



Menerga Adconair

Various solutions – one heat recovery system

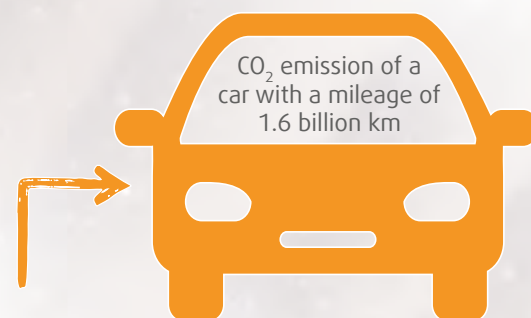
MINIMAL ENERGY APPLICATION – MENERGA

Menerga has developed and produced innovative ventilation and air conditioning systems for extensive fields of application since 1980. We can safely claim that our technology is the leader throughout these areas, and that we set the benchmark for efficiency and effectiveness. Our philosophy – “Creating a good indoor climate – through Minimal ENERGY Application” – is our guideline, in which we have succeeded every single day since the company was founded. We are proud that Menerga from its very beginning was one of the first companies to focus on energy efficiency. And, on the basis of this orientation, we have created many efficient solutions, if sometimes along somewhat unconventional paths.

Menerga Market segments



Heating energy consumption of the city Mülheim an der Ruhr with 170,000 inhabitants



CO₂ emission of a car with a mileage of 1.6 billion km

SAVINGS OF

210,000 t
CO₂



Heating energy consumption of approx. 80,000 apartments (100 m²)



Kilometers traveled by cars driven by 25,000 sales employees

*Average savings by Menerga solutions in the period 2011 until 2016.

Europe-wide sales and service network

Founded in Mülheim an der Ruhr, Germany, in 1980

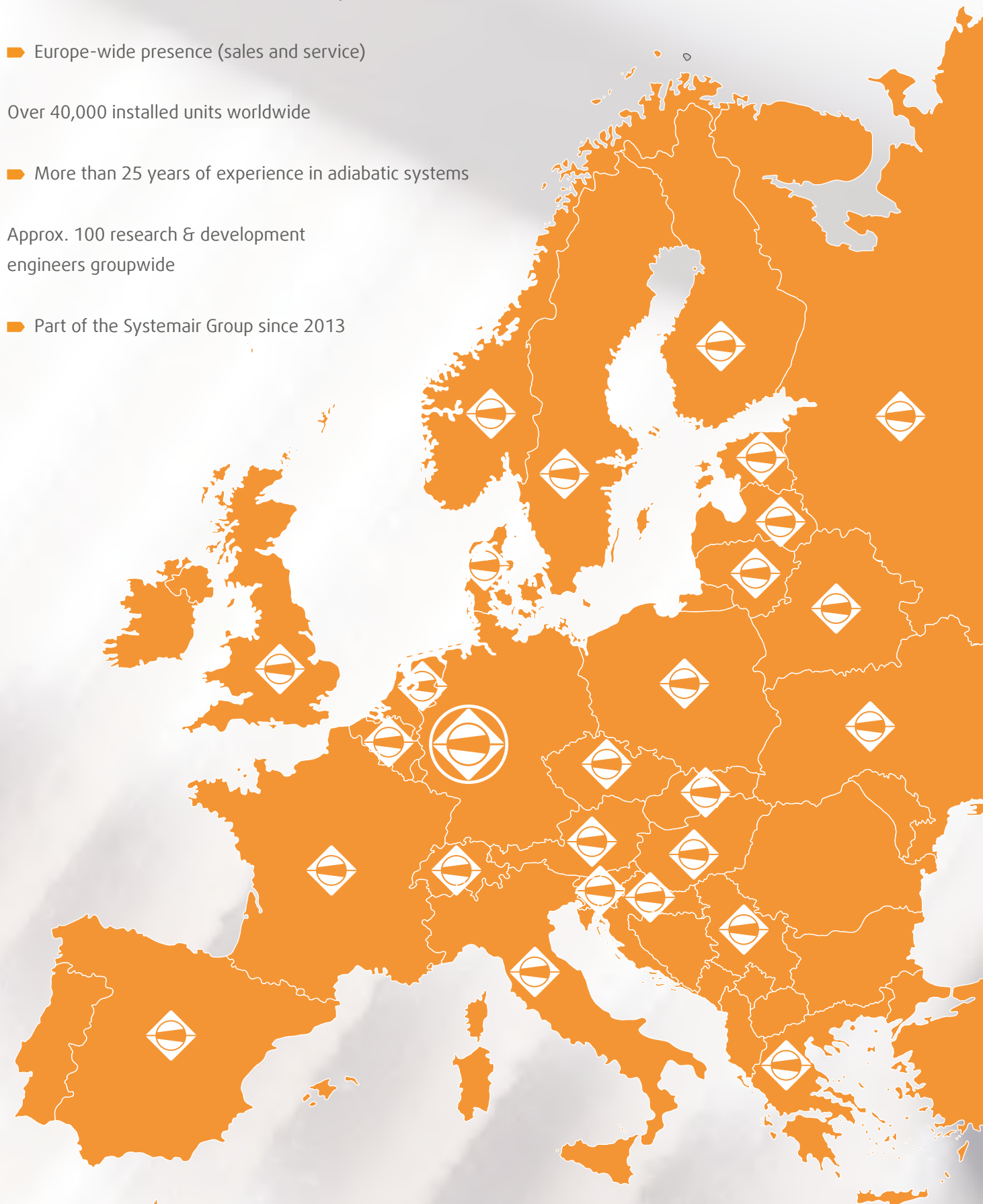
Europe-wide presence (sales and service)

Over 40,000 installed units worldwide

More than 25 years of experience in adiabatic systems

Approx. 100 research & development engineers groupwide

Part of the Systemair Group since 2013



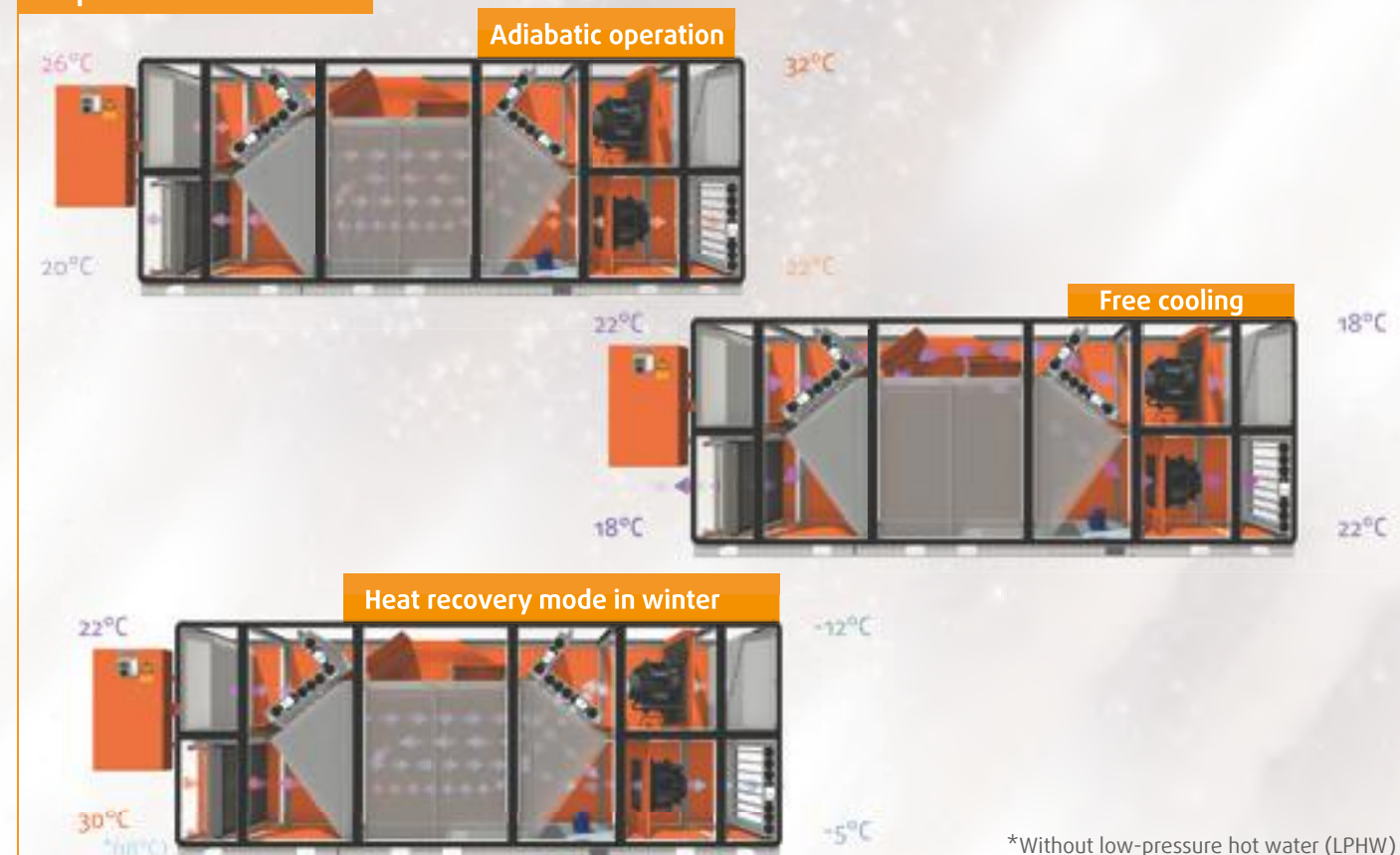
FULL COUNTERFLOW HEAT RECOVERY

Adconair heat recovery technology sets high standards with its counterflow plate heat exchanger. This new heat exchanger works with an actual counterflow exposure of more than 80 %, and at only 150 Pa pressure drop. At the same time, its performance places it in top energy efficiency classes and assures compliance with Ecodesign Directive 1253/2014. Menerga solutions with Adconair heat recovery are highly versatile and can be used in a great number and variety of applications.

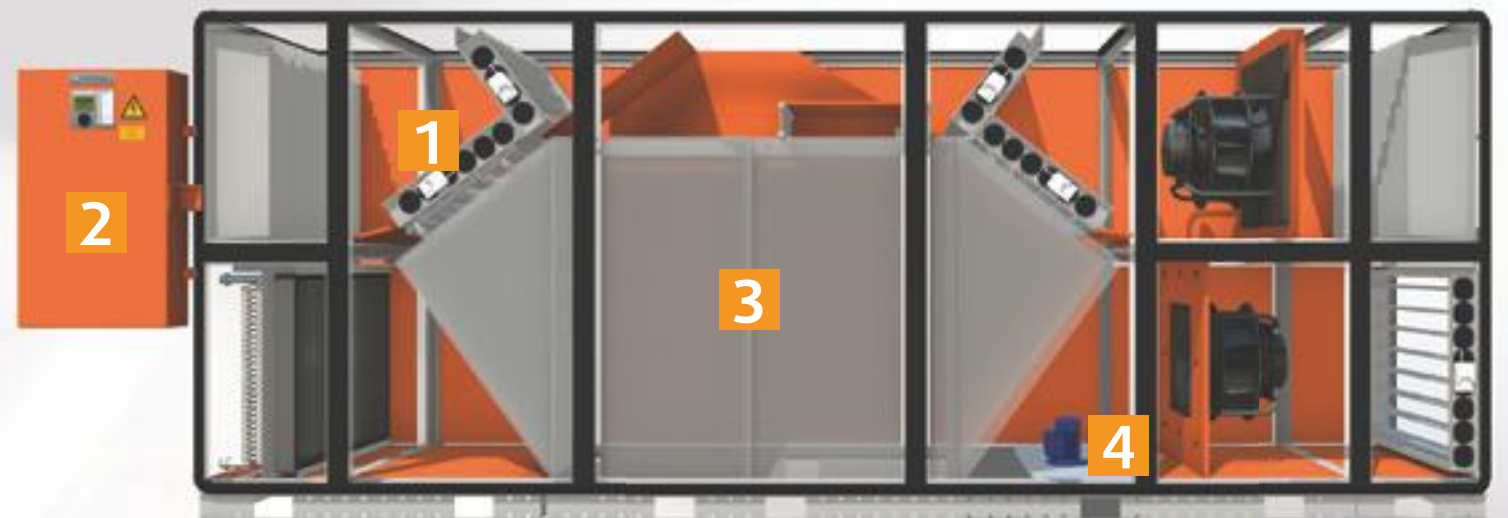
THE ADCONAIR HEAT RECOVERY SYSTEM IS AVAILABLE IN VARIOUS MODELS:

- Integrated, indirect adiabatic evaporative cooling
- Adiabatic^{Pro}
- Adiabatic^{zeroGWP}
- AdiabaticDX^{carbonfree}
- Compression refrigeration systems – also as reversible compression refrigeration systems

Operational modes



Areas of application



Adconair Adiabatic

1 Cooling system

- Adiabatic cooling efficiency of 90 %
- No additional air-side pressure drop resulting from components installed in the air path, e.g. humidifiers
- Low water consumption with circulating water system
- Reduction of the required DX cooling duty by up to 70 %
- Minimal power consumption
- Use of condensate in adiabatic cooling system
- No surface treatment of the recuperator required
- Resistance to corrosion

2 Controls

- Individual servo control of the motor-driven dampers
- Monitoring of the availability and efficiency of the system
- Individual control of heat recovery system
- Remote maintenance via 256-bit encrypted cloud, with Menerga vicomo
- Integrated data logger with trend display, directly at the device or via cloud
- Infinitely variable control of the integrated cooling system
- Individual customization of the control concept
- C-Bus system, with interference-immune shielding that is not dependent on cabling length

3 Heat recovery

- Maximum efficiency with minimal air-side pressure drop
- Use of polypropylene, which is microbiologically harmless and non-corroding
- Extremely long-lasting thanks to use of nonaging material
- Pressure stability for pressure differences up to 10,000 Pa between the two air flows
- Performance data of the cross-counterflow heat exchanger measured by TÜV NORD (German official technical inspection agencies) in actual installation situation and in accordance with EN308
- Demand-oriented defrost function
- Can be used in almost every application
- In-house production of all heat-exchange systems
- Over 25 years of experience in producing heat recovery systems made of polypropylene

4 DX cooling (optional)

- Performance increase of the integrated DX cooling system by up to 25 % by means of refrigerant sub-coolers
- Microchannel condensers, which enable reduction of refrigerant amount (up to 65 % less) and low air-side pressure drop (up to 40 % less)
- EER values of up to 12 by combining the adiabatic cooling system and DX cooling
- Low mains power consumption, and no peak power consumption during summer operation
- Point-perfect power control for great precision
- Various performance levels for optimally balanced systems

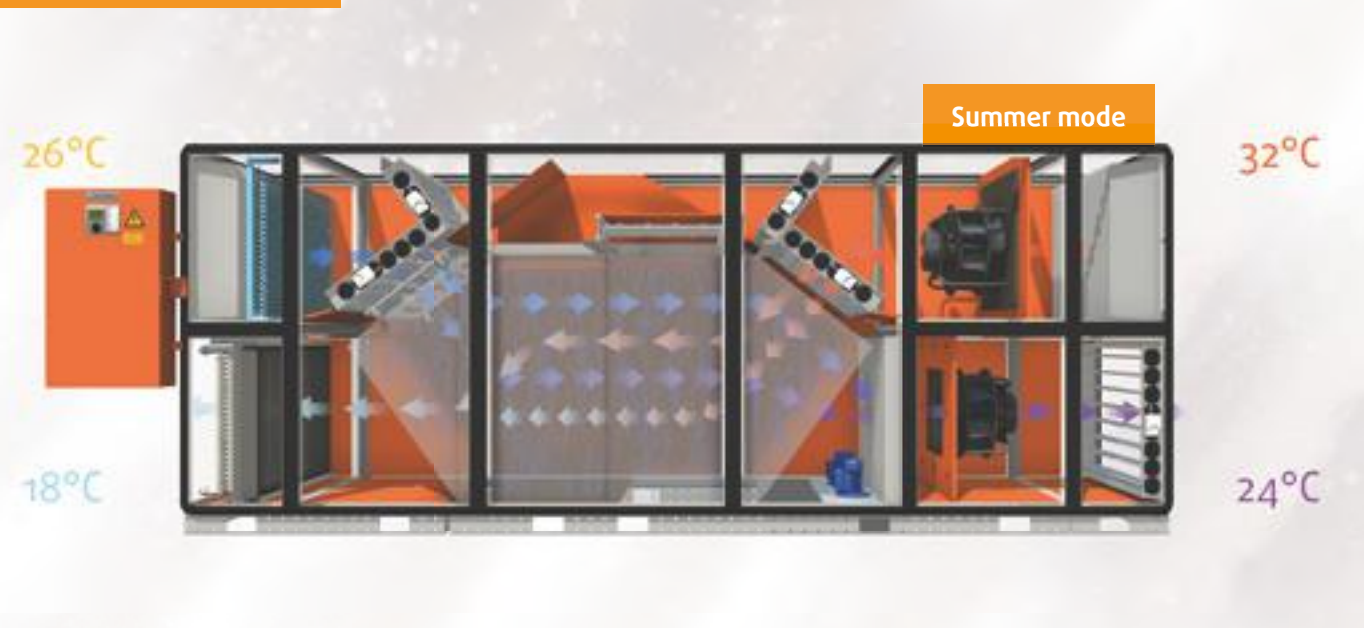
ADIABATIC EVAPORATIVE COOLING

With Adconair heat recovery in the Adiabatic^{Pro} version, Menerga has developed a technology to significantly optimize adiabatic evaporative cooling. This development is based on advances that include pre-cooling the extracted air upstream of the heat exchanger, which means increase of the overall efficiency of the cooling process to almost 100 %. Pre-cooling is used to lower the supply air temperature to 18 °C and to simultaneously increase cooling capacity by up to 30 % (based on average room temperature of 26 °C). Adconair heat recovery in the Adiabatic^{Pro} version is a full-fledged, energy-saving alternative to conventional air conditioning systems – entirely without a refrigeration system.

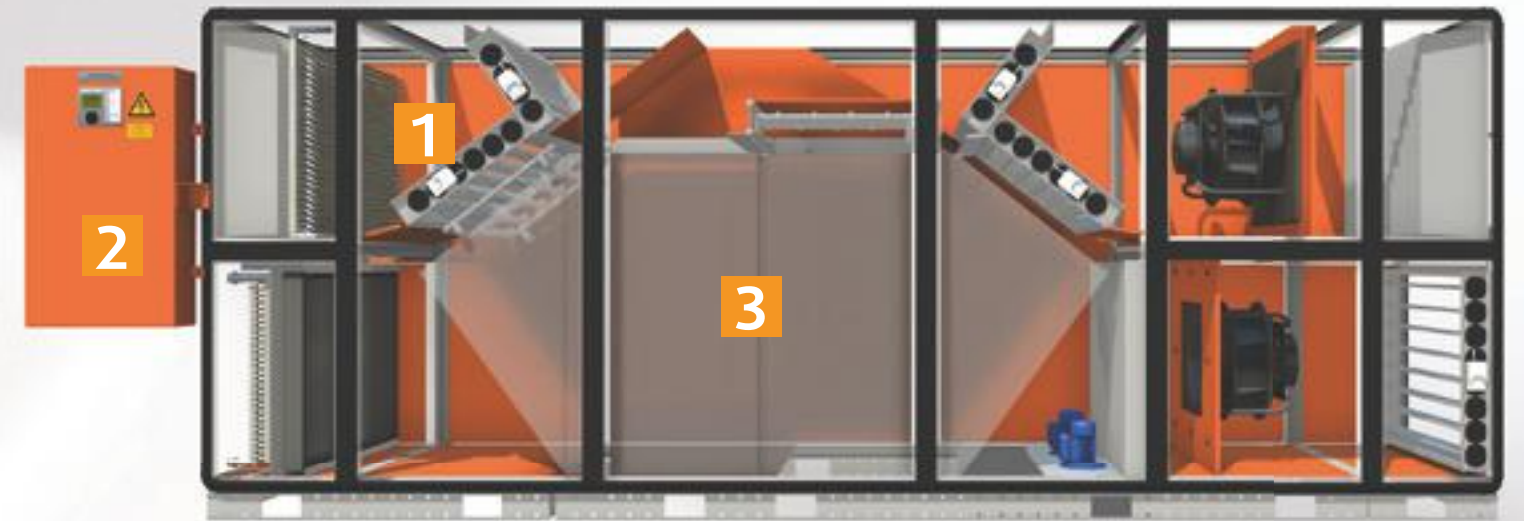
FUNCTIONAL PRINCIPLE

The Adconair Adiabatic^{Pro} cools the outside air three times. In the extracted air, sensible pre-cooling takes place using a cooling coil. The cooling water comes from the internal circuit in the indirect, adiabatic evaporative cooling system, located in the area of the extracted/supply air in the heat exchanger. This cooling water is sprayed in through an additional nozzle system into the area of the exhaust air in the heat exchanger. This enables indirect evaporative cooling and, in turn, the third stage of outdoor air cooling.

Operational mode



Areas of application



Adconair Adiabatic^{Pro}

1 Cooling system

- Adiabatic cooling efficiency of 100 %
- Low water consumption with circulating water system
- Minimal power consumption
- Use of condensate in adiabatic cooling system
- No surface treatment of the recuperator required
- Resistance to corrosion
- High output, even with especially high internal thermal loads
- No need for a conventional refrigeration system

2 Controls

- Individual servo control of the motor-driven dampers
- Monitoring of the availability and efficiency of the system
- Individual control of heat recovery system
- Remote maintenance via 256-bit encrypted cloud, with Menerga vicomo
- Integrated data logger with trend display, directly at the device or via cloud
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- C-Bus system, with interference-immune shielding that is not dependent on cabling length

3 Heat recovery

- Maximum efficiency with minimal air-side pressure drop
- Use of polypropylene, which is microbiologically harmless and non-corroding
- Extremely long-lasting thanks to use of nonaging material
- Pressure stability for pressure differences up to 10,000 Pa between the two air flows
- Performance data of the cross-counterflow heat exchanger measured by TÜV NORD (German official technical inspection agencies) in actual installation situation and in accordance with EN308
- Demand-oriented defrost function
- Application in virtually all areas of use
- In-house production of all heat-exchange systems
- Over 25 years of experience in producing heat recovery systems made of polypropylene

FLUOUROCARBON-FREE SUPPLY AIR COOLING

It is possible to provide sufficient cooling without compression refrigeration systems that use FC: as proven by the new climate-neutral cooling technology offered by Adconair Adiabatic^{zeroGWP}. This system cools summery warm outside air to 18 °C by a hybrid evaporative cooling system. By combination of the technologies of indirect adiabatic evaporative cooling with dewpoint cooling inside the proven Adconair heat recovery system, it is likewise possible to discharge high thermal and humidity loads outside the air conditioned rooms and to assure constant low supply air temperatures.

FUNCTIONAL PRINCIPLE

Within the first-half section of the heat exchanger, indirect, adiabatic evaporation cooling takes place, as familiar from Adconair Adiabatic and Adiabatic^{Pro} systems. Outside air is therefore already extensively cooled upstream. In the second-half section of the heat exchanger, so-called dew point cooling takes place. For this purpose, part of the already pre-cooled outdoor air is withdrawn after its exit from the heat exchanger as process air flow. Then it is directed back to the heat exchanger in accordance with the counterflow principle and again humidified. In this way, repeated indirect evaporative cooling takes place. Unlike conventional systems, the lowest possible temperature is no longer dependent on the wet-bulb temperature of the extracted air, but rather on the wet-bulb temperature of the pre-cooled outside air. The process air flow is approximately 50 % of the nominal flow and is controlled continuously such that constant supply air temperature is maintained. When dimensioning on-site duct networks, consideration of this arrangement is necessary, since the outdoor and exhaust air ducts must be planned accordingly.

Operational mode



Areas of application



Adconair Adiabatic^{zeroGWP}

1 Cooling system

- Adiabatic cooling efficiency of 100 % (based on the wet-bulb temperature of the extracted air)
- Low water consumption with circulating water system
- Minimal power consumption
- Use of condensate in adiabatic cooling system
- No surface treatment of the recuperator required
- Resistance to corrosion
- Great output, even with especially high internal thermal loads
- Cooling of the outdoor air by up to 16 K possible
- No need for a conventional refrigeration system

2 Controls

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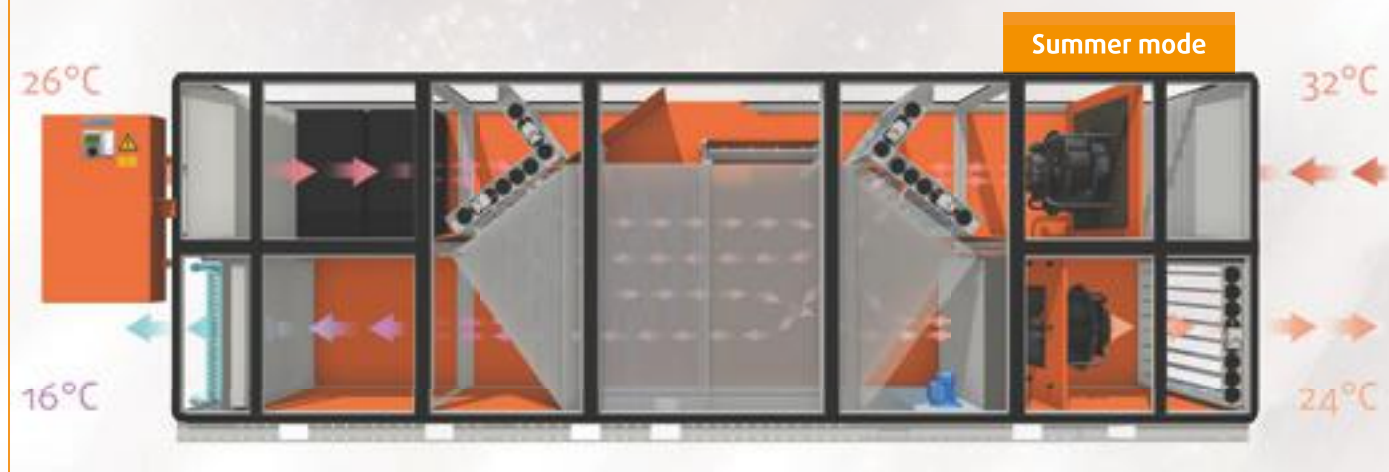
THERMALLY DRIVEN FLUOUROCARBON-FREE AIR CONDITIONING

The new thermally driven air conditioning technology in the AdiabaticDX^{carbonfree} version – installed inside the proven Adconair heat recovery system – prevents high electrical power consumption during the summer cooling season. The cooling supply is provided by a closed adsorption cooling circuit integrated into the HVAC unit – which supplies the heating coil, used for supply air heating in winter, with cold water for cooling. In contrast to a compression refrigeration system, no electric power is needed for this operation, since heat at a temperature level beginning at 60 °C is employed. This heat is provided by connection of the heating supply, needed in any case for winter operation. Even in midsummer, the integrated return cooling by the adsorption refrigeration unit guarantees extremely low recooling temperatures and therefore allows high cooling energy efficiency ratios (EER). The water refrigerant, R718, integrated into the adsorption refrigeration unit has a Global Warming Potential (GWP) of zero. Unlike other natural refrigerants, it is neither flammable nor toxic.

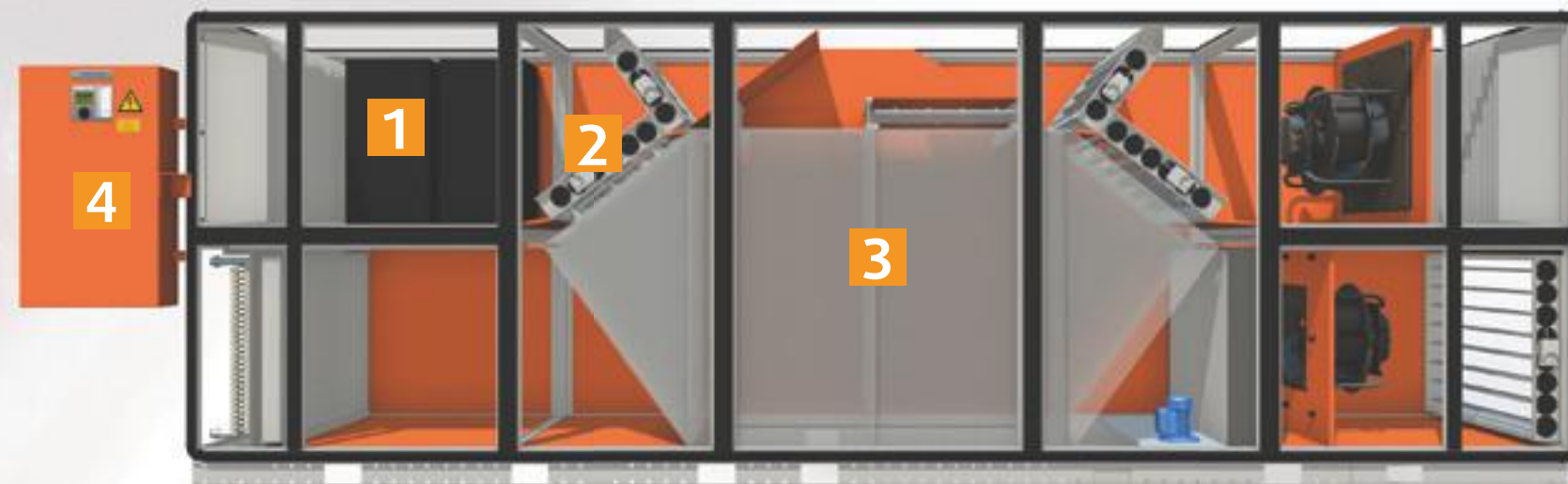
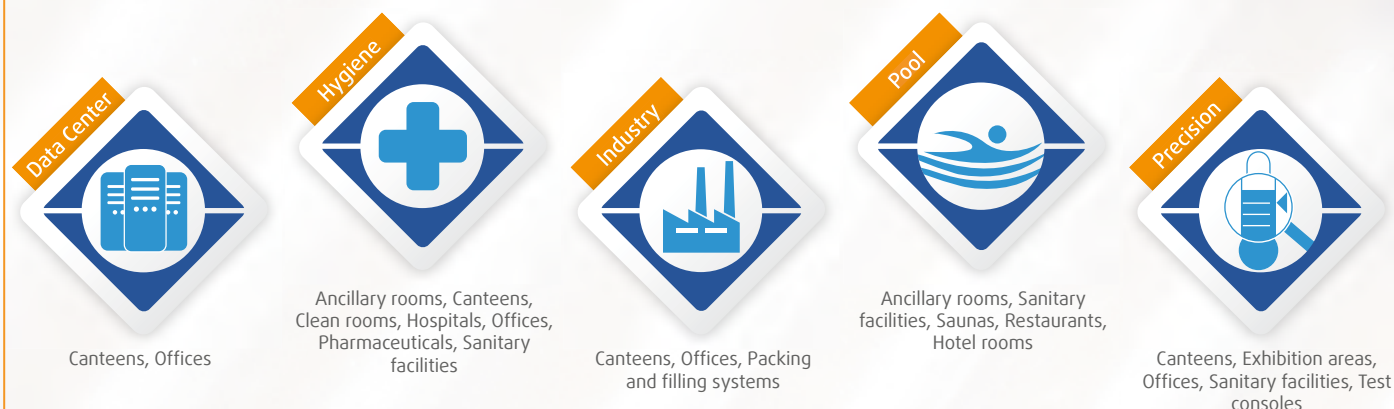
FUNCTIONAL PRINCIPLE

The key components of this system consist of two modules, which are equipped with silica gel as an adsorption material. The physical process of adsorption produces cold water, which is used in a combi-coil to cool and dehumidify the supply air. The flow temperatures from the refrigeration circuit are low enough to cool the outside air from 32 to around 16 °C, in combination with indirect, adiabatic evaporative cooling. While one module generates the cold water by this process, the second module is regenerated during the same process. For this purpose, hot water (from 60 °C) is applied, which leads to desorption of the saturated silica gel. The desorption is at least as fast as the adsorption, so that enough cold energy is always available.

Operational mode



Areas of application



Adconair AdiabaticDX^{carbonfree}

1 FC-free supply air cooling

- Carbon-free, since water is used as refrigerant (GWP = 0)
- No additional energy consumption for supply air cooling and dehumidifying
- Operating power from 60 to 90 °C
- Possible energy sources: solar heat, district heating, process heat, or the heating connection for the air heater, required in any case for winter operation
- Integrated re-cooling, therefore no external re-cooling plant required
- No additional heat exchanger in the supply air, therefore no additional, permanent pressure drops

2 Cooling system

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Creating a good indoor climate since 1980. Worldwide.



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