Certificate

Certified Passive House Component
For cool, temperate climates, valid until 31 December 2015

Passive House Institute
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Category: **Heat recovery unit**

Manufacturer: **UAB SALDA**
78109 Šiauliai, LITHUANIA

Product name: **SMARTY 3X P**

This certificate was awarded based on the following criteria:

Thermal comfort	$\theta_{supply\ air} \geq 16.5$ °C[1)] at $\theta_{outdoor\ air} = -10$ °C
Effective heat recovery rate	$\eta_{HR,eff} \geq 75$ %
Electric power consumption	$P_{el} \leq 0.45$ Wh/m³
Airtightness	Interior and exterior air leakage rates less than 3 % of nominal airflow rate
Balancing and adjustability	Airflow balancing possible: yes Automated airflow balancing: yes
Sound insulation	Sound level $L_w \leq 35$ dB(A) is not met Here $L_w = 49.4$ dB(A) Unit should be installed so that it is acoustically separated from living areas
Indoor air quality	Outdoor air filter at least F7 Extract air filter at least G4
Frost protection	Frost protection for the heat exchanger with continuous fresh air supply to $\theta_{outdoor\ air} = -15$ °C[1)]

1) Fulfilled with an optional external pre-heater.

Further information can be found in the appendix of this certificate.

Certified for airflow rates of

104-248 m³/h

$\eta_{HR,eff}$

85 %

Electric power consumption

0.31 Wh/m³

CERTIFIED COMPONENT
Passive House Institute

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Passive House comfort criterion

A supply air temperature of 17.5 °C is maintained at an outdoor air temperature of -10 °C. This criterion was fulfilled by using of an optional external pre-heater with a power of 1200 W.

Efficiency criterion (heat recovery rate)

The effective dry heat recovery rate is measured at the test facility using balanced mass flows on the outdoor air/extract air side. The boundary conditions for the measurement should be taken from the documents relating to the testing procedure.

$$\eta_{HR,eff} = \frac{(\vartheta_{ETA} - \vartheta_{EHA}) + \frac{P_{el}}{\dot{m} \cdot c_p}}{(\vartheta_{ETA} - \vartheta_{ODA})}$$

The (dry) ventilation heating load (the house is the system boundary) can be calculated using $\eta_{HR,eff}$ based on the formula $\dot{V}_{supply\_air}$ * (1- $\eta_{HR,eff}$) * 0.34 * $\Delta\vartheta$ (multiplied by the infiltration rate). The rates of heat recovery are usually greater if condensation occurs in the heat exchanger. Initially, this will not be taken into account on purpose.

For this device:

$\eta_{HR,eff}$ = 85 %

Efficiency criterion (power consumption)

The overall electrical power consumption of the device including that for regulation, but without that for the frost protection heating, is tested at the test facility at an external pressure of 100 Pa (50 Pa for each of the pressure/intake sides).

For this device: **0.31 Wh/m³**

Airtightness and insulation

Before starting the thermodynamic test, the airtightness test should be carried out in accordance with the DIBt guidelines for under pressure as well as for over pressure. The leakage airflows must not be greater than 3 % of the average airflow volume of the operating range of the ventilation device.

The following result was obtained for the device being tested according to DIBt guidelines:

Internal leakage: 1.43 %

External leakage: 0.70 %

This ventilation unit meets the airtightness requirements.

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Adjustability

It must be possible to adjust the balance between the exhaust airflow rate and the outdoor airflow rate for all units.

- This unit is certified for airflow rates of **104-248 m³/h**
- Balancing the airflow rates of the unit is possible
  - ✓ The airflow rates are hold steady automatically (by an internal measurement of the airflows and pressure)
- The users should have at least have following possibilities for adjustment:
  - ✓ Switching the system on and off
  - ✓ Synchronized adjustment of the supply air and extract airflow to basic ventilation (= 70-80 %), standard ventilation (= 100 %) and increased ventilation (= 130 %) with clear readability of the set status.
  - ✓ Depending on the demand, the user can choose between 3 operating levels as well as an Stand-by or Boost mode.
- The device being tested here has a standby power consumption of **5.1 W** and therefore does not comply with the target value of 1 W. The device must be equipped with an additional external switch to separate the device from the electric circuit if required.
- After a power failure the device automatically continues to operate in the mode that was set before the power failure.

Acoustical testing

In order to restrict the sound pressure level in the installation room, the sound power level should be restricted to 35 dB(A). With an equivalent room absorption area of 4 m² the amounts of sound power level and sound pressure level are nearly the same (the exact value of the sound pressure level in the specific installation room can be calculated with the help of the sound protection tool (download on www.passivehouse.com)).

Installation instructions must be provided which describe how the sound level can be kept below 25 dB(A) in living areas and below 30 dB(A) in functional areas. The following sound power levels have been determined at an airflow rate of **245 m³/h**:

Sound level unit [dB(A)]	Sound level ODA [dB(A)]	Sound level SUP [dB(A)]	Sound level ETA [dB(A)]	Sound level EHA [dB(A)]
49.4	48.8	63.1	48.1	61.9

- The sound level of the unit exceeds the limit value of 35 dB(A). Therefore the unit should be installed so that it is acoustically separated from living areas.
- Silencers are recommended by the manufacturer for complying with the required sound level in the supply air and extract air rooms. Detailed information about these can be found in the full report. Dimensioning of a suitable silencer is required for the specific project on the basis of the measured sound intensity level.

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Indoor air hygiene

Inspection and cleaning of the central device including the heat exchanger is simple. The filter can be replaced by the user himself/herself (no specialist required). The unit is equipped (as default) with following filter qualities:

- ✓ Outdoor Air filter F7
- ✓ Extract Air filter G4

If the device is not operated during summer, the filter should be replaced before the next operation.

Filter replacement is recommended after an interval of 3-4 months.

Frost protection

Appropriate measures should be taken to ensure prevention of icing over of the heat exchanger and freezing up of hydraulic post-heater coils during extreme winter temperatures (-15 °C). The regular functioning of the device should be permanently ensured during uninterrupted operation of the frost protection circuit (there is no interrupt circuit for outdoor air in the Passive House, as the heating loads caused by the forced infiltration would become too high). If heater coils for hot water are used, a suitable frost protection circuit should ensure prevention of frost damage to these heater coils. In the process, the possibility of failure of the pre-heating coils and extract air fans must also be taken into consideration.

- Frost protection circuit for the heat exchanger:
  - ✓ In order to protect the heat exchanger from freezing, installation of an additional external pre-heater is necessary. The producer of the unit recommends an electric heating element EKA NIS 160-1.2-1 with a power of 1200 W, which is available as an optional accessory for the unit. A control of the frost protection is dependent on the outdoor air temperature. The frost protection strategy is first activated by -6.0 °C. Through laboratory testing it was proved, that this frost-protection strategy at the upper limit of the airflow range and at outdoor air temperature of -15 °C is sufficient for Passive Houses.
- Frost protection circuit for downstream hydraulic heater coils:
  - ✓ This unit provides a frost protection of the downstream hydraulic heater coils. In the case the hydraulic post-heating coil is used, the supply air fan is automatically switched off when the supply air temperatures goes down to 3.5 °C.

It should be noted that cold air can also lead to freezing up of stationary fans due to free circulation; this can only be ruled out if the air duct is closed (by means of a shut-off flap).

Abbreviations

- AU/ODA = Outdoor air
- FO/EHA = Exhaust air
- ZU/SUP = Supply air
- AB/ ETA = Extract air