# EVU-S/SD

## Ceiling Type High Efficient Heat / Energy Recovery Units


eneko®

# EVU-S/SD 250/500/800/1000/1500/2000
## Ceiling Type Energy Recovery Unit

ErP 2018

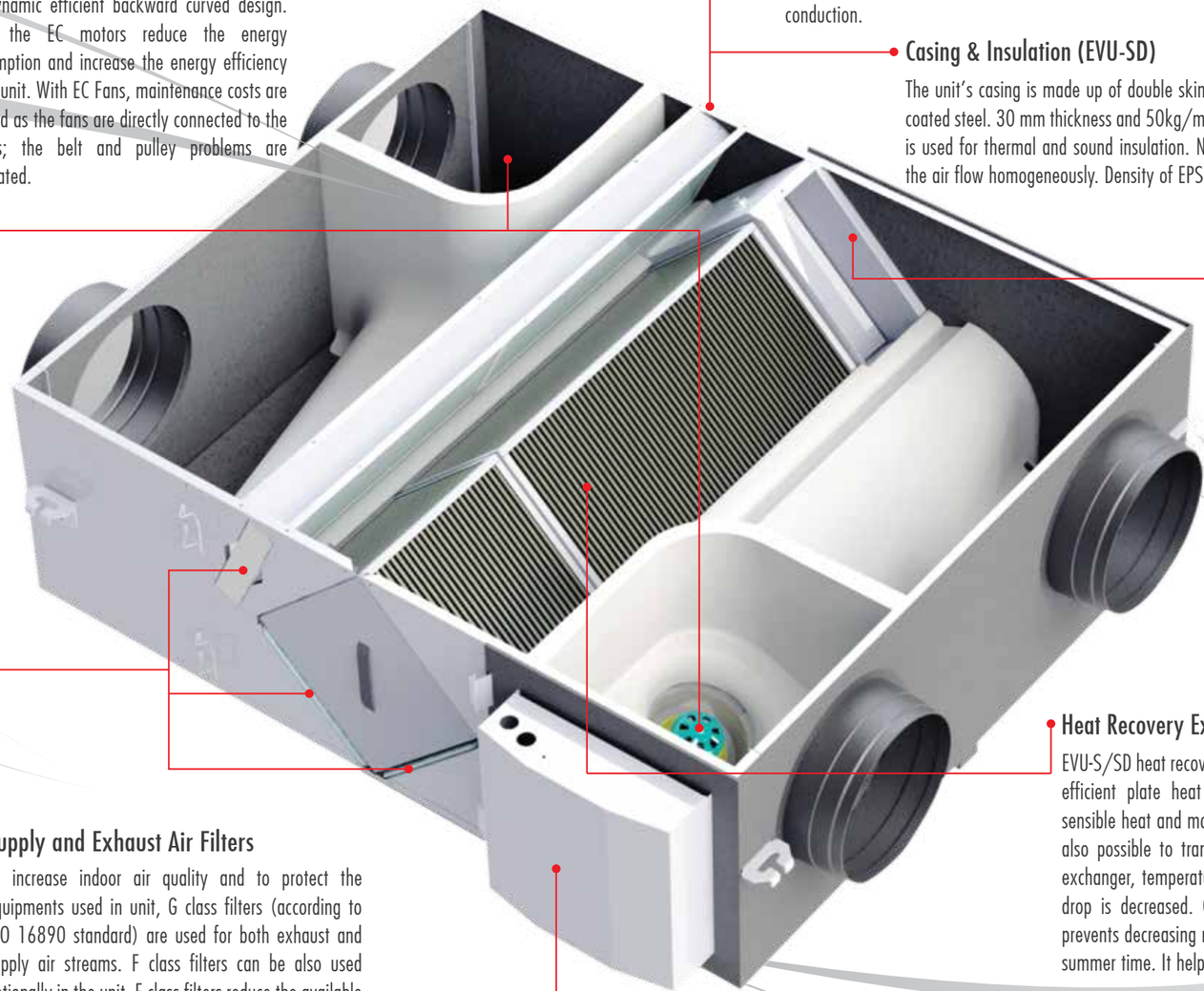
## Index



The technical specifications and the performance data declared with this logo have been developed by the tests performed in Eneko Energy Laboratory which is established with the development Project support of Tübitak by regarding relevant standards.

### Supply and Exhaust Air Fans

The fans in heat recovery units are equipped with innovative Electronically Commutated **EC motor** technology. EC motors have higher efficiency and simple speed control. Fan blades have high aerodynamic efficient backward curved design. Using the EC motors reduce the energy consumption and increase the energy efficiency of the unit. With EC Fans, maintenance costs are reduced as the fans are directly connected to the motors; the belt and pulley problems are eliminated.



### Casing & Insulation (EVU-S)

High corrosion resistive 200 gr/m² galvanize coated steel is used for the casing. Inside of outdoor air stream is insulated with 10 mm, outside of outdoor air stream is insulated with 5 mm; inside of indoor air stream is insulated with 10 mm non-flammable acoustics foam against sound and thermal conduction.

### Casing & Insulation (EVU-SD)

The unit's casing is made up of double skinned high corrosion resistive 200 gr/m² galvanize coated steel. 30 mm thickness and 50kg/m³ density of Rockwool insulation between the walls is used for thermal and sound insulation. Non-flammable EPS modules are used for directing the air flow homogeneously. Density of EPS is 40 kg/m³.

### By-Pass

EVU-S/SD units have by-pass ventilation as standard. During by-pass ventilation, no heat transfer occurs between exhaust and fresh air stream. In transition periods and at nights in summer, by-pass module helps to cool down (free-cooling) and heat up (free-heating) the building without any energy expense.

### Heat Recovery Exchanger (Cellulosic)

EVU-S/SD heat recovery ventilation units have cellulosic crossflow, high efficient plate heat recovery exchangers. The exchanger transfers sensible heat and moisture between supply and exhaust air. Thus, it is also possible to transfer latent heat. With the optimization of heat exchanger, temperature and humidity efficiency is increased, pressure drop is decreased. Cellulosic Paper Type Crossflow Heat Exchanger prevents decreasing moisture in winter time and increasing moisture in summer time. It helps indoor air quality to be increased.

### Supply and Exhaust Air Filters

To increase indoor air quality and to protect the equipments used in unit, G class filters (according to ISO 16890 standard) are used for both exhaust and supply air streams. F class filters can be also used optionally in the unit. F class filters reduce the available static pressure of the unit for the nominal air flow rate.

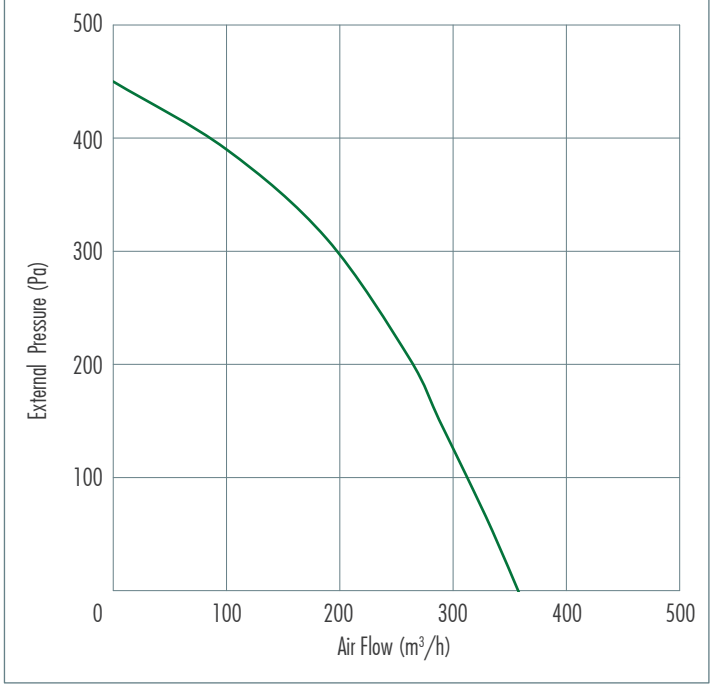
### Control System Plug&Play

ENECON PLUS control unit is developed for controlling of heat recovery units' equipments, meeting the demands coming from the customers and is user-friendly designed. ENECON PLUS is capable of commanding the equipments in standard unit and optional accessories. ENECON PLUS Control unit can be performed the basic functions without any control panel, with Standard Panel can be also used more functional. Besides, the control unit can control the all functions via ModBus and switch on/off via BMS as optional. Alternatives different from ENECON PLUS controller are listed in "Control System" part.

# Performance Data

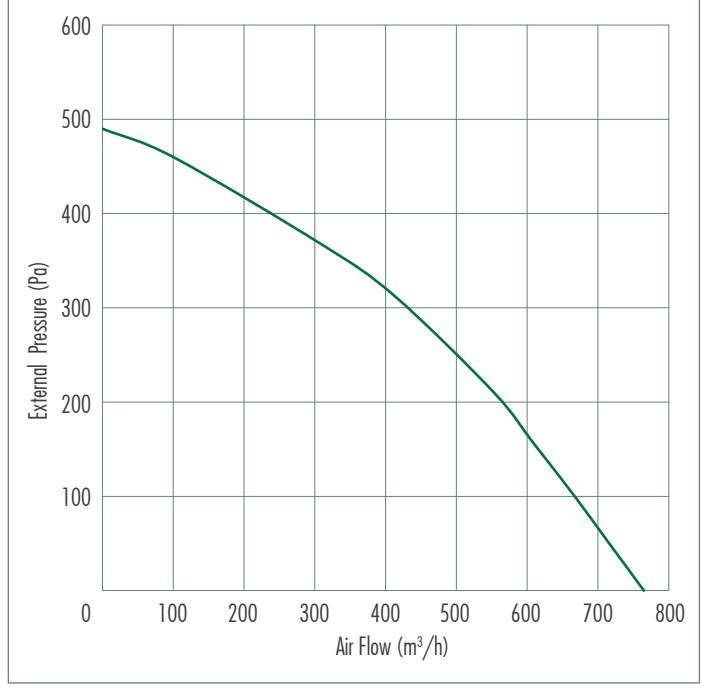
## EVU-S/SD 250

Performance Curve



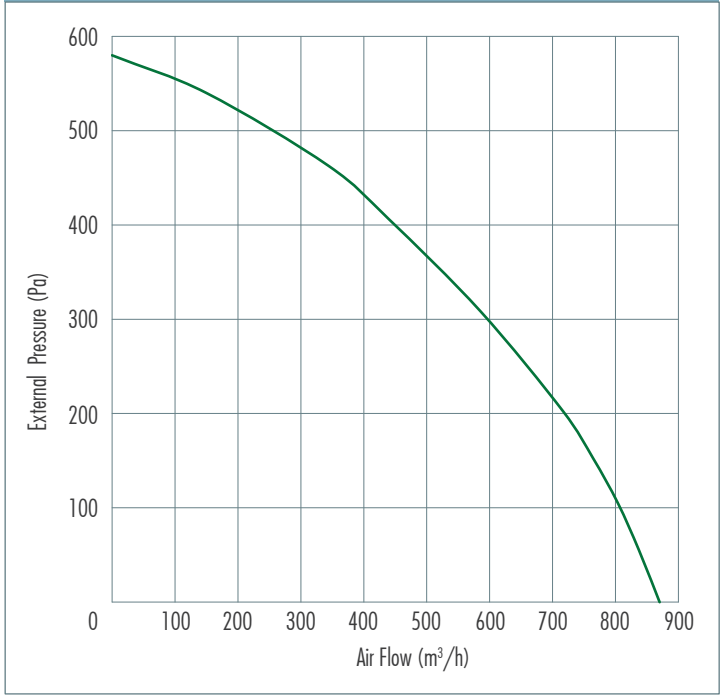

## EVU-S/SD 500

Performance Curve



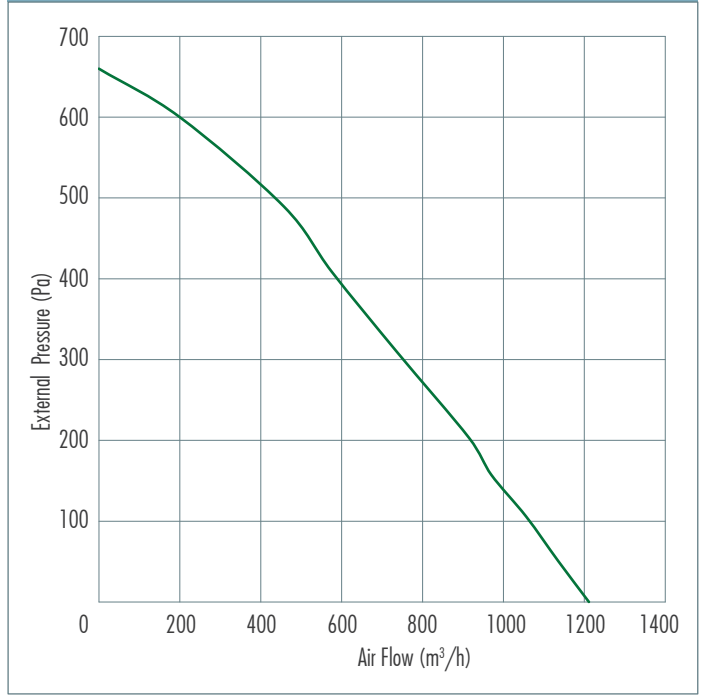

## EVU-S/SD 800

Performance Curve



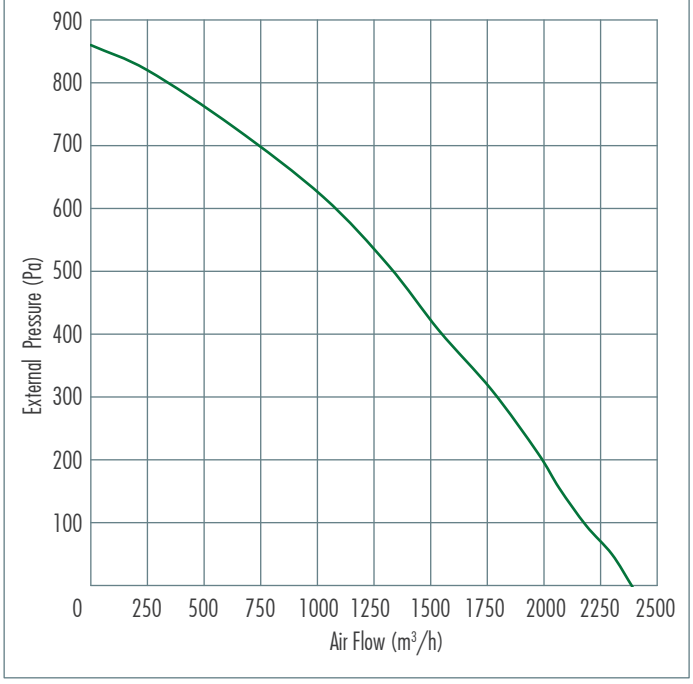

## EVU-S/SD 1000

Performance Curve



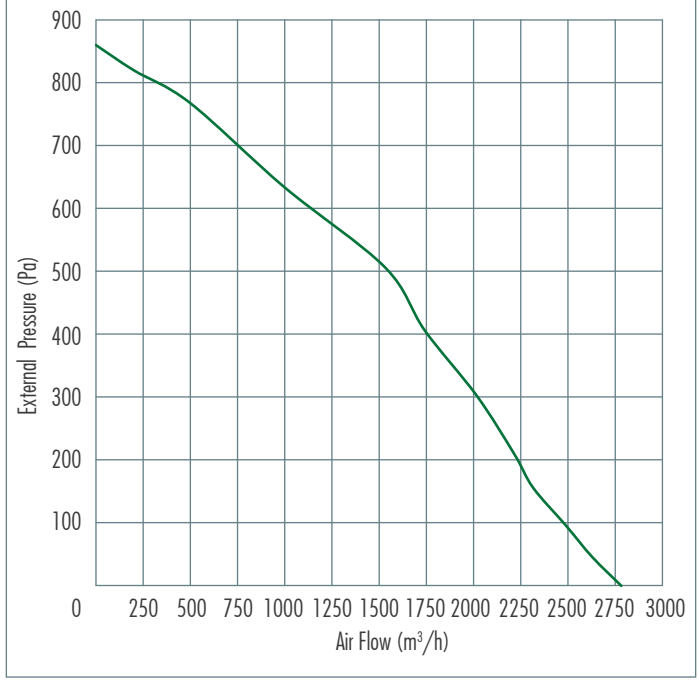
## EVU-S/SD 1500

Performance Curve




## EVU-S/SD 2000

Performance Curve

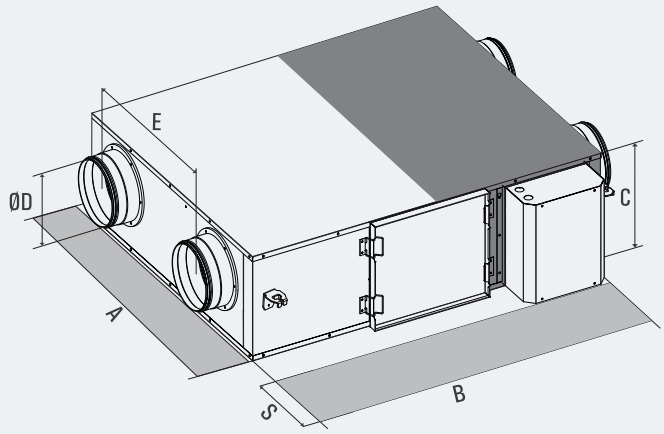


# Technical Specifications

| Product Model Identifier | | EVU-S/SD 250 | EVU-S/SD 500 | EVU-S/SD 800 | EVU-S/SD 1000 | EVU-S/SD 1500 | EVU-S/SD 2000 |
|---|---|---|---|---|---|---|---|
| Manufacturer | | ENEKO | | | | | |
| Erp | | Erp 2018 | | | | | |
| Declared typology | | NRVU/BVU | | | | | |
| Type of drive | | Variable speed drive (VSD) | | | | | |
| Type of HRS | % | Other | | | | | |
| Thermal efficiency of HRS[1] | % | 73.0 | 73.0 | 73.0 | 73.0 | 75.0 | 74.6 |
| Nominal flow rate | $m^3/h$ | 200 | 440 | 800 | 1000 | 1200 | 1700 |
| Effective electric power input | W | 53 | 107 | 177 | 233 | 361 | 468 |
| $SFP_{int}$ | $W(m^3/s)$ | 321 | 451 | 577 | 586 | 771 | 732 |
| Face velocity at design flow rate | m/s | 0.58 | 0.72 | 0.86 | 0.86 | 0.99 | 1.04 |
| Nominal external pressure ($\Delta P_{s,ext}$) | Pa | 100 | 100 | 100 | 100 | 100 | 100 |
| Internal pressure drop of ventilation components($\Delta P_{s,int}$) | Pa | 62 | 95 | 144 | 149 | 202 | 210 |
| Internal pressure drop of non-ventilation components($\Delta P_{s,add}$) | Pa | N/A | | | | | |
| Static efficiency of fans used in accordance with Regulation (EU) No. 327/2001 | | 39 | 42 | 50 | 51 | 52 | 57 |
| Declared maximum external leakage rate | % | < 3 | | | | | |
| Declared maximum internal leakage rate | % | < 5 | | | | | |
| Energy classification of the filters (Energy performance) | | Coarse > 40% (According to ISO 16890) | | | | | |
| Description of visual filter warning for NRVUs intented for use with filters | | Timer | | | | | |
| Casing sound power level ($L_{WA}$) | | 51/48 | 52/49 | 63/59 | 58/55 | 59/57 | 65/62 |
| Internet adress for pre-/dis-assembly instructions | | www.eneko.com.tr | | | | | |

[1] EN 308 condition (OA = 5°C & 72%, RA = 25°C & 28%).

## EVU-S/SD Unit Dimensions



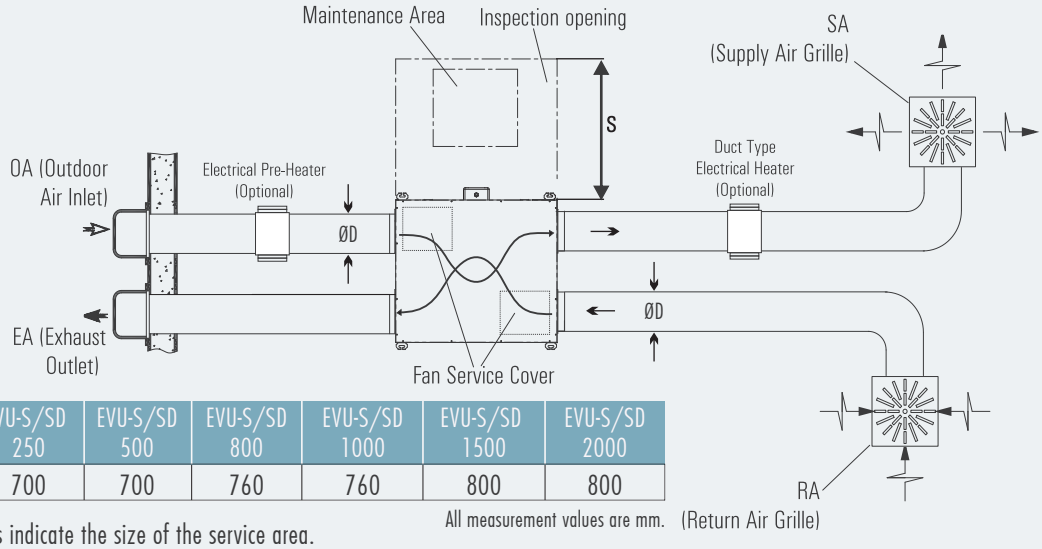

| | EVU-S 250 | EVU-S 500 | EVU-S 800 | EVU-S 1000 | EVU-S 1500 | EVU-S 2000 |
|---|---|---|---|---|---|---|
| A | 750 | 922 | 1014 | 1294 | 1128 | 1428 |
| B | 907 | 1130 | 1214 | 1606 | 1807 | 1807 |
| C | 296 | 344 | 410 | 410 | 552 | 552 |
| ØD | Ø160 | Ø200 | Ø250 | Ø300 | Ø355 | Ø355 |
| E | 404 | 499 | 589 | 719 | 623 | 921 |
| Unit Weight | 34 | 46 | 51 | 79 | 97 | 106 |

*All measurement values are mm.
**Unit weight is kg.

| | EVU-SD 250 | EVU-SD 500 | EVU-SD 800 | EVU-SD 1000 | EVU-SD 1500 | EVU-SD 2000 |
|---|---|---|---|---|---|---|
| A | 808 | 981 | 1071 | 1351 | 1185 | 1485 |
| B | 956 | 1186 | 1264 | 1657 | 1856 | 1856 |
| C | 358 | 416 | 472 | 472 | 614 | 614 |
| ØD | 160 | 200 | 250 | 300 | 355 | 355 |
| E | 404 | 505 | 590 | 720 | 623 | 921 |
| Unit Weight | 52 | 83 | 97 | 135 | 164 | 179 |

*All measurement values are mm.
**Unit weight is kg.

## Service Space & Installation



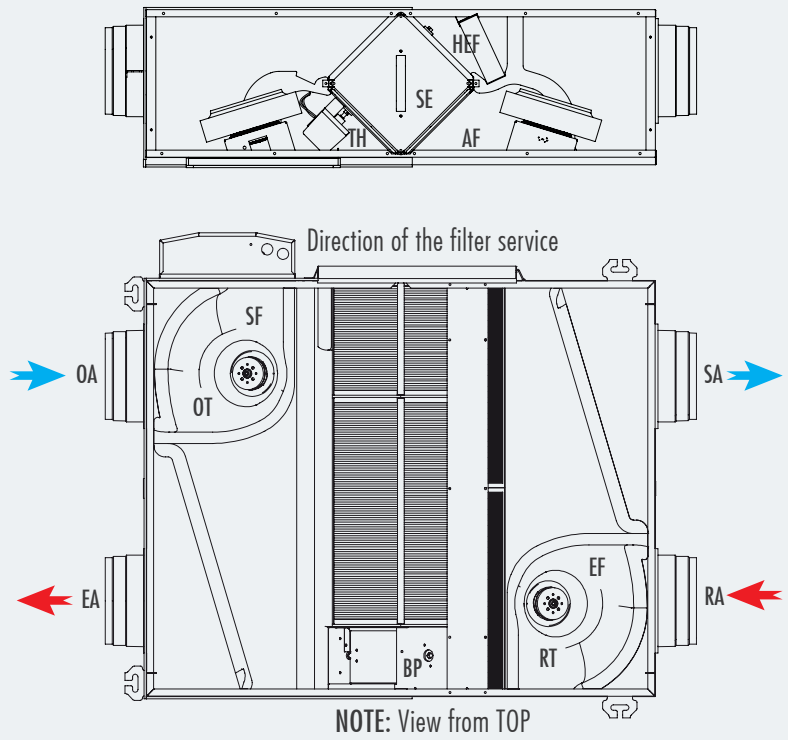

| | EVU-S/SD 250 | EVU-S/SD 500 | EVU-S/SD 800 | EVU-S/SD 1000 | EVU-S/SD 1500 | EVU-S/SD 2000 |
|---|---|---|---|---|---|---|
| S | 700 | 700 | 760 | 760 | 800 | 800 |

All measurement values are mm.

"S" values indicate the size of the service area.
A service space of "C" must be left under the unit for fan service.

**NOTE:** View from TOP

# Working Principle of Unit




Descriptions:

SA - Supply Air

RA - Return Air

EA - Exhaust Air

OA - Outdoor Air

BP - By-Pass Damper

SF - Supply Air Fan

OT - Outdoor Air Temperature Sensor

EF - Exhaust Air Fan

RT - Return Air Temperature Sensor

AF - Exhaust Air Filter

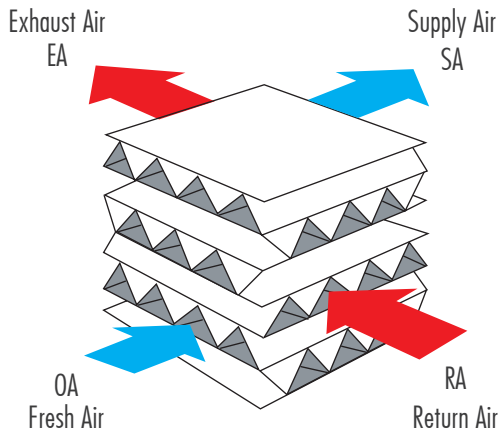
SE - Cellulosic Exchanger

TH - Fresh Air Filter

HEF - High efficient F class filter (Optional)

## Cellulosic Exchanger

- High Efficiency Sensible & Latent Enthalpy Transfer
- Humidity Transfer
- Up to 20% Reduction in cooling load
- Sound absorbing material



| Automation Options | | Control Cards | |
|---|---|---|---|
| Standard | Optional | Standard | Alternative |
| OA Temperature Sensor | | ✓ | ✓ |
| RA Temperature Sensor | | ✓ | ✓ |
| SA Fan Control | | ✓ | ✓ |
| RA Fan Control | | ✓ | ✓ |
| ByPass Damper | | ✓ | ✓ |
| Filter Contamination Info (Time) | | ✓ | ✓ |
| Modbus RTU | | ✓ | ✓ |
| Weekly Timer | | ✓ | ✓ |
| | On/Off Damper Control | ✓ | ✓ |
| | Proportional Damper Control | ⊗ | ✓ |
| | Airflow Control | ⊗ | ⊗ |
| | Humidity Control | ≡ | ≡ |
| | CO2 Control | | |
| | SA Temperature Sensor | ✓ | ✓ |
| | On/Off Heating Coil | ✓ | ✓ |
| | Proportional Heating Coil | ✓ | ✓ |
| | On/Off Cooling Coil | ✓ | ✓ |
| | Proportional Cooling Coil | ✓ | ✓ |
| | Electrical Pre-Heater | ✓ | ✓ |
| | Electrical After-Heater | ✓ | ✓ |
| | BacNET | ⊗ | ✓ |
| | Web Browser (TCP/IP) | ⊗ | ✓ |
| | Filter Contamination Info (DPS) | ⊗ | ✓ |

≡ Only one of them the defined functions is selectable for this control card.

⚠ The optional features in the table vary according to the product.

| Control Panel | | | Control Cards | |
|---|---|---|---|---|
| Panel Type | | Panel Descriptions | Standard | Alternative |
|  | Standard | Wall-mounted type<br>Max:30 m communication ability | ✓ | ⊗ |
|  | Standard* | Touch Buton Panel<br>(White and Black colour optional)<br>Wall-mounted type<br>Max: 30 m communication ability | ✓ | ⊗ |
|  | Standard* | Wired Panel with Wifi<br>(White and Black colour optional)<br>Wall-mounted type<br>Max: 30 m communication ability | ✓ | ⊗ |
|  | Alternative | Wall-mounted type hand panel,<br>IP 30 protection class,<br>Max:100 m communication ability | ⊗ | ✓ |
|  | Alternative** | Wall-mounted type hand panel,<br>IP 30 protection class,<br>Max:100 m communication ability | ⊗ | ✓ |
|  | Alternative** | Wall-mounted type hand panel,<br>IP 30 protection class,<br>Max:100 m communication ability | ⊗ | ✓ |

* This panel is optional for the standard panel.

** This panel is optional for the alternative panel.

## Selection of Electrical Cable Cross-Section

| Unit Model EVU-S/SD | Unit Voltage (V) | Unit Power Input (kW) | Current (A) | Fuse (A) | Cable Cross-Section ($mm^2$) for 50M and PF=0.8 |
|---|---|---|---|---|---|
| 250 | 230 | 0.138 | 0.94 | 1.00 | 1.5 |
| 500 | 230 | 0.280 | 2.18 | 2.50 | 1.5 |
| 800 | 230 | 0.380 | 2.88 | 3.15 | 1.5 |
| 1000 | 230 | 0.380 | 2.98 | 4.00 | 1.5 |
| 1500 | 230 | 1.040 | 4.58 | 5.00 | 2.5 |
| 2000 | 230 | 1.040 | 4.58 | 5.00 | 2.5 |

The data in the table shows the maximum power/current values. Please check unit label for updated values.

## Cable Cross-Section Formulas

**1**

$$I_{current} = \frac{P}{U.CosQ}$$

$I_{cable} > I_{current}$

**2**

$$\%e = \frac{100.P.L}{k.S.U^2} \quad , \quad S = \frac{100.P.L}{k.\%e.U^2}$$

$\%e = \%3$

**3**

$I_{cable} > I_{fuse} \geq I_{current}$

Cable Cross-Section S = Max (S1, S2, S3, 1.5$mm^2$)

**P** : Power
**I** : Current
**U** : Voltage
**S** : Conductor cross section
**k** : Conductor coefficient
**L** : Conductor length
**%e** : The voltage drop

## Example of Cable Cross-Section Calculation

**P** : 1 kW **L** : 50m
**U** : 230V **%e** : %3
**PF: CosQ** : 0.8 **k** : 56m / Ω

**1**

$$I_{current} = \frac{1000\ W}{230.0,8} = 5.43\ A$$

The cable will be used, is selected from the cable cross-section table so that the equivalent ampere value in the table should be higher than calculated "$I_{current}$" value.

S1 = 1.5 $mm^2$

**2**

$\%e = \%3$

$$S = \frac{100.1000.50}{56.3.230^2} = 0.56\ mm^2$$

S2 ≥ 0.56 $mm^2$ ≥ 0.75 $mm^2$

S2 = 0.75 $mm^2$

**3**

$I_{cable} > I_{fuse} \geq I_{current}$

$I_{cable} > 10A \geq 5.43A$

"$I_{fuse}$"which will be higher than "$I_{current}$", is selected.

The cable will be used, is selected from the cable cross-section table so that the equivalent ampere value in the table should be higher than selected "$I_{fuse}$" value.

$I_{cable} = 24A$

S3 = 1.5 $mm^2$

Cable cross-section S = Max (S1, S2, S3, 1.5 $mm^2$)

S = Max (1.5, 0.75, 1.5, 1.5)

S = 1.5 $mm^2$

## Electric Heaters

Electric heaters are optionally supplied in cold climates for supply air and in extreme climates for both supply and outdoor air sides against freezing. Electric heaters are manufactured according to circular or rectangular duct systems.
Standard types are produced of stainless steel heating elements and galvanized metal casing. Stainless steel casing is also avaliable. Electric heaters are equipped with two circuit cutting thermostats. Factory setting for the automatically operating one is 70 °C and for the manual operating 110 °C.
Electric heaters capacity can be controlled up to 3 steps with control panel according to the set temperature from the room control panel and room (or supply air) temperature. Speed controls shall not be used with Electric heater installations. Eneko electric heaters are connected in Delta connection in standard models.

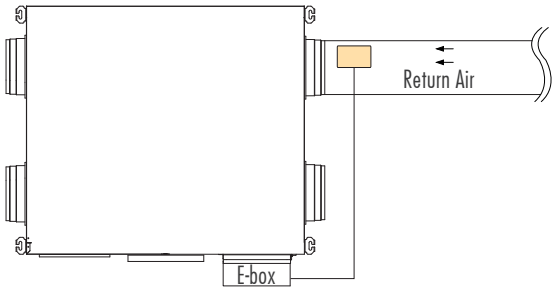
### Heating Capacity Calculation

$Q = 0{,}33 \times V \times (T_2 - T_1)$

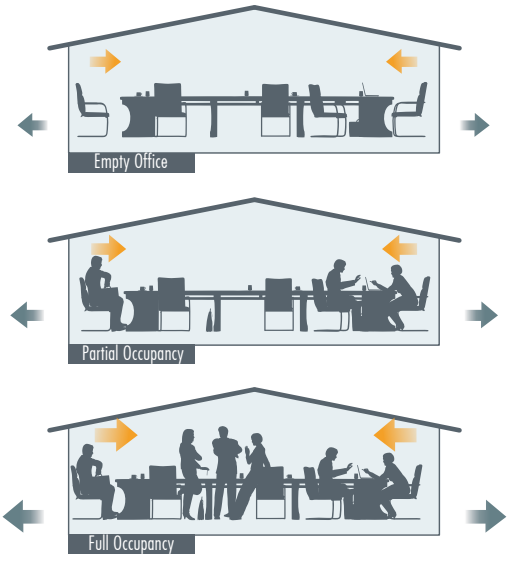
Q : Heating Capacity (W)
V : Air Flow through electric heater ($m^3/h$)
$T_1$ : Air temperature before the heater (°C)
$T_2$ : Air temperature after the heater (°C)

## Ventilation on Demand

Air Quality Sensor ($CO_2$ / Humidity) is mounted to the return air duct and is connected to control system of unit. The set point for the desired indoor air quality is set during the installation. According to the demand indoors, EVU S/SD units are modulated automatically by the sensor. Annual energy consumption of the unit is reduced as a result of the modulation, ending in reduction in energy costs.




Fresh air demand in a space is calculated according to human occupancy and/or physical properties of the conditioned space. The calculation is based on the maximum indoor occupancy. In practice maximum occupany is observed for only a small period of time annually where lower air flow rates will be sufficient for most of the year. By reducing the air flow rate according to the fresh air demand; it is possible to reduce units electrical consumption and reduce also energy consumption used to condition the space. It should be noted that by increasing fresh air rate, indoors heating/cooling demand will also be increased.




With the help of control panel, it is possible to regulate fresh air rate according to the demand indoors. Eneko Indoor air quality sensor ($CO_2$/Humidity) sensor is mounted to the return duct or the conditioned space and the demanded condition is set. A 0-10 V signal will be created and EVU S/SD unit's air flow will be regulated according to the signal.

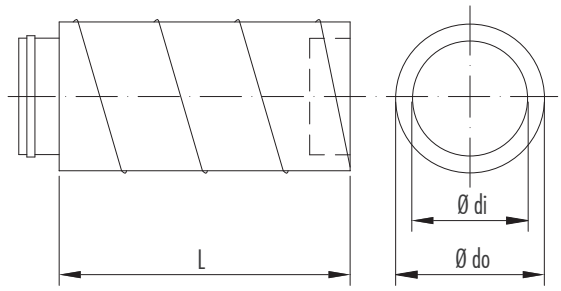
## Sound Attenuator For Circular Ducts

Sound attenuators are designed for standard duct dimensions. Various lenghts are avaliable accoring to attenuation demand. Sound attenuation capacities are given in the table.For better performance sound attenautors can be used in series. For the best result the sound attenuators shall be installed just after the unit.

### Notation

SLT ---- ----

- Sound Attenuator
- Diameter (mm)
- Lenght(mm)




### Sound Attenuator Capacity [dB]

| SLT | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
|---|---|---|---|---|---|---|---|---|
| 200-300 | 1 | 2 | 3 | 6 | 10 | 14 | 12 | 14 |
| 200-600 | 2 | 3 | 6 | 7 | 13 | 17 | 18 | 20 |
| 200-900 | 3 | 4 | 7 | 10 | 16 | 18 | 21 | 22 |
| 250-300 | 1 | 2 | 6 | 6 | 13 | 16 | 14 | 15 |
| 250-600 | 2 | 3 | 7 | 7 | 18 | 21 | 20 | 22 |
| 250-900 | 3 | 4 | 9 | 8 | 21 | 24 | 21 | 23 |
| 300-300 | 1 | 2 | 4 | 4 | 10 | 12 | 12 | 15 |
| 300-600 | 1 | 3 | 6 | 7 | 13 | 15 | 17 | 19 |
| 300-900 | 2 | 4 | 7 | 8 | 15 | 17 | 18 | 21 |
| 355-600 | 1 | 3 | 8 | 8 | 9 | 6 | 5 | 7 |
| 355-900 | 4 | 4 | 13 | 13 | 11 | 7 | 6 | 8 |

### Sound Attenuator Dimensions [mm]

| SLT | length (L) | Ø di | Ø do |
|---|---|---|---|
| 200-300 | 300 | 200 | 260 |
| 200-600 | 600 | 200 | 260 |
| 200-900 | 900 | 200 | 260 |
| 250-300 | 300 | 250 | 310 |
| 250-600 | 600 | 250 | 310 |
| 250-900 | 900 | 250 | 310 |
| 300-300 | 300 | 300 | 360 |
| 300-600 | 600 | 300 | 360 |
| 300-900 | 900 | 300 | 360 |
| 355-600 | 600 | 355 | 415 |
| 355-900 | 900 | 355 | 415 |

## Final Filter (F Class - Optional)

F class filters are optionally available for EVUVENT units. Additional pressure drop due to final filters are indicated on the diagrams. To reduce initial and operational pressure drop innovative pleated type filters are used to increase filtration surface. Units' maximum air flow is reduced due to filter pressure drop.

## GENERAL

The sale of all Products of ENEKO shall exclusively be made on the basis of these General Terms and Conditions of Sales. Any other conditions and General Conditions of Purchase of the Buyer are not accepted.

## OFFERS

Our offers are non-binding and without obligation. Contracts for delivery and all other agreements (including subsidiary agreements) as well as declarations of our representatives shall only become legally binding for us after written confirmation. We do not render planning service. Proposals made and information provided by our representatives shall be non-binding. Illustrations, drawings, dimensions and weights or other performance data shall only be binding if this is expressly agreed in writing.

## TERMS OF ORDER

Purchase orders shall be sent to ENEKO in written form and shall be non-binding unless they are accepted by written confirmation (order confirmation) from ENEKO. Each order shall include properly identified Products ordered and relevant shipping dates.

## PRICE OF THE GOODS

Prices are net Ex Works according to current Incoterms unless stated otherwise and do not include any kind of taxes.Prices are valid at the date of delivery will be applied.We reserve the right to adjust prices for confirmed orders as well to reflect any increase in our costs for any reason beyond our control like force majeure, shortage of primary material or labor strikes, official orders, transportation or similar problems.In this case, a new price agreement shall be required for higher rates. If such an agreement is not made, we shall be entitled to withdraw from the contract by written notice within 15 days.

## TERMS OF PAYMENT

Payments shall be carried out according to the contractual terms as defined and set forth in the order confirmation. If the payment conditions have not been agreed upon conclusion of the contract, the payment terms and payment dates specified in our invoices shall be binding. Deadlines for discounts and periods allowed for payment shall begin to run upon receipt of the invoice. Payments by draft, bills of Exchange or anyway extended payments shall mean neither credit novation, nor prejudice to the Retention of Title agreement, nor to territorial competence.If buyer fails to make payment by due date, we are entitled to charge the buyer with a relevant interest on the unpaid amount.

## TERMS OF DELIVERY

Delivery time information is only approximate. We shall only be in default if the performance is due and a written demand for payment was issued. Delivery day is the day of dispatch Ex Works.We shall also not be liable with regard to bindingly agreed periods and dates in the event of delays an delivery and of performance due to force majeure and events which considerably complicate or make delivery impossible not only temporarily-strike lockout, breakdown, delay in supply with important raw and auxiliary materials even if the delay occurs at our supplier, in particular. These delays entitle us to postpone delivery for the period of the impediment plus a reasonable start-up period or to withdraw from the contract as a whole or in part.If delivery time is extended or we are released from our delivery commitment, the buyer may not derive a claim for damages from it. However, we may only rely on the circumstances mentioned if we notify the buyer immediately.We shall be entitled to make part deliveries. Any part delivery shall be considered as independent transaction.In case of default, our liability is limited to contract-typical foreseeable damage.

# General Terms and Conditions of Sale

## SHIPMENT

Shipment is made for the buyer's account.Mode of shipment and shipping route, transport and packaging and other securities respectively shall be at our choice. We shall be entitled, however, not obliged to insure deliveries in the name and for account of the buyer.Risk passes to the buyer when shipment is handed over to the person performing the transport or left our Works for shipment. If shipment is delayed upon buyer's request, risk passes to the buyer with the ready for shipment note.If ordered goods are rejected after the ready for shipment note, we shall be entitled to request payment and store the goods at buyer's expense.Discharge of the goods is made at buyer's expense.

## RETENTION OF TITLE

In any event ENEKO shall retain full ownership of all materials supplied whilst the payment conditions of the entire amount have not been complied with, said materials may be removed from the customer at our request. Should the customer be declared bankrupt or insolvent and has not made paid the entire amount of payments. ENEKO shall be entitled to recover the goods. ENEKO may interrupt the supply without incurring any liability whatsoever if he had notice of or became aware of a decrease in the creditworthiness of the purchaser or if any of the existing negotiable instruments or debts were not properly complied with, shall result as being unpaid and protested.

## WARRANTY

ENEKO Products are under warranty (defect in material or workmanship)for 2 years from the date of sale reflected on the invoice. Under this warranty, ENEKO is under the obligation to replace the part requested under warranty.

The followings are excluded from ENEKO warranty:

- Normal wear and tear
- Defective assembly or handling
- Third party compensation

Parts the subject of a claim shall be sent to our warehouse as carriage paid with relevant report completely filled in, wherein the parts shall be subjected to analysis.

## LIABILITY

ENEKO, for any losses/damages, shall only be responsible within the limits of the law.Owing to basic obligations undertaken by simple negligence, if the contract is violated, ENEKO's liability shall be limited to compensate for losses which are emerged specific and predictable. ENEKO shall not carry any responsibility in case of a single negligence in breach of non-essential contractual obligations.

## PROPERTY RIGHTS

The purchaser in no event and under no circumstances whatsoever shall publish or use the trademark, trade name or logo of ENEKO without a prior written permission.

## GOVERNING LAW AND JURISDICTION

This agreement shall be governed with all aspects of the Turkish Law.The courts of Izmir/Turkey shall have an exclusive jurisdiction to adjudicate any dispute arising under or in connection with this agreement.

# Notes

ISTANBUL
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