



INSTALLATION, OPERATION AND  
MAINTENANCE INSTRUCTIONS



Monoblock heat pump

## CONTENTS

<b>1 - INTRODUCTION .....</b>	<b>09</b>
1.1 - Introduction .....	09
1.2 - Safety .....	09
1.3 - Preliminary checks .....	13
1.4 - Dimensions and clearance units .....	13
1.5 - Specification data and electrical data of units .....	16
1.6 - OPTIONS AND ACCESSORIES .....	18
<b>2 - INSTALLATION OF UNIT .....</b>	<b>19</b>
2.1 - General .....	19
2.2 - Moving and placing the unit .....	19
2.3 - Water connections .....	22
2.4 - Electrical connections .....	26
2.5 - Water flow rate control .....	28
2.6 - Commissioning modes .....	31
2.7 - Check before start the unit .....	31
<b>3 - INSTALLATION OF SYSTEM .....</b>	<b>32</b>
3.1 - General customer electrical connection on terminal block .....	32
3.2 - First step of configuration: Setting the time and day .....	32
3.3 - Installation with booster electric heaters .....	33
3.4 - Electrical connections .....	34
3.5 - Installation with DHW production and boiler .....	36
3.6 - Unit with remote user interface .....	39
3.7 - IAT sensor .....	40
<b>4 - OPERATION .....</b>	<b>41</b>
4.1 - Unit range .....	41
4.2 - Operating modes .....	41
4.3 - Major system components .....	49
<b>5 - MAINTENANCE .....</b>	<b>51</b>
5.1 - Standard maintenance .....	51
5.2 - Tightening torques for the main electrical connections .....	52
5.3 - Air heat exchanger .....	52
5.4 - Water heat exchanger maintenance .....	52
5.5 - Unit maintenance .....	53
5.6 - Refrigerant volume .....	53
5.7 - Characteristics of R32 .....	53
<b>6 - ALARM DESCRIPTION .....</b>	<b>54</b>
6.1 - Alarm listing .....	54
<b>7 - PARAMETERS OVERVIEW .....</b>	<b>56</b>
7.1 - Parameters list .....	56
<b>8 - START-UP CHECKLIST FOR 30AWH HEAT PUMPS (USE FOR JOB FILE) .....</b>	<b>62</b>
8.1 - General information .....	62
8.2 - Available options and accessories .....	62
8.3 - Checks before start of unit .....	62
8.4 - Checks during operation of unit .....	63
8.5 - Maintenance checks .....	63
<b>9 - ANNEX ( ELECTRICAL WIRING DIAGRAM ) .....</b>	<b>64</b>
9.1 - 4-6kW, single phase .....	64
9.2 - 8-10kW, single phase .....	65

9.3 - 12-16kW, single phase.....	66
9.4 - 12-16kW, three phase.....	67
9.5 - Nameplate template .....	68
9.6 - Table for backup heaters and craft heaters .....	68

## FIGURES CONTENT

Figure 1: Transport configuration .....	19
Figure 2: Offloading configuration .....	19
Figure 3: How to remove front panel for 12-16 kW units .....	20
Figure 4: How to remove front panel for 4-10 kW units .....	21
Figure 5: Water connection on unit.....	23
Figure 6: Typical diagram of the hydraulic circuit for 4-10kW units .....	24
Figure 7: Typical diagram of the hydraulic circuit for 12-16kW units .....	25
Figure 8: Hydraulic module equipped with variable speed single pump low available pressure with expansion tank .....	25
Figure 9: Power connection with Main Switch .....	26
Figure 10: Standard installation with electric booster heaters .....	34
Figure 11: Standard installation with DHW production and boiler .....	37
Figure 12: Electrical connection on terminal block for DHW production and boiler.....	38
Figure 13: Electrical connection of remote interface .....	39
Figure 14: Winter position for unit with hydraulic module .....	45
Figure 15: Operation of booster and backup .....	48

## TABLES CONTENT

Table 1: Minimum and maximum wire section (per phase) for connection to units .....	27
Table 2: Steps to clean, purge, and define a flow rate for hydraulic circuit .....	29
Table 3: Different operating modes.....	42
Table 4: Possible switches to install on system .....	42
Table 5: Different configurations of pump.....	47
Table 6: Different control logic for main water loop pump.....	47
Table 7: Different control logic for external heat source pump .....	47
Table 8: Alarms listing.....	54

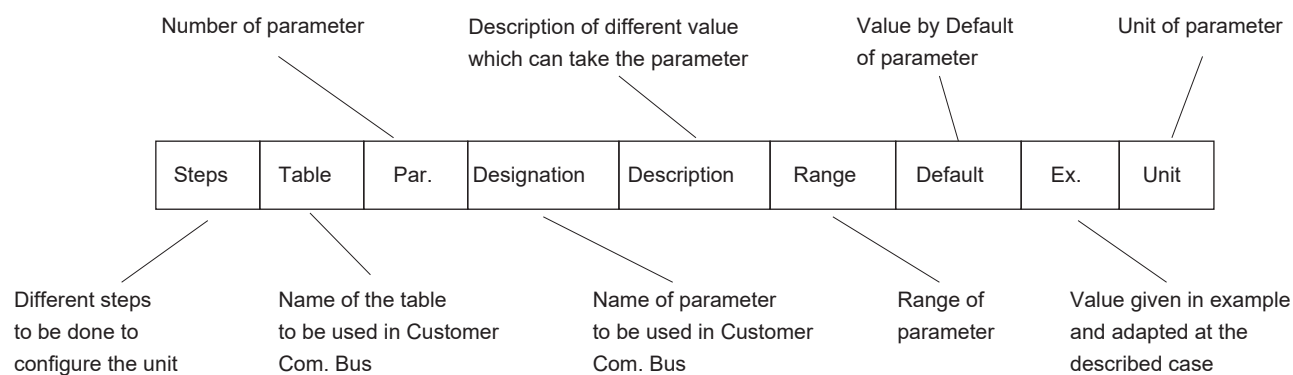
## GRAPHICS CONTENT

Graphic 1: Available static pressure for 4 to 16kW units with hydraulic module .....	30
Graphic 2: Pressure drop for 4 to 16kW units with additional main water loop pump .....	30

## ACRONYMS AND LEGEND

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

### Control Configuration Legend



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







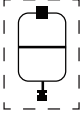


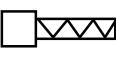


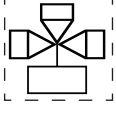

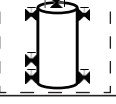
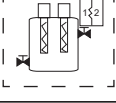
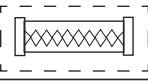



Check to be done



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

## Standard installation Legend

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

## Precaution 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 in the proximity of heat sources, open flames, operating gas appliance or an operating electric heater.
- The user/owner or their authorized representative shall regularly check the alarms, mechanical ventilation and detectors, at least once a year, where as required by national regulations, to ensure their correct functioning.
- A logbook shall be maintained. The results of these checks shall be recorded in the logbook.
- Ventilations in occupied spaces shall be checked to confirm no obstruction.
- Before a new refrigerating system is put into service, the person responsible for placing the system in operation should ensure that trained and certified operating personnel are instructed on the basis of the instruction manual about the construction, supervision, operation and maintenance of the refrigerating system, as well as the safety measures to be observed, and the properties and handling of the refrigerant used.
- The general requirement of trained and certified personnel are indicated as below:
  - a) Knowledge of legislation, regulations and standards relating to flammable refrigerants;
  - b) Detailed knowledge of and skills in handling flammable refrigerants, personal protective equipment, refrigerant leakage prevention, handling of cylinders, charging, leak detection, recovery and disposal; and,
  - c) Able to understand and to apply in practice the requirements in the national legislation, regulations and Standards;
  - d) Continuously undergo regular and further training to maintain this expertise.
- Protect the refrigerating system from accidental rupture due to moving furniture or reconstruction activities.
- To ensure no leaking, field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure ( $>1.04\text{MPa}$ , max  $4.15\text{MPa}$ ). No leak shall be detected.
- For joints made at the installation site:

Joints shall be tested with detection equipment with a capability of 5g/year of refrigerant or better, with the equipment in standstill and under operation or under a pressure of at least these standstill or operation conditions.



### Caution

#### 1. Installation (Space)

- Must comply with national gas regulations, state municipal rules and legislation. Notify relevant authorities in accordance with all applicable regulations.
- Must ensure mechanical connections be accessible for maintenance purposes.
- In cases that require mechanical ventilation, ventilation openings shall be kept clear of obstruction.
- When disposal of the product, do follow to the precautions in #12 and comply with national regulations.
- Always contact to local municipal offices for proper handling.

#### 2. Servicing

##### 1) Service personnel

- Any qualified person who is involved with working on or breaking into a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accordance with an industry recognised assessment specification.
- Servicing shall only be performed as recommended by the equipment manufacturer. Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants.
- Servicing shall be performed only as recommended by the manufacturer.
- The system is inspected, regularly supervised and maintained by a trained and certified service personnel who is employed by the person user or party responsible.
- Ensure refrigerant charge not to 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 repair to the refrigerating system, the precautions in #2-2 to #2-8 must be followed before conducting work on the system.
- Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.

## Precaution for Using R32 Refrigerant

---

- All maintenance staff and others working in the local area shall be instructed and supervised on the nature of work being carried out.
- Avoid working in confined spaces. Always ensure away from source, at least 2 meter of safety distance, or zoning of free space area of at least 2 meter in radius.

- Wear appropriate protective equipment, including respiratory protection, as conditions warrant.
- Keep all sources of ignition away.

### 3) Checking for presence of refrigerant

- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially flammable atmospheres.
- Ensure that the leak detection equipment being used is suitable for use with flammable refrigerants, i.e. non sparking, adequately sealed or intrinsically safe.
- In case of leakage/spillage happened, immediately ventilate area and stay upwind and away from spill/release.
- In case of leakage/spillage happened, do notify persons downwind of the leaking/spill, isolate immediate hazard area and keep unauthorized personnel out.

### 4) Presence of fire extinguisher

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

### 5) No ignition sources

- No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion.
- He/She must not be smoking when carrying out such work.
- All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which flammable refrigerant can possibly be released to the surrounding space.
- Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks.

### 6) Ventilated area

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

### 7) Checks to the refrigeration equipment

- Where electrical components are being changed, they shall be fit for the purpose and to the correct specification.
- At all times the manufacturer's maintenance and service guidelines shall be followed.
- If in doubt consult the manufacturer's technical department for assistance.
- The following checks shall be applied to installations using flammable refrigerants:
  - The ventilation machinery and outlets are operating adequately and are not obstructed.
  - Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.

### 8) Checks to electrical devices

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

### 3. Repairs to sealed components

- During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc.
- If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.
- Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.
- Ensure that apparatus is mounted securely.
- Ensure that seals or sealing materials have not degraded such that they no longer serve the purpose of preventing the ingress of

## Precaution for Using R32 Refrigerant

---

flammable atmospheres.

- Replacement parts shall be in accordance with the manufacturer's specifications.

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

### 4. Repair to intrinsically safe components

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

### 5. Cabling

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

### 6. Detection of flammable refrigerants

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

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

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

### 8. Removal and evacuation

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

#### The following procedure shall be adhered to:

- remove refrigerant -> purge the circuit with inert gas -> evacuate -> purge again with inert gas
- open the circuit by cutting or brazing.
- The refrigerant charge shall be recovered into the correct recovery cylinders.
- The system shall be purged with OFN to render the appliances safe. (remark: OFN = oxygen free nitrogen, type of inert gas)
- This process may need to be repeated several times.
- Compressed air or oxygen shall not be used for this task.
- Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum.
- This process shall be repeated until no refrigerant is within the system.
- When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.
- This operation is absolutely vital if brazing operations on the pipe work are to take place.
- Ensure that the outlet for the vacuum pump is not close to any ignition sources and there is ventilation available.

### 9. Charging procedures

- In addition to conventional charging procedures, the following requirements shall be followed:
  - Ensure that contamination of different refrigerants does not occur when using charging equipment.
  - Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
  - Cylinders shall be kept in an appropriate position according to the instructions.
  - 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 over fill the refrigeration system.



## Precaution for Using R32 Refrigerant

---

- Prior to recharging the system it shall be pressure tested with OFN (refer to #7).
- The system shall be leak tested on completion of charging but prior to commissioning.
- A follow up leak test shall be carried out prior to leaving the site.
- Electrostatic charge may accumulate and create a hazardous condition when charging and discharging the refrigerant. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before charging/discharging.

### 10. Decommissioning

- Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its details.
- It is recommended good practice that all refrigerants are recovered safely.
- Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of reclaimed refrigerant.
- It is essential that electrical power is available before the task is commenced.
- a) Become familiar with the equipment and its operation.
- b) Isolate system electrically.
- c) Before attempting the procedure ensure that:
  - mechanical handling equipment is available, if required, for handling refrigerant cylinders;
  - all personal protective equipment is available and being used correctly;
  - the recovery process is supervised at all times by a competent person;
  - recovery equipment and cylinders conform to the appropriate standards.
- d) Pump down refrigerant system, if possible.
- e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
- f) Make sure that cylinder is situated on the scales before recovery takes place.
- g) Start the recovery machine and operate in accordance with manufacturer's instructions.
- h) Do not over fill cylinders. (No more than 80 % volume liquid charge).
- i) Do not exceed the maximum working pressure of the cylinder, even temporarily.
- j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
- k) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.
- Electrostatic charge may accumulate and create a hazardous condition when charging or discharging the refrigerant. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before charging/discharging.

### 11. Labelling

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

### 12. Recovery

- When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.
- When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed.
- Ensure that the correct number of cylinders for holding the total system charge are available.
- All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant).
- Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order.
- Recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
- The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of flammable refrigerants.
- In addition, a set of calibrated weighing scales shall be available and in good working order.
- Hoses shall be complete with leak-free disconnect couplings and in good condition.
- Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.
- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Note arranged.
- Do not mix refrigerants in recovery units and especially not in cylinders.
- If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant.
- The evacuation process shall be carried out prior to returning the compressor to the suppliers.
- Only electric heating to the compressor body shall be employed to accelerate this process.
- When oil is drained from a system, it shall be carried out safely.

# 1 - INTRODUCTION

---

## 1.1 - Introduction

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

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

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

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

## 1.2 - Safety

### 1.2.1 - Installation safety considerations

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

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

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

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

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

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

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

### **DO NOT COVER ANY PROTECTION DEVICES.**

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

### **Control**

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

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

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

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

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

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

### 1.2.2 - Equipment and components under pressure

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

The units are intended to be stored and operate in an environment where the ambient temperature must not be less than the lowest allowable temperature indicated on the nameplate.

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

### **NOTES:**

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

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

# 1 - INTRODUCTION

---

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

## REPAIR:

Any repair or modification of a pressure vessel is prohibited.

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

## RECYCLING:

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

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

### 1.2.3 - Maintenance safety considerations

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

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

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

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

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

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

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

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

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

## Caution

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

## Caution

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

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

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

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

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

## OPERATING CHECKS:

- IMPORTANT INFORMATION REGARDING THE REFRIGERANT USED:

Refrigerant type: R32

Global Warming Potential (GWP): 675

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

## Caution

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

# 1 - INTRODUCTION

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

System WITHOUT leakage detection		No Check	12 Months	6 Months	3 Months
System WITH leakage detection		No Check	24 Months	12 Months	6 Months
Refrigerant charge/circuit (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 the type of fluid present within the installation (added and recovered), the quantity of recycled fluid, regenerated or destroyed, the date and output of the leak test, the designation of the operator and its belonging company, etc.

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

## Protection device checks:

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

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

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

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

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

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

## Caution

Inspect the protection devices such as valves.

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

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

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

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

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

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

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

## 1.2.4 - Repair safety considerations

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

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

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

# 1 - INTRODUCTION

---

## RISK OF EXPLOSION



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

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

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

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

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

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

Do not siphon refrigerant.

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

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

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

We recommend to apply standard ISO 5149.

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

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

Refer to the certified dimensional drawings for the units.

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

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

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



## Caution

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

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

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

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

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

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

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

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

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

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

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

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

# 1 - INTRODUCTION

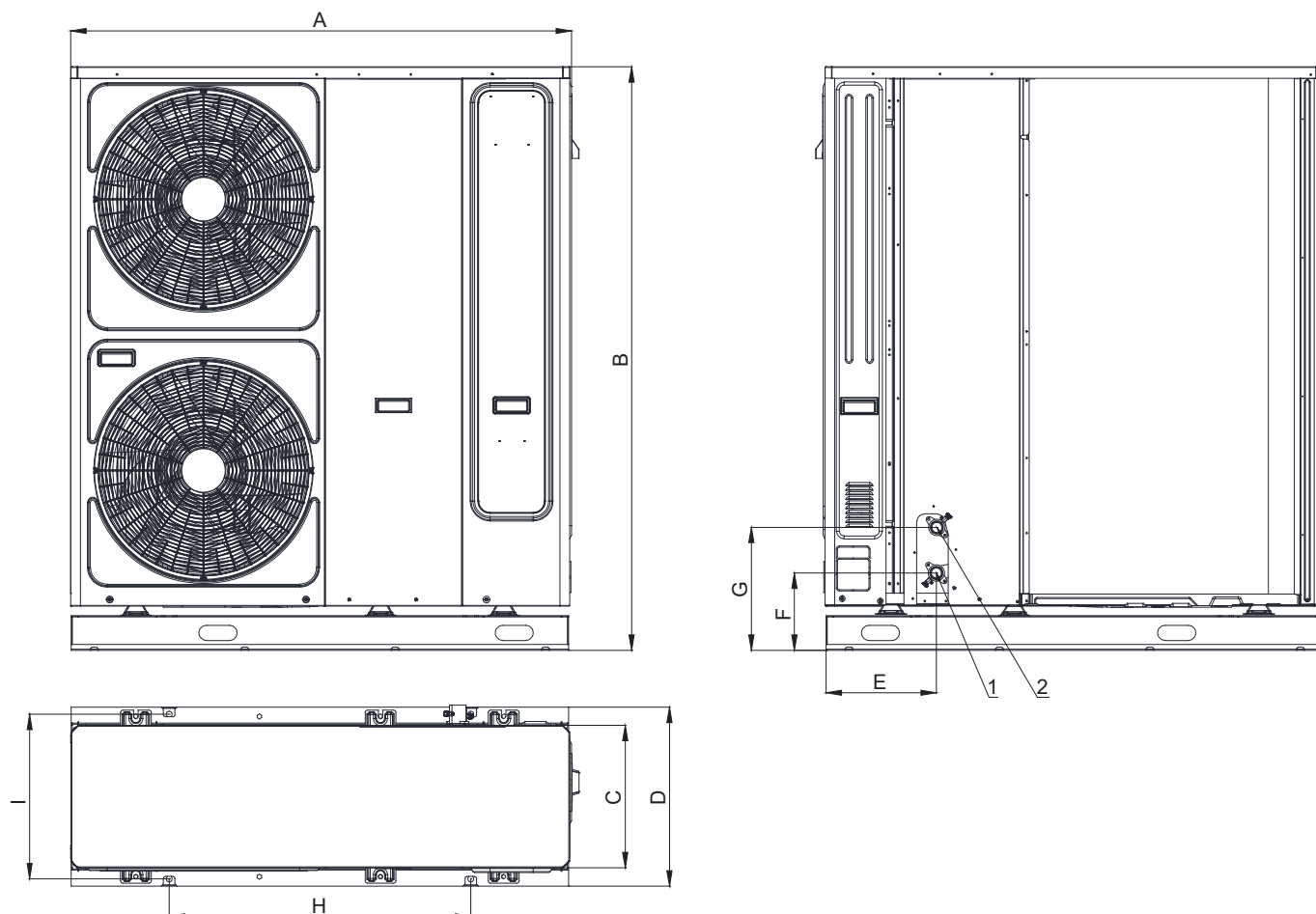
## 1.3 - Preliminary checks

Check equipment received:

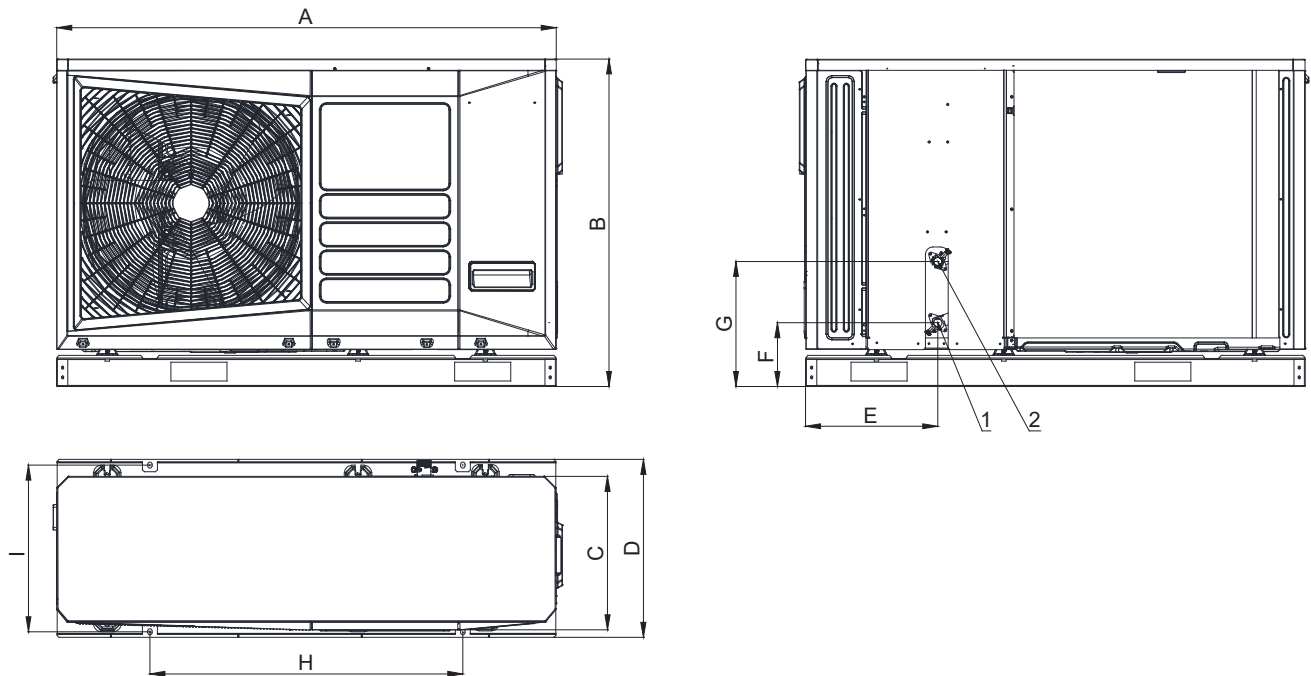
- Inspect the unit for damage or missing parts. If damage is detected, or if shipment is incomplete, immediately file a claim with the shipping company.
- Confirm that the unit received is the one ordered. Compare the name plate data with the order.
- The name plate is attached to the unit in two locations:
  - on the outside on one of the unit sides
  - on the inside
- 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 (high and low pressure side)
  - TS: Min./max. allowable temperature (high and low pressure side)
  - Unit leak test pressure
  - Voltage, frequency, number of phases
  - Maximum power input
  - Unit net weight
- Confirm that all options ordered for on-site installation have been delivered, and are complete and undamaged. The unit must be checked periodically, if necessary removing the insulation (thermal, acoustic), during its whole operating life to ensure that no shocks (handling accessories, tools, etc.) have damaged it. If necessary, the damaged parts must be repaired or replaced. See also chapter §5. Maintenance.

## 1.4 - Dimensions and clearance for units

### 1.4.1 - Dimensions and location of hydraulic connections



## 1 - INTRODUCTION

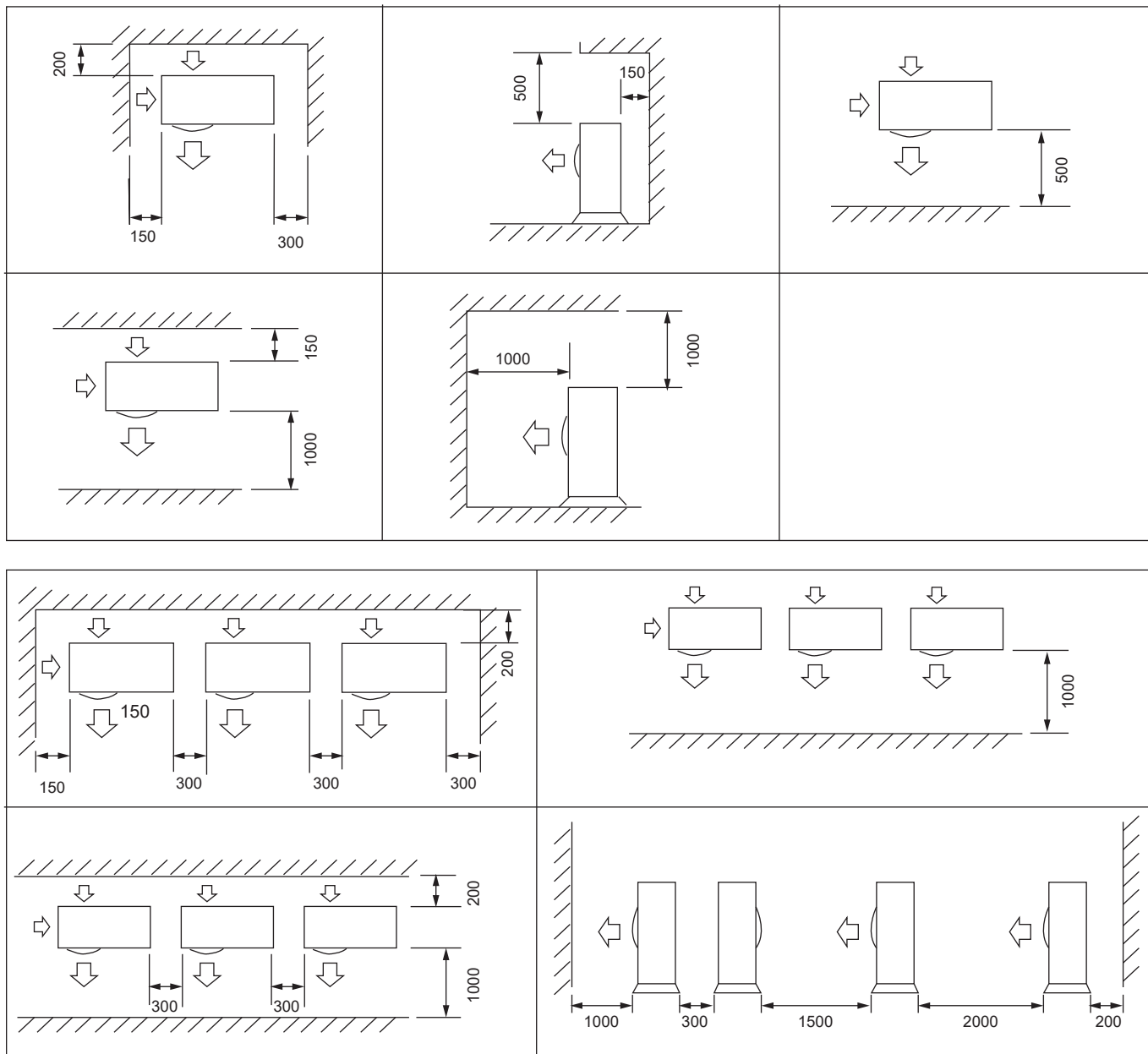


Model	A	B	C	D	E	F	G	H	I	Weight(kg)
4-6_1Ph	1335	875	410	475	353	170	334	836	445	109
8_1Ph	1335	875	410	475	353	170	334	836	445	120
10_1Ph	1335	875	410	475	353	170	334	836	445	126
12_1Ph	1302	1517	370	465	289	201	332	784	428	165.5
14-16_1Ph	1302	1517	370	465	289	201	332	784	428	167.7
12_3Ph	1302	1517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

NOTE : Dimensions are given in mm

## 1 - INTRODUCTION

1.4.2 -The picture presents the minimal distances of the wall to ensure the correct air flow on air heat exchanger<sup>(1)</sup>.



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



# 1 - INTRODUCTION

## 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 (Average climate)								
	Prated-NET		4.00	6.05	8.09	9.73	11.94	14.03	14.79
	SCOP-NET		4.73	4.75	4.90	4.98	4.91	4.94	4.78
	ηs 30/35-NET	%	186%	187%	193%	196%	193%	195%	188%
	Efficiency class 30/35		A+++	A+++	A+++	A+++	A+++	A+++	A+++
	A+7°C; W55°C (Average climate)								
	Prated-NET		4.01	5.59	7.61	9.09	11.96	11.99	13.06
	SCOP-NET		3.22	3.25	3.36	3.41	3.39	3.42	3.36
	ηs 47/55-NET	%	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%

# 1 - INTRODUCTION

Model			4	6	8	10	12	14	16
Sound levels	Standard unit								
	Sound power level (2)	dB(A)	61	64	65	66	69	69	70
	Sound pressure level (3)	dB(A)	50	53	54	55	56	56	58
Dimensions	Length	mm	1335	1335	1335	1335	1302	1302	1302
	Width	mm	475	475	475	475	465	465	465
	Height	mm	875	875	875	875	1517	1517	1517
Operating Weight (1)	Standard unit	kg	109	109	120	126	165.5	167.7	167.7
Compressors	Compressor type		DC Twin-rotary						
	Copressor qty		1						
Refrigerant	type		R32						
	Charge (1)	kg	1	1.1	1.6	1.8	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
	Rated total air flow	m³/h	3200	3600	4200	4200	7300	7300	7300
	Rated speed	rpm	630	730	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
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
	Max. water-side operating pressure with hydraulic module (4)	kPa	90	90	90	90	90	90	90
Water connections	Inlet diameter (MPT GAS)	inch	1	1	1	1	1.25	1.25	1.25
	Outlet diameter (MPT GAS)	inch	1	1	1	1	1.25	1.25	1.25

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

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

(3) Declared dualnumber noise emission values in accordance with EN12102-1 (with an associated uncertainty of +/-2dB(A)). For information, calculated 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 (1 Ph)	12 (1 Ph)	14 (1 Ph)	16 (1 Ph)	12 (3 Ph)	14 (3 Ph)	16 (3 Ph)
Power circuit	Nominal power supply	V-ph-Hz	230-1N-50							400-3N-50		
	Voltage range	V	220-240							380-415		
Control circuit supply												
Maximum unit power input (Un) (1)		kW	3.3	3.52	4.4	4.84	5.5	6.6	6.6	5.94	7.26	7.26
Cos Phi unit at maximum power (1)			0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Maximum unit current drawn (Un-10%) (2)		A	15	16	20	22	25	30	30	9	11	11
Maximum unit current drawn (Un) (3)		A	15	16	20	22	25	30	30	9	11	11
Maximum Start-up current, standard unit (4)		A	Not Applicable (less than the operating current)									

Note: the current is not included the electric heater current, current of standard electric heater is 13.6A

(1) Power input, compressors and fans, at the unit operating limits and nominal voltage of 220V-1ph/400V-3ph (data given on the unit nameplate).

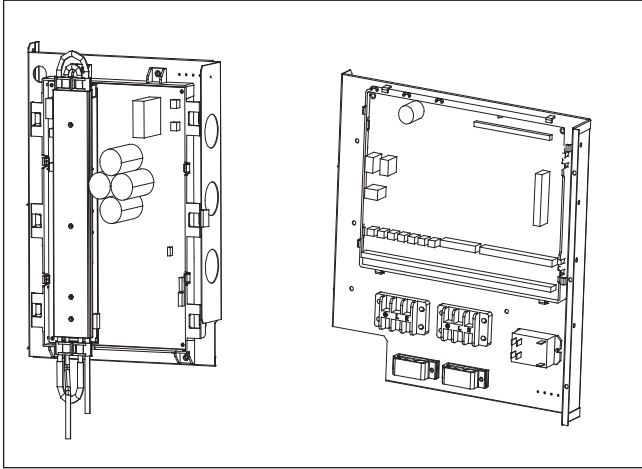
(2) Maximum unit operating current at maximum unit power input and at 200V-1ph/360V-3ph.

# 1 - INTRODUCTION

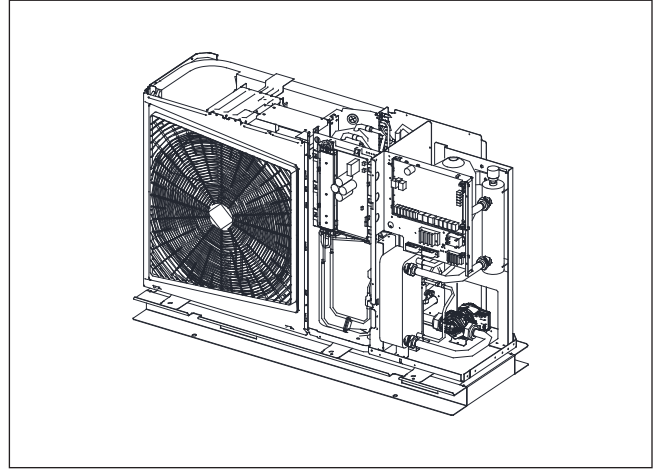
- (3) Maximum unit operating current at maximum unit power input and at 220V-1ph/400V-3ph (values given on the unit nameplate).
- (4) Maximum instantaneous start-up current at operating limits (maximum operating current of the smallest compressor(s) + fan current + locked rotor current of the largest compressor).

## 1.5.3 - Inside view

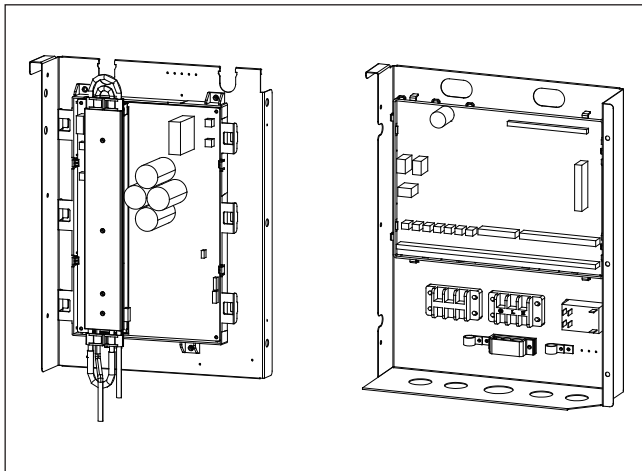
Electrical box



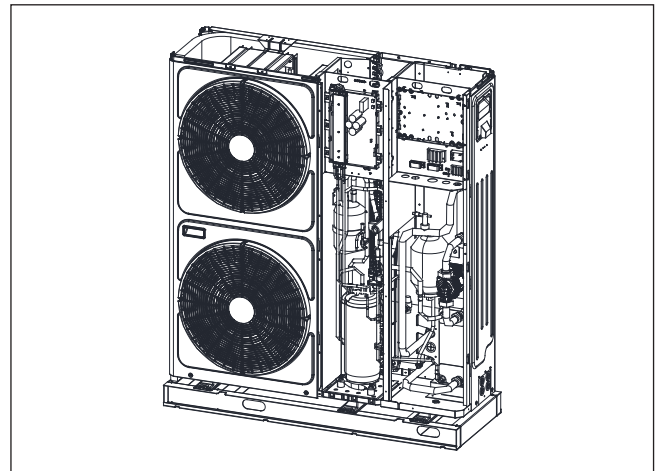
4-10 kW unit (1 Ph)



Electrical box



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



## 1.6 - 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 enabling 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 room temperature sensor used to offset the water control point. Possibility to configure the unit on field.	
Additional outdoor ambient temperature sensor	Additional outdoor ambient temperature sensor	Better reading of outdoor air temperature	
Connection cable of wired controller	Use for connect the wired controller		

## 2 - INSTALLATION OF UNIT

### 2.1 - General

To install an unit the following steps are requested

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

### 2.2 - Moving and placing the unit

#### 2.2.1 - Moving

See §1.2.1 Installation safety considerations.

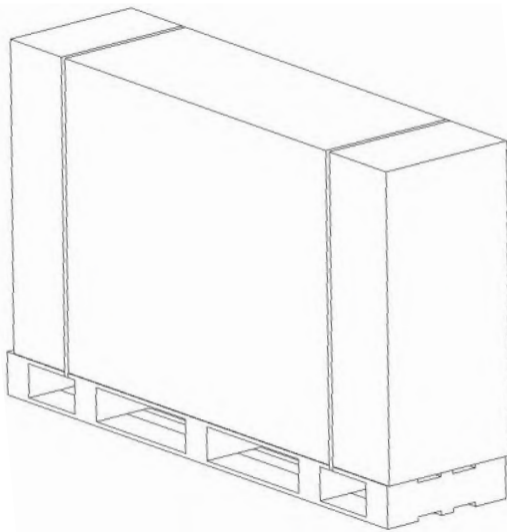


Figure 1: Transport configuration

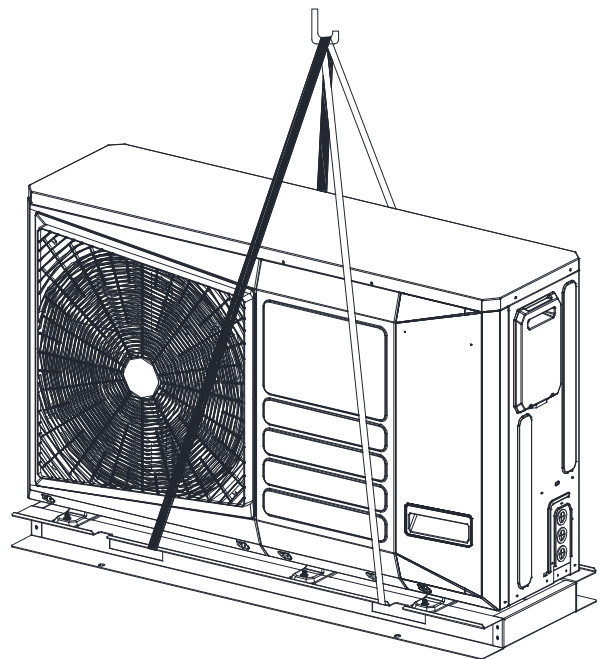


Figure 2: Offloading configuration

#### 2.2.2 - Placing the unit

In 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 siting the unit check that:

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

## 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 unit operation.

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

### CAUTION:

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

### 2.2.3 - Removing the unit panel

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

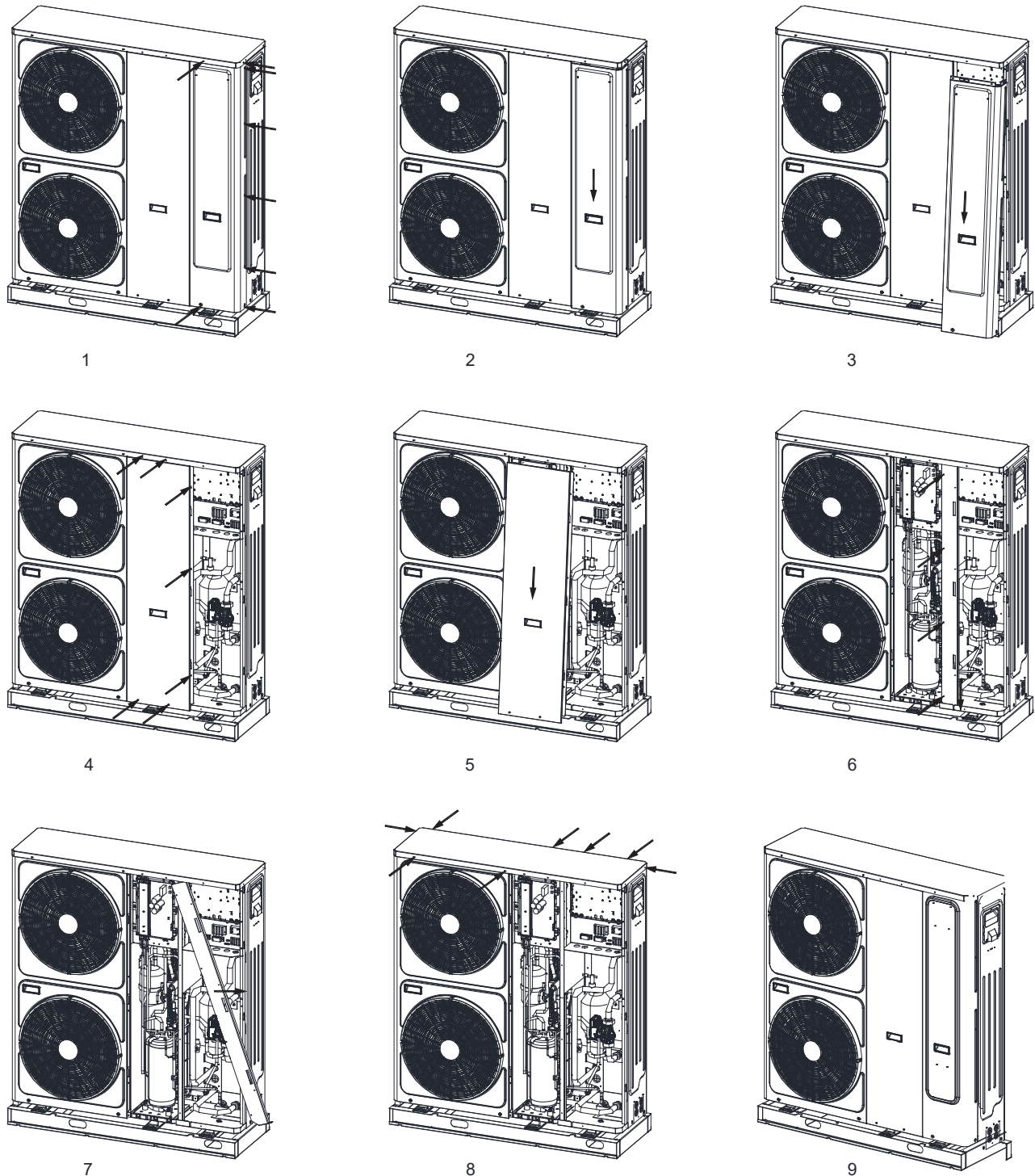
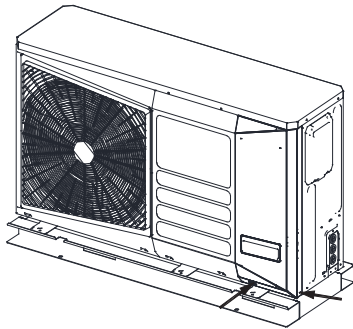


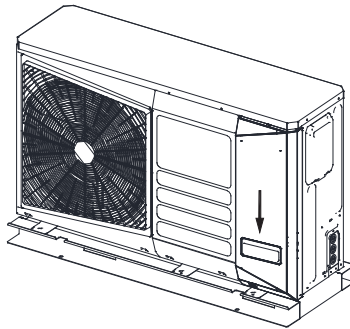
Figure 3 : How to remove front panel for 12 - 16 kW units



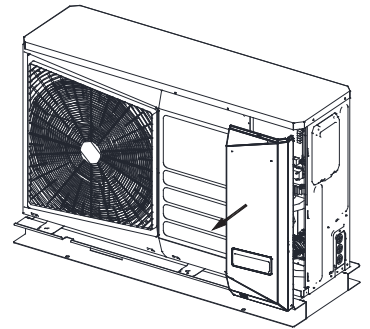
## 2 - INSTALLATION OF UNIT



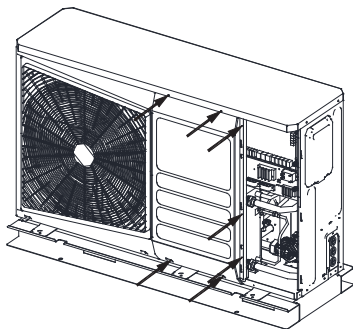
1



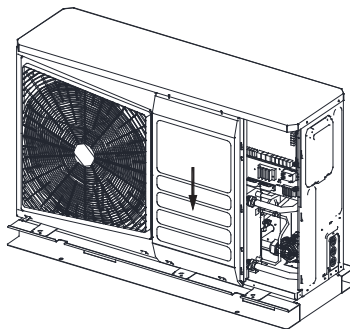
2



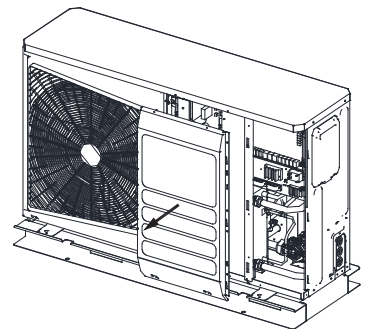
3



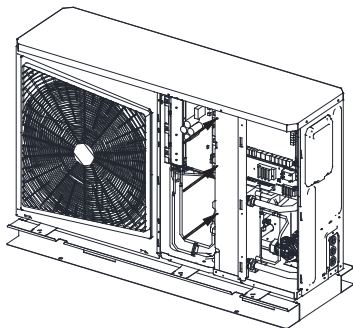
4



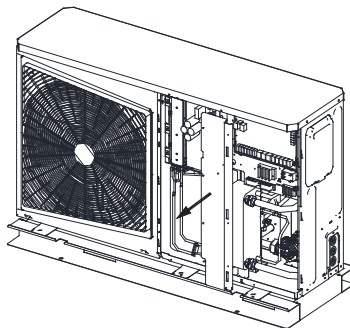
5



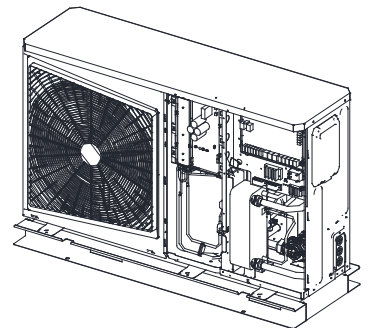
6



7



8



9

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

## 2 - INSTALLATION OF UNIT

---

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

### 2.3 - 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 a gas.

Recommendations on heat exchange fluids:

- No  $\text{NH}_4^+$  ammonium ions in the water, they are very detrimental for copper. This is one of the most important factors for the operating life of copper piping. A content of several tenths of mg/l will badly corrode the copper over time.
- $\text{Cl}^-$  Chloride ions are detrimental for copper with a risk of perforations by corrosion by puncture. If possible keep below 10 mg/l.
- $\text{SO}_4^{2-}$  sulphate ions can cause perforating corrosion, if their content is above 30 mg/l.
- No fluoride ions ( $< 0.1$  mg/l).
- No  $\text{Fe}^{2+}$  and  $\text{Fe}^{3+}$  ions with non negligible levels of dissolved oxygen must be present. Dissolved iron  $< 5$  mg/l with dissolved oxygen  $< 5$  mg/l.
- Dissolved silicon: silicon is an acid element of water and can also lead to corrosion risks. Content  $< 1$  mg/l.
- Water hardness:  $> 0.5$  mmol/l. Values between 1 and 2.5 mmol/l can be recommended. This will facilitate scale deposit that can limit corrosion of copper. Values that are too high can cause piping blockage over time. A total alkalimetric title (TAC) below 100 mg/l is desirable.
- Dissolved oxygen: Any sudden change in water oxygenation conditions must be avoided. It is as detrimental to deoxygenate the water by mixing it with inert gas as it is to over-oxygenate it by mixing it with pure oxygen. The disturbance of the oxygenation conditions encourages destabilisation of copper hydroxides and enlargement of particles.
- Electric conductivity: 0.001-0.06 S/m (10-600  $\mu\text{S/cm}$ ).
- pH: Ideal case pH neutral at 20-25°C ( $7 < \text{pH} < 8$ ).

#### CAUTION:

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

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

#### CAUTION:

The use of units in an open loop is forbidden.

## 2 - INSTALLATION OF UNIT

### 2.3.1 - Operating precautions and recommendations

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

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

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

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

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

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

### 2.3.2 - General

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

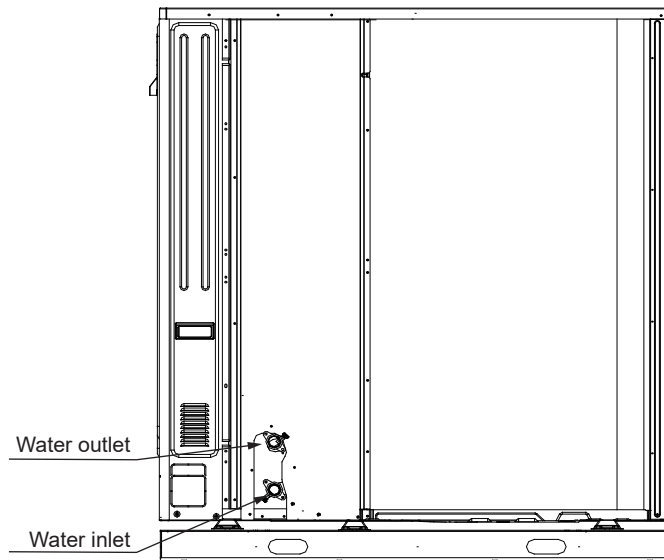


Figure 5: Water connection on unit

### 2.3.3 - Minimum water loop volume

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

$$\text{Volume (l)} = \text{CAP (kW)} \times \text{N}$$

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

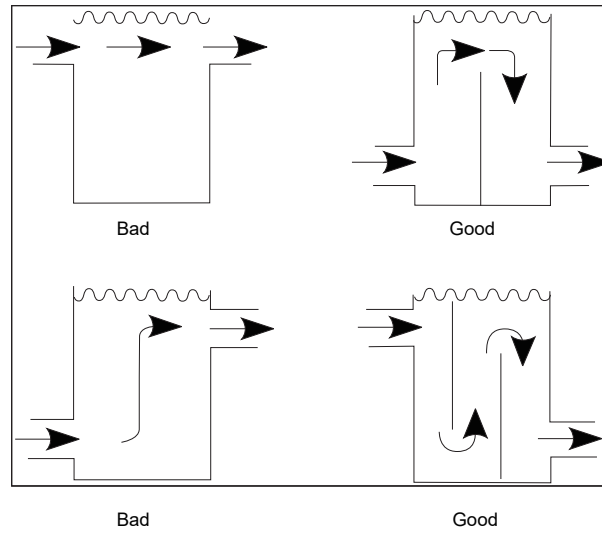
#### NOTE:

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 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 module 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 total system volume 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

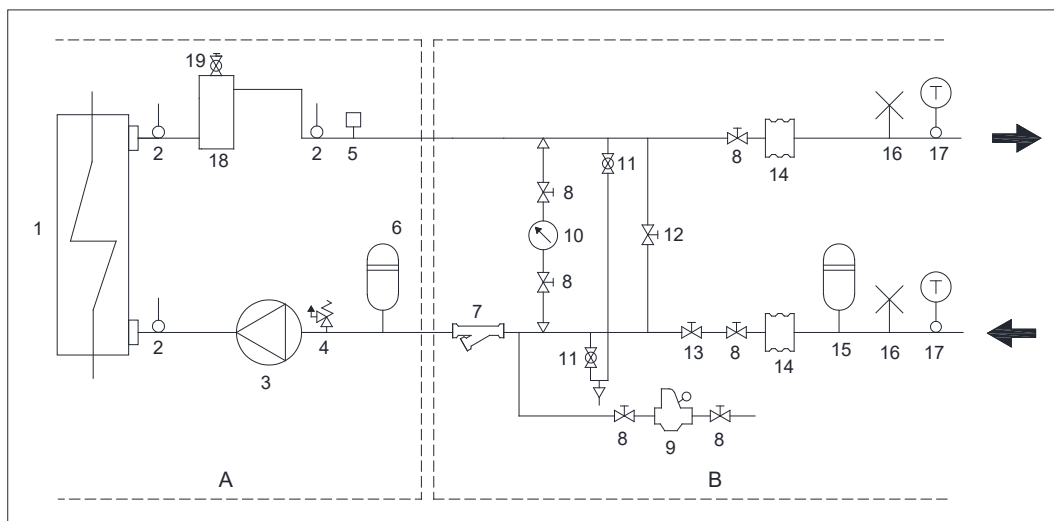


Figure 6: Typical diagram of the hydraulic circuit for 4-10kW units

## 2 - INSTALLATION OF UNIT

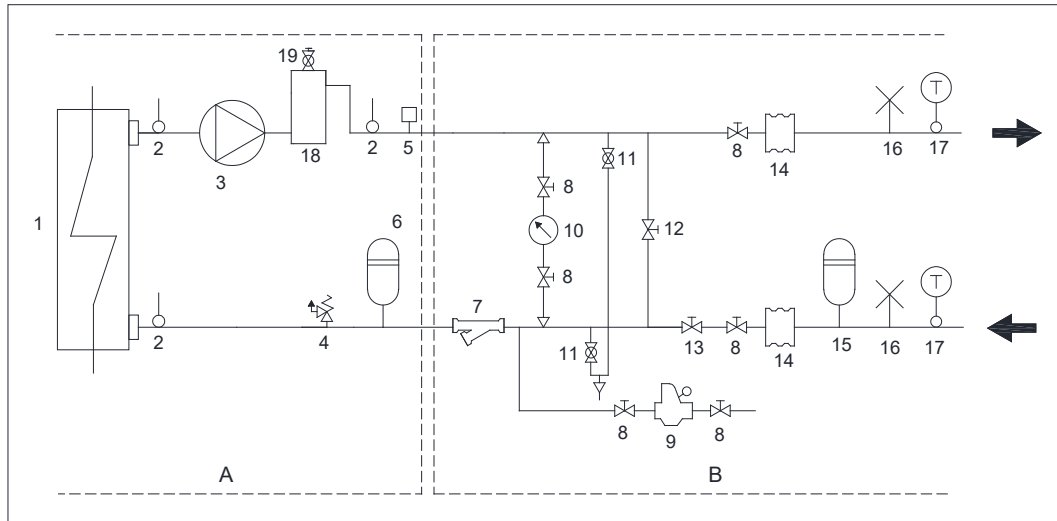


Figure 7: Typical diagram of the hydraulic circuit for 12-16kW units

### 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; 13: Calibration valve; 14: Anti-vibration joint; 15: Additional expansion vessel (if necessary); 16: Air bleed; 17: Thermometer; 18: Electrical heating; 19: Air evacuation valve

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

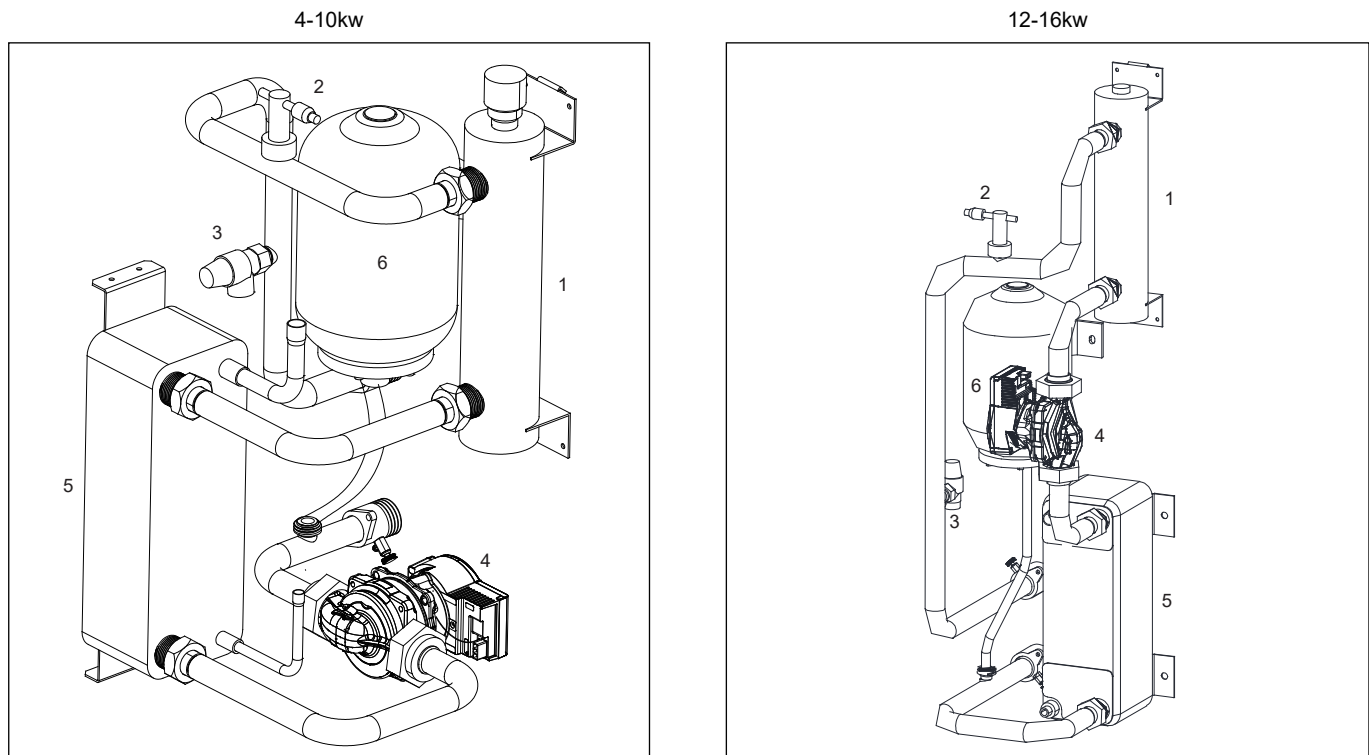


Figure 8: Hydraulic module equipped with variable speed single pump low available pressure with expansion tank

### LEGEND:

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

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

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

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

#### CAUTION:

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

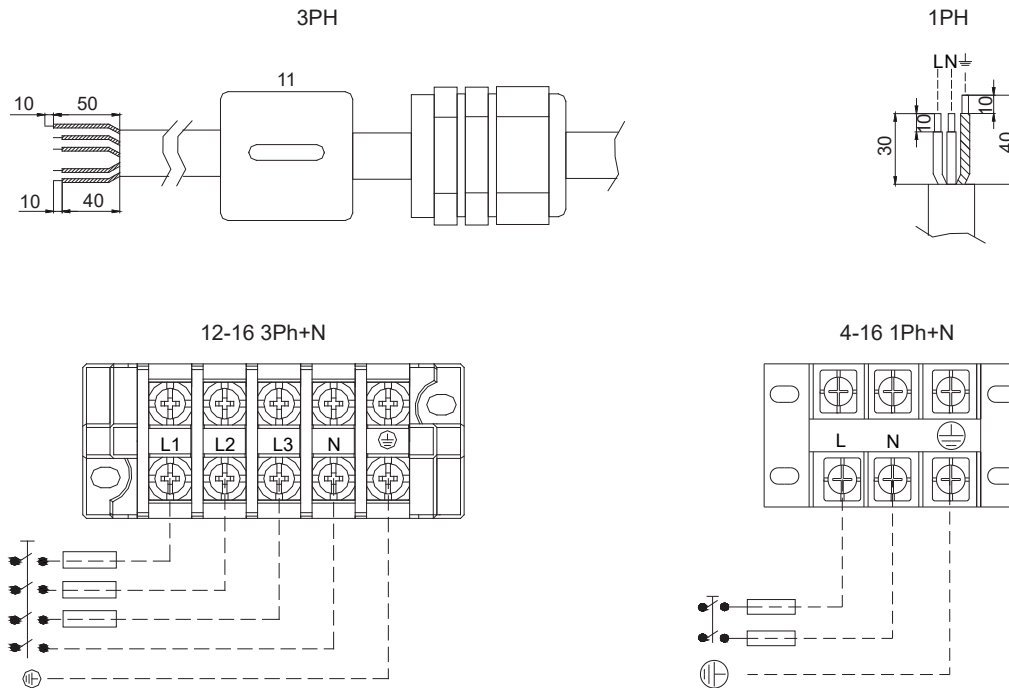


Figure 9: Power connection with Main Switch

#### 2.4.2 - Recommended wire sections

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

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

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

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

#### IMPORTANT:

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

## 2 - INSTALLATION OF UNIT

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

	Max. connectable section <sup>(1)</sup>	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 <sup>(2)</sup>	Max. length for voltage drop <5%	Cable type	Section <sup>(2)</sup>	Max. length for voltage drop <5%	Cable type <sup>(3)</sup>
	mm <sup>2</sup> (per phase)	mm <sup>2</sup> (per phase)	m	-	mm <sup>2</sup> (per phase)	m	-
4/6 (1ph)	3×4 <sup>2</sup>	3×4 <sup>2</sup>	100	H07RNF	3×4 <sup>2</sup>	80	H07RNF
8/10 (1ph)	3×6 <sup>2</sup>	3×6 <sup>2</sup>	100	H07RNF	3×6 <sup>2</sup>	80	H07RNF
12 (1ph)	3×6 <sup>2</sup>	3×6 <sup>2</sup>	100	H07RNF	3×6 <sup>2</sup>	80	H07RNF
14/16 (1ph)	3×8 <sup>2</sup>	3×8 <sup>2</sup>	100	H07RNF	3×8 <sup>2</sup>	80	H07RNF
12 (3ph)	5×4 <sup>2</sup>	5×4 <sup>2</sup>	100	H07RNF	5×4 <sup>2</sup>	80	H07RNF
14/16 (3ph)	5×6 <sup>2</sup>	5×6 <sup>2</sup>	100	H07RNF	5×6 <sup>2</sup>	80	H07RNF
Accessory wired controller	Use cables H07RN-F 4x0.75 mm <sup>2</sup> up to 50m to connect the wired controller (not supplied with accessory)						

### NOTES:

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

(2) Selection simulation result considering the hypothesis indicated.

(3) If the maximum calculated section is for an XLPE cable type, this means that a selection based on a PVC cable type can exceed the connection capacity actually available. Special attention must be given to the selection.

### Power cable entry

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



### Caution

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

### 2.4.3 - Recommended customer electrical protection

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

Model			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	32	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<sup>(1)</sup>.

### NOTES:

- The operating environment for the units is specified below:

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

- outdoor installation: protection level IP44<sup>(2)</sup>
- 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 - INSTALLATION OF UNIT

2. Power supply frequency variation:  $\pm 2\%$ .
3. The neutral (N) conductor must be always connected to the unit
4. Overcurrent protection of the power supply conductors is not provided with the unit.
5. The units are designed for simplified connection on TT networks (IEC 60364).

### CAUTION:

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

- (1) The absence of main power disconnect switch is an exception that must be taken into account at field installation level.
- (2) The required protection level for this class is IP43BW (according to reference document IEC 60529). All units fulfil this protection condition:
  - When accessing to interface, the level is IPxxB

### 2.5 - Water flow rate control

#### 2.5.1 - Water leakage

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

#### 2.5.2 - Minimum water flow rate

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

#### 2.5.3 - Maximum water flow rate

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

#### 2.5.4 - Water heat exchanger flow rate

Data applicable for:

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

Units with hydraulic module			
Model	Minimum water	Nominal water flow	Maximum water
	flow rate(m <sup>3</sup> /h)	rate (1)(m <sup>3</sup> /h)	flow rate(m <sup>3</sup> /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 low control

The water circulation pumps of the units have been sized to allow the hydraulic modules to cover all possible configurations based on the specific installation conditions, i.e. for various temperature differences between the entering and the leaving water ( $\Delta T$ ) 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  $\Delta T$  (variable flow).

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

## 2 - INSTALLATION OF UNIT

Table 2: Steps to clean, purge, and define a flow rate for hydraulic circuit

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

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

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

### NOTE:

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

To reduce the pressure drops of the hydraulic system:

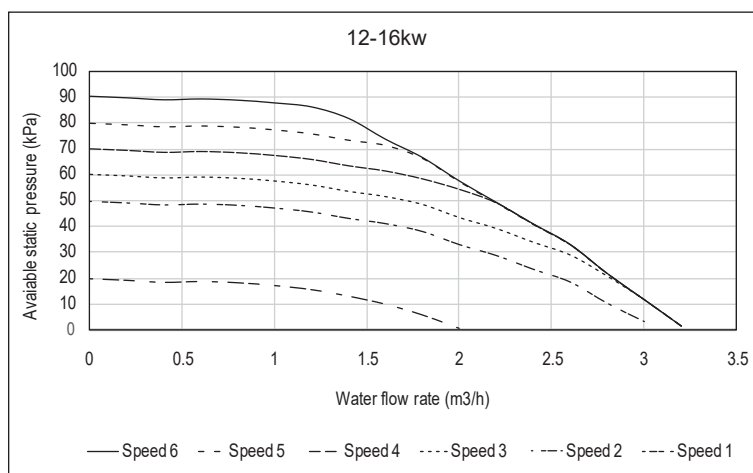
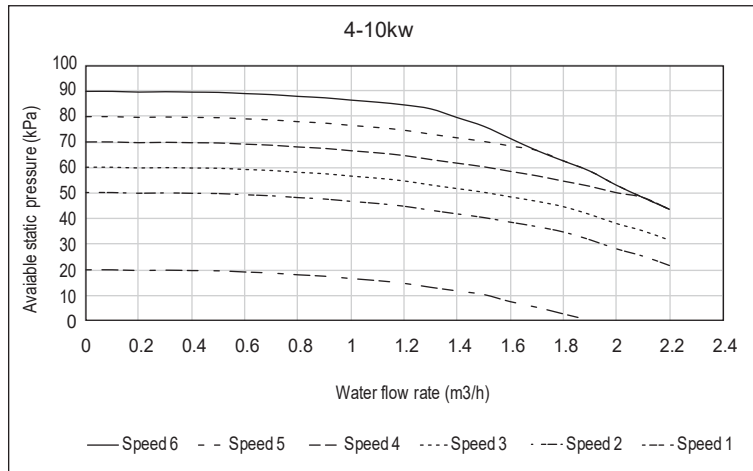
- reduce the individual pressure drops as much as possible (bends, level changes, options, etc.).
- use a correctly sized piping diameter.
- avoid hydraulic system extensions, wherever possible.

## 2 - INSTALLATION OF UNIT

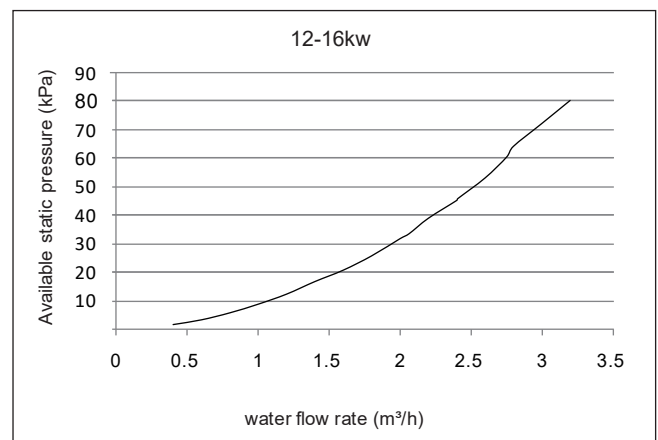
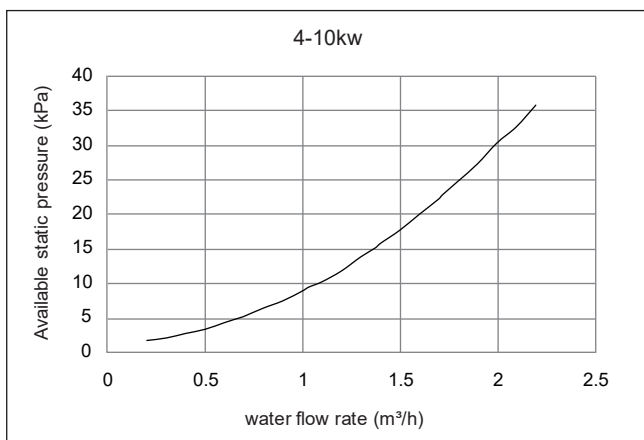
### 2.5.6 - Available external static pressure

Data applicable for:

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



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



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

## 2 - INSTALLATION OF UNIT

---

### 2.6 - Commissioning modes

#### IMPORTANT:

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

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

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

- Safety switch (normally close contact, mandatory)

#### Three possible control configurations:

##### 1.Connections to the customer remote control (for more details, refer to Figure 10 and §4.2.4 Switches)

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

##### 2.Connections to the user interface

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

### 2.7 - Check before start the unit

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

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

#### CAUTION:

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

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

#### NOTE:

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



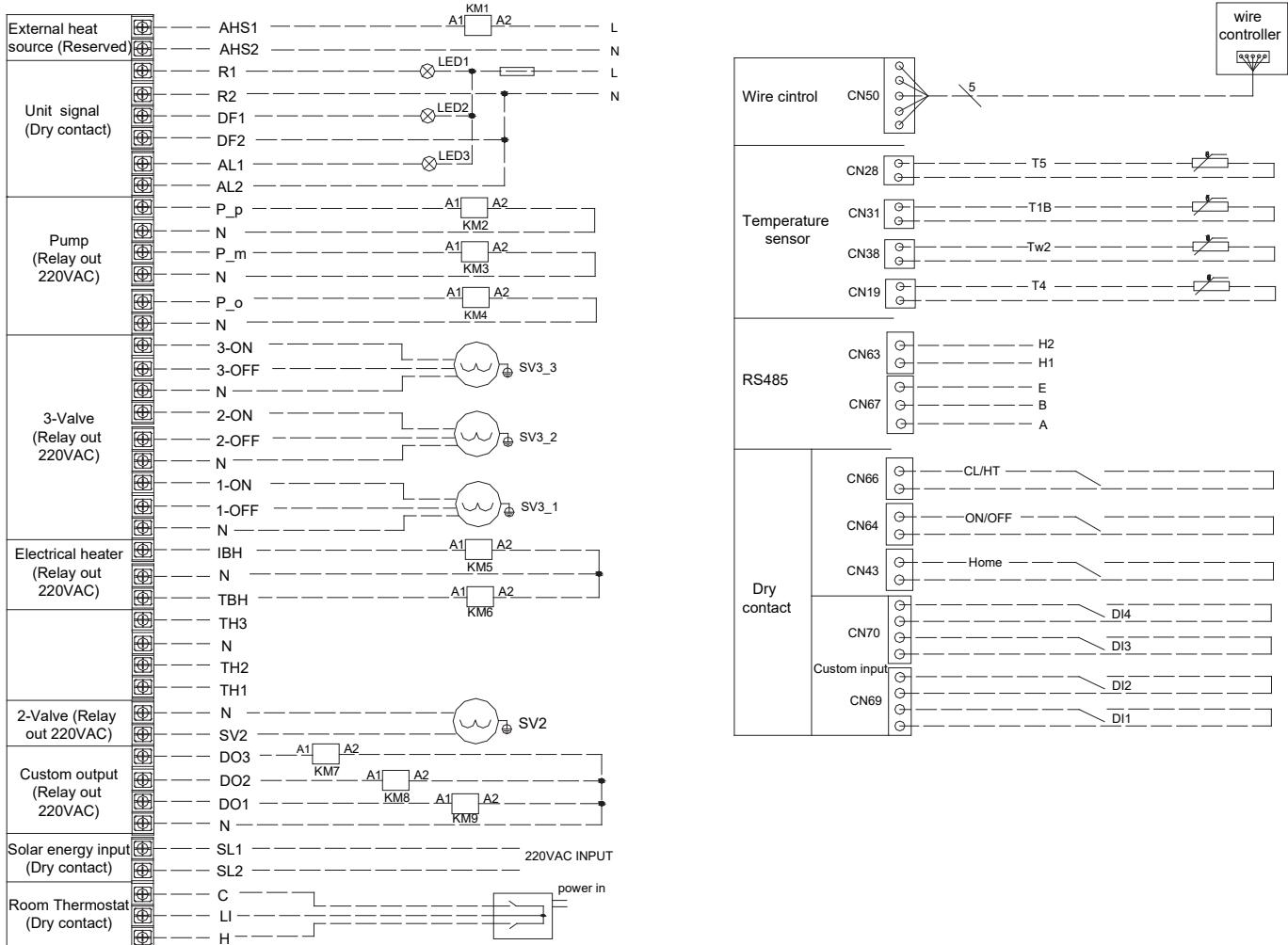
### 3 - INSTALLATION OF SYSTEM

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

To obtain the list of all parameters, refer to §7.Parameter overview.

#### 3.1 - General customer electrical connection on terminal block



Code	Description	Code	Description
AHS1-2	External heat source interface terminal	SL1-2	Solar energy input signal interface terminal
R1-2	Unit operation signal interface terminal	DI1-DI4	Custom defined input interface terminal
DF1-2	Unit defrost signal interface terminal	Remote	Remote switch interface terminal
AL1-2	Unit alarm signal interface terminal	Pro_hyd	Water flow switch interface terminal
P_p	The second zone water loop pump interface terminal	Home	Home / away mode interface terminal
P_m	External heat source water loop pump interface terminal	ON/OFF	ON /OFF interface terminal
P_o	Main water loop pump interface terminal	CL/HT	Cooling / heating mode interface terminal
1ON-3ON	Normally open type 3-way valve interface terminal	KM1-9	220V AC contactor
1OFF-3OFF	Normally closed type 3-way valve interface terminal	LED1-3	220V AC indicator
IBH, TBH	Electric heater interface terminal of domestic hot water	XT1-2	Terminal block
HT1-HT3	Electric heater interface terminal of main water loop	SV3_1	External heat source 3-way valve
SV2	2-way valve interface terminal	SV3_2	Mixing valve
DO1-DO3	Custom output interface terminal	SV3_3	Domestic hot water 3-way valve















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

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








Display on left digital tube	Items	Note
0	Day and time	
1	DHW schedule	
2	Power memory	
3	WIFI option--reserved	
4	Purge mode	
5	Home/away setting	
6	Night mode schedule	
7	Anti-legionella temperature	
8	Anti-legionella schedule	
9	Controller lock	

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

Display on left digital tube	Items	Note	Display on left digital tube	Items	Note
0	Controller type select	water/air setpoint control	13	Cool offset for ECO mode	
1	Controller interface	Wired controll Contact	14	Cool offset for AWAY mode	
2	Auxiliary heat source setting		15	Heat offset for ECO mode	
3	Climate curve setting		16	Heat offset for AWAY mode	
4	Capacity test	Reserved	17	DHW temp. setting for ECO mode	
5	3-way valve type selection	Always on Always off	18	Minimum OAT for heating	
6	DI1 setting		19	Booster OAT for heating	
7	DI2 setting		20	Warmup time	
8	DI3 setting		21	Booster delta temp.	
9	DI4 setting		22	Bi-zone select	
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	

#### 3.3 - Installation with electrical booster 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
	Additional Outdoor Air Temperature Sensor

#### IMPORTANT:

For more information, refer to §4.2.9 Electric Heaters.

3 - INSTALLATION OF SYSTEM

3.4.1 - Standard installation

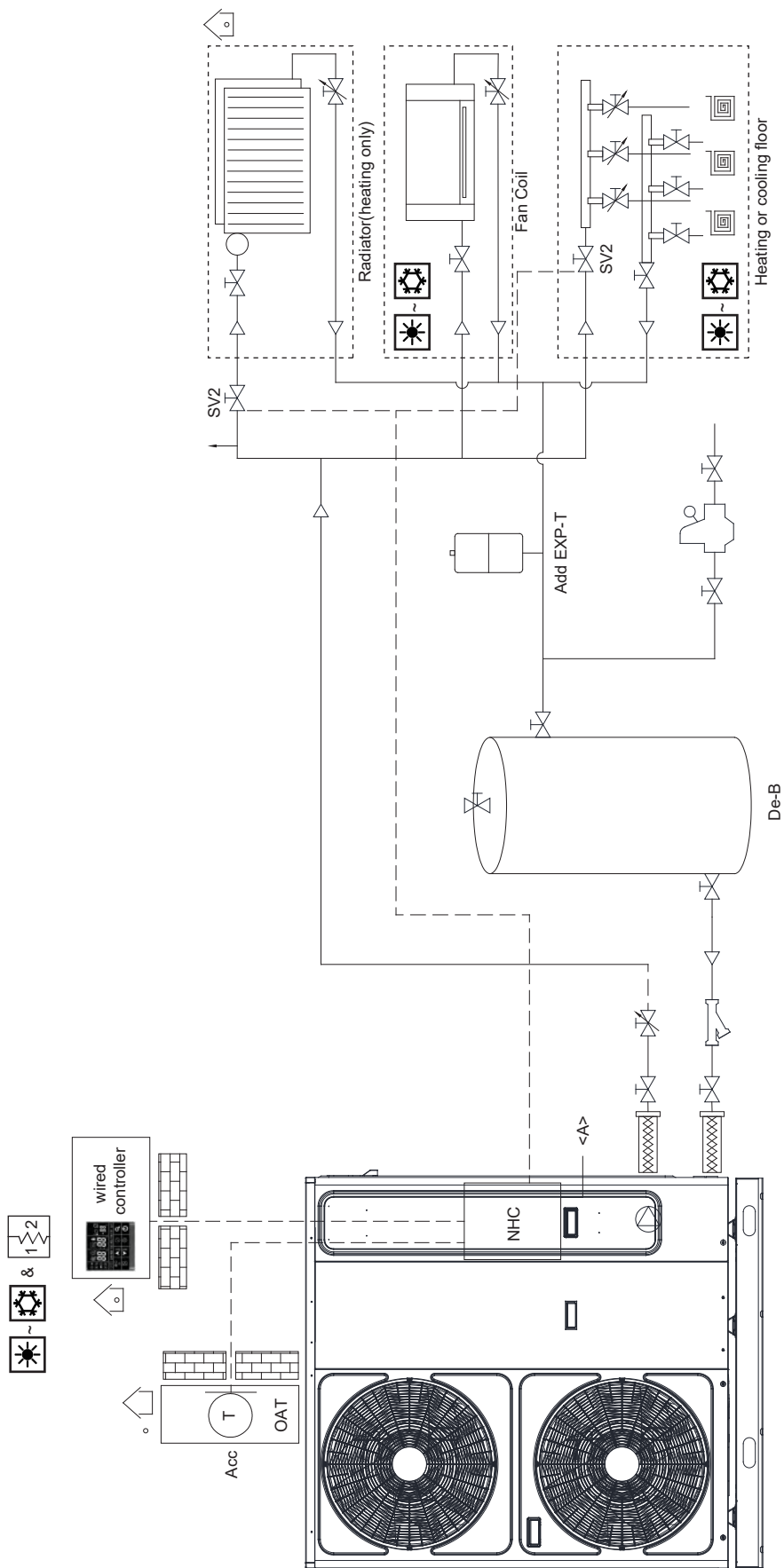
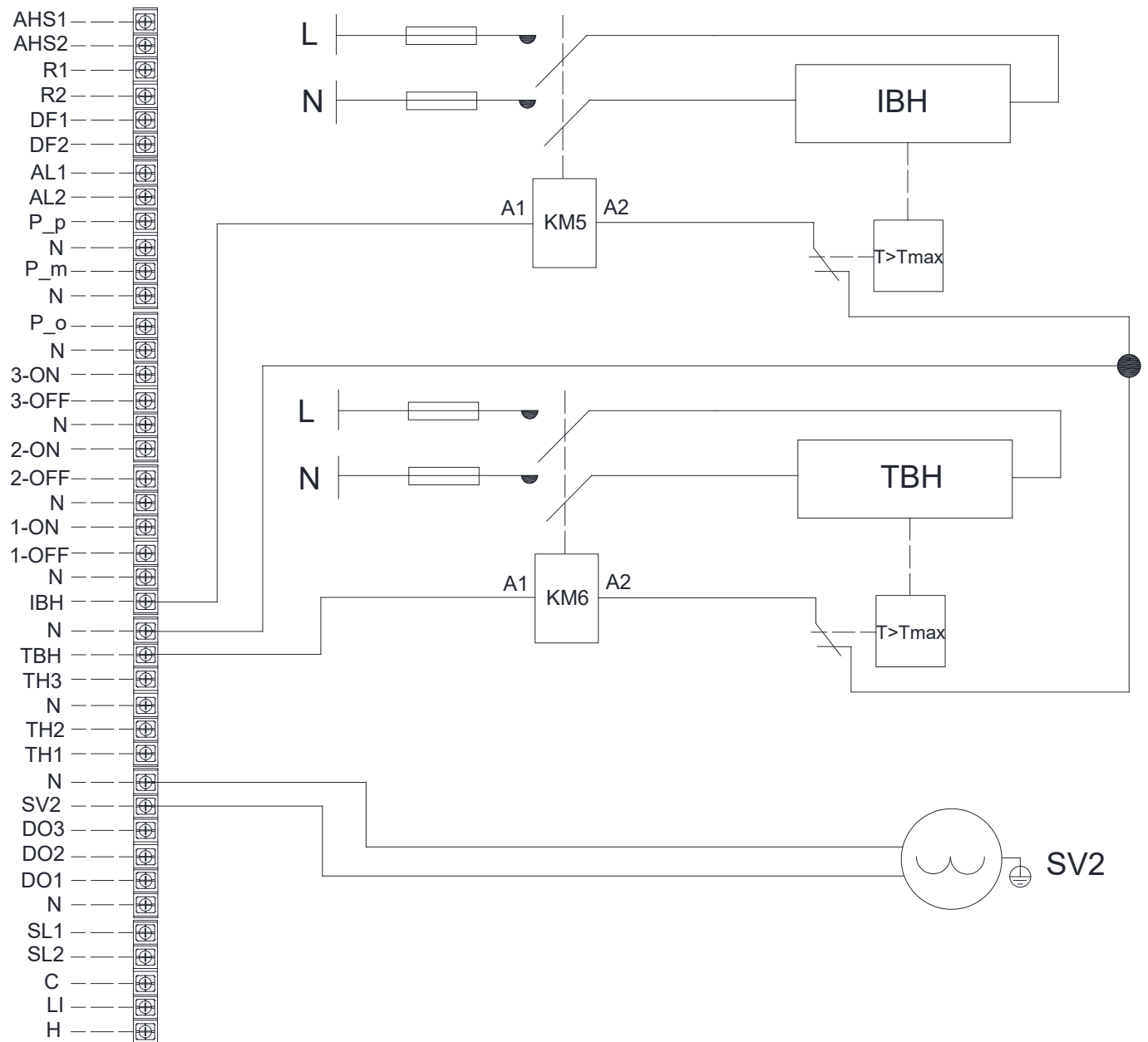


Figure 10: Standard installation with electrical booster heaters

### 3 - INSTALLATION OF SYSTEM

#### 3.4.2 - Electrical connection










#### 3.4.3 - Control configuration steps

Steps	Table	Par.	Designation	Description	Range	Default	Ex.	Unit
Set Booster stages	BCK_CONF	602	Backup Type	0-inner EH+DHW EH+gas boiler 1-inner EH+DHW EH 2-DHW EH+gas boiler 3-inncr EH+gas boiler 4-DHW EH 5-gas boiler 6-inner EH 7-no auxiliary heater	0 to 7	0	3	-
		602	Booster Warm up Timer	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
		604	Booster OAT Threshold	Booster heating is allowed to run if OAT goes below this threshold (with 1 K hysteresis).	-20 to 15	-	-	-

### 3 - INSTALLATION OF 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 - INSTALLATION OF SYSTEM

#### 3.5.2 - Electrical connection

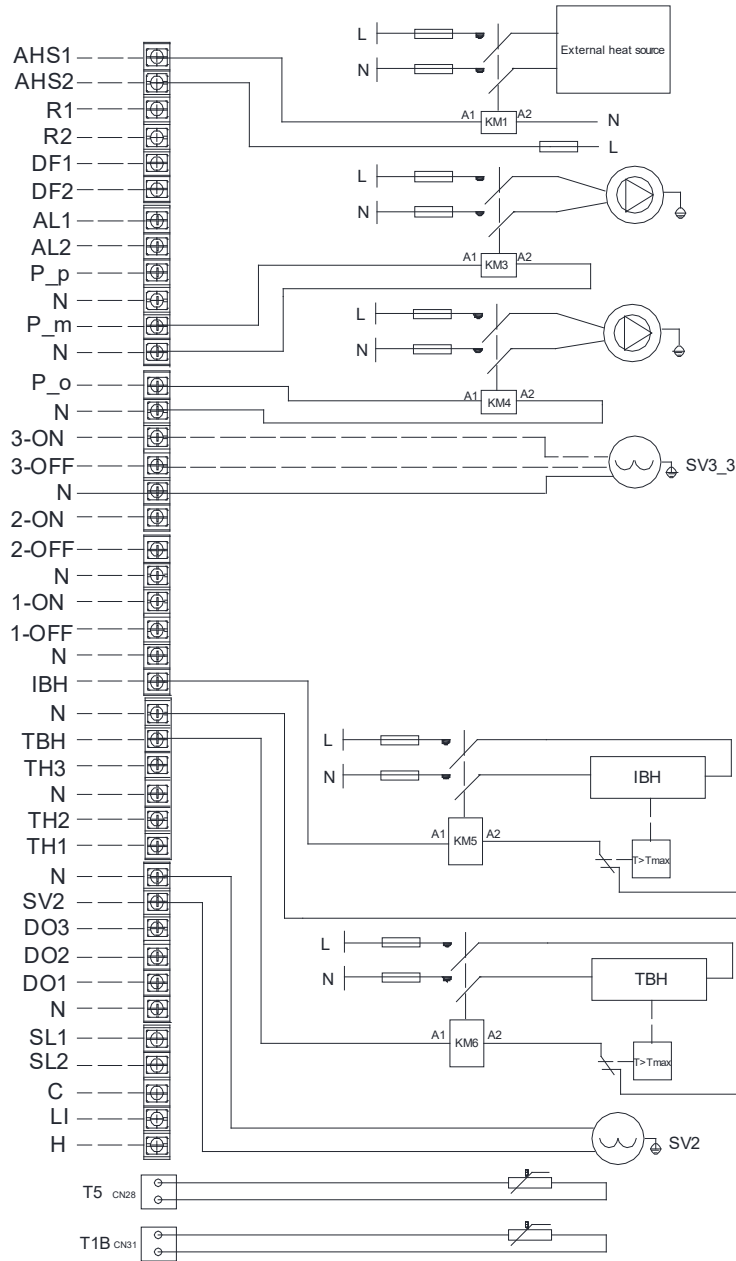


Figure 12: Electrical connection on terminal block for DHW production and boiler

#### 3.5.3 - Control configuration steps

Steps	Table	Par.	Designation	Description	Range	Default	Ex.	Unit
Set Booster stages	BCK_CONF	602	Backup Type	0-inner EH+DHW EH+gas boiler 1-inner EH+DHW EH 2-DHW EH+gas boiler 3-inncer EH+gas boiler 4-DHW EH 5-gas boiler 6-inner EH 7-no auxiliary heater	0 to 7	0	3	-
		602	Booster Warm up Timer	Once the unit has started, if after this timer has expired the capacity demand isat maximum a nd the setpoint isn't reached, then the booster is activated	0 to 120	0	0	min
		604	Booster OAT Threshold	Booster heating is allowed to run if OAT goes below this threshold (with 1 K hysteresis).	-20 to 15	-	-	-

## 3 - INSTALLATION OF SYSTEM

### 3.6 - Unit with wired controller

#### 3.6.1 - Electrical connection

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

**IMPORTANT:** For more information on:

- how to use this user interface, please refer to wired controller manual,
- the setpoint control, refer to §4.2.5 Setpoint,
- wired controller installation document, refer to document provided with accessory.

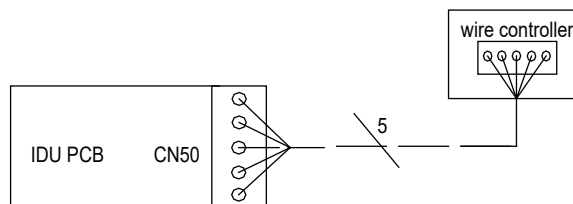


Figure 13: Electrical connection of remote interface

N°	Steps	Table	Par.	Designation	Description	Range	Default	Ex.	Unit
1	Check that the unit is configured in Remote Interface	UI_CONF	521	User Interface Type	0 = No User Interface 1 = Remote control by contacts or SUI 2 = Wired controller remotely installed in the house 3 = Wired controller locally installed on the unit for split	0 to 3	0	2	-
			Check on WIRED CONTROLLER screen that the unit is configured in Air setpoint						
2	Control on air setpoint	AIR_STP	421	Heat Home Setpoint	Air setpoint for heating mode when Occupancy mode = Home	16.0 to 32.0	19	20	°C
			422	Heat Sleep Offset	Air offset for heating mode when Occupancy mode = Sleep	-20.0 to 0.0	-2.0	-1	°C
			423	Heat Away Offset	Air offset for heating mode when Occupancy mode = Away	-20.0 to 0.0	-4.0	-3	°C
			424	Cool Home Setpoint	Air setpoint for cooling mode when Occupancy mode = Home	16.0 to 32.0	26	24	°C
			425	Cool Sleep Offset	VAir offset for cooling mode when Occupancy mode = Sleep	0.0 to 10.0	5	2	°C
				Cool Away Offset	Air offset for cooling mode when Occupancy mode = Away	0.0 to 10.0	4	4	°C
3a	First possibility: control on predefined climatic curve	CLIMCURV	581	Heat Clim Curv Select	0 = No Curve / Fixed Water Setpoint 1 to 12 = Heating Climatic Curve #number 13 = Custom Climatic Curve	0 to 13	0	2	-
			412	Heat Curv Max Stp Offset	Heat Maximum Water Setpoint can be offsetted by this parameter, to adjust at best the setpoint at customer needs	-5.0 to 5.0	0	5	°C
			586	Cool Clim Curv Select	0 = No Curve / Fixed Water Setpoint 1 to 2 = Cooling Climatic Curve #1number 3 = Custom Climatic Curve	0 to 3	0	1	-
			413	Cool Curve Min Stp Offset	Cool Minimum Water Setpoint can be offsetted by this parameter, to adjust at best the setpoint at customer needs	-5.0 to 5.0	0	5	°C
3b	Second possibility: control on fixed LWT setpoint	WAT_STP	581	Heat Clim Curv Select	Heating climatic curve select	0 to 13	0	-1	-
			401	Heat Home Setpoint	Water setpoint for heating mode when Occupancy mode = Home	25.0 to 60.0	45	50	°C
			402	Heat Sleep Offset	Water offset for heating mode when Occupancy mode = Sleep	-20.0 to 0.0	-10	-5	°C
			403	Heat Away Offset	Water offset for heating mode when Occupancy mode = Away	-20.0 to 0.0	-10	-10	°C
			586	Cool Clim Curv Select	Cooling climatic curve select	0 to 3	0	0	-
			407	Cool Home Setpoint	Water setpoint for cooling mode when Occupancy mode = Home	5 to 25.0	12	18	°C
			408	Cool Sleep Offset	Water offset for cooling mode when Occupancy mode = Sleep	0.0 to 10.0	5	2	°C
			409	Cool Away Offset	Water offset for cooling mode when Occupancy mode = Away	0.0 to 10.0	5	5	°C
3c	Third possibility: control on customer climatic curve	CLIMCURV	581	Heat Clim Curv Select	Heating climatic curve select	0 to 13	0	0	-
			582	Heat Minimum OAT	In heating mode, Customer minimum OAT	-30.0 to 10.0	-7.0	-20	°C
			583	Heat Maximum OAT	In heating mode, Customer maximum OAT	10.0 to 30.0	20	20	°C
			584	CMin Water Setpoint	In heating mode, Customer minimum Water Temperature	20.0 to 40.0	20	20	°C
			585	Heat Max Water Setpoint	In heating mode, Customer maximum Water Temperature	30.0 to 60.0	38	38	°C
			412	Heat Curv Max Stp Offset	Heat Maximum Water Setpoint can be offsetted by this parameter, to adjust at best the setpoint at customer needs	-5.0 to 5.0	0	5	°C
			586	Cool Clim Curv Select	Cooling climatic curve select	0 to 3	0	0	-
			587	Cool Minimum OAT	In cooling mode, Customer minimum OAT	0.0 to 30.0	20	22	°C
			588	Cool Maximum OAT	In cooling mode, Customer maximum OAT	24.0 to 46.0	35	35	°C
			589	Cool Min Water Setpoint	In cooling mode, Customer minimum Water Temperature	5.0 to 20.0	10	7	°C
			590	Cool Max Water Setpoint	In cooling mode, Customer maximum Water Temperature	5.0 to 20.0	18	15	°C
			413	Cool Curve Min Stp Offset	Cool Minimum Water Setpoint can be offsetted by this parameter, to adjust at best the setpoint at customer needs	-5.0 to 5.0	0	5	°C



## 3 - INSTALLATION OF SYSTEM

### 3.7 - IAT sensor

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

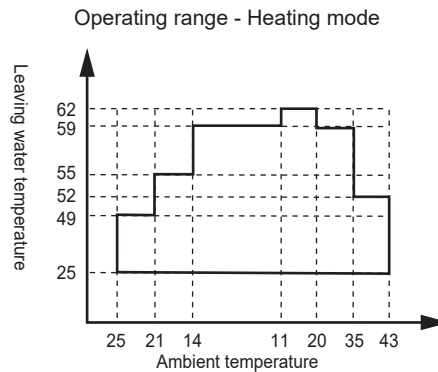
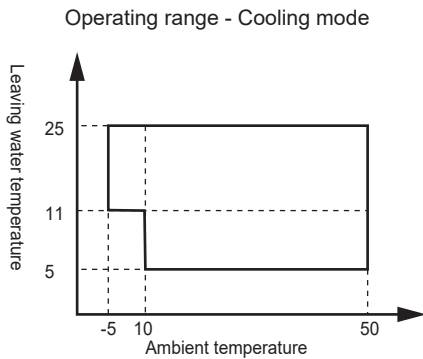
#### 3.7.1 - Control configuration steps

Control configuration steps

Steps	Table	Par.	Designation	Description	Range	Default	Ex.	Unit
Check that the unit is configured in Air setpoint	UI_CONF		User Interface Type	0 = No User Interface 1 = Remote control by contacts or SUI 2 = Wired controller remotely installed in the house 3 = Wired controller locally installed on the unit for split type			2	-
				Check on wired controller screen that the unit is configured in Air setpoint				

## 4 - OPERATION

### 4.1 - Unit range



Note:



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

### 4.2 - Operating modes

#### 4.2.1 - Occupancy mode

Depending on unit configuration, the system can be controlled in two ways. The first possible method embraces 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 wired controller manual).

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

#### CAUTION:

In case of 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: Unit is requested to stop.
- Cool: Unit is requested to run in Cooling mode.
- Heat: Unit is requested to run in Heating mode.

When 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 temperature.

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 protection, 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, or JBus communication.




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

#### a - Wired Controller control

If the unit is fitted with a user interface, the mode selection can be done by direct access on 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 user interface, please refer to the wired controller manual.

#### b - JBus communication

The unit can be started or stopped and its System Mode can be selected from the JBus network. Refer to JBus registers in § 7. Parameter overview.

## 4 - OPERATION

### 4.2.4 - Switches

Some modes described below could be activated or deactivated 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 parameter User Interface type in UI\_CONF table, with [P521] = 1.

Table 4: Possible switches to install on system

Switch	Definition
On/Off Switch (remote)	Used to start and stop the unit (if no user interface).
Mode Heat/Cool (remote)	Used to select (if no user interface): - Cooling Mode = contact opened - Heating Mode = contact closed
Normal/Eco (remote)	Used to select (if no user interface): - Home Mode = contact opened - Away Mode = contact closed
Safety Input Contact	This contact should be a 'normally closed' type.
Power Limitation Contact (Night Mode)	Used to reduce the compressor maximum frequency to avoid noise
Loadshed Request Switch	This contact is requested by electricity company (i.e. in Germany) to control the green electricity (wind, solar) production and consumption more efficiently. When switch is closed then unit shall be stopped as soon as possible
DHW Request Switch from tank	When this input is closed, the 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 [P708] 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, 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 a 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.

The air setpoint can be configured in two ways:

- By direct access to the wired controller (refer to wired controller manual)
- By access to the parameter menu via JBus (refer to § 7. Parameter Overview)

### 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 [P424]	16 to 32°C
Eco	Cool Sleep Setpoint	16 to 32°C	Cool Sleep Offset [P425]	0 to 10°C
Away	Cool Away Setpoint	16 to 32°C	Cool Away Offset [P426]	0 to 10°C

## 4 - OPERATION

### ☀ 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 [P421]	16 to 32°C
Eco	Heat Sleep Setpoint	16 to 32°C	Heat Sleep Offset [P422]	-20 to 0°C
Away	Heat Away Setpoint	16 to 32°C	Heat Away Offset [P423]	-20 to 0°C

Once air setpoints are defined, water setpoints must be configured (refer to §3.6 - Unit with wired controller). Please, find here below more details about water setpoint configuration.

#### Water setpoint configuration

The water setpoint calculation can be based on:

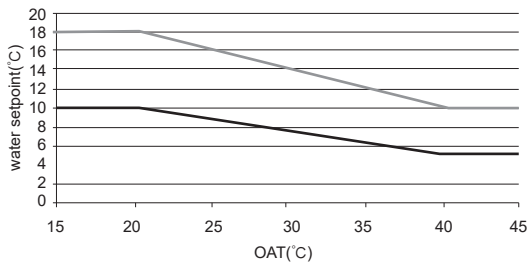
- 1) Predefined Climatic Curves depending on OAT: climatic curves already preconfigured in the control logic.
- 2) Fixed Water Setpoint: using a fixed value for each occupancy mode.
- 3) Custom Climatic Curve depending on OAT: define customized climatic curves in function of the application.
- 4) Offset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

#### 1. Predefined climatic curves

#### ⚙ COOLING:

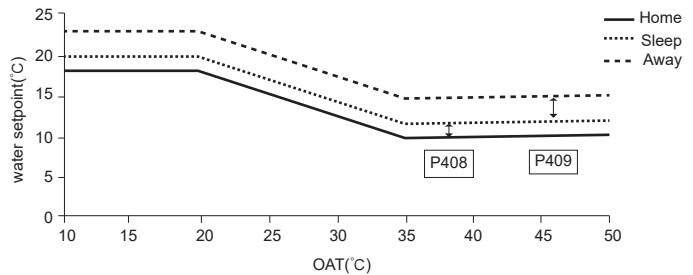
If the cooling climatic curve [P586] is configured to "1" or "2", the water setpoint will be calculated according to the selected cooling climatic curve. Two predefined cooling climatic curves are available:

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

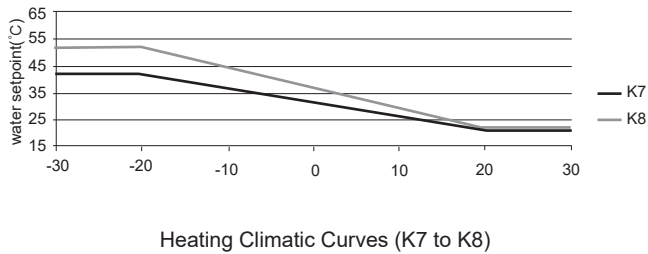
### ☀ HEATING:

If the heating climatic curve [P581] is configured to a parameter from "1" to "12", the water setpoint will be calculated according to the selected heating climatic curve.

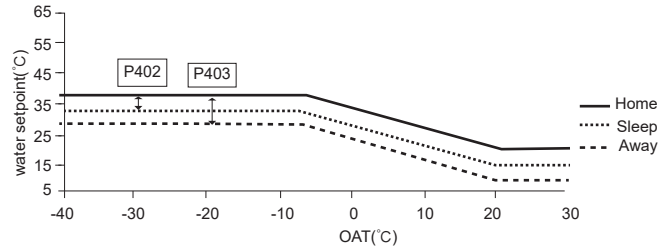
Twelve predefined heating climatic curves are available:

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

## 4 - OPERATION



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



### 2. Fixed water setpoint

If the cooling climatic curve [P586] or the heating climatic curve [P581] is configured to “-1”, the water control point will be determined according to the Occupancy mode.

The water setpoint can be configured in two ways:

- By direct access to the wired controller (refer to wired controller manual)
- By accessing the parameter menu via JBus or (refer to § 7. Parameter Overview)

#### COOLING

Wired Controller Occupancy	Water setpoint on wired controller direct access	Range	Water setpoint on parameter menu	Range
Home	Cool Home Setpoint	5 to 25°C	Cool Home Setpoint [P407]	5 to 18°C
Eco	Cool Sleep Setpoint		Cool Sleep Offset [P408]	0 to 10°C
Away	Cool Away Setpoint		Cool Away Offset [P409]	0 to 10°C

#### HEATING

Wired Controller Occupancy	Water setpoint on wired controller direct access	Range	Water setpoint on parameter menu	Range
Home	Heat Home Setpoint	25 to 62°C	Heat Home Setpoint [P401]	25 to 62°C
Eco	Heat Sleep Setpoint		Heat Sleep Offset [P402]	-10 to 0°C
Away	Heat Away Setpoint		Heat Away Offset [P402]	-10 to 0°C

#### DHW

Wired Controller Occupancy	Water setpoint on wired controller direct access	Range	Water setpoint on parameter menu	Range
Home	DHW Setpoint	40 to 62°C	DHW Setpoint [P406]	40 to 62°C
Eco	DHW Anti-Legionella Stp	60 to 70°C	DHW Anti-Legionella Stp [P405]	60 to 70°C

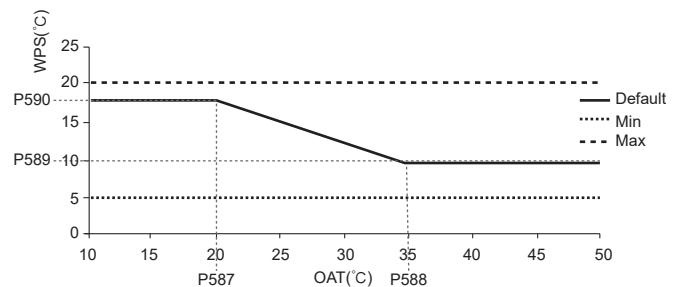
### 3. Custom climatic curve

#### COOLING:

If the cooling climatic curve [P586] is configured to “0”, 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

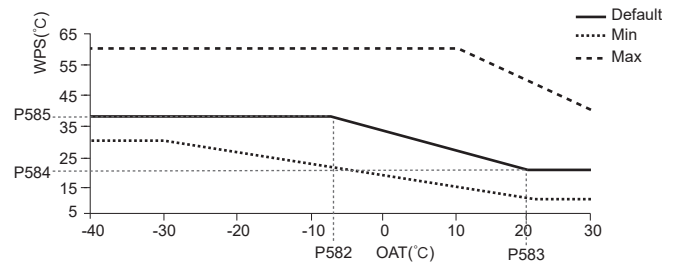


## 4 - OPERATION

### ☀ HEATING:

If the heating climatic curve [P581] is configured to "0", 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

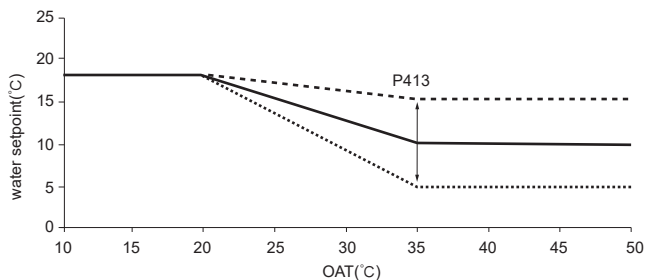


Example: Custom Cooling Climatic Curve

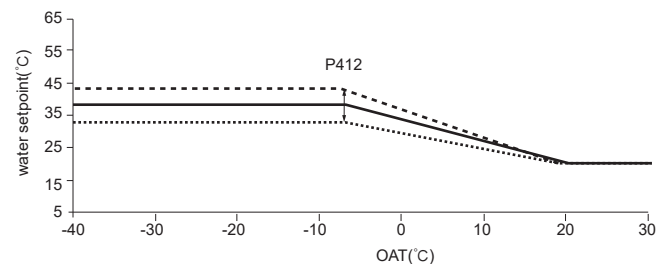
#### 4. Offset on climatic curves (predefined and customer)

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

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



Custom Cooling Climatic Curve : Offset on foot of the curve



Heating Cooling Climatic Curve : Offset on head of the curve

#### 4.2.6 - Water freeze protection

When the OAT is low (and pump is stopped), the risk to freeze the water exchanger and the water pipes is high. The pump shall be turned on regularly or continuously to make 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  $OAT < 7^{\circ}C$ , water temperature of BPHE is below  $3^{\circ}C$ , pump will run at maximum speed; anti-frozen EH, EH1, EH2, EH3 and auxiliary heat source will active if configure; unit start with heating mode

##### Heating mode and DHW mode:

If the  $OAT \leq 3^{\circ}C$ , water temperature of BPHE is below  $3^{\circ}C$ , pump will run at maximum speed; anti-frozen EH, EH1, EH2, EH3 and auxiliary heat source will active if configure; unit start with heating mode

##### Cooling mode:

If the water temperature of BPHE is below  $3^{\circ}C$ , pump will run at maximum speed; anti-frozen EH, EH1, EH2, EH3 and auxiliary heat source will active if configure; unit start with 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.

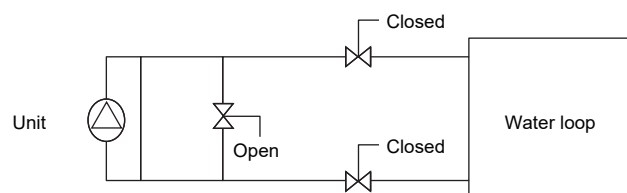


Figure 14: Winter position for unit with hydraulic module

#### 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 exchanger as a safety precaution, using the water inlet purge valve connection.

## 4 - OPERATION

- 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 between the values listed in the operating limit table (application data).
- To prevent corrosion by differential aeration, the complete 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 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 are 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 to freeze the water exchanger and the water pipes.

### 4.2.7 - Domestic hot water mode

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

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

And an additional water pump can be installed on 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 case of a domestic hot water request, the operating logic controls a diverting valve which directs the hot water to the storage tank.

Characteristics	Diverting valve with spring return and two wires control Recommendation: <ul style="list-style-type: none"><li>- Kvs = 16</li><li>- Max. Temperature = 150°C</li><li>- CHAR:L</li></ul>
-----------------	---

#### 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

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 [P707].

#### 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 unit).

Characteristics	Contactor Coil: 230 VAC 50Hz
-----------------	------------------------------------

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

- OAT is below Booster OAT Threshold [P604]
- OAT is above Maximum OAT for Heating [P515]
- Anti-legionella mode is active
- Defrost is active
- In case of unit of 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.

## 4 - OPERATION

### Water tank protection system

The system is scheduled to heat up 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 [P714]
- Anti-Legionella Start Time [P715]
- Anti-Legionella Setpoint[P405] (anti-legionella protection is stopped when the water temperature reaches the pre-set temperature)

### 4.2..8 - Pump configuration

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 (not supplied)
	Variable speed pump	Fixed speed pump
Internal main pump		✓
External main pump	x	✓

For external main pump and additional pump, the discrete output can control a contactor (not supplied with 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 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 main pump are presented in function of installation:

Table 6: Different control logic for main water loop pump						
Main Pump Logic [P565]	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 heat source pump						
Main Pump Logic [P565]	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 - OPERATION

### 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 case of low OAT or heat pump failure.

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

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

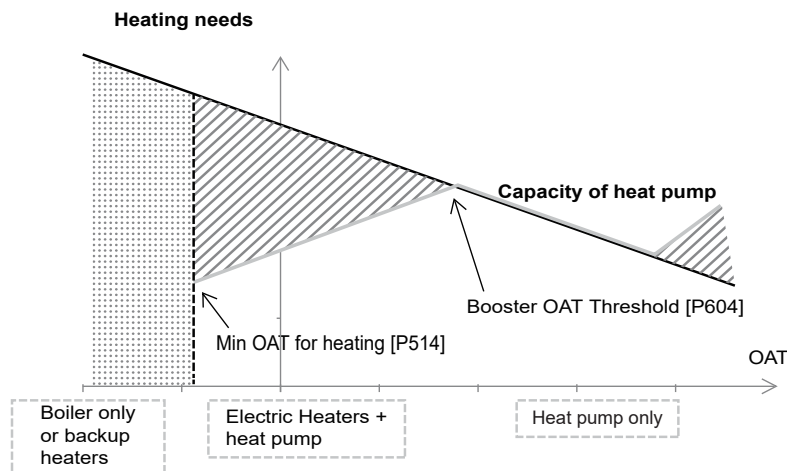


Figure 15: Operation of booster and backup

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 terminal block):

- Standard equip 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 configured even DHW heater is present.

Each discrete output can control a contactor (not supplied with 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

To satisfy the heating demand during periods very low ambient temperature, it is possible to install a boiler. The boiler is considered as a backup: when it is activated, the heat pump cannot operate. Boiler is activated when OAT is below Minimum OAT for Heating [P514] or in case of heat pump failure.

Characteristics	Contactor Coil: 230 VAC 50Hz
-----------------	------------------------------------

### 4.2.11 - Coil heating control for 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 a current to the compressor when 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.

## 4 - OPERATION

### 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.

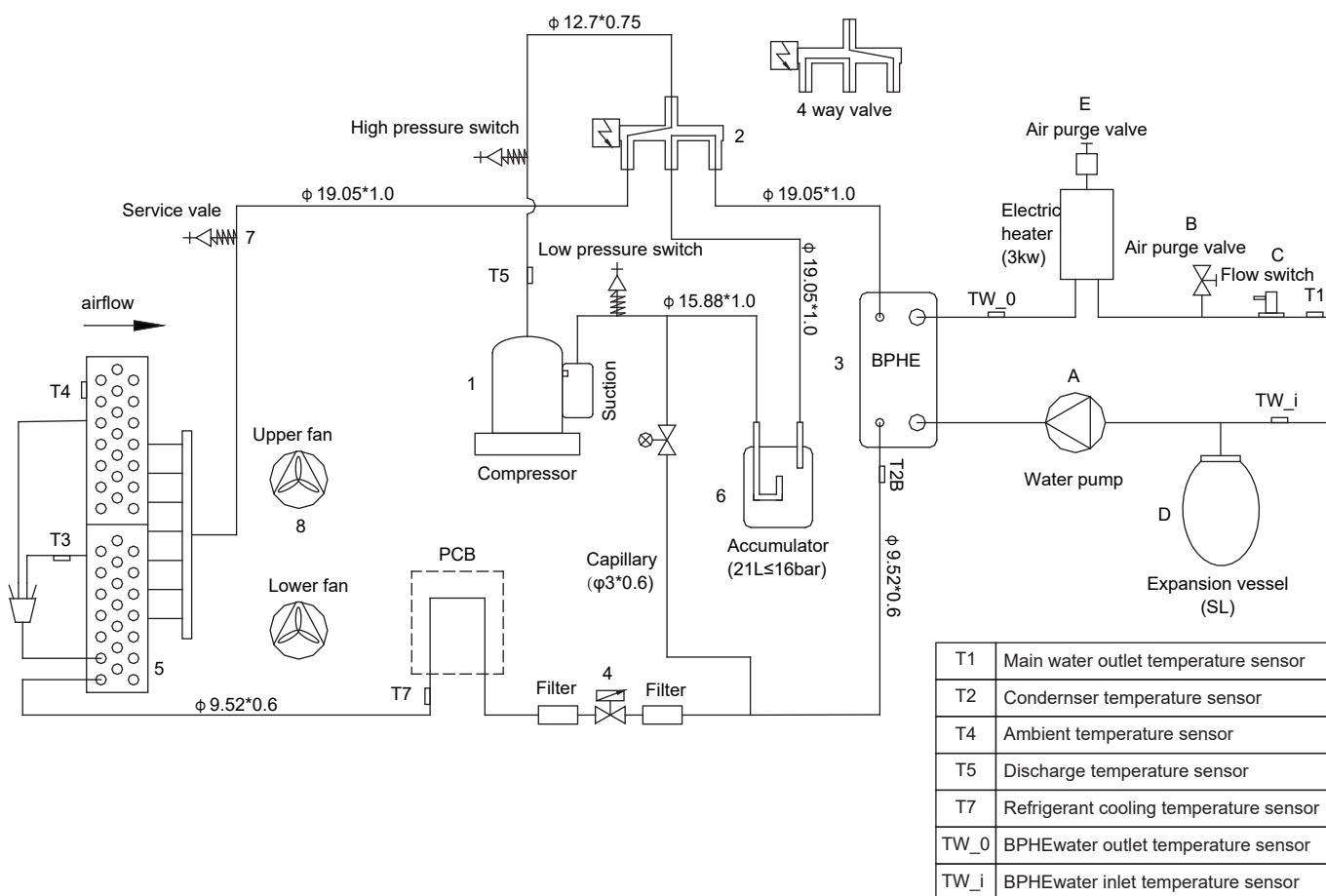
#### 4.2.13 - Night mode capacity control

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	Table	Par.	Designation	Description	Range	Default	Ex.	Unit
Set the night mode	CMP_CONF	518	Night Mode Start Time	Hour of starting up of night mode	00:00 to 23:59	0:00	0:00	hh:mm
	GEN_CONF	519	Night Mode Stop Time	Hour of stop of night mode	00:00 to 23:59	0:00	0:00	hh:mm

### 4.3 - Major system components

#### 4.3.1 - General – Refrigerant part



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

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

## 4 - OPERATION

---

### 4.3.2 - Compressors

The units use 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 compressor.

The compressors installed in these units have a specific oil charge.

#### NOTE:

Do not use refrigerants and lubricant 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 aluminium fins.

### 4.3.4 - Fans

The fans are driven by 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 its 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 that 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 a 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 operator sets up and maintains a monitoring and maintenance file.
- If there are no regulations or to complement them follow the control programmes of ISO 5149.
- If they exist follow local professional recommendations.
- Regularly check for 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 so that any malfunction is detected and corrected quickly, ensuring that no serious damage can occur.

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

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

#### CAUTION:

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

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 (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 wired controller manual).
- General visual inspection for any signs of deterioration.
- Verify the charge in the sight-glass.

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

#### 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 the condition of the electrical protection devices.
- Check the correct operation of all electric heaters.
- Check that no water has penetrated into the control box.

#### Mechanical checks

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

#### Water circuit checks

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

## 5 - MAINTENANCE

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

### Refrigerant circuit

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

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

### 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. These maintenance operations concern for example:

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

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

Any detected leaks must be repaired immediately.

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

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

### NOTE:

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

## 5.2 - Tightening torques for the main electrical connections

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

### 5.3 - Air heat exchanger

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

For coil cleaning, two maintenance levels are used.

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

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

- No. 00PSP000000115A: traditional cleaning method.

### CAUTION:

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

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

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

## 5.4 - Water heat exchanger maintenance

Check that:

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

## 5 - MAINTENANCE

---

### 5.5 - Unit maintenance

#### CAUTION:

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

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

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

### 5.6 - Refrigerant volume

The unit must be operate

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

#### IMPORTANT:

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

## 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 atmosphere.
- Never open system to atmosphere while it is under vacuum.
- When the system must be opened for service, break vacuum with dry nitrogen.
- Do not vent R32 into atmosphere.

### 6.1- Alarm listing

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

Table 8: Alarms listing	
Error code	Description
E0	Water flow switch fault
E1	Communication fault between IDU pcb and ODU PCB
E2	LWT sensor after EH(T1) fault
E3	T2: gas side of BPHE sensor fault -- reserved
E4	T2B: liquid side of BPHE sensor fault -- reserved
E5	ODU part error
E6	T7: water tank sensor fault
E7	T-in: EWT sensor fault
E8	T-out: LWT sensor fault
E9	Communication fault between wired controller and IDU PCB
EA	Tw-2: Bi-zone sensor fault (available when set the Bi-zone function)
Eb	T1B: auxiliary heat source sensor fault (available when set the auxiliary heat source)
Ec	Water pump fault
Ed	Reserved
EE	Reserved
EF	Mode conflict - reserved
P0	EPPROM fault
P1	Protection of huge tolerance between EWT and LWT
P2	Lack of water flow
P3	Protection of abnormal value between EWT and LWT
P6	Protection of the standard electrical heater overheat

## 6 - ALARM DESCRIPTION

Display on the PCB

Display content	Failure or protection definition	Remarks
E1	Three - phase supply phase - sequence fault	
E2	Communication failure between indoor unit and outdoor unit	Communication interrupted for 2mins or more between ODU and IDU
E4	Ambient temperature sensor failure	
E6	Condenser temperature sensor failure	
E8	Discharged temperature sensor failure	
E9	AC over voltage / under voltage protection	
E10	EEPROM failure	
EC	PCB refrigerant cooling sensor failure	
H0	Communication failure between the main control chip and the module board	
H1	Communication failure between the main control chip and the communication board	
H4	Display P6 protection for 3 times within 30 minutes	It can only be restored by repowering on the unit
H5	Display P2 protection for 3 times within 30 minutes	It can only be restored by repowering on the unit
H6	Display P4 protection for 3 times within 100 minutes	It can only be restored by repowering on the unit
H9	Display P9 protection for 2 times within 10 minutes	It can only be restored by repowering on the unit
H8	High pressure sensor failure	Exhaust pressure $P_c < 0.3\text{MPa}$
H10	Display P3 or P14 protection for 3 times within 60 minutes	It can only be restored by repowering on the unit
P1	High pressure protection	
P2	Low pressure protection	3 times P2 protection appears within 30 minutes and then reported H5
P3	Primary current overcurrent protection	
P4	Exhaust temperature is too high protection	3 times P4 protection appears within 100 minutes and then reported H6
P5	T3 high temperature protection	
P6	Module protection	3 times P6 protection appears within 30 minutes and then reported H4
P9	DC fan failure	2 times P9 protection appears within 10 minutes and then reported H9
P10	Typhoon protection	
P11	T2B refrigerant temperature of HPHE over-low protection	
P12	During heating operation the fan is in fault state in the area A for 5 minutes	



## 7 - PARAMETERS OVERVIEW

### 7.1 - Parameters list

This section includes an overview of all parameters that can be read or modified by the user.

The parameters are sorted as follows:

- 001 to 299 Display parameters
- 301 to 399 Maintenance parameters
- 401 to 499 Setpoint parameters
- 501 to 799 Configuration parameters

Legend:

No: No access; RO: Read-Only; RW: Read/Write;

RO/d: Read-Only and Display on the wired controller; RO/F: Read-Only and Parameter Forcing by CCN

Par.	Jbus	Mnemonic	Description	Range	Default	Unit			Table
001	0001H	OAT	Outdoor Air Temperature			1/10°C	RO/d	RO/F	GENUNIT
002	0002H	IAT	Indoor Air Temperature			1/10°C	RO/d	RO/F	GENUNIT
003	0003H	EWT	Entering Water Temperature			1/10°C	RO	RO/F	GENUNIT
004	0004H	LWT	Leaving Water Temperature			1/10°C	RO	RO/F	GENUNIT
005	0005H	TR	Refrigerant Temperature			1/10°C	RO	RO/F	GENUNIT
006	0006H	SPARE_T	Spare Temperature			1/10°C	RO	RO/F	GENUNIT
007	0007H	roomtemp	Room Temperature			1/10°C	RO	RO/F	GENUNIT
008	0008H	sst	Saturated Suction Temp			1/10°C	RO	RO	GENUNIT
009	0009H	ts	Suction Temperature			1/10°C	RO	RO	GENUNIT
010	000AH	td	Discharge Temperature			1/10°C	RO	RO	GENUNIT
011	000BH	te	Lower Air Exchanger Temp			1/10°C	RO	RO	GENUNIT
012	000CH	tl	Upper Air Exchanger Temp			1/10°C	RO	RO	GENUNIT
013	000DH	to	Inv. Outdoor Air Temp			1/10°C	RO	RO	GENUNIT
014	000EH	th	Heatsink Temperature			1/10°C	RO	RO	GENUNIT
015	000FH	sh	Superheat Temperature			1/10 K	RO	RO	GENUNIT
016	0010H	sh_targ	Superheat Target Temp			1/10 K	RO	RO	GENUNIT
017	0011H	dc_volt	Inverter DC High Voltage			V	RO	RO	GENUNIT
018	0012H	hv_stat	HV Bus Comm. Status	0/1 [Normal/Alarm]		-	RO	RO	GENUNIT
019	0013H	inv_mod	Inverter Current Mode			-	RO	RO	GENUNIT
020	0014H	freq_min	Actual Min Compr. Freq			1/10 Hz	RO	RO	GENUNIT
021	0015H	freq_max	Actual Max Compr. Freq			1/10 Hz	RO	RO	GENUNIT
022	0016H	FREQ_REQ	Requested Compr. Freq			1/10 Hz	RO	RO/F	GENUNIT
023	0017H	freq_cur	Actual Compressor Freq			1/10 Hz	RO	RO	GENUNIT
024	0018H	pmv_pos	PMV Position	0 to 500		step	RO	RO	GENUNIT
025	0019H	N.A.	Dummy parameter	N.A.					
026	001AH	N.A.	Dummy parameter	N.A.					
027	001BH	upr_fan	Upper Fan Speed	0 to 1000		rpm	RO	RO	GENUNIT
028	001CH	lwr_fan	Lower Fan Speed	0 to 1000		rpm	RO	RO	GENUNIT
029	001DH	EXCH_HTR	Exchanger Heater	0/1 [Off/On]		-	RO	RO/F	GENUNIT
030	001EH	BOILER	Boiler Output	0/1 [Off/On]		-	RO	RO/F	GENUNIT
031	001FH	EHS	Electrical Heat Stages	0 to 3		-	RO	RO/F	GENUNIT
032		SPARE_P	Backup By-pass Valve	0/1 [Off/On]		-			GEN_UNIT
035		SPARE_P	Spare Pressure			KPa	RO	RO/F	GENUNIT
039 <sup>(1)</sup>	0027H	to2	Corrected Inverter TO			1/10°C	RO	RO	GENUNIT
041	0029H	CHIL_OCC	Occupancy Mode	0 to 2 [Away/ Sleep/ Home]		-	RW/d	RW/F	STATUS
042	002AH	sum_mode	Summer Mode	0/1 [No/Yes]		-	RO	RO	STATUS
043	002BH	nightmod	Night Mode	0/1 [No/Yes]		-	RO	RO	STATUS
044	002CH	MOD_REQ	System Mode Request	0 to 9		-	RW/d	RW/F	STATUS
045	002DH	MOD_STAT	System Mode Status	0 to 109		-	RO/d	RO	STATUS
046	002EH	N.A.							
047	002FH	mod_ovr	System Mode Override	0 to xxx		-	RO	RO	STATUS
048	0030H	setpoint	Current Setpoint	0.0 to 60.0		1/10°C	RW/d	RO	STATUS
049	0031H	RESET	User Adjust Temperature	-5.0 to 5.0		1/10 K	RO	RO/F	STATUS
050	0032H	IAT_OFF	IAT Offset	-4.0 to 4.0		1/10 K	RO	RO/F	STATUS
051	0033H	CTRL_PNT	Control Point	0.0 to 60.0		1/10°C	RO/d	RO/F	"STATUS OR MSL_STAT"
052	0034H	CTRL_TMP	Control Temp	-40.0 to 115.0		1/10°C	RO/d	RO/F	STATUS
053	0035H	N.A.							
061	003DH	cmp_req	Compressor Mode Request			-	RO	RO	LOADFACT
062	003EH	cmp_inv	Compressor Mode To Inv.			-	RO	RO	LOADFACT
063	003FH	cmp_stat	Compressor Mode Status			-	RO	RO	LOADFACT
064	0040H	cap_ovr	Capacity Override			-	RO	RO	LOADFACT
065	0041H	cap_tmr	Capacity Timer			s	RO	RO	LOADFACT

## 7 - PARAMETERS OVERVIEW

Par.	Jbus	Mnemonic	Description	Range	Default	Unit			Table
066	0042H	CAP_T	Total Capacity	0 to 100		%	RO	RO/F	LOADFACT
067	0043H	DEM_LIM	Demand Limit	0 to 100		%	RO	RO/F	LOADFACT
068	0044H	FREQ_RED	Frequency Reduction Mode	0/1 [No/Yes]		-	RO	RO/F	LOADFACT
069	0045H	RUNNING	Unit Running Status	0/1 [No/Yes]		-	RO	RO/F	LOADFACT
081	0051H	pmp_ovr	Pump Override	-1 to 19		-	RO	RO	PMP_STAT
082	0052H	flow_err	Water Flow Failure	0/1 [No/Yes]		-	RO	RO	PMP_STAT
083	0053H	dtstp	Current DeltaT Setpoint			°C	RO	RO	PMP_STAT
084	0054H	delta_t	Water Delta Temperature			1/10 K	RO	RO	PMP_STAT
085	0055H	PMP	Water Pump Speed	0 to 100		%	RO	RO/F	PMP_STAT
088	0058H	ADD_PMP	Additional Pump Output	0/1 [No/Yes]		-	RO	RO/F	PMP_STAT
91	005BH	Backup_ovr	Backup Override	-1 to 100	N.A.	-	RO	RO	BCK_STAT
92	005CH	back_flg	Backup Authorized flag	0 to 1	N.A.	-	RO	RO	BCK_STAT
93	005DH	warmtime	Booster Warm Up timer	0 to 1800	N.A.	s	RO	RO	BCK_STAT
94	005EH	BACK_CAP	Backup Capacity	0 to 100	N.A.	%	RO	RO/F	BCK_STAT
101	0065H	ONOFF_SW	On/Off Switch Status	0/1 [Open/Close]		-	RO	RO/F	INPUT
102	0066H	HC_SW	Heat/Cool Switch Status	0/1 [Open/Close]		-	RO	RO/F	INPUT
103	0067H	ECO_SW	Eco Switch Status	0/1 [Open/Close]		-	RO	RO/F	INPUT
104	0068H	SAFE_SW	Safety Switch Status	0/1 [Open/Close]		-	RO	RO/F	INPUT
105	0069H	FLOW_SW	Flow Switch Status	0/1 [Open/Close]		-	RO	RO/F	PMP_STAT OR INPUT
106	006AH	CUST_DI5	Customized DI#5 Status	0/1 [Open/Close]		-	RO	RO/F	INPUT
107	006BH	CUST_DI6	Customized DI#6 Status	0/1 [Open/Close]		-	RO	RO/F	INPUT
108	006CH	CUST_DI7	Customized DI#7 Status	0/1 [Open/Close]		-	RO	RO/F	INPUT
109	006DH	CUST_DI8	Customized DI#8 Status	0/1 [Open/Close]		-	RO	RO/F	INPUT
110	006EH	RED_SW	Power Limitation Switch	0/1 [Open/Close]		-	RO	RO/F	INPUT
111	006FH	OPEAK_SW	Off Peak Hour Switch	0/1 [Open/Close]		-	RO	RO/F	INPUT
112	0070H	LSHED_SW	Loadshed Request Switch	0/1 [Open/Close]		-	RO	RO/F	INPUT
113	0071H	SOLAR_SW	Solar Input Switch	0/1 [Open/Close]		-	RO	RO/F	INPUT
114	0072H	DHW_REQ	DHW Request from tank	0/1 [Open/Close]		-	RO	RO/F	INPUT OR DHW_STAT
115	0073H	DHW_PRIO	DHW Priority Switch	0/1 [Open/Close]		-	RO	RO/F	INPUT OR DHW_STAT
116	0074H	DHW_ANTI	DHW Anti-Legionella Req.	0/1 [Open/Close]		-	RO	RO/F	INPUT OR DHW_STAT
117	0075H	SUMM_SW	Summer Switch	0/1 [Open/Close]		-	RO	RO/F	"INPUT OR DHW_STAT"
118	0076H	N.A.							
119	0077H	N.A.							
120	0078H	EXALM_SW	External Alarm Switch	0/1 [Open/Close]		-	RO	RO/F	INPUT
201	00C9H	DHW_MODE	DHW Mode	0 to 2 [Eco/ Anti-Leg./ Regular]		-	RW	RO/F	DHW_STAT
202	00CAH	dhw_ovr	DHW Override	-1 to 100		-	RO	RO	DHW_STAT
203	00CBH	dhw_dem	DHW Demand from Tank	0/1 [No/Yes]		-	RO	RO	DHW_STAT
204	00CCH	dhw_cond	DHW Conditions	0/1 [True/False]		-	RO	RO	DHW_STAT
205	00CDH	DHW_CTLP	DHW Control Point	20.0 to 60.0		1/10°C	RO	RO/F	DHW_STAT
206	00CEH	DHW_TT	DHW Tank Temperature			1/10°C	RO	RO/F	DHW_STAT
207	00CFH	shc_time	Current SHC Runtime			min	RO	RO	DHW_STAT
208	00D0H	dhw_time	Current DHW Runtime			min	RO	RO	DHW_STAT
209	00D1H	DHW_EXCP	DHW Exception Timer	0 to 1440		min	RO	RO/F	DHW_STAT
210	00D2H	DHW_VLV	DHW Diverting Valve	0/1 [Off/On]		-	RO	RO/F	DHW_STAT
211	00D3H	DHW_EHS	DHW Elec Heat Stage	0/1 [Off/On]		-	RO	RO/F	DHW_STAT
212	00D4H	DHW_RUN	DHW Running Status	0/1 [No/Yes]		-	RO	RO/F	DHW_STAT
221	00DDH	CHWSTEMP	Chiller Water System Temp			1/10°C	RO	RO/F	MSL_STAT
222	00DEH	ms_cap	Master/Slv Total Capacity	0 to 100	0	%	RO	RO	MSL_STAT
223		mst_req	Master Request Capacity	0 to 100	0	%	RO	RO	MSL_STAT
224		slv1_req	Slave #1 Request Capa.	0 to 100	0	%	RO	RO	MSL_STAT
225		slv2_req	Slave #2 Request Capa.	0 to 100	0	%	RO	RO	MSL_STAT
226		slv3_req	Slave #3 Request Capa.	0 to 100	0	%	RO	RO	MSL_STAT
227		msl_icon	Master/Slave Icon Status	0 to 3		-			N.A.
228		ms_activ	Master/Slv Active Flag	False/True	False	-	RO	RO	MSL_STAT
229		MS_STAT	Master/Slv Overall Status	-1 to 101	0	-	RO	RO	MSL_STAT
230	00E6H	mast_sta	Master Status	-1 to 101		-	RO	RO	MSL_STAT
231	00E7H	slv1_sta	Slave #1 Status	-1 to 101		-	RO	RO	MSL_STAT
232	00E8H	slv2_sta	Slave #2 Status	-1 to 101		-	RO	RO	MSL_STAT
233	00E9H	slv3_sta	Slave #3 Status	-1 to 101		-	RO	RO	MSL_STAT
234	00EAH	MS_LIM	Master/Slv Demand Limit	0 to 100	100	-	RO	RO/F	MSL_STAT

## 7 - PARAMETERS OVERVIEW

Par.	Jbus	Mnemonic	Description	Range	Default	Unit			Table
235		ms_prio	Mast/Slv Priority	123 = Master first, then Slave #1, then Slave #2 213 = Slave #1 first, then Master, then Slave #2 21 = Slave #1 first, then Master		-			MSL_STAT
239		CTRLPNT2	2nd Water Control Point			°C			MSL_STAT
301		model	Inverter Model			-	RO	RO	Inverter
302		prg_ver	Inverter Progr Version			-	RO	RO	Inverter
303		prg_rev	Inverter Progr Revision			-	RO	RO	Inverter
304		eep_cod	Inverter EEPROM Code			-	RO	RO	Inverter
305		sw_set	Inverter Switch Setting			-	RO	RO	Inverter
306		cdu_cap	CDU Capacity	0 to 15		-	RO	RO	Inverter
307		mcu_code	MCU Code			-	RO	RO	Inverter
308		cdu_amp	CDU Current			mA	RO	RO	Inverter
311		def_ovr	Defrost Override	-4 to 32	0	-			DEF_STAT
312		def_dt0m	Ref Defrost DeltaT (MD)	0 to 30	-	K			DEF_STAT
313		DEF_DT0	Ref Defrost DeltaT	0 to 30	-	K			DEF_STAT
314		def_dt	Actual Defrost DeltaT			K			DEF_STAT
315		def_fact	Frost Factor			%			DEF_STAT
316		def_nb	Free Defrost sessions number		0	-			DEF_STAT
317		def_time	Free Defrost duration			s			DEF_STAT
318		md_last	Time since last MD			min			DEF_STAT
319		fd_last	Time since last FD			min			DEF_STAT
321	0141H	QCK_ENA	QT: Quick Test enable	0/1 [No/Yes]		-	RW	RW/F	QCK_TEST
322	0142H	_HP_TEST	QT: HP Switch Test	N.A.		-	RW	RW/F	QCK_TEST
323	0143H	_RAT_MOD	QT: Rating Mode	0 to 4 [Rating Off/ Rating Cool/ Rating Heat/ Ramp Cool/ Ramp Heat]		-	RW	RW/F	QCK_TEST
324	0144H	_RAT_FRQ	QT: Rating Frequency	0 to 120		1/10 Hz	RW	RW/F	QCK_TEST
325		_FAN_LOW	QT: Lower Fan Speed	0 to 1000		rpm	RW	RW/F	QCK_TEST
326		_FAN_UPP	QT: Upper Fan Speed	0 to 1000		rpm	RW	RW/F	QCK_TEST
327		_PMV_POS	QT: PMV Position	0 to 1000		-	RW	RW/F	QCK_TEST
331	014BH	_PMP	QT: Water Pump Speed	0 to 100		%	RW	RW/F	QCK_TEST
332	014CH	EXH_HTR	QT: Water Exchanger Heater	0/1 [Off/On]		-	RW	RW/F	QCK_TEST
333	014DH	_ADD_PMP	QT: Additional Pump	0/1 [Off/On]		-	RW	RW/F	QCK_TEST
334	014EH	_SPR_REL	QT: Spare Relay	0/1 [Off/On]		-	RW	RW/F	QCK_TEST
335	014FH	_DHW_VLV	QT: DHW Diverting Valve	0/1 [Off/On]		-	RW	RW/F	QCK_TEST
336	0150H	_BOILER	QT: Boiler or EHS1	0/1 [Off/On]		-	RW	RW/F	QCK_TEST
320	0140H	_CUSTDO5	QT: Customized DO#5	0/1 [Off/On]		-	RW	RW/F	QCK_TEST
337	0151H	_CUSTDO8	QT: Customized DO#8	0/1 [Off/On]		-	RW	RW/F	QCK_TEST
338	0152H	_CUSTDO9	QT: Customized DO #9	0/1 [Off/On]		-	RW	RW/F	QCK_TEST
315		_CAP_OUT	QT: Capacity Output	0 to 100	0	%	RW	RW/F	QCK_TEST
339		_HP_MAX	Maximum High Pressure	0 to 100	0	1/10KPa	RO	RO	QCK_TEST
340	0154H	ALMRESET	Alarm Reset	0/1 [No/Yes]		-	RW	RW/F	ALARM
341	0155H	ALM	Alarm Status	0/1 [Normal/Alarm]	0	-	RO/d	RO	ALARM
342	0156H	ALERT	Alarm Status	0/1 [No/Yes]	0	-	RO	RO	ALARM
343	0157H	SHUTDOWN	Shutdown Status	0/1 [No/Yes]	0	-	RO	RO	ALARM
344	0158H	inv_err	Inverter Error (Code)	0 to 255		-	RO	RO	ALARM
345		inv_erra	Inverter Error (Alpha)	"Normal" / "Xnn"		-	RO	RO	ALARM
346		alm_cod1	Alarm Code bitmap 1			-	RO	RO	ALARM
347		alm_cod2	Alarm Code bitmap 2			-	RO	RO	ALARM
348		alm_cod3	Alarm Code bitmap 3			-	RO	RO	ALARM
349		alm_cod4	Alarm Code bitmap 4			-	RO	RO	ALARM
350	015EH	alm_01	Current Alarm #1	0 to 100		-	RO	RO	ALARM
351	015FH	alm_02	Current Alarm #2	0 to 100		-	RO	RO	ALARM
352	0160H	alm_03	Current Alarm #3	0 to 100		-	RO	RO	ALARM
353	0161H	alm_04	Current Alarm #4	0 to 100		-	RO	RO	ALARM
354	0162H	alm_05	Current Alarm #5	0 to 100		-	RO	RO	ALARM
360	0168H	alm_01p	Past Alarm #1	0 to 100		-	RO	RO	ALARM
361	0169H	alm_02p	Past Alarm #2	0 to 100		-	RO	RO	ALARM
362	016AH	alm_03p	Past Alarm #3	0 to 100		-	RO	RO	ALARM
363	016BH	alm_04p	Past Alarm #4	0 to 100		-	RO	RO	ALARM
364	016CH	alm_05p	Past Alarm #5	0 to 100		-	RO	RO	ALARM
371	0173H	comp1_st	Compressor Starts Nb			-	RO	RO	RUNTIME1
372	0174H	comp1_hr	Compressor Run Hours			h	RO	RO	RUNTIME1

## 7 - PARAMETERS OVERVIEW

Par.	Jbus	Mnemonic	Description	Range	Default	Unit			Table
373	0175H	pmp_st	Water Pump Starts Nb			-	RO	RO	RUNTIME1
374	0176H	pmp_hr	Water Pump Run Hours			h	RO	RO	RUNTIME1
379		wearfact	Unit Wear Factor			-			
381	017DH	RUN2_RST	User Runtime Reset	0 to 3	0	-	RW	RW	RUNTIME2
382	017EH	comp_hr	Compressor Run Hours			h	RO	RO	RUNTIME2
383	017FH	back_hr	Backup Running Hours			h	RO	RO	RUNTIME2
384	0180H	cool_hr	Cooling Mode Hours			h	RO	RO	RUNTIME2
385	0181H	heat_hr	Heating Mode Hours			h	RO	RO	RUNTIME2
386	0182H	dhw_hr	DHW Mode Hours			h	RO	RO	RUNTIME2
387	0183H	dfrt_hr	Defrost Mode Hours			h	RO	RO	RUNTIME2
388	0184H	nrg_heat	Energy consumed in Heat			kWh	RO	RO	RUNTIME2
389	0185H	nrg_cool	Energy consumed in Cool			kWh	RO	RO	RUNTIME2
391	0187H	CHIL_S_S	Unit Start/Stop	0/1 [Stop/Start]		-	RO	RO/F	AQUASMRT
392	0188H	HC_SEL	Heat/Cool Select	0/1 [Cool/Heat]		-	RO	RO/F	AQUASMRT
393	0189H	EMSTOP	Emergency Stop	0/1 [Disable/Enable]		-	RO	RO/F	AQUASMRT
394	018AH	CAP_REQ	Special Control (regardless of water temp. vs setpoint): 0 = Unit stopped (satisfied) 1 = Minimum allowed frequency 100 = Maximum allowed frequency	0 to 100	0	%	RO	RO/F	AQUASMRT
399		RESETDEV	Reset Device	0/1 [Disable/Enable]		-			
401	0191H	hwocstp	Heat Home Setpoint (Water)	20.0 to 60.0	45	1/10°C	RW	RW	WAT_STP
402	0192H	hwunoff	Heat Sleep Offset (Water)	-20.0 to 0.0	0.0	1/10 K	RW	RW	WAT_STP
403	0193H	hwecoff	Heat Away Offset (Water)	-20.0 to 0.0	-5.0	1/10 K	RW	RW	WAT_STP
404	0194H	N.A.							
405	0195H	leg_stp	DHW Anti-Legionella Stp	50.0 to 60.0	60	1/10°C	RW	RW	WAT_STP
406	0196H	dhw_stp	DHW Setpoint	30.0 to 60.0	50	1/10°C	RW	RW	WAT_STP
407	0197H	cwocstp	Cool Home Setpoint (Water)	0.0 to 18.0	12	1/10°C	RW	RW	WAT_STP
408	0198H	cwunoff	Cool Sleep Offset (Water)	0.0 to 10.0	0	1/10 K	RW	RW	WAT_STP
409	0199H	cwecoff	Cool Away Offset (Water)	0.0 to 10.0	5	1/10 K	RW	RW	WAT_STP
410		hw_hyst	Heat Hysteresis (Water)	0.5 to 2.0	0,5	1/10 K	RW	RW	WAT_STP
411		cw_hyst	Cool Hysteresis (Water)	0.5 to 2.0	0,5	1/10 K	RW	RW	WAT_STP
412		hcurvoff	Heat Curv Max Stp Offset	-5.0 to 5.0	0.0	1/10 K	RW	RW	WAT_STP
413		ccurvoff	Cool Curv Min Stp Offset	-5.0 to 5.0	0.0	1/10 K	RW	RW	WAT_STP
421	01A5H	htocstp	Heat Home Setpoint (Air)	12.0 to 34.0	19	1/10°C	RW	RW	AIR_STP
422	01A6H	htunoff	Heat Sleep Offset (Air)	-10.0 to 0.0	-2.0	1/10 K	RW	RW	AIR_STP
423	01A7H	htecoff	Heat Away Offset (Air)	-10.0 to 0.0	-4.0	1/10 K	RW	RW	AIR_STP
424	01A8H	clocstp	Cool Home Setpoint (Air)	20.0 to 38.0	26	1/10°C	RW	RW	AIR_STP
425	01A9H	clunoff	Cool Sleep Offset (Air)	0.0 to 10.0	2	1/10 K	RW	RW	AIR_STP
426	01AAH	clecoff	Cool Away Offset (Air)	0.0 to 10.0	4	1/10 K	RW	RW	AIR_STP
427	01ABH	freezstp	Home AntiFreeze Setpoint	6.0 to 12.0	6	1/10°C	RW	RW	AIR_STP
428		deltastp	Air Delta Setpoint	0.2 to 1.0	0,5	1/10 K	RW	RW	AIR_STP
429		iat_fact	IAT Reset Factor	0.0 to 2.0	0	1/10	RW	RW	AIR_STP
501		sfsw_typ	Safety Switch Type	1 to 3	1	-	RW	RW	GEN_CONF
502		cust_di5	Customized DI#5 Config	-15 to 15	1	-	RW	RW	GEN_CONF
503		cust_di6	Customized DI#6 Config	-15 to 15	0	-	RW	RW	GEN_CONF
504		cust_di7	Customized DI#7 Config	-15 to 15	0	-	RW	RW	GEN_CONF
505		cust_di8	Customized DI#8 Config	-15 to 15	0	-	RW	RW	GEN_CONF
500		cust_do5	Customized DO#5 Config	0 to 13	4	-	RW	RW	GEN_CONF
506		cust_do8	Customized DO#8 Config	0 to 13	1	-	RW	RW	GEN_CONF
507		cust_do9	Customized DO#9 Config	0 to 13	2	-	RW	RW	GEN_CONF
508		tr_type	Refrigerant Temp Type	0 to 2	0	-	RW	RW	GEN_CONF
509		ewt_type	EWT Sensor Type	0 to 1	1	-	RW	RW	GEN_CONF
510		iat_type	IAT Sensor Type	0 to 3	0	-	RW	RW	GEN_CONF
511		oat_type	OAT Sensor Type	0 to 3	0	-	RW	RW	GEN_CONF
512		iat_bias	IAT Sensor Bias	-5.0 to 5.0	0.0	1/10 K	RW	RW	GEN_CONF
513		oat_bias	OAT Sensor Bias	-5.0 to 5.0	0.0	1/10 K	RW	RW	GEN_CONF
514		oat_min	Minimum OAT for Heating	-20.0 to 10.0	-20.0	1/10°C	RW	RW	GEN_CONF
515		oat_max	Maximum OAT for Heating	5.0 to 99.0	99	1/10°C	RW	RW	GEN_CONF
516		oat_minc	Minimum OAT for Cooling	0.0 to 40.0	0	1/10°C	RW	RW	GEN_CONF
517		freez_dt	Anti-Freeze Delta Setpoint	0.0 to 6.0	0	°C	RW	RW	GEN_CONF
518		nghststrt	Night Mode Start Time	00:00 to 23:59	00:00	hh:mm	RW	RW	GEN_CONF
519		nghstop	Night Mode Stop Time	00:00 to 23:59	00:00	hh:mm	RW	RW	GEN_CONF
520		sparetyp	Spare Sensor Type	0 to 5	0	-	RW	RW	GEN_CONF
521		ui_type	User Interface Type	0 to 3	0	-	RW	RW	UI_CONF
522		ui_accss	Parameter Access from UI	0 to 3	3	-	RW	RW	UI_CONF
523		ui_tmt	Interface Comm. Timeout	0 to 240	60	s	RW	RW	UI_CONF

## 7 - PARAMETERS OVERVIEW

Par.	Jbus	Mnemonic	Description	Range	Default	Unit			Table
524		ui_back	Backlight Timeout	0 to 7	2	-	RW	RW	UI_CONF
525		ui_buzz	Buzzer on key press	0/1 [No/Yes]	No	-	RW	RW	UI_CONF
526		timebrod	Interface Time Broadcast	0/1 [No/Yes]	Yes	-	RW	RW	UI_CONF
527		ser_pass	Service Password	0 to 9999	120	-	RW	RW	UI_CONF
528		usr_pass	User Password	0 to 9999	0	-	RW	RW	UI_CONF
541		powr_lim	Power Limitation value	50 to 100	75	%	RW	RW	CMP_CONF
542		nght_lim	Nigh Limitation value	50 to 100	75	%	RW	RW	CMP_CONF
543		dhw_lim	DHW Limitation value	50 to 100	100	%	RW	RW	CMP_CONF
560		flui_typ	Fluid Type	1 to 1	1	-	RW	RW	PMP_CONF
561		pmp_ext	External Main Pump Ctrl	0/1 [No/Yes]	0 [No]	-	RW	RW	PMP_CONF
562		flw_chko	Flow Checked if Pump Off	0/1 [No/Yes]	1 [Yes]	-	RW	RW	PMP_CONF
563		pmp_stck	Anti-sticking function	0/1 [No/Yes]	1 [Yes]	-	RW	RW	PMP_CONF
564		sampling	Pmp Sampling Time Stby	5 to 240	15	min	RW	RW	PMP_CONF
565		pmp_log	Main Pump Logic	1 to 3	1	-	RW	RW	PMP_CONF
566		vsp_log	Var Speed Pump Logic	0 to 1	1	-	RW	RW	PMP_CONF
567	0237H	vsp_min	Minimum Pump Speed	19 to 100	19	%	RW	RW	PMP_CONF
568	0238H	vsp_max	Maximum Pump Speed	19 to 100	100	%	RW	RW	PMP_CONF
569	0239H	dt_stp	Water Delta T Setpoint	2.0 to 20.0	5	1/10 K	RW	RW	PMP_CONF
570		dt_kp	Delta T Proport. Gain	-10.000 to -0.001	-2.000	-	RW	RW	PMP_CONF
571		dt_ti	Delta T Integral Time	10 to 120	20	s	RW	RW	PMP_CONF
572		dt_ts	Delta T Sample Time	10 to 120	10	s	RW	RW	PMP_CONF
573		add_pmp	Additional Pump Logic	0 to 4	0	-	RW	RW	PMP_CONF
581		ht_curv	Heat Clim Curve Select	-1 to 12	-1	-	RW	RW	CLIMCURV
582		ht_min_a	Heat Minimum OAT	-30.0 to 10.0	-7.0	1/10°C	RW	RW	CLIMCURV
583		ht_max_a	Heat Maximum OAT	10.0 to 30.0	20	1/10°C	RW	RW	CLIMCURV
584		ht_min_w	Heat Min Water Setpoint	20.0 to 40.0	20	1/10°C	RW	RW	CLIMCURV
585		ht_max_w	Heat Max Water Setpoint	30.0 to 60.0	38	1/10°C	RW	RW	CLIMCURV
586		cl_curv	Cool Clim Curve Select	-1 to 2	-1	-	RW	RW	CLIMCURV
587		cl_min_a	Cool Minimum OAT	0.0 to 30.0	20	1/10°C	RW	RW	CLIMCURV
588		cl_max_a	Cool Maximum OAT	24.0 to 46.0	35	1/10°C	RW	RW	CLIMCURV
589		cl_min_w	Cool Min Water Setpoint	5.0 to 20.0	10	1/10°C	RW	RW	CLIMCURV
590		cl_max_w	Cool Max Water Setpoint	5.0 to 20.0	18	1/10°C	RW	RW	CLIMCURV
595		dry_stp	Drying Starting Setpoint	20.0 to 40.0	20	1/10°C	RW	RW	DRYING
596		drystep1	Drying Warm-up days	0 to 99	3	-	RW	RW	DRYING
597		drystep2	Drying Ramp-up days	0 to 99	4	-	RW	RW	DRYING
598		drystep3	Drying Hold-up days	0 to 99	4	-	RW	RW	DRYING
599		drying_time	Drying Runtime	N.A.	0	hours	RO	RO	RUNTIME2
601		bck_type	Backup Type	0 to 10	0	-	RW	RW	BCK_CONF
602		bck_warm	Booster Warm Up Time	0 to 120	30	min	RW	RW	BCK_CONF
603		bck_delt	Booster Delta Temp	1.0 to 20.0	5	1/10°C	RW	RW	BCK_CONF
604		bck_oat	Booster OAT Threshold	-20.0 to 15.0	-7.0	1/10°C	RW	RW	BCK_CONF
605		ehs_kp	EHS Proport. Gain	0.001 to 10.000	2	-	RW	RW	BCK_CONF
606		ehs_ti	EHS Integral Time	10 to 60	20	s	RW	RW	BCK_CONF
607		ehs_ts	EHS Sampling Time	10 to 120	30	s	RW	RW	BCK_CONF
611		def_sel	Energy Soft select	0 [Disable] to 1 [Enable]	1	-	RW	RW	DEF_CONF
612		def_oat	OAT Min Defrost threshold	2 to 10	2	°C	RW	RW	DEF_CONF
613		fd_nb	Max Free Defrost number	1 to 20	6	-	RW	RW	DEF_CONF
614		md_time	Max time between two MD	1 to 18	6	h	RW	RW	DEF_CONF
615		md_rec	MD Recovery Select	0/1 Disable/Enable	1	-	RW	RW	DEF_CONF
641		ccn_bus	CCN Element Address	1 to 239	1	-	RW	RW	
642		ccn_elm	CCN Element Bus	0 to 239	0	-	RW	RW	
643		ccn_typ	CCN Device Type	0 to 3	-	-			
645		ccn_bdr	Primary Baud Rate	0 to 2 [9600/19200/ 38400]	2 [38400]	-	RW	RW	
646		sec_bdr	Secondary Baud Rate	0 to 2 [9600/19200/38400]	2 [38400]	-	RW	RW	
648		location	Location Description			24 char			
650		serialnb	Serial Number			-	RO	RO	
651		ref_nb	Reference Number			24 char			
653		pic_type	PIC Type			-	RO	RO	
654		soft_ver	Software Version Number		-	-	RO	RO	
661		hod	Hour of Day	0 to 23	N.A.	-	RW	RW	TIME
662		mod	Minute of Hour	0 to 59	N.A.	-	RW	RW	TIME
663		dow	Day of Week	1 to 7 [Monday ~ Sunday]	N.A.	-	RW	RW	TIME
664		hol_flag	Holiday Flags	0 to 15	N.A.	-	RW	RW	TIME
665		dom	Day of Month	1 to 31	N.A.	-	RW	RW	TIME
666		month	Month	1 to 12	N.A.	-	RW	RW	TIME



## 7 - PARAMETERS OVERVIEW

Par.	Jbus	Mnemonic	Description	Range	Default	Unit			Table
667		year	Year	0 to 99	N.A.	-	RW	RW	TIME
701		dhw_type	Domestic Hot Water Type	0 to 3	0	-	RW	RW	DHW_CONF
702		dhw_vlvr	DHW 3-way Valve run time	0 to 240	30	s	RW	RW	DHW_CONF
703		dhw_prio	Dom. Hot Water Priority	0 to 1	0	-	RW	RW	DHW_CONF
704		shc_min	SHC Minimum Runtime	0 to 720	20	min	RW	RW	DHW_CONF
707		dhw_max	DHW Maximum Runtime	-1 to 720	60	min	RW	RW	DHW_CONF
708		dhw_excp	DHW Exception Time	1 to 24	2	hour	RW	RW	DHW_CONF
709		N.A.							
710		vsp_dhw	Pump Speed in DHW	19 to 100	100	%	RW	RW	DHW_CONF
711		dhw_dow	DHW Schedule Days	0000 0000 to 1111 1110	1111	-	RW	RW	DHW_CONF
712		dhw_strt	DHW Starting Time	00:00 to 23:59	21:00	hh:mm	RW	RW	DHW_CONF
713		dhw_stop	DHW Stopping Time	00:00 to 23:59	06:00	hh:mm	RW	RW	DHW_CONF
714		leg_dow	AntiLegionella Strt DOW	0000 0000 to 1111 1111	0	-	RW	RW	DHW_CONF
715		leg_time	AntiLegionella Strt Time	00:00 to 23:59	02:00	hh:mm	RW	RW	DHW_CONF
716		sum_oat	Summer Mode OAT Thrshold	15.0 to 30.0	20	1/10°C	RW	RW	DHW_CONF
717		sum_on	Summer Mode On Delay	0 to 12	0	h	RW	RW	DHW_CONF
718		sum_off	Summer Mode Off Delay	0 to 12	0	h	RW	RW	DHW_CONF
719		dhw_sens	DHW Tank Sensor Type	0 to 3	0	-	RW	RW	DHW_CONF
720		dhw_bias	DHW Tank Sensor Bias	-5.0 to 5.0	0.0	1/10 K	RW	RW	DHW_CONF
721		dhw_dt	DHW Tank Delta T (start)	2.0 to 10.0	0	1/10 K	RW	RW	DHW_CONF
722		dhw_dt_s	DHW Tank Delta T (stop)	0.0 to 5.0	5	1/10 K	RW	RW	DHW_CONF
741		ms_cod	Mst/Slv Activation Code	"XXXXXXXX"	0	-	RW	RW	MSL_CONF
742		ms_sel	Master/Slave Selection	0 to 2	0	-	RW	RW	MSL_CONF
743		slv1_add	Slave #1 Address	0 to 239	0	-	RW	RW	MSL_CONF
744		slv2_add	Slave #2 Address	0 to 239	0	-	RW	RW	MSL_CONF
745		slv3_add	Slave #3 Address	0 to 239	0	-	RW	RW	MSL_CONF
746		cap_strt	Capa. to Start Next Unit	30 to 100	75	%	RW	RW	MSL_CONF
747		cap_stop	Capa. To Stop Next Unit	1 to 25	25	%			MSL_CONF
750		chws_typ	CHWSTEMP Type	0 to 3	1	-	RW	RW	MSL_CONF
751		casc_typ	Cascade Type	0 to 2	1	-	RW	RW	MSL_CONF
752		ms_h_kp	M/S Heat Proport. Gain	0.001 to 10.000	6,000	-	RW	RW	MSL_CONF
753		ms_h_ti	M/S Heat Integral Time	10 to 120	30	s	RW	RW	MSL_CONF
754		ms_h_ts	M/S Heat Sampling Time	10 to 120	30	s	RW	RW	MSL_CONF
755		mslc_kp	M/S Cool Proport. Gain	-10.000 to -0.001	-0,9	-	RW	RW	MSL_CONF
756		ms_c_ti	M/S Cool Integral Time	10 to 120	30	s	RW	RW	MSL_CONF
757		ms_c_ts	M/S Cool Sampling Time	10 to 120	30	s	RW	RW	MSL_CONF
758		ms_pmp	Master/Slave Pump Type	0 to 3	2	-	RW	RW	MSL_CONF
761	02F9H	jbus_ena	JBus Control Enable	0 to 2	1	-	RW	RW	JBUSCONF
762	02FAH	jbus_add	JBus Slave Address	1 to 255	11	-	RW	RW	JBUSCONF
763	02FBH	jbus_bdr	JBus Baud Rate	0 to 2	2	-			JBUSCONF
764	02FCH	jbus_frm	JBus Frame Type	0 to 5	0	-	RW	RW	JBUSCONF
765	02FDH	jbus_cod	JBus Activation Code	"XXXXXXXX"	0	-	RW	RW	JBUSCONF
766	02FEH	jbus_tmt	JBus Comm. Timeout	0 to 600	600	s	RW	RW	JBUSCONF
767		mbusoff1	Modbus Display Offset	0 to 61440	16384	-	RW	RW	JBUSCONF
768		mbusoff2	Modbus Setpoint Offset	0 to 61440	32768	-	RW	RW	JBUSCONF
769		mbusoff3	Modbus Config Offset	0 to 61440	28672	-	RW	RW	JBUSCONF
770		mbusoff4	Modbus Service Offset	0 to 61440	36864	-	RW	RW	JBUSCONF

(1) Corrected Inverter TO parameter [P039] enables to correct the value measured by TO sensor (located on the air heat exchanger). And OAT [P001] is equal to to2 [P039]

Par.	Description	Range	Range description
502	Customized DI#5 Config	0 to 5	0 = Disabled -1 = Power Limitation Switch -2 = Loadshed Request Switch -3= Anti-Legionella Cycle Request Button -4= DHW Request Switch from tank -5 = DHW Priority Button
503	Customized DI#6 Config		
504	Customized DI#7 Config		
505	Customized DI#8 Config		
500	Customized DO#5 Config	0 to 8	0 = Disabled 1 = Unit in Alarm (Fail Mode) 2 = Unit is in Standby (Satisfied) 3 = Unit is Running (Cool, Heat, DHW, Defrost) 4 = Unit is Running in Cool Mode 5 = Unit is Running in Heat Mode 6 = Unit is Running in DHW Mode 7 = Unit is Running in Defrost Mode 8 = Output controlled by customer (via JBus/Modbus)
506	Customized DO#8 Config	0 to 8	
507	Customized DO#9 Config		

## 8 - START-UP CHECKLIST FOR HEAT PUMPS (USE FOR JOB FILE)

### 8.1 -General information

General information	
Job name	
Location	
Installing contractor	
Distributor	
Start-up performed by	Date
Equipment	
Unit type	
Serial number	
Software version [P654]	
Compressor	Model number
	Serial number
Air handling equipment	
	Manufacturer
	Model number
	Serial number

### 8.2 - Available options and accessories

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

### 8.3 - Checks before start of unit

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

## 8 - START-UP CHECKLIST FOR HEAT PUMPS (USE FOR JOB FILE)

### 8.4 - Checks during operation of unit

Date / Hour								
CHECKS DURING OPERATION	Air	Outdoor Air Temp	P001	°C				
		Entering Water Temp	P003	°C				
	Water	Leaving Water Temp	P004	°C				
		Water Control Temp	P052	°C				
	Suction	Suction Temperature	P009	°C				
	Discharge	Discharge Temperature	P010	°C				
		Refrigerant Temperature	P005	°C				
	Compressor	Requested Compressor Frequency	P022	Hz				
		Actual Compressor Frequency	P023	Hz				
	Water control	Water Control Point	P051	°C				
		Flow Switch Status	P105	-				
		Safety Switch Status	P104	-				
	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				

### 8.5 - Maintenance checks

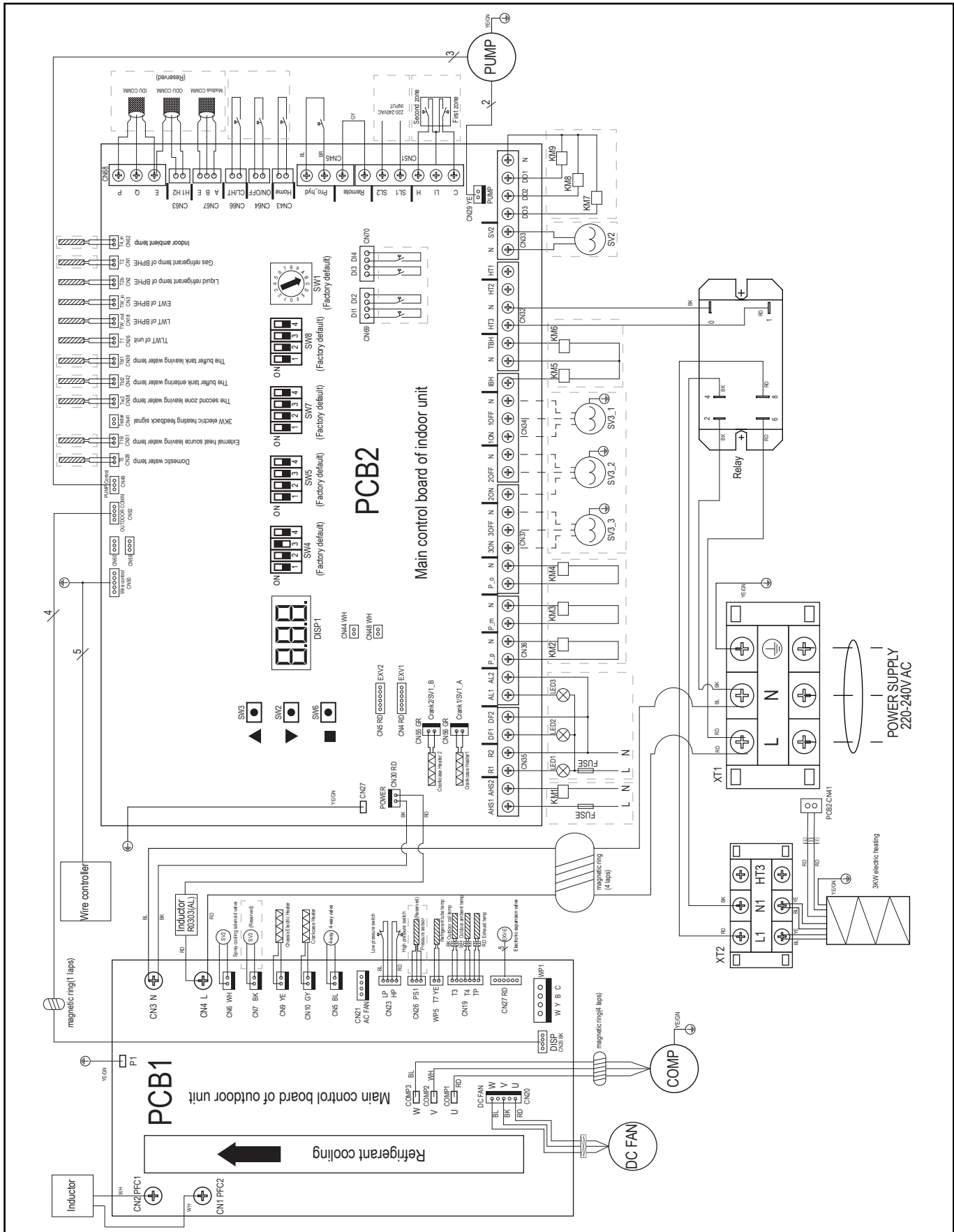
Date / Hour								
MAINTENANCE CHECKS	Control	Mechanical check						
		Leakage check						
		Relief valve check						
		Electrical connection check						
	Freeze protection	Water freeze protection check						
		Add glycol in water (%)						
	Cleaning	Coil cleaning						
		Water filter cleaning						

Comments:



## 9 - ANNEX ( ELECTRICAL WIRING DIAGRAM )

### 9.1 - 4-6kW, single phase(For reference only , please refer to the wiring diagram on the unit)



**9.2 - 8-10kW, single phase(For reference only , please refer to the wiring diagram on the unit)**

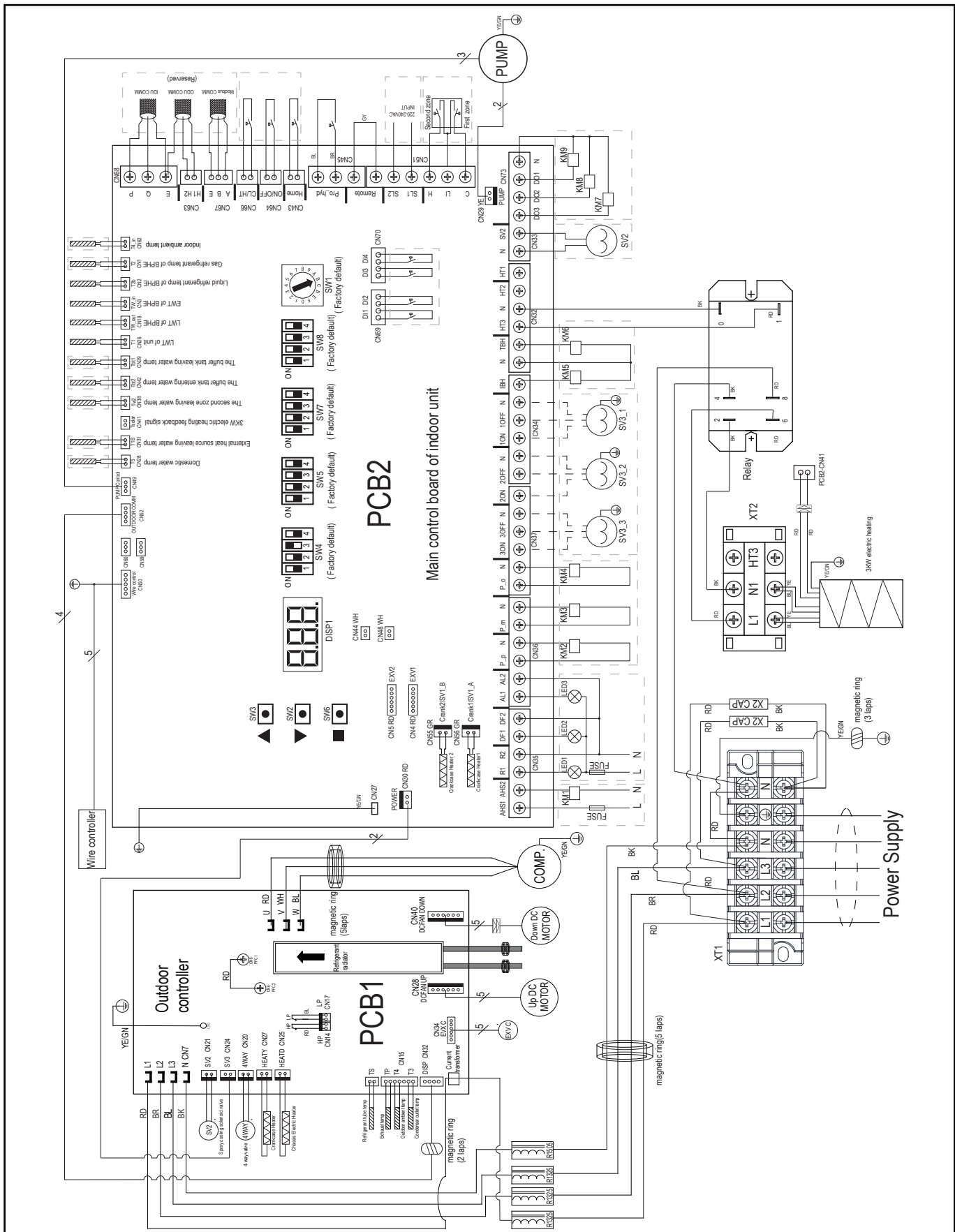


**9.3 - 12-16kW, single phase(For reference only , please refer to the wiring diagram on the unit)**




## 9 - ANNEX ( ELECTRICAL WIRING DIAGRAM )

### 9.4 - 12-16kW, three phase(For reference only , please refer to the wiring diagram on the unit)



## 9 - ANNEX ( ELECTRICAL WIRING DIAGRAM )

### 9.5 - Nameplate template

Model				CE	0598
Description	Air to water heat pump				
Variant					
Hermetically sealed equipment					Y
Contains fluorinated greenhouse gases				Y	
Fluid during transport	R32			Kg	
Refrigerant	R32	PED II	2		GWP 675
Circuit	A	B	C		
Factory charge				Kg	
Charge added on site				Kg	
Total charge				Kg	
Global warming potential	675	Kg eq CO2			
Inerting medium	NITROGEN				
Allowable pressure min/max (PS)	High pressure		Low pressure		
		bar		bar	
		kPa		kPa	
Allowable temperature max (TS)		°C		°C	
Allowable temperature min (TS)		°C		°C	
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					

### 9.6 - Table for backup heaters and craft heaters

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

#### NOTE:

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

DHW EHS: can connect two EHS in field

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

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

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

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

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

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

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

✓: means will be on according to control logic

✗: mean will be off always in any case



802058000116

SA-ZKRSENG02-1