recair

Recair Sensitive RS220

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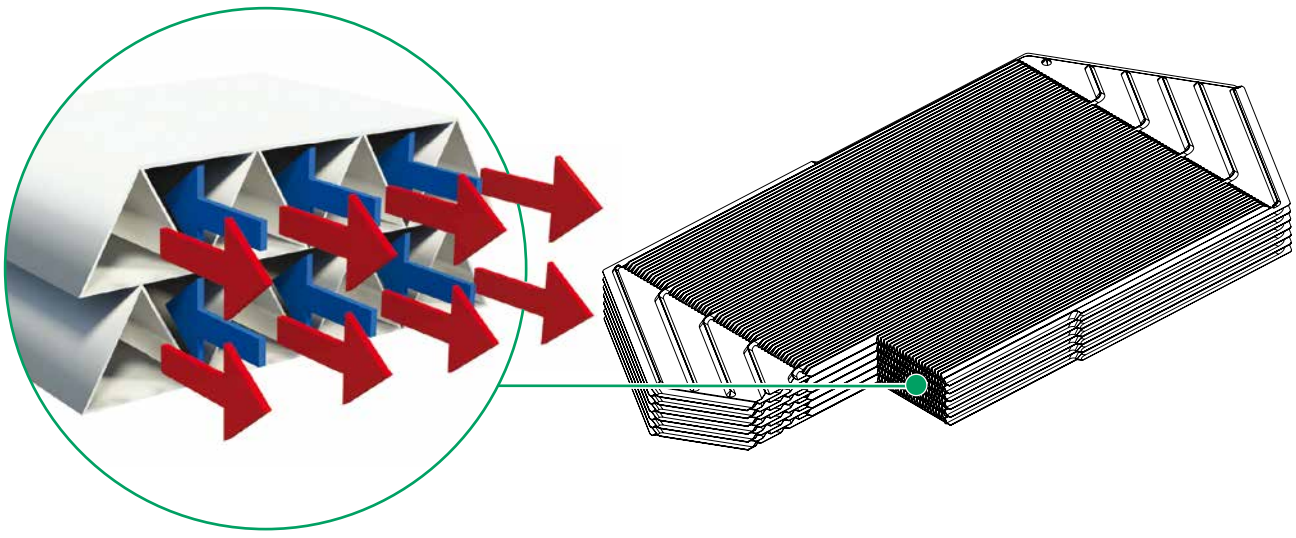
Recair Sensitive RS220 is a unique, patented recuperator specially designed for air-to-air heat recovery in single room balanced ventilation systems for homes and offices. It makes it possible to recover and efficiently reuse energy generated for heating or cooling rooms, while optimising the ventilation that is so crucial for a healthy, indoor climate. Recair Sensitive RS220 can be used in particular in single room ventilation systems to maximize indoor comfort and air quality while substantially reducing basic energy requirements and costs. This benefits end-users by increasing their wellbeing and reducing their energy bills. And, by reducing the need for fossil fuels, it also benefits our environment.

The Recair recuperation principle

Good ventilation is very important, but when the outside air temperature differs considerably from the indoor air temperature, ventilation results in a great deal of energy loss. The key to Recair recuperation technology is that it enables and maximizes the exchange of energy between the incoming and outgoing airflows before the energy dissipates in the atmosphere. Optimum recuperation (i.e., 100% thermal effectiveness) is achieved when the air temperature at the end of the cooling trajectory is equal to the counterflow at the beginning of the heating trajectory, and vice versa. It is impossible to realize this ideal situation in practice, but Recair Sensitive makes it possible to achieve thermal effectiveness of between 90-98%, thanks to its unique, patented design.

The triangular ducts in the recuperator are arranged so that each one is surrounded by parallel ducts in which the air is in counterflow (see Fig. 1). Each fresh-air duct is surrounded by three ducts filled with warmer exhaust air. Likewise, each duct with exhaust air is surrounded by three fresh-air ducts. This maximizes the surface area over which energy can efficiently be transferred, recaptured and reused. This design principle is what makes the Recair Sensitive's outstanding performance possible. In comparison with conventional cross-flow recuperators of the same size, the Recair Sensitive's thermal effectiveness is at least 33% better. The unique duct system design even gives the Recair Sensitive an advantage over counterflow plate recuperators: with air-flow space being the same, it has a heat exchange capacity that is almost 3.5 times higher.

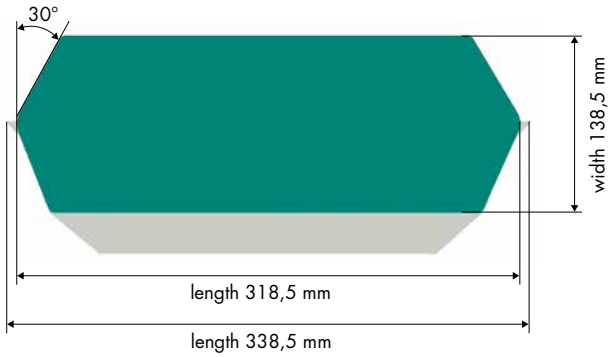
Figure 1: Triangular ducts principle.

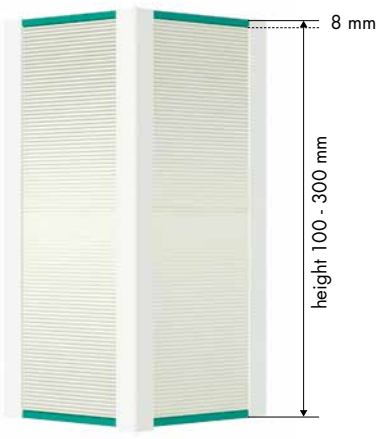


Construction and dimension

The Recair Sensitive can be used for air temperatures between -30 and +50 °C. The recuperator is constructed completely from polystyrene - from the foils to the casing. Only solvent-free elastic adhesives are used. The Recair Sensitive has a width of 138,5 mm and length of 318,5 mm, and the (stack) height can vary from 100 mm to 300 mm (see Fig. 2). It is also possible for several recuperators to operate in parallel. The largest recuperator (300 mm) weighs 2 kg, and has a heat exchange surface of ± 9,4 m^2, and a volume of 5,2 liters.

Figure 2: Dimensions.





Efficient performance

The effectiveness and pressure drop as a function of the airflow is illustrated in Fig. 3/4 (Note: this diagram is based on a dry return air temperature of 20 °C and an equal mass balance). Please note that there is no direct linear relationship between the supply-air temperature and the outside-air temperature when it comes to effectiveness: In fact, effectiveness will increase even further under conditions of high indoor relative humidity, with a potential of reaching up to 98% thermal effectiveness (see Fig. 5). At extreme condensation, the pressure drop in the return air may double. The overall result is a very small difference in temperature between the supply and return air, leading to greater indoor comfort and lower basic energy requirements.

Reduced freezing

When outside air temperatures are very low, freezing may occur at the end of a recuperator's return-air duct if the temperature of the exhaust air drops below 0 °C. In the Recair Sensitive, the condensation heat of the moisture in the return air helps keep the exhaust air above the freezing point, even when the outside air is much colder (see Fig. 6). The annual number of hours that the recuperator will freeze is therefore much lower than the actual number of hours of outdoor freezing temperatures. Manufacturers can also reduce the number of freezing hours even further by adjusting air intake, mass balance and recirculation.

Figure 3: Pressure loss as a function of airflow.

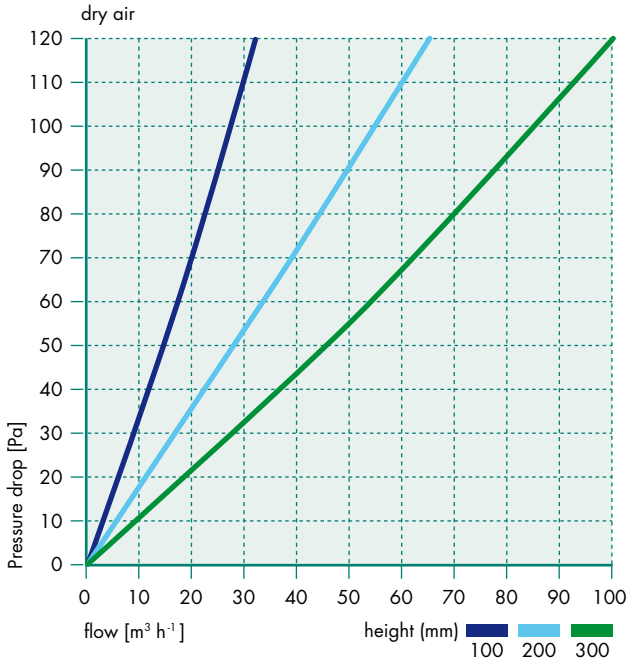


Figure 4: Effectiveness as a function of airflow.

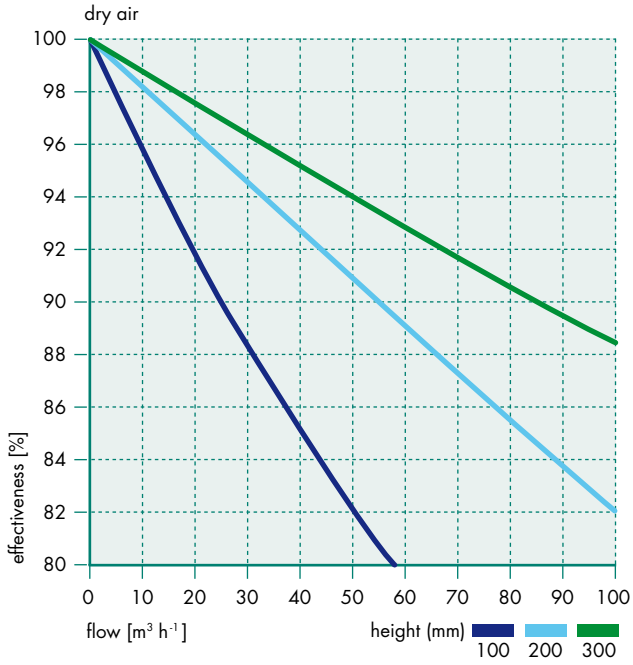


Figure 5: Influence on effectiveness due to condensation heat.

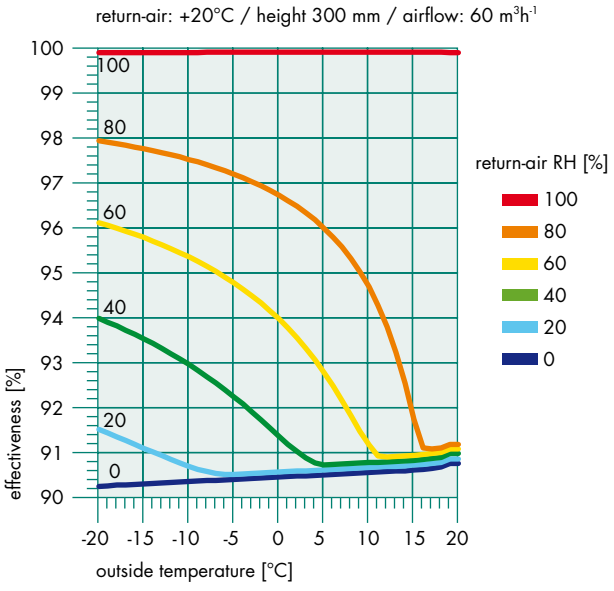
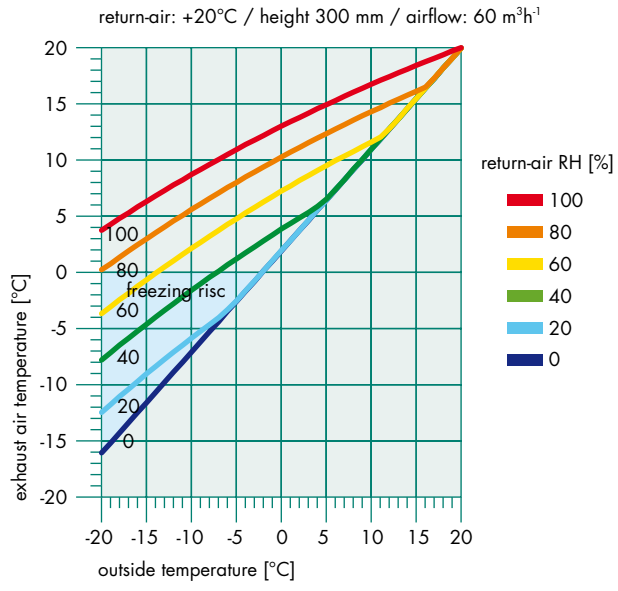


Figure 6: Exhaust air temperature as a function of the outside temperature.



Easy, efficient mounting

The Recair Sensitive has flat sides, side-profiles and flanges around the inlet- and outlet-air connections that allow easy and airtight integration into the heat recovery unit.
The Recair duct counter flow Sensitive series accomodate two flows through the heat exchanger. One flow loses heat to the benefit of the opposite flow. In all circumstances there is a possibility that the flow losing heat shows condensation set off to the heat exchanger interior. This condensation must be drained to the exterior and washed away into the sewage. In order to assure an optimum drainage of condensed moisture from the heatexchanger, three mounting orientations of the cell into the heat recovery unit are to be considered (See Fig. 7, 8, 9).

Directions for storage, assembly and use

1 Avoid any exposure to direct or indirect UV light, e.g. sunlight.
2 Recair heat exchangers are made of Polystyrene. Polystyrene is not known for its resistance against chemicals.
3 Operating temperatures: Recair Sensitive air to air heat exchangers may be exposed to temperatures between -30 and +50 °C.
4 Heat exchangers may only be removed from the apparatus by pulling the plastic strip running over the heat exchanger.
5 Exhaust and fresh air should be filtered at G4 class to keep the exchanger interior clean from pollution.
6 No cleaning with fluids only careful dust removal from air intake surfaces with a household vacuum cleaner.
7 Recair heat exchangers can have an internal leak. Maximum of 25 litres/minute of air at a pressure difference of 250 Pa. Under circumstances this leakage of air also could result in some leakage of condensation. For this reason, the air flow that loses heat should always be pointed downwards. In this way, the condensation will quickly be removed. Please note when mounting orientation as shown in figure 9 is preferred, the tag should always be on top. (See Fig. 9)
8 Pressure difference between the two flows may not exceed 2000 Pa to avoid irreversable mechanical damage to the heat exchanger.

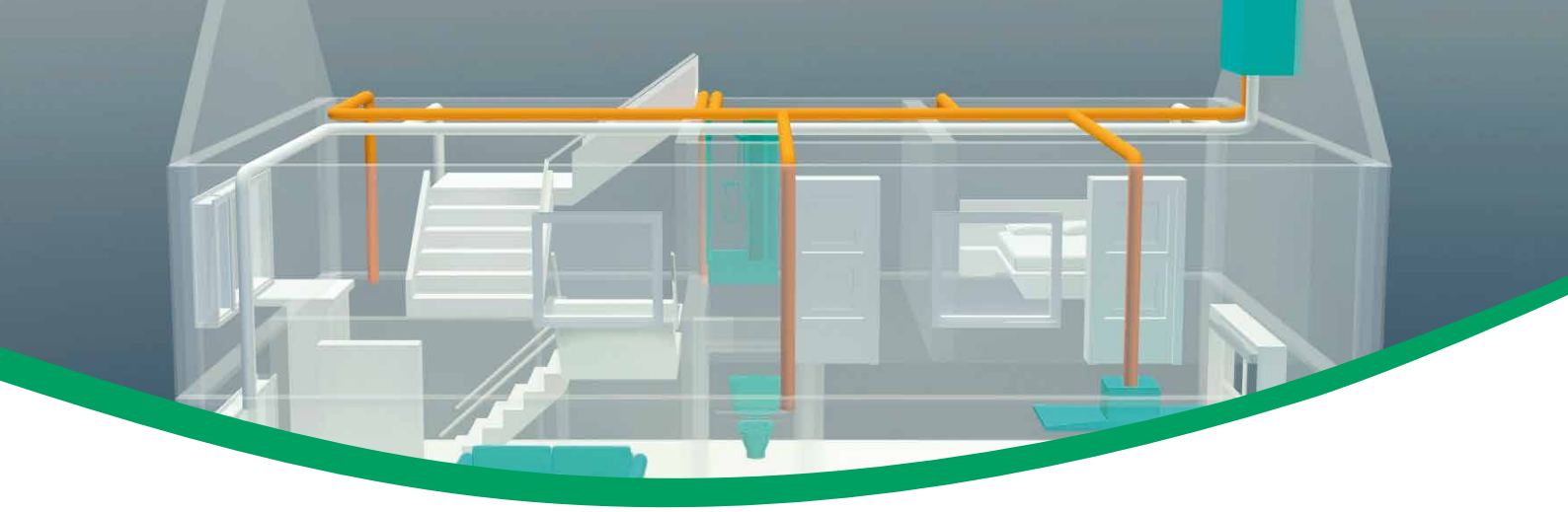


Figure 7: Mounting orientation "on the noses"

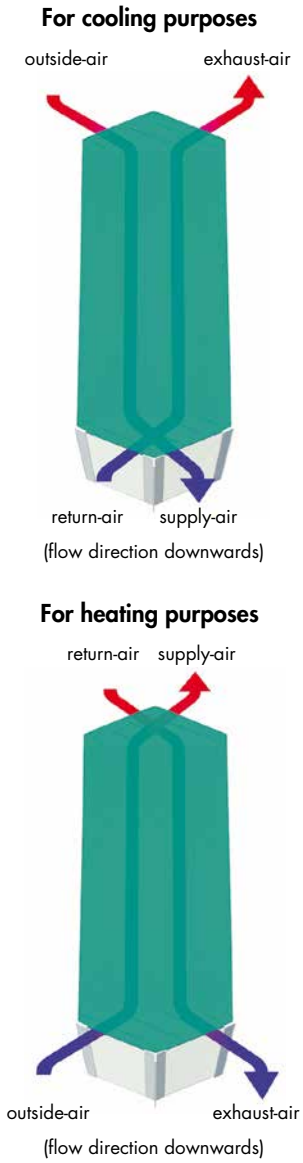
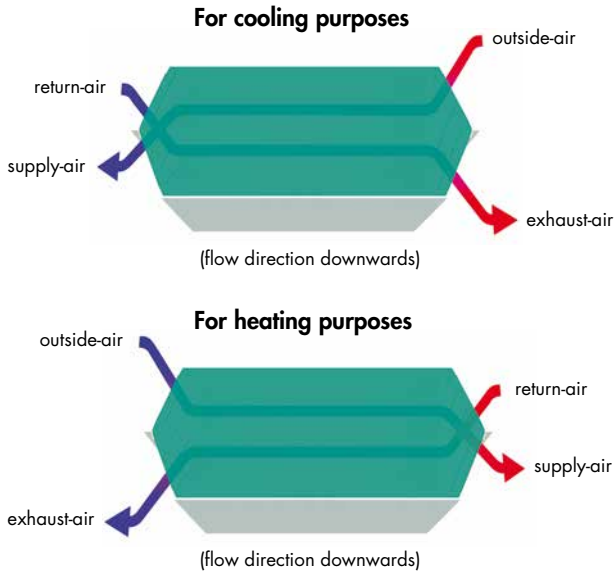


Figure 8: Mounting orientation "on the (white) side panels"



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