

# Enervent HP units

VENTILATION UNITS WITH INTEGRATED HEAT PUMPS



***enervent***



## Fresh, warm & cool

*The Enervent ventilation units with integrated extract- air-source heat pumps enable supply and extract air ventilation, heating and cooling by ventilation, dehumidification, humidification and excellent energy efficiency with two separate systems for heat recovery.*

### **An easy solution**

An ventilation unit with a built-in heat pump is an easy-to-use and diversified solution for providing an indoor climate of the highest quality.

Features of the solution:

- Fresh and clean indoor air
- Heating and cooling, using an extract-air-source heat pump
- No indoor units: the air is evenly distributed via the ventilation ducts
- No outdoor units: Enables installation in areas with tight restrictions set on exteriors.
- An intelligent control system with quick functions
- Two separate systems for heat

recovery

- The unit handles part of the heating requirement
- Well suited to be used along with all kinds of heating systems
- Two separate devices replaced with a single integrated unit
- An integrated unit saves space
- No cooling installation work on the work site

### **More than just heating and cooling**

The Enervent ventilation solutions can be used to control the indoor climate, according to the absolute humidity level of the indoor air.

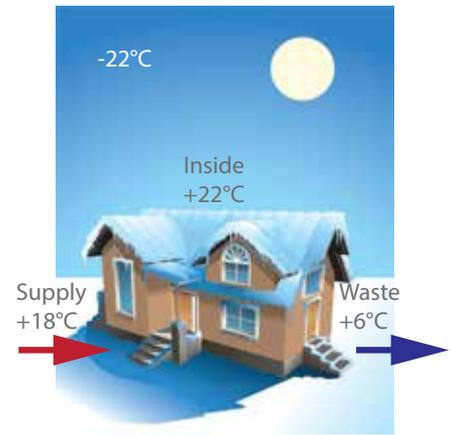
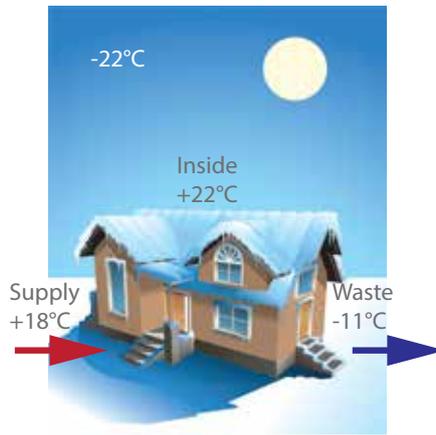
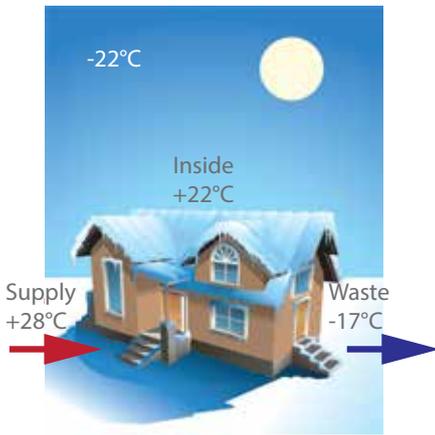
In spaces where maintaining the humidity level is essential, the ventilation unit can keep humidity at the desired level (g/kg). Thanks to the heat pump technology of the devices, humidity can be removed from the outdoor air before blowing the air into the building. The heat pump cools the air in order to remove humidity from the air.

To keep the supply air temperature at a comfortable level, the air is heated to the desired temperature before blowing it into the building. An external humidifier can be controlled via the Enervent ventilation system.

Case with Enervent HP solution

Case with rotating heat exchanger

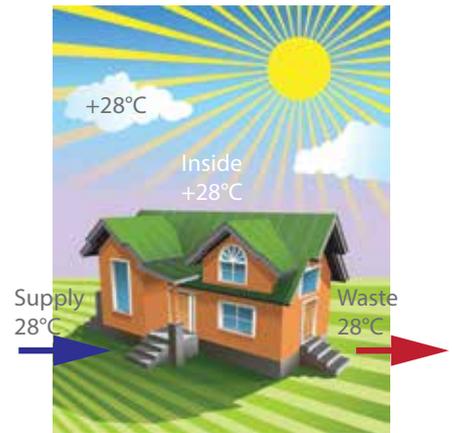
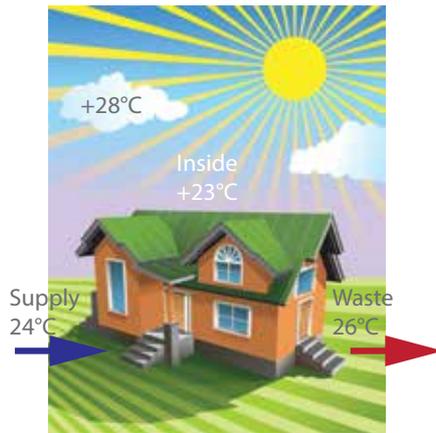
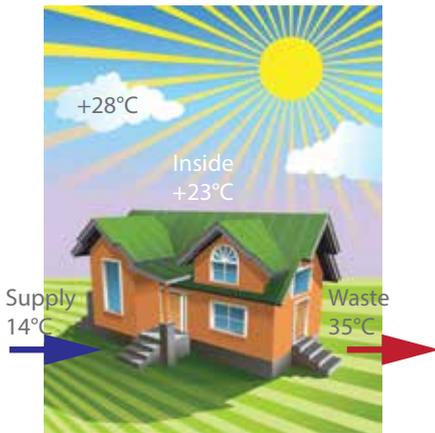
Case with plate heat exchanger



E = 18 000 kWh

E = 21 000 kWh

E = 26 000 kWh



E = Annual energy consumption

### Integrated heat pumps

The Enervent HP units have an integrated extract-air-source heat pump. In their energy-efficiency, these solutions are state-of-the-art products. The HP units have two separate systems for heat recovery: first, the heat is recovered in the heat pump and then, in the rotating heat exchanger.

The annual efficiency of heat recovery for the ventilation system can be as high as over 90 %. When adding the coefficient of performance (COP = 3 - 3,5) of the heat pump, the unit is extremely energy-efficient.

Example: The Pelican HP unit increases the temperature to +21 degrees by using about 1.2 kW of energy, when the outside temperature is -25°C. It would normally take about 4 kW of energy

to reach the same temperature increase using a ventilation unit, equipped with a plate heat exchanger of low efficiency, and an electric after heating coil. The HP unit thus has over three times higher energy efficiency than a traditional plate heat exchanger unit.

**Cooling, heating and dehumidification** with one unit! That's an installers dream!



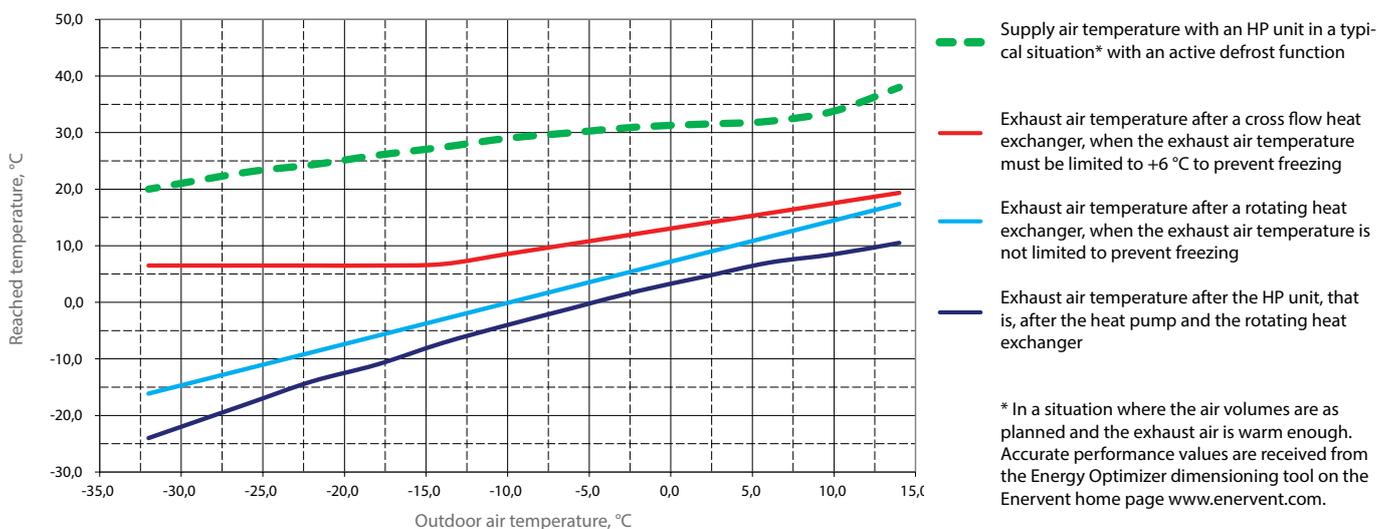
# Superior energy efficiency

The chart below shows examples of supply air temperature with HP units and compares exhaust air temperature by heat recovery method. The colder the exhaust air is, the energy efficient the unit is.

The graph displays temperatures of the supply air blown into and the exhaust air blown out of the house, during a specific outdoor temperature. The outdoor temperature is shown on the horizontal axis and the reached temperature on the vertical

axis. The top line describes the temperature of the air blown inside with an HP series unit in the house. The three lower lines describe the temperature of the air released from the house, using different heat recovery methods. The colder the air blown

outside, the more energy efficient the unit.



## Duct system for heating and cooling

Heating and cooling with air places demands on the duct system and the terminal devices in order to avoid temperature loss in the duct system and for the system to work properly.

### Heating

Heating and cooling with air places demands on the insulation of the duct system. Ventilation systems require thermal insulation in order to restrict and control heat loss. For financial and environmental reasons, it is important you reduce unnecessary heat loss in ducts. Ventilation ducts transport either warm or cold air. This, together with the temperature and moisture content of the surrounding air and in the duct, will influence your choice of insulation solution.

### Cooling

Ducts that also transport cool air need a good thermal insulation solution. The insulation maintains the lower temperature inside the duct by insulating it from the warmer ambient air temperature. If the cool air in the duct is heated by the surrounding air, the HVAC system functions less effectively and you will need more energy to maintain the duct's correct temperature. If the ducts are properly insulated, the whole ventilation system will work as designed and you need less equipment calibration.

### Condensation

With high humidity, the air can easily condense on the outer surface of ducts. Condensation also occurs inside the duct if the situation is reversed. Huge problems occur when condensation builds up on the outside of ducts containing material with a lower temperature than the ambient air temperature.

To prevent condensation apply insulation of the correct thickness to keep the insulation surface temperature higher than the ambient air temperature. Also use an effective water vapour barrier to prevent moisture permeating the insulation.



## Ease of use with intelligent control

*Enervent eAir is an investment into everyday luxury – the leading solution for easy and comfortable high-quality ventilation. Enervent always gives you easily controlled ventilation - also when the unit includes heat pump and dehumidification.*

### Intelligent control

Operation modes cover all the ventilation needs in Home mode. The supply and extract air flows can be controlled individually in all the operation modes. Available modes are Home, Away, Boost, Overpressure, Silent and Eco. eAir also include Office mode.

Most features in the control are totally automatic. The unit adjusts itself according to prevailing circumstances. An example of this is automatic humidity boosting when the humidity level inside exceed the set point.

The eAir control is also a master of energy efficiency by energy optimizing. The control chooses when to use what feature in order to consume as little energy as possible. The heat

pump is i.e. not activated if the supply air set temperature is reached with the rotating heat exchanger only.

### Setup Wizard – installation as if by magic

A Set-up Wizard application makes installation and set-up quick and easy. The touchscreen guides the contractor through every installation phase, follows through the process and checks that the installation is successful.

### Remote control

You can control the ventilation remotely by a web-based eAir interface.

### Measurement data

Measurement data trend graphs can be viewed on the eAir panel on a weekly or daily basis.

### House under control

It is possible to install two separate eAir panels, for example on two floors.

### Advance notifications

The control panel provides an advance notice of the next programmed event.

### Bus control

Bus control is created either via Ethernet or Modbus RTU bus.

# Pelican HP



## **Pelican HP**

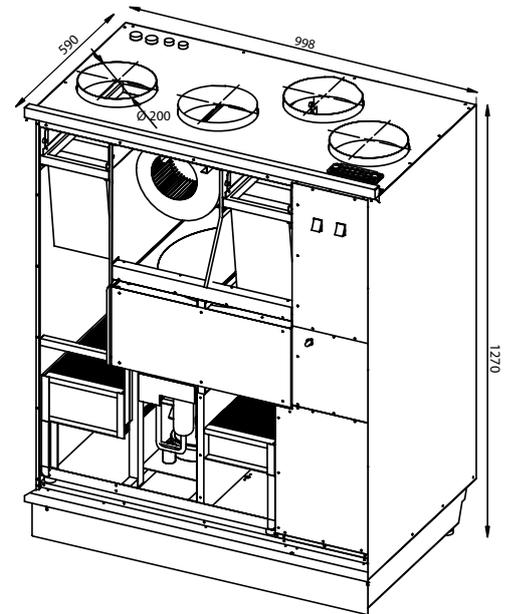
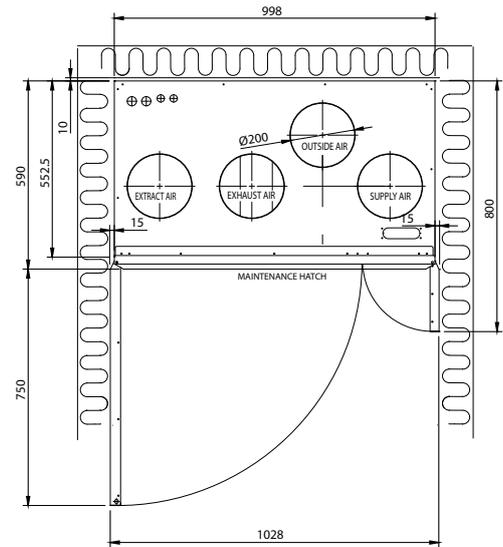
HP is available for the Pelican ventilation units for buildings of 60–160 m<sup>2</sup>, including, for example, single-family houses and offices.

Pelican is made of sheet metal painted white, with duct outlets upwards. A suitable ventilation solution must always be based on the project-specific dimensioning and requirements, but also on the personal preferences of the residents.



GENERAL TECHNICAL SPECIFICATIONS	PELICAN HP
Maximum air flow (filters M5)	580 m <sup>3</sup> /h
Minimum air flow (filters M5)	374 m <sup>3</sup> /h
Heating of the entire apartment (1–2 l/s/m <sup>2</sup> )	80–160 m <sup>2</sup>
Cooling of the entire apartment (1–3 l/s/m <sup>2</sup> )	60–160 m <sup>2</sup>
Fans á (supply and exhaust)	170 W
Duct diameter	Ø 200 mm
Weight	165 kg
Standard filters	F7/M5
Alternative filters	F7/F7
Overheating protector	Yes
Sound in the supply air duct with fan speeds 20, 40, 60, 80, 100 %	
LWA, dB(A)	–, –, 49, 52, 52
Voltage	230 V~/50 Hz
Fuse	16 A slow
Heat pump refrigerant	R410A, 1.5 kg
Compressor nominal output	0.98 kW
Heat pump COP according to EN14511 @ outside temperature +7°C and air flow 390 m <sup>3</sup> /h	3.3
Condensation-water connection	2x, Ø 32 mm
Compressor control	30–100 %

## Dimensional drawings



## The heating efficiency achieved with the HP units is calculated as follows:

$$\text{Heating efficiency} = \rho_i \times C_{pi} \times q_v \times \Delta T$$

$$= 1.2 \text{ kg/m}^3 \times 1 \text{ kJ/(Kxkg)} \times 120 \text{ l/s} \times 9^\circ\text{C} = 1,296 \text{ W}$$

$\rho_i$	air density, 1.2 kg/m <sup>3</sup>
$C_{pi}$	specific heat capacity of air, 1.0 kJ/(kgK)
$q_v$	air flow, l/s
$\Delta T$	excess heat, °C (in addition to room temperature)

## Control system



eAir

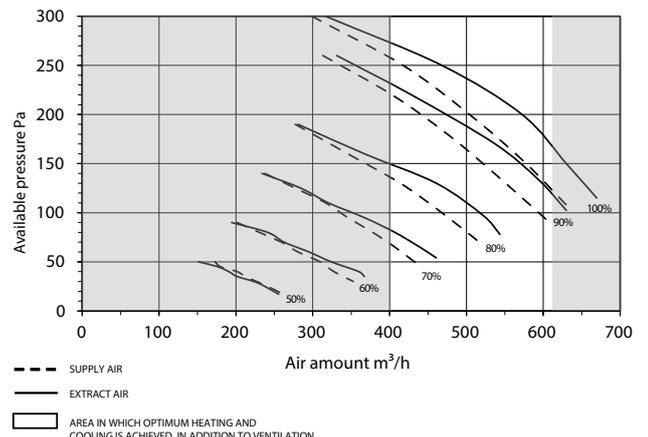
eAir is the most versatile Enervent control system. eAir can control all heating and cooling solutions and external components, such as humidifiers.

Control is based on use situations, such as Home, Away, Boost and Eco. Situation-based control covers all home requirements in various daily situations.

A free Internet user interface, eAir web, is included with all deliveries. You can control your ventilation from any place in the world.

## Characteristic curves

The characteristic curve for Pelican HP supply and extract air with M5 filters



# Pegasos HP



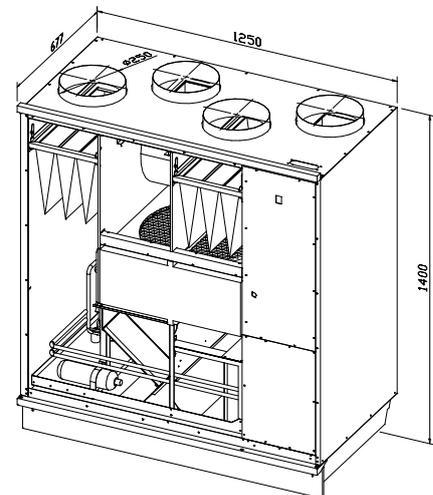
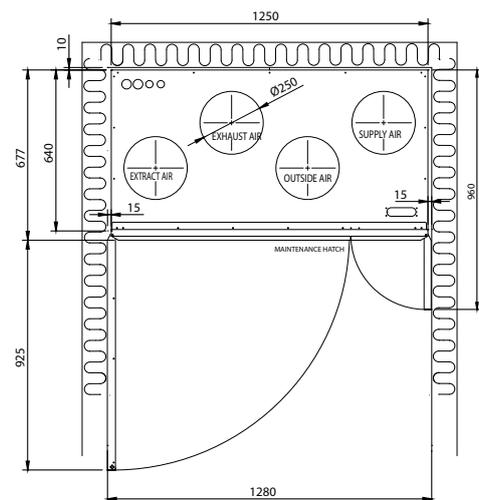
## **Pegasos HP**

HP is available for the Pegasos ventilation units for buildings of 130–390 m<sup>2</sup>, including, for example, large single-family houses and offices. Pegasos is made of sheet metal painted white, with duct outlets upwards. A suitable ventilation solution must always be based on the project-specific dimensioning and requirements, but also on the personal preferences of the residents.



GENERAL TECHNICAL SPECIFICATIONS	PEGASOS HP
Maximum air flow (filters M5)	1 404 m <sup>3</sup> /h
Minimum air flow (filters M5)	432 m <sup>3</sup> /h
Heating of the entire apartment (1–2 l/s/m <sup>2</sup> )	195–390 m <sup>2</sup>
Cooling of the entire apartment (1–3 l/s/m <sup>2</sup> )	130–390 m <sup>2</sup>
Fans á (supply and exhaust)	545 W
Duct diameter	Ø 250 mm
Weight	245 kg
Standard filters	F7/M5
Alternative filters	F7/F7
Overheating protector	Yes
LWA, dB(A)	41, 45, 58, 66, 68
Voltage	400 V 3~, 50 Hz
Fuse	3x16 A slow
Heat pump refrigerant	R410A, 1.5 kg
Compressor nominal output	2.6 kW
Heat pump COP according to EN14511 @ outside temperature -7°C and air flow 1008 m <sup>3</sup> /h	2.8
Condensation-water connection	2x, Ø 32 mm
Compressor control	10–100 %

## Dimensional drawings



The heating efficiency achieved with the HP units is calculated as follows:

$$\text{Heating efficiency} = \pi \times C_{pi} \times q_v \times \Delta T$$

$$= 1.2 \text{ kg/m}^3 \times 1 \text{ kJ/(kgK)} \times 250 \text{ l/s} \times 9^\circ\text{C} = 2,700 \text{ W}$$

$\pi$	air density, 1.2 kg/m <sup>3</sup>
$C_{pi}$	specific heat capacity of air, 1.0 kJ/(kgK)
$q_v$	air flow, l/s
$\Delta T$	excess heat, °C (in addition to room temperature)

## Control system



eAir

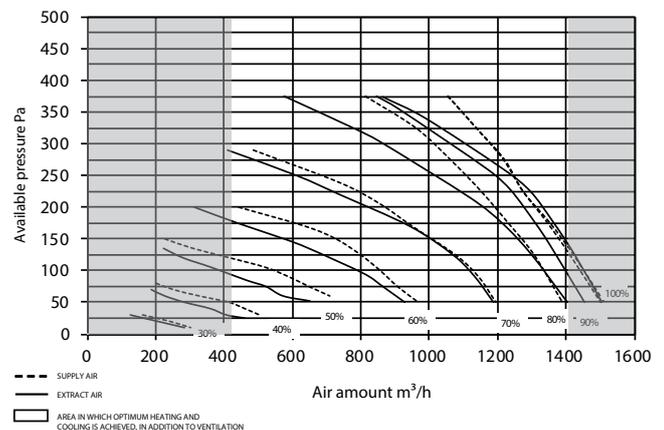
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## Characteristic curves

The characteristic curve for Pegasos HP supply and extract air with M5 filters



# Pallas HP



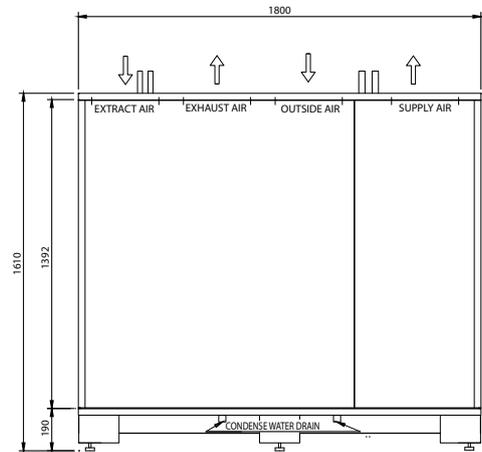
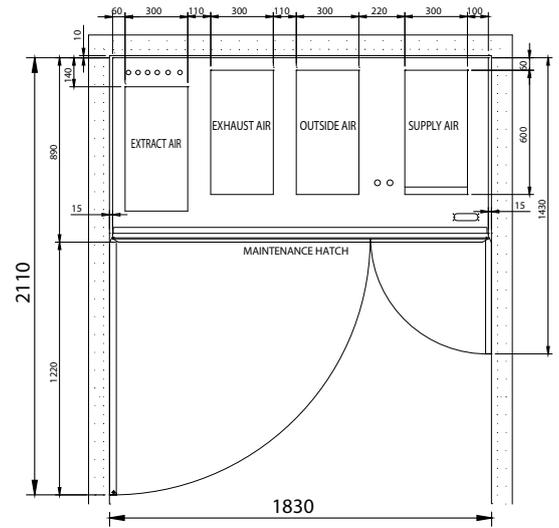
## **Pallas HP**

HP is available for the Pallas ventilation units for buildings of 300–700 m<sup>2</sup>, including, for example, offices, cafeterias, schools, industrial facilities and apartment buildings. Pallas is made of sheet metal, with duct outlets upwards. A suitable ventilation solution must always be based on the project-specific dimensioning and requirements, but also on the personal preferences of the residents.



GENERAL TECHNICAL SPECIFICATIONS	PALLAS HP
Maximum air flow (filters F7)	2 880 m <sup>3</sup> /h
Minimum air flow (filters F7)	720 m <sup>3</sup> /h
Heating of the entire apartment (1–2 l/s/m <sup>2</sup> )	300–700 m <sup>2</sup>
Cooling of the entire apartment (1–3 l/s/m <sup>2</sup> )	200–700 m <sup>2</sup>
Fans á (supply and exhaust)	1 000 W
Duct diameter	300 x 600 mm
Weight	450...500 kg
Standard filters	F7/M5
Alternative filters	F7/F7
Overheating protector	Yes
Sound level -> 10 m <sup>2</sup> absorption LpA	56,6 dB(A)
Voltage	400 V 3~, 50 Hz
Fuse	3x20 A slow
Heat pump refrigerant	R410A, 5.2 kg
Compressor nominal output	3.7 kW
Heat pump COP according to EN14511 @ outside temperature +2°C and air flow 1980/2052 m <sup>3</sup> /h	3.2
Condensation-water connection	2 pcs Ø 32 mm
Compressor control	10–100 %

## Dimensional drawings



## The heating efficiency achieved with the HP units is calculated as follows:

$$\text{Heating efficiency} = \rho_i \times C_{pi} \times q_v \times \Delta T$$

$$= 1.2 \text{ kg/m}^3 \times 1 \text{ kJ/(kgK)} \times 600 \text{ l/s} \times 9^\circ\text{C} = 6,480 \text{ W}$$

$\rho_i$	air density, <b>1.2 kg/m<sup>3</sup></b>
$C_{pi}$	specific heat capacity of air, <b>1.0 kJ/(kgK)</b>
$q_v$	air flow, <b>l/s</b>
$\Delta T$	excess heat, <b>°C</b> (in addition to room temperature)

## Control system



eAir

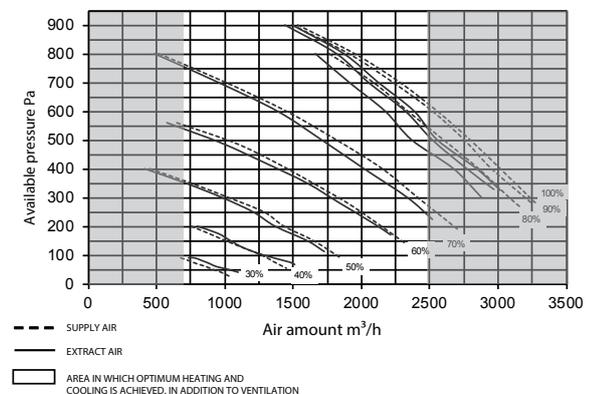
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## Characteristic curves

The characteristic curve for Pallas HP supply and extract air with F7/M5 filters



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