# AWHE

## HIGH EFFICIENCY AIR TO WATER MULTIPURPOSE UNIT AND 2 OR 4 PIPE HEAT PUMPS EQUIPPED WITH SCROLL COMPRESSOR AND AXIAL FANS WITH LOW GWP REFRIGERANT



## TECHNICAL MANUAL

Incorporated in this document are the following:
- Declaration of conformity
- Technical manual

Multiple instructions: Consult the specific part

Read and understand the instructions before undertaking any work on the unit

RETAIN FOR FUTURE REFERENCE

Present document is published on solely liability of manufacturer of product (described and called as “unit”) here described. In the document the terms “the company” or “the manufacturer” have to be considered synonyms.

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The Company follows a policy of continuous product development and improvement and reserves the right to modify specifications, equipment and instructions regarding use and maintenance at any time, without notice.

## Declaration of conformity

We declare under our own responsibility that the below equipment complies in all parts with the CEE and EN directives.
The declaration of conformity is enclosed to the technical booklet enclosed with the unit.

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# 1. INTRODUCTION AND SAFETY

## 1.1 Preliminary information

Reproduction, storage or transmission of any part of this publication in any form, without the prior written consent of the Company, is prohibited.
The unit to which these instructions refer, is designed to be used for the the purposes described and to be operated in accordance with these instructions.
The Company will not be liable for claims for damage caused to persons, animals, material goods or property caused by improper installation, adjustment and maintenance or improper use. Any use not specified in this manual is prohibited.
This document is intended to provide information only and does not form a contract with third parties.
The Company pursues a policy of constant improvement and development of its products and therefore reserves the right to change the specifications and the documentation at any time, without notice and without obligation to update existing equipment.

## 1.2 Aim and content of the manual

These instructions are intended to provide the information required for the selection, installation, use and maintenance of the unit.
They have been prepared in accordance with the European Union laws and with the technical standards in force at the date of issue of the instructions.
The instructions contain all the necessary information to prevent any reasonably foreseeable misuse.

## 1.3 How to store this manual

The manual must be kept in a suitable place with easy access for users and operators, protected from dust and damp.
The manual must always accompany the unit during the entire life cycle of the same and therefore must be transferred to any subsequent user.

## 1.4 Manual Update

It is recommended that the manual is updated to the latest revision available.
If updates are sent to the customer they must be added to this manual.
The latest information regarding the use of its products is available by contacting the Company.

## 1.5 How to use this manual



The manual is an integral part of the unit.

Users or operators must consult the manual before performing any operation and especially so when transporting, handling, installating, maintaining, or dismantling the unit in order to eliminate uncertainty and reduce risk.

In these instructions symbols have been used (described in the following paragraphs) to draw the attention of operators and users to the operations that have a higher risk and which must be performed safely.

## 1.6 Potential Risks

Whilst the unit has been designed to minimize any risk posed to the safety of people who will interact with it, it has not been technically possible to eliminate completely the causes of risk. It is therefore necessary to refer to the requirements and symbolism below:

| LOCATION OF RISK | POTENTIAL RISK | METHOD OF INJURY | PRECAUTIONS |
|---|---|---|---|
| Thermal heat exchangers. | Small stab wounds. | Contact | Avoid any contact, use protective gloves. |
| Fan and fan grilles. | Cuts, eye damage, broken bones. | Insertion of sharp objects through the grid while the fans are operating. | Never put objects through the protection grilles. |
| Internal component: compressors and discharge pipes | Burns. | Contact | Avoid any contact, use protective gloves. |
| Internal component: electric cables and metallic parts | Electrocution, severe burns. | Defect in the supply cable insulation, live metallic parts. | Adequate protection of power cables, ensure correct earthing of all metal parts. |
| External to unit: unit enclosure | Poisoning, severe burns. | Fire due to short circuit or overheating of the supply cable external to unit. | Size cables and mains protection system in accordance with iee regulations. |
| Low pressure safety valve. | Poisoning, severe burns. | High evaporating pressure causing a refgrigerant discharge during maintenance. | Carefully check the evaporating pressure during the maintenance operations. Use all personal protective equipment required by the law. PPE must also protect against gas leaks from the safety valve. The outlet of these valves is directed to avoid causing damage to persons or goods. |
| High pressure safety valve. | Poisoning, severe burns, hearing loss. | Activation of the high pressure safety valve with the refrigerant circuit open. | If possible, do not open the refrigerant circuit valve; carefuly check the condensing pressure; use all the personal protective equipment required by law. PPE must also protect against gas leaks from the safety valve. The outlet of these valves is directed to avoid causing damage to persons or goods. |
| Entire unit | External fire | Fire due to catastrophic events or combustions of elements nearby unit | Provide the necessary fire-fighting equipment |
| Entire unit | Explosion, injuries, burns, poisoning, contact with live parts and catastrophic events. | Breakages, failures due to catastrophic events or earthquake | Plan the necessary precautions both electrical (suitable differential magneto and electrical protection of the supply lines; greatest care during the connections of the metal parts), and mechanical (special anchors or seismic vibrations to prevent breakages or accidental falls ). |

## 1.7 General Description of Symbols Used

Safety symbols combined in accordance with ISO 3864-2 and ISO EN 7010:



**BANNED**
A black symbol inside a red circle with a red diagonal indicates an action that should not be performed.



**WARNING**
A black graphic symbol added to a yellow triangle with black edges indicates danger.



**ACTION REQUIRED**
A white symbol inserted in a blue circle indicates an action that must be done to avoid a risk.

Safety symbols combined in accordance with ISO 3864-2:




The graphic symbol “warning” is qualified with additional safety information (text or other symbols).

## 1.8 Safety symbols used



**GENERAL RISK**
Observe all signs placed next to the pictogram. The failure to follow directions may create a risk situation that may be injurious to the user.



**ELECTRICAL HAZARD**
Observe all signs placed next to the pictogram.
The symbol indicates components of the unit and actions described in this manual that could create an electrical hazard.



**MOVING PARTS**
The symbol indicates those moving parts of the unit that could create risk.



**HOT SURFACES**
The symbol indicates those components with high surface temperature that could create risks.



**SHARP SURFACES**
The symbol indicates components or parts that could cause stab wounds.



**EARTH CONNECTION**
The symbol identifies Earthing connection points in the unit.



**READ AND UNDERSTAND THE INSTRUCTIONS**
Read and understand the instructions of the machine before any operations.



**RECOVER OR RECYCLE MATERIAL**



**FIRE HAZARD**
The symbol indicates to warn of flammable material

## 1.9 Limitations and prohibited use

The machine is designed and built exclusively for the uses described in “Limitations of use” of the technical manual.
Any other use is prohibited because it may pose a potential risk to the health of operators and users.



The unit is not suitable for operations in environments:
1. With dusty atmospheres;
2. With potentially explosive atmospheres;
3. Where there are vibrations
4. Where there are electromagnetic fields;
5. With aggressive and corrosive atmospheres;

## 1.10 Unit identification

Each unit has a rating plate that provides key information regarding the machine.
The rating plate may differ from the one shown below as the example is for a standard unit without accessories.
For all electrical information not provided on the label, refer to the wiring diagram.
A facsimile of the label is shown below:




The product label should never be removed from the unit.

# 2. REFRIGERANT AND OIL

## 2.1 Warning on potentially hazardous toxic substances

The refrigerant R454B is classified as **A2L** according to **the ISO 817** standardz , they have the following characteristics:
• **Toxicity**: **Class A**, indicating low toxicity.
• **Flammability**: **Class 2L**, indicating slight flammability with a low flame spread rate (less than 10 cm/s).

### 2.1.1 Identification of the Type of Refrigerant Fluid Used: R454B

• Difluoromethane* CAS-No 75-10-5, classification, H220 Flammable gases, Category 1, H280 Gases under pressure, Liquefied gas, concentration 68.9 % by weight
• 2,3,3,3-Tetrafluoropropene* CAS-No 754-12-1, classification, H220 Flammable gases, Category 1, H280 Gases under pressure, Liquefied gas, concentration 31.1 % by weight
* Voluntarily-disclosed non-hazardous substance

### 2.1.2 Identification of the Type of Oil Used.

The lubricant used is polyester oil. Please refer to the information provided on the compressor data plate.



For further information regarding the characteristics of the refrigerant and oil used, refer to the safety data sheets available from the refrigerant and oil manufacturers.

Main Ecological Information Regarding the Types of refrigerants Fluids used.



**ENVIRONMENTAL PROTECTION :** Read the ecological information and the following instructions carefully.

### 2.1.3 Persistence and degradation

The refrigerants used decompose relatively quickly in the lower atmosphere (troposphere). The decomposed products are highly dispersible and therefore have a very low concentration. They do not contribute to photochemical smog and are not classified as VOCs (volatile organic compounds) under European regulations (Kyoto Protocol).

### 2.1.4 Effects of discharges

Discharges into the atmosphere of this product does not cause a long-term contamination.

### 2.1.5 Exposure controls and personal protection

Wear protective clothing and gloves, protect your eyes and face

### 2.1.6 Professional exposure limits

**Derived no Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:**

| Substance name | End Use | Exposure routes | Potential health effects | Value |
|---|---|---|---|---|
| Diflurometh ane | Workers | Inhalation | Long-term system effects | 7035 mg/m$^3$ |
| | Consumers | Inhalation | Long-term system effects | 750 mg/m$^3$ |
| 2,3,3,3-Tetrafluoropropene | Workers | Inhalation | Long-term system effects | 950 mg/m$^3$ |

**Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006**

| Substance name | Environmental Comportament | Value |
|---|---|---|
| • Difluorometano | Fresh Water | 0.142 mg/l |
| | Intermittent use/release | 1.42 mg/l |
| 2,3,3,3-<br>• Tetrafluoropropene | Fresh Water sediment | 0.534 mg/kg |
| | Fresh Water | 0.1 mg/l |
| | Intermittent use/release | 1 mg/l |
| | Fresh Water sediment | 1.77 mg/kg dry weight (d.w.) |
| | Soil | 1.54 mg/kg dry weight (d.w.) |
| | Marine Water | 0.01 mg/l |
| | Marine sediment | 0.178 mg/kg dry weight (d.w.) |

## 2.2 Refrigerant handling

The units use R454B refrigerant, classified according to EN 378-1 as slightly flammable (A2L). It's recommended, during the positioning phase, to follow all the prescriptions in the cited standard. In particular it's recommended to avoid positioning the unit near slits, cavedium, skylight, pits. The refrigerant is heavier than air so it uses to layer at the bottom.



Users and maintenance personnel must be adequately informed about the possible risks of handling potentially toxic substances. Failure to follow such instructions can cause damage to personnel or to the unit.



The units use the R454B gas as refrigerant, which is classified according to EN 378: 2017 as slightly flammable (A2L). It is recommended, during the positioning phase, to follow all the prescriptions in the cited standard.
In particular, it is recommended to avoid positioning the unit near slits or cavedium/sky light through which a possible loss of refrigerant may penetrate adjacent or underground rooms.



**CAUTION - Handling R454B (A2L) refrigerant**
R454B refrigerant is classified as A2L, i.e. low flammability. Handling and use must be carried out only by qualified and adequately trained personnel, in compliance with applicable safety regulations.

To ensure safety and compliance with standards, it is necessary to follow the indications given in the EN 378 series
In addition to these regulations, it is essential to comply with applicable local and international laws. In particular:
• Verify that the installation environment allows the use of A2L type refrigerants based on the available ventilation and the maximum allowable concentration (LFL).
• Use specific tools and equipment for low-flammability refrigerants.
• Ensure proper management of leaks and disposal of refrigerant in compliance with environmental regulations.

**Recommendation:** To reduce the risks associated with handling R454B, it is recommended to consult the present manual and conduct a specific risk assessment prior to installation or maintenance.

## 2.3 Prevent inhalation of high vapor concentration

Atmospheric concentrations of refrigerant must be minimized and kept to a level that is below the occupational exposure limit. Vapor is heavier than air and can form dangerous concentrations near the ground where the ventilation rate is lower. Always ensure adequate ventilation. Avoid contact with open flames and hot surfaces as this can cause toxic and irritating decomposition products to form. Avoid contact between liquid refrigerant and the eyes or skin.

## 2.4 Procedures to be adopted in the event of accidental release of refrigerant

Ensure suitable personal protection (especially respiratory protection) during cleaning operations.
If deemed safe, isolate the source of the leak. If the leakage is small and if adequate ventilation is provided, allow the refrigerant to evaporate. If the loss is substantial ensure that measures are taken to adequately ventilate the area.
Contain spilled material with sand, earth or other suitable absorbent material.
Do not allow the refrigerant to enter drains, sewers or basements, as pockets of vapor can form.

## 2.5 Main Toxicological Information Regarding the Type of refrigerant used

### 2.5.1 Inhalation

A high atmospheric concentration can cause anaesthetic effects with possible loss of consciousness. Prolonged exposure may lead to irregular heartbeat and cause sudden death. Higher concentrations may cause asphyxia due to the reduced oxygen content in the atmosphere.

### 2.5.2 Contact with skin

Splashes of nebulous liquid can produce frostbite. Probably not hazardous if absorbed trough the skin. Repeated or prolonged contact may remove the skin's natural oils, with consequent dryness, cracking and dermatitis.

### 2.5.3 Contact with eyes

Splashes of liquid may cause frostbite.

### 2.5.4 Ingestion

While highly improbable, may produce frostbite.

## 2.6 First Aid Measures



Adhere scrupulously to the warnings and first aid procedures indicated below.

### 2.6.1 Inhalation

Move the person away from the source of exposure, keep him/her warm and let him/her rest. Administer oxygen if necessary. Attempt artificial respiration if breathing has stopped or shows sings of stopping. If the heart stops, perform external heart massage. Seek medical assistance.

### 2.6.2 Contact with skin

In case of contact with skin, wash immediately with lukewarm water. Thaw tissue using water. Remove contaminated clothing. Clothing may stick to the skin in case of frostbite. If irritation, swelling or blisters appear, seek medical assistance.

### 2.6.3 Contact with eyes

Rinse immediately using an eyewash or clean water, keeping eyelids open, for at least ten minutes. Seek medical assistance.

### 2.6.4 Ingestion

Do not induce vomiting. If the injured person is conscious, rinse his/her mouth with water and make him/her drink 200-300ml of water. Seek immediate medical assistance.

### 2.6.5 Further medical treatment

Treat symptoms and carry out support therapy as indicated. Do not administer adrenaline or similar sympathomimetic drugs following exposure, due to the risk of cardiac arrhythmia.

# 3. TECHNICAL CHARACTERISTICS

## 3.1 Unit description

High-efficiency air/water heat pumps are particularly suitable for applications where maximum efficiency in heating mode and a low noise level are required. The units are specifically designed to provide the best efficiency in heating mode; they can operate at outside temperatures down to -20°C and produce water up to a temperature of 60°C. All sizez are supplied with reverse cycle valve used for winter defrost; the RV versions are also able to produce cold water in summer period.

### 3.1.1 Frame

All units are made from hot-galvanised sheet steel, painted with polyurethane powder enamel and stoved at 180°C to provide maximum protection against corrosion. The frame is self-supporting with removable panels. All screws and rivets used are made from stainless steel. The standard colour of the units is RAL9018.

### 3.1.2 Refrigerant circuit

The refrigerant circuit is assembled using internationally recognised brand name components with all brazing and welding being performed in accordance with ISO 97/23. The refrigerant utilised is R454B. The refrigerant circuit includes: sight glass, filter drier,electronic expansion valves, 4 way reversing valve, check valves, liquid receiver, liquid separator, schrader valves for maintenance and control, pressure safety device (for compliance with PED regulations).

### 3.1.3 Compressors

The compressors are scroll type, with crankcase resistance and thermal protection, installed in a separate compartment from the airflow in order to reduce noise. When the unit is on stand-by mode, the crankcase heater is always powered. Through the unit's front panel, it is possible to inspect and repair the compressors even when the unit is running.
The compressors used are tandem type. This solution allows a significantly higher efficiency with partial loads compared to the option with independent refrigerant circuits. The control system constantly monitors the discharge temperature of the single compressors.

### 3.1.4 Source heat exchanger

The source heat exchanger is made from 3/8" copper pipes and 0,1mm at least thick aluminium fins with the tubes being mechanically expanded into the aluminium fins in order to maximise heat transfer. Furthermore, the design guarantees a low air side pressure drop thus enabling the use of low rotation speed (and hence low noise) fans. All heat exchangers are supplied standard with fins hydrophilic coating "Blue Fins".

### 3.1.5 User circuit heat exchangers

The user heat exchanger is a braze welded, plate type heat exchanger, manufactured from AISI 316 stainless steel. The use of this type of exchanger results in a massive reduction of the refrigerant charge of the unit compared to a traditional shell-in-tube type. A further advantage is a reduction in the overall dimensions of the unit. The exchangers are factory insulated with flexible close cell material and can be fitted with an antifreeze heater (accessory). Each exchanger is fitted with a temperature sensor on the discharge water side for antifreeze protection.

### 3.1.6 Fans

The fans are direct drive axial type with aerofoil blades, are statically and dynamically balanced and are supplied complete with a safety fan guard complying with the requirements of EN13857. They are fixed to the unit frame via rubber anti-vibration mountings. The electric motors, in HA versions are 6 poles type and a phase-cut regulator controls their speed of rotation to increase energy efficiency and allow them to be used over a wider operating range. In the HE versions, the fans are electronic type, with permanent magnet motors with an integrated driver that modulates the speed of rotation. The motors are fitted with integrated thermal overload protection and have a moisture protection rating of IP 54.

### 3.1.7 Electric enclosure

The enclosure is manufactured in order to comply with the requirements of the electromagnetic compatibility standards 2014/35/UE and 2014/30/UE. Access to the enclosure is achieved by removing the front panel of the unit. The following components are supplied as standard on all units: main switch, a sequence relay that disables the power supply in the event that the phase sequence is incorrect (scroll compressors can be damaged if they rotate in the wrong direction), thermal overloads (protection of pumps and fans), compressor fuses, control circuit automatic breakers, compressor contactors, fan contactors and pump contactors. The terminal board has volt free contacts for remote ON-OFF, Summer/ winter change over (heat pumps only) and general alarm.

### 3.1.8 Microprocessors

All units are supplied as standard with microprocessor controls. The microprocessor controls the following functions: control of the water temperature, antifreeze protection, compressor timing, compressor automatic starting sequence (For multiple compressors), alarm reset.

The control panel is supplied with display showing all operational icons. The microprocessor is set for automatic defrost (when operating in severe ambient conditions) and for summer/ winter change over. The control also manages the integration with other heating sources (electric heaters, boilers, solar panels etc) and both the heating circuit pump and the domestic hot water circuit pump. If required (available as an option), the microprocessor can be configured in order for it to connect to a site BMS system thus enabling remote control and management.

#### 3.1.9 Control and protection devices

All units are standardly equipped with several control and safety devices: water return temperature sensor, installed on the water return pipe of the system, and anti-freeze probe, installed on the water supply pipe to the system high-pressure switch with automatic reset. There are also included a low-pressure automatic reset, pressure transducer (used to optimize the defrosting cycle and modulate the rotation speed of the fans according to external conditions), Freon side safety device, compressor thermal protection, fan thermal protection, flow switch, and external air compensation probe.

#### 3.3.10 Leak detector (option)

When the unit is powered ON, the sensor is warmed up/initialised (duration approx. 1min.).
During this period, the LEDs inside the sensor blink, the refrigerant leakage alarm is notified and the 24Vac auxiliary circuit is switched off. After this period, if in the absence of any further feedback from the sensor, the PLC control is powered up and the unit is ready to operate. If refrigerant leaks occur, the sensor is activated and the power supply to the control PLC is immediately switched off until the sensor indicates the refrigerant is still present.

## 3.2 Other versions

#### 3.2.1 Standard Version

Heating only versions are available in the 2P and 2P+DHW configuration only.

#### 3.2.2 RV Version

Reversible heating/cooling units, with a cycle inversion on the cooling circuit.

#### 3.2.3 ACF Version

High efficiency version, according to ERP2018 standard. Unit equipped with ACF fans.

#### 3.2.4 ECF Version

High efficiency version, according to ERP2018 standard. Unit equipped with ECF fans.

#### 3.2.5 LN Version

This version includes the complete acoustic insulation of the unit with compressor jackets and insulating material made with high density media and the interposition of heavy bitumen layer.

#### 3.2.6 SLN Super low noise version

All SLN super silenced units are supplied equipped with a special vibration-damping system consisting of a floating basement placed upon the unit's frame, through the interposition of high-damping steel springs.
The compressors are housed on this floating base and are in turn fixed by means of rubber anti-vibration supports.
The enclosure is manufactured from galvanized steel sandwich panels that have a micro-perforated inner skin and a core of 30 mm thick, high density (25 kg/m$^3$) soundproofing mat. The entire arrangement provides a double damping system and acoustic attenuation. The compressor refrigerant pipes are connected to the refrigerant circuit through "anaconda" flexible connections. Flexible connections are also used on the water pipework within the unit. The combination of these systems results in an overall noise reduction in the region of 6-8 dB(A) compared to units in standard configuration.

#### 3.2.7 2P Version

This is a two pipe version that can produce hot water for heating and cold water for cooling. The unit is used with two pipe water based change-over systems. It is not able to produce domestic hot water.

#### 3.2.8 S/2P Version

This is a two pipe version that can, in addition to producing hot water for heating and cold water for cooling, also generate domestic hot water. The controller has dual heating set points (heating and DHW) and can also control a three port diverting valve that directs the DHW to the cylinder. DHW production has priority irrespective of the mode of operation of the unit. The unit is normally used with two pipe water based change-over systems.

### 3.2.9 4P version

The 4P units use 4 hydraulic connections and are used in modern 4-pipe systems. In these systems, cold and hot water is always available (in every period of the year) and present in the specific hydraulic circuit. These systems allow the simultaneous production of cold water and hot water using 4 hydraulic connections, 2 connections are related to the hot water circuit, 2 connections are related to the cold water circuit. The plant thus conceived is able to heat and, at the same time, if required, to cool with very high energy efficiencies. In this configuration, however, the units are also able to produce hot or cold water separately at any time of the year.

The units are supplied with 2 heat exchangers, one dedicated to the production of cold water and one dedicated to the production of hot water. The operating modes are:

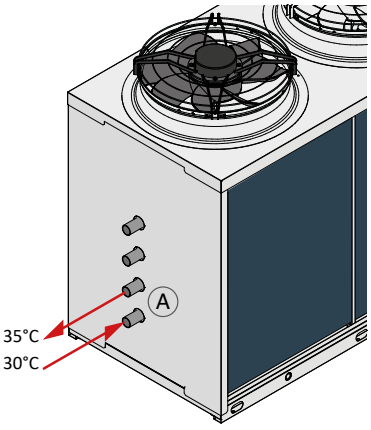
**1. User water heating:** The unit behaves like a normal air/water heat pump in heating mode, using the finned heat exchanger as the source and the A plate heat exchanger as user.

**2. User water cooling:** The unit behaves like a normal air / water chiller in cooling mode, using the finned exchanger as the source and the B plate heat exchanger as user.

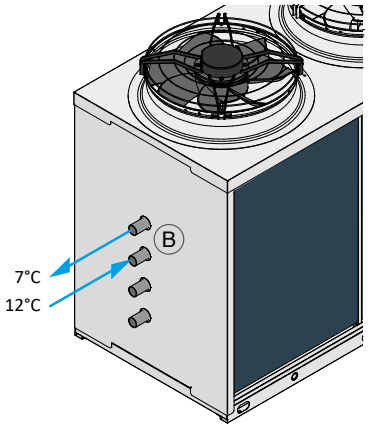
**3. Simultaneous user Cooling + heating:** The unit behaves like a water / water heat pump, using the plate heat exchanger B as the cold user and the plate heat exchanger A as hot user. This version is not able to produce domestic hot water.

4P version

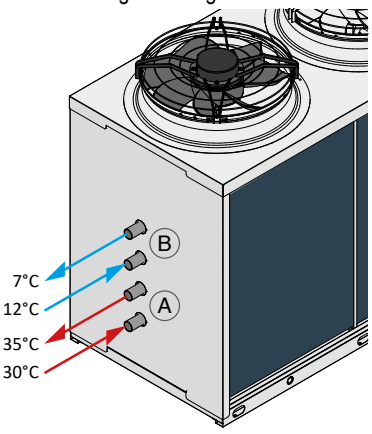
User water heating




User water cooling




Simultaneous user
Cooling + heating




The above scheme is for illustrative purposes only.

### 3.2.10 4P+DHW Version

The 4P units have been designed to meet the needs of 2 + 2 pipe systems (2 user side pipes, 2 domestic hot water pipes) throughout the year. The units are supplied with 2 exchangers, one dedicated to the production of the user cold and hot water and one dedicated to the production of domestic hot water only (D.H.W.). The production of domestic hot water always has priority. In winter mode the activation of D.H.W. production temporarily stops the production of the user hot water, which is restored when the D.H.W. accumulation reaches the temperature set. In summer mode the unit will switch to cooling (by activating the reverse cycle valve installed in the refrigerant circuit) and any request for domestic hot water will allow, at the same time, the production of cold water. In this operating mode, the system can simultaneously produce cold water and domestic hot water. Domestic hot water, in summer mode, is produced by heat recovery and therefore free of charge. When the temperature measured by the D.H.W. sensor reaches the set, the D.H.W. water pump is stopped and normal operation is restored in cooling mode.

The operating modes are:

**1. User water heating:** The unit behaves like a normal air/water heat pump in heating mode, using the finned heat exchanger as the source and the A plate heat exchanger as user.

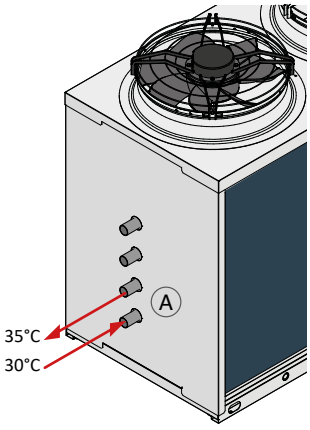
**2. User water cooling:** The unit behaves like a normal air/water chiller in cooling mode, using the finned heat exchanger as the source and the A plate heat exchanger as user.

**3. Domestic hot water production (D.H.W.):** The unit behaves like a normal air / water heat pump in heating mode, using the finned heat exchanger as the source and as a user the plate heat exchanger B (a special D.H.W. heat exchanger that works with a higher set point).

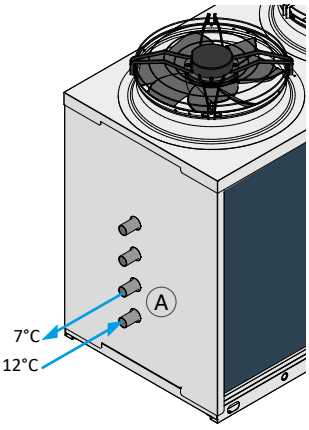
**4. User water cooling + D.H.W. production:** The unit behaves like a water / water heat pump, using the plate heat exchanger A as the cold user and the plate heat exchanger B as D.H.W. production).

4P+DHW Version

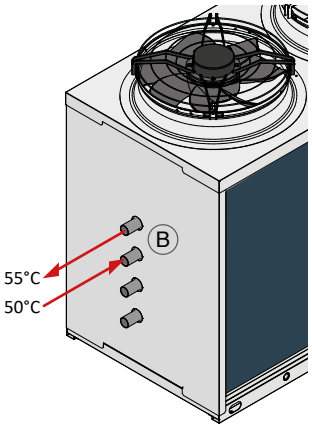
User water heating



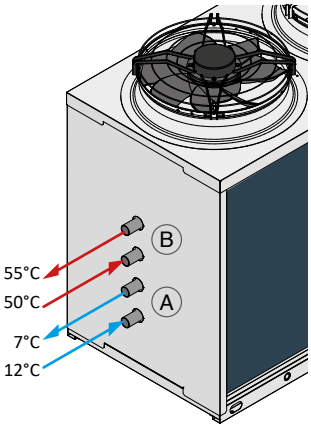

User water cooling




Domestic hot water production (D.H.W.)




User water cooling + D.H.W. production




The above scheme is for illustrative purposes only.

## 3.3 Accessories description

**3.3.1 Low Temperature Operating**
Unit suitable for working with evaporator outlet water temperatures lower than 4°C.

**3.3.2 Antifreeze kit**
This kit, used on units fitted with a hydraulic kit, comprises a “self-heating” electric cable that is wrapped around the user and domestic hot water exchanger (P4 Units only), the water circuit pipework. This device is controlled by the microprocessor.

**3.3.3 Rubber vibration dampers**
To be installed beneath the unit base and the ground to avoid the transmission of vibrations (and the noise) to the building.

**3.3.4 Spring vibration dampers**
To be installed between the unit base and the support structure to prevent the transmission of vibration and noise, to the building.

**3.3.5 RS485 serial interface card modbus protocol**
This controller card enables the controller to communicate with other devices on a BMS using Modbus protocol.

**3.3.6 High efficiency E.C. axial fans**
High efficiency E.C. axial fans, supplied with Brushless DC electric motors electronically commutated (E.C. motors) able to grants the highest energy efficiency class (EFF1), according to the latest EU specifications, with the result of substantial energy consumption reduction for ventilation and noise reduction thanks to the new ultra efficient blade profiling. The fans are statically and dynamically balanced and supplied complete with a safety fan guard complying with the requirements of EN13857. The fans are installed using a special steel profiled beam who minimize all vibrations and noise emitted. The nominal rotation speed is 700 rpm. All units are fitted with a pressure transducer for the control of the evaporation/condensation pressure. All electric motors are The motors are fitted with integrated thermal overload protection rating IP54.

**3.3.7 Electronic expansion valve**
The electronic expansion valve enables the maximum possible efficiency to be achieved by maximising the evaporator heat exchange, minimising the reaction time to load variations and optimising the superheat . It is strongly recommended for use in systems that will experience large load variations.

**3.3.8 Electronic soft starter**
The soft starter reduces the peak starting current down to a maximum of 40% of the nominal peak value. The device can only be installed in the factory.

**3.3.9 Remote control panel**
All units are supplied with microprocessor control panel with high definition display, mounted on board of the unit and it is remotable up to 50 mt. distance.

**3.3.10 Hydraulic circuit antifreeze kit**
This kit, used on units fitted with a hydraulic kit, comprises a “self-heating” electric cable that is wrapped around the user and domestic hot water exchanger (P4 Units only), the water circuit pipework and includes an armoured electric heater that is fitted inside the water tank. This device is controlled by the microprocessor and it is used in the unit equipped with hydraulic kit.

**3.3.11 Integrated hydraulic kit 1 pump + Water tank**
The hydraulic cooling circuit includes a storage tank and single low-pressure centrifugal pump. Also provided in the hydraulic circuit are an expansion vessel, pressure relief valve and system isolating valves with fittings.

**3.3.12 Integrated hydraulic kit 2 pumps + Water tank**
The hydraulic cooling circuit includes a storage tank and 2 pumps (running+stand-by) low-pressure centrifugal pump.
Also provided in the hydraulic circuit are an expansion vessel, pressure relief valve and system isolating valves with fittings.

**3.3.13 Hydraulic kit with one pump without tank - user circuit**
The hydraulic cooling circuit includes a single low-pressure centrifugal pump. The circuit also contains the safety valve and the manual shut-off valves.

**3.3.14 Hydraulic kit with one pump without tank - recovery circuit (only 4P/4P+DHW)**
The hydraulic heating circuit includes a single low-pressure centrifugal pump. The circuit also contains the safety valve and the manual shut-off valves.

**3.3.15 Hydraulic kit with two pumps without tank - user circuit**
The hydraulic cooling circuit includes 2 pumps (running+stand-b) ylow-pressure centrifugal pump. The circuit also contains the safety valve and the manual shut-off valves.

**3.3.16 Hydraulic kit with two pumps without tank - recovery circuit (only 4P/4P+DHW)**
The hydraulic heating circuit includes 2 pumps (running+stand-b) low-pressure centrifugal pump. The circuit also contains the safety valve and the manual shut-off valves.

**3.3.17 Hydraulic kit with storage tank and one low-pressure pump**
The hydraulic circuit includes a storage tank available in different capacities, depending on the size of the unit. It is factory insulated by using closed-cell material and suitable for the addition of antifreeze or other supplementary heaters (optional). The installation of the storage tank on the water discharge side minimizes the unavoidable temperature fluctuations caused by the continuous starts and stops of the compressor. It is also able to keep the user's water temperature constant for a certain time range while the compressor is not running. This type of control could not be possible with the storage tank installed on the return side. The pump is a single low-pressure centrifugal type, suitable for hot and chilled water use. The microprocessor controls it directly, regulating its starts and its proper functioning.The hydraulic circuit also contains the expansion vessel, the safety valve and the necessary manual shut-off valves.

**3.3.18 Hydraulic kit with one low-pressure pump**
The hydraulic circuit includes a single low-pressure centrifugal pump, suitable for hot and chilled water and directly controlled by the microprocessor. The circuit also contains the safety valve and the manual shut-off valves.

**3.3.19 User circuit hydraulic kit, one inverter pump, no tank (4P)**
The hydraulic cooling circuit includes a single variable speed, low-pressure centrifugal pump, equipped with Low noise motor (4 poles), The circuit also contains the safety valve and the manual shut-off valves.

**3.3.20 User circuit hydraulic kit, one inverter pump, no tank (2P)**
The hydraulic circuit includes a single inverter centrifugal pump, suitable for hot and chilled water and directly controlled by the microprocessor. The circuit also contains the safety valve and the manual shut-off valves.

**3.3.21 Hydraulic kit, recovery circuit (2P)**
The hydraulic heating circuit includes a single variable speed, low-pressure centrifugal pump. The circuit also contains the safety valve and the manual shut-off valves.

**3.3.22 Hydraulic kit, recovery circuit (4P)**
The hydraulic heating circuit includes a single variable speed, low-pressure centrifugal pump, equipped with Low noise motor (4 poles), The circuit also contains the safety valve and the manual shut-off valves.

**3.3.23 User circuit hydraulic kit + inverter centrifugal pump (2P)**
The hydraulic cooling circuit includes a storage tank and single variable speed low-pressure centrifugal pump. Also provided in the hydraulic circuit are an expansion vessel, pressure relief valve and system isolating valves with fittings.

**3.3.24 User circuit hydraulic kit + inverter centrifugal pump (4P)**
The hydraulic cooling circuit includes a storage tank and single variable speed low-pressure centrifugal pump, equipped with Low noise motor (4 poles), Also provided in the hydraulic circuit are an expansion vessel, pressure relief valve and system isolating valves with fittings.

**3.3.25 Hydraulic kit, recovery circuit**
This kit includes a water pump, centrifugal type, suitable for hot and cold water operation. The pump is directly controlled by the microprocessor. Also included in the hydraulic circuit are a safety valve and a fill and drain point with isolating valve.

**3.3.26 4-connection tank and low-pressure pump**
The hydraulic circuit includes a 4-connection storage tank, factory-insulated using closed-cell material, available in different capacities depending on the size of the unit. It also contains a low-pressure and low-noise pump on the primary side, an expansion vessel, and safety valves. The 4-connection tank allows the separation of the two hydraulic sides.

On the primary side circuit, the heat exchanger is ensured with the correct flow rate, while appropriate inertia guarantees the stable functioning of the heat pump. On the secondary side circuit, there are two hydraulic connections available, to which a pumping kit (not supplied), specifically sized for the characteristics of the system, must be connected. This setup allows the heat pump to operate efficiently while guaranteeing full optimization capacity on the hydraulic circuit connected to the secondary side.

**3.3.27 COP external optimizer kit**
The kit includes a wattmeter that constantly supervises the unit's input power and a flowmeter on the hydraulic side. These devices, along with the temperature probes, allow continuous monitoring of the power supplied.
The control guarantees constant monitoring of the unit's efficiency. It provides useful information to predict maintenance operations and reduce energy consumption through the improvement of the operating parameters.

**3.3.28 Cascade control system**
Cascade control system for the managment of units. The system is made of a separate plastic box, to be installed in the technical room. It is connected to the units via RS485.

**3.3.29 Condensing coil with pre-painted fins**
Double-layer treatment of condensing coils aluminium fins surface, to be used if there is an high concentration of corrosive agents in the environment.

**3.3.30 Condensing coil with epoxy coating**
Epoxy coating treatment on the entire condensing coils for installation in corrosive environments.

**3.3.31 Copper/copper coil**
Special condensing coils with copper pipes and fins.

**3.3.32 Seawood packing**
Fumigated wood case and film casing added with slow release corrosion inhibitors and completely free of nitrates and heavy metals (VCI) suitable for long sea transports.

**3.3.33 BACNET RS485 protocol serial interface**
Electronic card to be connected to the microprocessor to allow the connection of the unit to external supervision system with BACNET Protocol in order to fully and remotely assistance.

**3.3.34 Partial heat recovery not available in 4P/4P+DHW versions**
About 20% of condensing heat through a refrigerant/water plate exchanger (desuperheater) always in series to the compressors. It is used when you want to partially recover condensing heat capacity in chiller operation.

**3.3.35 Refrigerant leak detector**
As option, the unit has be equipped with a sensor located inside the compressor compartment, which continuously analyses the surrounding air and generates an alarm in the system if a refrigerant concentration above the threshold values is detected (due to a leak). The sensor is electrically connected to a control unit located inside the electrical panel, which coordinates its operational functions.



It is the installer's responsibility to prepare adequate ducting of the valves, sized in accordance with EN13136 and other regulations in force.

## 3.4 Technical data

| AWHE LN/HE/ACF/RV/U/2P | | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 44,6 | 50,8 | 67,2 | 72,7 | 88,5 | 99,9 | 111 | 130 | 147 | 158 |
| Total input power (EN14511) (1) | kW | 14,9 | 16,8 | 20,5 | 23,1 | 27,3 | 31,1 | 34 | 40,4 | 45,9 | 48,7 |
| COP (EN14511) (1) | W/W | 2,99 | 3,02 | 3,28 | 3,15 | 3,24 | 3,21 | 3,26 | 3,22 | 3,2 | 3,24 |
| Energy Class (2) | | A+ | A+ | A++ | A++ | A+ | A+ | A+ | A+ | A+ | A+ |
| SCOP (2) | kWh/kWh | 3,47 | 3,48 | 3,9 | 3,9 | 3,49 | 3,74 | 3,78 | 3,56 | 3,56 | 3,75 |
| ηs,h (2) | % | 136 | 136 | 153 | 153 | 137 | 147 | 148 | 140 | 140 | 147 |
| Cooling capacity (EN14511) (3) | kW | 38,3 | 44,1 | 57,8 | 62,1 | 76,8 | 86,4 | 96 | 112 | 125 | 135 |
| Total input power (EN14511) (3) | kW | 14,1 | 16,6 | 21,5 | 24,6 | 26,5 | 30,8 | 35,1 | 38,4 | 44,6 | 48,8 |
| EER (EN14511) (3) | W/W | 2,72 | 2,66 | 2,69 | 2,52 | 2,9 | 2,81 | 2,74 | 2,92 | 2,8 | 2,77 |
| Sound power (4) | dB (A) | 77 | 76 | 77 | 78 | 82 | 83 | 85 | 86 | 87 | 87 |
| Sound pressure (5) | dB (A) | 46 | 44 | 45 | 46 | 50 | 51 | 53 | 54 | 55 | 55 |
| **AWHE LN/HE/ECF/RV/V/2P** | | **45** | **50** | **70** | **75** | **90** | **105** | **115** | **135** | **150** | **160** |
| Heating capacity (EN14511) (1) | kW | 44,7 | 50,7 | 67,1 | 72,8 | 88,5 | 99,9 | 111 | 130 | 147 | 158 |
| Total input power (EN14511) (1) | kW | 14,3 | 16,3 | 20,2 | 22,7 | 26,3 | 30 | 33,2 | 38,8 | 44,4 | 47,3 |
| COP (EN14511) (1) | W/W | 3,13 | 3,11 | 3,32 | 3,21 | 3,37 | 3,33 | 3,34 | 3,35 | 3,31 | 3,34 |
| Energy Class (2) | | A+ | A+ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 3,72 | 3,75 | 4,11 | 4,08 | 3,84 | 4,02 | 4,07 | 3,86 | 3,85 | 4,02 |
| ηs,h (2) | % | 146 | 147 | 162 | 160 | 151 | 158 | 160 | 152 | 151 | 158 |
| Cooling capacity (EN14511) (3) | kW | 38,3 | 44,1 | 57,8 | 62,2 | 76,9 | 86,5 | 96 | 112 | 125 | 135 |
| Total input power (EN14511) (3) | kW | 13,9 | 16,4 | 21,3 | 24,4 | 25,8 | 30,3 | 34,7 | 37,7 | 44,1 | 48,2 |
| EER (EN14511) (3) | W/W | 2,76 | 2,69 | 2,71 | 2,55 | 2,98 | 2,85 | 2,77 | 2,97 | 2,83 | 2,8 |
| Sound power (4) | dB (A) | 77 | 76 | 77 | 78 | 82 | 83 | 85 | 86 | 87 | 87 |
| Sound pressure (5) | dB (A) | 46 | 44 | 45 | 46 | 50 | 51 | 53 | 54 | 55 | 55 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 |
| Fans | n° | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 11 | 11 | 17 | 17 | 25 | 25 | 25 | 36 | 36 | 36 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 5,1 | 5,1 | 7,9 | 7,9 | 11,7 | 11,7 | 11,7 | 16,8 | 16,8 | 16,8 |
| Water tank volume | l | 140 | 140 | 300 | 300 | 300 | 300 | 300 | 500 | 500 | 500 |

| AWHE LN/HE/ACF/RV/U/2P | | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 177 | 198 | 221 | 225 | 256 | 290 | 312 | 348 | 392 | 424 |
| Total input power (EN14511) (1) | kW | 54,3 | 59,9 | 68,3 | 66,8 | 81,3 | 93,1 | 98,5 | 112 | 125 | 137 |
| COP (EN14511) (1) | W/W | 3,26 | 3,31 | 3,24 | 3,37 | 3,15 | 3,11 | 3,17 | 3,11 | 3,14 | 3,09 |
| Energy Class (2) | | A++ | A++ | A+ | A++ | A+ | A+ | A+ | A+ | A+ | A+ |
| SCOP (2) | kWh/kWh | 3,89 | 3,97 | 3,79 | 4,12 | 3,54 | 3,57 | 3,71 | 3,72 | 3,67 | 3,73 |
| ηs,h (2) | % | 153 | 156 | 149 | 162 | 139 | 140 | 146 | 146 | 144 | 146 |
| Cooling capacity (EN14511) (3) | kW | 160 | 175 | 197 | 195 | 230 | 255 | 272 | 305 | 353 | 388 |
| Total input power (EN14511) (3) | kW | 57,1 | 63,0 | 70,3 | 69,8 | 78,0 | 91,6 | 100 | 116 | 125 | 141 |
| EER (EN14511) (3) | W/W | 2,8 | 2,78 | 2,8 | 2,79 | 2,95 | 2,78 | 2,72 | 2,63 | 2,82 | 2,75 |
| Sound power (4) | dB (A) | 89 | 89 | 88 | 91 | 89 | 90 | 90 | 92 | 92 | 94 |
| Sound pressure (5) | dB (A) | 57 | 57 | 56 | 58 | 56 | 58 | 58 | 60 | 59 | 62 |
| **AWHE LN/HE/ECF/RV/V/2P** | | **180** | **200** | **225** | **230** | **270** | **295** | **320** | **355** | **400** | **440** |
| Heating capacity (EN14511) (1) | kW | 177 | 198 | 221 | 225 | 260 | 291 | 312 | 349 | 393 | 425 |
| Total input power (EN14511) (1) | kW | 52,9 | 58,6 | 66,5 | 65,3 | 78,1 | 89,8 | 95,5 | 109 | 120 | 134 |
| COP (EN14511) (1) | W/W | 3,35 | 3,38 | 3,32 | 3,45 | 3,33 | 3,24 | 3,27 | 3,2 | 3,28 | 3,17 |
| Energy Class (2) | | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 4,16 | 4,19 | 4,08 | 4,3 | 3,86 | 3,88 | 3,98 | 4,01 | 3,96 | 3,94 |
| ηs,h (2) | % | 164 | 165 | 160 | 169 | 151 | 152 | 156 | 157 | 155 | 155 |
| Cooling capacity (EN14511) (3) | kW | 160 | 175 | 197 | 195 | 229 | 254 | 272 | 307 | 354 | 389 |
| Total input power (EN14511) (3) | kW | 56,4 | 62,3 | 69,4 | 69 | 76,3 | 89,9 | 98,5 | 115 | 123 | 139 |
| EER (EN14511) (3) | W/W | 2,84 | 2,81 | 2,84 | 2,83 | 3,0 | 2,83 | 2,76 | 2,67 | 2,88 | 2,8 |
| Sound power (4) | dB (A) | 89 | 89 | 88 | 91 | 89 | 90 | 90 | 92 | 92 | 94 |
| Sound pressure (5) | dB (A) | 57 | 57 | 56 | 58 | 56 | 58 | 58 | 60 | 59 | 62 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 4 / 2 | 2 / 1 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 |
| Fans | n° | 3 | 3 | 4 | 3 | 6 | 6 | 6 | 6 | 8 | 8 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 37 | 47 | 50 | 59 | 64 | 63 | 63 | 62 | 73 | 82 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 17,2 | 21,9 | 23,3 | 27,5 | 29,8 | 29,4 | 29,4 | 28,9 | 34,0 | 38,2 |
| Water tank volume | l | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |

Performances are referred to the following conditions:
(1) Heating: Ambient temperature 7°C DB, 6°C WB, water temperature 40/45°C
(2) Average conditions, low temperature, variable - Reg EU 811/2013
(3) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C (only RV versions)
(4) Sound power level in accordance with ISO 3744
(5) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744

The refrigerant data may change without notice. It is therefore necessary to refer always to the silver label placed on the unit.

| AWHE SLN/HE/ACF/RV/U/2P | | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 44,0 | 49,4 | 65,2 | 70,3 | 87,3 | 98,7 | 109 | 128 | 145 | 155 |
| Total input power (EN14511) (1) | kW | 14,5 | 16,4 | 20,2 | 22,8 | 26,6 | 30,4 | 33,4 | 39,4 | 45,0 | 47,8 |
| COP (EN14511) (1) | W/W | 3,03 | 3,01 | 3,23 | 3,08 | 3,28 | 3,25 | 3,26 | 3,25 | 3,22 | 3,24 |
| Energy Class (2) | | A+ | A+ | A++ | A++ | A+ | A++ | A++ | A+ | A+ | A++ |
| SCOP (2) | kWh/kWh | 3,61 | 3,64 | 3,97 | 3,94 | 3,71 | 3,91 | 3,94 | 3,77 | 3,77 | 3,87 |
| ηs,h (2) | % | 141 | 143 | 156 | 155 | 146 | 154 | 155 | 148 | 148 | 152 |
| Cooling capacity (EN14511) (3) | kW | 36,9 | 42,6 | 55,3 | 59,0 | 75,0 | 83,6 | 92,6 | 110 | 121 | 131 |
| Total input power (EN14511) (3) | kW | 14,6 | 17,1 | 22,5 | 25,9 | 26,8 | 31,6 | 36,1 | 38,8 | 45,7 | 49,9 |
| EER (EN14511) (3) | W/W | 2,53 | 2,49 | 2,46 | 2,28 | 2,8 | 2,65 | 2,57 | 2,84 | 2,65 | 2,63 |
| Sound power (4) | dB (A) | 73 | 73 | 73 | 74 | 76 | 77 | 79 | 81 | 82 | 82 |
| Sound pressure (5) | dB (A) | 41 | 41 | 41 | 42 | 44 | 45 | 47 | 49 | 50 | 50 |
| **AWHE SLN/HE/ECF/RV/U/2P** | | **45** | **50** | **70** | **75** | **90** | **105** | **115** | **135** | **150** | **160** |
| Heating capacity (EN14511) (1) | kW | 44,6 | 50,5 | 66,4 | 71,7 | 88,6 | 99,9 | 110 | 130 | 147 | 158 |
| Total input power (EN14511) (1) | kW | 13,7 | 15,6 | 19,5 | 22,0 | 25,1 | 28,9 | 31,9 | 37,2 | 43 | 45,8 |
| COP (EN14511) (1) | W/W | 3,26 | 3,24 | 3,41 | 3,26 | 3,53 | 3,46 | 3,45 | 3,49 | 3,42 | 3,45 |
| Energy Class (2) | | A++ | A++ | A++ | A++ | A++ | A++ | A+++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 4,13 | 4,06 | 4,43 | 4,39 | 4,36 | 4,38 | 4,45 | 4,26 | 4,25 | 4,37 |
| ηs,h (2) | % | 162 | 160 | 174 | 173 | 171 | 172 | 175 | 167 | 167 | 172 |
| Cooling capacity (EN14511) (3) | kW | 37,3 | 42,9 | 55,9 | 59,5 | 75,5 | 84,3 | 93,6 | 111 | 123 | 132 |
| Total input power (EN14511) (3) | kW | 13,9 | 16,5 | 21,8 | 25,3 | 25,6 | 30,3 | 34,7 | 36,9 | 43,7 | 48,1 |
| EER (EN14511) (3) | W/W | 2,68 | 2,6 | 2,56 | 2,35 | 2,95 | 2,78 | 2,7 | 3,01 | 2,81 | 2,74 |
| Sound power (4) | dB (A) | 73 | 73 | 73 | 74 | 76 | 77 | 79 | 81 | 82 | 82 |
| Sound pressure (5) | dB (A) | 41 | 41 | 41 | 42 | 44 | 45 | 47 | 49 | 50 | 50 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 |
| Fans | n° | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 11 | 11 | 17 | 17 | 25 | 25 | 25 | 36 | 36 | 36 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 5,1 | 5,1 | 7,9 | 7,9 | 11,7 | 11,7 | 11,7 | 16,8 | 16,8 | 16,8 |
| Water tank volume | l | 140 | 140 | 300 | 300 | 300 | 300 | 300 | 500 | 500 | 500 |

| AWHE SLN/HE/ACF/RV/U/2P | | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 172 | 196 | 216 | 222 | 254 | 285 | 305 | 337 | 382 | 415 |
| Total input power (EN14511) (1) | kW | 53,5 | 60,9 | 67,2 | 65,7 | 79,3 | 91,2 | 96,9 | 110 | 122 | 135 |
| COP (EN14511) (1) | W/W | 3,21 | 3,22 | 3,21 | 3,38 | 3,20 | 3,12 | 3,15 | 3,06 | 3,13 | 3,07 |
| Energy Class (2) | | A++ | A++ | A++ | A++ | A+ | A+ | A++ | A++ | A+ | A++ |
| SCOP (2) | kWh/kWh | 4,02 | 4,05 | 3,98 | 4,16 | 3,73 | 3,72 | 3,84 | 3,84 | 3,8 | 3,81 |
| ηs,h (2) | % | 158 | 159 | 156 | 164 | 146 | 146 | 151 | 151 | 149 | 150 |
| Cooling capacity (EN14511) (3) | kW | 154 | 168 | 190 | 185 | 222 | 247 | 263 | 293 | 342 | 375 |
| Total input power (EN14511) (3) | kW | 59,2 | 65,3 | 72,2 | 73,5 | 80,0 | 94,0 | 103 | 121 | 128 | 145 |
| EER (EN14511) (3) | W/W | 2,6 | 2,57 | 2,63 | 2,52 | 2,78 | 2,63 | 2,55 | 2,42 | 2,67 | 2,59 |
| Sound power (4) | dB (A) | 82 | 84 | 82 | 85 | 84 | 85 | 85 | 85 | 87 | 88 |
| Sound pressure (5) | dB (A) | 50 | 52 | 49 | 52 | 52 | 53 | 53 | 52 | 54 | 55 |
| **AWHE SLN/HE/ACF/RV/U/2P** | | **180** | **200** | **225** | **230** | **270** | **295** | **320** | **355** | **400** | **440** |
| Heating capacity (EN14511) (1) | kW | 175 | 200 | 220 | 225 | 257 | 290 | 310 | 344 | 389 | 421 |
| Total input power (EN14511) (1) | kW | 51,2 | 57,0 | 64,3 | 63,6 | 74,7 | 86,8 | 92,3 | 105 | 116 | 129 |
| COP (EN14511) (1) | W/W | 3,42 | 3,51 | 3,42 | 3,54 | 3,44 | 3,34 | 3,36 | 3,28 | 3,35 | 3,26 |
| Energy Class (2) | | A+++ | A+++ | A+++ | A+++ | A++ | A++ | A++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 4,52 | 4,52 | 4,5 | 4,56 | 4,22 | 4,3 | 4,37 | 4,36 | 4,3 | 4,3 |
| ηs,h (2) | % | 178 | 178 | 177 | 179 | 166 | 169 | 172 | 172 | 169 | 169 |
| Cooling capacity (EN14511) (3) | kW | 155 | 170 | 193 | 186 | 225 | 247 | 266 | 296 | 345 | 379 |
| Total input power (EN14511) (3) | kW | 57,1 | 63,2 | 69,1 | 71,8 | 75,6 | 90,9 | 98,1 | 117 | 123 | 140 |
| EER (EN14511) (3) | W/W | 2,71 | 2,69 | 2,79 | 2,59 | 2,98 | 2,72 | 2,71 | 2,53 | 2,8 | 2,71 |
| Sound power (4) | dB (A) | 82 | 84 | 82 | 85 | 84 | 85 | 85 | 85 | 87 | 88 |
| Sound pressure (5) | dB (A) | 50 | 52 | 49 | 52 | 52 | 53 | 53 | 52 | 54 | 55 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 4 / 2 | 2 / 1 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 |
| Fans | n° | 3 | 3 | 4 | 3 | 6 | 6 | 6 | 6 | 8 | 8 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 37 | 47 | 50 | 59 | 64 | 63 | 63 | 62 | 73 | 82 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 17,2 | 21,9 | 23,3 | 27,5 | 29,8 | 29,4 | 29,4 | 28,9 | 34,0 | 38,2 |
| Water tank volume | l | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |

Performances are referred to the following conditions:
(1) Heating: Ambient temperature 7°C DB, 6°C WB, water temperature 40/45°C
(2) Average conditions, low temperature, variable - Reg EU 811/2013
(3) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C (only RV versions)
(4) Sound power level in accordance with ISO 3744
(5) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744

The refrigerant data may change without notice. It is therefore necessary to refer always to the silver label placed on the unit.

| AWHE LN/HE/ACF/RV/S/2P | | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 44,6 | 50,8 | 67,2 | 72,7 | 88,5 | 99,9 | 111 | 130 | 147 | 158 |
| Total input power (EN14511) (1) | kW | 14,9 | 16,8 | 20,5 | 23,1 | 27,3 | 31,1 | 34,0 | 40,4 | 45,9 | 48,7 |
| COP (EN14511) (1) | W/W | 2,99 | 3,02 | 3,28 | 3,15 | 3,24 | 3,21 | 3,26 | 3,22 | 3,20 | 3,24 |
| Energy Class (2) | | A+ | A+ | A++ | A++ | A+ | A+ | A+ | A+ | A+ | A+ |
| SCOP (2) | kWh/kWh | 3,47 | 3,48 | 3,9 | 3,9 | 3,49 | 3,74 | 3,78 | 3,56 | 3,56 | 3,75 |
| ηs,h (2) | % | 136 | 136 | 153 | 153 | 137 | 147 | 148 | 140 | 140 | 147 |
| Cooling capacity (EN14511) (3) | kW | 38,3 | 44,1 | 57,8 | 62,1 | 76,8 | 86,4 | 96,0 | 112 | 125 | 135 |
| Total input power (EN14511) (3) | kW | 14,1 | 16,6 | 21,5 | 24,6 | 26,5 | 30,8 | 35,1 | 38,4 | 44,6 | 48,8 |
| EER (EN14511) (3) | W/W | 2,72 | 2,66 | 2,69 | 2,52 | 2,90 | 2,81 | 2,74 | 2,92 | 2,80 | 2,77 |
| Sound power (4) | dB (A) | 77 | 76 | 77 | 78 | 82 | 83 | 85 | 86 | 87 | 87 |
| Sound pressure (5) | dB (A) | 46 | 44 | 45 | 46 | 50 | 51 | 53 | 54 | 55 | 55 |
| **AWHE LN/HE/ECF/RV/S/2P** | | **45** | **50** | **70** | **75** | **90** | **105** | **115** | **135** | **150** | **160** |
| Heating capacity (EN14511) (1) | kW | 44,7 | 50,7 | 67,1 | 72,8 | 88,5 | 99,9 | 111 | 130 | 147 | 158 |
| Total input power (EN14511) (1) | kW | 14,3 | 16,3 | 20,2 | 22,7 | 26,3 | 30,0 | 33,2 | 38,8 | 44,4 | 47,3 |
| COP (EN14511) (1) | W/W | 3,13 | 3,11 | 3,32 | 3,21 | 3,37 | 3,33 | 3,34 | 3,35 | 3,31 | 3,34 |
| Energy Class (2) | | A+ | A+ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 3,72 | 3,75 | 4,11 | 4,08 | 3,84 | 4,02 | 4,07 | 3,86 | 3,85 | 4,02 |
| ηs,h (2) | % | 146 | 147 | 162 | 160 | 151 | 158 | 160 | 152 | 151 | 158 |
| Cooling capacity (EN14511) (3) | kW | 38,3 | 44,1 | 57,8 | 62,2 | 76,9 | 86,5 | 96 | 112 | 125 | 135 |
| Total input power (EN14511) (3) | kW | 13,9 | 16,4 | 21,3 | 24,4 | 25,8 | 30,3 | 34,7 | 37,7 | 44,1 | 48,2 |
| EER (EN14511) (3) | W/W | 2,76 | 2,69 | 2,71 | 2,55 | 2,98 | 2,85 | 2,77 | 2,97 | 2,83 | 2,8 |
| Sound power (4) | dB (A) | 77 | 76 | 77 | 78 | 82 | 83 | 85 | 86 | 87 | 87 |
| Sound pressure (5) | dB (A) | 46 | 44 | 45 | 46 | 50 | 51 | 53 | 54 | 55 | 55 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 |
| Fans | n° | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 11 | 11 | 17 | 17 | 25 | 25 | 25 | 36 | 36 | 36 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 5,1 | 5,1 | 7,9 | 7,9 | 11,7 | 11,7 | 11,7 | 16,8 | 16,8 | 16,8 |
| Water tank volume | l | 140 | 140 | 300 | 300 | 300 | 300 | 300 | 500 | 500 | 500 |

| AWHE LN/HE/ACF/RV/S/2P | | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 177 | 198 | 221 | 225 | 256 | 290 | 312 | 348 | 392 | 424 |
| Total input power (EN14511) (1) | kW | 54,3 | 59,9 | 68,3 | 66,8 | 81,3 | 93,1 | 98,5 | 112 | 125 | 137 |
| COP (EN14511) (1) | W/W | 3,26 | 3,31 | 3,24 | 3,37 | 3,15 | 3,11 | 3,17 | 3,11 | 3,14 | 3,09 |
| Energy Class (2) | | A++ | A++ | A+ | A++ | A+ | A+ | A+ | A+ | A+ | A+ |
| SCOP (2) | kWh/kWh | 3,89 | 3,97 | 3,79 | 4,12 | 3,54 | 3,57 | 3,71 | 3,72 | 3,67 | 3,73 |
| ηs,h (2) | % | 153 | 156 | 149 | 162 | 139 | 140 | 146 | 146 | 144 | 146 |
| Cooling capacity (EN14511) (3) | kW | 160 | 175 | 197 | 195 | 230 | 255 | 272 | 305 | 353 | 388 |
| Total input power (EN14511) (3) | kW | 57,1 | 63,0 | 70,3 | 69,8 | 78,0 | 91,6 | 100 | 116 | 125 | 141 |
| EER (EN14511) (3) | W/W | 2,80 | 2,78 | 2,80 | 2,79 | 2,95 | 2,78 | 2,72 | 2,63 | 2,82 | 2,75 |
| Sound power (4) | dB (A) | 89 | 89 | 88 | 91 | 89 | 90 | 90 | 92 | 92 | 94 |
| Sound pressure (5) | dB (A) | 57 | 57 | 56 | 58 | 56 | 58 | 58 | 60 | 59 | 62 |
| **AWHE LN/HE/ECF/RV/S/2P** | | **180** | **200** | **225** | **230** | **270** | **295** | **320** | **355** | **400** | **440** |
| Heating capacity (EN14511) (1) | kW | 177 | 198 | 221 | 225 | 260 | 291 | 312 | 349 | 393 | 425 |
| Total input power (EN14511) (1) | kW | 52,9 | 58,6 | 66,5 | 65,3 | 78,1 | 89,8 | 95,5 | 109 | 120 | 134 |
| COP (EN14511) (1) | W/W | 3,35 | 3,38 | 3,32 | 3,45 | 3,33 | 3,24 | 3,27 | 3,2 | 3,28 | 3,17 |
| Energy Class (2) | | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 4,16 | 4,19 | 4,08 | 4,3 | 3,86 | 3,88 | 3,98 | 4,01 | 3,96 | 3,94 |
| ηs,h (2) | % | 164 | 165 | 160 | 169 | 151 | 152 | 156 | 157 | 155 | 155 |
| Cooling capacity (EN14511) (3) | kW | 160 | 175 | 197 | 195 | 229 | 254 | 271 | 307 | 354 | 389 |
| Total input power (EN14511) (3) | kW | 56,4 | 62,3 | 69,4 | 69,0 | 76,3 | 89,9 | 98,5 | 115 | 123 | 139 |
| EER (EN14511) (3) | W/W | 2,84 | 2,81 | 2,84 | 2,83 | 3,00 | 2,83 | 2,75 | 2,67 | 2,88 | 2,8 |
| Sound power (4) | dB (A) | 89 | 89 | 88 | 91 | 89 | 90 | 90 | 92 | 92 | 94 |
| Sound pressure (5) | dB (A) | 57 | 57 | 56 | 58 | 56 | 58 | 58 | 60 | 59 | 62 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 4 / 2 | 2 / 1 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 |
| Fans | n° | 3 | 3 | 4 | 3 | 6 | 6 | 6 | 6 | 8 | 8 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 37 | 47 | 50 | 59 | 64 | 63 | 63 | 62 | 73 | 82 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 17,2 | 21,9 | 23,3 | 27,5 | 29,8 | 29,4 | 29,4 | 28,9 | 34,0 | 38,2 |
| Water tank volume | l | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |

Performances are referred to the following conditions:
(1) Heating: Ambient temperature 7°C DB, 6°C WB, water temperature 40/45°C
(2) Average conditions, low temperature, variable - Reg EU 811/2013
(3) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C (only RV versions)
(4) Sound power level in accordance with ISO 3744
(5) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744

The refrigerant data may change without notice. It is therefore necessary to refer always to the silver label placed on the unit.

| AWHE SLN/HE/ACF/RV/S/2P | | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 44 | 49,4 | 65,2 | 70,3 | 87,3 | 98,7 | 109 | 128 | 145 | 155 |
| Total input power (EN14511) (1) | kW | 14,5 | 16,4 | 20,2 | 22,8 | 26,6 | 30,4 | 33,4 | 39,4 | 45 | 47,8 |
| COP (EN14511) (1) | W/W | 3,03 | 3,01 | 3,23 | 3,08 | 3,28 | 3,25 | 3,26 | 3,25 | 3,22 | 3,24 |
| Energy Class (2) | | A+ | A+ | A++ | A++ | A+ | A++ | A++ | A+ | A+ | A++ |
| SCOP (2) | kWh/kWh | 3,61 | 3,64 | 3,97 | 3,94 | 3,71 | 3,91 | 3,94 | 3,77 | 3,77 | 3,87 |
| ηs,h (2) | % | 141 | 143 | 156 | 155 | 146 | 154 | 155 | 148 | 148 | 152 |
| Cooling capacity (EN14511) (3) | kW | 36,9 | 42,6 | 55,3 | 59,0 | 75,0 | 83,6 | 92,6 | 110 | 121 | 131 |
| Total input power (EN14511) (3) | kW | 14,6 | 17,1 | 22,5 | 25,9 | 26,8 | 31,6 | 36,1 | 38,8 | 45,7 | 49,9 |
| EER (EN14511) (3) | W/W | 2,53 | 2,49 | 2,46 | 2,28 | 2,80 | 2,65 | 2,57 | 2,84 | 2,65 | 2,63 |
| Sound power (4) | dB (A) | 73 | 73 | 73 | 74 | 76 | 77 | 79 | 81 | 82 | 82 |
| Sound pressure (5) | dB (A) | 41 | 41 | 41 | 42 | 44 | 45 | 47 | 49 | 50 | 50 |
| **AWHE SLN/HE/ECF/RV/S/2P** | | **45** | **50** | **70** | **75** | **90** | **105** | **115** | **135** | **150** | **160** |
| Heating capacity (EN14511) (1) | kW | 44,6 | 50,5 | 66,4 | 71,7 | 88,6 | 99,9 | 110 | 130 | 147 | 158 |
| Total input power (EN14511) (1) | kW | 13,7 | 15,6 | 19,5 | 22,0 | 25,1 | 28,9 | 31,9 | 37,2 | 43,0 | 45,8 |
| COP (EN14511) (1) | W/W | 3,26 | 3,24 | 3,41 | 3,26 | 3,53 | 3,46 | 3,45 | 3,49 | 3,42 | 3,45 |
| Energy Class (2) | | A++ | A++ | A++ | A++ | A++ | A++ | A+++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 4,13 | 4,06 | 4,43 | 4,39 | 4,36 | 4,38 | 4,45 | 4,26 | 4,25 | 4,37 |
| ηs,h (2) | % | 162 | 160 | 174 | 173 | 171 | 172 | 175 | 167 | 167 | 172 |
| Cooling capacity (EN14511) (3) | kW | 37,3 | 42,9 | 55,9 | 59,5 | 75,5 | 84,3 | 93,6 | 111 | 123 | 132 |
| Total input power (EN14511) (3) | kW | 13,9 | 16,5 | 21,8 | 25,3 | 25,6 | 30,3 | 34,7 | 36,9 | 43,7 | 48,1 |
| EER (EN14511) (3) | W/W | 2,68 | 2,60 | 2,56 | 2,35 | 2,95 | 2,78 | 2,70 | 3,01 | 2,81 | 2,74 |
| Sound power (4) | dB (A) | 73 | 73 | 73 | 74 | 76 | 77 | 79 | 81 | 82 | 82 |
| Sound pressure (5) | dB (A) | 41 | 41 | 41 | 42 | 44 | 45 | 47 | 49 | 50 | 50 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 |
| Fans | n° | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 11 | 11 | 17 | 17 | 25 | 25 | 25 | 36 | 36 | 36 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 5,1 | 5,1 | 7,9 | 7,9 | 11,7 | 11,7 | 11,7 | 16,8 | 16,8 | 16,8 |
| Water tank volume | l | 140 | 140 | 300 | 300 | 300 | 300 | 300 | 500 | 500 | 500 |

| AWHE SLN/HE/ECF/RV/S/2P | | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 172 | 196 | 216 | 222 | 254 | 285 | 305 | 337 | 382 | 415 |
| Total input power (EN14511) (1) | kW | 53,5 | 60,9 | 67,2 | 65,7 | 79,3 | 91,2 | 96,9 | 110 | 122 | 135 |
| COP (EN14511) (1) | W/W | 3,21 | 3,22 | 3,21 | 3,38 | 3,20 | 3,12 | 3,15 | 3,06 | 3,13 | 3,07 |
| Energy Class (2) | | A++ | A++ | A++ | A++ | A+ | A+ | A++ | A++ | A+ | A++ |
| SCOP (2) | kWh/kWh | 4,02 | 4,05 | 3,98 | 4,16 | 3,73 | 3,72 | 3,84 | 3,84 | 3,8 | 3,81 |
| ηs,h (2) | % | 158 | 159 | 156 | 164 | 146 | 146 | 151 | 151 | 149 | 150 |
| Cooling capacity (EN14511) (3) | kW | 154 | 168 | 190 | 185 | 222 | 247 | 263 | 293 | 342 | 375 |
| Total input power (EN14511) (3) | kW | 59,2 | 65,3 | 72,2 | 73,5 | 80,0 | 94,0 | 103 | 121 | 128 | 145 |
| EER (EN14511) (3) | W/W | 2,60 | 2,57 | 2,63 | 2,52 | 2,78 | 2,63 | 2,55 | 2,42 | 2,67 | 2,59 |
| Sound power (4) | dB (A) | 82 | 84 | 82 | 85 | 84 | 85 | 85 | 85 | 87 | 88 |
| Sound pressure (5) | dB (A) | 50 | 52 | 49 | 52 | 52 | 53 | 53 | 52 | 54 | 55 |
| **AWHE SLN/HE/ECF/RV/S/2P** | | **180** | **200** | **225** | **230** | **270** | **295** | **320** | **355** | **400** | **440** |
| Heating capacity (EN14511) (1) | kW | 175 | 200 | 220 | 225 | 257 | 290 | 310 | 344 | 389 | 421 |
| Total input power (EN14511) (1) | kW | 51,2 | 57,0 | 64,3 | 63,6 | 74,7 | 86,8 | 92,3 | 105 | 116 | 129 |
| COP (EN14511) (1) | W/W | 3,42 | 3,51 | 3,42 | 3,54 | 3,44 | 3,34 | 3,36 | 3,28 | 3,35 | 3,26 |
| Energy Class (2) | | A+++ | A+++ | A+++ | A+++ | A++ | A++ | A++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 4,52 | 4,52 | 4,5 | 4,56 | 4,22 | 4,3 | 4,37 | 4,36 | 4,3 | 4,3 |
| ηs,h (2) | % | 178 | 178 | 177 | 179 | 166 | 169 | 172 | 172 | 169 | 169 |
| Cooling capacity (EN14511) (3) | kW | 155 | 170 | 193 | 186 | 225 | 247 | 266 | 296 | 345 | 379 |
| Total input power (EN14511) (3) | kW | 57,1 | 63,2 | 69,1 | 71,8 | 75,6 | 90,9 | 98,1 | 117 | 123 | 140 |
| EER (EN14511) (3) | W/W | 2,71 | 2,69 | 2,79 | 2,59 | 2,98 | 2,72 | 2,71 | 2,53 | 2,8 | 2,71 |
| Sound power (4) | dB (A) | 82 | 84 | 82 | 85 | 84 | 85 | 85 | 85 | 87 | 88 |
| Sound pressure (5) | dB (A) | 50 | 52 | 49 | 52 | 52 | 53 | 53 | 52 | 54 | 55 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 4 / 2 | 2 / 1 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 |
| Fans | n° | 3 | 3 | 4 | 3 | 6 | 6 | 6 | 6 | 8 | 8 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 37 | 47 | 50 | 59 | 64 | 63 | 63 | 62 | 73 | 82 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 17,2 | 21,9 | 23,3 | 27,5 | 29,8 | 29,4 | 29,4 | 28,9 | 34,0 | 38,2 |
| Water tank volume | l | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |

Performances are referred to the following conditions:
(1) Heating: Ambient temperature 7°C DB, 6°C WB, water temperature 40/45°C
(2) Average conditions, low temperature, variable - Reg EU 811/2013
(3) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C (only RV versions)
(4) Sound power level in accordance with ISO 3744
(5) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744

The refrigerant data may change without notice. It is therefore necessary to refer always to the silver label placed on the unit.

| AWHE LN/HE/ACF/RV/U/4P | | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 45,0 | 51,1 | 67,5 | 72,9 | 89,2 | 101 | 111 | 131 | 148 | 159 |
| Total input power (EN14511) (1) | kW | 14,1 | 15,9 | 19,7 | 22,1 | 26,1 | 29,7 | 32,6 | 38,5 | 44,2 | 46,9 |
| COP (EN14511) (1) | W/W | 3,19 | 3,21 | 3,43 | 3,3 | 3,42 | 3,4 | 3,4 | 3,4 | 3,35 | 3,39 |
| Energy Class (2) | | A+ | A+ | A++ | A++ | A+ | A++ | A++ | A+ | A+ | A++ |
| SCOP (2) | kWh/kWh | 3,61 | 3,64 | 4,02 | 4,01 | 3,66 | 3,87 | 3,92 | 3,72 | 3,71 | 3,87 |
| ηs,h (2) | % | 142 | 143 | 158 | 157 | 144 | 152 | 154 | 146 | 146 | 152 |
| Cooling capacity (EN14511) (3) | kW | 38,3 | 44,1 | 57,8 | 62,1 | 76,8 | 86,4 | 96,1 | 112 | 125 | 135 |
| Total input power (EN14511) (3) | kW | 14,1 | 16,6 | 21,5 | 24,6 | 26,5 | 30,8 | 35,1 | 38,4 | 44,6 | 48,8 |
| EER (EN14511) (3) | W/W | 2,72 | 2,66 | 2,69 | 2,52 | 2,9 | 2,81 | 2,74 | 2,92 | 2,8 | 2,77 |
| TER (EN14511) (4) | W/W | 7,0 | 7,2 | 7,5 | 7,2 | 7,5 | 7,3 | 7,5 | 7,3 | 7,1 | 7,2 |
| Sound power (5) | dB (A) | 77 | 76 | 77 | 78 | 82 | 83 | 85 | 86 | 87 | 87 |
| Sound pressure (6) | dB (A) | 46 | 44 | 45 | 46 | 50 | 51 | 53 | 54 | 55 | 55 |
| **AWHE LN/HE/ECF/RV/U/4P** | | **45** | **50** | **70** | **75** | **90** | **105** | **115** | **135** | **150** | **160** |
| Heating capacity (EN14511) (1) | kW | 45,1 | 51,1 | 67,5 | 72,9 | 89,2 | 101 | 111 | 131 | 148 | 159 |
| Total input power (EN14511) (1) | kW | 13,6 | 15,4 | 19,3 | 21,7 | 25,0 | 28,7 | 31,7 | 37,0 | 42,8 | 45,5 |
| COP (EN14511) (1) | W/W | 3,32 | 3,32 | 3,50 | 3,36 | 3,57 | 3,52 | 3,50 | 3,54 | 3,46 | 3,49 |
| Energy Class (2) | | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 3,89 | 3,92 | 4,26 | 4,22 | 4,03 | 4,17 | 4,22 | 4,03 | 4,02 | 4,14 |
| ηs,h (2) | % | 153 | 154 | 168 | 166 | 158 | 164 | 166 | 158 | 158 | 163 |
| Cooling capacity (EN14511) (3) | kW | 38,3 | 43,9 | 57,8 | 62,1 | 76,8 | 86,6 | 96,4 | 112 | 125 | 135 |
| Total input power (EN14511) (3) | kW | 13,9 | 16,4 | 21,4 | 24,4 | 25,9 | 30,3 | 34,7 | 37,6 | 44,1 | 48,2 |
| EER (EN14511) (3) | W/W | 2,76 | 2,68 | 2,70 | 2,55 | 2,97 | 2,86 | 2,78 | 2,98 | 2,83 | 2,80 |
| TER (EN14511) (4) | W/W | 7,0 | 7,2 | 7,5 | 7,2 | 7,5 | 7,3 | 7,5 | 7,3 | 7,1 | 7,2 |
| Sound power (5) | dB (A) | 77 | 76 | 77 | 78 | 82 | 83 | 85 | 86 | 87 | 87 |
| Sound pressure (6) | dB (A) | 46 | 44 | 45 | 46 | 50 | 51 | 53 | 54 | 55 | 55 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 |
| Fans | n° | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 11 | 11 | 17 | 17 | 25 | 25 | 25 | 36 | 36 | 36 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 5,1 | 5,1 | 7,9 | 7,9 | 11,7 | 11,7 | 11,7 | 16,8 | 16,8 | 16,8 |
| Water tank volume | l | 140 | 140 | 300 | 300 | 300 | 300 | 300 | 500 | 500 | 500 |

| AWHE LN/HE/ACF/RV/U/4P | | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 179 | 199 | 222 | 227 | 260 | 292 | 312 | 348 | 393 | 427 |
| Total input power (EN14511) (1) | kW | 52,2 | 57,7 | 65,6 | 64,2 | 78,1 | 89,6 | 95,7 | 109 | 121 | 134 |
| COP (EN14511) (1) | W/W | 3,43 | 3,45 | 3,38 | 3,54 | 3,33 | 3,26 | 3,26 | 3,19 | 3,25 | 3,19 |
| Energy Class (2) | | A++ | A++ | A++ | A++ | A+ | A+ | A+ | A+ | A+ | A+ |
| SCOP (2) | kWh/kWh | 4,03 | 4,08 | 3,91 | 4,24 | 3,64 | 3,64 | 3,77 | 3,77 | 3,74 | 3,79 |
| ηs,h (2) | % | 158 | 160 | 154 | 167 | 143 | 143 | 148 | 148 | 147 | 149 |
| Cooling capacity (EN14511) (3) | kW | 160 | 175 | 197 | 195 | 230 | 255 | 272 | 305 | 353 | 388 |
| Total input power (EN14511) (3) | kW | 57,1 | 63,0 | 70,3 | 69,8 | 78,0 | 91,6 | 100 | 116 | 125 | 141 |
| EER (EN14511) (3) | W/W | 2,80 | 2,78 | 2,8 | 2,79 | 2,95 | 2,78 | 2,72 | 2,63 | 2,82 | 2,75 |
| TER (EN14511) (4) | W/W | 7,8 | 7,6 | 7,5 | 7,5 | 7,3 | 7,1 | 7,2 | 7,1 | 7,4 | 7,3 |
| Sound power (5) | dB (A) | 89 | 89 | 88 | 91 | 89 | 90 | 90 | 92 | 92 | 94 |
| Sound pressure (6) | dB (A) | 57 | 57 | 56 | 58 | 56 | 58 | 58 | 60 | 59 | 62 |
| **AWHE LN/HE/ECF/RV/U/4P** | | **180** | **200** | **225** | **230** | **270** | **295** | **320** | **355** | **400** | **440** |
| Heating capacity (EN14511) (1) | kW | 179 | 199 | 222 | 227 | 259 | 292 | 312 | 349 | 393 | 427 |
| Total input power (EN14511) (1) | kW | 50,9 | 56,4 | 63,9 | 62,8 | 74,9 | 86,5 | 92,8 | 106 | 117 | 130 |
| COP (EN14511) (1) | W/W | 3,52 | 3,53 | 3,47 | 3,61 | 3,46 | 3,38 | 3,36 | 3,29 | 3,36 | 3,28 |
| Energy Class (2) | | A++ | A++ | A++ | A+++ | A++ | A++ | A++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 4,33 | 4,32 | 4,22 | 4,44 | 3,96 | 4,00 | 4,06 | 4,05 | 4,03 | 4,01 |
| ηs,h (2) | % | 170 | 170 | 166 | 175 | 156 | 157 | 160 | 159 | 158 | 157 |
| Cooling capacity (EN14511) (3) | kW | 160 | 175 | 197 | 195 | 229 | 254 | 271 | 306 | 354 | 388 |
| Total input power (EN14511) (3) | kW | 56,5 | 62,3 | 69,4 | 68,9 | 76,4 | 90,4 | 99,0 | 115 | 123 | 139 |
| EER (EN14511) (3) | W/W | 2,83 | 2,81 | 2,84 | 2,83 | 3,00 | 2,81 | 2,74 | 2,66 | 2,88 | 2,79 |
| TER (EN14511) (4) | W/W | 7,8 | 7,6 | 7,5 | 7,5 | 7,3 | 7,1 | 7,2 | 7,1 | 7,4 | 7,3 |
| Sound power (5) | dB (A) | 89 | 89 | 88 | 91 | 89 | 90 | 90 | 92 | 92 | 94 |
| Sound pressure (6) | dB (A) | 57 | 57 | 56 | 58 | 56 | 58 | 58 | 60 | 59 | 62 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 4 / 2 | 2 / 1 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 |
| Fans | n° | 3 | 3 | 4 | 3 | 6 | 6 | 6 | 6 | 8 | 8 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 37 | 47 | 50 | 59 | 64 | 63 | 63 | 62 | 73 | 82 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 17,2 | 21,9 | 23,3 | 27,5 | 29,8 | 29,4 | 29,4 | 28,9 | 34,0 | 38,2 |
| Water tank volume | l | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |

Performances are referred to the following conditions:
(1) Heating: Ambient temperature 7°C DB, 6°C WB, water temperature 40/45°C
(2) Average conditions, low temperature, variable - Reg EU 811/2013
(3) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C (only RV versions)
(4) TER: Total Energy Ratio - cold circuit 12/7°C, hot circuit 40/45°C
(5) Sound power level in accordance with ISO 3744
(6) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744

The refrigerant data may change without notice. It is therefore necessary to refer always to the silver label placed on the unit.

| AWHE SLN/HE/ACF/RV/U/4P | | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 44,4 | 49,7 | 65,4 | 70,8 | 88,1 | 99,0 | 109 | 130 | 146 | 155 |
| Total input power (EN14511) (1) | kW | 13,8 | 15,5 | 19,4 | 21,8 | 25,5 | 29,1 | 32,0 | 37,6 | 43,3 | 46,0 |
| COP (EN14511) (1) | W/W | 3,22 | 3,21 | 3,37 | 3,25 | 3,45 | 3,4 | 3,41 | 3,46 | 3,37 | 3,37 |
| Energy Class (2) | | A+ | A+ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 3,76 | 3,78 | 4,13 | 4,1 | 3,86 | 4,03 | 4,08 | 3,91 | 3,89 | 4,01 |
| ηs,h (2) | % | 148 | 148 | 162 | 161 | 152 | 158 | 160 | 153 | 153 | 157 |
| Cooling capacity (EN14511) (3) | kW | 36,9 | 42,6 | 55,3 | 59,0 | 75,0 | 84,8 | 92,6 | 110 | 121 | 131 |
| Total input power (EN14511) (3) | kW | 14,6 | 17,1 | 22,5 | 25,9 | 26,8 | 31,5 | 36,1 | 38,8 | 45,7 | 49,9 |
| EER (EN14511) (3) | W/W | 2,53 | 2,49 | 2,46 | 2,28 | 2,80 | 2,69 | 2,57 | 2,84 | 2,65 | 2,63 |
| TER (EN14511) (4) | W/W | 7,0 | 7,2 | 7,5 | 7,2 | 7,5 | 7,3 | 7,5 | 7,3 | 7,1 | 7,2 |
| Sound power (5) | dB (A) | 73 | 73 | 73 | 74 | 76 | 77 | 79 | 81 | 82 | 82 |
| Sound pressure (6) | dB (A) | 41 | 41 | 41 | 42 | 44 | 45 | 47 | 49 | 50 | 50 |
| **AWHE SLN/HE/ECF/RV/U/4P** | | **45** | **50** | **70** | **75** | **90** | **105** | **115** | **135** | **150** | **160** |
| Heating capacity (EN14511) (1) | kW | 45,0 | 50,7 | 66,5 | 71,9 | 89,1 | 101 | 111 | 131 | 148 | 159 |
| Total input power (EN14511) (1) | kW | 13,0 | 14,8 | 18,7 | 21,1 | 24,1 | 27,7 | 30,6 | 35,6 | 41,2 | 43,9 |
| COP (EN14511) (1) | W/W | 3,46 | 3,43 | 3,56 | 3,41 | 3,7 | 3,65 | 3,63 | 3,68 | 3,59 | 3,62 |
| Energy Class (2) | | A++ | A++ | A+++ | A+++ | A+++ | A+++ | A+++ | A+++ | A++ | A+++ |
| SCOP (2) | kWh/kWh | 4,29 | 4,31 | 4,59 | 4,53 | 4,51 | 4,58 | 4,64 | 4,45 | 4,41 | 4,53 |
| ηs,h (2) | % | 169 | 169 | 181 | 178 | 177 | 180 | 183 | 175 | 173 | 178 |
| Cooling capacity (EN14511) (3) | kW | 37,3 | 42,9 | 55,9 | 59,5 | 75,5 | 84,3 | 93,6 | 111 | 123 | 132 |
| Total input power (EN14511) (3) | kW | 13,9 | 16,5 | 21,8 | 25,3 | 25,6 | 30,3 | 34,7 | 36,9 | 43,7 | 48,1 |
| EER (EN14511) (3) | W/W | 2,68 | 2,60 | 2,56 | 2,35 | 2,95 | 2,78 | 2,70 | 3,01 | 2,81 | 2,74 |
| TER (EN14511) (4) | W/W | 7,0 | 7,2 | 7,5 | 7,2 | 7,5 | 7,3 | 7,5 | 7,3 | 7,1 | 7,2 |
| Sound power (5) | dB (A) | 73 | 73 | 73 | 74 | 76 | 77 | 79 | 81 | 82 | 82 |
| Sound pressure (6) | dB (A) | 41 | 41 | 41 | 42 | 44 | 45 | 47 | 49 | 50 | 50 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 |
| Fans | n° | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 11 | 11 | 17 | 17 | 25 | 25 | 25 | 36 | 36 | 36 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 5,1 | 5,1 | 7,9 | 7,9 | 11,7 | 11,7 | 11,7 | 16,8 | 16,8 | 16,8 |
| Water tank volume | l | 140 | 140 | 300 | 300 | 300 | 300 | 300 | 500 | 500 | 500 |

| AWHE SLN/HE/ECF/RV/U/4P | | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 174 | 193 | 218 | 221 | 256 | 286 | 306 | 338 | 383 | 416 |
| Total input power (EN14511) (1) | kW | 51,3 | 56,8 | 64,4 | 63,2 | 76,2 | 87,6 | 93,7 | 107 | 118 | 131 |
| COP (EN14511) (1) | W/W | 3,39 | 3,40 | 3,39 | 3,50 | 3,36 | 3,26 | 3,27 | 3,16 | 3,25 | 3,18 |
| Energy Class (2) | | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 4,18 | 4,2 | 4,1 | 4,31 | 3,82 | 3,82 | 3,9 | 3,92 | 3,88 | 3,88 |
| ηs,h (2) | % | 164 | 165 | 161 | 169 | 150 | 150 | 153 | 154 | 152 | 152 |
| Cooling capacity (EN14511) (3) | kW | 154 | 168 | 190 | 185 | 222 | 247 | 263 | 293 | 342 | 375 |
| Total input power (EN14511) (3) | kW | 59,2 | 65,3 | 72,2 | 73,5 | 80,0 | 94,0 | 103 | 121 | 128 | 145 |
| EER (EN14511) (3) | W/W | 2,60 | 2,57 | 2,63 | 2,52 | 2,78 | 2,63 | 2,55 | 2,42 | 2,67 | 2,59 |
| TER (EN14511) (4) | W/W | 7,75 | 7,57 | 7,54 | 7,54 | 7,33 | 7,11 | 7,15 | 7,10 | 7,30 | 7,32 |
| Sound power (5) | dB (A) | 82 | 84 | 82 | 85 | 84 | 85 | 85 | 85 | 87 | 88 |
| Sound pressure (6) | dB (A) | 50 | 52 | 49 | 52 | 52 | 53 | 53 | 52 | 54 | 55 |
| **AWHE/SLN/RV/4P** | | **180** | **200** | **225** | **230** | **270** | **295** | **320** | **355** | **400** | **440** |
| Heating capacity (EN14511) (1) | kW | 177 | 197 | 221 | 226 | 259 | 291 | 311 | 345 | 391 | 422 |
| Total input power (EN14511) (1) | kW | 49,2 | 54,8 | 61,7 | 61,2 | 71,8 | 83,2 | 89,4 | 102 | 112 | 125 |
| COP (EN14511) (1) | W/W | 3,60 | 3,59 | 3,58 | 3,69 | 3,61 | 3,50 | 3,48 | 3,38 | 3,49 | 3,38 |
| Energy Class (2) | | A+++ | A+++ | A+++ | A+++ | A++ | A++ | A+++ | A+++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 4,74 | 4,67 | 4,64 | 4,7 | 4,4 | 4,38 | 4,45 | 4,45 | 4,43 | 4,38 |
| ηs,h (2) | % | 187 | 184 | 183 | 185 | 173 | 172 | 175 | 175 | 174 | 172 |
| Cooling capacity (EN14511) (3) | kW | 155 | 170 | 193 | 186 | 225 | 247 | 266 | 296 | 345 | 379 |
| Total input power (EN14511) (3) | kW | 57,1 | 63,2 | 69,1 | 71,8 | 75,6 | 90,9 | 98,1 | 117 | 123 | 140 |
| EER (EN14511) (3) | W/W | 2,71 | 2,69 | 2,79 | 2,59 | 2,98 | 2,72 | 2,71 | 2,53 | 2,80 | 2,71 |
| TER (EN14511) (4) | W/W | 7,8 | 7,6 | 7,5 | 7,5 | 7,3 | 7,1 | 7,2 | 7,1 | 7,4 | 7,3 |
| Sound power (5) | dB (A) | 82 | 84 | 82 | 85 | 84 | 85 | 85 | 85 | 87 | 88 |
| Sound pressure (6) | dB (A) | 50 | 52 | 49 | 52 | 52 | 53 | 53 | 52 | 54 | 55 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 4 / 2 | 2 / 1 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 |
| Fans | n° | 3 | 3 | 4 | 3 | 6 | 6 | 6 | 6 | 8 | 8 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 37 | 47 | 50 | 59 | 64 | 63 | 63 | 62 | 73 | 82 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 17,2 | 21,9 | 23,3 | 27,5 | 29,8 | 29,4 | 29,4 | 28,9 | 34,0 | 38,2 |
| Water tank volume | l | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |

Performances are referred to the following conditions:
(1) Heating: Ambient temperature 7°C DB, 6°C WB, water temperature 30/35°C
(2) Average conditions, low temperature, variable - Reg EU 811/2013
(3) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C (only RV versions)
(4) TER: Total Energy Ratio - cold circuit 12/7°C, hot circuit 40/45°C
(5) Sound power level in accordance with ISO 3744
(6) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744

The refrigerant data may change without notice. It is therefore necessary to refer always to the silver label placed on the unit.

| AWHE LN/HE/ACF/RV/S/4P | | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 44,6 | 50,8 | 67,2 | 72,7 | 88,5 | 99,9 | 111 | 130 | 147 | 158 |
| Total input power (EN14511) (1) | kW | 14,9 | 16,8 | 20,5 | 23,1 | 27,3 | 31,1 | 34,0 | 40,4 | 45,9 | 48,7 |
| COP (EN14511) (1) | W/W | 2,99 | 3,02 | 3,28 | 3,15 | 3,24 | 3,21 | 3,26 | 3,22 | 3,2 | 3,24 |
| Energy Class (2) | | A+ | A+ | A++ | A++ | A+ | A+ | A+ | A+ | A+ | A+ |
| SCOP (2) | kWh/kWh | 3,47 | 3,48 | 3,9 | 3,9 | 3,49 | 3,75 | 3,78 | 3,56 | 3,56 | 3,75 |
| ηs,h (2) | % | 136 | 136 | 153 | 153 | 137 | 147 | 148 | 140 | 140 | 147 |
| Cooling capacity (EN14511) (3) | kW | 38,3 | 44,1 | 57,8 | 62,1 | 76,8 | 86,4 | 96,0 | 112 | 125 | 135 |
| Total input power (EN14511) (3) | kW | 14,1 | 16,6 | 21,5 | 24,6 | 26,5 | 30,8 | 35,1 | 38,4 | 44,6 | 48,8 |
| EER (EN14511) (3) | W/W | 2,72 | 2,66 | 2,69 | 2,52 | 2,90 | 2,81 | 2,74 | 2,92 | 2,80 | 2,77 |
| TER (EN14511) (4) | W/W | 7,0 | 7,2 | 7,5 | 7,2 | 7,5 | 7,3 | 7,5 | 7,3 | 7,1 | 7,2 |
| Sound power (5) | dB (A) | 77 | 76 | 77 | 78 | 82 | 83 | 85 | 86 | 87 | 87 |
| Sound pressure (6) | dB (A) | 46 | 44 | 45 | 46 | 50 | 51 | 53 | 54 | 55 | 55 |
| **AWHE LN/HE/ECF/RV/S/4P** | | **45** | **50** | **70** | **75** | **90** | **105** | **115** | **135** | **150** | **160** |
| Heating capacity (EN14511) (1) | kW | 44,7 | 50,7 | 67,1 | 72,8 | 88,5 | 99,9 | 111 | 130 | 147 | 158 |
| Total input power (EN14511) (1) | kW | 14,3 | 16,3 | 20,2 | 22,7 | 26,3 | 30,0 | 33,2 | 38,8 | 44,4 | 47,3 |
| COP (EN14511) (1) | W/W | 3,13 | 3,11 | 3,32 | 3,21 | 3,37 | 3,33 | 3,34 | 3,35 | 3,31 | 3,34 |
| Energy Class (2) | | A+ | A+ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 3,72 | 3,75 | 4,11 | 4,08 | 3,84 | 4,02 | 4,07 | 3,86 | 3,85 | 4,02 |
| ηs,h (2) | % | 146 | 147 | 162 | 160 | 151 | 158 | 160 | 152 | 151 | 158 |
| Cooling capacity (EN14511) (3) | kW | 38,3 | 44,1 | 57,8 | 62,2 | 76,9 | 86,5 | 96,0 | 112 | 125 | 135 |
| Total input power (EN14511) (3) | kW | 13,9 | 16,4 | 21,3 | 24,4 | 25,8 | 30,3 | 34,7 | 37,7 | 44,1 | 48,2 |
| EER (EN14511) (3) | W/W | 2,76 | 2,69 | 2,71 | 2,55 | 2,98 | 2,85 | 2,77 | 2,97 | 2,83 | 2,80 |
| TER (EN14511) (4) | W/W | 7,0 | 7,2 | 7,5 | 7,2 | 7,5 | 7,3 | 7,5 | 7,3 | 7,1 | 7,2 |
| Sound power (5) | dB (A) | 77 | 76 | 77 | 78 | 82 | 83 | 85 | 86 | 87 | 87 |
| Sound pressure (6) | dB (A) | 46 | 44 | 45 | 46 | 50 | 51 | 53 | 54 | 55 | 55 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 |
| Fans | n° | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 11 | 11 | 17 | 17 | 25 | 25 | 25 | 36 | 36 | 36 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 5,1 | 5,1 | 7,9 | 7,9 | 11,7 | 11,7 | 11,7 | 16,8 | 16,8 | 16,8 |
| Water tank volume | l | 140 | 140 | 300 | 300 | 300 | 300 | 300 | 500 | 500 | 500 |

| AWHE LN/HE/ACF/RV/S/4P | | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 177 | 198 | 221 | 225 | 256 | 290 | 312 | 348 | 392 | 424 |
| Total input power (EN14511) (1) | kW | 54,3 | 59,9 | 68,3 | 66,8 | 81,3 | 93,1 | 98,5 | 112 | 125 | 137 |
| COP (EN14511) (1) | W/W | 3,26 | 3,31 | 3,24 | 3,37 | 3,15 | 3,11 | 3,17 | 3,11 | 3,14 | 3,09 |
| Energy Class (2) | | A++ | A++ | A+ | A++ | A+ | A+ | A+ | A+ | A+ | A+ |
| SCOP (2) | kWh/kWh | 3,89 | 3,97 | 3,79 | 4,12 | 3,54 | 3,57 | 3,71 | 3,72 | 3,67 | 3,73 |
| ηs,h (2) | % | 153 | 156 | 149 | 162 | 139 | 140 | 146 | 146 | 144 | 146 |
| Cooling capacity (EN14511) (3) | kW | 160 | 175 | 197 | 195 | 230 | 255 | 272 | 305 | 353 | 388 |
| Total input power (EN14511) (3) | kW | 57,1 | 63,0 | 70,3 | 69,8 | 78,0 | 91,6 | 100 | 116 | 125 | 141 |
| EER (EN14511) (3) | W/W | 2,8 | 2,78 | 2,80 | 2,79 | 2,95 | 2,78 | 2,72 | 2,63 | 2,82 | 2,75 |
| TER (EN14511) (4) | W/W | 7,8 | 7,6 | 7,5 | 7,5 | 7,3 | 7,1 | 7,2 | 7,1 | 7,4 | 7,3 |
| Sound power (5) | dB (A) | 89 | 89 | 88 | 91 | 89 | 90 | 90 | 92 | 92 | 94 |
| Sound pressure (6) | dB (A) | 57 | 57 | 56 | 58 | 56 | 58 | 58 | 60 | 59 | 62 |
| **AWHE LN/HE/ECF/RV/S/4P** | | **180** | **200** | **225** | **230** | **270** | **295** | **320** | **355** | **400** | **440** |
| Heating capacity (EN14511) (1) | kW | 177 | 198 | 221 | 225 | 260 | 291 | 312 | 349 | 393 | 425 |
| Total input power (EN14511) (1) | kW | 52,9 | 58,6 | 66,5 | 65,3 | 78,1 | 89,8 | 95,5 | 109 | 120 | 134 |
| COP (EN14511) (1) | W/W | 3,35 | 3,38 | 3,32 | 3,45 | 3,33 | 3,24 | 3,27 | 3,20 | 3,28 | 3,17 |
| Energy Class (2) | | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 4,16 | 4,19 | 4,08 | 4,29 | 3,86 | 3,88 | 3,98 | 4,01 | 3,96 | 3,94 |
| ηs,h (2) | % | 164 | 165 | 160 | 169 | 151 | 152 | 156 | 157 | 155 | 155 |
| Cooling capacity (EN14511) (3) | kW | 160 | 175 | 197 | 195 | 229 | 254 | 272 | 307 | 354 | 389 |
| Total input power (EN14511) (3) | kW | 56,4 | 62,3 | 69,4 | 69,0 | 76,3 | 89,9 | 98,5 | 115 | 123 | 139 |
| EER (EN14511) (3) | W/W | 2,84 | 2,81 | 2,84 | 2,83 | 3,00 | 2,83 | 2,76 | 2,67 | 2,88 | 2,8 |
| TER (EN14511) (4) | W/W | 7,8 | 7,6 | 7,5 | 7,5 | 7,3 | 7,1 | 7,2 | 7,1 | 7,4 | 7,3 |
| Sound power (5) | dB (A) | 89 | 89 | 88 | 91 | 89 | 90 | 90 | 92 | 92 | 94 |
| Sound pressure (6) | dB (A) | 57 | 57 | 56 | 58 | 56 | 58 | 58 | 60 | 59 | 62 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 4 / 2 | 2 / 1 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 |
| Fans | n° | 3 | 3 | 4 | 3 | 6 | 6 | 6 | 6 | 8 | 8 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 37 | 47 | 50 | 59 | 64 | 63 | 63 | 62 | 73 | 82 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 17,2 | 21,9 | 23,3 | 27,5 | 29,8 | 29,4 | 29,4 | 28,9 | 34,0 | 38,2 |
| Water tank volume | l | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |

Performances are referred to the following conditions:
(1) Heating: Ambient temperature 7°C DB, 6°C WB, water temperature 40/45°C
(2) Average conditions, low temperature, variable - Reg EU 811/2013
(3) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C (only RV versions)
(4) TER: Total Energy Ratio - cold circuit 12/7°C, hot circuit 40/45°C
(5) Sound power level in accordance with ISO 3744
(6) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744

The refrigerant data may change without notice. It is therefore necessary to refer always to the silver label placed on the unit.

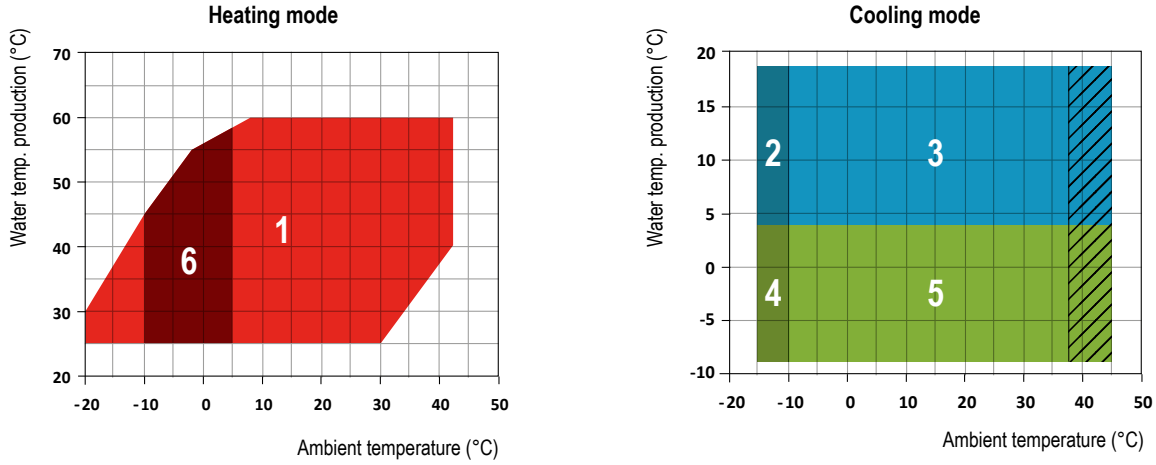
| AWHE SLN/HE/ACF/RV/S/4P | | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 44,0 | 49,4 | 65,2 | 70,3 | 87,3 | 98,7 | 109 | 128 | 145 | 155 |
| Total input power (EN14511) (1) | kW | 14,5 | 16,4 | 20,2 | 22,8 | 26,6 | 30,4 | 33,4 | 39,4 | 45 | 47,8 |
| COP (EN14511) (1) | W/W | 3,03 | 3,01 | 3,23 | 3,08 | 3,28 | 3,25 | 3,26 | 3,25 | 3,22 | 3,24 |
| Energy Class (2) | | A+ | A+ | A++ | A++ | A+ | A++ | A++ | A+ | A+ | A++ |
| SCOP (2) | kWh/kWh | 3,61 | 3,64 | 3,97 | 3,94 | 3,71 | 3,91 | 3,94 | 3,77 | 3,77 | 3,88 |
| ηs,h (2) | % | 141 | 143 | 156 | 155 | 146 | 154 | 155 | 148 | 148 | 152 |
| Cooling capacity (EN14511) (3) | kW | 36,9 | 42,6 | 55,3 | 59,0 | 75,0 | 83,6 | 92,6 | 110 | 121 | 131 |
| Total input power (EN14511) (3) | kW | 14,6 | 17,1 | 22,5 | 25,9 | 26,8 | 31,6 | 36,1 | 38,8 | 45,7 | 49,9 |
| EER (EN14511) (3) | W/W | 2,53 | 2,49 | 2,46 | 2,28 | 2,80 | 2,65 | 2,57 | 2,84 | 2,65 | 2,63 |
| TER (EN14511) (4) | W/W | 7,0 | 7,2 | 7,5 | 7,2 | 7,5 | 7,3 | 7,5 | 7,3 | 7,1 | 7,2 |
| Sound power (5) | dB (A) | 73 | 73 | 73 | 74 | 76 | 77 | 79 | 81 | 82 | 82 |
| Sound pressure (6) | dB (A) | 41 | 41 | 41 | 42 | 44 | 45 | 47 | 49 | 50 | 50 |
| **AWHE SLN/HE/ECF/RV/S/4P** | | **45** | **50** | **70** | **75** | **90** | **105** | **115** | **135** | **150** | **160** |
| Heating capacity (EN14511) (1) | kW | 44,6 | 50,5 | 66,4 | 71,7 | 88,6 | 99,9 | 110 | 130 | 147 | 158 |
| Total input power (EN14511) (1) | kW | 13,7 | 15,6 | 19,5 | 22,0 | 25,1 | 28,9 | 31,9 | 37,2 | 43 | 45,8 |
| COP (EN14511) (1) | W/W | 3,26 | 3,24 | 3,41 | 3,26 | 3,53 | 3,46 | 3,45 | 3,49 | 3,42 | 3,45 |
| Energy Class (2) | | A++ | A++ | A++ | A++ | A++ | A++ | A+++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 4,13 | 4,06 | 4,43 | 4,39 | 4,31 | 4,38 | 4,45 | 4,26 | 4,25 | 4,37 |
| ηs,h (2) | % | 162 | 160 | 174 | 173 | 169 | 172 | 175 | 167 | 167 | 172 |
| Cooling capacity (EN14511) (3) | kW | 37,3 | 42,9 | 55,9 | 59,5 | 75,5 | 84,3 | 93,6 | 111 | 123 | 132 |
| Total input power (EN14511) (3) | kW | 13,9 | 16,5 | 21,8 | 25,3 | 25,6 | 30,3 | 34,7 | 36,9 | 43,7 | 48,1 |
| EER (EN14511) (3) | W/W | 2,68 | 2,60 | 2,56 | 2,35 | 2,95 | 2,78 | 2,70 | 3,01 | 2,81 | 2,74 |
| TER (EN14511) (4) | W/W | 7,0 | 7,2 | 7,5 | 7,2 | 7,5 | 7,3 | 7,5 | 7,3 | 7,1 | 7,2 |
| Sound power (5) | dB (A) | 73 | 73 | 73 | 74 | 76 | 77 | 79 | 81 | 82 | 82 |
| Sound pressure (6) | dB (A) | 41 | 41 | 41 | 42 | 44 | 45 | 47 | 49 | 50 | 50 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 | 2 / 1 |
| Fans | n° | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 11 | 11 | 17 | 17 | 25 | 25 | 25 | 36 | 36 | 36 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 5,1 | 5,1 | 7,9 | 7,9 | 11,7 | 11,7 | 11,7 | 16,8 | 16,8 | 16,8 |
| Water tank volume | l | 140 | 140 | 300 | 300 | 300 | 300 | 300 | 500 | 500 | 500 |

| AWHE SLN/HE/ACF/RV/S/4P | | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating capacity (EN14511) (1) | kW | 172 | 196 | 216 | 222 | 254 | 285 | 305 | 337 | 382 | 415 |
| Total input power (EN14511) (1) | kW | 53,5 | 60,9 | 67,2 | 65,7 | 79,3 | 91,2 | 96,9 | 110 | 122 | 135 |
| COP (EN14511) (1) | W/W | 3,21 | 3,22 | 3,21 | 3,38 | 3,20 | 3,12 | 3,15 | 3,06 | 3,13 | 3,07 |
| Energy Class (2) | | A++ | A++ | A++ | A++ | A+ | A+ | A++ | A++ | A+ | A++ |
| SCOP (2) | kWh/kWh | 4,02 | 4,05 | 3,98 | 4,16 | 3,73 | 3,72 | 3,84 | 3,84 | 3,8 | 3,81 |
| ηs,h (2) | % | 158 | 159 | 156 | 164 | 146 | 146 | 151 | 151 | 149 | 150 |
| Cooling capacity (EN14511) (3) | kW | 154 | 168 | 190 | 185 | 222 | 247 | 263 | 293 | 342 | 375 |
| Total input power (EN14511) (3) | kW | 59,2 | 65,3 | 72,2 | 73,5 | 80 | 94 | 103 | 121 | 128 | 145 |
| EER (EN14511) (3) | W/W | 2,60 | 2,57 | 2,63 | 2,52 | 2,78 | 2,63 | 2,55 | 2,42 | 2,67 | 2,59 |
| TER (EN14511) (4) | W/W | 7,8 | 7,6 | 7,5 | 7,5 | 7,3 | 7,1 | 7,2 | 7,1 | 7,4 | 7,3 |
| Sound power (5) | dB (A) | 82 | 84 | 82 | 85 | 84 | 85 | 85 | 85 | 87 | 88 |
| Sound pressure (6) | dB (A) | 50 | 52 | 49 | 52 | 52 | 53 | 53 | 52 | 54 | 55 |
| **AWHE SLN/HE/ECF/RV/S/4P** | | **180** | **200** | **225** | **230** | **270** | **295** | **320** | **355** | **400** | **440** |
| Heating capacity (EN14511) (1) | kW | 175 | 200 | 220 | 225 | 257 | 290 | 310 | 344 | 389 | 421 |
| Total input power (EN14511) (1) | kW | 51,2 | 57,0 | 64,3 | 63,6 | 74,7 | 86,8 | 92,3 | 105 | 116 | 129 |
| COP (EN14511) (1) | W/W | 3,42 | 3,51 | 3,42 | 3,54 | 3,44 | 3,34 | 3,36 | 3,28 | 3,35 | 3,26 |
| Energy Class (2) | | A+++ | A+++ | A+++ | A+++ | A++ | A++ | A++ | A++ | A++ | A++ |
| SCOP (2) | kWh/kWh | 4,52 | 4,52 | 4,5 | 4,56 | 4,22 | 4,29 | 4,37 | 4,36 | 4,3 | 4,3 |
| ηs,h (2) | % | 178 | 178 | 177 | 179 | 166 | 169 | 172 | 172 | 169 | 169 |
| Cooling capacity (EN14511) (3) | kW | 155 | 170 | 193 | 186 | 225 | 247 | 266 | 296 | 345 | 379 |
| Total input power (EN14511) (3) | kW | 57,1 | 63,2 | 69,1 | 71,8 | 75,6 | 90,9 | 98,1 | 117 | 123 | 140 |
| EER (EN14511) (3) | W/W | 2,71 | 2,69 | 2,79 | 2,59 | 2,98 | 2,72 | 2,71 | 2,53 | 2,8 | 2,71 |
| TER (EN14511) (4) | W/W | 7,8 | 7,6 | 7,5 | 7,5 | 7,3 | 7,1 | 7,2 | 7,1 | 7,4 | 7,3 |
| Sound power (5) | dB (A) | 82 | 84 | 82 | 85 | 84 | 85 | 85 | 85 | 87 | 88 |
| Sound pressure (6) | dB (A) | 50 | 52 | 49 | 52 | 52 | 53 | 53 | 52 | 54 | 55 |
| Power supply | V/Ph/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| Compressors / Circuits | n° / n° | 2 / 1 | 2 / 1 | 4 / 2 | 2 / 1 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 | 4 / 2 |
| Fans | n° | 3 | 3 | 4 | 3 | 6 | 6 | 6 | 6 | 8 | 8 |
| Refrigerant | | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B | R454B |
| Refrigerant charge | kg | 37 | 47 | 50 | 59 | 64 | 63 | 63 | 62 | 73 | 82 |
| Global warming potential (GWP) | | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 | 466 |
| Equivalent $CO_2$ charge | t | 17,2 | 21,9 | 23,3 | 27,5 | 29,8 | 29,4 | 29,4 | 28,9 | 34,0 | 38,2 |
| Water tank volume | l | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |

Performances are referred to the following conditions:
(1) Heating: Ambient temperature 7°C DB, 6°C WB, water temperature 30/35°C
(2) Average conditions, low temperature, variable - Reg EU 811/2013
(3) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C (only RV versions)
(4) TER: Total Energy Ratio - cold circuit 12/7°C, hot circuit 40/45°C
(5) Sound power level in accordance with ISO 3744
(6) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744

The refrigerant data may change without notice. It is therefore necessary to refer always to the silver label placed on the unit.

## 3.5 Operation limits




| | | | |
|---|---|---|---|
| **1** | Heating mode | **4** | Cooling mode with glycol (only HE/BT version) |
| **2** | Cooling mode (only HE version) | **5** | Cooling mode with glycol (only BT version) |
| **3** | Cooling mode | **6** | Potential capacity reduction due to frosting cycle |
| | Possible noise increase for SLL versions | | |

Working close to the limits of operating envelope could activate prevention and automation due to preserve the unit that could temporarily change the noise and load of the unit.

### 3.5.1 User heat exchanger water flow rate

The nominal water flow rate given is referred to a Δt of 5 °C. Maximum flow rate allowed is the one that presents a Δt of 3°C: higher values may cause too high pressure drop.
The minimum water flow rate allowed is the one presenting a Δt of 8°C.
Insufficient values cause too low evaporating temperatures with the action of safety devices which would stop the unit.

| Model | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Minimum water flow ($m^3/h$)** | 4,8 | 5,5 | 7,4 | 7,8 | 9,7 | 11,1 | 12,3 | 14,3 | 16,1 | 17,3 |

| Model | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Minimum water flow ($m^3/h$)** | 19,7 | 21,9 | 24,5 | 24,8 | 28,5 | 32,1 | 34,5 | 37,6 | 43,2 | 49,0 |

### 3.5.2 User hot water temperature (Winter operation)

Once the system is on temperature, the minimum user water temperature should not be less than 30°C.
Lower values could cause incorrect working operation of the compressor and compressor failure may occur.
The maximum user outlet water temperature cannot exceed 60°C for ACF/STANDARD versions. Higher values may call the action of safety devices which would stop the unit.

### 3.5.3 Cold water temperature (RV versions Only)

The minimum user outlet water temperature allowed is 4°C.
To operates below this limit the unit should need some structural modifications. In this case please contact our company. The maximum user outlet water temperature 18°C.

### 3.5.4 Ambient air temperature

The units are designed and manufactured to operate, In winter operation (heating mode ) from -20°C to 45°C.
In cooling mode the units can operate with ambient air temperatures from -10 to 45°C.
The control system installed in the unit and the proper choice of fans allow the SLN series units to extend the operating range to the temperatures of the LN versions by increasing the rotation capacity of the fans and the air flow on the coils.

If the unit is installed in particularly windy areas, it will be necessary to provide some windbreaker barriers to avoid any malfunction. We suggest to install the barriers only if the wind exceeds 2,5m/s.

The units, in their standard configuration, are not suitable for installation in saline environments.

In WINTER mode, the unit can be started with external air of -20°C and cold inlet water (about 20°C). Such a configuration is allowed only for a short time and only to bring the plant to the right temperature.
To reduce this setting time, we suggest to install a 3-way valve which allows to by-pass water from the user to the plant till the standard conditions are reached.

Units are designed and manufactured to European safety and technical standards. The units have been designed exclusively for heating, cooling and domestic hot water production (D.H.W.). The units must be used for this specific purpose only. The Company will not be liable for claims for damage caused to persons, animals or material goods or property caused by improper installation, adjustment and maintenance or improper use. Any use not specified in this manual is prohibited.

All units are supplied as standard with evaporating/condensing pressure control. This feature allows the unit to operate in heating mode above 15°C and in cooling mode below 20°C ambient temperature. The device monitors the evaporating/condensing pressure and maintains it at a constant level by modulating the airflow. It can also be used to reduce noise emission when ambient temperatures are lower (eg. at night).

In case of operations outside of these values, please contact the company.

## 3.6 Domestic hot water production

The production of domestic hot water through heat pump is a sensitive issue that deserves proper consideration. There are several systems of domestic hot water production by using heat pumps, each of which brings advantages and disadvantages. It is not subject of this manual to deal with the matter in depth and in the case, please contact the company for all the appropriate solutions.

The 'Domestic Hot Water Tank Management' kit must be used to manage DHW production.

### 3.6.1 DHW storage tank management kit

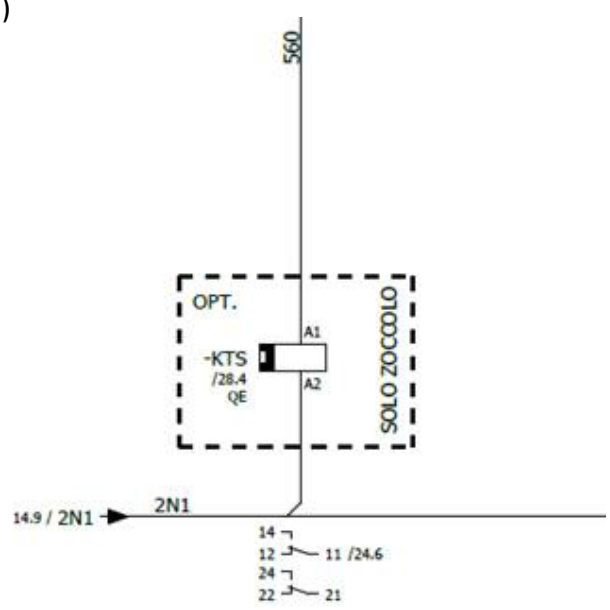
The kit should be used to control DHW production with a probe in the storage tank or to keep the DHW tank at a fixed set point temperature. The kit includes:

- an additional probe which must be installed in the DHW tank and connected to the dedicated terminals in the electrical panel of the unit;
- a relay which must be installed in the dedicated base in the control board.

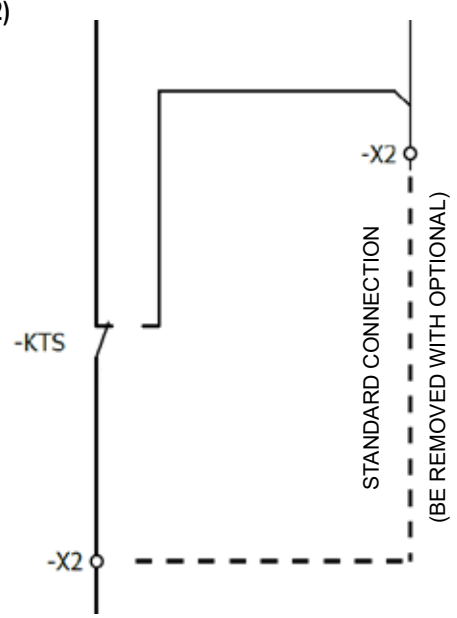
If the kit is installed, the unit itself is set to activate DHW production using the temperature value of the water in the tank. This allows the DHW circulation pumps to be activated only when DHW is produced.

To enable the domestic water temperature control function by means of a probe positioned in the storage tank, just insert the relay received in the supplied kit into the socket already located and wired in the electrical board (1) and remove the jumper between the dedicated terminals (2). An extract of the wiring diagram is shown in the figure.

**(1)**




**(2)**



## 3.7 Compressor capacity steps

| NUMBER OF COMPRESSORS | | | | |
|---|---|---|---|---|
| Model | 1 | 2 | 3 | 4 |
| **45** | 43% | 57% | … | … |
| **50** | 43% | 57% | … | … |
| **70** | 43% | 57% | … | … |
| **75** | 44% | 56% | … | … |
| **90** | 34% | 66% | … | … |
| **105** | 43% | 55% | … | … |
| **115** | 38% | 62% | … | … |
| **135** | 45% | 55% | … | … |
| **150** | 40% | 60% | … | … |
| **160** | 44% | 56% | … | … |
| **180** | 38% | 62% | … | … |
| **200** | 44% | 56% | … | … |
| **225** | 50% | 50% | … | … |
| **230** | 22% | 28% | 22% | 28% |
| **270** | 22% | 28% | 22% | 28% |
| **295** | 20% | 30% | 20% | 30% |
| **320** | 22% | 28% | 22% | 28% |
| **355** | 19% | 31% | 19% | 31% |
| **400** | 22% | 28% | 22% | 28% |
| **440** | 25% | 25% | 25% | 25% |

## 3.8 Correction tables

### 3.8.1 Operation with glycol

| Glycol percentage | Freezing point (°C) | CCF | IPCF | WFCF | PDCF |
|---|---|---|---|---|---|
| 10 | -3,2 | 0,985 | 1 | 1,02 | 1,08 |
| 20 | -7,8 | 0,98 | 0,99 | 1,05 | 1,12 |
| 30 | -14,1 | 0,97 | 0,98 | 1,09 | 1,22 |
| 40 | -22,3 | 0,965 | 0,97 | 1,14 | 1,25 |
| 50 | -33,8 | 0,955 | 0,965 | 1,2 | 1,33 |

**CCF: Capacity correction factor** **IPCF: Input power correction factor**
**WFCF: Water flow correction factor** **PDCF: Pressure drops correction factor**

The water flow rate and pressure drop correction factors are to be applied directly to the values given for operation without glycol. The water flow rate correction factor is calculated in order to maintain the same temperature difference as that which would be obtained without glycol. The pressure drop correction factor takes into account the different flow rate obtained from the application of the flow rate correction factor.

### 3.8.2 Correction tables different Fouling factors

| Fouling factor | 0.00005 | 0.0001 | 0.0002 |
|---|---|---|---|
| CCCP | 1 | 0,98 | 0,94 |
| IPCF | 1 | 1,02 | 1,05 |

**CCCP = Cooling capacity correction factor** **IPCF = Input power correction factor**

## 3.9 Sound data

| AWHE ACF/ECF | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mod. | Octave bands (Hz) | | | | | | | | Lw | Lp |
| | 63 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | dB(A) | dB(A) |
| | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) | | |
| 45 | 40 | 55 | 60 | 67 | 74 | 73 | 66 | 57 | 77 | 46 |
| 50 | 38,5 | 53,5 | 58,5 | 65,5 | 72,5 | 71,5 | 64,5 | 55,5 | 76,0 | 44,0 |
| 70 | 38,5 | 53,5 | 58,5 | 65,5 | 72,5 | 71,5 | 68,7 | 60,0 | 77,0 | 45,0 |
| 75 | 42,9 | 54,0 | 59,0 | 69,7 | 74,0 | 72,0 | 68,0 | 59,0 | 78,0 | 46,0 |
| 90 | 49,0 | 65,0 | 66,0 | 76,3 | 77,0 | 76,0 | 71,0 | 65,6 | 82,0 | 50,0 |
| 105 | 48,5 | 64,5 | 65,5 | 75,8 | 79,5 | 75,5 | 70,5 | 65,1 | 83,0 | 51,0 |
| 115 | 50,5 | 66,5 | 67,5 | 77,9 | 81,5 | 77,5 | 72,6 | 65,5 | 85,0 | 53,0 |
| 135 | 51,7 | 67,7 | 68,7 | 77,4 | 82,7 | 79,3 | 73,7 | 66,7 | 86,0 | 54,0 |
| 150 | 50,7 | 66,7 | 67,7 | 80,6 | 83,9 | 79,9 | 72,7 | 65,7 | 87,0 | 55,0 |
| 160 | 50,7 | 66,7 | 67,7 | 80,6 | 83,9 | 79,9 | 72,7 | 65,7 | 87,0 | 55,0 |
| 180 | 54,7 | 67,7 | 68,7 | 85,0 | 85,5 | 79,5 | 76,4 | 71,8 | 89,0 | 57,0 |
| 200 | 54,2 | 67,2 | 71,2 | 84,5 | 85,0 | 79,0 | 75,9 | 71,3 | 89,0 | 57,0 |
| 225 | 53,2 | 69,2 | 70,2 | 78,9 | 85,4 | 80,8 | 76,6 | 68,2 | 88,0 | 56,0 |
| 230 | 55,5 | 68,5 | 69,5 | 87,5 | 85,1 | 82,0 | 75,9 | 74,3 | 91,0 | 58,0 |
| 270 | 54,7 | 70,7 | 71,7 | 80,4 | 85,7 | 82,3 | 76,7 | 69,7 | 89,0 | 56,0 |
| 295 | 53,7 | 69,7 | 70,7 | 83,6 | 86,9 | 82,9 | 75,7 | 68,7 | 90,0 | 58,0 |
| 320 | 53,7 | 69,7 | 70,7 | 83,6 | 86,9 | 82,9 | 75,7 | 68,7 | 90,0 | 58,0 |
| 355 | 57,7 | 70,7 | 71,7 | 88,0 | 88,6 | 82,5 | 79,4 | 74,8 | 92,0 | 60,0 |
| 400 | 55,0 | 71,0 | 72,0 | 87,0 | 87,6 | 84,5 | 78,4 | 73,8 | 92,0 | 59,0 |
| 440 | 59,0 | 72,0 | 73,0 | 91,0 | 88,6 | 85,5 | 79,4 | 77,9 | 94,0 | 62,0 |
| AWHE ACF/ECF | | | | | | | | | | |
| 45 | 44 | 52 | 58 | 67 | 68 | 68 | 62 | 54 | 73 | 41 |
| 50 | 43,5 | 51,5 | 57,5 | 66,5 | 67,5 | 67,5 | 61,5 | 53,5 | 73,0 | 41,0 |
| 70 | 43,5 | 51,5 | 57,5 | 66,5 | 67,5 | 67,5 | 64,5 | 56,5 | 73,0 | 41,0 |
| 75 | 43,5 | 51,5 | 57,5 | 66,5 | 70,5 | 67,5 | 61,5 | 53,5 | 74,0 | 42,0 |
| 90 | 55,5 | 54,5 | 61,5 | 69,8 | 70,5 | 70,5 | 64,5 | 59,1 | 76,0 | 44,0 |
| 105 | 55,5 | 54,5 | 61,5 | 69,8 | 73,5 | 70,5 | 64,5 | 59,1 | 77,0 | 45,0 |
| 115 | 57,5 | 56,5 | 63,5 | 71,9 | 75,5 | 72,5 | 66,6 | 59,5 | 79,0 | 47,0 |
| 135 | 59,2 | 58,2 | 65,2 | 74,9 | 77,2 | 74,2 | 68,2 | 61,2 | 81,0 | 49,0 |
| 150 | 58.7 | 57.7 | 64.7 | 75.6 | 78.9 | 74.9 | 67.7 | 60.7 | 82,0 | 50,0 |
| 160 | 58.7 | 57.7 | 64.7 | 75.6 | 78.9 | 74.9 | 67.7 | 60.7 | 82,0 | 50,0 |
| 180 | 57.2 | 56.2 | 63.2 | 77.5 | 78 | 72.2 | 68.9 | 64.3 | 82,0 | 50,0 |
| 200 | 58,7 | 57,7 | 64,7 | 79,0 | 79,5 | 76,5 | 70,4 | 65,8 | 84,0 | 52,0 |
| 225 | 59,2 | 58,2 | 65,2 | 74,9 | 78,4 | 74,2 | 69,6 | 61,2 | 82,0 | 49,0 |
| 230 | 59,5 | 58,5 | 65,5 | 81,5 | 79,1 | 76,0 | 69,9 | 68,3 | 85,0 | 52,0 |
| 270 | 62,2 | 61,2 | 68,2 | 77,9 | 80,2 | 77,2 | 71,2 | 64,2 | 84,0 | 52,0 |
| 295 | 61,7 | 60,7 | 67,7 | 78,6 | 81,9 | 77,9 | 70,7 | 63,7 | 85,0 | 53,0 |
| 320 | 61,7 | 60,7 | 67,7 | 78,6 | 81,9 | 77,9 | 70,7 | 63,7 | 85,0 | 53,0 |
| 355 | 60,2 | 59,2 | 66,2 | 80,5 | 81,1 | 75,2 | 71,9 | 67,3 | 85,0 | 52,0 |
| 400 | 63,0 | 62,0 | 69,0 | 82,0 | 82,6 | 79,5 | 73,4 | 69,7 | 87,0 | 54,0 |
| 440 | 62,5 | 61,5 | 68,5 | 84,5 | 82,1 | 79,0 | 72,9 | 71,4 | 88,0 | 55,0 |

Lw: Sound power level according to ISO 3744.
Lp: Sound pressure level measured at 10 mt from the unit in free field conditions direction factor Q=2 according to ISO 3744.

## 3.10 Electrical Data

The following electrical data is essential for the correct design and installation of the electrical system associated with the unit. Ensure that the system components are sized correctly based on the values provided.

| Model | Maximum Current [A] | Max Startup Current [A] | LRA con soft starter [A] |
|---|---|---|---|
| **ACF Version** | | | |
| **45** | 41.8 | 120.8 | 81.6 |
| **50** | 46.8 | 164.8 | 108.0 |
| **70** | 58.8 | 185.8 | 122.6 |
| **75** | 67.8 | 228.8 | 150.0 |
| **90** | 80.6 | 258.6 | 167.8 |
| **105** | 92.6 | 270.6 | 179.8 |
| **115** | 99.6 | 303.6 | 199.6 |
| **135** | 116.4 | 320.4 | 216.4 |
| **150** | 132.4 | 354.4 | 236.8 |
| **160** | 139.4 | 361.4 | 243.8 |
| **180** | 158.4 | 456.4 | 300.8 |
| **200** | 174.4 | 472.4 | 316.8 |
| **225** | 193.4 | 491.4 | 335.8 |
| **230** | 199.2 | 403.2 | 299.2 |
| **270** | 232.8 | 436.8 | 332.8 |
| **295** | 264.8 | 486.8 | 369.2 |
| **320** | 278.8 | 500.8 | 383.2 |
| **355** | 316.8 | 614.8 | 459.2 |
| **400** | 356.4 | 654.4 | 498.8 |
| **440** | 394.4 | 692.4 | 536.8 |
| **ECF Version** | | | |
| **45** | 41.0 | 120.0 | 80.8 |
| **50** | 46.0 | 164.0 | 107.2 |
| **70** | 58.0 | 185.0 | 121.8 |
| **75** | 67.0 | 228.0 | 149.2 |
| **90** | 79.0 | 257.0 | 166.2 |
| **105** | 91.0 | 269.0 | 178.2 |
| **115** | 98.0 | 302.0 | 198.0 |
| **135** | 114.0 | 318.0 | 214.0 |
| **150** | 130.0 | 352.0 | 234.4 |
| **160** | 137.0 | 359.0 | 241.4 |
| **180** | 156.0 | 454.0 | 298.4 |
| **200** | 172.0 | 470.0 | 314.4 |
| **225** | 191.0 | 489.0 | 333.4 |
| **230** | 196.0 | 400.0 | 296.0 |
| **270** | 228.0 | 432.0 | 328.0 |
| **295** | 260.0 | 482.0 | 364.4 |
| **320** | 274.0 | 496.0 | 378.4 |
| **355** | 312.0 | 610.0 | 454.4 |
| **400** | 350.0 | 648.0 | 492.4 |
| **440** | 388.0 | 686.0 | 530.4 |

Currents are referred to nominal voltage and do not include pumps, please refer to data shown on selection software based on the hydronic kit selected.

### 3.10.1 Electrical Design Guidelines

1. The electrical system design must be carried out by qualified personnel, in compliance with current regulations, including:
   **EN 60204-1** : Safety of machinery - Electrical equipment.
   **IEC 60364** (Series): Low-voltage electrical installations.

2.Size power cables and protection devices (e.g. circuit breakers or fuses) considering:
   **Maximum current** for nominal operation.
   **Max startup current** (with or wothout soft starter) for starting current.

3.If using a soft starter , size the components according to the reduced max startup current values, as shown in the table.

4.Ensure proper protection of the system through:
   Overload and short circuit protection.
   Ground connections compliant with regulations.



Incorrect design of the electrical system or failure to comply with regulations may cause malfunctions, damage to the machine or risks to the safety of operators.



Short circuit current = 10 kA on the whole range.

# 4. INSTALLATION

## 4.1 General safety guidelines and and use of symbols



Before undertaking any task the operator must be fully trained in the operation of the machines to be used and their controls. They must also have read and be fully conversant with all operating instructions.



All maintenance must be performed by TRAINED personnel and be in accordance with all national and local regulations.



The installation and maintenance of the unit must comply with the local regulations in force at the time of the installation.



Avoid contact and do not insert any objects into moving parts.



It is recommended that natural and accidental events such as winds of abnormal force, seismic events, fire, abnormal precipitation including snowfall, lightning, flooding and inundation be considered during the design phase of the system according to current regulations.

## 4.2 Health and safety Considerations



The workplace must be kept clean, tidy and free from objects that may prevent free movement. Appropriate lighting of the work place shall be provided to allow the operator to perform the required operations safely. Poor or too strong lighting can cause risks.



Ensure that work places are always adequately ventilated and that respirators are working, in good condition and comply fully with the requirements of the current regulations.

## 4.3 Personal protective equipment



When operating and maintaining the unit, use the following personal protective equipment listed below as required by law.



Protective footwear.



Eye protection.



Protective gloves.



Respiratory protection.



Hearing protection.

## 4.4 Inspection

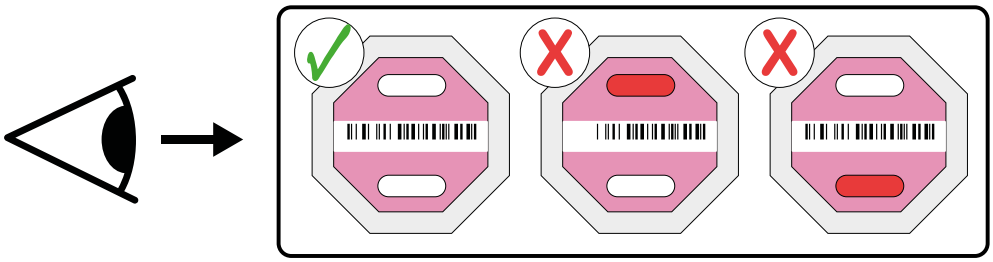
When installing or servicing the unit, it is necessary to strictly follow the rules reported on this manual, to conform to all the specifications of the labels on the unit, and to take any possible precautions of the case. Not observing the rules reported on this manual can create dangerous situations. After receiving the unit, immediately check its integrity. The unit left the factory in perfect conditions; any eventual damage must be questioned to the carrier and recorded on the Delivery Note before it is signed. The company must be informed, within 8 days, of the extent of the damage. The Customer should prepare a written statement of any severe damage.
Before accepting the unit check:

- The unit did not suffer any damage during transport;
- The delivered goods are conforming to what shown in the delivery note.

**In Case of Damage**

- List the damage on the delivery note
- Inform the Company of the extent of the damage within 8 days of receipt of the goods. After this time any claim will not be considered.
- A full written report is required for cases of severe damage.

The unit has been equipped with shock whatches, 5 adhesive devices placed on the frame which turn red if the unit is subjected to a deceleration of more than 5 G in the specified direction. In order to exclude risks to operators, it is important, before starting the unit, to check that none of the indicators present are red. If any shock is detected, even in the absence of visible faults, the unit cannot be start-up and it cannot be powered up until checking the integrity of the structure and piping and the absence of refrigerant leakage.



## 4.5 Storage

Units should be stored under cover and ideally, should remain in their packaging. The tools that are supplied for opening the electrics box should be formally transferred to the person responsible for the plant.

### 4.5.1 Shipment

The shipment must be carried out by authorised carriers and the characteristics of the vehicle used must be such as to avoid damaging the machinery transported/to be transported, neither during loading and unloading nor during transport. If the roads to be driven are irregular, the vehicle must be fitted with special suspensions or internal walls in order not to damage the unit during the shipment.

The maximum ambient temperature for storage/shipment is +45°C and the minimum is -20°C. If the temperature exceeds the prescribed one, there is a risk of refrigerant leakage through the low-pressure safety valve.

During shipping, the unit should NOT be excessively shocked: check the state of the shock watch to prevent damage to the unit.

## 4.6 Unpacking

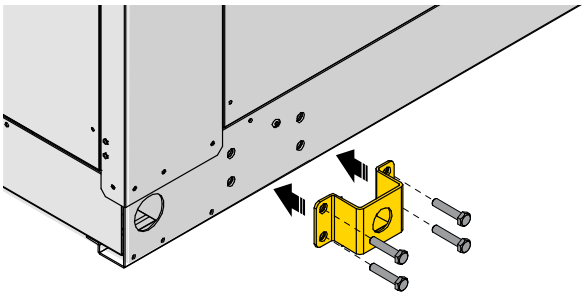
Packaging could be dangerous for the operators.

It is advisable to leave packaged units during handling and remove it before the installation.
The packaging must be removed carefully to prevent any possible damage to the machine.
The materials constituting the packaging may be different in nature (wood, cardboard, nylon, etc.).

The packaging materials should be seperated and sent for disposal or possible recycling to specialist waste companies.

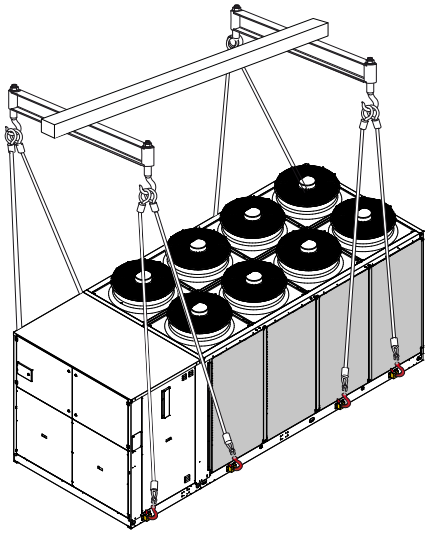
## 4.7 Lifting and handling

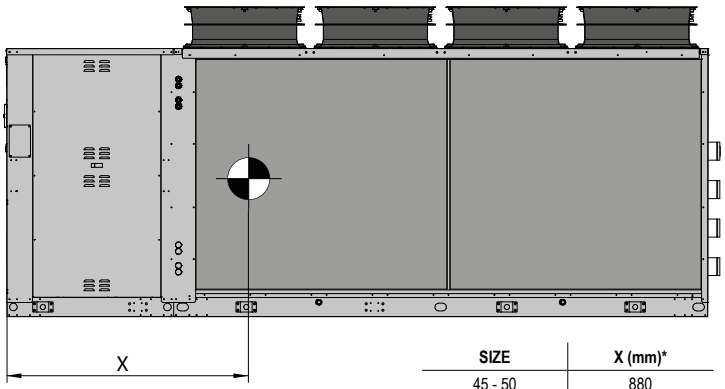
When unloading the unit, it is strongly recommended that sudden movements are avoided in order to protect the refrigerant circuit, copper tubes or any other unit component. Units can be lifted by using a forklift or, alternatively, using belts. Take care that the method of lifting does not damage the side panels or the cover. It is important to keep the unit horizontal at all time to avoid damage to the internal components. Handling must be carried out by skilled personnel with appropriate equipment for the weight and size of the model. The total weight of the unit must be checked before lifting. Units with pallets can be lifted by using the special yellow lifting blocks attached to the bottom rail.
The yellow lifting omega supplied must be properly fixed.



Make sure the screws are fully screwed in and that the screw head is fully in contact with the panel.

After securing the omegas, it is required to lift the unit using all the lifting points provided and with the appropriate distance bar (not included). When the unit is unloaded and positioned, it is necessary to take the maximum care to avoid rough or heavy movements in order to protect the internal components.





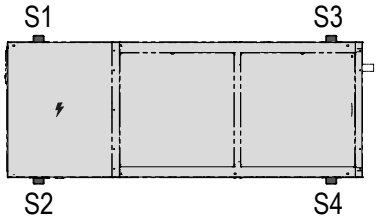

| SIZE | X (mm)* |
|---|---|
| 45 - 50 | 880 |
| 70 - 75 | 1040 |
| 90 - 115 | 950 |
| 135 - 180 | 1400 |
| 200 - 225 | 1400 |
| 230 - 355 | 1550 |
| 400 - 440 | 1630 |

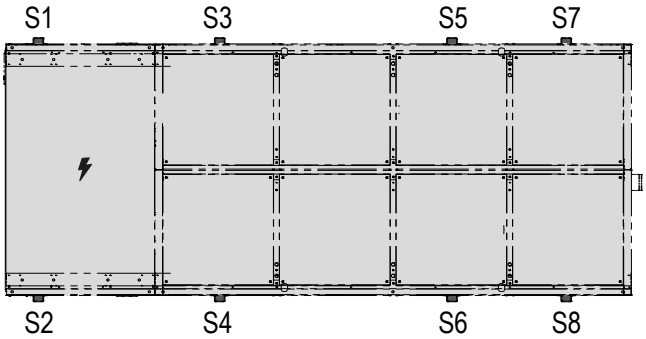
* ± 250 mm

The Source heat exchangers fins are sharp. Use protection gloves.

### 4.7.1 Weight distribution (kg) on lifting brackets P2U/P2S

| STD | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **S1** | **S2** | **S3** | **S4** | **S5** | **S6** | **S7** | **S8** | **TOT** |
| **45** | 234 | 234 | 91 | 91 | - | - | - | - | 650 |
| **50** | 237 | 237 | 92 | 92 | - | - | - | - | 658 |
| **70** | 258 | 258 | 184 | 184 | - | - | - | - | 884 |
| **75** | 259 | 259 | 186 | 186 | - | - | - | - | 890 |
| **90** | 312 | 312 | 238 | 238 | - | - | - | - | 1100 |
| **105** | 314 | 314 | 240 | 240 | - | - | - | - | 1108 |
| **115** | 315 | 315 | 240 | 240 | - | - | - | - | 1110 |
| **135** | 396 | 396 | 285 | 285 | 134 | 134 | 29 | 29 | 1688 |
| **150** | 402 | 402 | 289 | 289 | 136 | 136 | 30 | 30 | 1714 |
| **160** | 404 | 404 | 290 | 290 | 137 | 137 | 30 | 30 | 1722 |
| **180** | 417 | 417 | 299 | 299 | 141 | 141 | 31 | 31 | 1776 |
| **200** | 385 | 385 | 285 | 285 | 152 | 152 | 59 | 59 | 1762 |
| **225** | 388 | 388 | 288 | 288 | 153 | 153 | 60 | 60 | 1778 |
| **230** | 671 | 671 | 467 | 467 | 298 | 298 | 195 | 195 | 3262 |
| **270** | 689 | 689 | 480 | 480 | 305 | 305 | 200 | 200 | 3348 |
| **295** | 707 | 707 | 493 | 493 | 314 | 314 | 205 | 205 | 3438 |
| **320** | 716 | 716 | 498 | 498 | 318 | 318 | 208 | 208 | 3480 |
| **355** | 722 | 722 | 503 | 503 | 320 | 320 | 209 | 209 | 3508 |
| **400** | 773 | 773 | 569 | 569 | 308 | 308 | 179 | 179 | 3658 |
| **440** | 779 | 779 | 573 | 573 | 310 | 310 | 181 | 181 | 3686 |
| **Integrated hydraulic kit 2 pumps + Water tank** | | | | | | | | | |
| | **S1** | **S2** | **S3** | **S4** | **S5** | **S6** | **S7** | **S8** | **TOT** |
| **45** | 227 | 227 | 126 | 126 | - | - | - | - | 706 |
| **50** | 230 | 230 | 127 | 127 | - | - | - | - | 714 |
| **70** | 244 | 244 | 241 | 241 | - | - | - | - | 970 |
| **75** | 245 | 245 | 243 | 243 | - | - | - | - | 976 |
| **90** | 270 | 270 | 325 | 325 | - | - | - | - | 1190 |
| **105** | 272 | 272 | 327 | 327 | - | - | - | - | 1198 |
| **115** | 274 | 274 | 330 | 330 | - | - | - | - | 1208 |
| **135** | 402 | 402 | 296 | 296 | 154 | 154 | 54 | 54 | 1812 |
| **150** | 416 | 416 | 306 | 306 | 160 | 160 | 57 | 57 | 1878 |
| **160** | 418 | 418 | 308 | 308 | 160 | 160 | 57 | 57 | 1886 |
| **180** | 430 | 430 | 316 | 316 | 165 | 165 | 59 | 59 | 1940 |
| **200** | 395 | 395 | 302 | 302 | 177 | 177 | 89 | 89 | 1926 |
| **225** | 398 | 398 | 305 | 305 | 178 | 178 | 90 | 90 | 1942 |
| **230** | 650 | 650 | 478 | 478 | 336 | 336 | 249 | 249 | 3426 |
| **270** | 669 | 669 | 492 | 492 | 345 | 345 | 256 | 256 | 3524 |
| **295** | 686 | 686 | 504 | 504 | 354 | 354 | 263 | 263 | 3614 |
| **320** | 699 | 699 | 514 | 514 | 361 | 361 | 268 | 268 | 3684 |
| **355** | 704 | 704 | 518 | 518 | 364 | 364 | 270 | 270 | 3712 |
| **400** | 800 | 800 | 594 | 594 | 333 | 333 | 204 | 204 | 3862 |
| **440** | 805 | 805 | 599 | 599 | 335 | 335 | 206 | 206 | 3890 |

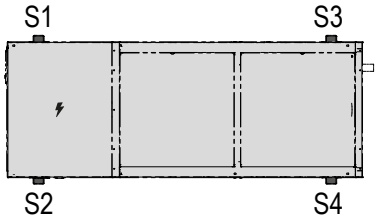


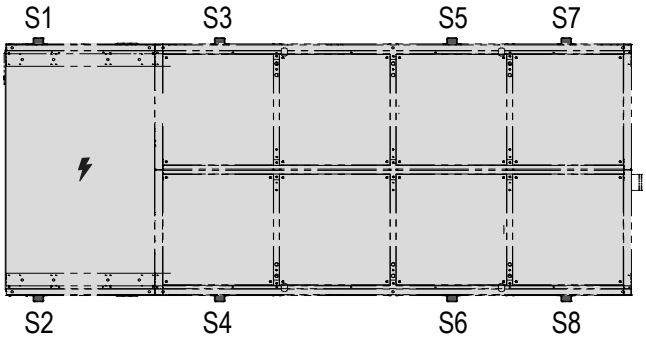




For weight distribution always refer to the data sheet received with the offer.

### 4.7.1 Weight distribution (kg) on lifting brackets P4U/P4S

| STD | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **S1** | **S2** | **S3** | **S4** | **S5** | **S6** | **S7** | **S8** | **TOT** |
| **45** | 244 | 244 | 96 | 96 | - | - | - | - | 680 |
| **50** | 248 | 248 | 97 | 97 | - | - | - | - | 690 |
| **70** | 273 | 273 | 196 | 196 | - | - | - | - | 938 |
| **75** | 275 | 275 | 197 | 197 | - | - | - | - | 944 |
| **90** | 330 | 330 | 251 | 251 | - | - | - | - | 1162 |
| **105** | 332 | 332 | 253 | 253 | - | - | - | - | 1170 |
| **115** | 333 | 333 | 255 | 255 | - | - | - | - | 1176 |
| **135** | 419 | 419 | 301 | 301 | 142 | 142 | 31 | 31 | 1786 |
| **150** | 425 | 425 | 306 | 306 | 143 | 143 | 32 | 32 | 1812 |
| **160** | 428 | 428 | 308 | 308 | 145 | 145 | 32 | 32 | 1826 |
| **180** | 441 | 441 | 316 | 316 | 150 | 150 | 33 | 33 | 1880 |
| **200** | 420 | 420 | 312 | 312 | 166 | 166 | 64 | 64 | 1924 |
| **225** | 424 | 424 | 314 | 314 | 167 | 167 | 65 | 65 | 1940 |
| **230** | 706 | 706 | 492 | 492 | 314 | 314 | 205 | 205 | 3434 |
| **270** | 724 | 724 | 504 | 504 | 322 | 322 | 210 | 210 | 3520 |
| **295** | 742 | 742 | 517 | 517 | 330 | 330 | 216 | 216 | 3610 |
| **320** | 766 | 766 | 534 | 534 | 340 | 340 | 222 | 222 | 3724 |
| **355** | 772 | 772 | 537 | 537 | 342 | 342 | 225 | 225 | 3752 |
| **400** | 854 | 854 | 628 | 628 | 341 | 341 | 199 | 199 | 4044 |
| **440** | 860 | 860 | 633 | 633 | 343 | 343 | 200 | 200 | 4072 |
| **Integrated hydraulic kit 2 pumps + Water tank** | | | | | | | | | |
| | **S1** | **S2** | **S3** | **S4** | **S5** | **S6** | **S7** | **S8** | **TOT** |
| **45** | 238 | 238 | 130 | 130 | - | - | - | - | 736 |
| **50** | 240 | 240 | 133 | 133 | - | - | - | - | 746 |
| **70** | 257 | 257 | 256 | 256 | - | - | - | - | 1026 |
| **75** | 259 | 259 | 257 | 257 | - | - | - | - | 1032 |
| **90** | 284 | 284 | 342 | 342 | - | - | - | - | 1252 |
| **105** | 286 | 286 | 344 | 344 | - | - | - | - | 1260 |
| **115** | 289 | 289 | 348 | 348 | - | - | - | - | 1274 |
| **135** | 423 | 423 | 312 | 312 | 162 | 162 | 58 | 58 | 1910 |
| **150** | 437 | 437 | 323 | 323 | 168 | 168 | 60 | 60 | 1976 |
| **160** | 440 | 440 | 325 | 325 | 169 | 169 | 61 | 61 | 1990 |
| **180** | 452 | 452 | 334 | 334 | 174 | 174 | 62 | 62 | 2044 |
| **200** | 428 | 428 | 327 | 327 | 192 | 192 | 97 | 97 | 2088 |
| **225** | 432 | 432 | 330 | 330 | 192 | 192 | 98 | 98 | 2104 |
| **230** | 682 | 682 | 502 | 502 | 353 | 353 | 262 | 262 | 3598 |
| **270** | 701 | 701 | 516 | 516 | 362 | 362 | 269 | 269 | 3696 |
| **295** | 718 | 718 | 529 | 529 | 371 | 371 | 275 | 275 | 3786 |
| **320** | 745 | 745 | 548 | 548 | 385 | 385 | 286 | 286 | 3928 |
| **355** | 751 | 751 | 552 | 552 | 387 | 387 | 288 | 288 | 3956 |
| **400** | 879 | 879 | 654 | 654 | 366 | 366 | 225 | 225 | 4248 |
| **440** | 885 | 885 | 658 | 658 | 369 | 369 | 226 | 226 | 4276 |




For weight distribution always refer to the data sheet received with the offer.

## 4.8 Location and minimum technical clearances

All units are designed for external installation: any overhang above the unit and location near trees, if they partially cover the unit,must be avoided in order to prevent air by-pass. It is advisable to create a proper mounting plinth, with a size similar to the unit foot-print. Unit vibration level is very low: it is advisable however, to install vibration dampers (spring or rubber) between the plinth and the unit base-frame to keep vibrations at a very low level. It is vital to ensure adequate air volume to the source fan.
The air flow in the coil is decisive for the proper functioning of the unit. Therefore, environments in which foliage or dust can deposit on the coil and obstruct the air passage must be avoided. At the same time it is essential that the coil is not obstructed by obstacles or barriers that could adversely affect the air flow.
In heat pump mode, the cold air discharged by the fans falls back downwards and is recirculated on the coil, causing inefficiencies, malfunctions, and in the worst cases, unit blockage; this is why installations in cavities or window wells should be avoided.
If there are walls close to the unit, the minimum distances provided in the table must be observed; furthermore, there may not be more than two contiguous walls, and their height must not exceed those of the fans of the unit.

Each wall reflector placed near the unit can increase the sound pressure measured by 3 dB.
If several units are installed side-by-side, the minimum space between 2 finned coils must be above D*1.5, where D is the largest space between the side-by-side units.

If the unit is installed in a Class A (General) or Class B (with Supervision) zone in accordance with EN 378-1, para. 4.2, precautions must be taken to ensure that only authorised persons may approach it by entering the zone.

The unit should be installed as far away as possible, and in any case at least 3m away from drainage systems and electrical installations, in order to prevent the propagation of potentially explosive atmospheres in case of refrigerant leakage.

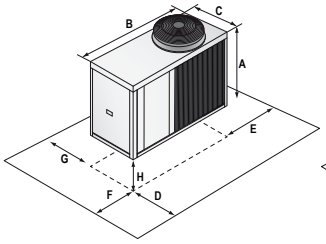
Installations close to the unit must in any case be filled with sand or provided with a siphon. Underground pipelines must be at a depth of at least 0.80 m below ground level. Installations must be inspected at least once every six months to verify that the precautions taken to prevent the spread of explosive atmospheres are effective.

The unit must be installed as to ensure that any refrigerant leaks cannot reach buildings or indoor spaces.

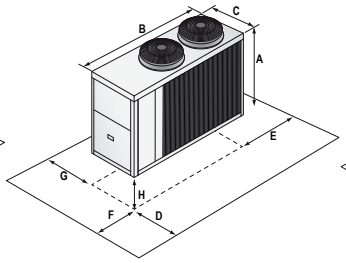
The unit has to be installed such that maintenance and repair is possible. The warranty does not cover costs for the provision of lifting apparatus, platforms or other lifting systems required to perform repairs during warranty period.

The installation site should be chosen in accordance with EN 378-1 and 378-3 standards. When choosing the installation site, all risks caused by accidental refrigerant A2L leakage should be taken into consideration.

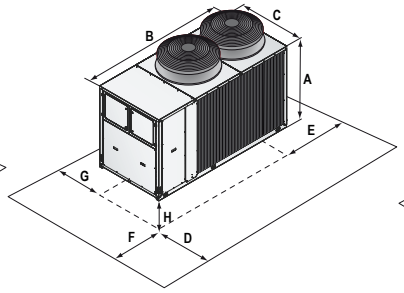
All air to water heat pumps, during defrost mode, produce condensate at the base of the source heat exchanger. If the ambient temperature is below 0°C the water may freeze, creating a thick layer of ice within the unit. This layer of ice, in specific conditions, may damage the heat exchanger and therefore, to guarantee correct operation of the units it is highly recommended to raise the unit of a minimum amount (H). This recommendation becomes more important if the unit is to be installed in a location that is subject to heavy snowfall.



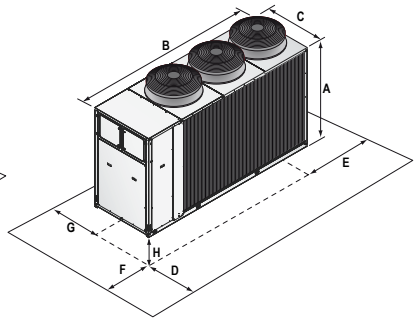

F1




F2

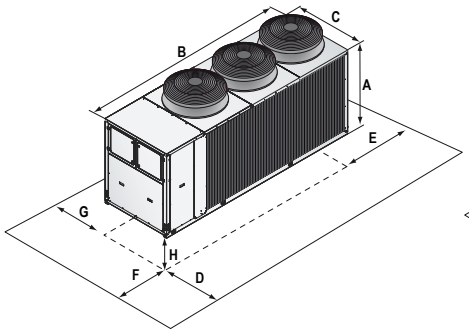



F3

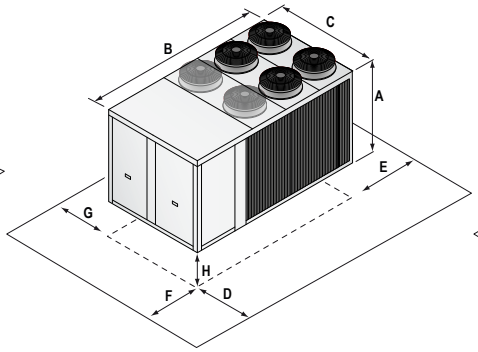



F4

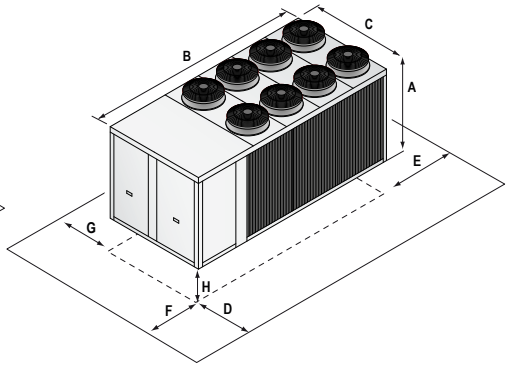
| | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|
| A (mm) | 1670 | 1670 | 1920 | 1920 | 1920 | 1920 | 1920 | 1920 | 1920 | 1920 |
| B (mm) | 2460 | 2460 | 3060 | 3060 | 3060 | 3060 | 3060 | 4295 | 4295 | 4295 |
| C (mm) | 1265 | 1265 | 1265 | 1265 | 1265 | 1265 | 1265 | 1265 | 1265 | 1265 |
| D (mm) | 1000 | 1000 | 1500 | 1500 | 1500 | 1500 | 2000 | 2000 | 2000 | 2000 |
| E (mm) | 800 | 800 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| F (mm) | 800 | 800 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| G (mm) | 800 | 800 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 2000 | 2000 |
| H (mm) | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 |
| **FRAME** | **F1** | **F1** | **F2** | **F2** | **F3** | **F3** | **F3** | **F4** | **F4** | **F4** |




F4,5




F5



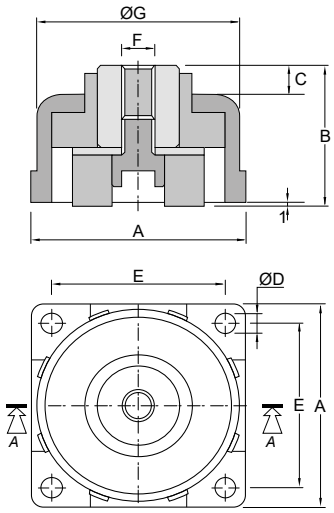

F6

| | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|
| A (mm) | 1920 | 2295 | 2380 | 2295 | 2380 | 2380 | 2380 | 2380 | 2380 | 2380 |
| B (mm) | 4295 | 4295 | 4520 | 4295 | 4520 | 4520 | 4520 | 4520 | 5570 | 5570 |
| C (mm) | 1265 | 1265 | 2310 | 1265 | 2310 | 2310 | 2310 | 2310 | 2310 | 2310 |
| D (mm) | 1000 | 1000 | 1500 | 1500 | 1500 | 1500 | 2000 | 2000 | 2000 | 2000 |
| E (mm) | 800 | 800 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| F (mm) | 800 | 800 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| G (mm) | 800 | 800 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 2000 | 2000 |
| H (mm) | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 |
| **FRAME** | **F4** | **F4,5** | **F5** | **F4,5** | **F5** | **F5** | **F5** | **F5** | **F6** | **F6** |

## 4.9 Installation of rubber vibration dampers

All units should be installed on vibration dampers in order to prevent the transmission of vibration to the supporting surface and reduce the noise level. Rubber vibration dampers are available as an option in the catalogue. The vibration dampers (optional) are supplied by the factory in separate packaging.

*sez A - A*




| Mod. | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| **45÷115** | 88 mm | 52 mm | 17 mm | 11 mm | 67 mm | M12 | 74,5 mm |
| **135÷230** | 118 mm | 69 mm | 27 mm | 11 mm | 90 mm | M12 | 102 mm |
| **225÷440** | 145 mm | 83 mm | 16 mm | 12,5 mm | 110 mm | M16 | 129 mm |

Refer to the instructions supplied with the kit for installation of the spring vibration dampers.

### 4.9.1 Weight distribution (kg) with vibration dampers P2U/P2S

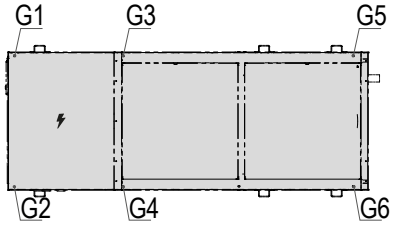
| | STD | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **G1** | **G2** | **G3** | **G4** | **G5** | **G6** | **G7** | **G8** | **TOT** |
| **45** | 160 | 160 | 110 | 110 | 59 | 59 | - | - | 658 |
| **50** | 162 | 162 | 111 | 111 | 60 | 60 | - | - | 666 |
| **70** | 179 | 179 | 136 | 136 | 90 | 90 | 45 | 45 | 900 |
| **75** | 180 | 180 | 137 | 137 | 91 | 91 | 45 | 45 | 906 |
| **90** | 217 | 217 | 167 | 167 | 114 | 114 | 61 | 61 | 1118 |
| **105** | 218 | 218 | 168 | 168 | 115 | 115 | 62 | 62 | 1126 |
| **115** | 220 | 220 | 169 | 169 | 115 | 115 | 61 | 61 | 1130 |
| **135** | 349 | 349 | 274 | 274 | 170 | 170 | 68 | 68 | 1722 |
| **150** | 355 | 355 | 277 | 277 | 172 | 172 | 70 | 70 | 1748 |
| **160** | 357 | 357 | 278 | 278 | 173 | 173 | 71 | 71 | 1758 |
| **180** | 368 | 368 | 287 | 287 | 178 | 178 | 73 | 73 | 1812 |
| **200** | 369 | 369 | 288 | 288 | 179 | 179 | 73 | 73 | 1818 |
| **225** | 372 | 372 | 290 | 290 | 181 | 181 | 74 | 74 | 1834 |
| **230** | 657 | 657 | 506 | 506 | 335 | 335 | 163 | 163 | 3322 |
| **270** | 674 | 674 | 519 | 519 | 343 | 343 | 168 | 168 | 3408 |
| **295** | 692 | 692 | 533 | 533 | 352 | 352 | 172 | 172 | 3498 |
| **320** | 706 | 706 | 543 | 543 | 360 | 360 | 176 | 176 | 3570 |
| **355** | 712 | 712 | 548 | 548 | 363 | 363 | 177 | 177 | 3600 |
| **400** | 771 | 771 | 616 | 616 | 379 | 379 | 143 | 143 | 3818 |
| **440** | 777 | 777 | 620 | 620 | 382 | 382 | 144 | 144 | 3846 |

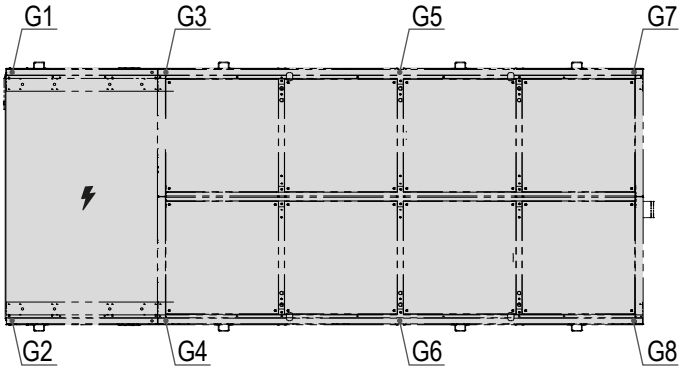
| Integrated hydraulic kit 2 pumps + Water tank | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | G1 | G2 | G3 | G4 | G5 | G6 | G7 | G8 | TOT |
| **45** | 168 | 168 | 143 | 143 | 115 | 115 | - | - | 852 |
| **50** | 170 | 170 | 144 | 144 | 117 | 117 | - | - | 862 |
| **70** | 173 | 173 | 165 | 165 | 157 | 157 | 148 | 148 | 1286 |
| **75** | 175 | 175 | 166 | 166 | 157 | 157 | 148 | 148 | 1292 |
| **90** | 194 | 194 | 190 | 190 | 187 | 187 | 182 | 182 | 1506 |
| **105** | 195 | 195 | 191 | 191 | 188 | 188 | 183 | 183 | 1514 |
| **115** | 197 | 197 | 192 | 192 | 189 | 189 | 185 | 185 | 1526 |
| **135** | 404 | 404 | 341 | 341 | 256 | 256 | 172 | 172 | 2346 |
| **150** | 415 | 415 | 351 | 351 | 263 | 263 | 177 | 177 | 2412 |
| **160** | 417 | 417 | 352 | 352 | 264 | 264 | 178 | 178 | 2422 |
| **180** | 427 | 427 | 359 | 359 | 270 | 270 | 182 | 182 | 2476 |
| **200** | 400 | 400 | 349 | 349 | 280 | 280 | 212 | 212 | 2.482 |
| **225** | 403 | 403 | 351 | 351 | 281 | 281 | 214 | 214 | 2498 |
| **230** | 671 | 671 | 562 | 562 | 441 | 441 | 318 | 318 | 3984 |
| **270** | 687 | 687 | 576 | 576 | 452 | 452 | 326 | 326 | 4082 |
| **295** | 702 | 702 | 589 | 589 | 462 | 462 | 333 | 333 | 4172 |
| **320** | 719 | 719 | 603 | 603 | 473 | 473 | 341 | 341 | 4272 |
| **355** | 724 | 724 | 607 | 607 | 475 | 475 | 344 | 344 | 4300 |
| **400** | 834 | 834 | 692 | 692 | 475 | 475 | 259 | 259 | 4520 |
| **440** | 839 | 839 | 696 | 696 | 479 | 479 | 260 | 260 | 4548 |

### 4.9.2 Weight distribution (kg) with vibration dampers P4U/P4S

| STD | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | G1 | G2 | G3 | G4 | G5 | G6 | G7 | G8 | TOT |
| **45** | 168 | 168 | 116 | 116 | 63 | 63 | - | - | 694 |
| **50** | 171 | 171 | 118 | 118 | 63 | 63 | - | - | 704 |
| **70** | 194 | 194 | 146 | 146 | 97 | 97 | 48 | 48 | 970 |
| **75** | 194 | 194 | 148 | 148 | 98 | 98 | 48 | 48 | 976 |
| **90** | 232 | 232 | 180 | 180 | 121 | 121 | 66 | 66 | 1198 |
| **105** | 234 | 234 | 180 | 180 | 123 | 123 | 66 | 66 | 1206 |
| **115** | 235 | 235 | 182 | 182 | 124 | 124 | 67 | 67 | 1216 |
| **135** | 376 | 376 | 294 | 294 | 182 | 182 | 75 | 75 | 1854 |
| **150** | 382 | 382 | 298 | 298 | 184 | 184 | 76 | 76 | 1880 |
| **160** | 386 | 386 | 300 | 300 | 187 | 187 | 76 | 76 | 1898 |
| **180** | 396 | 396 | 310 | 310 | 192 | 192 | 78 | 78 | 1952 |
| **200** | 414 | 414 | 322 | 322 | 200 | 200 | 82 | 82 | 2036 |
| **225** | 417 | 417 | 325 | 325 | 202 | 202 | 82 | 82 | 2052 |
| **230** | 703 | 703 | 540 | 540 | 358 | 358 | 175 | 175 | 3552 |
| **270** | 720 | 720 | 554 | 554 | 366 | 366 | 179 | 179 | 3638 |
| **295** | 738 | 738 | 568 | 568 | 375 | 375 | 183 | 183 | 3728 |
| **320** | 772 | 772 | 595 | 595 | 393 | 393 | 192 | 192 | 3904 |
| **355** | 778 | 778 | 599 | 599 | 396 | 396 | 193 | 193 | 3932 |
| **400** | 881 | 881 | 703 | 703 | 434 | 434 | 163 | 163 | 4362 |
| **440** | 887 | 887 | 708 | 708 | 436 | 436 | 164 | 164 | 4390 |

| Integrated hydraulic kit 2 pumps + Water tank | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | G1 | G2 | G3 | G4 | G5 | G6 | G7 | G8 | TOT |
| **45** | 176 | 176 | 149 | 149 | 120 | 120 | - | - | 890 |
| **50** | 178 | 178 | 150 | 150 | 122 | 122 | - | - | 900 |
| **70** | 183 | 183 | 174 | 174 | 165 | 165 | 156 | 156 | 1356 |
| **75** | 184 | 184 | 175 | 175 | 166 | 166 | 156 | 156 | 1362 |
| **90** | 204 | 204 | 200 | 200 | 197 | 197 | 192 | 192 | 1586 |
| **105** | 205 | 205 | 201 | 201 | 198 | 198 | 193 | 193 | 1594 |
| **115** | 208 | 208 | 203 | 203 | 200 | 200 | 195 | 195 | 1612 |
| **135** | 427 | 427 | 360 | 360 | 269 | 269 | 182 | 182 | 2476 |
| **150** | 438 | 438 | 369 | 369 | 277 | 277 | 187 | 187 | 2542 |
| **160** | 441 | 441 | 372 | 372 | 279 | 279 | 188 | 188 | 2560 |
| **180** | 450 | 450 | 380 | 380 | 285 | 285 | 192 | 192 | 2614 |
| **200** | 435 | 435 | 380 | 380 | 304 | 304 | 231 | 231 | 2.700 |
| **225** | 438 | 438 | 382 | 382 | 306 | 306 | 232 | 232 | 2716 |
| **230** | 709 | 709 | 595 | 595 | 466 | 466 | 337 | 337 | 4214 |
| **270** | 726 | 726 | 608 | 608 | 477 | 477 | 345 | 345 | 4312 |
| **295** | 741 | 741 | 621 | 621 | 487 | 487 | 352 | 352 | 4402 |
| **320** | 776 | 776 | 650 | 650 | 509 | 509 | 368 | 368 | 4606 |
| **355** | 780 | 780 | 654 | 654 | 513 | 513 | 370 | 370 | 4634 |
| **400** | 935 | 935 | 775 | 775 | 533 | 533 | 290 | 290 | 5066 |
| **440** | 940 | 940 | 779 | 779 | 536 | 536 | 292 | 292 | 5094 |

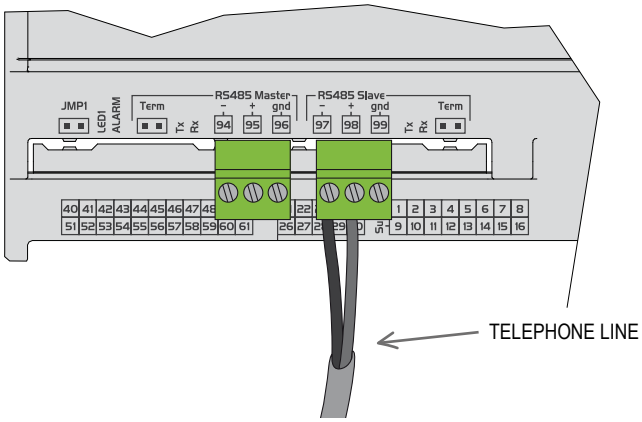



The water content of the unit was considered in the calculation of the weights.

## 4.10 Serial interface card RS485

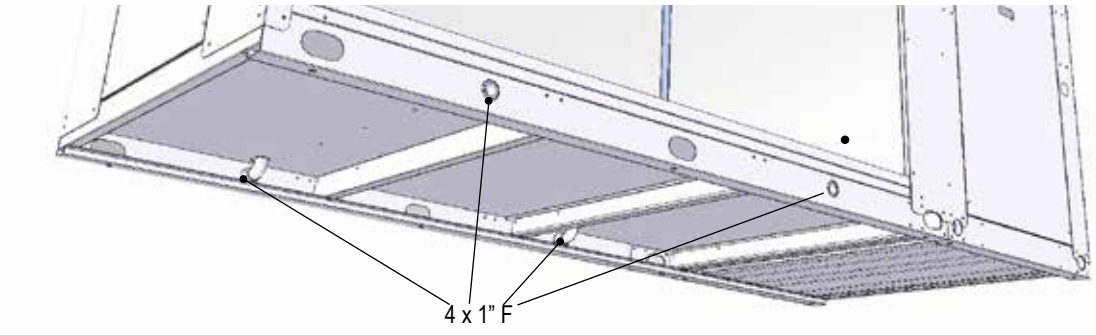
Supervision system interface (MODBUS RS485 available only)
This system allows you to remotely monitor all parameters of the unit and change their values.
It is necessary to respect the polarity of the wiring as shown in the diagram. Any reversal of polarity will result in the non-functioning unit.
The supervision connectivity cable must be telephone one type 2x0, 25 $mm^2$.
The unit is configured at the factory with serial address 1. In case of using the MODBUS system, you can request the list of variables by contacting the assistance.



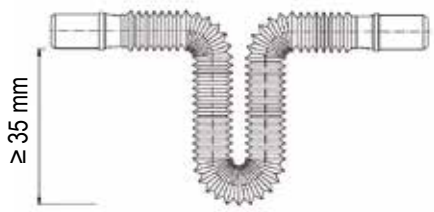

## 4.11 Installation of condensate drain line

In heating, the unit can produce a quantity of condensate, depending upon the ambient conditions and the working hours. This condensate may freeze in severe ambient conditions. The unit must therefore be installed in such a way as to prevent a slipping hazard to the user or third parties due to the presence of ice around the heat pump.

In all the units is installed a drip tray that, positioned underneath the source heat exchanger (finned coil) and above the base frame, recovers all water generated by the unit when in heating working mode. The drip tray is supplied with a self-heating antifreeze kit that melts the any ice present in the drip tray. The drip tray is supplied with a discharge connection that must be connected to a discharge pipe.



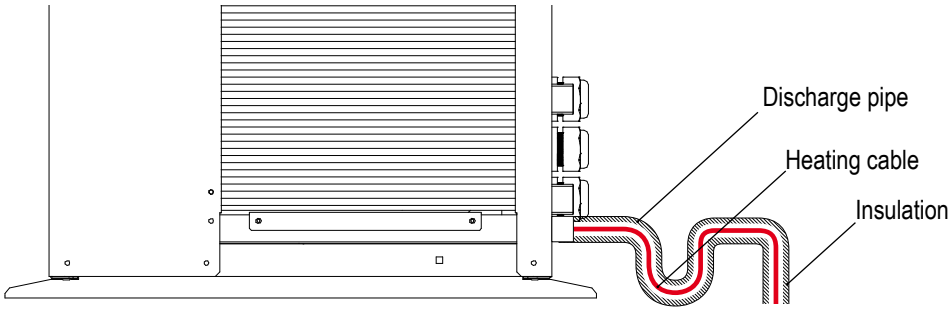

The condensate drain line should have a water trap which may have minimum flying height equal to the suction of the fan, in any case never less than 35 mm.



### 4.11.1 Installation of the heating cable

It is recommended that a heating cable be installed in the condensate drip tray discharge pipe to prevent freezing of the water inside the pipe itself, as this can lead to a malfunction of the unit.

The heating cable that is to be inserted in the discharge pipe must have a protection degree IP67 with a specific heating capacity of a minimum of 35W per linear metre. It is also recommended that the discharge pipe be insulated with closed cell type insulation having a minimum thickness of 15 mm.




## 4.12 Hydraulic connections

The water pipe-work must be installed in accordance with national and local regulation and can be made from copper, steel, galvanized steel or PVC. The Pipework must be designed to cater for the nominal water flow and the hydraulic pressure drops of the system. All pipes must be insulated with closed-cell material of adequate thickness. Unit must be connected to the piping using suitable flexible joints. The following components are recommended for installation in the hydraulic circuit:

- Pockets for temperature sensor to measure the temperature in the system.
- Shut-off manual valves to isolate the unit from the hydraulic circuit.
- Metallic filters to be mounted on the inlet pipe with a mesh not larger than 1 mm.
- Vent valves, expansion tank with water filling, discharge valve.

| | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Water connections** | Threaded | | | | | | | | | | |
| **Ø [“]** | 1"1/2 | 1"1/2 | 2" | 2" | 2" | 2" | 2" | 2" 1/2 | 2" 1/2 | 2" 1/2 | 2" 1/2 |
| **Ø [mm]** | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

| | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|
| **Water connections** | Victaulic* | | | | | | | | |
| **Ø [“]** | 3" | 3" | 3" | 3" | 3" | 4" | 4" | 5" | 5" |
| **Ø [mm]** | 88,9 | 88,9 | 88,9 | 88,9 | 88,9 | 114,3 | 114,3 | 139,7 | 139,7 |

Water pipe diameters UNI EN 10255

*** adaptation kit viktaulic - threaded**

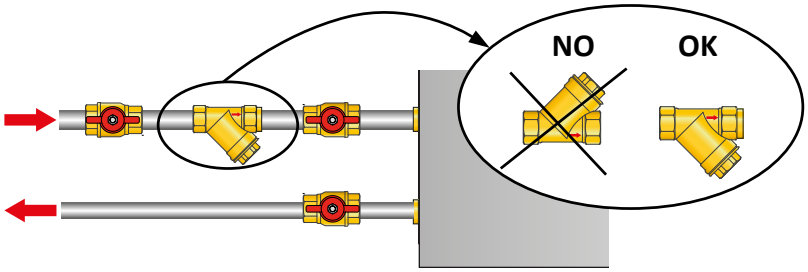
System return water must be fitted to the connection labelled: ”USER WATER IN” as incorrect connection can damage the heat exchanger by freezing.

The water flow through the heat exchangers of the unit should not be fall below Δt 8°C measured at the following conditions:

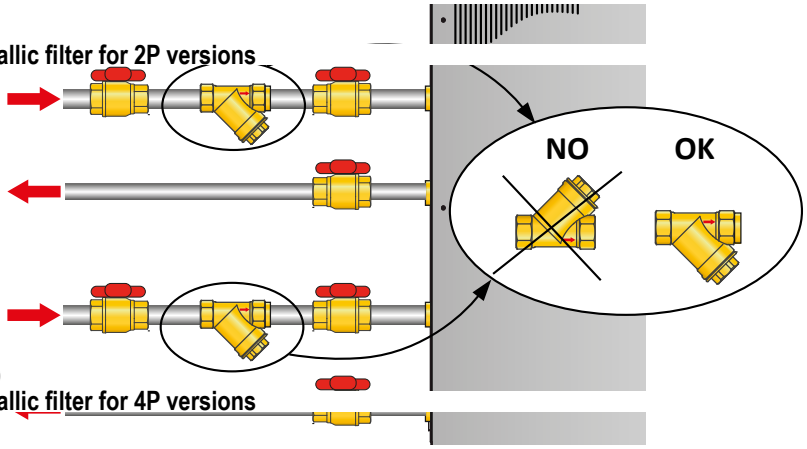
**Heating mode:** 7°C Dry bulb ambient temperature, 35°C water outlet temperature;
**Cooling mode:** 35°C dry bulb ambient temperature, 7°C water outlet temperature.

It is compulsory to install on the USER WATER IN connection, a water strainer with a mesh not larger than 1 mm. Fitting this filter is COMPULSORY and the warranty will be invalidated if it is removed. The filter must be kept clean and checked periodically.

### 4.12.1 Installation of metallic filter for P2U/P2S versions




### 4.12.2 Installation of metallic filter for P4U/P4S versions




### 4.12.1 Installation of metallic filter for 2P versions

DHW circuit (P4S)
Recovery system (P4U)

User circuit (P4S/P4U)

### 4.12.2 Installation of metallic filter for 4P versions

DHW circuit (4P+DHW)
Recovery system (4P)

User circuit (4P)

## 4.13 Chemical characteristics of the water

In the following table there are, just as an indication, the main values of chemical and physical properties of the water to be respected to avoid corrosion or any sediment. To this purpose it is advisable yearly check PH stability.

**EXPLANATIONS:**

+ Good resistance under normal conditions
0 Corrosion problems may occur especially when more factors are valued 0
- Use is not recommended

| | | | Plate Material | | | Brazing Material | | |
|---|---|---|---|---|---|---|---|---|
| **WATER CONTENT** | **CONCENTRATION (mg/l or ppm)** | **TIME LIMITS Analyze before** | **AISI 304** | **AISI 316** | **254 SMO** | **COPPER** | **NICKEL** | **STAINLESS STEEL** |
| Alkalinity ($HCO_3^-$) | < 70 | Within 24 h | + | + | + | 0 | + | + |
| | 70-300 | | + | + | + | + | + | + |
| | > 300 | | + | + | + | 0/+ | + | + |
| Sulphate[1] ($SO_4^{2-}$) | < 70 | No limit | + | + | + | + | + | + |
| | 70-300 | | + | + | + | 0/- | + | + |
| | > 300 | | + | + | + | - | + | + |
| $HCO_3^-$ / $SO_4^{2-}$ | > 1.0 | No limit | + | + | + | + | + | + |
| | < 1.0 | | + | + | + | 0/- | + | + |
| Electrical conductivity | < 10 µS/cm | No limit | + | + | + | 0 | + | + |
| | 10-500 µS/cm | | + | + | + | + | + | + |
| | > 500 µS/cm | | + | + | + | 0 | + | + |
| pH [2] | < 6.0 | Within 24 h | 0 | 0 | 0 | 0 | + | 0 |
| | 6.0-7.5 | | + | + | + | 0 | + | + |
| | 7.5-9.0 | | + | + | + | + | + | + |
| | >9.0 | | + | + | + | 0 | + | + |
| Ammonium ($NH_4^+$) | < 2 | Within 24 h | + | + | + | + | + | + |
| | 2-20 | | + | + | + | 0 | + | + |
| | >20 | | + | + | + | - | + | + |
| Chlorides ($Cl^-$) | <100 | No limit | + | + | + | + | + | + |
| *Please also see* | 100-200 | | 0 | + | + | + | + | + |
| *table below* | 200-300 | | - | + | + | + | + | + |
| | >300 | | - | - | + | 0/+ | + | - |
| Free chlorine ($Cl_2$) | < 1 | Within 5 h | + | + | + | + | + | + |
| | 1-5 | | - | - | 0 | 0 | + | - |
| | > 5 | | - | - | - | 0/- | + | - |
| Hydrogen sulfide ($H_2S$) | < 0.05 | No limit | | + | + | + | + | + |
| | >0.05 | | | + | + | 0/- | + | + |
| Free (aggressive) | < 5 | No limit | + | + | + | + | + | + |
| carbon dioxide ($CO_2$) | 5-20 | | + | + | + | 0 | + | + |
| | > 20 | | + | + | + | - | + | + |
| Total hardness (°dH) | 4.0-8.5 | No limit | + | + | + | + | + | + |
| Nitrate[1] ($NO_3^-$) | < 100 | No limit | + | + | + | + | + | + |
| | > 100 | | + | + | + | 0 | + | + |
| Iron[3] (Fe) | < 0.2 | No limit | + | + | + | + | + | + |
| | > 0.2 | | + | + | + | 0 | + | + |
| Aluminium (Al) | < 0.2 | No limit | + | + | + | + | + | + |
| | > 0.2 | | + | + | + | 0 | + | + |
| Manganese[3] (Mn) | < 0.1 | No limit | + | + | + | + | + | + |
| | > 0.1 | | + | + | + | 0 | + | + |

[1] Sulfates and nitrates works as inhibitors for pitting corrosion caused by chlorides in pH neutral environments
[2] In general low pH (below 6) increase corrosion risk and high pH (above 7.5) decrease the corrosion risk
[3] $Fe^{3+}$ and $Mn^{4+}$ are strong oxidants and may increase the risk for localised corrosion on stainless steels
[4] in combination with brazing material copper
$SiO_2$ above 150ppm increase the risk of scaling

| **CHLORIDE CONTENT** | **MAXIMUM TEMPERATURE** | | | | |
|---|---|---|---|---|---|
| | 30°C | 60°C | 80°C | 120°C | 130°C |
| = 10 ppm | SS 304 | SS 304 | SS 304 | SS 304 | SS 316 |
| = 25 ppm | SS 304 | SS 304 | SS 304 | SS 316 | SS 316[4] |
| = 50 ppm | SS 304 | SS 304 | SS 316 | SS 316 | Ti / 254 SMO |
| = 80 ppm | SS 316 | SS 316 | SS 316 | SS 316[4] | Ti / 254 SMO |
| = 150 ppm | SS 316 | SS 316 | SS 316[4] | Ti / 254 SMO | Ti / 254 SMO |
| = 300 ppm | SS 316 | SS 316[4] | Ti / 254 SMO | Ti / 254 SMO | Ti / 254 SMO |
| > 300 ppm | Ti / 254 SMO | Ti / 254 SMO | Ti / 254 SMO | Ti / 254 SMO | Ti / 254 SMO |

In order to prevent corrosive phenomena or deposits of any nature it is recommended to:
• Empty the evaporator before any maintenance work is carried out;
• Do not clean the evaporator with unsuitable mechanical systems, such as drill bits or high-pressure jets;
• Do not clean with too aggressive cleaning agents. Before using a chemical detergent, check the compatibility with the construction materials of the exchanger.
• During winter stops, carefully empty the heat exchanger.



In case of long stops, leave the heat exchanger completely filled with adequate glycol water or completely empty.

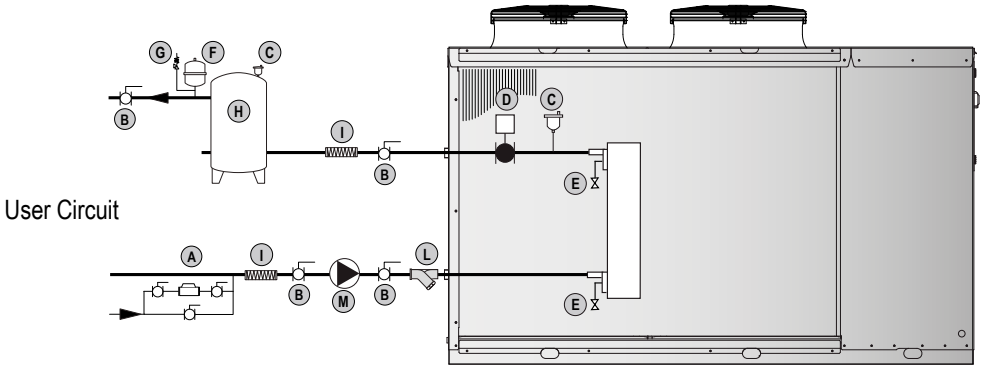
## 4.14 Unit water content

| | | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Std | 2P | 8 | 8 | 16 | 16 | 18 | 18 | 20 | 34 | 34 | 36 |
| | 4P | 14 | 14 | 32 | 32 | 36 | 36 | 40 | 68 | 68 | 72 |
| With tank | 2P | 146 | 148 | 317 | 317 | 317 | 317 | 319 | 536 | 536 | 538 |
| | 4P | 154 | 154 | 331 | 331 | 335 | 335 | 339 | 568 | 568 | 572 |

| | | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Std | 2P | 36 | 56 | 56 | 60 | 60 | 60 | 90 | 92 | 160 | 160 |
| | 4P | 72 | 112 | 112 | 118 | 118 | 118 | 181 | 181 | 319 | 319 |
| With tank | 2P | 538 | 558 | 558 | 560 | 560 | 560 | 590 | 590 | 660 | 660 |
| | 4P | 572 | 614 | 614 | 618 | 618 | 618 | 680 | 680 | 820 | 820 |

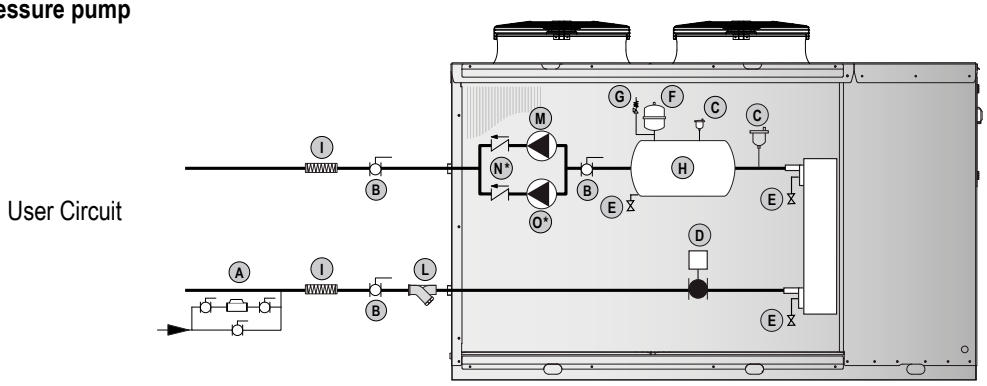
## 4.15 Hydraulic components

### 4.15.1 2P Standard Versions



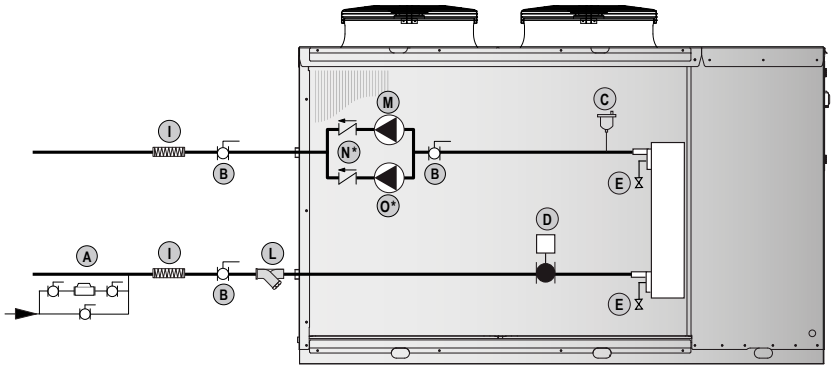

The water pump must be installed with the supply side toward the water inlet connection of the unit.

### 4.15.2 2P version + Integrated hydraulic kit 1 pump + Water tank - Integrated hydraulic kit 2 pumps + Water tank - Hydraulic kit with storage tank and one low-pressure pump

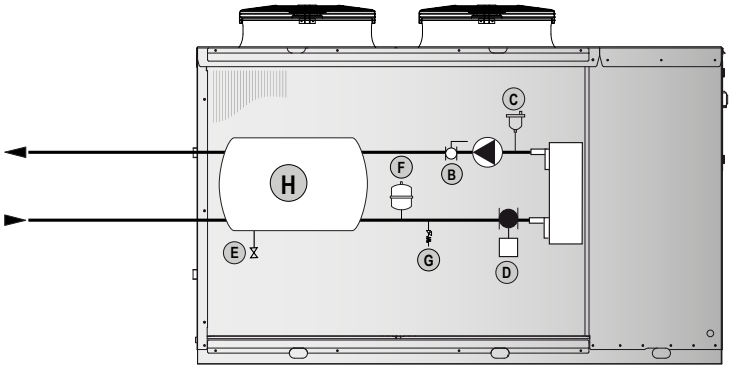


### 4.15.3 Version 2P + Hydraulic kit with one pump without tank - user circuit - Hydraulic kit with two pumps without tank - user circuit - Hydraulic kit with one low-pressure pump

User Circuit



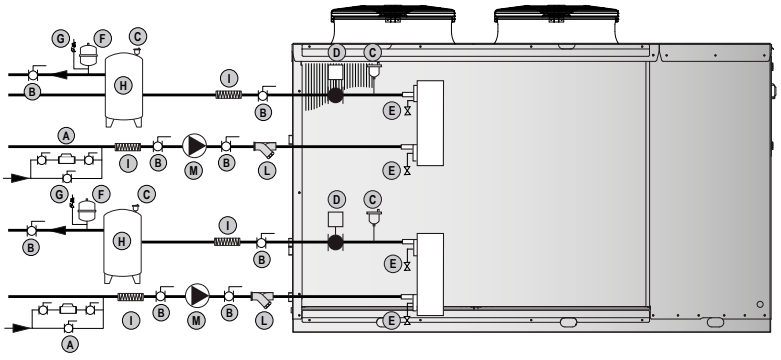

### 4.15.4 Version 2P + 4-connection tank and low-pressure pump




### 4.15.5 4P Versions

DHW circuit (4P+DHW)
Recovery system (4P)

User Circuit (4P)



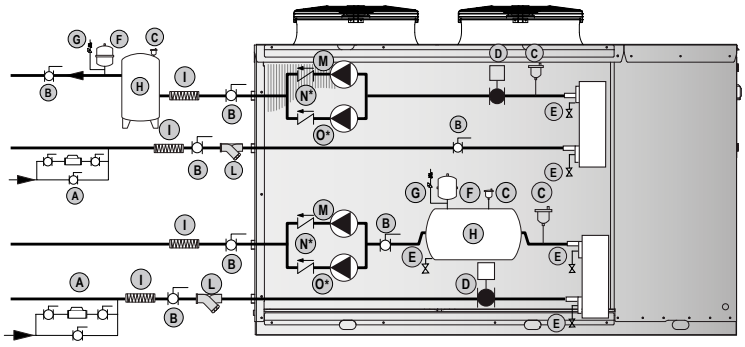

The water pump must be installed with the supply side toward the water inlet connection of the unit.

In the 4P versions, it is only possible to supply a double circulation pump (running + sand- by) on one of the two hydraulic circuits and if the tank is not installed. Consult the selection software to check the available hydraulic configurations.

### 4.15.6 4P Versions + Hydraulic kit with two pumps without tank - recovery circuit + Hydraulic kit with two pumps without tank - user circuit + Hydraulic kit with storage tank and one low-pressure pump

DHW circuit (4P+DHW)
Recovery system (4P)

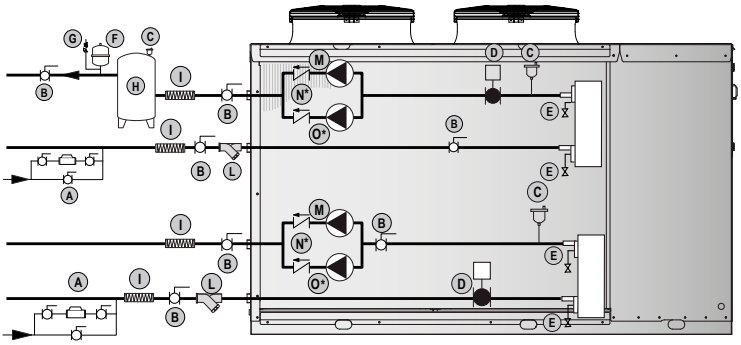
User circuit (4P)



### 4.15.7 4P Versions + Hydraulic kit with two pumps without tank - Hydraulic kit with two pumps without tank - user circuit - Hydraulic kit with one low-pressure pump

DHW circuit (4P+DHW)
Recovery system (4P)

User circuit (4P)



| | | | |
|---|---|---|---|
| A | System Filling Group | H | User water tank |
| B | Shut-off Valve | I | Flexible Connection |
| C | Vent Valve | L | Water Strainer |
| D | Flow Switch | M | Water Pump |
| E | Drainage valve | N* | One way valve |
| F | Expansion Vessel | O* | Water Pump |
| G | Safety Valve | | |

Legend:
*Available for 2 pumps versions only; not available for single pump units)

Components shown inside the units are factory fitted.
Components shown outside of the units must be present in the system to guarantee the correct operation. The installation of those components is charged to the installer.

Diagrams are for illustrative purposes only, check possible combinations through selection software

## 4.16 Connection to safety valves

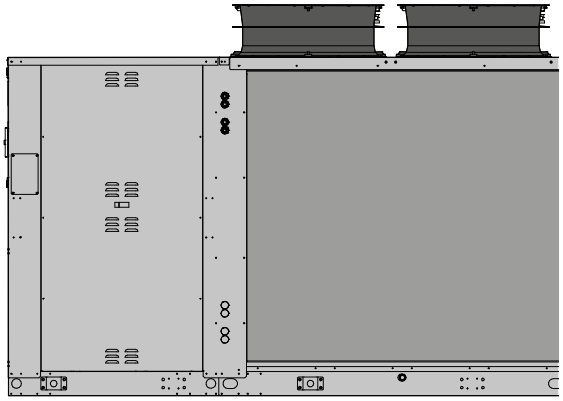
Units have two safety valves located in the service box and connected to the high and low pressure line respectively.

| | Output diameter | Pressure setting | Inner pressure drop |
|---|---|---|---|
| **High pressure** | ½" GM | 45 bar | 2,5 bar |
| **Low pressure** | ½" GM | 31 bar | 1,5 bar |

The pre-tranches located in the side frame allow the connection of the pipes needed for ducting the safety valves, which must be carried out in accordance with EN378, EN13136 and any further regulations in force.

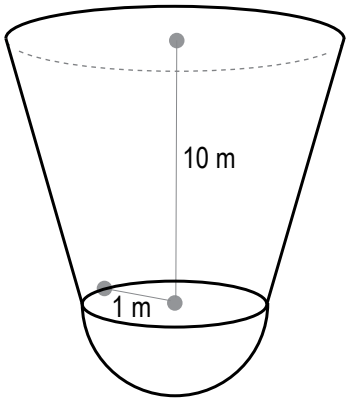
If the DSV (Double Safety Valve) accessory is used, all 4 valves must be piped externally.

The safety valve is in the hydraulic section where it has ducting at the outlet which reduces the pressure. The pressure drop has to be correctly included in the ducting calculation made by the system designer according to EN13136.



The safety valve discharge must be oriented upwards: if discharged, the safety valves produce a cone-shaped zone that could reach the concentration necessary to generate fires.

Activation of the safety valve creates an area around the discharge in which a flammable atmosphere can be created. Ensure that there are no obstacles or ignition sources in the cone area below.




Ice or other natural events must be prevented from obstructing the discharge of the safety valve.

In the event of damage to the plate heat exchanger, flammable refrigerant may be released into the hydraulic circuit, causing overpressure: it is the installer's responsibility to place automatic vents, any open expansion vessels and safety valves in suitable areas and away from any sources of ignition, considering the fire risk mentioned above.

## 4.17 User circuit minimum water content

Heat pump units need a minimum water content inside the user circuit in order to guarantee the correct functioning of the unit. A correct water content reduces the n° of starts-and-stops of the compressors and this extends the operating life of the unit and allows a reduced reduction of the hot water temperature during the defrosting cycle.
For these reason it's necessary to guarantee to the unit the following minimum water contents in the user circuit:
Recommended water content : 15l/kW
Recommended minimum water content : 20 lt. x Thermal power ( kW ) / Number of compressors.

| Model | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Minimum water content winter mode (l)** | 460 | 520 | 700 | 750 | 920 | 1040 | 1150 | 1360 | 1520 | 1630 |

| Model | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Minimum water content winter mode (l)** | 1850 | 2050 | 1170 | 2340 | 1370 | 1530 | 1640 | 1870 | 2080 | 2320 |

## 4.18 Minimum domestic hot water circuit content

The minimum domestic hot water circuit content required is:

| Model | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Minimum water content hydraulic circuit (l)** | 460 | 520 | 700 | 750 | 920 | 1040 | 1150 | 1360 | 1520 | 1630 |

| Model | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Minimum water content hydraulic circuit (l)** | 1850 | 2050 | 1170 | 2340 | 1370 | 1530 | 1640 | 1870 | 2080 | 2320 |

The minimum domestic hot water circuit content shown in the above table shows the minimum water content required by the system to guarantee the correct operation of the unit in terms of the acceptable number of starts of the compressors and the minimum allowed working time per cycle. **The above values do not guarantee the availability and temperature of domestic hot water**; the correct volume MUST be calculated based upon the domestic hot water system type and on the user requirements. Please contact the technical support team for information regarding this.

## 4.19 Filling the hydraulic circuit

- Before filling, check that the installation drain valve is closed.
- Open all pipework, heat pump and terminal unit air vents.
- Open the shut off valves.
- Begin filling, slowly opening the water valve in the filling group outside the unit.
- When water begins to leak out of the terminal air vent valves, close them and continue filling until the pressure gauge indicates a pressure of 1.5 bars.

The installation should be filled to a pressure of between 1 and 2 bars. It is recommended that this operation be repeated after the unit has been operating for a number of hours (due to the presence of air bubbles in the system). The pressure of the installation should be checked regularly and if it drops below 1 bar, the water content should be topped-up. If frequent top-ups are required, check all connections for leaks.

## 4.20 Emptying the installation

- Before emptying, place the mains switch in the "Off" position.
- Make sure the filling group valve is closed.
- Open the drainage valve outside the unit and all the installation and terminal air vent valves.

If the fluid in the circuit contains anti-freeze, it MUST not be allowed to run away to drain. It must be collected for possible re-cycling or for correct disposal.

## 4.21 Electric connections: preliminary safety information

The electric panel is located inside the unit at the top of the technical compartment where the various components of the refrigerant circuit are also to be found. To access the electrical board, remove the front panel of the unit:



**The unit might be equipped with a double power supply.**
Double-check the presence of a second power line for the ATEX fan and, if present, ensure it is externally disconnected before performing any service operation.



Power connections must be made in accordance to the wiring diagram enclosed with the unit and in accordance to the norms in force.



Make sure the power supply upstream of the unit is (blocked with a switch). Check that the main switch handle is padlocked and it is applied on the handle a visible sign of warning not to operate.



It must be verified that electric supply is corresponding to the unit electric nominal data (tension, phases, frequency) reported on the label in the front panel of the unit.



Power cable and line protection must be sized according to the specification reported on the form of the wiring diagram enclosed with the unit.



The cable section must be commensurate with the calibration of the system-side protection and must take into account all the factors that may influence (temperature, type of insulation, length, etc.).



Power supply must respect the reported tolerances and limits: If those tolerances should not be respected, the warranty will be invalidated.



Flow switches must be connected following the indication reported in the wiring diagram. Never bridge flow switches connections in the terminal board. Guarantee will be invalidated if connections are altered or not properly made.



Make all connections to ground provided by law and legislation.



Before any service operation on the unit, be sure that the electric supply is disconnected.



The power line and the unit external safety devices must be sized in order to ensure the correct voltage at the maximum operating conditions of the unit reported in the wiring diagram of the unit.



Frost protection
If opened, the main switch cuts the power off to any electric heater and antifreeze device supplied with the unit, including the compressor crankcase heaters. The main switch should only be disconnected for cleaning, maintenance or unit reparation.



The unit is equipped with the ATEX connection of 4 fans to maintain a continuous ventilation in the compressor compartment.
It is recommended to connect at least 2 of the 4 fans to an external power supply (UPS) in order to guarantee ventilation of the compartment also in case of a blackout. Follow the instructions on the wiring diagram.
Provide external disconnector for the UPS line.

## 4.22 Electric data

The electrical data reported below refer to the standard unit without accessories.
In all other cases refer to the data reported in the attached electrical wiring diagrams.

The line voltage fluctuations can not be more than ±10% of the nominal value, while the voltage unbalance between one phase and another can not exceed 2%. If those tolerances should not be respected, please contact our Company.

| | | 45 | 50 | 70 | 75 | 90 | 105 | 115 | 135 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Power supply** | V/~/Hz | 400/3+N/50 | 400/3+N/50 | 400/3+N/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| **Control board** | V/~/Hz | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V |
| **Auxiliary circuit** | V/~/Hz | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 |
| **Fans power supply** | V/~/Hz | 230/1/50 | 230/1/50 | 230/1/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| **Line section** | $mm^2$ | 25 | 25 | 35 | 50 | 70 | 70 | 95 | 120 | 120 | 150 |
| **PE section** | $mm^2$ | 16 | 16 | 25 | 35 | 50 | 50 | 70 | 95 | 95 | 120 |

| | | 180 | 200 | 225 | 230 | 270 | 295 | 320 | 355 | 400 | 440 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Power supply** | V/~/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| **Control board** | V/~/Hz | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V |
| **Auxiliary circuit** | V/~/Hz | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 |
| **Fans power supply** | V/~/Hz | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 | 400/3/50 |
| **Line section** | $mm^2$ | 185 | 185 | 185 | 185 | 240 | 240 | 240 | 2x150 | 2x240 | 2x240 |
| **PE section** | $mm^2$ | 150 | 150 | 150 | 150 | 185 | 185 | 185 | 240 | 2x150 | 2x150 |

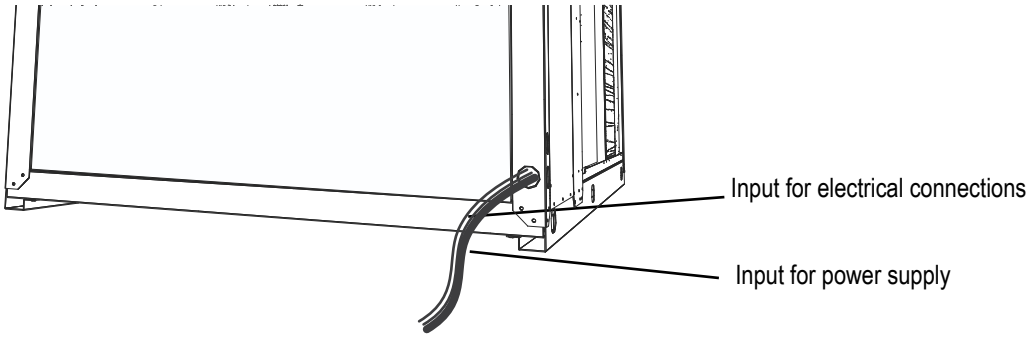
Electric data may change for updating without notice. It is therefore necessary to refer always to the wiring diagram present in the units.

The table indicates the recommended cable cross-sections for supplying the units; it will be the care and responsibility of the electrical designer to make precise estimates considering the type of installation and the type of cable used.

Copper condition only. Do not use aluminium cables.

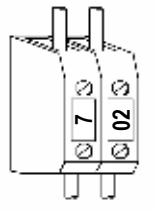
## 4.23 Electric connections

### 4.23.1 Power supply and electrical connections




### 4.23.2 Remote wiring connections (compulsory)

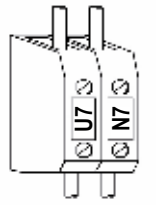
All terminals referred to in the explanations below will be found on the terminal board inside the electrical box. All electric connections mentioned below have to be made by the installer, on site.




**USER CIRCUIT WATER INLET SENSOR (BTI)**

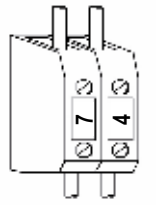
It is used to measure the return water temperature from the user circuit. The sensor is connected to terminals 7 and 02.

The standard working mode has the user pump switched off during stand-by periods (Compressors Off). The sensor must be placed in an appropriate position in order to measure the temperature of the secondary circuit. Incorrect positioning of the user water sensor can adversley affect the operation of the heat pump. The remote sensor is supplied loose with the unit (it is present inside the electric box) and it is supplied with a 3 mt. cable length. If this is too short, it is possible to increase the length by using cable of diameter 0.5 $mm^2$ up to a maximum distance of 50 meters.




**COLD CIRCUIT WATER PUMP**

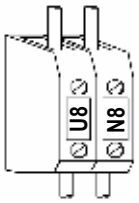
In standard configuration, the unit microprocessor controller switches off the user water pump when the set point. This strategy is suitable if the unit is heating a buffer substantial reduction of energy.




**DOMESTIC HOT WATER SENSOR (BTS)**

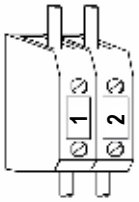
This is used to measure the return water temperature from the domestic hot water circuit. The sensor must be placed in the pocket provided in the DHW (Domestic hot water) cylinder, in an appropriate position, in order to measure the correct temperature of the domestic hot water. Incorrect positioning of the domestic hot water sensor can have an adverse effect on the operation of the heat pump. The sensor is supplied loose with the unit (it is placed inside the electric box) and it is supplied with a 3 mt. cable length. The sensor is conntected to terminals 7 and 4. If this is too short, it is possible to increase the length by using cable of diameter 0.5 mm2, up to a maximum distance of 50 meters.

The numbering of the terminals may change without notice. For their connection is mandatory to refer to the wiring diagram supplied along with the unit.

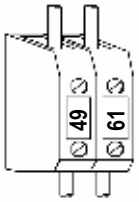



**HOT WATER CIRCUIT PUMP**
The user water pump is in standby.

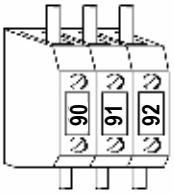
### 4.23.3 Remote wiring connections (optional)



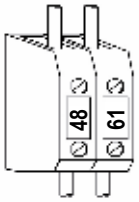

**REMOTE ON / OFF**
To switch the unit on or off remotely, the cable jumper connected across terminals 1 and 2 must be replaced with a switch.
Contact closed, unit ON,
Contact open, unit OFF.




**REMOTE SUMMER / WINTER CHANGE OVER**
To remotely switch the unit from heating to cooling, the cable jumper connected across terminals 50 and 49 must be replaced with a switch.
Contact closed, unit in Winter mode,
Contact open, unit Summer mode.

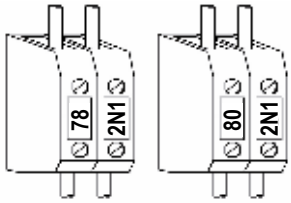



**REMOTE GENERAL ALARM**
For remote display of a general alarm, connect the visual or audible device between terminals 90-91-92.
Contacts 90/91 NC (Normally closed)
Contacts 91/92 NO (Normally opened)




**DOMESTIC HOT WATER CIRCUIT FLOW SWITCH (4P versions only)**
If a flow switch is required on the domestic hot water circuit , it must be connected across terminals 48 and 50. The unit is factory fitted with a jumper that has to be removed before installing the flow switch.

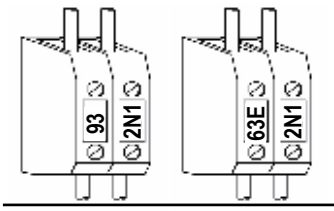
(Single circuit) (Double circuit)



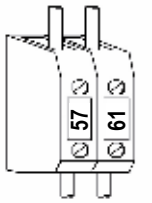

**USER CIRCUIT ELECTRIC INTEGRATION HEATERS**
If user circuit integration heaters are required, the coil of the contactor that is used to switch them must be connected across terminals 78 and 2N1.

The numbering of the terminals may change without notice. For their connection is mandatory to refer to the wiring diagram supplied along with the unit.

(Single circuit) (Double circuit)

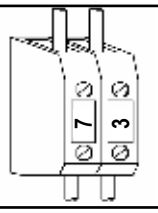



**DOMESTIC HOT WATER ELECTRIC INTEGRATION HEATERS**
If domestic hot water circuit integration heaters are required, the coil of the contactor that is used to switch them must be connected.

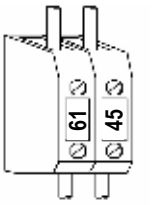



**PRIORITY SELECTOR (Hot water)**
If a priority selector switch is to be fitted, a voltage free switch has to be connected. The selector operates as follows:
Closed contact: Domestic hot water only;
Opened contact: Domestic hot water / Heating (and / or cooling);
The unit is supplied with noting connected to terminals (Open contact).

### 4.23.4 Factory fitted wiring connections




**USER CIRCUIT WATER OUTLET SENSOR (BTO)**
This is used to measure the outlet user temperature; it is also used as antifreeze protection in cooling mode; it is factory connected to terminals.




**USER CIRCUIT FLOW SWITCH (SFW1)**
This is used to protect the unit if there is a low water flow rate in the user circuit. It is factory fitted across terminals.

The numbering of the terminals may change without notice. For their connection is mandatory to refer to the wiring diagram supplied along with the unit.

# 5. UNIT START UP

## 5.1 Preliminary checks

Before starting the unit the checks detailed in this manual of the electric supply and connections, the hydraulic system and the refrigerant circuit, should be performed.



Start-up operations must be performed in accordance with the instructions detailed in the previous paragraphs.



If it is required to switch the unit on and off, never do this using the main isolator: this should only be used to disconnect the unit from the power supply when the unit is to be permanently off. Isolation will result in no supply for the crankcase heater and on start up the compressor could be seriously damaged.



Be sure to remove caps from the leak detector before starting.



In the extra low noise versions, be sure to remove the yellow hardware at the base of the compressor before starting.

### 5.1.1 Before start-up



In case of leak detection option. Wait a few minutes for leak sensor warmup.



Damage can occur during shipment or installation. It is recommended that a detailed check is made, before the installation of the unit, for possible refrigerant leakages caused by breakage of capillaries, pressure switch connections, tampering of the refrigerant pipework, vibration during transport or general abuse suffered by the unit.

- Verify that the unit is installed in a workmanlike manner and in accordance with the guidelines in this manual.
- Check that all power cables are properly connected and all terminals are correctly fixed.
- The operating voltage between phases is the one shown on the unit labels.
- Check that the unit is connected to the system earth.
- Check that there is no refrigerant leakage.
- Check for oil stains, sign of a possible leak.
- Check that the refrigerant circuit shows the correct standing pressure on the pressure gauges (if present) otherwise use external ones.
- Check that the Shrader port caps are the correct type and are tightly closed.
- Check that crankcase heaters are powered correctly (if present).
- Check that all water connections are properly installed and all indications on unit labels are observed.
- The system must be flushed, filled and vented in order to eliminate any air.
- Check that the water temperatures are within the operation limits reported in the manual.
- Before start up check that all panels are replaced in the proper position and locked with fastening screws.



Switch on the unit and check the correct operation of the ATEX fans in the unit's subframe.

Do not modify internal wiring of the unit as this will immediately invalidate the warranty.

Crankcase heaters must be powered at least 12 hours before start up (pre-heating period) To do this, isolate the compressor(s), fans and pump(s) in the electrics box and then switch on the main isolator (heaters are automatically supplied when the main switch is closed). The crankcase heaters are working properly if, after several minutes, the compressor crankcase temperature is about 10÷15°C higher than ambient temperature.

During the 12 hours pre-heating period it is also important to check that the label OFF is shown on the display or that the unit is on stand-by mode. If there is an accidental start-up before the 12 hours pre-heating period has elapsed, the compressors could be seriously damaged and therefore the warranty will immediately terminate .

### 5.1.2 Device Set-point Differential Reset

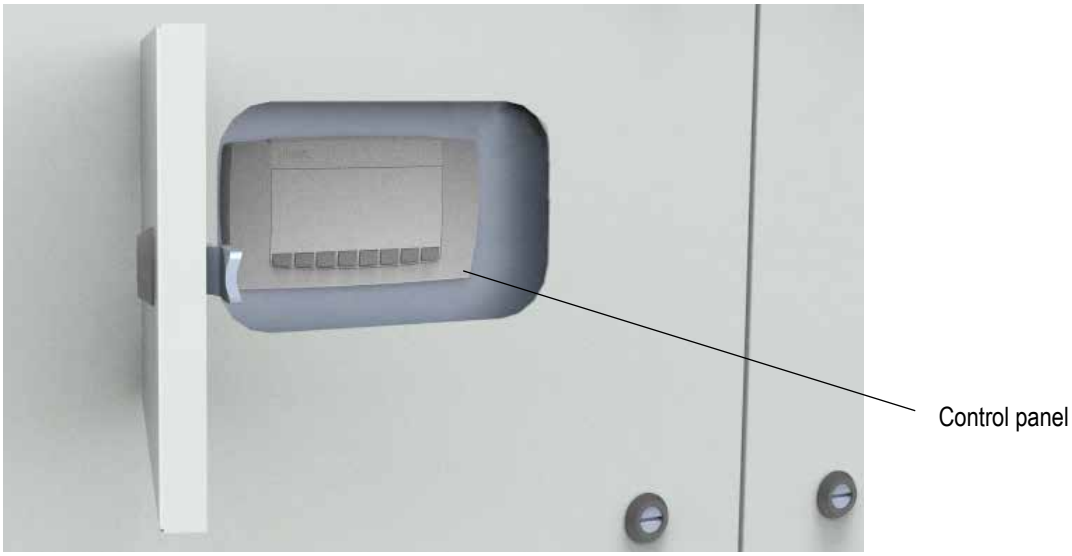
| Device | | Set-point | Differential | Reset |
|---|---|---|---|---|
| Heating mode | °C | 35 | 4 | ----- |
| Domestic hot water mode | °C | 50 | 4 | ----- |
| Cooling mode | °C | 23 | 4 | ----- |
| High pressure switch | Bar | 45 | 7 | Manual |
| Water safety valve (Present in A versions only) | Bar | 6,0 | | Automatic |

If the unit is required for heating/cooling only (without domestic hot water production) the internal parameter of the microprocessor FS1 has to be modified from 2 to 1 in order to avoid configuration alarms. Please contact the company for support.

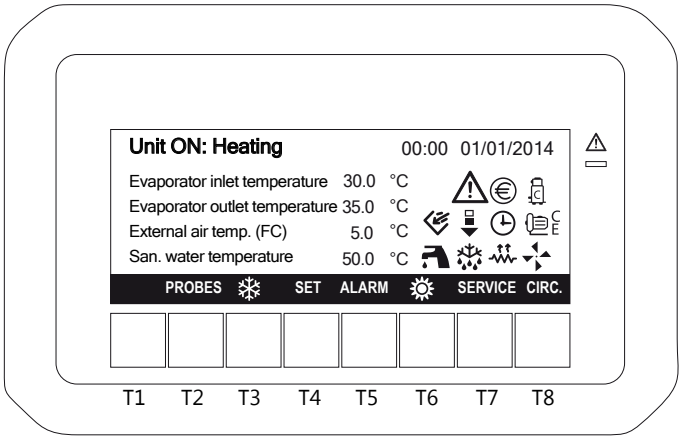
### 5.1.3 Controls during unit operation

- Check the rotation of the compressors and fans. If the rotation is incorrect, disconnect the main switch and change over any two phases of the incoming main supply to reverse motor rotation (only for units with three-phase fan motors).
- After several hours of operation, check that the sight glass has a green colour core: if the core is yellow moisture is present in the circuit. In this event it is necessary for dehydration of the circuit to take place. This must be performed by qualified people only. Check that there are no continuous vapour bubbles present at the sight glass. This would indicate a shortage of refrigerant. A few vapour bubbles are acceptable.
- Few minutes after start up, check that the equivalent temperature of the refrigerant gas, measured at the pressure inside the finned coil with fans running at full speed, differs from the outside air temperature of about 7-10°C; also verify that the equivalent temperature of the refrigerant gas, measured at the pressure in the plate heat exchanger, differs from the temperature of the water outlet from the exchanger of about 3-5°C .

## 5.2 Position of the control panel




## 5.3 Description of the control panel



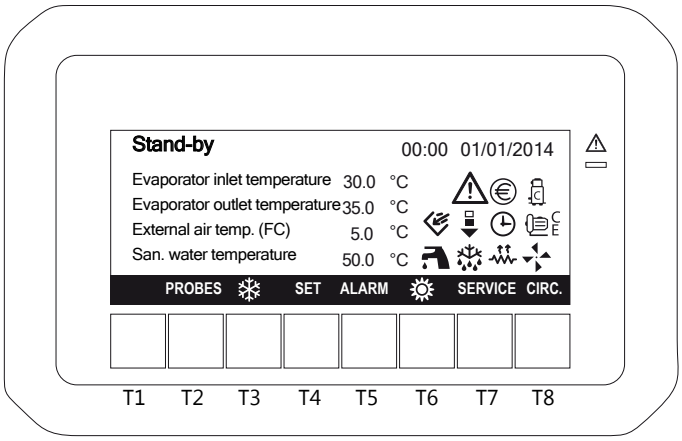

### 5.3.1 Display icons

| Icon | Meaning | Icon | Meaning |
|---|---|---|---|
| | Number of compressors in operation. | | Indicates that the electric heaters are active. |
| | Water pump | | Economy or ON/OFF by timetable. |
| | Indicates that the fans are working. | | Free cooling is active (not available). |
| | Indicates that an alarm is active. | | Domestic hot water. |
| | Economy function | | Indicates that the defrost is active. |
| | Unloading function (not available). | CH | Only cooling mode (chiller) |
| HP | Heat pump mode | HW | Domestico hot water mode |

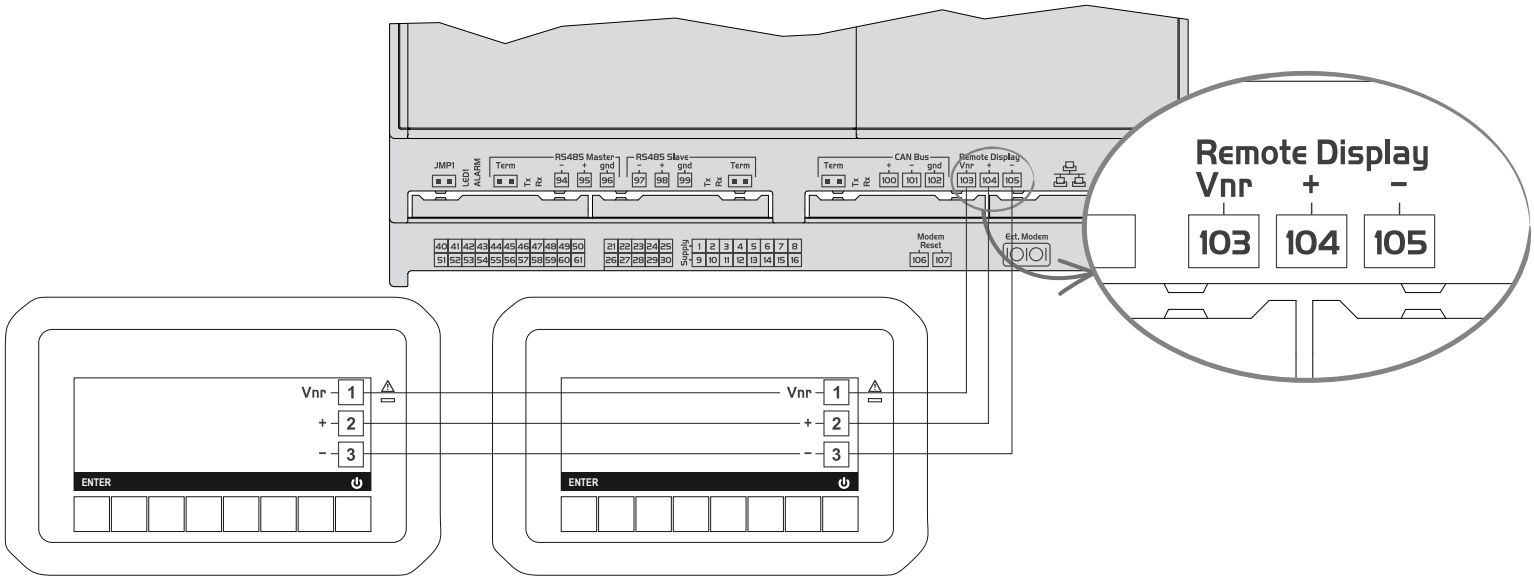
### 5.3.2 Key function

| | | |
|---|---|---|
| T2: | PROBES | Allows to read the value of the probes configured |
| T3: | ❄ | Allows to switch on the unit in cooling mode |
| T4: | SET | Allows to read and modify the set point |
| T5: | ALARM | Allows to read and reset the alarms |
| T6: | ☼ | Allows to switch on the unit in heating mode |
| T7: | SERVICE | Allows to enter the SERVICE menù |
| T8: | CIRC | Allows to read the main information of the circuits (compressor status, water pump status, pressure probe value,…) |

When the unit is turned on, the display will be as follows:



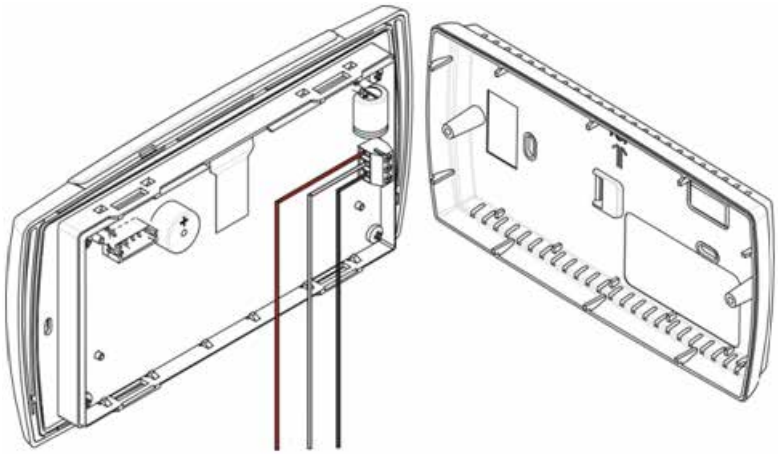
## 5.4 Remote keyboard connection




The remote control panel can be remotely up to a maximum distance of 100 meters from the unit.
In case the supply bipolarity is not respected, the remote control and the programmable control iPro.CHILL can be seriously damaged.

- In case of power supply failure, the keyboard doesn't work.
- In case of comunication problems, the display shows "noL" message.

### 5.4.1 Wall mounting connection diagram



# 6. USE

## 6.1 Switch the unit on

Unit switch-on and switch-off can take place:
• From the keyboard
• From digital input configured as remote ON/OFF



Before first start-up, consult and carry out the operations described in the paragraph “Periodical and start up checks”.

### 6.1.1 Switch the unit on from the keyboard

**Cooling mode**
To start the unit in the cooling mode, press the key. The icon appears on the display.
If requested, the compressor safety delay countdown starts and the compressor icon flashes. The water pump will be activated after few seconds, and then, once the compressor countdown has finished, the compressor starts and the icon remains on. The display shows the user water inlet temperature and Domestic hot water inlet temperature.

**Heating mode**
To start the unit in heating mode, press the key. The icon appears on the display.
If requested, the compressor safety delay countdown starts and the compressor icon flashes. The water pump will be activated after few seconds and then, once the compressor countdown has finished, the compressor starts and the icon remains on. The display shows the user water inlet temperature and Domestic hot water inlet temperature.

**Hot water mode**
At the first start up, the unit microprocessor control checks the hot water inlet temperature measured by the sensor BTS (this has priority over the other parameters) and, if the measured temperature is lower than the hot water set point , it will activate the hot water mode automatically. In P4S version, if the unit is required to operate in cooling and hot water mode the microprocessor control will activate both functions at the same time. If hot water is not required, the microprocessor control will activate cooling mode only.

In stand-by mode, the controller gives the possibility to:
• display the set values
• manage alarms, theyr display and reports.



If it is required to switch the unit on and off, never do this using the main isolator: this should only be used to disconnect the unit from the power supply when the unit is to be permanently off. Isolation will result in no supply for the crankcase heater and on start up the compressor could be seriously damaged.

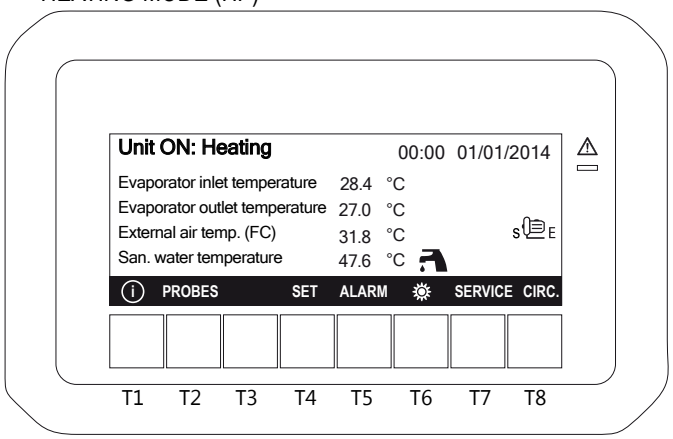


P4 unit must always operate in chiller mode: heating request will be automatically manage while priority.

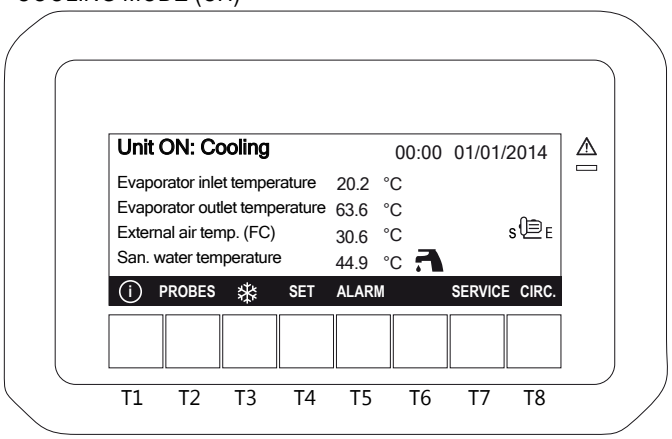
### 6.1.2 Heating and cooling mode

The display shows the typical visualization during the unit working in:

HEATING MODE (HP)

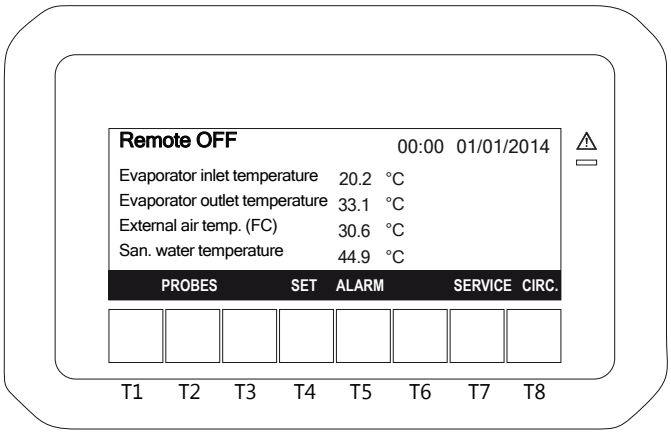



COOLING MODE (CH)




### 6.1.3 Switch the unit on from from digital input

If the unit is switch off by remote digital input, the display shows:

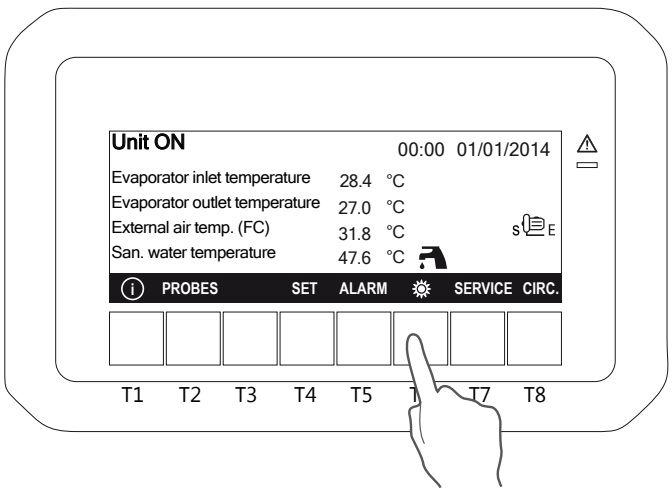


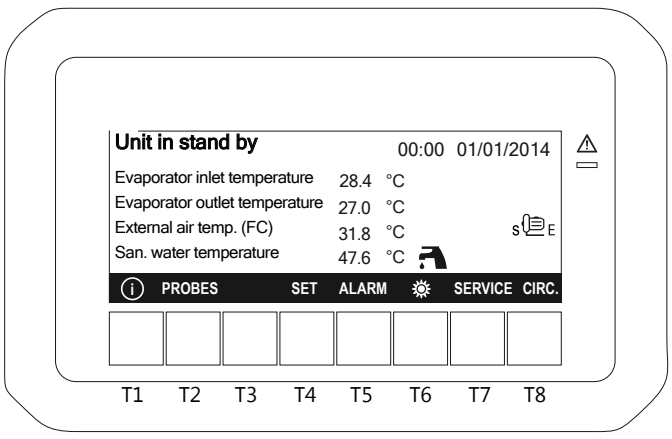

When the digital input is not active, the unit is in OFF mode

- The remote input has the priority with respect to the keyboard
- The unit can only be switched-on and off if the remote input is activated

## 6.2 Stop

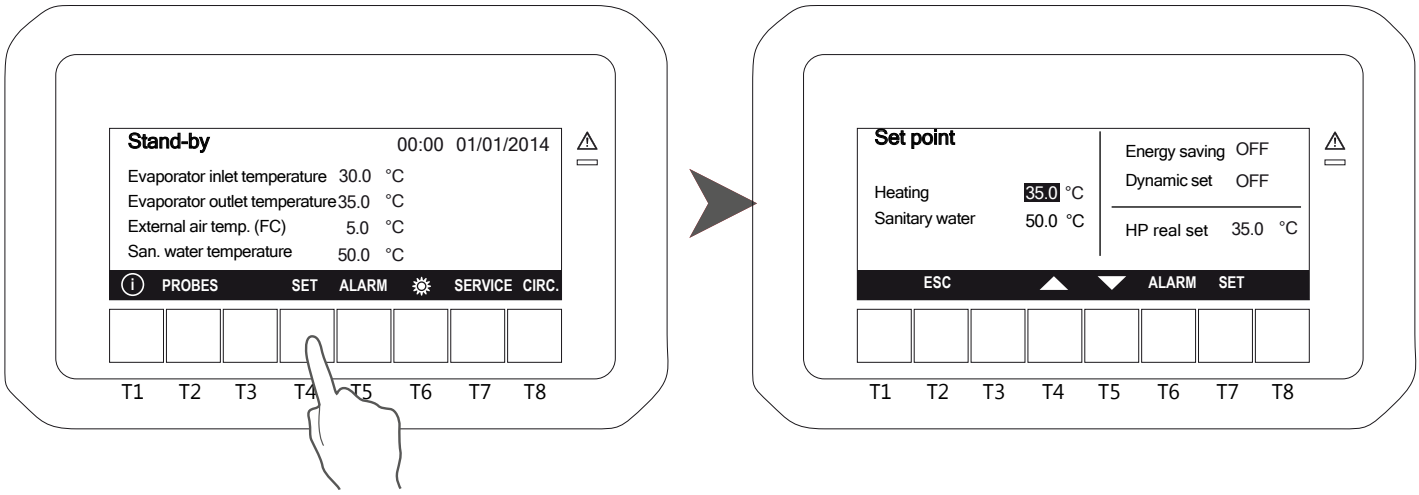
To switch the unit off press the key ❄



## 6.3 Set point

To change the set-point from the main screen, press **SET**.




To modify the values, move the cursor with T4; press **SET** to select, the value starts blinking, change the data pressing T4 and T5. Once the required value is reached, press again **SET** to confirm.
The cursor will automatically position itself on the next value, to modify it, repeat the operation just described.
In this screen it is also possible to verify (but not modify) whether the energy saving mode and dynamic set are active.

Press **ESC** to go back to the main menu.

All set points refer to the return temperature from the plant. In case hot water at 45°C is requested and the Δt is 5°C, then the set point must be set at 40°C. In case the Δt is 8°C, then the set point must be set at 37°C. In case cold water is requested, for example at 15°C and the Δt is 5°C, then the set point must be set at 20°C. If the Δt is 8°C, then the set point must be set at 23°C.

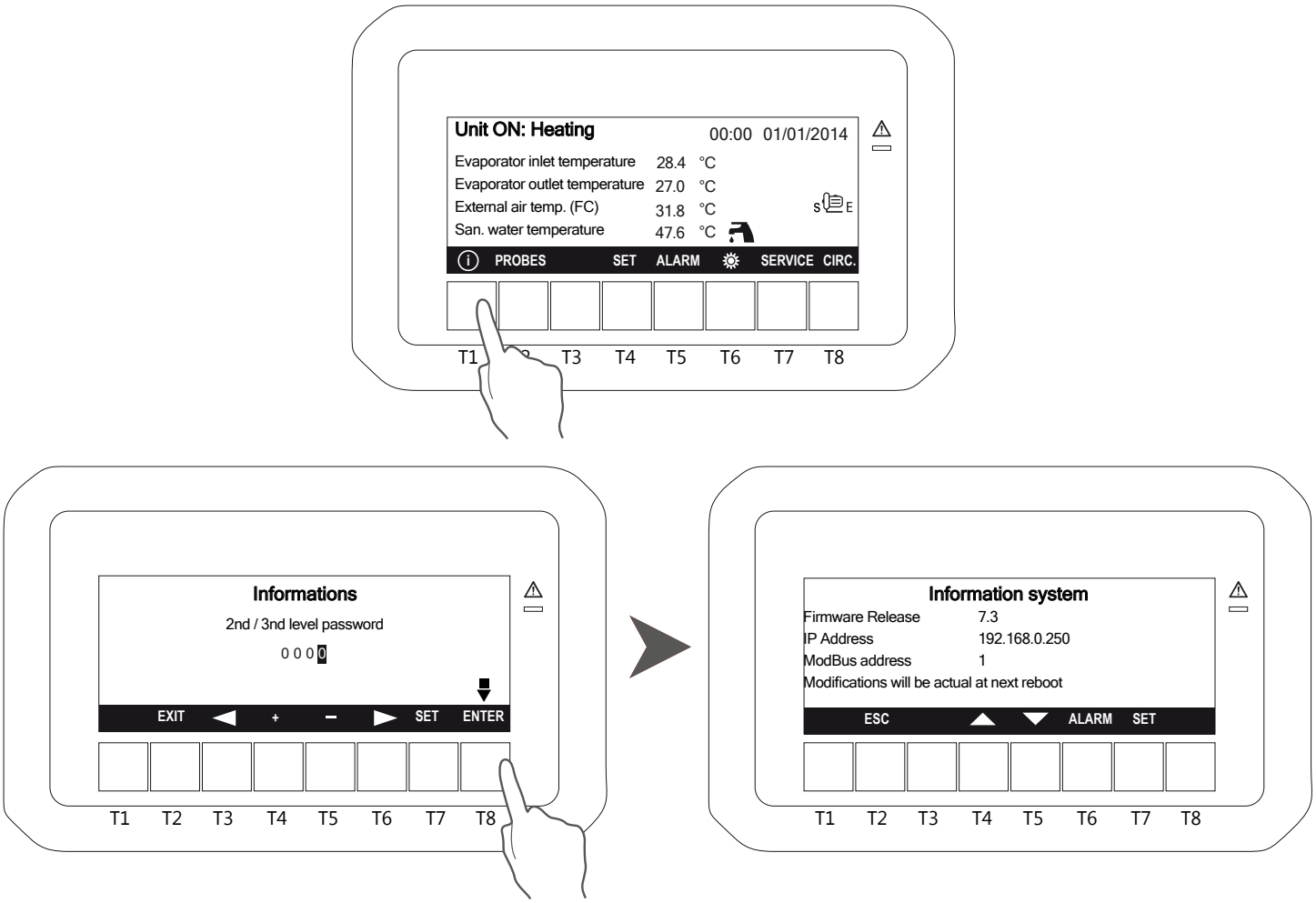
### 6.3.1 Adjustable parameters

The adjustable set point that can be modified by the end user are:

| Function | Adjustment limit | Default value |
|---|---|---|
| Heating set-point | 10÷55°C | 35°C |
| Hot water set-point | 20÷55°C | 50°C |
| Cooling set-point | 10÷25°C | 23°C |
| Set point compensation | 0÷15°C | 10°C |
| Password | (Contact the company) | |

The units are supplied with a very sophisticated control system with many other parameters that are not adjustable by the end user; these parameters are protected by a manufacturer password.

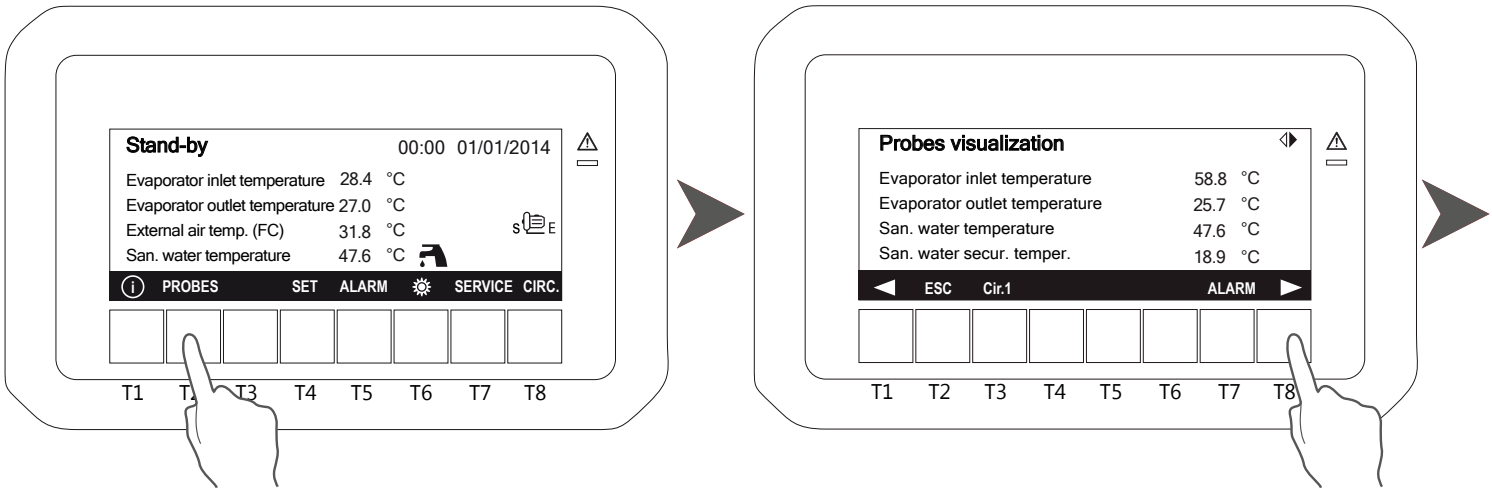
### 6.3.2 Change IP address



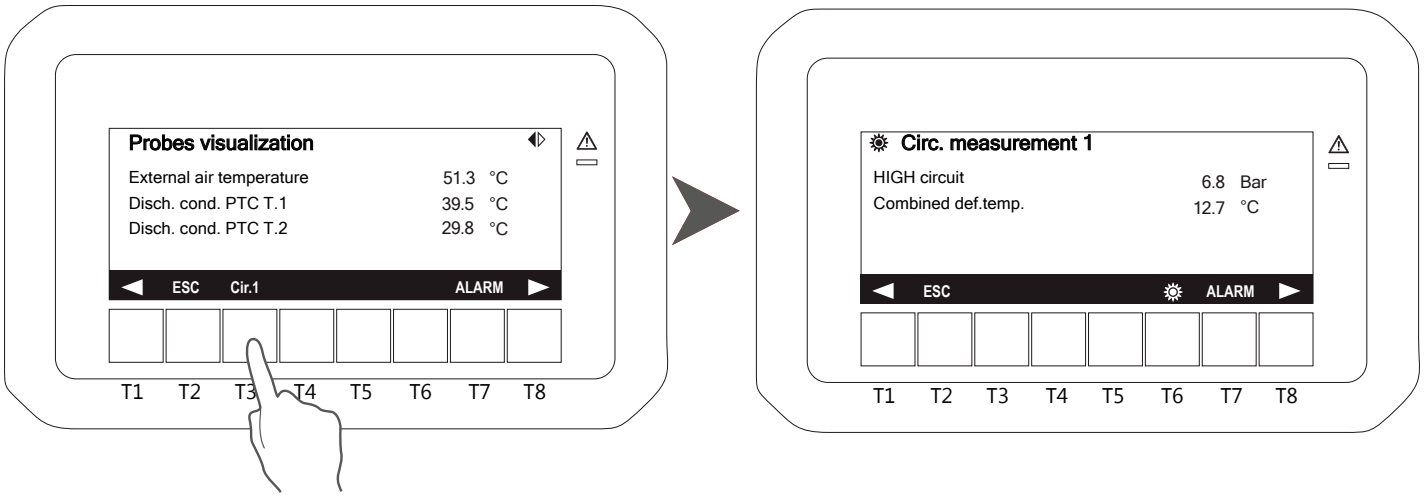

To change other network elements such as gateways, subnets, connect to the control panel. A notebook and a network cable are required.

## 6.4 PROBES key

To view all the parameters measured by the sensors of the unit press **PROBES**;




By pressing the T8 key, all relevant values of the circuit will be displayed

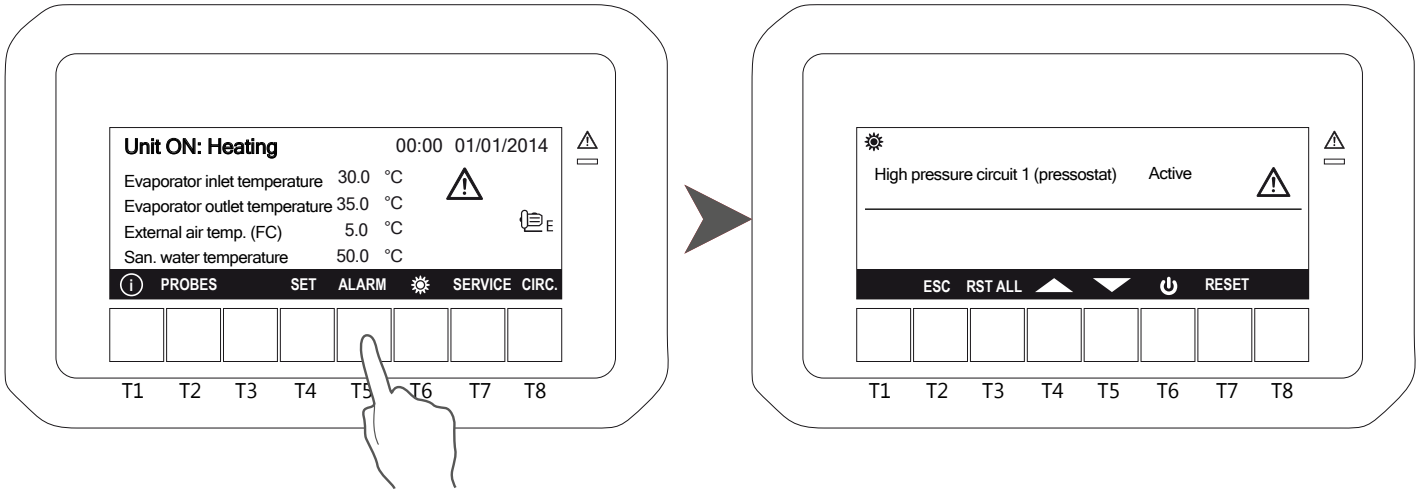



Press **ESC** to go back to the main menu.

## 6.5 ALARM key

When the alarm occurs, the display shows the icon ⚠ blinking.

Press **ALARM** key to read the alarm status:



The alarm status can be:

• **Reset:** the alarm is not active and it is possible to reset it. Press T4 and T5 keys to select the alarm to select it and press **SET** key to reset the alarm.
• **Password**: in this case the alarm is no longer active, but you need a password to reset it (please contact the Company).
• **Active**: the alarm is still active and it is not possible to reset it.

In case more resettable alarms are present, it's possible to reset all of them at once pressing **RST ALL** key.
In any case, even if all the alarms are reset, they remain present in the alarm history.

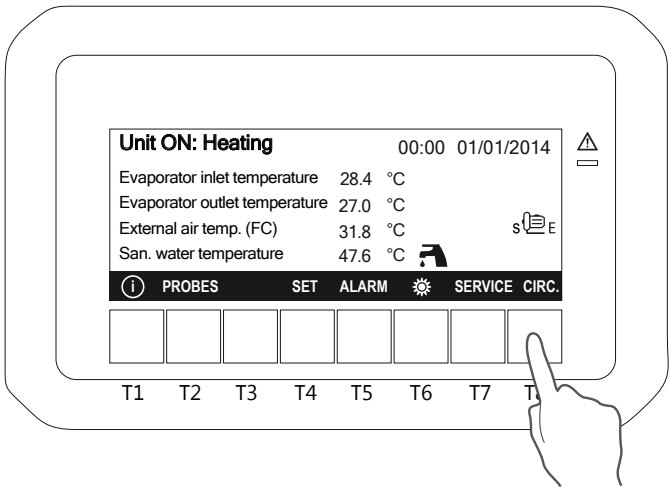
## 6.6 CIRC key

Pressing **CIRC** can view the different parameters of the unit:

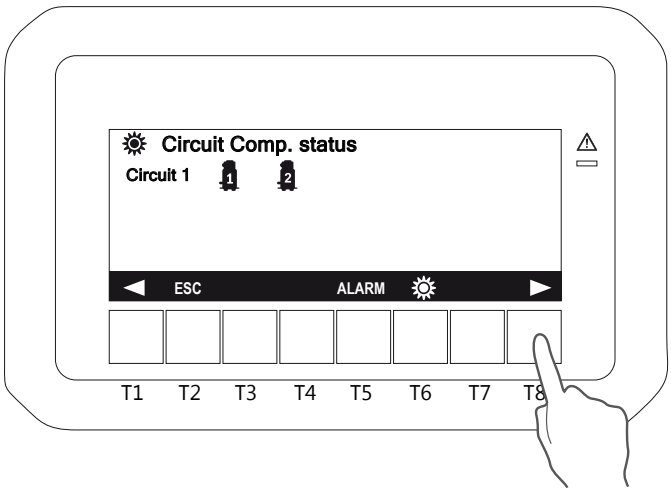
Pressing T1 and T8 you move from one screen to another.

**State of the compressors**; the display shows compressors present in each circuit and the activation status of each one.
**Color black:** compressor running
**Color white:** compressor on standby

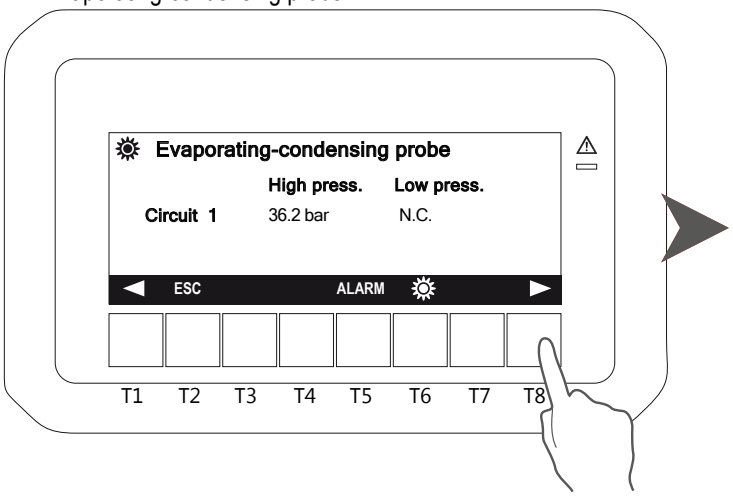
In case of use of compressors in part-loading (typically screw compressors) an icon appears to the right of the compressor showing the level of step control.
In case of use of On/Off compressors (Scroll) no icon appear to the right of the compressor.



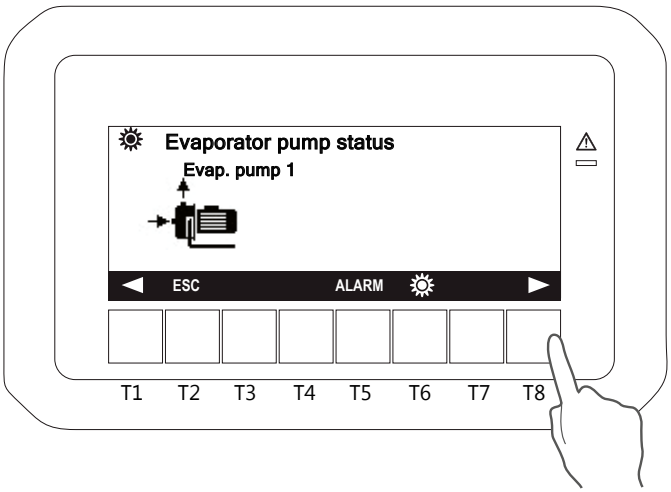

Compressor status



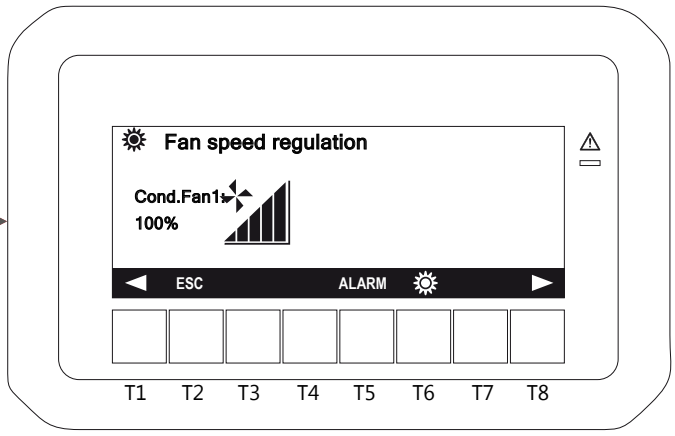

Evaporating-condensing probe



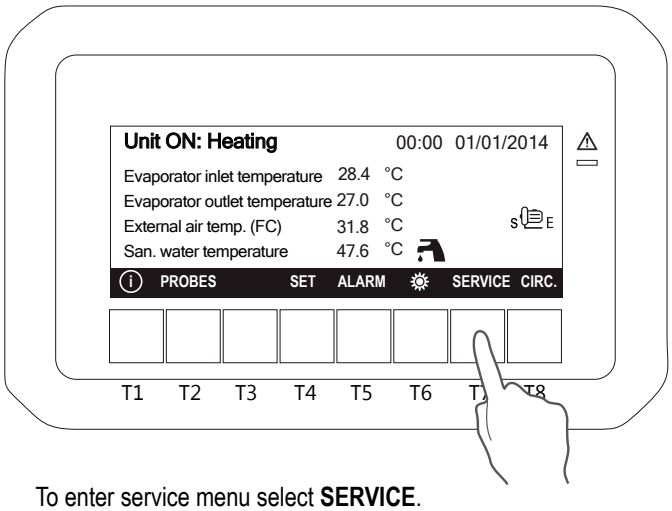
Evaporator pump status

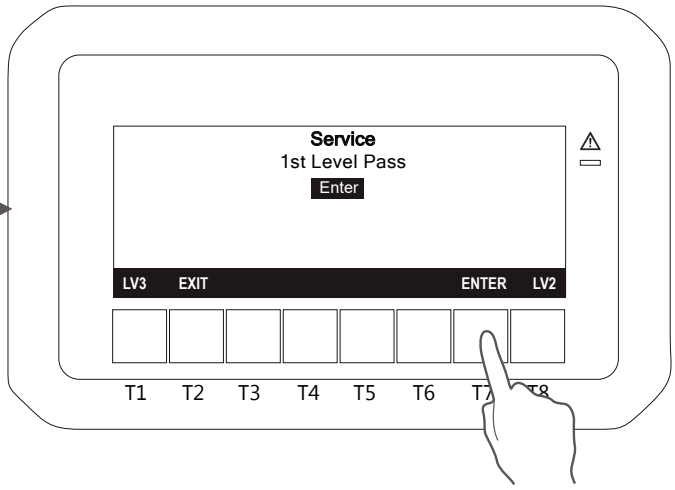



Fan speed regulation

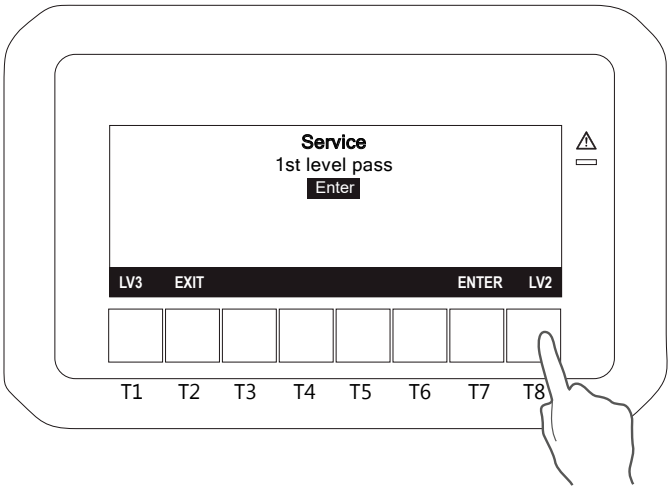


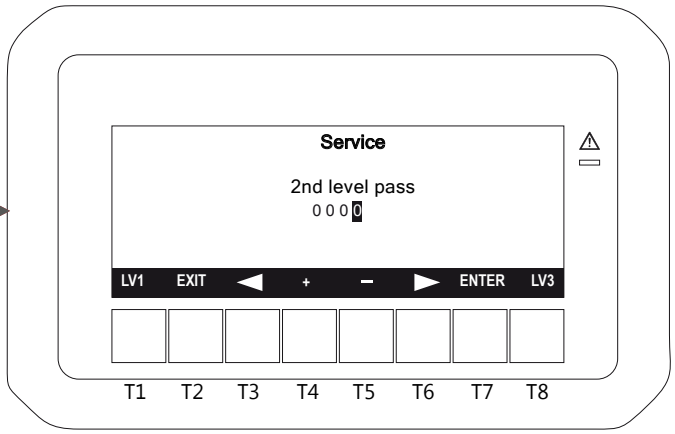

## 6.7 SERVICE key

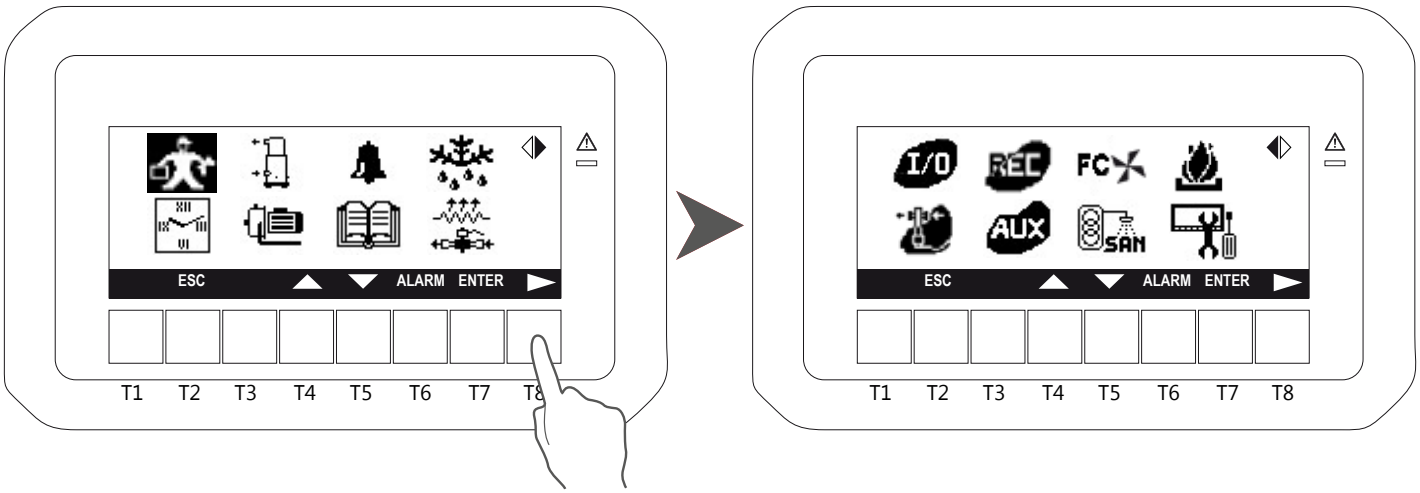



To enter service menu select **SERVICE**.
The system prompts you to enter the password to access to different levels of security; press **ENTER** to enter the first level or press T1 and T8 keys to enter in the other levels.






Press the **ENTER** key from main screen to access the following menus:

| | | | |
|---|---|---|---|
| | Setting parameters (for service only) | | Expansion Valve |
| | Time and date setting | I/O | I/O status (Inputs and Outputs) |
| | Compressors status | REC | Recovery (Not available) |
| | Pumps | AUX | Auxiliary outputs |
| | Display of alarms | FC | Free cooling (Not available) |
| | Alarm history | SAN | Domestic hot water (if available) |
| | Defrost (if available) | | Auxiliary heating (if available) |
| | Electrical heater and pump down valve status | | Control panel |

Press T8 key to display all the menu available.

Move between the available menu using the T4 and T5 keys, press **ENTER** to select the required menu.

To modify the value of the parameter: press T4 and T5 to select the parameter to modify then press **SET** the value start to blinking, press T4 and T5 to modify, than press **SET** again to confirm.

### 6.7.1 Service parameters setting

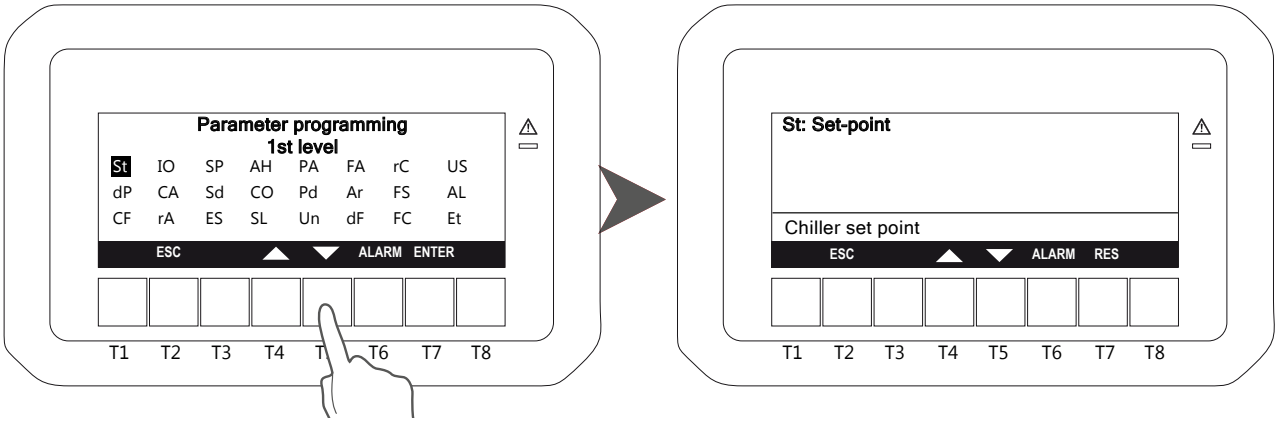
To enter this menu select  moving between the icons with the keys T4 and T5 and press **SET**.

With password level 1 you could only change the Set Point (**St**), Serial address (**SP**), dynamic Set point (**Sd**), Energy saving (**ES**) and parameters of sanitary circuit (**FS**); the unit must be in stand-by. Press **SET** to enter in the group of parameters. Other parameters can be modified by pressing **LV2** and **LV3** keys by service people only with a dedicated password.

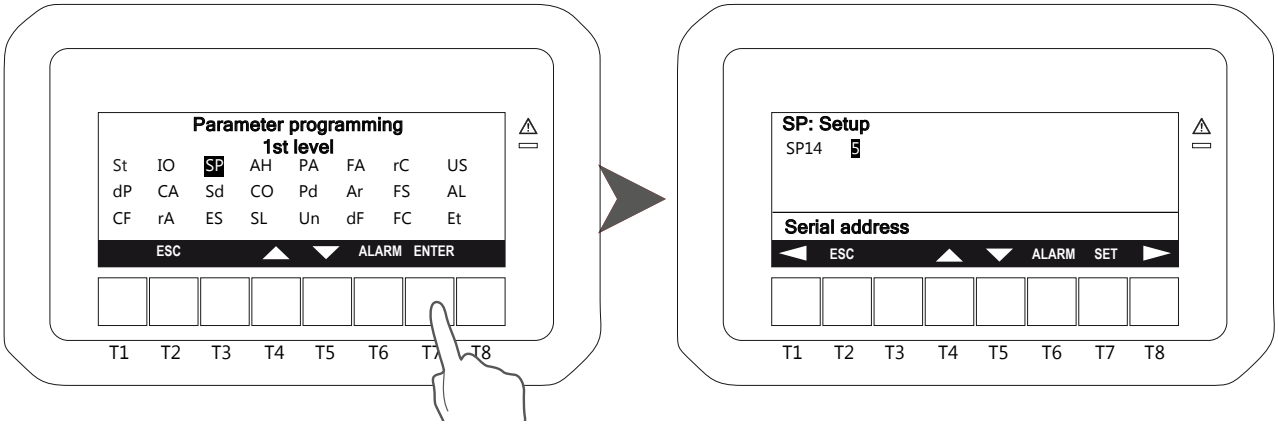
Parameters list:

| Code | Meaning | Code | Meaning |
|---|---|---|---|
| **ST** | Temperature control parameters | **FA** | Ventilation parameters |
| **DP** | Variables to be shown on the keyboard | **Ar** | Anti-freeze heaters parameters |
| **CF** | Configuration parameters | **dF** | Defrost parameters |
| **SP** | Parameters for machine set up | **rC** | Not available |
| **Sd** | Dynamic set-point parameters | **FS** | Production of domestic hot water parameters |
| **ES** | Energy saving and automatic timed switch-on/off parameters | **FC** | Not available |
| **AH** | Auxiliary heating parameters | **US** | Auxiliary output parameters |
| **CO** | Compressor parameters | **AL** | Alarm parameters |
| **SL** | Stepless compressor parameters | **Et** | Not available |
| **PA** | Evaporator/condenser water pump parameters | **IO** | Inputs/outputs configuration parameters |
| **Pd** | Not available | **CA** | Not available |
| **Un** | Unloading function parameters | **RA** | Analog input range parameters |

The values available in the group of parameters “Set point” (**St**) are: summer set point (St01) and winter set point (St04).

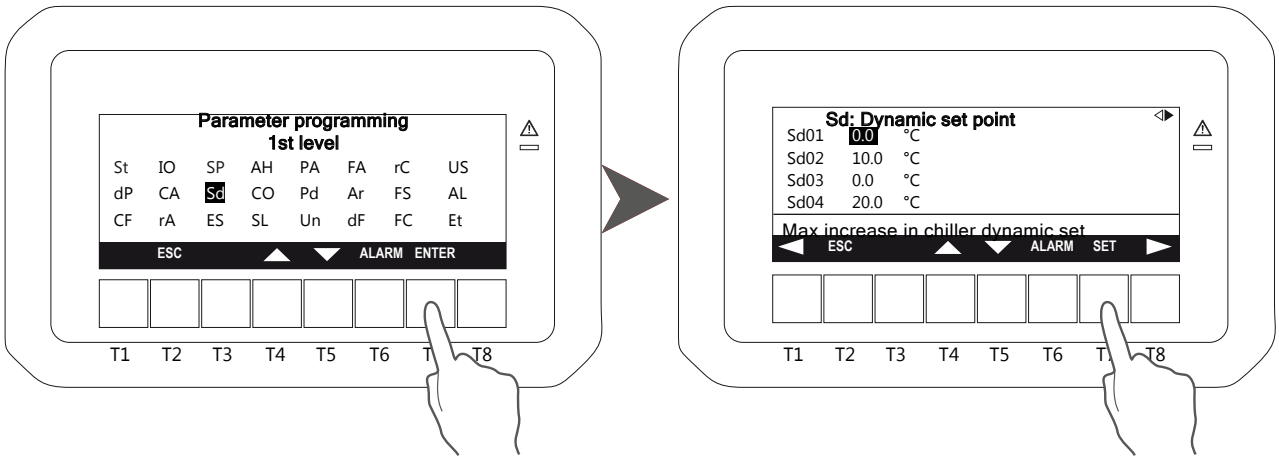



Setup parameters (**SP**): make possible to modify the serial address.



To modify the value of the parameter press **SET** key, the value start to blinking, press T4 and T5 o modify, than press **SET** again to confirm.

The values available in the group of parameters “Dynamic set point” (**Sd**) are: dynamic set point: summer offset (Sd01), dynamic set point: winter offset (Sd02), dynamic set point: summer outside temp. (Sd03), dynamic set point: winter outside temp. (Sd04), dynamic set point: summer differential temp. (Sd05) and dynamic set point: winter differential temp.(Sd06).
For more informations about the parameters see par. 6.3.1 and 6.3.2.

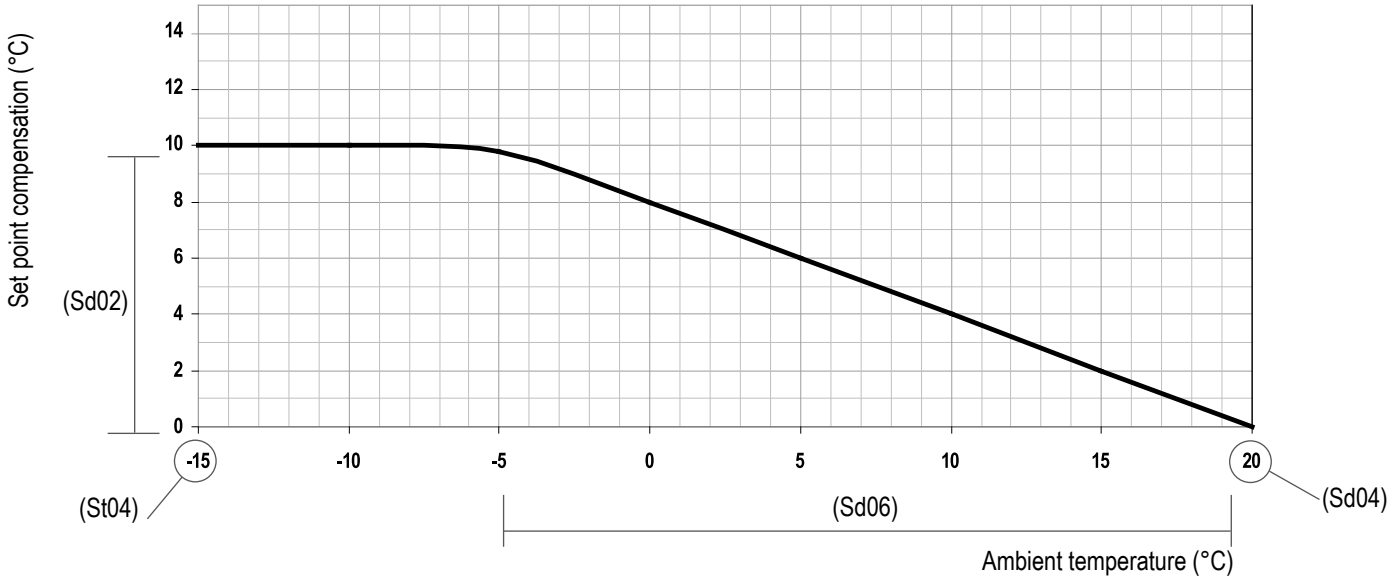



Press T4 and T5 keys to select the parameter.

To modify the value of the parameter press **SET** key, the value start to blinking, press T4 and T5 keys to modify, than press **SET** again to confirm.

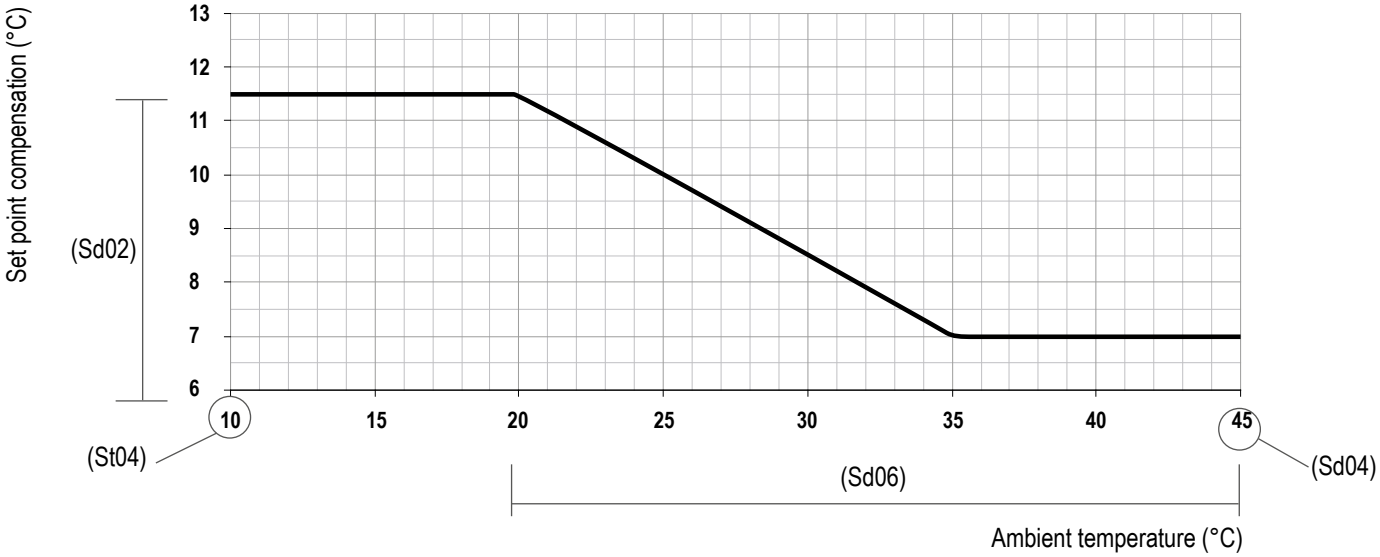
**Weather compensated function**

This function makes it possible to activate the weather compensation sensor in order to optimize the efficiency of the unit. Automatically it modifies the set-point value with respect to external air temperature: a calculation is performed on the set-point to provide a revised value of set point for higher ambient conditions (see example given below). This function makes it possible to save energy and to operate the unit in severe ambient conditions. This function is only active in heating mode.

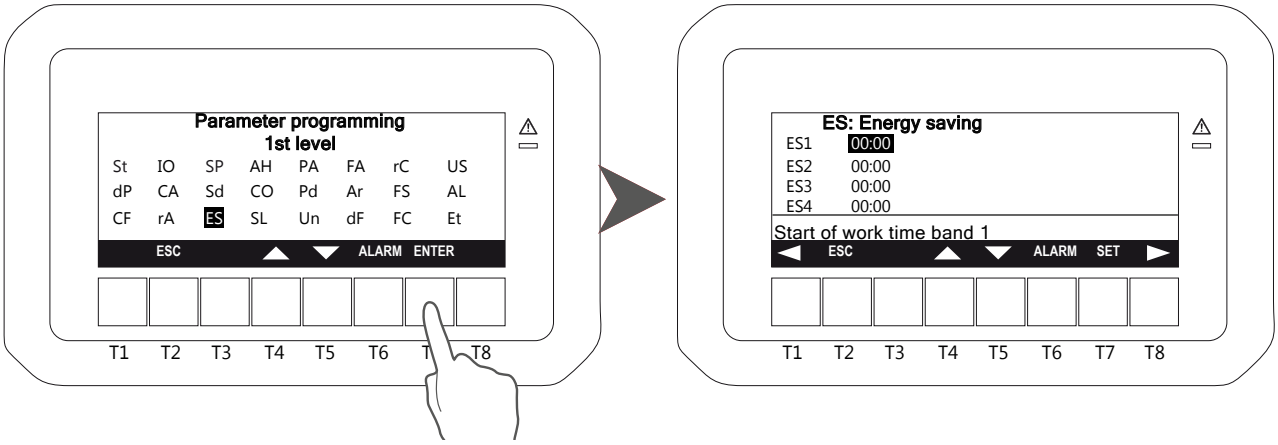



All units are factory set with the weather compensated function activated. The slope starts at +20°C with a differential of 10°C.

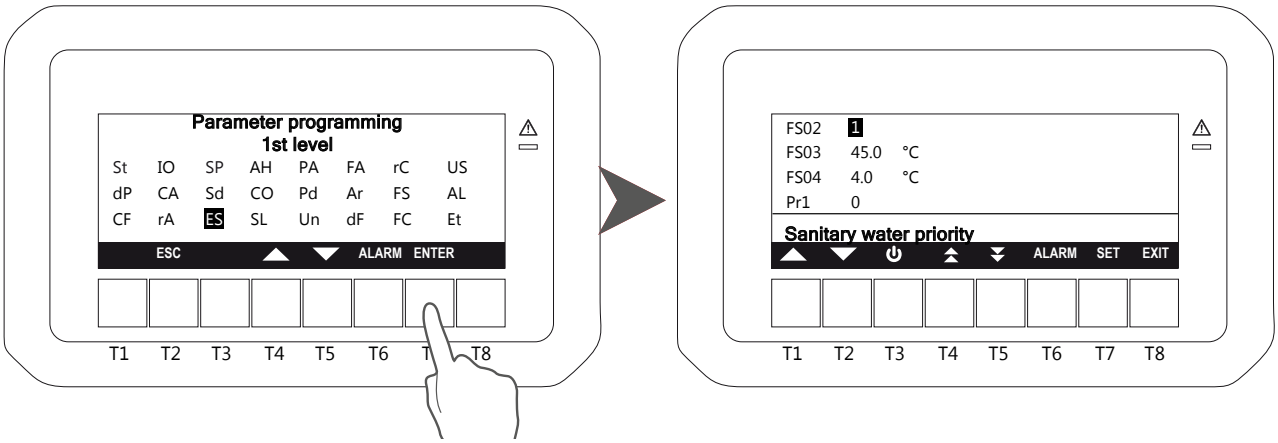
With the energy saving mode activated, if the SET key is pressed twice the bottom of the display shows the SEtTR (weather compensated set point) label that is the specific set point calculated by the microprocessor control for the measured ambient temperature condition.




Energy saving (**ES**)



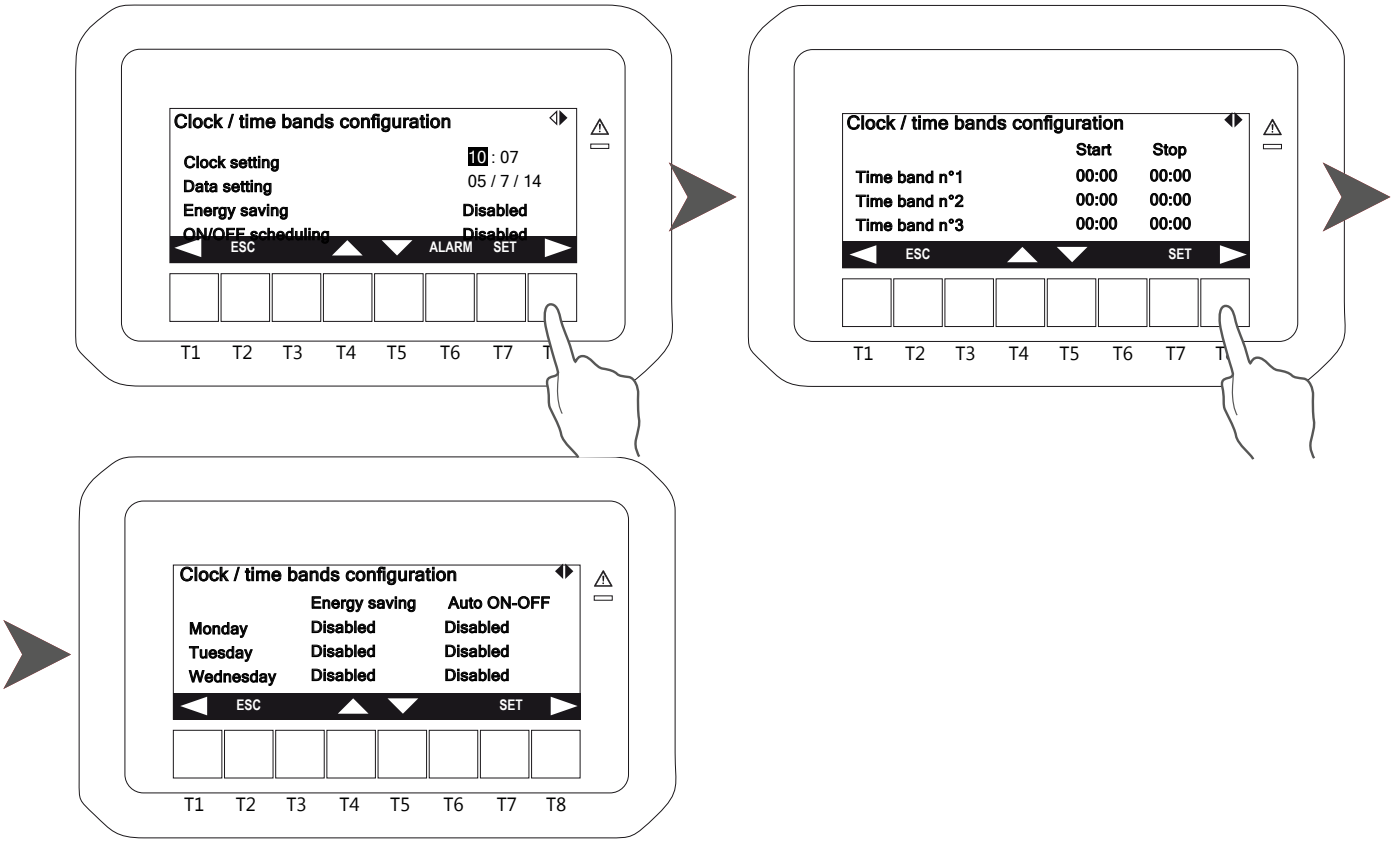

The values available in the group of parameters “Sanitary circuit” (**FS**) are: Sanitary water priority (FS02), Sanitary water set point (FS03), Sanitary water proportional band (FS04) .



### 6.7.2 Setting date and time

To enter this menu select  moving between the icons with the keys T4 and T5 and press **SET**.

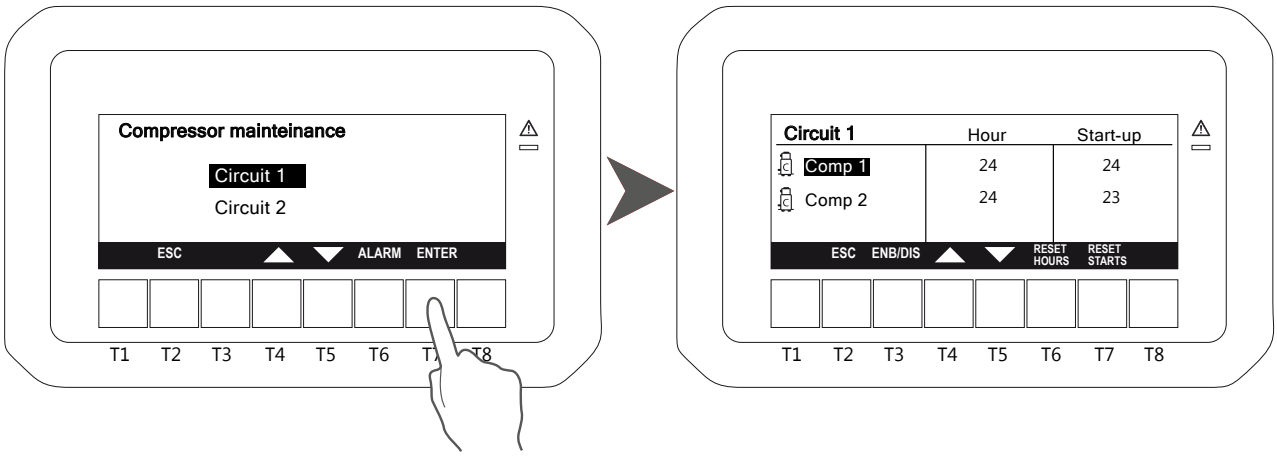
Press T4 and T5 to select the value you want to edit than press **SET**. The selected parameter will start blinking, press T4 and T5 to set the value and than press **SET** to confirm.
Pressing T8 it is possible to read the information about the Energy saving, ON/OFF scheduling and time bands. To modify the hour of the time band and to enable the function is necessary to insert the password, in case you do not have a password, you can only view the different parameters..




### 6.7.3 Compressor maintenance

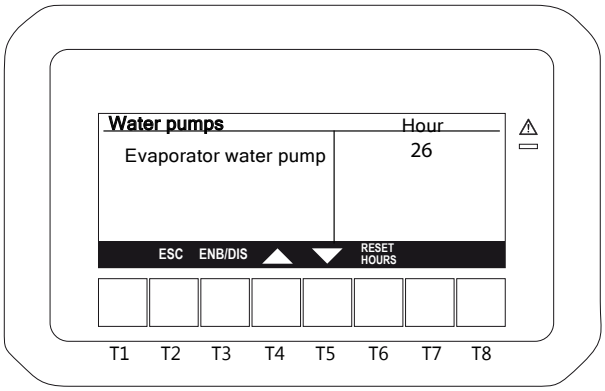
To enter this menu select  moving between the icons with the keys T4 and T5 and press **SET**.

It is possible to display the compressors working hour and the number of activations. Select the circuit with the keys T4 and T5 than press **SET** to display the parameters. The disabling function of the compressors **ENB DIS** and the reset functions **RESET HOURS**, **RESET STARTS** are only possible by service people.



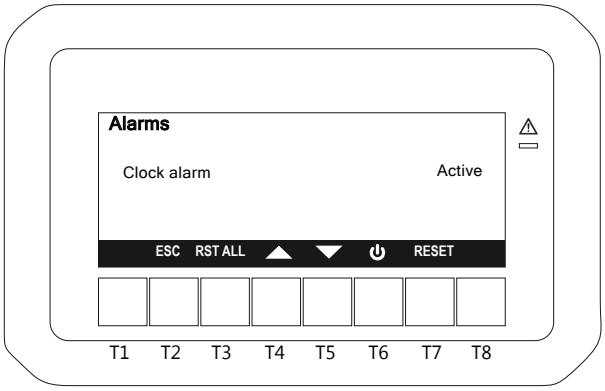
### 6.7.4 Water pumps

To enter this menu select  moving between the icons with the keys T4 and T5 and press **SET**.
It is possible to display the working hours of water pumps. The function **RESET HOURS** is only possible by service people.



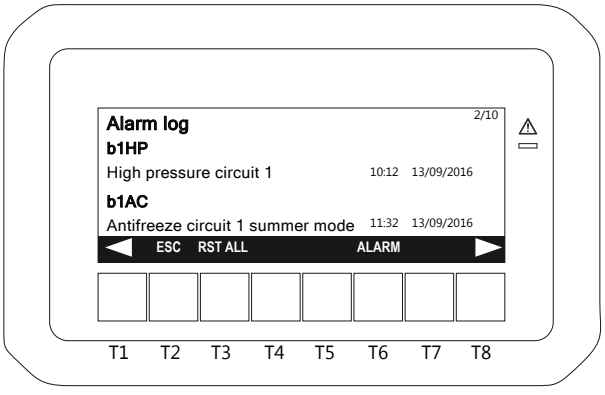

### 6.7.5 Alarms

To enter this menu select  moving between the icons with the keys T4 and T5 and press **SET**.




### 6.7.6 Alarm log

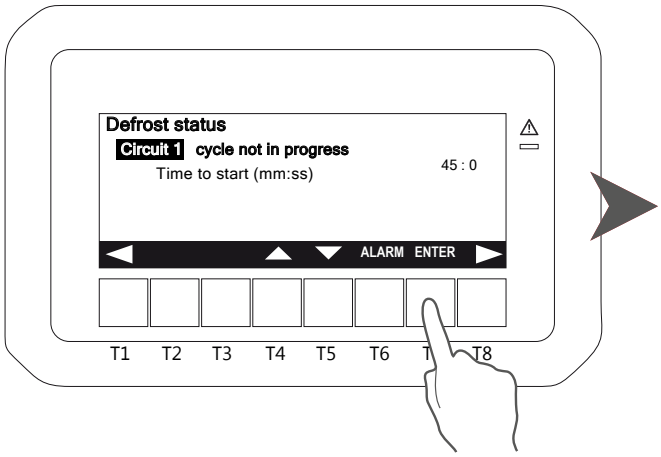
To enter this menu select  moving between the icons with the keys T4 and T5 and press **SET**.
Pressing T1 and T8 it is possible to read the last 99 alarms. The function of reset of all alarms **RST ALL** is only possible by service people.



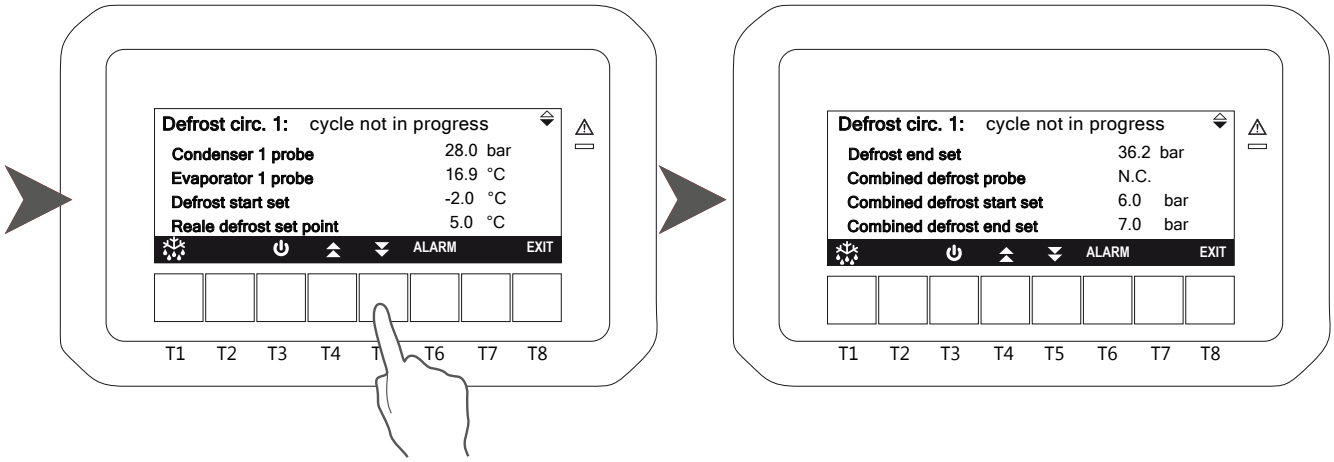
### 6.7.7 Defrost

To enter this menu select  moving between the icons with the keys T4 and T5 and press **SET**.

For each circuit it is possible to read the status of the defrost and, after selecting the circuit, pressing the **ENTER** key it is possible to display some parameters relating to the defrosting of the circuit (values related to the probes and to the set points).



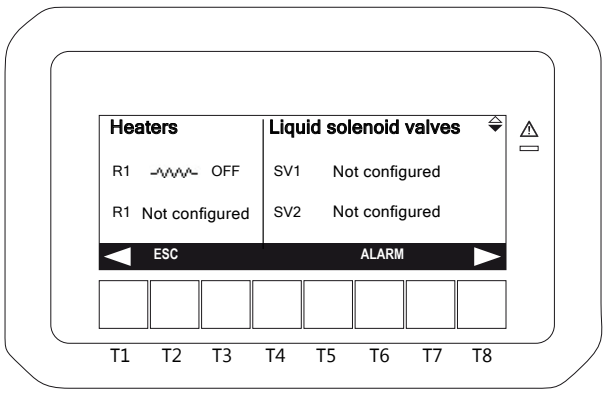

Press T4 and T5 to display all the available parameters.




### 6.7.8 Eletrical heater

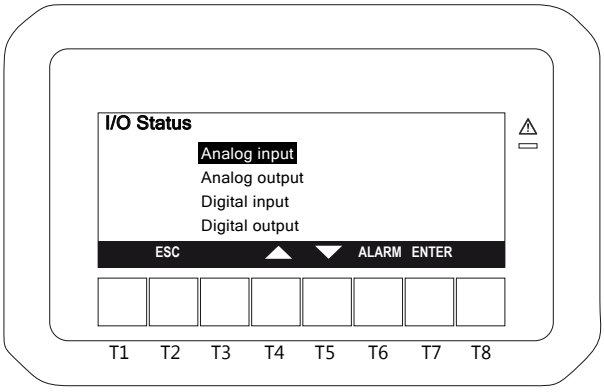
To enter this menu select  moving between the icons with the keys T4 and T5 and press **SET**.

It is possible to read the status of the electrical heaters.



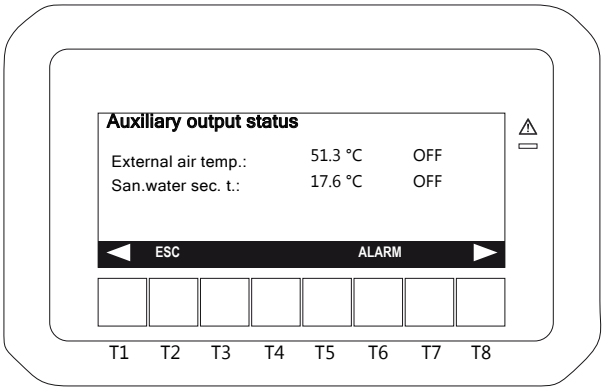
### 6.7.9 I/O Status (Input/Output)

To enter this menu select I/O moving between the icons with the keys T4 and T5 and press **SET**.
It is possible to display: probes status, analog input and output, digital input and output.



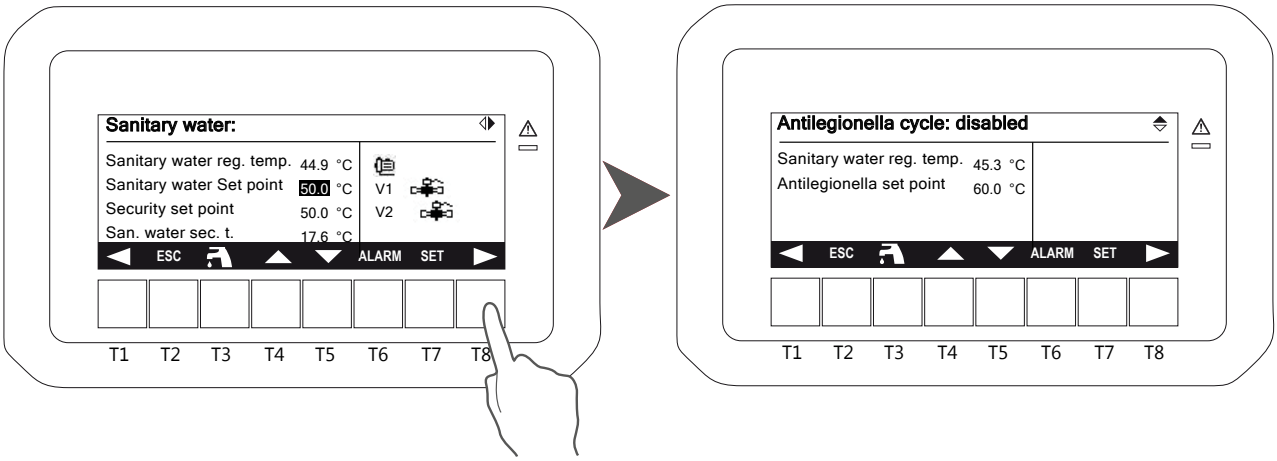

### 6.7.10 Auxiliary output

To enter this menu select AUX moving between the icons with the keys T4 and T5 and press **SET**.
It is possible to read informations about auxiliary outputs.




### 6.7.11 Sanitary water

To enter this menu select SAN moving between the icons with the keys T4 and T5 and press **SET**.
It is possible to read informations of the sanitary water regulation. Press **SET** key to modify the values.



## 6.8 Acoustic signal silencing

Pressing and releasing one of the keys; the buzzer is switched off, even if the alarm condition remains in place.

## 6.9 Emergency Stop

The emergency stop gives the possibility to stop the unit for the minimum possible time.
If an emergency stop is required, follows this procedure:

- Turn the main switch (red and yellow) OFF; the unit immediately stops.

### 6.9.1 Start after an emergency stop

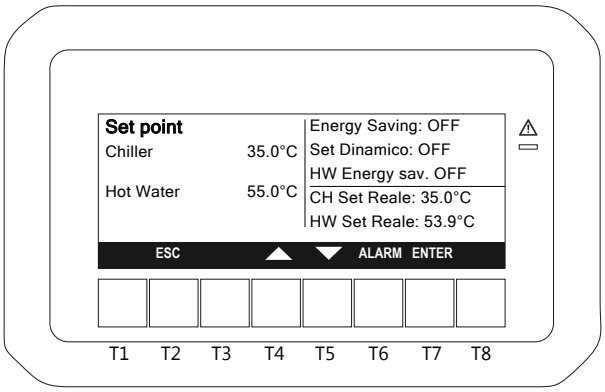


Before restarting the unit, verify that the cause of the emergency stop has been eliminated

Restarting the unit proceeding as follows:
Turn the main switch ON.

## 6.10 Cruise control

The control has a function capable of limiting the set point based on the external temperature.
If, as the air temperature lowers, the set point is too high for the operating range of the unit (see paragraph 3.5 “Operating Limits”), the control will automatically reset it to ensure correct operation of the heat pump in winter. When the external temperature rises, the set will be automatically increased to the original value. When this function is active, CC will be displayed next to the actual setpoint in the Set Point screen.






The use of a customised Winter Climate Compensation (set variation based on the external temperature) excludes the Cruise Control protection function: check that the setpoint variation does not cause the unit to operate outside the permitted operating range and contact the factory to disable Cruise Control.

## 6.11 Heating only version

To setup the unit in Heat Pump heating only mode, set parameter **CF2=2** while the unit is in stand-by mode.
The unit works as a heat pump, activating reverse cycle defrosting when necessary.

With this setting, the unit will not operate in Chiller mode based on the cold setpoint.

## 7. UNIT MAINTENANCE

All repairing operations, including the replacement of the fans located on the roof of the unit, must be carried out exclusively by qualified and authorised personnel, using suitable equipment and in compliance with current regulations.
In particular, it is recommended to operate in compliance with the **EN 378-1:2021 standard** , which defines the safety and environmental requirements for refrigeration systems and heat pumps.
It is the maintenance technician's responsibility to ensure compliance with work safety regulations, including those relating to safe access at height and protection against falls (for example, according to **EN ISO 14122** or applicable local regulations).

### 7.1 General warnings



Starting from 01/01/2016 the new European Regulation 517_2014, “Obligations concerning the containment, use, recovery and destruction of fluorinated greenhouse gases used in stationary refrigeration, air conditioning and heat pumps”, became effective. This unit is subject to the following regulatory obligations, which have to be fulfilled by all operators:
(a) Keeping the equipment records
(b) Correct installation, maintenance and repair of equipment
(c) Leakage control
(d) Refrigerant recovery and disposal management
(e) Presentation to the Ministry of the Environment of the annual declaration concerning the atmospheric emissions of fluorinated greenhouse gases.

Maintenance can:

- Keep the equipment operating efficiently
- Prevent failures
- Increase the equipment life



It is advisable to maintain a record book for the unit which details all operations performed on the unit as this will facilitate troubleshooting.



Maintenance must be performed in compliance with all requirements of the previous paragraphs.



Use personal protective equipment required by regulations as compressor casings and discharge pipes are at high temperatures. Coil fins are sharp and present a cutting hazard.



If the unit is not to be used during the winter period, the water contained in the pipes may freeze and cause serious damage. In this event, fully drain the water from the pipes, checking that all parts of the circuit are empty including any internal or external traps and siphons.



If it is necessary to replace a component of the machine, both for ordinary and extraordinary maintenance, this component must have the same or higher characteristics than those present. The same or higher performances or thicknesses are meant for the characteristics, which do not compromise the safety, the use, the handling, the storage, the pressures and the temperatures of use of the machine provided by the manufacturer.



The taps in the machine must always be in open position before starting. If it is necessary to disconnect the refrigeration circuit by closing the taps, it is necessary to take precautions to prevent the unit from starting up, even accidentally, and to indicate that the taps have been properly closed with special signs, both on the tap and in the electrical panel. In any case, the taps must remain closed as less as possible.

It is strictly forbidden to access the Hydronic vane when the unit is in operation: the possible activation of the upper fans may seriously damage the operators.

Following each maintenance operation, the operator must ensure that the compartment is closed again using the appropriate fixing screws.

## 7.2 Drive access

Access to the unit once installed, should only be possible to authorized operators and technicians. The owner of the equipment is the company legal representative, entity or person owns the property where the machine is installed.
They are fully responsible for all safety rules given in this manual and regulations. If it is not possible to prevent access to the machine by outsiders, a fenced area around the machine at least 1.5 meters away from external surfaces in which operators and technicians only can operate, must be provided.

## 7.3 Scheduled maintenance

The owner must make sure that the unit is periodically inspected, also on-site, adequately maintained, according to the type, size, age and use of the system, and to the indications contained in the Manual.
Servicing during the unit's operating lifetime and, in particular, scheduled leak detection, on-site inspections and check-ups of safety equipment, must be carried out as provided by local laws and regulations in force.

If leak detection instruments are installed on the system, they must be inspected at least once a year, to make sure that they work properly.

During its operating life, the unit shall be inspected and verified in accordance with applicable local laws and regulations. In particular, when there are no stricter specifications, the indications given in the following table (see EN 378-4, Annex D) must be followed, with reference to the situations described.

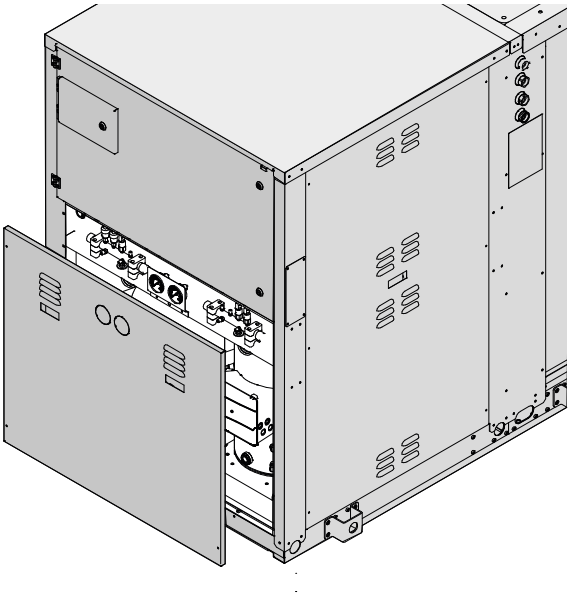
| CASE | Visual Inspection | Pressure Test | Search for leaks |
|---|---|---|---|
| **A** | X | X | X |
| **B** | X | X | X |
| **C** | X | | X |
| **D** | X | | X |

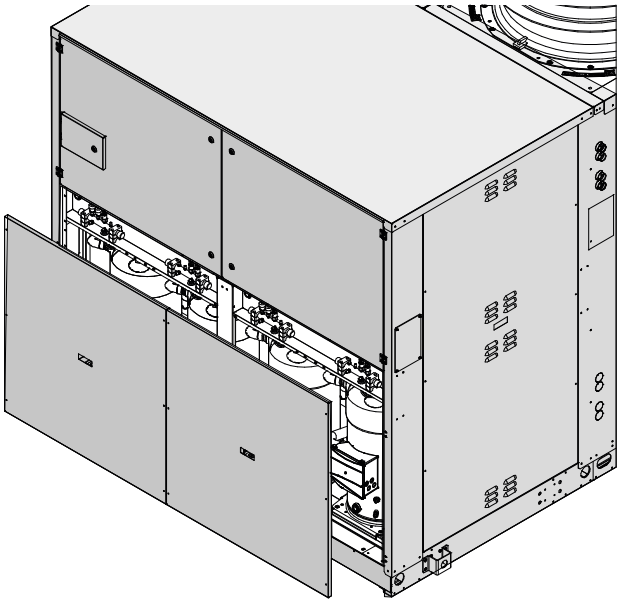
| | |
|---|---|
| **A** | Inspection after an intervention with possible effects on the mechanical strength or after use change or in case the machine has not being working for more than two years. Replace all the components which are not suitable any more. Do not carry out checks at a higher pressure than the one indicated in the project. |
| **B** | Inspection after a repair, or significant adjustment of the system, or its components. The check may be limited to the interested parts, but if a leakage of refrigerant is detected, a leakage search must be carried out on the entire system. |
| **C** | Inspection after installation in a different position than the original one. Refer to point A when mechanical strength could have been affected by the change. |
| **D** | Leak search, following a well-founded suspicion of refrigerant leakage. It is recommended examined the system for leakage, either directly (use of leak detection systems) or indirectly (deduction of leakage based on analysis of operating parameters), focusing on the parts most prone to leakage (e.g. joints). |

If a defect is detected that compromises the reliable operation of the unit, the unit cannot be re-started until it has been repaired.

### 7.3.1 Service during operation

Inside the unit there is a service box that encloses pressure switches, pressure transducers, service sockets and other components. Service employees can easily access via a panel on the outside of the unit without stopping the unit's operation and without entering the compressor compartment. The service box has slots communicating with the outside and is completely enclosed on the side of the compressor compartment, so that any refrigerant leaks are discharged to the external area.





### 7.3.2 Checking ATEX fans

Where possible, components with the following characteristics have been selected inside the compressor case: airtightness and impossibility of triggering possibly stoichiometric atmospheres even in the event of a fault. In order to avoid the residual risk associated with possible leaks in the compressor compartment and potentially triggering elements, a forced ventilation of the compressor compartment (by means of 4 ATEX fans) has been fitted, which guarantees the correct air flow by preventing dangerous concentrations from being reached even in the event of a leak.

It is mandatory to check the operation of ATEX extraction fans once a year.

After 5 years of operation, replacement of ATEX fans is recommended.

It's mandatory to visually check the fan

The fan operation check must be performed from the compressor compartment side.
Do not insert objects through the grille but use appropriate tools to check correct power supply and air flow.

## 7.4 Periodical checks



The start-up operations should be performed in compliance with all requirements of the previous paragraphs.



All of the operations described in this chapter MUST BE PERFORMED BY TRAINED PERSONNEL ONLY. Before commencing service work on the unit ensure that the electric supply is disconnected. The top case and discharge line of compressor are usually at high temperature. Care must be taken when working in their surroundings. Aluminium coil fins are very sharp and can cause serious wounds. Care must be taken when working in their surroundings. After servicing, replace the cover panels, fixing them with locking screws.



During extraordinary maintenance, operators must take all precautions due to the presence of a slightly flammable refrigerant. In particular, after recovery and vacuum it is possible that part of the refrigerant remains in solution in the oil in the circuit (subsequently generating possible flammable vapours). The operator must carry out nitrogen flushing or other operations to avoid this possibility by operating in accordance with the regulations in force for maintenance with an A2L type refrigerant.

### 7.4.1 Electrical system and adjustment

| Action to be performed | Frequency | | | | | |
|---|---|---|---|---|---|---|
| | Monthly | Every 2 months | Every 6 months | Every year | Every 5 years | As necessary |
| Check that the unit works properly and that there are no active warnings | X | | | | | |
| Visually inspect the unit | X | | | | | |
| Check noise and vibration level of the unit | | | | X | | |
| Check operation of safety features and of interblocks | | | | X | | |
| Check the unit's performance | | | | X | | |
| Check the current draws of the different parts (compressors, fans, pumps, etc.) | | | | X | | |
| Check the supply voltage of the unit | | | X | | | |
| Check tightness of cables in their clamps | | | X | | | |
| Check the integrity of the insulating coating of power cables | | | | X | | |
| Check the conditions and functioning of the counters | | | | X | | |
| Check functioning of the microprocessor and of the display | | | X | | | |
| Clean the electrical and electronic components of any dust | | | | X | | |
| Check functioning and calibration of probes and transducers | | | | X | | |
| Check the operation of ATEX fans | | | | X | | |
| Replace ATEX fans | | | | | X | |

### 7.4.2 Condensing coils and fans

| Action to be performed | Frequency | | | | | |
|---|---|---|---|---|---|---|
| | Monthly | Every 2 months | Every 6 months | Every year | Every 5 years | As necessary |
| Visually inspect the coil | X | | | | | |
| Clean finned coils [1] | | | X | | | |
| Check the water flow and/or any leaks | X | | | | | |
| Check that the flow switch is working properly | | | X | | | |
| Clean the metal filter on the water line [3] | | | X | | | |
| Check noise and vibration level of the fans | | | | X | | |
| Check the supply voltage of the fans | | | X | | | |
| Check the fans' electrical connections | | | | X | | |
| Check functioning and calibration of the fans' speed adjustment system (if present) | | | | X | | |
| Check 4-way valve operation (if present) | | | | X | | |
| Check air presence in the hydraulic circuit | X | | | | | |
| Check color of moisture indicator on liquid line | | | | X | | |
| Check for freon leaks [2] | | | | | | X |

[1] If the unit is installed in strongly windy areas, near coasts or deserts or in areas subjects to wind and/or sand storms, or near airports, industries or in places with high levels of air pollution in general inspect the unit more frequently (**every three months or more**) to check the real condition of the surface protection.

[2] In order to carry out operations on the refrigerant, it is necessary to observe the European Regulation 517_2014, "Obligations regarding the containment, use, recovery and destruction of fluorinated greenhouse gases used in stationary refrigeration, air conditioning and heat pump equipment".

[3] It can be carried out with a higher frequency (also weekly) depending on the $\Delta t$.

### 7.4.3 Compressors

| Action to be performed | Frequency | | | | | |
|---|---|---|---|---|---|---|
| | Monthly | Every 2 months | Every 6 months | Every year | Every 5 years | As necessary |
| Visually inspect compressors | | | | X | | |
| Check noise and vibration level of the compressors | | | | X | | |
| Check the supply voltage of the compressors | | | X | | | |
| Check the compressors' electrical connections | | | | X | | |
| Check oil level in the compressors using the oil fill level indicator | | | X | | | |
| Check that the crankcase heaters are powered and working properly | | | | X | | |
| Check the conditions of the compressors' power cables and their tightness in the clamps | | | X | | | |

### 7.4.4 Other components

| Action to be performed | Frequency | | | | | |
|---|---|---|---|---|---|---|
| | Monthly | Every 2 months | Every 6 months | Every year | Every 5 years | As necessary |
| Check corrosion signs on iron pressure vessels | | | X | | | |
| Inspect and retighten any loose threaded connections | | | | X | | |
| Visually check corrosion signs on framework | X | | | | | |
| Check and calibrate leak detector in case of option presence | | | | X | | |



Daily and monthly works may be carried out directly by the Owner of the system. All other works must be performed by authorised and trained personnel.



Any kind of cleaning whatsoever is forbidden before disconnecting the device from power supply by turning the master switch to the OFF position. It is forbidden to touch the device while barefooted or with wet or damp body parts.



Works on the cooling line must be carried out by qualified and trained technicians, as provided by local laws and regulations in force.



Before the start-up it is necessary to carry out all the operations described in the previous tables and make the necessary checks provided by the pre-start control module (valid for the italian market) to be requested to the service.



The component must be replaced if rust has compromised its thickness.

## 7.5 Refrigerant circuit repair

Maintenance must be carried out by qualified personnel with suitable equipment and an adequate procedure considering the presence of pressurised A2l refrigerant:
1.Ensure that maintenance is performed by competent and qualified personnel;
2.Avoid using ignition or heat sources without first performing recovery and vacuum;
3.Recover the refrigerant using appropriate equipment;
4.Perform a vacuum system after refrigerant recovery to avoid the risk of ignition or pressure increase;
5.Flush to ensure there is no flammable refrigerant retained in the oil in the circuit;
6.Carry out maintenance operations by disconnecting any piping sections with pipe cutters and other tools that do not involve the supply of heat;
7.Carry out rework taking into account the temperature and pressure limits reported on the label;
8.Check the tightness of the system.
The entire intervention must be carried out in accordance with EN 378-4.



If the refrigerant circuit is to be emptied, all the refrigerant must be recovered using the correct equipment.

For leak detection, the system should be charged with nitrogen using a gas bottle with a pressure reducing valve, until 15 bar pressure is reached. Any leakage is detected using a bubble leak finder. If bubbles appear discharge the nitrogen from the circuit before brazing using the proper alloys.



Never use oxygen instead of nitrogen: explosions may occur.

Site assembled refrigerant circuits must be assembled and maintained carefully, in order to prevent malfunctions.

Therefore:
- Avoid oil replenishment with products that are different from that specified and that are pre-loaded into the compressor.
- When replacing any part of the refrigerant circuit, do not leave it exposed for more than 15 minutes.
- It is important when replacing a compressor that the task be completed within the time specified above after removing the rubber sealing caps.
- When replacing the compressor following a burn out, it is advisable to wash the cooling system with appropriate products including a filter for acid.
- When under vacuum do not switch on the compressor.

# 8. DECOMMISSIONING

## 8.1 Disconnect the unit



All decommissioning operations must be performed by authorized personnel in accordance with the national legislation in force in the country where the unit is located.

- Avoid spills or leaks into the environment.
- Before disconnecting the machine please recover:
  - the refrigerant gas;
  - Glycol mixture in the hydraulic circuit;
  - the compressor lubricating oil.

Before decommissioning the machine can be stored outdoors, providing that it has the electrical box, refrigerant circuit and hydraulic circuit intact and closed.

## 8.2 Disposal, recovery and recycling

The frame and components, if unusable, should be taken apart and sorted by type, especially copper and aluminum that are present in large quantities in the machine.
All materials must be recovered or disposed in accordance with national regulations.



The refrigerant circuit of the unit contains lubricant oil that binds the disposal mode of components .

## 8.3 RAEE Directive (only UE)



The crossed-out bin symbol on the label indicates that the product complies with regulations on waste electrical and electronic equipment.
The abandonment of the equipment in the environment or its illegal disposal is punishable by law.

This product is included in the application of Directive 2012/19/EU on the management of waste electrical and electronic equipment (WEEE).
The unit should not be treated with household waste as it is made of different materials that can be recycled at the appropriate facilities. Inform through the municipal authority about the location of the ecological platforms that can receive the product for disposal and its subsequent proper recycling.
The product is not potentially dangerous for human health and the environment, as it does not contain dangerous substances as per Directive 2011/65/EU (RoHS), but if abandoned in the environment it has a negative impact on the ecosystem.
Read the instructions carefully before using the unit for the first time. It is recommended not to use the product for any purpose other than that for which it was designed, as there is a risk of electric shock if used improperly.

# 9. DIAGNOSIS AND TROUBLESHOOTING

## 9.1 Fault finding

All units are checked and tested at the factory before shipment, however, during operation an anomaly or failure can occur.



BE SURE TO RESET AN ALARM ONLY AFTER YOU HAVE REMOVED THE CAUSE OF THE FAULT; REPEATED RESET MAY RESULT IN IRREVOCABLE DAMAGE TO THE UNIT.

| Unit alarms | | | | |
|---|---|---|---|---|
| **Code** | **Visualization** | **Alarm Description** | **Cause** | **Solution** |
| **ACF1... ...ACF19** | Conf AL1…Conf AL19 | Configuration alarm | Wrong configuration of microprocessor control system. | Contact the company. |
| **AEFL** | Plant side flow AL | User water flow switch alarm | Presence of air or dirtiness in the user hydraulic system. | Bleed carefully the user hydraulic system or check and clean the water strainer. |
| **ACFL** | Source side flow AL | Source water flow switch alarm (only for water-water units) | Presence of air or dirtiness in the source hydraulic system. (Only water/water units) | Bleed carefully the spurce hydraulic system or check and clean the water strainer. |
| **AEUn** | Unload notify (evap.) | Compressor unloading alarm (only units with more than 1 compressor) | User water temperature is too high. | Wait until the user water temperature is lower. |
| **AHFL** | Sanitary water flow AL | Domestic hot water flow switch alarm | Presence of air or dirtiness in the user hydraulic system. | Bleed carefully the user hydraulic system or check and clean the water strainer. |
| **AP1...AP10** | Pb AL1 ... Pb AL10 | Alarm user inlet water temperature sensor | Wrong electrical connection, Sensor defect. | Check the electrical connection of the sensor to the terminal board, if correct call the service to replace the sensor. |
| **AP11...AP20** | Pb1 AL e1 …Pb7 AL e1 | Alarm expansion probe 1 (if used) | | |
| **AP21...AP27** | Pb1 AL e2 …Pb7 AL e2 | Alarm expansion probe 2 (if used) | | |
| **AtC1** | Cond.pump 1 overl | Condenser n° 1 water pump overload alarm (only water/water units) | Pump overload. | Check the hydraulic circuit |
| **AtC1** | Cond.pump 2 overl | Condenser support n° 2 water pump overload alarm (if used) (only water/water units) | Pump overload. | Check the hydraulic circuit |
| **AtE1** | Evaporator water pump 1 overload | Evaporator1 pump thermal protection alarm | Pump overload. | Check the hydraulic circuit |
| **AtE2** | Evaporator water pump 2 overload | Evaporator2 pump thermal protection alarm (if present) | Pump overload. | Check the hydraulic circuit |
| **AEht** | Hi temp.evap.water inlet | Evaporator water inlet high temperature | Evaporator water inlet high temperature alarm | Wait until the user water temperature is lower |

| | | | | |
|---|---|---|---|---|
| **AEM1** | E1 discon | Expansion alarm | The expansion is used and lose communication with the expansion card. | Check the expansion serial address |
| **AEM2** | E2 discon | Expansion alarm | | |
| **AFFC** | Antif AL FC | Anti-freeze alarm in free-cooling (if present) | Presence of air or dirtiness in the free cooling hydraulic system. | Contact the service department. |
| **Atrb** | Boiler overl AL | Boiler electrical heaters overloading alarm. | Digital input Thermal heaters active. | Contact the service department. |
| **APS** | Phases sequ AL | Phases sequence alarm. | Digital input Phase sequence relay active. | Check the connections of the main switch. |
| **AFr** | Power supply freq.AL | Power supply frequency alarm. | Power supply frequency is different from that configured. | Contact the service department. |
| **ALc1** | Generic AL1 | Generic alarm 1 | -- | Contact the service department. |
| **ALc2** | Generic AL2 | Generic alarm 2 | -- | Contact the service department. |
| **Probe fault** | Probe fault | Wiring alarm | Wrong electric connections. Sensor defect | Check the electrical connection of the sensor to the terminal board, if correct call the service to replace the sensor |

| Circuit alarms | | | | |
|---|---|---|---|---|
| **Code** | **Visualization** | **Alarm Description** | **Cause** | **Solution** |
| **B(n)HP** | Hi press circ(n) | Circuit high pressure pressu-re switch(n) | In heating mode:<br>Insufficient user circuit water flow;<br>Insufficient domestic hot water circuit water flow.<br><br>In cooling mode:<br>Insufficient air flow at the source fan;<br>Insufficient domestic hot water circuit water flow. | Restore the correct user circuit water flow.<br>Restore the correct domestic hot water circuit water flow.<br><br>Restore the correct air flow to spurce fan.<br>Restore the correct domestic hot water circuit water flow. |
| **b(n)AC** | Antif/lo temp.C(n) (DI - CH)<br>Antif/lo temp.C(n) (AI - CH) | Anti-freeze alarm circuit (n) (cooling mode) | Too low water temperature | Check user temperature set point;<br>Check user water flow. |
| **b(n)AH** | Antif/lo temp.C(n) (DI - HP)<br>Antif/lo temp.C1 (AI - HP) | Anti-freeze alarm circuit (n) (heating mode) | Too low water temperature | Check user temperature stet point. |
| **b(n)dF** | dF AL circ(n) | Wrong defrost circuit (n) (maximum time admitted) | Defrost time too long;<br>Outside temperature outside the working limits;<br>Refrigerant charge leakage. | Restore normal working conditions;<br>Find leakage and repair. |
| **b(n)hP** | Hi press circ(n) | High pressure transducer alarm circuit (n) | In heating mode:<br>Insufficient user circuit water flow;<br>Insufficient domestic hot water circuit water flow.<br><br>In cooling mode:<br>Insufficient air flow at the source fan;<br>Insufficient domestic hot water circuit water flow. | Restore the correct user circuit water flow.<br>Restore the correct domestic hot water circuit water flow.<br><br>Restore the correct air flow to spurce fan.<br>Restore the correct domestic hot water circuit water flow. |
| **B(n)LP** | Low press circ(n) | Low pressure switch circuit (n) | Refrigerant charge leakage. | Find leakage and repair. |
| **b(n)lP** | Low press circ(n) | Low pressure transducer alarm circuit (n) | No refrigerant flow between Heat Recovery and Chiller + Recovery in P4U operating with Tes < -10°C | Force changeover from Recovery to Chiller before switching to Chiller + Recovery by adjusting parameter FS 53 |
| **b(n)tF** | Cond.fan overl circ(n) | Source fan thermal protection alarm | Current input outside operating limits. | Check the correct working of the source fan and replace it if necessary. |
| **b(n)Cu** | Unload high t/p circ(n) | Warning high pressure circuit (n) | In heating mode:<br>Insufficient user circuit water flow;<br>Insufficient domestic hot water circuit water flow.<br>In cooling mode:<br>Insufficient air flow at the source fan;<br>Insufficient domestic hot water circuit water flow. | Contact the service department. |

letter (n) identifies the circuit concerned

| Compressors alarms | | | | |
|---|---|---|---|---|
| **Code** | **Visualization** | **Alarm Description** | **Cause** | **Solution** |
| **C(n)tr** | C(n) overl | Compressor (n) overload | Compressor (n) input current outside operation limits. | Replace the compressor. |
| **C(n)oP** | AL oil C (n) | Compressor (n) pressure switch/oil float | Maintainence required. | Contact the service department. |
| **C(n)dt** | Hi Disch temp.C(n) | Compressor (n) high discharge temperature | Service required. | Contact the service department. |

letter (n) identifies the circuit concerned

| Other alarms | | | |
|---|---|---|---|
| **Visualization** | **Alarm Description** | **Cause** | **Solution** |
| **Termostatic expansion valves AL!** | The expantion circuit stops (Only with electronic expantion valve). | Faults to the cooling circuit. | Contact the service department. |
| **Flowmeter transd.** | Wrong reading of flowmeter transducer. | Fault of the transducer and/ or hydraulic circuit. | Check the electrical connections, if correct call the service to replace the sensor. |

## 10. LOGBOOK

For the entire range covered by the manual, the establishment of a system Logbook.
The booklet must comply with EU Regulation No. 517/2014 The document must be prepared by the installer at the time of installation, kept available at the plant and updated for each maintenance and/or repair work, in accordance with the regulations and the indications described in the relevant chapters of this manual.
The system booklet must contain the data relating to the unit (including refrigerant type and charge), data relating to the system, long periods of inactivity and every single intervention carried out, including the actions performed, the components replaced and the anomalies found.
It is the obligation of the plant manager to carry out all the maintenance required in this manual and in accordance with the regulations, making sure that the work carried out is duly recorded in the system booklet.



Technical data shown in this booklet are not binding.
The Company shall have the right to introduce at any time whatever modifications necessary to the improvement of the product.
The reference languages for the whole documentation are Italian and English. The other languages are to be considered only as guidelines.