ENVU-ECO

Ceiling Type High Efficient Heat Recovery Units

ENVU- ECO 500/800/1200/1500/2200/2500
Ceiling Type Energy Recovery Unit

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ENVU-ECO

ENVU-ECO (500/800/1200/1500/2200/2500)
Ceiling Type Energy Recovery Unit

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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.

Control

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.

Casing & Insulation

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.

Fan

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.

Filter

To increase indoor air quality and to protect the equipments used in unit, ISO ePM 1 >50% (F7), &ISO ePM 10 >50% (M5) class filters (according to ISO 16890 standard) are used for supply and exhaust air streams, respectively. F9 class filters can be also used optionally inside the unit. (ISO ePM 1 >80%).

By-Pass

ENVU ECO 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.Provides frost protection.

Servis Area

All service doors are at the bottom surface of the unit and supported by a sliding rail mechanism. This structure allows fast, safe and ergonomic service and maintenance operations even in applications with limited headroom. Thanks to its compact design, maintenance efficiency is increased by providing maximum accessibility with minimum space.

Heat Exchanger

Heat recovery ventilation units have aluminum counterflow, high efficient plate heat recovery exchangers. Plate heat recovery exchangers have plates that are produced improved surface areas to provide high efficient and leakage free design. With the optimization of exchanger heat transfer is increased and pressure drop is decreased. Heat recovery exchanger has Eurovent certification.

eneko
www.eneko.com.tr

Technical Specifications

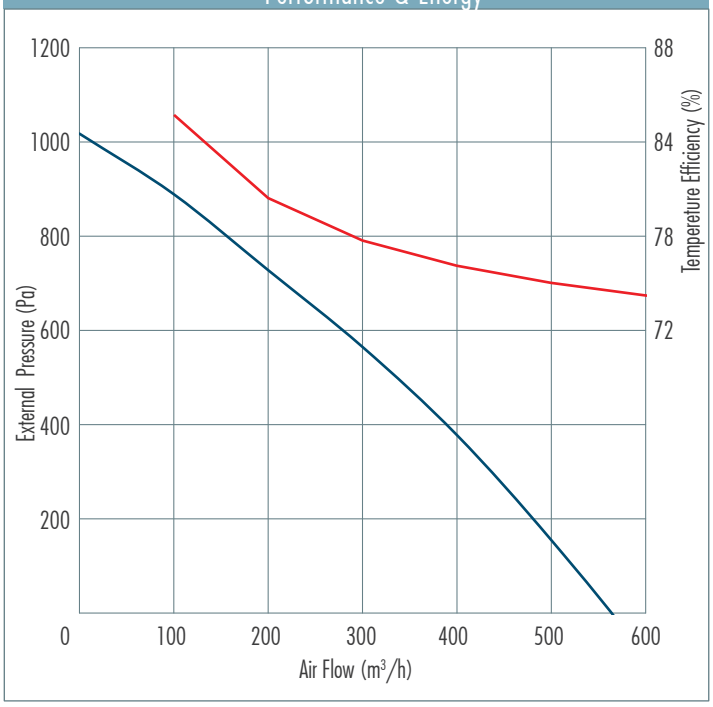
Unit Type			ENVU-ECO 500	ENVU-ECO 800	ENVU-ECO 1200	ENVU-ECO 1500	ENVU-ECO 2200	ENVU-ECO 2500
ERP			Yes					
Heat recovery		(EN 308)	Yes					
Heat recovery efficiency[1]	(%)	(EN 308)	>75					
Heat recovery efficiency[2]	(%)		>82					
Max air flow range	(m^3/h)	(at 0 Pa)	560	930	1.330	1.590	2.360	3.000
Nominal air flow range	(m^3/h)	(at 150 Pa) (EN 308)	450	750	1.000	1.350	2.100	2.500
Max air flow range	(m^3/h)	(at 150 Pa)	500	800	1.200	1.370	2.140	2.770
Max air flow range	(m^3/h)	(at 200 Pa)	480	740	1.150	1.300	2.070	2.640
Nominal external pressure	(Pa)		150	150	150	150	150	150
Unit Voltage	(V)		230	230	230	230	400	400
Key Points			1) Low Noise (due to 30 mm insulation) 2) Easy Service access 3) Compact structure - fit in small areas					
Control options			Enecon Plus as standard					
Bypass			On/Off					
Fan Motor			EC Fan					
Ventilator / Fan Material			Composite / Metallic Impellers as standard					
Heat Exchanger technology			Counterflow Aluminum					
Configuration / installation			Internal use only					
Installation Version			Both Right and Left versions are available					
Supply Air Filter			ISO ePM1 >50% (F7)					
Exhaust Air Filter			ISO ePM10 >50% (M5)					
Duct Connections			Round					
Casing material			0,8 mm Galvanized steel					
Insulation Panel thickness			30 mm - Rockwool					
Deicing Control			With outdoor air temperature sensor					
Service access From below			with sliding rail solution					
Accessories / Coils			1) Electrical Heating coil as external accessory / placed in the duct. 2) Water Cooling coil / Changeover coil / DX Cooling as external accessory (droplet eliminator as standard). 3) Water heater to be placed outside the unit. 4) Filter as internal accessory. (ISO ePM1 >80% as standard)					

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

[2] Wet efficiency refered to nominal airflow, outdoor (-5°C/80% RH) and indoor conditions (20°C/50%RH).

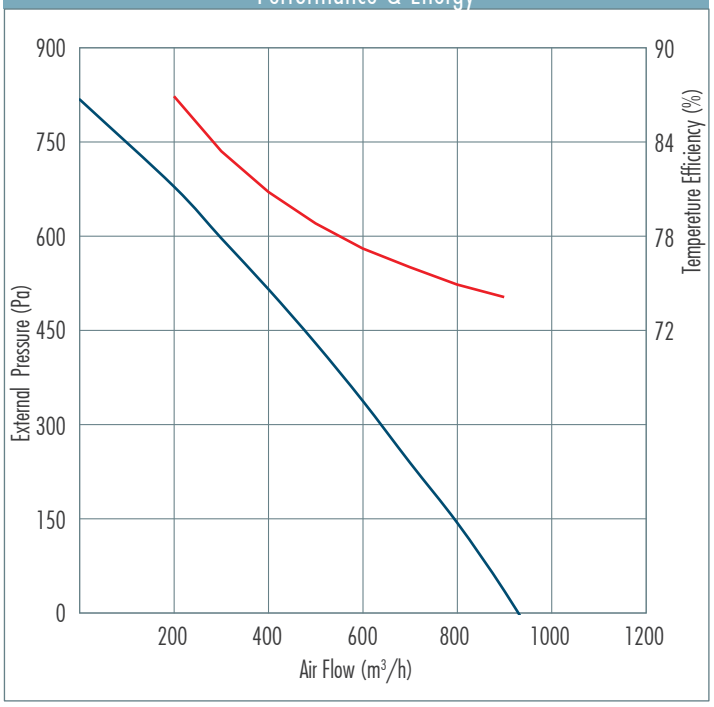
ENVU-ECO 500

Performance & Energy



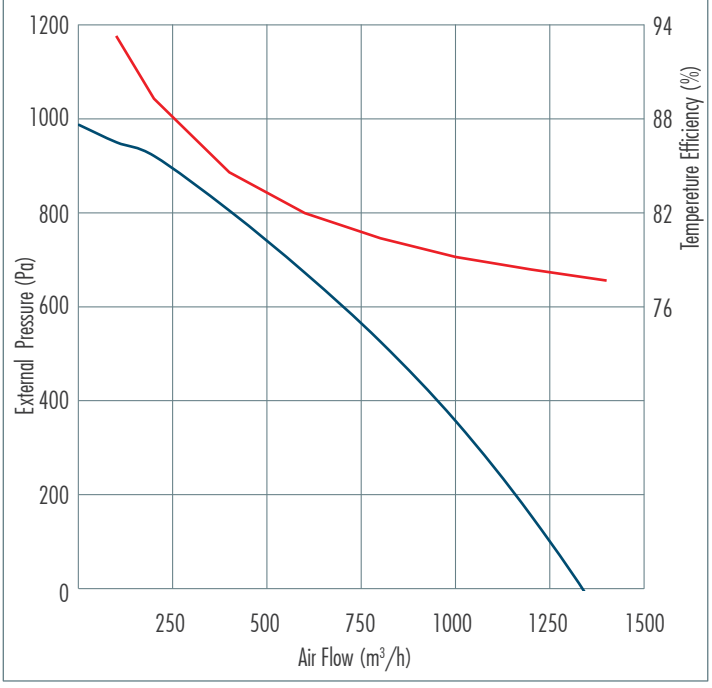
ENVU-ECO 800

Performance & Energy



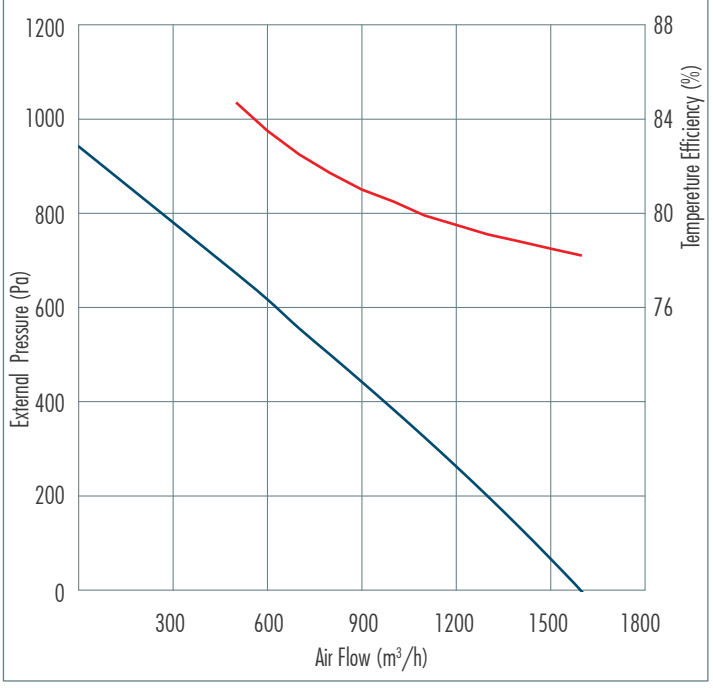
ENVU-ECO 1200

Performance & Energy



ENVU-ECO 1500

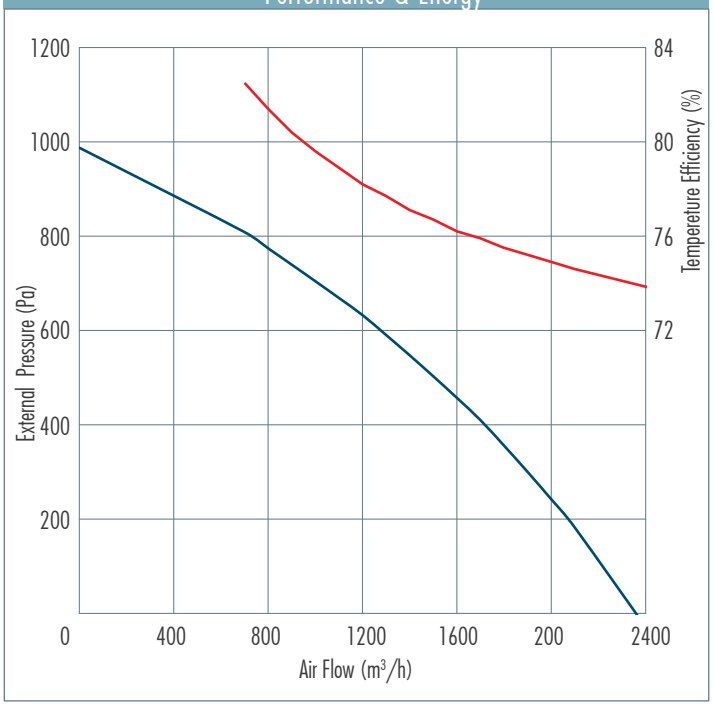
Performance & Energy



Performance Data

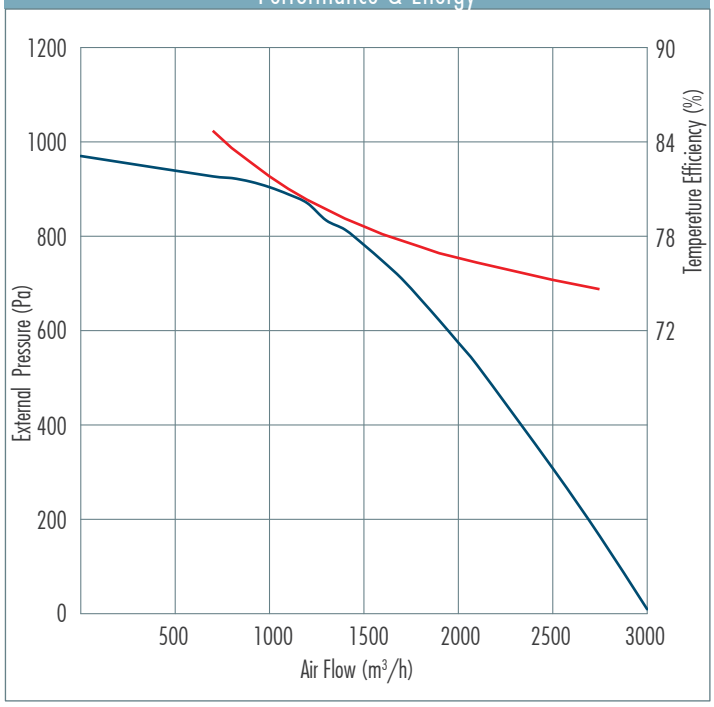
ENVU-ECO 2200

Performance & Energy

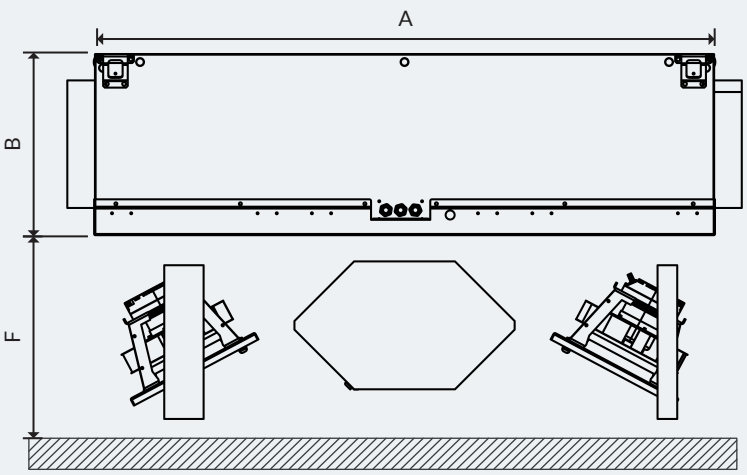


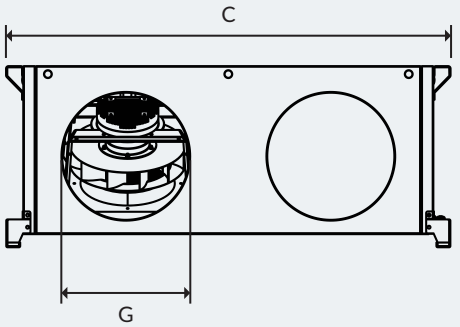
ENVU-ECO 2500

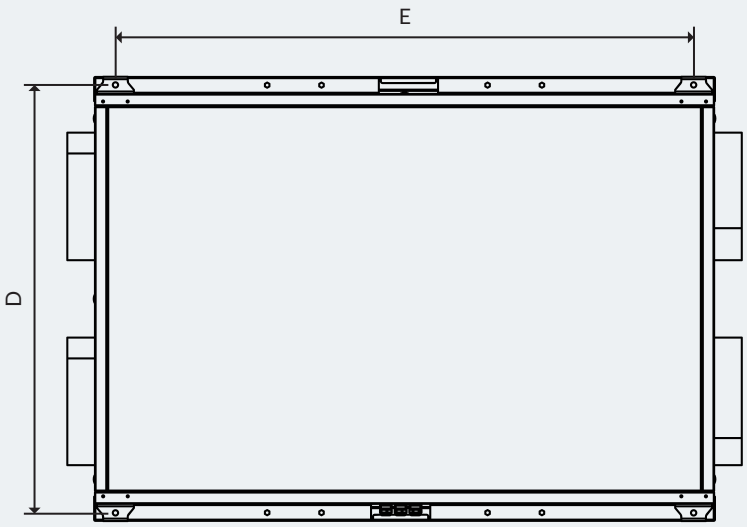
Performance & Energy



ENVU-ECO Unit Dimensions







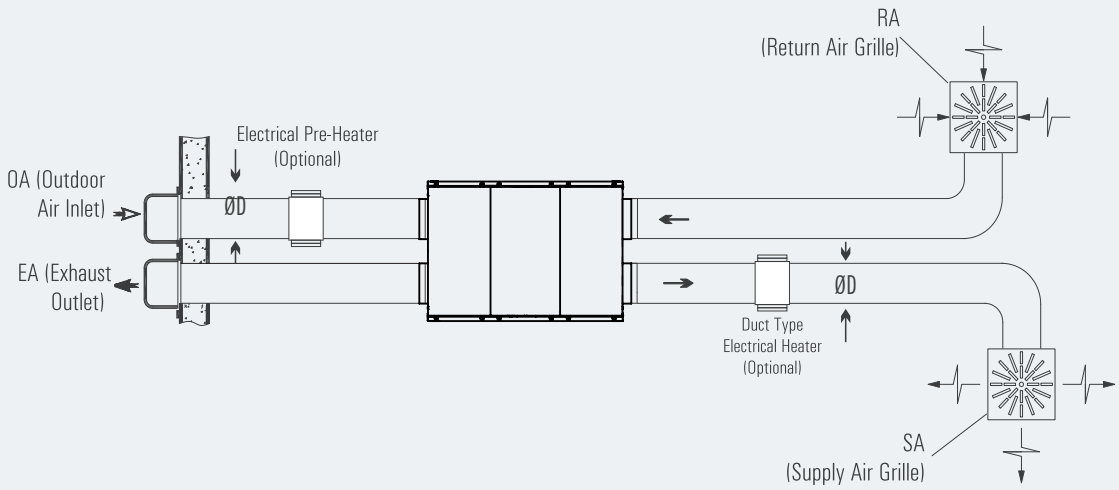
"F" values indicate the size of the service area.
A service space of "F" must be left under the unit for fan service.
Drain pipe must be installed.

	ENVU-ECO 500	ENVU-ECO 800	ENVU-ECO 1200	ENVU-ECO 1500	ENVU-ECO 2200	ENVU-ECO 2500
A	1310	1410	1510	1510	1760	1760
B	290	380	440	440	500	500
C	783	1083	1083	1287	1287	1587
D	744	1044	1044	1250	1250	1550
E	1210	1310	1410	1410	1660	1660
F	522	621	662	662	744	744
ØG	200	250	300	315	355	355
Unit Weight	57	85	118	130	145	150

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

Installation

Installation

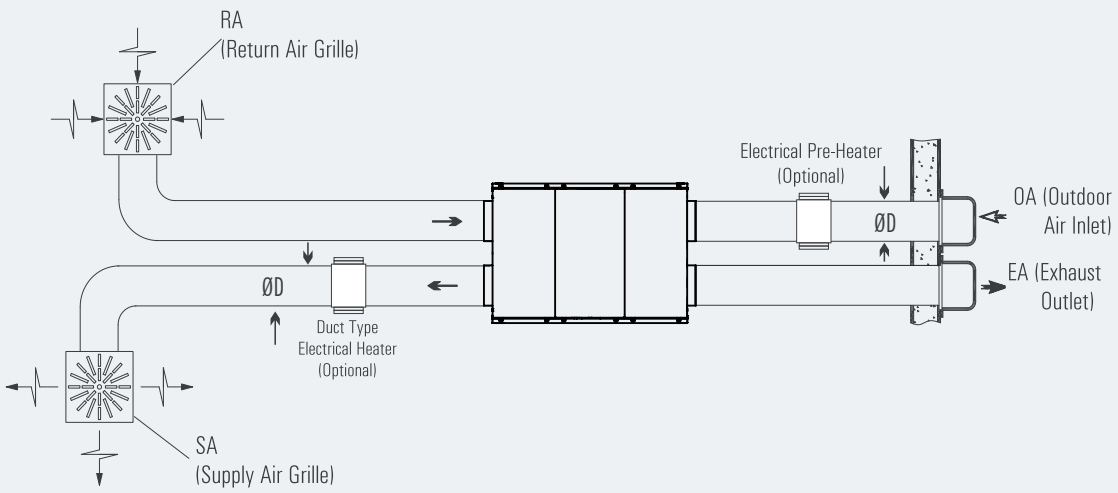


*Drain pipe must be installed

*The device direction is right

*Views are from bottom

Installation



*Drain pipe must be installed

*The device direction is left

*Views are from bottom

Automation Options		Control Cards
Standard	Optional	Enecon Plus
OA Temperature Sensor		✓
RA Temperature Sensor		✓
SA Temperature Sensor		✓
SA Fan Control		✓
RA Fan Control		✓
Fan Alarm		✓
Fire Alarm		✓
ByPass Damper (On/Off)		✓
Filter Contamination Info (Time)		✓
Filter Contamination Info (DPS)		✓
	Airflow Control	≡
	Constant Pressure	
	Humidity Control	
	CO2 Control	
	EA Temperature Sensor	⊗
	On/Off Hot Water Coil	✓
	Proportional Hot Water Coil	✓
	On/Off Cold Water Coil	✓
	Proportional Cold Water Coil	✓
	Electrical Pre-Heater	✓ (2 steps)
	Electrical After-Heater	✓ (1 step)
	Outdoor Damper (On-Off)	✓
	Outdoor Damper(Proportional)	⊗
	Freeze Protection	✓
	Heat Exchanger Freezing Pressure Control	✓
	Modbus RTU	✓
	MODBUS IP	⊗
	BACnet MSTP	⊗
	BACnet IP (with touchpanel)	✓
	Web Browser (TCP/IP-with touchpanel)	✓

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

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

Enecon Plus		
	STD Panel	Wall-mounted type Max: 30 m communication ability
	Black Panel	Wall-mounted type Max: 30 m communication ability
	Touch Buton Panel	Wall-mounted type Max: 30 m communication ability
	Wired Black Panel with Wifi	Wall-mounted type Max: 30 m communication ability
	Wired Panel with Wifi	Wall-mounted type Max: 30 m communication ability

Selection of Electrical Cable Cross-Section

Unit Model ENVU-ECO	Unit Voltage (V)	Unit Power Input (kW)	Current (A)	Fuse (A)	Cable Cross-Section(mm²) for 50M and PF=0.8
ENVU-ECO 500	230	0,36	2,58	4	1,5
ENVU-ECO 800	230	0,36	2,58	4	1,5
ENVU-ECO 1200	230	0,74	5,18	6,3	2,5
ENVU-ECO 1500	230	0,80	3,58	4	1,5
ENVU-ECO 2200	400	1,76	3,18	3x4	1,5
ENVU-ECO 2500	400	1,76	3,18	3x4	1,5

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, 1.5mm²)

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

$\%e = \%3$

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

$S2 \geq 0.56\ mm^2 \geq 0.75\ mm^2$

$S2 = 0.75\ mm^2$

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 mm²)

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.

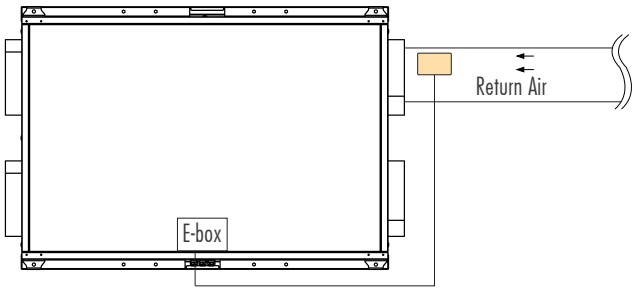
Heating Capacity Calculation

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

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)

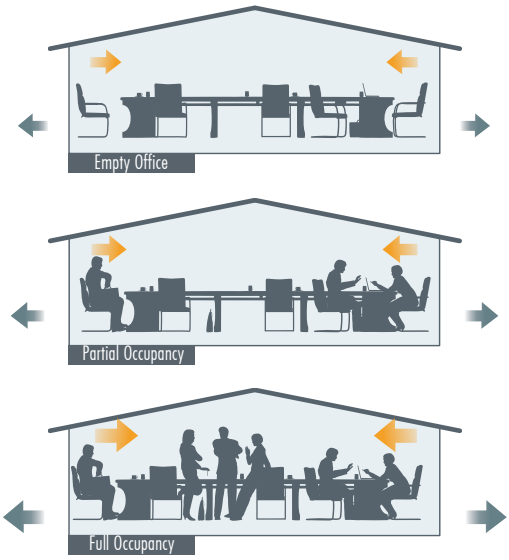
Ventilation on Demand

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, ENVU-ECO 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 ENVU-ECO unit's air flow will be regulated according to the signal.



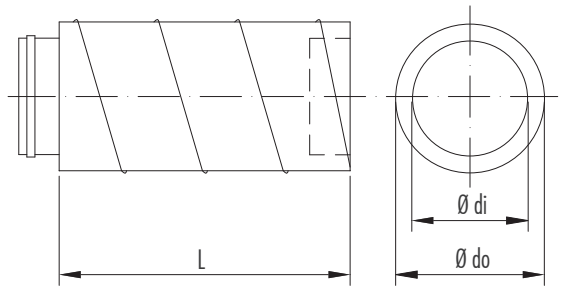
Sound Attenuator For Circular Ducts

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 ENVU-ECO 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.

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.

General Terms and Conditions of Sale

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.

Notes

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REV202500