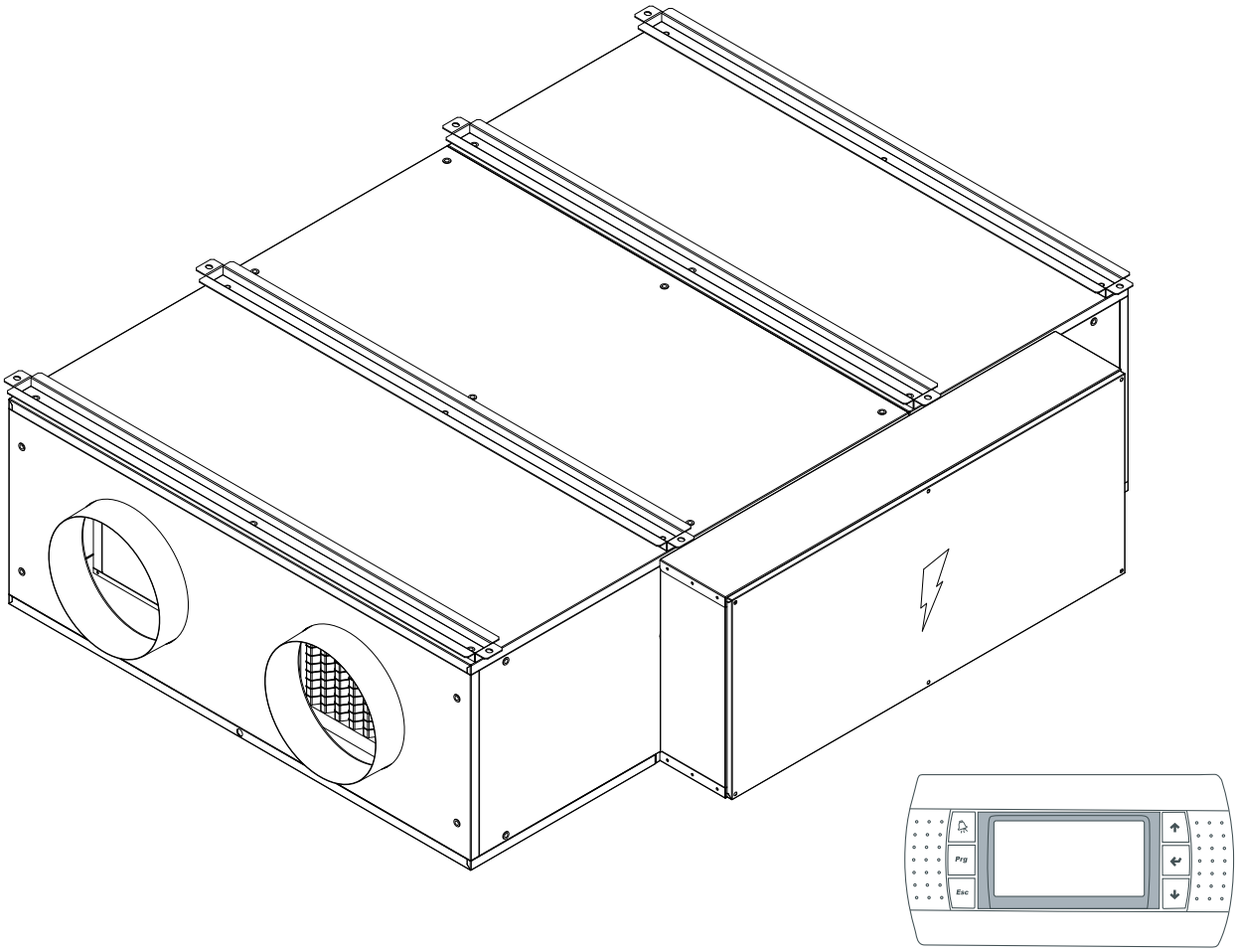
ENGLISH

www.vorticeindustrial.com
info@vorticeindustrial.com



Original Instructions

Installation Operations and Maintenance manual
RXC/Hi series

Incorporated in this manual there are the following documents:
- Declaration of conformity
- Technical schedule
- Dimensional drawing
- Wiring diagrams

PLEASE READ CAREFULLY
and save this document
CONSIDER THE ENVIRONMENT

cod. 4700050610

17/09/2024

Dear customer,
We thank you for purchasing a VORTICE INDUSTRIAL product,
manufactured with first choice materials and advanced technologies.
The quality level is under constant control, and VORTICE INDUSTRIAL products
are therefore synonymous with Safety, Quality and Reliability.

Multiple instructions:
Consult the specific part

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

The Company have the right to introduce at any time whatever modifications necessary to the improvement of the product.

Declaration of conformity

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

The unit is equipped with a series of prevention and safety devices described in detail in the accompanying documentation. The installer is required to connect and activate all these mounted components, checking their functionality.

The system or machine into which this unit is to be incorporated must also comply with the above mentioned Directives. The user, or whoever subsequently operates the system, must periodically check the functionality and efficiency of the safety devices.

The non-activation, removal or inhibition of the active safety systems, as well as the removal of the passive safety systems, exempt Vortice Industrial s.r.l. from any responsibility regarding any accident or damage, direct or indirect, to people and/or things, attributable to the machine.

The manual supplied with the unit is completed by a TECHNICAL DATA SHEET, with the fundamental constructive and functional data, and by the relative DRAWINGS.

Transport, handling, installation and subsequent operation must be carried out in full compliance with the above prescriptions, in the subsequent indications of the manual and the accompanying documentation.

GENERAL INDEX

1. INTRODUCTION

Units must be installed and operated according to the instructions in this manual. Strict adherence to these simple instructions is a prerequisite to:

- eliminate or reduce shutdown time due to unexpected failures;
- improve the performance of components, resulting in energy savings;
- increase the life of components and the entire unit;
- decrease maintenance costs.

1.1 General information

This manual has been prepared to allow correct installation, set-up and maintenance of the unit. Any contractual or extra-contractual responsibility of the Company for damage caused to persons, animals or things, due to installation, adjustment and maintenance errors or improper use, is excluded. Any use other than that specified does not imply for the manufacturer any commitment or obligation of any kind.
This documentation is an informative support and cannot be considered as a contract towards third parties.
The Company implements a policy of constant improvement and development of its products. It therefore reserves the right to make changes to specifications, fittings and documentation at any time, without prior notice and without any obligation to update what has already been delivered.

1.2 Purpose and Content of the Instructions

These instructions provide essential information for the installation, operation, testing and maintenance of the machine. They have been drawn up in accordance with the legal provisions issued by the European Union and the technical standards in force at the time the instructions were issued.
The local safety regulations in force at the time of installation must be observed.
The instructions contain instructions for avoiding reasonably foreseeable misuse.

1.3 Storage of instructions

This manual and the eventual wiring diagram of the unit must be carefully stored in a suitable place, protected from dust and humidity and easily accessible to users and operators for any further consultation.
The instructions must always follow the unit throughout its entire life cycle and must therefore be passed on to any subsequent user.

1.4 Instructions update

It is recommended to check that the instructions are up to date with the latest revision available.
Any updates sent to the customer should be retained as an attachment to this manual.
The Company is available to provide any information regarding the use of its products.

1.5 How to use these instructions

The instructions are an integral part of the unit.

It is compulsory for users or operators to consult the instructions before any operation on the unit and on any occasion of uncertainty regarding the transport, handling, installation, maintenance, use and dismantling of the unit.
In these instructions, in order to draw the attention of operators and users to the operations to be carried out in safety, graphic symbols have been included that are shown in the following paragraphs.

1.6 Residual Risks

A residual risk is any hazard that cannot be fully reduced by design and protective techniques, or a potential hazard that is not obvious.

ATTENTION
This manual indicates any operation that may generate a hazardous situation as well as the precautionary measures to be observed in each case.

- All units have pictograms with hazard warnings.
- The units are safe machines, provided the safety guards are not tampered with or removed.
- Technical preparation, observance of the procedures outlined in this manual, and markings at critical points on the unit will still allow safe operation.
- The following safety rules must be observed during installation, start-up, use and maintenance of the units:

- Do not operate the unit unless it and its electrical components have been connected to the earthing system;
- Do not operate unit unless fan is connected to a duct or protected with safety mesh;
- Do not use the unit as a stand for other machinery;
- Do not use unit as a walkway;
- Do not use unit as equipment storage;
- Do not open inspection panels while fan is running, especially in over pressure sections;
- Do not leave inspection panels partially closed; Make sure all handles or knobs are securely closed;

- Wear personal protective equipment before working on the unit;

- Before accessing the unit, make sure that all electrical utilities have been turned off, especially before opening the inspection panels, make sure that the fan is off and cannot be turned on again without the knowledge of the person working on the unit;

- Before starting the fan, always refit the protection cover or the closing panel of the fan section;

- Be careful when lifting the unit as its center of gravity may be severely unbalanced;
- Be careful when locking the lifting ropes/hooks;
- Be careful of sheet metal edges inside the unit;
- Be careful of sheet metal edges outside the unit;
- Be aware of possible burns from heating coils;
- Be aware of dampers that may close unexpectedly.

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 (if present)	RESIDUAL RISK	METHOD OF INJURY	PRECAUTIONS AND PROTECTIONS
Mixing box with dampers and actuators	Crush	Contact	Remove voltage before any operation
Thermal heat exchangers	Small stab wounds, burns	Contact	Avoid any contact, use protective gloves
Electric heaters	Electrocution, severe burns	Contact, Fire due to short circuit or overheating of the heating elements	Periodic check of the safety devices, adhesive warning signs on the machine
Heat exchangers	Small stab wounds, crush	Contact	Avoid any contact, use protective gloves
Fans	Cuts, eye damage, broken bones	Insertion of objects through the fans are operating	Never put objects through the fans sections
External to unit: unit enclosure	Intoxication, 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 standards regulations
Inside the unit: compressors and gas supply pipes	Severe 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
Low pressure safety valves	Intoxication, severe burns	Elevate evaporating pressure not suitable for correct operation of the unit during the maintenance operations	Carefully check the evaporating pressure during the maintenance operations
High pressure safety valves	Intoxication, severe burns, hearing loss	Intervention of the high pressure safety valve with open refrigerant circuit cabinet	Avoid, as much as possible, the opening of the refrigerant circuit cabinet; carefully check the condensing pressure value; use all protection devices as indicated by zregulations in force

1.7 General Safety Symbols

Individual safety symbols in accordance with ISO 3864-2:

PROHIBITION
A black symbol inserted in a red circle with a red diagonal indicates an action that must not be performed.

WARNING
A black graphic symbol within a yellow triangle with black borders indicates a hazard.

MANDATORY ACTION
A white symbol inserted in a blue circle indicates an action that must be performed to avoid a hazard.

Combined safety symbols in accordance with ISO 3864-2:

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

1.8 Safety Symbols

GENERAL DANGER
Strictly observe all indications placed beside the pictogram. Failure to observe the indications may lead to situations of risk with possible consequent damage to the health of the operator and the user in general.

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.

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

HOT SURFACES
The symbol indicates components of the unit at elevate surface temperature which might create risk.

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 Limits of use and prohibited uses

The machine has been designed and built exclusively for the uses described in the technical manual.
Any other use is prohibited as it could generate health risks for the operators and users.

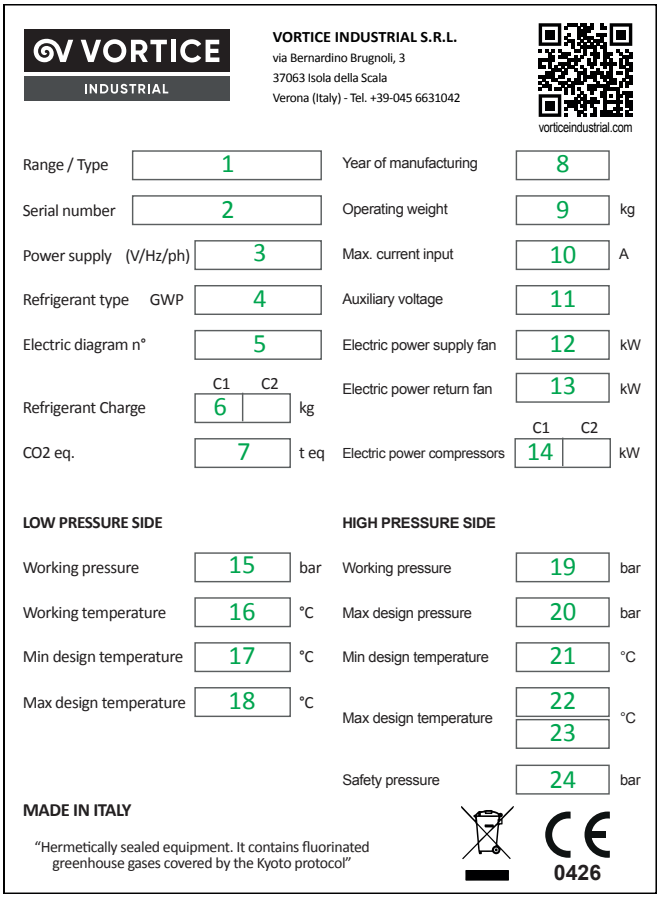
However, the unit is not suitable for operation in environments:

- where vibrations are present;
- where electromagnetic fields are present;
- where aggressive atmospheres are present.

THIS UNIT IS NOT SUITABLE FOR OPERATION IN EXPLOSIVE ATMOSPHERE.

1.10 Unit identification

Each unit has a label attached to the outside of the unit, which shows the identification data of the machine together with the main technical characteristics.
For electrical information not included on the label, refer to the electrical diagram.
Check that the characteristics of the electrical network comply with the data on the identification plate.



CAPTION:

(1) Unit model and size
(2) Serial number
(3) Power supply characteristics
(4) Type of refrigerant
(5) Wiring diagram number
(6) Refrigerant content
(7) CO_2 equivalents
(8) Manufactured year
(9) Overall unit weight
(10) Max. electric current consumption
(11) Auxiliary voltage
(12) Electric power input on supply fan
(13) Electric power input on exhaust fan
(14) Electric power input of compressor
(15) Working pressure (low pressure side)
(16) Working temperature (low pressure side)
(17) Min design temperature (low pressure side)
(18) Max design temperature (low pressure side)
(19) Working pressure (high pressure side)
(20) Max design pressure (high pressure side)
(21) Min design temperature (high pressure side)
(22) Max design temp. (gas) (high pressure side)
(23) Max design temp. (liquid) (high pressure side)
(24) Safety pressure (high pressure side)

In all dealings with the Company it's essential to quote the model and serial number indicated on this plate (ref. 1 and 2).

The identification label must never be removed from the unit.

2. TECHNICAL CHARACTERISTICS

2.1 Introduction

Any occupied room requires the correct supply of fresh air and at the same time the control of the internal thermo-hygrometric conditions. Through the recovery of energy from the air extracted from the room, through the use of systems with integrated heat pump technology, we offer a highly efficient solution to meet the needs of thermo-hygrometric well-being and air exchange in civil and tertiary air conditioning systems such as offices, bars, restaurants, etc., both in summer and winter and without additional charges in the management of primary air.
These units are particularly efficient since they use a high efficiency plate heat recovery, combined with a cooling circuit in heat pump operating with inverter compressor. The use of the high-efficiency plate heat recovery makes it possible to significantly reduce the period of use of the cooling circuit during the year, thus reducing its use to short periods, thus limiting electricity consumption to a minimum.
The compact dimensions of the units allow for easy installation even in false ceilings while maintaining excellent accessibi-lity for the maintenance of all internal components. The numerous accessories available on request complete the functions of the unit, which generally has to be combined with an air conditioning system.
The units are available in 5 sizes, with nominal air flow rates from 500 to 3500 m^3/h.
The units in H1, H2, H3, H4 configurations have been designed for false ceiling installation.

2.2 Structure

Structure in RAL 9010 steel profiles, pre-painted at 180°C with polyurethane powder paint and 25 mm thick panels.
Sheets with 6/10" thickness covered with protective film, in galvanized steel.
The internal insulation is made of high density polyurethane foam (40 kg/m^3) or mineral wool (90 kg/m^3). The frame is made according to EN1886 standard, class D1 mechanical resistance, class T3 thermal transmittance, air tightness class L1, thermal break factor TB3.
The air tightness is guaranteed by a particularly adaptable and resilient neoprene gasket, the tightening of the opening panels is made by means of push screws that ensure an adequate and constant pressure on the gaskets.
In all areas subject to condensation there is a condensation tray in AISI 304 stainless steel, inclined internally and in compliance with EN 1.4301.

2.3 Heat recovery (1° recovery stage)

The units are equipped with an aluminium counter-flow heat exchanger used to transfer heat from the exhaust air to the incoming fresh air. The heat exchange takes place in counter-flow with efficiencies higher than 85%. The spacing between the fins is optimized in order to reduce air side pressure drop and fan power consumption. In some conditions of low fresh air temperature and high humidity, the exchanger may start to frost. Through the integrated control system it is possible to manage the defrosting of the exchanger. The heat recovery is also equipped with an additional by-pass damper for the management of the free-cooling and free-heating mode.

2.4 Refrigerant circuit in heat pump (2° recovery stage)

The efficiency of the unit is further increased thanks to a second phase of indirect recovery, obtained through a heat pump refrigeration circuit compression system. The cooling circuit is equipped with a rotary or Scroll compressor with inverter, with continuous capacity regulation. The compressor is complete with thermal protection, crankcase heater, low and high pressure switches and vibration isolators suitable to isolate vibrations.

The refrigerant circuit is of direct expansion type loaded with R32 refrigerant. Each refrigerant circuit is factory tested both in terms of tightness (pressure test) and functionality. The main components are: finned pack heat exchangers and source, electronic expansion devices, solid-cartridge anti- acid filters, safety pressure switches on high and low refrigerant pressure side, receiver and liquid separator on suction side, liquid / humidity sight glass, cycle reversal valve, non-return valves, safety valves on high pressure side. The circuit is complete with reverse cycle defrosting system and a fresh air by-pass.

2.5 Electric box

The electric box is manufactured according to IEC 204-I / EN 60204-I standards and complete with door block disconnector, CE insulation transformer. All motors and auxiliary circuits are protected against overload and short circuits by fuses and/or circuit breakers. The electrical panel also includes the following components: General alarm contact, remote control ON/OFF, summer/winter seasonal changeover contact, outdoor air temperature probe, supply air temperature probe, return air temperature probe, recirculation air probe, defrost recovery probe, source exchanger defrost probe, pressure switches for supply and return dirty filters.

2.6 Control system

The unit is complete with adjustment by means of a microprocessor electronic board with dedicated software and external LCD display as user interface. Through the external or remote LCD display it is possible to set all the working set-points of the unit and to visualize the operating states and possible alarm conditions present. Through the values acquired by the room and air supply temperature probe, temperature control will be managed by activating the compressors with reference to the winter and summer set-points. The unit can manage the automatic change of the room cooling or heating modes, the free-cooling and free-heating conditions through the comparison with the fresh air temperature.

The heat capacity delivered by the heat pump unit will be continuously modulated through the speed variation of the inverter refrigeration compressor. This variable mainly depends on the value of the supply air temperature with reference to the fresh air conditions. This characteristic allows the operation at partial loads with a much higher energy saving compared to a traditional group equipped with ON/OFF compressors.

2.7 Fans

Independently controllable, they consist of aerodynamically balanced, statically and dynamically balanced backward blade centrifugal impellers with aerodynamic profile, made of galvanized steel. The impellers are directly coupled to brushless EC brushless motors, with external rotor, operating via a 0-10V PWM or MODBUS-RTU modulating signal.

2.8 Additional coils (external module)

External module that can accommodate heating and/or cooling coils with a high number of rows. The module can also accommodate combined coils (water cooling, water and / or electric heating).

2.9 Test

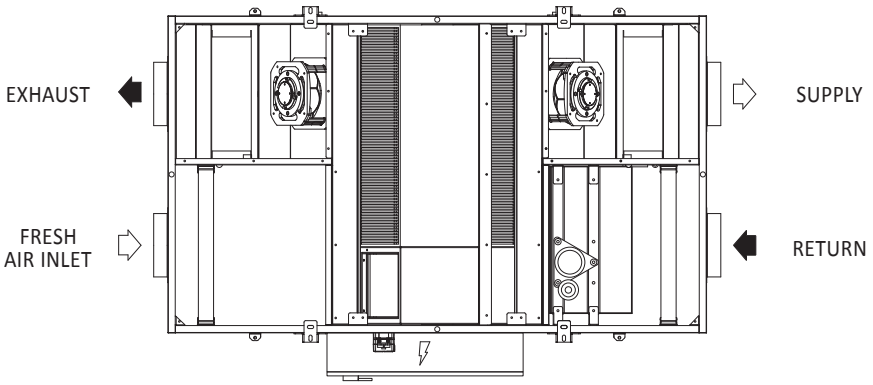
Units are fully assembled and wired at the factory and subjected to a complete functional test before shipment. They are manufactured in compliance with the safety standard of the Machinery Directive 2006/42/EC, the Low Voltage Directive 2006/95/EC, and the Electromagnetic Compatibility Directive 2004/108/EC and therefore complies with the "Health and safety requirements" prescribed. Units are provided with CE markings, certificate of conformity, user and maintenance manual.

2.10 Packing

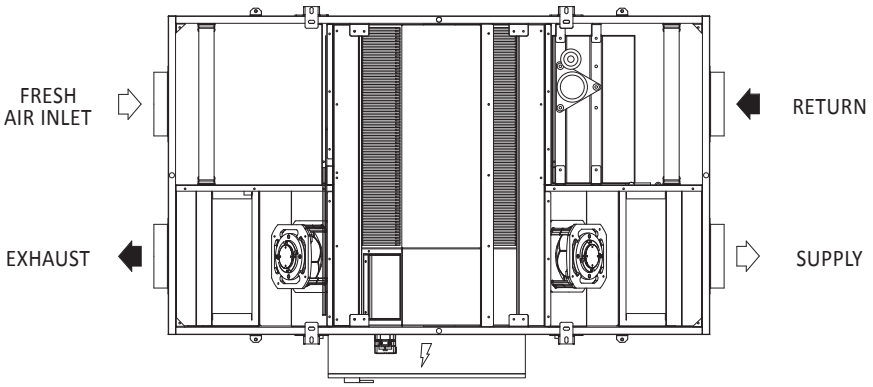
Units are supplied on thick wooden pallets and wrapped in plastic film to protect against impacts during transport and handling on site.

3. CONFIGURATIONS

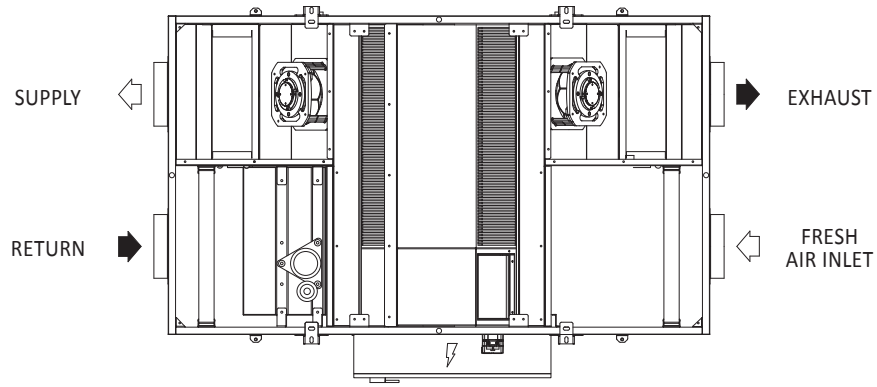
H1



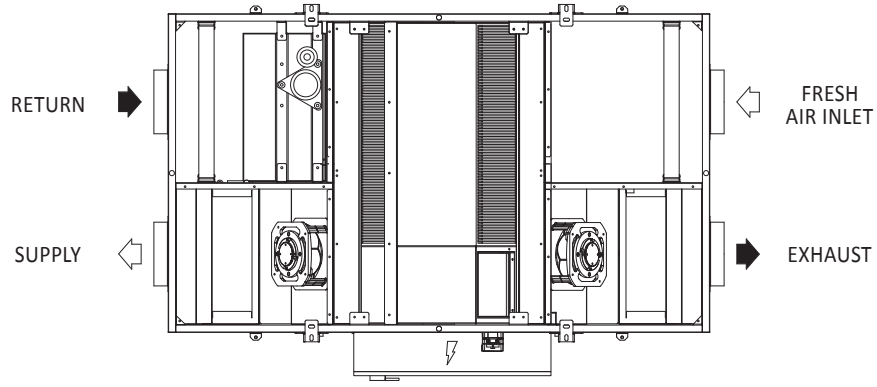
H2



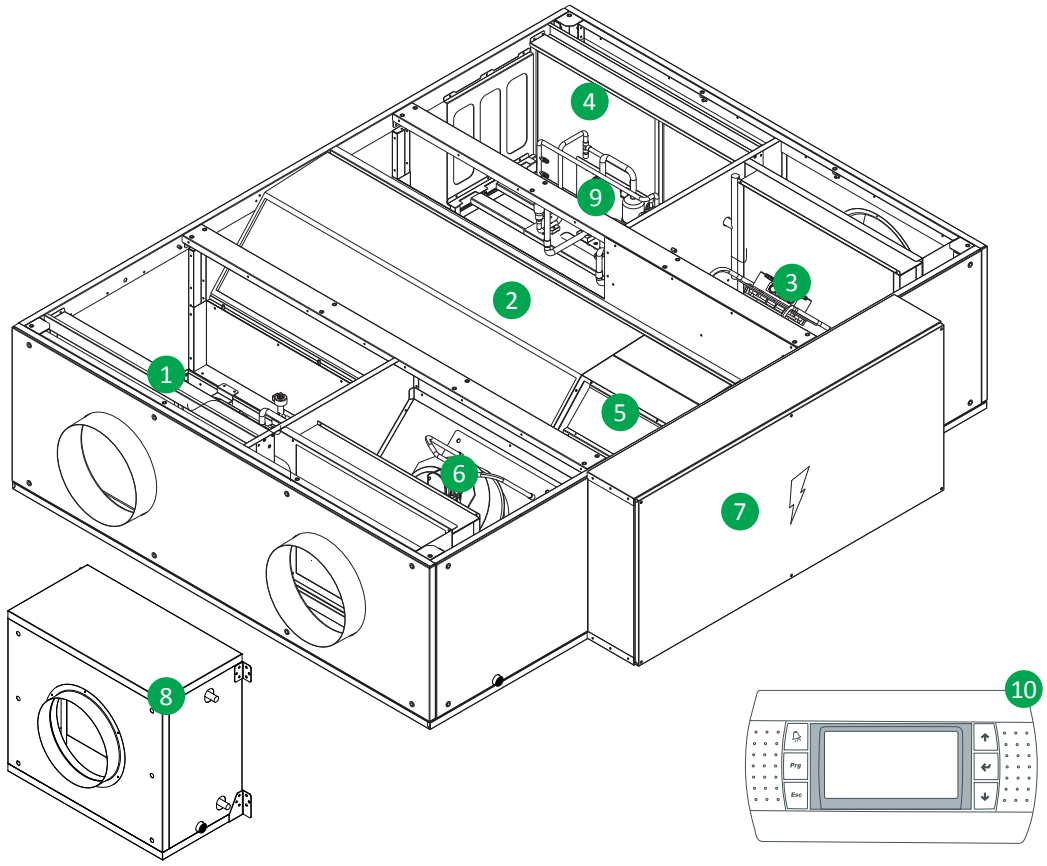
H3



H4



4. MAIN COMPONENTS OF THE UNIT



1	Return air filter	**7**	Electrical panel
2	Counterflow heat exchanger	**8**	External box for hydronic coils [1] (heating / cooling)
3	Backward blade fan, EC brushless motor with external rotor (exhaust side)		
4	Fresh air inlet filter	**9**	Refrigerant circuit in heat pump
5	By-Pass damper on heat exchanger		
6	Backward blade fan, EC brushless motor with external rotor (supply side)	**10**	LCD remote graphic display

[1] *component supplied on request as an accessory*

5. AVAILABLE ACCESSORIES

Return side ePM_{10} 50% (G4) air filter

Made of galvanized steel sheet frame and undulated filter media, 48mm thickness, in white synthetic material, contained by two welded galvanized nets. The filter media has an ePM_{10} 50% (G4) filtering degree, according to ISO 16890 and has a large filtering surface area that guarantees long operating life and less frequent replacements.

Supply side ePM_{10} 50% (G4) air filter

Made of galvanized steel sheet frame and undulated filter media, 48mm thickness, in white synthetic material, contained by two welded galvanized nets. The filter media has an ePM_{10} 50% (G4) filtering degree, according to ISO 16890 and has a large filtering surface area that guarantees long operating life and less frequent replacements.

Return side ePM_{10} 60% (M5) air filter

Built with a galvanized sheet metal frame and a 48 mm thick pleated filtering sieve, in white fiberglass, contained by two welded galvanized nets. The filter media has an ePM_{10} 60% (M5) filtering degree, according to ISO 16890 and has a large filtering surface area that guarantees long operating life and less frequent replacements.

Supply side ePM_{10} 60% (M5) air filter

Built with a galvanized sheet metal frame and a 48 mm thick pleated filtering sieve, in white fiberglass, contained by two welded galvanized nets. The filter media has an ePM_{10} 60% (M5) filtering degree, according to ISO 16890 and has a large filtering surface area that guarantees long operating life and less frequent replacements.

Return side eMP_1 55% (F7) air filter

Built with a galvanized sheet metal frame and a 48 mm thick pleated filtering sieve, in white fiberglass, contained by two welded galvanized nets. The filter media has an ePM_1 55% (F7) filtering degree, according to ISO 16890 and has a large filtering surface area that guarantees long operating life and less frequent replacements.

Supply side eMP_1 55% (F7) air filter

Built with a galvanized sheet metal frame and a 48 mm thick pleated filtering sieve, in white fiberglass, contained by two welded galvanized nets. The filter media has an ePM_1 55% (F7) filtering degree, according to ISO 16890 and has a large filtering surface area that guarantees long operating life and less frequent replacements.

Return side $eEPM_1$ 80% (F9) air filter

Built with a galvanized sheet metal frame and a 48 mm thick pleated filtering sieve, in white fiberglass, contained by two welded galvanized nets. The filter media has an ePM_1 80% (F9) filtering degree, according to ISO 16890 and has a large filtering surface area that guarantees long operating life and less frequent replacements.

Supply side $eEPM_1$ 80% (F9) air filter

Built with a galvanized sheet metal frame and a 48 mm thick pleated filtering sieve, in white fiberglass, contained by two welded galvanized nets. The filter media has an ePM_1 80% (F9) filtering degree, according to ISO 16890 and has a large filtering surface area that guarantees long operating life and less frequent replacements.

Electric re-heating coil (internal)

All units may be equipped with an internal re-heating electric coil, made up of armoured steel electric heaters, supplied complete with PWM control system, safety thermostat already wired and installed on board.

Hot water coil (external)

The hot water coils are supplied in a dedicated section to be installed in the supply air-flow line. The casing has the same sizes and features of the main unit and it is fixed with a dedicated installation kit supplied with it. The coil is manufactured with copper pipes thickness 0,4 mm and aluminium fins thickness 0,11 mm. The pipes are mechanically expanded in the aluminium fins to increase the thermal exchange rate.

3 way modulating valve

It consists of a kit including the 3-way valve for the control of the water flow, to be combined with the hot and/or cold water coil, and its modulating electric actuator. Connection and fitting devices not included (to be arrange for by the installer).

Air damper with actuator

This is installed on board the unit and operate to exclude the fresh air intake and/or the room return air flow. This option is particularly useful in areas with very cold winter temperatures, where it is necessary to avoid dangerous self-induced cold air flows by the installation itself, during the stand-by period of the unit, with the risk of freezing the water contained in the water coils, if any. The damper is controlled by On/Off actuator for the opening or the closing, or with return closing spring.

Feet for floor installation

Galvanized steel fixed feet kit for installing the unit on the floor.

Return side sound attenuator

The sound attenuator consists of a cylindrical section made in galvanized steel sheet, containing a mineral wool sound proofing material covered with glass wool jacket and perforated galvanized steel sheet containment. The soundproofing material is class M0. The construction avoids any risk of mineral wool fraying even at high air speeds. The cylindrical section is fixed to the unit by screws.

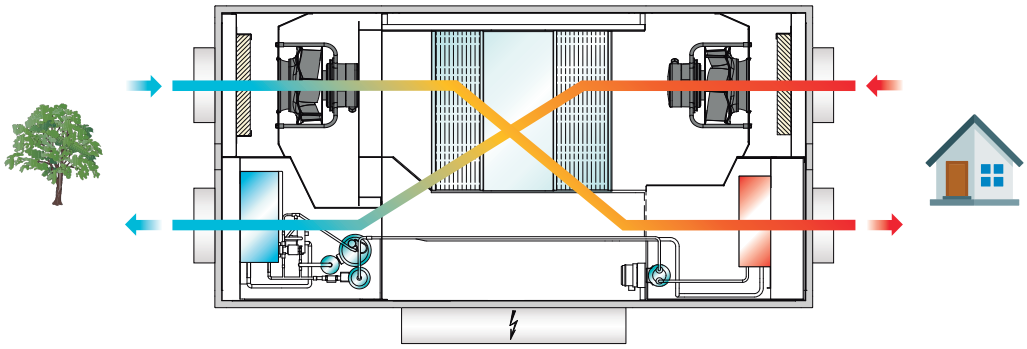
Supply side sound attenuator

The sound attenuator consists of a cylindrical section made in galvanized steel sheet, containing a mineral wool sound proofing material covered with glass wool jacket and perforated galvanized steel sheet containment. The soundproofing material is class M0. The construction avoids any risk of mineral wool fraying even at high air speeds. The cylindrical section is fixed to the unit by screws.

6. OPERATING MODE

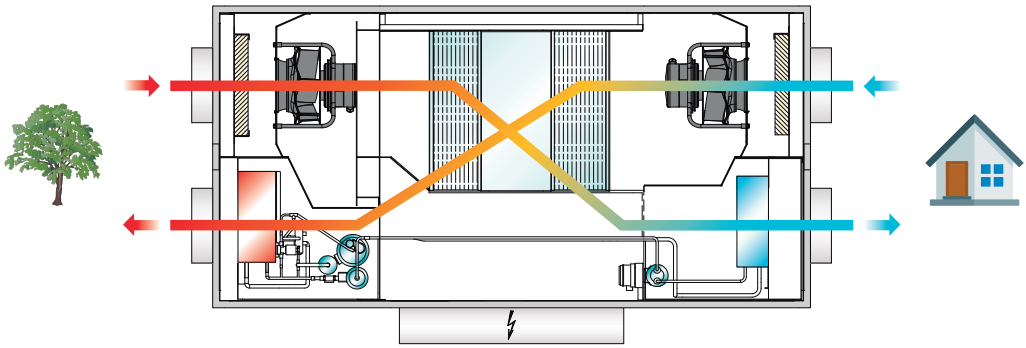
6.1 Winter operating mode

The return air, after passing through the cross-flow heat recovery, goes to feed the heat pump source exchanger that operates as an evaporator.
Through the vapour compression refrigeration cycle, the fresh air, coming out of the cross-flow heat recovery, is heated by the heat pump user exchanger, which operates as a condenser. The modulation of the thermal capacity, obtained through the inverter compressor, will allow to precisely control the supply air temperature.
During heating operation, the evaporator of the heat pump may be subject to the formation of surface frost with consequent loss of efficiency. To prevent this from happening, the unit provides controlled management of a defrosting cycle obtained by reversing the refrigeration cycle. During this phase the return fans are stopped and the compressors forced at maximum speed. Through the additional heating resources present in the unit, water heating coils or electrical resistances, the supply air temperature is maintained at a suitable value so as not to disturb the internal environment.



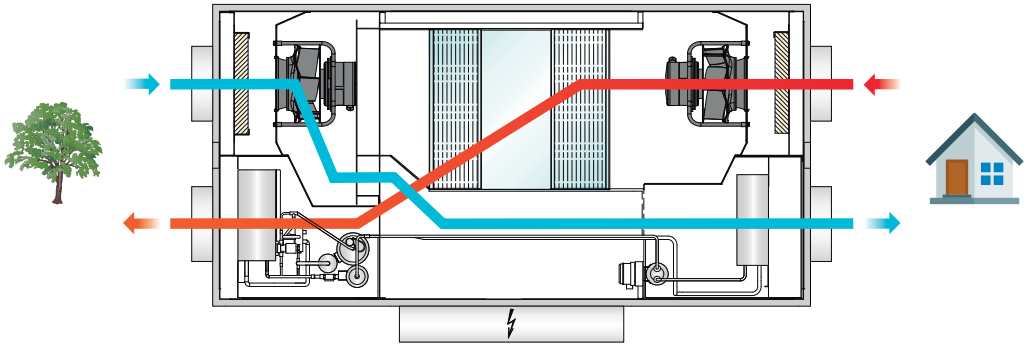
6.2 Summer operating mode

The return air, after passing through the cross-flow heat recovery, goes to feed the heat pump source exchanger, which operates as a condenser. The fresh air, after passing through the cross-flow heat recovery, is cooled by the heat pump user heat exchanger, which operates as an evaporator.



6.3 Free-Cooling operating mode

When the outside temperature is lower than the inside temperature of the room to be air-conditioned, if this needs cooling, the units operate in free-cooling mode and all integrated heat recovery stages are disabled.



7. TECHNICAL DATA

MODEL		005	011	015	021	031
Nominal airflow rate	m^3/h	500	1000	1500	2000	3000
Thermal efficiency recovery in cooling mode [1]	%	76,9	77,4	74,7	75,6	74,3
Total unit cooling capacity [1]	kW	4,50	8,24	11,1	15,5	18,1
Total unit EER [1]	w/w	3,85	4,43	4,13	4,16	4,76
Electrical power absorbed in cooling mode [1]	kW	1,17	1,86	2,69	3,73	3,80
Heating recovery thermal efficiency [2]	%	84,5	85,0	82,8	83,2	82,1
Total thermal power of unit [2]	kW	6,07	11,5	17,0	22,5	30,4
Total unit COP [2]	w/w	8,32	9,43	8,81	8,72	10,3
Electrical power absorbed in heating [2]	kW	0,73	1,22	1,93	2,58	2,96
Supply fan available static pressure	Pa	150	150	150	150	150
Return fan available static pressure	Pa	150	150	150	150	150
N° of compressors (DC inverter) / refrigerant circuits	n°	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
Type of refrigerant / GWP		R32 / 675				
Refrigerant charge / CO_2 equivalents ton	n°	1,08 / 0,73	1,39 / 0,94	1,54 / 1,04	2,29 / 1,55	2,42 / 1,63
Max. electricity absorbed by the unit	A	12,6	11,5	14,8	14,5	17,4
Power supply	V/ph/Hz	230/1/50		400/3/50		
Type of filters for fresh air section		ePM_1 55% (F7)				
Type of filters for return air section		ePM_{10} 60% (M5)				
Sound power level [3]	dB(A)	69	72	75	77	78
Sound pressure level [4]	dB(A)	53	57	60	62	62

[1] fresh air inlet +35 °C / 50% RH, return air +27 °C / 50% RH

[2] fresh air inlet -5 °C / 80% RH, return air +20 °C / 50% RH

[3] sound power level (irradiated) calculated in accordance with EN 3744

[4] sound pressure level measured at 1 m free field distance, in accordance with EN 3744

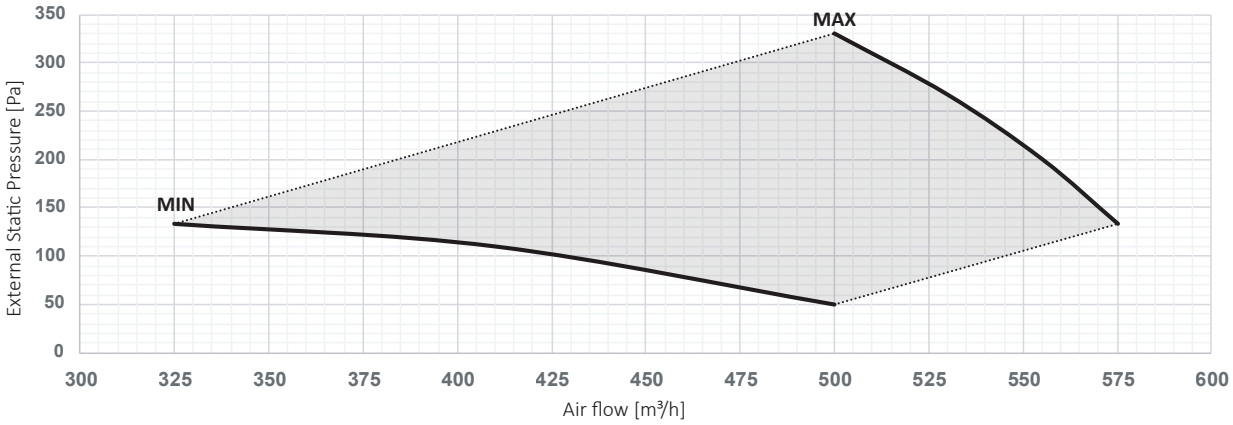
8. VENTILATION CURVES

The graphs below indicate the operating limits of the EC fans installed on the units.

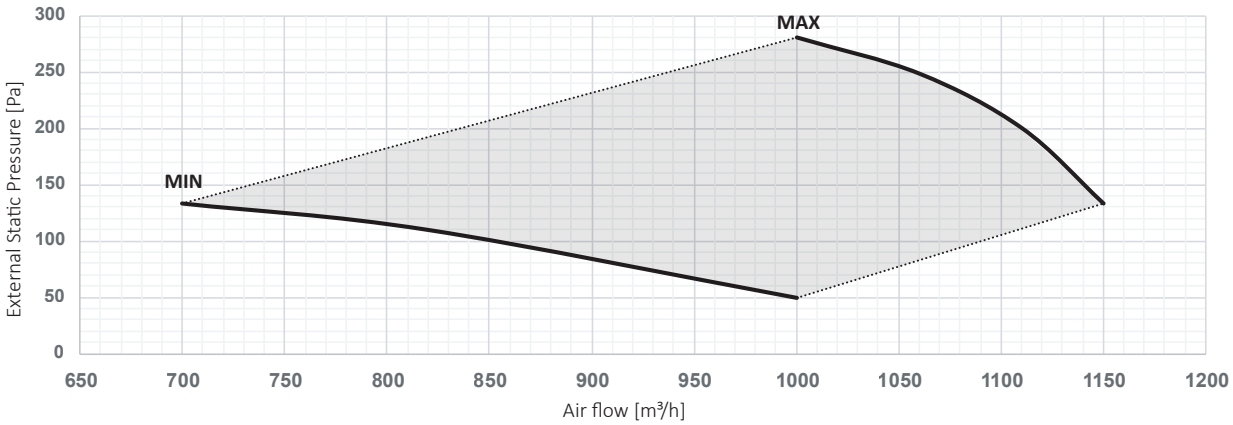
Consider the static pressure shown as available for ductwork, having a unit equipped with ePM_{10} 60% (M5) filters on the return side and ePM_1 55% (F7) on the supply side.

The operating limits of the units may vary depending on the configuration and the components installed. For different unit configurations, please refer to the selection software or contact the company.

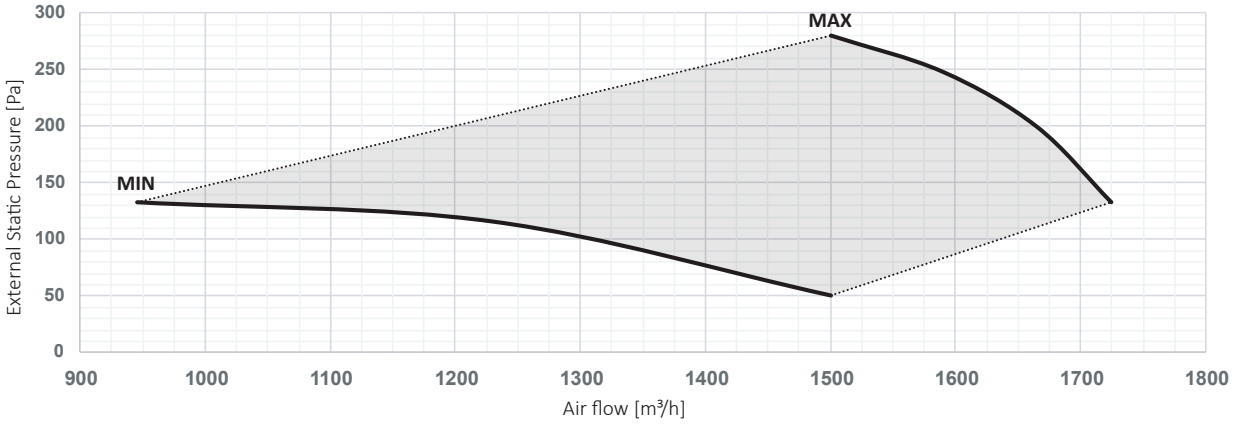
RXC/Hi 005



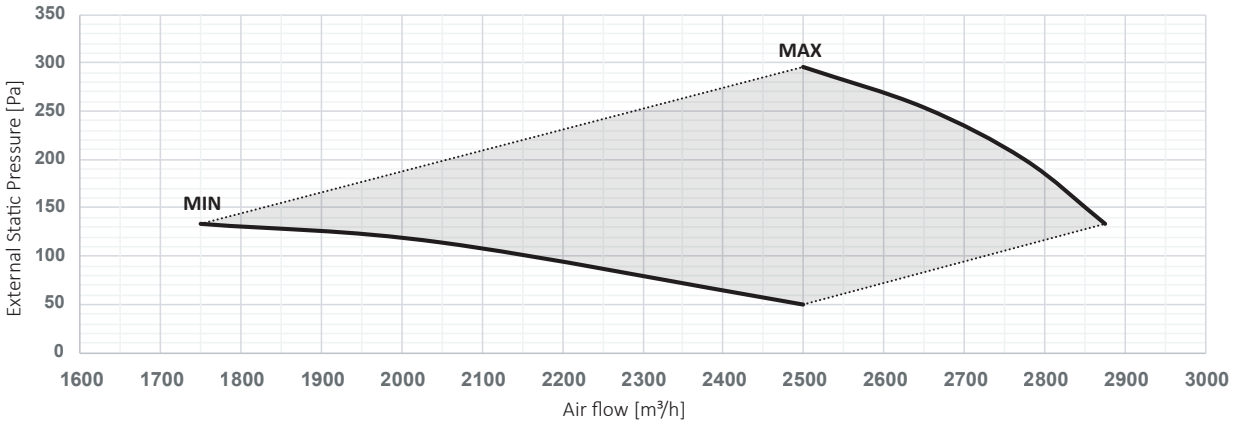
RXC/Hi 011



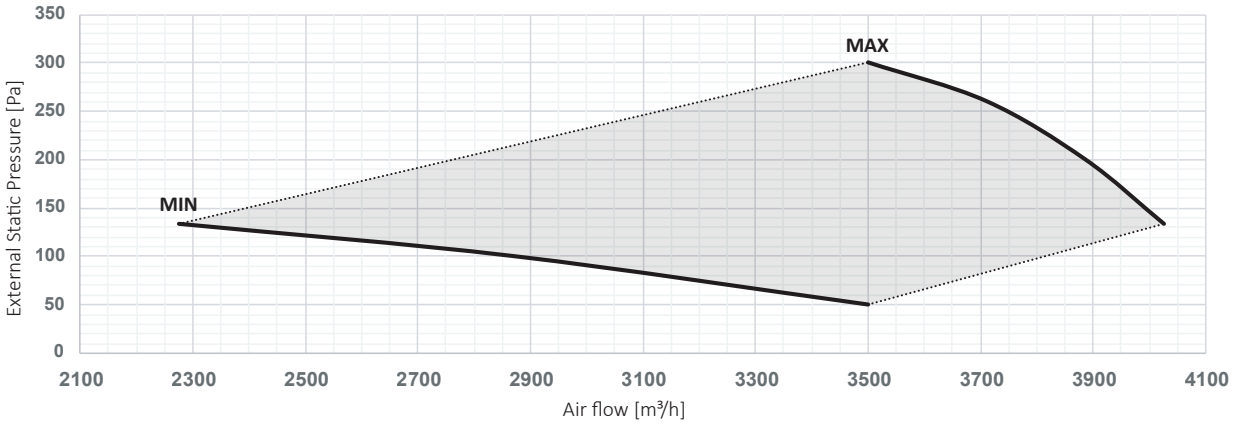
RXC/Hi 015



RXC/Hi 021

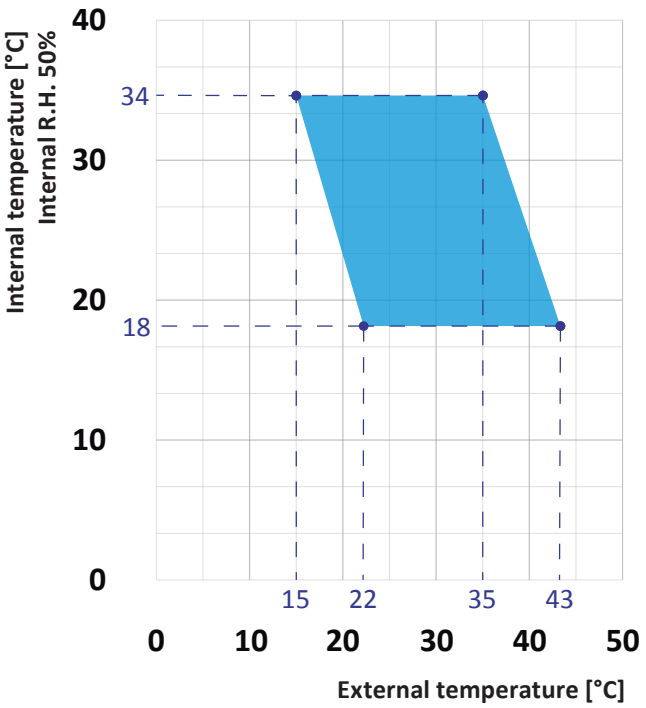


RXC/Hi 031

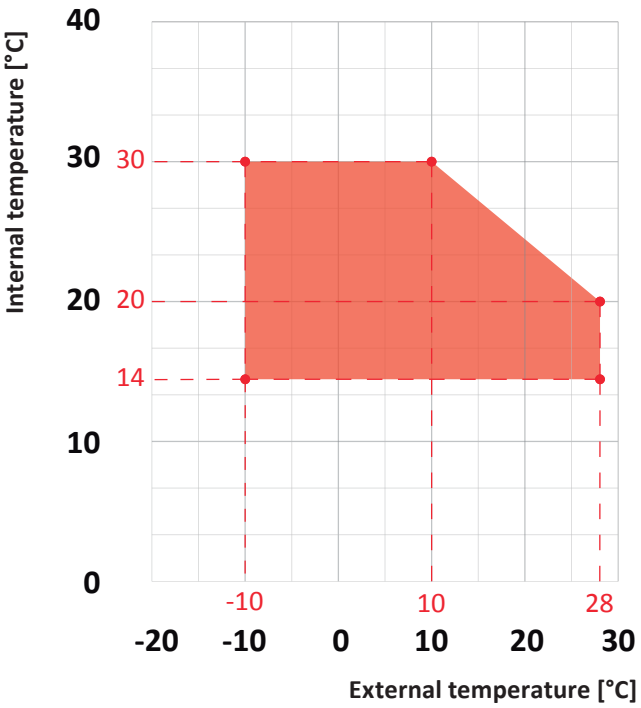


9. OPERATING LIMITS

SUMMER



WINTER



All units can operate, within the given limits, with room relative humidity in the not exceeding 65%.

It is mandatory to use the units within the operating limits shown in the diagrams above. The warranty will immediately expire if the unit is used in working conditions outside the above limits. If it is necessary to operate in conditions outside the operating range of the unit, please contact our technical department.

Units are designed and built to operate inside false ceilings and/or technical rooms.
The units are NOT suitable for outdoor installation as condensation may form on the unit's panels and inside the electrical panel with consequent damage to the unit.

10. SOUND DATA

The noise level of units is basically due to the fan rotation speed.
Obviously, with the same air flow rate, the fan speed will be lower if the required static pressure is low, while it will be higher (and therefore noisier) if the required static pressure is higher.

10.1 Noise levels

The table below shows the sound levels of the units at the nominal working conditions:

			Octave band (Hz)								Lw	Lp
MOD.	Nominal air flow	E.s.p.	63	125	250	500	1K	2K	4K	8K	dB(A)	dB(A)
	m³/h	Pa	dB	dB	dB	dB	dB	dB	dB	dB		
005	500	150	39	43	53	62	63	64	60	58	69	53
011	1000	150	41	46	57	65	66	67	63	61	72	57
015	1500	150	43	55	65	68	71	69	65	59	75	60
021	2000	150	43	49	60	69	72	73	68	61	77	62
031	3000	150	44	49	60	69	73	74	69	61	78	62

Lw: sound power level irradiated calculated in accordance with EN 3744

Lp: sound pressure level measured in free field at 1 m from the unit, directionality factor Q=2, according to EN 3744 with ducted unit.

10.2 Sound attenuators reduction

The sound attenuators are of the circular absorption type without baffle. They are suitable for reducing the noise that propagates through the ventilation systems in the aeraulic ducts.

			Octave band (Hz)							
MOD.	Nominal air flow	E.s.p.	63	125	250	500	1K	2K	4K	8K
	m³/h	Pa	dB	dB	dB	dB	dB	dB	dB	dB
005	500	150	1	3	5	9	14	10	7	8
011	1000	150	2	4	6	10	14	10	7	8
015	1500	150	2	4	6	10	14	10	7	8
021	2000	150	2	4	6	10	14	10	7	8
031	3000	150	2	4	6	10	14	10	7	8

11. SAFETY AND CONTROL DEVICES

- **Supply air temperature probe**

Passive sensor type NTC 10kΩ. Positioned on the supply air side, downstream of the heating/cooling units, it is used to monitor the temperature of the air supplied to the room. It is installed in combination with the temperature control accessories (water coils or post-heating electric resistance). Through this probe it is also possible to control eventual air delivery temperatures in the environment that are too cold in summer or too hot in winter.

- **Return air temperature probe**

Passive sensor type NTC 10kΩ. Positioned on the room air intake and upstream of the filtering section, its purpose is to monitor the temperature of the air extracted from the room to be treated. Always present in all units, it is used as a control probe of the room temperature set and for the management of the summer free-cooling function.

- **Outdoor air temperature probe (fresh air)**

Passive sensor type NTC 10kΩ. Positioned on the fresh air intake and upstream of the filtering section, it is used for monitoring the temperature of the fresh air entering the heat recovery unit. Always present in all units, it is used in combination with the room air intake temperature probe to manage the summer free-cooling function.

- **Exhaust air temperature probe**

Passive sensor type NTC 10kΩ. Positioned on the air outlet and downstream of the plate heat exchanger, it monitors the temperature of the air exhausted from the unit. It is installed in combination with the defrosting kit with the function of controlling the exhaust temperature of the plate heat exchanger in order to avoid freezing of the same during the winter operation of the unit.

- **Differential pressure switch**

This component is used to monitor the clogging status of the air filters. There are two pressure switches for each unit, one installed on the fresh air filter section and one located on the room return air filter section. If one of the filters has a pressure difference greater than the recommended limit, an alarm is displayed on the user interface.

- **Differential pressure transducer**

Active type transducer with 4-20mA output signal. It is located inside the control board and connected to the supply fan pressure sockets. The task is to maintain the air volume as constant at the variation of the internal pressure drop (dirtying of the filters).

- **Low pressure switch**

The low pressure switch stops the unit when the suction gas pressure is lower than the default value. The reset is automatic and it takes place when the gas pressure is superior to the set differential value. The pressure switch is set to allow for a maximum of 3 automatic resets per hour.

- **High pressure switch**

The high pressure switch stops the unit when the supply gas pressure is above default value. The reset is automatic and it takes place when the gas pressure is below the set differential value. The pressure switch is set to allow for a maximum of 3 automatic resets per hour.

- **Compressor discharge temperature sensor**

Passive NTC-type sensor mounted on the compressor discharge side, used to limit the discharge gas temperature.

12. INSTALLATION

General warnings and use of symbols

Before carrying out any type of operation, each operator must be perfectly familiar with the operation of the machine and its controls and must have read and understood all the information contained in this manual.

All operations performed on the machine must be carried out by qualified personnel in compliance with the national legislation in force in the country of destination.

Installation and maintenance of the machine must be performed in compliance with applicable national or local legislation.

Do not approach or insert any object into moving parts.

Workers' Health and Safety

The operator's workstation must be kept clean, tidy, and free of objects that may restrict free movement. The workplace should be adequately lightened for the intended operations. Insufficient or excessive lighting may present a hazard.

Ensure that the ventilation of the working areas is always optimal and that the extraction systems are always functional, in good condition and in compliance with the legal requirements.

Personal protection devices

Operators carrying out installation and maintenance of the machine must wear the legally required individual protective equipment listed below.

Safety footwear.

Eye protection.

Protective gloves.

Hearing protection.

Respiratory protection.

12.1 Receipt and inspection

When installing or working on the unit, it is necessary to scrupulously follow the instructions given in this manual, observe the indications on board the unit and in any case apply all necessary precautions. Failure to follow these instructions may result in dangerous situations.
Upon receipt of the unit, check its integrity: the machine left the factory in perfect condition; any damage must be immediately reported to the carrier and noted on the Delivery Note before signing it.
The Company must be informed, within 8 days, about the extent of the damage. The Client must fill out a written report in case of significant damage.

Before accepting the delivery check:
- that the unit has not been damaged during transport;
- that the material delivered corresponds to what is indicated in the transport document.

In case of damages or anomalies:
- immediately note the damage on the Delivery Note;
- inform the supplier, within 8 days of receipt, of the extent of the damage. Reports made after this deadline are not valid;
- in the event of significant damage, file a written report.

12.2 Storage

If it is necessary to store the unit, leave it packed in a closed place. If for some reason the machine has already been unpacked, follow the instructions below to prevent damage, corrosion and/or deterioration:
- make sure all openings are properly plugged or sealed;
- do not use steam or other cleaning agents to clean the unit, as these may damage it;
- remove any keys used to access the control panel and give them to the site manager.

12.3 Unpacking

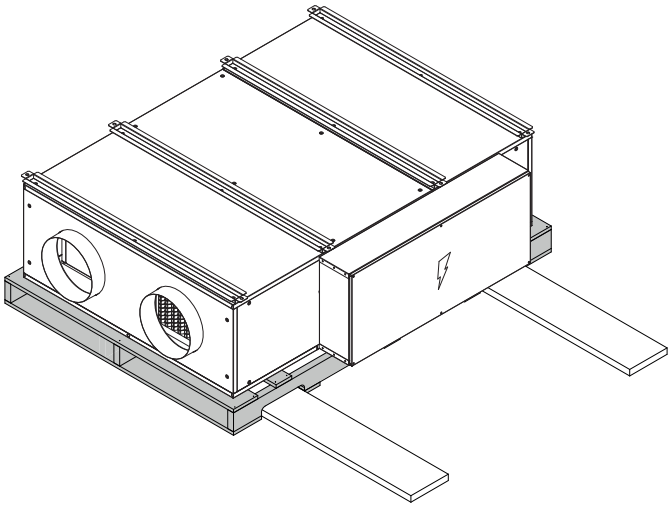
Packaging material (plastic film, expanded polystyrene, etc.) must be kept out of the reach of children as a potential hazard.

It is advisable to leave the units packed during handling and to remove the packaging only at the time of installation. Remove the packaging of the unit with care to avoid possible damage to the machine.
The materials making up the packaging can be of different kinds (wood, cardboard, nylon, etc.). It is advisable to remove the protective film from the panels (if present) after the installation of the unit.

Packaging materials should be stored separately and handed over for disposal or recycling to the appropriate.

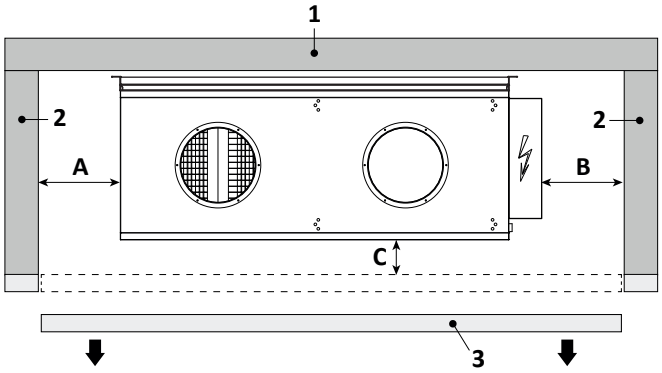
12.4 Lifting and Handling

When unloading and positioning the unit, care must be taken to avoid sudden or violent manoeuvres to protect internal components. Lifting should be done using a forklift or alternatively using straps, taking care not to damage the side and top panels of the unit.
The length of the forks must be adequate for the length of the section to be handled in order to avoid the risk of tipping over and/or damaging the bottom of the unit.
During handling and transport, sections must remain in position as packed at the factory, and absolutely no tipping or tilting should be done.



12.5 Positioning and minimum technical spaces

The drawing below shows the false ceiling installation (suitable for residential areas, offices etc.) where the unit is suspended thanks to dedicated fixing brackets. The brackets must be connected to anti-vibration dampers which must be selected according to the type of structure they will be fixed to. It is recommended to coat the inside of the false ceiling with a high density sound-absorbing material and to allow for one or more openings for the access and cleaning of the air filters, for the control of the refrigerant circuit, the maintenance and the check of the control board.



MOD.	A	B	C
005	500	500	120
011	500	500	120
015	500	500	120
021	500	500	120
031	500	500	120

CAPTION:

1. Ceiling | 2. Side walls | 3. Removable false ceiling

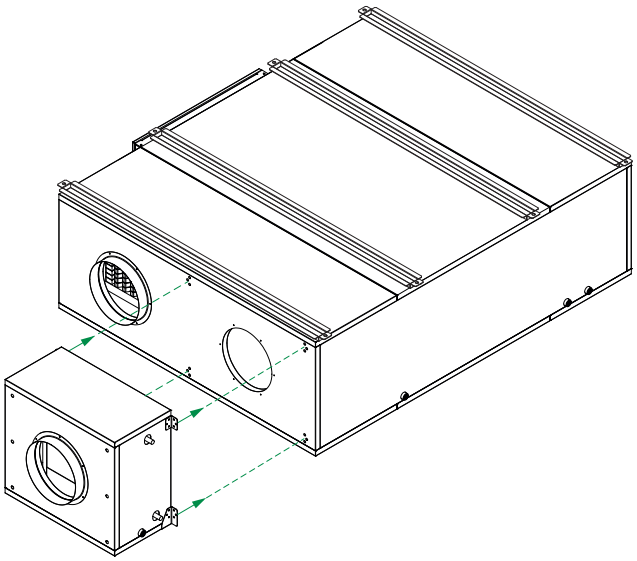
Install the unit to allow ordinary and extraordinary maintenance. The warranty does not cover costs related to platforms or handling equipment necessary for any intervention.

Choose the installation site in accordance with EN 378-1 and 378-3.

12.6 Connecting additional sections: Water coils

To connect additional sections containing water coils, proceed as follows:

- locate the opening of the unit on which to attach the section;
- apply the sealing gasket supplied with the unit, on the contact perimeter between the base unit and the additional box;
- approach the additional box to the base unit centering it on the fan mouth;
- using the brackets, if present, support the box so that its weight does not weigh on the unit;
- fix the module with the screws provided.

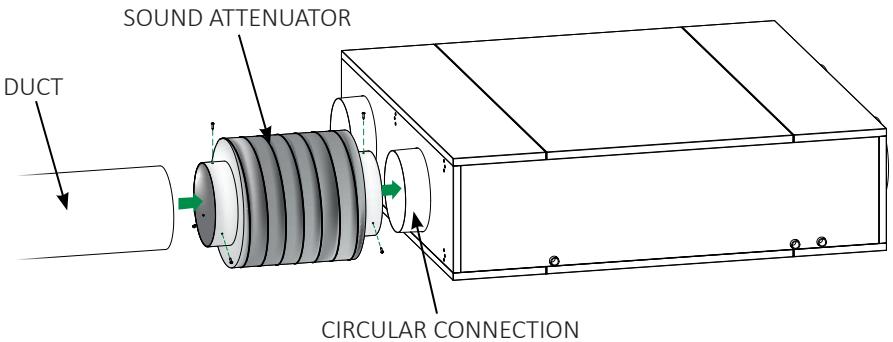


CAUTION: Do not remove any other screws / panels during this operation.

For box equipped with ceiling mounting brackets, do not lift the unit with the box attached. The box must be supported using the brackets provided.

12.7 Connecting additional sections: Sound attenuators

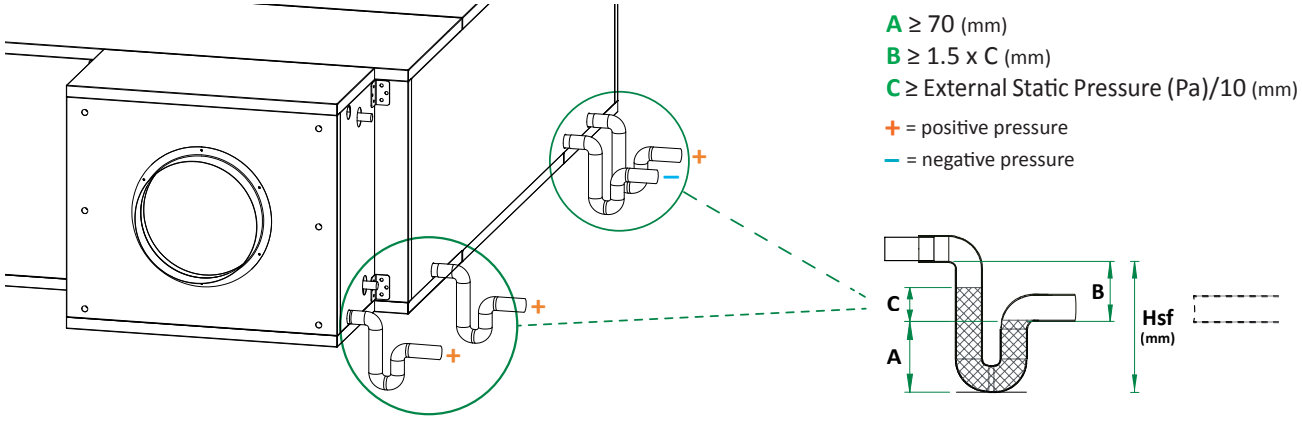
The sound attenuators are fastened with the screws provided between the edge at the end of the sound attenuator and the circular connection of the unit. The other end will be fixed, again with the supplied screws, to the circular duct.



Provide brackets to hold the sound attenuator and ductwork in order to prevent their weight from bearing on the unit.

12.8 Condensate drain connection

The connection to the condensate drain must be carried out on site by the customer, through a rigid pipe attached to the 1/2" F external diameter fitting located on the side panel of the unit.
A siphon sized for the maximum vacuum inside the unit must be installed on the condensate drain pipe.

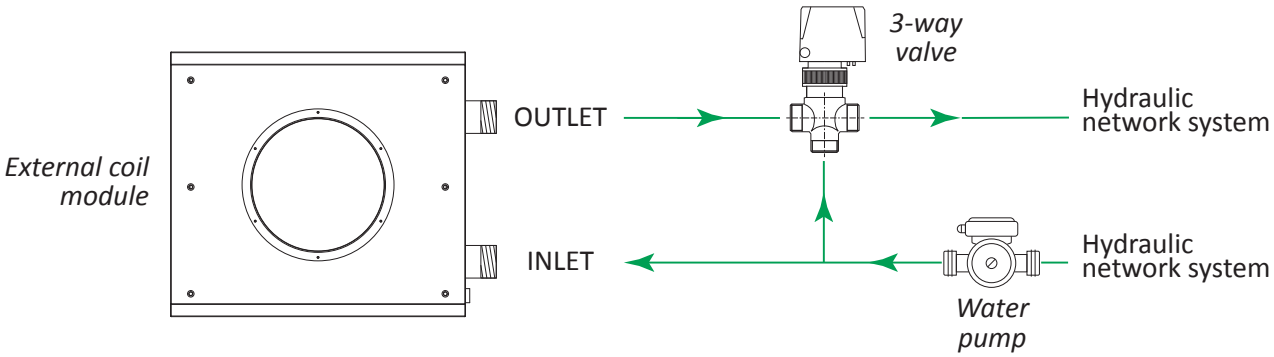


Example:
If the unit has 220 Pa of external static pressure, the total height (A+B) of the siphon (Hsf) in mm is:
Hsf = A + B = 70 + (1.5 x (220/10)) = 103 mm
B = 1.5 x C where C = 22 mm

- Each drain must be independent and have its own siphon.
- The lack of a siphon may affect the proper operation of the unit.
- It is necessary to trigger the siphon by pouring water into it before starting the unit.

12.9 Hydraulic connection to the water coil

For a correct hydraulic connection to the water coil and to the relative modulating 3-way valve, proceed as shown in the diagram below:



GENERAL RULES

- Respect the IN / OUT adhesive references on the side of the unit;
- The path of the pipes must be assessed so as not to create particular obstacles in case of removal of the coil;
- The piping must be supported by specific brackets in order to prevent their weight from bearing on the unit;
- The interposition of flexible joints is strongly recommended in order to avoid the transmission of vibrations and noise;
- During installation the hydraulic connections of the coil must be protected from twisting by locking;

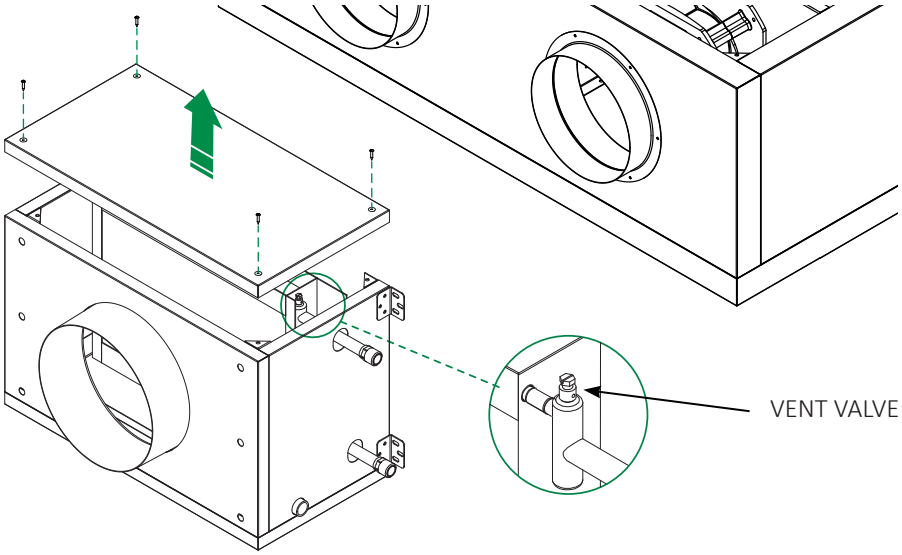
For proper operation of the equipment, it is recommended to supply the unit with a dedicated pump and to vent the circuit using the appropriate vent valves on the coil manifold.

12.10 How to vent the unit

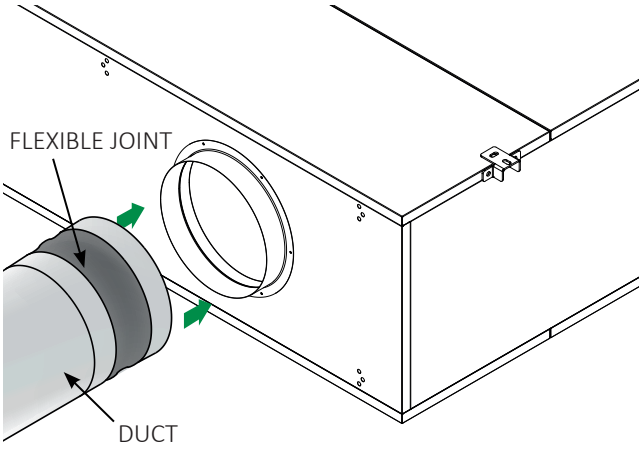
For a proper functioning of the system, it is essential to remove the air from the hydraulic circuit.
To vent the coil, proceed as follows:

- unscrew the fastening screws of the dedicated panel of the external box;
- remove the panel;
- use the vent valve located on the internal manifold of the coil.

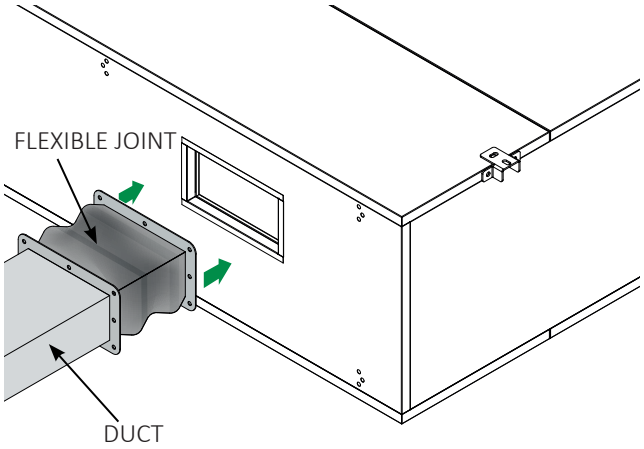
After venting the unit, close the panel with the screws.



12.11 Connecting the unit to air ducts



Fixing of air ducts on CIRCULAR connections on supply and return air



Fixing of air ducts on RECTANGULAR connections on supply and return air

GENERAL RULES

For a correct installation of the ductwork it is recommended to:

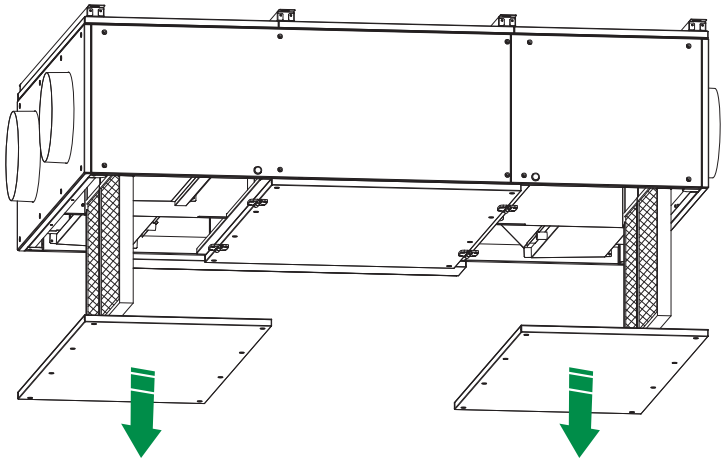
- design the duct so that the air speed never exceeds 4-5 m/s, for the purpose of noise containment;
- provide suitable brackets to support the ducting to prevent their weight from bearing on the unit;
- always use a flexible joint between the unit and the ductwork;
- provide an electrical earth cable to bridge the flexible joint, to ensure the duct and the unit are electrically equipotential;
- before bends and branches, provide a straight duct with a length equal to at least 2.5 times the shorter side (or diameter) of the duct to avoid drops in fan performance.

13. RS485 SERIAL INTERFACE CARD

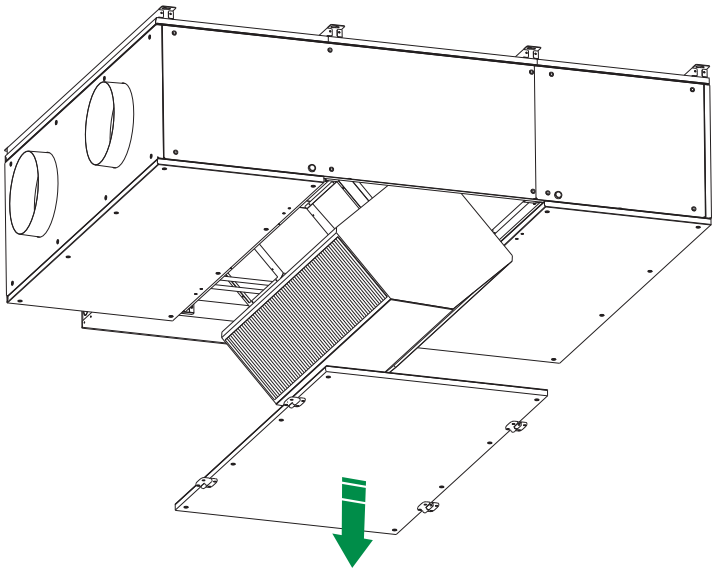
Serial line interface card to the supervision system (available only MODBUS-RS485). The installation of the card will allow the unit to be connected to a system with MODBUS-RS485 protocol.
This system allows you to remotely monitor all the operating parameters of the unit and change their values. The serial interface card is installed and wired exclusively in the factory.
The unit does not work in case of inversion of the polarity of the wiring. The unit is programmed with serial address 1. The list of MODBUS variables is available by contacting the company.

14. FILTERS and HEAT EXCHANGER extraction

In order to remove the filters, it is necessary to unscrew the dedicated panels as shown in the picture here below.

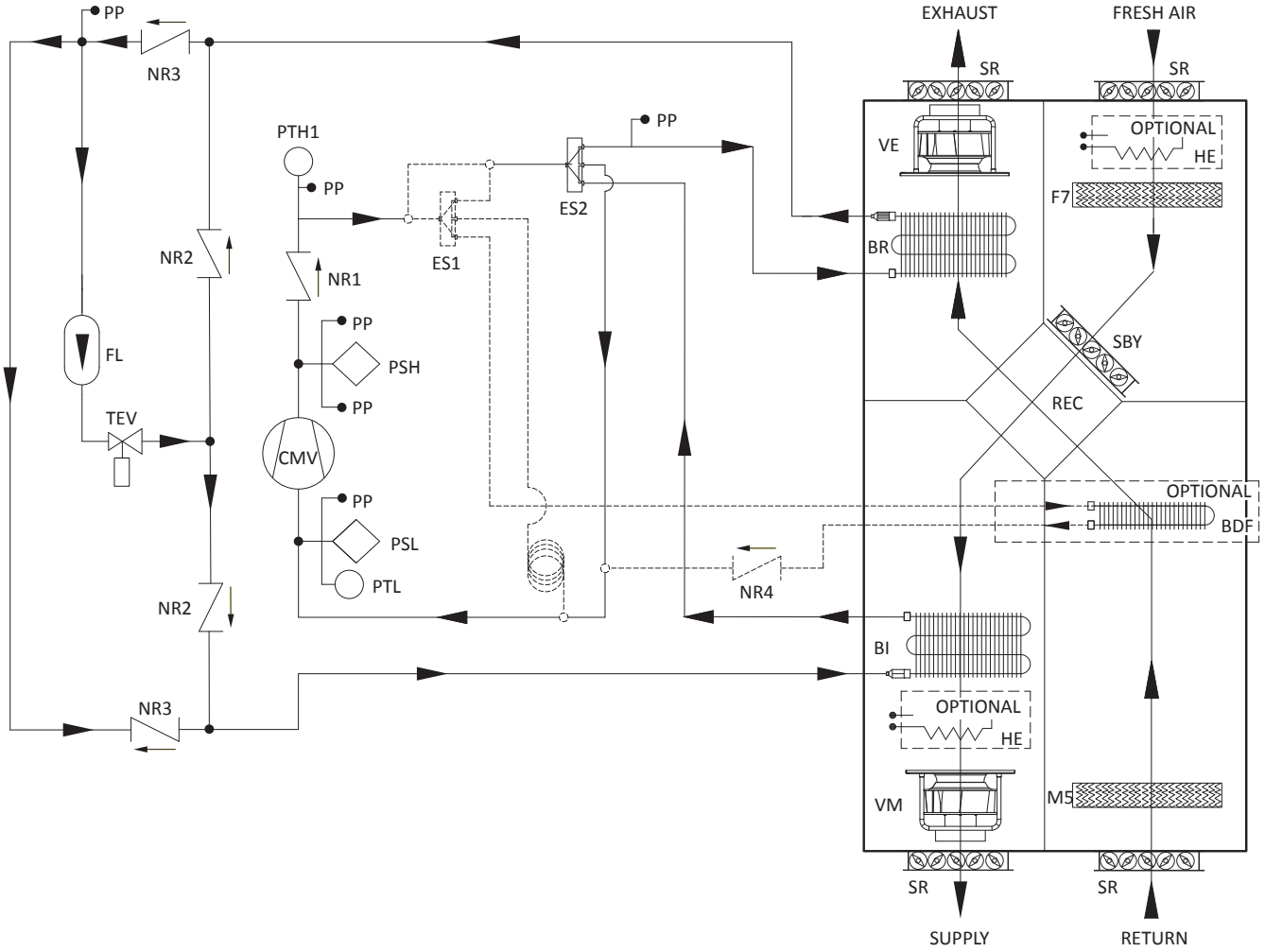


In order to remove the heat recovery unit, it is necessary to unscrew the dedicated panels as shown in the picture here below.



Do not use water to clean the plate heat recovery unit. It is however possible to vacuum the rear part of the heat exchanger after removing it, as shown on the picture.

15. REFRIGERANT DIAGRAM



COMPONENTS OVERVIEW

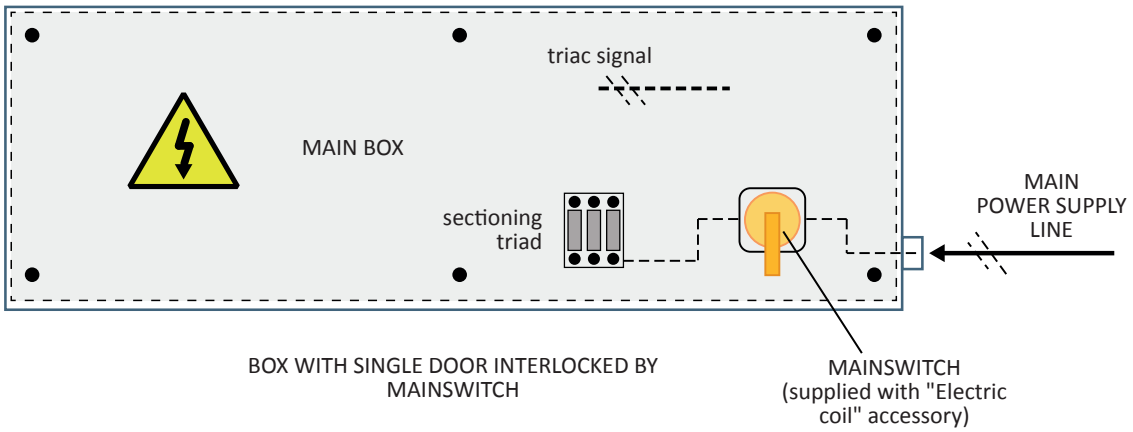
VM	Supply fan	**BDF**	Hotgas coil defrost active
VE	Exhaust fan	**SR**	Exclusion damper
REC	Cross-flow heat exchanger	**HE**	Electric heater
SBY	Exchanger bypass damper	**CMV**	Refrigerant compressor BLCD
BI	Internal treatment coil	**ES1|ES2**	4-way exchange valve
BR	Recovery coil	**NR1|2|3|4**	One-way check valves
F7	Supply air filter	**TEV**	Electronic thermostatic valve
M5	Return air filter	**FL**	Filter drier for liquid line
PP	Charge connection to be welded		

16. ELECTRICAL CONNECTIONS

Preliminary safety information

	The electrical connection must be made according to the wiring diagram enclosed with the unit and in compliance with local and international regulations.
	Make sure the disconnector of the unit power supply line is upstream the unit. Ensure it is padlocked or that the appropriate warning is present indicating not to operate.
	Check that the power supply corresponds to the rated data of the unit (voltage, phases, frequency) shown on the wiring diagram and on the nameplate attached to the unit.
	Power supply cables must be protected upstream against electric short-circuit and overload by a suitable device complying with current standards and laws.
	The cross-section of the cables must be suitable for the calibration of the upstream protection system and must take into account all factors that may affect it (temperature, type of insulation, length, etc.)
	The warranty will be void if the power supply does not comply with the above limits.
	Make all earthing connections required by current standards and legislation.
	Make sure to disconnect the power supply before beginning any operation.
	FROST PROTECTION: when open, the main switch excludes the electric power to the heating elements and any antifreeze device in the unit. Open the main switch only for cleaning, maintenance or repair of the unit.

16.1 Detail of electrical panel



16.2 Electrical data

The following electrical data refer to the basic unit without accessories.
In all other cases, refer to the electrical data in the wiring diagram attached to the unit.

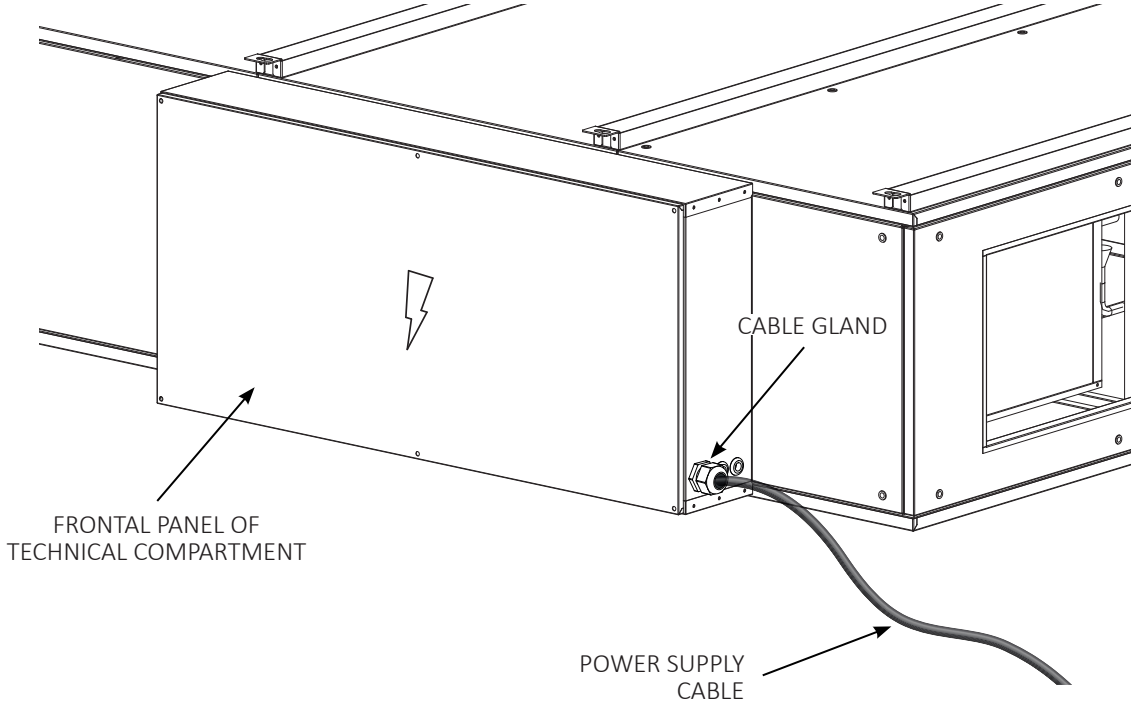
The supply voltage must not vary more than ± 10% of the nominal value and the unbalance between phases must be less than 1% according to EN 60204.
Please contact our technical department in case these tolerances are not respected.

MODEL		005	011	015	021	031
Power supply	V/Ph/Hz	230/1/50	230/1/50	400/3+N/50	400/3+N/50	400/3+N/50
Control circuit		12 VDC / 24 VAC				

Electrical data may change without notice. Therefore, ALWAYS refer to the wiring diagram supplied with the unit.

16.3 Power supply connection

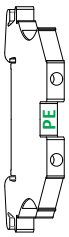
Remove the front panel of the electrical cabinet with the appropriate tool; use the cable gland on the side panel of the cabinet and connect the power supply cable inside the electrical cabinet to the disconnecting switch with fuses. After making the connection, carefully close the front panel of the electrical cabinet.



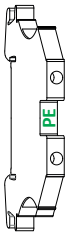
16.4 Terminal Block Connections

Terminal numbers may change without notice. ALWAYS refer to the wiring diagram supplied with the unit.

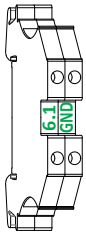
All the terminals shown in the following tables are in the terminal block inside the electrical cabinet, all the electrical connections mentioned below must be made in the field by the installer.



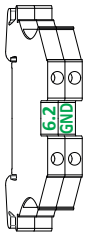
SINGLE-PHASE POWER SUPPLY
It is used to power supply the unit with single-phase system
(mod. 005 - 011).
The power cable should be connected directly to the fuses or to the electric coil mainswitch.
The earth terminal is present (PE).



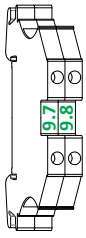
THREE-PHASE POWER SUPPLY
It is used to power supply the unit with three-phase system
(mod. 015 - 021- 031).
The power cable should be connected directly to the fuses or to the electric coil mainswitch.
The earth terminal is present (PE).



REMOTE ON/OFF
It is used to turn on/off the unit from a remote device.
The units are supplied as standard from the factory with jumpered terminals.
Closed contact: unit is ON;
Open contact: unit is OFF.



FIRE/SMOKE ALARM
It is used to turn off the unit from an external fire control unit.
The units are supplied as standard from the factory with jumpered terminals.
Closed contact: no unit alarm works;
Open contact: alarm from external fire control unit. The unit stops.

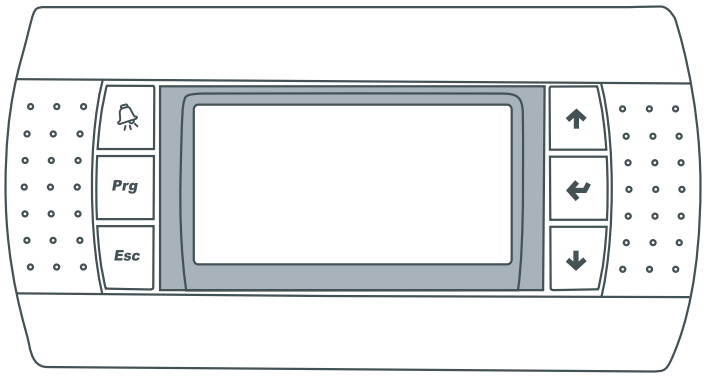


REMOTE GENERAL ALARM
For remote signalling of a general alarm.
Voltage-free contact.

Contacts 9.7 / 9.8 NO (Normally Open)

16.5 Description of the remotable control panel

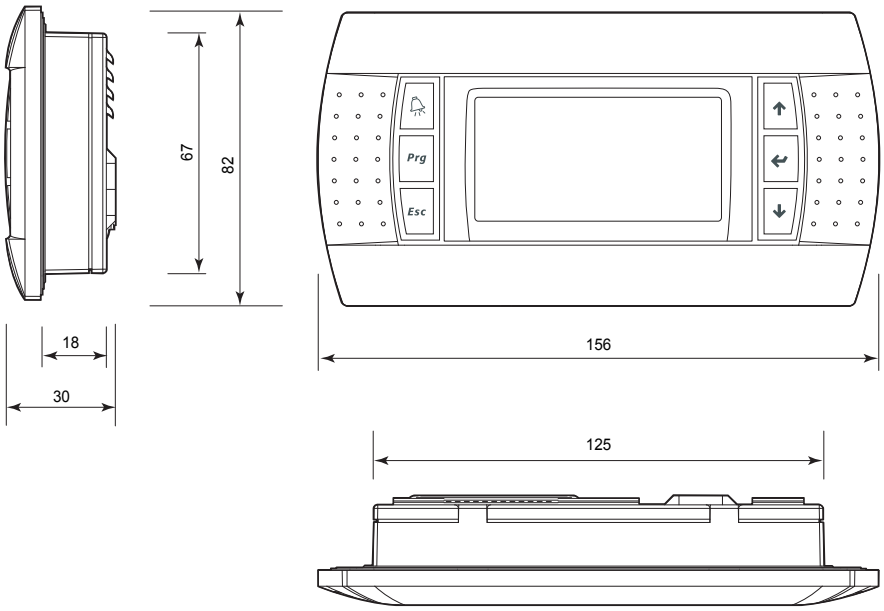
16.5.1 Position of the control panel



16.5.2 Remote panel keys

KEY	FUNCTION
	Pressing this key you will access the list of alarms presently active and you silence the siren. Inside the alarms list, if pressed for at least 3 seconds, the manual-reset alarms will be reset.
Prg	Pressing this key you will access a LOGIN screen which will allow you to access the main parameters modification menu. According to the password you insert, **SERVICE** or **MANUFACTURER**, it will be possible to modify the parametrs of just view them.
Esc	Pressing this key you will exit the present screen and return to the previous menu.
	Scroll the masks of a specific menu or, in case of a parameter, modification of its value.
	Confirm the value of a chosen parameter or selection of an item in case of a menu.
	Scroll the masks of a specific menu or, in case of a parameter, modification of its value.

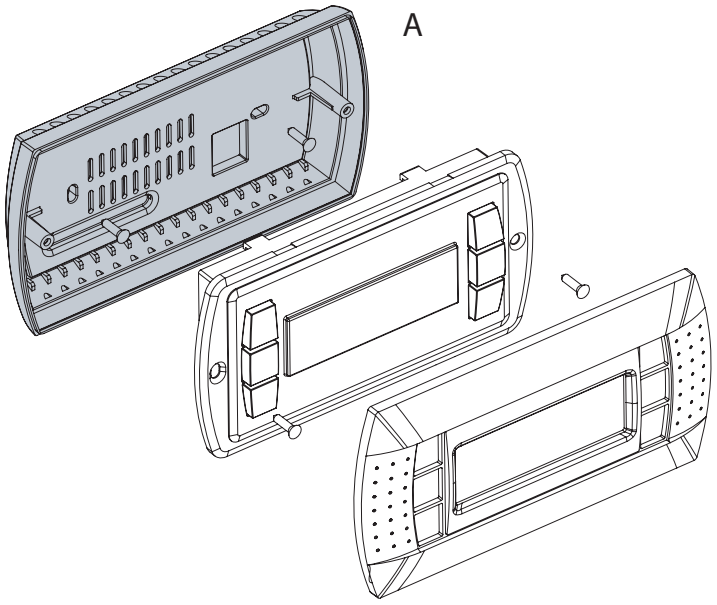
16.5.3 Dimensions



16.5.4 Wall installation

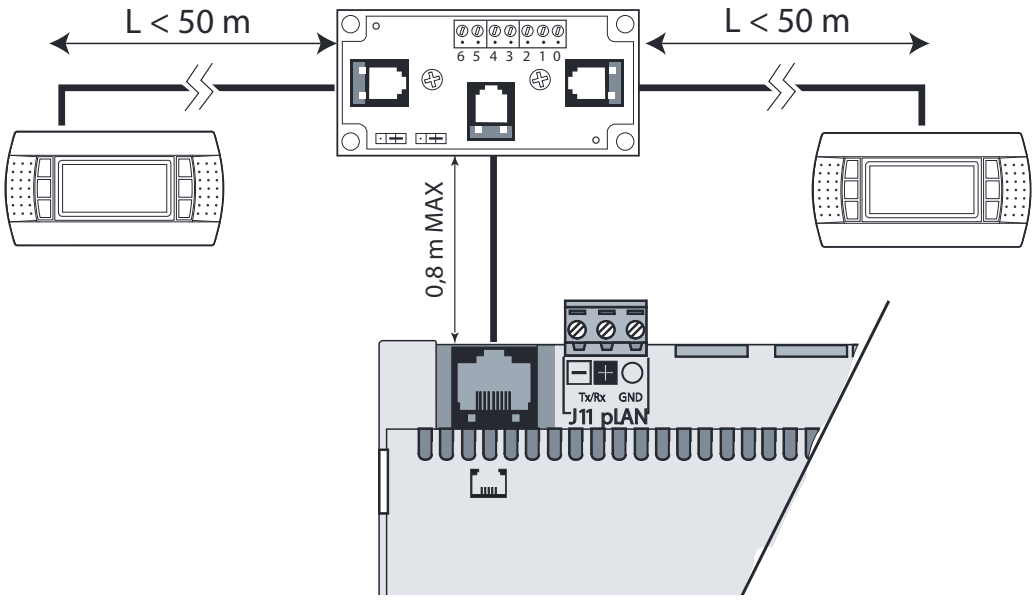
The wall mounting of the control panel considers the fixing of the back side of the container A or the standard 3-module case for switches.

- Fix the container to the box using the thumbscrews supplied with it in the packing;
- Connect the telephone wire;
- Apply the container front side and fix the set with countersunk screws (as shown in the picture) supplied with the casing;
- At the end, install the snap-in frame.



16.5.5 Electrical connection

Connect the telephone wire coming from the card in the dedicated connector located on the back side of the terminal unit.



For the electrical connections to the remote control panel, please refer to the wiring diagram supplied with the unit.

In case of damage of the controller/remote terminal, wiring error, lack of communication between the tool and the remote panel, a message on the display will appear indicating "noL" (no link).

17. STARTUP

17.1 Preliminary checks

It is necessary to carry out preliminary checks on the electrical, refrigeration and hydraulic parts before starting the unit.

Perform the commissioning operations in accordance with all the requirements of the previous paragraphs.

Malfunctions or damage may also result from lack of proper care during shipment and installation. It is good practice to check before installation or commissioning that there are no damages due to tampering, vibration during transport, mistreatment suffered on site.

- Check that the machine is installed in a state of the art manner and in accordance with the instructions in this manual.
- Check electrical connection and correct fastening of all terminals.
- Check that the voltage is as indicated on the unit's rating plate.
- Check that the unit is connected to the earth system.
- Check that no gas leakages are present, if necessary with a gas-leak detector.
- Check that no oil leaks are present, which might be indicating leakages.
- Check that the refrigerant circuit is in pressure: use manometers, if available, or service manometers.
- Check that all service outlets are closed with the appropriate caps.
- Check that the hydraulic connections have been installed correctly and that all indications on the nameplate are respected.
- Check that the system has been properly vented.
- Check that fluid temperatures are within operating limits.
- Before turning the unit on, check that all closing panels are in place and secured with the appropriate screws.

Do not modify the internal electrical connections as this will immediately invalidate the warranty.

If present, the electric heaters for the compressors must be turned on at least 12 hours before the start-up (pre-heating phase), shutting down the main switch (the heaters are fed automatically when the switch is OFF). The heaters operate correctly if, after a few minutes, the crankcase temperature of the compressor is 10÷15°C higher than the air temperature.

In case of presence of electric heaters for the compressors, during the 12 hours of pre-heating phase, it is important to check on the display whether the OFF indication is present or that the unit is in stand-by mode. In case of accidental start, before this 12-hour pre-heating time has elapsed, the compressors might seriously be damaged and the warranty would decay immediately.

17.2 Checks during the operation

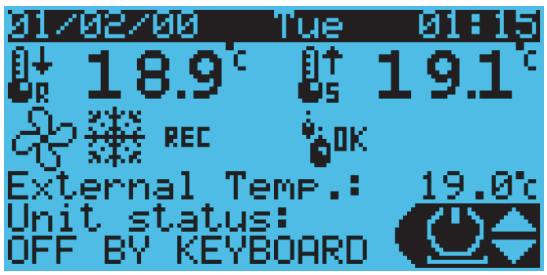
Check the rotation of the compressors and the fans. If the rotation is incorrect, immediately disconnect the unit from the main switch and change any one of the phases entering the main switch, so as to invert the rotation sense of the motors.

After a few operating hours, check the liquid sight glass has a greenish colour on its central part: should this be yellow, then some humidity could be present inside the circuit. In this case it will be necessary to dehydrate the circuit (only to be done by qualified personnel). Check that no air bubbles appear on the liquid sight glass. In this case it would be necessary to reintegrate the refrigerant charge. The presence of steam bubbles is however tolerated.

Some minutes after the switching on of the unit, check that the equivalent temperature of the refrigerant gas, as measured at the pressure present inside the coil with fans operating at the maximum velocity, differs from the fresh air temperature by some 7-10°C; also check that the equivalent temperature of the refrigerant gas, as measured at the pressure present inside the plate heat exchanger, differs from the water temperature going out of the exchanger by some 3-5°C.

18. UNIT USE

18.1 Function of display icons



ICON	FUNCTION
⏻	This icon allows you to access the screen for turning on the unit.
Set	Allows access to the page for changing set points.
i	Allows access to the menu with general information on the unit.

18.2 Factory default settings

The variable set points that can be changed by the user are:

SYMBOL	FUNCTION	ADMISSIBLE LIMITS	FACTORY VALUES
SEt U	Summer humidity setpoint	40 ÷ 80 %	60 %
SEt C	Summer temperature setpoint	18 ÷ 30 °C	26 °C
SEt H	Winter temperature setpoint	18 ÷ 25 °C	22 °C
PAS	Password	(Please contact our service office)	

All setpoints refer to the room air air conditions.

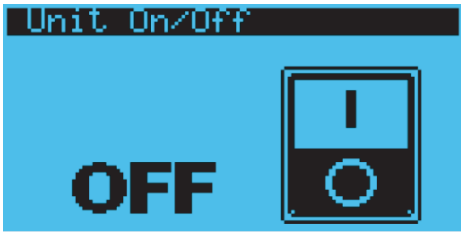
The units are equipped with a highly-sophisticated control system, with several parameters which may not be modified by the end user; these parameters are protected by manufacturer password.

18.3 Switching on and parameters setting

SWITCH THE UNIT ON

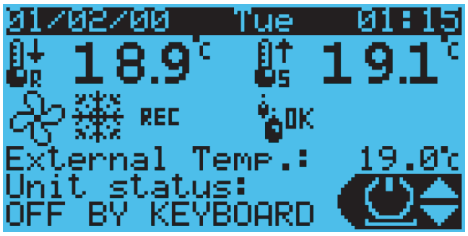
Once the heat recovery unit is supplied electrically and the main switch turned on, the display will be activated and will show the "**OFF**" screen, meaning unit OFF from keyboard.

From this screen, press the key ↑ or ↓ to switch the unit on.



MAIN SCREEN

At the start of the unit, the following screen will appear, showing the main operating and functioning parameters.



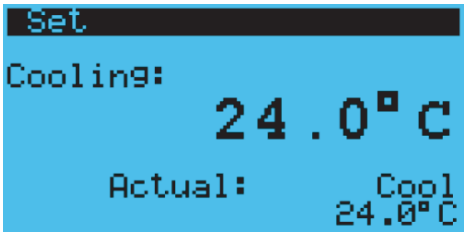
USER MENU

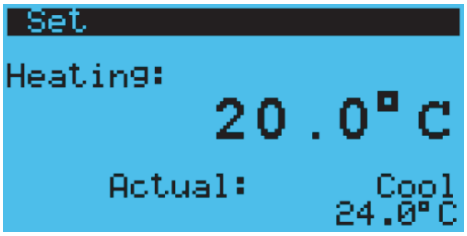
The visualization of the menu is done by pressing the key ↑ or ↓.
The following menus will be shown cyclically:
INFO
SET
ALARM

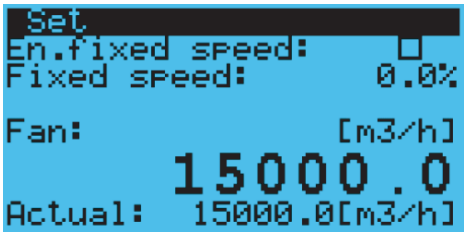
SET MENU

VISUALIZATION OF SET POINTS

The display of the set points is done by pressing the key ↑ or ↓ .







SET POINTS SETTING AND OPERATING MODE

To define the setpoints you need to be in the menu SET ; **Set**

Press key ↑ or ↓ to select the setpoint you wish to modify;

Confirm with key ↵ ;

Press key ↑ or ↓ to modify the parameter;

Confirm with key ↵ ;

Likewise also the operating mode, sumer/winter, may be set.

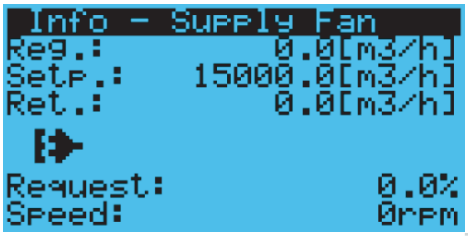
INFO MENU

To display the info menu and all the operating parameters you need to access the INFO menu. 

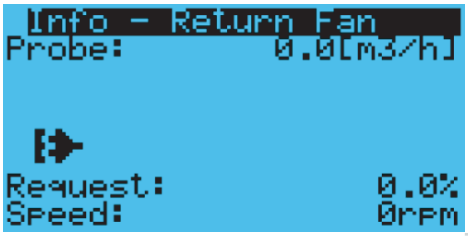
Press the key  or  to display the following parameters:

Information on the thermal controls of the unit.

External air damper position ON/OFF.

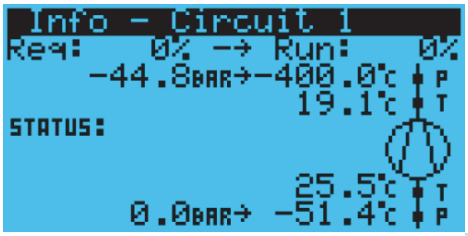


Information on the control of the supply fan.

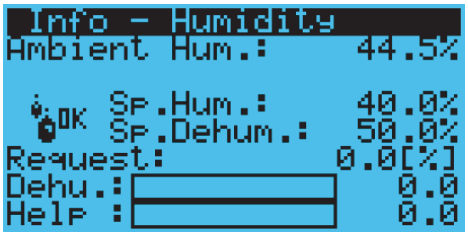


Reading of the retrun air differential pressure sensor and return air fan request.

Information on the by-pass damper of the heat recovery unit.

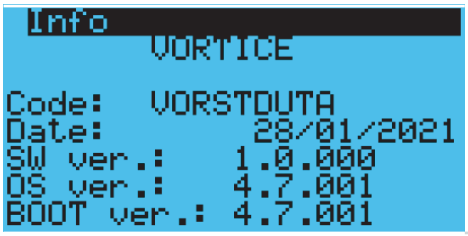


Information on the compressor control and status.

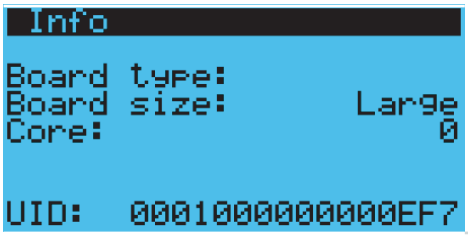


Information on the humidity control.

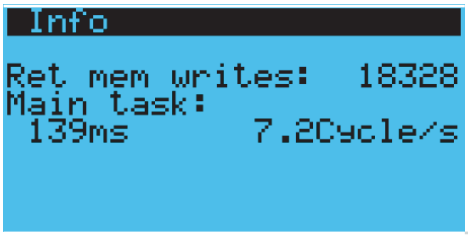
Information on the post-heating control.



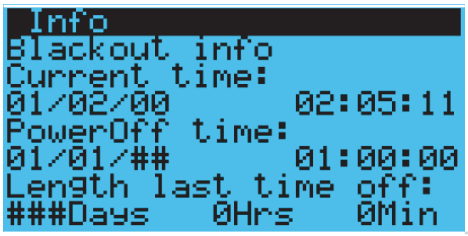
Software version, boot and OS.



Hardware information.

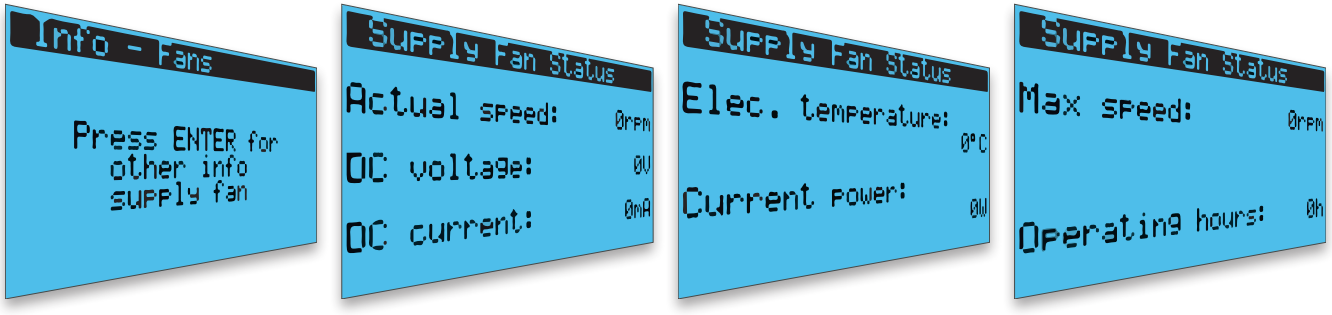


Performance hardware.



Blackout info.

Pressing the key ***Esc*** in corresponence with the different displays, you will access the under-menus of the various components, as instance:



SERVICE OR MANUFACTURER MENU

Pressing the key **Prg** you will access the main parameters modification menu.
Depending on the **SERVICE** or **MANUFACTURER** password, it will be possible to modify these parameters or only view them.

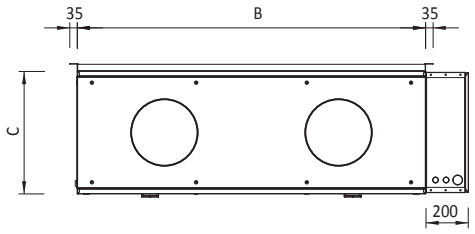
19. DIAGNOSIS AND TROUBLESHOOTING

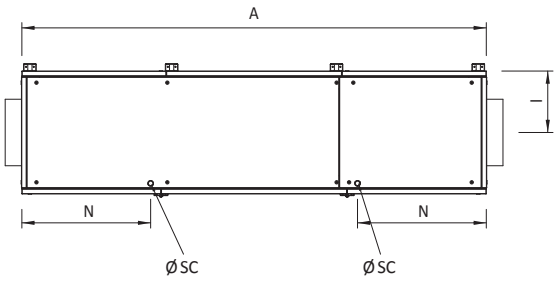
19.1 Troubleshooting

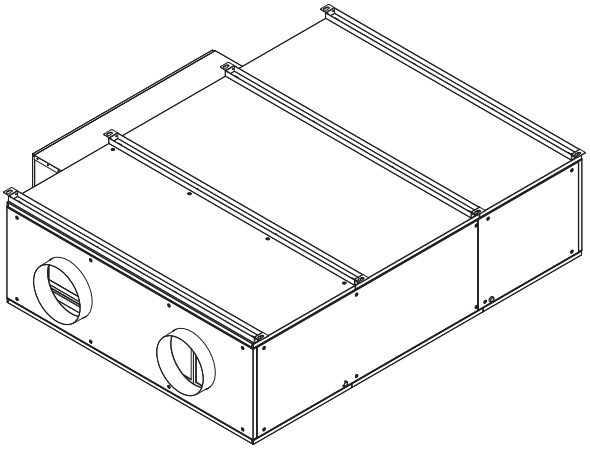
All units are checked and tested at the factory before delivery, however, it is possible that some anomaly or failure may occur during operation.

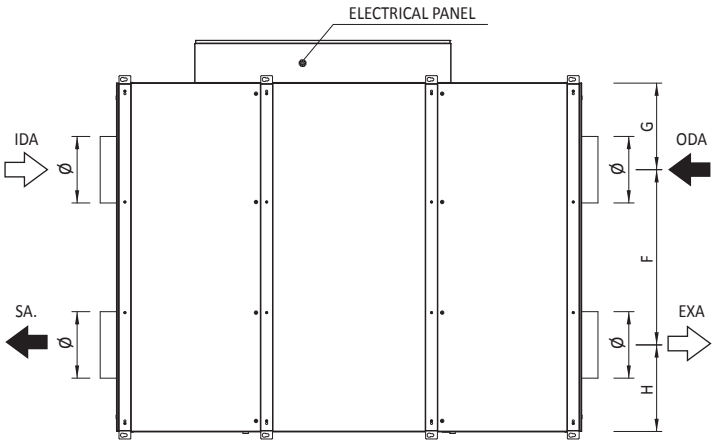
It is recommended to reset an identification alarm only after removing the cause that generated it; repeated resets may result in irreversible damage to the unit.

20. DIMENSIONAL DRAWINGS









Due to the large number of configurations available, only general dimensional drawings are shown, which are to be considered purely indicative and may change without notice. The specific drawing of the ordered unit is present in the documents supplied with the unit itself.

GENERAL DIMENSIONAL DATA

MOD.	A [mm]	B [mm]	C [mm]	F [mm]	G [mm]	H [mm]	I [mm]	N [mm]	Ø [mm]	ØSC [inch]	WEIGHT [kg]
005	1700	1000	380	478	276	246	184	473	200	1/2" F	204
011	1700	1300	500	628	326	346	242	403	315	1/2" F	265
015	1850	1300	500	628	326	346	242	473	315	1/2" F	295
021	2200	1650	580	978	481	391	280	453	450 x 350	1/2" F	342
031	2200	1900	580	929	456	515	280	453	450 x 350	1/2" F	394

21. UNIT MAINTENANCE

21.1 General warnings

As of 01 January 2016, the new European Regulation 517_2014, "Obligations arising in relation to the containment, use, recovery and distribution of fluorinated greenhouse gases used in stationary refrigeration, air conditioning and heat pump equipment" has become applicable. The unit in question is subject to the regulatory obligations listed below, which must be fulfilled by all operators:
a) Keeping of equipment records;
b) Correct installation, maintenance and repair of the equipment;
c) Leakage control;
d) Recovery of refrigerant and eventual management of disposal;
e) Submission to the Ministry of Environment of the annual declaration concerning emissions into the atmosphere of fluorinated of fluorinated greenhouse gases.

Maintenance allows you to:
- Keep the unit efficient.
- Prevent possible breakdowns.
- Reduce the rate of deterioration of the unit.

It is advisable to provide a unit booklet with the purpose of keeping track of the interventions carried out on the unit, facilitating the potential search for faults.

The maintenance operations must be carried out in compliance with all the prescriptions of the previous paragraphs.

Use personal protective equipment as required by current regulations.

21.2 Access to the unit

Access to the unit once it has been installed must be allowed only to authorised operators and technicians.
The owner of the machine is the legal representative of the company, body or natural person who owns the plant where the machine is installed.
He is responsible for observing all the safety rules indicated in this manual and in the regulations in force.

21.3 Periodical checks

Commissioning operations must be carried out in accordance with all the requirements of the previous paragraphs.

All operations performed on the unit must be carried out by qualified personnel in compliance with the national legislation in force in the country of destination.

Every 6 months

It is good practice to carry out periodic checks to ensure that the unit, control and safety devices are functioning correctly.

- Check that the electric terminals inside the compressor terminal plates are correctly fixed.
- Periodically clean the mobile and fixed contacts of the contactors.
- Check that there are no water leakages in the hydraulic circuit.
- Check that the flow switch operates properly, clean the metallic filter installed in the water pipe.
- Check that the crankcase heaters are supplied and operate properly (on a monthly basis).
- Check the condition of the finned coils, if necessary clean with compressed air in the opposite direction to the air flow. If the coil is completely clogged, clean it with a low-pressure cleaner, taking care not to damage the aluminium fins.
- Check the attachment and balance of the fans.

Unit shutdown

In case of long period shutdown, the hydraulic circuit must be drained so that there is no more water in the pipes and the exchanger.
This operation is compulsory if, during the shutdown period, the ambient temperature can fall below the freezingpoint of the mixture used (typical seasonal operation).

21.4 Refrigeration circuit repair

Please remember that, in case it is necessary to discharge the refrigerant circuit, it will be mandatory to recuperate all of the refrigerant gas by suitable machinery.

The system must be charged with nitrogen using a tank equipped with reducer, up to a pressure of approx. 15 bar. Leakages, if any, must be detected with a leakage detector. The formation of bubbles or foam indicates the presence of localised leakages. In this case, it will be necessary to discharge the circuit before carrying out the weldings with suitable alloys.

Never use oxygen instead of nitrogen: elevate explosion risk.

Refrigerant circuits operating with refrigerant gas require specific care in mounting and maintenance operations, in order to prevent them from operation anomalities.

It is therefore necessary to:

- Avoid refills with oil different from the specific one already charged in the compressor.
- For units using refrigerant gas R32, in case there are leakages such as to make the circuit also partially discharged, avoid refilling the missing refrigerant gas, but discharge the unit completely, recuperating the refrigerant gas for successive disposal. After vacuuming the circuit, recharge it with the suitable quantity.
- In case of replacement of any part of the refrigerant circuit, do not leave the circuit open for more than 15 minutes.
- In particular, in case of compressor replacement, complete the operation within the time indicated above, after removing the rubber caps.
- In case rubber caps.of compressor replacement, we recommend to wash the refrigerant circuit with suitable products. We also recommend to insert, for a determined time, an anti-acid filter.
- In vacuum conditions, do not supply the compressor electrically; do not compressr air inside the compressor.

22. DISMANTLEMENT, MATERIALS DISPOSAL AND RECYCLING

22.1 Unit disconnection

Disconnection operations must be effected by a qualified technicist, who must follow the dispositions provided in this manual into the section "*residual risks*".

Before the disconnection of the unit the following materials (if any) must be recovered:

- the refrigerant gas;
- brine mixtures from the hydraulic circuit;
- the compressors lubricant oil;
- avoid spillage or leakage into the environment.

All decommissioning operations must be carried out by authorised personnel in accordance with the national legislation in force in the country of destination.

Pending decommissioning and disposal, the machine can also be stored outdoors, provided that the unit has the electrical and hydraulic circuits intact and closed.

During recovery operations it is important to pay a great attention to avoid damages to people or environmental pollution.

During dismantlement phase the fan, the coil, the motor (if they are still usable) can be recovered in specialized centres.

The antifreeze liquid must be stored in appropriate containers according to the law.

Recover and dispose of materials according to national laws in force.

The structure and the various components, if not usable, must be demolished and subdivided according to their nature; in particular steel and aluminum present in high quantities in the unit.
All materials must be recovered or disposed of in compliance with the relevant national law.

- In the following table you can find the materials emploied to build the unit, even those which are present in its components:

Material type	Employment	Q.ty in relation to weight	Presence
Rolled metal	baseframe- panels fan- electric motor	HIGH	ALWAYS
Aluminium	case- electric motor's structure- coils dampers- droplet separators	HIGH	ALWAYS
Copper	coils- motor	MEDIUM	ALWAYS
Polyurethane	panels	HIGH	OPTIONAL
Mineral wood	panels- sound attenuators	HIGH	OPTIONAL
Gummy material	gaskets- rubber shock absorber antivibration joints	LOW	ALWAYS
Nylon	handles- hinges- claps panelblocks	LOW	ALWAYS

In order to better assist its customers and users of its equipment, the Company will be obliged if any changes in unit property are communicated by simply giving:
- serial number or construction number of the unit;
- new user's name and address;
- new unit location in case of change in installation address.

22.2 RAEE Directive (EU only)

- The RAEE Directive requires that the disposal and recycling of electrical and electronic equipment must be managed through a specific collection, in appropriate centres, separate from mixed urban waste.
- The user is obliged not to dispose of the equipment, at the end of its working life, as urban waste, but to comply with Directive 2012/19/EU at European level and with Legislative Decree 49/2014 at national level.
- Units covered by the RAEE Directive are identified by the symbol shown above.
- Manufacturer can supply additional information on request, in particular it will indicate the reference certification body according to RAEE.

NOTES

VORTICE GROUP COMPANIES

VORTICE S.p.A.
Strada Cerca, 2- frazione di Zoate
20067- Tribiano (MI)
Tel. +39 02-90.69.91
ITALY
vortice.com
postvendita@vortice-italy.com

VORTICE INDUSTRIAL S.r.l.
Via B. Brugnoli, 3
37063- Isola della Scala (VR)
Tel. +39 045 6631042
ITALY
vorticeindustrial.com
info@vorticeindustrial.com

VORTICE VENTILATION SYSTEM (CHANGZHOU) CO.LTD
Building 19, No.388 West Huanghe Road, Xinbei District,
Changzhou, Jiangsu Province CAP:213000
CHINA
vortice-china.com
vortice@vortice-china.com

VORTICE LIMITED
Beeches House-Eastern Avenue
Burton on Trent- DE 13 0BB
Tel. +44 1283-49.29.49
UNITED KINGDOM
vortice.ltd.uk
sales@vortice.ltd.uk

VORTICE LATAM S.A.
Bodega #6
Zona Franca Este Alajuela- Alajuela 20101
Tel. (+506) 2201 6934
COSTA RICA
vortice-latam.com
info@vortice-latam.com

CASALS VENTILACIÓN INDUSTRIAL IND., S.L.
Ctra. Camprodon, s/n
17860- Sant Joan de les Abadesses (Girona)
SPAIN
casals.com
ventilacion@casals.com