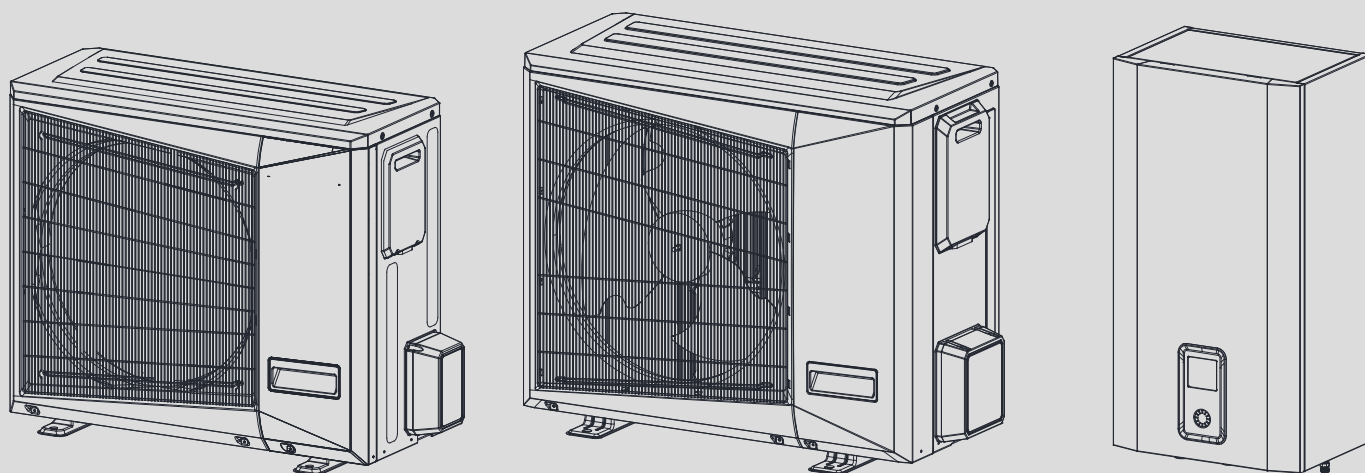




INSTALLATION, OPERATION AND
MAINTENANCE INSTRUCTIONS



Air-To-Water Split Type Heat Pump



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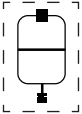





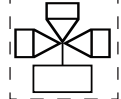
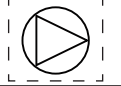
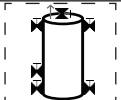
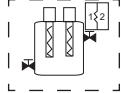
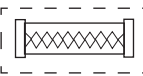

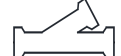
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ACRONYMS AND LEGEND

Acronyms	
IAT	Indoor Air Temperature
BPHE	Brazed Plate Heat Exchanger
CHWS	Chiller Water System
DHW	Domestic Hot Water
EHS	Electric Heater Stage
EWT	Entering Water Temperature
FCU	Fan Coil Unit
LWT	Leaving Water Temperature
NHC	New Hydraulic Control (refer to wiring diagram'Main control card')
OAT	Outdoor Air Temperature
PMV	Pulse Modulating Valve
SHC	Space Heating / Cooling Control
TR	Refrigerant Temperature
UFC	Underfloor Cooling
UFH	Underfloor Heating
Wired Controller	User Interface (Wall-mounted User Interface)

Standard installation Legend

Label	Symbol	Designation	Notes
-		Device	Field supplied
-		Accessory	Field mounted
-		Option	Factory mounted
-		Balancing valve	Field supplied Balancing to adjust the water flow rate
-		Stop valve	Field supplied
-		Automatic Air vent	Field supplied Automatic air vent(s) on highest position in the loop
Add EXP-T		Additional expansion tank	Field supplied Additional expansion tank depending the total water in the loop contend - taking in account the expansion tank (XXL) embedded in hydraulic module
-		Boiler	Boiler used to boost or backup the heat pump for comfort
Eh1 & EH2		Electrical Heater (1 or 2)	Electrical heaters up to two with a max. stages up to 3 Used to boost or backup the heat pump for comfort
EH3		DHW-Electrical Heater Backup (1 stage)	Domestic Hot Water Electrical Heater - one stage used to backup DHW (when condions are out of heat pump map)
DHW-T		Domestic Hot Water - Tank	Field supplied
DHW-S		Domestic Hot Water - Sensor	Accessory to mount on top of the DHW-Tank Measure DHW-Temperature
DHW-V		Domestic Hot Water - Valve or Diverting valve	Accessory to be field mounted, it will position the valve to send either to comfort loop or DHW-T, the processed water
add_pmp		Additional Water Pump	Field Supplied, it is used for comfort loop as a secondary loop
De-Coupling Tank		De-Coupling Tank	Field Supplied, it is used to connect different water loop rates as well as to receive the boiler loop
Backup-EH		Backup electrical heater	Field Supplied, it is used for comfort loop as a Booster Heater (HP+EH) or Backup (EH only) when HP is out of the map.
-		Flexible	Field supply, it is used to lower vibrations transmissions if necessary
HTSS		High Temperature Safety Switch	Field supplied, use to stop system when UFH max, water temperature is triggered
Filter		Water filter of inlet pipe	Accessory of water inlet pipe filter to install at the inlet water pipe of unit to protect the Hydraulic part

Precaution for Using R32 Refrigerant

Pay careful attention to the following points:



Warning

- Recommended outdoor temperature range:
Heating: -25~35°C (Units below -25°C only turn on electric heating)
Cooling: -5~50°C
Wet-bulb temperature: RH20%~95%
- The mixing of different refrigerants within a system is prohibited.
- Ensure that foreign matter (oil, water, etc.) does not enter the piping.
- Operation, maintenance, repairing and refrigerant recovery should be carried out by trained and certified personnel in the use of flammable refrigerants and as recommended by the manufacturer. Any personnel conducting an operation, servicing or maintenance on a system or associated parts of the equipment should be trained and certified.
- Any part of refrigerating circuit (evaporators, air coolers, AHU, condensers or liquid receivers) or piping should not be located in the proximity of heat sources, open flames, operating gas appliance or an operating electric heater.
- The user/owner or their authorized representative shall regularly check the alarms, mechanical ventilation and detectors, at least once a year, where as required by national regulations, to ensure their correct functioning.
- A logbook shall be maintained. The results of these checks shall be recorded in the logbook.
- Ventilations in occupied spaces shall be checked to confirm no obstruction.
- Before a new refrigerating system is put into service, the person responsible for placing the system in operation should ensure that trained and certified operating personnel are instructed on the basis of the instruction manual about the construction, supervision, operation and maintenance of the refrigerating system, as well as the safety measures to be observed, and the properties and handling of the refrigerant used.
- The general requirement of trained and certified personnel are indicated as below:
 - a) Knowledge of legislation, regulations and standards relating to flammable refrigerants;
 - b) Detailed knowledge of and skills in handling flammable refrigerants, personal protective equipment, refrigerant leakage prevention, handling of cylinders, charging, leak detection, recovery and disposal; and,
 - c) Able to understand and to apply in practice the requirements in the national legislation, regulations and Standards;
 - d) Continuously undergo regular and further training to maintain this expertise.
- Protect the refrigerating system from accidental rupture due to moving furniture or reconstruction activities.
- To ensure no leaking, field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure (>1.04MPa, max 4.15MPa). No leak shall be detected.
- For joints made at the installation site:
Joints shall be tested with detection equipment with a capability of 5g/year of refrigerant or better, with the equipment in standstill and under operation or under a pressure of at least these standstill or operation conditions.



Caution

1. Installation (Space)

- Must comply with national gas regulations, state municipal rules and legislation. Notify relevant authorities in accordance with all applicable regulations.
- Must ensure mechanical connections be accessible for maintenance purposes.
- In cases that require mechanical ventilation, ventilation openings shall be kept clear of obstruction.
- When disposal of the product, do follow to the precautions in #12 and comply with national regulations.
- Always contact to local municipal offices for proper handling.
- The maximum refrigerant charge amount (M)
 - 1) The minimum floor area of the room or the special requirements for the room in which the appliance can be located as defined in Annex GG, except where the refrigerant charge (M) is less than or equal to m1
 - 2) A warning that the appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation;
 - 3) A warning that the appliance shall be stored in a room without continuously operating open flames (for example an operating gas appliance) and ignition sources (for example an operating electric heater).

2. Servicing

1) Service personnel

- Any qualified person who is involved with working on or breaking into a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accordance with an industry recognised assessment specification.
- Servicing shall only be performed as recommended by the equipment manufacturer. Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants.
- Servicing shall be performed only as recommended by the manufacturer.

Precaution for Using R32 Refrigerant

- The system is inspected, regularly supervised and maintained by a trained and certified service personnel who is employed by the person user or party responsible.

2) Work

- Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimised.
- For repair to the refrigerating system, the precautions in #2-2 to #2-14 must be followed before conducting work on the system.
- Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.
- All maintenance staff and others working in the local area shall be instructed and supervised on the nature of work being carried out.
- Avoid working in confined spaces. Always ensure away from source, at least 2 meter of safety distance, or zoning of free space area of at least 2 meter in radius.
- Wear appropriate protective equipment, including respiratory protection, as conditions warrant.
- Keep all sources of ignition away.

3) 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. non sparking, adequately sealed or intrinsically safe.
- In case of leakage/spillage happened, immediately ventilate area and stay upwind and away from spill/release.
- In case of leakage/spillage happened, do notify persons downwind of the leaking/spill, isolate immediate hazard area and keep unauthorized personnel out.

4) 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 at hand.
- Have a dry powder or CO₂ fire extinguisher adjacent to the charging area.

5) 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.
- He/She must not be smoking when carrying out such work.
- 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.

6) Ventilated area

- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work.
- A degree of ventilation shall continue during the period that the work is carried out.
- The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

7) 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 ventilation machinery and outlets are operating adequately and are not obstructed.
 - Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.

8) Checks to electrical devices

- Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures.
- Initial safety checks shall include but not limit to:
 - That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking.
 - That there is no live electrical components and wiring are exposed while charging, recovering or purging the system.
 - That there is continuity of earth bonding.
- At all times the manufacturer's maintenance and service guidelines shall be followed.
- If in doubt consult the manufacturer's technical department for assistance.
- If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with.
- If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used.
- The owner of the equipment must be informed or reported so all parties are advised thereafter.

3. Repairs to sealed components

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

Precaution for Using R32 Refrigerant

be located at the most critical point to warn of a potentially hazardous situation.

- Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.
- Ensure that apparatus is mounted securely.
- Ensure that seals or sealing materials have not degraded such that they no longer serve the purpose of preventing the ingress of flammable atmospheres.
- Replacement parts shall be in 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.

4. 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. Unspecified parts by manufacturer may result ignition of refrigerant in the atmosphere from a leak.

5. 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.

6. Detection of flammable refrigerants

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

7. The following leak detection methods are deemed acceptable for all refrigerant systems.

- No leaks shall be detected when using detection equipment with a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure ($>1.04\text{MPa}$, max 4.15MPa). For example, a universal sniffer.
- Electronic leak detectors may be used to detect flammable refrigerants, but the sensitivity may not be adequate, or may need recalibration. (Detection equipment shall be calibrated in a refrigerant-free area.)
- Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used.
- Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed and the appropriate percentage of gas (25 % maximum) is confirmed.
- Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.
- If a leak is suspected, all naked flames shall be removed/extinguished.
- If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. The precautions in #8 must be followed to remove the refrigerant.

8. 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 purged with OFN to render the appliances safe. (remark: OFN = oxygen free nitrogen, type of inert gas)
- 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 close to any ignition sources and there is ventilation available.

9. 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 in an appropriate position according to the instructions.

Precaution for Using R32 Refrigerant

- Label the system when charging is complete (if not already).
 - Extreme care shall be taken not to over fill the refrigeration system.
 - Prior to recharging the system it shall be pressure tested with OFN (refer to #7).
 - 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.
 - Electrostatic charge may accumulate and create a hazardous condition when charging and discharging the refrigerant. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before charging/discharging.
10. Decommissioning
- Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its details.
 - 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 over fill 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.
- Electrostatic charge may accumulate and create a hazardous condition when charging or discharging the refrigerant. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before charging/discharging.
11. 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.
12. Recovery
- When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.
 - When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed.
 - Ensure that the correct number of cylinders for holding the total system charge are available.
 - All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant).
 - Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order.
 - Recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
 - The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of flammable refrigerants.
 - In addition, a set of calibrated weighing scales shall be available and in good working order.
 - Hoses shall be complete with leak-free disconnect couplings and in good condition.
 - Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.
 - The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Note arranged.
 - Do not mix refrigerants in recovery units and especially not in cylinders.
 - If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant.
 - The evacuation process shall be carried out prior to returning the compressor to the suppliers.
 - Only electric heating to the compressor body shall be employed to accelerate this process.
 - When oil is drained from a system, it shall be carried out safely.

1 - INTRODUCTION

1.1 - Introduction

Prior to the initial start-up of the units, the people involved should be thoroughly familiar with these instructions and technical data for the installation.

The outdoor systems are designed to provide a very high level of safety and reliability making installation, start-up, operation and maintenance easier and more secure. They will provide safe and reliable service when operated within their application range.

The procedures in this manual are arranged in the sequence required for machine installation, start-up, operation and maintenance.

Be sure you understand and follow the procedures and safety precautions contained in the instructions supplied with the machine, as well as those listed in this guide, such as: protective clothing such as gloves, safety glasses, safety shoes and appropriate tools, and suitable qualifications (electrical, air conditioning, local legislation).

1.2 - Safety

1.2.1 - Installation safety considerations

After the unit has been received, and before it is started up, it must be inspected for damage. Check that the refrigerant circuits are intact, especially that no components or pipes have shifted or been damaged (e.g. following a shock). If in doubt, carry out a leak tightness check. If damage is detected upon receipt and before signature, immediately file a claim with the shipping company.

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.

Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

Do not remove the pallet or the packaging until the unit is in its final position. These units can be moved with a fork lift truck, as long as the forks are positioned in the right place and direction on the unit.

The units can also be lifted with slings (refer to Figure 1 and 2).

Use slings with the correct capacity, and always follow the lifting instructions on the certified drawings supplied for the unit.

Safety is only guaranteed, if these instructions are carefully followed. If this is not the case, there is a risk of material deterioration and injuries to personnel.

DO NOT COVER ANY PROTECTION DEVICES.

This applies to fuse plugs and relief valves (if used) in the refrigerant or heat transfer medium circuits. Check if the original protection plugs are still present at the valve outlets. These plugs are generally made of plastic and should not be used. If they are still present, please remove them. Install devices at the valve outlets or drain piping that prevent the penetration of foreign bodies (dust, building debris, etc.) and atmospheric agents (water can form rust or ice). These devices, as well as the drain piping, must not impair operation and not lead to a pressure drop that is higher than 10% of the control pressure.

Control

When the unit is subjected to fire, the fluid may then be decomposed into toxic residues when subjected to the flame :

- Stay away from the unit.
- Set up warnings and recommendations for personnel in charge to stop the fire.
- Fire extinguishers appropriate to the system and the refrigerant type must be easily accessible.

All precautions concerning handling of refrigerant must be observed in accordance with local regulations.

Accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation or explosions.

Inhalation of high concentrations of vapour is harmful and may cause heart irregularities, unconsciousness, or death.

Vapour is heavier than air and reduces the amount of oxygen available for breathing. These products cause eye and skin irritation. Decomposition products can be hazardous.

1.2.2 - Equipment and components under pressure

These products incorporate equipment or components under pressure, produced by manufacturers. We recommend that you consult your appropriate national trade association or the owner of the equipment or components under pressure (declaration, re-qualification, retesting, etc.). The characteristics of this equipment/these components are given on the nameplate or in the required documentation, supplied with the products.

The units are intended to be stored and operate in an

environment where the ambient temperature must not be less than the lowest allowable temperature indicated on the nameplate.

Do not introduce significant static or dynamic pressure with regard to the operating pressures used during operation or for tests in the refrigerant circuit or in the heat exchange circuits.

NOTES:

Monitoring during operation, re-qualification, re-testing, exemption from retesting:

- Follow local regulations on the monitoring of pressure containing equipment.
- The user or the operator is usually requested to create and maintain a monitoring and maintenance register.
- In absence of regulation or in addition to the regulations, follow the guidance in ISO 5149.
- Follow the local professional recommendations, whenever they exist.
- Regularly monitor the surface of the components to detect cavernous corrosion. To do this check an uninsulated part of the pressure vessel or at a joint in the insulation.

1 - INTRODUCTION

- Regularly check for possible presence of impurities (e.g. silicon grains) in the heat exchange fluids. These impurities can cause wear and/or pitting corrosion.
- Filter the heat exchange fluid.
- The reports of the periodical checks by the user or the operator must be included in the monitoring and maintenance register.

REPAIR:

Any repair or modification of a pressure vessel is prohibited.

Only the replacement of the vessel by an original part from the manufacturer is allowed. In this case, the replacement must be carried out by a qualified technician. The replacement of the vessel must be entered in the monitoring and maintenance register.

RECYCLING:

The pressure equipment can be recycled in whole or in part.

After use they may contain refrigerant vapours and oil residue. Some parts are painted.

1.2.3 - Maintenance safety considerations

Professional technicians working on the electric or refrigeration components must be authorized, trained and fully qualified to do so.

All refrigerant circuit work must be carried out by a trained person, fully qualified to work on these units. He must have been trained and be familiar with the equipment and the installation. All welding operations must be carried out by qualified specialists.

The units use high-pressure R32 refrigerant. Special equipment must be used when working on the refrigerant circuit (pressure gauge, charge transfer, etc.).

Do not clean the unit with hot water or steam. This may cause a pressure increase of the refrigerant.

Any manipulation (opening or closing) of a shut-off valve must be carried out by a qualified and authorised technician, observing applicable standards (e.g. during draining operations). The unit must be switched off while this is done.

During any handling, maintenance and service operations the qualified technician working on the unit must be equipped with safety gloves, safety glasses, shoes and protective clothing.

Never work on a unit that is still energized. Never work on any of the electrical components, until the general power supply to the unit has been cut.

If any maintenance operations are carried out on the unit, lock the power supply circuit in the open position and secure the machine upstream with a padlock.

If the work is interrupted, always ensure that all circuits are still de-energized before resuming the work.

Caution

Even if the unit has been switched off, the power circuit remains energized, unless the unit or customer circuit disconnect switch is open. Refer to the wiring diagram for further details. Attach appropriate safety labels. When working in a fan area, specifically if the grilles have to be removed, isolate the power supply to the fans to prevent their operation.

Caution

The variable frequency drives (VFD) fitted to the units have circuit capacitors whose discharge time is five (5) minutes after disconnecting the power supply.

Therefore, after disconnecting the power supply of the control box, wait for 5 minutes before access it.

Before any intervention, verify that there is no voltage present at any accessible conducting parts of the power circuit.

Moreover be careful of contact with zones at hot temperature inside the unit, which can exist after the operation of unit (refrigerant and electronic parts).

It is recommended to install an indicating device to show if part of the refrigerant has leaked from the valve. The presence of oil at the outlet orifice is a useful indicator that refrigerant has leaked. Keep this orifice clean to ensure that any leaks are obvious. The calibration of a valve that has leaked is generally lower than its original calibration. The new calibration may affect the operating range. To avoid nuisance tripping or leaks, replace or re-calibrate the valve.

OPERATING CHECKS:

• IMPORTANT INFORMATION REGARDING THE REFRIGERANT USED:

Refrigerant type: R32

Global Warming Potential (GWP): 675

Periodic inspections for refrigerant leaks may be required depending on European or local legislation. Please contact your local dealer for more information.

Caution

1. Any intervention on the refrigerant circuit of this product should be performed in accordance with the applicable legislation.
2. Ensure that the refrigerant is never released to the atmosphere during installation, maintenance or equipment disposal.
3. The deliberate gas release into the atmosphere is not allowed.
4. If a refrigerant leak is detected, ensure that it is stopped and repaired as quickly as possible.

1 - INTRODUCTION

5. Only a qualified and certified personnel can perform installation operations, maintenance, refrigerant circuit leak test as well as the equipment disposal and the refrigerant recovering.
6. The gas recovery for recycling, regeneration or destruction is at customer charge.
7. Periodic leak tests have to be carried out by the customer or by third parties. The EU regulation set the periodicity here after:

System WITHOUT leakage detection		No Check	12 Months	6 Months	3 Months
System WITH leakage detection		No Check	24 Months	12 Months	6 Months
Refrigerant charge/circuit (CO ₂ equivalent)		< 5 Tons	5≤Charge <50 Tons	50≤Charge <500 Tons	Charge >500 Tons(1)
Refrigerant charge/Circuit (kg)	R32(GWP 675)	Charge <7.4 kg	7.4 ≤Charge <74.1kg	74.1≤Charge <740.7kg	Charge >740.7kg
	R407C(GWP 1774)	Charge <2.8 kg	2.8 ≤Charge <28.2 kg	28.2 ≤Charge <281.9 kg	Charge >281.9 kg
	R410A(GWP 2088)	Charge <2.4 kg	2.4≤Charge <23.9 kg	23.9≤Charge <239.5 kg	Charge >239.5 kg
	HFO's:R1234ze	No requirement			

(1) From 01/01/2017, units must be equipped with a leakage detection system

8. A logbook must be established for equipments subject to periodic leak tests. It should contain the quantity and the type of fluid present within the installation (added and recovered), the quantity of recycled fluid, regenerated or destroyed, the date and output of the leak test, the designation of the operator and its belonging company, etc.
9. Contact your local dealer or installer if you have any questions.

Protection device checks:

- If no national regulations exist, check the protection devices on site in accordance with standard ISO 5149: every five years for external relief valves.

NOTE: The following statements are only indicated if a pressure switch is available on the unit.

The company or organisation that conducts a pressure switch test shall establish and implement a detailed procedure to fix:

- Safety measures
- Measuring equipment calibration
- Validating operation of protective devices
- Test protocols
- Recommissioning of the equipment.

Consult Service for this type of test. The manufacturer mentions here only the principle of a test without removing the pressure switch:

- Verify and record the setpoints of pressure switches and relief devices (valves and possible rupture discs)
- Be ready to switch-off the main disconnect switch (on the unit or on the installation) of the power supply if the pressure switch does not trigger (avoid over-pressure)
- Connect a calibrated pressure gauge (with Schrader female port of ½ UNF)

Caution

Inspect the protection devices such as valves.

If the machine operates in a corrosive environment, inspect the protection devices more frequently.

Check regularly for leaks and repair immediately. Ensure regularly that the vibration levels remain acceptable and close to those at the initial unit start-up.

Before opening a refrigerant circuit, transfer the refrigerant to bottles specifically provided for this purpose and consult the pressure gauges.

Change the refrigerant after an equipment failure, following a procedure such as the one described in NF E29-795 or carry out a refrigerant analysis in a specialist laboratory.

If the refrigerant circuit remains open after an intervention (such as a component replacement, etc.):

- Seal the openings if the duration is less than a day.
- If more than 1 day, charge the circuit with oxygen free nitrogen (inertia principle).

The objective is to prevent penetration of atmospheric humidity and the resulting corrosion.

1.2.4 - Repair safety considerations

All installation parts must be maintained by the personnel in charge to avoid deterioration and injury. Faults and leaks must be repaired immediately. The authorized technician must have the responsibility to repair the fault immediately. After each unit repair check the operation of the protection devices and create a 100% parameter operation report.

Comply with the regulations and recommendations in unit and HVAC installation safety standards, such as: ISO 5149.

If the supply cord is damaged, it must be replaced by service agent or similarly qualified persons in order to avoid a hazard.

1 - INTRODUCTION

RISK OF EXPLOSION



Never use air or a gas containing oxygen during leak tests to purge lines or to pressurise a machine. Pressurised air mixtures or gases containing oxygen can be the cause of an explosion. Oxygen reacts violently with oil and grease.

Only use dry nitrogen for leak tests, possibly with an appropriate tracer gas.

If the recommendations above are not observed, this can have serious or even fatal consequences and damage the installation.

Never exceed the specified maximum operating pressures. Verify the allowable maximum high- and low-side test pressures by checking the instructions in this manual and the pressures given on the unit name plate.

Do not unweld or flamecut the refrigerant lines or any refrigerant circuit component until all refrigerant (liquid and vapour) as well as the oil have been removed from the heat pump. Traces of vapour should be displaced with dry nitrogen. Refrigerant in contact with an open flame can produce toxic gases.

The necessary protection equipment must be available, and appropriate fire extinguishers for the system and the refrigerant type used must be within easy reach.

Do not siphon refrigerant.

Avoid spilling liquid refrigerant on skin or splashing it into the eyes. Use safety goggles and safety gloves. Wash any spills from the skin with soap and water. If liquid refrigerant enters the eyes, immediately and abundantly flush the eyes with water and consult a doctor.

The accidental releases of the refrigerant, due to small leaks or significant discharges following the rupture of a pipe or an unexpected release from a relief valve, can cause frostbites and burns to personnel exposed. Do not ignore such injuries. Installers, owners and especially service technicians for these units must:

- Seek medical attention before treating such injuries.
- Have access to a first-aid kit, especially for treating eye injuries.

We recommend to apply standard ISO 5149.

Never apply an open flame or live steam to a refrigerant circuit. Dangerous overpressure can result.

During refrigerant removal and storage operations follow applicable regulations. These regulations, permitting conditioning and recovery of halogenated hydrocarbons under optimum quality conditions for the products and optimum safety conditions for people, property and the environment are described in standard NF E29-795. The units must never be modified to add refrigerant and oil charging, removal and purging devices. All these devices are provided with the units.

Refer to the certified dimensional drawings for the units.

It is dangerous and illegal to re-use disposable (non-returnable) cylinders or attempt to refill them. When cylinders are empty, evacuate the remaining gas pressure, and move them to a designated place for recovery. Do not incinerate.

Do not attempt to remove refrigerant circuit components or fittings, while the machine is under pressure or while it is running. Be sure pressure is at 0 kPa and that the unit has been shut-down and de-energised before removing components or opening a circuit.

Do not attempt to repair or recondition any safety devices when corrosion or build-up of foreign material (rust, dirt, scale, etc.) is found within the valve body or mechanism. If necessary, replace the device. Do not install safety valves in series or backwards.



Caution

No part of the unit must be used as a walkway, rack or support. Periodically check and repair or if necessary replace any component or piping that shows signs of damage.

Do not step on refrigerant lines. The lines can break under the weight and release refrigerant, causing personal injury.

Do not climb on a machine. Use a platform, or staging to work at higher levels.

Use mechanical lifting equipment (crane, hoist, winch, etc.) to lift or move heavy components. For lighter components, use lifting equipment when there is a risk of slipping or losing your balance.

Use only original replacement parts for any repair or component replacement. Consult the list of replacement parts that corresponds to the specification of the original equipment.

Do not drain water circuits containing industrial brines, without informing the technical service department at the installation site or a competent body first.

Close the entering and leaving water shut-off valves and purge the unit hydraulic circuit, before working on the components installed on the circuit (screen filter, pump, water flow switch, etc.).

Periodically inspect all valves, fittings and pipes of the refrigerant and hydraulic circuits to ensure that they do not show any corrosion or any signs of leaks.

It is recommended to wear ear defenders, when working near the unit and the unit is in operation.

Always ensure you are using the correct refrigerant type before recharging the unit.

Charging any refrigerant other than the original charge type (R32) will impair machine operation and can even lead to a destruction of the compressors. The compressors operate with R32 and are charged with asyntheticpolyol-ester oil.

Before any intervention on the refrigerant circuit, the complete refrigerant charge must be recovered.

1 - INTRODUCTION

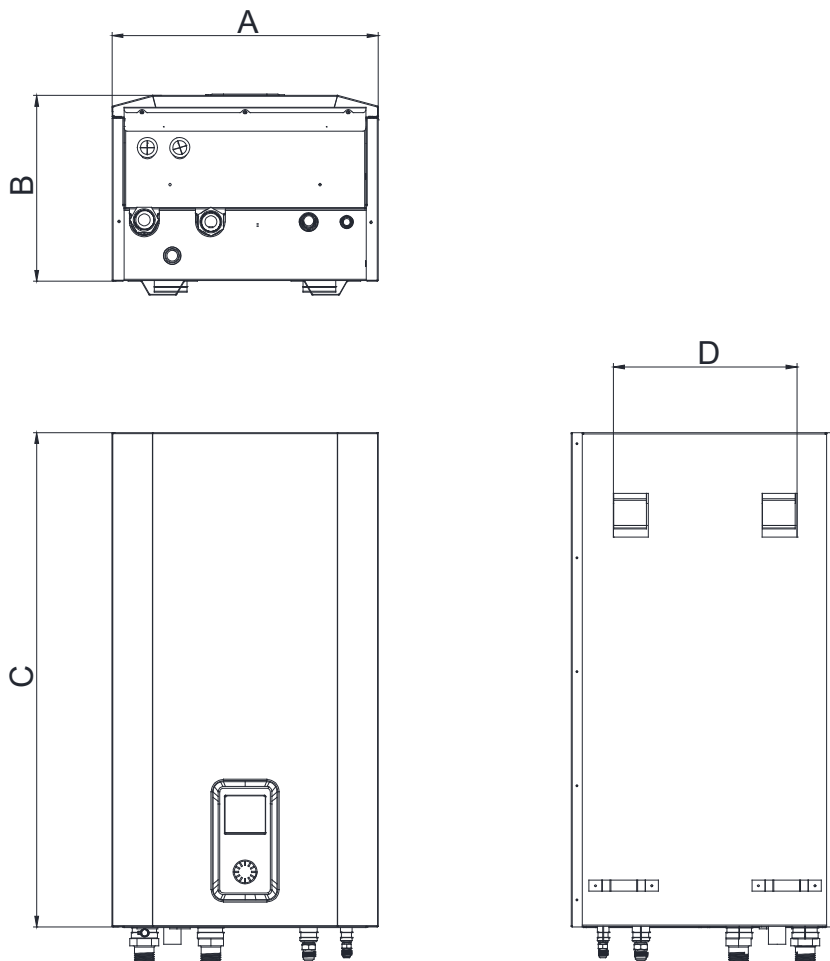
1.3 - Preliminary checks

Check equipment received:

- Inspect the unit for damage or missing parts. If damage is detected, or if shipment is incomplete, immediately file a claim with the shipping company.
- Confirm that the unit received is the one ordered. Compare the name plate data with the order.
- The name plate is attached to the unit in two locations:
 - on the outside on one of the unit sides
 - on the inside
- Confirm that all options ordered for on-site installation have been delivered, and are complete and undamaged. The unit must be checked periodically, if necessary removing the insulation (thermal, acoustic), during its whole operating life to ensure that no shocks (handling accessories, tools, etc.) have damaged it. If necessary, the damaged parts must be repaired or replaced. See also chapter §4. Maintenance.

1.4 - Dimensions and clearance for units

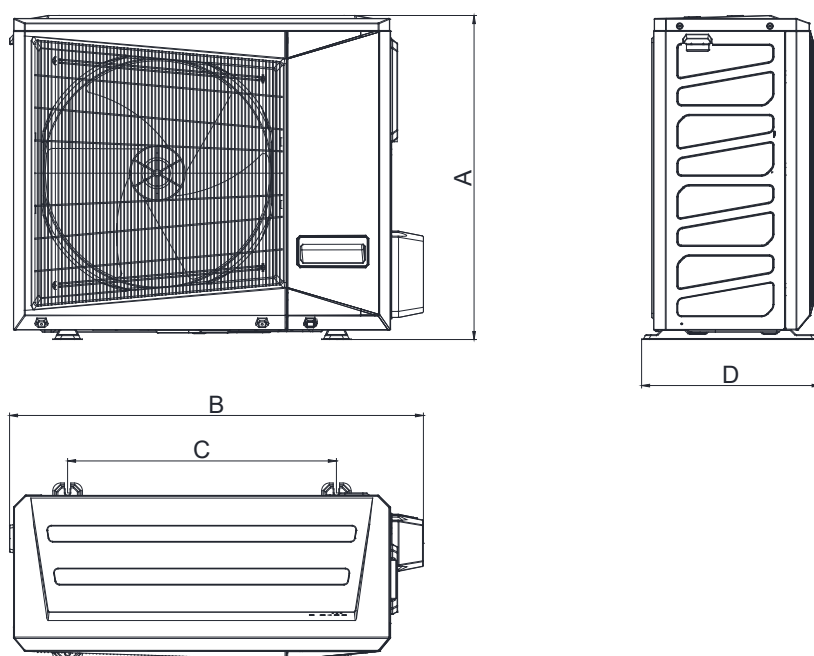
1.4.1 - Dimensions and location of hydraulic connections



Model	A	B	C	D	Weight(kg)
6_1Ph	490	342	910	338	57
10_1Ph	490	342	910	338	59
16_1Ph	490	342	910	338	61

NOTE : Dimensions are given in mm

1 - INTRODUCTION



4-16kw outdoor unit

Model	A	B	C	D	Weight(kg)
4-6_1Ph	807	1032	678	445	61
8_1Ph	807	1032	678	445	67
10_1Ph	807	1032	678	445	71.5
12_1Ph	869	1098	635	528	84.7
14_1Ph	869	1098	635	528	87.9
16_1Ph	869	1098	635	528	87.9
12_3Ph	869	1098	635	528	100.1
14_3Ph	869	1098	635	528	103.3
16_3Ph	869	1098	635	528	103.3

NOTE : Dimensions are given in mm

2 - INSTALLATION OF UNIT

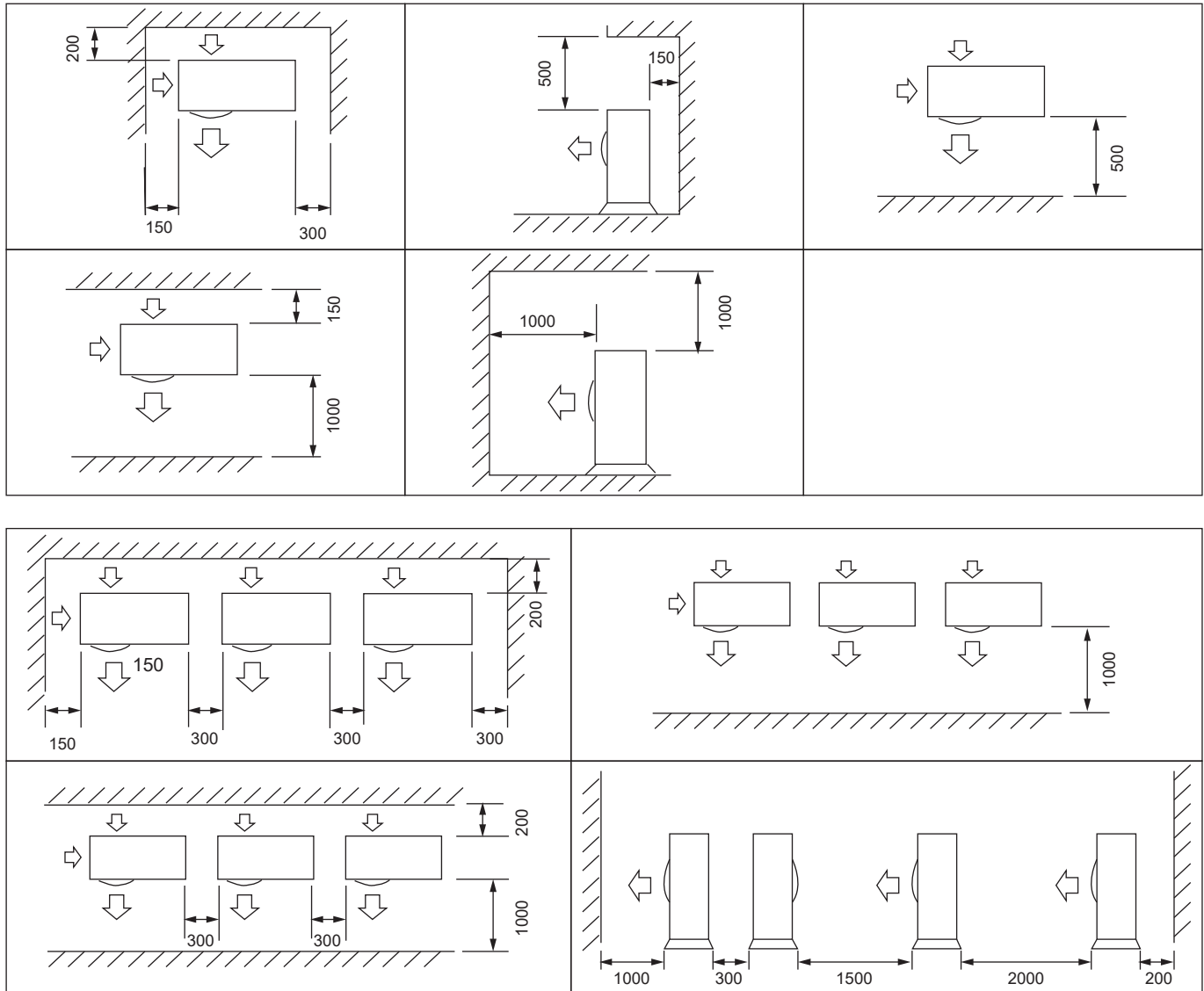
2.1 - General

To install an unit the following steps are requested

1. Place the unit
2. Make electrical connections
3. Check for water leaks and the water flow rate control
4. Finally, make commissioning of the unit

2.2 - Space required for installation and maintenance

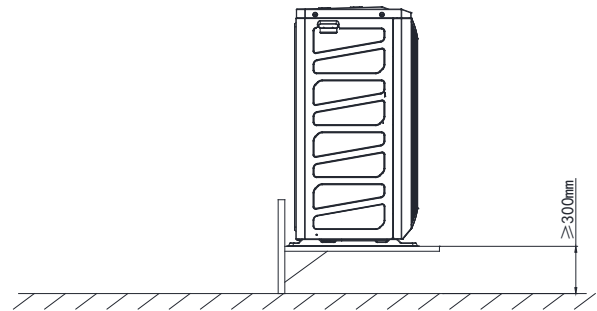
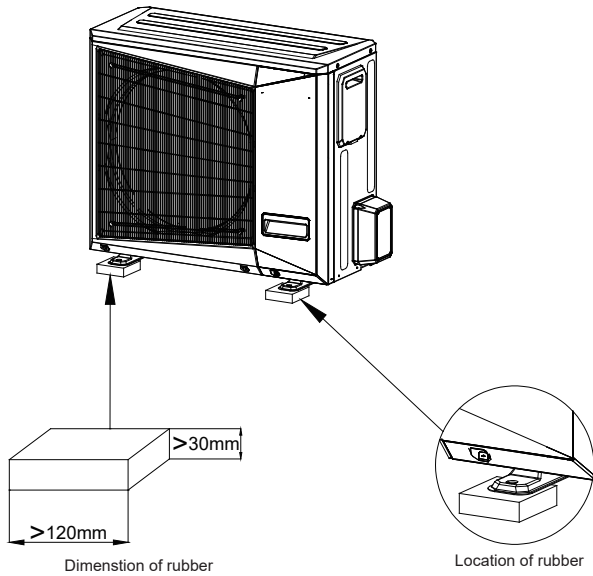
2.2.1 -The picture presents the minimal distances of the wall to ensure the correct air flow on air heat exchanger⁽¹⁾.



(1) Anticipate different maintenance actions before to place the unit (access of different parts / opening of panel/ part replacement...)

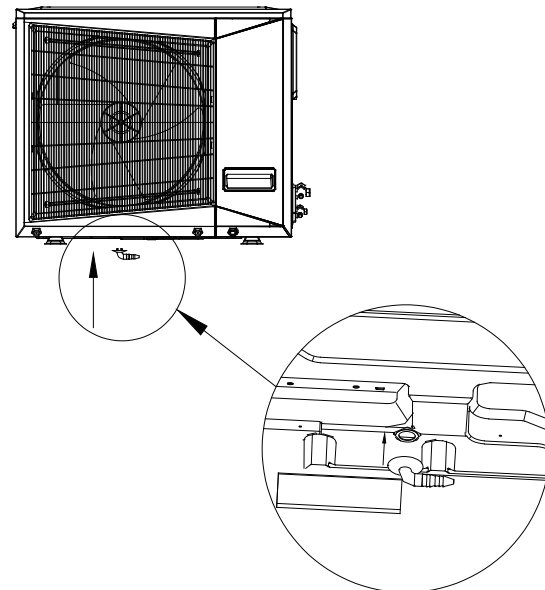
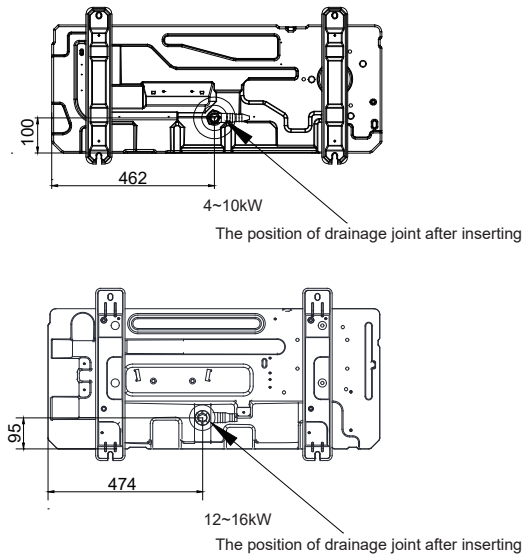
2 - INSTALLATION OF UNIT

CAUTION: Installation of anti-vibration rubber



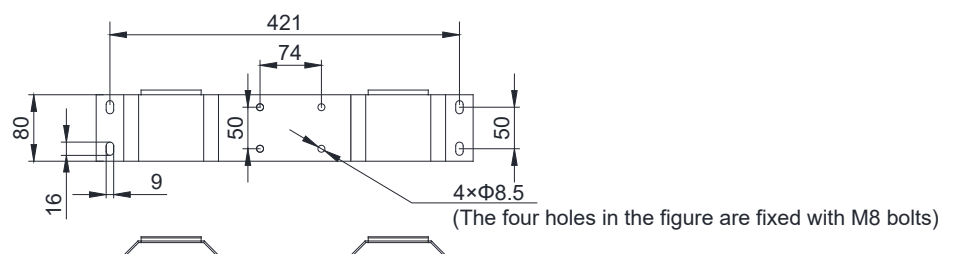
If drain holes of the outdoor unit are covered by a mounting base or by floor surface, raise the unit to provide a free space of more than 300 mm under the outdoor unit.

CAUTION: Mandatory installation of base-pan water drainage joint



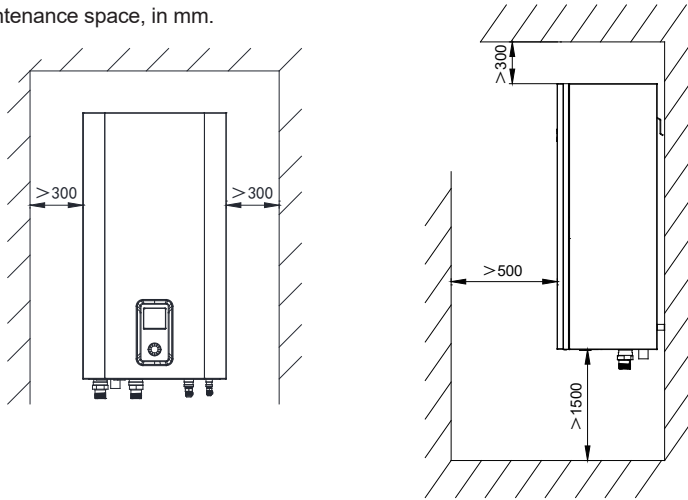
Put the water drainage joint to the base-pan drainage hole from bottom side of unit, and insert it firmly

2.2.2 -The size of the wall panel mounted on the wall, in mm.



2 - INSTALLATION OF UNIT

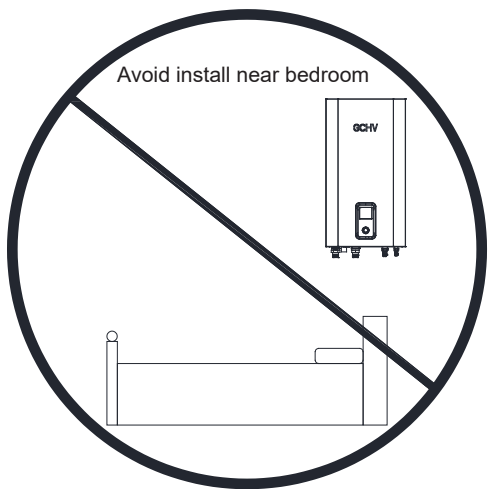
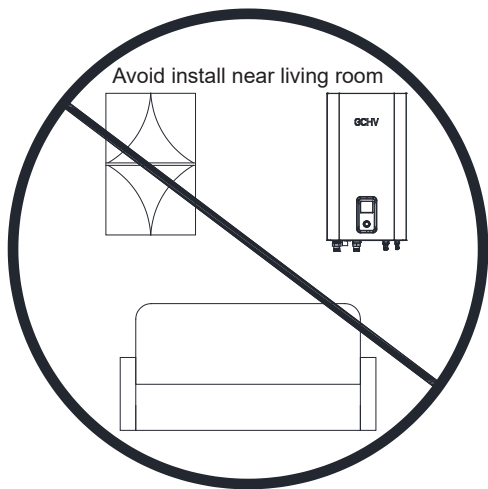
2.2.3 -Indoor unit installation and maintenance space, in mm.



Caution

2.2.4 - Indoor unit installation site requirements

Warm reminder: Due to the noise of water pump operation, the unit is prohibited to be installed near the living room&bedroom.



2.3 - Moving and placing the unit

2.3.1 - Moving

See §1.2.1 Installation safety considerations.

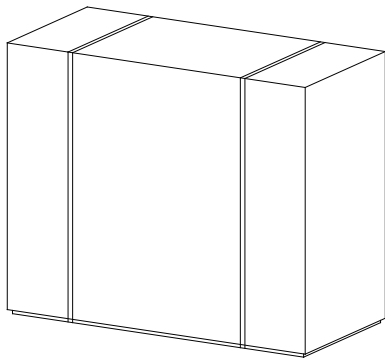


Figure 1: Transport configuration

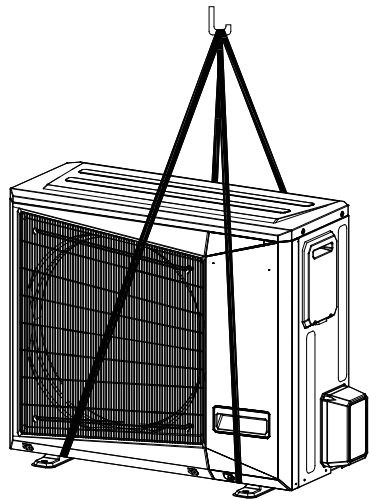


Figure 2: Offloading configuration

2 - INSTALLATION OF UNIT

2.3.2 - Placing the unit

In case of extra-high units the machine environment must permit easy access for maintenance operations.

Always refer to § 2.2. Dimensions and clearance for units to confirm that there is adequate space for all connections and service operations. For the centre of gravity coordinates, the position of the unit mounting holes, and the weight distribution points, refer to the certified dimensional drawing supplied with the unit.

Typical applications of these units do not require earthquake resistance. Earthquake resistance has not been verified.

CAUTION:

Only use slings at the designated lifting points (refer to Figure 2 to offload the unit).

Before siting the unit check that:

- The permitted loading at the site is adequate or that appropriate strengthening measures have been taken.
- If the unit has to operate as a heat pump in temperatures below 0°C it must be raised at least 300 mm from the ground. This is necessary to avoid ice build-up on the unit chassis and also to permit correct unit operation in locations where the snow level may reach this height.
- The unit is installed level on an even surface (maximum tolerance is 5 mm in both axes).
- There is adequate space above the unit for air flow and to ensure access to the components (see dimensional drawings).
- The number of support points is adequate and that they are in the right places.
- The location is not subject to flooding.
- For outdoor installations, where heavy snowfall is likely and long periods of sub-zero temperatures are normal, provision has to be made to prevent snow accumulating by raising the unit above the height of drifts normally experienced. Baffles may be necessary to deflect strong winds. They must not restrict air flow into the unit.
- OAT sensor, located on the coil, should not be exposed to the sun or other heat sources.

CAUTION:

Before lifting the unit, check that all casing panels are securely fixed in place. Lift and set down the unit with great care. Tilting and jarring can damage the unit and impair unit operation.

If units are hoisted with rigging, it is advisable to protect coils against crushing while a unit is being moved. Use struts or a lifting beam to spread the slings above the unit. Do not tilt a unit more than 15°.

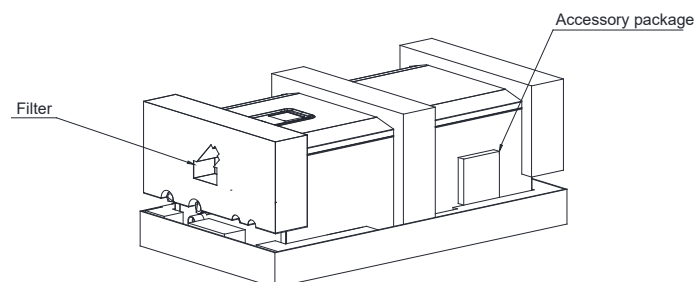
CAUTION:

Never push or lever on any of the enclosure panels of the unit. Only the base of the unit frame is designed to withstand such stresses.

2.3.3 - Standard accessories table

Accessories	Description	Advantages	Utilisation
Manuals	One operation manual of wired controller and the other is IOM of unit	Useful for installation guidance and configuration	
Domestic hot water management sensor and filter	Sensor enabling to manage the water setpoint inside the tank used for domestic hot water production	Useful for domestic hot water production	
Additional outdoor ambient temperature sensor	Additional outdoor ambient temperature sensor	Better reading of outdoor air temperature	
Indoor unit installation plate	Use for fixed the Indoor unit to the wall	Better fixing unit	

2.3.4 - Location of Accessory package



2 - INSTALLATION OF UNIT

2.3.5 - Removing the unit panel

To access at the inside of the unit (refrigerant parts / electrical parts), the panel can be removed. This operation must be carried out by a qualified technician.

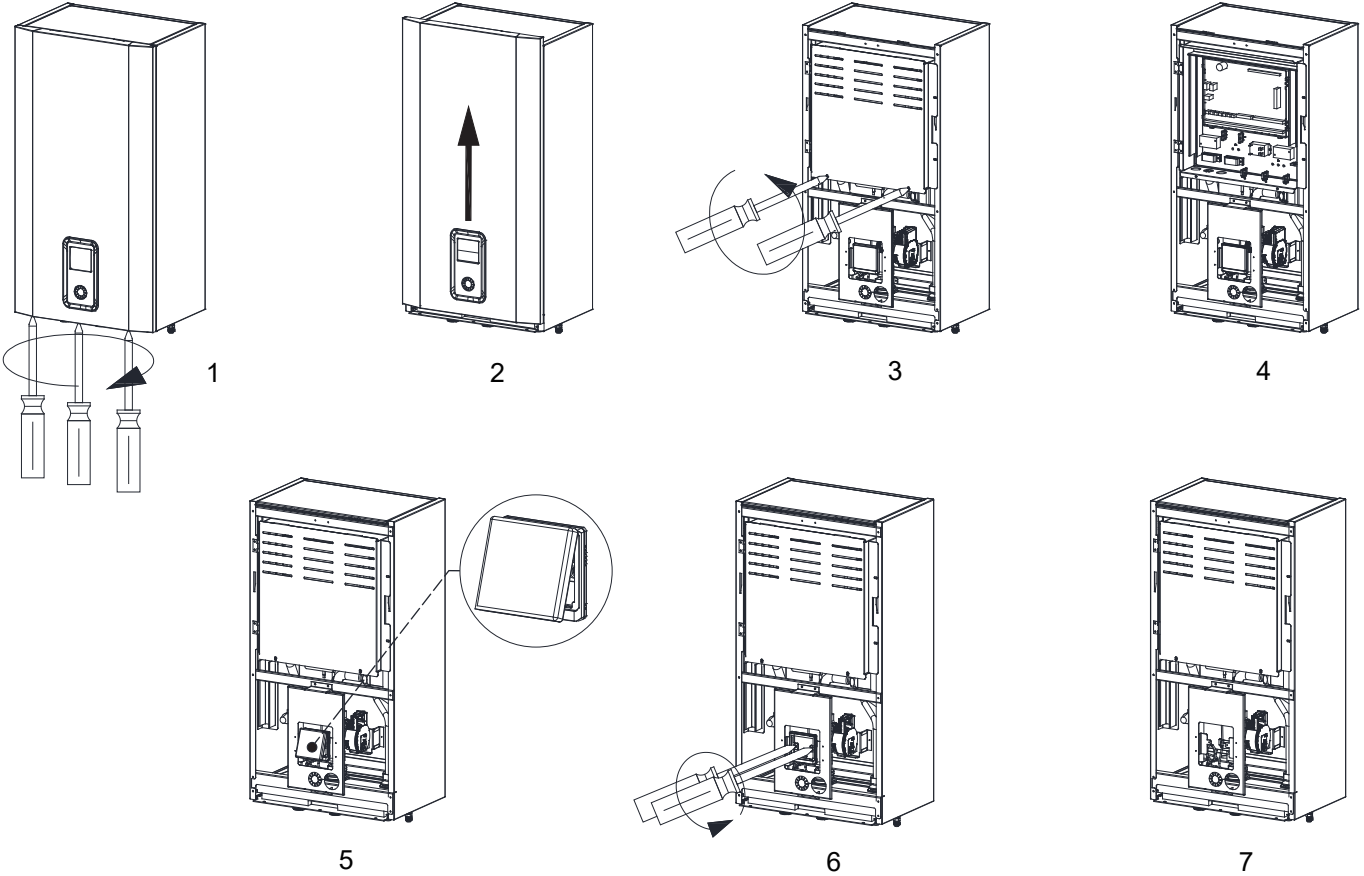


Figure 3 : How to remove front panel for Air-to-Water Split Type Heatpump Indoor Unit

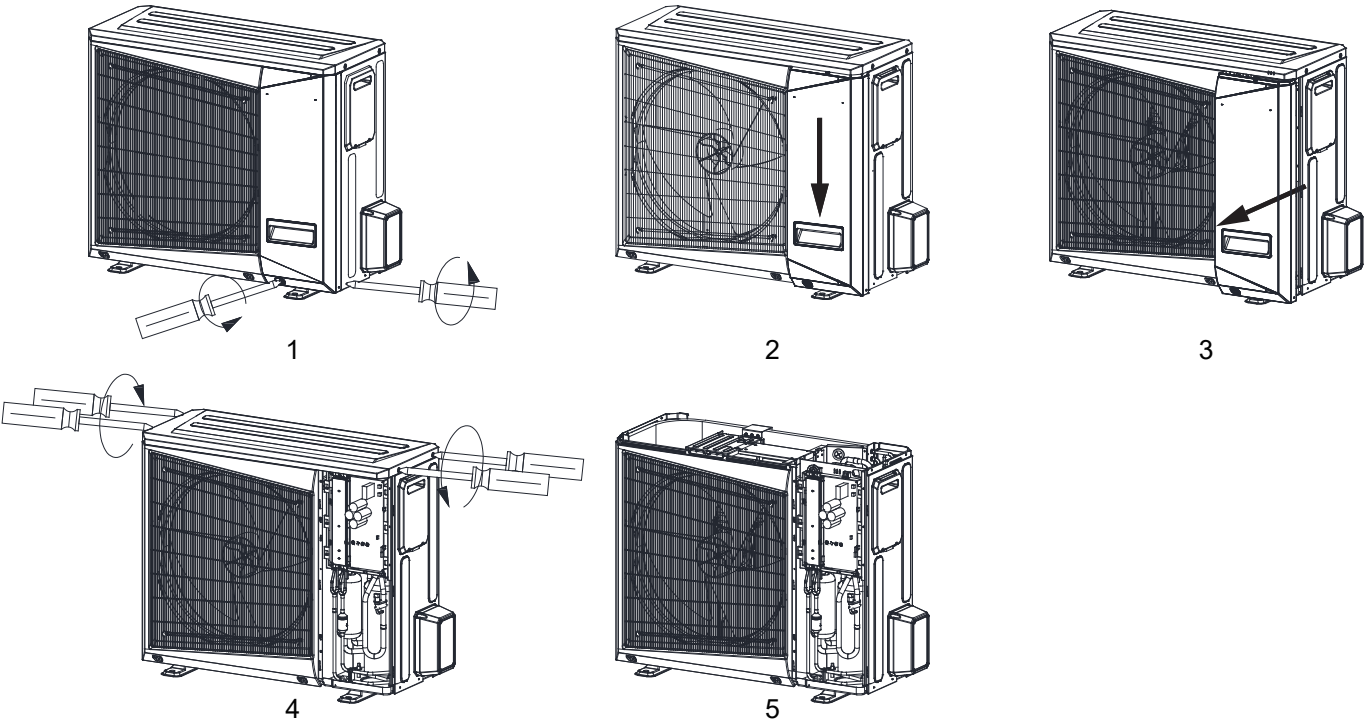


Figure 4 : How to remove front panel for Air-to-Water Split Type Heatpump Outdoor Unit

2 - INSTALLATION OF UNIT

2.3.6 - Checks before system start-up

Before the start-up of the refrigeration system, the complete installation, including the refrigeration system must be verified against the installation drawings, dimensional drawings, system piping and instrumentation diagrams, and wiring diagrams.

For these checks national regulations must be followed. If the national regulation does not specify any details, refer to standard ISO 5149 as follows:

External visual installation checks:

- Ensure that the machine is charged with refrigerant. Verify on the unit nameplate that the 'fluid being transported' is R32 and is not nitrogen.
- Compare the complete installation with the refrigeration system and power circuit diagrams.
- Check that all components comply with the design specifications.
- Check that all protection documents and equipment provided by the manufacturer (dimensional drawings, P&ID, declarations etc.) to comply with the regulations are present.
- Verify that the environmental safety and protection and devices and arrangements provided by the manufacturer to comply with the regulations are in place.
- Verify that all documents for pressure containers, certificates, name plates, files, instruction manuals provided by the manufacturer to comply with the regulations are present.
- Verify the free passage of access and safety routes.
- Verify the instructions and directives to prevent the deliberate removal of refrigerant gases.
- Verify the installation of connections.
- Verify the supports and fixing elements (materials, routing and connection).
- Verify the quality of welds and other joints.
- Check the protection against mechanical damage.
- Check the protection against heat.
- Check the protection of moving parts.
- Verify the accessibility for maintenance or repair and to check the piping.
- Verify the status of the valves.
- Verify the quality of the thermal insulation and of the vapour barriers.

2.4 - Pipe connections

For size and position of the unit water inlet and outlet connections refer to the certified dimensional drawings supplied with the unit. The water pipes must not transmit any radial or axial force to the heat exchangers nor any vibration.

The water supply must be analysed and appropriate filtering, treatment, control devices, shut-off and bleed valves and circuits built in, to prevent corrosion (example: damage to the protection of the tube surface if the fluid is polluted), fouling and deterioration of the pump fittings.

Before any start-up verify that the heat exchange fluid is compatible with the materials and the water circuit coating.

In case additives or other fluids than those recommended by the manufacturer are used, ensure that the fluids are not considered as a gas.

Recommendations on heat exchange fluids:

- No NH_4^+ ammonium ions in the water, they are very detrimental for copper. This is one of the most important factors for the operating life of copper piping. A content of several tenths of mg/l will badly corrode the copper over time.
- Cl^- Chloride ions are detrimental for copper with a risk of perforations by corrosion by puncture. If possible keep below 10 mg/l.
- SO_4^{2-} sulphate ions can cause perforating corrosion, if their content is above 30 mg/l.
- No fluoride ions (< 0.1 mg/l).
- No Fe^{2+} and Fe^{3+} ions with non negligible levels of dissolved oxygen must be present. Dissolved iron < 5 mg/l with dissolved oxygen < 5 mg/l.
- Dissolved silicon: silicon is an acid element of water and can also lead to corrosion risks. Content < 1 mg/l.
- Water hardness: > 0.5 mmol/l. Values between 1 and 2.5 mmol/l can be recommended. This will facilitate scale deposit that can limit corrosion of copper. Values that are too high can cause piping blockage over time. A total alkalimetric title (TAC) below 100 mg/l is desirable.
- Dissolved oxygen: Any sudden change in water oxygenation conditions must be avoided. It is as detrimental to deoxygenate the water by mixing it with inert gas as it is to over-oxygenate it by mixing it with pure oxygen. The disturbance of the oxygenation conditions encourages destabilisation of copper hydroxides and enlargement of particles.
- Electric conductivity: 0.001-0.06 S/m (10-600 $\mu\text{S}/\text{cm}$).
- pH: Ideal case pH neutral at 20-25°C ($7 < \text{pH} < 8$).

CAUTION:

Charging, adding or draining fluid from the water circuit must be done by qualified personnel, using air vents and materials suitable for the products. Water circuit charging devices are field-supplied.

Charging and removing heat exchange fluids should be done with devices that must be included on the water circuit by the installer. Never use the unit heat exchangers to add heat exchange fluid.

CAUTION:

The use of units in an open loop is forbidden.

2 - INSTALLATION OF UNIT

2.4.1 - Operating precautions and recommendations

The water circuit should be designed to have the least number of elbows and horizontal pipe runs at different levels. Below the main points to be checked for the connection:

- Comply with the water inlet and outlet connections shown on the unit.
- Install manual or automatic air purge valves at all high points in the circuit.
- Use a pressure reducer to maintain pressure in the circuit(s) and install a relief valve as well as an expansion tank. Units with the hydraulic module include a relief valve and an expansion tank (if option chosen).
- Install drain connections at all low points to allow the whole circuit to be drained.
- Install stop valves, close to the entering and leaving water connections.
- Use flexible connections to reduce vibration transmission.
- Insulate all pipework, after testing for leaks, both to reduce thermal leaks and to prevent condensation.
- Use thermal tape to seal joints and to seam the insulation.
- If the external unit water pipes are in an area where the ambient temperature is likely to fall below 0°C, they must be protected against frost (frost protection solution or trace heating).
- The use of different metals on hydraulic piping could generate electrolytic pairs and consequently corrosion. Verify then, the need to install sacrificial anodes.

The plate heat exchanger can foul up quickly at the initial unit start-up, as it complements the filter function, and the unit operation will be impaired (reduced water flow rate due to increased pressure drop).

Units with hydraulic module are equipped with Y filter as accessory.

Do not introduce any significant static or dynamic pressure into the heat exchange circuit (with regard to the design operating pressures).

The products that may be added for thermal insulation of the containers during the water piping connection procedure must be chemically neutral in relation to the materials and coatings to which they are applied. This is also the case for the products originally supplied by the manufacturer.

The refrigerant pipe and water pipe must be covered with insulation cotton, for details on cotton diameters, for details on connection diameters, refer to §2.4.4

2.4.2 - General

For details on connection diameters, refer to §2.4.4 Physical data.

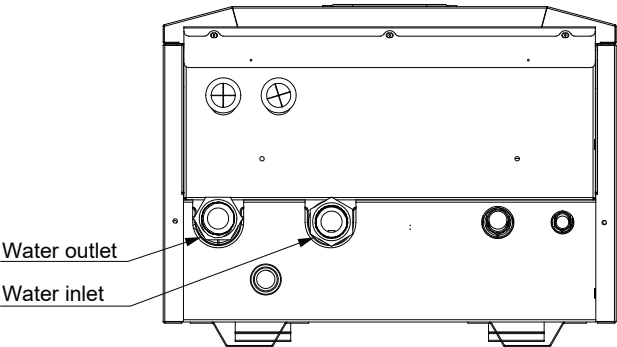
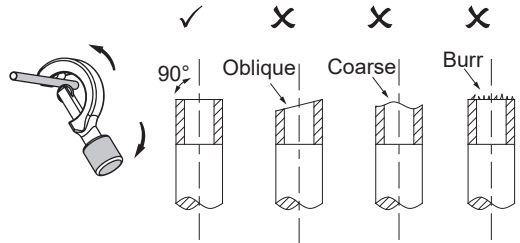


Figure 5: Water connection on unit

2.4.3 - Refrigerant piping

1) Flaring

Cut the pipe with the pipe cutter, and flare with a pipe expander.

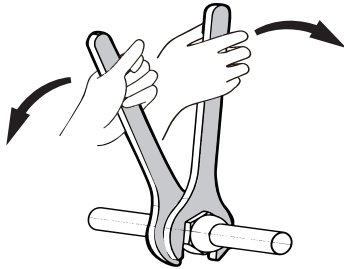


Outer diameter (mm)	A(mm)		
	MAX	MIN	
Φ9.52	12.4	12.0	
Φ15.88	19.0	18.6	

2 - INSTALLATION OF UNIT

2) Fastening nut

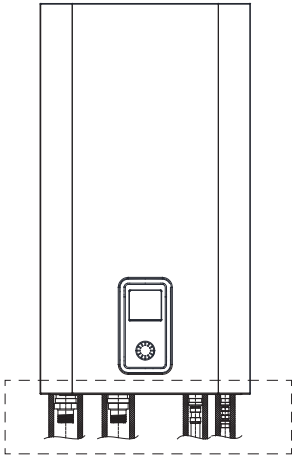
Align the connecting tube, tighten the nut by hand, and then tighten with a wrench. Please use two spanners, one common spanner, and the other moment spanner.



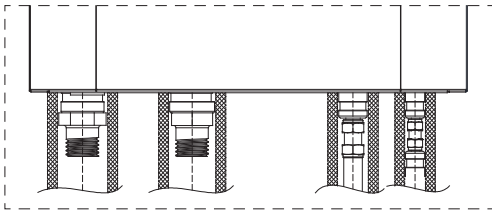
Piping size (mm)	Tightening torque (N•m)
Φ9.52	32.7~39.9 N.m (333~407 kgf.cm)
Φ15.88	61.8~75.4 N.m (630~770 kgf.cm)

2.4.4 Dimensions of the main pipe and insulation cotton

Determination of the main pipe diameter				
Model	Main pipe dimensions(mm)		Water pipe specification	
	Liquid pipe	Gas pipe	Water inlet pipe	Water outlet pipe
4kW	9.52	15.88	DN25	DN25
6kW	9.52	15.88	DN25	DN25
8kW	9.52	15.88	DN25	DN25
10kW	9.52	15.88	DN25	DN25
12kW	9.52	15.88	DN32	DN32
14kW	9.52	15.88	DN32	DN32
16kW	9.52	15.88	DN32	DN32



Dimensions of the insulation cotton (mm)				
	Water inlet pipe	Water outlet pipe	Gas pipe	Liquid pipe
Inner diameter	Φ48	Φ48	Φ30	Φ22
Material	EPDM			

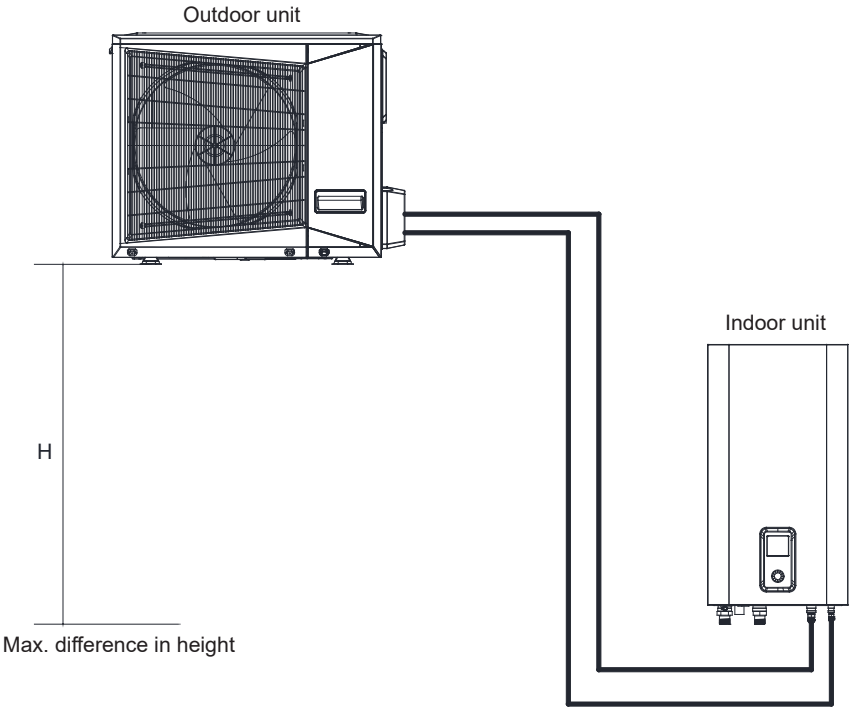


2 - INSTALLATION OF UNIT

2.4.5 Permitted pipin lengyh and level difference

Models	4-16kW		
Max.piping length	30m		
Max.difference in height	20m		

Refrigerant to be added	Model	L(m)	
		≤15m	> 15m
Tatal additional refirgerant	4-16kW	0g	(L-15)*38g

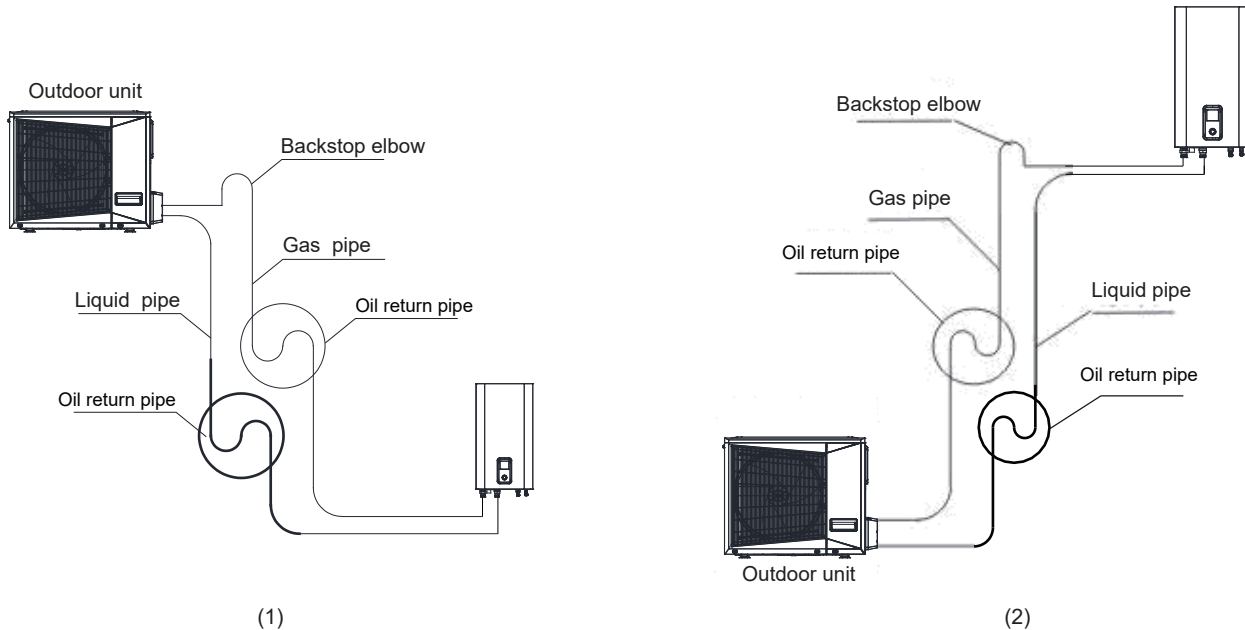


The largest level difference between indoor unit and outdoor unit should not exceed 20m

2 - INSTALLATION OF UNIT

2.4.6 The use of oil return elbow

When the height difference between the indoor and outdoor unit is greater than 5 m, in order to facilitate oil return of the compressor, oil return elbow must be used. Upon site operations, the following typical installation methods can be referred to (see Figure below).



Note:

Oil return elbow radius $R \leq 100\text{mm}$, oil return elbows must be located per 5m as shown above; when the height difference between indoor and outdoor unit exceeds five meters, oil reserve elbow and backstop elbow should be set according to the relative position of outdoor unit and indoor unit.

2.4.7 - Hydraulic circuit

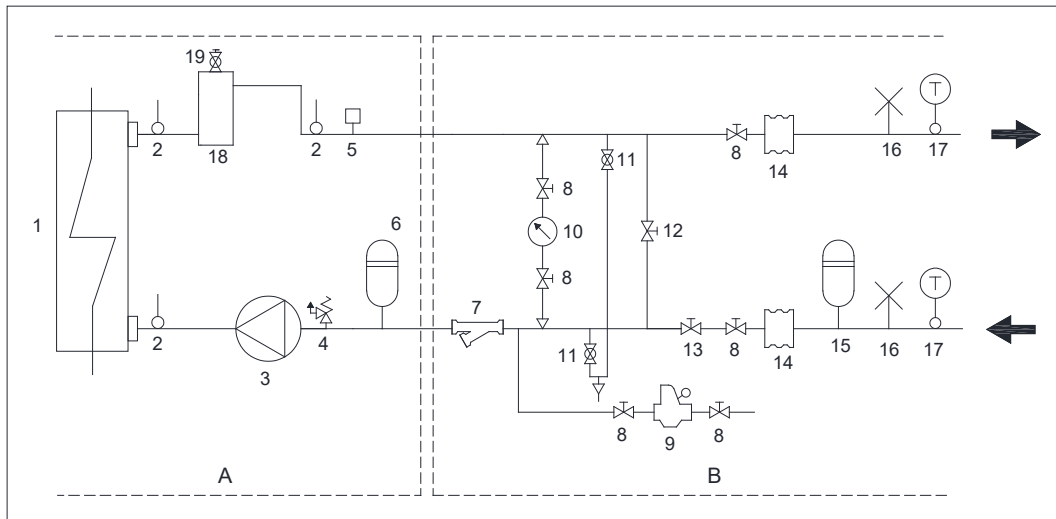


Figure 6: Typical diagram of the hydraulic circuit for 4-10kW units

LEGEND:

A: Factory connections; B: Field connections (for installer); 1: Plate heat exchanger; 2: Temperature sensor; 3: Circulation pump; 4: Safety valve; 5: Flow switch; 6: Expansion vessel; 7: Mesh filters (available as an option); 8: Stop valves; 9: Filling valve; 10: Pressure gauge; 11: Discharge tap; 12: By-pass valve for freezing protection; 13: Calibration valve; 14: Anti-vibration joint; 15: Additional expansion vessel (if necessary); 16: Air bleed; 17: Thermometer; 18: Electrical heating; 19: Air evacuation valve

CAUTION: The use of the hydraulic module on open loop is prohibited.

2 - INSTALLATION OF UNIT

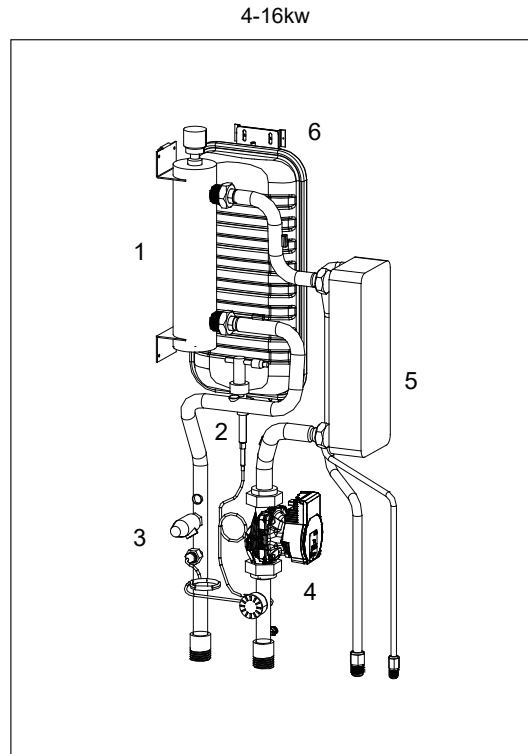


Figure 7: Hydraulic module equipped with variable speed single pump low available pressure with expansion tank

LEGEND:

1: Electrical heater component; 2: Flow switch; 3: Safety valve outlet; 4: Circulation pump; 5: BPHE; 6 :Expansion vessel

Minimum and maximum pressures necessary in the hydraulic circuit for correct operation of the units.

Hydraulic circuit	Minimum pressure at the suction of the pump to avoid the cavitation phenomena.	Maximum pressure at the suction of the pump before the opening of the water relief valve(1)
Variable speed hydraulic module	40 kPa (0.4 bar)	300 kPa(3 bar).

2.5 - Water flow rate control

2.5.1 - Water leakage

Check that the water-side connections are clean and show no sign of leakage.

2.5.2 - Minimum water flow rate

If the installation flow rate is below the minimum flow rate, there is a risk of excessive fouling.

2.5.3 - Maximum water flow rate

This is limited by the permitted water heat exchanger pressure drop.

2.5.4 - Water heat exchanger flow rate

Data applicable for:

- Fresh water 20°C
- In case of use of the glycol, the maximum water flow is reduced.

Units with hydraulic module			
Model	Minimum water	Nominal water flow	Maximum water
	flow rate(m3/h)	rate (1)(m3/h)	flow rate(m3/h)
4kw	0.3	0.69	4.9
6kw	0.3	1.03	4.9
8kw	0.5	1.38	4.9
10kw	0.5	1.72	4.9
12kw	0.8	2.06	7.2
14kw	0.8	2.41	7.2
16kw	0.8	2.76	7.2

2 - INSTALLATION OF UNIT

2.5.5 - Nominal system water low control

The water circulation pumps of the units have been sized to allow the hydraulic modules to cover all possible configurations based on the specific installation conditions, i.e. for various temperature differences between the entering and the leaving water (ΔT) at full load, which can vary between 3 and 10 K.

This required difference between the entering and leaving water temperature determines the nominal system flow rate. Use this specification for the unit selection to find the system operating conditions.

In particular, collect the data to be used for the control of the system flow rate:

- Units with variable speed pump-control on adjustable constant speed: nominal flow rate.
- Units with variable speed pump - control on temperature difference: heat exchanger ΔT (variable flow).

If the information is not available at the system start-up, contact the technical service department responsible for the installation to get it. These characteristics can be obtained from the technical literature using the unit performance tables for a ΔT of 5 K at the water heat exchanger.

Table 1: Steps to clean, purge, and define a flow rate for hydraulic circuit

	N°	Without Hydraulic module	With Variable Speed Hydraulic module Adjustable constant speed	With Variable Speed Hydraulic module ΔT
Cleaning procedure	1	Open the manual control valve fully.	No manual control valve required with Variable Speed Hydraulic module	
	2	Start the external pump which is professional pump for clean water pipe system ⁽¹⁾ .		
	3	Read the BPHE pressure drop by taking the difference of the readings of the pressure gauge connected to the unit inlet and outlet.		
	4	Let the pump run for two consecutive hours to flush the hydraulic circuit of the system (presence of solid contaminants).		
	5	Take another reading.		
	6	Compare this value to the initial value.		
	7	If the pressure drop has decreased, this indicates that the screen filter must be removed and cleaned, as the hydraulic circuit contains solid particles.		
	8	In this case stop the pump ⁽¹⁾ and close the shut-off valves at the water inlet and outlet and remove the screen filter after emptying the hydraulic section of the unit.		
	9	Repeat, if necessary, to ensure that the filter is not contaminated.		
Purge procedure	1	After filling with water, wait about 24h before activating the purge procedure.		
	2	Activate the purge mode ⁽¹⁾ : water pump is requested to run continuously at maximum speed to purge the hydraulic circuit regardless the flow switch value ⁽²⁾ .		
	3	1. The air purge which is field-supplied: If the purge is automatic, air will vent from circuit automatically. If the purge is manual, open the valve to vent air from the circuit 2. The air purge which is standrad with unit: It is manual, open the valve to vent air from the circuit		
Water flow control procedure	1	When the circuit is cleaned and purged, activate the pump in air purge mode ⁽¹⁾ , and read the pressures at the pressure gauges (entering water pressure - leaving water pressure), ...		
	2	... to find out the unit pressure drop (plate heat exchanger + internal water piping).		No need to adjust the flow rate because of ΔT control.
	3	Compare the value obtained with the pressure drop (Graphic 2).	Compare this value to the graph of available external static pressure using the appropriate speed curve (Graphic 1).	
	4	If the pressure read is higher than the value specified the unit flow rate (and thus system flow rate) is too high. The pump supplies an excessive flow rate based on the global pressure drop of the application. In this case close the control valve and read the new pressure difference	If the flow rate corresponding is higher, decrease pump speed ⁽¹⁾ , and vice versa	
	5	Proceed by successively closing the control valve until you obtain the specific pressure that corresponds to the nominal flow rate at the required unit operating point.	Proceed by successively adjusting the pump speed until the expected water flow rate is achieved.	

(1) For configuration details, refer to user parameter configuration of wired controller manual.

(2) CAUTION: In purge mode, the value of the flow switch is ignored, so check that there is water in the circuit, to avoid damage to the pump.

NOTE:

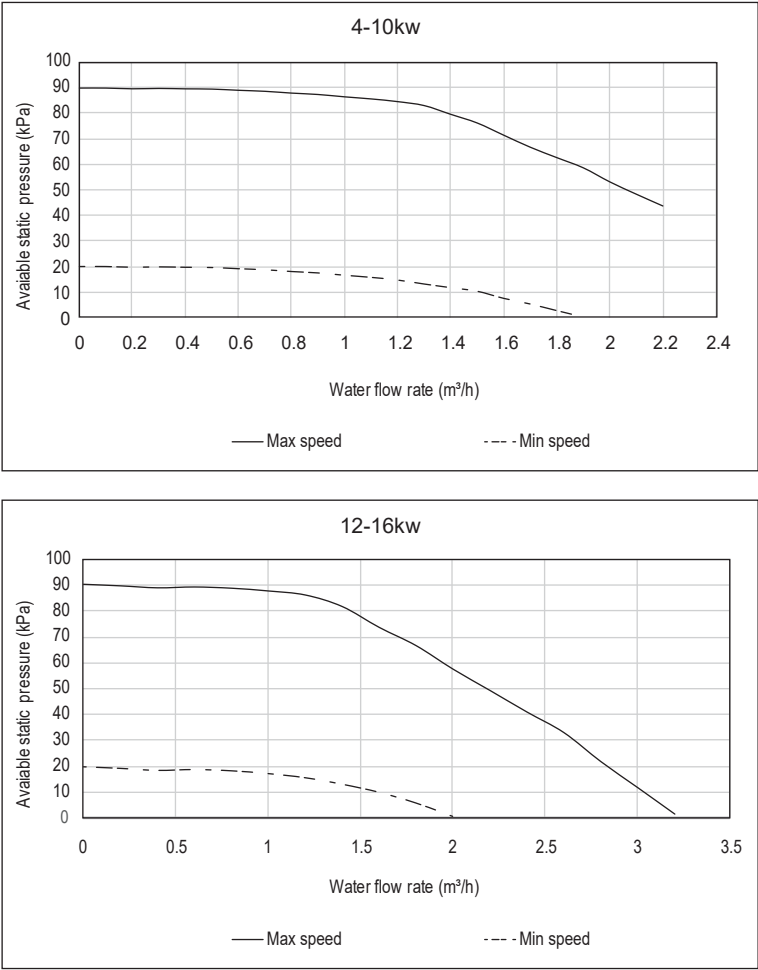
If the system has an excessive pressure drop in relation to the available static pressure provided by the system pump the nominal water flow rate cannot be obtained (the resulting flow rate is lower) and the temperature difference between the water heat exchanger entering and leaving water will increase.

To reduce the pressure drops of the hydraulic system:

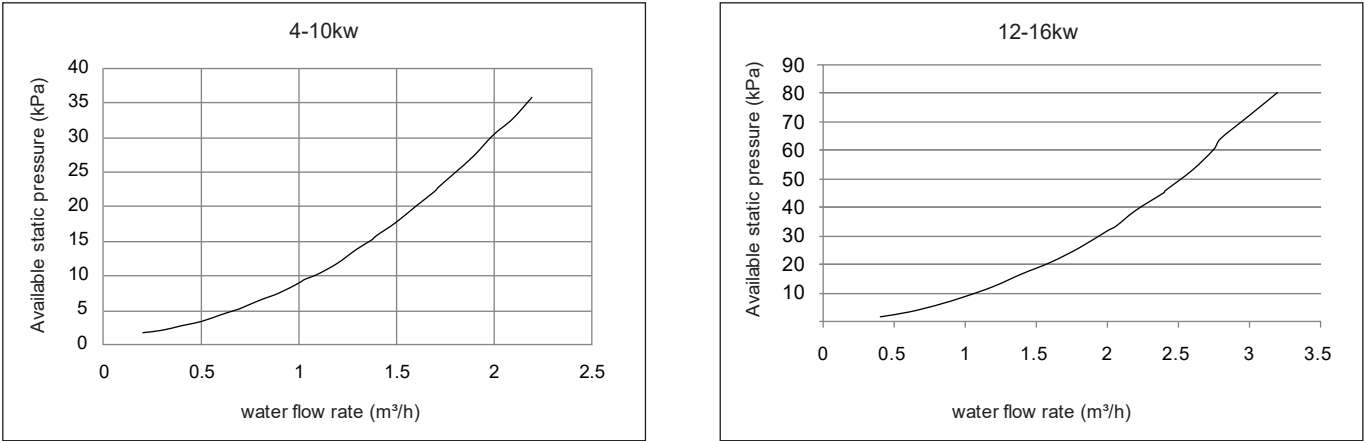
- reduce the individual pressure drops as much as possible (bends, level changes, options, etc.).
- use a correctly sized piping diameter.
- avoid hydraulic system extensions, wherever possible.

2 - INSTALLATION OF UNIT

2.5.6 - Available external static pressure of the pump
Data applicable for:
- Fresh water 20°C
- If glycol is used, the maximum water flow is reduced.



Graphic 1: Available static pressure for 4 to 16kW units with hydraulic mdule



Graphic 2: Pressure drop for 4 to 16kW units

2 - INSTALLATION OF UNIT

2.6 - Specification data and electrical data of units

2.6.1 - Electrical data

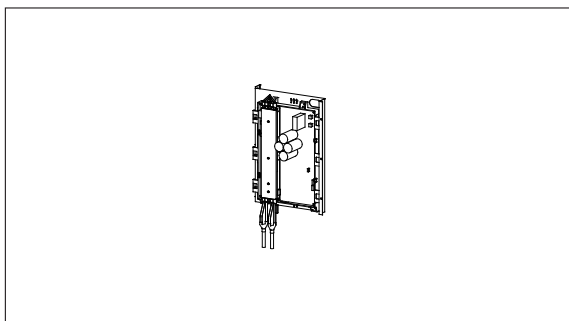
Model name			4 (1 Ph)	6 (1 Ph)	8 (1 Ph)	10(1 Ph)	12 (1 Ph)	14 (1 Ph)	16 (1 Ph)	12 (3 Ph)	14 (3 Ph)	16 (3 Ph)
Power circuit	Nominal power supply	V-ph-Hz	230-1N-50							400-3N-50		
	Voltage range	V	220-240							380-415		
Control circuit supply												
Maximum unit power input (Un) (1)		kW	3.3	3.52	4.4	4.84	5.5	6.6	6.6	5.94	7.26	7.26
Cos Phi unit at maximum power (1)			0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Maximum unit current drawn (Un-10%) (2)		A	15	16	20	22	25	30	30	9	11	11
Maximum unit current drawn (Un) (3)		A	15	16	20	22	25	30	30	9	11	11
Maximum Start-up current, standard unit (4)		A	Not Applicable (less than the operating current)									

(1) Maximum unit operating current at maximum unit power input and at 220V-1ph/400V-3ph (values given on the unit nameplate).

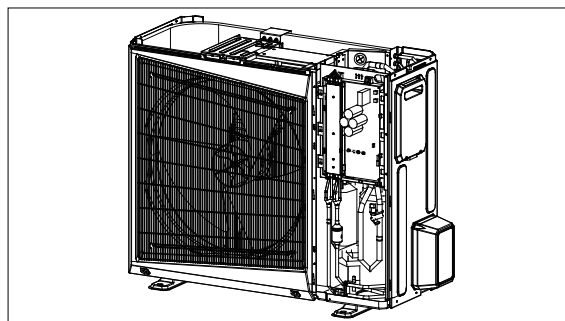
(2) Maximum instantaneous start-up current at operating limits (maximum operating current of the smallest compressor(s) + fan current + locked rotor current of the largest compressor).

(3) An all-pole disconnection device which has at least 3mm separation distance in all pole and a residual current device(RCD)with the rating of above 10mA shall be incorporated in the fixed wiring according to the national rule.

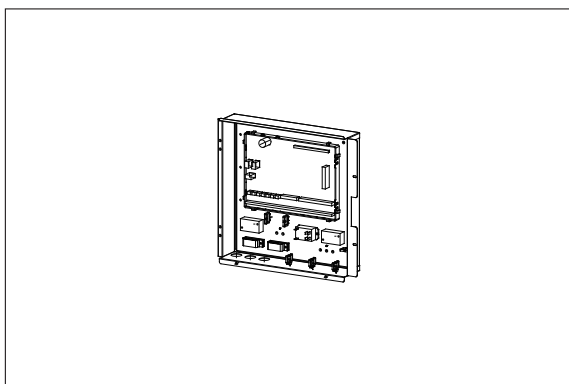
Electrical box



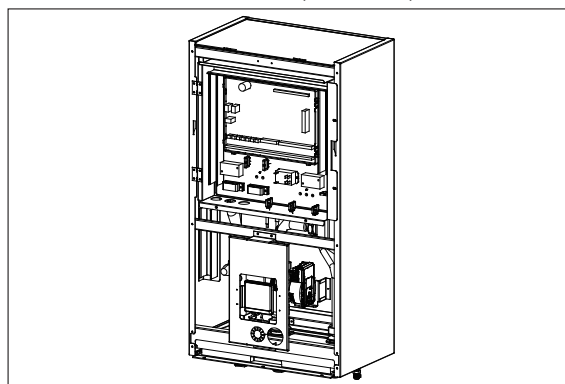
4-10kW unit (1 Ph)



Electrical box



12-16kW unit (1 Ph&3 Ph)

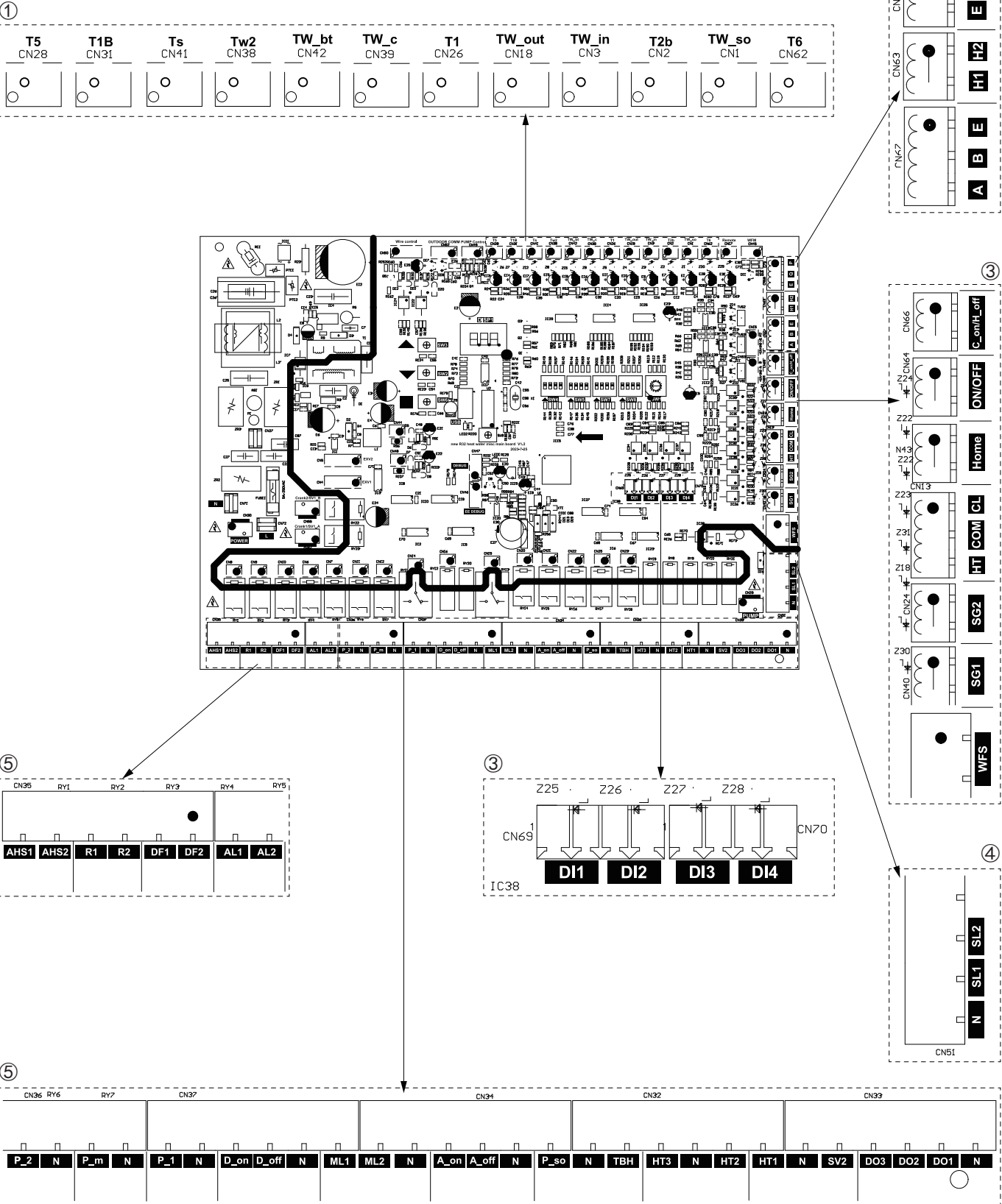


In this section, the general customer electrical connection is detailed as well as the main steps of configuration and examples of standard installation:

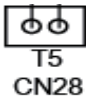
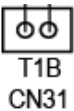
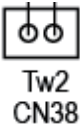

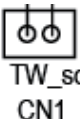
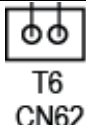
- Installation with electrical booster heaters
- Installation with DHW production and boiler

2 - INSTALLATION OF UNIT




2.7 - Description of the function interface of the control board extension function interface





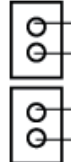
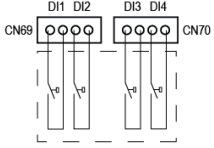


2 - INSTALLATION OF UNIT


① Description of the optional sensor interface				
Name	PCB Silk screening	Definition	Function description	illustrate
T5	 T5 CN28	Domestic water temp	Domestic hot water function configuration	When there is a domestic hot water function, it is necessary to receive the domestic hot water tank to detect the water temperature, and the internal machine accessory comes with one 4m (placed inside the tank, if there is no interface inside the tank, it is placed at the inlet of the tank)
T1B	 T1B CN31	External heat source leaving water temp	External heat source configuration	When the system is connected to an external heat source, an external T1B sensor is required, and the internal machine accessory comes with one 4m
Tw2	 Tw2 CN38	The second zone leaving water temp (Reserved)	Second temperature zone function	Select the second temperature zone
Tw_bt	 TW_bt CN42	Buffer tank temp	Buffer tank configuration	When the system is equipped with a buffer water tank, it is used to detect the water temperature of the buffer water tank, placed in the buffer water tank, and the internal machine accessory comes with one 4m (placed inside the water tank, if there is no interface inside the water tank, it is placed at the water tank inlet from the unit to the water tank)
Tw_so	 TW_so CN1	Solar water temp	Solar function configuration	When the solar function is configured externally, it needs to be placed at the outlet of the solar water tank to detect the water temperature of the solar water tank, and the internal machine accessory comes with one 4m (solar inside, if the solar energy has no sensor, it is placed at the solar water outlet)
T6	 T6 CN62	Indoor ambient temp	Room temperature control	When indoor ambient temperature control is required

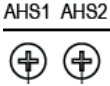
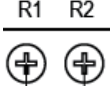
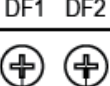

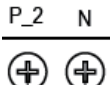
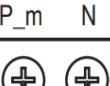
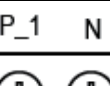
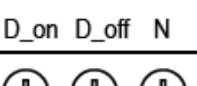
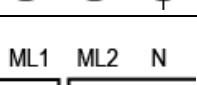
2 - INSTALLATION OF UNIT

② 485 communication interface				
Name	PCB Silk screening	Definition	Function description	illustrate
P Q E	CN68 E Q P 	IDU COMM	Internal and external machine communication	When the internal unit and the external unit are connected, the PQE of the internal and external unit must be connected one by one
H1 H2 E	CN63 H1 H2 	ODU COMM	External units are connected in parallel	When the external unit needs to be connected in parallel, H1 H2 E hand-in-hand connection between the external unit and the external unit When there is interference in communication, the last H1 H2 is connected in parallel with a 120 ohm resistor (Reserve)
A B E	CN67 A B E 	Modbus COMM	Modbus feature	The standard modbus protocol is used to monitor the read centralized control function

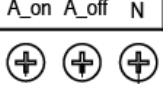
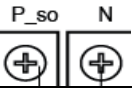
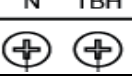
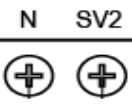
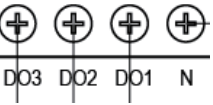
③ Dry contact input (Note: must be no potential, not strong electricity)				
Name	PCB Silk screening	Definition	Function description	illustrate
C_on / H_off	C_on/H_off 	Cooling / heating mode interface terminal	Cooling and heating function	Under dry contact control, cooling and heating function selection
ON/OFF	CN64 ON/OFF 	ON /OFF interface terminal	On/off function	Dry contacts control the power on and off function
Home	CN43 Home 	Home / away mode interface terminal Modbus	Home features	Dry contacts control home function selection
CL COM HT	CN13 CL COM HT 	Thermostat	Thermostat control	CL-COM first zone thermostat control HT-COM second zone thermostat control
SG1 SG2	CN24 CN40 SG2 SG1 	Smart grid	Reserved smart grid control functions	When configuration SG ready function, activate the SG1 &SG2 dry contact port for SG ready function: State 1: SG1-ON; SG2-OFF: Forced to turn off the unit State 2: SG1-OFF; SG2-OFF: Run in normal control without affecting by power grid State 3: SG1-OFF; SG2-ON: Run the unit at a A%*max.cap.Demand(A% is pre-set parameter, 40%~100%) State 4: SG1-ON; SG2-ON: Run the unit with max.cap.Demand(Forced to simulate Cooling setpoint to 5℃ ; Heating and DHW setpoint to 63℃)
DI1 DI2 DI3 DI4	CN69 DI1 DI2 DI3 DI4 CN70 	Custom defined input interface terminal	Custom features	Optional dry contacts, specific functions are described in the dry contacts

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④ Strong electrical input signal 220V AC				
Name	PCB Silk screening	Definition	Function description	illustrate
SL1 SL2		Solar energy input signal interface terminal	Solar capabilities	Used to control the output of the solar system when configuring the solar function (Reserve)

⑤ Extended output function interface description (control input and output on -off, isolation signal, can be connected to strong and weak electrical input signal) The specific connection method has been wired diagram				
Name	PCB Silk screening	Definition	Function description	illustrate
AHS1 AHS2		External heat source interface terminal	External heat source function	Control the gas stove switch
R1 R2		Unit operation signal interface terminal	Run the signal	Unit running signal, unit operation output, standby does not output
DF1 DF2		Unit defrost signal interface terminal	Defrost signal	Unit defrost signal, unit defrost output, other not output
AL1 AL2		Unit alarm signal interface terminal	Alarm signal	Unit alarm signal, unit fault output, other not output
Extended output function interface description (strong current output 220V AC) The specific connection method is subject to the wiring diagram				
Name	PCB Silk screening	Definition	Function description	illustrate
P_2 N		Zone2 on/off pump (Reserved)	Extended pump control	External circulating water pump in the second temperature zone
P_m N		Main loop booster on/off pump	Water pump control	Main booster pump water pump interface
P_1 N		Zone1 on/off pump	Water pump control	External first temperature zone circulating water pump control
D_on D_off N		DHW 3-way valve	Domestic hot water three-way valve control	When the domestic hot water mode is turned on, the terminal D_on output 220VAC, and the terminal D_off has no output; When the domestic hot water mode is turned off, the terminal D_on has no output, and the terminal D_off output 220VAC
ML1 ML2 N		Zone2 mixing valve (Reserved)	Second temperature zone mixing valve control	The second temperature zone mixing valve, two Ls (ML1/ML2, ML1 output increases the return water in the mixed water, ML2 output increases the unit water volume in the mixed water), one N

2 - INSTALLATION OF UNIT

A_on A_off N		Additional heat source 3-way valve	External heat source 3-way valve control	When the external heat source is turned on, the terminal A_on output 220VAC, and the terminal A_off has no output; When the external heat source is turned off, the terminal A_on has no output, and the terminal A_off output 220VAC
P_so N		Solar water pump interface terminal	Water pump control	Solar water pump
TBH N		Electric heater interface terminal of domestic hot water	Water tank electric heating control	Domestic hot water tank electric heating
SV2 N		Heating water loop cut off valve in cooling mode	Two-way valve control for refrigeration hot water circuit	Refrigeration mode waterway switching two-way solenoid valve (Normally closed solenoid valve is adopted. The SV2 has no output when it is refrigerated and Tw_out < 18°C. The SV2 is turned on when cooling and Tw_out ≥ 18°C, heating, defrosting, and antifreeze operation.)
DO1 DO2 DO3 N		Customized output interface terminal	Customize the output interface	See the output port description for details

2.8 - Electrical connections

Please refer to the certified wiring drawings, supplied with the unit.

2.8.1 - Power supply

The power supply must conform to the specification on heat pump nameplate. The supply voltage must be within the range specified in the electrical data table. For connections refer to the wiring diagrams and the certified dimensional drawings.

CAUTION:

After the unit has been commissioned, the power supply must only be disconnected for quick maintenance operations (one day maximum). For longer maintenance operations or when the unit is taken out of service and stored (e.g. during the winter or if the unit does not need to generate cooling) the power supply must be maintained to ensure supply to the electric heaters (compressor coil heater, unit frost protection).

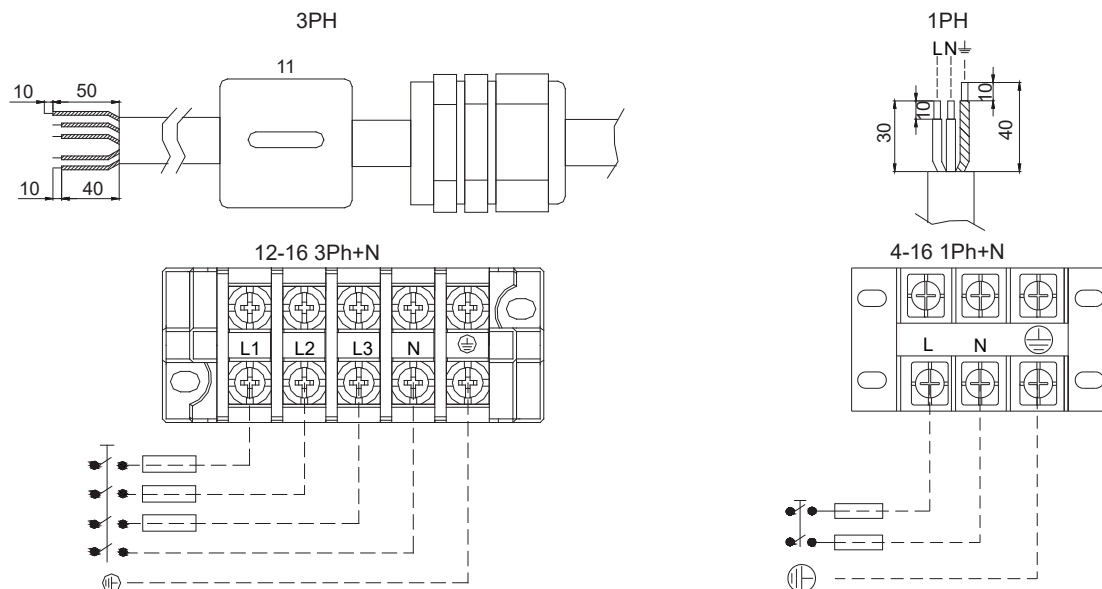


Figure 8: Power connection with Main Switch

2 - INSTALLATION OF UNIT

2.8.2 - Recommended wire sections

Wire sizing is the responsibility of the installer, and depends on the characteristics and regulations applicable to each installation site. The following is only to be used as a guideline, and does not make Manufacturer in any way liable. After wire sizing has been completed, using the certified dimensional drawing, the installer must ensure easy connection and define any modifications necessary on site.

The connections provided as standard for the field-supplied power entry cables are designed for the number and type of wires, listed in the table below.

The calculations of favourable and unfavourable cases are performed by using the maximum current possible of each unit fitted with a hydraulic kit (see the tables of electrical data for the unit and the hydraulic module).

The calculation is based on PVC or XLPE insulated cables with copper core. A maximum ambient temperature of 46°C has been taken into consideration. The given wire length limits the voltage drop to < 5% (length L in metres - see table below).

IMPORTANT:

Before connection of the main power cables (L1 - L2 - L3- N - PE or L1 - N - PE) on the terminal block, it is imperative to check the correct order of the 3 phases before proceeding to the connection and the good connection of the neutral wire (if the neutral conductor is not connected correctly, the unit can be damaged permanently).

Table 2: Minimum and maximum wire section (per phase) for connection to units(with Electrical heater component)								
	Max. connectable section ⁽¹⁾	Calculation favourable case:				Calculation unfavourable case:		
		- Suspended aerial lines (standardised routing No. 17) - XLPE insulated cable				- Conductors in conduits or multi-conductor cables in closed conduit (standardised routing No. 41) - PVC insulated cable, if possible		
MODEL NAME		Section	Section ⁽²⁾	Max. length for voltage drop <5%	Cable type	Section ⁽²⁾	Max. length for voltage drop <5%	Cable type ⁽³⁾
		mm ² (per phase)	mm ² (per phase)	m	-	mm ² (per phase)	m	-
Outdoor unit	4/6 (1ph)	3×2.5 ²	3×2.5 ²	100	H07RNF	3×2.5 ²	80	H07RNF
	8/10 (1ph)	3×4 ²	3×4 ²	100	H07RNF	3×4 ²	80	H07RNF
	12/14/16 (1ph)	3×6 ²	3×6 ²	100	H07RNF	3×6 ²	80	H07RNF
	12/14/16(3ph)	5×2.5 ²	5×2.5 ²	100	H07RNF	5×2.5 ²	80	H07RNF
Indoor unit	4-16KW (1ph)	3×2.5 ²	3×2.5 ²	100	H07RNF	3×2.5 ²	80	H07RNF
Communication wire between ODU&IDU		Three-core shielded cable 3×1.0 mm ²						
Accessory wired controller		Use cables H07RN-F 4x0.75 mm ² up to 50m to connect the wired controller (not supplied with accessory)						

NOTES:

- (1) Connection capacities actually available for each machine, defined according to the connection terminal size, the control box access opening size and the available space inside the control box.
- (2) Selection simulation result considering the hypothesis indicated.
- (3) If the maximum calculated section is for an XLPE cable type, this means that a selection based on a PVC cable type can exceed the connection capacity actually available. Special attention must be given to the selection.

Power cable entry

The power cables must be entered through the cable gland from the rear of the unit.

Caution

- Please clamp it directly after the customer's terminal block.
- Please clamp the second one close to the cable gland.
- The power cable should not be in contact with hot parts of the system.

2.8.3 - Recommended customer electrical protection

Electrical protection is the responsibility of the installer, and depends on the characteristics and regulations applicable to each installation site. The following is only to be used as a guideline, and does not make manufacturer in any way liable.

Model			Outdoor unit				Indoor unit
			4-6kw	8-10kw	12-16kw-1ph	12-16kw-3ph	4-16kw
Circuit breaker	Type		C	C	C	C	C
	Current	A	32	40	50	20	20
Fuses	Type		gG	gG	gG	gG	gG
	Current	A	32	50	63	20	20

2 - INSTALLATION OF UNIT

Electrical data and operating conditions notes:

- Field connections:

All connections to the system and the electrical installations must be in full accordance with all applicable local codes.

- The units are designed and built in compliance with EN 60335-1 and 2 ⁽¹⁾.

NOTES:

- The operating environment for the units is specified below:

1. Physical environment⁽²⁾. The classification of environment is specified in standard EN 60364:

- outdoor installation: protection level IP44 ⁽²⁾

- operating temperature range: -25°C to +50°C

- storage temperature range: -20°C to +48°C

- presence of hard solids, class AE3 (no significant dust present)

- presence of corrosive and polluting substances, class AF1 (negligible)

2. Power supply frequency variation: $\pm 2\%$.

3. The neutral (N) conductor must be always connected to the unit

4. Overcurrent protection of the power supply conductors is not provided with the unit.

5. The units are designed for simplified connection on TT networks (IEC 60364).

CAUTION:

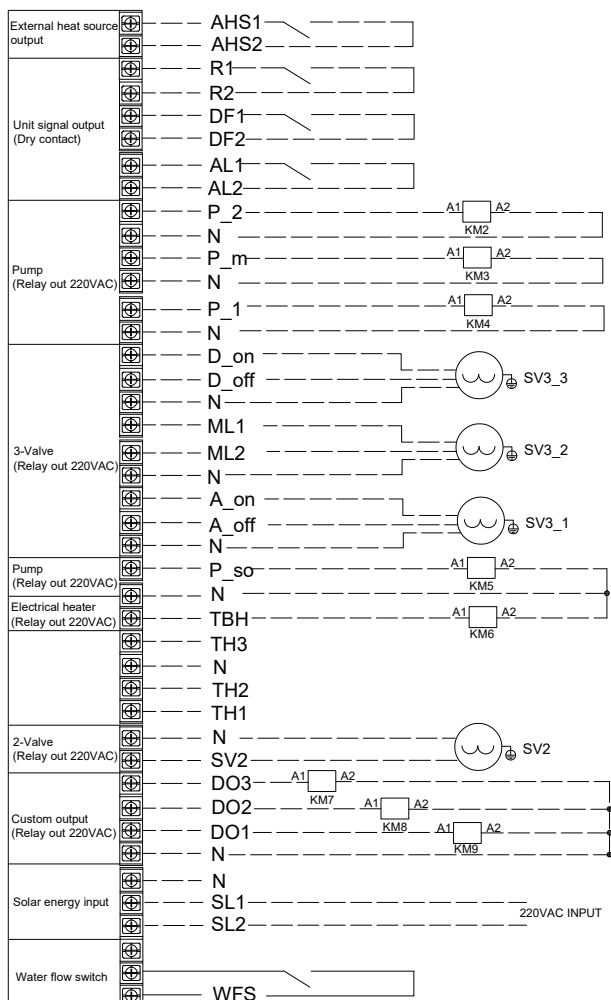
If particular aspects of an actual installation do not conform to the conditions described above, or if there are other conditions which should be considered, always contact your local representative.

(1) The absence of main power disconnect switch is an exception that must be taken into account at field installation level.

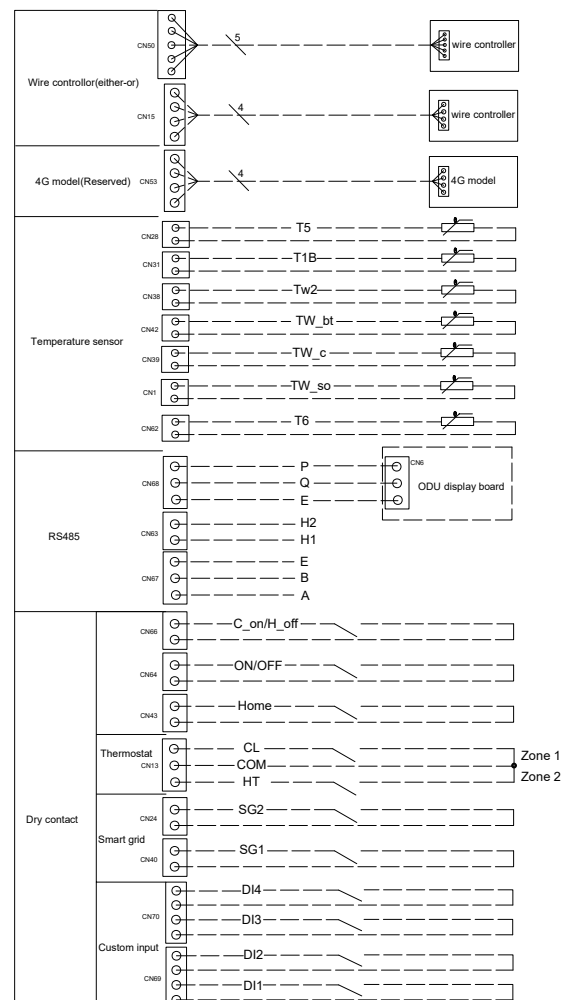
(2) The required protection level for this class is IP43BW (according to reference document IEC 60529). All units fulfil this protection condition:

- When accessing to interface, the level is IPxxB

2.9 - General customer electrical connection on terminal block



RESERVED



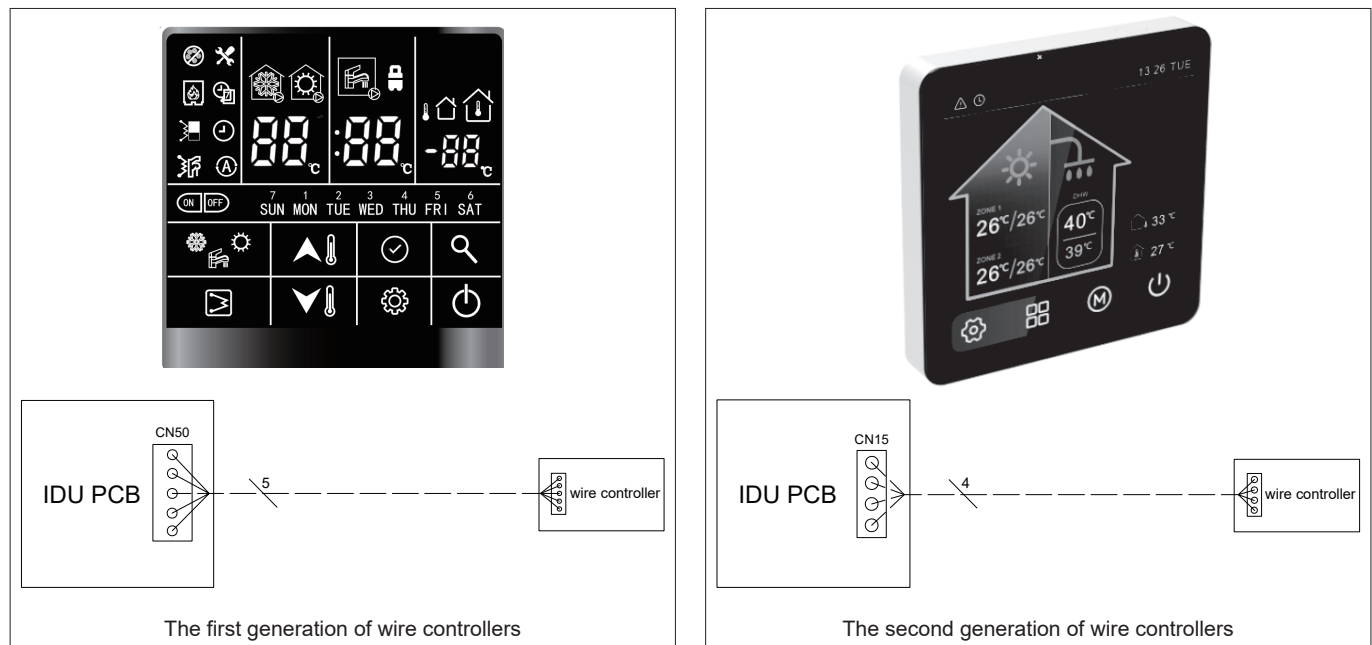
2 - INSTALLATION OF UNIT

CODE	Content	CODE	Content
AHS1-2	External heat source interface terminal	WFS	Water flow switch interface terminal
R1-2	Unit operation signal interface terminal	Home	Home / away mode interface terminal
DF1-2	Unit defrost signal interface terminal	ON/OFF	ON /OFF interface terminal
AL1-2	Unit alarm signal interface terminal	C_on/H_off	Cooling / heating mode interface terminal
P_2	Zone2 on/off pump	KM1-9	220V AC contactor
P_m	Main loop booster on/off pump	LED1-3	220V AC indicator
P_1	Zone1 on/off pump	XT1-2	Terminal block
TBH	Electric heater interface terminal of domestic hot water	A_on/A_off/N	Additional heat source 3-way valve
HT1-HT3	Electric heater interface terminal of main water loop	ML1/ML2/N	Zone2 mixing valve
SV2	Heating water loop cut off valve in cooling mode	D_on/D_off/N	DHW 3-way valve
DO1-DO3	Customized output interface terminal	A/B/E	Modbus communication
SL1-2	Solar energy input signal interface terminal(Reserved)	H1/H2/E	The outdoor unit communicates with the outdoor unit
DI1-DI4	Custom defined input interface terminal	Q/P/E	The outdoor unit communicates with the indoor unit
P_so	Solar water pump interface terminal		

2.10 - Unit with wired controller

Before using any parameter menu of the wired controller , it is necessary to set the time and day of the control.

The following sections explain the procedures for unit with user interface. If there is no user interface on the unit, it is necessary to use Customer communication bus to configure the unit.



2.10.1 - Electrical connection

The user interface is an accessory and must be installed indoors by the installer.







IMPORTANT: For more information on:

- how to use this user interface, please refer to wired controller manual,
- Wired controller installation document, refer to document provided with accessory.
- For more information, please refer to the IOM of wired controller.

2 - INSTALLATION OF UNIT

2.11 - Installation diagram 1

This installation could be composed of:

	Unit
	With or without integrated hydraulic kit (variable speed)
	With Remote User Interface
	Cooling Mode
	Heating Mode
	Up to three electrical booster heaters
Available accessories (if ordered)	Additional Outdoor Air Temperature Sensor

2.11.1 - Standard installation

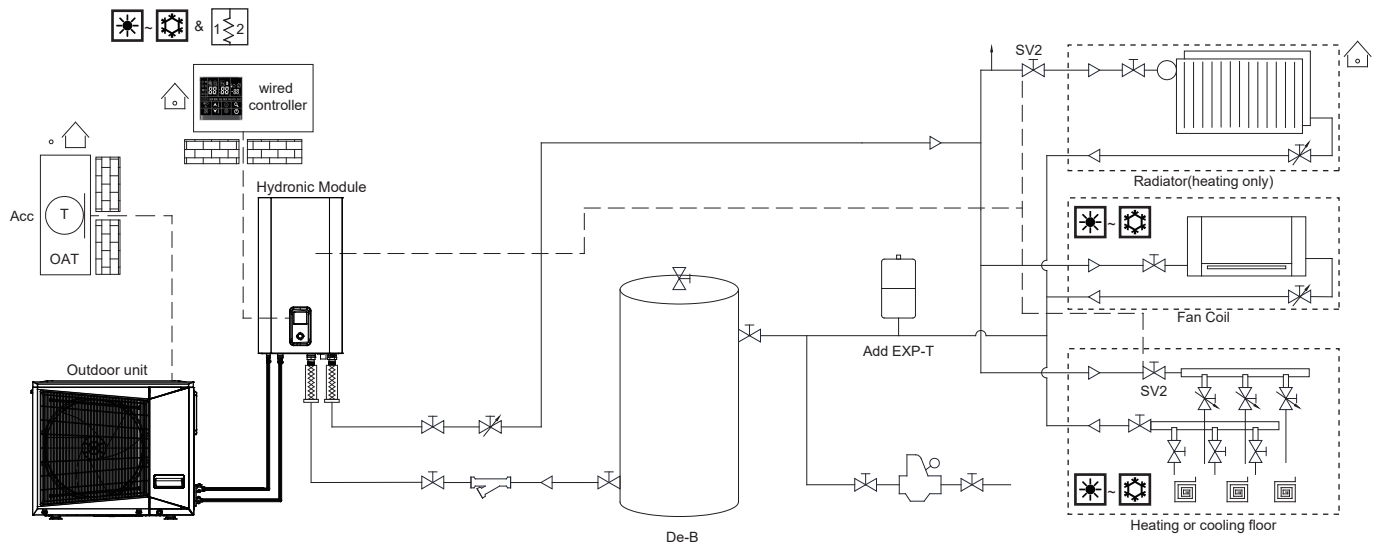
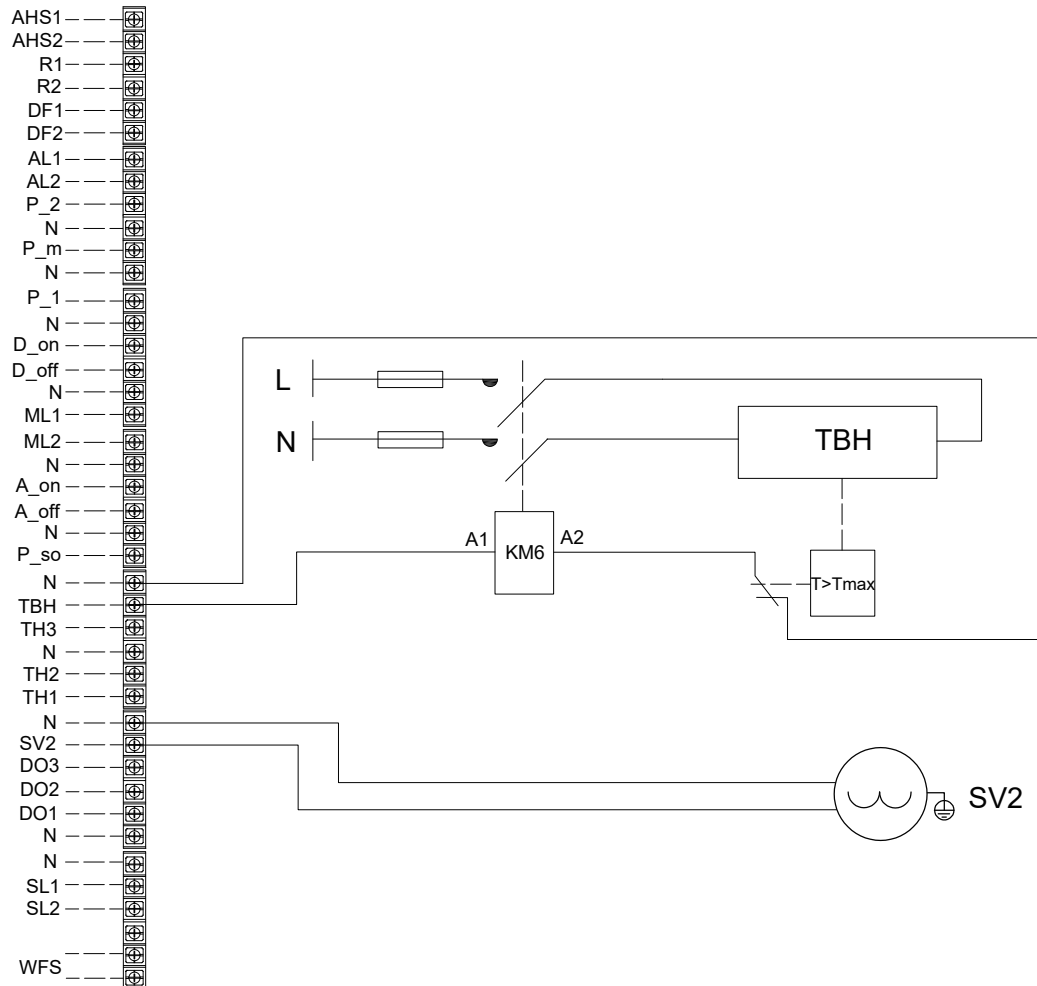


Figure 9: Standard installation with electrical booster heaters

2 - INSTALLATION OF UNIT

2.11.2 - Electrical connection



2.12 - Installation diagram 2

This installation could be composed of:

	Unit
	With or without integrated hydraulic kit (variable speed)
	With Remote User Interface
	Cooling Mode Heating Mode
	DHW production
	Boiler
	Additional Outdoor Air Temperature Sensor
	DHW sensor

Available accessories (if ordered)

2 - INSTALLATION OF UNIT

2.12.1 - Standard installation

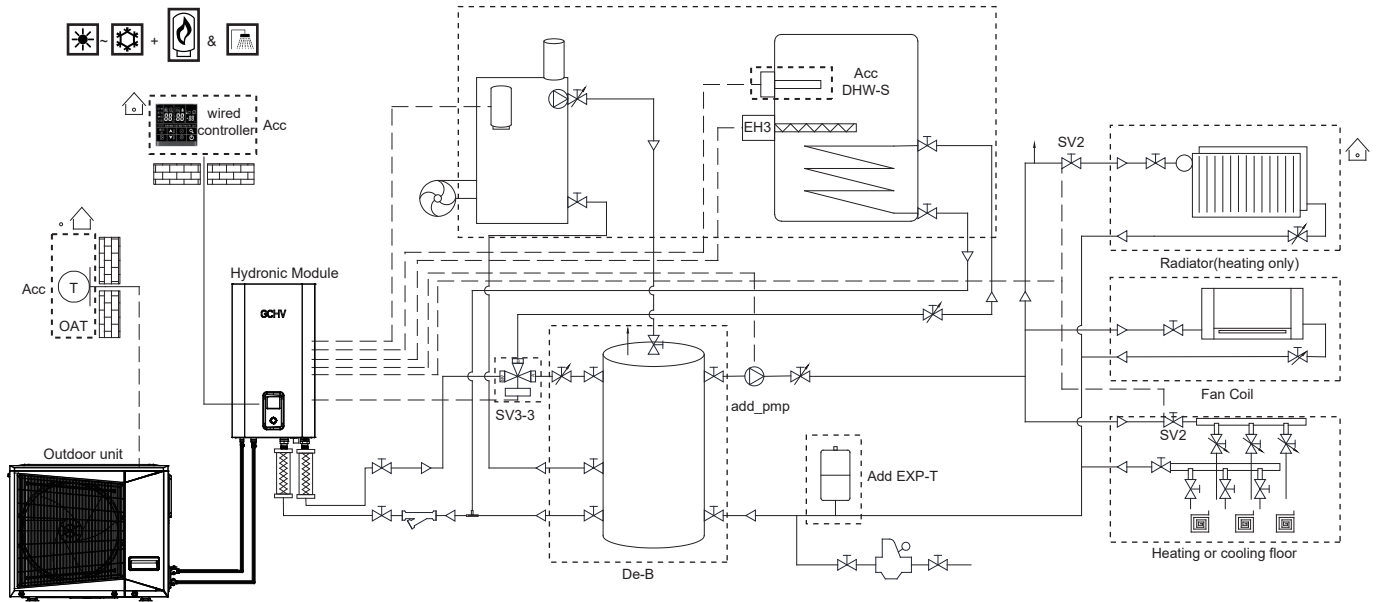


Figure 10: Standard installation with DHW production and boiler

2.12.2 - Electrical connection

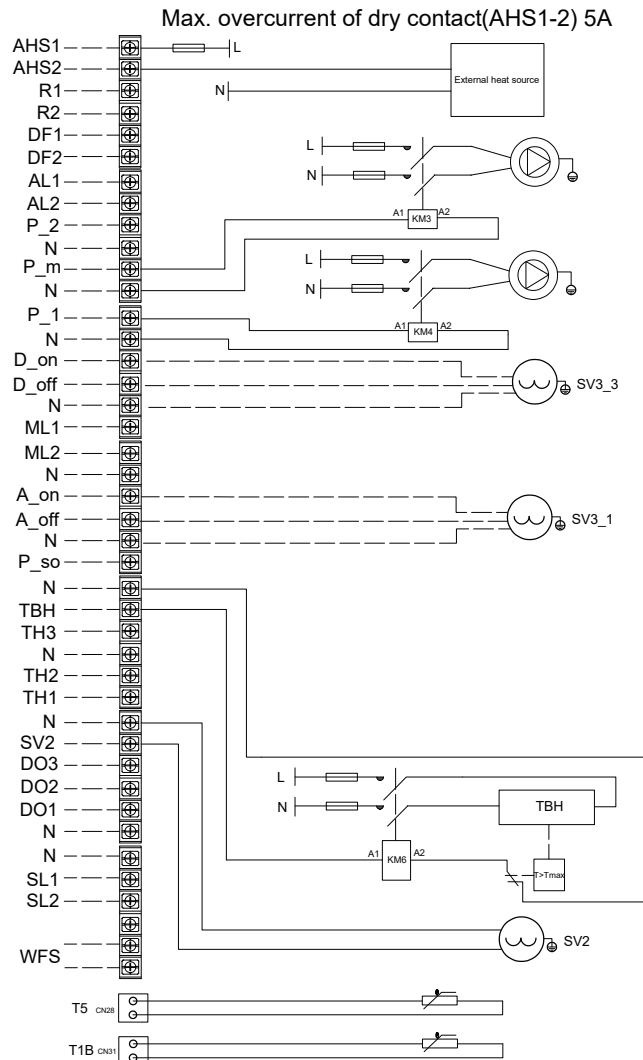



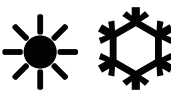





Figure 11: Electrical connection on terminal block for DHW production and boiler

2 - INSTALLATION OF UNIT

2.13 - Installation diagram 3

This installation could be composed of:

	Unit
	With or without integrated hydraulic kit (variable speed)
	With Remote User Interface
	Cooling Mode Heating Mode
	DHW production
	Boiler
	Available accessories (if ordered) Additional Outdoor Air Temperature Sensor DHW sensor Solar water heater

2.13.1 - Standard installation

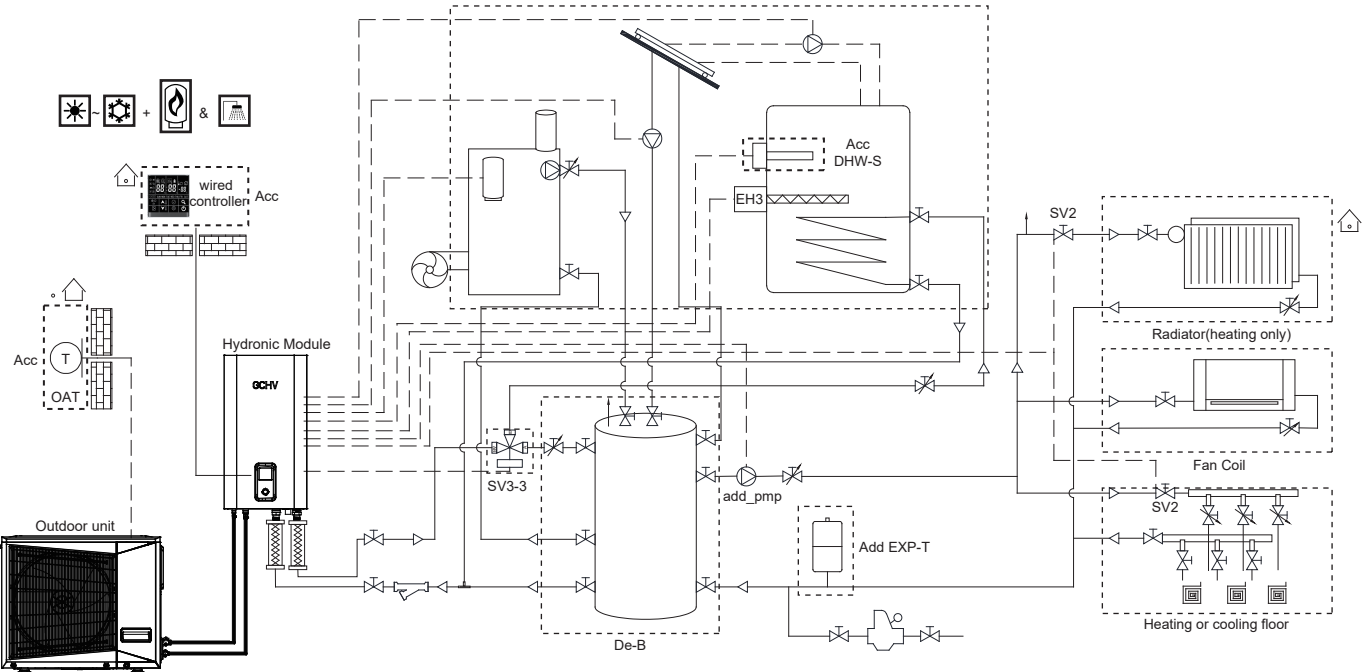


Figure 12: Standard installation with DHW production and boiler

2 - INSTALLATION OF UNIT

2.13.2 - Electrical connection

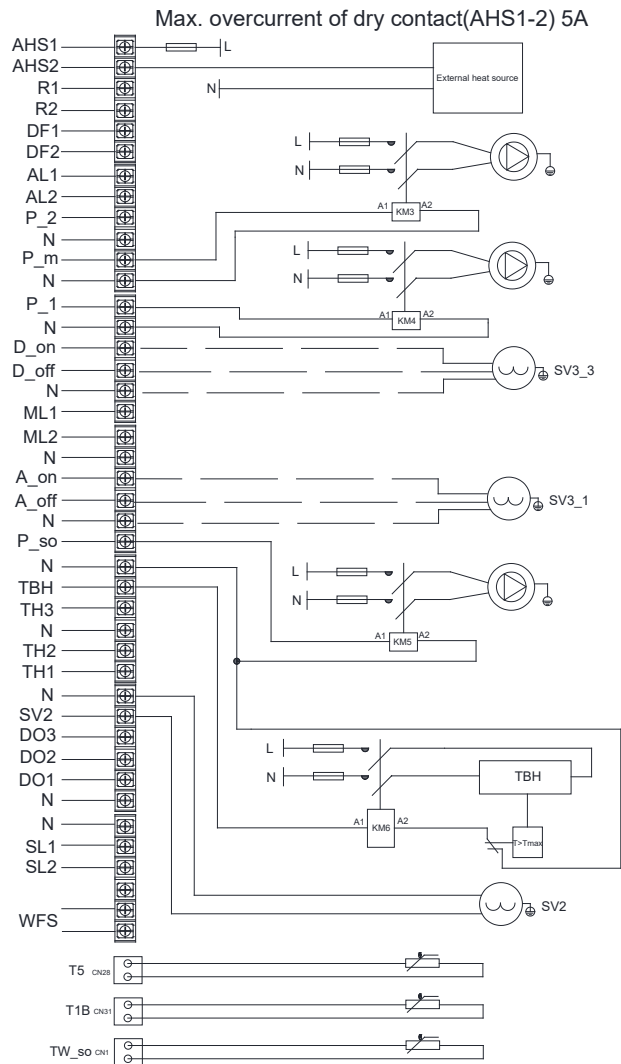


Figure 13: Electrical connection on terminal block for DHW production and boiler

When configure heating with solar water heater, and system runs the heating mode, $Tw_{bt} < TS1$:

- $Tw_{so} > Tw_{bt}$, P_{so} start;
- $Tw_{so} > TS1 + \Delta T_{solar}$, Solar water heater as priority, heat pump standby;
- $Tw_{so} < TS1 + \Delta T_{solar}$, heat pump start;
- $Tw_{so} < Tw_{bt}$, P_{so} stop; (P_{so} stop in non-heating mode)

Note:

1. Tw_{so} , Tw_{bt} must install;
2. If Tw_{so} fault, P_{so} always keeps running;
3. If Tw_{bt} fault, use the T1 working as Tw_{bt} ;

When configure DHW with solar water heater, and system runs the DHW mode, $T5 < TS2$:

- $Tw_{so} > T5$, P_{so} start;
- $Tw_{so} > TS2 + \Delta T_{solar}$, Solar water heater as priority, heat pump standby;
- $Tw_{so} < TS2 + \Delta T_{solar}$, heat pump start;
- $Tw_{so} < T5$, P_{so} stop; (P_{so} stop in non-DHW mode)

Note:

1. Tw_{so} , T5 must install;
2. If Tw_{so} fault, P_{so} always keeps running;
3. If T5 fault, P_{so} always keeps running, system can not run DHW mode;
4. DHW thermostat (dry contact) is not compatible with solar water heater;

2 - INSTALLATION OF UNIT

2.14 - Commissioning modes

IMPORTANT:

Field connection of interface circuits may lead to safety risks: any control box modification must maintain equipment conformity with local regulations. Precautions must be taken to prevent accidental electrical contact between circuits supplied by different sources:

- The routing selection and/or conductor insulation characteristics must ensure dual electric insulation.
- In case of accidental disconnection, conductor fixing between different conductors and/or in the control box prevents any contact between the conductor ends and an active energised part.

Refer to the wiring diagram supplied with the unit for the field control wiring of the following features:

- Safety switch (normally close contact, mandatory)

Three possible control configurations:

1.Connections to the customer remote control

- On/Off remote switch
- Heat/Cool select remote switch
- Home/Sleep select remote switch
- Alarm/Alert or Operation report...

2.Connections to the user interface

When the remote-mounted user interface accessory is chosen, the user interface has to be connected at the terminal block.

3.Connections to the customer communication bus

- The connection to the Modbus Protocol is carried out using a connector provided for this purpose inside the control box. One connector is provided to allow service connection.

2.15 - Check before start the unit

Never be tempted to start the heat pump without reading fully, and understanding, the operating instructions and without having carried out the following pre-start checks:

- Ensure that all electrical connections are properly tightened.
- Ensure that the unit is level and well-supported.
- Check that the hydraulic circuit has sufficient water flow and that the pipe connections correspond to the installation diagram.
- Ensure that there are no water leaks. Check the correct operation of the valves installed.
- All panels should be fitted and firmly secured with the corresponding screws.
- Make sure that there is sufficient space for servicing and maintenance purposes.
- Ensure that there are no refrigerant leaks.
- Confirm that the electrical power source agrees with the unit nameplate rating, wiring diagram and other documentation for the unit.
- Ensure that the power supply corresponds to the applicable standards.
- Make sure that compressors float freely on the mounting springs.

CAUTION:

- Commissioning and start-up of the heat pump must be supervised by a qualified refrigeration qualified technician.
- Start-up and operating tests must be carried out with a thermal load applied and water circulating in the water heat exchanger.
- All set point adjustments and control tests must be carried out before the unit is started up.

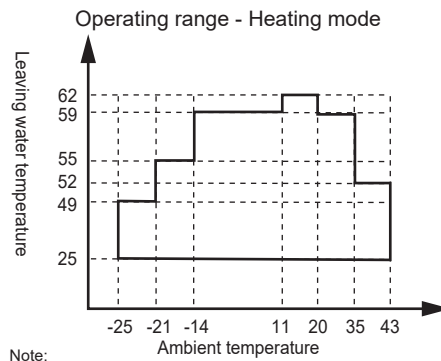
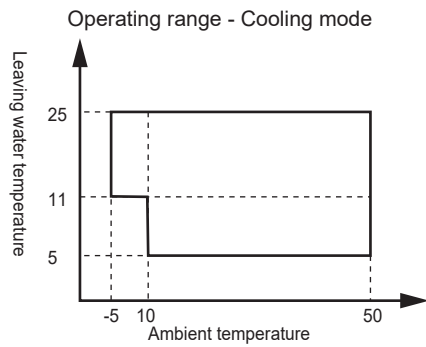
Ensure that all safety devices are operational, and that any alarms are acknowledged.

NOTE:

If the Manufacturer instructions (power and water connections and installation) are not observed, the Manufacturer warranty becomes invalid.

3 - OPERATION

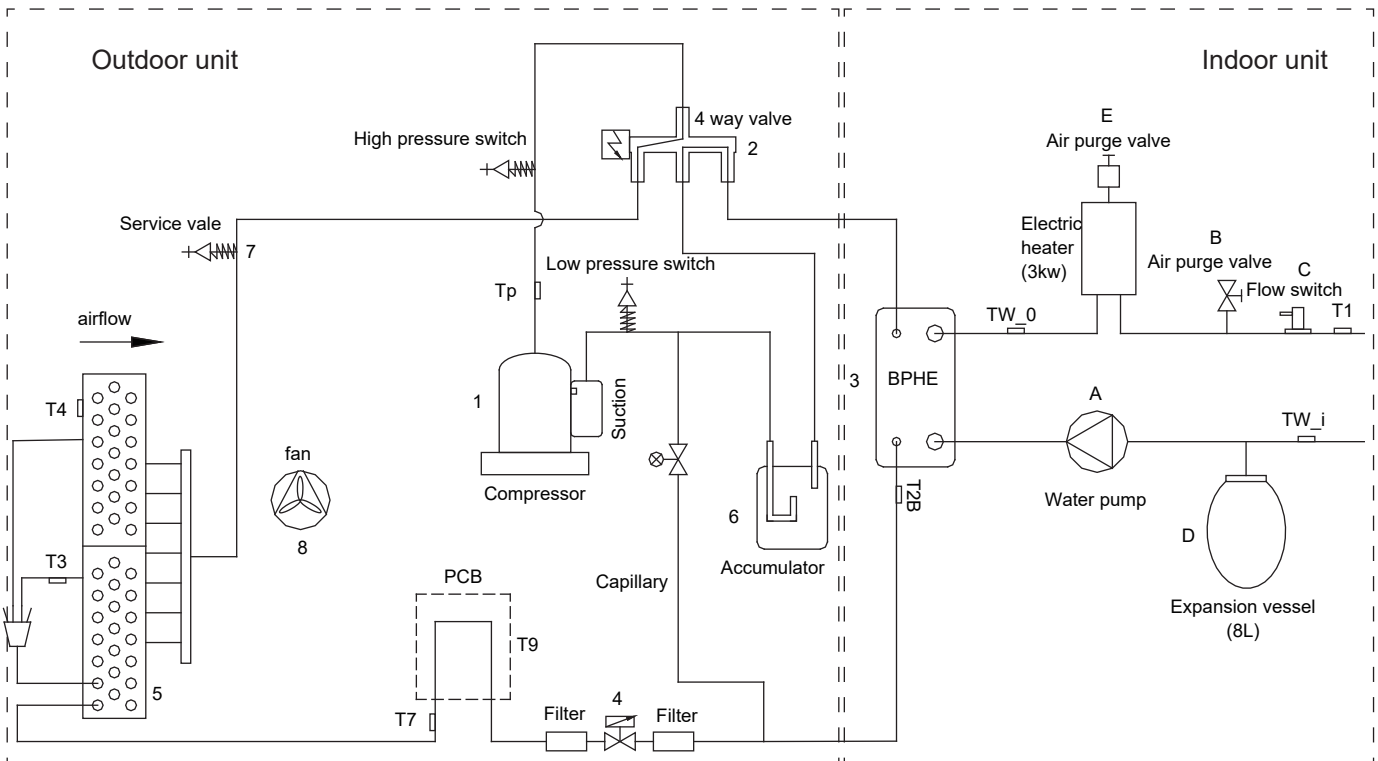
3.1 - Unit range



Note:
During heating/DHW mode, while the OAT is above 35°C, it can not keep the LWT below 35°C more than 8h.

3.2 - Major system components

3.2.1 - General – Refrigerant part



T1	Main water outlet temperature sensor
T3	Condenser temperature sensor
T4	Ambient temperature sensor
Tp	Discharge temperature sensor
T7	Refrigerant cooling temperature sensor
TW_0	BPHEwater outlet temperature sensor
TW_i	BPHEwater inlet temperature sensor

Water side legend	
Label	Description
A	Water Pump - Main water pump - primary loop (in hydraulic module)
B	Water High Pressure Safety Relief Valve (300 kPa)
C	Flow Switch (standard)
D	Expansion vessel (in hydraulic module option)
E	Air vent
F	Hydraulic module equipped with variable speed single pump

Unit refrigeration circuit legend	
Label	Description
1	Variable speed rotary compressor
2	Reverse 4 way valve (energized when in Heating mode)
3	Water exchanger - BPHE
4	Expansion valve - pulse modulating valve
5	Air cooled Exchanger
6	Accumulator or anti-slugging bottle
7	Service valve (Schrader valve)
8	fans

4 - MAINTENANCE

4.1 - Standard maintenance

To ensure optimal efficiency and reliability of the units, we recommend establishing a maintenance contract with your local Service organisation. This contract will include regular inspections by Service specialists so that any malfunction is detected and corrected quickly, ensuring that no serious damage can occur.

A Service maintenance contract is the best way to ensure the maximum operating life for your equipment and, through the expertise of technicians, provides the ideal way to manage your system cost effectively. Air conditioning equipment must be maintained by professional technicians, whilst routine checks can be carried out locally by specialised technicians. See the standard ISO 5149.

All refrigerant charging, removal and draining operations must be carried out by a qualified technician and with the correct material for the unit. Any inappropriate handling can lead to uncontrolled fluid or pressure leaks.

CAUTION:

Before doing any work on the machine ensure that the power is switched off. If a refrigerant circuit is opened, it must be evacuated, recharged and tested for leaks. Before any operation on a refrigerant circuit, it is necessary to remove the complete refrigerant charge from the unit with a refrigerant charge recovery group.

Disconnect the power supply before cleaning and maintenance.

Simple preventive maintenance will allow you to get the best performance from your HVAC unit:

- improved cooling and heating performance
- reduced power consumption
- prevention of accidental component failure
- prevention of major time-consuming and costly interventions
- protection of the environment

There are five maintenance levels for HVAC units, as defined by the AFNOR X60-010 standard.

NOTE:

Any deviation or non-observation of these maintenance criteria will render the guarantee conditions for the HVAC unit null and void, and the manufacturer, will no longer be responsible.

4.1.1 - Level 1 maintenance

See note in §4.1.3 Level 3.

Simple procedures can be carried out by the user on a weekly basis:

- Visual inspection for oil traces (sign of a refrigerant leak).
- Air heat exchanger cleaning - see §4.3 Air heat exchanger.
- Check for removed protection devices, and badly closed panels.
- Check the unit alarm report when the unit does not work (refer to wired controller manual).
- General visual inspection for any signs of deterioration.
- Verify the charge in the sight-glass.

Check that the water temperature difference between the heat exchanger inlet and outlet is correct.

4.1.2 - Level 2 maintenance

This level requires specific know-how in the electrical, hydraulic and mechanical fields.

The frequency of this maintenance level can be monthly or annually depending on the verification type.

In these conditions, the following maintenance operations are recommended.

Carry out all level 1 operations, then:

Electrical checks

- At least once a year tighten the power circuit electrical connections (refer to § 4.2 for the main electrical connections).
- Check and retighten all control/command connections, if required (refer to § 4.2 for the main electrical connections).
- Remove the dust and clean the interior of the control boxes, if required.
- Check the status of the contactors, disconnect switches and capacitors.
- Check the presence and the condition of the electrical protection devices.
- Check the correct operation of all electric heaters.
- Check that no water has penetrated into the control box.

Mechanical checks

- Check the tightening of the fan tower, fan, compressor and control box fixing bolts.

Water circuit checks

- Always take care when working on the water circuit to ensure that the condenser close by is not damaged.
 - Check the water connections.
 - Check the expansion tank for signs of excessive corrosion or gas pressure loss and replace it, if necessary.
 - Purge the water circuit (see §2.5 Water flow rate control).
 - Clean the water filter (see §2.5 Water flow rate control).
 - Examine the fixed speed pump bearing after 17500 hours of operation with water and the fixed speed pump mechanical seal after 15000 hours.
- Check the operation of the low water flow rate safety device.

4 - MAINTENANCE

- Check the status of the thermal piping insulation.
- Check the concentration of the anti-freeze protection solution (ethylene glycol or propylene glycol).

Refrigerant circuit

- Fully clean the air heat exchangers with a low-pressure jet and a bio-degradable cleaner.
- Check the unit operating parameters and compare them with previous values.
- Carry out an oil contamination test.
- Check the fouling of the filter drier. Replace it if necessary.
- Keep and maintain a maintenance sheet, attached to each HVAC unit.

All these operations require strict observation of adequate safety measures: individual protection garments, compliance with all industry regulations, compliance with applicable local regulations and using common sense.

4.1.3 - Level 3 (or higher) maintenance

The maintenance at this level requires specific skills/approval/tools and know-how and only the manufacturer, his representative or authorised agent are permitted to carry out these operations. These maintenance operations concern for example:

- A major component replacement (compressor, evaporator).
- Any intervention on the refrigerant circuit (handling refrigerant).
- Changing of parameters set at the factory (application change).
- Removal or dismantling of the HVAC unit.
- Any intervention due to a missed established maintenance operation.
- Any intervention covered by the warranty.
- One to two leak checks per year with a certified leak detector and carried out by a qualified person.

To reduce waste, the refrigerant and the oil must be transferred in accordance with applicable regulations, using methods that limit refrigerant leaks and pressure drops and with materials that are suitable for the products.

Any detected leaks must be repaired immediately.

The compressor oil that is recovered during maintenance contains refrigerant and must be treated accordingly.

Refrigerant under pressure must not be purged to the open air. If a refrigerant circuit is opened, plug all openings, if the operation takes up to one day, or for longer periods charge the circuit with nitrogen.

NOTE:

Any deviation or non-observation of these maintenance criteria will render the guarantee conditions for the HVAC unit null and void, and the manufacturer will no longer be held responsible.

4.2 - Tightening torques for the main electrical connections

Component	Designation in the unit	Value (N.m)
Terminal Block supply	L1 / L2 / L3 / N / PE	1,2
Terminal Block command		0,4 to 0,8
Transformer		0,5

4.3 - Air heat exchanger

We recommend, that finned coils are inspected regularly to check the degree of fouling. This depends on the environment where the unit is installed, and will be worse in urban and industrial installations and near trees that shed their leaves.

For coil cleaning, two maintenance levels are used.

- If the air heat exchangers are fouled, clean them gently in a vertical direction, using a brush.
- Only work on air heat exchangers with the fans switched off.
- For this type of operation switch off the HVAC unit if service considerations allow this.
- Clean air heat exchangers guarantee optimal operation of your HVAC unit. This cleaning is necessary when the air heat exchangers begin to become fouled. The frequency of cleaning depends on the season and location of the HVAC unit (ventilated, wooded, dusty area, etc.).

Clean the coil, using appropriate products. We recommend products for coil cleaning:

- No. 00PSP000000115A: traditional cleaning method.

CAUTION:

Never use pressurised water without a large diffuser. Do not use high-pressure cleaners for Cu/Cu and Cu/Al coils.

Concentrated and/or rotating water jets are strictly forbidden. Never use a fluid with a temperature above 45°C to clean the air heat exchangers.

Correct and frequent cleaning (approximately every three months) will prevent 2/3 of the corrosion problems.

4.4 - Water heat exchanger maintenance

Check that:

- the insulating foam is intact and securely in place.
- the BPHE and piping electric heaters are operating, secure and correctly positioned.
- the water-side connections are clean and show no sign of leakage.

4 - MAINTENANCE

4.5 - Expansion tank

CAUTION:

The pressure of the expansion tank needs to be checked every two years. If the pressure is less than 1.0bar, it needs to be inflated to 1.0bar

4.6 - Unit maintenance

CAUTION:

Before any work on the unit ensure that the circuit is isolated and there is no voltage present. Note that it may take 5 minutes for the circuit capacitors to fully discharge after isolating the circuit. Only appropriately qualified personnel are authorised to work on the VFD.

In case of any alarm or persistent problem related to the VFD, contact Service.

The VFDs fitted with units do not require an insulation test, even if being replaced; they are systematically verified before delivery. Moreover, the filtering components installed in the VFD can falsify the measurement and may even be damaged. If there is a need to test the insulation of the unit components (fan motors and pumps, cables, etc.), the VFD must be disconnected at the power circuit.

4.7 - Refrigerant volume

The unit must be operated in cooling mode to find out if the unit charge is correct by checking the actual subcooling.

Following a small refrigerant leak a loss of refrigerant, compared to the initial charge will be noticeable in the cooling mode and affect the subcooling value obtained at the air heat exchanger (condenser) outlet, but it will not be noticeable in the heating mode.

IMPORTANT:

It is therefore not possible to optimise the refrigerant charge in the heating mode after a leak. The unit must be operated in the cooling mode to check, if an additional charge is required.

5 - ALARM DESCRIPTION

The units use high-pressure R32 refrigerant. Special equipment must be used when working on the refrigerant circuit (pressure gauge, charge transfer, etc.).

Note :

- A vacuum pump is not enough to remove moisture from oil.
- Oils absorb moisture rapidly. Do not expose oil to atmosphere.
- Never open system to atmosphere while it is under vacuum.
- When the system must be opened for service, break vacuum with dry nitrogen.
- Do not vent R32 into atmosphere.

5.1- Alarm listing

The following tables of alarms list their probable cause and the likely effect on the unit, as well as the reset type.

Table 3: Fault table			
Code	Fault content	Code	Fault content
E1	Phase-loss failure	FA	Second zone LWT sensor (Tw_2 sensor) fault (Only valid after setting second zone function)
E2	Hydronic box and ODU communication fault		
E4	Outdoor ambient temperature sensor (T4) fault	Fb	External heat source LWT sensor (T1B sensor) fault (Only valid after set the external heat source – boiler)
E6	Condenser temperature sensor (T3) fault		
E8	Discharged temperature sensor (Tp) fault	FC	Water pump fault
E9	AC overvoltage/undervoltage fault	Fd	Buffer tank temp sensor (TW_bt sensor) fault
E10	EEPROM fault	FE	Parallel total effluent temp sensor (TW_c sensor) fault
EA	Condenser temperature sensor (T3B) fault(Reserved)	FF	Mode conflict
Ec	Refrigerant cooling outlet pipe temperature sensor (T7) fault	U0	EEPROM fault of function board
H0	Communication fault between main PCB and IPM	U1	Protection of huge different values between EWT and LWT
H1	Communication fault between ODU main board and display board	U2	Protection of lack of water
H4	3 times P6 protection in 30 min	U3	Protection of abnormal different value between EWT and LWT
H5	3 times P2 protection in 30 min	U4	Water pump protection
H6	3 times P4 protection in 100 min	U5	Pump shutdown protection
H7	The quantity of IDU is decreased	U6	Protection of standard electrical heater over heat
H9	2 times P9 protection in 10 min		
H10	3 times P3 protection in 60 min		
H11	2 times P13 protection in 10 min(Reserved)		
H12	3 times Pb protection in 10 min		
P1	High pressure protection		
P2	Low pressure protection		
P3	AC over-current protection		
P4	Over-high discharge temperature protection		
P5	High temperature protection of condenser		
P6	IPM module protection		
P9	DC fan motor protection		
P10	Anti typhoon protection(Reserved)		
P11	T2b low temperature protection		
P13	Current detection abnormal protection(Reserved)		
Pb	IPM module high temperature protection		
F0	Water flow switch fault		
F1	Communication fault between IDU and ODU		
F2	LWT of unit sensor (T1 sensor) fault		
F3	Solar water temp sensor (TW_so) fault		
F4	Liquid refrigerant temp sensor (T2B sensor) fault		
F5	(Reserved)		
F6	DHW sensor (T5 sensor) fault		
F7	LWT sensor (TW_in sensor) fault		
F8	LWT of BPHE sensor (TW_out sensor) fault		
F9	Communication fault between wired controller and Hydronic box		

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6.1- Modbus table

Default Baud Rate = 9600 Bauds, shall be configurable; Default Modbus Address = 11, shall be configurable; Modbus type = RTU; Frame type: shall be configurable (N,8,1)											
No.	Address (reading)	Address (writing)	Spec.	Note	R/W	Function code	Min	Max	Default	Unit	Conversion
1	002CH	002CH	Setting mode	0 = Off 1 = Cool+DHW 2 = Heat+DHW 3 = Cool 4 = Heat 5 = DHW	RW	0x03 0x04 0x06 0x10	0	2		-	
2	002DH	N.A.	Running mode	0=Off 1 = Cool 2 = Heat 4 = DHW 7 = Defrost 20 = Home Anti-Freeze (In our logic, it is anti-frozen for unit protection, not to keep room in the certain temp.)	RO	0x03 0x04	0	20		-	
4	0209H	0209H	User Interface type	1=contacts, (ON/OFF; HOME/AWAY; MODE only available with dry contact) 2=Wired controller (ON/OFF; HOME/AWAY; MODE only available with wired controller)	RW	0x03 0x04 0x06 0x10	0	0		-	
5	0029H	0029H	Occupancy Mode	0=Away, 1=Sleep, 2=Home	RW	0x03 0x04 0x06 0x10	0	2		-	
6	0067H	N.A.	Normal/Eco Switch status	0=Normal, 1=Eco	RO	0x03 0x04	0	1		-	
7	0001H	N.A.	Outdoor Air Temperature	-40°C = Invalid	RO	0x03 0x04				1/10°C	Data=Temp*10
8	0002H	N.A.	Indoor Air Temperature	-40°C = Invalid	RO	0x03 0x04				1/10°C	Data=Temp*10
9	0003H	N.A.	Entering Water Temperature Tw-in	-40°C = Invalid	RO	0x03 0x04				1/10°C	Data=Temp*10
10	0004H	N.A.	Leaving Water Temperature T1	-40°C = Invalid	RO	0x03 0x04				1/10°C	Data=Temp*10
11	0005H	N.A.	Refrigerant Temperature T2B	-40°C = Invalid	RO	0x03 0x04				1/10°C	Data=Temp*10
13	000AH	N.A.	Discharge Temperature	-40°C = Invalid	RO	0x03 0x04				1/10°C	Data=Temp*10
14	000BH	N.A.	Air Exchanger Temperature T3	-40°C = Invalid	RO	0x03 0x04				1/10°C	Data=Temp*10
17	0017H	N.A.	Actual Compressor Frequency		RO	0x03 0x04				1/10 Hz	Data=Freq*10
18	0044H	N.A.	Frequency Reduction Mode - Night mode	0 = Frequency Reduction inactive 1 = Frequency Reduction active	RO	0x03 0x04	0	1	0	-	
20	0174H	N.A.	Compressor runtime		RO	0x03 0x04	0	65535		hours	
22	0176H	N.A.	Pump runtime		RO	0x03 0x04	0	65535		hours	
23	01A5H	01A5H	Occupied Heating Air Setpoint		RW	0x03 0x04 0x06 0x10	16°C	32°C	25°C	1/10°C	Data=Temp*10
24	01A6H	01A6H	Unoccupied Heating Air Setpoint offset		RW	0x03 0x04 0x06 0x10	-20 °C	0 °C	-4 °C	1/10 °C	Data=Temp*10
25	01A7H	01A7H	Economic Heating Air Setpoint offset		RW	0x03 0x04 0x06 0x10	-20 °C	0 °C	-2 °C	1/10 °C	Data=Temp*10
26	01A8H	01A8H	Occupied Cooling Air Setpoint		RW	0x03 0x04 0x06 0x10	16°C	32°C	25°C	1/10°C	Data=Temp*10
27	01A9H	01A9H	Unoccupied Cooling Air Setpoint offset		RW	0x03 0x04 0x06 0x10	0 °C	10 °C	4 °C	1/10 °C	Data=Temp*10
28	01AAH	01AAH	Economic Cooling Air Setpoint offset		RW	0x03 0x04 0x06 0x10	0 °C	10 °C	2 °C	1/10 °C	Data=Temp*10
29	0245H	0245H	Heating climatic curve selection	-1 = No Curve / Fixed Water Setpoint 0 = Custom Climatic Curve using Par.582 to Par.585 1 = Heating Climatic Curve #1 2 = Heating Climatic Curve #2 3 = Heating Climatic Curve #3 4 = Heating Climatic Curve #4 ... 12 = Heating Climatic Curve #12	RW	0x03 0x04 0x06 0x10	-1	12	-1	-	
30	0246H	0246H	Customized Heating Curve Min OAT		RW	0x03 0x04 0x06 0x10	-30°C	10°C		1/10°C	Data=Temp*10
31	0247H	0247H	Customized Heating Curve Max OAT		RW	0x03 0x04 0x06 0x10	10°C	30°C		1/10°C	Data=Temp*10
32	0248H	0248H	Customized Heating Curve Min LWT		RW	0x03 0x04 0x06 0x10	25°C	40°C		1/10°C	Data=Temp*10
33	0249H	0249H	Customized Heating Curve Max LWT		RW	0x03 0x04 0x06 0x10	30°C	60°C		1/10°C	Data=Temp*10

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No.	Address (reading)	Address (writing)	Spec.	Note	R/W	Function code	Min	Max	Default	Unit	Conversion
34	024AH	024AH	Cooling climatic curve selection	-1 = No Curve / Fixed Water Setpoint 0 = Custom Climatic Curve using Par.587 to Par.590 1 = Cooling Climatic Curve #1 2 = Cooling Climatic Curve #2		0x03 0x04 0x06 0x10					
35	024BH	024BH	Customized Cooling Curve Min OAT		RW	0x03 0x04 0x06 0x10	0°C	30°C		1/10°C	Data=Temp*10
36	024CH	024CH	Customized Cooling Curve Max OAT		RW	0x03 0x04 0x06 0x10	24°C	50°C		1/10°C	Data=Temp*10
37	024DH	024DH	Customized Cooling Curve Min LWT		RW	0x03 0x04 0x06 0x10	5°C	20°C		1/10°C	Data=Temp*10
38	024EH	024EH	Customized Cooling Curve Max LWT		RW	0x03 0x04 0x06 0x10	5°C	20°C		1/10°C	Data=Temp*10
39	019CH	019CH	Heating Climatic Curve Max Setpoint Offset		RW	0x03 0x04 0x06 0x10	-5 °C	5 °C	0 °C	1/10 °C	Data=Temp*10
40	019DH	019DH	Cooling Climatic Curve Min Setpoint Offset		RW	0x03 0x04 0x06 0x10	-5 °C	5 °C	0 °C	1/10 °C	Data=Temp*10
41	0191H	0191H	Occupied Heating Water Setpoint		RW	0x03 0x04 0x06 0x10	25°C	63°C		1/10°C	Data=Temp*10
42	0192H	0192H	Unoccupied Heating Water Setpoint offset		RW	0x03 0x04 0x06 0x10	-20 °C	0 °C	-4 °C	1/10 °C	Data=Temp*10
43	0193H	0193H	Economic Heating Water Setpoint offset		RW	0x03 0x04 0x06 0x10	-20 °C	0 °C	-2 °C	1/10 °C	Data=Temp*10
44	0197H	0197H	Occupied Cooling Water Setpoint		RW	0x03 0x04 0x06 0x10	5°C	25°C		1/10°C	Data=Temp*10
45	0198H	0198H	Unoccupied Cooling Water Setpoint offset		RW	0x03 0x04 0x06 0x10	0 °C	10 °C	4 °C	1/10 °C	Data=Temp*10
46	0199H	0199H	Economic Cooling Water Setpoint offset		RW	0x03 0x04 0x06 0x10	0 °C	10 °C	2 °C	1/10 °C	Data=Temp*10
47	0055H	N.A.	Pump Speed		RO	0x03 0x04	0	100		-	
48	0033H	0033H	Water Control Point		RW	0x03 0x04 0x06 0x10	5°C	63°C		1/10°C	Data=Temp*10
49	0206H	0206H	Night Mode start time		RW	0x03 0x04 0x06 0x10	00:00	23:59	00:00	hh:mm	Data=(hh*256)+mm
50	0207H	0207H	Night Mode end time		RW	0x03 0x04 0x06 0x10	00:00	23:59	00:00	hh:mm	Data=(hh*256)+mm
51	0259H	0259H	Backup Type	0-inner EH+DHW EH+gas boiler 1-inner EH+DHW EH 2-DHW EH+gas boiler 3-innecr EH+gas boiler 4-DHW EH 5-gas boiler 6-inner EH 7-no auxiliary heater note: inner EH include EH1, EH2, EH3 for main water loop	RW	0x03 0x04 0x06 0x10	0	7		-	
52	025AH	025AH	Warmup Time		RW	0x03 0x04 0x06 0x10	0	60		min	
53	025BH	025BH	Booster Delta Temperature		RW	0x03 0x04 0x06 0x10	1 °C	20 °C		1/10 °C	Data=Temp*10
54	025CH	025CH	Booster OAT Threshold		RW	0x03 0x04 0x06 0x10	-20°C	15°C		1/10°C	Data=Temp*10
55	0202H	0202H	Minimum OAT for Heating (with compr.)		RW	0x03 0x04 0x06 0x10	-26°C	10°C		1/10°C	Data=Temp*10
56	0194H	0194H	DHW Type Normal Setpoint		RW	0x03 0x04 0x06 0x10	40°C	63°C		1/10°C	Data=Temp*10
57	0196H	0196H	Economic DHW Setpoint		RW	0x03 0x04 0x06 0x10	40°C	63°C		1/10°C	Data=Temp*10
58	02BFH	02BFH	DHW Priority	0=Automatic 1=Priority to DHW	RW	0x03 0x04 0x06 0x10	0	1		-	
59	02C7H	02C7H	DHW Scheduled days (bitmap)	b7=Monday, b6=Tuesday, ...	RW	0x03 0x04 0x06 0x10	00000000	11111110		-	bitfield
60	02C8H	02C8H	DHW Scheduled Starting Time		RW	0x03 0x04 0x06 0x10	00:00	23:59	00:00	hh:mm	Data=(hh*256)+mm
61	02C9H	02C9H	DHW Scheduled Stopping Time		RW	0x03 0x04 0x06 0x10	00:00	23:59	00:00	hh:mm	Data=(hh*256)+mm
62	00C9H	N.A.	DHW Mode	0=Eco 1=Anti-Legionella 2=Regular	RO	0x03 0x04				-	
63	00CEH	N.A.	DHW Tank Temperature		RO	0x03 0x04				1/10°C	Data=Temp*10
64	0195H	0195H	DHW Anti-legionella Setpoint		RW	0x03 0x04 0x06 0x10	60°C	70°C	60°C	1/10°C	Data=Temp*10
65	02CAH	02CAH	Anti-legionella Scheduled days (bitmap)	b7=Monday, b6=Tuesday, ...	RW	0x03 0x04 0x06 0x10	00000000	11111110		-	bitfield
66	02CBH	02CBH	Anti-legionella Scheduled Starting Time		RW	0x03 0x04 0x06 0x10	00:00	23:59	00:00	hh:mm	Data=(hh*256)+mm

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No.	Address (reading)	Address (writing)	Spec.	Note	R/W	Function code	Min	Max	Default	Unit	Conversion
67	01F6H	01F6H	Discrete Input #5 Type	0=disabled, 1=Power limitation(night mode), 2=Loadshed, 4=DHW Request, 5=DHW priority, 3 Anti-legionella request	RW	0x03 0x04 0x06 0x10	0	5	0	-	
68	01F7H	01F7H	Discrete Input #6 Type		RW	0x03 0x04 0x06 0x10					
69	01F8H	01F8H	Discrete Input #7 Type		RW	0x03 0x04 0x06 0x10					
70	01F9H	01F9H	Discrete Input #8 Type		RW	0x03 0x04 0x06 0x10					
71	01F4H	01F4H	Discrete Output #5 Type	0=disabled, 1==unit in alarm, 2=unit in standby, 3=unit running, 4=unit in cool mode, 5=unit in heat mode, 6=unit in DHW, 7=unit in defrost, 8= unit control by modbus	RW	0x03 0x04 0x06 0x10	0	8	0	-	
72	01FAH	01FAH	Discrete Output #8 Type		RW	0x03 0x04 0x06 0x10					
73	01FBH	01FBH	Discrete Output #9 Type		RW	0x03 0x04 0x06 0x10					
74	0069H	N.A.	Flow Switch Status	0=Opened, 1=Closed	RO	0x03 0x04	0	1		-	
75	006AH	N.A.	Discrete Input #5 Status	0=Opened, 1=Closed	RO	0x03 0x04	0	1		-	
76	006BH	N.A.	Discrete Input #6 Status	0=Opened, 1=Closed	RO	0x03 0x04	0	1		-	
77	006CH	N.A.	Discrete Input #7 Status	0=Opened, 1=Closed	RO	0x03 0x04	0	1		-	
78	006DH	N.A.	Discrete Input #8 Status	0=Opened, 1=Closed	RO	0x03 0x04	0	1		-	
79	0140H	0140H	Discrete Output #5 Force	0=Off, 1=On	RW	0x03 0x04 0x06 0x10	0	1		-	
80	0151H	0151H	Discrete Output #8 Force	0=Off, 1=On	RW	0x03 0x04 0x06 0x10	0	1		-	
81	0152H	0152H	Discrete Output #9 Force	0=Off, 1=On	RW	0x03 0x04 0x06 0x10	0	1		-	
83	00D2H	N.A.	DHW Valve status	0=Off, 1=On	RO	0x03 0x04	0	1		-	
107	1001H	N.A.	IDU side capacity demand		RO	0x03 0x04					
108	1002H	N.A.	Capacity demand after ODU rectify		RO	0x03 0x04					
109	1004H	N.A.	Actual capacity output		RO	0x03 0x04					
110	1005H	N.A.	Fan speed	0-8	RO	0x03 0x04	0	8		-	
111	1008H	N.A.	LWT after BPHE inside unit (Tw-out)		RO	0x03 0x04				1/10°C	Data=Temp*10
112	1012H	N.A.	EXV opening degree	Actual value=Display value *4	RO	0x03 0x04					
113	1013H	N.A.	IPM refrigerant cool pipe temp.		RO	0x03 0x04				1/10°C	Data=Temp*10
114	1014H	N.A.	AC current	Actual value=Display value *2	RO	0x03 0x04					
115	1015H	N.A.	DC current	Actual value=Display value *4	RO	0x03 0x04					
116	1016H	N.A.	AC voltage	Actual value=Display value	RO	0x03 0x04					
117	1017H	N.A.	DC voltage	Actual value=Display value /2	RO	0x03 0x04					
118	1019H	N.A.	Compressor frequency limitation reason 1	0-non; 1-T3B limitation(ODU coil T); 2-T4 limitation; 4-T5 limitation; 8-Voltage limitation; 16-Current limitation; 32-T9 limitation; 64-Night mode limitation; 128-LWT limitation (if many reason occur at the same time, value=sum of all occur reason)	RO	0x03 0x04				-	
124	1025H	N.A.	Compressor frequency Limitation reason 2	0-non; 1-LWT&EWT tolerance limitation , 2-Heating SH3 limitation; 4-T4 lowest frequency limitation ; 8-Cooling T2B limitation	RO	0x03 0x04	0	1		-	
119	1020H	N.A.	Program version		RO	0x03 0x04				-	
120	1021H	N.A.	EEPROM version		RO	0x03 0x04				-	
121	1022H	N.A.	P6 error reason (IPM protection reason)	0x0A-IPM error;0x01-DC voltage too low protection; 0x02-DC voltage too high protection;0x04-MCE error/Synchronization/closed-loop; 0x05-Compressor speed fault; 0x07: Phase error; 0x08-Compressor speed changing fault; 0x09-Compressor speed uncorrect	RO	0x03 0x04				-	
122	1023H	N.A.	T9 IPM temp.		RO	0x03 0x04				1/10°C	Data=Temp*10
123	1024H	N.A.	T30 (Using for defrost logic		RO	0x03 0x04				1/10°C	Data=Temp*10

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No.	Address (reading)	Address (writing)	Spec.	Note	R/W	Function code	Min	Max	Default	Unit	Conversion
125	1026H	N.A.	Target discharged temp.		RO	0x03 0x04				1/10°C	Data=Temp*10
126	1027H	N.A.	ODU PCB CRCH	Hex	RO	0x03 0x04				-	
127	1028H	N.A.	ODU PCB CRCL	Hex	RO	0x03 0x04				-	
128	1029H	N.A.	IDU PCB CRCH	Hex	RO	0x03 0x04				-	
129	1030H	N.A.	IDU PCB CRCL	Hex	RO	0x03 0x04				-	
130	1031H	N.A.	Modbus baudrate		RO	0x03 0x04	9600	38400	9600	-	Data = Value / 100
131	1032H	N.A.	Modbus parity check	0: non 1: odd parity check 2: even parity check	RO	0x03 0x04	0	2		-	
132	1033H	N.A.	Modbus ID	ID: 1~255	RO	0x03 0x04	1	255	11	-	
133	1009H	N.A.	Alarm Bitmap #1	bit 0 = Alarm index 1 (water flow switch fail) bit 1 = Alarm index 2 (comm. fail between ODU and hydraulic side PCB) bit 2 = Alarm index 3 (LWT sensor after EH is fail) bit 3 = Alarm index 4 (refrigerant sensor of BPHE outlet fail--reserved) bit 4 = Alarm index 5 (refrigerant sensor of BPHE inlet fail--reserved) bit 5 = Alarm index 6 (ODU fail) bit 6 = Alarm index 7 (DHW tank sensor fail) bit 7 = Alarm index 8 (EWT of BPHE fail) bit 8 = Alarm index 9 (LWT of BPHE fail) bit 9 = Alarm index 10 (comm. fail between wired controller and PCB--reserved) bit 10 = Alarm index 11 (Bi-zone sensor fail--when Bi-zone function is valid) bit 11 = Alarm index 12 (LWT sensor fail of auxiliary heat --When auxiliary is valid) bit 12 = Alarm index 13 (reserved) bit 13 = Alarm index 14 (reserved) bit 14 = Alarm index 15 (reserved) bit 15 = Alarm index 16 (reserved)	RO	0x03 0x04				bitfield	
134	100AH	N.A.	Alarm Bitmap #2	bit 0 = Alarm index 1 (reserved) bit 1 = Alarm index 2 (temp difference is too huge between ETW and LWT) bit 2 = Alarm index 3 (water flow rate shortage) bit 3 = Alarm index 4 (temp difference of WT and LWT abnormal) bit 4 = Alarm index 5 (reserved) bit 5 = Alarm index 6 (reserved) bit 6 = Alarm index 7 (EH FeedbackProtect) bit 7 = Alarm index 8 (reserved) bit 8 = Alarm index 9 (reserved) bit 9 = Alarm index 10 (reserved) bit 10 = Alarm index 11 (reserved) bit 11 = Alarm index 12 (reserved) bit 12 = Alarm index 13 (reserved) bit 13 = Alarm index 14 (reserved) bit 14 = Alarm index 15 (reserved) bit 15 = Alarm index 16 (reserved)	RO	0x03 0x04				bitfield	

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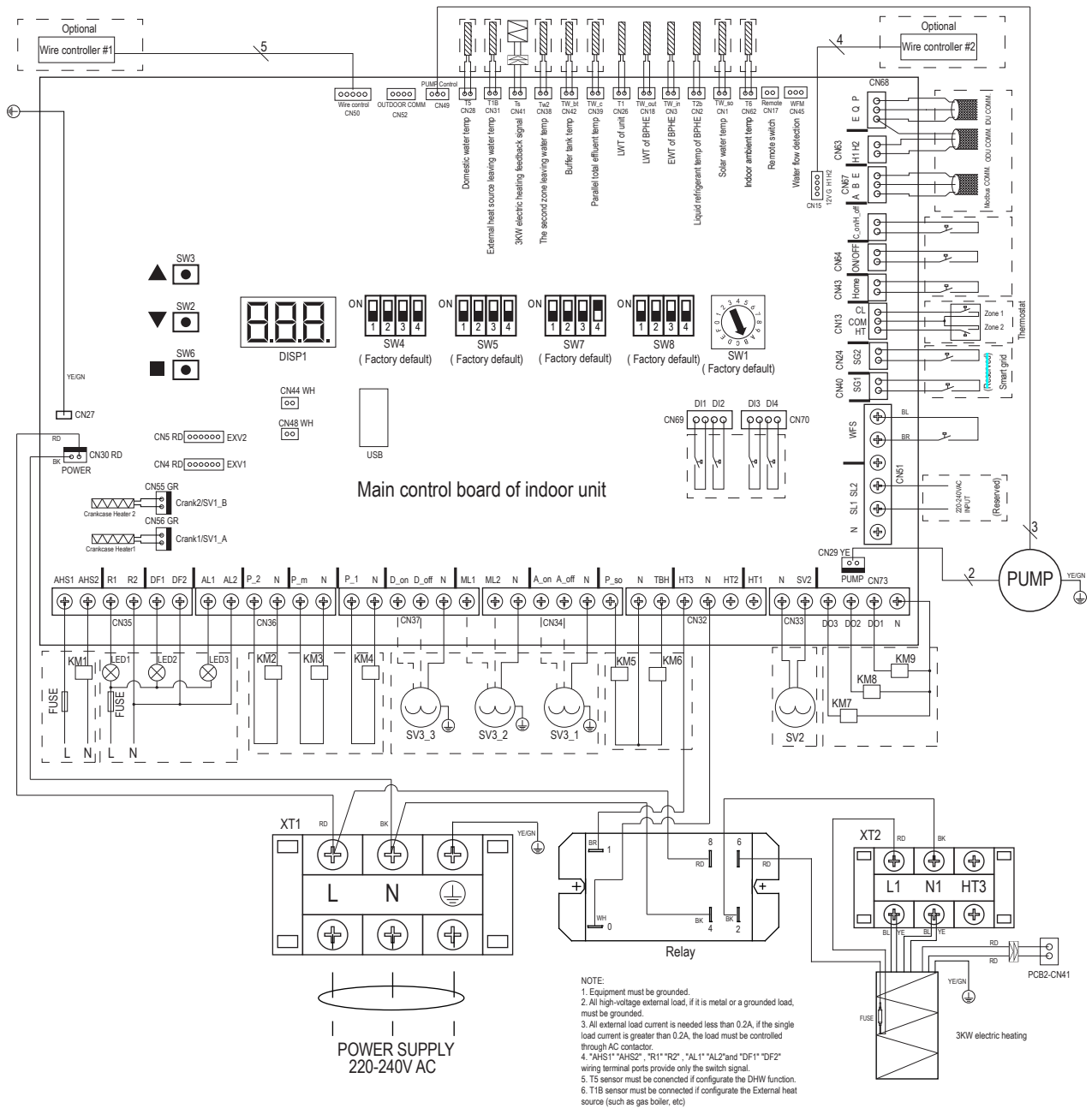
No.	Address (reading)	Address (writing)	Spec.	Note	R/W	Function code	Min	Max	Default	Unit	Conversion
135	100BH	N.A.	Alarm Bitmap #3	bit 0 = Alarm index 1 (condenser sensor fail) bit 1 = Alarm index 2 (discharged temp. sensor fail) bit 2 = Alarm index 3 (reserved) bit 3 = Alarm index 4 (high temp protection of BPHE outlet sensor for refrigerant) bit 4 = Alarm index 5 (P6 error 3 time in 30mins) bit 5 = Alarm index 6 (AC voltage abnormal) bit 6 = Alarm index 7 (OAT sensor fail) bit 7 = Alarm index 8 (over current protection) bit 8 = Alarm index 9 (IPM protection (P6)) bit 9 = Alarm index 10 (3 times high discharged temp protection in 100mins (H6)) bit 10 = Alarm index 11 (3 times IPM high temp. protection in 60mins (H12)) bit 11 = Alarm index 12 (EEPROM alarm (E10)) bit 12 = Alarm index 13 (High pressure protection (P1)) bit 13 = Alarm index 14 (3 time low pressure protection in 30mins (H5)) bit 14 = Alarm index 15 (2 times DC fan motor alarm in 10 mins (H9)) bit 15 = Alarm index 16 (condenser temp too high protection (P5))	RO	0x03 0x04				bitfield	
136	100CH	N.A.	Alarm Bitmap #4	bit 0 = Alarm index 1 (comm fail between IDU and ODU (E2) (reserved)) bit 1 = Alarm index 2 (ODU fan motor error (P9)) bit 2 = Alarm index 3 (IPM temp too high protection (Pb)) bit 3 = Alarm index 4 (IDU qty decrease--reserved (H7)) bit 4 = Alarm index 5 ((3 time s over current protection in 60mins (H10)) bit 5 = Alarm index 6 (discharged sensor fail (P4)) bit 6 = Alarm index 7 (refrigerant cool pipe sensor fail (Ec)) bit 7 = Alarm index 8 (low pressure protection (P2))	RO	0x03 0x04				bitfield	
139	1006H	N.A.	Capacity of the unit	4 = 4 KW 6 = 6 KW 8 = 8 KW 10 = 10 KW 12 = 12 KW 14 = 14 KW 16 = 16 KW	RO	0x03 0x04					
140	100DH	100DH	Ambient temp. control/water temp. control	0: Water temp. control; 1: Ambient temp. control	RW	0x03 0x04 0x06 0x10					
141	100EH	N.A.	ODU output status	bit0-AC fan motor H port output bit1-AC fan motor L port output bit2-Compressor heater port output bit3-Chassis heater port output bit4-Power PTC output bit5-SV1 output bit6-4-way valve output bit7-SV2 output	RO	0x03 0x04					

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No.	Address (reading)	Address (writing)	Spec.	Note	R/W	Function code	Min	Max	Default	Unit	Conversion
142	100FH	N.A.	Required compressor frequency	Frequency*10	RO	0x03 0x04				1/10 Hz	Data=Freq*10
143	101AH	N.A.	Required fan speed of upper motor	Fan speed/10	RO	0x03 0x04					RPM/10
144	101BH	N.A.	Required fan speed of down motor	Fan speed/10	RO	0x03 0x04					RPM/10
145	101CH	N.A.	Required opening degree of EXV	Opening degree/4	RO	0x03 0x04					P/4
146	101DH	N.A.	Actual fan speed of upper motor	Fan speed/10	RO	0x03 0x04					RPM/10
147	101EH	N.A.	Actual fan speed of down motor	Fan speed/10	RO	0x03 0x04					RPM/10
148	101FH	N.A.	Outdoor unit input status	bit0-LP low pressure switch bit1-HP high pressure switch	RO	0x03 0x04					
149	102AH	N.A.	Water flow feedback from water pump	water flow*100	RO	0x03 0x04					m3/h * 100
159	0239H	0239H	Water Delta T Setpoint	Out of range value is invalid	RW	0x03 0x04 0x06 0x10	35	00:00	50		
160	102CH	102CH	Zone 2 water setpoint in heating mode		RW	0x03 0x04 0x06 0x10					Data=Temp*10
161	102DH	102DH	Zone 2 water setpoint in cooling mode		RW	0x03 0x04 0x06 0x10					Data=Temp*10
162	102EH	102EH	Hot water setpoint in air temp. control		RW	0x03 0x04 0x06 0x10					Data=Temp*10
163	102FH	102FH	Cold water setpoint in air temp. control		RW	0x03 0x04 0x06 0x10					Data=Temp*10
164	1034H	1034H	Water temp. setting for switching on SV2 in cooling mode		RW	0x03 0x04 0x06 0x10					Data=Temp*10
165	1100H	N.A.	EXV opening degree of auxiliary loop (reserved)	Actual value=Display value *4	RO	0x03 0x04					
166	1035H	1035H	Zone 2 mixing valve hysteresis setting		RW	0x03 0x04 0x06 0x10					Data=Temp*10
167	1036H	1036H	Cascade control	0=Centralized control 1=parallel (Only the first unit can be set)	RW	0x03 0x04 0x06 0x10	0	1	0		
168	1037H	1037H	Solar water function	0=disable 1=enable	RW	0x03 0x04 0x06 0x10	0	1	0		
169	1038H	1038H	Solar water configuration	0=Buffer water tank 1=DHW water tank	RW	0x03 0x04 0x06 0x10	0	1	0		
170	1039H	1039H	SG Ready	0=disable 1=enable	RW	0x03 0x04 0x06 0x10	0	1	0		
171	103AH	103AH	Temp. difference of heat pump does not work in solar water function		RW	0x03 0x04 0x06 0x10					Data=Temp*10
172	103BH	103BH	Capacity output ratio of states 2 in SG Ready		RW	0x03 0x04 0x06 0x10	0	100	100		
173	103CH	103CH	Max. output ratio		RW	0x03 0x04 0x06 0x10	0	100	100		
174	103DH	N.A.	Zone 2 EWT, Tw_2		RO	0x03 0x04					Data=Temp*10
175	103EH	N.A.	LWT of boiler, T1B		RO	0x03 0x04					Data=Temp*10
176	103FH	N.A.	Solar water temperature, T2		RO	0x03 0x04					Data=Temp*10
177	1040H	N.A.	Buffer tank temp, TW_bt		RO	0x03 0x04					Data=Temp*10
178	1041H	N.A.	Total leaving water temp., TW_c		RO	0x03 0x04					Data=Temp*10
179	1042H	N.A.	Input state of SG Ready port	0=state2 1=state4 2=state3 3=state1 0=1 zone	RO	0x03 0x04	0	3			
180	1043H	1043H	2-zone setting	1=Only heating with 2 zones 2=Cooling&heating with 2 zones	RW	0x03 0x04 0x06 0x10	0	2			

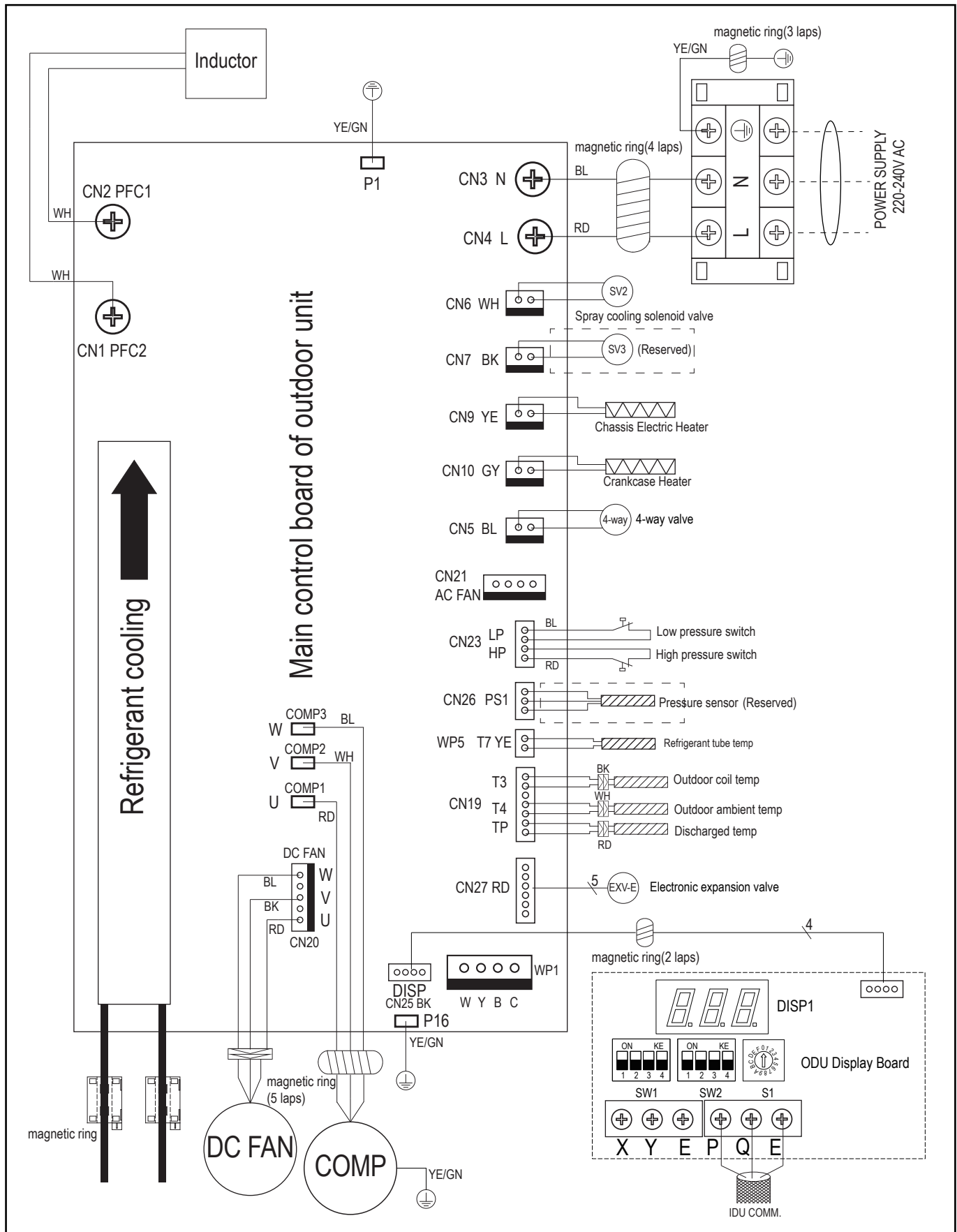
6 - ANNEX (ELECTRICAL WIRING DIAGRAM)

6.2 - Indoor unit 6-10kW, single phase (For reference only , please refer to the wiring diagram on the unit)



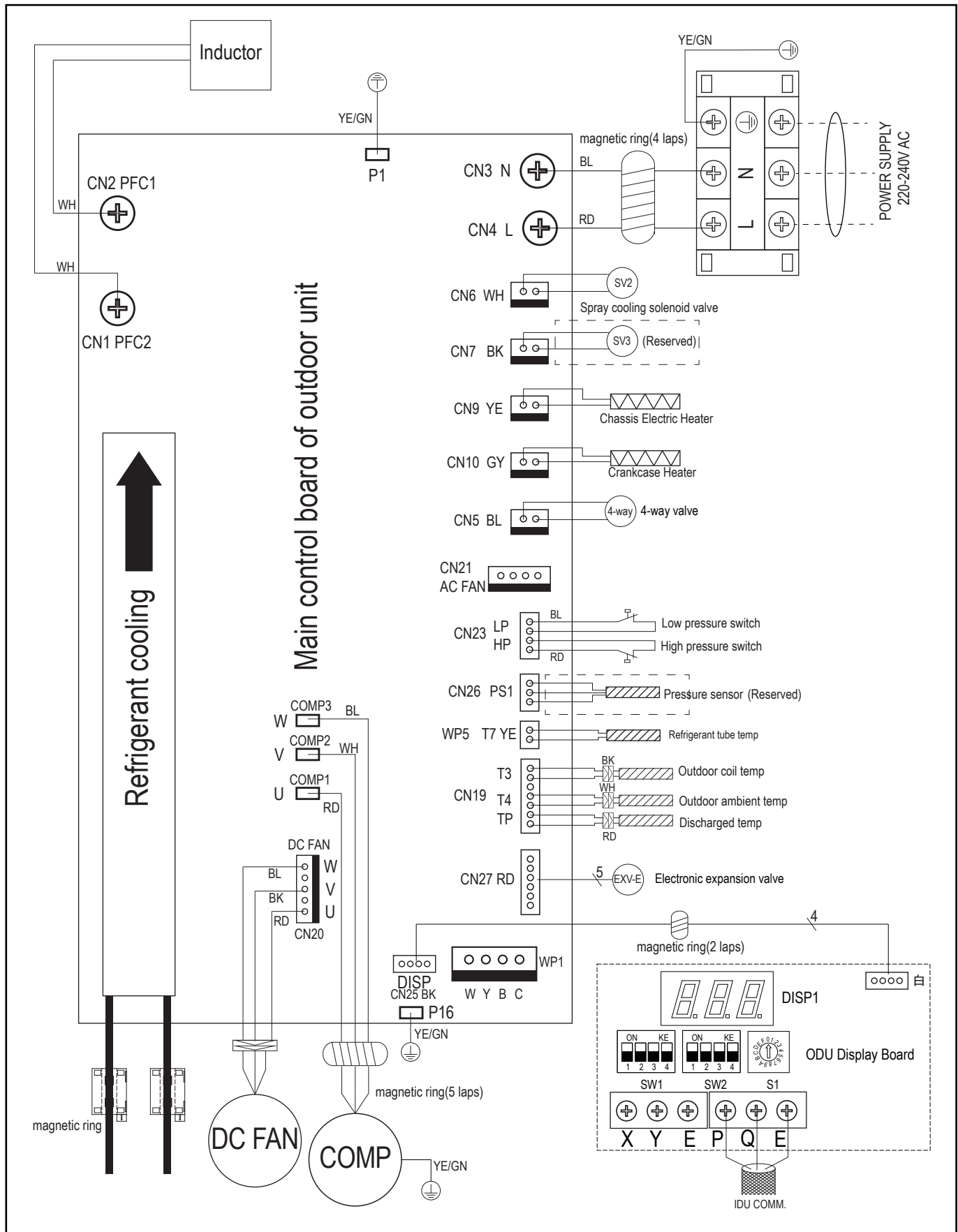
6 - ANNEX (ELECTRICAL WIRING DIAGRAM)

6.3 - Outdoor unit 4-6kW, single phase (For reference only , please refer to the wiring diagram on the unit)



6 - ANNEX (ELECTRICAL WIRING DIAGRAM)

6.4 - Outdoor unit 8-10kW, single phase (For reference only , please refer to the wiring diagram on the unit)



6.5 - Outdoor unit 12-16kW, three phase (For reference only , please refer to the wiring diagram on the unit)



6 - ANNEX

6.6 - Table for backup heaters and craft heaters

Configuration		Main water loop EHS	DHW EHS	Gas boiler	Anti-frozen craft heaters	Base-pan craft heater	Compressor craft heater
Back up function	0- Main water loop EHS + DHW EHS + boiler	✓	✓	✓	⊗	⊗	⊗
	1- Main water loop EHS + DHW EHS	✓	✓	✗	⊗	⊗	⊗
	2- DHW EHS + boiler	✗	✓	✓	⊗	⊗	⊗
	3- Main water loop EHS + boiler	✓	✗	✓	⊗	⊗	⊗
	4- DHW EHS only	✗	✓	✗	⊗	⊗	⊗
	5- Boiler only	✗	✗	✓	⊗	⊗	⊗
	6- Main water loop EHS only	✓	✗	✗	⊗	⊗	⊗
	7- Non back up	✗	✗	✗	⊗	⊗	⊗

NOTE:

Main water loop EHS: 3kw as standard in unit, can connect another two EHS in field

DHW EHS: can connect two EHS in field

Gas boiler: can connect to gas boiler and send the 220V start signal from unit

Anti-frozen craft heaters(2sets, 35W/25W): only for anti-frozen function

Base-pan craft heater(4-10kw: 150W; 12-16kw: 120W): Only for heating mode at low OAT

Compressor craft heater (35W): only for compressor pre-heat function

⊗: mean will be on while anti-frozen function is active

⊗: mean will be on while in heating mode at low OAT

⊗: mean will be on while to pre-heat the compressor and oil

✓: means will be on according to control logic

✗: mean will be off always in any case

7 - START-UP CHECKLIST FOR ATW HEAT PUMPS (USE FOR JOB FILE)

7.1 -General information

General information	
Job name	
Location	
Installing contractor	
Distributor	
Start-up performed by	Date
Equipment	
Unit type	
Serial number	
Software version	
Compressor	Model number
	Serial number
Air handling equipment	
	Manufacturer
	Model number
	Serial number

7.2 - Available options and accessories

Options	Yes	No	Accessories	Yes	No
Floor heating thermal cut off			Master / Slave sensor		
Backup heater			Domestic hot water management sensor		
Hydraulic module equipped with variable speed single pump low available pressure without expansion tank			Remote human interface		
Water filling system			Additional outdoor ambient temperature sensor		

7.3 - Checks before start of unit

	Yes	No	Comment
CHECKS BEFORE START-UP			Is there any shipping damage?
			Unit is level in its installation
			Power supply agrees with the unit name plate
			Electrical circuit wiring has been sized and installed properly
			Unit ground wire has been connected
			Unit neutral wire has been connected
			All terminals are tight
			All cables and thermistors have been inspected for crossed wires
			All plug assemblies are tight
			All air handlers are operating
			All water valves are open
			All fluid piping is connected properly
			All air has been vented from the system
			Water pump is operating with the correct rotation
			Water pump control has been properly interlocked with the heat pump
			Unit has been leak checked(including fittings):Locat, repair, and report any refrigerant leak
			All incoming power voltage is within rated voltage range

7 - START-UP CHECKLIST FOR ATW HEAT PUMPS (USE FOR JOB FILE)

7.4 - Checks during operation of unit

Date / Hour								
CHECKS DURING OPERATION	Air	Outdoor Air Temp		°C				
		Entering Water Temp		°C				
	Water	Leaving Water Temp		°C				
		Water Control Temp		°C				
	Suction	Suction Temperature		°C				
	Discharge	Discharge Temperature		°C				
		Refrigerant Temperature		°C				
	Compressor	Requested Compressor Frequency						
		Actual Compressor Frequency						
	Water control	Water Control Point		°C				
		Flow Switch Status						
		Safety Switch Status						
	Water pressure / flow rate	Entering water heat exchanger pressure	-	kPa				
		Leaving water heat exchanger pressure	-	kPa				
		Pressure drop (without internal pump)	-	kPa				
		Flow rate from curves (without internal pump)	-	l/s				
		Or available external pressure (with internal pump)	-	kPa				
		Flow rate from curves (with internal pump)	-	l/s				
	Power	Network Voltage	-	V				
		Input Amperage	-	A				

7.5 - Maintenance checks

Date / Hour								
MAINTENANCE CHECKS	Control	Mechanical check						
		Leakage check						
		Relief valve check						
		Electrical connection check						
	Freeze protection	Water freeze protection check						
		Add glycol in water (%)						
	Cleaning	Coil cleaning						
		Water filter cleaning						

Comments:

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