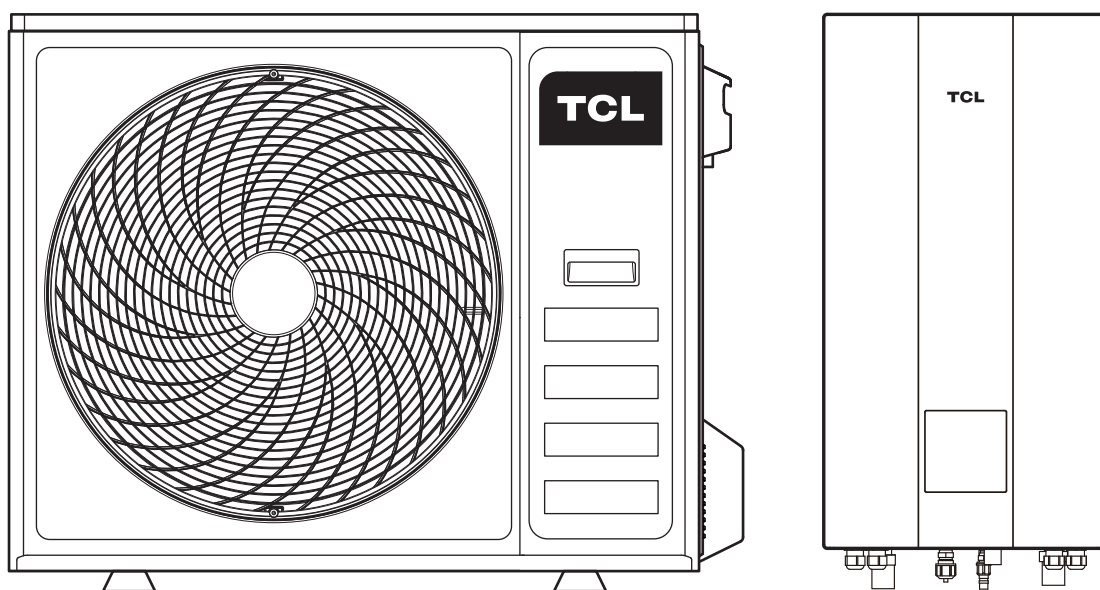




INSTALLATION AND OWNER'S MANUAL

Air to Water Heat Pump System Tri-Thermal Split



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.

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1 SAFETY PRECAUTIONS

The precautions listed here are divided into the following types. They are quite important, so be sure to follow them carefully. Read these instructions carefully before installation. Keep this manual in a handy for future reference.

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.

DANGER

Indicates an imminently hazardous situation which if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which if not avoided, may result in minor or moderate injury. It is also used to alert against unsafe practices.

NOTE

Indicates situations that could only result in accidental equipment or property damage.

WARNING

- 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 certified person.
- 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.



Caution: Risk of fire/
flammable materials

! WARNING

Servicing shall only be performed as recommended by the equipment manufacturer. Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants.

Special requirements for R32

! WARNING

- Do NOT have refrigerant leakage and open flame.
- Be aware that the R32 refrigerant does NOT contain an odour.

! WARNING

The appliance shall be stored so as to prevent mechanical damage and in a well-ventilated room without continuously operating ignition sources (example: open flames, an operating gas appliance) and have a room size as specified below.

! WARNING

Make sure installation, servicing, maintenance and repair comply with instruction and with applicable legislation (for example national gas regulation) and are executed only by authorized persons.

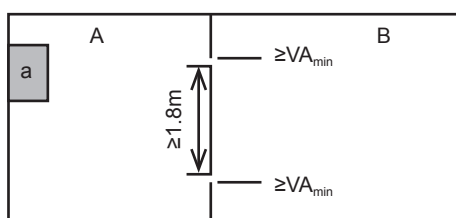
💡 NOTE

- Pipework should be protected from physical damage.
- Installation of pipework shall be kept to a minimum length.

If the total refrigerant charge in the system is <1.84 kg (i.e. if the piping length is <20m for 8/10kW), there are no additional minimum floor area requirement.

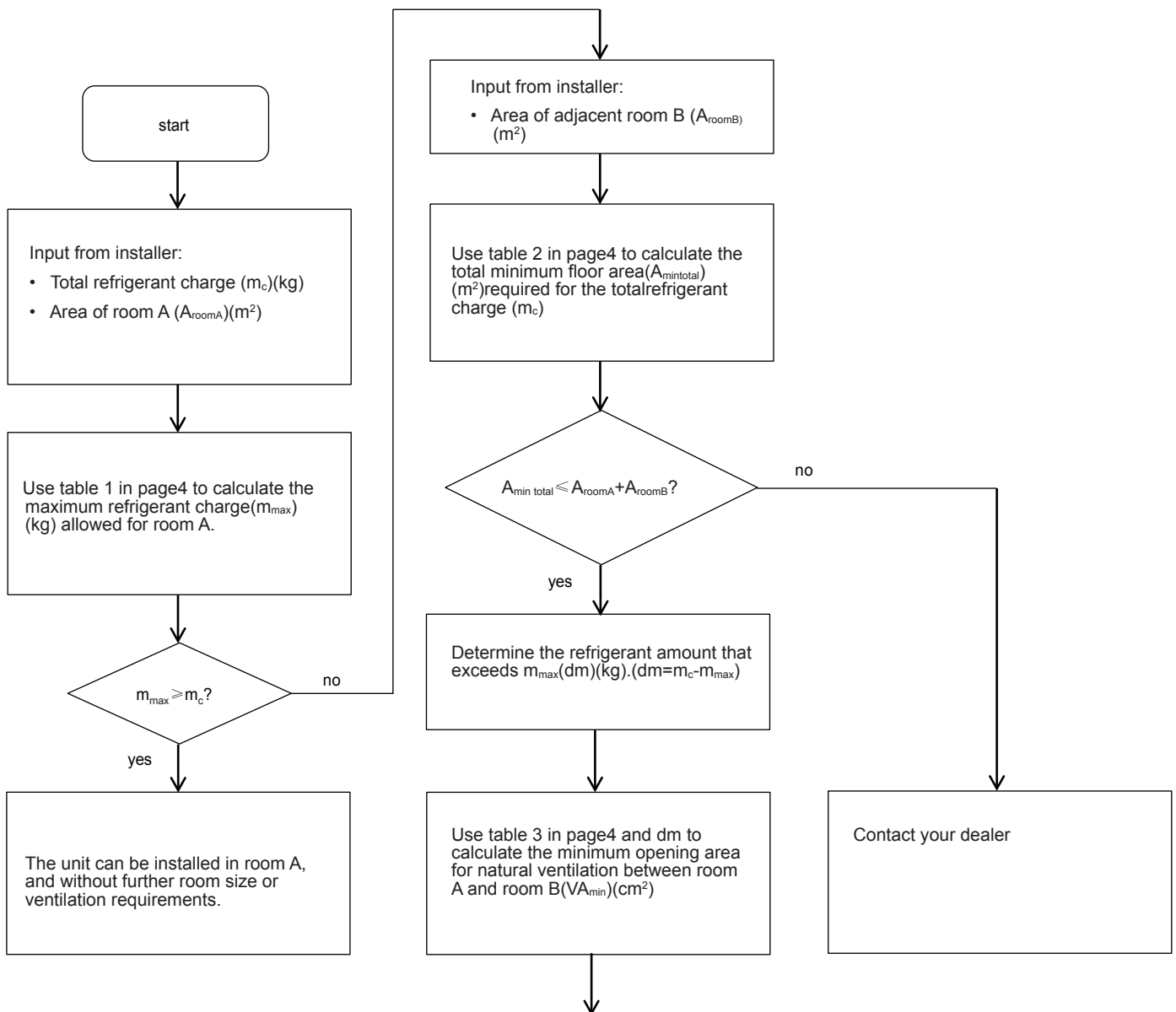
If the total refrigerant charge in the system is ≥1.84 kg (i.e. if the piping length is ≥20m for 8/10kW), you need to comply with additional minimum floor area requirements as described in the following flow chart. The flow chart uses the following tables: "Table 1-Maximum refrigerant charge allowed in a room: indoor unit" on page 4, "Table 2-Minimum floor area: indoor unit" on page 4 and "Table 3-Minimum venting opening area for natural ventilation: indoor unit" on page 4.

If the piping length is 30m, then the minimum floor area is ≥4.5m²; if the floor area is less than 4.5m², it needs to be predrilled with a hole of 200cm².



a Indoor unit
A Room where the indoor unit is installed.
B Room adjacent to room A.

The area of A plus B has to be greater than or equal to 4.5 m².



Unit can be installed at room A if:

- 2 ventilation openings (permanently open) are provided between room A and B, 1 at the top and 1 at the bottom.
- Bottom opening: The bottom opening must meet the minimum area requirements ($V_{A_{min}}$). It must be as close as possible to the floor. If the ventilation opening starts from the floor, the height must be ≥ 20 mm. The bottom of the opening must be situated ≤ 100 mm from the floor. At least 50% of the required opening area must be situated < 200 mm from the floor. The entire area of the opening must be situated < 300 mm from the floor.
- Top opening: The area of the top opening must be larger than or equal to the bottom opening. The bottom of the top opening must be situated at least 1.5 m above the top of the bottom opening.
- Ventilation openings to the outside are NOT considered suitable ventilation openings (the user can block them when it is cold).

Table 1 Maximum refrigerant charge allowed in a room:indoor unit

| A _{room} (m ²) | Maximum refrigerant charge in a room(mmax)(kg) | A _{room} (m ²) | Maximum refrigerant charge in a room(mmax)(kg) |
|-------------------------------------|--|-------------------------------------|--|
| | H=1800mm | | H=1800mm |
| 1 | 1.02 | 4 | 2.05 |
| 2 | 1.45 | 5 | 2.29 |
| 3 | 1.77 | 6 | 2.51 |

NOTE

- For wall mounted models, the value of "Installation height (H)" is considered 1800 mm to comply to IEC 60335-2-40:2013 A1 2016 Clause GG2.
- For intermediate A_{room} values(i.e. when A_{room} is between two values from the table), consider the value that corresponds to the lower A_{room} value from the table. If A_{room} = 3.5m², consider the value that corresponds to "A_{room} = 3m²".

Table 2-Minimum floor area:indoor unit

| mc(kg) | Minimum floor area(m2) |
|--------|------------------------|
| | H=1800mm |
| 1.84 | 3.32 |
| 2.00 | 3.81 |
| 2.25 | 4.83 |
| 2.50 | 5.96 |

NOTE

- For wall mounted models, the value of "Installation height (H)" is considered 1800 mm to comply to IEC 60335-2-40:2013 A1 2016 Clause GG2.
 - For intermediate m_c values(i.e. when m_c is between two values from the table), consider the value that corresponds to the higher m_c value from the table. If m_c = 1.87kg, consider the value that corresponds to "m_c = 2kg".
- Systems with total refrigerant charge lower than 1.84kg are not subjected to any room requirements.






Table 3 Maximum refrigerant charge allowed in a room:indoor unit

| m _c | m _{max} | dm=m _c -m _{max} (kg) | Minimum venting opening area(cm2) |
|----------------|------------------|--|-----------------------------------|
| | | | H=1800mm |
| 2.22 | 0.1 | 2.12 | 495.14 |
| 2.22 | 0.3 | 1.92 | 448.43 |
| 2.22 | 0.5 | 1.72 | 401.72 |
| 2.22 | 0.7 | 1.52 | 355.01 |
| 2.22 | 0.9 | 1.32 | 308.30 |
| 2.22 | 1.1 | 1.12 | 261.59 |
| 2.22 | 1.3 | 0.92 | 214.87 |
| 2.22 | 1.5 | 0.72 | 168.16 |
| 2.22 | 1.7 | 0.52 | 121.45 |
| 2.22 | 1.9 | 0.32 | 74.74 |
| 2.22 | 2.1 | 0.12 | 28.03 |

NOTE

- For wall mounted models, the value of "Installation height (H)" is considered 1800 mm to comply to IEC 60335-2-40:2013 A1 2016 Clause GG2.
- For intermediate dm values(i.e. when dm is between two values from the table), consider the value that corresponds to the higher dm value from the table. If dm = 1.55kg, consider the value that corresponds to "dm = 1.72kg".

Explanation of symbols displayed on the indoor unit or outdoor unit

| | | |
|---|---------|---|
|  | 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 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. |

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.

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 by 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.
- 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 certified person 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 residualcurrent 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.
- 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 BEFORE INSTALLATION

Before installation

Be sure to confirm the model name and the serial number of the unit.

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.

3 IMPORTANT INFORMATION FOR THE REFRIGERANT

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

Refrigerant type: R32; Volume of GWP: 675.

GWP=Global Warming Potential

| Model | Factory charged refrigerant volume in the unit | |
|-------|--|-----------------------------------|
| | Refrigerant/kg | Tonnes CO ₂ equivalent |
| 8kW | 1.65 | 1.11 |
| 10kW | 1.65 | 1.11 |

CAUTION

- Frequency of Refrigerant Leakage Checks
 - Equipment that contains less than 3 kg of fluorinated greenhouse gases or hermetically sealed equipment, which is labelled accordingly and contains less than 6 kg of fluorinated greenhouse gases shall not be subject to leak 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.
 - Only certificated person is allowed to do installation, operation and maintenance.

4 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.
- The equipment is not intended for use in a potentially explosive atmosphere.

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 next-door 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.
- Motor burnout.
- When a strong wind blows continuously on the front of the unit, the fan can start rotating very fast until it breaks.

4.1 Installation Site of indoor unit

CAUTION

The indoor unit should be installed in an indoor water proof place, or the safety of the unit and the operator cannot be ensured.

The indoor unit is to be wall mounted in an indoor location that meets the following requirements:

- The installation location is frost-free.
- The space around the unit is adequate for serving.
- The space around the unit allows for sufficient air circulation.
- There is a provision for condensate drain and pressure relief valve blow-off.

CAUTION

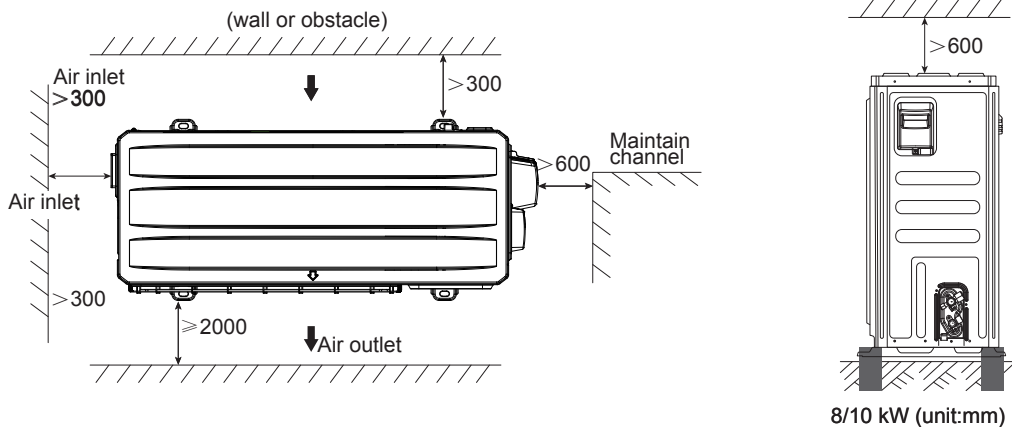
When the unit running in the cooling mode, condensate may drop from the water inlet and water outlet pipes. Please make sure the dropping condensate will not result in damage of your furniture and other devices.

- The installation surface is a flat and vertical non-combustible wall, capable of supporting the operation weight of the unit.
- All piping lengths and distance have been taken into consideration.

| Requirement | Value |
|---|-------|
| Maximum allowable piping length between the 3-way valve SV1 and the indoor unit (only for installations with domestic hot water tank) | 3m |
| Maximum allowable piping length between the domestic hot water tank and the indoor unit (only for installations with domestic hot water tank). The temperature sensor cable supplied with the indoor unit is 10m in length. | 8m |
| Maximum allowable piping length between the TW2 and the indoor unit. The temperature sensor a cable of TW2 supplied with the indoor unit is 10m in length. | 8m |

4.2 Installation Site of Outdoor unit

In normal condition, refer to the figures below for installation of the unit:



NOTE

- Make sure there is enough space 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**).
- 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 plate (field supply) (about 100mm, on the underside of the unit) in order to avoid drain water dripping. (See the picture in the right).



4.2.1 Selecting a location in cold climates

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).

4.2.2 Prevent sunshine

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.

WARNING

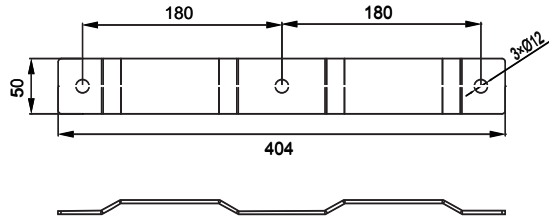
Uncovered scene, anti-snow shed must be installed: (1) to prevent rain and snow from hitting the heat exchanger, resulting in poor heating capacity of the unit, after long time accumulation, the heat exchanger freezes; (2) To prevent the outdoor unit air thermistor from being exposed to the sun, resulting in failure to boot; (3) To prevent freezing rain.

5 INSTALLATION PRECAUTIONS

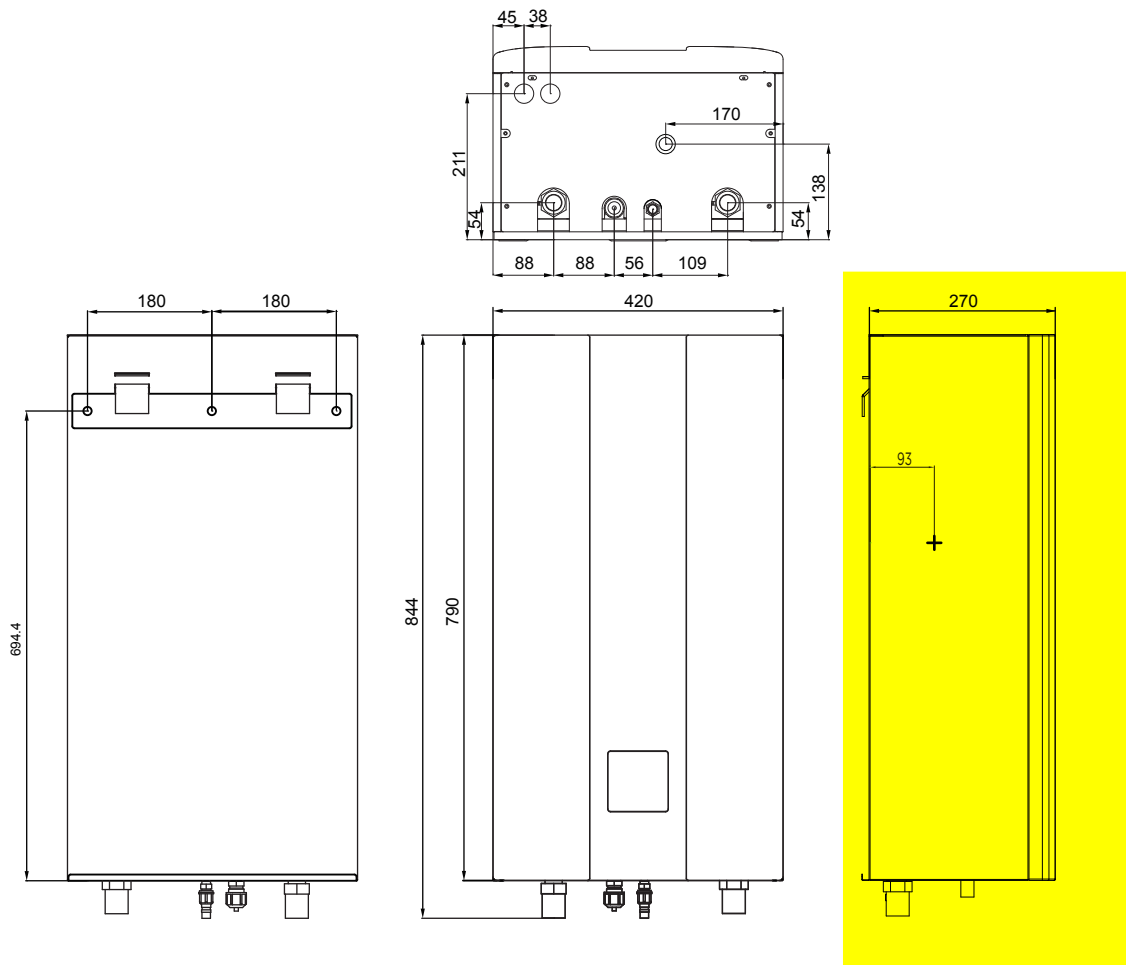
5.1 Installation precautions of indoor unit

5.1.1 Dimensions

Dimensions of the wall bracket:



5.1.2 Dimensions of the unit:



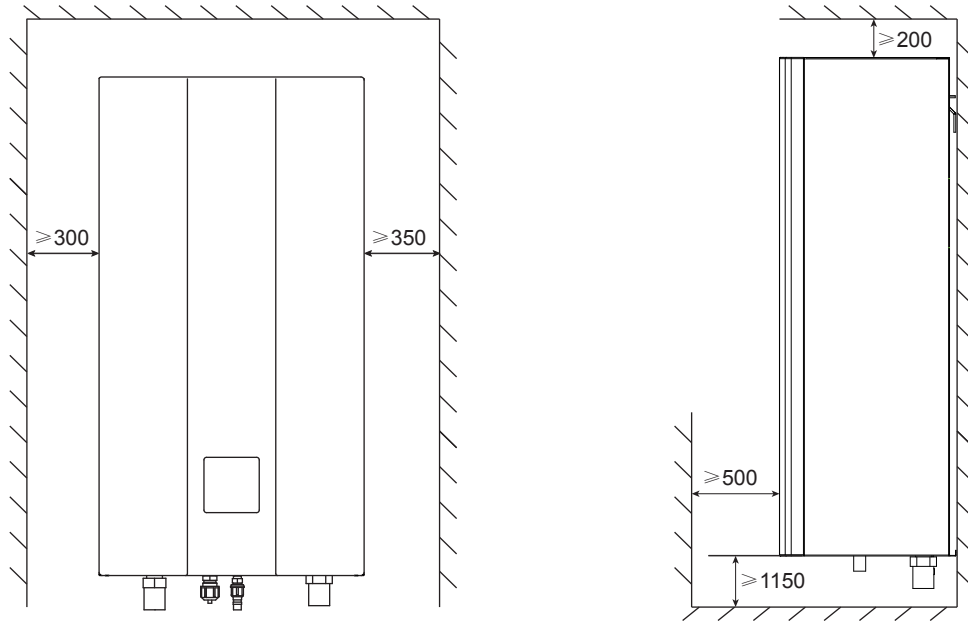
5.1.2 Installation requirements

- The indoor unit is packed in a box.
- At delivery, the unit must be checked and any damage must be reported immediately to the carrier claims agent.
- Check if all indoor unit accessories are enclosed.
- Bring the unit as close as possible to the final installation position in its original package in order to prevent damage during transport.
- The indoor unit weight is approximately 50kg and should be lifted by two persons.

WARNING

Do not grasp the control box or pipe to lift the unit!

5.1.3 Servicing space requirements



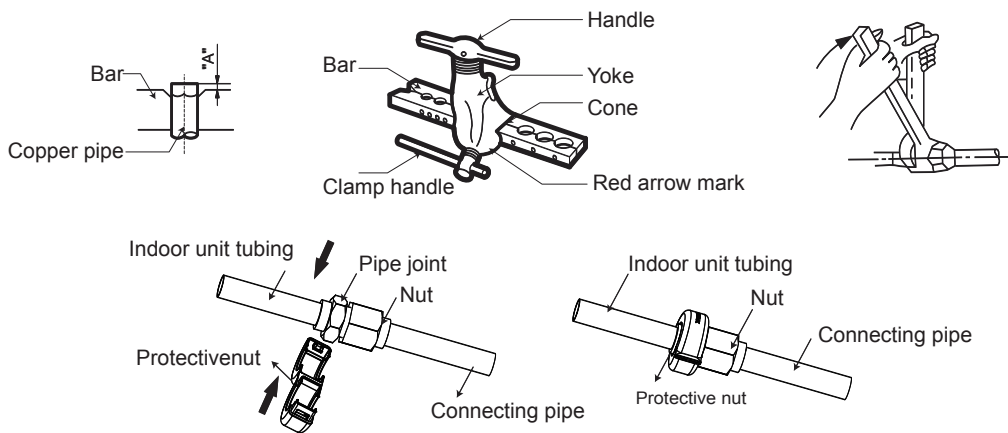
unit:mm

5.1.4 Mounting the indoor unit

- Fix the wall mounting bracket to the wall using appropriate plugs and screws
- Make sure the wall mounting bracket is horizontal level.
- Pay special attention to prevent overflow of the drain pan.
- Hang the indoor unit on the wall mounting bracket.

5.1.5 Refrigerant pipe connection

- Align the center of the pipes
- Sufficiently tighten the flare nut with fingers, and then tighten it with a spanner and torque wrench.
- The protective nut is a one-time part, it can not be reused. In case it is removed, it should be replaced with a new one.



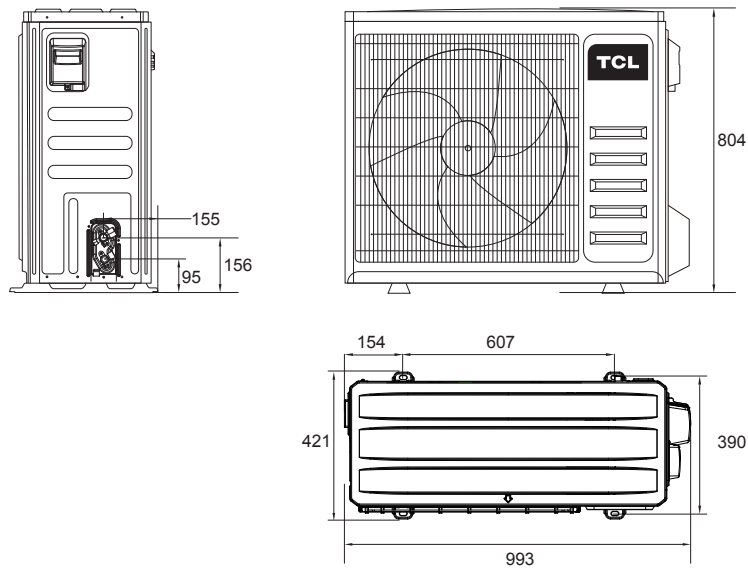
| Outer diam. | Tightening torque(N.cm) | Additional tightening torque(N.cm) |
|-------------|-------------------------|------------------------------------|
| φ6.35 | 1500 (153kgf.cm) | 1600 (163kgf.cm) |
| φ9.52 | 2500 (255kgf.cm) | 2600(265kgf.cm) |
| φ16 | 4500 (459kgf.cm) | 4700 (479kgf.cm) |

⚠ CAUTION

Excessive torque can break nut on installation conditions.
When flared joints are reused indoors, the flare part should be re-fabricated.

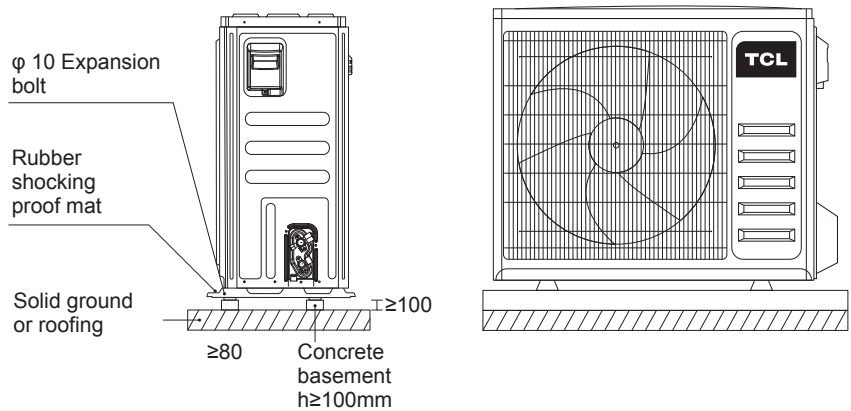
5.2 Installation precautions of Outdoor unit

5.2.1 Dimensions



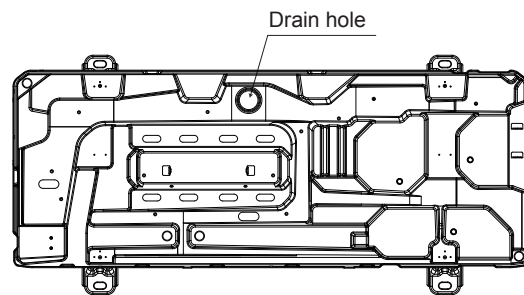
5.2.2 Installation requirements

- Check the strength and level of the installation ground so that the unit may not cause any vibrations or noise during the 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.



5.2.3 Drain hole position

- Check the strength and level of the installation ground so that the unit may not cause any vibrations or noise during the 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.

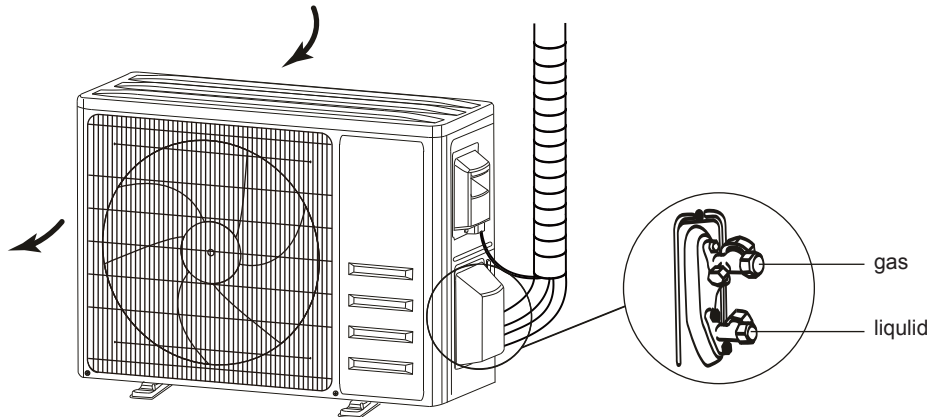


! CAUTION

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.
It is suggested to site the unit with the base electric heater.

6 INSTALLATION OF OUTDOOR UNIT CONNECTING PIPES

6.1 Refrigerant piping



⚠ CAUTION

- Please pay attention to avoid the components where it is connecting to the connecting pipes.
- To prevent the refrigerant piping from oxidizing inside when welding, It's necessary to charge nitrogen, or oxide will chock the circulation system.

6.2 Leakage detection

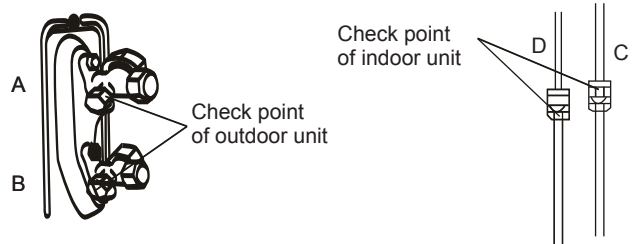
Use soap water or leakage detector to check every joint whether leak or not

Note:

A is high pressure side stop valve

B is low pressure side stop valve

C and D is connecting pipes interface of indoor and outdoor units

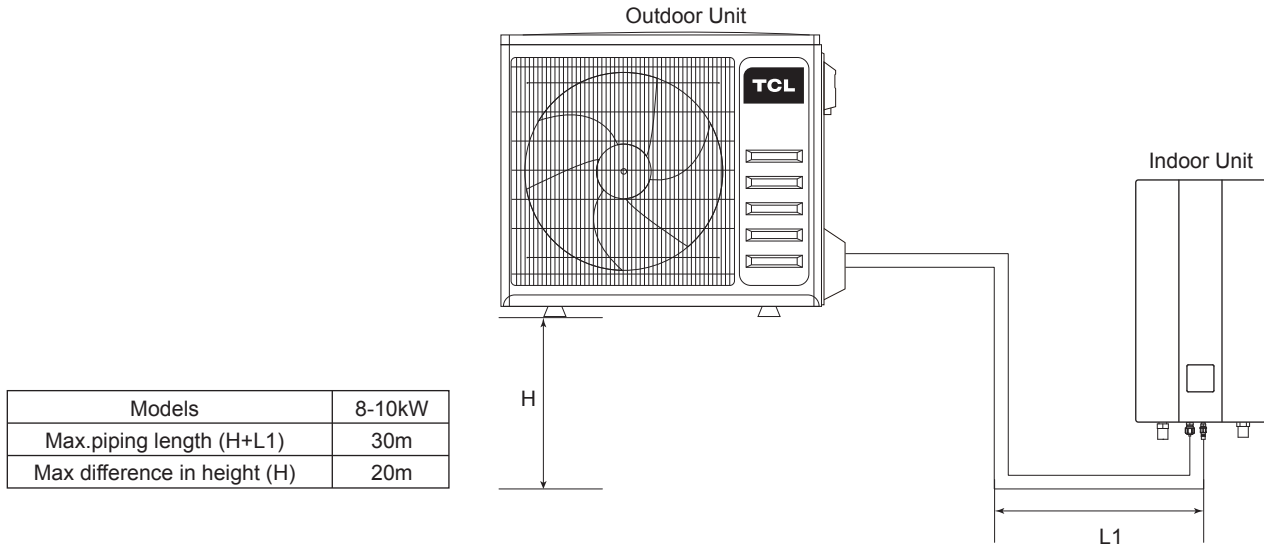


6.3 Heat insulation

In order to avoid the release of cold or heat from the connecting pipeline to the external environment during the operation of the equipment, please take effective insulation measures for the gas pipe and liquid pipe separately.

- 1) The gas side pipe should use closed cell foamed insulation material, which the fire-retardant is B1 grade and the heat resistance over 120°C.
- 2) When the external diameter of copper pipe $\leq \phi 12.7\text{mm}$, the thickness of the insulating layer at least more than 15mm; When the external diameter of copper pipe $\geq \phi 15.9\text{mm}$, the thickness of the insulating layer at least more than 20mm.
- 3) Please use attached heat-insulating materials do the heat insulation without clearance for the connecting parts of the indoor unit pipes.

6.4 Connecting method



1) Size of pipes of Gas side and Liquid side

| MODEL | Refrigerant | Gas side/Liquid side |
|--------|-------------|----------------------|
| 8/10kW | R32 | φ15.9/φ9.52 |

2) Connection method

| | Gas side | Liquid side |
|---------------------|----------|-------------|
| 8-10kW outdoor unit | Flaring | Flaring |
| Indoor unit | Flaring | Flaring |

6.5 Remove dirt or water in the pipes

- 1) Make sure there is no any dirt or water before connecting the piping to the outdoor and indoor units.
- 2) Wash the pipes with high pressure nitrogen, never use refrigerant of outdoor unit.

6.6 Airtight testing

Charge pressured nitrogen after connecting indoor/outdoor unit pipes to do airtight testing.

⚠ CAUTION

Pressured nitrogen [4.3MPa (44kg/cm²) for R32] should be used in the airtight testing.
 Tighten high/low pressure valves before charging pressured nitrogen.
 Charge pressure nitrogen from the connector on the pressure valves.
 The airtight testing should never use any oxygen, flammable gas or poisonous gas.

6.7 Air purge with vacuum pump

- 1) Using vacuum pump to do the vacuum, never using refrigerant to expel the air.
- 2) Vacuuming should be done from liquid side.

6.8 Refrigerant amount to be added

Calculate the added refrigerant according to the diameter and the length of the liquid side pipe of the outdoor unit/indoor unit connection.

If the length of the liquid side pipe is less than 15 meters it is no need to add more refrigerant, so than calculating the added refrigerant the length of the liquid side pipe must subtract 15 meters.

| Refrigerant to be added | MODEL | Total liquid pipe length L(m) | |
|------------------------------|--------|-------------------------------|------------|
| | | ≤15m | > 15m |
| Total additional refrigerant | 8/10kW | 0g | (L-15)x38g |

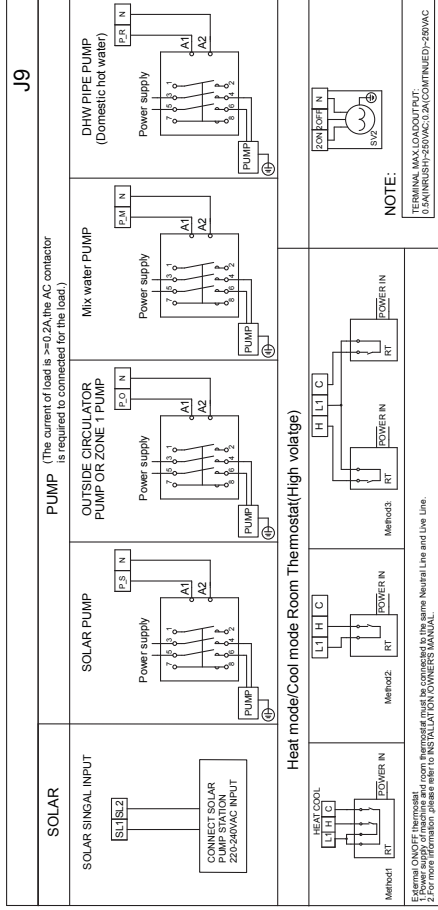
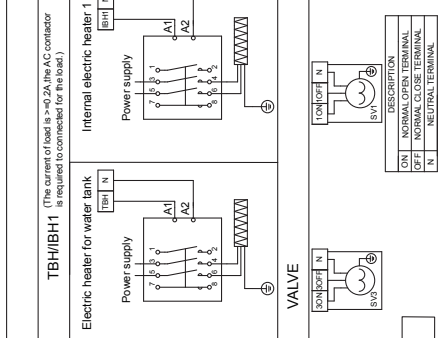
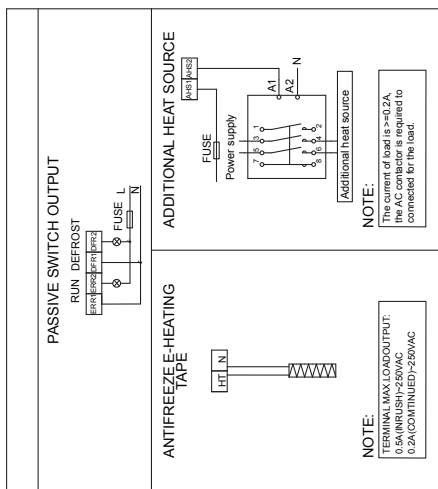
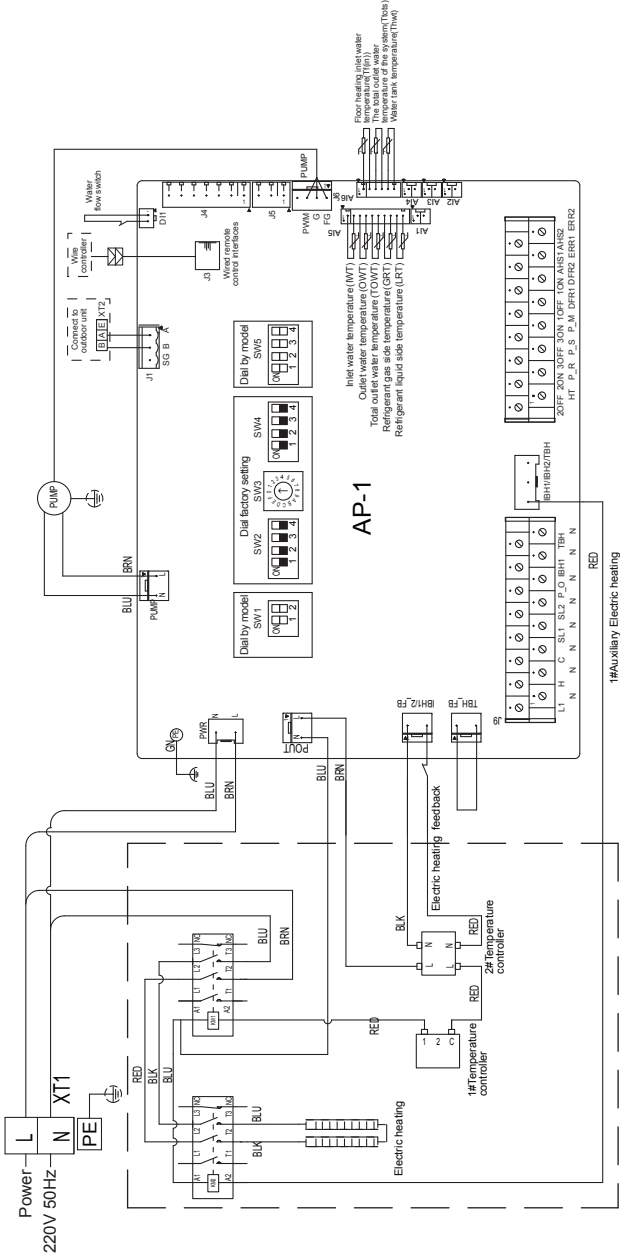
7 OVERVIEW OF THE UNIT

7.1 Electronic control box

7.1.1 Main control board of indoor unit

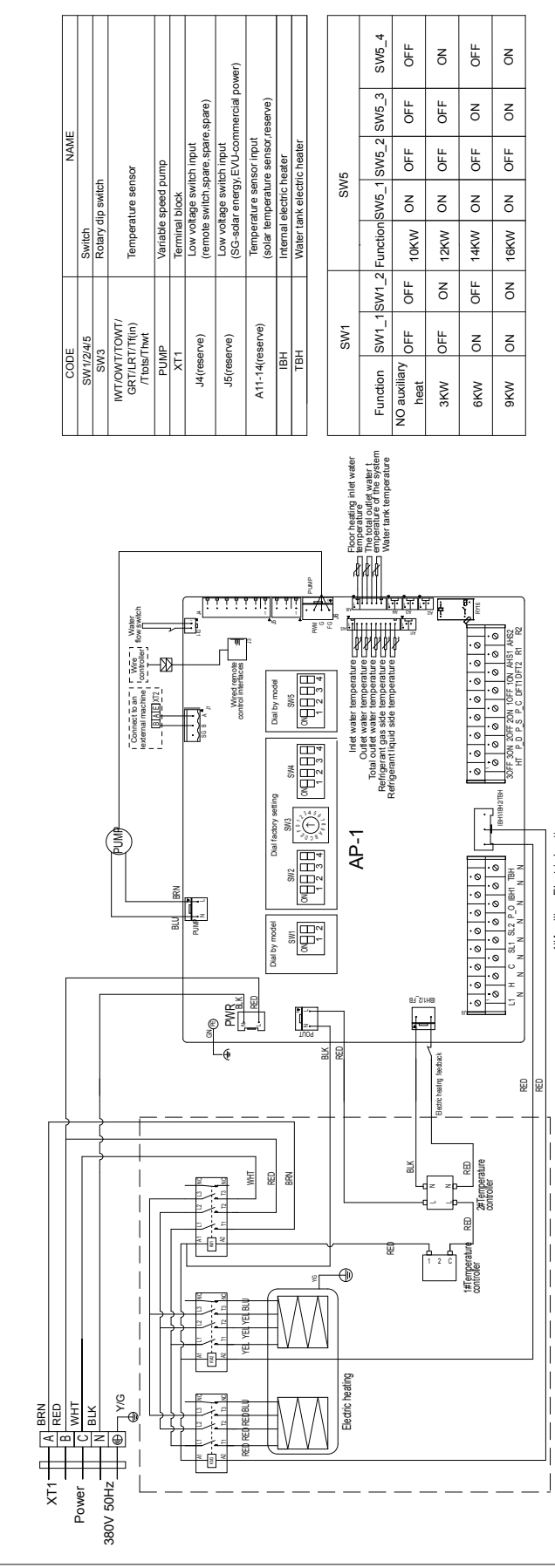
| CODE | NAME |
|--|--|
| SM12/4/5 | Switch |
| SW3 | Rotary dip switch |
| WT/OW/T/OWT/GR7/LRT/TH(in)/T/oter/Thwt | Temperature sensor |
| PUMP | Variable speed pump |
| XT1 | Terminal block |
| J4(reserve) | Low voltage switch input (remote switch spare spare) |
| J5(reserve) | Low voltage switch input (SG-solar energy, EVU-commercial power) |
| A11-14(reserve) | Temperature sensor input (solar temperature sensor reserve) |
| TBH | Internal electric heater |
| TBH | Water tank electric heater |

| Function | Switch | | | |
|-------------------|--------|-------|-------|-------|
| | SW1 | SW5 | SW5_1 | SW5_2 |
| NO auxiliary heat | SW1_1 | SW5_1 | SW5_2 | SW5_3 |
| | OFF | OFF | OFF | ON |
| 3KW | OFF | ON | OFF | ON |
| 6KW | ON | OFF | OFF | ON |
| 9KW | ON | ON | OFF | ON |



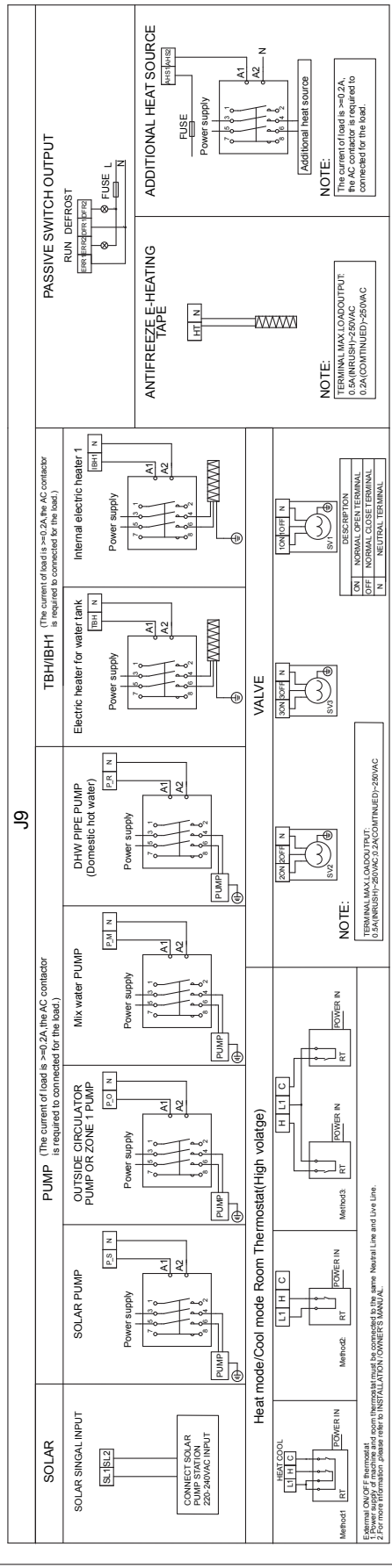
Tabel-1:1-phase

Tabel-1.3-phase



| CODE | NAME |
|--------------------------------------|---|
| SW1/2/4/5 | Switch |
| SW3 | Rotary dip switch |
| IMT/OMT/TOMT/GRY/LSI/TRM/IT/LSI/TM/T | Temperature sensor |
| PUMP | Variable speed pump |
| XT1 | Terminal block |
| J4(reserve) | Low voltage switch input (remote switch spare spare) |
| J5(reserve) | Low voltage switch input (SG-solar energy EVU-commercial power) |
| A11-14(reserve) | Temperature sensor input (solar temperature sensor/reserve) |
| IBH | Internal electric heater |
| TBH | Water tank electric heater |

| SW1 | | SW5 | | SW5_4 | |
|-------------------|-------|-------|----------|-------|-------|
| Function | SW1_1 | SW1_2 | Function | SW5_2 | SW5_3 |
| NO auxiliary heat | OFF | OFF | 10KW | ON | OFF |
| 3KW | OFF | ON | 12KW | ON | OFF |
| 6KW | ON | OFF | 14KW | ON | OFF |
| 9KW | ON | ON | 16KW | ON | ON |



| PASSIVE SWITCH OUTPUT | |
|-----------------------|-------|
| Function | SW5_4 |
| NO auxiliary heat | OFF |
| 3KW | OFF |
| 6KW | ON |
| 9KW | ON |

| ANTIFREEZE HEATING TAPE | |
|-------------------------|----------|
| Terminal | Terminal |
| HT | N |

| VALVE | |
|----------|----------|
| Terminal | Terminal |
| ON/OFF | N |

| PUMP | |
|----------|----------|
| Terminal | Terminal |
| ON/OFF | N |

| HEAT mode/Cool mode Thermostat (high voltage) | |
|---|----------|
| Terminal | Terminal |
| HEAT COOL | RT |
| RT | RT |

| SOLAR | |
|----------|----------|
| Terminal | Terminal |
| SL | RT |
| RT | RT |

NOTE:
The current of load is $\geq 0.2A$, the AC contactor is required to be connected for the load.

NOTE:
TERMINAL MAX. LOAD OUTPUT:
0.5A(IN RUSH)-250VAC
0.2A(CONTINUED)-250VAC

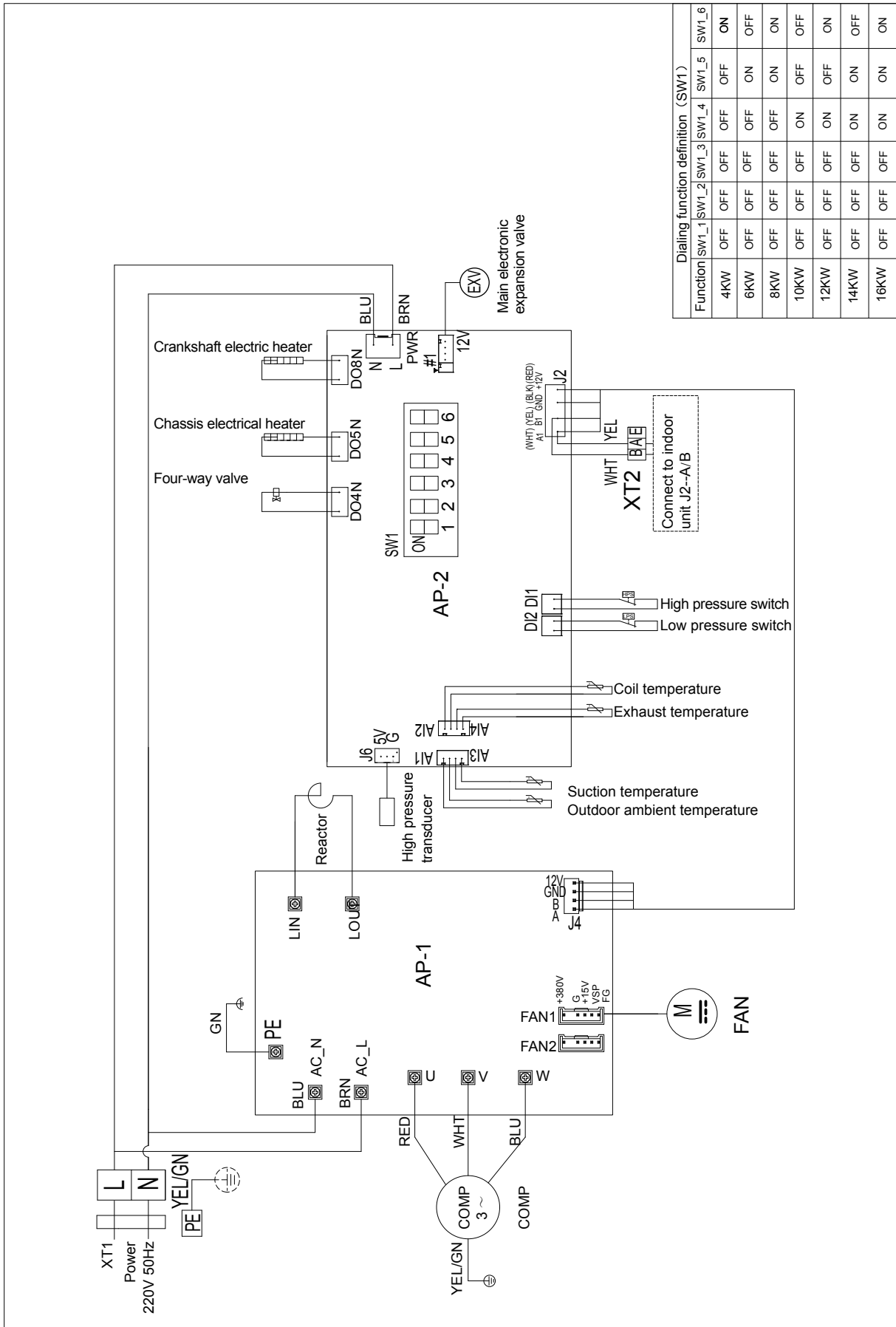
NOTE:
TERMINAL MAX. LOAD OUTPUT:
0.5A(IN RUSH)-250VAC
0.2A(CONTINUED)-250VAC

NOTE:
TERMINAL MAX. LOAD OUTPUT:
0.5A(IN RUSH)-250VAC
0.2A(CONTINUED)-250VAC

NOTE:
TERMINAL MAX. LOAD OUTPUT:
0.5A(IN RUSH)-250VAC
0.2A(CONTINUED)-250VAC

NOTE:
1. The thermostat should be connected to the Neutral Line and Live Line.
2. For more information, please refer to INSTALLATION/COVERS/MANUAL.

7.1.2 Main control board of outdoor unit

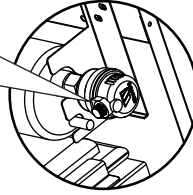


| Dialing function definition (SW1) | | | | | | |
|-----------------------------------|-------|-------|-------|-------|-------|-------|
| Function | SW1_1 | SW1_2 | SW1_3 | SW1_4 | SW1_5 | SW1_6 |
| 4KW | OFF | OFF | OFF | OFF | OFF | ON |
| 6KW | OFF | OFF | OFF | OFF | ON | OFF |
| 8KW | OFF | OFF | OFF | OFF | ON | ON |
| 10KW | OFF | OFF | OFF | ON | OFF | OFF |
| 12KW | OFF | OFF | OFF | ON | ON | ON |
| 14KW | OFF | OFF | OFF | ON | ON | OFF |
| 16KW | OFF | OFF | OFF | ON | ON | ON |

7.2 Filling water

- Connect the water supply to the filling valves and open the valve.
- Make sure all the automatic air purge valves are open (1.5-2 turns).
- Filling with water until the manometer indicates a pressure of approximately 2.0 bar. 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 it counterclockwise for 1.5-2 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 0.3 bar 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 EN 98/83 EC Directives.

7.3 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.

7.3.1 Precautions on electrical wiring work

- Fix cables so that cables do not make contact with the pipes (especially on the high pressure side).
- Secure the electrical wiring with cable ties as shown in figure so that it does not come in contact with the piping, particularly on the high-pressure side.
- Make sure no external pressure is applied to the terminal connectors.
- When installing the ground fault circuit interrupter make sure that it is compatible with the inverter (resistant to high frequency electrical noise) to avoid unnecessary opening of the ground fault circuit interrupter.

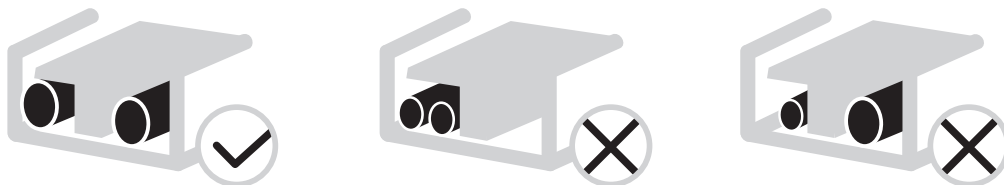
💡 NOTE

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.

7.3.2 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.)
 - When connecting wires of the same gauge, connect them according to the figure below.



- 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 wiring, make certain that prescribed wires are used, carry out complete connections, and fix the wires so that outside force cannot affect the terminals.

7.3.3 Safety device requirement

1. Select the wire diameters(minimum value) individually for each unit based on the table 1 and table 2, where the rated current in table 1 means MCA in table 2. In case the MCA exceeds 63A, the wire diameters should be selected according to the national wiring regulation.
2. Select circuit breaker that having a contact separation in all poles not less than 3 mm providing full disconnection, where MFA is used to select the current circuit breakers and residual current operation breakers:

Table 1

| Rated current of appliance: (A) | Nominal cross-sectional area (mm ²) | |
|---------------------------------|---|------------------------|
| | Flexible cords | Cable for fixed wiring |
| ≤3 | 0.5 and 0.75 | 1 and 2.5 |
| >3 and ≤6 | 0.75 and 1 | 1 and 2.5 |
| >6 and ≤10 | 1 and 1.5 | 1 and 2.5 |
| >10 and ≤16 | 1.5 and 2.5 | 1.5 and 4 |
| >16 and ≤25 | 2.5 and 4 | 2.5 and 6 |
| >25 and ≤32 | 4 and 6 | 4 and 10 |
| >32 and ≤50 | 6 and 10 | 6 and 16 |
| >50 and ≤63 | 10 and 16 | 10 and 25 |

Table 2

| System | Power Current | | | | | | | Compressor | | OFM | | IWPM | |
|-----------|---------------|----|----------|----------|---------|----------|---------|------------|---------|------|---------|-------|---------|
| | Voltage (V) | Hz | Min. (V) | Max. (V) | MCA (A) | TOCA (A) | MFA (A) | MSC (A) | RLA (A) | KW | FLA (A) | KW | FLA (A) |
| 8kW | 220-240 | 50 | 198 | 264 | 16 | 19 | 25 | - | 14.50 | 0.17 | 1.50 | 0.087 | 0.66 |
| 10kW | 220-240 | 50 | 198 | 264 | 17 | 19 | 25 | - | 15.50 | 0.17 | 1.50 | 0.087 | 0.66 |
| 8kW 3-PH | 380-415 | 50 | 342 | 456 | 10 | 14 | 16 | - | 9.15 | 0.17 | 1.50 | 0.087 | 0.66 |
| 10kW 3-PH | 380-415 | 50 | 342 | 456 | 11 | 14 | 16 | - | 10.15 | 0.17 | 1.50 | 0.087 | 0.66 |

NOTE

- MCA** : Max. Circuit Amps. (A)
- TOCA**: Total Over-current Amps. (A)
- MFA**: Max. Fuse Amps. (A)
- MSC**: Max. Starting Amps. (A)
- RLA**: In nominal cooling or heating test condition, the input Amps of compressor where MAX. Hz can operate Rated Load Amps. (A)
- OFM**:Outdoor fan motor
- IWPM**:Indoor Water Pump Motor
- KW**: Rated Motor Output
- FLA**: Full Load Amps. (A)

7.3.4 Remove the switch box cover

| Unit | 8kW | 10kW | 8kW 3-PH | 10kW 3-PH |
|---------------------------------------|-----|------|----------|-----------|
| Maximum overcurrent protector(MOP)(A) | 19 | 19 | 14 | 14 |
| Wiring size(mm ²) | 4.0 | 4.0 | 2.5 | 2.5 |

8 FIELD SETTINGS

The unit should be configured to match the installation environment (outdoor climate, installed options, etc.) and user demand.

A number of field settings are available. These settings are accessible and programmable through "Advanced setting" in user interface.

About Advanced setting

If required, the installer can perform a manual test run operation at any time to check correct operation of air purge, heating, cooling and domestic water heating.

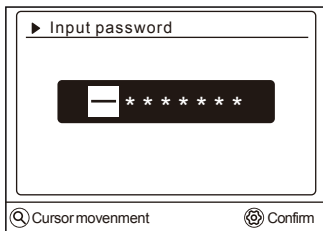
"Advanced setting" is designed for the installer to set the parameters.

Setting the composition of equipment.

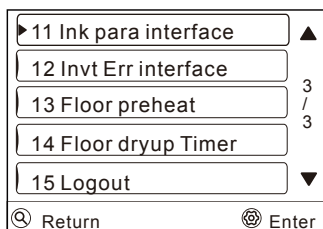
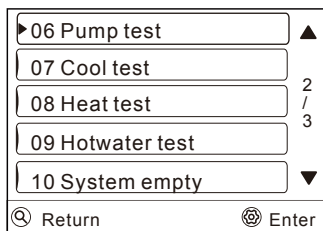
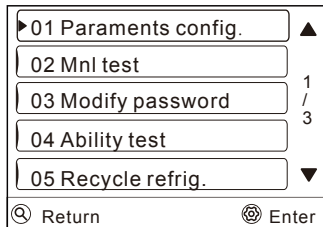
Setting the parameters.

How to go to Advanced setting

Go to "⊗" > "14 Advanced setting". Press "⊗". The following page will appear:



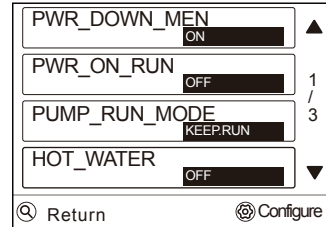
The password is 1234, the following pages will be displayed after putting the password:



Press "▲" or "▼" to scroll and use "⊗" to enter submenu.

8.1 DHW Mode Setting

Go to "⊗" > "14 Advanced setting" > "01 Paraments config." > "System Paraments" > "HOT_WATER". The following page will appear:



Change <OFF> to <ON>.

8.2 Control Method Setting

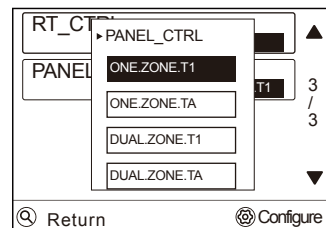
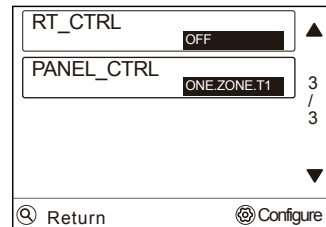
About Control Method Setting

The Control Method Setting is used for selecting whether the water flow temperature or room temperature is used to control the ON/OFF of the heat pump.

When ROOM TEMP. is enabled, the target water flow temperature will be calculated from climate-related curves.

How to enter the Control Method Setting

Go to "⊗" > "14 Advanced setting" > "01 Paraments config." > "System Paraments" > "PANEL_CTRL". The following page will appear:



Select a way to control the heat pump:

<ONE_ZONE.T1>=Control the unit based on the Water-out Temperature;

<ONE_ZONE.TA>=Control the unit based on the Room Temperature inside the controller;

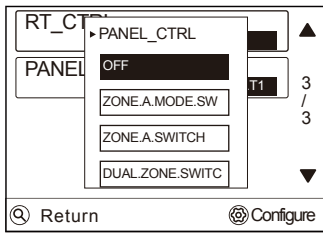
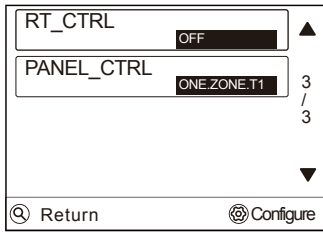
<DUAL_ZONE.T1>=Control the unit based on the Water-out Temperature;

<DUAL_ZONE.T1&TA>=Control the unit based on the Water-out Temperature and Room Temperature inside the controller;

8.3 ROOM THERMOSTAT

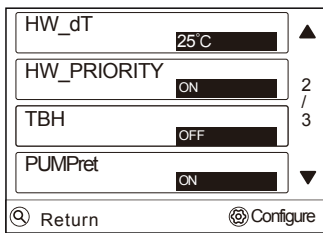
The ROOM THERMOSTAT is used to set whether the room thermostat is available.

Go to "☰" > "14 Advanced setting" > "01 Paraments config." > "System Paraments" > "RT_CTRL". The following page will appear:



8.4 Tank heater Setting

Go to "☰" > "14 Advanced setting" > "01 Paraments config." > "System Paraments" > "TBH". The following page will appear:



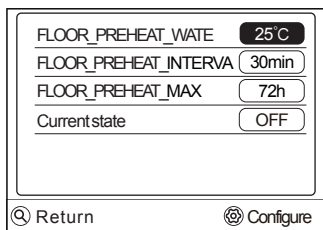
Change <OFF> to <ON>.

Before changing the parameters, you should confirm that the port <TBH_FB> has been connected like the picture shown as follow:



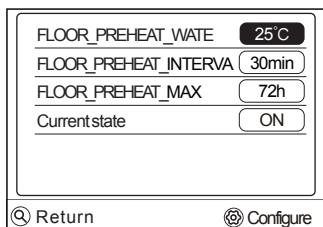
8.5 Floor preheat

Go to "☰" > "14 Advanced setting" > "13 Floor preheat". Press "☰". The following page will appear:

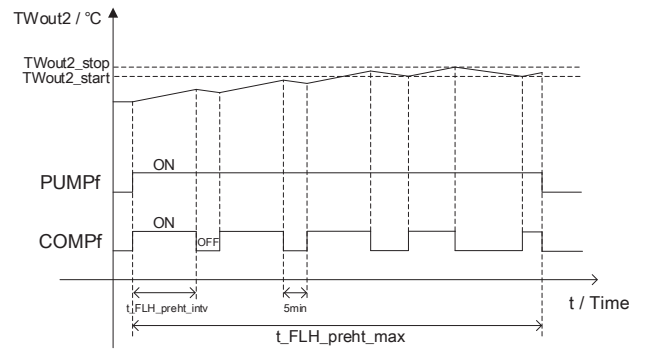


Use "▲" or "▼" to scroll and adjust the parameters.

If you want to turn on Floor preheat function, you need to turn on the DUAL.ZONE.T1 or DUAL.ZONE.TA. The following page will appear:

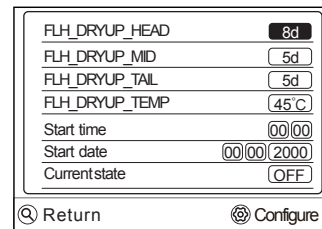


The operation of the unit during preheating for floor described in the picture below:



8.6 Floor dryup Timer

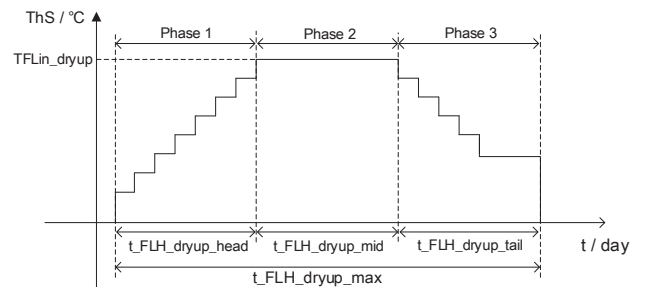
Go to "☰" > "14 Advanced setting" > "14 Floor dryup Timer". Press "☰". The following page will appear:



Use "▲" or "▼" to scroll and adjust the parameters. If you want to turn on Floor dryup Timer, you need to turn on the DUAL.ZONE.T1 or DUAL.ZONE.

When the heat pump malfunctions, the floor drying mode will turn off when the backup heater and additional heating source is unavailable.

The target outlet water temperature during floor drying up described in the picture below:



9 TEST RUN AND FINAL CHECKS

The installer is obliged to verify correct operation of unit after installation.

9.1 Final checks

Before switching on the unit, read following recommendations:

- When the complete installation and all necessary settings have been carried out, close all front panels of the unit and refit the unit cover.
- The service panel of the switch box may only be opened by a licensed electrician for maintenance purposes.

NOTE

That during the first running period of the unit, required power input may be higher than stated on the nameplate of the unit. This phenomenon originates from the compressor that needs elapse of a 50 hours run in period before reaching smooth operation and stable power consumption.

9.2 Test run operation (manually)

If required, the installer can perform a manual test run operation at any time to check correct operation of air purge, heating, cooling and domestic water heating, refer to 9.5.11 Test run.

10 MAINTENANCE AND SERVICE

In order to ensure optimal availability of the unit, a number of checks and inspections on the unit and the field wiring have to be carried out at regular intervals.

This maintenance needs to be carried out by your local technician.

In order to ensure optimal availability of the unit, a number of checks and inspections on the unit and the field wiring have to be carried out at regular intervals.

This maintenance has to be carried out by your local technician.

DANGER

ELECTRIC SHOCK

- Before carrying out any maintenance or repairing activity, must switch off the power supply on the supply panel.
- Do not touch any live part for 10 minutes after the power supply is turned off.
- The crank heater of compressor may operate even in standby.
- Please note that some sections of the electric component box are hot.
- Forbid touch any conductive parts.
- Forbid rinse the unit. It may cause electric shock or fire.
- Forbid leave the unit unattended when service panel is removed.

The following checks must be performed at least once a year by qualified person.

- Water pressure
- Check the water pressure, if it is below 1 bar, fill water to the system.
- Water filter
Clean the water filter.
- Water pressure relief valve
Check for correct operation of the pressure relief valve by turning the black knob on the valve counter-clockwise:
-If you do not hear a clacking sound, contact your local dealer.
-In case the water keeps running out of the unit, close both the water inlet and outlet shut-off valves first and then contact your local dealer.
- Pressure relief valve hose
Check that the pressure relief valve hose is positioned appropriately to drain the water.
- Backup heater vessel insulation cover
Check that the backup heater insulation cover is fastened tightly around the backup heater vessel.
- Domestic hot water tank pressure relief valve (field supply) Applies only to installations with a domestic hot water tank. Check for correct operation of the pressure relief valve on the domestic hot water tank.

11 TURN OVER TO CUSTOMER

The owner's manual of indoor unit and owner's manual of outdoor unit must be turned over to the customer. Explain the contents in the owner's manual to the customers in details.

WARNING

Ask your dealer for installation of the heat pump.

- Incomplete installation performed by yourself may result in a water leakage, electric shock, and fire.

Ask your dealer for improvement, repair, and maintenance.

- Incomplete improvement, repair, and maintenance may result in a water leakage, electric shock, and fire.

- **In order to avoid electric shock, fire or injury, or if you detect any abnormality such as smell of fire, turn off the power supply and call your dealer for instructions.**

- **Never let the indoor unit or the remote controller get wet.**

It may cause an electric shock or a fire.

- **Never press the button of the remote controller with a hard, pointed object.**

The remote controller may be damaged.

- **Never replace a fuse with that of wrong rated current or other wires when a fuse blows out.**

Use of wire or copper wire may cause the unit to break down or cause a fire.

- **It is not good for your health to expose your body to the air flow for a long time.**

- **Do not insert fingers, rods or other objects into the air inlet or outlet.**

- When the fan is rotating at high speed, it will cause injury.

- **Never use a flammable spray such as hair spray, lacquer or paint near the unit.**

It may cause a fire.

Never put any objects into the air inlet or outlet.

Objects touching the fan at high speed can be dangerous.

- **Do not dispose this product as unsorted municipal waste. Collection of such waste separately for special treatment is necessary.**

Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities. Contact your local government for information regarding the connection systems available.

- **If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the ground water and get into the food chain, damaging your health and well-being.**

- **To prevent refrigerant leak, contact your dealer.**

When the system is installed and runs in a small room, it is required to keep the concentration of the refrigerant, if by any chance coming out, below the limit. Otherwise, oxygen in the room may be affected, resulting in a serious accident.

- **The refrigerant in the heat pump is safe and normally does not leak.**

If the refrigerant leaks in the room, contact with a fire of a burner, a heater or a cooker may result in a harmful gas.

- **Turn off any combustible heating devices, ventilate the room, and contact the dealer where you purchased the unit.**

Do not use the heat pump until a service person confirms that the portion where the refrigerant leaks is repaired.

CAUTION

- **Do not use the heat pump for other purposes.**

In order to avoid any quality deterioration, do not use the unit for cooling precision instruments, food, plants, animals or works of art.

- **Before cleaning, be sure to stop the operation, turn the breaker off or pull out the supply cord.**

Otherwise, an electric shock and injury may result.

- **In order to avoid electric shock or fire, make sure that an earth leak detector is installed.**

Be sure the heat pump is grounded.

In order to avoid electric shock, make sure that the unit is grounded and that the earth wire is not connected to gas or water pipe, lightning conductor or telephone earth wire.

- **In order to avoid injury, do not remove the fan guard of the outdoor unit.**

- **Do not operate the heat pump with a wet hand.**

An electric shock may happen.

- **Do not touch the heat exchanger fins.**

These fins are sharp and could result in cutting injuries.

- **Do not place items which might be damaged by moisture under the indoor unit.**

Condensation may form if the humidity is above 80%, the drain outlet is blocked or the filter is polluted.

- **After a long use, check the unit stand and fitting for damage.**

If damaged, the unit may fall and result in injury.

- **To avoid oxygen deficiency, ventilate the room sufficiently if equipment with burner is used together with the heat pump.**

- **Arrange the drain hose to ensure smooth drainage.**

Incomplete drainage may cause wetting of the building, furniture etc.

- **Never touch the internal parts of the controller.**

Do not remove the front panel. Some parts inside are dangerous to touch, and a machine trouble may happen.

- **Never do the maintenances work by yourself.**

Please contact your local dealer to do the maintenances work.

- **Never expose little children, plants or animals directly to the air flow.**

Adverse influence to little children, animals and plants may result.

- **Do not allow a child to mount on the outdoor unit or avoid placing any object on it.**

Falling or tumbling may result in injury.

- **Do not operate the heat pump when using a room fumigation - type insecticide.**

Failure to observe could cause the chemicals to become deposited in the unit, which could endanger the health of those who are hypersensitive to chemicals.

- **Do not place appliances which produce open fire in places exposed to the air flow from the unit or under the indoor unit.**

It may cause incomplete combustion or deformation of the unit due to the heat.

CAUTION

- **Do not install the heat pump at any place where flammable gas may leak out.**

If the gas leaks out and stays around the heat pump, a fire may break out.

- **The appliance is not intended for use by young children or infirm persons without supervision.**

Young children should be supervised to ensure that they do not play with the appliance.

- **The outdoor unit window-shades should be periodic cleaning in case of being jammed.**

This window-shapes is heat dissipation outlet of components, if being jammed will cause the components shorten their service life spans because of overheated for a long time.

- **The temperature of refrigerant circuit will be high, please keep the interconnection cable away from the copper tube.**

12.3 Heating capacity

- The heating operation is a heat-pump process that heat will be absorbed from outdoor air and released to indoor water. Once the outdoor temperature is decreased, heating capacity decreased correspondingly.
- Other heating equipment is suggested to be used together when outdoor temperature is too low.
- In some extreme cold upland that buy the indoor unit equipped with electrical heater will obtain better performance.(Refer to indoor unit owner's manual for details)

NOTE

- 1) The motor in outdoor Unit will continue running for 60 seconds for to remove residual heat when the outdoor Unit receiving OFF command during heating operation.
- 2) If the heat pump malfunction occurs because of disturb, please reconnect the heat pump to power, then turn on it again.

12 OPERATION AND PERFORMANCE

12.1 Protection Equipment

This Protection Equipment will enable the Heat Pump to stop when the Heat Pump is to be directed running compulsively.

The protection equipment may be activated in following conditions:

Cooling Operation

- The air inlet or air outlet of outdoor unit is blocked.
- Strong wind is Continuously blowing to the air outlet of the outdoor unit.

Heating Operation

- Too much rubbish adhere to the filter in the water system.
- The air outlet of indoor unit is choked.
- Mishandling in operation:

If mishandling happens because of lighting or mobile wireless, please shut off the manual power switch, and turn on again, then push the ON/OFF button.

NOTE

When the protection equipment starts, please shut down the manual power switch, and restart operation after problem is solved.

12.2 About power cut

If power is cut during operation, stop all the operation immediately. Power comes again. If the auto-restart function is set on, then the unit will auto-restart.

12.4 Compressor protection feature

A protection feature prevents the heat pump from being activated for approximately several minutes when it restarts immediately after operation.

12.5 Cooling and heating operation

The the indoor unit in the same system can not run cooling and heating at the same time.

If the Heat Pump Administrator has set running mode, then the heat pump can not run on modes other than the presetted. Standby or No Priority will be displayed in the Control Panel.

12.6 Features of heating operation

Water will not become hot immediately at the beginning of the heating operation, 3~5 minutes ago (depends on the indoor and outdoor temperature), until the indoor heat exchanger become hot, then becomes hot.

During operation, the fan motor in the outdoor unit may stop running under high temperature.

12.7 Defrost in the heating operation

During heating operation, outdoor unit sometimes will frost. To increase efficiency, the unit will start defrosting automatically (about 2~10 minutes), and then water will be drained out from outdoor unit.

During defrosting, the fan motors in the outdoor unit will stop running.

13 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.

| Err code | MALFUNCTION OR PROTECTION | THE EXCLUSION METHOD |
|----------|---|---|
| 2 | EEPROM data error fault | Initialize all parameters. If the fault still cannot be solved after initialization, please contact us! |
| 3 | System ambient temperature fault | Check whether the sensor is connected normally; Check whether the temperature sensor is normal. |
| 5 | Total outlet water temperature fault | Check whether the temperature sensor is normal. |
| 6 | System maintenance data error | Initialize system maintenance settings. If the fault still cannot be solved after initialization, please contact us! |
| 9 | Insufficient water flow | Check whether the corresponding input point is closed. |
| 10 | Water tank electric overload | / |
| 12 | Hot water tank temperature fault | Check whether the temperature sensor is normal. |
| 14 | System total outlet water temperature fault | Check whether the temperature sensor is normal. |
| 15 | Floor heating inlet water temperature fault | Check whether the temperature sensor is normal. |
| 82 | Solar temperature sensor failure | Check whether the temperature sensor is normal. |
| 85 | Indoor temperature sensor failure | Check whether the temperature sensor is normal. |
| 86 | Inverter water pump failure | Check whether the variable frequency water pump is normal. |
| 97 | 0# compress low pressure fault | Check whether the input status of the low voltage signal of the press is normal! |
| 98 | 0# compress high pressure fault | Check whether the input state of the high pressure signal of the press is normal! |
| 101 | 0# Fin temperature sensor fault | Check whether the temperature sensor is normal. |
| 102 | 0# Exhaust temperature sensor fault | Check whether the temperature sensor is normal. |
| 103 | 0# Exhaust temperature is too high | Check whether the temperature sensor is normal. Check for lack of refrigerant. |
| 104 | 0# J5 pressure sensor fault | Check whether the sensor is connected properly |
| 105 | 0# J6 pressure sensor fault | Check whether the sensor is connected properly |
| 106 | 0# The pressure sensor pressure is too low | Check high pressure |
| 107 | 0# High pressure sensor pressure too high | Check high pressure |
| 108 | 0# Suction temperature sensor fault | Check whether the temperature sensor is normal. |

| Err code | MALFUNCTION OR PROTECTION | THE EXCLUSION METHOD |
|----------|---|---|
| 110 | 0# Suction temperature too low | Detect the amount of refrigerant |
| 111 | 0# Emergency defrosting frequently | Detect the amount of refrigerant |
| 112 | 0# The difference between suction and discharge temperature is unusual | Check whether the suction temperature and discharge temperature are normal. |
| 113 | 0# Cool mode evaporation temperature is too low | Check whether low pressure or post-valve temperature is normal |
| 115 | 0# Ambient temperature limits compressor on | |
| 116 | 0# The inlet water temperature of the plate heat exchanger is too low | Check the inlet water temperature of the plate heat exchanger |
| 117 | 0# The inlet water temperature of the plate heat exchanger is too high | Check the inlet water temperature of the plate heat exchanger |
| 118 | 0# Fan 1 speed is abnormal | Check whether the PWM fan wiring is normal |
| 119 | 0# Fan 2 speed is abnormal | Check whether the PWM fan wiring is normal |
| 124 | 0# Frequency conversion communication failure | Check whether the communication line is properly connected and in good contact. |
| 125 | 0# Frequency conversion communication failure | Inverter fault number is detailed in "Inverter fault table" Check the type of inverter fault |
| 126 | 0# board frequency conversion model setting | This fault prompt will appear when the inverter is connected for the first time. If the fault cannot be recovered automatically, power on again. If it still cannot recover, there is no corresponding press model in the variable frequency drive. |
| 129 | 0# Refrigerant gas side temperature sensor fault | Check whether the temperature sensor is normal. |
| 130 | 0# Refrigerant liquid side temperature sensor fault | Check whether the temperature sensor is normal. |
| 164 | 0# Auxiliary electric heating overload | / |
| 165 | 0# water tank electric overload | / |
| 166 | 0# The temperature of the outgoing water is too low | Check the outlet water temperature of the plate heat exchanger |
| 167 | 0# The temperature of the outgoing water is too high | Check the outlet water temperature of the plate heat exchanger |
| 168 | 0# Plate heat exchanger inlet water temperature sensor fault | Check whether the sensor is connected normally; Check whether the temperature sensor is normal. |
| 171 | 0# Plate heat exchanger outlet water temperature sensor fault | Check whether the sensor is connected normally; Check whether the temperature sensor is normal. |
| 174 | 0# The temperature difference between the board and the board is too large | Check the outlet water temperature of the plate heat exchanger and the return water temperature of the plate heat exchanger |
| 175 | 0# The temperature difference between the inlet and outlet of the plate heat exchanger is unusual | Check the outlet water temperature of the plate heat exchanger and the return water temperature of the plate heat exchanger |
| 178 | 0# Internal and external machine communication failure | Check whether the communication line is properly connected and in good contact. |
| 179 | 0# The protocol version of the board is too low | The version of the internal machine protocol is too low, please upgrade the program. |
| 65535 | Display communication failure | Check whether the connection between the indoor unit and the display screen is normal. |

| Err code | MALFUNCTION OR PROTECTION | THE EXCLUSION METHOD |
|--------------|---|--|
| Er.ocb (1) | Instantaneous overcurrent at start | <ul style="list-style-type: none"> • Check the model and model parameters of the press • Wait for the press to stop completely before starting it • Check whether the UVW output line is short-circuited • Seek service |
| Er.ocA (2) | Speed up overcurrent | <ul style="list-style-type: none"> • Check the model and model parameters of the press • Check the input power supply • Select an inverter with a large power level • Extend the acceleration time • Seek service |
| Er.ocd (3) | Overcurrent during deceleration operation | <ul style="list-style-type: none"> • Check the model and model parameters of the press • Select the inverter with large power level • Extend the deceleration time |
| Er.ocn (4) | Constant speed running over current | <ul style="list-style-type: none"> • Check the model and model parameters of the press • Check the input power supply • Check the load • Select the inverter with large power level |
| Er.ouA (5) | Accelerate overvoltage | <ul style="list-style-type: none"> • Check the input power • Wait for the press to stop completely before starting it • Check the model and model parameters of the press |
| Er.ocd (3) | Overvoltage during deceleration | <ul style="list-style-type: none"> • Check the input power • Check the model and model parameters of the press • Extend the deceleration time |
| Er.oud (6) | Overvoltage at constant speed | <ul style="list-style-type: none"> • Check the input power supply • Check the model and model parameters of the press • Properly extend the acceleration and deceleration time |
| Er.oun (7) | Overvoltage during standby | <ul style="list-style-type: none"> • Check input power supply, wiring • Check input power supply, wiring • Check and replace |
| Er.ouE (8) | Undervoltage during operation | <ul style="list-style-type: none"> • Check installation wiring • Check input voltage • Adjust parameters to eliminate oscillation |
| Er.dcL(9) | input phase loss | <ul style="list-style-type: none"> • Check the output wiring, check the motor and cable |
| Er.PLI (10) | output phase loss | <ul style="list-style-type: none"> • Check the model and model parameters of the press • Rewiring • Add output reactor or filter • Seek service |
| Er.PLo (11) | Power device protection | <ul style="list-style-type: none"> • Reduce the ambient temperature • Seek service • Clean the air duct or replace the fan • Check the load or choose a high-power inverter |
| Er. FoP (12) | Inverter overheating | <ul style="list-style-type: none"> • Check fan, air duct and ambient temperature • Extend acceleration time • Check input voltage • Check press model and model parameters |
| Er.oLI (14) | Inverter overload (PFC overheating) | <ul style="list-style-type: none"> • Check the model and model parameters of the press • Check the model and model parameters of the press • Check the input voltage |
| Er.oLL (15) | Motor overload | <ul style="list-style-type: none"> • Check the input voltage • Please power off for a few minutes, then power on again and start again, or seek service |
| Er.EEF (16) | PFC startup failed | <ul style="list-style-type: none"> • Check the press model and model parameters |
| Er.oLP (17) | Instantaneous overcurrent at start | <ul style="list-style-type: none"> • Check the press model and model parameters |

| Err code | MALFUNCTION OR PROTECTION | THE EXCLUSION METHOD |
|-----------------|--|---|
| Er.ULd (18) | Motor speed is too high | <ul style="list-style-type: none"> • The phase sequence of the press is reversed, or the press is not connected • Check the model and model parameters of the press |
| Er.Co1 (19) | Motor D axis current is too large | <ul style="list-style-type: none"> • Check the model and model parameters of the press • Start up after a few minutes of shutdown • Seek service • Replace the motor • Check the stator resistance of the motor and replace the motor |
| Er.Co2 (20) | Motor Q-axis current is too large | <ul style="list-style-type: none"> • Check the model and model parameters of the press • Start up after a few minutes of shutdown • Seek service • Replace the motor • Check the stator resistance of the motor and replace the motor |
| Er.EEP (21) | parameter storage failed | <ul style="list-style-type: none"> • Power off and then power on and try again, if the problem still exists, please seek service |
| Er.CFE (22) | Communication exception | <ul style="list-style-type: none"> • Check the control board and variable frequency drive board and wiring • Check the communication parameters • Check the communication circuit wiring and grounding |
| Er.ccF (23) | Current detection failure | <ul style="list-style-type: none"> • Power off and then power on and try again, if the problem still exists, please seek service |
| Er.ArF (24) | PFC temperature detection failure | <ul style="list-style-type: none"> • Power off and then power on and try again, if the problem still exists, please seek service |
| Er. Aco (25) | Motor stalls during startup | <ul style="list-style-type: none"> • Check the model and model parameters of the press • Restart after a few minutes of shutdown • Check the model and model parameters of the press • Replace the motor • Check the stator resistance of the motor, replace the motor • Check the motor load |
| Er.PGo (26) | Motor stalls during operation | <ul style="list-style-type: none"> • Check the model and model parameters of the press • Restart after a few minutes of shutdown • Check the model and model parameters of the press • Replace the motor • Check the stator resistance of the motor, replace the motor • Check the motor load |
| Er.rHo (27) | Heat dissipation temperature detection failure | <ul style="list-style-type: none"> • Power off and then power on and try again, if the problem still exists, please seek service |
| Er. Abb (28) | Stall (zero speed) fault | <ul style="list-style-type: none"> • Check the press model and model parameters |
| Er.lo1 (29) | interrupt overflow 1 | <ul style="list-style-type: none"> • Seeking service |
| Er.lo2 (30) | interrupt overflow 2 | <ul style="list-style-type: none"> • Seeking service |
| Er.PnL (31) | The rotor shakes too much during startup | <ul style="list-style-type: none"> • After stopping for a few minutes, start again • Check the model and model parameters of the press • Replace the motor • Check the stator resistance of the motor, replace the motor • Check the motor load |
| Er.rr1 (32) | The rotor shakes too much during operation | <ul style="list-style-type: none"> • After stopping for a few minutes, start again • Check the model and model parameters of the press • Replace the motor • Check the stator resistance of the motor, replace the motor • Check the motor load |
| Er.PF1 (33) | PFC overcurrent | <ul style="list-style-type: none"> • Check the input power • Check whether the PFC inductor lead wire or inductor coil is short-circuited, or seek service |
| Er.PF2 (34) | PFC peak current is too high | <ul style="list-style-type: none"> • Check the input power • Check whether the PFC inductor lead wire or inductor coil is short-circuited, or seek service |
| Er.PF2 (35) | PFC RMS current is too large | <ul style="list-style-type: none"> • Check input power • Check mechanical system, compressor refrigerant, etc., or seek service |

14 TECHNICAL SPECIFICATIONS

Indoor Unit

| Indoor unit model | 8kW | 10kW | 8kW(3kW heater) | 10kW(3kW heater) | 8kW(9kW heater) | 10kW(9kW heater) |
|-------------------------------|-----------------------------|------|-----------------|------------------|------------------|------------------|
| Power supply | 220-240V ~ 50Hz | | 220-240V ~ 50Hz | | 380-415V 3N~50Hz | |
| Rated input | 100W | | 3100W | | 9100W | |
| Rated Current | 0.4A | | 13.4A | | 13.3A | |
| Norminal capacity | Refer to the technical data | | | | | |
| Dimensions(W×H×D)[mm] | 420×790×270 | | | | | |
| Packing(W×H×D)[mm] | 530×1035×355 | | | | | |
| Heat exchanger | Plate heat exchanger | | | | | |
| Electric heater | / | | | | | |
| Internal water volume | 5.0L | | | | | |
| Rated water pressure | 0.3MPa | | | | | |
| Filter mesh | 60 | | | | | |
| Min. water flow (flow switch) | 13L/min | | | | | |
| Pump | | | | | | |
| Type | DC inverter | | | | | |
| Max. head | 9m | | | | | |
| Power input | 5~90W | | | | | |
| Expansion vessel | | | | | | |
| Volume | 8L | | | | | |
| Max. operating pressure | 0.3MPa(g) | | | | | |
| Pre-charge pressure | 0.10MPa(g) | | | | | |
| Weight | | | | | | |
| Net weight | 36.0kg | | 38.5kg | | 39.5kg | |
| Gross weight | 40.5kg | | 43.5kg | | 44.5kg | |
| Connections | | | | | | |
| Refrigerant gas/liquid side | Φ15.9/Φ9.52 | | | | | |
| Water inlet/outlet | R1" | | | | | |
| Drain connection | DN25 | | | | | |
| Operation range | | | | | | |
| Outlet water(heating model) | +25 ~ +65°C | | | | | |
| Outlet water(cooling model) | +5 ~ +20°C | | | | | |
| Domestic hot water | +20 ~ +60°C | | | | | |
| Ambient temperature | 0 ~ +35°C | | | | | |
| Water pressure | 0.1 ~ 0.3MPa | | | | | |

Outdoor Unit

| Outdoor unit model | 8kW | 10kW |
|--|-----------------------------|------|
| Power supply | 220-240V~ 50Hz | |
| Rated power input | 4370W | |
| Rated current | 19A | |
| Norminal capacity | Refer to the technical data | |
| Dimensions(W×H×D)[mm] | 993×804×421 | |
| Packing(W×H×D)[mm] | 1022×835×480 | |
| Fan motor | DC motor / Horizontal | |
| Compressor | DC inverter dual rotary | |
| Heat exchanger | Fin-coil | |
| Refrigerant | | |
| Type | R32 | |
| Quantity | 1650g | |
| Weight | | |
| Net weight | 61.0kg | |
| Gross weight | 64.5kg | |
| Connections | | |
| Liquid side | Φ9.52 | |
| Gas side | Φ15.9 | |
| Drain connection | DN32 | |
| Max. piping length | 30m | |
| Max. differance in height | 20m | |
| Refrigerant to be added | 38g/m | |
| Operation ambient temperature range | | |
| Heating mode | -25 ~ +35°C | |
| Cooling mode | -5 ~ +43°C | |
| Domestic hot water mode | -25 ~ +43°C | |

15 INFORMATION SERVICING

1) Checks to the area

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

2) Work procedure

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

3) General work area

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

4) Checking for presence of refrigerant

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with flammable refrigerants, i.e. no sparking, adequately sealed or intrinsically safe.

5) Presence of fire extinguisher

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

6) No ignition sources

No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion.

All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which flammable refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. NO SMOKING signs shall be displayed.

7) Ventilated area

Ensure that the area is in the open or that it's 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.

8) Checks to the refrigeration equipment

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

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

9) Checks to electrical devices

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

Initial safety checks shall include:

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

10) Repairs to sealed components

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

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

- Ensure that apparatus is mounted securely.
- Ensure that seals or sealing materials have not degraded such that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications.

NOTE

The use of silicon sealant may inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

11) Repair to intrinsically safe components

Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use. Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating. Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

12) Cabling

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

13) Detection of flammable refrigerants

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

14) Leak detection methods

The following leak detection methods are deemed acceptable for systems containing flammable refrigerants. Electronic leak detectors shall be used to detect flammable refrigerants, but the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed and the appropriate percentage of gas (25% maximum) is confirmed. Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work. If a leak is suspected, all naked flames shall be removed or extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

15) Removal and evacuation

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

- Remove refrigerant;
- Purge the circuit with inert gas;
- Evacuate;
- Purge again with inert gas;

Open the circuit by cutting or brazing.

The refrigerant charge shall be recovered into the correct recovery cylinders. The system shall be flushed with OFN to render the unit safe. This process may need to be repeated several times.

Compressed air or oxygen shall not be used for this task.

Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system.

When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

This operation is absolutely vital if brazing operations on the pipe-work are to take place.

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

16) Charging procedures

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

Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.

- Cylinders shall be kept upright.
- Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the refrigeration system.
- Prior to recharging the system it shall be pressure tested with OFN. The system shall be leak tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

17) Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail.

It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken.

In case analysis is required prior to re-use of reclaimed refrigerant. It is essential that electrical power is available before the task is commenced.

- a) Become familiar with the equipment and its operation.
- b) Isolate system electrically
- c) Before attempting the procedure ensure that:
 - Mechanical handling equipment is available, if required, for handling refrigerant cylinders;
 - All personal protective equipment is available and being used correctly;
 - The recovery process is supervised at all times by a competent person;
 - Recovery equipment and cylinders conform to the appropriate standards.
- d) Pump down refrigerant system, if possible.
- e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
- f) Make sure that cylinder is situated on the scales before recovery takes place.
- g) Start the recovery machine and operate in accordance with manufacturer s instructions.
- h) Do not overfill cylinders. (No more than 80% volume liquid charge).
- i) Do not exceed the maximum working pressure of the cylinder, even temporarily.
- j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
- k) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

18) Labelling

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

19) Recovery

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

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

Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs. The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order.

Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.

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

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

20) Transportation, marking and storage for units

Transport of equipment containing flammable refrigerants Compliance with the transport regulations

Marking of equipment using signs Compliance with local regulations

Disposal of equipment using flammable refrigerants Compliance with national regulations

Storage of equipment/appliances

The storage of equipment should be in accordance with the manufacturer's instructions.

Storage of packed (unsold) equipment

Storage package protection should be constructed such that mechanical damage to the equipment inside the package will not cause a leak of the refrigerant charge.

The maximum number of pieces of equipment permitted to be stored together will be determined by local regulations.