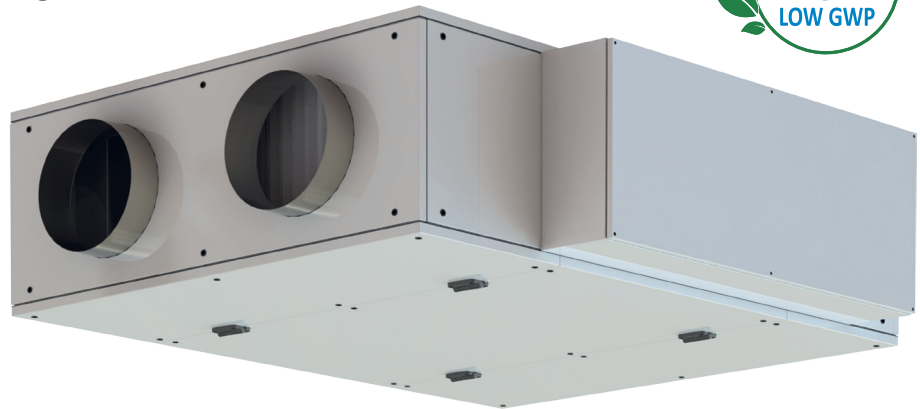


# RXC/Hi

## INTEGRATED REFRIGERANT CIRCUIT HEAT RECOVERY UNITS



### INTRODUCTION

Any occupied room requires the correct supply of fresh air and at the same time the control of the internal thermo-hygrometric conditions.

Through the recovery of energy from the air extracted from the room, through the use of systems with integrated heat pump technology, we offer a highly efficient solution to meet the needs of thermo-hygrometric well-being and air exchange in civil and tertiary air conditioning systems such as offices, bars, restaurants, etc., both in summer and winter and without additional charges in the management of primary air.

The RXC/Hi units are particularly efficient since they use a high efficiency plate heat recovery, combined with a cooling

circuit in heat pump operating with inverter compressor. The use of the high-efficiency plate heat recovery makes it possible to significantly reduce the period of use of the cooling circuit during the year, thus reducing its use to short periods, thus limiting electricity consumption to a minimum.

The compact dimensions of the units allow for easy installation even in false ceilings while maintaining excellent accessibility for the maintenance of all internal components.

The numerous accessories available on request complete the functions of the unit, which generally has to be combined with an air conditioning system.



## OPERATING MODE

### • HEATING MODE

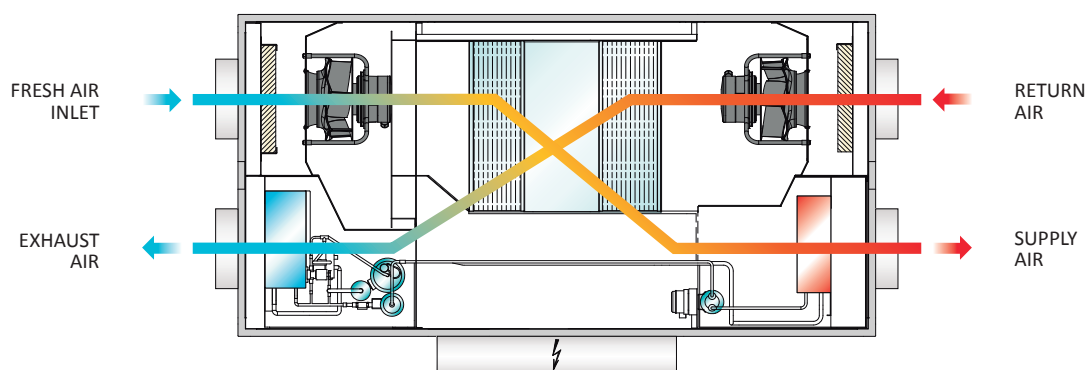
The return air, after passing through the cross-flow heat recovery, goes to feed the heat pump source exchanger that operates as an evaporator.

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.

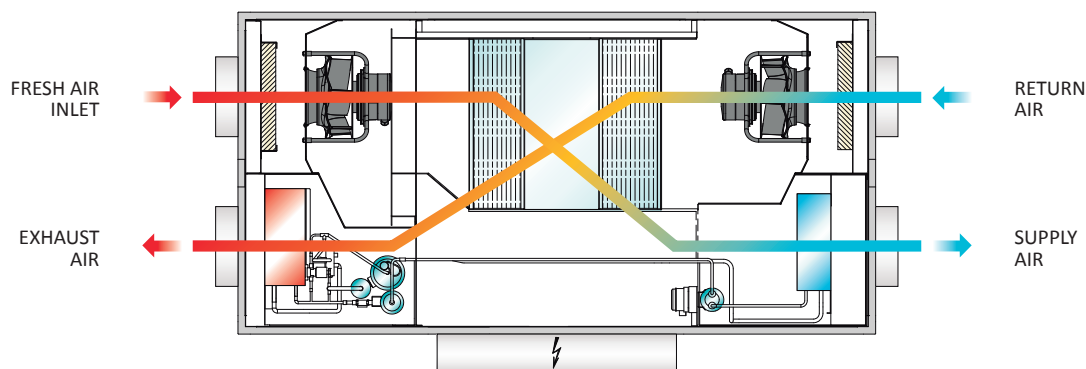
To prevent this from happening, the unit provides controlled management of a defrosting cycle obtained by reversing the refrigeration cycle. During this phase the return fans are stopped and the compressors forced at maximum speed. Through the additional heating resources present in the unit, water heating coils or electrical resistances, the supply air temperature is maintained at a suitable value so as not to disturb the internal environment.



### • COOLING 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.

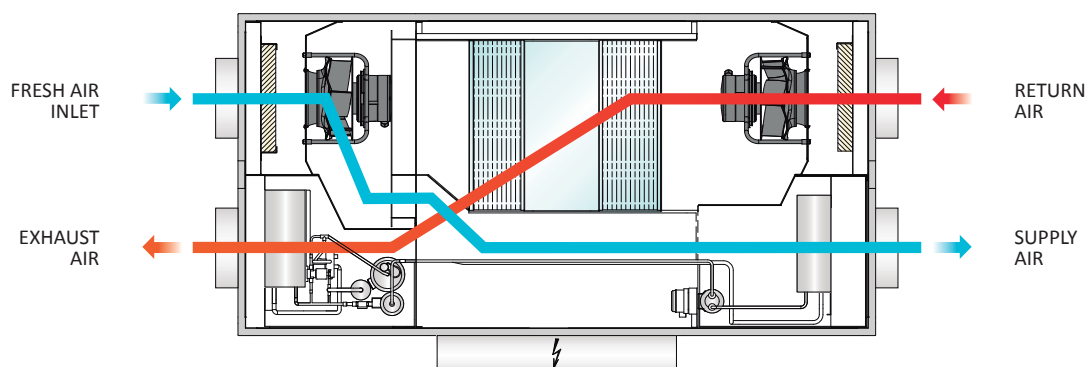
The fresh air, after passing through the cross-flow heat recovery, is cooled by the heat pump user heat exchanger, which operates as an evaporator.



### • FREE-COOLING

When the outside temperature is lower than the inside temperature of the room to be air-conditioned, if this needs

cooling, the units operate in free-cooling mode and all integrated heat recovery stages are disabled.



## MAIN CHARACTERISTICS

### 1 | STRUCTURE AND PANELS

Structure in RAL 9010 steel profiles, pre-painted at 180°C with polyurethane powder paint and 25 mm thick panels. Sheets with 6/10" thickness covered with protective film, in galvanized steel. The internal insulation is made of high density polyurethane foam (40 kg/m<sup>3</sup>) or mineral wool (90 kg/m<sup>3</sup>). The frame is made according to EN1886 standard, class D1 mechanical resistance, class T3 thermal transmittance, air tightness class L1, thermal break factor TB3.

The air tightness is guaranteed by a particularly adaptable and resilient neoprene gasket, the tightening of the opening panels is made by means of push screws that ensure an adequate and constant pressure on the gaskets. In all areas subject to condensation there is a condensation tray in AISI 304 stainless steel, inclined internally and in compliance with EN 1.4301.

### 2 | AIR FILTERS

ePM<sub>10</sub> 60% (M5) filters in air extraction and ePM<sub>1</sub> 55% (F7) filters in fresh air intake, in compliance with international norms. Both types of filters are mounted on slides equipped with gaskets to guarantee an effective seal. Their position, upstream of the internal components, also guarantees their protection.

### 3 | HEAT RECOVERY (1° recovery stage)

The units are equipped with an aluminium counter-flow heat exchanger used to transfer heat from the exhaust air to the incoming fresh air.

The heat exchange takes place in counter-flow with efficiencies higher than 85%. The spacing between the fins is optimized in order to reduce air side pressure drop and fan power consumption.

In some conditions of low fresh air temperature and high humidity, the exchanger may start to frost. Through the integrated control system it is possible to manage the defrosting of the exchanger.

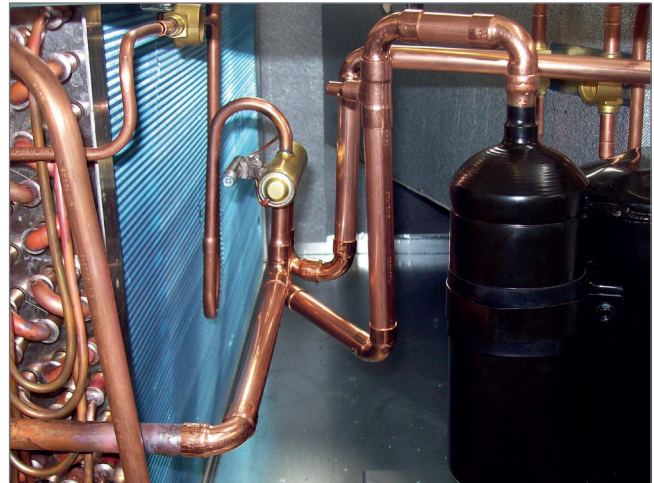
The heat recovery is also equipped with an additional by-pass damper for the management of the free-cooling and free-heating mode.



HEAT RECOVERY

### 4 | REFRIGERANT CIRCUIT IN HEAT PUMP (2° recovery stage)

The efficiency of the unit is further increased thanks to a second phase of indirect recovery, obtained through a heat pump refrigeration circuit compression system. The cooling circuit is equipped with a rotary or Scroll



REFRIGERANT CIRCUIT

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

### 5 | ELECTRIC BOX

The electric box is manufactured according to IEC 204-1 / EN 60204-1 standards and complete with door block disconnecter, 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.

## MAIN CHARACTERISTICS

### 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.

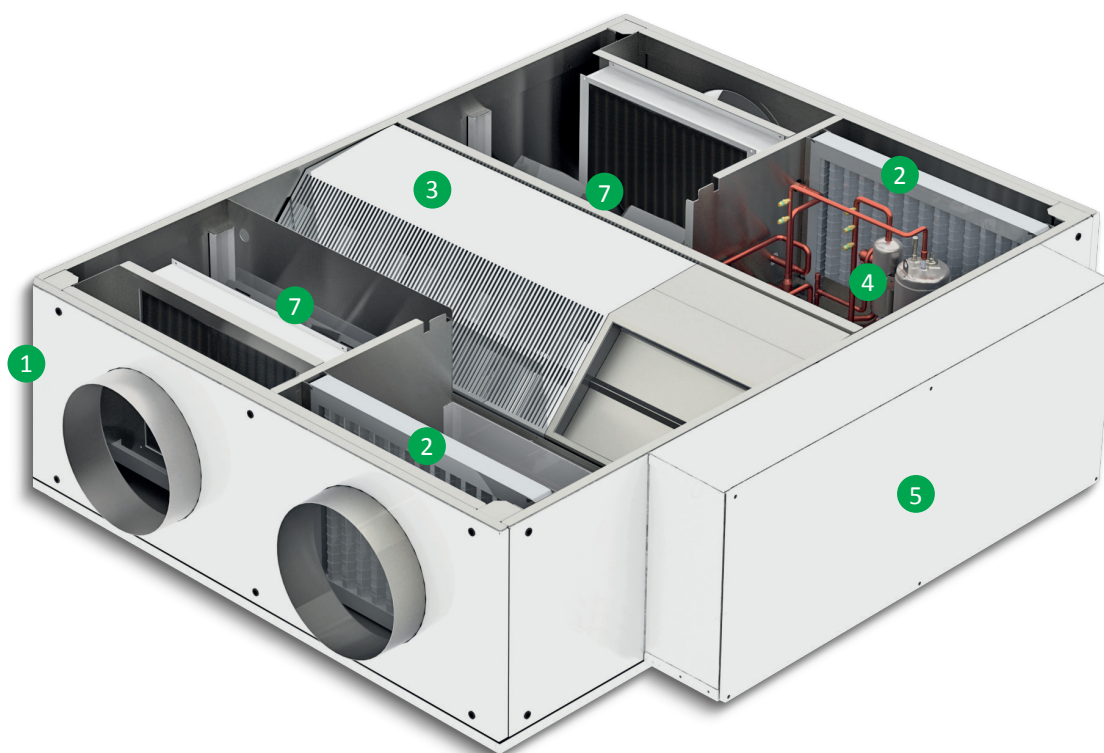
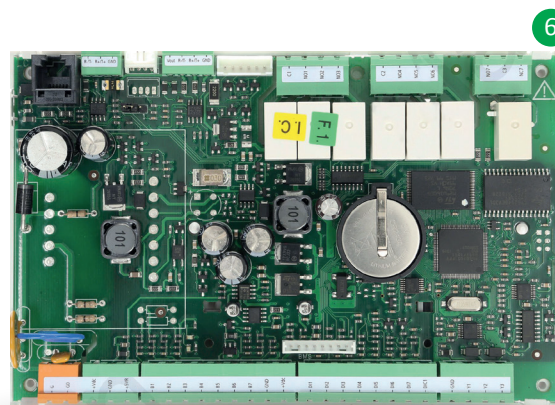


### 7 | FANS

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

### ADDITIONAL COILS (external module)

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



## TECHNICAL DATA

MODEL		005	010	015	025	035
Nominal airflow rate	m <sup>3</sup> /h	500	1000	1500	2500	3500
Thermal efficiency recovery in cooling mode <sup>(1)</sup>	%	77,3	77,5	75,6	74,6	73,8
Total unit cooling capacity <sup>(1)</sup>	kW	3,8	7,2	9,9	15,3	19,4
Total unit EER <sup>(1)</sup>	-	3,8	3,7	3,6	3,4	3,6
Electrical power absorbed in cooling mode <sup>(1)</sup>	kW	1,01	1,98	2,77	4,53	5,37
Heating recovery thermal efficiency <sup>(2)</sup>	%	84,0	85,1	83,4	80,8	80,2
Total thermal power of unit <sup>(2)</sup>	kW	6,59	12,7	18,5	29,0	37,2
Total unit COP <sup>(2)</sup>	-	7,7	7,5	7,5	6,7	7,8
Electrical power absorbed in heating <sup>(2)</sup>	kW	0,85	1,71	2,47	4,35	4,79
Supply fan available static pressure	Pa	200	200	200	200	200
Return fan available static pressure	Pa	150	150	150	150	150
N° of compressors (DC inverter) / refrigerant circuits	n°	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
Type of refrigerant / GWP		R32 / 675				
Refrigerant charge / CO <sub>2</sub> equivalents ton	n°	1,08 / 0,73	1,39 / 0,94	1,54 / 1,04	2,29 / 1,55	2,42 / 1,63
Max. electricity absorbed by the unit	A	12,3	13,4	17,6	18,7	21,4
Power supply	V/ph/Hz	230/1/50		400/3/50		
Type of filters for fresh air section		ePM <sub>1</sub> 55% (F7)				
Type of filters for return air section		ePM <sub>10</sub> 60% (M5)				
SFP <sub>int</sub>	W/(l/s)	655	745	788	1081	976
Sound power level <sup>(3)</sup>	dB(A)	76,5	78,7	77,5	85,4	88,3
Sound pressure level <sup>(4)</sup>	dB(A)	61,8	63,5	62,2	69,4	72,1

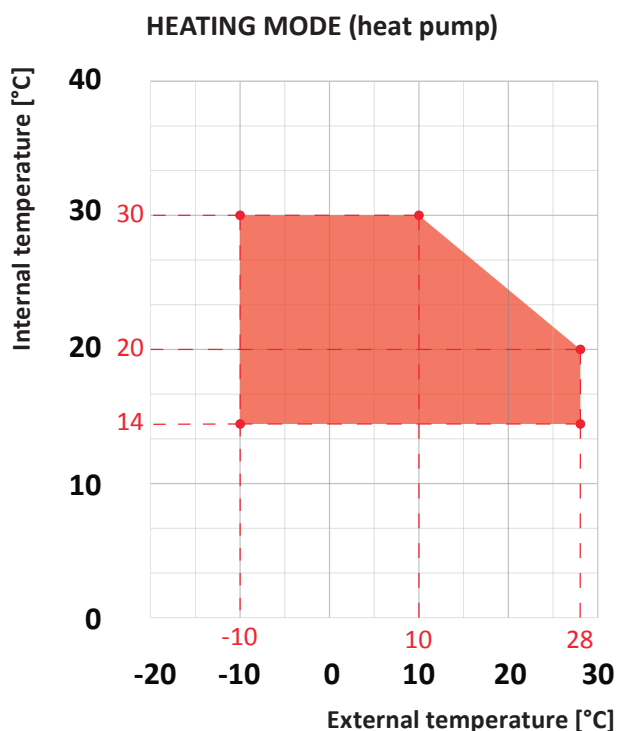
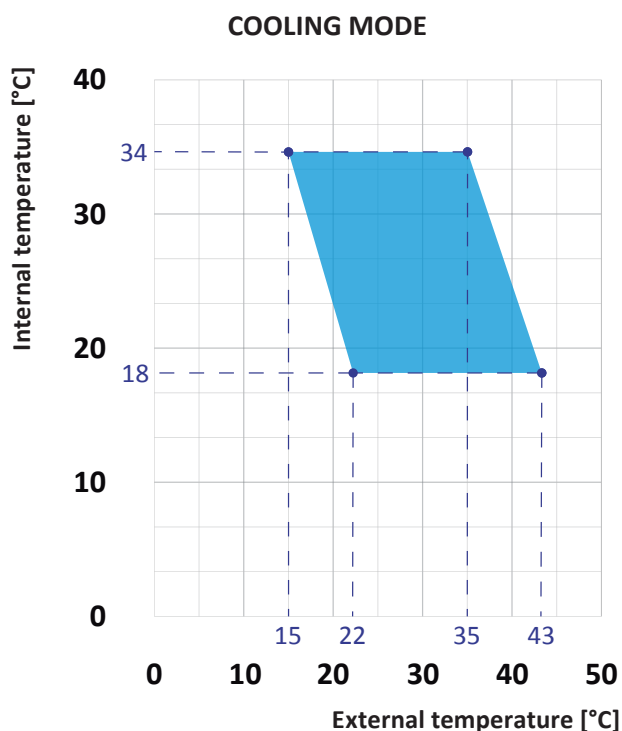
<sup>(1)</sup> fresh air inlet +35 °C / 40% RH, return air +26 °C / 50% RH

<sup>(2)</sup> fresh air inlet -5 °C / 80% RH, return air +20 °C / 50% RH

<sup>(3)</sup> sound power level calculated in accordance with EN 3744

<sup>(4)</sup> sound pressure level measured at 1 m free field distance, in accordance with EN 3744

## OPERATING LIMITS



## ACCESSORIES

### **ePM<sub>10</sub> 50% (G4) air pre-filter**

The filter media has a low pressure drop and it may be installed as pre-filter in combination with the ePM<sub>10</sub> 60% (M5), ePM<sub>1</sub> 55% (F7) or ePM<sub>1</sub> 80% (F9).

### **ePM<sub>10</sub> 60% (M5) air filter**

The filter media has an ePM<sub>10</sub> 60% (M5) filtering degree, according to ISO 16890 and has a large filtering surface area that guarantees long operating life and less frequent replacements.

### **ePM<sub>1</sub> 55% (F7) air filter**

The filter media has an ePM<sub>1</sub> 55% (F7) filtering degree, according to ISO 16890 and has a large filtering surface area that guarantees long operating life and less frequent replacements.

### **ePM<sub>1</sub> 80% (F9) air filter**

The filter media has an ePM<sub>1</sub> 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.

### **Electric re-heating coil (internal)**

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

### **Hot water coil (external)**

The hot water coils are supplied in a dedicated section to be installed in the supply air-flow line. The casing has the same sizes and features of the main unit and it is fixed with a dedicated installation kit supplied with it.

The coil is manufactured with copper pipes thickness 0,4 mm and aluminium fins thickness 0,11 mm. The pipes are mechanically expanded in the aluminium fins to increase the thermal exchange rate.

On request, it is possible to install coils with different capacities from the standard ones, when previously agreed with the factory.

### **Cold water coil (external)**

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

The pipes are mechanically expanded in the aluminium fins to increase the thermal exchange rate.

On request, it is possible to install coils with different capacities from the standard ones, when previously agreed with the factory.

The cooling coil section is supplied complete with condensate drain pan with side water discharge.

### **3 way modulating valve**

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

### **Air damper with actuator**

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

### **Supply / Return side sound attenuator**

The sound attenuator consists of a cylindrical section made in galvanized steel sheet, containing a mineral wool sound proofing material covered with glass wool jacket and perforated galvanized steel sheet containment.

The soundproofing material is class M0. The construction avoids any risk of mineral wool fraying even at high air speeds. The cylindrical section is fixed to the unit by screws.

### **Remotable control panel**

All units are supplied complete with microprocessor control board with high resolution display panel, installed on board the unit and which may be remotable up to 50 metres.

## ACCESSORIES

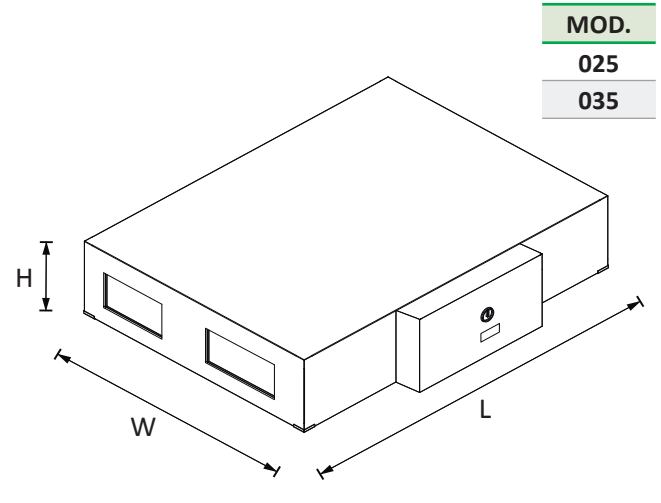
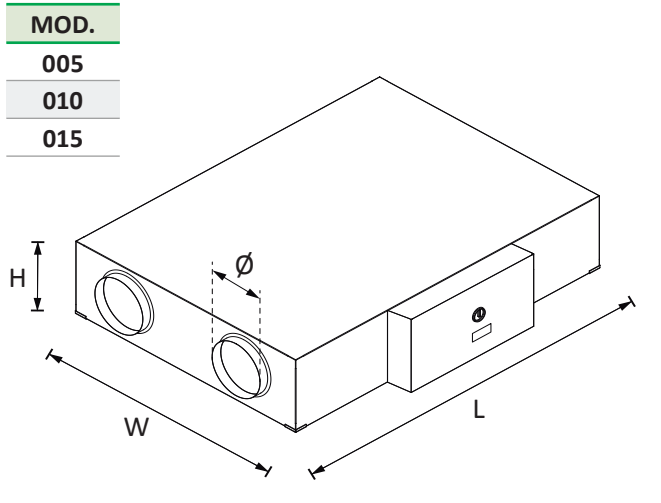
MODEL	005	010	015	025	035
EC Brushless fans on supply	■	■	■	■	■
EC Brushless fans on return	■	■	■	■	■
Fans differential pressure transducers	■	■	■	■	■
Filters differential pressure switches on supply	■	■	■	■	■
Filters differential pressure switches on return	■	■	■	■	■
Counter-flow plate heat recovery	■	■	■	■	■
100% by-pass damper with actuator	■	■	■	■	■
Inverter compressor	■	■	■	■	■
Microprocessor control system	■	■	■	■	■
Remotable control panel with LCD display	■	■	■	■	■
RS-485 serial port Modbus protocol	■	■	■	■	■
Integrated evaporator defrost system	■	■	■	■	■
25 mm frame + insulation in polyurethane 40 kg/m <sup>3</sup>	□	□	□	□	□
25 mm frame + insulation in mineral wool 90 kg/m <sup>3</sup>	□	□	□	□	□
ePM <sub>10</sub> 50% (G4) pre-filter on supply air	□	□	□	□	□
ePM <sub>10</sub> 50% (G4) pre-filter on return air	□	□	□	□	□
ePM <sub>10</sub> 60% (M5) filter on supply air	□	□	□	□	□
ePM <sub>10</sub> 60% (M5) filter on return air	□	□	□	□	□
ePM <sub>1</sub> 55% (F7) filter on supply air	□	□	□	□	□
ePM <sub>1</sub> 55% (F7) filter on return air	□	□	□	□	□
ePM <sub>1</sub> 80% (F9) filter on supply air	□	□	□	□	□
ePM <sub>1</sub> 80% (F9) filter on return air	□	□	□	□	□
Heat recovery hot gas defrost kit	□	□	□	□	□
Electric post-heating coil	□	□	□	□	□
Hot water coil <sup>(1)</sup>	□	□	□	□	□
Cold water coil <sup>(1)</sup>	□	□	□	□	□
3 way modulating valve <sup>(2)</sup>	□	□	□	□	□
Fresh air damper with On/Off actuator	□	□	□	□	□
Exhaust air damper with On/Off actuator	□	□	□	□	□
Circular duct flanges (4 pcs)	-	-	-	□	□
Sound attenuator <sup>(1)</sup>	□	□	□	□	□
Feet for floor installation	□	□	□	□	□

<sup>(1)</sup> mounted in a separated box

<sup>(2)</sup> supplied loose

■ Standard □ Optional - Not available

## DIMENSIONAL DRAWING



### DIMENSIONS AND WEIGHTS

MODEL		005	010	015	025	035
L	mm	1700	1700	1850	2200	2200
W	mm	1000	1300	1300	1650	1900
H	mm	380	500	500	580	580
Ø	mm	200	315	315	-	-
Weight *	kg	204	265	295	342	394

\* Dimensions and weights are referred to standard configuration

### CONFIGURATIONS (plan view)

