Hydro Unit
Installation manual

VHEC***S4-4P / VHTC***S4-4P

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

LENNOX Powered by SAMSUNG

Contents

Safety precautions

California Proposition 65 Warning (US)

⚠ **WARNING :** Cancer and Reproductive Harm - www.P65Warnings.ca.gov.

Before installing an Hydro unit / Hydro unit HT please read this manual thoroughly to ensure that you know how to safely and efficiently install a new appliance.

Store the Operation and Installation in a safe location and remember to hand it over to the new owner if the Product is sold or transferred.

❋ This product uses R-410A and R-134a (Hydro unit HT) refrigerant.
- When using R-410A and R-134a(Hydro unit HT), moisture or foreign substances may affect the capacity and reliability of the product. Safety precautions must be taken when installing the refrigerant pipe.
- The designed maximum pressure of the system is 4.1 MPa (594.7 psi). Select appropriate material and thickness according to the regulations.
- R-410A and R-134a(Hydro unit HT) are a quasi-azeotrope of two refrigerants. Make sure to charge with liquid phase when filling refrigerant. (If you charge vapor refrigerant, it may affect the capacity and reliability of the product as a result of a change in the blend of the refrigerant.)

❋ You must connect the outdoor unit for R-410A refrigerant.

❋ This product uses a plate type heat exchanger. Extra care must be taken when choosing the installation location as it requires water pipes.

❋ A closed type water circuit system must be applied for system protection and reliability.

Before installation, read the 'Severe warning signs' and the 'Caution signs' thoroughly.

Manufacturer is not responsible for accidents due to incorrect installation (user will be responsible for any service charges that may occur).

Manufacturer is not responsible for any product problems that may occur due to incorrect water pipe installation.

Maintain the water temperature and the amount of water flow within operational range. Manufacturer is not responsible if the heat exchanger freezes and ruptures due to incorrect installation.

This product is a PARTIAL UNIT, complying with PARTIAL UNIT requirements of this Standard, and must only be connected to other units that have been confirmed as complying to corresponding PARTIAL UNIT requirements of this Standard, UL 60335-2-40/CSA C22.2 No. 60335-2-40, or UL 1995/CSA C22.2 No 236.

⚠ **WARNING**	Hazards or unsafe practices that may result in **severe personal injury or death.**
⚠ **CAUTION**	Hazards or unsafe practices that may result in **minor personal injury or property damage.**

Safety precautions

SEVERE WARNING SIGNS

Installation must be performed by a qualified installer.

- If the user installs a product improperly on their own, it may cause refrigerant leakage and lead to electric shock or fire.

Install the unit in a place where it is strong enough to hold the product weight.

- When installed in place where it is not strong enough to withhold the product weight, the unit could fall and cause injury.

Do not put any product or object under the Hydro unit / Hydro unit HT.

- Water from the Hydro unit / Hydro unit HT may fall and cause fire or loss of property.

Electric work must be done by qualified persons, complying the national wiring regulations and installed according to the instruction stated in the installation manual with leased circuit.

- Insufficient capacity or improper installation of the power circuit may result in electric shock or fire hazard.

Use the specified wires for wiring. Make sure that the wires are firmly connected and firmly fixed to the terminal connections so that no external is applied to the wires.

- Improper connection or fixation may cause fire.

Neatly arrange the wires in the electrical parts to make sure that electrical cover is closed securely without any gap.

- If the cover is not properly closed, heat may generate on the electrical terminal and cause electric shock or fire.

Make sure to use the provided or specified parts with the specified tools for installation.

- Failing to do so may cause product failure, refrigerant leakage, fire or electric shock.

In any case of refrigerant leakage, make sure to ventilate.

- If the refrigerant gas comes in contact with fire, harmful gas will be generated.
- Make sure that the refrigerant gas does not leak after completing the installation. If the refrigerant gas of the indoor unit leaks and comes into contact with the fan heater, space heater or stove, harmful gas will be generated.

Make sure to perform grounding work.

- Do not connect the ground wire to a gas pipe, water pipe, lightning rod or telephone grounding. Improper grounding could cause electric shock.

Do not install the product in a place where it is or might be exposed to inflammable gas leakage.

- When the gas leaks and gets accumulated around the product, it may cause fire.

Installation work must be done according to the instruction in this installation manual.

- Improper installation may cause water leakage, electric shock or fire.

When connecting the power supply, make sure the connection is tight and the connection does not have any dust, blockage, or loose parts.

- If there are dusts, blockage or loosened part on the power supply connection, it can cause electric shock or fire. Also, replace the connection if it is loose.

When installation is in progress, check the following before operating the product.

- Make sure pipes are properly connected without any leakage.
- When there is leakage on the connected part, air may get in and cause abnormally high pressure state which may lead to pipe explosion and personal injury.

Do not assemble the power cord on your own, use two cables together to extend the cable length or connect the power to a multi consent connected with other products.

- Bad connection, isolation and over voltage may cause fire or electric shock.

Cut-off the main power supply before electrical installation of Hydro unit / Hydro unit HT.

- Potential risk or electric shock.

You may need to install an ELB (earth leakage breaker) depending on the installation location.

- Not installing an ELB (earth leakage breaker) may cause electric shock.

Supply power to the product for winter even if it is idle, because it operates in protection mode when the temperature goes down to zero.

- If you cut-off the power, protection mode cannot be operated and may cause damage to the product.
- Hydro unit / Hydro unit HT is designed to be installed indoor. Make sure to install it in a place where there is no risk of surrounding temperature from dropping below zero.

Wear protective equipment (such as safety gloves, goggles, and headgear) during installation and maintenance works. Installation/repair technicians may be injured if protective equipment is not properly equipped.

This appliance is not intended for use by persons(including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety ; Young children should be supervised to ensure that they do not play with the appliance.

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

Be sure not to perform power cable modification, midway wiring, and multiple wire connection.

- It may cause electric shock or fire due to poor connection or insulation and current limit override.
- When midway wiring is required due to power line damage, refer to "How to connect your extended power cables" in the installation manual.

CAUTION SIGNS

Read the installation manual thoroughly before installing the product.

Make sure to transport the product with its packages on. In case if you must remove the packaging, use soft materials to carry the product to prevent any damages on the product.

Perform the drainage/piping work securely according to the installation manual.

- If not, water could drop from the unit and household goods could get wet and damaged.

Wear thick gloves during the installation process.

- If not, personal injury may occur due to the product parts.

If the Hydro unit / Hydro unit HT is installed in a small area, beware of oxygen deficiency in the area that may caused by refrigerant leakage.

Do not install or operate Hydro unit / Hydro unit HT in following places:

- Place where surrounding air contains mineral oil or where oil vapor occurs; or cooking area where vapor or water particles occur by spraying. (When particles of oil sticks to the heat exchanger following incidents may occur; it may cause performance decrease or cause condensation water to scatter. Also, if oil particles sticks to the plastic parts, it may cause damage or deformation of those part which may lead to product malfunction or refrigerant leakage.)
- Place where corrosive gas, such as sulphurous gas, exists. (When installing the product in these places, contact an installation specialty store since the copper pipe and brazing part will need additional corrosion proof or anti-rust additive to prevent corrosion.
- Place where product is exposed to flammable gases, carbon fiber, flammable powder/dust or place where volatile flammable gases such as thinner or gasoline is frequently used. (Gases near Hydro unit / Hydro unit HT may ignite.)
- Place where electromagnetic waves are emitted (Control devices may not work.)
- Place with high level of basicity within the air such as near ocean; place with high voltage fluctuation such as factory; and within the car or ship.
- Place where special spray is frequently used.
- Place where fine powder is used (such as bakery)
- Do not use the product to store precision instrument, food, plants or animals, cosmetic goods, art works or any other special purpose. (There is risk of property loss.)

Safety precautions

CAUTION SIGNS

After completing the installation, run the trial operation. If no error occurs, explain to the customer how to use and clean the product according to the user's manual. In addition give the installation manual and the user's manual to the customer.

Before the installation, check if the product is in good shape.

▶ Do not install the product with the damage which occurred during shipment.

All of the materials used to manufacture product and packages are eco-friendly and they are recyclable.

Refrigerant used in this product must be added or disposed in an appropriate way by qualified personnel.

▶ At the end of the life cycle, take it to a proper recycling or disposal center or return it to the dealer so that it can be disposed correctly.

Combination rate

▶ This product should be connected to VRF / Water-Cooled VRF.

▶ Installation combinations:

- This product should be among 50~130% of the outdoor unit's nominal capacity.
- When this product is connected to heat pump outdoor units at 130~180% combination rate, it must meet the conditions below.

1) Combination rate for indoor units: Standard indoor units (ex: cassette, duct, etc.) under 100% + Hydro Unit/Hydro Unit HT under 80%.
2) Standard indoor units (ex: cassette, duct, etc.) should be operated in cooling mode only and Hydro unit/ Hydro Unit HT should be operated in heating mode only (including floor heating).
3) It is not possible to operate standard indoor units (ex: cassette, duct, etc.) and Hydro unit/ Hydro unit HT at the same time.

- When combining an outdoor unit with an indoor unit, refer to the tables below for the capacity of Hydro unit HT.

	Capacity correction
VHTC048S4-4P	48 kBTU/h
VHTC072S4-4P	72 kBTU/h

Preparing the installation

Tools required for installation

General tools

① Vacuum pump ② Torque wrench ③ Pipe cutter ④ Reamer ⑤ Pipe bender
⑥ Leveling tool ⑦ Screw driver ⑧ Spanner ⑨ Drill ⑩ L wrench
⑪ Measuring tape

Tools for operation

① Thermometer ② Resistance meter ③ Electroscope

Accessories (supplied)

Before the installation, make sure to check if following accessories are included inside the Hydro unit / Hydro unit HT.

Installation manual	Drain plug	Drain cap
		

Additional accessory (not included)

Additional accessory needs to be purchased separately and installed to operate Hydro unit / Hydro unit HT.

Hydro Unit Wired Controller
VSTAT05P-1


▶ Recommended specification of the strainer

Model type	Model name	Work pressure	Work temperature	Water pipe connection part	Mesh size	Material (Strainer/Mesh)
Hydro Unit	VHEC036S4-4P	1.0 MPa (145 psi)	-4 ~ 95 °F (-20 ~ 35 °C)	NPT 1″(25A)	50 Mesh	AISI316/SUS304
	VHEC048S4-4P					
	VHEC096S4-4P					
	VHEC144S4-4P			NPT 1-1/4″(32A)		
Hydro Unit HT	VHTC048S4-4P		-4 ~ 109.4 °F (-20 ~ 43 °C)	NPT 1″(25A)		
	VHTC072S4-4P					

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Preparing the installation

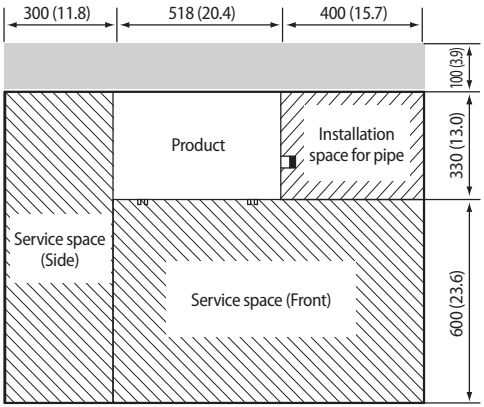
Selecting installation location

- Choose a location with ventilation ducts or openings to remove the heat generated from the product and maintain the surrounding temperature within: Hydro unit: 41 ~ 104 °F (5 ~ 40 °C), humidity 80 % Hydro unit HT: 41 ~ 95 °F (5 ~ 35 °C), humidity 80 %.
- Choose a place where the structure can bear the weight and vibration of the Hydro unit / Hydro unit HT.
- Choose a flat place that rainwater does not settle or leak.
- Choose a well ventilated place with sufficient space for repair and other services.
- Choose a place where you can easily connect the refrigerant pipes between the Hydro unit / Hydro unit HT and outdoor unit within allowable distance.
- Do not install this product in a place where it may corrode.
- Install the Hydro unit / Hydro unit HT power and communication cables to the outdoor unit at least 1 m (3.28 feet) away from electric appliances such as TVs. In some cases interference may occur even if there's more than 1 m (3.28 feet) gap from the electric appliances.

Space requirement

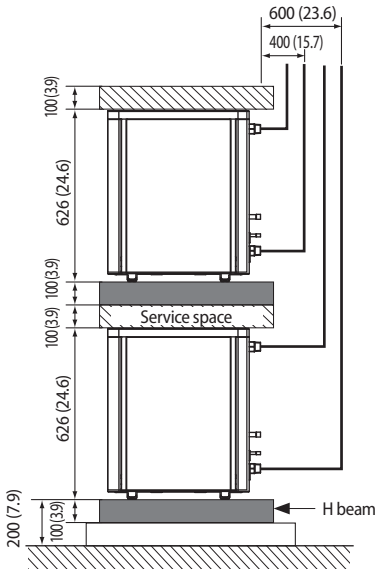
- When installing the product, make sure to secure minimum clearance with obstacles as shown below.
- When you install one product on top of the other one, secure at least 600 mm (23.6 inch) of space on the water pipe side.

Unit: mm (inch)



Hydro unit

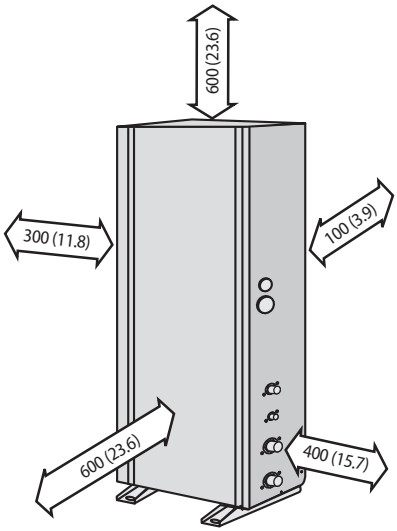
Unit: mm (inch)



<When stacking Hydro units>

Hydro unit HT

Unit: mm (inch)



CAUTION

- If the Hydro unit / Hydro unit HT must be installed close to a wall, prevent unit vibration from transmitting to nearby walls with cushioning materials etc.

Base construction and installation of the Hydro unit / Hydro unit HT

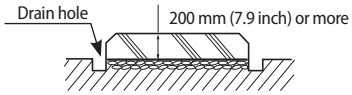
WARNING

- If this product is installed in residential area, apply vibration isolation to prevent the vibration from transferring to the building.

▶ Manufacturer is not responsible for the damage occurred by not following the installation standards.

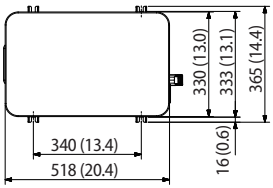
1. Considering the vibration and weight of the Hydro unit / Hydro unit HT, strength of the base ground must be strong enough to prevent noise and the top part of the base ground has to be flat.
2. Base ground should be 1.5 times larger than the bottom of the Hydro unit.
3. It is necessary to add wire mesh or steel bar during concrete construction for the base ground to prevent damages or cracks.
4. Place the Hydro unit / Hydro unit HT on the base construction and completely fix it with the bolt, nut and washer. [The bearing force has to be over 3.5 kN (786.8 lbf)]
5. Fix the Hydro unit / Hydro unit HT firmly with 4 foundation bolts.
6. When concrete construction for Hydro unit / Hydro unit HT installation is completed, install an anti-vibration pad(t=20 mm or more) or an anti-vibration frame(vibration transmissibility=5 % and below) to prevent vibration of the outdoor unit from transferring to the base ground.
7. When constructing base ground, Hydro unit / Hydro unit HT must be supported within the range of following dimensions.

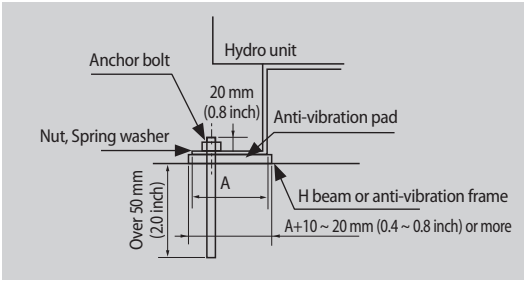
Base ground construction

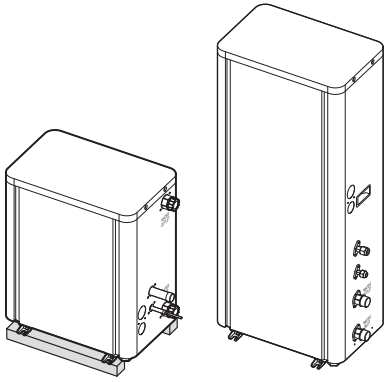


Hydro unit installation

Unit: mm (inch)

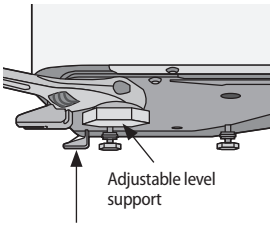




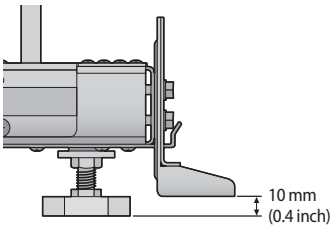


Hydro unit HT installation

Considering the weight and vibration of the Hydro unit HT, the strength of the base ground must be strong enough to support the unit and prevent noise. The base must be flat and level.

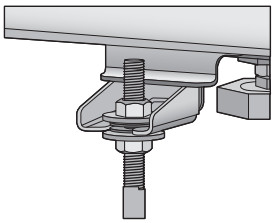


Adjust the level support keeping at least 10 mm (0.4 inch) from the bottom of the level support to the bottom of the fixed bracket.



Place the Hydro unit HT on the base and fix it with a bolt or threaded rod (M10, 3/8"), nut and washer.

The recommended length of the bolt or threaded rod is over 20 mm (0.78 inch) from the base.



< A method of fixing the bracket >

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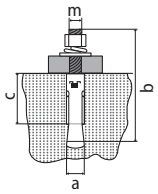
Base construction and installation of the Hydro unit / Hydro unit HT

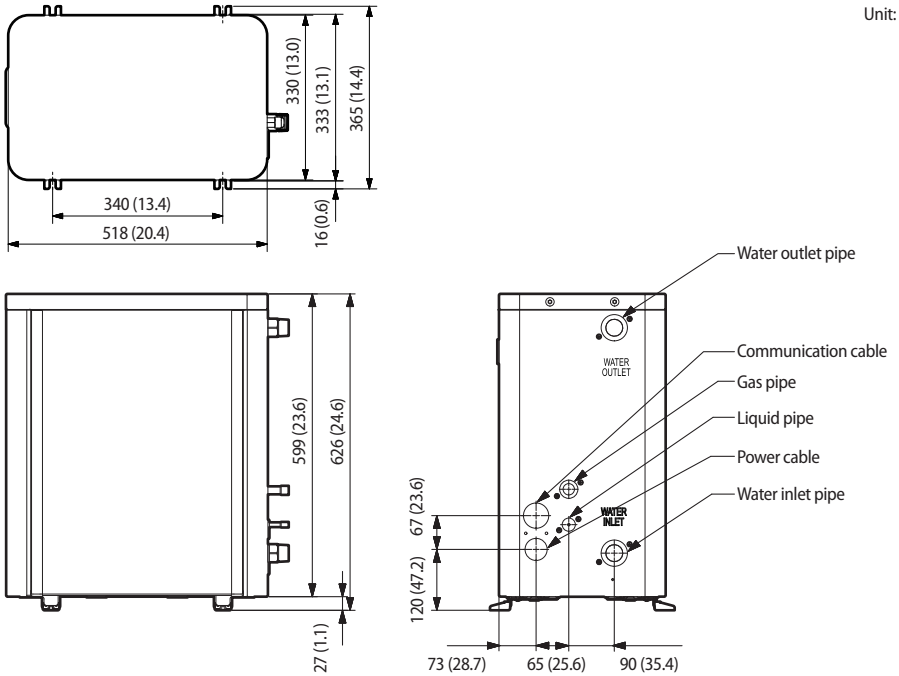
Anchor specification



Size	Diameter of drill bit (a)	Anchor length (b)	Sleeve length (c)	Insert depth	Fastening torque
M10 (3/8″)	14 mm (0.6 inch)	75 mm (3.0 inch)	40 mm (1.6 inch)	50 mm (2.0 inch)	30 N·m (22.1 lbf·ft)

Dimension of the Hydro unit

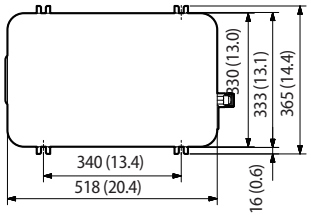
Unit: mm (inch)

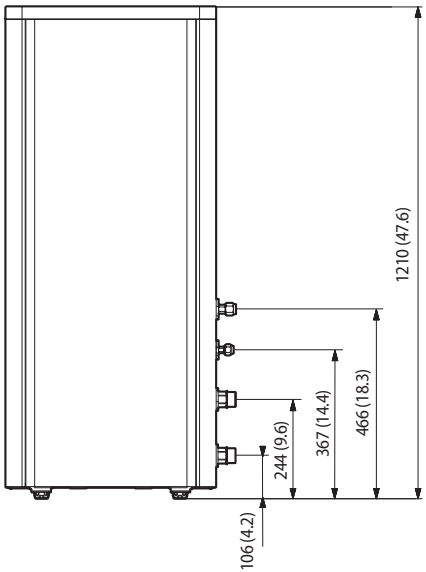


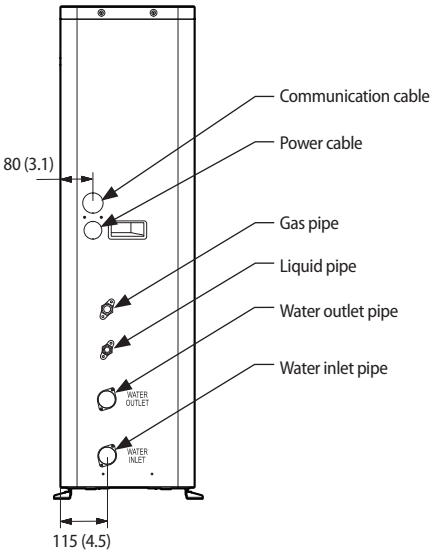
Model of the Hydro unit		VHEC036S4-4P VHEC048S4-4P	VHEC096S4-4P	VHEC144S4-4P
Refrigerant side	Liquid side connection part	3/8″ (ø9.52)	3/8″ (ø9.52)	1/2″ (ø12.7)
	Gas side connection part	5/8″ (ø15.88)	7/8″ (ø22.23)	1-1/8″ (ø28.58)
Water side connection part		NPT 1″ (25A)	NPT 1″ (25A)	NPT 1-1/4″ (32A)

Dimension of the Hydro unit HT

Unit: mm (inch)







Model of the Hydro unit		VHTC048S4-4P/VHTC072S4-4P
Refrigerant side	Liquid side connection part	3/8″ (ø9.52)
	Gas side connection part	5/8″ (ø15.88)
Water side connection part		NPT 1″ (25A)

Refrigerant pipe installation

Refrigerant pipe work

- Use exclusive tools and accessories for R-410A to respond to pressure of the R-410A and prevent foreign substances from entering into the pipes.
- The length of refrigerant pipe should be as short as possible and the height difference between the Hydro unit / Hydro unit HT and outdoor unit should be minimized.
- Piping work must be done within allowable piping length, height difference, and the allowable length after branching.
- The pressure of the R-410A is high. Use only certified refrigerant pipe and follow the installation method.
- Use clean refrigerant pipe and there shouldn't be any harmful ion, oxide, dust, iron content or moisture inside pipe.
- Pipe work must be done aside from the product.
- After completing the pipe installation, calculate the additional amount of refrigerant according to method of each indoor units and make sure to use R-410A refrigerant when charging. (Color of the R-410A refrigerant container is painted in pink.)

Model name of Hydro unit	VHEC036S4-4P VHEC048S4-4P VHTC048S4-4P VHTC072S4-4P	VHEC096S4-4P	VHEC144S4-4P
Amount of additional refrigerant	0.6 kg (1.3 lb)	0.7 kg (1.5 lb)	1.2 kg (2.6 lb)

- Do not use Flux when brazing the refrigerant pipes.

CAUTION

- The maximum number of the Hydro Unit HT connectable to one system(module) is 3 units.
- In case the capacity combination of the Hydro Unit/Hydro Unit HT exceeds 50 % among the total indoor unit, please don't put the additional refrigerant.
- If you need to perform cooling refrigerant charging mode with R-410A outdoor unit, the Hydro unit HT will not operate if the water temperature is below 33 ºC (91.4 ºF). Make sure to raise the water temperature above 33 ºC (91.4 ºF) before conducting cooling refrigerant charging mode.
  Alternatively, you can proceed with heating refrigerant charging mode.
- If you need to perform pump down operation, the Hydro unit HT will not operate if the water temperature is below 33 ºC (91.4 ºF). Make sure to raise the water temperature above 33 ºC (91.4 ºF) before conducting pump down operation.
- All other indoor units should perform the heating or stop, when R-134a refrigerant collecting operation.

Tools used for refrigerant pipe installation

Product using R-410A/R-134a refrigerant requires exclusive tools. Check the conventional tools for compatibility before installation.

<table>
<tr><th>Tool</th><th>Work</th><th colspan="2">Compatibility with conventional tool</th></tr>
<tr><td>Pipe cutter</td><td rowspan="5">Refrigerant pipe work</td><td>Pipe cutting</td><td rowspan="2">Compatible</td></tr>
<tr><td>Flaring tool</td><td>Pipe flaring</td></tr>
<tr><td>Refrigerating machine oil</td><td>Apply refrigerant oil on flared part</td><td>Use exclusive ether oil, ester oil, alkali benzene oil or mixture of these oils</td></tr>
<tr><td>Torque wrench</td><td>Connect flare nut with pipe</td><td rowspan="4">Compatible</td></tr>
<tr><td>Pipe bender</td><td>Pipe bending</td></tr>
<tr><td>Nitrogen gas</td><td rowspan="2">Air tightness test</td><td>Inhibition of oxidation</td></tr>
<tr><td>Welder</td><td>Pipe welding</td></tr>
<tr><td>Manifold gauge</td><td rowspan="2">Air tightness test ~ additional refrigerant charging</td><td rowspan="2">Vacuuming, charging and checking operation</td><td>Need exclusive one to prevent mixture of R-22 refrigerant oil use and also the measurement is not available due to the high pressure.</td></tr>
<tr><td>Refrigerant charging hose</td><td>Need exclusive one due to the refrigerant leakage or inflow of impurities.</td></tr>
<tr><td>Vacuum pump</td><td>Vacuum drying</td><td colspan="2">Compatible (Use products which contains the check valve to prevent the oil from flowing backward into the outdoor unit.)
Use the one that can be vacuumed up to 100.7 kPa (14.6 psi, 5 Torr).</td></tr>
<tr><td>Scale for refrigerant charging</td><td rowspan="2"></td><td colspan="2">Compatible</td></tr>
<tr><td>Gas leak detector</td><td>Gas leak test</td><td>Need exclusive one
(Ones used for R-134a is compatible)</td></tr>
<tr><td>Flare nut</td><td colspan="3">Must use the flare nut equipped with the product.
Refrigerant leakage may occur when the conventional flare nut for R-22 is used.</td></tr>
</table>

Refrigerant pipe installation

Selecting refrigerant pipe

▶ Install the refrigerant pipe according to main pipe size for each capacities of Hydro unit / Hydro unit HT.

Model name of Hydro unit		VHEC036S4-4P VHEC048S4-4P VHTC048S4-4P VHTC072S4-4P	VHEC096S4-4P	VHEC144S4-4P
Refrigerant side	Liquid side	3/8″ (ø9.52)	3/8″ (ø9.52)	1/2″ (ø12.7)
	Gas side	5/8″ (ø15.88)	7/8″ (ø22.23)	1-1/8″ (ø28.58)

Keeping refrigerant pipe

▶ To prevent foreign materials or water from entering the pipe, storing method and sealing method (especially during installation) is very important. Apply correct sealing method depending on the environment.

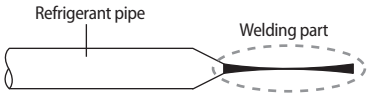
▶ Be especially careful when you penetrate the pipe through the hole in a wall or when the end of the pipe is exposed to outdoor during installation.

▶ Use the flare nut supplied with the product. If other flare nuts are used, it can cause refrigerant leakage.

Exposure place	Exposure time	Sealing type
Outdoor	Longer than one month	Pipe pinch
	Shorter than one month	Taping
Indoor	-	Taping

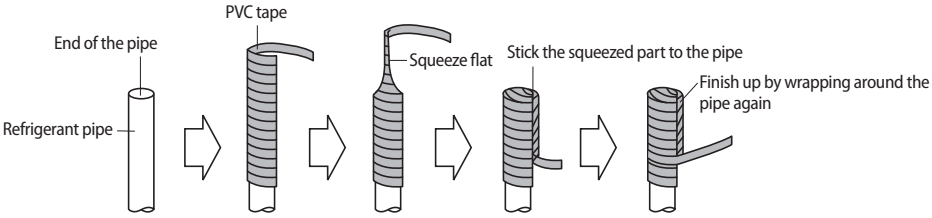
Pinching the refrigerant pipe

▶ Compress the end of the refrigerant pipe and weld the compressed part.



Taping the refrigerant pipe

▶ Seal the end of the refrigerant pipe with a PVC vinyl tape.



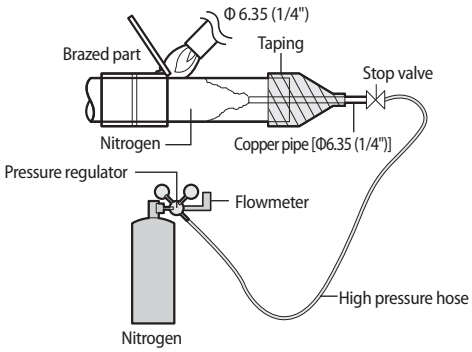
Refrigerant pipe welding and safety information

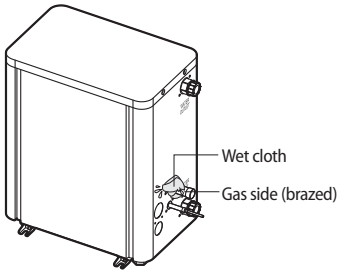
Important information for refrigerant pipe work

- Make sure there is no moisture inside the pipe.
- Make sure there are no foreign substances and impurities in the pipe.
- Make sure there is no leakage.
- Make sure to follow the instruction when welding or storing the pipe.

Nitrogen flushing while brazing (Hydro unit)

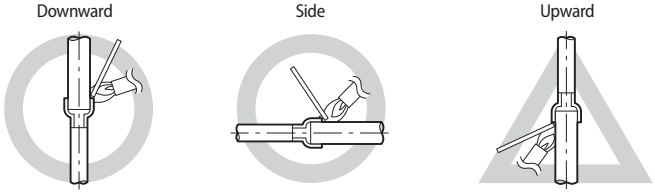
- When brazing the refrigerant pipes, flush them with nitrogen gas as shown in the picture.
- If you do not perform nitrogen flushing when brazing the pipes, oxide may form inside the pipe and can cause damage to the important parts such as compressor and valves etc.
- Adjust the flow rate of the nitrogen flushing with a pressure regulator to maintain 0.05 m^3/h (1.77 ft^3/h) or less.
- When brazing the pipes on the connection port, cover the valve with wet cloth before brazing (to protect the parts within the valve)





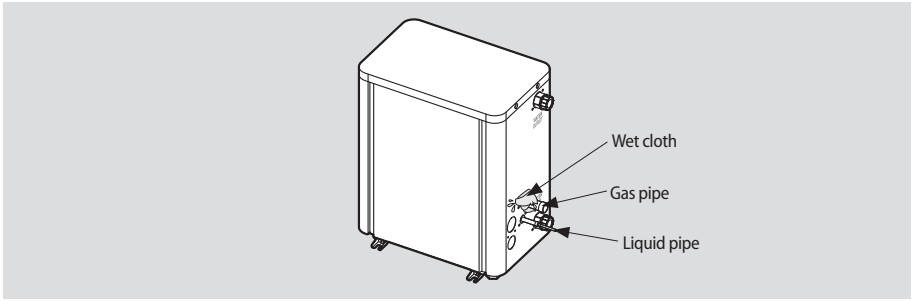
Direction of the pipe when brazing

- Direction of the pipe should be headed downward or sideways when brazing.
- Avoid brazing the pipe with pipe direction heading upward.



Refrigerant pipe installation

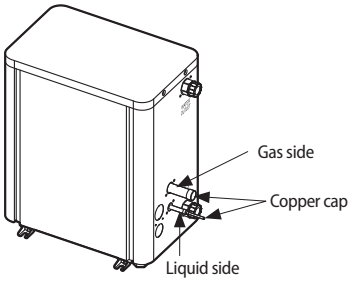
Refrigerant pipe work on Hydro unit



CAUTION

- Caution for brazing the pipe to a Hydro unit
  - When brazing the pipe to the product, the unit may get damaged by the heat and flame from brazing. Use a flame proofing cloth to protect the unit from a brazing fire or flame.
  - Wrap the pipe with a wet cloth and braze it as shown in the illustration. Also, water dripping from the wet cloth may interrupt the brazing so make sure the water does not drip from the wet cloth.
  - Make sure that connected pipes of Hydro unit and the outdoor unit do not interrupt each other or make contact with the product. (Vibration may cause damage to the pipes.)
  - When removing the sealed pipe on the bottom side of the service valve, cut it with a pipe cutter first and then start the brazing. When the sealed pipe is brazed without cutting, you may get injured by the refrigerant within the pipe.

1. Remove the copper cap of the refrigerant pipe and eliminate the sludge or foreign substances on the brazed part and then braze the connecting pipe on each port.
   - Since nitrogen gas is sealed within the pipe, you must discharge the nitrogen gas from the liquid pipe. Then remove the copper cap and check for existence of the nitrogen gas.
   - Check the pressure of the nitrogen gas before brazing. If the nitrogen gas is not being purged, product is not normal so do not install it.



2. Cover the refrigerant pipe well with insulation.
   - It prevents the water, on the outer surface of the pipe, from dripping and increase the efficiency of the Hydro unit.
3. Cut off the leftover insulator.
4. Check for cracks on the bent part of the pipes.
5. When the Hydro unit is installed in a hot and humid place, water may form on the outer surface of the insulation so it would be necessary to double the insulation thickness [10 mm (0.4 inch) or more].

Refrigerant pipe work on Hydro unit HT

Hydro unit HT has refrigerant pipes of two different types.

- ▶ Liquid side pipe
- ▶ Gas side pipe
- ▶ Make sure there are no foreign substances and impurities in the pipe.

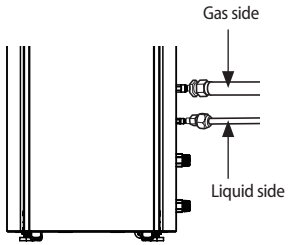
CAUTION

- There is no nitrogen gas inside of connected pipes of Hydro unit HT and the outdoor unit.
- Hydro unit HT is using refrigerant R-134a in the integral circuit. The connected pipes of Hydro unit HT and the outdoor unit are using R-410A
- If impurities (moisture, micro-substances) are introduced into the refrigerant pipes, the product performance and reliability may be seriously affected.
- The design pressure is 4.1 MPa (594.7 psi), and make sure to consider selecting the refrigerant pipes which meet the standard(material, thickness)
- Make sure to use liquid refrigerant when charging the refrigerant, because the used refrigerant is a blended refrigerant.

✻ Hydro unit HT uses a plate type heat exchanger, and make sure to consider installation location to connecting water pipes.

1. Remove the safety cap of the refrigerant pipe and fasten the nuts after connecting refrigerant pipes to each port of the Hydro unit HT.

▶ Make sure to hand tighten the nut first, after that use tools like torque wrench and spanner.



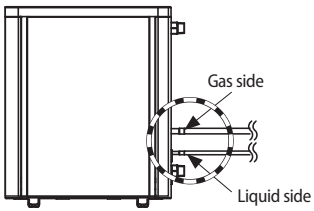
2. Wrap the refrigerant pipes with insulation.
3. Cut the rest of insulation.
4. Make sure to check any defects on the bent parts of the pipes.
5. The standard temperature and humidity condition is 86 °F (30 °C) with humidity below 85 %. If the condition is in high humidity, use one grade thicker. [Over 10 mm (0.4 inch)]

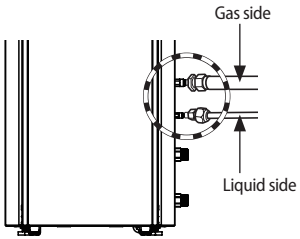
Performing leak test and insulation

Before completing the installation (insulating hose and pipes), you must check for gas leakage and when there is no leakage, you may insulate the pipes and hoses.

Leak test

Use a gas detector to check the connection part of the pipes for gas leakage.





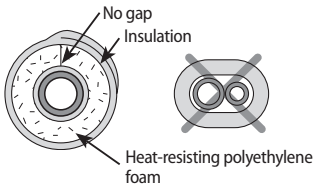
Insulation

Selecting the insulator of refrigerant pipe

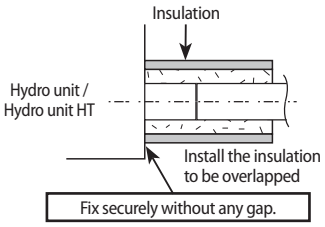
- ▶ Insulate the gas pipe and liquid pipe by referring to the thickness of insulation for each pipe size.
- ▶ The standard temperature and humidity condition is 86 °F (30 °C) with humidity below 85 %. If the condition is in high humidity, use one grade thicker.

Pipe	Outer diameter		Insulator				Remarks
			General [86 °F (30 °C), 85 %]		High humidity [86 °F (30 °C), over 85 %]		
			EPDM, NBR				
	mm	inch	mm	inch	mm	inch	
Liquid pipe	6.35 ~ 9.52	1/4 ~ 3/8	9	3/8	9	3/8	Heating resisting temperature over 248 °F (120 °C)
	12.7 ~ 50.8	1/2 ~ 2	13	1/2	13	1/2	
Gas pipe	6.35	1/4	13	1/2	19	3/4	
	9.52 ~ 25.4	3/8 ~ 1	19	3/4	25	1	
	28.58 ~ 44.45	1 1/8 ~ 1 3/4	19	3/4	32	1 1/4	
	50.8	2	25	1	38	1 1/2	

1. To avoid condensation problems, wrap each pipes with heat-resisting polyethylene foam.
   - Make sure that the opening part of the insulation to face up.



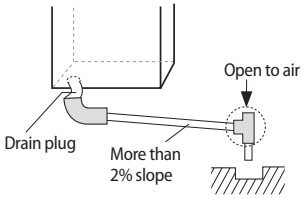
2. Wrap the refrigerant pipes and drain pipes with insulation.



Installing the drain pipe

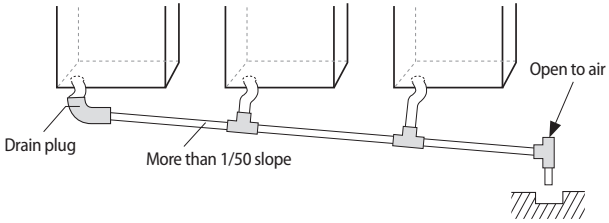
Installing the drain pipe

- Use a level to make sure that product is horizontally leveled.
- Choose one of the 2 drain holes on the bottom of the product and insert the provided drain plug, then connect the drain pipe.
- From the 2 drain holes, block the unused hole with the provided rubber plug.
- Install the drain pipe at the rear side of the unit to get a sufficient space for repairs and service on the front side.
- Do not install a trap on the pipe and install the drain pipe horizontally with a slope of 2% or more to prevent water from flowing backwards.
- For smooth drainage, install an air vent that is open to air.
- Insulate the drain pipe and drain plug with insulation over 10 mm (0.4 inch).
- Install the safety equipment for a heating appliance.



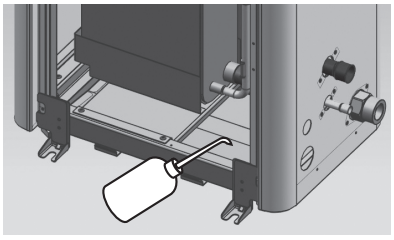
When common drainage is installed

- Install a common drain pipe with an air vent that is open to air.

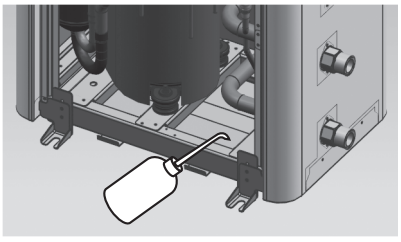


Checking the water leakage

Prepare about 2 liters of water and pour water into the drain pan of the Hydro unit / Hydro unit HT as shown in the illustration.



<Hydro unit>

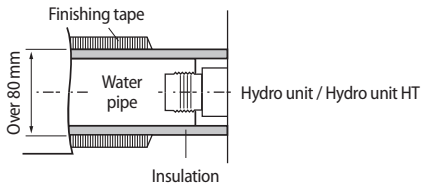


<Hydro unit HT>

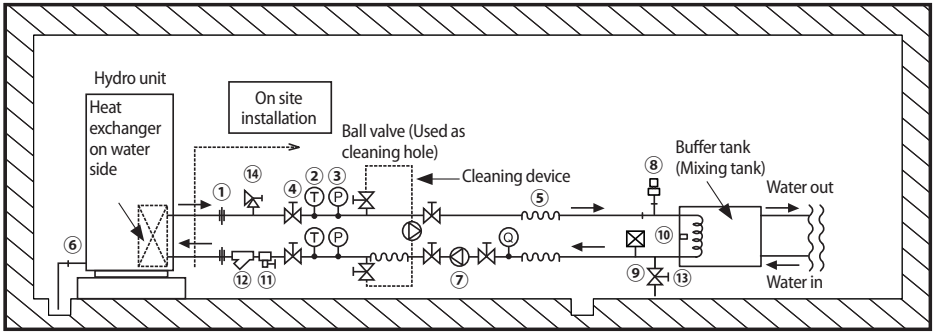
Water pipe installation

1. Use closed type water pipe and closed type expansion tank when constructing water piping system.
2. Water pipe installation system
   1) Install the water pipe as shown in the below illustration. All the parts, other than Hydro unit / Hydro unit HT, must follow on site installation specification.

<Water pipe connection part>

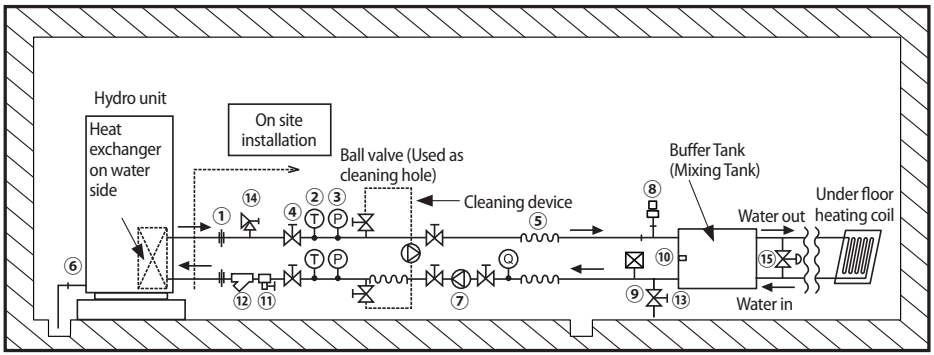


▶ Installing hot water supply



①	Water pipe joint (union, flange)	⑤	Flexible joint	⑨	Expansion tank
②	Thermometer	⑥	Drain (within the product)	⑩	Temperature sensor for hot water tank
③	Manometer	⑦	Pump	⑪	Drain valve
④	Ball valve	⑧	Air vent	⑫	Strainer
⑬	Water Valve	⑭	Pressure relief valve (Pressure safety valve)		

▶ Installing under floor heating



①	Water pipe joint (union, flange)	⑤	Flexible joint	⑨	Expansion tank
②	Thermometer	⑥	Drain (within the product)	⑩	Temperature sensor for thermal storage tank
③	Manometer	⑦	Pump	⑪	Drain valve
④	Ball valve	⑧	Air vent	⑫	Strainer
⑬	Water Valve	⑭	Pressure relief valve (Pressure safety valve)	⑮	Differential Pressure bypass Valve

When more than two water pipes are used for heating (e.g. Floor + Fan Coil Unit), Buffer Tank (Mixing Tank) or bypass valve should be used to maintain the water flow rate.

▶ On site installation specification

Model name	Strainer	Flow meter	Thermometer	Manometer	Air vent	Pump	Ball valve	Drain valve
VHTC048S4-4P	#50 NPT	0~50 ℓ/min (0 ~ 13.2 gal/min)	0~212 °F (0~100 °C)	0 ~ 1 Mpa (0 ~ 145 psi)	0.6 m^3/h (158.5gal/h) [Condition: 0.15MPa (21.8psi)]	23 ℓ/min (6.1 gal/min)	NPT 1"	15 A
VHTC072S4-4P		0 ~ 100 ℓ/min (0 ~ 26.4 gal/min)				36 ℓ/min (9.5 gal/min)		
VHEC036S4-4P		0 ~ 50 ℓ/min (0 ~ 13.2 gal/min)				36 ℓ/min (9.5 gal/min)		
VHEC048S4-4P						48 ℓ/min (12.7 gal/min)		
VHEC096S4-4P		0 ~ 100 ℓ/min (0 ~ 26.4 gal/min)				92 ℓ/min (24.3 gal/min) (Refer topressuredrop graph)		
VHEC144S4-4P	#50 NPT	0 ~ 150 ℓ/min (0 ~ 39.6 gal/min)	0 ~ 212 °F (0 ~ 100 °C)	0 ~ 1 Mpa (0 ~ 145 psi)	0.6 m^3/h (158.5 gal/h) [Condition: 0.15 MPa (21.8 psi)]	150 ℓ/min (39.6 gal/min) (Refer topressuredrop graph)	NPT 1-1/4"	15 A

Water pipe installation

2) Do not exceed the torque value stated in the below table. If you apply more torque, it may cause damage to the product.

Diameter of water pipe (Outer diameter, mm)		Tightening torque	
mm	inch	N·m	lbf·ft
10 ~ 20	0.39 ~ 0.79	25	18.4
21 ~ 30	0.83 ~ 1.18	50	36.9
31 ~ 50	1.22 ~ 1.97	100	73.8
51 ~ 80	2.0 ~ 3.15	220	162.3
81 ~ 115	3.19 ~ 4.53	600	442.5

3) Use certified parts for water pipe system and the water pressure of the water pipe system connected to outdoor unit must remain under 1.0 MPa (145.0 psi). Use copper or stainless pipe water pipe.

4) Water pipes must be equipped with valves and other instrumentations as shown in the diagram. Strainer must be installed within 1 ~ 2 m (3.3 ~ 6.6 ft) from the entrance pipe of the Hydro unit / Hydro unit HT.
   - When strainer is not installed, sand, dust or rust debris may cause product breakage.
   - Make sure that the strainer mesh is made of stainless steel.

5) Water inlet pipe is located at the bottom part of the heat exchanger and the water outlet pipe is at the top part of the heat exchanger.

6) Hydro unit / Hydro unit HT must be installed indoor at room temperature and the water inlet and outlet must be insulated as shown in the 'Water pipe installation system' diagram on page 22.

7) Insulation work must be done properly and thoroughly to prevent condensation from forming on the surface of the product and drain pipes of indoor/outdoor units. When the necessary work is not done thoroughly, you will waste energy caused by thermal loss. In cold applications pipes may freeze and burst causing property damage.

8) If you stop the product for long time or in night time, water pipe circuit may freeze naturally when the temperature around the Hydro unit / Hydro unit HT is under 32 °F (0 °C). When water pipe circuit freezes, it will cause damage to the plate type heat exchanger and therefore preventive measure must be taken according to the situation.
   - Drain remaining water in the water pipe
   - Install self-regulating heat cable on the water pipes
   - If the product is installed in a place where surround temperature drops below 32 °F (0 °C), use anti-freeze accordingly for freezing point depression.

9) Install number of auto air discharge valve at a point where air may remain within the pipe (such as vertical water pipe). If the air within the pipe is not discharged, it may cause performance decrease or corrosion on the product or pipes.

10) Following is the operation range of water.

Section		Outlet water temperature		Flow rate					
		VHEC***S4-4P	VHTC***S4-4P	VHEC036S4-4P	VHEC048S4-4P	VHEC096S4-4P	VHEC144S4-4P	VHTC048S4-4P	VHTC072S4-4P
Standard condition	Heating	95 °F (35 °C)	149 °F (65 °C)	36 l/min (9.5 GPM)	48 l/min (12.7 GPM)	92 l/min (24.3 GPM)	150 l/min (39.6 GPM)	23 l/min (6.1 GPM)	36 l/min (9.5 GPM)
Operation range	Heating	68 ~ 122 °F (20 ~ 50 °C)	77 ~ 176 °F (25 ~ 80 °C)	18~36 l/min (4.8~9.5 GPM)	24~48 l/min (6.3~12.7 GPM)	46 ~ 92 l/min (12.2 ~ 24.3 GPM)	75 ~ 150 l/min (19.8 ~ 39.6 GPM)	14 ~ 46 l/min (3.7 ~ 12.2 GPM)	14 ~ 72 l/min (3.7 ~ 19.0 GPM)

▶ When the amount of cooling water is out of the operation range, stop the Hydro unit / Hydro unit HT and take care of the cause before re-start the operation.

▶ Temperature of discharged water is very high so be careful not to come in contact with the body. Also, cover the external water pipe with appropriate insulator for insulation and preventing burns.

11) Water scale may occur on the plate type heat exchanger depending on the water quality and the type of plate heat exchanger so regular chemical cleaning is necessary. When installing water pipes, install a heat source water shut-off valve and also install the flushing pipe with a ball valves (for chemical cleaning) on the pipe installed between the shut-off valve and the outdoor unit.

12) Before trial operation, connect the cleaning pipes installed on inlet and outlet as shown in above illustration. Then, take appropriate measures (such as blind flange etc) to stop the circulation water from entering the outdoor unit plate type heat exchanger, and use circulating pump to remove foreign substance within the water pipes and clean the strainer. If you do not clean the strainer, foreign substances may accumulates on plate type heat exchanger and may break the heat exchanger or cause problem to it.

13) Make sure that water quality within the water pipe meets the standard of cooling water quality for refrigerating and air conditioning equipment.
   - Water containing high level of foreign substances can cause water heat exchanger and pipe corrosion or creation of water scale. (Use the appropriate heat source water according to the below table)
   - If the make-up water is provided from any other source than local water supply, make sure to check the quality of water.
   - Strainer (which needs to be purchased separately) must be installed to the 'Water IN' pipes of the water pipe. If sand, dust or rust debris enters to water system, it may cause corrosion on metallic materials or blockage of the water heat exchanger and damage the heat exchanger.
   - If the existing thermal storage tank or pipes are used, foreign substances may block the plate type heat exchanger of the Hydro unit / Hydro unit HT so, water quality and foreign substances must be managed.

14) Check that the total water volume in the installation, excluding the internal water volume of Hydro unit / Hydro unit HT, is 20 L (5.3 gal) minimum.

Classification	Item	Closed type system		Effects		Recommended number for water quality inspection
		Circulating water	Supplemented water	Corrosion	Scale	
Standard value	pH [77 °F (25 °C)]	7.0 ~ 8.0	7.0 ~ 8.0	O	O	Once a year
	Electric conductivity [77 °F (25 °C)] (mS/m)	30 or below	30 or below	O	O	
	Chloride ion (mg Cl-/L)	50 or below	50 or below	O		
	Sulfate ion (mg $S0_4^{2-}$/L)	50 or below	50 or below	O	O	
	M alkali level [pH 4.8] (mg $CaCo_3$/L)	50 or below	50 or below		O	
	Total hardness (mg $CaCo_3$/L)	70 or below	70 or below		O	
	Calcium hardness (mg $CaCo_3$/L)	50 or below	50 or below		O	
	Ionized silica (mg SiO_2/L)	30 or below	30 or below		O	
Reference	Iron (mg Fe/L)	1.0 or below	0.3 or below	O	O	
	Copper (mg Cu/L)	1.0 or below	1.0 or below	O		
	Sulfate ion (mg S^{2-}/L)	Not to be detected	Not to be detected	O		
	Ammonium ion (mg NH_4+/L)	0.3 or below	0.1 or below	O		
	Residual chlorine (mg Cl/L)	0.25 or below	0.3 or below	O		
	Free carbon dioxide (mg CO_2/L)	0.4 or below	0.4 or below	O		
	Stability index	-	-	O	O	

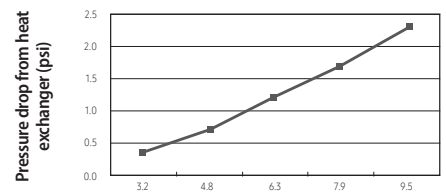
Water pipe installation

NOTE

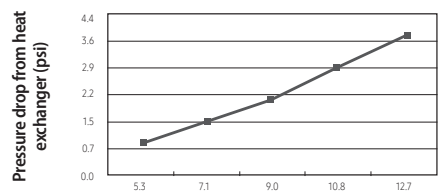
- Circle (O) marks in the chart show the factor relevant to corrosion or water scale.
- When the water temperature is over 40 ˚C (104 ˚F), steels without protective coating may corrode when exposed to water. Applying corrosion prevention material or degassing can be effective measure to prevent corrosion.
- For the cooling water and the make-up water, used under closed circuit water system with closed circuit cooling tower, should satisfy the standard shown in above table.
- Supplied water or make-up water should be tap water, industrial water. Purified water, neutralized water and softened water should not be supplied.
- 15 items in the above table is a typical factor for corrosion and/or water scale.
- When water pipe circuit freezes, it will cause breakage on the plate type heat exchanger. Therefore appropriate preventive measure must be taken according to the situation.
  - Drain remaining water in the water pipe
  - Constantly operate the water pump to circulate the water within the water pipe
  - Install a self-regulating heat cable on the water pipe
- Open the valve of the water pipe connected to the outdoor unit after flushing (cleaning foreign substances in water pipe) is completed.
- Check that air is vented from the water pipe and circulation amount is secured before opening the service valve on the refrigerant side of the outdoor unit.
- If water flow stops during outdoor unit operation, it may cause breakage on plate type heat exchanger.

Pressure drop graphs

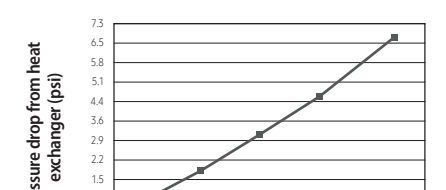
▶ VHEC036S4-4P



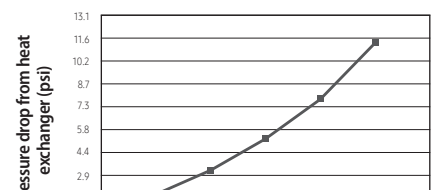
▶ VHEC048S4-4P



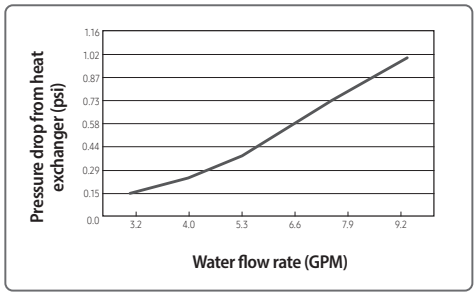
▶ VHEC096S4-4P



▶ VHEC144S4-4P

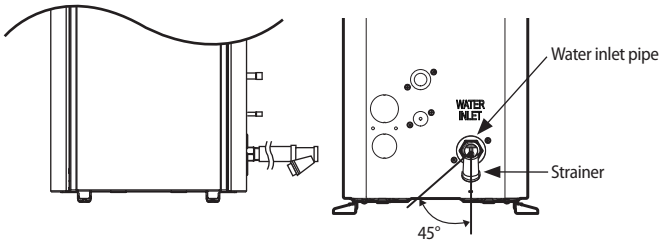


▶ VHTC048S4-4P / VHTC072S4-4P



Connecting strainer

- ▶ Use a strainer with 50 mesh (Diameter of each hole must be under 0.4 mm (0.016 inch), excluding punching plate)
- ▶ Connect the strainer after checking the direction of the strainer on the water inlet hole as shown in the illustration.
- ▶ Wind the Teflon tape more than 15 times on the thread of the water pipe before connecting it.
- ▶ Service port must face downward and angle should be within 45° on the left and the right side.
- ▶ After installing the strainer, makes sure that there is no water leakage on the connection part.
- ▶ For normal operation of the product, clean the strainer regularly (more than once a year).



<Front view> <Side view>

Connecting power and communication cable

Specification of electric wires

Indoor unit	Power supply	MCCB	ELB	Power cable	Earth cable	Communication cable
Hydro unit	208~230V/60 Hz Max: 253 V Min: 187 V	20 A	25 A, 30 mA, 0.1 sec ↓	10 AWG ↑ (Single Installation)	10 AWG	20 AWG~14 AWG
Hydro unit HT (VHTC048S4-4P)	208~230V/60 Hz Max: 253 V Min: 187 V	30 A	30 A, 30 mA, 0.1 sec ↓	6 AWG ↑ (Single Installation)		
Hydro unit HT (VHTC072S4-4P)		50 A	50 A, 30 mA, 0.1 sec ↓			

❋ Table for current (Single installation)

Indoor unit	Model	Rated current (A)	MCA (A)	MOP (Min. ELCB, MCCB, A)
Hydro unit	VHEC***S4-4P	0.05	2.2	15.0
Hydro unit HT	VHTC048S4-4P	14.3	18.0	25.0
	VHTC072S4-4P	23.1	30.0	40.0

▶ Decide the power cable specification and maximum length within 10 % power drop among indoor units.

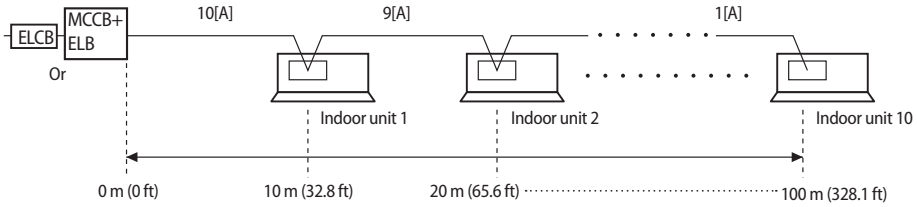
$$\sum_{k=1}^{n}\left(\frac{Coef\times 35.6\times Lk\times ik}{1000\times Ak}\right) < 10\ \%\ \text{of input voltage[V]}$$

- coef : 1.55
- Lk : Distance among each indoor unit [m (inch)], Ak: Power cable specification [mm^2 ($inch^2$)]
  ik : Running current of each unit [A]

Example of Installation

▶ Total power cable length L = 100 m (328.1 ft), Running current of each units 1[A]

▶ Total 10 indoor units were installed

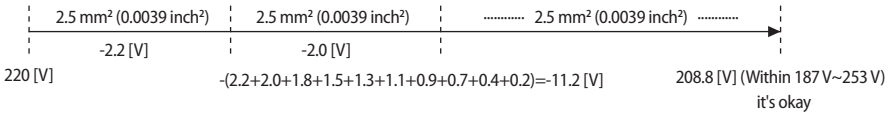


▶ Apply following equation

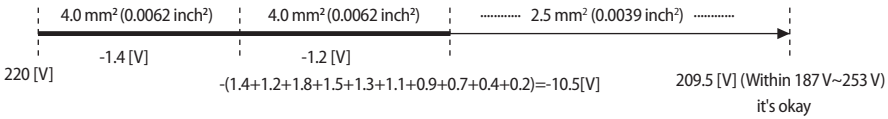
$$\sum_{k=1}^{n}\left(\frac{Coef \times 35.6 \times Lk \times ik}{1000 \times Ak}\right) < \text{10 \% of input voltage[V]}$$

❋ Calculation

• Installing 1 type of wire.



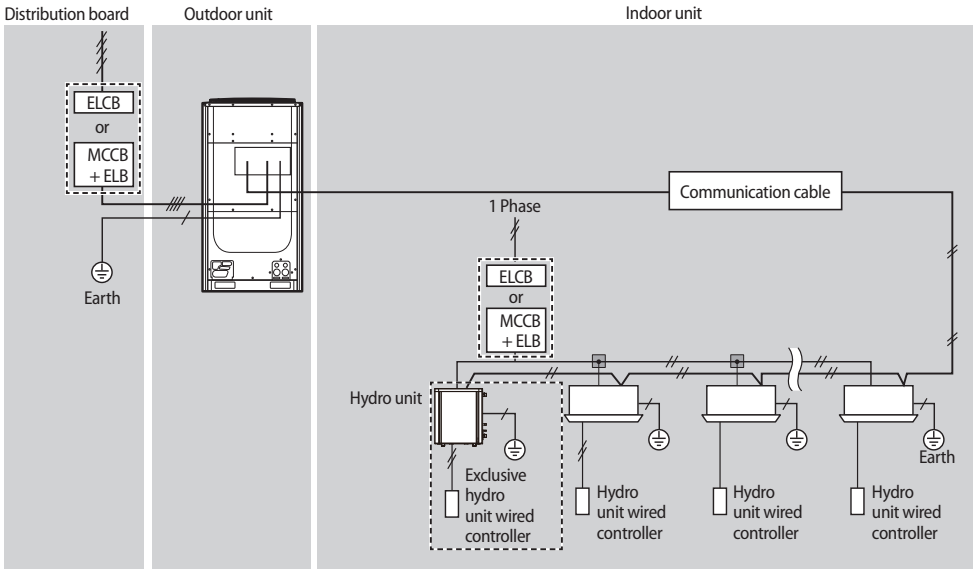
• Installing with 2 different sort wire.



Overall system configuration

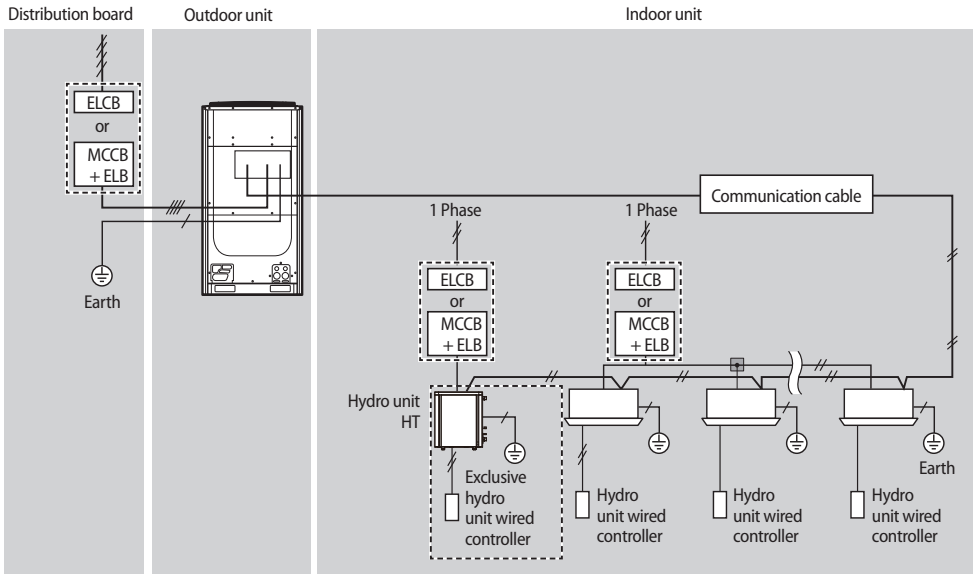
Hydro unit / Hydro unit HT use 208~230 V

Hydro unit



Connecting power and communication cable

Hydro unit HT

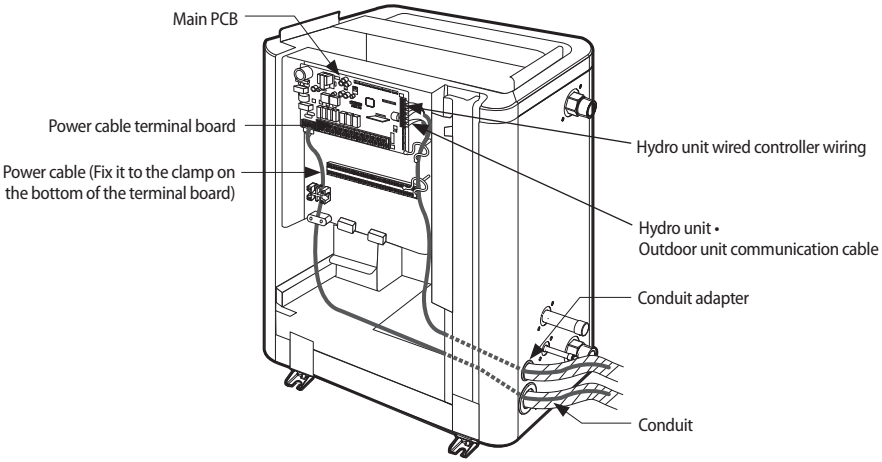


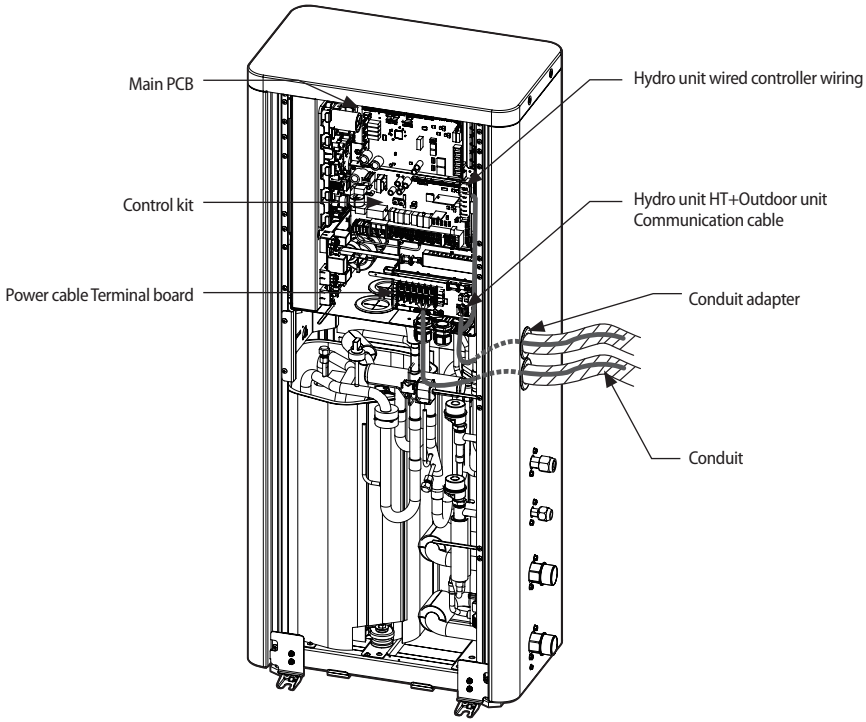
CAUTION

- Do not divide communication cable multiple times from one indoor / Hydro unit / Hydro unit HT to another. It may cause communication error.
- Do not divide power cable multiple times from one Hydro unit HT to another. Hydro unit HT can get a damage.
- Power supply cords of parts of appliances for outdoor use shall not be lighter than polychloroprene sheathed flexible cord. (Code designation IEC:60245 IEC 57 / CENELEC: H05RN-F) (VHEC***S4-4P Model)
- 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) (VHTC***S4-4P Model)

Power supply and communication cable configuration

- Withdraw a main power cable and a grounding cable through the cable outlet on the right side of the Hydro unit / Hydro unit HT.
- When connecting external contact signal wire, connect them to the PCB terminal board through the cable outlets in the right side of the outdoor unit.
- Wires must be installed after putting them in separate conduit tubes.
- Fix the conduit at the cable outlet using a conduit adapter.



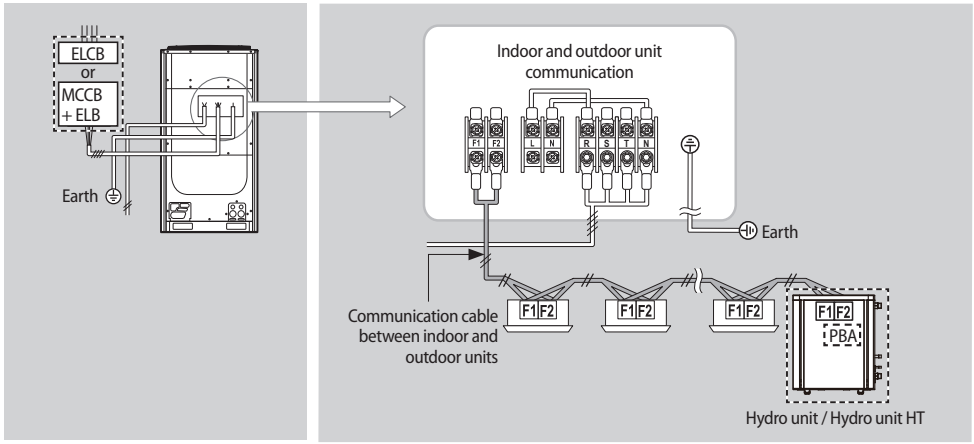


Connecting power and communication cable

Specifications of the cable protection tube

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

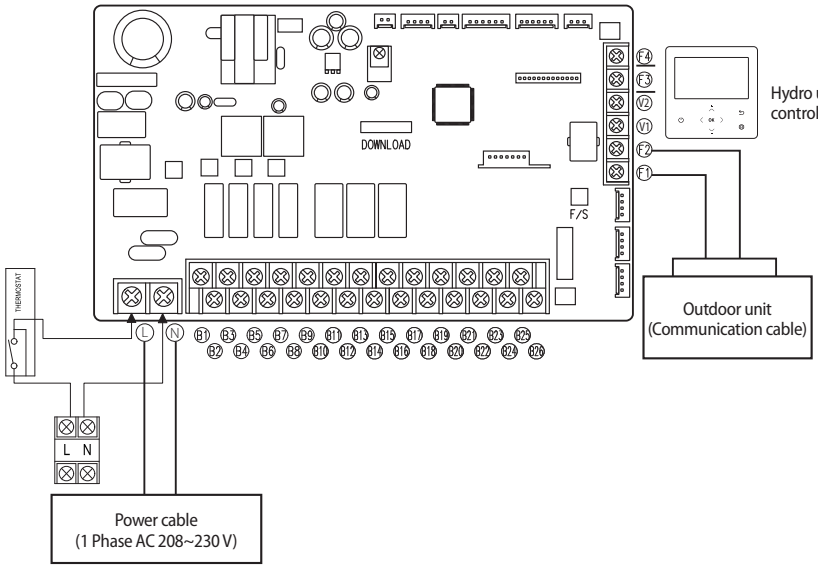
Power and communication wiring diagram



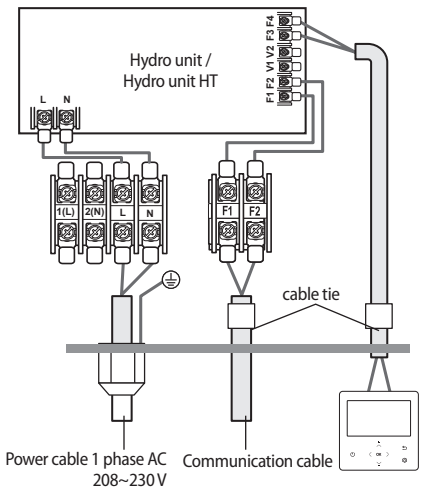
- The communication cable between indoor and outdoor units has no polarity.
- Arrange the cables using a clamp attached on the left side of the terminal board.
- When you connect the power cable, you must apply rated tightening torque to connect the screws for the terminal board.

PBA connection diagram

▶ VHEC***S4-4P



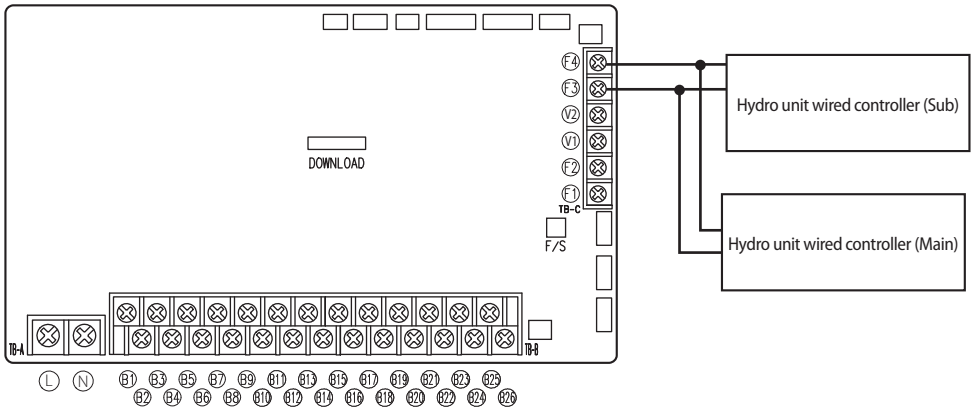
▶ VHTC***S4-4P



Connecting power and communication cable

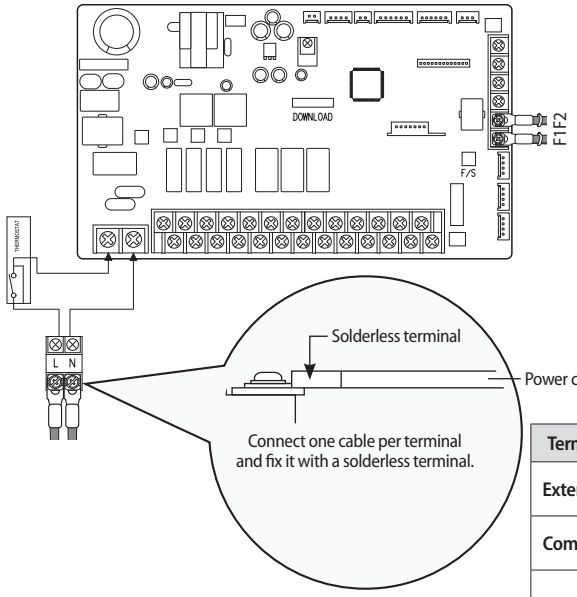
Wiring diagram for connecting 2 hydro unit wired controllers

▶ VHEC***S4-4P / VHTC***S4-4P



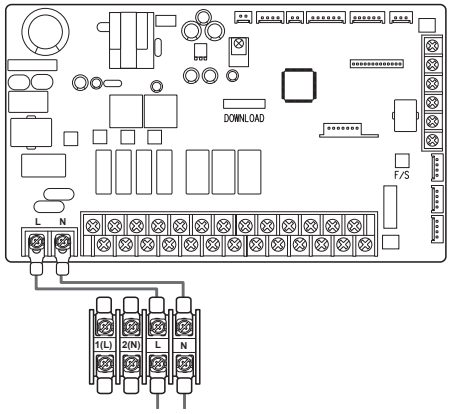
Connecting the power terminal

- Connect the cables to the terminal board using a solderless ring terminal.
- Properly connect the cables by using certified and rated cables and make sure to fix them properly so that external force is not applied to the terminal.
- Use a driver and wrench that can apply the rated torque when tightening the screws on the terminal board.
- Tighten the terminal screws by applying rated torque value. If the terminal is loose, arc heat may occur and cause fire and if the terminal is connected too firmly, terminal may get damaged.



Terminal name	Tightening Torque	
External contact	M3	0.5 ~ 0.75 N·m (0.37 ~ 0.55 lbf·ft)
Communication	M3.5	0.8 ~ 1.2 N·m (0.59 ~ 0.89 lbf·ft)
Power	M4	1.2 ~ 1.8 N·m (0.89 ~ 1.33 lbf·ft)

<Hydro unit >

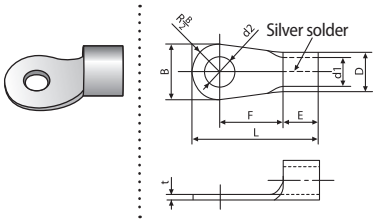


<Hydro unit HT>

Connecting power and communication cable

Selecting solderless ring terminal

- Select a solderless ring terminal for a power cable according to the nominal dimensions for cable.
- Apply insulation coating to the connection part of the solderless ring terminal and the power cable.



Norminal dimensions for cable [inch² (mm²)]		0.0023 (1.5)		0.0039 (2.5)			0.01 (10)	0.02 (16)
Norminal dimensions for screw [inch (mm)]		0.157 (4)	0.197 (5)	0.157 (4)		0.197 (5)	0.197 (5)	0.197 (5)
B	Standard dimension [inch (mm)]	0.260 (6.6)	0.315 (8)	0.260 (6.6)	0.335 (8.5)	0.374 (9.5)	0.472 (12)	0.472 (12)
	Allowance [inch (mm)]	± 0.008 (0.2)		± 0.008 (0.2)			± 0.008 (0.2)	± 0.008 (0.2)
D	Standard dimension [inch (mm)]	0.134 (3.4)		0.165 (4.2)			0.280 (7.1)	0.354 (9)
	Allowance [inch (mm)]	+0.012 (0.3)		+0.012 (0.3)			+0.012 (0.3)	+0.012 (0.3)
		-0.008 (0.2)		-0.008 (0.2)			-0.008 (0.2)	-0.008 (0.2)
d1	Standard dimension [inch (mm)]	0.067 (1.7)		0.091 (2.3)			0.177 (4.5)	0.228 (5.8)
	Allowance [inch (mm)]	± 0.008 (0.2)		± 0.008 (0.2)			± 0.008 (0.2)	± 0.008 (0.2)
E	Min. [inch (mm)]	0.161 (4.1)		0.236 (6)			0.311 (7.9)	0.374 (9.5)
F	Min. [inch (mm)]	0.236 (6)	0.276 (7)	0.236 (6)		0.276 (7)	0.236 (6)	0.374 (9.5)
L	Max. [inch (mm)]	0.630 (16)		0.689 (17.5)			0.945 (24)	1.181 (30)
d2	Standard dimension [inch (mm)]	0.169 (4.3)		0.169 (4.3)			0.209 (5.3)	0.209 (5.3)
	Allowance [inch (mm)]	+0.008 (0.2)		+0.008 (0.2)			± 0.008 (0.2)	± 0.008 (0.2)
		0 (0)		0 (0)			0 (0)	0 (0)
t	Min. [inch (mm)]	0.028 (0.7)		0.031 (0.8)			0.045 (1.15)	0.057 (1.45)

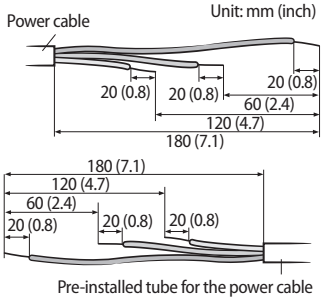
How to connect your extended power cables

1. Prepare the following tools.

Tools	Crimping pliers	Connection sleeve [mm (inch)]	Insulation tape	Contraction tube [mm (inch)]
Spec	MH-14	20 (0.79) x Φ 6.5 (0.26) (H x OD)	Width 19 mm	70 (2.76) x Φ 8.0 (0.31) (L x OD)
Shape				

2. As shown in the figure, peel off the shields from the rubber and wire of the power cable.
   - Peel off 20 mm of cable shields from the pre-installed tube.

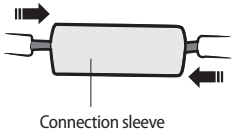
CAUTION
- For information about the power cable specifications for indoor and outdoor units, refer to the installation manual.
- After peeling off cable wires from the pre-installed tube, insert a contraction tube.



3. Insert both sides of core wire of the power cable into the connection sleeve.

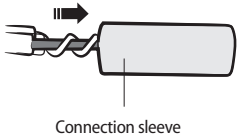
▶ **Method 1**

Push the core wire into the sleeve from both sides.



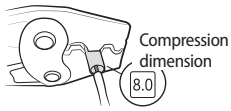
▶ **Method 2**

Twist the wire cores together and push it into the sleeve.

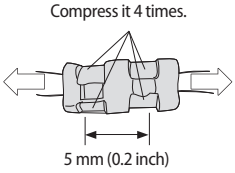


CAUTION
- If cable wires are connected without using connecting sleeves, their contact area becomes reduced, or corrosion develops on the outer surfaces of the wires (copper wires) over a long time. This may cause an increase of resistance (reduction of passing current) and consequently may result in a fire.

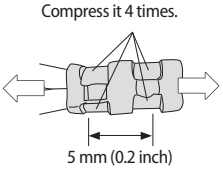
4. Using a crimping tool, compress the two points and flip it over and compress another two points in the same location.
   - The compression dimension should be 8.0 mm^2 (0.0124 $inch^2$).
   - After compressing it, pull both sides of the wire to make sure it is firmly pressed.



▶ **Method 1**



▶ **Method 2**

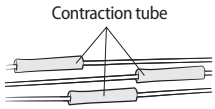


ENGLISH

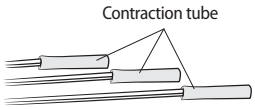
Connecting power and communication cable

5. Apply heat to the contraction tube to contract it.

▶ **Method 1**

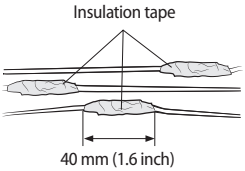


▶ **Method 2**

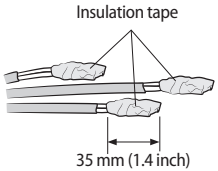


6. Wrap it with the insulation tape twice or more and position your contraction tube in the middle of the insulation tape.

▶ **Method 1**

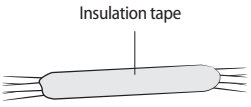


▶ **Method 2**

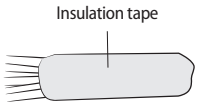


7. After tube contraction work is completed, wrap it with the insulation tape to finish.
   Three or more layers of insulation are required.

▶ **Method 1**



▶ **Method 2**

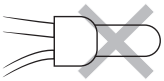


CAUTION

- Make sure that the connection parts are not exposed to outside.
- Be sure to use insulation tape and a contraction tube made of approved reinforced insulating materials that have the same level of withstand voltage with the power cable. (Comply with the local regulations on extensions.)

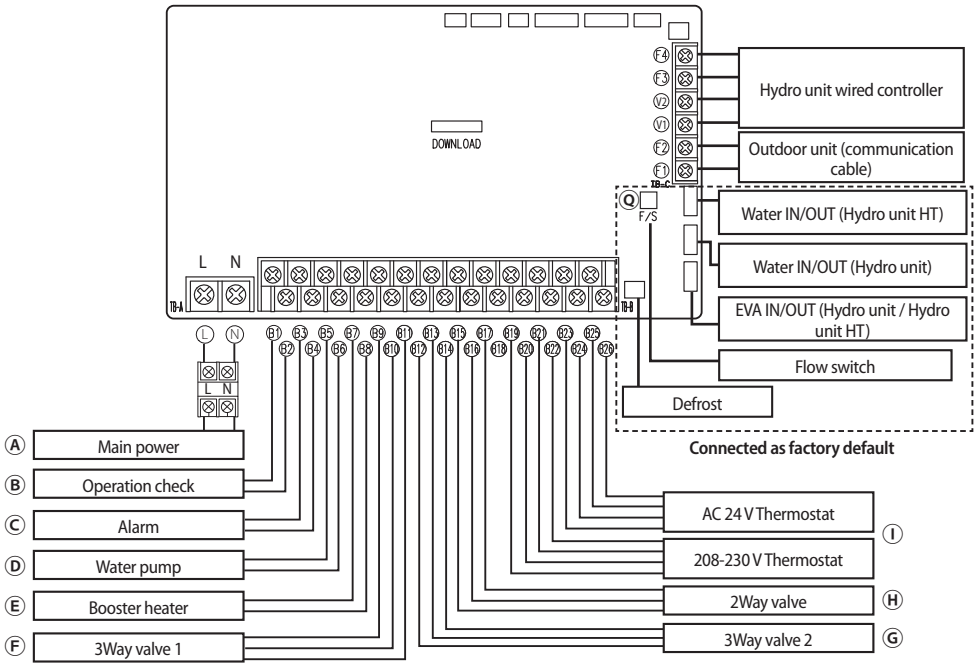
WARNING

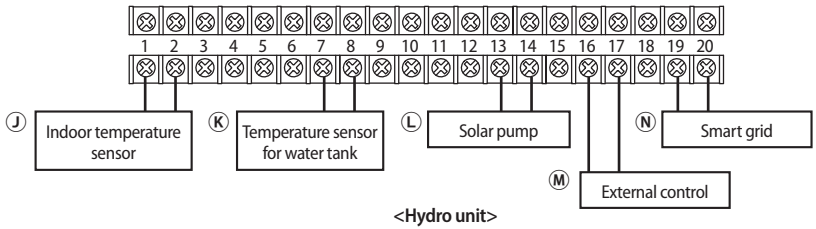
- In case of extending the electric wire, please DO NOT use a round-shaped Pressing socket.
  - Incomplete wire connections can cause electric shock or a fire.



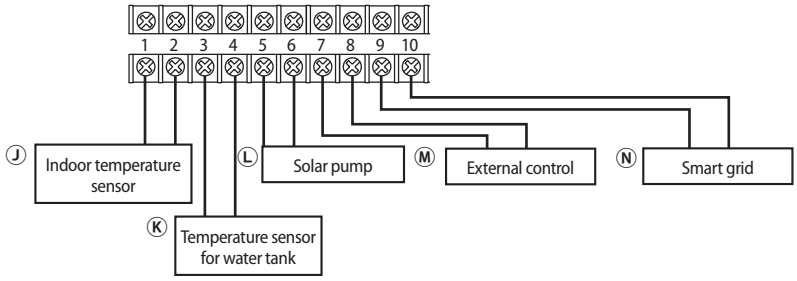
Connecting external contact

External contact connection diagram





<Hydro unit>



<Hydro unit HT>

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Connecting external contact

Explanation		Terminal No.	Input / Output	AC/DC	Maximum allowable current
A	Power	L, N	Input	AC	2.5 A
B	Operation check	B1, B2	Contact output	-	0.5 A
C	Alarm	B3, B4	Contact output	-	0.5 A
D	Water pump	B5, B6	Contact output	-	0.5 A
E	Booster heater	B7, B8	Contact output	-	0.5 A
F	3Way valve 1	B9 ~ B11	Output	AC	0.5 A
G	3Way valve 2	B12 ~ B14	Output	AC	0.5 A
H	2Way valve	B15 ~ B17	Output	AC	0.5 A
I	AC 208-230, AC 24 V Thermostat	B19 ~ B26	Input	AC	10 mA
J	Separately installed indoor temperature sensor (MRW-TA)	1,2(1,2)	Input	DC	1 mA
K	Temperature sensor for water tank	7,8(3,4)	Input	DC	20 mA
L	Solar pump	13,14(5,6)	Contact input	-	10 mA
M	External control	16,17(7,8)	Contact input	-	1 mA
N	Smart grid	19,20(9,10)	Input	DC	1 mA
O	Communication cable (RS485)	F1, F2	Input , Output	DC	10 mA
P	Hydro unit wired controller	V1	Output	DC	210 mA (per each controller)
		V2	Grounding	-	-
		F3, F4	Input, Output	DC	10 mA
Q	Flow switch	F/S	Input	DC	1 mA

❋ ( ) : Hydro unit HT

❋ For instruction regarding on wiring power, communication and hydro unit wired controller, refer to "Connecting power and communication cable" chapter.

❋ External control: Operation On or Off by external contact signal

❋ Smart grid: Set by remote controller FSV
FSV#5041 : Default is 0 (Disable)
FSV#5042 : 0 (default) While the external contact is maintained as High, disable all heat source (heater).
1 Use Booster Heater only

▶ Refer to the below table for the terminal numbers for connecting external contact.

Terminal No.	External contact	Function	Remarks
B1, B2	Operation check	Output operation status	Optional
B3, B4	Alarm	Output alarm status	Optional
B5, B6	Water pump	Output operation signal for a water pump	Mandatory
B7, B8	Booster heater	Output operation signal for booster heater of DHW tank	Optional
B9~B11	3Way valve 1	Output 3 way valve direction signal for indoor heating / DHW selection	Optional
B12~B14	3Way valve 2	Output for solar pump interconnection/defrost signal interconnection	Optional
B15~B17	2Way valve	Output 2 way valve switching signal for blocking cold water fall in floor cooling	Optional
B19, B20	AC 208-230, Thermostat 1	Input thermostat signal for cooling (AC 208-230 V)	Optional
B21, B22	AC 208-230, Thermostat 2	Input thermostat signal for heating (AC 208-230 V)	Optional
B23, B24	AC24, Thermostat 1	Input thermostat signal for cooling (AC 24V)	Optional
B25, B26	AC24, Thermostat 2	Input thermostat signal for heating (AC 24V)	Optional
1, 2 (1, 2)	Indoor temperature sensor	Connect indoor temperature sensor (Connection status can be checked on the hydro unit wired controller.)	Optional
7, 8 (3, 4)	Temperature sensor for water tank	Connect temperature sensor of DHW tank (Connection status can be checked on the hydro unit wired controller.)	hot water supply operation
13, 14 (5, 6)	Solar pump	Input contact signal for solar heat pump operation	Optional
16, 17 (7, 8)	External control	Input external contact control signal (Refer to seg 14 of 02 series remote controller installation option.)	Optional
19, 20 (9, 10)	Smart grid	Input contact signal for smart grid	Optional

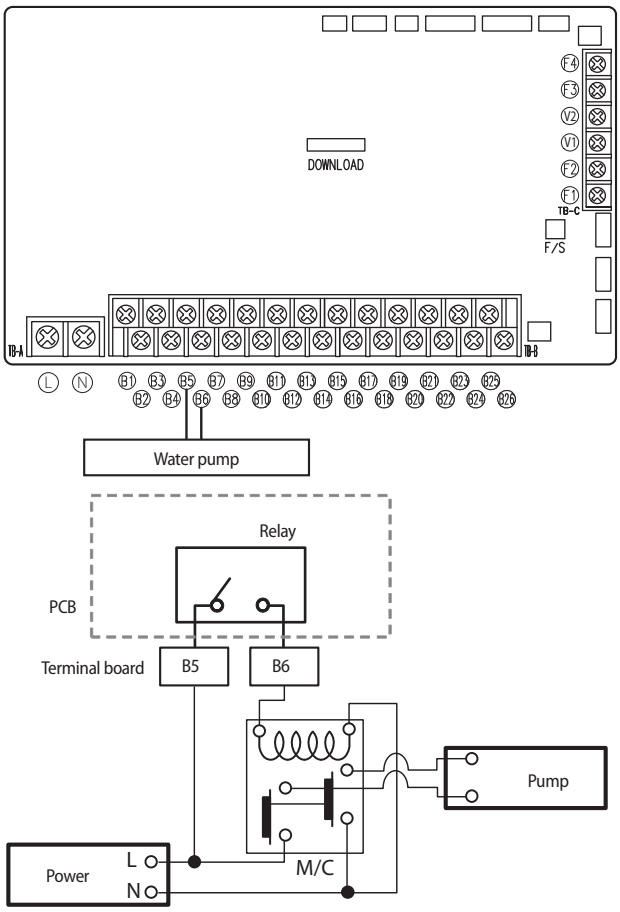
❋ ( ) : Hydro unit HT

❋ You may need to set different field specifications for the hydro unit wired controller depending on the function.

Connecting external contact

Water pump connection

▶ Connect a water pump to B5, B6 of the PBA terminal block.



CAUTION

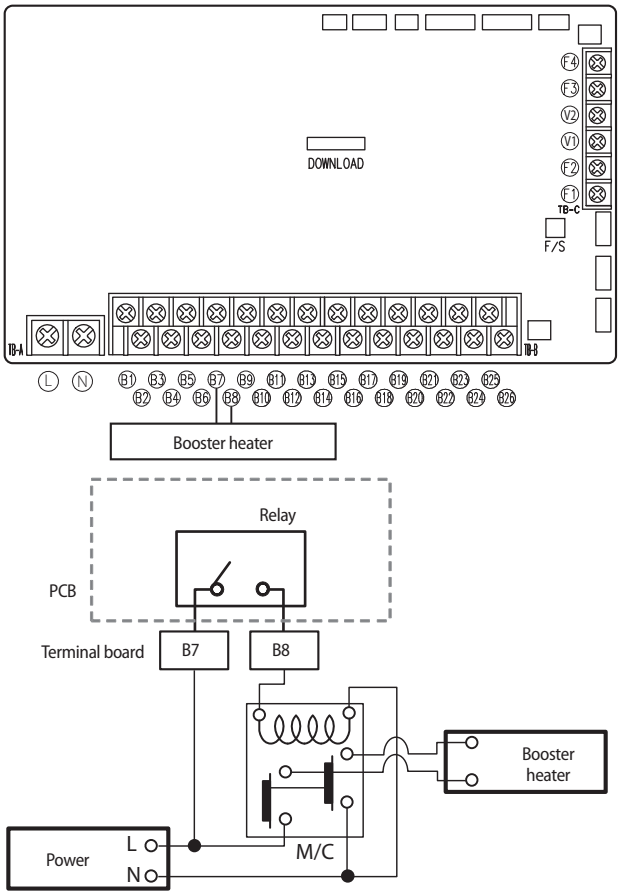
- Terminal of this product is for water pump and the maximum allowable current is 0.5 A

Specification table

Part	Specification
Terminal block (Output)	B5, B6
Connection type	Water pump (No-voltage contact)

Booster heater connection

▶ Connect a booster heater to B7, B8 of the PBA terminal block.



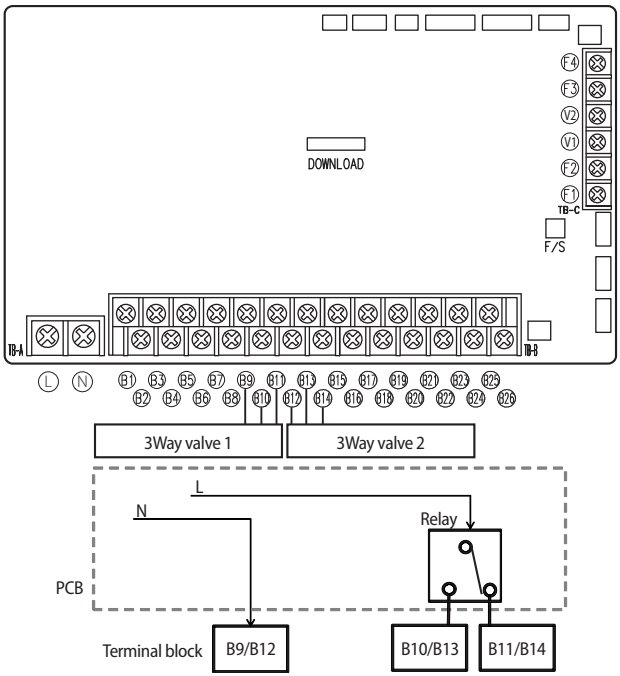
Specification table

Part	Specification
Terminal block (Output)	B7, B8
Connection type	Booster heater (No-voltage contact)

Connecting external contact

3Way valve connection

- Check the type of 3Way valve and connect it to the terminal board as shown in the illustration.
- Use a rated wire and connect it as shown in the illustration.
- 3 Way valve 1: When the valve is connected to B9 and B11, its direction should be indoor side.
- 3 Way valve 2: When the valve is connected to B12 and B14, its direction should be tank side.



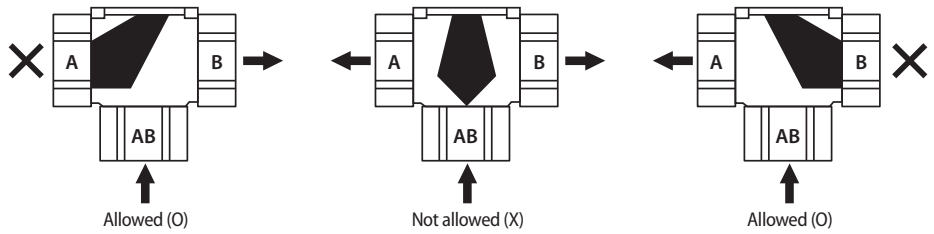
✻ Initially, relay is connected between L and B11/B14 of the terminal block.

CAUTION

- Before completing installation of 3Way valve, check the opening direction of the port.

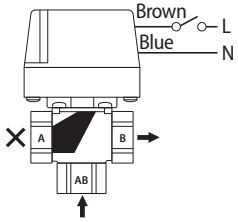
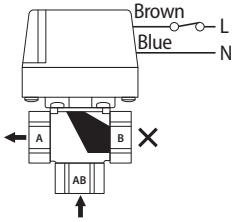
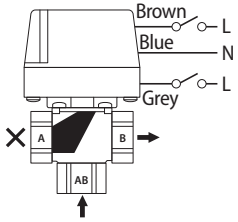
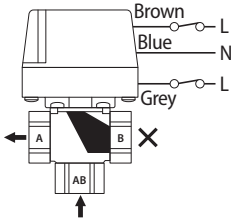
Part	Specification
Output (B9 ~ B11, B12 ~ B14)	AC 208-230 V (Max 0.5A / 120W)

Allowed connection

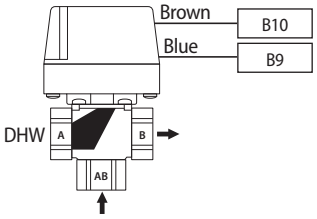
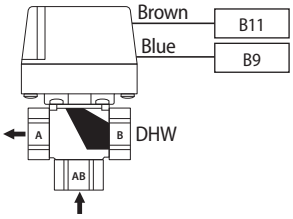
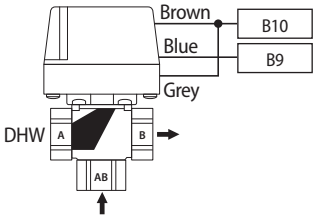
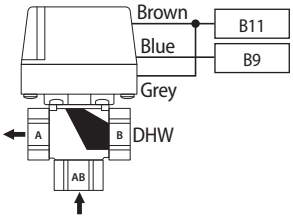


Example of installation (Danfoss H-series valve)

▶ Connecting the valve

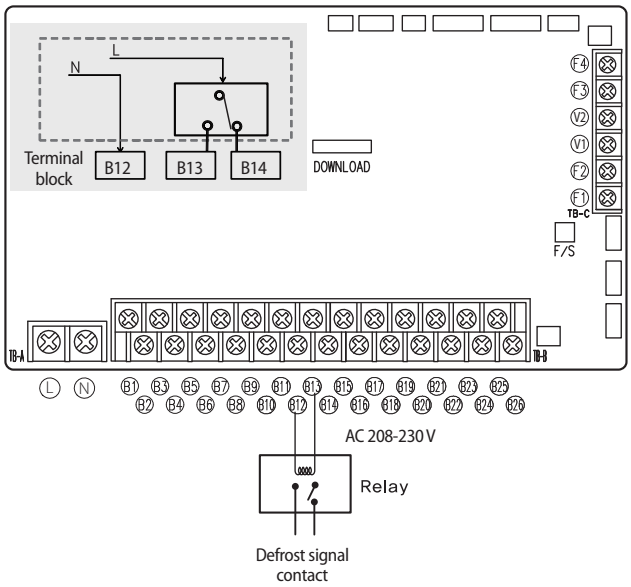
3-port diverter valves		
3-port mid-position valves		

▶ Example of wiring

3-port diverter valves		
3-port mid-position valves		

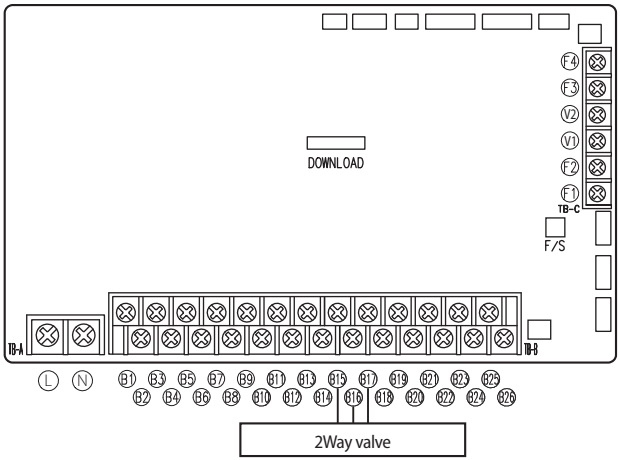
Connecting external contact

✻ Connect B12/B13 (3 Way valve 2) of the terminal block to use the defrost mode contact output.



Connecting 2Way valve

- ▶ Connect a 2Way valve to B15, B16 and B17 of the PBA terminal block.
- ▶ 2Way valve is interlocked with 3Way valve 1.



✻ Initially, relay is connected between L and B17 of the terminal block.

CAUTION

- Terminal of this product is for 2Way valve and the maximum allowable current is 0.5 A

Specification table

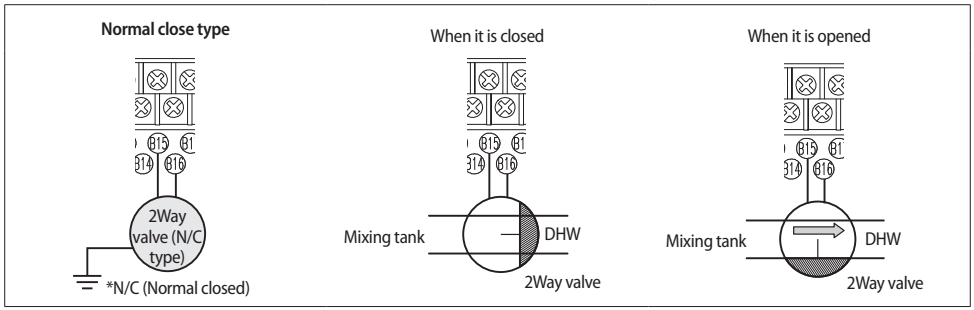
Part	Specification
Terminal block (Output)	B15: Output power N B16: Output power L (switch type) B17: Output power L (switch type)
Connection type	Directly connect 2Way valve (below 0.5 A)
Output (B15~B17)	AC 208 ~ 230 V (Max 0.5 A / 120 W)

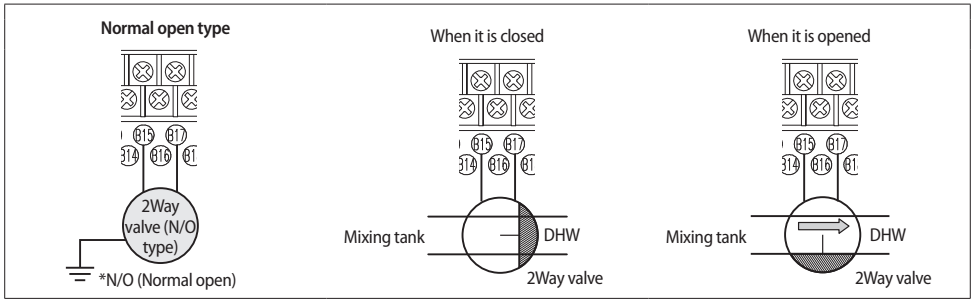
Connecting external contact

Wiring 2Way valve

When floor cooling and fan coil unit cooling operate at the same time, 2 way valve prevent temperature drop of the floor.

- ▶ Use a rated wire to connect it as shown in the illustration and fix it with a cable tie.
- ▶ Initial setting of the valve is 'closed (no flow)'.



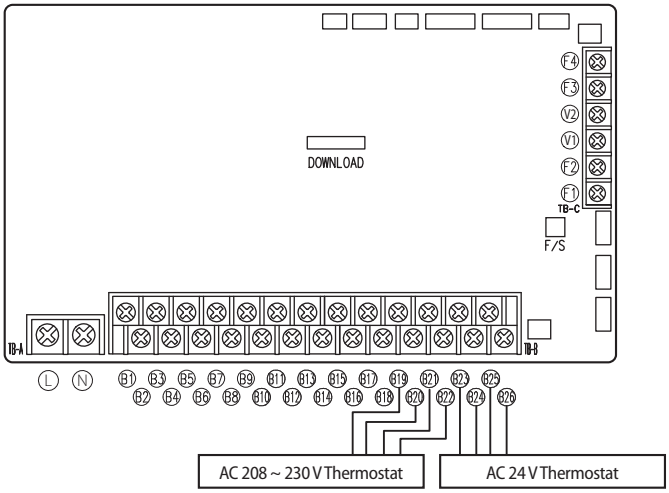


CAUTION

- Wiring is different for a N/C (Normal closed) valve and N/O (Normal open) valve.

AC 208 ~ 230 V or AC 24V thermostat

- Connect the indoor thermostat to B19~B26 of the PBA terminal block.
- Connect a thermostat to the designated terminal as stated in the rated table.
- Only 1 type of thermostat can be connected. (B19~B22 or B23~B26)
- Product will not operate when signal for cooling and heating mode is inputted at the same time.



CAUTION

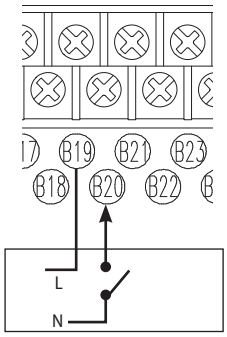
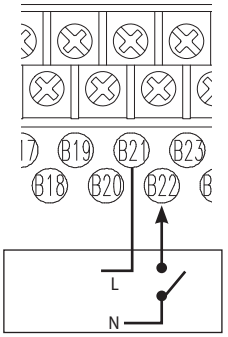
- Maximum allowable current of each terminal is below 10mA

Specification table

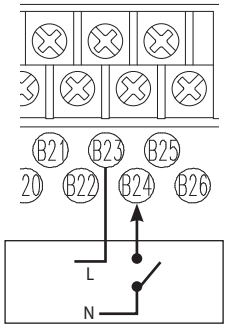
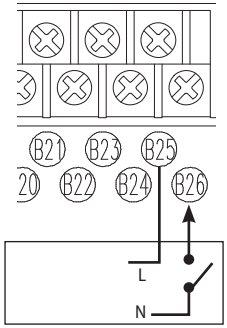
Part	Specification
Terminal block (AC 208 ~ 230 V)	B19: Output power L (for cooling mode) B20: Input power N (for cooling mode) B21: Output power L (for heating mode) B22: Input power N (for heating mode)
Terminal block (AC 24V)	B23: Output power L (for cooling mode) B24: Input power N (for cooling mode) B25: Output power L (for heating mode) B26: Input power N (for heating mode)
Connection type	Connect to indoor power controller
Input (B19~B22)	AC 208 ~ 230 V (Maximum 10 mA)
Input (B23~B26)	AC 24 V (Maximum 10 mA)
Condition for operation	When B20 or B24 is detected -> cooing mode When B22 or B26 is detected -> heating mode

Connecting external contact

AC 208 ~ 230 V thermostat

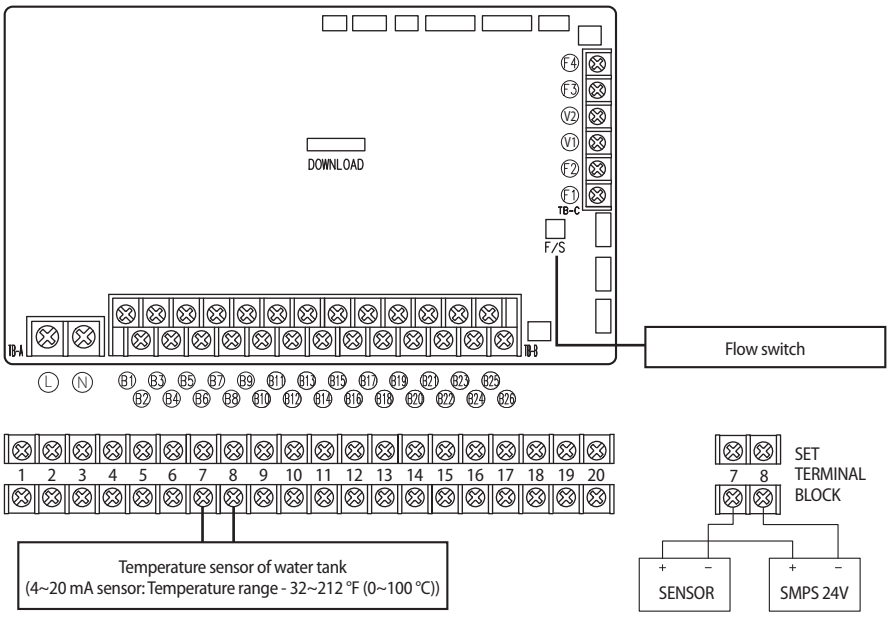
Cooling mode (Not use)	Heating mode
 Thermostat	 Thermostat

AC 24 V thermostat

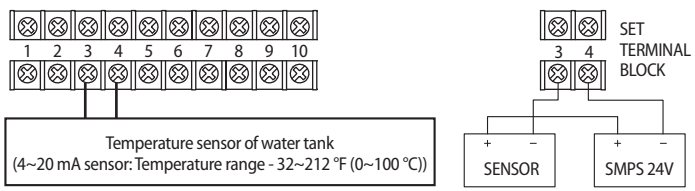
Cooling mode (Not use)	Heating mode
 Thermostat	 Thermostat

Connecting temperature sensor of water tank and flow switch

- Connect the temperature sensor of water tank to number 7 and 8 of the terminal block located on the bottom side.
- Connect 4~20 mA temperature sensor for water tank. When there is more than one unit, at least one of them should be connected directly to the temperature sensor.



<Hydro unit>

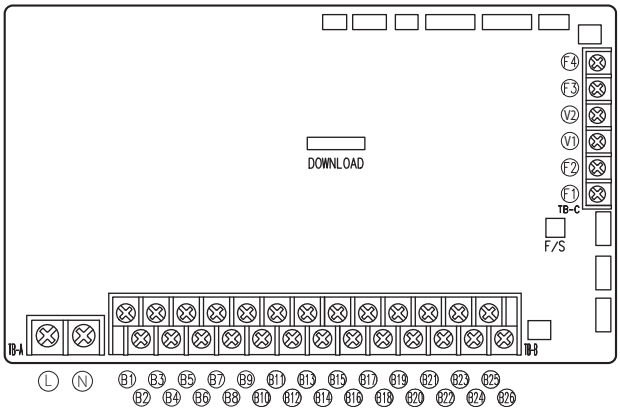


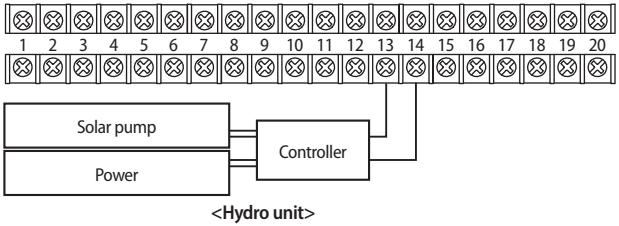
<Hydro unit HT>

Connecting external contact

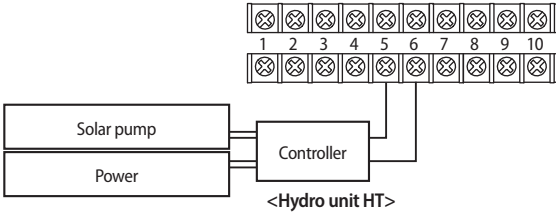
Connecting solar pump

▶ Connect the signal wire for solar pump to number 13 and 14 (Hydro Unit HT: 5. 6) of the terminal block located on the bottom side.





<Hydro unit>



<Hydro unit HT>

CAUTION
- Maximum allowable current of each terminal is below 10 mA.
- Ports number 13 and 14 (Hydro Unit HT: 5. 6) is for input port for detection and they do not supply power to a solar pump.

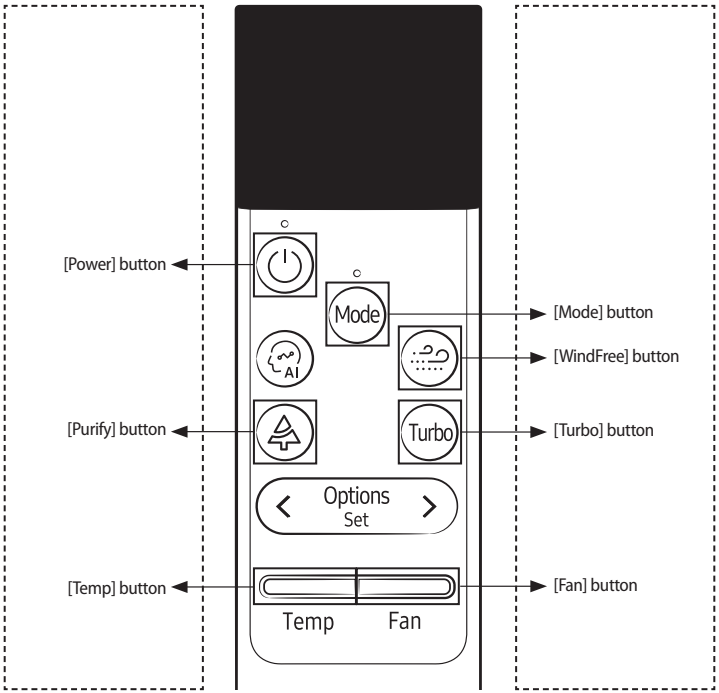
Specification table

Part	Specification
Terminal block (Input)	13 and 14 (Hydro Unit HT: 5. 6): No-voltage contact
Connection type	Connect to solar pump controller (contact signal)

Setting an indoor unit address and installation option

▶ Set the indoor unit address and installation option with wireless remote control option.
Set the each option separately since you cannot set the ADDRESS setting and indoor unit installation setting option at the same time.You need to set twice when setting indoor unit address and installation option.

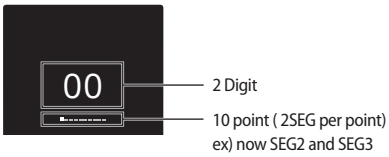
The procedure of option setting



NOTE

• The remote control display and buttons may vary depending on the model.

1. Enter the mode for setting the options.
   1) Reset remote control: Temp button Down + Fan button Down + Mode Press for 10 seconds
   2) You can see "SW Initialization" message and enter the following in 5 seconds.
   3) Press button and Turbo button.
   4) Make sure that you are entered into the mode for setting options.



Setting an indoor unit address and installation option

2. Set the option values.

CAUTION

- The total number of available options is 24 : SEG1 to SEG24
- Because SEG1, SEG7, SEG13 and SEG19 are the page options used by the previous remote control models, the modes to set values for these options are skipped automatically.
- Set a 2-digit value for each option pair in the following order.
- You can see 20 SEG (except SEG1, SEG7, SEG13, SEG19) SEG2 → ...→ SEG6 → SEG8 → .....→ SEG12 → SEG14 → .... → SEG18 → SEG20 → ... → SEG24

SEG1	SEG2	SEG3	SEG4	SEG5	SEG6	SEG7	SEG8	SEG9	SEG10	SEG11	SEG12
0	X	X	X	X	X	1	X	X	X	X	X
SEG13	SEG14	SEG15	SEG16	SEG17	SEG18	SEG19	SEG20	SEG21	SEG22	SEG23	SEG24
2	X	X	X	X	X	3	X	X	X	X	X

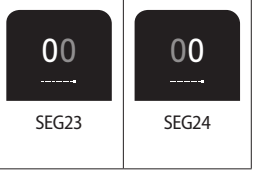
- You can set the next SEG by pressing the (Mode) button.
- You can change the digit value through the following operation.
  Left value: Temp up or down, range : 0 ~ F
  Right value: Fan up or down, range : 0 ~ F

Take the steps presented in the following table:

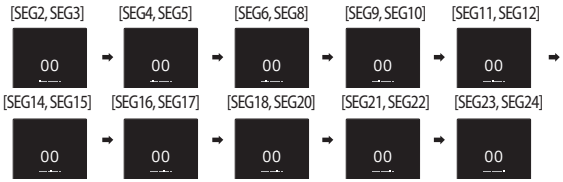
Steps	Remote control display
1. Set the SEG2 and SEG3 values: 1) Set the SEG2 value by pressing the Temp button repeatedly until the value you want to set appears on the remote control display. 2) Set the SEG3 value by pressing the Fan button repeatedly until the value you want to set appears on the remote control display. When you press the Fan or Temp button, values appear in the following order: 0 → 1 → ··· E → F	 SEG2 SEG3
2. Press the (Mode) button to move to next page.	
3. Set the SEG4 and SEG5 values: 1) Set the SEG4 value by pressing the Temp button repeatedly until the value you want to set appears on the remote control display. 2) Set the SEG5 value by pressing the Fan button repeatedly until the value you want to set appears on the remote control display. When you press the Fan or Temp button, values appear in the following order: 0 → 1 → ··· E → F	 SEG4 SEG5
4. Press the (Mode) button to move to next page.	
5. Set the SEG6 and SEG8 values: 1) Set the SEG6 value by pressing the Temp button repeatedly until the value you want to set appears on the remote control display. 2) Set the SEG8 value by pressing the Fan button repeatedly until the value you want to set appears on the remote control display. When you press the Fan or Temp button, values appear in the following order: 0 → 1 → ··· E → F	 SEG6 SEG8

Steps	Remote control display
6. Press the Mode button to move to next page.	
7. Set the SEG9 and SEG10 values: 1) Set the SEG9 value by pressing the Temp button repeatedly until the value you want to set appears on the remote control display. 2) Set the SEG10 value by pressing the Fan button repeatedly until the value you want to set appears on the remote control display. When you press the Fan or Temp button, values appear in the following order: 0 → 1 → ··· E → F	 SEG9  SEG10
8. Press the Mode button to move to next page.	
9. Set the SEG11 and SEG12 values: 1) Set the SEG11 value by pressing the Temp button repeatedly until the value you want to set appears on the remote control display. 2) Set the SEG12 value by pressing the Fan button repeatedly until the value you want to set appears on the remote control display. When you press the Fan or Temp button, values appear in the following order: 0 → 1 → ··· E → F	 SEG11  SEG12
10. Press the Mode button to move to next page.	
11. Set the SEG14 and SEG15 values: 1) Set the SEG14 value by pressing the Temp button repeatedly until the value you want to set appears on the remote control display. 2) Set the SEG15 value by pressing the Fan button repeatedly until the value you want to set appears on the remote control display. When you press the Fan or Temp button, values appear in the following order: 0 → 1 → ··· E → F	 SEG14  SEG15
12. Press the Mode button to move to next page.	
13. Set the SEG16 and SEG17 values: 1) Set the SEG16 value by pressing the Temp button repeatedly until the value you want to set appears on the remote control display. 2) Set the SEG17 value by pressing the Fan button repeatedly until the value you want to set appears on the remote control display. When you press the Fan or Temp button, values appear in the following order: 0 → 1 → ··· E → F	 SEG16  SEG17
14. Press the Mode button to move to next page.	

Setting an indoor unit address and installation option

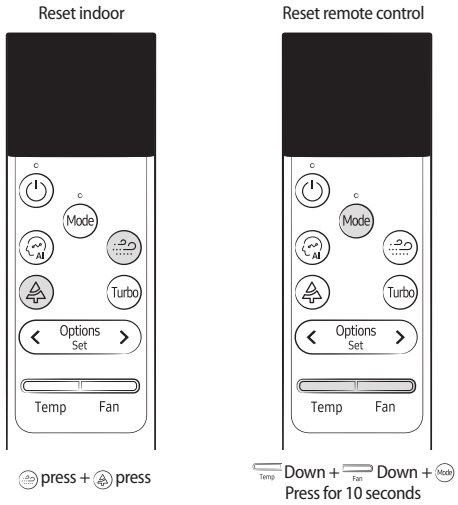
Steps	Remote control display
15. Set the SEG18 and SEG20 values: 1) Set the SEG18 value by pressing the Temp button repeatedly until the value you want to set appears on the remote control display. 2) Set the SEG20 value by pressing the Fan button repeatedly until the value you want to set appears on the remote control display. When you press the Fan or Temp button, values appear in the following order: 0 → 1 → ··· E → F	 SEG18 SEG20
16. Press the Mode button to move to next page.	
17. Set the SEG21 and SEG22 values: 1) Set the SEG21 value by pressing the Temp button repeatedly until the value you want to set appears on the remote control display. 2) Set the SEG22 value by pressing the Fan button repeatedly until the value you want to set appears on the remote control display. When you press the Fan or Temp button, values appear in the following order: 0 → 1 → ··· E → F	 SEG21 SEG22
18. Press the Mode button to move to next page.	
19. Set the SEG23 and SEG24 values: 1) Set the SEG23 value by pressing the Temp button repeatedly until the value you want to set appears on the remote control display. 2) Set the SEG24 value by pressing the Fan button repeatedly until the value you want to set appears on the remote control display. When you press the Fan or Temp button, values appear in the following order: 0 → 1 → ··· E → F	 SEG23 SEG24

3. Check whether the option values you have set are correct by pressing the Mode button repeatedly.



EX) VHHE***S4-4P
020010-100000-200000-300000

4. Save the option values into the indoor unit:
Point the remote control to the remote control sensor on the indoor unit and then press the button on the remote control twice.
Make sure that this command is received by the indoor unit. When it is successfully received, you can hear a short sound from the indoor unit. If the command is not received, press the button again.
5. Check whether the air conditioner operates following the option values you have set:
   1) Reset the indoor or outdoor unit.
      - Indoor Unit : Press button + button for 5 seconds
      - Outdoor Unit: Press the K3 button
   2) Reset remote control: Temp button Down + Fan button Down + Mode Press for 10 seconds
   You can see the "SW Initialization" message.



Setting an indoor unit address and installation option

Setting an indoor unit address (MAIN/RMC)

1. Check whether power is supplied or not.
   - When the indoor unit is not plugged in, there should be additional power supply in the indoor unit.
2. The panel(display) should be connected to an indoor unit to receive option.
3. Before installing the indoor unit, assign an address to the indoor unit according to the air conditioning system plan.
4. Assign an indoor unit address by wireless remote controller.
   - The initial setting status of indoor unit ADDRESS(MAIN/RMC) is "0A0000-100000-200000-300000".

Option No. : 0AXXXX-1XXXXX-2XXXXX-3XXXXX

Option	SEG1		SEG2		SEG3		SEG4		SEG5		SEG6	
Explanation	PAGE		MODE		Setting Main address		100-digit of indoor unit address		10-digit of indoor unit		The unit digit of an indoor unit	
Indication and Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details
	0		A		0	No Main address	0~9	100-digit	0~9	10-digit	0~9	A unit digit
					1	Main address setting mode						

Option	SEG7		SEG8		SEG9		SEG10		SEG11		SEG12	
Explanation	PAGE				Setting RMC address				Group channel(*16)		Group address	
Indication and Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details
	1				0	No RMC address			RMC1	0~2	RMC2	0~F
					1	RMC address setting mode						

CAUTION

- When "A"~"F" is entered to SEG5~6, the indoor unit MAIN ADDRESS is not changed.
- If you set the SEG3 as 0, the indoor unit will maintain the previous MAIN ADDRESS even if you input the option value of SEG5~6.
- If you set the SEG9 as 0, the indoor unit will maintain previous RMC ADDRESS even if you input the option value of SEG11~12.

Setting an indoor unit installation option (suitable for the condition of each installation location)

1. Check whether power is supplied or not.
   - When the indoor unit is not plugged in, there should be additional power supply in the indoor unit.
2. The panel(display) should be connected to an indoor unit to receive option.
3. Set the installation option according to the installation condition of a product.
   - The default setting of an indoor unit installation option is "020000-100000-200000-300000
   - Individual control of a remote controller(SEG20) is the function that controls an indoor unit individually when there is more than one indoor unit.
4. Set the indoor unit option by wireless remote controller.

■ 02 series installation option

SEG1	SEG2	SEG3	SEG4	SEG5	SEG6
0	2	-	-	Central control	-
SEG7	SEG8	SEG9	SEG10	SEG11	SEG12
1	-	-	-	Opening the electronic expansion valve	-
SEG13	SEG14	SEG15	SEG16	SEG17	SEG18
2	External control	External control output	-	-	-
SEG19	SEG20	SEG21	SEG22	SEG23	SEG24
3	-	Heating setting compensation	EEV opening of an indoor unit stopped during oil return or Defrost operation.	-	-

▶ If you input a number other than 0~4 of the individual control of the indoor unit(SEG20), the indoor is set as "indoor 1".

▶ SEG5 option for centralized control usage is set to 0(disuse) as a default setting. You must adjust the setting for this option separately when centralized control needs to be used.

■ 02 series installation option(Detailed)

Option No. : 02XXXX-1XXXXX-2XXXXX-3XXXXX

Option	SEG1		SEG2		SEG3		SEG4		SEG5		SEG6	
Explanation	PAGE		MODE		-		-		Use of central control		-	
Indication and Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details
	0		2		0	-	0	-	0	Disuse	0	-
									1	Use		

Setting an indoor unit address and installation option

Option	SEG7		SEG8		SEG9		SEG10		SEG11		SEG12	
Explanation	PAGE		-		-		-		Opening the electronic expansion valve of an indoor unit when heating operation stops.		-	
Indication and Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details
	1		0	-	0	-	0	-	0	Default	0	-
									1	Noise reduction setting		

Option	SEG13		SEG14		SEG15		SEG16		SEG17		SEG18	
Explanation	PAGE		Use of external control		Setting the output of external control		-		-		-	
Indication and Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details
	2		0	Disuse	0	Thermo on	0	-	0	-	0	-
			1	ON/OFF Control	1	Operation on						
			2	OFF Control								

Option	SEG19		SEG20		SEG21		SEG22		SEG23		SEG24	
Explanation	PAGE		-		Heating setting compensation		EEV opening of an indoor unit stopped during oil return or defrost operation.		-		-	
Indication and Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details
	3		0	-	0	Default	0	Default	0	-	0	-
					1	35.6 °F (2 °C)	1	Noise reduction setting				
					2	41.0 °F (5 °C)						

✻ Use of external control function in SEG14

1: When the contact is open, indoor unit operation is turned off, when the contact is short, the indoor unit returns to previous operation status. / When the contact is open, the indoor unit can be controlled by a remote controller.

2: When the contact is open, indoor unit operation is turned off, when the contact is short, indoor unit is controlled by a remote controller / When the contact is open, the indoor unit cannot be operated.

■ 05 series installation option

SEG1	SEG2	SEG3	SEG4	SEG5	SEG6
0	5	-	-	-	-
SEG7	SEG8	SEG9	SEG10	SEG11	SEG12
1	-	-	Compensation option for Long pipe or height difference between indoor units	-	-
SEG13	SEG14	SEG15	SEG16	SEG17	SEG18
2	-	-	-	-	-
SEG19	SEG20	SEG21	SEG22	SEG23	SEG24
3	-	-	-	-	Water tank sensor setting

■ 05 series installation option(Detailed)

Option No. : 05XXXX-1XXXXX-2XXXXX-3XXXXX

Option	SEG1		SEG2		SEG3		SEG4		SEG5		SEG6	
Explanation	PAGE		MODE		-		-		-		-	
Indication and Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details
	0		5		0	-	0	-	0	-	0	-
Option	SEG7		SEG8		SEG9		SEG10		SEG11		SEG12	
Explanation	PAGE		-		-		Compensation option for Long pipe or height diffference between indoor units		-		-	
Indication and Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details
	1		0	-	0	-	0	Use default value	0	-	0	-
							1	1) Height difference[1] is more than 30m or 2) Distance[2] is longer than 110m				
							2	1) Height difference is[1] 15~30m or 2) Distance[2] is 50~110m				
Option	SEG13		SEG14		SEG15		SEG16		SEG17		SEG18	
Explanation	-		-		-		-		-		-	
Indication and Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details
	2		0	-	0	-	0	-	0	-	0	-

Setting an indoor unit address and installation option

Option	SEG19		SEG20		SEG21		SEG22		SEG23		SEG24	
Explanation	-		-		-		-		-		Water tank sensor setting	
Indication and Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details
	3		0	-	0	-	0	-	0	-	0	Default (Direct connected water tank sensor)
											1	Shared sensing value of water tank

1) Height difference : The difference of the height between the corresponding indoor uint and the indoor unit installed at the lowest place. For example, When the indoor unit is installed 40 m (131.2 ft) higher than the indoor unit installed at the lowest place, select the option "1".

2) Distance : The difference between the pipe length of the indoor unit installed at the farthest place from an outdoor unit and the pipe length of the corresponding indoor unit from an outdoor unit. For example, when the farthest pipe length is 100m and the corresponding indoor unit is 40m away from an outdoor unit, select the option "2". 100 m (328.1 ft) – 40 m (131.2 ft) = 60 m (196.9 ft)

Changing a particular option

You can change each digit of set option.

Option	SEG1		SEG2		SEG3		SEG4		SEG5		SEG6	
Explanation	PAGE		MODE		The option mode you want to change		The tens' digit of an option SEG you will change		The unit digit of an option SEG you will change		The changed value	
Indication and Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details	Indication	Details
	0		D		Option mode	0~F	Tens' digit of SEG	0~9	Unit digit of SEG	0~9	The changed value	0~9

NOTE

- When changing a digit of an indoor unit address setting option, set the SEG3 as 'A'.
- When changing a digit of indoor unit installation option, set the SEG3 as '2'.

Ex) When setting the 'buzzer control' into disuse status.

Option	SEG1	SEG2	SEG3	SEG4	SEG5	SEG6
Explanation	PAGE	MODE	The option mode you want to change	The tens' digit of an option SEG you will change	The unit digit of an option SEG you will change	The changed value
Indication	0	D	2	1	7	1

Product maintenance

1. Water quality management
   - The plate type heat exchanger is impossible to disassemble for cleaning or to replace parts. To prevent corrosion or water scale on the plate type heat exchanger, you must manage the cooling water quality in compliance with national standards.
   - If the temperature of water is higher than room temperature, make sure to keep the concentration of chloride ion below 100 ppm to prevent corrosion and the water hardness should be below 150 $mCaCO_3/L$ to prevent water scale. When scale inhibitor is used, make sure to use the ones that does not cause corrosion to stainless steel and copper.
2. Amount of water flow management
   - Insufficient amount of water flow will lead to accidents related to frozen plate type heat exchanger. Check to make sure if there is any decrease in amount of water flow due to blocked strainer, problem on air ventilation or circulation pump after checking the temperature/pressure difference between the inlet and outlet of the plate type heat exchanger. If the temperature/pressure difference exceeds optimal range, stop the operation until cause is taken care before re-start the operation.
3. Precautions on plate type heat exchanger maintenance

▶ Make sure to tell the user to keep this installation manual.

1) When the product was not operated for long period of time, check the followings.
- Check the water to see if the water quality meets the standard.
- Clean the strainer.
- Check if the amount of water flow is appropriate. (The Flow switch starts to operate at a minimum flow rate of 12 liters per minute.)
- Check to see if there is any problems on the water pressure, amount of water and the water temperature at inlet/outlet.

2) The plate type heat exchanger is impossible to disassemble for cleaning or to replace parts. Therefore it has to be cleaned by following methods.
- Check if there is any cleaning hole for chemical cleaning at the inlet water pipe. For water scale cleaning use diluted (down to 5 %) citric acid, oxalic acid, acetic acid, phosphoric acid. However, do not use a cleaning solution containing hydrochloric acid, sulfuric acid or nitric acid since they are highly corrosive.
- Check if there is valve on the inlet/outlet of the plate type heat exchanger.
- Connect a exclusive pipe for cleaning to the inlet/outlet pipe of the plate type heat exchanger and fill the detergent at the temperature of 50 ~ 60 ˚C (122 ~ 140 ˚F) and circulate the detergent for about 2~5 hours. Cleaning time can be different depending on the temperature of detergent or degree of water scale. Judge the degree of water scale removal by the color of water detergent.
- After cleaning, discharge the detergent within the plate type heat exchanger and fill the plate type heat exchanger with a water mixed with 1~2 % of sodium hydroxide (NaOH) or sodium bicarbonate ($NAHCO_3$). Circulate the water mixture for 15~20 minutes to neutralize.
- After neutralizing the pipes, rinse the plate type heat exchanger with distilled water.
- If you are using the detergent sold at local retail stores, make sure that it doesn't cause any corrosion to the stainless steel.
- For detail information on cleaning method (and proper use of detergent), contact the detergent manufacturer.

3) After cleaning, check to see if it is possible to operate normally.

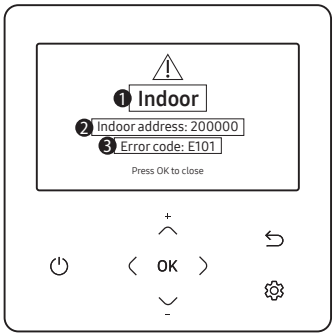
Failure diagnosis

When there is problem on Hydro unit / Hydro unit HT, error will be displayed on the Main PCB and the display of the remote controller.

Display on the remote controller display when error is detected

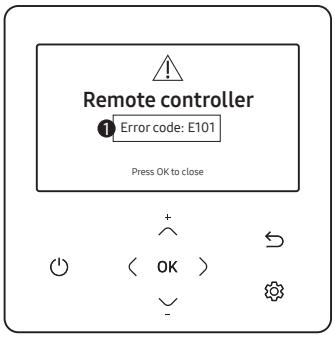
Error indications are displayed as seen below.

1. Popup-Indoor Error



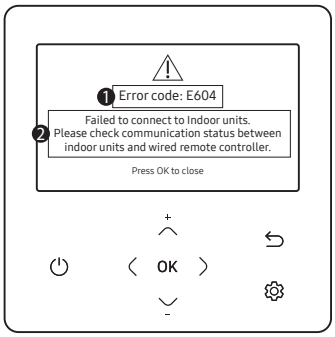
❶	Indoor
❷	Indoor address - Basic address 200000, and then address allocation to 200001, 200002, 200003... for additional connection
❸	Error Code - E###

2. Popup-Hydro unit wired controller Error



❶	Error code

3. Popup-Tracking failure Error



❶	Error code
❷	Error Guide

Error code

Please follow below instruction when there is error on sensor.

- ▶ Check the resistance of the sensor
  - Hydro unit : Water pipe inlet/outlet, R-410A EVA IN/OUT → 10 kΩ @ 77 °F (25 °C)
  - Hydro unit HT : Water pipe inlet/outlet → 200 kΩ @ 77 °F (25 °C), R-410A EVA IN/OUT → 10 kΩ @ 77 °F (25 °C)
- ▶ Check the Hydro unit / Hydro unit HT's system diagram for the location of each sensor.
- ▶ Check if the sensor is attached properly to the copper pipe.
- ▶ If the problem persist after checking following above instruction, replace the PBA.

CAUTION

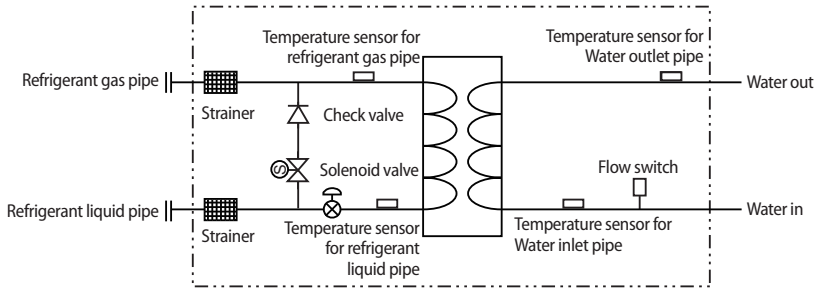
- When error is occurred due to 'Freeze prevention', 'Pipe rupture protection' (E907, E908/E909), make sure to solve the cause before re-start the operation.

Display	Explanation
E101	Communication error between Hydro unit / Hydro unit HT and outdoor unit (When Hydro unit / Hydro unit HT is having trouble with receiving data from outdoor unit)
E102	Communication error on outdoor unit (When outdoor unit is having trouble sending data to Hydro unit / Hydro unit HT)
E109	Communication error on indoor address incompletion
E110	Communication error between Hydro unit / Hydro unit HT and Control Kit (Detection from the Control Kit)
E121	Error on room temperature sensor of Hydro unit / Hydro unit HT (Short or Open)
E122	Error on EVA IN sensor of Hydro unit / Hydro unit HT (Short or Open)
E123	Error on EVA OUT sensor of Hydro unit / Hydro unit HT (Short or Open)
E128	EVA IN sensor of Hydro unit / Hydro unit HT is detached
E129	EVA OUT sensor of Hydro unit / Hydro unit HT is detached
E130	EVA IN and EVA OUT sensor of Hydro unit / Hydro unit HT is detached
E151	Error due to opened EEV of Hydro unit / Hydro unit HT (2nd detection)
E152	Error due to closed EEV of Hydro unit / Hydro unit HT (2nd detection)
E161	Mixed operation mode error
E162	EEPROM error
E163	EEPROM option setting error
E177	Check the water circulating
E185	Cross wiring error (When power line is connected to communication line of Hydro unit / Hydro unit HT)
E198	Error due to disconnected Thermal Fuse (When the temperature of terminal block is increases)
E601	Communication error between remote controller and the Hydro unit / Hydro unit HT
E602	Communication error between main and sub remote controller
E604	Tracking error between remote controller and the Hydro unit / Hydro unit HT
E618	Error due to exceeding maximum numbers of Hydro unit installation (16 units)
E627	Error due to exceeding maximum numbers of hydro unit wired controller installation (2 units)
E633	Error caused by installing mixed models
E653	Remote controller's temperature sensor is disconnected or has problem
E654	Data error on remote controller (Memory read/write error)
E901	Error on the sensor of water inlet pipe (Short or Open)
E902	Error on the sensor of water outlet pipe (Short or Open)

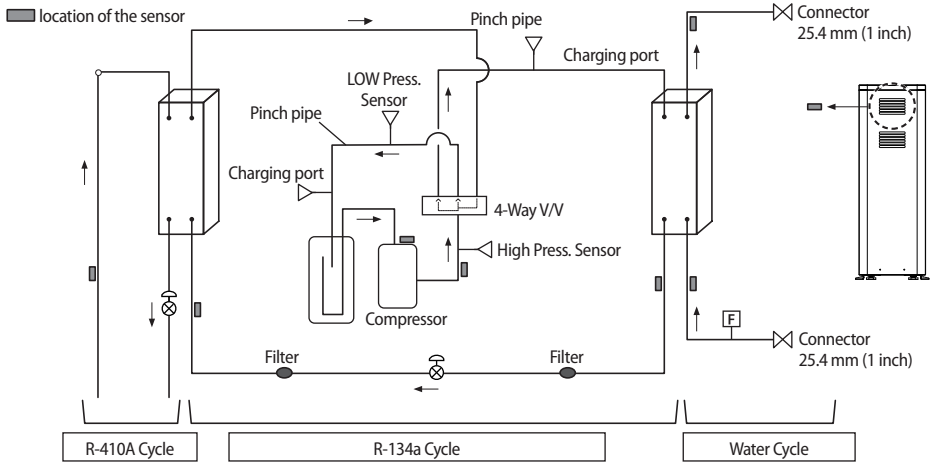
Error code

Display	Explanation
E904	Hot Water Tank Temperature sensor short/open
E907	Error due to pipe rupture protection (Re-operation is impossible)
E908	Error due to freeze prevention (Re-operation is possible)
E909	Error due to freeze prevention (Re-operation is impossible)
E910	Water temperature sensor on water outlet pipe is detached
E911	Flow Switch Off Error, When Water pump is running
E913	Six times detection for Flow Switch Error (Re-operation is possible, VHTC***S4-4P model only)
E914	Error due to incorrect thermostat connection
E915	Error on DC fan (Non-operating)
E917	Water Tank Sensor configuration error
E919	Error that the set temperature for disinfection operation is not reached, or, after reaching, the temperature fails to continue for the requested time

System diagram for Hydro unit / Hydro unit HT



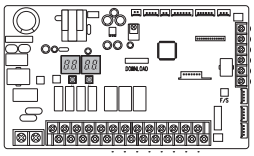
<Hydro unit>



<Hydro unit HT>

Using the PCB Switch

Switch is located on the control kit PCB



1. Check the power between Hydro unit / Hydro unit HT and the distribution board.
   - Single phase: L, N
2. Check the outdoor unit.
   1) Check if power and communication cable of the outdoor unit is connected properly. (Communication cable between the Hydro unit / Hydro unit HT and the outdoor unit should be connected to F1, F2)
   2) Check the connection of the temperature sensor, drain pump and display etc.
3. Press the [K1] button to check the information on status of Hydro unit / Hydro unit HT as shown in the below table.

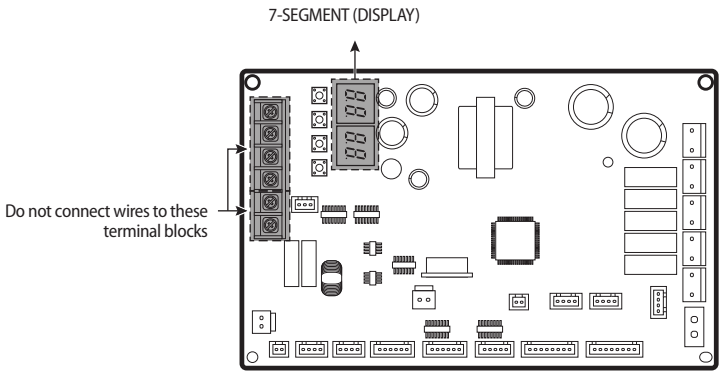
[K1] Number of press	Displayed contents	Display			
		SEG1	SEG2	SEG3	SEG4
1	Capacity of Hydro unit / Hydro unit HT	1	25000 W → 250		
2	Set temperature	2	80.6 °F (27 °C) → 027		
3	Current temperature	3	80.6 °F (27 °C) → 027		
4	Room temperature	4	80.6 °F (27 °C) → 027		
5	EVA IN temperature	5	1.4 °F (-17 °C) → -17		
6	EVA OUT temperature	6	1.4 °F (-17 °C) → -17		
7	WATER IN temperature	7	1.4 °F (-17 °C) → -17		
8	WATER OUT temperature	8	1.4 °F (-17 °C) → -17		
9	Hot water tank temperature	9	80.6 °F (27 °C) → 027		
10	Defrost bypass valve	A	ON → 000 / OFF → 001		
11	Pump output	B	ON → 000 / OFF → 001		
12	Flow switch input	C	ON → 000 / OFF → 001		
13	EEV Step	D	1400 → 140		
14	Current targeted degree of super heat	E	37.4 °F (3 °C) → 003		
15	Hydro unit / Hydro unit HT address	F	01 → 001		
16	Version	June 2020 → 2006			

4. When there are more than one error, press the [K2] button to check the errors.

[K2] Number of press	Displayed contents
1	Currently displayed error
2	Most recently occurred error 1
3	Most recently occurred error 2
4	Most recently occurred error 3
5	Most recently occurred error 4

Using the PCB Switch

Switch is located on the Main PCB (VHTC***S4-4P Series)



Tact S/W Function

Tact switch	Number of press	Content	SEG1	SEG2	SEG3	SEG4
K1	1	Heating refrigerant charging	H	1		
	2	Vacuuming	H	2		
	3	End Key operation	-	-		
K2	1	Inverter Check	H	3		
	2	Discharge mode of DC link voltage	H	4		
	3	End Key operation	-	-		
K3	1	Reset	-	-		

▶ K4 input display order

(1) Current frequency → (2) Low pressure value → (3) Outdoor temperature → (4) Discharge temperature → (5) OLP temperature → (6) COND temperature → (7) Suction temperature → (8) High pressure value → (9) → (10) → (11) MAIN EEV → (12) Present running current → (13) Number of connected hydro units → (14) Number of operating hydro units → (15) Sum of hydro unit capacity

K4(Press and hold to enter the setting) → K4 press(Number of press)	Displayed content	Display on segment		
0 time	Main Micom version	Version (ex. 0912)		
1 time	Inverter Micom version	Version (ex. 0912)		
2 times	EEPROM version	Version (ex. 0912)		
3 times	Automatically assigned address of the units	SEG1	SEG2	SEG3, 4
		Hydro unit: "A"	Hydro unit: "0"	Address (ex: 05)
4 times	Manually assigned address of the units	SEG1	SEG2	SEG3, 4
		Hydro unit: "M"	Hydro unit: "A"	Address (ex: nU)

[K4] Number of press	Displayed contents	Display			
		SEG1	SEG2	SEG3	SEG4
1	Current frequency	1	15Hz → 015		
2	Low pressure value	2	1.56 MPa (226.3 psi) → 156		
3	Outdoor temperature	3	74.3 °F (23.5 °C) → 235		
4	Discharge temperature	4	177.3 °F (80.7 °C) → 807		
5	OLP temperature	5	203 °F (95 °C) → 950		
6	COND temperature	6	79.3 °F (26.3 °C) → 263		
7	Suction temperature	7	80.1 °F (26.7 °C) → 267		
8	High pressure value	8	1.56 MPa (226.3 psi) → 156		
9		9			
10		A			
11	MAIN EEV	B	1500Step → 150		
12	Present running current	C	15A → 150		
13	Number of connected hydro units	D	10 → 010		
14	Number of operating hydro units	E	10 → 010		
15	Sum of hydro unit capacity	F	12000kcal/h → 120		

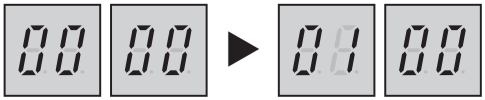
Using the PCB Switch

Setting key function (VHTC***S4-4P Model only)

1. Press and hold K2 to enter the option setting. (Only available when the operation is stopped)
   - If you enter the option setting, display will show the following. (If you have set the 'Emergency operation for compressor malfunction', 1 or 2 will be displayed on Seg 4.)

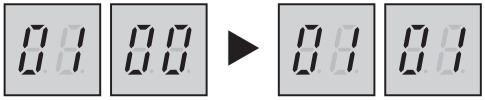
   - Seg 1 and Seg 2 will display the number for selected option.
   - Seg 3 and Seg 4 will display the number for set value of the selected option.
2. If you have entered option setting, you can shortly press the K1 switch to adjust the value of the Seg 1, Seg 2 and select the desired option.

   Example)



3. If you have selected desired option, you can shortly press the K2 switch to adjust the value of the Seg 3, Seg 4 and change the function for the selected option.

   Example)



4. After selecting the function for options, press and hold the K2 switch for 2 seconds. Edited value of the option will be saved when entire segments blinks and tracking mode begins.

CAUTION

- Edited option will not be saved if you do not end the option setting as explained in above instruction.

❋ While you are setting the option, you may press and hold the K1 button to reset the value to previous setting.

❋ If you want to restore the setting to factory default, press and hold the K4 button while you are in the option setting mode.

- If you press and hold the K4 button, setting will be restored to factory default but it doesn't mean that restored setting is saved. Press and hold the K2 button. When the segments shows that tracking mode is in progress, setting will be saved.

Operation item	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Capacity correction for heating	0	0	0	0	Default	Targeted high pressure [MPa (psi)]
			0	1	Default - 0.2	
			0	2	Default - 0.1	
			0	3	Default + 0.1	
Changing current limit value	0	1	0	0	Default	A: 1 phase (2A) B: 1 phase (4A) C: 1 phase (6A)
			0	1	Default-A	
			0	2	Default-B	
			0	3	Default-C	
Stabilization mode of water outlet temperature	0	2	0	0	Disabled (Factory default)	
			0	1	Enabled	Compressor Hz control to continuously maintain the set water outlet temperature

Completing the installation

▶ Measure the power terminal (1 phase : L, N) and the grounding of the outdoor unit using a DC 500 V insulation resistance meter before connecting the power.

The measured value should be over 30 MΩ

CAUTION

- Never measure the communication terminal to prevent the communication circuit from being damaged.
- Check the short-circuit of the communication terminal using a general circuit tester.
- When you execute Key operation (trial operation, pump down etc.) from the outdoor unit, select 'Water temperature' as a control type for Hydro unit / Hydro unit HT. (This can be set from the service mode for hydro unit wired controller)

Explaining functions to the user

When the Hydro unit / Hydro unit HT is completed explain the following functions to the user by referring to the user manual.

1. Starting/Stopping the operation of Hydro unit / Hydro unit HT.
2. Adjusting the temperature when selecting the operation mode.
3. Setting the 'On/Off timer'
4. Cleaning the Hydro unit / Hydro unit HT.
   - To prevent performance decrease or product failure, strainer on the Hydro unit / Hydro unit HT must be cleaned regularly (at least once a year). Explain these matters to the user and how to clean the strainer.
5. When user moves out for long time, user should drain water circuit of the product, or do not cut off the power supply if the outside temperature is under the 32 °F (0 °C)

CAUTION

- Hand over the user manual to the user after explaining the functions of the Hydro unit / Hydro unit HT and make sure to tell them to keep the manual.