


# Air To Water Heat Pump
## (Outdoor Unit)

**STU Series**

# Installation Manual

Version 4.0

www.solaxpower.com

eManual in the QR code or at www.solaxpower.com

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# About This Manual

## Scope of Validity

This manual is an integral part of outdoor unit of air to water heat pump. It describes the assembly, installation, commissioning, maintenance and failure of the product. Please read it carefully before operating.

This manual is valid for the following heat pump models:

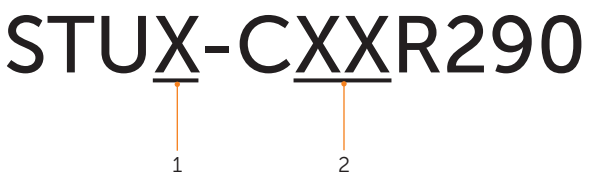
- Three phase

  STU3-C08R290 | STU3-C10R290 | STU3-C12R290 | STU3-C14R290 | STU3-C16R290

- One phase

  STU1-C08R290 | STU1-C10R290 | STU1-C12R290 | STU1-C14R290 | STU1-C16R290

Model description




| Item | Meaning | Description |
|---|---|---|
| 1 | Phase | "1": one phase<br>"3": three phase |
| 2 | Power | "08": rated output power of 8 kW. |

## Conventions

The symbols that may be found in this manual are defined as follows.

| Symbol | Description |
|---|---|
| DANGER | Indicates a hazardous situation which, if not avoided, will result in death or serious injury. |
| WARNING | Indicates a hazardous situation which, if not avoided, could result in death or serious injury. |
| CAUTION! | Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury, device damage, power generation loss or unanticipated results. |
| NOTICE! | Provides tips for the optimal operation of the product. |

## Change History

**Version 4.0 (2025-12-10)**

Updated "1.1 General Safety Instructions", "1.2 Safety Instructions for Refrigerant", "1.4 Safety Instructions for Electrical Connection"

Updated "2.2 Main Modules of Outdoor Unit", "2.3 Hydraulic Components of Outdoor Unit", "2.5 Main Parts of Outdoor Unit", "8.3 Freeze Protection" (Modified the exhaust valve)

Updated "8.1 Preparations for Installation" (Added the instruction of Pressure Drop)

Updated "9.4.2 Operating Current and Wire Diameter"

Updated "17 Technical Data"

**Version 3.0 (2025-10-11)**

Updated "2.5 Main Parts of Outdoor Unit"

Updated "4.2 Tools Requirement"

Updated "5.2 Accessories of Outdoor Unit"

Updated "7.3 Mounting the Unit"

Updated "8.1 Preparations for Installation" (Modified the flow rate range)

Updated "9.3 Overview of Electrical Wiring"

Updated "9.4.2 Operating Current and Wire Diameter"

Updated "17 Technical Data"

Updated "18 Typical Applications" (Updated all diagrams)

**Version 2.0 (2025-05-29)**

Updated "2.5 Main Parts of Outdoor Unit"

Updated "2.6 Operating Range"

Updated "9 Electrical Connection"

Updated "17 Technical Data"

**Version 1.0 (2025-04-08)**

Updated "17 Technical Data"

**Version 0.0 (2025-03-31)**

Initial release

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# 1 Safety

## 1.1 General Safety Instructions

The series heat pump has been meticulously designed and tested to comply with the relevant state and international safety standards. Nevertheless, like all electrical and electronic device, safety precautions must be observed and followed during the installation of the heat pump to minimize the risk of personal injury and ensure a safe installation.

Please carefully read, fully comprehend, and strictly adhere to the comprehensive instructions provided in the user manual and any other relevant regulations prior to the installation of the heat pump. This document does not replace and is not intended to replace any local, state, provincial, federal or national laws, regulations or codes applicable to the installation, electrical safety and use of the heat pump.

SolaX assumes no responsibility for any consequences resulting from the violation of the storage, transportation, installation and operation regulations outlined in this document. Such consequences include, but are not limited to:

- Heat pump damage caused by force majeure events, such as earthquakes, floods, thunderstorms, lightning, fire hazards, volcanic eruptions, and similar events.
- Heat pump damage due to human causes.
- Heat pump damage caused by strong vibrations from external factors before, during and after installation.
- Use or operation of the heat pump in violation of state and local policies or regulations.
- Failure to comply with the operation instructions and safety precautions provided with the product and in this document.
- Improper installation or use of the heat pump in unsuitable environmental or electrical conditions.
- Unauthorized modifications to the product or software.
- Heat pump damage occurring during transportation by the customer.
- Storage conditions that do not meet the requirements specified in this document.
- Installation and commissioning performed by unauthorized personnel who lack the necessary licenses or do not comply with state and local regulations.

**⚠ WARNING!**

- This appliance 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 appliance. Cleaning and user maintenance shall not be made by children without supervision.

**⚠ WARNING!**

- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.
- 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 odour.
- The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.
- The appliance shall be stored so as to prevent mechanical damage from occurring.
- Any person who is involved with working on or breaking into a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorises their competence to handle refrigerants safely in accordance with an industry recognised assessment specification.
- Servicing shall only be performed as recommended by the equipment manufacturer. Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants.
- Compliance with national gas regulations shall be observed.

### 1.1.1 Target Group

These instructions are exclusively intended for qualified contractors and authorized installers.

Work on the refrigerant circuit with flammable refrigerant in safety group A3 may only be carried out by authorized heating contractors.

- Heating contractors must be trained in accordance with EN 378 Part 4 or IEC 60335-2-40, Section HH.
- Heating contractors must hold the certificate of competence from an industry recognized body.

Brazing or soldering work on the refrigerant circuits may only be carried out by personnel certified in accordance with ISO 13585 and AD 2000, Datasheet HP 100 R.

Brazing or soldering work on accumulator connections requires certification of personnel and processes by a notified body according to the Pressure Equipment Directive (2014/68/EU).

Electrical work should only be carried out by a qualified electrician.

All safety related points must be checked by the specified certified heating contractors before commissioning. System commissioning must be carried out by the system installer or qualified personnel.

### 1.1.2 Intended Use

**WARNING!**

- Improper or unintended use may result in injury or death to the user or others, or damage to the product and other property.

#### Product introduction

- The product is the outdoor unit of an air-to-water heat pump with single-unit and split-unit design.
- The product is only intended for outdoor installation.
- The product uses the outdoor air as a heat source and can be used to heat a residential building and generate domestic hot water.
- The air that escapes from the product must be able to flow out freely, and must not be used for any other purposes.
- The product is intended exclusively for domestic use.

#### Limitations on use

The following places are not appropriate for installation:

- Where there is mist of mineral oil or oil spray or vapors. Plastic parts may deteriorate, and cause joint loose and leakage of water.
- Where corrosive gases (such as sulfurous acid gas) are produced, or corrosion of copper pipes or soldered parts may cause leakage of refrigerant.
- Where flammable gases may leak, carbon fiber or ignitable dust is suspended in the air or volatile flammables such as paint thinner or gasoline are handled. These types of gases might cause a fire.
- Where the air contains high levels of salt such as a location near the ocean.
- Where there is machinery which emits massive electromagnetic waves. Enormous electromagnetic waves can disturb the control of the system and cause equipment malfunction.
- Where voltage fluctuates a lot, such as a location in a factory.
- In vehicles or vessels.
- Where acidic or alkaline vapors are present.

#### Regulatory compliance

- Observe the operating instructions of the product and any other installation components.
- Comply with all inspection and maintenance conditions listed in the instructions.
- Install and set up the product in accordance with the product and system approval.
- Installation, commissioning, inspection, maintenance and troubleshooting by qualified contractors and authorized installers.
- Cover installation in accordance with the IP code.

**WARNING!**

- Any other use that is not specified in these instructions, or use beyond that specified in this document, should be considered as improper use.

**CAUTION!**

- Improper use of any kind is prohibited.
- Do not rinse the unit.
- Do not place any object or equipment on top of the unit (top plate).
- Do not climb, sit or stand on top of the unit.

## 1.2 Safety Instructions for Refrigerant

**CAUTION!**

- Servicing shall be performed only as recommended by the manufacturer.

### 1.2.1 Information on Servicing

#### 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.

#### 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.

#### 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.

#### 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. nonsparking, adequately sealed or intrinsically safe.

## 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.

## 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.

## 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 preferably expel it externally into the atmosphere.

## 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.

## 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 no live electrical components and wiring are exposed while charging, recovering or purging the system
- that there is continuity of earth bonding.

### 1.2.2 Detection of Flammable Refrigerants

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

### 1.2.3 Leak Detection Methods

The following leak detection methods are deemed acceptable for systems containing flammable refrigerants.

Electronic leak detectors shall be used to detect flammable refrigerants, but the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed and the appropriate percentage of gas (25 % maximum) is confirmed.

Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

If a leak is suspected, all naked flames shall be removed/extinguished.

If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

### 1.2.4 Removal and Evacuation

When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, it is important that best practice is followed since flammability is a consideration. The following procedure shall be adhered to:

- remove refrigerant;
- purge the circuit with inert gas;
- evacuate;
- purge again with inert gas;
- open the circuit by cutting or brazing.

The refrigerant charge shall be recovered into the correct recovery cylinders. The system shall be "flushed" with OFN to render the unit safe. This process may need to be repeated several times. Compressed air or oxygen shall not be used for this task.

Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. This operation is absolutely vital if brazing operations on the pipework are to take place.

Ensure that the outlet for the vacuum pump is not close to any ignition sources and there is ventilation available.

### 1.2.5 Charging Procedures

In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimise the amount of refrigerant contained in them.
- Cylinders shall be kept upright.
- Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the refrigeration system.

Prior to recharging the system it shall be pressure tested with OFN. The system shall be leak tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

### 1.2.6 Labelling

Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

### 1.2.7 Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of reclaimed refrigerant. It is essential that electrical power is available before the task is commenced.

a) Become familiar with the equipment and its operation.

b) Isolate system electrically.

c) Before attempting the procedure ensure that:

- mechanical handling equipment is available, if required, for handling refrigerant cylinders;
- all personal protective equipment is available and being used correctly;
- the recovery process is supervised at all times by a competent person;
- recovery equipment and cylinders conform to the appropriate standards.

d) Pump down refrigerant system, if possible.

e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.

f) Make sure that cylinder is situated on the scales before recovery takes place.

g) Start the recovery machine and operate in accordance with manufacturer's instructions.

h) Do not overfill cylinders. (No more than 80 % volume liquid charge).

i) Do not exceed the maximum working pressure of the cylinder, even temporarily.

j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

k) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

### 1.2.8 Recovery

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge are available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.

The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

## 1.3 Safety Instructions for Installation

### Preparation before lifting

- Clarify the model, specification, installation location and foundation requirements of the heat pump unit.
- Ensure that the lifting site is level, free of obstacles, and meet the requirements for the passage and operation of lifting equipment.
- Inspect the lifting equipment (e.g. crane, sling) to ensure its good performance.
- The lifting operator, signalman and rigger must be licensed.

### Lifting equipment and tools

- Select the appropriate crane according to the weight and size of the heat pump and make sure its rated lifting capacity meets the requirements.
- Use canvas sling or steel wire rope with sufficient strength (diameter >10mm), and add protective pads on the contact parts to avoid damaging the unit when lifting.
- Equipped with winches, ground cows, jacks and other tools for equipment leveling and adjustment.
- Check whether the crane's outriggers, brakes, limiters and other safety devices are normal before lifting.

### Requirements of lifting

- Avoid lifting operations in windy or snowy weather or strong wind conditions.
- When handling the unit, the tilting angle should be less than 15°, carry it gently and put it down lightly to avoid violent collision.
- During lifting, make sure the unit is stable and avoid shaking or collision. The sling should be subjected to uniform force, avoiding excessive local force.
- The lifting height should meet the requirements of the installation position of the unit, and the height of the sling should be considered at the same time.
- During the lifting process, it is strictly prohibited for people to stay or pass under the lifting object.

### Unit installation

- Lift the heat pump unit to a predetermined position.
- Use shock-absorbing shims and fix it with bolts to ensure that the unit is level and securely installed.
- When installing the import and export piping, make sure that the connections are well sealed and free of leakage.

- Check whether the unit is firmly installed, confirm that the unit is installed in the correct position and that connecting pipes have no leakage.

## 1.4 Safety Instructions for Electrical Connection

**DANGER!**

- Contact with live components can result in injuries. Before removing covers from the appliances, wait at least 4 minutes until the voltage has completely dropped out.
- Wear suitable personal protective equipment when carrying out any work.
- Do not touch any switch or electrical parts with wet fingers. It may cause electrical shock and compromise the system.
- Do not smoke. Avoid naked flames and sparks. Never switch lights or electrical appliances on or off in environments with naked flames or sparks.

**CAUTION!**

- Take measures to prevent static electricity.
- Electrostatic discharge may damage electronic components. Before beginning work, touch earthed objects, such as heating or water pipes, to discharge any static.

### Before electrical connection

- Installation needs to be in strict compliance with local laws, regulations and standards, and voltage and frequency need to be checked.
- Use only grounded outlets for the unit, and the unit should have an independent switch.
- Prepare the tools required for electrical wiring, make sure they are in good condition and can be used properly.
- Confirm that there is a suitable power outlet or distribution box near the installation location, and the power supply voltage and frequency should be consistent with the requirements of the unit.
- Make sure that there is a reliable grounding device to ensure the safety of electricity.

### During electrical connection

- Connect the power cable and control cable correctly according to the requirements of the equipment manual.
- Ensure that the wiring is firm and in good contact to avoid loose, short circuit and other problems.
- The wiring should be neat and standardized to avoid friction and extrusion with other pipes or objects, and should be protected by wearing pipes if necessary.

### After electrical connection

- Ensure the grounding of the equipment is good, and the leakage protection device is working properly.

- Test the insulation performance of the equipment to ensure that no leakage and other safety accidents will occur during operation.

### Repairs to sealed components

During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.

Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.

Ensure that apparatus is mounted securely.

Ensure that seals or sealing materials have not degraded such that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in NOTE The use of silicon sealant may inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

### Repair to intrinsically safe components

Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.

Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating.

Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

### Cabling

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of ageing or continual vibration from sources such as compressors or fans.

## 1.5 Safety Instructions for Operation

### 1.5.1 Commissioning Safety

### Before commissioning

- Ensure that the heat pump is firmly installed to avoid vibration or tipping during operation.

- Ensure that the equipment is disconnected from the power supply and that it is well grounded to avoid electric shock.
- Check all parts to ensure that there is no damage or abnormality.
- Make sure the power and control cables are connected correctly and securely to prevent short-circuiting or loosening.
- Check the refrigerant piping to ensure there is no leakage.
- Conduct pressure test to ensure that the system has no leakage and the pressure is normal.

### During commissioning

- Pay attention to high temperature parts, such as compressor, heat exchanger, etc., avoid direct contact.
- The commissioning should be carried out by qualified technicians. Strictly follow the operation manual for commissioning.
- Closely monitor the operation status during commissioning and stop the machine immediately for inspection if any abnormality is found.

## 1.5.2 Emergency Response

### Response to refrigerant leakage

**⚠ DANGER!**

- Immediately keep a distance of at least 2 meters from the equipment and prohibit uninvolved persons (especially children) from approaching.
- Evacuate persons from the danger zone and ensure ventilation (open windows/ activate exhaust system).
- Open flames, smoking and spark-producing operations (e.g. switching on/off electrical units) are strictly prohibited.
- Quickly cut off the power supply to the equipment (via the main switch or distribution box) and remove surrounding sources of ignition.
- Avoid direct contact with the refrigerant (to prevent frostbite/asphyxiation) and prohibit inhalation of vapors.
- Immediately contact a professional maintenance organization for treatment, and deactivate the system until the repair is completed.

**⚠ WARNING!**

- Maintenance must be performed by a licensed contractor and operation by unauthorized personnel is prohibited.
- Users are required to supervise the control of ignition sources during maintenance.

### Response to water leakage

- Immediately turn off the main power supply to the system (via fuse box or switchboard).

- Prohibit contact with leaking equipment and evacuate the wet area by wearing insulated shoes.
- Keep away from hot water leakage area and avoid touching hot parts with bare hands.

### Response to the freezing outdoor unit

- Violent de-icing is prohibited.
- Prohibit striking the ice with sharp tools to prevent equipment damage.
- Before using EN 60335-2-30 certified electric heating equipment, refrigerant needs to be tested for leaks.
- It is recommended to install condensate tray electric heating belt (professional installation is required) in high-cold areas.
- Regularly check the sealing of refrigerant piping.
- Anti-icing heating devices should be pre-installed in areas with frequent icing.

### 1.5.3 Maintenance check

- Before starting up the equipment, a comprehensive gas device leakage test (recommended to use soapy water or electronic leak detector) needs to be executed.
- At least 1 systematic leakage test per quarter, shorter cycles are required for high risk environments.
- After the refrigeration system repair is completed, the vacuum process must be carried out, holding pressure for 30 minutes to confirm that there is no leakage; ensure that air and non-condensable gases are discharged.
- Only the specified refrigerant (labeled with specific types) is allowed to be used, and mixed charging is strictly prohibited.

## 1.6 Safety Instructions for Storage

### 1.6.1 Storage of Unit

**⚠ WARNING!**

- The outdoor unit is charged at the factory with refrigerant R290 (propane).

### Storage environment requirements

- Strictly comply with the regulations and standards on product storage.
- Keep away from fire source, heat source and combustible materials (such as oil, paper, wood, etc.).
- Prohibit the use of open flame equipment (such as gas equipment, electric heaters) near the storage area of outdoor unit.
- Prohibit smoking, open flame or spark operation.

- Prohibit the use of explosion-proof electrical equipment (such as lamps, switches).
- Anti-static devices should be installed on the floor to avoid static electricity accumulation.
- Ensure air circulation in the storage area (such as ≥6 air changes per hour).
- The temperature is controlled within the range of -25°C to 70°C.

## Packaging and stacking

- Retain the anti-shock foam and packing outer box from the factory to prevent transport damage.
- Stack the unit no more than 2 layers, and pad the pallet at the bottom to avoid deformation caused by extrusion.
- The maximum number of outdoor units that can be stored in one place depends on local conditions.

**⚠ WARNING!**

- The use of open flames in the storage or servicing area is strictly prohibited.
- It is prohibited for non-professionals to handle repairs involving flammable refrigerants.
- It is prohibited to transfer the handling unit by destructive means (e.g. knocking, corrosive substances).
- In the event of a fire in the storage area, select a carbon dioxide ($CO_2$) or dry powder fire extinguisher, and prohibit the use of water-based fire extinguishers (which may extend the scope of the leak) or foam extinguishers.



**WARNING: Risk of fire**

# 2 Product Overview

## 2.1 Appearance and Dimensions

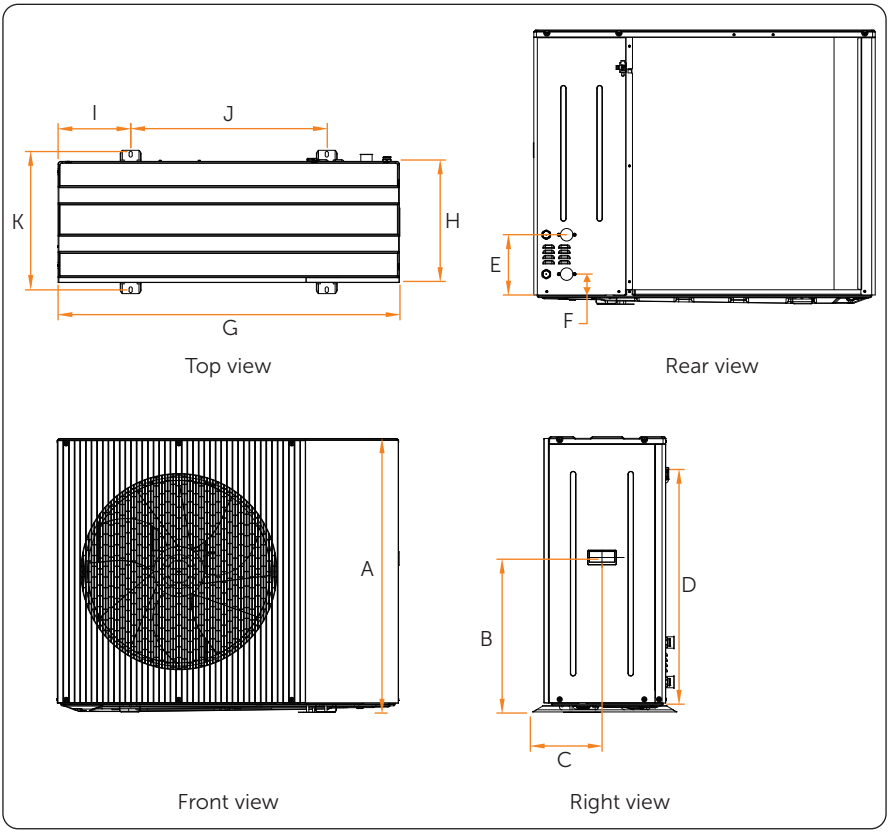



Table 2-1 Dimensions (Unit: mm)

| Model | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Three phase (8-16 kW) | 1050 | 589 | 264 | 899 | 231 | 80 | 1310 | 465 | 279 | 753 | 530 |
| One phase (8-16 kW) | 1050 | 589 | 264 | 899 | 231 | 80 | 1310 | 465 | 279 | 753 | 530 |

## 2.2 Main Modules of Outdoor Unit

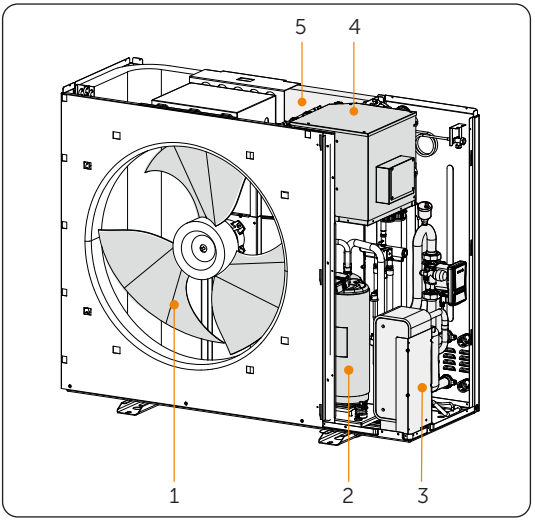



Table 2-1 Description of main modules

| No. | Name | Description |
|---|---|---|
| 1 | Fan blade | For promoting air flow and enhancing heat transfer |
| 2 | Compressor | Core component. It can transfer heat by compressing refrigerant, which can achieve heating or cooling. |
| 3 | Hydraulic components | For transferring heat, maintaining hydraulic balance, and reducing energy consumption and noise |
| 4 | Control box | For executing various commands and monitoring the operation of the entire system |
| 5 | Finned heat exchanger | For increasing heat transfer area and improving heat transfer efficiency |

## 2.3 Hydraulic Components of Outdoor Unit

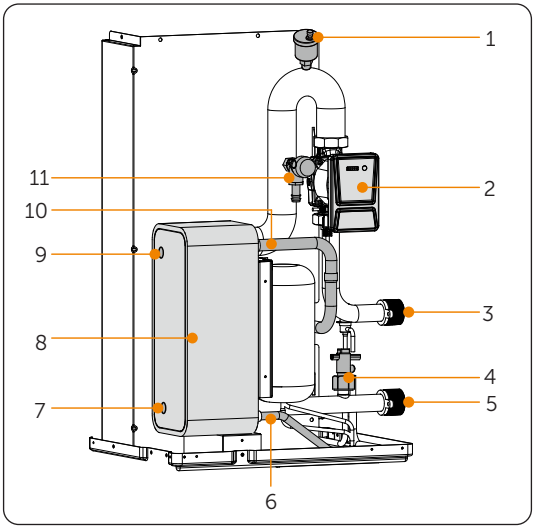
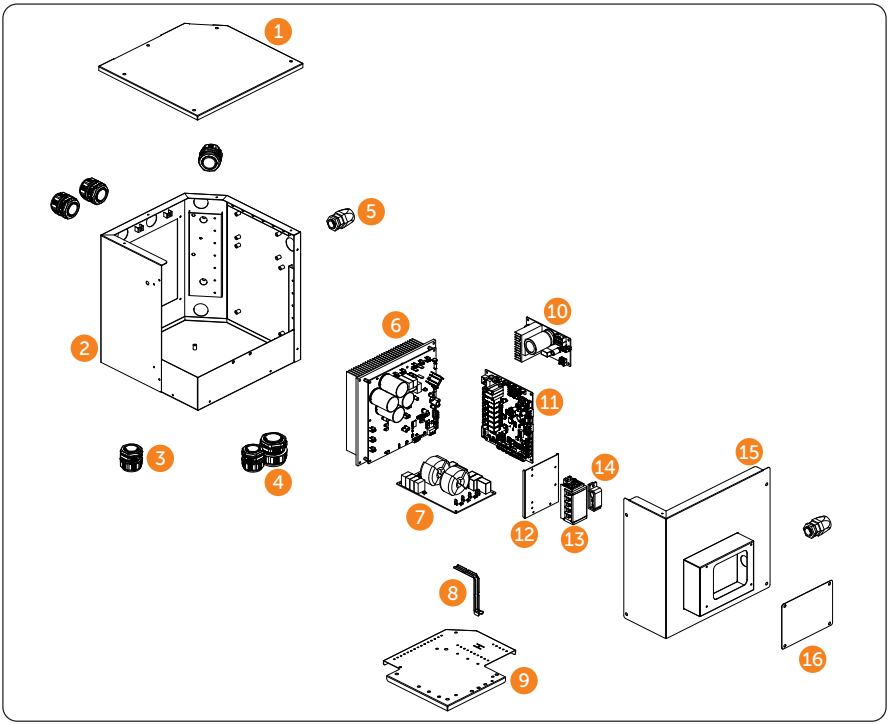



Table 2-1 Description of hydraulic components

| No. | Name | Description |
|---|---|---|
| 1 | Exhaust valve | Automatically removes the remaining air from the water loop. |
| 2 | Water pump | Circulates water in the water loop. |
| 3 | Water outlet pipe | / |
| 4 | Water flow switch | Water loop protection switch. The switch will trigger in the event of insufficient water flow. |
| 5 | Water inlet pipe | / |
| 6 | Refrigerant liquid pipe | / |
| 7 | Temperature sensor | Temperature sensor determine the water and refrigerant temperature at various points in the water loop: TW_in |
| 8 | Plate heat exchanger | Transfers heat between the refrigerant and the water. |
| 9 | Temperature sensor | Temperature sensor determine the water and refrigerant temperature at various points in the water loop: TW_out |
| 10 | Refrigerant gas pipe | / |
| 11 | Pressure relief valve | Prevents excessive water pressure by opening when the pressure reaches 0.3 MPa (3 bar) and discharging water from the water loop. |

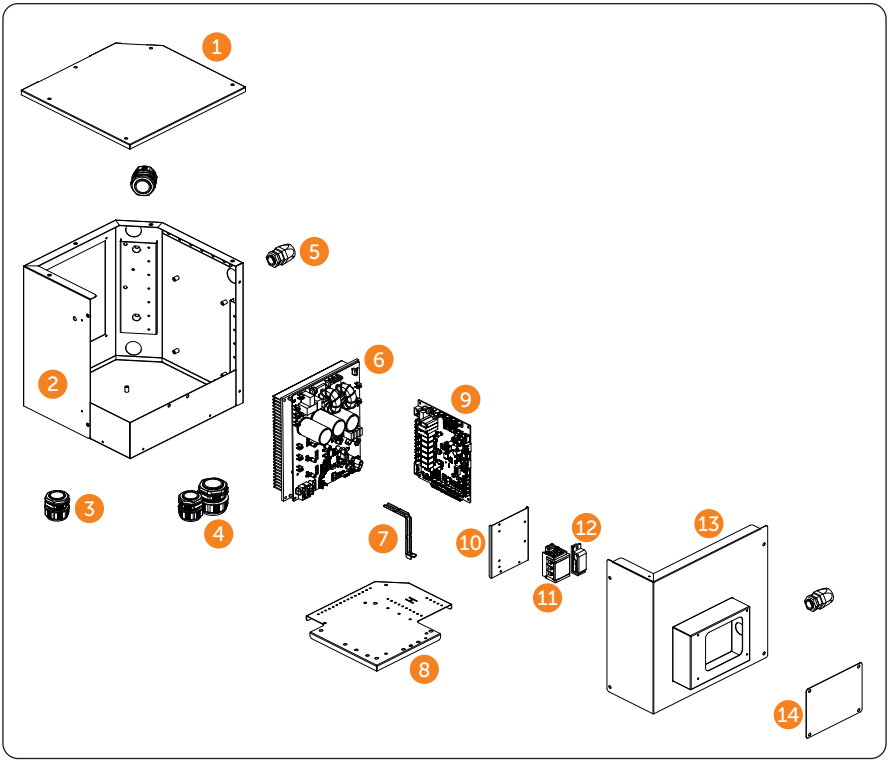
## 2.4 Main Parts of Control Box

### Three phase




| | | | | | |
|---|---|---|---|---|---|
| 1 | Control box top cover plate | 7 | Filter board | 13 | Five-position terminal block |
| 2 | Control box body | 8 | Signal line bridge | 14 | Wire clamp |
| 3 | PG joint (M30*1.5) | 9 | Electronic control mounting plate | 15 | Control box front cover plate |
| 4 | PG joint (M32*1.5) | 10 | Fan drive board | 16 | Electrical box cover plate |
| 5 | Fastened joint (M25*1.5) | 11 | Main control board | | |
| 6 | Compressor driver board | 12 | Terminal block mounting plate | | |

## One phase



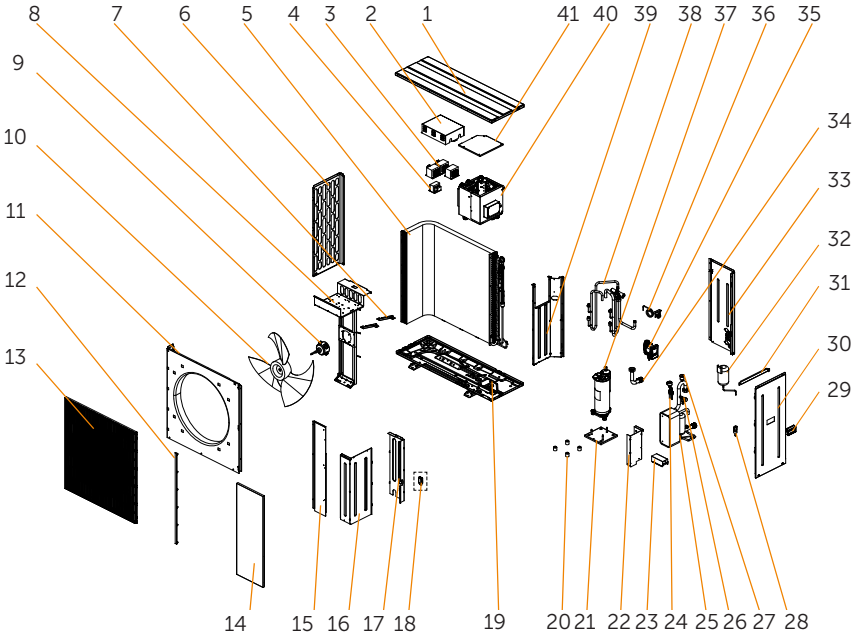

| | | | | | |
|---|---|---|---|---|---|
| 1 | Control box top cover plate | 6 | Compressor driver board | 11 | Three-position terminal block |
| 2 | Control box body | 7 | Signal line bridge | 12 | Wire clamp |
| 3 | PG joint (M30*1.5) | 8 | Electronic control mounting plate | 13 | Control box front cover plate |
| 4 | PG joint (M32*1.5) | 9 | Main control board | 14 | Electrical box cover plate |
| 5 | Fastened joint (M25*1.5) | 10 | Terminal block mounting plate | | |

## 2.5 Main Parts of Outdoor Unit

**NOTICE!**

- This diagram takes STU3-C16R290 as an example, the main parts of other models are different.

### STU3-C16R290



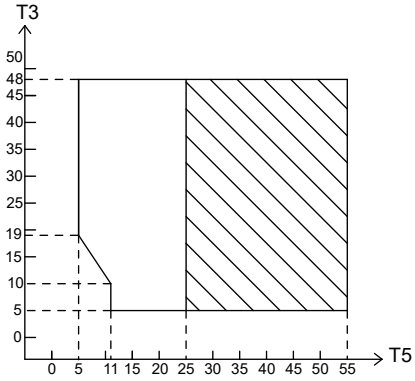

| | | | | | |
|---|---|---|---|---|---|
| 1 | Top cover | 15 | Center pillar | 29 | Handle |
| 2 | Reactor cover | 16 | Compressor compartment right plate | 30 | Right plate |
| 3 | Harmonic reactor | 17 | Compressor compartment rear plate | 31 | Connecting strips of front and rear plates |
| 4 | Inverter reactor | 18 | Refrigerant sensor (Optional) | 32 | Liquid storage tank |
| 5 | Finned heat exchanger | 19 | Chassis | 33 | Rear maintenance plate |

| | | | | | |
|---|---|---|---|---|---|
| 6 | Left plate | 20 | Rubber feet | 34 | Inlet and outlet pipe components |
| 7 | Reactance bridge frame | 21 | Compressor mounting plate | 35 | Water pump |
| 8 | Motor bracket | 22 | Plate heat exchanger pillar | 36 | Globe valve components |
| 9 | Motor | 23 | Plate heat exchanger support bracket | 37 | Compressor |
| 10 | Fan blade | 24 | Expansion valve component | 38 | 4-way valve component |
| 11 | Wind guide ring | 25 | Plate heat exchanger component | 39 | Median septum |
| 12 | Decorative strip | 26 | Pressure relief valve | 40 | Control box |
| 13 | Front plate | 27 | Exhaust valve | 41 | Control box cover |
| 14 | Front maintenance plate | 28 | Water flow switch | | |

## 2.6 Operating Range

### Cooling mode

In cooling mode, the heat pump works at an outdoor temperature of 5°C to 48°C.

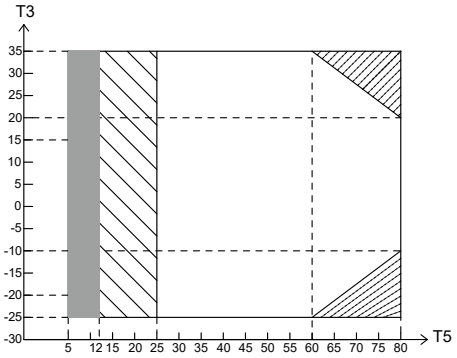



T5: leaving water temperature
T3: outdoor ambient temperature

Operation range by heat pump with possible limitation and protection.

## Heating mode

In heating mode, the heat pump works at an outdoor temperature of -25°C to 35°C.




T5: leaving water temperature
T3: outdoor ambient temperature

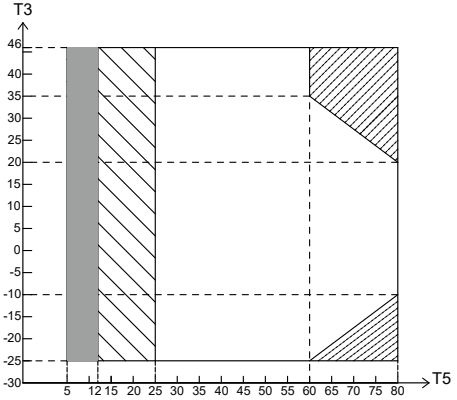
If IBH/AHS setting is valid, only IBH/AHS turns on;
If IBH/AHS setting is invalid, only heat pump turns on, limitation and protection may occur during heat pump operation.

Operation range by heat pump with possible limitation and protection.

Heat pump turns off, only IBH/AHS turns on.

## DHW mode

In DHW mode, the heat pump works at an outdoor temperature of -25°C to 46°C.



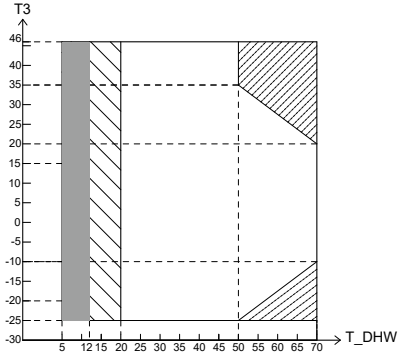

T5: leaving water temperature
T3: outdoor ambient temperature

If IBH/AHS setting is valid, only IBH/AHS turns on;
If IBH/AHS setting is invalid, only heat pump turns on, limitation and protection may occur during heat pump operation.

Operation range by heat pump with possible limitation and protection.

Heat pump turns off, only IBH/AHS turns on.

In DHW mode, the heat pump works at an outdoor temperature of -25°C to 46°C.




T_DHW: DHW tank temperature
T3: outdoor ambient temperature

If TBH/IBH/AHS setting is valid, only TBH/IBH/AHS turns on;
If TBH/IBH/AHS setting is invalid, only heat pump turns on, limitation and protection may occur during heat pump operation.

Operation range by heat pump with possible limitation and protection.

Heat pump turns off, only IBH/AHS turns on.

## 2.7 Symbols on the Label and Heat Pump

| Symbol | Description |
|---|---|
| CE | CE mark.<br>The heat pump complies with the requirements of the applicable CE guidelines. |
| | Additional grounding point. |
| | Risk of electric shock.<br>High voltage exists after the heat pump is powered on! |
| | Risk of danger.<br>Potential hazards exist after the heat pump is powered on! |
| | Risk of fire.<br>Heat pumps contain refrigerant inside, and the heat pump are at risk of explosion when exposed to an fire. |
| | Do not dispose of the heat pump together with household waste. |
| | The manual should be read carefully. |
| | Information is available such as the installation manual. |
| | Only a competent service should be handling this equipment with reference to the installation manual. |

# 3 System Overview

## System overview

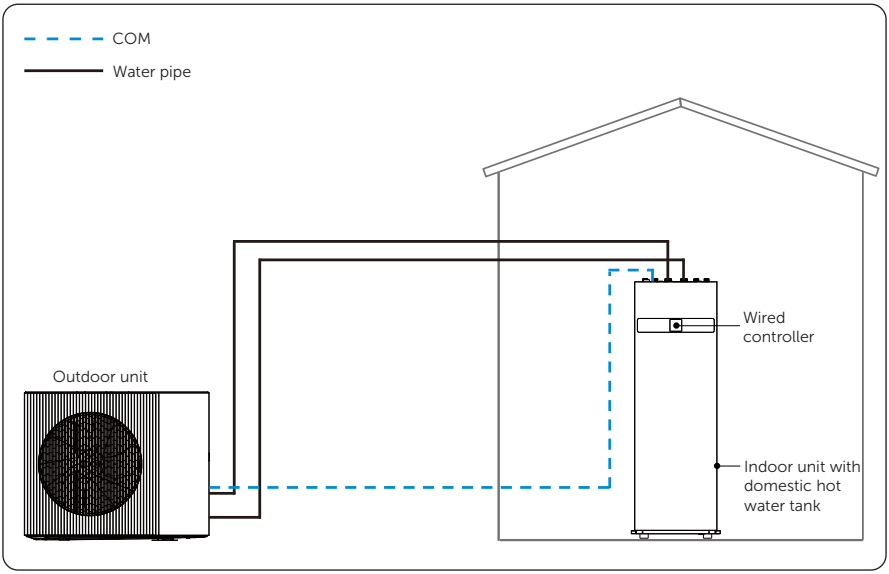



Figure 3-1 System diagram

**NOTICE!**

- The system diagram is for illustration purposes only. Heat pumps are not limited to one application scenario.

# 4 Preparation before Installation

## 4.1 Selection of Installation Location

### 4.1.1 Environment Requirement

- Install the outdoor unit on the outdoors, avoiding room corners, alcoves or between walls.
- Install safety piping when passing through a building wall from the outdoor unit.
- Select an installation location with good sound absorption properties, such as an area with grass, hedges or fences.
- Select an installation location that is free of large amounts of snow in winter.
- Select an installation location where the air intake is not affected by strong winds. If the installation location is not protected from wind, please install a protective wall.
- Prevent air from flowing back through the vents.
- Bury hydraulic piping and electrical wiring in the ground.
- Lay gravel and rubble for the condensate drain.
- Ensure that water does not accumulate in the subsoil.
- Ensure that the subsoil absorbs water well.
- Ensure that the ambient temperature range of the outdoor unit is -25°C~48°C.
- Avoid snow accumulation and strong sunlight. It is recommended to install an awning over the heat pump.

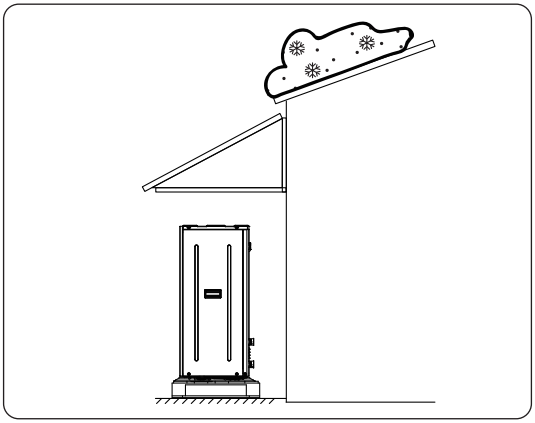


Figure 4-2 Installing an awning

### 4.1.2 Safety Zone Requirement

The refrigerant circuit in the outdoor unit contains easily flammable refrigerant in safety group A3 as described in ISO 817 and ANSI/ASHRAE Standard 34. So the safety zone is defined near the outdoor unit.

**CAUTION!**

- This refrigerant has a higher density than air. In the event of a leak, escaping refrigerant may be collected near the earth.

The following conditions must be avoided within the safety zone:

- Property boundaries, neighboring properties, footpaths, and driveways;
- Pump shafts, inlets to waste water systems, downpipes, and waste water shafts, etc.;
- Other slopes, troughs, depressions, and shafts;
- Electrical house supply connections;
- Electrical systems, sockets, lamps, and light switches;
- Building openings such as windows, doors, light wells, and flat roof windows;
- Outdoor air and exhaust air apertures of ventilation and air conditioning systems;
- Snowfall from roofs.

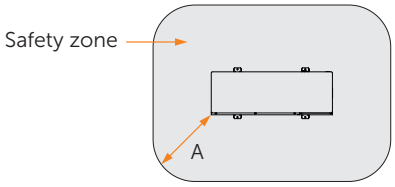
Do not introduce ignition sources into the safety zone:

- Tools that generate sparks;
- Naked flames or burner gauze assemblies;
- Objects with a temperature of above 360°C;
- Grills;
- Electrical devices not free of ignition sources, mobile devices with integrated batteries (such as mobile phones and fitness watches).

**NOTICE!**

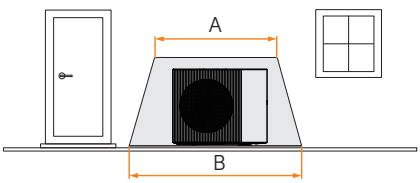
- The particular safety zone is dependent on the surroundings of the outdoor unit.
- The safety zones shown below are floor standing installation.

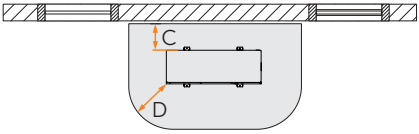
#### Ground installation (no obstacle)




| | |
|---|---|
| A | 1000 mm |

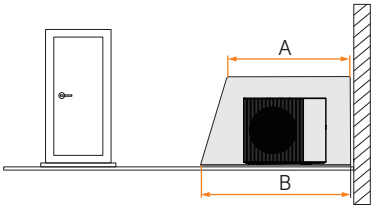
## Ground installation (in front of the wall)

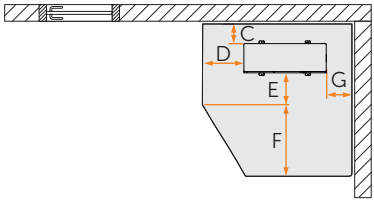



| | |
|---|---|
| A | 2400 mm |
| B | 3400 mm |
| C | ≥300 mm |
| D | 1000 mm |

## Ground installation (in a corner with wall)

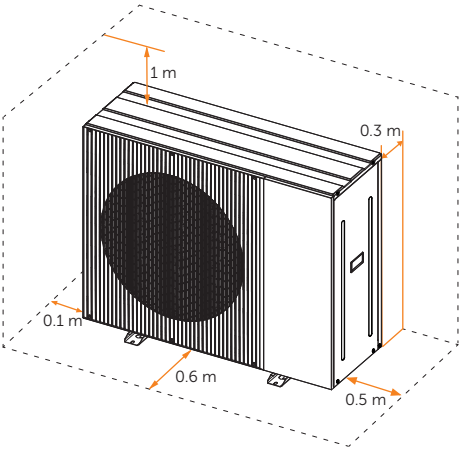


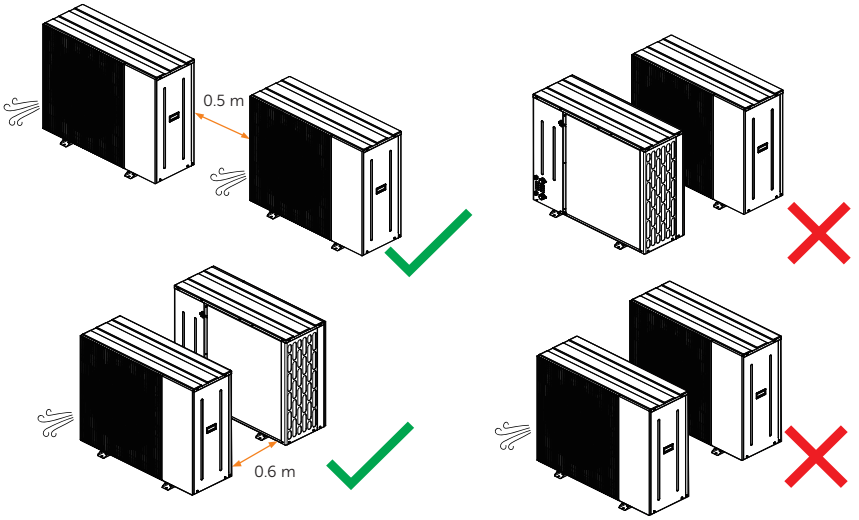

| | |
|---|---|
| A | 2400 mm |
| B | 2900 mm |
| C | 300 mm |
| D | 500 mm |
| E | 500 mm |
| F | 1800 mm |
| G | 500 mm |

### 4.1.3 Clearance Requirement

#### Single unit




#### Two units

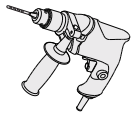


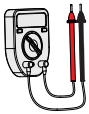

**WARNING!**

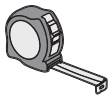
- Make sure that the air vents of two heat pumps can not be blocked!

## 4.2 Tools Requirement

The following tools are recommended for installation. Additional auxiliary tools may be used as needed, provided they comply with applicable regional safety regulations.


Hammer drill

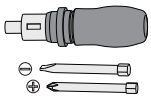

Multimeter

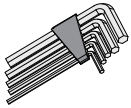

Measuring tape


Utility knife

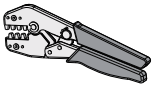

Marker

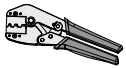

Spirit level


Torque screwdriver

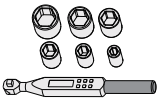

Allen key


Wire stripper

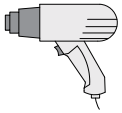

Crimping tool


Crimping tool for terminals


Crimping tool for RJ45

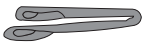

Torque wrench


Current clamp


Heat gun


Heat shrink tubing


Crane


Lifting rope

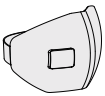

Ladder


Vacuum cleaner


Safety gloves


Safety boots

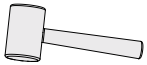

Safety goggles


Anti-dust mask


Pipe wrench


Spanner


PPR pipe cutter


Rubber mallet

## 4.3 Additionally Required Materials

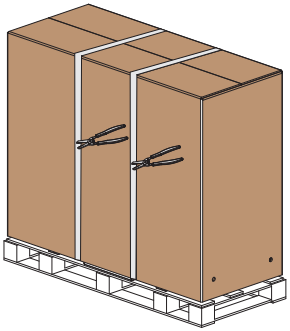
Table 4-1 Additionally required materials

| No. | Required material | | Type | Conductor cross-section |
|---|---|---|---|---|
| 1 | Main power cable (three phase) |  | Five-core cable, voltage rating of 600 V, a temperature resistance of 105°C | Refer to "9.4.2 Operating Current and Wire Diameter" |
| 2 | Main power cable (one phase) |  | Three-core cable, voltage rating of 600 V, a temperature resistance of 105°C | |

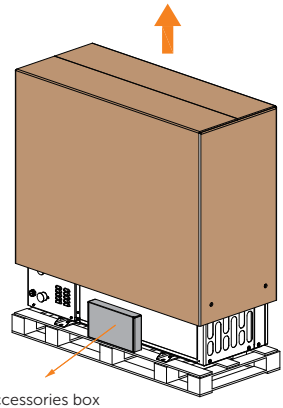
# 5 Unpacking and Inspection

## 5.1 Unpacking

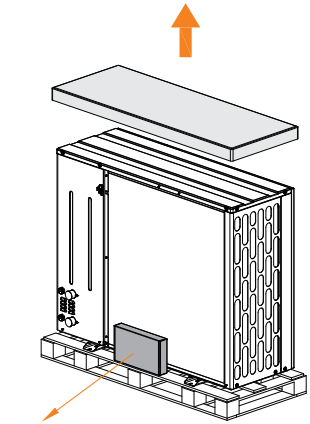
1 Cut the tape above the outer package;



2 Remove the outer cover of the carton upward;




3 Pick up the cover above the outdoor unit;




4 Remove the protective cardboard.

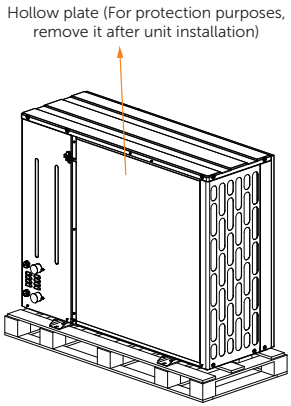



Figure 5-1 Unpacking

## 5.2 Accessories of Outdoor Unit

| Illustration | Name | Quantity | Remark |
|---|---|---|---|
|  | Installation manual | 1 PC | Guiding installers to install the product correctly |
|  | Y-type strainer | 1 PC | Installed at the inlet side of the pressure relief valve, for removing impurities from the medium |
|  | Temperature sensor | 1 PC | e.g., THWt / TMb1 / TMb2 / TACt1 / TACt2 / TWout2 / TWout3 |
|  | Drain joint (φ36) | 1 PC | Installed at the centralized drain hole in the chassis, for discharging condensate generated by the unit |
|  | Energy label | 1 PC | / |
|  | Cable tie | 7 PCS | For bundling and securing cables or pipes |
|  | Paper edge protector | 2 PCS | For protecting the corners of the product packaging carton |

# 6 Transportation

**CAUTION!**

- The barycenter of the product and the hook should be kept in a straight line in the vertical direction to prevent excessive tilting.
- For the weight distribution, the compressor side of the unit is significantly heavier than the fan motor side.

- Select the proper lifting tool and lifting ropes, ensure they can meet the weight and size requirements of heat pump (refer to "17 Technical Data").
- Use two paper edge protector underneath the outdoor unit to protect the housing part from damage.
- Do not tilt the unit more than 15° during lifting.
- After transportation, remove the lifting ropes.

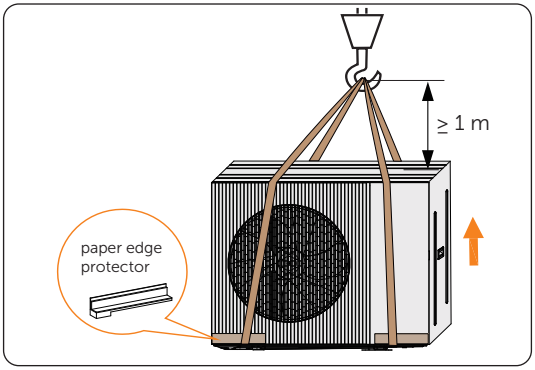
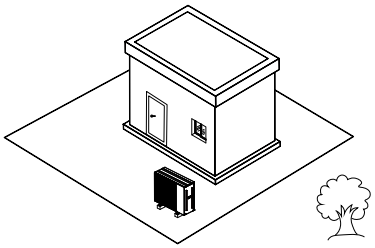


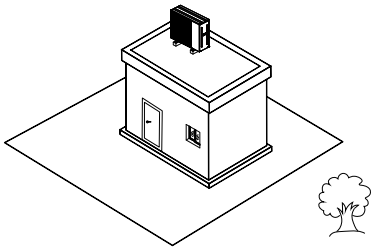

Figure 6-2 Lifting the unit

# 7 Unit Installation

## 7.1 Installation Scenario



Install on the ground



Install on the flat roof

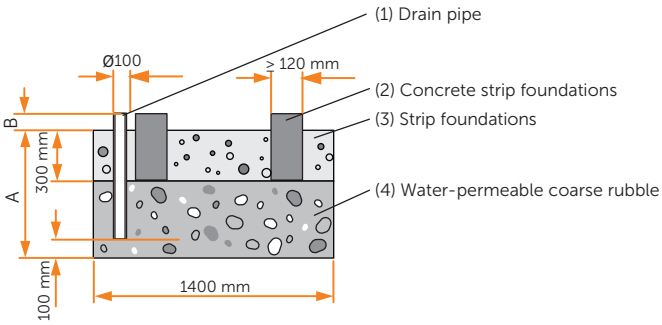
**NOTICE!**

- Considering the length of the communication cable and the performance of the built-in pump, the installation distance between the outdoor unit and indoor unit should be as close as possible.
- The connection pipes between the outdoor unit and indoor unit should be as straight as possible to minimize the use of elbow joints.

## 7.2 Creating the Foundation

### 7.2.1 Creating the Foundation on the Soft Ground

If the outdoor unit is installed on the soft ground (such as lawn, soil), the creation of the foundation needs to be completed.



### Procedures for creating the foundation

**Step 1:** Dig a hole (Ø100) in the ground. For the location of the drain hole, please refer to "7.4.1 Drain Hole Position".

**Step 2:** Insert the drain pipe (1) into the hole for draining condensate.

**Step 3:** Add a layer of water-permeable coarse rubble (4).

NOTICE!

- Calculate the depth (A) in accordance with local conditions.
  - Region with ground frost: minimum depth: 900 mm.
  - Region without ground frost: minimum depth: 600 mm.
- Calculate the height (B) in accordance with local conditions. Such height should not be smaller than 100 mm.

**Step 4:** Create two concrete strip foundations (2). The recommended width of concrete strip foundation is not smaller than 120 mm.

NOTICE!

- Make sure the two foundations are level.
- There are no restrictions on the width or length of foundations, it is required that the outdoor unit can be mounted on the foundation properly and the drain pipe is not blocked.

**Step 5:** Add a gravel bed between and beside the strip foundations (2) to divert the condensate.

## 7.2.2 Creating the Foundation on the Solid Ground

If the outdoor unit is installed on the solid ground (such as concrete), two strip foundations should be created on the ground surface.

- The height of the strip foundation should not be smaller than 100 mm.
- The width of the strip foundation should not be smaller than 120 mm.

## 7.2.3 Creating the Foundation on the Flat Roof

If the outdoor unit is installed on the flat roof, two strip foundations should be created on the roof surface.

- The height of the strip foundation should not be smaller than 100 mm.
- The width of the strip foundation should not be smaller than 120 mm.

NOTICE!

- Take drainage layout into consideration, and the unit should be installed close to the drainage system.

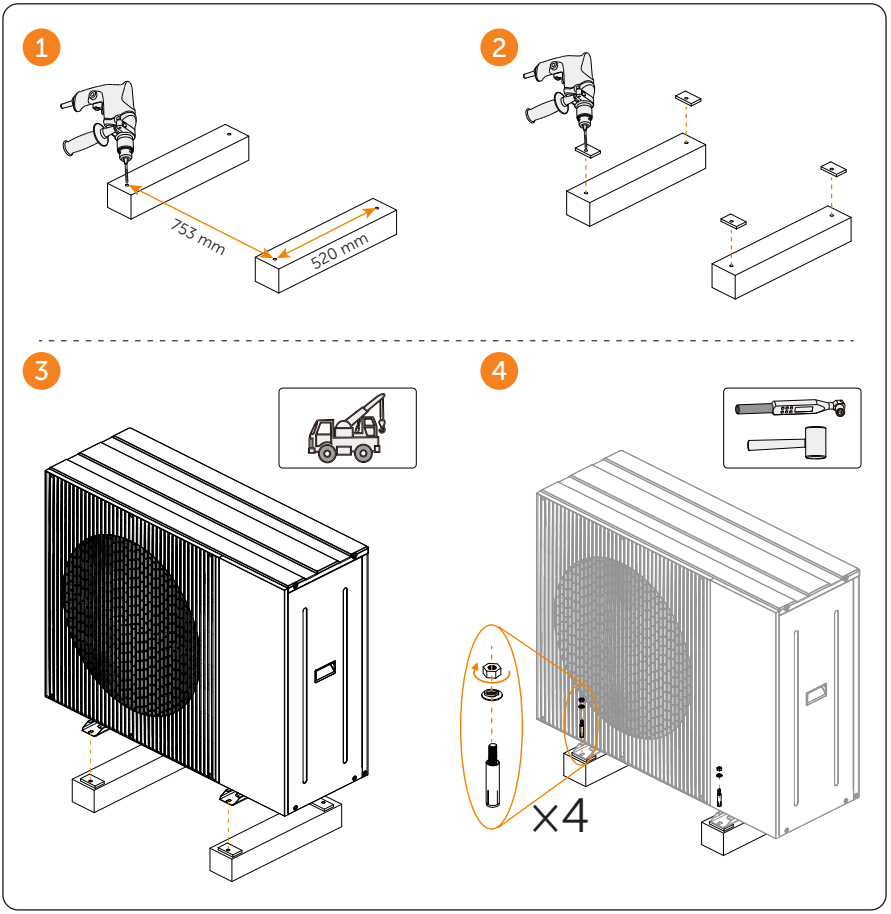
## 7.3 Mounting the Unit

**Step 1:** Mark and drill four holes on two concrete strip foundations (Recommended hole diameter Ø12, hole depth 200 mm).

**Step 2:** Drill holes on four anti-vibration pads (hole diameter Ø12, field supply). Align the holes and place four anti-vibration pads above the strip foundations.

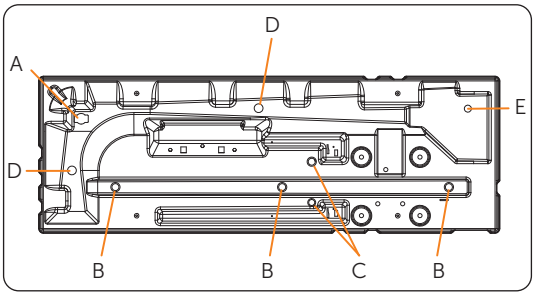
**Step 3:** Align the holes and lift the outdoor unit on the strip foundations.

**Step 4:** Install four sets of expansion bolts (M10*15, field supply) and fix the outdoor unit to the strip foundations.



## 7.4 Draining Condensate

### 7.4.1 Drain Hole Position




| Item | Explanation |
|---|---|
| A | Centralized drain hole (Connecting to drain joint for condensate discharge) |
| B | Secondary drain holes (Used for drainage when the centralized drain hole and reserved drain holes are blocked) |
| C | Tertiary drain holes (Used for drainage when all drain holes are blocked) |
| D | Reserved drain holes (Sealed with rubber plugs, remove the plugs when in use)<br>**Note:** If other drainage holes cannot meet the drainage requirements, the reserved drain holes can be used. |
| E | Hole for exhaust and drainage |

**CAUTION!**

- Pay attention to condensation when removing the rubber plug attached to the reserved drain holes.
- Make sure the condensate is drained properly. Collect and direct the condensate dripped from the unit base to a drain tray. Avoid water dripping onto the floor that may cause a slip hazard, especially in winter.

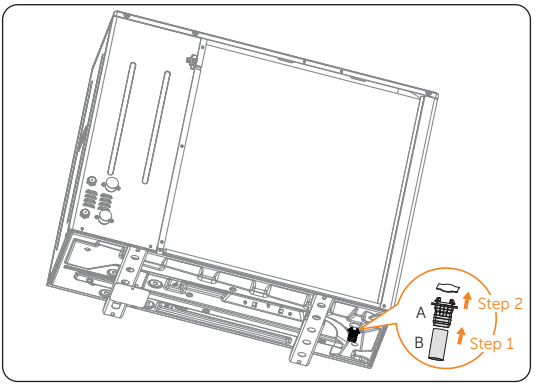
**NOTICE!**

- For cold climates, it is highly recommended to install a belt heater to avoid damage to the outdoor unit due to the freeze in case of a low drainage rate.

### 7.4.2 Installing the Drain Joint

**Step 1:** Connect the drain hose (B) to the drain joint (A).

**Step 2:** Plug the connected drain joint into the drain hole at the bottom of the outdoor unit.

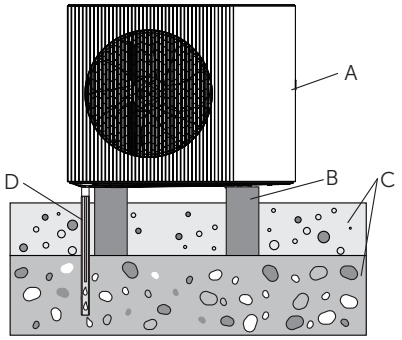



| Item | Explanation |
|---|---|
| A | Drain joint (plastic, Pagoda connection, 1") |
| B | Drain hose (field supply) |

### 7.4.3 Draining Condensate on the Soft Ground

#### Draining condensate into a gravel bed

If condensate is drained into a gravel layer below ground, the pipe must be directed to the frost-free area. The gravel layer needs to be large enough for the condensate to flow freely.




A - Outdoor unit
B - Concrete strip foundations
C - Foundation (See "7.2 Creating the Foundation")
D - Drain pipe (at least DN30)

**NOTICE!**

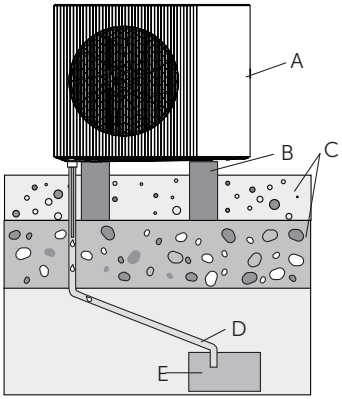
- To prevent the condensate from freezing, self-regulating heating cable (field supply) must be threaded into the downpipe so that the condensate can discharge via the downpipe.

### Draining condensate through a pump sump / soakaway / sewer

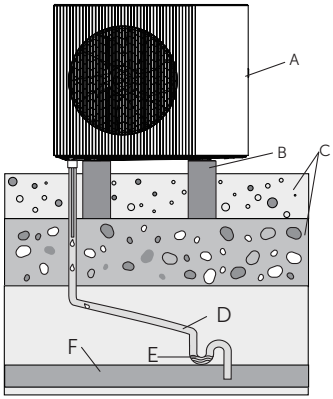
If condensate is to be discharged into a pump sump, soakaway or sewer, pay attention to the slope of the pipe and ensure that the pipe is frost free.

**WARNING!**

- Do not connect to a sewer that is connected to the room, because leaking refrigerant may enter the building.




A - Outdoor unit
B - Concrete strip foundations
C - Foundation (See "7.2 Creating the Foundation")
D - Drain pipe (at least DN30)
E - Pump sump/soakaway




A - Outdoor unit
B - Concrete strip foundations
C – Foundation (See "7.2 Creating the Foundation")
D - Drain pipe (at least DN30)
E - Sewer
F - Stench trap in an area free from frosting risks

### 7.4.4 Draining Condensate on the Solid Ground

Use a hose to guide the condensate into a sewer, pump sump or soakaway, and run it off.

### 7.4.5 Draining Condensate on the Flat Roof

Use a hose to guide the condensate into a sewer, pump sump or soakaway, and run it off.

# 8 Hydraulic Installation

## 8.1 Preparations for Installation

### Valves and pipes in water loop

- When a 3-way valve is used in the water loop, it is recommended to use a ball valve to guarantee full separation between the domestic hot water loop and the floor heating water loop.
- When a 3-way valve or a 2-way valve is used in the water loop, it is recommended that the valve reversal time is less than 60 s.
- To optimize the efficiency of unit operation, it is recommended that the valve and the domestic hot water tank are installed as close as possible to the outdoor unit.
- If plastic pipes are used, make sure that they meet the requirements for complete oxygen tightness according to DIN 4726.
- It is necessary to avoid diffusion of oxygen into the pipes, as this may lead to corrosion of the pipes.

### System water volume

- Check the total water volume in the installation according to the expansion tank.
- The expansion tank must be dimensioned according to standard EN 12828.
- The outdoor unit does not contain an integrated expansion tank. The expansion tank integrated in the indoor unit has a volume of eight liters. If the volume of expansion tank is insufficient, please install an additional expansion tank (field supply).

**CAUTION!**

- To ensure proper operation of the expansion tank, the working pressure of the expansion tank needs to be properly adjusted. The equipment must be checked every 12 months.
- The maximum operating pressure of the expansion tank needs to be considered.

**NOTICE!**

- It is recommended to install an expansion tank on the intake side.

### Flow rate range

The operating flow rate ranges for each unit are shown below. During installation, check and ensure that the flow rate is guaranteed under all conditions.

Table 8-1 Flow rate range

| Unit | 8 kW | 10 kW | 12 kW | 14 kW | 16 kW |
|---|---|---|---|---|---|
| Flow rate range ($m^3/h$) | 0.45*-1.65 | 0.45*-2.0 | 0.66*-2.5 | 0.66*-2.9 | 0.66*-3.2 |

*The minimum output flow value of the pump can be set via the wired controller.

**CAUTION!**

- The heat exchanger could be damaged by freezing water due to low water flow rate.

## Requirements for third-party water tanks

If a third-party water tank need to be connected to the unit, follow the below requirements.

- The heat exchanger coil of the water tank is not less than 1.05 $m^2$, 1.94 $m^2$ is recommended.
- The tank thermistor must be located above the heat exchanger coil.
- The booster heater must be located above the heat exchanger coil.
- Notice the pressure loss of the water tank and install a water pump externally if necessary.

**NOTICE!**

- **Performance:** The performance data for third-party water tanks is for reference only, and the performance cannot be guaranteed.
- **Configuration:** The configuration of the third-party water tank depends on the size of the heat exchanger coil of the tank.

For the installation of the domestic hot water tank (supplied by the user), please refer to the specific manual of the domestic hot water tank.

## Thermistor of domestic hot water tank

The maximum allowable thermistor cable length is 20 m, which is equal to the maximum allowable distance between the domestic hot water tank and the unit (only for the installation with a domestic hot water tank). The length of thermistor cable supplied with the domestic hot water tank is 10 m. The resistance value is: R25=10KΩ±2%; B25/50=3950K±2%.

## Requirements for balance tank volume

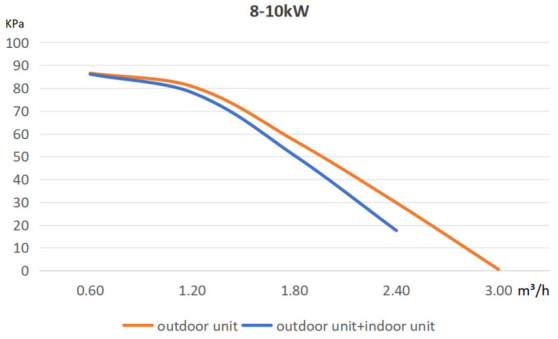
Installing a balancing tank in the system (provided by the user) can effectively reduce the frequency of unit start-up, enable efficient defrosting and effectively mitigate room temperature fluctuations. Recommended balancing tank capacities are listed below.

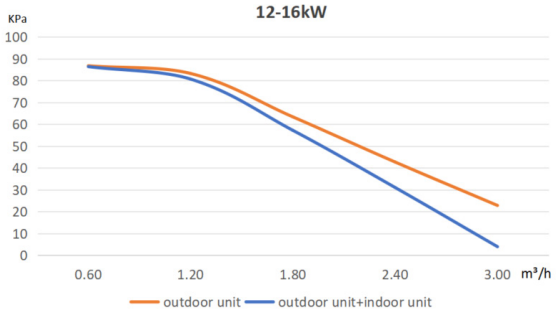
Table 8-2 Recommended balancing tank capacity

| No. | Model | Balance tank (L) |
|---|---|---|
| 1 | 8-10 kW | ≥25 |
| 2 | 12-16 kW | ≥40 |
| 3 | Cascade system | ≥40*n (n: Number of outdoor units) |

### Pressure Drop

The relationship between the available external pressure and the water flow rate:




**NOTICE!**

- The above data is for reference only. Please refer to the actual installation.
- Ensure minimum flow rate under all operating conditions, low traffic may cause the product to overload.

## 8.2 Connecting the Water Loop

**Step 1:** Connect the water pipe to the outdoor unit.

**Step 2:** Check the water.

**Step 3:** Fill the water loop with water.

**Step 4:** Fill the domestic hot water tank with water (if available).

**Step 5:** Insulate the water pipe.

### 8.2.1 Connecting the Water Pipe

#### Requirements of components used

- The pipe inside must be clean.
- Do not use Zn-coated parts.
- Do not use materials that will react with the water used in the system and the materials used in the unit.
- The components installed in the piping meet the requirements of the water pressure and water temperature.

#### Procedures for connecting the water pipe

**CAUTION!**

Before installation:

- Reserve enough space for installation.
- Clean the water pipes and connectors with clean water. Make sure they are free of dirt.

**CAUTION!**

During installation:

- Use proper tools to avoid damage to the mounting components. Because copper is soft.
- Correctly connect the water outlet and water inlet. Otherwise, it will cause the unit failure.
- When connecting the pipes provided on-site, do not apply excessive force and ensure the pipe connections are properly aligned. No deformation and cracks occurs on the pipe.
- When the pipe needs to be installed through a wall, cover the pipe end to prevent dust and dirt from entering the pipe.
- The joint parts of seals shall be impermeable with Teflon tape, rubber sleeves or sealant.
- When using non-copper metallic piping, connections between different materials need to be insulated to prevent galvanic corrosion.
- In cold areas, take proper drainage and antifreeze measures.

**CAUTION!**

- A Y-type strainer must be installed at the water inlet. Otherwise, plate heat exchangers are prone to deposits inside, which may lead to fault and even refrigerant leaks.
- It is recommended to use a strainer with 60 mesh or higher.
- Pay attention to the correct flow direction of the Y-type strainer.
- Problems caused by not installing a strainer are not covered by the warranty.

**Step 1:** Connect the Y-type strainer with the water inlet (b) of the unit, and use thread sealing tape at the connection. The extension pipe (c) is required between the water inlet (b) of the unit and the Y-type strainer (d) to facilitate cleaning of the Y-type strainer.

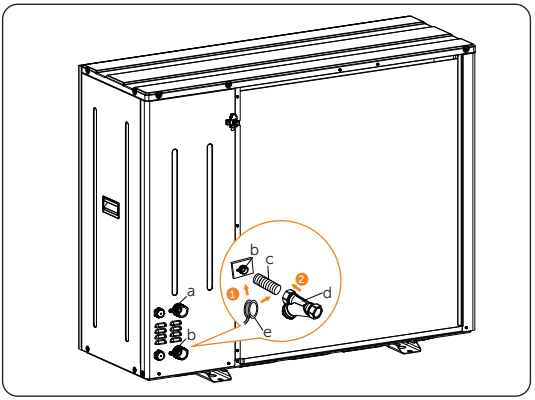



Figure 8-1 Connecting the Y-type strainer with the water inlet

**Step 2:** Connect the pipe (field supply) to the water outlet (a) of the unit.

| Item | Explanation |
|---|---|
| a | Water outlet (connection with screws, male, 1 1/4" for 8-16 kW units) |
| b | Water inlet (connection with screws, male, 1 1/4" for 8-16 kW units) |
| c | Extension pipe (the length depends on the field conditions) |
| d | Y-type strainer (delivered with the unit, 2 screws for connection, female, 1 1/4" for 8-16 kW units) |
| e | Thread seal tape |

## Domestic hot water tank

For the installation of the domestic hot water tank, please refer to the specific manual of the domestic hot water tank.

## Others

**NOTICE!**

- The exhaust valve (supplied by user) used in indoor water loop must be installed at the highest point of the system.
- The drain valve (supplied by user) should be installed on the water inlet pipe of outdoor unit and close to outdoor unit, and antifreeze protection measures should be taken.

### 8.2.2 Checking the Water

**NOTICE!**

- Poor quality water will increase the risk of damage to system.
- The circulator will only work properly if clean and high quality tap water is used.
- The main factors affecting the running of the circulator and system are oxygen, lime levels, sludge, acidity levels and other substances (including chlorides and minerals).
- The quality of pipe installation in water system is very important. The heating system must be airtight. Choose materials that are not sensitive to oxygen diffusion to reduce the risk of corrosion.

#### Requirements of water

- Comply with local regulations.
- Water quality must be checked by qualified personnel.
- Langolier Index (LI) between 0 and +0.4.
- With proper hardness. If the water is hard, fit a water softener
- With certain cleanliness. Before filling the water to water loop, clean the system carefully with specific products.
- Water component for corrosion limit on copper:

| Water component | Limit | |
|---|---|---|
| PH | 7.5-9.0 | - |
| Ryznar Stability Index (RSI) | <6.0 | - |
| Electric conductivity | 100-500 | μS/cm |
| Total Hardness | 4.5-8.5 | dH |
| Max. quantity glycol | 40 | % |
| Sulfate ions ($SO_4$) | < 50 | ppm |
| Alkalinity ($HCO_3$) | 70-300 | ppm |
| Chloride ions (Cl-) | < 50 | ppm |
| Phosphates ($PO_4$) | <2.0 | ppm |
| $NH_3$ | <0.5 | ppm |
| Iron (Fe) | <0.3 | ppm |
| Manganese (Mn) | < 0.05 | ppm |
| Sulfate ions (S) | None | - |
| Ammonium ions ($NH_4$) | None | - |
| Silica ($SiO_2$) | < 30 | ppm |

| Water component | Limit | |
|---|---|---|
| $CO_2$ | < 50 | ppm |
| Oxygen content | <0.1 | ppm |
| Sand | < 10 mg/L, 0.1 to 0.7 mm max diameter | |
| Ferrite hydroxide $Fe_3O_4$ (black) | Dose < 7.5 mg/L, 50% of mass, with diameter < 10 µm | |
| Iron oxide $Fe_2O_3$ (red) | Doe < 7.5 mg/L, diameter < 1µm | |

### How to clean the water loop

- If the new system is assembled for the first time, clean all connecting parts and pipes to ensure the filling water is clean and of high quality.
- If installing the heat pump on the existing heating system:
  - » Drain and flush the system by a proper flow of water to avoid particulate sludge and waste.
  - » Clean each connecting parts and pipes individually and adequately.

**NOTICE!**

- If a potable water source is used as the water supply for the unit, an anti-siphon device needs to be installed between the potable water source and the unit.
- Installation of a sludge filter in the water loop is effective in preventing degradation of the system performance.
- It is recommended to install additional filters in the heating water loop. Especially for the removal of metal particles from the heating pipes, magnetic or cyclone filters are recommended, because such small particles may damage the unit and will not be removed by standard heat pump system filters.

## 8.2.3 Filling Water Loop with Water

Before filling water, make sure the water meets the requirements of "8.2.2 Checking the Water". Pumps and valves may become stuck as a result of poor water quality.

For the water filling, please follow below procedures:

**Step 1:** Turn the exhaust valve at least 1 full turn counterclockwise to release air from the system. Do not tighten the yellow knob on the exhaust valve at the top of the unit while the system is running.

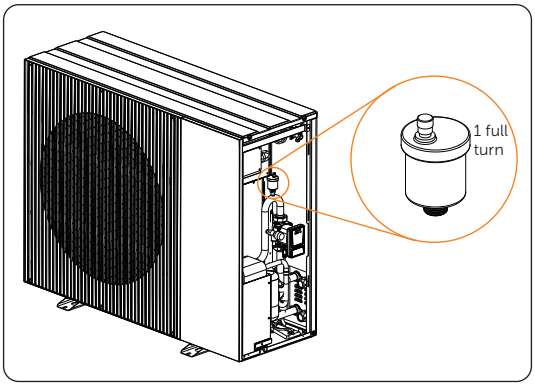



Figure 8-2 Opening the exhaust valve

**Step 2:** Connect the water supply to the filling valve (supplied on site) by following the relative regulations.

**Step 3:** Start filling water.

**Step 4:** Monitor the water pressure. When the water pressure reaches 0.3 MPa (3 bar±0.3), the unit may discharge excess water through the pressure relief valve.

**Step 5:** After the water filling is completed, if the pressure gauge shows less than 1 bar of water pressure, it is necessary to refill the water. And check for leaks at the water pipe connections.

NOTICE!

- During filling, it may not be possible to remove all air from the system. During the first operation of the system, the remained air will be removed automatically through the exhaust valve. It may be necessary to refill with water afterward.

### 8.2.4 Filling Domestic Hot Water Tank with Water

Please refer to the specific manual of the domestic hot water tank.

### 8.2.5 Insulating Water Pipes

Water pipes need to be insulated to prevent heat loss to the external environment and condensate on the pipe surface when the unit is running.

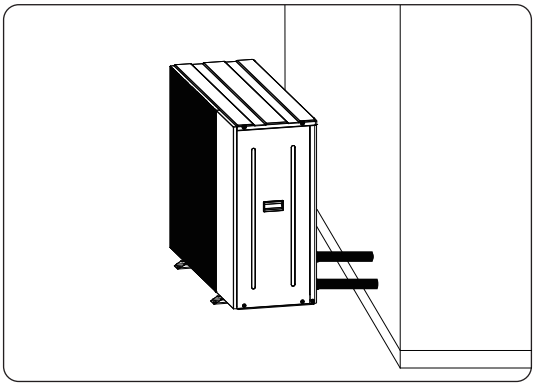


Figure 8-3 Connecting insulated water pipes

**NOTICE!**

- The insulation material should be provided with a fire resistance rating of B1 or above and comply with all applicable regulations.
- For cooling function requirements, the insulation type must be suitable for cold water, and all pipe joints must be sealed tightly to prevent that the insulation becomes wet from the inside.
- The thermal conductivity of the sealing material should be below 0.039 W/mK. Recommended thickness of the sealing material is shown as below.
- The recommended minimum insulation thickness ensures the correct operation of the product, but regulations may be different everywhere and must be followed.

Table 8-3 Recommended thickness of the sealing material

| Pipe length (m) between the unit and the terminal device | Minimum insulation thickness (mm) |
|---|---|
| <20 | 20 |
| 20~30 | 30 |
| 30~40 | 40 |
| 40~50 | 50 |

## 8.3 Freeze Protection

### 8.3.1 Freeze Protection by Software

The outdoor unit is equipped with antifreeze protection function, the function is enabled by default. The pump run mode is set to "KEEP RUN", it can make the pump run all the time after the power is turned on and ensure that the water can keep flowing and protect the

whole system from freezing.

**CAUTION!**

- If the power supply of the unit is switched off for a long time, add glycol to the water or drain off the water to avoid freeze. For more details about how to add glycol and drain off water, refer to "8.3.2 Freeze Protection by Glycol" and "8.3.3 Freeze Protection by Valves (Supplied by User)".

### 8.3.2 Freeze Protection by Glycol

Adding glycol to water can lower the freezing point. In areas where the water temperature is below 0°C, an approved antifreeze must be used to protect water pipes. Adding antifreeze to the system may cause a reduction in the actual performance of the unit.

#### Requirements of use of glycol

- Only qualified personnel can add the glycol. Do not touch the glycol during operation.
- Do not use any automotive glycol.
- Do not use galvanized pipes in glycol systems.
- Comply with local laws and regulations.
- Type of glycol:
  - » If the system contains a domestic hot water tank, Only use propylene glycol[(a)].
  - » If the system does not contain a domestic hot water tank, either propylene glycol[(a)] or ethylene glycol can be used.

(a): Propylene glycol, including the necessary inhibitors, falls in Category III according to EN1717.

**CAUTION!**

- Ethylene glycol and propylene glycol are toxic.

#### How to add glycol

Add glycol according to the table below.

Table 8-4 Required concentration of glycol

| Lowest expected outdoor temperature | Prevention[1] from freezing | Prevention[2] from bursting |
|---|---|---|
| -5°C | 10% | 15% |
| -10°C | 15% | 25% |
| -15°C | 20% | 35% |
| -20°C | 25% | N/A* |

| Lowest expected outdoor temperature | Prevention[1] from freezing | Prevention[2] from bursting |
|---|---|---|
| -25°C | 30% | N/A* |
| -30°C | 35% | N/A* |

*Additional action is needed to prevent freezing.

[1]: Glycol can prevent the piping from bursting, but cannot prevent the liquid inside the piping from freezing.

[2]: Glycol can prevent the liquid inside the piping from freezing.

**CAUTION!**

- The actual concentration required is related to the type of glycol used. Please refer to the requirements set by the glycol manufacturer.
- The added concentration of glycol should NEVER exceed 35%.
- Check the antifreeze concentration in the system periodically to maintain the same concentration.
- When using this antifreeze measure, you should minimize the exposure time of glycol to the air.
- If the liquid in the system is frozen, the pump will not start. Please note that solely preventing the system from bursting may not prevent the liquid inside from freezing.
- If water remains stagnant within the system, it is highly likely to freeze and cause damage to the system.

**NOTICE!**

- Adding glycol to the water loop reduces the maximum allowed water volume of the system.

### 8.3.3 Freeze Protection by Valves (Supplied by User)

- If no glycol is added to the water, you can install the **anti-freeze valve** at the lowest point of all pipes.
- The distance between the anti-freeze valve and the ground, and the distance between the anti-freeze valves is at least 12 cm.

**NOTICE!**

- When the anti-freeze valve is open, the **normally closed valve** can prevent the water in indoor pipes from being drained out.

**CAUTION!**

- If glycol is added to the water, do not install the anti-freeze valve, the glycol may leak.

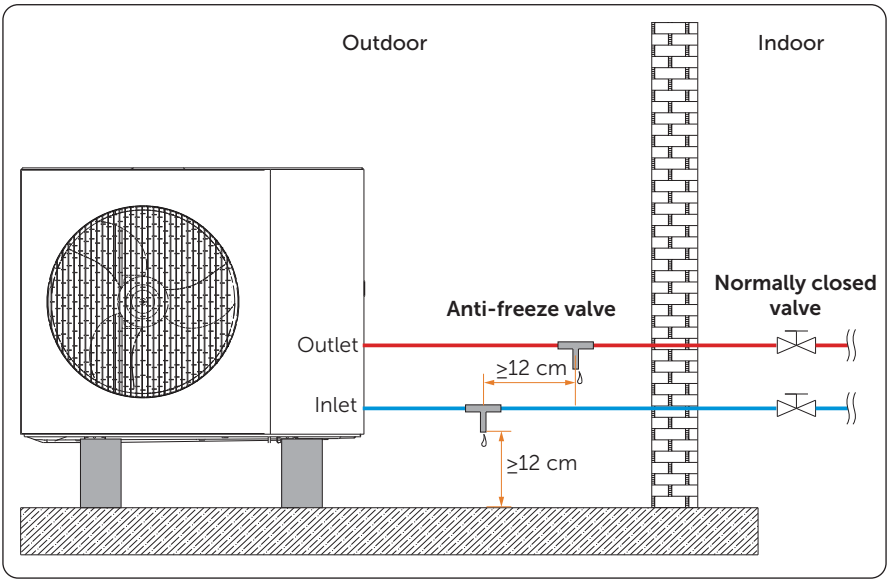



Figure 8-4 Draining the system

### 8.3.4 Measures without freeze protection

In cold environments, if no glycol is added to the water, or a prolonged power outage or pump failure, you should drain off the water to prevent freezing. Otherwise, the frozen water may damage the water loop components.

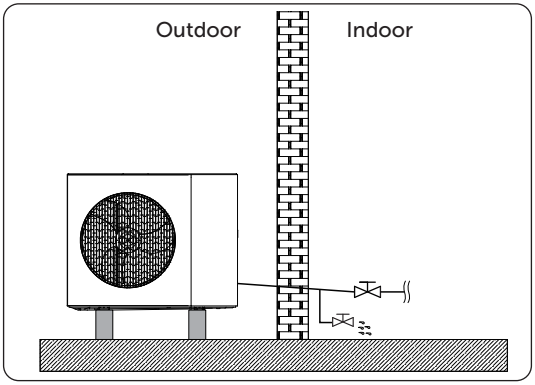



Figure 8-5 Draining the system

### 8.3.5 Other Freeze Protection Measures

There is a flow switch in the water loop.

- Water may enter the flow switch and cannot be drained out, when the temperature is low enough, the flow switch may freeze.
- When there is no power for a long time and the temperature is low enough, the water in the water loop may freeze.

After the system water drained out, please do as follows on the flow switch:

**Step 1:** Rotate the flow switch counterclockwise to remove it.

**Step 2:** Dry the flow switch completely.

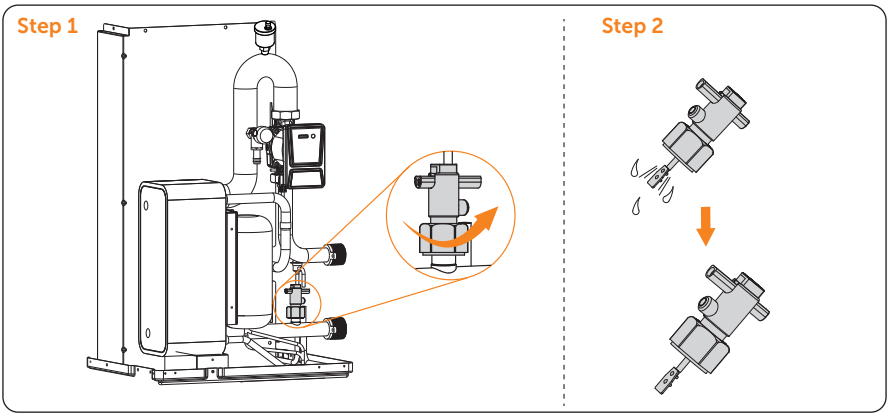



Figure 8-6 Removing and drying the flow switch

NOTICE!

- After the operation is completed, it is necessary to restore the original state: the direction of the arrow on the flow switch is same as the direction of the water flow from the inlet.

## 8.4 Checking the Water Loop

The conditions below should be met:

- The maximum water pressure is lower than or equal to 3 bar.
- The temperature resistance of the water loop related devices is not less than 80°C.
- Drain taps must be installed at lowest points of the system to ensure complete drainage of the circuit during maintenance.
- Exhaust valves must be installed at highest points of the system. The vents should be located at points that are easily accessible for service.
- Make sure that the exhaust valve is not tightened so that water loop can automatically release air.

# 9 Electrical Connection

**DANGER!**

- Risk of electrocution.

**WARNING!**

- The unit should be installed in accordance with national wiring regulations.
- This unit incorporates an earth connection for functional purposes only.
- Be sure to install the required fuses or circuit breakers. An all-pole disconnection switch having a contact separation of at least 3 mm in all poles should be connected in fixed wiring.
- It is prohibited to install emergency stop switches, remote stop switches (including circuit breaker, contactor and relay), within two meters of the unit.

## 9.1 Opening the Electrical Box Cover

**WARNING!**

- Risk of electrocution.
- Risk of burning.

**NOTICE!**

- Keep the screws properly for later use.

To access the unit for installation and maintenance, follow the instructions below.

**Step 1:** Unscrew the four screws on the cover plate of the outdoor unit, and take off the cover plate downward and outward.

**Step 2:** Unscrew the four screws on the cover plate of the electrical box, and take off the cover plate of the electrical box.

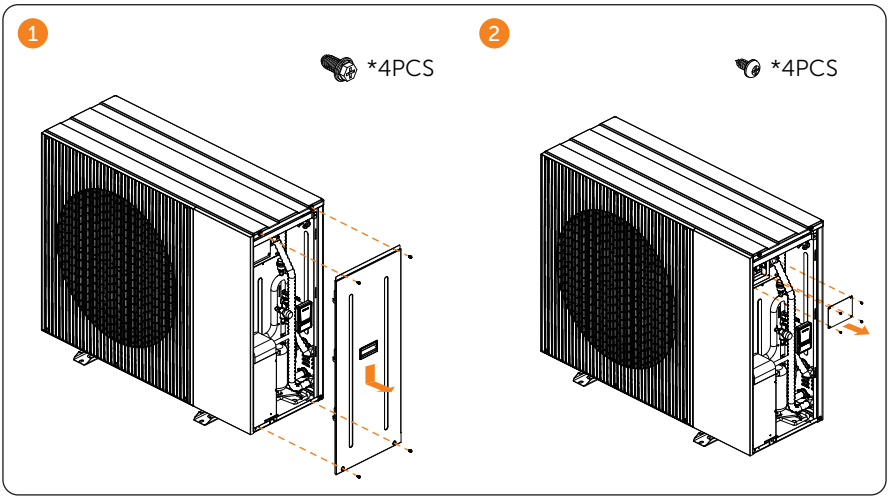



Figure 9-1 Opening the electrical box cover

## 9.2 Back Plate Layout for Wiring

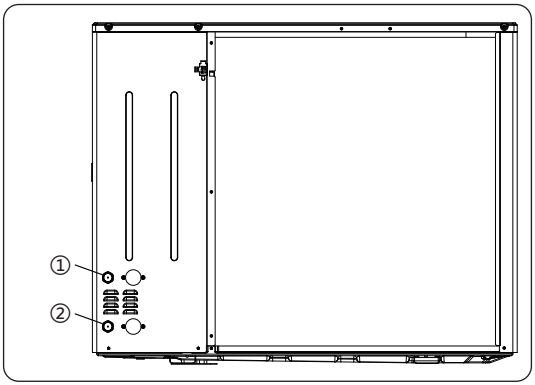



Figure 9-2 Back plate layout for wiring

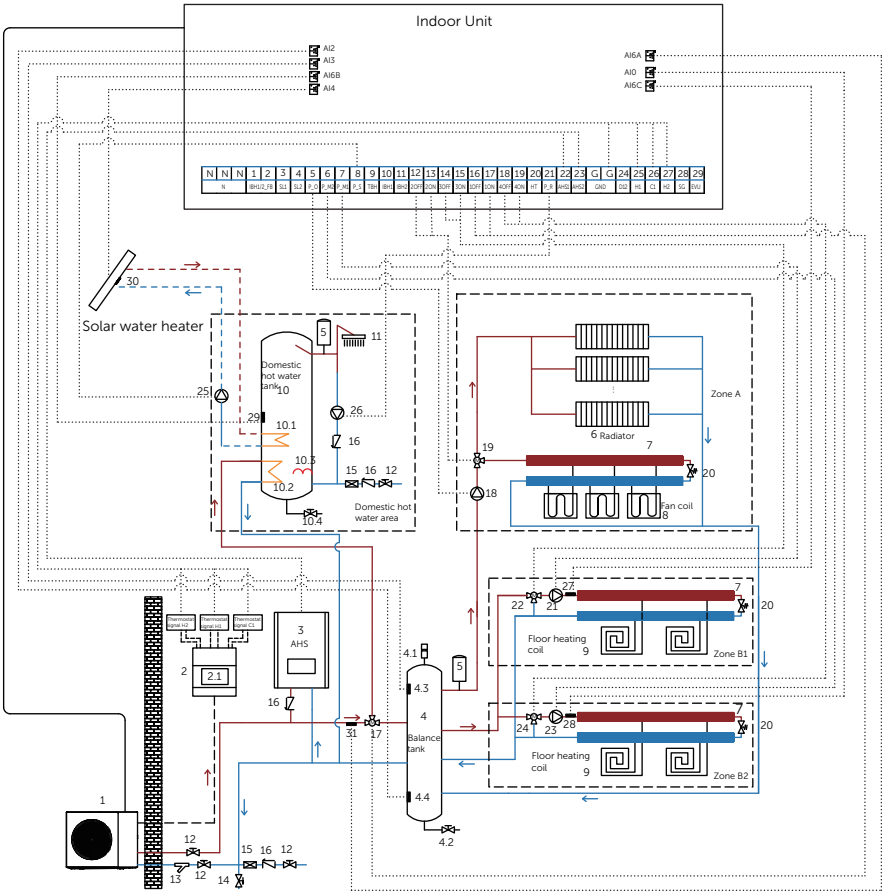
| | |
|---|---|
| ① | For low voltage wiring (for communication) |
| ② | For high voltage wiring (for main power supply) |

## 9.3 Overview of Electrical Wiring

**CAUTION!**

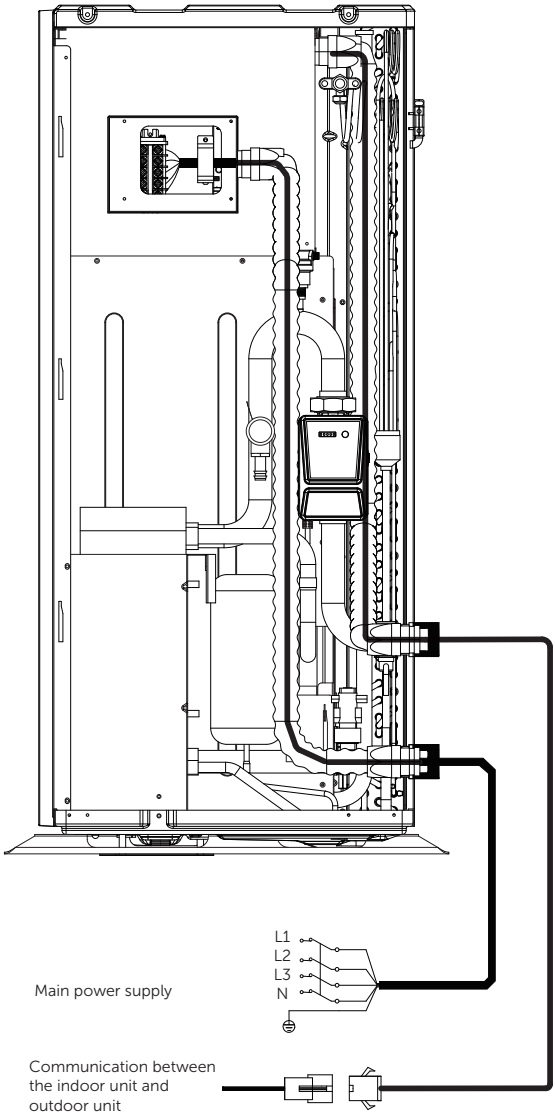
- Use a round crimp-style terminal for connection to the power supply terminal board.
- The power cable model is H07RN-F.
- Leakage protection switch must be installed.

### Wiring overview of the different components

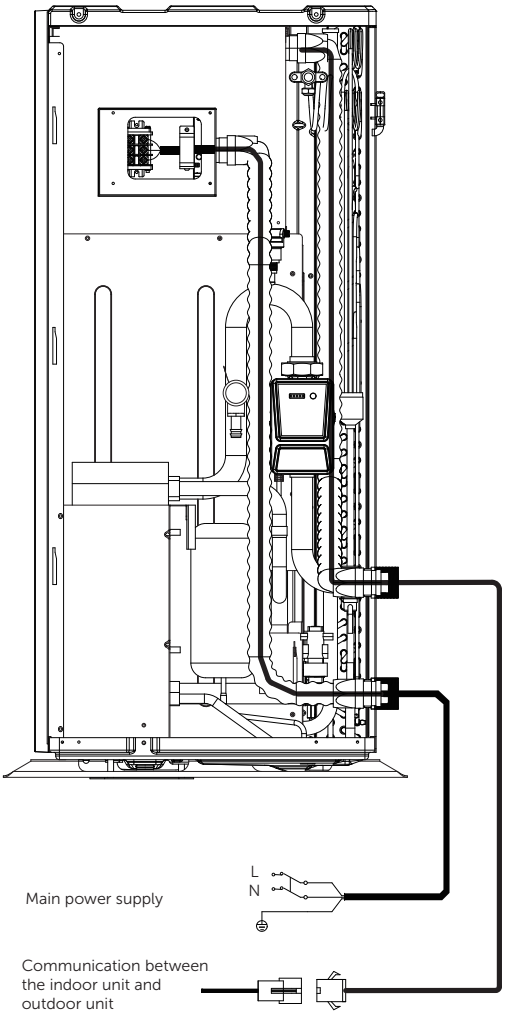


| Item | Name | Item | Name |
|---|---|---|---|
| 1 | Outdoor unit | 12 | Globe valve (field supply) |
| 2 | Control unit | 13 | Y-type strainer |
| 2.1 | Wired controller | 14 | Drain valve (field supply) |
| 3 | AHS: additional heat source (field supply) | 15 | Filter (field supply) |
| 4 | Balance tank (field supply) | 16 | Check valve (field supply) |
| 4.1 | Exhaust valve (field supply) | 17 | S3V1: three-way solenoid valve (field supply) |
| 4.2 | Drain valve (field supply) | 18 | PUMPo: outside circulating pump (field supply) |
| 4.3 | TACt1: balance tank upper temperature sensor (optional) | 19 | S3V2: three-way solenoid valve (field supply) |
| 4.4 | TACt2: balance tank lower temperature sensor (optional) | 20 | Bypass valve (field supply) |
| 5 | Expansion tank (field supply) | 21 | PUMPmb1: zone B1 circulating pump (field supply) |
| 6 | Radiator (field supply) | 22 | S3V3/S3Vmpb1: zone B1 mixing valve (field supply) |
| 7 | Water manifold (field supply) | 23 | PUMPmb2: zone B2 circulating pump (field supply) |
| 8 | Fan coil (field supply) | 24 | S3V4/S3Vmpb2: zone B2 mixing valve (field supply) |
| 9 | Floor heating coil (field supply) | 25 | PUMPsl: solar pump (field supply) |
| 10 | Domestic hot water tank (field supply) | 26 | PUMPret: lower return water pump (field supply) |
| 10.1 | Heat pump coil (field supply) | 27 | TMb1: zone B1 water flow temperature sensor (optional) |
| 10.2 | Solar coil (field supply) | 28 | TMb2: zone B2 water flow temperature sensor (optional) |
| 10.3 | TBH: tank booster heater (field supply) | 29 | THWt: DHW tank temperature sensor (accessory) |
| 10.4 | Drain valve (field supply) | 30 | TSL_SENSOR: solar temperature sensor (field supply) |
| 11 | Hot water faucet (field supply) | 31 | TWout3: system total water flow temperature sensor (optional) |

## Three phase


L1
L2
L3
N
Main power supply
Communication between the indoor unit and outdoor unit

### One phase




## 9.4 Electrical Wiring Guidelines

### 9.4.1 Field Wiring Guidelines

- Most field wiring of the unit is to be made on the terminal block inside the electrical box. To gain access to the terminal block, remove the electrical box cover plate.

- Fix all cables with cable ties.

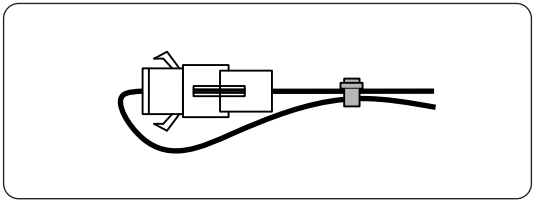


Figure 9-3 Fixing the cable with cable tie

- Lay out the electrical cables so that the front cover does not rise up during the wiring, and attach the front cover securely.
- Install the wires and fix the cover firmly so that the cover may be fit properly.

### 9.4.2 Operating Current and Wire Diameter

- Refer to the table below to select the wire diameter (minimum value) individually for each unit.
- The maximum allowable voltage deviation between phases is 2%.
- Select circuit breakers that have a contact separation of at least 3 mm in all poles for full disconnection.
- The required power cable material should be at least 60245 IEC 57.

Table 9-5 Recommended wire

| Outdoor unit | Power supply | Maximum circuit current (A) | Recommended circuit breaker (A) | Recommended wire size ($mm^2$) |
|---|---|---|---|---|
| 8/10 kW | 220-240 V 1N~ 50 Hz | 21 | 32 | (2 + PE) × (4–6) |
| 12/14/16 kW | | 33 | 50 | (2 + PE) × (6) |
| 8/10 kW | 380-415 V 3N~ 50 Hz | 11 | 16 | (4 + PE) × (2.5–4) |
| 12/14/16 kW | | 15 | 25 | (4 + PE) × (4) |

### 9.4.3 Tightening Torque

Table 9-6 Tightening torques

| Item | Tightening torque (N·m) |
|---|---|
| M4 (power terminal, electric control board terminal) | 1.2 to 1.4 |
| M4 (earthing) | 1.2 to 1.4 |
| M5 (power terminal, electric control board terminal) | 2.0 to 2.5 |
| M5 (earthing) | 2.0 to 2.5 |

## 9.5 Connecting the Power Supply

### 9.5.1 Precautions

For connection of the unit to a power supply terminal, the terminal should be a circular wiring terminal with an insulation casing.

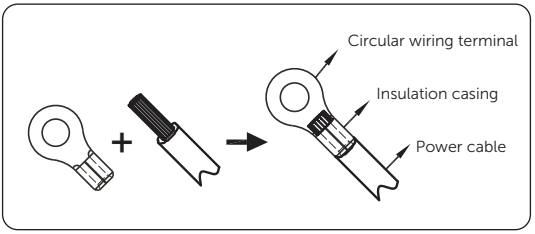



Figure 9-4 Wiring terminal

Observe the following instructions:

- Use a power cable that conforms to the specifications and connect the power cable firmly. Apply a proper tightening torque (refer to "9.4.3 Tightening Torque") to prevent the cord from being accidentally pulled out by an external force.
- Do not connect two power cables with different diameters to the same power supply terminal. Otherwise, the cables may overheat due to loose wiring.

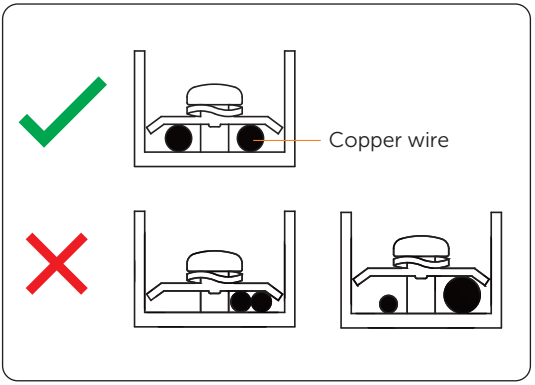



Figure 9-5 Proper power wiring connection

### 9.5.2 Instructions of Corrugated Pipe and Joint

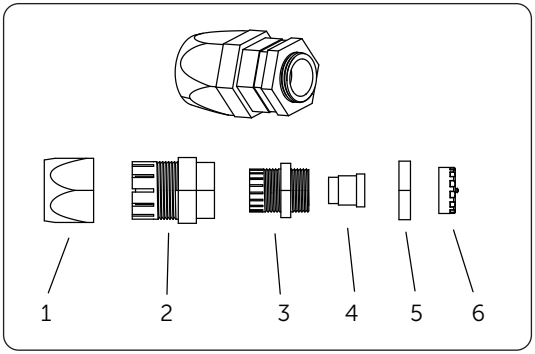



Figure 9-6 Exploded view of the joint

- Unscrew the dust cover (6), loosen the locking part (1), and then the corrugated pipe can be removed.
- Unscrew the cable locking parts (2) and (3), take out the rubber plug (4), and trim the rubber plug (4) according to the selected diameter of the power cable until the power cable can pass.
- Pass the power cable or communication cable through all the components and the corrugated pipe from one side in sequence. After the wiring is completed, first tighten (2) and (3) to fix the cable; then insert the corrugated pipe into (1) and (2), tighten (1) and (2) to fix the corrugated pipe.

### 9.5.3 Wiring of Main Power Supply

**Step 1:** Open the right plate and remove the joint cap at the hole ② of back plate (refer to "9.2 Back Plate Layout for Wiring"); remove the corrugated pipe on the side of the electrical box and straighten the corrugated pipe.

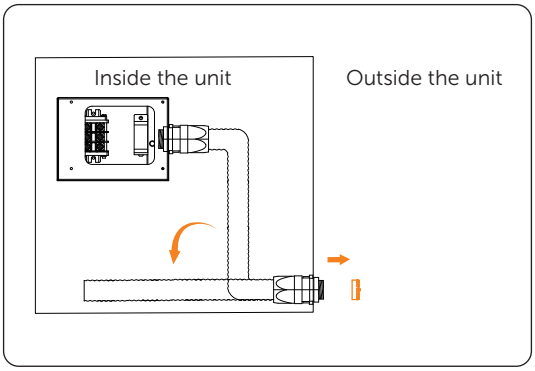



Figure 9-7 Removing the joint cap

**Step 2:** After the main power cable is threaded through the outside of the joint, return the corrugated pipe to its original position.

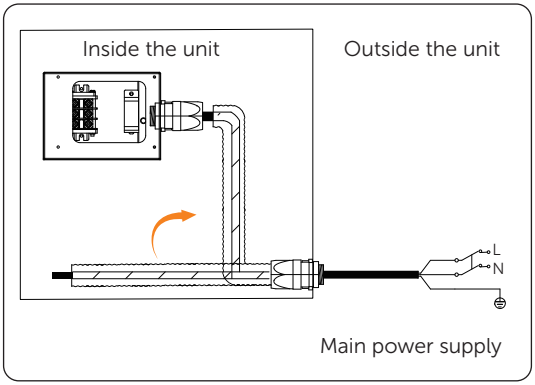



Figure 9-8 Returning the corrugated pipe to its original position

**Step 3:** After connecting the main power terminal block, insert the corrugated pipe into the joint and snap it securely.

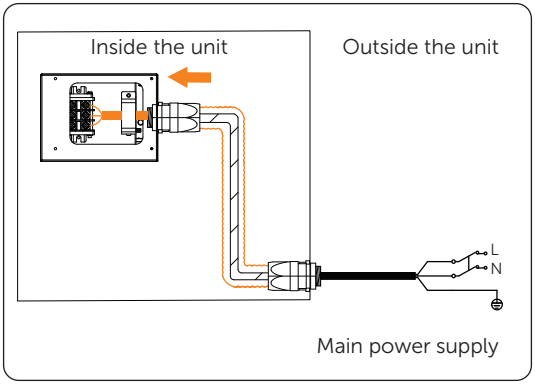



Figure 9-9 Inserting the corrugated pipe into the joint

### 9.5.4 Wiring of Communication Cable

**Step 1:** Open the right plate of the outdoor unit, and remove the joint cap at the hole ① of back plate (refer to "9.2 Back Plate Layout for Wiring").

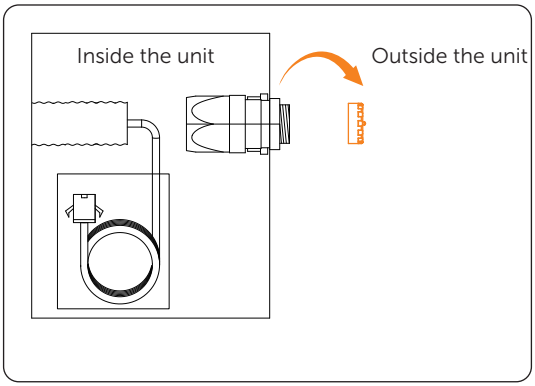



Figure 9-10 Removing the joint cap

**Step 2:** Cut the cable ties that bind the communication cable of the indoor unit and outdoor units. Route the communication cable (reserved inside the outdoor unit) outward from the inside of the unit through the joint.

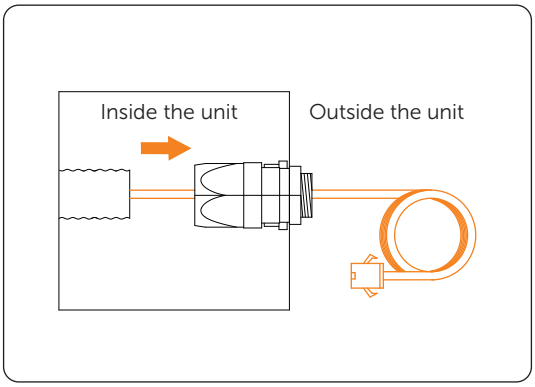



Figure 9-11 Routing the communication cable outward

**Step 3:** Plug the corrugated pipe into the joint and snap it securely.

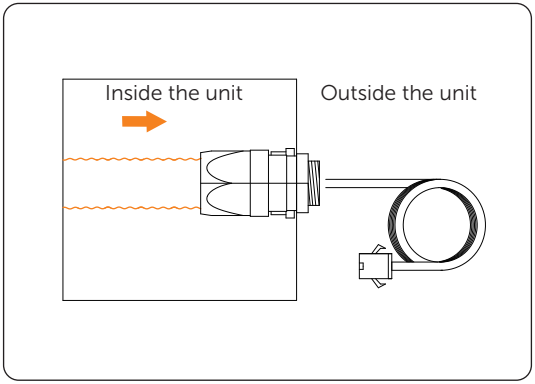



Figure 9-12 Plugging the corrugated pipe

## 9.6 Connecting Other Components

For details about connecting other components, please refer to the *Indoor Unit Installation Manual*.

# 10 Completion of Installation

**Step 1:** Cover the electrical box with the cover plate, and screw four screws to secure the cover plate of the electrical box.

**Step 2:** Snap the cover plate of the outdoor unit inwards and upwards, and screw four screws to secure the cover plate of the outdoor unit.

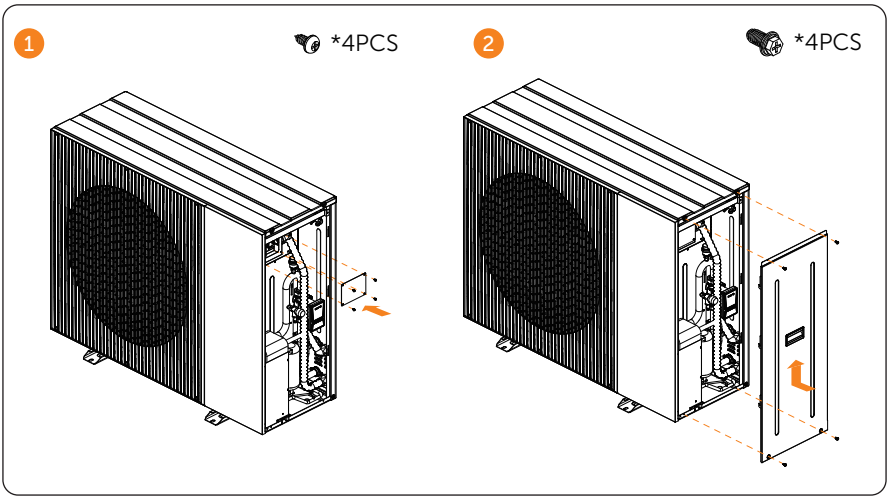



Figure 10-13 Completing the installation

# 11 Configuration

**WARNING!**

- The unit should be configured by an authorized installer to match the installation environment (outdoor climate, installed options,etc.) and meet the needs of users.

## 11.1 Checking before Configuration

Before powering on the unit, check the following items:

| Item | YES | NO |
|---|---|---|
| **Field wiring:** Ensure all wiring connections follow the instructions mentioned in the installation manual. | ☐ | ☐ |
| **Fuses, circuit breakers or protective devices:** Check the size and type according to "9.4 Electrical Wiring Guidelines". Make sure no fuse or protective device has been bypassed. | ☐ | ☐ |
| **Internal wiring:** Check the wiring and connections inside the electrical box have no loose or damaged parts, including the ground wire. | ☐ | ☐ |
| **Piping installation and insulation:** Check that the unit and water system are installed correctly, and that the piping has insulation measures. | ☐ | ☐ |
| **Integrity of the unit:** Check that there is no visible damage to the internal components and piping of the outdoor unit. | ☐ | ☐ |
| **Refrigerant leakage:** Check that there is no refrigeration leakage inside the outdoor unit. | ☐ | ☐ |
| **Power supply voltage:** Check that the power supply voltage must be consistent with the voltage on the identification label of the machine. | ☐ | ☐ |
| **Exhaust valve:** Ensure the exhaust valve is open (at least 1 turn counterclockwise). | ☐ | ☐ |
| **Sheet metal:** Check that all sheet metal of the outdoor unit is installed correctly. | ☐ | ☐ |
| **Water Flow:** Ensure the amount of water in the system is within the corresponding limits of the unit. | ☐ | ☐ |
| **Strainers:** Ensure strainers are installed correctly and kept clean. | ☐ | ☐ |

After powering on the unit, check the following items:

| Item | YES | NO |
|---|---|---|
| **If nothing is displayed on the wired controller:**<br>Check the following exceptions before diagnosing possible error codes.<br>• Wiring problems (power supply or communication signals)<br>• Fuse failure on PCB | ☐ | ☐ |
| **Empty the entire unit for test run:**<br>Check the water system and tank are filled with water, and air is removed. | ☐ | ☐ |
| **If error code "1" is displayed on the wired controller:**<br>Check whether the wiring sequence of the three-phase live wire is right. | ☐ | ☐ |
| **If error code "7" is displayed on the wired controller:**<br>Check whether the wiring of three-phase fire wire is connected correctly or whether the power supply is normal. | ☐ | ☐ |
| **If error code "83" is displayed on the wired controller:**<br>Check whether the communication cable of the wired controller is well plugged in. | ☐ | ☐ |
| **If error code "178" is displayed on the wired controller:**<br>Check the communication cable between the indoor unit and outdoor unit is correctly connected. | ☐ | ☐ |

NOTICE!

- More error codes can be found in *Indoor Unit Installation Manual*.

## 11.2 Configuration on the Wired Controller

After the installation of the unit is completed, it is necessary to set some operating parameters of the unit before it can be used. These settings need to be completed through the operation of wired controller. For more detailed information, please refer to *Wired Controller Operating Manual*.

# 12 Commissioning

## 12.1 Checking the Actuator

**NOTICE!**

- During the commissioning of the actuator, the protection function of the unit is disabled. Excessive use may damage components.

### Why

Check whether each actuator is in good working conditions.

### What (actuator list)

| No. | Name | Explanation | Note |
|---|---|---|---|
| 1 | S3V2 | Three-way valve 2 | / |
| 2 | S3V3/S3Vmpb1 | Three-way valve 3 | / |
| 3 | S3V4/S3Vmpb2 | Three-way valve 4 | / |
| 4 | PUMPo | PUMPo pump state | / |
| 5 | PUMPmb1 | PUMPmb1 pump state | / |
| 6 | PUMPmb2 | PUMPmb2 pump state | / |
| 7 | IBH1 | IBH1 e-heating state | / |
| 8 | IBH2 | IBH2 e-heating state | / |
| 9 | AHS | AHS state | / |
| 10 | S3V1 | Three-way valve 1 | Invisible if DHW is disabled |
| 11 | PUMPret | PUMPret pump state | Invisible if DHW is disabled |
| 12 | PUMPsl | PUMPsl pump state | Invisible if DHW is disabled |
| 13 | TBH | TBH e-heating state | Invisible if DHW is disabled |

### How

| | |
|---|---|
| 1 | Go to "**Set menu**". |
| 2 | Find "**Advanced setting**" and enter the page. |
| 3 | Find "**Manual test**" and enter the page. |
| 4 | Select the actuator to activate or deactivate the actuator.<br>The status  means the actuator is activated, and  means the actuator is deactivated. |

**NOTICE!**

- When you return to the upper layer, all actuators turn OFF automatically.

## 12.2 Checking the System Empty

### Why

To remove air from the water circulating system and reduce the impact on piping corrosion and unit performance.

### How

| | |
|---|---|
| 1 | Go to "**Set menu**". |
| 2 | Find "**Advanced setting**" and enter the page. |
| 3 | Select "**System empty**" and confirm it. |

## 12.3 Checking the Unit

### Why

Check whether the unit is in good working conditions.

### What

- Circulating pump operation
- Cooling operation
- Heating operation
- DHW operation

### How

| | |
|---|---|
| 1 | Go to "**Set menu**". |
| 2 | Find "**Advanced setting**" and enter the page. |
| 3 | Select "**Pump test**" / "**Cool test**" / "**Heat test**" / "**Hotwater test**".<br>The unit will run according to the default parameters. During the test, you can select the exit button to return to the top layer. |

**NOTICE!**

- During performance test, the target temperature is preset and cannot be changed.
- If the outdoor temperature is not within the operating temperature range, the unit may not operate or may not provide the required capacity. Operation of the unit in all modes needs to meet the operating temperature range requirements, otherwise the unit may not start or achieve the desired results.
- During circulating pump commissioning, if the flow rate exceeds the recommended range, please make reasonable changes to the installation to meet the recommended requirements, and ensure that the flow rate in the installation is met under all operating conditions of the unit.

## 12.4 Checking the Minimum Flow Rate

### How

| | |
|---|---|
| 1 | Check the hydraulic configuration to find out the space heating loops that can be closed by mechanical, electronic, or other valves. |
| 2 | Close all space heating loops that can be closed. |
| 3 | Start and operate the circulating pump. |
| 4 | Read out the flow rate[(a)] and modify the bypass valve settings until the set value reaches the minimum flow rate required +2 l/min. |

(a) During test run for the pump, the unit can operate below the minimum flow rate required.

# 13 Hand-over to the User

- Ensure that the user understands all the operating procedures and marks the manual to locate relevant information quickly.
- Provide a detailed list of contact information, including technical support, customer service and emergency contact information, to ensure that the user can get help in a timely manner in case of any problems.
- Provide a thorough demonstration before the user operates the equipment to ensure that the user is able to perform basic operations independently.
- Instruct users on how to monitor the operating status of the equipment, including key indicators such as temperature and pressure.
- Emphasize the importance of regular inspection and maintenance to reduce the risk of unplanned downtime, and advise users to develop a maintenance plan.
- Remind users to be safe during operation and to follow all applicable safety regulations and standards.
- Ensure that users are satisfied with the functionality and performance of the entire system, and encourage them to contact technical support whenever they have any questions during operation.
- Explain to the user how to switch between the various modes and set up special functions. For details, please refer to *Wired Controller Operating Manual*.

# 14 Troubleshooting

This chapter provides guidance on some of the problems and solutions that may occur in the daily operation of the unit, which is convenient for users to check on their own or for professional maintenance personnel to carry out troubleshooting.

## 14.1 General Guidelines

**NOTICE!**

- Before dealing with any technical problems, first check that the unit's power connections are correct and that all external control switches are in the proper position, mark or record any obvious anomalies, and contact your local supplier promptly.

**NOTICE!**

- Make sure the unit's maintenance and inspection records are up to date, which will help to quickly identify and resolve problems.

## 14.2 Typical Problems

**Problem 1: Unsatisfied with the cooling or heating effect of the unit during operation.**

| Possible cause | Solution |
|---|---|
| Improper target temperature | • Check the setting temperature is appropriate.<br>• Check the temperature collection point is set correctly. If there is any abnormality, modify it in time, please refer to *Wired Controller Operating Manual*. |
| Low water flow rate | • Check the water pressure is normal, the pressure value should not less than 1.5 bar.<br>• Check the water loop is not blocked, especially at the filter connections. |
| Insufficient system charge | • Check the system water volume meet the recommended value (refer to "8.1 Preparations for Installation").<br>• Check the value of water pressure meter is 2.0~2.5 bar. |

Problem 2: There is abnormal noise from the circulating pump.

| Possible cause | Solution |
|---|---|
| There is air in the water loop | • Enable the **System empty** function for test run, please refer to *"12.2 Checking the System Empty"*.<br>• Open the exhaust valve and fill the system with water until the pressure is 2.0~2.5 bar. |
| The pressure of pump inlet is low | • Check the water pressure is not less than 1.5 bar.<br>• Check the expansion tank and pressure gauge are working properly. |

Problem 3: Water is discharged through the connection pipe of the pressure relief valve.

| Possible cause | Solution |
|---|---|
| High water pressure in the water system | • Open the pressure relief valve to drain the excess water. The recommended value of the pressure gauge is 2.0~2.5 bar. |
| Damaged pressure relief valve | • Check the pressure relief valve is working properly, replace the pressure relief valve if necessary.<br>• Check the pressure relief valve connection piping for damage or improper installation. |
| High operating pressure | • Check if the system is overloaded or the pressure is out of the normal working range.<br>• Ensure that the maximum working pressure of the equipment is not exceeded by adjusting the system pressure to a safe level. |
| Damaged expansion tank | • Check that the expansion tank is working properly, if not, replace it. |

Problem 4: DHW is not heated.

| Possible cause | Solution |
|---|---|
| Damaged internal thermal element | • Check the heating element for damage, if damaged, replace with a new element. |
| Mode disabled | • Set the DHW mode via the wired controller and observe the display screen for the mode icon. |
| Tank heating protector activated | • Switch on the DHW tank and press the reset button of the heating protector. |

**Problem 5: The unit has pressed the on button, but the compressor will not start.**

| Possible cause | Solution |
|---|---|
| Control panel failure | • Check that the control panel is working properly and that there are no error codes on the display. If there is an error code, please refer to the chapter of troubleshooting in *Indoor Unit Installation Manual*. |
| Compressor protector activated | • If the compressor protector has been activated due to an overload or short circuit, please reset the protector. |
| Compressor malfunction | • Check if the compressor motor winding is damaged, if the start capacitor has failed, or if the internal mechanical parts of the compressor are stuck or damaged. |
| Too low Water temperature, out of operating range | • In case of low water temperature, the system activates the backup heater to reach the minimum water temperature (12°C) first.<br>• Verify that the backup heater is properly powered.<br>• Verify that the thermal fuse for the backup heater is closed.<br>• Verify that the backup heater's thermal protector is not activated.<br>• Verify that the backup heater's contactor is not damaged. |

**Problem 6: The outdoor ambient temperature is too low and the heating capacity is insufficient.**

| Possible cause | Solution |
|---|---|
| Insufficient or leaking system refrigerant | • Perform a pressure test on the system to check that the amount of refrigerant charged is up to standard (refer to "17 Technical Data") and make necessary replenishment or repair leaks. |
| Exceeding the operating range of heating mode | • Turn on the TBH or IBH.<br>• Check whether IBH is enabled.<br>• Check whether the thermal protector of IBH is activated.<br>• Check whether TBH is running.<br>• Check that the IBH and TBH can not operate simultaneously. |

| Possible cause | Solution |
| --- | --- |
| Excessive heat pump capacity used for heating domestic hot water (applicable only to installations with a domestic hot water tank) | Procedures for forced opening TBH:<br>**Step 1:** Turn on the **hot water** mode;<br>**Step 2:** Enter the **Set menu**;<br>**Step 3:** Click on **Force open T heat**;<br>**Step 4:** Click on **Confirm**. |

NOTICE!

- The above is only a list of common problems and solution guide, if you encounter more other faults, please contact the supplier or professional personnel to solve.

## 14.3 Error Codes

Each error code and its explanation can be found in *Indoor Unit Installation Manual*.

# 15 Maintenance

Regular inspections are required at certain intervals to ensure optimum unit performance.

## 15.1 Safety Precautions for Maintenance

**DANGER!**

- Risk of electrocution.

**WARNING!**

- Do not flush the unit directly with water, as this may cause damage to the electrical circuits or even electric shock or fire.
- When disassembling the unit for maintenance operations, it must be guarded during the period until the maintenance work is completed.
- Use insulated tools and equipment to avoid direct contact of metal tools with live parts.
- Ensure that the work area is dry and avoid performing electrical maintenance in a wet environment.

**NOTICE!**

- Touch the metal parts of the unit before performing any maintenance or repair work to eliminate static electricity and protect the PCB.
- Periodic maintenance is required to prevent serious performance degradation of the unit as well as to increase the risk of abnormal operation of parts.
- When replacing or inspecting electrical parts, it should be performed by a professional and follow the appropriate safety procedures.
- During maintenance, the operator should wear appropriate protective equipment such as insulated gloves and safety shoes.
- During maintenance, safety warning signs should be checked periodically to ensure that they are clearly visible and that all operators are aware of them.
- After completing maintenance, a thorough inspection should be carried out to ensure that all parts are correctly installed, not loose or damaged, and to reconfirm that the equipment is in power-off state.

## 15.2 Maintenance Routines

### By user

| Items | Check notes | Maintenance interval |
|---|---|---|
| General | Clean around the outdoor unit | Once a month |

## By installer

| Items | Check notes | Maintenance interval |
|---|---|---|
| General | Check if all the parts are in the proper position | Once a year |
| Outdoor unit | Clean dust on the finned heat exchanger of the outdoor unit | Once every three months |
| | Clean dust from fan blades | Once every three months |
| Water loop | Check if the water pressure is sufficient | Once a year |
| | Check that the water quality meets the requirements (Be careful if antifreeze is added) | Once a year |
| | Check for leaks in the water loop | Once a year |
| | Check for air inside the water loop system | Once a year |
| | Check that the flow switch is working properly | Once a year |
| | Check that the backup heater is well insulated (If installed) | Once a year |
| | Clean the filter connected in the water loop and wash out the dirt | Once a year |
| | Check that the water pressure reducing valve in the DHW water loop is working properly | Once a year |
| | Check that the booster heater in the DHW water tank is clean and in good condition | Once a year |
| Wiring and electrical parts | Check that all sensors (temperature sensors, pressure sensors, etc.) are working properly. | Once a year |
| | Check that all installation wiring and cables are intact | Once a year |
| | Check contactors and circuit breakers for proper operation | Once a year |
| | Check all terminals for good contact | Once a year |
| Refrigerant loop | Check if there is refrigerant leakage in the refrigerant loop | Once a year |

**NOTICE!**

- Before starting a service on a system containing flammable refrigerants, a safety check must be carried out to minimise the risk of ignition.
- After all checks have been completed and the problem has been solved, the equipment must be restored to its original condition to ensure that it can operate properly.
- The above is only a list of the more important checks, please contact your local dealer for more information.

# 16 Disposal

**WARNING!**

- All parts and accessories of the unit are different from normal household waste. The unit, compressor, motor, etc. should only be disposed of by qualified professionals.

**WARNING!**

- The unit uses R290 refrigerant, only carry out the removal, evacuation and recovery of refrigerant by the operators who have specialized refrigeration knowledge and are able for handle R290 refrigerant.

## Package handling

Dispose of all packaging properly.

Comply with all relevant regulations.

## Removal and evacuation of refrigerant

It is important to follow the best practice since flammability should be considered. Follow the procedures below:

**Step 1:** Remove the refrigerant, and put it in correct recovery cylinders.

**Step 2:** Purge the circuit with inert gas (such as oxygen free nitrogen (OFN)) until the system reaches the working pressure;

**NOTICE!**

- Compressed air or oxygen should not be used.

**Step 3:** Pump the system, and recover the system to a vacuum.

**NOTICE!**

- Ensure that the outlet of the vacuum pump is not closed to any ignition sources and adequate ventilation is available.

**Step 4:** Repeat Step 2 and Step 3 several times until no refrigerant exists in the system.

**NOTICE!**

- Upon the final OFN charge, the system should be vented down to reach the atmospheric pressure to start the work.

## Recovery

### Preparation before recovery

- Wear protective equipment (including gloves, goggles, protective clothing) when recovering.
- Check that the equipment is in good condition and that containers are certified, well sealed, and clearly labelled.
- Prepare R290-specific recycled cylinders that meet local standards and ensure that the remaining volume of the cylinder before filling is ≥ 20% (to avoid the risk of thermal expansion).
- Check connected hoses for no cracks or deterioration.
- Check that the operating area is well ventilated without any flammable and hazardous materials.
- Turn off the heat pump and make sure the system is off.
- Verify system pressure is within safe limits.
- Prepare emergency equipment: fire extinguishers, leak treatment tools (such as absorbent).
- Prepare recovery record sheet for recording information (such as refrigerant type, amount recovered, time).

### Procedures for recovering

**NOTICE!**

- Operators should hold relevant certificates or local refrigerant handling qualifications, and ensure that they meet the requirements of operation as specified locally.

**Step 1:** Connect the hoses from the recovery device to the heat pump. Make sure the connections are tight to prevent leakage.

**Step 2:** Power on the recovery device and start the unit. Set the recycling mode.

**Step 3:** Slowly open the valve of the heat pump to start recovering the refrigerant.

**Step 4:** Monitor the pressure, temperature and refrigerant flow of the recovery device in real time. When the system pressure drops to a safe level and the recovery is complete, close valves and power off the recovery device.

**Step 5:** Slowly loosen the hose connecting the recovery device to the heat pump. Check hoses and connections to ensure no residual refrigerant.

**Step 6:** Store the recovered refrigerant in special containers, ensuring that they are sealed and clearly labelled with the type of refrigerant and the date of recovery.

**Step 7:** Clean up the operating area and check for leaks or residue. Dispose of waste properly (such as damaged hoses).

**Step 8:** Fill out the recovery record sheet. If required, submit recycling reports to the relevant authorities.

# 17 Technical Data

## 17.1 General

### Three phase

| Model | | STU3-C08R290 | STU3-C10R290 | STU3-C12R290 | STU3-C14R290 | STU3-C16R290 |
|---|---|---|---|---|---|---|
| Power supply | | 380-415 V 3N~ 50 Hz | | | | |
| Heating (A:7/6°C W: 30/35°C) | Capacity [kW] | 8.50 | 10.00 | 12.50 | 14.00 | 15.50 |
| | COP | 5.15 | 4.95 | 4.90 | 4.75 | 4.55 |
| Heating (A:7/6°C W: 47/55°C) | Capacity [kW] | 8.00 | 10.00 | 12.00 | 14.00 | 16.00 |
| | COP | 3.45 | 3.25 | 3.25 | 3.15 | 3.10 |
| Cooling (A:35°C W: 23/18°C) | Capacity [kW] | 8.50 | 10.00 | 12.00 | 14.00 | 15.50 |
| | EER | 5.20 | 4.70 | 4.70 | 4.50 | 4.35 |
| Cooling (A:35°C W: 12/7°C) | Capacity [kW] | 8.00 | 9.00 | 12.00 | 13.00 | 14.00 |
| | EER | 3.40 | 3.20 | 3.10 | 3.05 | 2.75 |
| Seasonal space heating energy efficiency class | LWT at 35°C | A+++ | | | | |
| | LWT at 55°C | A+++ | | | | |
| SCOP | LWT at 35°C | 5.44 | 5.30 | 5.07 | 4.94 | 4.90 |
| | LWT at 55°C | 4.12 | 4.07 | 3.89 | 3.84 | 3.83 |
| Compressor | Type | Rotary DC inverter | | | | |
| Outdoor fan | Motor type | Brushless DC motor | | | | |
| | Number of fans | 1 | | | | |
| Throttle type | | Electronic expansion valve | | | | |
| Air side heat exchanger | Type | Finned tube | | | | |
| Water side heat exchanger | Type | Plate type | | | | |
| Refrigerant | Type/GWP | R290/3 | | | | |
| | Factory charge [g] | 1200 | 1200 | 1500 | 1500 | 1500 |

| Model | | STU3-C08R290 | STU3-C10R290 | STU3-C12R290 | STU3-C14R290 | STU3-C16R290 |
|---|---|---|---|---|---|---|
| Sound level [dB(A)] | | 49 | 49 | 51 | 52 | 52 |
| Net dimensions (W×H×D) [mm] | | 1310 × 1050 × 465 | | | | |
| Net weight [kg] | | 151 | 151 | 165 | 165 | 165 |
| Piping connection | | G1-1/4" | | | | |
| Operation range (air side) | Heating | -25°C ~ 35°C | | | | |
| | Cooling | 5°C ~ 48°C | | | | |
| | DHW | -25°C ~ 46°C | | | | |
| Operation range (water side) | Heating | Maximum 80°C | | | | |
| | Cooling | Minimum 5°C | | | | |

### Fuse on PCB

| PCB name | Main control board | Fan drive board |
|---|---|---|
| Model name | 50CT(P)-100H250V/ 50CT-100H250V | 50CT(P)-160H250V |
| Working voltage [V] | 250 | |
| Working current [A] | 10 | 16 |

## One phase

| Model | | STU1-C08R290 | STU1-C10R290 | STU1-C12R290 | STU1-C14R290 | STU1-C16R290 |
|---|---|---|---|---|---|---|
| Power supply | | 220-240 V 1N~ 50 Hz | | | | |
| Heating (A:7/6°C W: 30/35°C) | Capacity [kW] | 8.50 | 10.00 | 12.50 | 14.00 | 15.50 |
| | COP | 5.15 | 4.95 | 4.90 | 4.75 | 4.55 |
| Heating (A:7/6°C W: 47/55°C) | Capacity [kW] | 8.00 | 10.00 | 12.00 | 14.00 | 16.00 |
| | COP | 3.45 | 3.25 | 3.25 | 3.15 | 3.10 |
| Cooling (A:35°C W: 23/18°C) | Capacity [kW] | 8.50 | 10.00 | 12.00 | 14.00 | 15.50 |
| | EER | 5.20 | 4.70 | 4.70 | 4.50 | 4.35 |
| Cooling (A:35°C W: 12/7°C) | Capacity [kW] | 8.00 | 9.00 | 12.00 | 13.00 | 14.00 |
| | EER | 3.40 | 3.20 | 3.10 | 3.05 | 2.75 |

| Model | | STU1-C08R290 | STU1-C10R290 | STU1-C12R290 | STU1-C14R290 | STU1-C16R290 |
|---|---|---|---|---|---|---|
| Seasonal space heating energy efficiency class | LWT at 35°C | A+++ | | | | |
| | LWT at 55°C | A+++ | | | | |
| SCOP | LWT at 35°C | 5.44 | 5.30 | 5.07 | 4.94 | 4.90 |
| | LWT at 55°C | 4.12 | 4.07 | 3.89 | 3.84 | 3.83 |
| Compressor | Type | Rotary DC inverter | | | | |
| Outdoor fan | Motor type | Brushless DC motor | | | | |
| | Number of fans | 1 | | | | |
| Throttle type | | Electronic expansion valve | | | | |
| Air side heat exchanger | Type | Finned tube | | | | |
| Water side heat exchanger | Type | Plate type | | | | |
| Refrigerant | Type/GWP | R290/3 | | | | |
| | Factory charge [g] | 1200 | 1200 | 150 | 1500 | 1500 |
| Sound level [dB(A)] | | 49 | 49 | 51 | 52 | 52 |
| Net dimensions (W×H×D) [mm] | | 1310 × 1050 × 465 | | | | |
| Net weight [kg] | | 140 | 140 | 154 | 154 | 154 |
| Piping connection | | G1-1/4" | | | | |
| Operation range (air side) | Heating | -25°C ~ 35°C | | | | |
| | Cooling | 5°C ~ 48°C | | | | |
| | DHW | -25°C ~ 46°C | | | | |
| Operation range (water side) | Heating | Maximum 80°C | | | | |
| | Cooling | Minimum 5°C | | | | |

## Fuse on PCB

| PCB name | Main control board | Compressor driver board |
|---|---|---|
| Model name | 50CT(P)-100H250V/ 50CT-100H250V | 65TS(P)300H |
| Working voltage [V] | 250 | |
| Working current [A] | 10 | 30 |

## 17.2 Piping Diagram

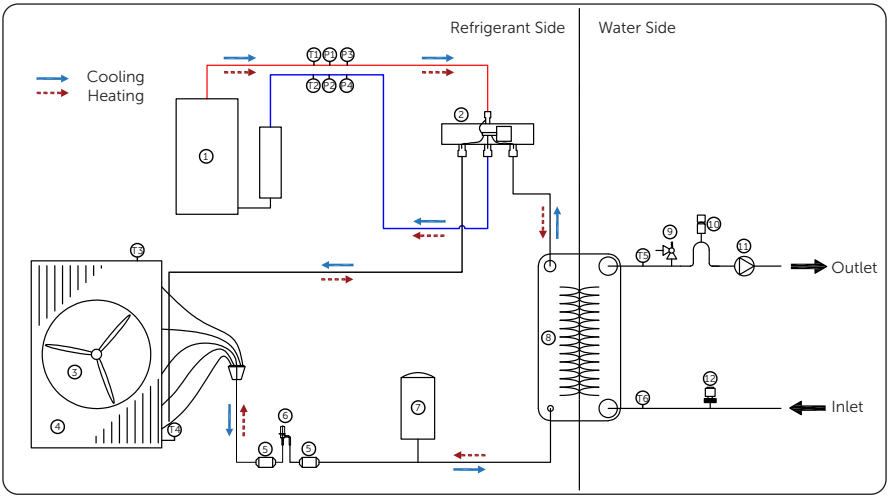



Figure 17-14 System diagram

| Item | Description | Item | Description |
|---|---|---|---|
| 1 | Compressor | 12 | Flow switch |
| 2 | Four-way switching valve | T1 | Temperature sensor (TD: Compressor discharge) |
| 3 | Fan | T2 | Temperature sensor (TS: Compressor suction) |
| 4 | Heat exchanger | T3 | Temperature sensor (Outdoor air) |
| 5 | Filter | T4 | Temperature sensor (Heat exchanger temperature) |
| 6 | Electronic expansion valve | T5 | Temperature sensor (Tw_out:Outlet water) |
| 7 | Fluid reservoir | T6 | Temperature sensor (Tw_in: Inlet water) |
| 8 | Plate heat exchanger | P1 | High pressure switch |
| 9 | Pressure relief valve | P2 | Low pressure switch |
| 10 | Exhaust valve | P3 | High pressure sensor |
| 11 | Water pump | P4 | Low pressure sensor |

# 18 Typical Applications

The following settings can be made on the wired controller:

- Single-zone water temperature + hot water
- Single-zone room temperature + hot water
- Two-zone water temperature + hot water
- Two-zone water temperature + room temperature + hot water
- Three-zone water temperature + hot water

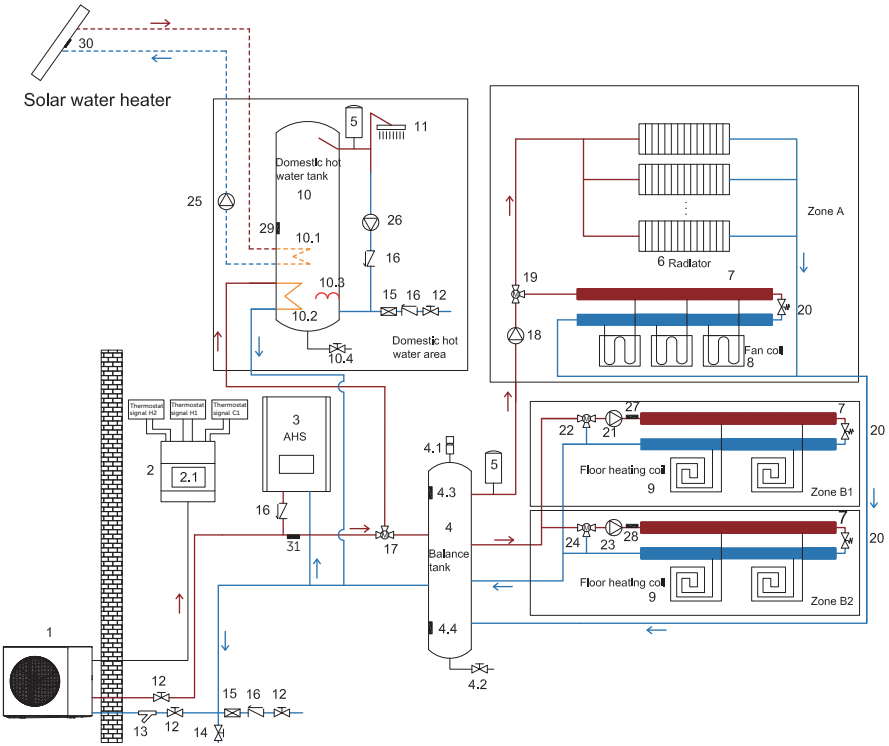
The system application solutions in this chapter are for reference only. Please install and use them according to the actual scenario.

NOTICE!

The following installation suggestions are provided:

- Drain valves should be set at the lowest point of the system and set on the inner side to facilitate operation and maintenance.
- Exhaust valves must be added at the highest point of the system and local high points to ensure the normal operation of the system.
- The end can be connected to different devices (such as fan coil, floor heating, radiator). To reduce the water resistance during operation, it is recommended to connect devices in parallel.

## 18.1 Control Module + AHS




| Item | Name | Item | Name |
|---|---|---|---|
| 1 | Outdoor unit | 12 | Globe valve (field supply) |
| 2 | Control unit | 13 | Y-type strainer |
| 2.1 | Wired controller | 14 | Drain valve (field supply) |
| 3 | AHS: additional heat source (field supply) | 15 | Filter (field supply) |
| 4 | Balance tank (field supply) | 16 | Check valve (field supply) |
| 4.1 | Exhaust valve (field supply) | 17 | S3V1: three-way solenoid valve (field supply) |
| 4.2 | Drain valve (field supply) | 18 | PUMPo: outside circulating pump (field supply) |
| 4.3 | TACt1: balance tank upper temperature sensor (optional) | 19 | S3V2: three-way solenoid valve (field supply) |

| Item | Name | Item | Name |
|---|---|---|---|
| 4.4 | TACt2: balance tank lower temperature sensor (optional) | 20 | Bypass valve (field supply) |
| 5 | Expansion tank (field supply) | 21 | PUMPmb1: zone B1 circulating pump (field supply) |
| 6 | Radiator (field supply) | 22 | S3V3/S3Vmpb1: zone B1 mixing valve (field supply) |
| 7 | Water manifold (field supply) | 23 | PUMPmb2: zone B2 circulating pump (field supply) |
| 8 | Fan coil (field supply) | 24 | S3V4/S3Vmpb2: zone B2 mixing valve (field supply) |
| 9 | Floor heating coil (field supply) | 25 | PUMPsl: solar pump (field supply) |
| 10 | DHW tank (field supply) | 26 | PUMPret: lower return water pump (field supply) |
| 10.1 | Heat pump coil (field supply) | 27 | TMb1: zone B1 water flow temperature sensor (optional) |
| 10.2 | Solar coil (field supply) | 28 | TMb2: zone B2 water flow temperature sensor (optional) |
| 10.3 | TBH: tank booster heater (field supply) | 29 | THWt: DHW temperature sensor (accessory) |
| 10.4 | Drain valve (field supply) | 30 | TSL_SENSOR: solar temperature sensor (field supply) |
| 11 | Hot water faucet (field supply) | 31 | TWout3: system total water flow temperature sensor (optional) |

**NOTICE!**

- The specification of the temperature sensor:
  temperature sensor property values B25/50=3950K, K25=10KΩ

## Space heating

The ON/OFF signal, operation mode, and temperature are set on the wired controller. When PUMPo keeps running and S3V1 remains OFF, the unit can turn on the heating mode.

## Domestic hot water

The ON/OFF signal and target tank water temperature (AI6B) are set on the wired controller. When PUMPo stops running and S3V1 remains ON, the unit can turn on the hot water mode.

## AHS control

- When the unit has a heating demand, and AHS is set to **HEAT.ONLY** or **HEAT&HOTW**:

  - » Turn on or off through **Force AHS** on the wired controller.
  - » When **TA' ambient temp.** and **TWout3 water temp.** are low, and the shutdown time of AHS exceeds a certain period, turn on AHS until **TA' ambient temp.** or **TWout3 water temp.** rises, then turn off AHS.
- When the unit has a hot water demand, and AHS is set to **HOTW.ONLY** or **HEAT&HOTW**:
  - » Turn on or off through **Force AHS** on the wired controller.
  - » When **THWt hot water temp.** and **TWout3 water temp.** are low, and the shutdown time of AHS exceeds a certain period, turn on AHS until **THWt hot water temp.** or **TWout3 water temp.** rises, then turn off AHS.

## TBH control

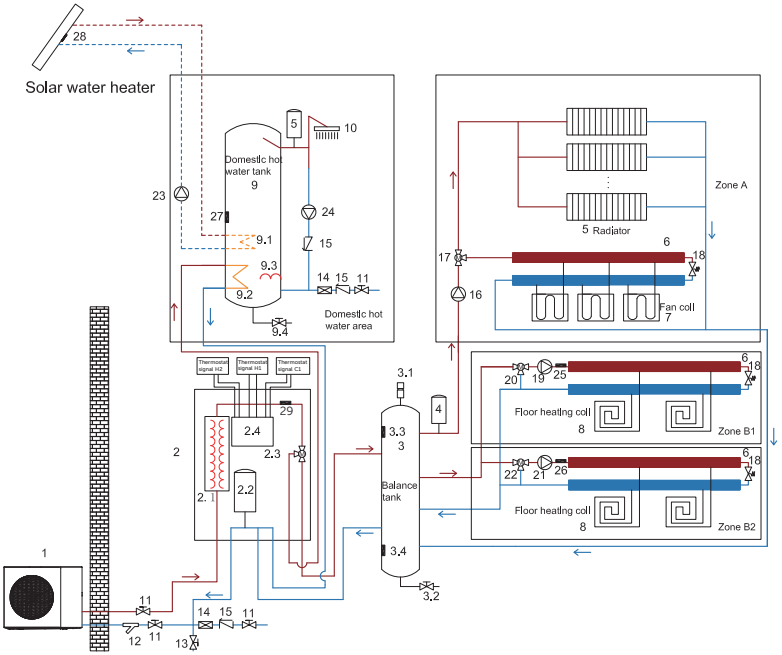
- When TBH is set to **ON** and **HOT_WATER** is turned on:
  - » Turn on or off through **Force open T heat** on the wired controller.
  - » When **TA' ambient temp.** and **THWt hot water temp.** are low, and the hot water production time exceeds a certain period, turn on TBH until **THWt hot water temp.** rises, then turn off TBH.

## Solar control

Premise: **SOLAR** is set to **ON** and **HOT_WATER** is set to **ON**.

- **TSL_SENSOR** is set to **OFF**:
  - » When the solar signal is detected and **THWt hot water temp.** is low, turn on **PUMPsl** until the solar signal is disconnected or **THWt hot water temp.** rises, then turn off **PUMPsl**.
- **TSL_SENSOR** is set to **ON**:
  - » When **TSL solar temp.** is high and **THWt hot water temp.** is low, turn on **PUMPsl** until **TSL solar temp.** drops and **THWt hot water temp** rises, then turn off **PUMPsl**.

## 18.2 Hydraulic Module




| Item | Name | Item | Name |
|---|---|---|---|
| 1 | Outdoor unit | 10 | Hot water faucet (field supply) |
| 2 | Hydraulic unit | 11 | Globe valve (field supply) |
| 2.1 | Auxiliary electric heating | 12 | Y-type strainer |
| 2.2 | 8L expansion tank | 13 | Drain valve (field supply) |
| 2.3 | S3V1: three-way solenoid valve | 14 | Filter (field supply) |
| 2.4 | Wired controller | 15 | Check valve (field supply) |
| 3 | Balance tank (field supply) | 16 | PUMPo: outside circulating pump (field supply) |
| 3.1 | Exhaust valve (field supply) | 17 | S3V2: three-way solenoid valve (field supply) |
| 3.2 | Drain valve (field supply) | 18 | Bypass valve (field supply) |
| 3.3 | TACt1: balance tank upper temperature sensor (optional) | 19 | PUMPmb1: zone B1 circulating pump (field supply) |
| 3.4 | TACt2: balance tank lower temperature sensor (optional) | 20 | S3V3/S3Vmpb1: zone B1 mixing valve (field supply) |

| Item | Name | Item | Name |
|---|---|---|---|
| 4 | Expansion tank (field supply) | 21 | PUMPmb2: zone B2 circulating pump (field supply) |
| 5 | Radiator (field supply) | 22 | S3V4/S3Vmpb2: zone B2 mixing valve (field supply) |
| 6 | Water manifold (field supply) | 23 | PUMPsl: solar pump (field supply) |
| 7 | Fan coil (field supply) | 24 | PUMPret: lower return water pump (field supply) |
| 8 | Floor heating coil (field supply) | 25 | TMb1: zone B1 water flow temperature sensor (optional) |
| 9 | DHW tank (field supply) | 26 | TMb2: zone B2 water flow temperature sensor (optional) |
| 9.1 | Solar coil (field supply) | 27 | THWt: DHW tank temperature sensor (accessory) |
| 9.2 | Heat pump coil (field supply) | 28 | TSL_SENSOR: solar temperature sensor (field supply) |
| 9.3 | TBH: tank booster heater (field supply) | 29 | TWout2: total water flow temperature sensor (optional) |
| 9.4 | Drain valve (field supply) | | |

## Heating mode

The general control logic of the unit is the same as the single zone control. S3Vmpb2 and PUMPmb2 operate when zone B2 is on. Zone B2 cannot be in cooling operation.

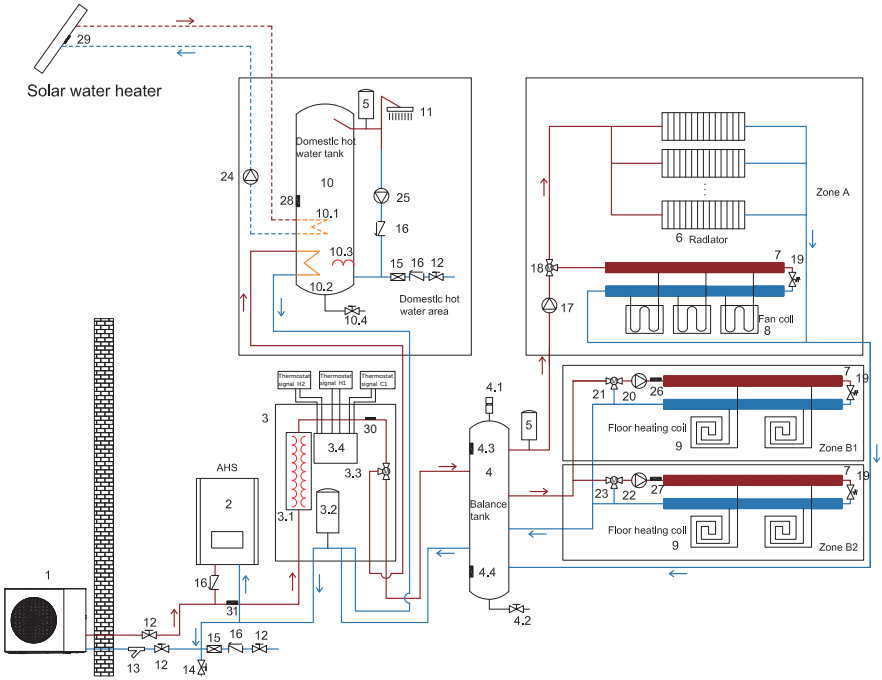
The domestic water tank, AHS, TBH and solar control can be connected. The control method is the same as described in the above section.

## Control through wired controller and room thermostat (RT)

Space heating or cooling control is available through the room thermostat. It can be controlled through the mode setting on the wired controller, single zone control, two zone control or three zone control.

- When **RT_CTRL** is set to "**ZoneA.Mode.SW** (Single zone mode switch)":
  - » When C1 signal is closed, zone A turns on the cooling mode.
  - » When C1 signal is disconnected and H1 signal is closed, zone A turns on the heating mode.
  - » When both C1 signal and H1 signal are disconnected, zone A turns off the RT control function.
- When **RT_CTRL** is set to "**ZONE.A.SWITCH** (Single zone switch)":
  - » When C1 signal is closed, zone A turns on the RT control function.
  - » When C1 signal is disconnected, zone A turns off the RT control function.

## 18.3 Hydraulic Module + AHS




| Item | Name | Item | Name |
|---|---|---|---|
| 1 | Outdoor unit | 11 | Hot water faucet (field supply) |
| 2 | AHS: additional heat source (field supply) | 12 | Globe valve (field supply) |
| 3 | Hydraulic unit | 13 | Y-type strainer |
| 3.1 | Auxiliary electric heating | 14 | Drain valve (field supply) |
| 3.2 | Expansion tank | 15 | Filter (field supply) |
| 3.3 | S3V1: three-way solenoid valve | 16 | Check valve (field supply) |
| 3.4 | Wired controller | 17 | PUMPo: outside circulating pump (field supply) |
| 4 | Balance tank (field supply) | 18 | S3V2: three-way solenoid valve (field supply) |
| 4.1 | Exhaust valve (field supply) | 19 | Bypass valve (field supply) |
| 4.2 | Drain valve (field supply) | 20 | PUMPmb1: zone B1 circulating pump (field supply) |

| Item | Name | Item | Name |
|---|---|---|---|
| 4.3 | TACt1: balance tank upper temperature sensor (optional) | 21 | S3V3/S3Vmpb1: zone B1 mixing valve (field supply) |
| 4.4 | TACt2: balance tank lower temperature sensor (optional) | 22 | PUMPmb2: zone B2 circulating pump (field supply) |
| 5 | Expansion tank (field supply) | 23 | S3V4/S3Vmpb2: zone B2 mixing valve (field supply) |
| 6 | Radiator (field supply) | 24 | PUMPsl: solar pump (field supply) |
| 7 | Water manifold (field supply) | 25 | PUMPret: lower return water pump (field supply) |
| 8 | Fan coil (field supply) | 26 | TMb1: zone B1 water flow temperature sensor (optional) |
| 9 | Floor heating coil (field supply) | 27 | TMb2: zone B2 water flow temperature sensor (optional) |
| 10 | DHW tank (field supply) | 28 | THWt: DHW temperature sensor (accessory) |
| 10.1 | Heat pump coil (field supply) | 29 | TSL_SENSOR: solar temperature sensor (field supply) |
| 10.2 | Solar coil (field supply) | 30 | TWout2: total water flow temperature sensor (optional) |
| 10.3 | TBH: tank booster heater (field supply) | 31 | TWout3: system total water flow temperature sensor (optional) |
| 10.4 | Drain valve (field supply) | | |

## Space heating

The cooling or heating mode is set via the room thermostat and the water temperature is set on the wired controller.

1) When C1 signal is closed, zone A turns on the cooling mode and the system will be set to operate in cooling mode.

2) When C1 signal is disconnected and H1 signal is closed, the system will be set to the heating mode.

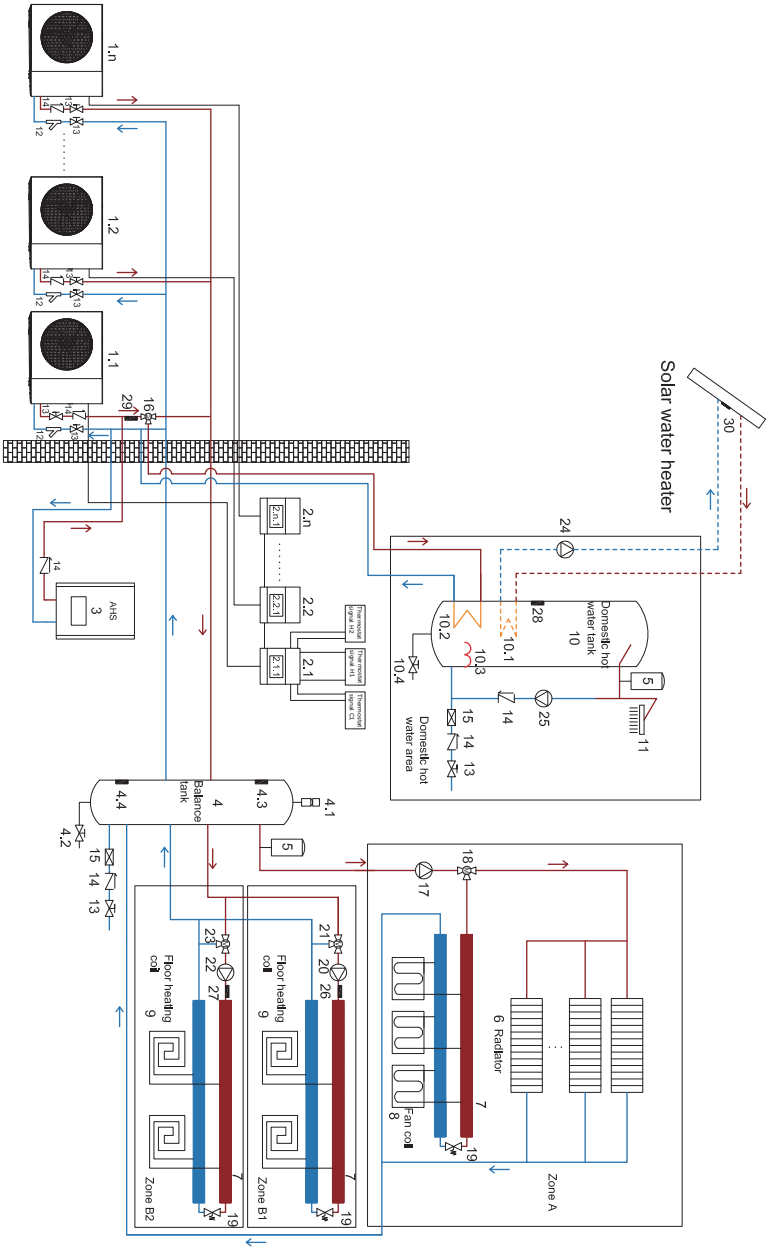
## Circulating pump operation

1) When the system is in cooling mode, this means that thermostat “C1” is closed, S3V1 remains closed, and PUMPo starts.

2) When the system is in heating mode, this means that “C1” is disconnected and “H1” is closed, S3V1 remains closed and PUMPo starts.

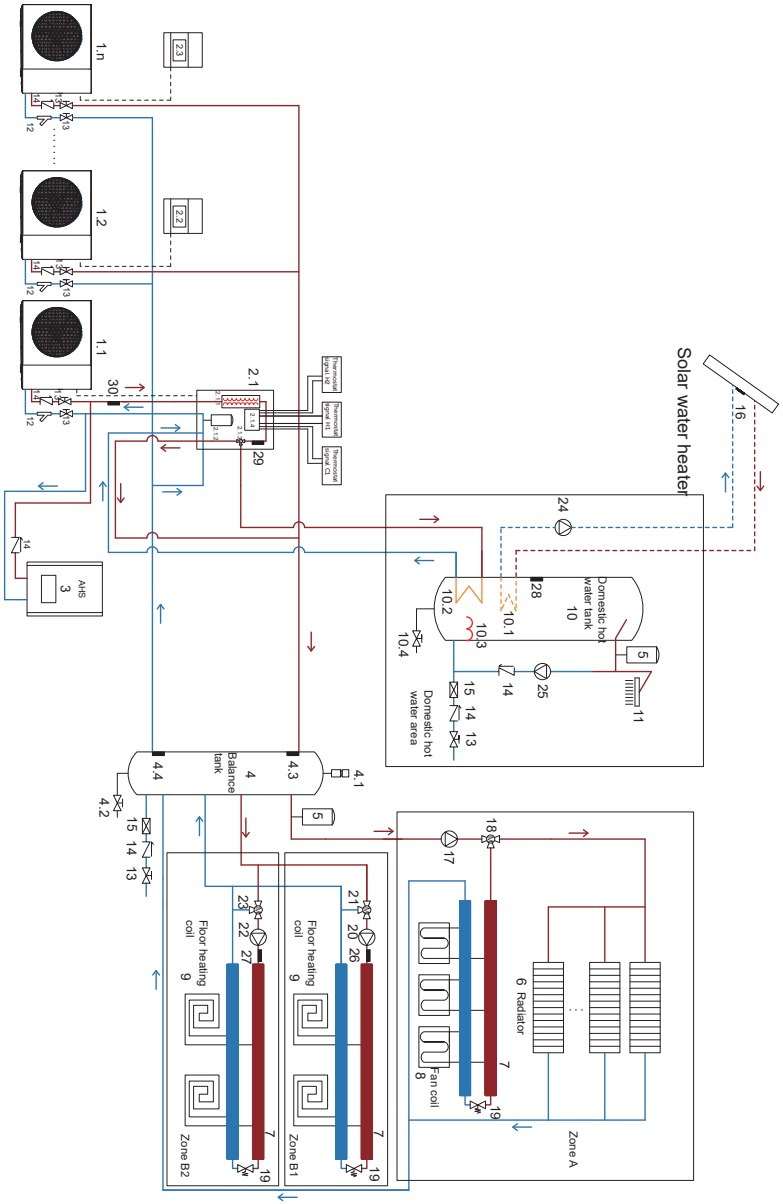
The domestic water tank, AHS, TBH and solar control can be connected. The control method is the same as described in the above section.

## 18.4 Cascade Mode (Control Module + AHS)



| Item | Name | Item | Name |
|---|---|---|---|
| 1 | Master outdoor unit | 10.4 | Drain valve (field supply) |
| 1.2...n | Slave outdoor unit | 11 | Hot water faucet (field supply) |
| 2.1 | Master control unit | 12 | Y-type strainer (accessory) |
| 2.2...n | Slave control unit | 13 | Globe valve (field supply) |
| 2.1.1 | Master wired controller | 14 | Check valve (field supply) |
| 2.2(n).1 | Slave wired controller | 15 | Filter (field supply) |
| 3 | AHS: additional heat source (field supply) | 16 | S3V1: three-way solenoid valve (field supply) |
| 4 | Balance tank (field supply) | 17 | PUMPo: outside circulating pump (field supply) |
| 4.1 | Exhaust valve (field supply) | 18 | S3V2: three-way solenoid valve (field supply) |
| 4.2 | Drain valve (field supply) | 19 | Bypass valve (field supply) |
| 4.3 | TACt1: balance tank upper temperature sensor (optional) | 20 | PUMPmb1: zone B1 circulating pump (field supply) |
| 4.4 | TACt2: balance tank lower temperature sensor (optional) | 21 | S3V3/S3Vmpb1: zone B1 mixing valve (field supply) |
| 5 | Expansion tank (field supply) | 22 | PUMPmb2: zone B2 circulating pump (field supply) |
| 6 | Radiator (field supply) | 23 | S3V4/S3Vmpb2: zone B2 mixing valve (field supply) |
| 7 | Water manifold (field supply) | 24 | PUMPsl: solar pump (field supply) |
| 8 | Fan coil (field supply) | 25 | PUMPret: lower return water pump (field supply) |
| 9 | Floor heating coil (field supply) | 26 | TMb1: zone B1 water flow temperature sensor (optional) |
| 10 | DHW tank (field supply) | 27 | TMb2: zone B2 water flow temperature sensor (optional) |
| 10.1 | Heat pump coil (field supply) | 28 | THWt: DHW tank temperature sensor (accessory) |
| 10.2 | Solar coil (field supply) | 29 | TWout3: system total water flow temperature sensor (optional) |
| 10.3 | TBH: tank booster heater (field supply) | 30 | TSL_SENSOR: solar temperature sensor (field supply) |

## 18.5 Cascade Mode (Hydraulic Module + AHS)



| Item | Name | Item | Name |
|---|---|---|---|
| 1.1 | Master outdoor unit | 10.3 | TBH: tank booster heater (field supply) |
| 1.2...n | Slave outdoor unit | 10.4 | Drain valve (field supply) |
| 2.1 | Master hydraulic unit | 11 | Hot water faucet (field supply) |
| 2.2...n | Slave hydraulic unit | 12 | Y-type strainer (accessory) |
| 2.1(n).1 | Internal electric heating | 13 | Globe valve (field supply) |
| 2.1(n).2 | 8L expansion tank (field supply) | 14 | Check valve (field supply) |
| 2.1(n).3 | S3V1: three-way solenoid valve (field supply) | 15 | Filter (field supply) |
| 2.1.4 | Master wired controller | 16 | TSL_SENSOR: solar temperature sensor (field supply) |
| 2.2(n) | Slave control unit | 17 | PUMPo: outside circulating pump (field supply) |
| 3 | AHS: additional heat source (field supply) | 18 | S3V2: three-way solenoid valve (field supply) |
| 4 | Balance tank (field supply) | 19 | Bypass valve (field supply) |
| 4.1 | Exhaust valve (field supply) | 20 | PUMPmb1: zone B1 circulating pump (field supply) |
| 4.2 | Drain valve (field supply) | 21 | S3V3/S3Vmpb1: zone B1 mixing valve (field supply) |
| 4.3 | TACt1: balance tank upper temperature sensor (optional) | 22 | PUMPmb2: zone B2 circulating pump (field supply) |
| 4.4 | TACt2: balance tank lower temperature sensor (optional) | 23 | S3V4/S3Vmpb2: zone B2 mixing valve(field supply) |
| 5 | Expansion tank (field supply) | 24 | PUMPsl: solar pump (field supply) |
| 6 | Radiator (field supply) | 25 | PUMPret: lower return water pump (field supply) |
| 7 | Water manifold (field supply) | 26 | TMb1: zone B1 water flow temperature sensor (optional) |
| 8 | Fan coil (field supply) | 27 | TMb2: zone B2 water flow temperature sensor (optional) |
| 9 | Floor heating coil (field supply) | 28 | THWt: DHW temperature sensor (accessory) |
| 10 | DHW tank (field supply) | 29 | TWout2: total water flow temperature sensor (optional) |
| 10.1 | Heat pump coil (field supply) | 30 | TWout3: system total water flow temperature sensor (optional) |
| 10.2 | Solar coil (field supply) | | |

## Module number setting

- **Cascade wiring:** for instance, connect the communication cable A1 of master unit to A1 of slave unit 1, then connect A1 of slave unit 1 to A1 of slave unit 2; connect the communication cable B1 of master unit to B1 of slave unit 1, then connect B1 of slave unit 1 to B1 of slave unit 2, and so on.
- **Address dialing code:** as shown in the electrical connection diagram, set the address of each unit in the power-off state. Address 0 represents the master outdoor unit, address 1 represents slave outdoor unit 1, and so on. And the display screen and network monitoring only need to be connected to the master outdoor unit.
- **Parameter setting:** when multiple units are cascaded, the **UNIT_MAX** should be set to the corresponding number, and each unit can be set to enable or disable. After changing the parameters on the master unit, it will be automatically broadcasted to the salve units.

## Correct disposal of this product

This marking indicates that this product should not be disposed with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.



# Service Record

| SERVICE 01 | Date: | SERVICE 02 | Date: |
|---|---|---|---|
| Engineer name: | | Engineer name: | |
| Company name: | | Company name: | |
| Telephone No.: | | Telephone No.: | |
| Operative ID No.: | | Operative ID No.: | |
| Comments: | | Comments: | |
| **SERVICE 03** | **Date:** | **SERVICE 04** | **Date:** |
| Engineer name: | | Engineer name: | |
| Company name: | | Company name: | |
| Telephone No.: | | Telephone No.: | |
| Operative ID No.: | | Operative ID No.: | |
| Comments: | | Comments: | |
| **SERVICE 05** | **Date:** | **SERVICE 06** | **Date:** |
| Engineer name: | | Engineer name: | |
| Company name: | | Company name: | |
| Telephone No.: | | Telephone No.: | |
| Operative ID No.: | | Operative ID No.: | |
| Comments: | | Comments: | |
| **SERVICE 07** | **Date:** | **SERVICE 08** | **Date:** |
| Engineer name: | | Engineer name: | |
| Company name: | | Company name: | |
| Telephone No.: | | Telephone No.: | |
| Operative ID No.: | | Operative ID No.: | |
| Comments: | | Comments: | |

# Warranty Registration

Please visit the website: https://www.solaxcloud.com/user-center/ to complete the warranty registration. For more detailed warranty terms, please visit SolaX official website: www.solaxpower.com.



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