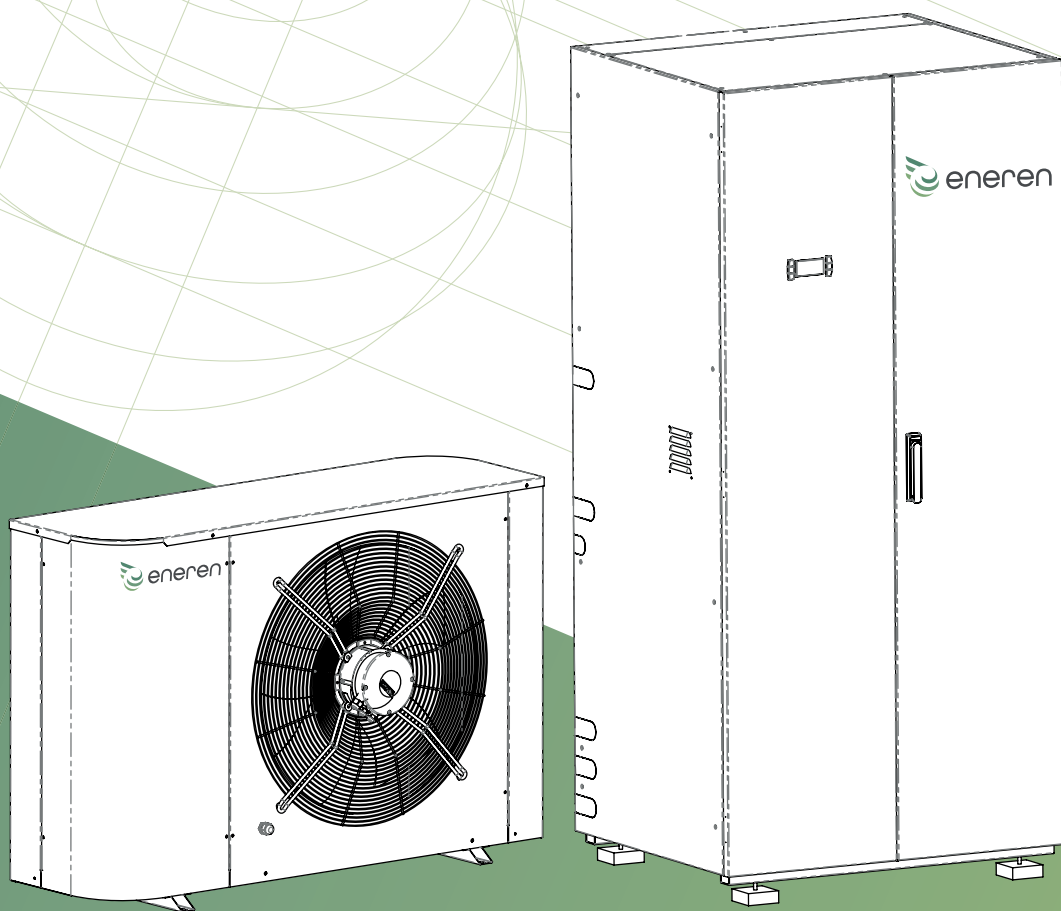




USER MANUAL AND TECHNICAL MANUAL

# RAW

AIR/WATER AEROTHERMAL HYDROTHERMAL UNITS  
WITH INTEGRATED HYDRONIC MODULE



**EN**  
TRANSLATION OF THE ORIGINAL INSTRUCTIONS

HF61GJ0600G / 08\_24



Each unit has an identification plate that is located on its frame and inside the electrical control panel, which shows all the data necessary for the installation, maintenance and traceability of the machine.

**THE LABEL SHOWS THE FOLLOWING DATA:**

- Manufacturer/Marketing body
- CE mark, possibly accompanied by a subscript that identifies the certifying body for the Pressure Equipment Directive 2014/68/EU (PED). The number of the certifying body must be indicated for units of a PED category equal to or greater than class 2.
- Series and size of the unit
- Date of manufacture
- Main technical data

Note the model, the serial number, the final refrigerant charge and the machine reference diagrams attached to this manual so that they can be easily found in case of data plate damaging and system maintenance.

 **ATTENTION**




Never remove the label. This shows the serial number of the unit from which it is possible to obtain information about the technical features and the components installed, to then identify the unit correctly.



**Manufactured by Tecnorefrigeration S.r.l.**

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Modello - Model	
Matricola - Serial number	
Codice identificativo - ID code	
Data di produzione - Date of production	
Categoria PED/ 2014/68/EU - Category PED/ 2014/68/EU	
Procedura di valutazione conformità PED - PED conformity module	
Max pressione ammissibile (PS) lato alta pressione - Max allowable pressure (PS) high pressure side [bar-r]	
Max pressione esercizio (PS) lato bassa pressione - Max allowable pressure (PS) low pressure side [bar-r]	
Max/min temperatura di stoccaggio - Max/min storage temperature [°C]	
Max/min temperatura ambiente di funzionamento - Max/min ambient working temperature [°C]	
Potenza frigorifera* - Cooling capacity* [kW]	
EER*	
Potenza termica* - Heating capacity* [kW]	
COP*	
Refrigerante - Refrigerant [Ashrae 15/1992] / GWP	
Carica refrigerante - Refrigerant charge [kg]	C1 C2 C3 C4
Refrigerante aggiunto - Added refrigerant [kg]	C1 C2 C3 C4
Carica totale refrigerante - Total charge refrigerant [kg]	
CO2 equivalenti - CO2 equivalent [t]	
Taratura pressione lato alta - High pressure switch set [bar-r]	
Taratura pressione lato bassa - Low pressure switch set [bar-r]	
Taratura valvola sicurezza refrigerante lato alta/bassa pressione - Safety valve refrigerant high/low pressure side set [bar-r]	
Massima pressione esercizio circuito acqua - Max working pressure water circuit [bar-r]	
Taratura valvola sicurezza acqua - Safety valve water side set [bar-r]	
Alimentazione elettrica - Power supply	
Potenza massima assorbita - Max absorbed power [kW]	
Corrente massima - Full load ampere FLA [A]	
Corrente di spunto - Starting current LRA [A]	
Schema elettrico - Wiring diagram	
Schema frigorifero - Refrigeration diagram	
Peso a vuoto - Empty weight [kg]	
* EN14511-2 Contiene gas fluorurati ad effetto serra disciplinati dal protocollo di Kyoto/ Contains fluorinated greenhouse gases governed by the Kyoto protocol Ermeticamente sigillato/Hermetically sealed	

SAFETY SYMBOLS	
 <b>WARNING</b>	With reference to additions or recommendations for the correct use of the unit.
 <b>DANGER</b>	With reference to dangerous situations that may occur with the use of the unit to guarantee personal safety.
 <b>ATTENTION</b>	With reference to dangerous situations that may occur with the use of the unit to prevent damage to property and to the unit itself.

## INTRODUCTION

RAW

### SPLIT REVERSIBLE AEROTHERMAL UNITS WITH INTEGRATED HYDRONIC MODULE

#### **WARNING**

**CAREFULLY READ THIS MANUAL BEFORE USING THE UNIT.**

#### **DECLARATION OF CONFORMITY**

**The declaration of conformity is attached separately to the documents on board the unit, usually placed inside the electrical compartment.**

Dear Customer,

Thanking you for choosing our products, we are pleased to provide you this manual for the correct use of equipment.

Please read the recommendations described in the following pages carefully and keep the manual available to personnel who will be responsible for managing and maintaining the unit.

Our company is at your complete disposal for any and all questions that you should require both in the unit starting phase and at any time of its utilization.

Should scheduled and unscheduled maintenance be necessary, please contact our After-sales Technical Service for assistance and spare parts.

Please find here attached our direct contacts in case you may need assistance:



**Eneren S.r.l.**

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[www.eneren.it](http://www.eneren.it)

## START-UP INSTRUCTIONS

### 1 YOUR INSTALLATION

All the tips required for a perfect installation of the equipment can be found in the installation manual.

### 2 REQUIRED ACCESSORIES FOR A PROPER INSTALLATION OF THE UNIT

To ensure efficient unit operation and validity of the guarantee, check the correct sizing of the following hydraulic components installed inside the machine to make sure they match system connection requirements. Please refer to par. 8.4 General guidelines for plumbing connections p. 34

### 3 FIRST START-UP

With at least 15 working days in advance, send the machine start request via email or fax to the following contact ENEREN:

**Fax.** 049 9588522

**e-mail:** support@eneren.it

**Tel.** 049 9271513

ENEREN Assistance will organize the intervention by putting you in contact with Authorized Technical Assistance Center of the area.

All the preliminary checks and testing of the machine will be carried out together with your staff.

Your staff will be given instructions for the correct running of the machine.

### 4 WARRANTY ISSUE

For the warranty to be valid, the first start-up by an Authorized Technical Assistance Center is mandatory

After testing, the Authorized Technical Assistance Center will issue a valid test certificate for the machine warranty.

### 5 CONNECTIONS

Check the minimum diameters required for water pipes according to the heads, see par. 5.3 Characteristic curves of the circulation pumps p. 17.

Check the diameters of refrigeration pipes, see par. 5.5 Liquid refrigerant lines and refrigerant charge p. 18.

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**USER MANUAL**

## 3 GENERAL DESCRIPTION

### 3.1 Precautions for use

The operating rules contained in this manual are solely applicable for the units:

#### **RAW**

The instructions manual must be read and used as follows:

- every unit operator and maintenance technician must carefully read the entire manual and comply with that stipulated therein;
- the employer must ensure that the operator has the requirements to operate the unit and has carefully read the manual;
- read the instructions manual carefully and consider it an integral part of the unit;
- the instructions manual must be readily available to operating personnel and maintenance technicians;
- keep the manual throughout the life of the unit;
- make sure that any update is included in the text;
- hand the manual to any other user or subsequent owner of the unit;
- use the manual in such a way so as not to damage its content;
- do not, for any reason, remove, tear or rewrite parts of the manual;
- keep the manual away from humidity and heat;
- if the manual is lost or partially damaged and therefore the contents can no longer be read entirely, it is advisable to request a new manual from the manufacturer by communicating the code found on the cover or the serial number of the unit.

### 3.2 Premise

The operating rules described in this manual are an integral part of the unit supply.

These rules are also intended for the previously trained operator specifically to operate this type of unit and contain all the necessary and important information for operating safety and optimal, proper use of the unit. Avoid hasty and incomplete preparation that lead to improvisation and cause many accidents.

Before starting to work, read through and strictly observe the following suggestions:

- the operator must always have the instructions manual at his disposal;
- plan each action carefully;
- before starting work, make sure the safety devices function correctly and you have no doubts on how they work; otherwise, do not start-up the unit;
- carefully observe the warnings relating to special hazards contained in this manual;
- preventive and thorough maintenance guarantees constantly high operating safety for the unit. Never delay repairs and always have them carried out solely by qualified personnel; only original spare parts are to be used.

### 3.3 Liability

The MANUFACTURER cannot be held liable for any personal accident or damage to property, which may arise from:

- failure to comply with the instructions provided in this manual regarding unit management, use and maintenance;
  - violent actions or incorrect manoeuvres when performing maintenance on the unit;
  - alterations made to the unit without prior written authorisation from the MANUFACTURER;
  - incidents beyond the normal and correct use of the unit.
- In any case, if the user attributes the incident to a defect in the unit, he must prove that the damage caused was a main and direct consequence of this “defect”.

#### **ATTENTION**

- When installing or servicing the unit, the rules stipulated in this manual must be complied with together with those on board the unit and in any case all necessary precautions must be taken.
- The presence of pressurised fluids in the refrigerant circuit and of electrical components can create hazardous situations during installation and maintenance.
- Therefore, only qualified personnel may perform work on the unit.
- **THE UNIT MUST BE STARTED UP FOR THE FIRST TIME ONLY BY QUALIFIED PERSONNEL AUTHORISED BY THE COMPANY PLACING IT ON THE MARKET.**
- **FAILURE TO COMPLY WITH THE RULES STIPULATED IN THIS MANUAL AND ANY ALTERATION TO THE UNIT WITHOUT PRIOR AUTHORISATION WILL IMMEDIATELY MAKE THE WARRANTY NULL AND VOID.**
- Before performing any work on the unit, ensure it has been disconnected from the power supply.
- For maintenance service or repairs always and exclusively use original spare parts. **THE MANUFACTURER declines all responsibility for damages that may occur due to non-compliance with the above.**
- The unit is covered by the warranty according to the contractual agreements established at the time of sale.
- However, the warranty is rendered null and void if the regulations and user instructions stipulated in this manual are not complied with.
- In the event of a fault, do not try to repair it yourself or have an unauthorised technician perform the repairs. The warranty will otherwise be rendered null and void.

### 3.4 Intended use

RAW are air-water heat pumps which, without using any type of combustion or flame, allow the entire home to be heated or cooled and technical hot water to be produced for sanitary purposes in a completely autonomous way, thanks to the exchange of heat with the outside air.



Their use is recommended within the functioning limits carried in this manual, or else the warranty attached to the sales contract would cease.

Any other use is to be considered inappropriate and the manufacturer declines all liability for any damage caused to persons, property or the unit that may derive from such use.

 **DANGER**

- Place the unit in environments where there is no risk of explosion, corrosion or fire.
- Improper use could cause serious repercussions on the unit.
- All routine and special maintenance operations must be performed with the unit off and the power supply disconnected.
- Wait approximately 30 minutes after switching off the unit before carrying out any maintenance operations to avoid burns.
- The indoor unit is only for indoor use, the outdoor unit is only for outdoor use.

 **ATTENTION**

- Before performing any work on the unit, each operator must be perfectly aware of how the unit and its controls work and must have read and understood all the technical information in this manual.
- It is forbidden to use the unit in conditions or for uses other than what is indicated in this manual and the **MANUFACTURER** may not be held responsible for breakdowns, accidents or injuries due to failure to comply with this prohibition.
- Do not repair high pressure pipes with welds.
- It is forbidden to tamper with, alter or modify, even partially, the systems or equipment described in the instruction manual, and in particular, the guards and warning symbols required for personal safety.
- It is also forbidden to operate in manners different from those indicated or fail to perform operations necessary for safety reasons.
- Safety instructions are particularly important, as well as general information contained in this manual.

courses held by the manufacturer, with reference to particular maintenance operations.

- This manual is to be considered an integral part of the unit and must be stored near the unit in a special container until the unit is eventually demolished.
- Request a new copy from the manufacturer if it is lost or deteriorated.
- Make sure all the users have thoroughly understood the operating instructions together with the meaning of any symbols on the unit.
- Possible accidents can be avoided by following these technical instructions drafted in accordance with the Machinery Directive 2006/42/EC and subsequent additions.
- In any case, always comply with national safety regulations.
- Do not remove or damage the safety devices, labels and notices, especially those imposed by law.
- Adhesive labels intended for safer use are applied to the unit, therefore, it is very important to replace them if they become illegible.
- This manual reflects the applicable technology at the time the unit is sold and cannot be considered inadequate due to subsequent updates based on new experience.
- The **MANUFACTURER** has the right to update the production and manuals, without being obliged to update previous production and manuals, except for exceptional cases.
- Any updates or additions to this use and maintenance manual are to be considered an integral part of the manual and may be requested via the contact phone numbers listed in this manual.
- Contact **THE MANUFACTURER** for further information and to submit any proposals on how to improve the manual.
- **THE MANUFACTURER** kindly asks you to report the address of the new owner in case of transfer of the unit, in order to facilitate forwarding any supplements of the manual to the new user.

## 3.5 General instructions

 **ATTENTION**

- This manual must be stored carefully in a place that is known by the user of the unit, managers and operators in charge of transport, installation, use, maintenance, repairs and final dismantling.
- This manual indicates the intended use of the unit and provides instructions regarding transport, installation, assembly, adjustment and use. It provides information regarding maintenance, ordering spare parts, the presence of residual risks and personnel training.
- Please note that the use and maintenance manual is not intended to be a substitute for adequate user experience.
- This manual represents a reminder of the main operations to be performed by operators who have received specific training, for example by attending training

## 4 SAFETY INSTRUCTIONS

### ATTENTION

The safety instructions below should be read carefully after understanding the operation of the unit, and before proceeding with its installation, commissioning and/or maintenance.

Electrical equipment must be installed, used, and maintained by qualified personnel.

Personnel must have skills and knowledge relating to the construction, installation and operation of electrical equipment and must have received adequate safety training.

### 4.1 Safety prescriptions

#### 4.1.1 Thoroughly know the unit

The unit must be installed, adjusted, and maintained exclusively by qualified personnel, who are obliged to be familiar with the provisions and the function of all controls, instruments, indicators, warning lights, and various tags.

#### 4.1.2 Wear protective clothing

Each operator must use personal protective equipment such as gloves, headgear, safety goggles, safety shoes, and hearing protection.



#### 4.1.3 Use safety equipment

A first aid kit and a fire extinguisher must be placed near the unit.



#### 4.1.4 Fire extinguisher and a first aid kit

Check the presence and location of the fire extinguisher. Regularly check that the fire extinguishers are charged and their operating instructions are clearly understood.

It is required to be aware of where the first aid box is kept. Periodically check that the first aid kit is stocked with disinfectants, bandages, drugs, etc.

The personnel must know what to do in the event of a fire. Make sure that emergency help phone numbers are readily available.

In the event of a fire, use a fire extinguisher in compliance with the regulations in force. Contact the fire department.

### WARNING

The owner of the building where the unit is installed must provide the required fire extinguisher.

#### 4.1.5 General precautions

The Machinery Directive 2006/42/EC provides the following definitions (Annex 1.1.1.1):

**DANGER ZONE:** any area next to and/or inside a machine, where the presence of an exposed person constitutes a risk for the safety and health of said person.

**EXPOSED PERSON:** any person found entirely or partially within a danger zone.

**OPERATOR:** means the person or persons installing, operating, adjusting, maintaining, cleaning, repairing or moving machinery or a related product;

### WARNING

- Before carrying out any operation or maintenance on the unit it is mandatory to read and follow the instructions given in the use and maintenance manual. During the actual work, it would be too late: any not recommended or wrong operation could then cause serious damage to people or property.

- The employer must inform in detail all operators about the risks of accidents and particularly about risks related to noise, required personal protective devices and general accident prevention rules provided by laws or international standards and national standards in the Country of destination of the unit.
- All the operators must comply with international accident prevention regulations and those applicable in the country of use in order to prevent potential accidents. Please be reminded that the European Union has issued some directives concerning the safety and health of workers, among which the directives 89/391/EEC, 89/686/EEC, 89/654/EEC, 2009/104/EC, 89/656/EEC, 2003/10/EC, 92/58/EEC and 92/57/EEC that each employer has an obligation to observe and to enforce. In the event that the unit is installed outside the European union, always refer to the regulations in force in the country of installation.
- Before starting any work on the unit, each operator must be perfectly familiar with its operation and its controls, and have read and understood all the information contained in this manual.

#### **ATTENTION**

It is forbidden to tamper with or replace parts of the unit unless this has been expressly authorised by the **MANUFACTURER**.

The use of accessories, tools, consumables or spare parts other than those recommended by the **MANUFACTURER** and/or specified in this manual may be a hazard to operators and/or damage the unit.

Any alteration to the unit that is not specifically authorised by the **MANUFACTURER** relieves the manufacturing company from any civil or criminal liability.

#### **WARNING**

- It is strictly forbidden to remove or tamper with any safety devices.
- Any installation, ordinary and extraordinary maintenance operations must be carried out with the unit stopped and without power supply.
- Once the unit has been cleaned, the operator must check that there are no worn or damaged parts or parts that are not safely fixed, or if this is the case, ask the maintenance staff to fix the problem. Special attention must be paid to the state of repair of the pressurised pipes or other parts exposed to wear. It must also be ensured that there are no leaks of fluid, or other dangerous substances. In these cases, it is forbidden for the operator to restart the unit before the situation has been remedied. If any of these occurrences are detected, the operator, before leaving the unit unattended, must display a warning sign indicating that maintenance is in progress and it is forbidden to start the unit.
- The use of flammable fluids in cleaning operations is prohibited.
- Periodically check the condition of the data plates and arrange, if necessary, for them to be restored.
- The operator work place must be kept clean, tidy and free from any objects that may limit unhindered movement.
- Operators should avoid operating the device from unsafe, uncomfortable positions that may affect their balance.

- Operators must be aware of possible risks of entrapment and entanglement of clothes and/or hair in moving parts; it is recommended to wear caps over long hair.
- Wearing chains, bracelets and rings can also be dangerous.
- The workplace must be adequately lit for the intended operations. Insufficient or excessively bright lighting can imply safety risks.
- The instructions, accident-prevention rules and warnings contained in this manual must be observed at all times.

### 4.1.6 Safety information

The units have been designed and built according to the current state of the art and the technical rules currently applicable to fluid chillers and heat pumps and/or fluid chillers with free-cooling exchange intended for cooling water or water and anti-freezing agent mixtures, for housing air conditioning and industrial cooling systems. Compliance with the laws, provisions, prescriptions, orders and directives in force for these machines has been ensured.

The materials and the equipment parts used, as well as the production, quality assurance and control processes meet the highest safety and reliability requirements.

By using them for the purposes specified in this user manual, by operating them with the required diligence and performing accurate maintenance and overhauling in a workmanlike manner, consistent performance and functionality and durability can be ensured.

### 4.1.7 Accident prevention

The **MANUFACTURER** will not be liable for accidents, during the use of the unit, due to failure by the user to comply with laws, provisions, prescriptions and regulations applicable to fluid chillers and heat pumps and/or fluid chillers with free-cooling exchange system.

### 4.1.8 Operational safety

The **MANUFACTURER** will not be responsible in case of malfunctions and damage if the unit:

- is used for purposes other than those intended;
- Is not handled and maintained according to the operating rules specified in this manual;
- It does not regularly and consistently receive maintenance as prescribed or non-original spare parts are used;
- Is modified or some components are replaced without the **MANUFACTURER's** written authorisation, especially when the effectiveness of the safety systems has been altered or minimised on purpose;
- It is used outside the permissible temperature range.

### 4.1.9 Tools

Use only tools prescribed by the unit manufacturer; in order to avoid personal injury, do not use worn or damaged, low quality or makeshift tools.

If tools not recommended or modified without authorisation are used, the manufacturer will no longer be liable for damages caused.

### 4.1.10 Personnel

Ordinary maintenance prescribed in this manual must only be performed by authorised and trained personnel. For the

maintenance or overhauling of components not specified in this manual, contact the **MANUFACTURER**.

#### 4.1.11 Keep the unit clean

Oil and grease stains, misplaced tools or broken pieces are harmful to people as they can cause slipping or falls. Always keep the area where the unit is installed clean and tidy.

Do not use diesel fuel, oil or solvents to clean the unit as the first two leave an oily film that makes it easier for dust to stick, while solvents (even milder ones) damage the paint finish and cause rusting.

If a jet of water penetrates the electrical equipment the contacts oxidise and the unit may malfunction. Therefore, do not use jets of water or steam on the sensors, connectors or any electrical part.

#### 4.1.12 Warning plates

Before starting any maintenance operation, turn off the unit. If other people start the unit and operate the control buttons while maintenance operations are being performed, serious injury or even death may result.

To avoid these dangers, before carrying out maintenance, hang caution signs around the unit.

#### 4.1.13 Warnings for inspections and maintenance

Display a sign with the warning: **"INSPECTION IN PROGRESS"** on all sides of the unit.

Check the unit carefully following the list of operations contained in this manual.



#### 4.1.14 Care and maintenance

The cause of damages and accidents is often attributable to wrong maintenance, such as:

- Inadequate refrigerant;
- Poor cleaning in the unit setting;
- Circuit inefficiency (damage to the finned coils, pipe connections, tightening of pipes, screws, etc.).

Carry out maintenance work as required: this is also critical for your own safety.

Never postpone scheduled repairs.

Only assign skilled or authorised personnel to repair tasks.

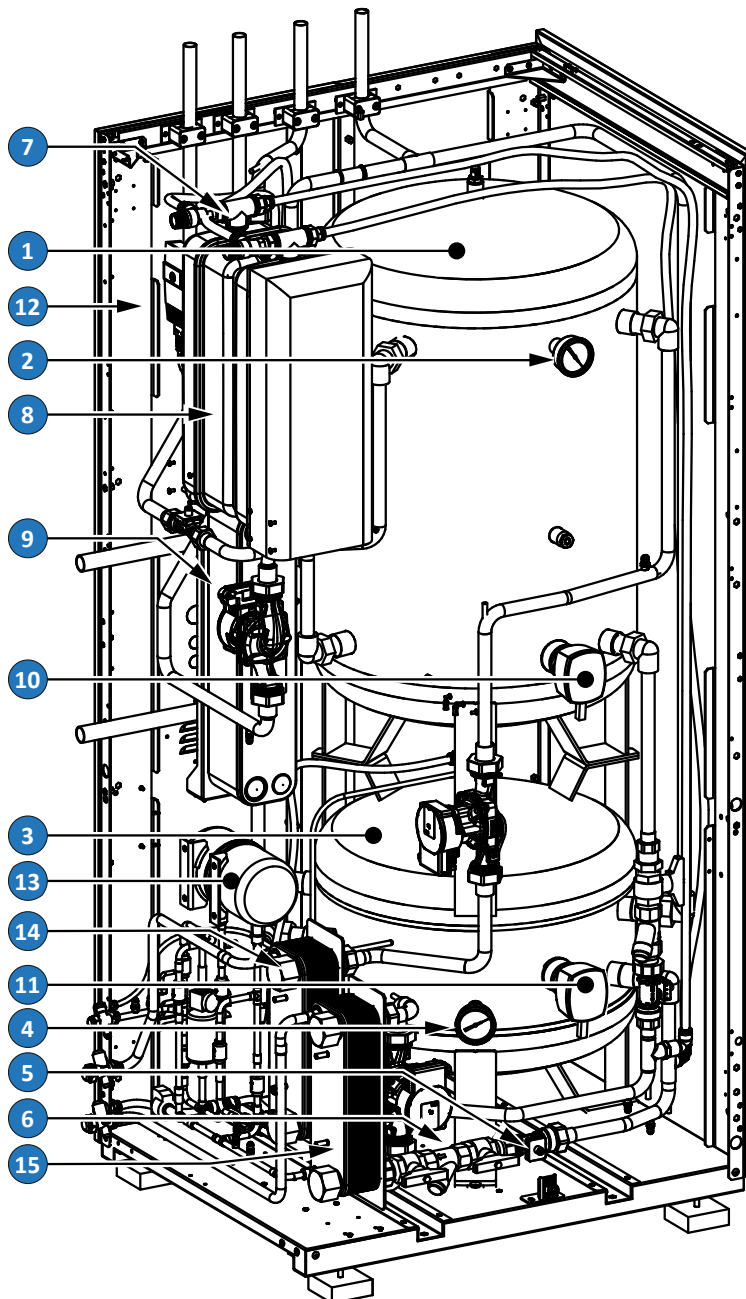
Always observe the following safety rules, even when you are thoroughly familiar with the operations involved:

- Always keep the unit and the surrounding area clean;
- Before beginning to work, check the perfect efficiency of protective devices;
- Make sure that no unqualified or not specially appointed persons enter the unit operating area.

## 5 DESCRIPTION OF THE PRODUCT AND TECHNICAL DATA

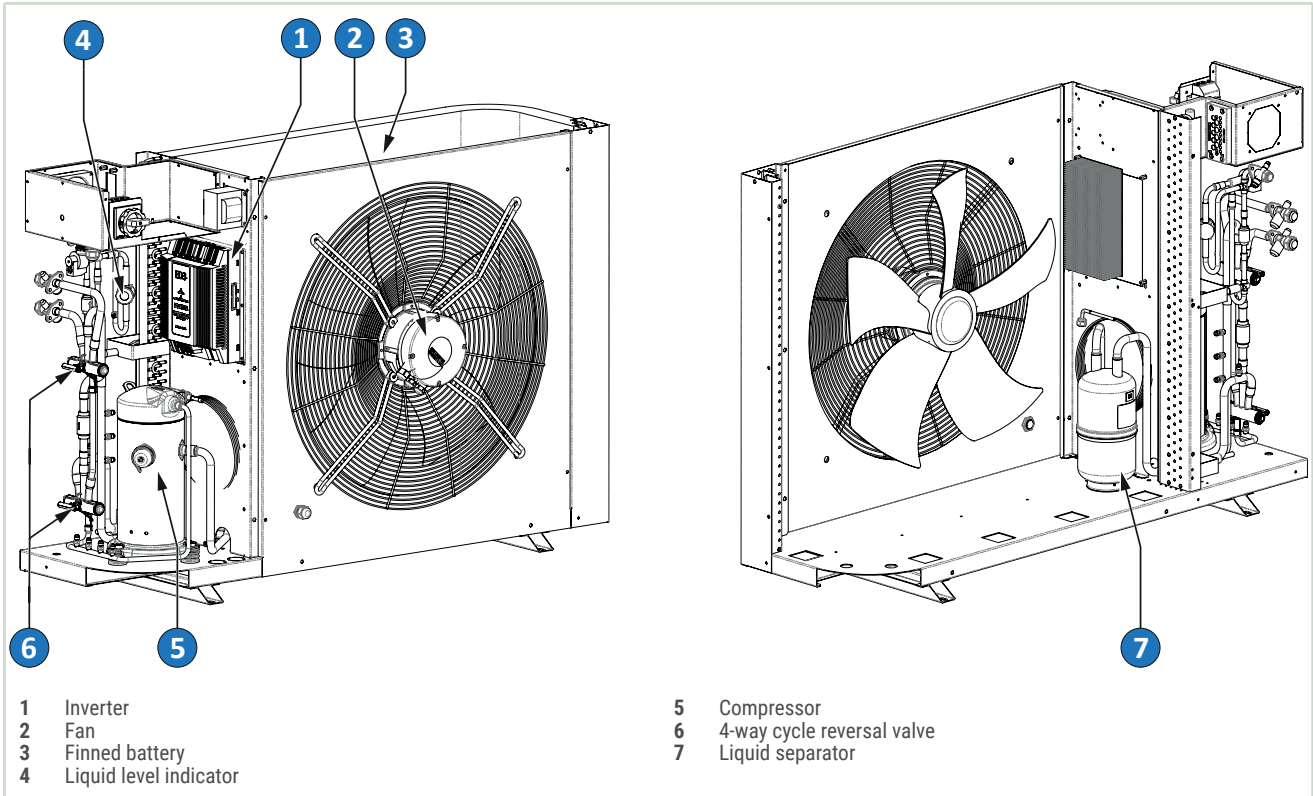
### 5.1 Main components

#### 5.1.1 Main components of the indoor unit



- 1 DHW tank
- 2 Technical DHW circuit pressure gauge
- 3 User tank
- 4 User circuit pressure gauge
- 5 User and technical DHW circuit temperature and flow sensor
- 6 Y filters + throttle valves in the User and technical DHW circuit
- 7 Safety valves for User and technical DHW circuit
- 8 Expansion vessel for User and technical DHW circuit
- 9 DHW quick preparator
- 10 Technical DHW tank back-up heater (optional)
- 11 User tank back-up heater (optional)
- 12 Modulating pump kit and 3-way mixing valve for system side distribution (optional)
- 13 Liquid receiver
- 14 User exchanger
- 15 DHW side heat exchanger

### 5.1.2 Main components of the outdoor unit



- 1 Inverter
- 2 Fan
- 3 Finned battery
- 4 Liquid level indicator

- 5 Compressor
- 6 4-way cycle reversal valve
- 7 Liquid separator

## 5.2 Operating limits

### 5.2.1 Limits for the temperature of water produced

The units of the series can work with mixtures of water and glycol, with glycol percentages up to 40%. If this percentage is exceeded, please contact the sales department for a special selection of pumps.

**⚠ ATTENTION**

Using glycol is necessary in all cases in which the temperature of the heat transfer fluid drops below 5°C, i.e. even when

the unit is switched off or only running in summer mode, should this temperature condition occur. This will prevent water freezing and the resulting internal damage to components.

**⚠ WARNING**

The percentage of glycol must be selected according to the lowest expected temperature.

In the following tables, the freezing temperatures of the mixture are given as a function of the glycol content and the recommended amount of glycol - respectively.

% by weight of glycol	Freezing temperature of the mixture with ethylene glycol (°C)	Freezing temperature of the mixture with propylene glycol (°C)	Adjustable antifreeze temperature set for the mixture with ethylene glycol (°C)	Adjustable antifreeze temperature set for the mixture with propylene glycol (°C)
0	0	0	5	5
10	-3	-3	2	2
15	-5	-5	0	0
20	-8	-7	-3	-2
25	-11	-10	-6	-5
30	-14	-13	-9	-8
40	-22	-21	-17	-16

The use of glycol will determine a change in terms of heating capacity, water flow and pressure drop. The corrective factors to be used according to the percentage of glycol are shown in the following table.



Glycol percentage by weight	%	0%	10%	20%	30%	40%
ETHYLENE-BASED	Developed heat capacity correction factor	1,00	1,00	0,99	0,99	0,98
	Water flow correction factor	1,00	1,05	1,09	1,14	1,20
	Pressure drop correction factor	1,00	1,16	1,35	1,58	1,86
PROPYLENE-BASED	Developed heat capacity correction factor	1,00	1,00	0,98	0,97	0,96
	Water flow correction factor	1,00	1,02	1,04	1,07	1,10
	Pressure drop correction factor	1,00	1,11	1,31	1,53	1,78

 **ATTENTION**

The freezing temperature of the mixture must be at least 5 °C lower than the minimum temperature expected at the heat pump outlet. Otherwise it is possible to cause the formation of ice inside the evaporator with consequent breakage of the same.

 **WARNING**

All the temperatures on the perimeter of the operating areas can only be reached as transients and if the unit runs beyond these limits for a prolonged time, the software on board will implement corrective actions to restore the unit within the operating limits.

<b>Thermal carrying fluid</b>	water or mixture of water and antifreeze (max 40%)
<b>Maximum water side pressure</b>	3 bars
<b>Maximum pressure on high pressure side [ps]</b>	45,0 bar
<b>Minimum operating temperature</b>	+42 °C
<b>Minimum operating temperature</b>	5 °C
<b>Maximum pressure on low pressure side</b>	28 bar-r (*)
<b>Supply voltage</b>	+/- 10% compared to plate voltage
<b>Maximum storage temperature</b>	+42 °C
<b>Minimum storage temperature</b>	-20 °C (limit determined by on board electronics)

(\*) this value can be reached only in storage conditions and determines the refrigerant saturation pressure of 28 bar-r on the low pressure side of the circuit, a value which in fact defines the limits.

### Water flow to the user exchanger

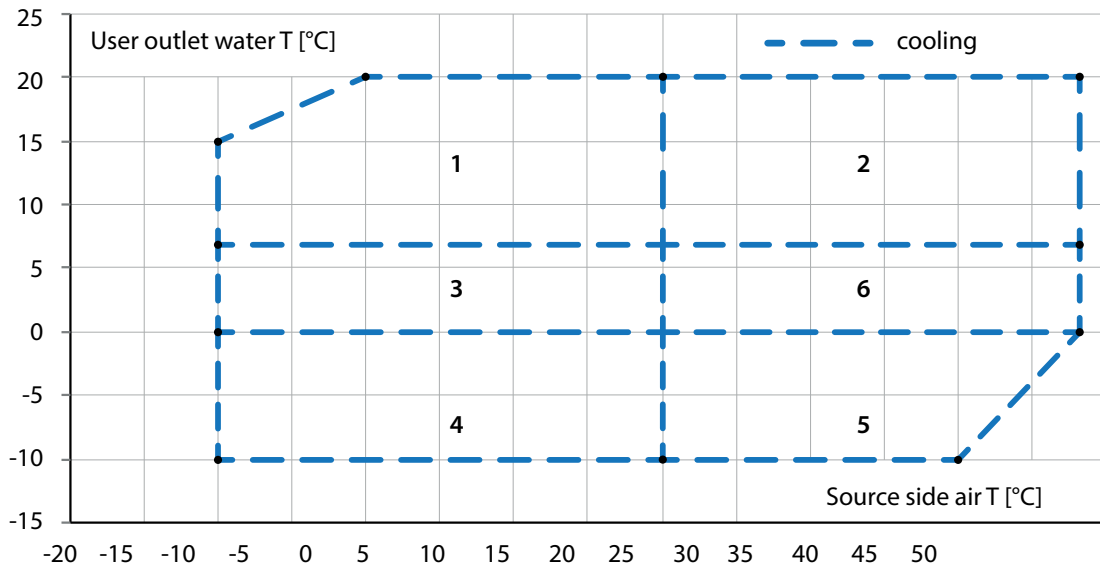
The nominal flow rate is based on a thermal differential of 5° C between inlet and outlet water, in relation to the cooling capacity provided at the nominal water temperatures (12/7 °C).

The maximum allowed flow rate is associated with a thermal differential of 3 °C. Higher flow rate values cause too big pressure drops.

The min flow value allowed is the one belonging to a 8°C temperature differential through the evaporator: minor flow values could cause evaporating temperatures too low for the compressors, with the group stopping or in any case bad distribution and risk of heat exchange in motion not turbulent or not completely turbulent.

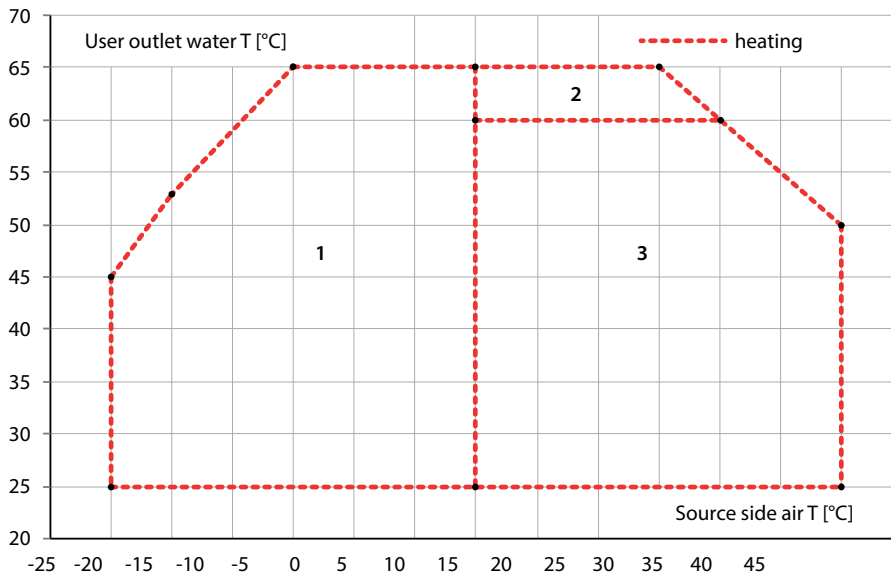
### 5.2.2 Operating limits

» RAW operating limits during cooling for produced water and outside air temperature



- 1 condensation control
- 2 standard unit
- 3 condensation control / glycol mix on user side
- 4 condensation control / glycol mix on user side / custom version on request
- 5 glycol mix on user side / custom version on request
- 6 Glycol mix on user side

» RAW operating limits during heating for produced water and outside air temperature



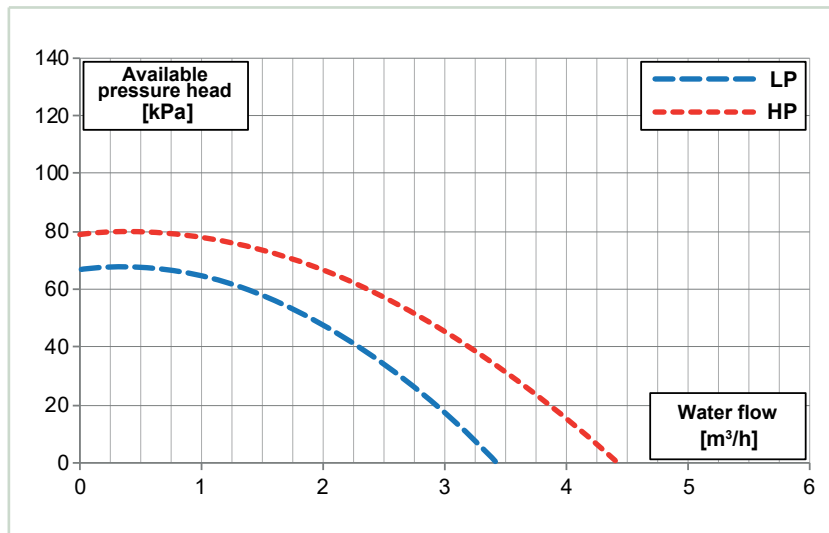
- 1 standard unit
- 2  $\Delta T > 7^\circ\text{C}$  user side
- 3 evaporation control



## 5.3 Characteristic curves of the circulation pumps

### 5.3.1 Circulation pumps on user and DHW side

The circulation pumps of the User and DHW circuit located in the primary circuit between the heat pump and the tanks (always supplied inside the unit) have already been accurately sized, therefore, it is not necessary to check them against the head-flow characteristic curve.



### 5.3.2 Circulation pump for system side distribution (optional)

Working head of the pump mounted upstream of the User tank integrated in the indoor unit. Pressure drops of the 3-way mixing valve mounted upstream of the circulator have been taken account in calculating the working heads.

The following circulator and 3-way valve are available inside the unit if selected at the time of ordering in the "User side hydraulic configuration" section. It is also possible to select whether the kit should be controlled by the heat pump internal software or if dedicated terminals should be provided for control from an external regulator.

## 5.4 Calibration of control devices

### 5.4.1 General description

All the control devices are set and tested in the factory before the unit is dispatched. However, after the unit has been in service for a reasonable period of time you can perform a

check on the operating and safety devices. The settings are shown in Table 5.4 Setting of safety-control devices p. 17.

#### **! DANGER**

All service operations on the control equipment must be carried out **EXCLUSIVELY BY QUALIFIED PERSONNEL**: incorrect calibration values can cause serious personal injuries and damage the unit.

Many of the operating parameters and system settings are configured by means of the microprocessor control and are protected by passwords.

#### » SETTING OF SAFETY-CONTROL DEVICES

CONTROL DEVICE		ACTIVATION	DIFFERENTIAL	REACTIVATION
Antifreeze thermostat	°C	+4	1	Manual
Maximum safety pressure switch	bar	45	-10	Manual
Modulating condensation control	bar	18	10	-
Minimum time between two starts on the same compressor	s	450	-	-
Flow switch alarm delay	s	15 (start-up)	5 (running)	-
Low pressure alarm delay	s	0	-	-

### 5.4.2 Maximum pressure switch

The high pressure switch is of the manual reset type and classifiable as category IV under 97/23 EC. It directly stops the compressor when the discharge pressure exceeds the set value.

#### **! ATTENTION**

Any kind of block or alarm must be promptly reported to the After Sales Service!

**WARNING**

The high pressure switch must be manually reset; this is possible only when the pressure falls below the set differential (see Table 5.4 Setting of safety-control devices p. 17).

### 5.4.3 Anti-freeze thermostat function

The anti-freeze sensor situated at the evaporator outlet detects the presence of excessively low temperatures and stops the unit.

Together with the flow switch and low pressure switch, this device protects the evaporator from the risk of freezing as a result of faults in the water circuit.

This device is a function included in the microprocessor control.

**ATTENTION**

If there are any alarms relating to the intervention of the protections described, the unit must request the intervention of the Authorised Technical Service Centre, otherwise the warranty will be considered null and void.

## 5.5 Liquid refrigerant lines and refrigerant charge

All copper pipes are made to our specifications for us to be able to fully control their construction process and inherently improve the quality of our products. Each pipe complies with the requirements of directive 97/23PED and is inspected in accordance with the FEM calculation code at the point most

stressed by 180° bending and at the maximum pressure allowed by the safety devices - taking into account adequate safety coefficients.

As regards the external refrigeration lines, the indications given in this paragraph and the diameter figures in the following table must be complied with. Make sure there are no leaks and ensure pressure tightness of the refrigeration lines with a leak test (see para. 11.4 Tightness test p. 46).

**ATTENTION**

The unit RAW is supplied with a pre-charge of refrigerant and oil.

Check the table to learn about the basic refrigerant charge and the line length requirements met by this charge; beyond this value, provide by the agreed first start-up date the refrigerant needed and, if necessary, oil as well, as shown in the following tables.

The addition of the refrigerant and oil required for correct operation of the unit will be carried out by the Authorised Service Centre during the start-up phase.

To complete the operation, the line must have been under negative pressure conditions for 6-8 hours up to maximum 24 hours before starting the unit.

If it is not possible to create vacuum shortly before start-up, carry out the procedure anyway as indicated and then let the pre-charge contained in the unit flow into the line.

**WARNING**

Document the procedure by providing information to the Service Centre on the pressures reached and the pressures' hold time.

The following table provides indications on the pipes, the refrigerant and oil charges, depending on size changes:

#### » VERSION H: Multi functional heat pump

Refrigerant	R410A - R454B					
	Emkarate RL-32-3 MAF					
Oil type	RAW	006H	009H	012H	015H	017H
Size						
Precharge	[kg]	2,2	2,2	2,5	2,8	2,8
Refrigerant charge limit	[kg]	4,9	4,9	4,9	7,8	7,8
Basic oil charge	[kg]	0,74	0,74	0,74	1,18	1,18
Line length requirements met by the basic charge	[m]	1	1	1	1	1
<b>Line length 0 - 25 m</b>						
Addition of refrigerant per metre of line beyond the length requirement met by the basic charge	[g]	90	90	120	130	130
Addition of oil due to exceeding the refrigerant charge limit (for each additional kg of refrigerant)	[g/kg]	50	50	50	50	50
Addition of oil for each single siphon	[g]	20	20	34	34	34
<b>Refrigerant line diameters</b>						
Suction lines (gas)	[inch]	1/2"	1/2"	5/8"	3/4"	3/4"
Liquid line	[inch]	3/8"	3/8"	1/2"	1/2"	1/2"

**» VERSION M: Total recovery multipurpose heat pump (ATTENTION: the unit includes three refrigerant lines)**

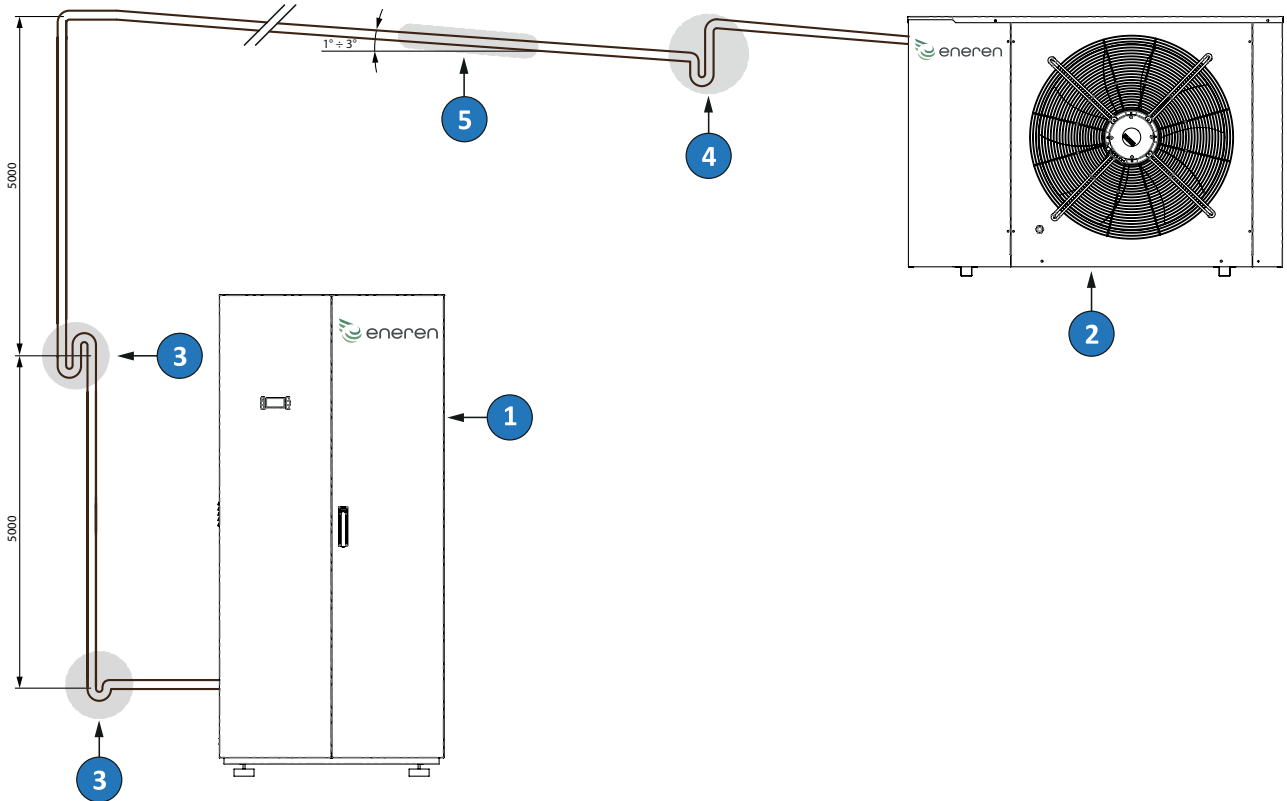
Refrigerant	R410A - R454B					
	Emkarate RL-32-3 MAF					
Oil type	RAW	006M	009M	012M	015M	017M
Size						
Precharge	[kg]	2,2	2,2	2,5	2,8	2,8
Refrigerant charge limit	[kg]	4,9	4,9	4,9	7,8	7,8
Basic oil charge	[kg]	0,74	0,74	0,74	1,18	1,18
Line length requirements met by the basic charge	[m]	1	1	1	1	1
<b>Line length 0 - 25 m</b>						
Addition of refrigerant per metre of line beyond the length requirement met by the basic charge	[g]	100	100	150	160	160
Addition of oil due to exceeding the refrigerant charge limit (for each additional kg of refrigerant)	[g/kg]	50	50	50	50	50
Addition of oil for each single siphon	[g]	20	20	34	34	34
<b>Refrigerant line diameters</b>						
Suction line 1 (gas)	[inch]	1/2"	1/2"	5/8"	3/4"	3/4"
Suction line 2 (gas)	[inch]	1/2"	1/2"	5/8"	3/4"	3/4"
Liquid line	[inch]	3/8"	3/8"	1/2"	1/2"	1/2"

 **ATTENTION**

Building refrigeration lines that do not comply with the instructions provided in this paragraph, or reaching a height difference greater than 10 metres without the explicit authorisation of Eneren, will result in the immediate termination of the guarantee validity. It is also necessary to provide information on the completion of the procedure to create vacuum conditions as indicated in the following paragraph, otherwise, the unit cannot be started up and the resulting costs will be charged as reported in the first start-up request document.

If the length of the connection line between the indoor and outdoor units exceeds 15 metres in length, it is mandatory to contact the design department for inspections as required. In no case should the length of the connection line between the indoor and outdoor units exceed 25 metres in length.

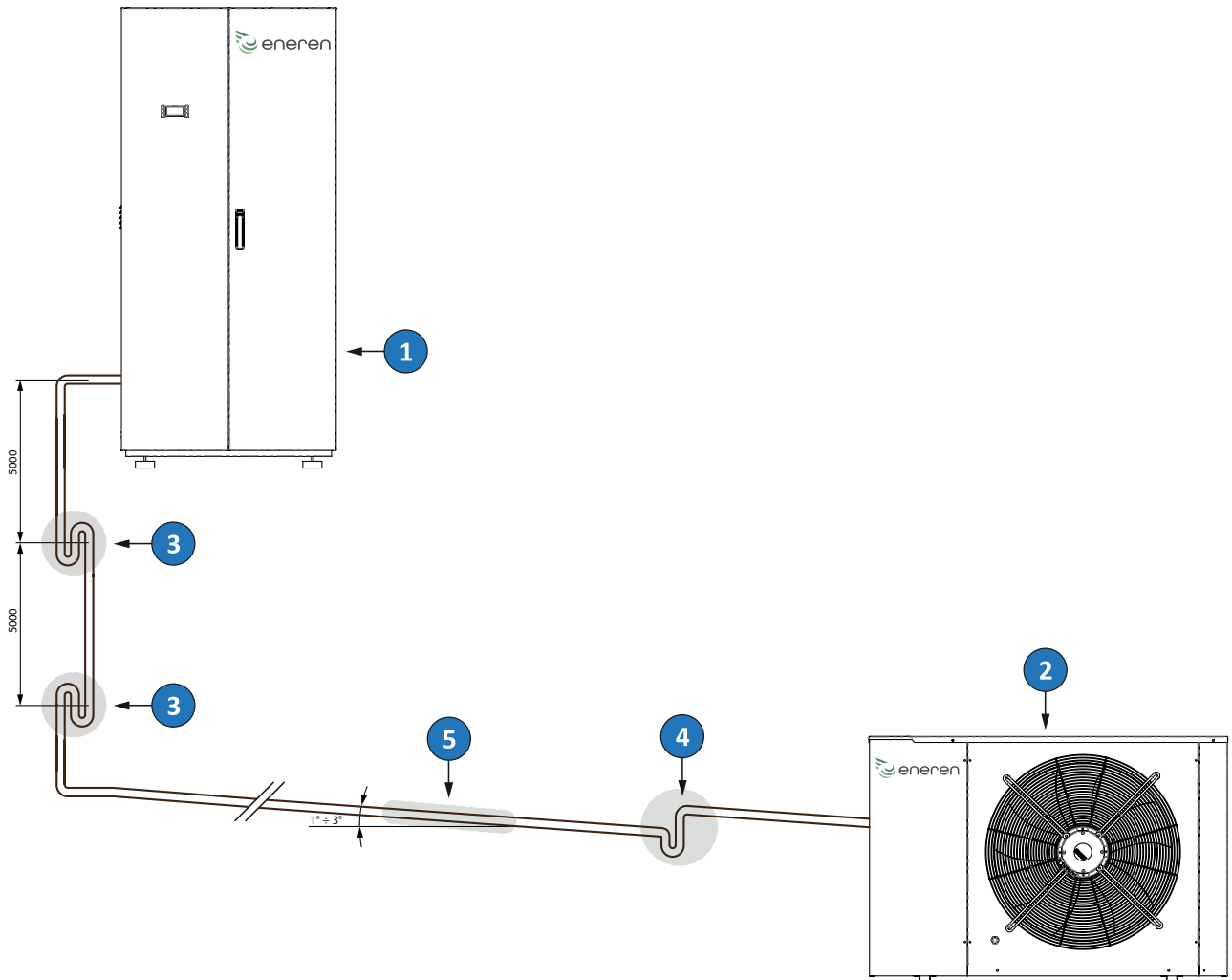
» Installation of the gas line with the remote unit located higher than the indoor unit



- 1 Indoor unit
- 2 Outdoor unit
- 3 Siphons  $h = 200 \text{ mm}$  Radius =  $2D$  every 5 m of height

- 4 Siphons to recover some height throughout long horizontal lines
- 5 Lines gradient between  $1^\circ$  and  $3^\circ$  to facilitate oil return

» Installation of the gas line with the remote unit located lower than the indoor unit

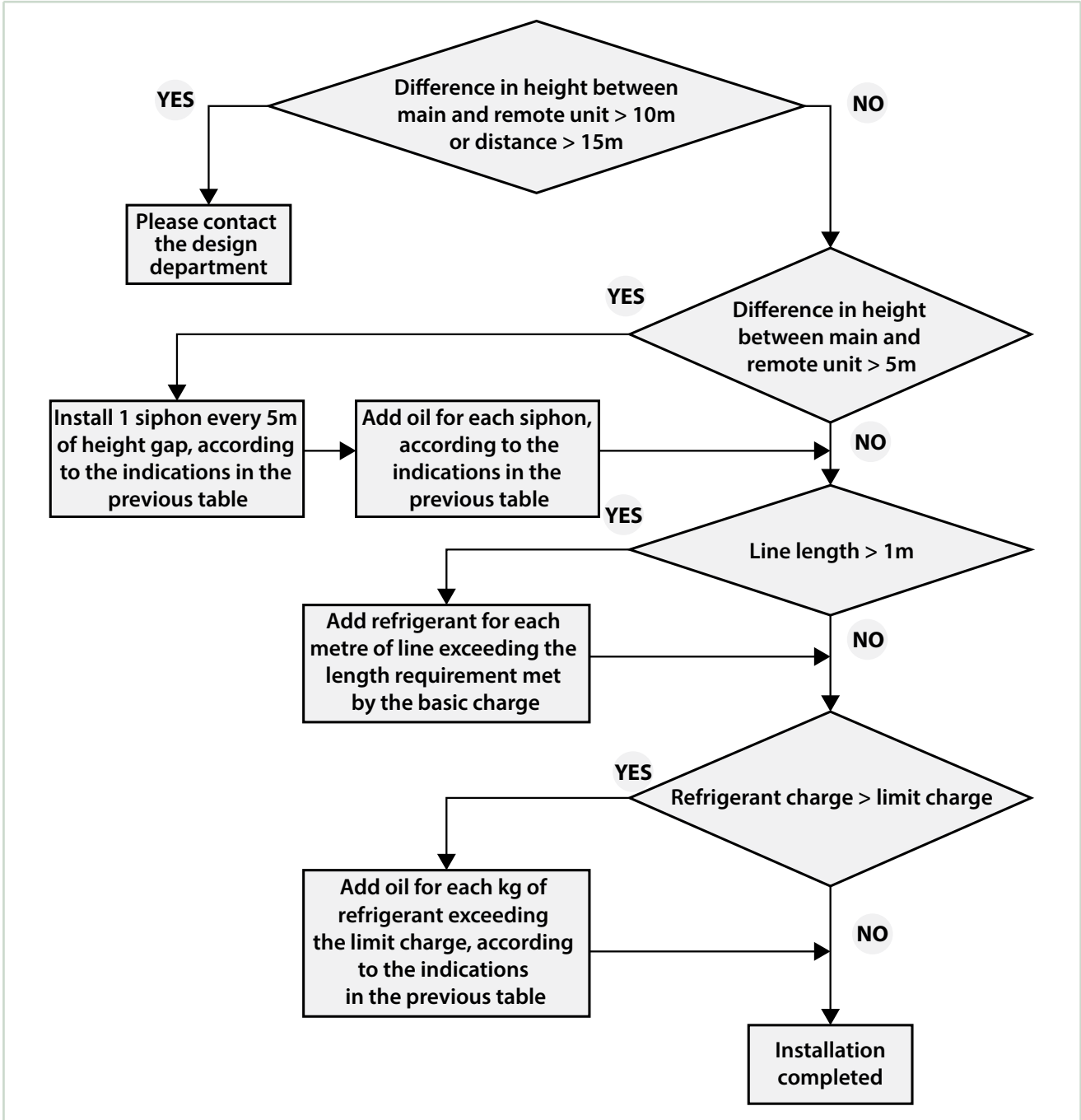


- 1 Indoor unit
- 2 Outdoor unit
- 3 Siphons  $h = 200 \text{ mm}$   $R = 2D$  every 5 m of height

- 4 Siphons to recover some height throughout long horizontal lines
- 5 Lines gradient between  $1^\circ$  and  $3^\circ$  to facilitate oil return

**WARNING**

Use pipes marked in accordance with the UNI12735 standard



### 5.5.1 Oil and refrigerant charge

#### 5.5.1.1 Refrigerant charge (e.g. with RAW 009 H, 25 m line)

Refrigerant charge to add, due to the length of the line
$(25\text{ m} - 1\text{ m}) \times 90\text{ g/m}^{**} = 2.16\text{ kg}$
* - Line metres ** - Addition of refrigerant per metre of line

Total refrigerant charge
$2.16\text{ kg}^* + 2.2\text{ kg}^{**} = 4.36\text{ kg}$
* - Charge due to the length of the line ** - Pre carica di refrigerante

#### 5.5.1.2 Addition of oil

Vertical line 10m => 2 siphons. Addition of oil due to siphons.
$20\text{ g}^* \times 2^{**} = 40\text{ g}$
* - Addition of oil for each single siphon ** - No. of siphons

Refrigerant charge other the limit
<b>0 g</b>
* - Total refrigerant charge ** - Limit refrigerant charge for the compressor

Addition of oil due to exceeding the refrigerant limit charge
<b>0 g</b>
* - Refrigerant charge above the limit ** - Addition of oil per kg of refrigerant

Total addition of oil
<b>40 g</b>
* - Addition of oil due to exceeding the limit charge ** - Addition of oil due to siphons

 **ATTENTION**

The gas/liquid lines connecting the indoor and outdoor units must be under vacuum conditions before opening the taps of the outdoor unit. The absence of air and humidity in the pipes is an essential condition to guarantee trouble-free operation and long life of the machine. Pipe laying and installation operations should be carried out by qualified personnel.

 **WARNING**

Since R410A and R454B are a binary mixture of R32-R125 and R32-R1234yf - respectively, it is advisable that the refrigerant charge be created with refrigerant in liquid form to guarantee the correct percentage of the two components. Fill through the filling port located between the lamination valve and the evaporator inlet.

 **ATTENTION**

A unit originally filled with R410A (or R454B) back at the factory cannot be filled with other refrigerants.

 **WARNING**

We recommend reading the Refrigerant Fluid Safety Data Sheet (MSDS) before using R410A or R454B.

3. If regenerated refrigerant fluid is used, a copy of the analysis must be attached
4. All parts that are replaced or modified must be noted
5. The results of the periodic checks must be noted
6. Long periods of machine downtime must be noted

 **WARNING**

In Italy the booklet is regulated by the D.P.R. 147.

## 5.6 System booklet

The charge of the refrigerant fluid determines the obligation on the part of the system manager to keep a system booklet. If the charge exceeds 3 kg of refrigerant fluid, EN378-2 requires the installer to prepare the system booklet which must be regularly updated with any ordinary or extraordinary maintenance.

This is the information that must be inserted:

1. Details of the repair or maintenance
2. Quantity and type of refrigerant that is added / removed from the system

## 6 INSPECTION AND TRANSPORT

### 6.1 Inspection

Upon receipt of the unit, check the integrity.  
The machine has left the factory in perfect condition.

**⚠ ATTENTION**

Any damage must be immediately reported to the carrier and noted on the Delivery Sheet before signing this.

**📣 WARNING**

The manufacturer or its agent must be promptly notified of the extent of the damage.

The Customer must submit a written report describing any significant damage.

Check the integrity of the documents accompanying the unit and of this manual.

Check for the presence of the wiring diagram.

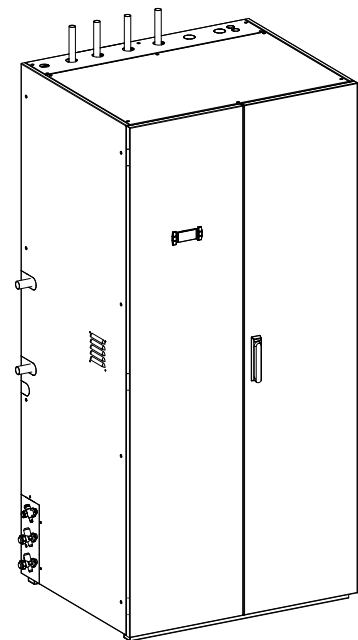
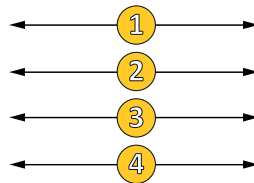
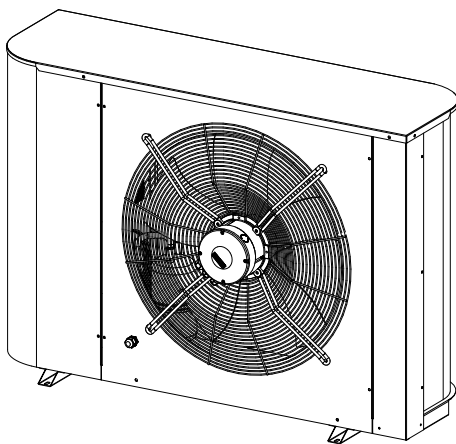
After starting up the unit, check the commissioning report.

**⚠ ATTENTION**






The rules for the correct positioning of the unit, maintenance and management of any alarms are given in the technical manual.

### 6.2 Location of safety data plates

» Safety data plates





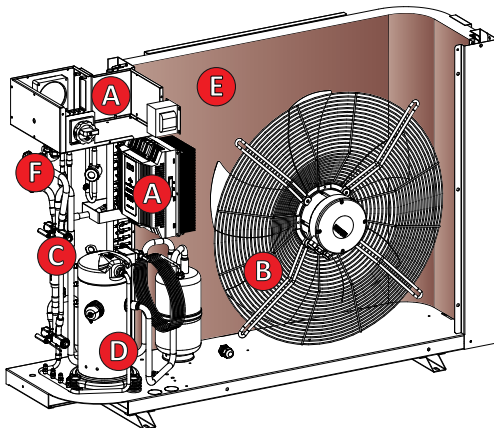
<p><b>1</b></p> <p>A. Warning: danger due to poor familiarity with all the functions of the unit and the resulting risks.          B. Read the use and maintenance manual carefully before operating the unit.</p>	<p>(A)   (B)</p>
<p><b>2</b></p> <p>Electric power supply data plate</p>	<p><b>ALIMENTAZIONE ELETTRICA          POWER SUPPLY          SPG.VERSORGUNGSTEIL          400V/3+N/50Hz</b></p>
<p><b>3</b></p> <p>A. Danger: live parts.          B. Danger of burns.          C. Danger of mechanical moving parts.</p>	<p>(A)   (B)</p> <p>(C) </p>
<p><b>4</b></p> <p>Refrigerating liquid</p>	<p><b>R454B</b>    <b>R410A</b></p>

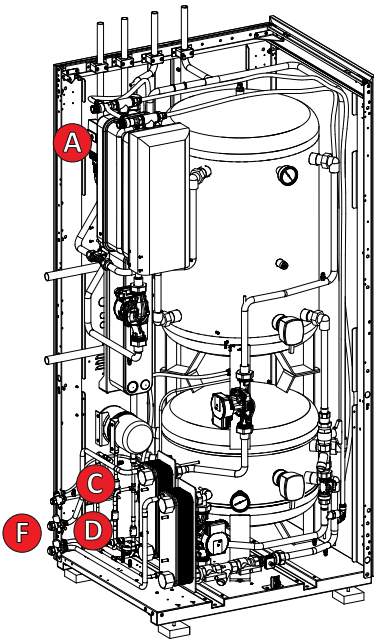
### 6.3 Residual risk areas

protected with guards due to specific features of the unit. Each operator must be aware of the residual risks on this unit in order to prevent potential accidents.

**⚠ DANGER**

It has not been possible to eliminate certain residual risks during the design phase, found in some areas of the unit, or





**A** Risk of short circuit and fire  
**B** Impact and abrasion hazard in fan area  
**C** Danger of explosion due to the presence of pressurised circuits

**D** Danger of pollution due to the presence of refrigerant in the circuit  
**E** Danger of cutting injuries near finned exchangers  
**F** Danger of burns due to the presence of high temperature pipes

 **WARNING**

In order to avoid the risks listed above it is essentially important to:

- A. Set the control panel according to the manufacturer's instructions.
- B. Not place metal objects inside the electrical control panel.
- C. Not store flammable materials near the machine.
- D. Do not alter any component of the cooling circuit.
- E. Not let the machine work outside the limits indicated by the manufacturer.
- F. Dispose of all the materials that make up the machine correctly, use suitable equipment for the recovery of the refrigerant gas (see chapter 7 Retiring the unit p. 27).
- G. Not touch the internal components during operation without adequate protection.

## 6.4 Lifting and Conveyance

During the unloading and positioning of the unit, be extremely careful to avoid bumps and knocks or sudden movements. Factory handling must be carried out with the utmost care, avoiding using any machine components for support.

 **ATTENTION**

In all lifting operations make sure that the unit is securely anchored in order to prevent accidental falls or overturning.

Do not tilt, overturn or drag the unit during transport and installation.

The unit must only be handled exclusively by forklift.

## 6.5 Unpacking

 **ATTENTION**

The unit packaging must be carefully removed avoiding possible damage to the machine.

The packaging materials are of a different nature: wood, cardboard, nylon etc. Refer to the next paragraph for the correct disposal of the packaging.

## 7 RETIRING THE UNIT

When the unit has reached the end of its expected working life and therefore needs to be removed and replaced, a number of precautions must be followed:

- the refrigerant gas that it contains should be recovered by specialised personnel and sent to a waste collection facility;
- the lubrication oil of the compressors must also be recovered and sent to special collection centres;
- the structure and the various components, if not reusable, must be demolished and separated according to their product type: this is particularly relevant for copper and aluminium, which are present in fairly high amounts in the machine.

This should be done to facilitate work at the special collection, disposal and recycling centres and to minimise the environmental impact that this operation requires.

### **ATTENTION**

If the unit, or part of it, has been decommissioned, any of its parts that are likely to cause dangers must be rendered harmless.

Please note that any replacement of unit parts subject to separate waste disposal must always be done by referring to the currently applicable legal provisions.

Please note that it is mandatory to record the loading and unloading of special and toxic-harmful waste.

Collection of special and toxic-harmful waste must be carried out by specially authorized companies.

Disposal of special and toxic or harmful waste must be carried out in compliance with the law provisions in force in the user's country.

For unit scrapping, follow the law prescriptions in force in the user's country. Before demolition ask the appointed organism to inspect the unit and write a report.

Finally, carry out scrapping according to the law in force in the country of use.

### **WARNING**

Dismantling, disposal and scrapping operations must be carried out by qualified personnel.

## 7.1 Environment protection

In general, the laws regulating the use of substances that damage the stratospheric ozone layer and the gases responsible for the greenhouse effect in force in the various countries provide that it is forbidden to disperse refrigerant gases in the environment and request their originators to recover them and return them, at the end of their service life, to the retailers or to special collection centres.

The refrigerant, although not harmful to the ozone layer, is listed among the substances responsible for the greenhouse effect and must therefore be used in compliance with the above obligations.

### **ATTENTION**

Caution is therefore recommended during maintenance operations in order to minimise refrigerant leaks as much as possible. In any case, refer to the laws in force in the country of installation.

## 7.2 Waste electrical and electronic equipment management

This product falls within the application scope of the Directive 2012/19/EU concerning the management of waste electrical and electronic equipment (WEEE).

Equipment must not be disposed of with household waste as it is made of different materials that can be recycled at special facilities. Please inquire through your municipal authorities as to the location of the eco-friendly waste management sites where waste can be received for disposal and its subsequent recycling as recommended.

Furthermore, please note that, when an equivalent appliance is purchased, the seller is expected to collect free of charge the old product to be disposed of.

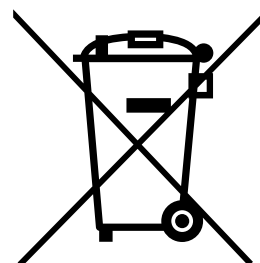
The product is not potentially dangerous for human health and the environment, as it does not contain any harmful substances according to the Directive 2011/65/EU (RoHS), but if disposed of freely in the environment, it might adversely affect the ecosystem.

Read the instructions carefully before using the equipment for the first time. It is strongly recommended not to use the product for any purpose other than that for which it was designed, to prevent the risk electric shock if the product is used incorrectly.

### **WARNING**

The crossed-out wheelie bin symbol on the equipment label indicates that the equipment is compliant with the Waste Electrical and Electronic Equipment (WEEE) Directive.

Disposing of the equipment freely in the environment or illegally disposing of the equipment are punishable by law.



## 7.3 Packaging disposal

The QR Code below is shown on a label on the packaging of the machine, which allows the user to identify the nature of the packaging used in order to follow the correct disposal procedure.

RECYCLING INFO



SCAN ME

 **ATTENTION**

For disposal of packaging, always refer to local laws that implement Directives 2018/851/UE and 2018/852/UE.

**TECHNICAL MANUAL**

## 8 INSTALLATION

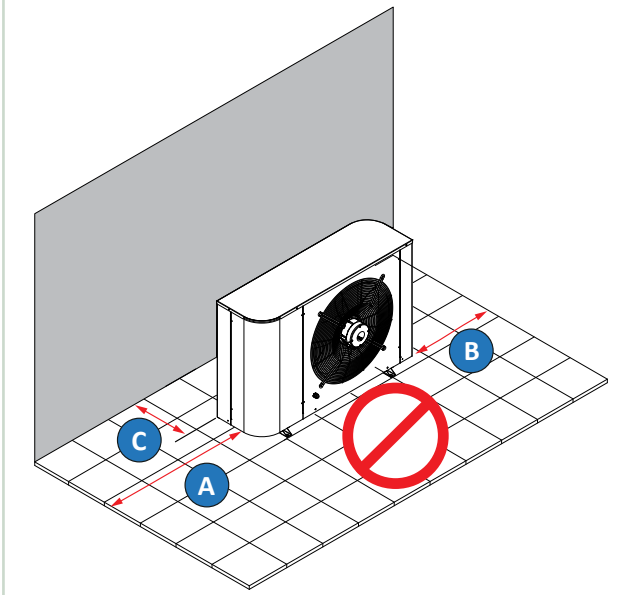
### 8.1 Positioning and installation

#### 8.1.1 Positioning and minimum spaces of respect

**ATTENTION**

The spaces indicated in the dimensional drawings must be complied with for the units to function properly and routine maintenance to be performed.

##### » MINIMUM SPACES OF RESPECT OUTDOOR UNIT

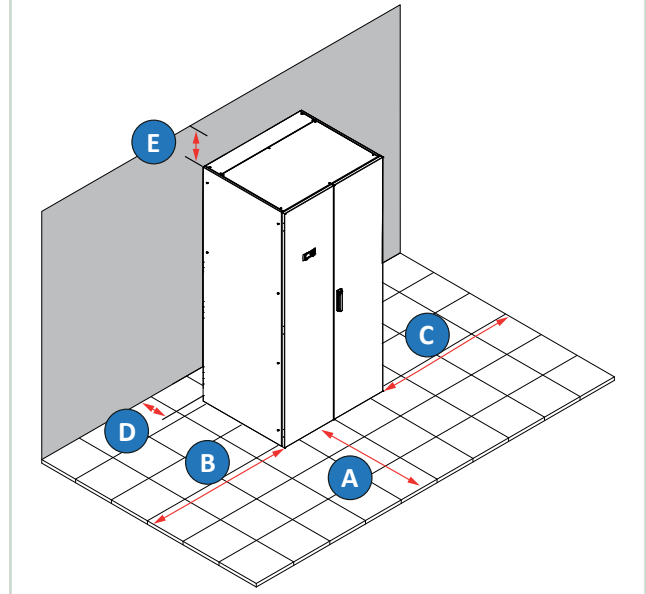


	A [mm]	B [mm]	C [mm]
Clearance spaces	500	500	300

**ATTENTION**

There must be no obstacles or objects in front of the outdoor unit.

##### » MINIMUM SPACES OF RESPECT INDOOR UNIT



	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
Clearance spaces	600	800	200	0	350

**ATTENTION**

The positioning of the unit that does not respect the minimum spaces indicated in the following paragraph without the explicit authorization of Eneren will result in the immediate voidance of the guarantee.

#### 8.1.2 Unit installation

You should bear in mind the following aspects when choosing the best site for installing the unit and the relative connections:

- Size and origin of water pipes;
- power supply location;
- accessibility for maintenance or repairs;
- solidity of the supporting surface
- the application limits of the unit:

Maximum (ambient) temperature	°C	42
Minimum (ambient) temperature	°C	+5
Maximum (storage) temperature	°C	42
Minimum (storage) temperature	°C	-20

**ATTENTION**

The indoor unit has a protection degree of IP22 that does not allow it to be installed outdoors.

Make sure the unit is not exposed to much dust and protect it from humidity and salt spray.

It is mandatory to use the anti-vibration mounts supplied.

## 8.2 Requirements for the installation of units with A2L refrigerant

Safety of household and similar electrical appliances - Part 2: Special rules for electric heat pumps, air conditioners and dehumidifiers

IMPROVED TIGHTNESS REFRIGERANT SYSTEMS ACCORDING TO IEC 60335-2-40:2018, REQUIREMENT 22.125

### Abbreviations

m	Refrigerant charge in the machine with refrigeration line shorter than 5 metres.
m <sub>extra</sub>	Addition of refrigerant per metre of line beyond the length requirement met by the basic charge.
m <sub>c</sub>	m + m <sub>extra</sub> = Total system charge (same as m if the refrigeration line is shorter than 5 metres).
m <sub>max</sub>	Maximum refrigerant charge for the room area.
h <sub>inst</sub>	Height installed.
h <sub>rel</sub>	Relative release height.
A <sub>min</sub>	Minimum required plan area.

A <sub>room</sub>	Area of the room where the machine is installed.
A <sub>adjacent</sub>	Area of the adjacent space.
Anv <sub>min</sub>	Total minimum area required for the lower intake openings used for natural ventilation.
Anv <sub>min2</sub>	Total minimum area required for the upper delivery openings used for natural ventilation.
Q	Minimum flow rate required for mechanical ventilation (indoor or outdoor).
V	Minimum indoor delivery volume required.

### 8.2.1 Calculation of the minimum plan surface area required for installation

			RAW006H	RAW009H	RAW012H	RAW015H	RAW017H
Refrigerant charge in the machine	m	[kg]	2,5	2,5	3	3,3	3,3
Height installed	h <sub>inst</sub>	[m]	0	0	0	0	0
Relative release height	h <sub>rel</sub>	[m]	1,875	1,875	1,875	1,875	1,875
MINIMUM plan AREA required if the distance between the indoor and outdoor units is less than 5 m <sup>(1)</sup>	A <sub>min</sub>	[m <sup>2</sup> ]	5,99	5,99	8,52	10,31	10,31
Addition of refrigerant per metre of line beyond the length requirement met by the basic charge	m <sub>extra</sub>	[kg]	0,10	0,10	0,15	0,15	0,15
MINIMUM plan AREA required if the distance between the indoor and outdoor units is between 5 and 25 m <sup>(1)</sup>	A <sub>min</sub>	[m <sup>2</sup> ]	$A_{min} = 0.948 * m_c^2$				

<sup>(1)</sup> If the minimum area requirements are not complied with, see the indications in the following paragraphs.

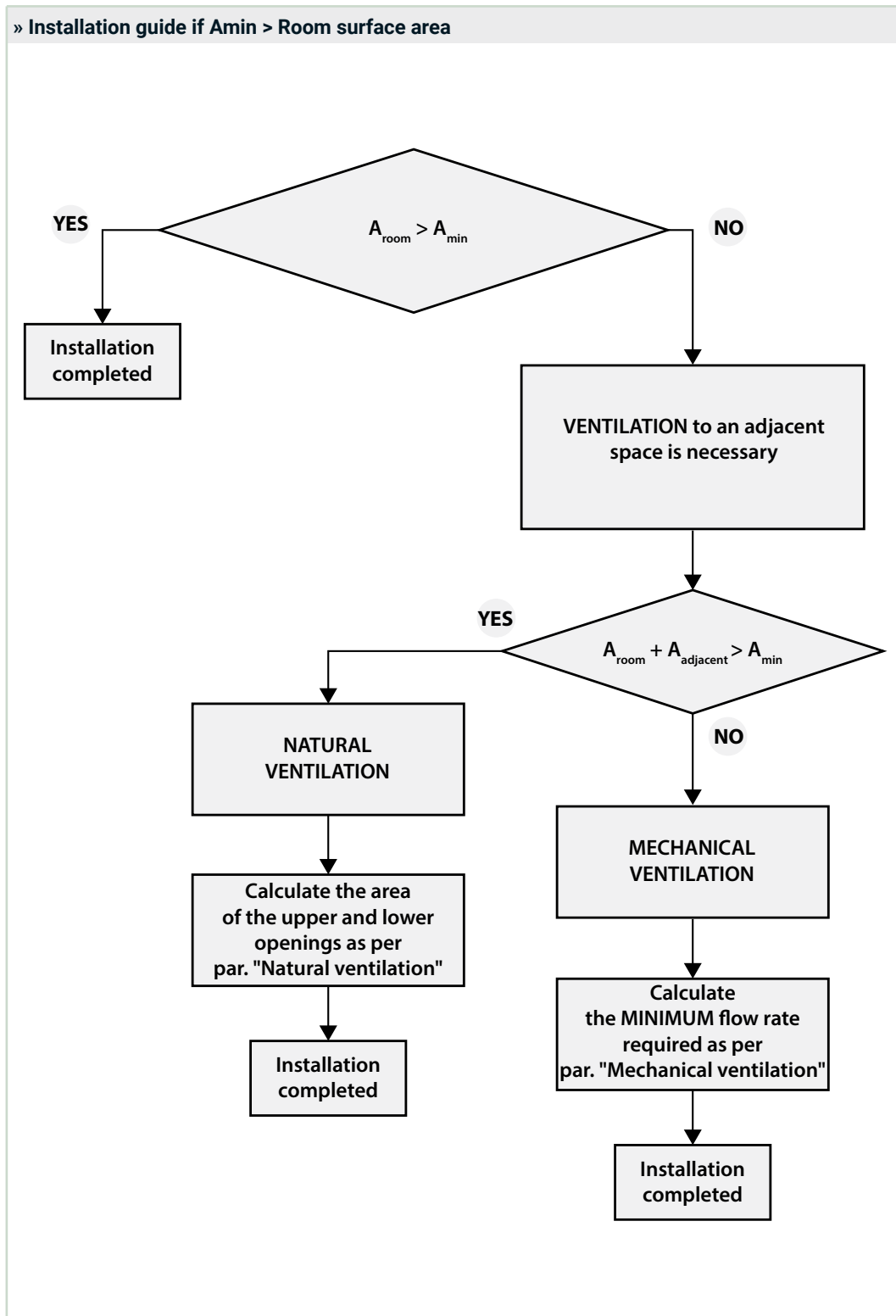
			RAW006M	RAW009M	RAW012M	RAW015M	RAW017M
Refrigerant charge in the machine	m	[kg]	2,6	2,6	3,1	3,4	3,4
Height installed	h <sub>inst</sub>	[m]	0	0	0	0	0
Relative release height	h <sub>rel</sub>	[m]	1,875	1,875	1,875	1,875	1,875
MINIMUM plan AREA required if the distance between the indoor and outdoor units is less than 5 m <sup>(1)</sup>	A <sub>min</sub>	[m <sup>2</sup> ]	6,40	6,40	9,10	10,94	10,94
Addition of refrigerant per metre of line beyond the length requirement met by the basic charge	m <sub>extra</sub>	[kg]	0,10	0,10	0,15	0,15	0,15
MINIMUM plan AREA required if the distance between the indoor and outdoor units is between 5 and 25 m <sup>(1)</sup>	A <sub>min</sub>	[m <sup>2</sup> ]	$A_{min} = 0.948 m_c^2$				

<sup>(1)</sup> If the minimum area requirements are not complied with, see the indications in the following paragraphs.

Indication relating to maximum refrigerant charge for the installation room area:

MAXIMUM REFRIGERANT CHARGE ADMISSIBLE IN THE INSTALLATION ROOM							
Maximum refrigerant charge for the room area	m <sub>max</sub>	[kg]	If A <sub>room</sub> > 6.06 m <sup>2</sup> $m_{max} = 1.0277 * \sqrt{A_{room}}$ Otherwise $m_{max} = 0.4176 * A_{room}$				

8.2.2 Installation guide if  $A_{room} < A_{min}$





### 8.2.3 Natural ventilation

If the surface area of the installation room is smaller than the minimum area  $A_{min}$ , calculated as described above, at

least NATURAL VENTILATION is required towards an occupied or unoccupied internal space or to the outside.

Natural ventilation towards an occupied interior space			
Total minimum AREA required for the lower intake openings used for natural ventilation	$AnV_{min}$	[m <sup>2</sup> ]	$AnV_{min} = (m_c - 1.0277 * \sqrt{A_{room}}) / 30.888 * 0.4298 * A_{room}^{1/4}$ If $A_{room} > 6.06 \text{ m}^2$ Otherwise $AnV_{min} = (m_c - 0.4176 * A_{room}) / 30.888$
Total minimum AREA required for the upper delivery openings used for natural ventilation	$AnV_{min2}$	[m <sup>2</sup> ]	$AnV_{min2} = AnV_{min} * 0.5$

Natural ventilation towards a not occupied interior space or to the outside			
Total minimum AREA required for the lower intake openings used for natural ventilation	$AnV_{min}$	[m <sup>2</sup> ]	$AnV_{min} = 0.0513 * \sqrt{m_c}$
Total minimum AREA required for the upper delivery openings used for natural ventilation	$AnV_{min2}$	[m <sup>2</sup> ]	$AnV_{min2} = AnV_{min} * 0.5$

**WARNING**

The total plan surface area of the two rooms (the room where the equipment is installed and the adjacent space connected through lower and upper openings) must be greater than  $A_{min}$ ; otherwise, mechanical ventilation is required.

**WARNING**

- At least 50% of the lower intake openings used for natural ventilation must be at a height between 100mm and 200mm above floor level.
- The maximum height to consider for the lower openings area is 300mm.
- The upper delivery openings used for natural ventilation must be at a height of at least 1.5m above floor level.
- All openings should be permanent and their minimum height must be 20mm.

### 8.2.4 Mechanical ventilation

If the area of the installation room added to that of the adjacent space is not greater than  $A_{min}$ , MECHANICAL VENTILATION is required.

MECHANICAL VENTILATION REQUIREMENTS			
Minimum flow rate required for mechanical ventilation (indoor or outdoor)	Q	[m <sup>3</sup> /h]	Lower value between: 15.44 and If $A_{room} > 6.06 \text{ m}^2$ $Q = (m_c - 1.0277 * \sqrt{A_{room}}) * 101.01$ otherwise $Q = (m_c - 0.4176 * A_{room}) * 101.01$
Condition for indoor ventilation: minimum indoor delivery volume required	V	[m <sup>3</sup> ]	$V = m_c * 13.468$

## 8.3 Quality of the water in the systems

Calcification (solid sediments, especially calcium carbonate) might occur according to the quality of the water, which can be harmful to the hydraulic components inside the unit.

For this reason, it is necessary to treat circuit water with special softening/desalting, neutralization and pH stabilisation equipment.

To fill the heating systems, it is advisable to comply with the applicable regulations in force, in particular the VDI-2035 standard.

In the below, they are the values of dissolved substances and water characteristics that must be respected for all hydraulic

circuits connected to the unit (source circuit, heating / cooling circuit and domestic hot water circuit):

WATER CONTENT	CONCENTRATION
Alkalinity (HCO <sub>3</sub> )	70 - 300 ppm
Sulphate (SO <sub>4</sub> <sup>2-</sup> )	< 70 ppm
HCO <sub>3</sub> <sup>-</sup> / SO <sub>4</sub> <sup>2-</sup>	> 1.0 ppm
Electrical conductivity	10 - 500 µS/cm
pH*	7.5 - 9.0
Ammonium (NH <sub>4</sub> <sup>+</sup> )	< 2 ppm
Chloride (Cl <sup>-</sup> )	< 30 ppm
Free chlorine (Cl <sub>2</sub> )	< 0.5 ppm
Hydrogen sulphide (H <sub>2</sub> S)	< 0.05 ppm
Carbon dioxide (CO <sub>2</sub> )	< 5 ppm
Total hardness (°dH)	4.5 - 8.5
Nitrate (NO <sub>3</sub> )	< 100 ppm
Iron (Fe)**	< 0.2 ppm
Aluminium (Al)	< 0.2 ppm
Manganese (Mn)**	< 0.05 ppm
Calcium carbonate (CaCO <sub>3</sub> )	< 200 ppm
Phosphate (PO <sub>4</sub> <sup>3-</sup> )	< 2 ppm
Ammonia (NH <sub>3</sub> )	< 0.5 ppm
Temperature (°C)	< 65 °C
Oxygen content	< 0.1 ppm

\*Generally a low pH value (less than 6) increases the risk of corrosion and a high pH (above 7.5) decreases the risk of corrosion  
 \*\*Fe<sup>3+</sup> and Mn<sup>4+</sup> are powerful oxidants and may increase the risk of localized corrosion on stainless steel

**⚠ ATTENTION**

These values are to be considered limit values and therefore, they must be verified and respected under penalty of voidance of the guarantee.

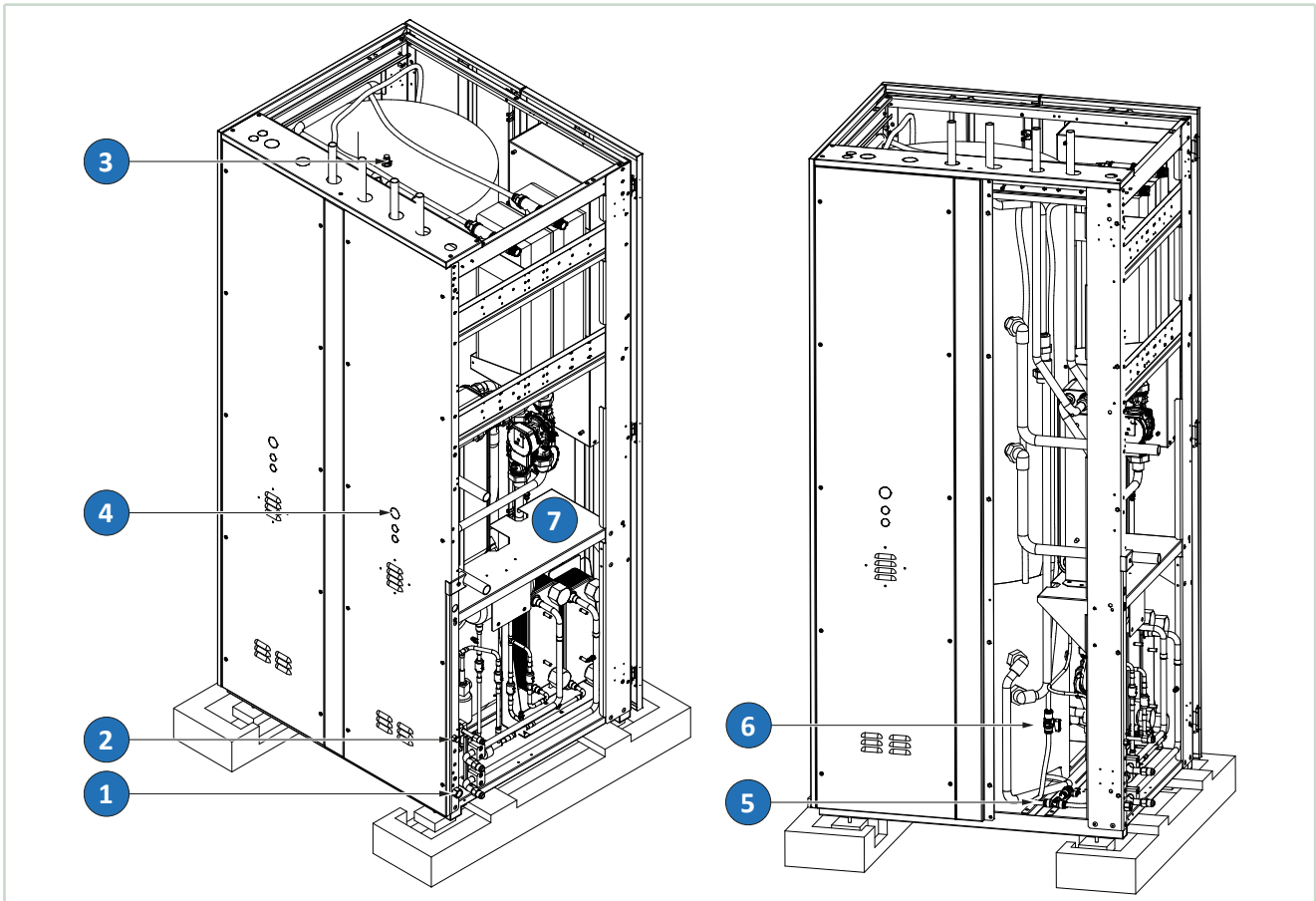
## 8.4 General guidelines for plumbing connections

### 8.4.1 Hydraulic system components

Install the following components on the piping:

- air vent valves, placed on the higher parts of the water circuits to bleed the air. The internal pipes of the unit are fitted with manual air vent valves to bleed the unit: **this operation can only be carried out when the unit is disconnected from the power supply.**
- For process applications, it is recommended to install a decoupling heat exchanger to avoid the probable dirtying of the heat exchangers.
- **In case of very low water temperatures at the evaporator outlet, it is possible to add ethylene/propylene glycol in a percentage not exceeding 40% by weight to lower the freezing point; consequently, there will be a decline in performance depending on the amount of glycol (please refer to the table in paragraph 5.2 Operating limits p. 14).**

### 8.4.2 Hydraulic connections inside the unit



Point 1 shows the single connection for filling and draining the User and DHW tanks inside the unit. To drain the tanks, connect to the point indicated via a 1/2" G male connector and then open the dedicated disconnecter valves inside the unit specially provided for each tank. The disconnecter valves of the User and DHW tanks are shown in points 5 and 6 - respectively and are accessible from the left side panel of the unit. **The connection shown in point 1 is designed to allow the system to be filled and drained for maintenance operations or seasonal breaks.**

Point 4 shows the pre-cut slots to be used for conveying the unit internal overpressure valves of the user and domestic hot water circuits. The safety valves inside the unit are supplied pre-conveyed with a 2 m long flexible hose rolled up inside the unit. This hose can be found coiled in the section indicated in point 7 and is accessible from the left side of the unit. **The customer must ensure appropriate conveying by routing the hoses through the pre-cut slots in the point indicated (point 4), so as to avoid possible electrical damage caused by the waste water, following the actuation of the safety valves.**

Points 2 and 3 show the valves for venting the User tank at point 2 and the DHW tank at point 3 - respectively, required to carry out tank bleeding operations: **these operations must be carried out while the unit is not electrically live.** To access the valve shown in point 3 it is necessary to remove the cover of the unit by unscrewing the special fixing screws.

 **ATTENTION**

If glycol is present inside the user circuit, the installer must see to conveying the glycol-containing water as recommended.

### 8.4.3 Operations and inspections

 **WARNING**

It is extremely important that the water inlet is connected at the height of the "Water Inlet" sign.

Otherwise, there would be a risk of freezing the evaporator, since there would be no control by the antifreeze thermostat and the required circuit flow conditions would not be complied with.

This position does not enable the operation of the water flow control device.

The dimensions and position of the water connections are provided in the dimensional tables and overall drawings.

 **WARNING**

The water circuit must be set up in such a way as to guarantee that the nominal flow rate of the water supplied to the evaporator remains constant (+/- 15%) in all operating conditions.

 **ATTENTION**

When making the plumbing connections, make sure there are no open flames in proximity to or inside the unit.

 **ATTENTION**

For this reason, make sure that the pressure on the pump intake side, where the expansion vessel is positioned, is always above 0.5 Bar with pump running: this helps reduce the risk of cavitation.

It is extremely important that the installer follows and verifies this procedure step-by-step to prevent the risk of tank implosion or pump cavitation:

- Drain the system expansion tank (inside the unit) until pressure reaches 0.5 bars;
- Fill the system and pressurise it to approximately + 1 bar in pump suction (pump stopped);
- Allow air to escape from the system;
- Check the pump suction pressure (approximately 1 Bar) and start up the system;
- Stop the pump after 15-30 minutes. Repeat the procedure from step 3 until no more air system noise can be heard.

#### Draining the system

Drain outlets must always be set-up in the lower parts of the system. Drain the unit from the connections on the water pipes beneath the pumps.

#### 8.4.3.2 DHW quick preparator

The machine is internally equipped with a quick preparator for instantaneous production of domestic hot water, equipped with a plate exchanger and flow meter with temperature probe. If a sufficient flow of water is detected, the internal storage whose temperature is maintained by the heat pump will transfer heat to the water flowing through the exchanger, so as to obtain the desired temperature, which can be set on the display, at the outlet from the machine.

 **WARNING**

Any recirculation systems must be installed externally to the heat pump so that when they are activated, the minimum water flow for the activation of the quick preparator is guaranteed.

 **WARNING**

In case of cold temperature at the taps, check that the storage in the heat pump has reached a sufficiently high temperature, otherwise, raise the DHW set point of the heat pump.

 **ATTENTION**

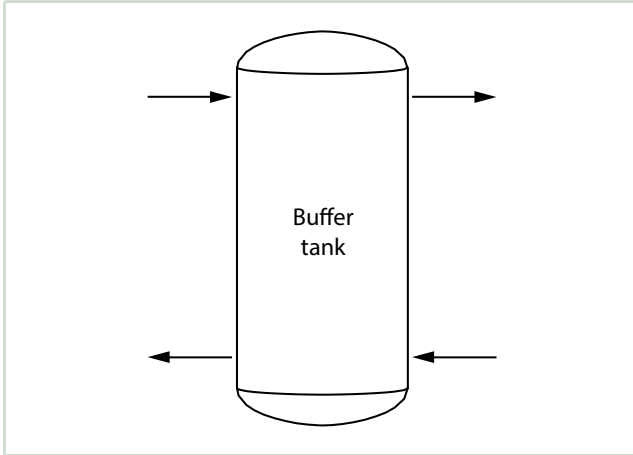
There are no safety valves, pressure reducers and expansion vessels in the domestic hot water circuit. It is advisable for the installer to check and install the safety devices necessary for trouble-free operation of the system.

 **ATTENTION**

The maximum aqueduct pressure admissible for the machine is equal to 6 bar.

## 8.5 Buffer tank for heating and cooling circuit

Inside the unit there is always a 95 L user tank.



### **ATTENTION**

The units are supplied with a standard flowmeter for controlling the water flow in the hydraulic circuit. If this device is tampered with, the guarantee is no longer valid.

## 8.6 Control and safety devices

All control equipment is calibrated and tested at the factory before shipping the machine. However, after the unit has been operating for a reasonable period of time, it is advisable to check the operating and safety devices. The calibration values are shown in the following tables.

### **DANGER**

All service operations on the control equipment must be carried out **EXCLUSIVELY BY QUALIFIED PERSONNEL**: incorrect calibration values can cause serious personal injuries and damage the unit.

### **ATTENTION**

Many of the operating and calibration parameters of control systems are set by microprocessor control and are password protected.

### Service thermostat

The service thermostat activates and deactivates the operation of the compressor, depending on chilled water (operation as a chiller) or heated water (operation as a heat pump) requirements, via a probe located at the inlet or outlet of the water exchanger.

This device is managed by the microprocessor control and operates with a proportional band of adjustable width.

### **WARNING**

For further details please refer to the control manual.

### Control device settings

The calibration values of the control devices set by default for the specific unit are contained in the document "Parameter List", made available to customers by the manufacturer. On each refrigerant circuit, according to the volumetric capacity of the installed compressors, the PED (Pressure Equipment Directive 2014/68/EU) category of the machine and the refrigerant circuit configuration, there are safety devices for the refrigeration circuit as prescribed by the PED regulation. In particular, this regulation requires designing to be carried out by referring to the technical standard that is closest to the type of item produced; in the case of machines designed for air conditioning or cooling of liquids, the UNI EN 378-2 standard is referred to.

According to this standard, on a case by case basis, on the high and low pressure sides of each refrigerant circuit safety venting valves can be provided, connected to an exchange tap, to protect the pressurised parts and programmed to be activated when the maximum pressure setting is reached on the corresponding side (PS).

The high and low pressure sides have a maximum pressure PS defined by the pressure limit of the components of the machine; this pressure cannot be reached during normal operation of the machine. Further details are given in the diagram of the cooling circuit of the unit.

During normal use, high pressure at the compressor outlet is limited by the high pressure switch, set to the maximum working pressure of the compressor itself, which depends on the unit model and is equal to the PS, in compliance with the UNI standard EN 378-2.

All the safety devices installed on the units are listed and described here below.

### High pressure switch

The high pressure switch stops the compressor when the outlet pressure exceeds the set value.

To check its operation, shut the air flow in the condensers with the compressors running, and check on the compressor delivery pressure gauge (previously installed) that the pressure switch (compressor stop) is activated when the calibration value is reached.

### **ATTENTION**

Any shutdown or alarm must be reported immediately to the service department.

### **ATTENTION**

Do not attempt to change the setting of the maximum pressure switch. Should the latter fail to trip in the event of a pressure increase, the pressure relief valve will open.

### **ATTENTION**

If, during this operation, the safety device is not activated, the second pressure switch in a cascade configuration or a second protection system will operate by switching off the unit; in any case, however, always be sure to be ready to turn the unit off.

Resetting the high pressure switch must be done manually and only when the pressure has fallen below the value

indicated by the set differential value (see 5.4 Calibration of control devices p. 17).

**ATTENTION**

The high pressure switch connector does not have the refrigerant sealing needle.

**DANGER**

Do not unscrew the device: this would cause the refrigerant to flow out of the refrigerating circuit.

As an antifreeze protection, a pressure probe is also provided which stops the unit as soon as the pressure falls below the calibration value for a set time.

**WARNING**

For more information related to the operation, the calibration values and the set delays, please refer to the microprocessor manual and the document "Parameter List", supplied with the unit.

### On and off timing

The compressor switching on and off timing schedules programmed by the manufacturer on the units guarantee correct operation of the compressors and an increased durability and stability of the system. They establish:

- the minimum activation time of a compressor, which must remain on for a time equal to the set time;
- the minimum shutdown time of a compressor, which is not powered back on unless the minimum selected time has not elapsed since the last power-off;
- the delay time between two power-on requests of different compressors, i.e. the minimum time that must elapse between two power-ons of the devices independently of the detected measurement and the setpoint;
- the delay time between two successive power-ons of the same compressor, the minimum time that must elapse between two power-ons of the device.

The purpose of the minimum time intervals is to stabilize the operation of the compressors, ensuring adequate circulation of the oil in the refrigerant circuit and preventing too frequent compressor stops and starts, limiting the maximum number of starts per hour.

**WARNING**

For more information related to the operation, the calibration values and the set delays, please refer to the microprocessor manual and the document "Parameter List", supplied with the unit.

**ATTENTION**

Never change the factory preset time interval: values other than the default ones may cause serious damage to the unit.

### Antifreeze sensor

The antifreeze sensor, located at the outlet of the plate heat exchanger, detects any temperatures that are too low and stops the unit operation.

This function, together with the flow switch and the low pressure probe protects the exchanger against the risk of freezing due to faults in the hydraulic circuit.

This device is managed by the microprocessor control, for further details please refer to the control manual.

**ATTENTION**

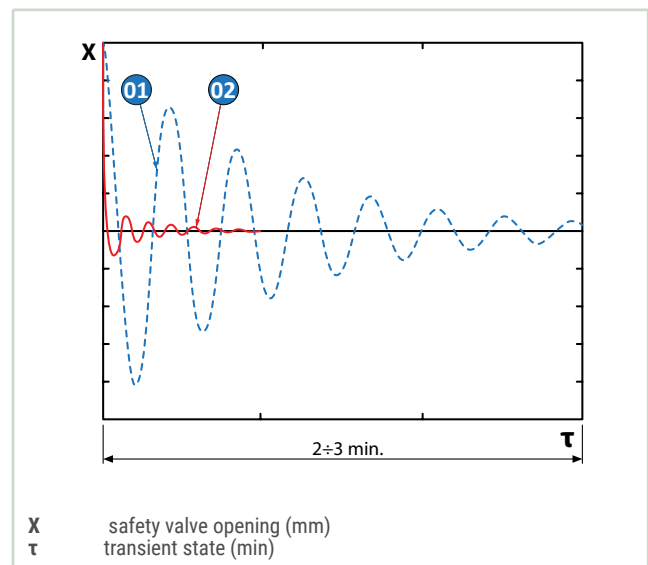
If there are any alarms relating to the intervention of the protections described, the unit must request the intervention of the Authorised Technical Service Centre, otherwise the warranty will be considered null and void.

On all units the electronically controlled expansion valve is fitted as part of the standard equipment. This device, if correctly parameterized and controlled by the software, can make the operation of the refrigeration circuit highly effective, which has as a final effect that of decreasing the power absorbed by the system.

When a sudden change in the thermal load occurs, a traditional expansion valve is designed to be in a transient state for 2-3 minutes before reaching its equilibrium condition.

Example:

- One compressor switches off;
  - Evaporation temperature increases;
  - Overheating decreases;
  - Valve closes;
  - Refrigerant flow decreases;
  - Refrigerating power decreases;
  - Evaporation temperature decreases;
- ...and so on...



If, on the other hand, there is an electronic expansion valve (2), in case of a compressor switch on or off request:

- the electronic driver pre-positions the valve at a point very near the final equilibrium point;
- the state of balance is quickly reached by small adjustments;
- the expansion valve becomes an active and no longer passive system component;
- the transient state lasts for a very short time;
- globally, the system is more efficient, with higher EER values and therefore, with more considerable savings.

The calibration values of the software and mechanical safety devices are visible respectively:

- in the “Parameter List” document, made available to customers by the manufacturer;
- in the silver label provided on the unit.

### **Paddle flow switch or flowmeters**

The paddle flow switches or flowmeters (DHW and user branch), supplied pre-mounted and wired, stop the unit in case of excessive reduction of the water flow, preserving it from frosting (operation as a chiller) and excessive condensation temperatures (operation as a heat pump).

### **Safety valves**

The water safety valves (user and DHW branches) open when the pressure of the hydraulic system exceeds dangerous values for machine safety.



## 9 ELECTRICAL CONNECTIONS

### 9.1 General description

#### ATTENTION

The electrical connections must be carried out by qualified personnel.

#### WARNING

All connections must comply with the regulations imposed in the country of installation.

Upstream of the unit's power supply, an adequate sectioning unit must be provided, located **near** the unit, considering the electrical absorption indicated in the wiring diagram supplied with the unit and on the data plate.

#### DANGER

Before carrying out any operation on electrical parts, make sure that there is no applied voltage.

#### ATTENTION

Check that the mains electricity supply is compatible with the specifications (voltage, number of phases, frequency) shown on the unit rating plate.

Power is connected via a more neutral three-core cable and earth cable or unipolar cables (one per phase) plus earth according to the minimum sections indicated in the wiring diagram, an integral part of the documentation supplied with the machine and whose identification code also appears on the characteristic data plate located outside the unit.

#### ATTENTION

The size of the cable and line protections must conform to the specifications provided in the wiring diagram.

The supply voltage may not undergo fluctuations exceeding  $\pm 10\%$  and the unbalance between phases must always be below 2%.

#### WARNING

The unit must operate within the above values, or the warranty will be invalidated.

Carry out the electrical connections following the wiring diagram provided with the unit, as well as current regulations.

#### ATTENTION

Regarding the differential protection that needs to be installed upstream, it is necessary to use a type B switch that is sensitive to direct currents.

Furthermore, it is preferable that it has also the following characteristics:

1. Adjustable operation threshold;
2. Adjustable operation delay;
3. Dedicated to the heat pump only.

### 9.2 External enabling controls

If you intend to launch a remote control on the unit, you must remove the jumper between the contacts indicated in the wiring diagram and connect the remote control to the terminals themselves [see enclosed wiring diagram].

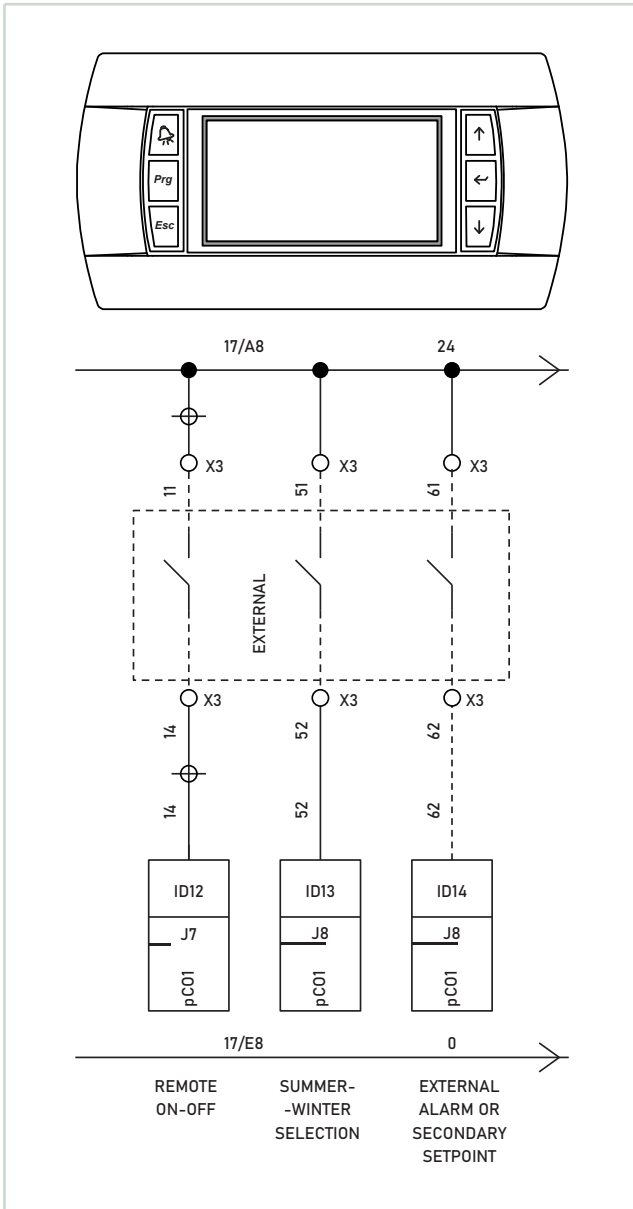
#### WARNING

All remote controls work with a very low voltage (24 Vac) supplied by the insulating transformer on the electric control board.



### 9.3 Remote summer-winter switching

If you wish to include a remote control for summer/winter switching of the unit, you must remove the bridge between the contacts indicated in the wiring diagram and connect the remote control to the terminals themselves [see annexed wiring diagram].

The switching modes are indicated in the microprocessor user manual, an integral part of the accompanying documentation.



**ATTENTION**







If an alarm is triggered and the **ALARM** button  lights up, do not press the **ALARM** button  to reset the alarm and immediately contact our After Sales Service. For the full list of alarms, refer to the documentation enclosed with the unit.

**DANGER**

All service operations on the control equipment must be carried out **EXCLUSIVELY BY QUALIFIED PERSONNEL**: incorrect calibration values can cause serious personal injuries and damage the unit.

The user interface, PCO, consists of an LCD display and 6 keys. All the program operations can be run, the conditions of the operating unit can be displayed at any time and the parameters can be modified.

The 6 keys and their use are described in the following table:

Icon	Key	Description
	<b>ALARM</b>	Press the ALARM key to access the alarm list. The button lights up with red LED when an alarm is triggered.
	<b>PROGRAM</b>	Press PRG to access the main menu.
	<b>ESC</b>	Press ESC to go back to the main menu or to the main mask.
	<b>UP</b>	Press UP to go to the next screen or increase the value of a parameter.
	<b>ENTER</b>	Press ENTER to access a parameter to be edited, to confirm editing of a parameter or to select a menu item.
	<b>DOWN</b>	Press DOWN to go to the previous screen or decrease the value of a parameter.



## 10 START-UP

### 10.1 Preliminary checks

- Check that all the valves in the cooling circuit are open.
- Check that the electrical connections have been made properly and that all the terminals are securely tightened. This check should also be included in a periodic six-month inspection.
- Check that the voltage at the LN terminals is  $230V \pm 10\%$  (in the case of single-phase power supply) or RST terminals is  $400 V \pm 5\%$  (in the case of three-phase power supply) and make sure the yellow indicator light of the phase sequence relay is on. The phase sequence relay is present only in units with three-phase power supply; if the sequence is not duly observed, it will not enable the machine to start.
- Make sure that there are no refrigerant leaks due to accidental impacts during transport and/or installation.
- Check that the water connections have been properly made according to the indications given on the plates located on the unit itself and the dimensional drawings enclosed with the unit's documentation.
- Make sure that the water circuit is duly bled to completely eliminate the presence of air: fill the circuit gradually and open the air vent valves on the top part, which the installer should have set in place.

#### Hydraulic connections

##### **ATTENTION**

The machine is loaded with refrigerant type HFC R410A or R454B – classified Group II (non-hazardous substances) in compliance with the provisions of the EC 2037/00 regulation.

- The heat pumps are intended to be integrated into systems, even complex ones, that employ water as a heat transfer fluid.
- Although all the components used in the hydraulic circuits are designed for this purpose by using suitable materials, we recommend checking the quality of the water used to fill and top up the system to ensure constant performance of the unit over time and avoid unpleasant failures.
- Water connections must be carried out respecting the inlets and outlets as marked on the connections and on the enclosed documentation. Take great care not to reverse the circuits.
- Provide disconnecter taps on the water side to be able to isolate the machine from the system.
- Load the water circuits and make sure you bleed out all the air inside them via the vents located on the highest points of the pipes and at the top of the tank, if there is one.

#### Electrical connections

##### **ATTENTION**

The unit may not be equipped with magneto-thermal protection. Provide for suitable protections before connecting the unit to the mains.

- Open the front doors of the unit using the special key to obtain access to the electrical panel.
- Lead the power supply cable through the hole in the upper part of the unit and indicated in the dimensional drawings supplied attached to the unit literature.
- Connect the power supply and earthing wire to the terminals.
- Power on the equipment via the arranged main switch.
- Activate the automatic switch inside the electrical panel (if present).

#### Start-up

- Check that all valves of the water circuits are open and water flows properly (the flow alarm should not be triggered);
- Put the main switch on the ON position;
- The unit is now in standby mode;
- Request support from an authorised Technical Assistance Centre (CAT) to start up the refrigeration units.

#### Use

##### **ATTENTION**

Consult the manuals supplied for all maintenance and/or advanced set-up operations.

##### **WARNING**

The commissioning of the unit must comply with the statutory regulations of the State where the machine is installed. The responsibility for correct use is exclusively ascribable to the user.

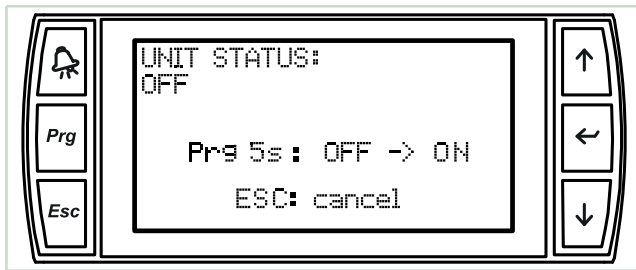
### 10.2 Start-up the unit

Ad for the commands mask, there can be different configurations based on the type of unit or the settings of the final user. The following table shows the various icons that may be featured, with their relative meaning.

Pos.	Icon	Description
1.		Main ON-OFF of the unit.
2.		Access to information menu (work sizes, device status, software version).
3.		Selection of utility cold/hot mode (summer/winter).
4.		Adjustment of set-points of all utilities (air conditioning/DHW).
5.		Adjustment of air conditioning system set-point.
6.		Access to advanced user / maintenance / manufacturer parameters menu.
7.		DHW set-point adjustment.

### Switching on from local or remote display

To switch the unit on from the local or remote display screen, enter the controls screen and select the **START** command, then press **ENTER** to access the power-on screen:



Press the key **PRG** for 5 seconds to switch the status of the machine or press the key **ESC** to exit without changing the status.

The group will start if an enabling signal is received:

- linked to safety devices related to the water circulation pump(s);
- the flow switch (or differential pressure switch);
- of the plant backflow water temperature sensor (chiller inlet);
- there are no triggered alarms; if there are, clear the alarm to be able to start-up the unit.

#### **WARNING**

If the unit fails to start up, check whether the service thermostat has been set at the rated calibration values.

### Switching On from digital input

If remote ON-OFF has been enabled from the digital input, the input must be closed (with inverse logic) so that the unit can start (open with direct logic). Refer to the wiring diagram enclosed with the unit to correctly identify the terminals designed for the ON-OFF functions from the digital input.

#### **ATTENTION**

The remote ON/OFF terminals are normally bridged. In this case if you wish to use this function, remove the bridge and place a potential-free contact. The contact draws the 24Vac voltage directly from the unit. The digital input must be configured correctly.

### 10.2.3 Switching On from supervisor

If ON-OFF from the supervisor is among the options selected, then the communication port BMS must be configured and the following values must be written on the variable:

- **0** = unit OFF
- **1** = unit ON

See the list of supervision variables featured in the documentation enclosed with the unit for the address of the specific variable.

#### **ATTENTION**

Before switching ON-OFF from the supervisor, make sure that the communication port has been configured properly, that the bus is wired correctly and with a suitable cable, and that the communication protocols are compatible.

### Switching On from the LAN network Master

If the unit is inserted in a LAN network between units, the start consent is determined by the Master logics and the final user cannot force starting.

In this case the user can only switch the unit off, using the main switch on the local display.

#### **ATTENTION**

You should not disconnect the unit from the power supply during periods when it is idle but only when it is to be taken out of service for a prolonged period (e.g. at the end of the season).

#### **WARNING**

If one or several options among the ones listed in this paragraph have been activated, all the selected sources must provide their consent to switch on the unit.

## 10.3 Selecting the operating modes

The active mode of the utility is indicated in the status bar on the main mask.

The following table summarises the possible indications:

Pos.	Icon	Description
1.		Summer mode active.
2.		Winter mode active.
3.		Disabled utility

In the "DISABLED UTILITY" mode, the unit only produces heat for Domestic Hot Water. In this case, the unit remains in standby if there is no DHW call.

For cooling/heating reversible units, the software offers various ways of selecting the mode, namely:

1. Select from local display
2. Select from remote display
3. Select from digital input
4. Select from supervisor

**WARNING**

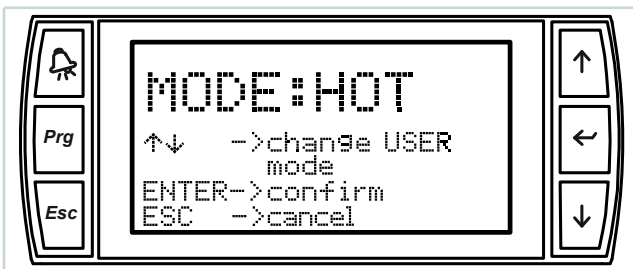
To avoid incompatible mode choices, only one option can be selected.

**WARNING**

The “UTILITY DISABLED” function (OFF option from the display) can only be selected from the remote or local display.

### Selection from the local or remote display

To select the mode from the local display, select the command from the command panel and press **ENTER** to access the setting mask of the operating mode.



Use **UP** or **DOWN** keys to select the new status. Press **ENTER** to confirm the new status or press **ESC** to exit without changing the status. The selection from the local or remote display allows you also to choose the **OFF** mode, namely to disable the utility. In this case if the unit is multi-purpose, it will only start for domestic hot water production.

### Select from digital input

If selection from a digital input has been enabled, the input must be closed (with inverse logic) so that the unit can be set to summer mode (open with direct logic). In summer mode, the unit is adjusted to produce cold air, and in winter mode, hot air.

**WARNING**

Refer to the wiring diagram enclosed with the unit to correctly identify the terminals designed for switching from summer to winter mode and vice versa from the digital input.

**ATTENTION**

The terminals for mode selection are normally bridged. In this case if you wish to use this function, remove the bridge and place a potential-free contact. The contact draws the 24Vac voltage directly from the unit. The digital input must be configured correctly.

### Select from supervisor

If the mode has been selected from the supervisor, then the communication port BMS must be configured and the following values written on the variable:

- 0 = summer mode
- 1 = winter mode

**WARNING**

See the list of supervision variables featured in the documentation enclosed with the unit for the address of the specific variable.

**ATTENTION**

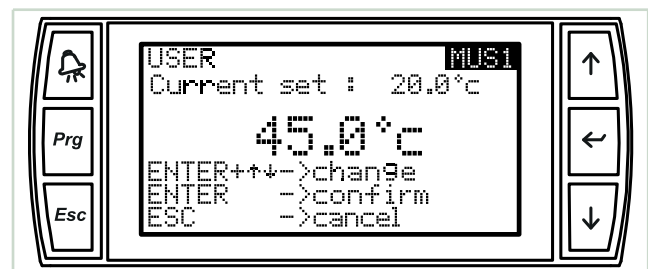
Before using the mode, make sure that the communication port has been configured properly, that the bus is wired correctly and with a suitable cable, and that the communication protocols are compatible.

## 10.4 Setting the set-points

To change the working set-point, select from the main control menu the icon “**thermometer**” and press **ENTER**.

- to change the user (air-conditioning) set-point
- to change the domestic hot water (DHW) set-point
- to change both user and DHW set-points

Once you have entered the setting template:



1. Use the **ENTER** key to select the setpoint to edit;
2. Use the **UP** and **DOWN** keys to increase or decrease the set-point;
3. Press **ENTER** to confirm the new value;
4. Press **ESC** to quit without changing the set-point.

**WARNING**

For supplementary functions to be applied to the set-point, see the specific paragraph of the microprocessor enclosed with the unit’s documentation.

## 10.5 Checks during operation

- Check the correct phase sequence (three phase power supply) via the special relay provided in the electrical control panel: in the event of an incorrect phase sequence, disconnect voltage and exchange two phase wires of the three-pole lead at unit inlet. Never alter the internal electrical wiring, otherwise the warranty will be voided.
- Check that the temperature of the water entering the evaporator is close to the value set on the service thermostat.
- After a few hours of operation, check whether the liquid level indicator has a green crown: a yellow colour indicates the presence of humidity in the circuit. In such a

case the circuit must be dehumidified by qualified personnel.

- Large quantities of bubbles should not appear through the liquid level indicator. A constant passage of numerous bubbles may indicate that the refrigerant level is low and needs to be topped up. The presence of a few bubbles is however allowed, especially in the case of high-glide ternary mixtures such as HFC R410A or R454B.
- Also check that the end-of-evaporation temperature shown on the pressure gauge (refer to the pressure gauge scale for the refrigerant R410A or R454B) is about 4°C lower than the temperature of the water leaving the evaporator.
- Make sure the overheating of the cooling fluid is limited to between 5 and 8 °C. To this end:
  1. detect the temperature indicated by a contact thermometer placed on the compressor intake pipe;
  2. read the temperature indicated on the scale of a pressure gauge likewise connected to the intake side; refer to the pressure gauge scale for the refrigerant R410A or R454B.

The degree of superheating is given by the difference between the temperatures thus determined.

— Make sure that the undercooling of the cooling fluid is limited to between 3 and 5°C. To this end:

1. detect the temperature indicated by a contact thermometer placed on the compressor outlet pipe;
2. read the temperature indicated on the scale of a pressure gauge connected to the liquid inlet at the condenser outlet; refer to the pressure gauge scale for the refrigerant R410A or R454B.

The difference between the temperatures determined in this way indicates the undercooling value.

 **ATTENTION**

All units in the series are filled with refrigerant R410A or R454B. Any top-ups must be carried out with refrigerant of the same type and are part of the unscheduled maintenance tasks performed by skilled staff.

 **ATTENTION**

The refrigerant R410A or R454B requires "POE" polyolester oil of the type and viscosity indicated on the compressor data plate. For no reason should other oil types be introduced in the circuit.

## 10.6 Stopping the unit

The unit can be stopped by pressing the "OFF" control on the front panel of the display on the switch-on mask.

 **ATTENTION**

To stop the unit do not disconnect it using the main switch: this device must only be used to disconnect the unit from the power supply without current flow, i.e. when the unit is switched **OFF**.

# 11 ROUTINE MAINTENANCE AND CHECKS

## ATTENTION

The only tasks to be performed by the end user are turning the chillers on and off and switching them between the cooling and heating functions as the seasons change.

All other operations are maintenance tasks and must be performed by qualified personnel who are able to operate according to the laws and regulations in force.

## 11.1 Warnings

### ATTENTION

All the operations described in this chapter **MUST ALWAYS BE PERFORMED BY QUALIFIED PERSONNEL.**

### WARNING

Before carrying out any work on the unit or accessing internal parts, make sure you have disconnected it from the mains power supply.

## ATTENTION

After completing maintenance jobs, always replace the panels enclosing the units and secure them with the fastening screws provided.

### WARNING

The top part and the supply piping of the compressor are at high temperatures. Be especially careful when working close by with open panelling.

## 11.2 Maintenance table

To make sure performance remains constant in time, it is recommended to respect the following maintenance and control schedule in addition to what is required by the regulations in force.

Activity	Frequency
Check the efficiency of all the control and safety devices.	Yearly
Check the terminals on the electric control board and compressor terminal boards to ensure that they are securely tightened. The movable and fixed contacts of the contactors must be periodically cleaned and replaced whenever they show signs of deterioration.	Yearly
Check the refrigerant level by means of the liquid level indicator.	Yearly
Check the oil levels through the indicators provided on the compressor crankcases.	Yearly
Check the water circuit for leaks.	Every 6 months
If the unit is to remain inactive for a long period of time, discharge the water from the piping and from the heat exchanger. This operation is of the utmost importance especially when there are periods while the unit is idle in which the temperature drops below the freezing point of the fluids used.	Yearly
Check that the water circuit is full.	Every 6 months
Check the efficient operation of the flow switch or differential pressure switch.	Yearly
Clean the unit internal metal filters.	Every 6 months
Check the humidity indicator (green=dry, yellow=humid) on the liquid level indicator; if the indicator is not green as shown on the indicator sticker, replace the filter.	Yearly

As required by Regulation (EU) no. 517/2014, the operators of equipment for which leakage checks are necessary (load of fluorinated gases equal to or greater than 5 tons of CO<sub>2</sub> or 10 tons of CO<sub>2</sub> equivalent if “hermetically sealed equipment”), must communicate electronically all the information relating to the activities control of leaks as well as installation, assistance, maintenance, repair, dismantling activities to the National Database;

In particular:

- Quantity and type of refrigerant installed;
- the quantities of fluorinated gases added during the installation, maintenance or assistance or due to leaks
- the quantities of installed fluorinated gases that have been recycled or regenerated, including the name and address of the plant recycling or reclamation and, where applicable, the certificate number;
- the quantities of fluorinated greenhouse gases recovered;

- the dates and results of the leak checks and the cause of any losses found;
- if the equipment has been dismantled, the measures taken to recover and dispose of fluorinated effect gases greenhouse;
- dates and results of checks on the detection system leaks (if installed).

It is normally the responsibility of the owner of the equipment arrange for the checks to be carried out by authorized operators leak research periodicals according to the reported frequency in the table:

EQUIPMENT NOT HERMETICALLY SEALED		HERMETICALLY SEALED EQUIPMENT	
Teq CO <sub>2</sub>	Periodic check	Teq CO <sub>2</sub>	Periodic check
≥ 5 : < 50	12 months	≥ 10 : < 50	12 months
≥ 50 : < 500	6 months	≥ 50 : < 500	6 months
≥ 500	3 months	≥ 500	3 months

For the CO<sub>2</sub> Teqs contained in the equipment, refer to the identification label supplied with it.

 **WARNING**

In Italy the booklet is regulated by the D.P.R. 146/2018.

## 11.3 Refrigeration circuit repairs

 **ATTENTION**

While performing repairs on the cooling circuit or maintenance work on the compressors, make sure the circuit is left open for as little time as possible. Even if briefly exposed to air, ester oils tend to absorb large amounts of humidity, which results in the formation of weak acids.

If the refrigeration circuit has been repaired, the following operations must be carried out:

- leak test;
- refrigeration circuit vacuum and drying cycle;
- refrigerant charge

 **WARNING**

If the system has to be drained, always recover the refrigerant present in the circuit using suitable equipment; the refrigerant should be handled exclusively in the liquid phase.

## 11.4 Tightness test

Fill the circuit with anhydrous nitrogen supplied from a tank with a pressure-reducing valve until reaching 10 bar less than the PS declared on the data plate.

 **ATTENTION**

During the pressurisation phase, do not exceed the pressure setting of the safety valves; otherwise you will cause the latter to open.

The presence of any leaks must be determined using special leak detectors. Should any leaks be detected during the test, empty out the circuit before repairing the leaks with suitable alloys.

 **DANGER**

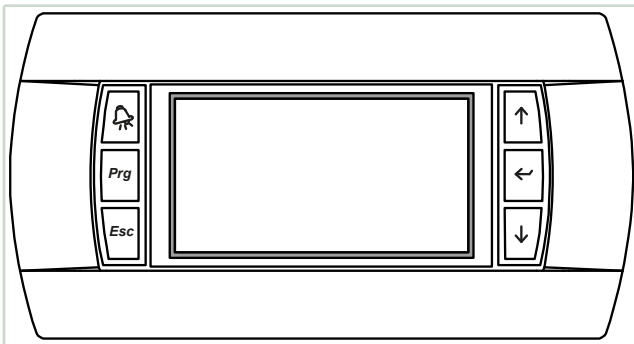
Do not use oxygen in the place of nitrogen as a test agent, since this could cause a risk of explosion as well as the certainty of extensive oxidisation in high-temperature areas.

## 12 TROUBLESHOOTING

### 12.1 Unit alarm

#### ATTENTION

If an alarm is triggered and the **ALARM** button lights up, do not press the **ALARM** button to reset the alarm and immediately contact our After Sales Service. For the full list of alarms, refer to the documentation enclosed with the unit.



### 12.2 Troubleshooting

For troubleshooting purposes, please refer to the list and to the complete description of the alarms related to the installed software version.

#### ATTENTION

Do not reset the alarm until after an accurate analysis and subsequent removal of the causes of the alarm: continuous resetting operations could lead to compressor breakdowns.

#### DANGER

As far as possible remedies are concerned, it is first of all essential to have read the chapter "3 General description p. 8" and the chapter "4.1 Safety prescriptions p. 10", to be able to adopt all the necessary precautions.

#### WARNING

You should be extremely careful when attempting to implement any of the possible remedies suggested: overconfidence can result in injuries, even serious ones, to inexperienced individuals.

In case of breakdowns, please contact a qualified and authorised technician or our customer care.

## Customer Service



049-9271513


[support@eneren.it](mailto:support@eneren.it)

[www.eneren.it](http://www.eneren.it)

## 13 SAFETY DATA SHEET OF REFRIGERANT

For refrigerant fluid safety data sheet, please refer to the documents supplied with the unit.



## 14 MAINTENANCE TABLE

Fill in the following table to keep the track of the maintenance carried out:

FIRST START-UP DATE ___/___/_____	YEAR											
	SEMESTER		1°	2°	1°	2°	1°	2°	1°	2°	1°	2°
Check the efficiency of all the control and safety devices.												
Check the terminals on the electric control board and compressor terminal boards to ensure that they are securely tightened. The movable and fixed contacts of the contactors must be periodically cleaned and replaced whenever they show signs of deterioration.												
Check the refrigerant level by means of the liquid level indicator.												
Check the oil levels through the indicators provided on the compressor crankcases.												
Check the water circuit for leaks.												
If the unit is to remain inactive for a long period of time, discharge the water from the piping and from the heat exchanger. This operation is of the utmost importance especially when there are periods while the unit is idle in which the temperature drops below the freezing point of the fluids used.												
Check that the water circuit is full.												
Check the efficient operation of the flow switch or differential pressure switch.												
Clean the metal filters.												
Check the humidity indicator (green=dry, yellow=humid) on the liquid level indicator; if the indicator is not green as shown on the indicator sticker, replace the filter.												

## 15 SYSTEM DIAGRAMS

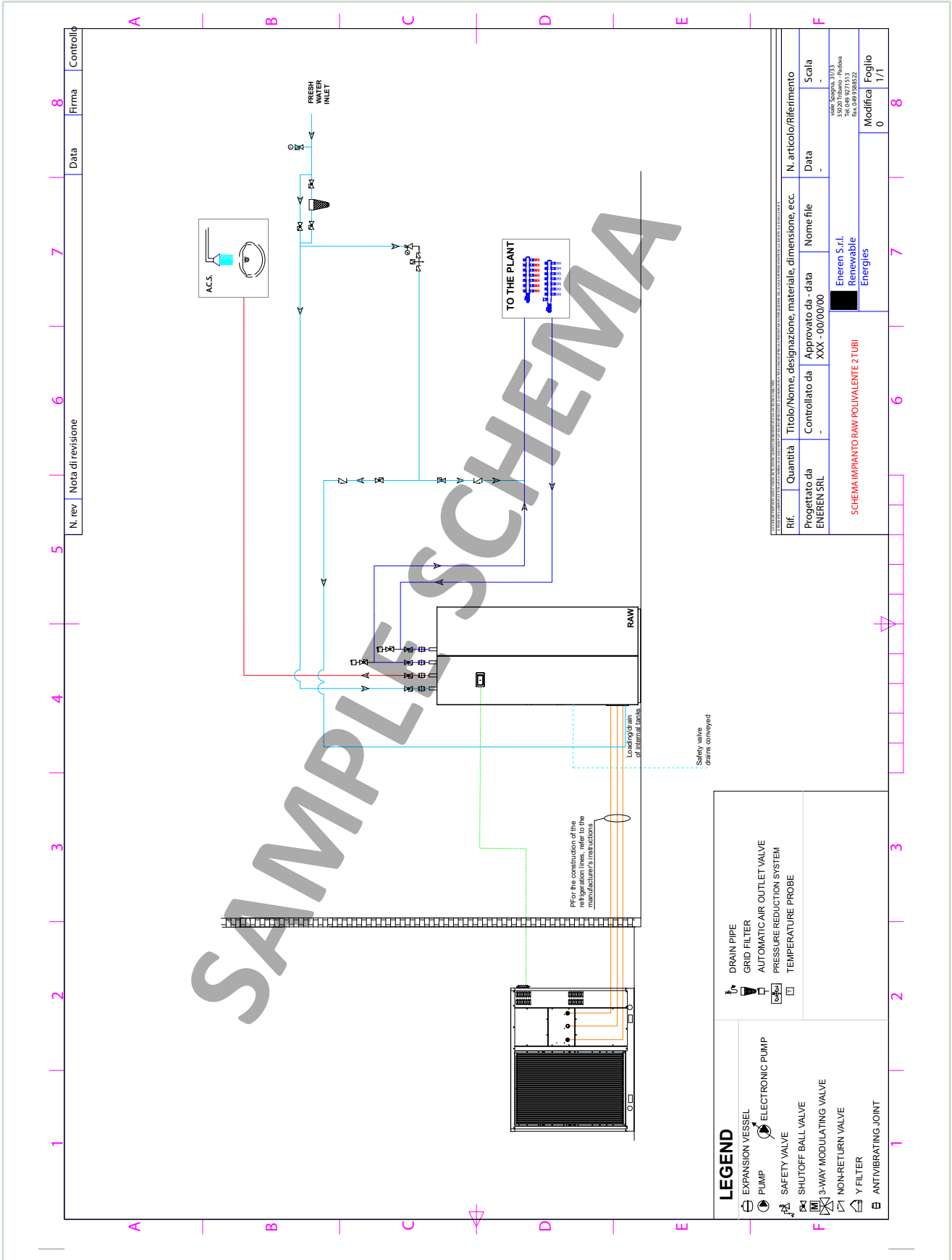
Hydraulic connection diagram for heating, cooling and domestic hot water production with aerothermal heat pump in multipurpose version with DHW circuit in total recovery mode (3 refrigeration tubes).

 **ATTENTION**

For proper installation guidelines, please follow the dimensional and wiring diagrams supplied with the unit.

 **ATTENTION**

The system diagrams shown in this manual are generic and illustrative. For proper installation guidelines, please follow the dimensional and wiring diagrams supplied with the unit.





If any usage other than those described in this User Manual is envisaged, the user must contact ENEREN and, before using, expressly request the written authorization from ENEREN. Otherwise, the usage is exclusively at the user's risk.

In these cases, the usage, use and processing of our products are beyond our control.

If, despite everything, a dispute should arise on our responsibility, this will be limited to the value of the products supplied by us and used by you. Rights derived from warranty statements are no longer valid in the event of applications not described in the Technical information.

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