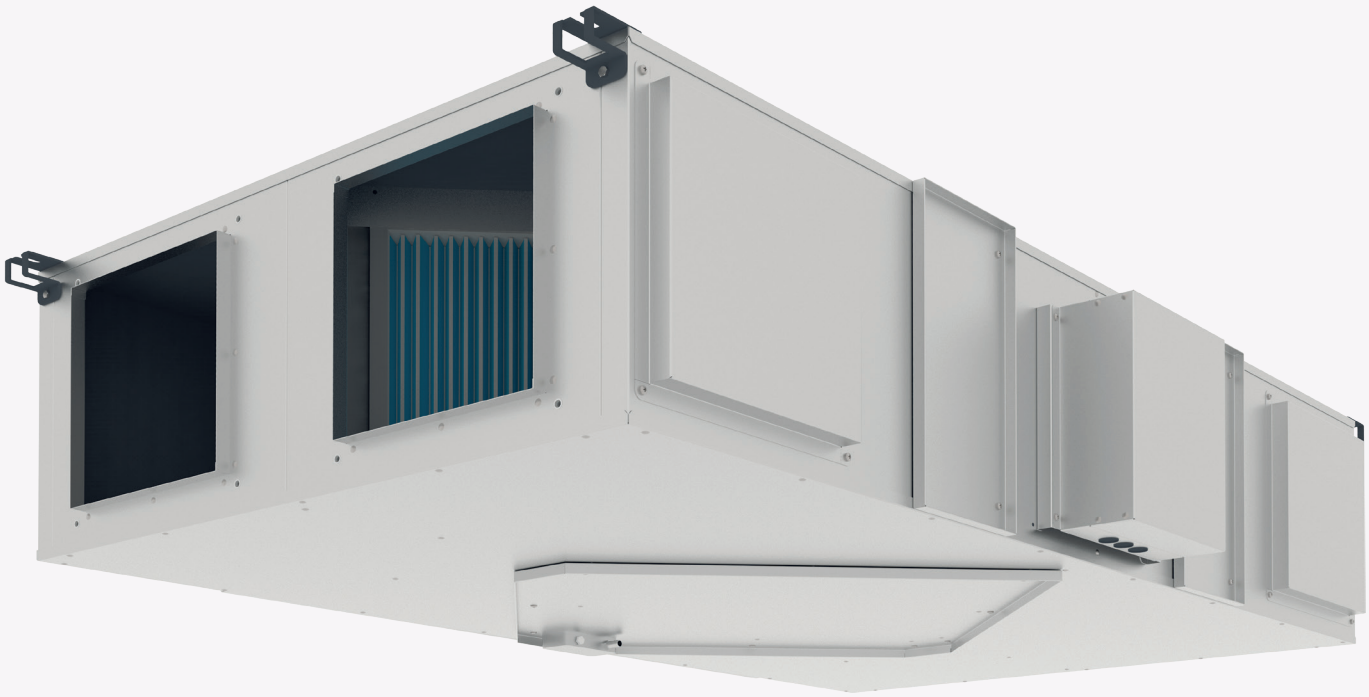
# ERP Pro

CROSS FLOW HEAT RECOVERY VENTILATION



ECO DESIGN

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AERA air innovation

AERA has been founded in 2016 by national and international partners to be an important player in HVAC industry with its young but experienced spirit, innovative product design, sustainable quality control and assurance system and advanced logistics. AERA aims to present products and solutions to meet the increasing demand on energy efficiency and human comfort.

AERA is located in Izmir with its production facilities and R&D center of excellence and in Istanbul with its Sales Office. The efficiency and the effectiveness of the manufacturing is ensured with modern production and IT systems. All production processes are monitored with intensive quality control processes in accordance with the national and international regulations and norms to ensure the quality of the end product and overall efficiency.


MAIN PRODUCT GROUPS

- Modular Air Handling Units
- Compact Air Handling Units
- Heat Recovery Ventilators
- Ventilation Units with Heat Pump
- Water Terminal Units (Fan Coils)
- Chillers

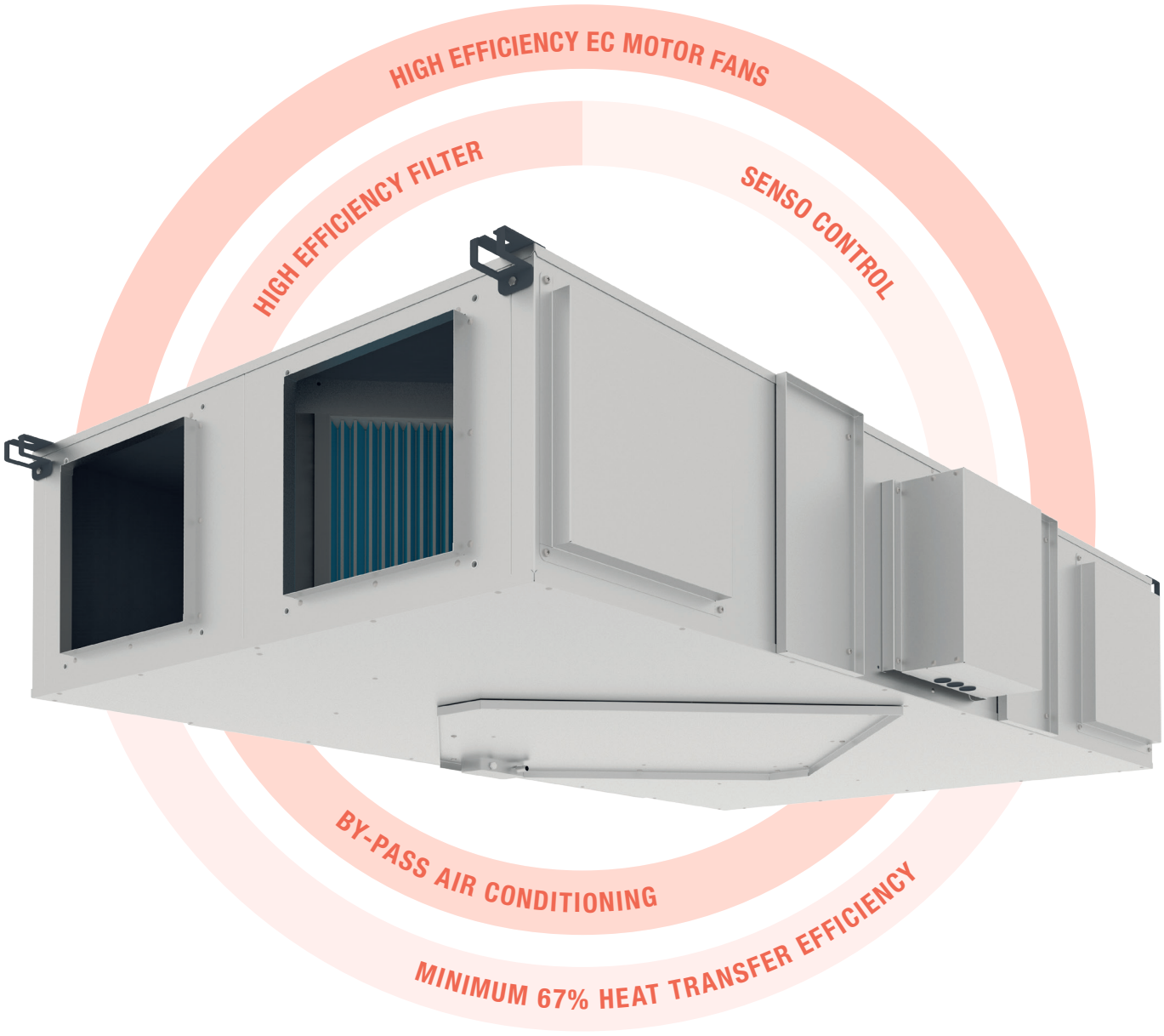
The limited availability of energy resources has increased energy costs, making energy access difficult. States have begun to establish efficiency criteria in energy-using devices in order to reduce the consumption of limited energy, and these criteria have become compulsory for producers. The energy criteria in ventilation devices are determined by the European Union with the Ecodesign directive, which became compulsory since 2016 and it has been set as a prerequisite of CE certification.

Heat recovery ventilation appliances, which are present in a significant part of small, large and medium sized projects in the market, are listed in accordance with the heat recovery utilization and expenditure fan power criteria in the direction of the directive entered into force in 2016, and the entry of non-standard devices into EU countries is prohibited.

**Special Features of Vesta ERP**

- EC Fans with low SFP value.
- Plate heat recovery exchanger with large heat transfer surface area ($\eta_t$> 67%).
- F7 on fresh air side, M5 class filter on exhaust air.
- ECO-DESIGN 2016 compliant performance, ECO-DESIGN 2018 upgradeable.
- Easy Service thanks to service friendly casing design.
- Modern Automatic Control.
- By-pass Ventilation.

ECO DESIGN RoHS 2002/95/EC CE TSEK International Organization for Standardization ISO 9001



VESTA ERP devices are subjected to performance tests periodically after design and production. The following international standards are used during performance testing of devices;

- EN 1886 Ventilation for Buildings - Air Handling Units - Mechanical Performance
- EN 13053 Air handling units - Classification and performance for devices, components and cells
- EN 13779 Performance requirements for ventilation and room conditioning systems
- EN 305 Performance specifications for heat exchangers and test procedures for performance measurement

All tests are carried out in ANEMO test lab in AERA.

VESTA ERP production processes are controlled at every stage with quality control criteria according to international standards.The process starts with raw material quality control (Incoming Quality Control) continues in the process of semi-finished product (Process Quality Control) and ending with completion of production (Final Quality Control) all stages which are completely documented. All VESTA ERP units are subjected to CE tests according to the electrical standard (EN 60204-1) during final quality control.

Final quality control tests;

- Voltage Tests
- Insulation Resistance Test
- Continuity of the protective bonding circuit Test

The test results and the compliance report are sent along with the unit.

All manufacturers are legally obliged to obey ECO-DESIGN directives, which are a set of the European Union's regulations that state use of energy for energy-consuming products. LOT6 of the directives reviews the ventilation devices and air handling units and is affective in the European Parliament with the EU directive number 1253/2014. The ECO-DESIGN directives, prepared by the European Council for the purpose of replacing low energy-efficient products in the market with those of high efficiency, have been accepted as a prerequisite for CE certification with the dates specified and the entry of non-conforming devices into EU countries is prohibited.

Within the scope of the ECO-DESIGN directive, which has been in force since January 1 st, 2016 a number of sub-limit values have been defined for air handling units, such as fans, heat recovery exchangers and filters. There are also directives concerning the operation of the air handling unit.

**ECO-DESIGN Application Criteria**

| | |
|---|---|
| For which applications does the ECO-DESIGN directive apply? | The Directive has been created for ventilation devices and air handling units where some or all of the air contaminated by human activity or building emissions in the interior is replaced by fresh air from outside. |
| Device Classification | Residential Ventilation Equipments (RVU) Qmax ≤ 250 $m^3/h$ Non-Residential Ventilation Devices (NRVU) Qmax> 250 $m^3/h$ Residential Ventilation Devices (RVU) * 1000 $m^3/h$ > Qmax> 250 $m^3/h$ |
| Implementation Schedule | Tier 1: January 1, 2016<br>Tier 2: January 1, 2018 |
| Unit Exceptions | ■ Agricultural ventilation applications<br>■ Transportation applications<br>■ Exhaust hoods in industrial kitchens<br>■ Fresh air or exhaust devices with a power consumption of 30 W or less and a one-way airflow<br>■ Bi-directional flow devices with a power consumption of 30 W or less for each fan<br>■ Axial or radial fans in a body according to EU 327/2011<br>■ Fans operating in explosive atmosphere<br>■ Emergency fans<br>■ Fans operating at very high or very low temperatures |

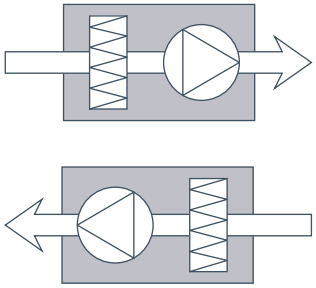
* In cases where the manufacturer states that it is for residential use.

### Unidirectional Ventilation Units (UVU)

The model device is defined in the directive as follows.

- Airflow is one-way (supply or exhaust only).
- On the inlet side there is a class F or better filter.
- There are one or more fans in the same air line inside the device.

In the Directive, the limit value for minimum fan efficiency and $SFP_{int}$ is specified as follows.



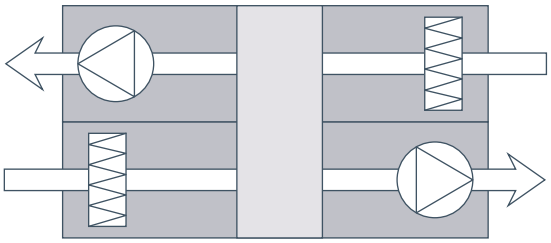
| | | ErP 2016 | ErP 2018 |
|---|---|---|---|
| Minimum Fan Efficiency $n_s$ (%) | P≤30 kW | 6,2xln(P*)+35 | 6,2xln(P)+42 |
| | P>30 kW | 56,1 | 63,1 |
| The maximum allowed $SFP_{int}$ [W/(m³/s)] value for the model device | | 250 | 230 |
| Variable speed drive requirement | | Yes | Yes |
| Obligation to monitor pressure drop for filters | | No | Yes |

* Nominal Effective power supply at nominal external pressure and air flow, including electric power supply (kW), fan motors and drives of motors.

### Bidirectional Ventilation Units (BVU)

The model device is defined in the directive as follows:

- Airflow is bidirectional (with supply air and exhaust)
- There is a class F on the supply air side and a class M filter on the exhaust side.
- The unit has a heat recovery system.



In the Directive, the limit value for minimum fan efficiency and $SFP_{int}$ is specified as follows:

| | | | ErP 2016 | ErP 2018 |
|---|---|---|---|---|
| Heat recovery system with thermal by-pass mandatory | | | Yes | Yes |
| Thermal Efficiency (EN308)*1 $\eta_t$ [%] | Plate / Rotary HR | | 67 | 73 |
| Maximum allowed $SFP_{int}$ value for model device | Plate / Rotary HR | $q^{*2} < 2m^3/s$ | 1.200 + E - 300 x q / 2 - F | 1.100 + E - 300 x q / 2 - F |
| | | $q \geq 2m^3/s$ | 900 + E - F | 800 + E - F |
| HR efficiency addon, E | Plate / Rotary HR | | ($\eta_t$-67) x 30 | ($\eta_t$-73) x 30 |
| Filter correction coefficient, F | Model Unit | | 0 | 0 |
| | No M filter | | 160 | 150 |
| | No F filter | | 200 | 190 |
| | No M + F filter | | 360 | 340 |
| Variable speed drive requirement | | | Yes | Yes |
| Obligation to monitor pressure drop for filters | | | No | Yes |

*1 EN 308 conditions are internal and external weather conditions where condensation has not occurred and should be taken as follows. **OUTDOOR AIR CONDITIONS:** 5 °C **ROOM CONDITIONS:** 25 °C, 28 % RH

*2 Air flow at the working point of the device (m³/s)

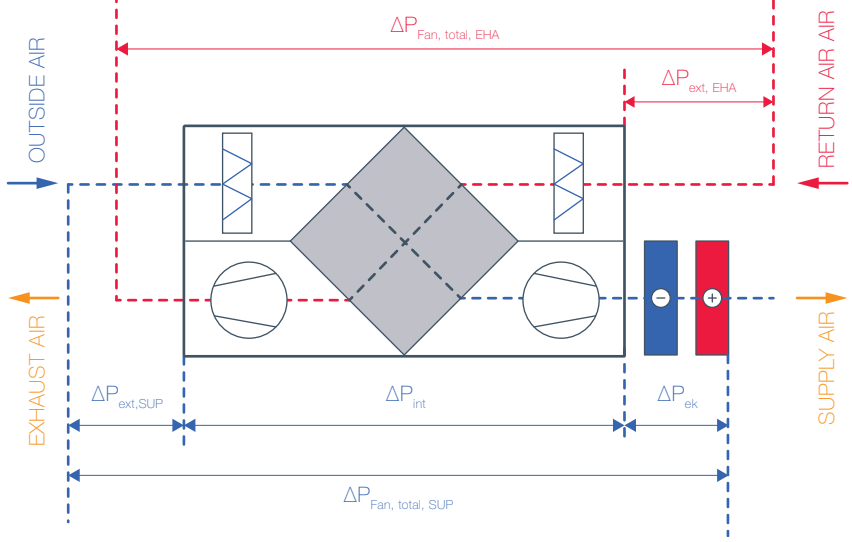
## $SFP_{int}$ Value and Calculation Method

According to EN 13779, the SFP is calculated as the ratio of the fans of the air supply unit provided by the unit.

In ECO-DESIGN directives, the SFP value is redefined as $SFP_{int}$. The $SFP_{int}$ value relates to the performance of the components used in the design of the device, and does not add any inefficiencies in the ducting system. This provides a more accurate comparison between units. The internal losses to be taken into account in the $SFP_{int}$ calculation are pressure losses in the heat recovery exchanger, filter and housing.

Sample Calculator: The table below shows the operating point for the internal pressure drops in a heat recovery ventilator. The SFP value is compared with the $SFP_{limit}$ value specified in the ECO DESIGN criteria, calculated by these values and fan efficiencies. If the SFP interior is smaller than the $SFP_{limit}$ the device meets the ECO DESIGN criteria.

$$SFP_{int} = 100 * \left( \frac{\Delta P \text{ int, nom, SUP}}{\eta e, \text{ SUP}} + \frac{\Delta P \text{ int, nom, EHA}}{\eta e, \text{ EHA}} \right)$$

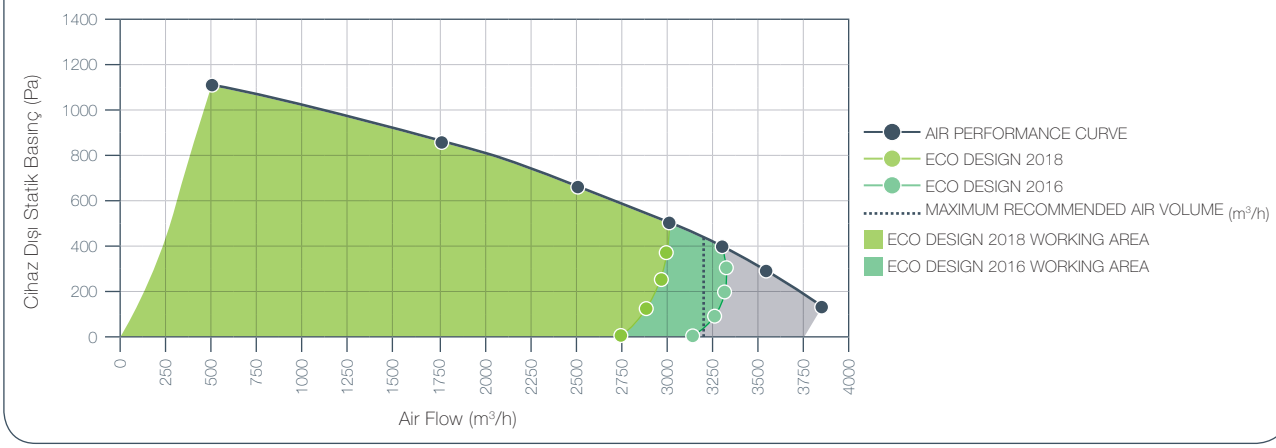



| | Intra-device pressure loss [Pa] | | | | External Static pressure (Pa) | Fan efficiency at the operating point (including external static pressure) | $SFP_{int}$ |
|---|---|---|---|---|---|---|---|
| | HR Exchanger | Supply Air Filter (F7) Exhaust Air Filter (M5) | System Loss | Total | | | |
| Supply Air | 179 | 109.97 | 44.75 | 333.72 | 100 | 0.596 | 559.9 |
| Exhaust Air | 180 | 90.86 | 44.75 | 315.61 | 100 | 0.596 | 529.5 |
| | | | | | | **$SFP_{int}$, total** | **1089.5** |

| | | |
|---|---|---|
| Filter Correction Factor, F | M5 and F7 filter | 0 |
| HRE efficiency addition, E | ($\eta_t$-0.67)*3000 | 30 |
| **$SFP_{iç}$, limit (2016)** | **1200 + E - 300 * $q_{nom}$ / 2 - F** | **1146.66** |

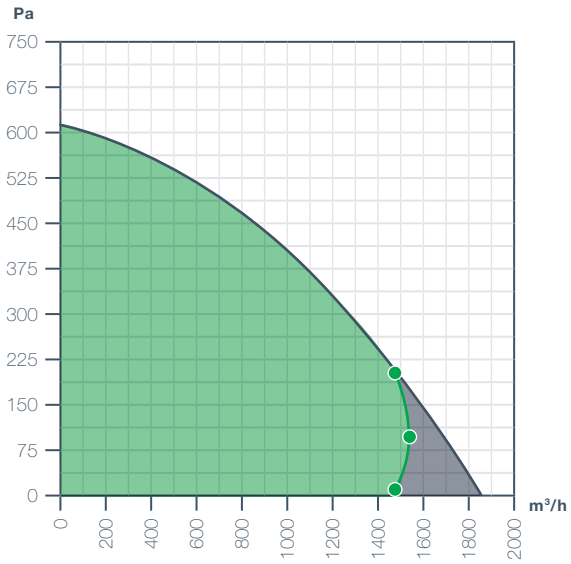
Where the ventilation unit is not designed for a single operating point, compliance with the ECO-DESIGN directive should be indicated on the unit operating curves. The following is an ECO-DESIGN operating curve for an air handling unit with variable airflows.

**PERFORMANCE CURVES**



# VESTA ERP PERFORMANCE CURVES

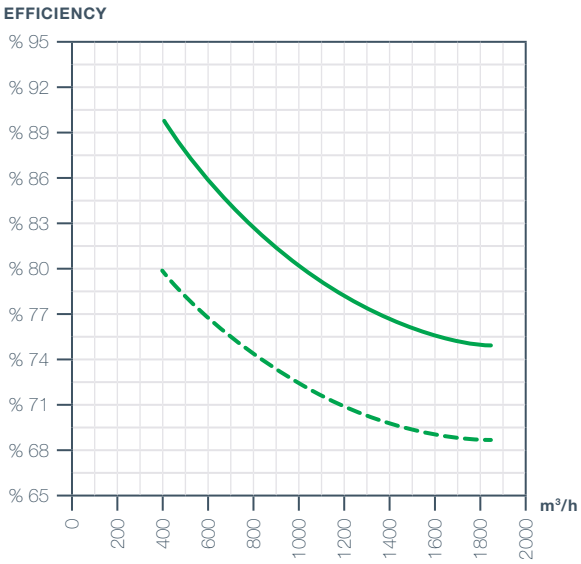
## VESTA ERP-1200 ▪ AIR PERFORMANCE CURVE




ECO DESIGN 2016 WORKING AREA

Curves are presented at conditions where air density is measured 1,2 kg/m³

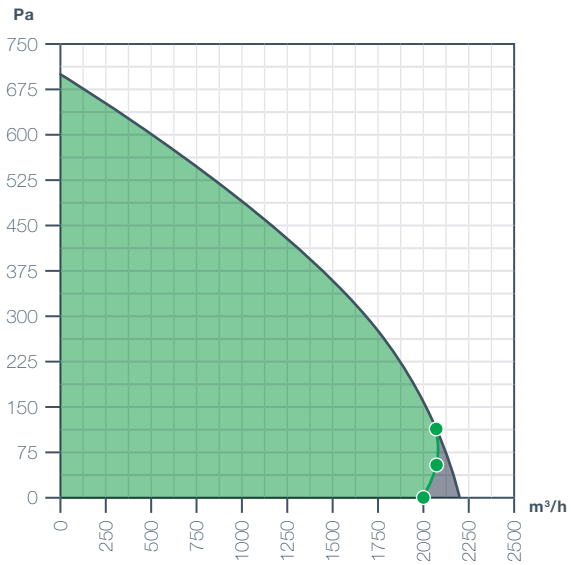
## VESTA ERP-1200 ▪ EFFICIENCY CURVE




Outside air -5°C, Inside air 22°C, 50% RH

EN 308 Conditions, +5°C Outside Air, 25°C, 28% RH Indoor Air

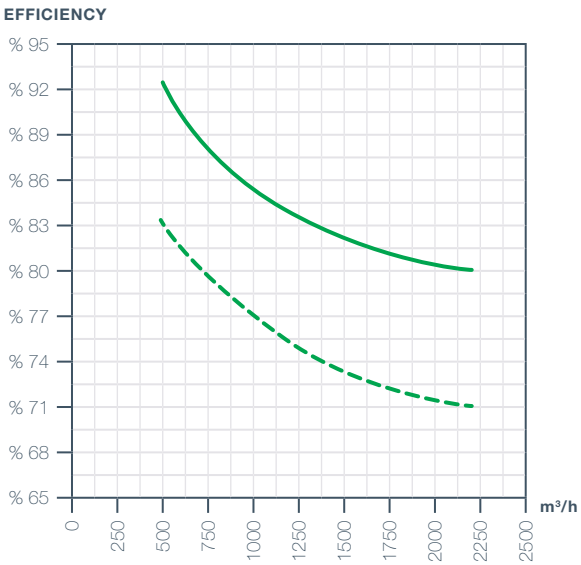
## VESTA ERP-2200 ▪ AIR PERFORMANCE CURVE




ECO DESIGN 2016 WORKING AREA

Curves are presented at conditions where air density is measured 1,2 kg/m³

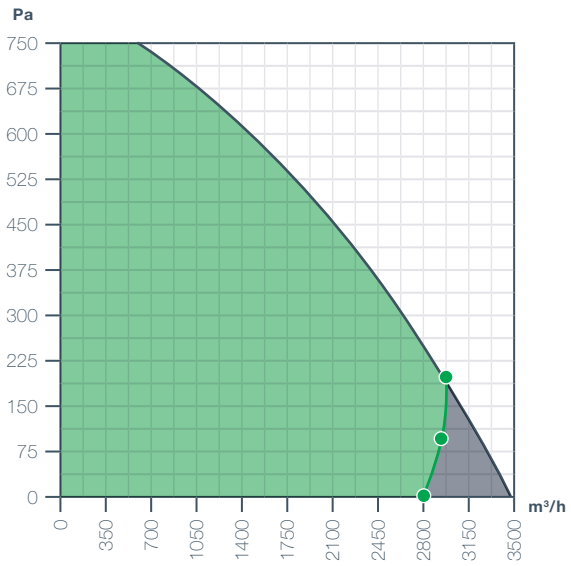
## VESTA ERP-2200 ▪ EFFICIENCY CURVE




Outside air -5°C, Inside air 22°C, 50% RH

EN 308 Conditions, +5°C Outside Air, 25°C, 28% RH Indoor Air

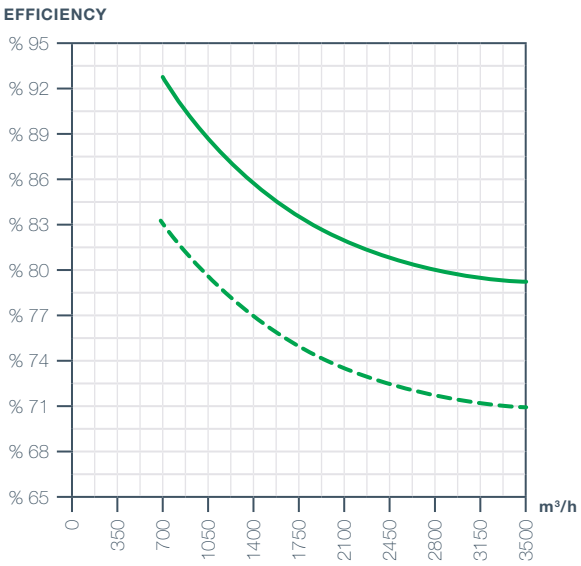
## VESTA ERP-3200 ▪ AIR PERFORMANCE CURVE




ECO DESIGN 2016 WORKING AREA

Curves are presented at conditions where air density is measured 1,2 kg/m³

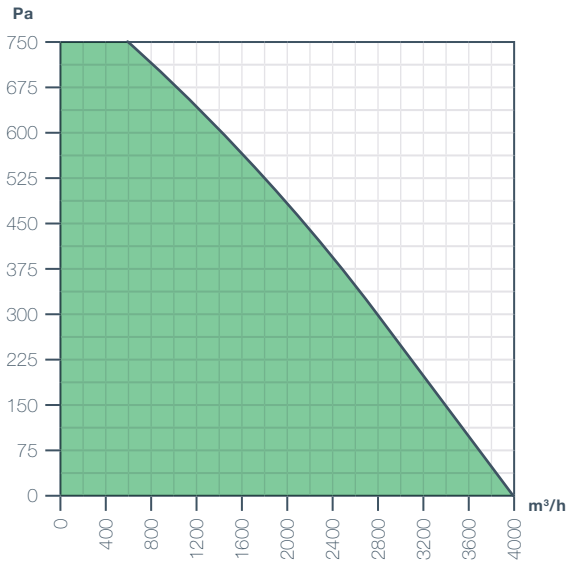
## VESTA ERP-3200 ▪ EFFICIENCY CURVE




Outside air -5°C, Inside air 22°C, 50% RH

EN 308 Conditions, +5°C Outside Air, 25°C, 28% RH Indoor Air

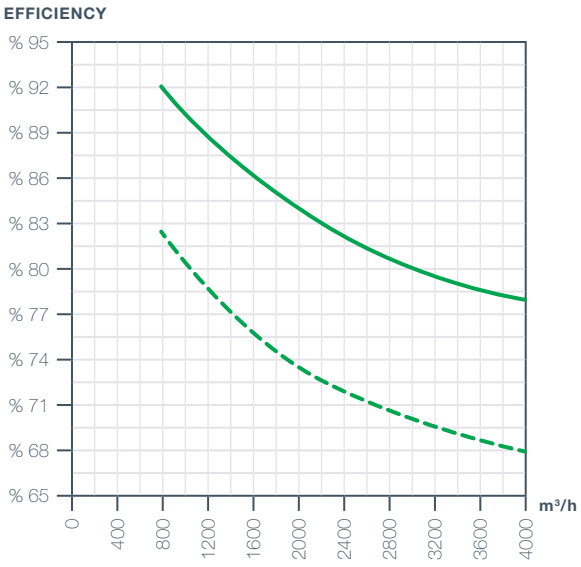
## VESTA ERP-4000 ▪ AIR PERFORMANCE CURVE




ECO DESIGN 2016 WORKING AREA

Curves are presented at conditions where air density is measured 1,2 kg/m³

## VESTA ERP-4000 ▪ EFFICIENCY CURVE




Outside air -5°C, Inside air 22°C, 50% RH

EN 308 Conditions, +5°C Outside Air, 25°C, 28% RH Indoor Air

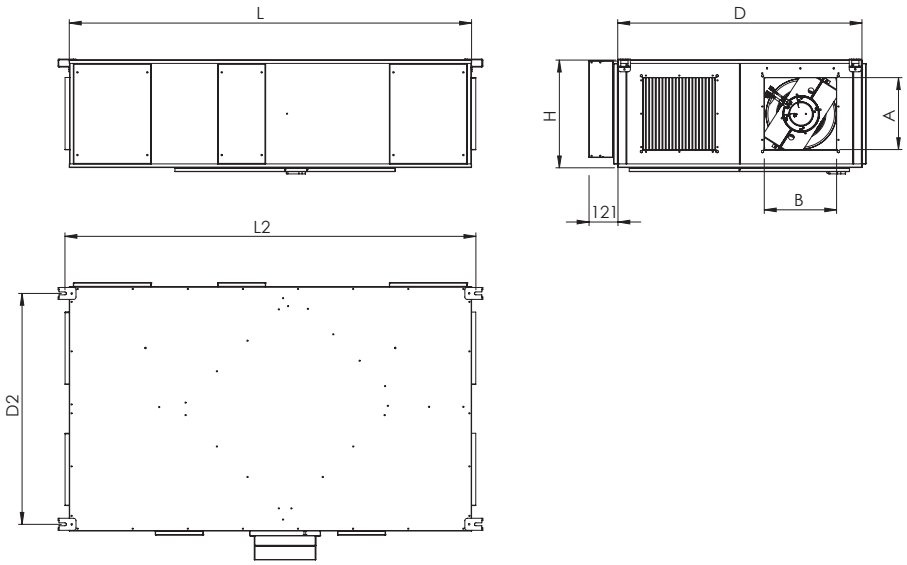
# TECHNICAL SPECIFICATION TABLE

| MODEL | VESTA ERP | | | |
|---|---|---|---|---|
| | 1200 | 2200 | 3200 | 4000 |
| MAXIMUM AIR FLOW ($m^3/h$) | 1850 | 2185 | 3500 | 4000 |
| MAXIMUM POWER CONSUMPTION (kW) | 920 | 1000 | 1500 | 1500 |
| MAXIMUM CURRENT (A) | 4,00 | 4,40 | 6,60 | 6,60 |
| SUPPLY VOLTAGE | 230 V / 50 Hz / 1 ~ | | | |
| FILTER CLASS (EXHAUST/FRESH AIR) | M5/F7 | M5/F7 | M5/F7 | M5/F7 |
| WEIGHT (kg) | 98 | 155 | 205 | 260 |
| SOUND PRESSURE (dB) | 48 | 54 | 54 | 53 |

Sound values are measured for a ducted unit at 250Hz and 1,5m away from the unit.
The filter class is specified according to EN779: 2012 standard.
Max Air Volumes are Indicated according to 0 Pa static pressure loss.

## DIMENSIONS

| | | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | AxB | L | D | H | L2 | D2 |
| | | mm | | | | | |
| VESTA ERP | 1200 | 300x300 | 1600 | 1050 | 480 | 1635 | 1000 |
| | 2200 | 350x350 | 1850 | 1250 | 540 | 1885 | 1200 |
| | 3200 | 450x450 | 2200 | 1600 | 580 | 2235 | 1550 |
| | 4000 | 500x500 | 2300 | 1600 | 710 | 2335 | 1550 |



## Heating Coils

Water heater coils used in VESTA ERP units can be installed in the unit. Coils are designed for standard capacities and they heat the air to the reqiured supply air temperature.

Duct type cooling coils have drain pans, and an insulated casing to prevent condensation. Both heating and cooling coils can be separately controlled from Senso Plus control system.

| WATER HEATER MODEL | CAPACITY | WATER REGIME |
|---|---|---|
| POWH 300 AZ | 1,2 kW | 80/60°C |
| POWH 500 AZ | 2,0 kW | |
| POWH 700 AZ | 2,8 kW | |
| POWH 1400 AZ | 5,6 kW | |
| POWH 2200 AZ | 8,8 kW | |
| POWH 3200 AZ | 12,8 kW | |

*Heating coils are shipped with an integrated frost protection temperature sensor and a 2 way valve.

## Duct Type Silencer

Sound Absorbers are designed considering VDI 6022 and DIN 1946 hygine criteria. They are produced using A1 fire class stonewool according to EN 13501, in a sheet metal casing. A sleeve is used to prevent the rockwool particles into air flow. Rectangular shaped silencers can be installed to the units duct connection spigots.

| SILENCER MODEL | SOUND ATTENUATION (250 Hz) | LENGTH |
|---|---|---|
| SA 300 AZ | 6 dBA | L=600 mm |
| SA 500 AZ | | |
| SA 700 AZ | | |
| SA 1400 AZ | 5 dBA | |
| SA 2200 AZ | | |
| SA 3200 AZ | | |

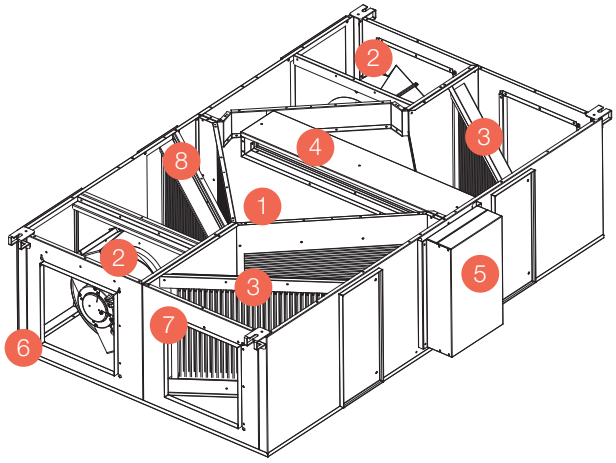
Silencers are produced using 30 mm rock wool insulation perfore sheet on the inside, aluzinc sheet metal on the outside.

## Electrical Heater

Electrical preheaters are designed for cold/extra cold climates to prevent condensing air from freezing. The preheaters are designed to fit inside the unit,  2 safety thermostats are supplied as standard with all units for extended safety.

| ELECTRICAL HEATER MODEL | CAPACITY | CONTROL STEPS | VOLTAGE SUPPLY |
|---|---|---|---|
| PREH 300 AZ | 1 kW | 1 Step Control | 230 V, 50Hz |
| PREH 500 AZ | 1,6 kW | | |
| PREH 700 AZ | 2,3 kW | | |
| PREH 1400 AZ | 4,5 kW | | 380 V, 50Hz |
| PREH 2200 AZ | 7,1 kW | 3 Step Control | |
| PREH 3200 AZ | 10,4 kW | | |

*The electric preheater is integrated into the casing of the device, and the electric after heater is manufactured as duct type.




1. Heat Exchanger
2. Fan
3. Filter
4. By-pass damper
5. Controls
6. Casing
7. Alternative Duct Connections
8. Optional Second Stage Filter

## CASING

VESTA ERP units are produced using polyester painted sheet metal with high corrosion resistance. Inside the unit, Aluminum and Zinc coated AZ 150 quality Aluzinc sheet metal is used. The casing is patented with its low pressure drop and high stability.

By-pass ventilation is supplied standard on the units, allowing free cooling in the indoor environment by bypassing the heat exchanger and taking it directly indoors.

All components that require service, have their own service doors. This way the unit does not have to be disconnected from ducting system for servicing.

## FAN

VESTA ERP units are designed with high energy efficient, low sound pressure and low power consumption plug fans. All the fans are compliant with ECO-DESIGN criteria by Eruopean Union Energy Comitee and ErP 2015.

Plug fans with EC motors can be driven with 3 fixed speeds or steplessly with the help of an air quality sensor thanks to built in smart control system SENSO

Plug fans with EC motors are AC-powered fans with DC motor technology. DC motor provides high electrical efficiency while it can be connected to AC mains via on board converter. It is perfectly in harmony with the high-tech electronic components used and magnetic noise transmitted to the network is prevented.

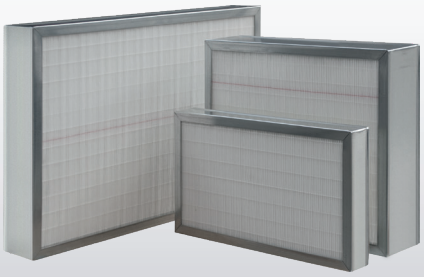
## HEAT RECOVERY EXCHANGER

The heat recovery exchangers used in VESTA ERP units reaches up to 90% efficiency by offering a combination of cross and counter flow with special fin structure.The special fin structure increases efficiency and helps to achieve low pressure drops. The heat exchanger consists of Aluminum plates with high corrosion resistance. Thus, the highest versatility of heat recovery exchangers in their class ensures the continuity of the performance values with the EUROVENT certificate.

## FILTER

VESTA ERP units are produced with F7 class on the supply air side and M5 class filter on the exhaust side as ECO-DESIGN directives. With these highly efficient filters, indoor air quality is increased by keeping 90% of dust and particles up to diameter of 0,4 µm in the indoor environment.

High efficiency filters are produced especially for extending the surface area and reducing pressure drops. Filters fill up because of the particles they hold and this results in reduced air flow. In order to avoid dirty filters to affect air balance in the building, the unit has a filter cleaning alarm based on working hours.



SENSO Intelligent Control, specially designed and tuned for Ceiling Type ventilation devices, controls both the standard components in the appliance and the optional components that can be installed in the duct to meet the desired blowing air conditions. All devices manufactured with Plug and Play logic and are shipped after extensive testing of control equipment and all components in the factory.

**Basic functions provided by SENSO control ventilation**

- Fans can be set at 3 different speeds independently
- Weekly timer schedule
- Building automation connection (ModBUS)
- Preheater Control (7 Stage Step Control)
- Final Heater Control (7 Stage Step Control or 0-10V Control)
- Heat Exchanger Frost Protection
- Heating coil freeze Protection
- Automatic BOOST Mode
- Damper Control
- VOD
- Filter Pollution Control (Pressure drop monitoring or checking running time)
- Fire Alarm

**Room Control Panel (HMI)**

The appliances have a room control panel so that the functions can be adjusted easily. This user-friendly interface allows flow rate, temperature setting, operating mode selection, season selection, weekly time schedule to be done easily and quickly.

**Building Management System Connection**

SENSO CONTROL works interactively with other ventilation and air conditioning devices and building automation systems using Modbus protocol.

**Heating Capacity Control**

Preheaters are used for purposes such as increasing the supply air temperature in the units preheating fresh air from the outside, and bringing the supply air to the desired temperature after the dehumidification process. An electric heater can be used as a preheater with SENSO control and energy saving is achieved by gradually driving according to a set temperature. All of the safety and working equipment required by the electric heater is supplied with the SENSO control.

After heaters are used for purposes such as increasing the supply air temperature in the devices and bringing air to the desired temperature after the dehumidifying process. Hot water coils can be used and can be driven with 2 way valves. With SENSO control, there is a frost protection mechanism that prevents the temperature of the feed water from reaching freezing conditions in extreme cold climates.

**Flow Control**

Fan speed can be adjusted according to 3 different speed levels from the room control panel for supply air and extract air. It is also capable of automatic BOOST with the help of an additional sensor, so that it can meet the instant fresh air increase needs (decreasing indoor air quality, increasing relative humidity etc.). In addition, in applications where stepless control is required, fresh air need is calculated according to the conditions in the indoor environment with the help of an additional sensor, and ventilation can be done as much as required by the automatic flow rate option. In this way, the load of indoor air conditioning devices can be reduced and the total energy consumption of the building can be reduced considerably.

**Plate Heat Recovery Exchanger Control**

Vesta ERP units are equipped with by-pass dampers in order to be able to deliver the outside air directly without entering the heat exchanger under suitable conditions. With the SENSO control, sensors are used to determine when the by-pass will turn on and off. This function, also known as Free Cooling, saves energy by opening the by-pass dampers when the outside air is suitable.

**Weekly Timer**

The units have a programmable weekly schedule and the unit automatically switches on and off at the desired time according to the program set.

**Alarms**

When the operation and performance of the devices are monitored by the SENSO control, the inputs from the ventilation system are also carried to the device and the operation is regulated accordingly. Fan overheating warning, electric heater high temperature warning, fire alarm, filter pollution control, device status information and so on. With the alarms the system provides the highest performance and continuous operation.

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