

Installer manual

Intelligent inverter heat pump



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1. About This Document

1.1 Meaning of Warnings and Symbols



Danger

Indicates a situation that will result in death or serious injury.



Warning: flammable material



Danger: risk of electric shock

Indicates a situation that may result in electric shock.

Symbol	Description
	Before installation, read the installation and operation manual, as well as the wiring instructions.
	Read the service manual before carrying out maintenance and service tasks.
	For more information, refer to the installer and user reference guide.

2. General Safety Guidelines

2.1 Precautions

- Before installing the air-to-water heat pump (hot water) unit, carefully read the following “Safety Precautions”.
- Electrical work and plumbing must be carried out by licensed electricians and certified plumbers respectively. For the model to be installed, ensure the use of correct ratings and main circuit.
- The precautions specified here must be observed as they contain important safety-related information. The meaning of each indication used is shown below.

Incorrect installation resulting from disregarding or neglecting the instructions may cause injury or damage, the severity of which is classified according to the following indications.

The following items are classified by symbols:

	Symbols with a white background indicate actions that are prohibited.
 	Symbols with a black background indicate items that must be carried out.

- Perform a test run to confirm that no abnormalities occur after installation. Then, explain to the user about operation, care, and maintenance as described in the instructions. Remind the customer to keep the operating instructions for future reference.
- If you have any doubts about the installation procedure or operation, always contact an authorized dealer for advice and information.

		
1. Do not install the heat pump near balcony railings. If you install the heat pump on a balcony of a high-rise building, children may climb onto it and over the railing, resulting in an accident.		
2. Do not use unspecified power cords, modified power cords, joint power cords or extension cords. Do not share a single socket with other electrical appliances. Poor contact, poor insulation or overcurrent can lead to electric shock or fire.		
3. Do not bundle power cords together, as this may cause an abnormal temperature rise in the cords.		
4. Do not insert fingers or other objects into the heat pump. The high-speed rotating fan may cause injury.		
5. Do not sit or stand on the heat pump, as this may result in accidental falls.		
6. Keep plastic bags (packaging materials) away from children, as they may cause suffocation.		
7. Do not use pipe wrenches to install refrigerant pipes. This may deform the pipes, causing heat pump malfunction.		
8. Do not purchase unauthorized electrical components for installation, repair, and maintenance. They may cause electric shock or fire.		
9. This heat pump is a multi-power device. All circuits must be disconnected before connecting to the device terminals.		
10. Do not modify the heat pump's wiring to install additional components (such as heaters). Overloading wires or connection points may lead to electric shock or fire.		
11. Do not add or replace refrigerants other than the specified type. This may cause product damage, bursting, and injury.		

12. For electrical work, follow local national wiring standards, regulations, and this installation manual. An independent circuit and single socket must be used. Insufficient circuit capacity or defects in electrical work will result in electric shock or fire.	!
13. For water circuit installation, comply with relevant European and national regulations (including EN61770) as well as local plumbing and building codes.	!
14. Installation must be performed by an authorized dealer or expert. Faulty installation may lead to water leakage, electric shock, or fire.	!
15. Install strictly according to this installation manual. Faulty installation may lead to water leakage, electric shock, or fire.	!
16. Use only the provided or specified installation parts. Otherwise, it may cause the heat pump to vibrate, fall, leak water, or result in electric shock or fire.	!
17. Install in a flat, solid, and secure location that can support the weight of the heat pump. If the location is slanted or not strong enough, the heat pump may fall and cause injury.	!
18. It is strongly recommended to install a residual current device (RCD) on-site according to respective national wiring rules or country-specific safety measures for residual current.	!
19. This heat pump is for use with closed water systems only. Use it in an open water system may lead to excessive corrosion of water pipes and increase the risk of bacterial colonies growing in the water, especially Legionella.	!
20. If you have any doubts about the installation procedure or operation, always contact an authorized dealer for advice and information.	!
21. Choose an appropriate location where water leakage, if it occurs, will not cause damage to other property.	!
22. According to electrical installation standards, when electrical equipment is installed on wooden buildings with metal lath or metal wire lath, no electrical contact is allowed between the equipment and the building. Insulators must be installed between them.	!
23. This installation may require approval under building regulations applicable to each country, and it may be necessary to notify local authorities before installation.	!
24. Any work performed on the heat pump after removing the front panel secured by screws must be carried out under the supervision of an authorized dealer and licensed installation contractor.	!
25. The heat pump must be properly grounded. Electrical grounding must not be connected to gas pipes, water pipes, lightning rods, or telephone ground wires. Otherwise, there is a risk of electric shock if the heat pump experiences insulation breakdown or grounding failure.	!
	
1. Do not install the heat pump in areas prone to flammable gas leakage. There is a risk of fire if flammable gas accumulates near or around the heat pump.	⊘
2. Do not release refrigerant during pipe work for installation, re-installation, and repair of refrigerating parts. Be careful of liquid refrigerant as it may cause frostbite.	⊘
3. Ensure that the power cord does not come into contact with hot parts (i.e., water pipes). High temperatures may damage the power cord insulation, leading to electric shock or fire.	⊘
4. Do not touch the sharp aluminum fins, as sharp parts may cause injury. 	⊘
5. Do not apply excessive force to water pipes, as this may damage them. If water leakage occurs, it will lead to flooding and damage to other property.	⊘
6. Install drainage piping according to the installation manual. If drainage is inadequate, water leakage may occur and potentially cause damage to user property.	!

7. Flush the pipe installation before connecting the heat pump to remove contaminants. Contaminants may damage heat pump components.	!
8. Choose an installation location that allows for easy maintenance.	!
9. Power connection to the heat pump: • The power supply point shall be located in an easily accessible place for power disconnection in case of emergency. • Local national wiring standards, regulations, and this installation manual must be followed. • It is strongly recommended to make a permanent connection with a circuit breaker. It must be a double-pole switch with a minimum gap of 3.0 mm. • Select the circuit breaker according to the total current of the unit.	!
10. Ensure all wiring maintains correct polarity. Failure to do so may result in electric shock or fire.	!
11. After installation, it is the installer's responsibility to verify the correct operation of the heat pump. During the test run, check connection points for water leakage. If leakage occurs, it will cause damage to other property.	!
12. Installation. Installation work requires four or more people. If carried by fewer than four people, the weight of the heat pump may cause injury.	!

2.2 Installation Location

- Install the unit outdoors only.
- Avoid installation in areas where ambient temperature may drop below -30°C.
- The heat pump must be installed on a flat, solid surface.
- Avoid places with heat sources or steam that may affect the heat pump's operation.
- Choose a place with good air circulation.
- Choose a place where drainage is easy.
- Choose a place where the operating noise of the heat pump will not cause discomfort to the user.
- Choose a place convenient for maintenance.
- Maintain minimum distances from walls, ceilings, or other obstacles.
- Choose a place where flammable gas leakage is unlikely to occur.
- Choose a place where the piping and wiring lengths of the heat pump are within reasonable limits.
- If installing an awning over the heat pump to protect from direct sunlight or rain, be careful not to obstruct heat radiation from the heat exchanger.
- Do not place any obstacles that could cause short-circuiting of discharged air.
- Avoid installing the heat pump where the intake side may be directly exposed to wind.
- If the heat pump is installed near the sea, which is a high-sulfur area, or in an oil-containing location (e.g., machine oil), its lifespan may be shortened.
- When the heat pump is installed in a place affected by typhoons or strong winds, such as between buildings, including on rooftops and in areas without surrounding buildings, secure the product with anti-toppling wires or similar measures.

The heat pump becomes very heavy when filled with water. Please install the unit on a solid concrete surface, taking into account the weight of both the unit and the water.

- Secure the unit to the concrete floor at 4 positions using M12 anchor bolts.
- The pull-out strength of these anchor bolts must be greater than 15000N.

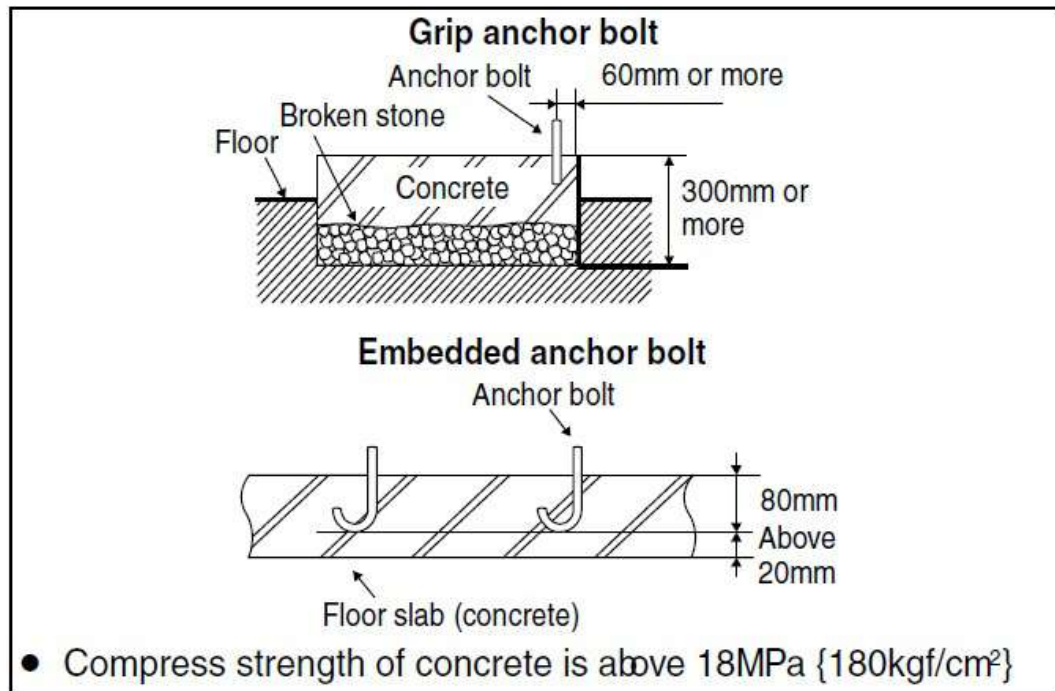


Illustration of grip type and embedded type anchor bolt

2.3 Refrigerant - R290


1. Due to higher working pressure than R22 refrigerants, some pipes and installation and service tools are specialized. The same piping can be used for R32 and R410A.
2. Mixing different refrigerants within a system is prohibited.
3. Ensure foreign substances (oil, water, etc.) do not enter the piping.
4. Operation, maintenance, repair, and refrigerant recovery shall be carried out by trained and certified personnel familiar with the use of flammable refrigerants, as recommended by the manufacturer. Any person operating, servicing, or maintaining the system or associated parts shall be trained and certified.
5. Any part of refrigeration circuits (evaporators, air coolers, AHU, condensers, or liquid receivers) or piping shall not be located near heat sources, open flames, operating gas appliances, or operating electric heaters.
6. The user/owner or their authorized representative shall check alarms, mechanical ventilation, and detectors regularly, at least once a year (as required by national regulations), to ensure their proper functioning.
7. A logbook shall be maintained, and the results of these inspections shall be recorded in the logbook.
8. Ventilation of occupied spaces shall be checked to confirm no obstructions.
9. Before a new refrigeration system is put into service, the person responsible for placing the system in operation shall ensure that trained and certified operators are instructed based on the instruction manual on the construction, supervision, operation, and maintenance of the refrigeration system, as well as the safety measures to be observed, and familiarize them with the properties and handling methods of the refrigerant used.
10. Trained and certified personnel shall meet the following general requirements: a) Knowledge of laws, regulations, and standards relating to flammable refrigerants; b) Detailed knowledge and skills in handling flammable refrigerants, personal protective equipment, refrigerant leak prevention, cylinder handling, charging, leak detection, recovery, and disposal;

c) Ability to understand and apply in practice the requirements in national laws, regulations, and standards;
d) Continuous regular and further training to maintain this expertise.
11. Protect the refrigeration system from accidental rupture due to moving furniture or reconstruction activities.
12. To ensure no leakage, technicians shall test field-made refrigerant joints for tightness indoors, using a test method with a refrigerant sensitivity of 5 grams per year or better at a pressure of at least 0.25 times the maximum allowable pressure (>1.04 MPa, max 4.15 MPa). No leakage shall be detected.

2.4 Pipe installation



This section applies only to authorized and licensed electricians/water system installers. Work behind the front panel secured by screws shall only be carried out under the supervision of a qualified contractor, installation engineer, or service personnel.

Please hire licensed water system installers to install this water circuit.

- The water circuit must comply with relevant national regulations and local building codes.
- Ensure that components installed in the water circuit can withstand water pressure during operation.
- Do not apply excessive force to pipes that may be damaged.
- Use 1-inch nuts for inlet and outlet connections, and clean all pipes with tap water before connecting to the heat pump.
- Cover pipe ends to prevent dust and dirt when inserting into walls. If connecting an existing tank to the heat pump, ensure pipes are clean before installing water pipes.
- Choose appropriate sealants that can withstand system pressure and temperature.
- Ensure connections are tightened using two wrenches.
- If using non-brass metal pipes for installation, ensure pipes are insulated to prevent galvanic corrosion.
- Do not use crushed or deformed pipes. Using these substandard pipes may cause heat pump failure.
- Ensure water circuit pipes are insulated (insulation thickness: 20 mm or thicker) to prevent condensation during cooling operation and reduced heating capacity, and to avoid freezing of outdoor water circuit pipes in winter.
- After installation, check for water leaks in connection areas during the test run.
- Drain the system if power failure or pump operation failure occurs.

3. Specific Safety Instructions



1. Installation (Space)

- National gas regulations, state/municipal regulations and laws must be adhered to. Notify relevant authorities in accordance with all applicable regulations.
- Mechanical connections must be made accessible for maintenance.

In cases where mechanical ventilation is required, vent holes shall be kept free of obstruction.

- When disposing of the product, always follow the precautions in #12 and comply with national regulations.
- Always contact your local municipal office for proper handling.

2. Service

2-1 Service Personnel

- Any qualified person involved in working on the refrigerant circuit shall hold a valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accordance with an industry-recognized assessment specification.
- Repairs shall only be performed as recommended by the equipment manufacturer. Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants.
- Repairs shall only be carried out according to manufacturer's recommendations.
- The system is inspected, regularly supervised, and maintained by trained and certified service personnel employed by the user or responsible party.
- Ensure that refrigerant charging does not leak.

2-2 Work

- Before the work on systems containing flammable refrigerants, safety checks must be carried out to ensure that the risk of ignition is minimized.
- For repairs to the refrigeration system, precautions in #2-2 to #2-8 must be followed before conducting work on the system.
- Work shall proceed under a controlled procedure to minimize the risk of a flammable gas or vapor being present while the work is being performed.
- All maintenance staff and others working in the local area shall be instructed and supervised on the nature of work being carried out.
- Avoid working in confined spaces. Always ensure a safe distance of at least 2 m from the source, or a free space area with a radius of at least 2 m.
- Wear appropriate protective equipment, including respiratory protection, as conditions dictate.
- Keep away from all sources of ignition and hot metal surfaces.

2-3 Checking for Presence of Refrigerant

- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially flammable atmospheres.
- Ensure that the leak detection equipment being used is suitable for use with flammable refrigerants, i.e., non-sparking, adequately sealed, or intrinsically safe.
- In case of leakage/spillage, immediately ventilate the area, stay upwind, and away from the leak/spill.
- If a leakage/spillage occurs, do notify people downwind, isolate immediate hazard area, and keep unauthorized personnel out.

2-4 Presence of Fire Extinguishers

- If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available.
- Place dry powder or CO₂ fire extinguishers adjacent to the charging area.

2-5 Avoidance of Ignition Sources

- Any person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant must not use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. Smoking is not allowed while performing such work.
- All possible ignition sources, including cigarette smoking, shall be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which flammable refrigerant might be released to the surrounding space.
- Prior to work, the area around the equipment shall be checked to make sure that there are no flammable hazards or ignition risks.
- “No Smoking” signs shall be displayed.

2-6 Ventilated Area

- Ensure the area is open or adequately ventilated before conducting any hot work on the system.
- Maintain ventilation to some extent during the period that the work is carried out.
- The ventilation shall safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

2-7 Checking the Refrigeration Equipment

- Where electrical components are being changed, they shall be fit for the purpose and to the correct specification.
- Manufacturer’s maintenance and service guidelines shall be followed at all times.
- If in doubt, consult the manufacturer’s technical department for help.
- The following checks shall apply to installations using flammable refrigerants:
 - The ventilation machinery and outlets are operating adequately without obstructions.
 - Markings on the equipment remain visible and legible. Illegible markings and signs shall be corrected.

2-8 Checking the Electrical Devices

- Repair and maintenance of electrical components shall include initial safety checks and component inspection procedures.
- Initial safety checks shall include but not be limited to:
 - Capacitor discharge: This shall be done in a safe manner to avoid possibility of sparking.
 - No live electrical components and wiring are exposed when charging, recovering or purging the system.
 - Continuity of earth bonding.
- Manufacturer’s maintenance and service guidelines shall be followed at all times.
- If in doubt, consult the manufacturer’s technical department for help.
- If a fault exists that could compromise safety, then no power supply shall be connected to the circuit until it is solved.
- If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used.
- The owner of the equipment must be informed or reported so all parties are subsequently notified.

3. Repair of Sealed Components

- During repair of sealed components, all power supplies shall be disconnected from the equipment being worked upon prior to removal of sealed covers.
- If it is absolutely necessary to have a power supply to equipment during servicing, then a permanently operating device for leak detection shall be located at the most critical point to warn of a potentially hazardous situation.
- Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not conforming to original specification, damage to seals, and incorrect fitting of glands.
- Ensure that the device is mounted securely.
- Ensure that seals or sealing materials have not degraded such that they no longer serve the purpose of preventing the

ingress of flammable atmospheres. • Replacement parts shall comply with the manufacturer's specifications.
4. Repair of Intrinsically Safe Components • Do not apply any permanent inductive or capacitance loads to the circuit when you are not sure whether this will exceed the permissible voltage and current for the equipment in use. • Intrinsically safe components are the only type that can be worked on while live in the presence of a flammable atmosphere. • The test apparatus shall be at the correct rating. • Replace components only with parts specified by the manufacturer. Parts not specified by the manufacturer may result in the ignition of refrigerant in the atmosphere from a leak.
5. Cabling • Check that cables will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. • During the check, also take into account the effects of aging or continual vibration from sources such as compressors or fans.
6. Detection of Flammable Refrigerants • Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. • A halide torch (or any other detector using a naked flame) shall not be used.
7. The following leak detection methods are deemed acceptable for all refrigerant systems. • No leakage shall be detected using detection equipment with a refrigerant sensitivity of 5 grams per year or better under a pressure of at least 0.25 times the maximum allowable pressure (>1.04 MPa, max 4.15 MPa). For example, a universal sniffer. • Electronic leak detectors may be used to detect flammable refrigerants, but the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) • Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. • Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant used, and the appropriate percentage of gas (25% maximum) shall be confirmed. • Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipes. • If a leak is suspected, all naked flames shall be removed/extinguished. • If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. The precautions in #8 must be followed to remove the refrigerant.
8. Removal and Evacuation • When breaking into the refrigerant circuit to make repairs or for any other purpose, you shall follow conventional procedures. However, it is important that best practice is followed since flammability is a consideration. The following procedure shall be adhered to: Remove refrigerant -> purge circuit with inert gas -> evacuate -> purge again with inert gas -> open the circuit by cutting or brazing • The refrigerant charge shall be recovered into the correct recovery cylinders. • The system shall be flushed with OFN to render the unit safe. (Note: OFN = oxygen-free nitrogen, a type of inert gas) • This process may need to be repeated several times. • Compressed air or oxygen shall not be used for this task. • Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. • This process shall be repeated until no refrigerant exists within the system.

• When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. • This operation is absolutely vital if the brazing operation on the pipework are to take place. • Ensure that the outlet of the vacuum pump is not close to any ignition sources and is well ventilated.
9. Charging Procedure • In addition to the conventional charging procedure, the following regulations shall also be observed: – Ensure that no contamination occurs between different refrigerants when using charging equipment. – Hoses or piping shall be as short as possible to minimize the amount of refrigerant contained within them. – Cylinders shall be placed in the appropriate position according to the instructions. – Before charging refrigerant into the refrigeration system, the system shall be properly grounded. – After charging is complete, the system shall be labeled (if not already done). – Special care shall be taken not to overcharge the refrigeration system. • Before charging the system, a pressure test with OFN shall be conducted (refer to #7). • After the system is charged, a leak test shall be performed before commissioning. • A follow-up leak test shall be conducted before leaving the site. • During refrigerant charging and discharging, static electricity may accumulate and create hazardous conditions. • To prevent fire or explosion, static electricity shall be dissipated by grounding and bonding the containers and equipment before charging/discharging.
10. Decommissioning • Before performing this procedure, technicians shall be fully familiar with the equipment and all its details. • It is recommended that all refrigerants be safely recovered. • If analysis of reclaimed refrigerant is required before the task, samples of oil and refrigerant shall be taken. • Power supply is essential before commencing the task. a) Familiarize yourself with the equipment and its operation. b) Electrically isolate the system. c) Before attempting this procedure, ensure that: • Mechanical handling equipment can be used to move refrigerant cylinders if necessary; • All personal protective equipment is complete and properly used; • The recovery process is always supervised by qualified personnel; • Recovery equipment and cylinders meet the appropriate standards. d) Evacuate the refrigeration system if possible. e) If evacuation is not feasible, set up a manifold to remove refrigerant from various parts of the system. f) Ensure that the cylinder is placed on a scale before recovery begins. g) Start the recovery machine and operate it according to the manufacturer's instructions. h) Do not overfill the cylinder (not exceeding 80% of the liquid volume). i) Do not exceed the cylinder's maximum working pressure, even temporarily. j) Once the cylinder is properly filled and the process is complete, ensure that the cylinder and equipment are immediately removed from the site, and all isolation valves on the equipment are closed. k) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and inspected. • During refrigerant charging or discharging, static electricity may accumulate and create hazardous conditions. To prevent fire or explosion, static electricity shall be dissipated by grounding and bonding the containers and equipment before charging/discharging.
11. Labeling • The equipment shall be labeled to indicate that it has been decommissioned and the refrigerant has been evacuated. • The label shall be dated and signed. • Ensure that the equipment is labeled to indicate that it contains flammable refrigerant.

12. Recovery

- When removing refrigerant from the system, whether for maintenance or decommissioning, it is recommended that all refrigerant be safely recovered.
- When transferring refrigerant to cylinders, ensure that only appropriate refrigerant recovery cylinders are used.
- Ensure that the correct number of cylinders is available to determine the total charge of the system.
- All cylinders used shall be designated for refrigerant recovery and labeled accordingly (i.e., cylinders specifically for recovered refrigerant).
- Cylinders shall be equipped with pressure relief valves and associated shut-off valves, which shall be in good working condition.
- Prior to recovery, cylinders shall be evacuated, and if possible, cooled.
- Recovery equipment shall be in good working condition and accompanied by a set of instructions for the existing equipment, and it shall be suitable for recovering flammable refrigerants.
- Additionally, a calibrated weighing scale shall be provided and kept in good working condition.
- Hoses shall be equipped with leak-free disconnect fittings and be in good condition.
- Before using the recovery machine, check that it is in satisfactory working condition, properly maintained, and that any relevant electrical components are sealed to prevent ignition in case of refrigerant release.

For any questions, consult the manufacturer.

- Recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery containers, with appropriate waste transfer documentation arranged.
- Do not mix refrigerants in the recovery unit, and especially do not mix them in the cylinders.
- To remove the compressor or compressor oil, ensure it has been evacuated to an acceptable level so that no flammable refrigerant remains in the lubricant.
- The evacuation process shall be carried out before returning the compressor to the supplier.
- Only electrical heating of the compressor body shall be used to expedite the process.
- When oil is drained from the system, it shall be done safely.

4. Unit Packaging

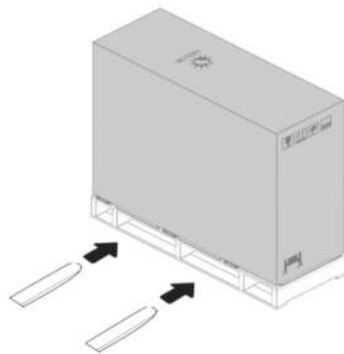
Please keep the following in mind:

- Upon delivery, the equipment must be inspected for damage and completeness. Any damaged or missing parts must be reported immediately to the carrier's claims agent.
- Move the packaged unit as close as possible to its final installation location to prevent damage during transportation.
- Prepare the path in advance that you intend to use to bring the equipment to its final installation location.

4.1 Handling the Outdoor Unit

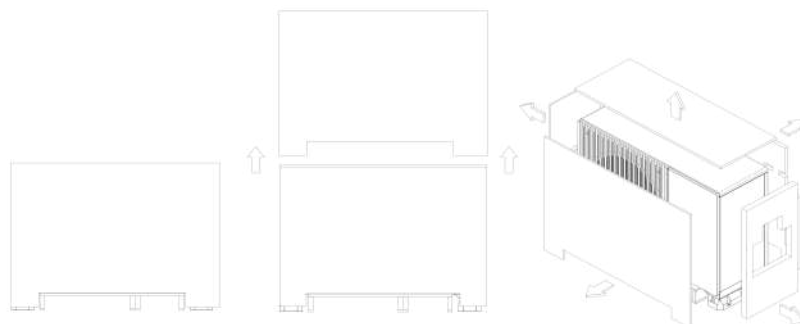
	
To avoid injury, do not touch the unit's air intake or aluminum fins.	
Ensure the stability of the outdoor unit during transportation to prevent it from falling.	

Align the forklift or pallet truck with the unit's central wooden base from the front side when moving it.

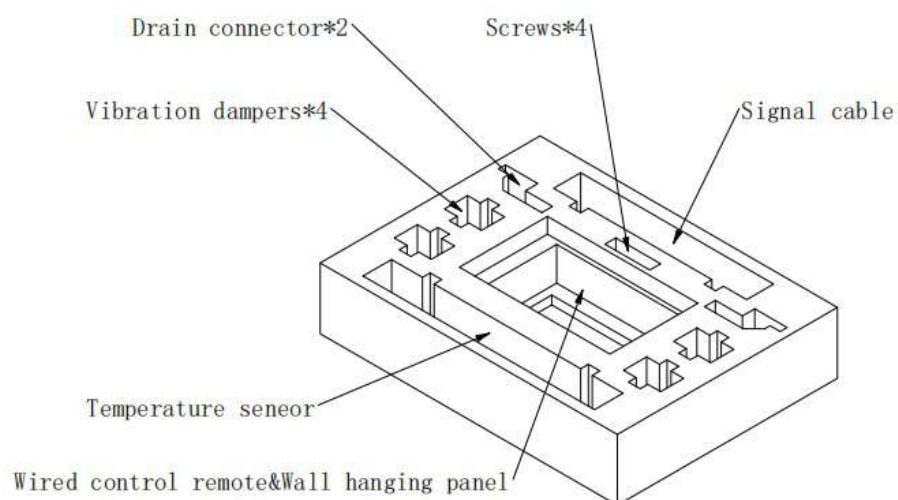


4.2 Unpacking the Outdoor Unit

- ①: Cut the straps around the outer packaging of the carton.
- ②: Remove the outer packaging straps.
- ③-④: Slide off the carton.
- ⑤: Remove the honeycomb cardboard.
- ⑥: Remove them along with the top honeycomb cardboard, and take out the accessory box.
- ⑦: Unpacking is complete.



4.3 Removing Accessories from the Outdoor Unit



Name	Shape	Quantity
User Manual		1
Vibration dampers		4
Screws		4
Signal cable		1
Wired control remote		1
Temperature sensor		1
Drain connector		1
Energy labelling		1

5.Application Guide

5.1The data of unit

***REFRIGERANT: R290

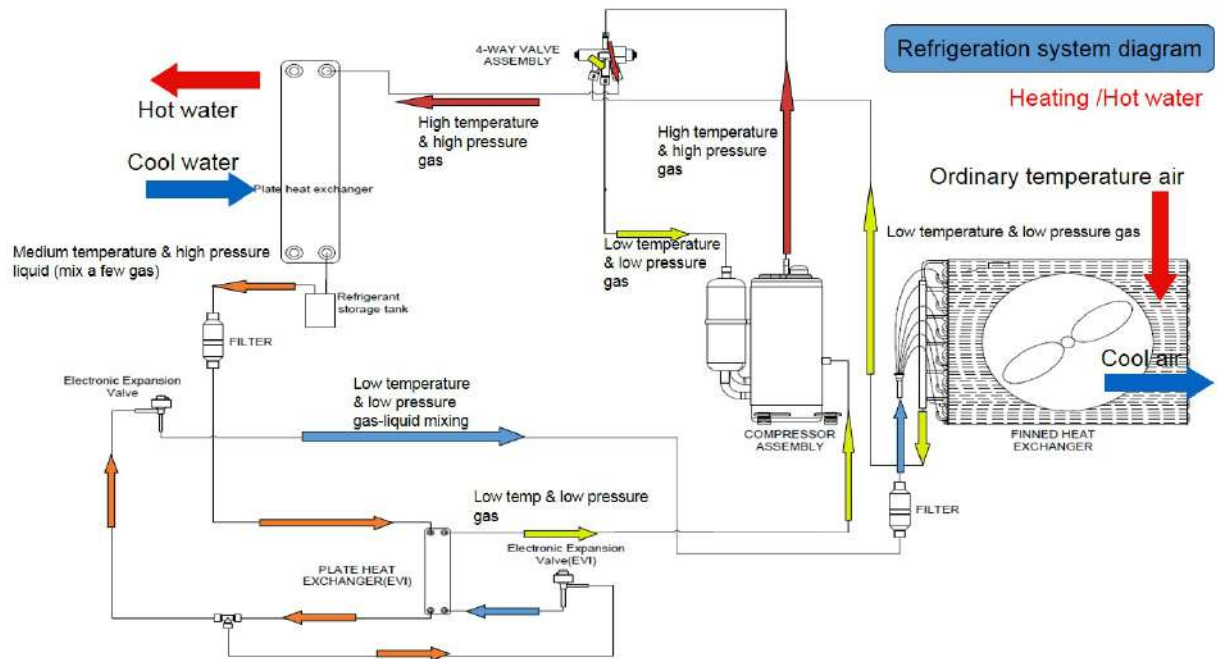
Model		CH-HP15UIMPZK~H	CH-HP15UIMPZM~H	CH-HP22UIMPZM~H
Heating Capacity Range(A)	kW	3.70~18.40	4.30~18.70	4.50~23.40
Heating Power Input Range(A)	kW	0.70~4.80	0.70~4.50	0.90~5.50
Heating Capacity Range(B)	kW	3.00~18.00	4.30~18.20	3.90~23.20
Heating Power Input Range(B)	kW	1.10~6.60	0.90~6.20	1.20~7.60
Cooling Capacity Range(C)	kW	3.90~15.40	3.80~15.50	5.00~23.20
Cooling Power Input Range(C)	kW	0.80~5.60	0.80~5.50	1.00~6.60
*Rated Power Input	kW	7	8	8.5
*Rated Current Input	A	30	12	15
Power Supply	V/Ph/Hz	220~240/50	400/3/50	
Aux. heater	kW	N/A	N/A	N/A
Compressor Type/Quantity	-	Rotary/1	Rotary/1	Rotary/1
Fan Type/Quantity	-	DC/1	DC/1	DC/2
Fan Power Input	W	120	120	160
Nominal Air Flow	m³/h	4000	4000	5200
Sound Pressure Level(1m)	dB(A)	40	40	42
Rated Flow Rate	m³/h	2.06	2.06	2.90
Water Connection	inch	1	1	1
Internal Water Pressure Drop	kPa	20	20	34
Water Head	m	5.2	5.2	10.4
Water Pipe Connection	inch	1	1	1
Refrigerant Charge	kg	1.2	1.2	1.7
Maximum Outlet Temperature	°C	80	80	80
Operating Range(Heating)	°C	-30~43	-30~43	-30~43
Operating Range(DHW)	°C	-30~43	-30~43	-30~43
Operating Range(Cooling)	°C	-30~43	-30~43	-30~43
Net Dimension(L/W/H)	mm	1438 × 545 × 1105	1438 × 545 × 1105	1438 × 545 × 1524
Net Weight	kg	210	214	275
Condenser Type	kg	Brazen Plate Heat Exchanger		
Shipping Dimensions(L/W/H)	mm	See Data On The Package		
Shipping Weight	kg	See Data On The Package		

Note:

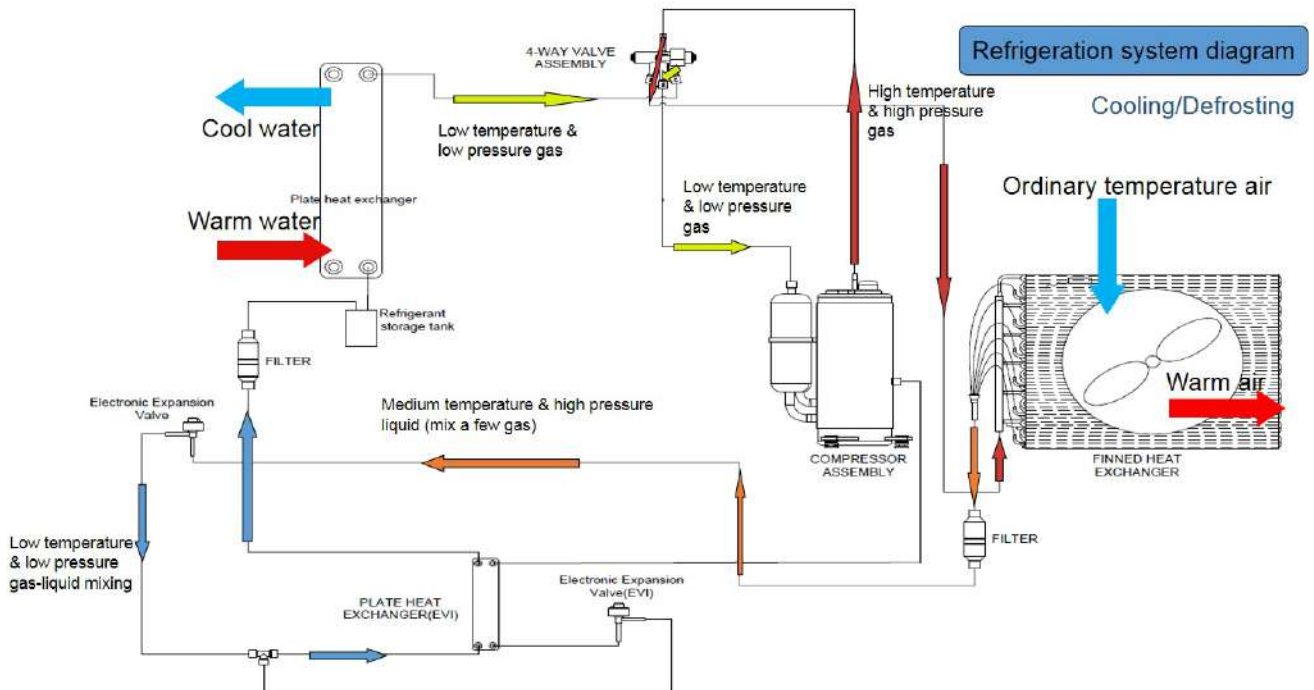
- 1) The heating performance data is tested by EN14511;
- 2) A:Ambient temp.(DB/WB):7℃/6℃,outlet water temp.35℃;
B:Ambient temp.(DB/WB):7℃/6℃,outlet water temp.55℃;
C:Ambient temp.(DB/WB):35℃/24℃,outlet water temp.18℃;
- 3)*According to IEC/EN 60335-1

5.2 System Principle of Heat Pump

5.2.1 Heating Cycle

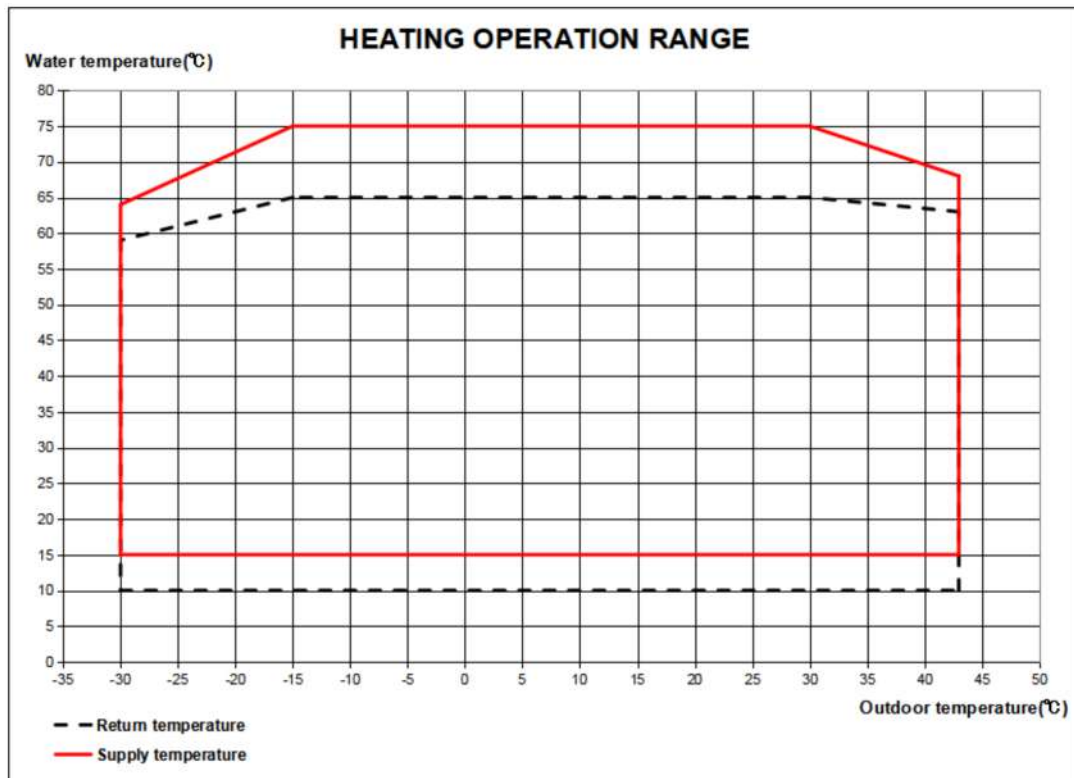


5.2.2 Cooling Cycle

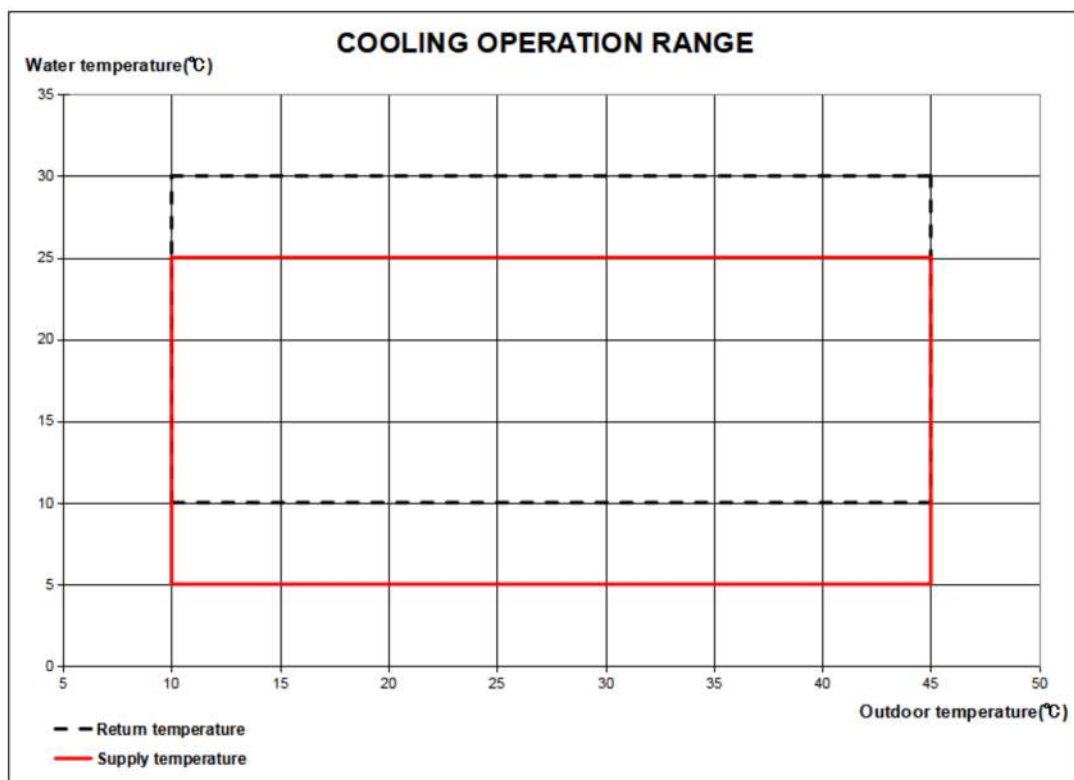


5.3 Block Diagram of Cooling and Heating Operation

Heating



Cooling



6.Operation and control

6.1Main interface display and function



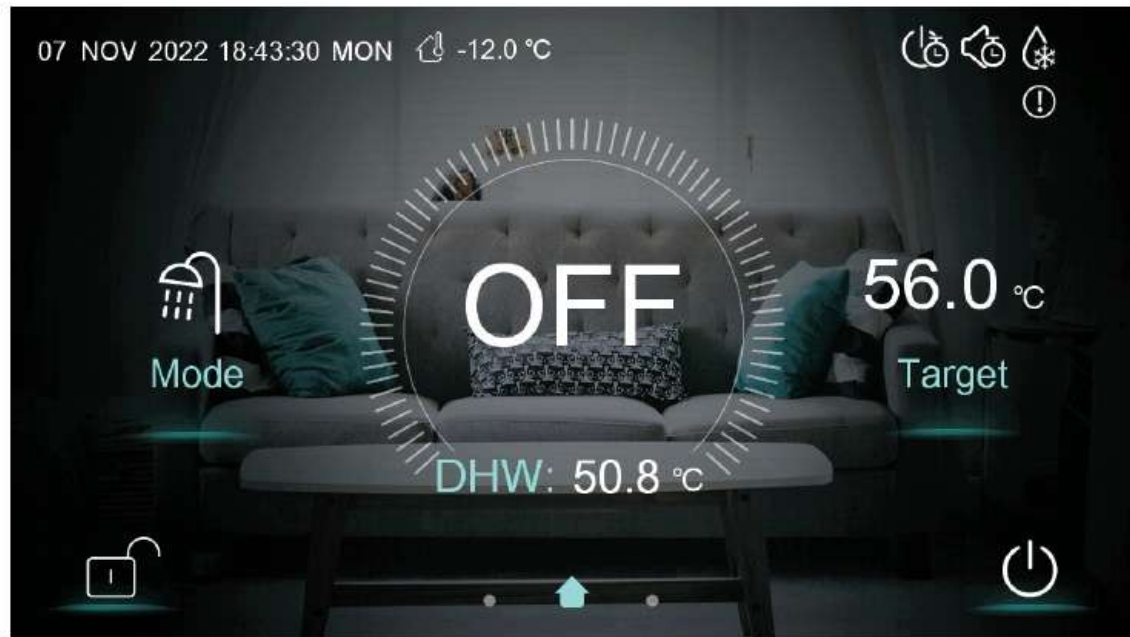
Key	Function
①	Screen lock button:You can perform various operations on the display when the lock is open, but you cannot operate the display when the lock is closed.After locking the screen,press the screen lock button and enter the password to unlock the screen.
④	On/off button:when the button is displayed in blue,it means power on state,and it will turn to white as tapped and switch to power off state.
⑤	Target temperature setting button.When the button is tapped,the unit will enter the target temperature setting interface,allowing you to set the target temperature of the current mode.
⑦	Modeselection button.When the button is tapped,the unit will enter the mode selection interface,allowing you to set the mode.There are five modes: heating,cooling,hot water,hot water + cooling,hot water + heating.
②	Main interface icon: It indicates that the current page is the main interface.
③	DHW temperature: The unit is in DHW mode when this icon is shown , otherwise this icon is not shown.

⑥	Inlet temperature: Display the control temperature: Outlet, room, Buffer Tank, Inlet.
⑦	Target temperature: Display the current mode target temperature.
⑧	Fault icon: This icon will be displayed when the unit fails ,then the display will enter Failure record interface after tapping this icon.
⑨	Defrosting icon: This icon will be displayed when the unit enters the defrosting function.
⑩	Mute timer icon: This icon will be displayed after the mute timer function is enabled.
⑪	Power on/off timer icon: This icon will be displayed after the power on/off timer function is enabled.
⑫	Mode&temp .&power timer icon: This icon will be displayed when enters this timer.
⑬	SG Ready Icon: This icon will be displayed when enters SG Ready, SG Ready includes five modes: Solar Sleep Mode , Solar Low Mode , Solar Medium Mode , Solar High Mode, Normal Mode.
⑭	Ambient temperature: Display the current ambient temperature.
⑮	System time: Display the current real-time time . The time can be changed as required.
⑯	Running mode icon: representing the unit is currently running in DHW+heating mode . There are five modes , namely: heating , cooling , hot water, DHW+ cooling , DHW + heating

6.1.1 On and off

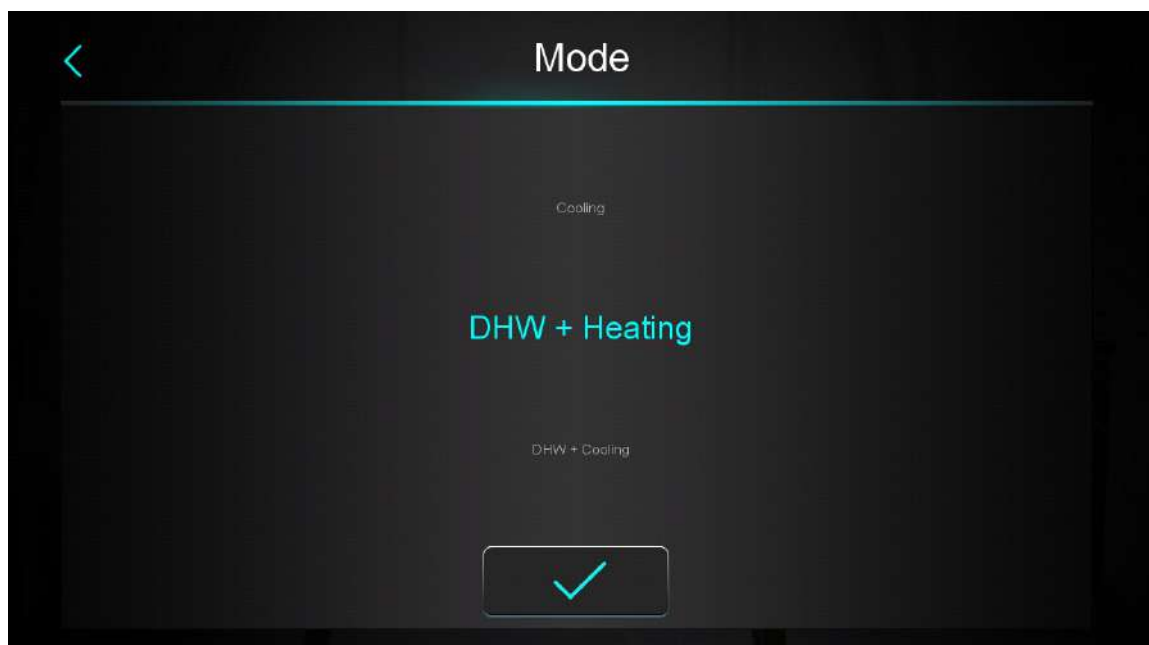
As the main interface shows

- (1) In shutting down interface (on/off key is in white status),
press on/off key can start up the machine.



- (2) In starting up interface (on/off key is in blue status),
press on/off key can shutdown the machine.

6.1.2 Mode switch



There are five modes can be selected after sliding the mode icon.

- (1) selecting DHW mode icon, then the display will change to this mode interface;
- (2) selecting heating mode icon, then the display will change to this mode interface;
- (3) selecting cooling mode icon, then the display will change to this mode interface;
- (4) selecting DHW+heating mode icon, then the display will change to DHW+heating mode interface;

(5) selecting DHW+cooling mode icon,then the display will change to DHW+cooling mode interface;

Note : a) If the machine model you purchased has no cooling function,the key of cooling mode will not be displayed.

b) If the machine model you purchased has no DHW function, the key of hot water mode function will not be displayed.

c) If the machine model you purchased has only DHW function,the mode interface only displays DHW icon.

6.1.3 Setting of target temperature

6.1.3.1 Disable zone control



Take DHW+heating mode for example:

(1)Tapping ①,the wire controller back to the main interface;

(2)Sliding ②,the target temperature can be adjusted in the clockwise or counterclock--wise direction.Minimum adjustment range is 0.5°C .

(3)Tapping ③,the target temperature can be saved.

Note:When room temperature control,click the room temperature display in the main interface to enter the room target temperature setting page,and slide the adjustment to set the room target temperature.

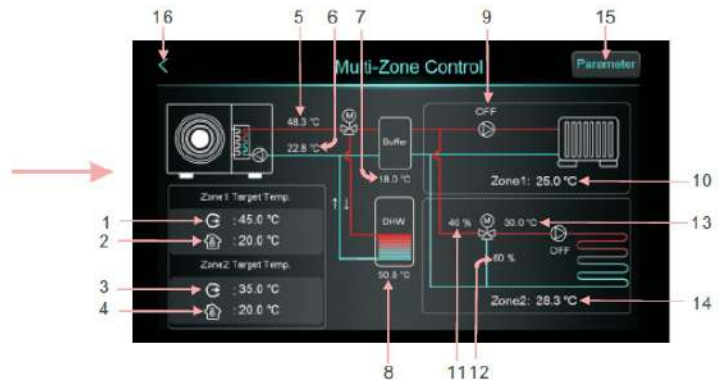
6.1.3.2 Enable zone control

6.1.3.2.1 Heating Mode Multi-Zone Control

When heating or DHW+heating mode,click“



”interface: to enter the multi-zone function



1	Display target outlet temperature in zone 1/target outlet water temperature after compensation
2	Display room target temperature in zone 1,when Z01=4/5/6/7/8/9,it displays"/"
3	Display target outlet temperature in zone 1/target outlet water temperature after compensation
4	Display room target temperature in zone 2,when Z01=4/5/6/7/8/9,it displays"/"
5	Display outlet water temperature
6	Display inlet water temperature
7	When H25=buffer tank control,display buffer tank temperature When H25*buffer tank control,display ---,and Buffer will become "Not used"
8	Display Tank temperature
9	When zone 1 pump turns on,display "ON",otherwise display "OFF"
10	Display zone 1 room temperature.When Z01=4/5/6/7/8/9,it means the unit is connected to the passive switch thermostat or room thermostat,and the unit will just receives the signal,when the thermostat asks the unit to turn on,then here will show Zone1:Start,otherwise,it will show Zone1:Stop.
11	Display the percentage of zone 2 mixing valve steps.
12	Display 100-the percentage of zone 2 mixing valve steps
13	Display zone 2 mixing water temperature
14	Display zone 2 room temperature.When Z01=4/5/6/7/8/9,it means the unit is connected to the passive switch thermostat or room thermostat,and the unit will just receives the signal,when the thermostat asks the unit to turn on,then here will show Zone2:Start,otherwise,it will show Zone2:Stop.
15	After clicking,enter password,will enter the multi-zone function parameter list.
16	Click to return the main screen

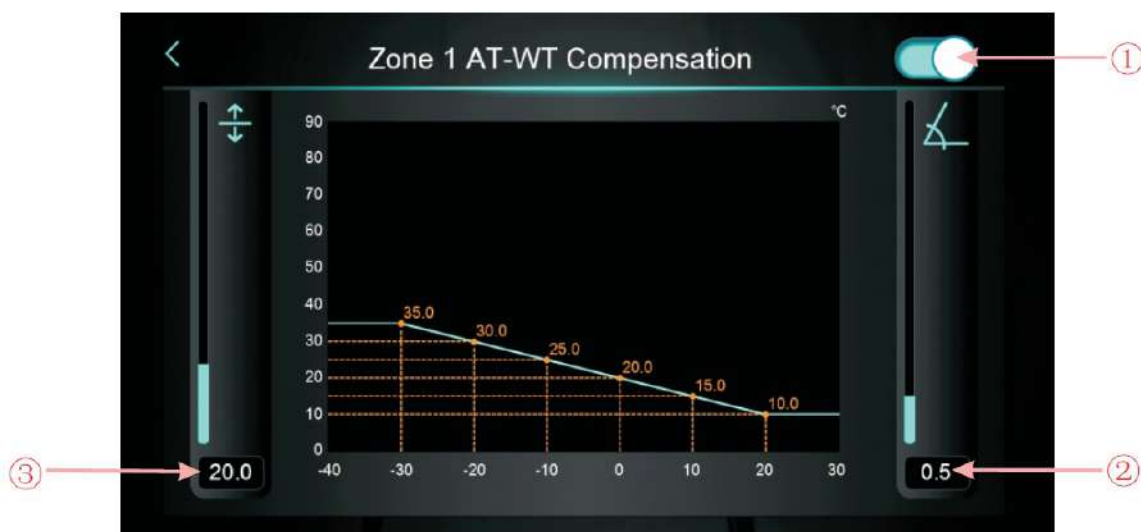
1) Zone 1 target temperature setting interface

click“  to enter the target temperature in zone 1:



Number	Key name	Key function
①	Zone1Set Target WT	Click to set zone 1 target outlet water temperature
②	Zone 1 Target RT	Click to set zone 1 room target temperature,when Z01=4/5/6/7/8/9,it displays"/"
③	Zone 1 AT-WT Compensation	Click to enter the zone 1 weather compensation curve,When the zone 1 weather compensation is disable,it will display Not Used.Enable to display the compensated temperature. Enable condition:Z01=1/3/4/6/7/9 and Z16=1

Zone 1 weather compensation curve



Number	Key name	Key function
①	Enable key	Enable weather compensation button
②	Slope	Set the slope by sliding up and down or clicking on the value
③	Offset	Set the offset by sliding up and down or clicking on the value

Celsius calculation formula: Compensated temp. = -Slope*Current AT + Offset

Fahrenheit calculation formula: Compensated Target = -Slope*(Current AT - 32)+ Offset

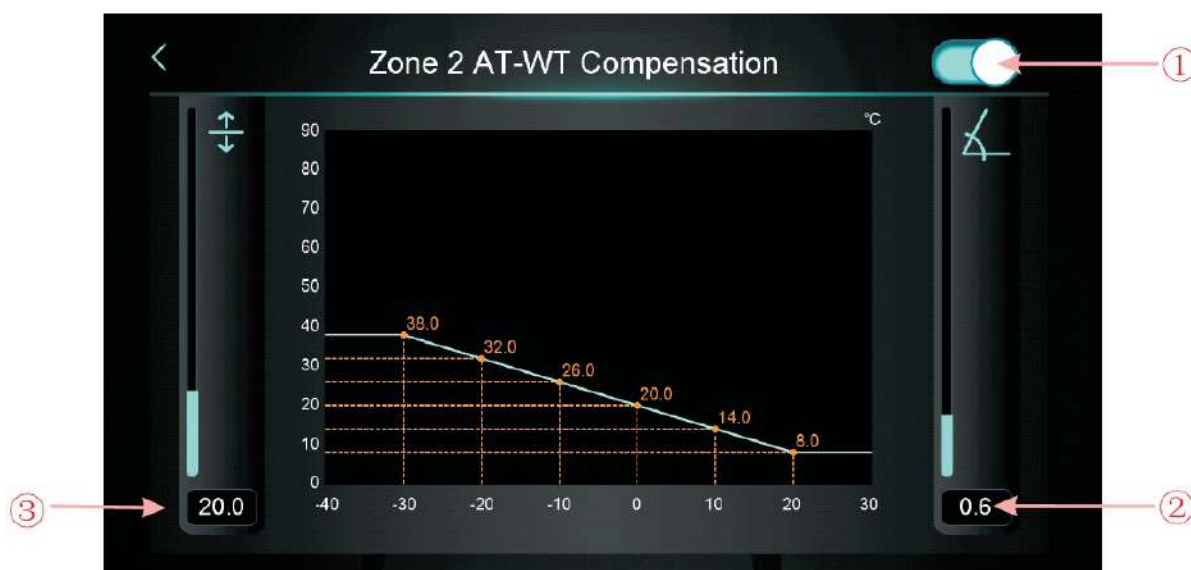
2) Zone 2 target temperature setting interface

Click " " to enter the target temperature in zone 2:



Number	Key name	Key function
①	Zone 2 Set Target WT	Click to set the zone 2 target outlet water temperature
②	Zone 2 Target RT	Click to set the zone 2 room target temperature,when Z01=4/5/6/7/8/9,it displays"/"
③	Zone 2 AT-WT Compensation	Click to enter the zone 2 weather compensation curve,When the zone 2 weather compensation is disable,it will display Not Used.Enable to display the compensated temperature. Enable condition:Z01=2/3/5/6/8/9 and Z17=1

Zone 2 weather compensation curve



Number	Key name	Key function
①	Enable key	Enable weather compensation button.
②	Slope	Set the slope by sliding up and down or clicking on the value
③	Offset	Set the offset by sliding up and down or clicking on the value

2) Zone control function parameters

Click "Parameter" enter the password to enter the zone control function parameters

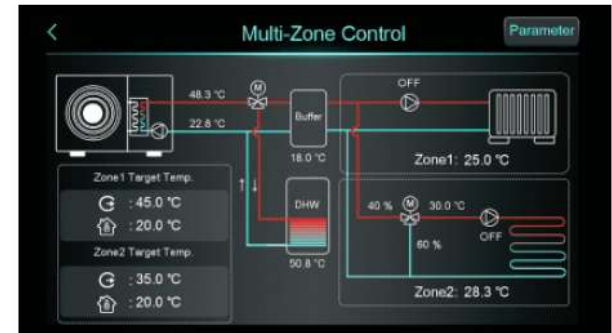
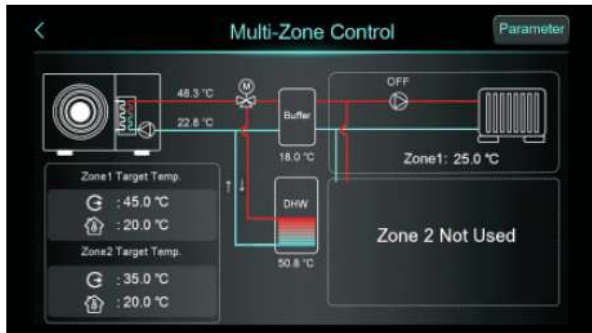
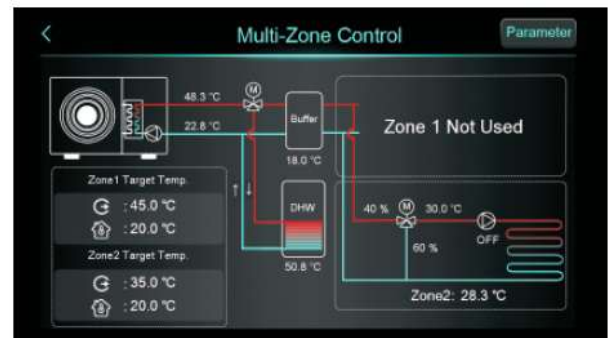
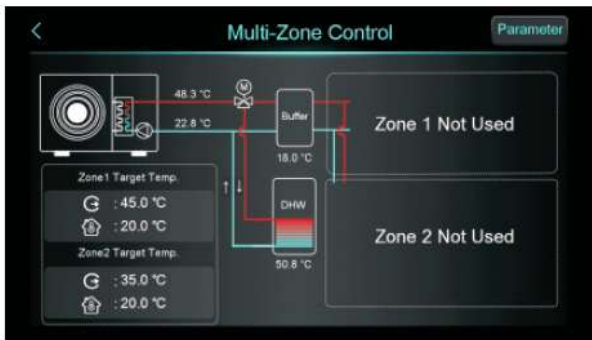
A: Set Z01 to change the main zone control interface

When Z01=0, it means disable zone 1 and zone 2, display Not Used;

When Z01=2/5/8, it means disable Zone 1, Zone 1 will display Zone 1 Not Used;

When Z01=1/4/7, it means disable Zone 2, Zone 2 will display Zone 2 Not Used;

When Z01=3/6/9, it means enable Zone 1 and Zone 2.



6.1.3.2.2 Cooling Multi-Zone Control

When cooling or DHW+cooling mode, click“” to enter the multi-zone function interface:



1	Click to set the cooling target temperature
2	Click to set the zone 1 room target temperature
3	Click to set the zone 2 room target temperature

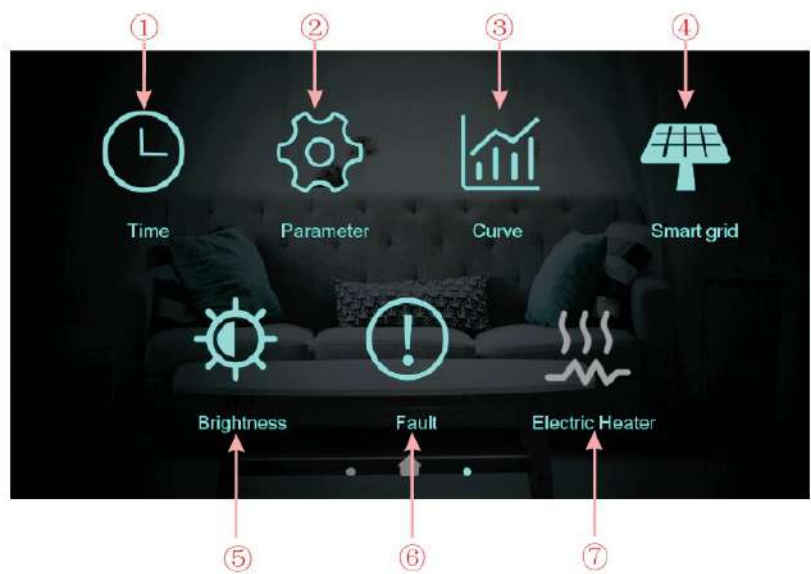
6.1.4 Unlock screen

After locking screen, click“”to pop up the following screen. Enter password to unlock.



6.2.Setting interface display and function

Swipe from right to left on the main interface to enter the function setting interface,and swipe from left to right on the function setting interface to return to the main interface.The function setting interface is shown in the figure below.



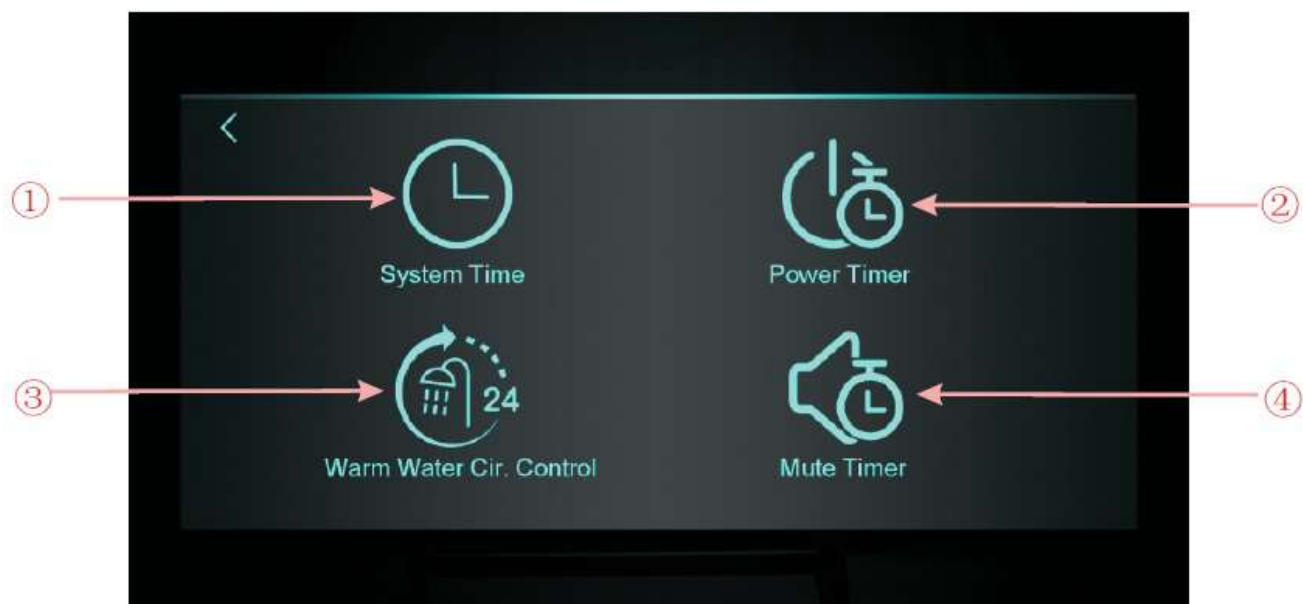
Buttons description

Key number	Key name	Key function
①	Time setting	Click this key to set the time function
②	Factory parameter	Click the key and enter the password to enter the factory parameter settings and status parameters interface
③	Curve key	Click this key to view the temperature curve.
④	Smart grid	Click this key to Smart Grid
⑤	Adjust brightness	Click this key to adjust screen brightness
⑥	Fault	Click to view fault history
⑦	Electric Heater	Click to turn on/off the electric heater

6.2.1Time setting



In the setup interface,tapping the button,then the interface display is shown as follows:



Key number	Key name	Key function
①	System Time	Click to set system time
②	Power Timer	Click to set timed switch on/off
③	Warm Water Cir.Control	Click to set warm water pump timed cycle, hide the icon when H40=0/2,show the icon when H40=1
④	Mute Timer	Click to set timed mute,hide the icon when H22=0,show the icon when H22=1

6.2.1.1 System time setting



In the time setting interface,click ① interfac displays as follows:



When entering the page of system time setting,the system time will be initialized to the time at the moment when the system time setting button is pressed,and you can adjust the time by sliding up and down. Note:When the temperature unit is $^{\circ}\text{F}$,the time format is displayed as: month-day-year hour:minute:second.

6.2.1.2 Power Timer setting



In the time setting interface,click ②interface displays as follows:

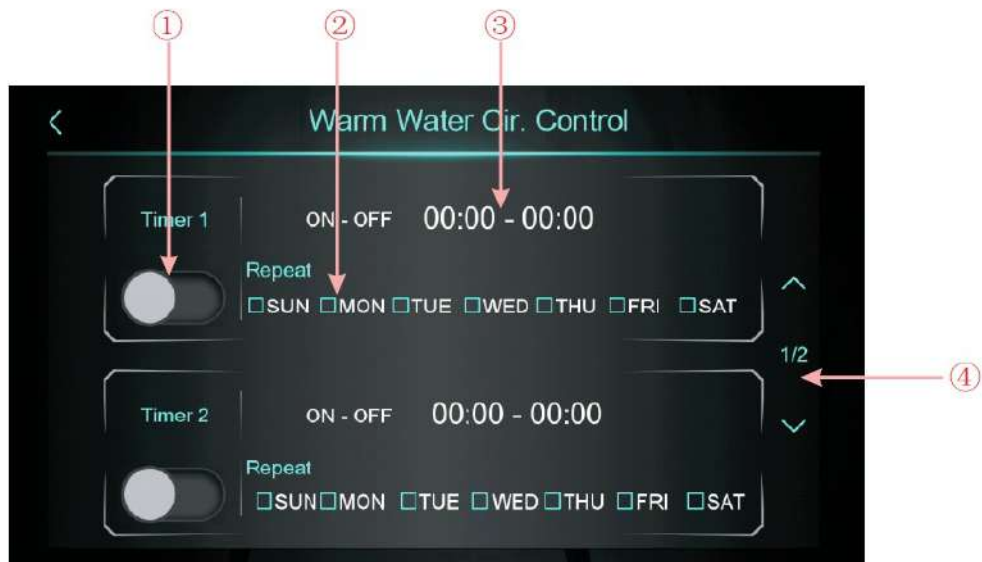


NO	Name	Button function
①	Timing switch function on	Clicking the button,when the font color is blue, the timing switch is on
②	Week setting	Set the day of the week to activate the timing switch
③	Time period setting	Set the time to turn on and the time to turn off
④	Turn page	Atotal of 6 timing switch time periods can be set which can be selected by turning the page

6.2.1.3 Warm Water Cir.Control



In the time setting interface,click ③ interface displays as follows:

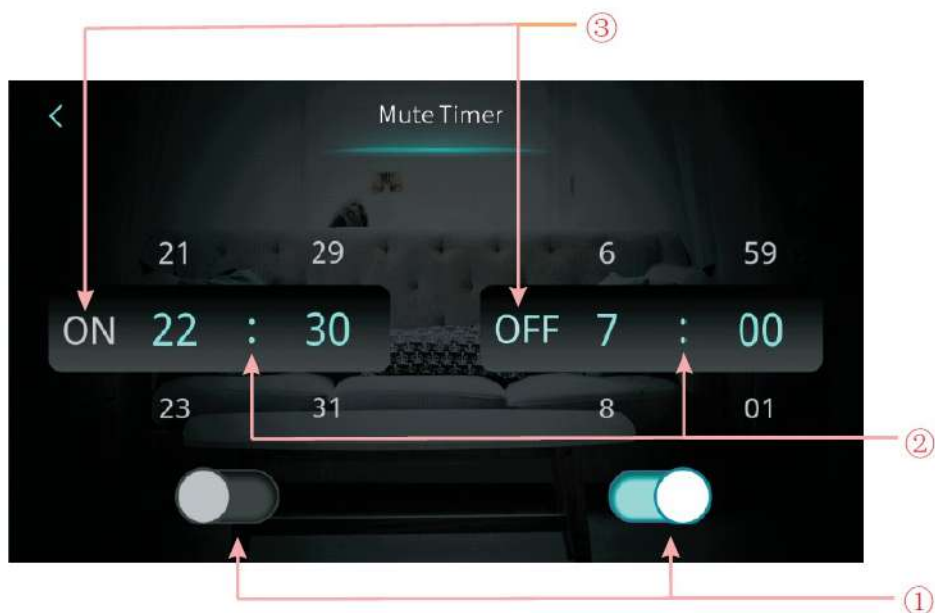


NO	Name	Button function
①	Timing switch function on	Clicking the button,when the font color is blue the timing switch is on
②	Week setting	Set the day of the week to activate the timing switch
③	Time period setting	Set the time to turn on and the time to turn off
④	Turn page	A total of 3 timing switch time periods can be set which can be selected by turning the page

6.2.1.4 Mute Timer setting



In the time setting interface,click ④ interface displays as follows:

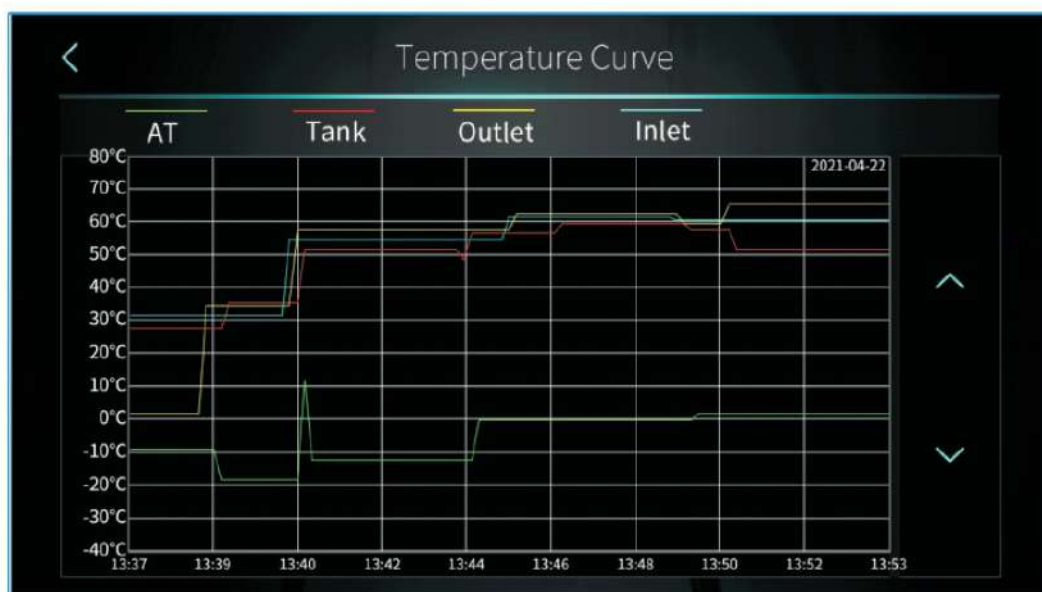


NO.	Name	Key color	Button function
①	Whether enable the mute timer on function	Enable:Blue Disable:Gray	Click this key to enable or disable the mute timer on function
	Whether enable the mute timer off function	Enable:Blue Disable:Gray	Click this key to enable or disable the mute timer off function
②	The mute timer on setting point		Select from 0:00-23:59
	The mute timer off setting point		Select from 0:00-23:59
③	The status of mute timer on	Enable:Blue Disable:Gray	The status of mute timer on is shown
	The status of mute timer off	Enable:Blue Disable:Gray	The status of mute timer on is shown

6.2.2 Temperature Curve



In the setup interface, tapping the button, then the interface display is shown as follows:



Note:

- 1) This curve function records the water inlet temperature, water outlet temperature, tank water temperature and ambient temperature;
- 2) Temperature data is collected and saved every five minutes. Timekeeping is made from the latest data saving, if the power is disrupted when the time is less than five minutes, the data during such period will not be saved;
- 3) Only curve for power-on status is recorded, and that for power-off will not be saved;
- 4) The value of the abscissa indicates the time from the point on the curve to the current time point. The rightmost point on the first page is the latest temperature record;
- 5) Temperature curve record is provided with power-down memory function.

6.2.3 Smart Grid



In the setup interface,tapping the button,then the interface display is shown as follows:



Key number	Key name	Key function
①	SG Ready	Click to enter SG Ready
②	Mode&Temp.& Power Timer	Click to enter Mode&Temp.&Power Timer

6.2.3.1 SG Ready Function



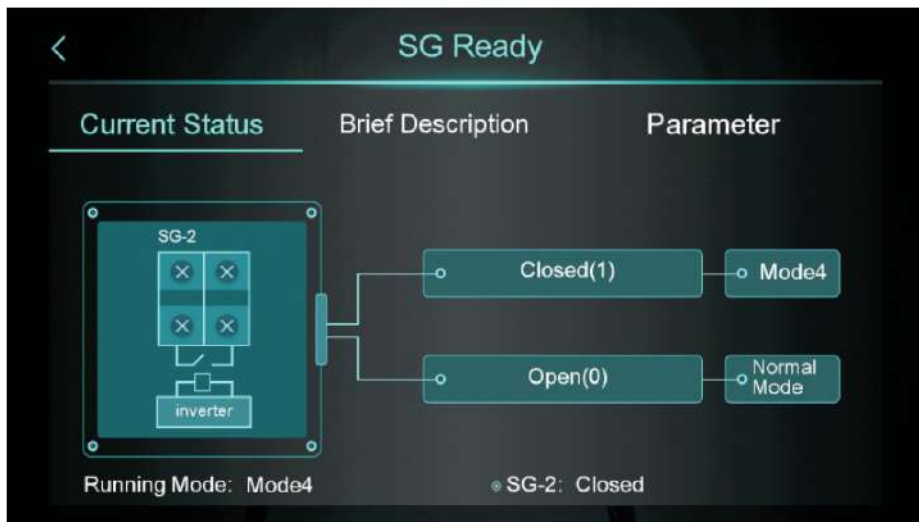
6.2.3.1.1 Disable SG Ready

When the Smart Grid Ready mode is not yet set,the interface will display:

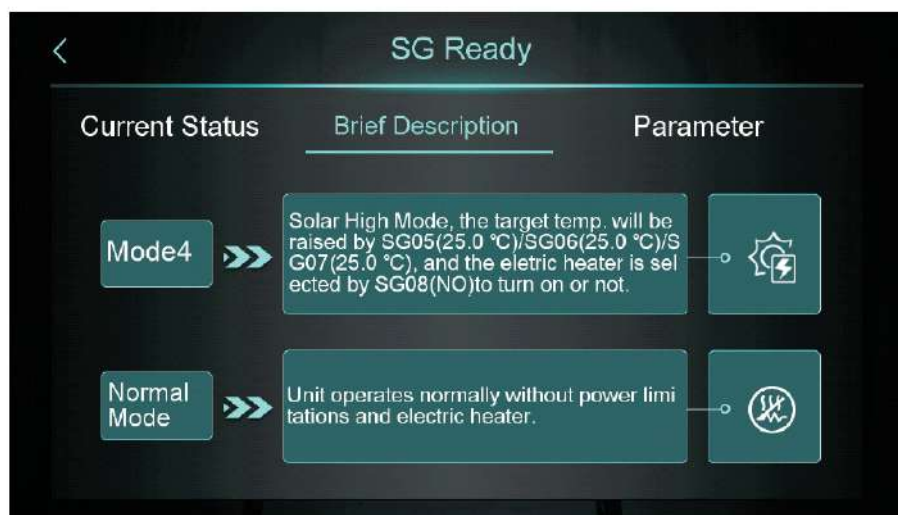


6.2.3.1.2 Smart Grid Ready=1

When using one dry contact,the interface will display:



Click "Brief Description" to enter the function description screen:



Click "Parameter" and enter the password to enter the parameter setting screen:



6.2.3.2 Mode&Temp.&Power Timer



Click “  ” to enter the Mode&Temp.&Power Timer screen:

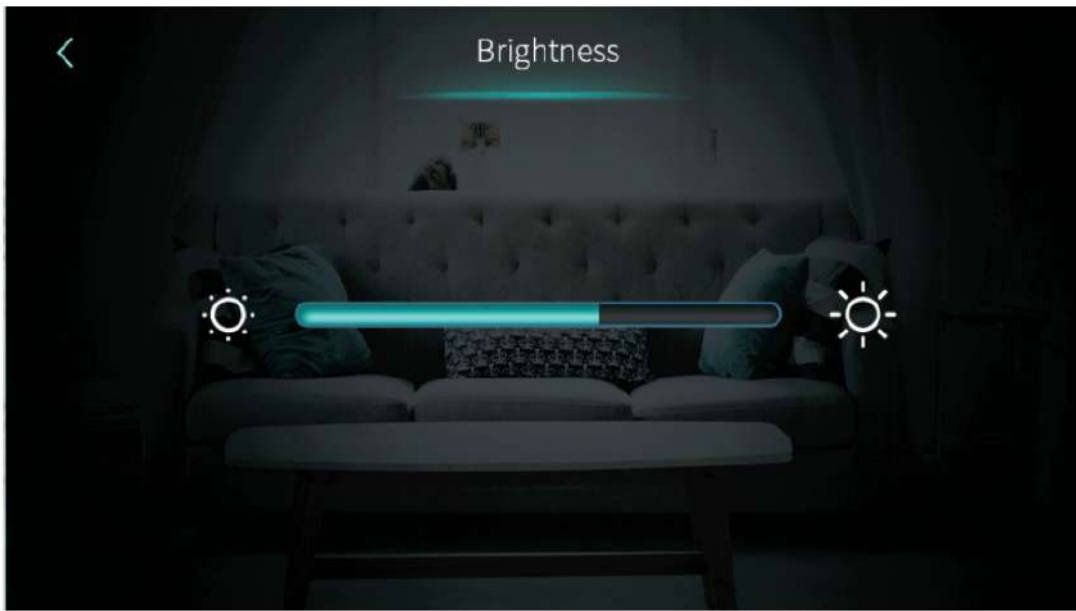


NO.	Name	Button function
①	Enable key	Enable the timer,when the font color is blue, the timing switch is on
②	Function Description	Click to enter the function introduction
③	Time setting	Settimer time
④	Mode	Settarget mode,If you don't need to control mode, please choose“/”
⑤	Target Temp.	Settarget temperature
⑥	Max.Power	Set power limitation,Setting range 0.0~99.9KW If you don't need to limite the power,please set “Max.Power”to 0.
⑦	Week setting	Settimer date
⑧	Turn page	A total of 6 timing switch time periods can be set, which can be selected by turning the page

6.2.4 Color Display Calibration



In the setup interface,tapping the button,then the interface display is shown as follows:



Note:

- 1)The middle display bar can be dragged or clicked to adjust the brightness of the screen,with power-down memory.
- 2)Press the back key to return to the previous level and save the brightness setting value.
- 3)The screen has the function of automatic on and off,if there is no operation for 30s,the screen will enter the half-time screen state.
- 4)If there is no operation for another 5 minutes,the screen will enter the screen state.

6.2.5.Fault interface display and function



In the setup interface,tapping the button,then the interface display is shown as follows:

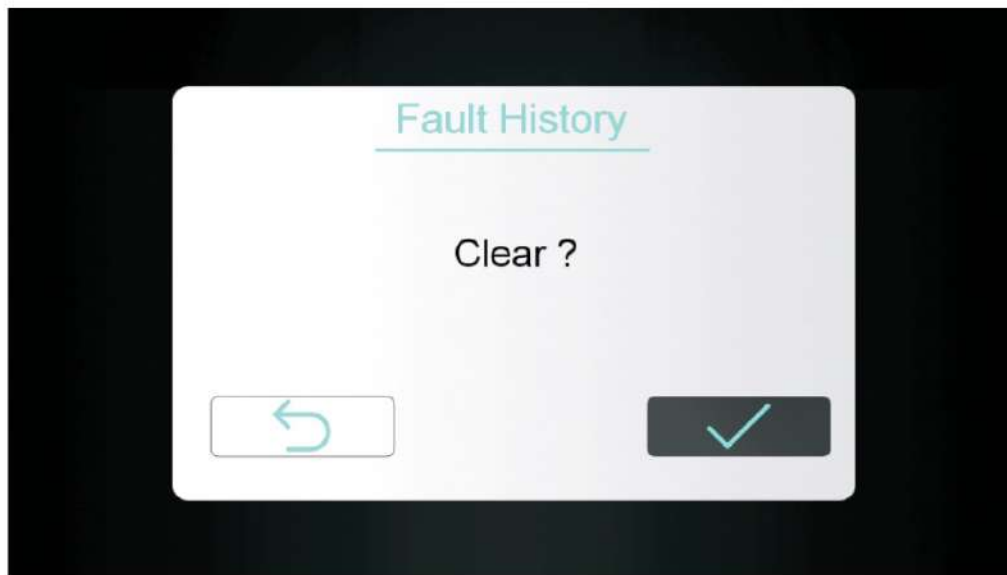


- ①:Fault code ②:Faultname
 ③:Occurrence time of the fault:Day and month hour:minute:second

Note:If the current temperature is °F ,occurrence time of the fault:

Month and day hour:minute:second

④:Click this key to clear all fault records,enter the date of the day into the OK screen.

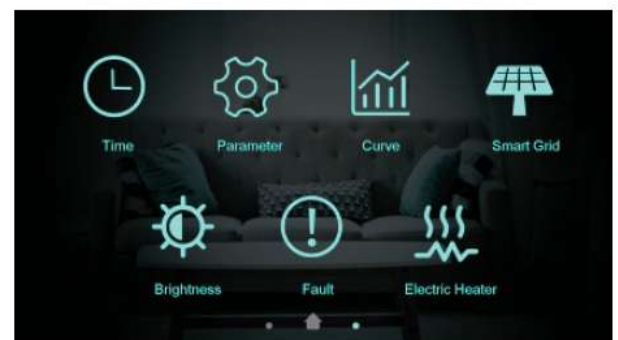
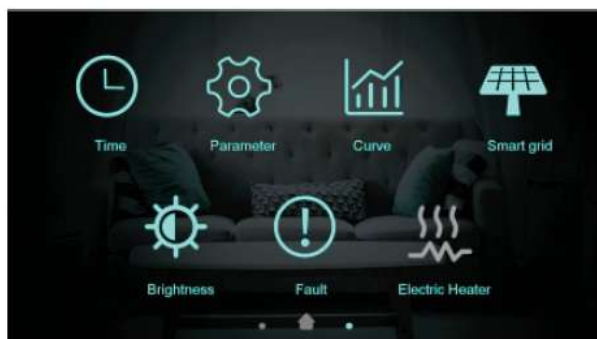


6.2.6 Electric Heater



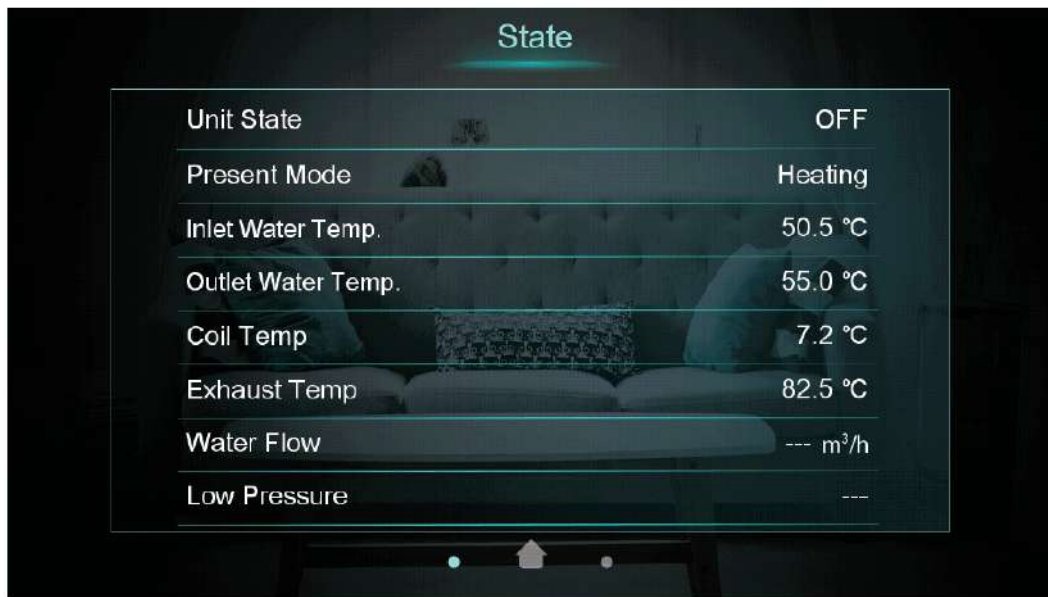
In the setup interface,tapping the button,One-click to turn electric heater on or off. On is bright,off is grey.

Note:When electric heating is not enabled,the icon is hidden.



6.3.Status interface display

Swipe from left to right on the main screen to enter the main status screen.Swipe from right to left on the main status screen to return to the main screen interface.The main status screen displays the main status parameters.



6.4. Parameter list and breakdown table

6.4.1 Electronic control fault table

Can be judged according to the remote controller failure code and troubleshooting.

Protect/fault	Fault display	Reason	Elimination methods
Inlet Water Temp. Sensor Fault	P01	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Outlet Water Temp. Sensor Fault	P02	The temp. sensor is broken or short circuit	Check or change the temp. sensor
DHW Tank Sensor Fault	P03	The temp. sensor is broken or short circuit	Check or change the temp. sensor
AT Sensor Fault	P04	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Suction Temp. Sensor Fault	P17	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Heating Returning Water Temp. Sensor Fault	P013	The temp. sensor is broken or short circuit	Check or change the temp. sensor
DHW Returning Water Temp . Sensor Fault	P018	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Protect/fault	Fault display	Reason	Elimination methods

Heating Leaving Water Temp . Sensor Fault	P023	The temp. sensor is broken or short circuit	Check or change the temp. sensor
DHW Leaving Water Temp . Sensor Fault	P028	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Room Temp. Sensor Fault	P42	The temp. sensor is broken or short circuit	Check or change the temp. sensor
EVI Inlet Sensor Fault	P101	The temp. sensor is broken or short circuit	Check or change the temp. sensor
EVI Outlet Sensor Fault	P102	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Distributor Tube Temp . Sensor Fault	P152	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Coil Temp. Sensor Fault	P153	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Exhaust Temp. Sensor Fault	P181	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Overhigh Exhaust Temp .	P182	The compressor is overload	Check whether the system of the compressor running normally
Anti-freezing Temp. Sensor Fault	P191	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Mix Tube Outlet Water Temp . Sensor Fault	P02a	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Buffer Tank Temp. Sensor Fault	P03a	The sensor is broken or short circuit	Check or change the temp. sensor
Pressure Sensor Fault	PP11	The pressure sensor is broken or short circuit	Check or change the pressure sensor or pressure
High Pressure Sensor Fault	PP12	The pressure sensor is broken or short circuit	Check or change the pressure sensor or pressure
Low AT Protection	TP	The ambient temp. is low	Check the ambient temp value
No Cooling at Low AT Protection	TC	The temp. sensor is incorrectly-detected or the temp.sensor is lower- -than the set value A30	Check or change the temp. sensor
Protect/fault	Fault display	Reason	Elimination methods

Electric Heater Overheat Fault	E04	The electric-heater protection switch is broken	Check whether the electric heater runs at the temperature above 150℃ for a long time
Excess Temp. Diff. Between Inlet & outlet	E06	Water flow is not enough and low differential pressure	Check the pipe water flow and whether water system is jammed or not
Communication Fault	E08	Communication failure between wire controller and mainboard	Check the wire connection between remote wire controller and main board
Primary Anti-freezing Fault	E19	The ambient temp. is low	Check the ambient temp value
Secondary Anti-freezing Fault	E29	The ambient temp. is low	Check the ambient temp value
Insufficient Defrosting Water Flow Alarm	E030	The unit flow rate is less than the minimum flow value of the unit.	Check or change waterway systems to provide unit flow
Protect/fault	Fault display	Reason	Elimination methods
Flow Switch Fault	E032	No water/little water in water system	Check the pipe water flow and water pump
Overhigh Outlet Water Temp .	E065	No water/little water in water system	Check the pipe water flow and water pump
Low Outlet Water Temp . Temp. Fault	E071	No water/little water in water system	Check the pipe water flow and water pump
Fan Motor 1 and PCB Communication Fault	E081	Speed control module and main board communication fail	Check the communication connection
Fan Motor 2 and PCB Communication Fault	E082	Speed control module and main board communication fail	Check the communication connection
Display and PCB Communication Fault	E084	The wire controller software is not match the mainboard software	Check the wire control software number and the mainboard software number
Communication Fault with Hydraulic Module	E08c	Hydraulic Module and mainboard communication fail	Check the communication connection
HP Fault	E11	The high-pressure switch is broken	Check the pressure switch and cold circuit
LP Fault	E12	The low-pressure switch is broken	Check the pressure switch and cold circuit
Protect/fault	Fault display	Reason	Elimination methods

Anti-freezing Fault	E171	Use side water system temp. is low	1 .Check the water temp. or change the temp . sensor 2 .Check the pipe water flow and whether water system is jammed or not
Fan Motor1 Fault	F031	1. Motor is in locked- rotor state 2 .The wire connection between DC-fan motor module and fan motor is in bad contact	1 .Change a new fan motor 2 .Check the wire connection and make sure they are in good contact
Fan Motor2 Fault	F032	1. Motor is in locked- rotor state 2 .The wire connection between DC-fan motor module and fan motor is in bad contact	1 .Change a new fan motor 2 .Check the wire connection and make sure they are in good contact
Zone 1 Room Temp. Sensor Fault	P105	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Zone 2 Room Temp. Sensor Fault	P106	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Zone 2 Mixing Temp. Sensor Fault	P107	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Abnormal Adjustment of Mixing Valve	E122	1. Mixing Valve is incorrectly connected ; 2. Mixing Valve is damaged ;	1. Plug and unplug terminals; 1. Replace the Mixing Valve;
Zone 1 Thermostat Communication Fault	E08g	1 . Thermostat not connected 2 . Thermostat failure 3 .Wrong parameter setting	1. Check the wiring connection between the thermostat and the unit 2. Replace the thermostat 3 .Check the parameters
Zone 2 Thermostat Communication Fault	E08h	1 . Thermostat not connected 2 . Thermostat failure 3 .Wrong parameter setting	1. Check the wiring connection between the thermostat and the unit 2. Replace the thermostat 3 .Check the parameters
Low Water Flow Protection	E035	Water flow is too low	Increased water flow
IPM Overcurrent Fault	F00	IPM Input current is large	Check and adjust the current measurement
Protect/fault	Fault display	Reason	Elimination methods

Comp. Driver Fault	F01	Lack of phase , step or drive hardware damage	Check the measuring voltage check frequency conversion board hardware
Pre-Charge Failure	F03	The PFC circuit protection	Check the PFC switch tube short circuit or not
DC Power Bus Overvoltage Fault	F05	DC bus voltage>Dc bus Overload-voltage protection value	Check the input voltage measurement
DC Power Bus Undervoltage	F06	DC bus voltage<Dc bus Underload-voltage protection value	Check the input voltage measurement
AC Power Undervoltage Fault	F07	The input voltage is low, causing the input current is low	Check the input voltage measurement
AC Power Overcurrent Fault	F08	The input voltage is too high , more than outage protection current RMS	Check the input voltage measurement
Input Power Voltage Sampling Fault	F09	The input voltage sampling fault	Check and adjust the current measurement
DSP and PFC Communication Fault	F12	DSP and PFC connect fault	Check the communication connection
DSP and Comp. Driver Communication Fault	F11	DSP and Inverter board communication failure	Check the communication connection
Comp. Driver and PCB Communication Fault	F151	DSP and Mainboard communication failure	Check the communication connection
IPM Overheat Fault	F13	The IPM module is overheat	Check and adjust the current measurement
Comp. Overcurrent Fault	E051	The compressor is overload	Check whether the system of the compressor running normally
Input Power Lacking Phase Fault	F15	The input voltage lost phase	Check and measure the voltage adjustment
IPM Current Sampling Fault	F18	IPM sampling electricity is fault	Check and adjust the current measurement
Comp. Driver Temp . Sensor Fault	F17	The transducer is overheat	Check and adjust the current measurement
Protect/fault	Fault display	Reason	Elimination methods
IGBT Power Device Overheat Alarm	F20	The IGBT is overheat	Check and adjust the current measurement

Comp. Weak Magnetic Alarm	F16	Compressor magnetic force is not enough	Check and adjust the current measurement
AC Input Current Frequency Decrease Alarm	F22	Input current is too large	Check and adjust the current measurement
EEPROM Alarm	F23	MCU error	Check whether the chip is damaged Replace the chip
Destroyed EEPROM & No Activated Fault	F24	MCU error	Check whether the chip is damaged Replace the chip
Input Power Current Sampling Fault	F25	The V15V is overload or undervoltage	Check the V15V input voltage in range 13.5V~ 16.5V or not
IGBT Overheat Fault	F26	The IGBT is overheat	Check and adjust the current measurement
Comp. Current Frequency Decrease Alarm	F33	The compressor current frequency reduction	Check and adjust the current measurement
AC Power Overvoltage Fault	F10	Input voltage>Input Overload-voltage protection value	Check whether the input voltage is higher than 265V
Compressor Lacking Phase Fault	F14	The compressor lost phase	Check whether compressor cables are connected properly and reliably
EEPROM Fault	F29	Failed to read the memory chip	Check the frequency conversion board
Overspeed Fault	F21	The compressor is running abnormally	Check whether the compressor cable is normal and whether the compressor is blocked
Driver (Fan)Temp .Sensor Fault	F120	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Driver (Fan) IPM Overheat Fault	F106	The fan IPM drive plate has poor heat dissipation	Check heat dissipation conditions
Driver (Fan) External Overcurrent Fault	F105	The fan IPM hardware running current is too large	Check whether the fan is blocked
Protect/fault	Fault display	Reason	Elimination methods
Driver (Fan) Power Lacking Phase Fault	F101	The fan lost phase	Check whether fan cables are connected properly and reliably
Driver (Fan) Current Sampling Fault	F112	Fan sampling electricity is fault	Check whether the fan drive plate is abnormal
Driver (Fan) Start Fault	F102	The fan fails to start	Check whether the fan is blocked

Driver (Fan) Internal Overcurrent Fault	F113	The fan software running current is too large	Check whether the fan is blocked
Driver (Fan) overspeed Fault	F109	The fan speed is too high	Check whether the fan drive board is abnormal

6.4.2 Parameter list

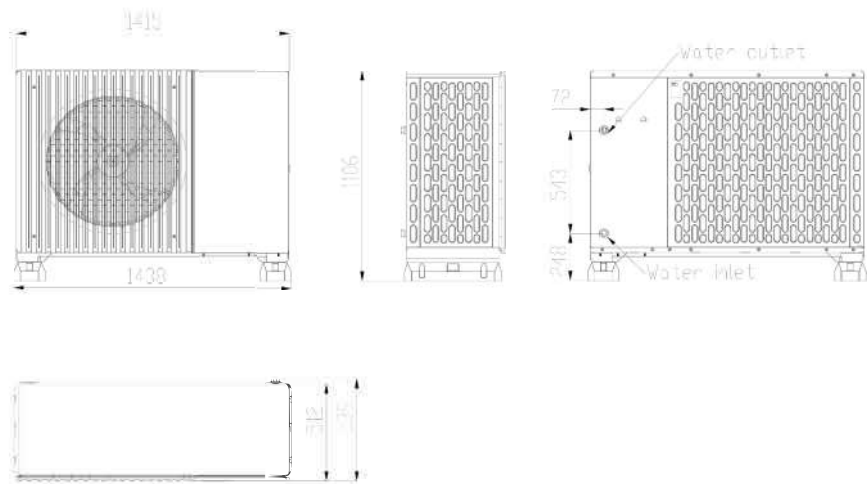
Meaning	Default	Remarks
Cooling target temperature set point	12℃	Adjustable
Heating the target temperature set point	45℃	Adjustable
Hot water target temperature set point	55℃	Adjustable

7.Unit Installation

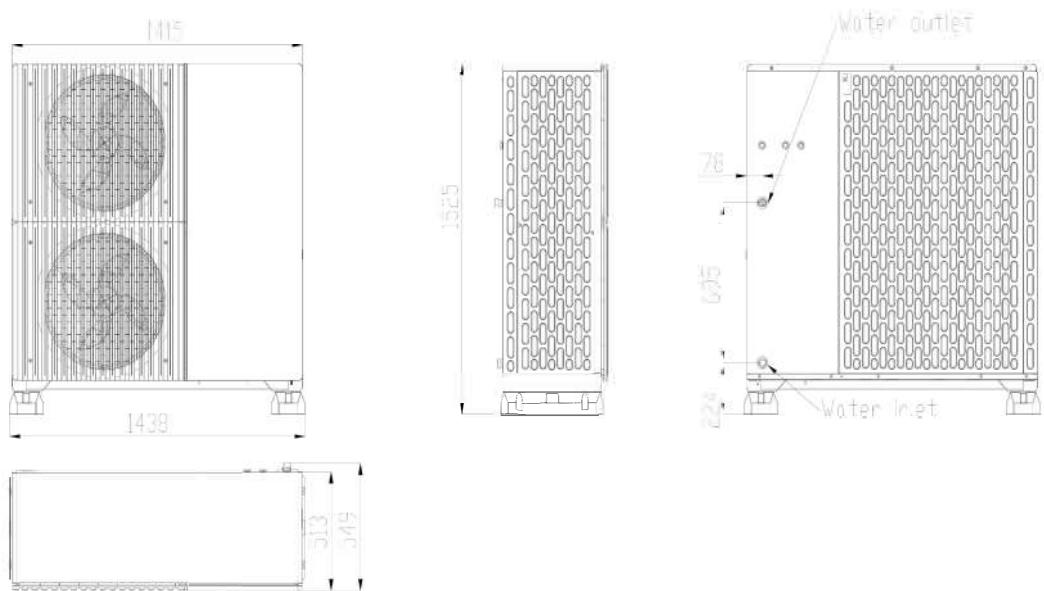
7.1 Installation Site Requirements for the Outdoor Unit


Please refer to the installation dimensions of the unit for installation
Pay attention to distinguish the inlet and outlet of the unit
Pay attention to the installation spacing of the unit

Models:CH-HP15UIMPZK-H/CH-HP15UIMPZM-H



Models:CH-HP22UIMPZM-H

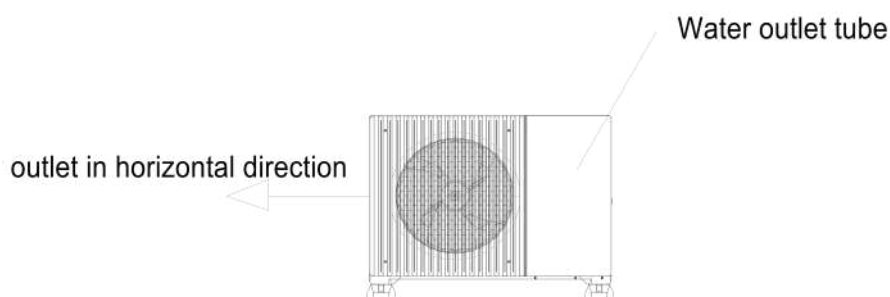


7.2 Safe Installation Range Requirements for R290 Outdoor Units

Please note the following requirements and precautions:

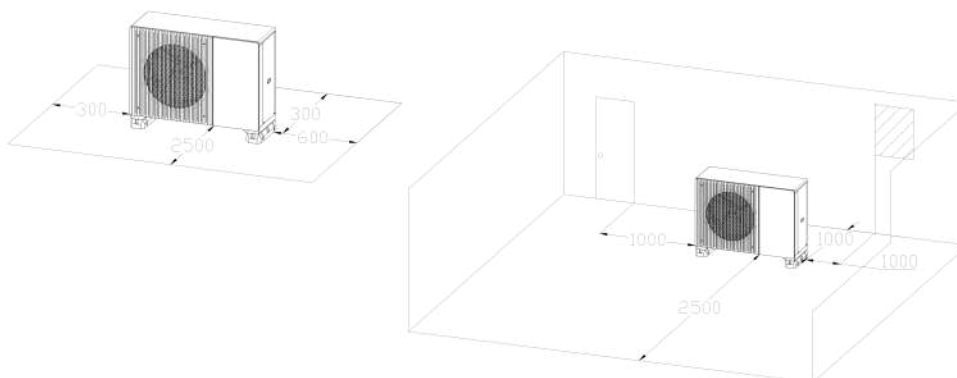

▪ Do not pierce or burn refrigerant cycle components. ▪ Do not use methods to accelerate the defrosting process or clean the equipment other than those recommended by the manufacturer. ▪ Please note that R290 refrigerant has an odor.
The appliance shall be protected from mechanical damage and stored in a well-ventilated room (e.g., away from open flames, gas appliances, or electric heaters).
Ensure that installation, service, maintenance, and repair comply with Phnix's instructions and applicable legal regulations, and are performed only by authorized personnel.

7.2.1 Single Installation Requirements

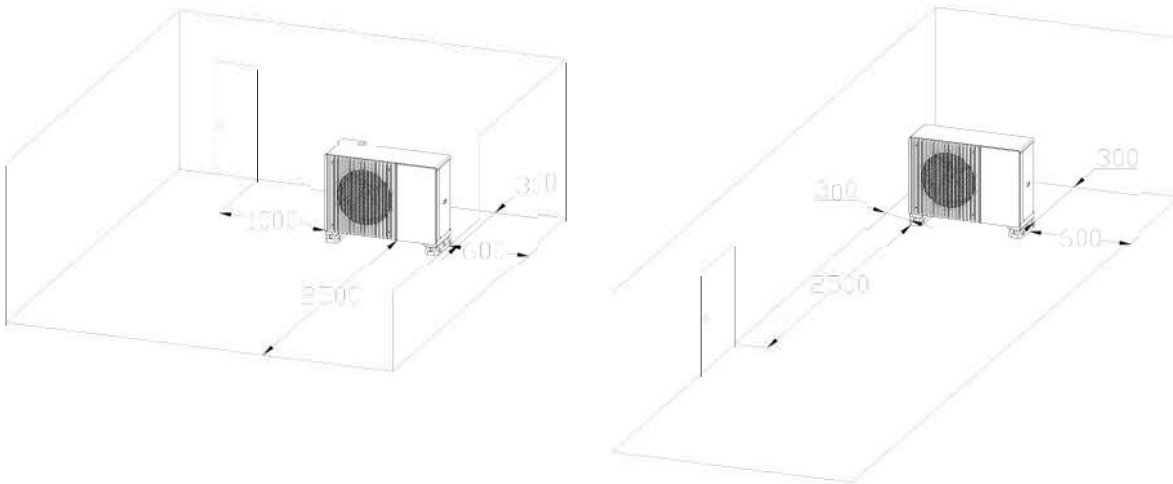


Installation space:

Unit: mm

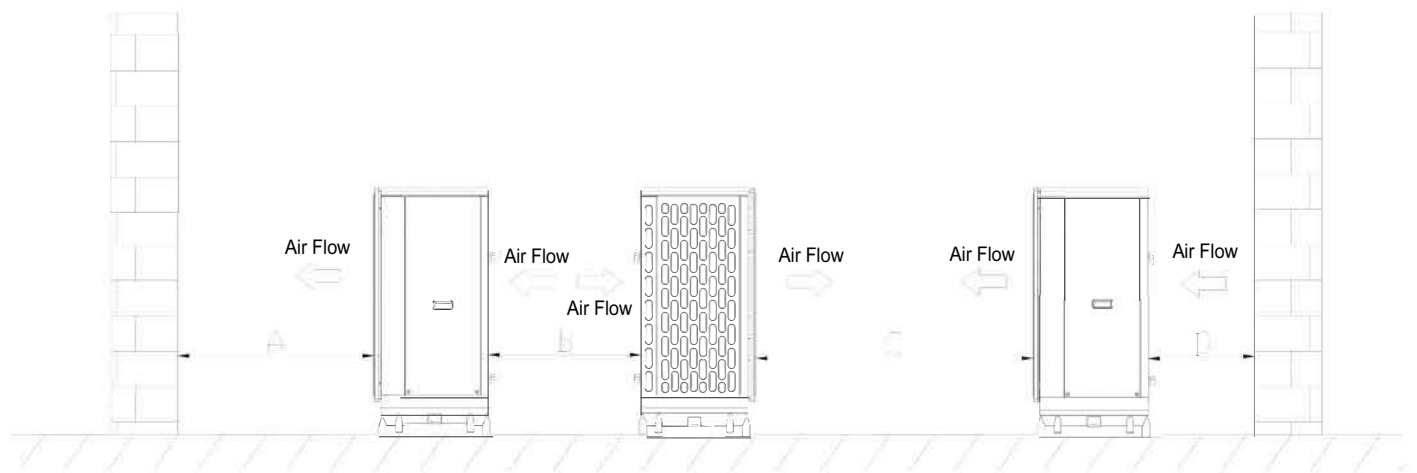


Unit: mm



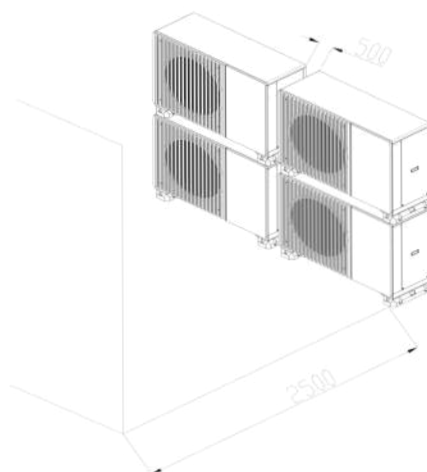
7.2.2 Cascade Installation Requirements

Outdoor units must be spaced such that sufficient air may flow through each unit. Sufficient air flow across heat exchange is essential for outdoor units to function properly. The following figure shows the minimum distance required for a multi-unit installation scenario.

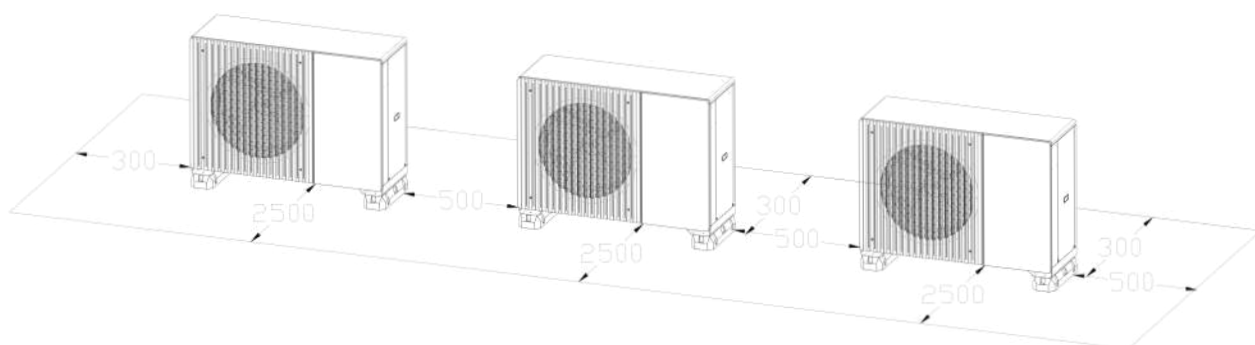


Model	A(mm)	B(mm)	C(mm)	D(mm)
15K/15M	2500	800	5000	300
22M	3000	1000	6000	300

Unit: mm



Unit: mm



7.3 Additional Installation Site Requirements for the Outdoor Unit in Cold Climate

Protect the outdoor unit from direct snowfall, and ensure the outdoor unit does not get covered by snow.

In all cases, provide at least 300 mm of free space beneath the unit. Additionally, ensure that the unit is positioned at least 100 mm above the expected snow level.

In areas with heavy snowfall, it is crucial to select an installation site where snow accumulation will not affect the unit. If lateral snowfall is possible, ensure that the heat exchanger coil is not affected by snow. If necessary, install a snow canopy and pedestal.

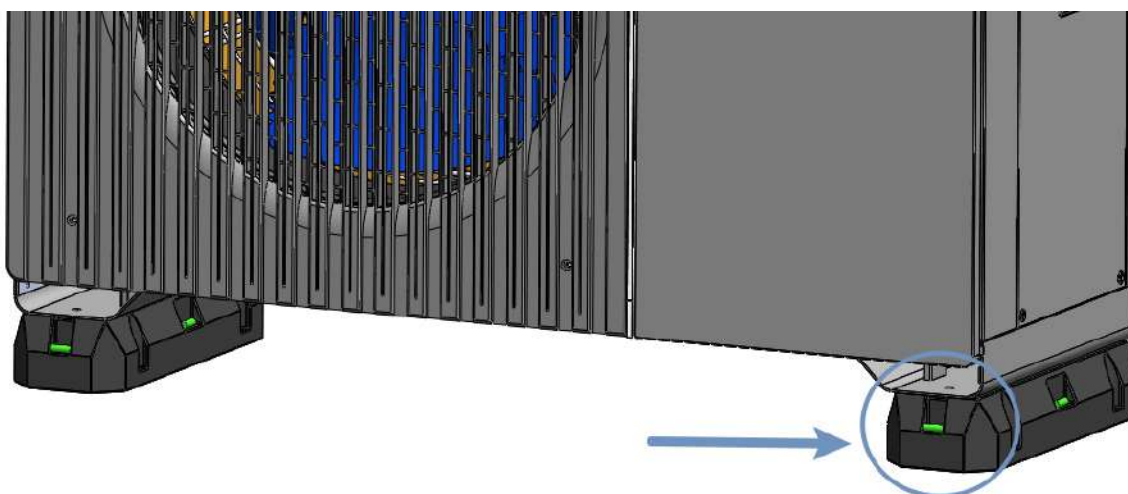
7.4 Precautions for Installing the Outdoor Unit

	
Follow the installation recommendations in this manual	
Professional personnel are recommended to perform this operation	
Professional personnel are recommended to perform this operation	

7.5 Installing the Outdoor Unit

1. Check the strength and levelness of the installation surface to ensure the unit will not produce vibration or noise during operation.
2. Secure the unit using rubber feet and bolts by referring to the installation diagram below.
3. Use four sets of M12 anchor bolts, nuts, and washers.
4. Keep the bottom of the equipment a minimum distance of 300 mm from the ground.

(The installation dimensions for the fixing holes of the platform chassis for different models are shown in the figure below.)



8. Water Circuit Installation



Professional water connections are required

Before connecting the indoor and outdoor units, ensure that they have been installed

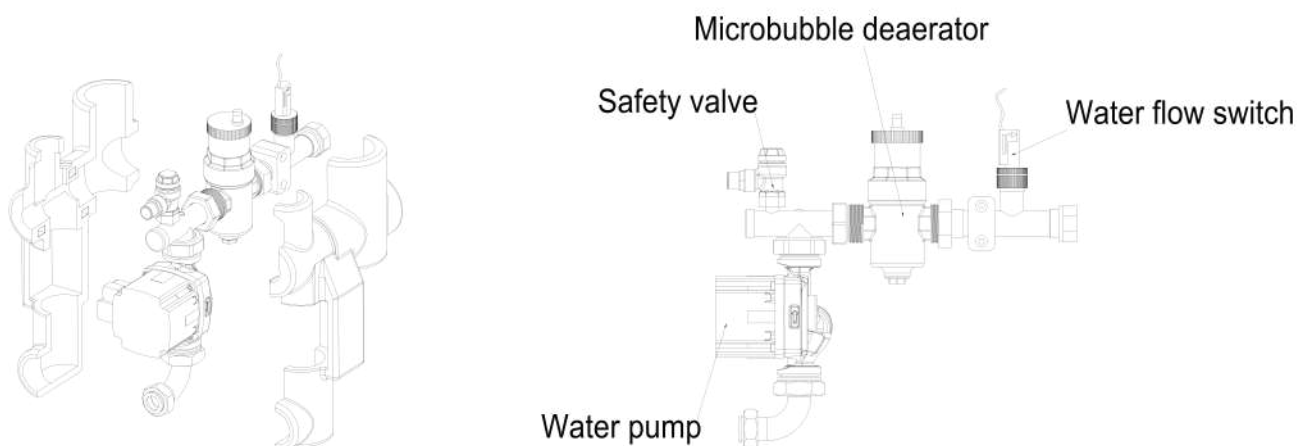
Before connecting the indoor and outdoor units, ensure that they have been installed

Please pay attention to the matters below when connecting the water pipe:

- Try to minimize the resistance to water flow within the piping.
- The piping must be clean and free from dirt and obstructions. A water leakage test must be conducted to ensure there are no leaks before proceeding with the insulation.
- Note that the pipe must undergo pressure testing separately. DO NOT test it concurrently with the heat pump.
- An expansion tank must be installed at the highest point of the water loop, and the water level in the tank should be at least 0.5 meters higher than the highest point of the water loop.
- The flow switch is installed inside the heat pump; ensure the wiring and functionality of the switch are normal and controlled by the controller.
- Try to prevent air from remaining inside the water pipe; there must be an air vent at the highest point of the water loop.
- A thermometer and pressure meter must be installed at the water inlet and outlet to facilitate easy inspection during operation.

8.1 Installing the Microbubble Deaerator

Microbubble deaerator is a device specifically designed to remove gases and impurities from piping systems. It is typically installed in the return water pipes of heating or cooling systems to improve system efficiency and prevent equipment damage.



Installation location: The microbubble deaerator is generally installed at the highest point of the system to improve air removal efficiency. The installation location shall avoid dead corners in the piping system to ensure that gases can flow smoothly towards the deaerator and be expelled.

Installation direction: The microbubble deaerator must be installed vertically to ensure that its internal float ball is in a vertical position, preventing interference with the normal operation of the deaerator.

Sealing: During installation, ensure that the sealing ring provides a tight seal between the water pipe and the main body of the microbubble deaerator.

Accessibility: Choose a location that is easily accessible for maintenance and inspection, allowing for convenient cleaning and

replacement of parts when necessary.

Follow manufacturer guidelines: Adhere to the installation guidelines and recommendations provided by the microbubble deaerator manufacturer to ensure correct installation and operation.

Maintenance and Inspection of Microbubble Deaerator (Twice a Year):

1. Regular inspection of the deaerator: Regularly check if the microbubble deaerator is functioning normally, and ensure there are no blockages or damage. This typically includes checking if the deaerator can vent air smoothly and if there are any visible signs of damage or wear.
2. Check seals, such as O-rings and other sealing materials, to ensure they are not aged or damaged, which could lead to leaks.
3. Clean the filter screen: If the microbubble deaerator is equipped with a filter screen, clean it regularly to prevent debris accumulation, which could affect venting efficiency.
4. Inspect the float ball: Check if the float ball is intact, ensuring it can move freely and is not stuck by debris.
5. Check connections and fasteners: Regularly inspect all connections and fasteners to ensure they are not loose or damaged.
6. Check valve's pressure drop: Monitor the pressure drop produced by the microbubble deaerator to ensure it is within the normal operating range.
7. Check the automatic air vent valve: Ensure the automatic air vent valve is working properly, and regularly check if it can vent air smoothly.
8. Examine the valve body and internal parts for signs of corrosion or wear.
9. Record maintenance activities: Document all maintenance activities, including dates of inspections and part replacements, to facilitate tracking of maintenance cycles and history.

8.2 Selection of Buffer Tank

During the defrosting process, the heat pump stops heating and absorbs heat from the system for defrosting. At this time, the buffer tank must provide sufficient heat to ensure that the water temperature does not drop by more than 3°C.

Heat Demand Calculation Formula for Defrosting:

$$Q_d = P_d + t_d$$

In the formula:

Q_d : Total heat demand during defrosting, in kJ.

P_d : Defrosting power, in kW (typically 20%-30% of the heat pump's heating power).

t_d : Defrosting time, in hours (h) (usually 5-10 minutes, i.e., 0.083-0.167 h).

Example: If the heat pump's heating capacity $Q_h = 10kW$, the defrosting power is 25%, and the defrosting time

$t_d = 0.1h$, then:

$$Q_d = 0.25 \cdot 10 \cdot 0.1 = 0.25kWh = 900kJ$$

The buffer tank must provide sufficient heat to compensate for the heat loss during defrosting while ensuring that the water temperature does not drop by more than 3°C.

Buffer Tank Capacity Calculation Formula:

$$V = \frac{Q_d}{\rho \cdot c \cdot \Delta T}$$

V :Buffer tank capacity, in liters (L).

Q_d :Total heat demand during defrosting, in kJ.

ρ :Density of water, taken as 1kg/L.

c :Specific heat capacity of water, taken as .

ΔT :Allowable temperature drop of water, in °C (as required, $\Delta T = 3$ °C)

Example:If $Q_d = 900$ kJ and $\Delta T = 3$ °C, then:

$$V = \frac{900}{1 \cdot 4.18 \cdot 3} = \frac{900}{12.54} \approx 71.8L$$

During defrosting, in addition to the heat provided by the buffer tank, the system itself (e.g., pipes, terminal equipment, etc.) also has some thermal inertia, which can provide part of the heat. Therefore, the capacity of the buffer tank can be appropriately reduced.

Revised Formula:

$$V_{actual} = V \cdot (1 - \eta)$$

V_{actual} :Actual required buffer tank capacity.

η :Thermal inertia coefficient of the system, typically taken as 0.1-0.3 (i.e., the system can provide 10%-30% of the heat).

Example: If $V = 71.8L$ and $\eta = 0.2$, then:

$$V_{actual} = 71.8 \cdot (1 - 0.2) = 57.4L$$

Based on the calculation results, select a buffer tank with a standard capacity. For example, if the calculated required capacity is 57.4 L, a 60 L or 80 L standard model can be selected.

8.3 Selection of Internal Coil for DHW Tank

Domestic hot water (DHW) is typically heated using an internal coil, therefore the selection of the internal coil specifications directly affects the heating performance and the reliability of the unit's operation.

The material specifications for the internal coil in the tank are shown in the following table:

Material	SUS 316L	20# steel + surface enameling
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Based on experience, the heat exchange rate per unit area for smooth tubes is 3 kW, while for corrugated tubes it is 6 kW.

$$S = \frac{Q}{q}$$

In the formula:

S – External surface area of the internal coil, unit: m²

Q – Rated heating capacity of the unit, unit: kW

q – Heat exchange rate per unit area, unit: kW/m²

Calculation of coil length

$$L = \frac{S}{\pi \times d}$$

In the formula:

S – External surface area of the internal coil, unit: m²

π – Pi (take 3.14)

d – Diameter of the coil, unit: m

Calculate the appropriate pipe length for selecting the tank coil using the above formula.

Note: If corrugated internal coils are used, the resistance loss in the water system increases. Please adjust the water pump head accordingly.

Model	15K	15M	22M
Recommended capacity for domestic water tank/L	200	200	250

(Tips: Selection shall be based on actual DHW demand. The above selection recommendations are only for the usage needs of a family of three.)

8.4 Filter Selection

A water filter must be installed at the water inlet of the heat pump unit. This reduces the entry of impurities from the piping into the unit, protecting its normal operation.

Basic requirements: The material of the water filter is generally brass or stainless steel. When stainless steel is chosen for the filter, it is suitable for water media with ethylene glycol (below 30%).

Filter Standards

Connection Diameter	1"F	1.1/4"F	1.1/2"F	2"F
Filter Mesh Count	40	40	40	40

Selection recommendations:

The filter is used to collect impurities in the system, preventing them from affecting the normal operation of the system. The larger the mesh size, the smaller the impurities that can be filtered; the smaller the mesh size, the larger the impurities that can be filtered. The filter size shall be the same as or one size larger than the outer diameter of the system's main water supply pipe.

Installation recommendations:

1. The filter must be installed in an appropriate position. The direction of water flow inside the valve stem must be consistent with the arrow direction on the filter. For filters with a drain valve, the drain valve must face downward. Incorrect installation may likely result in the inability to discharge impurities from the filter. Moreover, long-term retention of these impurities inside the unit will lead to reduced effectiveness of the filter, increased resistance, decreased water flow in the system, thus affecting the heat exchange efficiency of the unit.
2. Ensure that there are sufficient straight pipe sections before and after the Y-strainer to guarantee the filtering effect.
3. To facilitate maintenance and cleaning of impurities in the filter, it is recommended to add a globe valve both before and after the filter.

The impact of different mesh counts on water resistance:

The higher the mesh count of the Y-strainer screen, the higher the filtration precision, and the greater its inherent water resistance.

Methods for cleaning the filter and determining cleaning intervals:

- (1) The Y-strainer screen shall be cleaned once every 3 months. This is to prevent the accumulation of filtered impurities on the screen, which would increase fluid resistance and affect normal system circulation.
- (2) When cleaning, first close the inlet and outlet manual valves, then disassemble the filter and clean it thoroughly. After cleaning, open the inlet manual valve to flush out sediments in the pipeline and discharge until the quality of discharged water is close to the turbidity of the main pipeline water. Afterwards, follow the same steps to clean the outlet manual valve section.
- (3) After cleaning, observe carefully whether there is any water leakage from the filter gasket. If leakage is detected, replace the sealing gasket promptly.

8.5 Expansion Tank Selection

$$V = \frac{C \times e}{1 - \frac{P1 + 1}{P2 + 1}}$$

In the formula: V = volume of the expansion tank, unit: L

C = total water volume of the system (including boiler, pipes)

e = thermal expansion coefficient of water (see table below)

P1 = pre-charge pressure of the expansion tank (unit: bar)

P2 = maximum operating pressure of the system (unit: bar)

Thermal Expansion Coefficient of Water			
Water Temperature	Expansion Coefficient	Water Temperature	Expansion Coefficient
0	0.00013	55	0.01447
10	0.00025	60	0.01704
15	0.00085	65	0.01979
20	0.00180	70	0.02269
25	0.00289	75	0.02575
30	0.00425	80	0.02898
35	0.00582	85	0.03236
40	0.00782	90	0.03590
45	0.00984	95	0.03958
50	0.01207	100	0.04342

Installation notes:

- In a heating system, the expansion tank is generally installed on the return water side where the water temperature is relatively lower, or on the cold water inlet of the hot water storage tank.
- Generally, expansion tanks of 35L (or 24L) and below can be directly connected to the system's piping. Expansion tanks of 35L (or 24L) and above usually come with a triangular support to avoid placing a large load on the system piping due to the tank's weight during operation. Use metal hoses to connect the expansion tank to the system's reserved interface. It is strictly prohibited to use rigid plastic pipes to connect to the system (if there is vibration in the piping, the connection between rigid plastic pipes and the expansion tank interface is prone to water leakage or even cracking). Use anchor bolts to fix the expansion tank's feet, ensuring stability during use.
- A safety valve shall be installed near the expansion tank to prevent damage to the expansion tank and other system components in case of abnormal system pressure.
- In closed-loop heating systems, the expansion tank shall not be installed at the water pump's outlet, as this may cause cavitation in the pump.
- In thermal systems such as air conditioning, boilers, and heat pumps, the expansion tank is generally installed on the return water side of the system.
- Before replacing the expansion tank, first shut down the system or isolate the expansion tank from the system to prevent system media from leaking through the expansion tank interface. The replaced expansion tank shall ideally have the same volume, temperature resistance, and pressure resistance as the original one.

Application notes:

- The expansion tank is pre-charged with pressure at the factory. Generally, for tanks smaller than or equal to 150L, the pre-charge pressure is 1.5 bar, while for those above 150L, it's 2 bar. If this pressure is not suitable, it can be adjusted under the supplier's guidance.
- When testing the expansion tank's air bladder, it is recommended to use water pressure directly. Never use sharp objects to touch the air bladder.

- c) If the expansion tank is to be used in special circumstances, inform the supplier so that appropriate membranes can be provided.
- d) The working medium for expansion tanks is generally water or a mixture of water and antifreeze (the proportion of water shall not be less than 50%).
- e) The expansion tank's pre-charge pressure shall be checked regularly. If a pressure drop is detected, it shall be replenished promptly to avoid affecting normal use.
- f) The working temperature and maximum working pressure are indicated on the expansion tank's label. It is strictly prohibited to exceed this range.
- g) The volume of expansion tank shall be strictly calculated according to the formula. An undersized expansion tank will cause frequent triggering of the safety valve and frequent water replenishment by the automatic water replenishment valve.
- h) The maximum working pressure of the expansion tank corresponds to the pre-charge pressure marked on its body. If the pre-charge pressure needs to be changed for use, the maximum working pressure will change accordingly, generally following this rule: if the pre-charge pressure decreases, the maximum working pressure decreases (the specific decrease needs to be calculated); if the pre-charge pressure increases, the maximum working pressure remains unchanged.
- i) Check the expansion tank's pre-charge pressure every 6 months (or annually). If insufficient air pressure is found, replenish it promptly.

8.6 Safety Valve Selection

The safety valve is generally installed on the return water side of systems such as air conditioning, boilers, and heat pumps.

Basic requirements: Safety valves are typically made of brass or stainless steel, and are also suitable for media containing ethylene glycol (concentration below 30%).

Safety valve specifications

Connection Size	1/2"MF	1/2"FF
Design Pressure (bar)	1.5/2.5/3	

Selection recommendations: The safety valve serves as a safety protection in the system. When the system pressure exceeds the maximum value, the safety valve opens, discharging part of the hot water from the system, ensuring that the system pressure does not exceed the maximum value, thereby guaranteeing that the system does not exceed the safe pressure range. The set pressure of the safety valve shall be consistent with the maximum working pressure of the system. Usually, the parameters provided by the equipment supplier are sufficient.

Installation position of safety valve:

- (1) The safety valve shall be installed at the highest point or the point of highest pressure in the water pipeline, ensuring that the pipeline medium can flow smoothly.
- (2) The safety valve must be installed vertically.
- (3) The safety valve shall be installed in a position easy to inspect and adjust, with sufficient operating space around it.
- (4) When the safety valve discharges liquid, it shall be guided to discharge to an appropriate location.

Maintenance measures of safety valve:

- (1) Cleaning of the safety valve: Regularly clean the interior and exterior of the safety valve, and remove deposits on the valve seat and piston to prevent impurities from affecting the sealing performance of the valve.
- (2) Seal inspection: Regularly check the sealing performance of the safety valve, especially the sealing condition of the valve seat and piston. If damage or severe wear is found, it shall be replaced promptly.
- (3) Valve lubrication: As needed, apply an appropriate amount of lubricant to the opening and closing parts of the safety valve to ensure smooth operation of the valve.
- (4) Regular calibration: According to regulations, regularly calibrate the safety valve and check its opening and closing pressure and seat sealing performance. If found to be substandard, it shall be adjusted or replaced promptly.
- (5) Handling abnormal situations: If abnormalities such as air leakage or valve sticking are found during the operation of the safety valve, promptly stop the machine for inspection and repair or replace the safety valve.

8.7 Secondary Pump Selection

The pump selection shall meet the larger flow rate and head required by the system design heating condition and summer cooling condition.

If the head of the built-in pump in the unit is less than the system resistance, a secondary pump shall be used to supplement.

Perform hydraulic calculations using the water system circuit with the maximum resistance. Based on the total pressure loss and considering a margin, select an appropriate circulation pump.

Water head calculation

The hydraulic calculation formula for floor heating pipes is: $\Delta P = \Delta P_m + \Delta P_j$

Frictional resistance loss: $\Delta P_m = R \cdot L$

Local resistance loss: $\Delta P_j = \xi \frac{\rho v^2}{2}$

The above can be calculated in detail using relevant parameters from the hydraulic calculation verification table.

Alternatively, the following formula can be used for estimation:

Head $H = K \times (\text{height difference between pipes } h \text{ (m)} + \text{unit water-side pressure loss} + \text{longest pipe length (m)} \times 0.07)$

Note:

K is a safety factor of 1.1~1.2, take 1.1 for a single water system, and 1.2 for a multi-water system.

The water-side pressure loss unit is kPa, 10 kPa = 1 m (H₂O) head.

In the case of a unit with a built-in water pump, the head of the secondary water pump shall be calculated by subtracting the corresponding head of the unit's water pump.

Calculation of water pump flow

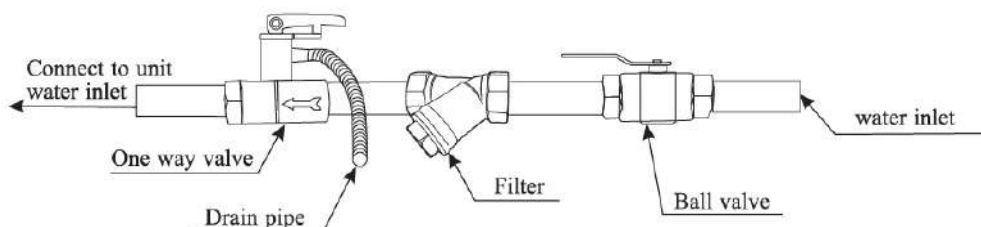
Calculate based on 1.2 times the total system flow.

Tips: Users shall select based on their actual engineering installation application.

8.8 Connecting Water Pipes

8.8.1 Filter Installation

- (1) A water filter must be installed before the unit's water inlet and the water tank's inlet to ensure clean water quality by filtering out impurities in the water as much as possible.
- (2) The filter screen must face downward.
- (3) It is recommended to install one-way valves on both sides of the filter, which makes it more convenient to clean and replace the filter.
- (4) Sufficient straight pipe sections shall be ensured before the filter to guarantee the filtering effect.



8.8.2 Water Pipe Insulation

	
One-way valves shall not be wrapped with insulation cotton to facilitate future maintenance.	
Do NOT use excessive force when connecting the field piping and make sure the piping is aligned properly. Deformation of the piping can cause malfunctioning of the unit.	

- (1) After all water fittings and pipes are installed and connected, the water pipes shall be insulated.
- (2) Pipe laying and insulation shall be formed in one go, with tightly adhered joints, smooth surfaces, uniform arcs, and no circular breaks.
- (3) It is recommended to use insulation cotton with a thickness of 10 mm or more.



- (1) Use external insulation materials: When installing the water tank, wrapping it with insulation materials on the exterior can effectively reduce heat loss.
- (2) Regularly check the water tank's sealing: The sealing of the insulated water tank is crucial for insulation effectiveness. Regularly inspect the tank's sealing to ensure there are no water leak or heat escape.
- (3) Use insulation covers: Installing an insulation cover on top of the water tank can effectively reduce heat loss. The insulation cover can be made of insulating materials such as insulation cotton or insulation adhesive.
- (4) Regularly clean the water tank: Dirt inside the water tank can affect insulation performance. Regular cleaning of the water tank, maintaining its interior cleanliness, can improve insulation effectiveness.

8.8.3 Water Quality Requirements

Poor water quality will produce more scale, sand, and other sediments. Therefore, before entering the water system, water must be softened and filtered through water softening equipment.

Before using the unit, water quality analysis shall be conducted, to determine the chloride ion concentration, sulfate ion concentration, pH value, etc.

The water quality standards applicable to this unit are shown in the figure below.

1. Corrosion resistance of stainless steel and brazed materials in tap water at room temperature

Attention: + : Good corrosion resistance under normal conditions

0 : There may be corrosion problems

- : Not recommended

			Plate material			Brazing material		
Moisture	Concentration	Time limit	AISI 304	AISI 316	254 SMO	Cuprum	Nickel	SS
Alkalinity (HCO ₃)	<70	24h	+	+	+	0	+	+
	70-300		+	+	+	+	+	+
	>300		+	+	+	0/+	+	+
Sulfate (SO ₄ ²⁻)	<70	unlimited	+	+	+	+	+	+
	70-300		+	+	+	0/-	+	+
	>300		+	+	+	-	+	+
HCO ₃ ⁻ /SO ₄ ²⁻	>1.0	unlimited	+	+	+	+	+	+
	<1.0		+	+	+	0/-	+	+
Electrical conductivity	<10	unlimited	+	+	+	0	+	+
	10-500		+	+	+	+	+	+
	>500		+	+	+	0	+	+
pH	<6.0	24h	0	0	0	0	+	0
	6.0-7.5		+	+	+	0	+	+
	7.5-9		+	+	+	+	+	+
	>9		+	+	+	0	+	+
Ammonium (NH ₄ ⁺)	<2	24h	+	+	+	+	+	+
	2-20		+	+	+	0	+	+
	>20		+	+	+	-	+	+
Chloride (Cl ⁻)	<10	unlimited	+	+	+	+	+	+
	100-200		0	+	+	+	+	+
	200-300		-	+	+	+	+	+
	>300		-	-	+	0/+	+	-

8.8.4 Water Replenishment Requirements

First, open the air vent valve on the manifold and all other valves.

Add water at the pipe inlet.

During the water replenishment process, observe whether water overflows from the air vent valve. If water overflows, it indicates that the system is fully filled with water.

Close the air vent valve and observe the water pressure gauge. If the pressure is greater than 0.15 MPa, the water replenishment valve can be closed, and air venting is complete for the water system.

How to determine if there is air in the heating water system:

1. Noise: When air is present in the system, water flowing through pipes and radiators may produce noises such as “gurgling” or “hissing” sounds. This is caused by air bubbles moving and bursting in the water flow.
2. Uneven floor heating: If some parts of the floor heating are hotter or colder than others, this may indicate air bubbles obstructing the flow of hot water.
3. System pressure fluctuations: The presence of air can lead to unstable system pressure. If the pressure gauge shows fluctuations, this may be a sign of air in the system.
4. Circulation pump overheating: If the circulation pump overheats or runs abnormally, it may be due to the pump attempting to push water flow containing air, which increases the pump’s workload.
5. Air bubbles in the water system: Observing continuous bubble production at the system’s air release points (such as air vent valves) indicates that air is still present in the system.
6. Reduced system efficiency: If the efficiency of the entire heating system decreases, such as slow rising of room temperature, the system may contain air that affects heat transfer.
7. Poor water flow: In some parts of the system, water flow may appear sluggish or obstructed, possibly due to air bubbles accumulating in the pipes.
8. Continuous air release from automatic air vent valves: If automatic air vent valves are continuously releasing air, this may indicate a persistent air entry into the system.

How to perform air venting:

1. Observe the air vent valve: After the air venting operation, ensure that the air vent valve is no longer continuously releasing bubbles. If only water flows out without bubbles, this usually means the air in the system has been removed.
2. Check radiators: After air venting, check if all radiators are heating evenly. If every part of the radiator is warm, this indicates that air has been removed and hot water can flow freely.
3. Listen for noises: While the system is running, listen carefully for any water flow noises. If the previous “gurgling” or “hissing” sounds caused by air have disappeared after venting, this typically means the air has been removed.
4. Inspect the unit and circulation pump: Observe the operation of the unit and circulation pump. If they are running smoothly without abnormal noise or overheating, this may indicate that air has been removed from the system.
5. System pressure: Check the pressure gauge on the system to ensure the pressure is stable and within the normal range. If the pressure is stable, this usually means there is no excess air in the system.
6. Temperature changes: Observe changes in room temperature. If the room temperature rises faster after venting, this may indicate that air has been removed from the system, and the heating efficiency has been improved.
7. Check automatic air vent valves: If automatic air vent valves are installed in the system, check if they are functioning properly. These valves shall continuously release small amounts of air from the system.
8. Perform multiple venting operations: In some cases, multiple venting operations may be necessary to ensure all air is removed from the system.
9. Professional inspection: If uncertain whether the system has been completely vented, request a professional technician to conduct an inspection. They can use specialized equipment and methods to detect any remaining air in the system.
10. Re-check after system operation: After the system has been running for a period, re-check all the above indicators to ensure that air has not accumulated after long-term operation. Check whether air in the water system can completely pass through the highest point, and inspect for air in the water system every week.

8.8.5 Protecting the Water Circuit from Freezing

To prevent hydraulic components from freezing, the software has special anti-frost functions, including starting the pump in low-temperature conditions:

Water pipe anti-freezing

Drainage prevention.

However, in the event of a power outage, these functions cannot guarantee protection. Perform one of the following operations to protect the water circuit from freezing:

Add ethylene glycol to the water. Ethylene glycol lowers the freezing point of water.

Install the freeze protection valve. This valve drains water from the system before it freezes. Insulate the freeze protection valve in a manner similar to water pipes, but do not insulate its inlet and outlet (release).

Adding antifreeze to the water circuit:

1. Ethylene glycol is toxic.	!
2. The presence of ethylene glycol may cause corrosion in the system. Uninhibited ethylene glycol becomes acidic under the influence of oxygen. The presence of copper and high temperatures accelerates this process. Acidic uninhibited ethylene glycol attacks metal surfaces, forming galvanic corrosion cells, causing severe damage to the system. Therefore, it is important that: a. Water treatment shall be correctly executed by a qualified water specialist. b. A type of ethylene glycol with corrosion inhibitors shall be chosen to counteract the acids formed by the oxidation of ethylene glycol. c. Automotive ethylene glycol shall not be used because it has a limited lifetime of corrosion inhibitors and contains silicates which may foul or clog the system. ▪ Galvanized piping shall not be used in the ethylene glycol system, as its presence may lead to the precipitation of certain components in the ethylene glycol's corrosion inhibitors.	!
3. Ethylene glycol absorbs water from its environment. Therefore, do not add ethylene glycol that has been exposed to air. Taking the cap off the ethylene glycol container results in increased water concentration. The ethylene glycol concentration is then lower than assumed. As a result, hydraulic components may freeze after all. Take preventive measures to ensure minimal exposure of ethylene glycol to air.	!
4. Burst protection: Ethylene glycol prevents pipes from bursting, but not the freezing of liquid inside the pipes. Freeze protection: Ethylene glycol prevents the liquid inside pipes from freezing.	!
5. The required concentration may vary depending on the type of ethylene glycol. Always compare the requirements in the table above with the specifications provided by the ethylene glycol manufacturer. If necessary, meet the requirements set by the ethylene glycol manufacturer. a. The concentration of added ethylene glycol shall not exceed 35%. b. If the liquid in the system freezes, the pump will not be able to start. Please note that if you only protect the system from bursting, the liquid inside may still freeze. c. When water is static inside the system, it is likely to freeze and cause damage.	!

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

Add ethylene glycol according to the table below.

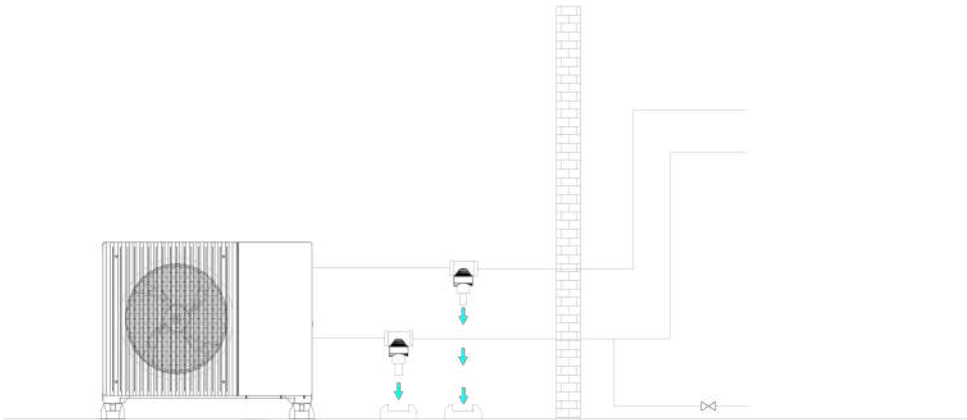
Lowest Expected Outdoor Temperature	Burst Prevention	Freeze Prevention
-5°C	10%	15%
-10°C	15%	25%
-15°C	20%	35%
-20°C	25%	—
-25°C	30%	—
-30°C	35%	—

Add propylene glycol

Lowest Expected Outdoor Temperature	Burst Prevention	Freeze Prevention
-3°C	10%	15%
-7°C	20%	30%
-13°C	30%	45%
-25°C	40%	—
-37°C	50%	—

Add anti-freeze valve in engineering installation

Anti-freeze valves allow the drainage of pipe medium when the average temperature of the medium reaches 3°C. This can prevent ice formation in the system circuit. When used in heating engineering installations, it can effectively avoid potential damage to machines and pipes.



11.8.6 Flow and Heat Exchange Correction After Adding Antifreeze

Concentration Of ethylene glycol (%)	Modification coefficient				Freezing point (°C)
	capacity	Power input	Water resistance	Water flow	
0	1.000	1.000	1.000	1.000	0
10	0.984	0.998	1.118	1.019	-4
20	0.973	0.995	1.268	1.051	-9
30	0.965	0.992	1.482	1.092	-16
40	0.960	0.989	1.791	1.145	-23
50	0.950	0.983	2.100	1.200	-37

Propylene Glycol

Concentration Of ethylene glycol (%)	Modification coefficient				Freezing point (°C)
	capacity	Power input	Water resistance	Water flow	
0	1.000	1.000	1.000	1.000	0
10	0.976	0.996	1.071	1.000	-3
20	0.961	0.992	1.189	1.016	-7
30	0.948	0.988	1.380	1.034	-13
40	0.938	0.984	1.728	1.078	-22
50	0.928	0.975	2.150	1.125	-35

9. Electrical Installation

- Open the front panel , and open the power supply access.
- The power supply must go through the wire access and be connected to the power supply terminals in the controlling box. Then connect the 3-signal wire plugs of the wire controller and main controller.
- If an external water pump is required, please also insert its power supply cable through the wire access point and connect it to the water pump terminals.
- If an additional auxiliary heater needs to be controlled by the heat pump controller, the relay (or power supply) of the auxiliary heater must be connected to the relevant output on the controller.

9.1 Precautions for Connecting Electrical Wires

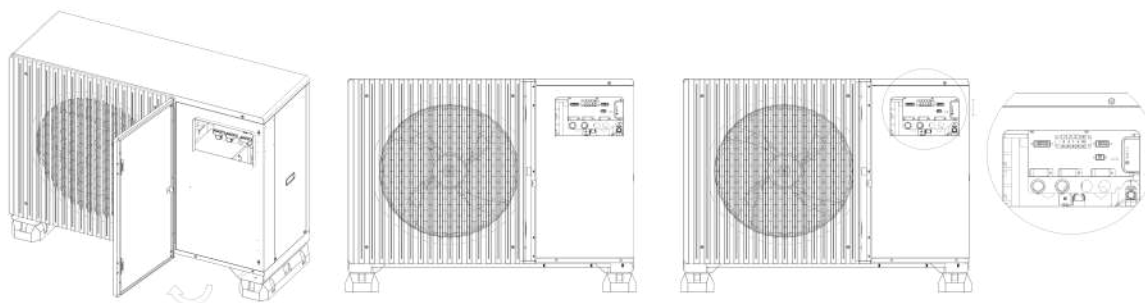
	
Turn OFF all power supply before removing the switch box cover, connecting electrical wiring or touching electrical parts.	
Disconnect the power supply for more than 10 minutes, and measure the voltage at the terminals of main circuit capacitors or electrical components before servicing. The voltage MUST be less than 50 V DC before you can touch electrical components.	
Do NOT touch electrical components with wet hands	

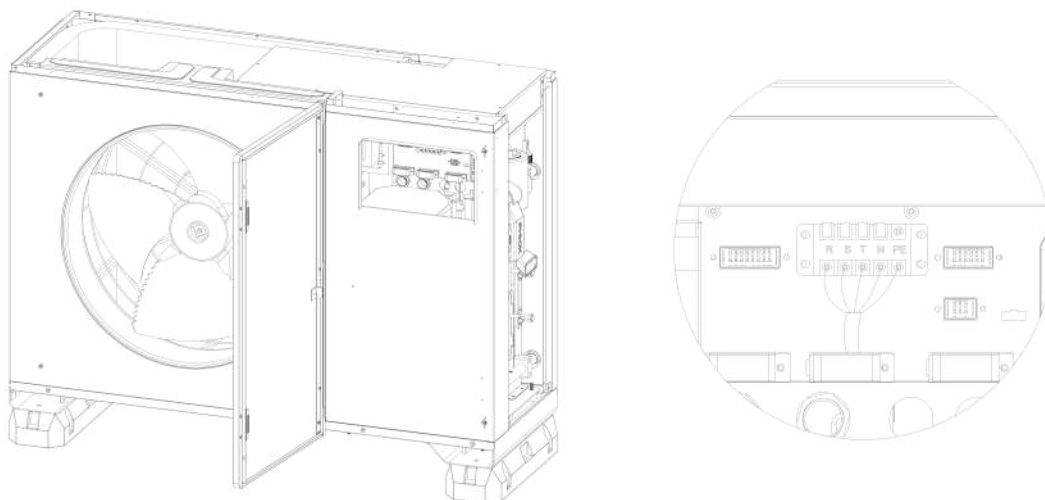
9.2 Guidelines for Connecting Electrical Wires

1. To prevent cables and wires from being damaged by sharp edges, they must pass through waterproof wire grommets before connecting to the terminal box.
2. Strip the cables and connect them to the power terminal block.
3. Secure the cable to the electrical box using cable clamps.
4. If an external water pump is required, insert the power cord into the wire entry port and connect it to the water pump terminal.
5. If the heat pump controller needs to control an additional auxiliary heater, the relay (or power supply) of the auxiliary heater must be connected to the relevant output of the controller.

9.3 Connection with the Outdoor Unit

- ① Remove the service panel according to the instructions shown in the diagram below.
- ② Pass the cables through the wire grommet into the interior of the unit.
- ③ Connect the cables according to the neutral, live, and ground lines.

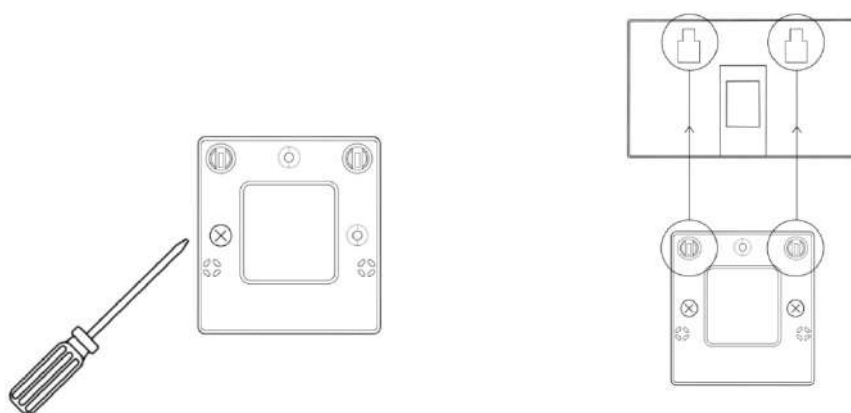




9.4 Installation of Wired Controller and Wall-mounted Bracket

Installation of wall-mounted bracket

1. Install at a height of 1 to 1.5 m from the floor (a position where average room temperature can be detected).
2. Install vertically against the wall.
3. Avoid installation in the following locations:
 - Near windows or other places exposed to direct sunlight or direct air flow.
 - In the shadow or behind objects that deviate from the room's air flow.
 - Locations where condensation occurs.
 - Near heat sources.
 - Uneven surfaces.
4. Installation method: Use an electric drill to secure the wall-mounted bracket to the wall with screws. The screw positions are shown in the figure below.



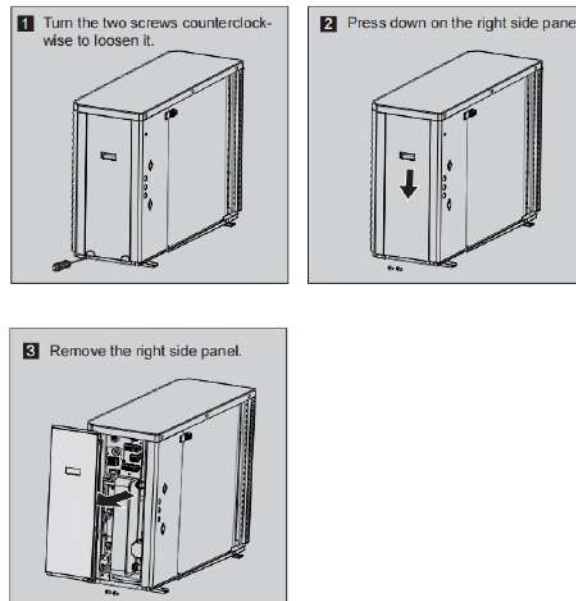
Wired controller installation and connection

1. Clip the wired controller onto the wall-mounted bracket, ensuring it is secure and does not fall.
2. Pass the signal wire of the wired controller through the waterproof wire grommet.

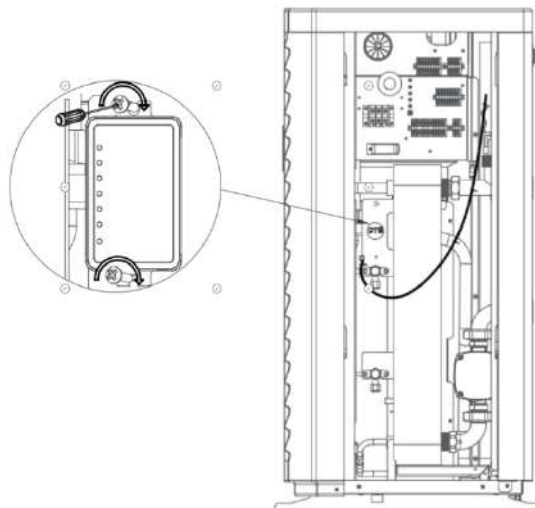
3. Connect the signal wire terminal of the wired controller to the corresponding signal wire terminal on the unit.

9.5 DTU Installation and Connection

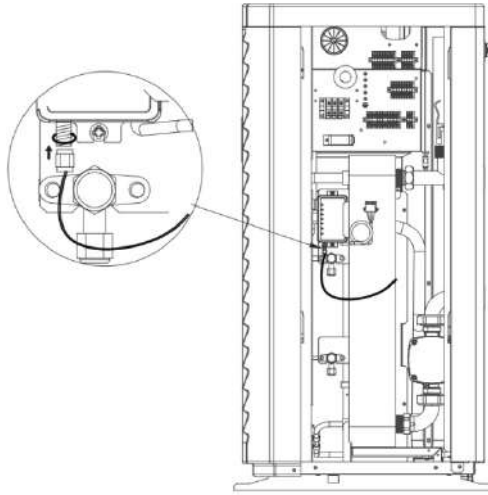
1. Remove the service panel. The disassembly process can be referred to the following figures.



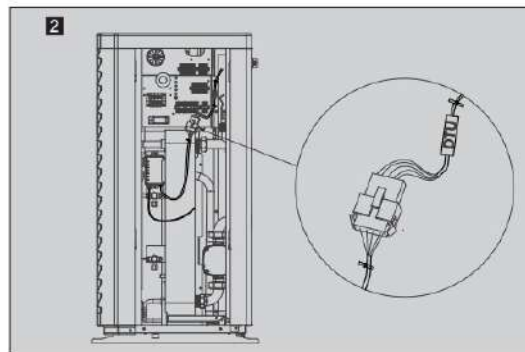
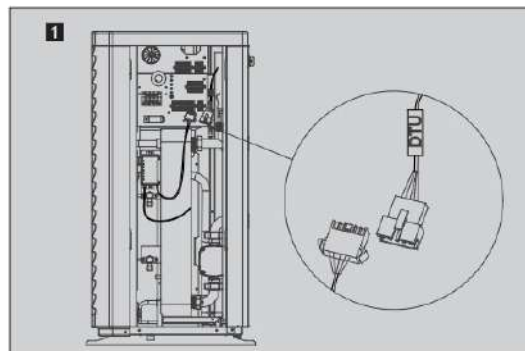
2. Take the DTU module out of the DTU accessory box and install it in the position designated for DTU assembly on the unit. This usually can be seen after removing the unit's service panel.



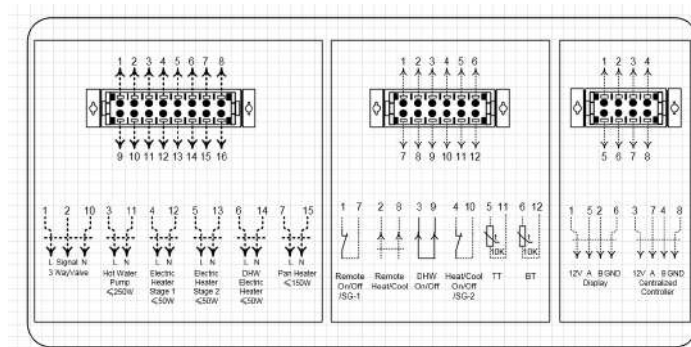
3. Take the antenna out of the DTU accessory box, connect it to the DTU with the threaded connection, and extend the antenna to the outside of the unit to ensure the stability of DTU data reception.



4. Connect the communication line labeled “DTU” on the unit body to the DTU RS485 communication line for installation.



9.6 Electrical Connections with Various Auxiliary Devices



Customers can connect different auxiliary devices according to their needs, based on the circuit diagram shown in the figure.

10.Commissioning

10.1 Precautions During Commissioning

	
When connecting the power supply: connect the earth cable first, before making the current-carrying connections.	
When disconnecting the power supply: disconnect the current-carrying cables first, before separating the earth connection.	
After finishing the electrical work, confirm that each electrical component and terminal inside the electrical components box is connected securely	

10.2 Checks Before Commissioning

Before starting the unit, a certain number of verifications must be performed on the installation process to ensure that the unit can operate under the best possible conditions. The following checklist is not exhaustive, and should only be used as a minimum reference:

- A. Ensure that the fan can rotate freely;
- B. Check the flow direction of all water pipes;
- C. Verify that all system piping is operating correctly according to installation requirements;
- D. Check the unit's power supply voltage and ensure that the voltage is within authorized limits;
- E. Ensure that the unit is properly grounded;
- F. Check for the presence of protective devices and disconnecting devices;
- G. Check that all electrical connections are tight;
- H. Check all pipes for leaks and ensure good air ventilation.

10.3 Checks During Commissioning

- A. When the unit installation is complete, the water system piping is properly connected, air purging is finished, and there are no leakage issues, the unit can be powered on and started.
- B. Turn on the unit, press the switch button on the operation panel to start the unit. Please carefully check for any abnormal noise or vibration, or whether the display of the wired controller is normal.
- C. After the unit has been working normally for 10 minutes without any issues, the pre-start is complete. If not, please refer to the repair and maintenance section of this manual to resolve the problem.

10.4 Minimum Flow Rate

Model	Rated Water Flow Rate (m ³ /h)	Minimum Water Flow Rate to be Guaranteed (m ³ /h)
CH-HP15UIMPZK-H	2.08	1.65
CH-HP15UIMPZM-H	2.08	1.65
CH-HP22UIMPZM-H	2.90	2.32

10.5 Water Pressure Adjustment Requirements

Before the test, the pipes shall be fixed, and the connections shall be openly laid.

The pressure gauge shall be installed at the lowest part of the test pipe section, with a pressure accuracy of 0.01 MPa.

Slowly fill the pipe with water from the lowest section, fully expel the air in the pipe, and conduct a water tightness test.

Slowly pressurize the pipe. Pressurization shall be done using a manual pump, and the pressurization time shall not be less than 10 minutes.

After pressurizing to the specified test pressure, maintain stable pressure for 1 hour. The pressure drop shall not exceed 0.06 MPa.

At 1.15 times the working pressure, maintain stable pressure for 2 hours. The pressure drop shall not exceed 0.03 MPa.

Before the test, ensure that there are no leaks at any connection points.

Within 30 minutes, two pressure replenishments are allowed to reach the specified test pressure.

10.6 Test Run of Heat Pump

1. Press the “” button on the wired controller to start the heat pump. Check if the water pump is running.

2. When the water pump has been running for 3 minutes, the compressor will start.

Listen for any strange sounds from the compressor. If an abnormal sound occurs, stop the heat pump and check the compressor. If the compressor is running well, check the refrigerant pressure gauge.

3. Then check if the power input and running current meet the manual requirements. If not, stop the machine and inspect.

4. Adjust the valves on the water circuit to ensure good hot (cold) water supply for each valve, meeting the heating (or cooling) requirements. Check if the outlet water temperature is stable.

5. The parameters of the wired controller are set by the factory, and users shall not change them on their own.

6. It is necessary to verify against the project delivery checklist for compliance.

11. Maintenance and Service

- 1) Users shall not alter the internal structure or wiring of the equipment.
- 2) Service and maintenance shall be carried out by qualified and trained technicians. When the unit fails to operate, immediately cut off the power supply.
- 3) The intelligent control system can automatically analyze various protection issues that occur in daily use and display fault codes on the controller. This system can recover on its own. Under normal operating conditions, the pipes inside the unit do not require any maintenance.
- 4) Under normal environmental conditions, users shall clean the surface of the outdoor heat exchanger monthly or quarterly.
- 5) If the unit operates in a dirty or oily environment, please have professionals clean the outdoor heat exchanger using specified detergents to ensure the unit's performance and efficiency.
- 6) Please pay attention to the surrounding environment, check if the unit installation is secure, or if the air inlet and outlet of the outdoor unit are blocked.
- 7) Unless the water pump is damaged, no special repair or maintenance shall be performed on the water system inside the unit. It is recommended to clean the water filter regularly or replace it when it is very dirty or clogged.
- 8) If the unit is not used for a long time in winter, please drain all the water from the system to prevent damage to the water pipes due to freezing.

11.1 Tools Used for Maintenance

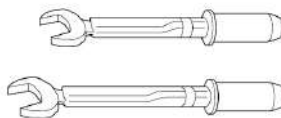
(1) Flaring tool (clutch type)

The flaring tool has a larger clamping bar hole to set the pipe end to 0-0.5 mm, and has a stronger spring inside to ensure reliable flaring torque.



(2) Torque wrench

To enhance compression strength, the diameter of the wrench varies according to the size of the flare nut. It is generally used for installing and removing globe valve caps.



(3) Phillips screwdriver

Generally used for installing and removing screws.



(4) Hexagonal wrench

Generally used for opening and closing globe valve gates.



Specification: 3/8" hexagonal

(5) Pipe cutter

Generally used for cutting copper pipes.



(6) Multimeter

Generally used for detecting electrical circuits during circuit failures



(7) Manifold pressure gauge

Each port of the manifold has a different shape to prevent insertion of incorrect refrigerant.

* However, the port shapes for R410A and R32 are the same; therefore, care must be taken not to insert the wrong refrigerant.

Differences in high/low pressure gauges

	R32 (Compatible with R410A)	R290	R454B
High-pressure gauge (red)	-0.1 ~ 5.3 MPa -76 cmHg ~ 53 kgf / cm ²	-76 cmHg ~ 35 kgf / cm ²	-0.1 ~ 5.3 MPa -76 cmHg ~ 53 kgf / cm ²
Low-pressure gauge (blue)	-0.1 ~ 3.8 MPa -76 cmHg ~ 38 kgf / cm ²	-76 cmHg ~ 17 kgf / cm ²	-0.1 ~ 3.8 MPa -76 cmHg ~ 38 kgf / cm ²

Differences in manifold port sizes

	R32 (Compatible with R410A)	R290	R454B
Port size	1/2 UNF20	7/16 UNF20	1/2 UNF20

(8) Charging hose

The charging hose has increased pressure resistance.

At the same time, the material has been changed to HFC-resistant, and the size of each manifold adapter has been altered to match the port size of the manifold gauge itself.

Additionally, some hoses have a check valve near the sampler to prevent gas pressure backflow. (It is recommended to use hoses with valves)



Differences in charging hoses

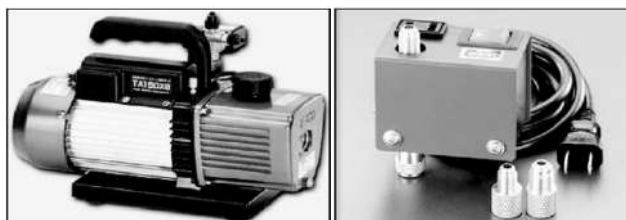
		R32 (Compatible with R410A)	R290	R454B
Pressure resistance	Normal working pressure	5.1 MPa (52 kgf / cm ²)	3.4 MPa (35 kgf / cm ²)	5.1 MPa (52 kgf / cm ²)
	Burst pressure	27.4 MPa (280 kgf / cm ²)	17.2 MPa (175 kgf / cm ²)	27.4 MPa (280 kgf / cm ²)
Material		HNBR rubber with nylon inner coating	NBR rubber	HNBR rubber with nylon inner coating

(9) Vacuum pump and vacuum pump adapter

When the vacuum pump is used, a solenoid valve must be set to prevent vacuum pump oil from flowing back into the charging hose.

Also, a vacuum pump with an anti-oil backflow function (or with a vacuum pump adapter) shall be used.

If vacuum pump oil (mineral oil-based) mixes with R410A (R32), it may damage the machine.



(10) Electrical leak detector for HFC refrigerant

For more accurate detection, we recommend using a detector specifically set up and adjusted for R290 detection.



(11) Digital scale for refrigerant charging

R32 and R410A have high pressure levels and fast evaporation rates. Therefore, if refrigerant is recovered using the cylinder charging method (rather than liquefying the refrigerant into the cylinder), the refrigerant will evaporate in the weighing glass, making it difficult to read the weight. (R22 charging cylinders have different pressure resistance, scale, and connection port sizes; therefore, they are not usable). Moreover, the digital scale for refrigerant charging is reinforced by receiving the weight of the refrigerant cylinder with four pillars at the corners. The connection port of the charging hose has two separate ports for R22 (7/16 UNF20) and R32/R410A (1/2 UNF20), so they can be inserted into existing refrigerants.



(12) Refrigerant cylinder

R290 is a single refrigerant, so both liquid and gas can be inserted, and additional charging is possible.

The color of the cylinder varies by manufacturer. When using, please carefully identify the label on the refrigerant cylinder, including the chemical name of the refrigerant (propane), the R290 identification, and warning information for safe use and storage.

(13) Connection port for refrigerant cylinder and filler

A charging port that matches the size of the charging hose's connection port (1/2 UNF20) is required. At the same time, the packaging must use HFC-resistant materials.



For other installations, you can use common tools such as metal saw, electric drill, long-nose pliers, hole core drill, flax tape, level, thermometer, clamp, electric knife, pliers, reamer or scraper, spring bender, adjustable wrench, fixed wrench, feeler gauge, hexagonal wrench (4 mm), tester, and megohmmeter.

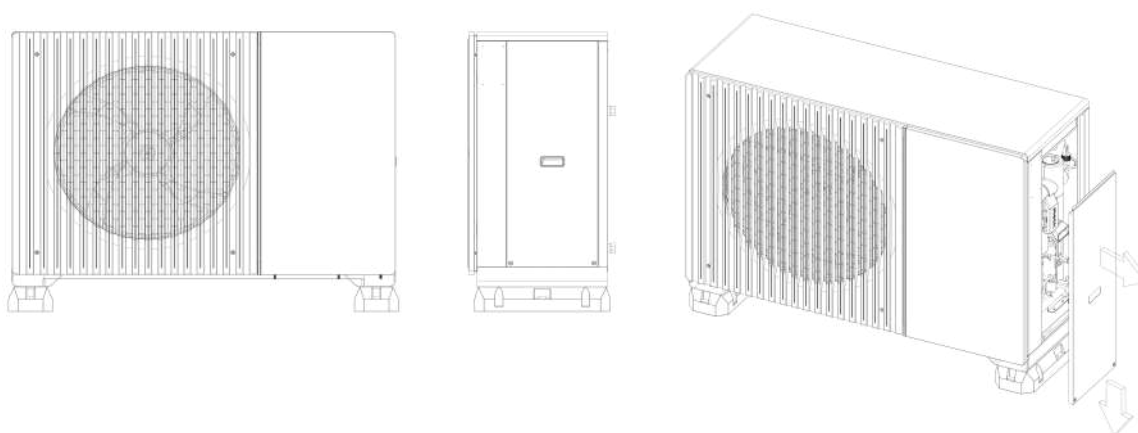
11.2 Disassembly of Structural Components

11.2.1 Safety Precautions for Maintenance

	
The diagonal-patterned front frame is relatively sharp. When disassembling, please be careful to avoid direct contact with sharp areas.	
The position of the sheet metal parts should be careful not to hit people	
The unit is in a static state of power and water cut	

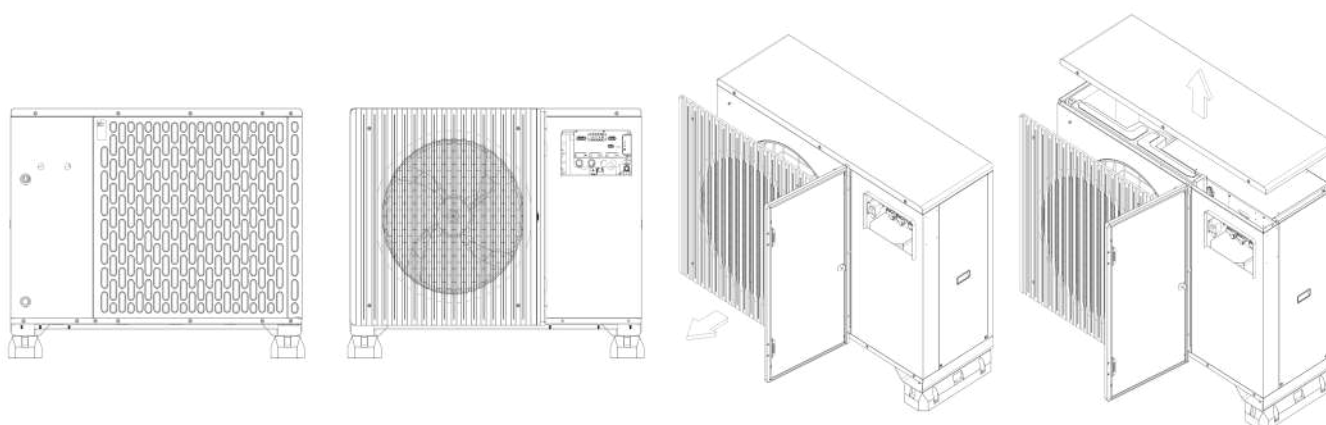
11.2.2 Removing the Service Panel

- ① Loosen two screws (ST3.9).
- ② Push the side panel downwards, then pull it out horizontally.



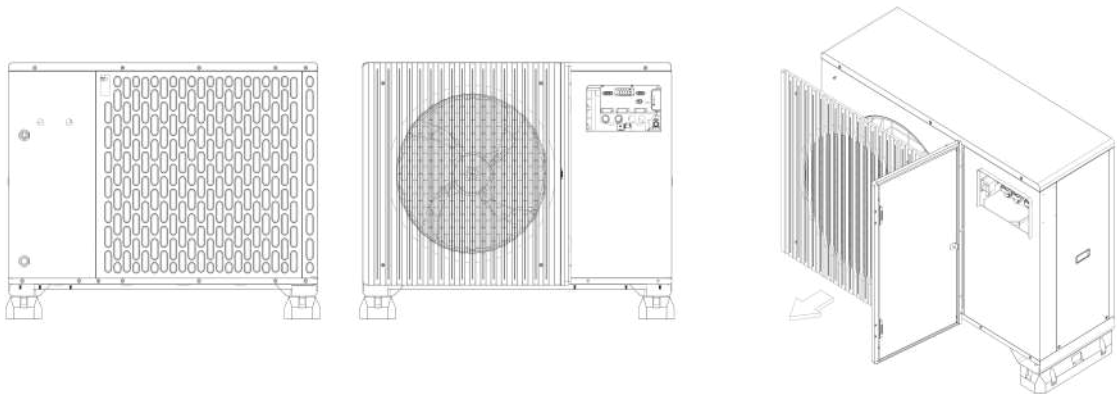
11.2.3 Removing the Top Cover

- ① Loosen four screws (ST3.9) at the rear of the top cover.
- ② Open the magnetic front panel and remove one screw (ST3.9).
- ③ Slide the top cover out diagonally downwards.
- ④ Remove the top cover upwards.



11.2.4 Removing the Front Frame

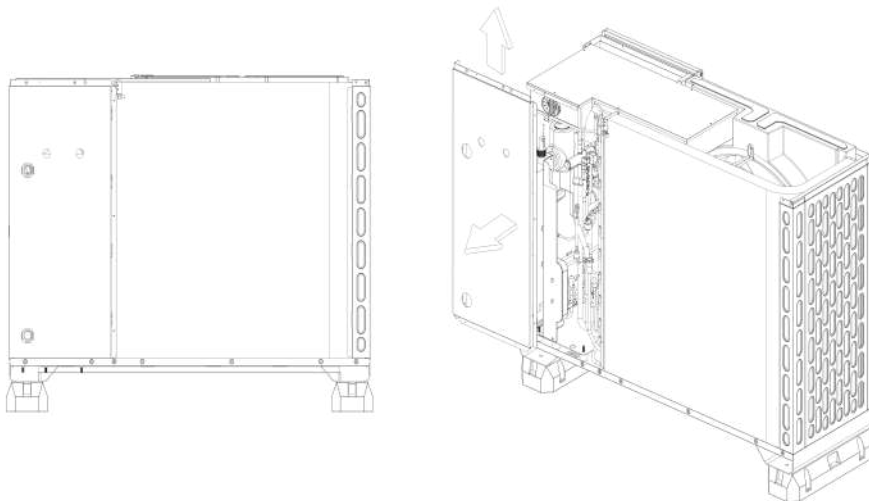
- ① Loosen the four bolts (M6) of the front panel
- ② Remove the front panel outward.



11.2.5 Removing the Water Inlet Panel

Note: Before removing the water inlet panel, ensure that the service panel, rear protective mesh, and top cover have been removed.

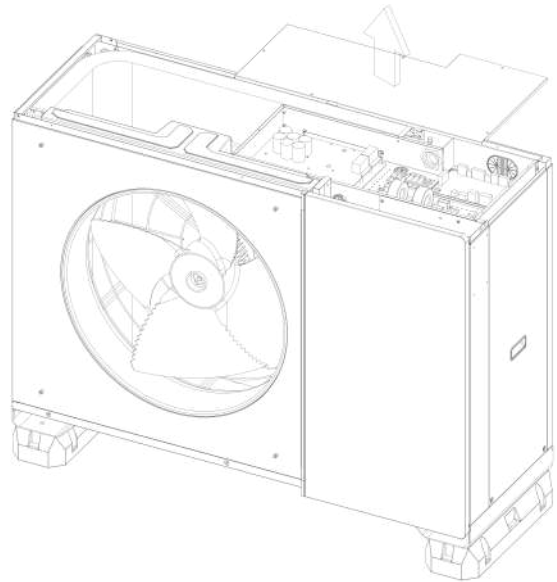
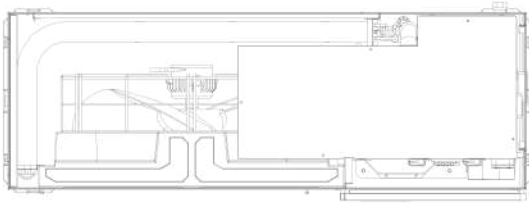
- ① Loosen three screws (ST3.9) between the water inlet panel and the fin end plate.
- ② Loosen a screw (ST3.9) that is connected to the electrical box.
- ③ Loosen the two screws that connect the water outlet plate to the chassis.
- ④ After completing the above steps, remove the water inlet panel towards the rear direction.



11.2.6 Removing the Electrical Box Cover

Note: Before removing the electrical box cover, please ensure that the top cover has been removed.

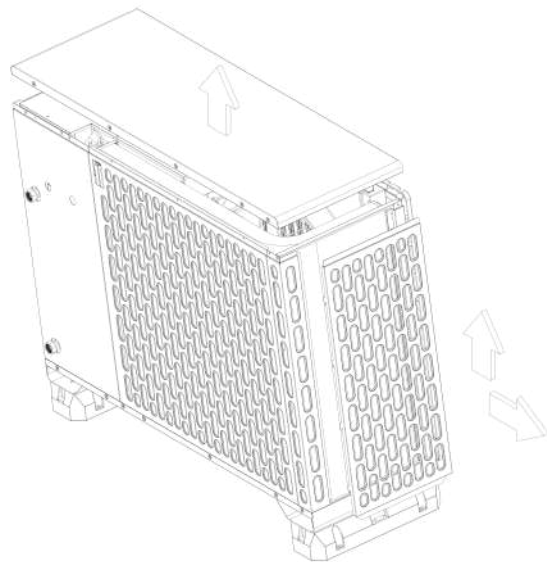
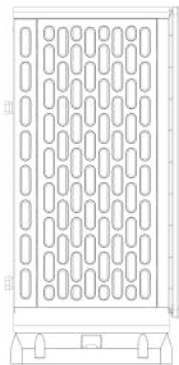
- ① Loosen five screws (ST3.9) on the top of the electrical box cover.
- ② Remove the electrical box cover upwards.



11.2.7 Removing the Side Protective Mesh

Note: Before removing the Side Protective Mesh, please ensure that the top cover has been removed.

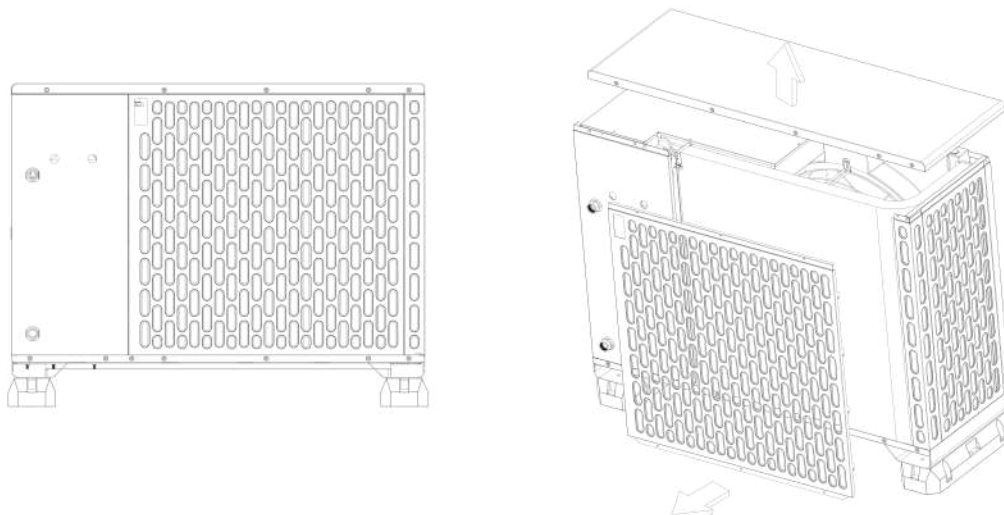
After you remove the top cover, you can simply pull out the Side Protective Mesh.



11.2.8 Removing the Rear Protective Mesh

Note: Before removing the Side Protective Mesh, please ensure that the top cover has been removed.

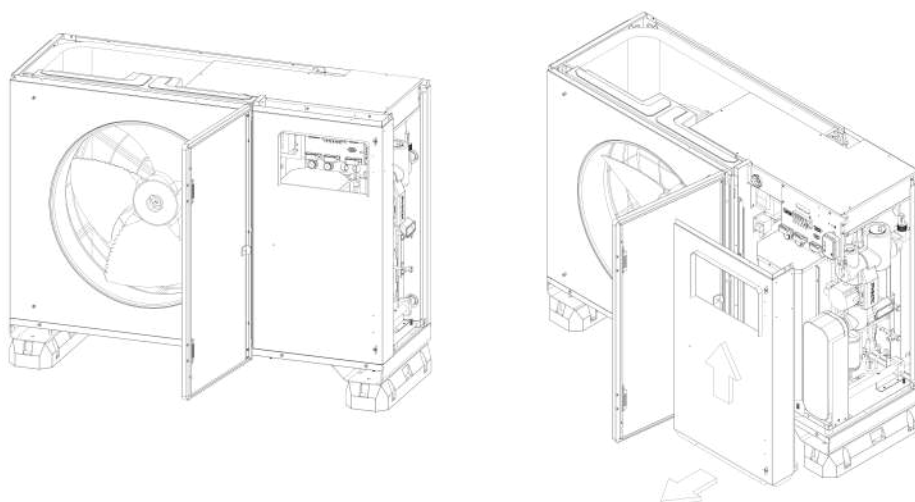
- ① Loosen three screws at the bottom of the rear protective mesh.
- ② Push the rear protective mesh outwards.
- ③ Pull the rear protective mesh outwards.



11.2.9 Removing the Pre-repair panel

Note: Before removing the Side Protective Mesh, please ensure that the top cover has been removed.

- ① Loosen the two screws that connect the front maintenance panel to the chassis.
- ② Loosen a screw that is connected to the electrical box.
- ③ Pull the Pre-repair panel outwards.



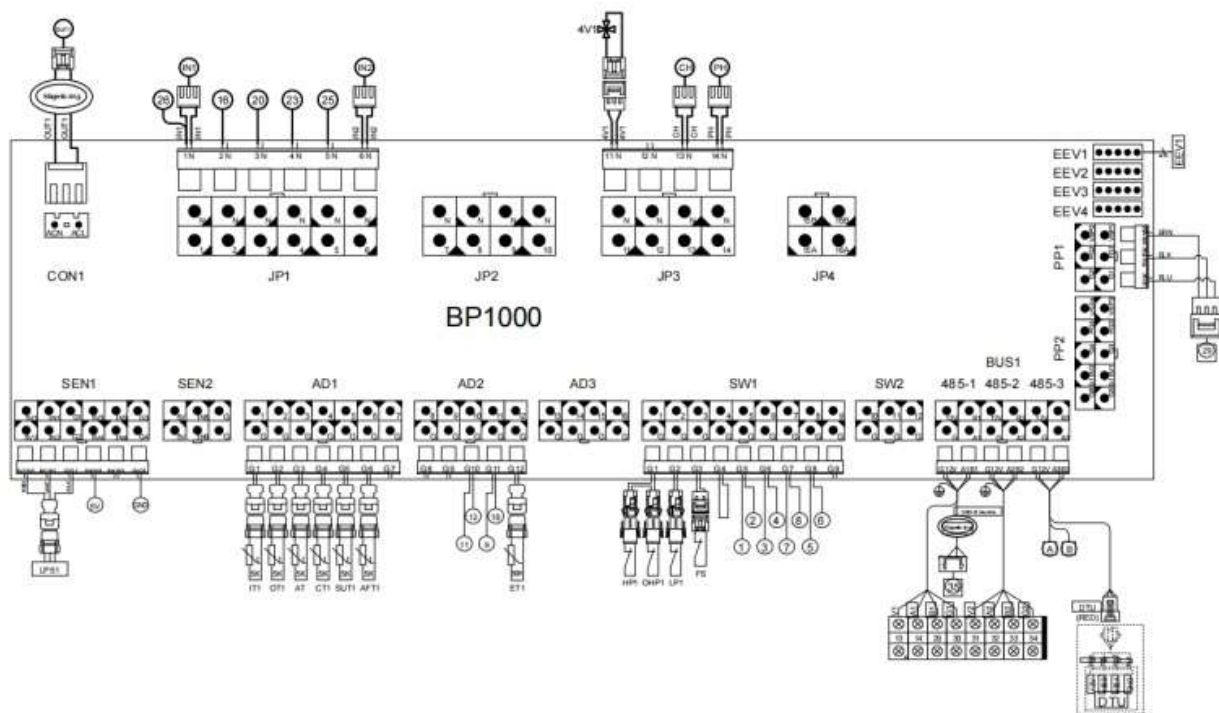
11.3 Replacement of Electrical Components

11.3.1 Replacing the Drive Board

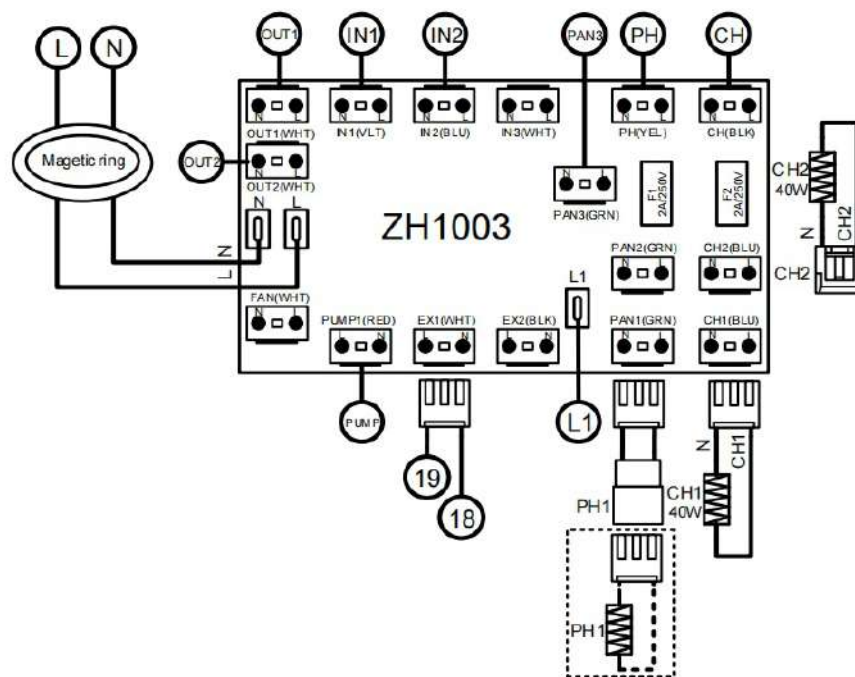
1. Ensure the unit is in a stopped state and disconnected from the power supply.
2. The service panel and top cover need to be removed.
3. Locate the position of the drive board, which can be determined by referring to the unit's exploded view in the appendix.
4. Remove the wire harnesses connected to the drive board.
5. Use a Phillips screwdriver to loosen the screws fixing the drive board.
6. Pull upwards forcefully to remove the damaged drive board.
7. Install the replacement drive board in the position of the electrical box, referring to the circuit diagram to reconnect the wire harnesses to their original positions.
8. Use the screwdriver to secure the drive board.
9. Ensure the drive board has been programmed with the drive software before powering on the unit.
10. Check if the compressor parameters are normal and if the unit can start normally.
11. Debug various parameters of the unit, and only deliver to the customer after ensuring stable operation.

11.3.2 Replacing the Main Board

1. Ensure the unit is in a stopped state and disconnected from the power supply.
2. The service panel and top cover need to be removed.
3. Locate the position of the main board, which can be determined by referring to the unit's exploded view in the appendix.
4. Remove the wire harnesses connected to the main board.
5. Use a Phillips screwdriver to loosen the screws fixing the drive board.
6. Pull upwards forcefully to remove the damaged drive board.
7. Install the replacement drive board in the position of the electrical box, referring to the circuit diagram to reconnect the wire harnesses to their original positions.
8. Use the screwdriver to secure the main board.
9. Power on and verify the unit's main control program.
10. After confirming that the unit's main control parameters are correct, attempt to start the unit.
11. Debug various parameters of the unit, and only deliver to the customer after ensuring stable operation.



11.3.3 Replacing the Power Transfer Board



If the unit's load output is abnormal and it is determined that the power transfer board needs to be replaced, follow these steps:

- ① Stop the unit and ensure it is completely disconnected from the power supply.
- ② Remove the top cover and the electrical box cover.
- ③ Unplug the load wires related to the transfer board.
- ④ The transfer board is fixed with standoffs; use pliers or similar tools to remove it.
- ⑤ Replace with a new transfer board and connect the load wires according to the diagram.
- ⑥ After checking that the wiring is correct, reconnect the power.
- ⑦ Check if the unit reports any faults and re-debug its operation.
- ⑧ Once it's confirmed to be operating normally, deliver to the customer.

11.4 Replacing the Motor

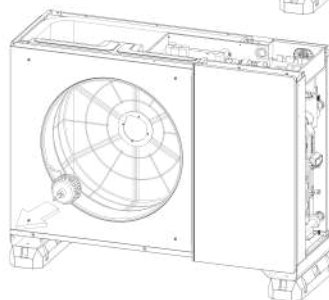
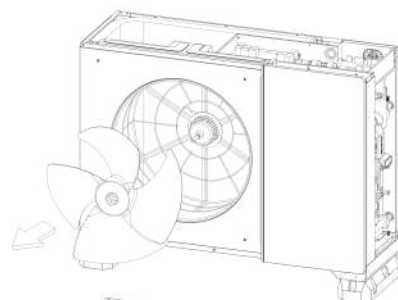
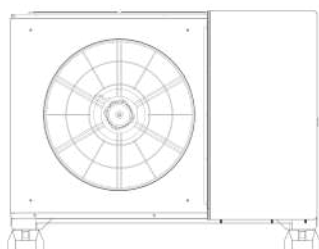
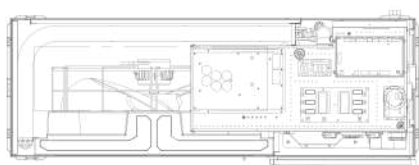


Please ensure the unit is in a stopped and powered-off state.

When removing the fan blade, be careful to avoid its sharp edges to prevent injury.

Note: Before removing the motor, ensure that the service panel, top cover, front frame have been removed.

- ① Use a wrench to loosen the fan blade bolts counterclockwise.
- ② Pull the fan blade outwards.
- ③ Use a screwdriver to loosen the four screws fixing the motor to the motor bracket.
- ④ After unplugging the motor's wire harness from the fan's drive board, the fan can be removed.



11.5 Replacing the Water Pump

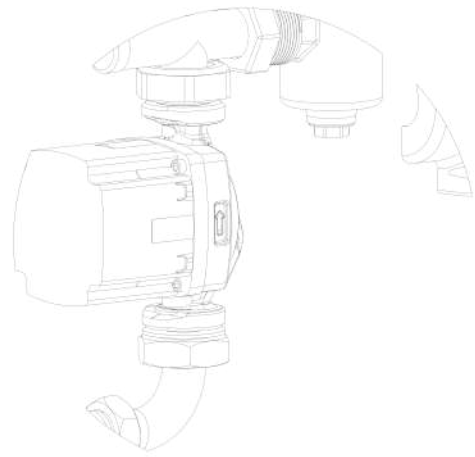
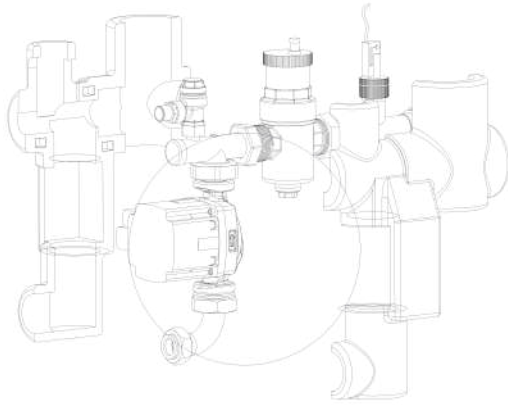


Please ensure the unit is in a stopped and powered-off state.

Please ensure that the unit's water circuit is in a no-flow state.

Note: Before removing the water pump, please ensure that the water inlet panel has been removed.

- ① Use a wrench to loosen the water pipe fittings connected to the water pump.
- ② Remove the water pipe fittings.
- ③ Unplug the wire harness connected to the water pump to complete the removal of the water pump.



11.6 Regular Cleaning and Maintenance of the Outdoor Unit

11.6.1 Cleaning the Environment Around the Outdoor Unit

- ① Regularly remove accumulated branches and leaves around the outdoor unit.
- ② Regularly remove leaves and debris from the ventilation grille under the product.
- ③ Regularly remove accumulated snow from the surface and grilles of the outdoor unit.
- ④ Regularly remove accumulated snow around the outdoor unit.

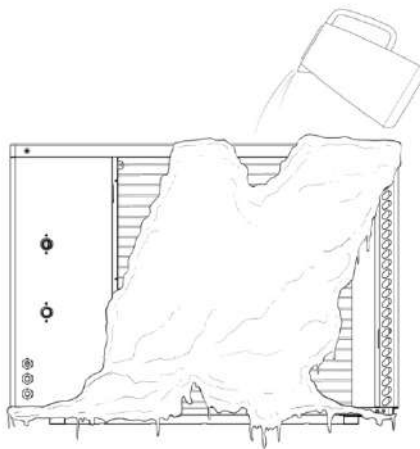
11.6.2 Chassis Inspection Cycle and Precautions

- ① Check if there are any foreign objects blocking the drainage of the chassis.
- ② Check if there is any ice blockage in the chassis.
- ③ Check the stability of the chassis at the bottom corner, and whether there are issues such as unstable fixation or shaking.

11.6.3 Handling Abnormal Frosting Situations

Scenario 1: thick frost on the fin surface, spreading upwards from the bottom drainage tray

Solution: First, try manual defrosting through the wired controller to melt part of the frost. If thick frost still accumulates on the unit's fin surface, use hot water (90-100°C) to rinse until the ice on the fin surface is completely removed. During the cleaning process, be careful to protect the fins. Do not use hard objects to directly strike the fin surface for manual de-icing, as this can easily damage the aluminum foil of the fins, and excessive force may even damage the copper tubes of the fins. After cleaning the ice from the fin surface, check if there are any foreign objects blocking the drainage tray of the chassis and clean them promptly to avoid repeated ice accumulation.



Scenario 2: ice formation on the front frame

Solution: When ice forms on the unit's front frame, immediately stop the unit and rinse with hot water (90-100°C) until the surface snow is completely cleared. If frost reappears shortly after cleaning, it is recommended that the customer install a snow shelter to ensure the unit's performance and operational stability.

Scenario 3: repeated frosting of the unit in a short time

Solution: Check if there is accumulated debris near the unit and if the air flow is smooth.

Operate the wired controller for manual defrosting while observing the changes in low pressure values during the unit's heating process. If the value is too low, promptly recharge the refrigerant.

11.7 Repair of Refrigerant Cycle/Brazing Points


This operation must be performed by professional welders.
It should be operated by professionals
Welding should be done in a safe area

11.7.1 Preparation for Refrigerant Cycle/Brazing Repair

Brazing is a technique required for repairing the refrigerant cycle, which requires advanced skills and experience. This brazing procedure can only be performed by workers who have completed the “gas welding skills training” as stipulated by the *Occupational Safety and Health Act* and passed the training program for refrigerant operations.

Disassembly and reconnection (assembly) of the refrigerant system requires a workspace that must ensure good air flow and fire prevention (buckets and fire extinguishers). Additionally, workers must wear goggles, gloves, safety shoes, and long-sleeved shirts, be aware of work safety, and strive to prevent secondary defects (product quality assurance). For brazing of indoor/outdoor unit's structural components (heat exchangers, compressors, expansion valves, four-way valve assemblies), after recovering all refrigerant, confirm that no refrigerant residue remains in the system, and fully open the needle valves and globe valves. When brazing outdoors, check and ensure there is no refrigerant in the air (be cautious of evaporated refrigerant).

Furthermore, protect the compressor terminals with metal plates and heat them, but cool the expansion valve and four-way valve (to prevent component damage) using wet towels (to release heat). During the brazing process, it is important to pour the brazing material without melting the base material, based on the principle of capillary action. If overheating causes holes and oxidation, do not re-braze or patch, but replace the component instead.

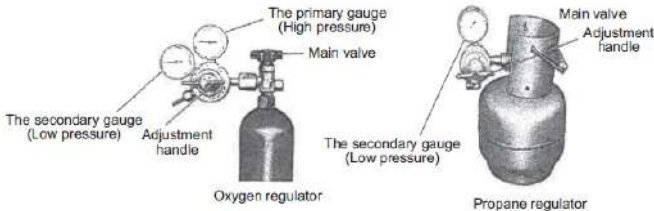
11.7.2 Pressure Adjustment for Vacuum Pump

1. Cylinder with adjustment handle

- (1) Check and confirm that the adjustment handle of pressure regulator No. 1 is loosened (counterclockwise). If the cylinder valve is opened when the pressure adjustment handle of the first pressure gauge is closed, the second pressure gauge may be damaged.
- (2) Open the cylinder valve and check the remaining amount with the first pressure gauge.
- (3) Check the pressure on the second pressure gauge and turn the adjustment handle clockwise to adjust the pressure.

© Second gauge pressure of Oxygen 0.5 MPa (5.0 kgf/cm²)

© Second gauge pressure of Propane 0.05 MPa (0.5 kgf/cm²)

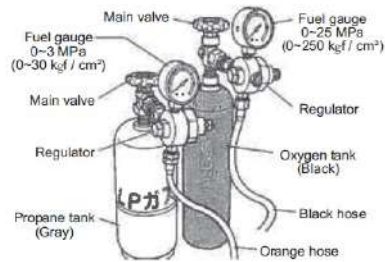


2. For cylinders without adjustment valves, the second gauge pressure is regulated by the regulator.

Check the valves on both sides of the torch, open the cylinder valve, and check the remaining refrigerant in the cylinder.

Note: Do not connect oil components to the connection ports of the regulator.

Especially, use oxygen cylinder regulators of an oil-free substance type. Do not disassemble or repair regulators and pressure gauges.



11.7.3 Checks to Gas Supply

Check that there is no fire around the torch, then confirm the gas supply.

1. Slightly open the “propane valve” of the torch, ensure gas flows out from the torch nozzle, then close the “propane valve”.
2. Gently open the “oxygen valve” of the torch, ensure gas flows out from the torch nozzle, then close the “oxygen valve”.

Check for gas leaks around the hose connections.

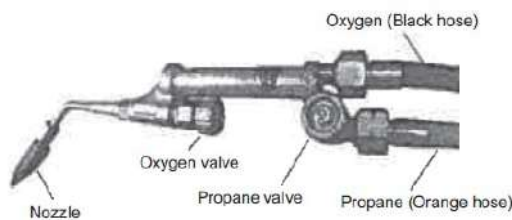
11.7.4 Flame Adjustment

1. Gently open the “propane valve” of the torch and ignite with a lighter.

At this point, the flame is only propane and appears red.

2. Gradually open the “oxygen valve” of the welding torch, mixing in oxygen. Adjust the amount of propane and oxygen with the valves to make the flame suitable for brazing work.

If the white core flame splits in two, the torch nozzle may be clogged. In this case, remove the welding tip from the torch and inspect it.

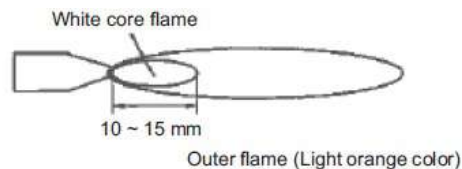


11.7.5 Flame Types

Types of flame variations based on the ratio of propane and oxygen.

[Neutral flame]

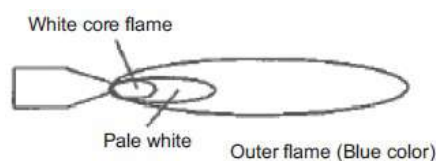
Use this flame for brazing (This is the flame when oxygen and propane are mixed in the appropriate ratio, with minimal impact on the brazing metal).



[Carburizing flame]

When propane is excessive, there is a white flame between the white core flame and the outer flame.

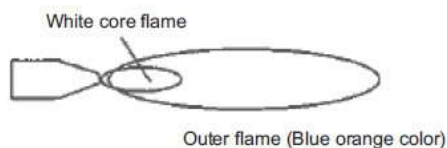
(This is due to insufficient oxygen, with a high proportion of unburned propane. The carbon black produced during brazing may contaminate the surface of the brazing metal).



[Oxidizing flame]

Compared to the neutral flame, there is more oxygen. Although the flame size is small, its flame heat is the highest.

However, due to the excess oxygen in the flame, the brazing point will be oxidized. (Due to the high temperature, this flame may cause holes. The pipe may melt).



11.7.6 Shutting Off the Flame

[In case of short interruption]

1. Close the “propane valve” of the torch.
2. Close the “oxygen valve” of the torch.

[In case of completion]

1. As mentioned above, shut off the flame following the procedure for “short interruption”.
2. Completely close valves of the oxygen cylinder and propane cylinder.
3. Open the “oxygen valve” and “propane valve” of the torch to release the remaining gas in the hoses.

Confirm that the first and second gauge pressures of the “oxygen” and “propane” cylinder’s pressure adapters are “zero”.

11.7.7 Flux Requirements

Use flux to protect the base material.

1. Remove impurities and oxide films from the metal substrate, improving the fluidity of the brazing alloy.
2. Prevent oxidation of the metal surface during brazing.
3. Reduce the surface tension of the brazing material.

11.7.8 Nitrogen Requirements

To prevent oxidation inside the pipes, perform brazing operations in a nitrogen flow.

The flow rate should be 0.05 m³/h, or the pressure of the relief valve should be below 0.02 MPa (0.2 kgf/cm²).

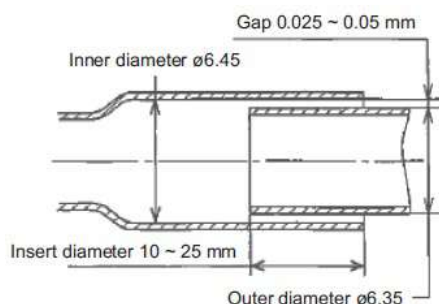
11.7.9 Checking Brazing (Insertion) Points

1. Brazing points are free of impurities.

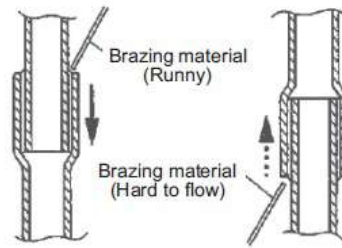
If dirt or oil is attached to the brazing point, the brazing filler metal cannot reach the joint, which may lead to poor welding.

2. Brazing points have sufficient gap space to create a capillary action advantage in brazing.

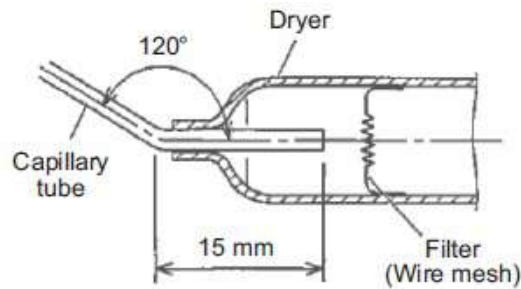
If the gap space is too large, this phenomenon may not occur and may result in poor welding because the brazing filler metal will not flow to connect the front.



3. Appropriate insertion size. The guideline for pipe insertion size is three times the diameter of the base material, but the insertion size needs to be determined considering the clogging situation of the brazing material. Generally, for thin pipes, the insertion size needs to be increased to ensure welding stability and strength, and for thick pipes, the insertion size also needs to be increased to adapt to thicker base metal and create bigger welding or brazing space.

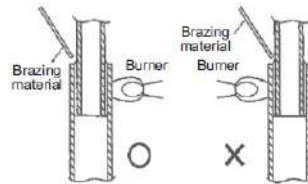


4. Brazing material flows from top to bottom. The brazing alloy easily flows towards the connection part through capillary action. Additionally, by bending the brazing part of the capillary [dryer side] at an angle of about 120° from 15 mm from the top of the pipe, it can prevent damage to the inside of the dryer and clogging of the brazing material due to excessive insertion of the capillary.



11.7.10 Brazing and Heating

1. Place the flame on the pipe with larger heat capacity so that the brazing material melts under the pipe heat. Heat the pipe to the melting temperature of the brazing material. However, when it overheats, assess the temperature based on the pipe color to avoid melting the pipe.



Preheating is to heat the base material to the melting temperature, and it requires some training to distinguish the color of the heated base material to avoid melting the material.

Color and temperature of copper pipe

Turns red 480°C

Dark red 650°C

Bright red 760°C

Bright white red 870°C

(Reference)

Melting temperature of copper Approx. 1083°C

Highest temperature obtained in propane and oxygen Approx. 1083°C

It is important to heat the bonding parts evenly in a short time until the brazing temperature is reached in the following manner.

2. Apply the flame on the side with better heat transfer. If the pipe thickness is consistent, by heating 30% iron and 70% copper, the

inside of the copper pipe reaches the brazing temperature.

Iron pipes have a low heat transfer rate, and only the part where the flame acts has a high temperature, which causes pipe oxidation. The flow of brazing filler is negatively affected.

3. Use the flame on the side with larger heat capacity.

When brazing thin pipes (such as capillaries and dryers), take care to apply the flame on the dryer side (thick pipe side) to prevent heat damage (to capillary and dryer).

4. When brazing the compressor's connection pipes (suction and discharge), remove the soundproof panel and fan, place the compressor bracket vertically (to prevent refrigeration oil leakage from the compressor), and apply the flame from the compressor body side.

11.7.11 Brazing Terminology

Pin hole → small holes produced on the surface of the brazing metal.

Wet temperature → the liquidus temperature at which the brazing material begins to flow out through heating.

Gas hole → cavities formed by gas in the brazing material at the brazing part (gas reservoir).

Pit → small dents produced on the outer surface of the welded part due to gas holes.

Void ratio → the brazing filler metal cannot fully contact the brazing parts. Cannot be identified from the outside.

11.7.12 Selection of Brazing Materials

Use bag-type brazing materials (silver brazing alloy) to improve welding performance.

Category	JIS Default Number	Composition (%)						Temperature (°C)			Tensile Strength (Reference)		Characteristics and Applications
		Ag	Cu	Zu	Cd	Ni	P	Solidification Temperature	Evaporation Temperature	Brazing Application Temperature	Kgf•cm ²	Base Material	
BAg	BAg•1A	49.0	14.5	14.5	17.0	-	-	Approx. 625	Approx. 635	635	45.5	S20C	Good fluidity at low temperatures, best for small joint gaps in general.
		~	~	~	~	-	-			~			
	BAg•1	51.0	16.5	18.5	19.0	-	-	Approx. 605	Approx. 620	760	45.5	S20C	Similar performance to BAg•1A, suitable for all base materials except light metals.
		~	~	~	~	-	-			~			
BAg	BAg•2	44.0	14.0	14.0	23.0	-	-	Approx. 605	Approx. 620	620	45.5	S20C	It is a universal form of brazing filler metal, suitable for slightly larger gap connections.
		~	~	~	~	-	-			~			
	BAg•3	56.0	16.0	18.0	25.0	-	-	Approx. 605	Approx. 700	760	45.5	S20C	Good corrosion resistance in stainless steel base brazing, suitable for brazing tungsten carbide, aluminum bronze, and copper.
		~	~	~	~	-	-			~			
BCuP	BCuP-2	34.0	25.0	19.0	17.0	-	-	Approx. 630	Approx. 690	620	620	SS	Good fluidity, suitable for copper pipe brazing.
		~	~	~	~	-	-			~			
	BCuP-3	48.0	14.5	19.0	15.0	15.0	-	Approx. 630	Approx. 690	620	620	SS	Suitable for brazing when joint spacing is not constant.
		~	~	~	~	~	-			~			

	BCuP-5	14.5 ~ 15.5	Residual	-	-	-	5.8 ~ 6.7	5.8 ~ 6.7	Approx. 800	705 ~ 815	21 ~ 24.5	Cu	For brazing copper and copper without using flux, but not possible to braze base materials.
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Note:

BCuP (brazing copper phosphorus) easily reacts with sulfur, forming brittle compounds that are water-soluble, which can lead to gas leaks. In hot spring areas, use other brazing materials or apply protective paint to the surface.

12.Troubleshooting

12.1 Overview: troubleshooting

Fault	Cause	Solution
The unit fails to start	1. No power supply	1. Check the power supply
	2. Fuse blown or circuit breaker tripped	2. Check if the unit is open-circuited or grounded. Then replace the fuse, reset the circuit breaker, and check if the circuit is stable or well connected.
	3. Some protection activated	3. Check which protection is working, clear the protection, then restart the unit.
	4. Loose wiring	4. Check wire connections and tighten screws on terminals
	5. Compressor failure	5. Replace the compressor
Fan fails to run	1. Fan motor wire loose	1. Check wire connections
	2. Fan motor failure	2. Replace the fan motor.
Insufficient capacity	1. Fins are dirty	1. Clean the evaporator coil
	2. Air inlet blocked	2. Remove any objects obstructing air circulation of the unit.
	3. Insufficient refrigerant	3. Check the unit for leaks, repair if any. Evacuate all refrigerant and recharge the unit with correct amount.
Excessive noise from water pump or no water flow	1. Lack of water in the water system	1. Check the water filling device. Add sufficient water to the system
	2. Air exists in the water system	2. Purge the air.
	3. Valves in the water system are not fully open	3. Check all valves to ensure they are fully open
	4. Water filter dirty or clogged	4. Clean the water filter
Compressor discharge pressure too high	1. Excessive refrigerant	1. Evacuate all refrigerant and recharge with correct amount.
	2. Air exists in the refrigeration system	2. Evacuate all refrigerant and recharge with correct amount.
	3. Insufficient water flow	3. Check the water flow rate of the system. Use a larger pump to increase water flow if necessary

	4. Water temperature too high	4. Check the value of the water temperature sensor to ensure it works properly.
System low pressure	1. Filter clogged	1. Replace with a new one
	2. Electronic expansion valve not open	2. Repair or replace with a new one
	3. Refrigerant leakage	3. Check the unit for leaks, repair if any. Evacuate all refrigerant and recharge with correct amount.

12.2 Troubleshooting Based on Symptoms

12.2.1 Drive Board Faults

③ Reset methods: A = automatic reset; M = Manual reset; A/M = Restricted automatic reset;									
	No.	Fault code	Alarm name	Reset method	Alarm action	Possible causes	Troubleshooting method	Solutions	
bit0	1	F00	IPM overcurrent fault	A/M	Shut down compressor	1. Compressor model code is incorrect; 2. Compressor is incorrectly connected; 3. Compressor is damaged; 4. Inverter board is damaged	1. Check whether the compressor model code is correct (check whether the parameter C04 is consistent with the parameter table, and if it is inconsistent, the model code is incorrect); 2. Check the compressor connection according to the circuit diagram, whether the connection is correct and whether the contact is poor; 3. Check the resistance value between UV, UW and VW phases of the compressor with multimeter in ohm mode. Under normal conditions, the resistance value is between 1 ~ 20 ohms, and the resistance value between each phase is basically equal. If it exceeds the normal range, the compressor is damaged; 4. If all the above are OK, replace the inverter board	1. Reset the correct compressor model code; 2. Reinforce the compressor input terminal; 3. Replace the compressor; 4. Replace the inverter board;	
bit1	2	F01	Compressor drive fault	A/M	Shut down compressor	1. Compressor model code is incorrect; 2. Compressor is incorrectly connected; 3. Compressor is damaged; 4. Inverter board is damaged	1. Check whether the compressor model code is correct (check whether the parameter C04 is consistent with the parameter table, and if it is inconsistent, the model code is incorrect); 2. Check the compressor connection according to the circuit diagram, whether the connection is correct and whether the contact is poor; 3. Check the resistance value between UV, UW and VW phases of the compressor with multimeter in ohm mode. Under normal conditions, the resistance value is between 1 ~ 20 ohms, and the resistance value between each phase is basically equal. If it exceeds the normal range, the compressor is damaged; 4. If all the above are OK, replace the	1. Reset the correct compressor model code; 2. Reinforce the compressor input terminal; 3. Replace the compressor; 4. Replace the inverter board;	

							inverter board	
bit2	3	E051	Compressor or over-current protection	A/M	Shut down compressor	1. Current detection module is damaged; 2. The compressor load is too large	1. Check the displayed current T36 of compressor (effective value of compressor phase current), measure the actual compressor current value with current clamp, and compare the error between actual and displayed values. If the current detection result exceeds a certain error range, the inverter board current detection circuit is damaged; 2. Check the resistance value between UV, UW and VW phases of the compressor with a multimeter in ohm mode. Under normal conditions, the resistance value is between 1 ~ 20 ohms, and the resistance value between each phase is basically equal. If it exceeds the normal range, the compressor is damaged; 3. Check other temperature/pressure parameters and check the system cause of compressor overcurrent	1. Replace the inverter board; 2. Replace the compressor; 3. Professional problems, contact after-sales service personnel

bit3	4	F15	Input voltage phase loss	A	Shut down compressor	1. Incorrect connection of input terminal; 2. The fuse is damaged and the driver is damaged	1. Check whether the input terminal connection is correct and whether the contact is poor 2. Check whether the fuse is off (using a multimeter). If it is off, the fuse is damaged; 3. If all the above are OK, replace the driver board	1. Reinforce the connections of the power input terminal and the three-phase power board; 2. Replace the fuse 3. Replace the driver board
bit4	5	F18	IPM current sampling fault	A	Shut down compressor	1. The inverter board is damaged	1. Turn power off, wait for 5 minutes and then power on again, and try several times	1. If the fault is not eliminated, it is recommended to replace the inverter board directly
bit5	6	F26	Over temperature protection of driver board components (overheat shutdown of power components)	A	Shut down compressor	1. The fan does not rotate and the current is large; 2. Less thermally conductive silicone grease at the bottom of the module	1. Check whether the fan is running normally; 2. Check the thermally conductive silicone grease on the heat sink of the inverter board (whether it is unevenly distributed and whether there is no thermal conductive silicone grease); 3. If the above are ok, contact after-sales service personnel	1. Troubleshoot the fan and fan driver board; 2. Remove the old thermally conductive silicone grease and re-add thermally conductive silicone grease to ensure that all gaps are filled; 3. Professional problems, contact after-sales service personnel

bit6	7	F03	Precharge failed	A/M	Shut down compressor	1. Input phase loss; 2. Power on after power failure without complete discharge, frequent power on and off resulting in PTC overheating	1. Check the connections of the input terminals of the driver board and the power supply; 2. Try to power up after 5 minutes of power failure	1. Reinforce the connections of the input terminals of the driver board and the power supply; 2. Power up after a long time of power off
bit7	8	F05	DC bus overvoltage	A	Shut down compressor	1. The input voltage is too high; 2. Sampling circuit is damaged	1. Check whether the input voltage is too high (single-phase 170-265V, three-phase 320-460V); 2. If the voltage detected for many times is within the normal range, and the fault is still reported after power-off, power-on and restart, replace the driver board	1. Fix the power grid problem first and then start; 2. Replace the inverter board if the fault still exists after restarting
bit8	9	F06	DC bus undervoltage	A	Shut down compressor	1. The input voltage is too low; 2. Sampling circuit is damaged	1. Check whether the input voltage is too low (single-phase 170-265V, three-phase 320-460V); 2. If the voltage detected for many times is within the normal range, and the fault is still reported after power-off, power-on and restart, replace the driver board	1. Fix the power grid problem first and then start; 2. Replace the inverter board if the fault still exists after restarting
bit9	10	F07	AC input undervoltage	A	Shut down compressor	1. Input voltage is too low	1. If the input voltage is too low, the measuring position is the input end of the power grid, and the connection positions of the terminal block can be measured;	1. Fix the power grid problem first and then start;
bit10	11	F08	AC input overcurrent shutdown	A	Shut down compressor	1. The sampling circuit of the driver is damaged;	1. The sampling circuit of the driver is damaged; 2. If the above methods cannot solve the problem, contact after-sales service personnel;	1. Replace the driver board; 2. Professional problems, contact after-sales service personnel

bit11	12	F09	Input voltage sampling fault	A	Shut down compressor	1. Abnormal input voltage; 2. The voltage sampling circuit is damaged	1. Check whether the input voltage is too low (single-phase 170-265V, three-phase 320-460V); 2. If the voltage detected for many times is within the normal range, and the fault is still reported after power-off, power-on and restart, replace the driver board	1. Fix the power grid problem first and then start; 2. Replace the inverter board if the fault still exists after restarting
bit13	13	F17	Driver board temperature sensor fault	A	Shut down compressor	1. Sensor cable is broken, terminal is not plugged in place; 2. The sensor is damaged; 3. The inverter board is damaged	1. Check the connection between sensor cable and terminal; 2. The sensor is damaged; 3. Hardware is damaged	1. Check and reinforce the sensor terminal; 2. Replace the temperature sensor; 3. Replace the inverter board
Note: The temperature sensors of some inverter boards are connected by terminals, and those of some inverter boards are integrated internally. If the fault is reported when the temperature sensor is integrated inside inverter board, the inverter board can be replaced directly								It can be distinguished by photo and material code
	No.	Fault code	Alarm name	Reset method	Alarm action	Possible causes	Troubleshooting method	Solutions
bit1	15	F14	Compressor phase loss	A/M	Shut down compressor	1. Compressor is incorrectly connected, with poor contact; 2. The compressor is damaged;	1. Check the compressor connection according to the circuit diagram, whether the connection is correct and whether the contact is poor; 2. Check the resistance value between UV, UW and VW phases of the compressor with a multimeter in ohm mode. Under normal conditions, the resistance value is between 1 ~ 20 ohms, and the resistance value between each phase is basically equal. If it exceeds the normal range, the compressor is damaged; 3. If all the above are OK, replace the driver board	1. Reinforce the compressor input terminal; 2. If the compressor is damaged, replace the compressor; 3. Replace the driver board

bit3	16	F25	Input current sampling fault	A	Shut down compressor	1. Switched-mode power supply is damaged	1. Check the voltage of 15V power supply (difficult, replace the board)	1. Replace the inverter board
bit6	17	F29	EEPROM fault	M	Shut down compressor	1. Burning data is incorrect, read EEPROM data is incorrect, EEPROM is damaged	Burned EEPROM data is incorrect	1. Replace the inverter board
bit7	18	F10	AC input overvoltage protection	A	Shut down compressor	1. The input voltage is too high; 2. Voltage sampling current is damaged	1. Check whether the input voltage is too low (single-phase 170-265V, three-phase 320-460V); 2. If the voltage detected for many times is within the normal range, and the fault is still reported after power-off, power-on and restart, replace the driver board	1. Fix the power grid problem first and then start; 2. Replace the inverter board if the fault still exists after restarting
bit15	19	F21	Compressor over-speed protection	A	Shut down compressor	1. Compressor model code is incorrect; 2. Compressor is incorrectly connected; 3. The driver sampling circuit is damaged	1. Check whether the compressor model code is correct (check whether the parameter C04 is consistent with the parameter table, and if it is inconsistent, the model code is incorrect); 2. Check the compressor wiring according to the circuit diagram, whether the wiring is correct and whether the contact is poor; 3. The driver board is damaged; 4. If all the above are OK, contact after-sales service personnel	1. Reset the correct compressor model code; 2. Reinforce the compressor input terminal; 3. Replace the inverter driver board; 4. Professional problems, contact after-sales service personnel
bit0	20	F33	Compressor current frequency reduction alarm	A	Do not shut down compressor	1. The operating environment is harsh and beyond the allowable working condition, resulting in excessive compressor load	1. Check whether the unit is operating within the allowable working condition range	/

bit1	21	F16	Compressor flux weakening protection alarm	A	Do not shut down compressor	1. The compressor model code is incorrect; 2. Abnormal input voltage; 3. PFC is not turned on	1. Check whether the compressor model code is correct (check whether the parameter C04 is consistent with the parameter table, and if it is inconsistent, the model code is incorrect); 2. Measure the bus voltage and confirm whether the input voltage is normal (see T37 (DC bus voltage value) parameter); 3. Check whether PFC is turned on (if input current T35 (AC input current value) > 3A, it is turned on)	1. Reset the correct compressor model code; 2. Input the correct voltage; 3. Wait for PFC to turn on
bit2	22	F20	Power component overheating alarm	A	Do not shut down compressor	1. The fan does not rotate and the current is large; 2. Less thermally conductive silicone grease at the bottom of the module	1. Check whether the fan is running normally; 2. Check the thermally conductive silicone grease on the heat sink of the inverter board (whether it is unevenly distributed and whether there is no thermal conductive silicone grease); 3. If the above are ok, contact after-sales service personnel	1. Troubleshoot the fan and fan driver board; 2. Remove the old thermally conductive silicone grease and re-add thermally conductive silicone grease to ensure that all gaps are filled; 3. Professional problems, contact after-sales service personnel
bit4	23	F22	AC input current frequency reduction alarm	A	Do not shut down compressor	1. The operating environment is harsh and beyond the allowable working condition, resulting in excessive compressor load	1. Check whether the unit is operating within the allowable working condition range	/
bit5	24	F23	EEPROM fault alarm	A	Do not shut down compressor	Burning data is incorrect, read EEPROM data is incorrect, EEPROM is damaged	Burned EEPROM data is incorrect	1. Replace the inverter board directly

bit7	25	F24	Burned E2 startup prohibited fault	A	Do not shut down compressor	Burning data is incorrect, read EEPROM data is incorrect, EEPROM is damaged	Burned EEPROM data is incorrect	1. Replace the inverter board directly
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12.2.2 Fan Faults

③ Reset methods: A = automatic reset; M = Manual reset; A/M = Restricted automatic reset;							
No.	Fault code	Alarm name	Reset method	Alarm action	Possible causes	Troubleshooting method	Solutions
1	F031/ F032	Fan 1 fault/Fan 2 fault	A	Shut down compressor	1. The parameter setting is incorrect; 2. Abnormal connection 3. Fan communication fault; 4. Communication fault; 5. The fan module or inverter driver board is faulty; 6. The fan module or inverter driver board is faulty; 7. The fan is damaged	1. Check whether the fan parameters are correct (F01 parameter is selected as 3) 2. Confirm whether the position of communication connection is correct and loose according to the circuit diagram; 3. When electrifying, measure the voltage change between A and B ports of the mainboard with a multimeter. If there is basically no change, or the change is maintained at about 0.1 V, the communication port is damaged; 4. Measure whether the voltage between the red line and the black line of the fan terminal on the fan driver board is 200-370V. If not, it means that the power supply is abnormal and there is something wrong with the fan module or the inverter driver board; 5. Measure whether the voltage between the white line and the black line of the fan terminal on the fan driver board is 13.5-16.5 V. If not, it means that the power supply is abnormal and there is something wrong with the fan module or the inverter driver board 6. If there is nothing wrong with the front, replace a motor	1. Check and reset the fan selection parameters; 2. Plug and unplug terminals; 3 Replace the main control panel; 4. Replace the fan speed driver board or check the inverter driver board 5. Replace the fan speed driver board or check the inverter driver board 6. Replace the fan
2	F120	(Fan) Temperature sensor fault	A	Shut down compressor	1. Fan driver board is damaged	1 . Temperature sensor fault, replace the driver board	1. Replace the driver board

3	F106	(Fan) IPM over temperature protection	A	Shut down compressor	1. The fan does not rotate and the current is large; 2. Less thermally conductive silicone grease at the bottom of the module	1. Check whether the fan is running normally; 2. Check the thermally conductive silicone grease of the heat sink of the fan driver board (whether it is unevenly distributed and whether there is no thermally conductive silicone grease); 3. If the above are ok, contact after-sales service personnel	1. Troubleshoot the fan and fan driver board; 2. Remove the old thermally conductive silicone grease and re-add thermally conductive silicone grease to ensure that all gaps are filled; 3. Professional problems, contact after-sales service personnel
4	F105	(Fan) IPM hardware overcurrent protection	A/M	Shut down compressor	1. The parameter setting is incorrect; 2. Incorrect connection of fan; 3. There is something wrong with the fan module or inverter driver board; 4. There is something wrong with the fan module or inverter driver board;	1. Check whether the fan selection parameters are correct (F01 parameter is selected as 3); 2. Check the fan connection according to the circuit diagram, whether the connection is correct and whether the contact is poor; 3. Measure whether the voltage between the red line and the black line of the fan connection terminal on the fan driver board is 200-370V. If not, it means that the power supply is abnormal and there is something wrong with the fan module or the inverter driver board 4. Measure whether the voltage between the white line and the black line of the fan connection terminal on the fan driver board is 13.5-16.5 V, if not, it means that the power supply is abnormal, and there is something wrong with the fan module or the inverter driver board 5. If all the above are OK, replace the inverter driver board	1. Check and reset the fan selection parameters; 2. Reinforce the input terminal of the fan; 3. Replace the fan speed driver board or check the inverter driver board; 4. Replace the fan speed driver board or check the inverter driver board; 5. Replace the inverter driver board;

5	F101	(Fan) Phase loss protection	A/M	Shut down compressor	1. The fan is incorrectly connected, with poor contact; 2. The fan is damaged;	1. Check the fan connection according to the circuit diagram, see whether the connection is correct and whether the contact is poor; 2. Check the resistance value between UV, UW and VW phases of the fan with a multimeter in ohm mode. Under normal conditions, the resistance value is between 1 ~ 20 ohms, and the resistance value between each phase is basically equal. If it exceeds the normal range, the fan is damaged; 3. If all the above are OK, replace the fan speed driver board	1. Reinforce the fan input terminal; 2. If the fan is damaged, replace the fan; 3. Replace the fan speed driver board
6	F112	(Fan) Current sampling fault	A	Shut down compressor	1. Switched-mode power supply is damaged	1. Check the voltage of 15V power supply (difficult, replace the board)	1. Replace the fan speed driver board
7	F102	(Fan) start failed (zero speed)	A/M	Shut down compressor	1. The fan is incorrectly connected, with poor contact; 2. The fan is damaged;	1. Check the fan connection according to the circuit diagram, see whether the connection is correct and whether the contact is poor; 2. Check the resistance value between UV, UW and VW phases of the fan with a multimeter in ohm mode. Under normal conditions, the resistance value is between 1 ~ 20 ohms, and the resistance value between each phase is basically equal. If it exceeds the normal range, the fan is damaged; 3. If all the above are OK, replace the fan speed driver board	1. Reinforce the fan input terminal; 2. If the fan is damaged, replace the fan; 3. Replace the fan speed driver board

8	F113	(Fan) Software overcurrent	A/M	Shut down compressor	1. Current detection module is damaged; 2. The fan load is too large, and the fan speed driver board is damaged	1. Check the displayed current T48 of the fan (external drive fan current), measure the actual fan current value with a current clamp, and compare the error between actual and displayed values. If the current detection result exceeds a certain error range, the current detection circuit of the fan speed driver board is damaged; 2. If the fault is not cleared with the above method, contact after-sales service personnel	1. Replace the fan speed driver board; 2. Professional problems, contact after-sales service personnel
9	F109	(Fan) over-speed protection	A	Shut down compressor	1. The parameter setting is incorrect; 2. Incorrect connection of fan; 3. The fan speed driver board is damaged	1. Check whether the fan selection parameters are correct (F01 parameter is selected as 3); 2. Check the fan connection according to the circuit diagram, and see whether the connection is correct and whether the contact is poor; 3. The fan speed driver board is damaged; 4. If all the above are OK, contact after-sales service personnel	1. Check and reset the fan selection parameters; 2. Reinforce the input terminal of the fan; 3. Replace the fan speed driver board; 4. Professional problems, contact after-sales service personnel

12.2.3 Communication Faults

③ Reset methods: A = automatic reset; M = Manual reset; A/M = Restricted automatic reset;							
No.	Fault code	Alarm name	Reset method	Alarm action	Possible causes	Troubleshooting method	Solving method
1	E08	Communication fault	A	/	1. Incorrect connection or poor contact; 2. The display is damaged; 3. The communication line is damaged; 4. The communication port of mainboard is damaged;	1. Check whether the connection is correct (mainboard and terminal block, terminal block and display); 2. Change a normal display to see if the fault is eliminated. If the fault is eliminated, the display is damaged; 3. Connect the display directly to the mainboard to see if the fault is eliminated. If the fault is eliminated, the communication line is damaged; 4. When electrifying, measure the voltage change between A and B ports of the mainboard with a multimeter. If there is basically no change, or the change is maintained at about 0.1 V, the communication port is damaged; 5. If all the above are ok, contact after-sales service personnel	1. Reconnect; 2. Replace the new display; 3. Replace the wire; 4. Replace the mainboard;
2	E081 / E082	Communication fault (E081 mainboard and DC fan)/communication fault (E082 mainboard and DC fan 2)	A	/	1. Incorrect connection or poor contact; 2. The communication line is damaged; 3. The mainboard communication port is damaged; 4. The fan speed driver board is damaged	1. Check whether the connection is correct (mainboard and terminal block, terminal block and display) 2. Connect the fan board directly to the mainboard to see if the fault is cleared. If the fault is cleared, the communication line is damaged; 3. When electrifying, measure the voltage change between A and B ports of the mainboard with a multimeter. If there is basically no change, or the change is maintained at about 0.1 V, the communication port is damaged; 4. If all the above are OK, replace the fan speed driver board	1. Reconnect; 2. Replace the communication line; 3. Replace the mainboard; 4. Replace the fan speed driver board
3	F12	Communication fault between DSP and PFC	A	Shut down compressor	1. Hardware is damaged;	1. Reset after power failure to see if it will reappear. If it reappears, the driver board is damaged	1. Replace the driver board

4	F11	Communication fault between DSP and communication board	A	Shut down compressor	1. Hardware is damaged;	1. Reset after power failure to see if it will reappear. If it reappears, the driver board is damaged	1. Replace the driver board
5	F151	Communication fault between compressor inverter board and main control board	A	Shut down compressor	1. Incorrect connection or poor contact; 2. The communication line is damaged; 3. The mainboard communication port is damaged; 4. The compressor inverter board is damaged	1. Check whether the connection is correct (mainboard and terminal block, terminal block and display) 2. Connect the compressor inverter board directly to the mainboard to see if the fault is cleared. If the fault is cleared, the communication line is damaged; 3. When electrifying, measure the voltage change between A and B ports of the mainboard with a multimeter. If there is basically no change, or the change is maintained at about 0.1 V, the communication port is damaged; 4. If all the above are OK, replace the compressor inverter board	1. Reconnect; 2. Replace the communication line; 3. Replace the mainboard; 4. Replace the compressor inverter board
6	E08c	Communication fault with hydraulic module	A	/	1. Incorrect connection or poor contact; 2. The communication line is damaged; 3. The mainboard communication port is damaged; 4. The circuit board of the hydraulic module is damaged	1. Check whether the connection is correct (mainboard and terminal block, terminal block and display) 2. Connect the hydraulic module directly to the mainboard to see if the fault is cleared. If the fault is cleared, the communication line is damaged; 3. When electrifying, measure the voltage change between A and B ports of the mainboard with a multimeter. If there is basically no change, or the change is maintained at about 0.1 V, the communication port is damaged; 4. If all the above are OK, replace the circuit board of the hydraulic module	1. Reconnect; 2. Replace the communication line; 3. Replace the mainboard; 4. Replace the circuit board of hydraulic module
7	E084	display did not match the mainboard	A	/	1. The display cannot match the main control program	1. Check the software code and version number of master control and wire control	1. Re-burn the correct master control program

12.2.4 Sensor Faults

☐ Reset methods: A = automatic reset; M = Manual reset; A/M = Restricted automatic reset;							
No.	Fault code	Alarm name	Reset method	Alarm action	Possible causes	Troubleshooting method	Solving method
1	P01	Inlet water temperature sensor fault	M	Shut down compressor	1. Open circuit or short circuit of inlet temperature sensor 2. Damage of inlet temperature sensor	1. Check the connection and resistance of the inlet temperature sensor 2. The inlet temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the inlet temperature sensor
2	P02	Outlet water temperature sensor fault	M	Shut down compressor	1. Open circuit or short circuit of outlet temperature sensor 2. Damage of outlet temperature sensor	1. Check the connection and resistance of the outlet temperature sensor 2. The outlet temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the inlet temperature sensor
3	P04	Ambient temperature sensor fault	M	/	1. Open circuit or short circuit of environmental temperature sensor 2. Damage of environmental temperature sensor	1. Check the connection and resistance of the temperature sensor 2. The environmental temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the environmental temperature sensor
4	P05	Coil 1 temperature sensor fault	M	/	1. Open circuit or short circuit of temperature sensor of coil 1. 2. Damage of temperature sensor of coil 1	1. Check the connection and resistance of the temperature sensor 2. Coil 1 temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the temperature sensor of coil 1
5	P15	Coil 2 temperature sensor fault	M	/	1. Open circuit or short circuit of temperature sensor of coil 2. 2. Damage of temperature sensor of coil 2	1. Check the connection and resistance of the temperature sensor 2. Coil 2 temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the temperature sensor of coil 2

6	P07	Return air temperature sensor fault	M	/	1. Open circuit or short circuit of return air temperature sensor 2. Damage of return air temperature sensor	1. Check the connection and resistance of the return air temperature sensor 2. The return air temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the return air temperature sensor
7	P081	Exhaust temperature sensor fault	M	Shut down compressor	1. Open circuit or short circuit of exhaust temperature sensor 2. Damage of exhaust temperature sensor	1. Check the connection and resistance of the exhaust temperature sensor 2. Exhaust temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the exhaust temperature sensor
8	P09	Antifreeze temperature sensor fault	M	Shut down compressor	1. Open circuit or short circuit of antifreeze temperature sensor 2. Damage of antifreeze temperature sensor	1. Check the connection and resistance of the antifreeze temperature sensor 2. Antifreeze temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the antifreeze temperature sensor
9	PP11	Pressure sensor fault	M	/	1. Open circuit or short circuit of pressure sensor 2. Damage of pressure sensor	1. Check the connection of the pressure sensor 2. Pressure sensor is damaged	1. Reconnect the sensor; 2. Replace the pressure sensor
10	P152	Coil outlet temperature sensor fault	M	/	1. Open circuit or short circuit of the coil outlet temperature sensor. 2. Damage of the coil outlet temperature sensor	1. Check the connection and resistance of the coil outlet temperature sensor 2. Coil outlet temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the coil outlet temperature sensor
11	PP12	High pressure sensor fault	M	/	1. Open circuit or short circuit of high pressure sensor 2. Damage of high pressure sensor	1. Check the connection of the pressure sensor 2. High pressure sensor is damaged	1. Reconnect the sensor; 2. Replace the high pressure sensor
12	P03a	Buffer tank temperature sensor fault	M	/	1. Open circuit or short circuit of buffer tank temperature sensor 2. Damage of buffer tank temperature sensor	1. Check the connection and resistance of the buffer tank temperature sensor 2. Buffer tank temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the buffer tank temperature sensor

13	P03	Water tank temperature sensor fault	M	/	1. Open circuit or short circuit of water tank temperature sensor 2. Damage of water tank temperature sensor	1. Check the connection and resistance of the water tank temperature sensor 2. Water tank temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the water tank temperature sensor
14	P42	Room temperature sensor fault	M	Shut down compressor	1. Open circuit or short circuit of room temperature sensor 2. Damage of room temperature sensor	1. Check the connection and resistance of the room temperature sensor 2. The room temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the room temperature sensor
15	P013	Heating return water temperature sensor fault	M	/	1. Open circuit or short circuit of heating return water temperature sensor 2. Damage of heating return water temperature sensor	1. Check the connection and resistance of the heating return water temperature sensor 2. The heating return water temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the heating return water temperature sensor
16	P023	Heating outlet water temperature sensor fault	M	/	1. Open circuit or short circuit of heating outlet water temperature sensor 2. Damage of heating outlet water temperature sensor	1. Check the connection and resistance of the heating outlet water temperature sensor 2. The heating outlet water temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the heating outlet water temperature sensor
17	P02a	Water mixer outlet water temperature sensor fault	M	/	1. Open circuit or short circuit of water mixer outlet water temperature sensor 2. Damage of water mixer outlet water temperature sensor	1. Check the connection and resistance of the water mixer outlet water temperature sensor 2. The water mixer outlet water temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the water mixer outlet water temperature sensor
18	P018	Hot return water temperature sensor fault	M	/	1. Open circuit or short circuit of hot return water temperature sensor 2. Damage of hot return water temperature sensor	1. Check the connection and resistance of hot return water temperature sensor 2. Hot return water temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the hot return water temperature sensor
19	P028	Hot outlet water temperature sensor fault	M	/	1. Open circuit or short circuit of hot outlet water temperature sensor 2. Damage of hot outlet water temperature sensor	1. Check the connection and resistance of the hot outlet water temperature sensor 2. The hot outlet water temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the hot outlet water temperature sensor

20	P101	EVI inlet temperature sensor fault	M	/	1. Open or short circuit of the EVI inlet temperature sensor 2. Damage of the EVI inlet temperature sensor	1. Check the connection and resistance of the EVI inlet temperature sensor 2. The EVI inlet temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the EVI inlet temperature sensor
21	P102	EVI outlet temperature sensor fault	M	/	1. Open or short circuit of EVI outlet temperature sensor 2. Damage of EVI outlet temperature sensor	1. Check the connection and resistance of the EVI outlet temperature sensor 2. The EVI outlet temperature sensor is damaged	1. Reconnect the sensor; 2. Replace the EVI inlet temperature sensor is damaged

12.2.5 Internal System Faults

□ Reset methods: A = automatic reset; M = Manual reset; A/M = Restricted automatic reset;

No.	Fault code	Alarm name	Reset method	Alarm action	Possible causes	Troubleshooting method	Solving method
1	E01	High pressure protection	A	Shut down compressor	1. High pressure switch is damaged or false connected; 2. Scaling of casing or plate heat exchanger; (Heating) 3. The fins are dirty and blocked, and the ventilation is poor; (Cooling) 4. Abnormal throttling; 5. System blocking; 5. The outlet water temperature is on the high side; 6. Excessive refrigerant charge.	1. Use multimeter to check whether the high pressure switch is closed after stopping for 3 minutes. If it is disconnected, check the connection of the high pressure switch. If it is still disconnected after checking the connection, it can be determined that the high pressure switch is damaged; 2. Check the scaling at the inlet and outlet of casing or plate heat exchanger, and observe the scaling on the inner wall. If the scaling is serious, it can be determined that the scaling causes heating high pressure protection; 3. Check whether the fin return air channel is unobstructed and whether there is foreign body blockage; 4. Check the opening of the electronic expansion valve, manually increase or decrease the opening of the electronic expansion valve, and observe whether the high and low pressure, suction temperature and exhaust temperature change. If not, it means that the electronic expansion valve is damaged or stuck or the coil is abnormal or the opening is small. If there is any change, check whether it is dirty before throttling after eliminating reasons 1. 2. 3, 5 and 6; 5. Check the set temperature, especially when the set temperature is close to the limit water temperature, check whether the detected value of outlet water temperature before fault is lower than the actual temperature by more than 2℃; 6. Connect the pressure gauge, start up for heating after fault recovery, then read the high pressure and antifreeze temperature of fluorine exchange circuit before fault, convert the high pressure into condensation temperature, and calculate the condensate depression= condensation temperature-antifreeze temperature of fluorine exchange circuit. If the condensate depression is > 10 ℃, it can be determined that the refrigerant is overcharged. If there is no abnormality, please contact professional technician further.	1. Reconnect the connecting line or replace the high pressure switch; 2. Ask professionals to clean the casing or plate heat exchanger; 3. Clean up dirty and blocked foreign bodies, and ask professionals to clean the fin heat exchanger; 4. Replace throttle valve or coil and filter; 5. Fill thermally conductive silicone and insulate with a heat-insulating sleeving; 6. According to the charging amount on nameplate, re-evacuate and hold pressure, and then charge the refrigerant.

2	E02	Low pressure protection	A	Shutdown compressor	1. Connect the pressure gauge and observe the refrigerant pressure during shutdown. If it is 0, it means that the refrigerant has leaked out. If it is greater than 0, proceed to the next step; 2. Use halogen leak detector for leak detection. If leakage points are detected, repair welding is required. If no leakage points are detected, check whether the compressor current and temperature difference between inlet and outlet water are low after starting up. If so, start the machine to heat up after re-evacuating and charging. If there is no abnormality after re-charging refrigerant, it means that the machine lacks fluorine. If low-pressure protection still occurs, proceed to the next step; 3. Connect the pressure gauge and observe whether the pointer of the pressure gauge reaches the disconnection value range of the low pressure switch before the machine fails. If not, check whether the connection of the low pressure switch is loose and whether the pressure switch is damaged. If so, proceed to the next step; 4. Check whether the fins are seriously frosted. If so, observe whether the machine will still be protected under low pressure after manual defrosting. If it runs normally, it will be caused by poor defrosting. If it will still be protected under low pressure, proceed to the next step; 5. Check whether the ventilation of the fins is not smooth and whether there are too many impurities and dirt. If so, it can be determined that the fins are dirty and blocked. If not, proceed to the next step; 6. Check whether the coil and body of the electronic expansion valve are fixed firmly, whether the connection between the coil and the mainboard is loose, etc. After checking, start up for heating, if low pressure protection still works, proceed to the next step; 7. Knock the body of the electronic expansion valve for several times, and turn on the machine for heating again. If the heating is normal, the electronic expansion valve is stuck. If low pressure protection still works, proceed to the next step; 8. Discharge the refrigerant in the system and remove the filter for inspection. If there is dirty blockage, it means that the filter blockage leads to low pressure protection. If the filter is normal, please further contact professional technicians for handling.	1. Perform repair welding, pressure holding, evacuating, and charge refrigerant according to the amount on nameplate; 2. Fasten the connection of the pressure switch or replace the pressure switch; 3. Perform manual defrosting, then adjust defrosting setting parameters, shorten heating cycle, extend defrosting time, increase set water temperature, etc.; 4. Clean the fins to remove dirt and debris; 5. Replace or tighten the coil of the electronic expansion valve, and knock or replace the valve body of the electronic expansion valve; 6. Weld to remove the filter, clean up the impurities in the filter before throttling or replace the filter.
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3	E03	Water flow switch protection	A	Shut down compressor	1. Water pump failure; 2. The water system is not completely emptied and still contains gas; 3. The resistance of water system is too large; 4. The valves of the water system are not fully opened; 5. The water circuit filter is dirty and blocked; 6. The water flow switch is false connected or damaged;	1. Check whether the water pump is running and observe whether the indicator light of the water pump is faulty; 2. Check the exhaust valve at the top of the water system, open it, and observe whether there is intermittent gas discharge; 3. Check the length of circulating water circuit and elbow valve, and calculate water resistance; 4. Check whether all valves in the water system that should be opened have been opened; 5. Check whether the water circuit filter is dirty and blocked with too many impurities; 6. Check whether the connection of the water flow switch is loose, and check whether the contact of the water flow switch is normally closed and disconnected normally with a multimeter. If there are still problems after the above troubleshooting steps, please contact professional technicians further for handling.	1. Troubleshoot the pump or replace the pump; 2. Open the high point exhaust valve of the system and completely empty it; 3. Calculate and check the water resistance of water circuit system. If the water resistance is too large, add a secondary pump; 4. Check all valves in the water circuit, and all the valves that should be opened should be opened; 5. Clean the water circuit filter to remove impurities; 6. Check the connection and tighten it again. If the water flow switch is abnormally on or off after the connection has been troubleshot, replace the water flow switch.
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4	E05	Water circuit frost protection	A/M	Shut down compressor	1. Insufficient water flow; 2. The outlet water temperature is too low;	1. Check whether the water flow is low. If it is low, refer to the troubleshooting methods 1 ~ 5 of "Water Flow Switch Protection". If the water flow is normal, proceed to the next step; 2. Check whether the outlet water temperature before protection is too low, if so, increase the set value of water temperature, if not, proceed to the next step; 3. If there are still problems after the above troubleshooting steps, please contact professional technicians further for handling.	1. Refer to the solutions 1 ~ 5 of "Water Flow Switch Protection"; 2. Raise the set water temperature;
5	E06	Inlet and outlet water over temperature protection	A/M	Shut down compressor	1. Insufficient water flow;	1. Check whether the water flow is low. If it is low, refer to the troubleshooting methods 1 ~ 5 of "Water Flow Switch Protection". If the water flow is normal, proceed to the next step; 2. Check whether the ambient temperature is greater than 30 ℃. 3. If there are still problems after the above troubleshooting steps, please contact professional technicians further for handling.	1. Refer to troubleshooting methods 1 ~ 5 of "Water Flow Switch Protection"; 2. Reduce the set value of the parameter setting item F06 of the display.

9	TP	Low ambient temperature shutdown protection	A/M	Shut down compressor	1. The ambient temperature is too low; 2. The ambient temperature sensor detection deviation is too large. 3. Check the installation space	1. Check whether the ambient temperature is too low; 2. Check whether the detected value by the temperature sensor is too much lower than the actual ambient temperature.	1. If the unit is beyond the operating range and cannot be started, it is recommended not to operate; 2. Replace the ambient temperature sensor or change the installation position of the temperature sensor.
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10	P082	Exhaust air over-temperature protection	A/M	Shut down compressor	1. Lack of fluorine in the system; 2. Scaling of casing or plate heat exchanger; 3. Fin frosting is serious; 4. The fins are dirty and blocked, and the ventilation is poor; 5. Abnormal throttling; 6. The outlet water temperature is on the high side; 7. System blocking;	1. Connect the pressure gauge and observe the refrigerant pressure during shutdown. If it is 0, it means that the refrigerant has leaked out. If it is greater than 0, proceed to the next step; 2. Use halogen leak detector for leak detection. If leakage points are detected, repair welding is required. If no leakage points are detected, check whether the compressor current and temperature difference between inlet and outlet water are low after starting up. If so, start the machine for heating after re-evacuating and charging. If there is no abnormality after re-charging refrigerant, it means that the machine lacks fluorine. If exhaust protection still occurs, proceed to the next step; 3. Check the scaling at the inlet and outlet of casing or plate heat exchanger, and observe the scaling on the inner wall. If the scaling is serious, the machine can be turned on for heating only after descaling, and if there is still a fault, proceed to the next step; 4. Check whether the fins are seriously frosted. If so, observe whether the machine will still be protected under low pressure after manual defrosting. If it runs normally, it means that the problem is caused by poor defrosting. If it will still be protected under low pressure, proceed to the next step; 5. Check whether the fin return air channel is unobstructed and whether there is foreign body blockage; 6. Check whether the coil and body of the electronic expansion valve are fixed firmly, whether the connection between the coil and the mainboard is loose, etc. After checking, start up for heating, and if low pressure protection still works, proceed to the next step; 7. Knock the body of the electronic expansion valve for several times, and turn on the machine again for heating. If the heating is normal, the electronic expansion valve is stuck. If low pressure protection still works, proceed to the next step; 8. Check the deviation between the detected value of water temperature and the actual value. If it is much lower, it is necessary to replace the sensor or take heat preservation and conduction measures or move the sensor to a suitable position; 9. Discharge the refrigerant in the system and remove the filter for inspection. Replace it if there is blockage by dirt or clean it up and start up for trial run. If it runs normally, the problem will be solved. If the filter is normal, please contact professional technician for handling.	1. Recharge refrigerant; 2. Please ask professionals to carry out descaling; 3. Manual defrosting and appropriate adjustment of defrosting setting parameters; 4. Please ask professionals to clean up the dirty blocked fins; 5. Replace the body or coil of the electronic expansion valve; 6. Replace the sensor or take heat preservation and conduction measures or move the sensor to a suitable position or reduce the water temperature setting value; 7. Replace the filter or clean up the dirty blocked filter.
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11	E04	Electric heating overload protection	A/M	/	1. Electric heating without load; 2. Insufficient water flow; 3. The electric heating overload protection switch is false connected or damaged. 4. False connection of jumper of electric heating overload protection terminal strip	1. Check whether there is water in the water system, and if so, proceed to the next step; 2. Check whether the water flow is too low. If the water flow is low, check the reasons for the low water flow. Refer to the troubleshooting methods 1 ~ 5 of "Water Flow Switch Protection". If the water flow is normal, proceed to the next step; 3. Check whether the overload protection switch is closed in the shutdown state. If it is opened, check whether the connection is false. If there is no abnormality in the connection, the overload protection switch is damaged. If it is closed, please further contact professional technicians for handling.	1. Fill the water system with water; 2. Refer to methods 1 ~ 5 of "Water Flow Switch Protection"; 3. Fasten the connecting wire of overload protection switch, replace the overload protection switch or replace the electric heating assembly.
12	E065	Outlet water over temperature protection	A	Compressor frequency reduction	1. Insufficient water flow; 2. Improper selection; 3. Terminal is not opened;	Refer to troubleshooting methods 1 ~ 5 of "Water Flow Switch Protection"	Refer to troubleshooting method 1 ~ 5 of Water Flow Switch Protection;
13	E071	Outlet water temperature too low protection	A	Shutdown compressor	1. Insufficient water flow; 2. Improper selection; 3. Terminal is not opened;	Refer to troubleshooting methods 1 ~ 5 of "Water Flow Switch Protection"	Refer to troubleshooting method 1 ~ 5 of Water Flow Switch Protection;

/	/	Serious frosting on fins	/	No fault	1. Insufficient installation space; 2. Water temperature is too low; 3. Insufficient refrigerant; 4. Water flow is insufficient for normal defrosting;	1. Check whether the return air and outlet air are smooth and whether the space meets the requirements of the manual; 2. Check whether the return water temperature is lower than the parameter D11; 3. Check whether the unit has insufficient refrigerant; 4. Check whether the water flow of the unit is lower than D22 parameter;	1. Remove debris from return air and outlet air, and use baffle and air duct to guide the outlet air; 2. Adjust the set water temperature to meet D22 and meet the setting of minimum inlet water temperature for defrosting; 3. Recharge refrigerant; 4. Add secondary pump.
/	/	Water temperature cannot reach	/	No fault	1. The selected heat pump is small; 2. The ambient temperature is too low; 3. Insufficient refrigerant; 4. Too high water temperature, compressor frequency limited; 5. Insufficient water flow, compressor frequency limited;	1. Check the model selected; 2. Check whether the ambient temperature is too low and whether it is lower than the outdoor environment of heating design; 3. Check whether the refrigerant is insufficient; 4. Check whether the set water temperature is too high. If it exceeds 55 ℃, the compressor current frequency limit and frequency reduction will be caused; 5. Check whether the water flow is lower than 50% of the rated flow;	1. If the selected model is small, replace the machine; 2. Add electric auxiliary heating; 3. Recharge refrigerant; 4. Reduce the set water temperature appropriately; 5. Add secondary pump.

13.Refrigerant Charging and Recovery

	
The R290 refrigerant is a flammable refrigerant	
Charging and discharging should be carried out on the low pressure side as far as possible to avoid frostbite by the refrigerant	
It should be operated by professionals	

13.1 Refrigerant Charging

When recharging is needed, follow the steps to ensure correct amount of new refrigerant is inserted.

1. Connect the charging hose (blue) to the service port.
Connect the charging hose (red) to the vacuum pump. Fully open the globe valve.
2. Place the refrigerant cylinder on the digital scale for refrigerant charging, and connect the charging hose (yellow) to the connection port of the vacuum pump and digital scale. Fully open the cylinder valve.
3. Fully open the Lo and Hi handles of the manifold gauge, turn on the vacuum pump, and evacuate for at least one hour.
4. Confirm the compound gauge reads -0.1 MPa (-76 cmHg), fully open Lo and Hi handles, and turn off the vacuum pump. Maintain for about 1-2 minutes and confirm the pointer of the compound gauge does not return.
Remove the charging hose (red) of the manifold gauge from the vacuum pump adapter.
5. After zeroing the digital scale, open the cylinder valve and Lo valve of the manifold gauge, and insert refrigerant.
6. If the specified amount of refrigerant cannot be inserted immediately, run cooling mode and gradually insert refrigerant (recommended amount is about 150 g per time)
*Do not insert too much refrigerant every time.
7. Close the on/off valve, and charge refrigerant into the hose.
*Perform this step during cooling operation. Close the stem of the two-way valve, and quickly remove the charging hose (blue) when the pressure of the manifold gauge becomes zero (0).
8. Final check, confirm the shut-off valve is fully closed.
Connect the caps of service port and control valve, then check for gas leakage around the caps.

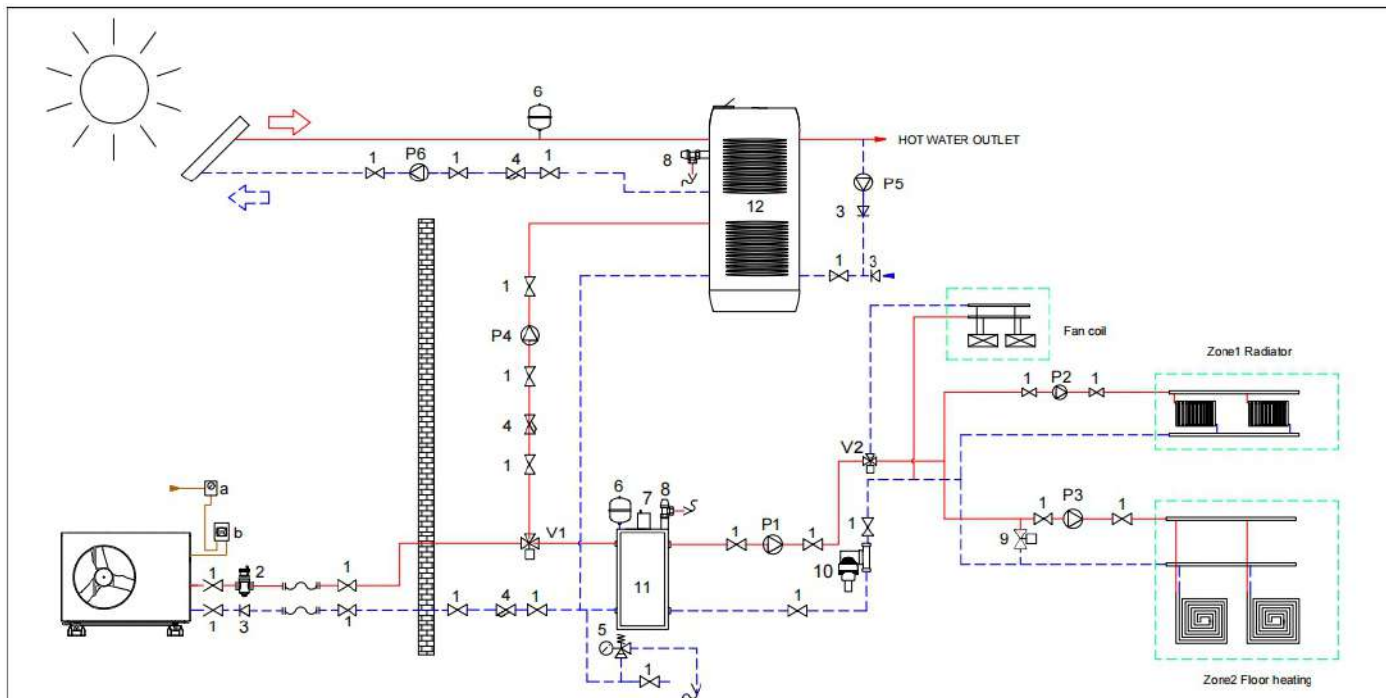
13.2 Refrigerant Recovery

1. Connect the central charging hose of the manifold gauge to the inlet side of the recovery device.
2. Connect the red hose (charging hose) between the discharge side of the recovery device and the valve on the liquid side of the refrigerant cylinder.
3. Connect the yellow float switch cable of the recovery device to the refrigerant cylinder.
4. Open the valve on the low pressure side of the manifold gauge.
5. Slightly loosen the charging hose on the inlet connection side of the recovery device for air purging.
6. Open the liquid valve of the refrigerant cylinder, slightly loosen the charging hose on the discharge side of the recovery device, and perform air purging (the recovery tank needs slight internal pressure).
7. Insert the electrical plug of the recovery device into the power socket (fan starts running).
8. Turn the valve of the recovery device to the equalization point.
9. After a few seconds, turn the valve back to its original position.
10. Turn the switch of the recovery device to "ON". (Compressor starts running)
11. When the low pressure of the manifold gauge approaches "0", close the valve on low pressure side, and turn the switch of the recovery device to "OFF".
12. Remove the central charging hose of the manifold gauge from the recovery device.

14. Technical Data

14.1 Piping Diagram

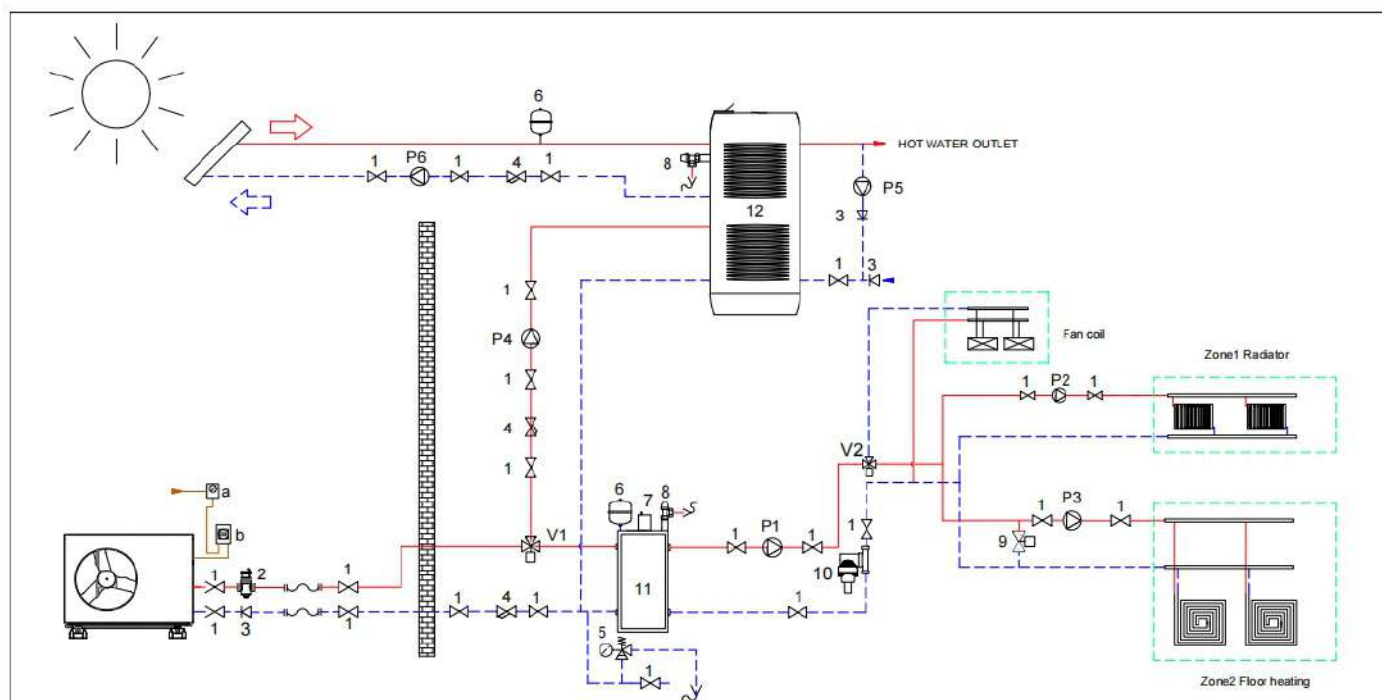
14.1.1 Underfloor Heating & Fan coil(Cooling) & DHW



NO.	Name	NO.	Name
1	Shut-off valve	V1	Hot Water Three-Way Valve
2	Micro Bubble Vent Valve	V2	Cooling Three-Way Valve
3	One-way Valve	P1	Auxiliary Water Pump(Field Supply)
4	Filter	P2	Water pump for Zone1 Radiator
5	Pressure Relief Valve	P3	Water pump for Zone2 Floor heating
6	Expansion tank	P4	Water pump for Hot Water
7	Relief Valve	P5	Return Water Pump(Field Supply)
8	Safe Valve	a	Electric Meter
9	Mixing Valve	b	Switching Power Supply
10	Magnetic filter		
11	Buffer tank		
12	Hot water tank		

Note: The installation diagram is for reference only and installation is subject to actual conditions.

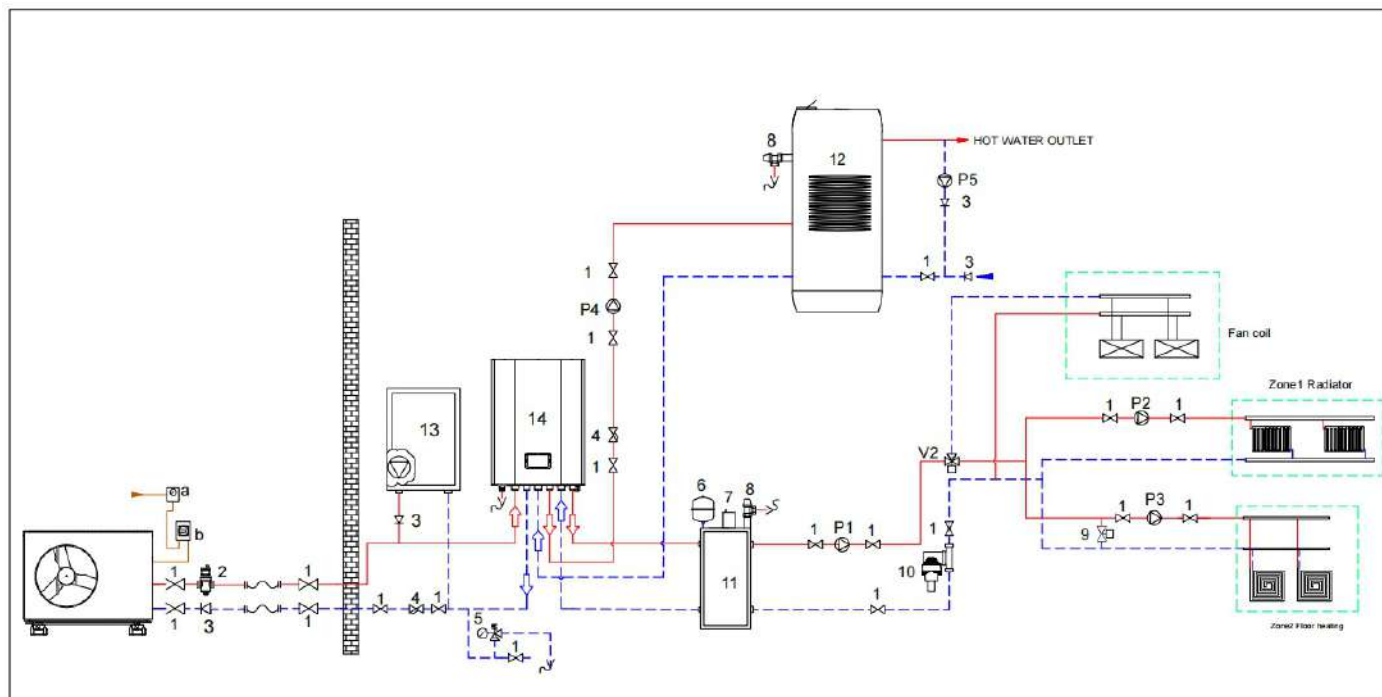
14.1.2 Underfloor Heating & Fan Coil(Cooling) & DHW & Solar Water Heater



NO.	Name	NO.	Name
1	Shut-off valve	V1	Hot Water Three-Way Valve
2	Micro Bubble Vent Valve	V2	Cooling Three-Way Valve
3	One-way Valve	P1	Auxiliary Water Pump(Field Supply)
4	Filter	P2	Water pump for Zone1 Radiator
5	Pressure Relief Valve	P3	Water pump for Zone2 Floor heating
6	Expansion tank	P4	Water pump for Hot Water
7	Relief Valve	P5	Return Water Pump(Field Supply)
8	Safe Valve	P6	Water pump for Solar Heater
9	Mixing Valve	a	Electric Meter
10	Magnetic filter	b	Switching Power Supply
11	Buffer tank		
12	Hot water tank		

Note: The installation diagram is for reference only and installation is subject to actual conditions.

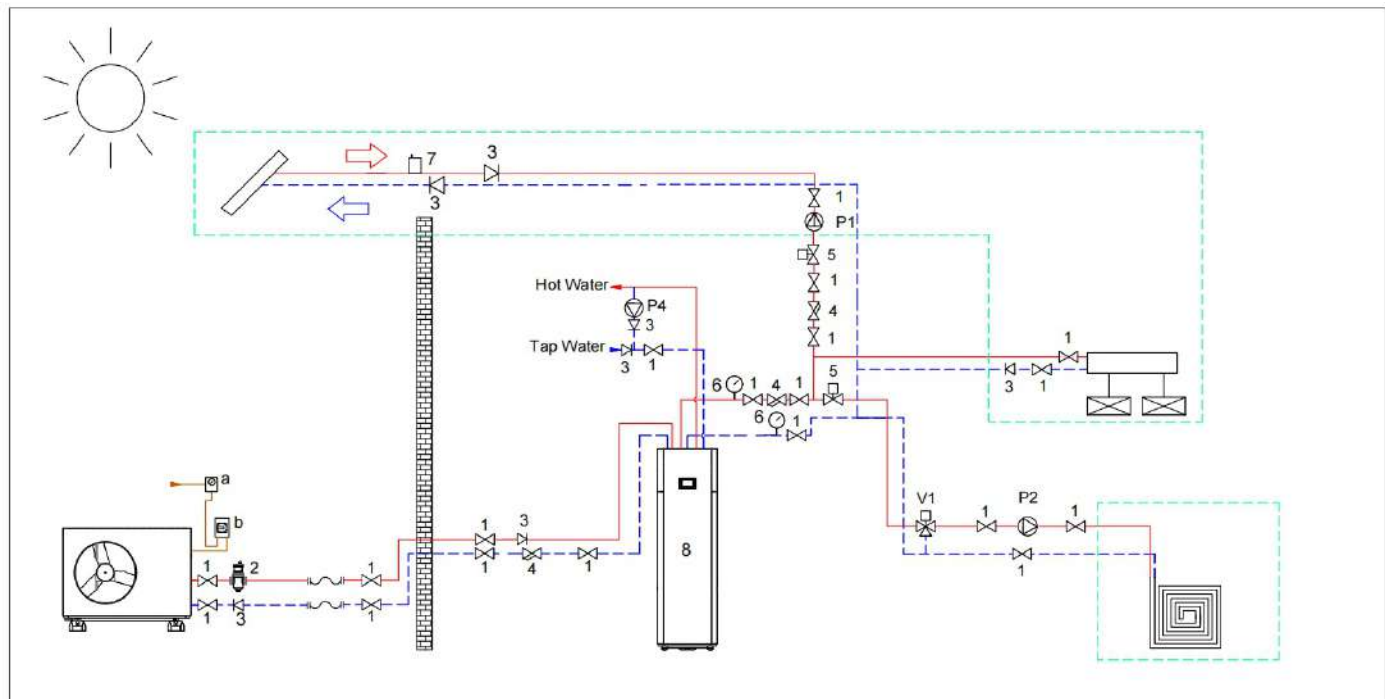
14.1.3 Underfloor Heating & Fan Coil(Cooling) & DHW & Boiler & Hydraulic Module



NO.	Name	NO.	Name
1	Shut-off valve	V1	Hot Water Three-Way Valve
2	Micro Bubble Vent Valve	V2	Cooling Three-Way Valve
3	One-way Valve	P1	Auxiliary Water Pump(Field Supply)
4	Filter	P2	Water pump for Zone1 Radiator
5	Pressure Relief Valve	P3	Water pump for Zone2 Floor heating
6	Expansion tank	P4	Water pump for Hot Water
7	Relief Valve	P5	Return Water Pump(Field Supply)
8	Safe Valve	a	Electric Meter
9	Mixing Valve	b	Switching Power Supply
10	Magnetic filter		
11	Buffer tank		
12	Hot water tank		
13	Boiler		
14	Hydraulic Module		

Note: The installation diagram is for reference only and installation is subject to actual conditions.

14.1.4 Underfloor Heating & Fan Coil(Cooling) & Multi-function water tank



NO.	Name	NO.	Name
1	Shut-off valve	V1	Hot Water Three-Way Valve
2	Micro Bubble Vent Valve	V2	Cooling Three-Way Valve
3	One-way Valve	P1	Auxiliary Water Pump(Field Supply)
4	Filter	P2	Water pump for Zone1 Radiator
5	Electromagnetic Two-way Valve	P3	Water pump for Zone2 Floor heating
6	Pressure Gauge	P4	Water pump for Hot Water
7	Automatic Vent Valve	P5	Return Water Pump(Field Supply)
8	Multi-function water tank	a	Electric Meter
9		b	Switching Power Supply

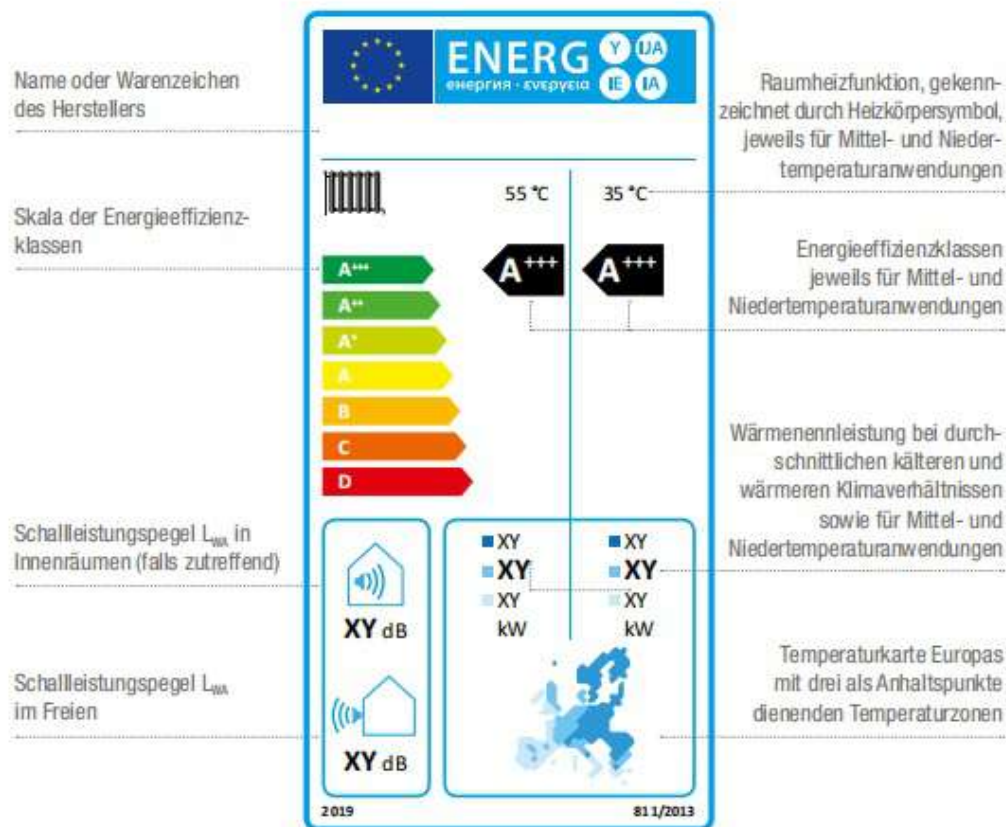
Note: The installation diagram is for reference only and installation is subject to actual conditions.

15.EU Energy Label

Adopting air-to-water heat pump systems can significantly reduce carbon dioxide emissions, thus contributing to environmental goals. This drives gradual phase-out of natural gas for building heating. Under the banner of “decarbonization,” electric heating systems are becoming increasingly important, which is evident in the political framework.

ERP

The energy-related product (ERP) directive aims to help consumers choose environment-friendly products, which are classified into different energy efficiency classes in different ERP groups.



16.Product Fiche

16.1 CH-HP15UIMPZK-H

Models: <u>Outdoor</u> Unit: <u>CH-HP15UIMPZK-H</u> Indoor Unit: <u>None</u>							
Air-to-water heat pump				☒			
Brine-to-water heat pump				☐			
Low temperature heat pump				☐			
Equipped with a supplementary heater				☐			
Heat Pump Combination Heater				☐			
Parameters shall be declared for <u>Medium-temperature applications</u>							
Parameters shall be declared for <u>Average Climate Conditions</u>							
Item	Symbol	Value		Unit			
Rated Heat Output	Prated	12.09		kW			
Seasonal space heating energy efficiency	η_s	151.0		%			
Energy Classes		A+++					
Seasonal Coefficient of Performance	SCOP	3.85		kWh/kWh			
Annual Energy consumption	QHE	6489		kWh			
Sound power level indoors/outdoors	LWA	56		dB(A)			
Declared capacity for heating for part load at indoor ratio for Temperature 20°C and outdoor temperature Tj				Declared coefficient of performance or primary energy part load at indoor temperature 20°C and outdoor			
Tj = -7°C	Pdh	10.70	kW	Tj = -7°C	COPd	2.29	
Tj = +2°C	Pdh	6.82	kW	Tj = +2°C	COPd	3.79	
Tj = +7°C	Pdh	4.23	kW	Tj = +7°C	COPd	4.96	
Tj = +12°C	Pdh	4.22	kW	Tj = +12°C	COPd	6.61	
Tj = bivalent temperature	Pdh	10.70	kW	Tj = bivalent temperature	COPd	2.29	
Tj = operation limit temperature	Pdh	12.13	kW	Tj = operation limit temperature	COPd	2.00	
Bivalent temperature	Tbiv	-7	°C	Operation limit temperature	TOL	-10	°C
Degradation Coefficient (**)	Cdh	0.90	-		WTOL	80	°C
Power consumption in modes other than active mode				Supplementary Heater			
Off Mode	P _{OFF}	0.008	kW	Rate heat output	P _{sup}	0	kW
Thermostat-off mode	P _{TO}	0.008	kW				
Standby mode	P _{SB}	0.008	kW	Type of energy input	-		
Crankcase heater mode	P _{CK}	0.041	kW				
Other items							
Capacity control	Variable			Rated airflow rate, outdoors		5000	m³/h
Outlet temperature capacity control	Variable						
Water flow rate capacity control	Fixed						
(*) For heat pump space heaters and heat pump combination heaters, the rated heat output <i>Prated</i> is equal to the design load for heating <i>Pdesignh</i>, and the rated heat output of a supplementary heater <i>Psup</i> is equal to the supplementary capacity for heating <i>sup(Tj)</i>. (**) Cdh shall be determined for each part load ratio, where applicable, by measurement. If not, the default degradation coefficient is Cdh = 0,9							

(***) If the declared *TOL* is lower than the *Tdesignh* of the considered climate, then the outdoor dry bulb temperature is equal to *Tdesignh* for the part load

Models: Outdoor Unit: CH-HP15UIMPZK-H Indoor Unit: None

Air-to-water heat pump	☒
Brine-to-water heat pump	☐
Low temperature heat pump	☐
Equipped with a supplementary heater	☐
Heat Pump Combination Heater	☐

Parameters shall be declared for Low-temperature applications

Parameters shall be declared for Average Climate Conditions

Item	Symbol	Value	Unit
Rated Heat Output	Prated	12.21	kW
Seasonal space heating energy efficiency	η_s	189.8	%
Energy Classes		A+++	
Seasonal Coefficient of Performance	SCOP	4.82	kWh/kWh
Annual Energy consumption	QHE	5233	kWh
Sound power level indoors/outdoors	LWA	54	dB(A)

Declared capacity for heating for part load at indoor ratio for Temperature 20°C and outdoor temperature T_j				Declared coefficient of performance or primary energy part load at indoor temperature 20°C and outdoor			
$T_j = -7^\circ\text{C}$	Pdh	10.80	kW	$T_j = -7^\circ\text{C}$	COPd	2.81	
$T_j = +2^\circ\text{C}$	Pdh	6.66	kW	$T_j = +2^\circ\text{C}$	COPd	4.73	
$T_j = +7^\circ\text{C}$	Pdh	4.24	kW	$T_j = +7^\circ\text{C}$	COPd	6.53	
$T_j = +12^\circ\text{C}$	Pdh	4.34	kW	$T_j = +12^\circ\text{C}$	COPd	7.85	
$T_j = \text{bivalent temperature}$	Pdh	10.80	kW	$T_j = \text{bivalent temperature}$	COPd	2.81	
$T_j = \text{operation limit temperature}$	Pdh	12.40	kW	$T_j = \text{operation limit temperature}$	COPd	2.29	
Bivalent temperature	Tbiv	-7	°C	Operation limit temperature	TOL	-10	°C
Degradation Coefficient (**)	Cdh	0.90	-		WTOL	80	°C

Power consumption in modes other than active mode				Supplementary Heater			
Off Mode	P _{OFF}	0.008	kW	Rate heat output	P _{sup}	0	kW
Thermostat-off mode	P _{TO}	0.008	kW				
Standby mode	P _{SB}	0.008	kW	Type of energy input	-		
Crankcase heater mode	P _{CK}	0.041	kW				
Other items							
Capacity control	Variable			Rated airflow rate, outdoors		5000	m³/h
Outlet temperature capacity control	Variable						
Water flow rate capacity control	Fixed						

(*) For heat pump space heaters and heat pump combination heaters, the rated heat output *Prated* is equal to the design load for heating *Pdesignh*, and the rated heat output of a supplementary heater *Psup* is equal to the supplementary capacity for heating *sup(Tj)*.

(**) Cdh shall be determined for each part load ratio, where applicable, by measurement. If not, the default degradation coefficient is Cdh = 0,9

(***) If the declared *TOL* is lower than the *Tdesignh* of the considered climate, then the outdoor dry bulb temperature is equal to *Tdesignh* for the part load

16.2 CH-HP15UIMPZM-H

Models: <u>Outdoor</u> Unit: <u>CH-HP15UIMPZM-H</u> Indoor Unit: <u>None</u>							
Air-to-water heat pump				☒			
Brine-to-water heat pump				☐			
Low temperature heat pump				☐			
Equipped with a supplementary heater				☐			
Heat Pump Combination Heater				☐			
Parameters shall be declared for <u>Medium-temperature applications</u>							
Parameters shall be declared for <u>Average Climate Conditions</u>							
Item	Symbol		Value		Unit		
Rated Heat Output	Prated		12.22		kW		
Seasonal space heating energy efficiency	η_s		151.5		%		
Energy Classes			A+++				
Seasonal Coefficient of Performance	SCOP		3.86		kWh/kWh		
Annual Energy consumption	QHE		6537		kWh		
Sound power level indoors/outdoors	LWA		55		dB(A)		
Declared capacity for heating for part load at indoor ratio for Temperature 20°C and outdoor temperature T_j				Declared coefficient of performance or primary energy part load at indoor temperature 20°C and outdoor			
$T_j = -7^\circ\text{C}$	Pdh	10.81	kW	$T_j = -7^\circ\text{C}$	COPd	2.20	
$T_j = +2^\circ\text{C}$	Pdh	6.81	kW	$T_j = +2^\circ\text{C}$	COPd	3.85	
$T_j = +7^\circ\text{C}$	Pdh	4.28	kW	$T_j = +7^\circ\text{C}$	COPd	5.09	
$T_j = +12^\circ\text{C}$	Pdh	4.36	kW	$T_j = +12^\circ\text{C}$	COPd	7.19	
$T_j = \text{bivalent temperature}$	Pdh	10.1	kW	$T_j = \text{bivalent temperature}$	COPd	2.20	
$T_j = \text{operation limit temperature}$	Pdh	12.19	kW	$T_j = \text{operation limit temperature}$	COPd	2.02	
Bivalent temperature	Tbiv	-7	°C	Operation limit temperature	TOL	-10	°C
Degradation Coefficient (**)	Cdh	0.90	-		WTOL	80	°C
Power consumption in modes other than active mode				Supplementary Heater			
Off Mode	P _{OFF}	0.013	kW	Rate heat output	P _{sup}	0	kW
Thermostat-off mode	P _{TO}	0.012	kW				
Standby mode	P _{SB}	0.013	kW	Type of energy input	-		
Crankcase heater mode	P _{CK}	0.041	kW				
Other items							
Capacity control	Variable			Rated airflow rate, outdoors		5000	m³/h
Outlet temperature capacity control	Variable						
Water flow rate capacity control	Fixed						
(*) For heat pump space heaters and heat pump combination heaters, the rated heat output <i>Prated</i> is equal to the design load for heating <i>Pdesignh</i>, and the rated heat output of a supplementary heater <i>Psup</i> is equal to the supplementary capacity for heating <i>sup(Tj)</i>. (**) Cdh shall be determined for each part load ratio, where applicable, by measurement. If not, the default degradation coefficient is Cdh = 0,9 (***) If the declared <i>TOL</i> is lower than the <i>Tdesignh</i> of the considered climate, then the outdoor dry bulb temperature is equal to <i>Tdesignh</i> for the part load							

Models: <u>Outdoor</u> Unit: <u>CH-HP15UIMPZM-H</u> Indoor Unit: <u>None</u>							
Air-to-water heat pump				☒			
Brine-to-water heat pump				☐			
Low temperature heat pump				☐			
Equipped with a supplementary heater				☐			
Heat Pump Combination Heater				☐			
Parameters shall be declared for <u>Low-temperature applications</u>							
Parameters shall be declared for <u>Average Climate Conditions</u>							
Item	Symbol	Value		Unit			
Rated Heat Output	Prated	12.03		kW			
Seasonal space heating energy efficiency	η_s	190.4		%			
Energy Classes		A+++					
Seasonal Coefficient of Performance	SCOP	4.83		kWh/kWh			
Annual Energy consumption	QHE	5141		kWh			
Sound power level indoors/outdoors	LWA	54		dB(A)			
Declared capacity for heating for part load at indoor ratio for Temperature 20°C and outdoor temperature T_j				Declared coefficient of performance or primary energy part load at indoor temperature 20°C and outdoor			
$T_j = -7^\circ\text{C}$	Pdh	10.64	kW	$T_j = -7^\circ\text{C}$	COPd	2.96	
$T_j = +2^\circ\text{C}$	Pdh	6.72	kW	$T_j = +2^\circ\text{C}$	COPd	4.78	
$T_j = +7^\circ\text{C}$	Pdh	4.20	kW	$T_j = +7^\circ\text{C}$	COPd	6.31	
$T_j = +12^\circ\text{C}$	Pdh	4.47	kW	$T_j = +12^\circ\text{C}$	COPd	8.43	
$T_j = \text{bivalent temperature}$	Pdh	10.64	kW	$T_j = \text{bivalent temperature}$	COPd	2.96	
$T_j = \text{operation limit temperature}$	Pdh	12.00	kW	$T_j = \text{operation limit temperature}$	COPd	2.35	
Bivalent temperature	Tbiv	-7	°C	Operation limit temperature	TOL	-10	°C
Degradation Coefficient (**)	Cdh	0.90	-		WTOL	80	°C
Power consumption in modes other than active mode				Supplementary Heater			
Off Mode	P _{OFF}	0.013	kW	Rate heat output	P _{sup}	0	kW
Thermostat-off mode	P _{TO}	0.012	kW				
Standby mode	P _{SB}	0.013	kW	Type of energy input	-		
Crankcase heater mode	P _{CK}	0.041	kW				
Other items							
Capacity control	Variable			Rated airflow rate, outdoors		5000	m³/h
Outlet temperature capacity control	Variable						
Water flow rate capacity control	Fixed						
(*) For heat pump space heaters and heat pump combination heaters, the rated heat output <i>Prated</i> is equal to the design load for heating <i>Pdesignh</i>, and the rated heat output of a supplementary heater <i>Psup</i> is equal to the supplementary capacity for heating <i>sup(Tj)</i>. (**) Cdh shall be determined for each part load ratio, where applicable, by measurement. If not, the default degradation coefficient is Cdh = 0,9 (***) If the declared <i>TOL</i> is lower than the <i>Tdesignh</i> of the considered climate, then the outdoor dry bulb temperature is equal to <i>Tdesignh</i> for the part load							

16.3 CH-HP22UIMPZM-H

Models: <u>Outdoor</u> Unit: <u>CH-HP22UIMPZM-H</u> <u>Indoor</u> Unit: <u>None</u>							
Air-to-water heat pump				☒			
Brine-to-water heat pump				☐			
Low temperature heat pump				☐			
Equipped with a supplementary heater				☐			
Heat Pump Combination Heater				☐			
Parameters shall be declared for <u>Medium-temperature applications</u>							
Parameters shall be declared for <u>Average Climate Conditions</u>							
Item	Symbol			Value		Unit	
Rated Heat Output	Prated			17.22		kW	
Seasonal space heating energy efficiency	ηs			157.4		%	
Energy Classes				A+++			
Seasonal Coefficient of Performance	SCOP			4.01		kWh/kWh	
Annual Energy consumption	QHE			8870		kWh	
Sound power level indoors/outdoors	LWA			57		dB(A)	
Declared capacity for heating for part load at indoor ratio for Temperature 20°C and outdoor temperature Tj				Declared coefficient of performance or primary energy part load at indoor temperature 20°C and outdoor			
Tj = -7°C	Pdh	15.23	kW	Tj = -7°C	COPd	2.56	
Tj = +2°C	Pdh	9.29	kW	Tj = +2°C	COPd	3.88	
Tj = +7°C	Pdh	6.01	kW	Tj = +7°C	COPd	5.15	
Tj = +12°C	Pdh	5.24	kW	Tj = +12°C	COPd	7.21	
Tj = bivalent temperature	Pdh	15.23	kW	Tj = bivalent temperature	COPd	2.56	
Tj = operation limit temperature	Pdh	16.13	kW	Tj = operation limit temperature	COPd	2.32	
Bivalent temperature	Tbiv	-7	°C	Operation limit temperature	TOL	-10	°C
Degradation Coefficient (**)	Cdh	0.90	-		WTOL	80	°C
Power consumption in modes other than active mode				Supplementary Heater			
Off Mode	P _{OFF}	0.016	kW	Rate heat output	P _{sup}	1.09	kW
Thermostat-off mode	P _{TO}	0.016	kW				
Standby mode	P _{SB}	0.016	kW	Type of energy input	-		
Crankcase heater mode	P _{CK}	0.045	kW				
Other items							
Capacity control	Variable			Rated airflow rate, outdoors		6000	m³/h
Outlet temperature capacity control	Variable						
Water flow rate capacity control	Fixed						
(*) For heat pump space heaters and heat pump combination heaters, the rated heat output <i>Prated</i> is equal to the design load for heating <i>Pdesignh</i> , and the rated heat output of a supplementary heater <i>Psup</i> is equal to the supplementary capacity for heating <i>sup(Tj)</i> .							
(**) Cdh shall be determined for each part load ratio, where applicable, by measurement. If not, the default degradation coefficient is Cdh = 0,9							
(***) If the declared <i>TOL</i> is lower than the <i>Tdesignh</i> of the considered climate, then the outdoor dry bulb temperature is equal to <i>Tdesignh</i> for the part load							

Models: <u>Outdoor</u> Unit: <u>CH-HP22UIMPZM-H</u> Indoor Unit: <u>None</u>							
Air-to-water heat pump				☒			
Brine-to-water heat pump				☐			
Low temperature heat pump				☐			
Equipped with a supplementary heater				☐			
Heat Pump Combination Heater				☐			
Parameters shall be declared for <u>Low-temperature applications</u>							
Parameters shall be declared for <u>Average Climate Conditions</u>							
Item	Symbol		Value		Unit		
Rated Heat Output	Prated		17.35		kW		
Seasonal space heating energy efficiency	η_s		203.0		%		
Energy Classes			A+++				
Seasonal Coefficient of Performance	SCOP		5.15		kWh/kWh		
Annual Energy consumption	QHE		6957		kWh		
Sound power level indoors/outdoors	LWA		58		dB(A)		
Declared capacity for heating for part load at indoor ratio for Temperature 20°C and outdoor temperature T_j				Declared coefficient of performance or primary energy part load at indoor temperature 20°C and outdoor			
$T_j = -7^\circ\text{C}$	Pdh	15.34	kW	$T_j = -7^\circ\text{C}$	COPd	3.32	
$T_j = +2^\circ\text{C}$	Pdh	9.44	kW	$T_j = +2^\circ\text{C}$	COPd	5.02	
$T_j = +7^\circ\text{C}$	Pdh	6.17	kW	$T_j = +7^\circ\text{C}$	COPd	6.59	
$T_j = +12^\circ\text{C}$	Pdh	5.57	kW	$T_j = +12^\circ\text{C}$	COPd	9.07	
$T_j = \text{bivalent temperature}$	Pdh	15.34	kW	$T_j = \text{bivalent temperature}$	COPd	3.32	
$T_j = \text{operation limit temperature}$	Pdh	16.02	kW	$T_j = \text{operation limit temperature}$	COPd	2.94	
Bivalent temperature	Tbiv	-7	°C	Operation limit temperature	TOL	-10	°C
Degradation Coefficient (**)	Cdh	0.90	-		WTOL	80	°C
Power consumption in modes other than active mode				Supplementary Heater			
Off Mode	P _{OFF}	0.016	kW	Rate heat output	P _{sup}	1.33	kW
Thermostat-off mode	P _{TO}	0.016	kW				
Standby mode	P _{SB}	0.016	kW	Type of energy input	-		
Crankcase heater mode	P _{CK}	0.045	kW				
Other items							
Capacity control	Variable			Rated airflow rate, outdoors		6000	m³/h
Outlet temperature capacity control	Variable						
Water flow rate capacity control	Fixed						
(*) For heat pump space heaters and heat pump combination heaters, the rated heat output <i>Prated</i> is equal to the design load for heating <i>Pdesignh</i>, and the rated heat output of a supplementary heater <i>Psup</i> is equal to the supplementary capacity for heating <i>sup(Tj)</i>. (**) Cdh shall be determined for each part load ratio, where applicable, by measurement. If not, the default degradation coefficient is Cdh = 0,9 (***) If the declared <i>TOL</i> is lower than the <i>Tdesignh</i> of the considered climate, then the outdoor dry bulb temperature is equal to <i>Tdesignh</i> for the part load							

17. Check list

Engineering Commissioning Acceptance Form for Overseas Domestic Products						
I. Project Information						
User Information	Project name			User name		
	Installation address			Contact number		
Dealer Information	Company name					
	Contact		Contact number			
Installation Company	Company name					
	Installation manager		Contact number			
Temperature at Installation Site	Average surface water temperature		User demand	Cooling/heating demand		
	Summer highest temperature			Air-conditioned area		
	Winter lowest temperature			Hot water demand		
Unit Information	Unit number	Unit model	Unit barcode	Unit number	Unit model	Unit barcode
Other Project Information	Terminal:	☐ Fan coil ☐ Floor heating ☐ Radiator				
	Buffer/insulation tank (T)			Electric heater configuration (kW)		
	Rated head of primary pump (m):			Rated flow (m³/h):		
	Rated head of secondary pump (m):			Rated flow (m³/h):		

II. Pre-acceptance Inspection				
Inspection Item		Technical Specification Requirements	Result	Remarks
Unit Installation	Installation environment	No strong radiation, no corrosive source, no oil fume; where unit noise and exhaust do not affect surrounding personnel activities; windbreak walls are installed in strong wind environment.		
	Maintenance space	Sufficient maintenance space (side air outlet: over 0.5 m)		
	Ventilation and heat dissipation	Good ventilation and heat dissipation (air outlet 3 m away from obstacles, multiple units' rear air return must keep 1 m or more from units and other obstacles)		
	Condensate drainage	Bottom suspended, with reasonable condensate drainage design		
	Bottom foundation	Sufficient foundation height		
	Fixation and vibration damping measures	Fixed with bolts and installed with rubber or spring vibration dampers		
	Unit installation spacing	Complies with unit installation spacing requirements in Section 6.1		
	Terminal fan coil installation	Condensate drainage is smooth and reasonable		
		The installation of Indoor air outlet and return air inlet meets installation standards.		
		Inspection openings have been reserved according to standards.		
		If fan coils are equipped with solenoid valves, ensure 30% or more fan coils are installed with three-way solenoid valves.		
Electrical System	Unit distribution box (if any)	Independent distribution box is installed for the project.		
		The distribution box is equipped with a leakage protection device, and electrical parts have rain and moisture protection measures		
		The distribution box is kept 50 cm or more above ground and securely fixed		
		The specifications of the distribution box's circuit breaker and wire meet the maximum power requirements for unit operation.		
		Copper lugs for load connection are installed tightly.		

	Main unit control box	The phase sequence and neutral wire connection are correct between unit, water pump and control box.		
		The main unit control box is correctly grounded, and not connected to gas pipes, water pipes, lightning arresters, or telephone lines.		
		Copper lugs for load connection are installed tightly in unit control box.		
		The connection between the unit and the water tank temperature sensor is correct.		
		The circulating water pump is interlocked with the main unit, and the wiring is correct.		
	Power cable diameter	Power cable diameters for total power supply and main unit meet the design requirements.		
		Power cable diameters for water pump, electric heater and other loads meet design requirements.		
	Signal cables	The connection between the unit and the wired controller is correct.		
		The connection between the solenoid valve and the room thermostat is correct		
		The connection between the room thermostat and fan coils is correct		
		The smart control wiring of the room thermostat is correct.		
	Selection of air circuit breaker (ACB)	The main ACB of the distribution box and the ACB for the main unit meet the design requirements.		
		ACBs for loads such as water pumps and electric heaters meet the design requirements.		
		Water pump and other AC contactor specifications meet design requirements.		
	Circuit installation	Connection cables between distribution box and unit, water pump run through cable troughs or conduits.		
		HV and LV wires are installed separately to prevent signal interference.		
		The distribution box (ACBs, terminal blocks) and the power supply terminals of loads such as the main unit are installed and tightened securely.		
	Voltage detection	Phase A to neutral voltage		
		Phase B to neutral voltage		
		Phase C to neutral voltage		
		380V±7%: (354V~407V); 220V±7%: (205V~236V); three-phase voltage imbalance <2%		
Water System	Piping design	With ≥3 units in the water system, the water piping is installed in a reverse return configuration.		

	Pipe specifications	The main pipe diameter meets design requirements.		
		The unit, terminal inlet and outlet pipe diameters meet design requirements.		
	Pipe fixation	Pipes are well fixed according to design requirements.		
	Pipe insulation	When water pipes pass through wall openings, foam sealant should be added on both sides of the opening for stability and to prevent thermal bridge insulation.		
		Pipes between the unit, water tank, terminals are insulated according to specifications.		
	Pipe valves	Pipe valve types are correctly selected in accordance with design requirements.		
		Unit valves can be opened normally.		
		The one-way valve on the piping is installed in the correct direction.		
		The Y-strainer and two/three-way solenoid valve are installed on the terminal inlet pipe.		
	Flexible connections	Flexible connections are installed between the unit and pipes to prevent vibration.		
		Flexible connections are installed at both ends of water pumps to prevent vibration.		
		Flexible connections, valves are installed on inlet and outlet pipes for the fan coil.		
	Pressure relief valve	Pressure relief valves are installed on the unit's return water pipe.		
	Air vent valve	Automatic air vent valves are installed on supply and return main pipes.		
	Drain valve	Drain valves are installed at the lowest point of the water system.		
	Water replenishment valve	Water replenishment valves are installed on the unit's inlet/return water pipes.		
	Microbubble deaerator	A microbubble deaerator is installed on the unit's outlet pipe side.		
	Anti-freeze valve	Ensure complete drainage at the valve installation point.		
	Differential bypass valve	A differential bypass valve is installed in the primary circulation system with solenoid valves.		
		It is installed between unit inlet and outlet pipes, with the direction from outlet to inlet.		
	Y-strainer	The Y-strainer is correctly installed on the unit's water inlet pipe or before the water pump.		
	Water tank installation	Must be installed on a load-bearing platform (steel frame or concrete foundation).		

		The water tank openings are made and installed according to the design requirements.		
		The water tank temperature sensor is securely installed in the sensor pocket, inserted to a depth of more than 250 mm. The sensor pocket is aligned vertically with the lower circulation port, and installed 50 mm higher than the latter.		
		The high water level probe is installed 150 mm below the horizontal position of the overflow outlet bottom.		
	Water pump installation	The rated head and flow of the circulating water pump meet the design requirements and are installed in the correct direction.		
		The pump is installed horizontally with proper vibration reduction and rain protection measures.		
	Installation of water replenishment system	Open or closed water replenishment system		
		For closed systems, check if the pressure is sufficient.		
	Water treatment system (hot water)	A water softening system is installed according to design requirements (resin softening, silica phosphate crystal softening, etc.).		
		Water quality meets the pH and hardness requirements specified in the technical manual.		
	Drainage and leak detection	The water system is pressurized, checked for leaks, and drained.		

III. Unit Acceptance and Commissioning

- ☐ Power-on test to verify the correct phase sequence for power wiring of the main unit and power lines of the water pump;
- ☐ Preheat the compressor for 12 hours with unit powered on but not running;
- ☐ Test if terminal fan coils can turn on/off normally: speed, cooling/heating switch, two/three-way valve are operating normally;
- ☐ Manually start to check if water pump runs normally before operation;
- ☐ Water system filling (if filling is unsuccessful or test run fails (power outage) midway, drain and blow out water to avoid freezing damage to unit heat exchanger and pipes);
- ☐ Air purging of water system: You can use reverse, sectional, layered methods for rapid air purging;
- ☐ Start the unit, test the wired controller and thermostat for on/off, temperature adjustment, mode switching, full function switching;
- ☐ Run the unit for 30 minutes, check and record the following: operating current, high/low pressure, inlet/outlet water temperature, discharge temperature, return gas temperature, coil temperature and other real-time operating data, as shown in table below;
- ☐ If abnormalities are found during above data monitoring, stop the unit immediately and perform troubleshooting;
- ☐ After 4 hours of normal operation, stop the unit and clean Y-strainer to remove pipe debris;
- ☐ Restart the unit, and continue data monitoring. If no abnormalities are found, unit commissioning and acceptance are completed.

Test Items	Test Results
Ambient temperature	

Inlet water temperature		
Outlet water temperature		
Water tank temperature		
Compressor current		
Discharge temperature		
Coil temperature		
Return gas temperature		
Operating current		
Inlet temperature of vapor injection		
Outlet temperature of vapor injection		
System anti-freeze temperature		
Opening of electronic expansion valve		
Low pressure		
High pressure		
DTU online status		
IV. Delivery and Training		
1. Delivery: ☐ User Manual		
2. User training: ☐ Equipment operation: on/off, temperature setting, function switching, status checking, etc.; ☐ Unit maintenance: regular cleaning of Y-strainer and piping, regular power cable inspection, regular cleaning of unit fins, regular cleaning of return air filter, etc.; ☐ Simple troubleshooting: water flow fault, high pressure fault, phase sequence fault, etc.; ☐ How to protect unit from freezing in winter		
Rectification Requirements		
Signature Confirmation	Acceptance Person	
	Date	MM/DD/YY
	User Representative	
	Date	MM/DD/YY

Note: _____

[illegible]