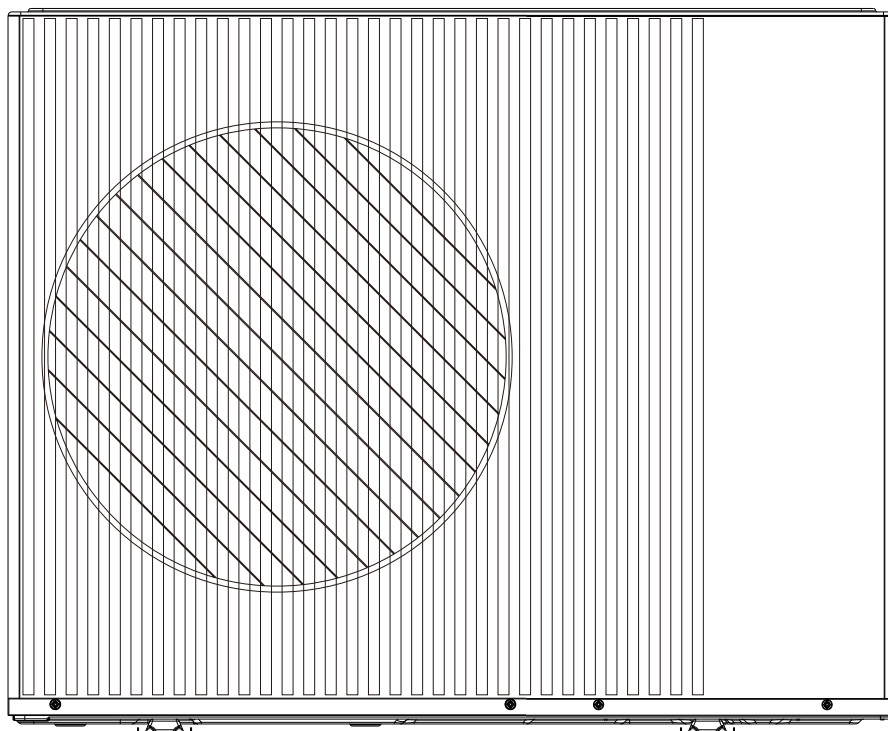




INSTALLATION AND OPERATION MANUAL FOR R290 A-THERMAL ALL IN ONE ATW HEAT PUMP OUTDOOR UNIT



- For your convenience, please read this statement carefully, in accordance with the specification steps.
- Please safely keep this manual to inspection.

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Note: All the illustrations in this manual are for explanation purpose only. Your air conditioner may be slightly different. The actual shape shall prevail. They are subject to change without notice for future improvement.

1 SAFETY PRECAUTIONS

The precautions listed here are divided into the following types. They are quite important, so be sure to follow them carefully. Meanings of DANGER, WARNING, CAUTION and NOTE symbols.







INFORMATION

Read these instructions carefully before installation. Keep this manual in a handy for future reference. Improper installation of equipment or accessories may result in electric shock, short-circuit, leakage, fire or other damage to the equipment.

- Be sure to only use accessories made by the supplier, which are specifically designed for the equipment and make sure to get installation done by a professional.
- All the activities described in this manual must be carried out by a licensed technician. Be sure to wear adequate personal protection equipment such as gloves and safety glasses while installing the unit or carrying out maintenance activities, contact your dealer for any further assistance.
- Any activity that requires the unit to be opened must only be carried out by your local technician.
- Comply with the corresponding local laws and regulations.
- There is a risk of fire and explosion. Ensure that there are no ignition sources, such as plug sockets, light switches, lamps, electrical switches or other permanent ignitions sources, around the product.
- Ensure that there are no ignition sources, such as plug sockets, light switches, lamps, electrical switches or other permanent ignitions sources, in the protective zone.
- Do not use any sprays or other combustible gases around the product.
- Keep all ignition sources away from around the product. In particular, open flames, hot surfaces with temperatures above 370°C, electrical devices or tools that are not free from electrical sources, static discharges.
- Equipment should be stored in a well-ventilated room to avoid mechanical damage.

NOTE

- Do not reuse the gasket that has been used.
- Installation joints between refrigeration system components shall be accessible for maintenance purposes.
- Pipes must be protected from physical damage.
- Pipeline installation should be minimized.

		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 operation manual should be read carefully
		CAUTION	This symbol shows that a service personnel should be handling this equipment with reference to the installation manual.
		CAUTION	This symbol shows that information is available such as the operating manual or installation manual.
		CAUTION	This symbol shows that information is available such as the operating manual or installation manual.

This AIR-TO-WATER HYDROMODULE + TANK operates in combination with an outdoor unit containing refrigerant R290.

DANGER

- Before touching electric terminal parts, turn off power switch.
- When service panels are removed, live parts can be easily touched by accident.
- Never leave the unit unattended during installation or servicing when the service panel is removed.
- Do not touch water pipes during and immediately after operation as the pipes may be hot and could burn your hands. To avoid injury, give the piping time to return to normal temperature or be sure to wear protective gloves.
- Do not touch any switch with wet fingers. Touching a switch with wet fingers can cause electrical shock.
- Before touching electrical parts, turn off all applicable power to the unit.

1 SAFETY PRECAUTIONS

WARNING

- Tear apart and throw away plastic packaging bags so that children will not play with them. Children playing with plastic bags face danger of death by suffocation.
 - Safely dispose of packing materials such as nails and other metal or wood parts that could cause injuries.
 - Ask your dealer or qualified personnel to perform installation work in accordance with this manual. Do not install the unit yourself. Improper installation could result in water leakage, electric shocks or fire.
 - Be sure to use only specified accessories and parts for installation work. Failure to use specified parts may result in water leakage, electric shocks, fire, or the unit falling from its mount.
- Install the unit on a foundation that can withstand its weight. Insufficient physical strength may cause the equipment to fall and possible injury.
- Perform specified installation work with full consideration of strong wind, hurricanes, or earthquakes. Improper installation work may result in accidents due to equipment falling.
 - Make certain that all electrical work is carried out by qualified personnel according to the local laws and regulations and this manual using a separate circuit. Insufficient capacity of the power supply circuit or improper electrical construction may lead to electric shocks or fire.
 - Be sure to install a ground fault circuit interrupter according to local laws and regulations. Failure to install a ground fault circuit interrupter may cause electric shocks and fire.
 - Make sure all wiring is secure. Use the specified wires and ensure that terminal connections or wires are protected from water and other adverse external forces. Incomplete connection or affixing may cause a fire.
- When wiring the power supply, form the wires so that the front panel can be securely fastened. If the front panel is not in
- place there could be overheating of the terminals, electric shocks or fire.
 - After completing the installation work, check to make sure that there is no refrigerant leakage.
 - Never directly touch any leaking refrigerant as it could cause severe frostbite. Do not touch the refrigerant pipes during and immediately after operation as the refrigerant pipes may be hot or cold, depending on the condition of the refrigerant flowing through the refrigerant piping, compressor and other refrigerant cycle parts. Burns or frostbite are possible if you touch the refrigerant pipes. To avoid injury, give the pipes time to return to normal temperature or, if you must touch them, be sure to wear protective gloves.
 - Do not touch the internal parts (pump, backup heater, etc.) during and immediately after operation. Touching the internal parts can cause burns. To avoid injury, give the internal parts time to return to normal temperature or, if you must touch them, be sure to wear protective gloves.

CAUTION

- Ground the unit.
 - Grounding resistance should be according to local laws and regulations.
 - Do not connect the ground wire to gas or water pipes, lightning conductors or telephone ground wires.
 - Incomplete grounding may cause electric shocks.
- Gas pipes: Fire or an explosion might occur if the gas leaks.
- Water pipes: Hard vinyl tubes are not effective grounds.
- Lightning conductors or telephone ground wires: Electrical threshold may rise abnormally if struck by a lightning bolt.
- Install the power wire 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.)
 - Do not wash the unit. This may cause electric shocks or fire. The appliance must be installed in accordance with national wiring regulations. If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.
 - Do not install the unit in the following places:
- Where there is mist of mineral oil, oil spray or vapors. Plastic parts may deteriorate, and cause them to come loose or water to leak.
- Where corrosive gases (such as sulphurous acid gas) are produced. Where corrosion of copper pipes or soldered parts may cause refrigerant to leak.
- Where there is machinery which emits electromagnetic waves. Electromagnetic waves can disturb the control system and cause equipment malfunction.
- Where flammable gases may leak, where carbon fiber or ignitable dust is suspended in the air or where 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 near the ocean.
- Where voltage fluctuates a lot, such as in factories.
- In vehicles or vessels.
- Where acidic or alkaline vapors are present.
- This appliance can be used by children 8 years old and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they are supervised or given instruction on using the unit in a safe manner and understand the hazards involved. Children should not play with the unit. Cleaning and user maintenance should not be done by children without supervision.
 - Children should be supervised to ensure that they do not play with the appliance.
- If the supply cord is damaged, it must be replaced by the manufacturer or its service agent or a similarly qualified person.

1 SAFETY PRECAUTIONS

CAUTION

- **DISPOSAL:** 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 municipal waste, 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 substance can leak into the groundwater and get into the food chain, damaging your health and well-being.
- The wiring must be performed by professional technicians in accordance with national wiring regulation and this circuit diagram. An all-pole disconnection device which has at least 3mm separation distance in all pole and a residual current device (RCD) with the rating not exceeding 30mA shall be incorporated in the fixed wiring according to the national rule.
- Confirm the safety of the installation area (walls, floors, etc.) without hidden dangers such as water, electricity, and gas, before wiring/pipes.
- Before installation, check whether the user's power supply meets the electrical installation requirements of unit (including reliable grounding, leakage, and wire diameter electrical load, etc.). If the electrical installation requirements of the product are not met, the installation of the product is prohibited until the product is rectified.
- When installing multiple air conditioners in a centralized manner, please confirm the load balance of the three-phase power supply, and multiple units are prevented from being assembled into the same phase of the three-phase power supply. Product installation should be fixed firmly. Take reinforcement measures, when necessary.

NOTE

About Fluorinated Gases

- This air-conditioning unit contains fluorinated gases. For specific information on the type of gas and the amount, please refer to the relevant label on the unit itself. Compliance with national gas regulations shall be observed.
- Installation, service, maintenance and repair of this unit must be performed by a certified technician.
- Product uninstallation and recycling must be performed by a certified technician.
- If the system has a leak-detection system installed, it must be checked for leaks at least every 12 months. When the unit is checked for leaks, proper record-keeping of all checks is strongly recommended.

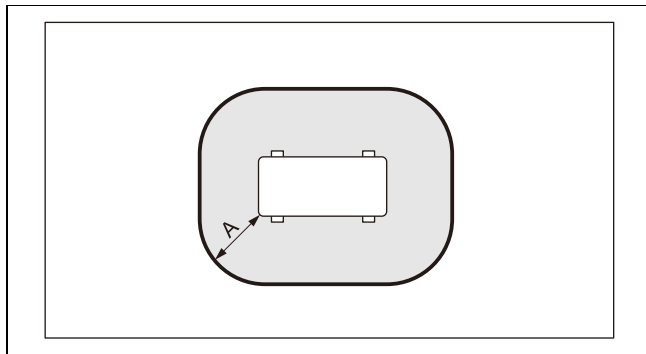
2 PROTECTIVE ZONE

2.1 Protective zone

- The product contains R290 refrigerant. Note that this refrigerant has a higher density than air. In the event of a leak, escaping refrigerant may collect near the ground.
- The refrigerant must not collect in any way that may lead to a dangerous, explosive, suffocating or toxic atmosphere.
- The refrigerant must not get inside the building via building openings. The refrigerant must not collect in grooves.
- A protective zone is defined around the product. There must be no windows, doors, light shafts, cellar entrances, escape hatches, flat-roof windows or ventilation openings in the protective zone.
- There must be no ignition sources, such as plug sockets, light switches, lamps, electrical switches or other permanent ignition sources, in the protective zone.
- The protective zone must not extend to adjacent buildings or public traffic areas.

In the protective zone, you are not permitted to make any subsequent structural alterations which infringe the stated rules for the protective zone.

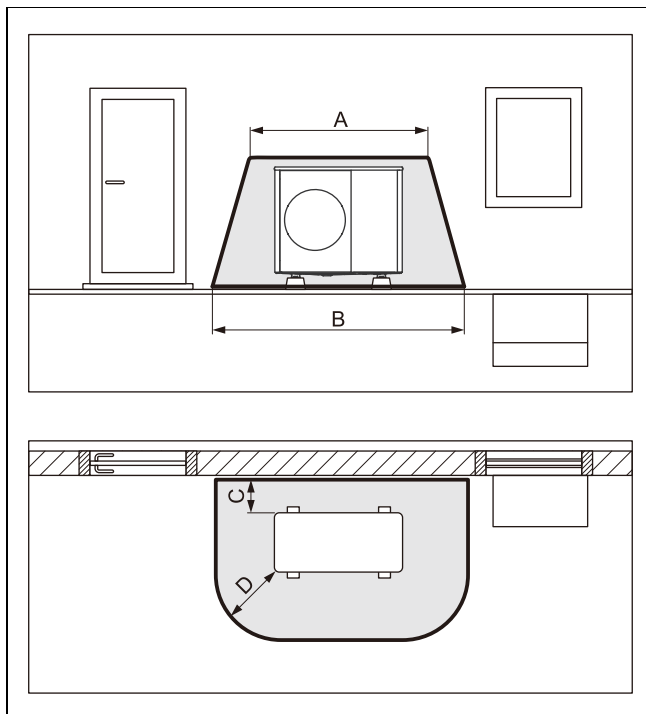
2.1.1 Protective zone for ground installation on the premises



A 1000mm

Dimension A is a clearance around the product.

2.1.2 Protective zone for ground installation in front of a building wall



A 2100 mm

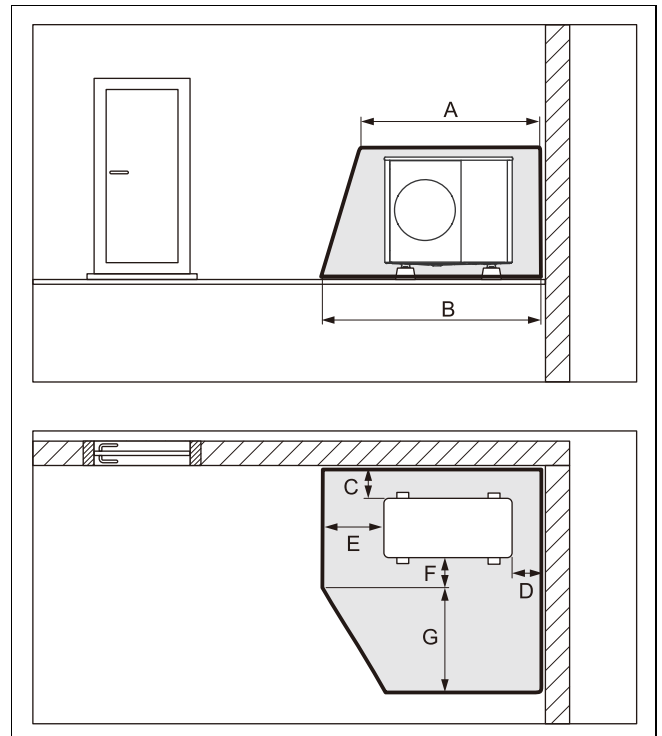
B 3100 mm

C 200 mm/250 mm

D 1000 mm

Dimension C is the minimum clearance that must be maintained to the wall (→ Section 7).

2.1.3 Protective zone for ground installation in a building corner



A 2100 mm

B 2600 mm

C 200 mm/250 mm

D 500 mm

E 1000 mm

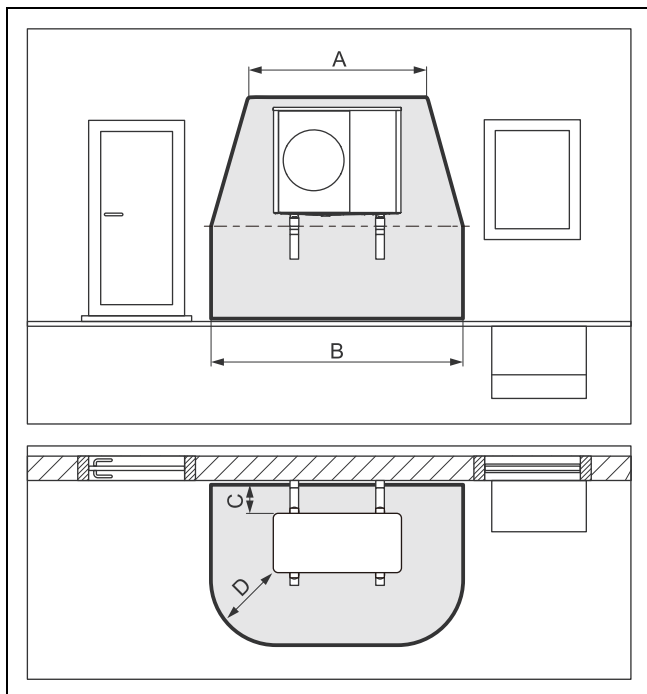
F 500 mm

G 1800 mm

The right-hand corner of the building is shown here. Dimensions C and D are the minimum clearances that must be maintained to the wall (→ Section 7). Dimension D varies for the left-hand corner of the building.

2 PROTECTIVE ZONE

2.1.4 Protective zone for wall installation in front of a building wall

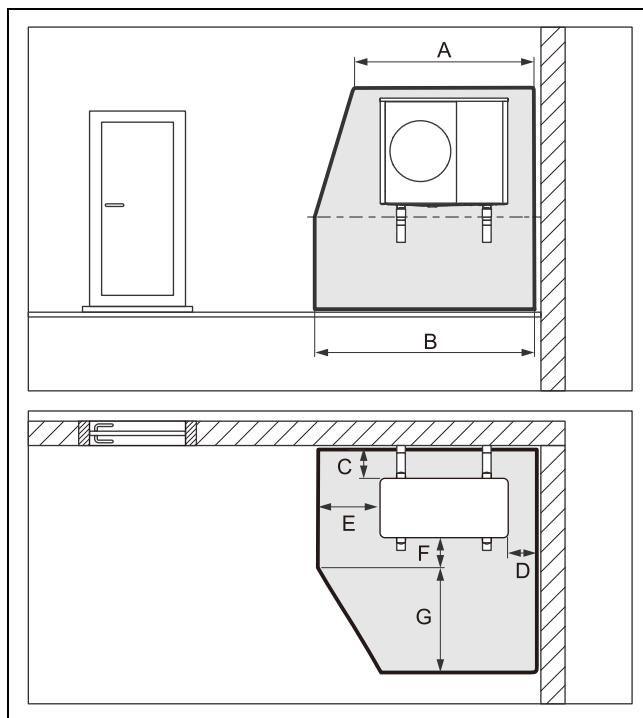


A 2100mm
B 3100mm
C 200mm/250mm
D 1000mm

The protective zone below the product extends as far as the floor.

Dimension C is the minimum clearance that must be maintained to the wall (→ Section 7).

2.1.5 Protective zone for wall installation in a building corner



A 2100mm
B 2600mm
C 200mm/250mm
D 500mm
E 1000mm
F 500mm
G 1800mm

The protective zone below the product extends as far as the floor.

The right-hand corner of the building is shown here.

Dimension C is the minimum clearance that must be maintained to the wall (→ Section 7).

Dimension D varies for the left-hand corner of the building.

3 BEFORE INSTALLATION

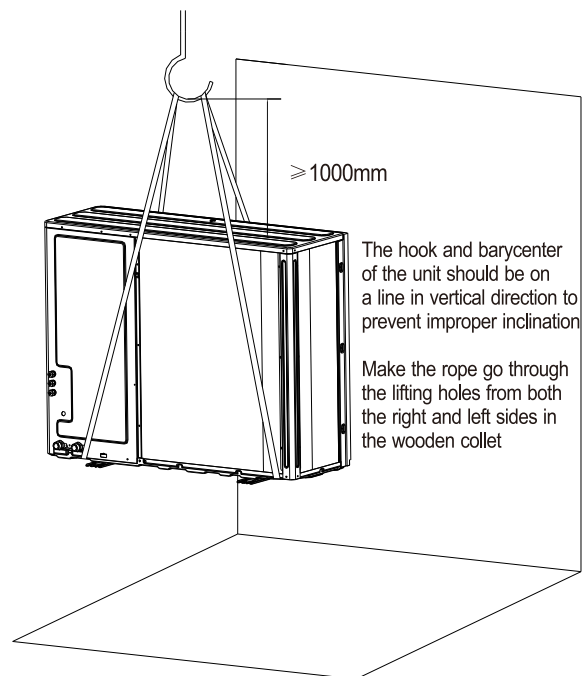
- Before installation
- Be sure to confirm the model name and the serial number of the unit.
- The product contains the combustible refrigerant R290. The refrigerant may mix with air to form a flammable atmosphere.
- There is a risk of fire and explosion.
- Only carry out the work if you are competent at handling R290 refrigerant.
- Wear suitable personal protective equipment and bring a fire extinguisher with you.
- Only use tools and units that are permitted for R290 refrigerant and are in proper working condition.
- Ensure that no air gets into the refrigerant circuit, into refrigerant-carrying tools or units, or into the refrigerant cylinder.
- Note that the refrigerant R290 must never be introduced into the sewage system.

- Handling

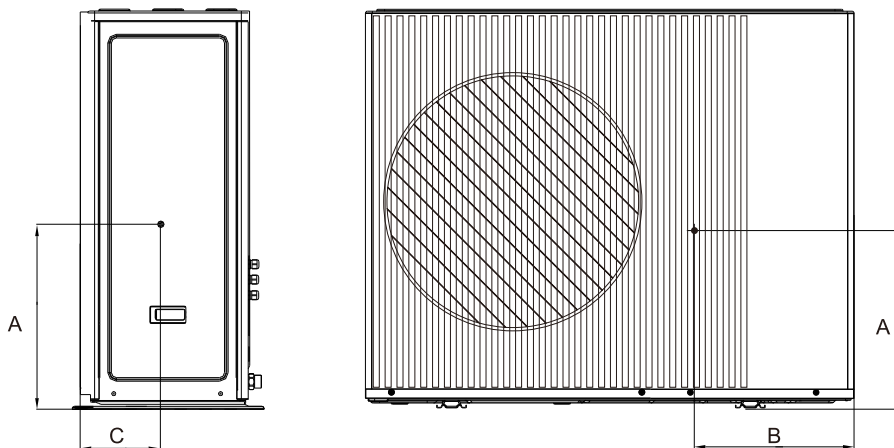
Due to relatively large dimensions and heavy weight, the unit should only be handled using lifting tools with slings. The slings can be fitted into foreseen sleeves at the base frame that are made specifically for this purpose.

CAUTION

- To avoid injury, do not touch the air inlet or aluminum fins of the unit.
- Do not use the grips in the fan grills to avoid damage.
- The unit is top heavy! Prevent the unit from falling due to improper inclination during handling.



The position of barycenter for different units can be seen in the picture below



unit:mm

Model	A	B	C
4/6kW	300	400	180
8/10kW	550	480	280
12/14/16kW	500	470	245

4 MPORTANT INFORMATION FOR THE REFRIGERANT

This product has the fluorinated gas, which is forbidden to release to air.

Refrigerant type: R290 ; Volume of GWP: 3

GWP=Global Warming Potential

Model	Factory charged refrigerant volume in the unit	
	Refrigerant /kg	Tonnes CO ₂ equivalent /tCO ₂ eq.
4kW	0.55	0.00165
6kW	0.55	0.00165
8kW	0.85	0.00225
10 kW	0.85	0.00225
12 kW	1.35	0.00405
14 kW	1.35	0.00405
16 kW	1.35	0.00405

CAUTION

Frequency of Refrigerant Leakage Checks

- For unit that contains fluorinated greenhouse gases in quantities of 5 tonnes of CO₂ equivalent or more, but of less than 50 tonnes of CO₂ equivalent, at least every 12 months, or where a leakage detection system is installed, at least every 24 months.
- For unit that contains fluorinated greenhouse gases in quantities of 50 tonnes of CO₂ equivalent or more, but of less than 500 tonnes of CO₂ equivalent at least every six months, or where a leakage detection system is installed, at least every 12 months.
- For unit that contains fluorinated greenhouse gases in quantities of 500 tonnes of CO₂ equivalent or more, at least every three months, or where a leakage detection system is installed, at least every six months.
- This air-conditioning unit is a hermetically sealed equipment that contains fluorinated greenhouse gases.
- Only certificated person is allowed to do installation, operation and maintenance.

5 INSTALLATION SITE

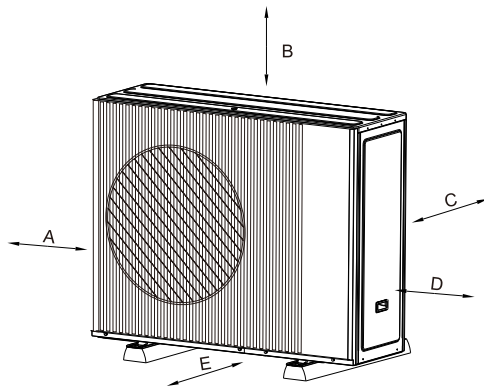
WARNING

- There is flammable refrigerant in the unit and it should be installed in a well-ventilated site. If the unit is installed inside, an additional refrigerant detection device and ventilation equipment must be added in accordance with the standard EN378.
- Be sure to adopt adequate measures to prevent the unit from being used as a shelter by small animals.
- Small animals making contact with electrical parts can cause malfunction, smoke or fire.
- Please instruct the customer to keep the area around the unit clean.
- Select an installation site where the following conditions are satisfied and one that meets with your customer's approval.
 - Places that are well-ventilated.
 - Places where the unit does not disturb neighbors.
 - Safe places which can bear the unit's weight and vibration and where the unit can be installed at an even level.
 - Places where there is no possibility of flammable gas or product leak.
 - The equipment is not intended for use in a potentially explosive atmosphere.
 - Places where servicing space can be well ensured.
 - Places where the units' piping and wiring lengths come within the allowable ranges.
 - Places where water leaking from the unit cannot cause damage to the location (e.g. in case of a blocked drain pipe).
 - Places where rain can be avoided as much as possible.
 - Do not install the unit in places often used as a work space. In case of construction work (e.g. grinding etc.) where a lot of dust is created, the unit must be covered.
 - 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.
 - Be sure that sufficient precautions are taken in case of refrigerant leakage according to relevant local laws and regulations.
 - Don't install the unit near the sea or where there is corrosion gas.
- When installing the unit in a place exposed to strong wind, pay special attention to the following.
 - Strong winds of 5 m/sec or more blowing against the unit's air outlet causes a short circuit (suction of discharge air), and this may have the following consequences:
 - Deterioration of the operational capacity.
 - Frequent frost acceleration in heating operation.
 - Disruption of operation due to rise of high pressure.
 - When a strong wind blows continuously on the front of the unit, the fan can start rotating very fast until it breaks. In normal condition, refer to the figures below for installation of the unit.
- The product is filled with R290 refrigerant.
 - Refrigerant must only be disposed of by an authorized competent person.
 - Observe the general safety information.

5 INSTALLATION SITE

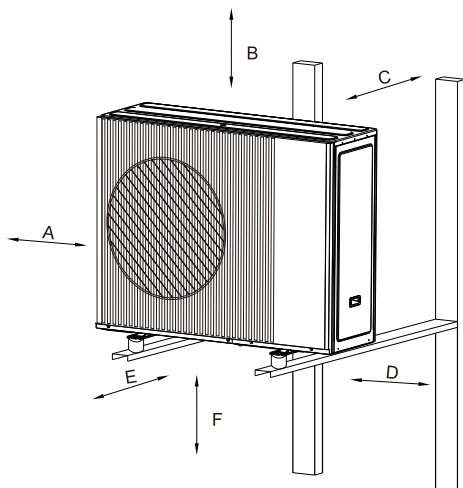
To guarantee sufficient air flow and to facilitate maintenance work, observe the minimum clearances that are specified. Ensure that there is sufficient room to install the hydraulic lines.

Validity: Floor installation OR Flat roof installation



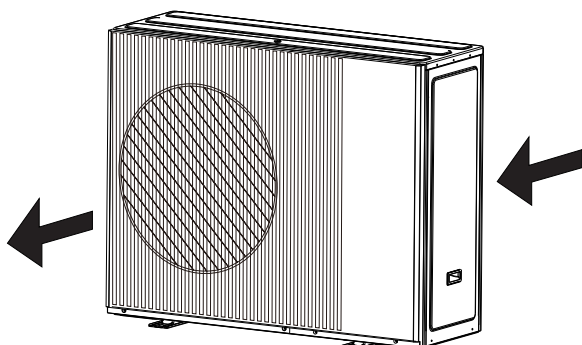
Minimum clear-ance	Heating mode	Heating and cooling mode
A	100 mm	100 mm
B	1000 mm	1000 mm
C	200 mm	250 mm
D	500 mm	500 mm
E	600 mm	600 mm

Validity: Wall-mounting



Minimum clear-ance	Heating mode	Heating and cooling mode
A	100 mm	100 mm
B	1000 mm	1000 mm
C	200 mm	250 mm
D	500 mm	500 mm
E	600 mm	600 mm
F	300 mm	300 mm

Make sure there is enough room to do the installation. Set the outlet side at a right angle to the direction of the wind.



Prepare a water drainage channel around the foundation, to drain waste water from around the unit. If water does not easily drain from the unit, mount the unit on a foundation of concrete blocks, etc. (the height of the foundation should be about 100 mm (3.93 in)). If you install the unit on a frame, please install a waterproof plate (about 100 mm) on the underside of the unit to prevent water from coming in from the low side. When installing the unit in a place frequently exposed to snow, pay special attention to elevate the foundation as high as possible. If you install the unit on a building frame, please install a waterproof tray (field supply) (about 100mm, on the underside of the unit) in order to avoid drain water dripping. (See the picture in the right).



5.1 Selecting a location in cold climates

Refer to "Handling" in section "5 Before installation"

NOTE

When operating the unit in cold climates, be sure to follow the instructions described below.

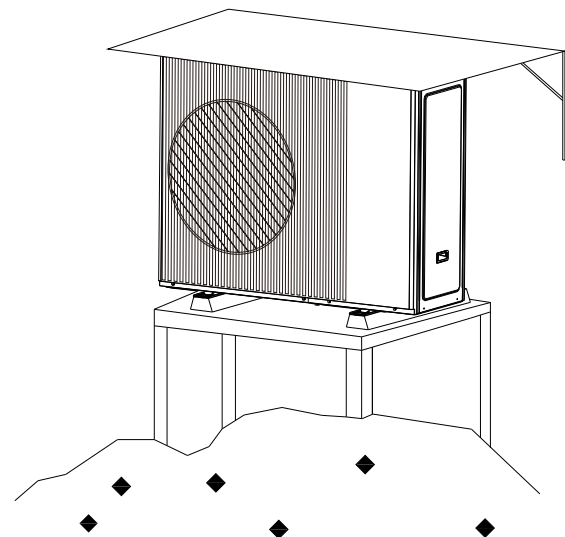
To prevent exposure to wind, install the unit with its suction side facing the wall.

Never install the unit at a site where the suction side may be exposed directly to wind.

To prevent exposure to wind, install a baffle plate on the air discharge side of the unit.

In heavy snowfall areas, it is very important to select an installation site where the snow will not affect the unit.

If lateral snowfall is possible, make sure that the heat exchanger coil is not affected by the snow (if necessary construct a lateral canopy).



① Construct a large canopy.

② Construct a pedestal.

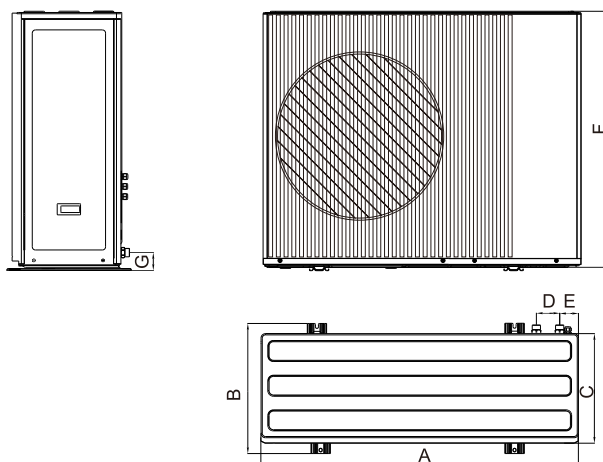
Install the unit high enough off the ground to prevent it from being buried in snow.

5.2 Selecting a location in hot climates

As the outdoor temperature is measured via the outdoor unit air thermistor, make sure to install the outdoor unit in the shade or a canopy should be constructed to avoid direct sunlight, so that it is not influenced by the sun's heat, otherwise protection may be possible to the unit. enough off the ground to prevent it from being buried in snow.

6 INSTALLATION PRECAUTIONS

6.1 Dimensions

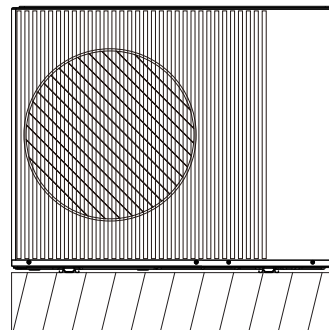
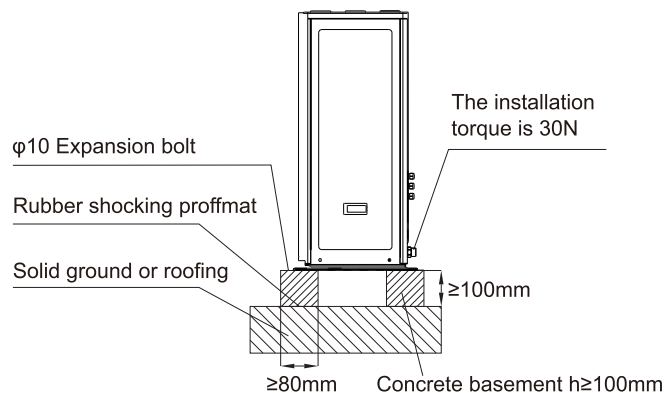


unit: mm

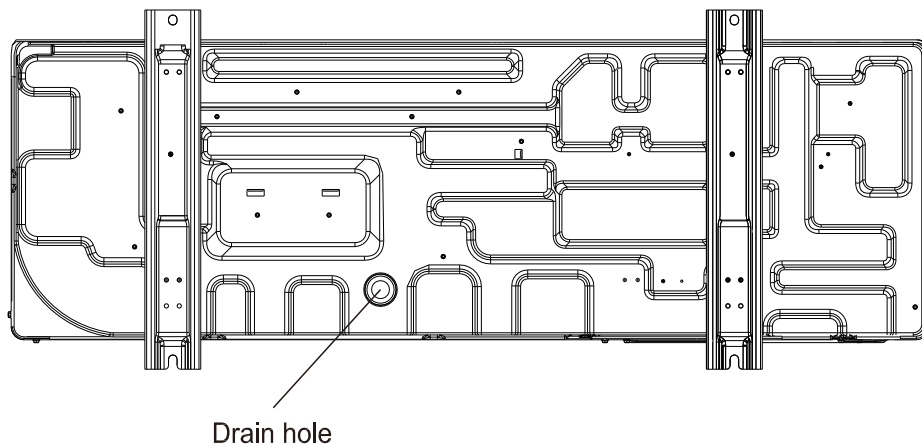
Model	A	B	C	D	E	F	G
4/6kW	1130	480	450	102	116	710	67
8/10/12/14/16kW	1280	480	450	94	81	1040	72

6.2 Installation requirements

Check the strength and level of the installation ground so that the unit may not cause any vibrations or noise during its operation. In accordance with the foundation drawing in the figure, fix the unit securely by means of foundation bolts. (Prepare four sets each of $\phi 10$ Expansion bolts, nuts and washers which are readily available in the market.) Screw in the foundation bolts until their length is 20 mm from the foundation surface.



6.3 Drain hole position



NOTE

It's necessary to install an electrical heating belt if water can't drain out in cold weather even the big drain hole has opened.

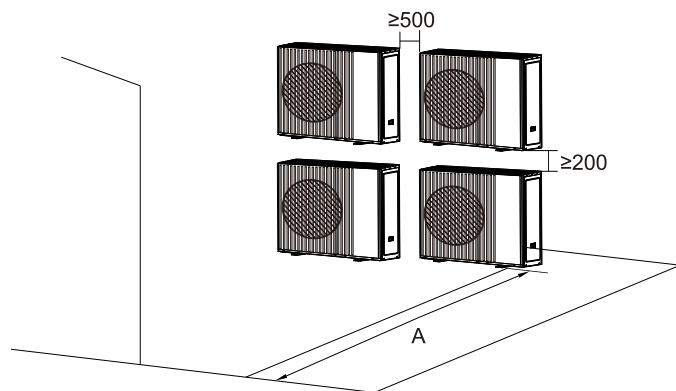
6 INSTALLATION PRECAUTIONS

6.4 Servicing space requirements

6.4.1 In case of stacked installation

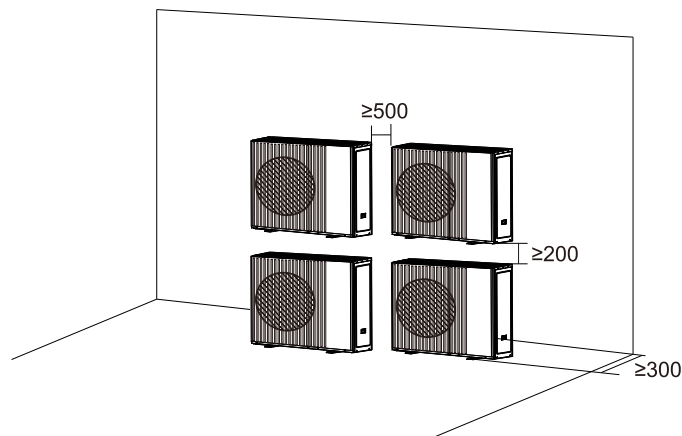
1) In case obstacles exist in front of the outlet side.

unit: mm



2) In case obstacles exist in front of the air inlet.

unit: mm



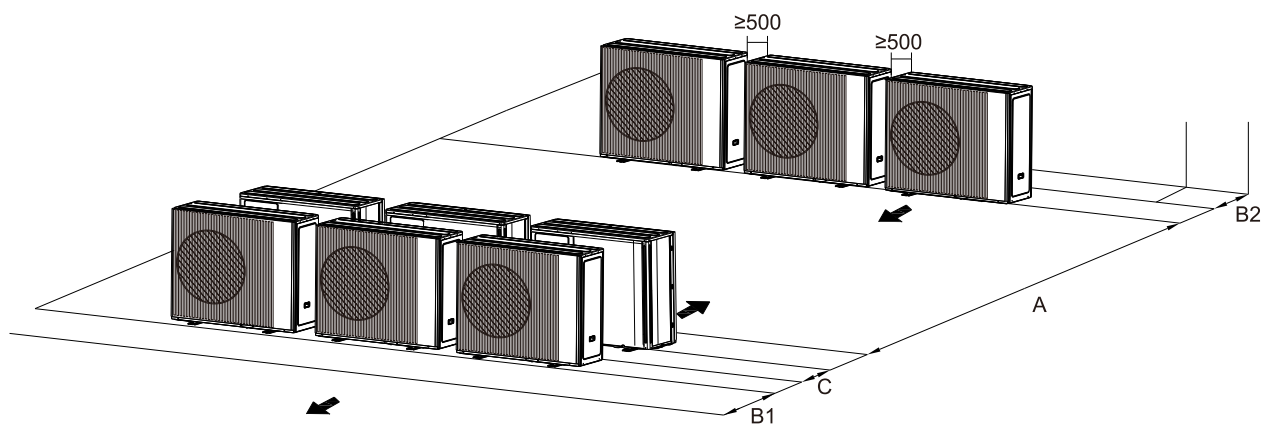
unit: mm

Unit	A(mm)
4/6kW	≥1000
8/10/12/14/16kW	≥1500

6.4.2 In case of multiple-row installation(for roof top use, etc.)

In case of installing multiple units in lateral connection per row.

unit: mm



unit: mm

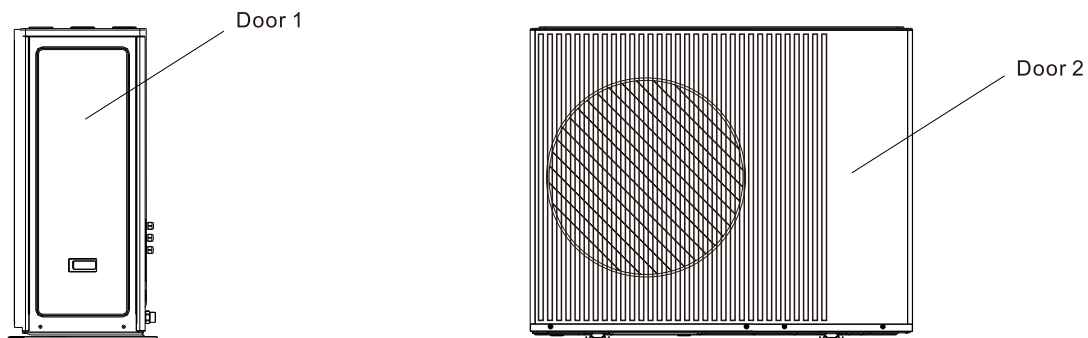
Unit	A	B1	B2	C
4/6kW	≥2500	≥1000	≥300	≥600
8/10/12/14/16kW	≥3000	≥1500		

7 OVERVIEW OF THE UNIT

7.1 Disassembling the unit

Door 1 To access to the hydraulic compartment and electrical parts.

Door 2 To access to the compressor.

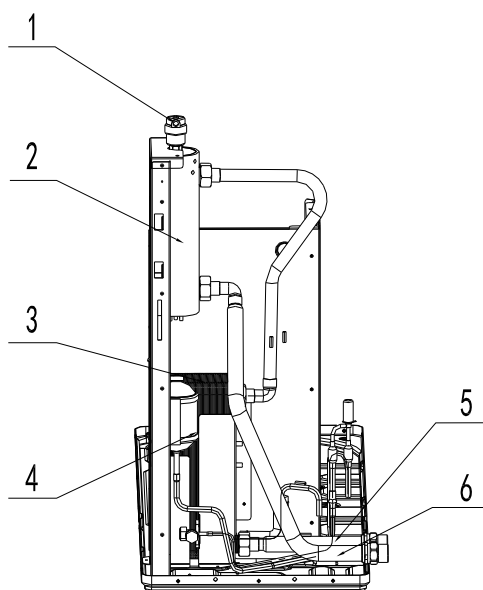


WARNING

Switch off all power — i.e. unit power supply and backup heater and domestic hot water tank power supply (if applicable) — before removing door 1 and door 2.
Parts inside the unit may be hot.

7.2 Main components

7.2.1 Hydraulic module



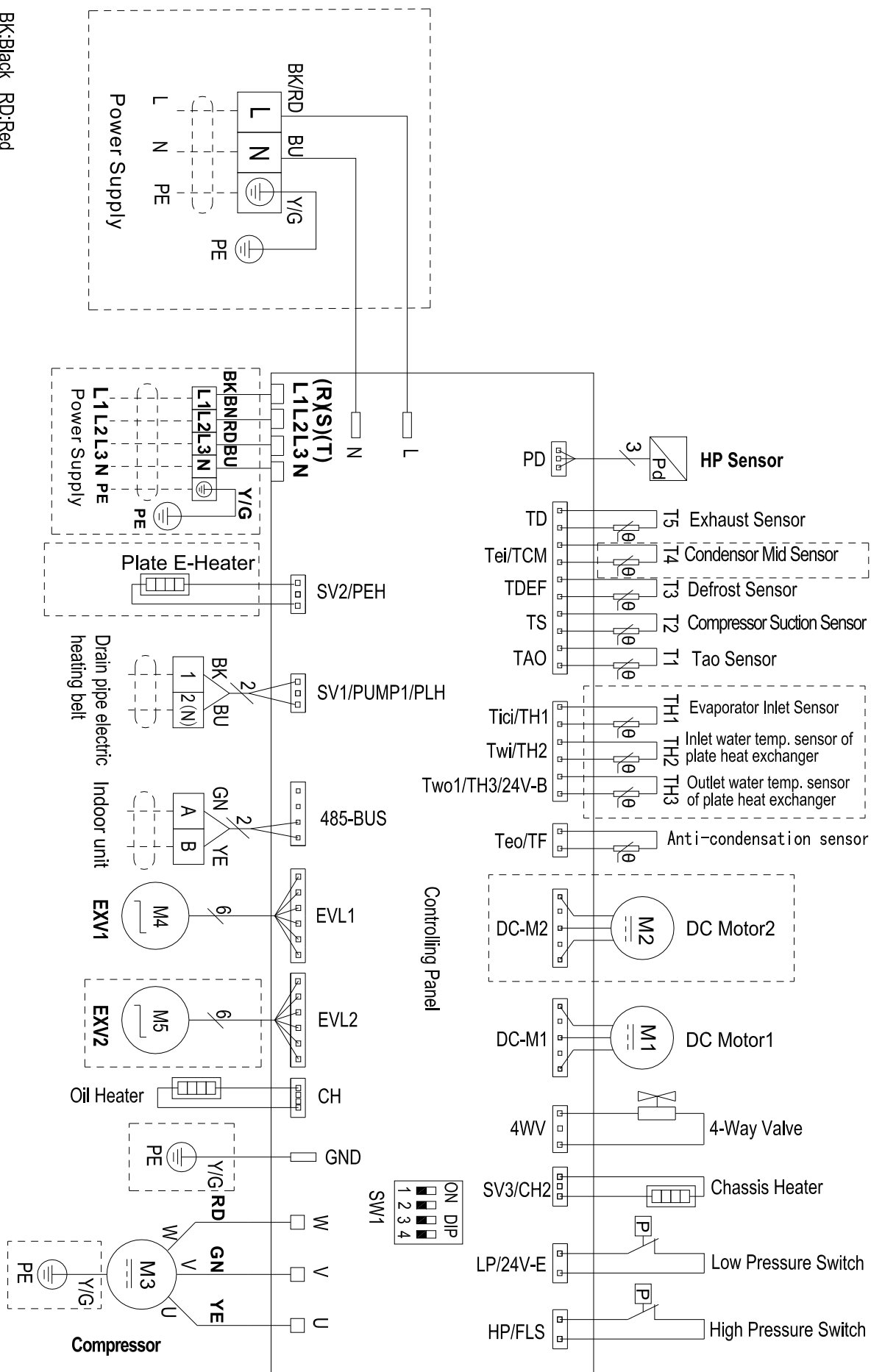
With backup heater for example (optional)

Code	Assembly	Explanation
1	Automatic air purge valve	Remaining air in the water circuit will be automatically removed via the automatic air purge valve.
2	Air-water separator	When the plate heat exchanger is frozen in the low temperature environment, the refrigerant can be discharged through the air-water separator in time to prevent the refrigerant from following the water flow into the room.
3	Plate heat exchanger	Heat exchanging between water and refrigerant.
4	Refrigerant storage tank	Only 12kW~16kW.
5	Water inlet pipe	/
6	Water outlet pipe	/

7 OVERVIEW OF THE UNIT

7.3 Electronic control box

BK:Black RD:Red
 BU:Blue WH:White
 GN:Green YE:Yellow
 Y/G:Yellow/Green
 BN:Brown



7 OVERVIEW OF THE UNIT

7.4 Water piping

All piping lengths and distances have been taken into consideration.

NOTE

- If no glycol is in the system, in case of a power supply failure or pump operating failure, drain all the water system if the water temperature is below 0°C in the cold winter.
- When water is at standstill inside the system, freezing is very likely to happen and damage the system in the process.

7.4.1 Check the water circuit

- The unit is equipped with a water inlet and water outlet for connection to a water circuit.
- This circuit must be provided by a licensed technician and must comply with local laws and regulations.
- The unit is only to be used in a closed water system.
- Application in an open water circuit can lead to excessive corrosion of the water piping.
- Before continuing installation of the unit, check the following:
 - The maximum water pressure ≤ 3 bar.
 - The maximum water temperature $\leq 80^{\circ}\text{C}$ according to safety device setting.
- Always use materials that are compatible with the water used in the system and with the materials used in the unit.
- Ensure that components installed in the field piping can withstand the water pressure and temperature.
- Drain taps must be provided at all low points of the system to permit complete drainage of the circuit during maintenance.
- Air vents must be provided at all high, points of the system. The vents should be located at points that are easily accessible for service. An automatic air purge is provided inside the unit. Check that this air purge valve is not tightened so that automatic release of air in the water circuit is possible.

7.4.2 Water circuit connection

Water connections must be made correctly in accordance with respect to the water inlet and water outlet.

CAUTION

Be careful not to deform the unit's piping by using excessive force when connecting the piping. Deforming the piping can cause the unit to malfunction.

If air, moisture or dust gets in the water circuit, problems may occur. Therefore, always take into account the following when connecting the water circuit:

- Use clean pipes only.
- Hold the pipe end downwards when removing burrs.
- Cover the pipe end when inserting it through a wall to prevent dust and dirt entering.
- Use a good thread sealant for sealing the connections. The sealing must be able to withstand the pressures and temperatures of the system.
- When using non-copper metallic piping, be sure to insulate two kind of materials from each other to prevent galvanic corrosion.
- As copper is a soft material, use appropriate tools for connecting the water circuit. Inappropriate tools will cause damage to the pipes.

NOTE

The unit is only to be used in a closed water system. Application in an open water circuit can lead to excessive corrosion of the water piping:

- Never use Zn-coated parts in the water circuit. Excessive corrosion of these parts may occur as copper piping is used in the unit's internal water circuit.
- When using a 3-way valve in the water circuit. Preferably choose a ball type 3-way valve to guarantee full separation between the domestic hot water and floor heating water circuit.
- When using a 3-way valve or a 2-way valve in the water circuit. The recommended maximum changeover time of the valve should be less than 60 seconds.

7 OVERVIEW OF THE UNIT

7.4.3 Water circuit anti-freeze protection

- All internal hydronic parts are insulated to reduce heat loss. Insulation must also be added to the field piping.
- The software contains special functions using the heat pump and backup heater (if it is available) to protect the entire system against freezing. When the temperature of the water flow in the system drops to a certain value, the unit will heat the water, either using the heat pump, the electric heating tap, or the backup heater. The freeze protection function will turn off only when the temperature increases to a certain value.
- In event of a power failure, the above features would not protect the unit from freezing.

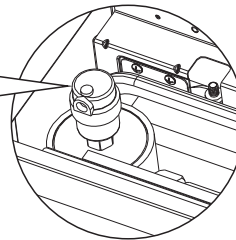
CAUTION

When the unit is not running for a long time make sure the unit is powered on all the time. If you want to cut off the power, the water in the system pipe needs to be drained clean, avoid the pump and pipeline system being damaged by freezing. Also the power of the unit needs to be cut off after water in the system is drained clean.

7.5 Filling water

- Connect the water supply to the filling valves and open the valve.
- Make sure all the automatic air purge valves are open (at least 2 turns).
- Filling with water until the manometer indicates a pressure of approximately 2.0bar. Remove air in the circuit as much as possible using the automatic air purge valves.

Do not fasten the black plastic cover on the automatic bleed valve at the top side of the unit when the system is running.
Open the automatic bleed valve, turn counterclockwise at least 2 full turns to release air from the system.



NOTE

During filling, it might not be possible to remove all air in the system. Remaining air will be removed through the automatic bleed valve during the first operating hours of the system. Topping up the water afterwards might be required.

- The water pressure indicated on the manometer will vary depending on the water temperature (higher pressure at higher water temperature). However, at all times water pressure should remain above 0.3bar to avoid air entering the circuit.
- The unit might drain-off too much water through the pressure relief valve.
- Water quality should be complied with EN 98/83 EC Directives.
- Detailed water quality condition can be found in EN98/83 EC Directives.

7.6 Water piping insulation

The complete water circuit including all piping, water piping must be insulated to prevent condensation during cooling operation and reduction of the heating and cooling capacity as well as prevention of freezing of the outside water piping during winter. The insulation material should at least of B1 fire resistance rating and complies with all applicable legislation. The thickness of the sealing materials must be at least 13 mm with thermal conductivity 0.039 W/mK in order to prevent freezing on the outside water piping.

If the outdoor ambient temperature is higher than 30°C and the humidity is higher than RH 80%, then the thickness of the sealing materials should be at least 20 mm in order to avoid condensation on the surface of the seal.

7 OVERVIEW OF THE UNIT

7.7 Field wiring

WARNING

- A main switch or other means of disconnection, having a contact separation in all poles, must be incorporated in the fixed wiring in accordance with relevant local laws and regulations. Switch off the power supply before making any connections. Use only copper wires. Never squeeze bundled cables and make sure they do not come in contact with the piping and sharp edges. Make sure 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.
- The field wiring must be carried out 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 supply shared by another appliance.
- Be sure to establish a ground. Do not ground the unit to a utility pipe, surge protector, or telephone ground. Incomplete grounding may cause electrical shock.
- Be sure to install a ground fault circuit interrupter(30 mA). Failure to do so may cause electrical shock.
- Be sure to install the required fuses or circuit breakers.

7.7.1 Precautions on electrical wiring work

- The ground fault circuit interrupter must be a high- speed type breaker of 30 mA (<0.1 s).
- This unit is equipped with an inverter. Installing, a phase advancing capacitor not only will reduce the power factor improvement effect, but also may cause abnormal heating of the capacitor due to high-frequency waves. Never install a phase advancing capacitor as it could lead to an accident.

7.7.2 Wiring overview

Loads requiring field wiring. Refer also to "typical application".

- (a) Minimum cable section AWG18 (6mm²).
- (b) The thermistor cable are delivered with the unit: if the current of the load is large, an AC contactor is needed.

NOTE

Please use HO7RN-F for the power wire, all the cables are connect to high voltage except for thermistor cable and cable for user interface.

- Equipment must be grounded.
- All high-voltage external load, if it is metal or a grounded port, must be grounded.
- All external load current is needed less than 0.2A, if the single load current is greater than 0.2A, the load must be controlled through AC contactor.
- Plate heat exchanger E-Heating tape and Flow switch E-Heating tape share a control port.
- Field wiring guidelines.
- Most field wiring on the unit is to be made on the terminal block inside the switch box. To gain access to the terminal block, remove the switch box service panel.

WARNING

Switch off all power including the unit power supply and backup heater (if applicable) before removing the switch box service panel.

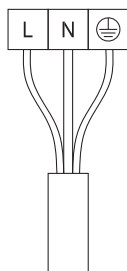
- Fix all cables using cable ties.
- A dedicated power circuit is required for the backup heater.
- Lay out the electrical wiring so that the front cover does not rise up when doing wiring work and attach the front cover securely.
- Follow the electric wiring diagram for electrical wiring works (the electric wiring diagrams are located on the rear side of door 1).
- Install the wires and fix the cover firmly so that the cover may be fit in properly.

7.7.3 Precautions on wiring of power supply

- Use a round crimp-style terminal for connection to the power supply terminal board. In case it cannot be used due to unavoidable reasons, be sure to observe the following instructions.
 - Do not connect different gauge wires to the same power supply terminal.(Loose connections may cause overheating.)
- Use the correct screwdriver to tighten the terminal screws. Small screwdrivers can damage the screw head and prevent appropriate tightening.
- Over-tightening the terminal screws can damage the screws.
- Attach a ground fault circuit interrupter and fuse to the power supply line.
- In wining, make certain that prescribed wires are used, carry out complete connections, and fix the wires so that outside force cannot affect the terminals.

7 OVERVIEW OF THE UNIT

Equipment main Power Supply Wiring



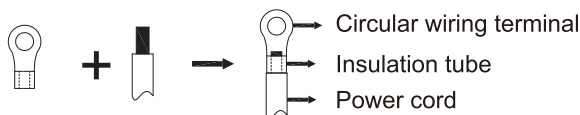
Single phase power

Unit	12kW-16kW (3kW-1PH heater)
1PH-wiring size(mm ²)	6

- Stated values are maximum values (see electrical data for exact values)

CAUTION

When connecting to the power supply terminal, use the circular wiring terminal with the insulation casing. Use power cord that conforms to the specifications and connect the power cord firmly. To prevent the cord from being pulled out by external force, make sure it is fixed securely.



NOTE

The ground fault circuit interrupter must be a high-speed type breaker of 30 mA(<0.1 s). Flexible cord must meet 60245IEC(HO5VV-F) standards.

7.7.4 Safety device requirements

1. Select the wire diameters (minimum value) individually for each unit based on the table below.
2. Select circuit breaker that having a contact separation in all poles not less than 3 mm providing full disconnection.

1-phase 4-16kW (Backup heater: 3kW) and 3-phase 12-16kW (Backup heater: 9kW) standard

System	Power Current				
	Hz	Voltage(V)	Min(V)	Max(V)	MCA(A)
12-16kW	50	220-240/1N	198	264	30

NOTE:

MCA: Max. Compressor Amps.(A)

- A creepage circuit breaker above the maximum current must be installed to avoid possible electric shocks.

8 TRAIL OPERATION

8.1 Checking before trail operation

- Indoor unit and outdoor unit is properly installed.
- The piping and wiring is correct.
- Refrigerant piping system is leak detection.
- Heat insulation is perfect.
- Ground wire is properly connected.
- The length of the pipe and the additional quantity of refrigerant has been recorded.
- Power supply voltage and rated voltage of air condition is equal.
- Inlet and outlet of outdoor unit is not obstacles.
- Open stop valve.
- Switch on the power to let the air conditioner warm.

8.2 Trail operation

- There is no vibration and abnormal sound.
- The noise and air of outdoor unit impacts the normal life of local people.
- No refrigerant leakage.

NOTE:

After turning on the power supply, immediately turned on or off when the reboot, air conditioner equipped with protection function, compressor delay start 5 minutes.

9 TROUBLE SHOOTING

This section provides useful information for diagnosing and correcting certain troubles which may occur in the unit. This troubleshooting and related corrective actions may only be carried out by your local technician.

9.1 General guidelines

Before starting the troubleshooting procedure, carry out a thorough visual inspection of the unit and look for obvious defects such as loose connections or defective wiring.

WARNING

- When carrying out an inspection on the switch box of the unit, always make sure that the main switch of the unit is switched off.
- When a safety device was activated, stop the unit and find out why the safety device was activated before resetting it. Under no circumstance can safety devices be bridged or changed to a valve other than the factory setting. If the cause of the problem cannot be found, call your local dealer.

Note: For problems related to the optional solar kit for domestic water heating, refer to the troubleshooting in the Installation and owner's manual for that kit.

9.2 Error codes

When a safety device is activated, an error code will be displayed on the user interface. A list of all errors and corrective actions can be found in the table below.

Reset the safety by turning the unit OFF and back ON.

In case this procedure for resetting the safety is not successful, contact your local dealer.

ERROR CODE	MALFUNCTION OR PROTECTION	FAILURE CAUSE AND CORRECTIVE ACTION
A3	Refrigerant liquid temp. sensor (TICl) fault	<ol style="list-style-type: none">1. Check the resistance of the sensor.2. The TICl sensor connector is loosen. Re connect it.3. The TICl sensor connector is wet or there is water in, remove the water, make the connector dry. Add waterproof adhesive4. The TICl sensor failure, change a new sensor.
A4	Refrigerant gas temp. sensor (TICO) fault	<ol style="list-style-type: none">1. Check the resistance of the sensor.2. The TICO sensor connector is loosen. Reconnect it.3. The TICO sensor connector is wet or there is water in. remove the water, make the connector dry. Add waterproof adhesive,4. The TICO sensor failure, change a new sensor.
94	Inlet water temp. sensor(TWI)malfuction	<ol style="list-style-type: none">1. Check the resistance of the sensor.2. The TWI sensor connector is loosen. Re connect it, Inlet water temp. sensor3. The TWI sensor connector is wet or there is water in. (TWI) malfuction remove the water, make the connector dry. Add waterproof adhesive4. The TWI sensor failure, change a new sensor.
95	Outlet water temp. sensor (TWO1) fault	<ol style="list-style-type: none">1. The TWO1 sensor connector is loosen, Reconnect it2. The TWO1 sensor connector is wet or there is water in. remove the water, make the connector dry. add waterproof adhesive.3. The TWO1 sensor failure, change a new sensor.
97	Anti-freezing Low Pressure Switch (AFLP) protection	<ol style="list-style-type: none">1. Check whether AFLP is loose.2. Check whether there is insufficient refrigerant.3. Check whether the filter is dirty and blocked.4. The AFLP failure, change a new AFLP.
D7	EE fault	<ol style="list-style-type: none">1. Check whether the internal and external connecting lines are connected normally.2. The control panel failure, change a new control panel.

9 TROUBLE SHOOTING

Code display	Failure	Code display	Failure
36	Inverter OVV or UNDV protect	J2	ODU Comm fault with IDUs
35	Inverter OVC protect	3E	Inverter ACC protect
H4	Low PRESS switch protect	3F	Inverter PFC protect
H1	High PRESS switch protect	31	Inverter IPM protect
39	Inverter high temp protect	J3	Comm fault between main PCB and COMP Inverter
C1	ODU Ambient temp sensor fault	J4	Comm fault between main PCB and Fan Inverter
C6	Suction temp sensor fault	32	Inverter hardware protect
E3	DISC temp too high protect	37	Inverter temp sensor fault
E1	Four-way valvedy fault	33	Inverter software protect
C2	Defrosting temp sensor fault	F1	DISC PRESS sensor fault
3H	Inverter fault start or out of step	F3	DISC PRESS too high protect
C3	DISC temp sensor fault	J5	Wrong ODU quantity setting and address setting

CAUTION

In winter, if the unit has failure and the unit is not repaired in time, the water pump and pipeline system may be damaged by freezing, so failure must be repaired in time.

10 TECHNICAL SPECIFICATIONS

Model	12/14/16 kW
Power supply	220-240V~50Hz
Nominal Running Current	See "Safety device requirement"
Nominal	Refer to the Technical Data
Dimensions (H×W×D) [mm]	1040×1280×420
Packing Dimensions (H×W×D) [mm]	1210×1355×545
Refrigerant	
Type	R290
Quantity	1350g
Weight	
Net weight (kg)	145
Gross weight (kg)	156
Connections	
water inlet/outlet	G1"BSP
Operation range-air side	
heating (°C)	-25~+35
cooling (°C)	-5~+43
Domestic hot water (°C)	-25~+43

11 MAINTENANCE NOTICE

Attention:

- For maintenance or scrap, please contact authorized service centers.
- Maintenance by unqualified person may cause dangers.
- Feed air conditioner with R290 refrigerant, and maintain the air conditioner in strictly accordance with manufacturer's requirements.
- The refrigerant may mix with air to form a flammable atmosphere. There is a risk of fire and explosion.
- The chapter is mainly focused on special maintenance requirements for appliance with R290 refrigerant.
- Ask repairer to read after-sales technical service handbook for detailed information.

Qualification requirements of maintenance personnel

- 1.Special training additional to usual refrigerating equipment repair procedures is required when equipment with flammable refrigerants is affected. In many countries, this training is carried out by national training organisations that are accredited to teach the relevant national competency standards that may be set in legislation. The achieved competence should be documented by a certificate.
- 2.The maintenance and repair of the air conditioner must be conducted according to the method recommended by the manufacturer. If other professionals are needed to help maintain and repair the equipment, it should be conducted under the supervision of individuals who have the qualification to repair AC equipped with flammable refrigerant.
- 3.Wear suitable personal protective equipment and bring a fire extinguisher with you.

Inspection of the Site

- Safety inspection must be taken before maintaining equipment with R290 refrigerant to make sure the risk of fire is minimized. Check whether the place is well ventilated, whether anti-static and fire prevention equipment is perfect.
- While maintaining the refrigeration system, observe the following precautions before operating the system.
- Note that the refrigerant R290 must never be introduced into the sewage system.

Operating Procedures

- 1.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.
- 2.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. no-sparking, adequately sealed or intrinsically safe.
- 3.Presence of fire extinguisher:
If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO₂ fire extinguisher adjacent to the charging area.
- 4.No ignition sources:
No person carrying out work in relation to a refrigeration system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which 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.
- 5.Ventilated Area(open the door and window):
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.
- 6 Checks to the refrigeration equipment:
Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance. The following checks shall be applied to installations using flammable refrigerants:
 - The charge size is in accordance with the room size within which the refrigerant containing parts are installed.
 - The ventilation machinery and outlets are operating adequately and are not obstructed.
 - If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.
 - Refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.
- 7.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.
 - Keep continuity of earthing.

11 MAINTENANCE NOTICE

Inspection of Cable

Check the cable for wear, corrosion, overvoltage, vibration and check if there are sharp edges and other adverse effects in the surrounding environment. During the inspection, the impact of aging or the continuous vibration of the compressor and the fan on it should be taken into consideration.

Leakage check of R290refrigerant

- Note: Check the leakage of the refrigerant in an environment where there is no potential ignition source. No halogen probe (or any other detector that uses an open flame) should be used.
- Leak detection method:
 - For systems with refrigerant R290, electronic leak detection instrument is available to detect and leak detection should not be conducted in environment with refrigerant. Make sure the leak detector will not become a potential source of ignition, and is applicable to the measured refrigerant.
 - Leak detector shall be set for the minimum ignitable fuel concentration (percentage) of the refrigerant. Calibrate and adjust to proper gas concentration(no more than 25%) with the used refrigerant.
 - The fluid used in leak detection is applicable to most refrigerants. But do not use chloride solvents to prevent the reaction between chlorine and refrigerants and the corrosion of copper pipeline.
 - If you suspect a leak, then remove all the fire from the scene or put out the fire.
 - If the location of the leak needs to be welded, then all refrigerants need to be recovered, or isolate all refrigerants away from the leak site (using cut-off valve). Before and during the welding, use OFN to purify the entire system.

Removal and Vacuum Pumping

- 1.Make sure there is no ignited fire source near the outlet of the vacuum pump and the ventilation is well.
- 2.Allow the maintenance and other operations of the refrigeration circuit should be carried out according to the general procedure, but the following best operations that the flammability is already taken into consideration are the key.
You should follow the following procedures:
 - Remove the refrigerant.
 - Decontaminate the pipeline by inert gases.
 - Evacuation.
 - Decontaminate the pipeline by inert gases again.
 - Cut or weld the pipeline.
- 3.The refrigerant should be returned to the appropriate storage tank. The system should be blown with oxygen free nitrogen to ensure safety. This process may need to be repeated for several times. This operation shall not be carried out using compressed air or oxygen.
- 4.Through blowing process, the system is charged into the anaerobic nitrogen to reach the working pressure under the vacuum state, then the oxygen free nitrogen is emitted to the atmosphere, and in the end, vacuum the system.
Repeat this process until all refrigerants in the system is cleared. After the final charging of the anaerobic nitrogen, discharge the gas into the atmosphere pressure, and then the system can be welded. This operation is necessary for welding the pipeline.

Procedures of Charging Refrigerants

- As a supplement to the general procedure, the following requirements need to be added:
- Make sure that there is no contamination among different refrigerants when using a refrigerant charging device.
The pipeline for charging refrigerants should be as short as possible to reduce the residual of refrigerants in it.
 - Storage tanks should remain vertically up.
 - Make sure the grounding solutions are already taken before the refrigeration system is charged with refrigerants.
 - After finishing the charging (or when it is not yet finished), label the mark on the system.
 - Be careful not to overcharge refrigerants.

11 MAINTENANCE NOTICE

Scrap and Recovery

Scrap:

Before this procedure, the technical personnel shall be thoroughly familiar with the equipment and all its features, and make a recommended practice for refrigerant safe recovery. For recycling the refrigerant, shall analyze the refrigerant and oil samples before operation. Ensure the required power before the test.

1. Be familiar with the equipment and operation.
2. Disconnect power supply.
3. Before carrying out this process, you have to make sure:
 - If necessary, mechanical equipment operation should facilitate the operation of the refrigerant tank.
 - All personal protective equipment is effective and can be used correctly.
 - The whole recovery process should be carried out under the guidance of qualified personnel.
 - The recovering of equipment and storage tank should comply with the relevant national standards.
4. If possible, the refrigerating system should be vacuumized.
5. If the vacuum state can't be reached, you should extract the refrigerant in each part of the system from many places.
6. Before the start of the recovery, you should ensure that the capacity of the storage tank is sufficient.
7. Start and operate the recovery equipment according to the manufacturer's instructions.
8. Don't fill the tank to its full capacity (the liquid injection volume does not exceed 80% of the tank volume).
9. Even the duration is short, it must not exceed the maximum working pressure of the tank.
10. After the completion of the tank filling and the end of the operation process, you should make sure that the tanks and equipment should be removed quickly and all closing valves in the equipment are closed.
11. The recovered refrigerants are not allowed to be injected into another system before being purified and tested.

Note: The identification should be made after the appliance is scrapped and refrigerants are evacuated. The identification should contain the date and endorsement. Make sure the identification on the appliance can reflect the flammable refrigerants contained in this appliance.

Recovery:

1. The clearance of refrigerants in the system is required when repairing or scrapping the appliance.
It is recommended to completely remove the refrigerant.
2. Only a special refrigerant tank can be used when loading the refrigerant into the storage tank.
Make sure the capacity of the tank is appropriate to the refrigerant injection quantity in the entire system. All tanks intended to be used for the recovery of refrigerants should have a refrigerant identification (i.e refrigerant recovery tank).
Storage tanks should be equipped with pressure relief valves and globe valves and they should be in a good condition.
If possible, empty tanks should be evacuated and maintained at room temperature before use.
3. The recovery equipment should be kept in a good working condition and equipped with equipment operating instructions for easy access. The equipment should be suitable for the recovery of R290 refrigerants. Besides, there should be a qualified weighting apparatus which can be normally used. The hose should be linked with detachable connection joint of zero leakage rate and be kept in a good condition.
Before using the recovery equipment, check if it is in a good condition and if it gets perfect maintenance. Check if all electrical components are sealed to prevent the leakage of the refrigerant and the fire caused by it.
If you have any question, please consult the manufacturer.
4. The recovered refrigerant shall be loaded in the appropriate storage tanks, attached with a transporting instruction, and returned to the refrigerant manufacturer. Don't mix refrigerant in recovery equipment, especially a storage tank.
5. The space loading R290 refrigeration can't be enclosed in the process of transportation.
Take anti electrostatic measures if necessary in transportation. In the process of transport, loading and unloading, necessary protective measures must be taken to protect the air conditioner to ensure that the air conditioner is not damaged.
6. When removing the compressor or clearing the compressor oil, make sure the compressor is pumped to an appropriate level to ensure that there is no residual R290 refrigerants in the lubricating oil. The vacuum pumping should be carried out before the compressor is returned to the supplier. Only the electrical heating method for heating the compressor housing is allowed to speed up the process.
Ensure the safety when discharging oil from the system.

DE-COMMISSIONING,DISMANTLING&DISPOSAL

This product contains refrigerant under pressure, rotating parts, and electrical connections which may be a danger & cause injur. All work must only be carried out by competent persons using suitable protective clothing and safety precautions.



Read the Manual



Risk of Electric Shock

RoHS



Unit is Remotely controlled
& may start without warning



1. Isolate all sources of electrical supply to the unit including any control system supplies switched by the unit.
Ensure that all points of electrical and gas isolation are secured in the OFF position.
The supply cables and gas pipe work may then be disconnected and removed.
For points of connection refer to unit installation instructions.
2. Remove all refrigerant from each system of the unit into a suitable container using a refrigerant reclaim or recovery unit.
This refrigerant may then be reused, if appropriate, or returned to the manufacturer for disposal.
Under no circumstances should refrigerant be vented to atmosphere Where appropriate, drain the refrigerant oil from each system into a suitable container and dispose of according to local laws and regulations governing disposal of oily wastes.
3. Packaged units can generally be removed in one piece after disconnection as above.
Any fixing down bolts should be removed and then unit lifted from position using the points provided and equipment of adequate lifting capacity.
Reference **MUST** be made to the unit installation instructions for unit weight and correct methods of lifting.
Note that any residual or spilt refrigerant oil should be mopped up and disposed of as described above.
4. After removal from position the unit parts may be disposed of according to local laws and regulations.
5. Meaning of crossed Out wheeled dustbin: Do not dispose of electrical appliances as unsorted municipal waste, 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. When replacing old appliances with new ones, the retailer is legally obligated to take back your old appliance for disposals at least free of charge.

