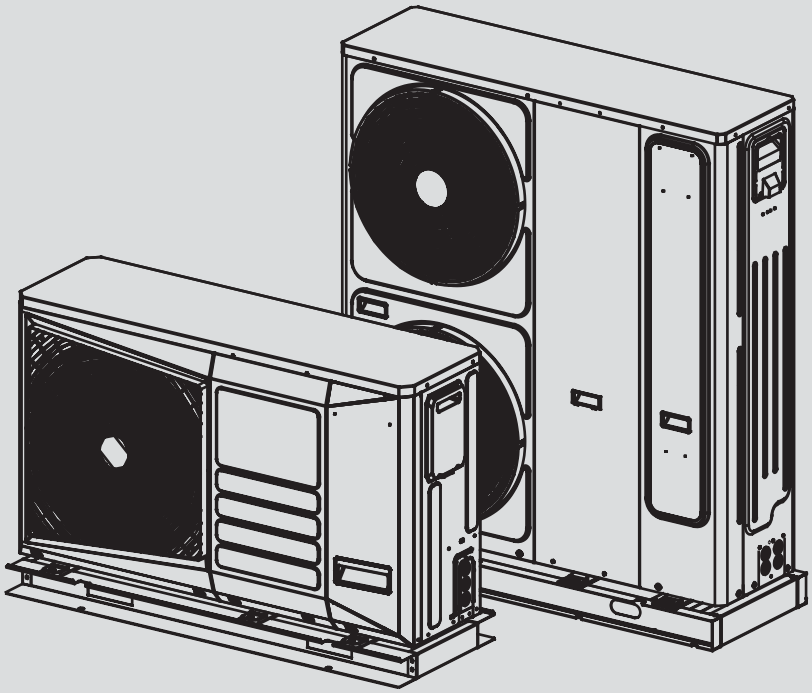
Carrier®

INSTALLATION, OPERATION AND
MAINTENANCE INSTRUCTIONS



R32 Air-to-water Monobloc

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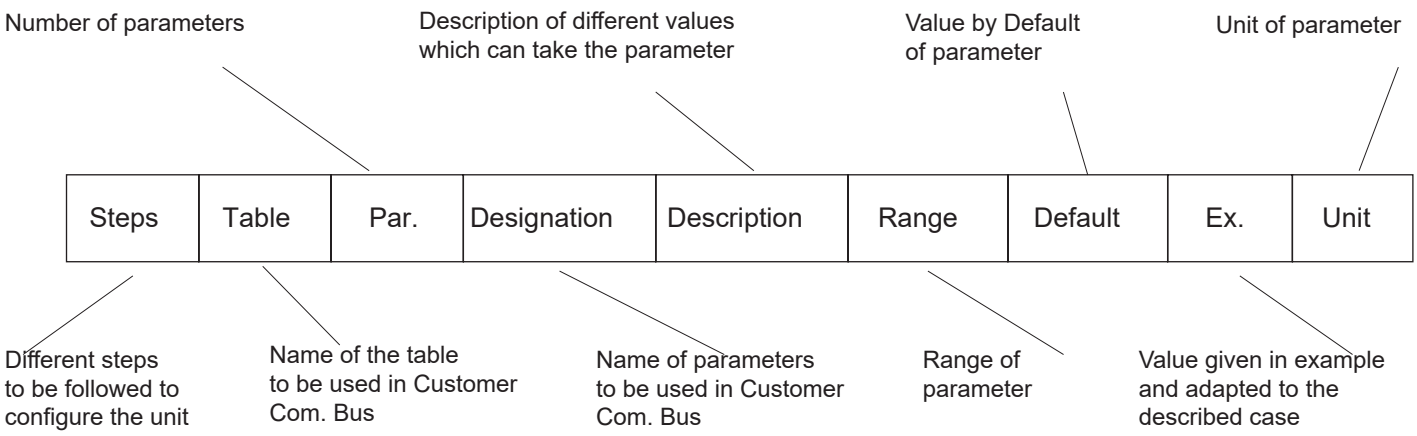
ABBREVIATIONS AND LEGENDS

Abbreviations	
IAT	Indoor Air Temperature
BPHE	Brazed Plate Heat Exchanger
DHW	Domestic Hot Water
EH	Electric Heater
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
TR	Refrigerant Temperature
UFC	Underfloor Cooling
UFH	Underfloor Heating
Wired Controller	User Interface (Wall-mounted User Interface)

Control Configuration Legend

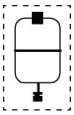
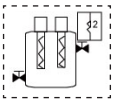


Possible to configure by direct access on wired controller. Refer to wired controller end user manual.

✓ Checks to be done

Advanced Configuration Level (for basic operation, no need to modify the settings)

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
Add EXP-T		Automatic Air vent	Field supplied Automatic air vent(s) on the highest position in the loop
-		Additional expansion tank	Field supplied Additional expansion tank depending on the total water in the loop content - taking into account the expansion tank (XXL) embedded in hydraulic module
-		Boiler	Boiler used to boost or back up the heat pump for comfort
Eh1 & EH2		Electrical Heater	Electrical heaters Used to boost or back up the heat pump for comfort
EH3		DHW-Electrical Heater Backup (1 stage)	Domestic Hot Water Electrical Heater - one stage used to backup DHW (when conditions 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 supplied: it is used to lower vibrations transmissions if necessary
HTSS		High Temperature Safety Switch	Field supplied: use to stop the 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

English

Precautions for Using R32 Refrigerant

Pay careful attention to the following points:

Warning

- 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 near heat sources, open flames, operating gas appliances 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, as required by national regulations to ensure their smooth 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 certified operating personnel are trained on 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 requirements of trained and certified personnel are indicated below:
  a) Knowledge of legislation, regulations and standards related 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 the requirements in the national legislation, regulations and standards;
  d) Undergo regular and advanced 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 tested for tightness. The testing 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 should 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 regulations. Notify relevant authorities in accordance with all applicable regulations.
- Must ensure mechanical connections be accessible for maintenance.
- In cases that require mechanical ventilation, ventilation openings shall be kept clear of obstructions.
- When disposing the product, do follow the precautions in #12 and comply with national regulations.
- Always contact local municipal offices for proper handling.

2. Servicing

1) Service personnel

- Any qualified person who is involved in 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.

Precaution for Using R32 Refrigerant

- Servicing shall be performed only as recommended by the manufacturer.
- The system is inspected, regularly supervised and maintained by a trained and certified service personnel who is employed by the user or party responsible.
- Ensure refrigerant charge does not leak.

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 repairing the refrigerating system, the precautions in #2-2 to #2-8 must be followed before beginning work.
- Work shall be undertaken under a controlled procedure 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 you are away from source, at least 2 meters 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, immediately ventilate area and stay upwind and away from spill/release.
- In case of leakage/spillage, do notify persons downwind of the leakage/spillage, isolate immediate hazardous 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 sur+eyed 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.

Precaution for Using R32 Refrigerant

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 thereinafter.

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 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 specifica- tion, 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 silicone sealant may inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated before 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 living in the presence of flammable atmosphere.
- The test apparatus shall be at the correct rating.
- Replace components only with parts specified by the manufacturer. Unspecified parts by the manufacturer may result in ignition of refrigerant in the atmosphere from a leak.

5. Cabling

- Check if cabling will not be subject to wear and tear, 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 circumstance shall potential sources of ignition be used in the search 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 while 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 (>1.04MPa, 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 require recalibration (Detection equipment shall be calibrated in a refrigerant-free area).

Precaution for Using R32 Refrigerant

- 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 should be removed/extinguished.
- If leakage of refrigerant is found which requires brazing, all of the refrigerants 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

- Conventional procedures must be followed when breaking into the refrigerant circuit to make repairs or for any other reason.However, it is important that best practice is followed since flammability is a consideration.

The following procedure shall be adhered to:

- removing the refrigerant -> purging the circuit with an inert gas-> evacuate -> purge again with inert gas
- open the circuit by cutting or brazing.
- The refrigerant charge must be recovered into the proper recovery vessel.
- 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.
- To flush the system, break the vacuum with OFN and continue to fill until the working pressure is reached, then vent to atmosphere, and finally pull down to a vacuum.
- This process must be repeated until no refrigerant remains in 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 that there is ventilation available.

9. Procedures for Charging

- 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.
  - Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
  - Label the system when charging is complete (if not already).
  - Extreme care shall be taken not to overfill the refrigeration system.
- Prior to recharging the system, it shall be pressure tested with OFN (refer to #7).
- The system shall be leak tested after charging but before use .
- A follow up leak test shall be carried out prior to leaving the site.
- An electrostatic charge may accumulate and create a hazardous condition when charging and discharging the refrigerant. To avoid a 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 as 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; and
- recovery equipment and cylinders conform to the appropriate standards.

d) If possible, pump down the refrigerant system.

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 the cylinder is situated on the scales before recovery takes place.

g) Start the recovery machine and operate it in accordance with the manufacturer's instructions.

h) Do not overfill cylinders. (No more than 80% liquid charge volume).

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

j) When the cylinders have been filled correctly and the process is completed, make sure that the cylinders and the equipment are removed from the site promptly and all isolation valves on the equipment are closed off.

k) Recovered refrigerant must be cleaned and tested before being charged into another refrigeration system.

- Electrostatic charge may accumulate and create a hazardous condition when charging or discharging the refrigerant. To avoid a 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 that it 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 must be complete with a working pressure relief valve & any 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 the 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 shall be 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 flamma- ble refrigerant does not remain within the lubricant.
- The evacuation process shall be carried out prior to returning the compressor to the suppliers.
- To accelerate this process, only electric heating to the compressor body shall be used.
- 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 the technical data for the installa- tion.

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 prevents 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 must 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 the 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.

English

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, which is supplied with the products.

The units are intended to be stored and operated 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.
- Follow the ISO guidance in the absence of regulation or in addition to the regulations..
- 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.
- Regularly check for the 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 with 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 - Safety considerations for Maintenance

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 in 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.

1-INTRODUCTION

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 the 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 accessing 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 of hot temperature inside the unit, which can exist after the operation of the 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 of any obvious leaks. 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.

1-INTRODUCTION

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
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 charged to the customer..
7. Periodic leak tests have to be carried out by the customer or by third parties. The EU regulation sets 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 (CO2 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 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 parrent company, etc.

9. Contact your local dealer or installer if you have any questions.

Checks for Protection device:

- 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 the operation of protective devices
- Test protocols
- Recommissioning of the equipment.

For this type of test, consult service. 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 switchoff 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 them immediately. Regularly ensure 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 the penetration of atmospheric humidity and the resulting corrosion.

1.2.4 - Safety considerations for Repair

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 is repaired, 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 a service agent or similarly qualified person 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. Mixers of pressurised air or gases containing oxygen can be the cause of an explosion. Oxygen reacts violently with oil and grease. Use only 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 pressure. Verify the allowable maximum highand low-side test pressures by checking the instructions in this manual and the pressures given on the unit nameplate.

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

The accidental release 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. It can result in dangerous overpressure.

During refrigerant removal and storage operations follow applicable regulations. These regulations, permitting the conditioning and recovery of halogenated hydrocarbons under optimum quality conditions for the products and optimum safety conditions for people, property and the environ- ment 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 remain- ing 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 that pressure is at 0 kPa and 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 the 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 repairs or component replacements. Consult the list of replacement parts that correspond to the specification of the original equipment.

1-INTRODUCTION

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

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 the machine operation and can even lead to the destruction of the compressors. The compressors operate with R32 and are charged with asynthetic polyolester oil.

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

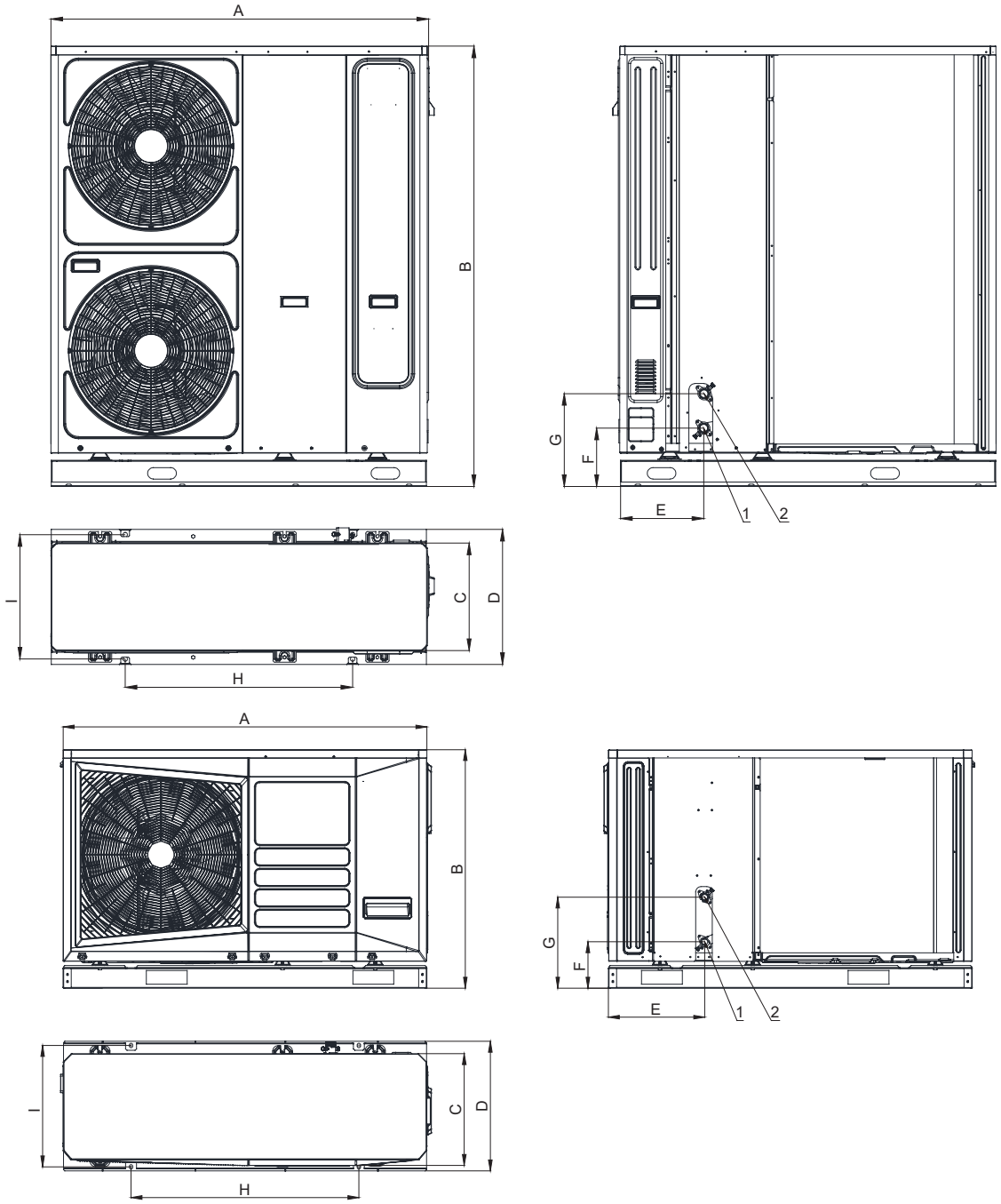
1.3 - Preliminary checks

Check the equipment received:

- Inspect the unit for damage or missing parts. If damage is detected, or if the shipment is incomplete, immediately file a claim with the shipping company.
- Confirm that the unit received is the one ordered. Compare the nameplate data with the order.
- The nameplate is attached to the unit in two locations:
  - on the outside on one of the unit sides
  - on the inside
- The unit name plate must include the following information:
  - Model number - size
  - CE marking
  - Serial number
  - Year of manufacture, pressure and leak tightness test date
  - Fluid being transported
  - Refrigerant used
  - Refrigerant charge per circuit
  - PS: Min./max. allowable pressure (on both higher and lower pressure side)
  - TS: Min./max. allowable temperature (on both higher and lower pressure side)
  - Unit leak test pressure
  - Voltage, frequency, phase count
  - Maximum input power
  - Net unit weight
- Confirm that all options ordered for on-site installation have been delivered, are complete and undamaged. The unit must be checked periodically, if necessary, by 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 §5. Maintenance.

1.4 – Dimensions and clearance units

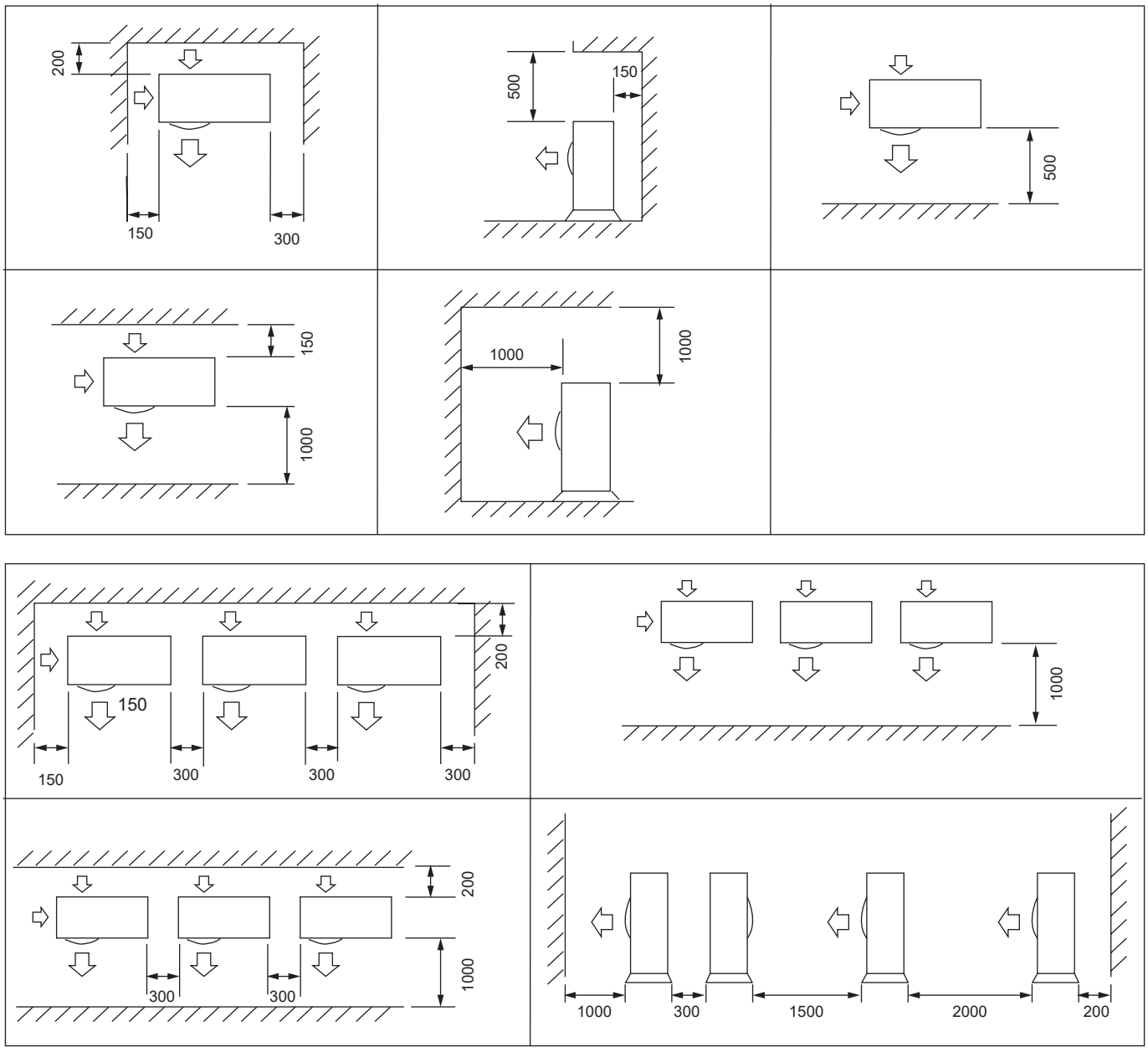
1.4.1 - Dimensions and location of hydraulic connections



Model	A	B	C	D	E	F	G	H	I	Weight(kg)
4-6_1Ph	1335	875	410	475	353	170	334	836	445	109
8_1Ph	1335	875	410	475	353	170	334	836	445	120
10_1Ph	1335	875	410	475	353	170	334	836	445	126
12_1Ph	1302	1517	370	465	289	201	332	784	428	165.5
14-16_1Ph	1302	1517	370	465	289	201	332	784	428	167.7
12_3Ph	1302	1517	370	465	289	201	332	784	428	180.9
14-16_3Ph	1302	1517	370	465	289	201	332	784	428	182.9

NOTE : Dimensions are given in mm

1.4.2 - The picture presents the minimal distance of the wall to ensure the correct airflow on the air heat exchanger (1).



1) Anticipate different maintenance actions before placing the unit (access of different parts /opening of panel/ part replacement…)

1.5 - Specification data and electrical data of units

1.5.1 - Specification data

Model			4	6	8	10	12	14	16
Heating performances	A+7°C; W30/35°C								
	Heating capacity	kW	4.00	6.00	8.00	10.00	12.00	14.00	16.00
	COP		4.80	4.50	4.75	4.50	4.80	4.70	4.65
	A+2°C; W30/35°C								
	Heating capacity	kW	4.00	5.70	7.80	10.00	12.00	13.70	14.50
	COP		3.50	3.25	3.40	3.35	3.40	3.40	3.30
	A-7°C; W30/35°C								
	Heating capacity	kW	4.00	6.00	8.00	9.00	12.00	12.50	13.50
	COP		2.85	2.74	2.70	2.70	2.85	2.80	2.70
	A+7°C; W40/45°C								
	Heating capacity	kW	4.00	6.00	8.00	10.00	12.00	14.00	16.00
	COP		3.50	3.45	3.60	3.50	3.55	3.55	3.50
	A+7°C; W47/55°C								
	Heating capacity	kW	4.00	5.80	7.70	9.50	11.50	12.00	13.50
	COP		2.59	2.70	2.85	2.68	2.85	2.75	2.70
	A+2°C; W47/55°C								
	Heating capacity	kW	4.00	6.00	8.00	9.50	11.00	12.00	13.50
	COP		2.20	2.12	2.30	2.25	2.45	2.40	2.35
	A-7°C; W47/55°C								
	Heating capacity	kW	3.50	5.00	7.00	8.00	10.00	10.50	11.50
	COP		1.76	1.74	1.95	1.91	2.05	2.00	1.95
	A+7°C; W35°C (ErP-average)								
	Prated		4.00	6.05	8.09	9.73	11.94	14.03	14.79
	SCOP		4.73	4.75	4.90	4.98	4.91	4.94	4.78
	ηs 30/35	%	186%	187%	193%	196%	193%	195%	188%
	Efficiency class 30/35		A+++	A+++	A+++	A+++	A+++	A+++	A+++
	A+7°C; W55°C (ErP-average)								
	Prated		4.01	5.59	7.61	9.09	11.96	11.99	13.06
	SCOP		3.22	3.25	3.36	3.41	3.39	3.42	3.36
	ηs 47/55	%	126%	127%	131%	134%	133%	134%	131%
	Efficiency class 47/55		A++	A++	A++	A++	A++	A++	A++
Cooling performances	A+35°C; W23/18°C								
	Cooling capacity	kW	4.00	5.50	7.00	9.00	11.00	13.50	14.50
	EER		3.85	4.00	4.40	4.00	4.00	3.90	3.80
	SEER		6.45	6.39	6.80	6.25	6.60	6.37	6.14
	ηs 23/18		255%	253%	270%	247%	261%	252%	243%
	A+35°C; W12/7°C								
	Cooling capacity	kW	4.00	5.00	6.50	8.00	10.50	12.00	14.00
	EER		2.85	2.75	2.90	3.00	2.75	2.70	2.65
	SEER		4.52	4.51	4.79	4.89	5.04	5.05	5.06
	ηs 23/18		178%	177%	189%	193%	199%	199%	199%

English

1.5 - Specification data and electrical data of units

1.5.1 - Specification data

Model			4-1Ph	6-1Ph	8-1Ph	10-1Ph	12-1Ph	14-1Ph	16-1Ph	12-3Ph	14-3Ph	16-3Ph
Sound levels	Standard unit											
	Sound power level (2)	dB(A)	61	64	65	66	69	69	70	69	69	70
	Sound pressure level (3)	dB(A)	50	53	54	55	56	56	58	56	56	58
Dimensions	Length	mm	1335	1335	1335	1335	1302	1302	1302	1302	1302	1302
	Width	mm	475	475	475	475	465	465	465	465	465	465
	Height	mm	875	875	875	875	1517	1517	1517	1517	1517	1517
Operating Weight (1)	Standard unit	kg	109	109	120	126	165.5	167.7	167.7	180.9	182.9	182.9
Compressors	Compressor type		DC Twin rotary									
	Compressor qty.		1									
Refrigerant	Type		R32									
	Charge (1)	kg	1	1.1	1.6	1.8	2.2	2.6	2.6	2.2	2.6	2.6
Condenser	Copper		Grooved copper tubes,									
	Fin type		Hydrophilic aluminum foil									
Fans	Fan type		Axial type									
	Fan quantity		1	1	1	1	2	2	2	2	2	2
	Rated total air flow	m3/h	3200	3600	4200	4200	7300	7300	7300	7300	7300	7300
	Rated speed	rpm	630	730	860	860	860	860	860	860	860	860
Evaporator	type		Brazed plate heat exchanger									
	Water volume	L	0.62	0.62	1.08	1.08	1.45	1.45	1.45	1.45	1.45	1.45
Hydraulic module			Circulator, relief valve, paddle flow switch, expansion tank									
	Circulator		Centrifugal pump (variable speed)									
	Expansion tank volume	L	5	5	5	5	5	5	5	5	5	5
	Max. water-side operating pressure with hydraulic module (4)	kPa	90	90	90	90	90	90	90	90	90	90
Water connections	Inlet diameter (MPT GAS)	inch	1	1	1	1	1.25	1.25	1.25	1.25	1.25	1.25
	Outlet diameter (MPT GAS)	inch	1	1	1	1	1.25	1.25	1.25	1.25	1.25	1.25

(1) Values are only guidelines . Refer to the unit's nameplate.

(2) Declared dual number noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-2dB(A)). Measured in accordance with ISO 9614-1.

(3) Declared dual number noise emission values in accordance with EN12102-1 (with an associated uncertainty of+/-2dB(A)). For information, calculate it from the sound power level Lw(A).

(4) Min. water-side operating pressure with variable speed hydraulic module is 40 kPa.

1.5.2 - Electrical data

Model name			4 (1 Ph)	6 (1 Ph)	8 (1 Ph)	10 (1Ph)	12 (1Ph)	14 (1 Ph)	16 (1 Ph)	12 (3Ph)	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-5%) (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)									

Note : The current is not included in the electric heater current, current of a standard electric heater is 13.6A.

(1) Power input, compressors and fans, at the unit's operating limits and a nominal voltage of 230V-1ph/ 400V-3ph (data given on the unit nameplate).

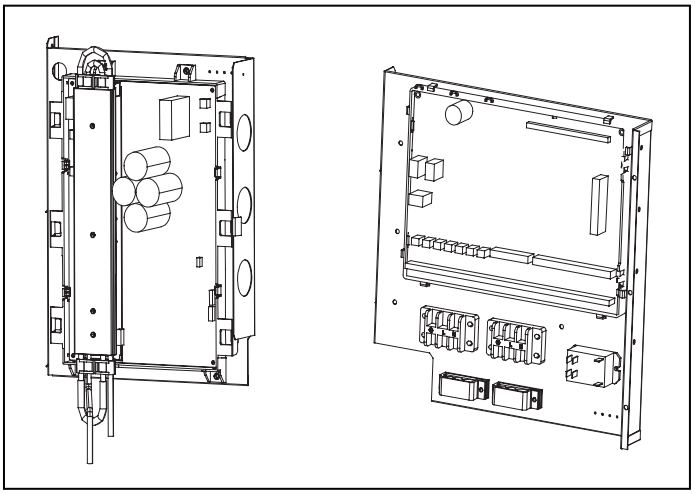
(2) Maximum unit operating current at maximum unit power input and at 207V-1ph/360V-3ph.

(3) Maximum unit operating current at maximum unit power input and at 220V-1ph/380V-3ph (values given on the unit nameplate).

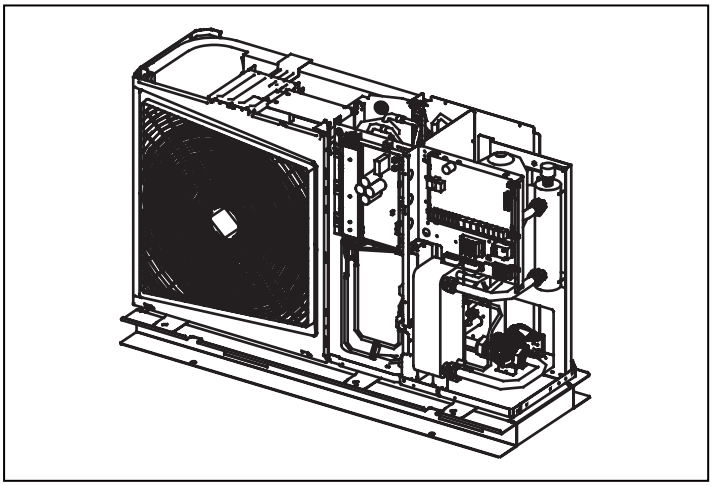
(4) Maximum instantaneous start-up current at operating limits (smallest compressor(s) maximum operating current + fan current + largest compressor locked rotor current).

1.5.3 - Inside view

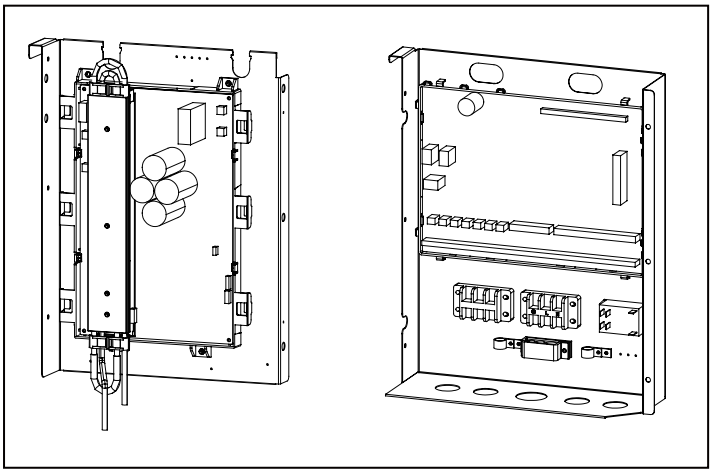
Electrical box



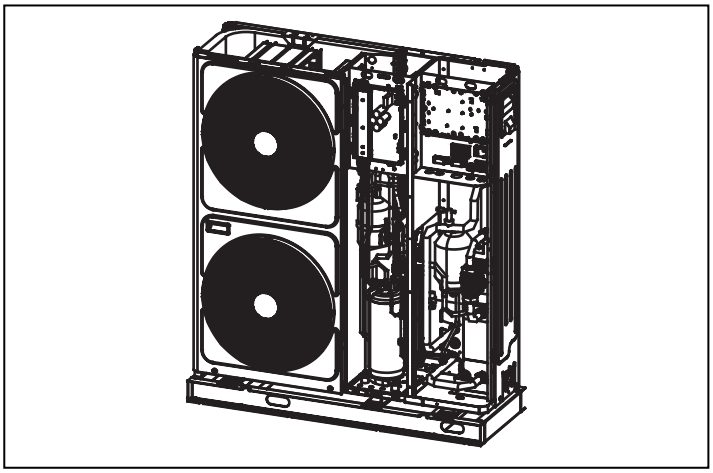
4-10 kW unit (1 Ph)



Electrical box



12-6kW unit (1 Ph&3 Ph)



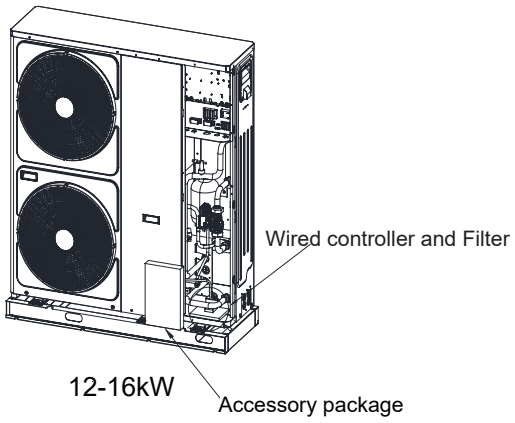
English

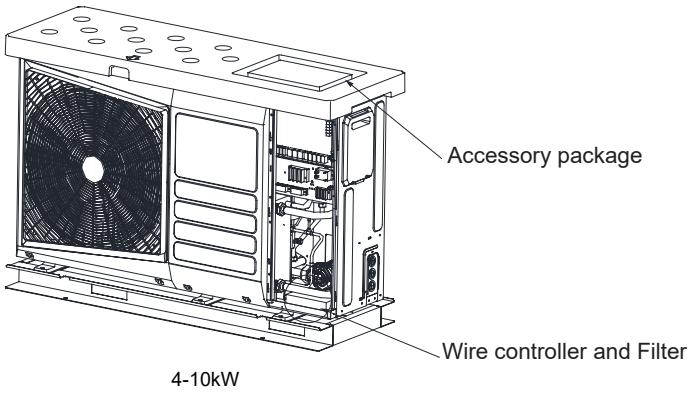
1.6 - OPTIONS AND ACCESSORIES

1.6.1 - 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 enables to manage the water setpoint inside the tank used for domestic hot water production	Useful for domestic hot water production	
wired controller	Remotely installed user interface	Remote heat pump control with a room temperature sensor is used to offset the water control point.It is possible to configure the unit on field.	
Additional outdoor ambient temperature sensor	Additional outdoor ambient temperature sensor	A better reading of the outdoor air temperature	
Connnection cable of wired controller	Use for connecting the wired controller		
Zone 2 Water Temperature Sensor	The sensor detects Zone 2 water temperature and manages to control the mixing valve.	Useful for zone 2 application	

1.6.2 - Location ofAccessory package





2 - INSTALLATION OF UNIT

2.1 - General

To install a unit the following steps are requested

1. Setup 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 - Moving and placing the unit

2.2.1 - Moving

See §1.2.1 Installation safety considerations.

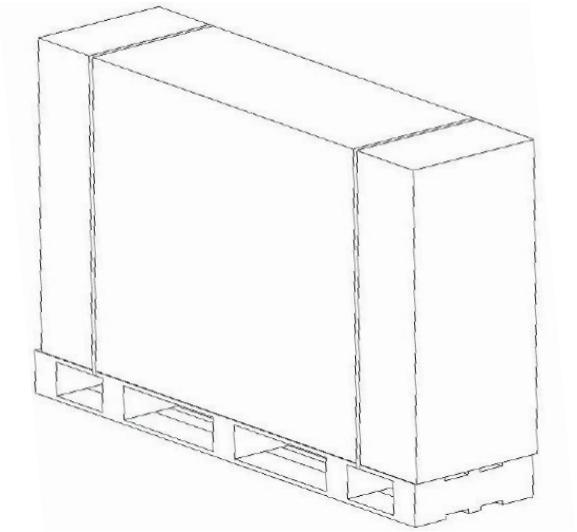


Figure 1: Transport configuration

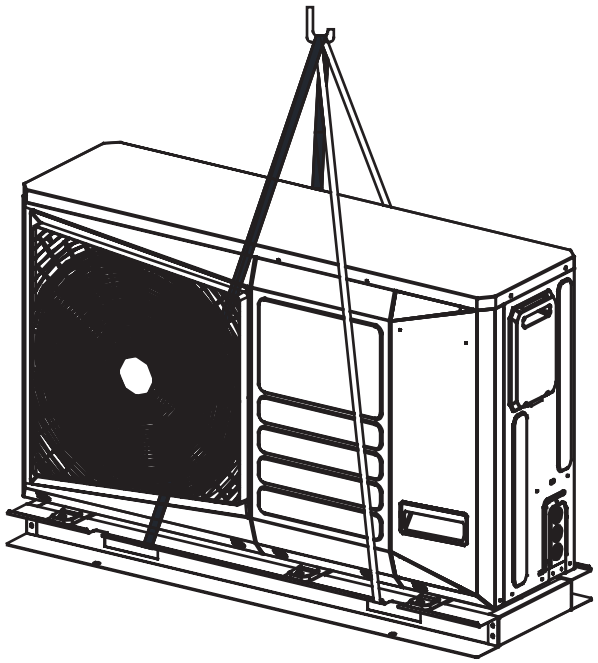


Figure 2: Offloading configuration

English

2.2.2 - Placing the unit

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

Always refer to § 1.4. 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 placing 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 at a level on an even surface (maximum tolerance is 5 mm on 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 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 from 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.
- The OAT sensor, located on the coil, should not be exposed to the sun or other heat sources.

2- INSTALLATION OF UNIT

CAUTION:

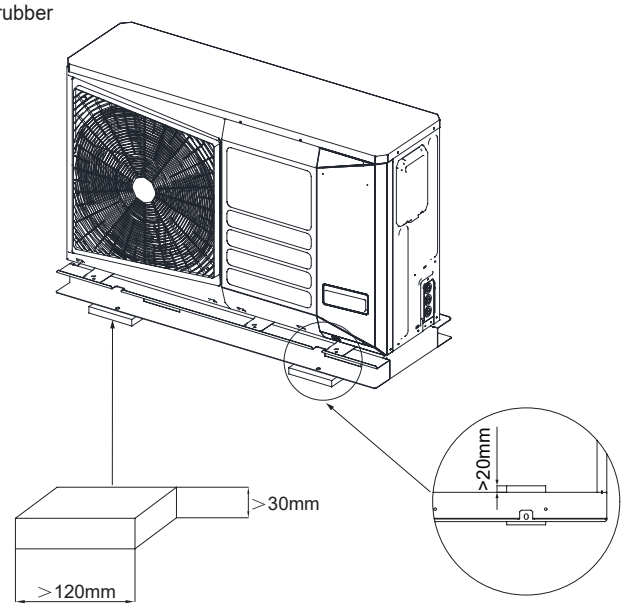
Before lifting the unit, check that all casing panels are securely fixed in place. Lift and set down the unit with great care. Tilting and jarring can damage the unit and impair its operation.

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.

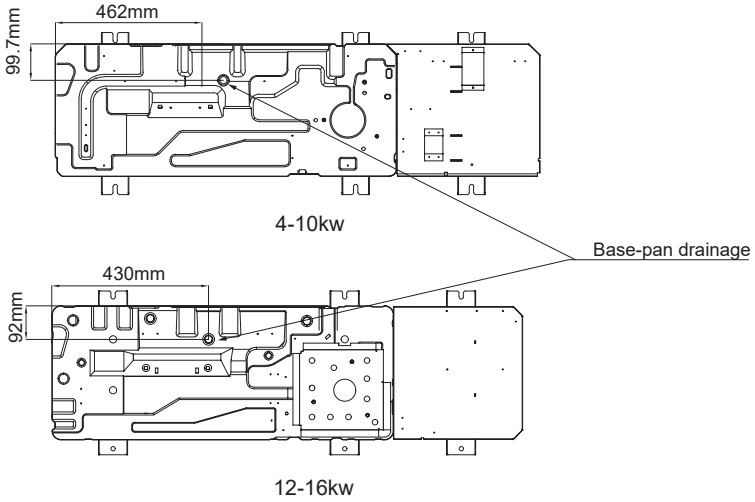
CAUTION: Installation of anti-vibration rubber



Dimenstion of rubber

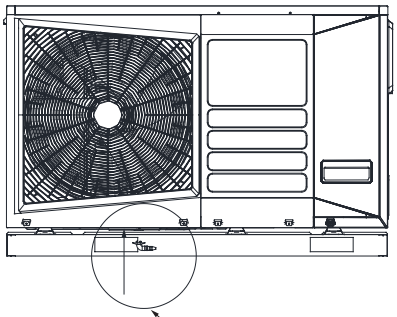
Location of rubber

CAUTION: Installation of base-pan water drainage joint

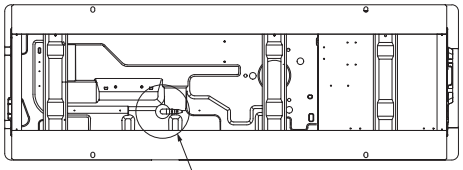


4-10kw

12-16kw



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



The position of drainage joint after inserting

2.2.3 - Removing the unit panel

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

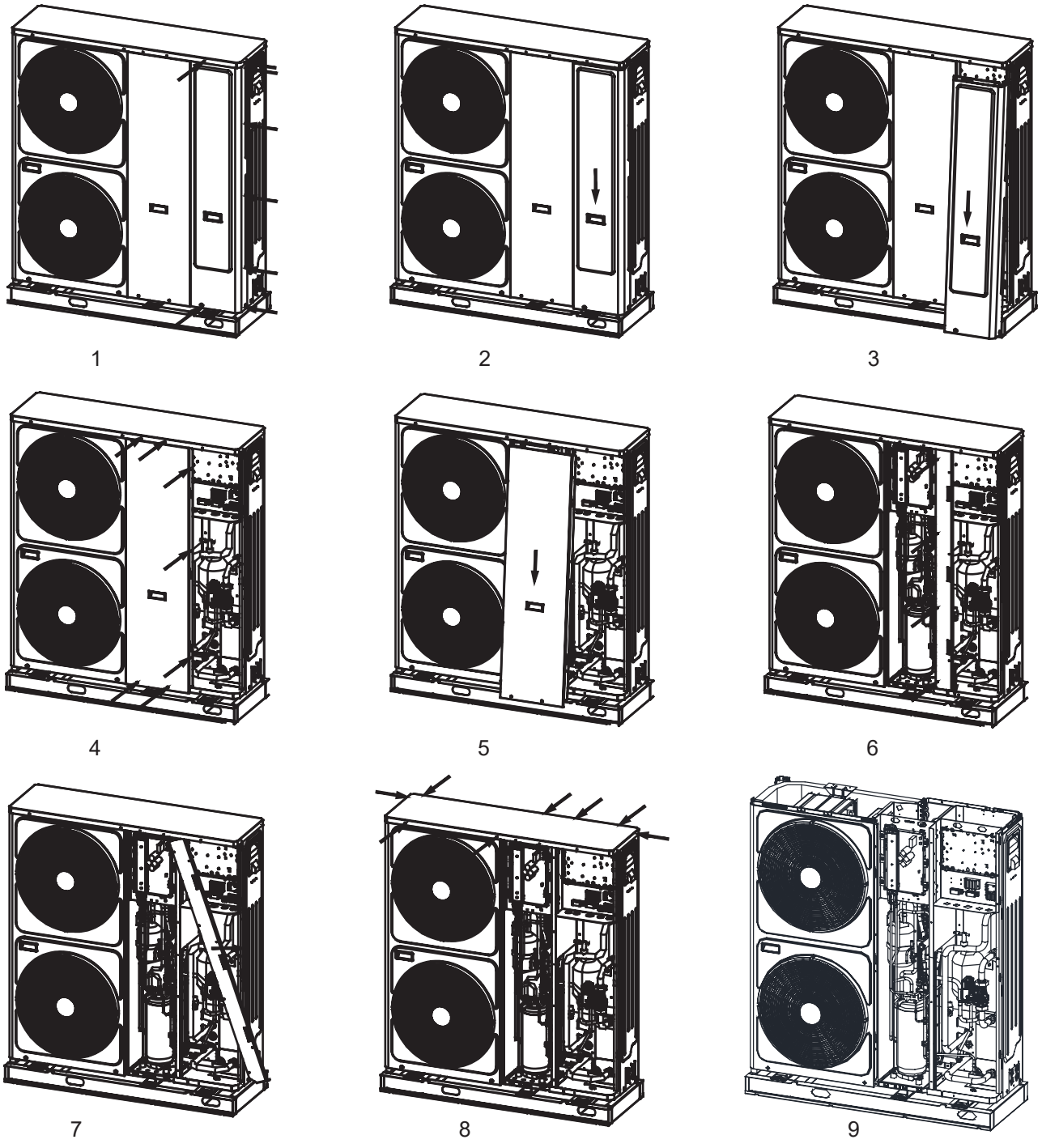


Figure 3 : How to remove front panel for 12 - 16 kW units

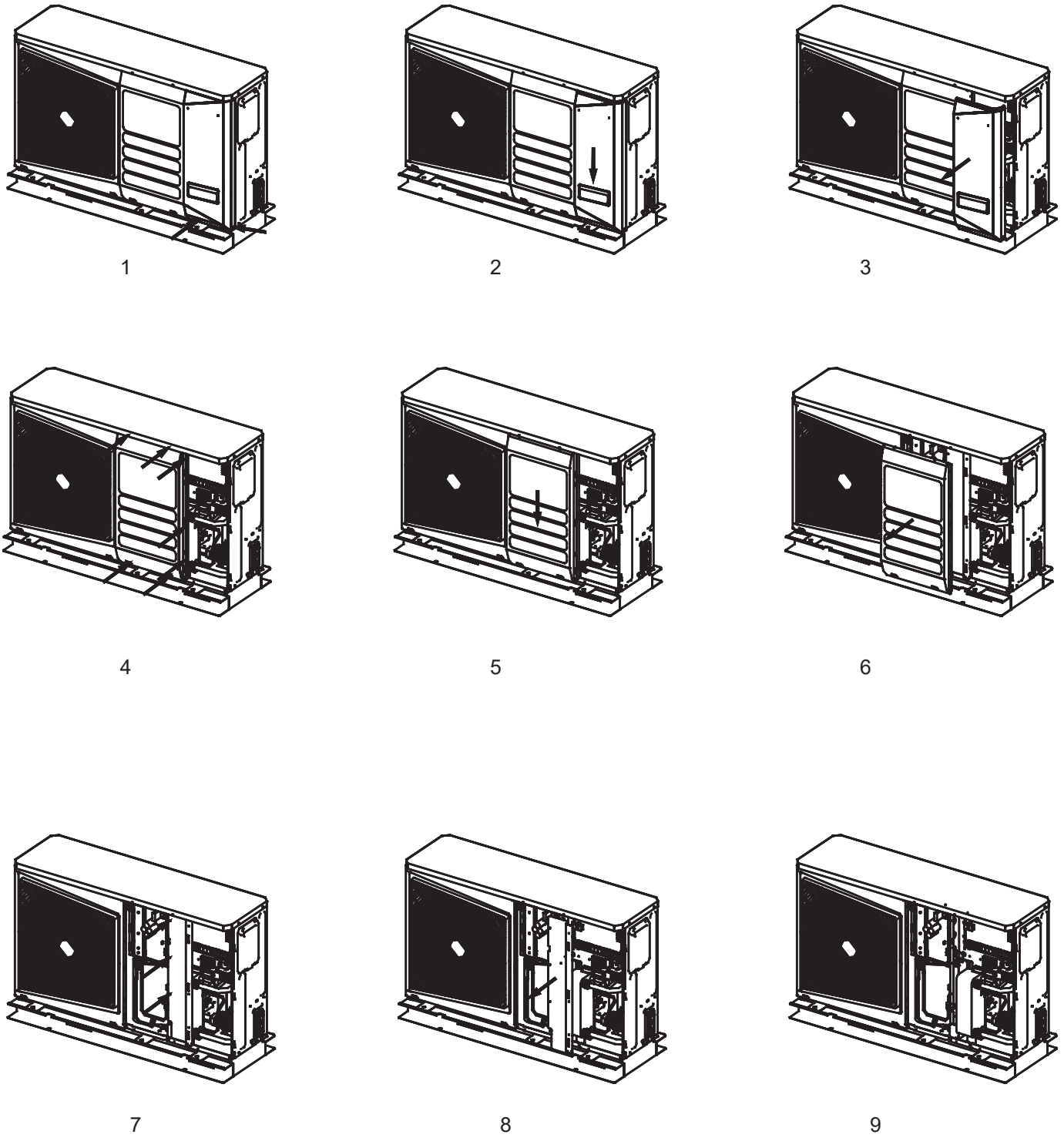


Figure 4 : How to remove front panel for 4 - 10 kW units

2.2.4 - 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 not nitrogen.
- Compare the complete installation with the refrigeration system and power circuit diag rams.
- 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.) comply with the regulations are present.
- Verify that the environmental safety and protection and devices and arrangements provided by the manufacturer comply with the regulations are in place.
- Verify that all documents for pressure containers, certificates, name plates, files and instruction manuals provided by the manufacturer 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 check the piping.
- Verify the status of the valves.
- Verify the quality of the thermal insulation and of the vapour barriers.

2.3 - Water 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 gas.

Recommendations on heat exchange fluids:

- No NH4+ 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 or by puncture.
  If possible keep below 10 mg/l.
- SO42- sulphate ions can cause perforating corrosion, if their content is above 30 mg/l.
- No fluoride ions (<0.1 mg/l).
- No Fe2+ and Fe3+ 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 < 1mg/l.
- Water hardness: >0.5 mmol/l. Values between 1 and 2.5 mmol/l can be recommended. This will facilitate scale deposits 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 the destabilisation of copper hydroxides and enlargement of particles.
- Electric conductivity: 0.001-0.06 S/m (10-600 µS/cm).
- pH: Ideal case pH neutral at 20-25°C (7 < 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.

2.3.1 - Operating precautions and recommendations

The water circuit should be designed to have the least number of elbows and horizontal pipes running at different levels. Below are 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 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 sacrifi- cial 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 the hydraulic module are equipped with a Y filter as an 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 products originally supplied by the manufacturer.

2.3.2 - General

For details on connection diameters, refer to §1.5.1 Physical data.

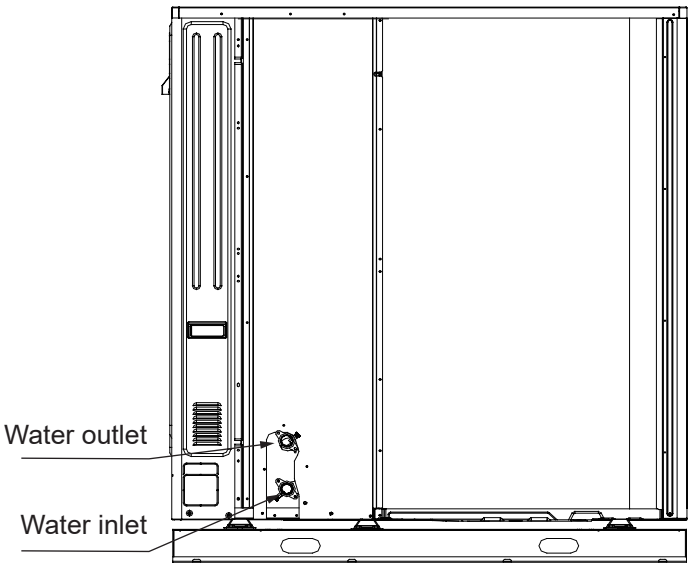


Figure 5: Water connection on unit

2.3.3 - Minimum water loop volume

The minimum water loop volume, in litres, is given by the following formula:

Volume (l) = CAP (kW) x N

Where CAP is the nominal cooling capacity at nominal operating conditions.

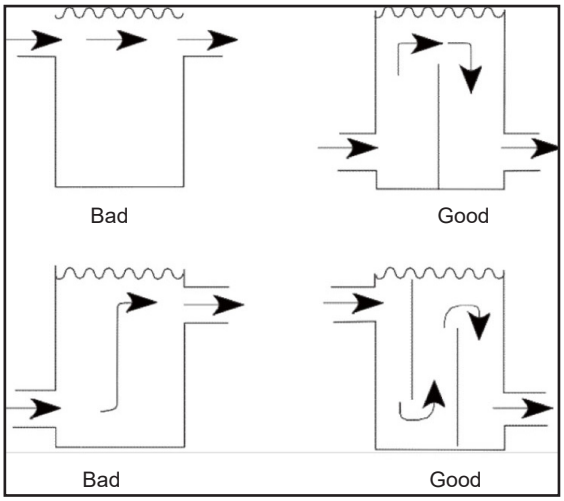
Application	N
Air conditioning	3,5
Heating or domestic hot water application	6
Industrial process cooling	See note below

NOTE:

For industrial process cooling applications, where high stability of water temperature levels must be achieved, the values above must be increased. We recommend consulting the factory for these particular applications.

2- INSTALLATION OF UNIT

This volume is required to obtain the temperature stability and precision. To achieve this volume, it may be necessary to add a storage tank to the circuit. This tank should be equipped with baffles to allow mixing of the fluid (water or brine). Please refer to the examples below.



2.3.4 - Maximum water loop volume

Units with hydraulic modules incorporate an expansion tank that limits the water loop volume. The table below gives the maximum loop volume for pure water or ethylene glycol with various concentrations.

If the volume of the total system is higher than the values given above, the installer must add another expansion tank, suitable for the additional volume.

Water maximum volume (L) (4-16kW)		
Static pressure (bar)	1,5	3
Fresh water	200	50
Ethylen glycol 10%	150	38
Ethylen glycol 20%	110	28
Ethylen glycol 30%	90	23
Ethylen glycol 40%	76	19

2.3.5 - Hydraulic circuit

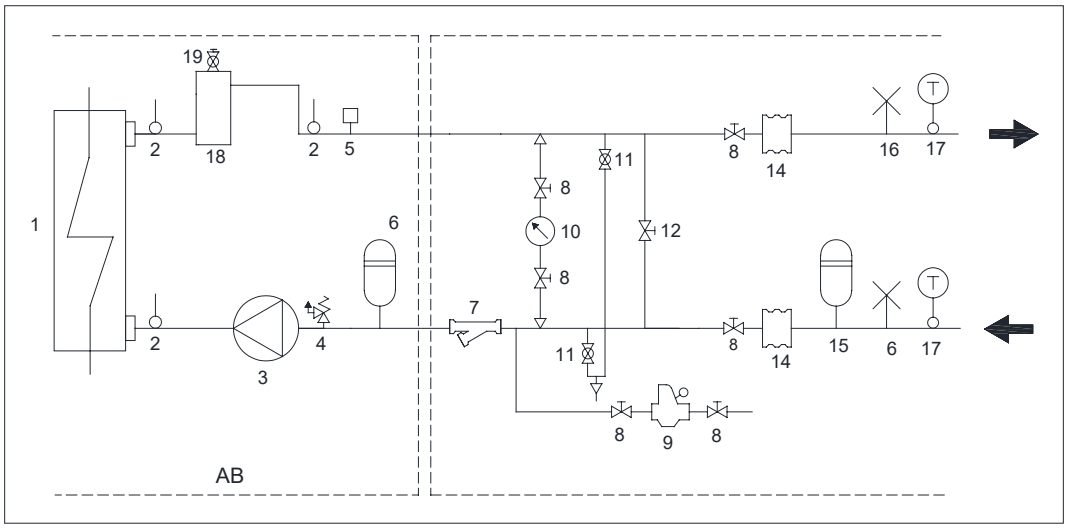


Figure 6: Typical diagram of the hydraulic circuit for 4-10kW units

2- INSTALLATION OF UNIT

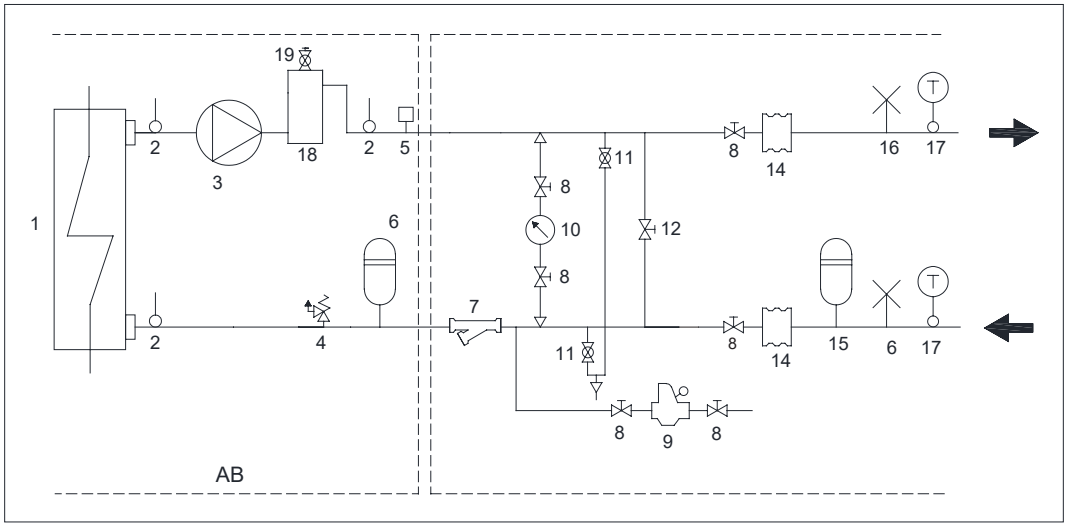


Figure 7: Typical diagram of the hydraulic circuit for 12-16kW units

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; 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 an open loop is prohibited.

4-10kw

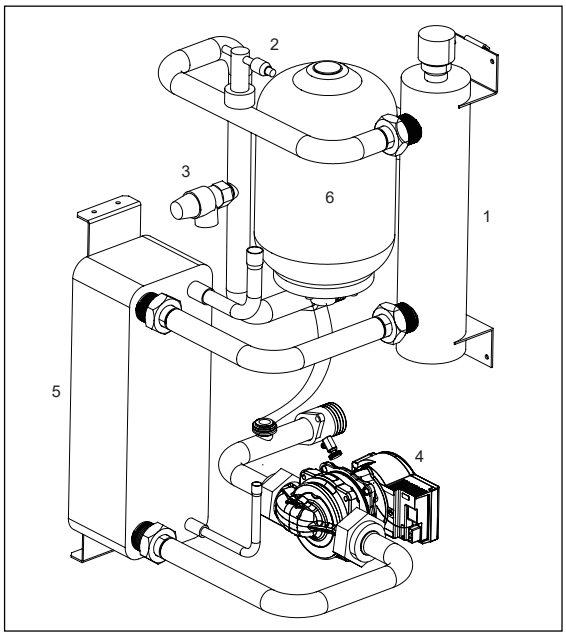
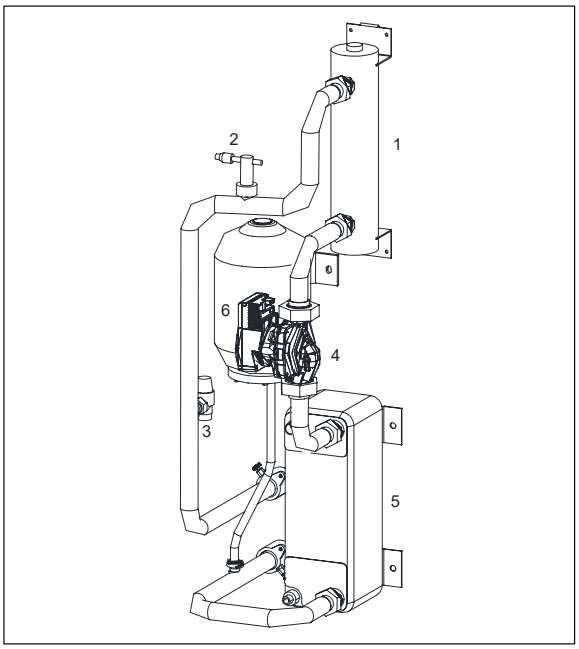


Figure 8: Hydraulic module equipped with variable speed

12-16kw



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- INSTALLATION OF UNIT

2.4 - Electrical connections

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

2.4.1 - Power supply

The power supply must conform to the specifications on the 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 be disconnected only for quick maintenance operations (maximum for one day). For longer maintenance operations or when the unit is taken out for 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 (i.e.compressor coil heater, unit frost protection).

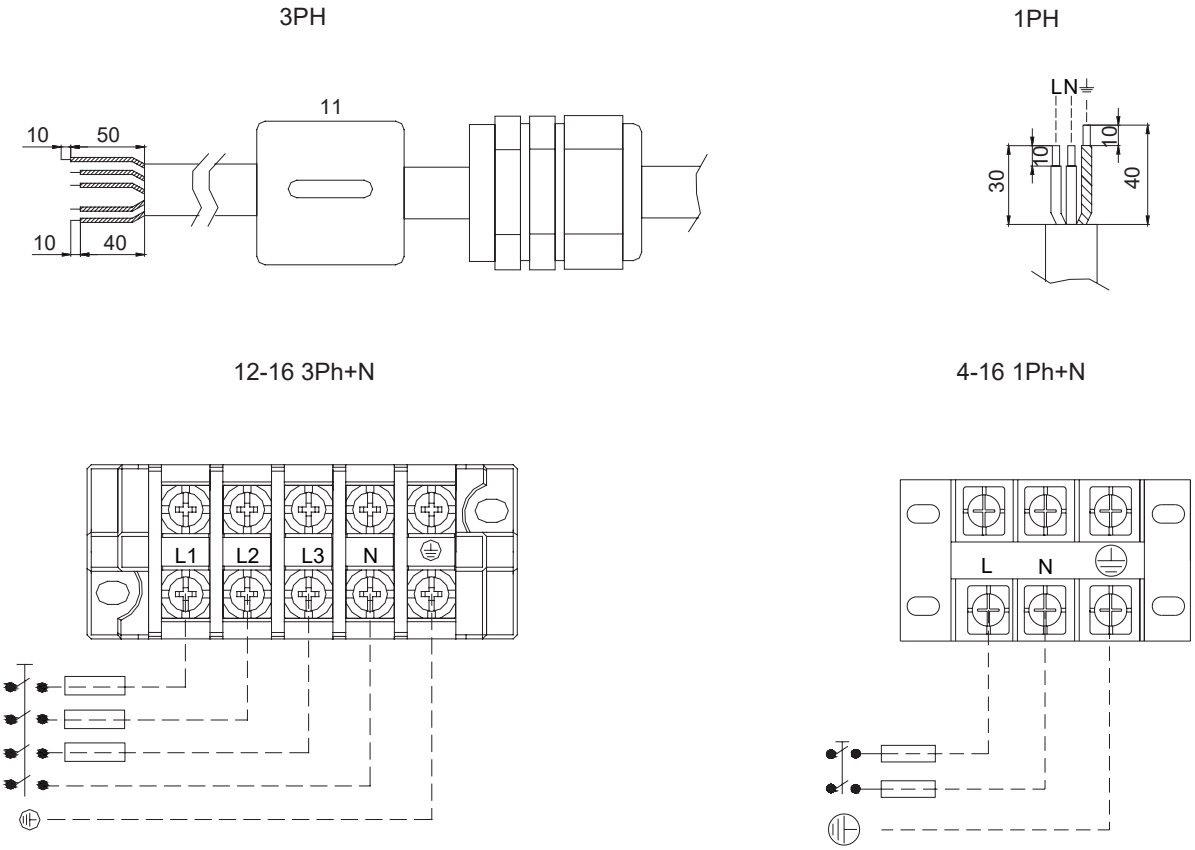


Figure 9: Power connection with Main Switch

2.4.2 - Wire sections recommended

Wire sizing is the responsibility of the installer and depends on the characteristics and regulations applicable to each installation site. The follow- ing is only to be used as a guideline and does not make the manufacturer in any way liable. After wire sizing has been completed and by 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).

2- INSTALLATION OF UNIT

The calculation is based on PVC or XLPE insulated cables with a 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 correct- ly, the unit can be damaged permanently).

Table 1: Minimum and maximum wire section (per phase) for connection to units

	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)
	mm² (per phase)	mm² (per phase)	m	-	mm² (per phase)	m	-
4/6 (1ph)	3×4²	3×4²	100	H07RNF	3×4²	80	H07RNF
8/10 (1ph)	3×6²	3×6²	100	H07RNF	3×6²	80	H07RNF
12 (1ph)	3×6²	3×6²	100	H07RNF	3×6²	80	H07RNF
14/16 (1ph)	3×8²	3×8²	100	H07RNF	3×8²	80	H07RNF
12 (3ph)	5×4²	5×4²	100	H07RNF	5×4²	80	H07RNF
14/16 (3ph)	5×6²	5×6²	100	H07RNF	5×6²	80	H07RNF
Accessory wired controller	Use the wired controller cable in the accessory						

NOTES:

(1) Connection capacities are actually available for each machine are defined according to the connection terminal size, the control box access opening size and the available space inside the control box.

(2) Selection of simultation 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.

English

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 the hot parts of the system.

2.4.3 - Recommended electrical protection for customer

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			4kw	6-10kw	12-16kw-1ph	12-16kw-3ph
Circuit breaker	Type		C	C	C	C
	Current	A	32	40	50	40
Fuses	Type		gG	gG	gG	gG
	Current	A	40	50	63	50

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 the 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
   - altitude: ≤ 2000 m (see note for table 1.5.4 - Electrical data, hydraulic module)
   - presence of hard solids, class AE3 (no significant dust present)
   - presence of corrosive and polluting substances, class AF1 (negligible)
2. Power supply frequency variation: ± 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 connectivity 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 a 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 the interface, the level is IPxxB

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 - Flow rate of water heat exchanger

Data applicable for:

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

Units with a hydraulic module			
Model	Minimum water flow rate(m3/h)	Nominal water flow rate (1)(m3/h)	Maximum water flow rate(m3/h)
4kw	0.4	0.69	4.9
6kw	0.4	1.03	4.9
8kw	0.4	1.38	4.9
10kw	0.4	1.72	4.9
12kw	0.75	2.06	7.2
14kw	0.75	2.41	7.2
16kw	0.75	2.76	7.2

2.5.5 - Nominal system water flow 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 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. From the technical literature, these characteristics can be obtained using the unit performance tables for a ΔT of 5 K at the water heat exchanger.

Table 2: Steps to clean, purge, and define a flow rate for the 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 is 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 in 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	Wait approximately for 24 hours before initiating 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 the circuit automatically. If the purge is manual, open the valve to vent air from the circuit. 2. The air purge which is standard with the 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).		If the flow rate corresponding is higher, decrease pump speed (1), and vice versa
	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 corresponding flow rate 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.	

2- INSTALLATION OF UNIT

(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.

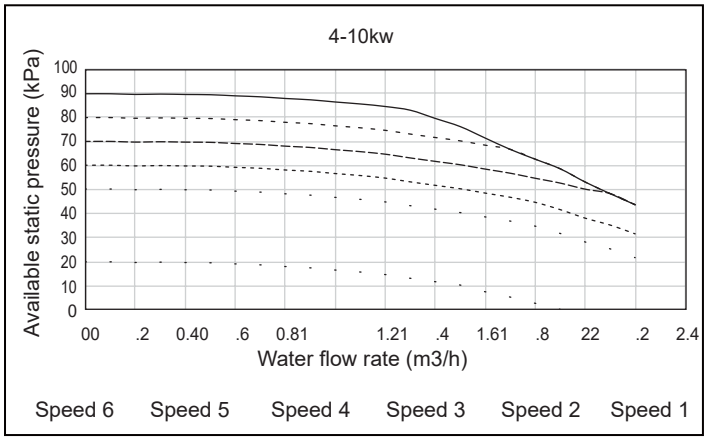
To reduce the pressure drops in the hydraulic system:

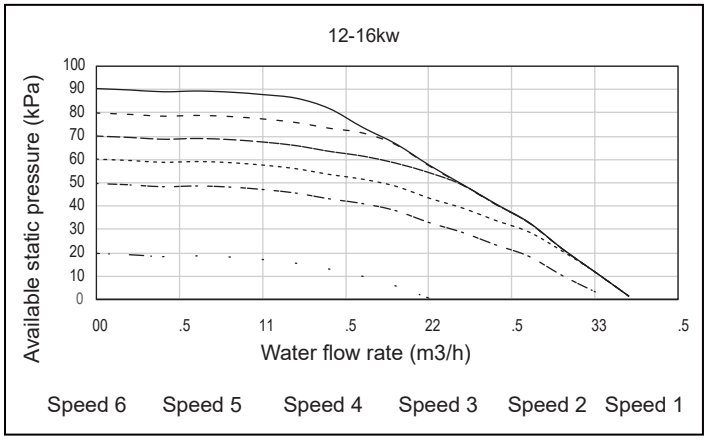
- Reduce the individual pressure drops as much as possible (bends, level changes, options, etc.).
- Use a pipe that is the correct size.
- Avoid hydraulic system extensions, wherever possible.

2.5.6 - Available external static pressure

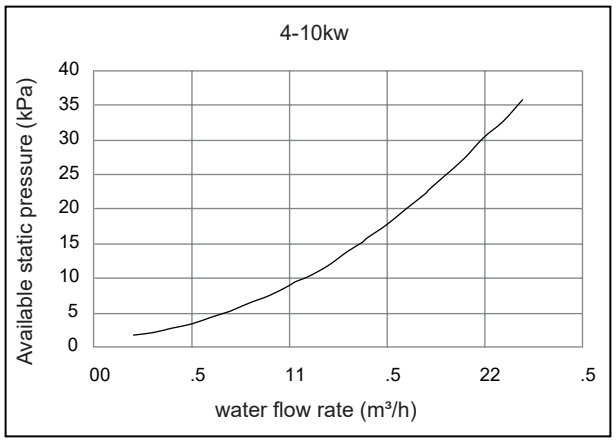
Data applicable for:

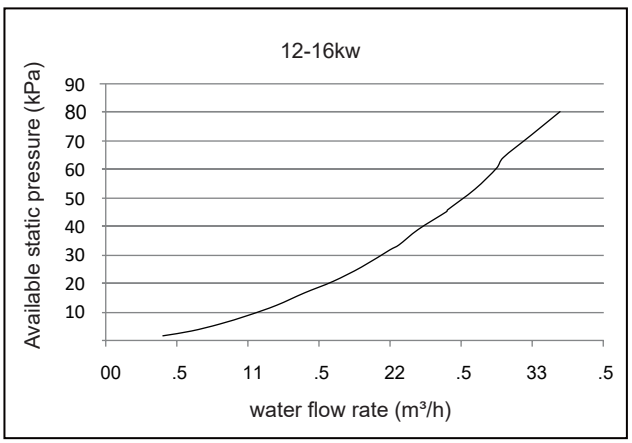
- Fresh water at 20°C
- If the glycol is used, the maximum water flow is reduced.





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





Graphic 2: Pressure drop for 4 to 16kW units with additional main water loop pump

2.6 - Commissioning modes

IMPORTANT:

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

- Dual electricity must be ensured through routing selection and/or conductor insulation characteristics.
- Conductor fixing between different conductors and/or in the control box prevents any contact between the conductor ends and an active energised conductor in the event of accidental disconnection.

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 (for more details, refer to Figure 10 and §4.2.4 Switches)

- The On/Off remote switch
- Select remote switch for Heat/Cool
- Select remote switch for Home/Sleep
- Alarm/Alert or Operation report…

2. Connections to the user interface

When using the remote-mounted user interface accessory, the user interface must be connected at the terminal block (refer to §3.7 Unit with remote user interface).

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 access to the service connection.

2.7 - Checks before starting 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 secure.
- 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.

Ensure that all safety devices are operational, and that every alarm is acknowledged.

NOTE:

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

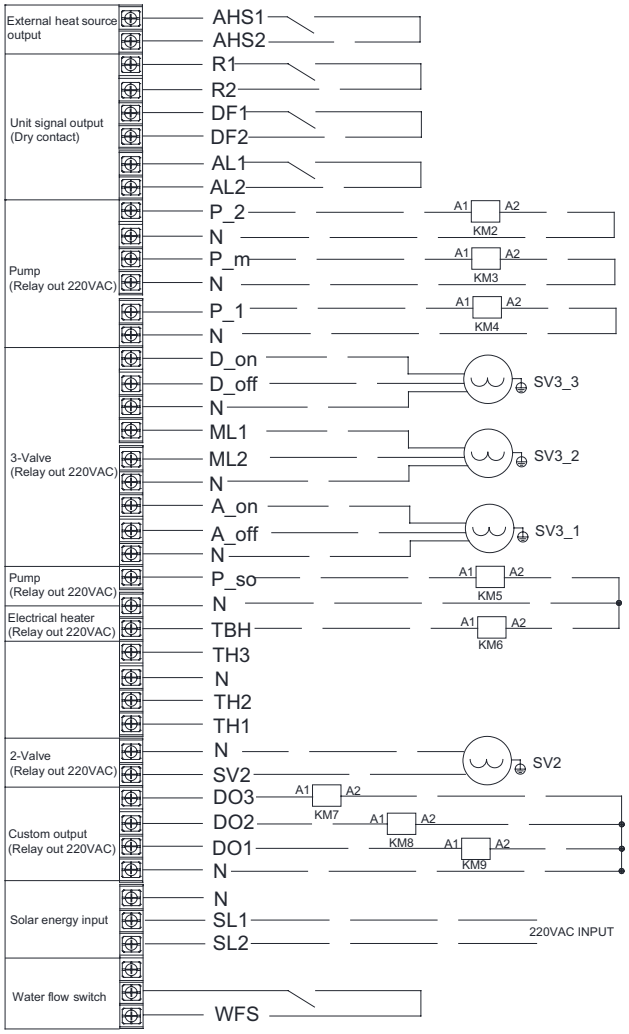
3 - INSTALLATION OF THE SYSTEM

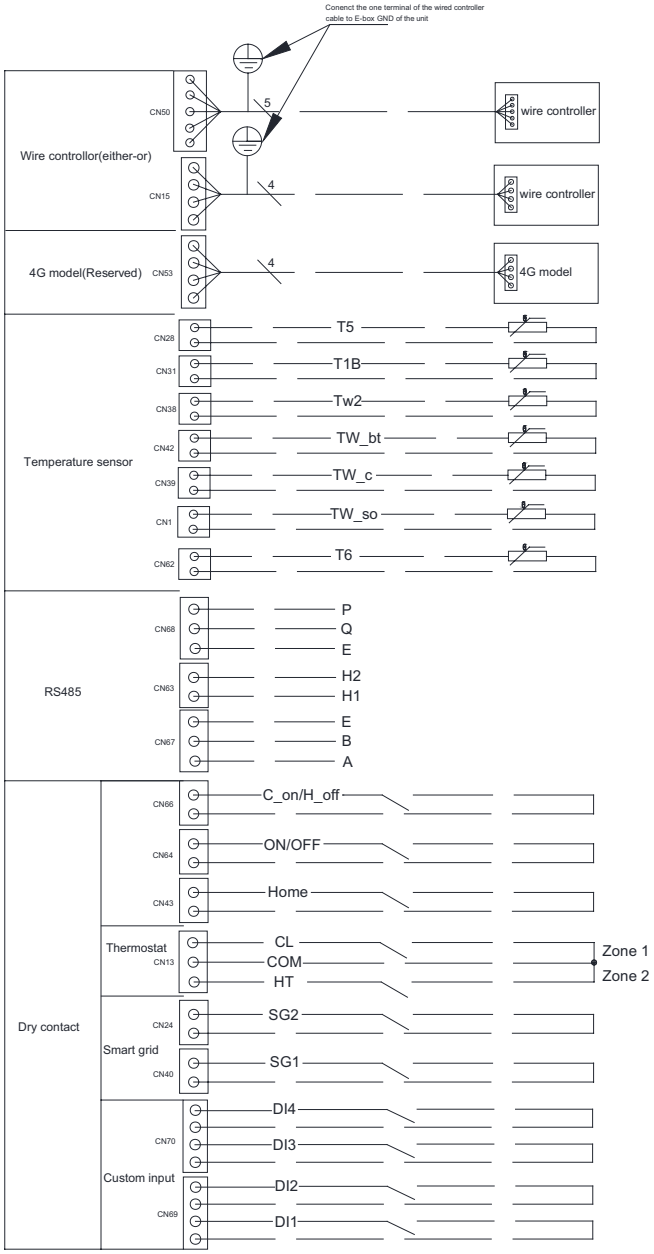
In this section, the general customer electrical connection is detailed as well as the main steps of configuration and examples of standard installation:

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

3.1 - General customer electrical connection on terminal block

section 3.1 wiring





Section 3.1 table

CODE	Content
AHS1-2	External heat source interface terminal
R1-2	Unit operation signal interface terminal
DF1-2	Unit defrost signal interface terminal
AL1-2	Unit alarm signal interface terminal
P_2	Zone 2 on/off pump (reserved)
P_m	Main loop booster on/off pump
P_1	Zone 1 on/off pump
TBH	Electric heater interface terminal of domestic hot water
HT1-HT3	Electric heater interface terminal of main water loop
SV2	Heating water loop cut off valve in cooling mode
DO1-DO3	Customized output interface terminal
SL1-2	Solar energy input signal interface terminal
DI1-DI4	Custom defined input interface terminal
P_so	Solar water pump interface terminal
WFS	Water flow switch interface terminal
Home	Home / away mode interface terminal
ON/OFF	ON /OFF interface terminal
C_on/H_off	Cooling / heating mode interface terminal
KM1-9	220V AC contactor
LED1-3	220V AC indicator
XT1-2	Terminal block
A_on/A_off/N (SV3_1)	Additional heat source 3-way valve
ML1/ML2/N (SV3_2)	Zone2 mixing valve (reserved)
D_on/D_off/N (SV3_3)	DHW 3-way valve

3- INSTALLATION OF THE SYSTEM

3.2 - First step of configuration: setting the time and day

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 a 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.

1. Press the "setting" button, to go into the day and time setting;
2. Through the "up" or "down" button to change the day of the week, such as Monday;
3. After the day of the week has been selected, press the "confirm" button to confirm and go to the hour setting;
4. Through the "up" or "down" button to set the hour;
5. After selecting the hour, press the "confirm" button to confirm and go to the minute setting;
6. Through the "up" or "down" button to set the minute;
7. After selecting the minute, press the "confirm" button to confirm the minute setting. Setting button: press to set the parameter, refer to the wired controller manual for details "up" and "down" button: use to change the setting item and its value.

"confirm" button: use it to confirm the setting

Parameter setting 1: press the setting button to get the below items:

Digital display in the left	Item	Note
0	Clock setting	
1	Schedule of DHW	
2	Power memory setting	
3	WIFI statue	Reserved
4	Air purge setting	
5	Occupancy mode setting	
6	Night mode setting	
7	Anti-legionella temperature setting	
8	Anti-legionella timer	
9	Lock of wired controller	

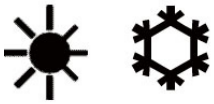
Parameter setting 2: press and hold the setting button for 10s to get the below items:

Digital display in the left	Item	Note	Digital display in the left	Item	Note
0	Control setpoint type		13	Eco mode cooling setpoint offset	
1	Controller selection		14	Away mode cooling setpoint offset	
2	Back up function		15	Eco mode heating setpoint offset	
3	Climate curve selection		16	Away mode heating setpoint offset	
4	Capacity test setting	Reserved	17	Eco mode DHW setpoint offset	
5	3-way valve type select		18	Minimum OAT for heating	
6	DI1 setting		19	Booster OAT Threshold	
7	DI2 setting		20	Heat pump warmup time	
8	DI3 setting		21	Booster Delta temperature	
9	DI4 setting		22	Second zone setting	
10	DO1 setting		23	Water pump ΔT control setting	
11	DO2 setting		24	Water pump control type setting	
12	DO3 setting		25	Water pump speed setting	
			26	SV2 solenoid valve control setting	

3- INSTALLATION OF THE SYSTEM

3.3 - Installation with booster electric heaters

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

IMPORTANT:

For more information, refer to §4.2.9 Electric Heaters.

English

3- INSTALLATION OF THE SYSTEM

3.4 - Master / Slave installation

3.4.1- Standard installation

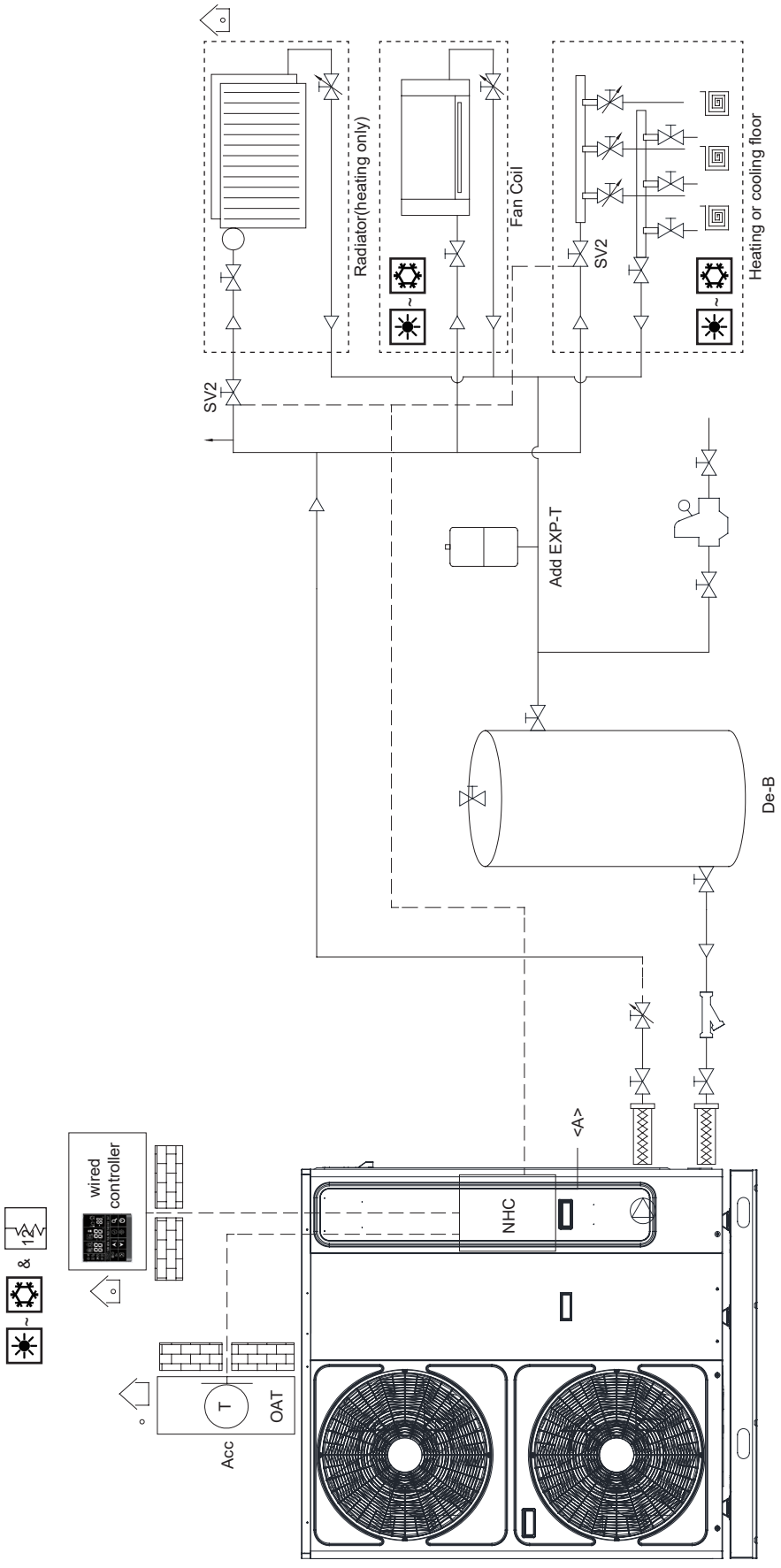
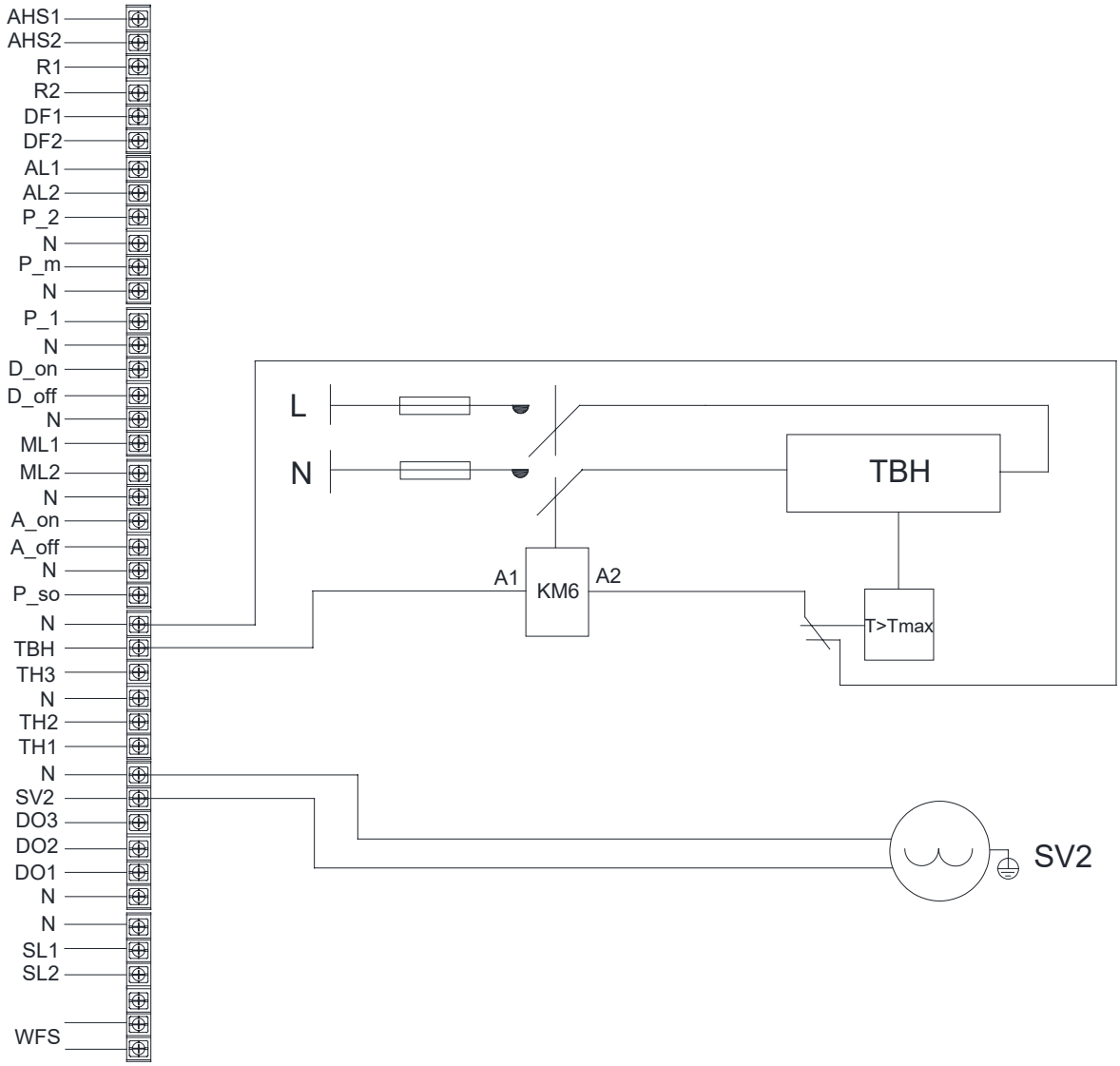


Figure 10: Standard installation with electrical booster heaters

Section 3.4.2 wiring



3.4.3- Control configuration steps

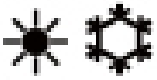
Steps		No.	Designation	Description	Range	Default	Ex.	Unit
Set Booster stages	BCK_ CONF	2	Back up function	0-inner EH+DHW EH+gas boiler 1-inner EH+DHW EH 2-DHW EH+gas boiler 3-inner EH+gas boiler 4-DHW EH 5- gas boiler 6- inner EH 7- no auxiliary heater	0 to 7	0	3	-
		20	Heat pump warmup time	Once the unit has started, if after this timer has expired, the capacity demand is at maximum and the set point isn't reached, then the booster is activated.	0 to 120	0	0	min
		19	Booster OAT Threshold	Booster heating is allowed to run if OAT goes below this threshold (with 1 K hysteresis).	-20 to 15	-	-	-

English

3- INSTALLATION OF THE SYSTEM

3.5 - Installation with DHW production and boiler

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

IMPORTANT:

For more information, refer to § 4.2.7 Domestic hot water mode and § 4.2.10 Boiler.

3.5.1 - Standard installation

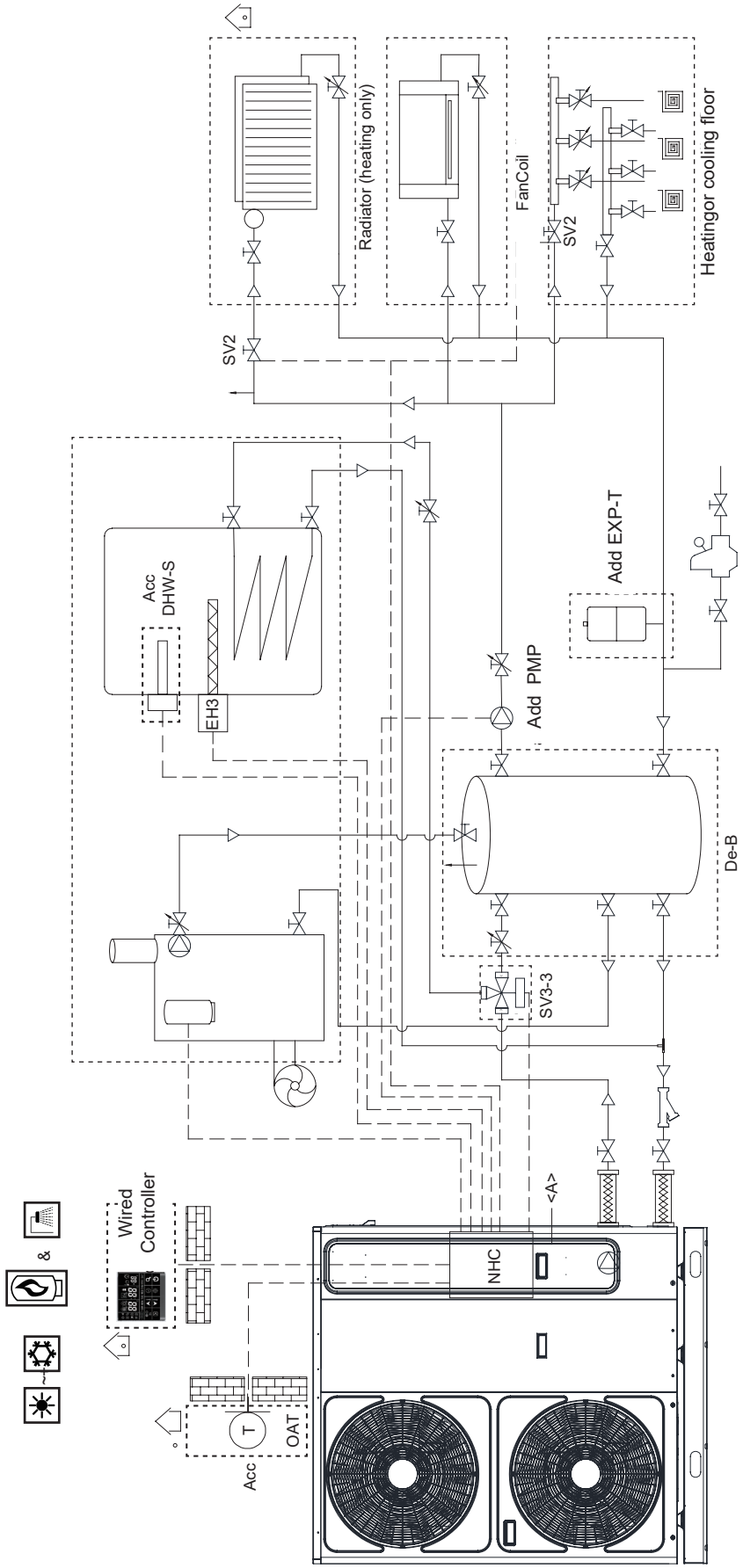


Figure11: Standard installation with DHW production and boiler

English

Section 3.5.2 wiring

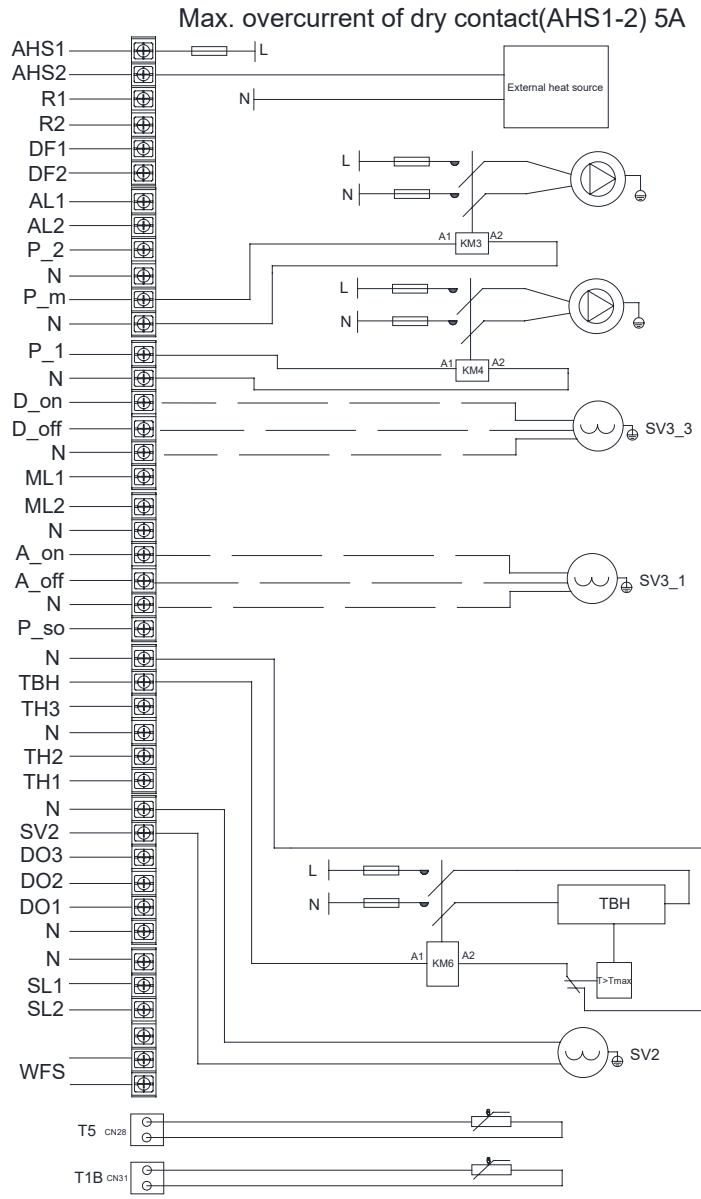


Figure12: Electrical connection on the terminal block for DHW production and boiler

3.5.3. - Control configuration steps

Steps		No.	Designation	Description	Range	Default	Ex.	Unit
Set Booster stages	BCK_ CONF	2	Back up function	0- inner EH+DHW EH+gas boiler 1- inner EH+DHW EH 2- DHW EH+gas boiler 3- inner EH+gas boiler 4- DHW EH 5- gas boiler 6- inner EH 7- no auxiliary heater	0 to 7	0	3	-
		20	Heat pump warmup time	Once the unit has started, if after this timer has Expired, the capacity demand is at maximum and the setpoint isn't reached, then the booster is activated.	0 to 120	0	0	min
		19	Booster OAT Threshold	Booster heating is allowed to run if OAT goes below this threshold (with 1 K hysteresis).	-20 to 15	-	-	-

3.6 - Unit with remote user interface

3.6.1 - Electrical connection

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

IMPORTANT: For more information on:

- Please refer to the wired controller manual on how to use this user interface.
- Refer to 4.2.5 Setpoint for more information.
- Refer to the accessory provided with the Wired Controller Installation Document.
- Standard length of wired controller is 10m
- The wired controller cable must be separated from high voltage power supply cables.

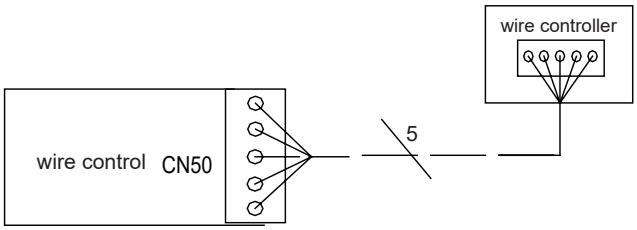
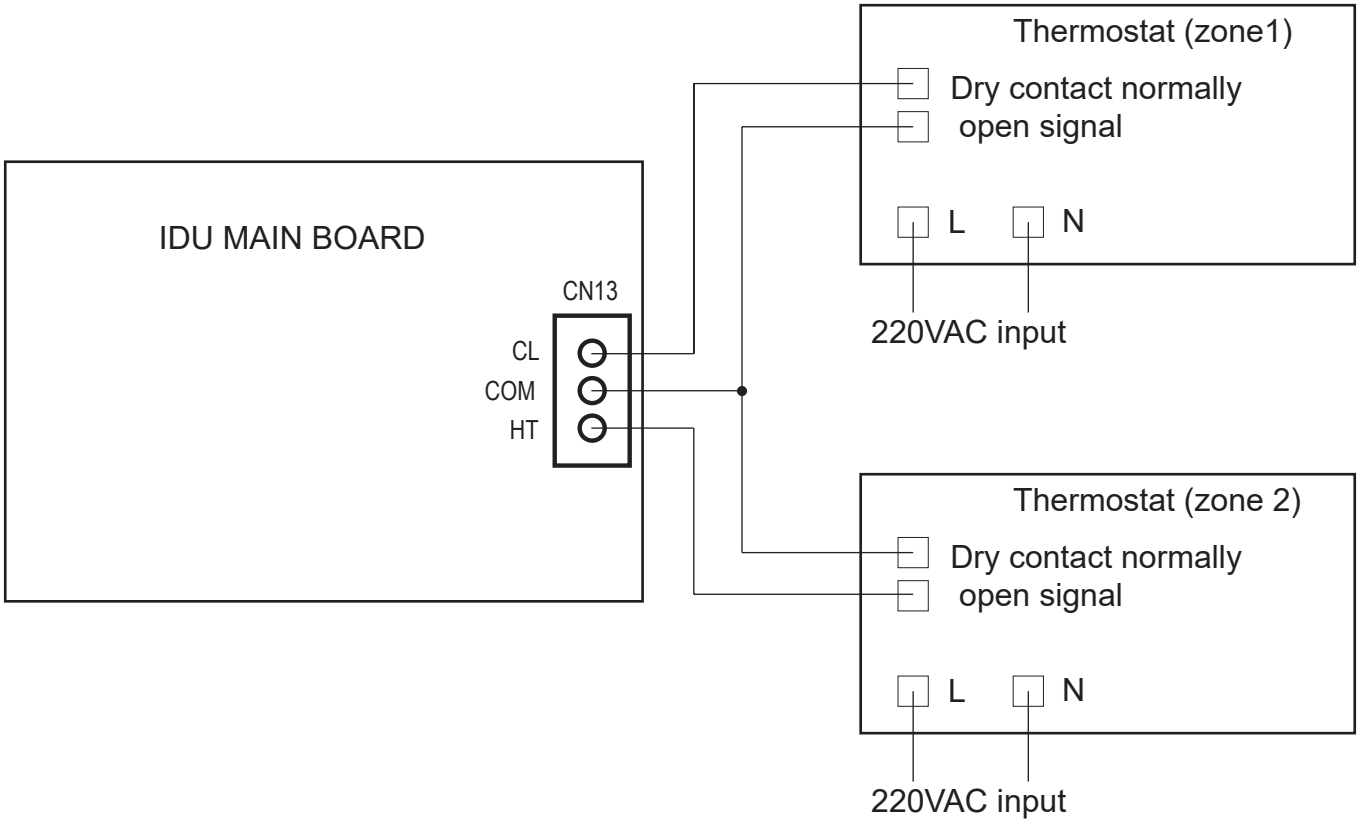


Figure 13: Electrical connection of remote interface

Section 3.6.1 thermostat connection



Connection of thermostat

Steps	No.	Designation	Description	Range	Default	Ex.	Unit
Controller_ CONF	1	Controller selection	"0=Wired controller control 1=Dry contact control"	0-1	0	0	-

3.7 - IAT sensor

The IAT sensor is built-in to the wired controller, which is used to measure the room temperature. Its value is compared to the air setpoint to determine the demand for heating or cooling.

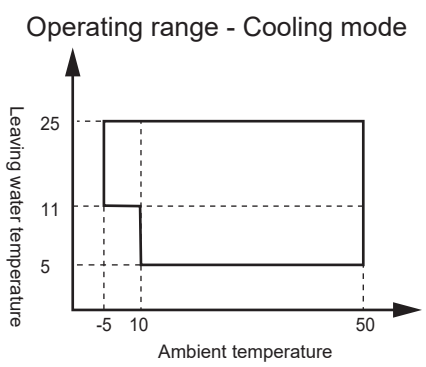
3.7.1 - Control configuration steps

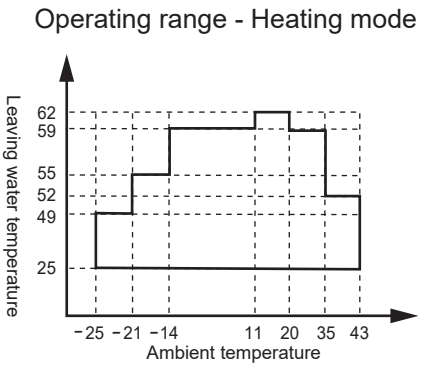
Control configuration steps

Steps	No.	Designation	Description	Range	Default	Ex.	Unit
Controller_CONF	1	Controller selection	"0=Wired controller control 1=Dry contact control"	0-1	0	0	-
Setpoint_CONF	0	Control setpoint type	"0=Water setpoint control 1=Air setpoint control"	0-1	0	0	-

4- OPERATION

4.1 - Unit range





During heating/DHW mode, while the OAT is above 35^{0}C, it can not keep the LWT below 35^{0}C for more than 8h.

4.2 - Operating modes

4.2.1 - Occupancy mode

Depending on the unit configuration, the system can be controlled in two ways. The first possible method involves the use of setpoints, where the outdoor air temperature has no effect on the temperature set by the control. The second control method is based on a climatic curve. In this case, the water temperature is adjusted in response to changes in the external temperature.

The unit may operate in HOME, SLEEP, or AWAY mode. The occupancy can be set manually by the user or automatically according to the schedule (refer to the wired controller manual).

Occupancy	Wired Controller Display	Comfort Type
Home	No icon	Comfort
Sleep	Light on	Comfort
Away	Flashing	Eco

CAUTION:
In case of the power cycle, the previous operating mode (cooling / heating / DHW) or occupancy mode (home / sleep / away) will be automatically restored.

4.2.2 - Operating modes

The user can normally choose one of three available operating modes, i.e. cooling, heating or domestic hot water production only. The unit may run in the following modes:

- Off: The unit has been instructed to stop.
- Cool: The unit has been instructed to run in Cooling mode.
- Heat: The unit has been instructed to run in Heating mode.

When the Cooling mode is selected, the chiller or heat pump will operate in the Cooling mode in order to cool the water loop to the selected tempera- ture.

When the heat pump is in Heating mode, the heat pump heats the water loop to the selected temperature. When the outdoor air temperature is very low, electric heaters or boiler heating can be used in order to satisfy the heating demand.

It is also possible for the unit to operate in DHW mode when heating mode or cooling mode is selected, according to schedule / temperature condition / maximum runtime.

When the system is in the Off mode, the compressor and the pump are stopped (except for home anti-freeze protection and water freeze protec- tion, refer to 4.2.6 Water freeze protection).

4.2.3 - Operating mode control

The operating mode selection may differ depending on access level and the use of communication methods, i.e. wired controller display.

In the following sections of this document,the configuration steps are the same for all of these communication methods.

English

4- OPERATION

a - Wired Controller control

If the unit is fitted with a user interface, the mode selection can be done by direct access on the wired controller.
When the unit is Off, press the ON/OFF key to wake up the user interface and then press the Mode key to select the required operating mode.

Table 3: Different operating modes		
System Mode	Wired Controller display	Icon
Off	-	[no icon]
Cool		[steady icon]
Heat		[steady icon]
DHW		[steady icon]

For more information on the user interface, please refer to the wired controller manual.

4.2.4 - Switches

Some of the modes described below could be activated or desactivated by switches. Moreover, other remote contacts can be connected to the unit in order to add new features. If the unit is managed by remote contacts, it is necessary to change the value of the parameter of User Interface type in the UI_CONF table, with controller selection = 1.

Table 4: Possible switches to install on the system	
Switch	Definition
On/Off Switch (remote)	Used to start and stop the unit (if there is no user interface).
Mode Heat/Cool (remote)	Used to select (if there is no user interface): - Cooling Mode = contact opened - Heating Mode = contact closed
Normal/Eco (remote)	Used to select (if there is no user interface): - Home Mode = contact opened - Away Mode = contact closed
Safety Input Contact	This contact should be a 'normal closed' type.
Power Limitation Contact (Night Mode)	Used for reducing the compressor maximum frequency to avoid noise.
Load shed Request Switch	This contact is requested by an electricity company (i.e. in Germany) to control the green electricity (wind, solar) production and consumption more efficiently. When the switch is closed then the unit shall be stopped as soon as possible.
DHW Request Switch from tank	When this input is closed, Domestic Hot Water production is requested. A thermal switch mounted on the Domestic Hot Water tank shall be connected to this input.
DHW Priority Contact (thermal switch)	When the status of this input goes from open to closed, the unit is switched to Domestic Hot Water production for the programmed duration regardless of the Space Heating demand and the current DHW schedule.
Anti-Legionella Cycle Request Button	When the status of this input goes from open to closed, the Domestic Hot Water production is requested with the Anti-Legionellasetpoint
External Alarm Indication Input	When this input is opened, an alarm is tripped. This alarm is for information only, it does not affect the unit operation.

4.2.5 - Setpoint

To achieve better comfort, it is possible to adjust the room temperature setpoint or water temperature setpoint according to your needs. Please note that the temperature setpoint can be adjusted only within the range defined for each occupancy mode. When the unit is equipped with a remote user interface, the control can be based on the air setpoint.

Air setpoint configuration

Depending on the occupancy and heating/cooling/DHW mode, the air setpoint is as given below.

- By direct access to the wired controller (refer to the wired controller manual)

COOLING

Wired Controller Occupancy	Air setpoint on Wired controller direct access	Range	Air setpoint on parameter menu	Range
Home	Cool Home Setpoint	16 to 32°C	Cool Home Setpoint	16 to 32°C
Eco	Cool Sleep Setpoint	16 to 32°C	Cool Sleep Offset	0 to 10°C
Away	Cool Away Setpoint	16 to 32°C	Cool Away Offset	0 to 10°C

HEATING

Wired controller Occupancy	Air setpoint on Wired controller direct access	Range	Air setpoint on parameter menu	Range
Home	Heat Home Setpoint	16 to 32°C	Heat Home Setpoint	16 to 32°C
Eco	Heat Sleep Setpoint	16 to 32°C	Heat Sleep Offset	-20 to 0°C
Away	Heat Away Setpoint	16 to 32°C	Heat Away Offset	-20 to 0°C

Once air setpoints are defined, water setpoints must be configured (refer to §3.6 - Unit with wired controller). Please see the table below for more information on water setpoint configuration.

Water setpoint configuration

The water setpoint calculation can be based on:

1) Predefined Climatic Curves depending on OAT: climatic curves are already preconfigured in the control logic.
2) Fixed Water Setpoint: a fixed value is used for each occupancy mode.
3) Custom Climatic Curve depending on OAT: define customized climatic curves on function of the application.
4) Offset on climatic curves (predefined and customer)

English

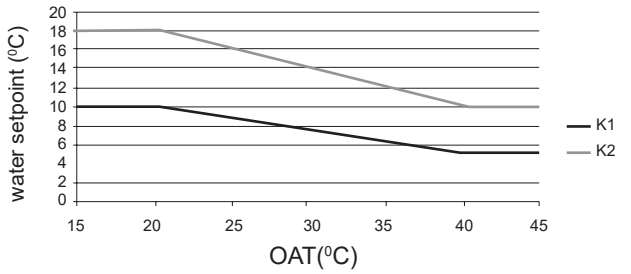
4- OPERATION

1. Predefined climatic curves

COOLING

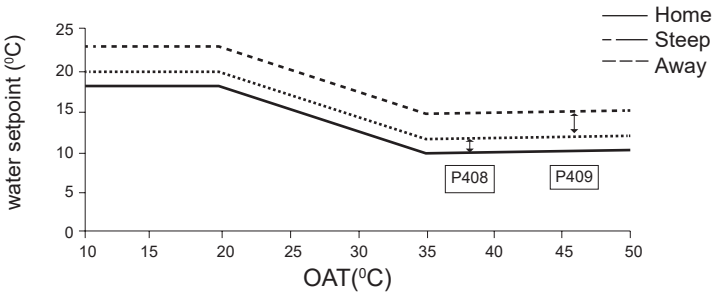
If the cooling climatic curve is configured to “1” or “2”, the water setpoint will be calculated according to the selected cooling climatic curve. Two predefined cooling climatic curves are available:

Climatic Curve	Min.OAT	Max.OAT	Min.Water Temp	Max. Water Temp	Application
K1	20°C	40°C	5°C	10°C	FCU’s
K2	20°C	40°C	10°C	18°C	UFC



Cooling Climatic Curves

The climatic curve corresponds to the water setpoint in Home mode. To define the other occupancy modes, it is necessary to configure Cool Sleep Offset [P408] and Cool Away Offset [P409]:



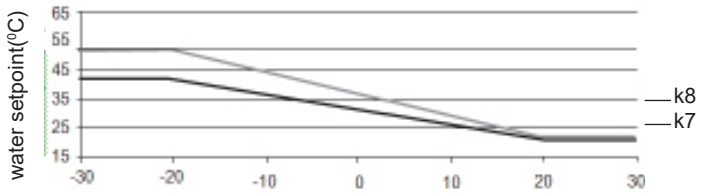
Cooling Climatic Curve in function of occupancy mode

HEATING

If the heating climatic curve is configured to a parameter from “1” to “12”, the water setpoint will be calculated according to the selected heating climatic curve.

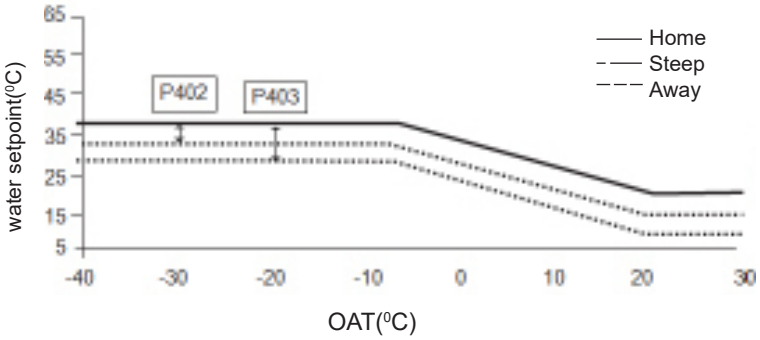
Twelve predefined heating climatic curves are available:

Climatic Curve	Min.OAT	Max.OAT	Min.Water Temp	Max. Water Temp	Application
K1	-7°C	20°C	20°C	38°C	UFH
K2	-5°C	20°C	20°C	33°C	UFH
K3	-9°C	20°C	20°C	45°C	FCU’s
K4	-8°C	20°C	40°C	50°C	FCU’s
K5	-5°C	20°C	40°C	55°C	Radiators
K6	0°C	20°C	40°C	60°C	Radiators
K7	-20°C	20°C	22°C	42°C	FCU’s
K8	-20°C	20°C	23°C	55°C	Radiators
K9	-12.7°C	20°C	24°C	60°C	Radiators
K10	-5.9°C	20°C	25°C	60°C	Radiators
K11	-1.5°C	20°C	26°C	60°C	Radiators
K12	3.5°C	20°C	27°C	60°C	Radiators



Heating Climatic Curves (K7 to K8)

The climatic curve corresponds to the water setpoint in Home mode. To define the other occupancy modes, it is neces sary to configure Heating Sleep Offset [P402] and Heating Away Offset [P403]:



Heating Climatic Curve in function of occupancy mode

2. Fixed water setpoint

If the cooling climatic curve or the heating climatic curve is configured to “0”, the water control point will be determined according to the Occupancy mode.

- By direct access to the wired controller (refer to wired controller manual)

English

COOLING

Wired Controller Occupancy	Water setpoint on Wired Controller Occupancy direct access	Range	Water setpoint on parameter menu	Range
Home	Cool Home Setpoint	5 to 25°C	Cool Home Setpoint	5 to 18°C
Eco	Cool Sleep Setpoint		Cool Sleep Offset	0 to 10°C
Away	Cool Away Setpoint		Cool Away Offset	0 to 10°C

HEATING

Wired Controller Occupancy	Water setpoint on Wired Controller Occupancy direct access	Range	Water setpoint on parameter menu	Range
Home	Heat Home Setpoint	25 to 62°C	Heat Home Setpoint	25 to 62°C
Eco	Heat Sleep Setpoint		Heat Sleep Offset	-10 to 0°C
Away	Heat Away Setpoint		Heat Away Offset	-10 to 0°C

DHW

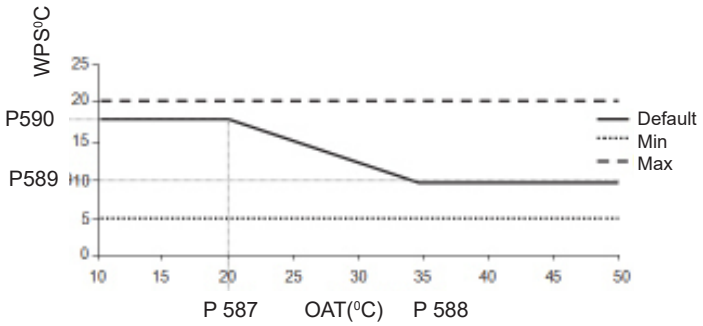
Wired Controller Occupancy	Water setpoint on Wired Controller Occupancy direct access	Range	Water setpoint on parameter menu	Range
Home	DHW Setpoint	40 to 62°C	DHW Setpoint	40 to 62°C
Eco	DHW Anti-Legionella Stp	60 to 70°C	DHW Anti-Legionella Stp	60 to 70°C

3. Custom climatic curve

COOLING:

If the cooling climatic curve is configured to “3”, the water setpoint will be calculated according to the custom cooling climatic curve. This custom cooling climatic curve can be defined using the following parameters:

Parameter	Description	Default	Min.	Max.
P587	Custom Minimum OAT	20°C	0°C	30°C
P588	Custom Maximum OAT	35°C	24°C	50°C
P589	Custom Minimum Water Temp	10°C	5°C	20°C
P590	Custom Maximum Water Temp	18°C	5°C	20°C

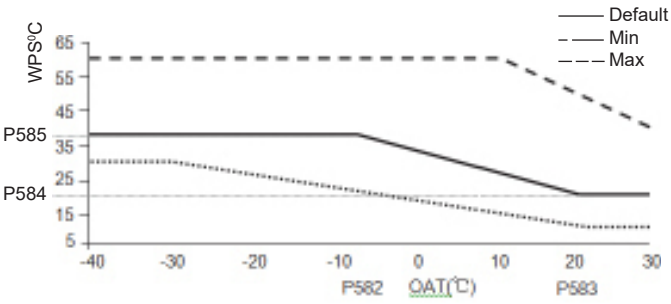


Example: Custom Cooling Climatic Curve

HEATING:

If the heating climatic curve is configured to “13”, the water setpoint will be calculated according to the custom heating climatic curve.This custom heating climatic curve can be defined using the following parameters:

Parameter	Description	Default	Min.	Max.
P582	Custom Minimum OAT	-7°C	-30°C	10°C
P583	Custom Maximum OAT	20°C	10°C	30°C
P584	Custom Minimum Water Temp	25°C	25°C	40°C
P585	Custom Maximum Water Temp	38°C	30°C	60°C



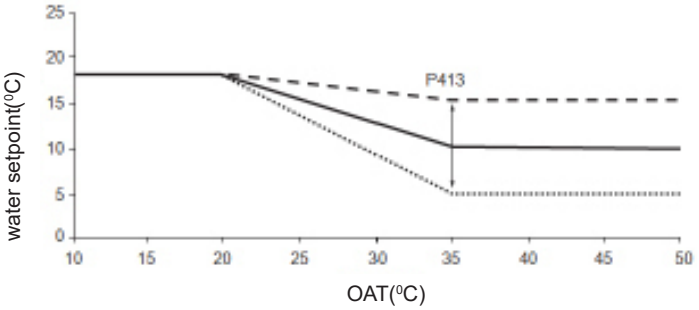
Example: Custom Cooling Climatic Curve

4. Offset on climatic curves (predefined and customer)

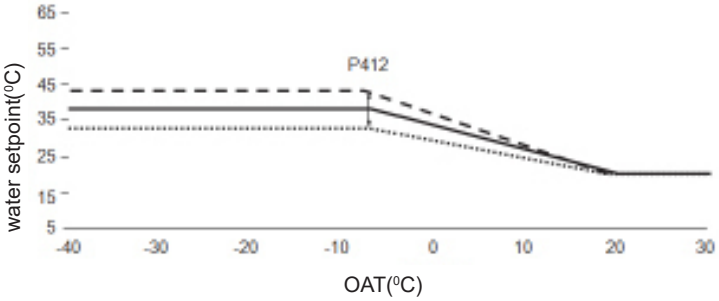
Example: Custom Cooling Climatic Curve

Two other parameters are also configurable to adjust the water setpoint to suit customer needs:

- for cooling curve, Cool Minimum Water Setpoint [P589] can be offsett by an offset on the foot of the curve (Cool Curve Min Stp Offset [P413])
- and for heating curve, Heat Maximum Water Setpoint [P585] can be offsettby an offset on head of the curve (Heat Curv Max Stp Offset [P412])



Custom Cooling Climatic Curve : Offset on the foot of the curve



Heating Cooling Climatic Curve : Offset on the head of the curve

4.2.6 - Water freeze protection

When the OAT is low (and the pump is stopped), the risk of freezing the water exchanger and the water pipes is high. The pump should be turned on regularly or continuously to make the water circulate and decrease the risk. Likewise, the BPHE and piping electric heaters present on the hydraulic kit (refer to Figures 6 and 7) are activated in some cases.

Standby mode:

If the OAT<7°C, water temperature of BPHE is below 3°C, pump will operate at maximum speed; anti-frozen EH, EH1, EH2, EH3 and auxiliary heat source will be activated if configured; the unit starts in heating mode.

Heating mode and DHW mode:

If the OAT≤3°C, water temperature of BPHE is below 3°C, pump will run at maximum speed; anti-frozen EH, EH1, EH2, EH3 and auxiliary heat source will be activated if configured; the unit starts in heating mode.

Cooling mode:

If the water temperature of BPHE is below 3°C, pump will run at maximum speed; anti-frozen EH, EH1, EH2, EH3 and auxiliary heat source will be activated if configured; the unit starts in heating mode.

Never switch off the unit, otherwise freeze protection cannot be guaranteed. For this reason, the main unit and/or customer circuit disconnect switch must always be left closed.

If a shut-off valve is installed, a bypass must be included as shown below.

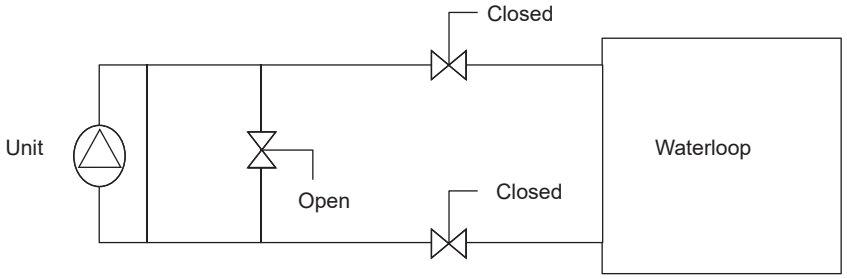


Figure 14: Winter position for unit with hydraulic module

IMPORTANT:

Depending on the atmospheric conditions in your area, you must do the following when switching the unit off in winter:

- Add ethylene glycol or propylene glycol with an adequate concentration to protect the installation up to a temperature of 10 K below the lowest temperature likely to occur at the installation site.
- If the unit is not used for an extended period, it should be drained, and ethylene glycol or propylene glycol should be charged in the heat exchang- er as a safety precaution, using the water inlet purge valve connection.

- At the start of the next season, refill the unit with water and add an inhibitor.
- For the installation of auxiliary equipment, the installer must comply with basic regulations, especially for minimum and maximum flow rates, which must be within the values listed in the operating limit table (application data).
- To prevent corrosion by differential aeration, the completely drained heat transfer circuit must be charged with nitrogen for a period of one month. If the heat transfer fluid does not comply with the manufacturer's regulations, the nitrogen charge must be added immediately.
- If frost protection is dependent on electric trace heaters, never switch off their power.
- If trace heating is not used, or during a prolonged power failure, the unit water system must be drained to protect the unit.
- The heat exchanger temperature sensor is a part of frost protection: If piping trace heaters are used, ensure the external heaters do not affect the measurement of these sensors.

CAUTION:

Please note that water freeze protection is used in order to reduce the risk of freezing the water exchanger and the water pipes.

4.2.7 - Domestic hot water mode (refer to DIP setting to activate)

For heat pumps with a domestic water tank, the DHW mode is used to produce hot water for domestic purposes. The system control manages to operate the hot domestic water tank, as well as the diverting value.

The heat pump is standard fitted with a variable speed pump in a hydraulic kit, and this pump is controlled with adjustable speed based on entering and leaving water temperature.

And an additional water pump can be installed on the secondary water loop (refer to § Installation with DHW production and boiler for details).

a - DHW diverting valve

The units can drive a diverting valve to manage a domestic hot water storage tank application. In the case of a domestic hot water request, the operating logic controls a diverting valve that directs the hot water to the storage tank.

Characteristics	Diverting valve with spring return and two wires control Recommendation: - Kvs = 16 - Max. Temperature = 150°C - CHAR:L

b - DHW temperature sensor or thermostat

According to the configuration, it is possible to control the DHW option with either a temperature sensor or thermostat.

	Temperature sensor	Thermostat
Characteristics	Accessory Resistance = 5 KOhms Cable length = 4 m	When the thermostat is closed, the domestic hot water mode is requested.

It must connect the DHW water sensor if configuring the DHW function.

The DHW production is possible when:

- DHW schedule is activated and there is DHW production demand (temperature conditions) and operating time in this mode is below DHW Maximal Runtime.

C- DHW electric heater

When the unit is requested to run in DHW mode, the DHW electric heater (if configured) can be used in order to provide domestic hot water.The discrete output can control a contactor (not supplied with the unit).

Characteristics	Contactor Coil: 230 VAC 50Hz

The electric heater is started when the tank temperature is below DHW setpoint and one of the following conditions is true:

- OAT is below Booster OAT Threshold.
- OAT is above Maximum OAT for Heating.
- Anti-legionella mode is active.
- Defrost is active.
- Incase of the unit failure.

IMPORTANT:

Electric heating is disabled when Load Shedding is active or in the case of DHW thermistor sensor failure (refer to § 4.2.4 Switch).

d - Domestic water tank

The water inside the domestic water tank must be constantly controlled in order to minimize the risk of any contamination, including legionella bacteria. Bearing this in mind, it is important to inform the user about the significance of water temperature control.

Water tank protection system

The system is scheduled to heat up the water in the domestic hot water tank in order to eliminate the possibility of legionella growth or kill any existing bacteria.

Legionella will not survive if the temperature is above 50°C. The risk of contamination is practically non-existent when the water temperature is set to 60°C.

Water tank protection settings

To protect the domestic water tank against legionella bacteria, the following parameters must be set:

- Anti-Legionella Start Day of Week
- Anti-Legionella Start Time
- Anti-Legionella Setpoint
  (anti-legionella protection is stopped when the water temperature reaches the pre-set temperature)

4.2.8- Pump con iguration

There are several possible configurations of the hydraulic circuit:

- Unit with hydraulic module (internal main pump included),
- If a secondary hydraulic loop is used, this will have its own additional pump.

Table 5: Different configurations of pump

Different configurations with pump	Internal main pump	Additional pump (notsupplied)
	Variable speed pump	Fixed speed pump
Internal main pump		✓
External main pump	×	✓

4- OPERATION

For external main pump and additional pump, the discrete output can control a contactor (not supplied with the unit).

Characteristics	Contactor Coil: 230 VAC 50Hz

CAUTION:

The installer is responsible for ensuring the protection of any additional pump against the low water flow rate (no flow switch can be managed by unit control).

The management of different states of the main water loop pump (ON / OFF) is different according to the kind of installation (options, accessories, applications). In the compatibility table below, the different control logics for the main pump are presented in function of installation:

Table 6: Different control logic for main water loop pump

Main Pump Logic	Wired Controller	OFF Mode	Cooling/Heating Mode	DHW		
			Satisfied Demand	Demand	On	Off
Always On	N.A.	Off	On	On	On	N.A.
Water Sampling	N.A.	Off	Off (On for sampling)	On	On	N.A.
According to setting Temp	N.A.	Off	According to Water setpoint or Air setpoint	On	On	N.A.

The management of different states of external heat source pump (ON / OFF) is different according to the kind of installation (options, accessories, applications). In the compatibility table below, the different control logics for additional pump are presented in function of installation:

Table 7: Different control logic for external heats source pump

Main Pump Logic	Wired Controller	OFF Mode	Cooling/Heating Mode	Boiler		
			Satisfied Demand	Demand	On	Off
Always On	N.A.	Off	On	On	On	Off
According to setting Temp	N.A.	Off	According to Water setpoint or Air setpoint	On	On	Off

4.2.9- Electric Heaters

NOTE:

The installer is responsible for ensuring that the installation complies with the applicable legislation in terms of electrical and thermal safety. It is possible to include electric heaters in the hydraulic circuit to ensure heating in the case of low OATor heat pump failure.

When OAT is below Booster OAT Threshold [P604], then the electrical booster heaters can be activated. These electrical booster heaters can be operated at the same time as the heat pump.

When OAT is below Min OAT for heating [P514], the heat pumps are stopped, and the electric heaters can be activated.

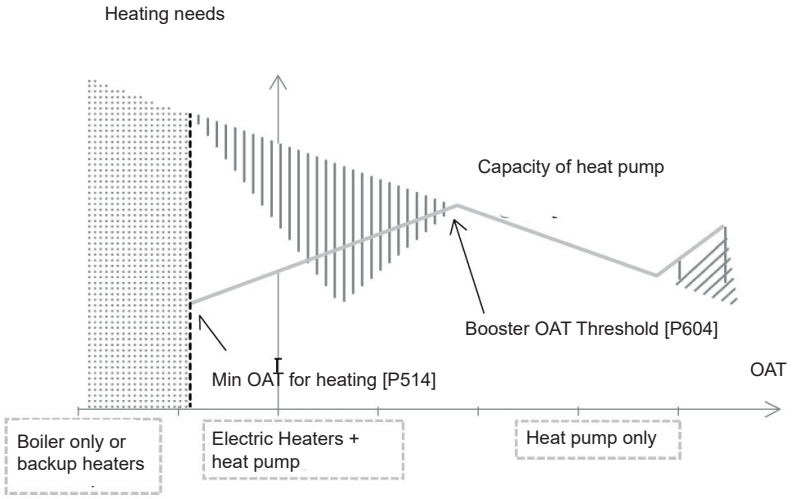


Figure 15: Operation of booster and backup

Depending on the configuration, it is possible to control up to three electric heaters or three electric heat stages (refer to § 3.1 General customer electrical connection on the terminal block):

- Standard equipment with one 3kw EH inside the hydraulic kit connecting to standard electric heat output: EH1.
- Another two standard electric outputs for field connect to EH2 and EH3.
- These three standard outputs: EH1, EH2, and EH3 can be configurated even if a DHW heater is present. Each discrete output can control a contactor (not supplied with the unit).

Characteristics	Contactor Coil: 230 VAC 50Hz
Electrical connection	Refer to § 3.4 Installation with electrical booster heaters
Configuration	Refer to § 3.4 Installation with electrical booster heaters

4.2. 10- Boiler

A boiler can be installed to meet heating demand during periods of extremely low ambient temperature. The boiler is considered a backup: when it is activated, the heat pump cannot operate. The boiler is activated when OAT is below the Minimum OAT for Heating [P514] or in the case of heat pump failure.

Characteristics	Contactor Coil: 230 VAC 50Hz

4.2.11- Coil heating control for the compressor

CAUTION:

When the unit doesn't operate, the compressor can be energized. The coil heating control has the function of heating the compressor by applying current to the compressor, when it is not operating instead of using a case heater.

This control is for the purpose of preventing stagnation of the refrigerant inside the compressor.

4.2.12- Defrost cycle (traditional defrost)

When the outdoor air temperature is low and the ambient humidity is high, the probability of frost forming on the surface of the outdoor coil increases. The frost covering the outdoor coil may reduce the air flow across the coil and impair the performance of the unit. To remove the frost from the coil, the control initiates the defrost cycle when necessary.

During the defrost cycle, the refrigerant circuit is forced into the cooling mode. To prevent the water loop from cooling down, BPHE and piping electric heaters may be started.

CAUTION:

Please note that "defrost" and "anti-freeze protection" are two different modes. Defrost is used in order to remove the frost that is covering the outside coil, whereas the antifreeze protection is used to protect the water loop against freezing.

4.2.13 - Night mode capacity control

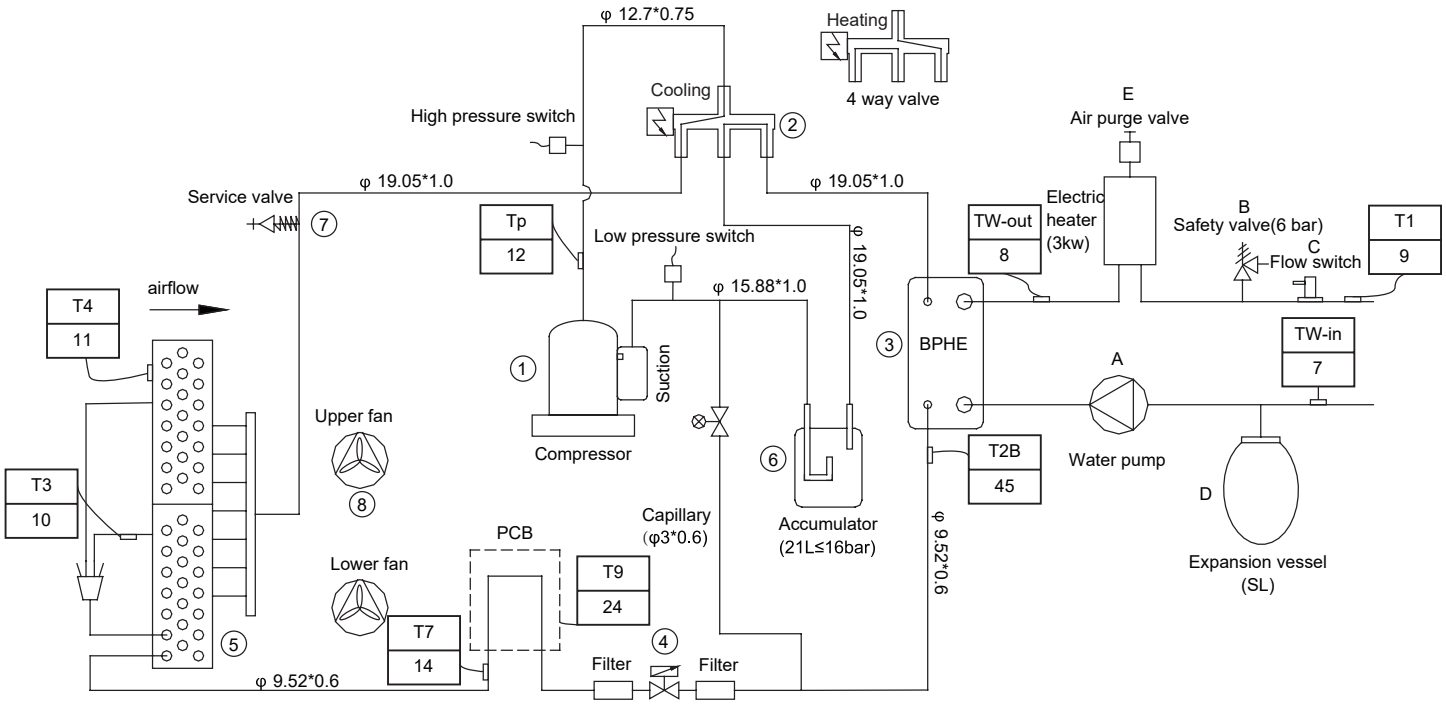
The night period is defined by the start hour and the end hour which can be set by the user. The night mode allows users to configure the unit to operate with specific parameters within a given period of time, e.g., night period. Particularly this mode permits the reduction of compressor frequency (and noise level) during defined period.

Steps		No.	Designation	Description	Range	Default	Ex.	Unit
Set the night mode	CMP_ CONF	6	Night Mode Start Time	Hour of starting up of night mode	00:00 to 23:59	0:00	0:00	hh:mm
	GEN_ CONF	6	Night Mode Stop Time	Hour of stop of night mode	00:00 to 23:59	0:00	0:00	hh:mm

4- OPERATION

4.3 - Major system components

4.3.1 - General – Refrigerant part



T1	Main water outlet temperature sensor	Resistance value(25^{0}C)
T3	Condenser temperature sensor	5KΩ
T4	Ambient temperature sensor	5KΩ
Tp	Discharge temperature sensor	50KΩ
T7	Refrigerant cooling temperature sensor	5KΩ
TW-out	BPHE water outlet temperature sensor	5KΩ
TW-in	BPHE water inlet temperature sensor	5KΩ

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 circuitlegend	
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	Upper & Lower fans

English

Running parameters of ODU PCB	
Parameter checklist	
Number	Content
0	Frequency or quantity of online indoor units
1	Outdoor unit capacity
2	Total capacity demand of indoor units
3	Amended total capacity
4	Running mode(0: off; 2: cooling mode; 3: heating mode; 4: forced heating)
5	Actual running capacity of outdoor unit
6	Fan motor speed(0-8)
7	Tw-in Entering water temperature of brazed plate heat exchanger
8	Tw-out Leaving water temperature of brazed plate heat exchanger
9	T1: Leaving water temperature of unit
10	T3: Condenser temperature
11	T4: Outdoor ambient temperature
12	Tp: Discharged temperature
13	Opening degree of EXV(Actual value=display value×4)
14	T7: Refrigerant cooling outlet pipe temperature
15	AC current
16	DC current
17	AC voltage
18	DC voltage(Actual value=display value×2)
19	Last time error code(No error or protection display ---)
20	Frequency limitation(0: no limit; 1: T3B limit; 2: T4 limit; 4: T5 limit; 8: voltage limit; 16: current limit; 32: T9 limit; 64: mute limit; 128: water outlet temperature limit(If the multiple frequency limits are displayed, the sum of the outputs is displayed.)
21	Program edition
22	EEPROM edition
23	P6 reason(L-: No fault; L0: Over current fault of IPM or IGBT; L1: Open phase fault; L2: Compressor stall fault; L3: Low voltage fault of DC bus; L4: Fan over current fault; L5: Fan phase loss fault; L6: Zero speed fault of fan; L7: PFC fault; L8: High voltage fault of DC bus; L9: Compressor zero speed fault; LA: PWM synchronization fault; Lb: MCE fault; Lc: Compressor over current protection; Ld: EEPROM data eeror; LE: Compressor start fault; LF: Fan stall fault.
24	T9: IPM module temperature
25	T30
26	Frequency limitation(0: no limit; 1: inlet and outlet water temperature difference limit; 2: heating SH3 limit; 4: T4 minimum frequency limit; 8: cooling T2b limit)
27	Target discharged temperature
28	Outdoor unit CRCH(Hexadecimal)
29	Outdoor unit CRCL(Hexadecimal)
30	Indoor unit CRCH(Hexadecimal)
31	Indoor unit CRCL(Hexadecimal)
32	Modbus baud rate(Actual baud rate=data×2)
33	Modbus parity check(0: No check; 1:Odd check; 2: Even check;)
34	Modbus ID(Slave station ID: 0-255)
35-44	Last ten failures
45	T2b temperature
46	IDU PCB Software version
47	Name of the USB record data file

4.3.2 - Compressors

The units use a hermetic rotary compressor. It is driven by a variable frequency drive (VFD). The rotary compressor incorporates an oil coil heating inside the shell.

The compressor sub-assembly is complete with:

- Anti-vibration mountings between the unit and the compressor chassis.
- A compressor case thermostat control at the discharge of the compressor.
- The compressors installed in these units have a specific oil charge.

NOTE:

Do not use refrigerants and lubricants besides those specified. Do not compress air (there must be no air intake due to leakage in the refrigeration cycles).

4.3.3 - Air evaporator/condenser

The coils are heat exchangers with internally grooved copper tubes with aluminum fins.

4.3.4 - Fans

The fans are driven by a permanent magnet synchronous motor.
The motors are managed via a variable frequency drive (VFD).

4.3.5- Pulse Motor Expansion Valve (PMV)

The PMV is equipped with a stepper motor (0-500 pulses). The 4 to 16 kW units have one PMV in their refrigerant circuit.

4.3.6- Filter drier

This is a one-piece, brazed filter drier, located in the liquid line. The role of the filter drier is to keep the circuit clean and moisture-free. The moisture indicator shows when it is necessary to change the filter drier. The filter drier is a biflow device on the units, which means that it filters and dehydrates in both operating modes. The pressure drop is much higher in the heating mode. A difference in temperature between the filter inlet and outlet shows that the element is dirty.

4.3.7 - Water evaporator/condenser

The evaporator/condenser is a plate heat exchanger. The water connection of the heat exchanger is a threaded connection. It has thermal insulation of polyurethane foam and includes frost protection, as standard. 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.

NOTES - Monitoring during operation:

- Follow the regulations on monitoring pressurised equipment.
- It is normally required that the user or the operator set it up and maintain a monitoring and maintenance file.
- If there are no regulations or to complement them, follow the control programmes of ISO 5149.
- Follow local professional recommendations, if they exist.
- Regularly check for the possible presence of impurities (e.g. silicon grains) in the heat exchange fluids. These impurities maybe the cause of the wear or corrosion by puncture.
- The reports of periodical checks by the user or operator must be included in the supervision and maintenance file.

4.3.8 - Refrigerant

Units operate with refrigerant R32.

4.3.9 - Four-way valve

For the units, this device permits the reversal of the refrigeration cycle to allow operation in cooling mode, in heating mode, and during defrost cycles.

4.3.10- Inverter subassembly for compressor and fans

The units are fitted with Inverter modules to control the compressor and the fan motors.

4.3.11- Accumulator

The units are fitted with an accumulator in the compressor suction line to prevent liquid carry-over to the compressor, particularly during defrost cycle and transient operations.

5- MAINTENANCE

5.1- 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 to detect any malfunction and correct it quickly, ensuring no serious damage occurs.

A service maintenance contract is the best way to ensure the maximum operating life for your equipment and through the expertise of techni cians, 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 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.

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.

5.1.1 - Level 1 maintenance See note in §5.1.3 Level 3.

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

- Visual inspection for oil traces (the sign of a refrigerant leak).
- Air heat exchanger cleaning - see §5.3 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 the wired controller manual).
- General visual inspection for any signs of deterioration.
- Verify the charge in the sight-glass.

Check if the water temperature difference between the heat exchanger’s inlet and outlet is correct.

5.1.2 - 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 § 5.2 for the main electrical connections).
- Check and retighten all control/command connections, if required (refer to § 5.2 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 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 close by condenser 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 its mechanical seal after 15000 hours. Check the operation of the low water flow rate safety device.
- 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's 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 regula- tions, compliance with applicable local regulations and use of common sense.

5.1.3 - 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. The concerned maintenance operations are :

- 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 using products-appropriate materials.
Any detected leaks must be repaired immediately.

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

Refrigerants under pressure must not be purged in 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 HVAC unit's guarantee conditions null and void, and the manufacturer will no longer be held liable.- Tightening torques for the main electrical connections.

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

5- MAINTENANCE

5.2 - 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.

5.3 - Water heat exchanger maintenance

Check that:

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

5.4- Unit maintenance

CAUTION :

Before doing 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 the event 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.

5.5 - 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 with 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.

6 - 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 the atmosphere.
- When a system is under vacuum, never expose it to the outside atmosphere.
- When the system must be opened for service, break the vacuum with dry nitrogen.
- Do not vent R32 into atmosphere.

6.1- Alarm listing

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

Display on the wired controller

Table 8: Alarms listing

Alarm code	Description	Remarks
E1	Phase sequence fault	Reserved
E2	Hydronic box and OUD communication fault	Reserved
E4	Ambient temperature sensor (T4) fault	
E6	ODU condenser temperature sensor (T3) fault	
E8	Discharged temperature sensor (Tp) fault	
E9	AC over/under voltage fault	
E10	EPPROM fault	
EA	Condenser temperature sensor (T3B) fault	Reserved
Ec	Refrigerant cooling pipe temperature sensor (T7) fault	
H0	Communication fault between the main chip and module chip of ODU PCB	
H1	Communication fault between the main boards of ODU and IDU	
H4	3 times P6 error in 30 minutes	It can only be restored by repowering the unit
H5	3 times P2 error in 30 minutes	It can only be restored by repowering the unit
H6	3 times P4 error in 100 minutes	It can only be restored by repowering the unit
H7	IDU quantity decrease alarm	Reserved
H9	2 times P9 error in 10 minutes	It can only be restored by repowering the unit
H10	3 times P3 error in 60 minutes	It can only be restored by repowering the unit
H11	2 times P13 error in 10 minutes	Reserved
H12	3 times Pb error in 60 minutes	It can only be restored by repowering the unit
P1	High pressure protection	
P2	Low pressure protection	P2 protection appears 3 times within the span of 30 minutes and is then reported as H5
P3	Over current protection	P3 protection appears 3 times within the span of 60 minutes and is then reported as H10
P4	Protection from excessively high discharge temperature	P4 protection appears 3 times within the span of 100 minutes and is then reported as H6
P5	High temperature protection of condenser	

English

6 - ALARM DESCRIPTION

P6	IPM board protection	P6 protection appears 3 times within the span of 30 minutes and is then reported as H4
P9	DC fan motor protection	P9 protection appears 2 times within the span of 10 minutes and is then reported as H9
P10	Anti-typhoon protection	Reserved
P11	T2B Low temperature protection	Refrigerant temperature of HPHE
P13	Abnormal current detection protection	Reserved
Pb	IPM temperature over-heating protection	
F0	Water flow switch fault	
F1	Communication fault between IDU and ODU boards	Reserved
F2	LWT of unit sensor (T1 sensor) fault	
F3	Water temperature sensor (Tw_so sensor) of solar water heater fault	Reserved
F4	Liquid refrigerant temperature sensor (T2B sensor) fault	
F5	ODU (module part) alarm	Reserved
F6	DHW sensor (T5 sensor) fault	
F7	EWT sensor (Tw_in sensor) fault	
F8	LWT of BPHE sensor (Tw_out sensor) fault	
F9	Communication fault between wired controller and IDU board	
FA	Second zone LWT sensor (Tw_2 sensor) fault	Only valid after setting second zone function
Fb	External heat source LWT sensor (T1B sensor) fault	Only valid after set the external heat source – boiler
Fc	Reserved	
Fd	Buffer tank water temperature sensor (Tw_bt) fault	Reserved
FE	Cascade LWT sensor (Tw_c) fault	Reserved
FF	Mode conflict	Reserved
U0	EEPROM fault	
U1	Protection activated due to high difference between EWT and LWT	
U2	Water storage protection	
U3	Protection activated due to high difference between EWT and LWT	
U4	Water pump protection	Reserved
U5	Water pump has stopped working	Reserved
U6	Protection from the overheating of the standard electrical heater	

6- ALARM DESCRIPTION

Display on the PCB

Alarm code	Description	Remarks
E1	Phase sequence fault	Reserved
E2	Hydronoic box and OUD communication fault	Reserved
E4	Ambient temperature sensor (T4) fault	
E6	ODU condenser temperature sensor (T3) fault	
E8	Discharged temperature sensor (Tp) fault	
E9	AC over voltage/ under vlotage fault	
E10	EPPROM fault	
EA	Condenser temperature snesor (T3B) fault	Reserved
Ec	Refrigerant cooling pipe temperature sensor (T7) fault	
H0	Communication fault between main chip of ODU PCB and module chip of ODU PCB	
H1	Communication fault between ODU mian board and IDU mian board	
H4	3 times P6 error in 30mins	It can only be restored by repowering the unit
H5	3 times P2 error in 30mins	It can only be restored by repowering the unit
H6	3 times P4 error in 100mins	It can only be restored by repowering the unit
H7	IDU quantity decrease alarm (reserved)	Reserved
H9	2 times P9 error in 10mins	It can only be restored by repowering the unit
H10	3 times P3 error in 60mins	It can only be restored by repowering the unit
H11	2 times P13 error in 10mins (reserved)	Reserved
H12	3 times Pb error in 60mins	It can only be restored by repowering the unit
P1	High pressure protection	
P2	Low pressure protection	3 times P2 protection appears within 30 minutes and is then reported H5
P3	Over current protection	3 times P3 protection appears within 60 minutes and is then reported H10
P4	over-high discharged temperature protection	3 times P4 protection appears within 100 minutes and is then reported H6
P5	High temperature protection of condenser	
P6	IPM board protection	3 times P6 protection appears within 30 minutes and is then reported H4
P9	DC fan motor protection	2 times P9 protection appears within 10 minutes and is then reported H9
P10	Anti-typhoon protection (reserved)	
P11	T2B Low temperature protection	Liquid refrigerant temperature of BPHE
P13	Current detection abnormal protection	Reserved
Pb	IPM temperature over heat protection	

English

7 - START-OFF CHECKLIST FOR 30AWH 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
Thermal cut off for floor heating			Master / Slave sensor		
Backup heater			Domestic hot water management sensor		
Hydraulic module equipped with variable speed single pump low available pressure in the absence of an expansion tank			Remote human interface		
A water filling system			Additional outdoor ambient temperature sensor		

7 - START-OFF CHECKLIST FOR 30AWH HEAT PUMPS (USE FOR JOB FILE)

7.3 - Checks performed prior to the start of the unit

		Yes	No	Comment
CHECKS BEFORE START-UP	Is there any shipping damage?			
	The unit is level in its installation.			
	The power supply agrees with the unit nameplate.			
	The electrical circuit wiring has been sized and installed properly.			
	The unit ground wire has been connected			
	The 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 pipings are connected properly.			
	All air has been vented out from the system.			
	The water pump is operating with the correct rotation.			
	The water pump control has been properly interlocked with the heat pump.			
	The unit has been leak checked(including fittings):Find, repair & report any refrigerant leak.			
	All incoming power voltage is within the rated voltage range.			

English

7.4 - Checks during the operation of the unit

		Date / Hour						
CHECKS DURING OPERATION	Air	Outdoor Air Temp.	°C					
	Water	Entering Water Temp.	°C					
		Leaving Water Temp.	°C					
		Water Control Temp.	°C					
	Suction	Suction Temperature	°C					
	Discharge	Discharge Temperature	°C					
		Refrigerant Temperature	°C					
	Compressor	Requested Compressor Frequency	Hz					
		Actual Compressor Frequency	Hz					
	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 - START-OFF CHECKLIST FOR 30AWH HEAT PUMPS (USE FOR JOB FILE)

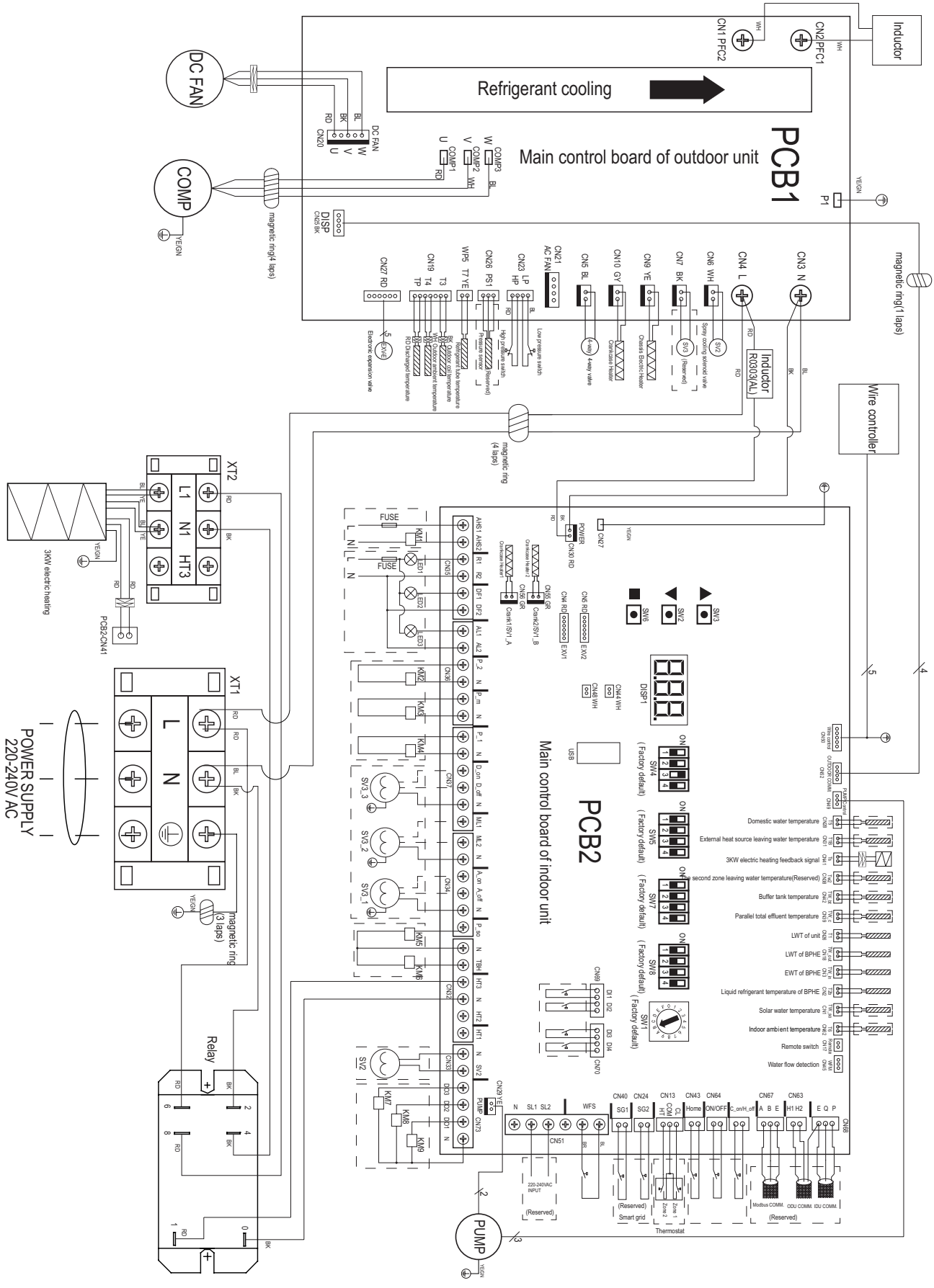
7.5 - Maintenance checks

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 :

8 - ANNEX (ELECTRICAL WIRING DIAGRAM)

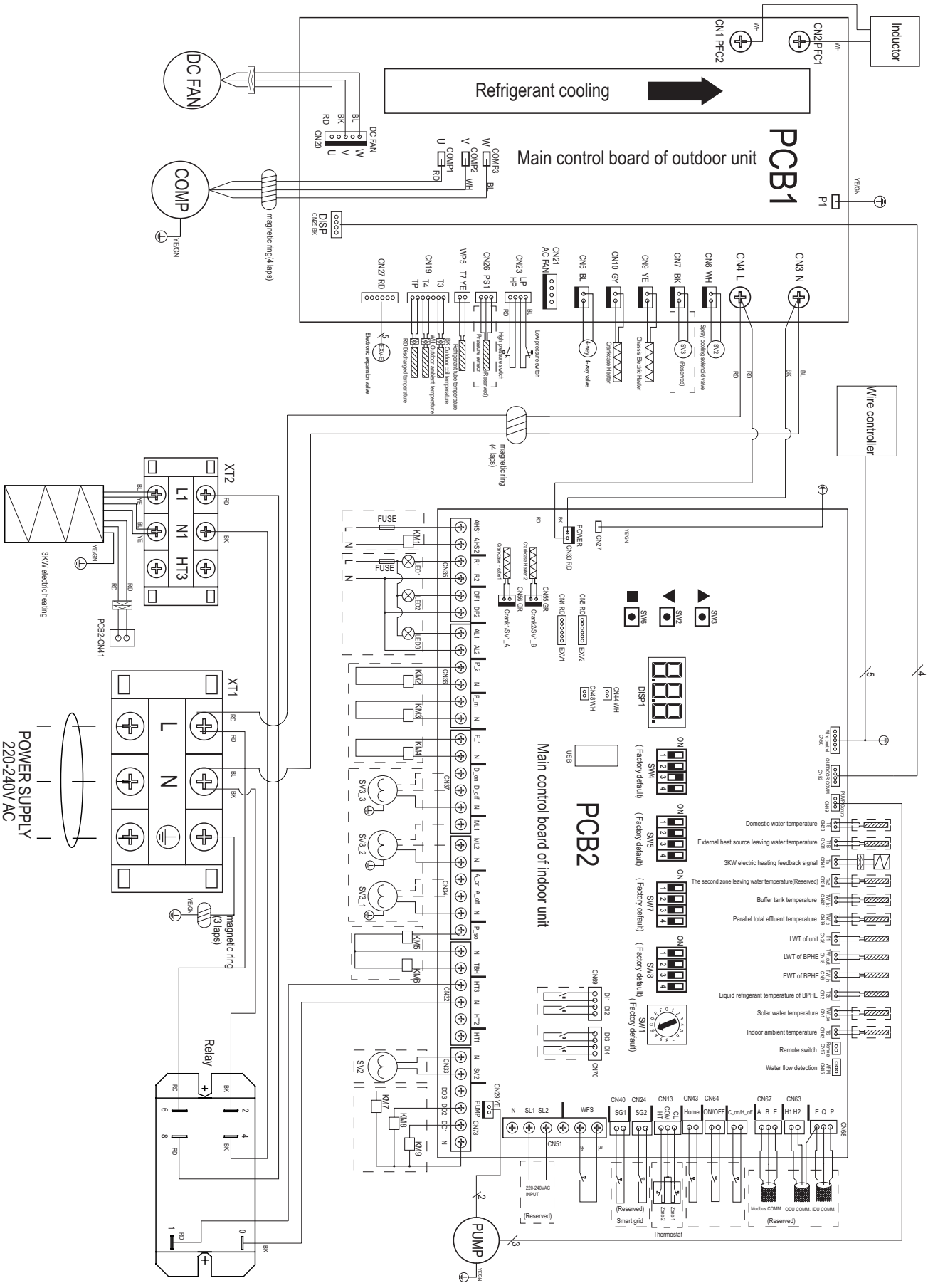
8.1 4-6kW, single phase



English

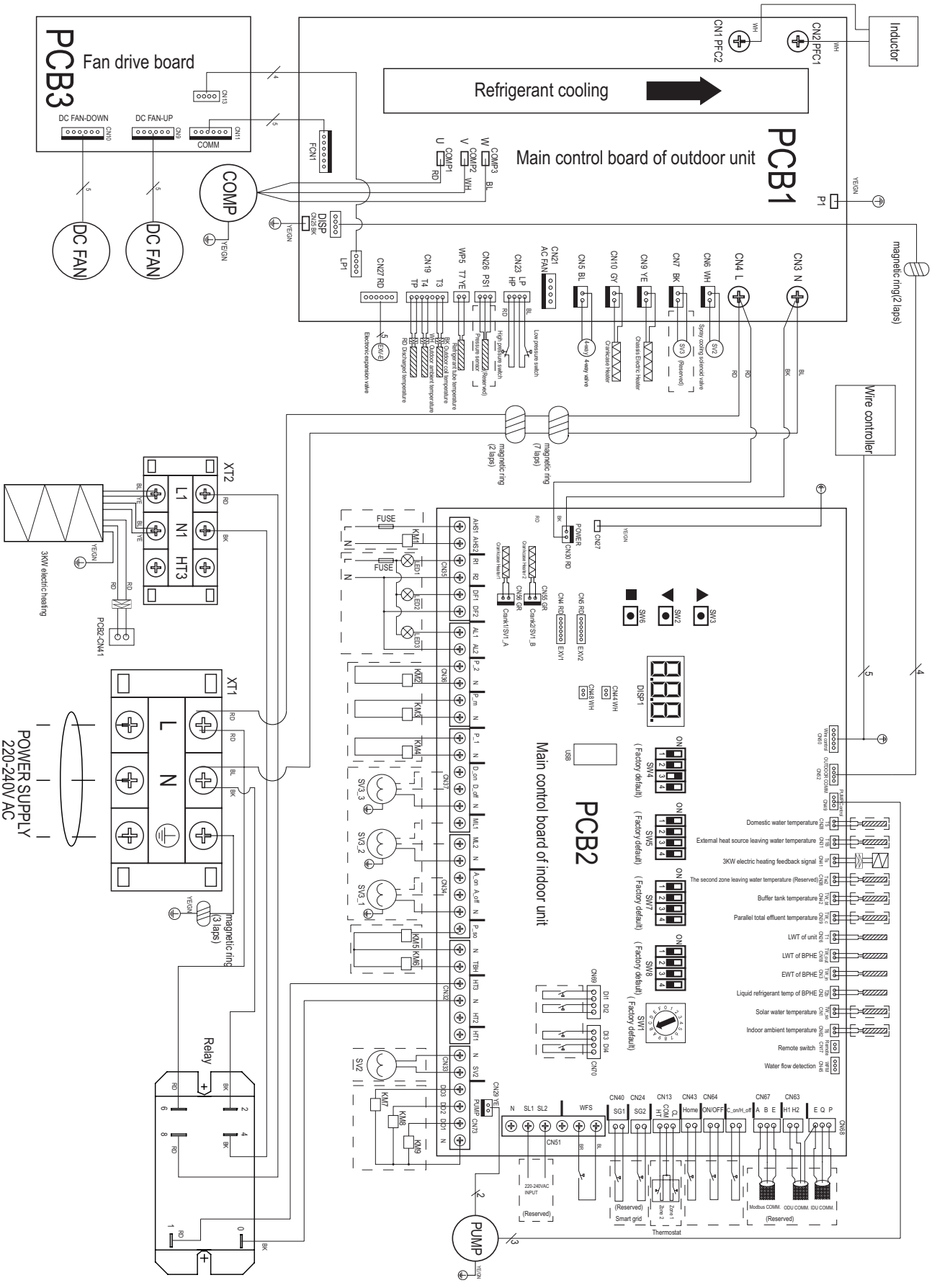
8 - ANNEX (ELECTRICAL WIRING DIAGRAM)

8.2 - 8-10kW, single phase



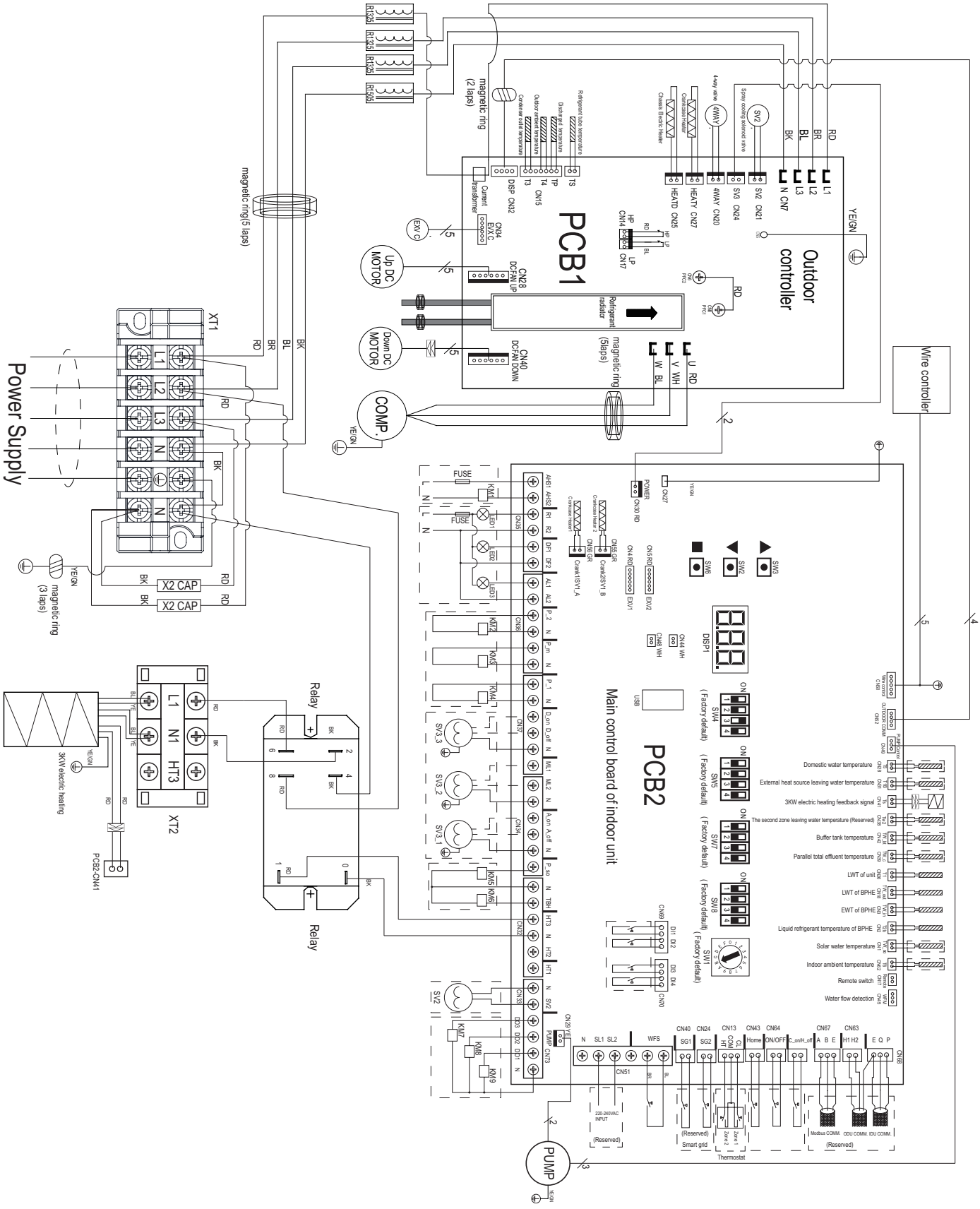
8 - ANNEX (ELECTRICAL WIRING DIAGRAM)

8.3 - 12-16kW, single phase



8 - ANNEX (ELECTRICAL WIRING DIAGRAM)

8.4 - 12-16kW, three phase



8 - ANNEX (ELECTRICAL WIRING DIAGRAM)

8.5 - DIP switches setting

SW4

Factory default

SW4 Dial definition					
SW4_1	SW4_2	Modbus baud rate(bit/s)	SW4_3	SW4_4	Modbus parity check
OFF	OFF	9600(default)	OFF	OFF	No check
ON	OFF	4800	ON	OFF	Even check(default)
OFF	ON	19200	OFF	ON	Odd check
ON	ON	38400	ON	ON	No check

SW5

Factory default

SW5 Dial definition	
1-OFF: Heat pump	1-ON: Heating only
2-OFF: Wired controller control	2-ON: Thermostat control
3-OFF: Normal control	3-ON: Laboratory test mode
4-OFF: With DHW mode	4-ON: Without DHW mode

SW7

Factory default

SW8

Factory default

SW1

Factory default

SW7 Dial definition	SW7_1	SW7_2	SW7_3	SW7_4	Brand
	OFF	OFF	OFF	OFF	Carrier
SW8 Dial definition					
SW8_1-OFF	Modbus stop bit 1 bit(Default except Riello)				
SW8_1-ON	Modbus stop bit 2 bit(Riello default)				
MODBUS Network Address					
SW8_4-OFF			SW8_4-ON		
SW1 CODE	Network address		SW1 CODE	Network address	
0	32		0	16	
1	1		1	17	
2	2		2	18	
3	3		3	19	
4	4		4	20	
5	5		5	21	
6	6		6	22	
7	7		7	23	
8	8		8	24	
9	9		9	25	
A	10		A	26	
B	11		B	27	
C	12		C	28	
D	13		D	29	
E	14		E	30	
F	15		F	31	

English

8 - ANNEX (ELECTRICAL WIRING DIAGRAM)

8.6 - Nameplate template

Model				CE	0598
Description	Air to water heat pump				
Variant					
Hermetically sealed equipment			Y		
Contains fluorinated greenhouse gases			Y		
Fluid during transport	R32K		g		
Refrigerant	R32	PED Ⅱ	2	GWP	675
Circuit	A	BC			
Factory charge				Kg	
Charge added on site				Kg	
Total charge				Kg	
Global warming potential	675	Kg eq CO2			
Inerting medium	NITROGEN				

	High pressure		Low pressure	
Allowable pressure min/max (PS)		bar		bar
		kPa		kPa
Allowable temperature max (TS)				
Allowable temperature min (TS)				
Pressure safety switch		bar		bar
Test pressure (PS)		bar		bar
Relief valve setting		bar		bar

Voltage		Phase		Frequency	
Maximum AMPS		A	IP		
Max power input		kW			
Net weight		Kg			

Heating capacity(@A7W35)		kW
Cooling capacity(@A35W18)		kW

Series number

Year of manufacturing & test date

8 - ANNEX (ELECTRICAL WIRING DIAGRAM)

8.7 - 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 the field .

DHW EHS : can connect two EHS in the field.

Gas boiler : can connect to a gas boiler and send the 220V start signal from the 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): used only for compressor pre-heat function.

❂ **:** mean will be on while anti-frozen function is active.

❄ : mean will be on during heating mode at low OAT.

♨ : mean will be on during pre-heating of the compressor and oil.

✔ : means will be on according to control logic.

✘ : mean will be off at all times.

English

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