

EMICON

VENTILATION

AHU

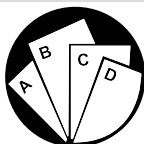
AIR HANDLING UNITS



INSTALLATION, USE AND MAINTENANCE TECHNICAL MANUAL

Incorporated in this document are the following:

- Declaration of conformity
- Technical manual



Multiple instructions:
Consult the specific part



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

RETAIN FOR FUTURE REFERENCE

Reproduction, data storage and transmission, even partial, of this publication, in any form, without the prior written authorisation of the Company, is prohibited. The Company can be contacted for all inquiries regarding the use of its products.

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

Declaration of conformity

We declare under our own responsibility that the below equipment complies in all parts with the CEE and EN directives.

The declaration of conformity is enclosed to the technical booklet enclosed with the unit. The unit may contains fluorinated greenhouse gases.

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1. INTRODUCTION

1.1 Preliminary information

Reproduction, storage or transmission of any part of this publication in any form, without the prior written consent of the Company, is prohibited.

The unit to which these instructions refer, is designed to be used for the the purposes described and to be operated in accordance with these instructions.

The Company will not be liable for claims for damage caused to persons, animals, material goods or property caused by improper installation, adjustment and maintenance or improper use. Any use not specified in this manual is prohibited.

This document is intended to provide information only and does not form a contract with third parties.

The Company pursues a policy of constant improvement and development of its products and therefore reserves the right to change the specifications and the documentation at any time, without notice and without obligation to update existing equipment.

In accordance with the law, this document is considered a company secret and it is forbidden for anyone to reproduce it or make it known, as a whole or partially, to third parties such as competing companies, without specific written authorization from the management. Photocopying, duplicating or electronically acquiring this manual violates copyright conditions and is punishable by law.

1.2 Aim and content of the manual

These instructions are intended to provide the information required for the selection, installation, use and maintenance of the unit.

They have been prepared in accordance with the European Union laws and with the technical standards in force at the date of issue of the instructions.

The instructions contain all the necessary information to prevent any reasonably foreseeable misuse.

1.3 How to store this manual

The manual must be kept in a suitable place with easy access for users and operators, protected from dust and damp.

The manual must always accompany the unit during the entire life cycle of the same and therefore must be transferred to any subsequent user.

1.4 Manual Update

It is recommended that the manual is updated to the latest revision available.

If updates are sent to the customer they must be added to this manual.

The latest information regarding the use of its products is available by contacting the Company.

1.5 How to use this manual



The manual is an integral part of the unit.



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

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

The technical documentation delivered with the unit is an integral part of the unit itself, and have the serial number of the unit it refers to.

1.6 Potential Risks

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

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

1.7 General Description of Symbols Used

Safety symbols combined in accordance with ISO 3864-2:



BANNED

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



WARNING

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



ACTION REQUIRED

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

Safety symbols combined in accordance with ISO 3864-2:



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

1.8 Safety symbols used



GENERAL RISK

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



ELECTRICAL HAZARD

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



MOVING PARTS

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



HOT SURFACES

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



SHARP SURFACES

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



EARTH CONNECTION

The symbol identifies Earthing connection points in the unit.



READ AND UNDERSTAND THE INSTRUCTIONS

Read and understand the instructions of the machine before any operations.



RECOVER OR RECYCLE MATERIAL

1.9 Limitations and prohibited use

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



The unit is not suitable for operations in environments:

- excessively dusty or potentially explosive atmospheres;
- where there are vibrations;
- where there are electromagnetic fields;
- where there are aggressive atmospheres

1.10 Unit identification

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

TEL.+39 0426 740011 FAX+39 0426 740009 Via Valletta n°16 Cantarana di Cona -VE - ITALY	
MODELLO MODEL	EMV 27
MATRICOLA SERIAL NR	V21B01
ANNO DI COSTRUZIONE MANUFACTURE YEAR	2021
CODICE DISEGNO DRAWING CODE	XXXXXXXXXXXXXXXXXXXX
CODICE SCHEMA ELETTRICO ELECTRICAL DIAGRAM CODE	YYYYYYYYYYYYYYYYYYYY
ALIM. ELETTRICA ELECTRICAL SUPPLY	400V-3f-50Hz+N+G
POTENZA ELETTRICA NOMINALE ABSORBED NOMINAL POWER	12.3 kW
CORRENTE MAX MAX EL. CURRENT	65 A
PESO OPERATIVO OPERATING WEIGHT	789 kg
PORTATA ARIA NOMINALE MANDATA SUPPLY NOMINAL AIR FLOW PREVALENZA UTILE NOMINALE MANDATA SUPPLY NOMINAL STATIC PRESSURE	15000 m3/h
PORTATA ARIA NOMINALE RIPRESA RETURN NOMINAL AIR FLOW PREVALENZA UTILE NOMINALE RIPRESA RETURN NOMINAL STATIC PRESSURE	350 Pa
	15000 m3/h
	200 Pa
BATT. PRERISCALDAM. PORTATA LIQUIDO PREHEATING COIL LIQUID FLOW RATE	14123 l/h
BATT. PRERISCALDAM. PERD. DI CARICO LIQ. REHEATING COIL LIQUID PRESS. DROP	10.5 kPa
FLUIDO BATTERIA RAFFREDDAMENTO FLUID COOLING COIL	ACQUA-WATER
BATT. RAFFREDDAM. PORTATA LIQUIDO COOLING COIL LIQUID FLOW RATE	23456 l/h
BATT. RAFFREDDAM. PERD. DI CARICO LIQ. COOLING COIL LIQUID PRESS. DROP	34.6 kPa
BATT. POSTRISCALD. PORTATA LIQUIDO POSTHEATING COIL LIQUID FLOW RATE	10789 l/h
BATT. POSTRISCALD. PERD. DI CARICO LIQ. POSTHEATING COIL LIQUID PRESS. DROP	8.7 kPa
UMIDIFICAZIONE PORTATA LIQUIDO HUMIDIFIER LIQUID FLOW RATE	35 l/h



The product label should never be removed from the unit.

2. SAFETY

2.1 Warning re potentially hazardous toxic substances

2.1.1 Identification of the Type of Oil Used.

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



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

Main Ecological Information Regarding the Types of refrigerants Fluids used.



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

2.1.2 Persistence and degradation

The refrigerants used decompose in the lower atmosphere (troposphere) relatively quickly. The decomposed products are highly dispersible and therefore have a very low concentration. They do not influence the photochemical smog which is not among the VOC volatile organic compounds (as stipulated in the guidelines to the UNECE). The used constituent refrigerants do not damage the ozone layer. These substances are regulated under the Montreal Protocol (revised 1992) and regulations EC no. 2037/200 of 29 June 2000.

2.1.3 Effects of discharges

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

2.1.4 Exposure controls and personal protection

Wear protective clothing and gloves, protect your eyes and face

2.2 Refrigerant handling



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

2.3 Prevent inhalation of high vapor concentration

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

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

Ensure suitable personal protection (especially respiratory protection) during cleaning operations.

If deemed safe, isolate the source of the leak. If the leakage is small and if adequate ventilation is provided, allow the refrigerant to evaporate. If the loss is substantial ensure that measures are taken to adequately ventilate the area.

Contain spilled material with sand, earth or other suitable absorbent material.

Do not allow the refrigerant to enter drains, sewers or basements, as pockets of vapor can form.

2.5 Main Toxicological Information Regarding the Type of refrigerant used

2.5.1 Inhalation

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

2.5.2 Contact with skin

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

2.5.3 Contact with eyes

Splashes of liquid may cause frostbite.

2.5.4 Ingestion

While highly improbable, may produce frostbite.

2.6 First Aid Measures



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

2.6.1 Inhalation

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

2.6.2 Contact with skin

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

2.6.3 Contact with eyes

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

2.6.4 Ingestion

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

2.6.5 Further medical treatment

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

3. TECHNICAL CHARACTERISTICS

3.1 Sections description

AHU units are designed for air conditioning and ventilation; they may consist of one or more sections, depending on requirements.

3.1.1 Filters

The construction and the selection of filters is extremely important, since they are essential in ensuring a healthy environment.

The filter section includes galvanized sheet steel frames for pleated mat cell filters, rigid pocket filters and floppy pocket filters.

The section is complete with inspection door or removable panel with Dual handles to ensure proper maintenance of the section.

On the outside there are gripping points for the application of pressure gauges or differential pressure switches.

The flat pleated filters provide efficiencies according to ISO16890 from ISO Coarse 30% to ePM1 80%. They are usually used as a pre-filter before the pocket filter. The thickness of the single cell can be 48 or 98 mm.

Rigid or floppy pocket filters are associated with efficiencies (ISO 16890) from ePM10 70% to ePM1 80%; they have a higher holding capacity than flat filters with the same efficiency and size.

Absolute filters, with efficiencies (EN1822) from 85% (class E10) to 99.999% (class H14), are able to retain objects with a diameter of thousandths of a millimeter; they have a considerable filtering surface and are used in environments where it is particularly important to guarantee high air quality (ex. hospitals, laboratories, etc.).

Activated charcoal filters guarantee absorption of smells, vapours or particular gases (depending on the type of charcoal used); for a correct use and to avoid rapid saturation of the charcoal, use fresh air with relative humidity of less than 70%.

3.1.2 Heating coil

This section can consist of a hydronic coil, a steam coil or an electric coil, with the number of rows required for the correct treatment.

For the hydronic coil, copper pipes with aluminium fins are foreseen; use this component with a maximum water temperature of 120°C and a maximum pressure of 10 bar.

In case of steam coils, the tubes are made of galvanized iron, while the finning is made of aluminium or galvanized iron.

The electric coils are produced with several stages of regulation depending on the request, with armoured type heaters; the three-phase power supply is 400V with 50Hz.

3.1.3 Cooling coil

This section may consist of a hydronic or refrigerant gas coil, with a number of rows suitable for the foreseen heat treatments.

The coils are produced with copper tubes and aluminium fins; the maximum operating pressure is 10 bar.

The condensate drip tray in AISI 304 stainless steel is always provided with drainage on the inspection side; a drop separator is also provided, if requested.

3.1.4 Humidification

This section can be realized with adiabatic evaporation with honeycomb pack with or without circulation pump, with steam with or without producer, with atomized water evaporation.

The AIS 304 stainless steel condensate drip tray and drop separator are always provided.

3.1.5 Ventilation section

There can be EC fans with built in speed control, plug fans to which the inverter can be added, belt-pulley fans.

An inspection door or a removable panel and adequate space for proper operation and maintenance are provided.

3.1.6 Heat recovery

We can find static type cross-flow plate heat exchangers, rotary drum hygroscopic recoveries, coils connected to closed hydronic circuit.

This section is designed according to the criteria imposed by the regulations in force and according to the purpose and destination of the units.

3.1.7 Dampers

They are made of galvanized steel or aluminium with a wing profile and a sealing gasket. They regulate the air flow through the unit or insulate it from the outside.

They can be equipped with a modulating or an on-off type servo control.

It is possible to create mixing chambers with 2 or 3 dampers by combining several dampers.

3.1.8 Silencers

They consist of mineral wool panels with lengths from 500 to 1500 mm and baffles with widths of 100 or 200 mm. Their function is to reduce the sound pressure downstream of the silencer itself.

3.2 Laws followed during the design process

Here all the laws followed in the design process and about safety:

UNI EN 292-1 UNI EN 292-2 CEI 44/5 2119

89/392/EC 91/368/EC (UNI EN 60204-1)

93/68/EEC 93/44/EEC 85/374/EEC

89/336/EEC

3.5 Operational limits



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



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



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

4. INSTALLATION

4.1 General safety guidelines and use of symbols



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



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



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



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

4.2 Health and safety Considerations



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



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

4.3 Personal protective equipment



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



Protective footwear.



Eye protection.



Protective gloves.



Respiratory protection.



Hearing protection.

4.4 Inspection

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

Before accepting the unit check:

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

In Case of Damage

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

4.5 Transport and handling

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

For transport or handling requirements in narrow and confined spaces, the units can be supplied as "demountable". In this case each component can be disassembled to minimize the size or weight of the individual parts. Depending on the size, the machine will either be shipped assembled or split into standard sections.

When reassembling, it is important to take all precautions to ensure that the machine operates smoothly (no air leaks, no water ingress, etc.).

The unit may have been supplied in several sections.

Refer to the relevant drawing for the dimensions and weight of each unit and/or section.

The single sections of the unit have a serial number label with the same code as the main unit. Transfer the components to the installation point before reassembling the unit.

The materials required for final assembly (brackets, nuts and bolts, etc.) will be placed in the supply fan vane.

The technical documentation for the unit will be placed in the same vane.



The transport company is always responsible for any possible damage during the transport of the goods. Before installing the unit and preparing it for the commissioning, accurately sight inspect the unit to verify the packaging integrity or that the unit has no visible damage, and oil or refrigerant leakage. Also verify that the unit complies what required in phase of order.



Any possible damage or claim must be communicated to the Manufacturer or to the carrier by means of registered mail within 8 days from goods receipt.



If one or more components are damaged, do not start the unit, and immediately inform the manufacturer, in order to agree any intervention on the unit.



It is suggested to unpack the unit at effective unit installation place. The internal handling must be done with care, avoiding using the equipment components as holds. Avoid any damage during the unit handling.



The hydraulic circuit must be fully empty before anyhow move the unit.



The units lifting must be vertical, preferably done by means of a forklift.
Use a distribution beam if straps or ropes are used for the harness, carefully checking that no pressure is done on the higher edges of the unit or of the packaging.



During lifting and transport operations, locations and routes must allow safe operation.
During all phases of transport, do not generate imbalances in the load's centre of mass or excessive acceleration or deceleration.

4.6 Storage

If it is necessary to store the unit, leave it packed in a closed place. If for any reason the machine has already been unpacked, follow these instructions to prevent damage, corrosion and/or deterioration:

- Make sure that all openings are properly closed or sealed;
- Never use steam or other cleaning agents to clean the unit that could damage it;
- Store filters (preferably packaged) and other unassembled components in a protected place and replace them before starting up the system.
- Protect the finning of the coils from impact.
- Remove any keys needed to access the control panel and entrust them to the site manager.



The unit can be stored at temperatures between -15°C and 45°C. When not in use, in order to prevent corrosion, deposits or breakage due to the ice formation, it is essential that the heat exchangers, on the user side, are completely empty or completely filled with water properly glycol.

4.7 Unpacking



Packaging could be dangerous for the operators.

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



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

The materials required for final assembly (brackets, screws, etc.) will be placed inside the supply fan compartment.
The technical documentation for the unit will be stored in the same compartment.

4.8 Lifting and handling

When unloading the unit, it is strongly recommended that sudden movements are avoided in order to protect the refrigerant circuit, copper tubes or any other unit component. Units can be lifted by using a forklift or, alternatively, using belts. Take care that the method of lifting does not damage the side panels or the cover.

If a cable crane is to be used, fit cable attachment tubes of adequate capacity to the holes in the base of the unit and provide spacers to prevent the cables from damaging the body of the unit.

It is important to keep the unit horizontal at all time to avoid damage to the internal components.

It is important to keep the unit horizontal at all times to avoid damage to the internal components.

The manufacturer will not supply lifting gear and/or ropes and/or other accessories between the lifting device and the load (chains, slings, hooks, slingbars).

The weight of objects to be lifted manually must not exceed 25 kg for each single operation carried out by a single operator and 40 kg for each individual lifting operation carried out by 2 operators.



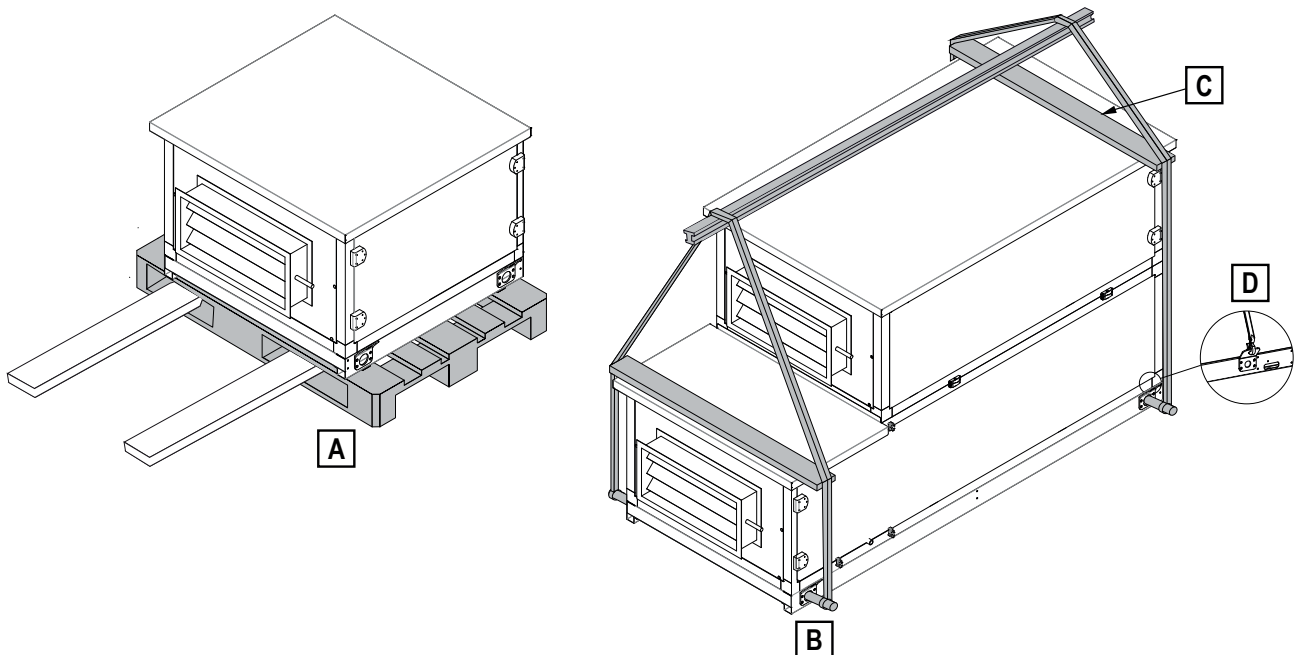
When lifting by helicopter, pay particular attention to the sealing of the openings in the unit, to prevent the air, during flight, from breaking the various panels and components, with repercussions on safety.



Use ropes of appropriate load capacity and equal length. Ensure that the ropes are safely attached to the unit or pipes. A sling bar of adequate capacity must be used to ensure stability when lifting and to prevent the ropes from coming into contact with the unit.



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



Keep a safe distance and implement all preventive measures so that, for no reason, people and things can pass/move along the path of the lifted unit or in the area of transport, handling and lifting operations outside and inside the working environment where the unit will be installed.



Do not leave the load suspended in the air. Ensure that there are no people or foreign bodies within the lift's operating range. Do not strike. Move carefully, at moderate speed, avoiding uneven or steeply sloping surfaces. Risk of the load tipping over. Do not use protruding parts as gripping points for ropes (e.g. handles, attachments, etc.).

4.9 Location and minimum technical clearances

The units are designed for external or internal installation: any overhang above the unit and location near trees, if they partially cover the unit, must be avoided in order to prevent air by-pass. It is advisable to create a proper mounting plinth, with a size similar to the unit foot-print. It is vital to ensure adequate air volume to the source fan. Re-circulation of discharge air must be avoided; failure to observe this point will result in poor performance or activation of safety controls. For these reasons it is necessary to observe the following clearances:



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



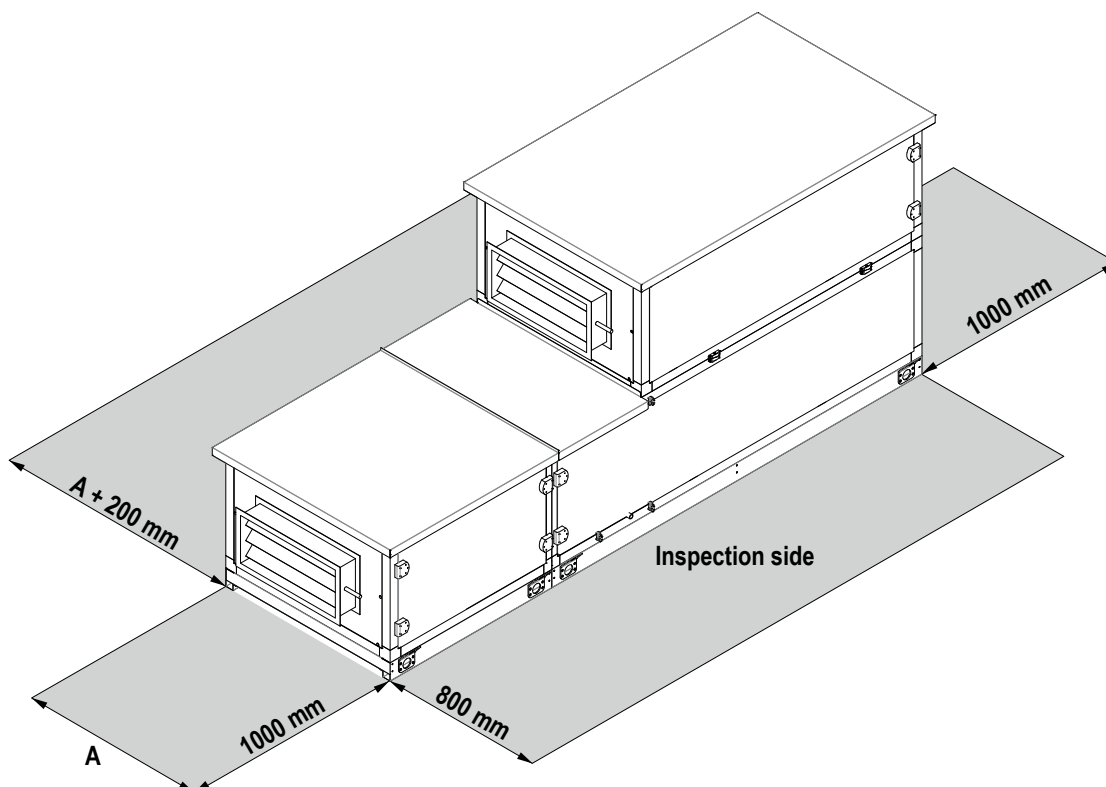
The installation site should be chosen in accordance with EN 378-1 and 378-3 standards. When choosing the installation site, all risks caused by accidental refrigerant leakage should be taken into consideration.



If current regulations require fire extinguishing systems to be provided in the vicinity of the unit, check that these are suitable for extinguishing fires on electrical equipment.



Except in specific cases, it is not necessary to install vibration dampers between the AHU base and the floor. However, it is recommended to place an elastic rubber gasket between the base and the support surface along the entire surface to prevent the transmission of noise and vibrations.



4.10 Installation of condensate drip tray

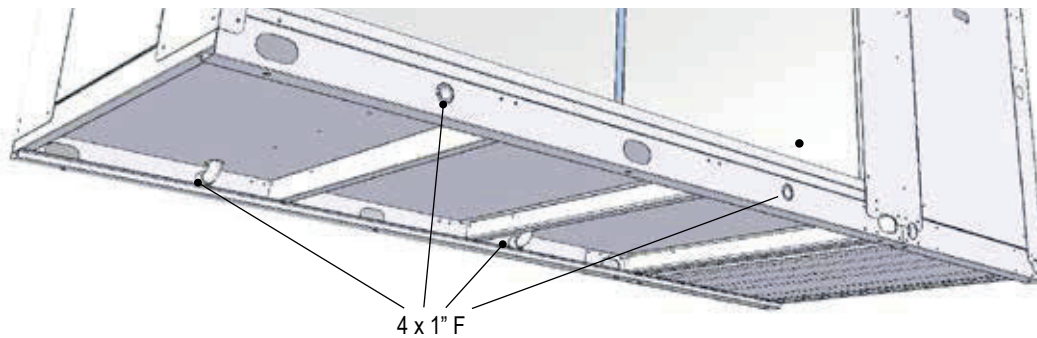


The unit can produce a quantity of condensate, depending upon the ambient conditions and the working hours. This condensate may freeze in severe ambient conditions. The unit must therefore be installed in such a way as to prevent a slipping hazard to the user or third parties due to the presence of ice.

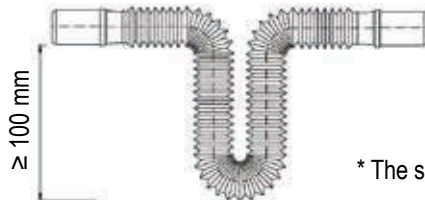


Installing the condensate drip tray on site may be difficult. We recommend that you request the drip tray when ordering the unit so that it can be installed at the factory. In the heat recovery, cooling coil and humidification sections, the condensate drip tray is standard.

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



The siphon* must have a minimum height of 100 mm. For units with fan head greater than 900Pa, increase the height of the siphon by 10mm for every additional 100Pa of fan head (example: head 1400Pa, siphon height 150mm).



* The siphon is not supplied and is at charge of the installer.

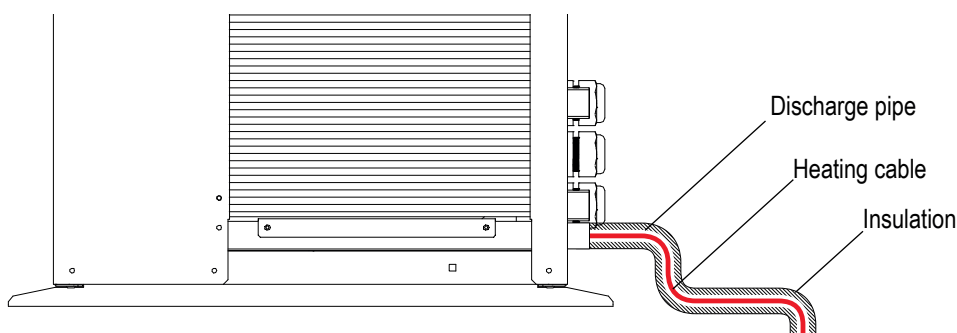
4.11.1 Installation of the heating cable (Optional)



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



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



The outlet pipe to the sewer system

- must not be connected directly to the siphon; this is to absorb air backflow or sewage and to make it possible to visually check the correct flow of the waste water.
- It must have a larger diameter than the central drain and a minimum inclination of 2% in order to guarantee its own function.

4.11 Connection of the unit to air ducts

The units allow connection to the air ducting by means of flanged vibration dampers and calibration dampers; if these components are not supplied, the coupling can also be made by a direct connection to the unit.

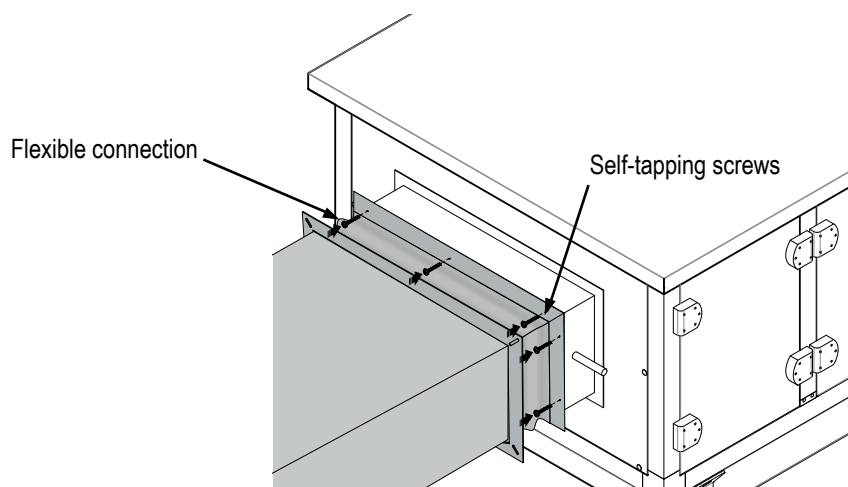
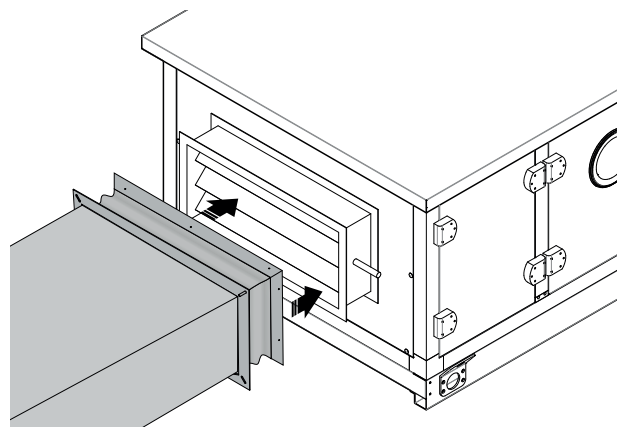
Flexible couplings, dampers and rain caps can be supplied disassembled on pallets or inside the unit, fixing them to the section. These should be secured using the screws provided as shown in the image below.



A suitable anti-vibration system is recommended between the unit and the duct.



To ensure the tightness of the connections and the integrity of the unit, the conduit must be supported by suitable brackets and not encumber the connections or the unit itself.



4.12 Union of several sections

For AHU consisting of more than one section, it is necessary to assemble the various sections using the screws provided.

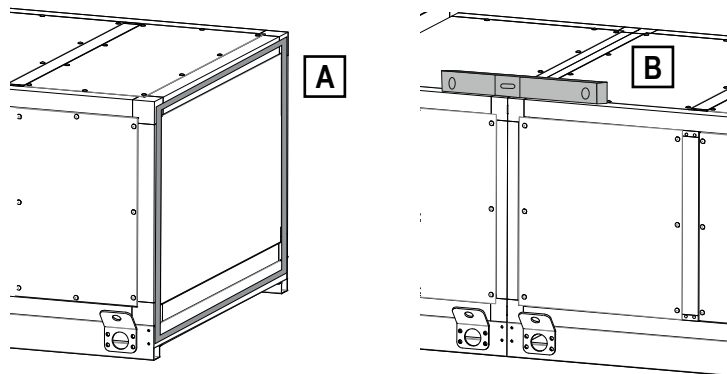
Clean the frame to be flanged and apply the self-adhesive gasket supplied on one of the two sides.

Approach the flanges and check for parallelism: if necessary, add shims to the bases to obtain a perfect fit all round.

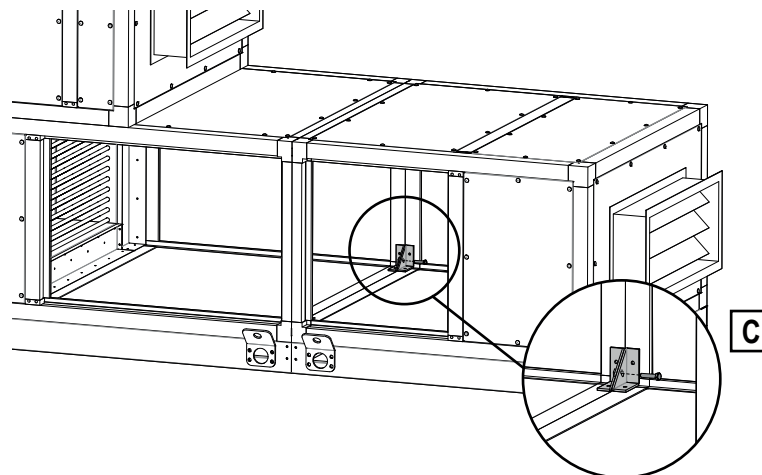
If the flange is accessible from the inside (via an upstream or downstream inspection door), it is fastened from the inside with bolts at the four corners and any intermediate bolts according to the size of the unit.

If the flange is not accessible internally, it is secured from the outside using lever locks or brackets.

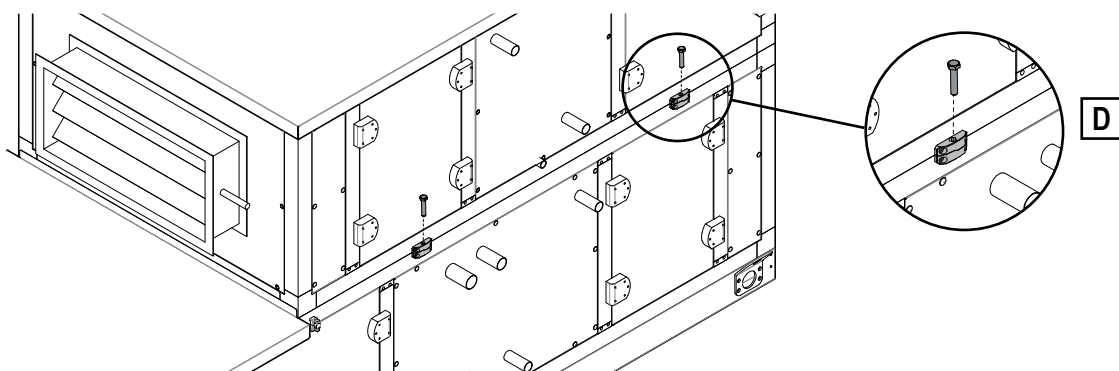
After assembly, seal the spaces between the individual sections with the silicone supplied.



4.12.1 Internal securing



4.12.2 External securing



4.13 Hydraulic connections

The water pipe-work must be installed in accordance with national and local regulation and can be made from copper, steel, galvanized steel or PVC. The Pipework must be designed to cater for the nominal water flow and the hydraulic pressure drops of the system, a maximum pressure drop of 300 Pa/m run being typical. All pipes must be insulated with closed-cell material of adequate thickness. The hydraulic piping should includes:

- Pockets for temperature sensor to measure the temperature in the system.
- Flexible joints, to isolate the unit from the rest of the system.
- Temperature and pressure gauges for maintenance and servicing operations.
- Shut-off manual valves to isolate the unit from the hydraulic circuit.
- Vent valves, expansion tank with water filling, discharge valve.



The hydraulic connection diameters are specified in the in the dimensional drawings and data sheets supplied with the unit.



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



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

The connection of the unit to the hydraulic circuit must be carried out by an experienced and qualified technician in accordance with the local regulations in force.

- To avoid any vibration transmission and permit the thermal expansions, anti-vibration fittings must be installed on the pipes. ;
- To avoid the inlet of foreign bodies and particles, you need to install, on unit inlet, a cleanable mechanic filter, with mesh dimension not larger than 2mm and with suitable nominal diameter, to reduce pressure drops;
- The installation of shut-off valve up and down stream of the filter is recommended, in order to make the cleaning operation simpler and quicker;
- The installation of thermometers and gauges near the inlet and outlet connection of the device, make the check of the unit operation easier;
- The chilled water system must be coated with close-cells anti-condensation material, with thermal insulation characteristics, vapor impermeability and with suitable thickness for the worst foreseeable conditions, in operation and stand-by mode;
- Once the circuit is done and the unit installed, seal test of the whole system must be done, in order to find out any possible leakage and repair it, before the circuit filling and commissioning.



After the seal test, if the start-up of the system is planned after a long period of stop or if the ambient temperature can go down till values near to 0°C or lower, you need to drain the water from the circuit or enter a suitable percentage of glycol.



When starting the unit for the first time, it is necessary to load it with clean water with chemical-physical characteristics such as to prevent corrosive phenomena or deposits of any kind. For this purpose, it is advisable to check annually the stability of the pH.

4.13.1 Hydronic coils

Remove the plastic plugs on the connections only immediately before making the hydraulic connections.

For temperature values, minimum and maximum water flow rates and water content of the water circuit of the heat exchangers, refer to the data sheet of the unit.

When screwing in the system piping, force the coil terminal in the opposite direction using pipe pliers.



Provide connections of suitable union or flange fittings to allow easy disconnection and removal of the coils.



Maximum operating pressure 10 bar!

4.13.2 Humidification by honeycomb pack or high-pressure nozzles

The arrangement of the hydraulic connections must be such that the evaporator pack or the distribution ramp can be easily removed.

It is advisable to install, in the hydraulic network connections

- a shut-off valve
- a filter
- a pressure gauge
- a regulating valve, which also allows the exclusion of the humidification system.

In the case of a honeycomb pack with a pump, also check that

- the electrical connection has been carried out correctly and in accordance with the regulations in force
- the water level in the tank is constantly 15-20mm below the level of the overflow, for the correct operation of the pump.

It is advisable, in the case of humidification with disposable water, to provide a flow regulation valve for connection to the water mains, and then to add the necessary shut-off valves (at customer's charge).

4.13.3 Atomized water or steam humidification

In the case of atomized water or steam humidification, please refer to the supplementary manual delivered with the unit.

4.14 Filling the hydraulic circuit

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

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

4.15 Emptying the installation

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



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

4.16 Electric connections: preliminary safety information

To work on the electrical panel, if present, follow the instructions listed below.



Power connections must be made in accordance to the wiring diagram enclosed with the unit and in accordance to the norms in force (the wiring diagram is provided in case of a unit equipped with regulation).



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



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



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



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



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



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



Make all connections to ground provided by law and legislation.



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



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



FROST PROTECTION

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

It is advisable to keep power cables separate from control cables. If not, shielded cables should be used. For any serial connections, use only shielded cables with a characteristic impedance of 120 ohms. The maximum distance of the cable connecting the supervision devices to the furthest unit must not exceed 1000 metres.

The unit must be powered by a 4-wire cable (3 phases +GND), if the power supply is 400 V73PH/50 Hz +GND. However, different power supplies, single-phase or three-phase, are possible (check on the unit nameplate and wiring diagram).

Connect the phases to the input clamp of the main switch and the ground conductor to the dedicated clamp. Use a power supply cable with suitable section and as short as possible to avoid voltage drops.

Protect the power supply cable upstream the unit by means of an automatic switch with suitable size and features. The power supply cable section and the automatic switch size, can be found in the wiring diagram supplied with the unit. The cable entry is shown in the dimensional drawing of the unit attached to the Handbook. It must be suitably protected in compliance with the local regulations in force.

If the power supply cable entry is from the top, make a drop-break fold.



Before anyhow intervene on the unit, slightly verify that the electrical circuits of the device have not been damaged during the transport. Especially check that all the screws of the clamps are correctly tightened, and that the cable insulation is intact and in good conditions.

The conductors for the phases power supply cable, must be connected to the free clamps to the unit main switch entry; the ground conductor must be connected to the dedicated pre-arranged clamp (PE).

4.17 Electric data



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



The line voltage fluctuations can not be more than $\pm 10\%$ of the nominal value, while the voltage unbalance between one phase and another can not exceed 1%, according to EN60204. If those tolerances should not be respected, please contact our Company. **The use of the unit with a power supply with higher variations than those indicated will invalidate the warranty.**



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

5. UNIT START UP

5.1 Preliminary checks

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



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



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

5.1.1 Before start-up



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

- Verify that the unit is installed in a workmanlike manner and in accordance with the guidelines in this manual.
 - Check that there are no foreign bodies left which could damage the fans or other parts of the system
 - Check that there are no obstructions in the air ducts (motorized fire dampers, manual dampers, etc.).
 - Check that a suitable condensate drain has been installed and that the procedure indicated in this manual has been followed.
 - Check the cleanliness of the filters and clean/replace them if necessary.
 - If there is a humidification section with a pump, check that the water level is 2 cm lower than the overflow and if necessary adjust the float and insert the purge pipe into the overflow outlet
 - Check that all condensate drains have been siphoned off correctly.
- Check that all power cables are properly connected and all terminals are correctly fixed.
- The operating voltage between phases R S T is the one shown on the unit labels.
 - Check that the unit is connected to the system earth.
 - Check that there is no refrigerant leakage.
 - Check for oil stains, sign of a possible leak.
 - Check that the refrigerant circuit shows the correct standing pressure on the pressure gauges (if present) otherwise use external ones.
 - Check that the Schrader port caps are the correct type and are tightly closed.
 - Check that crankcase heaters are powered correctly (if present).
 - Check that all water connections are properly installed and all indications on unit labels are observed.
 - The system must be flushed, filled and vented in order to eliminate any air.
 - Check that the water temperatures are within the operation limits reported in the manual.
 - Before start up check that all panels are replaced in the proper position and locked with fastening screws.
 - Before start-up, check that all the water taps on the compressor outlets are open.



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



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



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

5.1.2 Commissioning

The unit commissioning must be carried-out by a skilled technician authorized by the manufacturer.



Before switching the unit ON check that all the shut-off valves on compressors discharge side are open.



Before starting the unit for the first time or after a long period of stop, verify that the parameters set on the microprocessor are coherent with the required working conditions.

To switch the device ON, turn the main switch to ON, to power the unit. Then press the ON/OFF key on the microprocessor keyboard, positioning it on ON.

If the remote ON/OFF contact is closed, the circulation water pump, if present, will immediately start. After a delay time, settable by microprocessor, also the fans will start and then the different compressors in relation to the required cooling capacity to satisfy the present thermal load.

Once the unit has reached a stable operation regime, the technicians must verify the group working parameters and verify that:

- a) the safety high pressure switches are right installed and calibrated;
- b) on the external safety valves it is shown the calibration pressure and that the value is the one foreseen.
- c) No refrigerant leakage is present (if the refrigerant circuit is present)

The collected data must to be recorded on the commissioning report. The module is attached to the unit if it is equipped with regulation, otherwise it is at charge of the installer.



A copy of the commissioning report, duly filled, must be sent to the manufacturer, to make the warranty valid.



During the commissioning, the technician must check that the safety (high and low pressure switches, water differential pressure switch, anti-freeze thermostat etc.) and control devices (regulation thermostat, condensation pressure regulation device etc) properly work.

5.1.3 Controls during unit operation

- Check the rotation of the compressors and fans. If the rotation is incorrect, disconnect the main switch and change over any two phases of the incoming main supply to reverse motor rotation (only for units with three-phase fan motors).
- If the unit is equipped with a refrigerant circuit, after several hours of operation, check that the sight glass has a green colour core: if the core is yellow moisture is present in the circuit. In this event it is necessary for dehydration of the circuit to take place. This must be performed by qualified people only. Check that there are no continuous vapour bubbles present at the sight glass. This would indicate a shortage of refrigerant. A few vapour bubbles are acceptable.

5.1.4 Safety valves

The outlet connections of the safety valves installed on the unit are provided with a threaded connection, which must be connected to a safe area at a height of not less than 3 metres from the condenser or at a distance of at least 3 metres from the machine and any other sources of ignition. If provided, the valves must be individually directed in metal piping, to an area where the refrigerant spill cannot damage people or things.



If the unit is equipped with a refrigerant circuit: The refrigerant spilled from safety valves is an high pressure, high temperature and high speed discharged gas. Its flow may damage things and people coming in direct contact with it.



The opening of safety valves comes with a noise whose intensity may damage hearing capabilities of surrounding people.

The piping diameter must be no smaller than the safety valves draining pipe ones; refrigerant leaks in the line must be as small as possible and in any case should not cause a reduction in the discharge rate of the valves.

The piping outlet connection must be done so to avoid that rain water, snow, ice, and dirt can accumulate and obstruct the pipeline.

The valve discharge must be at a suitable distance from other equipments, systems or ignition sources; the discharged refrigerant must not accidentally enter buildings.

In any case, any pipes on the safety valves discharge must be made in compliance with current laws and regulation.

5.1.5 Security systems implemented

The safety system stops the functioning of the unit in the event of an accident or misuse.

The following precautions are applied to the various sections of the AHU:

- earthing arrangement;
- safety microswitches on the access doors to the sections;
- internal handles on the doors where the operator enters;
- protective netting on the suction and pressure ports (when not ducted);
- rubber tip guards for protruding screws.

On request (optional):

- emergency mushroom button accessible to the operator*;
- protection cover for moving parts.

5.2 Emergency Stop

The emergency stop gives the possibility to stop the unit for the minimum possible time.

If an emergency stop is required, follows this procedure:

- Turn the main switch (red and yellow) OFF; the unit immediately stops.
- Press the red emergency stop button as well.

5.2.1 Start after an emergency stop



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

Restarting the unit proceeding as follows:

Turn the main switch ON; (this does not switch the unit ON and does not allow a restarting after a second voluntary action);

Rotate the emergency stop button. The unit is thus restarted).

6. MAINTENANCE OF THE UNIT

6.1 General warnings



Starting from 01/01/2016 the new European Regulation 517_2014, "Obligations concerning the containment, use, recovery and destruction of fluorinated greenhouse gases used in stationary refrigeration, air conditioning and heat pumps", became effective. This unit is subject to the following regulatory obligations, which have to be fulfilled by all operators:

- (a) Keeping the equipment records
- (b) Correct installation, maintenance and repair of equipment
- (c) Leakage control
- (d) Refrigerant recovery and disposal management
- (e) Presentation to the Ministry of the Environment of the annual declaration concerning the atmospheric emissions of fluorinated greenhouse gases.

Maintenance can:

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



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



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



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



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



If the unit is not used for long or during the seasonal stops, do not forget to close the shut-off valve on compressor discharge side.



Inside the unit, there can be high voltage zones. Any intervention on them, must be done by authorized personnel qualified in compliance with the local regulations in force.



The surfaces of the components in the compressor discharge side and in the refrigerant liquid line could reach very high temperatures and any contact can cause burns.



Before carrying out any kind of work on the machine, it is necessary to cut off the power supply from the electric panel, by turning the main switch to the OFF position



To carry on any intervention requiring the opening of the cooling circuit, follow this procedure:

- 1) activate the crankcase heater of the compressor for 4 hours minimum-
- 2) recover the refrigerant by means of an approved cylinder
- 3) make the vacuum in the circuit
- 4) flow the circuit with inert gas (nitrogen)
- 5) use orbital blades to dissect the pipes



Smoking is forbidden during maintenance operations.



It is forbidden to climb on top of the units; use special gangways

6.2 Drive access

Access to the unit once installed, should only be possible to authorized operators and technicians. The owner of the equipment is the company legal representative, entity or person owns the property where the machine is installed.

They are fully responsible for all safety rules given in this manual and regulations. If it is not possible to prevent access to the machine by outsiders, a fenced area around the machine at least 1.5 meters away from external surfaces in which operators and technicians only can operate, must be provided.

6.3 Routine maintenance

The Owner must take care that the unit is adequately maintained, according to the indications contained in the Handbook and what required by current local laws and regulations.

The Owner must take care that the unit is periodically suitably inspected and maintained, according to the system type, size, age and functions and to the indication in the Handbook.



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

During its operation life the unit must be inspected and checked as stated by the current local laws and regulation. In particular, unless more restrictive specifications, follow the recommendation on the following table (see. EN 378-4. encl. D).

CASE	Sight Inspection (par. 4.2, p.ti a - l)	Pressure test	Leak detection
A	X	X	X
B	X	X	X
C	X		X
D	X		X

A	Inspection, after an intervention, with possible effects on the mechanical resistance or after a change of purpose or after a stop longer than 2 years; all unfit components must be replaced. Do not carry on checks with higher pressures than design ones.
B	Inspection following an intervention, or a relevant modification of the system or its components. The check can be restricted to the components involved in the intervention, but if a refrigerant leak is detected, a leak detection must be made on the all system.
C	Inspection following a change of the unit position. If there is the chance to have effects on the mechanical resistance, refer to point A.
D	For units with a refrigerant circuit: Refrigerant leak detection after a justified suspicious. The system must be checked to find any leaks, using direct measures (devices able to find the leak) or indirect ones (deduction of the leak presence analysing the operational parameters), focusing attention on those parts which are more easily exposed to leaks (junctions, for example).



If it is detected a fault that endangers the reliable operation of the unit, it's necessary to rectified it before restart the unit.

6.4 Periodical checks



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



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

6.4.1 Electrical system and control devices

Actions	Frequency						
	Daily	Monthly	Every 2 months	Every 6 months	Once a year	Every 5 years	If required
Check that the unit works properly and that there are no alarms	X						
Visually inspect the unit		X					
Check unit noise and vibration		X					
Check safety devices and interlocks				X			
Check the unit performances				X			
Check the absorbed current of the components (compressors, fans, pumps, etc.)				X			
Check the supply voltage of the unit				X			
Check the connection of cables to the pre-arranged clamps				X			
Check the integrity of the insulating coating of the electrical cables					X		
Check contactors conditions and functioning					X		
Check microprocessor and display functioning			X				
Check microprocessor set parameter values					X		
Eliminate any dust from electrical and electronic components				X			
Check probes and transducers functioning and calibration					X		
Check evaporator refrigerant level sensor functioning (if present)					X		
Check evaporator refrigerant level sensor calibration (if present)					X		
Check the calibration of the refrigerant leakage sensor					X		

6.4.2 Condensing coils fans and cooling circuit (if present)

Actions	Frequency						
	Daily	Monthly	Every 2 months	Every 6 months	Once a year	Every 5 years	If required
Visually inspect condensing coil		X					
Clean finned coils ⁽¹⁾				X			
Check the water flow and/or any leaks		X					
Check that the flow switch is working properly				X			
Clean the metallic filter on the water pipe ⁽³⁾				X			
Check fans noise and vibration		X					
Check fans supply voltage				X			
Check fans electrical connection					X		
Check proper operation and calibration of the fans speed regulation system					X		
Check 4 way valve proper operation (if present)					X		
Check 3 way valve proper operation (if present)					X		
Check presence of air the hydraulic circuit		X					
Check the color of the humidity display on the liquid line				X			
Check if there are any freon leaks ⁽²⁾							X



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



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



⁽³⁾ It can be carried out with a higher frequency (also weekly) depending on the Δt .

6.4.3 Compressor (if present)

Actions	Frequency						
	Daily	Monthly	Every 2 months	Every 6 months	Once a year	Every 5 years	If required
Visually inspect compressors		X					
Check compressor noise and vibration		X					
Check compressors supply voltage				X			
Check the compressors electrical connections					X		
Check the oil level in the compressors using the oil level indicator light.				X			
Check that the crankcase heaters are powered and working properly.		X					
Check the conditions of the compressors electrical cables and their connection to their clamps				X			



Monthly and daily procedure can be directly done by the Owner. The other interventions must be done by qualified and suitably trained personnel.



Do not start any cleaning operation before disconnecting the unit from the electrical power supply, turning the main switch to OFF Position. Do not touch the equipment with barefoot or wet /damp parts of the body.



Any intervention on the cooling circuit must be done by qualified and suitable trained technicians, licensed in compliance with current local laws and regulation.

6.4.4 Other operations on coils, fans and sections

Actions	Frequency				
	Every 15 days	Monthly	Every 3 months	Every 6 months	Once a year
Extracting and washing the cell filters of the flat pre-filtration sections	X				
Check the degree of clogging of absolute filters and pockets in order to plan a possible replacement	X				
Check the condition of connection tubes of pressure gauges and pressure switches	X				
Check the efficiency of germicidal lamps		X			
Check tension of belts and alignment of drive pulleys and check condition of rubber			X		
Clean the air handling unit, the thermo-ventilation unit and air extractors				X	
Replace cell filters if deteriorated				X	
Check the jet of the nozzles in the humidification ramps and clean the nozzles and tanks				X	
Clean the water filter of the humidification sections				X	
Check the functioning of the float cock in the humidification section.				X	
Check drainage of humidification and condensation water and clean siphons drainage				X	
Check the degree of soiling of the evaporator pack and replace if necessary.				X	
Check the adjustment and lubricate the servocontrols and levers for operating the gripping dampers				X	
Clean the heat exchanger surfaces of the heat recovery units					X
Check and lubricate fan bearings					X
Check the condition of the vibration dampers					X
Check tightness of fan section screws and bolts					X
Check the screw, impeller and various devices and remove any deposits.					X
Paint the internal and external parts of the air handling unit if necessary					X

6.4.4 Filter maintenance

In order to safeguard the performance and efficiency of the AHU, the control system of the central unit must include a differential pressure switch for each filter unit, which activates an alarm when the pressure drop on the filter exceeds the maximum permissible value. If the AHU is supplied complete with regulation, the control system already includes all the necessary differential pressure switches and informs the user which filter bank is in alarm.

When the filter alarm is activated, the filters concerned must be cleaned or replaced.

In addition to the purely functional aspects, the cleaning and eventual replacement of the filters are very important from a hygiene-sanitary point of view.



Operation with clogged filters leads to a reduction of the air flow rate with malfunctions and blocks, up to possible breakages of the unit with stop of the unit itself.



The frequency with which the filters should be checked varies according to the quality of the outside air, the operating hours of the unit, and the dustiness and crowding of the rooms.

- Rigid pocket filters: they are not regenerable and must be replaced when dirty:
 - Open the access panel or inspection door
 - Carefully remove the filters
 - Insert new filters
 - Close access panel or inspection door
 - Dispose of the old filters in accordance with the regulations in force.
- ISO COARSE synthetic pleated air filters
 - Open the access panel or inspection door
 - Carefully remove the filters
 - Wash the filter mat in lukewarm water and with a common detergent (if regenerable filters)
 - Rinse in running water avoiding spillage into the environment (if regenerable filters)
 - Dry the filter (if regenerable filters)
 - Reinsert the filter (if regenerable filters) or insert new filters (if filters to be replaced)
 - Close inspection panel or door
 - Dispose of old filters according to the regulations in force (if filters to be replaced)
- High-efficiency and absolute filters: they are not regenerable and must be replaced when dirty.
 - Open the inspection door
 - Carefully remove the filters
 - Insert the new filters
 - Close the inspection door
 - Dispose of the old filters according to the regulations in force.
- Active carbon filters: **carry out maintenance with all necessary safety equipment in place.**
 - Open the inspection door
 - Remove the active carbon cylinders
 - Insert new cylinders
 - Close the inspection door
 - Dispose of the old cylinders in accordance with the regulations in force

6.4.5 Coils maintenance

All coils are removable (unless otherwise requested) from the side opposite the connections. If it is necessary to remove the coils, proceed as follows:

- Disconnect the connections
- Remove the panel opposite the connections
- Prepare any brackets to support the coil (consider that the average weight of Cu/Al batteries is approximately 10 kg/m²/range, to which the weight of the collectors and frame should be added)

- If necessary, lubricate the lower rail and remove the coil using horizontal force.
- Before reinserting the coil, clean and grease the rails.
- Insert the coil
- Refit the panel opposite the connection side
- Connect the connections

6.4.6 Maintenance of rotary recovery

The rotor must be checked regularly to avoid dust and dirt deposits. When necessary, clean as follows

- with a Hoover (if limited dry deposits)
- with compressed air (many dry deposits)
- with a high-pressure cleaner using hot water (max. 70°C) or water and detergent to remove greasy deposits or considerable non-dry deposits (max. pressure 50 bar).

Avoid substances that are strongly alkaline or corrosive to the rotor (aluminium material).



The rotor is rotated by a motor through a belt that wraps around the rotor, the tension of which must be checked after the first 100 hours of operation. If necessary, increase the tension by reducing the length of the belt. The gap between the seals and the rotor should also be checked periodically and corrected if necessary. The seals require no further maintenance.

6.4.8 Steam humidifier maintenance

Refer to the steam humidifier manual supplied with the unit (if a steam humidifier is present).

6.4.9 Maintenance of the Humifog atomized water humidifier

Refer to the Humifog manual supplied with the unit (if Humifog humidifier is present).

6.4.10 Maintenance of the humidifier with nozzles

Check monthly that the nozzles form a regular conical jet; if there are any anomalies, remove them and clean or descale them. At the end of the season, empty the collection tank. Frost protection should be provided if necessary.

6.4.11 Maintenance of the evaporative pack humidifier

At the beginning of operation and monthly, check that the evaporating septum is evenly wetted, without excessive flow and splashing from the outer surface.

If necessary, adjust the flow rate using the control valve.

If the evaporating pack is excessively encrusted or deteriorated, it must be replaced.

To remove the evaporating pack, proceed as follows

- Stop the pump (or shut off the inlet in devices with disposable water) while keeping the fan running and wait until the pack is completely dry.
- remove the cover panel at the evaporating pack
- Unscrew the fixing screws and lower it into the tank
- slide the pack and the honeycomb distributor sideways on the guides
- check that the water comes out evenly from the holes in the distributor tube; if it does, clean it without enlarging the holes.
- slide on the guides, pack and honeycomb distributor
- tighten the fixing screws
- refit the cover panel

6.4.12 End of seasons

If the unit is to be left out of commission for a long period, the hydraulic circuit should be drained down. This operation is compulsory if the ambient temperature is expected to drop below the freezing point of the fluid in the circuit (typical seasonal operation). Before a new filling, the system must be washed.

6.4.13 Unit OFF

To stop the unit, press the ON/OFF key on the microprocessor, turning it on OFF position. If the unit will be OFF for more than 24 h turn the main switch to OFF position to cut the unit electrical power.

If any malfunction has occurred during the unit operation, solve it asap, in order to avoid that it will occur again at next operation.

6.5 Refrigerant circuit repair (if present)



Before any intervention with devices able to create sparks, heat, naked flames etc. totally empty and blow the circuit from any refrigerant.

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



Never use oxygen instead of nitrogen: explosions may occur.

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

Therefore:

- Avoid oil replenishment with products that are different from that specified and that are pre-loaded into the compressor.
- In the event of a gas leakage on machines using refrigerant R407C, even if it is only a partial leak, do not top up. The entire charge must be recovered, the leak repaired and a new refrigerant charge weighed in to the circuit.
- When replacing any part of the refrigerant circuit, do not leave it exposed for more than 15 minutes.
- It is important when replacing a compressor that the task be completed within the time specified above after removing the rubber sealing caps.
- When replacing the compressor following a burn out, it is advisable to wash the cooling system with appropriate products including a filter for acid.
- When under vacuum do not switch on the compressor.

7. DECOMMISSIONING

7.1 Disconnect the unit



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

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

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

7.2 Disposal, recovery and recycling

The frame and components, if unusable, should be taken apart and sorted by type, especially copper and aluminum that are present in large quantities in the machine.

All materials must be recovered or disposed in accordance with national regulations.



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

7.3 RAEE Directive (only UE)



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

This product is included in the application of Directive 2012/19/EU on the management of waste electrical and electronic equipment (WEEE).

The unit should not be treated with household waste as it is made of different materials that can be recycled at the appropriate facilities. Inform through the municipal authority about the location of the ecological platforms that can receive the product for disposal and its subsequent proper recycling.

The product is not potentially dangerous for human health and the environment, as it does not contain dangerous substances as per Directive 2011/65/EU (RoHS), but if abandoned in the environment it has a negative impact on the ecosystem.

Read the instructions carefully before using the unit for the first time. It is recommended not to use the product for any purpose other than that for which it was designed, as there is a risk of electric shock if used improperly.

8. DIAGNOSIS AND TROUBLESHOOTING

8.1 Fault finding

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



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

The table below lists the most common malfunctions that may occur while using the unit. For each malfunction, we give an indication of the component involved and the most probable cause. If necessary, contact your authorized service centre.

Problem	Component involved	Cause
Noise	Fan	Impeller deformed, unbalanced or loose Damaged nozzle Presence of foreign bodies in the fan
	Transmission	Mis-aligned or loose pulleys Loose, worn, dirty or incorrectly sized belts Motor or fan not properly secured
	Bearings	Loose or non-lubricated bearings Worn or deteriorated bearings
	Engine	Incorrect power supply Worn bearings Contact between rotor and stator
	Ducts	too high air speed in the ducts Anti-vibration joints too tight
Insufficient air flow	Fan	Reverse rotation
	Ducts	Excessive pressure drops Closed dampers Obstruction in ducts
	Filters	Dirty filters
	Coils	Dirty coils
Excessive air flow	Ducts	Low pressure losses Oversized channels Terminals not installed
	Unit	No filters Open inspection panels Uncalibrated dampers

Insufficient thermal performance	Coils	Dirty coils Poor, missing or reversed coil supply Air bubbles in the circuits Insufficient air flow
	Electric pump	Insufficient water flow Insufficient pressure Wrong direction of rotation
	Fluid	Incorrect temperature Non-compliant control elements
	Fan section	Transfer of water droplets thanks to air speed Clogging of the overflow drain
Humidification insufficient	Nozzles	Clogged nozzles or filter Limescale deposits
	Electric pump	Wrong direction of rotation No water in the tank Dirty pump filter
	Coils	Insufficient preheating
	Evaporative pack	Dirty, clogged or worn packet Clogged holes
	Non-return valve	Broken or blocked valve
Water leakage	Coils	Coil leakage due to corrosion
	Fan section	Transfer of water droplets thanks to air speed Clogging of the overflow drain

8.2 Spare parts

To order spare parts, please contact the company, referring to the data on the rating plate and describing the component required.



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Technical data shown in this booklet are not binding.

The Company shall have the right to introduce at any time whatever modifications necessary to the improvement of the product.
The reference languages for the whole documentation are Italian and English. The other languages are to be considered only as guidelines.
