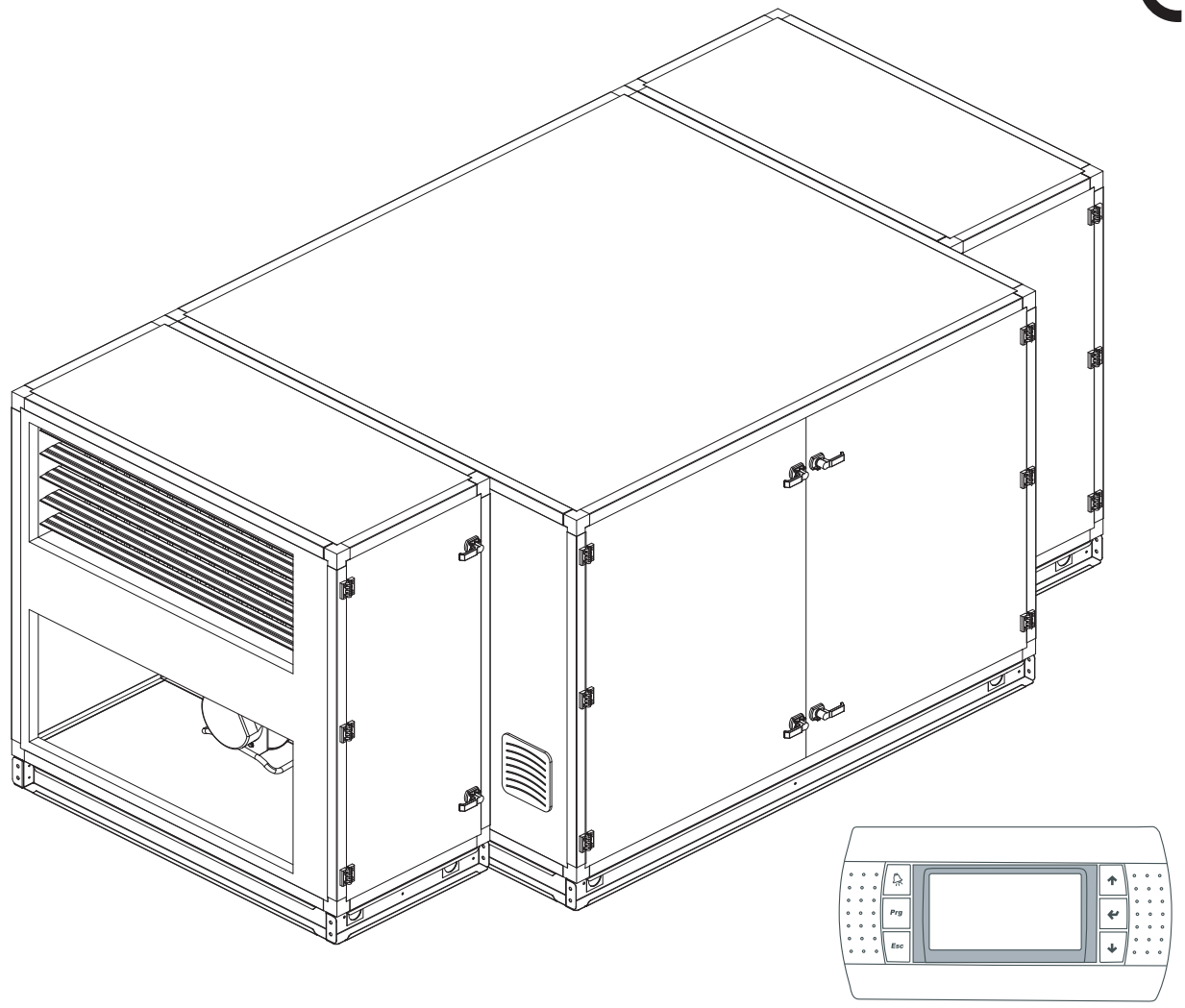
VORTICE
INDUSTRIAL

ENGLISH

www.vorticeindustrial.com
info@vorticeindustrial.com

CE



Original Instructions

Installation Operations and Maintenance manual
RXH/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. 4700050611

13/01/2023

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.

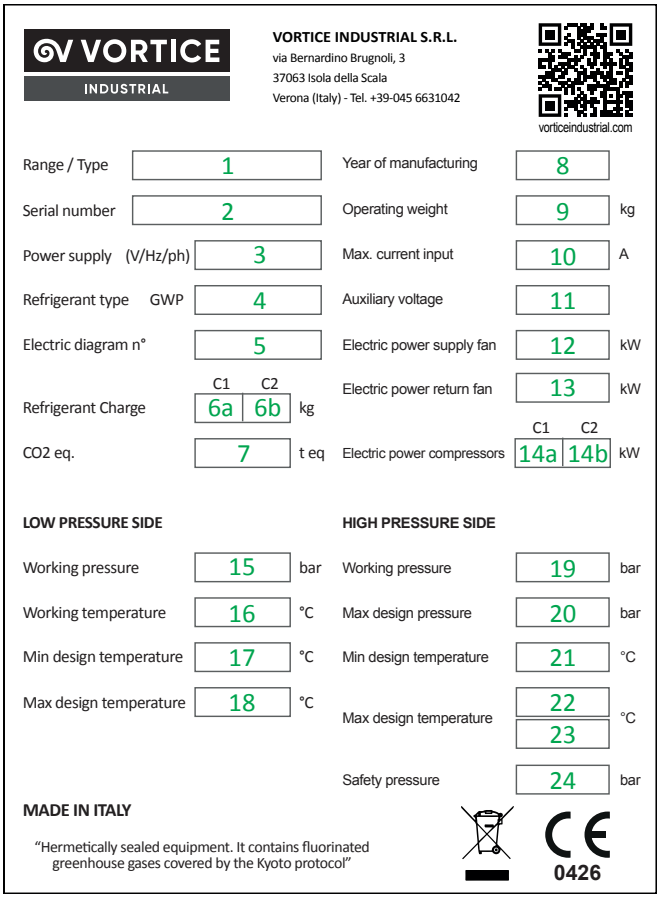
However, the unit is not suitable for operation in environments:

- 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
(6a-6b) Refrigerant content in the circuits 1 & 2
(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
(14a-14b) Electric power input on circ. 1 & 2 compressors
(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 room requires the correct supply of outside air and at the same time the control of the internal thermohygrometric conditions. Through the recovery of energy from the air extracted from the environment, through the use of systems with integrated heat pump technology, an economic way in the installation of energy-efficient power plants is offered, which also ensures the degree of comfort to the occupants, both in summer and winter and without added costs in the management of primary air.
For buildings that require air exchange and are not equipped with dedicated air conditioning systems, the installation of these units allows the introduction of primary air at a controlled temperature without disturbing the internal conditions in the occupied spaces. It is therefore not necessary to use additional systems to heat or cool the incoming primary air. Moreover, these units allow to guarantee a support to the air conditioning system in the intermediate seasons by exploiting the free-cooling or free-heating periods. If installed on existing buildings, they guarantee the energy upgrading of the system through the management of the air exchange without additional charges.
On new installations, on the other hand, the air exchange is completely carried out allowing to reduce the size of the main air conditioning system. In the intermediate seasons the building will benefit from the free or partial cooling generated by these units, which during the partial load phases allow the main system to operate with higher efficiencies.

2.2 Structure

The structure of the units can be realized in two versions:

VERSION 1:
Profiles 50 x 50 mm in self-supporting extruded anodized aluminium, with mechanical strength requirements in accordance with EN 1886: D1 (M). 50 mm thick double-walled sandwich type paneling with exterior in pre-painted RAL 9010 galvanized sheet steel and interior in hot-dip galvanized sheet steel with interposed insulation made of polyurethane foam with a density of 40 kg/m^3.
This structure has a seal class L1 while the thermal transmittance and the thermal bridge characteristic is class T3/TB4 according to EN1886.

VERSION 2:
Thermal break profiles 60 x 60 mm in self-supporting extruded anodized aluminium, with mechanical strength requirements in accordance with EN 1886: D1 (M). 63 mm thermal break sandwich-type double-walled sandwich type panels with exterior in pre-painted RAL 9010 galvanized sheet steel and interior in hot-dip galvanized sheet steel with interposed insulation made of polyurethane foam with a density of 40 kg/m^3. This structure has a seal class L1 while the thermal transmittance and the thermal bridge characteristic is class T2/TB2 according to EN1886.

Safety microswitches are applied to the inspection doors to allow internal access to the various compartments of the unit only when the unit is completely switched off. The main access and inspection panels consist of inspection doors with perimeter hinges made of non-corrosive polyamide and handles.
All units can be supplied in both monobloc and modular sections for on-site assembly when required.

The units are supplied as standard in a MONOBLOCK configuration, in case of multi-section units, they are available in special execution. Please contact the Company for further details.

2.3 Heat recovery (1° recovery stage)

The units are equipped with a counter-flow heat exchanger in aluminium (painted on request) used in cooling/heating mode to transfer the heat from the exhaust air to the inlet fresh air. The heat exchange is counter-flow with efficiencies higher than 80%. The spacing between the fins is optimized in order to reduce the pressure drop on the air side and the electrical consumption of the fan. Under certain conditions of low outside air temperature and high humidity, the heat recovery may start to frost. Through the integrated control system it is possible to manage the defrosting of the heat recovery by activating different stages of electrical resistances (pre-heaters), or by activating the recirculation damper. The heat recovery is also equipped with an additional by-pass damper for the management of the free-cooling and free-heating mode. The heat exchanger participates to the **Eurovent Certification** program and it is sized according to the **ECO Design** specification.

2.4 Heat pump refrigerant circuit (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 R410A 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 Air filters

ePM_{10} 60% (M5) filters in return air and ePM_1 55% (F7) rigid bag filters in fresh air. Both types of filters are mounted on slides equipped with gaskets to ensure effective sealing. Their position, upstream of the internal components, also guarantees their protection.

2.8 Fans

The units are equipped with high efficiency plug-fan type fans with built-in brushless EC motor. In this way it is possible to guarantee an accurate regulation of the airflow both in the supply and extract section, ensuring that all regulatory requirements such as SFP are met with. The airflow rate of the fan is managed through the integrated electronic control system thus ensuring, according to the needs of the system, that the correct operation of the unit is maintained with consequent saving of the energy absorbed by the unit.

The fans are fixed to the frame by means of selfcentering brackets to ensure the correct distance between the impeller and the nozzle, thus optimizing performance.

2.9 Test

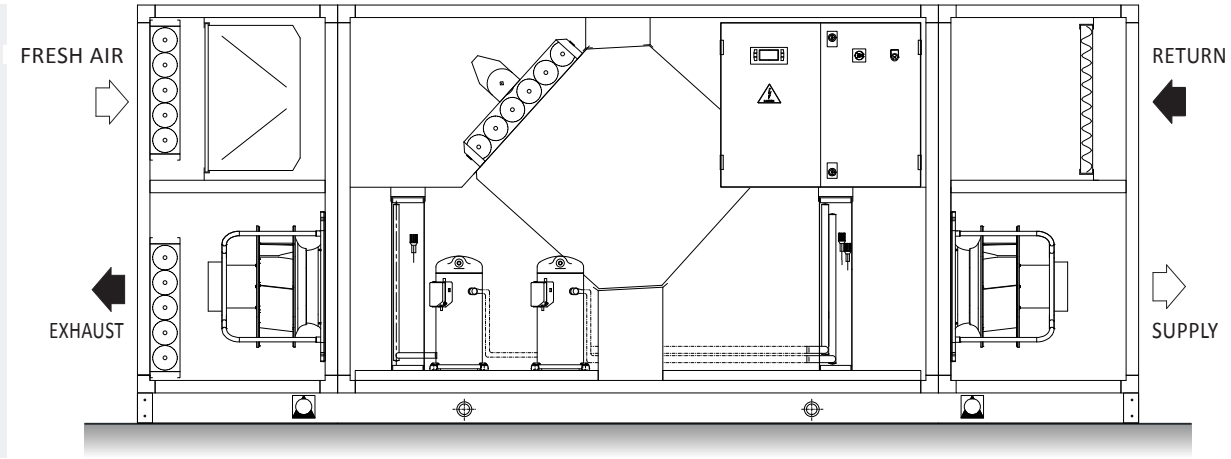
Units are fully assembled and wired at the factory and subjected to a complete functional test before shipment. They are manufactured in compliance with the safety standard of the Machinery Directive 2006/42/EC, the Low Voltage Directive 2006/95/EC, and the Electromagnetic Compatibility Directive 2004/108/EC 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

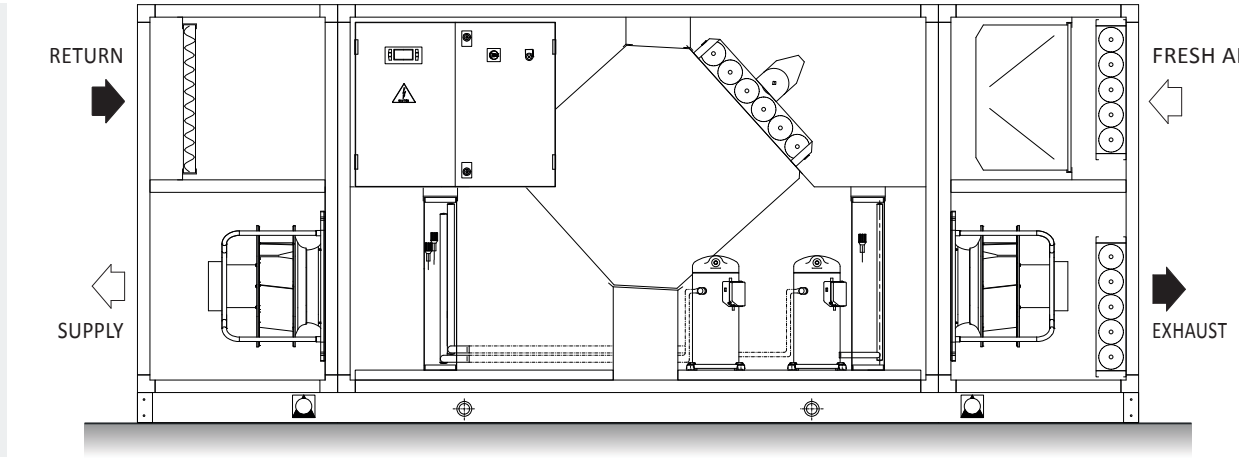
Units are supplied on thick wooden feet and wrapped in plastic film to protect against impacts during transport and handling on site.

3. CONFIGURATIONS

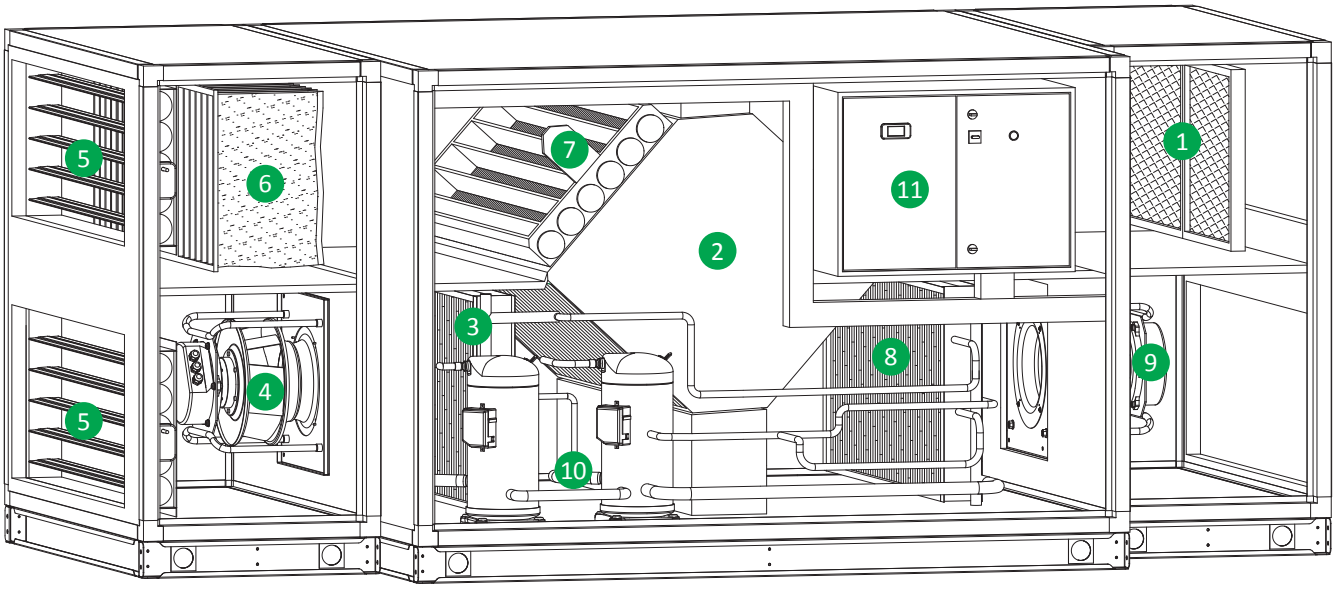
H1

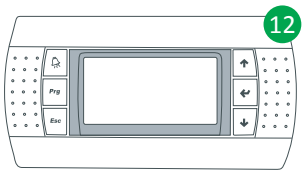


H2



4. MAIN COMPONENTS OF THE UNIT





1	Return air filter	**8**	Heat pump user exchanger
2	Counterflow heat exchanger	**9**	Backward blade fan, EC brushless motor with external rotor (supply side)
3	Heat pump source exchanger		
4	Backward blade fan, EC brushless motor with external rotor (exhaust side)	**10**	Compressors with inverters complete with heat pump refrigerant circuit
5	Air damper with actuator [(1)]	**11**	Electrical panel
6	Fresh air inlet filter	**12**	Microprocessor control panel with LCD display
7	By-Pass damper on heat exchanger		

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

5. AVAILABLE ACCESSORIES

Return side grease ISO coarse 40% (G2) air pre-filter

It is built with galvanized sheet metal frame, filtering media in galvanized wire tubular sock, 48mm thickness, contained by two welded galvanized nets. The filter is used in the presence of dust and large pollutants suspended in the air or in case of filtration of oily mists. It may be installed as pre-filter in combination with the ePM_{10} 60% (M5), ePM_1 55% (F7) or ePM_1 80% (F9) filters, located on the room air return side.

Return / Supply side ePM_{10} 50% (G4) air pre-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 a low pressure drop and it may be installed as pre-filter in combination with the ePM_{10} 60% (M5), ePM_1 55% (F7) or ePM_1 80% (F9) filters, located on the room air return side and/or supply air side.

Return / Supply side ePM_1 55% (F7) air pre-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 a low pressure drop and it may be installed as pre-filter in combination with ePM_1 80% (F9) filters, located on the room air return side and/or supply air side.

Return / 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 / Supply side ePM_1 55% (F7) air filter

Built with a polyester frame and a rigid bag filter media, tickness 292 mm, made of white glass microfibre. 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 / Supply side ePM_1 80% (F9) air filter

Built with a polyester frame and a rigid bag filter media, tickness 292 mm, made of white glass microfibre. 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.

Heat recovery hot gas defrost kit

The system consists of a specific circuit with a direct expansion heat exchanger with hot gas, acting as condenser, located upstream the heat recovery unit on the room return air side. The hot gas allows to increase the air temperature in exhaust, thus allowing the melting of ice which might deposit on the plate heat recovery unit during severe operating conditions.

Antifreeze electric coil (external)

The antifreeze system consists of an electric coil installed on the fresh air inlet. It is supplied in a dedicated section external to the base unit to be fixed using an installation kit supplied with it.

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.

Water control valve

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

Hot water coil (external)

The hot water 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.

Cold water coil (external)

The coil is manufactured with copper pipes thickness 0,40 mm and aluminium fins thickness 0,11 mm. The pipes are mechanically expanded in the aluminium fins to increase the thermal exchange rate.
The cooling coil section is supplied complete with condensate drain pan with water discharge.

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.

Roof for outdoor installation

Flat roof rainproof for outdoor execution, made of pre-painted sheet metal.

45° hood with bird-trap

Rain hood with 45° angle for outdoor execution, to be applied in fresh air inlet or exhaust air, complete with bird-trap net.

CO_2 probe

Units can be equipped with air quality CO_2 probe. This accessory is installed and wired in the factory.
If it's installed on the return air duct it allows to determine the quantity of carbon dioxide present in the environment, increasing the quantity of external air to dilute its content.

Remotable control panel

All units are supplied as standard with a microprocessor control panel with high-resolution display, installed on board the unit. It is possible, however, to install a second control panel remotable up to 50 m away.

BACnet interface

Communication protocol BACnet for building automation and control (BAC) networks that use the ASHRAE, ANSI, and ISO 16484-5 standards protocol.

Flexible joint

Flexible joint for rectangular ducts, complete with galvanized steel flange.

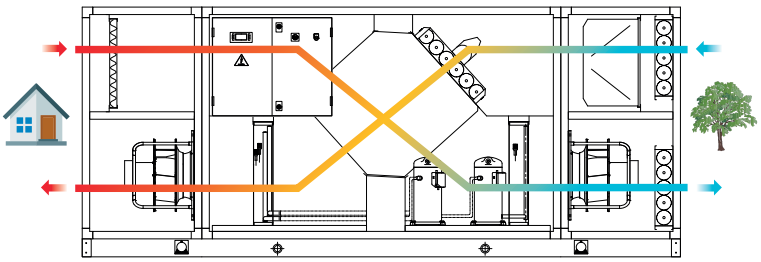
Sound attenuator on return / supply side (external)

The sound attenuator is supplied in a dedicated section external to the base unit, with the same sizes and features of the main unit, to be fixed using an installation kit supplied with it.
The sound attenuator baffles are made of mineral wool, thickness 100/200 mm, density 90 kg/m^3, protected by a fabric veil that prevents any risk of fraying of the mineral wool even at high air velocities.
The mineral wool is contained in a galvanised frame with a galvanised steel microstretched retaining mesh.
The sound-absorbing material is class M0.

6. OPERATING MODE

6.1 Winter operating mode

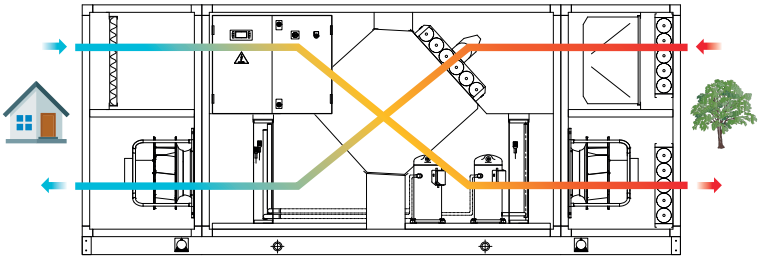
The return air, after passing through the cross-flow heat recovery, goes to feed the heat pump source exchanger that operates as an evaporator.
Through the vapour compression refrigeration cycle, the fresh air, coming out of the cross-flow heat recovery, is heated by the heat pump user exchanger, which 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.

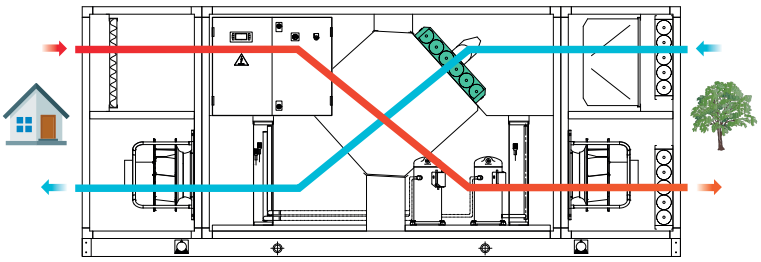
6.2 Summer operating mode

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 outdoor air temperature is lower than the temperature of the room to be air-conditioned and if the latter requires cooling, the unit operates in Free-Cooling mode. All integrated heat recovery stages are disabled and the By-Pass damper positioned on the plate heat exchanger is opened, thus allowing the entry of outdoor air without heat recovery.



7. TECHNICAL DATA

MODEL		011	021	031	041	061	081	101
Nominal airflow rate	m^3/h	1000	2000	3000	4500	6000	8000	10000
Thermal efficiency recovery in cooling mode [1]	%	77,90	78,40	77,90	77,90	78,10	78,50	74,90
Total unit cooling capacity [1]	kW	6,59	14,75	21,98	33,82	43,70	54,24	66,46
Total EER of unit [1]	-	6,79	5,57	5,97	5,98	5,46	6,09	5,63
Electrical power absorbed in cooling mode [1]	kW	1,63	3,88	5,62	8,67	11,93	14,11	17,79
Heating recovery thermal efficiency [2]	%	92,90	94,20	94,40	94,60	94,70	95,30	89,10
Total thermal power of unit [2]	kW	12,73	24,74	40,31	56,69	77,91	98,73	122,72
Total COP of unit [2]	-	12,60	13,98	11,10	13,03	11,63	12,36	10,31
Electrical power absorbed in heating [2]	kW	1,67	2,95	5,52	7,26	10,54	13,00	17,68
Supply fan available static pressure	Pa	250	250	250	250	250	250	250
Return fan available static pressure	Pa	200	200	200	200	200	200	200
N° of refrigerant circuits	n°	1	1	1	1	1	1	1
Type of refrigerant	R410A							
Number of compressors: Inverter	n°	1	1	1	1	1	1	1
Max. electricity absorbed by the unit	A	26,90	26,80	34,00	44,40	53,50	60,20	64,20
Power supply	V/ph/Hz	400 V +- 10% / 3 / 50 + N + ⏚						
Type of filters for fresh air section	ePM1 55% (F7)							
Type of filters for return air section	ePM10 60% (M5)							
SFP factor filters	W/(l/s)	2,09	1,96	2,15	2,18	2,18	2,19	1,99
Supply sound power level [3]	dB(A)	80	80	80	84	84	85	85
Return sound power level [3]	dB(A)	66	65	68	69	73	73	72
Sound pressure level in scale A (ISO EN 3744) [4]	dB(A)	57	56	54	59	59	60	60

MODEL		062	082	102	132	172	242
Nominal airflow rate	m^3/h	6000	8000	10000	13000	17000	24000
Thermal efficiency recovery in cooling mode [1]	%	78,10	78,50	74,90	75,10	75,30	74,90
Total unit cooling capacity [1]	kW	43,80	55,00	67,49	93,77	116,77	149,75
Total EER of unit [1]	-	5,41	5,92	5,62	5,32	5,36	5,76
Electrical power absorbed in cooling mode [1]	kW	12,03	14,50	17,99	25,87	32,36	42,08
Heating recovery thermal efficiency [2]	%	94,70	95,30	89,10	89,70	90,20	89,80
Total thermal power of unit [2]	kW	78,06	100,25	126,22	156,99	204,52	265,78
Total COP of unit [2]	-	11,92	12,69	10,40	11,97	11,95	15,18
Electrical power absorbed in heating [2]	kW	10,39	12,91	17,92	21,17	27,54	32,87
Supply fan available static pressure	Pa	250	250	250	250	250	250
Return fan available static pressure	Pa	200	200	200	200	200	200
N° of refrigerant circuits	n°	2	2	2	2	2	2
Type of refrigerant	R410A						
Number of compressors: Inverter + On/Off	n°	1 + 1	1 + 1	1 + 1	1 + 2	1 + 2	1 + 2
Max. electricity absorbed by the unit	A	51,40	53,40	73,60	84,70	99,70	103,70
Power supply	V/ph/Hz	400 V +- 10% / 3 / 50 + N + ⏚					
Type of filters for fresh air section	ePM1 55% (F7)						
Type of filters for return air section	ePM10 60% (M5)						
SFP factor filters	W/(l/s)	2,18	2,19	1,99	2,13	2,09	2,26
Supply sound power level [3]	dB(A)	84	85	85	92	94	96
Return sound power level [3]	dB(A)	73	73	72	76	77	85
Sound pressure level in scale A (ISO EN 3744) [4]	dB(A)	59	60	60	61	63	63

[1] *fresh air inlet +35 °C / 40% RH, return air +26 °C / 50% RH*
[2] *fresh air inlet -10 °C / 90% RH, return air +20 °C / 50% RH*
[3] sound power level calculated in accordance with EN 3744
[4] sound pressure level meausured at 1 m free field distance, in accordance with EN 3744

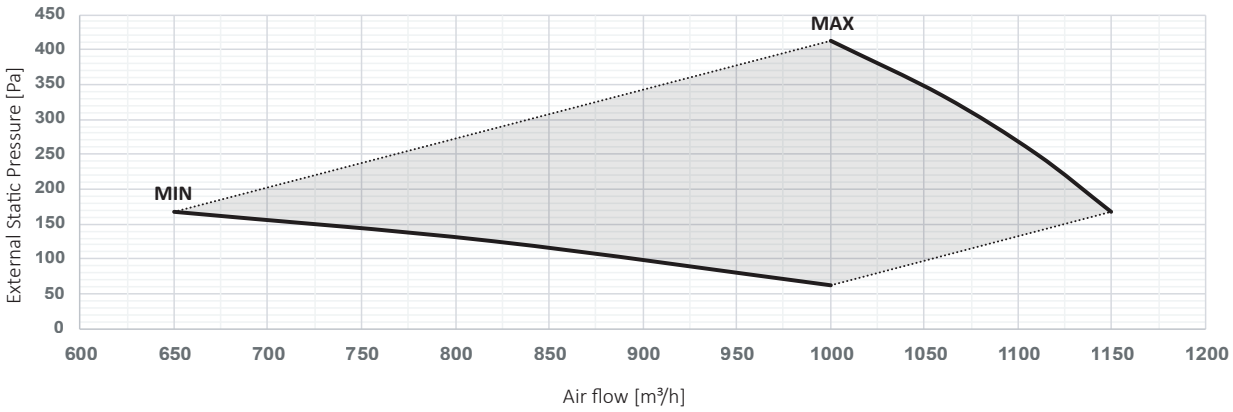
8. VENTILATION CURVES

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

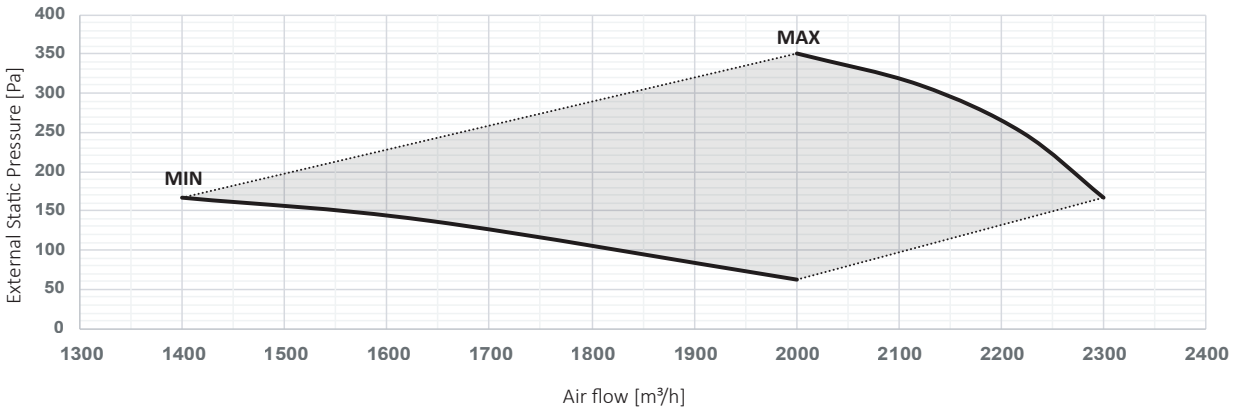
Consider the static pressure shown as available for ductwork, having a unit equipped with ePM_{10} 60% (M5) filters on the return side and ePM_1 55% (F7) on the supply side.

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.

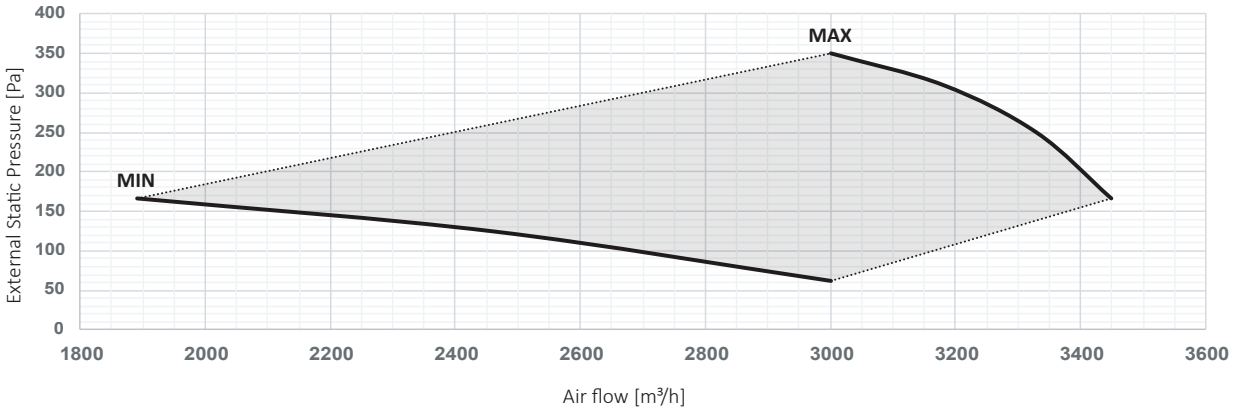
RXH/Hi 011



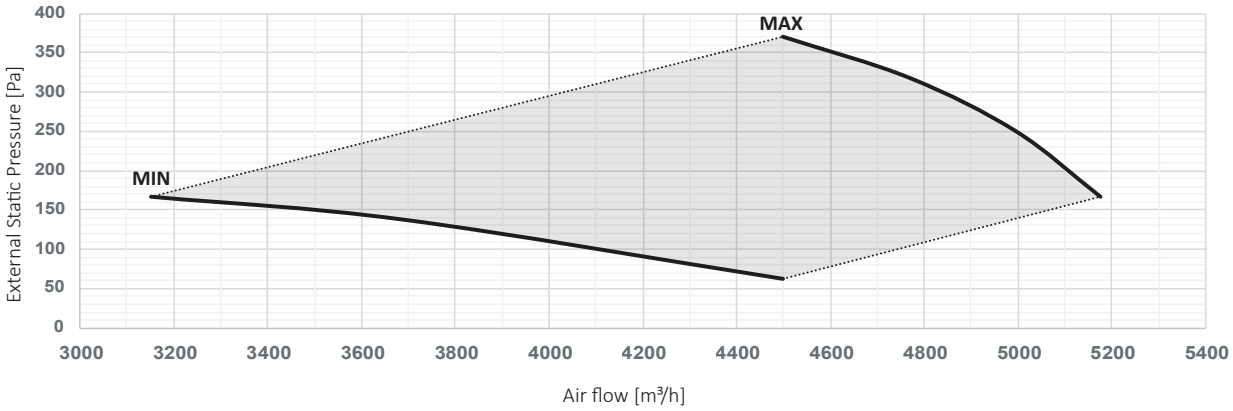
RXH/Hi 021



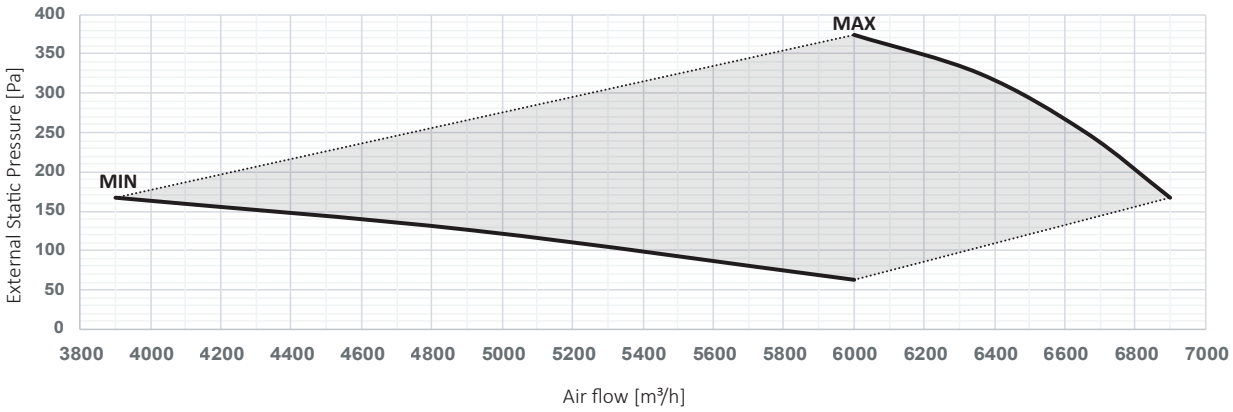
RXH/Hi 031



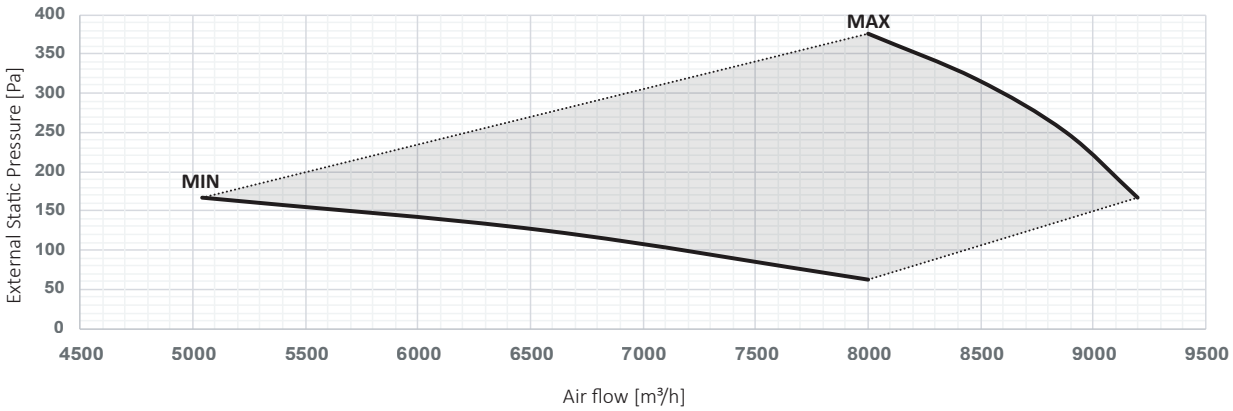
RXH/Hi 041



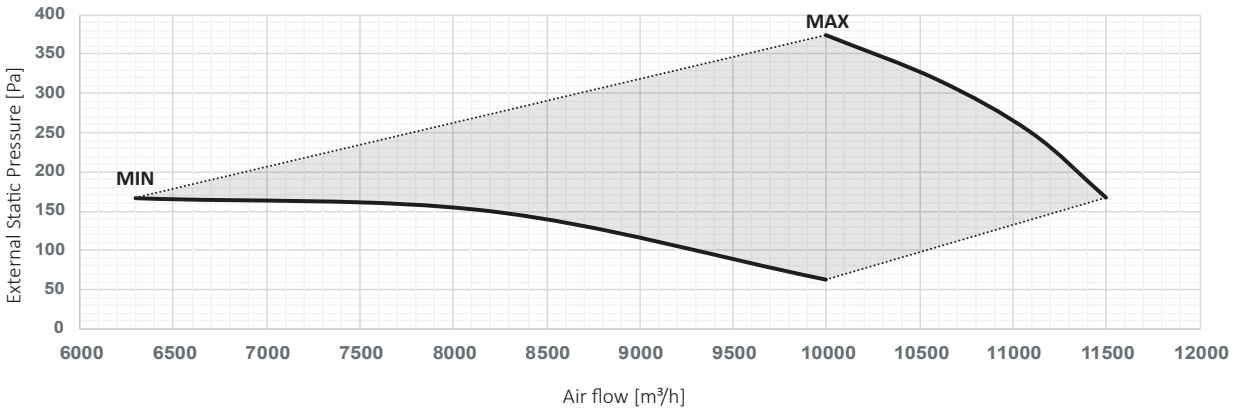
RXH/Hi 061 - 062



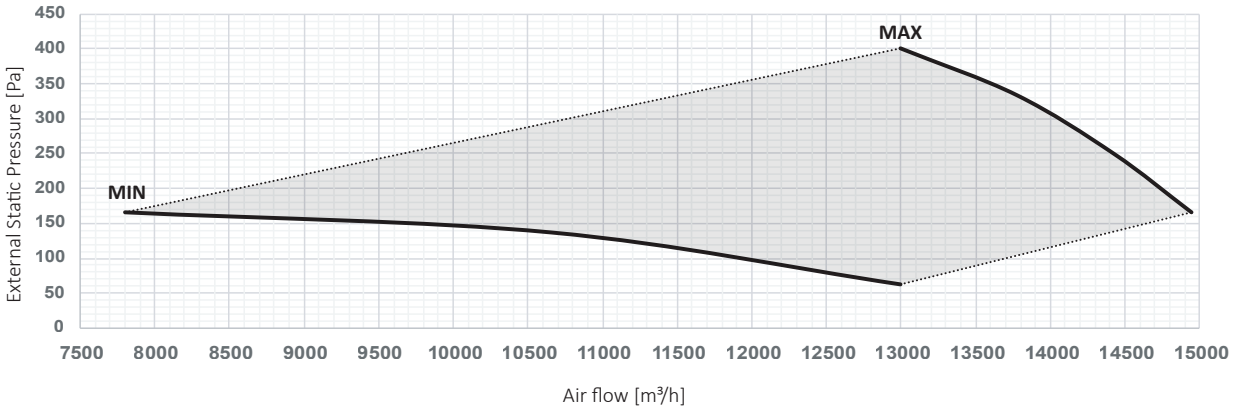
RXH/Hi 081 - 082



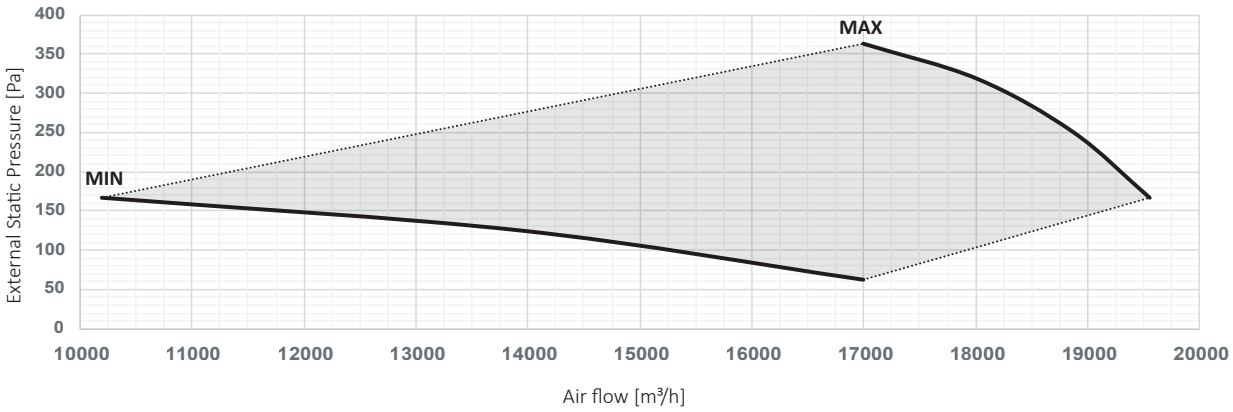
RXH/Hi 101 - 102



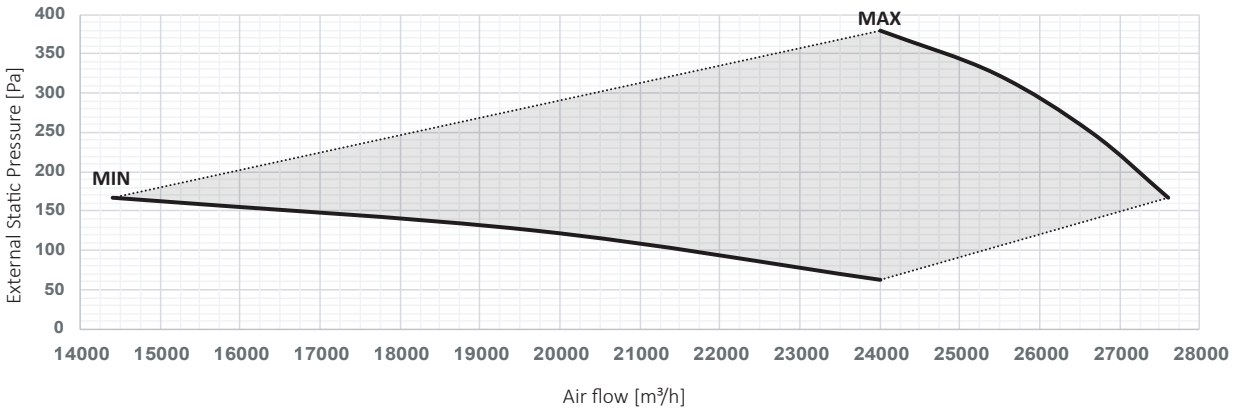
RXH/Hi 132



RXH/Hi 172

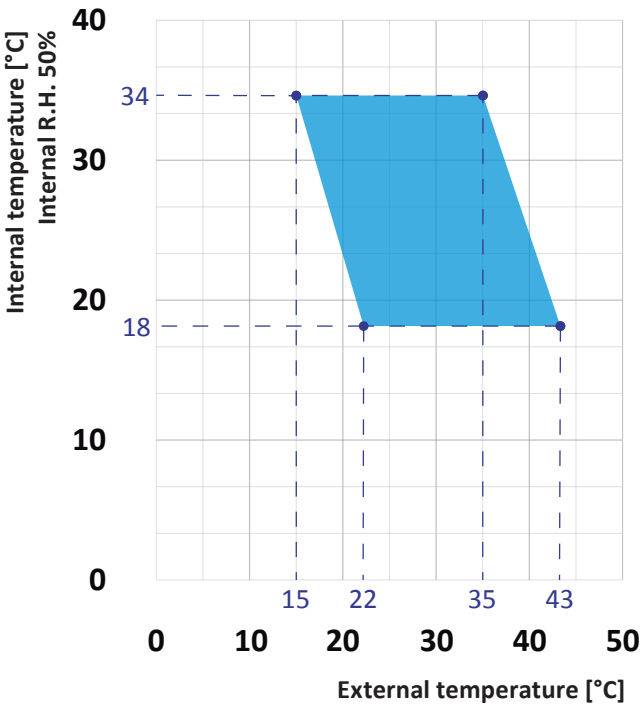


RXH/Hi 242

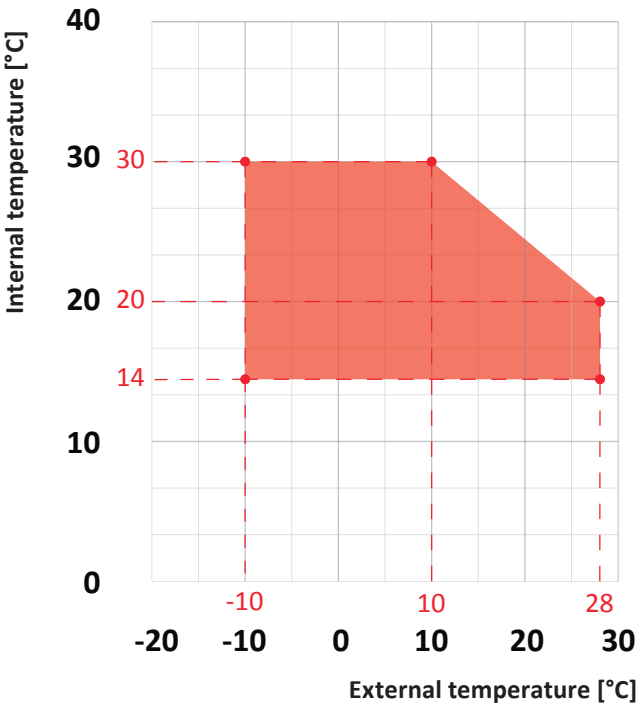


9. OPERATING LIMITS

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.

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	Lw	Lp
MOD.	Nominal air flow m^3/h	E.S.P. Ret. | Supp. Pa	63 dB	125 dB	250 dB	500 dB	1K dB	2K dB	4K dB	8K dB	dB	dB(A)	dB(A)
011	1000	200 | 250	58	72	70	73	78	71	48	35	81	80	57
021	2000	200 | 250	58	72	70	73	78	71	48	35	81	80	57
031	3000	200 | 250	58	72	70	73	78	71	48	35	81	80	57
041	4500	200 | 250	62	76	74	77	82	75	52	39	85	84	59
061	6000	200 | 250	62	76	74	77	82	75	52	39	85	84	59
062	6000	200 | 250	62	76	74	77	82	75	52	39	85	84	59
081	8000	200 | 250	63	77	75	78	83	76	53	40	86	85	60
082	8000	200 | 250	63	77	75	78	83	76	53	40	86	85	60
101	10000	200 | 250	63	77	75	78	83	76	53	40	86	85	60
102	10000	200 | 250	63	77	75	78	83	76	53	40	86	85	60
132	13000	200 | 250	70	84	82	85	90	83	60	47	93	92	61
172	17000	200 | 250	72	86	84	87	92	85	62	49	95	94	63
242	24000	200 | 250	74	88	86	89	94	87	64	51	97	96	63

Lw: sound power level 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 sound-absorbing baffles type. They are suitable for reducing the noise that propagates through the ventilation systems in the aeraulic ducts.

To check the sound absorpion data to the various octave band frequencies, please refer to the our selection software.

The sound attenuators are supplied in a dedicated section external to the base unit, thus increasing the total length of the unit (depth and height of the section remain the same as the base unit). Below are the additional section lengths according to size and profile, to be taken into account when calculating the final length of the unit.

Additional dimensions sound attenuator section (50 mm profile)

MOD.	011	021	031	041	061 | 062	081 | 082	101 | 102	132	172	242
Length [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

Additional dimensions sound attenuator section (60 mm profile)

MOD.	011	021	031	041	061 | 062	081 | 082	101 | 102	132	172	242
Length [mm]	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020

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.

- **Source exchanger defrost kit**

The source heat exchanger defrost kit is composed of a pressure transducer and a cycle inversion valve, directly managed by the microprocessor control. In case, in heating mode, the conditions downstream the plate heat exchang should fall below the ice formation threshold, the defrost system would activate, which would invert the refrigerant gas flow andsend hot gas to the heat exchanger to defrost.
As soon as the conditions downstream the heat exchanger would allow, the heating operating mode would be reset.

- **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.

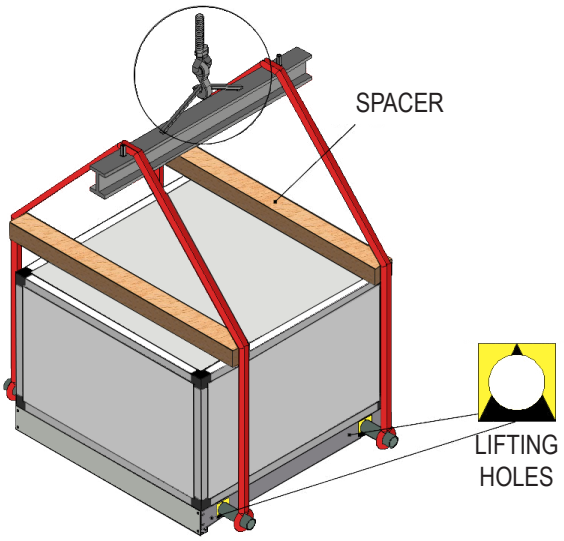
It is advisable to leave the units packed during handling and to remove the packaging only at the time of installation. Remove the packaging of the unit with care to avoid possible damage to the machine.
The materials making up the packaging can be of different kinds (wood, cardboard, nylon, etc.). It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

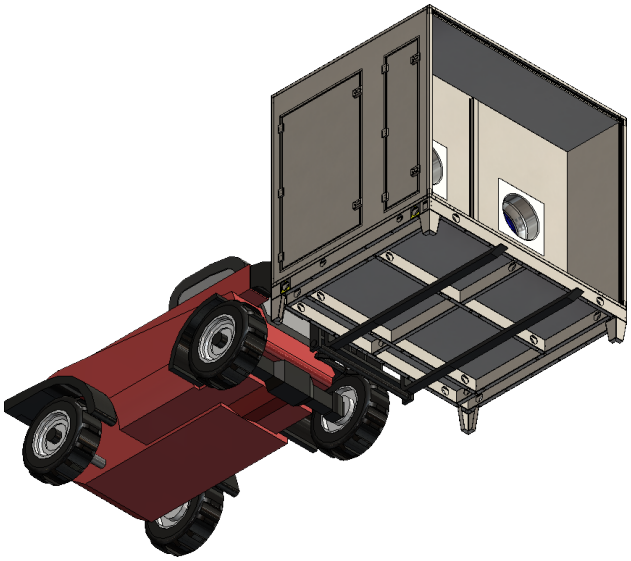
Packaging materials should be stored separately and handed over for disposal or recycling to the appropriate.

12.4 Lifting and handling

Each unit section or single piece unit is provided with appropriate lifting points (lifting lugs or perimeter holes for lifting bars) clearly identified in the structural base.
When unloading the unit, it is strongly recommended that sudden movements are avoided in order to protect the internal component of the unit. Lifting procedure to be followed in order to avoid any damages to side panels is schematically shown on the pictures below, otherwise it is possible to proceed with the handling by means of forklifts.

It is important to keep the unit horizontal during the handling and lifting, avoiding absolutely to flip or tilt the sections.





Unit sections should be handled separately, before any assembly or coupling is made. After sections are assembled, it is NOT possible to move the whole resulting unit.

Weight of each section or unit module, as well as the unit total weight, are shown in the technical documentation supplied with the unit.

12.5 Positioning

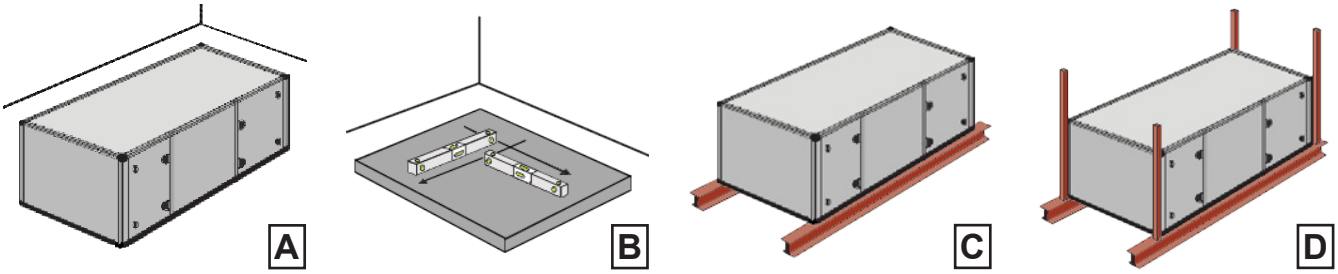
12.5.1 Preliminary notice

The unit must be placed in a special area that can be made inside a technical room or outside in a covered area or not, depending on the structure on site.
Prior to proceeding to unit installation it is recommended to check the following:

- the structure (concrete or other) supporting the unit must be ad quately designed for the unit static and operating weight; water mass forecasted in unit sumps must also be considered; supporting base should have an horizontal surface, flat and regular;
- The installation position must minimize the risks in the event of an earthquake or strong winds;
- Electric supply lines must be adequately sized according to the unit electric characteristics.

The positioning area for the unit can be obtained:

- directly on the floor (Fig. A)
- on a special concrete pedestal (Fig. B)
- on a pedestal in metal profiles (Fig. C)
- on a hanging structure in metal profiles (Fig. D)

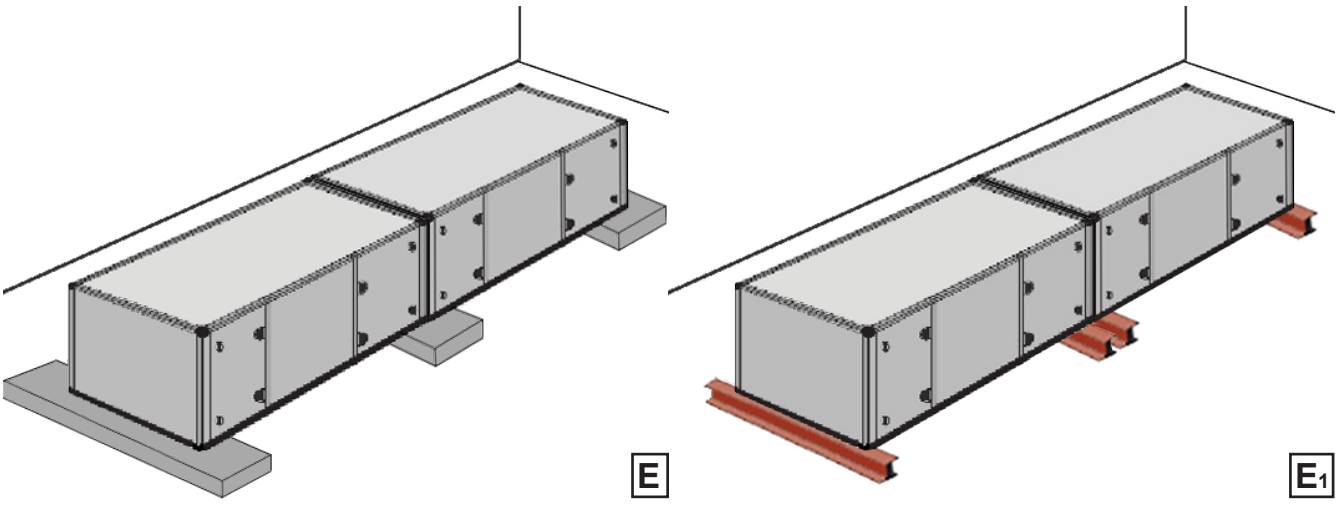


In any case the following minimum requirements must be respected:

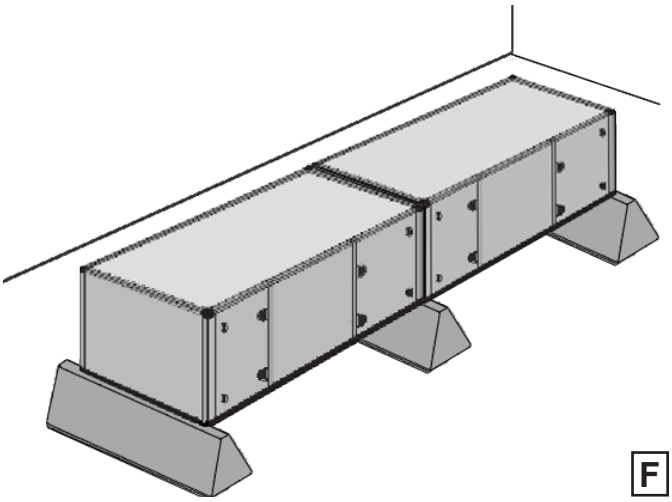
- The floor or pedestals must have suitable characteristics to support the mass of the unit in compliance with the required safety limits;
- The contact surface with the lower base frame of the unit must be sufficiently smooth and hard in relation to the mass of the machine;
- The floor or pedestals must allow the construction of siphons on the discharges with the provided hydraulic components;
- The horizontality of the support surface must be checked and any corrections can be obtained using metal shims.

Special precautions must be taken in case of unit supplied splitted into sections and/or large dimensions where it's not envisaged the creation of a positioning place with a single and continuous surface:

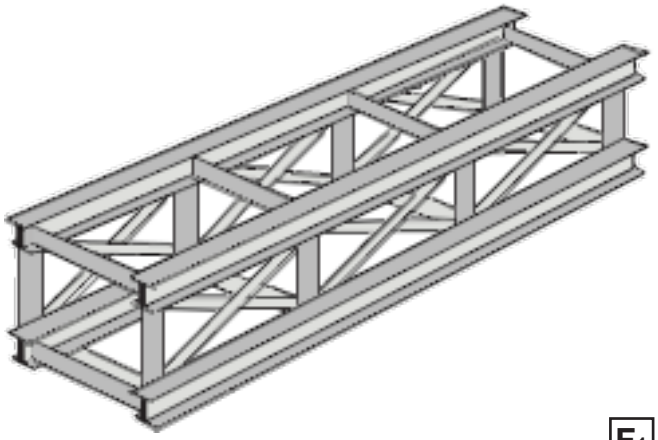
- as well as at the begin and end of the unit, points of support must be made in correspondence with any intermediate junctions between individual sections (detectable by the drawing of the machine and / or checked with our Technical Department) (Fig. E (concrete)- Fig. E_1 (IPE beams));



- in case of overhead positioning, the individual support points must be realized in order to support the corresponding mass of the section in consideration of the unit's height and in compliance with the safety limits for seismic risk. (Fig. F (concrete) Fig. F1 (structure in metal profiles));

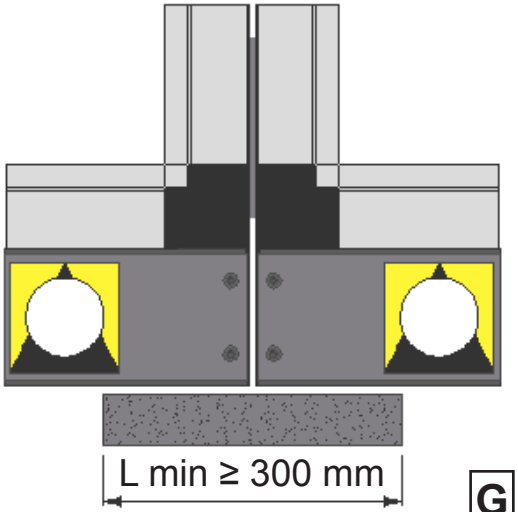


F



F1

- the surface of the support points must have a suitable width to allow positioning / approaching and assembly operations of the individual sections during the installation phase (Fig. G);
- the contact surface with the base frame must be sufficiently hard and smooth to allow positioning / approaching and assembly operations in relation to the mass of the unit;
- the overall planarity of all the individual support points must be checked and if necessary corrected using metal shims.



G

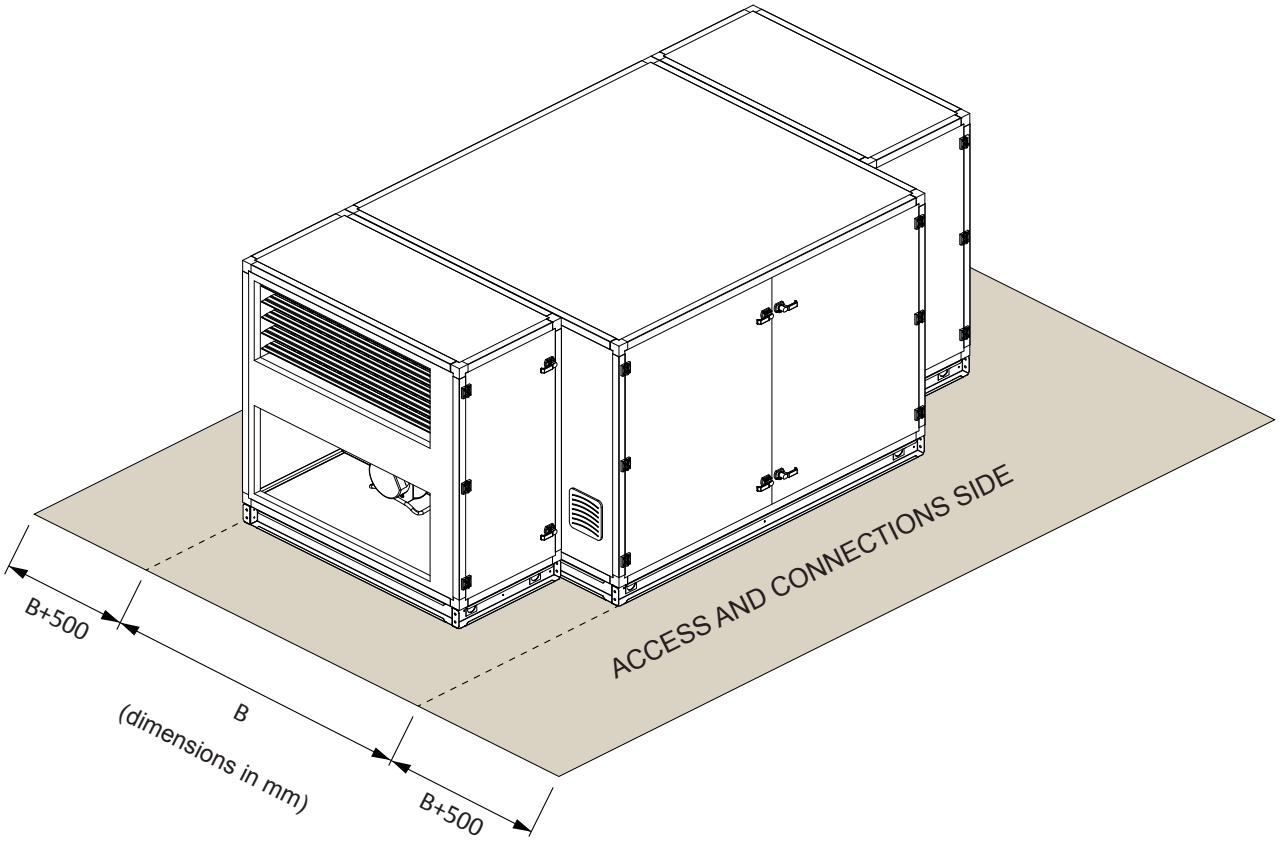
READ AND UNDERSTAND THE INSTRUCTIONS
Before undertaking any task the operator must be fully trained in the operation of the machines to be used and their controls. They must also have read and be fully conversant with all operating instructions.

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.

12.5.2 Service area requirements

Area choosen for unit assembly must allow sufficient clearance space, around and on top of unit, for unit installation and further ordinary and extraordinary maintenance operations. Particularly important is the service area on the inspection and connection side, in order to allow panels to open completely and coils to slide out completely for extraordinary maintenance. The picture below show minimum clearances requested.



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 units are supplied as standard in a MONOBLOCK configuration, in case of multi-section units, they are available in special execution. Please contact the Company for further details.

12.6 Section coupling and bolting

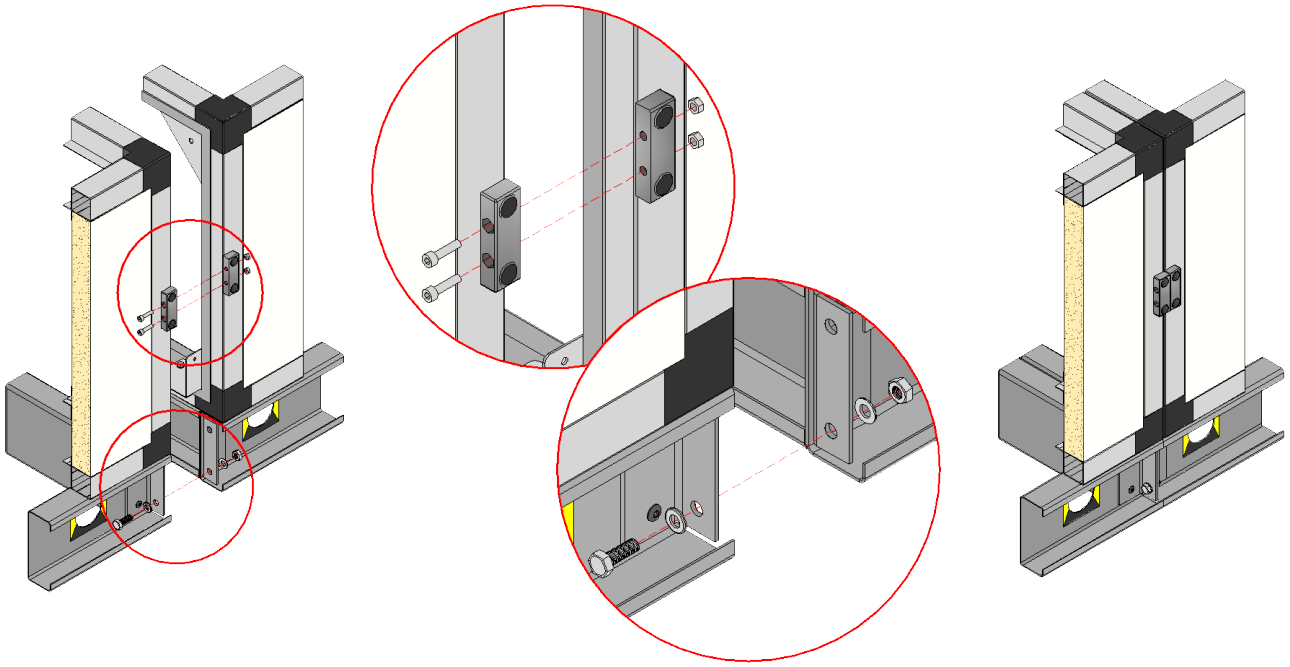
For unit delivered in separate sections, it is necessary to proceed to the total assembly on site, according to the overall drawings provided with the unit.

1. Apply supplied self adhesive gasket along the perimetrical face of one of the sections to be coupled.
2. Position first the heaviest section, then set beside the second one and embed it in the provided corner mortises.
3. Bolt sections together by means of holes provided in the profiles and using M8 bolts supplied with the unit. Fasten gradually and alternatively along the full perimeter (fastening couple 8-12 Nm/0,8-1,2 kgm) until gasket between profiles is fully and uniformely presse.

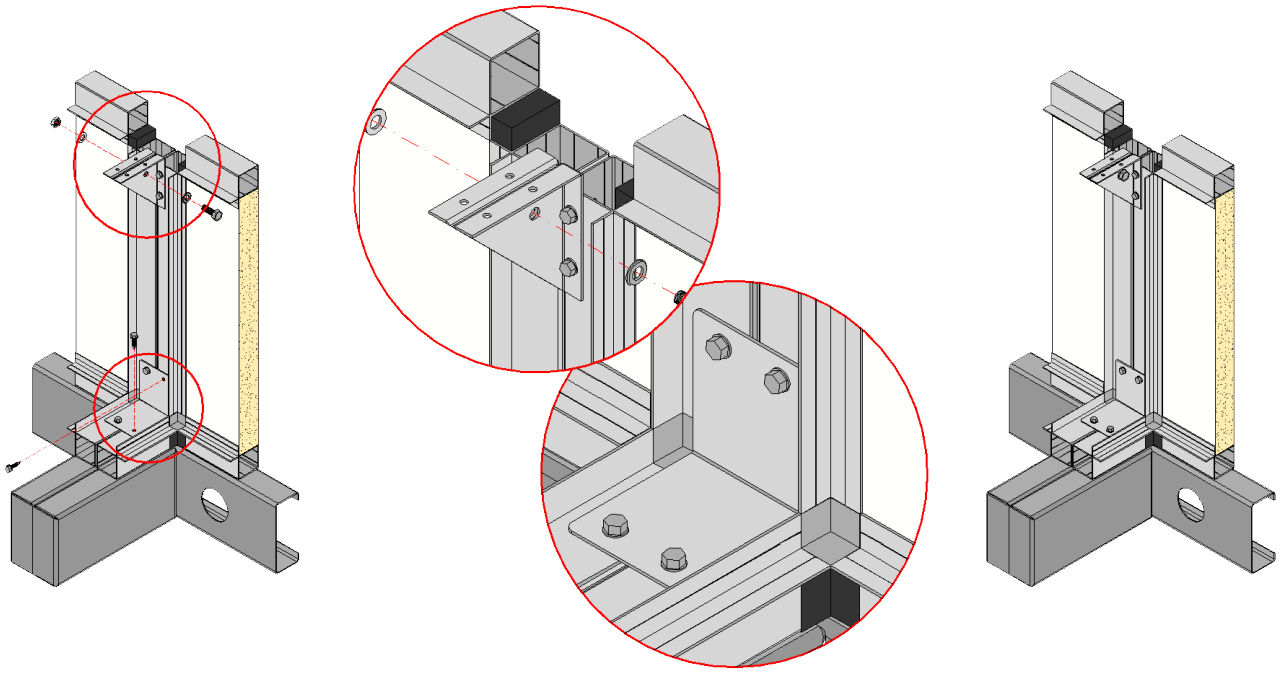
Assembly of union bolts is carried out through inspection panels, or by disassembling side panels adjacent to union profiles; as side panels are secured on to profiles by self-threading screws, highest care is required for re-assemblyng the same, in order not to break panel seal gasket and not to dent panel surfaces. In some cases it may be necessary to partially remove the coils and/or droplet eliminator to access to the junction plates.

4. Apply the sealing cord, supplied with unit, on the two sides and on top of the union perimeter.

EXTERNAL JUNCTIONS SCHEME



INTERNAL JUNCTIONS SCHEME

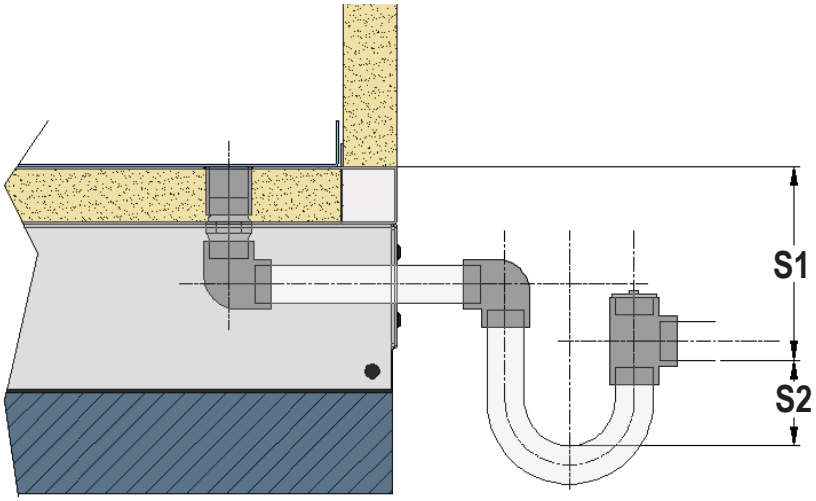


Install the unit to allow ordinary and extraordinary maintenance. The warranty does not cover costs related to platforms or handling equipment necessary for any intervention.

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

12.7 Hydronic connections

All connections should be made with the best available current workmanship practice according to the indicated dimensions of inlet and outlet diameters.
Outlet connections should be complete with water traps and their height calculated on the basis of the maximum negative pressure existing at the drainage point. A semplified method is to assume this value equal to the total fan pressure and calculate trap dimension as indicated in the picture below.



S1 = Ht / 10 + 35	**S2** = Ht / 10 x 0,75

S1- S2 = minimum height, mm, as indicated
Ht = total fan pressure, Pa, as indicated in the “TECHNICAL SCHEDULE”

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 advisable to provide a siphon for EVERY SINGLE DRAIN. We also recommend that separated drains are NOT connected with each other, before or after the siphon/s, but are left independent.

12.8 Hydraulic connection to the exchange water coils

The following requirements for water connections are also applicable for coils with other fluid, such as glicole solutions, dia-thermal oil, etc. The following minimal requirements are recommended for any type of installations.

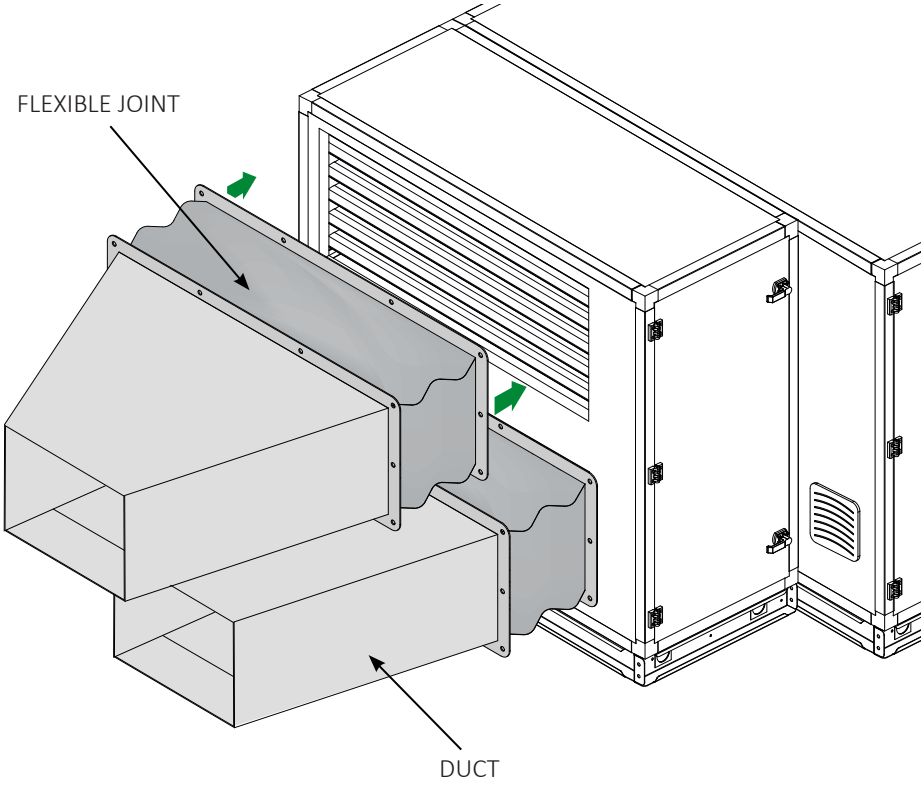
a) Provide appropriate supports for external circuit and thermal expansion joints with vibration isolators; avoid to load coil connections.
b) Position water pipes and water circuit devices not to impede coil slide out, inspection panel openings and access to any unit sections.
c) Avoid damages to coil connection solderings by fastening mechanical connections with care without applying any torsions to the same especially when the exchangers are small.

Coil performance is normally rated for counter-flow circuit arrangement, consequently coils are provided with water inlet at the bottom and downstream air flow, outlet at the top and upstream air flow. The stickers on the unit with the respective inlet and outlet symbols placed near the headers respect this rule.

Furthermore, water circuit should be provided with:
1) water drain to be positioned at the unit lowest point (obligatory);
2) vent valve at the circuit highest point to allow easy replenishment (recommended);
3) shut-off valves, on water inlet and outlet, to allow coil disassembly for extraordinary maintenance;
4) for hot water coils, water pump electric interlock with the fan cycling device or circuit bypass, to avoid damages resulting from overheated stagnating air, during fan shutdown periods.

Installer must obviously guarantee the requested value of water flow.

12.9 Connecting the unit to air ducts



Fixing of air ducts

GENERAL RULES

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

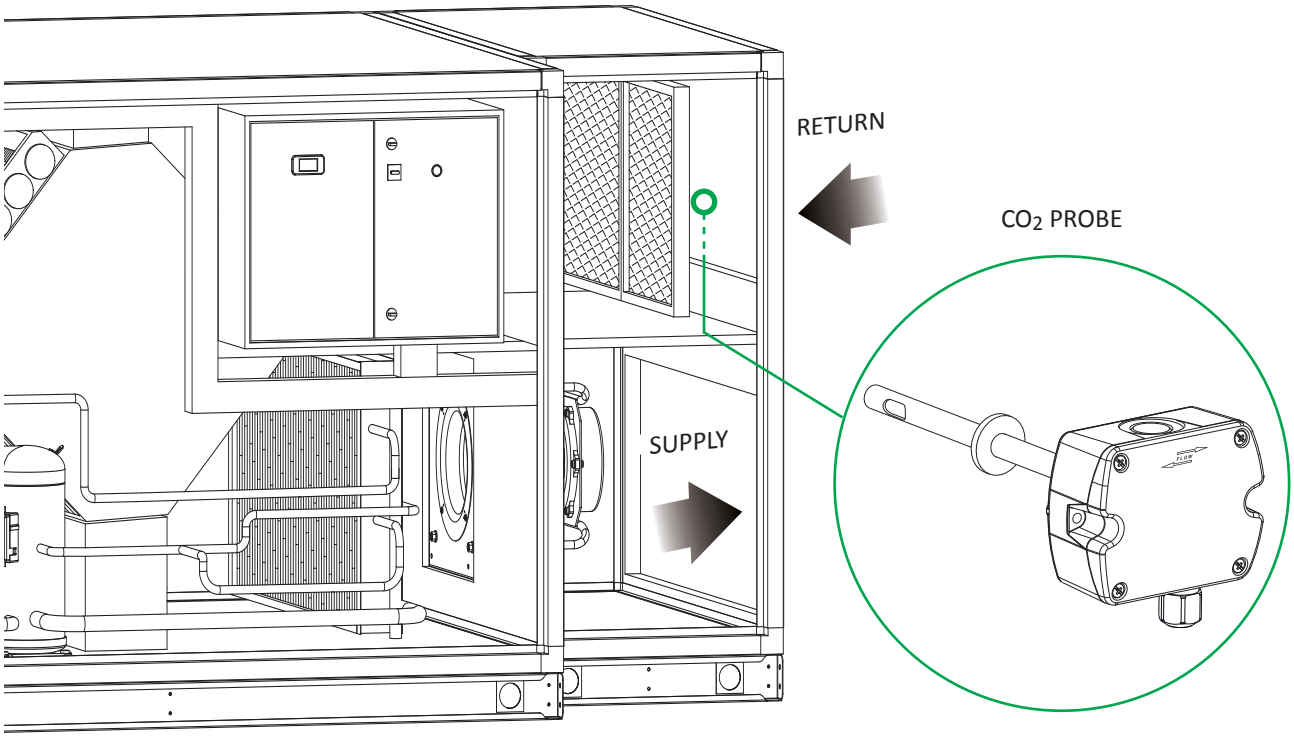
- design the duct so that the air speed never exceeds 4-5 m/s, for the purpose of noise containment;
- provide suitable brackets to support the ducting to prevent their weight from bearing on the unit;
- always use a flexible joint between the unit and the ductwork;
- provide an electrical earth cable 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 diameter of the duct to avoid drops in fan performance.

13. MODBUS-RS485 / BACnet serial interface card

Serial line interface card to the supervision system (available only MODBUS-RS485 / BACnet). The installation of the card will allow the unit to be connected to a system with MODBUS-RS485 / BACnet 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 list of MODBUS / BACnet variables is available by contacting the company.

14. CO_2 PROBE

The CO_2 air quality probe can only be available for ECO configuration units. It is installed inside the unit, on the return room intake and wired at the factory. The probe measures the carbon dioxide amount present in the room, according to the value it will increase (or decrease) the fresh air volume so that the presence of CO_2 will be diluted.

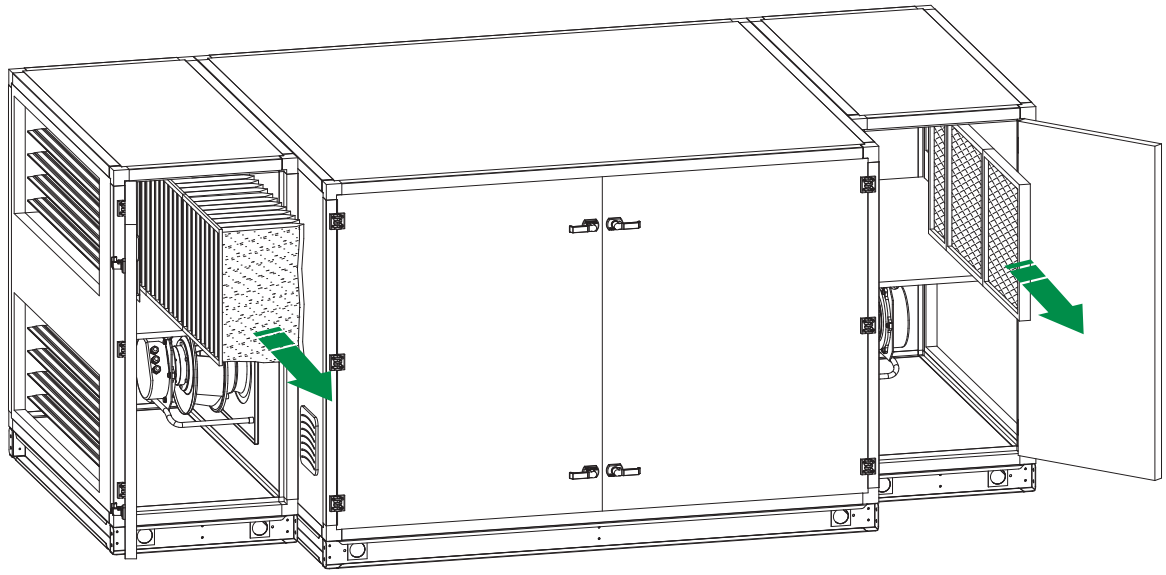


TECHNICAL DATA

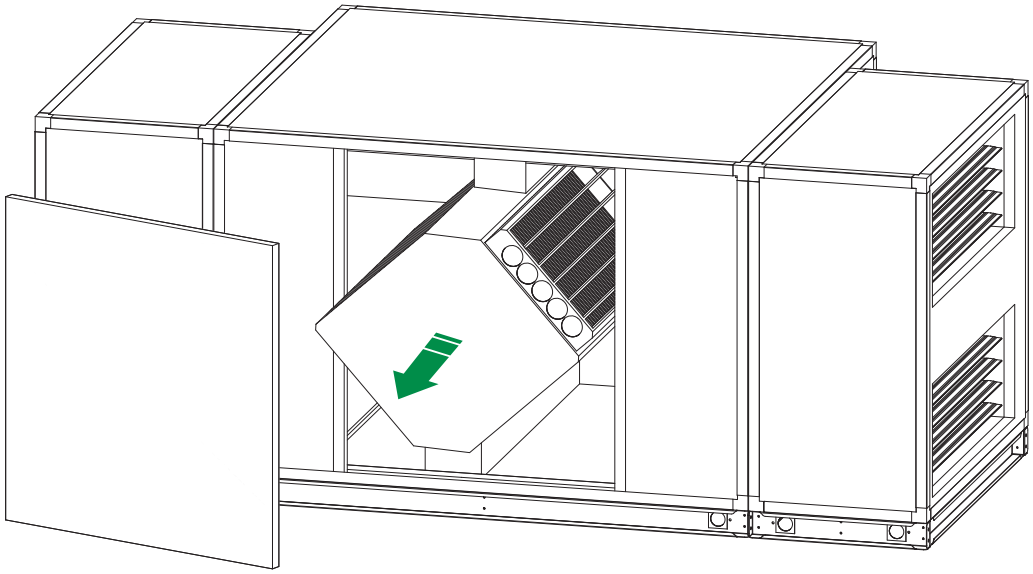
Measuring range	ppm	0-2000
Grade of accuracy at 25°C	%	± 5
Interval of measure	sec.	about 15
Temperature operating range	°C	20 - 60
Humidity operating range	%	0 - 95

15. FILTERS and HEAT EXCHANGER extraction

In order to service / replace the air filters, they must be accessed by opening the inspection doors located on the front of the unit (inspection side), as shown in the picture here below.



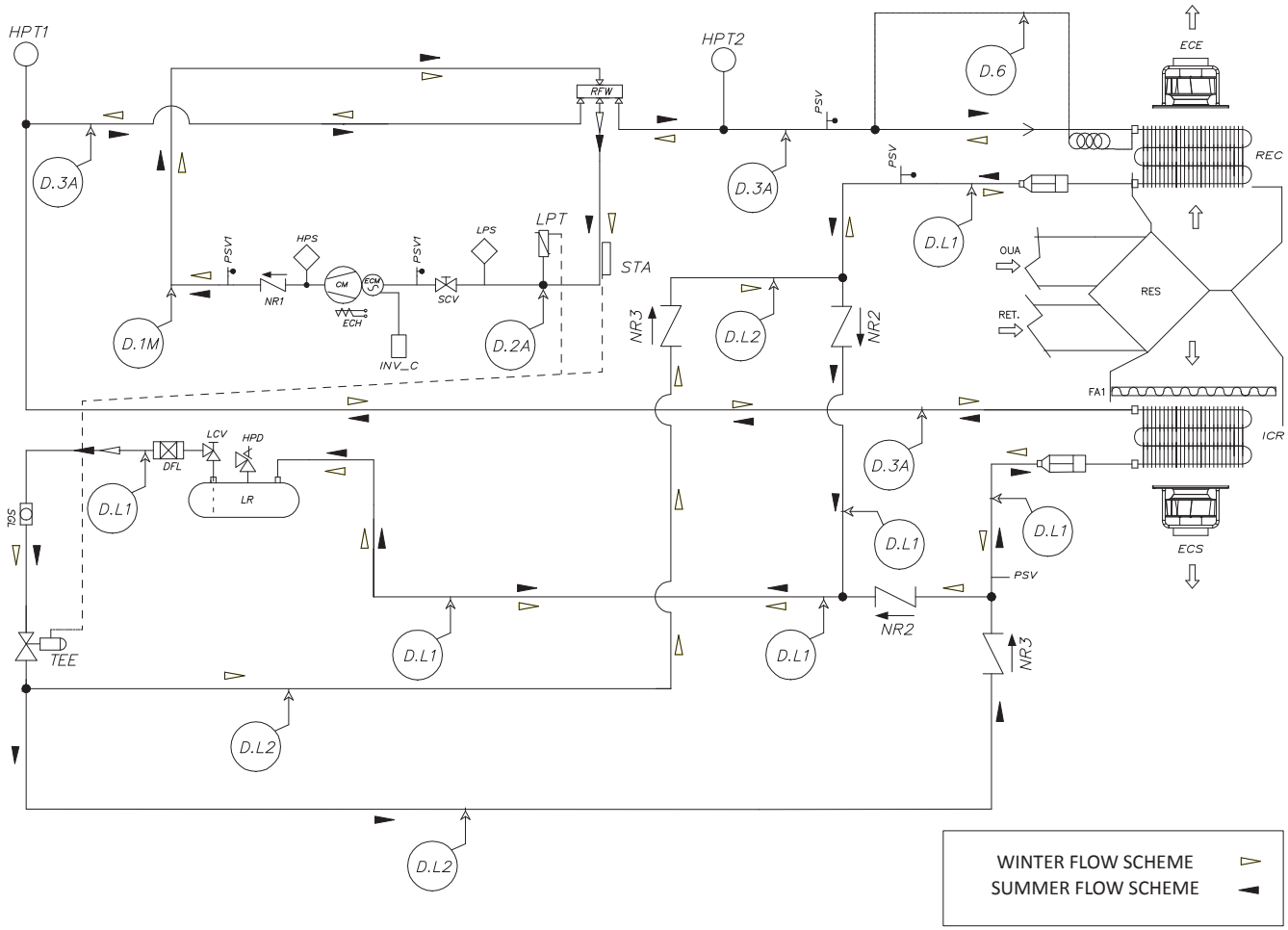
In order to inspect, service and extract the heat exchanger, unscrew the screws on the rear panel of the unit (opposite the inspection side), as shown in the picture here below.



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

16. REFRIGERANT DIAGRAM

16.1 Refrigerant circuit with 1 compressor

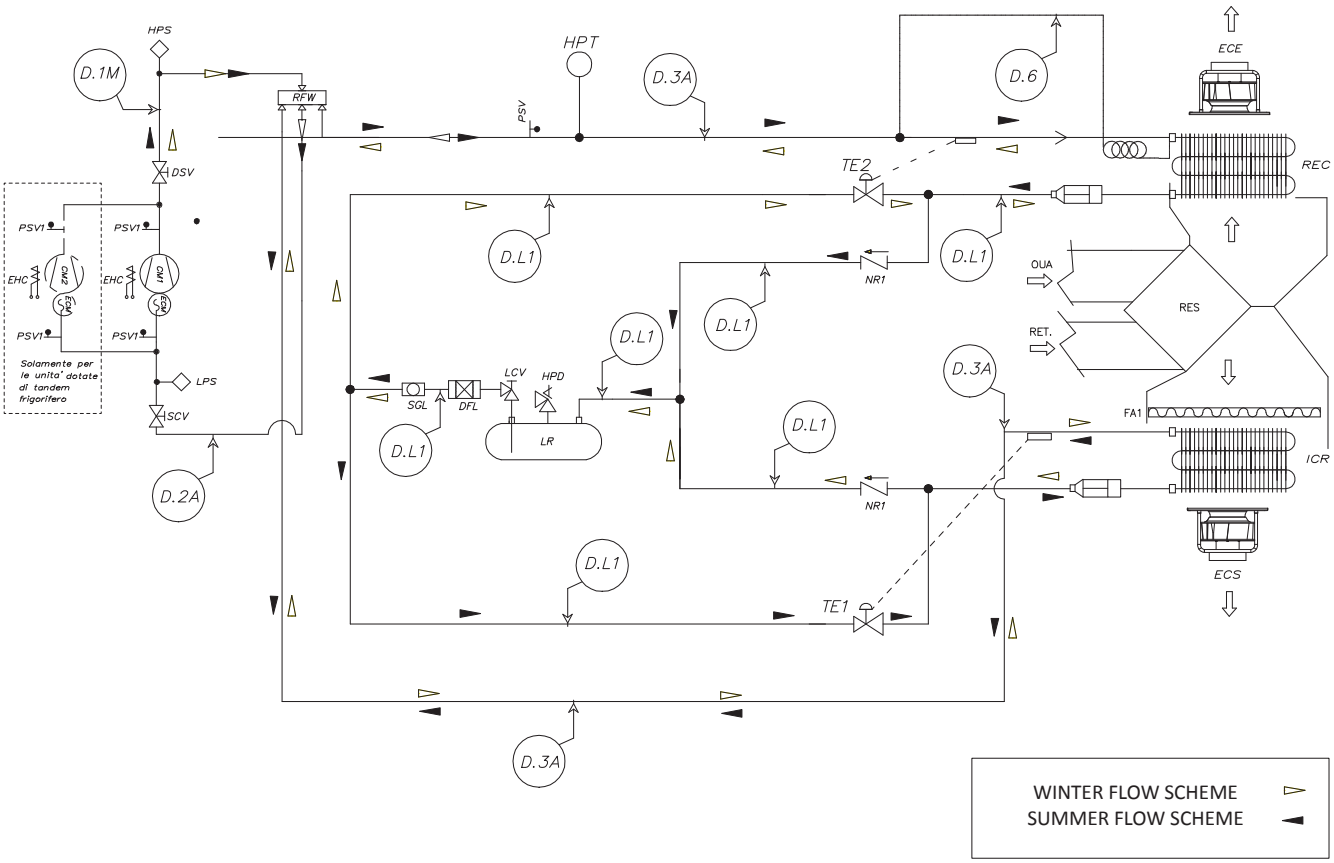


COMPONENTS OVERVIEW

CM	Compressor type Scroll
NR1	Non-return valve on supply
ECH	Heater on compressor crankcase
INV_C	Frequency converter on compressor
LPT	Transducer LP
HPS	Pressure switch HP with manual reset
HPD	Safety valve HP
HPT1 - HPT2	Transducer HP
STA	NTC probe on suction
RFW	4-way reverse valve
REC	Finned recovery exchanger
ECE	Extraction fans
ICR	Finned internal exchanger
ECS	Supply fans
NR2	Liquid line non-return valve
NR3	Expansion line non-return valve

SGL	Liquid / humidity indicator
TEE	Electronic expansion valve
DFL	Liquid line filter drier
LVC	Liquid line tap
LR	Liquid receiver
RES	Air/air plate heat recovery exchanger
OUA	Fresh air inlet
RET	Return air inlet
FA1	Air filters
D.1M	Supply line CU *(DN max 32)*
D.2A	Suction line CU *(DN max 32)*
D.3A	Common suction/supply CU *(DN max 32)*
D.L1	Liquid line CU *(DN max 32)*
D.L2	Liquid expansion line CU *(DN max 32)*
PSV	Single service outlet with pressure pin
PSV1	Double service outlet with pressure pin
D.6	Capillary tube CU *(optional)*

16.2 Refrigerant circuit with 2 compressors



COMPONENTS OVERVIEW

CM	Compressor circuit 1	**SGL**	Liquid / humidity indicator
DSV	Globe type tap on supply	**TE2**	Electronic expansion valve
ECH	Heater on compressor crankcase	**DFL**	Liquid line filter drier
SCV	Globe type tap on suction	**LVC**	Liquid line tap
LPS	Low pressure switch	**LR**	Liquid receiver
HPS	Pressure switch HP with manual reset	**RES**	Air/air plate heat recovery exchanger
HPD	Safety valve HP	**OUA**	Fresh air inlet
HPT	Transducer HP	**RET**	Return air inlet
TE1	Mechanical summer thermostatics	**FA1**	Air filters
RFW	4-way reverse valve	**D.1M**	Supply line CU *(DN max 32)*
REC	Finned recovery exchanger	**D.2A**	Suction line CU *(DN max 32)*
ECE	Extraction fans	**D.3A**	Common suction/supply CU *(DN max 32)*
ICR	Finned internal exchanger	**D.L1**	Liquid line CU *(DN max 32)*
ECS	Supply fans	**PSV**	Single service outlet with pressure pin
NR1	Liquid line non-return valve	**PSV1**	Double service outlet with pressure pin
NR3	Expansion line non-return valve	**D.6**	Capillary tube CU *(optional)*

17. 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.

17.1 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.

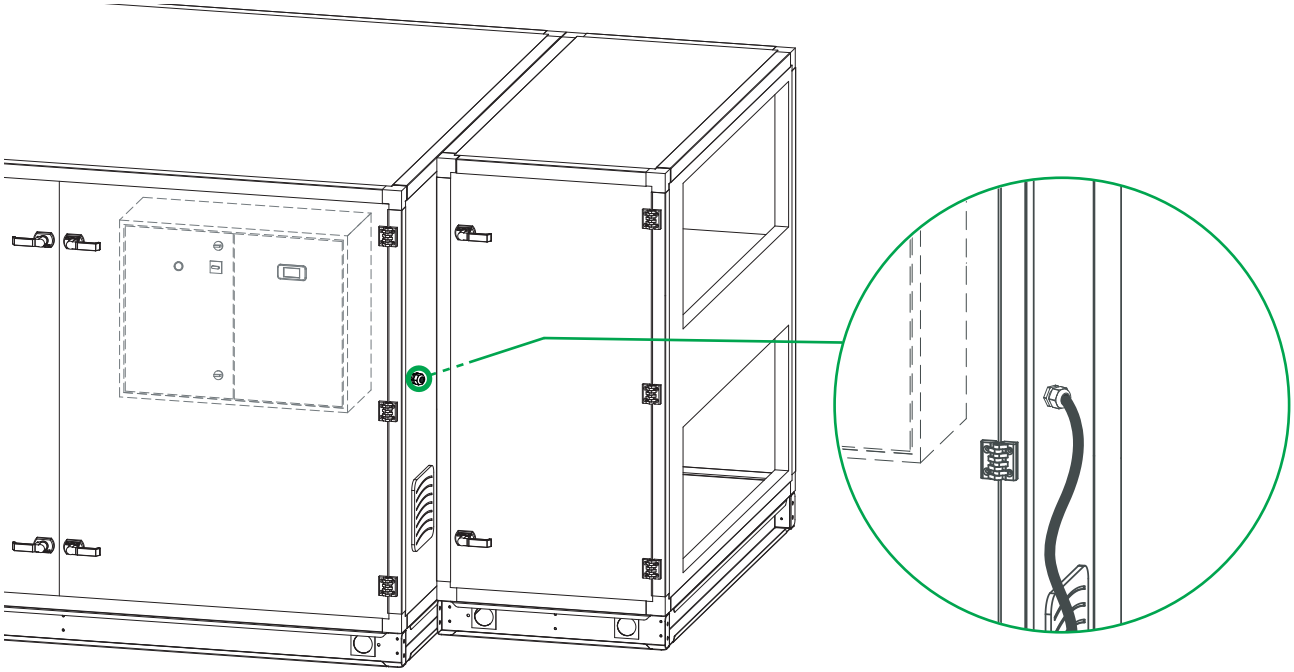
MODEL		011	021	031	041	061 | 062
Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Control circuit		12 VDC / 24 VAC				

MODEL		081 | 082	101 | 102	132	172	242
Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Control circuit		12 VDC / 24 VAC				

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

17.2 Power supply connection

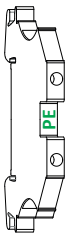
The electrical panel is located inside the unit and it is accessible through the inspection door on the front of the unit (inspection side). To connect the power supply, use the cable gland on the side panel of the section and connect the power cable inside the electrical cabinet to the disconnecting mainswitch.



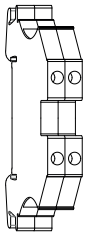
17.3 Terminal Block Connections

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

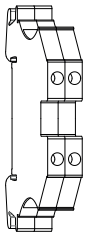
All the terminals shown in the following tables are in the terminal block inside the electrical cabinet, all the electrical connections mentioned below must be made in the field by the installer.



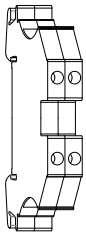
THREE-PHASE POWER SUPPLY
It is used to power supply all the units with three-phase system.
The power cable should be connected directly to the mainswitch.
The earth terminal is present (PE).



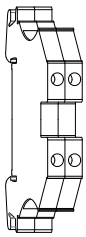
REMOTE ON/OFF
It is used to turn on/off the unit from a remote device.
The units are supplied as standard from the factory with jumpered terminals.
Closed contact: unit is ON;
Open contact: unit is OFF.



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.

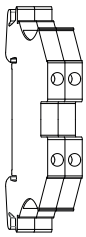


REMOTE GENERAL ALARM
For remote signalling of a general alarm.
Voltage-free contact.



WATER COIL PUMP CONTROL *
Control by voltage-free contact, which sends a consent to the external water pump, if present:

accessory cooling coil;
accessory heating coil;



HUMIDIFIER CONTROL *
Control by voltage-free contact, which sends a consent to the external humidifier, if present.

* accessory

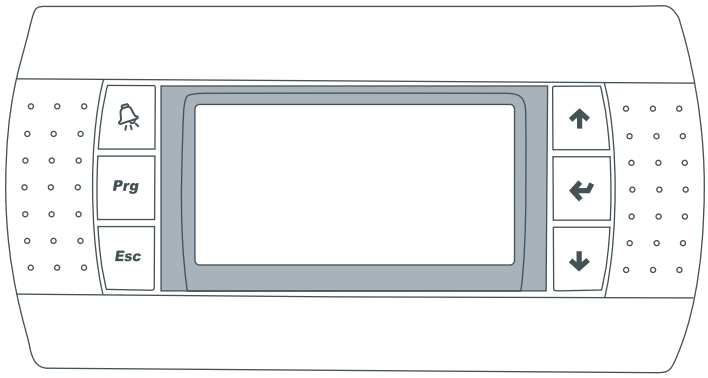
17.4 Connections on main board

MODBUS RS-485 CONNECTION on port BMS / FieldBUS2
Rx- / Tx- connect the negative pole (-) of the ModBus network;
Rx+ / Tx+ connect the positive pole (+) of the ModBus network;
GND connect the GND of the ModBus network;
allows connection to a supervisory system (BMS) via ModBus RTU communication protocol on RS-485 serial line.

ADDITIONAL DISPLAY CONNECTION
Display port allow connection of an additional diplay on a serial dedicated port.

17.5 Description of the remotable control panel

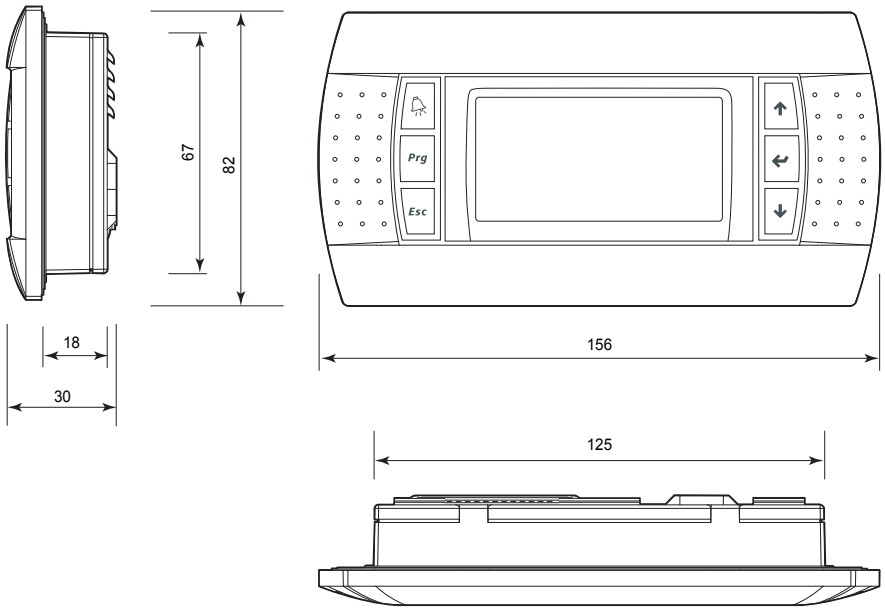
17.5.1 Position of the control panel



17.5.2 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.

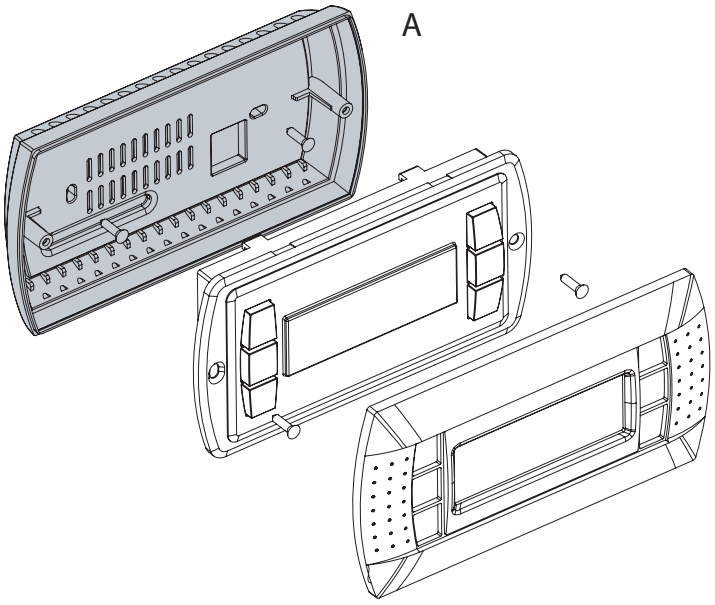
17.5.3 Dimensions



17.5.4 Wall installation

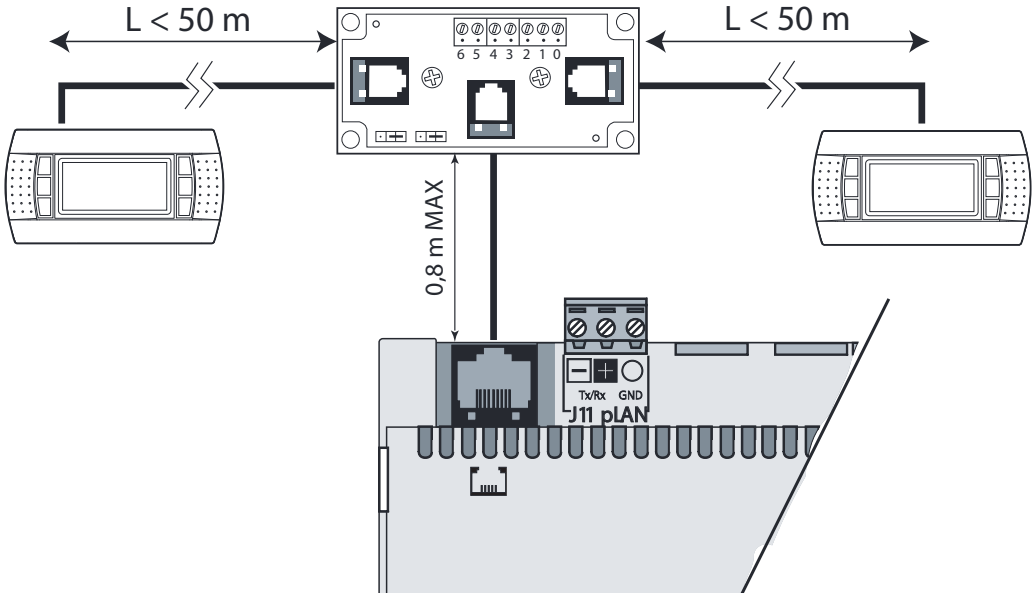
The wall mounting of the control panel considers the fixing of the back side of the container A or the standard 3-module case for switches.

- 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.



17.5.5 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).

18. STARTUP

18.1 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.

18.2 Checks during the operation

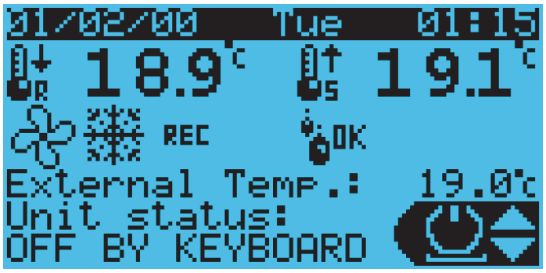
Check the rotation of the compressors and the fans. If the rotation is incorrect, immediately disconnect the unit from the main switch and change any one of the phases entering the main switch, so as to invert the rotation sense of the motors.

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.

19. UNIT USE

19.1 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 and switching on the Drycooler.
i	Allows access to the menu with general information on the unit.

19.2 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.

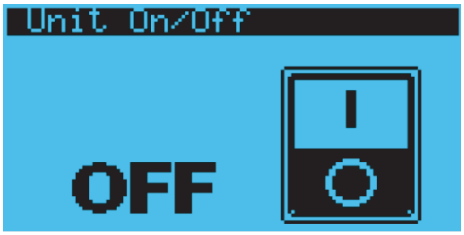
The units are equipped with a highly-sophisticated control system, with several parameters which may not be modified by the end user; these parameters are protected by manufacturer password.

19.3 Switching on and parameters setting

SWITCH THE UNIT ON

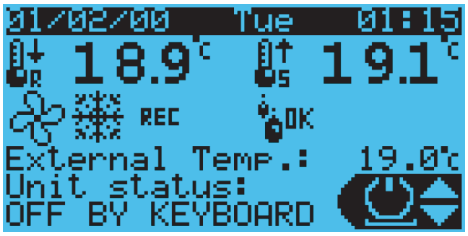
Once the heat recovery unit is supplied electrically and the main switch turned on, the display will be activated and will show the "**OFF**" screen, meaning unit OFF from keyboard.

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.



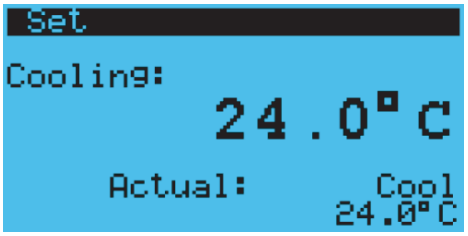
USER MENU

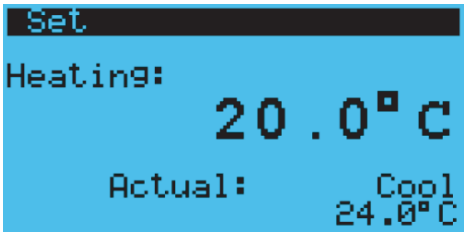
The visualization of the menu is done by pressing the key ↑ or ↓.
The following menus will be shown cyclically:
INFO
SET
ALARM

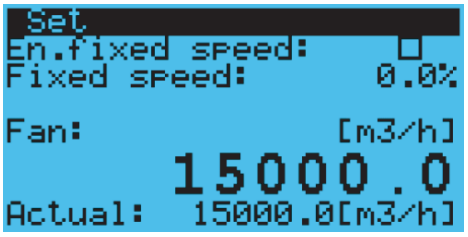
SET MENU

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.

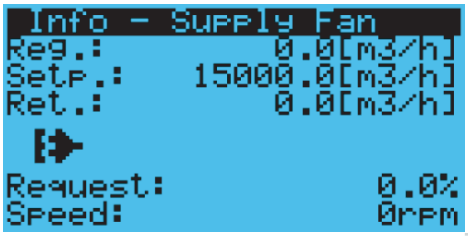
INFO MENU

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

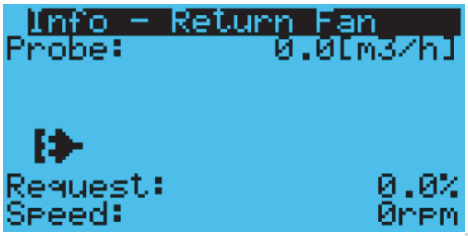
Press the key or to display the following parameters:

Information on the thermal controls of the unit.

External air damper position ON/OFF.

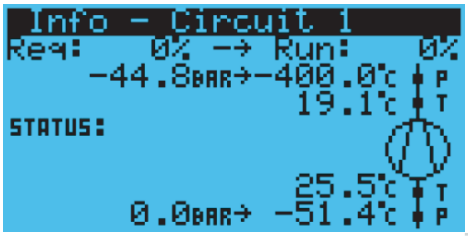


Information on the control of the supply fan.

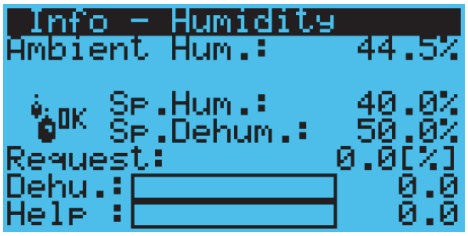


Reading of the retrun air differential pressure sensor and return air fan request.

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

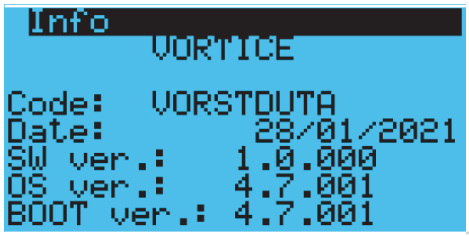


Information on the compressor control and status.

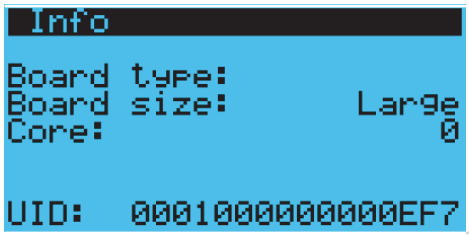


Information on the humidity control.

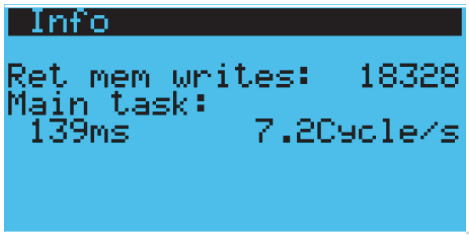
Information on the post-heating control.



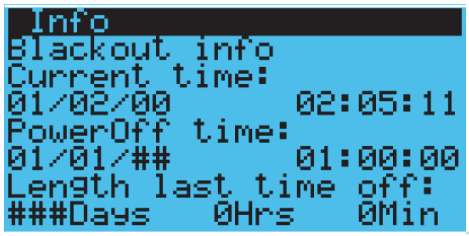
Software version, boot and OS.



Hardware information.

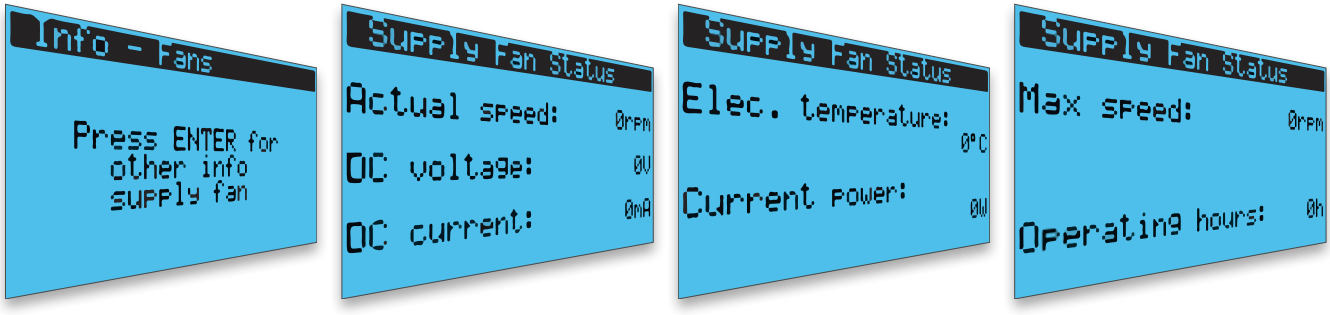


Performance hardware.



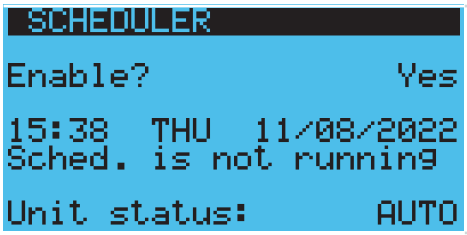
Blackout info.

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



19.4 Enabling time bands

Press the button ***Prg*** to access the main menu for changing parameters. If required, enter the password **0000** to access. Go to the **Scheduler** menu item and then activate the time bands with the option **Enable? *Yes*** .



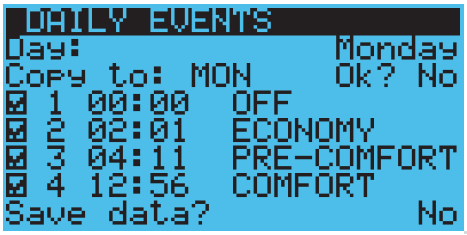
1° Enabling time bands management.

Time bands management is divided into the following order of priority:
- Special days;
- Vacation periods;
- Days of the week.

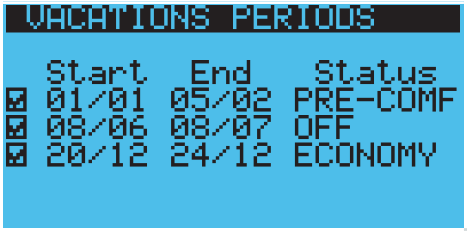
The operating modes of the unit in settable time bands are as follows:
- Unit off (**OFF**);
- Economy mode (**ECO**);
- Pre-comfort mode (**P-C**);
- Comfort mode (**COM**).

In the economy, pre-comfort and comfort modes, the following setpoints can be defined:
- Cooling;
- Heating.

The settable setpoints are accessible according to the configured unit type.

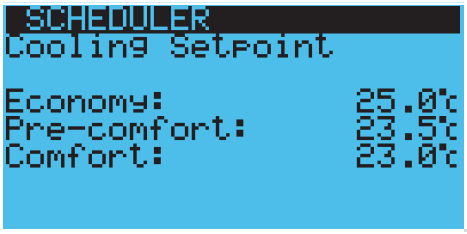


1° Selection day on which the time bands are to be configured.
2° Select day to which the currently selected time bands are to be copied.
3° Confirm copy time bands.
4°-7° First/Second/Third/Fourth configurable time bands.
(Up to 4 time bands can be configured per day).
8° Confirm saving of configured time bands.

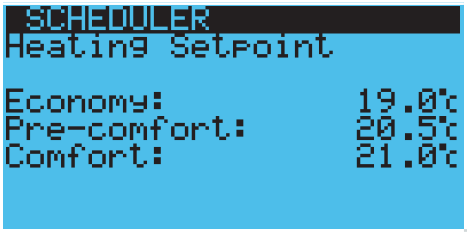


1°-3° First/Second/Third configurable vacation period.
(Up to 3 vacation periods can be configured)

1°-6° First/Second/Third/Fourth/Fifth/Sixth configurable special days.
(Up to 6 special days can be configured)



1° Cooling setpoint in economy mode (ECO).
2° Cooling setpoint in pre-comfort mode (P-C).
3° Cooling setpoint in comfort mode (COM).
When the unit is in scheduler off (OFF), the working setpoint of the automatic mode (AUTO) is maintained.



1° Heating setpoint in economy mode (ECO).
2° Heating setpoint in pre-comfort mode (P-C).
3° Heating ling setpoint in comfort mode (COM).
When the unit is in scheduler off (OFF), the working setpoint of the automatic mode (AUTO) is maintained.

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.

20. DIAGNOSIS AND TROUBLESHOOTING

20.1 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.

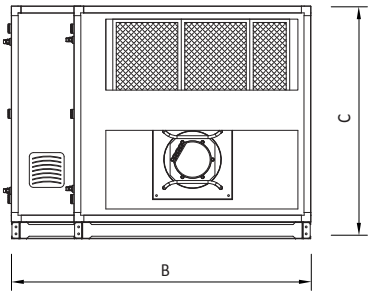
CODE	ALARM DESCRIPTION	PARAMETERS
AL001	Too many mem writings	
AL002	Retain mem write error	
AL003	Return temperature probe error	
AL004	Supply temperature probe error	
AL005	External humidity probe error	
AL006	External temperature probe error	
AL007	Recovery temperature probe error	
AL008	Ambient humidity probe error	
AL009	CO_2 probe error	
AL010	Supply differential pressure probe error	
AL011	Return differential pressure probe error	
AL012	Discharge pressure circ.1 probe error	
AL013	Suction pressure circ.1 probe error	
AL014	Discharge temperature circ.1 probe error	
AL015	Suction temperature circ.1 probe error	
AL016	Liquid temperature circ.1 probe error	
AL017	Discharge pressure circ.2 probe error	
AL018	Suction pressure circ.2 probe error	
AL019	Discharge temperature circ.2 probe error	
AL020	Suction temperature circ.2 probe error	

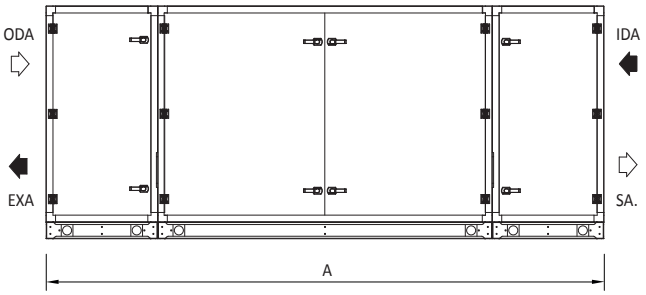
CODE	ALARM DESCRIPTION	PARAMETERS
AL021	Liquid temperature circ.2 probe error	
AL028	Alarm remote	
AL029	Alarm antifreeze switch	
AL030	Overload heater	
AL031	Alarm air filter	
AL032	High compression ratio circuit 1	
AL033	High discharge pressure circuit 1	
AL034	High motor current circuit 1	
AL035	High suction pressure circuit 1	
AL036	Low compression ratio circuit 1	
AL037	Low differential pressure circuit 1	
AL038	Low discharge pressure circuit 1	
AL039	Low suction pressure circuit 1	
AL040	High discharge temp. circuit 1	
AL041	High compression ratio circuit 2	
AL042	High discharge pressure circuit 2	
AL043	High motor current circuit 2	
AL044	High suction pressure circuit 2	
AL045	Low compression ratio circuit 2	
AL046	Low differential pressure circuit 2	
AL047	Low discharge pressure circuit 2	
AL048	Low suction pressure circuit 2	
AL049	High discharge temp. circuit 2	
AL050	Low SuperHeat EVD circuit 1	
AL051	LOP EVD circuit 1	
AL052	MOP EVD circuit 1	
AL053	High condensing temp. EVD circuit 1	
AL054	Low suction temp. EVD circuit 1	
AL080	Alarm HP circuit 1 pressure switch	
AL081	Alarm LP circuit 1 pressure switch	
AL082	Overload compressor 1 circuit 1	
AL083	Overload compressor 2 circuit 1	
AL084	Overload compressor 3 circuit 1	

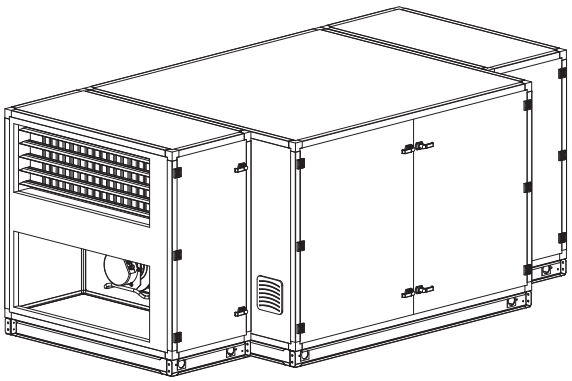
CODE	ALARM DESCRIPTION	PARAMETERS
AL086	Alarm HP circuit 2 pressure switch	
AL087	Alarm LP circuit 2 pressure switch	
AL088	Overload compressor 1 circuit 2	
AL089	Overload compressor 2 circuit 2	
AL090	Overload compressor 3 circuit 2	
AL092	Warning timeout recovery defrost	
AL155	Offline supply diff.pressure sensor	
AL156	Offline return diff.pressure sensor	
AL274	Offline cpCOe 1	
AL275	Configuration error cpCOe 1	
AL276	Serious alarm supply fans 0-10V	
AL277	Serious alarm return fans 0-10V	
AL278	Overload coil 1 pump	
AL279	Overload coil 2 pump	
AL280	Overload heating coil pump	
AL281	Inlet rec.pool temp. probe error	

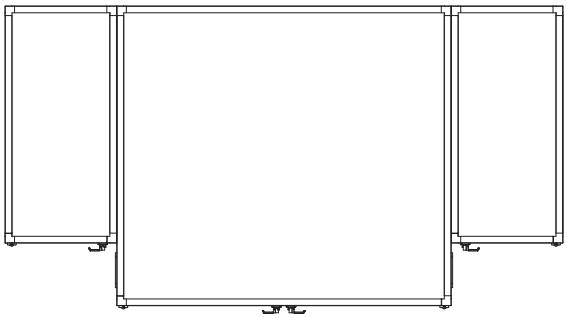
21. DIMENSIONAL DRAWINGS

CONFIGURATION H1









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 (50 mm profile)

MOD.	011	021	031	041	061 | 062	081 | 082	101 | 102	132	172	242
A [mm]	2860	2900	3250	3650	3650	3900	4000	4360	4900	5300
B [mm]	1150	1350	1500	1650	1900	2150	2250	2280	2380	2380
C [mm]	1020	1270	1300	1550	1700	1700	1820	2220	2550	2750
Weight [kg]	319	464	581	714	929	1043	1160	1375	1706	1932

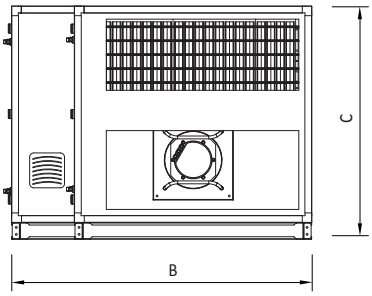
Dimensions and weights refer to standard version without accessories

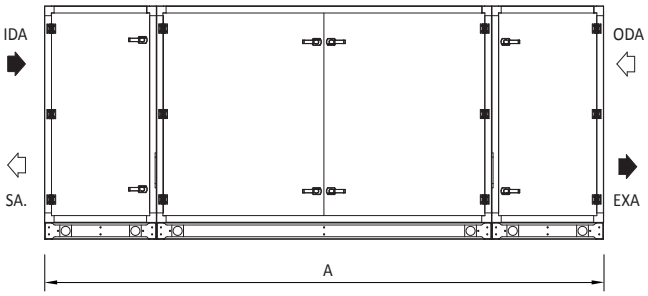
GENERAL DIMENSIONAL DATA (60 mm profile)

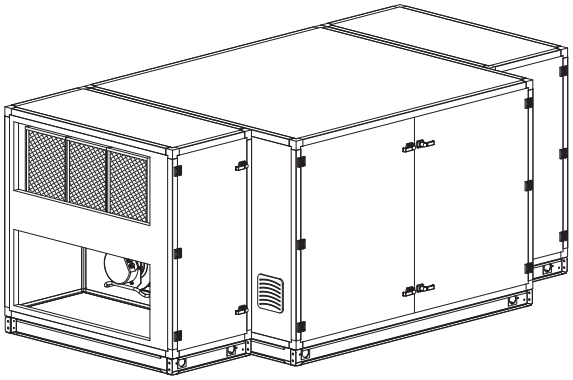
MOD.	011	021	031	041	061 | 062	081 | 082	101 | 102	132	172	242
A [mm]	2880	2920	3270	3670	3670	3920	4020	4380	4920	5320
B [mm]	1170	1370	1520	1670	1920	2170	2270	2300	2400	2400
C [mm]	1040	1290	1320	1570	1720	1720	1840	2240	2570	2770
Weight [kg]	325	473	592	728	947	1064	1183	1402	1740	1970

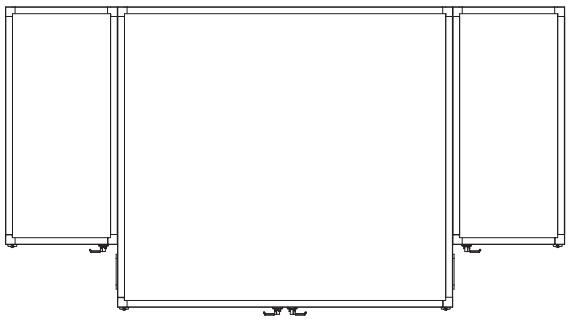
Dimensions and weights refer to standard version without accessories

CONFIGURATION H2









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 (50 mm profile)

MOD.	011	021	031	041	061 | 062	081 | 082	101 | 102	132	172	242
A [mm]	2860	2900	3250	3650	3650	3900	4000	4360	4900	5300
B [mm]	1150	1350	1500	1650	1900	2150	2250	2280	2380	2380
C [mm]	1020	1270	1300	1550	1700	1700	1820	2220	2550	2750
Weight [kg]	319	464	581	714	929	1043	1160	1375	1706	1932

Dimensions and weights refer to standard version without accessories

GENERAL DIMENSIONAL DATA (60 mm profile)

MOD.	011	021	031	041	061 | 062	081 | 082	101 | 102	132	172	242
A [mm]	2880	2920	3270	3670	3670	3920	4020	4380	4920	5320
B [mm]	1170	1370	1520	1670	1920	2170	2270	2300	2400	2400
C [mm]	1040	1290	1320	1570	1720	1720	1840	2240	2570	2770
Weight [kg]	325	473	592	728	947	1064	1183	1402	1740	1970

Dimensions and weights refer to standard version without accessories

22. UNIT MAINTENANCE

22.1 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.

22.2 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.

22.3 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).

22.4 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 R134a or R410A, 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.

23. DISMANTLEMENT, MATERIALS' DISPOSAL AND RECYCLING

23.1 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.

23.2 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