

# Solar-Biomass-Combined Heat Recovery Unit

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Favourites for *sustainable heating systems* are:

- heat recovery in combination with heat pump technology,
- solar thermal systems and
- advanced bioenergy technologies.

Beside of thermal energy systems, also solar electric technologies (photovoltaic) will contribute to sustainable heating systems in the way of operating pumps, fans, regulation etc. of heating systems.

Heat recovery systems will cover the main part of the heat demand of *passive housing*. Nevertheless, about 15 kWh/(m<sup>2</sup>, a) has to be shared by auxiliary heating. In low-energy housing without heat recovery about 40 kWh/(m<sup>2</sup>, a) have to be covered by a “conventional” heating system.

Figure 1a and 1c show a compact unit for heat recovery. Heat recovery is combined with an air-heat pump. The characteristic data of the unit are documented in Figure 2. The air-heat pump – using pre-heated outside air through a ground heat exchanger – will cover about 15 kWh/(m<sup>2</sup>, a). For the rest of space heat demand an additional heat source is needed, e.g. direct electricity.

New developments combine the renewable energy sources heat recovery, solar thermal, solar electric and bioenergy; Figure 3 and Figure 4.

The combination of heat recovery with renewable energy sources will reduce the requirements for passive housing: high building insulation (U-value  $\leq 0,1$  W/(m<sup>2</sup>, K)), high insulated windows ( U-value for glass and frame  $\leq 0,7$  W/(m<sup>2</sup>, K)). Also natural air conditioning would be possible.

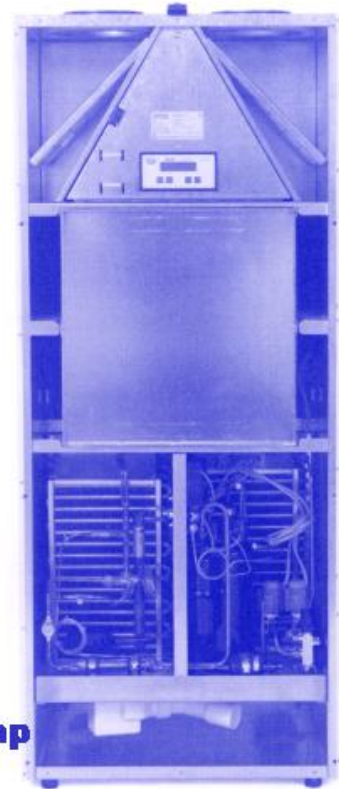
## More information:

[www.aerex.de](http://www.aerex.de)

AEREX Haustechnik Systems, GmbH, Königsweg, D-37534 Eisdorf

[www.drexel-weiss.at](http://www.drexel-weiss.at)

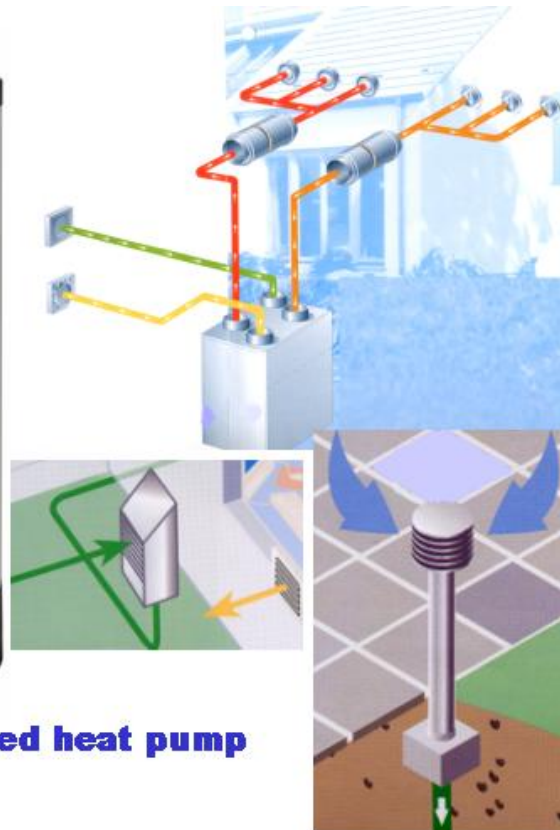
Energieeffiziente Haustechniksysteme GmbH, Drexel und Weiss, Kennelbacherstraße 36, A-6900 Bregenz



**Heat recovery with air-preheated heat pump**

**Airex**

Fig. 1a: Heat recovery combined with air-heat pump



**Heat recovery with air-preheated heat pump**

**Airex**

Fig. 1b: Heat recovery combined with air-heat pump

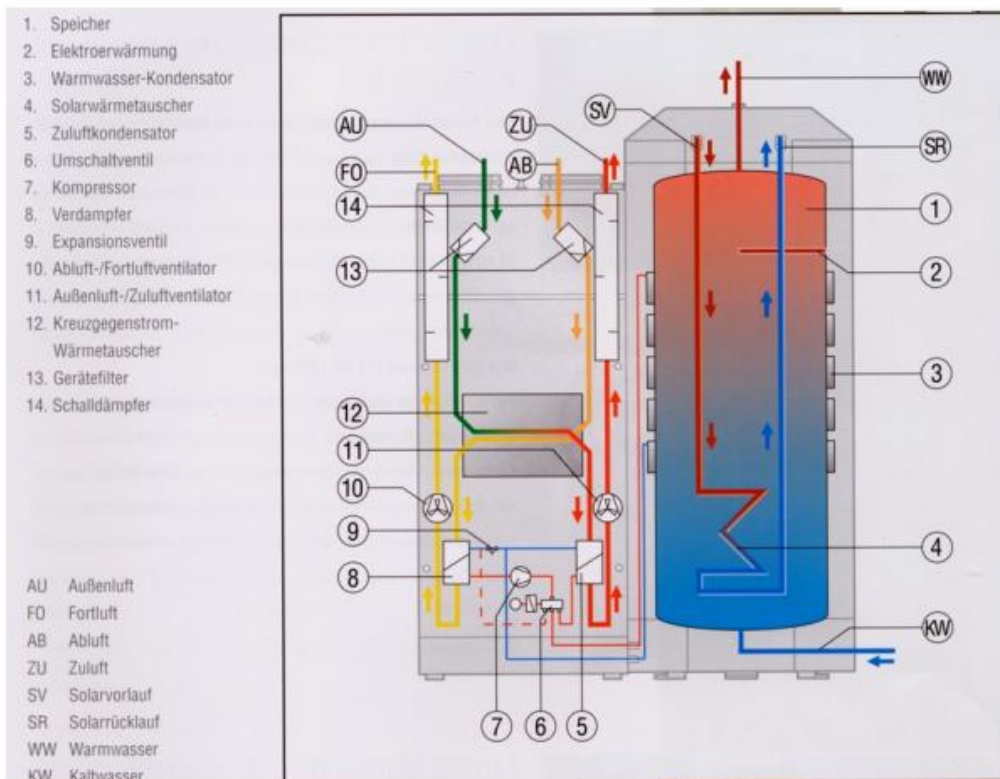


Fig. 1c: Heat recovery combined with air-heat pump

## AEREX

**Heat load: < 2.8 kW**

**Heat pump: 1.05 – 1.80 kW**

**Direct electricity: 1.00 – 1.75 kW**

**COP heat pump: 2.0 – 2.3  
 (average 2.2)**

**Heat production:**

**Heat pump: < 15 kWh/(m<sup>2</sup>, a)**

**Direct electricity: > 15 kWh/(m<sup>2</sup>, a)**

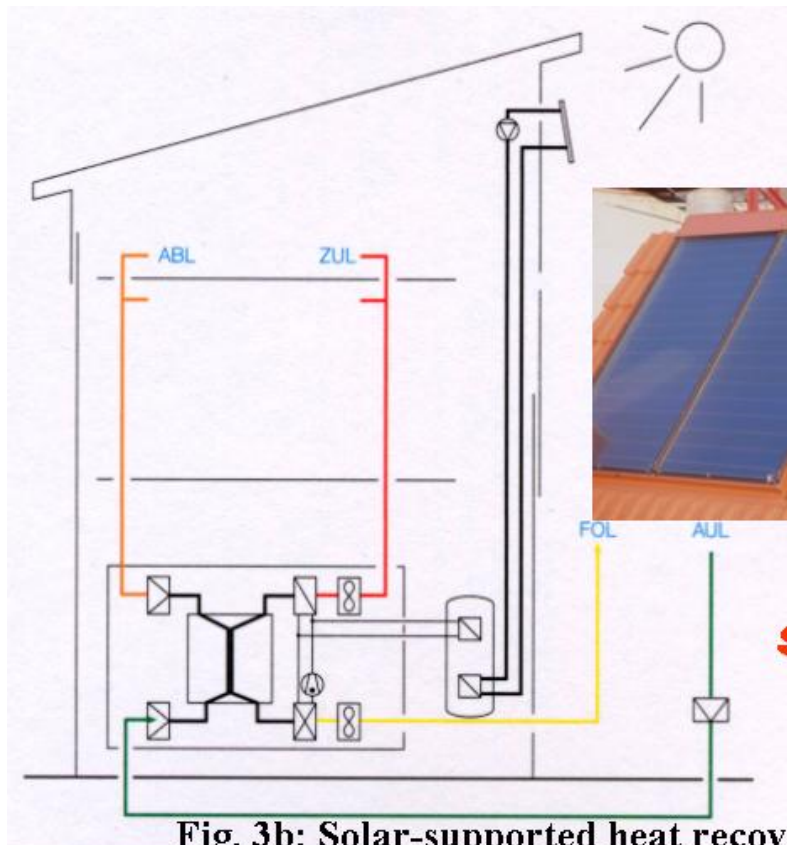
Fig. 2: Heat recovery combined with air-heat pump: characteristically data



**Airex**

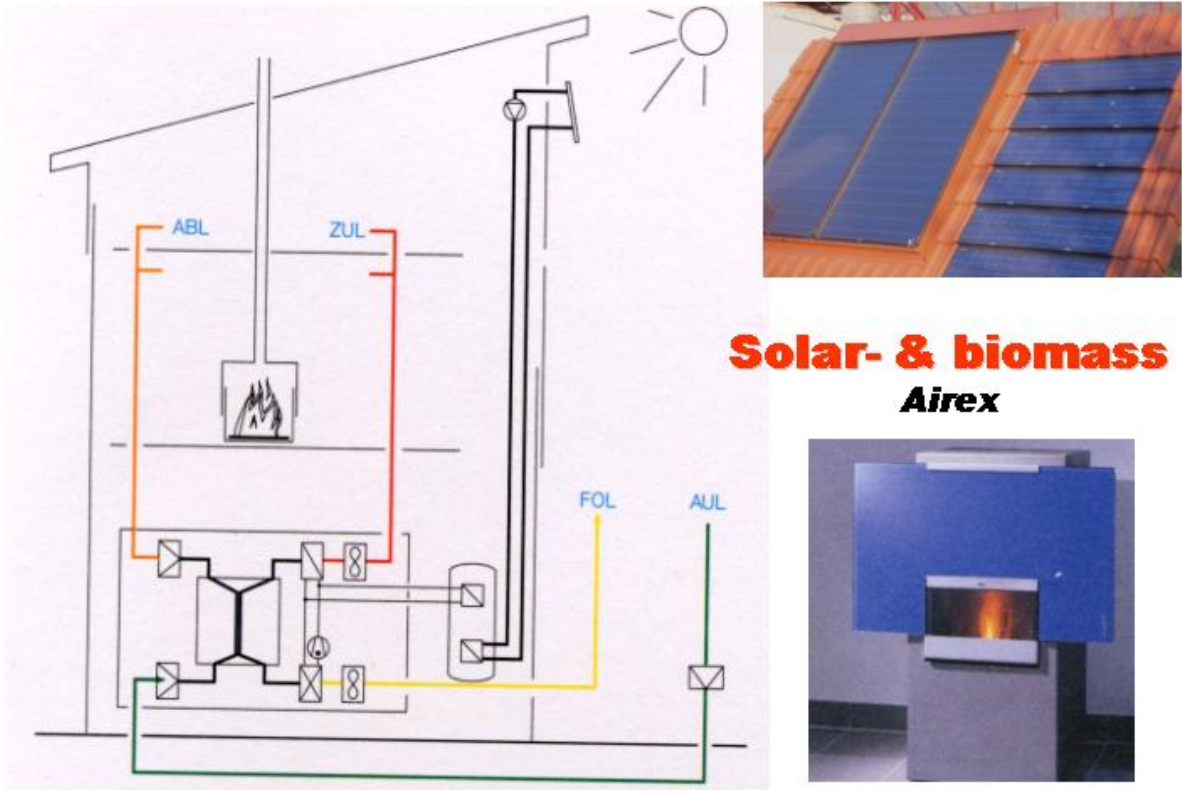


**Fig. 3a: Solar-supported heat recovery combined with air-heat pump**

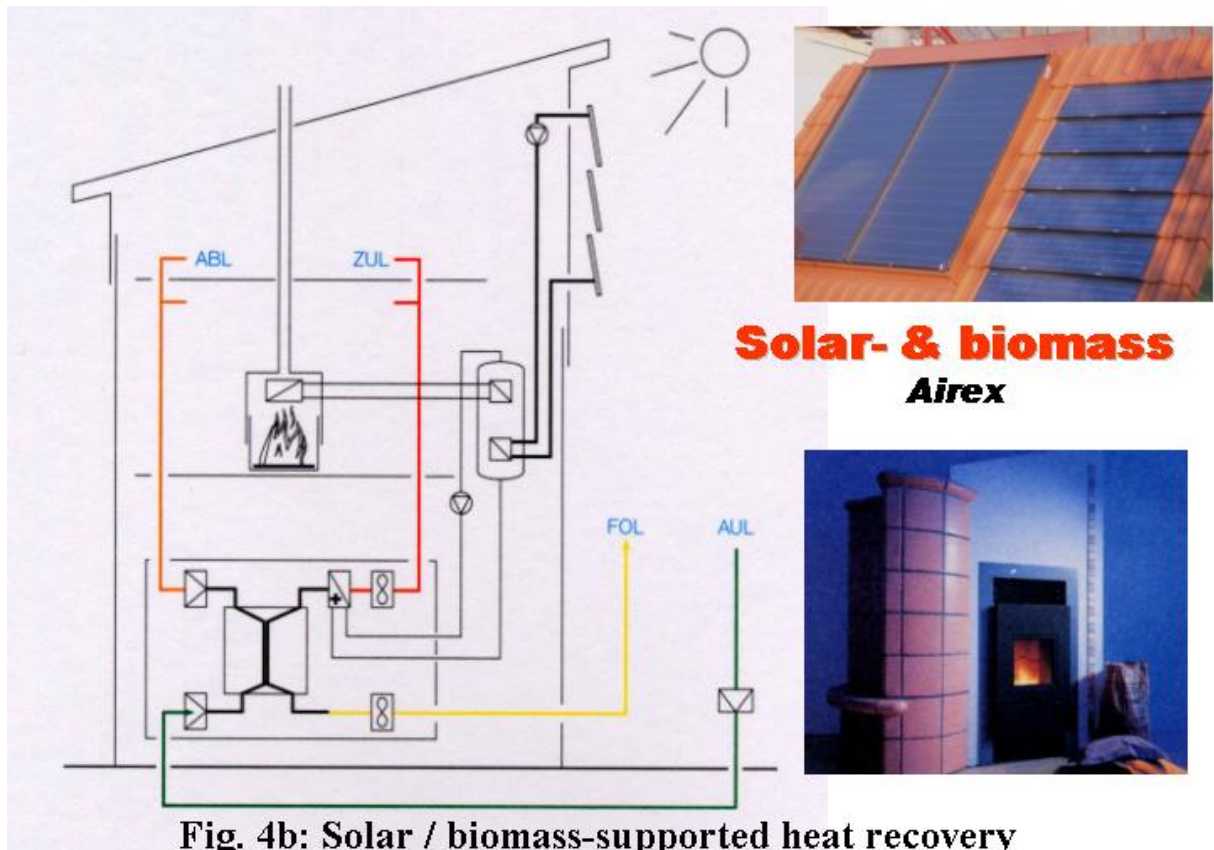


**Solar thermal & PV**  
**Airex**

**Fig. 3b: Solar-supported heat recovery combined with air-heat pump**



**Fig. 4a: Solar / biomass-supported heat recovery combined with air-heat pump**



**Fig. 4b: Solar / biomass-supported heat recovery combined with air-heat pump**