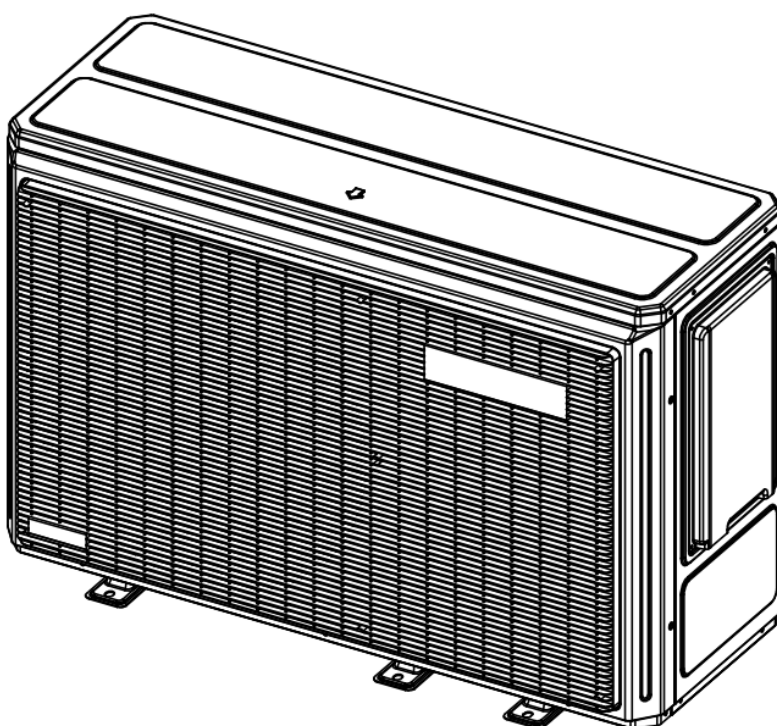




Installation and Operation Manual

Triple Heating Pump Unit
(WLRK-___BM/B3 Series)



Dear Users,

Thank you for selecting **Hien**[®] air source heating pump unit!

◇ To ensure the safe use of this product, please read this Manual carefully before installation and operation, and keep it properly for reference when necessary.

◇ Be sure to install the earth leakage protection device.

◇ The triple heating pump unit must be grounded reliably. Do not operate the unit without reliable grounding, and do not connect the ground wire to the neutral wire or a tap water pipe.

◇ Do not insert anything into the unit or cover it with anything, lest an accident should occur.

◇ The hot water pipe of the equipment is a high-temperature pipe. Do not touch it with your hands or open the gate valve to get water directly.

◇ A Y-type filter must be installed on the inlet pipe of the equipment, and any damage due to the failure to install the filter is not covered by the warranty of the company.

◇ For its long-time normal operation, the unit can only be connected to tap water, and the use of inferior water sources including groundwater is strictly prohibited.

◇ If the ambient temperature is below 0 °C, add antifreeze of an appropriate type to the water system. If the unit is idled for a long time, drain the water system to avoid the freezing and cracking of the heat exchanger and pipes.

◇ In case of extremely severe weather, when the equipment is operating in a low-temperature and high-humidity environment continuously, we recommend checking the equipment once every 12 hours. If much ice is found on the air outlet grille and the return air grille, remove the ice immediately to maintain the normal operation of the equipment.

◇ AC contactors must be installed when an external air conditioning circulating pump, a solar water pump, a lower return pump, an electric heater, and other electrical equipment are to be connected.

◇ If the technical parameters and circuit diagrams included in this Manual are different from those pasted on the machine, the contents on the machine's nameplate shall prevail.

◇ When designing an engineering scheme concerning the equipment, select the type of the unit according to the local minimum temperature, lest the selected unit should be too small to meet the customer's demand for energy, resulting in a poor user experience. Otherwise, an additional auxiliary electric heater shall be installed on the water pipeline in the engineering system of the unit for supplemental heating in severe weather. The power of the electric heater shall be calculated and selected according to the customer's actual demand.





◇ The equipment has an automatic anti-freeze function, and its power supply must be maintained and must not be cut off in winter. If, at an ambient temperature lower than 0 °C, a normal power supply cannot be guaranteed, drain the water system or add antifreeze of an appropriate type to it to prevent the water pipeline from freezing and cracking.

◇ Upon expiration of the service life of the equipment, contact a qualified appliance recycling company for its disposal according to the applicable local laws and regulations.

◇ For safe operation, be sure to connect the wires according to the wiring diagram. R290 refrigerant shall be used for the unit. Do not dismantle it for maintenance without authorization. Please contact the after-sales station as designated for repairs.

Warning: R290 refrigerant (propane) is a colorless and odorless gas, which is used in the refrigeration circuit of our Series B equipment. Existing in nature, propane is possible to be obtained without chemical synthesis. It has not only good cooling performance, but also low power consumption. R290 refrigerant has a global warming potential (GWP) of 3, no ozone depleting potential (ODP), and a small recharge quantity. It is a non-toxic gas, and is highly explosive at a concentration of 2.1% to 9.5% when mixed with air!

1. SAFETY INSTRUCTION

 warning	This unit uses a flammable refrigerant. If refrigerant leaks and comes in contact with fire or heating part, it will create harmful gas and there is risk of fire.
	Read the USER MANUAL carefully before operation.
	Further information is available in the USER MANUAL, SERVICE MANUAL, and the like
	Service personnel are required to carefully read the USER MANUAL and SERVICE MANUAL before operation.



WARNING

- **Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.**
- **The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).**
- **Do not pierce or burn,**
- **Be aware that refrigerants may not contain an odor.**

2. SAFETY INSTRUCTION

Check the voltage and make sure it meets the technical specification of the machine.

- This machine can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the machine. Cleaning and user maintenance shall not be made by children without supervision.
- The machine must always stand upright.
- The machine must stand upright for at least 1 hour before it is used for the first time
- Never sit, cover or place foreign objects on the product.
- Make sure that the air filter is clean and fitted correctly before turning the machine on
- Never use the product if the mains lead, plug or any other part is damaged or does not work properly.
- Never try to dismantle or repair the machine yourself.
- Never plug in or unplug the product with wet hands.
- Never insert foreign objects into the machine.
- Unplug the product immediately if it emits strange noises, odours or smoke.
- Make sure that no foreign objects cover or block the air inlet/outlet. Blockages can lead to fires, electric shocks or damage to the product.
- Unplug the product when it is not in use.
- Before the machine is moved, make sure it is switched off, unplugged and that the water tank is empty.

- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified person in order to avoid a hazard.
- The appliance shall be installed in accordance with national wiring regulations.
- The machine is designed A-weighted sound pressure level below 70 dB.

3. SAFETY INSTRUCTION



Warning on Refrigerant R290:

- The machine is designed only for use with R290 (propane) gas as the designated refrigerant.
- **THE REFRIGERANT LOOP IS SEALED. ONLY A QUALIFIED TECHNICIAN SHOULD ATTEMPT TO SERVICE!**
- The lack of smell does not indicate a lack of escaped gas.
- No open flames, cigarettes or other possible sources of ignition should be used in the vicinity of the machine.
- Component parts are designed for propane and non-incentive and non-sparking. Component parts shall only be replaced with identical repair parts.

THE MACHINE MAY ONLY BE INSTALLED IN A ROOM WITH A MINIMUM FLOOR AREA OF 4 m².

R290 is a flammable gas that is heavier than air. On this basis, if the gas leaks from the unit, the concentration will be the highest at ground level. However, the gas can be lifted (e.g. by draught, fan, etc) to higher levels. The R290 (propane) used in this unit has no odour.

Do not use the machine in a room with an open flame, other high-level heat sources (e.g. cigarettes, candles, etc.) or electrical discharges. Install the machine in a room which can be ventilated when necessary and where gas accumulation is not possible.

If R290 (propane) is detected in the room, or a leak is suspected, do not allow unauthorized persons to search for the source of the leak. In such cases, evacuate all people from the room, open the windows, leave the room and notify your local fire department to advise them that a propane leak has occurred. Do not allow any person to return to the room until the commanding officer of the fire department or a certified service engineer decides that the risk has ceased to exist.

4. SAFETY REGULATIONS FOR SERVICE AND REPAIRE WORK

Repairs must only be carried out by authorised service personnel and only using genuine spare parts.

① Checks to the Area

Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimised. For repair to the refrigerating system, the following precautions shall be complied with prior to conducting work on the system.

② Work procedure

Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapour being present while the work is being performed.

③ General work Area

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided. The area around the workspace shall be sectioned off. Ensure that the conditions within the area have been made safe by control of flammable material.

④ 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.

⑤ Presence of fire extinguisher

If any hot work is to be conducted on the refrigeration equipment or any associated parts appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

⑥ No ignition sources

No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which flammable refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No smoking” signs shall be displayed.

⑦ Ventilated area

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferable expel it externally into the atmosphere.

⑧ Checks to the refrigeration equipment

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer’s maintenance and service guidelines shall be followed. If in doubt consult the manufacturer’s technical department for assistance. The following checks shall be applied to installations using flammable refrigerants.

- The charge size is in accordance with the room size within which the refrigerant containing parts are installed;
- The ventilation machinery and outlets are operating adequately and are not obstructed;
- If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant;
- Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;
- Refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

⑨ Checks to electrical devices

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures if a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised. Initial safety checks shall include:

- That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- That there no live electrical components and wiring are exposed while charging, recovering or purging the system;
- That there is continuity of earth bonding.







5. Link to the Manual

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Chapter 1 Identification Symbols and Meanings

1. Warning symbols and meanings

	<p>Fire warning</p> <p>Indicating that there are flammable materials and attention shall be paid to fire prevention.</p>
	<p>Electric shock warning</p> <p>Indicating that the object is electrically charged, and touching it may cause an electric shock.</p>
	<p>Danger warning</p> <p>Indicating that death or injury may be caused.</p>
	<p>Blade warning</p> <p>Indicating that the blade cannot be touched when the fan is running.</p>
	<p>High temperature warning</p> <p>Indicating that the temperature of the object is high, and touching it may cause burns.</p>
	<p>Explosion warning</p> <p>Indicating that there is a risk of explosion, so take protective measures and do not use fire.</p>

2. Caution symbols and meanings


	<p>Please read the installation and operation manual before installation.</p>
	<p>Please read the installation and operation manual before maintenance and repair.</p>
	<p>Please read the installation and operation manual.</p>

	<p>Recycling symbol. Please send it back for recycling.</p>
	<p>Watch out for danger. Indicating a situation that may cause damage to equipment or property.</p>



Chapter 2 Instructions on the Safety of Specific Installation Personnel

Always comply with the following instructions and regulations on safety.


Regulations on installation sites


	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Install the equipment according to the dimensions of the maintenance space set forth herein. Please refer to “Requirements for Equipment Installation” for details.
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Installation procedure



	<p>Caution:</p> <ul style="list-style-type: none"> ➤ Please comply with local laws and regulations, report to the local competent authorities, and obtain installation and construction licenses; ➤ According to the requirements of local laws and regulations, paste and publicize the construction license, the instructions on shutting down the system in emergency circumstances, the emergency contact person, the addresses and telephone numbers of the fire/police station and the hospital, and so on.
	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Tear open plastic bags and throw them to the designated location, ensuring that no person (especially no children) can play with the bags, so as to avoid the danger of suffocation; ➤ Dispose in a safe way of such packaging materials as nails and other metal or wood components that may cause personal injury; ➤ Do not place any article or device on top of the equipment; ➤ Do not sit, climb or stand on the equipment; ➤ Wear adequate personal protective equipment (protective gloves, safety glasses, etc.) when installing, maintaining, or servicing the system.





Special requirements for R290

	<p>Warning:</p> <ul style="list-style-type: none"> ➤ As a combustible substance, it shall be kept away from open fire. Be careful with fire; ➤ Do not pierce through or burn the components for refrigerant circulation; ➤ The equipment shall be stored in a well-ventilated room without a continuously operating ignition source to prevent mechanical damage (e.g. open fire, a gas appliance in operation, or an electric heater in operation); ➤ Do not use methods other than those recommended by the manufacturer to speed up the defrosting process or clean the equipment; ➤ Do not install, repair, maintain, and overhaul the equipment by yourself. Please contact the authorized and qualified personnel and ask them to do such work.
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	<p>Warning:</p> <ul style="list-style-type: none"> ➤ R290 refrigerant is a non-toxic gas, and is highly explosive at a concentration of 2.1% to 9.5% when mixed with air!
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Requirements for electric installation



	<p>Warning:</p> <p>The electrical wiring and connection method must comply with the following instructions:</p> <ul style="list-style-type: none"> ➤ All the accessories and electrical components purchased on site must comply with the applicable local regulations; ➤ All wiring must be performed by authorized and qualified electricians and must comply with the applicable local regulations; ➤ Make sure that all electrical appliances are protectively grounded and must comply with the applicable local regulations; ➤ Make sure that necessary fuses or circuit breakers are installed and must comply with the applicable local regulations; ➤ Any power cord damaged must be replaced by the manufacturer, its service agent, or a person with a relevant qualification certificate, so as to avoid the occurrence of any hazard.
	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Turn off all power supplies before removing a switch box cover, connecting a wire, or touching an electrical component; ➤ After the power supplies are disconnected for more than 10 minutes, measure the voltage at the terminals of the capacitors or electrical components of the main circuit before doing repairs. Only after the voltage is lower than 50V DC can the electrical components be touched. Please refer to the wiring diagram for the positions of the terminals; ➤ Do not touch the electrical components with wet hands;

	<p>➤ Do not leave the unit unattended after removing the service cover.</p>
	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Before installing the equipment, please read carefully the circuit diagram of the equipment (attached to the inside of the terminal box on the right side of the equipment). ➤ The equipment shall be properly grounded. Its grounding wire shall not be connected to a utility pipe, a surge absorber, or a telephone grounding wire. No circuit breakers can be installed on the grounding wire. ➤ Cables shall be secured with cable ties so that they will not come into contact with sharp edges or pipes; ➤ Ribbon conductors, stranded conductors, extension cords, or star systems shall not be used for connection; ➤ Do not push the extra cables into or place them in the equipment; ➤ Make sure that all the terminal boxes are closed before starting the equipment.
	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Adequate measures shall be taken to prevent the unit from being used as a shelter for small animals. A small animal that comes into contact with the electrical components may cause failure, smoke, or fire.
	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Power cords of different diameters shall not be connected to the same power supply terminal (a loose power cord will lead to abnormal heating); ➤ Use the designated power cords for wiring and connect and fix them firmly to prevent external pressure from being applied to the terminal boards; ➤ Use a proper screwdriver to tighten the terminal screws. A small screwdriver may cause damage to the head of a screw. Tighten the terminal screws properly. If a screw is tightened too hard, it may break.
	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Connecting the power supply: First connect the grounding cable, and then connect the current-carrying cable; ➤ Disconnecting the power supply: First disconnect the current-carrying cable, and then disconnect the grounding cable;

Installation of pipes

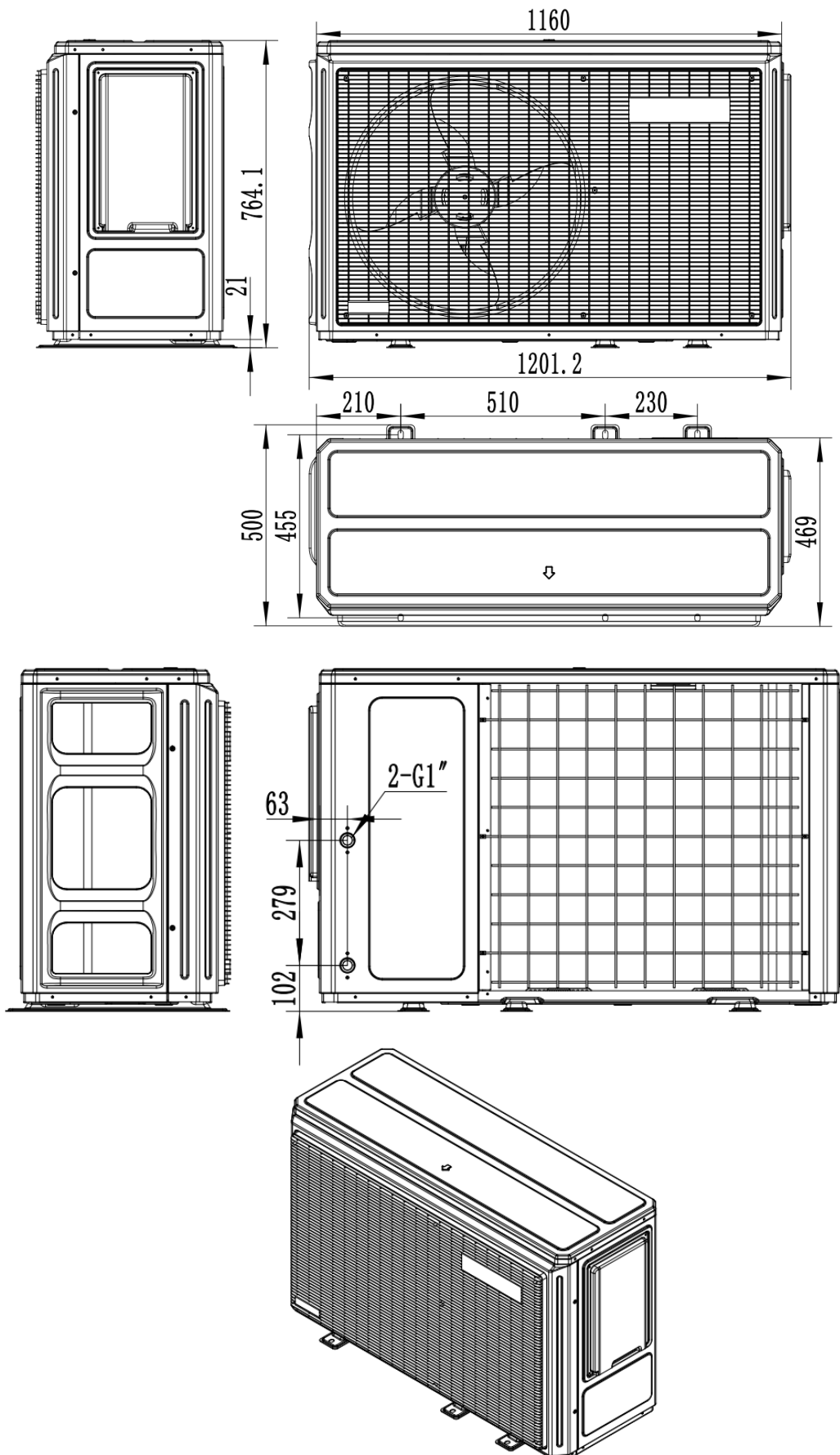
	<p>Warning:</p> <ul style="list-style-type: none"> ➤ The on-site pipe installation method must follow the instructions in the Manual; ➤ Make sure that the water quality complies with the requirements of the local laws and regulations.
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Installation and commissioning of the unit

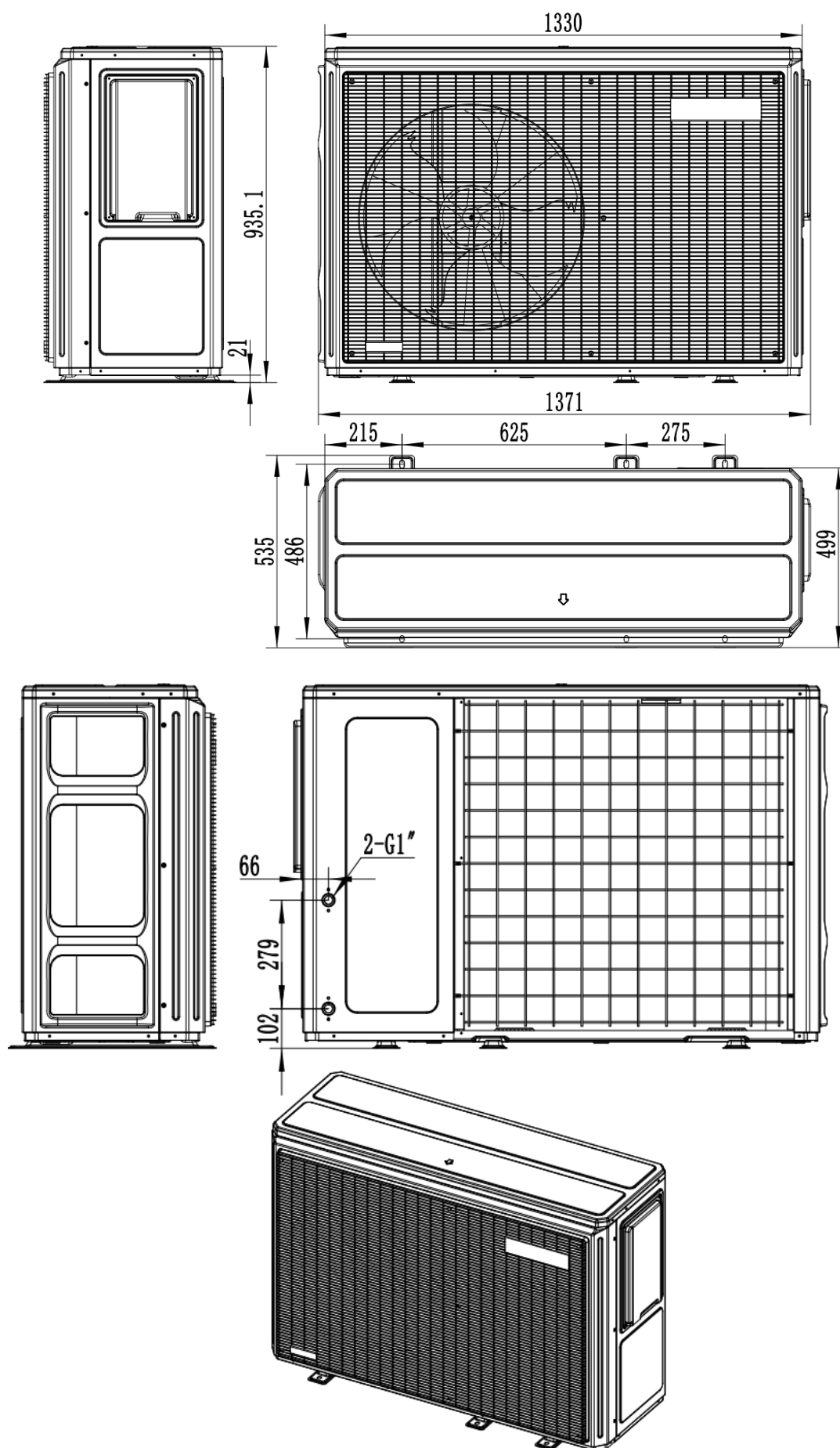
	<p>Warning:</p> <ul style="list-style-type: none">➤ Do not leave the unit unattended after removing the service cover;➤ Do not touch the blade when the equipment is energized, for the fan may start suddenly;➤ Do not stay at the air inlet or the aluminum fin of the equipment when it is in operation, so as to avoid personal injury;➤ The outdoor unit must be secured according to the instructions in the Manual.
	<p>Warning:</p> <ul style="list-style-type: none">➤ Incorrect installation of the equipment and its accessories may result in electric shocks, short circuit, leakage, fire, or other damage to the equipment;➤ During the testing process, using a higher pressure (as indicated on the equipment nameplate) to pressurize the equipment is strictly prohibited.

Chapter 3 Dimensional Drawings of the Equipment

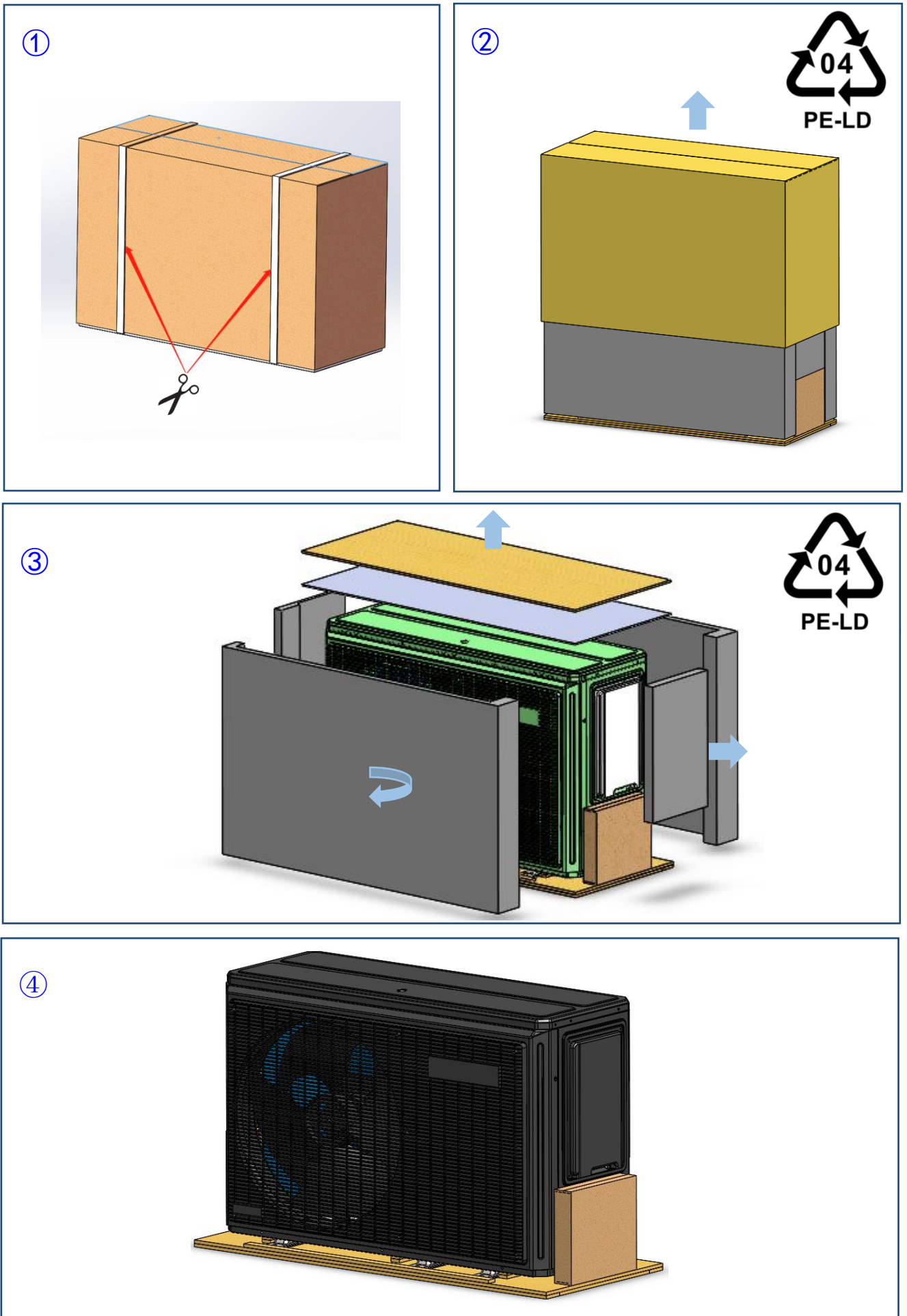
Equipment Model: WLRK-6 (8/10) I BM/B3



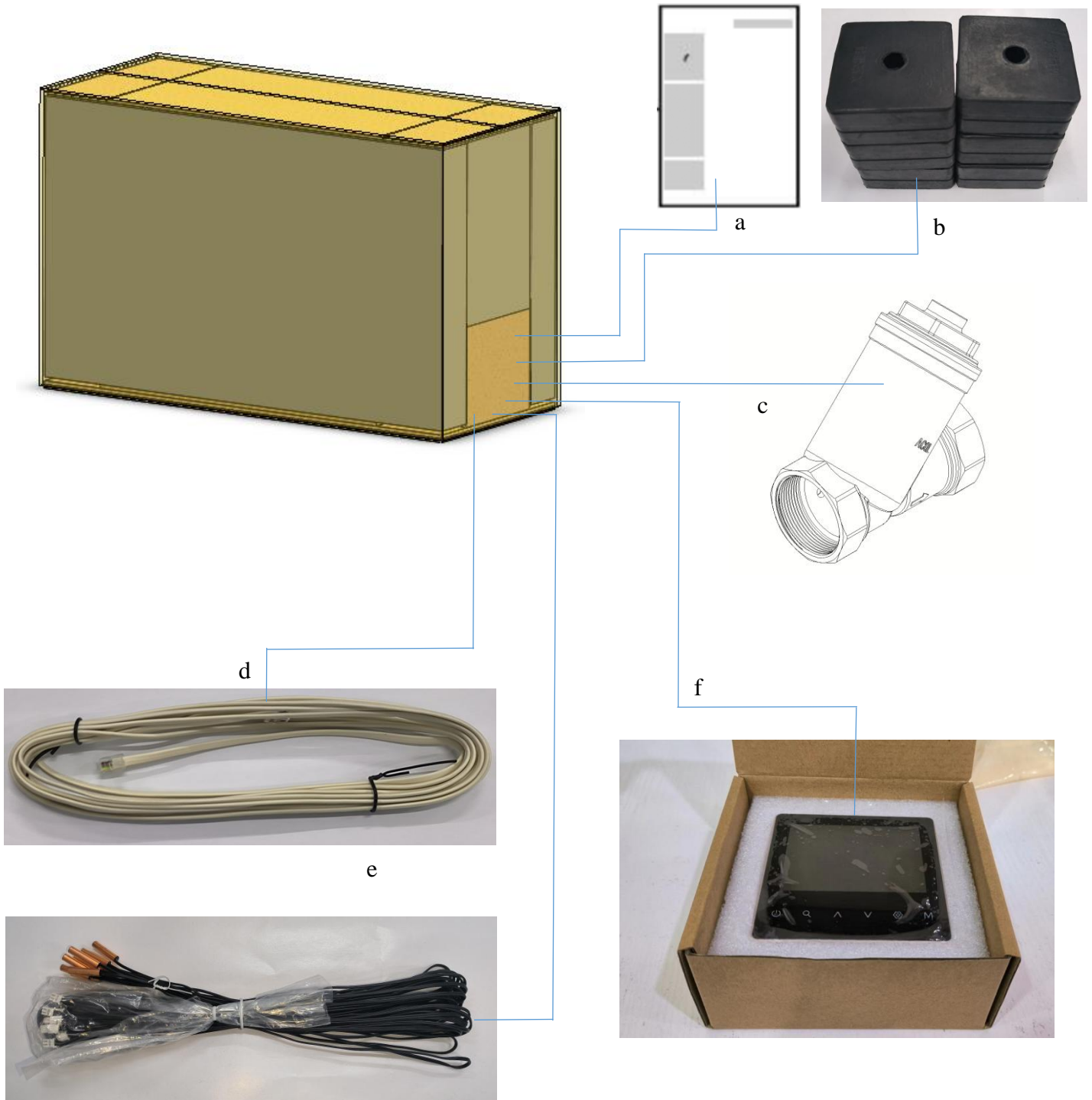
Equipment Model: WLRK-12 (14) I BM/B3, WLRK-12 (14) II BM/B3



Chapter 4 Unpacking and Details of Accompanying Accessory Kit




No.	Name of Accessory	Quantity
a	Installation and Operation Manual (including the certificate of conformity and the packing list)	1
b	Shock-absorbing rubber block	6
c	Y-shaped filter	1
d	Display communication line	1
e	Temperature sensor	7
f	Display	1




Chapter 5 Requirements for Equipment Installation

5.1 Equipment installation site

	<p>Warning:</p> <ul style="list-style-type: none">● Main unit<ul style="list-style-type: none">➤ The equipment shall be stored in a place where there are no ignition sources (e.g. open fire, gas appliances in operation, or electric heaters in operation);➤ The equipment shall be installed in a well-ventilated place with ample space.➤ The installation site shall be able to ensure that the air inlet and outlet are unimpeded;➤ A drainage ditch or outlet shall be provided nearby the installation site to facilitate drainage;➤ The installation base or bracket shall be solid and firm to ensure the smooth operation of the unit;➤ Make sure that the whole installed unit is upright without tilting;➤ Do not install the main unit in a place where there is pollution, corrosive gases, and contaminants like ash, sand, and fallen leaves;➤ The elevation of the site where the unit is installed shall not be higher than 1,000 m. If it is more than 1,000 m, please contact the maintenance technicians.● Water tank<ul style="list-style-type: none">➤ The water tank shall be installed in a place where the ambient temperature is above 0 °C;➤ A drainage ditch or outlet shall be provided nearby the installation site to facilitate drainage;➤ The installation base or bracket shall be solid and firm, and shall be designed to be able to bear the weight of the water tank;➤ Do not install the water tank in a place where there is pollution and corrosive gases.
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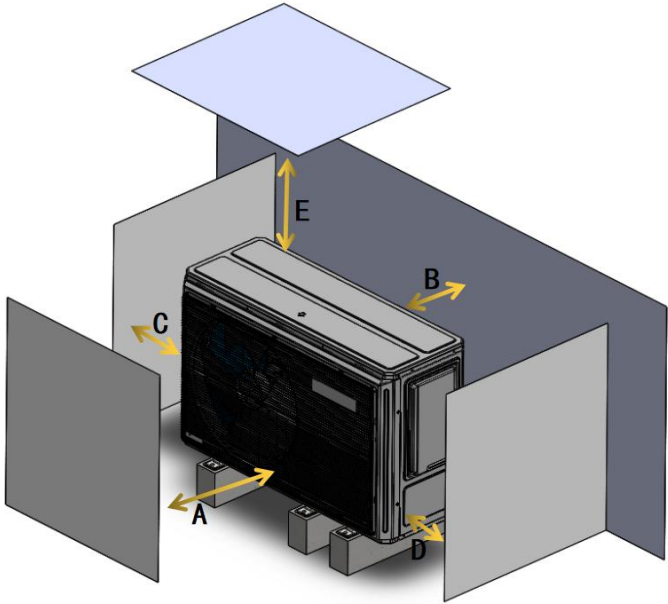
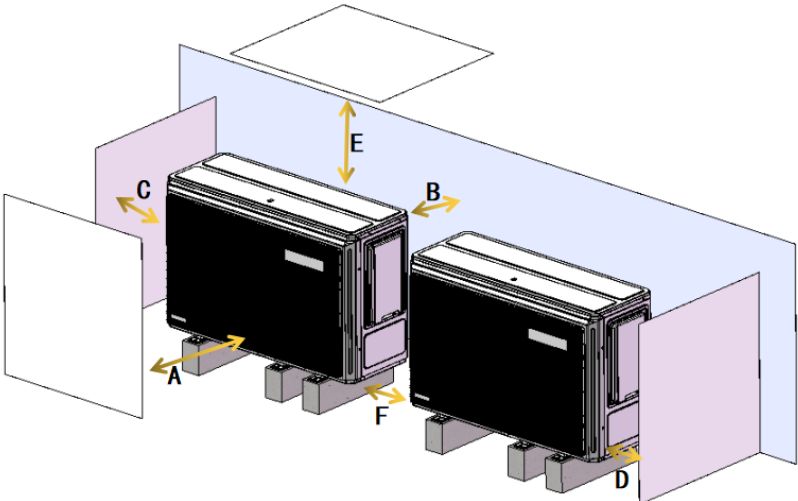
Select an installation site with sufficient space to facilitate transportation equipment's entry into and exit from the site. Do not install the unit in a place that is often used for work. If a lot of dust is produced on the installation site, protective measures (e.g. covering the unit with a dust shield) must be taken.

	<p>Warning:</p> <ul style="list-style-type: none">➤ Ask your distributor or qualified personnel to do the installation according to the Manual. Do not install the unit by yourself. Improper installation may result in water leakage, electric shocks, or fire;➤ Give full consideration to a strong wind, hurricane, or earthquake when performing a specified installation task. Improper installation work may cause the equipment to fall.
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Caution:

- Do not pile the units one above another;
- Do not hang the unit from the ceiling.

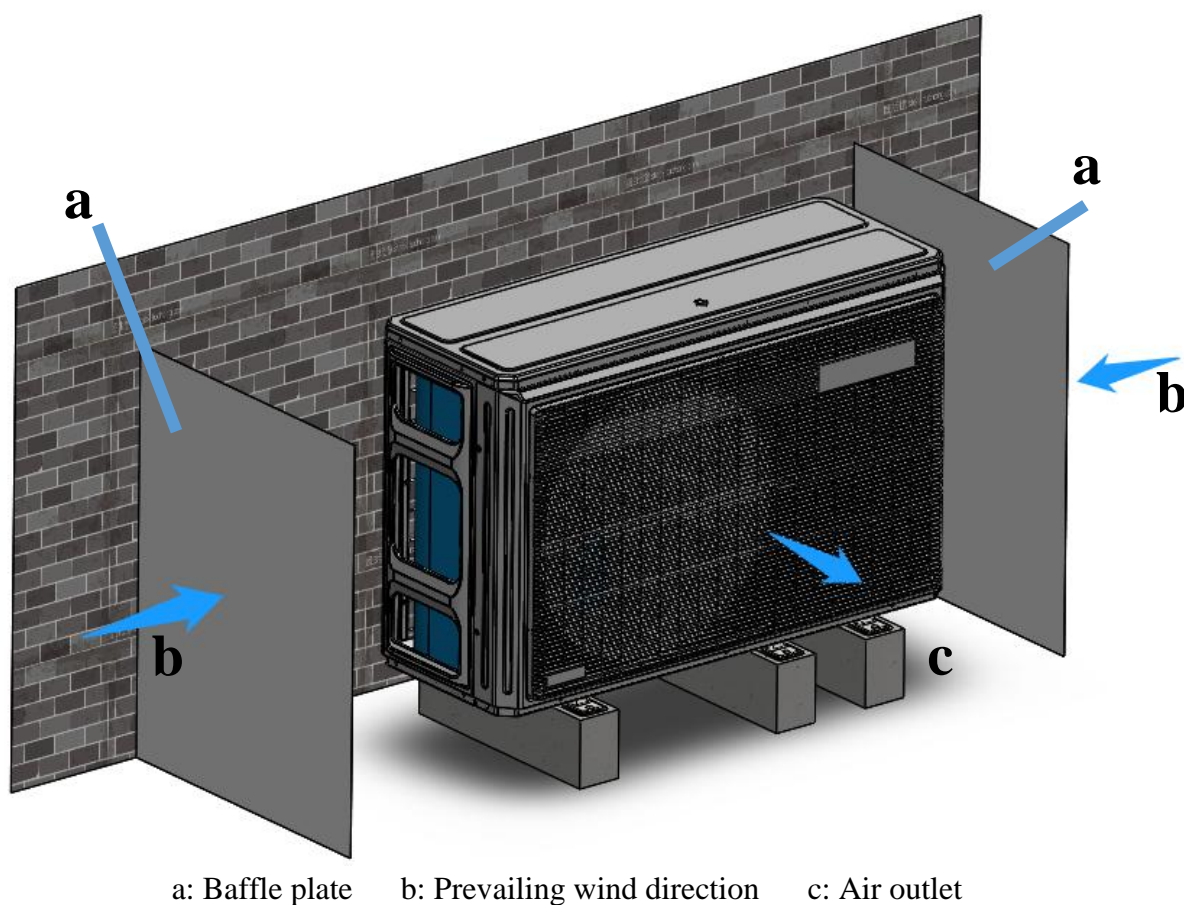
Installation Mode	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
<p>Single-unit installation</p> 	≥ 2000	≥ 500	≥ 500	≥ 500	≥ 1000	/
<p>Double-unit installation</p> 	≥ 2000	≥ 500	≥ 500	≥ 500	≥ 1000	≥ 1000

5.2 Requirements for equipment installation

A strong wind (≥ 18 km/h) blows into the air outlet of the outdoor unit, resulting in a short circuit (exhaust gas is inhaled). This may lead to the following results:

- The performance of the unit will be degraded;
- Acceleration of frosting occurs frequently during the heating operation;
- The operation is interrupted due to the decrease of low pressure or increase of high pressure;
- The fan breaks (if the strong wind blows on the fan continuously, the fan will rotate rapidly until it breaks);

We recommend installing a baffle plate to prevent the fan from coming into direct contact with a strong wind.



Caution:

Do not install the main unit in the following places

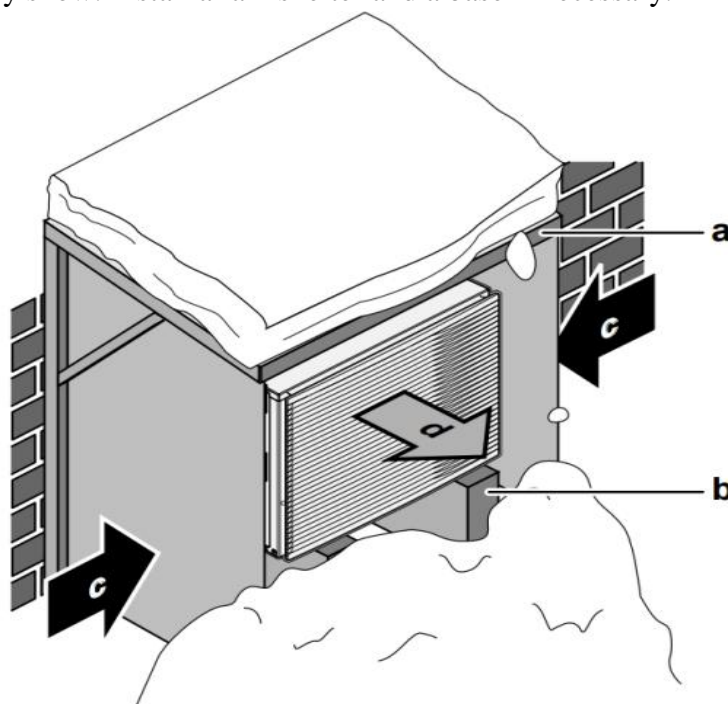
- A sound-sensitive area (e.g. a place that is near your bedroom or disturbs your neighbors). Note: Due to ambient noise and sound reflection, the sound power level measured may be higher than that referred to on the nameplate;
- A place where mineral oil mists, sprays, or vapors may be present in the atmosphere. Plastic components may deteriorate, come off, or cause water leakage;
- A place where flammable gases may leak, or a potentially explosive environment;
- A place with narrow space;
- A place with large fluctuation in voltage;
- On a vehicle or a vessel;



- | | |
|--|--|
| | <p>➤ A place with acidic or alkaline vapors. When the unit is to be installed by the seaside, make sure that the outdoor unit is not directly exposed to sea winds, lest it should be corroded by the air with high salinity and its service life should be shortened.</p> |
|--|--|

Additional requirements for the installation site of an outdoor unit in a cold climate.

- To protect the main unit, do not install it in a place where its suction side may be directly exposed to wind and snow;
- In any case, a free space of at least 150 mm shall be available beneath the unit;
- In an area that gets heavy snowfall, it is very important to select an installation site where accumulated snow will not affect the unit. If lateral snowfall is possible, make sure that the pipeline of the heat exchanger is not affected by snow. Install a rain shelter and a base if necessary.



a: Rain shelter b: Base c: Prevailing wind direction d: Air outlet



Caution:

- If extreme weather comes locally, and the equipment operates continuously in a low-temperature and high-humidity environment, we recommend checking the equipment once every 12 hours. If much ice is found on both the air outlet grille and the return air grille, remove the ice immediately to maintain the normal operation of the equipment.

Selection of the installation site in hot climate.

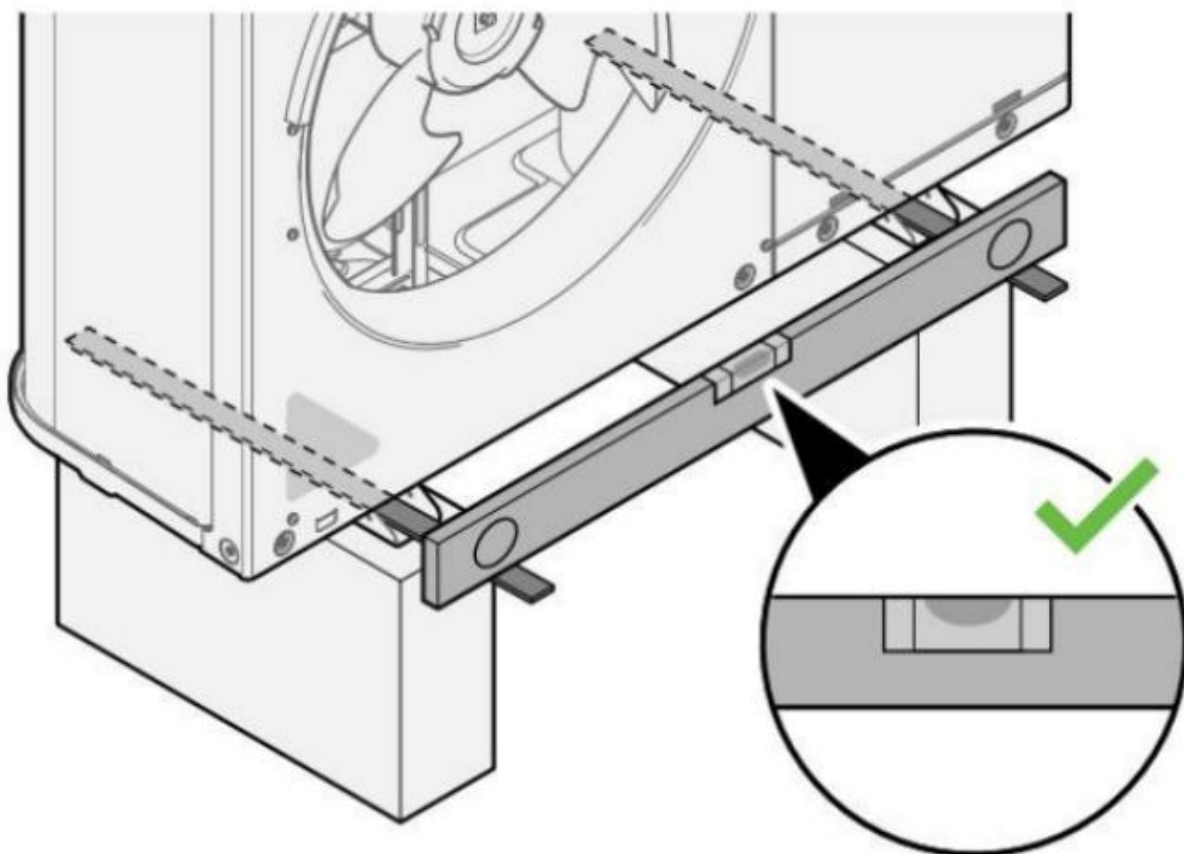
The outdoor temperature is measured by a thermistor on the equipment. Direct sunlight may cause the outdoor temperature detected by the equipment to be higher than the actual ambient temperature, and the protection system is triggered to make the equipment unable to operate, resulting in a poor user experience. The unit shall be installed in a cool place or under an awning to avoid direct sunlight, so that it will not be affected by solar heat.

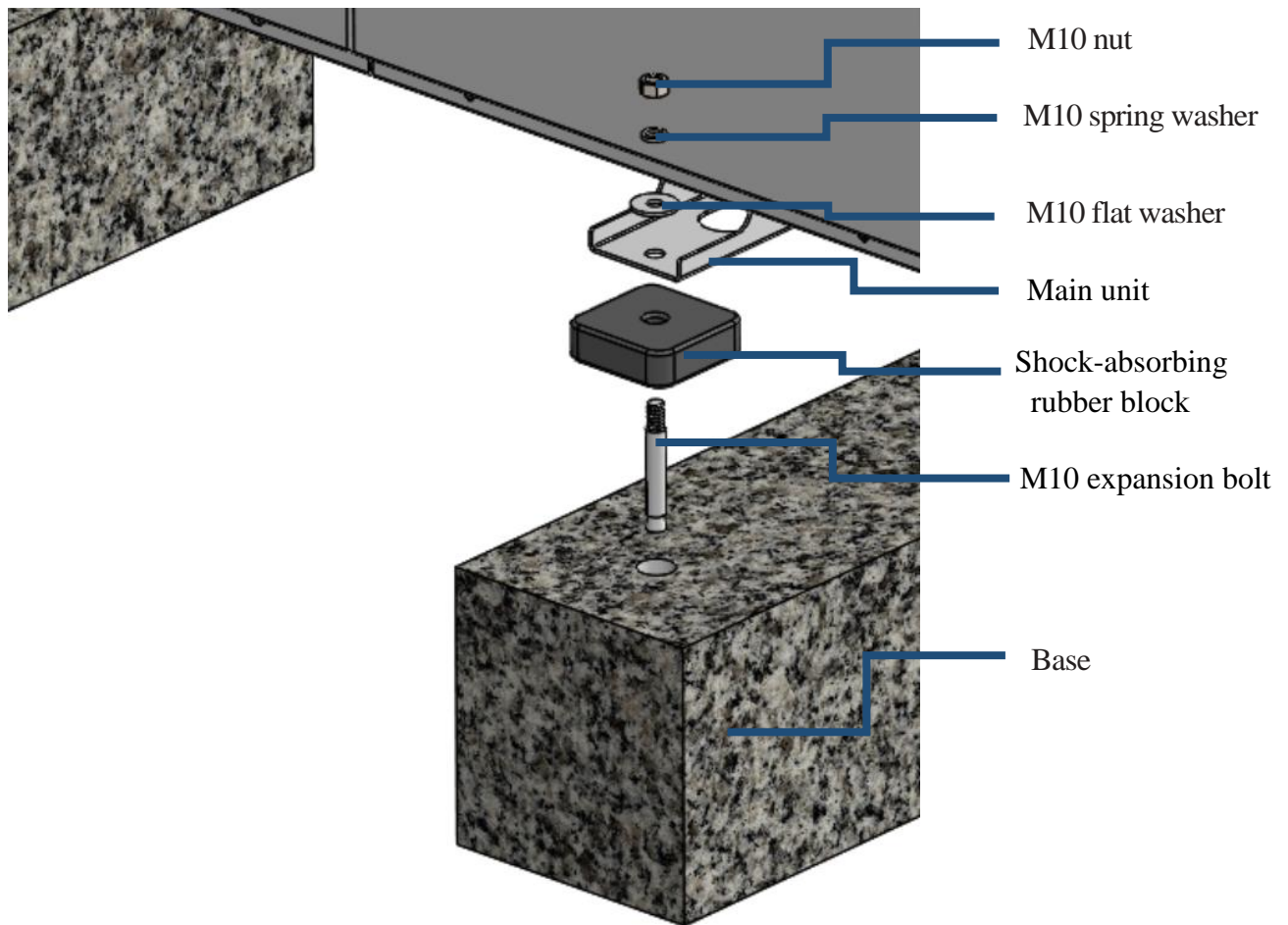


Warning:


In any case, the following principles shall be abided by:

- The equipment shall be installed on a base that is at least 150 mm tall;
- Before installation, inspect the base with a level instrument to ensure the levelness of the equipment;
- We recommend placing shock-absorbing rubber blocks between the equipment and the base;
- Fix the equipment to the base with 6 sets of M10 bolts. Note: The length of the part of each bolt inside the base shall be at least 20 mm.




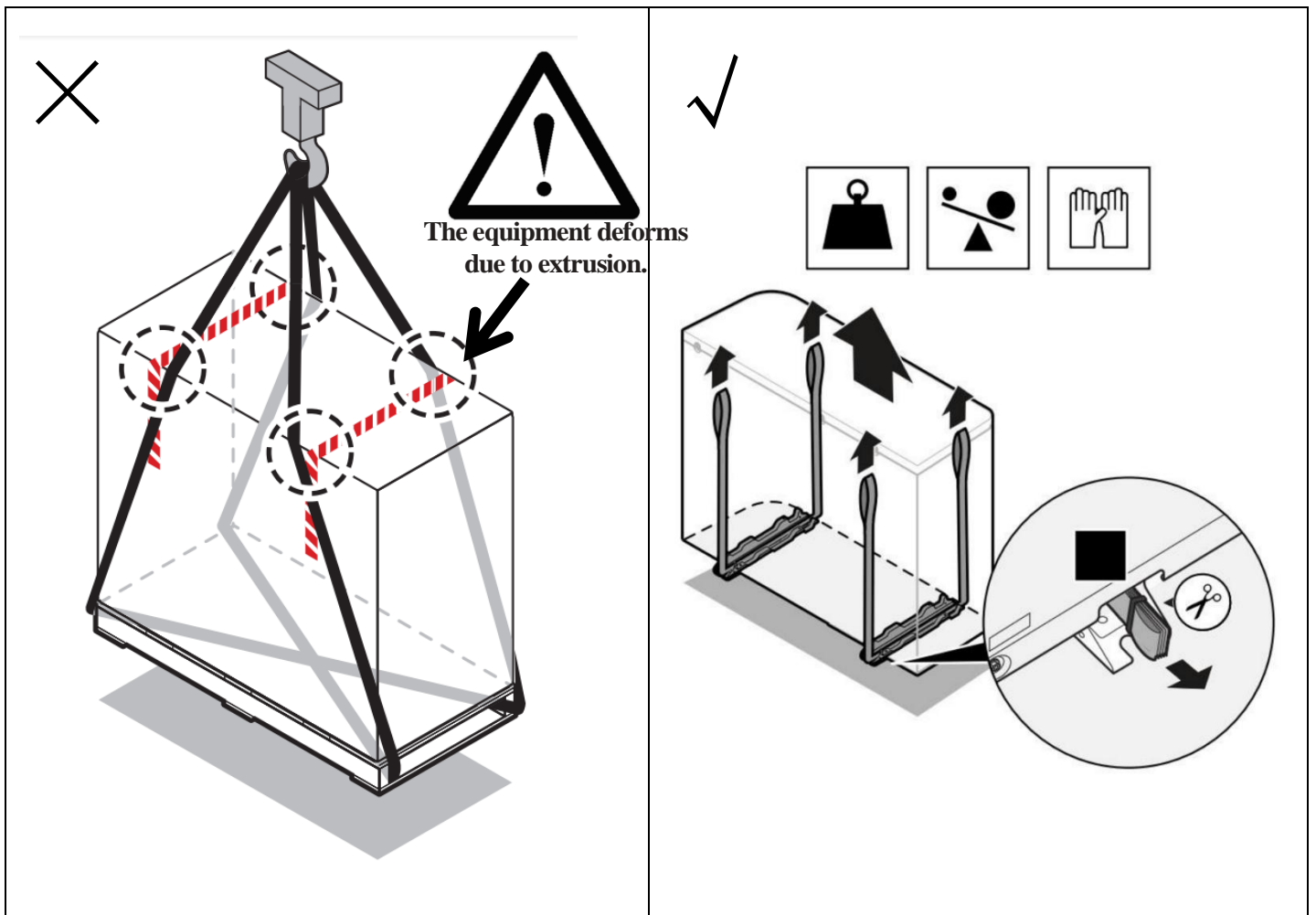


5.3 Requirements for equipment hoisting


	<p>Warning:</p> <ul style="list-style-type: none"> ➤ To avoid dangers, contact the personnel with relevant qualification certificates and ask them to hoist the equipment. ➤ The equipment must be hoisted according to the instructions in this Manual.
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① Handle the equipment with slings, and then place it on the structural frame for installation:

	<p>Warning:</p> <ul style="list-style-type: none"> ➤ After placing the equipment on the base, fix it with bolts immediately. Do not leave it unattended, lest an accident should occur.
--	---




② Fix the equipment to the structural frame for installation:




	<p>Warning:</p> <ul style="list-style-type: none"> ➤ After placing the equipment on the structural frame for installation, fix it with bolts immediately and then remove the slings. Do not leave it unattended, lest an accident should occur.
--	---

5.4 Requirements for water supply and drainage

- Make sure that condensate drains away quickly;
- Install the unit on the base to make a proper drainage system available, so as to avoid ice build-up;
- Build a drainage channel around the base to discharge the waste water outside the unit, lest the waste water should flow over the sidewalk, making it slippery and then causing people to slip and fall.

	<p>Caution:</p> <ul style="list-style-type: none"> ➤ If the equipment is installed in cold climate, take appropriate measures to prevent the discharged condensate from freezing. (We recommend installing a heater on the drain pipeline.)
---	---

5.5 Removal and installation of the front panel of the equipment

	<p>Warning:</p> <ul style="list-style-type: none"> ➤ To avoid injury, do not touch the air inlet or the aluminum fin of the equipment when it is in operation.
	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Do not do any work when the equipment is energized. All the work must comply with applicable local laws and regulations.
	<p>Caution:</p> <ul style="list-style-type: none"> ➤ When removing the terminal box's cover/the front panel, hold it to prevent it from falling and breaking.

1) Removal of the terminal box's cover

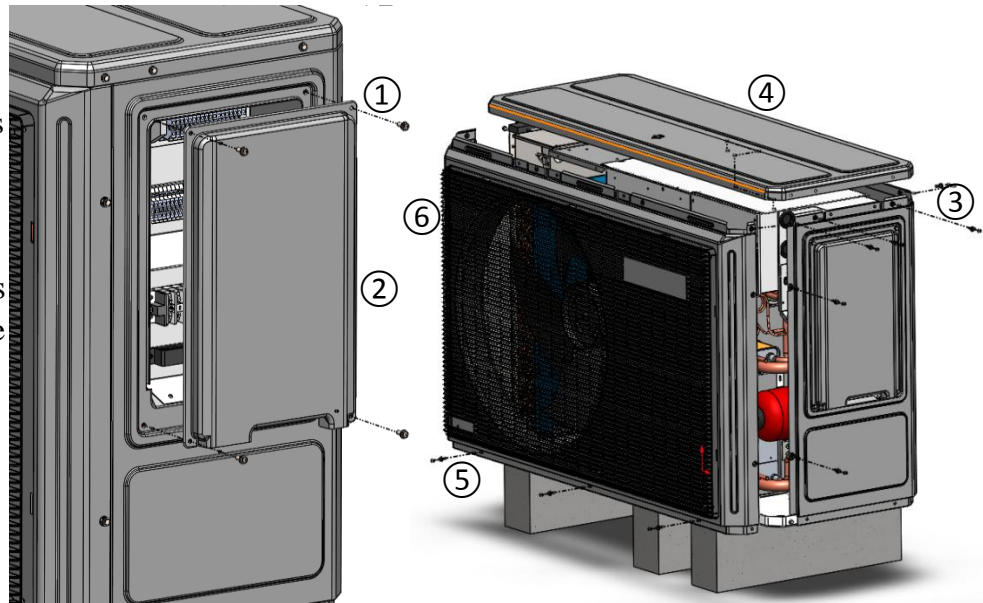
- ① Remove the four M4 screws fixing the terminal box's cover;
- ② Remove the terminal box's cover.

Installation of the terminal box's cover: Install it in the reverse order of its removal.

2) Removal and installation of the front panel


- ③ Remove nine M5 screws fixing the terminal box's cover;
- ④ Remove the top cover upwards;
- ⑤ Remove the seven M5 screws fixing the front panel;
- ⑥ Move the front panel forward.

Installation of the front panel: Install it in the reverse order of its removal.



Chapter 6 Installation of the Engineering Pipes


6.1 Requirements for the pipes


	<p>Caution:</p> <ul style="list-style-type: none"> ➤ All the work must be done by the personnel with relevant qualification certificates; ➤ Do not apply excessive force when connecting the on-site pipes and make sure that the pipes are aligned properly; ➤ A deformed pipe will cause an equipment failure; ➤ Connect the water inlet and outlet of the unit with flexible connectors; ➤ Install an antifreeze valve (to be supplied on the site) at each of the lowest points of the on-site pipes; ➤ The normally closed valves (near the inlet/outlet of the indoor pipes) can prevent all the water in the indoor pipes from being discharged when the antifreeze valves are opened; ➤ The pipes of the whole water circuit must be insulated for heat preservation (the insulating materials shall reach fire protection rating B1 and conform to the applicable local laws and regulations), lest condensate water should occur during the period of refrigeration operation to reduce the heating and refrigerating capacity; ➤ Pay attention to the flow direction of the valves.
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The outdoor water pipes must be external pipes insulated for heat preservation. Make sure that the external pipes are insulated according to the instructions to prevent heat leakage, freezing, condensate water, etc.

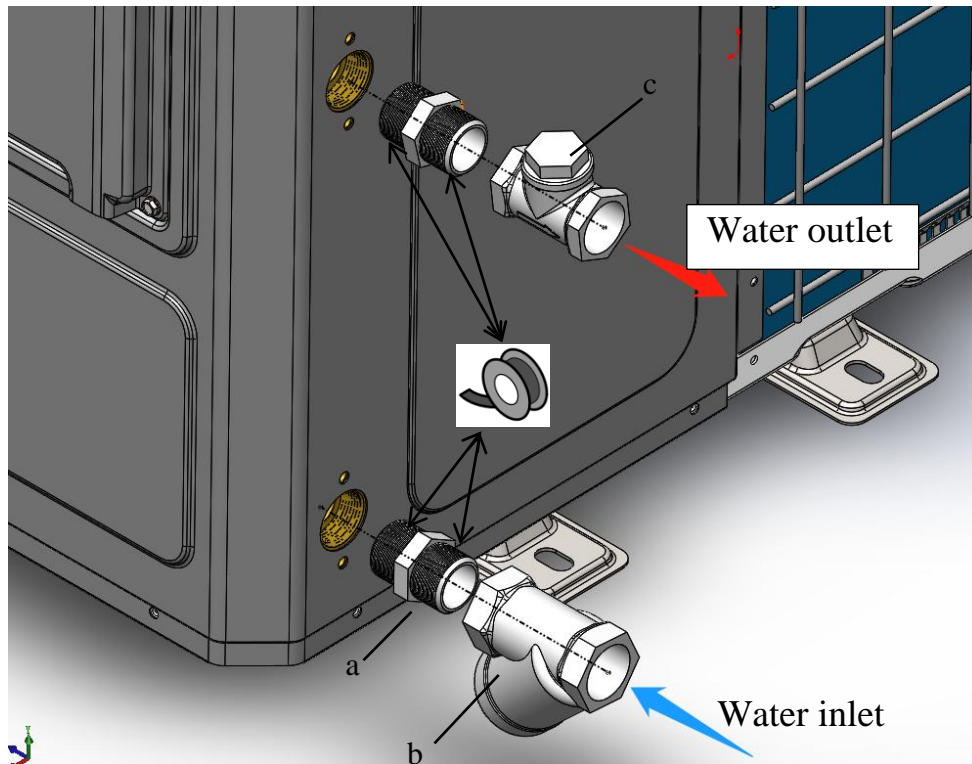
Note: For the pipes in free air, we recommend using the insulation thicknesses shown in the table below (thermal conductivity coefficient $\lambda = 0.039\text{W/mK}$) as a minimum.

Length of the pipe (m)	Minimum insulation thickness (mm)
<20	19
20~30	32
30~40	40
40~50	50


	<p>Warning:</p> <ul style="list-style-type: none"> ➤ If the ambient temperature is below 0 °C, add antifreeze of an appropriate type to the water system.
--	---

	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Install the filter properly at the water inlet of the equipment (the filter provided as an accessory has a 60-mesh screen); ➤ We recommend connecting the water inlets/outlets of all the water pumps with flexible connectors. ➤ <i>If ethylene glycol is added to water, do not install antifreeze valves. Possible consequence: ethylene glycol leaks from the antifreeze valves.</i>
--	---

	<p>Caution:</p> <ul style="list-style-type: none"> ➤ Inject water to get a water pressure of approximately 2.0 bar. Use the air exhaust valve to remove as much air as possible from the water circuit. The air in the water circuit may cause an equipment failure; ➤ The water pressure varies with the water temperature (the higher the water temperature, the larger the water pressure). However, the water pressure shall always be maintained above 0.5 bar to keep air out of the water circuit; ➤ The equipment may discharge excessive water through the pressure relief valve.
---	---



a: Counter threaded joint b: Filter c: One-way valve


	<p>Caution:</p> <p>Problems may occur if air, moisture, or dust enters the water circuit. Therefore, when connecting the water circuit, consideration shall be always given to the following matters:</p> <ul style="list-style-type: none"> ➤ Use clean pipes only; ➤ When removing burrs, keep the pipe ends down; ➤ Cover its end when a pipe passes through a wall to avoid the entry of dust; ➤ Seal the joints with a good thread sealant. The sealing must be able to withstand the system's pressure and temperature; ➤ When using a non-copper metal pipe, make sure to insulate the two materials against each other to avoid galvanic corrosion; ➤ Since copper is a soft material, connect the water circuit with appropriate tools. Inappropriate tools may cause damage to the pipes.
---	---


6.2 Use of ethylene glycol for freeze protection

Frosting can cause damage to the system. To prevent the hydraulic components from freezing, the system has special anti-freeze functions such as water pipe freeze protection and drainage, including starting the pumps at a low temperature. However, in case of a power failure, these functions cannot provide the system with sufficient protection.

The following operation can be performed to prevent the water circuit from freezing:

- 1) Add ethylene glycol to water: Ethylene glycol can lower the freezing point of the mixed liquid.
- 2) Install antifreeze valves: The antifreeze valves are used to discharge water from the system before the water freezes.

	<p>Warning:</p> <p>The system may be corroded due to the presence of ethylene glycol. The uncontrolled ethylene glycol becomes acidic under the influence of oxygen. The presence of copper and a high temperature will speed up this process. The ethylene glycol with uncontrolled acidity can erode metal surfaces and form a galvanic corrosion battery, thus causing serious damage to the system. Therefore, it is important that:</p> <ul style="list-style-type: none">➤ The water is properly treated by water experts with relevant qualification certificates;➤ Use ethylene glycol containing a corrosion inhibitor to counteract the acid formed during the oxidation of ethylene glycol;➤ Do not use automotive ethylene glycol because its corrosion inhibitor has a limited service life and contains silicates that can contaminate or clog the system.➤ <i>Do not use galvanized pipes for an ethylene glycol system because they may cause certain components in the ethylene glycol corrosion inhibitor to precipitate.</i>
--	--

	<p>Caution:</p> <ul style="list-style-type: none">➤ Ethylene glycol absorbs water from its surrounding environment. Therefore, do not add the ethylene glycol that has been exposed to air. The concentration of water will increase after the cover of an ethylene glycol container is removed, and then the concentration of ethylene glycol will be lower than the assumed value. As a result, the hydraulic components may freeze finally. Take preventive measures to minimize the contact of ethylene glycol with air.
---	---

① Types of ethylene glycol

The type of ethylene glycol to be used depends on whether there is a domestic hot water tank in the system:

If	Then
There is a domestic hot water tank in the system	Only propylene glycol (a) will be used.
There is no domestic hot water tank in the system	Either propylene glycol (a) or ethylene glycol can be used.

- (a) Propylene glycol, including the necessary inhibitors, is classified as Class III 7 according to EN1717.

Caution: Both ethylene glycol and propylene glycol are toxic.

② Concentration of the ethylene glycol required

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

Add ethylene glycol according to the table below.

Expected minimum outdoor temperature	Anti-bursting concentration	Anti-freezing concentration
-5 °C	10%	15%
-10 °C	15%	25%
-15 °C	20%	35%
-20 °C	25%	—
-25 °C	30%	—
-30 °C	35%	—



Caution:

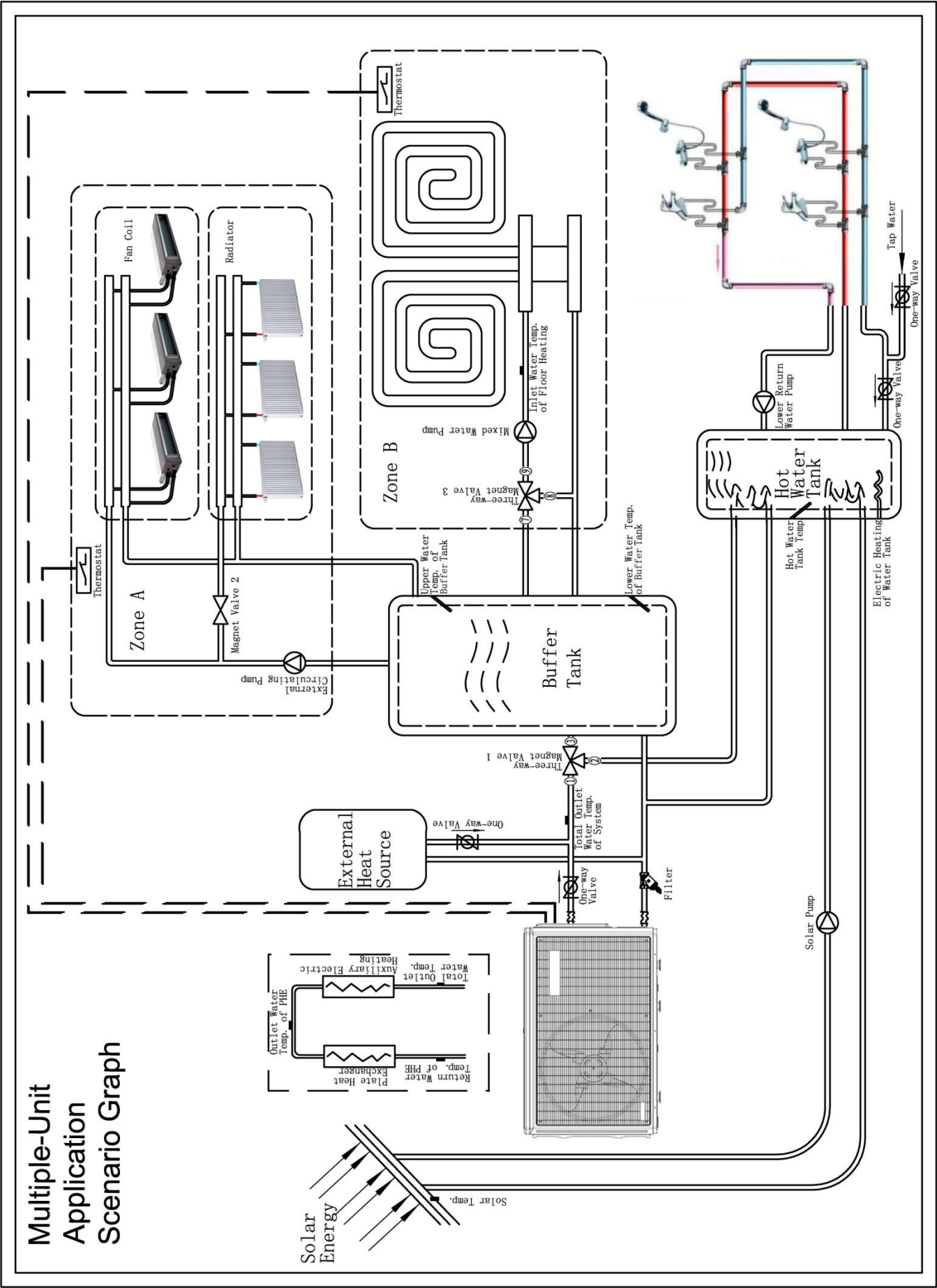
- Anti-bursting concentration: Ethylene glycol can prevent the pipes from bursting, but cannot prevent the liquid inside the pipes from freezing.
- Anti-freezing concentration: Ethylene glycol can prevent the liquid in the pipes from freezing.




Caution:


- The concentration required may vary with 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.
- The concentration of the ethylene glycol added shall not exceed 35%.
- If the liquid in the system freezes, it is impossible to start the pump. Note that if you only prevent the system from bursting, the liquid in the system may still freeze.
- If the water in the system is at rest, the system is likely to freeze and become damaged.

6.3 Application scenario graph (the application example given below is for reference only)



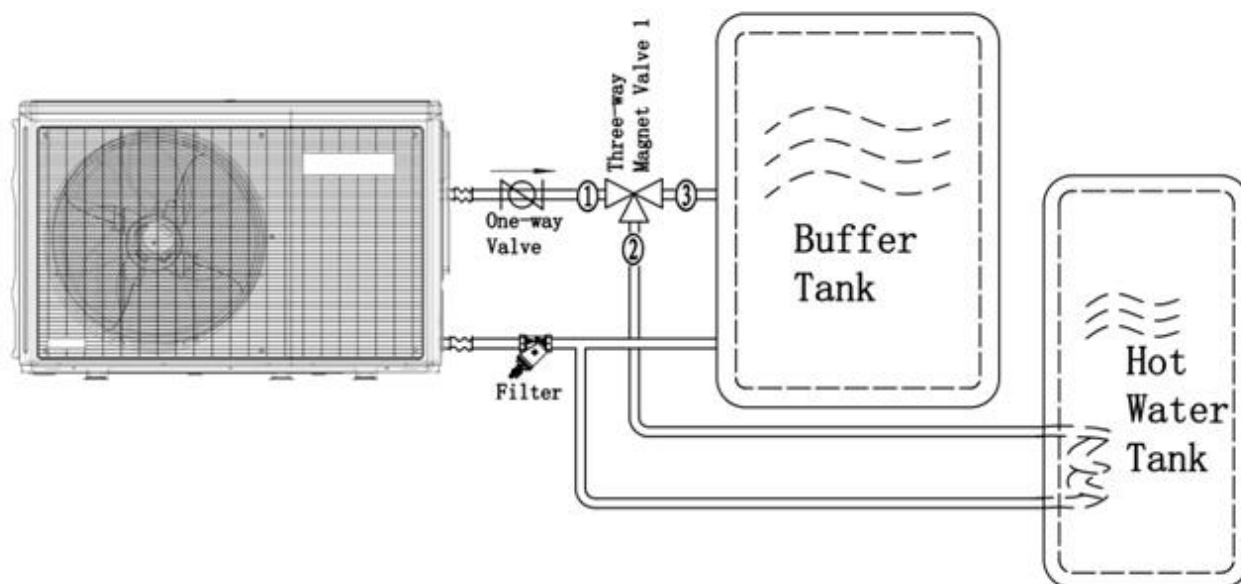
	<p>Caution:</p> <ul style="list-style-type: none"> ➤ Please be sure to install one-way valves at the water outlets of the external heat sources and the heating pumps, lest short circuit of the water circuit should occur to result in self-circulation between the external heat sources and the heating pumps and a poor user experience; ➤ Be sure to install a one-way valve at the return water inlet of the hot water tank to avoid heat loss of the hot water tank. ➤ Be sure to install a one-way valve at the municipal tap water inlet to avoid water pollution caused by backflow. ➤ The pipes of the whole water circuit must be insulated for heat preservation, lest condensate water should occur during the period of refrigeration operation to reduce the heating and refrigerating capacity.
---	---

6.4 Instructions on the installation of three-way magnet valves

	<p>Caution:</p> <ul style="list-style-type: none"> ➤ Three-way magnet valves play a key role in the water system. Realize the switch-over of functions in the system by changing the flow direction of the water circuit with the three-way magnet valves. Be sure to read the instructions on three-way magnet valves carefully and install them cautiously, lest the three-way magnet valves should be installed in the wrong direction to affect the normal operation of the equipment and cause unnecessary losses; ➤ All the valve symbols in the Manual are schematic, and the appearance and shape of the valves shall be subject to the actual models selected.
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➤ Three-way magnet valve 1

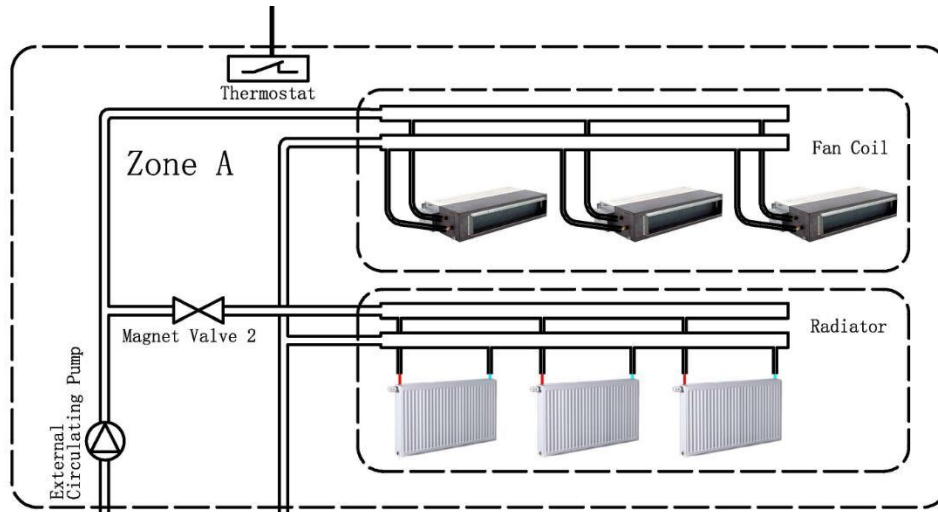
Three-way magnet valve 1 is used to control the direction of the water circuit between the heating pump and the hot water tank and the buffer tank in the water system. By switching over three-way magnet valve 1, you can connect the equipment to the hot water tank or the buffer tank, as shown in the figure below:



- When three-way magnet valve 1 OFF is turned on, three-way magnet valve magnet 1 will be switched over to the direction ①=>②, and the heating pump is connected to the hot water tank, so as to heat the latter;
- When three-way magnet valve 1 ON is turned on, three-way magnet valve magnet 1 will be switched over to the direction ①=>③, and the heating pump is connected to the buffer tank, so as to cool down and heat the latter.

➤ Magnet Valve 2

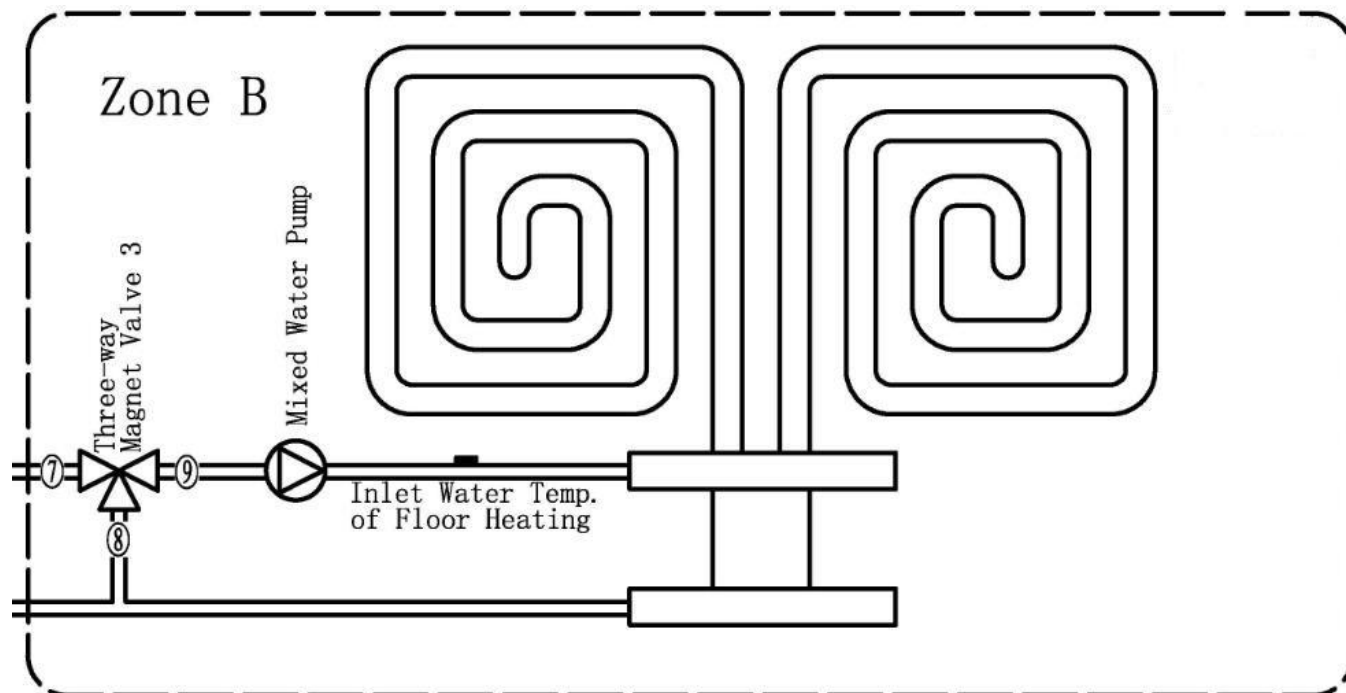
Magnet Valve 2 is used to control the direction of the water circuit in Zone A in the water system. By switching over Magnet Valve 2, you can connect the buffer tank to the radiator or disconnect them from each other, as shown in the figure below:



- When Zone A needs heating, the heating pump is switched over to the heating mode. At this moment, Magnet Valve 2 is turned on, and the buffer tank is connected to both the radiator and the fan coil to heat Zone A;
- When Zone A needs cooling, the heating pump is switched over to the cooling mode. At this moment, Magnet Valve 2 is turned off, and the buffer tank is connected only to the fan coil to cool Zone A.






➤ Three-way magnet valve 3

Three-way magnet valve 3 is used to control the direction of the water circuit in Zone B in the water system. By switching over three-way magnet valve 3, you can adjust the temperature of Zone B, as shown in the figure below:



- If Zone B needs heating, three-way magnet valve 3 OFF is turned on, and three-way magnet valve 3 is switched over to the direction ⑦=>⑨, the buffer tank is connected to the floor heating to heat Zone B;
- If Zone B does not need heating, three-way magnet valve 3 ON is turned on, and three-way magnet valve 3 is switched over to the direction ⑧=>⑨, the buffer tank is disconnected from the floor heating, and the floor heating achieves self-circulation.

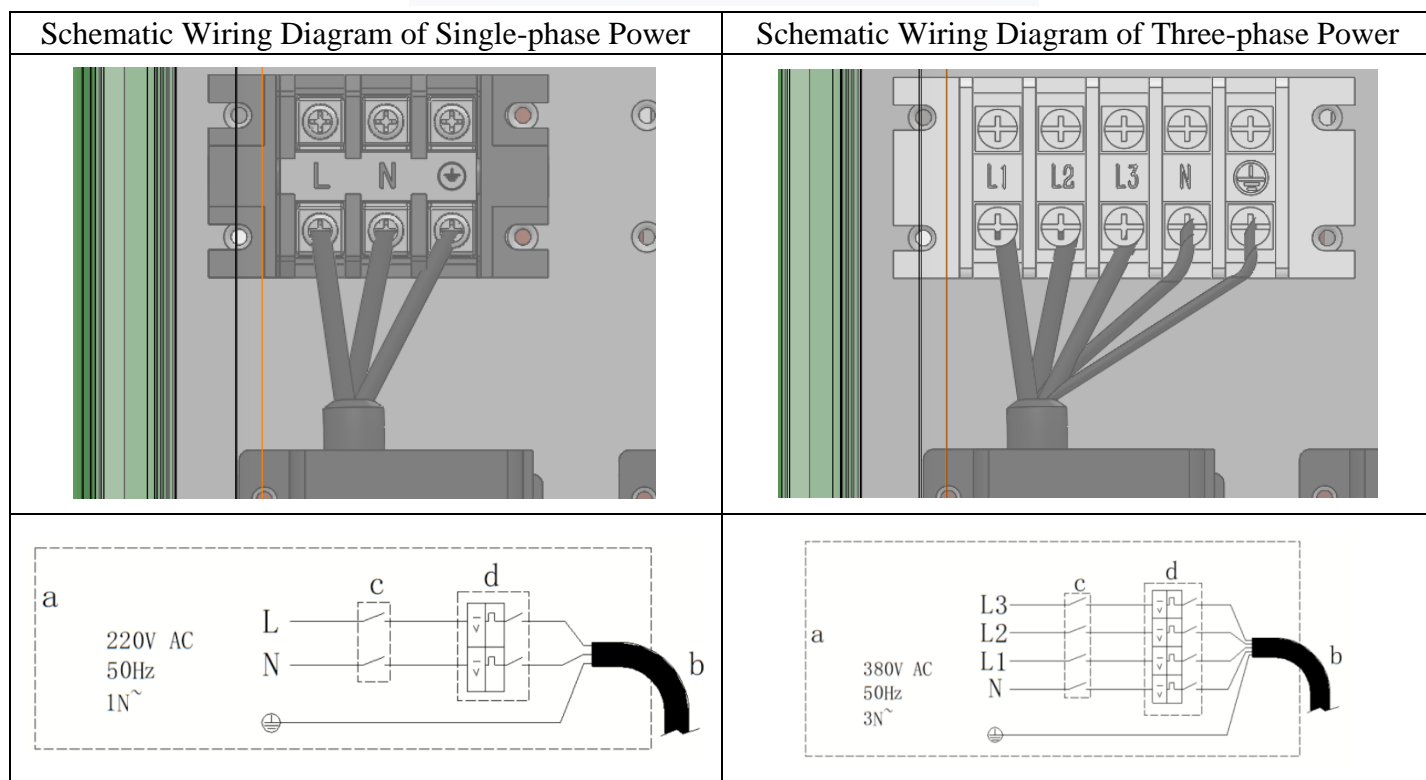
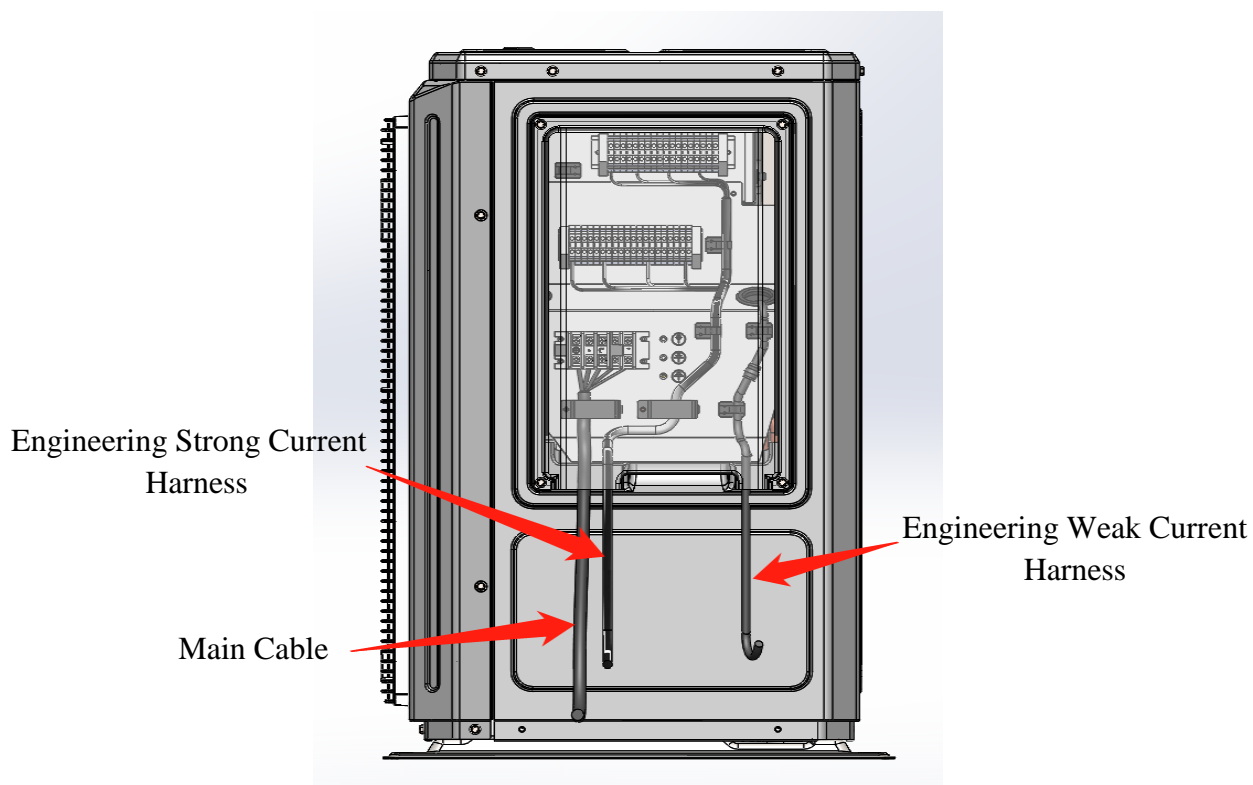
Chapter 7 Electrical Installation

	<p>Warning: Electric shock hazard</p> <ul style="list-style-type: none"> ➤ All wires must be connected by authorized electricians with relevant qualification certificates, and must comply with the applicable local laws and regulations; ➤ All cables and electrical components must comply with the local laws and regulations.
	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Always use multi-core cables as power cables; ➤ Do not push the extra cables into or place them in the equipment; ➤ Make sure that all electrical appliances are grounded for protection and must comply with the applicable laws and regulations; ➤ All wires must be connected by authorized electricians and must comply with the applicable laws and regulations.
	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Any power cord damaged must be replaced by the manufacturer, its service agent, or a person with a relevant qualification certificate to avoid the occurrence of any hazard; ➤ Install the fuses or circuit breakers as required; ➤ Do not use tape wires, stranded wires, extension wires, or connections from the star system, for they may cause overheating, electric shocks, or fire; ➤ Cables shall be secured with cable ties so that they will not come into contact with sharp edges or pipes, especially at the high voltage side; ➤ Before switching on the power supply or repairing the outdoor unit, make sure that the fan grille covers the fan to avoid the occurrence of any hazard.
	<p>Caution:</p> <ul style="list-style-type: none"> ➤ The distance between the strong and weak current systems shall be at least 50 mm; ➤ During the installation of the field power supply or the selection of cables, a sufficient length of cable shall be reserved, so that it is possible to open the switch box and get access to other components during the period of service.
	<p>Caution:</p> <ul style="list-style-type: none"> ➤ 30 mA high-speed circuit breakers shall be used as earth leakage circuit breakers and must comply with the applicable laws and regulations; ➤ Be sure to use a dedicated power supply. Do not use a power supply to be shared with other equipment.

- ❖ **Power cords of different diameters must not be connected to the same power supply terminal (a loose power cord will lead to abnormal heating).**

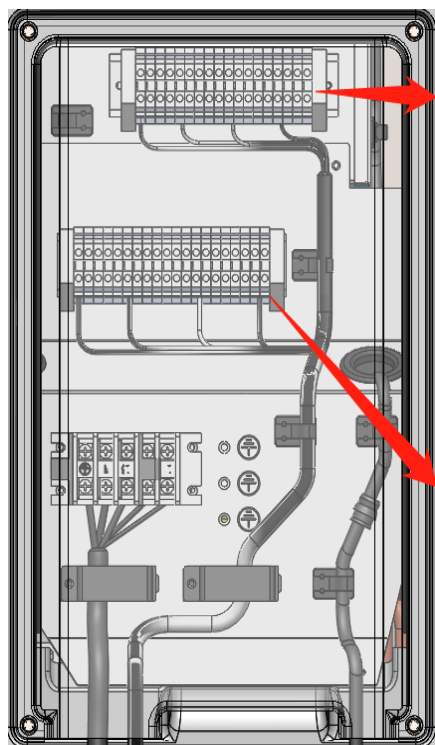


7.1 Schematic wiring diagram of the equipment's main power supply:

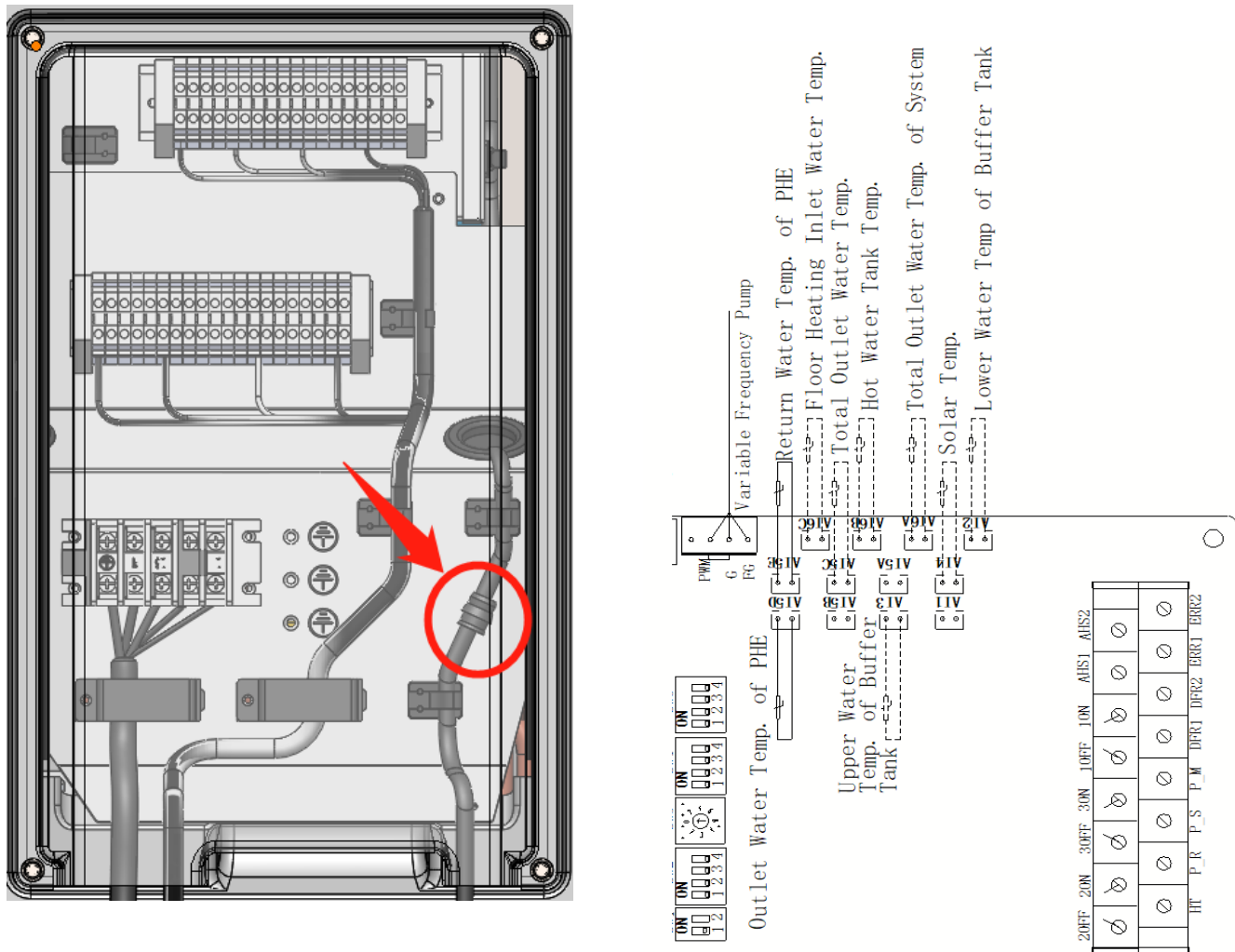


a: Field Cabling b: Main Cable of Equipment c: Earth Leakage Circuit Breaker d: Overload Fuse

- ❖ *Specification of the fuses for the indoor and outdoor unit boards: 10A/250V;*
- ❖ *Specification of the fuses for frequency converters: 30A/250V.*

[illegible][illegible]

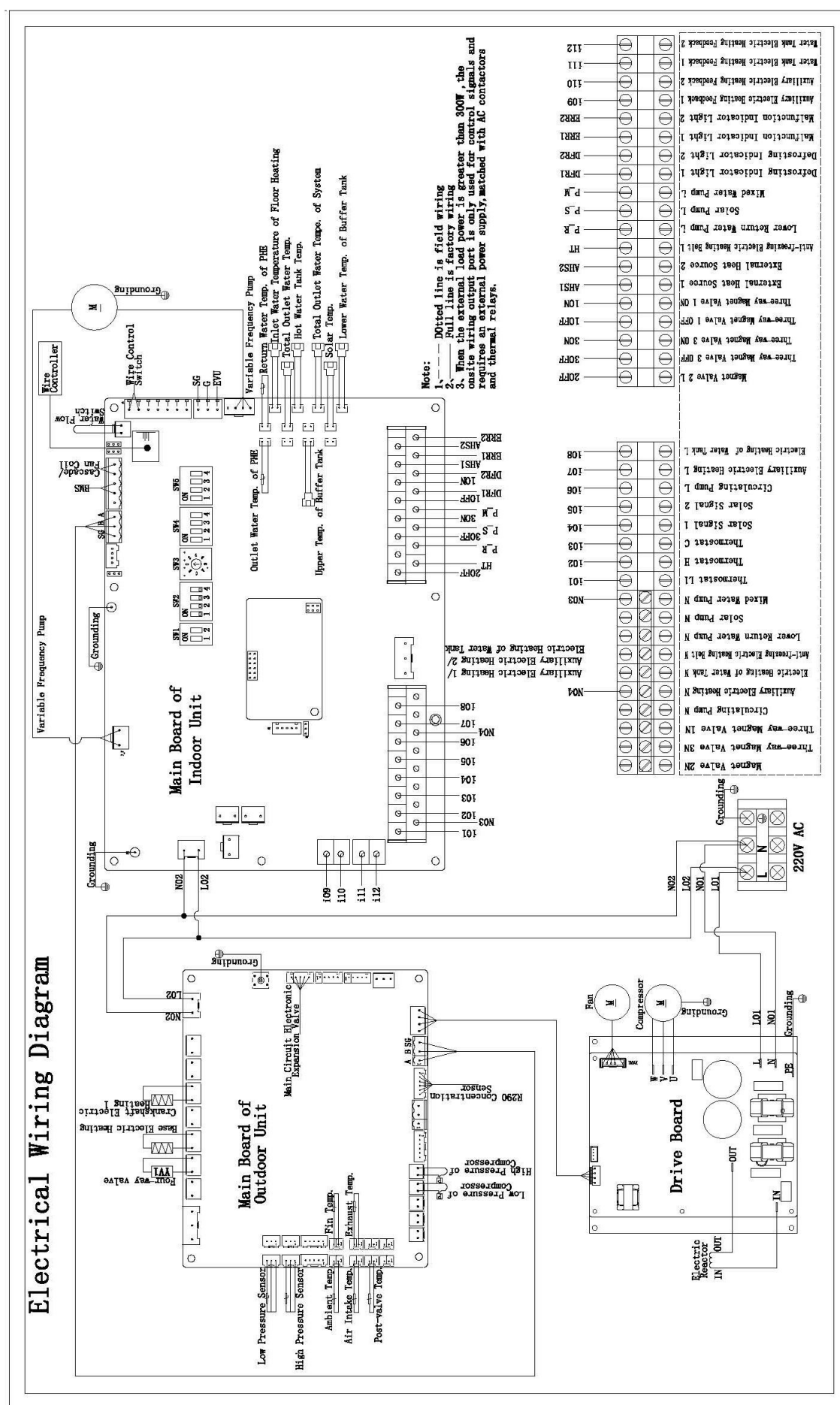
7.3 Schematic wiring diagram of the equipment's engineering weak current system:



The temperature sensing probes required by the system can be found in the terminal box on the right side of the equipment, and they shall be connected to the temperature sensors in the accessory package, as shown in the figure above.

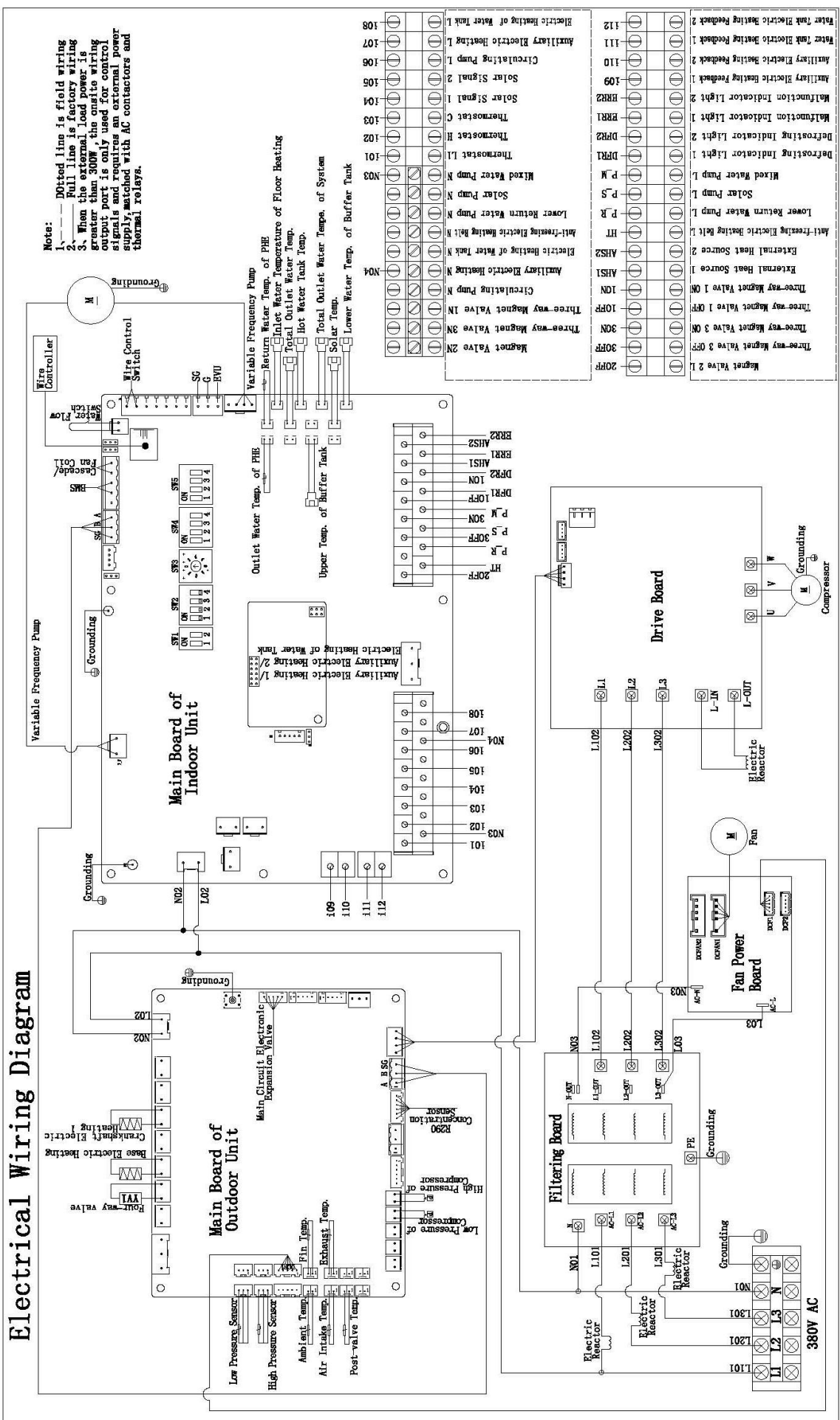
7.4 Electrical wiring diagram

Equipment Model: **WLRK-6(8/10) I BM/B3**





Electrical Wiring Diagram



Chapter 8 Instructions on the Display's Operation

8.1 Description of the icons on the display



A total of 6 touch buttons:

Button Icon	Meaning	Name
	Used to switch on and off the equipment	[Switch on/off]
	Used to enter the query menu or return to the previous level	[Query/Return]
	Used to page up or adjust the parameter value	[Up]

V	Used to page down or adjust the parameter value	[Down]
⚙️	Used to enter the setting menu or confirm	[Set/Confirm]
M	Used to set the mode	[Mode]

The main interface varies with the application scenario. The possible scenarios are described below:

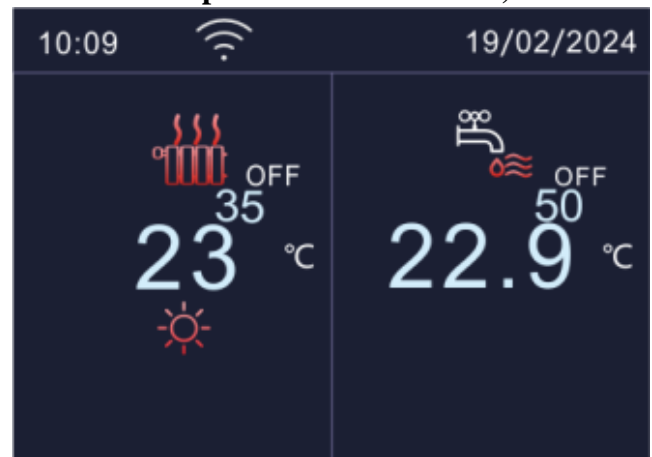
Main interface 1 (Single-Zone Water Temperature + Hot):



The system includes the air conditioning water temperature control and domestic hot water control in a single zone.

Prompt: All the icons in the Manual are used for explanation and may differ from the actual content on the screen.

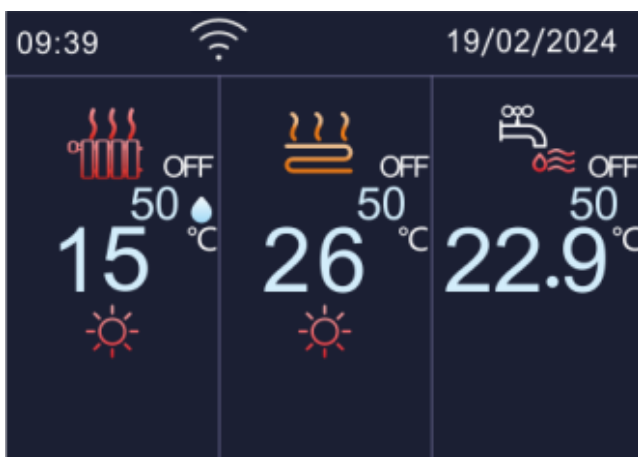
Main interface 2 (Single-Zone Room Temperature + Hot Water):



The system includes the air conditioning room temperature control and the domestic hot water control in a single zone.

Prompt: The display shall be installed indoors to detect the room temperature.

Main interface 3 (Two-Zone Mixed + Hot Water):



The system includes the air conditioning water temperature (Zone A)+ the room temperature (Zone B) control (Zone A can be heated or cooled, and Zone B can only be heated) and the domestic hot water control in two zones.

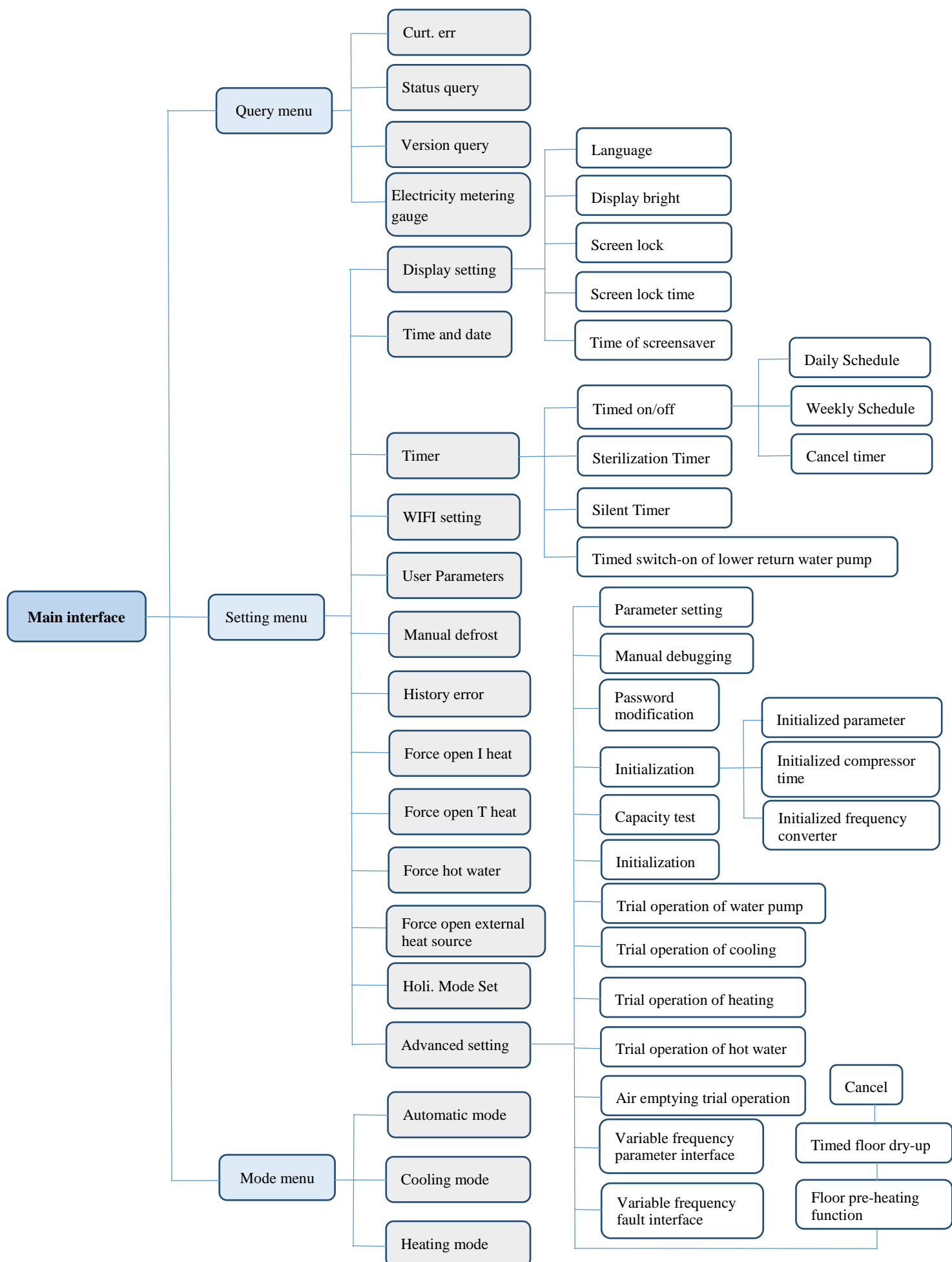
Main interface 4 (Two-Zone Water Temperature + Hot Water)



The system includes the air conditioning water temperature control (Zone A can be heated or cooled, and Zone B can only be heated) and the domestic hot water control in two zones.


Caution: When controlling with the thermostat, the unit can only control the water temperature.

8.2 List of menus





8.3 Basic usage

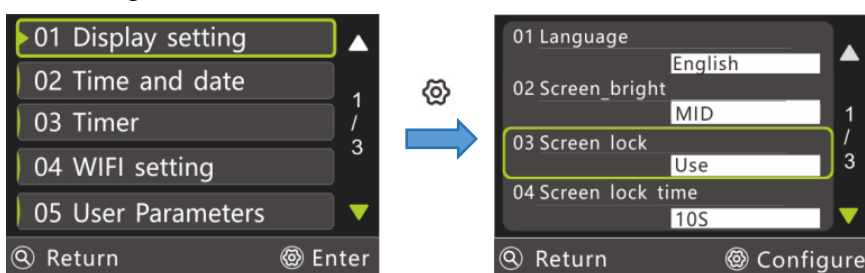
8.3.1 Screen unlock

If the “screen lock” icon appears on the screen, the display will not operate; press and hold  button for three seconds, the display is operable, as shown in the figures below:







Enabled/disabled setting of the lock screen function:





On the main interface, click  to enter the setting menu interface, find “Display setting” and click  to enter the adjustment of [Setting of screen lock function].

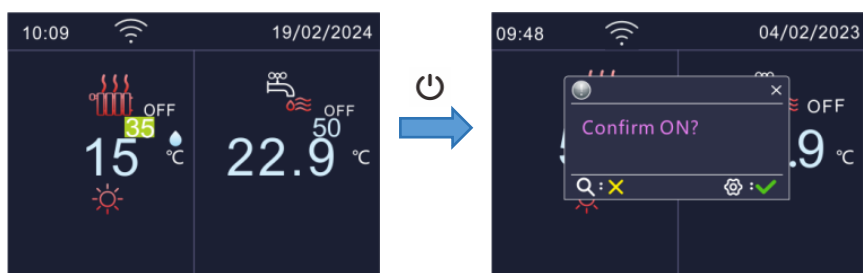


8.3.2 Switch-on/off

- Switch on/off the air conditioning zone on the display

On the main interface, click  or  button to select the air conditioning zone to be switched on/off, and then press  button and click  to confirm the switch-on/off of the cooling or heating in the corresponding air conditioning zone.

Take the water temperature in a single zone as an example. First press  or  button to select the air conditioning zone, and then press  button and click  to confirm the switch-on of air conditioning zone A, as shown in the figures below:



- Switch on/off the air conditioning zone on the thermostat

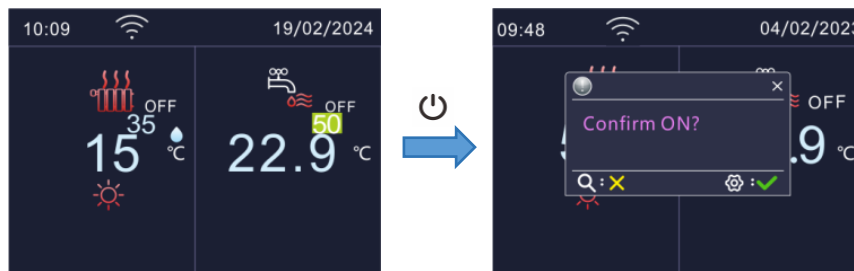
[Thermostat control] If the “Single-zone mode switch-over” is selected, the operating mode of Zone A and the switch-on/off are controlled by the thermostat.

[Thermostat control] If the “Single-zone switch-on/off” or the “Two-zone switch-on/off” is selected, the switch-on/off of the air conditioning zone is controlled by the thermostat, and the operation mode of the air conditioning zone is set by the display.

- Switch on/off the domestic hot water on the display

First, make sure that the [Hot water function] is set to “Enabled”; otherwise, it is impossible to switch on the hot water.

On the main interface, click ^ or v button to select the hot water zone, and then press U button and click ⚙️ to confirm the switch-on/off of hot water production, as shown in the figures below:



8.3.3 Temperature adjustment

On the main interface, click ^ or v button to select the zone where the temperature needs be adjusted, and click ⚙️ and the temperature adjustment box will pop up, as shown in the figures below:



Here, click ^ or v button to adjust the temperature value, and then click ⚙️ to save the adjusted temperature value, as shown in the figures below:

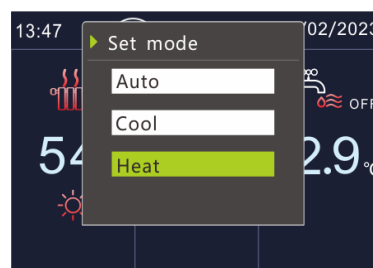


8.3.4 Setting of the space modes

There are three space modes in total:

- Cooling mode
- Heating mode
- Automatic mode

On the main interface, click M button and the space mode setting window will pop up, as shown in the figure below:

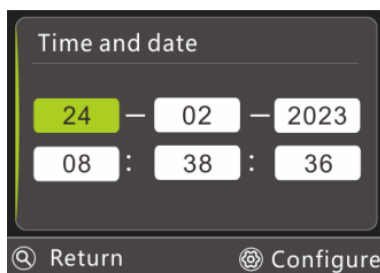


Click ^ or v button to select the mode to be set, and then click ⚙️ for confirmation, and the setting is successful; if Q is clicked, the pop-up window is closed directly, and the mode setting is cancelled.

8.3.5 Operation of time setting

All time modifications (e.g. year, month, day, hour, minute, second) on the display are made in the same way; here, the modification of the year in the “Time and date” is taken as an example.

Enter the “Time and date” interface through the path by reference to 8.5.2 “Time and date”.



Click ^ or v to select the option “Year”, and click ⚙️, and the year modification box will pop up;



Click ^ or v to modify the year value; then click ⚙️ to save the modification or click Q to close the pop-up window directly, and the modification is not saved.

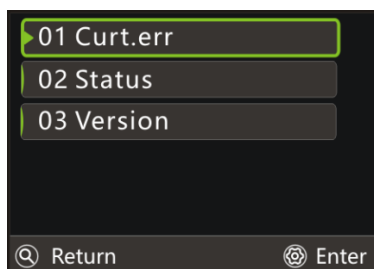
8.4 Query menu

The query menu has 3 interfaces in total:

- Curt. err (current error) interface
- Status query interface
- Version query interface

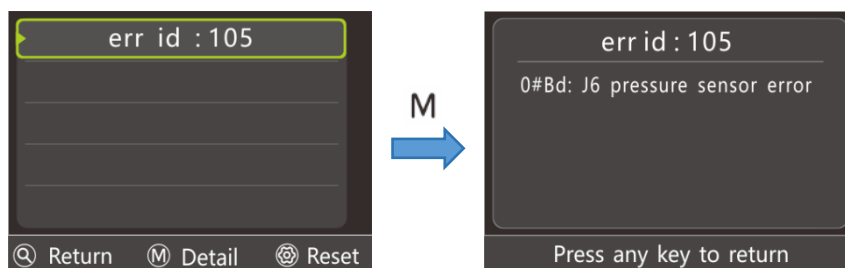
8.4.1 Fault query interface

On the main interface, click Q to enter the query interface.



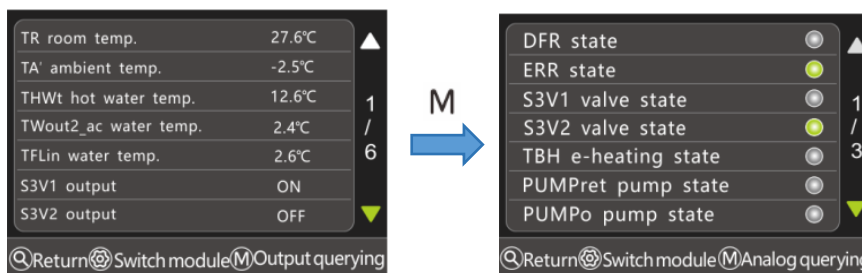
You can see three options including current error query, status query, and version query. Move via ^ or v, and click ⚙️ to enter the options.

In case of any error, the current error interface is as shown in the figure below (click ⚙️ to eliminate the error that meets the reset condition). Click M to see the specific meaning of the error ID.



8.4.2 Status query interface

When you need to view the current information about the unit (e.g. temperature, electrical components enabled, etc.), you may enter the status query interface for viewing. Click **M** to switch over to view the output querying status information (if the circle on the right side of a component is green, it indicates that there is an output from the component), and click **M** again to return to the analog querying status information.



8.4.3 Version query interface

When handling some after-sales problems, to have the problems identified accurately, you need to provide the software information used by the unit controller, which can be viewed on the version query interface.

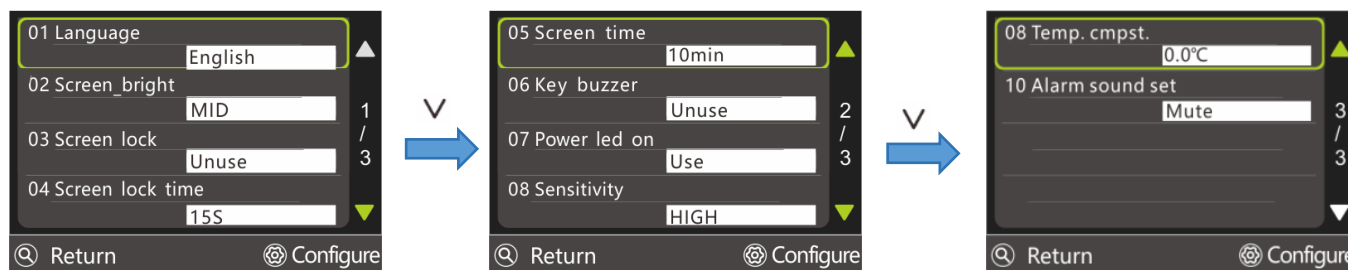


8.5 Setting menu

8.5.1 Display setting

With the “Display setting”, you can set the needs for daily use, such as language, screen brightness, use of screen lock function, and key buzzer use. Enter the “Display Setting” interface through the following path.

“Main interface” > “Setting menu” > “Display setting”

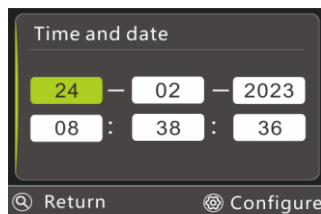


Caution: If the “Screensaver Time” is set to 0, there is no screensaver function available, and the screen remains on normally.

8.5.2 Time and date

If the time and date are inconsistent with the actual time and date, you can modify the time and date through the following path.

“Main interface” > “Setting menu” > “Time and date”



Please refer to 8.3.5 “Operation of Time Setting” for time modification.

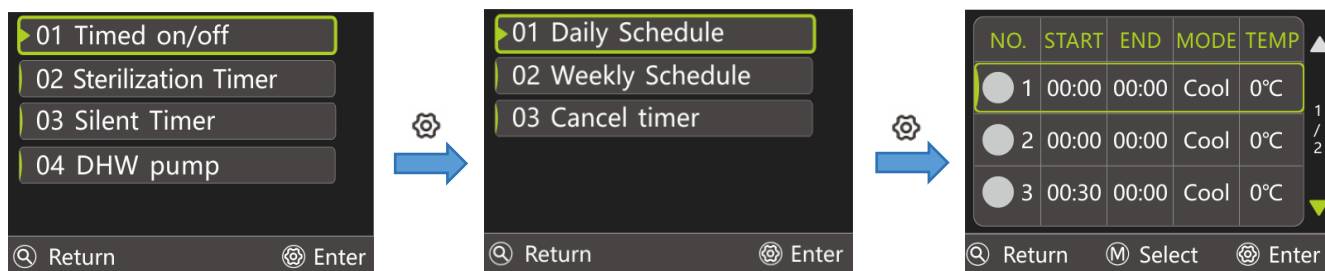
8.5.3 Timer setting

8.5.3.1 Timed on/off

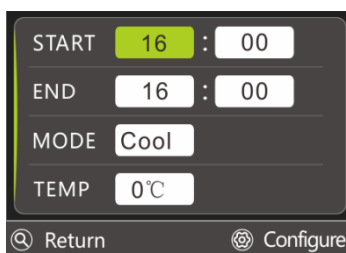
● Daily timed on/off

On the main interface, click to enter the setting menu and select “Timer”.

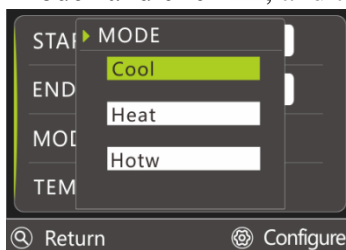
Click to enter the timer menu, select “Timed On/off” and click to enter the timed on/off menu, select “Daily Schedule” and click to enter the daily schedule setting interface.



Click or to move and browse; click to use or cancel this group of timers; and click to enter the setting interface of this group of timer settings (please refer to 8.3.5 “Operation of Time Setting” for time setting in detail).



Click or to move the cursor to “Mode” and click , and the corresponding window will pop up.

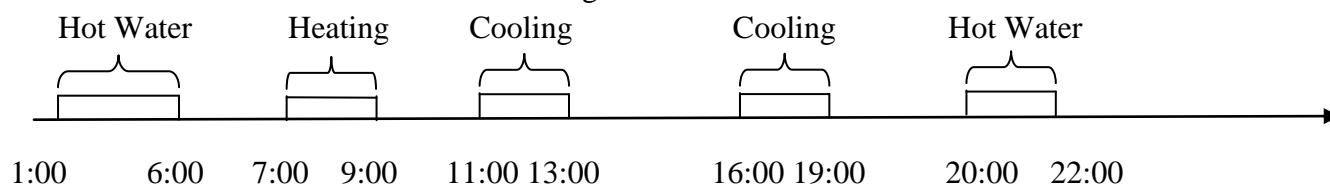


Click or to adjust the set value. Now, if you click , the pop-up window will be closed, and the modification will not be saved; if you click , the setting will be saved, and the pop-up window will be closed.

Example: Five groups of timer settings are set according to the table below

No.	Start Time	End Time	Mode	Temperature
1	1:00	6:00	Hot water	50 ℃
2	7:00	9:00	Heating	30 ℃
3	11:00	13:00	Cooling	20 ℃
4	16:00	19:00	Cooling	20 ℃
5	20:00	22:00	Hot water	50 ℃

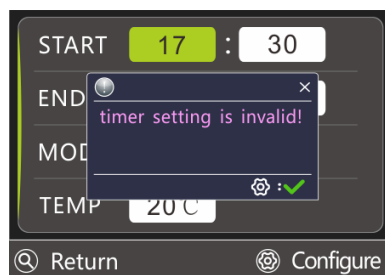
The unit is controlled as shown in the figure below.



The operations of the unit are described as follows:

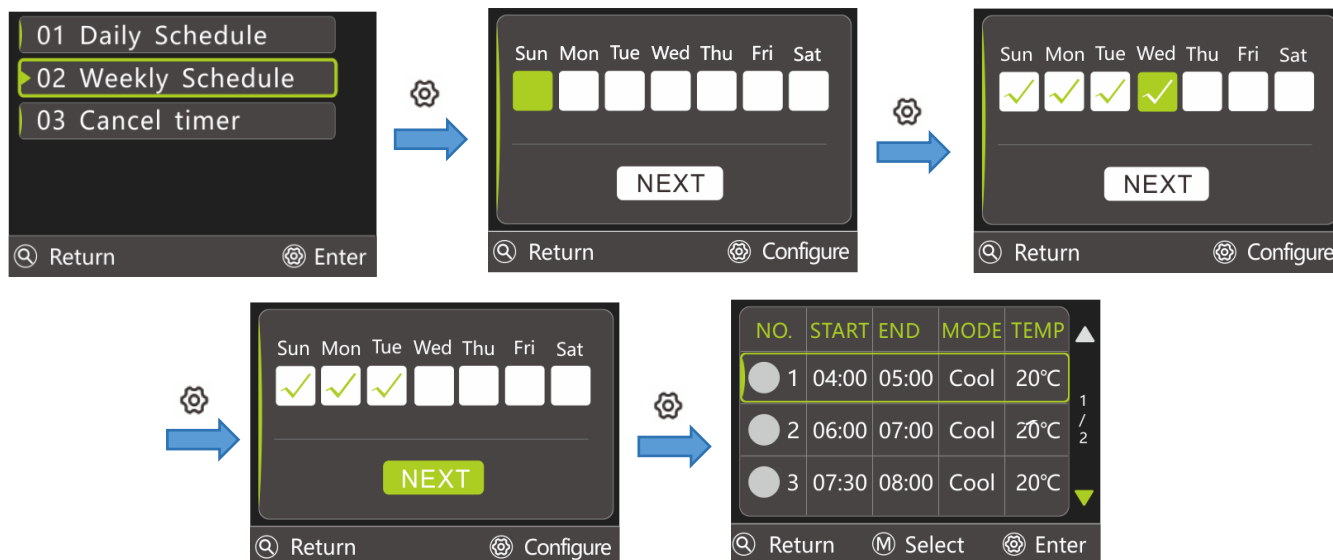
Time	Operation of Unit
1:00	Switch-on in hot water mode
6:00	Switch-off in hot water mode
7:00	Switch-on in heating mode
9:00	Switch-off in heating mode
11:00	Switch-on in cooling mode
13:00	Switch-off in cooling mode
16:00	Switch-on in cooling mode
19:00	Switch-off in cooling mode
20:00	Switch-on in hot water mode
22:00	Switch-off in hot water mode

Prompt: If the start time is the same as the end time, the start time is later than the end time, a cross-day setting is made, or the temperature goes beyond the range allowed in the mode, this group of timer settings shall become invalid, and the following screen will be displayed.



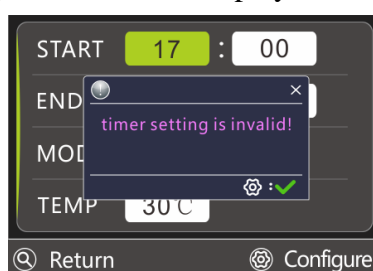
● Weekly timed on/off

Select “Weekly Schedule” in the “Timed On/off” menu; click to enter the “Week Check” interface. Click or to one day or several days of a week which shall become valid; click for checking or cancellation. Click or to move to the “Next Page”. Click to enter the timer group interface.




Note: The operation of timer setting is the same as that of the daily timed on/off, so it is unnecessary to go into details here.

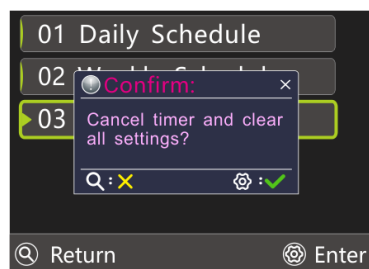
Prompt: If the start time is the same as the end time, the start time is later than the end time, a cross-day setting is made, or the temperature goes beyond the range allowed in the mode, this group of timer settings shall become invalid, and the following screen will be displayed.





- Timer cancellation

If you want to cancel all timed on/off settings by one operation (without affecting the setting of other timer functions), just follow the instructions as set forth in this section.

Select “Cancel timer” in the “Timed on/off” menu, and click , and the confirmation window will pop up.

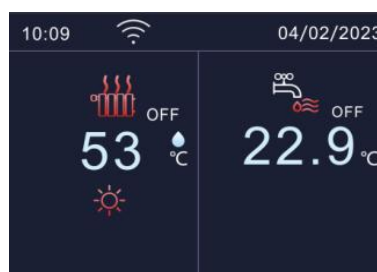


Click  to confirm the cancellation of the timer settings and close the pop-up window, or click  to cancel your choice and close the pop-up window.

If the “Daily schedule” or the “Weekly schedule” becomes valid, the timer icon will be displayed on the main interface.



If the “Daily schedule” or the “Weekly schedule” becomes invalid, the timer icon will not be displayed on the main interface.







8.5.3.2 Sterilization Timer

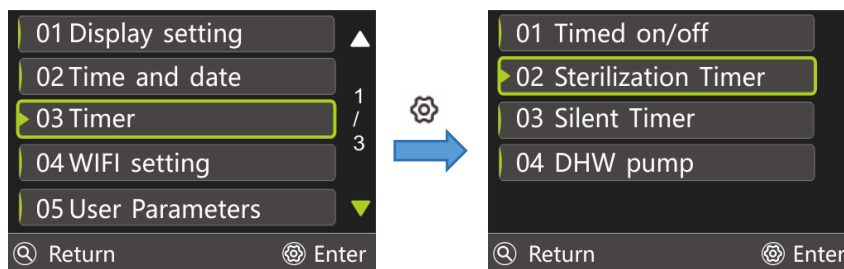
There are two ways to use the sterilization function:





- 1. Timed use
- 2. Manual use

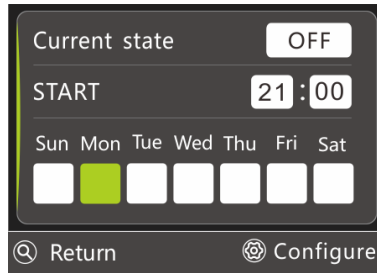
The timed sterilization function is used to kill the bacteria and germs in the hot water tank; the temperature of the hot water tank will be forced to reach 61-70 °C (the specific value is determined by the parameter “sterilization temperature”), which can be set in the “Advanced setting”.

Before using the sterilization function, make sure that the “User Parameters” > [Sterilization Timer Function] parameter is set to “Enabled” (For details of the parameter, see the parameter table in 8.5.5 “User Parameters”). If the parameter value is “Disabled”, it is impossible to use the sterilization function. The timed use and the manual use are described respectively below. The timed use is shown as follows:

On the main interface, click  to enter the setting menu, and click  to select “Timer”. Click  to enter the timer menu, and click  to select “Sterilization Timer”.

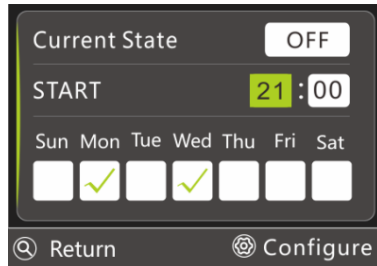


After setting the start time, click  or  to one day or several days of a week which shall become valid. For example, to set “Monday”, click  or  to move to “Mon”.



If the box is not checked, click to check and validate it. If the box is checked, click to cancel the checking, and it will not become valid on the day.

According to the settings as shown in the figure below, sterilization will start at 21:00 on Monday and Wednesday.



The operation of manual control is shown as follows:

The manual control takes precedence over the timed control. Click or to move to “Current State”.

If the current state is “Off”, click to enable the sterilization function manually.

If the current state is “On”, click to disable the sterilization function manually.



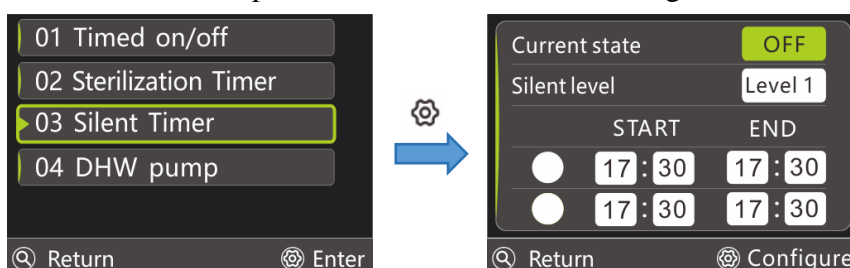
8.5.3.3 Silent timer

There are two ways to use the silent mode:

- Timed use
- Manual use

There are two levels of silent mode, i.e. level 1 and level 2. In the mode at level 2, the maximum speeds of the fan and the compressor are lower than those at level 1. How to use the “Silent timer” is shown as follows:

On the main interface, click to enter the setting menu, click or to find the “Timer” option, and click or to find the “Silent Timer” option. Click to enter the setting interface.



Click ^ or v to move to “Silent level”, and click ⚙️ to switch over the silent level (Level 1 and level 2)

There are two groups of timer settings in total. Click ^ or v to move to the circle, and click ⚙️ to use or cancel this group of timer settings (the circle of the timer used will be checked)

Note: For time setting, refer to 8.3.5 “Operation of Time Setting”

The operation of manual control is shown as follows:

The manual control takes precedence over the timed control. Click ^ or v to move to the “Current State”.

If the current state is “Off”, click ⚙️ to enable the silent mode manually (the timer operation will be performed at the next timer node).

If the current state is “On”, click ⚙️ to disable the silent mode manually.

Check whether there is a silent icon on the main interface to confirm the silent mode. It is the silent mode as shown in the figure below.



8.5.3.4 Timed switch-on of DHW pump

The DHW pump is used to return the water in the water circuit.

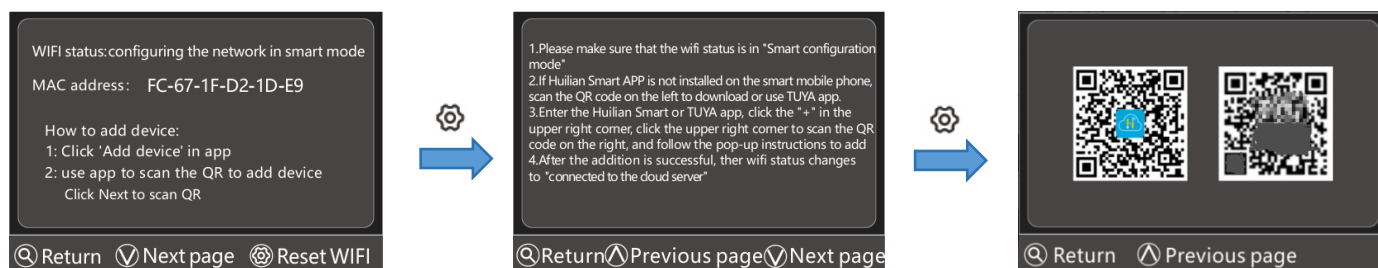
On the main interface, click ⚙️ to enter the setting menu, click ^ or v to select “Timer” and click ⚙️ to enter the mode. Find the “DHW Pump”. Click ⚙️ to enter the setting interface. Click ^ or v and move the cursor to set the circle on each group of serial numbers, and click ⚙️ to validate or cancel this group of timer settings.



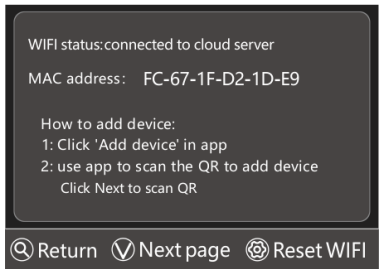
8.5.4 Guidance on network configuration

With a built-in WIFI module in the display, it is possible to establish communication between the display and the mobile phone APP, so as to operate the unit with the mobile phone APP.


During the display’s initial configuration of WIFI network, it is necessary to ensure that the display and the mobile phone are covered by the same WIFI signal, which shall not be too weak. Through “Main interface” > “Setting menu” > “WIFI setting”, click ⚙️ to enter the network configuration information interface, on which the current WIFI status, MAC address, and network configuration method are displayed.

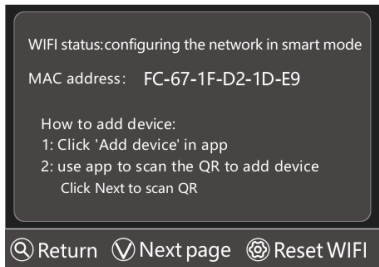


If the WIFI status shows “connected to cloud server”, the network has been configured for the display, and the display can be operated with the account in which the network configuration is completed.



If the WIFI status displays other content or it is necessary to cancel the network configuration completed previously, operation can be carried out by the following steps (note: the unit cannot be operated with the account in which the network configuration is completed and the communication is achieved).

On the first page of the network configuration information interface, click  until the WIFI status displays “configuring network in smart mode”, and configure the network and perform the connection operation with the mobile phone APP. See the “Operating Instructions on the Device Network Configuration for Huilian Smart APP” for details.

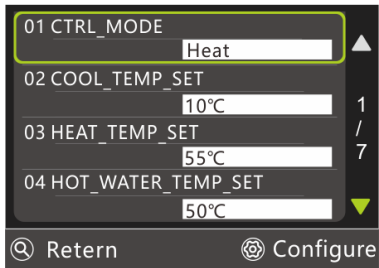


Please identify the QR code below view the details of guidance on network configuration.



8.5.5 User parameters

The user parameters can be used directly by the end users, with the interface as shown in the figure below:



For more user parameters, refer to the table below (the actual parameters shall be those shown on the display):

User Parameter						
Set Item		Range of Setting	Default Value	Unit	Permission	Remarks
01	Control mode	Cooling mode Heating mode Automatic mode	Heating mode			It can be changed and switched over when the unit is in operation.



02	Set temperature of cooling	min...max	7	℃		See the “Lower limit of cooling temperature rising” and “Upper limit of cooling temperature rising” for set range of min and max for details
03	Set temperature of heating	min...max	50	℃		See the “Lower limit of heating temperature rising” and “Upper limit of heating temperature rising” for set range of min and max for details
04	Set temperature of hot water	min...max	50	℃		See the “Lower limit of heating temperature rising” and “Upper limit of heating temperature rising” for set range of min and max for details
05	Set room temperature of cooling	16...30	26	℃		
06	Set room temperature of heating	16...30	20	℃		
09	Set temperature of heating (B)	40...60	50	℃		
10	Set room temperature of heating (B)	16...30	26	℃		
11	Power mode	Standard Forceful Energy saving	Standard			
13	Timed sterilization function	Disabled, enabled	Disabled			
14	Sterilization temperature	60...70	70	℃		
15	Maximum period of sterilization	90...300	210	Min		
16	High temperature time of sterilization	5...60	15	Min		
26	Cooling curve of Zone A	Disabled Low temperature curve 1 Low temperature curve 2 Low temperature curve 3 Low temperature curve 4 Low temperature curve 5 Low temperature curve 6 Low temperature curve 7 Low temperature curve 8 High temperature curve 1 High temperature curve 2 High temperature curve 3 High temperature curve 4 High temperature curve 5 High temperature curve 6 High temperature curve 7 High temperature curve 8 Curve 9	Disabled			
27	Heating curve of Zone A	Disabled Low temperature curve 1 Low temperature curve 2	Disabled			

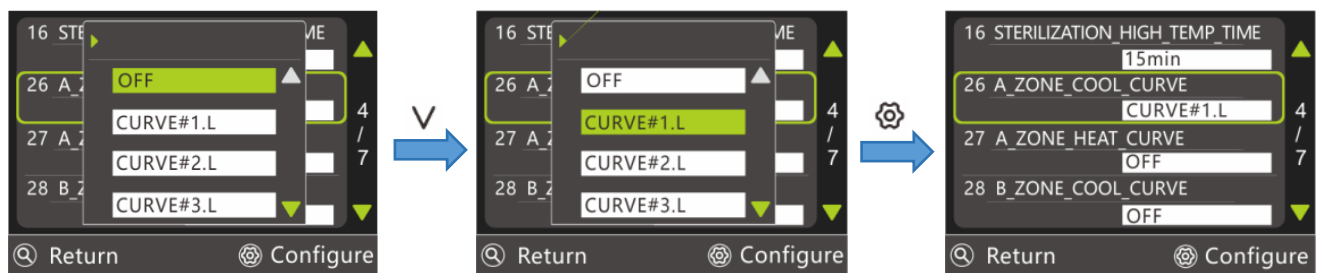
		Low temperature curve 3 Low temperature curve 4 Low temperature curve 5 Low temperature curve 6 Low temperature curve 7 Low temperature curve 8 High temperature curve 1 High temperature curve 2 High temperature curve 3 High temperature curve 4 High temperature curve 5 High temperature curve 6 High temperature curve 7 High temperature curve 8 Curve 9				
28	Cooling curve of Zone B	Disabled Low temperature curve 1 Low temperature curve 2 Low temperature curve 3 Low temperature curve 4 Low temperature curve 5 Low temperature curve 6 Low temperature curve 7 Low temperature curve 8 High temperature curve 1 High temperature curve 2 High temperature curve 3 High temperature curve 4 High temperature curve 5 High temperature curve 6 High temperature curve 7 High temperature curve 8 Curve 9	Disabled			
29	Heating curve of Zone B	Disabled Low temperature curve 1 Low temperature curve 2 Low temperature curve 3 Low temperature curve 4 Low temperature curve 5 Low temperature curve 6 Low temperature curve 7 Low temperature curve 8 High temperature curve 1 High temperature curve 2 High temperature curve 3 High temperature curve 4 High temperature curve 5 High temperature curve 6 High temperature curve 7 High temperature curve 8 Curve 9	Disabled			
30	Curve 9 cooling ambient temperature 1	-5...46	35	℃		
31	Curve 9 cooling ambient temperature 2	-5...46	25	℃		
32	Curve 9 cooling	5...25	10	℃		

	output temperature 1					
33	Curve 9 cooling output temperature 2	5...25	16	℃		
34	Curve 9 heating ambient temperature 1	-25...35	7	℃		
35	Curve 9 heating ambient temperature 2	-25...35	-5	℃		
36	Curve 9 heating output temperature 1	25...65	28	℃		
37	Curve 9 heating output temperature 2	25...65	35	℃		
38	00# module setting	Disabled, enabled	Enabled			
39	01# module setting	Disabled, enabled	Enabled			
40	02# module setting	Disabled, enabled	Enabled			
41	03# module setting	Disabled, enabled	Enabled			
42	04# module setting	Disabled, enabled	Enabled			
43	05# module setting	Disabled, enabled	Enabled			
44	06# module setting	Disabled, enabled	Enabled			
45	07# module setting	Disabled, enabled	Enabled			

8.5.5.1 Ambient temperature presetting function

With the ambient temperature presetting function, it is possible to preset the target water temperature according to the external ambient temperature. When the weather gets warm, heating can be reduced. For energy saving, when the external ambient temperature rises, the ambient temperature presetting function can be used to select a lower target water temperature for heating.

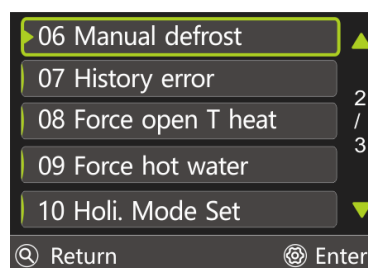
On the “User Parameters” interface, select one or more of the parameters, i.e. “A_ZONE-COOL-CURVE”, “A_ZONE-HEAT-CURVE”, “B_ZONE-COOL-CURVE”, and “B_ZONE-HEAT-CURVE” as required, and click . Click ^ or v to disable or enable different “preset ambient temperature curves”, and click  to save the current modification.




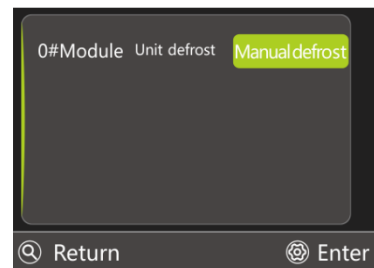
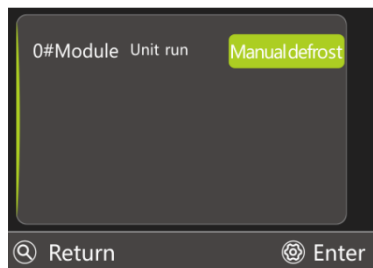
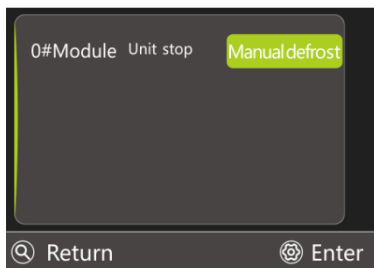
8.5.6 Manual defrosting

During its normal operation, the unit has the smart (automatic) defrosting function. However, in certain cases, the manual defrosting function may be used through the following path:

“Main interface” > “Setting menu” > “Manual defrost”, as shown in the figure below:



Click  to enter the manual defrosting setting interface, and the current state of each module will be displayed on the interface, e.g. Unit stop, Unit run, and Unit defrost.

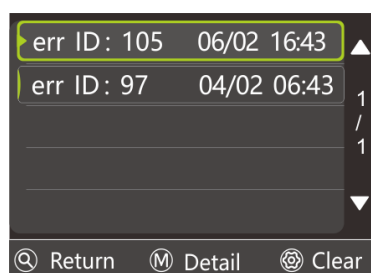


Only when the module is running, and the water temperature and fin temperature meet the requirements, is it possible to enter the defrosting successfully by clicking . At this moment, the current state of the module will be switched over to defrosting; otherwise, the original state will be maintained.

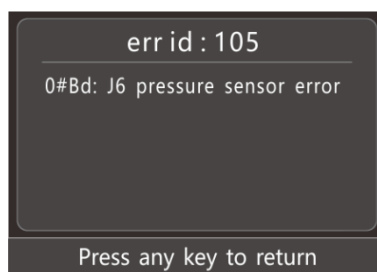
8.5.7 History error query

All the errors (including the errors for which resetting has been completed) will be recorded in the controller. The method for query of such errors is shown as follows:

First, find the “History error” option through the path “Main interface” > “Setting menu” > “History error”, and click to enter the history error interface.



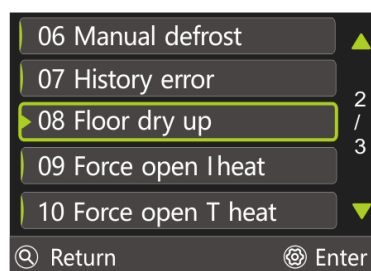
On the interface, you can view the ID and occurrence time of each error. If you click , all the history errors will be cleared, so be careful with your operation. Click to view the specific meaning of the error ID.






8.5.8 Floor dry-up function

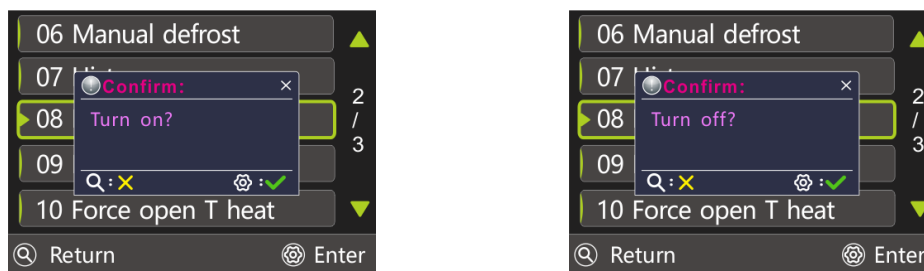
This function can be turned on only when the “floor inlet temperature probe” is used and the unit is in the standby status.

Find the “Main interface” > “Setting menu” > “Floor dry-up”.



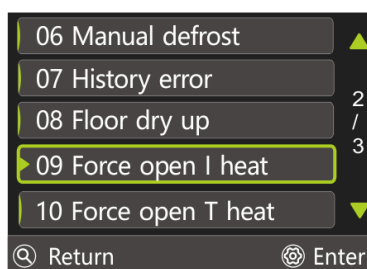
Click , the confirmation window will pop up (as shown in the figure below). Click to confirm that this function is turned on, and the pop-up window is closed, or click to cancel your choice and close the pop-up window.




If the floor dry-up function has been turned on, click  on the “Floor dry up” option to have the confirmation window pop up to close this function (as shown in the figure below). Click  to confirm that the floor dry-up function is turned off, and the pop-up window is closed, or click  to cancel your choice and close the pop-up window.






8.5.9 Forced open auxiliary electric heater

Find the “forced open auxiliary electric heater” function through the following path:
“Main interface” > “Setting menu” > “Force open I heat”.






Click  to have the confirmation window popup (as shown in the figure below). Click  to confirm that this function is turned on, and the pop-up window is closed, or click  to cancel your choice and close the pop-up window.

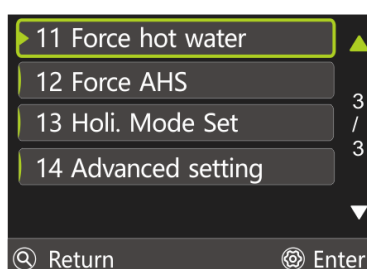
If the forced open auxiliary electric heater function has been turned on, click  on the “Force open I heat” option to have the confirmation window pop up to turn this function (as shown in the figure below). Click  to confirm that the force open auxiliary electric heater function is turned off, and the pop-up window is closed, or click  to cancel your choice and close the pop-up window.









8.5.10 Forced open hot water mode

With the forced open hot water mode function, the system is forced to operate in the hot water production mode, and the heating pump, auxiliary electric heater, water tank electric heater, and external heat source will all operate in the forced open hot water mode if the conditions are met.

On the main interface, click  to enter the setting menu, and click  or  to find the “Force hot water” option.



Click  to have the confirmation window pop up. Click  to confirm that the force hot water mode is turned on, and the pop-up window is closed, or click  to cancel your choice and close the pop-up window.

If the forced open hot water function has been turned on, click  on the “Force hot water” option to have the confirmation window pop up to turn off this function. Click  to confirm that the force open hot water function is turned off, and the pop-up window is closed, or click  to cancel your choice and close the pop-up window.

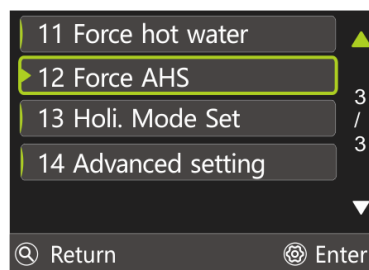





8.5.11 Forced open external heat source




In the heating or hot water production mode, heat can be provided by forced switching on the external heat source manually.

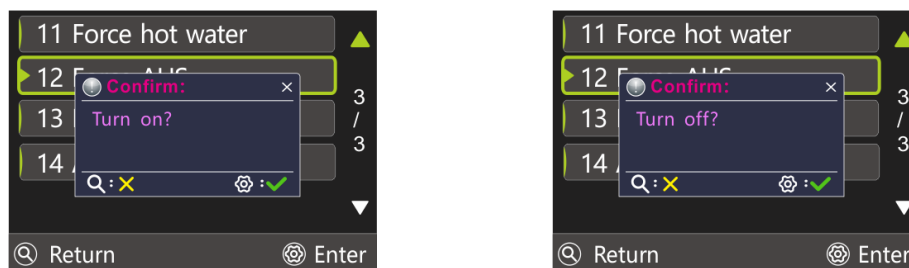
Find the “forced open external heat source” function through the following path:

“Main interface” > “Setting menu” > “Force AHS”.



Click  to have the confirmation window pop up. Click  to confirm that the forced open external heat source function is turned on, and the pop-up window is closed, or click  to cancel your choice and close the pop-up window.

If the force open external heat source function has been turned on, click  on the “Force AHS” option to have the confirmation window pop up to turn off this function. Click  to confirm that the force open external heat source function is turned off, and the pop-up window is closed, or click  to cancel your choice and close the pop-up window.










8.5.12 Holiday mode

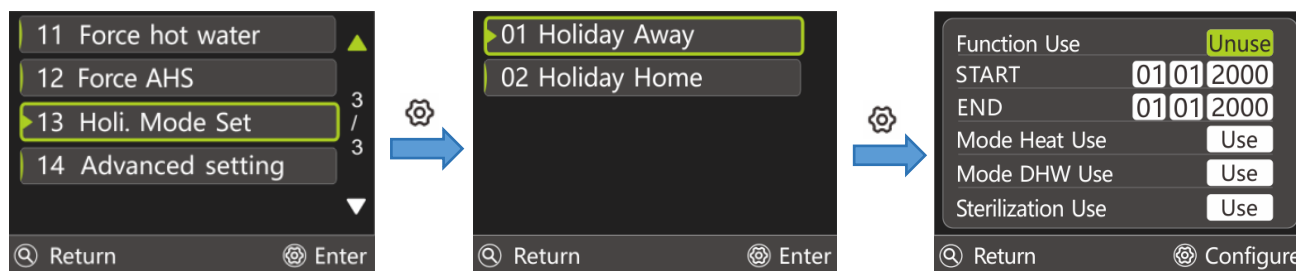
8.5.12.1 Holiday away mode

When you enter the holiday away mode, the following icon will be displayed on the main interface:



The holiday away mode is often used to prevent the water circuit from freezing while you are going out on holiday in winter. This mode starts after you leave and ends before you come back.








On the main interface, click  to enter the setting menu, click  or  to find “Holi. Mode Set”; click  to enter the holiday mode selection interface; click  or  to find “Holiday Away”; and click  to enter the holiday away mode setting interface.

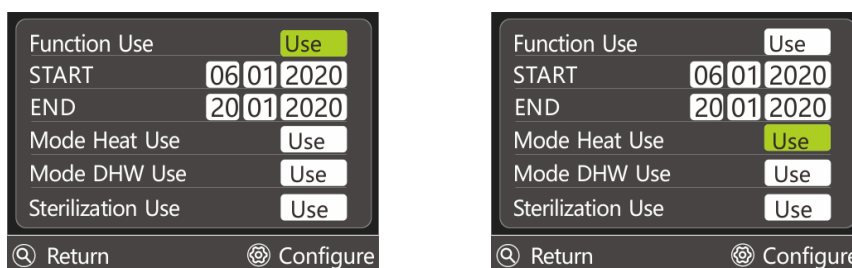


An example of application: Assuming that today is January 3, 2020, and you will go out three days later for two weeks, that is, you will leave on January 6, 2020, and return on January 20, 2020. To prevent the water circuit from freezing, you can set the parameters according to the table below.

Parameter Name	Parameter Value
Function use	Use
Start	06-01-2020
End	20-01-2020
Mode Heat Use	Use
Mode DHW Use	Use

The operation is shown as follows:

Click  or  to move to “Function Use”, and then click  to set to “Use” (click  again to set to “No Use”), and the holiday away function is turned on. Click  or  to move to “Mode Heat Use”, and click  to set to “Use”.



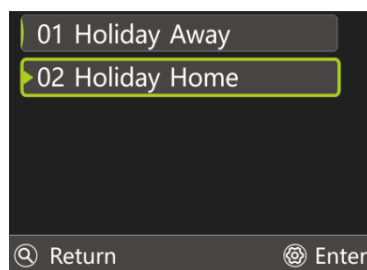
The setting of “Mode DHW Use” and “Sterilization Use” is the same as that of “Mode Heat Use”.

8.5.12.2 Holiday home mode

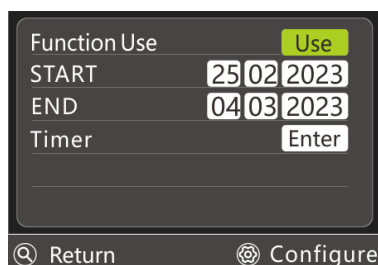
The holiday home mode is similar to the timer mode. When the holiday home mode becomes valid, the setting of the timer function will become invalid. For example, if the holiday home function is turned on from July 1, 2020 to July 20, 2020 according to the setting, the regular timer function shall be performed before July 1, 2020 and after July 7, 2020, and the holiday home function will be performed from July 1, 2020 to July 7, 2020.

Enter the holiday home mode setting interface through the following path:

“Main interface” > “Setting menu” > “Holi. Mode Set” > “Holiday Home”, as shown in the figure below:

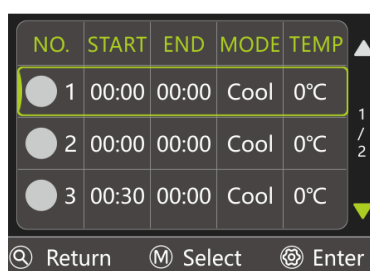


Click ^ or v to select “Function Use”, and click ⚙️ to set to “Use” (click ⚙️ again to set to “No Use”), and the holiday home function is turned on.



The setting of “START” and “END” shall be operated by reference to 5.3.5 “Operation of time setting”.

Click ^ or v to select “Timer”, and click ⚙️ to enter the timer setting interface. Refer to 8.5.3 “Daily timed on/off”.

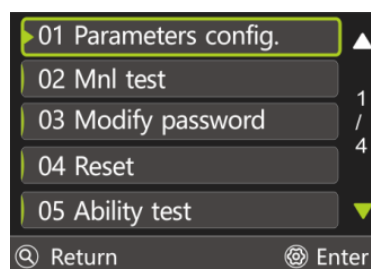
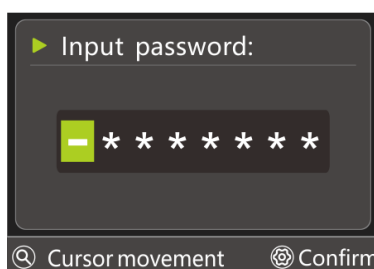


8.5.13 Advanced setting

For the purposes of installation and service, the authorized engineers or service personnel may modify the parameters of the controller through the following path and by entering the password.

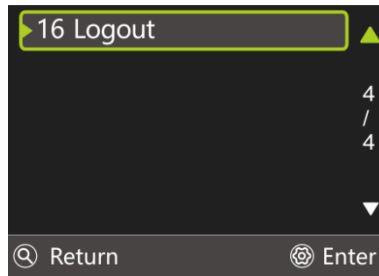
The path to the advanced setting interface is shown as follows: “Main interface” > “Setting menu” > “Advanced setting”.

Enter the correct password on the following interface, and click ⚙️ for confirmation.



Exit from “Advanced setting”

After confirming that all the parameters are modified, you need to select the logout of the current password. Find “Logout” on the advanced setting interface, and click ⚙️. Re-enter the password when you want to enter the advanced setting interface next time.



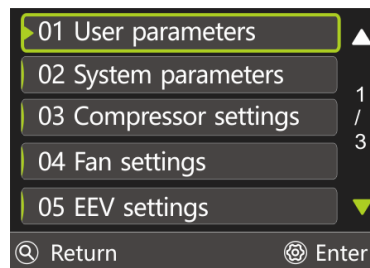
If you do not click “Logout,” you can enter the advanced setting interface next time without the need to enter the password (unless the equipment is re-powered on or no operation is carried out for a long time).

If you want to enter “Advanced setting”, you need to enter the password.

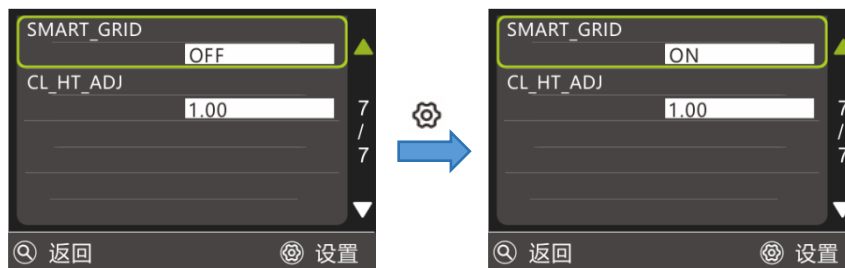
8.5.14 Smart grid

When entering “Advanced setting”, enter a password with the high-level permission to obtain the permission to set the smart grid function.

After entering the password in “Advanced setting”, you enter “Parameter setting”, and multiple parameter groups will be shown.



Use ^ or v to move to the “System parameters”, and select “SMART_GRID”. If “SMART_GRID” is “OFF”, click ⚙️ to change to “ON”. If “SMART_GRID” is “ON”, click ⚙️ to change to “OFF”.



8.6 Setting of the multi-zone mode

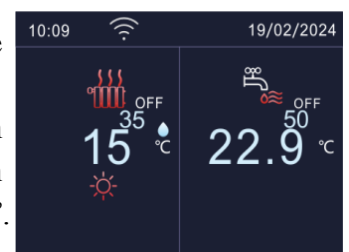
Upon delivery, the equipment is in the single-zone water temperature mode by default, and can be set to multi-zone operation according to the actual situation.

8.6.1 Single-zone water temperature:

It is set by default upon delivery, and you do not need to perform any operation.

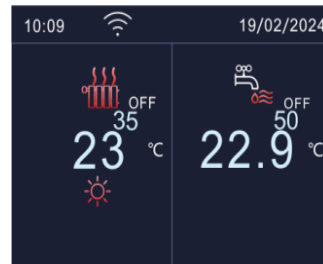
8.6.2 Single-zone water temperature + hot water: The system includes single-zone air conditioning water temperature control and domestic hot water control.

When you need to enable the hot water mode, click ^ or v in “Main interface” > “Setting menu” > “Advanced setting” > “Parameter setting” > “System parameters” to select “Hot Water Function”. If you click ⚙️, it will change to “ON”. At this moment, the main interface is switched over to that as shown in the figure on the right.



8.6.3 Single-zone room temperature + hot water: The system includes single-zone air conditioning room temperature control and domestic hot water control.

If air conditioning needs to be controlled by the room temperature, click ^ or v in “Main interface” > “Setting menu” > “Advanced setting” > “Parameter setting” > “System parameters” to select “Thermostat Control”, and click ⚙ to enter the menu. Click ^ or v to select “Single-zone Room Temperature”, and press ⚙ for confirmation, and the change is completed. At this moment, the main interface is switched over to that as shown in the figure on the right.



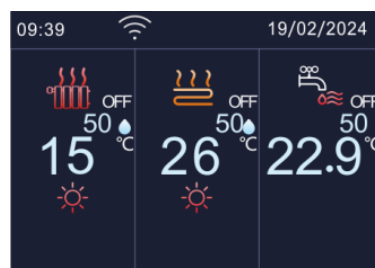
8.6.4 Two-zone mixing + hot water: The system includes two-zone air conditioning water temperature (Zone A) + room temperature (Zone B) control (Zone A can be heated or cooled, and Zone B can only be heated) and domestic hot water control.

If floor heating is added to the system, click ^ or v in “Main interface” > “Setting menu” > “Advanced setting” > “Parameter setting” > “System parameters” to select “Thermostat Control”, and click ⚙ to enter the menu. Click ^ or v to select “Two-zone Water Temperature + Room Temperature”, and press ⚙ for confirmation, and the change is completed. At this moment, the main interface is switched over to that as shown in the figure on the right.



8.6.5 Two-zone water temperature + hot water: The system includes two-zone air conditioning water temperature control (Zone A can be heated or cooled, and Zone B can only be heated) and domestic hot water control.

If floor heating is added to the system, click ^ or v in “Main interface” > “Setting menu” > “Advanced setting” > “Parameter setting” > “System parameters” to select “Thermostat Control”, and click ⚙ to enter the menu. Click ^ or v to select “Two-zone Water Temperature”, and press ⚙ for confirmation, and the change is completed. At this moment, the main interface is switched over to that as shown in the figure on the right.



Caution:

- The room temperature sensor is located in the display. If the air conditioning zone is controlled by room temperature, be sure to place the display indoors;
- Connect the temperature sensor in the accessories to the corresponding position according to the actual situation, so that the equipment can operate normally, and unnecessary losses will not be caused.

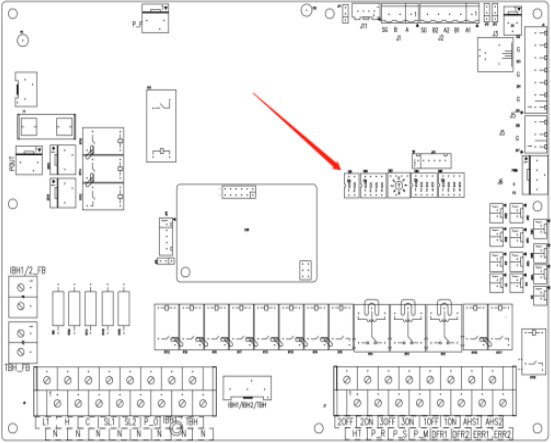
According to the actual situation, click ^ or v in “Main interface” > “Setting menu” > “Advanced setting” > “Parameter setting” > “On-off Value and Probe” to select the corresponding temperature sensing probe, and click ⚙ to change to “Enabled”.

Chapter 9 Instructions on Other External Heat Sources

1. Auxiliary electric heater:

If an auxiliary electric heater shall be added to the system, connect it in series behind the heating pump.

The parameters and the dial codes shall be set. In “Main interface → Advanced setting → Parameter setting → Energy control”, set “Auxiliary electric heater” to “Enabled”; and the dial codes shall also be set on the main board as follows: (Note: If any of the dial codes and the parameters is not set, the auxiliary electric heater will become invalid)

/	SW1.1	SW1.2	
No auxiliary electric heater output	OFF	OFF	
IBH1 auxiliary electric heater output	OFF	ON	
IBH2 auxiliary electric heater output	ON	OFF	
IBH1+IBH2 auxiliary electric heater output	ON	ON	

Note: OFF on SW terminal indicates “0”, and ON indicates “1”. IBH2 auxiliary electric heater output is located in the lower middle part of the main board as shown in the figure above.

Before using the auxiliary electric heater, connect the temperature sensor in the accessories to “Total Water Outlet Temperature” on the terminal box on the right side of the equipment, and place the temperature sensor within 20 cm behind the auxiliary electric heater. (In “Main interface” > “Setting menu” > “Advanced setting” > “Parameter setting” > “On-off Value and Probe”, set “Total Water Outlet Temperature” to “Enabled”.)

Before using the auxiliary electric heater, connect the feedback signal line on the auxiliary electric heater to the corresponding position on the terminal box on the right side of the equipment, so that the equipment can operate normally, and unnecessary losses will not be caused.

2. The electric heater of the water tank:

If the electric heater of the water tank needs to be added to the system, place the electric heater into the hot water tank.

To use the electric heater, you need to set the parameters. Set the parameters in “Electric Heater of Water Tank” in “Main interface → Advanced setting → Parameter setting → System parameters”.

Before using the electric heater of the water tank, connect the feedback signal line on the electric heater of the water tank to the corresponding position on the terminal box on the right side of the equipment, so that the equipment can operate normally, and unnecessary losses will not be caused.

3. Solar energy

If solar energy needs to be added to the system, connect solar energy into the hot water tank in parallel.

When using solar energy, connect the signal line to the corresponding position on the terminal box on the right side of the equipment.

The solar water pump is controlled by the temperature probe or the solar signal. (Note: The solar temperature probe is set in “Advanced setting → Parameter setting → On-off Value and Probe”)

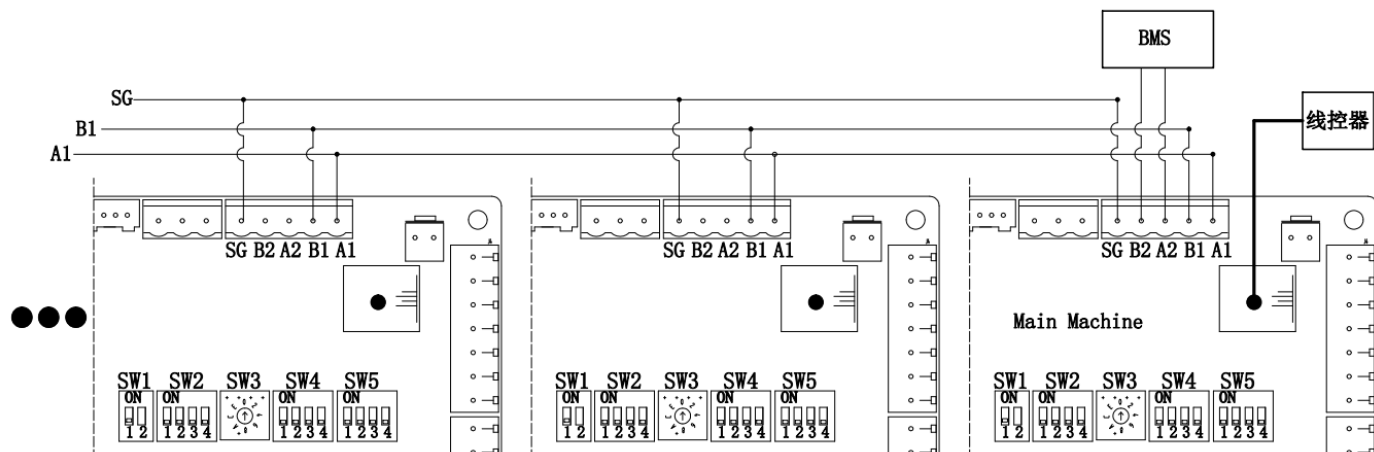
- If the “Solar Energy Temperature Probe” is set to “Enabled”, the solar water pump is controlled by the “Solar Temperature Probe”, and “Solar Signal” is invalid.
- If the “Solar Temperature Probe” is set to “Disabled”, the solar water pump is controlled by “Solar Signal”, and “Solar Temperature Probe” is invalid. When the solar signal is received, the solar water pump is turned on; and when the solar signal is not received, the solar water pump is turned off.

4. External heat source

If the external heat source needs to be added to the system, connect it behind the heating pump in parallel (If an auxiliary electric heater is provided, connect the external heat source behind the auxiliary electric heater).

To use the external heat source, you need to set the parameters. Set “External heat source” to “Enabled” in “Advanced setting → Parameter setting → Energy control”, and connect the signal to the corresponding position on the terminal box on the right side of the equipment.

Chapter 10 Operation Instructions on Connection



➤ Operation instructions on cascading connection

The above figure is the schematic diagram for the cascading connection of eight modules at most.

Operating steps for module cascading

Step 1: Switch off all module units;

Step 2: Connect wires to the cascading interfaces accordingly;

As shown in the figure, controller J2 is a module cascading terminal.

If the modules shall be cascaded, the wires shall be connected properly from A1 to A1, B1 to B1, SG to SG on J2 terminal of each module, and from the main unit to slave 1, from slave 1 to slave 2, from slave 2 to slave 3, and so on.

Step 3: Dial codes of module address;

As shown in the figure, the circular dial of controller SW3 is the dial code of the module address.

It can be seen that the dial is a 16-bit dial code from 0 to F (the first eight bits of the current series equipment shall be valid). When grouping the modules, you need to dial the main unit address SW3 to 1, the slave 2 module SW3 address to 2, the slave 3 module SW3 address to 3, and so on, so as to dial the address properly one by one.

Step 4: Switch on all modules.


Step 5: Enter the module parameter setting, and set the number of modules based on the actual number of the grouped modules.


Caution: If the module address is dialed with power on, the controller can read the address only after the unit is switched on again.

➤ Operation instructions on cloud service connection

After the operation of cascade connection is completed, dial the main unit address SW3 to 0, locate J2 terminal of the controller, connect A2 of J2 terminal to A of the cloud service equipment, connect B2 to B of the cloud service equipment, and then connect the cloud service equipment to the computer.

Chapter 11 Trial operation

	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Check whether the appearance of the unit and the pipeline system in the unit are damaged during transportation; ➤ Check whether the fan blades are working well; ➤ Check whether the system pipeline, water supply pipes, return water pipes, pressure gauges, valves, and other equipment are installed correctly; ➤ Check whether the insulation measures of the system are in a good condition; ➤ Turn on the power to start the unit, and the main unit will start up automatically after a delay of 6 minutes. For the equipment with an external three-phase power supply, first check whether it rotates in the correct direction; if not, turn off the power immediately, and adjust the phase sequence; ➤ It is necessary to make sure that the system runs properly with no abnormalities before leaving.
--	--

	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Check whether the power supply is consistent with that required on the nameplate of the unit; ➤ Check whether all power supply and control lines are connected correctly according to the wiring diagram, whether the grounding is reliable, and whether all wiring terminals are tightened; ➤ You must make sure that the covers of the terminal boxes of all the electrical components are closed.
--	--

The trial operation shall include the air emptying trial operation, the water pump trial operation, the cooling trial operation, the heating trial operation, and the hot water trial operation.

- ✧ When performing the “air emptying trial operation”, run from the heating pump to the buffer tank, from the heating pump to the hot water tank, the water system of heating in Zone A, cooling in Zone A, and floor heating in Zone B for 10 minutes, respectively.

When performing the “water pump trial operation”, run the external circulating water pump, the solar water pump, and the mixing water pump for 5 minutes, respectively.

Conditions for exit: 1. The program running ends; 2. A failure occurs; 3. The command of next trial operation is received.

- ✧ When the “cooling/heating/hot water production trial operation” is performed, the water pump will run until the default water temperature reaches the target (the cooling target is 7 °C, the heating target 35 °C, and the hot water target 55 °C).

Conditions for exit: 1. The target temperature is reached; 2. A failure occurs; 3. The command of next trial operation is received.

Note: During trial operation, attention shall always be paid to the occurrence of any abnormality in the whole system (whether the water system is sealed, and whether the thermal insulation measures are taken properly).

Chapter 12 Common Faults and Troubleshooting

Fault	Reset Mode	Alarm Action	Troubleshooting
Faults with the controller itself			
EEPROM data error	Switch-on reset	An alarm goes off, and the equipment cannot be started.	1. Initialize all parameters. 2. If the fault is still not fixed after initialization, please contact us!
System maintenance data error	Switch-on reset	An alarm goes off, and the equipment cannot be started.	1. Initialize the setting of system maintenance. 2. If the fault is still not fixed after initialization, please contact us!
Frequency converter communication fault	A	Shut down the compressor	1. Short-circuit or open circuit: Reconnect the wires correctly. 2. Damage to the frequency converter communication line: Replace it with a new one.
Frequency converter fault	A/M	Shut down the compressor	Please contact us!
Frequency converter model is being set	A	Shut down the compressor	1. Switch on the power again. 2. If the fault is still not fixed after initialization, please contact us!
Fan coil communication fault n	A	An alarm only, and no shutdown	1. Check the connection and setting of the terminal communication and whether the power supply is available.
Fan coil fault n	A	An alarm only, and no shutdown	1. Check the fan coil.
Module n# communication fault Module n# abnormal communication	A	Shut down the corresponding module	1. There are no connecting wires between the line controller and the equipment: Connect the wires. 2. The communication line sequence is incorrect: Reconnect the communication line sequence. 3. Whether there is any interference from a high-intensity magnetic field or a high power, such as an elevator, a high-power transformer, and ETC. 4. Check the dial code of the address: Set the dial code according to the circuit diagram or the manual.
Abnormal setting of model	Switch-on reset	Shut down the corresponding module	1. Check the dial code of the address: Set the dial code according to the circuit diagram or the manual.
Faults with the unit			
Insufficient water flow	A/M	Shut down the unit and the pump; do not shut down the end pump; if “Insufficient Water Flow for Pump Start” is “Enabled”, and the ambient temperature TA is lower than 2 ℃, do not shut down the air conditioning pump.	1. Short-circuit or open circuit: Reconnect the wires correctly. 2. Too low water flow: Check whether the filter is blocked and whether the head goes beyond the design range. 3. Fault with the water flow switch: Replace it. 4. Check whether the water pump is damaged: Replace it.

Overload of the auxiliary electric heater	M	An alarm only, and no shutdown	<p>1. Check whether the water flow is too small: Clean the filter and check whether the water flow switch is abnormal.</p> <p>2. Check whether the feedback signal line is short-circuited or open- circuited: Reconnect the wires correctly.</p> <p>3. Check whether the protector is faulty: Replace it.</p>
Overload of the electric heater of the water tank	M	An alarm only, and no shutdown	<p>1. Check whether the feedback signal line is short-circuited or open-circuited: Reconnect the wires correctly.</p> <p>2. Check whether the protector is faulty: Replace it.</p> <p>3. Check whether the water temperature in the water tank is too low: Add water and adjust the water supply valve.</p>
High pressure of the compressor	A/M	Shut down the compressor “Non-frequency-decrease shutdown”	<p>1. Check whether the water temperature goes beyond the design range: adjust the set temperature of the unit.</p> <p>2. The protector line is short-circuited or open-circuited: Reconnect it correctly.</p> <p>3. Check whether the water temperature probe is damaged: Replace it.</p> <p>4. Check whether the protector is damaged: Replace it.</p> <p>5. Check whether the ambient temperature for operation is higher than the designed ambient temperature.</p>
Too high pressure of the pressure sensor	A/M		
Low pressure of the compressor	A/M	Shut down the compressor	<p>1. Check whether there is leakage in the unit: Ask professional personnel to come for repairing and troubleshooting.</p> <p>2. The protector line is short-circuited or open-circuited: Reconnect it correctly.</p> <p>3. Check whether the water temperature probe is damaged: Replace it.</p> <p>4. Check whether the protector is damaged: Replace it.</p> <p>5. Check whether the ambient temperature for operation is higher than the designed ambient temperature.</p>
Too low pressure of the pressure sensor	A/M		

Too high exhaust temperature	A/M	Shut down the compressor “Non-frequency-decrease shutdown”	1. Check whether the water temperature goes beyond the design range: Adjust the set temperature of the unit. 2. The water temperature or exhaust temperature probe line is short-circuited or open- circuited: Reconnect it correctly. 3. Check whether the water temperature and exhaust probes are damaged: Replace them. 4. Check whether the ambient temperature for operation is higher than the designed ambient temperature.
Too low water output temperature of the plate heat exchanger	A/M	Shut down the compressor “Non-frequency-decrease shutdown”	1. Check whether the temperature probe is damaged: Replace it. 2. Check whether the temperature probe is loose: Reconnect it.
Too low return water temperature of the plate heat exchanger	A/M		
Too high water output temperature of the plate heat exchanger	A/M	Shut down the compressor	
Too high return water temperature of the plate heat exchanger	A/M		
Too high difference between the output temperature and the return water temperature of the plate heat exchanger	A/M	Shut down the compressor	
Abnormal difference between the output temperature and the return water temperature of the plate heat exchanger	A/M	Shut down the compressor	
Frequent emergency defrosting	M	Shut down the compressor	1. Check whether there is leakage in the unit: Ask professional personnel to come for repairing and troubleshooting. 2. Check whether the water temperature probe is damaged: Replace it. 3. Check whether the water temperature probe is short-circuited or open-circuited: Reconnect it correctly.
Too low cooling suction	A/M	Shut down the compressor “Non-frequency-decrease shutdown”	
Abnormal rotational speed of fan 1	M	Shut down the compressor	1. Check whether the wiring of PWM fan is loose: Reconnect the wires. 2. Check whether the blades are suffering from foreign matter interference: Remove the foreign matters and check whether the blades are

			damaged (if damaged, replace them). 3. Check whether the fan is faulty: Replace it.
Abnormal difference between the suction temperature and the exhaust temperature	M	Shut down the compressor “Non-frequency-decrease shutdown”	1. Check whether the suction temperature and the exhaust temperature probes are faulty: Replace them. 2. Check whether the suction temperature and the exhaust temperature probes are connected reversely: Connect them according to the circuit diagram. 3. Check whether the compressor is running: Ask professional personnel to come for repairing and troubleshooting.
Too low cooling evaporation	A/M	Shut down the compressor “Non-frequency-decrease shutdown”	1. Whether the temperature probe is faulty: Replace it. 2. Check whether there is leakage in the unit: Ask professional personnel to come for repairing and troubleshooting. 3. Check whether the water temperature goes beyond the design range: Adjust the set temperature of the unit.
Too low ambient temperature limiting the switch-on of the compressor	A	Shut down the compressor	1. Whether the temperature probe is faulty: Replace it. 2. Check whether the ambient temperature for operation is higher than the designed ambient temperature.
Fault with the communication between the indoor unit and the outdoor unit	A	Shut down the compressor	1. There are no connecting wires between the line controller and the equipment: Connect the wires. 2. The communication line sequence is incorrect: Reconnect the communication line sequence. 3. Whether the mainboards of the indoor unit and the outdoor unit are properly energized: Connect the power supply according to the circuit diagram. 4. If the fault still cannot be fixed after initialization, please contact us!
Too early a version of the protocol	A	Shut down the compressor	1. If the fault is still not fixed after initialization, please contact us!
Faults with the sensors			
Fault with the ambient temperature	A	Shut down the compressor	1. Check whether the temperature probe is damaged: Replace it. 2. Check whether the temperature probe is short-circuited or open-circuited: Reconnect it correctly.
Fault with the fin temperature	M		
Fault with the exhaust temperature	M		
Fault with the suction temperature	M		
Fault with J5 pressure sensor	M		

Fault with J6 pressure sensor	M		
Fault with the hot water tank temperature	A	Shut down the compressor	
Fault with the total water outlet temperature	A	Shut down the compressor	
Fault with the total water outlet temperature of the system	A	Shut down the external heat source (AHS)	
Fault with the water inlet temperature of the floor heating	A	Shut down the compressor	
Fault with the water outlet temperature of the plate heat exchanger	A	Shut down the compressor	
Fault with the return water temperature of the plate heat exchanger	A	Shut down the compressor	
Fault with the temperature on the liquid side of the coolant	A	An alarm only	
Fault with the temperature on the gas side of the coolant	A	An alarm only	
Fault with the solar energy temperature	A	Shut down the solar water pump (PUMPSl)	
Fault with the room temperature	A	Shut down the unit	

Four resetting modes for faults:

1) Switch-on reset

- Faults that can be reset by switching on the power again after troubleshooting;
- Faults that can be reset by switching on the power again: See the fault list.

2) Limited automatic resetting (A/M)

- After a fault alarm goes off, if the fault is fixed, delay [**Fault Reset Time**]; and if the same fault does not occur during this period, resetting will be carried out automatically;
- Within the set [**Allowable Time for Automatic Resetting**], it can be reset twice automatically, and it will be locked when a third alarm goes off; and resetting will be carried out automatically only after the unit is shut down for the “Specified Time”;
 - Specified Time: It starts from 30 minutes and increases by 30 minutes each time locking is triggered, and its upper limit is 4 hours;
- After the manual resetting, the number of alarms shall be added up again, and the “Specified Time” shall start from 30 minutes again.

Limited faults: See the fault list.

3) Automatic resetting A

- The alarm can be reset automatically after the fault is fixed;
- The number of automatic re-settings is not limited;

4) Manual resetting M

- The alarm can be reset manually only on the controller after the fault is fixed;
- The faults of types 2) and 3) can also be reset manually.

Caution: If the faults cannot be fixed by the aforesaid operations, contact the local dealer or the designated maintenance entity in time. Do not dismantle the equipment for repair without authorization!!!

Chapter 13 Leakage Fault and Troubleshooting

R290 refrigerant (propane) is a colorless and odorless gas, which is used in the refrigeration circuit of the equipment. Existing in nature, propane is possible to be obtained without chemical synthesis. It has not only good cooling performance, but also low power consumption. R290 has a global warming potential (GWP) of 3, no ozone depleting potential (ODP), and a small recharge quantity. It is a non-toxic gas, **and is highly explosive at a concentration of 2.1% to 9.5% when mixed with air!** During the process of combustion, it will not release toxic substances. At a temperature above 650 °C, it will be decomposed into ethylene and ethane.

Hazards of R290: Simple effect of asphyxia and anesthesia.

- 1) Short exposure to propane with a concentration of 1% causes no symptoms;
- 2) Exposure to propane with a concentration of less than 10% causes only mild dizziness;
- 3) Exposure to propane with a high concentration can cause anesthesia and loss of consciousness;
- 4) Exposure to propane with an extremely high concentration can cause asphyxia.

When detecting a concentration of R290 beyond the limit, the equipment will report the fault of “R290 Leakage” and carry out the following alarm operations:

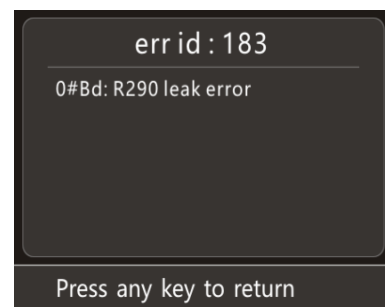
- 1) Shut down all the modules’ compressors;
- 2) Turn off all the auxiliary electric heaters;
- 3) Turn off the base electric heater;
- 4) Turn off the crankshaft electric heater;
- 5) Run the variable frequency fan at the lowest speed.

“R290 Leakage” cannot be reset automatically. If “R290 Leakage” occurs on the equipment, do not handle it without authorization. Be sure to carry out the following operations:

- 1) Immediately switch off the power supply of the equipment and close the relevant valves. (Caution: If there is a risk of freezing in the water system, drain the water system in time to prevent it from freezing);
- 2) Strengthen the ventilation on the site, and detect and remove the fire source nearby;
- 3) Contact the authorized outlet as soon as possible and ask professional personnel to handle the problem to avoid greater losses. (After eliminating the leakage source, perform a trial operation of the equipment. It can be put into normal operation only if no leakage is confirmed.)

Measures to prevent refrigerant leakage

- 1) Prevent sharp objects from hitting the equipment’s pipeline;




- 2) Arrange for professional personnel to maintain the equipment on schedule.

Chapter 14 Maintenance and Servicing

The air source heating pump unit is a kind of equipment with a high degree of automation, and its status shall be inspected regularly. Its operational reliability and service life will be improved by long-term and effective maintenance and servicing.

- 1) The water filter installed outside the equipment shall be cleaned regularly to guarantee the cleanliness of the water in the system, lest the unit should be damaged due to a dirty and blocked water filter.
- 2) When using and maintaining the unit, the user shall realize that all the safety protection devices in the unit have been set before delivery, and that adjustment shall not be made without authorization.
- 3) Often check whether the wires of the power supply and the electrical system of the unit are firm and whether the electrical components operate abnormally. If there is any abnormality, carry out repairs or replacement immediately.
- 4) Often check whether the water supply to the water system as well as the safety valves, the level controllers, and the exhaust devices of the water tank are working normally, lest air should enter the system to result in a reduction in the circulating water, thus affecting the heat production and operational reliability of the equipment.
- 5) Often check whether the pumps and the water circuit valves are working normally and whether the water pipes and water pipe joints are leaking.
- 6) Do not pile up sundries around the equipment, lest the air inlet and outlet should be blocked. Keep the area around the equipment clean, dry, and well-ventilated. Clean the heat exchanger on the air side regularly (once every 1-2 months) to maintain a good heat exchange effect.
- 7) Check the operating conditions of the components of the equipment regularly, check whether there are oil stains at the pipe joints and valves in the equipment, and make sure that there is no leakage of refrigerant from the equipment.
- 8) If the equipment will be shut down for a long time, you need to discharge the water out of the equipment's pipeline, cut off the power supply, and put on the protective cover properly. Before re-starting the equipment, check the system thoroughly.
- 9) If you cannot fix a fault that occurs on the equipment, call the company's local special maintenance station and ask it to dispatch personnel to do the repairs in time.
- 10) The company recommends cleaning the main unit's condenser (the heat exchanger on the water side) with a citric acid solution with a concentration of 5% at 50 ℃-60 ℃. Start the circulating water pump mounted on the main unit for cleaning for 2 hours, and finally rinse the condenser with tap water three times. (It is recommended that three-way joints be reserved during the installation of the pipeline. Seal up a joint with a sluice valve or plug for connection of a pipe when cleaning the condenser.) Do not clean the condenser (the heat exchange on the water side) with a corrosive cleaning solution.
- 11) The scale shall be removed after the water tank has been used for a period of time (generally half a year, depending on the local water quality).
- 12) In extremely severe weather, when the equipment is running continuously in a low-temperature and high-humidity environment, it is recommended that the equipment be checked once every 12 hours. If much ice is found on the air outlet grille and the return air grille, remove the ice immediately to maintain the normal operation of the equipment.

	<p>Warning:</p> <ul style="list-style-type: none"> ➤ Do not dismantle the equipment for maintenance without authorization. Go to the after-sales service station as designated for maintenance; ➤ Make sure that technicians have the relevant qualification certificates and have been authorized and that they perform maintenance and repairs under the supervision of the personnel qualified for using flammable and explosive refrigerants; ➤ Do not use chlorine-based cleaners, for chlorine may react with the refrigerant and corrode copper pipes; ➤ Under no circumstances shall the potential fire sources be used to look for or detect the leakage of refrigerant. Do not use a halide detector lamp (or any other detectors using open fire). Do not expose the live electrical components and wires when charging, restoring, or purifying the system; ➤ Electrified operations are prohibited under any circumstance.
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14.1 Maintenance of the cooling system

Before maintaining the system containing a flammable and explosive refrigerant, you must conduct a comprehensive safety check to make sure that the equipment is not likely to catch fire. The following preventive measures shall be taken before the maintenance of the cooling system:

1. The maintenance shall be carried out in a controlled procedure, and the risk of flammable gas or vapor shall be eliminated during the process of such maintenance.

2. All the personnel involved in the maintenance of the unit must have relevant certificates of qualification, and shall not work in a confined space. Warning or caution signs shall be set up in the working area to ensure the safety of the unit maintenance area by managing and controlling the flammable and explosive refrigerants.

3. An appropriate refrigerant detector shall be used to check the area before and during the work to make sure that the unit maintenance personnel can understand the concentration of the flammable and explosive refrigerants in the working area in a timely manner and eliminate potential hazards on time. Make sure that the leak detection equipment used shall be suitable for use together with flammable and explosive refrigerants, that is, spark free, adequate sealing, or intrinsically safe.

4. If an open-fire operation needs to be performed to the cooling equipment or any related parts, appropriate fire extinguishing equipment shall be provided in the working area.

5. If braze welding is required due to the leakage of refrigerant found in the unit system, all the refrigerant shall be recovered or discharged from the system to an open and well-ventilated area. Before braze welding, it is required to make sure that the concentration of the flammable and explosive refrigerant in the pipeline of the cooling system shall fall within the safe range values. Only after the risk of explosion is eliminated can braze welding be performed.

The method for dilution of the flammable and explosive refrigerant in the pipeline of the cooling system is recommended as follows: The system shall use OFN “flushing”.

- ① First, all the refrigerant shall be recovered or discharged from the cooling system to an open and well-ventilated area.
- ② Connect the relevant meters and valves properly, and use a vacuum pump to discharge the residual refrigerant in the system out of the cooling system pipeline.
- ③ Connect the relevant meters and valves properly, inject an appropriate amount of OFN into the


cooling system, stabilize it for 5 minutes, and then discharge OFN to an open and well-ventilated area.


④ The aforesaid operations ② and ③ shall be repeated more than three times.

6. After braze welding has been performed for the cooling system of the unit, OFN shall be used to conduct a pressure leakage test, so as to ensure no leakage in the system.

7. After confirming that there is no leakage in the system, connect the relevant meters and valves properly, and use the vacuum pump to vacuum the cooling system.

8. If the vacuum degree of the cooling system meets the technical requirements of the unit, re-inject refrigerant according to the parameters on the unit nameplate.

	<p>Warning:</p> <p>If the refrigerant circuit is opened for maintenance or for any other purpose, the following procedures shall be followed:</p> <ul style="list-style-type: none"> ➤ Removing the refrigerant: Purge the pipeline with an inert gas; ➤ Air emptying: Purge the pipeline with an inert gas again; ➤ Open the pipeline by cutting or braze welding; ➤ Make sure that the outlet of the vacuum pump shall not be near any fire source and shall be well-ventilated.
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	<p>Caution:</p> <p>During the injection of refrigerant, the following requirements shall be satisfied:</p> <ul style="list-style-type: none"> ➤ Make sure that when the injection equipment is used, the contamination of different refrigerants will not occur. The hoses or pipelines shall be as short as possible to minimize the amount of refrigerant contained therein; ➤ The steel cylinders shall remain upright; (Follow the instructions on the steel cylinders.) ➤ Make sure that the cooling system has been grounded before injecting the refrigerant into the system; ➤ Label the system after injection; ➤ Extra care shall be taken to use qualified measuring instruments, and inject the amount of refrigerant in strict accordance with the marking on the system.
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A leakage test shall be conducted after the refrigerant is injected to the cooling system and before the commissioning. Make sure that there is no leakage in the system and no residual refrigerant in the surrounding environment before conducting the switch-on test.

- When removing the refrigerant from the system, you must safely remove all the refrigerant for maintenance or discontinuing the use of the equipment.
- The hoses shall be equipped with no-leakage disconnecting joints and in good condition.

14.2 Maintenance of electrical components

If electrical components need to be replaced, the new ones shall be fit for their purpose and conform to the correct specifications. The manufacturer's maintenance and service guidelines shall always be followed. In case of any doubt, consult with the manufacturer's technical department for assistance.

The repairs and maintenance of electrical components shall include an initial safety inspection and a component inspection procedure. If a fault that may endanger the safety is found, the power supply of the unit shall be disconnected first. Before the fault is eliminated, the owner of the equipment shall be informed in time, and switching on the power supply of the unit shall be prohibited.

	<p>Warning:</p> <p>Particular attention shall be paid to the following matters:</p> <ul style="list-style-type: none">➤ Make sure that when the electrical components are operated, their enclosures shall not be changed to affect their level of protection, including damage to cables, excessive number of connections, nonconformance of terminals to original specifications, damage to seals, and incorrect installation of glands;➤ Make sure that the equipment shall be installed firmly;➤ Make sure that the seals or the sealing materials are not degraded so that they still can be used to prevent access in a flammable environment;➤ Check and make sure that the cables shall not be subject to wear, corrosion, overpressure, vibration, sharp edges, or any other adverse environmental effects. During checking, consideration shall also be given to the effects of aging or continuous vibration of such electrical components as compressors or fans.
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Chapter 15 Schedule I

➤ Unit start-stop control

Parameter value	Name	Start-stop mode allowed		
		Start-stop by the display screen (including timer, automatic switch-on start function)	Start-stop by the line control switch	Online monitoring start-stop
0 (default)	Combined	√	√	√
1	Remote	×	√	√
2	Local	√	×	×
3	Line control	×	√	×
4	Network control	×	×	√

Schedule II

➤ Installation configuration of the power cords

- ◇ The power cords connected to the main unit must be those wires conforming to the local regulations, and they shall be fastened with wire fixing devices. Improper connection or fastening will lead to fire;
- ◇ If a power cord is damaged, it must be replaced by qualified personnel to avoid any hazard;
- ◇ During the installation of the unit, the power cords shall be configured with reference to the table below:

Model	Type of power supply	Cross sectional area						Capacity of the air switch
		Phase wire		Neutral wire		Ground Wire		
		Diameter (CWG)	Wire No. (AWG)	Diameter (CWG)	Wire No. (AWG)	Diameter (CWG)	Wire No. (AWG)	
WLRK-6 I BM/B3	220~240V 50Hz	2.5mm ²	12#	2.5mm ²	12#	2.5mm ²	12#	16A
WLRK-8 I BM/B3	220~240V 50Hz	2.5mm ²	12#	2.5mm ²	12#	2.5mm ²	12#	16A
WLRK-10 I BM/B3	220~240V 50Hz	4.0mm ²	10#	4.0mm ²	10#	4.0mm ²	10#	25A
WLRK-12 I BM/B3	220~240V 50Hz	4.0mm ²	10#	4.0mm ²	10#	4.0mm ²	10#	32A
WLRK-12 II BM/B3	380V/3N 50Hz	2.5mm ²	12#	2.5mm ²	12#	2.5mm ²	12#	16A
WLRK-14 I BM/B3	220~240V 50Hz	6.0mm ²	8#	6.0mm ²	8#	6.0mm ²	8#	40A
WLRK-14 II BM/B3	380V/3N 50Hz	2.5mm ²	12#	2.5mm ²	12#	2.5mm ²	12#	16A

Note:

1. The diameter of the wire selected shall be larger than that as required above;
2. The above wire diameters are selected on condition that the distance between the unit and the distribution boxes is less than 100 meters. If the distance exceeds 100 meters, consult professionals about the selection.

Schedule III

➤ Model Dial Code List

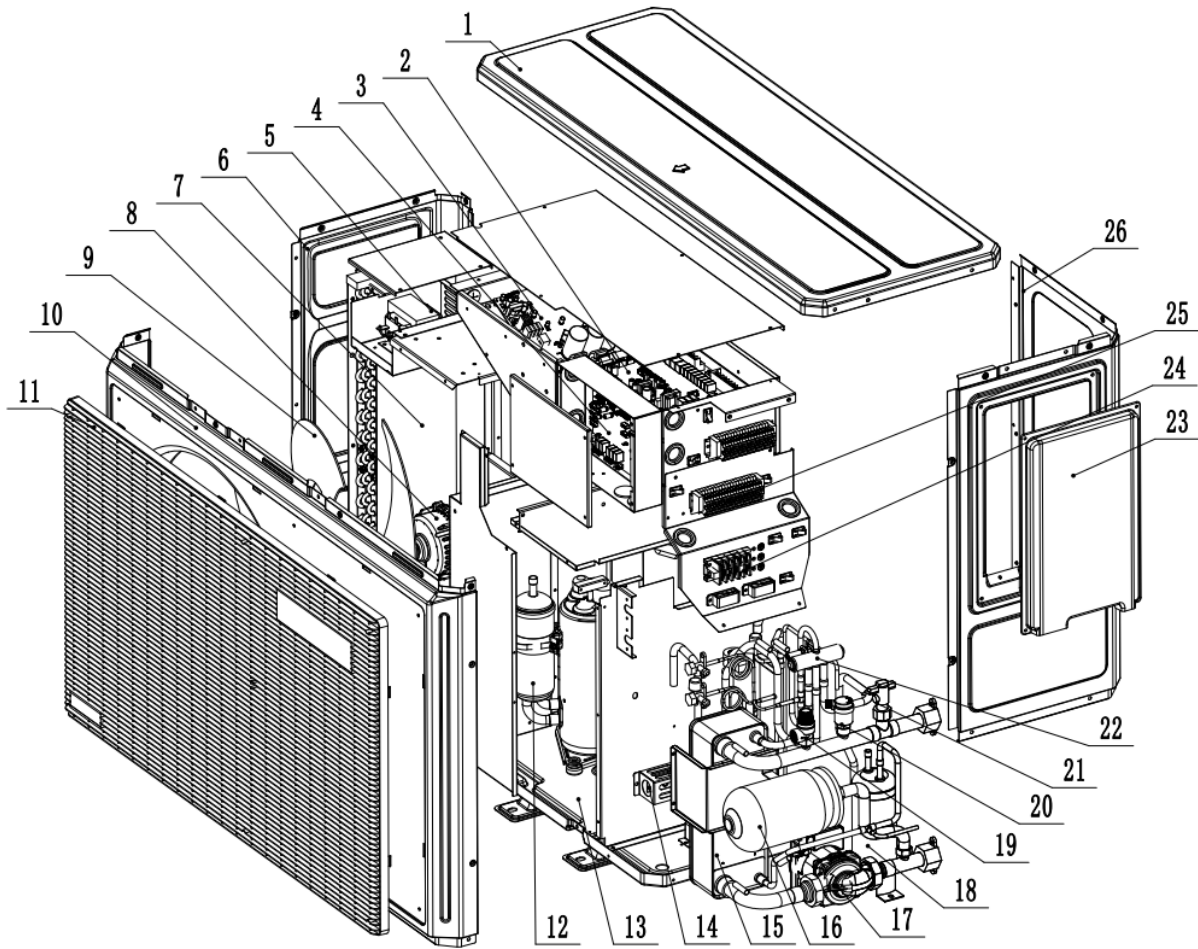
If the mainboard shall be replaced, be sure to contact the manufacturer and ask it to dispatch its service agent or qualified personnel to replace the mainboard and select the corresponding model code on SW4 and SW5 terminals on the mainboard, so as to avoid any hazard.

Model	Model Code						
	Terminal SW4			Terminal SW5			
	2	3	4	1	2	3	4
WLRK-6 I BM/B3	0	1	0	1	0	1	1
WLRK-8 I BM/B3	0	1	0	1	1	0	0
WLRK-10 I BM/B3	0	1	0	1	1	0	1
WLRK-12 I BM/B3	0	1	0	1	1	1	0
WLRK-12 II BM/B3	0	1	0	1	1	1	1
WLRK-14 I BM/B3	0	1	1	0	0	0	0
WLRK-14 II BM/B3	0	1	1	0	0	0	1

Note: On SW terminal, OFF indicates “0”, and ON indicates “1”.

Schedule IV

➤ Exploded Drawing



No.	Component name	No.	Component name	No.	Component name
1	Top cover	11	Plastic net guard	21	Target flow switch
2	Main board of the indoor unit	12	Compressor	22	Four-way valve component
3	Driver board	13	Base component	23	Terminal box
4	Main board of the outdoor unit	14	Refrigerant concentration sensor	24	Power supply terminal block
5	Electric reactor	15	Insulation cotton plate-type heat exchanger component	25	1-position terminal block
6	Left side plate	16	Expansion tank	26	Right side plate
7	Fin-type heat exchanger component	17	Water pump		
8	DC motor	18	Liquid reservoir		
9	Fan blade	19	Safety valve		
10	Front panel	20	Automatic exhaust valve		



Packing List

No.	Accessory name	Quantity	Remarks
1	Main unit	1	/
2	Display	1	/
3	Display communication line	1	/
4	Y-type filter	1	60-mesh screen
5	Temperature sensor	7	/
6	Shock-absorbing rubber block	6	/
7	Quality certificate	1	Attached to the Operation Manual
8	Packing list	1	Attached to the Operation Manual
9	Operation Manual	1	/

No.: AMA-SMS-392

Version: VER1.00