

The New Sorption Rotary Heat Exchanger



FläktWoods



Two of the most important factors affecting indoor air climate are the air temperature and the humidity but achieving comfort conditions can be very expensive.

Our new Sorption wheel radically reduces that cost by up to 50%

Air handling systems are fitted with heating and cooling systems designed to treat the air so that the correct condition is supplied to the room. Heating and especially cooling systems are expensive to install and run. This is why it is important to install efficient energy recovery.

Rotary heat exchangers offer high efficiency in a compact design and often provide the best return on investment.

We offer two types of rotary heat exchangers: One for heating only; which we call a sensible wheel because it transfers only sensible energy and the other is for both heating and cooling. We call that the new Sorption Wheel.

Better energy recovery during summer

The main feature of the Sorption wheel is that it can not only transfer heat energy but also moisture.

When warm outdoor air is cooled, the moisture in the air condenses to water when the air reaches the dew point. This takes a lot of energy and requires that the chiller is designed to cope with it.

The new Sorption wheel will help with that by transferring a large part of the moisture in the outdoor air and exhausting it directly through the exhaust fan. This means the size of the cooling system is reduced.

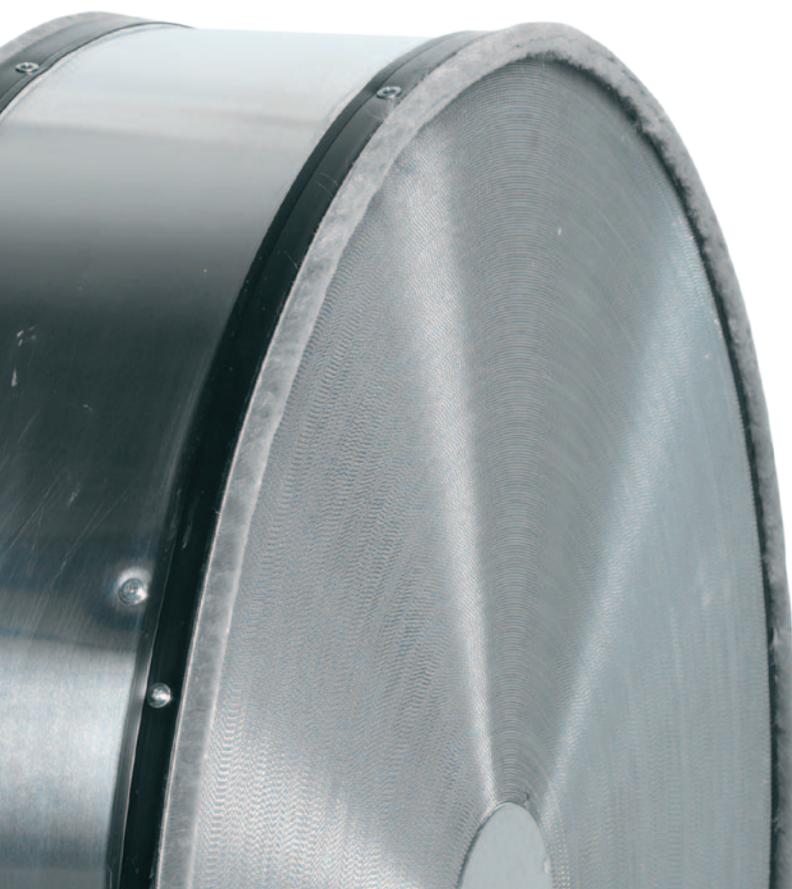
Better humidity level during the winter

In the winter time, the outdoor air contains very little moisture and when heated to room temperature will cause very dry conditions indoors. Our new Sorption wheel can help here too. By recovering the moisture in the extract air, the supply air is humidified and we maintain a higher level of moisture indoors than would be the case with other heat recovery systems.

Better energy recovery during the winter

On very cold days, normal heat exchangers can become frosted and then the performance drops quite rapidly. To avoid this it is necessary to employ defrosting systems which will cost additional energy in one way or another.

The new Sorption wheel will help here as well. The moisture in the extract air is recovered and transferred to the supply air which means frost will not accumulate in the wheel and maximum heat recovery will be available all the way down to around -24°C saving both energy costs and installation costs.

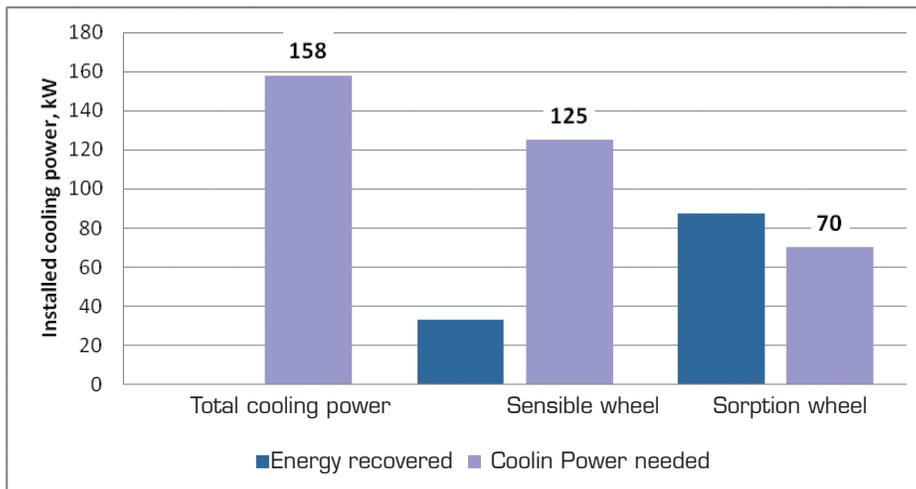




In chilled beam systems it is necessary to control the humidity of the air to avoid condensation. Usually this means reducing the supply air humidity to 8-9 g/kg in order to keep the air dew point in the room below the chilled beam temperature.

The following example compares the installed capacity and the energy consumption for a unit with a non hygroscopic wheel and a new Sorption wheel. The same conditions are used in both cases. The cooling power needed to cool air from 26°C dry bulb, 21°C wet bulb (12.7 g/kg) is 31,6 kW for each cubic meter per second of air. For 5 m³/s that means 158 kW.

Here we see how we can reduce that with a rotary heat exchanger.



The installed cooling capacity is reduced from 158 kW to 70 kW and the annual energy consumption is reduced by 1700 kWh. This brings a significant reduction in the size of the chiller and cooling energy savings.



The new Sorption wheel brings benefits in all seasons

CASE 1 - Summer Conditions

When cooling warm outdoor air, the moisture in the air condenses to water. This takes a lot of energy and requires that the chiller is sized to cope with it.

This is especially true in systems requiring special control of the humidity. Chilled beam systems are a common example.

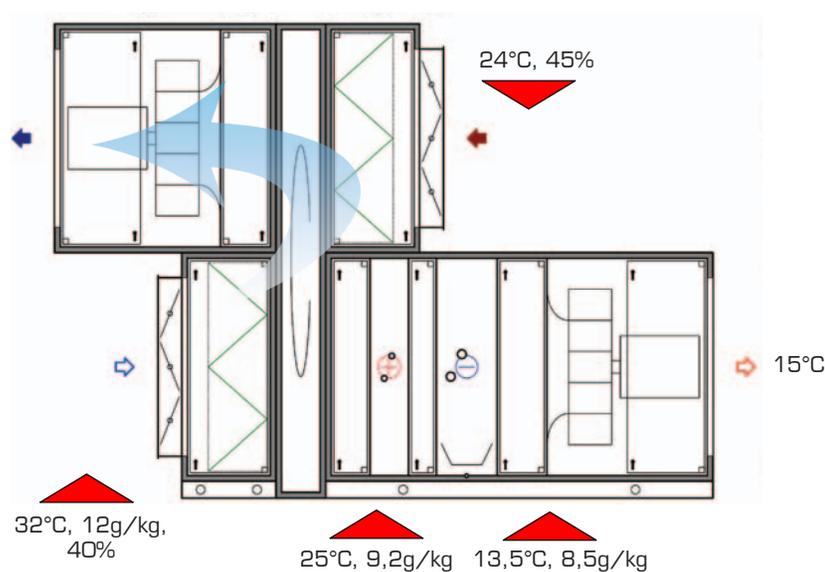


How?

The new Sorption wheel is able to dehumidify and cool the outdoor air by transferring the heat and moisture to the exhaust air.

Benefits

- Smaller chiller installation
- Smaller cooling circuit: Pumps, valves, pipes etc
- Reduced refrigerant quantities in buildings.



Reduction of cooling peak load by 20-40% due to efficient cooling recovery



CASE 2 - Winter Conditions

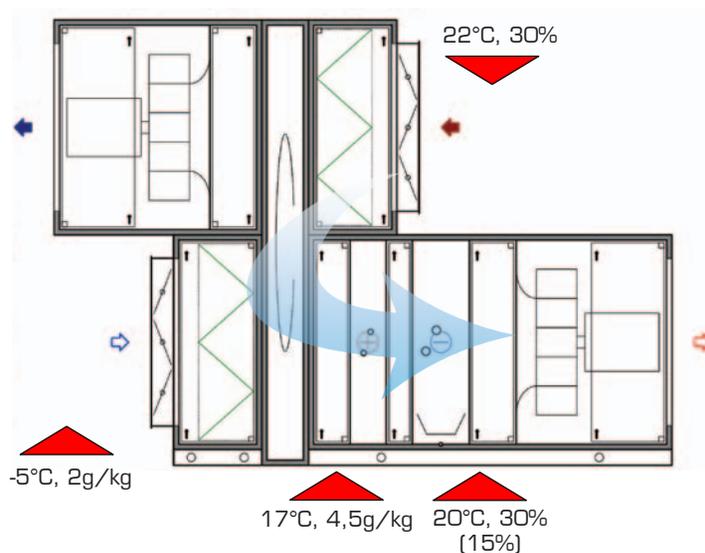
Heat recovery systems often face frost problems on cold winter days. The problem occurs when the humidity in the exhaust air condensates on the recovery system and turns into ice with the impact on reduced recovery and increased pressure losses in the device which in the end blocks the air flow totally in the AHU. To avoid this scenario most recovery systems are equipped with frost protection which cost energy and money. The new Sorption wheel can solve the frost problem.

How?

The new Sorption wheel recovers the moisture in the extract air and transfers it to the supply air which means frost will not accumulate in the wheel and maximum heat recovery will be available all the way down to around -24°C saving both energy costs and installation costs.

Benefits

- Reduced heating energy cost by avoiding defrosting
- Reduced heating system size
- Higher moisture content in the supply air; which means better comfort and more hygienic indoor climate
- Enhanced reliability in the winter due to reduced frosting problem



Supply air humidity increases from 15% to 30% with the new Sorption wheel

The Effects of Dry Air on Comfort and Hygiene

Dry air has significant effects on people and processes. It affects people's comfort, health and consequently, their performance at work. In northern Europe/Alps etc, low relative humidity in the workplace occurs primarily in the winter and, with increasingly high summer temperatures is becoming more significant in warmer months too. The optimum level of relative humidity for people is around 50%.

On colder days, the humidity level inside can be as low as 15-20% even when it's damp outside, it can be drier than the Sahara inside.

Electrostatic

Perhaps the most obvious dry air effect is electrostatic shocks. The threshold for the ability of electrostatic is 40%.

Visual discomfort

In dry air, the eyes lose moisture to the surroundings, causing drying the surface of the cornea. Contact lens wearers express discomfort that can increase by a factor of five as the humidity drops from 45% to 20%.

Dry mouth, throat and nose

The nose and throat act as a powerful humidifier for inhaled air and mucous helps protect against infection by trapping microbes and dust.

Persistently low relative humidity increases susceptibility to infection as the mucosa dries out. Appropriate humidity levels prevent these problems.

Perception of warmth

People's perception of warmth varies with relative humidity. It is possible to reduce ambient temperature to provide a sensation of warmth which will save heating cost.

Stress and absenteeism

Research has shown that absenteeism of 4% at 40% rises to 5% at 20%.

Summary

The effects of dry air on people vary with temperature and individual sensitivity but, at temperatures between 20-23°C, which are typical of the modern workplace, a comfortable and healthy level of relative humidity is found at around 50%. Little tangible effect is felt, except by people with sensitive eyes, until the relative humidity drops below 40%, at which level electrostatic shocks are generated. Below this level an uncomfortable and unhealthy environment is created. According to temperature, conditions above 60-70% become uncomfortably humid. An appropriate range of relative humidity for people at work is therefore 40-60%.



Econovent® – savings in practice

Using the newly-developed life cycle cost and payback module in our web-based product selection program, you can quickly and easily run your own payback calculation when making product selection assessment. Using the program, you can choose between run-



ning a LCC calculation or a payback calculation. You can also compare the payback different heat exchangers will give, including various Econovent® rotor sizes and variants, or even competitive products. The results can prove to be invaluable when making your choice of heat exchanger!

For your personal copy, please enter go to www.flaktwoods.com



The Econovent® family

ECONOVENT is the original rotary heat exchanger, manufactured since 1956 and its characteristics are known as high energy recovery efficiency, low pressure drop, reliable technical data with excellent operational features.

We test our products extensively during the development process at our own Technical Centre and the ECONOVENT product and selection program Eurovent certified.

Range

Our rotors are suited for all kinds of applications and climates, including: Comfort (offices, hotels, Supermarkets), Industrial and Marine (cruise ships, coastal areas), from Arctic to Tropical climates.

The ECONOVENT family contains of a range of rotary heat exchangers, Non hygroscopic, Sorption also available with special treatment, anti-corrosion for example.

Our rotors are available in several different foil spacing's and rotor diameters with a flexibility of 10 mm steps in diameter.

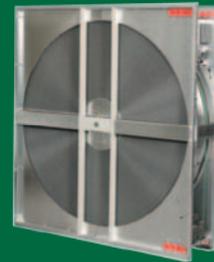
We have 3 different variants:
PUML : separate rotor, with out any casing.
PUMK : rotor in a cassette style casing.
PUMO : rotor in a full stand alone casing.

We can manufacture rotors up to 5.0 metres in diameter, handling airflows of up to 50 m³/s.

We have a Global sales organisation and we are able to offer our customers high quality products and levels of technical, application and product support.



Separate rotors can be supplied in any dimensions up to 5 m.



The cassette unit is a customised slide-in unit to fit any AHU.



Cased version for installation in AHU, duct works or plant rooms.

Save Energy, Economy and Environment with Fläkt Woods

Energy optimization is an important aspect of ventilation, where Fläkt Woods have acclaimed expertise. We use e³ to highlight products and solutions that are particularly effective. They serve a dual purpose of saving both your long-term economy and our environment.

www.flaktwoods.com/energy

We Bring Air to Life

Fläkt Woods is a global leader in air management. We specialise in the design and manufacture of a wide range of air climate and air movement solutions. And our collective experience is unrivalled.

MUNTERS INTERNATIONAL INC.

1964 N. Town & River Dr.
Fort Myers, FL 33919, USA
T: +1 540-0006 F: +1 481-3566
WWW.muntersinternational.com
E:anders@muntersinternational.com

