

### VORT NRG MEGA

High efficiency heat recovery units with plate heat exchanger and 50mm thick insulated panels



#### 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, by means of static counter-flow heat recoveries, the level of well-being of the occupants is guaranteed, both in summer and winter.

For buildings that require air changes and are not equipped with dedicated air conditioning systems, the installation of such units allows the supply of primary air at controlled temperature without substantially changing the internal conditions in the occupied spaces.

These units also make it possible to guarantee support for the air conditioning system in the intermediate seasons using free-cooling or free-heating modes.

These units, if installed on existing buildings, guarantee the energy requalification of the system through the management of the air change without additional charges; in the case of new installations, instead, the air change is completely carried out allowing to reduce the size of the main air conditioning system.

In the intermediate seasons the building will benefit from free or partially-generated cooling from these units, which during the partial load phases allow the main system to operate with higher efficiency.





### STRUCTURE AND PANELS

The structure of the units can be realised in 2 types:

#### Type 1: Panels 50 mm Standard [T3/TB3]

50 x 50 mm extruded anodised aluminium profiles with mechanical resistance requirements according to EN 1886: D1 (M). 50 mm thick double-wall sandwich type panelling with exterior in prepainted steel RAL 9010 and interior in galvanised steel with polyurethane foam insulation with a density of 40 kg/m<sup>3</sup>. This structure has a tightness class L1 while the thermal transmittance and thermal bridge characteristic is class **T3/TB3** in accordance with EN1886.

#### Type 2: Panels 50 mm TB [T2/TB2]

50 x 50 mm thermal break profiles in extruded anodised aluminium, with mechanical resistance requirements in accordance with EN 1886: D1 (M).

50 mm thermal break sandwich type double-wall paneling with exterior in prepainted steel RAL 9010 and interior in galvanised steel with polyurethane foam insulation with a density of 40 kg/m<sup>3</sup>. This structure has a tightness class L1 while the thermal transmittance and thermal bridge characteristic is class **T2/TB2** in accordance with 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 are supplied in monobloc sections.

### AIR FILTERS

The units can host different types of filters, both in the room air extract and in the fresh air intake.

They are mounted on guides equipped with gaskets to guarantee effective sealing. Their position, upstream of the internal components, also guarantees their protection.

All units are equipped with differential pressure switches to monitor the air side pressure drops of the filtering sections.

### 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 control of the airflow both in the supply and extract section, ensuring that all regulatory requirements such as SFP are met.

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 self-centering brackets to ensure the correct distance between the impeller and the nozzle, thus optimizing performance.

### HEAT RECOVERY

The units are equipped with an aluminium counter-flow plate heat exchanger used to transfer heat from the exhaust air to the fresh air. The heat exchange takes place in counter-flow.

In some conditions of low outside air temperature and high humidity, the exchanger may start to frost. The units are equipped with a defrost system required in case of very low ambient conditions. The defrost system can either be electric or by hot water.

The heat recovery is also equipped with an additional bypass 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.

### CONTROLS

The unit is managed by 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 display the operating status and any alarm conditions present.

Through the values acquired by the room temperature probe and the supply air, the thermoregulation will be managed with reference to the set-points.

The unit can manage the automatic change of operating modes by comparing the temperature and humidity of the outside and room air.

The microprocessor also activates and modulates all the dampers of the unit and optimizes all the operating parameters of the refrigerant circuit.

The RS485 interface is standard (MODBUS protocol) to be used for connection to remote supervision and control systems. The control can also be supplied with a second remotable control panel (optional).



LCD REMOTE GRAPHIC DISPLAY

### CONTROLS

The units are supplied as standard with a microprocessor control system and remotable control panel with graphic LCD display. They are available in two versions: **PLUS** and **TOP**.

**PLUS:** this control option is set to operate at **CONSTANT PRESSURE**, it is supplied complete with pressure transducer and air temperature sensors installed on the fresh air intake and room return air.

**TOP:** this control option is set to operate at **CONSTANT AIRFLOW**, it is supplied complete with pressure transducer and air temperature sensors installed on the fresh air intake and room return air.

All control systems allows to select, in stepless mode, the supply and return fan speeds, through the use of differential transducers and automatically manages the heat recovery by-pass damper through the motorized On/Off control.

They also manages the summer/winter seasonal change over and programming for daily time bands.

The controls can also manages an optional hot water or cold water coil through a 3-way modulating valve and an additional supply air sensor in order to maintain a fixed point operating logic. The same logic can also be used to manage an electric post-heating coil, if present.

They are also able to manage the unit's defrosting system, (optional), by means of an additional temperature probe located in the heat exchanger exhaust air.

The systems alerts to the user when filters need replacing (the clogged state of the filters is monitored by a pair of differential pressure switches supplied as standard) or the onset of any alarm and this may also be integrated into modern home automation systems via RS485 serial port with Modbus protocol (supplied as standard).

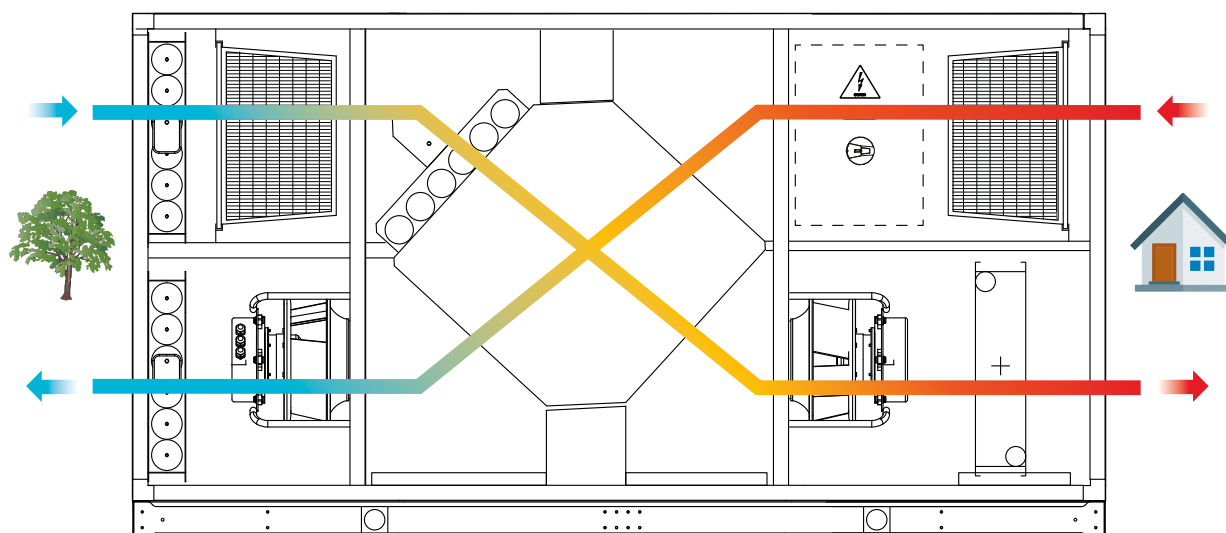
### OPERATING MODE

In winter, the ambient air with a higher thermal load passes through the plate heat exchanger, releasing heat and cooling down before being expelled. The fresh air passes through the exchanger in the opposite direction, warming up.

In summer, the ambient air with a lower thermal load passes through the exchanger, absorbing heat and warming up before being expelled. The fresh air passes through the exchanger in the opposite direction, cooling down before being introduced into the environment.

The airflow is modulated by varying the speed of the EC fans to control the supply air temperature.

In Free-Cooling mode, the unit opens the By-Pass damper, allowing external fresh air to enter without heat recovery when the external temperature is lower than the internal temperature.





### TECHNICAL DATA

MODEL		1000	1500	2000	3000	4000	6000	8000
Nominal airflow rate	m <sup>3</sup> /h	1000	1500	2000	3000	4000	6000	8000
Type of ventilation unit		UVNR-B (Non Residential Ventilation Units- Bidirectional)						
Type of drive installed		Analog signal on EC fan (0-10Vdc)						
Type of fans	type/nr.	EC/4	EC/2	EC/2	EC/2	EC/2	EC/4	EC/4
Type of heat recovery system (HRS)	type/nr.	static counter-flow / 1						
Winter Thermal Efficiency ( $\eta_{t\_nrvu}$ ) <sup>(1)</sup>	%	75,2	75,2	75,2	74,4	74,3	77,8	77,8
Winter Thermal Efficiency <sup>(2)</sup>	%	83,7	83,7	83,7	82,9	80,8	86,4	86,4
Nominal electric power input <sup>(2)</sup>	kW	0,54	0,84	0,88	1,05	1,90	2,10	4,80
Max electrical power absorbed	kW	0,68	1,00	1,00	2,20	3,00	4,40	6,00
Max electrical current absorbed	A	2,8	4,6	4,6	3,5	4,8	7,0	9,6
SFP <sub>int</sub>	W/(m <sup>3</sup> /s)	858	849	759	916	949	943	811
SFPlim 2018	W/(m <sup>3</sup> /s)	1121	1101	1090	1014	974	991	941
External nominal pressure $\Delta p_{s, ext}$ <sup>(3)</sup>	Pa	250	250	250	250	250	250	250
Internal pressure drop $\Delta p_{s, int}$ on supply air	Pa	290	323	304	384	364	344	329
Fans static efficiency (UE) n.327/2011	%	58	59	61	62	61	65	63
Max. external / internal leakage percentage	%	max 3,5 % at -400 Pa   max 5,0 % at +250 Pa						
Energy classification filters		ePM1 55% (F7)   ePM1 55% (F7)						
Filter pressure switch		present						
Sound power level $L_{WA}$ <sup>(4)</sup>	dB(A)	62	66	68	67	71	70	74
Sound pressure level <sup>(5)</sup>	dB(A)	45	49	52	50	55	53	58
Power supply	V/ph/Hz	230/1/50			400/3/50			

<sup>(1)</sup> ratio between the thermal gain of the inlet air (0 °C) and the thermal loss of the exhaust air (20 °C), both referred to the external temperature, measured under dry reference conditions, with balanced mass flow and a thermal difference of the internal/external air of 20K, excluding the thermal gain generated by the fan motors and the internal leakage, in accordance

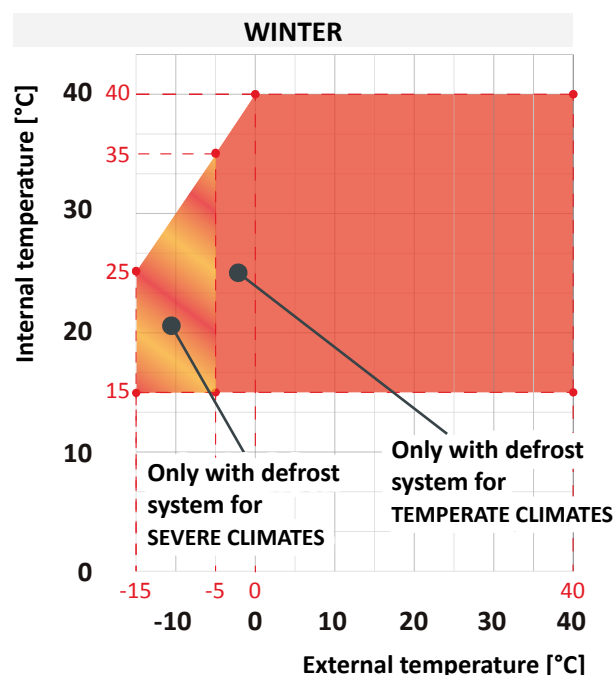
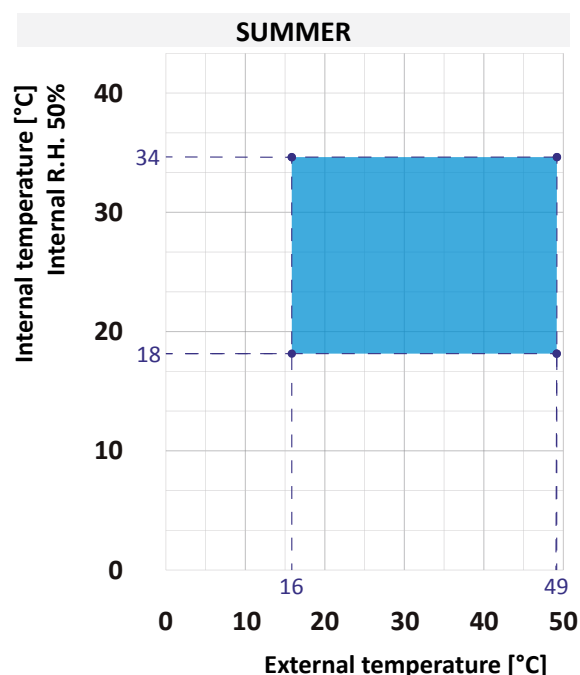
<sup>(2)</sup> outside air: -5 °C / 80 % RH- Inside air: 20 °C / 50 % RH

<sup>(3)</sup> performance with clean filters

<sup>(4)</sup> sound power level calculated in accordance with EN 3744

<sup>(5)</sup> sound pressure level measured at 1 m free field distance, ducted unit, in accordance with EN 3744

### OPERATING LIMITS



### ACCESSORIES

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

Synthetic panel filter with low pressure drop.

#### ePM<sub>10</sub> 60% (M5), ePM<sub>1</sub> 55% (F7), ePM<sub>1</sub> 80% (F9) air filters

Rigid bag filters with large filtering surface area that guarantees long operating life and less frequent replacements.

#### Defrost system for TEMPERATE CLIMATES (down to -5°C external)

To prevent frost formation on the heat exchanger, the unit manages an automatic defrost cycle through the unbalance of air flows.

The defrost system consists of a specific device and a software that prevents an excessive drop of the temperature in the exhaust air by slowing down the supply air flow. The system is guaranteed for external temperatures down to -5°C.

#### Defrost system for SEVERE CLIMATES (down to -15°C external)

To prevent frost formation on the heat exchanger, the unit manages an automatic defrost cycle through the unbalance of air flows. The defrost system (optional) consists of a specific device and a software that prevents an excessive drop of the temperature in the exhaust air by slowing down the supply air flow and opening the by-pass damper in the heat exchanger.

This device requires pairing with a hot water coil kit + modulating valve or a self-regulating electric heater. The system is guaranteed for external temperatures down to -15°C.

#### Hot / Cold water coil

Coil manufactured with copper pipes mechanically expanded in the aluminium fins, complete with condensate drain pan with water discharge (only for cold water coil). On request, it is possible to install coils with thermal performances different from the standard ones, when previously agreed with the factory.

#### 3 way modulating valve

Valve with modulating electric actuator for the control of the water flow of the hot / cold water coil.

Connections not included (to be arranged for by the installer).

#### Air damper with actuator

It operates to exclude the fresh air intake and/or the room return air flow. The damper is controlled by On/Off actuator for the opening or the closing, or with return closing spring.

#### Flexible joints kit (4 pcs)

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

#### CO<sub>2</sub> probe

This accessory is installed and wired in the factory on the return air and it allows to determine the quantity of carbon dioxide present in the environment, increasing the quantity of external air to dilute its content.

**NOTE:** CO<sub>2</sub> probe is available in TOP version only.

#### Ethernet port and TCP/IP modbus | BACnet port

Ethernet port for BMS Modbus or BACnet network connection.

#### Second remotable control panel with LCD display

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

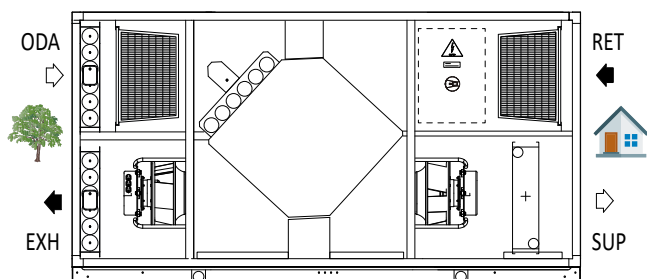
MODEL	1000	1500	2000	3000	4000	6000	8000
50 mm Thermal Break frame [T2/TB2]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ePM <sub>10</sub> 50% (G4) pre-filter on supply and return air	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ePM <sub>10</sub> 60% (M5) rigid bag filter on supply and return air	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ePM <sub>1</sub> 55% (F7) rigid bag filter on supply and return air	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ePM <sub>1</sub> 80% (F9) rigid bag filter on supply and return air	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unbalanced airflows desfrost system for temperate climates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unbalanced airflows desfrost system for severe climates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electric post-heating coil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hot water coil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cold water coil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 way modulating valve	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fresh air / Exhaust air damper with On/Off actuator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flexible joints kit (4 pcs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CO <sub>2</sub> probe (available in TOP version only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ethernet port and TCP/IP Modbus   BACnet port	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Second remotable control panel with LCD display	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



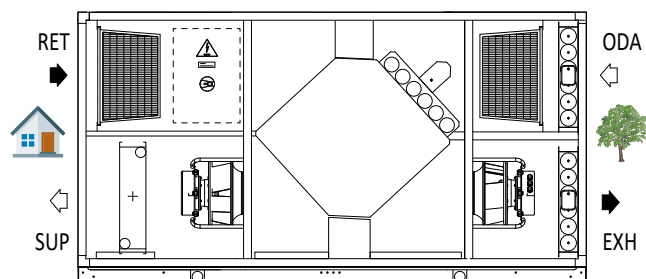


### CONFIGURATIONS

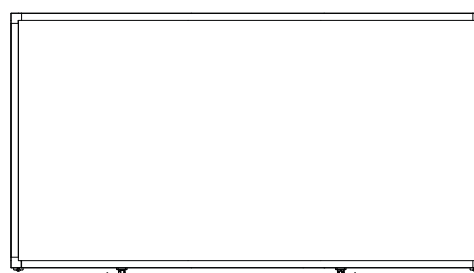
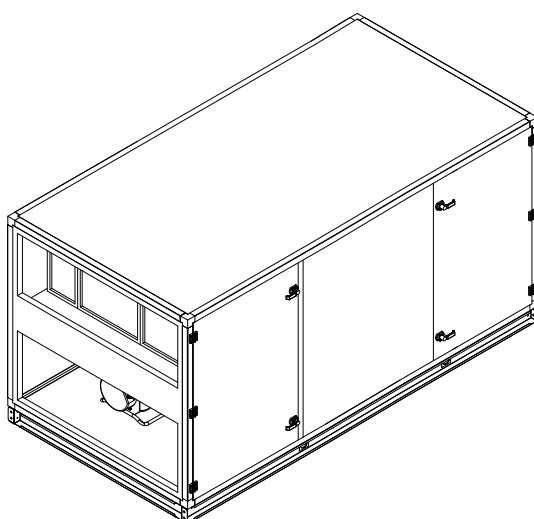
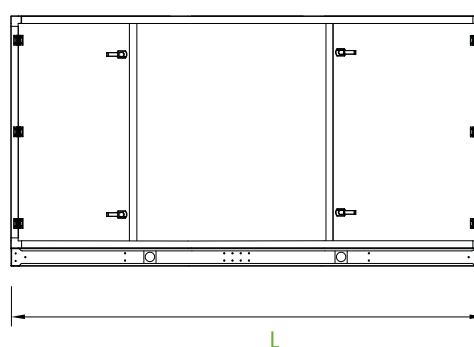
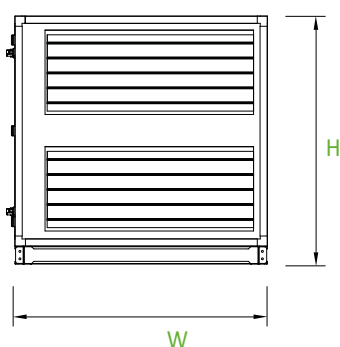
#### CONFIGURATION H1



#### CONFIGURATION H2



### DIMENSIONAL DRAWING



### DIMENSIONS AND WEIGHTS

MODEL	1000	1500	2000	3000	4000	6000	8000
<b>L</b> (mm)	2310	2310	2460	2460	2760	3060	3360
<b>W</b> (mm)	810	810	960	1110	1410	1410	1710
<b>H</b> (mm)	1080	1080	1230	1380	1380	1530	1680
<b>Weight</b> (kg)	268	271	322	379	498	612	761

Dimensions and weights refer to standard version without accessories