HR-ECO

Residential Type Heat Recovery Unit

VOLTVENT®
VENTILATION SYSTEMS

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HR-ECO
Residential Type Heat Recovery Unit

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 than AC motors and connect the AC mains. 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 it is also possible to reduce maintenance costs as the fans are direct drive; free of belt and pulley.

Supply and Exhaust Air Filter

To increase indoor air quality and to protect the equipments used in unit, G class filters (according to EN 779 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.

Casing

High corrosion resistive 200 gr/m² galvanize coated steel is used for the casing. The case of unit is painted by electrostatic powdered paint. Non-flammable EPS modules are used for directing the air flow homogeneously. Density of EPS is 40 kg/m³.

By-Pass

HR-ECO 300 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.

Control System

Plug&Play

VOLTVENT PLUS control unit is developed for controlling of heat recovery units' equipments, meeting the demands coming from the customers and is user-friendly designed. VOLTVENT PLUS is capable of commanding the equipments in standard unit and optional accessories. VOLTVENT 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 VOLTVENT PLUS controller are listed in "Control System" part.

Heat Recovery Exchanger

HR-ECO 300 heat recovery ventilation units have plastic counterflow, high efficient plate heat recovery exchangers. Plate heat recovery exchangers have plates that are produced improved surface areas to provide high efficiency and leakage free design. With the optimisation of exchanger heat transfer is increased and pressure drop is decreased.

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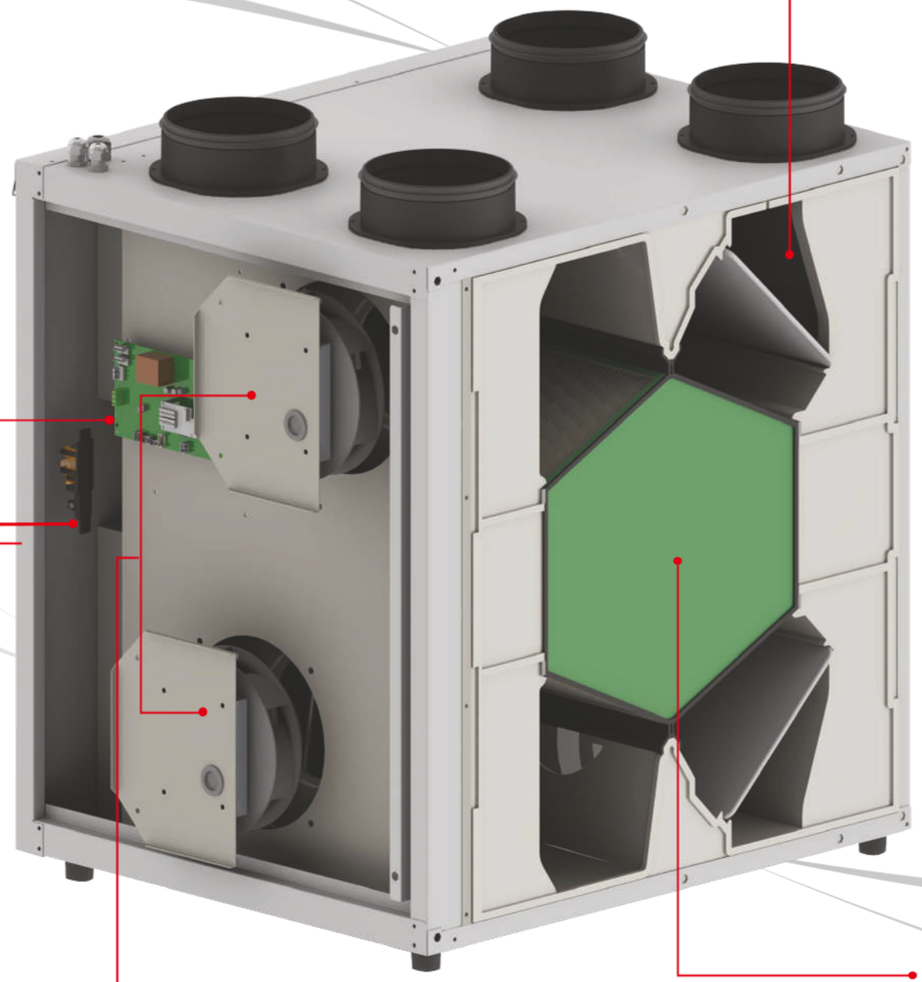

Casing

High corrosion resistive 200 gr/m^2 galvanize coated steel is used for the casing. The case of unit is painted by electrostatic powdered paint. Non-flammable EPS modules are used for directing the air flow homogeneously. Density of EPS is 40 kg/m^3.

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 than AC motors and connect the AC mains. 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 it is also possible to reduce maintenance costs as the fans are direct drive; free of belt and pulley.

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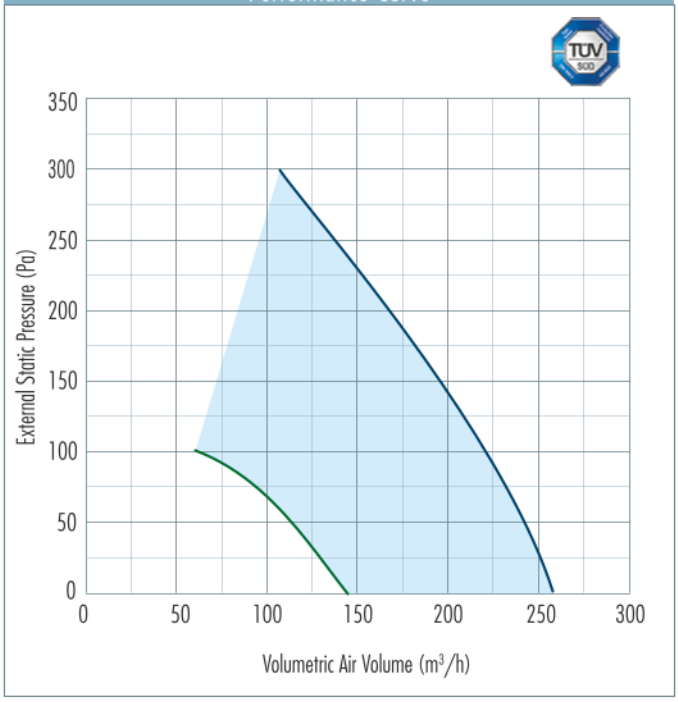
Heat Recovery Exchanger

HR-ECO 500/700 heat recovery ventilation units have plastic counterflow, high efficient plate heat recovery exchangers. Plate heat recovery exchangers have plates that are produced improved surface areas to provide high efficiency and leakage free design. With the optimisation of exchanger heat transfer is increased and pressure drop is decreased.

Performance Data

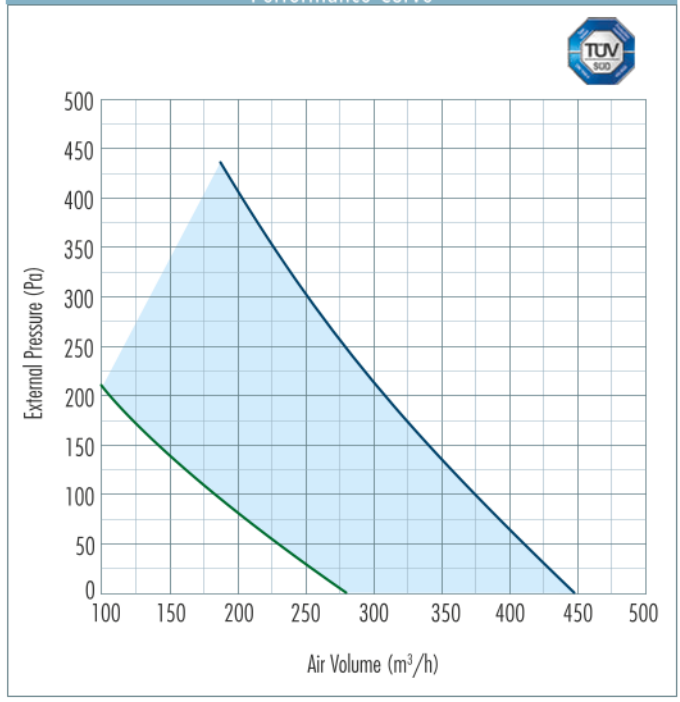
HR-ECO 300

Performance Curve



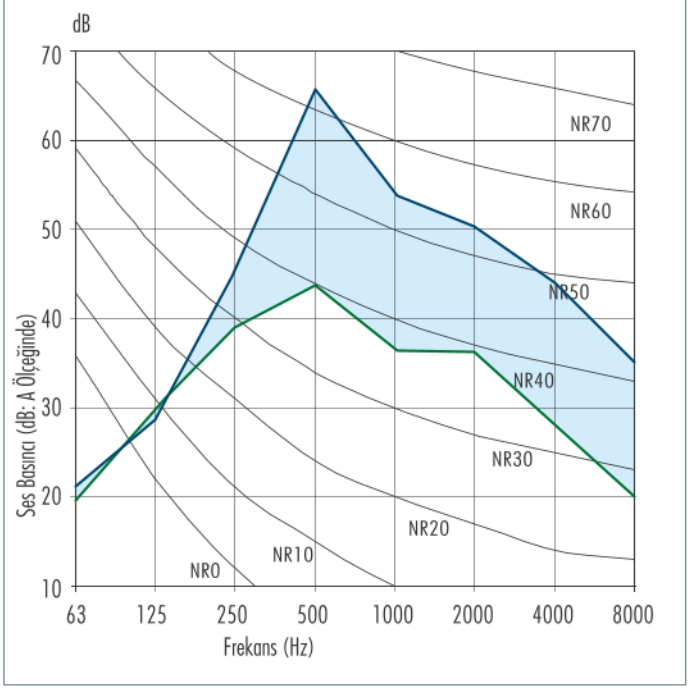
HR-ECO 500

Performance Curve



HR-ECO 300

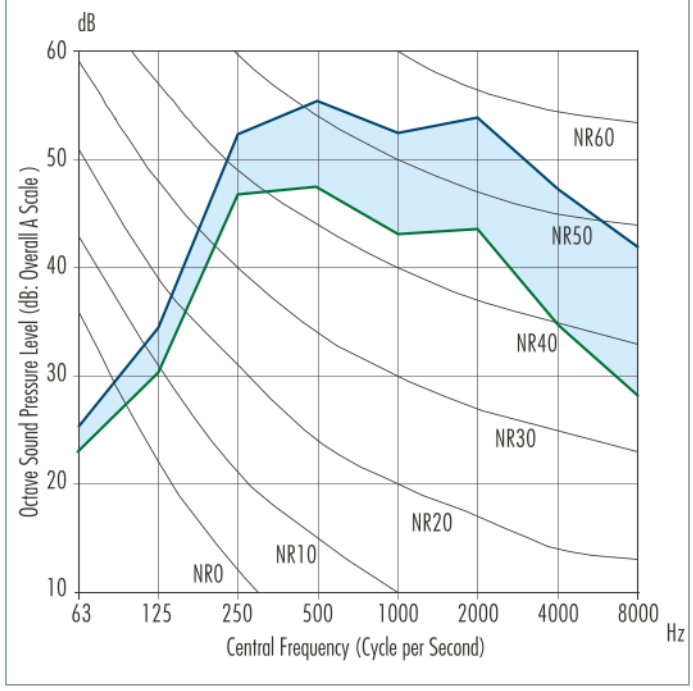
Sound Curve



*Ses testi cihazın 1.5 m uzağından yapılmıştır.

HR-ECO 500

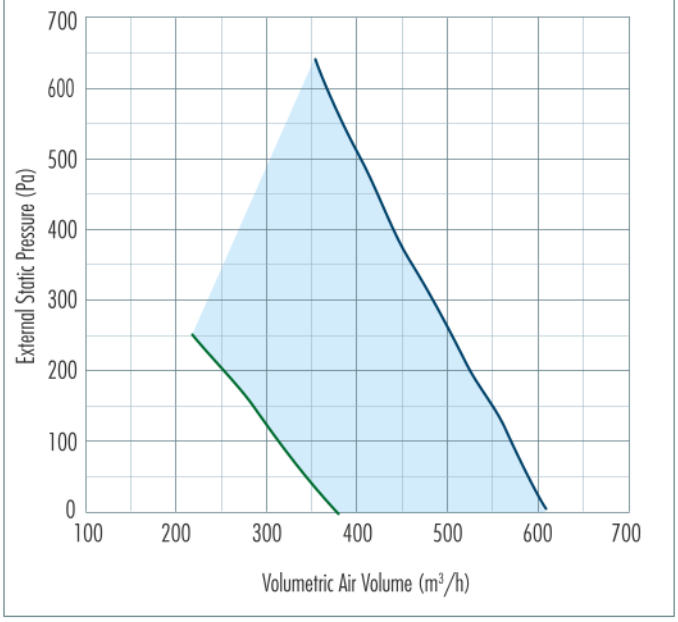
Sound Curve



*Acoustic test is performed 1.5 meter away from the unit.

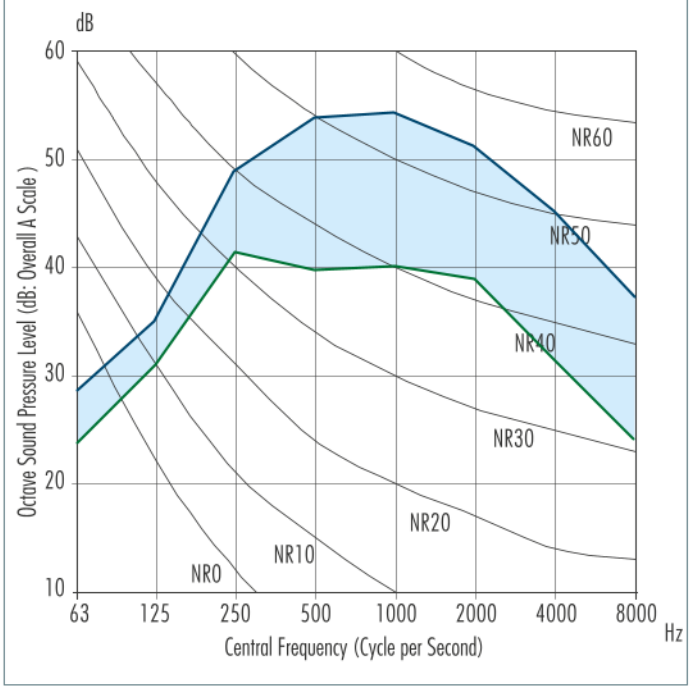
HR-ECO 700

Performance Curve



HR-ECO 700

Sound Curve



*Acoustic test is performed 1.5 meter away from the unit.

Technical Specification

		HR-ECO 300		
		Manual Control (no DCV)	Clock Control (no DCV)	Central Demand Control
SEC [1]	Average	-32.68	-33.75	-35.82
	Warm	-8.71	-9.65	-11.48
	Cold	-69.93	-71.21	-73.71
SEC class		B	B	A
Typology		Bidirectional		
Type of drive		Multi-speed[4]		
Heat recovery system		Recuperative		
Thermal efficiency	%	86.1		
Maximum flow rate (@100Pa)	m^3/h	220		
Electrical power input at maximum flow	W	112		
Sound power level at reference flow rate	Lwa	57.4		
Reference flow rate	m^3/s	0.043		
Reference pressure difference	Pa	50		
SPI	$W(m^3/h)$	0.366		
MISC		1.1		
CTRL		1	0.95	0.85
Declared leakage rates	Internal	< %3		
	External	< %3		
Mixing rate	%	0		
Position and description of filter warning		www.voltvent.com		
Instruction of grilles		www.voltvent.com		
Internet address		www.voltvent.com		
AEC [2]	Average	5.1	4.7	4.0
	Warm	4.6	4.2	3.6
	Cold	10.4	10.1	9.4
AHS [3]	Average	44.9	45.2	45.6
	Warm	20.4	20.4	20.6
	Cold	88.0	88.4	89.2

[1] Specific Energy Consumption [kWh/(m^2.a)]
[2] Annual Electricity Consumption [kWh/a electric per year]
[3] Annual Heating Saved [kWh fuel gross calorific value per year]
[4] If a sensor or a pressure transmitter is used in the system, the device can work at variable speed.

Technical Specification

VOLTVENT® VENTILATION SYSTEMS

		HR-ECO 500		
		Manual Control (no DCV)	Clock Control (no DCV)	Central Demand Control
SEC [1]	Average	-36.23	-37.07	-38.69
	Warm	-11.49	-12.24	-13.71
	Cold	-74.82	-75.81	-77.72
SEC class		A	A	A
Typology		Bidirectional		
Type of drive		Multi-speed[4]		
Heat recovery system		Recuperative		
Thermal efficiency	%	90.5		
Maximum flow rate (@100Pa)	m^3/h	370		
Electrical power input at maximum flow	W	169		
Sound power level at reference flow rate	L_{WA}	57.3		
Reference flow rate	m^3/s	0.072		
Reference pressure difference	Pa	50		
SPI	$W(m^3/h)$	0.297		
MISC		1.1		
CTRL		1	0.95	0.85
Declared leakage rates	Internal	< %3		
	External	< %3		
Mixing rate	%	0		
Position and description of filter warning		www.voltvent.com		
Instruction of grilles		www.voltvent.com		
Internet address		www.voltvent.com		
AEC [2]	Average	4.2	3.9	3.4
	Warm	3.7	3.4	2.9
	Cold	9.5	9.3	8.7
AHS [3]	Average	46.3	46.4	46.7
	Warm	20.9	21.0	21.1
	Cold	90.5	90.8	91.3

[1] Specific Energy Consumption [kWh/(m^2.a)]
[2] Annual Electricity Consumption [kWh/a electric per year]
[3] Annual Heating Saved [kWh fuel gross calorific value per year]
[4] If a sensor or a pressure transmitter is used in the system, the device can work at variable speed.

Technical Specification

		HR-ECO 700		
		Manual Control (no DCV)	Clock Control (no DCV)	Central Demand Control
SEC [1]	Average	-31.15	-32.34	-34.65
	Warm	-6.99	-8.07	-10.15
	Cold	-68.75	-70.13	-72.83
SEC class		B	B	A
Typology		Bidirectional		
Type of drive		Multi-speed[4]		
Heat recovery system		Recuperative		
Thermal efficiency	%	87.2		
Maximum flow rate (@100Pa)	m^3/h	570		
Electrical power input at maximum flow	W	333		
Sound power level at reference flow rate	Lwa	57.0		
Reference flow rate	m^3/s	0.111		
Reference pressure difference	Pa	50		
SPI	$W(m^3/h)$	0.425		
MISC		1.1		
CTRL		1	0.95	0.85
Declared leakage rates	Internal	< %3		
	External	< %3		
Mixing rate	%	0		
Position and description of filter warning		www.voltvent.com		
Instruction of grilles		www.voltvent.com		
Internet address		www.voltvent.com		
AEC [2]	Average	5.8	5.4	4.6
	Warm	5.3	4.9	4.2
	Cold	11.1	10.8	10.1
AHS [3]	Average	45.3	45.5	45.9
	Warm	20.5	20.6	20.7
	Cold	88.6	89.1	89.7

[1] Specific Energy Consumption [$kWh/(m^2.a)$]
[2] Annual Electricity Consumption [kWh/a electric per year]
[3] Annual Heating Saved [kWh fuel gross calorific value per year]
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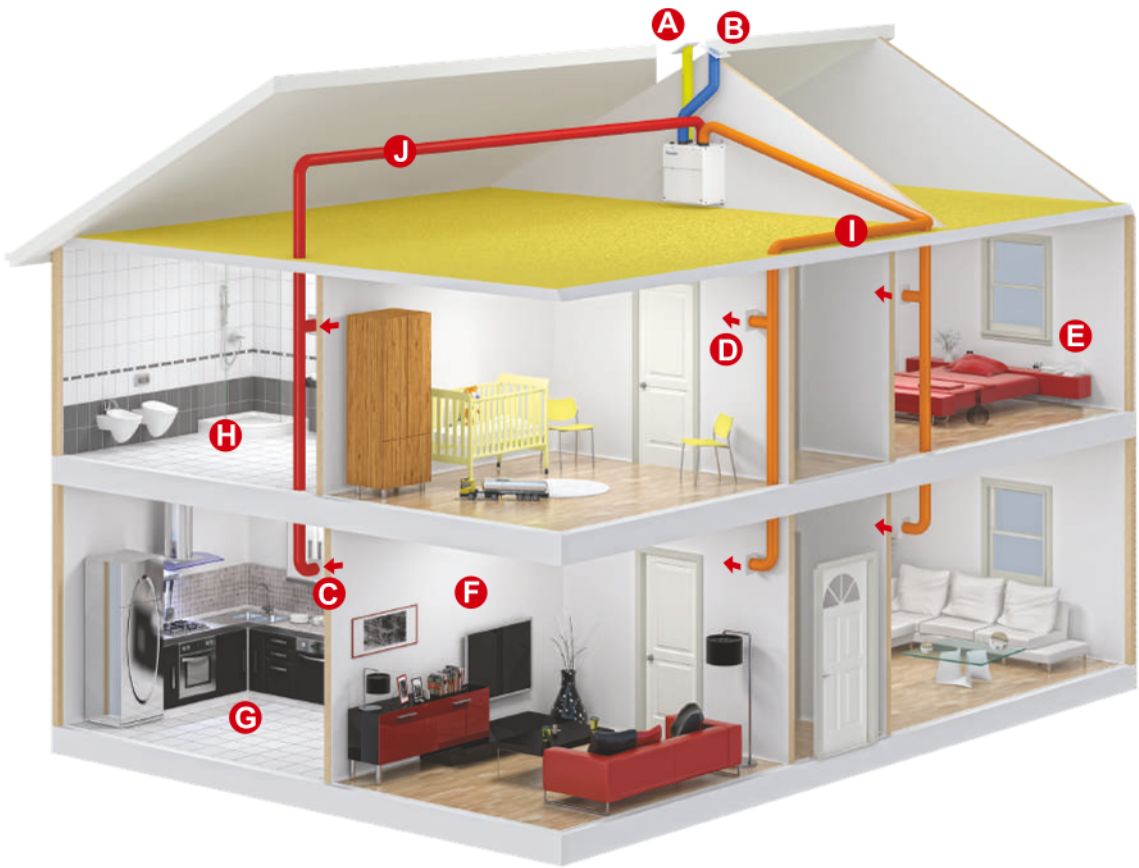
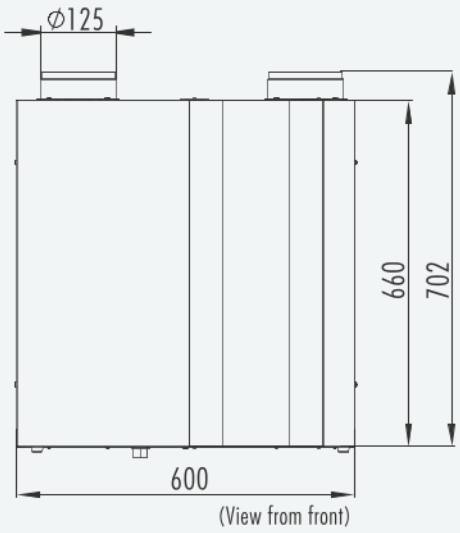


- A Exhaust Air
- B Fresh Air
- C Return Air
- D Supply Air
- E Bedroom
- F Living Room
- G Kitchen
- H Bathroom
- I Supply Air Duct
- J Return Air Duct

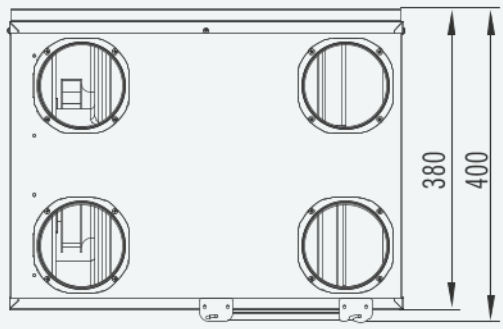
Fresh air is introduced to the ventilation system with fresh air duct. Fresh air is filtered with G class filter in the inlet of the unit. Fresh air is preconditioned through the counter-flow heat exchanger in the unit and then delivered to the demanded spaces in the house.
Return air is exhausted from kitchen, bathroom, toilet and similar spaces where odours, steam etc. is created and delivered to the unit with return air ducts. To prevent fouling of the counter-flow heat exchanger G class filters are introduced to the unit. Return air is then exhausted outdoors after transferring its energy to fresh air.

Unit Dimension

HR-ECO 300



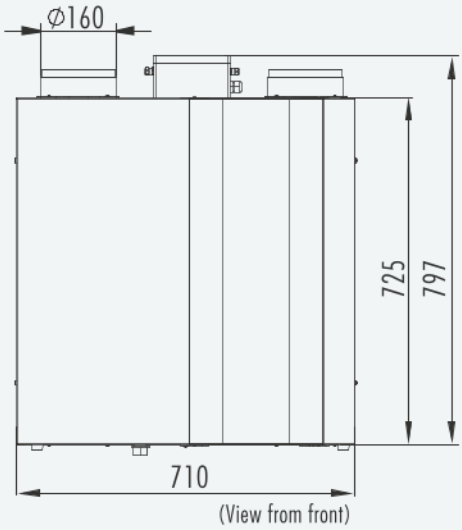
(View from front)



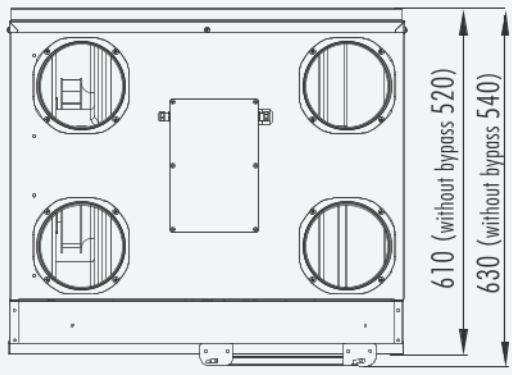
(View from top)

* Unit weight is 24 kg.
* All measurement values are mm.

HR-ECO 500 / 700



(View from front)

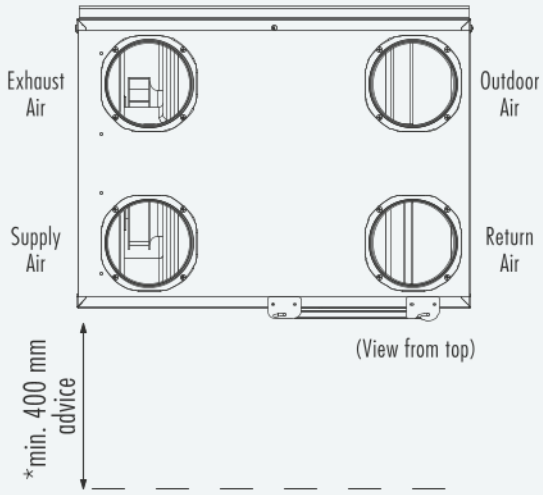


(View from top)

* Unit weight is 38 kg (without by-pass module).
* Unit weight is 41 kg (with by-pass module).
* Event 700 unit has Ø200 mm diameter ducts.
* All measurement values are mm.

Service Space - HR-ECO 300

* A clear space of 400 mm must be provided in front of the unit for service.

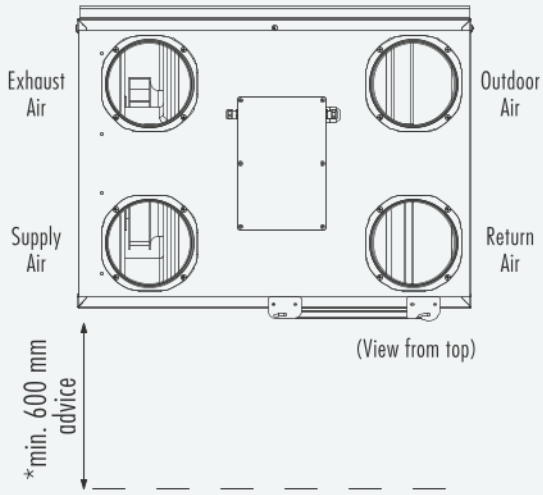


(View from top)

* Drain pipe must be installed.

Service Space - HR-ECO 500/700

* A clear space of 600 mm must be provided in front of the unit for service.



(View from top)

* Drain pipe must be installed.

Wall-mounted type Max: 30 m communication ability.

Automation Options		Control Cards
Standard	Optional	Enecon Plus
OA Temperature Sensor		✓
RA Temperature Sensor		✓
SA Fan Control		✓
RA Fan Control		✓
Filter Contamination Info (Time)		✓
ByPass Damper		✓
Modbus RTU		✓
Weekly Timer		✓
	On/Off Damper Control	✓
	Proportional Damper 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 of defined functions is selectable for this control card.

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

Selection of Electrical Cable Cross-Section

Unit Model HR-ECO	Unit Voltage (V)	Unit Power Input (kW)	Current (A)	Fuse (A)	Cable Cross-Section (mm^2) for 50M and PF=0.8
300	230	0.11	1	1	1.5
500	230	0.17	1.68	2	1.5
700	230	0.35	2.88	3.15	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, 1.5mm^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 : 0,169 kW **L** : 50m
U : 230V **%e** : %3
PF: CosQ : 0.8 **k** : 56m / Ω

1

$$I_{current} = \frac{166\ W}{230.0{,}8} = 0.9\ A$$

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 = 0.5 mm^2

2

%e = %3

$$S = \frac{100.166.50}{56.3.230^2} = 0.09\ mm^2$$

S2 ≥ 0.09 mm^2 ≥ 0.5 mm^2

S2 = 0.5 mm^2

3

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

I_{cable} > 0.5A ≥ 0.09A

"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} = 12A

S3 = 0.5 mm^2

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

S = Max (0.5, 0.5, 0.5, 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 2 or 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. Voltvent electric heaters are connected in VREH connection in standard models.

Heating Capacity Calculation

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

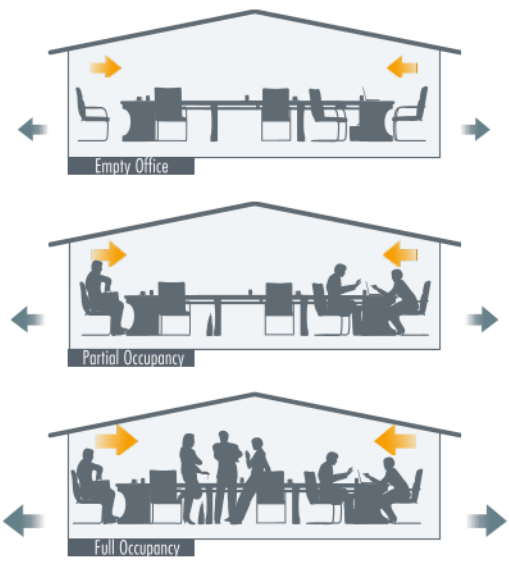
Q : Heating Capacity (W)
V : Air Flow through electric heater (m^3/h)
T_1 : Air temperature before the heater (°C)
T_2 : Air temperature after the heater (°C)

Electric Heater Capacity of Heat Recovery Unit-230V 1 phase				
Unit Model	Heater Diameter (mm)	Capacity (Pre-Heater) (kW) (Outdoor air between 0°C and -5°C)	Capacity (Pre-Heater) (kW) (Outdoor air between -5°C and -15°C)	Capacity (After-Heater) (kW) (Heating the supply air to 25°C)
HR-ECO 300	125	0.5	1.5	1
HR-ECO 500	160	1	2	1
HR-ECO 700	200	1.5	3	3

*Except this application about electic heaters, please contact us.

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, HR-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. Voltvent Indoor air quality sensor (CO /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 HR-ECO unit's air flow will be regulated according to the signal.

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Notes