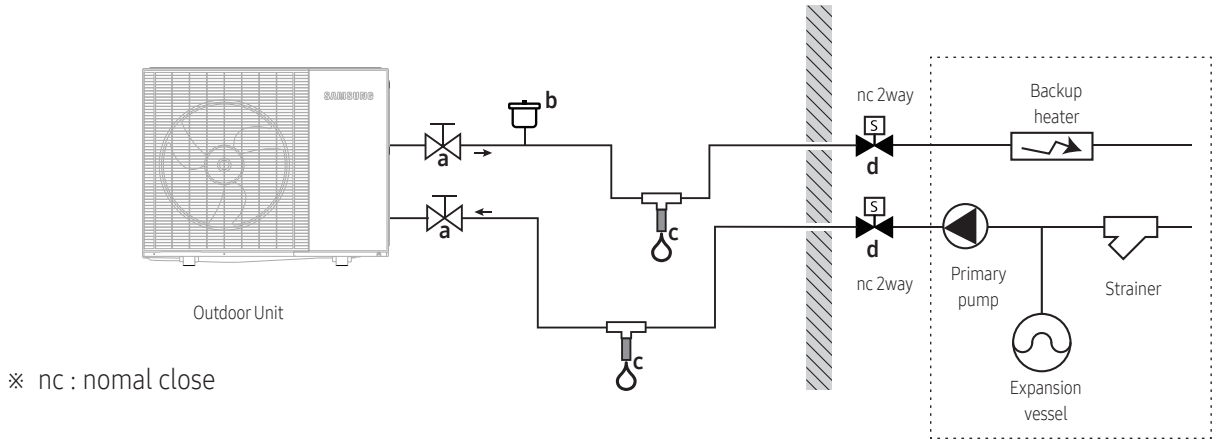
Freezing protection: Anti freeze valves

In order to prevent system water from freezing inside the pipework during subzero ambient conditions after sudden power outage, anti freeze valves are advised if glycol is not a suitable solution.

An anti freeze valve opens when the medium (water) is below a certain low temperature value.

When using the EHS for cooling in summertime, an anti freeze valve with ambient sensor is required to avoid unwanted opening due to low water temperatures.

To protect the field piping against freezing, install the following parts



※ nc : nomal close

a. Shut off valve (in/out)
b. Aeration valve (Optional - field supply)
c. Anti freeze valve (Optional - field supply)
d. Normally closed valves (recommend - field supply)

CAUTION

If the system is utilized for both cooling operation (summer), please install freeze protection valves with an ambient air sensor in order to avoid valve opening due to low water temperatures.

Alternatively set FSV #1012 (minimum cooling set point) 7°C or higher in order to prevent triggering the freeze protection valves during cooling operation.

Part	Description
a	If necessary, you can close the valve to isolate the water in the outdoor unit.
b	Aeration valve (to clear the water from the system).
c	Protection for the field piping. The anti freeze valve must be installed (field supply) • Vertically to allow water to flow out properly and free from obstructions. • At the lowest point in all field piping. • In the coldest part and away from heat sources.
d	Water isolation inside the house in case of power outage. Normally closed valves (located indoors near the inlet/outlet pipes) can prevent all water in the indoor plumbing from draining when the anti freeze valve is opened. (filed supply) • Power outage: The normally closed valves close to shut off the water in the house. When the anti freeze valve is open, only water outside the house is drained. • Other situations (eg pump failure): When the anti freeze valves open when the power is still applied to the normally closed valves, the system will drain completely.

Charging the DHW tank

1 Open every hot water tap in turn to purge air from the system pipe work.
2 Open the cold water supply valve.
3 Close all water taps after all air is purged.
4 Check for water leaks.

Outdoor water piping insulation

The complete water circuit, inclusive all piping, must be insulated to prevent condensation during cooling operation and reduction of the heating and cooling capacity as well as prevention of freezing of the outside water piping during winter time. The thickness of the sealing materials must be at least 9 mm with (0.035 W/mK) in order to prevent freezing on the outside water piping.

If the temperature is higher than 30°C and the humidity is higher than RH 80%, then the thickness of the sealing materials should be at least 20 mm in order to avoid condensation on the surface of the sealing.

For piping in free air, it is recommended to use the insulation thickness as shown in below table as a minimum (with ƛ=0.035 W/mK).

Piping length (m)	Minimum insulation thickness (mm)
<20	19
20~30	32
30~40	40
40~50	50

NOTE

This recommendation ensures good operation of the unit, however, local regulations may differ and shall be followed.

7. Electrical installation

SAMSUNG

7.1. Precaution

Precautions when connecting the electrical wiring

WARNING

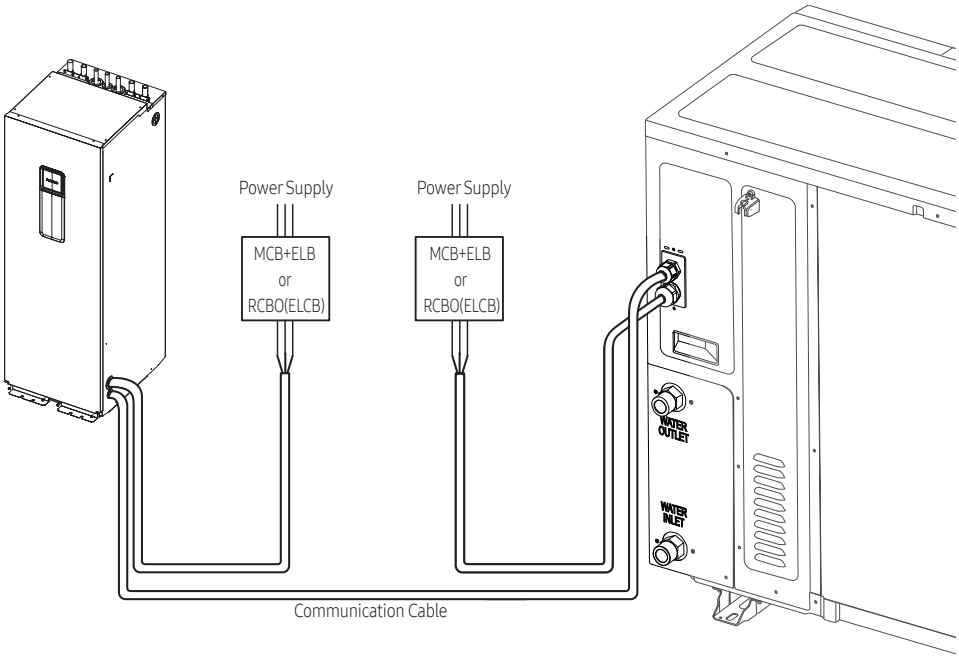
- Make sure first the water piping is connected before the electrical wiring work.
- When removing or relocating the equipment, power off first and then disconnect the electrical wiring.
- Connect the air to water heat pump to a protected earth (PE) before connecting the phase and neutral to the product.
- Follow the local installation standards and regulations when installing electrical wiring. Electrical wiring should be installed by a certified electrician or certified installer.
  Failing to comply, might lead to damaging the product, starting a fire and personal injury, electrocution or death.

- Make sure that wiring work must be done by an authorized electrician.
  The wiring materials and wiring work must comply with the applicable legislation.
- Always verify that a suitable grounding connection is available.
- Verify that the voltage and frequency of the power supply comply with the specifications and that the installed power is sufficient to ensure the operation of any other domestic appliance connected to the same electric lines.
- Always verify that the cut-off and protection switches are suitably dimensioned.
- Verify that the air to water heat pump is connected to the power supply in accordance with the instructions provided in the wiring diagram included in the manual.
- Always verify that electric connections (cable entry, the section of leads, protections...) comply with the electric specifications, local regulations and installation standards and with the instructions provided in the wiring scheme.
  Always verify that all connections comply with the standards applicable to the installation of air to water heat pumps.
- Depending on the condition of power supply, unstable power or voltage may cause malfunction of the parts or control system. (Avoid using power supply from electric generator, like on a ship etc).

CAUTION

- Make sure that you earth the cables.
  – Do not connect the earth wire to the gas pipe, water pipe, lighting rod or telephone wire. If earthing is not complete, electric shock or fire may occur.
- Install the circuit breaker.
  – Failing to install a circuit breaking device may result in electric shock and fire occurrence.
- Install the power cable and communication cable of the indoor and outdoor unit according IEC 60364-1 (Electrical installations and protection against electric shock).
- Be sure to install both an earth leakage detector and circuit breaker with specified capacity in accordance with relevant local and national regulations.
  – If it is not installed properly, it may cause electric shocks and fire.

Electrical wiring diagram



About correct grounding

Grounding the power cable

- The standard of grounding may vary according to the rated voltage and installation place of the heat pump.
- Grounding must be done by an authorized electrician (sometimes appointed by the electricity company), according to local regulation.

※ Do not earth the installation via connecting to water or gas piping, telephone earth or surge absorber.

※ Earthing wiring must have the same diameter of the phase and neutral lines.

※ Earthing cables are recognizable by their green/yellow colour labeling.

Specification of power cable

- 1 Phase
  - The power cables are not supplied with the air to water heat pump.
  - Power supply cords of parts of appliances for outdoor use shall not be thinner than polychloroprene sheathed flexible cord (Code designation IEC:60245 IEC 57 / CENELEC:H05RN-F)
  - This equipment complies with IEC 61000-3-12.

Outdoor unit	Rated		Voltage Range		MCA	MFA
	Hz	Volts	Min	Max	Min. Circuit Amps.	Max. Fuse Amps.
AE050CXYDEK	50	220-240	198	264	16.1 A	17.6 A
AE080CXYDEK	50	220-240	198	264	26 A	28.6 A
AE120CXYDEK	50	220-240	198	264	32 A	35.2 A
AE160CXYDEK	50	220-240	198	264	32 A	35.2 A

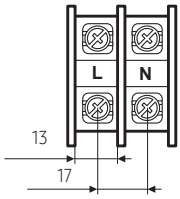
- 3 Phase
  - The power cables are not supplied with the air to water heat pump.
  - Power supply cords of parts of appliances for outdoor use shall not be lighter than polychloroprene sheathed flexible cord (Code designation IEC:60245 IEC 66 / CENELEC:H07RN-F)
  - This equipment complies with IEC 61000-3-12 provided that the short-circuit power (SSC) is greater than or equal to 3.3[MVA] at the interface point between the user's supply and the public system. It is the responsibility of the installer to ensure, by consultation with the energy company if necessary, that the equipment is connected only to a supply with a short-circuit power (SSC) greater than or equal to 3.3[MVA].

Outdoor unit	Rated		Voltage Range		MCA	MFA
	Hz	Volts	Min	Max	Min. Circuit Amps.	Max. Fuse Amps.
AE080CXYDGK	50	380-415	342	457	16.1 A	17.7 A
AE120CXYDGK	50	380-415	342	457	16.1 A	17.7 A
AE160CXYDGK	50	380-415	342	457	16.1 A	17.7 A

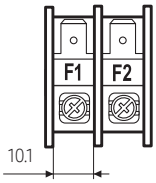
Terminal block specification

- 1 Phase

AC power : M5 screw

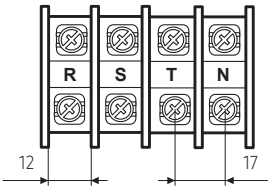


Communication : M4 screw

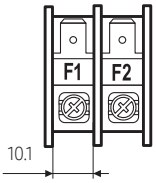


- 3 Phase

AC power : M5 screw

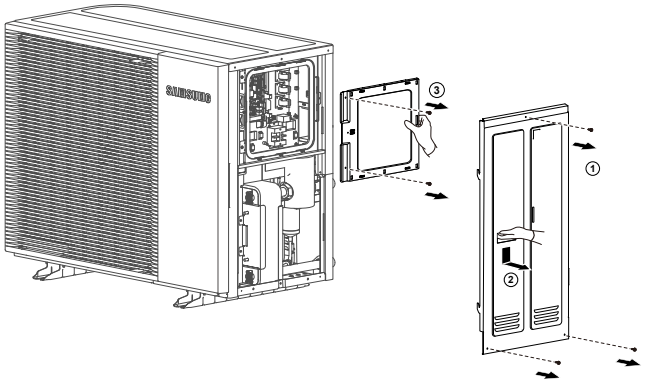


Communication : M4 screw

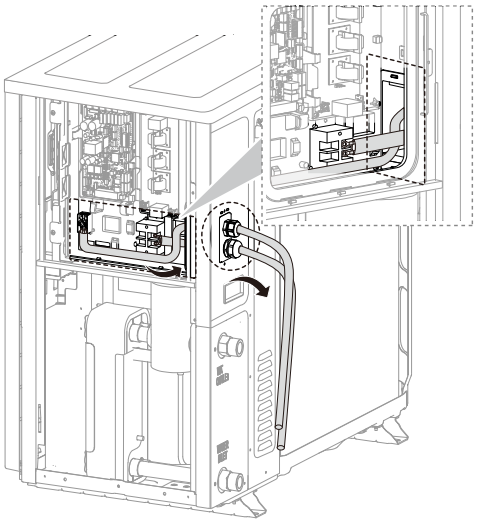


7.2 Outdoor unit's wiring

1 Open the switch side cover. See "to open the outdoor".



2 Insert the cables at the rear of the unit, and route them through the factory mounted cable sleeves into the switch box.



Power and communication cable configuration

- Power supply cable must be guided through the knock-out hole on the bottom-right or right side of the cabinet.
- Guide the communication cable through the designated knock-out hole on the bottom-right side of the front part.
- Install the power and communication cable using a separate cable protection tubing.
- Fix the conduit to the knock-out hole on the outdoor unit by using a conduit bushing and nut.

Specification of the protection tube

Name	Temper grade	Applicable conditions
Flexible PVC conduit	PVC	When the protection tube is installed indoor and not exposed to outside, because it is embedded in concrete structure
Class 1 flexible conduit	Galvanized steel sheet	When the protection tube is installed indoor but exposed to outside so there are risk of damage to the protection tube
Class 1 PVC coated flexible conduit	Galvanized steel sheet and Soft PVC compound	When the protection tube is installed outdoor and exposed to outside so there are risk of damage to the protection tube and extra waterproof is needed

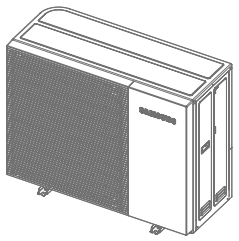
CAUTION

- Caution for perforating the knock-out hole
- Perforate a knock-out hole by punching it with a hammer
- After perforating the knock-out hole, apply rust resisting paint around the hole.
- When you need to pass the cables through the knock-out hole, remove burrs on the hole and protect the cable with a bushing. Install the bushing first before feeding the cables through. If the power supply cable is damaged, it should be replaced directly by a certified electrician.
- The communication cable must be protected by a shield connected to earth at a single side.
- Power and communication cables should be fixed to a clamp highlighted with a box on the illustration.

Specification of the power supply and communication cable

Connection of the power supply and communication cable.

Model	Description	No. of wires	Max. A	Thickness	Supply Scope
AE***CXYDEK	1 Phase main power	2 + ground	32A	4.0mm² ↑ H05RN-F or H07RN-F	Field supply (220-240Vac, Input)
	Communication	2	0.1A	0.75mm² ↑ LiYCY	Field wiring (7Vdc, data)
AE***CXYDGK	3 Phase power	4 + ground	16.1A	2.5mm² ↑ H07RN-F	Field supply (380-415Vac, Input)
	Communication	2	0.1A	0.75mm² ↑ LiYCY	Field wiring (7Vdc, data)



Inlet hole positions for power/ communication wires

To connect power supply

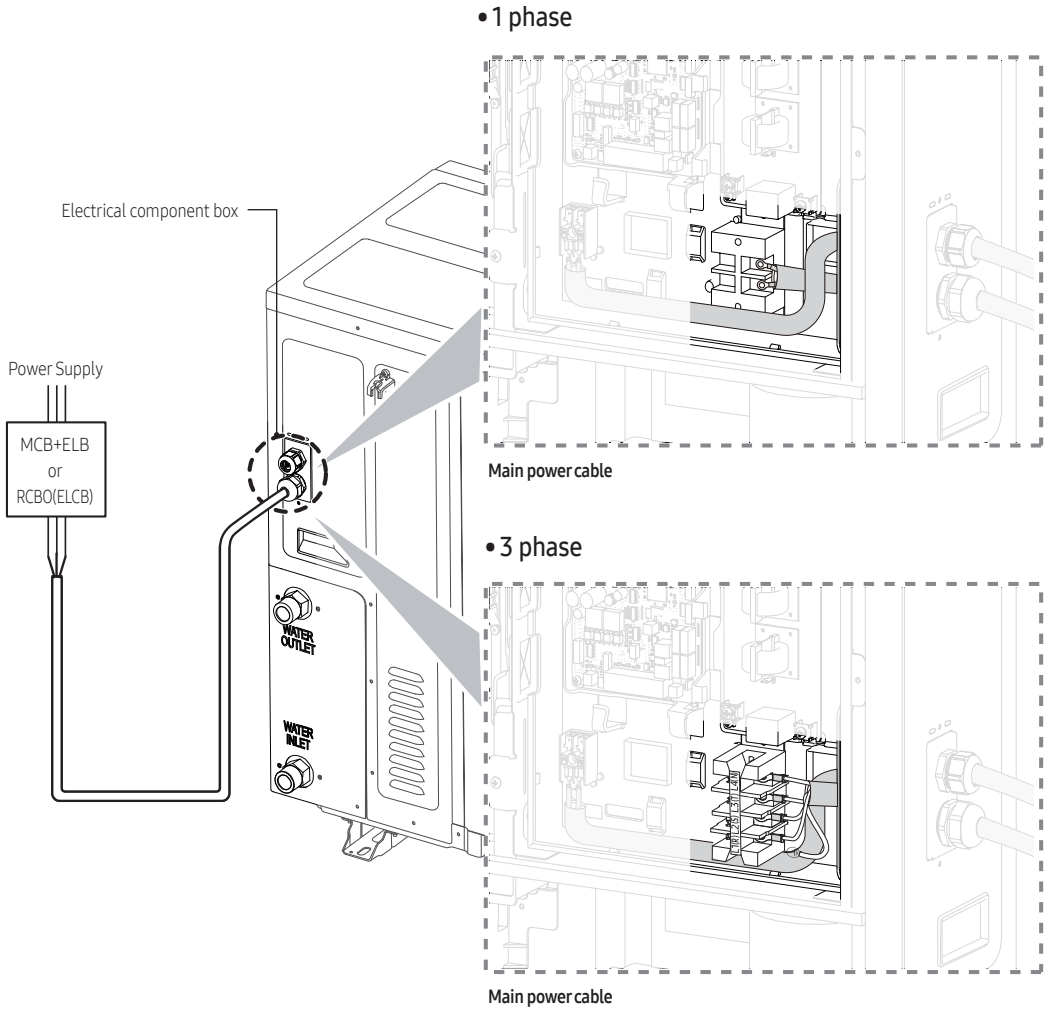
- Two cables must be connected to the outdoor unit
  - The communication cable between indoor unit and outdoor unit
  - The power cable between outdoor unit and auxiliary circuit breaker.
- Specially for the Russian and European market, before installation, the supply authority should be consulted to determine the supply system impedance to ensure compliance.

CAUTION

- You should connect the power cable into the power cable terminal and fasten it with a clamp.
- The unbalanced power must be maintained within 2% of the supply rating.
  - If the power is unbalanced greatly, it may shorten the life of the electrical components. If the unbalanced power is exceeding 4% of the supply rating, the control kit is protected, stopped and an error code is displayed.
- To protect the product from water and possible shock, keep the power cable and the connection cord of the control kit and outdoor units within ducts (with appropriate IP rating and material selection for your application).
- Ensure that main supply connection is made through a disconnection switch within arms reach, that disconnects all poles, with contact gap of a least 3 mm.

Route the cable through the frame

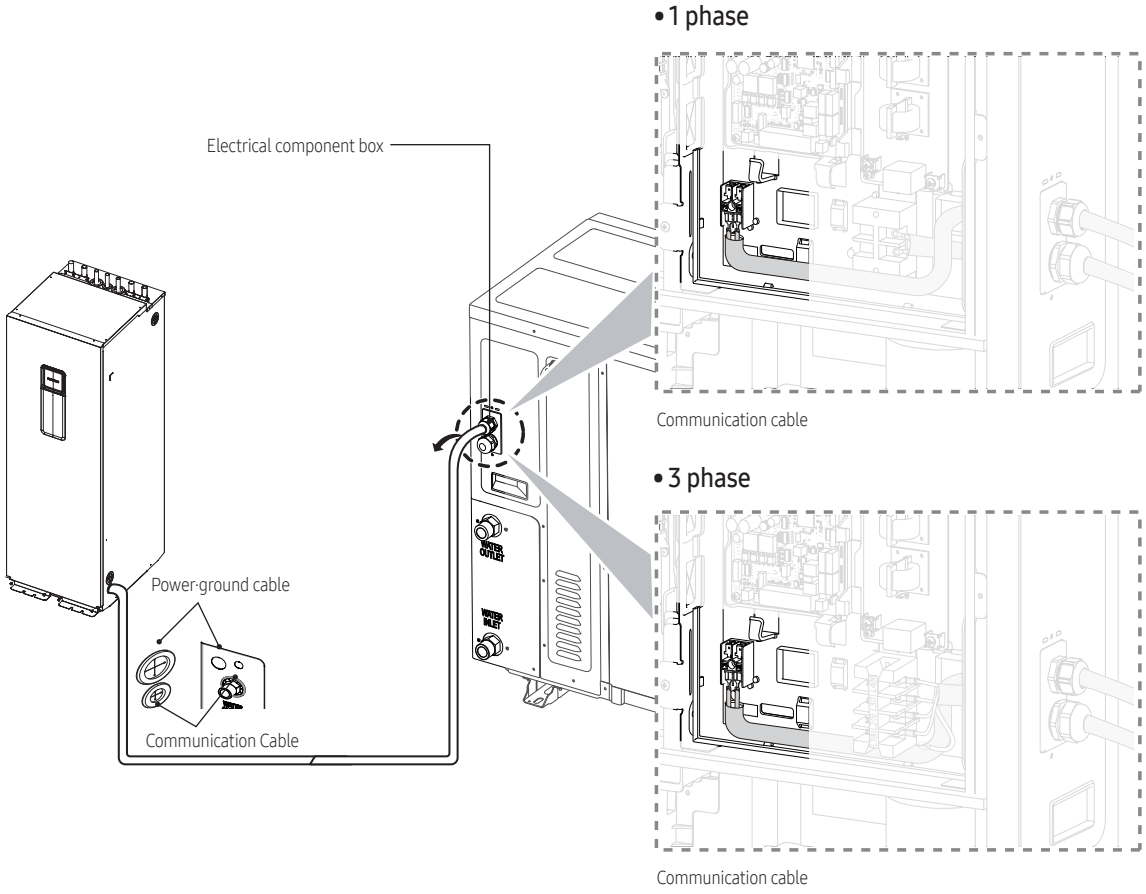
- Connect the wires to the terminal block and fix the cable with the cable tie.



- When installing electrical wiring: tension on the cable(s) must be avoided.
- Earth wire for the indoor unit and outdoor unit cables must be clamped to a suitable ring terminal clamp (not supplied).
- For the power cable, use the grade H07RN-F or H05RN-F materials.
- Power supply cords of parts of appliances for outdoor unit use shall not be thinner than polychloroprene sheathed flexible cord. (Code designation IEC:60245 IEC 57 / CENELEC: H05RN-F or IEC:60245 IEC 66 / CENELEC: H07RN-F)

To connect the communication cable

- The communication cable between indoor unit and outdoor unit.
- Route the cable through the frame.
- Connect the wires to the terminal block and the earth screw (single side, the other end of the protective shield is not again connected to earth).
- Fix the cable with a cable tie.



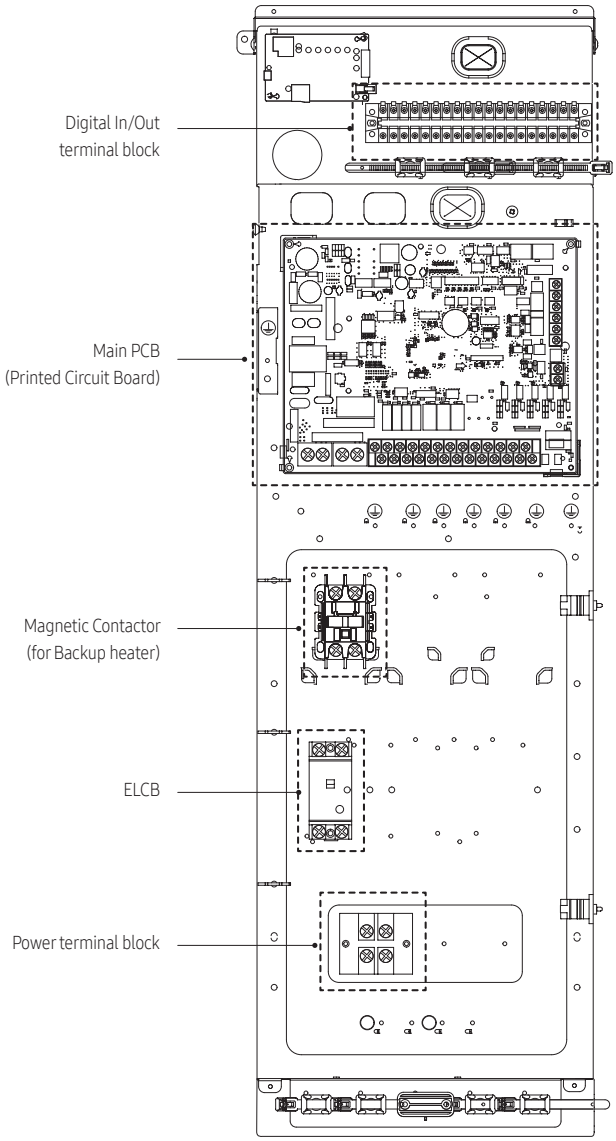
- Specification of communication cable

Communication cable	Specifications
0.75mm², 2wires shielded	LiYCY

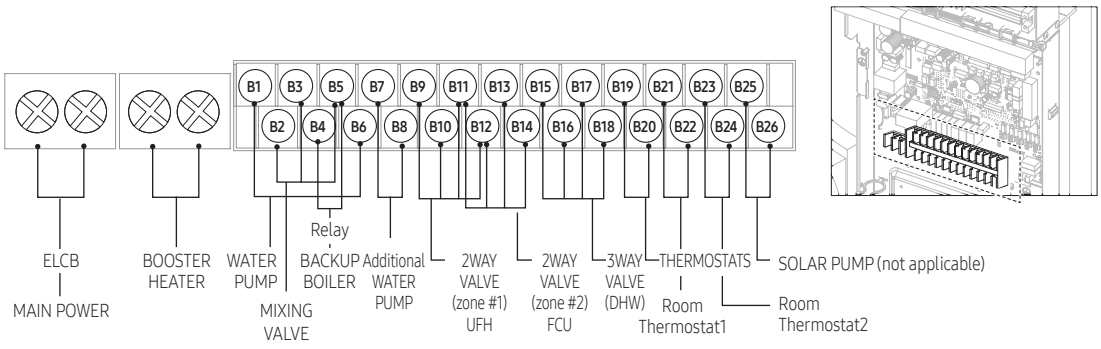
7.3 Indoor unit's wiring

Indoor unit control panel and terminal block connections

- The indoor unit's control panel consist of 5 parts.
  - Digital in/out terminal block
  - Main PCB
  - Magnetic Contactor (for BUH)
  - ELCB
  - Power terminal block
- Terminal block connections
- The five control panel parts:

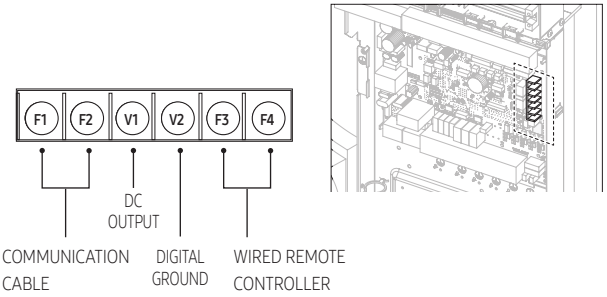


Main PCB



Terminal No.	Function	Input/Output	Max. current	Description	Remark
B1/B6	WATER PUMP	AC 230V output	0.5A	Water pump operation (maximum input power of pump 100W)	
B2/B3/B5	MIXING VALVE	AC 230V output	22mA	Mixing Valve operation	Option
B4/B5	BACKUP BOILER	AC 230V output	10mA	Signal output for Backup Boiler	Option
B7/B8	WATER PUMP	AC 230V output	0.5A	Additional Water pump operation (maximum input power of pump 100W)	Option
B9/B10/B11/B12	2WAY VALVE #1	AC 230V output	22mA	2WAY VALVE operation for Zone#1 (UFH)	Option
B13/B14/B11/B12	2WAY VALVE #2	AC 230V output	22mA	2WAY VALVE operation for Zone#2 (UFH)	Option
B15/B16/ B 17/B18	3WAY VALVE	AC 230V output	22mA	3WAY VALVE operation for DHW	Option
B19/B20	THERMOSTATS	AC 230V output	22mA	Power to external thermostat(s)	Option
B21/B22	THERMOSTAT 1	AC 230V input	22mA	Thermostat for zone#1 (UFH) Cooling/ Heating Signal	Option
B23/B24	THERMOSTAT 2	AC 230V input	22mA	Thermostat for zone#2 (FCU) Cooling/ Heating Signal	Option
B25/B26	SOLAR PUMP	AC 230V input	10mA	Signal input from Solar Pump/ DHW Tank Thermostat	Option

※ UFH : Under floor heating

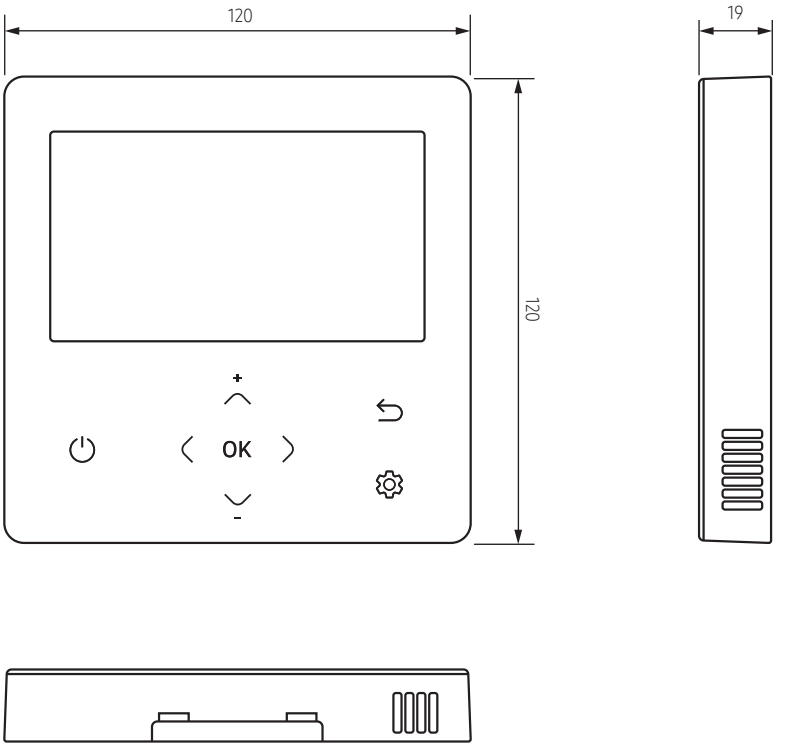


Part code	Part name	Terminal	Terminal description
TB-C	Communication & DC 12V	#1:COM1 (F1)	Communication cable
		#2:COM1 (F2)	
		#3:V1 (DC 12V)	DC 12 V
		#4:V2 (GND)	Digital ground
		#5:COM2 (F3)	Wired remote controller
		#6:COM2 (F4)	

To connect the wired remote controller

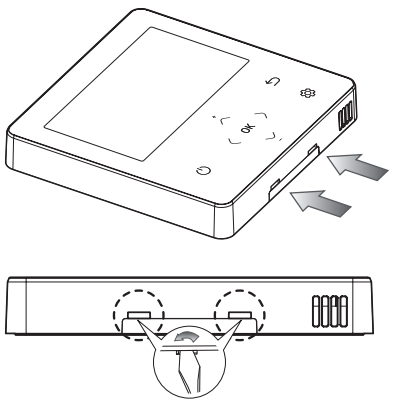
Dimension

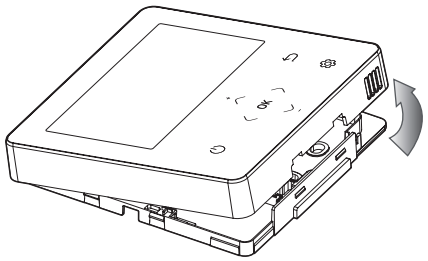
(Unit : mm)



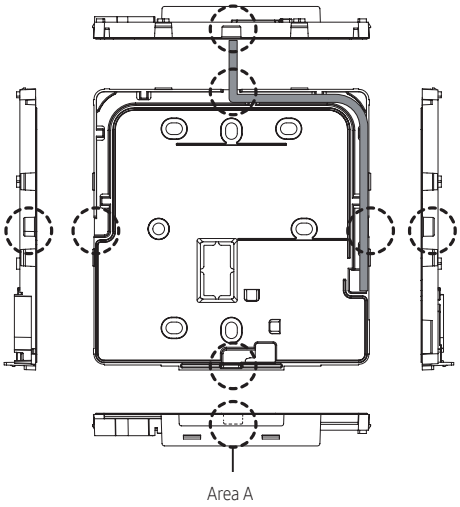
Wired remote controller installation

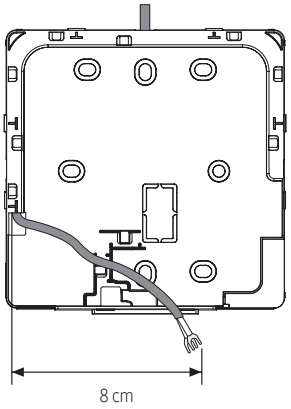
1 Insert the flat-head screwdriver into two square grooves at the bottom of the wired remote controller and rotate it to lift the front cover for removal from the rear cover.



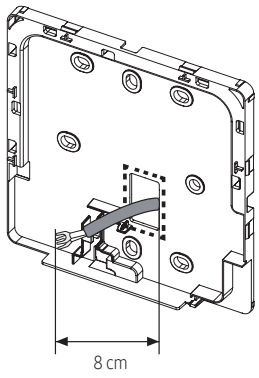


2 Arrange the power cable and the communication cable so that they fit in the housing along the edges of the rear cover.





‹When the cable is not concealed›

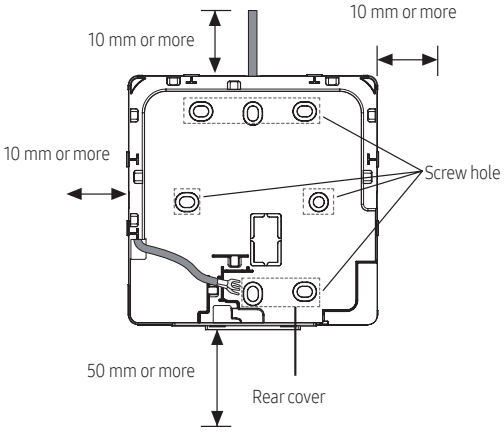


‹When the cable is concealed›

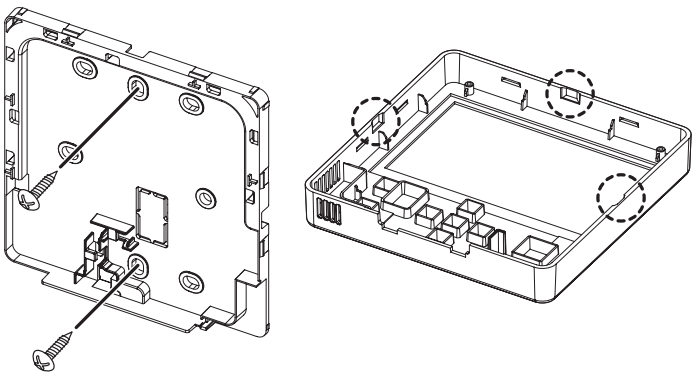
NOTE

- When connecting the communication cable to the bottom of the Wired Remote Controller, first cut off the area A

3 Using two or more screws, firmly affix the rear cover of the remote controller to the wall, and then cut off the grooves of the front covers for communication and power cables, making sure these cables have reasonable length.

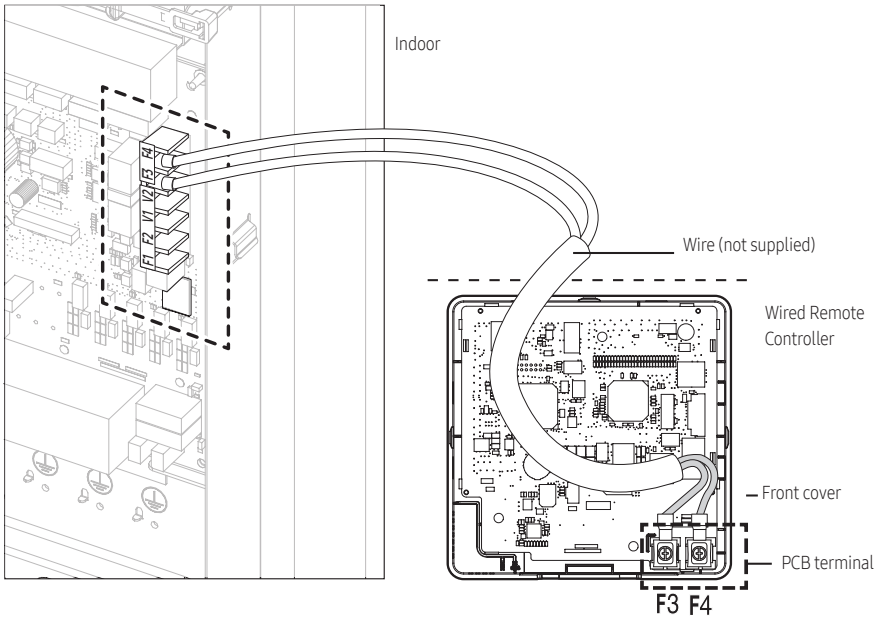


※ Before fixing the rear cover, secure at least 10 mm space of upper side, left side, right side, and 50 mm space of bottom side.

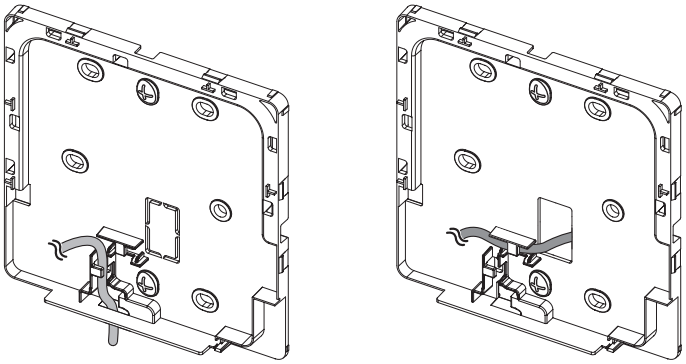


※ You must fit the screws into the screw holes.

4 Connect the communication cable to the indoor terminal (F3, F4),and then fix the wires.



※ Do not tighten the screws on the PCB terminal with excessive force.



CAUTION

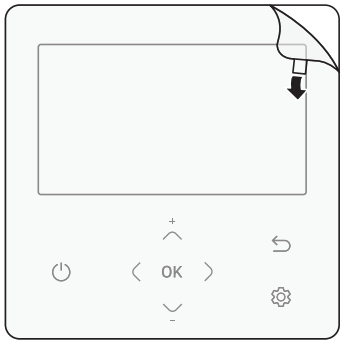
- When using an electric screwdriver, tighten the screws to the standard torque because the top of screws may be worn out if you use a strong torque.

5 Reassemble the Wired Remote Controller.

NOTE

- Align the controller with the upper groove first, and then insert it by turning it downwards as shown in the figure.
  After assembly, check and confirm that no wires are stuck in the gap between the back and front covers.

6 Remove the front protective film.

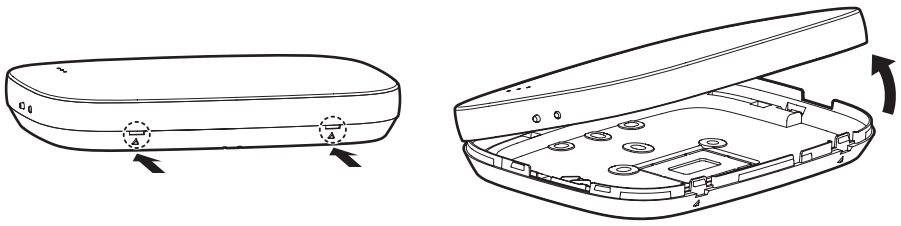


To connect the Wi-Fi kit

CAUTION

- To ensure smooth operation, there should be no obstacle between the Wi-Fi Kit and wireless router that may interfere with communication. When the Wi-Fi Kit is too far from a router or there are potentially interfering elements between them, it may cause problems with the performance of the Wi-Fi Kit that cannot be resolved by customer services.
- Place the Wi-Fi Kit in an area where you can easily press the AP button for device verification.
- Do not install the Wi-Fi Kit in an area where it may be exposed to moisture or impact.
- Operating temperature 0-40°C, Operating humidity 30-90%(relative humidity)

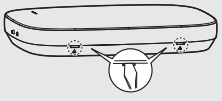
1 Use a flathead screwdriver to turn each of the square holes at the lower part of the Wi-Fi Kit and remove the back cover.



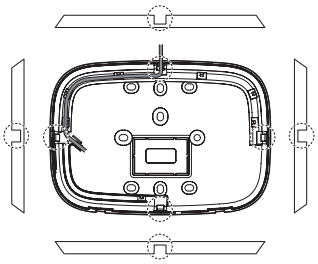
※ Push both latches at the same time.

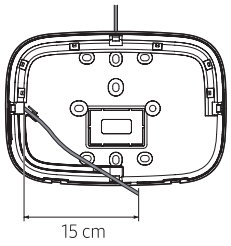
NOTE

- Use a flathead screwdriver to turn the rectangular hole at the upper part of the fixing hook for easy removal.



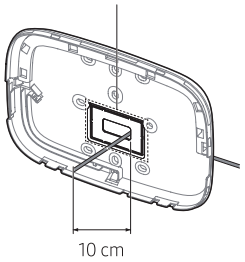
2 Arrange the power and communication cables along the back cover.





‹Wires installed on the wall›

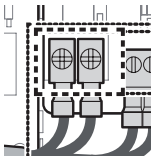
If necessary, remove this part to secure more space for wiring.



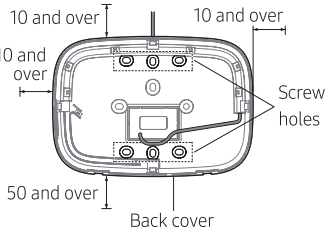
‹Wires installed in the wall›

3 Use two or more screws to fix the back cover to the wall. Connect the power cables (V1, V2) and communication cables (F1, F2) to the terminals on the back of the front cover while adjusting them to a suitable length.

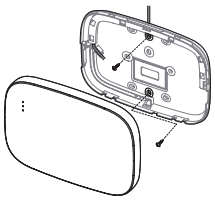
4 When connecting the power cables to V1 and V2, fasten the PCB terminal screws (CN5) to a torque of 0,6Nm or less.
Screw size : M3 x 6



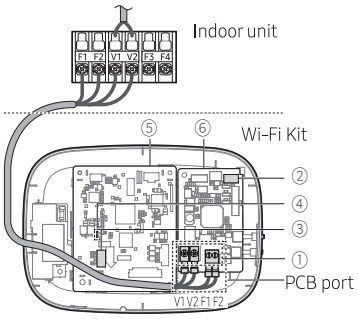
Unit: mm



※ Be sure to secure space of at least 10 mm (up/right/left) and 50 mm (down) around the back cover before fixing the back cover on the wall



※ Fix the screws to the screw holes.



※ Do not over-tighten the PCB terminal.

Item	Contents	Item	Contents
①	Power/Communication terminals	④	LED
②	Tracking/Reset button	⑤	Network PBA
③	Micro SD card slot	⑥	Interface module PBA

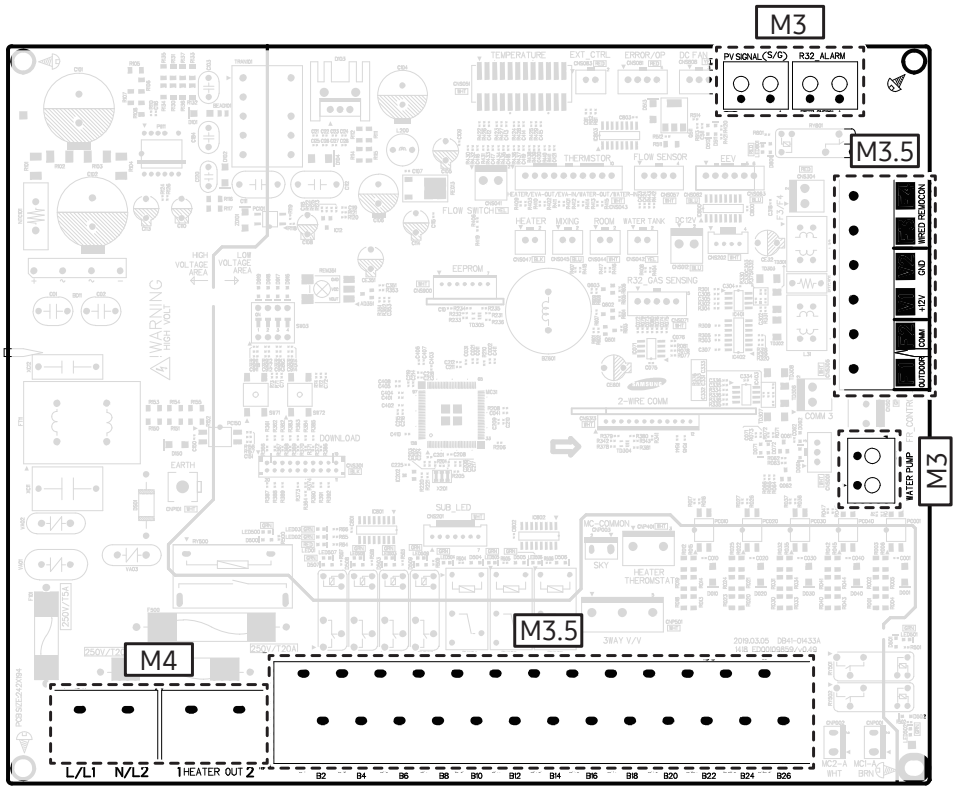
5 Assemble the Wi-Fi Kit again.

NOTE

- Insert the front cover to the upper grooves as shown in the figure. After assembly, make sure that there is no gap between the covers.

Screw sizes and torque specifications of the terminal blocks

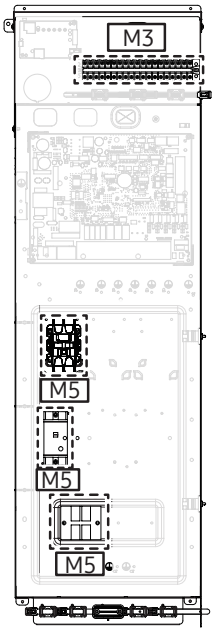
- When fastening cables under terminal screws, please use the correct torque range as indicated below.



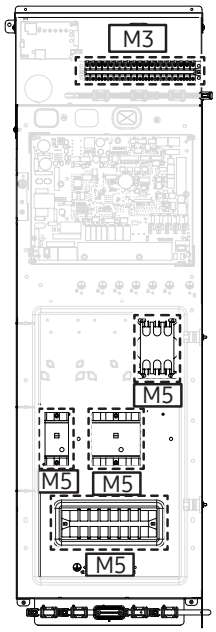
Terminal code		Part	Screw size	Tightening torque(N•m)	Remarks
PV/Peak power control signal		Control Kit PBA 2P Terminal Block	M3	0.5~0.75	Dry contact input
R-290 ALARM					Dry contact input
WATER PUMP					PWM signal output
F1, F2, V1, V2, F3, F4		Control Kit PBA 6P Terminal Block	M3.5	0.8~1.2	DC SV/12V output
B1 ~ B26		Control Kit PBA 26P Terminal Block			AC 220V-240V power input/output
TB-A	L/L1	Control Kit PBA 2P Terminal Block	M4	1.2~1.8	AC 220V-240V power input/output
	N/L2				
TB-A1 (HEATER POWER)					AC 220V-240V power input/output

Control box

- SINGLE PHASE



- 3 PHASE

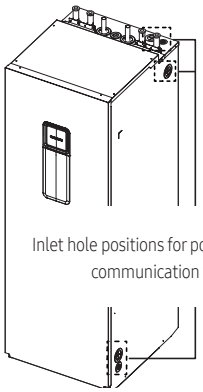


Terminal code	Part	Screw size	Tightening torque(N•m)	Remarks
1~20	20P Terminal Block	M3	0.5~0.75	Digital input/output
-	Magnetic contactor 2P Single phase	M5	2.0~2.9	AC 220V-240V power input/output
-	Magnetic contactor 3P 3phase			AC 380V-415V power input/output
-	ELCB 2P Single phase			AC 220V-240V power input/output
-	ELCB 4P 3 phase			AC 380V-415V power input/output
L, N	Terminal block 2P Single phase			AC 220V-240V power input/output
N, L	Terminal block 8P 3 phase			AC 220V-240V power input/output
L1(R), L2(S), L3(T), N				AC 380V-415V power input/output

Specification of the power supply and communication cable

Connection of the power supply and communication cable

Model	Description	No. of wires	Max. A	Thickness	Supply Scope
AE***RNW*EG	1 Phase main power	2 + ground	22.7A	4.0mm² ↑ H05RN-F or H07RN-F	Field supply (220-240Vac, Input)
	Communication	2	0.1A	0.75mm² ↑ LiYCY	Field wiring (7Vdc, data)
AE***RNW*GG	1 Phase main power	2 + ground	14.0A	2.5mm² ↑ H05RN-F or H07RN-F	Field supply (220-240Vac, Input)
	3 Phase power	4 + ground	8.7A	2.5mm² ↑ H07RN-F	Field supply (380-415Vac, Input)
	Communication	2	0.1A	0.75mm² ↑ LiYCY	Field wiring (7Vdc, data)



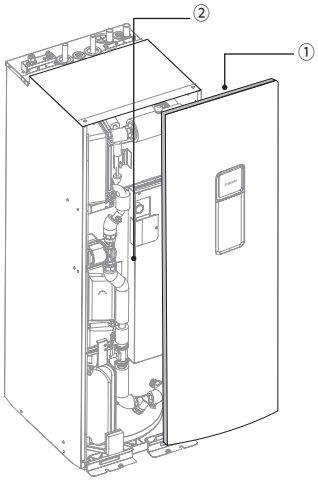
Inlet hole positions for power/ communication wires

To connect the main power supply

To access the switch box:

1 Unscrew the front panel screws and take the front panel from the indoor unit.

2 Unscrew the control box cover.



1 Front panel

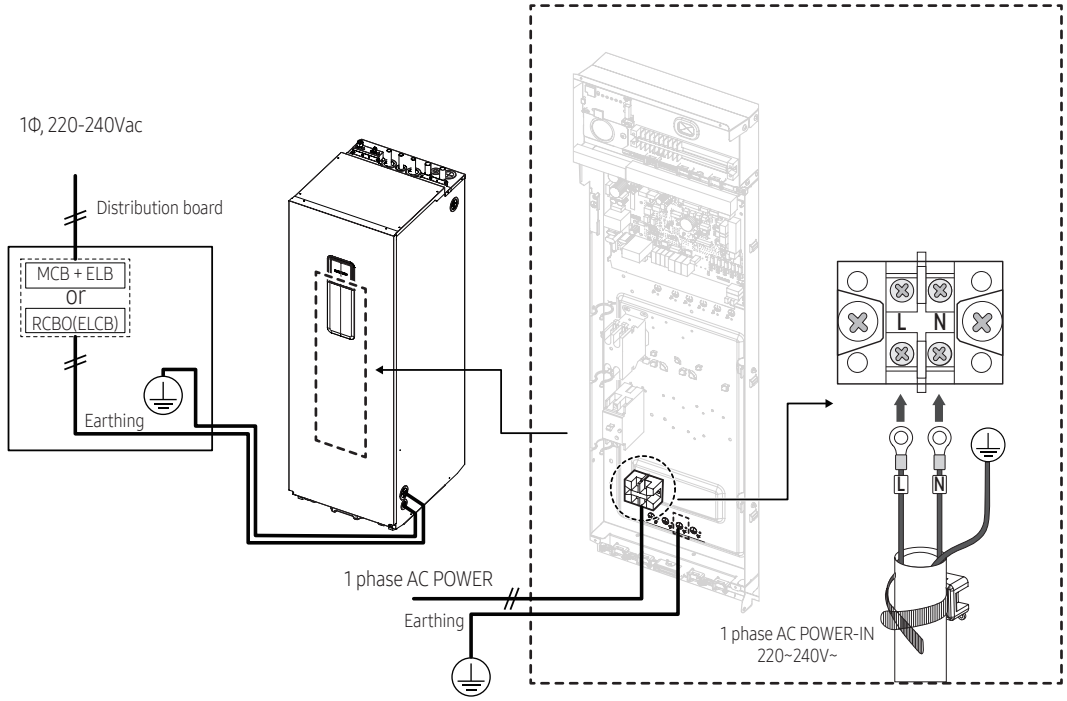
2 Control box cover

NOTE

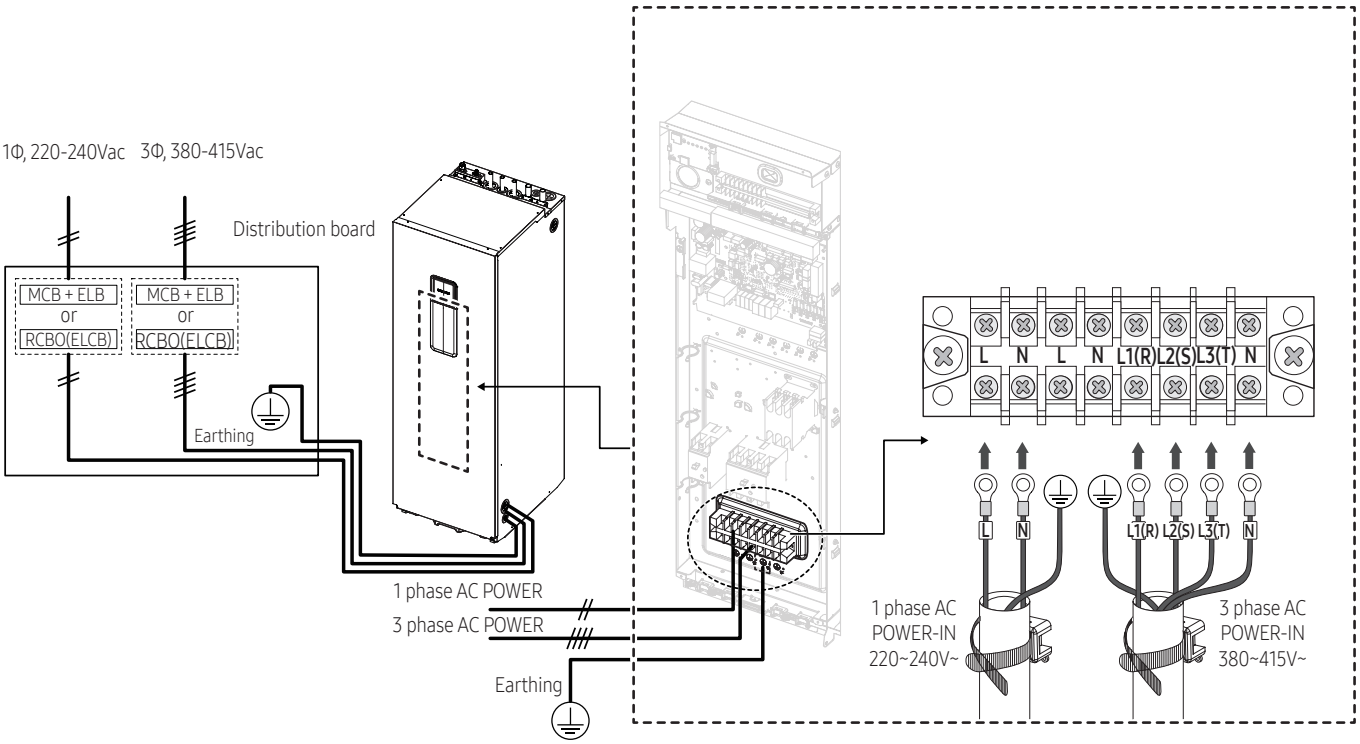
Store both panel and cover in a safe place to avoid damage or injury.

Power supply cable connections to the power in/out terminal of the control panel.

- 1 phase product

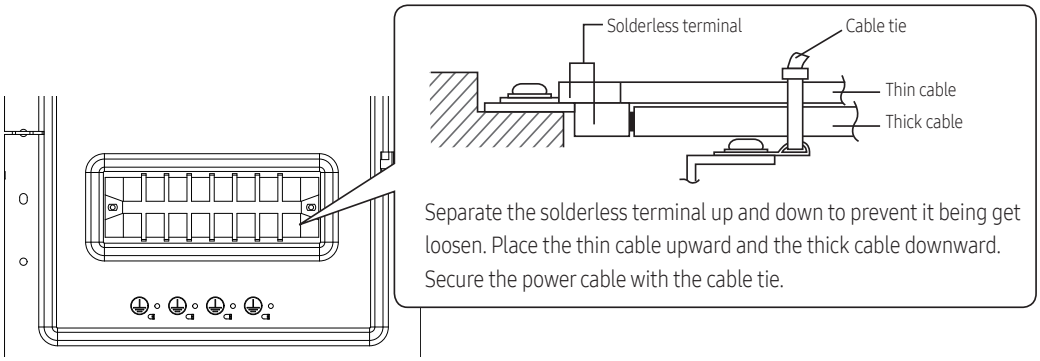


- 3 phase product



Connecting the power terminal

- Connect the cables to the terminal block using the solderless ring terminal.
- Use certified and reliable cables.
- Connect the cables with the torque as below chart.
- If the terminal is loose, fire may occur caused by arc. If the terminal is connected too firmly, the terminal may be damaged.
- External force should not be applied to the terminal block and wires.
- The cable ties to fasten the wire should be an incombustible material, V0 or above. (The cable ties should be used to fasten the power wire and they are supplied with the unit.)



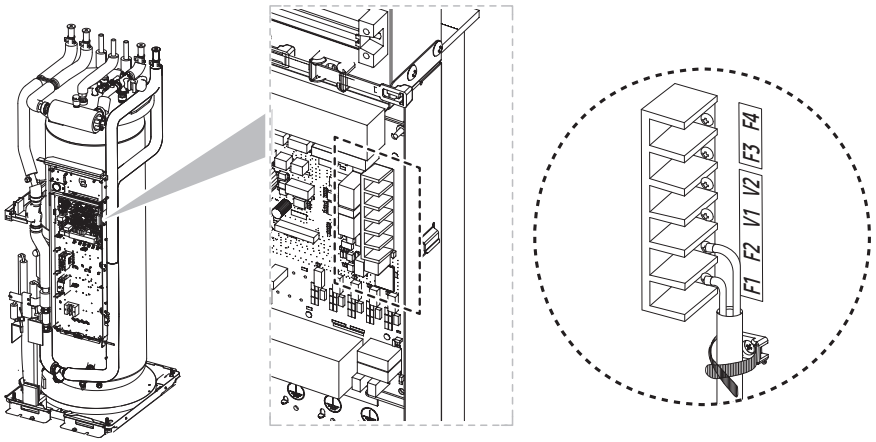
Tightening Torque (kgf • cm)	
M3	5 ~ 7.5
M5	20 ~ 30

CAUTION

- If the supply cable is damaged, it must be replaced by a certified electrician or installer before (re) commissioning or powering on of the unit.
- Circuit Breaker MCB+ELB or RCBO(ELCB) for both outdoor and indoor units shall be installed by a certified electrician or installer because they are not sub-parts in the units.
- Ensure that R, S, T (3 phase models only) is connected correctly and firmly before turning on the main power.
- Failing to correctly connect the main power to the product may result in damage, fire and or injury.

To connect the communication cable

- The communication cable between indoor unit and outdoor unit.
- Route the cable through the frame.
- Connect the wires to the terminal block and the earth screw. (at the outdoor unit only)
- Secure the cable with a cable tie.



To expand the backup heater capacity

- The wiring of the backup heater is connected from the factory. (default: 2kW)
- The backup heater is also available in: 4W or 6kW.

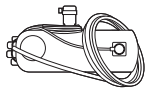
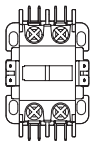
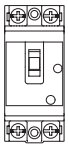
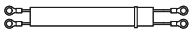
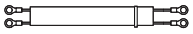
WARNING

- Disconnect all electric power before servicing.
  Follow procedures as described in EN 50110-1:2013 to ensure the power cannot be unintentionally energized. Failure to disconnect power before servicing could result in death or serious injury.
- The backup heater must be protected by safety devices as required by the applicable legislation.
  Before installing the optional backup heater, always check if the connected circuit breaker and power cable thickness are according to the specifications and applicable legislation.
  If not installed according to specifications, safety problems may occur.
- Before installing the backup heater, drain the water using the drain port at the bottom of the pipe.

Connection of the backup heater supply

Model	Capacity [kW]	Power Supply				Current [A]	
		Φ	Wires	Hz	Voltage	MCA	MFA
MHC-400FE	4kW	1	2	50	220~240	31.4	40.0
MHC-600FE	6kW					40.1	50.2

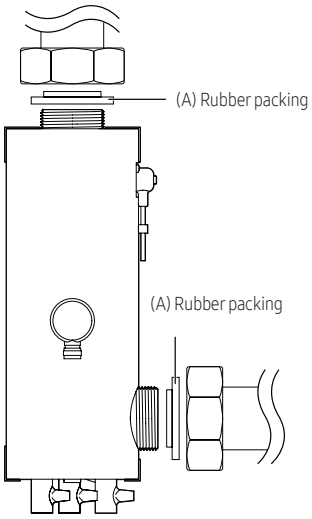
Components

Product Name	Shape	Quantity	
		MHC-400FE	MHC-600FE
① Assy heater parts		1	1
② Magnetic contactor		-	1
③ Magnetic contactor-ELCBD		-	1
④ Assy connector wire-power(sky blu)			1
⑤ Assy connector wire-power(white)			1
⑥ Assy connector wire-power(sky blu+brown, L=300mm)			1
⑦ Assy connector wire-power(sky blu+brown, L=500mm)			1
⑧ Cable tie		4	4
⑨ Screw-tapping		-	2
⑩ Screw		-	2
⑪ Installation manual		1	1
⑫ Label instruction		1	1

Installation procedure (MHC-400FE, 4kW)

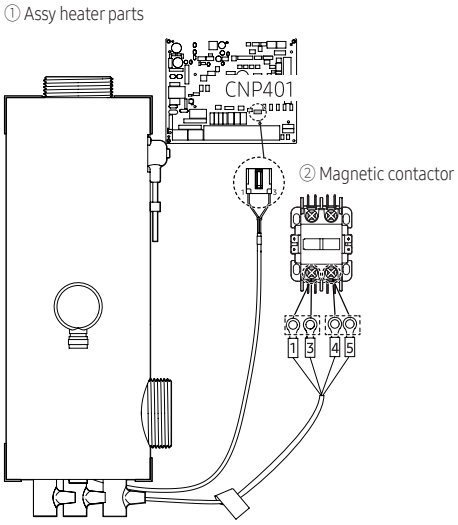
1 Remove the installed backup heater from the tank integrated hydro unit.

- Reuse the rubber packings (A) when you reconnect ① Assy heater parts



2 Connect ① Assy heater parts to the pipe.

3 Connect the wires of the backup heater to the PBA connector (CNP401) and ② Magnetic contactor, as shown in the figure below.



4 Tidy up the wires of ① Assy heater parts using ⑧ Cable ties so that they look the same as before.

5 Finally, please attach the enclosed ⑫ Label instruction to the bottom of the label rating of tank integrated hydro unit.

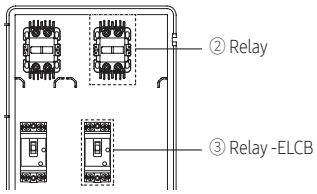
Installation procedure (MHC-600FE, 6kW)

1 Remove the installed ASSY HEATER PARTS from the tank integrated hydro unit using a tool.

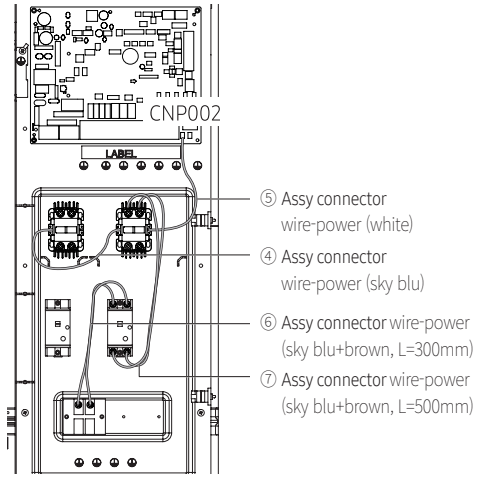
- Reuse Rubber packings (A) when you reconnect ① Assy heater parts. (Refer to the figure in "Installation (MHC-400FE)", step 1.)

2 Connect ① Assy heater parts to the pipe.

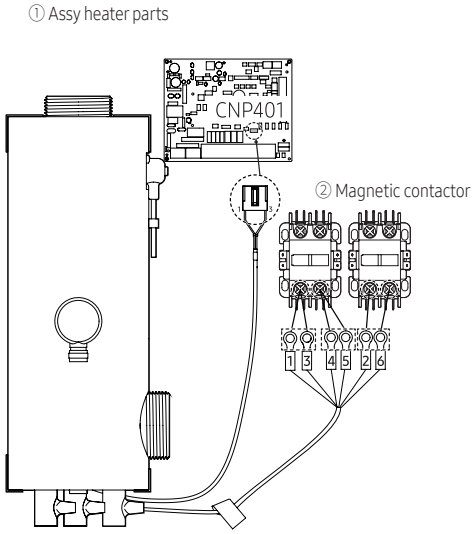
3 Additionally install ② Magnetic contactor and ② Magnetic contactor-ELCB included with the unit in the position (dotted box) using ⑨ Screw-tappings and ⑩ Screws, as shown in the figure below.



4 Connect ④, ⑤, ⑥, ⑦ ASSY CONNECTOR WIRE-POWERs to ② Magnetic contactor and ③ Magnetic contactor-ELCB installed additionally,
as shown in the figure below.



5 Connect the wires of ① Assy heater parts to the PBA connector (CNP401) and ② Magnetic contactor, as shown in the figure below.



6 Tidy up the wires of ① Assy heater parts using ⑧ Cable ties so that they look the same as before.

7 Finally, please attach the enclosed ⑫ Label instruction to the bottom of the label rating of tank integrated hydro unit.

FSV setting table

- When changing the backup heater for a different capacity, it is required to also change the FSV settings for the energy metering function.

1 To accurately indicate the energy consumption, the capacity of the backup heater must be set using FSV #3081. [Default setting : 2(kW) / MHC-400FE : 4(kW) / MHC-600FE : 6(kW)]

2 For using the various additional functions of the Wired Remote Controller, press the and ∨ buttons at the same time for more than 3 seconds.
   – The password entry screen appears.

3 Enter the password, 0202, and then press the OK button.
   – The settings screen for installation/service mode appears.

4 See the list of additional functions for the Wired Remote Controller on the next page, and then select the desired menu.
   – After entering the setting screen, the current setting appears.
   – Refer to the chart for data setting.
   – Using the∧ / ∨ buttons, change the settings and press the 〉button to move to the next setting.
   – Press the OK button to save the new setting.
   – Press the ⮌ button to move to the Home screen.

NOTE

- While setting the data, press the ⮌ button to move to the Home screen after checking the saving status at a pop-up screen..

Main Menu (FSV)	Menu	Function				FSV	Setting Standard		
		Item		Step	Unit		Default	Min.	Max.
DHW FSV 30**	Addition Function	Energy metering	Backup Heater 1step capacity	1	kW	3081	2	1	6

To connect the mixing valve (B2/B3/B5)

Installation of the mixing valve

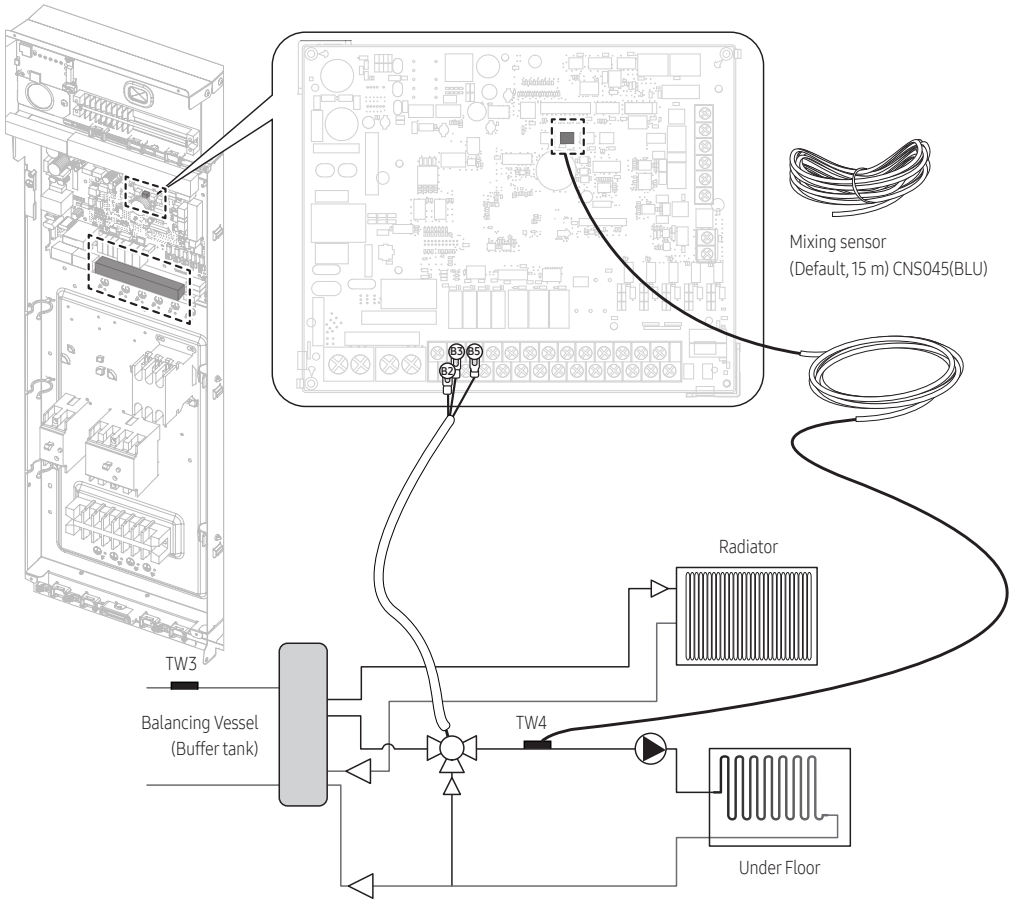
- For two different temperature zone applications, the low-temperature water is supplied after adjusting the water amounts between high temperature and return water of low temperature by the mixing valve.

1 Select a mixing valve from the manufacturers as below (recommended) and install it at the inlet of the zone.

2 Install the supplied temperature sensor (TW4) on the supply port of the mixing valve. 1 m away from the Mixing Valve.

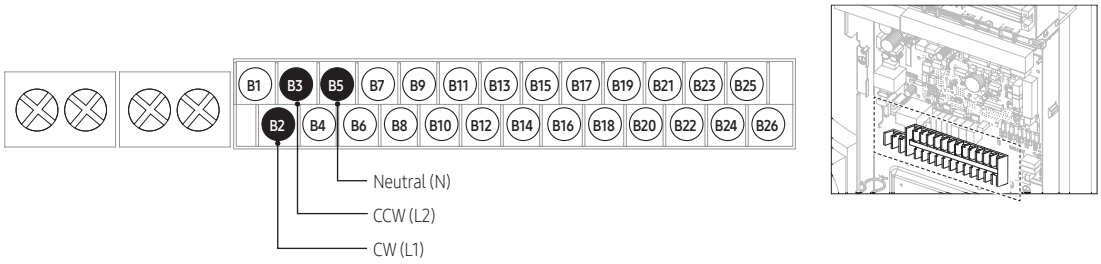
3 Since running time varies depending on the manufacturer, set the FSV (default 90 sec.) by referring to the FSV value below (different running times apply for different product models or brands).

Maker		belimo	siemens	honeywell
Model code	3WAY VALVE	R3020-6P3-S2	VXP45.20-4 (kvs 4)	V5011E1213
	Actuator	LR230A(-S)	SSB31	ML6420A3015
Running time		90sec.	150sec.	60sec.
FSV(#4046) setting		9	15	6



CAUTION

Make sure to switch the power to the indoor unit off before connecting the wires of the mixing valve.



Description	No. of wires	Max. A	Thickness	Remark
Mixing valve	4	22mA	>0.75mm², H05RN-F or H07RH-F	Field supply (220-230V~, Input)

When to install a mixing valve

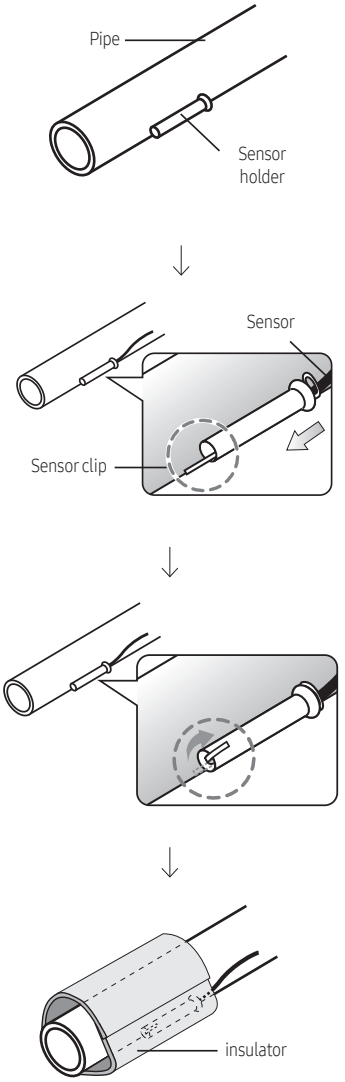
- Where radiators need high temperature supply, under floors need less hot supply to make walking on it comfortable.
  A mixing valve is required in a two-zone configuration with different supply temperatures per zone.
  The position of the mixing valve is at the water inlet of the lowest temperature zone.

Temperature sensor installation

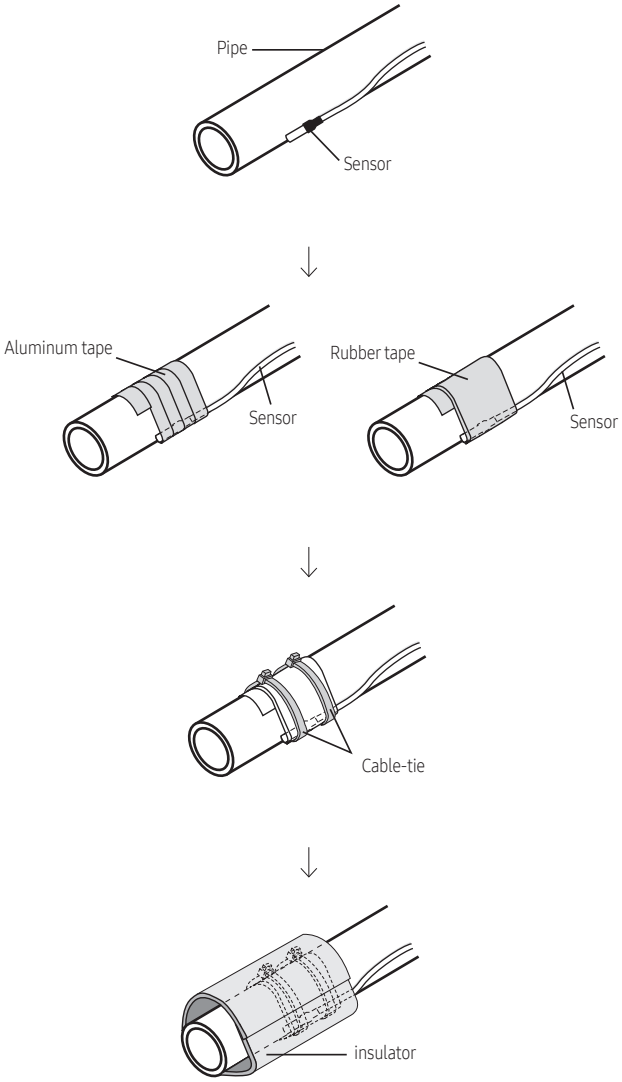
Example of sensor installation

Weld the sensor holder on the selected location of the pipe and then insulate it.

When the pipe is a copper pipe



When the pipe is not a copper pipe



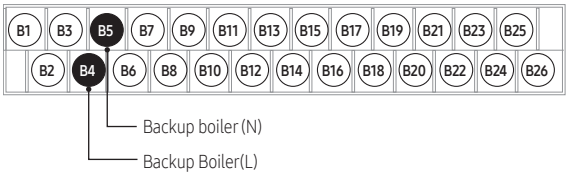
To connect the backup boiler (B4/B5)

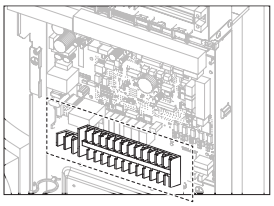
1 Before connecting the backup boiler (output) signal wiring, the tank integrated hydro unit should be turned off.

2 Make sure to connect the backup boiler signal (output) at the correct terminal of the terminal block (as shown in the diagram).

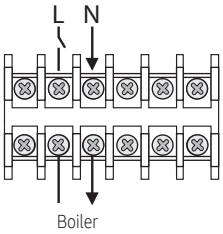
3 The output from the terminal block is a switched live ((B4) L 220-240V~) and a permanent neutral (B5 - N).

- Do not connect supply power to the backup boiler directly but connect via a 230Vac rated relays.
- The heat pump does not work when the backup boiler operates, this includes no zone-control, no pump control and no temperature control in the zone(s).

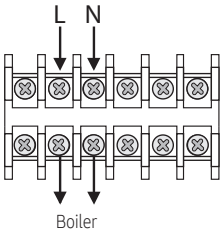




When it set backup boiler on the control kit (relay off)



When it order to backup boiler operates (relay on)



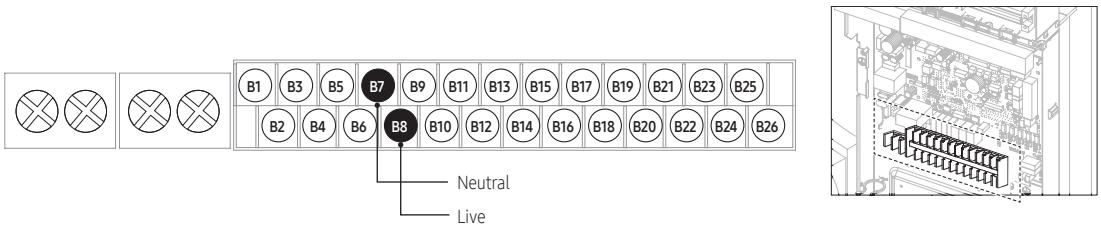
CAUTION

- The heat pump does not work when the backup boiler operates, this includes no zone-control, no pump control and no temperature control in the zone(s).

Description	No. of wires	Mini./Max. current	Thickness	Remark
Backup boiler	2+ground	10mA /50mA	>0.75mm², H05RN-F or H07RH-F	Field supply (220-240V~, Input)

Additional pump (B7/B8)

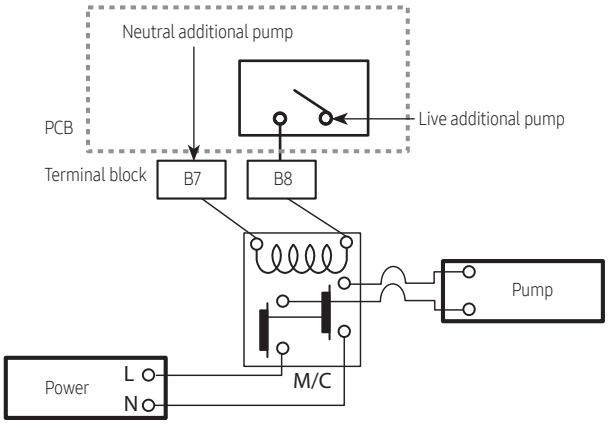
- When connecting the additional pump, a relays must be used, in order to prevent electrical damage to the PCB by over current. This terminal is rated for 0.5A maximum allowable current only.



CAUTION

- The terminal of this product is for the additional pump and the max allowable current is 0.5A

- The maximum allowed quantity of additional pumps is one.
- Maximum allowed power consumption is 100W.



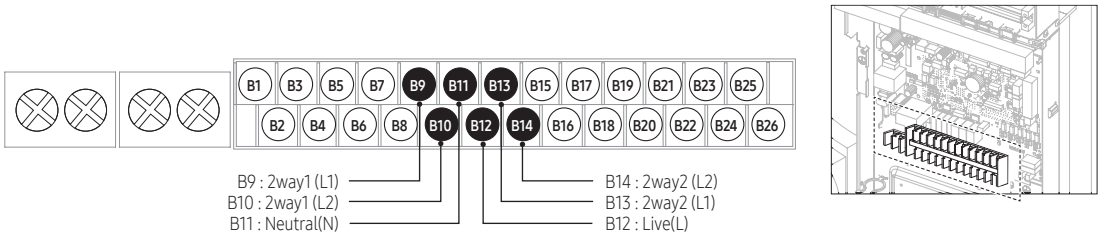
Terminal No.	Function	Input/output	Min./Max. current	Description	Remark
B7/B8	Additional AC Water Pump	AC 230V output	-/100mA	Additional pump (for built-in pump support) 100W max. (B7=N, B8=L)	Option

To connect 2WAY VALVES (B9/B10/B11/B12/B13/B14)

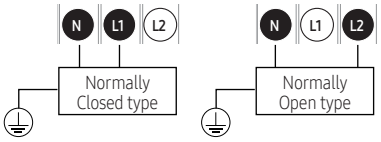
- The UFH loops will be closed when the supply temperature (TW2) is reaching temperatures below 16 °C during cooling operation. This control logic is to prevent condensation of moisture on the floor.

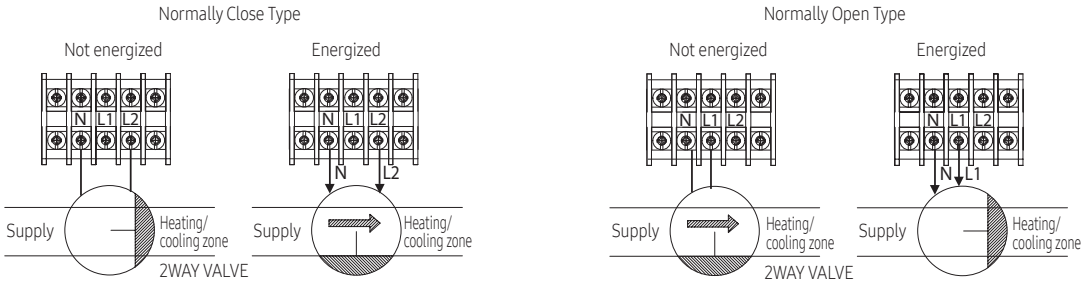
1 Make sure to wire the valves for the installation to the correct terminals, as two types are supported (Normally Open - NO or Normally Closed type - NC).

2 Make sure what type is installed (NO or NC type).



※ Connection of 2 wires 2WAY VALVE





Description	No. of wires	Min./Max. current	Thickness	Remark
Motorized 2WAY VALVE control flow to the heating/ cooling zones	2+ground	10mA /50mA	>0.75mm², H05RN-F or H07RH-F	Field supply (220-240V~, Output)

CAUTION

- There are 2 types of 2WAY VALVE, Normally Open (NO) and Normally Closed (NC) type. Make sure to connect the wires to the correct terminals of the terminal block. As per above mentioned wiring diagram and illustrations.

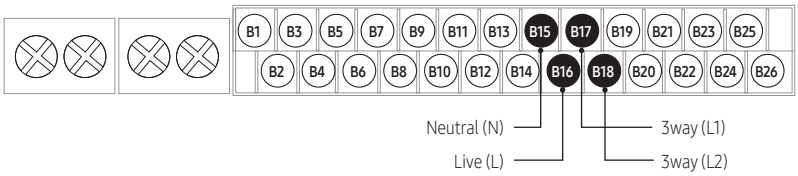
The built-in the 3WAY VALVE (B15/B16/B17/B18)

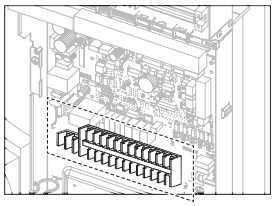
- The built-in 3way diverter valve for diverting the flow towards DHW (boiler) or Space Heating/Cooling.

1 Make sure to wire the valves for the installation to the correct terminals.

2 Make sure what type of 3WAY VALVE you use

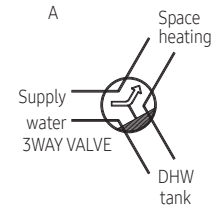
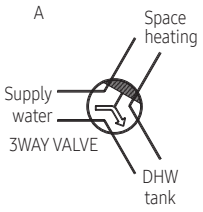
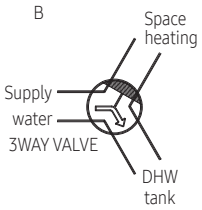
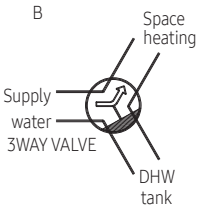
Status	L1	L2
A (Initial)	OFF	ON
B	ON	OFF





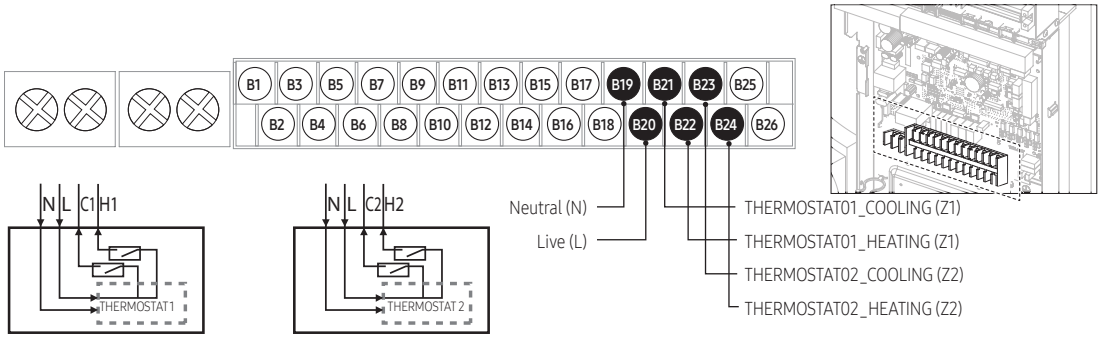
Description	No. of wires	Mini./Max. current	Thickness	Remark
Diverting type 3WAY VALVE	4	10mA /50mA	>0.75mm², H05RN-F or H07RH-F	Installed (220-240V~, Input)

- Changing default position of the diverter valve via Field Setting Values (FSV)

Field Setting Value (#3071) "0" Space heating as default	Field Setting Value (#3071) "1" DHW tank as default
	
	

To connect external inputs for zone control via thermostats (B19/B20/B21/B22/B23/B24)

- Make sure to wire the thermostats for the zone control to the correct terminals (zone1/ zone2, cooling / heating).
- Make sure the external thermostat is rated for 220-240V~ input.
- The input signal is a switched Live (L). Zone2 has a priority over Zone1. The mode of operation (cooling or heating) will be determined by Zone2 (when two signals are simultaneously applied).



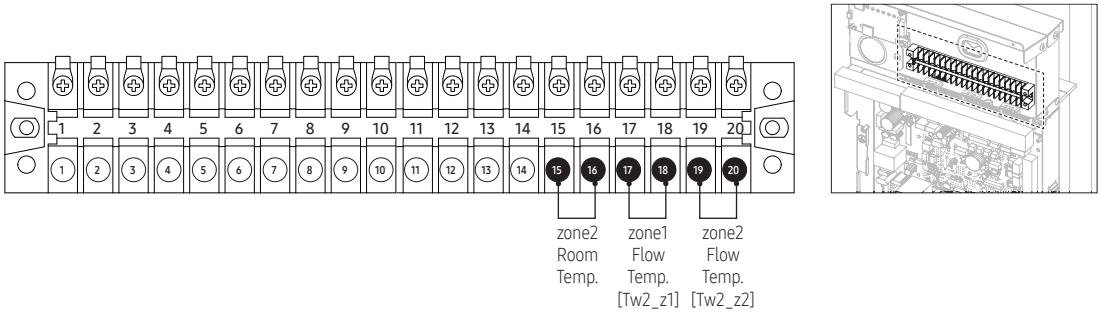
Description	No. of wires	Max. current	Thickness	Remark
Room Thermostat	4	22mA	>0.75mm², H05RN-F or H07RH-F	Field supply (220-240V~, Input)

CAUTION

When both cooling and heating input signals are applied for a single zone, the product will not operate.

To connect external sensors

- When the room temperature for zone2 is controlled via a remote sensor, please connect the zone sensor (white, supplied) to the correct terminals (15/16).
- To control the supply water temperature for both zone1 and zone2, it is required to install the supplied sensor(s) at the correct position (see instructions at page 101). Please connect zone sensors (Tw2_z1 and Tw2_z2) to the below mentioned terminal block at the correct terminals (17/18 and 19/20).

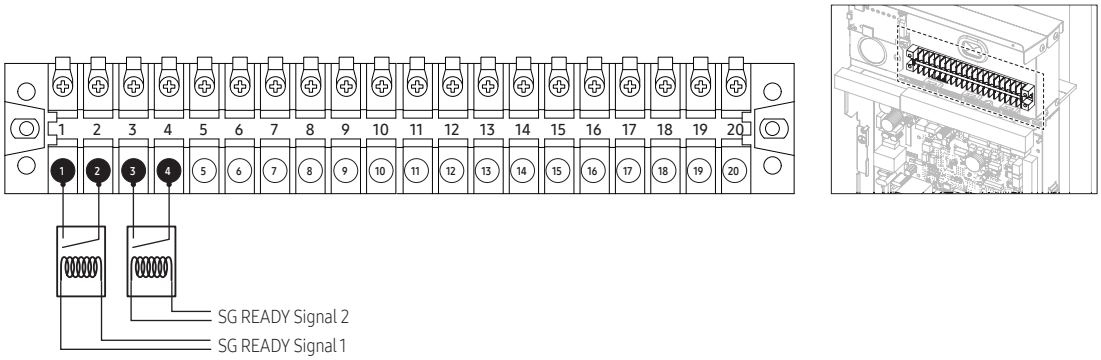


CAUTION

Please use sensors as supplied with the ClimateHub or with identical spcifications (10 kΩ at 25 °C, B constant = 3435 k).

To connect smart grid

- To control the ClimateHub via external smart grid (SG) input signals (potential free, dry contact), please connect to the correct terminals (Signal1 (1/2), Signal2 (3/4)).
  If needed use relays, not supplied with the product.



SG READY Signal 1	SG READY Signal 2	Description
Short	Open	Forced thermo off operation
Open	Open	Normal operation
Open	Short	Heating / DHW setting temperature 1step-up operation
Short	Short	Heating / DHW setting temperature 2step-up operation

CAUTION

Optional relays might be needed in order to convert from a powered output to a potential free contact.

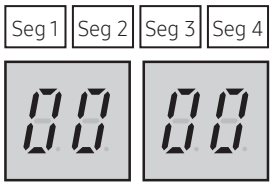
8.1 Outdoor unit

Setting the outdoor options via K-button tactile switches

Setting the correct options for the outdoor unit for site specific conditions via K-button tactile switches and explanation of their functions.

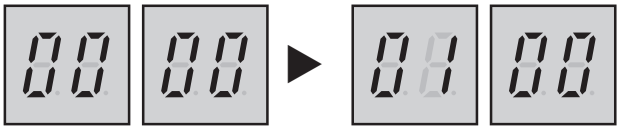
Setting the option

1 Press and hold K2 to enter the option setting. (Only available when the operation is stopped)
   – When entering the option setting, the display will show the following :

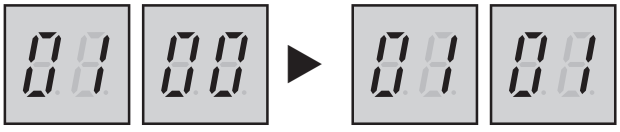


   – Seg 1 and Seg 2 will display the number for the selected option.
   – Seg 3 and Seg 4 will display the number for the set value of the selected option.

2 After entering the option setting mode, shortly press the K1 switch to go to the desired option to change, indicated by Seg 1, Seg 2 and select the desired option.
   Example)



3 After selecting the desired option, you can shortly press the K2 switch to adjust the value of the option, as indicated by Seg 3, Seg 4 and change the function setting for the selected option.



4 After selecting the function setting for the selected options, press and hold the K2 switch for 2 seconds to store the value. The changed value of the option will be saved when the entire segment display blinks and tracking mode begins.

CAUTION

- If the above instruction is not exactly followed, there is a risk that changed option settings are not saved.

※ To restore previous setting, press and hold the K1 button.

※ To call for the factory default setting, press and hold K4 during the option setting mode.
   – After the factory default value is displayed, it needs to be saved. Press and hold the K2 button. When the segments shows that tracking mode is in progress, the setting is saved.

Key Option

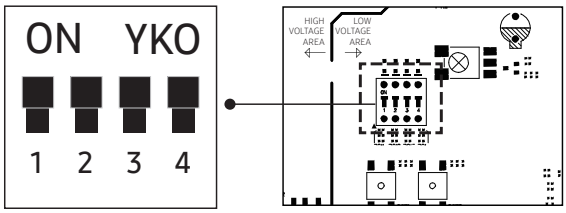
Option	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Current restriction rate	0	0	0	0	100% (Factory default)	When restriction option is set, cooling and heating performance may decrease.
			0	1	95%	
			0	2	90%	
			0	3	85%	
			0	4	80%	
			0	5	75%	
			0	6	70%	
			0	7	65%	
			0	8	60%	
			0	9	55%	
			1	0	50%	
			1	1	No restriction	
Defrost operation	0	1	0	0	Basic	-
			0	1	Option	
Fan speed correction for outdoor unit	0	2	0	0	Basic	-
			0	1	Option	
Quiet mode	0	3	0	0	Low noise (Basic)	-
			0	1	Level1	-
			0	2	Level2	-
			0	3	Level3	-
Channel address	0	4	A	U	Automatic setting (Factory default)	Address for classifying the product from upper level controller
			0~15		Manual setting for channel 0~15	
Snow accumulation prevention control	0	5	0	0	Enabled (Factory default)	During snow accumulation, the fan may spin even when the unit is not in operation.
			0	1	Disabled	
Base Heater	0	6	0	0	Disabled	-
			0	1	Enabled (Factory default)	
Operation mode	0	7	0	0	Heat pump (Factory default)	-
			0	1	Cooling only (Disabled)	
			0	2	Heating only	
Energy saving mode	0	8	0	0	Disabled (Factory default)	Cannot be used in combination with centralized control or Snow Accumulation Prevention mode.
			0	1	Enabled	

WARNING

- Incorrect handling of the thermostat, safety valve or other valves may lead to tank rupture, or plate heat exchanger damage. When servicing the unit follow instructions carefully:
  - Always turn off main power supply when water supply is being shut off.
  - Test the free operation of the safety valve regularly by opening the valve ensuring the water flows freely.
  - Electrical connection and all servicing of the electrical components should only be carried out by an authorized electrician.
  - Fitting and all servicing of plumbing fixtures should only be carried out by an authorized installer.
  - When replacing the thermostat, safety valve or any other valve or part supplied with this unit, use only approved parts of the same specification.

8.2. Indoor unit

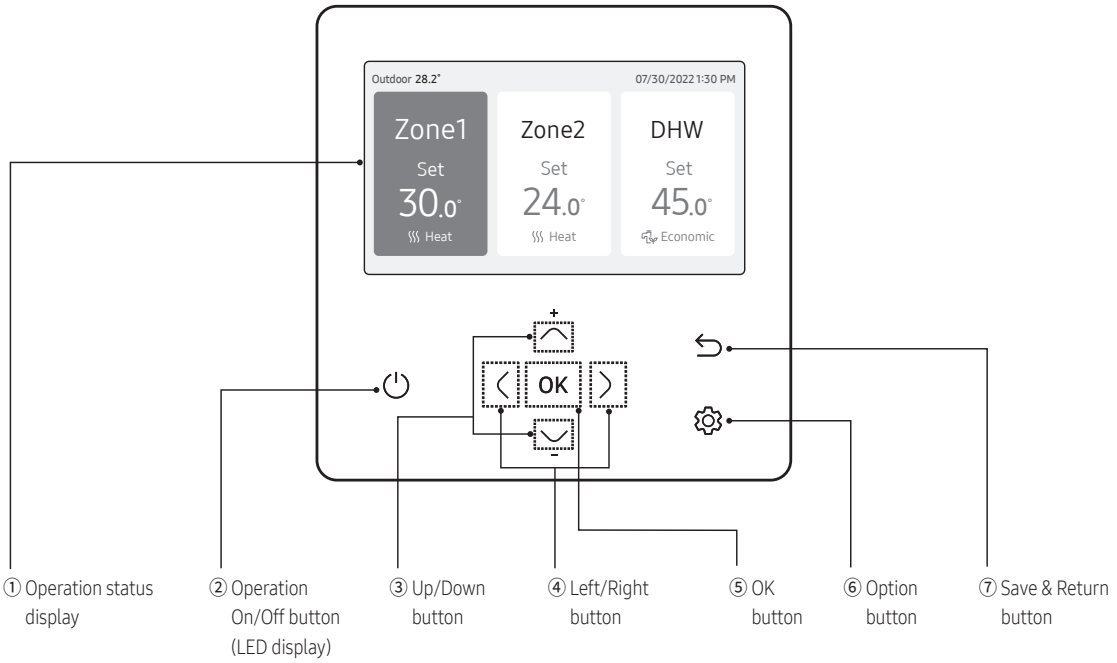
Indoor unit - Dip switches



KEY	ON(default)	OFF	Remark
DIP1	Normal Operation	Emergency Heating Operation	When both DIP1 and 2 are OFF at the same time, EHS operates only emergency heating mode
DIP 2	Normal Operation	Emergency DHW Operation	
DIP 3	Normal Operation	Concrete Curing Function	-
DIP 4	Normal Operation	Outdoor unit power off → on Error code modification	If you set Dip s/w #4 off in the tank integrated hydro unit, then the Error E101 still there but after outdoor unit power restores the error will go away → can run

8.3 Service Mode

Remote controller overview



1 Operation status display

- Display the operation/function settings and statuses.

2 Operation On/Off button (LED display)

- Turn the air to water heat pump power On/Off.

3 Up/Down button

- Move between items vertically or changes the set temperature.

4 Left/Right button

- Move between items horizontally or changes the item value.

5 OK button

- Save your new settings.

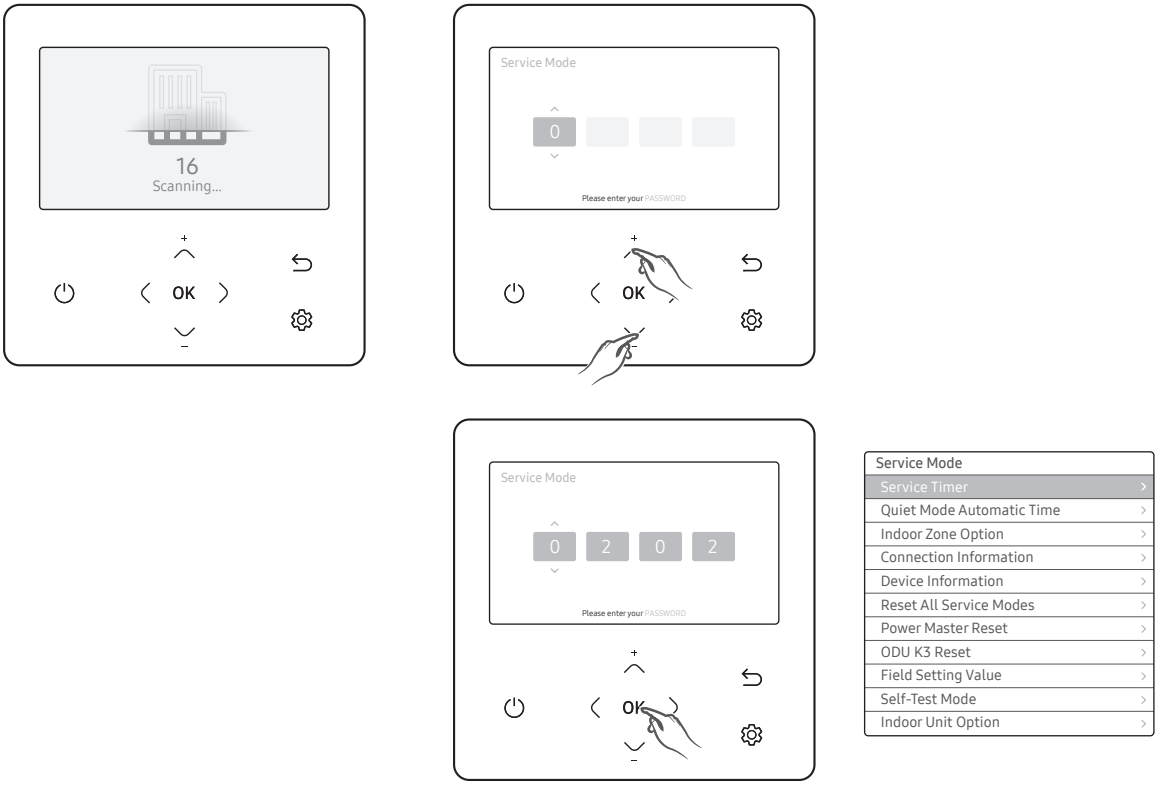
6 Save & Return button

- Save your new settings and returns to the previous step.

7 Option button

- Select the detailed setting function.

Service Mode



1 If you want to use the various additional functions of your wired remote controller, press the ∧ and ∨ buttons at the same time for more than 3 seconds.
   – The password entry screen appears.
2 Enter the password, 0202, and then press the OK button.
   – The settings screen for installation/Service Mode appears.
3 See the list of additional functions of the wired remote controller on the next page, and then select the desired menu.
   – Once you have entered the setting screen, the current setting appears.
   – Refer to the chart for data setting.
   – Using the ∧/∨ buttons, change the settings and press the 〉button to move to the next setting.
   – Press the OK button to save the new setting.
   – Press the ⮌ button to move to the Home screen.

NOTE

- While setting the data, you can press the ⮌ button to move to the Home screen after observing the saving status at a pop-up screen.
- Unavailable functions are marked inactive and they cannot be set.
- If communication initialization is needed after the setting, the system will reset automatically and communication will be initialized.

Step 1	Step 2	Step 3	Description	Default
Service Timer	Service Call Number	-	16-digit phone number Input: Blank, -, 0-9	-
	Last Inspection	-	Year, Month, Day	-
	Installation Data	-	Year, Month, Day	-
Quiet Mode Automatic Time		-	Enable/Disable	Disable
			Entry time to Exit time	PM 10:00 ~ AM 06:00
Indoor Zone Option	Cool/Heat Selection	-	Cool & Heat/Heat only	Cool & Heat
	Main/Sub Wired Remote	-	Main/Sub	Main
	Zone Selection	-	Zone 1/Zone 2	Zone 1
	Standard Temperature	-	Water Outlet/Indoor	Water Outlet
	Temperature Unit	-	Celsius(°C): 1°C/0.5°C/0.1°C	0.5°C
	Temperature Sensor Selection	-	Wired Remote Controller/ External Temperature Sensor	Wired Remote Controller
	Room Temperature Calibration	Reference Temperature	-9 to 40°C	-
		Calibration Value	-9 to 40°C	0°C
	Indoor Zone Status Information	Central	ON/OFF	-
		Normal Power	ON/OFF	-
		Mode	Heat/Cool/Auto	-
		DHW Power	ON/OFF	-
		DHW Mode	Economic/Standard/Power/ Forced	-
		Water Pump	ON/OFF	-
		BUH	ON/OFF	-
		BSH	ON/OFF	-
		Flow sensor	lpm	-
		Inverter Pump	0% ~ 100%	-
		EEV Step	0~2000Step	-
		Thermostat 1	ON/OFF	-
		Thermostat 2	ON/OFF	-
		DHW Thermostat	ON/OFF	-

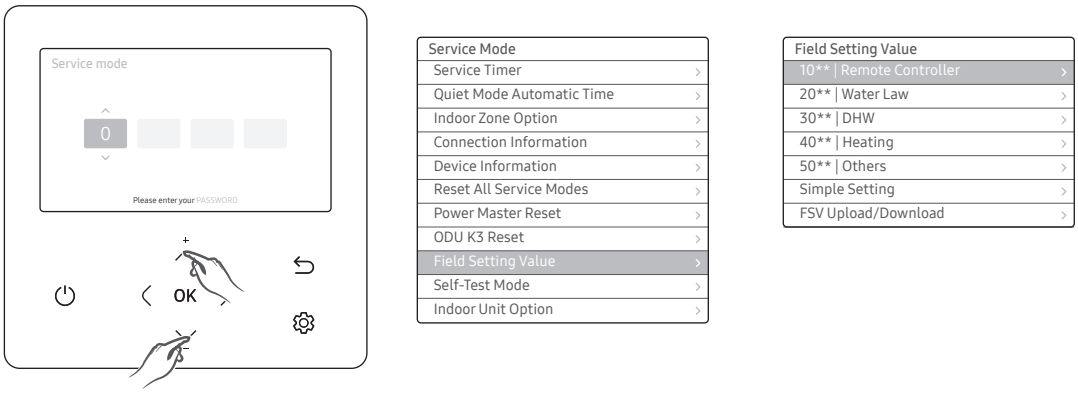
Step 1	Step 2	Step 3	Description	Default
Connection Information	Number of Connection	-	0 to 16	-
	View Master Indoor Unit	-	Address	-
	Master Indoor Zone Information	Serial No.	-	-
		Indoor Unit Eva In Temp. (Teva_in)	Temperature	-
		Indoor Unit Eva Out Temp. (Teva_out)	Temperature	-
		Indoor Unit PHE IN(Tw1)	Temperature	-
		Indoor Unit PHE OUT(Tw2)	Temperature	-
		DHW Tank Temp.(Tt)	Temperature	-
		DHW Mode	Economic/Standard/Power/ Forced	-
Device Information	Micom Code	-	Micom code	-
	Program Version	-	Modified date	-
	Touch Code	-	Touch IC code	-
	Program Version	-	Modified date	-
	Graphic Image	-	Graphic image code	-
	Program Version	-	Modified date	-
Reset All Service Modes	Erase All Service mode data	-	-	-
	Initialize a remote controller	-	-	-
Power Master Reset 1)*	-	-	-	-
ODU K3 Reset	-	-	-	-
Indoor Unit Option	Address	Main address	00 to 4F	-
		RMC address	00 to FE	-
	Product Option 2)*	-	Refer to the installation manual of the connected indoor unit.	-
	Installation Option 1 2)*	-	-	-
	Installation Option 2 2)*	-	-	-
	MCU Port	MCU address	00 to 15	-
		MCU Port	A to F	-

※ BSH (Booster heater)

1)* Power Master Reset is a setting needed to supply optimized power to wired remote controller when multiple indoor units are connected to wired remote controller in a group.

2)* The total option codes are 24 digits. You can set six digits at a time and it is distinguished by page number. Press the OK button to move to the next page.

Field Setting Value

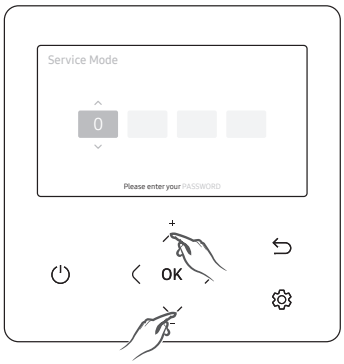


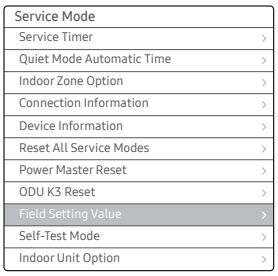
※ WL : Water law / UFH : Under floor heating / FCU : Fan coil unit

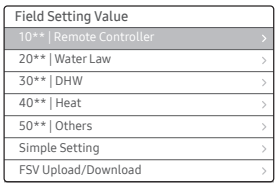
Step 1	Step 2	Step 3	Description
Field Setting Value	10	10**	Remote Controller
	20	20**	Water Law
	30	30**	DHW
	40	40**	Heating
	50	50**	Others
	Simple Setting	-	-
	FSV Upload/Download	-	-

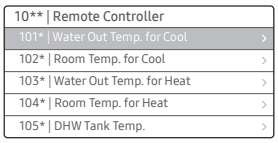
- After installation of the product, the correct settings must be made in accordance to the chosen application and control options.
  Under main menu item "Field Setting Value", the following menu items are available:
  - Menu 10** : Remote Controller
  - Menu 20** : Water Law
  - Menu 30** : DHW
  - Menu 40** : Heating
  - Menu 50** : Others
  - FSV Upload / Download

Menu 10** : Remote Controller









It is possible to change the upper and lower temperature limits for each operation mode of heating (Water Outlet, Room), cooling (Water Outlet, Room) and DHW (Tank), of the wired remote controller.

- The remote controller setting range and default settings:

Main Menu(FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
Remote Controller Setting Range FSV 10**	Water Out Temp. for Cooling	Max	1011	1	℃	25	18	25
		Min	1012	1	℃	16	5	18
	Room Temp. for Cooling	Max	1021	1	℃	30	28	30
		Min	1022	1	℃	18	18	28
	Water Out Temp. for Heating	Max	1031	1	℃	70	37	70
		Min	1032	1	℃	25	15	37
	Room Temp. for Heating	Max	1041	1	℃	30	18	30
		Min	1042	1	℃	16	16	18
	DHW tank Temp.	Max	1051	1	℃	55	50	70
		Min	1052	1	℃	40	30	40

Space Cooling Setting (101* Water out Temp. for cooling or 102* Room Temp. for Cool)

- Target water outlet temperature : Upper limit (#1011, Default 25°C, Range : 18 ~ 25°C), Lower limit (#1012, Default 16°C, Range : 5 ~ 18°C)
  - With this default FSV settings, the user can change the target water outlet temperature within the range of 5 ~ 25°C for cooling.
- Target room temperature : Upper limit (#1021, Default 30°C), Lower limit (#1022, Default 18°C)
  - With this default FSV settings, the user can change the target room temperature within the range of 18 ~ 30°C for cooling.

※ Tip: setting a higher room set point for cooling may result in saving energy and reducing the energy costs.

Space Heating Setting (103* Water out Temp. for heat, 104* Room Temp. for heat)

- Target water outlet temperature : Upper limit (#1031, Default 70°C, Range : 37 ~ 70°C), Lower limit (#1032, Default 25°C, Range : 15 ~ 37°C)
  - With this default FSV settings, the user can change the target water outlet temperature within the range of 15 ~ 70°C for heating.
- Target room temperature : Upper limit (#1041, Default 30°C), Lower limit(#1042, Default: 16°C)
  - With this default FSV settings, the user can change the target room temperature within the range of 16 ~ 30°C for heating.

※ Tip: Setting a lower room heating set point may result in saving energy and reducing the energy costs.

DHW Heating Setting (105* DHW Tank Temp.)

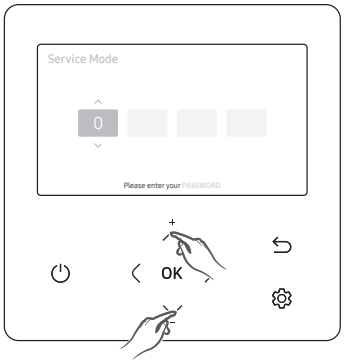
- Target DHW tank temperature. : Upper limit (#1051, Default 55°C, Range : 50 ~ 70°C), Lower limit (#1052, Default 40°C, Range : 30 ~ 40°C)
  - With this default FSV settings, the user can change the target tank temperature within the range of 30 ~ 70°C for DHW heating

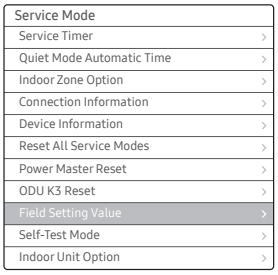
※ Tip: A lower DHW set temperature may result in a higher efficiency of the heat pump, but it may limit the total number of showers before recharging.

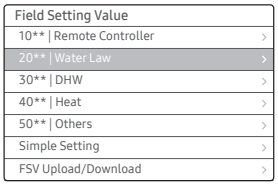
Menu 20** : Water Law

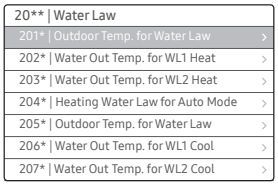
- Via the Water Law settings, the heat pump can adjust the water temperature according to the ambient temperature.
  A so called weather dependent control.
  This can reduce unnecessary energy consumption through adjusting the water temperature in relation to the ambient temperature.
- This function is used in combination with the room sensor of the wired remote controller or via thermostat control.

※ Only heating mode with target water outlet temperature control can use this function during auto mode.









WL for Heating

- The Water Law setting range and default values:

Main menu (FSV)	Menu	Item			Step	Unit	FSV	Default	Min.	Max.
WL Item 20**	Heating	Outdoor Temp. for WL		Max (Point ①)	1	℃	2011	-10	-20	5
				Min (Point ②)	1	℃	2012	15	10	20
		Water out Temp.	UFH - WL1	Max (Point ①)	1	℃	2021	40	17	65
				Min (Point ②)	1	℃	2022	25	17	65
			FCU - WL2	Max (Point ①)	1	℃	2031	50	17	65
				Min (Point ②)	1	℃	2032	35	17	65
		Heating WL Selection		WL Type	-	-	2041	1(WL1)	1	2

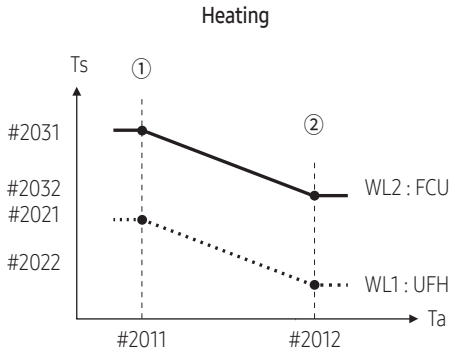
- Outdoor air temperature range :
  - Lower limit 1 (#2011, Default -10°C, Range : -20 ~ 5°C),
  - Upper limit 2 (#2012, Default 15°C, Range : 10 ~ 20°C)
  - With these default settings, the water outlet temperature by heating WL can be changed within the outdoor temperature range of -10 ~ 15°C.
- Water out temperature range for UFH/FCU applications respectively :
  - Upper limit 1 (#2021/2031, Default 40/50°C, Range : 17 ~ 65°C),
  - Lower limit 2 (#2022/2032, Default 25/35°C, Range : 17 ~ 65°C)
  - With these default settings, the water outlet temperature by heating WL can be changed within the range of 25/35 ~ 40/50°C.
- Type of WL for according to heating devices (UFH/FCU) : #2041 (Default 1 (WL1 for floor)), 2 (WL2 for FCU or radiator)

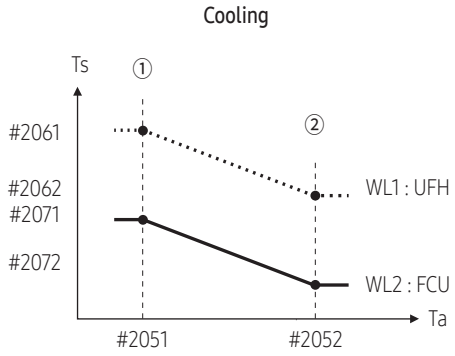
WL for Cooling

- The Water Law setting range and default values:

Main menu (FSV)	Menu	Item			Step	Unit	FSV	Default	Min.	Max.
WL Item 20**	Cooling	Outdoor Temp. for WL		Max (Point ①)	1	℃	2051	30	25	35
				Min (Point ②)	1	℃	2052	40	35	45
		Water out Temp.	WL1 (UFH)	Max (Point ①)	1	℃	2061	25	5	25
				Min (Point ②)	1	℃	2062	18	5	25
			WL2 (FCU)	Max (Point ①)	1	℃	2071	18	5	25
				Min (Point ②)	1	℃	2072	5	5	25
		Cooling WL Selection		WL Type	-	-	2081	1(WL1)	1	2

- Outdoor air temperature range : Lower limit 1 (#2051, Default 30 ℃, Range : 25 ~ 35 ℃),
  Upper limit 2 (#2052, Default 40 ℃, Range : 35 ~ 45 ℃)
  - With these default settings, the water outlet temperature by cooling WL can be changed within the outdoor temperature range of 30 ~ 40 ℃.
- Water out temperature range for UFH/FCU applications respectively :
  - Upper limit 1 (#2061/2071, Default 25/18 ℃), Lower limit 2 (#2062/2072, Default 18/5 ℃)
  - With these default settings, the water outlet temperature by cooling WL can be changed within the range of 5/18 ~ 18/25 ℃.
- Type of WL for according to cooling devices (UFH/FCU) : #2081 (Default 1 (WL1 for floor),
  2 (WL2 for FCU or radiator)





Max (Point ①) / Min (Point ②), Ts : Target Temp., Ta : Ambient Temp.

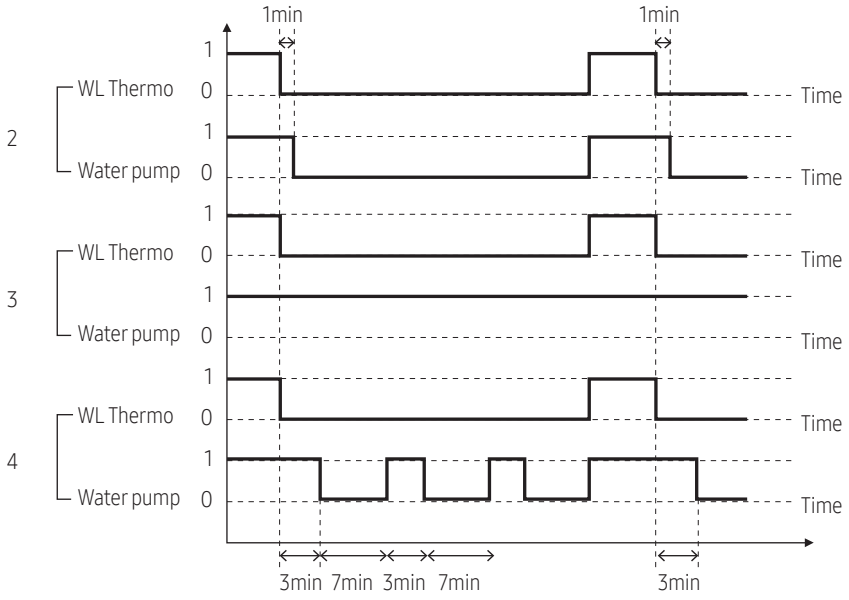
External Room Thermostat (Field Option)

- The values in the following table are just examples for your understanding.

Main menu (FSV)	Menu	Item		Step	Unit	FSV	Default	Min.	Max.
WL Item 20**	External Control	External Room Thermostat	#1 (UFHs)	1	-	2091	0(No)	0	4
			#2 (FCUs)	1	-	2092	0(No)	0	4

- Thermostat #1 (#2091, Default 0 for no usage), #2 (#2092, Default 0 for no usage)
  - To use wired remote controller for heating/cooling operation, both of the above settings should be set to 0 simultaneously. If not, thermostat controls system.
  - To use the external room thermostat option, set the 2-zone control option (FSV #4061) to "0" for disabling it.
  - If set to #2091/#2092: 1, the compressor can be turned on or off only by the thermostat.
  - If set to #2091/#2092: 2~4, the compressor can be turned on or off by the thermostat or according to the WL discharged water temperature.
    (#2092: 2, WL Thermo off → Water pump off, #2092: 3, WL Thermo off → Water pump on, #2092: 4, WL Thermo off → Water pump 7 min off → 3 min on →.....)

• #2091/ #2092 Setting value:



Remote controller room temperature control

- The values in the following table are just examples for your understanding.

Main menu (FSV)	Menu	Item	Step	Unit	FSV	Default	Min.	Max.
WL Item 20**	Remote Controller	Remote Controller Room Temp. Control	1	-	2093	4	1	4

- Control by room temperature sensor

Status by wired remote controller		Thermo On	Thermo On	Thermo Off	Thermo Off	Pump status during "Thermo Off"
Status by *WL		Thermo On	Thermo Off	Thermo On	Thermo Off	
Value of #2093	1	On	On	Off	Off	Off (1min delay)
	2	On	Off	Off	Off	Off (1min delay)
	3					On
	4					Repeat 3min On/7min Off

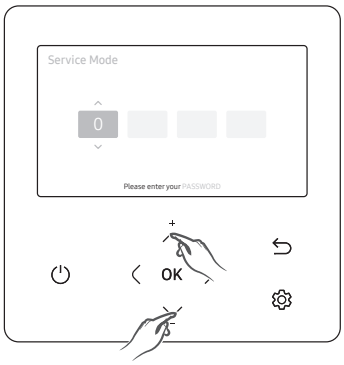
- If set to #2093: 1, the compressor can be turned on or off only by room temperature sensor.
- If set to #2093: 2~4, the compressor can be turned on or off by room temperature sensor or according to the WL discharged water temperature.
  (#2093: 2, WL Thermo off → Water pump off, #2093: 3, WL Thermo off → Water pump on, #2093: 4, WL Thermo off → Water pump 7min off → 3min on →.....)

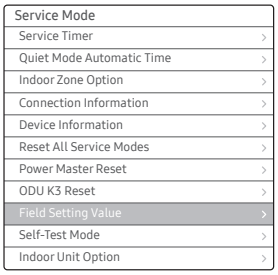
NOTE

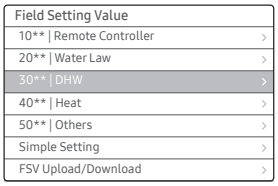
- Types of WL used by room thermostat operation will follow the FSV settings defined in #2041 (heating) and #2081 (cooling) respectively.
- During the thermostat operation, the user has the possibility to shift up or down the target water temperature within the range of -5 ~ +5 °C.
- When the remote controller is used as a zone controller, the zone pumps can be connected to the 2-way valve terminals for respectively zone1 and zone2. Make sure to set FSV #4061=1, to enable zone control.
- To protect zone1 (underfloor heating) against too low water temperatures (<16°C) entering the floor during cooling mode, the 2-way valve or zone1 pump can block the flow. This might lead to an E911 error occurrence.
- When the floor and FCU units are installed together and operating in cooling mode, floor valve may close and E911 may occur to prevent floor condensation when the outlet water temperature is below 16 °C. Therefore FCU should secure minimum value for the flow rate.
- Zone2 has the priority for operation modes and the outlet water temperature.
- Samsung is not responsible for the accidents such as floor condensations which can occur by not connecting the valve to the zone #1 port of the tank integrated hydro unit PBA.

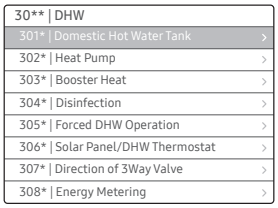
Menu 30** : DHW code

- User's options for DHW tank heating







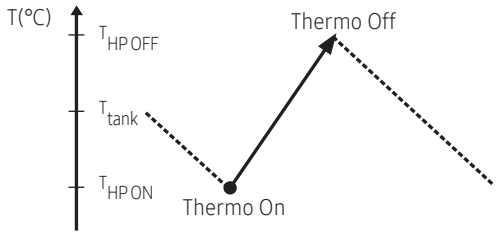


Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
DHW FSV 30**	DHW	Application	3011	-	-	1(Yes)	0	2

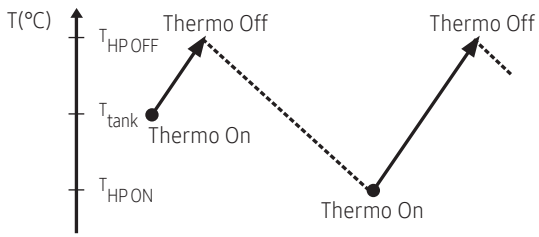
DWH option consist of following FSV

- #3011 : DHW Application
  - The FSV #3011 in the wired remote controller should be set to 1 or 2 to use DHW function. Determined by #3011 when DHW operation is first run in combination operation.
    : If FSV #3011 is set to 1, the DHW operation starts based on the thermo on temperature, but stops at thermo off temperature.
    : If FSV #3011 is set to 2, the DHW operation starts, but stops based on the thermo off temperature.
    (For example, when the current tank temperature drops to 45 °C under the conditions that the thermo on temperature is 43 °C and the thermo off temperature is 48 °C, the DHW turns off if FSV #3011 is set to 1 and DHW turns on if FSV #3011 is set to 2.)

FSV #3011: 1 - when $T_{HP\,ON} < Ttank < T_{HP\,OFF}$: Thermo off, $Ttank \leq T_{HP\,ON}$: Themo on



FSV #3011: 2 - $T_{HP\,ON} < Ttank < T_{HP\,OFF}$, according to the previous thermo on/off control



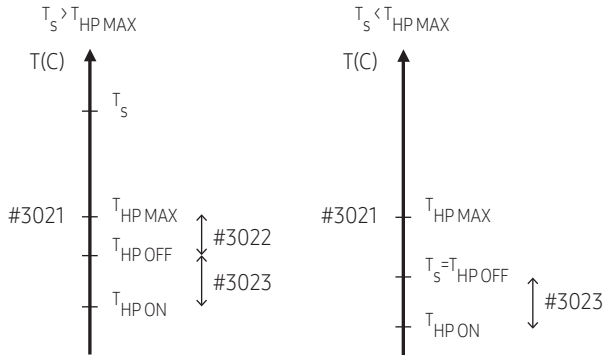
Dotted line : Thermo off line
Solid line : Thermo on line
T_{tank} : DHW tank temperature
$T_{HP\,ON}$: Temperature for start (Heat Pump On)
$T_{HP\,OFF}$: Temperature for stop (Heat Pump Off)

1) Thermo On/Off control during DHW mode (Code #3021 -23)

Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
DHW FSV 30**	Heat Pump	Max. temperature	3021	1	˚C	55	45	55
		Stop	3022	1	˚C	0	0	10
		Start	3023	1	˚C	5	5	30

- #3021 ~ #3023 : Thermo On/Off control during DHW mode
- #3022, #3023, #3033 : Thermo On/Off control of Heat pump and booster heater
  - Maximum DHW tank temperature with R-290(refrigerant) heat pump operation
    : FSV #3021, Default 55°C, Range : 45 ~ 55°C.
  - Temperature difference determining the heat pump OFF temperature
    : FSV #3022, Range : 0 ~ 10°C.
  - Temperature difference determining the heat pump ON temperature
    : FSV #3023, Default 5°C, Range : 5 ~ 30°C

• Thermo On/Off control during DHW mode



T_S : Set temperature
$T_{HP\,MAX}$: Max temperature available through a Heat Pump
$T_{HP\,ON}$: Temperature for start (Heat Pump On)
$T_{HP\,OFF}$: Temperature for stop (Heat Pump Off)

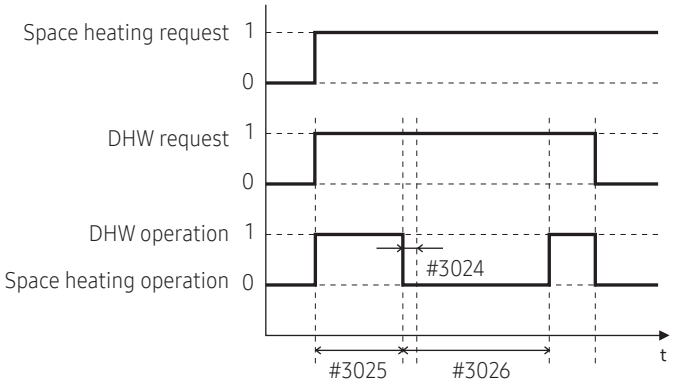
#3021 : Max temperature available through a Heat Pump ($T_{HP\,MAX}$)
#3022 : Temperature difference with $T_{HP\,MAX}$ for Thermo Off
#3023 : Temperature difference between $T_{HP\,OFF}$ and $T_{HP\,ON}$ for Thermo On

2) DHW heating mode timer (#3024-3032)

Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
DHW FSV 30**	Heat Pump	Min. Space heating operation time	3024	1	min	5	1	20
		Max. DHW operation time	3025	5	min	30	5	95
		Max. Space heating operation time	3026	0.5	hour	3	0.5	10

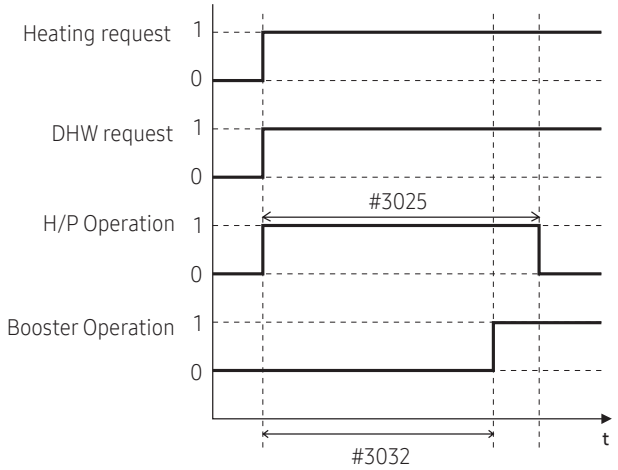
- #3024 ~ #3026 : Time variation control between DHW and space heating mode
- #3025, #3032 : Time variation control of heat pump and booster heater
- Mode timer manage the operation terms when there are simultaneous requests of space heating/cooling and DHW.
  - FSV #3024 (minimum Space heating operating time, default 5 min., Range 1 ~ 20 min.), #3025 (maximum DHW time, default 30 min., Range 5 ~ 95 min.), #3026 (maximum space heating operation time, default 3 hour, Range 0.5 ~ 10 hour)
  - Maximum operation time is applied only when both DHW and space heating request operation. DHW or space heating operates continuously until reaching at target temperature without time limitation in the single operation.

• Time variation control of DHW and Space heating mode



#3024 : Minimum time for Space heating operation
#3025 : Maximum time for DHW operation
#3026 : Time for Space heating operation after DHW operation

• Time variation control of Heat Pump and Booster heater



#3025 : Maximum time for DHW operation
#3032 : Delay time for activation of Booster heater

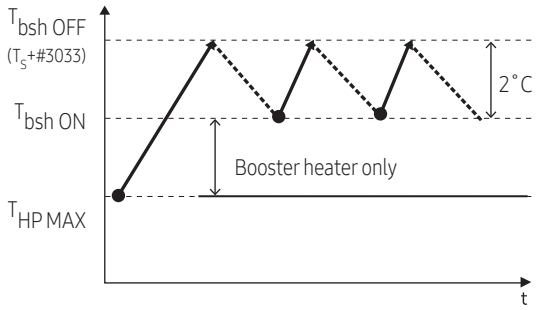
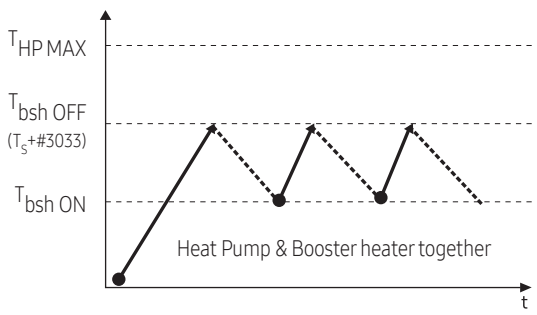
NOTE

- The FSV #4022 for booster heater priority should be set to “0” (both) or “2” (booster) to use booster heater.
- If not(backup heater priority), the booster heater can be operated in case of no backup heater demand.

3) Booster Heater Variables for Controlling DHW tank (#303*)

Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
DHW FSV 30**	Booster Heat	Application	3031	-	-	1 (On)	0 (Off)	1
		Delay Time	3032	5	min	20	20	95
		Overshoot	3033	1	˚C	0	0	4

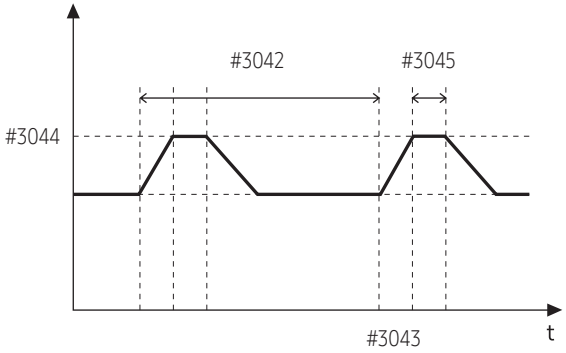
- The FSV #3031 should be set to “1(On)” (Default) to use booster heater as an additional heat source for DHW tank.
- Booster heater startup delay timer : In case of DHW request, this timer will delay the operation of booster heater compared to heat pump.
  - FSV #3032 (Default 20 min., Range 20 ~ 95 min.), In "Power/Forced" DHW mode the delay timer will be neglected, and the booster starts immediately.
  - In “Economic” DHW mode, the DHW heating will be conducted only with heat pump.
  - #3032 should be smaller than the maximum H/P time (#3025). If the delay time is set too high, it might take very long time for DHW heating.
- Temperature difference determining the booster heater OFF temperature ($T_{bsh\ OFF} = T_S + \#3033$) : FSV #3033, Default 0 ˚C, Range : 0 ~ 4 ˚C.
- Temperature difference determining the booster heater ON temperature ($T_{bsh\ ON} = T_{bsh\ OFF} - 2$)

Condition	Operation
Setting temp. of DHW > $T_{HP\ MAX}$	
Setting temp. of DHW ≤ $T_{HP\ MAX}$	

T_S : Set temperature
$T_{HP\ MAX}$: Max temperature available through a Heat Pump
$T_{HP\ ON}$: Temperature for start (Heat Pump On)
$T_{HP\ OFF}$: Temperature for stop (Heat Pump Off)
$T_{bsh\ ON}$: Temperature at which the booster heater starts to operate
$T_{bsh\ OFF}$: Temperature at which the booster stop to operate
#3033 : Temperature(overshoot) value for Booster heater control

4) Periodical Disinfection heating of water tank (#304*)

Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
DHW FSV 30**	Disinfection	Application	3041	-	-	1 (On)	0 (Off)	1
		Interval	3042	1	day	Fri (5)	Sun (0)	All (7)
		Start Time	3043	1	o'clock	23	0	23
		Target Temp.	3044	5	˚C	70	40	70
		Duration	3045	5	min	10	5	60
		Max time	3046	1	hour	8	1	24



#3043 : Start time for disinfection (0~24hr)

#3044 : Target temp.for disinfection

#3045 : Time duration which satisfy the target temp. for disinfection

5) Forced DHW operation (#305*)

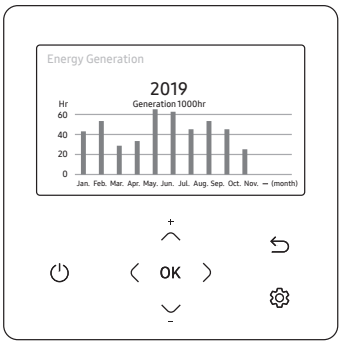
Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
DHW FSV 30**	Forced DHW Operation	Timer OFF Function	3051	-	-	0 (No)	0	1 (Yes)
		Time Duration	3052	1	(x10)min	6	3	30

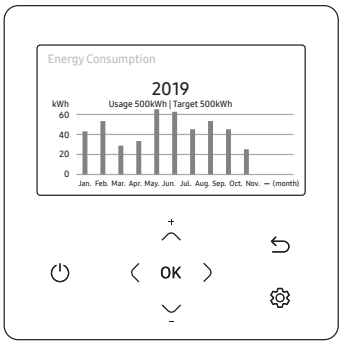
- Forced DHW mode shall be working depending on timer setting.
- #3051 : Set whether to use a timer for forced DHW function
- #3052 : Set time for forced DHW operation

6) Solar Panel/DHW Thermostat, Direction of 3Way Valve, Energy Metering (#306*-308*)

Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
DHW FSV 30**	Solar Panel/DHW Thermostat	H/P Combination	3061	1	-	0 (No)	0	2
	Direction of 3Way Valve	DHW Tank	3071	-	-	0 (Room)	0	1 (Tank)
	Energy Metering	BUH 1 step capacity	3081	1	kW	2	1	6
		BUH 2 step capacity	3082	1	kW	2	0	6
		BSH capacity	3083	1	kW	3	1	6

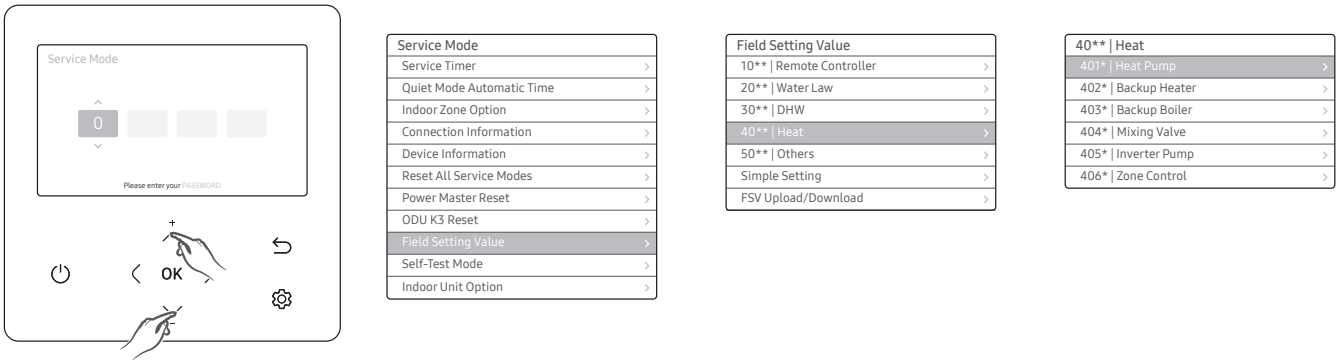
- #3061 : Solar panel application (Not supported)
  - Set whether to use a solar panel application. If you apply solar panel application, you have to change this field setting value to “1”. The ClimateHub doesn't support a solar panel, as there is no secondary coil in the ClimatHub's DHW tank.
    When the solar application is activated, the compressor (heat pump) and booster heater will not be activated for DHW mode. The diverter valve switches automatically to space heating position, so that heating is possible during solar
    It is possible to operate the heat pump for space heating or cooling simultaneously with the solar panel for DHW heating.
- #3071 : Water flow direction by 3way diverter valve
  - Set default direction of water flow between room and DHW tank
- #308* : Energy metering
- To check energy information of system, user should set to FSV #308* according to heater (BUH, BSH) capacity.
  - In order to get the exact value, this should be set.





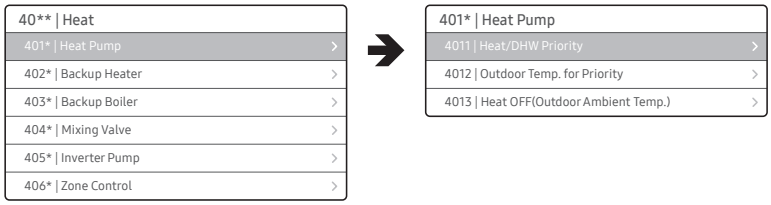
(MWR-WW10N)

Menu 40** : Heating code



※ Default setting may vary depending on the model.

1) Heat Pump variables for space heating (#401*)

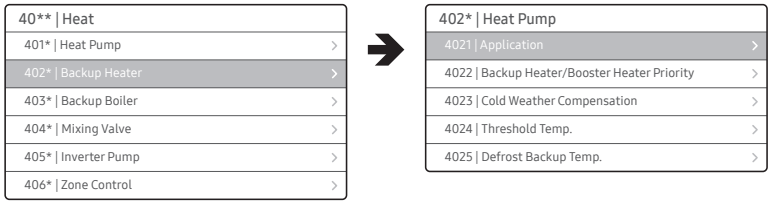


Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
Heating (FSV 40**)	Heat Pump	Heating/ DHW Priority	4011	-	-	0 (DHW)	0	1 (Heat)
		Outdoor Temp. for Priority	4012	1	˚C	0	-15	20
		Heat OFF	4013	1	˚C	35	14	35

- #4011 : Set priority when both DHW and heating are required at the same time.
  - Default of FSV #4011 is “0” (DHW priority).
    Space heating gets a priority by setting FSV #4011 to “1”, but this is only valid when the outdoor temperature is lower than the specified temperature defined by FSV #4012.
- #4012 : Outdoor temperature for priority changeover.
- #4013 : Outdoor temperature at which the heating stops, DHW via heat pump is available until high limit (45°C).

Item	Description	Operation
DHW (#4011 = "0")	-	Regardless of the current mode of operation, the DHW mode takes a priority (DHW and Heating mode are operated alternatively by FSV #3025, #3026)
Heating (#4011 = "1")	Outdoor temp. < FSV #4012	Regardless of the current mode of operation, space heating is prioritised.

2) Backup Heater variables for Space heating (#402*)



※ BUH : Backup heater / BSH : Booster heater

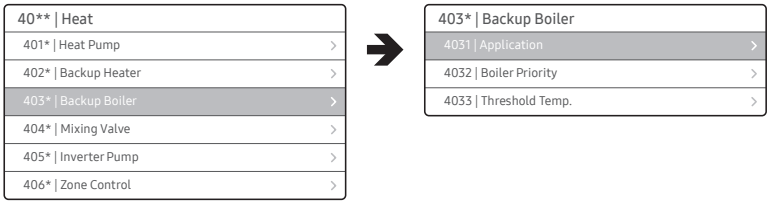
Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
Heating (FSV 40**)	Backup Heater	Application	4021	-	-	0 (No)	0	2
		BUH/BSH Priority	4022	1	-	2 (BSH)	0 (Both)	2 (BSH)
		Cold Weather Compensation	4023	-	-	1 (Yes)	0 (No)	1
		Threshold Temp.	4024	1	˚C	0	-25	35
		Defrost Backup Temp.	4025	5	˚C	15	10	55

- #4021 : Application of the backup heater
  - FSV #4021 should be set to “1” (2-step: BUH 1 + BUH 2) or “2” (1-step: BUH 1) for using the electric backup heater in the tank integrated hydro unit as an additional heat source.
- #4022 : Priority between the booster heater and the backup heater
  - FSV #4022 for backup heater priority should be set to “2” (*BSH) or “0” (Both), “1” (BUH) to use backup heater. If the BSH is set to priority, the backup heater can be operated in case of no booster heater demand.
- #4023 : Enabling the backup heater for cold weather compensation
  - To compensate the lowered heat pump heating performance under very cold weather conditions, the FSV #4023 should be set to “1” (On).
- #4024 : Threshold temperature for control of the backup heater
  - The threshold temperature to use the backup heater for cold weather compensation : #4024 = 0 °C (Default)
    → The backup heater can only be operated below the threshold temperature for optimum energy saving. (Range -25 ~ 35°C)
- #4025 : Temperature at which the backup heater turns on during defrost mode
  - The threshold temperature for backup heater operation during defrost mode to prevent cold draft because of chilled water can be controlled by adjusting FSV #4025. Under FSV #4025 of the water outlet temperature, the backup heater will be turned on.

NOTE

To use both heaters together at the same time, please check the capacity of the power circuit breaker of the mains power supply, before commissioning.

3) External Backup boiler for Space heating (#403*)



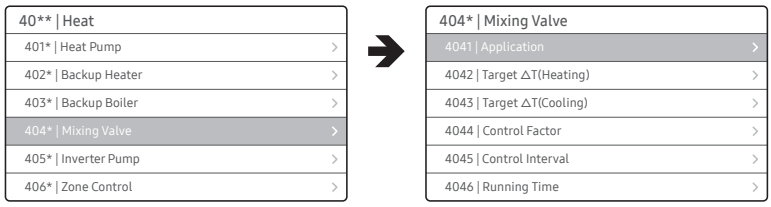
Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
Heating (FSV 40**)	Backup Boiler	Application	4031	-	-	0 (No)	0	1 (Yes)
		Boiler Priority	4032	-	-	0 (No)	0	1 (Yes)
		Threshold Temp.	4033	1	˚C	-15	-20	5

- #4031 = 1 : To use a backup boiler an additional heat source.
- #4031 = 0 : Default , Disable
- #4032 = 1 : Backup boiler priority

NOTE

Only when the EHS system is added to an existing external boiler system, the existing boiler system can operate as a backup for the heat pump system below the threshold temperature (FSV #4033). It requires autonomous operation of the existing system (i.e. regarding zone control and pump control) during temperatures below the threshold value. During backup boiler activation, the heat pump remains inactive. Release of the backup mode is when FSV #4033 +3˚C is reached.

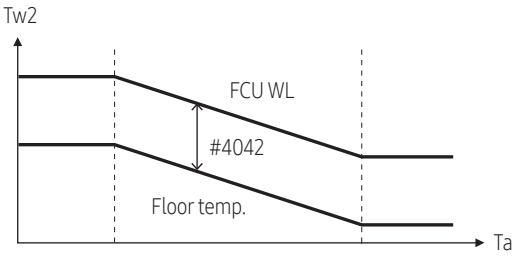
4) Mixing valve installation (Field Option) (#404*)



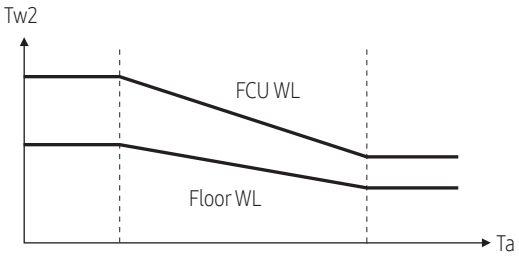
Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
Heating (FSV 40**)	Mixing Valve	Application	4041	1	-	0 (No)	0	2
		Target ΔT (Heating)	4042	1	˚C	10	5	15
		Target ΔT (Cooling)	4043	1	˚C	10	5	15
		Control Factor	4044	1	-	2	1	5
		Control Interval	4045	1	min	2	1	30
		Running Time	4046	3	(x10) sec	9	6	24

- #4041 = 1 : Controlled based on the temperature difference by FSV #4042, #4043
- #4041 = 2 : Controlled based on the temperature difference of the *WL value

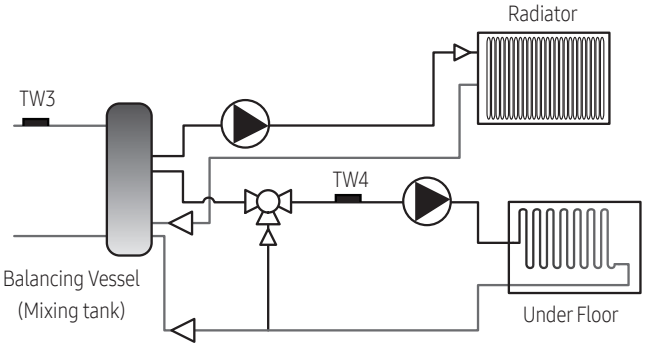
ex) Heating ‹#4041=1›



‹#4041=2›



- The mixing valve is controlled based on the floor temp. a set ΔT (FSV #4042) or according to the floor WL value.
- As the #4044 value increase and the #4045 value decrease, the control speed increase.
  (Temperature fluctuation may occur if the control speed increases depending on the load.)



5) Inverter Pump Installation (Field Option) (#405*)

Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
Heating (FSV 40**)	Inverter Pump	Application	4051	-	-	1 (Yes)	0	2
		Target △T	4052	1	˚C	5	2	8
		Control Factor	4053	1	-	2	1	3

- FSV #4051 = 1 (Default) : Inverter pump use + Output 100%
- FSV #4051 = 2 : Inverter pump use + Output 70%*
- FSV #4051 = 0 : Inverter pump not use.
- FSV #4052 is for adjusting temperature difference between Tw2 and Tw1.

* Too high flow is a design issue which must be rectified via balancing valves or regulation valves. Reducing max PWM output results in reduced control possibility for the PWM pump. See section 6.1 Flow Rate, for flow rate information.

NOTE

- Tw1 (Inlet Water Temp.), Tw2 (Discharge Water Temp.), Tw3 (Backup Heater oulet Water Temp.), Tw4 (Mixing valve Temp.).

6) Zone Control (Field Option)

Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
Heating (FSV 40**)	Zone Control	Application	4061	1	-	0 (No)	0	1 (Yes)

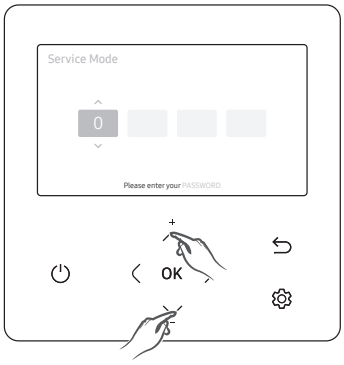
- FSV # 4061 should be set to "1 (Yes)" to enable zone control via the wired remote controller.
  - To use the zone control (FSV #4061 = 1), set the thermostat control option (FSV #2091 & #2092) to "0" to disable external thermostat control.
  - This field option controls two zones (Zone 1, Zone 2) via application of the wired remote controller as a room sensor, not by using an external room thermostat signal.

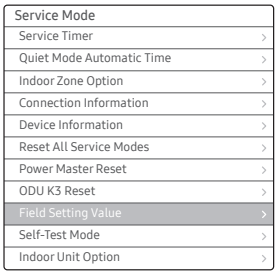
NOTE

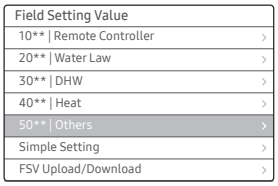
- MIM-E03CN (MONO Control Kit) model does not support this zone control function.
- MIM-E03EN (MONO Control Kit) model does support this zone control function.
- The upper-level controllers excluding Wi-Fi kit (2.0) and MWR-WW10** wired remote controller cannot use the 2-zone control and energy monitoring.
- When connecting between the MWR-WW10** wired remote controller and an upper-level controller, the settings for FSV (#4061) must be changed not to use the 2-zone control.

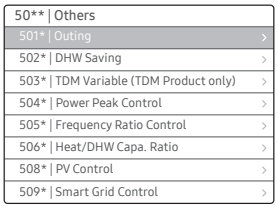
Menu 50** : Others code

- All the target temperatures – space heating and cooling, WL, DHW, Room temperature – are set to the values defined in the above table under the holiday mode



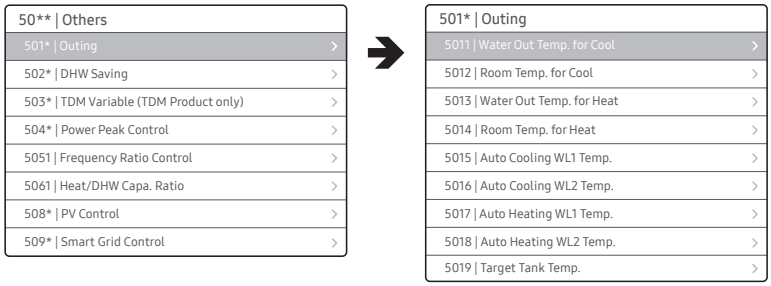






※ Default setting may vary depending on the model.

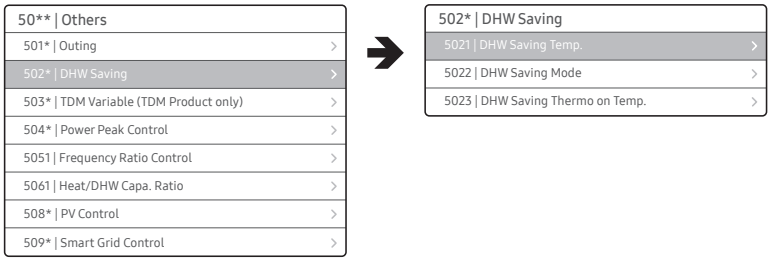
1) #501* : Outing



Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
Others FSV 50**	Outing Mode	Water Out Temp. for Cooling	5011	1	˚C	25	5	25
		Room Temp. for Cooling	5012	1	˚C	30	18	30
		Water Out Temp. for Heating	5013	1	˚C	15	15	55
		Room Temp. for Heating	5014	1	˚C	16	16	30
		Auto Cooling WL1 Temp.	5015	1	˚C	25	5	25
		Auto Cooling WL2 Temp.	5016	1	˚C	25	5	25
		Auto Heating WL1 Temp.	5017	1	˚C	15	15	55
		Auto Heating WL2 Temp.	5018	1	˚C	15	15	55
		Target Tank Temp.	5019	1	˚C	30	30	70

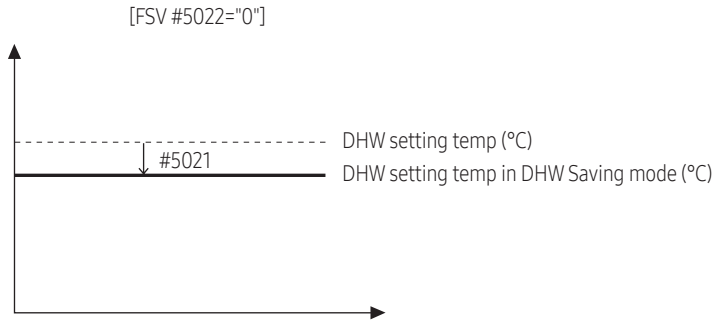
- FSV #5011 ~ #5019 : Set temperature in Outing mode

2) #502* : DHW Saving mode

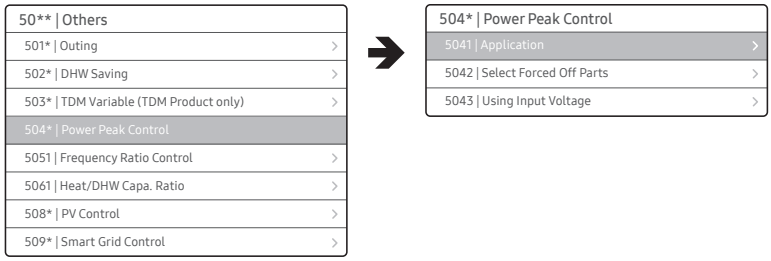


Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
Others FSV 50**	DHW Saving	DHW Saving Temp.	5021	1	˚C	5	0	40
		DHW Saving Mode	5022	1	-	0	0	1
		DHW Saving Thermo on Temp.	5023	1	˚C	25	0	40

- DHW heating only by the heat pump to save energy (Operated in Eco mode of wired remote controller)
  Target DHW temperature is lower than the temperature set by the user.
  The temperature difference is defined by FSV #5021. (default: 5 °C) If the user sets the temperature 45 °C, the system sets the target temperature 40 °C with the default setting.
  - If the user wants an additional energy saving, use a “DHW Saving Mode” (#5022, default : 0, ON)
  - The user can set the “Thermo On” temperature during “Saving mode” using FSV #5023



3) #504* : Power Peak Control



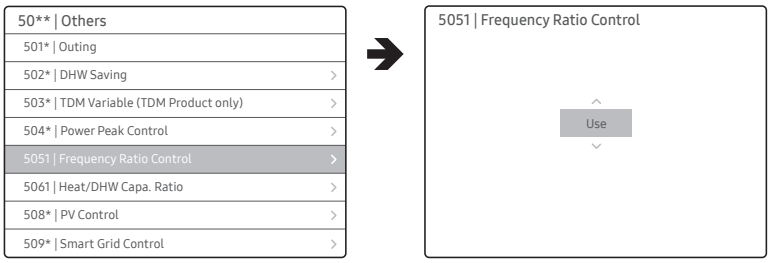
Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
Others FSV 50**	Power Peak Control	Application	5041	-	-	0 (No)	0	1 (Yes)
		Select Forced Off Parts	5042	1	-	0 (All)	0	3
		Using Input Voltage	5043	-	-	1 (High)	0 (Low)	1

- Depending on the local situation, a power company can limit the amount of power consumed by consumers during a power surge. The FSV (#5041 = 1) enables the Power Peak Control function for a "Forced off" by external input signal.
- The default setting for FSV (#5041) is value 0 (No, no application of the Power Peak Control).
- If FSV(#5041) setting "1", compressor, backup heater, booster heater operate according the below table:

#5042	Compressor	Backup heater	Booster heater
0 (Default)	Permitted	Forced off	Permitted
1	Permitted	Forced off	Forced off
2	Forced off	Forced off	Permitted
3	Forced off	Forced off	Forced off

- The default input type is a high signal (voltage applied).
- In exceptional situations it is required to change to low input, depending on the demands of the (local) power company. In order to invert the working, change FSV (#5043 = 0(Low)).
- When the input signal is applied, the system goes into "Thermo off" for all operations (as indicated by FSV (#5042)).
- If the EHS system is not operable for a long time (>60min) by applying the Power Peak Control, the usage of glycol is advised during subzero ambient conditions. Please check the terms and conditions of the (local) power company.

4) #505* : Frequency Ratio Control



※ FR Control : Frequency ratio control/ DR : Demand ratio
(The Frequency Ratio Control function displays as "DR" on the display for "Demand Ratio".)

Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
Others FSV 50**	Frequency Ratio Control		5051	-	-	0 (Disable)	0	1 (USE)

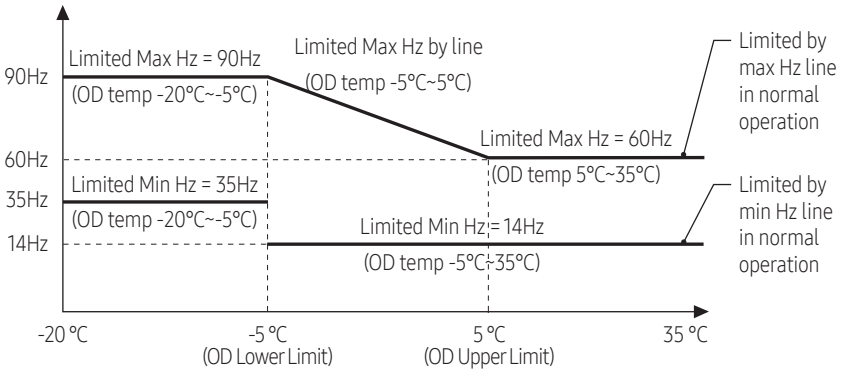
- This is to limit the maximum frequency of the outdoor unit compressor.
- #5051 = 0 : Disable (default)
- #5051 = 1 : USE
  - Method 1 : External DC signal Control uses a DC voltage of 0 ~ 10V (0v = 50%, ~ 10v = 150%)
  - Method 2 : Demand ratio (DR) control through Modbus communication

Voltage(V)	FR	Hz
0.0 ≤ V ≤ 1.0	50%	Min
1.0 ≤ V ≤ 2.0	60%	
2.0 ≤ V ≤ 3.0	70%	
3.0 ≤ V ≤ 4.0	80%	
4.0 ≤ V ≤ 5.0	90%	
5.0 ≤ V ≤ 6.0	100%	
6.0 ≤ V ≤ 7.0	110%	
7.0 ≤ V ≤ 8.0	120%	
8.0 ≤ V ≤ 8.5	130%	
8.5 ≤ V ≤ 9.0	140%	
9.0 ≤ V ≤ 10.0	150%	Max

(Example)

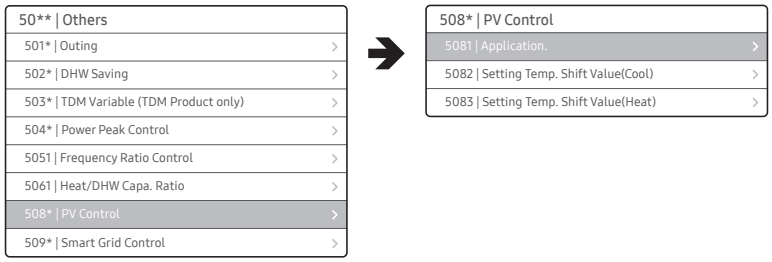
(Normal operation)	(FR 120% Control)	(FR 100% Control)	(FR 80% Control)
-10 °C Max Hz : 90	-10 °C Max Hz : 72	-10 °C Max Hz : 60	-10 °C Max Hz : 48
0 °C Max Hz : 75	0 °C Max Hz : 66	0 °C Max Hz : 60	0 °C Max Hz : 48
10 °C Max Hz : 60	10 °C Max Hz : 60	10 °C Max Hz : 60	10 °C Max Hz : 48

※ Whether or not FR control is set is limited by maximum Hz and minimum Hz of normal operation.



* The values may vary depending on the model.

5) #508* : PV Control (Photovoltaics control)



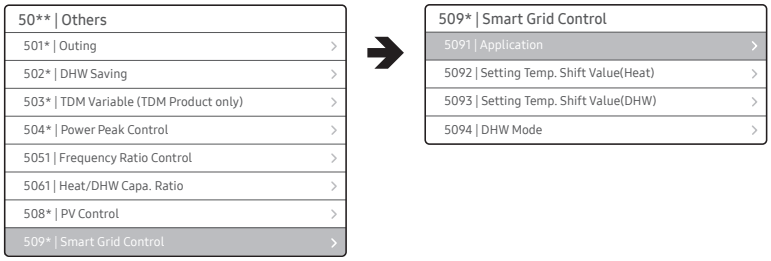
Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
Others FSV 50**	PV Control	Application	5081	-	-	0 (No)	0	1 (Yes)
		Setting Temp. Shift Value (Cool)	5082	0.5	˚C	1	0	5
		Setting Temp. Shift Value (Heat)	5083	0.5	˚C	1	0	5

- If the PV panel system can provide a signal during optimum power generation, it is possible to benefit from free available solar energy. The FSV #5081 should be set to "1 (Yes)" for PV Control.
  (PV Panel input uses the same input contact as Power Peak Control, therefore they can't be used both.)

FSV	0	1
#5081	Disable(Default)	Activation

- Except for DHW mode, this function is activated only during the outing mode.
- Cooling mode (FSV #5082 = 1 ℃, Default)
  - Room sensor setting: Current setting value - FSV #5082 (Min = FSV #1022)
  - Water outlet setting: Current setting value - FSV #5082 (Min = FSV #1012)
  - WL setting: Current setting value - FSV #5082 (Min = FSV #2061, #2062, #2071, #2072)
- Heating mode (FSV #5083 = 1 ℃, Default)
  - Room sensor setting : Current setting value + FSV #5083 (Max = FSV #1041)
  - Water outlet setting : Current setting value + FSV #5083 (Max = FSV #1031)
  - WL setting: Current setting value + FSV #5083 (Max = FSV #2021, #2022, #2031, #2032)
- Hot water mode (DHW)
  - Thermo on operation regardless of outing mode: Setting temperature = Max temperature of hot water mode (FSV #1051)

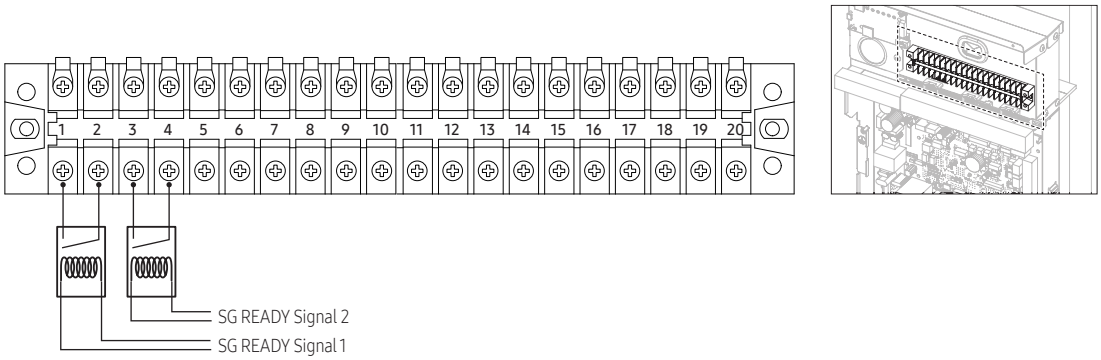
6) #509* :Smart Grid control



※ SG : Smart Grid

Main Menu (FSV)	Sub Menu Function	Description	FSV	Step	Unit	Default	Min.	Max.
Others FSV 50**	Smart Grid Control	Application	5091	-	-	0 (No)	0	1 (Yes)
		Setting Temp. Shift Value (Heat)	5092	0.5	˚C	2	2	5
		Setting Temp. Shift Value (DHW)	5093	0.5	˚C	5	2	5
		DHW Mode	5094	-	-	0	0	1

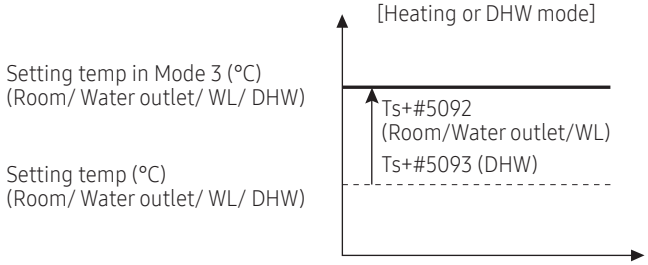
- Similar to Power Peak Control, but more detailed. It allows power companies to provide four operating modes via two digital inputs. Not only during power surge, but also when there is an abundance of power in the grid, the power company can force remotely to store more energy in the system, to prevent grid overload situations.
- FSV #5091 should be set "1": to use Smart Grid control. (#5091 = 0 disable , #5091 = 1 use)



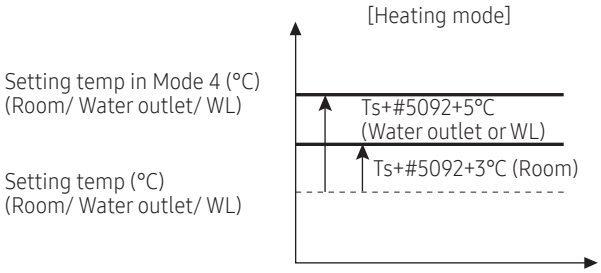
Operation Mode	SG Ready Signal 1 (#1,2 Pin)	SG Ready Signal 2 (#3,4 Pin)	Product Operation
Mode 1	1 (Short)	0 (Open)	Forced Thermo off operation
Mode 2	0 (Open)	0 (Open)	Normal operation
Mode 3	0 (Open)	1 (Short)	1 Step-up operation
Mode 4	1 (Short)	1 (Short)	2 Step-up operation

- Mode 1 : Forced Thermo off of all system
- Mode 2 : Normal operation
  - Normal control is performed.

- Mode 3 : 1 Step-up operation
  - The heating and DHW setting temp are set according the setting temperature shift value (Heating/DHW) FSV (#5092/#5093).

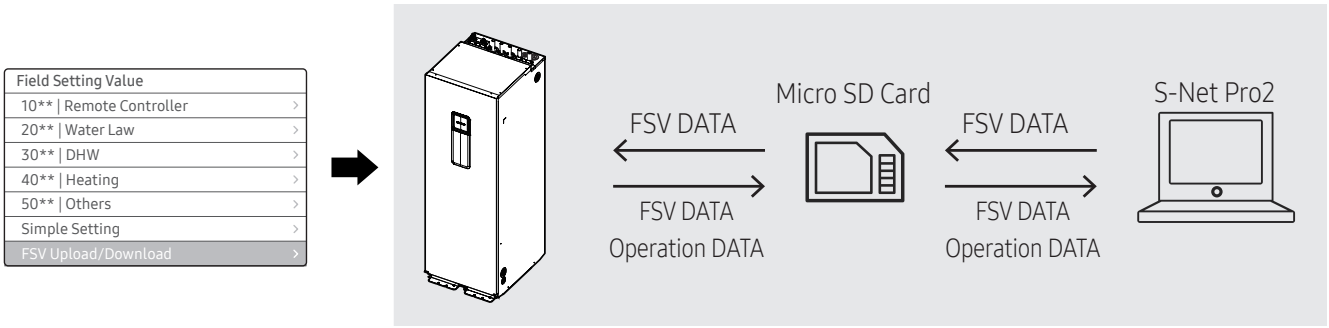


- Mode 4 : 2 Step-up operation
  - DHW mode : #5094 = 0 : Target setting temp is 55 °C (By Heat Pump only)
    #5094 = 1 : Target setting temp is 70 °C (By Heat Pump and BSH)



FSV Upload / Download

To make an easy installation and service possible, please use an SD card and the wired remote controller's function.



How to upload or download the Field Setting Values (example)

1. Insert an SD card into the Sub PBA SD Card slot on the tank integrated hydro unit.
2. Select Field Setting Value in the Service mode.
3. Press the ∧ or ∨ button to select FSV Upload/Download.

NOTE

- Upload: Uploads the FSV data of the tank integrated hydro unit to the SD card.
- Download: Downloads the FSV data of the SD card to the tank integrated hydro unit.

1 Download the wired remote controller image, change the file name to “IMAGE.BIN,” and then download to microSD Card.

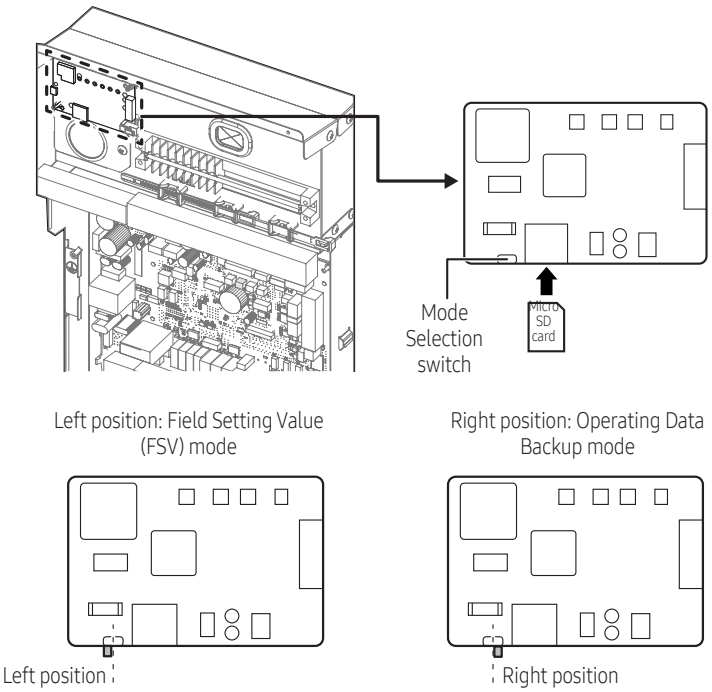
2 Download the wired remote controller program, change the file name to “MICOM.BIN,” and then download to microSD Card.

3 Insert the microSD card with the wired remote controller active, and then reset the system.
For system reset, press the 〈 and ⚙ buttons at the same time for more than 5 seconds.

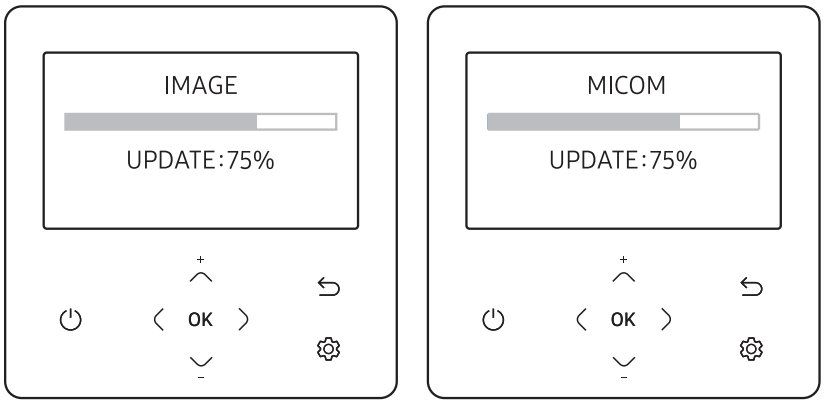
4 The download to microSD card is performed as follows:
- Download proceeds in the order of first IMAGE and then MICOM.
- When the update fails, the wired remote controller is reset automatically and the update proceeds again.

5 When the download is finished, tracking starts automatically.
When tracking is completed, remove the microSD Card.

- Add the function of FSV download/upload and data backup with SD card
- When FSV is download/upload, using the remote controller.



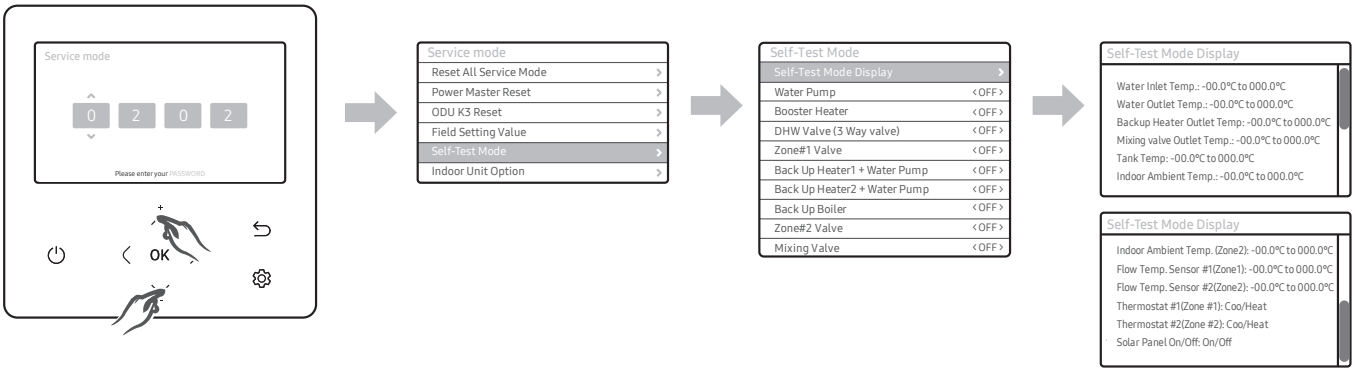
- Micro SD card is a separate purchase, using 8 ~ 32GB It's possible.



CAUTION

- Be sure to use the microSD card after formatting in FAT16 or FAT32.
- The microSD card supports the SD or SDHC with the capacity of 1 GB to 32 GB.
- The update is performed only when the file version in the microSD card differs from the one of the wired remote controller.
- When the screen is frozen for more than 3 minutes after completing the microSD card update by 100%, product inspection is required.
- Delete the files except for the ones for download. (Only IMAGE.BIN and MICOM.BIN are required.)

Self-test display mode



- Enter the self-test mode using wired remote controller,

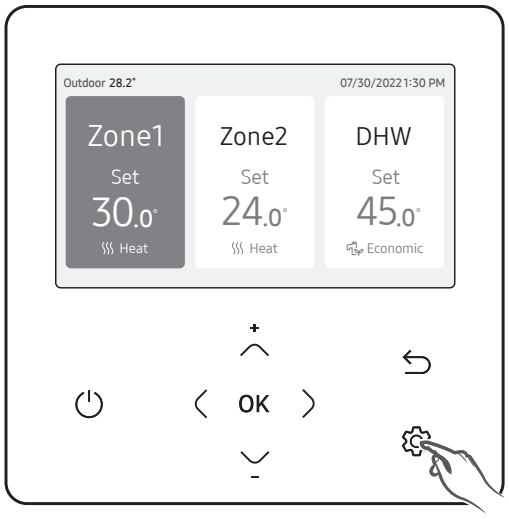
※ Load list : When pressing the corresponding button, you can set the load On or Off.

Step 1	Step 2	Step 3	Description	Default
Self-Test Mode	Self-Test Mode Display	Water Inlet Temp.	Temperature	-
		Water Outlet Temp.	Temperature	-
		Backup Heater Outlet Temp.	Temperature	-
		Mixing Valve Outlet Temp.	Temperature	-
		Tank Temp.	Temperature	-
		Indoor Ambient Temp.	Temperature	-
		Indoor Ambient Temp.(Zone 2)	Temperature	-
		Water Outlet Temp. (Zone 1)	Temperature	-
		Water Outlet Temp. (Zone 2)	Temperature	-
		Thermostat #1(Zone 1)	Heat/ Cool	-
		Thermostat #2(Zone 2)	Heat/ Cool	-
		Solar Panel	ON/ OFF	-
	Water Pump	-	ON/ OFF	OFF
	Booster Heater	-	ON/ OFF	OFF

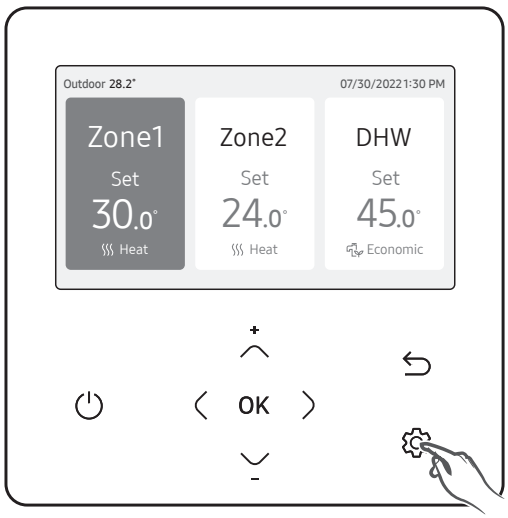
Step 1	Step 2	Step 3	Description	Default
Self-Test Mode	DHW Valve (3 Way valve)	-	ON/ OFF	OFF
	Zone #1 Valve	-	ON/ OFF	OFF
	Backup Heater1 + Water Pump	-	ON/ OFF	OFF
	Backup Heater 2 + Water Pump	-	ON/ OFF	OFF
	Backup Boiler	-	ON/ OFF	OFF
	Zone #2 Valve	-	ON/ OFF	OFF
	Mixing Valve	-	ON/ OFF	OFF

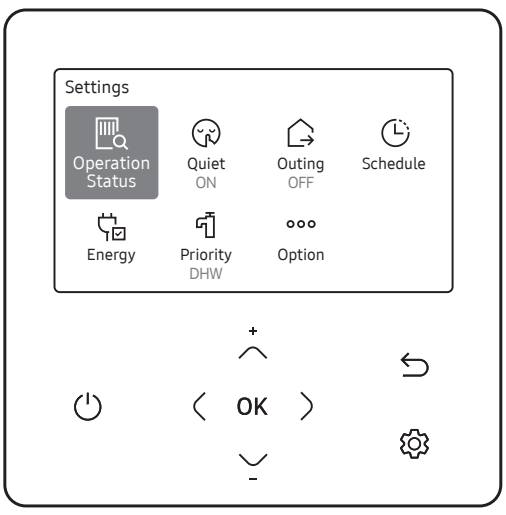
8.4 Usage of wired remote controller

- Home screen



- Setting mode screen

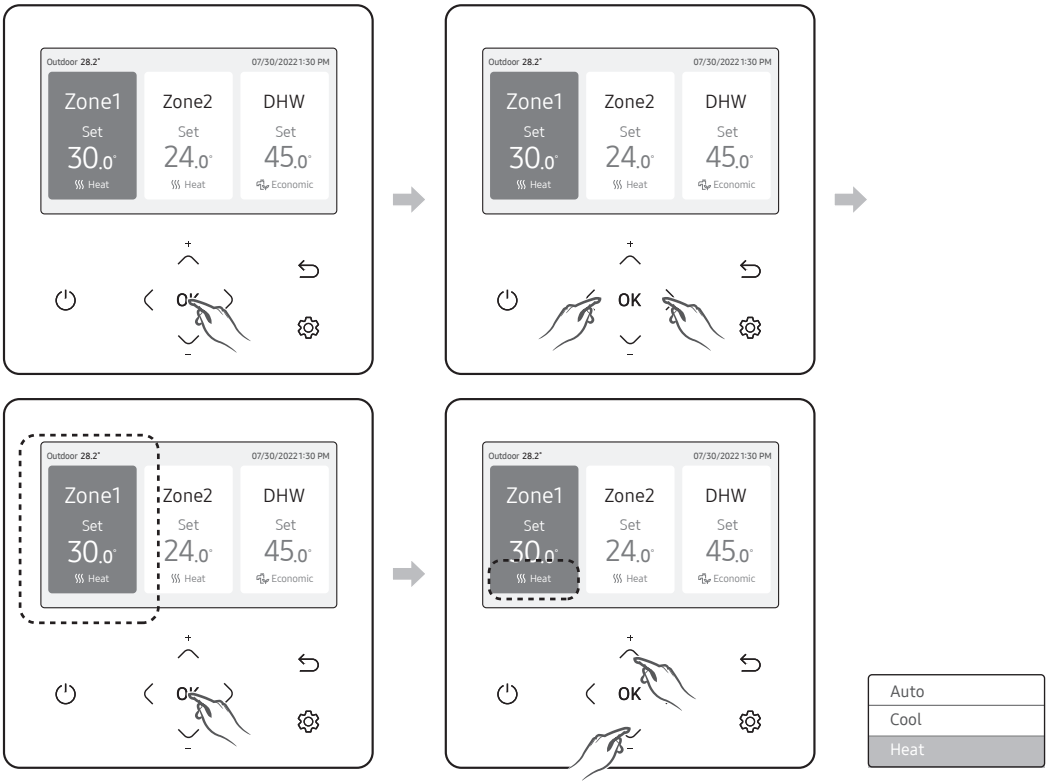




Operating basic mode

Operating basic mode

Press the OK button to enter the Setting screen from the home screen with the Zone 1 or Zone 2 activated. On each screen, press the OK and then press the ∧ or ∨ button to select any of Auto, Cool, and Heat modes.



Auto mode

For indoor units set to automatic mode, the tank integrated hydro unit automatically adjusts the temperature of the discharged water.

NOTE

- When WL is active, the target supply water temperature will be determined automatically depending on the outdoor temperature: For the Heat mode, colder outdoor temperatures will result in warmer water.

Cool mode

You can adjust cooling temperature as you like with the Cool mode to cool indoor place.

- When selecting the Heat mode during the Cool mode, the Cool mode will be canceled.

Heat mode

Floor heating is available with the Heat mode by providing hot water in the spring, autumn and winter.

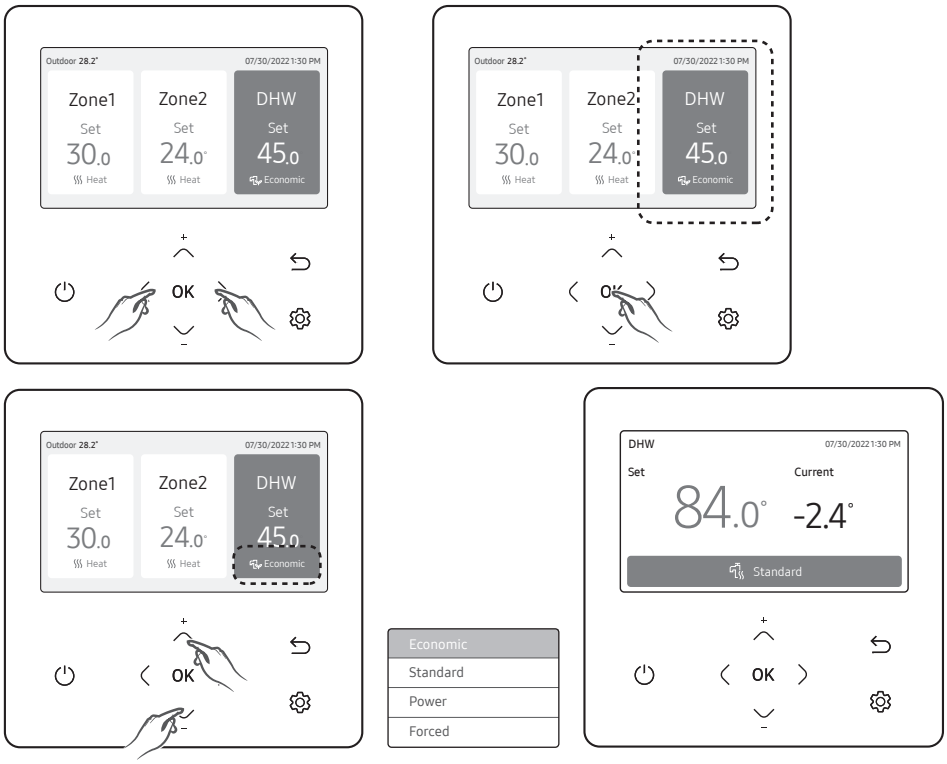
- You can check the defrost operation on the operation status menu under option.
- When selecting the Cool mode during the Heat mode, the Heat mode will be canceled.

NOTE

- When setting standard cooling & heating temperature as indoor temperature, the Auto mode cannot be selected.

Domestic Hot Water (DHW) mode

Press the OK button to enter the Setting screen from the home screen with the DHW activated. On each screen, press the OK and then press the ∧ or ∨ button to select and use any of Economic, Standard, Power, and Forced modes.



NOTE

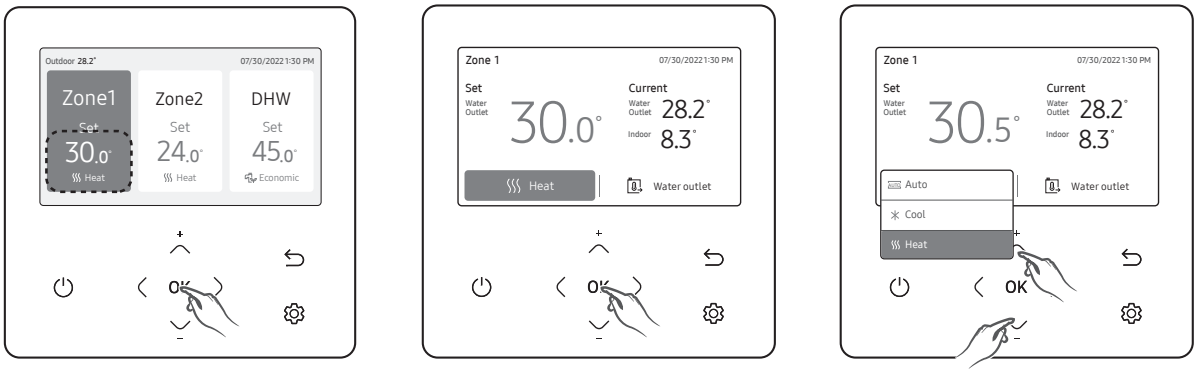
- When the DHW mode is not supported, "Not Supported" appears.
- To operate hot water mode, you need to set the hot water function 'Yes' in the field specification setting mode (#3011) of wired remote controller.
- When the Cool/Heat mode and the DHW mode are selected at the same time, the Cool/Heat mode and the DHW mode will operate alternately.
- (power operation) for the DHW mode cannot be used when the booster heater is not in use.
- If you want to enjoy a leisurely bath or need a lot of warm water urgently, select the Forced mode. When this mode is enabled, it is assured that the full capacity of the heat pump is only delivered for domestic water heating.

CAUTION

- Per default setting in the field setting value options, this function will not turn off automatically.
- To limit the duration time for forced mode, set the Field Setting Values #3051 = 1 (Yes) and #3052 = 3~30 (x10 min. =30~300min.).

Setting the set temperature

On each screen, press the 〈 or 〉 button to select a desired mode and then press the the OK button. You can adjust the set temperature by pressing the ∧ or ∨ button.



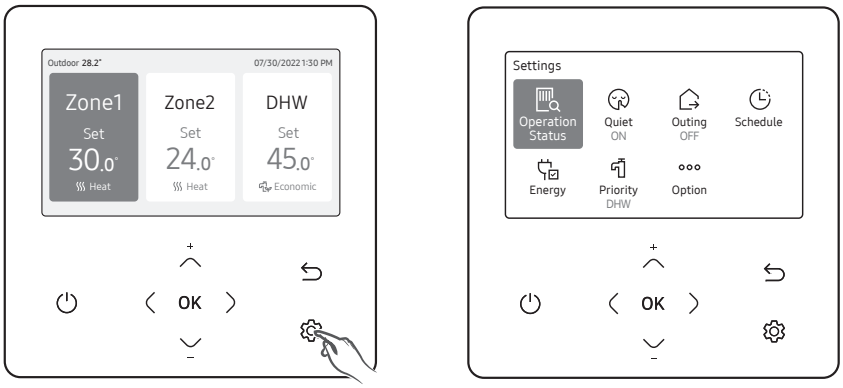
NOTE

- You can adjust the desired temperature by 0.1, 0.5, 1 °C. (Default 0.5 °C)
- When the reference temperature to control is Water Outlet, you can set the temperature only for Water Outlet.
- When the reference temperature to control is Indoor, you set the temperatures for Indoor and Water Outlet.
- When applying Water Law function (FSV #2093 = 1~4), only the room set temperature can be set via the wired remote controller, the water law is set via FSV (#2011~#2081).
- Depending on the Reference temperature set for cooling and heating, the controllable temperatures are restricted for each mode.

	Auto	Cool & Heat
Water Outlet	WL	Water Outlet
Indoor Temp	-	Indoor Temp, Water Outlet

Setting mode feature

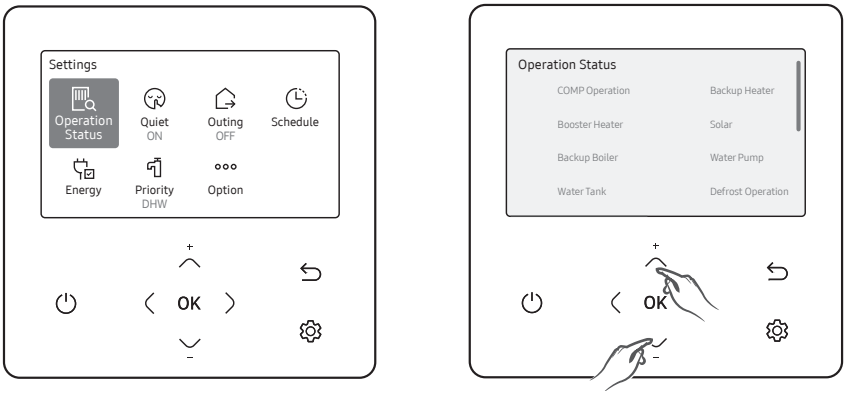
Press the ⚙ button, press the ∧, ∨ or 〈, 〉 button to select press the Operation status, Quiet mode, Outing mode.



Operation status

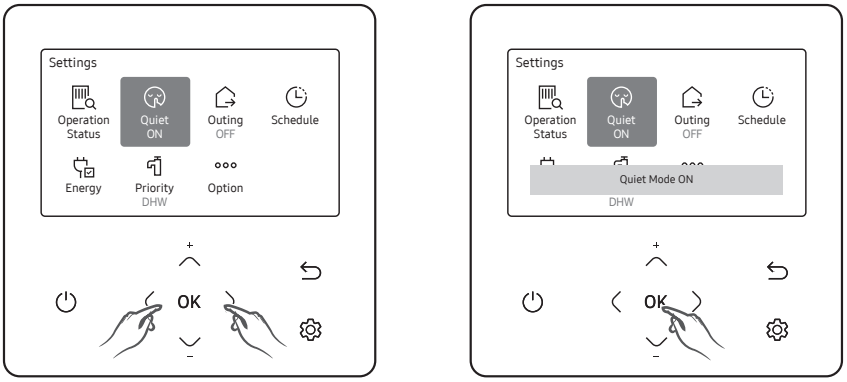
Use this to display the operation status:

COMP operation, Backup heater, Booster heater, Solar, Backup boiler, Water pump, Water tank, Defrost operation, Freezing control, Water Tank Sterilization Operation, Indoor Thermostat Installation, Air to air operation, Solar PV, Smart Grid, Eco Level, Demand Response.



Quiet mode

Noise from operation can be reduced with the Quiet mode.



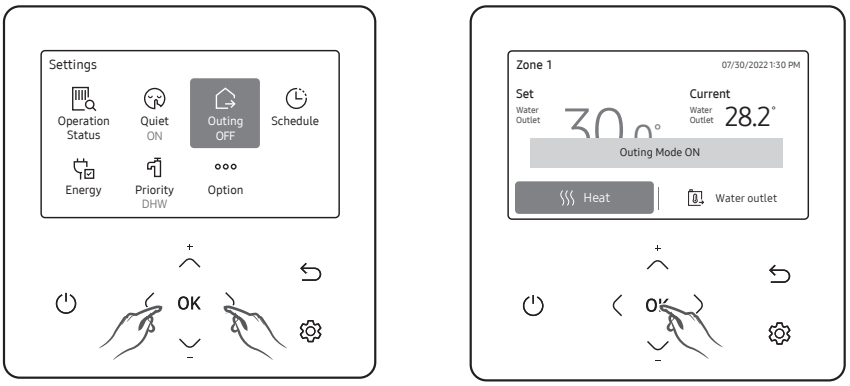
NOTE

- When setting the Quiet mode through a contact from the outdoor unit or setting the Quiet mode Automatic Time in the service mode using the wired remote controller, the mode cannot be controlled by user entry.

Outing mode

Heating can operate at low temperature while you are out with the Outing mode.

The product provides function that allow you to reduce electricity consumption.



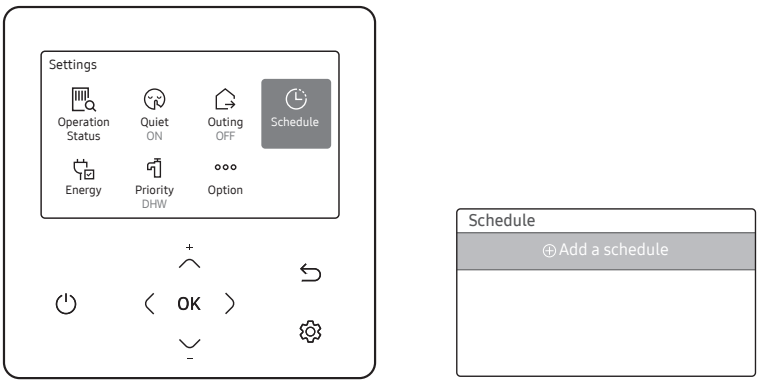
NOTE

- To cancel this mode, press any button on the remote controller.
- When the Outing mode is On, the Home screen appears before entering the setting.
- When you press any key, the Outing mode is canceled. However, pressing the keys for switching between the home and main screen does not cancel this mode.
  - HOME: Directional button, **OK** button
  - Main screen: Back button

Setting schedule

Press the ⚙ button, press the ∧, ∨ or 〈, 〉 button to select Schedule, and then press the OK button.

When you select "Add a schedule", you can configure settings for Daily schedule, Weekly schedule, Yearly Schedule, and Holiday.



Type	Description
Daily schedule	• Can set the Quiet mode or hot water status in the preset time. • Can set up to 8 schedules.
Weekly schedule	• Can set the operation for the desired units in the scheduled day and time. – The scheduling is possible on the weekly basis. You can set the values for day, time, operation On/Off, scheduled units, operation state (operation mode, desired temperature).
Yearly schedule	• Can create a group for the month to schedule and assign scheduling to the group on the weekly basis. – Yearly scheduling is possible and the scheduling can be assigned to up to 8 groups.
Holiday	• Can set not to run the weekly and yearly schedules on holidays.

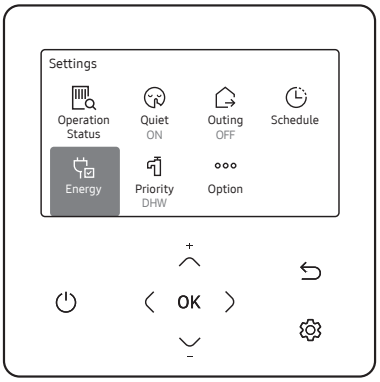
NOTE

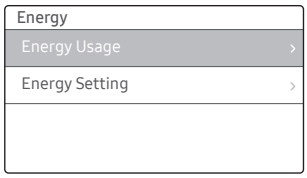
- Weekly and Yearly schedule can cover settings up to 49.
- When using the Wi-Fi kit, the SmartThings app can also create schedules and automations based on time settings. Try to avoid time schedule in the wired remote controller and SmartThings at the same time.

Energy

Press the ⚙ button, press the ∧, ∨ or 〈, 〉 button to select Energy, and then press the OK button.

You can see and set any of Energy Usage and Energy Setting.





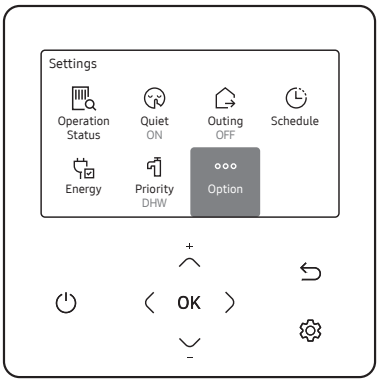
Classification	Type	Description
Energy Usage	-	Displays the Instantaneous Power, Weekly Energy Usage, Monthly Energy Usage, Yearly Energy Usage, Energy Usage over Last Year, and Operation Time in graph format. **NOTE** • For accuracy of operation time, use the DMS time. • The weekly display follows the ISO 8601 standards.
Energy Setting	Target Energy Consumption	Sets the target energy consumption.
	Target Operation Time	Sets the target operation time.
	Alarm Popup	Sets whether or not to generate an alarm when the target energy consumption is reached.
	Usage Data Initialization	Initialize the entire energy function.

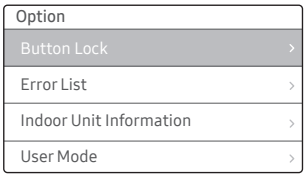
How to set the Options

Press the ⚙ button.

Press the ∧ ∨ or 〈 〉 button to select Option, and then press the OK button.

See the following pages to select the desired menu.





Step 1	Step 2	Step 3	Step 4	Step 5	Description	Default
Button Lock	-	-	-	-	ON/OFF	OFF
Error List	-	-	-	-	-	-
Indoor Unit Information	-	-	-	-	-	-
User Mode	Language	-	-	-	Differs depending on the language	First value for the language pack
User Mode	Daylight Saving Time	Daylight Saving Time	-	-	ON/OFF	OFF
		Unit	-	-	Day/Week	Week
		Month	-	-	January to December	Mar
		Week	-	-	1st to 4th, F (final week)	F (final week)
		Day	-	-	1 to 31	22
	Lock	All Lock	-	-	ON/OFF	OFF
		Lock of partial function	Operation Lock	-	ON/OFF	OFF
			Operation Mode Lock	All Mode Lock	ON/OFF	OFF
				Auto Mode Lock	ON/OFF	OFF
				Cool Mode Lock	ON/OFF	OFF
				Heat Mode Lock	ON/OFF	OFF
			Temperature Lock	-	ON/OFF	OFF
			Schedule Lock	-	ON/OFF	OFF

Step 1	Step 2	Step 3	Step 4	Step 5	Description	Default
User Mode	Wired remote controller	LED	-	-	ON/OFF	ON
		Button Mute	-	-	ON/OFF	OFF
		Current Time	Date	Date Format	YYYY/MM/DD, DD/MM/YYYY, MM/DD/YYYY	DD/MM/YYYY
				Year/Month/Day	2000 to 2099/1 to 12/1 to 31	2019.01.01
			Time	Time Format	12-Hour/24-hour	12-Hour
				Hour/Minute/ AM/PM	0 to 12/0 to 60/AM.PM	PM 12 Hour 00 Minute
		Reset Remote Controller	-	-	-	-
		Display Setting	Brightness		10 to 100%	100%
			Screen Saver	Timer	10 to 60 seconds	30sec
				Brightness	0, 10, 30, 50, 70%	30%
	Smart Reset	-	-	-	-	-
	Reset All User modes	-	-	-	-	-
	Service Time Check	Service Call Number	-	-	Service call number entered for Service mode	-
		Last Inspection	-	-	Final control date entered for Service mode	-

NOTE

- When two wired remote controllers are connected, the brightness can be set within 10 to 50%.

8.5 Testing operations and concrete curing function

Testing operations

1 Check the power supply between the outdoor unit and the auxiliary circuit breaker.
   - 1 phase power supply : L, N
   - 3 phases power supply : R,S,T,N

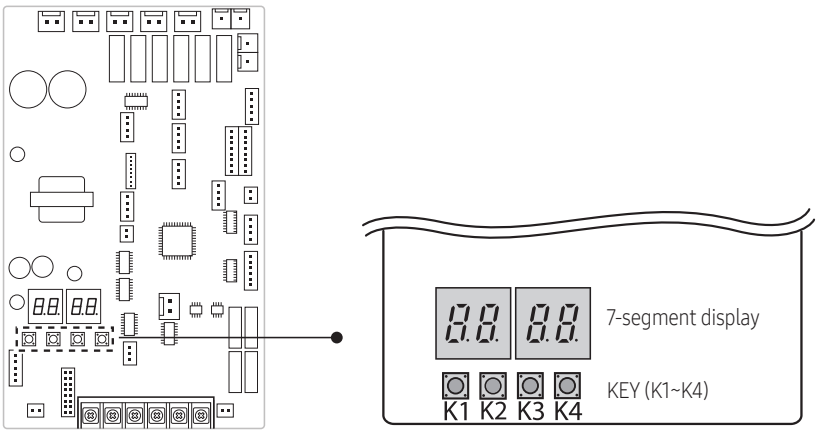
2 Check the control panel
   - Check that you have connected the power and communication cables correctly. (If the power cable and communication cables one mixed up or connected incorrectly, the PCB will be damaged.)
   - Check the temp. sensor, drain pump/hose, and display are connected correctly.

3 Press K1 or K2 on the outdoor unit PCB to run the test mode and stop.

K1 (Number of Press)	KEY operation	7-segment display
1 time	Trial operation in Heating mode	“K” “1” “BLANK“ “BLANK“
2 times	Vacuuming (Outdoor unit address 1)	“K” “2” “BLANK“ “1“
3 times	Inverter Fault Detection (Comp #1)	“K” “3” “I“ “1“
4 times	End Key operation	-

K2 (Number of Press)	KEY operation	7-segment display
1 time	Trial operation in Cooling mode	“K” “4” “BLANK“ “BLANK“
2 times	Discharge mode of DC link voltage	“K” ”5” ”o” ”k” (1phase) “K” ”5” ”n” ”A” (3phase)
3 times	Forced defrost operation	“K” “6” “BLANK“ “BLANK“
4 times	Inverter compressor1 check	“K” “7” “BLANK“ “BLANK“
5 times	End Key operation	-

K3 (Number of Press)	KEY operation	7-segment display
1 time	Intialize (Reset) setting	Same as initial state



4 View Mode : When the K4 switch is pressed, you can see information about our system state as below.

K4 (Number of press)	KEY operation	Display on segment	
		SEG1	SEG 2,3,4
1 time	Capacity of outdoor unit	1	16HP g 0,1,6
2 times	Order frequency of the compressor	2	120Hz g 1,2,0
3 times	High pressrue (kg/cm^2)	3	15.2K g 152
4 times	Low pressrue (kg/cm^2)	4	4.3K g 043
5 times	Discharge temperature Compressor	5	87˚C g 087
6 times	IPM temperature	6	87˚C g 087
7 times	CT sensor value	7	2A g 020
8 times	Suction temperature	8	-42˚C g -42
9 times	COND OUT temperature	9	-42˚C g -42
10 times	EVA in temperature	A	87˚C g 087
11 times	Compressor top temperature	B	87˚C g 087
12 times	Outdoor temperature	C	-42˚C g -42
13 times	EVI inlet temperature	D	-42˚C g -42
14 times	EVI outlet temperature	E	-42˚C g -42
15 times	Main EEV step	F	2000 g 200
16 times	EVI EEV step	G	300 g 300
17 times	Fan step (ssr or bldc)	H	13Step g 0,1,3
18 times	Current frequency Compressor	I	120Hz g 1,2,0
19 times	EVI SOL EEV step	J	300 g 300
20 times	Inverter pump output	K	100% g 100

K4 (Number of press) Press and hold the K4 to enter the setting	Displayed content	Display on segment		
		Page 1	Page 2	
1 time	Main version	MAIN	Version (ex. 1412)	
2 times	Inverter version	INV	Version (ex. 1412)	
3 times	EEP version	EEP	Version (ex. 1412)	
4 times	Automatically assigned address of the units	AUTO	SEG1,2	SEG3,4
			Indoor unit : “A“, ”0” MCU : “C“, “1“	Address (ex:07)
5 times	Manually assigned address of the units	MANU	SEG1,2	SEG3,4
			Indoor unit : “A“, ”0”	Address (ex:15)

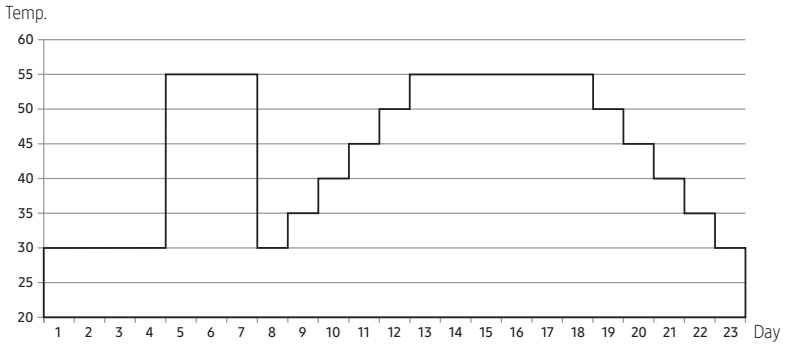
Concrete curing function

- When pipes of the under floor heating are installed, operation for reinforcing concrete curing is applied. (Period of operation: 23 days)
- Entering procedure

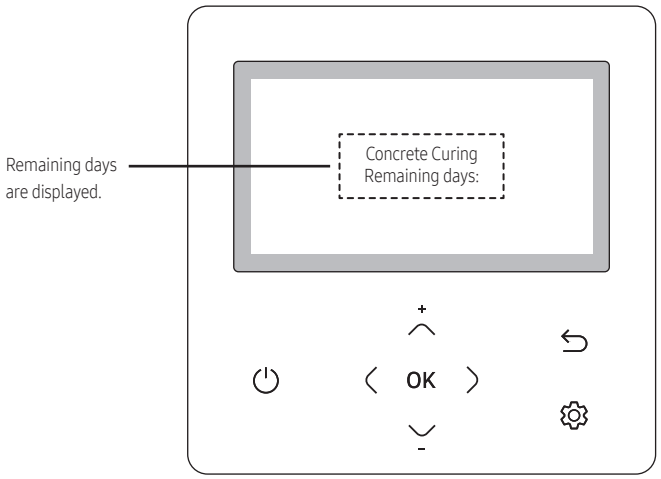
1 After turning off the DIP switch Dip3 of indoor unit (Default ON), power off and on the indoor unit. The operation for concrete curing starts automatically. (If blackout occurs and communication restarts later, operation will continue.)

2 Outlet water temperature is controlled as time goes on like below.

3 Remaining days are displayed on the wired remote controller during operation but key operation is unavailable.



Classification	Initial Heating		Step raise					Heating	Step down					Total (Hour)
Time	96	72	24	24	24	24	24	144	24	24	24	24	24	552
Temp.	30	55	30	35	40	45	50	55	50	45	40	35	30	-



※ If an error is displayed, concrete curing function does not work.

WARNING

- Please consult the supplier of the concrete on beforehand, to know if the above mentioned curing curve can be used for the specific mixture. Failing to do so, may result in cracks and or damage to the concrete. When the curve doesn't match the concrete curing demands, please do not attempt to use it.

9. Commissioning & Recommissioning

SAMSUNG

9.1 Overview

This chapter explains what you have to do and know to commission the system after it is installed and configured.

9.2 Precaution

NOTE

- When starting the unit for the first time, it is expected that the power consumption exceeds the stated standard power consumption.
  This is caused by the new compressor that needs about 50 hours of cumulative running hours before reaching a stable (lower) power consumption.
- Always operate the unit with the switches and sensors in the correct places. Failing to do so, may result in damaging the compressor and or the electronics.
- Only operate the unit with the outlet water temperatures within range of the specifications 15>Tw2 < 75, if needed preheat via BUH/BSH.

9.3 Checklist before commissioning

Checklist before commissioning

Outdoor unit		
Installation space is according manual (above average snow height/ enough clearances)	☐ Yes	☐ No
Outdoor unit is installed higher ☐ / same level ☐ / lower ☐ , than the indoor unit.		
Product is protected against direct wind on fan/ snow ingress	☐ Yes	☐ No
In case the product is installed close to sea, additional protection (coating) is applied	☐ Yes	☐ No
Outdoor unit is correctly secured to base	☐ Yes	☐ No
Provisions for condensate/ drainage are made, without any risk of freezing (tracing heating)	☐ Yes	☐ No
All external pipework is insulated	☐ Yes	☐ No
Power supply is installed with a dedicated correctly rated ELCB and correct cable sizing	☐ Yes	☐ No
Voltage between (*optional: in case of 3PH) L1 - N ☐ V~ L2 - N* ☐ V~ L3 - N* ☐ V~		
Voltage between (*optional: in case of 3PH) L1 - N ☐ V~ L2 - N* ☐ V~ L3 - N* ☐ V~		
Voltage between N - PE ☐ V~		
Power supply is fitted with an isolator within in reach (arm length)	☐ Yes	☐ No
ELCB fuse rating (Amps)	☐ A	
Mains power supply cable size (mm²)	☐ mm²	
Communication cable size (mm²)	☐ mm²	
Communication cable shielded, single sided connected to PE	☐ Yes	☐ No
Total charge (kg) (R-290)	☐ kg	☐ R
Outdoor unit channel address setting (default is 00)	☐	
Outdoor unit noise restriction setting ☐ No (default) ☐ -3dB ☐ -5dB ☐ -7dB ☐ max.35dB		

Checking the presence of refrigerant

- Before, during, and after work, use the R-290 refrigerant detector to check for refrigerant leaks around.
- This refrigerant detector must not generate sparks and must be properly sealed.

Indoor unit			
Installation space is according manual (enough clearances)		☐ Yes	☐ No
Product is installed indoors without any risk of freezing, rain, moisture ingress		☐ Yes	☐ No
Indoor unit is correctly secured to the floor (tank integrated)		☐ Yes	☐ No
Provisions for condensate/ drainage are made (cooling/defrost), without any risk of flooding		☐ Yes	☐ No
All external pipework is insulated		☐ Yes	☐ No
Power supply is installed with a dedicated correctly rated ELCB and cable sizing for the indoor unit		☐ Yes	☐ No
Indoor unit ELCB rating (Amps)		☐ A	
Mains power supply cable size (mm²)		☐ mm²	
Mains power supply cable length and size to indoor unit (m, mm²)	☐ m	☐ mm²	
Voltage between	L1 - N ☐ V~ L2 - N* ☐ V~ L3 - N* ☐ V~		
Voltage between	L1 - N2* ☐ V~ L2 - L3* ☐ V~ L3 - L1* ☐ V~		
Voltage between	N - PE ☐ V~		
The power / amperage rating of the primary pump	☐ W	☐ A	
Default direction of 3way diverting valve		☐ Room	☐ DHW

※ 3-phase models only

9.4 Air purging

When commissioning and installing the unit, it is very important to remove all air in the water circuit.
Automatic air purging is possible via manually starting the primary pump of the ClimateHub via the self test mode (water pump On/Off) in the service menu (password 0202) of the wired remote controller.
Before commissioning the unit, make sure to check the following points:

1. The maximum water pressure of the unit is 2.9 bar static pressure.
2. The operating range of leaving water temperature is 15~70˚C at heating conditions and 5~25˚C at cooling conditions.
3. The minimum required water flow for operation is 16 liters/min (this is not the same as the standard or nominal flow, for details see section 6.1 Flow rate).
   At all times the required water flow rates should remain.
   A flow error can stop the compressor.

- Water quality must be according to EN directive 98/83 EC.
- If the unit and the pipes are exposed to freezing temperature, it can cause damage to the hydraulic system. Special care must be taken to prevent freezing of the total water system.
- The unit is designed to be used in a closed-loop system. Do not use any other components which are designed only for an open-loop system.
- Never use Zn-coated parts in the water circuit.
- All hydraulic parts including field piping must be insulated to reduce heat loss and condensation.

Checking-piping / Air purging

- It is recommended to install an inlet combination valve to feed small quantities of water to the system automatically, replacing the minor water losses and maintaining the system pressure.
- Drain taps must be provided at all low points of the system to permit complete drainage of the circuit for maintenance use.
- Make sure that the check valves are correctly installed in the system (field supply).
- Flush pipes out with clean water to remove contaminants in pipes during installation.
- The strainer(water filter) must be cleaned after flushing the pipes, and it should be cleaned periodically.
  Replace strainer when necessary.
- Charge the water until a pressure of 1.5~2.0bar by using make-up water assembly (Field supply).
  (The water pressure indicated on the manometer will vary depending on the water temperature)
  The nominal water pressure in the system should remain about 1.0 bar at all times to avoid air entering the water system.
- Make sure that air should be vented from the system at start-up or after installing/ servicing.
  The air vent valve must be opened during charging the water circuit (at least 2 turns) in order to remove all air in the circuit, and a inlet combination valve allows water into the system continuously.
- The mandatory service valves
  – When using freeze protection valves also the valves and the required air vent and NC 2WAY VALVES.

Air purging

Regarding air purging :

- Make sure the pump is operating via the Self-Test Mode of the Service Menu. You can set the circuit (the position of the 3WAY VALVE) to space or tank via the Self-Test Menu. Air purge must be performed for both space heating and tank (DHW) circuits.

9.5 Commissioning

Pre-test operation check

Pre-test Operation Checks		
Water filled	☐ Yes	☐ No
Glycol / Brine added (mono)	☐ Yes	☐ No
System water pressure (bar)		bar
Air purged	☐ Yes	☐ No
Isolating valves fitted (supply and return side)	☐ Yes	☐ No
Manometer installed	☐ Yes	☐ No
Secondary circuit pump(s) installed	☐ Yes	☐ No
Expansion vessel isolating valve installed and opened (if required)	☐ Yes	☐ No
Expansion vessel is installed and pre-charged according Pg=(H/10+0.3) bar		bar
Expansion vessel size in volume (no calculation check by commissioning engineer)		bar
Combination inlet valve installed	☐ Yes	☐ No
Tundish installed and connected to drain	☐ Yes	☐ No
Water temperature in operation range for heating (20°C > Tw2 < 55°C), if needed preheat by BUH/BSH	☐ Yes	☐ No
S-NET connected and ready to collect data	☐ Yes	☐ No
Additional heat sources max. supply temperature are limited to max. 70°C	☐ Yes	☐ No
Pipe diameter space heating		mm
Main material	☐ Steel ☐ Copper	☐ Plastic
Pipe diameter DHW		mm
Main material	☐ Steel ☐ Copper	☐ Plastic
Water quality pH(25°)	Hardness	mg/L
Additives (Inhibitors) used		
Corrosion inhibitor used		

Test run

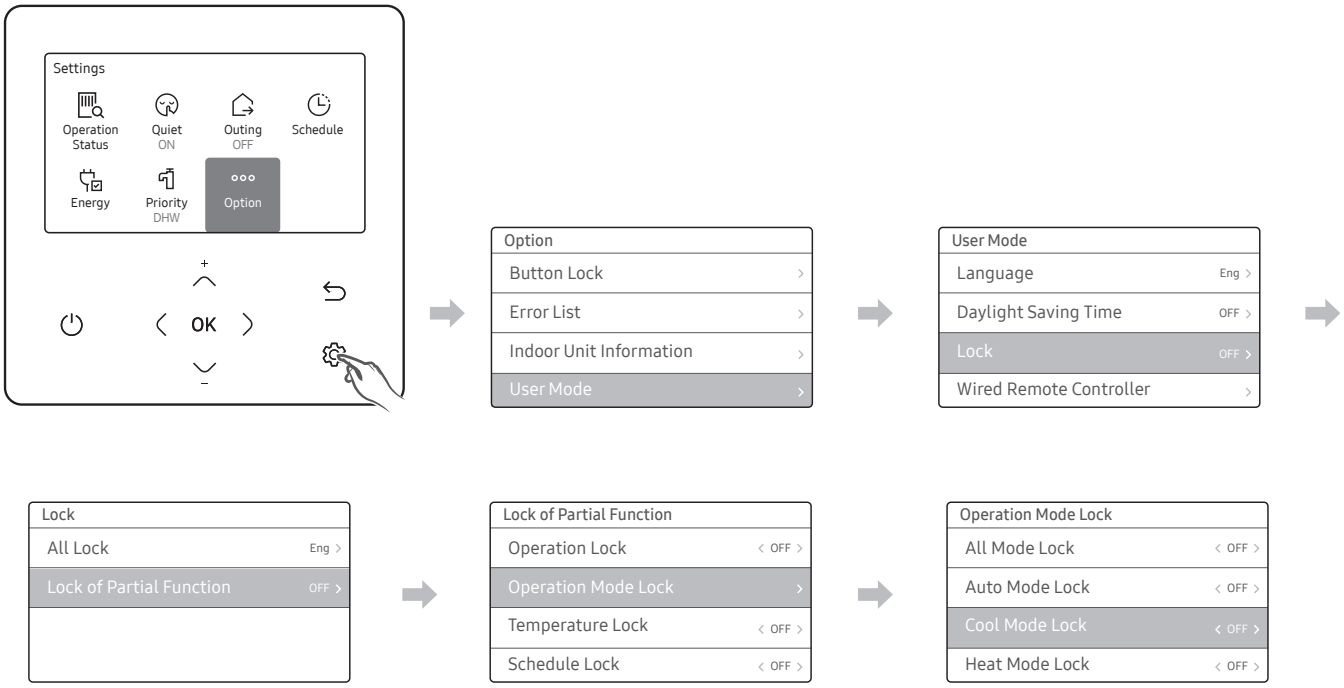
- Perform test runs on the unit and monitor the leaving water and tank temperatures to check if the unit is working correctly.

  The following test runs should be made:

  – Heating

  – Cooling (if applicable)

  – DHW



9.6 Check operation measured data

Test Operation Measured Data Collection (after min. 15 minutes, preferred via S-NET Pro/ MWR-WW10N)	
Ambient Temperature	°C
Compressor speed (actual)	Hz
Running amps on power supply at the outdoor unit	A
Discharge Temperature	°C
Target Discharge Temperature	°C
Condenser Out Temperature	°C
Evaporator In Temperature	°C
Evaporator Out Temperature	°C
Heating Set Temperature	°C
Heating - Flow (l/min)	l/min
Heating - Temperature difference over the Plate Heat Exchanger (ΔT = Tw2 - Tw1)	°C
DHW Set Temperature	°C
DHW - Flow (l/min)	l/min
DHW - Temperature difference over the Plate Heat Exchanger (ΔT = Tw2 - Tw1)	°C

9.7 Recommissioning

- Cold or tepid water discharge from tundish
  - The tundish should be installed away from electrical devices.

1 Close cold water supply valve.
2 Open a hot tap.
3 Repressurize the expansion vessel air charge to its set level.
4 Close hot tap.
5 Open the cold water supply valve.

NOTE

Hot water discharge from the tundish :
This indicates a malfunction of a thermal cut-out, operating thermostat or the combined temperature and pressure relief valve. Turn off the electrical supply to the immersion heater and also isolate an indirect unit from the boiler. Contact the installer or the service agent.

10. Maintenance

SAMSUNG

10.1 Overview

The unit shall be checked and inspected regularly for correct operation and overall status.

NOTE

- Always switch off the unit and turn off the main power supply to the unit and switch off the power via disconnect switch before carrying out any maintenance or repair works.
- Mentioned actions shall be carried out at least once a year by qualified personnel.

CAUTION

- Any released refrigerant should safely be vented to the atmosphere, without risks of igniting the flammable gas.
- Suitable flammable gas detectors must be present and continuously operating to warn workers in case of a dangerous concentration of refrigerants and that the gas detection equipment used is non-sparking, adequately sealed, or intrinsically safe.
- All staff (installer and maintenance) must have been instructed before starting the execution of the works.
- Setup proper signage, including “No smoking” and “Do not enter the area” signs.
- All appropriate and necessary tools and equipment are available.
- All staff and others working in the local area must be instructed on the nature of the work being carried out.
- The area around the workspace must be sectioned off.
- In certain cases it is mandatory to obtain a work permit prior to the work, a work permit must be obtained from the relevant responsible on the site.
- Working within confined spaces should be avoided.
- No flammable materials should be stored in the work area.
- No ignition sources must be present anywhere in the work area.
- Suitable fire extinguishing equipment (CO_2 or dry-powder type) must be available within the immediate area.
- The work area should be appropriately ventilated before working on the refrigerant circuit, brazing, or handling electrics.
- Only oxygen-free dry nitrogen (OFDN) must be used. The presence of oxygen can raise the flammability risk (and the presence of moisture can damage the reliability and operation of the refrigerating system).
- The technician should always carefully read the installation and/or service manual provided by the manufacturer so that they are aware of any particular special requirements associated with the equipment under consideration. New or replacement components should be according to the manufacturer's specifications.
- Leak detectors rated for combustible gas must be used; if the leak cannot be located with an electronic detector, remove the charge, purge, fill with nitrogen, and use a micro leak detector spray. (GUIDE FOR THE USE OF HCS REFRIGERANTS)
- The maximum amount of R-290 in an area considered 0.0093 m^3/kg

10.2 Check list before working on an R-290 contained system

NOTE

- Work may only be performed by qualified personnel.
- Service work should only be performed in accordance with the manufacturer's specifications.
- A safety check is required before starting work on equipment containing flammable refrigerants to minimize the risk of ignition.

Point	Check prerequirments	Compliance (Y/N)
1	Awareness Familiar with the information provided by other sources, such as the system equipment manufacturers, component manufacturers, refrigerant suppliers, and Material Safety Datasheets (MSDSs). Occupants should be aware of manufacturer operating instructions, procedures, guidelines and safety issues regarding the equipment. Be made aware	
2	Safety distance Safety distance to building openings with regard to the movement of refrigerant required. For outdoor installations refrigerating system sited in the open air shall be positioned to avoid leaked refrigerant following into a building or otherwise endangering people and property.	
3	No ignition Sources No smoking, including displaying 'No Smoking' signs. Survey the area around the equipment before servicing to establish any flammability or ignition risks. Remove all sources of ignition. Be aware that a cell phone or similar electronic devices could be the source of ignition.	
4	Labels R-290 is classified as a highly flammable category A3 gas and must be labeled accordingly.	
5	General Work Area Instruct anyone in the temporary flammable zones as to the nature of the work."	
6	Personal Protective Equipment Technicians should wear appropriate protective equipment, including chemical goggles, protective gloves, grounding probes, and anti-static bands.	
7	Free Air Movement Ensure that free air movement around all refrigerant-containing parts of the systems can be achieved. Depending on the size of the room, especially in a confined space, mechanical ventilation may need to be considered. The ventilation should displace any released refrigerant and expel it to the outdoors.	
8	Base Emptiness R-290 is heavier than air. Precautions should be made against refrigerant collecting in troughs and low points of the structure.	
9	Electrical Devices An initial safety check of components to see if a fault exists that could compromise safety. Capacitors should be discharged with bleed resistors (minimum 2 Watt / 10,000 Ω) or multimeters. Do not work on 'live' electrical components. Ensure good ground equipment and user are maintained.	

Point	Check prerequirments	Compliance (Y/N)
10	Certified Equipment – Gas Leak Detectors and Monitors, Electrical Test meters, Portable Lighting, non-sparking tool, and etc.	
11	Work Space Guidelines – Good ventilation – Dry powder fire extinguishers	

10.3 The components of maintenance

Yearly maintenance of the outdoor unit

Heat exchanger of the outdoor unit

- The heat exchanger of the outdoor unit can get blocked up due to dust, dirt, leaves, etc. It is recommended to clean the heat exchanger annually or any sooner if dirt becomes visible. A blocked heat exchanger can cause performance issues and poor energy efficiency.

Water filter

- Use a water filter which is available for cleaning and clean it regularly.

Yearly maintenance of the indoor unit

Water pressure

- Check if the water pressure is according to the pressure as stated in the commissioning sheet (calculation depending on installation volume and height) If necessary, fill with more water. Also check the expansion vessel's pressure (by Nitrogen). As a broken expansion vessel can cause a low system pressure when the system is cold.

Water pressure relief valve

- Check for correct operation of the pressure relief valve.
  - The valve will work over the designated pressure.
  - If there is leakage of water or water splashed in normal condition, please contact your local installer.

Pressure relief valve of the DHW (field supply)

- Open the valve
  - Make sure that there is no water blockage inside the valve or between piping. The flow of water from the relief valve must be sufficient.
  - Make sure the water from the relief valve is clean. If it contains foreign objects or dust:
    Open the valve until the drained water contains no more foreign objects.
    Flush and clean the entire tank, including the piping between the relief valve and the cold water inlet.

– Check after the tank heat cycle to make sure this water is coming out of the tank.

Descaling

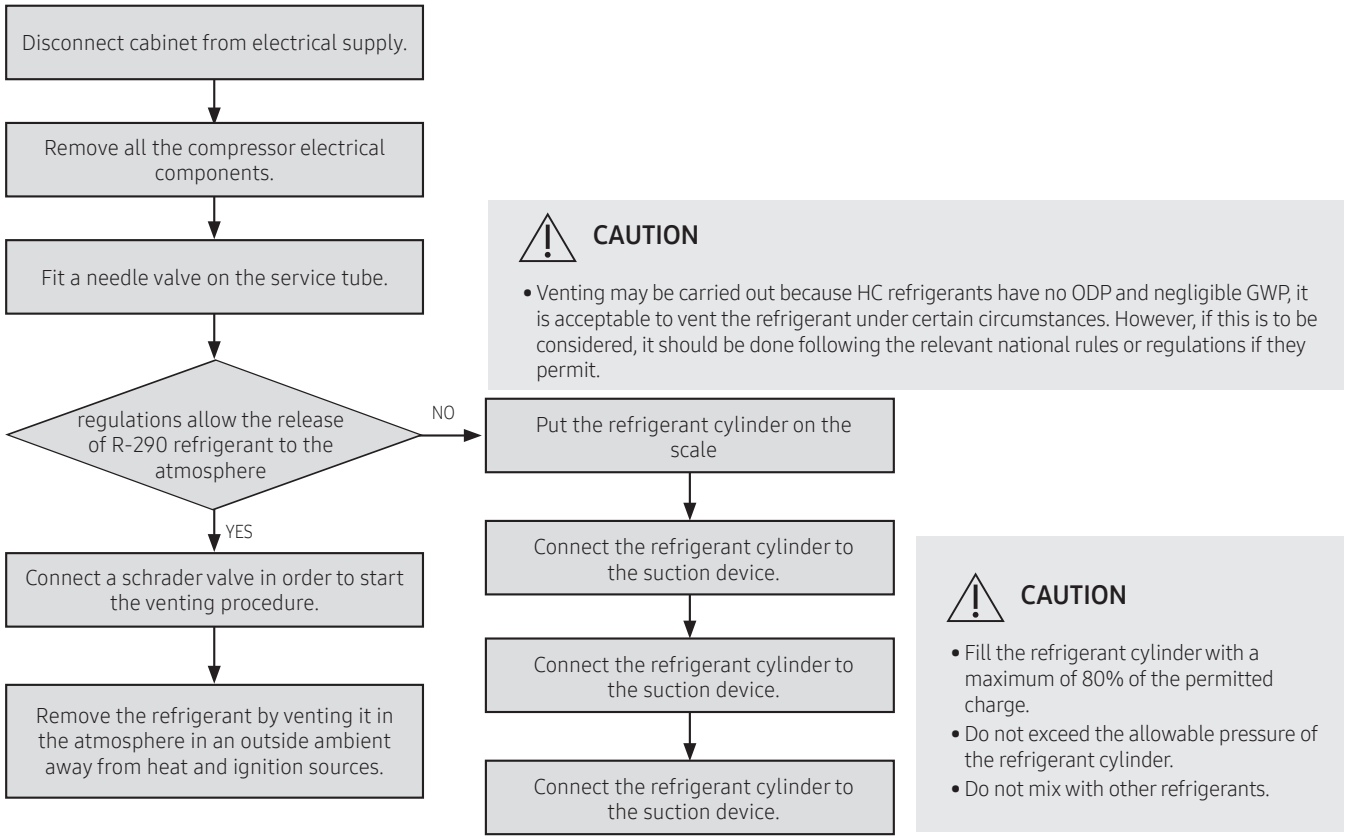
• Depending on the water quality and set temperature, scale may be attached to the heat exchanger inside the domestic hot water tank, which may decrease the heat transfer efficiency. For this reason, it may be necessary to periodically descale the heat exchanger.

10.4 The refrigerant of maintenance

Glycol

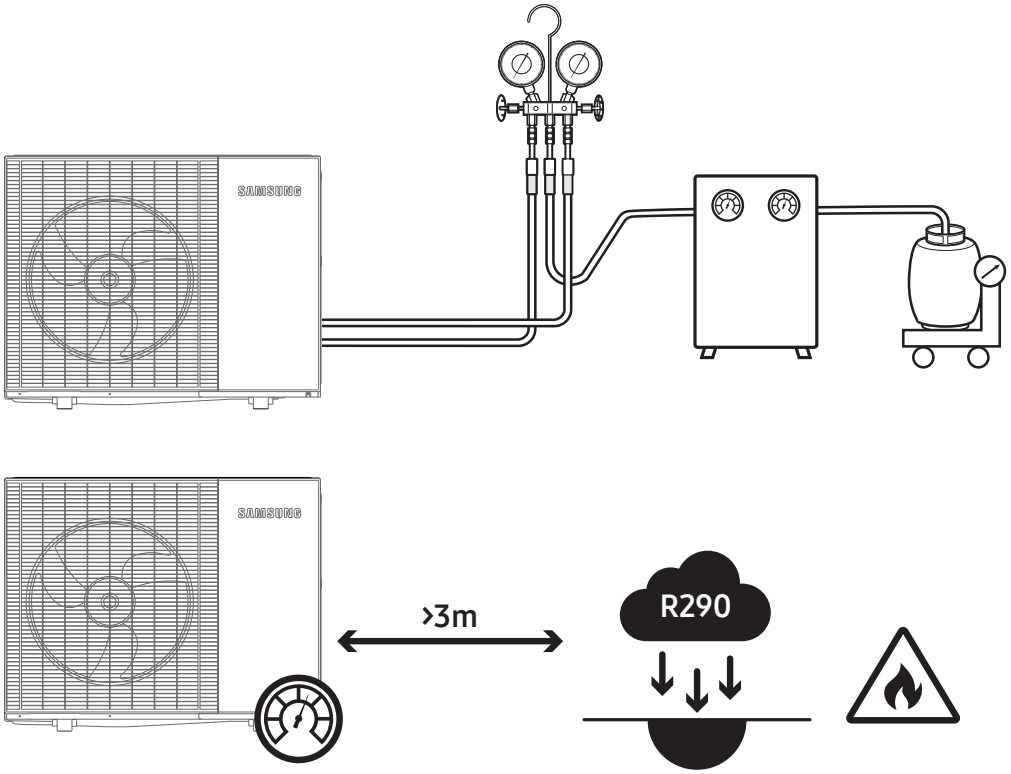
- Record and check the glycol concentration and the pH-value in the system at least once a year.
- A Ph-value below 8.0 indicates that a significant portion of the inhibitor has been depleted and that more inhibitor needs to be added.
- When the Ph-value is below 7.0 then oxidation of the glycol occurred, the system should be drained and flushed thoroughly before severe damage occurs.
- Make sure that the disposal of the glycol solution is done in accordance with relevant local and national regulation.

Refrigerant removal

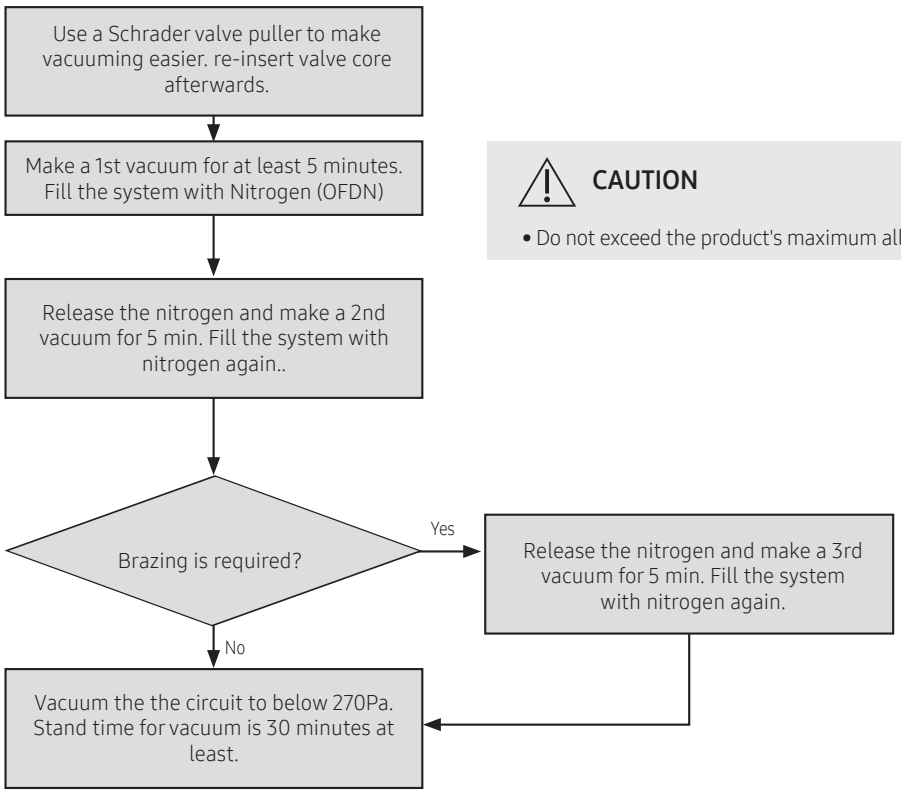


WARNNING

- Venting inside a building is not permissible under any circumstances.
- Venting must not be in a public area or where people are unaware of the procedure.
- The hose must be sufficient to extend to at least 3 m beyond the outside of the building.
- The venting should only occur on the certainty that the refrigerant will not get blown back into any adjacent buildings and will not migrate to a location below ground level.
- The hose is made of a material compatible with HC refrigerants and oil.
- A device is used to raise the hose discharge at least 1 m above ground level so that the discharge is pointed upwards (to assist with dilution).
- Ideally, there should be a rose on the end of the hose so that the vented refrigerant can discharge in different directions, with reasonably small outlet orifices (to assist dilution).
- Close to the inlet of the hose, an oil-separating device is fitted to present the emission of refrigeration oil so that it may be collected and disposed of properly following the venting procedure (a recovery cylinder may be used for this).
- There must be no sources of ignition near the hose discharge.
- A flammable gas warning sign must be positioned close to the hose discharge.
- The hose should be regularly checked to ensure that there are no holes or kinks in it, which could lead to leakage or blocking of the flow passage.



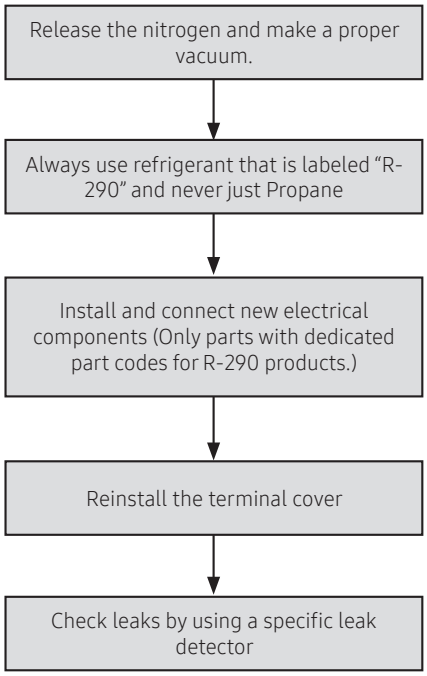
System evacuation



CAUTION

- Do not exceed the product's maximum allowable pressure (3.3 MPa)

Refrigerant charge



CAUTION

- Using the wrong refrigerant or contaminated refrigerant may damage the product.
  Use only R-290 refrigerant with a purity of 99.5% or higher.

NOTE

- Flash point: The temperature at which a mixture of vapor and air on the surface of a flammable liquid first ignites upon contact with a fire.
  - R-290 Flash point (°C): -104
  - Upper explosive limit % (V/V): 9.5
  - Lower explosive limit % (V/V): 2.1

11. Trouble shooting

SAMSUNG

11.1 Overview

Fault	Possible cause	Remedy
No water flow from hot taps	• Main water supply closed. • Strainer blocked. • Cold water inlet combination valve incorrectly fitted.	• Mains water supply open. • Clean strainer. • Fit the cold water inlet combination valve correctly.
Water from hot taps is cold.	• Immersion heater not switched on. • Immersion heater thermal cut-out has operated. • FSV set to space heating or not enabled. • Boiler not working • Diverter valve not operating correctly.	• Check and switch on. • Check and reset button. • Check and set to domestic hot water. • Check DHW operation. If fault suspected, consult installer or boiler manufacturer. • Check wiring and/or plumbing connections to diverter valve.
Intermittent water discharge	• Reduced internal expansion. • Thermal control failure. (Note water will be hot).	• Repressurize expansion vessel. Follow cold water discharge. • Switch off power to immersion heater(s) of the unit. When discharge has stopped, check thermal controls, replace if faulty.
Excessive hot water from taps	• Cylinder thermostat set to high • Faulty cylinder thermostat	• Adjust cylinder thermostat. • Replace faulty thermostat. • Check wiring on cylinder thermostat
The compressor does not start	• When the water inlet temperature is over 60 °C, the compressor does not work. (it is not an error) only the pump works, and if the water inlet temperature is below 60 °C, the compressor will work.	• If the water inlet temperature is below 60 °C, the compressor does not work: – Check if outdoor unit is thermo on – Check error details on the outdoor unit..
After commissioning the system makes a gurgling noise.	• There is air in the system.	• Purge air from the system by opening the automatic air vent.
	• Incorrect hydraulic balance.	1 Perform hydraulic balancing to assure that the flow is correctly distributed between the emitters. 2 If hydraulic balancing is not sufficient, change the pump limitation settings [FSV #4051 Setting], a design issue is present in the system.
	• Various malfunctions.	• Check the installation status or whether the system is working properly.

Fault	Possible cause	Remedy
The pump is blocked	• If the unit has been powered off for a long time, lime might block the rotor of the pump.	• When a locked rotor occurs for 3 seconds, a locked rotor fault is reported. • The pump stops working and the indicator(Both MAX & PWM LED) flashes 5 times. • Every 8 seconds, the pump tries to re-start. If the fault is not eliminated, after 5 failed attempts the pump will no longer re-start. • The indicator continues to flash. The pump requires a power reset. • If the fault continues, disassemble the pump and clean and free the locked rotor.
	• Flow error E911 is displayed	• The pump is blocked or there is not sufficient voltage towards the pump.
The pump is making noise (cavitation)	• There is air in the system	• Purge air from the system by opening the automatic air vent.
	• The water pressure at the pump inlet is too low	• Check and make sure that – The water pressure is >1 bar. – The water pressure sensor is not broken. – The expansion vessel is not broken. – The valve (if equipped) of the water circuit towards the expansion vessel is open. – The pre-pressure setting of the expansion vessel is correct. – The strainer is clean.
The pressure relief valve opens	• The expansion vessel is broken or sized too small for the total volume	• Replace the expansion vessel or add another after determining the needed expansion size.
	• The valve (if equipped) of the water circuit towards the expansion vessel is closed.	• Open the valve.
	• The water volume in the installation is too high	• Make sure that the water volume in the installation is below the maximum allowed value.
	• The water circuit head pressure is too high	• The pressure relief valve is 3 bar. Check the water circuit head pressure.
The water pressure relief valve leaks	• Dirt is blocking the water pressure relief valve outlet	• Check that the pressure relief valve is working properly by turning the valve on or off. • If the water keeps running out of the unit, close both the water inlet and outlet shut-off valves first and then if broken, replace it. The system must have a good working pressure relief valve for operating safely.

Fault	Possible cause	Remedy
The space is not sufficiently heated at low outdoor temperatures (heating complaint)	• The backup heater operation is not activated	• Check the following: – The backup heater overcurrent circuit breaker is on. If not, turn it back on. – The thermal protector of the backup heater is not activated. If it has,check the following, and then press the reset button in the switch box: • The water pressure • Whether there is air in the system • The air purge operation
	• The backup heater FSV Setting has not been configured correctly	• Check FSV Setting (#4021-#4025).
	• There is air in the system.	• Purge air from the system.
	• Too much heat pump capacity is used for heating domestic hot water	• Check if the Space heating priority settings have been configured appropriately: – Make sure that the Space heating priority has been enabled. [FSV Setting] – Increase the "space heating priority temperature" [FSV #4012 Setting]
The pressure at the tapping point is temporarily unusually high	• Failing or blocked pressure relief valve.	• Flush and clean the complete tank including the piping between pressure relief valve and the cold water inlet. • Replace the pressure relief valve.
Tank disinfection function is not completed correctly	• The disinfection function was interrupted by domestic hot water tapping	• Program the start-up of the disinfection function when no domestic hot water tapping is expected.
	• Large domestic hot water tapping happened recently before the programmed start-up of the disinfection function	• Adjust the operating time of the tank disinfection function or increase the maximum time. [FSV #3041-3046 Setting]
	• The disinfection operation was stopped manually.	• Do not stop tank operation during disinfection manually

NOTE

- Disconnect electrical supply before removing any electrical equipment covers.

11.2 Trouble shooting of error code

Display	Explanation	Error Source
E108	Setting Address Duplicate Error	OUTDOOR UNIT/ Hydro Unit
E120	Zone2 Indoor Room Temperature Sensor Short/Open	Hydro Unit
E121	Error of ROOM Temperature Sensor in Indoor unit short/open	Hydro Unit
E122	Error of Evaporator_in Sensor of Indoor unit short/open	Hydro Unit
E123	Error of Evaporator_out Sensor of Indoor unit short/open	Hydro Unit
E162	Outdoor UNIT EEPROM Error	OUTDOOR UNIT
E163	EEPROM OPTION SETTING Error	OUTDOOR UNIT
E177	In hydro box, take place emerency signal Error	Hydro Unit
E201	CONTROL KIT / Outdoor UNIT Communication Error (Matching Error)	OUTDOOR UNIT
E202	CONTROL KIT / Outdoor UNIT Communication Error	OUTDOOR UNIT
E205	Communication Error Between Outdoor Unit Inv Micom - Fan Motor Micom	OUTDOOR UNIT
E221	Outdoor Temperature Sensor Error (open/short)	OUTDOOR UNIT
E231	COND_OUT Main Temperature Sensor Error (open/short)	OUTDOOR UNIT
E241	COND OUT Sensor of Outdoor Unit breakaway Error	OUTDOOR UNIT
E251	Discharge Temperature Sensor Error (open/short)	OUTDOOR UNIT
E262	Discharge Sensor breakaway Error	OUTDOOR UNIT
E266	Comp Top Sensor breakaway Error	OUTDOOR UNIT
E269	SUCTION Sensor breakaway Error	OUTDOOR UNIT
E276	Compressor Top Temperature Sensor Error (open/short)	OUTDOOR UNIT
E291	High Pressure Sensor Error (open/short)	OUTDOOR UNIT
E296	Low Pressure Sensor Error (open/short)	OUTDOOR UNIT
E308	Suction Sensor Error (open/short)	OUTDOOR UNIT
E403	Protect for Freezing Control Error	OUTDOOR UNIT
E407	COMP down due to High PressureSensor Protection Control	OUTDOOR UNIT
E410	COMP down due to Low PressureSensor Protection Control	OUTDOOR UNIT
E416	Comp down due to discharge Temperature	OUTDOOR UNIT
E425	Outdoor Reverse Phase or Missing Phase Detect Error	OUTDOOR UNIT
E428	COMP down by Compression Ratio control Error	OUTDOOR UNIT
E436	Protect for Freezing Burst Control Error	OUTDOOR UNIT
E438	EVI EEV Opening Error	OUTDOOR UNIT
E439	Refrigerant Leakage Error (Detect when the system is not operated)	OUTDOOR UNIT
E440	Forbid Heat mode Operation when Outdoor Temperature is over 43 °C	OUTDOOR UNIT

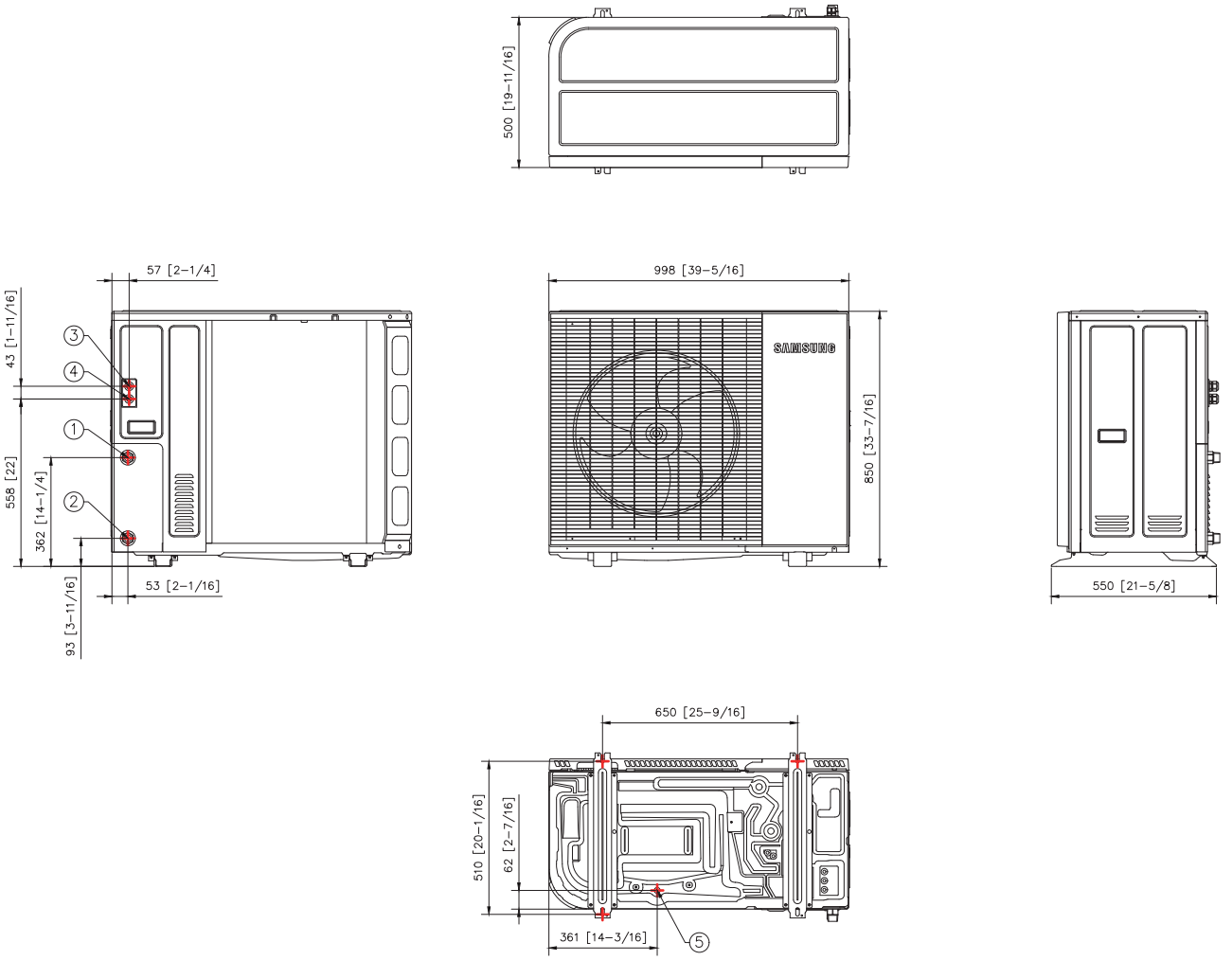
Display	Explanation	Error Source
E441	Forbid Cooling Mode when Outdoor Temperature is Low10 °C	OUTDOOR UNIT
E443	No startup due to Low pressure	OUTDOOR UNIT
E458	Outdoor unit Fan Error	OUTDOOR UNIT
E461	[Inverter] COMP Operating failure	OUTDOOR UNIT
E462	All currency control COMP Stop Or CT2 Low currency	OUTDOOR UNIT
E464	[Inverter] DC peak Error	OUTDOOR UNIT
E465	Compressor V limit Error	OUTDOOR UNIT
E466	[Inverter] DC-Link voltage under/over Error	OUTDOOR UNIT
E467	COMP Revolute Error	OUTDOOR UNIT
E468	[Inverter] Comp Current Sensor Error	OUTDOOR UNIT
E469	DC Link Sensor Error	OUTDOOR UNIT
E471	[Inverter] OTP Error → Outdoor unit EEPROM Read/Write Error (OTP error)	OUTDOOR UNIT
E474	[Inverter] IPM Heat Sink Error	OUTDOOR UNIT
E475	Outdoor unit BLDC Fan Error	OUTDOOR UNIT
E483	H/W DC_link over voltage Error	OUTDOOR UNIT
E484	PFC Overload Error	OUTDOOR UNIT
E485	[Inverter] Input Current Sensor Error (open/short)	OUTDOOR UNIT
E488	AC Input Voltage Sensor Error	OUTDOOR UNIT
E500	IPM Overheat Error for Inverter COMP	OUTDOOR UNIT
E507	Comp Down due to high pressure or High Pressure Switch Open	OUTDOOR UNIT
E536	PHE refrigerant leakage error	Outdoor unit
E554	Refrigerant leakage error (detection during system operation)	Outdoor unit
E563	INDOOR UNIT Mixed Install Error	OUTDOOR UNIT
E590	[Inverter] Data flash Error	OUTDOOR UNIT
E897	Water Tank in sensor error(Short/Open)	Indoor unit
E899	Zone1 Tw Temperature Sensor Short/Open	Hydro Unit
E900	Zone2 Tw Temperature Sensor Short/Open	Hydro Unit
E901	Water Inlet Sensor Error (open/short)	OUTDOOR UNIT
E902	Water Outlet Sensor Error (open/short)	OUTDOOR UNIT
E904	Water TANK Sensor SHORT / OPEN	Hydro Unit
E906	Outdoor EVA in Sensor Error (open/short)	OUTDOOR UNIT
E910	Water Temperature Sensor on water Outlet pipe is datached	Hydro Unit
E911	FLow Swtich Open Error	Hydro Unit
E912	FLow Swtich Close Error	Hydro Unit

Display	Explanation	Error Source
E914	Error due to Incorrect Themostat Connection	Hydro Unit
E916	Mixing Sensor Short/Open	Hydro Unit
E919	Disinfection Operation Incomplete Error	Hydro Unit
E973	Water pressure sensor research (Short/Open)	Outdoor unit

12.1 Outdoor unit main components

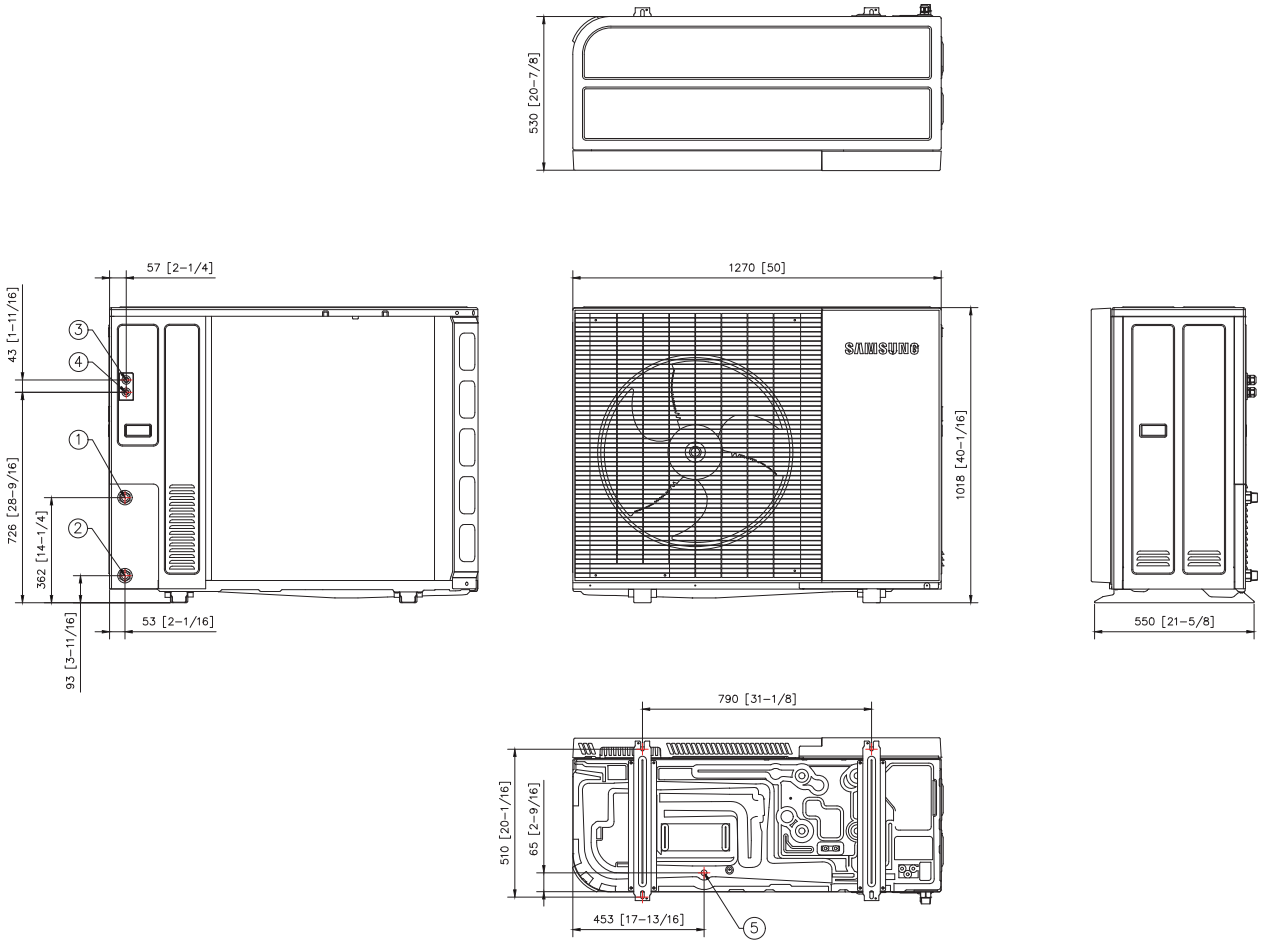
Dimensions

※ AE050CXYDEK, AE080CXYD*K



Ondoor unit	
Type	UBS-S
Net Weight (kg)	98
Shipping Weight (kg)	111
Net Dimensions (WxHxD) (mm)	998 x 850 x 500
Shipping Dimensions (WxHxD) (mm)	1,070 x 1,028 x 630

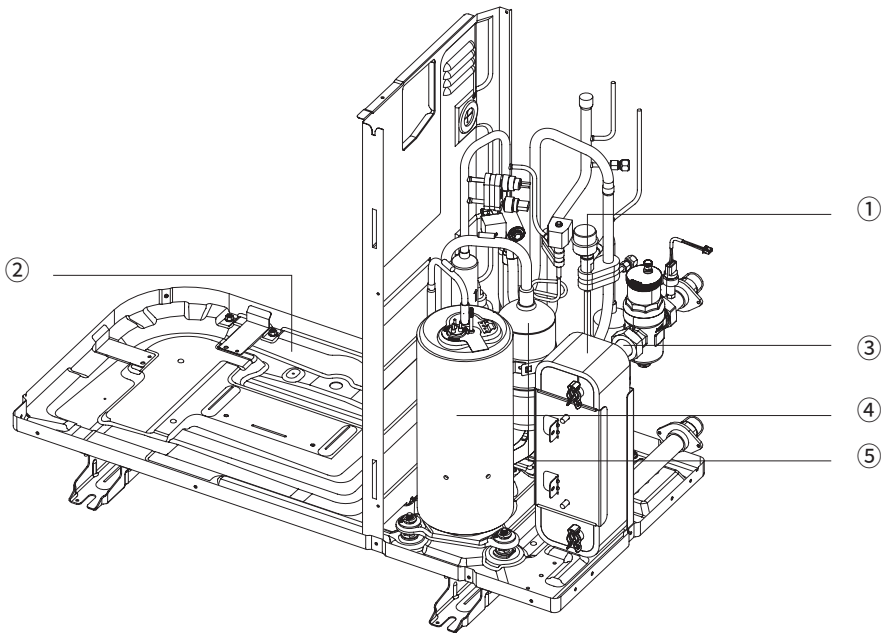
※ AR120CXYD*K, AE160CXYD*K



Ondoor unit	
Type	UBS
Net Weight (kg)	140
Shipping Weight (kg)	160
Net Dimensions (WxHxD) (mm)	1,270 x 1,018 x 530
Shipping Dimensions (WxHxD) (mm)	1,330 x 1,226 x 630

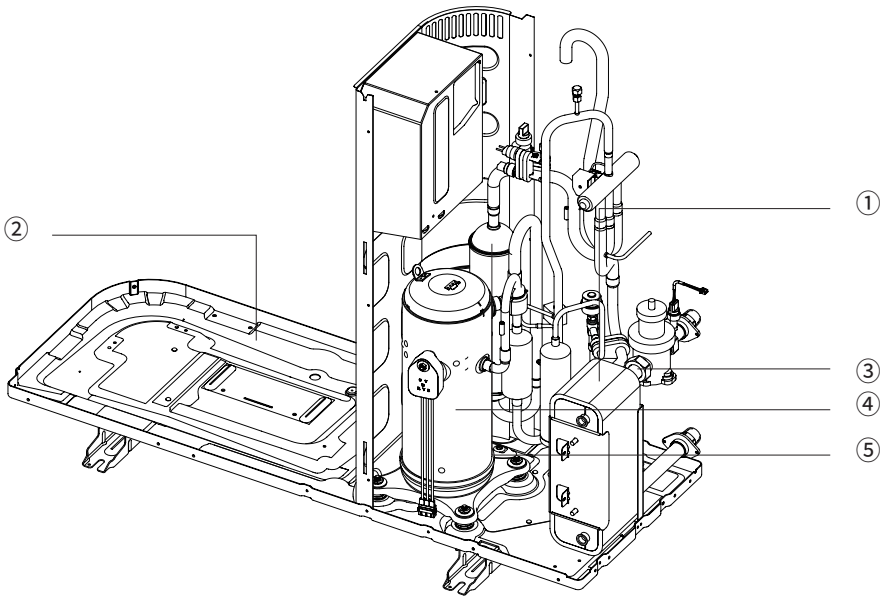
Component

※ AE050CXYDEK, AE080CXYD*K



No.	Name	Description
①	PHE	Danfoss, B3-030 series
②	Base heater	SUS316L, 150W
③	Water fitting	BSPP1"Male
④	Compressor	Scroll type
⑤	Accumulator	-

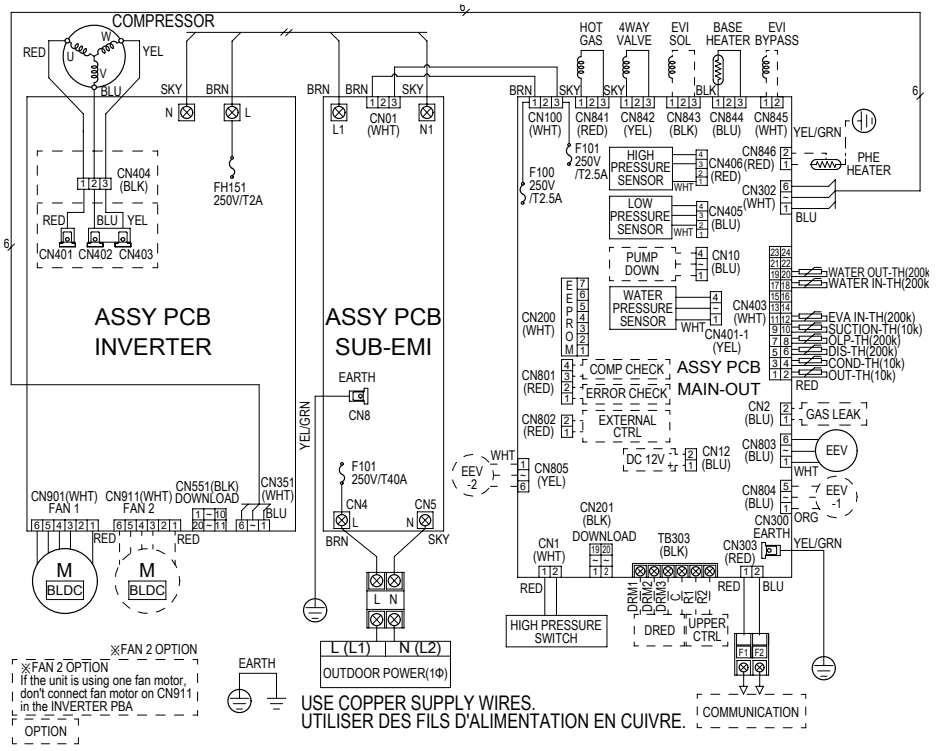
※ AR120CXYD*K, AE160CXYD*K



No.	Name	Description
①	PHE	Danfoss, B3-030 series
②	Base heater	SUS316L, 150W
③	Water fitting	BSPP 1"Male
④	Compressor	Scroll type
⑤	Accumulator	-

Electrical wiring diagram outdoor unit

- AE050CXYDEK, AE080CXYDEK, AE120CXYDEK, AE160CXYDEK



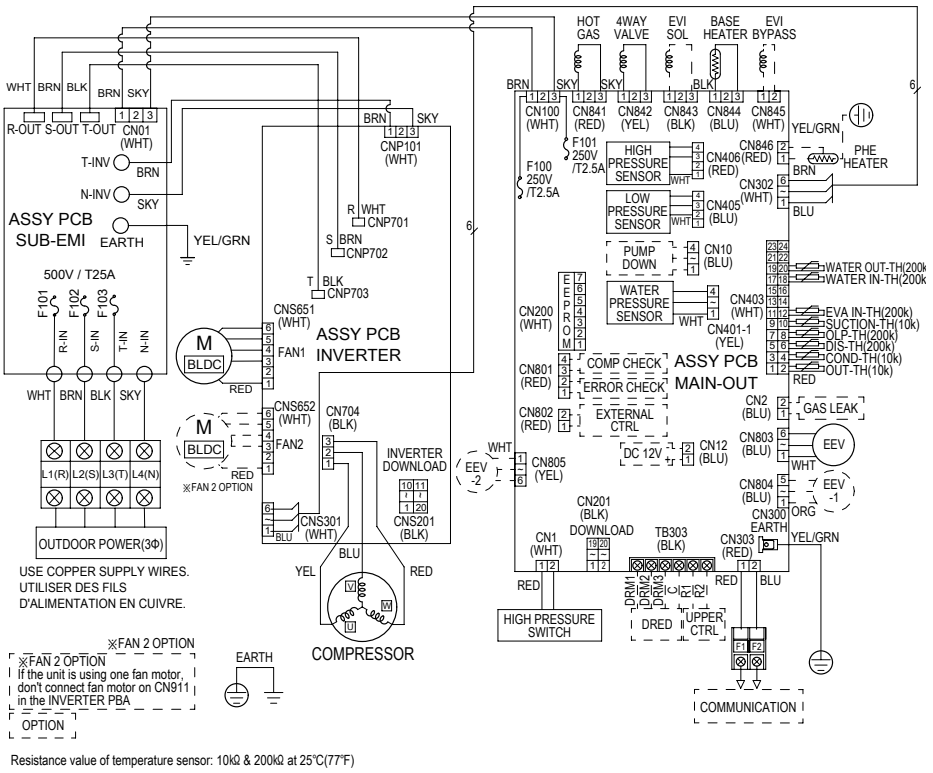
ASSY PCB MAIN-OUT	Printed circuit board(MAIN)
ASSY PCB INVER	Printed circuit board(INVERTER)
ASSY PCB SUB-EMI	Printed circuit board(EMI)
OUT-TH(10k)	Thermistor (OUT_10Kohm)
COND-TH(10k)	Thermistor (COND_10Kohm)
DIS-TH(200k)	Thermistor (DISCHARGE_200Kohm)
OLP-TH(200k)	Thermistor (OLP_200Kohm)
SUCTION-TH(10k)	Thermistor (SUCTION_10kKohm)
EVA IN-TH(200k)	Thermistor (EVA IN_200Kohm)
WATER IN-TH(200k)	Thermistor (WATER IN_200Kohm)

WATER OUT-TH(200k)	Thermistor (WATER OUT_200Kohm)
HOT GAS	Solenoid Valve - Hot Gas bypass
4WAY VALVE	Solenoid Valve - 4Way
EVI SOL	Solenoid Valve - EVI
EVI BYPASS	Solenoid Valve - EVI Bypass
M-BLDC	Motor for Outdoor Fan
EEV	Electronic Expansion Valve
EXTERNAL CTRL	External Control
UPPER CTRL	Upper Control

NOTE

- Symbols show as follow :
  BLK: black, RED: red, BLU: blue, WHT: white, yel: yellow, BRN: brown, SKY: skyblue, GRN: green
- Wiring indoor-outdoor communication F1-F2
- ⏚ Protective earth (SCREW)

- AE080CXYDGK, AE120CXYDGK, AE160CXYDGK



Resistance value of temperature sensor: 10kΩ & 200kΩ at 25℃(77℉)

ASSY PCB MAIN-OUT	Printed circuit board(MAIN)
ASSY PCB INVER	Printed circuit board(INVERTER)
ASSY PCB SUB-EMI	Printed circuit board(EMI)
OUT-TH(10k)	Thermistor (OUT_10Kohm)
COND-TH(10k)	Thermistor (COND_10Kohm)
DIS-TH(200k)	Thermistor (DISCHARGE_200Kohm)
OLP-TH(200k)	Thermistor (OLP_200Kohm)
SUCTION-TH(10k)	Thermistor (SUCTION_10kKohm)
EVA IN-TH(200k)	Thermistor (EVA IN_200Kohm)
WATER IN-TH(200k)	Thermistor (WATER IN_200Kohm)

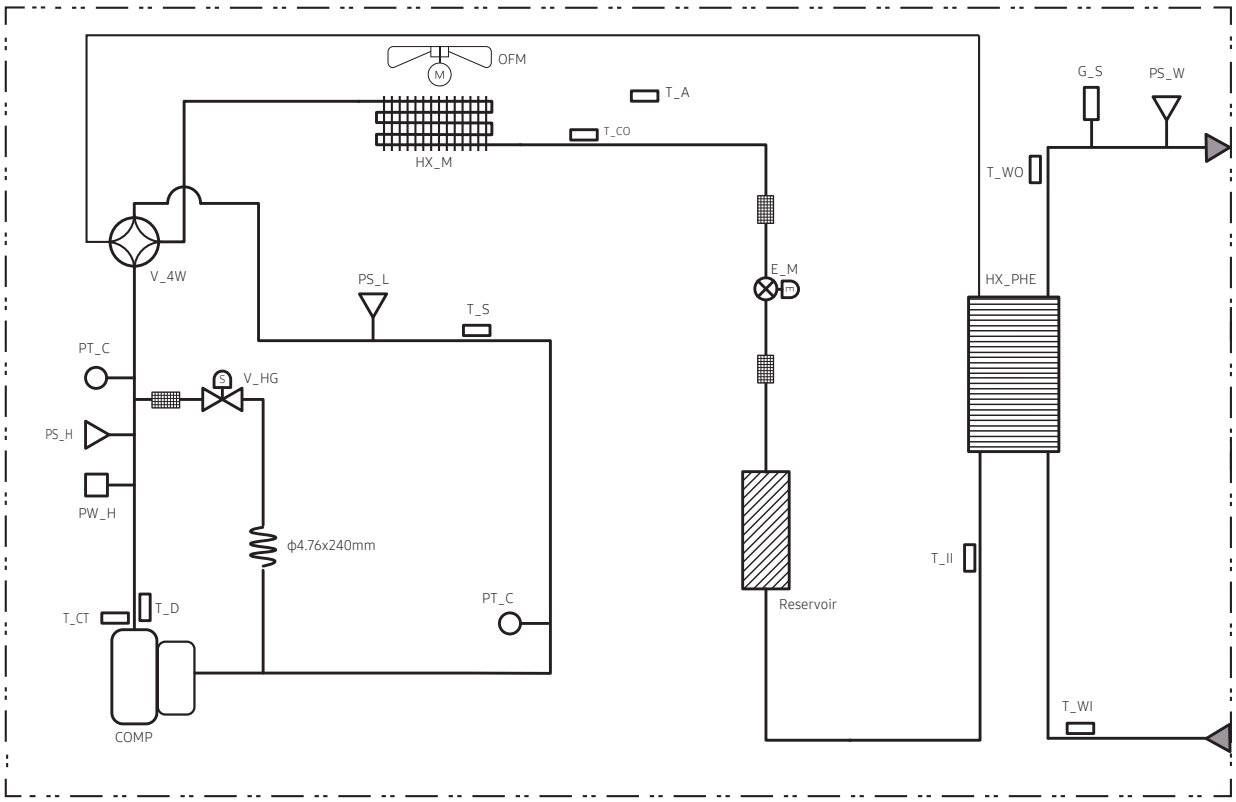
WATER OUT-TH(200k)	Thermistor (WATER OUT_200Kohm)
HOT GAS	Solenoid Valve - Hot Gas bypass
4WAY VALVE	Solenoid Valve - 4Way
EVI SOL	Solenoid Valve - EVI
EVI BYPASS	Solenoid Valve - EVI Bypass
M-BLDC	Motor for Outdoor Fan
EEV	Electronic Expansion Valve
EXTERNAL CTRL	External Control
UPPER CTRL	Upper Control

NOTE

- Symbols show as follow :
  BLK: black, RED: red, BLU: blue, WHT: white, yel: yellow, BRN: brown, SKY: skyblue, GRN: green
- Wiring indoor-outdoor communication F1-F2
- ⏚ Protective earth (SCREW)

Refrigerant circuit diagram outdoor unit

- AE050/080CXD*K

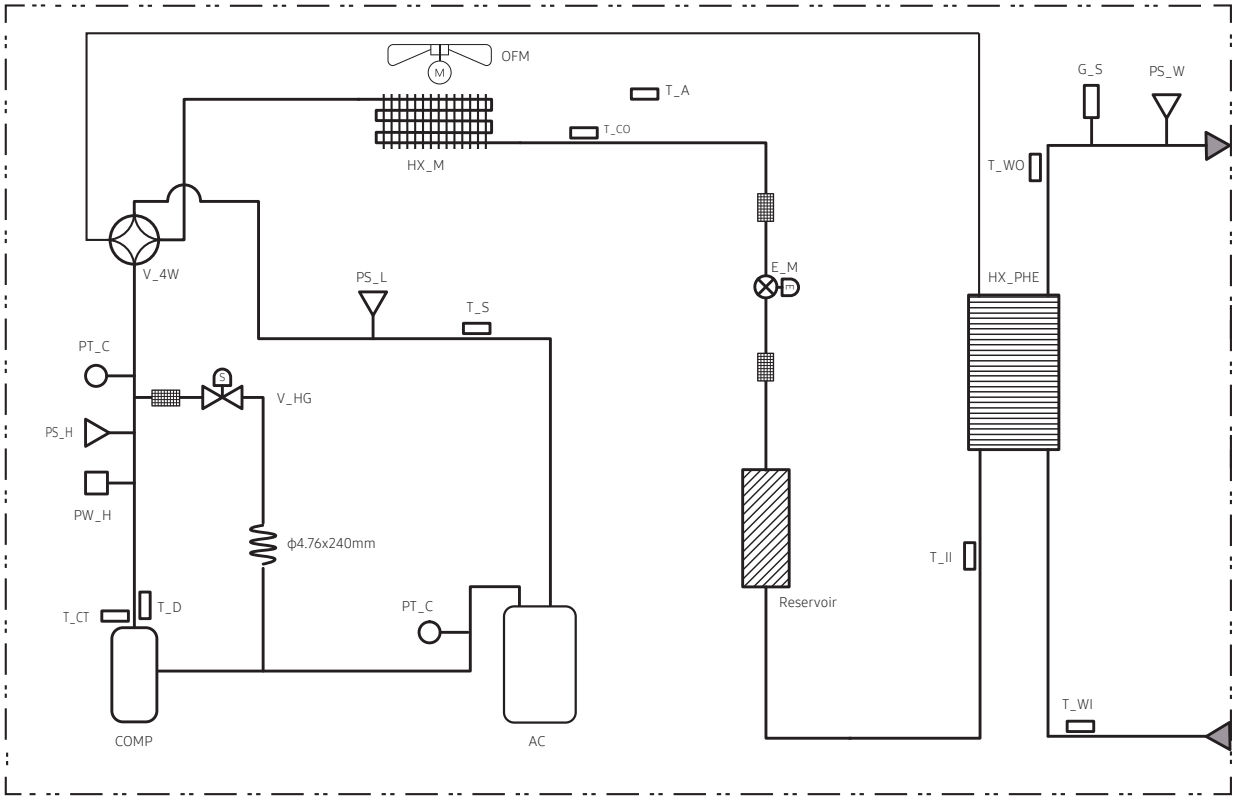


Part	Description
CV	Check Valve
COMP	Compressor
HX_IC	Heat Exchanger - Intercooler
HX_M	Heat Exchanger - Main (Outdoor unit)
HX_PHE	Heat Exchanger - PHE
IPMC	IPM Cooler
OFM	Outdoor Fan Motor
AC	Accumulator
PS_H	Pressure Sensor - High
PS_L	Pressure Sensor - Low
PW_H1	Pressure Switch - High 1
PW_H2	Pressure Switch - High 2
E_EV	Electronic Expansion Valve - EVI
E_M	Electronic Expansion Valve - Main
E_S	Electronic Expansion Valve - Shut off

Part	Description
PT_C	Service Port - Charging
V_4W	Solenoid valve - 4 Way
V_EB	Solenoid valve - EVI Bypass
V_HG	Solenoid valve - Hot Gas Bypass
T_LB	Solenoid valve - Liquid Bypass
T_A	Thermistor - Ambient
T_CO	Thermistor - Cond Out
T_CT	Thermistor - Compressor Top
T_D	Thermistor - Discharge pipe
T_EI	Thermistor - EVI In
T_EO	Thermistor - EVI Out
T_II	Thermistor - Heat Exchanger In
T_S	Thermistor - Suction pipe
T_WI	Thermistor - Water In
T_WO	Thermistor - Water Out

Refrigerant circuit diagram outdoor unit

- AE120/160CXD*K



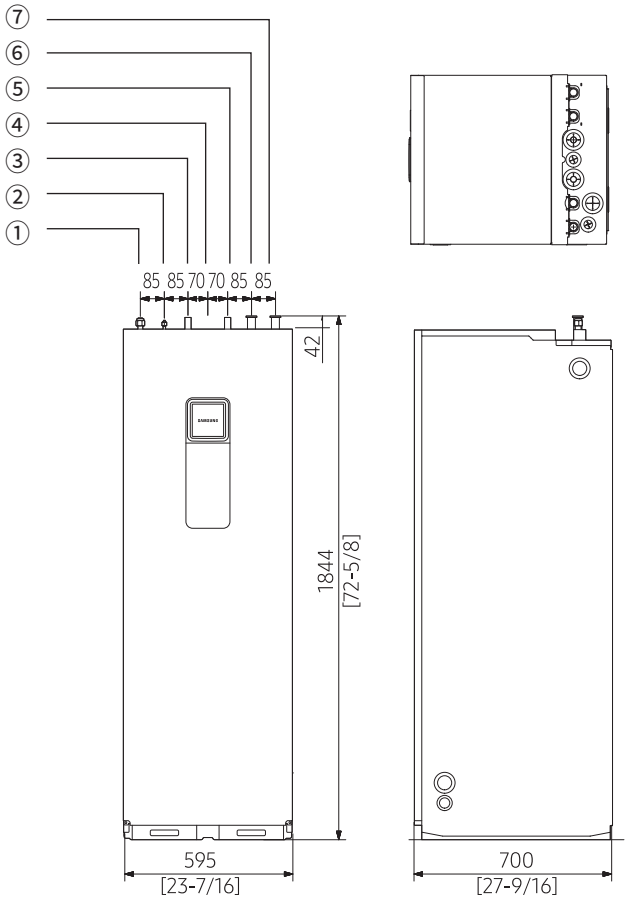
Part	Description
CV	Check Valve
COMP	Compressor
HX_IC	Heat Exchanger - Intercooler
HX_M	Heat Exchanger - Main (Outdoor unit)
HX_PHE	Heat Exchanger - PHE
IPMC	IPM Cooler
OFM	Outdoor Fan Motor
AC	Accumulator
PS_H	Pressure Sensor - High
PS_L	Pressure Sensor - Low
PW_H1	Pressure Switch - High 1
PW_H2	Pressure Switch - High 2
E_EV	Electronic Expansion Valve - EVI
E_M	Electronic Expansion Valve - Main
E_S	Electronic Expansion Valve - Shut off

Part	Description
PT_C	Service Port - Charging
V_4W	Solenoid valve - 4 Way
V_EB	Solenoid valve - EVI Bypass
V_HG	Solenoid valve - Hot Gas Bypass
T_LB	Solenoid valve - Liquid Bypass
T_A	Thermistor - Ambient
T_CO	Thermistor - Cond Out
T_CT	Thermistor - Compressor Top
T_D	Thermistor - Discharge pipe
T_EI	Thermistor - EVI In
T_EO	Thermistor - EVI Out
T_II	Thermistor - Heat Exchanger In
T_S	Thermistor - Suction pipe
T_WI	Thermistor - Water In
T_WO	Thermistor - Water Out

12.2 Indoor unit main components

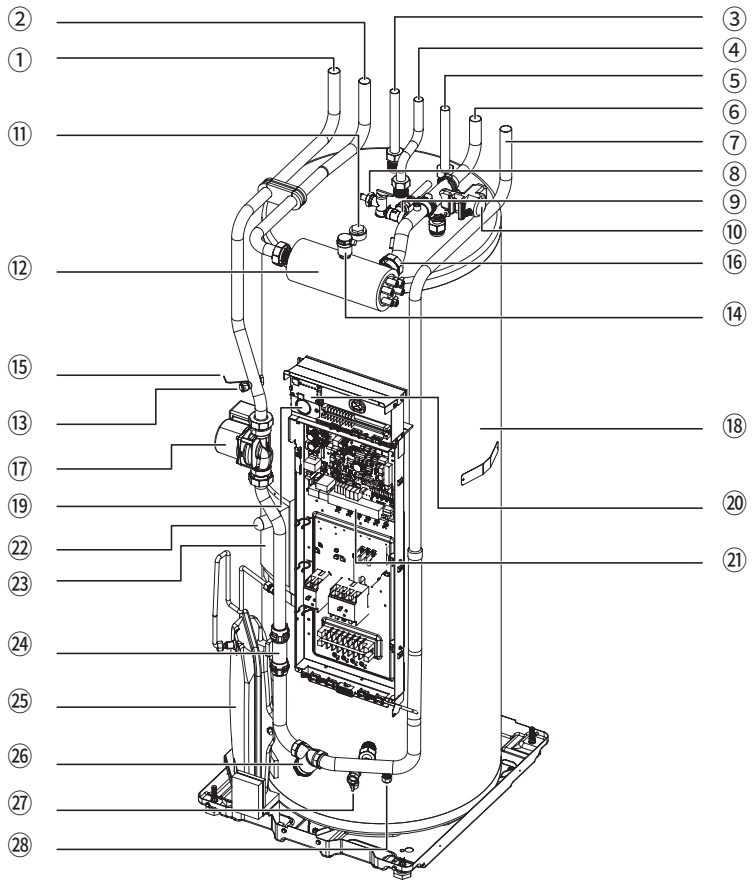
Dimensions

- Tank integrated hydro unit



No.	Part	Description
①	Mono outdoor outlet	Ø28, T1.2
②	Mono outdoor inlet	Ø28, T1.2
③	Hot water outlet	Ø22, T1.0
④	Secondary return (260L option)	Ø22, T1.0
⑤	Cold water inlet	Ø22, T1.0
⑥	Space heating outlet	Ø28, T1.2
⑦	Space heating inlet	Ø28, T1.2

Component

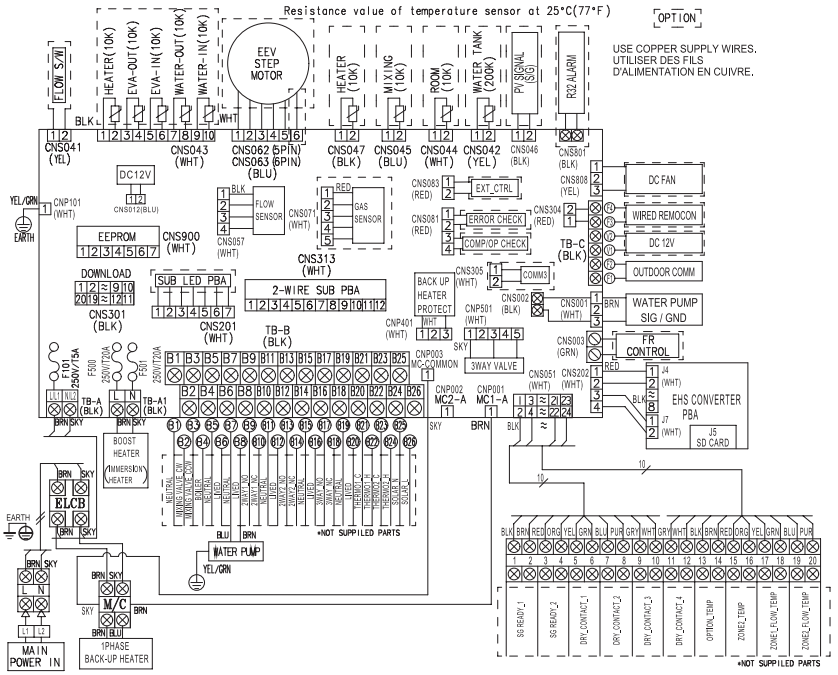


No.	Part	Description
①	Water pipe (Return to heat pump)	ø28, Straight pipe
②	Water pipe (Flow from heat pump)	ø28, Straight pipe
③	Hot water outlet	ø22, Straight pipe
④	Secondary return	ø22, Straight pipe (260 L option)
⑤	Cold water inlet	ø22, Straight pipe
⑥	Space heating outlet	ø28, Straight pipe
⑦	Space heating inlet	ø28, Straight pipe
⑧	T/P valve	7 bar, 90°C
⑨	Pressure relief valve	3 bar, BSPP 1/2"
⑩	3WAY VALVE	
⑪	Anode bar	BSPP 1”
⑫	Backup heater	
⑬	Drain port	
⑭	Air vent	BSPP 3/8”

No.	Part	Description
⑮	Tank thermistor	
⑯	Heater thermistor	
⑰	Water pump	
⑱	Water tank	200 L / 260 L
⑲	Manometer	0~4 bar
⑳	S/D converter	
㉑	Control box	
㉒	Booster heater	3kW
㉓	Booster heater thermostat	
㉔	Flow sensor	
㉕	Expansion vessel	8 L, Pre-charge gas: 0.1 MPa, N2, BSPP 3/8”
㉖	Strainer	
㉗	Tank drain valve	
㉘	Drain port	Primary circuit

Electrical wiring diagram indoor unit

- AE200/260CNWMEG/EU



※ It does not support external input(CNS083)/output(CNS081) signal function

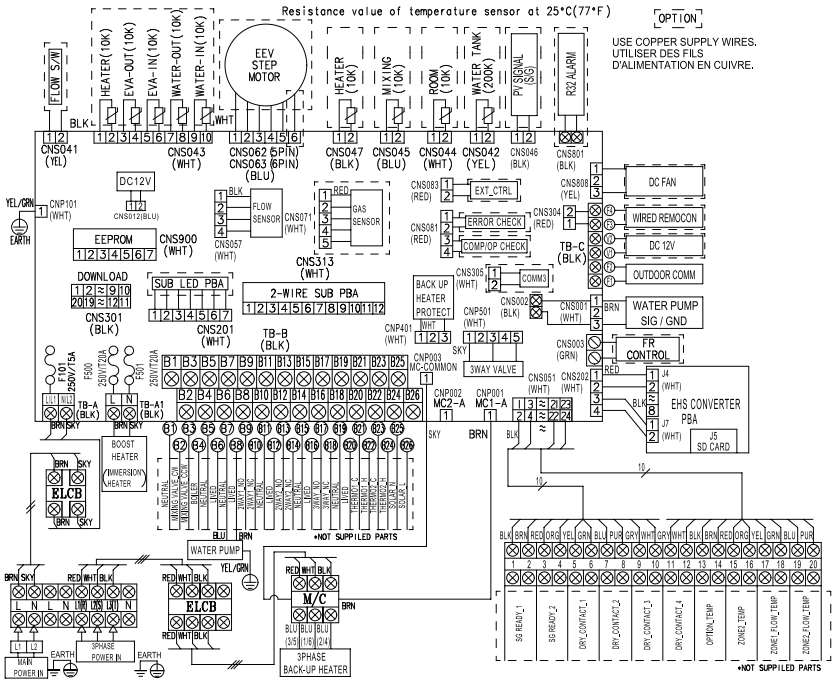
HEATER	Thermistor HEATER(10K)
EVA-OUT	Thermistor EVA-OUT(10K)
EVA-IN	Thermistor EVA-IN(10K)
WATER-OUT	Thermistor WATER-OUT(10K)
WATER-IN	Thermistor WATER-IN(10K)
MIXING	Thermistor MIXING VALVE(10K)

OUTDOOR COMM	Outdoor Communication
ELCB	Earth Leakage Circuit Breaker
WATER TANK	Thermistor WATER TANK(200K)
WIRED REMOCON	Wired Remote Controller
SIG/GND	Signal/Ground
M/C	Magnetic Contactor

NOTE

- Symbols show as follow :
  BLK: black, RED: red, BLU: blue, WHT: white, yel: yellow, BRN: brown, SKY: skyblue, GRN: green
- Wiring indoor-outdoor communication F1-F2, indoor-wired remote controller communication F3-F4.
- ⏚ Protective earth (SCREW)

- AE200/260CNWMGG/EU



※ It does not support external input(CNS083)/output(CNS081) signal function

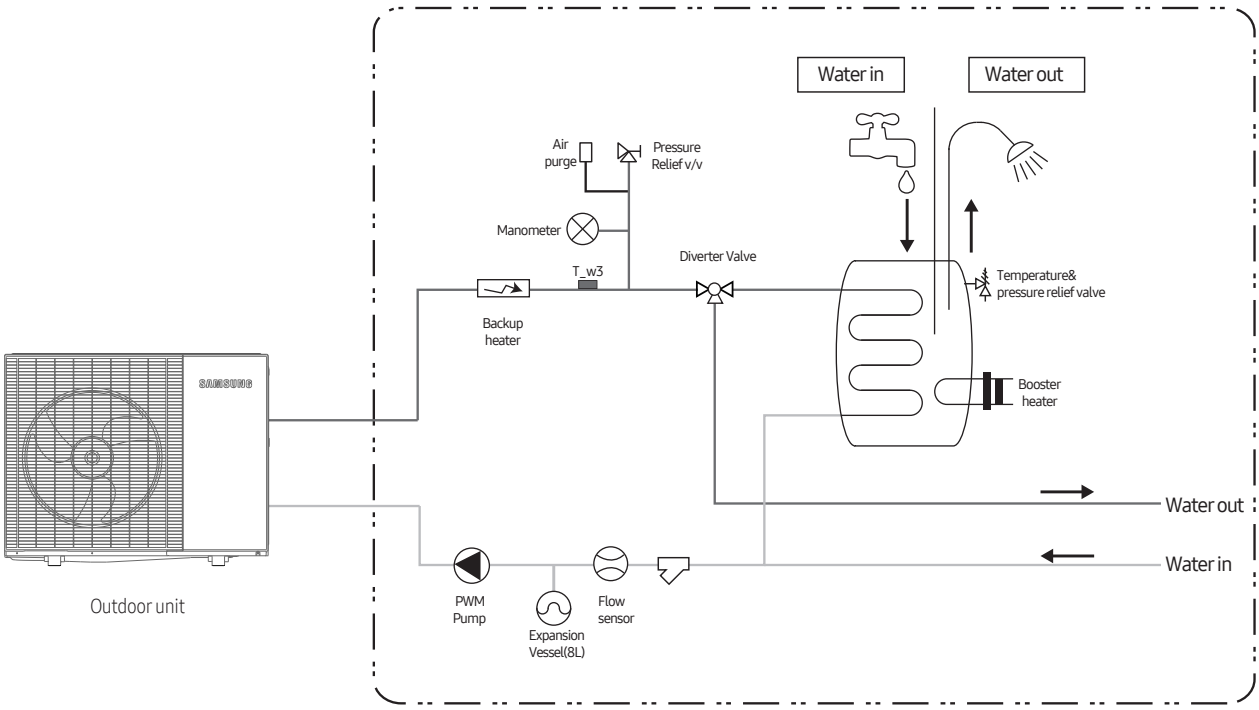
HEATER	Thermistor HEATER(10K)
EVA-OUT	Thermistor EVA-OUT(10K)
EVA-IN	Thermistor EVA-IN(10K)
WATER-OUT	Thermistor WATER-OUT(10K)
WATER-IN	Thermistor WATER-IN(10K)
MIXING	Thermistor MIXING VALVE(10K)

OUTDOOR COMM	Outdoor Communication
ELCB	Earth Leakage Circuit Breaker
WATER TANK	Thermistor WATER TANK(200K)
WIRED REMOCON	Wired Remote Controller
SIG/GND	Signal/Ground
M/C	Magnetic Contactor

NOTE

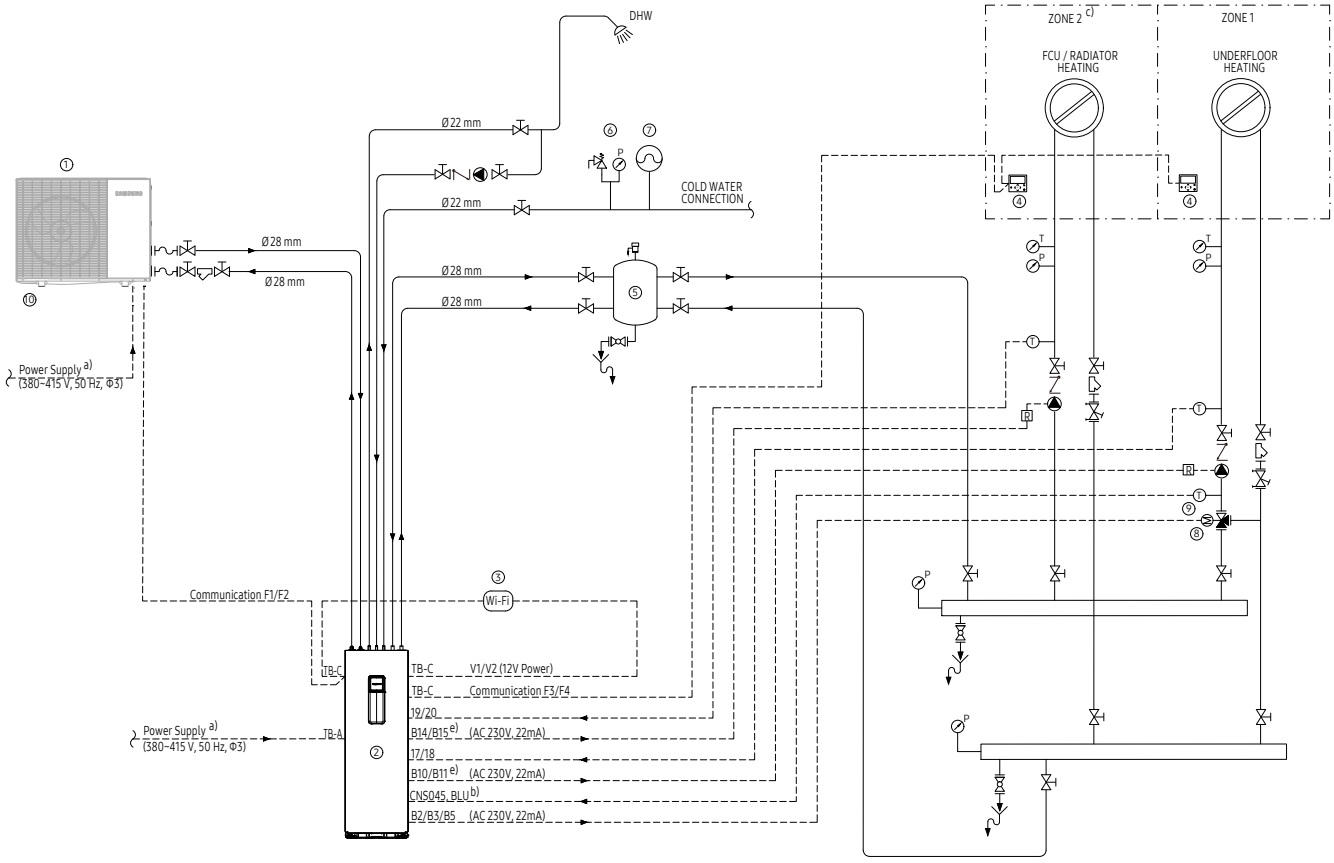
- Symbols show as follow :
  BLK: black, RED: red, BLU: blue, WHT: white, yel: yellow, BRN: brown, SKY: skyblue, GRN: green
- For indoor-outdoor communication F1-F2, indoor-wired remote controller communication F3-F4.
- ⏚ Protective earth (SCREW)

Water primary circuit diagram



Tank integrated hydro unit

12.3 Piping & Wiring diagram



a) Samsung EHS ClimateHub Mono is available in 1-phase and 3-phase version.

b) Mixing valve temperature sensor for floor heating comes with tank integrated hydro unit (15 m red cable, blue connector on PBA).

c) When both zones are simultaneously Thermo On, the operation is performed based on Zone 2. Set the zone with the higher set temperature to Zone 2.

d) Air vent included in tank integrated hydro unit. In case that the water piping would be located in a higher position than the air vent of the tank integrated hydro unit, it is necessary to add additional one at the highest position of water circuit.

e) Pumps for radiator and floor heating can be regulated (on/off) by tank integrated hydro unit (terminals B10/B11 and B14/B15) or their own regulators.

f) 200 L tank integrated hydro unit has six connection pipes (water inlet/outlet, space heating inlet/outlet and DHW inlet/outlet) while 260 L model has additional pipe for DHW circulation.

No.	Legend
①	Samsung EHS ClimateHub outdoor unit
②	Samsung Mono Tank Integrated Hydro unit f)
③	Samsung Wi-Fi Module
④	Samsung Wired Remote Controller (MWR-WW10N)
⑤	Balancing vessel (Decoupler)
⑥	Safety group (Safety valve, Manometer)

No.	Legend
⑦	Expansion vessel
⑧	3way mixing valve for floor heating (in case of combination with radiators)
⑨	Mixing valve temperature sensor b)
⑩	Vibro-isolating mounting bases

Symbols	
	Circulation pump
	Shut off valve
	Ball valve
	Check valve
	Strainer

Symbols	
T	Temperature gauge
P	Pressure gauge
	Safety valve
	3way mixing valve
	Regulation valve

Symbols	
T	Temperature sensor
	Air vent (apply when necessary) d)
R	Relay

NOTE

Shielded (LiYCY type) cable 0.75 - 1.5 mm 2core cable rated for 240V to be utilized for communication wiring (shielded / screen to the earthed at outdoor unit only).

Ensure that the required minimum water volume for the system is met.
A low-loss header or buffer tank should be suitably sized to comply with the above.

To ensure the minimum flowrates are maintained at all times, even whilst there is no heating demand, a low loss header, buffer tank or automatic bypass valve(s) must be fitted into the circuit.

It is advised to mount the unit on rubber feet to reduce the noise and vibration.

This schematic must be used in conjunction with supporting technical documents issued by Samsung

A backup heater should always be installed to secure the minimum water leaving temperature at 20°C or above for reliable heating and compressor operation.

In areas with a moderate climate (long part load operation time), it is needed to secure a minimum active water volume that allows for a minimum operation time of 12 minutes in order to prevent from short cycling.

QUESTIONS OR COMMENTS?

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