

# Hi-Master V Installation

R290(Propane) ATW Heat Pump



**IMPORTANT NOTE:**

Thank you very much for purchasing our product. Before using your unit, please read this manual carefully and keep it for future reference.



# CONTENTS

1 Foreword .....	1
1.1 The Symbol Description of the Device .....	2
2 General Instructions .....	14
2.1 Unboxing Steps .....	14
2.2 Accessories .....	15
2.3 Main Parts of Unit .....	16
2.4 Main Parts of Electric Control Box .....	17
2.5 Installation and Use Temperature Range .....	18
2.6 Transportation and Lifting .....	19
2.7 Split Hydraulic Module and Control Module .....	22
2.8 Installation and Operation Safe Space .....	23
3 Installation Location and Precautions .....	24
3.1 Pre-requirements .....	24
3.2 Location and Space .....	24
3.3 Installation Layout .....	28
3.4 Electrical Installation .....	31
3.5 Electrical Connection .....	32
4 Trial After Installation .....	42
4.1 Inspection Before Trial Running .....	42
4.2 Trial Running .....	42
5 Maintenance and Winterization .....	43
5.1 Maintenance .....	43
5.2 Winterizing .....	43
6 Removal Procedures for Outdoor Units .....	44

## 1 Foreword

Before starting the installation, please read the relevant contents of the installation instructions carefully and comply with basic safety regulations when performing operations. Personnel involved in the operation and installation of the refrigerant system must have corresponding qualifications and certificates. The air source heat pump with R290 refrigerant has special characteristics. Since R290 refrigerant is flammable and explosive, the standard installation operation must be carried out strictly in accordance with this instruction manual. If safety accidents and personal injuries occur due to non-standard installation operations, we will not assume any legal responsibility.

The symbols in the instruction manual are divided into four categories: danger, warning, caution, and note.



### **DANGER**

This symbol indicates a potentially high-risk hazard that should be avoided with caution as death or serious personal injury may result. Please be sure to carefully read the points where this symbol appears, which can help you effectively avoid these risks.



### **WARNING**

This symbol indicates a potentially medium-risk hazard that should be avoided with caution, otherwise death or serious personal injury may result. Please be sure to carefully read the points where this symbol appears, which can help you effectively avoid these risks.



### **CAUTION**

This symbol indicates a potentially low-risk hazard that should be avoided with caution or could result in death or serious personal injury. Please be sure to carefully read the points where this symbol appears, which can help you effectively avoid these risks.








### **NOTE**

This symbol indicates additional information and some attention to detail.

## 1.1 The Symbol Description of the Device

The signs posted on internal and external units mainly include the following. Please read them carefully and strictly abide by them.

Symbols	Meaning	Description
	<b>WARNING</b>	The symbol shows that this appliance uses a flammable refrigerant. If the refrigerant is leaked and exposed to an external ignition source, there is a risk of fire.
	<b>WARNING</b>	The symbol shows that this appliance uses a low burning velocity material. Please keep away from the fire source.
	<b>CAUTION</b>	This symbol shows that the operation manual should be read carefully.
	<b>CAUTION</b>	This symbol shows that service personnel should be handling this equipment with reference to the installation manual.
	<b>CAUTION</b>	This symbol shows that information is available such as the operating manual or installation manual.

## User qualifications



### **DANGER**

These instructions are only applicable to authorized and qualified dealers and qualified installers.

- Installation operations in A3 grade flammable and explosive R290 refrigerant circuit system heat pumps can only be carried out by authorized and qualified HVAC dealers and qualified installers. These HVAC dealers and installers must receive qualified training according to EN 378 Part 4 or IEC 60335-2-40, Section HH. Operators need to have industry-recognized job skills certificates.
- Brazing/welding work in R290 refrigerant circuit system heat pumps can only be performed by personnel certified according to ISO 13585 and AD 2000, Data sheet HP 100R. Only qualified and certified HVAC dealers should perform brazing/welding work.

The operation process must fall within the application scope of the application and be carried out in accordance with the prescribed procedures. According to the Pressure Vessels Directive (2014/68/EU), welding/brazing work on heat pump type pressure vessel connections requires certification of personnel and processes by a notified body.

- The wiring related to electrical installation, including power supply wiring, component wiring and other wiring, must be operated by qualified electricians.
- Before commissioning at the end of the installation, all safety-related links and matters must be inspected by a certified and qualified HVAC dealer. The installed heat pump heating system must be commissioned by the installer or a qualified person authorized by the installer.

## Expected Usage

This product is designed based on the reverse Carnot cycle principle. Through the state change of the refrigerant, it absorbs the heat in the air, thereby providing heat for heating and domestic hot water to the user's residential building. This product is an outdoor integrated unit that can be used in conjunction with indoor control modules, small hydraulic modules, and large hydraulic modules. It facilitates installation and saves system maintenance costs. Improper or accidental use may cause injury or death to the user or others, or damage to the product and other property.

This product is suitable for outdoor installation only. This product is for home use only, which means the following locations are not suitable for installation:

- Places with mineral oil mist or oil mist or vapor. Plastic parts may deteriorate, causing joints to loosen and leak.
- In places where corrosive gases (such as sulfurous gas) are generated, or corrosion of copper pipes or welded parts may cause refrigerant leakage.
- Near mechanical equipment that emits large amounts of electromagnetic waves. Huge electromagnetic waves may interfere with system control and cause equipment failure.
- In places where flammable gases may leak, carbon fibers or flammable dust are suspended in the air, or volatile flammable substances such as thinner or gasoline are handled. These types of gases can cause fires.
- In places with high concentrations of salt in the air, such as areas near the ocean.
- In places with large voltage fluctuations, such as locations within factories.
- In a vehicle or vessel.
- Where acidic or alkaline vapor exists

**Intended uses include the following:**

- Follow the operating instructions for the product and other installed components.
- Observe all inspection and maintenance conditions listed in the instructions.
- Install and set up products as per product and system approvals.
- Installation, commissioning, inspection, maintenance and troubleshooting by qualified contractors and authorized installers.



**CAUTION**

Improper use of any kind is prohibited:

- Do not flush the device.
- Do not place any objects or equipment on top of the unit (top plate).
- Do not climb, sit or stand on top of this device.

**Regulations to be followed:**

1. National installation regulations.
2. Legal provisions to prevent accidents.
3. Legal provisions for environmental protection.
4. Legal requirements for pressure equipment: Pressure Equipment Directive 2014/68/EU.
5. Industry practices of relevant industry associations.
6. Relevant country-specific safety regulations.
7. Regulations and guidelines applicable to the operation, service, maintenance, repair and safety of refrigeration, air conditioning and heat pump systems containing flammable and explosive refrigerants.



## Operating safety instructions

The outdoor unit contains flammable refrigerant R290 (propane C<sub>3</sub>H<sub>8</sub>). If a leak occurs, the escaping refrigerant may create flammable and explosive conditions in the ambient air. A safety zone is defined in the immediate surroundings of the outdoor unit and special regulations need to be observed when servicing the equipment. See the "Safe Zone" section.

### Work in a safe area



#### **DANGER**

Explosion risk: Refrigerant leaks may create a flammable or explosive atmosphere in the ambient air. Take the following measures to prevent fires and explosions in safe areas:

- Stay in safe areas away from sources of ignition, including naked fires, sockets, hot surfaces, switches, light fixtures, appliances that are not fire-resistant, and mobile devices with integrated batteries (such as cell phones and fitness watches).
- Do not use any sprays or other flammable gases in safe areas.



#### **CAUTION**

Permitted tools: All tools used for work in safe areas must be designed in accordance with applicable standards and regulations and comply with the requirements for explosion protection for refrigerants of safety groups A2L and A3, such as brushless machines (cordless processing vessels, installation aids and screwdrivers ), extraction equipment, vacuum pumps, conductive hoses and non-sparking machine tools.



## CAUTION

These tools must be within a reasonable pressure range during use and maintained in a good state of maintenance.

- Electrical equipment must comply with the requirements for explosion hazardous areas.
- Do not use flammable materials such as sprays or other flammable gases.
- Before starting work, discharge static electricity by touching a grounded object (such as a heating or water pipe). Do not remove, block, or bridge security devices.
- Do not make any changes: Do not modify the outdoor unit, inlet/outlet ducts, electrical connections/cables, or surroundings. Do not remove any components or seals.

## About the refrigerant system



## WARNING

- The following applies to R290 refrigerant system.
- Before working on systems containing flammable refrigerants, safety checks are required to minimize the risk of fire.

### **Before performing refrigeration system repairs, the following precautions should be observed:**

1. Work should be carried out under controlled procedures to minimize the risk of flammable gases or vapors that may be present while the work is being carried out.
2. All maintenance personnel and others working on site should be informed of the nature of the work being performed. Work in confined spaces should be avoided and work areas should be isolated. Keep work areas safe by controlling flammable materials.
3. Before and during work, work areas should be inspected using appropriate refrigerant detectors to ensure technicians are aware of potentially flammable atmospheres.
4. Ensure that the leak detection equipment used is suitable for flammable refrigerants,

i.e. the equipment should be non-sparking, well-sealed or inherently safe. If hot work will be carried out on the refrigeration equipment or any associated components, appropriate fire-fighting equipment should be available. Place a dry chemical or CO<sub>2</sub> fire extinguisher next to the filling area.

5. Any person performing work in connection with piping that contains or has contained flammable refrigerant must not use any ignition source that may create a risk of fire or explosion.

6. All possible sources of ignition, including lit cigarettes, should be kept away from the site of installation, repair, disassembly and handling, during which flammable refrigerant may be released into the surrounding space.

7. Before work is carried out, the area around the equipment should be inspected to ensure that there are no flammable hazards or risk of ignition. "No Smoking" signs should be displayed.

8. Before disassembling the system or performing any hot work, make sure the area is open or adequately ventilated. A certain degree of ventilation should be maintained during work to safely disperse the released refrigerant and preferably vent it to the atmosphere.

9. As with the replacement of any electrical components, they should be suitable for the intended use and conform to the correct specifications.

10. Always follow the manufacturer's maintenance and service instructions. If in doubt, please consult the manufacturer's technical department for assistance.

**Installations using flammable refrigerants should be inspected for the following:**

- The amount of charging should be determined according to the size of the room where the components containing refrigerant are installed;
- Ventilation equipment and air outlets should operate normally and must not be blocked;
- If an indirect refrigeration circuit is used, the secondary circuit should be checked to see if it contains refrigerant;
- Equipment identification should remain clearly visible. Unclear logos and signs should be corrected;
- Refrigeration piping or components should be installed in a location where they are unlikely to come into contact with any substance that may corrode the components containing the refrigerant, unless the components are made of corrosion-resistant

materials or are appropriately protected against corrosion.

Repair and maintenance of electrical components should include initial safety inspections and component inspection procedures. If there is a fault that may compromise safety, power should not be connected to the circuit until the fault has been satisfactorily dealt with. If a fault cannot be corrected immediately, but operation must continue, adequate temporary solutions should be used. This situation should be reported to the owner of the device so that advice can be provided to all parties involved.

**The initial security check should include the following:**

- Capacitors should be discharged in a safe manner to avoid the possibility of sparks;
- When inflating, recycling or cleaning the system, no moving electrical parts and wires should be exposed;
- Grounding should be continuous. When repairing sealed components, all electrical power should be disconnected from the equipment being worked on before removing any sealing covers or other components. If equipment must remain connected to the power supply during repairs, permanent leak detection should be performed at the most critical points to avoid potential hazards.

Pay special attention to the following points to ensure that when handling electrical components the enclosure is not altered and thus affects the level of protection. This includes damaged cables, too many connections, terminals that do not meet original specifications, damaged seals, and improperly installed sealing threads. Make sure the seal or sealing material has not deteriorated to the point that it no longer protects against the ingress of flammable gases. Replacement parts should conform to manufacturer's specifications.

Do not place any permanent inductive or capacitive load on a circuit that exceeds the voltage or current allowed by the equipment.

In an environment where flammable gases are present, only intrinsically safe components may be repaired while powered. Test equipment should have the correct ratings.

Only replace components with parts specified by the manufacturer. Other parts may leak and cause the refrigerant in the air to catch fire.

Check to make sure the cables are free from wear, corrosion, excessive stress, vibration, sharp edges, or any other adverse environmental effects. Inspections should also take into account the effects of age or ongoing vibration from sources such as compressors or fans.

When opening a refrigerant circuit for maintenance or other purposes, follow normal procedures. However, it is important to follow best practices.

**Since flammability is a consideration, the following process should be followed:**

- Remove refrigerant;
- Purge the circuit with inert gas;
- Vacuum;
- Purge the circuit with inert gas again;
- Open the circuit by cutting or brazing.

Refrigerant should be recycled into the correct recycling cylinder. The system should be "flushed" with Oxygen Free Nitrogen (OFN) to ensure the safety of the unit. This process may need to be repeated several times. Compressed air or oxygen should not be used for this task.

Flushing should be accomplished by using OFN in the system to break the vacuum, continuing to charge until operating pressure is reached, then emptying to atmosphere and evacuating. This process should be repeated until no refrigerant is present in the system. When the last OFN charge is used, the system should be vented to atmospheric pressure in order to begin operation. This operation is absolutely necessary if pipe brazing is to be performed.

Make sure the vacuum pump outlet is not near any source of ignition and that there is adequate ventilation.

Ensure that contamination of different refrigerants does not occur when using inflatable equipment.

Hoses or lines should be kept as short as possible to reduce the amount of refrigerant contained within them.

Before re-inflating the system, a pressure test should be performed using OFN.

### **Decommissioning:**

Before starting this procedure, the technician must be completely familiar with the equipment and all its details. It is recommended that all refrigerants be recycled safely. Oil and refrigerant samples should be removed prior to performing the task to prevent the need for analysis prior to reuse of the recovered refrigerant. Before starting a task, you must ensure that power is available.

- a) Be familiar with the equipment and its operation.
- b) Electrically isolate the system.
- c) Before trying this program, please make sure:

- Mechanical handling equipment is available, if necessary, for handling refrigerant cylinders;
- All personal protective equipment is available and used correctly;
- The recycling process is always supervised by qualified personnel;
- Recycling equipment and cylinders should comply with corresponding standards.

d) If possible, evacuate the refrigeration system.

e) If vacuum is not possible, make multi-directional ducts to remove refrigerant from various parts of the system.

f) Ensure the cylinder is placed on the scale before recovery.

g) Start the recovery equipment and follow the manufacturer's instructions.

h) Do not overfill the cylinder. (Liquid aeration volume does not exceed 80%).

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

j) When the cylinder is properly filled, ensure that the cylinder and equipment are removed from the site immediately and all isolation valves on the equipment are closed.

k) Recycled refrigerant should not be added directly to another refrigeration system unless it has been cleaned and inspected.

Equipment should be marked out of service and drained of refrigerant. The label should be dated and signed. Make sure the equipment has a label stating it contains flammable refrigerant.

It is recommended that all refrigerant be safely removed when removing refrigerant from the system, whether for servicing or decommissioning. Always transfer refrigerant to the appropriate cylinder. Make sure there are a sufficient number of cylinders to support filling the entire system. All cylinders to be used should be designated as recovered refrigerant and labeled accordingly (i.e. dedicated cylinders for recovered refrigerant). Cylinders should be equipped with pressure relief valves and associated shut-off valves and be in good working order. Empty recovery gas bottles should be evacuated and cooled down if possible.

Recovery equipment should be in good working order and equipped with a set of instructions for the equipment used and suitable for the recovery of flammable refrigerants. In addition, a calibrated set of weighing scales should be available and functioning properly. Hoses should be equipped with leak-free quick connectors and function properly. Before using the recovery machine, check to make sure it is in good working order and properly maintained, and that all relevant electrical components are sealed to prevent refrigerant leaks that could cause a fire. If in doubt, please consult

the manufacturer.

Recycled refrigerant should be returned to the refrigerant supplier using the correct recycled cylinder and relevant waste transfer records arranged. Do not mix refrigerant in recovery units or cylinders. If any compressor or compressor oil needs to be removed, make sure it is evacuated to an acceptable level to ensure that flammable refrigerant is not left in the oil. Before returning the compressor to the supplier, it should be evacuated. To speed up this process, the compressor body can only be heated with an electric heater. Draining oil from the system should be done safely.



## **WARNING**

- Please disconnect the device from the power source when performing repairs and replacing parts.
- These devices are partial unit air conditioners that comply with the partial unit requirements of this international standard and can only be connected to other units that have been confirmed to meet the corresponding partial unit requirements.

## **Refrigerant leak detection**

The following leak detection methods are considered suitable for systems containing flammable refrigerants.

Electronic leak detectors should be used to detect flammable refrigerants, but may not be sufficiently sensitive or may need to be recalibrated. (Detection equipment should be calibrated in a refrigerant-free area.) Make sure the detector is not a potential ignition source and is suitable for use with the refrigerant. Leak detection equipment should be set at a percentage of the lower limit concentration of the refrigerant and should be calibrated to the percentage of gas applicable to the refrigerant used (up to 25%). Leak detection fluid should work with most refrigerants, but detergents containing chlorine should be avoided as the chlorine may react with the refrigerant and corrode the copper pipes. If a leak is suspected, any bare flames should be removed or extinguished. If a refrigerant leak is discovered and brazing is required, all refrigerant should be recovered from the system or a portion of the system should be isolated (by closing a valve) away from the leak. During the brazing process, oxygen free nitrogen (OFN) should be used for cleaning in the system and during the brazing process.

## **Disposal**

This equipment uses flammable refrigerant. Equipment must be disposed of in compliance with national regulations.

Do not dispose of this product as unsorted municipal waste. This type of waste requires separate collection for special treatment.

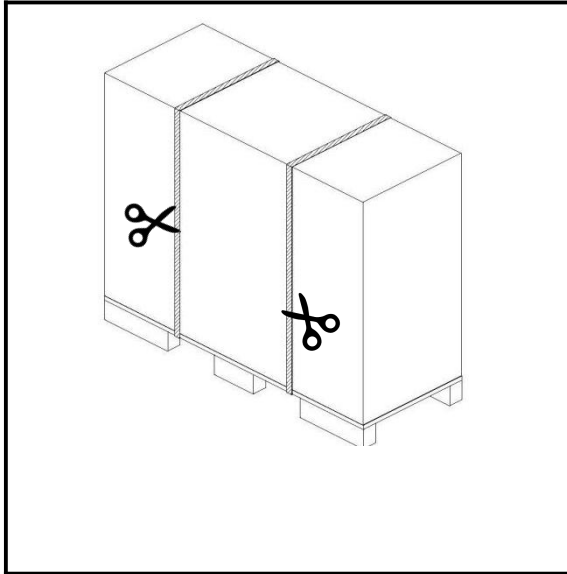
- Do not dispose of electrical equipment as unsorted municipal waste but use separate collection facilities.
- Contact your local government for information on available collection systems.

If electrical equipment is disposed of in landfills or dumps, hazardous materials can leak into groundwater and enter the food chain, harming your health and well-being.

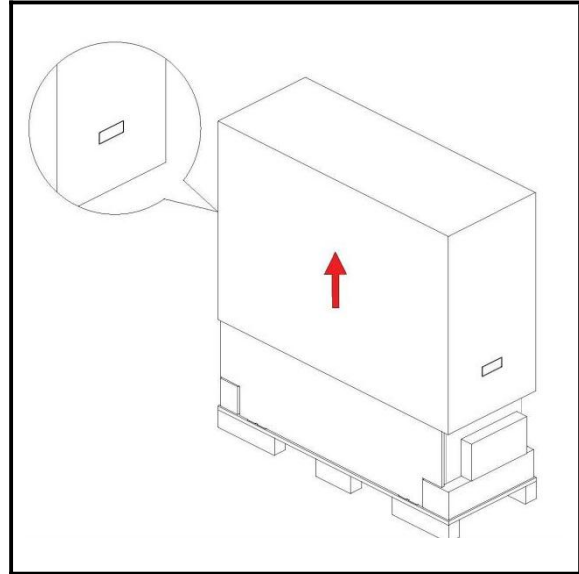


## 2 General Instructions

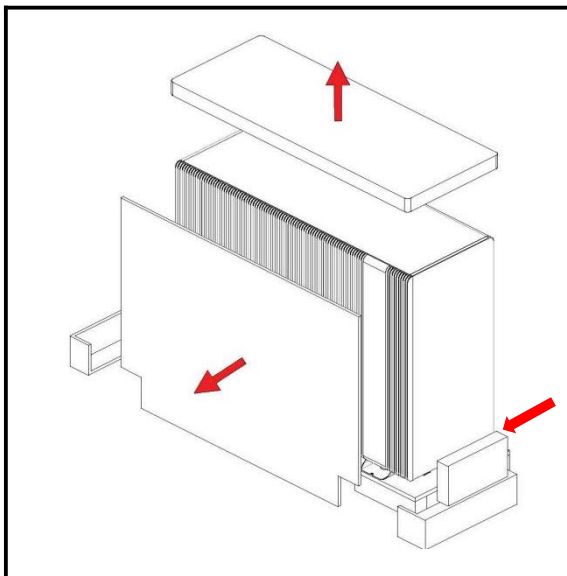
### 2.1 Unboxing Steps



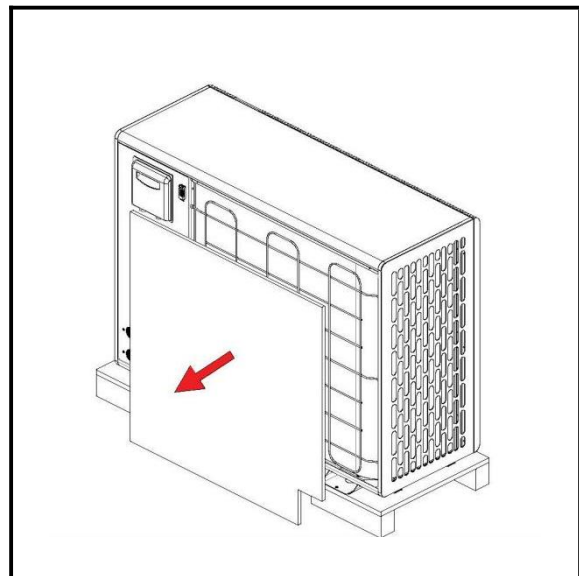
1. Go around to see if the package is intact and use scissors to untie the tie.



2. Use the left and right handles to lift the carton upwards



3. Remove protective cardboard from top and front panels



4. Remove the protective cardboard from the back

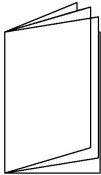

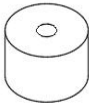


For more details on the accessory box, please see chapter 2.2 Accessories.



#### NOTE

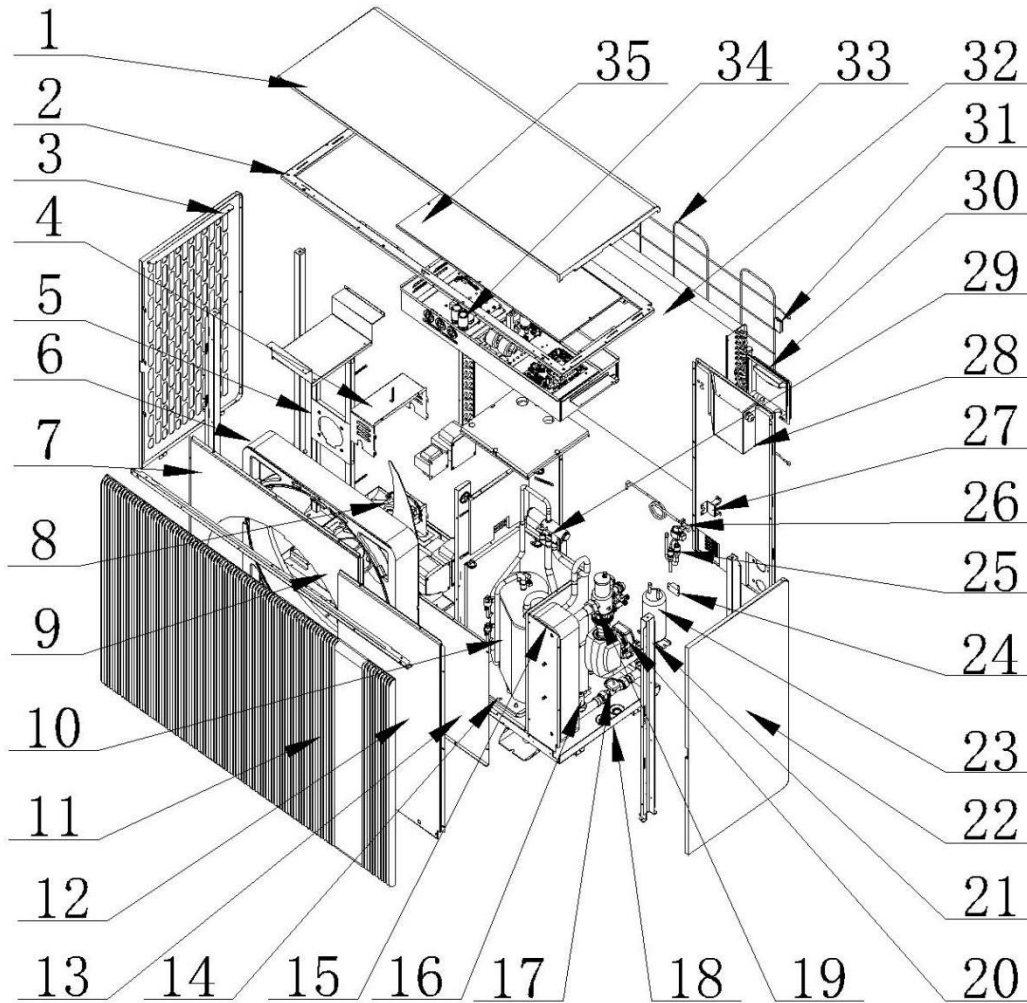
Applicable to all models of Hi-Master series 6-16KW.

## 2.2 Accessories

Name	Illustration	Quantity
Installation Manual		1
Energy Label		1
Rubber Mat		4
Drain Nozzle		1
Sling		2

### 2.3 Main Parts of Unit

6KW / 9KW / 13KW / 16KW

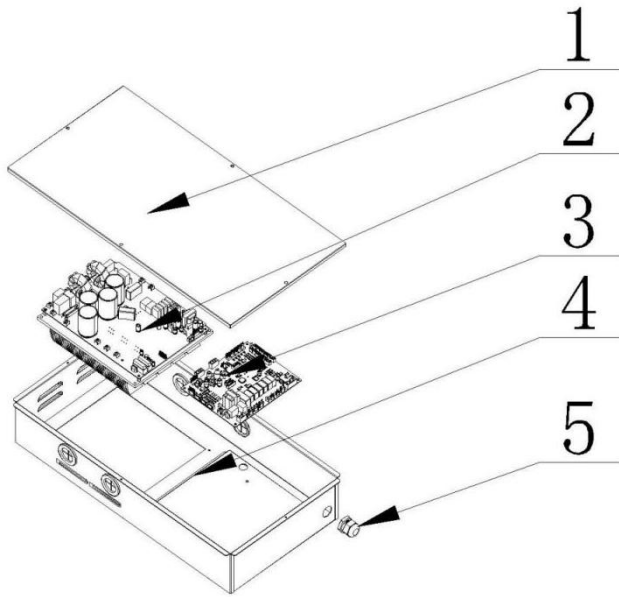


No	Description	No	Description	No	Description
1	Top Cover	13	Fixed Frame	25	Throttle Assembly
2	Upper Frame	14	Compressor Mounting late	26	Stop Valve Assembly
3	Left Plate	15	Plate Heat Exchanger	27	Fixed Frame
4	Reactor Shield	16	Water Flow Switch	28	Junction Box
5	Motor Support	17	Vortex Flowmeter	29	Four-way Valve
6	Air Guide Plate	18	Chassis	30	Handle
7	Fixed Frame	19	Gas and Magnetic Dirt Seperator	31	Ambient Temp. Sensor Holder
8	Fan Motor	20	Water Pump	32	Finned Heat Exchanger
9	Fan Blade	21	Columns	33	Back Net
10	Compressor	22	Right Plate	34	Electrical Box
11	Front Plate	23	Liquid Reservoir	35	Electrical Box Cover
12	Front Service Plate	24	R290 Refrigerant Sensor		

## 2.4 Main Parts of Electric Control Box

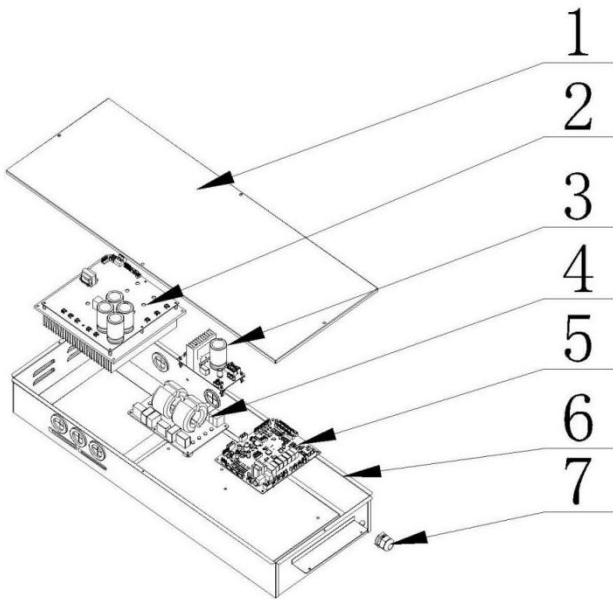
1 Phase 6/9KW

1 Phase 13KW



1	Electrical Box Cover
2	Compressor Driver Board
3	External Main Board
4	Electrical Box
5	PG Connector

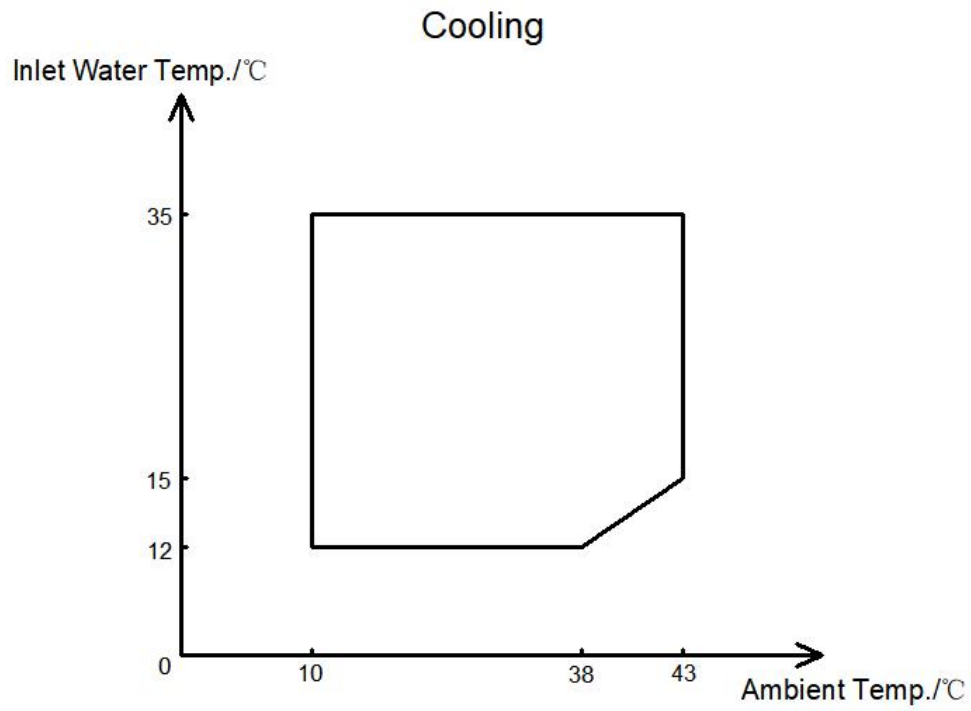
3 Phase 13/16KW



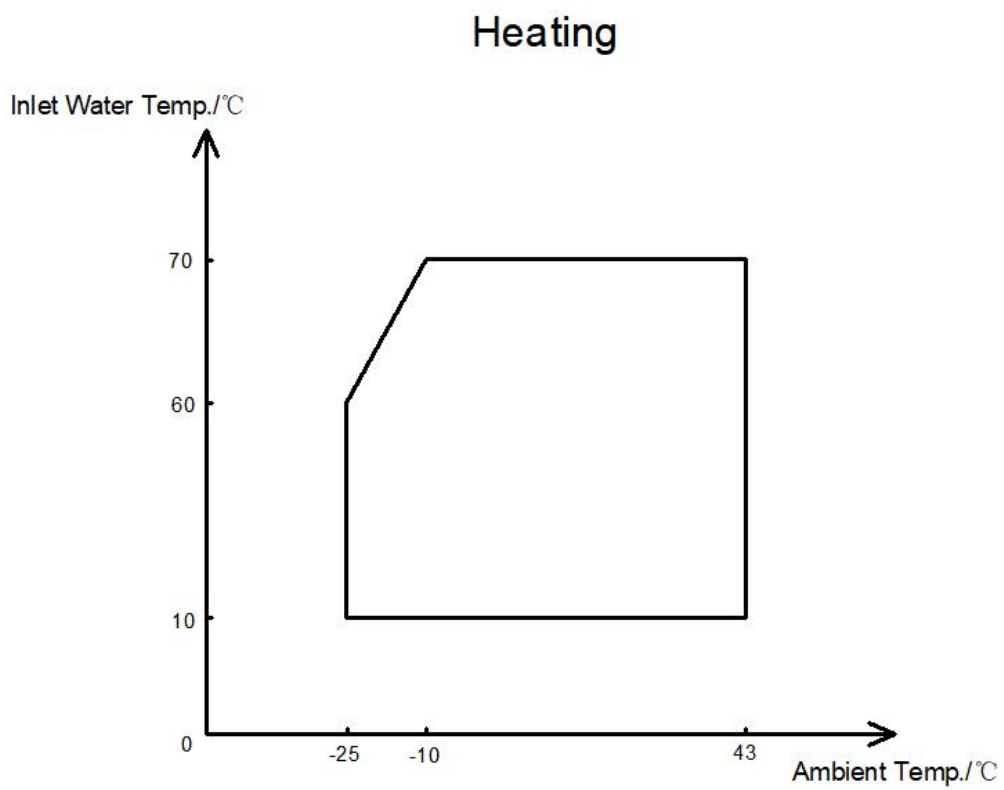
1	Electrical Box Cover
2	Compressor Driver Board
3	Fan Driver Board
4	Filter Board
5	External Main Board
6	Electrical Box
7	PG Connector

## 2.5 Installation and Use Temperature Range

Cooling operating range

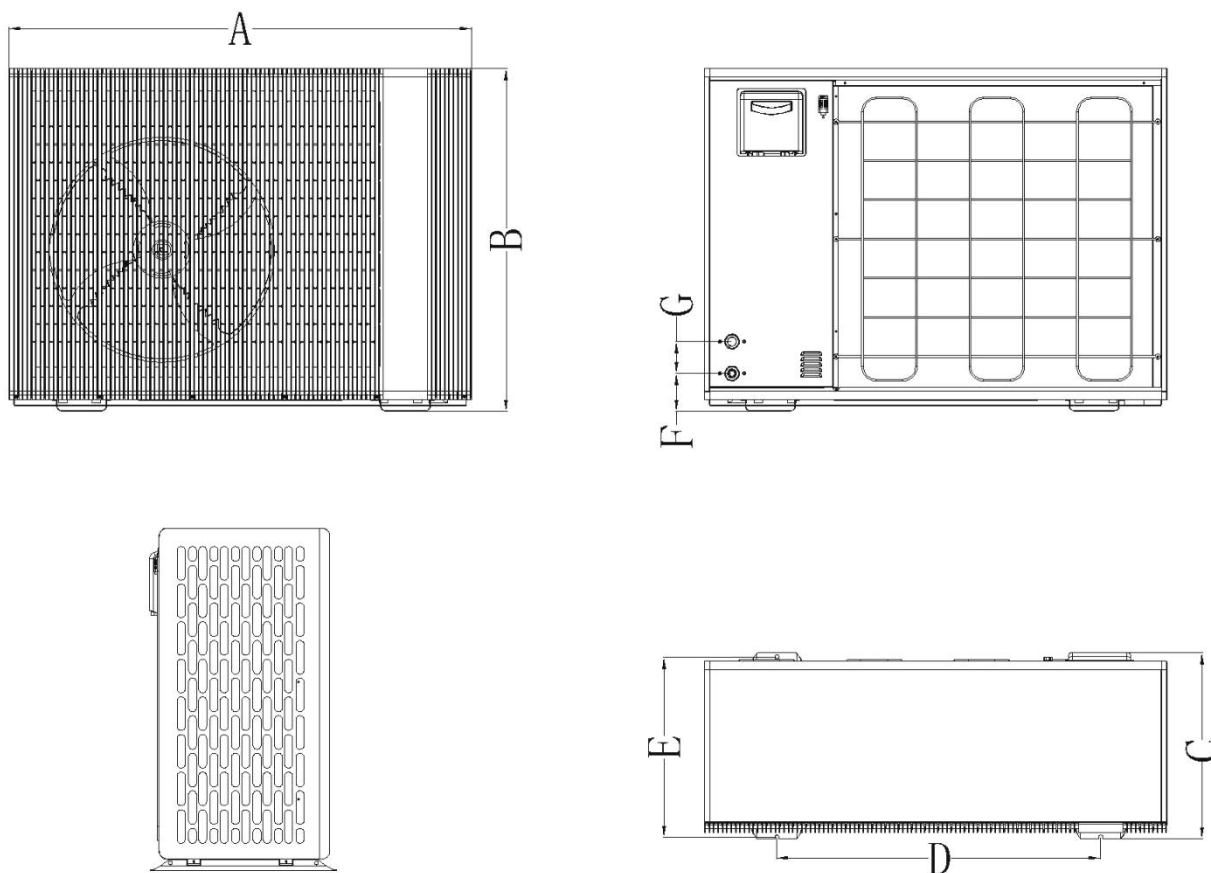


Heating operating range



## 2.6 Transportation and Lifting

### 2.6.1 Dimensions of the Unit



#### NOTE

As shown in the picture above, the appearance of 6~16KW is common, and the appearance dimensions of different models are different. Please see the table below for detailed dimensions.

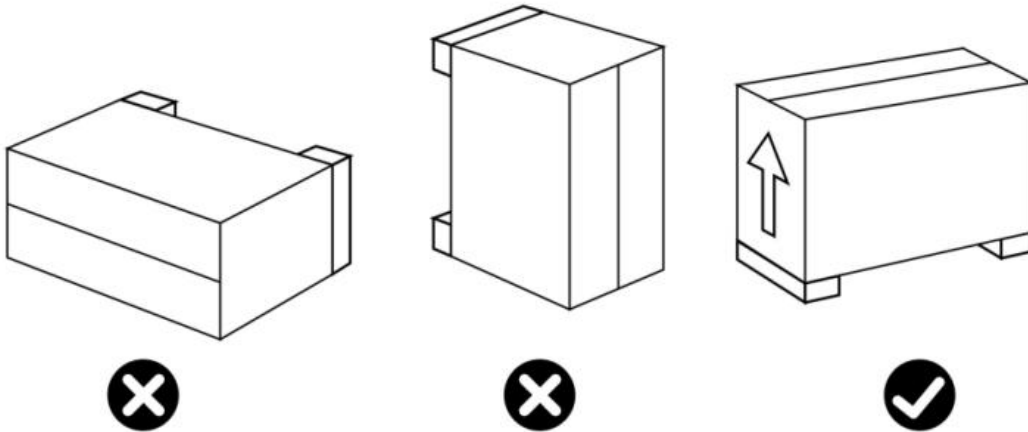
Model	A	B	C	D	E	F	G
1 Phase 6/9KW	1102	1021	557	706	537	112	95
1 Phase 13KW	1377	1021	557	964	537	112	95
3 Phase 13/16KW	1377	1021	557	964	537	112	95

## 2.6.2 Manual handling



### WARNING

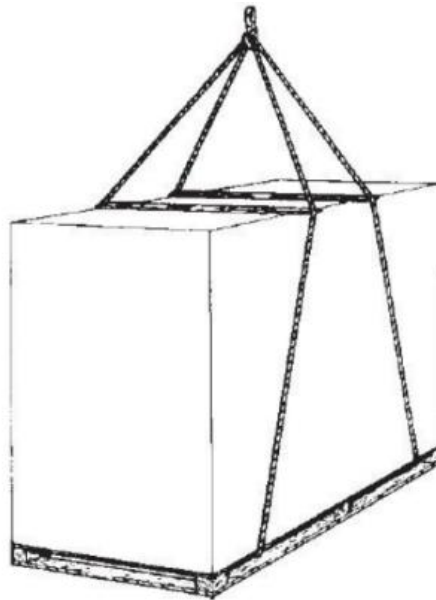
Hi-Master series of models is heavy. When carrying heavy objects, please pay attention to the weight information of the unit and act according to your ability to avoid injury to the waist due to carrying heavy objects. When manually transporting, it is recommended that 2 to 4 people use tools and nylon straps of sufficient strength to carry out the task at the same time.



1. When you move or transport it to the warehouse for storage, the heat pump should be kept upright, and it is strictly prohibited to place it sideways or upside down;
2. Know the weight distribution of the heat pump before transportation. The place where the compressor is installed near the right side is heavier. Choosing the appropriate center of gravity during transportation can make transportation safer;
3. During transportation, the angle of the cargo should not exceed 45°;
4. Remove the straps after transportation.

### 2.6.3 Lifting

1. The unit's handling and lifting plan should be prepared in advance. The plan should include the unit's arrival date, size, weight, handling path, reserved holes and lifting and handling equipment.
2. When hoisting and transporting the unit, do not be careless and keep your distance to ensure your own safety.
3. When hoisting and transporting, the weight of the unit must be considered. Straps should be used as diffusers and supported to prevent panel damage. Try to keep the units horizontal and vertical. It is prohibited to tilt the unit beyond an angle of 30 degrees.
4. When hoisting and transporting the unit, the unit should be prevented from being scratched or deformed, and protective pads or other supports should be placed at the contact areas between the cloth belt and the machine body.



#### **WARNING**

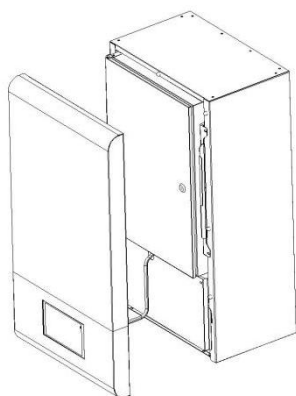
During hoisting, no one is allowed to stand or work at the bottom of the cargo.



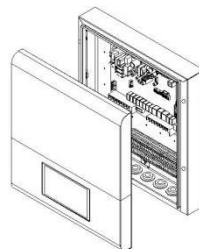
## 2.7 Split Hydraulic Module and Control Module

Hi-Master series of models is designed as a split hydraulic module, which requires a control module or hydraulic module when installed and used.

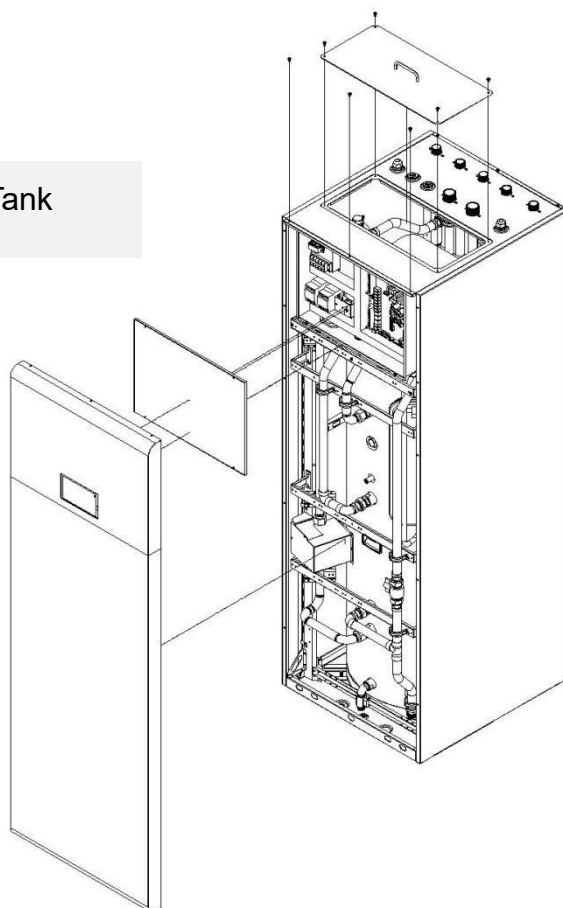
Hydraulic Module



Control Module



Hydraulic Module with Tank



### NOTE

For more details about the hydraulic module and control module, please refer to the "Control Module & Hydraulic Module Instructions".

## 2.8 Installation and Operation Safe Space

The refrigerant circuit in the outdoor unit contains flammable refrigerant and belongs to safety group A3 as described in ISO 817 and ANSI/ASHRAE Standard 34. Therefore, a safety zone is defined in the immediate surroundings of the outdoor unit, to which special requirements apply. Note that this refrigerant is denser than air. In the event of a leak, escaping refrigerant may collect near the floor. The following situations must be avoided within the safe area:

- Building openings such as windows, doors, light wells and flat roof windows;
- Outdoor air and exhaust vents for ventilation and air conditioning systems;
- Property boundaries, adjacent properties, sidewalks and driveways;
- Pump shafts, sewage system inlets, drainage pipes and sewage wells, etc.
- Other slopes, grooves, depressions and channels;
- Power supply connection in the power room;
- Electrical systems, sockets, lamps and lighting equipment, switches, etc.

Do not introduce fire sources into safe areas:

- Bare flame or burner combustion grid assembly.
- Barbecue grill.
- Tools that produce sparks.
- Electrical equipment that does not exclude ignition sources.
- Mobile devices with integrated batteries (such as cell phones and fitness watches).
- Objects with a temperature higher than 360°C.

### 3 Installation Location and Precautions

#### 3.1 Pre-requirements

**Equipment necessary for the installation of your heat pump:**

- ① Power supply cable suitable for the unit's power requirements.
- ② A By-Pass kit and an assembly of PVC tubing suitable for your installation as well as stripper, PVC adhesive, and sandpaper.
- ③ A set of wall plugs and expansion screws suitable to attach the unit to your support.
- ④ We recommend that you connect the unit to your installation by means of flexible PVC pipes in order to reduce the transmission of vibrations.
- ⑤ Suitable fastening studs may be used to raise the unit.

#### 3.2 Location and Space

Please comply with the following rules concerning the choice of heat pump location.

- ① The unit's future location must be easily accessible for convenient operation and maintenance.
- ② It must be installed on the ground, fixed ideally on a level concrete floor. Ensure that the floor is sufficiently stable and can support the weight of the unit.
- ③ A water drainage device must be provided close to the unit in order to protect the area where it is installed.
- ④ If necessary, the unit may be raised by using suitable mounting pads designed to support its weight.
- ⑤ Check that the unit is properly ventilated, that the air outlet is not facing the windows of neighbouring buildings and that the exhaust air cannot return. In addition, provide sufficient space around the unit for servicing and maintenance operations.
- ⑥ The unit must not be installed in an area exposed to oil, flammable gases, corrosive products, sulphur compounds, or close to high-frequency equipment.
- ⑦ To prevent mud splashes, do not install the unit near a road or track.
- ⑧ To avoid causing a nuisance to neighbors, make sure the unit is installed so that it is positioned towards the area that is least sensitive to noise.
- ⑨ Keep the unit as much as possible out of the reach of children.

**Installation space:**

The unit shall be installed in a place with air circulation, no heat radiation or other heat sources, and the allowable minimum distance between the unit and the

surrounding walls or other shelters is: the distance between the air inlet surface and the air inlet surface is more than 300 mm, the distance between every 2 units is more than 600 mm, as shown in the figure:

Unit: mm

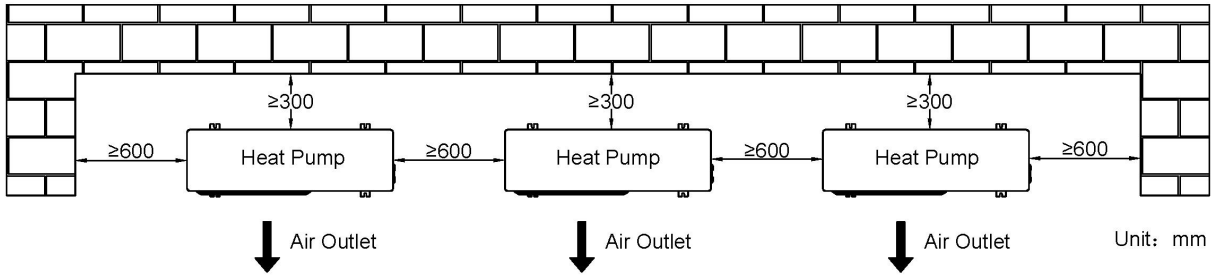
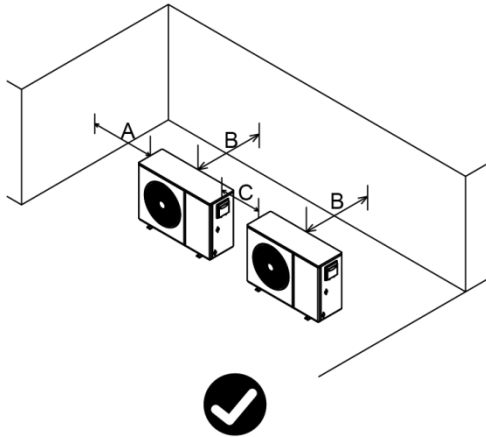
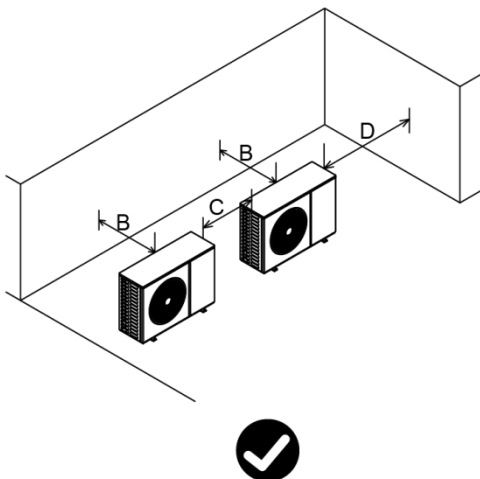


Diagram of the unit installation:

1. It is recommended that the unit be installed in an open position with no obstacle blocking the air outlet of the unit, as shown in the diagram.



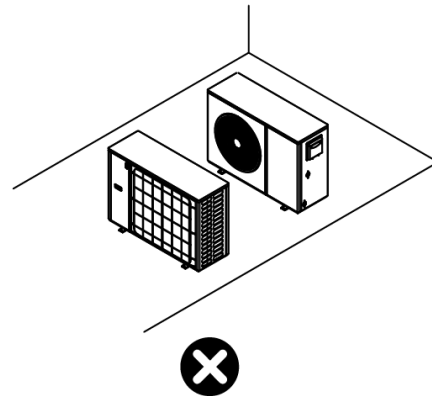
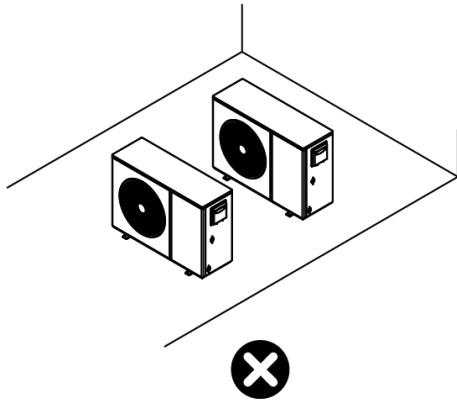
	Unit	Min. Distance
A	mm	600
B	mm	300
C	mm	600



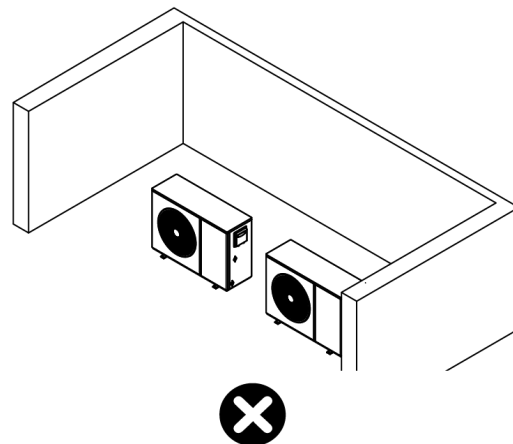
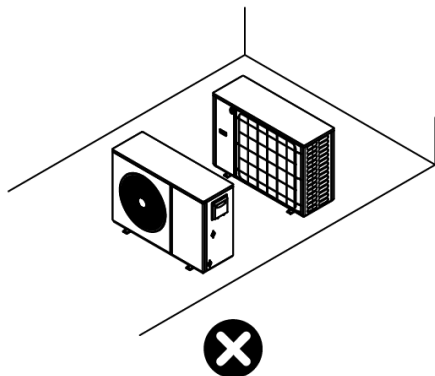
	Unit	Min. Distance
B	mm	300
C	mm	600
D	mm	600

2. It is not recommended to install the unit according to the following installation method.

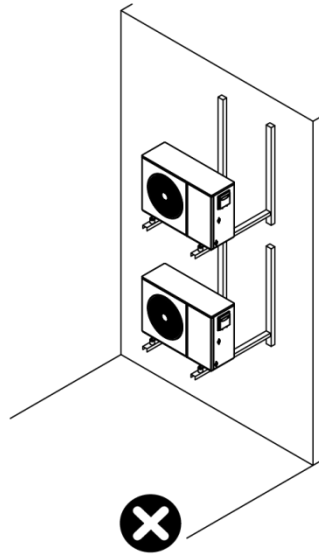
① Do not make the air outlet of the unit blow against the air inlet of another unit and do not make the air outlet of the unit blow against the air outlet of another unit.



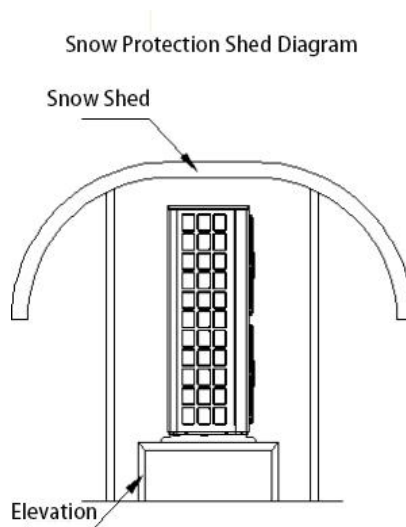
② Don't make the air inlet of the unit opposite to each other and don't make the air inlet of the unit blocked by the wall.



③ Do not install the unit vertically up and down. The condensate of the unit is discharged from the chassis. If the condensate of the unit drips onto the unit below, it will easily cause the unit below to freeze.



In snowy areas, anti-snow facilities shall be installed. In order not to be affected by snow, an elevated platform is adopted, and an anti-snow shed is installed at the air inlet and air outlet.

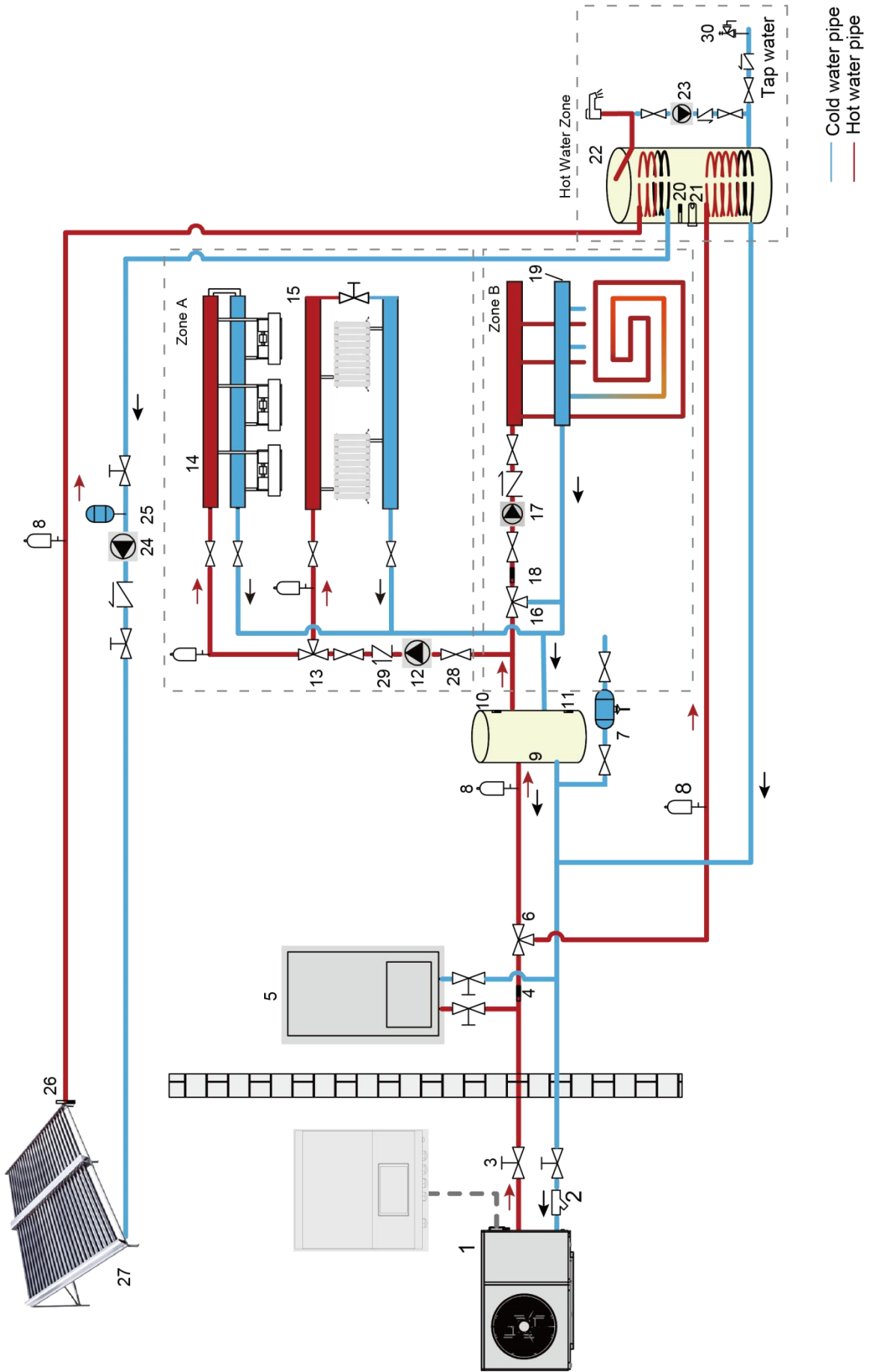


### 3.3 Installation Layout

Notice:

- ① Flexible connection between the unit and circulating water pipe can prevent vibration from unit to water pipe.
- ② The gate valve must be installed at the inlet/outlet of the unit. When the pressure test is completed after the installation of the end of the water system, the gate valve shall be closed for the pressure test.
- ③ Open after discharge.
- ④ "Y" filter (60 mesh) must be installed at the inlet pipe of the main engine to effectively prevent impurities from damaging the unit.
- ⑤ Clean water quality regularly and use.
- ⑥ Installation of the relief valve, bypass valve, and other valve parts must be in the direction of the arrow of the valve body.
- ⑦ After installation, water injection is required to detect leakage, confirm no leakage, and clean the filter.

The installation diagram is shown in the following figure:



Heating&Cooling+Hot water Installation Instructions Schematic



NO.	Meaning	NO.	Meaning
1	Outdoor Unit	16	3#Solenoid 3-way Valve (Field supply)
2	Y-type Filter (Field supply)	17	Mixing Water Pump (Field supply)
3	Manual Ball Valve (Field supply)	18	Floor Heating Inlet Water Temp. Sensor (Accessories)
4	Total System Outlet Water Temp. Sensor(Accessories)	19	Floor Heating Loop (Field supply)
5	Auxiliary Heat Source (Field supply)	20	Hot Water Tank Temp. Sensor (Accessories)
6	1#Solenoid 3-way Valve (Field supply)	21	Hot Water Tank Electric Heater (Optional)
7	Water Refill Valve (Field supply)	22	Hot Water Tank (Field supply)
8	Automatic Exhaust Valve (Field supply)	23	Lower Return Water Pump (Field supply)
9	Buffer Tank (Field supply)	24	Solar Pump (Field supply)
10	Buffer Tank Upper Temp. Sensor (Optional)	25	Expansion Tank (Field supply)
11	Buffer Tank Lower Temp. Sensor (Optional)	26	Solar Water Temp. Sensor(Accessories)
12	External Circulation Pump (Field supply)	27	Solar Heat Exchanger(Field supply)
13	2#Solenoid 3-way Valve (Field supply)	28	Shut-off Valve(Field supply)
14	Fan Coils(Field supply)	29	One-way Valve(Field supply)
15	Radiator (Field supply)	30	Safety Valve(Field supply)

### 3.4 Electrical Installation

To function safely and maintain the integrity of your electrical system, the unit must be connected to a general electricity supply under the following regulations:

- ① Upstream, the general electricity supply must be protected by a 30mA differential switch.
- ② The heat pump must be connected to a suitable D-curve circuit breaker in accordance with current standards and regulations in the country where the system is installed.
- ③ The electricity supply cable must be adapted to match the unit's rated power and the length of wiring required by the installation. The cable must be suitable for outdoor use.
- ④ For a three-phase system, it is essential to connect the phases in the correct sequence. If the phases are inverted, the heat pump's compressor will not work.
- ⑤ In places open to the public, it is mandatory to install an emergency stop button close to the heat pump.

Model	Power Supply Wires		
	Electricity Supply	Cable Diameter	Specification
6KW	220-240V~/ 50Hz	3G 2.5mm <sup>2</sup>	AWG 14
9KW		3G 4mm <sup>2</sup>	AWG 12
13KW		3G 4mm <sup>2</sup>	AWG 12
13KW	380V-415V/3N ~/ 50Hz	5G 2.5mm <sup>2</sup>	AWG 14
16KW		5G 2.5mm <sup>2</sup>	AWG 14

### 3.5 Electrical Connection

#### WARNING

- Parts of the main switch or other disconnect switch that have a separate connection point on all branch lines must be incorporated into the prescribed wiring in accordance with relevant local laws and regulations. Turn off the power before making any connections. Only copper wire can be used. Never pinch the bundled wires, and make sure they don't touch pipes and sharp edges. Make sure that no external pressure is applied to the terminal connections. All field wiring and components must be installed by a licensed electrician and must comply with relevant local laws and regulations.
- Field wiring must be done in accordance with the wiring diagram supplied with the unit and the instructions given below.  
Be sure to use a dedicated power supply. Never use a power source shared by other devices.
- Be sure to build a foundation. Do not ground the device to a utility pipe, surge protector, or telephone ground. Incomplete grounding may result in electric shock.  
Be sure to install a ground fault circuit interrupter (30 mA). Failure to do so may result in electric shock.
- Be sure to install the required fuse or circuit breaker.

#### Precautions for installing wires

- Secure the wires so that they do not come into contact with the pipes (especially the high voltage side)
- Secure the wires with cable ties as shown so that they do not touch the pipe, especially the high voltage side.
- Make sure that no external pressure is applied to the terminal connectors.
- When installing a ground fault circuit interrupter, make sure it is compatible with the inverter (anti-high frequency electrical noise) to avoid opening the ground fault circuit interrupter unnecessarily.

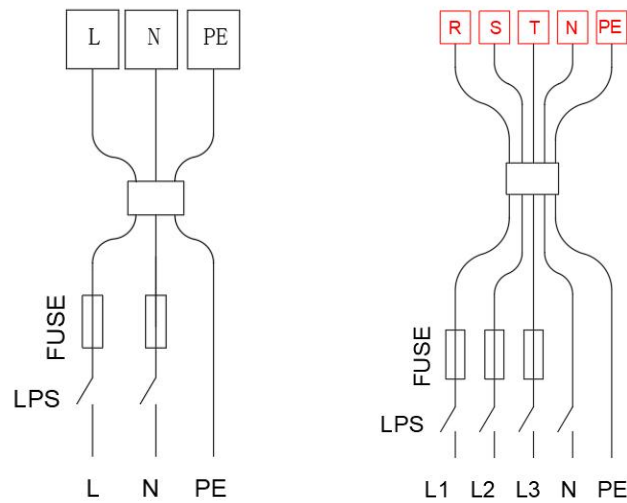
#### NOTE

- This unit is equipped with an inverter. Installing a phase leading capacitor not only reduces the power factor improvement effect, but also may cause abnormal heating of the capacitor due to high frequency waves. Never install a phase lead capacitor as it may cause an accident.

#### Wiring overview

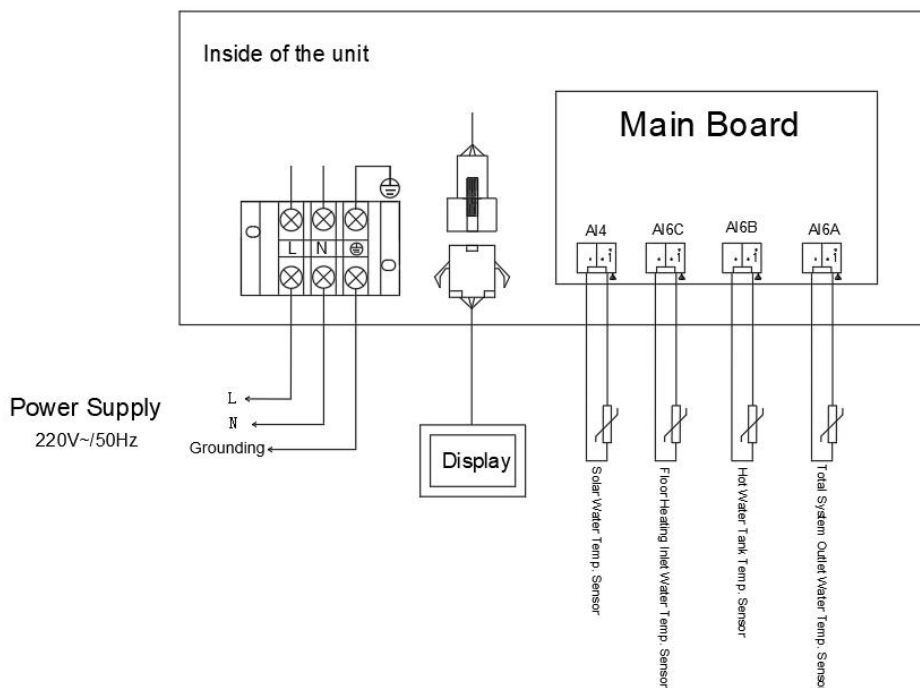
#### NOTE

- Please use the H07RN-F power cord, except the thermistor cable and user interface cable, all other wires are connected to the high voltage end. The equipment must be grounded.
  - All high voltage external loads, if metallic or grounded, must be grounded.
  - All external load currents must be less than 0.2A. If a single load current is greater than 0.2A, the load must be controlled through an AC contactor.
- "AHS1, AHS2", "DFR1, DFR2" and "ERR1, ERR2" terminal ports only provide switching signals.
- The "DI2, G" and "SG, EVU, G" terminal ports receive switching signals.
- See the image below for the port location in the device.

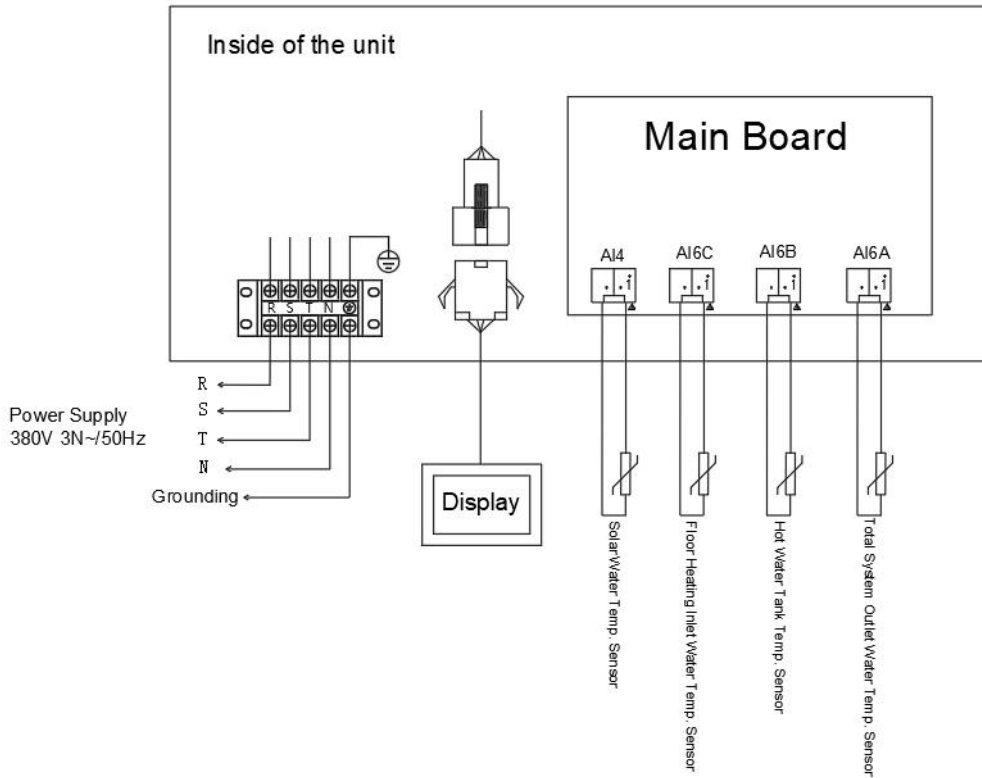


### Installation Wiring Section

- ① Open the handle on the right side of the unit
- ② Wiring Section



**Power supply:220V-240V~/50Hz**



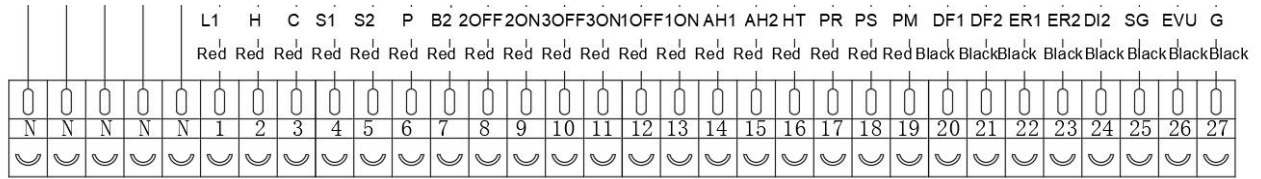
**Power supply:380V-415V/ 3N~/50Hz**

## NOTE

- The ground fault circuit breaker must be a 30 mA (<0.1 s) high speed type circuit breaker. Please use a cable with the corresponding number of cores and specifications.
- The current rating is based on the allowable maximum operating temperature of the conductor (105°C/70°C) and the rated ambient temperature (40°C/25°C), and assumes that the single wire is freely separated in the air, and the wire diameter comparison table is as follows.

The maximum operating current of the unit (A)	Wire cross-sectional area (AWG)	The maximum operating current of the unit (A)	Wire cross-sectional area (AWG)
≤3.0	≥24	≤15	≥14
≤4.6	≥22	≤21	≥12
≤6.5	≥20	≤28	≥10
≤8.5	≥18	≤40	≥8
≤11	≥16	≤55	≥6

## Connection of other components



Print	Connect to	Print	Connect to
N	Null Line	14-15	External Heat Source
1-2	Thermostat (H Signal)	16-N	Anti-freeze Electric Heater Belts
1-3	Thermostat (C Signal)	17-N	Lower Return Pump
4-5	Solar Signal	18-N	Solar Pump
6-N	Outside Circulator Pump	19-N	Mixing Water Pump
7-N	Electric Heater for Water Tank	20-21	Defrost Indication
8-N	2# Three-Way Valve (Heating Direction)	22-23	Fault Indication
9-N	2# Three-Way Valve (Cooling Direction)	24-27	Linkage Switch
10-N	3# Three-Way Valve (Open Circulation)	25-27	Smart Grid (SG)
11-N	3# Three-Way Valve (Close Circulation)	26-27	Smart Grid (EVU)
12-N	1# Three-Way Valve (DHW Direction)		
13-N	1# Three-Way Valve (H&C Direction)		

### Function instructions:

1. Output: control method

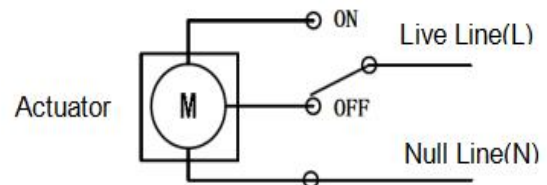
**Type 1:** Non-voltage dry connector.

**Type 2:** The port provides a signal of 220V voltage. If the load current is  $<0.2A$ , the load can be directly connected to the port.

If the load current  $\geq 0.2A$ , you need to connect the AC contactor to the load.

### 1) For Three-way Valve

Please use the three-wire two-control three-way valve when installing the waterway. The wiring diagram of the three-way valve is shown in the figure below:



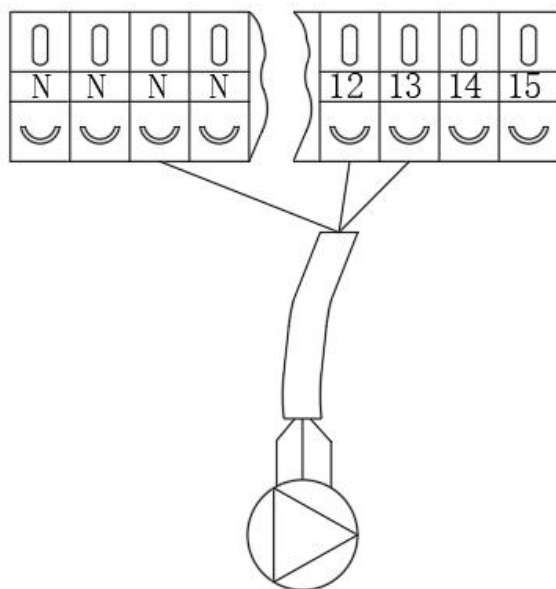
The wiring specifications of the three-way valve are shown in the figure below:

Voltage	220-240VAC
Maximum Current	0.2A
Wire Specifications	20AWG/0.75mm <sup>2</sup>
Control Method	Type 2

### 1# Electromagnetic three-way valve wiring

The electromagnetic three-way valve is used to switch the Heating & Cooling waterway and the hot water waterway.

During construction and installation, it is necessary to connect the three-way valve control line to the corresponding point on the terminal block of the unit. When the unit running Heating & Cooling mode, the 12# wiring point has 220V voltage output, and the 13# point has no output; when the unit is running hot water mode, the 13# point has 220V voltage output, and the 12# point has no output. When wiring, it is necessary to confirm each waterway interface of the electromagnetic three-way valve to ensure that the three-way valve is switched to the correct waterway when the unit is running.

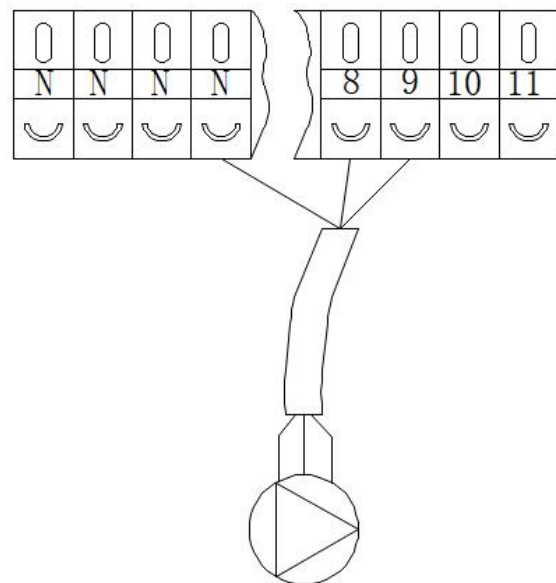


1#Electromagnetic 3-way valve

### 2# Electromagnetic three-way valve wiring

The 2# electromagnetic three-way valve is used to switch the Heating & Cooling water channels of the air conditioner.

During construction and installation, the control line of the three-way valve needs to be connected to the corresponding point on the terminal block of the unit. When the air conditioner of the unit is heating, the 8# wiring point has 220V voltage output, and the 9# point has no output; when the unit is cooling, the 9# point has 220V voltage output, and the 8# point has no output. When wiring, it is necessary to confirm each waterway interface of the electromagnetic three-way valve to ensure that the three-way valve is switched to the correct waterway when the unit is running.



2#Electromagnetic 3-way valve

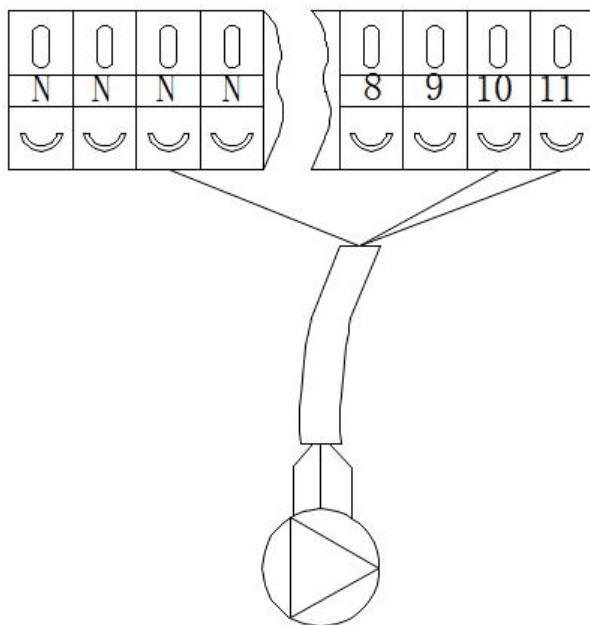
### 3# Electromagnetic three-way valve wiring

The 3# electromagnetic three-way valve is used to control whether the water in the balance water tank enters the floor heating waterway in area B.

When the floor heating water temperature is too high, the three-way valve switches

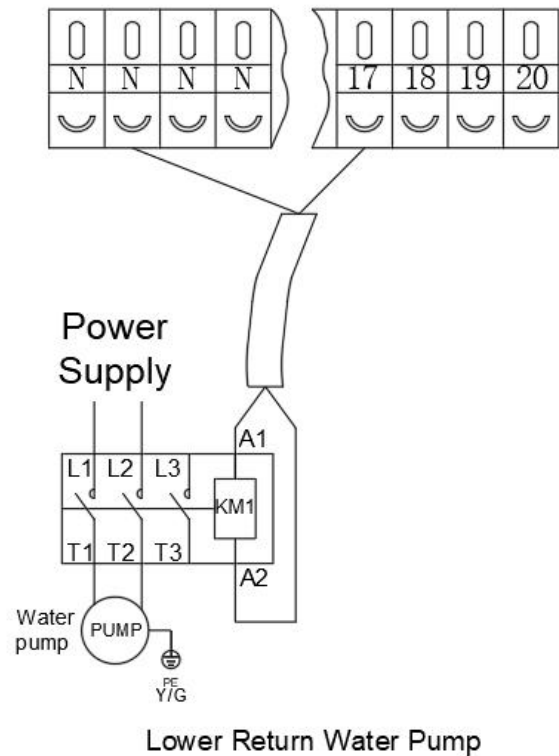
direction. At this time, the floor heating water circuit circulates in the floor heating pipe, and the hot water in the balance tank does not enter the floor heating. The 11# point maintains 220V output, and the 10# point has no output; the local heating water temperature If it is too low, the hot water in the balance water tank will enter the floor heating in zone B after the three-way valve is reversed. At this time, the 10# point maintains 220V output, and the 11# point has no output.

When wiring, it is necessary to confirm each waterway interface of the electromagnetic three-way valve to ensure that the three-way valve is switched to the correct waterway when the unit is running.

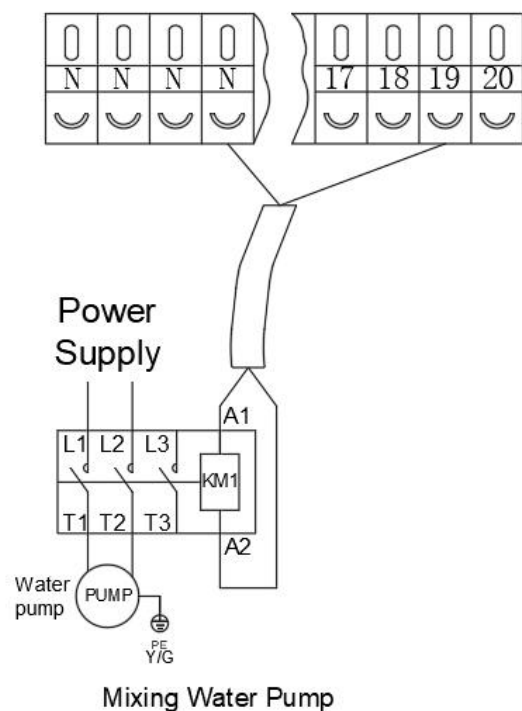


3#Electromagnetic 3-way valve

## 2) For Water Pump

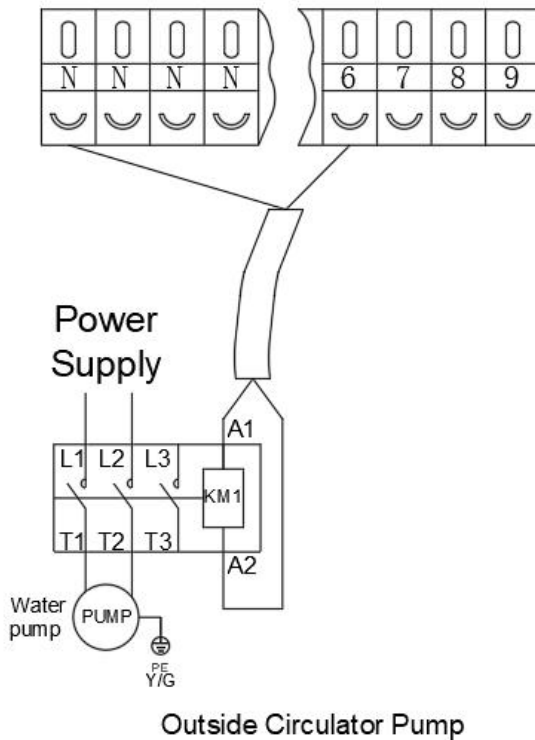
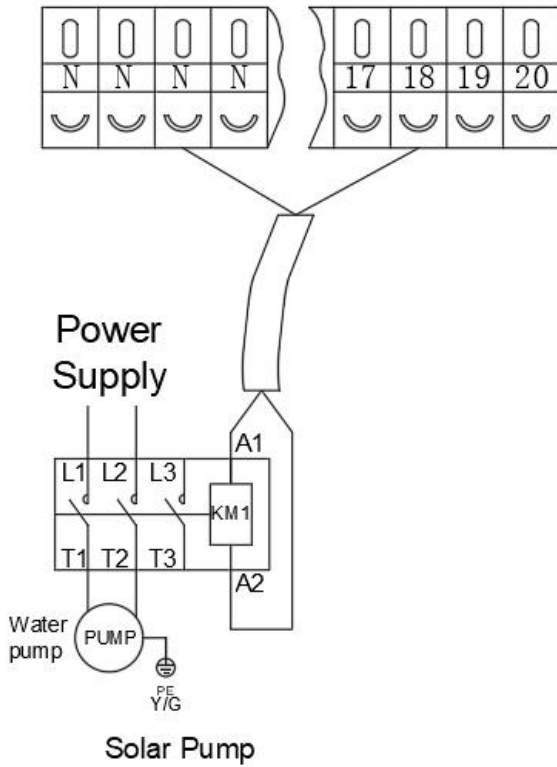


Lower Return Water Pump



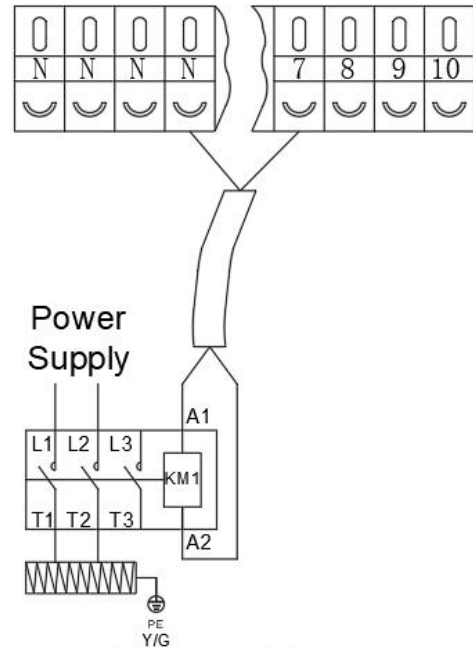
Mixing Water Pump





Voltage	220-240VAC
Maximum current	0.2A
Wire Specifications	20AWG/0.75mm <sup>2</sup>
control method	Type 2

### 3) Electric heater for water tank



Voltage	220-240VAC
Maximum current	0.2
Wire Specifications	20AWG/0.75mm <sup>2</sup>
Control method	Type 2

### 4) For Thermostat

"Power input" provides the voltage of "thermostat", and does not directly supply power to the motherboard interface.

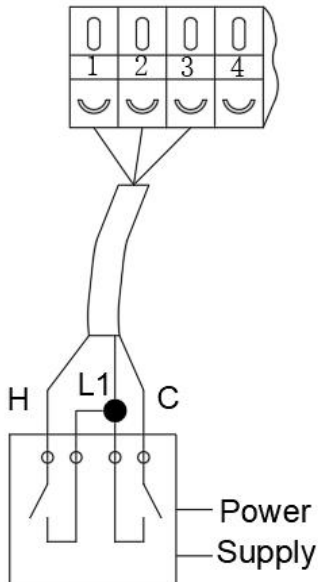
Port "L1" supplies 220V to the RT connector.

Port "L1" is connected to single-phase power from the unit's main power port L.

There are three methods of connecting the thermostat cable (as pictured above), depending on the application.

**Method 1** When "thermostat control" is set to "single zone mode switch":

When the signal C is closed, zone A starts cooling operation;  
 When the C signal is disconnected and the H signal is closed, zone A starts heating operation;  
 When both the C signal and the H signal are disconnected, the A area is closed;

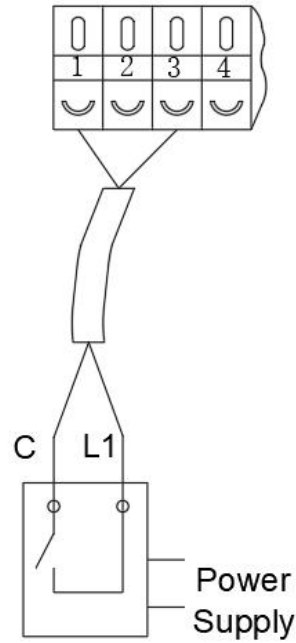


Method 1

(Single Zone Mode Switch)

**Method 2** When "thermostat control" is set to "single zone switch":

When the C signal is closed, the A area is open;  
 When the C signal is disconnected, the A area is closed;

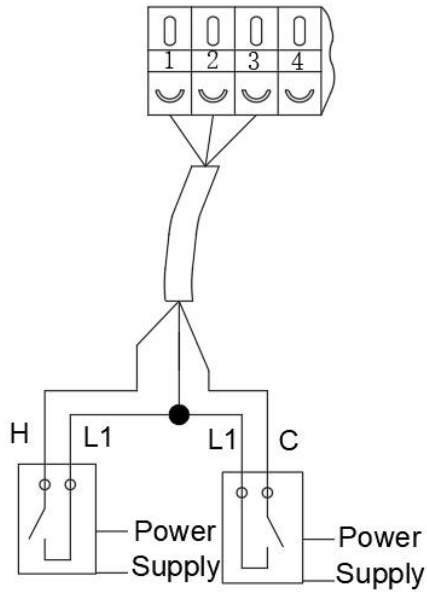


Method 2

(Single Zone Switch)

**Method 3** When "thermostat control" is set to "dual zone switch":

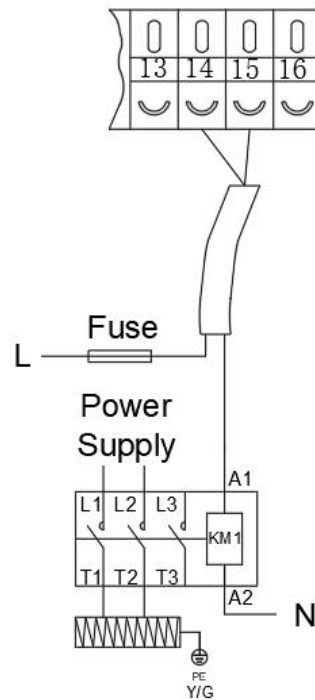
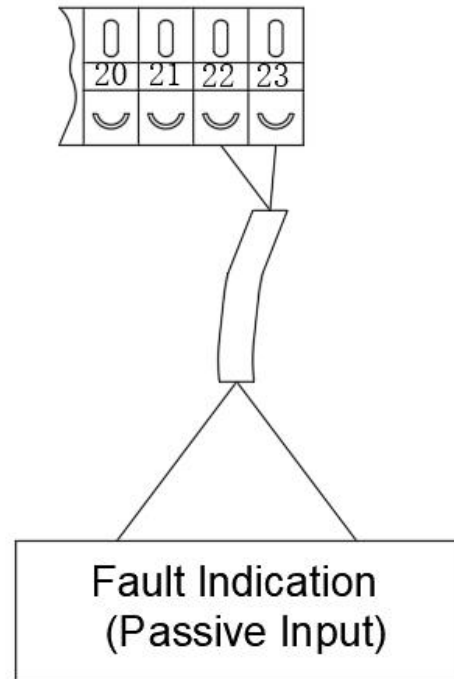
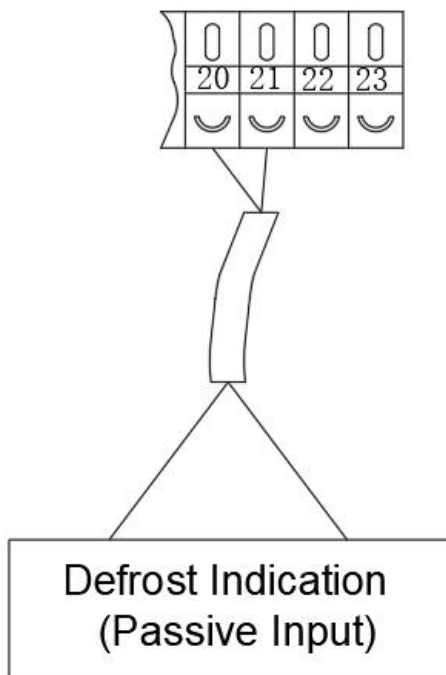
When the C signal is closed, the A area is opened; when the C signal is disconnected, the A area is closed;  
 When the H signal is closed, the B area is opened; when the H signal is disconnected, the B area is closed;  
 (Note: Zone B is only used for heating operation)



Method 3  
(dual zone switch)

Voltage	220-240VAC
Maximum current	0.2A
Wire Specifications	20AWG/0.75mm <sup>2</sup>

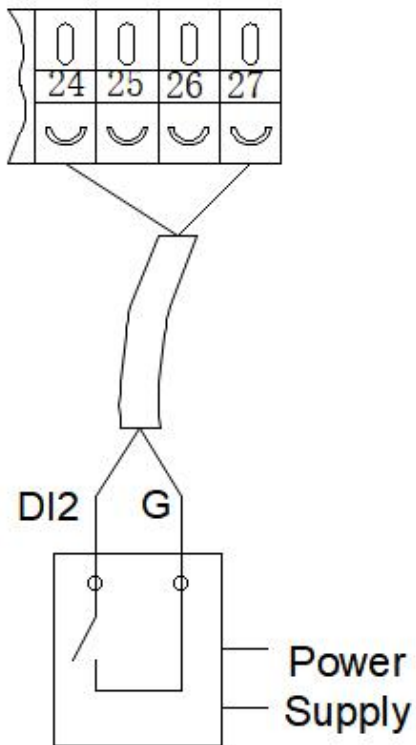
### 5) For Signal Output, External Heat Source



External Heat Source

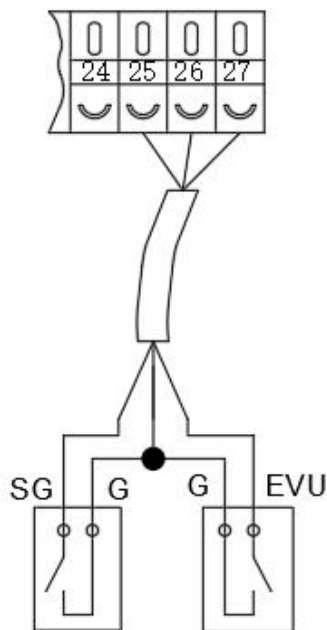
Voltage	220-240VAC
Maximum current	0.2A
Wire Specifications	20AWG/0.75mm <sup>2</sup>
Control method	Type 1

**6) For Wire Control Switch**



**For Smart Grid**

The smart grid wiring is shown in the figure below, SG is the smart grid signal, EVU is the photovoltaic signal.



**Smart Grid, Photovoltaic Power**

**7) For Solar Signal (220V power input, L and N)**

When [solar temperature probe] is set to "disabled", it is necessary to connect the solar signal to control the start and stop of the solar water pump. The wiring is shown in the figure below.

## 4 Trial After Installation

### WARNING

Please check all the wiring carefully before turning on the heat pump.

#### 4.1 Inspection Before Trial Running

Before the running test, confirm the below items and write  $\checkmark$  in the block;

<input type="checkbox"/>	Correct unit installation
<input type="checkbox"/>	The power supply voltage is the same as unit rated voltage
<input type="checkbox"/>	Correct piping and wiring
<input type="checkbox"/>	The air inlet & outlet port of the unit is unblocked
<input type="checkbox"/>	Drainage and venting are unblocked and no water leaking
<input type="checkbox"/>	The leakage protector is working
<input type="checkbox"/>	Piping insulation is working
<input type="checkbox"/>	The ground wire is connected correctly

#### 4.2 Trial Running

Step 1:Running test can begin after completing all installation;

Step 2:All wiring and piping should be connected well and carefully checked, then fill the water tank with water before power is switched on;

Step 3:Emptying all air within pipes and water tank, press the “ON/OFF” button on the control panel to run the unit at setting temperature;

Step 4:Items need to be checked during the running test:

- ① During the first running, the unit current is normal or not;
- ② Each function button on the control panel is normal or not;
- ③ Display screen is normal or not;
- ④ Is there any leakage in the whole heating circulation system;
- ⑤ Condensate drain is normal or not;
- ⑥ Are there any abnormal sounds or vibrations during running.

## 5 Maintenance and Winterization

### 5.1 Maintenance



Before undertaking maintenance work on the unit, ensure that you have disconnected the electrical power supply.

#### ● **Cleaning**

- a. The heat pump's casing must be cleaned with a damp cloth. The use of detergents or other household products could damage the surface of the casing and affect its properties.
- b. The evaporator at the rear of the heat pump must be carefully cleaned with a vacuum cleaner and soft brush attachment.

#### ● **Annual maintenance**

The following operations must be undertaken by a qualified person at least once a year.

- a. Carry out safety checks.
- b. Check the integrity of the electrical wiring.
- c. Check the earthing connections.
- d. Monitor the state of the pressure gauge and the presence of refrigerant.

### 5.2 Winterizing

#### ● **“CUTOFF” power supply of the heater before cleaning, examination and repairing**

When you don't use:

- a. Cut off the power supply to prevent any mechanical damage.
- b. Drain water clear of the machine.
- c. Cover the machine body when not in use.

#### ● **NOTE: Unscrew the water nozzle of the inlet pipe to let the water flow out.**

## 6 Removal Procedures for Outdoor Units

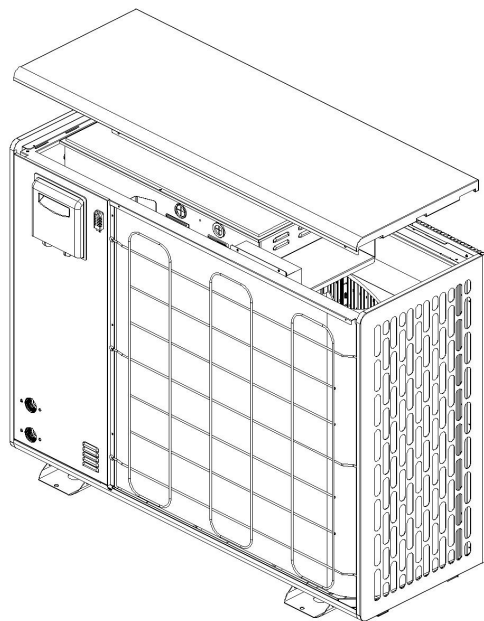
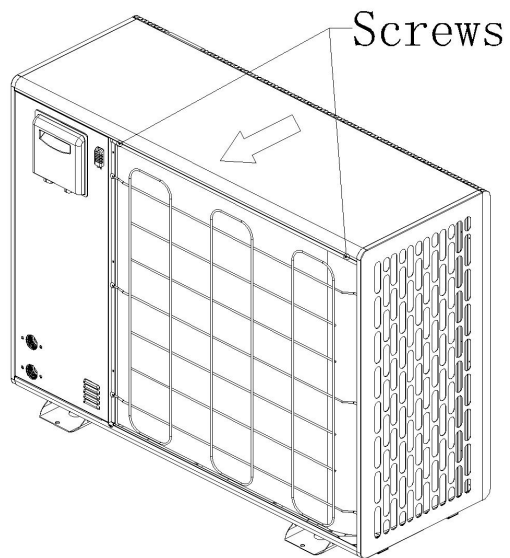
### Work Procedure

#### 1.Remove the Top Cover

① Remove the two screws of the top cover.

② Slide the top cover to the back.

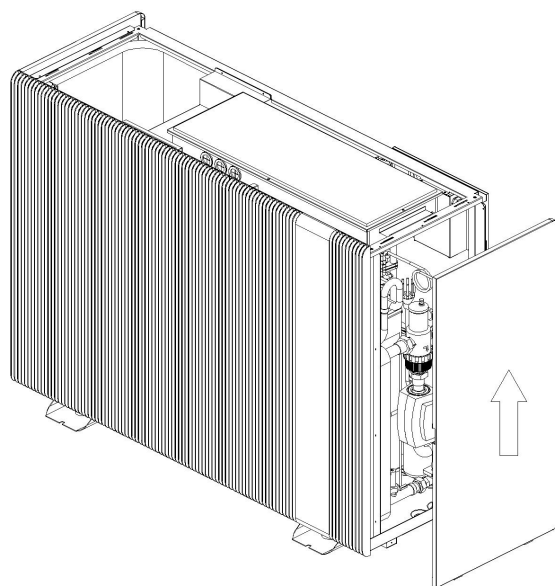
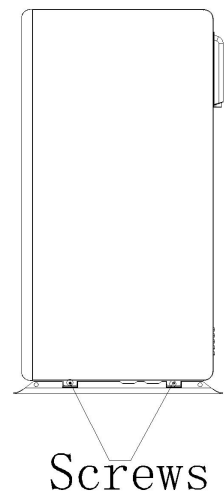
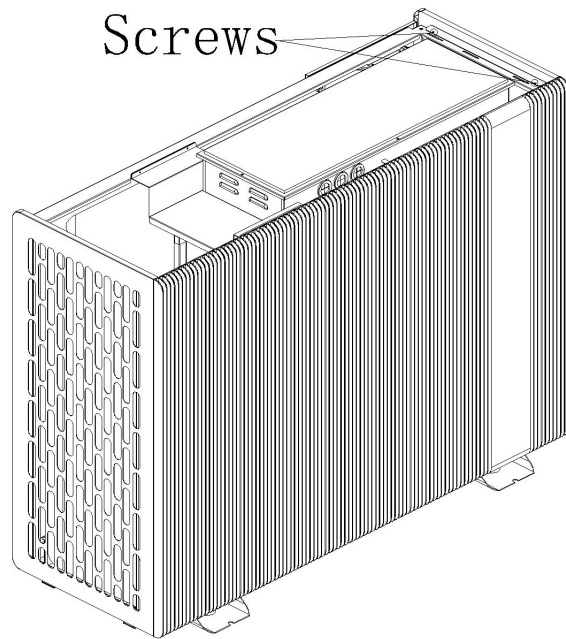
③ Pull out the top cover upwards.



## 2.Remove The Front Service Panel

① Remove the four screws shown in the figure, then, push the front panel upwards.

② Remove the panel

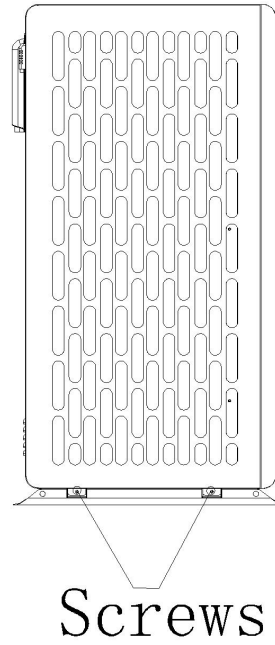
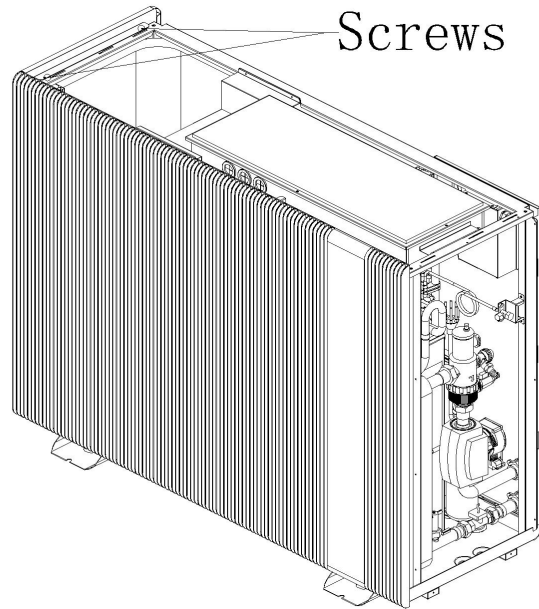


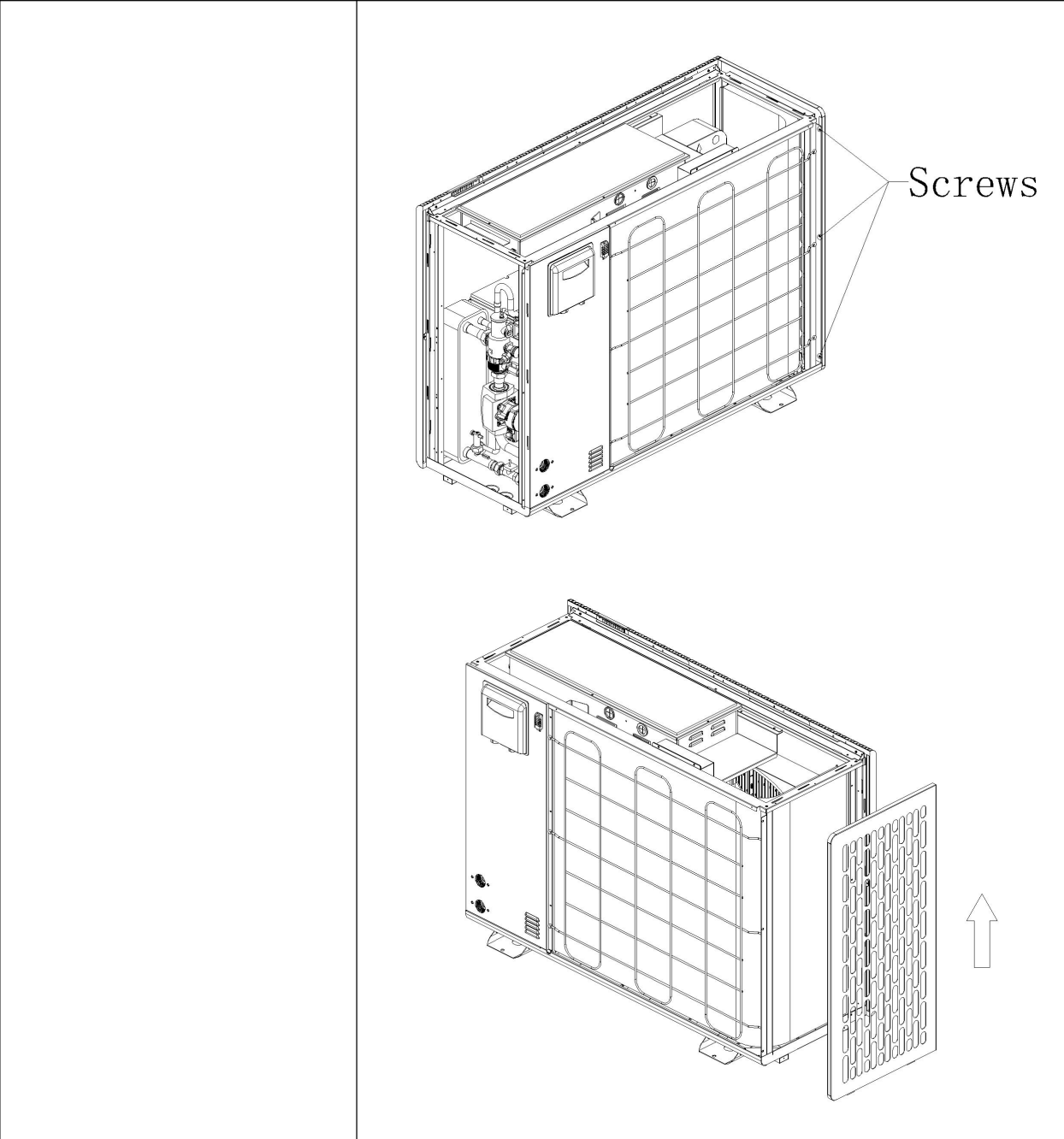


### 3.Remove The left Panel

① Remove the seven screws from the side of the panel.

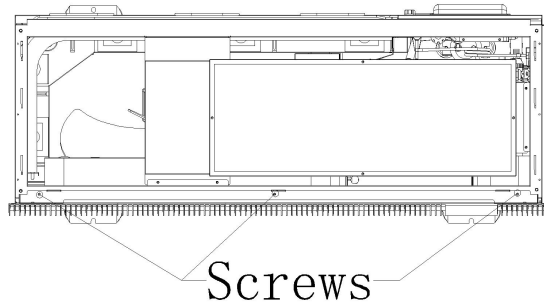
② Remove the panel by pushing it upwards.



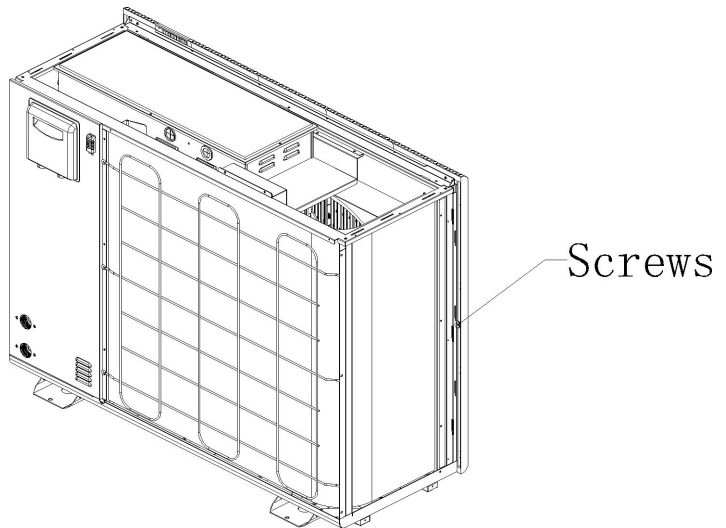
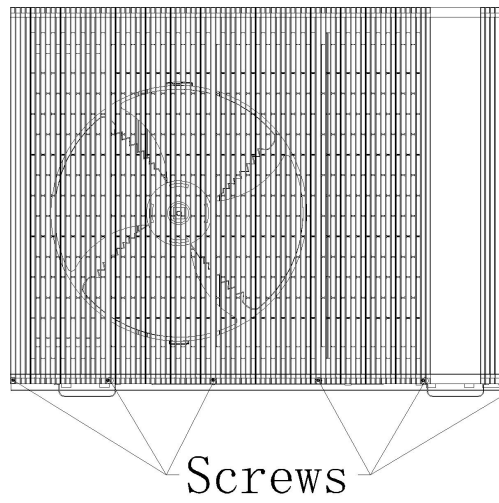


#### 4.Remove The Front Panel

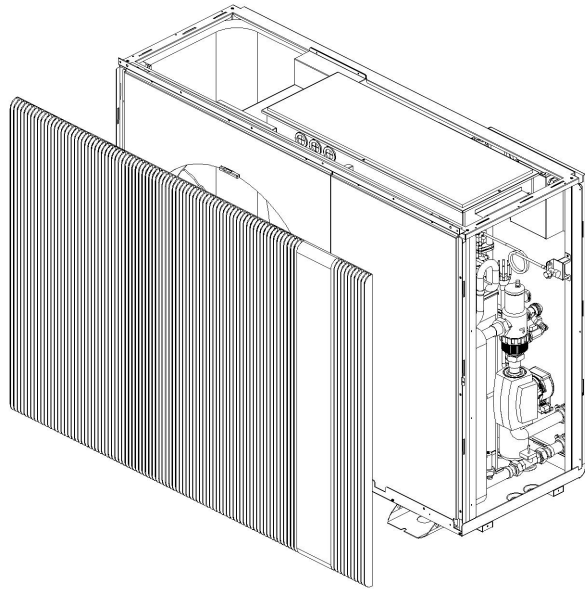
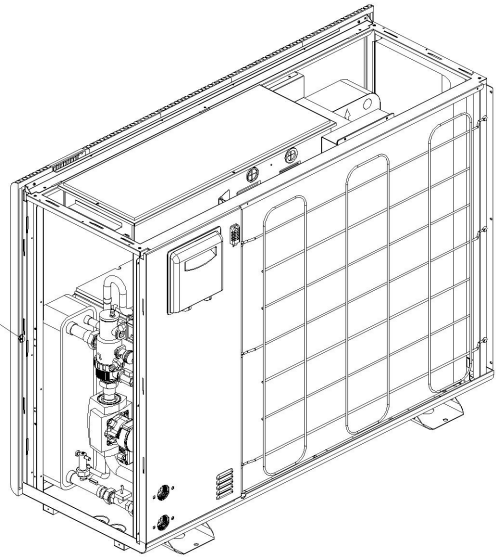
① Remove the nine screws of the back net.



② Remove the front panel.



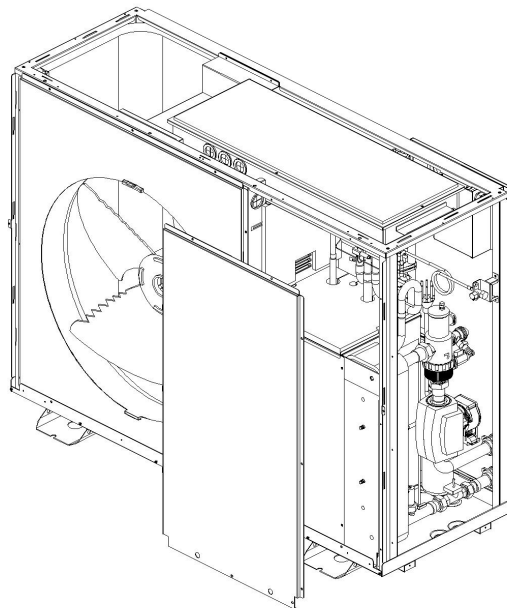
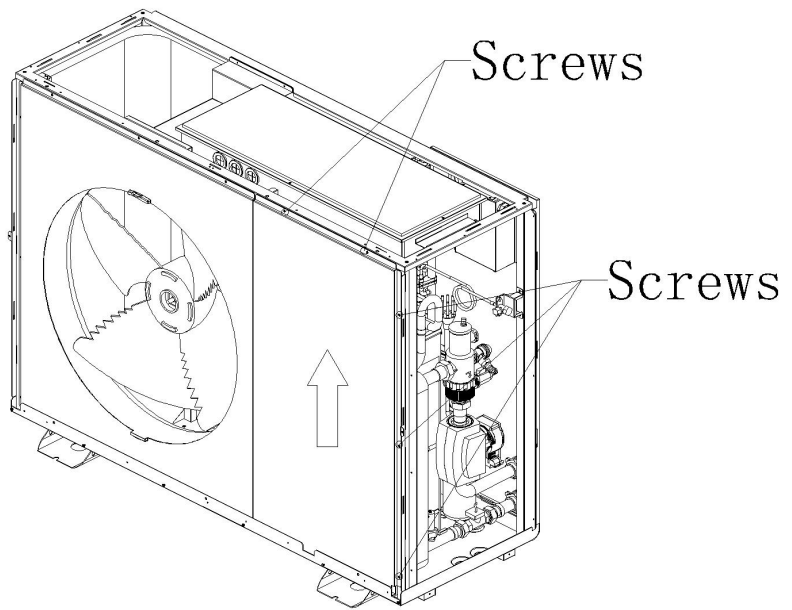
Screw



## 5.Remove The right-front Panel

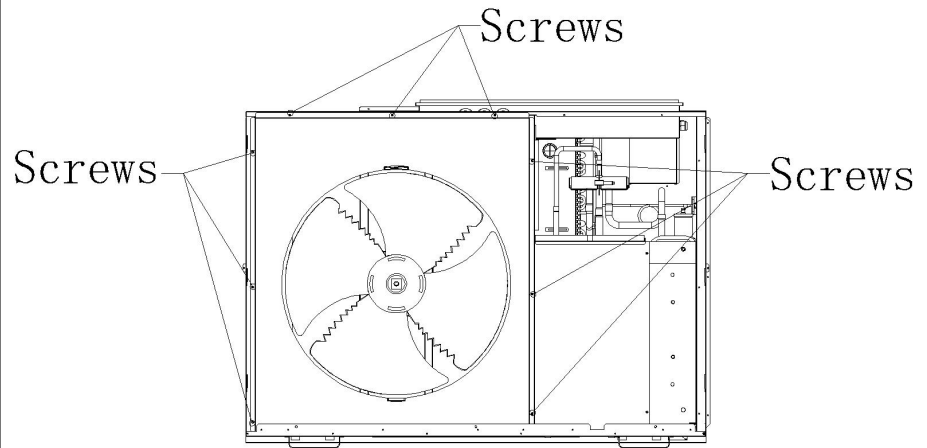
① Remove the five screws in the left panel.

② Remove the right-front panel.

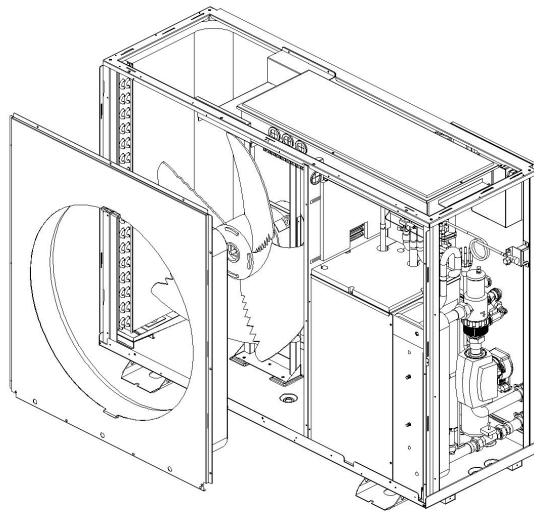


## 6.Remove The Fan Guide Panel

① Remove the eight screws from the back service panel.



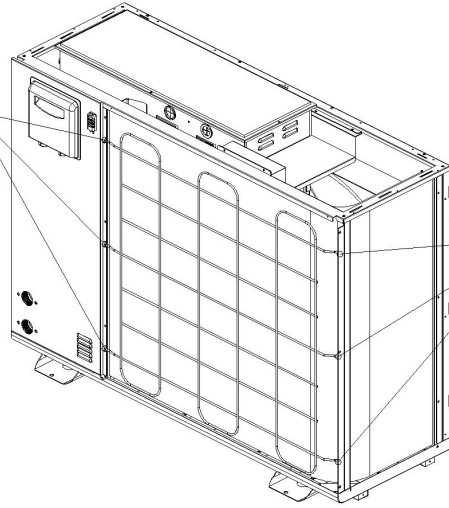
② Remove the back service panel by pulling it upwards.



## 7.Remove The Back Net

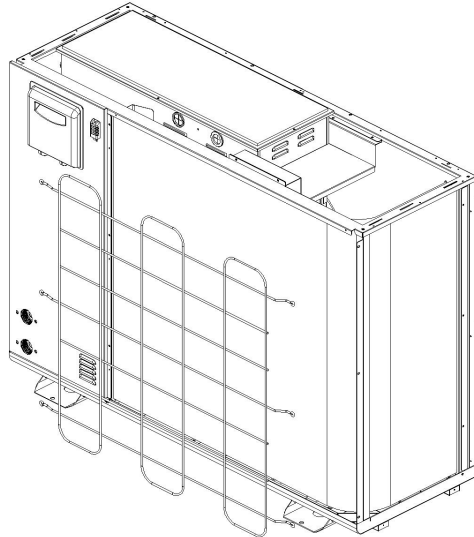
① Remove the six screws from the back net.

Screws



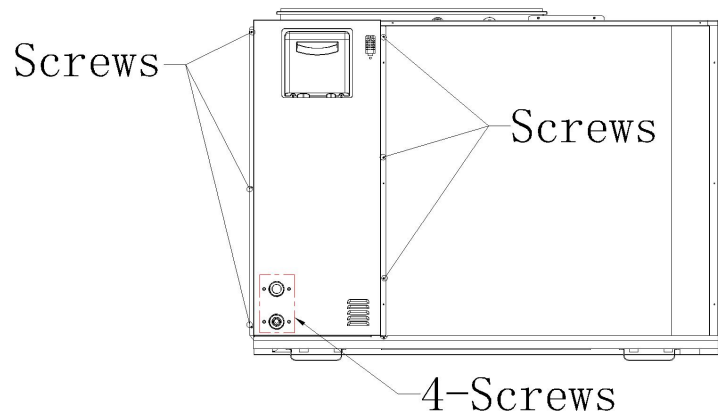
Screws

② Remove the back net.

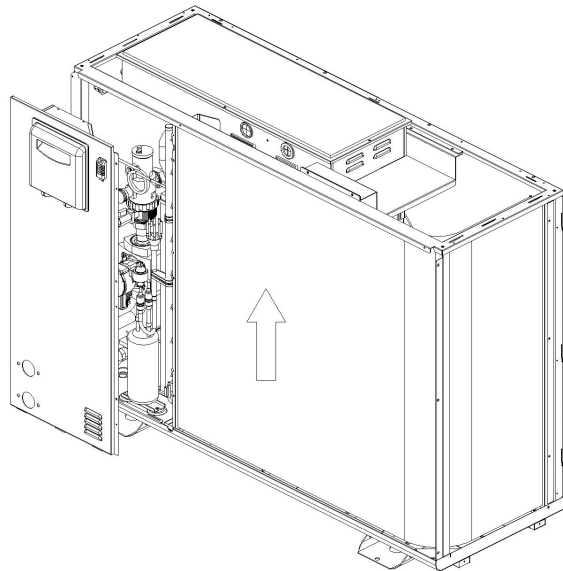


## 8.Remove The Right-Back Net

① Remove the seven screws from the right-back panel.



② Remove the right-back panel.











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