

Air to Water Heat Pump Installation manual

AE*HCTP*S**

- Thank you for purchasing this Samsung Product.
- Before operating this unit, please read this manual carefully and retain it for future reference.

SAMSUNG

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***Correct Disposal of This Product
(Waste Electrical & Electronic Equipment)***

(Applicable in countries with separate collection systems)

This marking on the product, accessories or literature indicates that the product and its electronic accessories (e.g. charger, headset, USB cable) should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

For information on Samsung's environmental commitments and product regulatory obligations, e.g. REACH, visit our sustainability page available via www.samsung.com

※ Please refer to the reference guide for details.

Safety Information

General

- All materials supplied in this manual are indispensable for the safety of the equipment.
Users shall establish appropriate safety and health practices and determine the applicability of regulatory limitations based on the following descriptions before use.
- 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 parts (hydro unit and air to air units).
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, hydraulic lines and refrigerant pipework. 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 (A2A : Heat -25~24 °C, A2W : Heat -25~43 °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 packing material and exhausted 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.
- 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.
- 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.

Symbol	Meaning
	WARNING: Low burning velocity material (This appliance is filled with R-32.)
	Refer to operating manual
	Read operating manual
	Read installation and service manual

Installing the unit



NOTE

- When installing the unit, remember to firstly connect the refrigerant pipework, then the electrical lines. Always disassemble the electric lines before the refrigerant pipework.
- 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. 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)

- Installation of an air to water heat pump without working backup heater can lead to compressor damages and can not be covered under warranty.
- The installer must proof conformity of the installation via adhering to the official commissioning protocol and providing the commissioning evidence upon request of Samsung.
- 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 pipings.

WARNING

- Use only suitable and clean service equipment such as the manifold gauge, vacuum pump and charging. Make sure that any pump and leakage detection device must be suitable for safely working. 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-32, water, etc.) enter the refrigerant circuit.
- Outdoor products should be installed outdoors with natural ventilation.
- For disposal of the product, follow the local laws and regulations. (Please refer to the reference guide for details.)
- 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 dry-powder type) should be located nearby and conveniently located.
 - The work area should be appropriately ventilated before working on the refrigerant circuit, brazing, or handling electrics.
- Note that the refrigerant has no odour.
- The units are not explosion proof so they must be installed with no risk of explosion.

- 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.
- 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.

Caution of Ignition sources

- Appropriate fire extinguishing equipment should always be available during any type of hot work.
- A dry powder or CO₂ 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 fire 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.

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.
- The leakage detector shall be set to the LFL (lower flammability limit).
- 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 shall be removed.
- 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.
- The evacuation process shall be performed before sending the compressor to the suppliers.
- Only the electrical heating to the compressor body is allowed to accelerate the process.

- Oil shall be drained safely from the system.
- Never install a motor-driven equipment to prevent ignition.
- Empty recovery cylinders shall be evacuated and cooled before recovery.

Installation location requirement of outdoor unit

- The outdoor 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: (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. In the European Union and UK, the field engineer must be F-GAS certified and adhere to the F-GAS regulations.
- Do not install the indoor unit if it has any drainage problem. Poor drainage can lead to excessive ice build-up during low ambient conditions and may cause disturbances in operation and failure of the product.

R-32 system arrangement requirements

Installing the outdoor unit

Make sure to install the outdoor unit outdoors. If the outdoor unit is installed indoors, additional measures may be required to comply with relevant regulations. A terminal for external output is available in the outdoor unit. This terminal can be used when additional measures should be taken. An external output signal occurs if the R-32 sensor in the indoor unit detects a refrigerant leak, or the sensor has a malfunction or short circuit. Based on this signal, safety measures required for the outdoor unit, such as ventilation system activation and alarm activation, can be taken.

Installing the indoor unit

For details on indoor unit installation, refer to the installation and user manual that came with the indoor unit. Outdoor units for the EHS R-32 All-in-one model are compatible with R-32-sensor-embedded indoor units only. See table 1 on the following page for minimum required (indoor installation) room area, depending on the amount of refrigerant charging of the outdoor unit. The minimum installation area must be satisfied. The indoor unit provides an additional output signal for external devices. This output signal occurs if the R-32 sensor in the indoor unit detects a refrigerant leak, or the R-32 sensor has a malfunction or short circuit. Based on this signal, an additional ventilation system or alarm can be activated. For details on this option, refer to the indoor unit installation manual.

Deciding on the required Safety Measures for indoor unit

► Step 1: Determine the system's total refrigerant charge.

The total refrigerant charge of the system is determined by the sum of the refrigerant charged in the outdoor unit and the additional refrigerant required based on the piping length and indoor unit combination.

► Step 2: Determine the smallest area of the room the indoor units are installed in.

It includes the room where the indoor unit is directly installed and the room served by the ducted indoor unit.

Calculate the area of the room with walls, doors, and partitions excluded.

Spaces connected by false ceilings, ducts, or similar connections are not considered a single space.

► Step 3: Referring to the refrigerant charge and room area determined at Steps 1 and 2, use the tables below to decide the necessary safety measures.

<Table 1>

m(kg)	Minimum required room area (A, m ²)													
	No underground floor Installation Height (m)							Underground Floor Installation Height (m)						
	1.8	2.2	2.5	3	3.5	4	4.5	1.8	2.2	2.5	3	3.5	4	4.5
≤1.842	No requirement							No requirement						
2.2	4.3	4.3	3.8	3.2	2.7	1.8	1.6	5.3	4.3	3.8	3.2	2.7	2.4	2.1
2.4	4.7	4.7	4.2	3.5	3.0	2.0	1.8	5.8	4.7	4.2	3.5	3.0	2.6	2.3
2.6	5.1	5.1	4.5	3.8	3.2	2.2	1.9	6.4	5.1	4.5	3.8	3.2	2.8	2.5
2.8	5.5	5.5	4.9	4.1	3.5	2.3	2.1	7.4	5.5	4.9	4.1	3.5	3.0	2.7
3.0	5.9	5.9	5.2	4.3	3.7	2.5	2.2	8.5	5.9	5.2	4.3	3.7	3.3	2.9
3.2	6.3	6.3	5.6	4.6	4.0	2.7	2.4	9.5	6.5	5.6	4.6	4.0	3.5	3.1
3.4	6.7	6.7	5.9	4.8	4.1	2.8	2.5	10.1	7.3	5.9	4.9	4.2	3.7	3.3
3.6	7.1	6.9	6.1	5.0	4.2	3.0	2.7	10.7	8.2	6.4	5.2	4.5	3.9	3.5
3.8	7.3	7.2	6.3	5.1	4.3	3.2	2.8	11.3	9.1	7.1	5.5	4.7	4.1	3.7
4.0	7.6	7.4	6.5	5.3	4.4	3.3	3.0	11.8	10.1	7.8	5.8	5.0	4.3	3.9
4.2	7.8	7.6	6.6	5.4	4.5	3.5	3.1	12.4	11.2	8.6	6.0	5.2	4.6	4.1
4.4	8.0	7.8	6.8	5.6	4.6	3.7	3.3	13.0	12.3	9.5	6.6	5.5	4.8	4.2
4.6	8.1	7.9	7.0	5.7	4.8	3.8	3.4	13.6	13.4	10.4	7.2	5.7	5.0	4.4
4.8	8.3	8.1	7.1	5.9	4.9	4.0	3.6	14.2	14.2	11.3	7.8	6.0	5.2	4.6
5.0	8.4	8.2	7.3	6.1	5.1	4.2	3.7	14.8	14.8	12.3	8.5	6.3	5.4	4.8
5.2	8.5	8.3	7.5	6.2	5.3	4.3	3.9	15.4	15.4	13.6	9.2	6.8	5.6	5.0
5.4	8.7	8.4	7.6	6.4	5.4	4.5	4.0	16.0	16.0	14.1	9.9	7.3	5.9	5.2
5.6	8.8	8.6	7.8	6.6	5.6	4.7	4.1	16.6	16.6	14.6	10.7	7.8	6.1	5.4
5.8	8.9	8.7	7.9	6.7	5.7	4.8	4.3	17.2	17.2	15.1	11.5	8.4	6.4	5.6
6.0	9.0	8.8	8.1	6.9	5.9	5.0	4.4	17.8	17.8	15.6	12.3	9.0	6.9	5.8
6.2	9.2	9.0	8.4	7.1	6.0	5.2	4.6	18.4	18.4	16.2	13.1	9.6	7.4	6.0
6.4	9.3	9.1	8.7	7.3	6.2	5.3	4.7	19.0	19.0	16.7	13.9	10.2	7.8	6.2
6.6	9.4	9.2	8.9	7.5	6.4	5.5	4.9	19.5	19.5	17.2	14.3	10.9	8.3	6.6
6.8	9.6	9.4	9.2	7.6	6.5	5.7	5.0	20.1	20.1	17.7	14.8	11.6	8.9	7.0
7.0	9.7	9.6	9.5	7.8	6.7	5.8	5.2	20.7	20.7	18.2	15.2	12.3	9.4	7.4
7.2	9.9	9.8	9.7	8.0	6.9	6.0	5.3	21.3	21.3	18.8	15.6	13.0	9.9	7.8
7.4	10.1	10.0	9.9	8.2	7.1	6.2	5.5	21.9	21.9	19.3	16.1	13.7	10.5	8.3
7.6	10.3	10.2	10.1	8.4	7.2	6.3	5.6	22.5	22.5	19.8	16.5	14.1	11.1	8.7
7.8	10.5	10.4	10.4	8.6	7.4	6.5	5.8	23.1	23.1	20.3	16.9	14.5	11.7	9.2
8.0	10.7	10.7	10.6	8.8	7.6	6.7	5.9	23.7	23.7	20.8	17.4	14.9	12.3	9.7
8.2	11.0	10.9	10.9	9.0	7.8	6.8	6.1	24.3	24.3	21.4	17.8	15.3	12.9	10.2
8.4	11.3	11.2	11.2	9.2	8.0	7.0	6.2	24.9	24.9	21.9	18.2	15.6	13.5	10.7
8.6	11.6	11.5	11.5	9.5	8.1	7.2	6.4	25.5	25.5	22.4	18.7	16.0	14.0	11.2
8.8	11.9	11.8	11.7	9.7	8.3	7.3	6.5	26.1	26.1	22.9	19.1	16.4	14.3	11.7
9.0	12.2	12.2	11.9	9.9	8.5	7.5	6.7	26.7	26.7	23.5	19.5	16.8	14.7	12.3
9.2	12.5	12.5	12.1	10.1	8.7	7.7	6.8	27.2	27.2	24.0	20.0	17.1	15.0	12.8
9.4	12.9	12.9	12.5	10.3	8.9	7.8	7.0	27.8	27.8	24.5	20.4	17.5	15.3	13.4
9.6	13.3	13.3	12.7	10.6	9.1	8.0	7.1	28.4	28.4	25.0	20.8	17.9	15.6	13.9
9.8	13.7	13.7	13.0	10.8	9.3	8.2	7.3	29.0	29.0	25.5	21.3	18.2	16.0	14.2
10.0	14.1	14.1	13.3	11.0	9.5	8.3	7.4	29.6	29.6	26.1	21.7	18.6	16.3	14.5
10.2	14.7	14.7	13.6	11.3	9.7	8.5	7.6	30.2	30.2	26.6	22.1	19.0	16.6	14.8
10.4	15.3	15.3	14.1	11.6	9.9	8.7	7.9	30.8	30.8	27.1	22.6	19.4	16.9	15.1
10.6	15.9	15.9	14.6	12.1	10.4	8.9	8.3	31.4	31.4	27.6	23.0	19.7	17.3	15.3
10.8	16.5	16.5	15.1	12.6	10.8	9.3	8.6	32.0	32.0	28.1	23.5	20.1	17.6	15.6
11.0	17.1	17.1	15.6	13.1	11.3	9.7	9.0	32.6	32.6	28.7	23.9	20.5	17.9	15.9
11.2	17.7	17.7	16.1	13.6	11.7	10.2	9.3	33.2	33.2	29.2	24.3	20.8	18.2	16.2
11.4	18.3	18.3	16.6	14.1	12.2	10.6	9.7	33.8	33.8	29.7	24.8	21.2	18.6	16.5

Safety Information

m(kg)	Minimum required room area (A, m ²)													
	No underground floor Installation Height (m)							Underground Floor Installation Height (m)						
	1.8	2.2	2.5	3	3.5	4	4.5	1.8	2.2	2.5	3	3.5	4	4.5
11.6	18.9	18.9	17.1	14.6	12.6	11.0	10.0	34.4	34.4	30.2	25.2	21.6	18.9	16.8
11.8	19.5	19.5	17.6	15.1	13.1	11.4	10.4	34.9	34.9	30.7	25.6	22.0	19.2	17.1
12.0	20.1	20.1	18.1	15.6	13.5	11.8	10.7	35.5	35.5	31.3	26.1	22.3	19.5	17.4
12.2	20.7	20.7	18.6	16.1	14.0	12.3	11.1	36.1	36.1	31.8	26.5	22.7	19.9	17.7
12.4	21.3	21.3	19.1	16.6	14.4	12.7	11.4	36.7	36.7	32.3	26.9	23.1	20.2	18.0
12.6	21.9	21.9	19.6	17.1	14.9	13.1	11.8	37.3	37.3	32.8	27.4	23.5	20.5	18.2
12.8	22.5	22.5	20.1	17.6	15.3	13.5	12.1	37.9	37.9	33.4	27.8	23.8	20.8	18.5
13.0	23.1	23.1	20.6	18.1	15.8	13.9	12.5	38.5	38.5	33.9	28.2	24.2	21.2	18.8

m : Total refrigerant charge in the system

- A : Minimum required room area

- ▶ **IMPORTANT:** it's mandatory to consider either the table 1 or taking into consideration the local law regarding the minimum living space of the premises.
- ▶ Minimum installation height of indoor unit is 1.8 m for wall, 2.5 m for ceiling, 2.2 m for Ducted.

Wired remote control requirements

For details on wired remote control installation, refer to the installation manual and user manual that came with the wired remote control. For R-32 indoor unit, make sure to install at least one wired colour remote control (model name: MWR-WG01**) that doubles as a safety alarm device. This wired remote control serves as a visual/audible warning alarm device in the event of R-32 refrigerant leaks. Please follow the instructions below to connect a wired colour remote control:

- Make sure to install a dedicated R-32-capable wired remote control for indoor unit.

Make sure to use R-32-capable wired remote controls. The product will not operate if an R-32-capable wired remote control is not located in the vicinity or if users try to control the product using a common wired remote control.

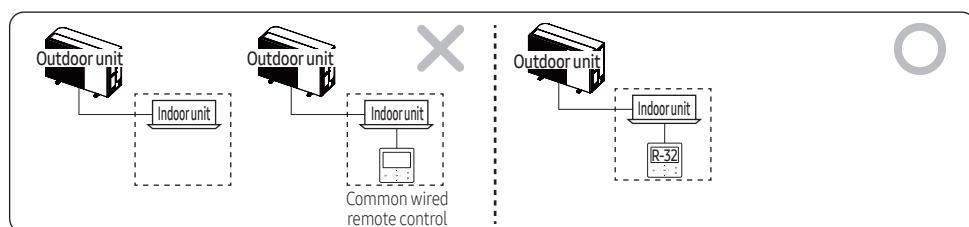
※ E694 : This error occurs if an R-32 indoor unit and a non-R-32 indoor unit are connected to R-32-capable wired remote control, or when a non-R-32 wired remote control is connected to R-32 indoor unit.

※ MWR-WG01*N

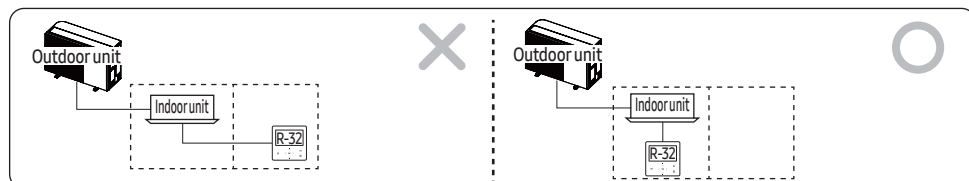
※ R-32-capable wired remote controls should be purchased separately.

! WARNING

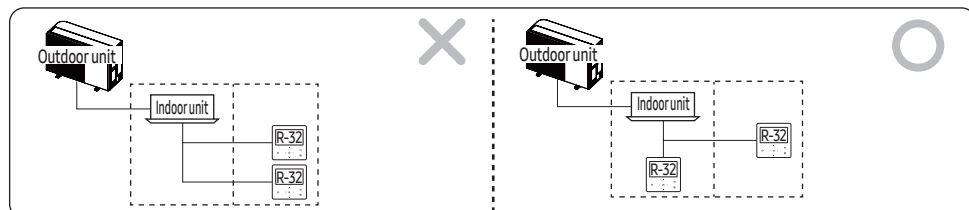
- Samsung Electronics is not responsible for any loss or damage to the product resulting from using anything but the specified wired remote control.



Make sure R-32-capable wired remote controls are located in the same room as the indoor units.

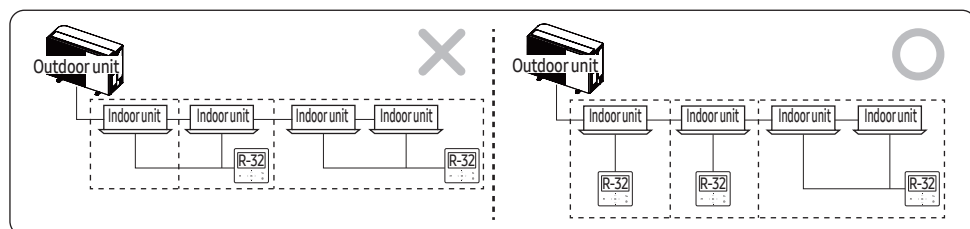
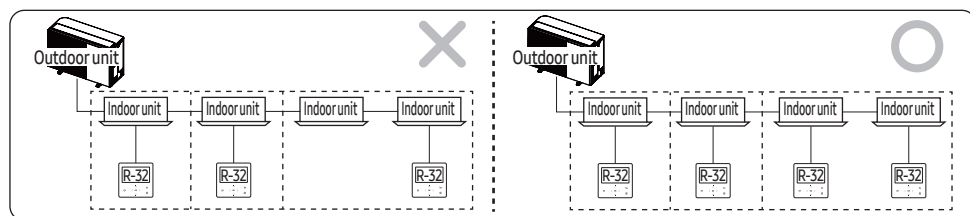


If using two or more R-32-capable wired remote controls, at least one of them must be placed in the same room as the indoor units.



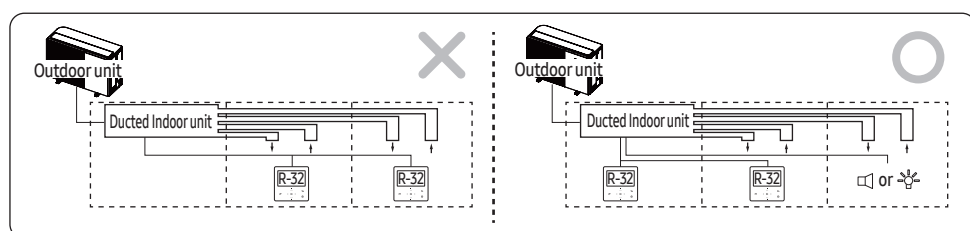
Be sure to connect all indoor units to R-32-capable wired remote controls.

If multiple indoor units are installed in the same room, each indoor unit must be connected to an R-32-capable wired remote control. Make sure that at least one R-32-capable wired remote control is installed in each room.



During grouped control, up to 16 indoor units can be connected to a single R-32 wired remote control.

During grouped control and individual control, each indoor unit can be connected to a maximum of two R-32 wired remote controls.



In case a ducted indoor unit serves a different room than where it is installed, both supply and return air must be directly ducted to that room.

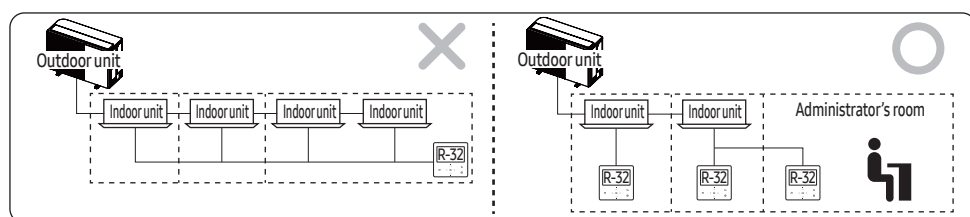
The room area and remote controller rules must be followed for both installed and served room.

If there are more than 3 rooms, install the lamp or alarm device using the indoor unit contact signal.

For the occupancy listed below, the safety alarm system shall also warn at a supervised location, such as the night porter's location, as well as the occupied space:

- ▶ rooms, parts of buildings, building where sleeping facilities are provided,
- ▶ rooms, parts of buildings, building where people are restricted in their movement,
- ▶ rooms, parts of buildings, building where an uncontrolled number of people are present, or
- ▶ rooms, parts of buildings, building to which any person has access without being personally acquainted with the necessary safety precautions.

A wired remote control must be installed in the administrator's room, using wired remote control supervisor mode. For details on how to set wired remote control supervisor mode, refer to the wired remote control installation manual.



NOTE

- In case local regulations require temperature control per zone (or room), a ducted unit cannot be used for multiple rooms, unless controlled zone dampers are installed (third party).

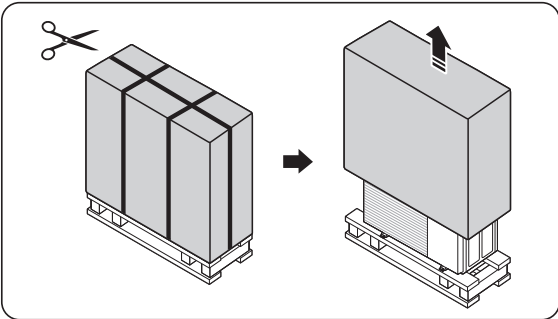
Handling the box

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

NOTE

- 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.
- Preparation of both horizontal and vertical transport (routes and equipment) might be required in order to get the product in the correct installation location.

Unpacking the outdoor unit



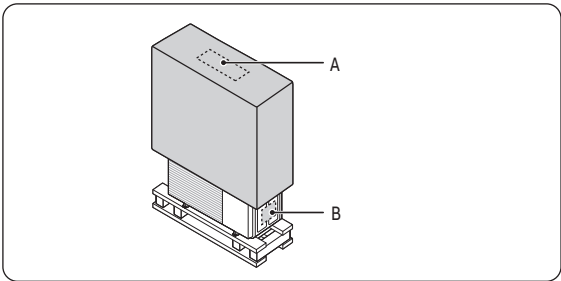
Product line-up and accessories

Product line-up

Outdoor unit	
Chassis	
Model name	AE125HCTP*S AE160HCTP*S

Accessories

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



Accessories in area A

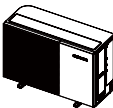
Installation manual (1)	Instruction manual (1)

Accessories in area B

Drain plug (1)	Rubber leg (4)
Shut Off Valve (1) IN (inc. Filter)	

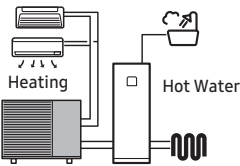
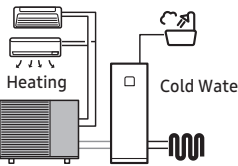
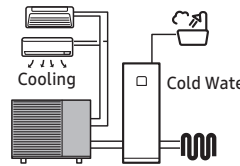
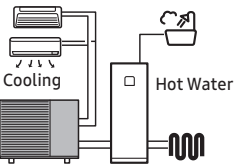
Product Specification

Product compatibility

Indoor unit \ Outdoor unit		LSP Duct	MSP Duct	QMD RAC	1way cassette	Wall mounted hydro unit	Tank integrated hydro unit	Control kit
								
Classification	Features	2.2~5.6 kW	3.6~9.0 kW	1.5~7.1 kW	1.7~5.6 kW	16.0 kW	200 L	
	- Outdoor unit: 12.5/16.0 kW - Long pipe reliability: 70m	AM022DNLDKG	AM036DNMDKG	AE015HEADKG	AM017DN1DKG	AE160DNYMPK	AE200DNWMPK	MIM-E03FN
		AM028DNLDKG	AM056DNMDKG	AE022HEADKG	AM022DN1DKG	AE160DNZMPK	AE200DNXMPK	-
		AM036DNLDKG	AM071DNMDKG	AE028HEADKG	AM028DN1DKG	-	-	-
		AM056DNLDKG	AM090DNMDKG	AE036HEADKG	AM036DN1DKG	-	-	-
		-	-	AM056DNVDKG	AM056DN1DKG	-	-	-
		-	-	AM071DNVDKG	-	-	-	-

NOTE

- A2W: Air to Water, A2A: Air to Air
- The indoor units can be installed in a combination of up to 200%, such as A2A 100% + A2W 100%. However, the performance may change depending on the indoor unit operation rate. Please refer to the table below.
- During A2W operation, if the capacity requirement on the A2A side exceeds 30%, simultaneous operation may not be feasible. In this case, the operation switches to TDS mode. During TDS operation, the system switched alternately between 30 min of A2A and 5 min of A2W by default. Operating time can be changed by FSV setting.

Simultaneous Operation ≤ 130 %	HR (Heat Recovery) Operation ≤ 200%	TDS (Time Division Switching) Operation ≥ 130 % * Operation priority is in A2W
30% 100% 	100% 100% 	100% 0% 0% 100%
30% 100% 	100% 100% 	100% 0% 0% 100%

Product Specification

Subsidiary materials compatibility

Indoor unit		LSP Duct	MSP Duct	RAC		1 Way Cassette	Remark
							
Subsidiary materials		2.2~5.6 kW	3.6~9.0 kW	1.5~3.6 kW	5.6~7.1 kW	1.7~5.6 kW	
EEV Kit	 EEV Kit for 1/2/3 room	-	-	MXD-J24K200A MXD-J24K300A	-	-	Requisite
Y-joint		MXJ-YA1509M (≤15.0kW and below)					Requisite
Drain Pump		MDP-Z075SZED (Option, Internal Type)	MDP-G075SP (Option, External Type) MDP-G075SQ (Option, Internal Type)	-	-	-	-
Wireless remote controller		AR-EH03E (Option)					-
		AR-CH01* (Option)					-
Remote controller receive kit		MRK-A10N (Option)		-	-	-	-
Wired remote controller		MWR-WG01JN/KN					Requisite



NOTE

- Subsidiary materials are compatible with DVM products.
- EEV KIT : Required installation. It is not included inside of product. Install distribution kit for 1, 2 or 3 indoor on the ceiling or outdoor area.
- A2W: Air to Water, A2A: Air to Air

Unit installation

Preparing the installation of the outdoor unit

Prepare a route with 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 a construction work site.



WARNING

- 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 with 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:
 - A2W
 - Space heating mode -25~43 °C
 - Domestic hot water mode -25~43 °C
 - Space cooling mode 10~46 °C
 - A2A
 - Space heating mode -25~24 °C
 - Space cooling mode 10~46 °C
 - Heat Recovery
 - A2W Heating (Domestic hot water mode) + A2A Cooling mode 10~43 °C
 - A2W Cooling + A2A Heating mode 10~24 °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 the outdoor unit.
- Maintain sufficient clearance around the outdoor unit, especially from a radio, computer, and stereo system.

- The outdoor unit shall be installed in an open space that is always ventilated.

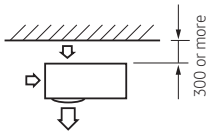
Do not install the air to water Heat Pump in the following locations:

- 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 for 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.

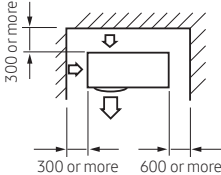
Unit installation

When installing 1 outdoor unit

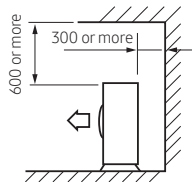
(Unit : mm)



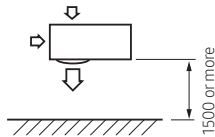
- When the air outlet is opposite the wall



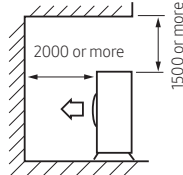
- When 3 sides of the outdoor unit are blocked by the wall



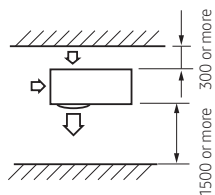
- The upper part of the outdoor unit and the air outlet is opposite the wall



- When the air outlet is towards the wall



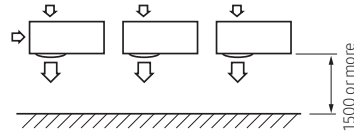
- The upper part of the outdoor unit and the air outlet is towards the wall



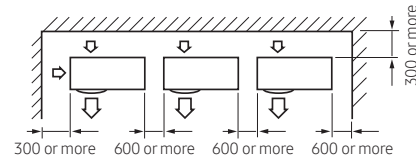
- When front and rear side of the outdoor unit is towards the wall

When installing more than 1 outdoor unit

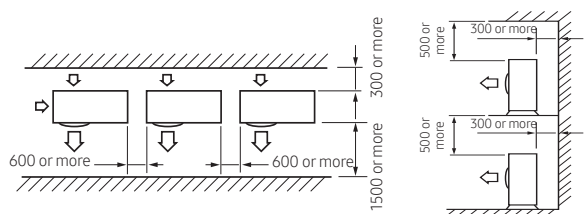
(Unit : mm)



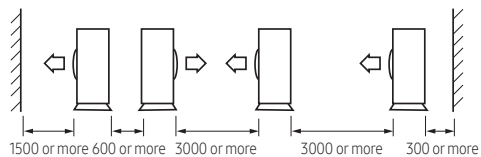
- When the air outlet is towards the wall



- When 3 sides of the outdoor unit are blocked by the wall



- When front and rear side of the outdoor unit is towards the wall
- The upper part of the outdoor unit and the air outlet is opposite the wall



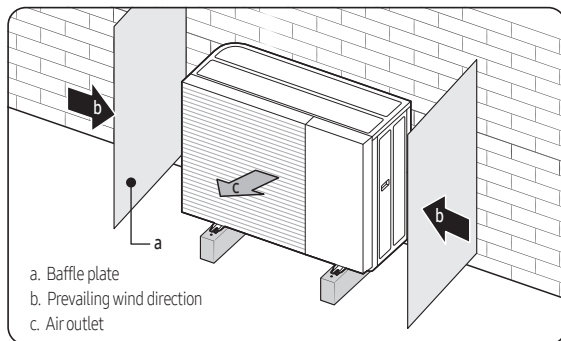
- When front and rear side of the outdoor unit is towards the wall

⚠ 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:

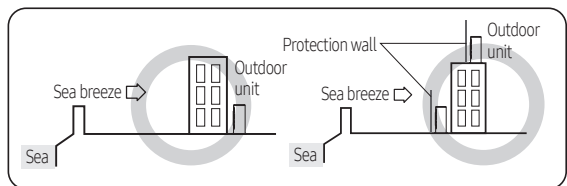
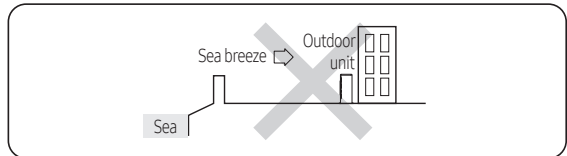
- Outdoor unit must be fixed firmly so that it can withstand the wind speed of the strong wind. If you cannot fix the outdoor unit on the base ground, fixate it sideways or use an extra support structure.
- To prevent exposure to (strong) wind, install a baffle plate on the air discharge side of the 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.



Installation guide at the seashore

Make sure to follow the 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 a building) that can block sea 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 at 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 substances, 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 is installed within 500 m of a seashore, special anticorrosion treatment (like special coating) is required.
 - Please contact your local Samsung representative for further details.
 - 5 When the 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.

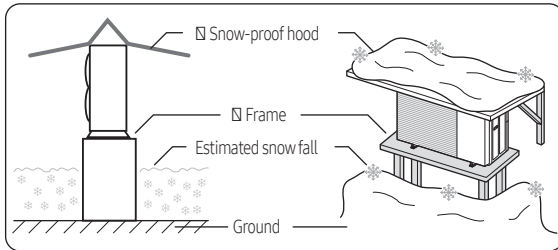
Unit installation

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)

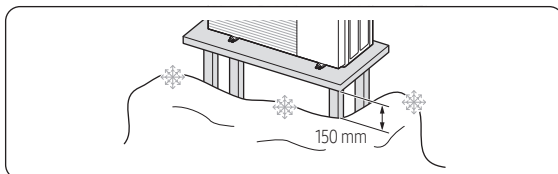


- Construct a large canopy.
- Construct a pedestal.
 - Install the unit high enough off the ground to prevent it from being buried under snow.

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.

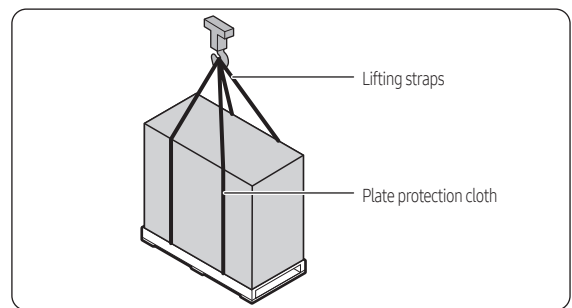


Moving the outdoor unit

- 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.).

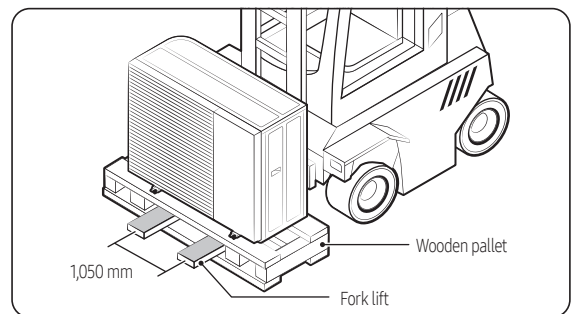
Moving the outdoor unit by hoisting

- 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.



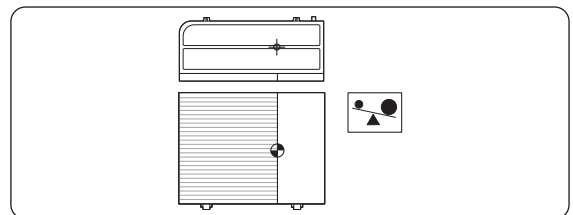
Moving the outdoor unit with a forklift

- 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.



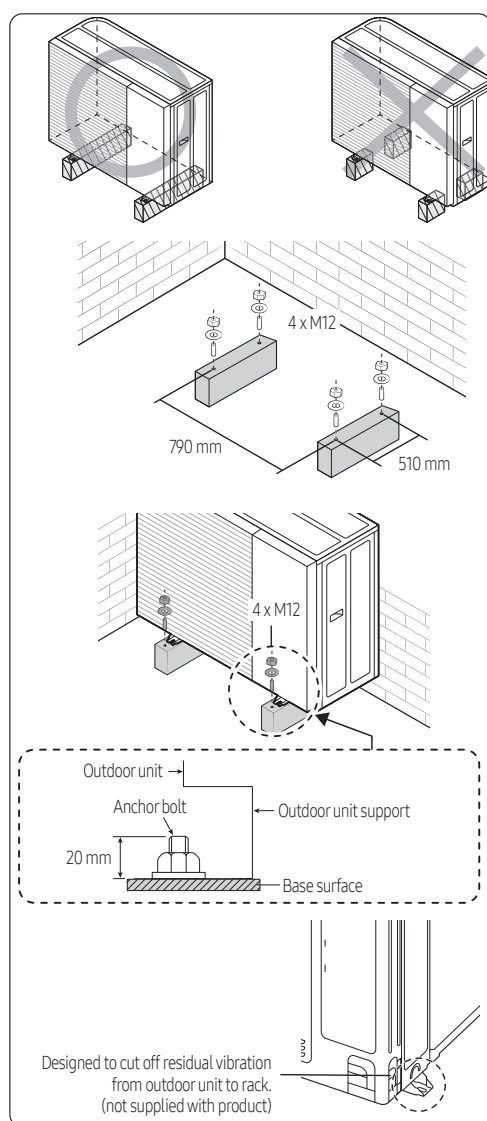
Mounting the outdoor unit

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 20 mm 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.



Outdoor unit drain work

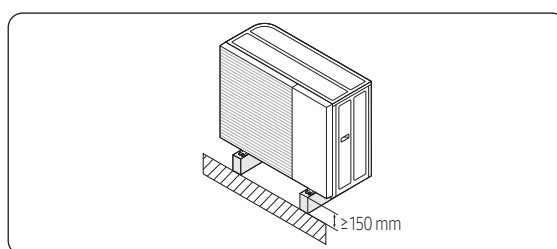
General area

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.

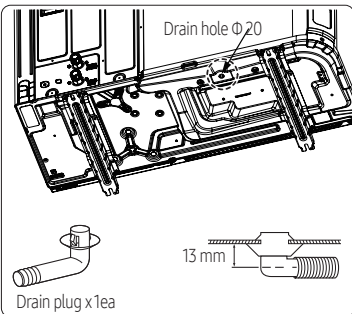
- In case there is not enough space for natural drainage from the outdoor unit, additional drain work is required. Follow the description as per below:
 - Provide a minimum of 150 mm of free space to the floor.
 - Insert the drain plug into the hole at the bottom of the outdoor unit.
 - Connect the drain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



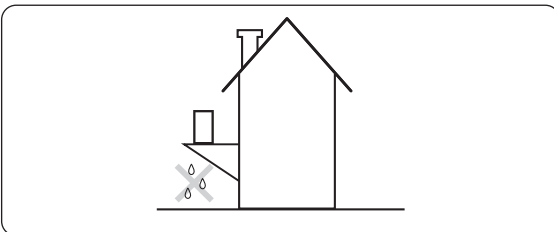
Unit installation

⚠ WARNING

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



- 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).

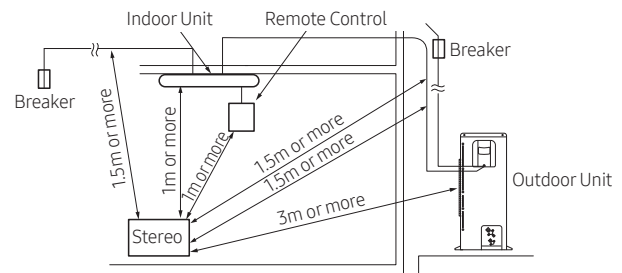


- 3 When installing the unit on a frame, please install a slanted waterproof plate within 150 mm of the underside of the unit to prevent water from plashing against the bottom plate from below.
 - 4 When installing the unit in a place frequently exposed to snow, pay special attention to elevating the foundation as high as the average snow height plus the additional required 150 mm.
 - 5 The installer must ensure proper drainage of thawed off water from the product's defrosting process. This should prevent potential slip hazards and rapid ice build-up below and around the unit.
- ※ Please securely mount the outdoor unit before connecting the water piping.

Space requirement for the indoor unit installation

⚠ CAUTION

- Install the indoor unit away from any interfering sources such as radio, computer, stereo equipment and also select a place where the electrical wiring work and an indoor unit installation are possible.
- Especially keep the unit at least 3m away from the electrical equipment in an area where weak electromagnetic waves are generated and install the protection tube to protect the main power cable and communication cable.
- Make sure that there is no equipment that generates electromagnetic waves. If so, malfunction of the control system may occur due to the effect of the electromagnetic wave. (For example: The remote control sensor of the indoor unit may not have good reception in an area with fluorescent lamp style lighting.)
- According to the condition of power supply, electric noise or unstable voltage can occur malfunction of electric parts or control system. (At the ship or places using power supply from electric generator... etc)



Combinations (Outdoor / indoor units)

Outdoor unit	Cooling capacity (kW)	Total capacity of connected A2A indoor units (kW)
AE125HCTP*S	12.5	6.3~12.5
AE160HCTP*S	14.5	7.3~14.5

- When considering the system capacity of allowable indoor units, follow the table above.

Refrigerant piping work

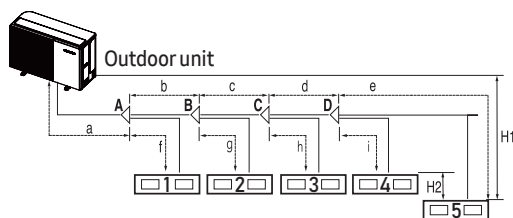
About the refrigerant piping work

- Install the refrigerant pipe within the maximum allowable length, difference in height and length of after the first branch pipe.
- The pressure of the R-32 is high. Use only rated refrigerant pipe and follow the installation method.
- Use clean refrigerant pipe without harmful ion, oxide, dust, iron content or moisture. Refrigerant pipes must stay capped off until installation.
- Use adequate tools and accessories for R-32.

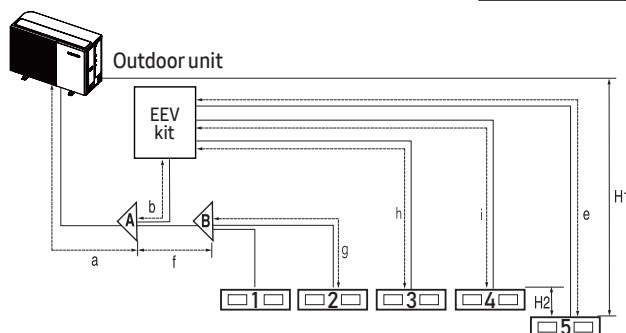
Manifold gauge	• Use a manifold gauge only for R-32 to prevent the inflow of foreign substances.
Vacuum pump	• Use only a vacuum pump with a check valve to prevent contamination when the vacuum pump is stopped. • Use a vacuum pump that is capable to reach up to 5Torr. (-100.7kPa)
Flare nut	• Use only the flare nut supplied with the product.

Allowable length of the refrigerant pipe and the installation examples

Using only Y-joint



Using EEV kit



		Item	Example		Remarks
Maximum allowable length of pipe	Outdoor unit ~ Indoor units	Longest piping length	Less than 70m	$a+b+c+d+e \leq 70m$	
		Equivalent length	Less than 85m	Y-joint and EEV kit : 0.5m	
		Total length	Less than 200m	$a+b+c+d+e+f+g+h+i \leq 200m$	$10m \leq \text{Total length} \leq 200m$
Maximum allowable height	Outdoor unit ~ Indoor units	Less than 30m		H1	If outdoor unit is located lower position $H1 \leq 25m$
	Indoor unit ~ Indoor unit	Height difference between indoor units	Less than 15m	H2	
Maximum allowable length of pipe	First Y-joint ~ Last indoor unit	Actual piping length	Less than 40m	$b+c+d+e \leq 40m$ (between first Y-joint and indoor unit) $h \leq 20m$ (between EEV kit and indoor unit)	
Additional refrigerant calculation		$R = \text{Basic Charge} + \text{Additional charge by the piping length} + \text{Additional charge by (A2A) Indoor}$ Basic Charge : 2700g Additional charge by the piping length : $3/8" - 55g/m, 1/4" - 20g/m$ Additional charge by (A2A) Indoor : Refer to page 25 'Amount of additional refrigerant for each indoor unit' table.			

- Contact the manufacturer if the length should exceed.

EEV Kit			Model name		Remarks
EEV Kit ~ Indoor units	Actual pipe length	20m or less	MXD-J24K200A	Up to 2 indoor units	Apply to products without EEV (AE015-036HEADKG)
			MXD-J24K300A	Up to 3 indoor units	

- Please refer to the EEV Kit manual.

Refrigerant piping work

Selecting the refrigerant pipe and Fasten Torque

Outdoor unit capacity (kW)	Liquid side [mm]	Gas side [mm]	Fasten Torque ϕ 9.52 / ϕ 15.88 [N·m]
12.5 / 16.0	ϕ 9.52	ϕ 15.88	24~42 / 68~82

Outer diameter (mm)	Minimum thickness (mm)	Temper grade
ϕ 6.35	0.7	C1220T-O
ϕ 9.52	0.7	
ϕ 12.70	0.8	
ϕ 15.88	1.0	
ϕ 15.88	0.8	C1220T-1/2H OR C1220T-H
ϕ 19.05	0.9	
ϕ 22.23	0.9	

- ▶ Temper grade and minimum thickness of the refrigerant pipe.
- ▶ The material specification (thickness) of the refrigerant pipes must be in accordance with EU and /or local legislation and standards.

Selecting the Refrigerant Pipe

Installing pipes between outdoor unit and first Y-joint

Model	Liquid side	Gas side (Air)
	mm	mm
AE125HCTP*S	ϕ 9.52	ϕ 15.88
AE160HCTP*S	ϕ 9.52	ϕ 15.88

Outer diameter	Minimum thickness	Temper grade
mm	mm	
ϕ 6.35	0.8	
ϕ 9.52	0.8	
ϕ 12.70	0.8	
ϕ 15.88	1.0	

- Install refrigerant pipe depending on the outdoor unit capacity.
- Temper grade and minimum thickness of the refrigerant pipe.

Installing pipes between Y-joints

Indoor unit total capacity (kW)	Liquid side (mm)	Gas side (mm)
X < 20.2	ϕ 9.52	ϕ 15.88

Selecting the Y-joint

- Select the first Y-joint depending on the outdoor unit capacity. Select the other Y-joints depending on the total capacity of attached indoor units below the selected joint individually.

Selecting the first Y-joint	
Model	Y-joint model
AE125HCTP*S	MXJ-YA1509M
AE160HCTP*S	

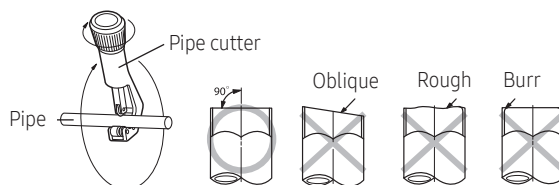
The other Y-joint	
Total capacity of attached indoor units below this Y-joint (kW)	Y-joint model
X < 20.2	MXJ-YA1509M

Keeping refrigerant pipe clean and dry

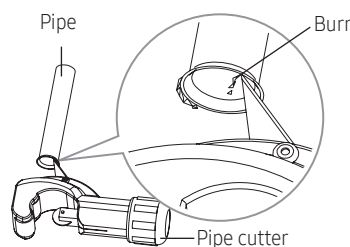
- To prevent foreign materials or water from entering the pipe, pipes shall be sealed by caps.

Cutting or Flaring the Pipes

- 1 Make sure that you have the required tools available. (pipe cutter, reamer, flaring tool and pipe holder)
- 2 If you wish to shorten the pipes, cut it with a pipe cutter, taking care to ensure that the cut edge remains at a 90° angle with the side of the pipe. Refer to the illustrations below for examples of edges cut correctly and incorrectly.



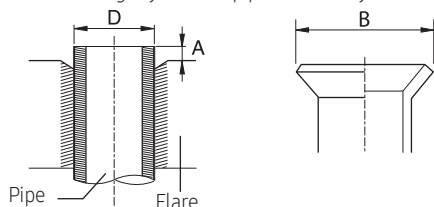
- 3 To prevent a gas leak, remove all burrs at the cut edge of the pipe using a reamer.



CAUTION

- Point the pipe downwards while deburring, to prevent the burrs from entering into the pipe.

- 4 Put a flare nut slightly into the pipe and modify the flare.

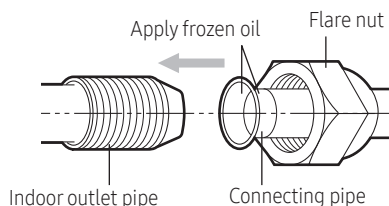


Outer Diameter (D)	Depth (A)	Flaring Size (B)
Φ6.35 mm	1.3 mm	8.7~9.1 mm
Φ9.52 mm	1.8 mm	12.8~13.2 mm
Φ12.70 mm	2.0 mm	16.2~16.6 mm
Φ15.88 mm	2.2 mm	19.3~19.7 mm

- 5 Check that the flaring is correct, referring to the illustrations below for examples of incorrect flaring.



- 6 Align the pipes to connect them easily. Tighten the flare nuts first with your hands, and then with a torque wrench, applying the following torque:



Outer Diameter (D)	Torque (N·m)
Φ6.35 mm	14~18
Φ9.52 mm	34~42
Φ12.70 mm	49~61
Φ15.88 mm	68~82

NOTE

- Excessive torque can be cause of gas leakage.

CAUTION

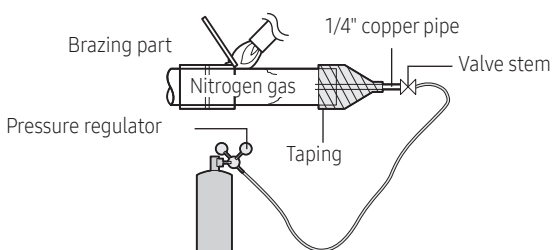
- Always use the flow of oxygen free nitrogen during brazing as a backing gas to avoid oxidation inside the refrigerant pipes. Failing to do so, may lead to critical damage to the product and will void the manufacturer warranty.

Brazing the Pipe

- Make sure that there is no moisture inside the pipe.
- Make sure that there are no foreign materials and impurities in the pipe.

Replacement of Nitrogen gas

- 1 Use oxygen free nitrogen gas when brazing the pipes as shown in the picture.



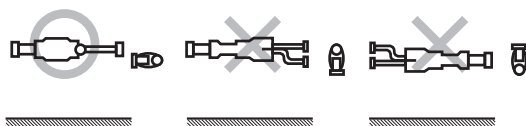
- 2 If you do not use Nitrogen gas when brazing the pipes, oxidation may form in the pipe. It can cause the damage of the compressor and valves. Failing to do so, may lead to critical damage to the product and will void the manufacturer warranty.
- 3 Adjust the flow rate of the replacement with a pressure regulator to maintain 0.05m³/h or more.
- 4 Perform brazing of the service valve after protecting the valve.

Refrigerant piping work

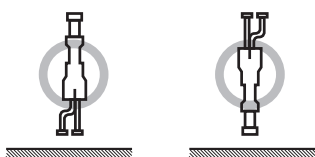
Installing the Y-Joint

Install the Y-joint 'horizontally' or 'vertically'.

- Install horizontally

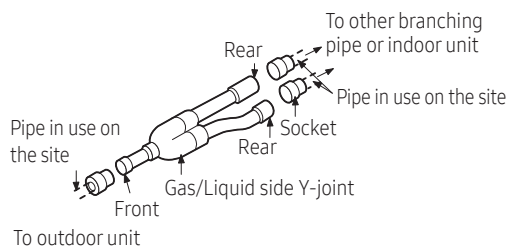


- Install vertically

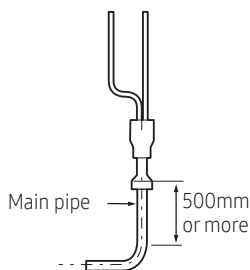
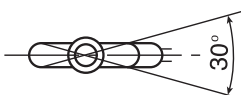


CAUTION

- Make certain of a minimum distance in straight line.



Maintain $\pm 15^\circ$ start from the horizontal line



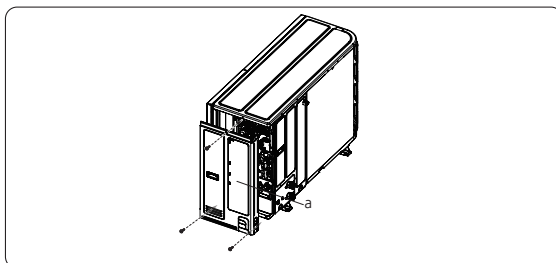
- Install the Y-joint within $\pm 15^\circ$ from the horizontal or vertical line.

Connecting the Outdoor Unit Pipe

- Install pipe work within maximum allowable length, height and length after branching.
- Make sure there are no cracks on pipe bends.

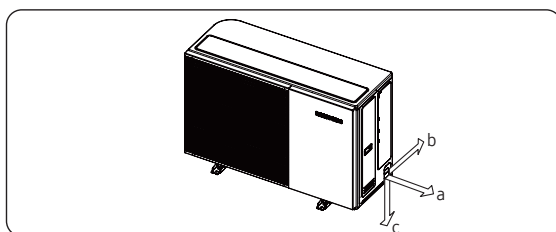
To connect the refrigerant piping

1. Remove the service cover (a)



2. Choose a piping route (a, b, c)

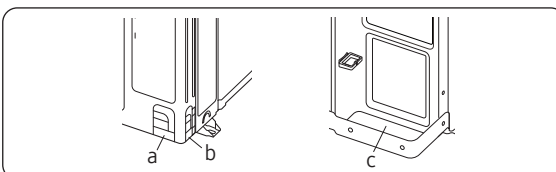
- a Side
- b Rear
- c Bottom



3. remove the knock out hole. (a or b or c)

- a Side
- b Rear
- c Bottom (inner bottom surface)

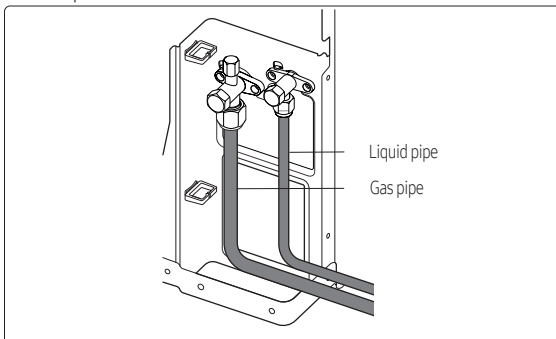
To remove knockout hole, use a flathead screw driver and hammer to pry it out.



4. Connect the liquid pipe ($\varnothing 9.52$) & gas pipe ($\varnothing 15.88$) to the service port.

• Cover liquid & gas pipe with insulation.

• keep the pipe out of contact with vibrating parts such as compressor.



5. Reassemble this service cover.

6. Seal the gaps to prevent snow or small animals from entering.

CAUTION

- Be sure to remove the burr after making the knockout hole.
- When passing electrical wiring through a knockout hole, be sure to wrap it with protective tape to prevent damage.
- If small animals come into contact with electrical components, there is a risk of malfunction or fire, so be sure to seal them.

Performing air tightening test

- ▶ Use tools for R-32 only to prevent the inflow of foreign substances and to resist the internal pressure.
- ▶ Use dry Nitrogen gas to do an airtight test as below.

Apply pressure to the liquid side pipe, gas side pipe with Nitrogen gas of 4.1MPa (gauge pressure).

If you apply pressure more than 4.1MPa (gauge pressure), the pipes may be damaged. Apply pressure using pressure regulator.

Continue to apply pressure for minimum 24 hours to check if the pressure drops or follow local rules.

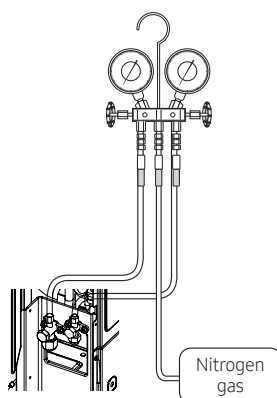
After applying Nitrogen gas, check the change of pressure using pressure regulator.

If the pressure drops, check if there is a gas leak.

If the pressure is changed, apply soapy water to check the leak. Check the pressure of the gas again.

Maintain 1.0 MPa (gauge pressure) of the pressure before performing vacuum drying and check for further gas leak.

After checking first gas leak, maintain 1.0 MPa (gauge pressure) to check for further gas leaks.



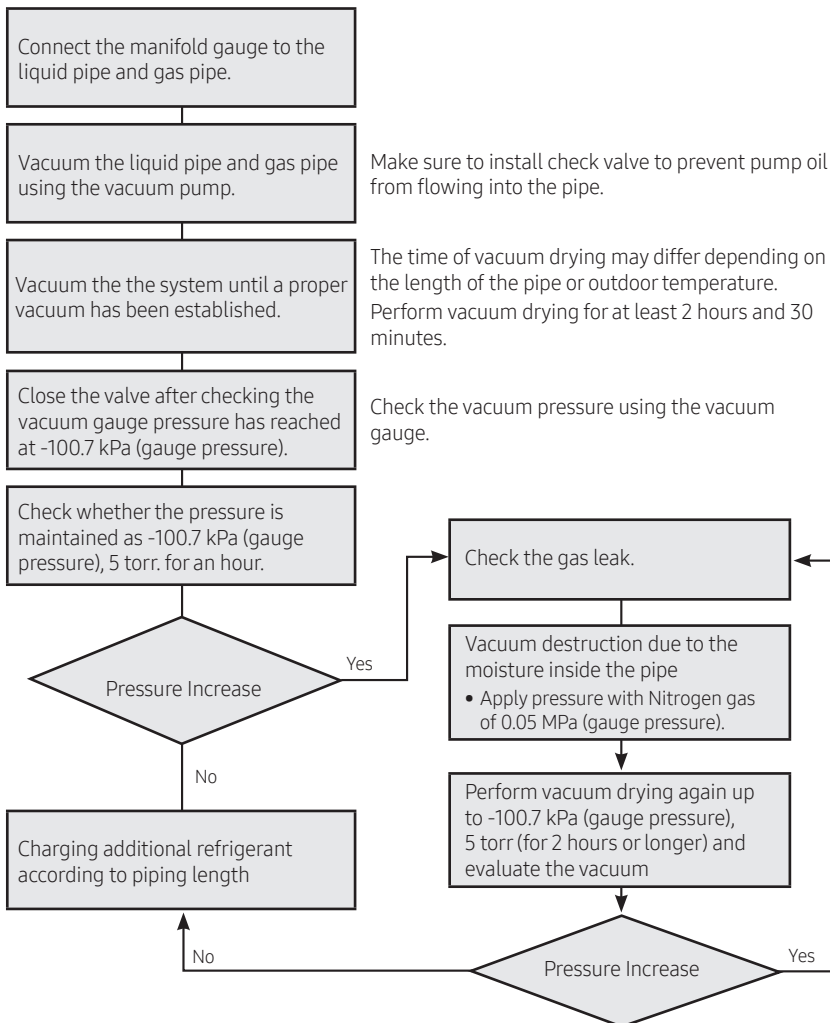
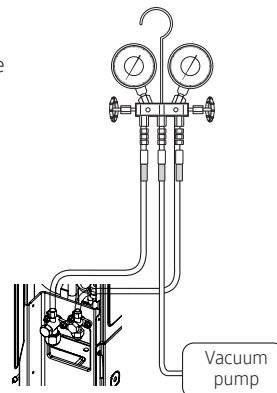
CAUTION

- If the joint of high pressure side is disconnected and the nitrogen gas come into contact with human body, injury may occur. Tighten the joint connection firmly to prevent dangerous situation.

Refrigerant piping work

Vacuuming a pipe and an indoor unit

- ▶ Use the tools for R-32 only to prevent the inflow of foreign substances and resist against the internal pressure.
- ▶ Use the vacuum pump with the check valve to prevent pump oil from flowing backward while the vacuum pump is stopped suddenly.
- ▶ Use the vacuum pump that can be vacuumed up to 666.6Pa(5mmHg).
- ▶ Close the service valve of the liquid side pipe, gas side pipe completely when performing air tightening test or vacuum drying.



⚠ CAUTION

- If the pressure rises in an hour, either water remains inside the pipe, or there will be a leak.

Selecting additional refrigerant charging

► Basic refrigerant

The basic amount of additional refrigerant charged at a factory

Model	Factory charge(kg)
AE125HCTP*S	2.7
AE160HCTP*S	2.7

► Charging additional refrigerant

The amount of additional refrigerant charging	=	The amount of refrigerant charging for pipe + the amount of refrigerant for each indoor unit.
---	---	---

1. The amount of additional refrigerant depending on the liquid pipe size(HP/HR).

- Amount of additional refrigerant has to be calculated based on the sum of all liquid pipe length.

Size of liquid pipe (mm)	6.35	9.52	12.7	15.88
Additional amount (g/m)	20	55	115	165

Additional refrigerant charging calculation = The sum of total length of Ø 9.52 liquid pipe(m) x 55g + the sum of total length of Ø 6.35 liquid pipe(m) x 20g

Ex) a(Ø 9.52)=40m, b+c+d(Ø 9.52)=15m, e+f+g(Ø 6.35)=15m

The amount of additional refrigerant = 55m x 55g + 15m x 20g = 3325g

2. Sum of total amount of additional refrigerant and the basic amount of refrigerant should not exceed 8.5kg

► Amount of additional refrigerant for each indoor unit

Model	Capacity [kW]	Model name	Refrigerant amount [kg]
LSP Duct	2.2	AM022DNLDKG/EU	0.12
	2.8	AM028DNLDKG/EU	0.12
	3.6	AM036DNLDKG/EU	0.15
	5.6	AM056DNLDKG/EU	0.22
MSP Duct	3.6	AM036DNMDKG/EU	0.41
	5.6	AM056DNMDKG/EU	0.41
	7.1	AM071DNMDKG/EU	0.41
	9	AM090DNMDKG/EU	0.61
RAC	1.5	AE015HEADKG/EU	0.15
	2.2	AE022HEADKG/EU	0.15
	2.8	AE028HEADKG/EU	0.29
	3.6	AE036HEADKG/EU	0.29
	5.6	AM056DNVDKG/EU	0.43
	7.1	AM071DNVDKG/EU	0.43
1way cassette	1.7	AM017DN1DKG/EU	0.14
	2.2	AM022DN1DKG/EU	0.14
	2.8	AM028DN1DKG/EU	0.23
	3.6	AM036DN1DKG/EU	0.23
	5.6	AM056DN1DKG/EU	0.29

Refrigerant piping work

Charging refrigerant

- ▶ The R-32 refrigerant is blended refrigerant. Add only liquid refrigerant.
- ▶ Measure the quantity of the refrigerant according to the length of the liquid side pipe. Add quantity of the refrigerant using a scale.

Important information: regulation regarding the refrigerant used

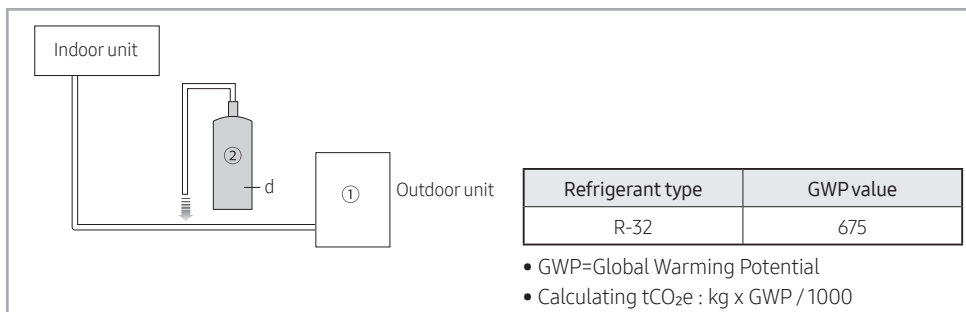
This product contains fluorinated greenhouse gases. Do not vent gases into the atmosphere.

CAUTION

- Inform user if the system contains 5tCO₂e or more fluorinated greenhouse gases. In this case, it must be checked for leakage at least once every 12 months, according to regulation No. 517/2014. This activity must be covered by qualified personnel only. In the case of the situation above, the installer (or authorized person with responsibility for final check) must provide a maintenance book, with all the information recorded, according to REGULATION (EU) No. 517/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 April 2014 on fluorinated greenhouse gases.

Please fill in the following with indelible ink on the refrigerant charge label supplied with this product and on this manual.

- ▶ ① : The factory refrigerant charge of the product.
- ▶ ② : The additional refrigerant amount charged in the field.
- ▶ ①+② : The total refrigerant charge.



NOTE

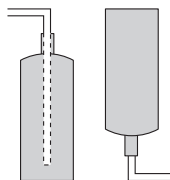
- a Factory refrigerant charge of the product: see unit name plate.
- b Additional refrigerant amount charged in the field. (Refer to the above information for the quantity of refrigerant replenishment.)
- c Total refrigerant charge.
- d Refrigerant cylinder and manifold for charging.

CAUTION

- The filled-out label must be adhered in the proximity of the product charging port. (ex. onto the inside of the stop valve cover.)
- ▶ Before charging, check whether the refrigerant cylinder has a siphon attached or not and position the cylinder accordingly.

Charging using a cylinder with a siphon attached

Charge the liquid refrigerant with the cylinder in upright position.



Charging using a cylinder without a siphon attached

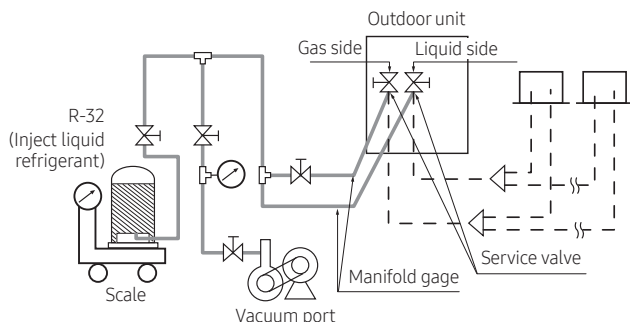
Charge the liquid refrigerant with the cylinder in up-side-down position.



CAUTION

- The filled-out label must be adhered in the proximity of the product charging port (e.g. onto the inside of the stop valve cover).
- Make sure that the total refrigerant charge does not exceed (A), the maximum refrigerant charge, which is calculated in the following formula: Maximum refrigerant charge (A)= factory refrigerant charge (B) + maximum additional refrigerant charge due to piping extension (C).

- ▶ Open the manifold gauge valve connected to the liquid side service valve and add the liquid refrigerant.
- ▶ If you cannot add the whole quantity of the refrigerant while the outdoor unit is stopped, open the gas side and liquid side service valve. Then, add remaining refrigerant by pressing the refrigerant adding button of the outdoor PCB.



⚠ CAUTION

- Open the gas side and liquid side service valve completely after charging the refrigerant. (If you operate the air conditioner with the service valve closed, the important parts may be damaged.)
- Put on safety equipment when charging refrigerant.
- Do not charge the refrigerant when you adjust or control other product such as indoor units or EEV kits.
- When the ambient temperature is low in winter time, do not heat the refrigerant container to speed up the charging process. There is risk of explosion.
- Beware for possibility of refrigerant leakage when you connect the manifold gauge to the charging port for heating.
- Close the valve of the refrigerant container immediately after charging the refrigerant. If not, there might be a change in entire amount of refrigerant.

Selecting the insulation of refrigerant pipe

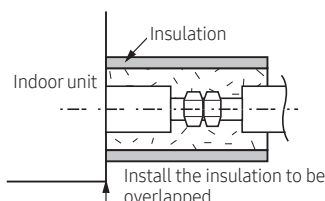
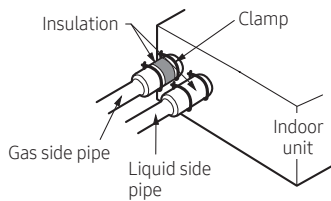
- ▶ Insulate the gas pipe and liquid pipe by referring to the thickness of insulator for each pipe size.
- ▶ The standard condition is 30°C, with humidity less than 85%. In the conditions of high humidity, use one grade thicker.

Pipe	Pipe size (mm)	Insulation(Cooling, Heating)		Remarks
		Standard [30°C, 85%]	High humidity [30 °C, 85% or more]	
		EPDM, NBR		
Liquid pipe	Ø6.35~Ø9.52	9t	9t	Heat resisting temperature is more than 120°C
	Ø12.70~Ø50.80	13t	13t	
Gas pipe	Ø6.35	13t	19t	
	Ø9.52	19t	25t	
	Ø12.70			
	Ø15.88			
	Ø19.05			
	Ø22.23			

Insulating refrigerant pipe

- ▶ You must insulate refrigerant pipe, Y-joint, header joint, and pipe connection area.
- ▶ If you insulate the pipes, the condensed water does not fall from the pipes.
- ▶ Check if there are any insulation cracks on the bent pipe.

Refrigerant piping work

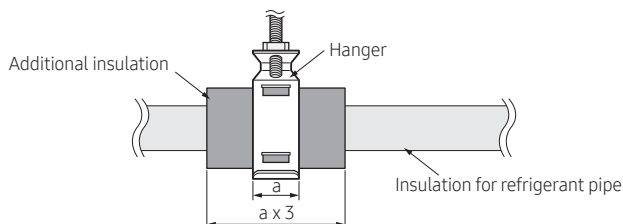


Fix securely without any gap.

Pipe insulation	Pipe insulation after insulating EEV kit
- The insulation of the gas and liquid pipes can be in contact with each other but they should not press excessively against each other. - When contacting the gas side and liquid side pipe, use thicker insulation.	- When installing the gas side and liquid side pipes, leave 10mm of space. - When contacting the gas side and liquid side pipe, use thicker insulation.

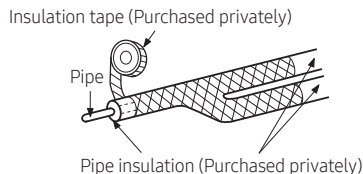
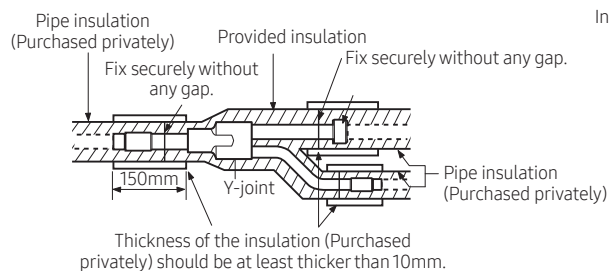
CAUTION

- Install the insulation not to be get wider and use adhesive on the connection part of it to prevent moisture entering.
- Bind the refrigerant pipe with insulation tape if it is exposed to outside sunlight. (When binding the pipe with finishing tape, be careful not to reduce the thickness of the insulation.)
- Install the refrigerant pipe respecting that the insulation does not get thinner on the bent part or hanger of pipe.
- When the thickness of insulation is reduced, supplement the reduced thickness with additional insulation.



Insulating the Y-joint, liquid & gas side connecting pipe

- Attach the insulation provided with the Y-joint to the insulation purchased privately without a gap. Wrap the connected part with insulation (Purchased privately) of a thickness of at least 10mm.
- Use insulation that should be able to handle an interior temperature of over 120°C. Wrap the Y- joint with insulation of a thickness of at least 10mm.



- * Attach the adhesive insulation tape to the pipe as shown in the picture after insulating the pipe.

Water piping work

About the water 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 the 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, and leak.

Name	Tightening torque	
BSP P1	350~380 kgf•cm	34~37 N•m

Connecting the water pipes

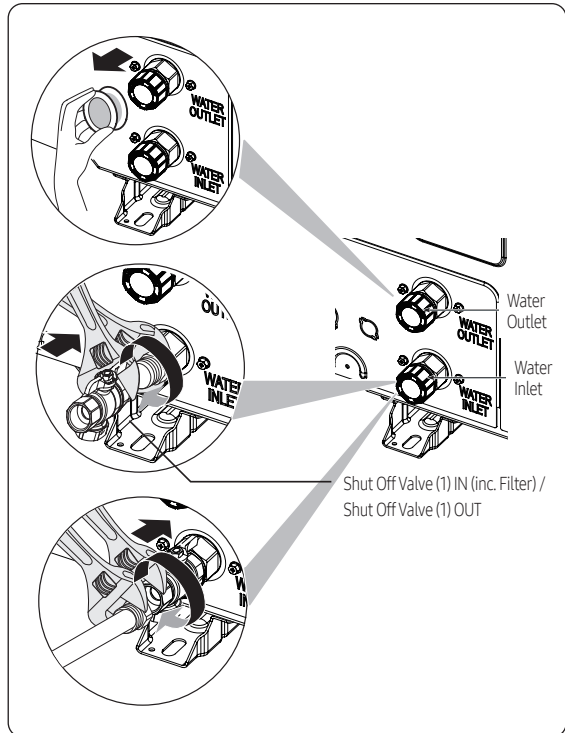
Connecting the water piping typically follows the below procedure:

- 1 Connect the water piping to the outdoor unit.
- 2 Connect the recirculation piping.
- 3 Connect the drain hose to the drain.
- 4 Fill the water circuit.
- 5 Fill the DHW tank.
- 6 Insulate the water piping.



NOTE

- Do not use excessive force when connecting the piping. Deformation of the piping can cause malfunctioning of the unit.
- 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.
- Connect the field piping to the shut-off valve.
- Connect the shut-off valve to the outdoor unit water outlet, using the thread sealant.



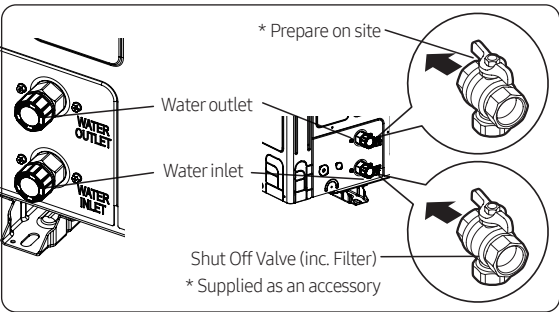
NOTE

- 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.

Water piping work

Water Charging

Fill water into the outdoor unit by opening the shut-off and drain valves.



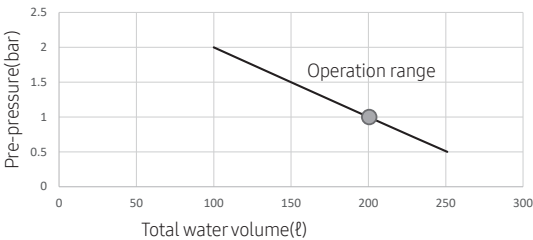
CAUTION

- The operating range of leaving water temperature is 15~65 °C at heating conditions and 5~25 °C at cooling conditions.
- The minimum required water flow for operation is 7 liters/ min. At all times the required water flow-rates should remain. Otherwise, the unit can stop due to a lack of water.
- Water quality must be according to EN directive 98/83 EC. (Please refer to the reference guide for details.)
- 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.

Setting capacity and pre-pressure of the expansion vessel

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 a licensed installer.



Installation height difference ^(a)	Water volume	
	< 200 Litres	> 200 Litres
<7m	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.
>7m	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.

Installation height difference:

Height difference(m) between the highest point of the water circuit. If the unit is located at the highest point of the installation, the installation height is considered 0m.

- When Expansion vessel has a capacity 10 liters and 1bar pre-charged. Water volume of total system for reliable performance is minimum 50 Liter (AE125/160HCTP*S).

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 :

$$Pg=(H/10+0.3) \text{ bar}$$

Protection of the water circuit freezing

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

However, in case of a power failure, these functions cannot guarantee protection.

To protect the water circuit from freezing, any one 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 portable circuit.
- If you add glycol to the water, do NOT install anti-freeze valve, to avoid Glycol leaking out of the anti-freeze valves into the environment.
- If an anti-freeze protection is used, it will result in increased pressure drop and it may also cause a slight capacity reduction.

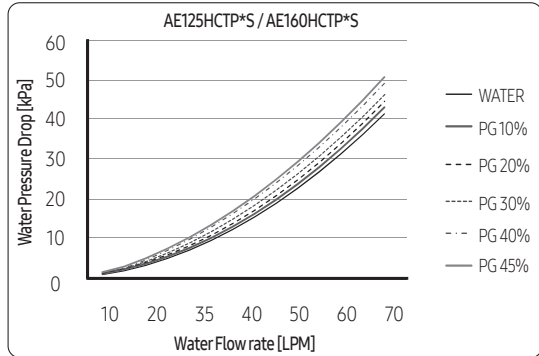
CAUTION

- 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 of 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

Water piping work

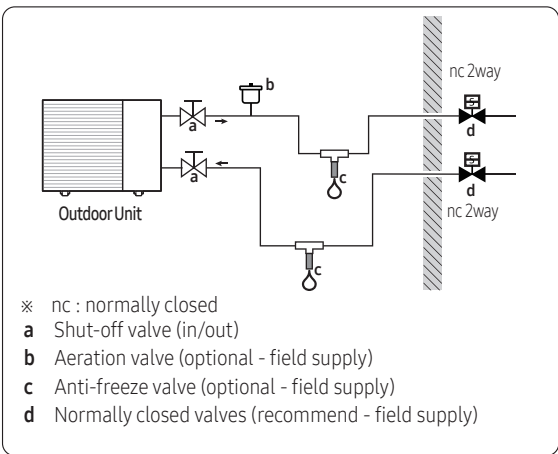
Freezing protection: Anti-freeze valves

In order to prevent system water from freezing inside the pipework during subzero ambient conditions after a 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 the 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:



CAUTION

- If the system is utilized for both cooling operations (summer), please install anti-freeze 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) to 7 °C or higher in order to prevent triggering the anti-freeze valves during cooling operation.

Part	Description
	If necessary, you can close the valve to isolate the water in the outdoor unit.
	Aeration valve (to clear the water from the system).
	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.
	Water isolation inside the house in case of a 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. (field 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.

Outdoor water piping insulation

The complete water circuit, inclusive all the 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 $\lambda=0.035$ 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 the below table as a minimum (with $\lambda=0.035$ 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.

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.

Ideally, systems should be designed for around 12 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:

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

$V_{\min}$: Minimum active volume	[dm ³]
$t_{\min}$: Minimum allowed operation time is 12 min or 720 sec per cycle	[s, sec]
$\Phi_{\min}$: Minimum compressor output	[kW = kJ/s]
C_{water} : Specific heat of water (4,2)	[kJ/kg*°K]
ΔT : Temperature increase (5-10 K)	[K]

Electrical installation

Precautions when connecting the electrical wiring

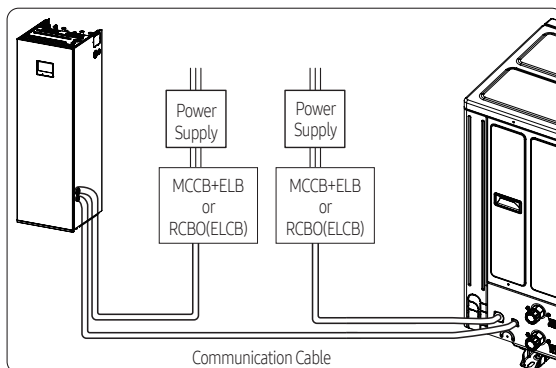
WARNING

- 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 an 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 to 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



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.
AE125HCTPES	50	220-240	198	264	32.0	35.2
AE160HCTPES	50	220-240	198	264	32.0	35.2

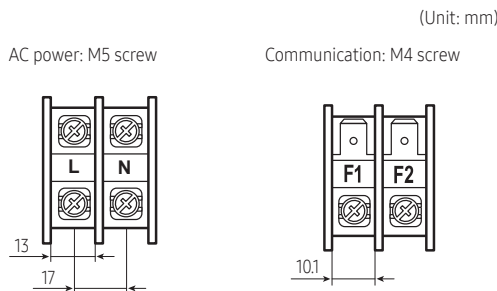
- **3 Phase**
 - The power cables are not supplied with the air to water heat pump.
 - Power supply cords of parts of appliances for outdoor use shall not be lighter than polychloroprene sheathed flexible cord (Code designation IEC:60245 IEC 66 / CENELEC:H07RN-F)
 - This equipment complies with IEC 61000-3-12 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.
AE125HCTPGS	50	380-415	342	457	16.1	17.7
AE160HCTPGS	50	380-415	342	457	16.1	17.7

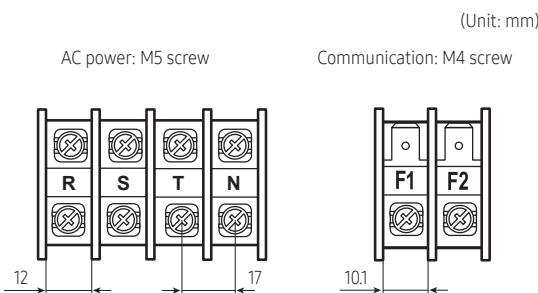
Electrical installation

Terminal block specification

1 Phase



3 Phase



Connecting the power terminal

- ▶ Connect the cables to the terminal board using the compressed ring terminal.
- ▶ Connect the rated cables only.
- ▶ Connect using a wrench which is able to apply the rated torque to the screws.
- ▶ If the terminal is loose, fire may occur caused by arc. If the terminal is connected too firmly, the terminal may be damaged.

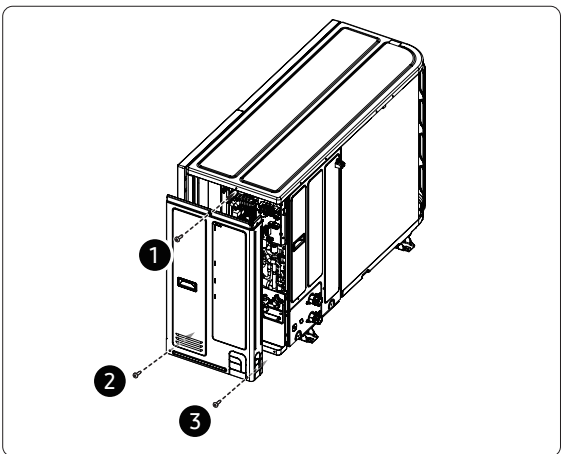
Tightening Torque (kgf.cm)	
M4	12~18
M5	20~30

CAUTION

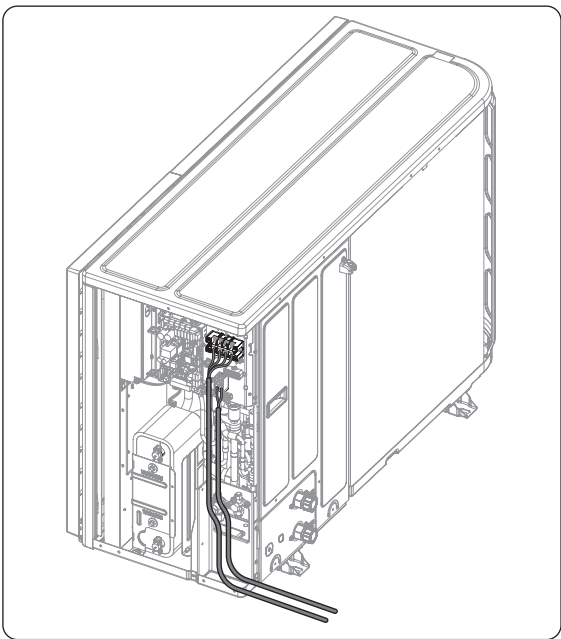
- For the product that uses the R-32 refrigerant, be cautious not to generate a spark by keeping the following requirements:
 - Do not remove the fuses with power on.
 - Do not disconnect the power plug from the wall outlet with power on.
 - It is recommended to locate the outlet in a high position. Place the cords so that they are not tangled.

Outdoor wiring

1 Open the side cover.



2 Insert the cable through the knockout hole and connect the communication and power line.



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 knockout hole on the bottom-right side of the front part.
- Install the power and communication cable using a separate cable protection tubing.

To connect the power supply

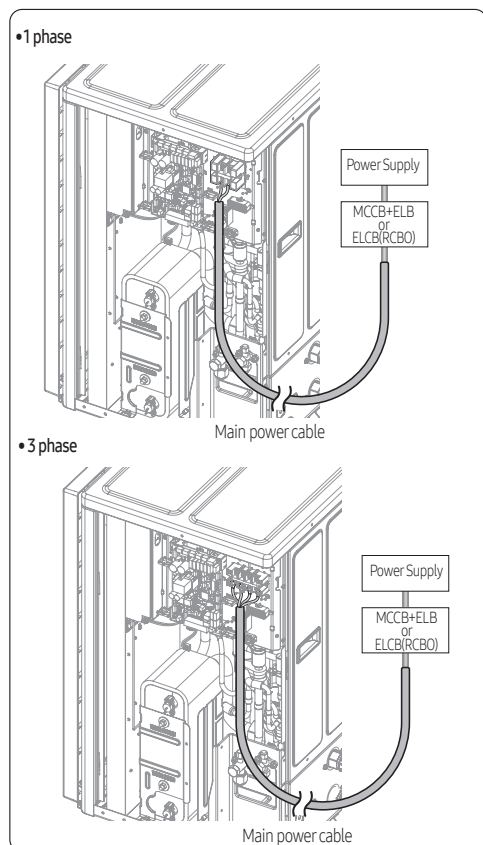
- Two cables must be connected to the outdoor unit
 - The communication cable between the indoor and outdoor unit.
 - The power cable between the outdoor unit and the auxiliary breaker.
- Especially for the Russian and European market, before installation, the supply authority should be consulted to 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.
- To protect the product from water and possible shock, keep the power cable and the connection cord of outdoor units within ducts (with appropriate IP rating and material selection for your application).
- Ensure that the main supply connection is made through a disconnection switch within your arm's 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.

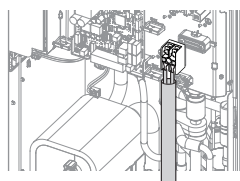


- When installing electrical wiring: tension on the cable(s) must be avoided.
- Earth wire for the indoor unit and outdoor unit cables must be clamped to a suitable ring terminal clamp (not supplied)
- For the power cable, use the grade H07RN-F or H05RN-F materials.
- Power supply cords of parts of appliances 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 the indoor 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.

•1 phase & 3 phase



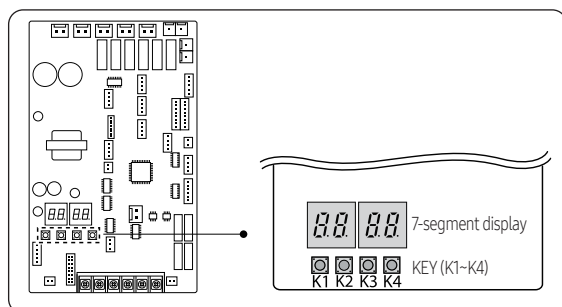
- Specification of communication cable

Communication cable	Specifications
0.75 mm ² , 2 wires shielded	LiYCY

System configuration

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.



- 1 In the initial, display will show the following.



- 2 Press and hold simultaneously K1, K2 to enter the setting mode.

When entering the setting mode, display will show the following.



- 3 When setting manually, press K2 or K4 shortly.

- K2 : 10 digit / K4 : 1 digit

Example) total number of installed indoor unit : 08
press K2 1 time, press K4 2 times.
then, display will show(The displayed value is including hydro unit.)



- 4 For setting automatically, press and hold K4 for 2 seconds.
Display will show total number of installed indoor units. But you have to be careful, it is displayed only for the indoor unit in which a communication and power lines are connected normally.

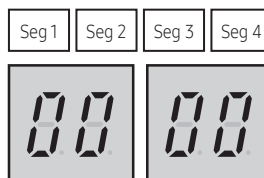
- 5 To end setting mode, press and hold K2.
And then Main PCB will be reset after display blinking in 3 seconds.

* In case of inputting in the wrong way while you inputting, press "K3" (Main PCB reset) and progress again from the first step.

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 and 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 the 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 show that tracking mode is in progress, the setting is saved.

Key Option

Option item	Input unit	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Cooling capacity correction	Main	0	0	0	0	7-9	Targeted evaporation temperature [°C]. (When low temperature value is set, discharged air temperature of the indoor unit will decrease)
				0	1	5-7 (Factory default)	
				0	2	9-11	
				0	3	10-12	
				0	4	11-13	
				0	5	12-14	
				0	6	13-15	
Capacity correction for heating	Main	0	1	0	0	3.0 (Factory default)	Targeted high pressure [MPa]. (When low temperature value is set, discharged air temperature of the indoor unit will decrease)
				0	1	2.5	
				0	2	2.6	
				0	3	2.7	
				0	4	2.8	
				0	5	2.9	
				0	6	3.1	
				0	7	3.2	
Current restriction rate	Main	0	2	0	0	100% (Factory default)	When restriction option is set, cooling and heating performance may decrease. If the rate is set to 1 and 1, there is no current limit, so current usage exceeding 100% is possible. Current usage may be limited due to protection control.
				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%	
Oil collection interval	Main	0	3	1	1	No restriction	
				0	0	Factory default	
				0	1	Shorten the interval by 1/2	
Temperature to trigger defrost operation	Main	0	4	0	0	Factory default	The defrost option shortens the starting time of the defrost operation.
				0	1	Apply setting when the product is being installed in humid area such as near river or lake	
Fan speed correction for outdoor unit	Main	0	5	0	0	Disabled (Factory default)	Increase the outdoor unit's fan speed to maximum value.
				0	1	Increase fan speed	
Quiet mode	Main	0	6	0	0	Low noise (Basic)	
				0	1	Level1	
				0	2	Level2	
				0	3	Level3	
Standby power saving	Main	0	7	0	0	Disabled (Factory default)	
				0	1	Enabled	
Energy saving setting	Main	0	8	0	0	Disabled (Factory default)	Energy saving mode triggers when the room temperature reaches desired temperature while operation in heating mode.
				0	1	Energy saving mode	
				0	2	Rapid cooling	This function increases cooling speed.
Snow accumulation prevention control	Main	0	9	0	0	Enabled (Factory default)	During snow accumulation, the fan may spin even when the unit is not in operation.
				0	1	Disabled	
Max. capacity restriction	Main	1	0	0	0	Enabled (Factory default)	Restrict excessive capacity increase when operating indoor units with small capacity.
				0	1	Disabled	

System configuration

Option item	Input unit	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Channel address	Main	1	3	0	0	Automatic setting (Factory default)	
				0	1	Manual setting for channel 0~15	
View mode unit option	Main	1	4	0	0	°C & MPa (Factory default)	Converts the temperature, pressure units in the view mode (K4 switch).
				0	1	°F & psi	
Gas leak pump down	Main	1	9	0	0	Disabled (Factory default)	If the gas leak occurred, it should be entered in the pump down operation.
				0	1	Enabled	
Unused option	Main	2	0~2	0	0	Unused option	Unused option by this model
Base Heater	Main	2	3	0	0	Disabled (Factory default)	
				0	1	Enabled	Set when base heater is installed.
Emergency heat	Main	3	0	0	0	Disabled (Factory default)	While configured, in case of the system errors, emergency heating operation is possible using an external heater.
				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 the instructions carefully:
 - Always turn off the main power supply when the 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.

Testing operations

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

K1(Number of press)	KEY operation	Display on segment
1 time	Refrigerant charging in Heating mode	"K" "1" "BLANK" "BLANK"
2 times	Trial operation in Heating mode	"K" "2" "BLANK" "BLANK"
3 times	Vacuuming	"K" "3" "BLANK" "1"
4 times	Inverter Fault Detection	"K" "4" "1" "1"
5 times	End Key operation	—

K2(Number of press)	KEY operation	Display on segment
1 time	Refrigerant charging in Cooling mode	"K" "5" "BLANK" "BLANK"
2 times	Trial operation in Cooling mode	"K" "6" "BLANK" "BLANK"
3 times	Pump down in Cooling mode	"K" "7" "BLANK" "BLANK"
4 times	Automatic setting of operation mode (Cooling/Heating) for trial operation	"K" "8" "BLANK" "BLANK"
5 times	Discharge mode of DC link voltage	"K" "9" "BLANK" "BLANK"
6 times	Forced defrost operation	"K" "A" "BLANK" "BLANK"
7 times	Forced oil collection	"K" "B" "BLANK" "BLANK"
8 times	Inverter compressor check	"K" "C" "BLANK" "BLANK"
9 times	Checking the amount of refrigerant	"K" "D" "BLANK" "BLANK"
10 times	End Key operation	—

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

- 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	SEG2, 3, 4
1 time	Outdoor unit Capacity (HP)	1	6HP → 0, 0, 6
2 times	Order frequency of compressor	2	120 Hz → 1, 2, 0
3 times	High pressure (kgf/cm ²)	3	15.2 kgf/cm ² → 1, 5, 2 / 220 psi → 2, 2, 0
4 times	Low pressure (kgf/cm ²)	4	4.3 kgf/cm ² → 0, 4, 3 / 62 psi → 0, 6, 2

5 times	Discharge temperature of compressor	5	87 °C → 0, 8, 7 / 189 °F → 1, 8, 9
6 times	IPM temperature of compressor	6	87 °C → 0, 8, 7 / 189 °F → 1, 8, 9
7 times	CT sensor value of compressor	7	2 A → 0, 2, 0
8 times	Suction temperature	8	-42 °C → -, 4, 2 / -44 °F → -, 4, 4
9 times	COND OUT temperature	9	-42 °C → -, 4, 2 / -44 °F → -, 4, 4
10 times	Cond in temperature	A	87 °C → 0, 8, 7 / 189 °F → 1, 8, 9
11 times	TOP temperature of compressor	B	87 °C → 0, 8, 7 / 189 °F → 1, 8, 9
12 times	Outdoor temperature	C	-42 °C → -, 4, 2 / -44 °F → -, 4, 4
13 times	PHE in temperature	D	-42 °C → -, 4, 2 / -44 °F → -, 4, 4
14 times	PHE out temperature	E	-42 °C → -, 4, 2 / -44 °F → -, 4, 4
15 times	Main EEV step	F	2000 steps → 2, 0, 0
16 times	Liquid bypass EEV	G	300 steps → 3, 0, 0
17 times	Fan step	H	13 steps → 0, 1, 3
18 times	Current frequency of compressor	I	120 Hz → 1, 2, 0
19 times	Master indoor unit address (Master indoor unit can be selected by wired remote-controller)	J	Master indoor unit not selected → BLANK, N, D If indoor unit No.1 is selected as the master unit → 0, 0, 1
20 times	PHE EEV Step	K	300 steps → 3, 0, 0
21 times	Refrigerant leak detection sensor operational duration	L	1000 days → 100
22 times	Water in temperature	M	-42 °C → -, 4, 2 / -44 °F → -, 4, 4
23 times	Water out temperature	N	-42 °C → -, 4, 2 / -44 °F → -, 4, 4
24 times	End Key operation	-	-

K4 (Press and hold for 2 seconds to enter the setting) → K4 press (Number of press)	Displayed content	Display on segment	
		Page 1	Page 2
1 time	Main version	MAIN	Ver. (ex) 1412)
2 times	Inverter version	INV1	Ver. (ex) 1412)
3 times	EEP version	EEP	Ver. (ex) 1412)
4 times	SHUT OFF version	SHOF	Ver. (ex) 1412)
5 times	Assigned address of the units	AUTO	SEG 1,2 Indoor unit: "A", "0" HR Changer/MCU Unit : "C", "1" SEG 3,4 Address (ex) 07)
6 times	Manually assigned address of the units	MANU	SEG 1,2 Indoor unit: "A", "0" SEG 3,4 Address (ex) 15)
Press and hold (for 2 sec.)	Key operation ends	-	

Troubleshooting

Troubleshooting of error code

Display	Explanation	Error Source
E108	Setting Address Duplicate Error	Outdoor unit/ Hydro Unit
E116	Refrigerant leak detection sensor (open/ short)	Indoor 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
E128	Indoor unit Eva in sensor dislodged	Indoor unit
E129	Indoor unit Eva out sensor dislodged	Indoor unit
E151	Error due to opened EEV of indoor unit (2nd detection)	Indoor unit
E152	Error due to closed EEV of indoor unit (2nd detection)	Indoor unit
E153	Indoor unit Floating s/w abnormality (secondary detection)	Indoor unit
E154	Indoor unit fan abnormality	Indoor unit
E162	Outdoor UNIT EEPROM Error	Outdoor unit
E163	EEPROM OPTION SETTING Error	Outdoor unit
E177	In hydro box, take place emergency 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
E232	Cond in 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
E381	Outdoor Inverter1 Controller PCB Overheat	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

Display	Explanation	Error Source
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
E441	Forbid Cooling Mode when Outdoor Temperature is Low 10 °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
E601	Wired LCD ↔ indoor unit communication error	Indoor unit
E641	Wired remote controller ↔ Indoor Unit Communication Error (Indoor Unit Side Occurrence)	Indoor unit
E694	R-32 indoor unit and wired remote control installation combination error	Indoor unit
E695	Refrigerant leak detection sensor lifespan prediction impossible error	Indoor unit
E697	Secondary refrigerant leak detection	Indoor unit

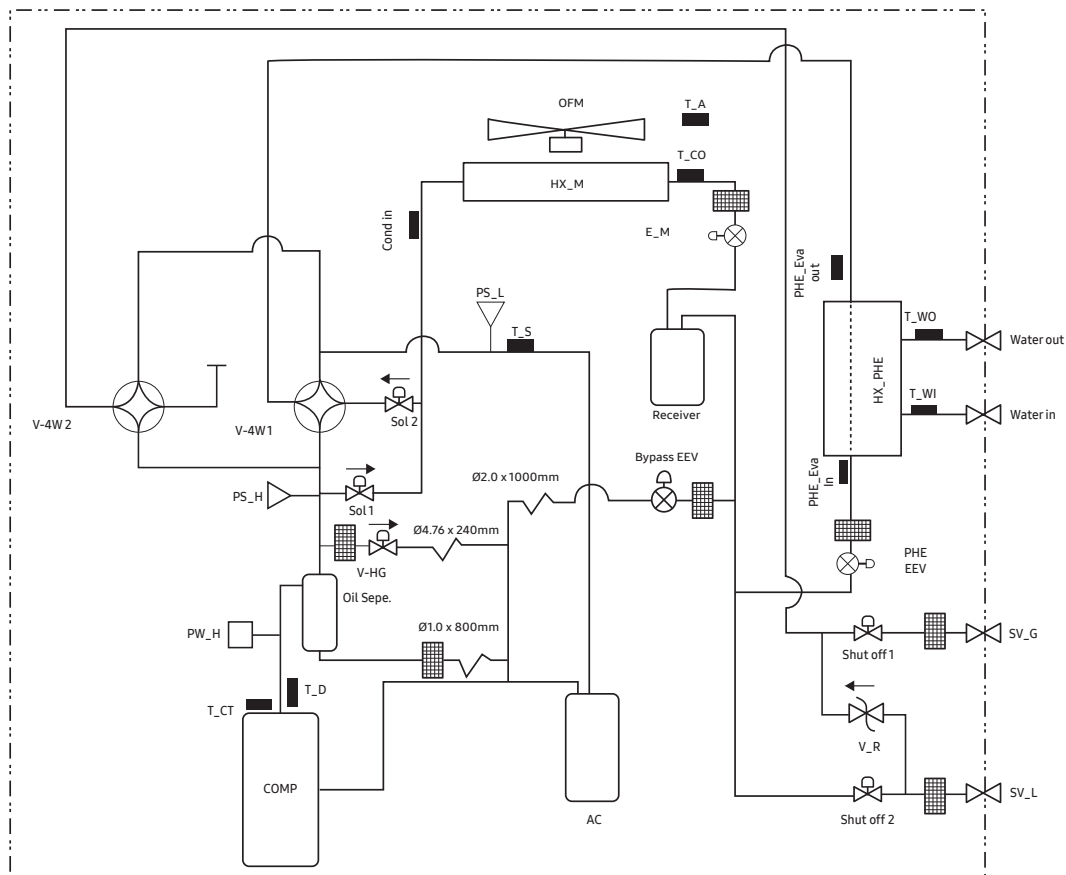
Display	Explanation	Error Source
E698	Refrigerant leak detection sensor malfunction error	Indoor unit
E699	Refrigerant leak detection sensor replacement notification error	Indoor unit
E700	Refrigerant leak detection sensor lifespan expiration error	Indoor unit
E702	Error due to closed EEV of indoor unit (1st detection)	Indoor unit
E703	Error due to opened EEV of indoor unit (1st detection)	Indoor 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

Display	Explanation	Error Source
E902	Water Outlet Sensor Error (open/short)	Outdoor unit
E904	Water TANK Sensor SHORT / OPEN	Hydro Unit
E906	PHE 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
E914	Error due to Incorrect Thermostat 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
E982	PHE out Sensor Error(open/short)	Outdoor unit

Technical data

Refrigerant circuit diagram

- AE125HCTP*S / AE160HCTP*S

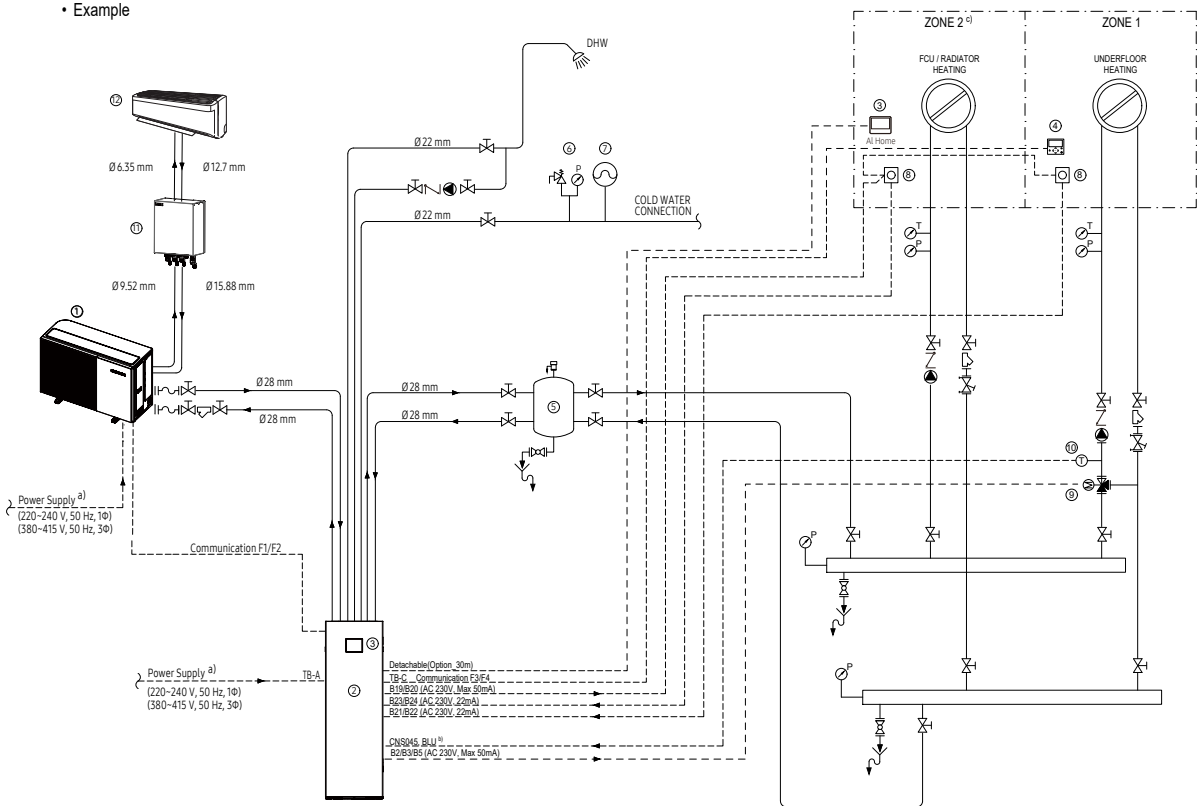


Item	Description
COMP	Rotary Compressor
HX_M	Heat Exchanger - Main (Outdoor unit)
HX_PHE	Heat Exchanger - Plate
OFM	Outdoor Fan Motor
AC	Accumulator
Receiver	Receiver
Oil Sepe	Oil Separator
PS_H	Pressure Sensor - High
PS_L	Pressure Sensor - Low
PW_H	Pressure Switch - High
V_HG	Hot gas Bypass Valve
E_M	Electronic Expansion Valve - Main
PHE EEV	Electronic Expansion Valve - PHE
Bypass EEV	Electronic Expansion Valve - Bypass
V-4W1	Solenoid valve - 4 Way
V-4W 2	Solenoid valve - 4 Way
Sol1	Solenoid valve

Item	Description
Sol 2	Solenoid valve
T_CT	Thermistor - Compressor Top
T_D	Thermistor - Discharge pipe
T_S	Thermistor - Suction pipe
T_CO	Thermistor - Cond Out
T_A	Thermistor - Ambient
PHE_Eva in	Thermistor - Eva In
PHE_Eva out	Thermistor - Eva Out
Cond in	Thermistor - Cond In
T_WI	Thermistor - Water In
T_WO	Thermistor - Water Out
Shut off 1	Shut off valve - Gas
Shut off 2	Shut off valve - Liquid
SV_G	Service Port - Gas
SV_L	Service Port - Liquid
Water in	Water Port - Water in
Water out	Water Port - Water out

Piping & Wiring diagram

• Example



- a) Samsing EHS ClimateHub 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 the 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. Based on the current logic only with two zones control with wired remote controller. Not with thermostat.
- f) 200 L tank integrated hydro unit has six connection pipes (water inlet/outlet, space heating inlet/outlet and DHW inlet/outlet).
- g) The 4-pipe structure buffer tank shown in this scheme is an example of the installation, and the buffer tank installation in the actual site can differ depending on the project requirements.

Technical data

No.	Legend
☐	EHS All-In-One outdoor unit
☐	EHS Mono ClimateHub (Standard)
☐	AI Home (7" Full Touch Display)
☐	(Option) Wired Remote Controller 4.3" Sub (MWR-WW10N)
☐	Balancing vessel (Decoupler)
☐	Safety group (Safety valve, Manometer)
☐	Expansion vessel
☐	Room thermostat (3rd party)
☐	Mixing valve for floor heating (in case of combination with radiators)
☐	Mixing valve temperature sensor ^{b)}
☐	EEV Kit
☐	RAC

Symbols	
	Circulation pump
	Shut off valve
	Ball valve
	Check valve
	Strainer
	Temperature gauge
	Pressure gauge
	Safety valve
	Mixing valve
	Regulation valve
	Temperature sensor
	Air vent (apply when necessary) ^{d)}
	Relay

