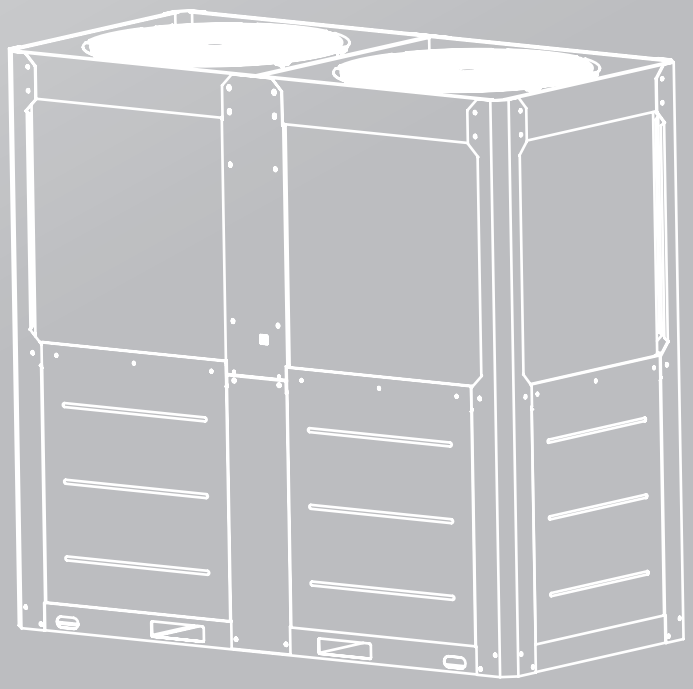
INSTALLATION MANUAL

DC INVERTER AQUA THERMAL
R290



IMPORTANT NOTE:
Original instructions.
Please read this manual carefully and keep it for future reference.
All the pictures in this manual are for illustrations purpose only.

CONTENTS

1 SAFETY PRECAUTIONS

Observe the basic safety regulations before starting work and operation.

⚠ DANGER

It indicates a hazard with a high level of risk which, if not avoided, will result in serious injury.

⚠ WARNING

It indicates a hazard with a medium level of risk which, if not avoided, could result in serious injury.

⚠ CAUTION

It indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

NOTE

Additional information.

Target group

⚠ DANGER

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. These heating contractors must be trained in accordance with EN 378 Part 4 or IEC 60335-2-40, Section HH. The certificate of competence from an industry accredited body is required.

• Brazing/soldering work on the refrigerant circuit may only be carried out by personnel certified in accordance with ISO 13585 and AD 2000, Datasheet HP 100R. And only contractors qualified and certified for the processes can perform brazing/soldering work. The work must fall within the range of applications purchased and be carried out in accordance with the prescribed procedures.Soldering/brazing work on accumulator connections requires certification of personnel and processes by a notified body according to the Pressure Equipment Directive (2014/68/EU).

• Work on electrical equipment may only be carried out by a qualified electrician.

• Before initial commissioning, all safety-related points must be checked by the particular certified heating contractors. The system must be commissioned by the system installer or a qualified person authorized by the installer.

Safety precaution about the appliances using flammable refrigerant

⚠ WARNING

• The following precautions should be complied with when installation, service, maintenance and repair, and decommissioning of appliances using flammable refrigerant.

General

This appliance employed A3 flammable refrigerant R290. The appliance shall be stored so as to prevent mechanical damage from occurring.This appliance employed A3 flammable refrigerant R290.

Symbols

	WARNING	this symbol shows that this appliance used a flammable refrigerant. If the refrigerant is leaked and exposed to an external ignition source, there is a risk of fire.
	CAUTION	this symbol shows that the manual should be read carefully.
	CAUTION	this symbol shows that only a competent service personnel should be handling this equipment with reference to the technical manual.
	CAUTION	this symbol shows that information is available such as the operating manual or installation manual.

⚠ WARNING

• Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

• The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).

• Do not pierce or burn.

• Be aware that refrigerants might not contain an odour.

Installation

① **Qualification of workers**

⚠ WARNING

Refer to Target group described in chapter 1 SAFETY PRECAUTION.

Every working procedure that affects safety means shall only be carried out by competent persons.

Examples for such working procedures are:

- breaking into the refrigerating circuit;
- opening of sealed components;
- opening of ventilated enclosures.

② **General**

⚠ WARNING

• Protection devices, piping and fittings shall be protected as far as possible against adverse environmental effects, for example the danger of water collecting and freezing in relief pipes or the accumulation of dirt and debris;

• Provision shall be made for expansion and contraction of long runs of piping;

• Piping in refrigerating systems shall be so designed and installed as to minimize the likelihood of hydraulic shock damaging the system;

• Steel pipes and components shall be protected against corrosion with a rustproof coating before applying any insulation;

Information on servicing

① General

⚠ CAUTION

Servicing shall be performed only as recommended by the manufacturer.

② 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, Clause 4.3 to Clause 4.7 shall be completed prior to conducting work on the system.

③ 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.

④ 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.

⑤ 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 toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

⑥ Presence of fire extinguisher

If any hot work is to be conducted on the refrigerating equipment or any associated parts,
appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

⑦ No ignition sources

No person carrying out work in relation to a refrigerating system which involves exposing any pipe work shall use any sources of ignition in such a manner that it can 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 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.

⑧ 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.

⑨ Checks to the refrigerating 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 refrigerant charge 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;
– refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which can 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.

⑩ 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.

Sealed electrical components

⚠ WARNING

Sealed electrical components shall not be repaired.

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 aging or continual vibration from sources such as compressors or fans.

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.
The following leak detection methods are deemed acceptable for all refrigerant systems.
Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity can be inadequate, or can 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 also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine can react with the refrigerant and corrode the copper pipe-work.
NOTE Examples of leak detection methods are
– bubble method,
– fluorescent agent method.
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. Removal of refrigerant shall be according to Clause 8.

⚠ CAUTION

Oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

Refrigerant removal and circuit evacuation

When breaking into the refrigerant circuit to make repairs – or for any other purpose –
conventional procedures shall be used. However, for flammable refrigerants it is important that best practice is followed since flammability is a consideration. The following procedure shall be adhered to:
– safely remove refrigerant following local and national regulations;
– evacuate;
– purge the circuit with inert gas (optional for A2L);
– evacuate (optional for A2L);
– continuously flush with inert gas when using flame to open circuit;
– open the circuit.
The refrigerant charge shall be recovered into the correct recovery cylinders.

⚠ CAUTION

An inert gas, specifically, is dry oxygen free nitrogen(OFN).
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 purging refrigerant systems.
Purging of the refrigerant circuit shall be achieved by breaking the vacuum in the system with inert gas 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. The system shall be vented down to atmospheric pressure to enable work to take place.

⚠ CAUTION

This operation is absolutely vital if brazing operations on the pipework are to take place.

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

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 in an appropriate position according to the instructions.
– Ensure that the refrigerating system is earthed prior to charging the system with refrigerant.
– Label the system when charging is complete (if not already labelled).
– Extreme care shall be taken not to overfill the refrigerating system.
Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. 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.

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 recovered refrigerant. It is essential that electrical power is available before the task is commenced.
1) Become familiar with the equipment and its operation.
2) Isolate system electrically.
3) Before attempting the procedure, ensure that:

a) mechanical handling equipment is available, if required, for handling refrigerant cylinders;
b) all personal protective equipment is available and being used correctly;
c) the recovery process is supervised at all times by a competent person;
d) recovery equipment and cylinders conform to the appropriate standards.
4) Pump down refrigerant system, if possible.
5) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
6) Make sure that the cylinder is situated on the scales before recovery takes place.
7) Start the recovery machine and operate in accordance with instructions.
8) Do not overfill cylinders (no more than 80 % volume liquid charge).
9) Do not exceed the maximum working pressure of the cylinder, even temporarily.
10) 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.
11) Recovered refrigerant shall not be charged into another refrigerating system unless it has been cleaned and checked.

Labelling

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

Recovery

When removing refrigerant from a system, either for servicing or decommissioning, it is required to follow good practice so 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 is 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 the flammable refrigerant. Consult manufacturer if in doubt. 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.
The recovered refrigerant shall be processed according to local legislation 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 compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. Draining of oil from a system shall be carried out safely.
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 compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. Draining of oil from a system shall be carried out safely.

Intended use

There is a risk of injury to the user or others, or of damage to the product and other property in the event of improper or unintended use.
The product is the outdoor unit of an air-to-water heat pump with monoblock design.
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 only intended for outdoor installation.
The product is intended exclusively for domestic use, which means that 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 there is machinery which emits massive electromagnetic waves. Enormous electromagnetic waves can disturb the control of the system and cause equipment malfunction.
• 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 voltage fluctuates a lot, such as a location in a factory.
• In vehicles or vessels.
• Where acidic or alkaline vapors are present.
Intended use includes the following:
• Observance of the operating instructions included for the product and any other installation components.
• Compliance with all inspection and maintenance conditions listed in the instructions.
• Installing and setting up the product in accordance with the product and system approval.

• Installation, commissioning, inspection, maintenance and troubleshooting by qualified contractors and authorized installers.
Intended use also covers installation in accordance with the IP code.
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 provided that they have been given supervision or instruction concerning the use of the appliance in a safe way and understand the hazards involved. Children should not play with the appliance. Cleaning and maintenance should not be made by children without supervision
Any other use that is not specified in these instructions, or use beyond that specified in this document, should be considered as improper use. Any direct commercial or industrial use is also deemed to be improper.

⚠ 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.

Regulations to be observed

• National installation regulations.
• Statutory regulations for the prevention of accidents.
• Statutory regulations for environmental protection.
• Statutory requirements for pressure equipment: Pressure Equipment Directive 2014/68/EU.
• Codes of practice of the relevant trade associations.
• Relevant country-specific safety regulations.
• Applicable regulations and guidelines for operation, service, maintenance, repair and safety of cooling, air conditioning and heat pump systems containing flammable and explosive refrigerant.

Safety instructions for working on the system

The outdoor unit contains flammable refrigerant R290 (propane C3H8). In case of a leak, the escaping refrigerant may form a flammable or explosive atmosphere in the ambient air. A safety zone is defined in the immediate vicinity of the outdoor unit, in which special rules apply when work is performed on the appliance. See section "Safety zone".

Working in the safety zone

⚠ DANGER

Risk of explosion: Refrigerant leak may form a flammable or explosive atmosphere in the ambient air.
• Take the following measures to prevent fire and explosion in the safety zone:
• Keep ignition sources away, including naked flames, plug sockets, hot surfaces, light switches, lamps, electrical devices not free of ignition sources, mobile devices with integrated batteries (such as mobile phones and fitness watches).
• Do not use any sprays or other combustible gases in the safety zone.

⚠ CAUTION

Permissible tools: All tools for working in the safety zone must be designed and explosion-protected in accordance with the applicable standards and regulations for refrigerant in safety groups A2L and A3, such as brushless machines (cordless disposal containers, installation aids, and screwdrivers), extraction equipment, vacuum pumps, conductive hoses, and mechanical tools of non-sparking material.

⚠ CAUTION

The tools must also be suitable for the pressure ranges in use. Tools must be in perfect maintenance conditions.
• The electrical equipment must meet the requirements for areas at risk of explosion, zone 2.
• Do not use flammable materials such as sprays or other flammable gases.
• Before starting work, discharge static electricity by touching earthed objects, such as heating or water pipes.
• Do not remove, block or bridge safety equipment.
• Do not make any changes: Do not modify the outdoor unit, inlet/ outlet lines, electrical connections/ cables or the surroundings. Do not remove any components or seals.

Working on the system

Switch off the power supply for the unit (including all affiliated parts) at a separate fuse or mains isolator. Check and ensure that the system is no longer live.

⚠ CAUTION

In addition to the control circuit there may be several power circuits.

⚠ DANGER

Contact with live components can result in severe injuries. Some components on PCBs remain live even after the power supply has been switched off. Prior to removing covers from the appliances, wait at least 4 minutes until the voltage has completely dropped out.
• Safeguard the system against re-connection.
• 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.

⚠ DANGER

Hot surfaces and fluids can result in burns or scalding. Cold surfaces may cause frostbite.
• Prior to servicing or maintenance tasks, switch off and allow the equipment to cool down or warm up.
• Do not touch hot or cold surfaces on the appliance, fittings or pipework.

NOTE

Electronic assemblies can be damaged by electrostatic discharge. Before beginning work, touch earthed objects, such as heating or water pipes, to discharge any static.

Safety work area and temporary flammability zones.

⚠ CAUTION

When working on systems using flammable refrigerants, the technician should consider certain locations as “temporary flammable zones”. These are normally regions where at least some emission of refrigerant is anticipated to occur during the normal working procedures, such as recovery, charging and evacuation, typically where hoses may be connected or disconnected. The technician should ensure three meters safety working area (radius of the unit) in case of any accidental release of refrigerant that forms a flammable mixture with air.

Working on the refrigerant circuit

R290 refrigerant (propane) is an air displacing, colorless, flammable, odorless gas which forms explosive mixtures with air. Refrigerant drained must be properly disposed of by authorized contractors.
• Perform the following measures before beginning work on the refrigerant circuit:
• Check the refrigerant circuit for leaks.
• Ensure very good ventilation especially in the floor area and maintain this for the duration of the work.
• Secure the area surrounding the work area.
• Inform the following persons of the type of work to be carried out: – All maintenance personnel – All persons in the vicinity of the system.
• Inspect the area immediately around the heat pump for flammable materials and ignition sources: Remove all flammable materials and ignition sources.
• Before, during and after the work, check the surrounding area for escaping refrigerant using an explosion-proof refrigerant detector suitable for R290. This refrigerant detector must not generate any sparks and must be suitably sealed.
• A CO_2 or powder extinguisher must be available in the following cases: – Refrigerant is being drained. – Refrigerant is being topped up. – Soldering or welding work is in progress.
• Display signs prohibiting smoking.

⚠ DANGER

Escaping refrigerant can lead to fires and explosions that result in very serious injuries.
• Do not drill or apply heat to a refrigerant circuit filled with refrigerant.
• Do not operate Schrader valves unless a fill valve or extraction equipment is attached.
• Take measures to prevent electrostatic charge.
• Do not smoke. Avoid naked flames and sparks. Never switch lights or electrical appliances on or off in environments with naked flames or sparks.
• Components that contain or contained refrigerant must be labeled, and stored in well ventilated areas in accordance with the applicable regulations and standards.

⚠ DANGER

Direct contact with liquid or gaseous refrigerant can cause serious damage to health such as frostbite and/or burns. There is a risk of asphyxiation if liquid or gaseous refrigerant is breathed in.
• Prevent direct contact with liquid or gaseous refrigerant.
• Wear personal protective equipment when handling liquid or gaseous refrigerant.
• Never breathe in any refrigerant vapor.

⚠ DANGER

Refrigerant is under pressure: Mechanical loading of lines and components can cause leaks in the refrigerant circuit. Do not apply loads to the lines or components, such as supporting or placing tools.

⚠ DANGER

Hot or cold metallic surfaces of the refrigerant circuit may cause burns or frostbite in case of skin contact. Wear personal protective equipment to protect against burns or frostbite.

NOTE

Hydraulic components may freeze during refrigerant removal. Drain heating water from the heat pump beforehand.

⚠ DANGER

Damage to the refrigerant circuit can cause refrigerant to enter the hydraulic system. After completion of the work, vent the hydraulic system correctly. When doing so, ensure the area is sufficiently ventilated.

Installation

General

Be sure to use only specified accessories and parts for installation. Failure to use specified parts may result in water leakage, electric shocks, fires, or the unit falling from its mount.

Install the unit on a foundation that can withstand its weight. Insufficient physical strength may cause the unit to fall and possible injury.

Perform specified installation work with full consideration of strong wind, hurricanes, or earthquakes. Improper installation may result in accidents due to equipment falling.

Earth the unit and install a ground fault circuit interrupter in accordance with local regulations. Operating the unit without a proper ground fault circuit interrupter may cause electric shocks and fires.

Install the power cable at least 3 feet (1 meter) away from televisions or radios to prevent interference or noise. (Depending on the radio waves, a distance of 3 feet (1 meter) may not be sufficient to eliminate the noise.)

Any damaged power cord must be replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid a hazard.

⚠ CAUTION

Do not install any air vent valve in the indoor side. Make sure the outlet of the indoor safety valve leads to the outdoor side.
Two situations should be considered for outdoor installations to prevent damage to the system, releases, and undesirable consequences:
• Where the equipment is located in an area accessible by members of the public, and.
• Where the equipment is located in a restricted area, with access to authorized persons only.

⚠ DANGER

Open flames, fires, open ignition sources and smoking are prohibited.

⚠ DANGER

Inflammable matters are prohibited.

Frost protection

⚠ CAUTION

Freezing can cause damage to the heat pump.
• Thermally insulate all the hydraulic lines.
• Antifreeze can be filled in the secondary circuit in accordance with local regulations and standards.

Connecting cables

⚠ DANGER

With short electrical cables, should there be leakage in the refrigerant circuit, gaseous refrigerant may reach the inside of the building. Min. length of the electrical connecting cables between the indoor and the outdoor unit: 3 m.

Repair work

⚠ CAUTION

Repairing components that fulfil a safety function can compromise the safe operation of the system.
• Replace faulty components only with genuine spare parts from the manufacturer.
• Do not undertake any repairs on the inverter. Replace the inverter if there is a defect.
• Repair work should not be performed in the field. Repair the unit in a specified location.

Auxiliary components, spare and wearing parts

⚠ CAUTION

Spare and wearing parts that have not been tested together with the system can compromise the function of the system. Installing non-authorized components and making non-approved modifications or conversions can compromise the safety and may invalidate our warranty. Only use original spare parts supplied or approved by the manufacturer for replacement.

Safety instructions for operating the system

What to do if refrigerant leaks

⚠ WARNING

To avoid potential risk from refrigerant leak, always keep 2 meters away from the unit, especially for kids, no matter the unit is in operation or not.

⚠ DANGER

Refrigerant leak can lead to fires and explosions that result in very serious injuries. Breathing in refrigerant may cause asphyxiation.
• Ensure very good ventilation especially in the floor area of the outdoor unit.
• Do not smoke. Avoid naked flames and sparks. Never switch lights or electrical appliances on or off in environments with naked flames or sparks.
• Evacuate any people from the dangerous zone.
• From a safe position, switch off the power supply for all system components.
• Remove ignition sources from the dangerous zone.
• The system user should know that no ignition source may be brought into the dangerous zone during the repair.
• Repair work must be carried out by an authorized contractor.
• Do not recommission the system until it is repaired.

⚠ CAUTION

Direct contact with liquid or gaseous refrigerant can cause serious damage to health, e.g. frostbite and/or burns. Breathing in liquid or gaseous refrigerant may cause asphyxiation.
• Prevent direct contact with liquid or gaseous refrigerant.
• Never breathe in refrigerant vapors.

What to do if water leaks

⚠ DANGER

If water leaks from the appliance, an electric shock may occur. Switch off the heating system at the external isolator (e.g. fuse box, domestic distribution board).

⚠ CAUTION

If water leaks from the appliance, scalding may occur. Never touch hot water.

What to do if the outdoor unit ices up

⚠ CAUTION

A build-up of ice in the condensate pan and in the fan area of the outdoor unit can cause damage to the equipment.
• Do not use mechanical items/aids to remove ice.
• Before using electrical heating appliances, check the refrigerant circuit for leaks with a suitable measuring device. The heating appliance should not be a source of ignition, and must meet the requirements of EN 60335-2-30.
• If ice regularly builds up on the outdoor unit (e.g. in areas where frost and heavy fog occur frequently), install a fan ring heater (accessory) that is suitable for refrigerant R290 and/or an electric ribbon heater in the condensate pan (accessory or factory-fitted device).

Safety instructions for storage of the outdoor unit

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

⚠ DANGER

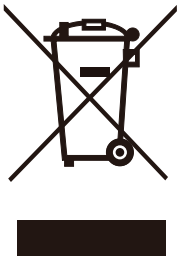
Refrigerant leak can lead to fires and explosions that result in very serious injuries. Breathing in refrigerant may cause asphyxiation. Store the outdoor unit in the following conditions:
• An explosion prevention plan must be in place for storage.
• Ensure the storage location is well ventilated.
• Keep away from ignition sources (avoid exposure to heat and smoking).
• Temperature range for storage: –25 °C to 70 °C
• Only store the outdoor unit in its exfactory protective packaging.
• Protect the outdoor unit against damage.
• The maximum number of outdoor units that may be stored in one place is determined according to local conditions.

⚠ WARNING

A fire with R290 should only be fought with CO2 or dry powder extinguishers.

Disposal

This equipment uses flammable refrigerants. The disposal of the equipment must comply with national regulations.
Do not dispose this product as unsorted municipal waste. Collection of such waste separately for special treatment is necessary.
Do not dispose of electrical appliances as unsorted municipal waste, and use separate collection facilities.
Contact your local government for information regarding the collection systems available.
If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being.



Caution: Risk of fire

2 GENERAL INTRODUCTION

2.1 Documentation

Always observe all the operating and installation instructions included with the system components.
Hand these instructions and all other applicable documents to the end user.
This document is part of a documentation set. The complete set consists of:

Document	Content	Format
Installation Manual (this manual)	Installation instructions	Paper (in the box next to the outdoor unit)
Operation Manual (wired controller)	Quick guide for basic usage	Paper (in the box next to the outdoor unit)
Technical Data Manual	Performance data and ERP information	Paper (in the box next to the outdoor unit)

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2.2 Transportation and storage

NOTE

- Improper transportation may damage the product.
- After storage for more than half a year, the water side heat exchanger should be checked every three months for leakage.

⚠ CAUTION

- Do not store near heat sources or in direct sunlight.
- No open storage.
- No fire source, high temperature equipment and pressurized gas tanks are allowed to approach to prevent personal injury caused by explosion at high temperature.
- This product should be stored at room temperature.

2.3 Arrival and unboxing

NOTE

- After receiving the machine, please check the machine for transportation damage. If any damage is found, it should be reported to the transport company immediately in writing.
- After receiving the machine, please check whether the model, specification and quantity of the equipment are consistent with the contract; When unpacking, please take good care of the instructions and count the attachments.
  In case of problems, please contact your local supplier.
- We will not be responsible for any modification of the equipment without our written consent.

2.4 Dimensional (unit:mm)

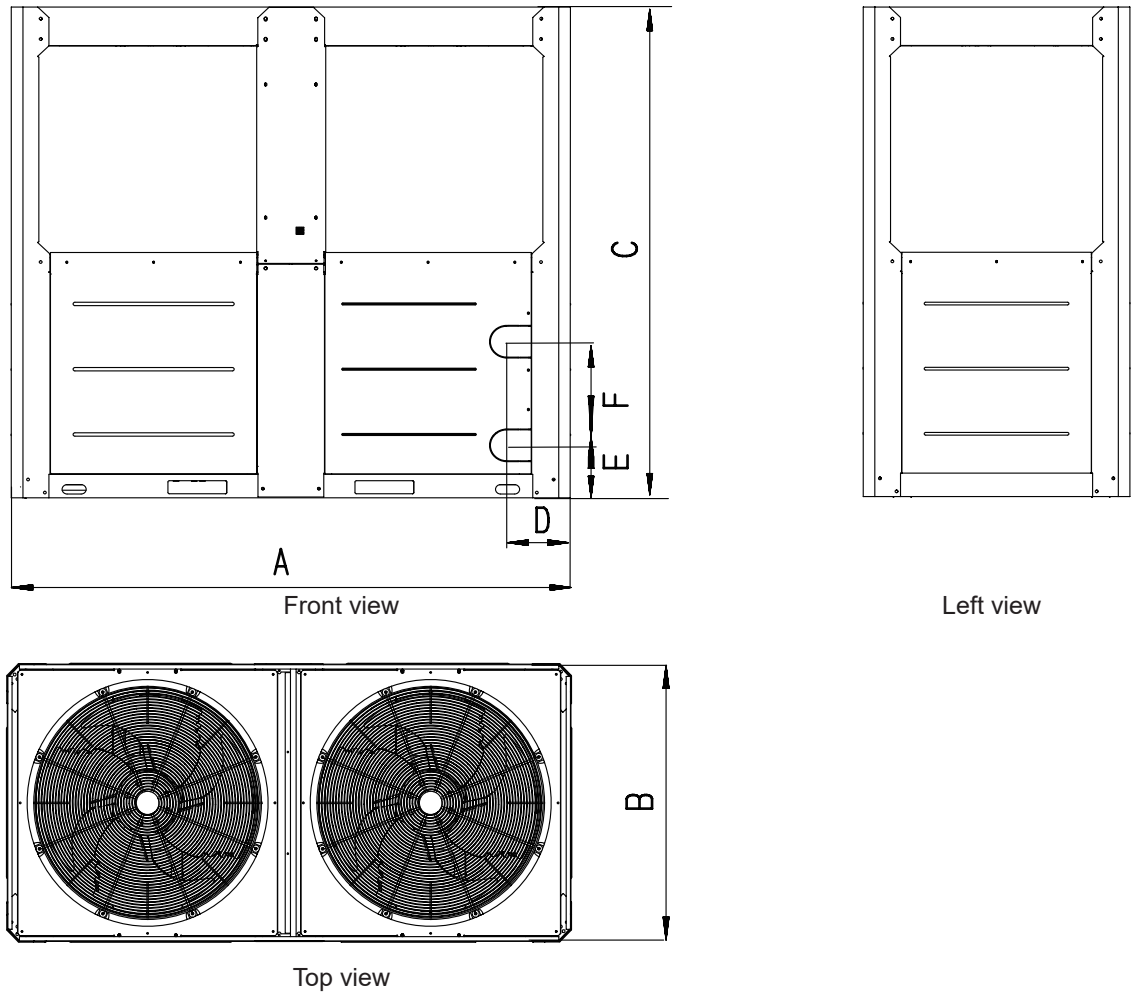


Fig. 2-1 Outline dimensional

Table 2-1

Model	50/60/70kW
A	2 000
B	960
C	1 870
D	226
E	200
F	397

NOTE

After installing the spring damper, the total height of the unit will increase by 135 mm approximately.

2.5 Main parts of the uint

Table 2-2

NO.	NAME	NO.	NAME
1	Air outlet	6	Condenser
2	Top cover	7	Water outlet
3	Electric control box	8	Air inlet
4	Compressor	9	Water intlet
5	Evaporator	10	wired controller (It can be placed indoors)

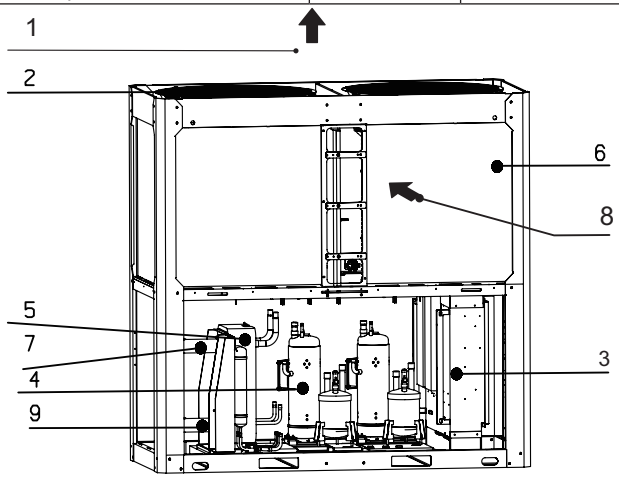


Fig. 2-2 Main parts of 50/60/70kW

2.6 Opening the uint

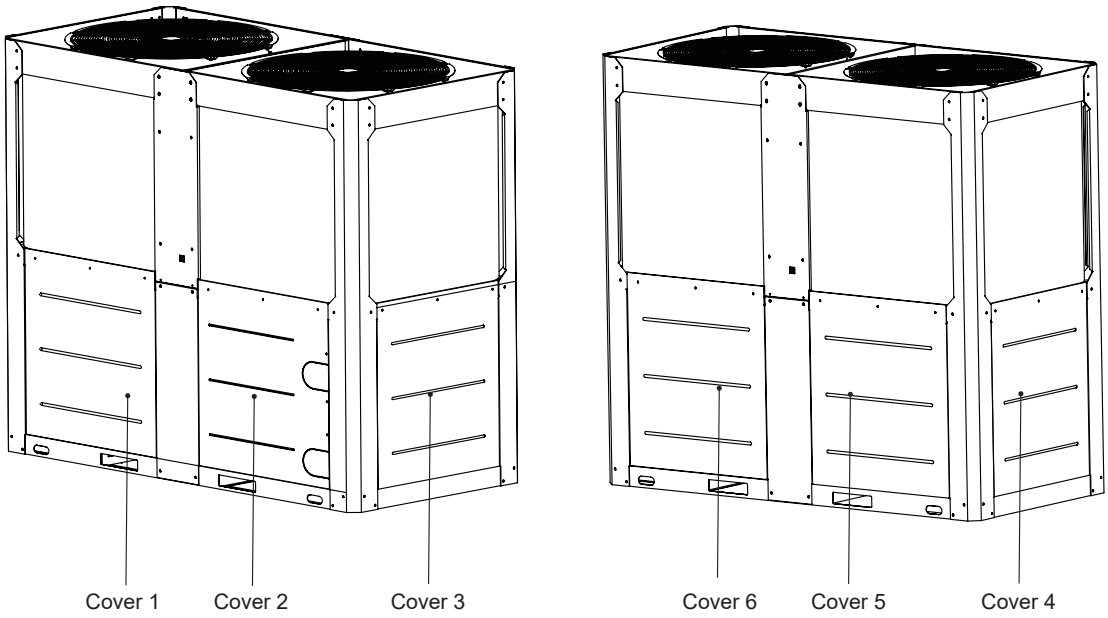


Fig. 2-3 Doors of 50/60/70kW

Cover 1/2/3 give access to the compartment of water pipes and water side heat exchanger.
Cover 4 give access to the electrical parts.
Cover 5/6 give access to the hydraulic compartment.

2.7 Operating range

1) The standard voltage of power supply is 380-415 V 3N~ 50 Hz, the minimum allowable voltage is 342 V, and the maximum voltage is 456 V.
2) To maintain better performance, please operate the unit under the following outdoor temperature:

50/60/70 kw
COOLING

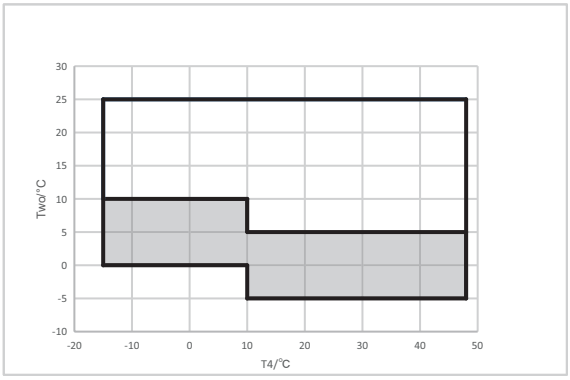


Fig. 2-4-1 Cooling operating range

50/60/70 kw
HEATING

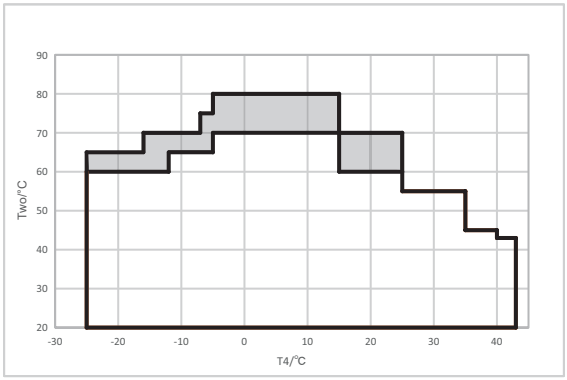


Fig. 2-4-2 Heating operating range

50/60/70 kw
DHW

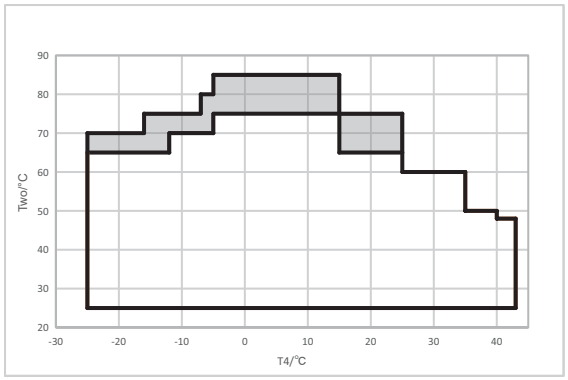


Fig. 2-4-3 DHW operating range

3) Cooling
I f the unit is operating in a the temperature range with shadow, the antifreeze system must be used instead of the water system,and the antifreeze (especially the glycol solution) must meet the following two requirements at the same time:
① Volume concentration ≥30%;
② The freezing point temperature of antifreeze < the coldest temperature at the using site - 5.5 °C .Otherwise, the water side pipes and heat exchanger may be frozen!
Tsafe is set to -5 °C in the low water output control in service menu of the wired controller, allowing the unit to enter the cooling low water output mode control to obtain water output below 5 °C.
When switching from the antifreeze system to the water system, the Tsafe must be changed to 5 °C to avoid freezing of the water side pipes and heat exchanger!

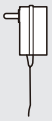
4) Heating
If the unit is operating in the temperature range with shadow, the dial code S1-2 needs to be set to ON.The frequency conversion water pump needs to be matched, and the minimum water flow of the water pump should be able to be as low as 1.8 m^3/h.

NOTE

- It is recommended to customize the centralized drainage module if operating under ambient temperature -15 °C.

2.8 Accesssories

Table 2-3

Unit	Installation Manual	Temperature testing components of total water outlet	Transformer	Installation manual of wired controller	Water Temperature Sensor	Wired Controi ler	Ferrite core	Tie wrap
Quantity	1	1	1	1	1	1	1	7
Shape								
Purpose	/	Use for installation (only need for setting the main module)						

2.9 Handling of the unit

The angle of inclination should not be more than 15º when carrying the unit in case of overturn of the unit.
1) Rolling handling: several rolling rods of the same size are placed under the base of the unit, and the length of each rod must be more than the outer frame of the base and suitable for balancing of the unit.
2) Lifting: each lifting rope (belt) should be able to bear 4 times the weight of the unit. Check the lifting hook and ensure that it is firmly attached to the unit. To avoid damages to the unit, a protective block made of wood , cloth or hard paper should be placed between the unit and rope when lifting, and its thickness should be 50 mm or more. It is strictly forbidden to stand under the machine when it is hoisted.

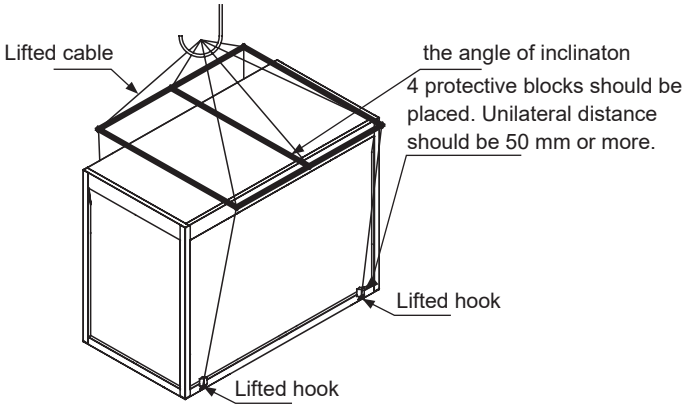


Fig. 2-5 lifting of the unit

3 IMPORTANT INFORMATION ON REFRIGERANT

This product contains fluorinated greenhouse gases covered by the Kyoto Protocol. Do not vent gases into the atmosphere.
Refrigerant type: R290
GWP value: 3
GWP : global warming potential
The refrigerant volume is indicated on the unit nameplate

- Add the refrigerant
  Amount of the refrigerant and tonnes CO2 Equivalent is

Table 3-1

Model	Tota(A+B) refrigerant(kg)	A system refrigerant(kg)	B system refrigerant(kg)	Tonnes CO_2 equivalent
50/60/70 kW	5.6	2.8	2.8	0.0168

4 SELECTION OF INSTALLATION SITE

4.1 Installation site

1) Units can be installed on the ground or proper place on a roof, provided that sufficient ventilation can be guaranteed.
2) Do not install the unit in a scenario with requirements on noise and vibration.
3) When installing the unit, take measures to avoid exposure to direct sunlight, and keep the unit away from boiler pipeline and surroundings which might corrode the condenser coil and copper pipes.
4) If the unit can be achieved by unauthorized personnel, take protective measures for safety considerations, such as installing a fence. These measures can prevent man-caused or accidental injuries, and can also prevent the electrical parts in operation from being exposed when the main control box is opened.
5) Install the unit on a foundation at least 200 mm high above the ground, where the floor drain is needed, to ensure that no water accumulate.
6) If installing the unit on the ground, put the steel base of the unit on the concrete foundation, which must be as deep as into the solid soil layer. Ensure the installation foundation is separated from buildings, as the noises and vibration of the unit may adversely affect the latter. By means of the installation holes on the unit base, the unit can be fastened on the foundation reliability.
7) If the unit is installed on a roof, the roof must be strong enough to bear the weight of the unit and the weight of maintenance personnel. The unit can be placed on the concrete and groove-shaped steel frame, similar to the case when the unit is installed on the ground. The weight-bearing groove-shaped steel must match the installation holes of the shock absorber and is wide enough to accommodate the shock absorber.
8) For other special requirements for installation, please consult the building contractor, architectural designer or other professionals.

NOTE

The selected installation site of the unit should facilitate connection of water pipes and wires, and be free from water inlet of oil fume, steam or other heat sources. Besides, the noise of the unit and discharge air should not influence the surrounding environment.

4.2 Requirements of arrangement space of the unit

1) To ensure adequate airflow entering the condenser, the influence of descending airflow caused by the high-rise buildings around upon the unit should be taken into account when installing the unit.
2) If the unit is installed where the flowing speed of air is high, such as on the exposed roof, the measures including sunk fence and Persian blinds can be taken, to prevent the turbulent flow from disturbing the air entering the unit. If the unit needs to be provided with sunk fence, the height of the latter should not be more than that of the former; if Persian blinds are required, the total loss of static pressure should be less than the static pressure outside the fan. The space between the unit and sunk fence or Persian blinds should also meet the requirement.
3) If the unit needs to operate in winter, and the installation site may be covered by snow, the unit should be located higher than the snow surface, to ensure that air flows through the coils smoothy.

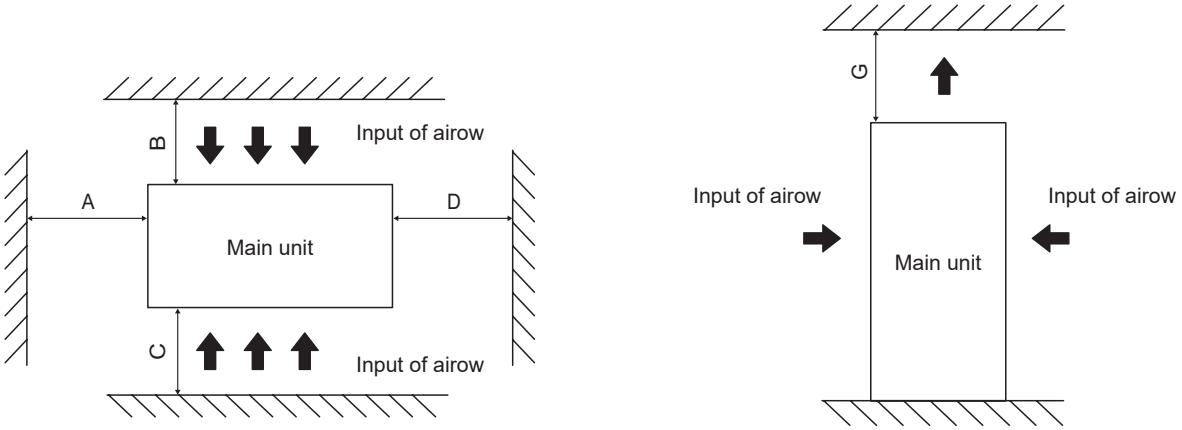


Fig. 4-1 single unit installstion

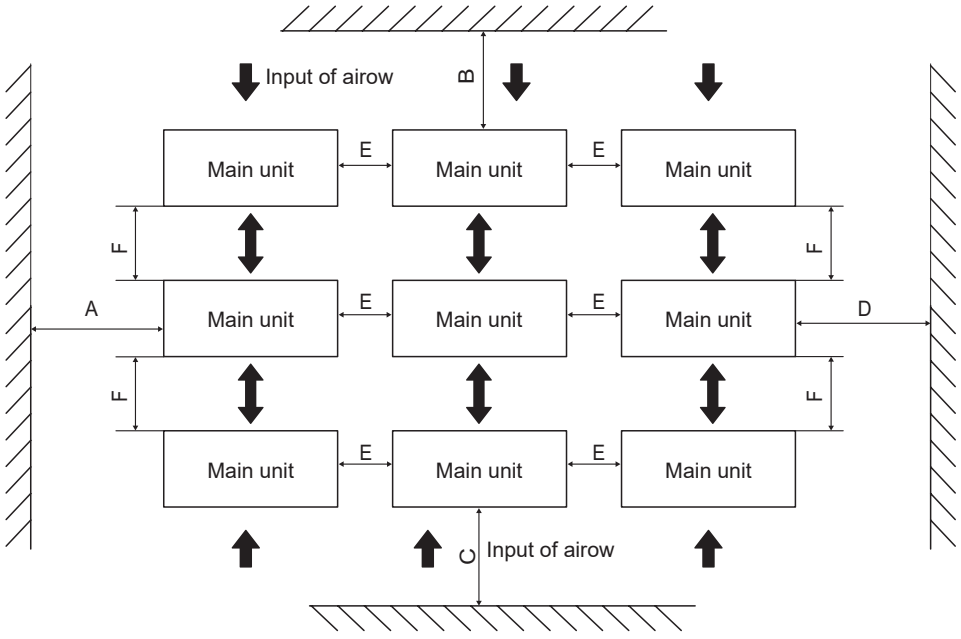


Fig. 4-2 multiple units installstion

Table 4-1

Installation space (mm)			
A	≥1 500	E	≥800
B	≥1 500	F	≥1 100
C	≥1 500	G	≥3 000
D	≥1 500	/	/

⚠ WARNING

When the number of units installed in the same place is greater than 40 units, please contact professionals to confirm the installation method.

4.3 Installation foundation

4.3.1 Base structure

Outdoor unit base structure design should take account of the following considerations:
1) A solid base prevents excess vibration and noise. Outdoor unit bases should be constructed on solid ground or on structures of sufficient strength to support the units' weight.
2) Bases should be at least 200 mm high to provide sufficient access for installation of piping.Snow protection should also be considered for the base height.
3) Either steel or concrete bases may be suitable.
4) A typical concrete base design is shown in Fig. 4-3. A typical concrete specification is 1 part cement, 2 parts sand and 4 parts crushed stone with steel reinforcing bar. The edges of the base should be chamfered.
5) To ensure that all contact points are equally secure, bases should be completely level. Base design should ensure that the points on the units' bases designed for weight-bearing support are fully supported.

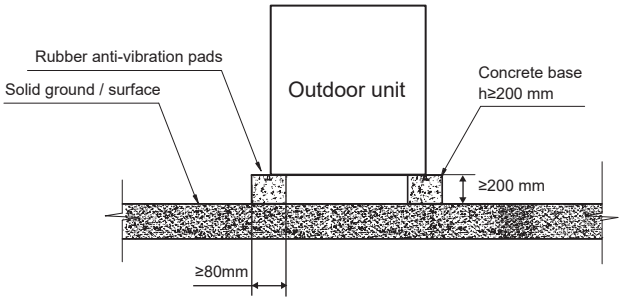


Fig.4-3 Front view of base structure

4.3.2 Location drawing of installation foundation of the unit: (unit: mm)

1) If the unit is located so high that it is inconvenient for maintenance personnel to conduct maintenance, the suitable scaffold can be provided around the unit.
2) The scaffold must be able to bear the weight of maintenance personnel and maintenance facilities.
3) The bottom frame of the unit is not allowed to be embedded into the concrete of installation foundation.
4) A drainage ditch should be provided to allow drainage of condensate that may form on the heat exchangers when the units are running in heating mode. The drainage should ensure that condensate is directed away from roadways and footpaths, especially in locations where the climate is such that condensate may freeze.

(unit: mm)

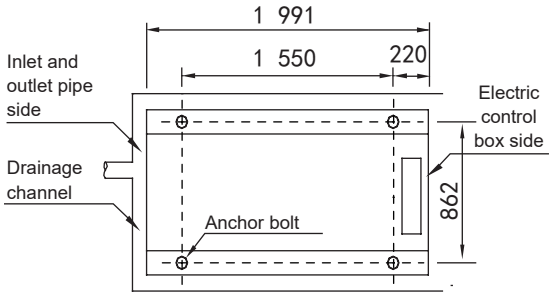


Fig. 4-4 Top view of schematic diagram of installation dimension of 50/60/70 kW

(unit: mm)

4.4 Installation of damping devices

4.4.1 Damping devices must be provided between the unit and its foundation.

By means of the Φ15mm diameter installation holes on the steel frame of the unit base, the unit can be fastened on the foundation through the spring damper. See Fig.4-4 (Schematic diagram of installation dimension of the unit) for details about center distance of the installation holes. The damper does not go with the unit, and the user can select the damper according to the relevant requirements. When the unit is installed on the high roof or the area sensitive to vibration, please consult the relevant persons before selecting the damper.

4.4.2 Installation steps of the damper

Step 1. Make sure that the flatness of the concrete foundation is within ±3 mm, and then place the unit on the cushion block.
Step 2. Raise the unit to the height suitable for installation of the damping device.
Step 3. Remove the clamp nuts of the damper. Place the unit on the damper, and align the fixing bolt holes of the damper with the fixing holes on the unit base.
Step 4. Return the clamp nuts of the damper to the fixing holes on the unit base, and tighten them into the damper.
Step 5. Adjust the operational height of the damper base, and screw down the leveling bolts. Tighten the bolts by one circle to ensure equal height adjustment variance of the damper.
Step 6. The lock bolts can be tightened after the correct operational height is reached.

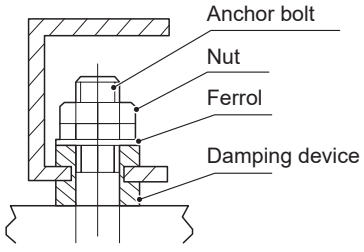
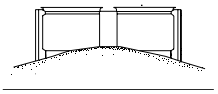


Fig. 4-5 Installation of the damper

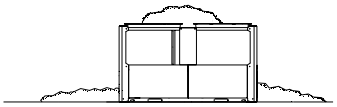
4.5 Installation of device to prevent snow build-up and strong breeze

When installing an air-cooled heat pump in a place with heavy snow, it is necessary to take snow protection measures to ensure trouble-free operation of the equipment. Otherwise, accumulated snow will block the air flow and may cause equipment problems.

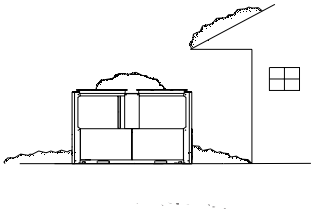
(a) Buried in the snow



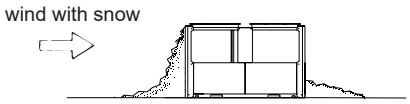
(b) Snow accumulated on the top plate



(c) Snow falling on the equipment



(d) Air inlet blocked by snow



(e) Equipment covered with snow

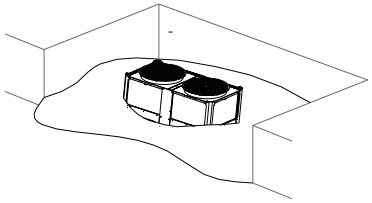


Fig. 4-6 Types of problems caused by snow

4.5.1 Measures used to prevent problems caused by snow

1) Measures to prevent build-up of snow
The base height should be as least the same as the predicted snow depth in the local area.

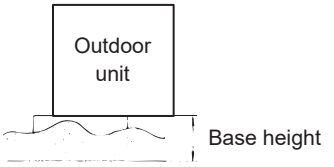


Fig. 4-7 Snow prevention base height

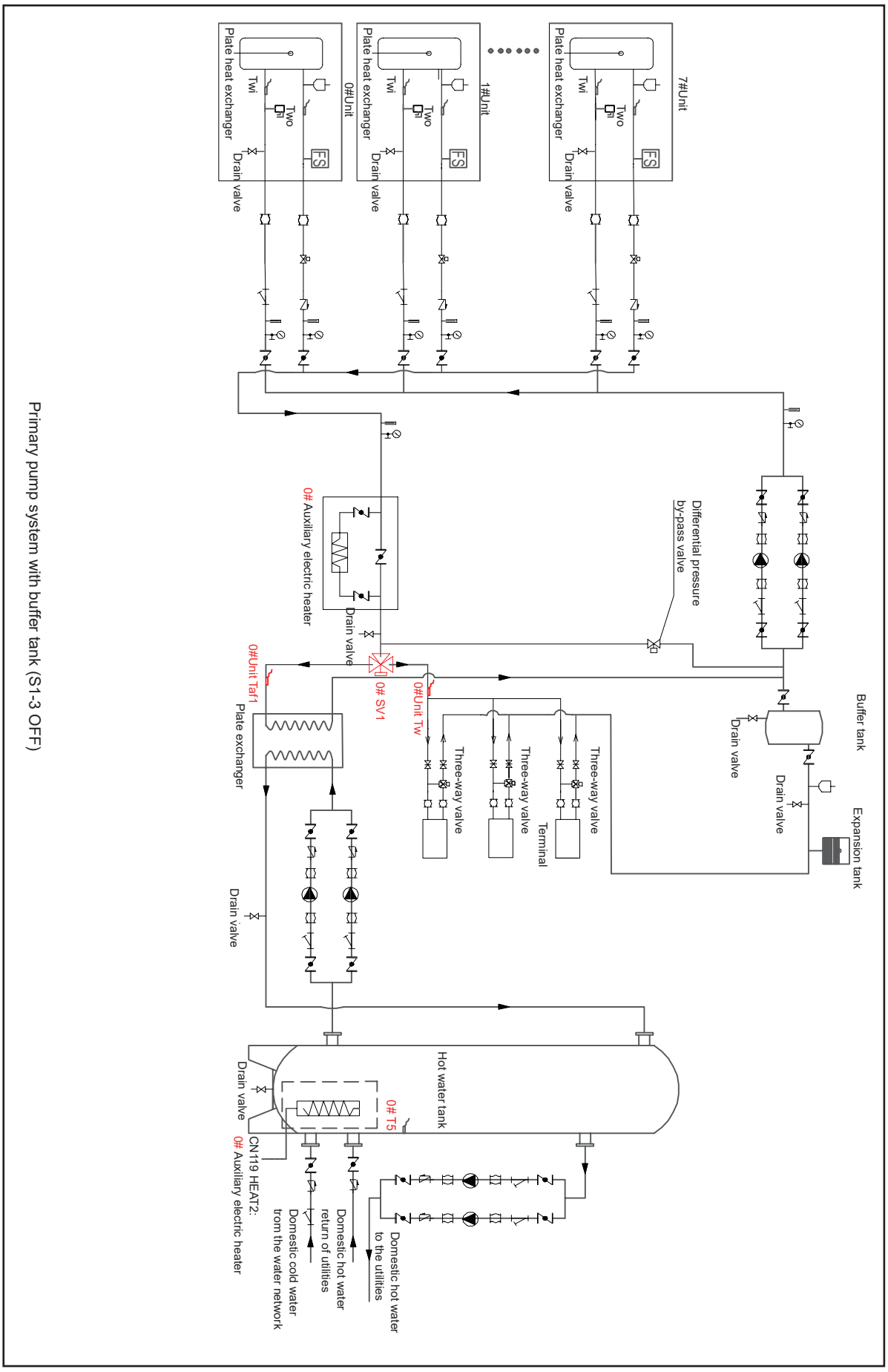
2) Lightning protection and snow protection measures
Check the installation site thoroughly; do not install the equipment under awnings or trees or a place where snow is piled up.

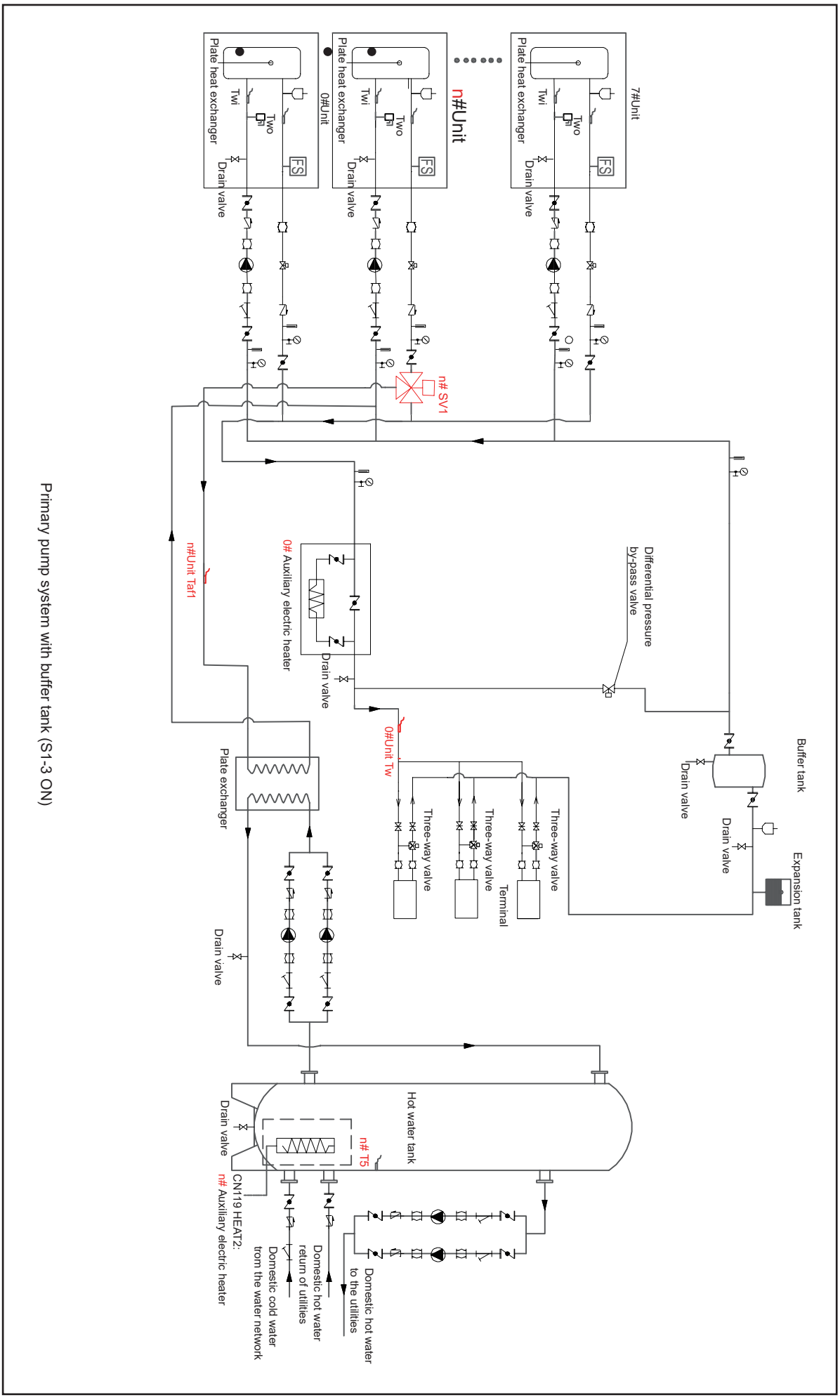
4.5.2 Precautions for designing a snow cover

1) To ensure a sufficient air flow required by the air-cooled heat pump, design a protective cover to make the dust resistance 1 mm H2O or less lower than the allowable external static pressure of air-cooled heat pump chiller.
2) The protective cover must be strong enough to withstand the snow weight and the pressure caused by strong wind and typhoon.
3) The protective cover must not cause short circuit of air discharge and suction.

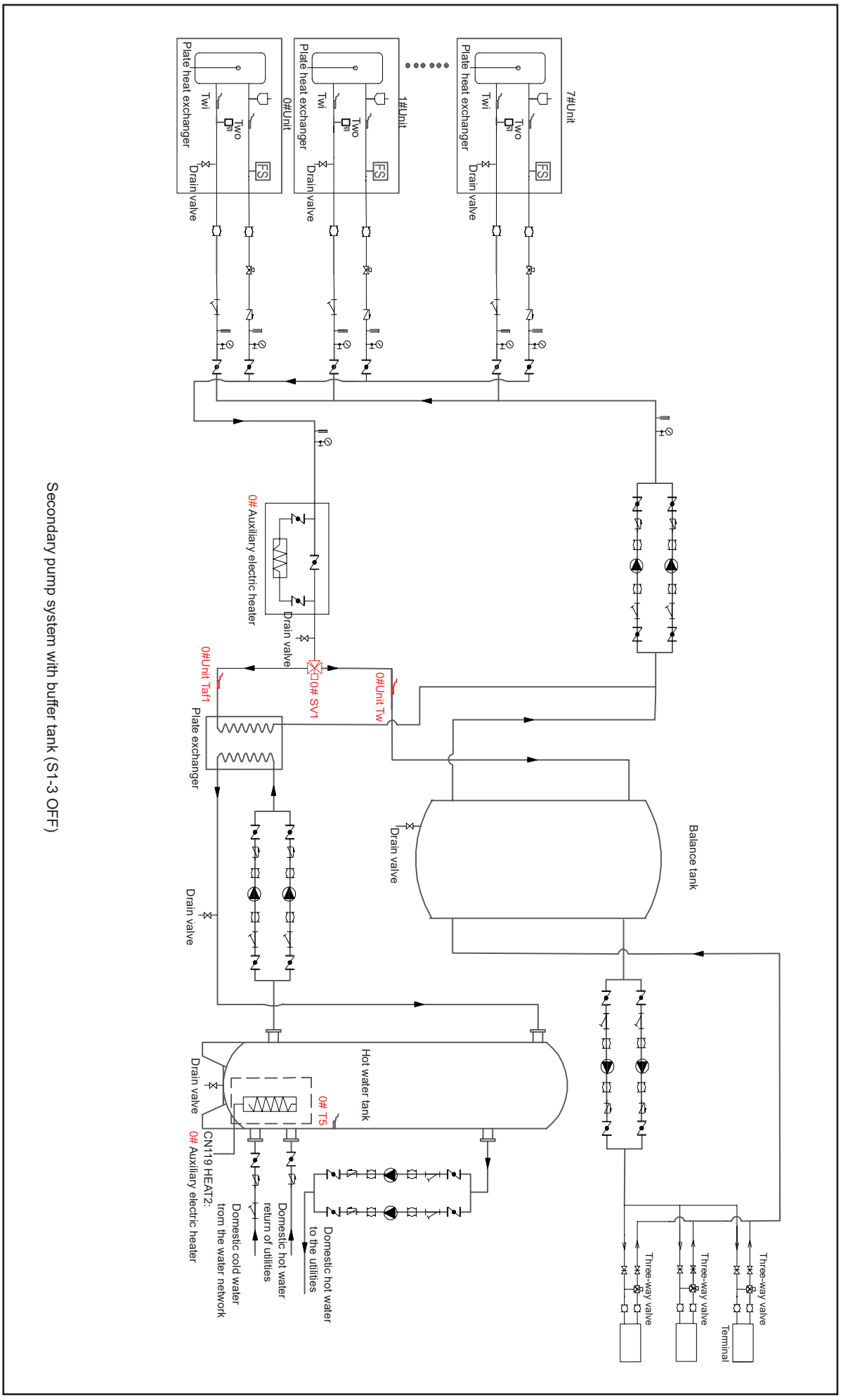
5 HYDRAYLIC INSTALLATION

5.1 Water system diagram

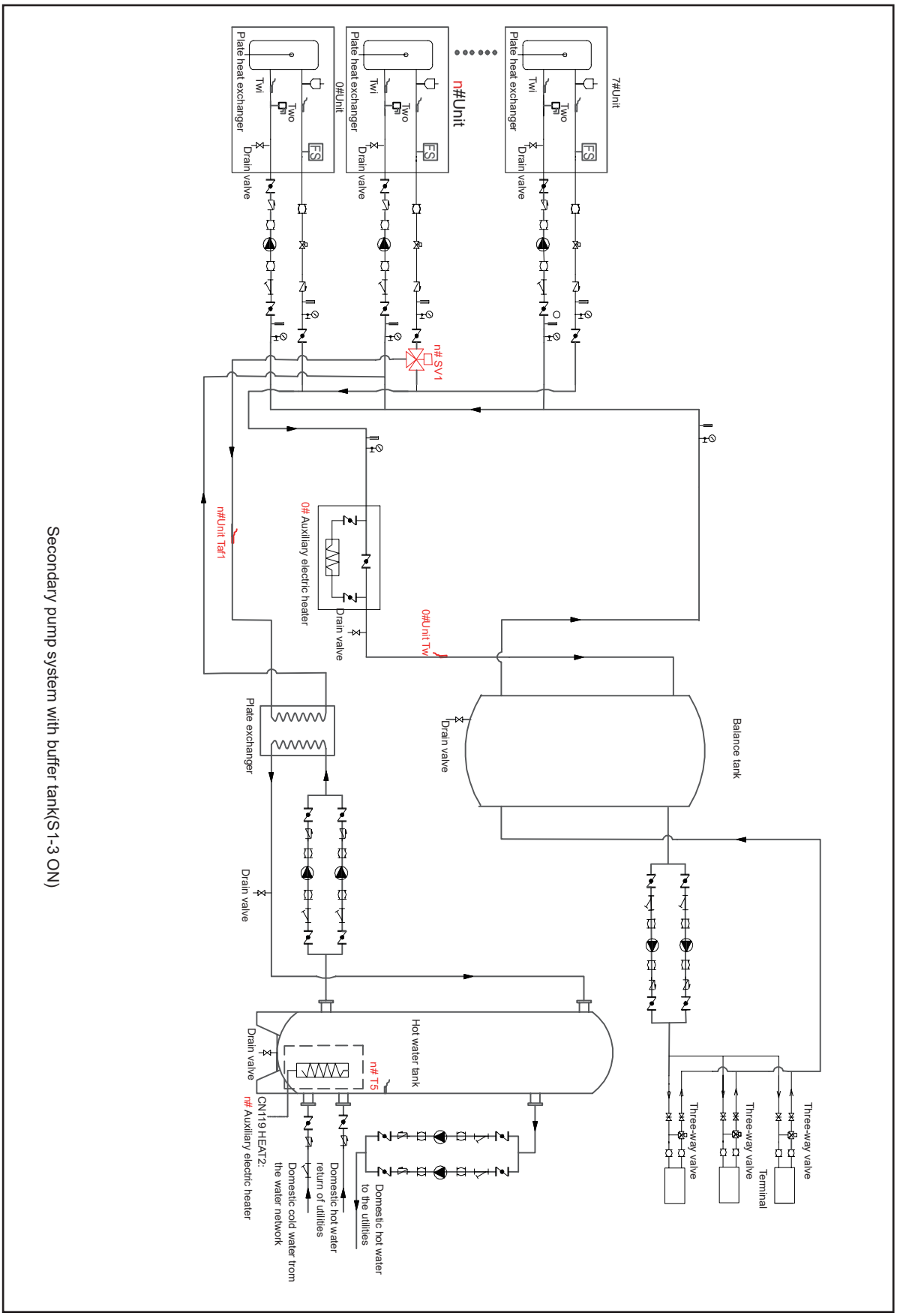




Primary pump system with buffer tank (S1-3 ON)



Secondary pump system with buffer tank (S1-3 OFF)



Water flow switch	Gate valve	Safety valve	Drain valve	Auto vent valve
Soft joint	Water pump	Shut off valve	Temperature sensor	Solenoid three-way valve
Water pressure meter	Check valve	Thermometer	Y-type strainer	

Fig.5-1 Connection drawing of water system

NOTE

The ratio of the two - way valves on the terminal shall not exceed 50 percent.
The main outlet water temperature sensor (Tw) head of the unit at address 0 needs to be placed on the main outlet pipe.
The hot water tank and the hot water exchange pump of the unit use the CN125(220 V) port control switch on the slave board of the 0 # unit, pump output is controlled through CN108(0-10 V).

⚠ CAUTION

To avoid backsiphonage, it is required to install a non-return valve on the water inlet of the domestic hot water tank or water loop in accordance with the applicable legislation.

5.2 Water system installation

5.2.1 Basic requirements of connection of chilled water pipes

⚠ CAUTION

- After the unit is in place, chilled water pipes can be laid.
- The relevant installation regulations should be abided with when conducting connection of water pipes.
- The pipelines should be free of any impurity, and all chilled water pipes must conform to local rules and regulations of pipeline engineering.

Connection requirements of chilled water pipes
a) All chilled water pipelines should be thoroughly flushed, to be free of any impurity, before the unit is operated. Anyimpurity should not be flushed to or into the heat exchanger.
b) Water must enter the heat exchanger through the inlet; otherwise the performance of the unit will decline.
c) The pump installed in the water pipeline system should be equipped with starter. The pump will directly press water into the heat exchanger of the water system.
e) The pipes and their ports must be independently supported but should not be supported on the unit.
f) The pipes and their ports of the heat exchanger should be easy to disassemble for operation and cleaning, as well as inspection of port pipes of the evaporator.
g) The evaporator should be provided with a filter with more than 40 meshes per inch at site. The filter should be installed near to the inlet port as much as possible, and beunder heat preservation.
h) The by-pass pipes and by-pass valves must be mounted for the heat exchanger, to facilitate cleaning of the outside system of water passage before the unit is adjusted. During maintenance, the water passage of the heat exchanger can be cut off without disturbing other heat exchangers.
i) The flexible ports should be adopted between the interface of the heat exchanger and on-site pipeline, to reduce transfer of vibration to the building.
j) To facilitate maintenance, the inlet and outlet pipes should be provided with thermometer or manometer. The unit is not equipped with pressure and temperature instruments, so they need to be purchased by the user.
k) All low positions of the water system should be providedwith drainage ports, to drain water in the evaporator and the system completely; and all high positions should be supplied with discharge valves, to facilitate expelling air from the pipeline. The discharge valves and drainage ports should not be under heat preservation, to facilitate maintenance.
l) All possible water pipes in the system to be chilled should be under heat preservation, including inlet pipes and flanges of the heat exchanger.
m) The outdoor chilled water pipelines should be wrapped with an auxiliary heating belt for heat preservation, and the material of the auxiliary heat belt should be PE, EDPM, etc., with thickness of 20mm, to prevent the pipelines from freezing and thus cracking under low temperature. The power supply of the heating belt should be equipped with an independent fuse.
n) The common outlet pipelines of combined units should be provided with mixing water temperature sensor.

⚠ WARNING

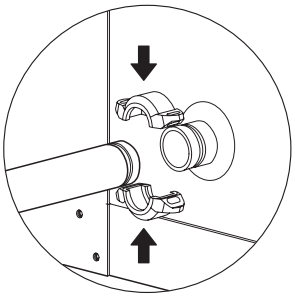
- For the water pipeline network including filters and heat exchangers, dreg or dirt may seriously damages the heat exchangers and water pipes.
- The installation persons or the users must ensure the quality of chilled water, and de-icing salt mixtures and air should be excluded from the water system, since they may oxidize and corrode steel parts inside the heat exchanger.
- When the ambient temperature is lower than 2°C, and the unit will be not used for a long time, water inside the unit should be drained. If the unit is not drained in winter, its power supply should not be cut off, and the fan coils in the water system must be provided with three-way valves, to ensure smooth circulation of the water system when the anti-freezing pump is started up in winter.

5.2.2 Connection mode of pipe

The water inlet and outlet pipes are installed and connected as shown in the following figures. 50/60/70kW model uses hoop connection. For the specifications of the water pipes and screw thread, see the Table 8-6 below.

Table 5-1

Model	Pipe connection methods	Specifications of water pipe
50/60/70 kW	Hoop connection	DN 50



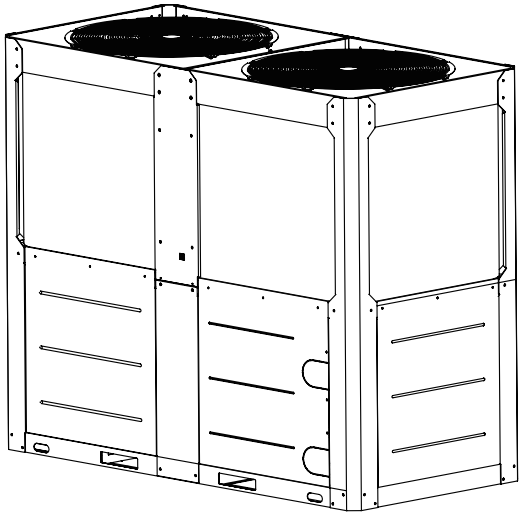


Fig.5-2

5.2.3 Selection of buffer tank

The role of the buffer water tank:
In cooling mode, it prevents frequent opening and stopping of the equipment, thus protecting it.
The buffer water tank serves different purposes depending on whether the system is in cooling or heating mode. In heating mode, it ensures system stability during defrosting and reduces the need for frequent start-stop of the unit under small load conditions.

1) Design calculation method
a. Calculation of defrosting time under heating conditions
The most significant factor affecting the air source heat pump heating system is the defrosting of the winter unit. To ensure thermal stability, the main engine's defrosting time should be limited to 4 minutes during winter operation. Additionally, the water temperature before and after defrosting should not decrease by more than 3°C. The buffer tank's volume should be calculated based on the above data.
Heating conditions, minimum effective water capacity calculation:
$M_H = [Q_h \times H_{min} \times T_H/(C \times \Delta T_H)] / \rho$
Where:
M_H: minimum water capacity of the system, m^3;
Qh: rated heat production of the main engine, kW;
Hmin: coefficient of defrosting ability, %; Generally take: 50%;
ΔT_H : Water temperature drop before and after defrosting,°C; Conventional units generally take 3°C;
C: specific heat gain of water 4.18 kJ/(kg·°C);
ρ : density of water,1000 kg/m^3;
T_H: defrosting time, s; Generally take 240 s:

b. cooling running time calculation method
During the cooling process, avoid frequently opening and stopping the equipment to protect it. Ensure that there is enough water to allow the equipment to run continuously for at least 5 minutes.

Refrigeration conditions, the minimum effective water capacity calculation:
$M_C=[Q_C \times C_A \times C_{min} \times T_C/(C \times \Delta T_C)] / \rho$
Where:
M_C: minimum system water capacity, m^3;
Q_C: cooling rated capacity,kW;
C_A: Capacity coefficient of small load condition: generally: 1.6.
Cmin: the minimum operating capacity ratio of the unit, %; Fixed frequency according to 100%; Frequency conversion unit according to 30%;
ΔT_C: Control temperature range, °C; Factory default 4°C;
C: specific heat gain of water 4.18 kJ/(kg·°C);
ρ: density of water, 1000 kg/m^3;
Tc :cooling operation time, s, generally 300 s;

c. Calculate the system capacity according to the cooling and heating conditions, and take the maximum value;
$M=MA\ X\ (M_H,M_C)$
Single cooling unit takes Mc, single heating unit takes M_H;

d. The effective water capacity of a water system refers to its total capacity, including the main pipeline, water storage tank, and the normally open end of the two-way valve involved in circulation during operation.
$M2 = V \times L$
Where: M2: effective water capacity of water system, m^3;
L: Total length of system pipeline, m;
V: Water capacity m^3 /m per meter pipe length of each model system pipeline.

e. Buffer tank volume refers to the minimum water capacity required to meet the normal operation of the unit:
$Vmin = M – M2$
Vmin - Minimum volume of buffer tank, m^3.

2) Empirical Estimation Method
For renovation projects where the system water capacity cannot be estimated, the volume of the buffer tank can be estimated empirically using the following formula:
$Vmin = Q \times K.$
Here, Vmin represents the minimum volume of the buffer tank in litres.The comfort air conditioning requires 10 L/kW and the process air conditioning requires 15L/kW. The stability of the system water temperature increases with a higher K value.
The main mechanism for heat is measured in kW.

3) Precautions for buffer tank selection:
a. The configuration of the buffer tank depends on the specific project instance. If the water system capacity is large or the end form is in the form of floor heating, the buffer tank should not be added. However, increasing the size of the buffer water tank has several advantages for the system's operation. It helps to avoid frequent opening and stopping of the main engine under small load conditions, prevents defrosting of the main engine, and ensures that there is enough water in the system to meet the unit defrosting requirements. This improves the comfort of the unit. Therefore, it is necessary to comprehensively consider various factors on the site from an investment perspective.

b. There are two methods to calculate the volume of the buffer tank. The results differ, with method 1 being more accurate as it is based on actual operation data analysis. Therefore, it is recommended to use method 1 for actual design and selection. Method 2 is an empirical estimate.

c. When using multiple units in parallel, it is recommended to base the calculation on the maximum capacity of the parallel unit.

⚠ WARNING

Adequate system water capacity is a necessary condition to ensure reliable operation of equipment. Otherwise, it may cause frequent start and stop of the compressor, shorten the service life of the compressor, cause large fluctuations in defrosting water temperature during heating operation, and result in abnormal defrosting. When the water capacity of the accounting system is insufficient, the system must add a buffer water tank to meet the minimum water capacity requirements for equipment operation.

5.2.4 Minimum chilled water flow

The minimum chilled water flow is shown in the table 5-3. If the system flow is less than the minimum unit flow rate, the evaporator flow can be recirculated, as shown in the diagram.
For minimum chilled water flow rate

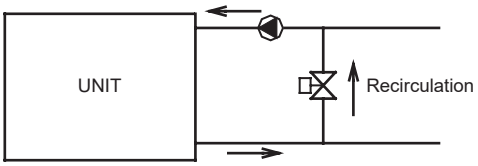


Fig. 5-3

5.2.5 Maximum chilled water flow

The maximum chilled water flow is limited by the permitted pressure drop in the evaporator. It is provided in the table 5-4.
If the system flow is more than the maximum unit flow rate, bypass the evaporator as shown in the diagram to obtain a lower evaporator flow rate.

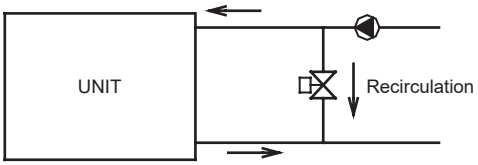


Fig. 5-4

5.2.6 Minimum and Maximum water flow

Table 5-2

Model	Item	Waterflow rate(m^3/h)	
		Maximum	Maximum
50 kW	Normal Temperature Outlet(S1-2=OFF)	9.6	14.4
	High Temperature Outlet(S1-2=ON)	1.8	10.3
60 kW	Normal Temperature Outlet(S1-2=OFF)	9.6	14.4
	High Temperature Outlet(S1-2=ON)	1.8	12.4
70 kW	Normal Temperature Outlet(S1-2=OFF)	9.6	14.4
	High Tempe r a ture Outlet(S1-2=ON)	1.8	14.4

5.2.7 Water Pump Selection and Installation

5.2.7.1 Water Pump Selection Requirements
The external linkage water pump must be controlled by the host logic program and the signal should be linked with the external water pump control cabinet.
The water pump should be installed on the inlet pipe of the unit, and the inlet/outlet pipe diameter of the water pump should be the same as the main water pipe diameter. The inlet and outlet interfaces of the water pump should be connected softly, and the foundation should have vibration damping measures. The pump should be installed outdoors with rain, sun, and frost protection measures.
The selected pump power should meet the required flow/head performance curve at any point and ensure that there are no humps or inflection points in the working area. Standby pumps should be set up, with at least one backup pump, to ensure that the water system remains operational during maintenance and replacement of pumps. The standby pumps should be of the same type as the primary pumps, and no more than three units should be in operation at any given time.
If the head of a pump cannot meet the water pressure requirements at the most unfavorable points, tandem pumps can be used to increase the head while keeping the flow rate constant. If the flow rate of a single pump cannot meet the flow rate requirements at the most unfavorable points, parallel pumps can be used to increase the flow rate of the entire system while maintaining the same pressure at the water pump outlet.
5.2.7.2 Calculation of water pump selection
(1) Flow rate selection calculation
For the primary pump system, the water pump's rated flow rate should be equal to or greater than the unit's rated flow rate. In parallel mode, the water pump's rated flow rate should be equal to or greater than the sum of the rated flow rates of the parallel units.
The secondary pump system requires a host side circulating pump flow (L1) that is equal to or greater than the unit's rated flow. The end user side circulating pump flow (L2) can be calculated using the following formula:
L2= (1.1~1.2) × (Q x 0.86 / Δ T)
L2- circulating water flow m^3/h
Q - Total terminal load kW
ΔT - Temperature difference of inlet and return water at the end °C

(2) Head selection calculation
Primary pump system, pump head: H=H1+H2
On the host side: H1= (h11+h12) x (1.1 to 1.2)
Terminal side: H2= (h21+h22)× (1.1 ~ 1.2)
Where:
h11-- water resistance of main engine, unit: m
h12-- the most unfavorable water pipe resistance on the main engine side, unit: m. Including the sum of water pipe resistance and various valve body resistance;
h21-- end water resistance, unit: m
h22-- the most adverse pipe resistance on the end side, unit: m. Including water pipe resistance and the sum of various valve resistance;

The calculation method for the head of the secondary pump system should take into account the head of the primary pump, the H1 head of the host-side circulating water pump for unit water resistance and piping water resistance, the height difference between the tank and the host, and the open water system. It is recommended that the total head value should not be less than 18 meters. For open systems, the height difference between the tank and the host must be considered when dealing with the user-side circulating water pump head H2, which is subject to the end of the water resistance and the most unfavorable loop water resistance.

5.2.8 Water Quality Requirements

When using urban tap water for hot and cold water, scale buildup is rare. However, when using well water or river water, more scale, sand, and other sediments are produced. Therefore, it is necessary to filter and soften this water with water softening equipment before it flows into the hot and cold water system. Sand and soil settling in the water-side heat exchanger can block the circulation of hot and cold water, leading to freezing accidents. To prevent scaling and corrosion of equipment, it is important to analyze the water quality before use, including factors such as pH value, conductivity, chloride ion concentration, and sulfur ion concentration.

Water quality standards applicable to the unit

Table 5-3

test item	units	permissible value	test item	units	permissible value
pH(25°C)	/	7.5~8.0	Dissolved Oxygenturbidity	mg/L	not detectable
turbidity	NTU	≤3	Organophosphorus (P)	mg/L	not detectable
Conductivity(25°C)	μS/cm	≤200	Sulfide ion	mg/L	≤50
Chloride ion	mg/L	≤50	acid consumption	mg/L	≤50
Iron content	mg/L	≤0.3	Sulfide ion	mg/L	not detectable
calcium hardness	mg/L	≤80	Ammonium ion	mg/L	not detectable
total alkalinity	mg/L	≤200	silicon dioxide	mg/L	≤30

⚠ WARNING

Water quality is crucial to ensure the normal and reliable operation of equipment, otherwise it may cause damage to the unit casing or reduce its lifespan. Therefore, it is necessary to ensure that the water quality meets the requirements of equipment use.

5.2.9 Pipe diameter selectio

The following values refer to the main inlet and outlet water pipe, not the unit inlet and outlet water pipe. The data is for reference. Please refer to the actual project.

Table 5-4

Rated capacity(kW)	Total inlet and outlet diameter	Rated capacity(kW)	Total inlet and outlet diameter
25≤Q≤40	DN32	210<Q≤325	DN100
40<Q≤50	DN40	325<Q≤510	DN125
50<Q≤80	DN50	510<Q≤740	DN150
80<Q≤145	DN65	740<Q≤1 300	DN200
145<Q≤210	DN80	1300<Q≤2 080	DN250

⚠ CAUTION

Please pay attention to the following items when installing multiple modules:

• Each module corresponds to an address code which cannot be repeated.

• Main water outlet temperature sensing bulb, target flow controller and auxiliary electric heater are under control of the main module.

• One wired controller is required and connected on the main module.

• The unit can be started up through the wired controller only after all addresses are set and the aforementioned items are determined. The wired controller is ≤500 m away from the outdoor unit.

5.2.10 Installation of single or multiple water pumps

1) DIP switch

The choice of DIP switch see Table 7-1 in detail when single or multiple water pumps are installed for MHC-SVC50-RN7TL-B,MHC-SVC60-RN7TL-B,MHC-SVC 70-RN7TL-B.

Pay attention to the following problems:

a. If the DIP switch is inconsistent, and the error code is FP, the unit is not allowed to operate.

b. Only the main unit has the water pump output signal when single water pump installed, auxiliary units has no water pump output signal.

c. The water pump control signal is available for both the main unit and auxiliary units when multiple pumps installed.

2) Installation of water pipe system

a. Single water pump

Piping does not require a one-way valve when single water pump is installed, refer to figure as follow.

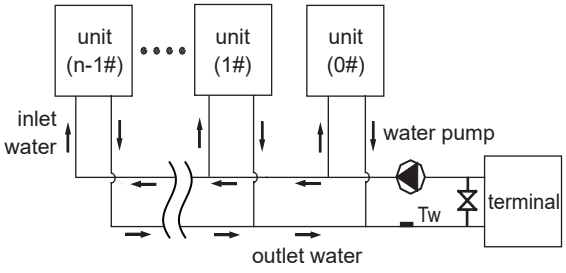


Fig.5-5 Installation of single water pump

b. Multiple water pumps

Each unit is required to install a one-way valve when multiple pumps are installed, refer to figure as follow.

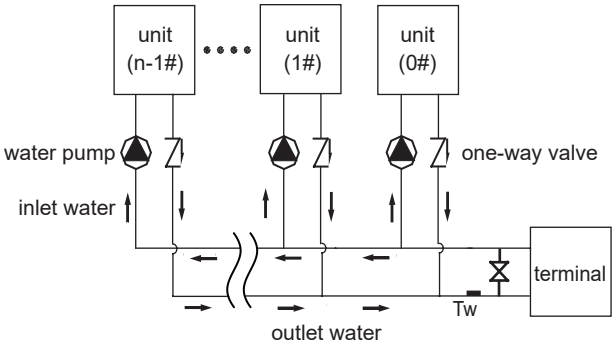


Fig.5-6 Installation of multiple water pump

3) Electric wiring

Only the main unit requires wiring when single water pump installed, auxiliary units do not require wiring. All of the main unit and auxiliary units require wiring when multiple water pumps installed.For specific wiring, see figure 6-10, 6-11.

5.2.11 Design of the tank in the system

The expansion water tank is divided into two types:
open and closed. Its purpose is to maintain constant pressure and accommodate expansion water. The closed expansion water tank is also known as an expansion tank. The open expansion tank is connected to the atmosphere without pressure and is usually installed at the suction inlet of the circulating pump, which should be 1 to 2 meters higher than the highest point of the system. The water supply of the water tank is determined by the water level. In large systems, an expansion tank should be set up for the primary pump water system if it is not equipped with a buffer tank or heat storage tank in the open water system. In large systems, an expansion tank should be set up for the primary pump water system if it is not equipped with a buffer tank or heat storage tank in the open water system. The expansion tank should be arranged at the highest point of the water system to accommodate any excess water volume. The expansion tank, also known as a closed expansion tank, can be installed in the suction inlet of the circulating pump. It should not be connected to the atmosphere or pressure. If the room is far away, it is not necessary to connect the expansion tank to the room. In this case, the expansion tank can be connected to the outdoor return water main. When selecting the capacity of the expansion tank, ensure that specific terms, abbreviations, and symbols are used consistently once they have been introduced. This type of expansion tank uses constant pressure water supply and is commonly used in small systems.
Capacity selection of expansion tank:
V= system water capacity x expansion coefficient x safety margin
The expansion coefficient ranges from 1 to 3%, and the safety margin ranges from 1.1 to 1.2.

5.2.12 Capacity selection of auxiliary electric heater

1) Electric auxiliary heat use
When repairing certain units of the system or in the event of temporary faults (such as protection mechanisms), the system is opened as a backup. It is important to ensure that the system can maintain water temperature and heat production even in harsh conditions of low ambient temperature, in order to compensate for any attenuation of heat production in the unit under such conditions.
2) Electric auxiliary thermal linkage control.
If the ambient temperature is too low for the unit to turn on or if the failure protection cannot be activated, the auxiliary heat heater will automatically turn on according to the water temperature control program. This ensures reliable operation of the customer's water and the unit.

3) Electric auxiliary thermal selection

The figure below demonstrates that when the design point and balance point are the same, the unit's total heat production is equal to the building's heat load. In this case, electric auxiliary heat is unnecessary.

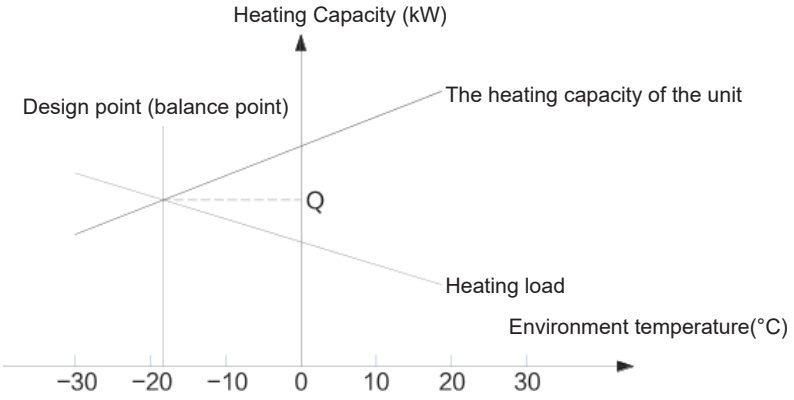


Fig. 5-7

If the design point and the balance point do not coincide, the heating capacity of the unit at the design point (Q2) will be less than the building heat load (Q1). In this case, electric heating must be configured with a power output equal to the difference between Q1 and Q2.

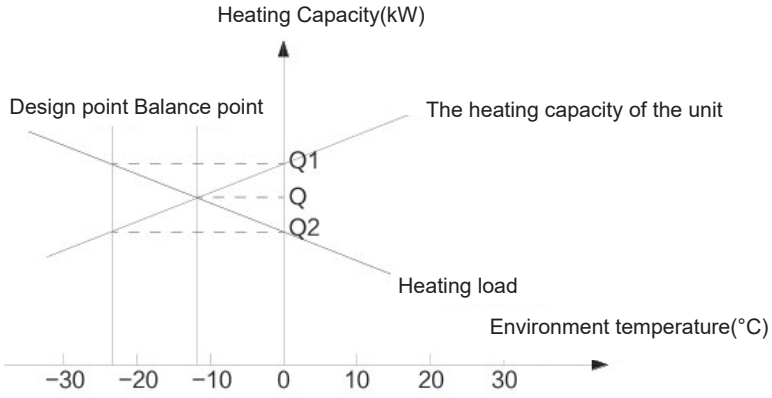


Fig. 5-8

6 ELECTRICAL INSTALLATION

6.1 Outdoor unit PCBs

1) Label descriptions are given in Table 6-1,6-2.

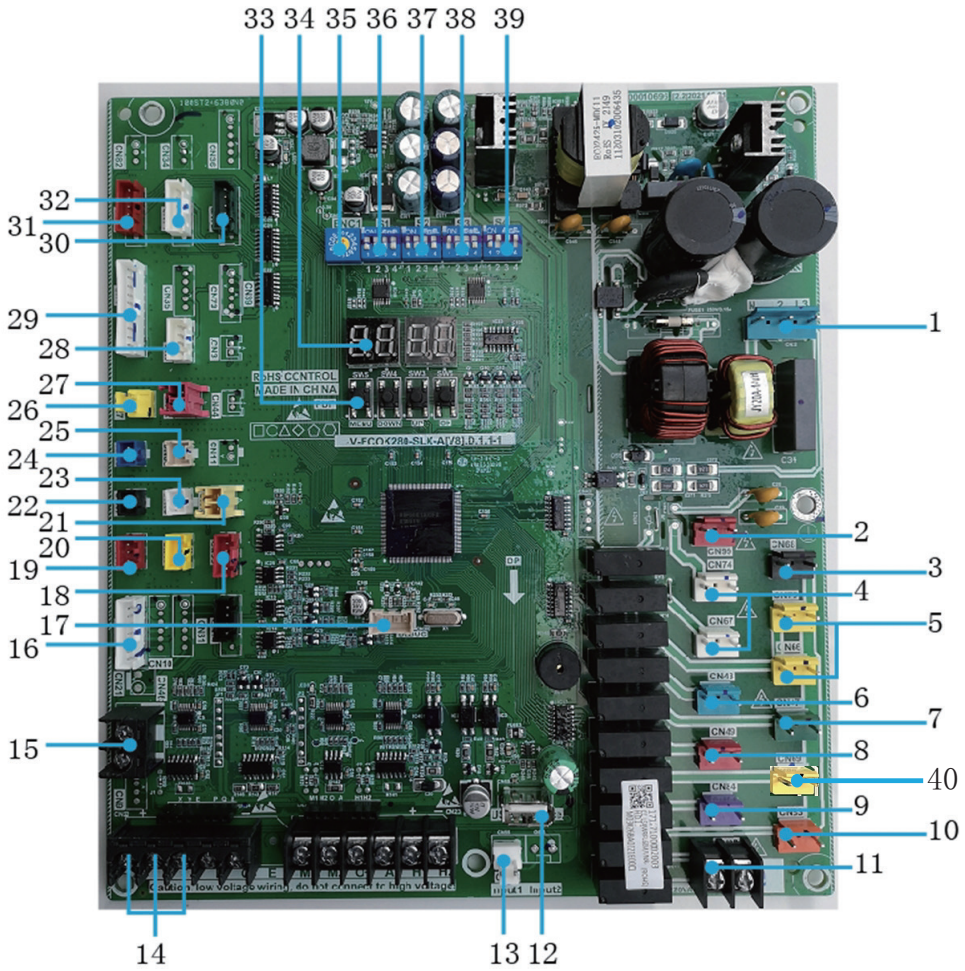


Fig. 6-1 Main board of 50/60/70KW

Table 6-1

NO.	Port Code	Content	Voltage	Direction
1	CN32	Main board power supply	230 V AC	Input
2	CN99	Expansion board power supply	230 V AC	Output
3	CN68	Reserved	230 V AC	Output
4	CN74/CN67	Reserved/Crankcase Heater	230 V AC	Output
5	CN75/CN66	Reserved/Electronic heating belt for plate heat exchanger	230 V AC	Output
6	CN48	Four-way valve	230 V AC	Output
7	CN47	Solenoid valve	230 V AC	Output
8	CN49	Water tray electric heating belt	230 V AC	Output
9	CN84	Reserved	0 V	Output
10	CN83	Reserved	0 V	Output
11	CN93	The alarm signal output of the unit(ON/OFF signal)		Input/Output
12	CN65	Program burn in port(USB)	5 V DC	Input/Output
13	CN28	Three-phase protector output switch	12 V DC	Input
14	CN22	Outdoor units communication and wired controller conmunication port	5 V DC	Output
15	CN46	The power supply port of the wired controller	12 V DC	Output
16	CN26	Compressor inverter module and Fan inverter module communication ports	12 V/5 V DC	Input/Output
17	CN300	Program burn in port	3.3 V DC	Input/Output

NO.	Port Code	Content	Voltage	Direction
18	CN33	Conmunicate with slave board	12 V/3.3 V DC	Input/Output
19	CN41	System low pressure sensor	5 V DC	Input
20	CN40	System high pressure sensor	5 V DC	Input
21	CN45	Probe of outlet water side antifreeze temp	3.3 V DC	Input
22	CN37	pipe temperature sensor of the condenser	3.3 V DC	Input
23	CN30	outdoor ambient temperature sensor	3.3 V DC	Input
24	CN16	Reserved	3.3 V DC	Input
25	CN38	Reserved	3.3 V DC	Input
26	CN27	Discharge temperature switch protection (protection code P0, provent the compressor from over temperature 115°C)	3.3 V DC	Input
27	CN42	Reserved	3.3 V DC	Input
28	CN8	Refrigerant inlet temperature of EVI plate heat exchanger/ Refrigerant outlet temperature of EVI plate heat exchanger	3.3 V DC	Input
29	CN4	Unit water inlet temperature sensor	3.3 V DC	Input
		System suction temperature sensor		
		Unit water outlet temperature sensor		
		coil final outlet temperature sensor		
		DC inverter compressor discharge temperature sensor		
30	CN72	Port for electrical expansion valve C	12 V DC	Output
31	CN70	Port for electrical expansion valve A	12 V DC	Output
32	CN71	Port for electrical expansion valve B	12 V DC	Output
33	SW3	Up button	3.3 V DC	Input
	SW4	Down button		
	SW5	Menu Buttons		
	SW6	Confirm button		
34	DSP1/DSP2	Digital tube 1) In case of stand-by, the address of the module is displayed; 2) In case of normal operation, 10. is displayed (10 is followed by dot). 3) In case of fault or protection, fault code or protection code is displayed.	3.3 V DC	Output
35	ENC1	ENC1:NET_ADDRESS DIP switch 0-F of outdoor unit network address is enabled, which represent address 0-15.	3.3 V DC	Input
36	S1	Dip switch	3.3 V DC	Input
37	S2	Reserved	3.3 V DC	Input
38	S3	Dip switch	3.3 V DC	Input
39	S4	Dip switch	3.3 V DC	Input
40	CN69	Water tray electric heating belt	230 V AC	Output

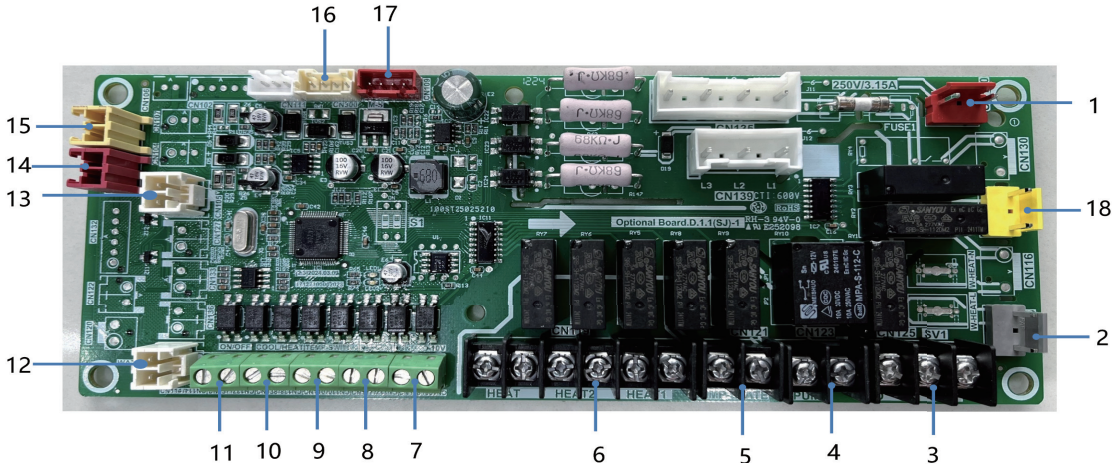


Fig. 6-2 expansion board of 50/60/70KW

Table 6-2

NO.	Port Code	Content	Voltage	Direction
1	CN140	Expansion board power supply	230 V AC	Input
2	CN115	Electric heater of water flow switch	230 V AC	Output
3	CN125	Three-way valve(hot-water valve)	230 V AC	Output
4	CN123	Port controlled by the contactor of the constant speed water pump		Intput/Output
5	CN121	Compressor status indication		Intput/Output
6	CN119	Pipeline Auxiliary Heater/Hot Water Tank Auxiliary Heater		Intput/Output
7	CN108	Inverter pump 0-10V output control singnal	0-10 V DC	Output
8	CN117	Water pressure switching port.	12 V DC	Intput
9	CN110	Target water temperature switch	12 V DC	Intput
10	CN138	Remote function of cool/heat signal	12 V DC	Intput
11	CN137	Remote function of on/off signal	12 V DC	Intput
12	CN114	Water flow switch signal	12 V DC	Intput
13	CN105	Probe of inlet water side antifreeze temp	3.3 V DC	Input
14	CN101	Probe of finaunit water outlet temp	3.3 V DC	Intput
15	CN103	Probe of water tank	3.3 V DC	Intput
16	CN300	Program burn in port	3.3 V DC	Intput/Output
17	CN109	Conmunicate with main board	12 V/3.3 V DC	Intput/Output
18	CN118	Reserved	230 V AC	Output

⚠ CAUTION

- Faults
  When the main unit suffers faults, the main unit stops operating, and all other units also stop running;
  When the subordinate unit suffers faults, only the unit stops operating, and other units are not affected.
- Protection
  When the main unit is under protection, only the unit stops operating, and other units keep running;
  When the subordinate unit is under protection, only the unit stops operating, and other units are not affected.

6.2 Electric wiring

6.2.1 Electric wiring

⚠ CAUTION

- The air-conditioner should apply special power supply, whose voltage should conform to rated voltage.
- Wiring construction must be conducted by the professional technicians according to the labeling on the circuit diagram.
- The power wire and the grounding wire must be connected to the suitable terminals.
- The power wire and the grounding wire must be fasten up by suitable tools.
- The terminals connected the power wire and the grounding wire must be fully fastened and regularly checked, in case to become loose.
- Only use the electric components specified by our company, and require installation and technical services from the manufacturer or authorized dealer. If wiring connection doesn't conform to electric installation specification, it may cause many troubles like failure on controller, electronic shock and so on.
- The connected fixed wires must be equipped with full switching-off devices with at least 3 mm contact separation.
- Set leakage protective devices according to the requirements of national technical standard about electric equipment.
- After completing all wiring construction, conduct careful check before connecting the power supply.
- Please carefully read the labels on the electric cabinet.
- Please don't repair the controller by yourself, since improper operation may cause electric shock, damages to the controller and other bad results. If the unit need repair, please contact the maintenance center., since improper repair may cause electric shock, damages to the controller, and so on. If the user has any requirement of repair, please contact the maintenance center.

Explanation of harmonic current short-circuit ratio

NOTE

- We declare the model MHS-SVC70-RN7TL-B.This equipment complies with IEC 61000-3-12 provided that the sort-circuit power Ssc is greater than or equal to 15518720W at the interface point between the user's supply and the public system.It is the responsibility of the installer or user of the equipment to ensure,by consultation with the distribution network operator if necessary,that the equipment is connected only to a supply with a short-circuit power Ssc greater than or equal to 15518720W.
- We declare the model MHS-SVC60-RN7TL-B.This equipment complies with IEC 61000-3-12 provided that the sort-circuit power Ssc is greater than or equal to 15033760W at the interface point between the user's supply and the public system.It is the responsibility of the installer or user of the equipment to ensure,by consultation with the distribution network operator if necessary,that the equipment is connected only to a supply with a short-circuit power Ssc greater than or equal to 15033760W.
- We declare the model MHS-SVC50-RN7TL-B.This equipment complies with IEC 61000-3-12 provided that the sort-circuit power Ssc is greater than or equal to 14548800W at the interface point between the user's supply and the public system.It is the responsibility of the installer or user of the equipment to ensure,by consultation with the distribution network operator if necessary,that the equipment is connected only to a supply with a short-circuit power Ssc greater than or equal to 14548800W.

6.2.2 Safety percautions

a. On-site wiring, parts and materials must comply with the local and national regulations as well as relevant national electrical standards.

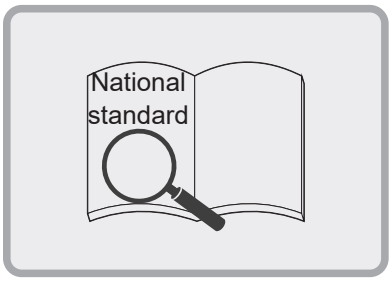


Fig. 6-3 Electrical wiring precaution (a)

b. Copper core wires must be used

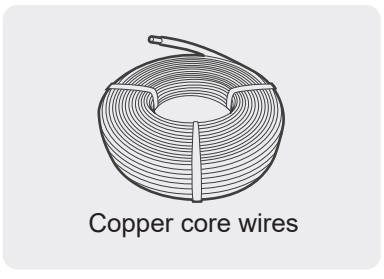


Fig. 6-4 Electrical wiring precaution (b)

c. It is advisable to use 3-core shielded cables for unit to minimize interference. Do not use the unshielded multicore conductor cables.

Fig. 6-5 Electrical wiring precaution (c)

d. Power wiring must be entrusted to professionals with electrician qualification.

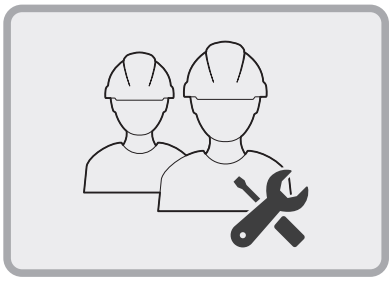


Fig. 6-6 Electrical wiring precaution (d)

6.2.3 Operating current and wire diameter

1) Select the wire diameter (minimum value) individually for each unit based on Table 6-3 and Table 6-4. The rated current in Table 6-3 means MCA in Table 6-4.
2) The maximum allowable voltage deviation between phases is 2 %,power cord length<20 m.
3) Select circuit breakers that have a contact separation of at least 3 mm in all poles for full disconnection. MFA is used to select the current circuit breakers and residual current operation breakers.
4) The drive electronic control box is equipped with an overcurrent protector (fuse). In case any additional overcurrent protector is needed, refer to the TOCA in Table 6-4.

Table 6-3

Rated current (A)	Nominal cross-sectional area (mm^2)	
	Flexible cord	Cable for fixed wiring
≤ 3	0.5 and 0.75	1 and 2.5
>3 and ≤6	0.75 and 1	1 and 2.5
>6 and ≤10	1 and 1.5	1 and 2.5
>10 and ≤16	1.5 and 2.5	1.5 and 4
>16 and ≤25	2.5 and 4	2.5 and 6
>25 and ≤32	4 and 6	4 and 10
>32 and ≤50	6 and 10	6 and 16
>50 and ≤63	10 and 16	10 and 25
>63 and ≤95	16 and 25	25 and 35

Table 6-4

System	Outdoor unit				Power current		
	Voltage (V)	Hz	Min. (V)	Max. (V)	MCA (A)	TOCA (A)	MFA (A)
50kW 3-PH	380-415	50	342	456	60	70	80
60kW 3-PH	380-415	50	342	456	62	70	80
70kW 3-PH	380-415	50	342	456	64	70	80

MCA: min. circuit current. (A)
TOCA: total over current (A)
MFA: max. fuse current (A)

NOTE

See the writings above for power wire diameter and length when the voltage drop at the power wiring point is within 2%. If the wire length exceeds the value specified in the writings or the voltage drop is beyond the limit, the power wire diameter should be larger in accordance with the relevant regulations.

6.2.4 Connection with Power Supply

6.2.4.1 Wiring of main power supply

⚠ CAUTION

• Use a round crimp-style terminal for connection to the power supply terminal board.
• Leakage protection switch must be installed.

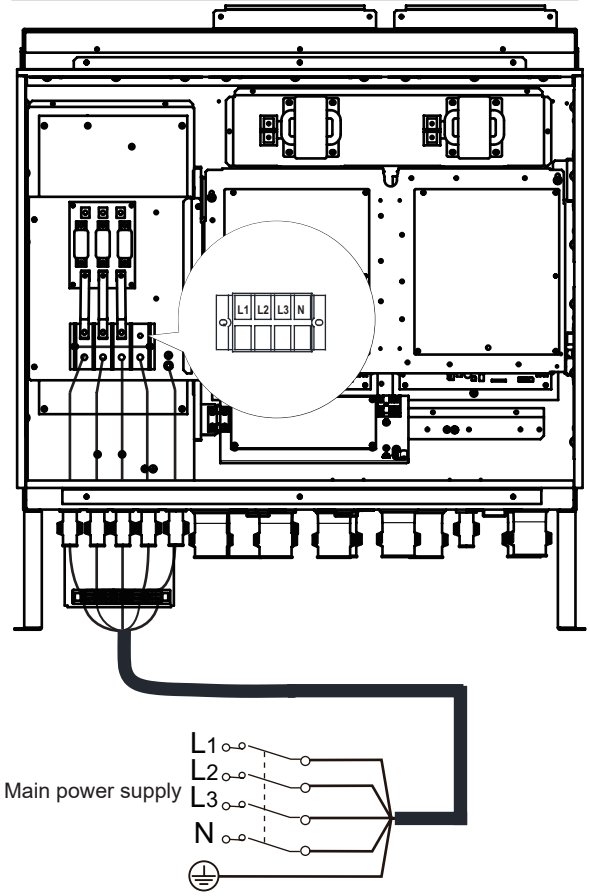
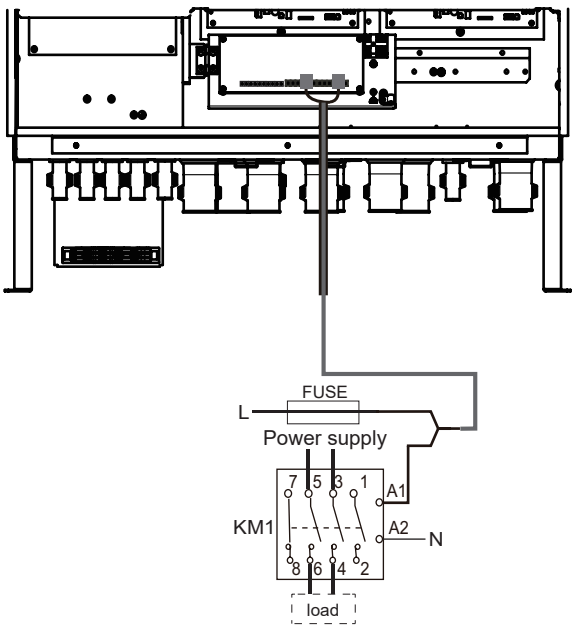


Fig. 6-7

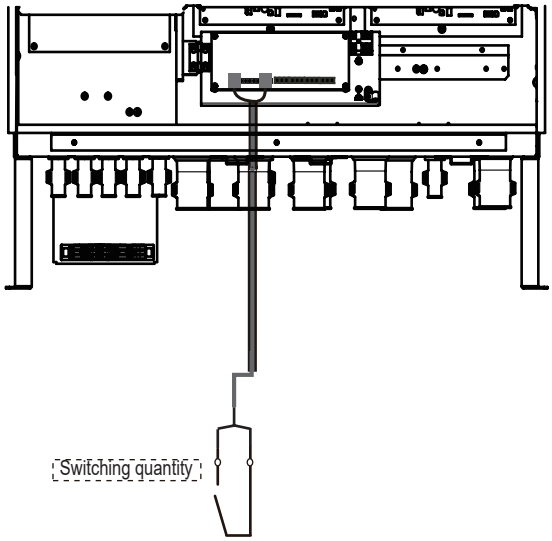
6.2.4.2 Connection of Other Components

The whole machine expansion board provides two control ports:
Type 1: Strong current control (method guide, specific wiring method can be found on the wiring nameplate)
Type 2: Weak current detection (method guide, specific wiring method can be found on the wiring nameplate)



Type 1

L-N Voltage	220-240 VAC
Maximum running current (A)	0.2
Minimum wire size (mm^2)	0.75
Control port signal type	Type 1



Type 2

NOTE

The type 2 must be low-voltage.

6.2.4.3 Overall

If multiple units are connected in cascade, the unit address should be set on the DIP switch ENC1. With 0-F being valid, 0/1 indicates the master unit and 2-F indicate slave units.

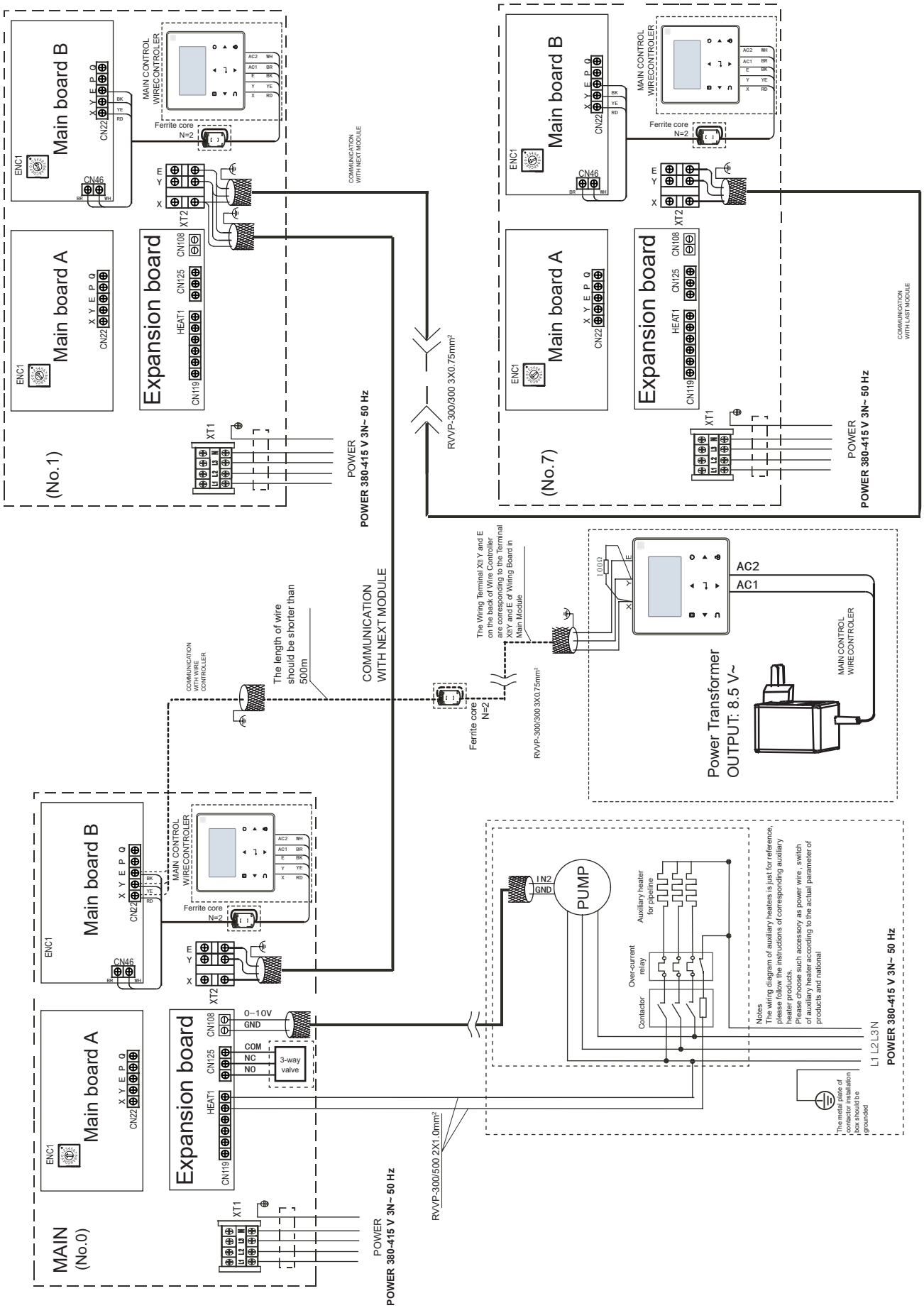


Fig. 6-10 Networking communication schematic of main unit and auxiliary unit for 50/60/70kW

If multiple units are connected in cascade, the unit address should be set on the DIP switch ENC1. With 0-F being valid, 0/1 indicates the master unit and 2-F indicate slave units.

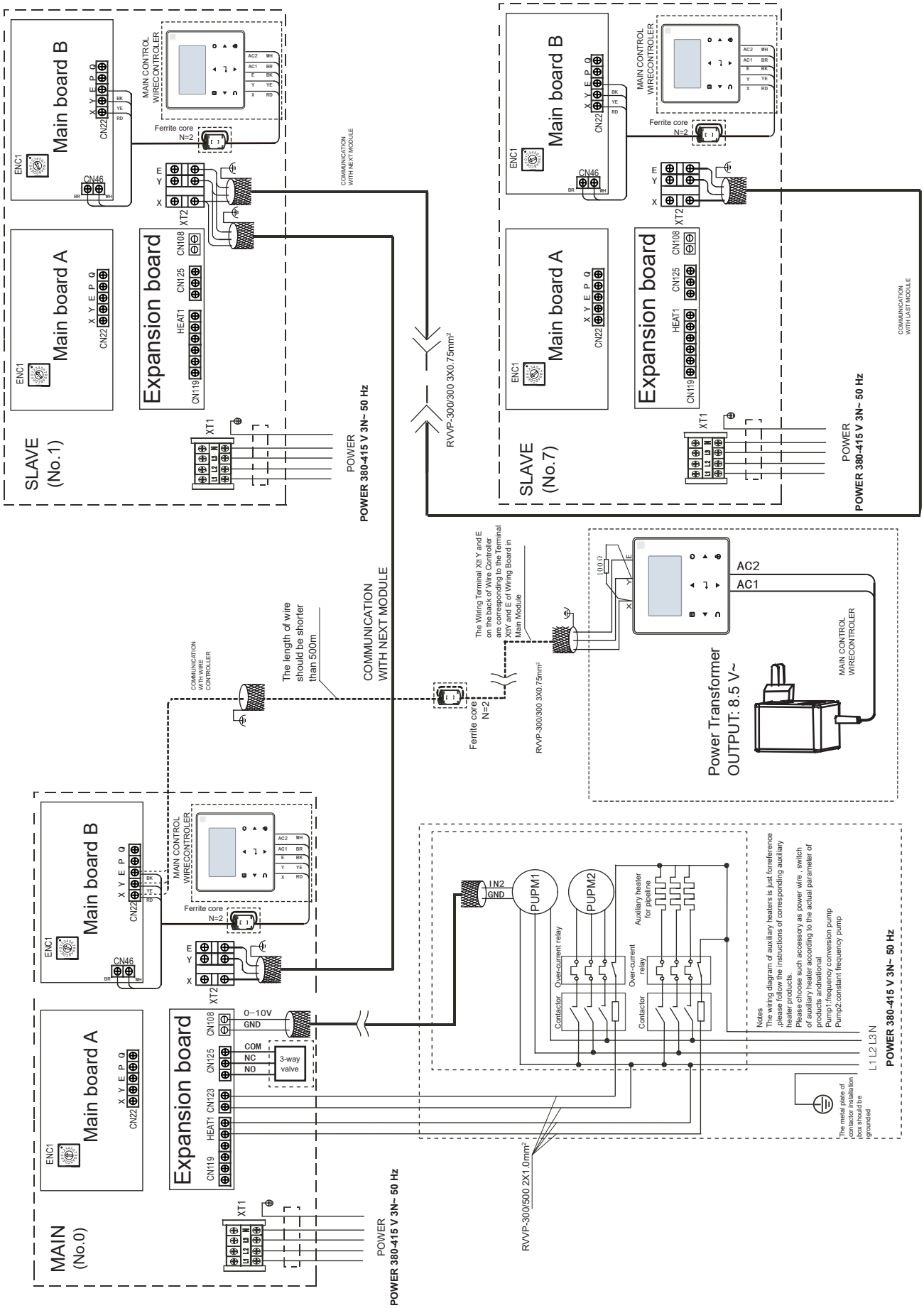


Fig. 6-11 Networking communication schematic of main unit and auxiliary unit for 50/60/70kW

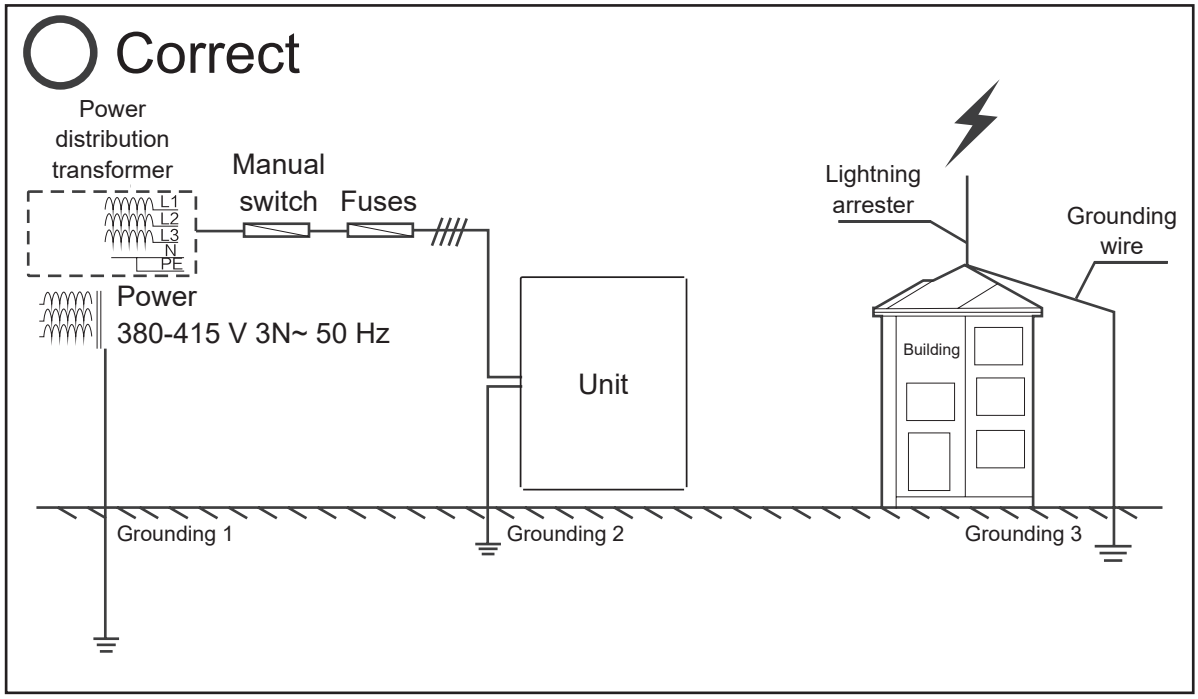
NOTE

When the power cord is parallel to the signal wire, make sure that they are enclosed in respective conduits and are kept a reasonable wire spacing. (Distance between the power cord and signal wire: 300 mm if below 10 A, and 500 mm if below 50 A)

⚠ CAUTION

In the case of multiple units connection, the HMI can be parralled with in the same system.

6.2.4.4 Requirements for power supply wiring



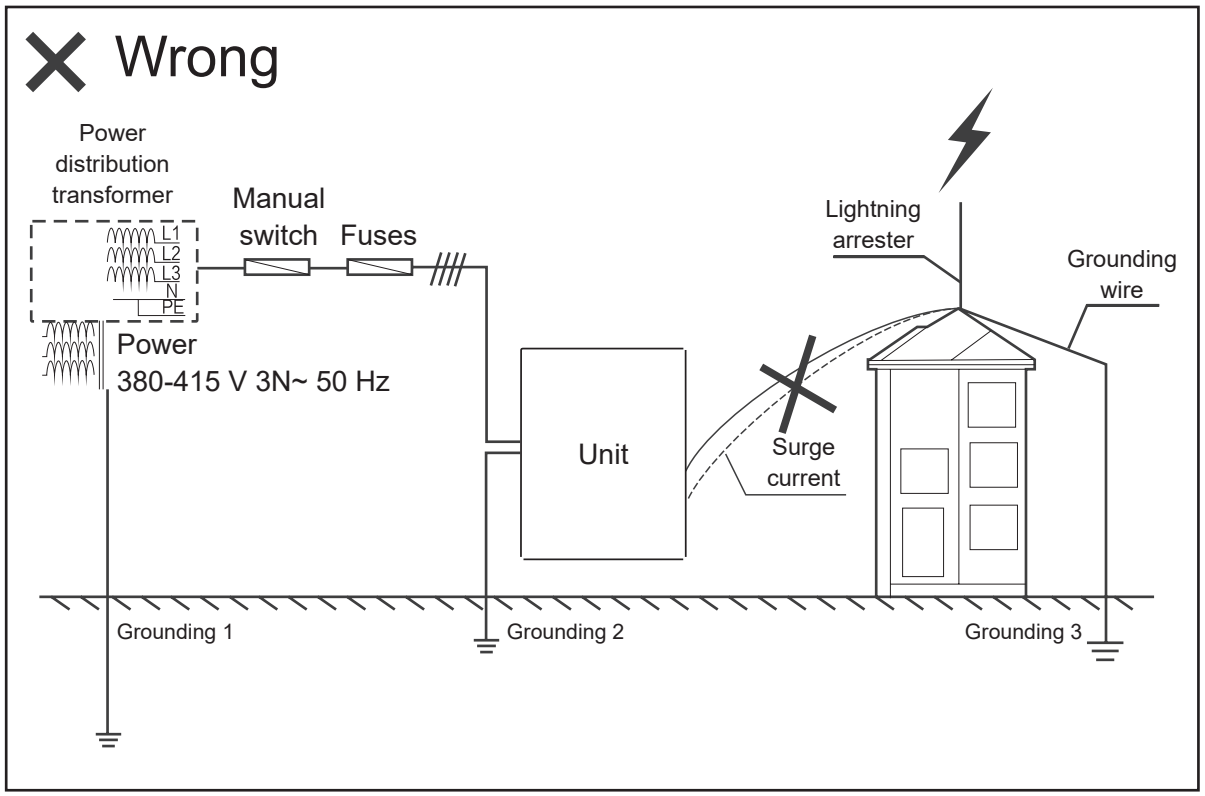


Fig. 6-12 Requirements of power supply wiring

NOTE

Do not connect the grounding wire of the lightning arrester to the unit shell. The grounding wire of the lightning arrester and the power supply grounding wire must be configured separately.

6.2.4.5 Requirements for power cord connection

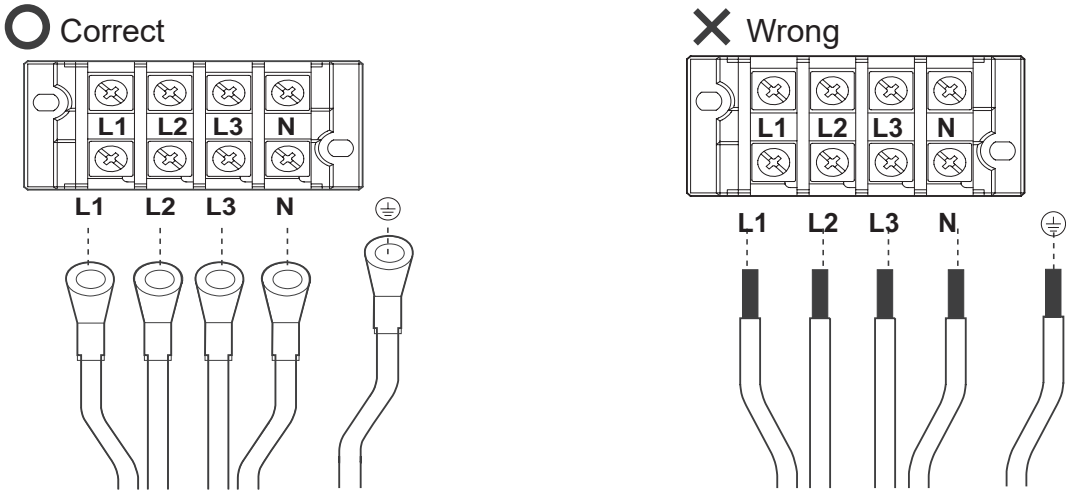


Fig. 6-13 Requirements for power cord connection

NOTE

Please use the round-type terminal with correct specifications to connect the power cord.

6.2.4.6 Function of terminals

As shown in the figure below, For 50/60/70kW, the unit communication signal wire is connected to the terminal block XT2 at XYE inside the electric control box.
The wired controller signal wire is connected to the terminal block CN22 at XYE on main board B inside the electric control box.
For specific wiring, see chapter 6.2.4.

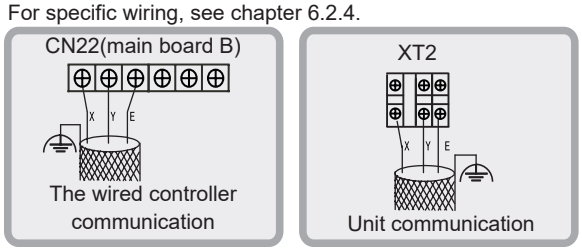


Fig. 6-14

When the auxiliary heater are added externally, a 3-phase contactor must be used for control. The model of contactor is subject to the power of heater power. The contactor coil is controlled by the expansion board. See the figure below for coil wiring. For specific wiring, see chapter 6.2.4.
The user can connect an ac light to monitor the state of compressor.When the compressor is operating,the light will be powered on.
The wiring of pipeline auxiliary heater and ac light of the state of compressor is as follows.
Connect the frequency conversion pump and constant frequency pump according to unit requirements.

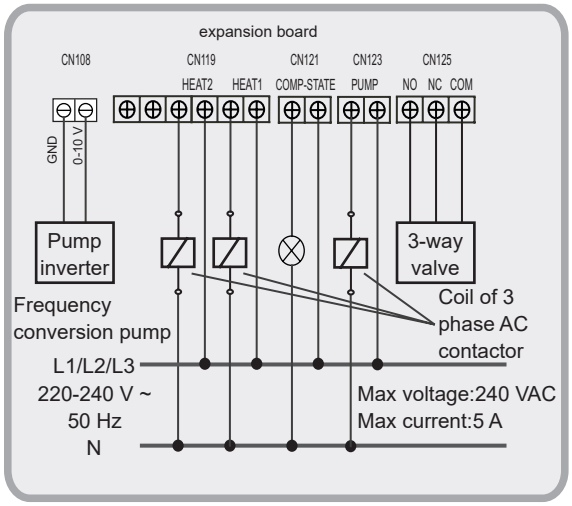


Fig. 6-15 Wiring of pipeline auxiliary heater and ac light of the state of compressor(50/60/70kW)

6.2.4.7 Wiring of “ON/OFF” weak electric port

The remote function of “ON/OFF” must be set by DIP switch. The remote function of “ON/OFF” is effective when S1-1 is chosen ON, at the same time, the wired controller is out of control.
Corresponding parallel connect the “ON/OFF” port of the main unit’s electric control box,then, connect the “ON/OFF” signal (provide by user) to the “ON/OFF” port of main unit as follows.
The remote function of “ON/OFF” must be DIP switch set.
Wiring method:
For 50/60/70 kW:Shorting the terminal block CN137 at expansion board inside the electric control box to enable the remote function of “ON/OFF”.

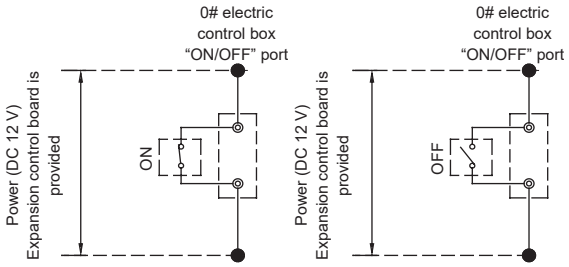


Fig. 6-16 Wiring of “ON/OFF ” weak electric port

6.2.4.8 Wiring of “HEAT/COOL” weak electric port

The remote function of “HEAT/COOL” must be set by DIP switch.The remote function “HEAT/COOL” is effective when S1-1 is chosen ON, at the same time, the wired controller is out of control.
Corresponding parallel connect the “HEAT/COOL” port of the main unit’s electric control box,then, connect the “ON/OFF” signal (provide by user) to the “HEAT/COOL” port of main unit as follows.
Wiring method:
For 50/60/70 kW:Shorting the terminal block CN138 at expansion board inside the electric control box to enable the remote function of “HEAT/COOL”.

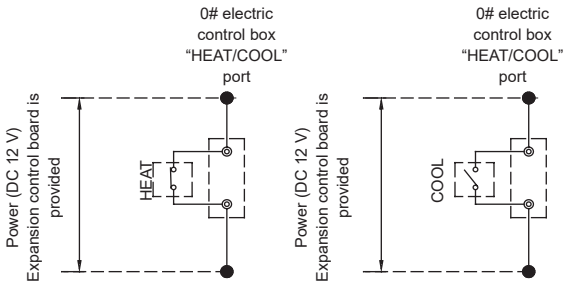


Fig. 6-17 Wiring of “HEAT/ COOL” weak electric port

6.2.4.9 Wiring of “TEMP-SWITCH” weak electric port

The function of “TEMP-SWITCH” must be set by wired controller for two setting water temperature. For cooling and heating mode.

Wiring method:

For 50/60/70kW: Shorting the terminal block CN110 at expansion board inside the electric control box to chose the target water temperature.

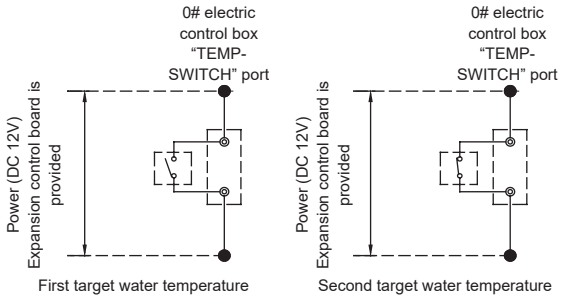


Fig. 6-18 Wiring of “TEMP-SWITCH” weak electric port

6.2.4.10 Wiring of “ALARM” port

Connect the device provided by user to the “ALARM” ports of the module units as follows.

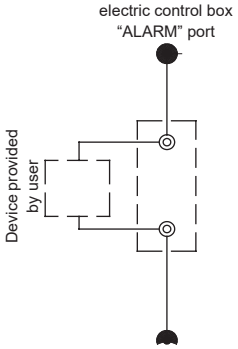


Fig. 6-19 Wiring of “ALARM” port

If the unit is operating unnormally,the ALARM port is closed,otherwise,the ALARM port is open.

The ALARM ports are on the main control board A. See the wiring diagram for details.

6.2.4.11 Control system and installation precautions

a. Use only shielded wires as control wires. Any other type of wires may produce a signal interference that will cause the units to malfunction.

Fig. 6-20-1 Control system and installation precaution (a)

b. The shielding nets at both ends of the shielded wire must be grounded. Alternatively, the shielding nets of all shielded wires are interconnected and then connected to earth through or one `metal plate.

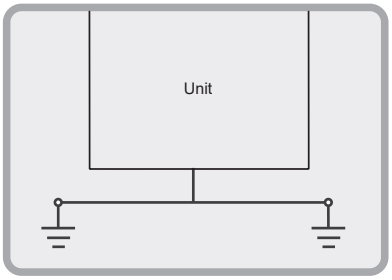


Fig. 6-20-2 Control system and installation precaution (b)

c. Do not bind the control wire, refrigerant piping and power cord together. When the power cord and control wire are laid parallel, they should be kept at a distance of more than 300 mm to prevent signal source interference.

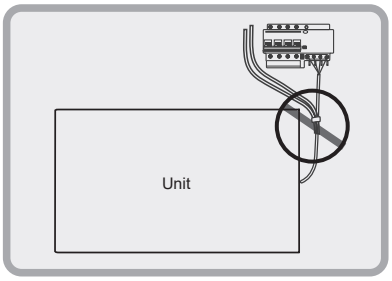


Fig. 6-20-3 Control system and installation precaution (c)

d. Pay attention to the polarity of the control wire when conducting wiring operations.

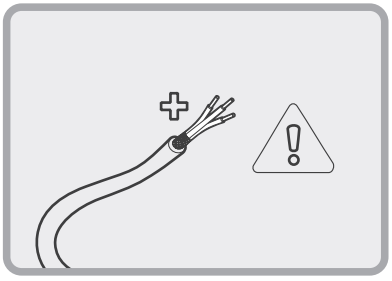


Fig. 6-20-4 Control system and installation precaution (d)

NOTE

When the customer is wiring, first cut off the zip ties at the customer's wiring port below the electrical control box, and then proceed with the wiring. After completion, use zip ties to fix and tighten the wire sealing ring (zip ties are included in the attachment)

7 CONFIGURATION

7.1 Initial start-up at low outdoor ambient temperatures

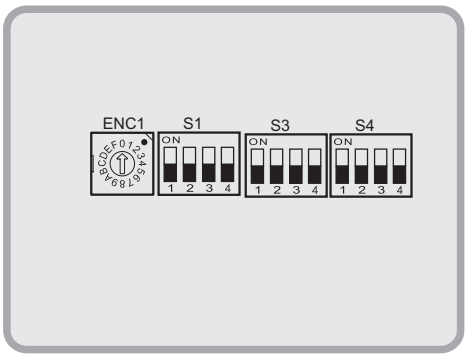
During initial start-up and when water temperature is low, it is important that the water is heated gradually. Failure to do so may result in concrete floors cracking due to rapid temperature change. Please contact the responsible cast concrete building contractor for further details.

7.2 Points for attention prior to trial run

1) After the water system pipeline is flushed several times, please make sure that the purity of water meets the requirements; the system is re-filled with water and drained, and the pump is started up, then make sure that water flow and the pressure at the outlet meet the requirements.
2) The unit is connected to the main power 12 hours before being started up, to supply power to the heating belt and pre-heat the compressor. Inadequate pre-heating may cause damages to the compressor.
3) Setting of the wired controller. See details of the manual concerning setting contents of the controller, including such basic Zsettings as refrigerating and heating mode, manual adjustment and automatic adjustment mode and pump mode. Under normal circumstances, the parameters are set around standard operating conditions for trial run, and extreme working conditions should be prevented as much as possible.
4) Carefully adjust the minimum output of the water pump on the water system and the inlet shut-off valve of the unit to ensure that the minimum water flow rate of the system is 110% of the minimum water flow rate specified in Table 5-2.

7.3 DIP switch instructions

DIP switch, buttons and digital display positions of uints.



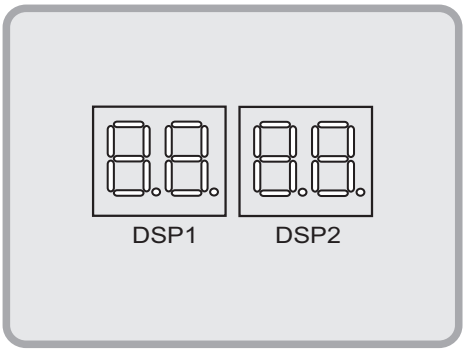
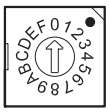
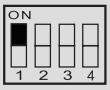
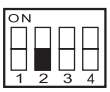
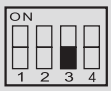
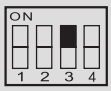
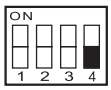
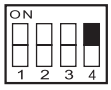
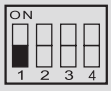
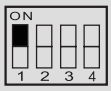


Fig. 7-1 Display positions

Table 7-1

ENC1 S1 S2 S3 S4			Meaning	Notes
ENC1 system address		0-F	Each unit is composed of two independent refrigerant circulation systems, and each refrigerant circulation system corresponds to its own address dialing code. Among them, 0# address is the A system of the host, 1# address is the B system of the host, and the address dialing code of other unit computer systems is dialing code in order from small to large.	Host system A address dial code to 0#; Each refrigerant circulation system should choose the address dialing code; Other system address dialing code cannot be repeated
S1-1 remote control		OFF	When the dial code is off, the unit has no remote control, can only be controlled by the wired controller (factory default).	This dial is valid for 0# address, but not for other addresses
		ON	When the dial code is on, the remote control of the unit takes effect. 1. Control the start and stop of the unit through the ON/OFF port of the mainboard extension board. Short-circuit unit starts, disconnected unit shuts down; 2. Adjust the unit operation mode through the H/C port on the expansion board. The short connection is heating mode, and the disconnection is cooling mode. 3. If the unit is connected with the wired controller, the wired controller can only change the setting temperature, boot back error and other parameters (if there is no wired controller, it is controlled by the default value).	This dial is valid for 0# address, but not for other addresses
S1-2 heating outlet temperature selection		OFF	When the dial code is off, the maximum temperature of the heating mode can be set to 60°C (factory default).	Each system in the system controlled by the same one-line controller needs to select S1-2, and it is recommended to select the same.
		ON	When the dial code is on, the maximum temperature of the heating mode can be set to 65°C. Note that only when the unit is equipped with a frequency conversion pump and the water flow range meets our company's requirements, this dial code can be set to ON, otherwise it may lead to the unit not reaching the set temperature.	

S1-3 multi pump & single pump selection		OFF	When all units controlled by the same wired controller share the same main water pump, this dial code should be OFF (factory default).	Single unit this dial code should be off; It is necessary to select S1-3 in the parallel system controlled by the same line controller,and the selection should be consistent, otherwise the fault FP will be displayed. The model of all pumps in the same parallel system should be uniform.
		ON	When each unit in a system controlled by the same wire is equipped with a separate water pump, this dial should be ON.	
S1-4 constant and variable water pump linkage control		OFF	When a single unit machine is matched with a single fixed speed water pump or a single variable frequency water pump, this dial code should be OFF (factory default).	Each system in the system controlled by the same line controller needs to select S1-4.
		ON	When the hydrodynamic equipment of a single unit machine is a constant speed water pump and parallel variable frequency water pump, this dial code should be ON. When the dial code is on, the fixed speed water pump and the variable frequency water pump will be adjusted.	
S3-1 unit machine system differentiation		OFF	This dial code is used to distinguish the AB system in A single unit machine. When the dial code is off, the system is A system.	This dial has been set, installation and debugging need not be changed. When appeared?? Failure, need to check whether the dial is correct.
		ON	This dial code is used to distinguish the AB system in a single unit machine. When the dial code is on, it means that the system is B system.	

8 FINAL CHECK

8.1 Check item table after installation

Table 8-1

Checking item	Description	Yes	No
Whether installing site is meet for requirements	Units are fixed mounting on level base.		
	Ventilating space for heat exchanger at the air side is meeting for requirement		
	Maintenance space is meeting for requirement.		
	Noise and vibration is meeting for requirement.		
	Sun radiation and rain or snow proof measures are meeting for requirements.		
	External physical is meeting for requirement.		
Whether water system is meeting for requirements	Pipe diameter is meeting for requirement		
	The length of system is meeting for requirement		
	Water discharge is meeting for requirement		
	Water quality control is meeting for requirement		
	Flexible tube's interface is meeting for requirement		
	Pressure control is meeting for requirement		
	Thermal insulation is meeting for requirement		
	Wire capacity is meeting for requirement		
	Switch capacity is meeting for requirement		
	Fuse capacity is meeting for requirement		
	Voltage and frequency are meeting for requirement		
Whether electric wiring system is meeting for requirements	Connecting tightly between wires		
	Operation control device is meeting for requirement		
	Safety device is meeting for requirement		
	Chained control is meeting for requirement		
	Phase sequence of power supply is meeting for requirement		

9 COMMISSIONING

1) Start up the controller and check whether the unit displays a fault code. If a fault occurs, remove the fault first, and start the unit according to the operating method in the "unit control instruction", after determining that there is no fault existing in the unit.
2) Conduct trial run for 30 minutes. When the influent and effluent temperature becomes stabilized, adjust the water flow to nominal value, to ensure normal operation of the unit.
3) After the unit is shut down, it should be put into operation 10 minutes later, to avoid frequent start-up of the unit. In the end, check whether the unit meets the requirements according to the contents in Table 10-1.

⚠ CAUTION

- The unit can control start-up and shut-down of the unit, so when the water system is flushed, the operation of the pump should not be controlled by the unit.
- Do not start up the unit before draining the water system completely.
- The target flow controller must be installed correctly. The wires of the target flow controller must be connected according to electric control schematic diagram, or the faults caused by water breaking while the unit is in operation should be the user's responsibility.
- Do not re-start the unit within 10 minutes after the unit is shut down during trial run.
- When the unit is used frequently, do not cut off the power supply after the unit is shut down; otherwise the compressor cannot be heated, thus leading to its damages.
- If the unit is not in service for a long time, and the power supply needs to be cut off, the unit should be connected to the power supply 12 hours prior to re-starting of the unit, to pre-heat the compressor,the pump,the plate heat exchanger and the differential pressure value.

9.1 Checklist before starting

Table 9-1

Items	Description	Acceptance method and specification requirements	Yes	No
Unit installation and acceptance	Whether the appearance integrity of the unit meets the requirements.	No scratches, fins inverted, etc		
	Check whether the attached accessories are complete.	Please refer to the appendix		
	Whether the integrity of the internal systems and components of the unit meets the requirements.	No pipe bump, loose parts and leaks		
	Whether the unit installation threedimensional space meets the requirements.	See the installation space requirements of the unit in the instruction manual for details		
	Whether the installation base height of the unit meets the requirements.	The base height of the cold temperature zone should be ≥ 500 mm; The base height of other temperature zones should be ≥ 300 mm;		
	Whether the vibration reduction measures of the unit and water pump meet the requirements.	Standard damping parts or damping springs have been installed.		
	Whether the unit is installed on a firm foundation and leveling meets the requirements.	Fixed bolts are locked and levelled with horizontal instruments.		
	Whether the air inlet and outlet space of the wind side heat exchanger meet the requirements.	Air circulation and no shelter around the heat exchanger.		
	Whether the unit against direct sunlight, water pump rain meet the requirements.	Confirm that there is no direct sunlight sensor and that the water pump has rain protection measures.		
	Whether after-sales maintenance and repair work space meet the requirements.	The sheet metal around the unit is convenient for disassembly and electric control box maintenance space.		
	Whether the snow protection measures of the unit meet the requirements.	The height of the base should be more than 200 mm higher than the maximum snowfall height in the area, and snow and ice removal should be performed regularly to ensure the normal operation of the unit.		
	Whether the noise of the unit has an impact on the surrounding environment and whether the resonance of the unit has an impact on the building.	Noise reduction and resonance avoidance measures for noise-sensitive areas.		
Water system installation and acceptance	Whether the installation of the entire water system and the appearance of the water tank meet the requirements.	See the standard water system installation connection diagram in the instruction manual for details.		
	Whether the pump head and flow meet the design requirements.	Calculate the pump head and total flow of the whole engineering system.		
	Whether the water supply control of the water system meets the design requirements.	Check the reliability of the water supply control, the test pressure is not lower than the water pressure corresponding to the pump head.		
	Whether the water quality of the water system meets the design requirements.	See the water quality control requirements in the instruction manual for details.		
	Whether the water pipe specifications of single and multiple units meet the requirements.	See the pipe diameter requirements corresponding to pipe diameter accounting in the Instructions for details.		
	Whether the end cleaning and tight pressure to meet the requirements.	Ensure that the end and unit are disconnected to maintain pressure and clean, control the water pressure value.		
	Whether the water system pipeline cleaning and tight pressure to meet the requirements.	See the acceptance specification for pressure holding, sealing and cleaning in the Instruction Manual for details.		

Water system installation and acceptance	Whether the highest point of the water system and the high point of the branch emptying measures meet the requirements.	Check the location and number of exhaust valves at the branch and the highest point.		
	Whether the low point of the water system and the low point drainage measures of the branch meet the requirements.	Check that branch and nadir drain functions are drained.		
	Whether the entire water system pipeline, water tank and valve insulation to meet the requirements.	Check the thickness and adhesive quality of insulation cotton, and the protective layer is fixed.		
	Whether the installation of water flow switch of the unit meets the requirements.	See the installation requirements of water flow switch in the instruction manual for details.		
	Whether the water system filtration and descaling device installation meets the requirements.	The flow direction of the filter, the mesh number and technical requirements of the filter.		
	Whether the total water temperature sensor installation of the entire water system meets the requirements.	See the installation requirements of the total water temperature sensor in the instruction manual for details.		
	Ethylene glycol percentage (if available).	Confirm the glycol percentage.		
	Whether to open all isolation valves (or globe valves).	Open or not.		
	Water channel cleaning.	Ensure water quality.		
	Cleaning of filters.	Make sure the filter is clean.		
Electrical installation and acceptance	Whether the circuit and electrical components inside the electrical control box meet the requirements.	Check electrical components and wiring plugs, terminals are loose.		
	Whether the integrity of lines and protection devices inside the unit meets the requirements.	Check the cable ties, fasteners, sensors are disconnected, etc.		
	Whether the power supply voltage and frequency of the unit meet the design requirements.	The main supply voltage value is in the range of 220V±10%, and the frequency is 60Hz.		
	Whether the power phase sequence wiring and wire specifications meet the design requirements.	See the wire diameter specification and check the phase sequence wiring in the instruction manual for details.		
	Whether the protection switch specifications of the system meet the design requirements.	See the technical requirements for protection switch in the instruction manual for details.		
	Whether the electrical control box needs external access to the weak line wiring meets the requirements.	Check that the access line corresponds to the identification of the terminal row, and the terminal is locked.		
	Whether the linkage control of pump control cabinet and unit meets the design requirements.	The linkage test run and acceptance of water pump and unit on site.		
	Whether the connection between the wire controller and the unit and the power supply meet the design requirements.	The three-core communication line and shielding layer of the wired controller are properly connected, and the power supply source requirements.		
	Whether the dial settings of the host and the slave are correct when multiple sets are installed.	Note the dial code settings of the master and slave units, and note the water flow Settings of the main machine.		
	Whether the lock of each terminal meets the design requirements at the site.	Make sure all lugs and terminals are locked before test run.		
	Whether the grounding of power supply, the internal grounding of unit and electric control box meet the design requirements.	Check the effectiveness of grounding measures with a multimeter on site.		
	Whether the lightning protection net of the unit site meets the design requirements.	Check the existing lightning protection measures and the lightning protection network system of the access building.		
	Whether the power preheating reaches 12 hours.	Compressor protection.		

10 MAINTENANCE

10.1 Failure information and code

In case the unit runs under abnormal condition, failure protection code will display on both control panel and wired controller, and the indicator on the wired controller will flash with 1Hz. The display codes are shown in the following table:

Table10-1

No.	Code	Content	Note
1	E0	Midea/clivet model mismatch fault	The capability selection is inconsistent with the actual model. Power on again after setting correctly
2	E1	Phase sequence error of main control board check	Recovered upon failure recovery
3	E2	Communication failure between master and the HMI or master and salve	Recovered upon failure recovery
	2E2	Communication failure between main control and extension board	Recovered upon failure recovery
	3E2	Communication failure between master and salve in a unit	Recovered upon failure recovery
4	E3	Total water outlet temperature sensor failure	Recovered upon failure recovery
5	E4	Unit water outlet temperature sensor failure	Recovered upon failure recovery
6	1E5	Condenser tube temperature sensor T3A failure	Recovered upon failure recovery
7	E6	Water tank temperature sensor T5 failure	Recovered upon failure recovery
8	E7	Ambient temperature sensor failure	Recovered upon failure recovery
9	E8	Power supply phase sequence protector output error	Recovered upon failure recovery
10	E9	Water flow detection failure	Failure locking for 3 times in 60 minutes(Recovered by power off or Wired controller clear fault)
11	1Eb	Taf1 the pipe of the tank antifreeze protection sensor failure	Recovered upon failure recovery
12	2EB	Taf2 cooling evaporator low-temperature antifreeze protection sensor failure	Recovered upon failure recovery
13	Ed	System discharge temperature sensor failure	Recovered upon failure recovery
14	1EE	EVI plate heat exchanger refrigerant temperature T6A sensor failure	Recovered upon failure recovery
	2EE	EVI plate heat exchanger refrigerant temperature T6B sensor failure	Recovered upon failure recovery
15	EF	Unit water return temperature sensor failure	Recovered upon failure recovery
16	EP	Discharge sensor failure alarm	Recovered upon failure recovery
17	EU	Tz sensor failure	Recovered upon failure recovery
18	P0	System high-pressure protection or discharge temperature p rotection	for 3 times in 60 minutes (Recovered by power off)
	1P0	System high-pressure switch disconnect protection	Recovered upon failure recovery
19	P1	System low pressure protection(or Severe refrigerant leakage protection)	for 3 times in 60 minutes (Recovered by power off)
20	P3	T4 ambient temperature too high in cooling mode	Recovered upon failure recovery
21	1P4	System A current protection	for 3 times in 60 minutes (Recovered by power off)
	2P4	System A DC bus current protection	
22	P6	Inverter module failure	Recovered upon error recovery
23	P7	High temperature protection of system condenser	for 3 times in 60 minutes (Recovered by power off)
24	P9	Water inlet and outlet temperature difference protection	Recovered upon failure recovery
25	PA	Abnormal water inlet and outlet temperature difference protection	Recovered upon failure recovery
26	PC	Cooling evaporator pressure too low	Recovered upon error recovery
27	PE	Cooling evaporator low temperature antifreeze protection	Recovered upon error recovery
28	PH	Heating T4 too high temperature protection	Recovered upon error recovery
29	PL	Tfin module temperature too high protection	for 3 times in 100 minutes(Recovered by power off)
	1PU	DC fan A module protection	Recovered upon failure recovery
30	1bh	Module 1 fialure	Recovered upon error recovery
31	H5	Voltage too high or too low	Recovered upon error recovery
32	1H9	Compressor inverter module is not matched	Recovered upon error recovery
33	HC	High pressure sensor failured	Recovered upon error recovery
34	1HE	No inset A valve error	Recovered upon error recovery
	2HE	No inset B valve error	Recovered upon error recovery
	3HE	No inset C valve error	Recovered upon error recovery
35	1F0	IPM module A transmission error	Recovered upon error recovery
36	F2	Superheat insufficient	Wait at least 20min before recovering
37	F4	1F4 module 1L0 or 1LE protection occursfor 3 times in 60 minutes	Recovered by power off
38	1F6	A system bus voltage error (PTC)	Recovered upon error recovery
39	Fb	Low pressure sensor error	Recovered upon error recovery
40	Fd	Suction temperatrue sensor error	Recovered upon error recovery
41	1FF	DC fan A errorr	Recovered by power off

No.	Code	Content	Note
42	FP	DIP switch inconsistency of multiple water pumps	Recovered by power off
43	1L10	Overcurrent protection	Overcurrent fault
	1L11	Transient phase current overcurrent protection	
	1L12	Phase current overcurrent lasts 30s protectionr	
44	1L20	Module over temperature protection	Over temperature fault
45	1L31	Low bus voltage error	Power fault
	1L32	High bus voltage error	
	1L33	Excessively high bus voltage error	
	1L34	Phase loss errorr	
46	1L43	Phase current sampling bias abnormal	hardware fault
	1L45	Motor code not match	
	1L46	IPM protection	
	1L47	Module type not match	
47	1L50	Startup failure	Control fault
	1L51	Out of step error	
	1L52	Zero speed error	
48	1L60	Fan motor phase loss protection	Diagnostic fault
	1L65	IPM short circuit error	
	1L66	FCT detection error	
	1L6A	Open circuit of U-phase upper tube	
	1L6B	Open circuit of U-phase lower tube	
	1L6C	Open circuit of V-phase upper tube	
	1L6D	Open circuit of V-phase lower tube	
	1L6E	Open circuit of W-phase upper tube	
	1L6F	Open circuit of W-phase lower tube	

10.2 Digital display of main board

The data display area is divided into Up area and Down area, with two groups of two-digit half 7-segment digital display, respectively.

a. Temperature display
Temperature display is used for displaying the total outlet water temperature of unit system, outlet water temperature, condenser pipe temperature T3A of system A, condenser pipe temperature T3B of system B, outdoor environmental temperature T4, anti-freezing temperature T6 and setting temperature Ts, with allowable data display scope -15 °C~ 70 °C. If the temperature is higher than 70 °C, it is displayed as 70 °C. If there is no effective date, it displays "— —" and indication point is °C on.

b. Current display
Current display is used for displaying Modular unit system A compressor current IA or system B compressor current IB, with allowable display scope 0 A~99 A. If it is higher than 99 A, it is displayed as 99A. If there is no effective date, it displays "— —" and indication point A is on.

c. Failure display
It is used for displaying the total failure warning date of unit or that of Modular unit, with failure display scope E0~EF, E indicating failure, 0~F indicating failure code. "E-" is displayed when there is no failure and indication point # is on at the same time.

d. Protection display
It is used for displaying the total system protection data of unit or the system protection data of Modular unit, with protection display scope P0~PF, P indicating system protection, 0~F indicating protection code. "P-" is displayed when there is no failure .

e. Unit number display
It is used for displaying the address number of the currently selected Modular unit, with display scope 0~15 and indication point # is on at the same time.

f. Display of online unit number and startup unit number
They are used for displaying the total online Modular units of the whole unit system and the number of the Modular unit under running state, respectively, with display scope 0~16. Any time when the spot check page is entered to display or change Modular unit, it is needed to wait for the up-to-date data of the Modular unit received and selected by wired controller. Before receiving the data, the wired controller only displays "——" on the data display Down area, and the Up area displays the address number of the Modular unit. No page can be turned, which continues until the wired controller receives the communication data of this Modular unit.

10.3 Care and maintenance

1) Maintenance period
It's recommended that before cooling in summer and heating in winter every year, consult local air conditioner customer service center to check and maintain the unit, to prevent air conditioner errors which bring inconvenience to your life and work.
2) Maintenance of main parts
Close attention should be paid to the discharge and suction pressure during the running process. Find out reasons and eliminate the failure if abnormality is found.
Control and protect the equipment. See to it that no random adjustment be made on the set points on site.
Regularly check whether the electric connection is loose, and whether there is bad contact at the contact point caused by oxidation and debris etc., and take timely measures if necessary.
Frequently check the work voltage, current and phase balance.
Check the reliability of the electric elements in time. Ineffective and unreliable elements should be replaced in time.

10.4 Removing scale

After long-time operation, calcium oxide or other minerals will be settled in the heat transfer surface of the water-side heat exchanger. These substances will affect the heat transfer performance when there is too much scale in the heat transfer surface.
and sequentially cause that electricity consumption increases and the discharge pressure is too high (or suction pressure too low). Organic acids such as formic acid, citric acid and acetic acid may be used to clean the scale. But in no way should cleaning agent containing fluoroacetic acid or fluoride should be used as the water-side heat exchange is made from stainless steel and is easy to be eroded to cause refrigerant leakage. Pay attention to the following aspects during the cleaning and scale-removing process:
1) Water-side heat exchanger should be done be professionals. Please contact the local air-conditioner customer service center.
2) Clean the pipe and heat exchanger with clean water after cleaning agent is used. Conduct water treatment to prevent water system from being eroded or re-absorption of scale.
3) In case of using cleaning agent, adjust the density of the agent, cleaning time and temperature according to the scale settlement condition.
4) After pickling is completed, neutralization treatment needs to be done on the waste liquid. Contact relevant company for treating the treated waste liquid.
5) Protection equipments (such as goggles, gloves, mask and shoes) must be used during the cleaning process to avoid breathing in or contacting the agent as the cleaning agent and neutralization agent is corrosive to eyes, skins and nasal mucosa.

10.5 Winter shutdown

For shutdown in winter, the surface of the unit outside and inside should be cleaned and dried. Cover the unit to prevent dust. Open discharge water valve to discharge the stored water in the clean water system to prevent freezing accident (it is preferable to inject antifreezer in the pipe).

10.6 Replacing parts

Parts to be replaced should be the ones provided by our company.
Never replace any part with different part.

10.7 First startup after shutdown

The folowing preparations should be made for re-startup of unit after long-time shutdown:
1) Thoroughly check and clean unit.
2) Clean water pipe system.
3) Check pump, control valve and other equipments of water pipe system.
4) Fix connections of all wires.
5) It is a must to electrify the machine 12 hours before starup.refrigeration system must be completely dry and of vacuum pumping.

10.8 Refrigeration system

Determine whether refrigerant is needed by checking the value of suction and discharge pressure and check whether there is a leakage. Air tight test must be made if there is a leakage or parts of refrigerating system is to be replaced. Take different measures in the following two different conditions from refrigerant injection.
1) Total leakage of refrigerant. In case of such situation, leakage detection must be made on the pressurized nitrogen used for the system. If repair welding is needed, welding cannot be made until all the gas in the system is discharged. Before injecting refrigerant, the whole refrigeration system must be completely dry and of vacuum pumping.
Connect vacuum pumping pipe at the fluoride nozzle at low-pressure side.
Remove air from the system pipe with vacuum pump. The vacuum pumping lasts for above 3 hours. Confirm that the indication pressure in dial gauge is within the specified scope.
When the degree of vacuum is reached, inject refrigerant into the refrigeration system with refrigerant bottle. Appropriate amount of refrigerant for injection has been indicated on the nameplate and the table of main technical parameters. Refrigerant must be injected from the low pressure side of system.
The injection amount of refrigerant will be affected by the ambient temperature. If the required amount has not been reached but no more injection can be done, make the chilled water circulate and start up the unit for injection. Make the low pressure switch temporarily short circuit if necessary.
2) Refrigerant supplement. Connect refrigerant injection bottle on the fluoride nozzle at low-pressure side and connect pressure gauge at low pressure side.
Make chilled water circulate and start up unit, and make the low pressure control switch short circuit if necessary.
Slowly inject refrigerant into the system and check suction and discharge pressure.

⚠ CAUTION

- Connection must be renewed after injection is completed.
- Never inject oxygen, acetylene or other flammable or poisonous gas to the refrigeration system at leakage detection and air tight test. Only pressurized nitrogen or refrigerant can be used.

10.9 Disassembling compressor

Follow the following procedures if compressor needs to be disassembled:
1) Cut off the power supply of unit.
2) Remove power source connection wire of compressor.
3) Remove suction and discharge pipes of compressor.
4) Remove fastening screw of compressor.
5) Move the compressor.

10.10 Auxiliary electric heater

When the ambient temperature is lower than 2 °C, the heating efficiency decreases with the decline of the outdoor temperature. In order to make the air-cooled heat pump stably run in a relatively cold region and supplement some heat lost due to de-frosting. When the lowest ambient temperature in the user's region in winter is within 0 °C~10 °C, the user may consider to use auxiliary electric heater. Please refer to relevant professionals for the power of auxiliary electric heater.

10.11 System antifreezing

In case of freezing at the water-side heat exchanger interval channel, severe damage may be caused, i.e. heat exchange may be broken and appears leakage. This damage of frost crack is not within the warranty scope, so attention must be paid to antifreezing.
1) If the unit that is shutdown for standby is placed in an environment where the outdoor temperature is lower than 0°C, the water in the water system should be drained.
2) Water pipe may be frozen when the chilled water target flow controller and anti-freezing temperature senor become ineffective at running, therefore, the target flow controller must be connected in accordance with the connection diagram.
3) Frost crack may happen to water-side heat exchanger at maintenance when refrigerant is injected to the unit or is discharged for repair. Pipe freezing is likely to happen any time when the pressure of refrigerant is below 0.4Mpa. Therefore, the water in the heat exchanger must be kept flowing or be thoroughly discharged.

10.12 Water flow switch antifreezing

When the unit is shut down and powered off at a lower ambient temperature, if it is placed in an outdoor environmentwith a temperature below 2 °C, the water flow switch inside the unit should be removed (as shown in the figure below), and theremaining water should be thrown dry before reinstalling it in place.

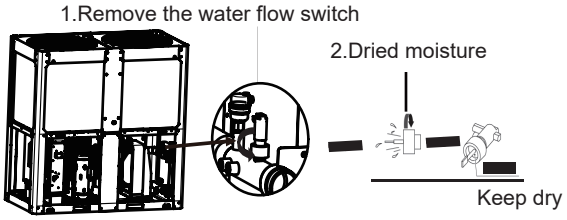


Fig. 10-1 Water flow switch drying diagram

10.13 Frost protection

1) The system design must consider the followin methods as a whole:
ensure continuous water circulation in the pipes and heat exchangers.
2) Apply additional moisturizing and heating to exposed pipes (inside and outside) as well as equipment along the pipes.
3) Add appropriate amount of ethylene glycol to the waterway.
4) If the unit does not work during the winter, clean and empty the water-water heat exchanger.

⚠ WARNING

- It is the responsibility of installers and/or maintenance personnel to ensure that the above antifreeze methods are used.
- Ensure proper protection against freezing is maintained at all times.
- Failure to follow the above instructions may result in damage to the equipment and a significant release of refrigerant.

NOTE

- Note that damage caused by freezing is not covered by the warranty.
- Electric heater (available on request).
  Heating belts are installed on water-side components (water-water heat exchangers and expansion tanks, etc.) to protect key components of the water system.
- The on-site ammonia heating belt must be provided by the installation personnel.

10.14 Y-type strainer

The Y-type strainer must be installed.
1) Function of Y-type strainer
Used to strainer impurities and particles from water.
Protect the heat exchanger from being damaged.
Protect the water flow switch to ensure operation.
Protect water pumps, valves, water meters and other equipment from being turned off warning.

⚠ WARNING

Not installing Y-type strainer or installing incorrect Y-type strainer over-honesty device will lead to heat exchanger damage, resulting in the leakage of refrigerantand and serious consequences.

2) Y-type strainer selection
Y-type strainer should meet standards.According to the technical parameters provided by the Y-type strainer manufacturer, water resistance is included in the calculation of pump selection.
3) Installation precautions
Ensure that the use of pressure should be within the specified range, to avoid excessive pressure on the Y-type strainer caused by damage.Before installing the Y-type strainer, the inside of the Y-type strainer must be cleaned to ensure the patency and strainering effect of the Y-type strainer.
4) Installation position
It must be installed at the inlet of the water pipeline to facilitate the filtration of impurities in the water. The installation position must avoid the impact of external forces.

NOTE

- It is suggested that regular cleaning of the Y-type strainer will accumulate certain impurities and gather in the use of a period of time, affecting the filtration effect.Therefore, the Y-type strainer should be cleaned regularly to maintain the patency of the Y-type strainer.
- If you want to clean or replace the Y strainer, close the valves on both sides and start cleaning after reducing pressure. Empty the impurities, clean the mesh strainer or replace the mesh strainer.
- When replacing the mesh strainer, it is necessary to select the mesh strainer with the matching specification and model of the Y-type strainer to ensure the strainering effect and patency.

10.15 Maintenance checklist

By user

Table 10-4

Items	Recommended frequency	YES	NO
Clean the surrounding of the outdoor unit	Once a month		

By installer

Table 10-5

Items	Recommended frequency	YES	NO
General			
Check if all the parts are in the proper position	Once a year		
Water loop			
Check if the water pressure is sufficient	Once a year		
Clean the strainer in water system	Once a year		
Check if the flow switch works in good condition	Once a year		
Check if the water pressure relief valve (in water system) works in good condition	Once a year		
Check if the water pressure relief valve (in DHW water loop) works in good condition	Once a year		
Check if the insulation of backup heater is in good condition	Once a year		
Check if there is water leakage in the water loop Take care if anti-refrigerant is applied	Once a year		
Check if the booster heater of DHW water tank is clean and in good condition	Once a year		
Wiring and electrical parts			
Check if the temperature sensor works in good condition	Once a year		
Check if the wiring and cables of the installation is in good condition	Once a year		
Check if the contactors and circuit breakers works in good condition	Once a year		
Refrigerant loop			
Check if there is refrigerant leakage in the refrigerant loop	Once a year		

RECORD TABLE OF TEST RUN AND MAINTENANCE

Table 11-2

Model:	Code labeled on the unit:
Customer name and address:	Date:
1. Check temperature of chilled water or hot water	
Inlet ( )	Outlet ( )
2. Check air temperature of air-side heat exchanger:	
Inlet ( )	Outlet ( )
3. Check refrigerant suction temperature and superheating temperature:	
Refrigerant suction temperature:	( ) ( ) ( ) ( ) ( )
Superheating temperature:	( ) ( ) ( ) ( ) ( )
4. Check pressure:	
Discharge pressure: ( ) ( ) ( ) ( ) ( )	
Suction pressure: ( ) ( ) ( ) ( ) ( )	
5. Check running current: ( ) ( ) ( ) ( ) ( )	
6. Whether unit has been through refrigerant leakage test?	( )
7. Whether there is noise on all the panels of unit?	( )
8. Check whether the main power source connection is correct.	( )

RECORD TABLE OF ROUTINE RUNNING

Table 11-3

Model:		Date:												
Weather:		Operation time: Startup ( ) Shutdown ( )												
Outdoor temperature	Dry bulb	°C												
	Wet bulb	°C												
Indoor temperature		°C												
Compressor	High pressure	MPa												
	Low pressure	MPa												
	Voltage	V												
	Current	A												
Air temperature of air-side heat exchanger	Inlet (dry bulb)	°C												
	Outlet (dry bulb)	°C												
Temperature of chilled water or hot water	Inlet	°C												
	Outlet	°C												
Current of cooling water pump or hot water pump		A												
Note:														

11 TECHNICAL DATA

Table 11-1

Model	3-phase	3-phase	3-phase
	50 kW	60 kW	70 kW
Nominal capacity	Refer to the Technical Data		
Dimensions H×W×D	2 000 mm x 960 mm x 1 880 mm		
Packing dimensions H×W×D	2 850 mm x 1 030 mm x 2 050 mm		
Weight			
Net weight	560 kg		
Gross weight	585 kg		
Connections			
Specifications of water pipe	DN 50		
Pipe connection	Hoop connection		
Water side heat exchanger			
Water pressure drop	60 kPa		
Operating Maximum pressure	2100 kPa		

Operation range - water side	
Heating	+25 to +85 °C
Cooling	-5 to +25 °C
Operation range - air side	
Heating	-25 to 43°C
Cooling	-15 to 48°C
Domestic hot water by heat pump	-25 to 43 °C

Refrigerant	
Refrigerant type	R290
Refrigerant charge	5.6 kg(2.8 kg per system)

Fuse – on PCB		
PCB name	Main control board A/B	Expansion board
Model name	FUSE-T-5A/250VAC-T/S	FUSE-T-3.15A/250VAC-T-P
Working voltage (V)	250	250
Working current (A)	5	3.15

Fuse – on Electronic control box	
Model name	FUSE-T-100A/690VAC-T/S
Working voltage (V)	690
Working current (A)	100

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