Comfort air conditioning

School/Kindergarten | University | Hotel | Trade and Commerce | Restaurant/Hotel | Production/Logistics Office/Bank | Health service | Sport | Cultural/Leisure | Special solutions and more





Menerga: Minimal Energy Application

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Complex buildings accommodate a large number of different room types and special architectural features. Menerga remains on top of things and finds the perfect solution for any project. With over 40,000 installations and systems worldwide, we cover almost every type of building. When searching for the best solution, we jointly analyse the conditions at the location. In this manner, we and our partners have jointly implemented countless projects, which have received many awards for energy efficiency. We are proud of this. But what we really like about this is the knowledge about jointly developed solutions, which allow operators

and investors to save money – day after day, month after month, and year after year. The investment costs are amortised within a very short period.

We will be happy to produce reference lists for the building types in which you are interested. And in the event that you surprise us with a totally new project, we will find the right solution for any requirements. With our eyes sharpened by countless special projects, e.g. the "ALMA" telescope facility in the Atacama desert, or the "Princess Elisabeth Station" at the South Pole, we will be happy to accept the challenge.



Experts at your service Technical Customer Service

Experts at your service, anytime, anywhere. With a comprehensive range of services and an extensive service network throughout Europe, the Menerga Technical Service guarantees the most economical and advanced services over the entire life cycle of your system, from the day of commissioning onwards.

More than 120 service technicians at various service centres, and 40 service engineers at the Menerga locations, provide a professional all-inclusive service, with the objective of achieving high availability of the systems and a maximum of efficiency. The range of services offered by the Menerga Technical Service covers everything from the test run at the factory and on-site commissioning, through periodic servicing, repairs, remote maintenance and remote diagnosis by means of direct dial-up options, to the refurbishment and optimisation of the systems.

We supply you with the right service concept, customer-specific and application-specific. In the event of an emergency, you can reach us 24 hours a day on the following telephone number: +49 208 9981-199

Core competencies Our Areas of Application









INDOOR SWIMMING POOL AIR CONDITIONING

Private swimming pools, public swimming pool halls, adventure pools, sports pools, saline baths, hotel pools, school pools, therapeutic pools and many more. Last not least: heat recovery from waste water.

The air conditioning of swimming pool halls is one of the most challenging areas for air conditioning. Here we started 35 years ago, this is where we grew up, and we are now market leaders and innovation pioneers. Our special competency lies in the high heat recovery efficiency lowering operating costs, while robust system design overcomes adverse conditions.

COMFORT AIR CONDITIONING

Low-energy buildings, offices, museums, sports facilities, schools, clinics, hotels, banks, historical buildings and many more.

With comfort air conditioning, the focus is on people. Our technology is based on the respective requirements of a project, but simultaneously always looks for the most efficient method with the lowest consumption of energy. For example, we cool with water in order to save electrical energy, or make use of sorption-based air conditioning, with which you can carry out dehumidification by means of heat, e.g. from solar thermal energy or process waste heat. It is even possible to store excess solar heat for an indefinite period without any losses for the purposes of dehumidification.

PROCESS AIR CONDITIONING AND CHILLED WATER

Air conditioning of data centres, industrial drying, process cooling, air conditioning for warehouses, cold water generation and much more.

Last not least: heat recovery from waste water.

The process air conditioning system must ensure that defined air conditions prevail in a defined situation. Menerga systems guarantee reliable drying, cooling or heating. In the field of chilled water, our systems reliably provide the desired water conditions. In this sector, too, saving energy through the use of intelligent technology is our top priority.

SPECIAL SOLUTIONS

Research projects, special applications

Challenges and unusual projects are the milestones of Menerga's company history. Since the foundation of our company, we have designed solutions for each individual customer. We enjoy taking on challenging projects, knowing that these are the projects that bring valuable experience, and which also improve the filter class of our "standard" systems.



Requirements of Comfortable Climate THE FOCUS IS ON PEOPLE

Climate affects our personal well-being and performance. It is a regulator for production and working conditions and influences the performance of the employees. At the same time, the indoor climate is an important aspect of buildings and responsible for ensuring that not only your employees, but also your visitors and guests feel comfortable.

The Advantages for your Climate:

Menerga systems are developed and manufactured for long-term use and operation with the lowest possible operating costs. We at Menerga always think things through that one famous step further, and focus on your project and all its special conditions. You yourself profit from this doubly. This is because anyone who decides on efficient, first-class technology not only saves on operating costs, but also benefits in terms of environmentalism and independence. On the subject of a comfortable climate, the focus is on people. We at Menerga not only ensure the "measurable" factors such as temperature, humidity and air quality. With over 30 years of experience and more than 40,000 systems installed worldwide, we know that for every room and every building it is not possible to consider just the individual parts, but that the room or building has to be considered in its entirety in order to create the optimum solution. We integrate external influences such as solar radiation and the external climate into our plans in the same way as a wide range of internal

influences, e.g. the design of the room, light instalments or the existing sources of heat. We develop the perfect solution in collaboration with all of the individuals involved in the project. For this reason we ask you to excuse us if we ask more questions in advance than others - subsequently, our questions will save you not only money, but also a lot of time! And after the technology has been commissioned we are available to you night and day with our professional Technical Service team to deal with any malfunctions or for regular maintenance. We look forward to executing some exciting projects with you!



Relevant Values AT THE END OF THE DAY IT IS THE COSTS THAT COUNT!

It is a well-known fact that how well individuals perform is influenced by the climate. However, most people are not aware of the specific economic impacts this has. Solely in terms of the number of days employees are off sick, a good climate generates a 25-fold return on the capital invested (cf. model calculation of Doctor of Engineering Rainer Bareiß, Ed. Züblin AG Stuttgart for CCI 7/2009).

Therefore, those who calculate the actual costs take into consideration not only the investment costs, but above all the operating costs. The less energy that is required for air conditioning, the lower the operating costs. Menerga systems are

based on the principle of the lowest possible application of energy. This aspect will become increasingly relevant in a future with rising energy costs.

These considerations do not take into account the fact that the building becomes more attractive as a result of the improved indoor climate. This "soft" location factor will become increasingly significant - whether in the competition for the best talents, renting out the rooms or in terms of the numbers of visitors. A good climate is and remains an investment that is worthwhile.

Your advantages:

Intelligent, innovative and highly efficient systems and concepts
Very low operating costs
Utilisation of renewable energy sources
Integrated control and regulation
Compact, space-saving integrated units
All systems tested in factory trial runs
Delivery ready for installation
Excellent maintenance concepts
Representatives throughout Europe



Good Climate in Schools and Kindergartens

REQUIREMENTS

A good climate promotes the ability to learn and concentrate - that is well known. But is it enough to air the room by opening the windows during the breaks? Many schools today are in need of repair; too many pupils are taught in rooms which are too small and not air-conditioned. Just a short time after the start of lessons, the CO₂ content can reach critical values under such conditions. The higher the CO₂ content of the air, the more often the children suffer from tiredness, headaches and an inability to concentrate. Oxygen forms the basis for all learning success!

Airing the rooms simply by opening the windows has many disadvantages. In addition to the possible disturbance caused by noise, e.g. the noise of the street, opening the windows also allows the outside air to bring fine dust particles and pollen into the rooms; cold air and draughts also negatively affect the children's well-being. During the winter months, whether or not to open the window to air the room may well depend on how the pupil sitting closest to the window reacts to the cold – with the result that this is often kept to a minimum. And not forgetting: simply opening the window for the purposes of ventilation releases the heating energy that has been stored in the room.

In schools in particular, a far more effective method is the entry of fresh air by means of ventilation and air conditioning in line with requirements - if possible based on CO₂-controlled regulation. Air conditioning

in line with requirements reduces the energy costs drastically, since the rooms are only used for limited periods during the day. The heating capacity in the evening or night can be reduced; just before the start of lessons, the indoor air is air-conditioned to the desired values.

In addition to the health aspects and the provisions of VDI 6022 which have to be complied with, the importance of the costs also increases. Intelligent air conditioning reduces these significantly – refurbishment of the building is no longer worthwhile! Another important aspect: a good climate protects the building, as excessive moisture loads are reliably removed.





Unit type: **Resolair ANGELASCHULE OSNABRÜCK** Historical school complex with listed facade.



Unit type: Resolair NECKARGMÜND SCHOOL CENTRE The largest passive school building in

Germany has 206 rooms, offering space for 1250 high school students.



Unit type: Adsolair, Resolair KREYENBRÜCK SECONDARY SCHOOL,

OLDENBURG The extension built according to the passive house standard accommodates the canteen, among other things.

Technology Hits MENERGA FITS!

The Menerga Resolair, Adsolair and Adconair systems are ideal for the air conditioning of schools.

In the summer months, efficient cooling is important - due to the high thermal load of the pupils present, and in some cases the very large glass fronts of the buildings. Here, Adsolair systems cool according to the principle of adiabatic evaporative cooling and achieve temperature reductions of up to 14 K simply through the use of water alone. Owing to the design of this system, it is also possible for the heat exchanger to recover "cold". In the winter months the significance of the heat recovery increases, even if some of the heating energy in the room is itself generated by the thermal loads. Resolair systems achieve a regenerative heat recovery level of over 90%. Moisture recovery is also possible because of the design of the heat exchanger, preventing the

formation of excessively dry air in the classroom in the winter months. Adconair systems achieve a very high heat recovery efficiency with their counterflow plate heat exchangers. All systems are fitted with two-stage supply air filtering as standard, which prevents the entry of dust and pollen into the classrooms. For higher thermal loads Adconair systems can be equipped with adiabatic evaporative cooling or with AdiabaticPro. With AdiabaticPro temperature reductions up to 16 K can be achieved.

All Menerga systems are equipped with low-noise fans, which reduce the sound emissions into the classrooms and surroundings. Additional sound attenuators mean that the units are extremely quiet when in operation. Similarly, all Menerga systems are equipped with integrated regulation and control, so that the system automatically selects the most economical mode of operation.

For example:

ANGELASCHULE OSNABRÜCK

The listed Angelaschule school buildings are part of the Bishopric of Osnabrück. In 2009, one wing of classrooms and the auditorium were comprehensively refurbished. The previous heating system for the building had utilised a joint agreement with a neighbouring school, which possesses a biogas-fired combined heat and power plant and two condensing gas boilers. The auditorium building was given a "classical" refurbishment: thick external insulation, new windows, a ventilation system, and improvements to the heating system. Three Resolair systems were used for air conditioning; the decisive factor was the high heat recovery levels, a moisture recovery level of up to 70% and the possibility of "cold recovery".

The concept implemented for the refurbishment of listed buildings is groundbreaking. In conjunction with pressure loss-optimised ventilation ducts, the controlled ventilation in conjunction with highly efficient heat recovery provides energy savings of almost 90%. In the process, it was possible to exceed the high demands made on the CO₂ emissions reduction; analysis of operating data so far shows a

drop in CO, of almost 80%.

System types



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Good Climate at Universities

REQUIREMENTS

A university and all of its parts are like a small town. Accordingly, the air conditioning is a challenge. Many buildings with a wide range of requirements have to be brought together into one efficient overall concept. It is therefore expedient to incorporate all of the special features and influences into the plans as early as possible.

How complex the requirements are is shown when the different types of rooms and uses are considered. Lecture halls form a large proportion of the total area of a university. Here, the climate must be comfortable in order to promote learning so that the students and teaching staff can achieve the levels of performance required for themselves and the university. The same comfortable climate is required in the office wings. But that is not all. Almost every university has its own data processing centre. Some maintain research laboratories with cleanroom conditions and even offer a swimming pool. They also have the catering areas with a cafeteria and kitchen. When the above are planned as an overall unit, the operators of university can significantly reduce their total costs. The waste heat from the cooling of data processing centres, for example, can be used to heat the lecture halls. Or a solar thermal system on the roof provides the energy required for sorption-assisted air conditioning.

The relevant aspect with respect to all components for the air conditioning is high energy saving levels in order to keep the monthly operating costs as low as possible. If the overall system is efficiently planned, the investment costs for state-of-the-art equipment technology are recovered within a very short time. Investment in intelligent, state-of-theart technology brings three types of benefits: lower operating costs, higher performance levels at the university and an additional image boost.





Unit type: Resolair, Adsolair, Trisolair, Hybritemp

UNIVERSITY OF PASSAU

Bavaria's youngest university - over 100 Menerga systems ensure a good climate, also in the data processing centre.



Unit type: Adsolair UNIVERSITY OF MUSIC AND THEATRE, LEIPZIG Founded in 1843 by Mendelssohn, the State Academy is considered to be one of the most prestigious in Europe.



Unit type: Adsolair, Resolair **UNIVERSITY OF SPLIT, CROATIA** 21 Menerga systems create a good climate.

Technology Hits MENERGA FITSI

Menerga offers the appropriate systems technology for all challenging room requirements at universities. For example, we can not only ensure the comfort air conditioning in the lecture halls and offices, but also air-condition cleanrooms and laboratories or the university swimming pool. The example of the IT centre at the University of Passau below shows the form that the intelligent use of existing resources can take.

For example: IT CENTRE UNIVERSITY OF PASSAU, GERMANY

Since its establishment in 1978, the fledgeling University of Passau has developed into one of the most popular universities in Germany and one of the best academic addresses there is. During the construction of the new IT Centre/ International House (the facilities accommodated here include the research institutes and Departments of Informatics and Economic Sciences) in 2005, the knowledge acquired over the previous years was integrated into the new technology. In this, the theme of energy efficiency played a decisive role. The result was a state-of-the-art building which has the character of a role model with respect to the heat recovery rate of the ventilation system.

In total, the construction of the new IT Centre included seven ventilation systems with CO₂-dependent regulation. The aim was to achieve a high level of flexibility for the use of the office and seminar rooms, as well as full use of the internal heat loads.

The IT Centre/International House is equipped with a glass facade and divided up into three. In order to prevent flooding, it is partly situated over an underground garage and partly on concrete stilts above the slope leading to the River Inn. The energy supply of heat and cold is provided via the university's district heating/cooling network. The district cooling network is used to cool not only the seminar rooms but also, for example, the server rooms.

For the server room, measurement technology and various lecture halls (multi-purpose rooms), one Resolair system each with a capacity of 3,800 m³/h was installed. Due to the optimum design of the system, the units achieve 95% heat recovery during operation. Further Resolair systems provide the club room (including kitchen), as well as the office and seminar rooms with fresh air. A Trisolair comfort air conditioning system was installed for the toilet area. Here in particular, the recuperative heat recovery system plays a major role due to the latent heat stored in the water vapour, as no odours are exchanged. The stored heat is returned almost completely to the supply air without any transfer of substances. The result is something to be proud of. Not least due to the highly

efficient systems, the IT Centre's consumption of 20 kWh/m²/year is equivalent to that of a passive house.



System types

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Good Climate in Sports Facilities/Arenas REQUIREMENTS

Increasing numbers of sportsmen and women are training in more and more clubs. This is not surprising, since physical exercise has never been as comfortable and pleasant as today. There is hardly a sport that cannot be played in a sports hall the whole year round protected against the wind and weather. One of the important aspects for enjoying sport and successful training is the climate in a sports hall. In addition to the correct temperature, it is essential to avoid draughts.

However, the indoor climate has to be adapted not only to the athletes. Many sports facilities offer space for visitors and stands for spectators. While the spectator is almost motionless while following the game sitting down or standing up, the active sportsman/woman is moving the whole time. Athletes give the best performance within a temperature range around 18°C; however, the most pleasant temperature in the stand for the spectators is 22°C. It is therefore necessary to create different "climate zones" in the grandstand and in the area where the sport is played.

Generally speaking, the components of the climate technology used at sports facilities have to be very powerful because of the large volume of air involved. Here, the air distribution of the air is just as relevant as the performance of the technology used. Since sports halls are not used the entire day, air conditioning in line with requirements offers significant potential for savings. The room is supplied with the required amount of outside air, which is heated indoor if necessary, shortly before the training or event begins. In order to keep the ventilation heat losses as low as possible, the unit should offer maximum levels of heat recovery. Similarly, it must also be possible in the case of high thermal loads resulting, for example, from the fact that the hall is full of spectators, to switch over within a very short time to cooling or "cold" recovery while maintaining the infeed of fresh air.



Unit type: **Dosolair EWS ARENA IN GÖPPINGEN** Multi-purpose arena for up to 5,500 spectators, used for sports competitions, concerts and more.



Unit type: Adsolair, Hybritemp OSIJEK MULTI-FUNCTIONAL HALL One of the venues for the 2009 Handball World Championships, the largest athletics hall in Croatia.



Unit type: Resolair THREE-COURT SPORTS HALL GROSS-OSTHEIM Winner of the IOC/IAKS AWARD 2003 in silver.

Technology Hits MENERGA FITS!

For use at sports facilities, Menerga offer the Dosolair, Adsolair and Resolair ranges. All of the systems in these ranges are available with high air volume flows; for example, Resolair systems have a capacity of 34,000 m³/h and more even in the standard version. All systems are based on the principle of the minimal application of energy and work with extremely low energy consumption rates.

Depending on the specific situation, it is expedient to use several units for the air conditioning of a single hall. At the Velodromo de Mallorca the entire sports hall is air-conditioned in four zones by four Adsolair systems.

Adsolair and Resolair systems provide extremely efficient heat recovery, but at the same time also the possibility of recovering "cold". With the "adiabatic" evaporative cooling, Adsolair also offers extremely energy-efficient cooling with temperature reductions of up to 14 K simply through the use of water. The 58 series is equipped with an additional refrigeration system which, for example, enables reliable dehumidification where there is high moisture penetration from spectators (30g/h per person).

When the overall air conditioning concept is drawn up, it is important not to forget the entrance and changing areas. As the cooling requirements are lower here, small Dosolair systems or Trisolair units are ideal.

The shower areas offer further potential for savings: valuable waste heat can be recovered with AquaCond systems and transferred to the fresh water.

For example: EWS ARENA IN GÖPPINGEN

In spite of the outstanding sporting achievements of the Bundesliga handball team "Frisch auf" in Göppingen, the old nickname of the EWS Arena "Southern Hell" was simply due to the climatic conditions within the hall. In addition to the sports events, the multi-purpose hall is also used for further types of sports, as well as concerts, trade fairs and other major events. The 1,250 m² area offers space for a maximum of 5,500 spectators.

With the refurbishment of the former Hohenstaufen Hall in 2009, the "hellish atmosphere" was rectified. Menerga Dosolair systems were installed which are designed to be an optional extension to the "adiabatic" evaporative cooling. These now air-condition the arena, sports hall, spectators' grandstands and the changing area with a total air flow rate of 133,000 m³/h. The high level of heat recovery and adaptation of the air flow rate in line with requirements to the number of visitors provide significant operating cost savings for the operator. Not to mention the improved climate for the sportsmen/women and spectators.



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Good Climate in Trade and Commerce REQUIREMENTS

Whether a shopping centre, discount centre or car dealership – the appropriate climate influences the purchasing decision of your customer. When the customer feels comfortable, he or she stays longer and buys more. Even if the climate is an unconscious factor, it has an effect on the level of your turnover.

At the same time, ventilation and air conditioning are important factors for every retailer and operator of shopping centres. As soon as the shop doors are open, the temperature and humidity must be constant. The fresh air infeed must be perfect at all times even if the customer density is high. However, when the shop has closed, it is important to change these optimum conditions as quickly as possible over to an energy-efficient mode of operation. Flow rate control in line with requirements is therefore an absolute must.

The air conditioning can also have an impact on the premises themselves. Large glass fronts not only attract many customers into the shops, they also result in high heating and cooling loads. This is not a problem if the correct technology is selected. High heat recovery is worth its weight in gold in the winter. The use of alternative energy sources, e.g. the waste heat from systems with commercial cooling or the use of district heating, bring significant operating cost savings. However, the cooling capacity is particularly important in retail outlets. Every retail outlet makes targeted use of its lighting to create highlights and viewing directions, thereby generating a heat load which should not be underestimated. During the summer months, cooling in the form of free ventilation is not usually enough. Here, alternative concepts such as "adiabatic" evaporative cooling or sorption-assisted air conditioning – also known as the principle of "cooling with the sun" – are available.

The optimum system prevents malfunctions, requires little maintenance and offers optimum accessibility to the components. Intelligent maintenance concepts offer additional security against breakdowns.



Unit type: Sorpsolair TOYOTA FREY, SALZBURG The "oreepest" car dealer in

The "greenest" car dealer in the world was recently classified as "excellent" under BREEAM.



Unit type: Adsolair, Resolair MERCATOR PESNICA, SLOVENIA

5,000 m² shopping centre with affiliated office areas, presented with the GreenBuilding Award 2011.



AUDI TERMINAL IN LUDWIGSBURG Large vehicle centre of Hahn Automobiles in Southern Germany.

Technology Hits MENERGA FITS!

In the field of trade and commerce, very high quantities of air are moved. Menerga offer systems for this with a capacity of 55,000 m³/h and more - also as a roofmounted version of course. All systems are equipped with intelligent control and regulation and always automatically select the optimum mode of operation. For you this means that when the shops are closed, the air volume flow is reduced in line with requirements, i.e. lower nominal values, so that the operating costs are drastically reduced. Before the shops are open and/or before the beginning of operations, the system returns the room conditions to the desired values. If the annual heat requirement is higher than the cooling requirement, Resolair systems achieve maximum values of up to 90% with their regenerative heat recovery. In order to satisfy increased cooling requirements in an energy-efficient manner, use is made of our Adsolair systems. The systems work according to the principle of "adiabatic" evaporative cooling, where the

For example: TOYOTA FREY, SALZBURG

In the planning and design of the Toyota Frey car dealership in Salzburg, which was opened in 2010, the owners decided to use the latest environmental and energy technology. For the total area of 4,000 m², €1.5 million was invested, which should quickly pay for itself due to the very low operating costs. One impressive feature is the innovative building services, which are designed as a complete system. Special glazing, for example, ensures that the building envelope is thermally optimised. A solar thermal energy system is integrated into the roof itself and provides 10% of the building's energy requirements.

The high efficiency levels of the complete system are demonstrated on hot days in particular, when the solar energy is used together with the Menerga

spraying of water into the return air channel can produce a temperature reduction in the supply air of up to 14 K - without the use of energy for cooling. The sorption-assisted air conditioning works in a similarly intelligent manner. This is performed in the two steps of air dehumidification and air cooling. For the purposes of dehumidification, warm outside air is passed through a water-absorbing brine solution. Subsequently, this dried outside air flows through a double plate heat exchanger with indirect evaporative cooling. in which it is cooled down by 10 to 14 K to form the supply air. The diluted brine is regenerated through the use of thermal energy. The heat sources used here are solar thermal systems, district heat networks or waste heat. The air dehumidification and regeneration of the brine are performed in separate circuits. This means that the heat can be stored for an almost unlimited time and without losses in a fluid medium and used when the heat supply is not constant.

Sorpsolair for cooling the building. The energy requirements are up to 40% lower compared to conventional systems. The entire system is free of CO₂ and nitrogen emissions. Not for nothing is Toyota Frey in Salzburg considered to be the greenest car dealership in the world and was recently classified according to BREEAM as "excellent".



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Good Climate in Cafes and Restaurants

REQUIREMENTS

There is a genuine energy treasure lurking in the catering industry. It is concealed in almost every kitchen – especially in commercial kitchens – in the form of unused waste heat.

In the past, only a fraction of the energysaving potential was exploited, as the exhaust air from kitchens is always strongly contaminated. Fatty aerosols are often carried into the system despite separation and filtering. This leads to an extremely high level of maintenance effort for filter changes and cleaning. Similarly, owing to the design, the required thorough cleaning, including the heat exchanger, is not possible in full in many central air conditioning units. As a result, fat deposits can lead to malfunctions and even cause the heat exchanger to breakdown due to blockages. For these reasons, a central air conditioning unit with heat recovery is not used in many kitchens – so that every day, valuable energy is "thrown out of the window". This is a pity, as the waste heat from the kitchen is enough to supply most of the rest of the building with energy.

Menerga has developed an innovative, fully automatic cleaning system specifically for the catering field, with which the highly efficient central air conditioning units of the Adsolair range can be used without difficulty for heat recovery in kitchens and commercial kitchens. Through the holistic planning of ventilation ceilings and central air conditioning, it is possible to recover almost all of the waste heat from the kitchen. It goes without saying that the requirements placed on the indoor air, as stipulated in VDI 2052, are fulfilled. One of the purposes of this is to prevent the spread of unpleasant odours in the kitchen and the adjacent rooms by quickly and reliably leading away the contaminated air. A second advantage is that the working conditions for the kitchen staff are pleasant with respect to the air temperature, humidity and speed.





Unit type: Adsolair, Resolair BOHINJ PARK HOTEL, ECO RESORT & SPA, BOHINJ SLOVENIA Luxury holiday and conference hotel in the Triglav National Park.



Unit type: Trisolair, Dosolair, ThermoCond WEISSENHÄUSER BEACH Holiday and leigure park with adventurelar

Holiday and leisure park with adventureland on the German Baltic Sea.



Unit type: **Sorpsolair MUNICH AIRPORT** Freight staff canteen of the second largest aerospace hub in Germany.

Technology Hits MENERGA FITS!

There are three steps in the exploitation of the waste heat from the kitchen that is lost:

1st Reduce the necessary energy use to a minimum (Reduce) First of all, the energy consumption of the entire ventilation system has to be reduced to the greatest extent possible. This is achieved by the harmonised design of the ventilation ceiling and the central air conditioning unit. With regard to the ventilation ceiling, this primarily concerns the establishment of the ideal flow pattern for the respective kitchen area so that heat, odours, air pollutants and humidity can be quickly and safely discharged and that pleasant working conditions also prevail.

2nd Recover as much energy as possible for the kitchen (Recycle). In the second step, the greatest possible proportion of the heat contained in the return air is recycled to the kitchen. This is performed by the highly efficient heat recovery of the central air conditioning unit, which transmits the energy contained in the return air to the outside air with an efficiency level of up to 85%. In the winter this can save a considerable amount of heating energy.

3rd Use excess energy in the building

(Reuse). The third system consists in the extraction of the excess heat. The percentage of this is particularly high in summer and transitional periods when the majority of the outside air flow is fed past the heat exchanger via a bypass. In order to make use of the heat contained in the exhaust air, the Adsolair central air conditioning unit, for example, is supplemented with an integrated heat pump whose evaporator is located behind the heat exchanger in the airstream. Here, the residual heat is withdrawn, brought to a higher temperature and subsequently fed into a central storage unit via a water circuit. When applying this method, it is possible to supply a significant amount of energy from the kitchen return air throughout the year for heating and water heating.

With the help of such an integrated ventilation and energy concept it is possible to recover almost all of the waste heat of a (commercial) kitchen and use it in the building.

For example: BOHINJ PARK HOTEL, ECO RESORT & SPA,

The Bohinj Park Hotel is a luxury holiday and congress hotel which has professional bowling alleys and a water park, amongst other attractions. It has been presented with the European Commission GreenBuilding Award 2011. The air conditioning of the hotel was planned from scratch by planners, architects and the investor to be sustainable and an integral part of the building. All waste heat sources, e.g. in the swimming pool or in the shower and bath areas are used consistently. Even in the kitchen area almost all waste heat is recovered. The energy thus recovered, which cannot be used in the kitchen, is used for heating the rest of the building.

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Good Climate in the Hotel

REQUIREMENTS

Hotels are small, independent microcosms – a continuous changeover of people with a wide range of requirements is found here in a number of different types of rooms. The requirements placed on a good and efficient hotel air conditioning system are correspondingly varied.

In the basement, food has to be kept at exactly the right temperature, while in the conference rooms it must be possible to switch from "break" to "ready for operation" within a very short time, and in the hotel rooms the guests want to decide themselves how warm or cold it should be. Additionally, the smells from a delicious meal should remain in the kitchen if possible and not greet the guests in the lobby. The air conditioning of a hotel crucially depends on the occupancy level - and in turn, the occupancy level depends on good air conditioning. Each room has its particular features. If there is also a swimming pool available, the wellbeing of the guests and protection of the fabric of the building depends not only on the air conditioning and ventilation, but also dehumidification in line with requirements. There is usually not much space available for technology, and architecture of the external facade should not be spoilt by ventilation technology components. And very importantly: the equipment that creates a good climate should be as quiet as possible so that the guests are not

kept awake by the noise at night. The air conditioning of a hotel provides the hotel operator with a competitive advantage on the one hand through the creation of a "comfortable climate", but on the other hand it also makes up a large share of the energy costs. This is where energy-efficient, state-of-the-art concepts are required which incorporate all aspects of the local situation. For example, is it possible to use the waste heat from the kitchen for heating up the water? Are there heating and cooling requirements at the same time within the building? Or can solar thermal energy be used for cooling? Many requirements - one solution: Menerga.



Unit type: Trisolair, ThermoCond HOTEL DOLLENBERG

Exclusive 5 -star superior hotel of the "Relais & Chateau" Group at an altitude of 650 m on Dollenberg in the Black Forest.



Unit type: **Resolair, Trisolair, Thermocond WALD- UND SCHLOSSHOTEL FRIEDRICHS-RUHE** Tranquillity, exclusivity and excellent cuisine in its purest form - a private resort with 4,400 m² of wellness, spa and sport.



Unit type: ThermoCond
VILLA AM RUHRUFER

One of the smallest and most exclusive 5-star hotels in North Rhine-Westphalia, Germany.

Technology Hits MENERGA FITS!

While hotel guests and staff enjoy the perfect climate in every room without realising it, the systems work out of sight in the plant room under varying workloads in order to meet the highest requirements. It goes without saying that the noise produced is kept as low as possible thanks to the efficient technology and use of sound attenuators.

Menerga systems are designed to be compact and ready for use and are also suitable for plant rooms where other technology could not be housed. Whether ThermoCond for the efficient dehumidification and air conditioning of swimming baths or Resolair for producing a climate with the highest heat recovery efficiency- one thing that all the systems have in common is the approach of the minimal application of energy. For this, Resolair systems use the approach of regenerative heat recovery, with which it is also possible to recover moisture. This technology achieves the highest heat recovery efficiency currently known!

In the planning process, it is not the location of the system which is the starting point for the procedure, but the overall complex: Where is which form of energy required, and how can this be made available and used in the most efficient manner possible? Every system is aligned to the specific application. For example, if there is a saline pool in the hotel swimming baths, the air-conditioning technology must be able to cope with the more aggressive air. For this, Menerga has developed the special units of the ThermoCond series. Together with the planner, we search for the best possible solution for your hotel. A consistently good climate also has a positive effect on customer loyalty. Because the guests will only return if the climate is right.

For example:

DOLLENBERG 5-STAR SUPERIOR HOTEL

The Dollenberg five star superior hotel belongs to the elegant "Relais & Châteaux" group. The hotelier places great importance on a high comfort factor which is uncompromisingly tailored to the wishes of the distinguished clientele. One essential aspect in achieving this goal is the building equipment, which works behind the scenes. When the equipment technology was selected the emphasis was on quality. ThermoCond systems where used for the swimming baths and saline pool, a Trisolair for the relaxation and wellness rooms and an individual unit for the beauty rooms. As the hotel was built on a slope, it was very important for the system to be compact. The entire system technology was built into the mountain so the areas on the sunny side could be used for quests. Only the central exhaust air channel had to be

built vertically over five storeys owing to the mountain cover.

The ventilation concept used at Hotel Dollenberg shows that comfort and energy efficiency are not mutually exclusive. The basis for this is created by air conditioning units with highly efficient heat recovery systems in combination with energy-saving refrigeration for air dehumidification.

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Good Climate in Production and Logistics REQUIREMENTS

In the production and logistics areas of companies it is important not only to air-condition the processes and products. In most production facilities – no matter how large or modern – there are a large number of people working, for whom the working climate has to be pleasant and in line with the regulations. But almost all production halls have one thing in common: they are usually very large and very high and therefore contain very large airflow rates. These airflow rates have to be kept at an appropriate temperature, as well as being treated and circulated. Heating is mainly required during the night and in the morning; during the day - particularly in the summer - the halls have to be cooled. At many companies this

requirement applies to most of the day, e.g. when the employees work on shifts. The air conditioning requires high volumes of air, and above all the very efficient provision of heat and cold. Furthermore, the regulations governing workplace conditions have to be complied with. In many production companies, air pollutants are produced which can have harmful effects on health or product quality. These have to be reliably removed by means of efficient ventilation. The air quality in the hall is essentially determined by the design and layout of the air technology units. In order to create a perfect production and working climate, high amounts of energy are often needed. However, the air conditioning always pays off. In the hot

summer months in particular, it is not only the motivation and performance of the employees which improves. The cooling in line with requirements of the production and storage areas also has positive effects on product quality and the resilience of the production machines used. Draughts which might cause additional problems simply when the skylights and hall doors are opened are prevented through the intelligent distribution of air. Besides the actual production hall, an intelligent air conditioning concept also takes into account the adjacent rooms such as the staffrooms etc.





Unit type: Resolair HÄRING, BUBSHEIM

A leading manufacturer of precision parts and assembly units for the automotive industry.



Unit type: Adsolair STIHL, WAIBLINGEN

This family company is active in over 160 countries, and is famous for power saws.



Unit type: Resolair, Trisolair SOLVIS, BRAUNSCHWEIG

The company complex is considered to be Europe's largest zero-emission factory and the most energy-efficient commercial property in Germany.

Technology Hits MENERGA FITS!

All Menerga systems with a high air volume flow, e.g. the units of the Adconair, Adsolair and Resolair series, are suitable for use in production halls. Adsolair systems are easily capable of dissipating the high thermal loads in the hall with very low energy expenditure for cooling. The basis of this is the adiabatic evaporative cooling, which achieves temperature reductions of more than 14 K through the use of water alone. Resolair systems work on the principle of regenerative energy recovery and can also recover "cold" and moisture from the air in the hall. For peak loads, the systems can be equipped with pumped hot water or pumped cold water units.

All Adconair, Adsolair and Resolair systems provide extremely efficient heat

recovery. The energy used for heating the halls in winter is therefore kept to a very low level. The systems are able to further reduce operating costs by feeding in recirculated air as required. If for example no work is carried out in the production hall during the night or over a specific period, the rooms can be kept at the required temperature for inexpensive recirculation mode. In the early morning just before the start of the first shift the required proportion of outside air is mixed in in order to achieve the required air quality. The systems respond with variable volume flows to different occupancy levels of the halls.

Installation as a rooftop unit is particularly simple and possible for all systems.

For example: HÄRING, BUBSHEIM

For many years, the Häring Company has been one of the leading manufacturers of precision parts and assembly units for the automotive industry. In addition to the actual production area, it was also intended to provide air conditioning for the cafeteria, foreman's area and the PC training rooms. The aim was for the air conditioning to be perfectly integrated into the company in terms of investment, operating costs, environmental impact and employee satisfaction. The systems used were those of the Resolair series with airflow rates of between 1,100 and 15,000 m³/h. All systems work with highly sensitive heat recovery and a heat recovery rate > 95%. The regulation and control integrated into all Menerga systems ensures that the systems are fully automatically in the optimum mode of operation at all times. High levels of employee satisfaction and

low rates of illness due to the good climate in the workplace, a major reduction in the impact on the environment and minimal operating costs through the use of highly efficient technologies are the result of the successful implementation. The air conditioning concept ideally supports the corporate philosophy of Häring: "Wollen. Können. Machen." ("Want. Can. Do.")





Good Climate in Offices and Banks REQUIREMENTS

When considering the theme of the climate in offices and banks, many think first of the temperature, since this is one of the most common reasons for employees' complaints. But the indoor climate is much more complex and also comprises - among other things - the components of air humidity, air circulation, heat radiation and of course the quality of the air.

The special feature of offices is that owing to the larger number of people and the technical equipment such as computers, copiers or lighting, excess heat is often produced. For this reason, the air conditioning requires not so much heating, but rather cooling and dehumidification in the summer months, as well as an efficient and continuous exchange of air. The temperature and air humidity in the room must of course be kept constant. The temperature should be individually controllable, and of course there must be no draughts.

The climate in offices and administration departments is laid down in the Workplace Ordinance and other regulations. The requirement here is for "breathing air which is sufficiently conducive to good health". But good air conditioning can be much more; it improves the performance and motivation of the employees. The aim therefore is to create a climate where the heat levels are comfortable. This depends not only on the individual and the air conditioning solution, but also on the room itself. In modern office buildings in particular, the ratio of the window area to the total facade area is very high. This results in rapid changes to the air temperature in the room. The heat capacity of the walls is very low owing to the frequently used dry construction method. This also promotes fluctuations in the radiation and air temperature in terms of time and space. An intelligent air conditioning concept compensates for these fluctuations, enabling individual settings for different offices.





Unit type: Adsolair KÄRCHER CENTER, WINNENDEN

Sales centre and office building of one of the largest cleaning equipment manufacturers in the world.



Unit type: Trisolair SPARKASSE HRV HILDEN-RATINGEN-VELBERT (SAVINGS BANK) The largest Sparkasse in the District of Mettmann.



Unit type: Adsolair USM MÜNSINGEN

The corporate office of the Swiss furniture manufacturer has been setting trends for 45 years.

Technology Hits MENERGA FITS!

Owing to the strict requirements, the Adconair and Adsolair range with adiabatic evaporative cooling and a small downstream compressor refrigeration system is suitable for the air conditioning of office buildings and administration departments. The largest proportion of the outside air is cooled down by means of adiabatic cooling. Via the integrated refrigeration system, the outside air in the 2nd cooling stage can be dehumidified in order to ensure maximum levels of comfort in all areas during the summer.

Reheating for a comfortable SA temperature after dehumidification is carried out via an integrated air condenser. This has two advantages: on the one hand, the SA temperature can be raised after dehumidification without any costs, and on the other hand the efficiency of the continuously adjustable refrigerating machine is increased.

The refrigeration performance figures for this system are around 10. In winter temperatures, the highly efficient heat recovery provides a level of efficiency of > 78%.

If owing to the fabric of the building and the use of the rooms there is a heating requirement instead of a cooling requirement, Resolair and Adconair systems are suitable owing to their very high heat recovery. The individual requirements of a building and its use can be quickly clarified in a discussion with the Menerga Sales Team – we will find the ideal solution for you!

For example:

KÄRCHER CENTER, WINNENDEN

As one of the world's largest manufacturers of cleaning equipment, Kärcher offers an extensive product range for private households, commerce and industry. During the planning and implementation of the new sales building on the Winnenden site near Stuttgart, the focus was on sustainability and energy efficiency in conjunction with the many different ways in which the rooms are used. On the ground floor of the building is the new Kärcher shop, on the first floor the cafeteria and on the second and third floors the offices. Owing to the integrated shop, the building is visited by many members of the public and therefore strongly represents the image of the company. The different requirements and cooling loads of the rooms require continuously adjustable air conditioning that is optimised to the various demands. One further request of the building

owner: low operating costs and an environmentally-friendly solution – the entire building services had to harmonise with the corporate philosophy. An Adsolair system was used which conforms to all of these requirements. In addition to the consistently good climate in the office, cafeteria and shop,

the system also ensures that the operating costs remain low at all times.

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Good Climate in the Health Service REQUIREMENTS

Like many other fields, the health service sector is undergoing a period of transition. Public subsidies and acceptance among customers and patients is increasingly only achievable by projects that have a flagship character. The technical equipment of the building is increasingly becoming a competitive factor – no wonder when one considers that patients in a hospital, for example, rely on this equipment 24 hours a day.

The requirements placed on air conditioning in the health sector are as varied as the different types of rooms. One major focus is on the field of hygiene, i.e. the avoidance of contamination with germs, bacteria or viruses – and therefore also on the prevention of infection. In special protection areas such as the surgery department, not only occupational health standards are required, but also dynamic screening by ventilation. Active and passive airlocks protect sensitive areas. Overpressure zones for the supply of sterile items are just as necessary as sub-pressure zones in intensive care units or in areas in which air that is completely germ-free has to be guaranteed. An intelligent ventilation and air conditioning system fulfils all of these requirements with a high level of reliability against breakdowns.

In addition to the technical functions, every company in the health service is obliged to remain cost-effective. The operating costs have to be kept as low as possible, without jeopardising the functionality of the overall system. And one further question arises in this sector: can an energy-saving, intelligent ventilation and air conditioning system improve my image and my competitiveness? Yes it can. For example, by cooling in the summer not with the resourceconsuming compressor refrigeration system, but with the energy of the sun. The use of regenerative energies saves operating costs and sets you apart from the competition.



Unit type: Sorpsolair FREIBURG UNIVERSITY HOSPITAL Sorption-based air conditioning of the outpatient and emergency room areas.



Unit type: Adsolair HAMBURG-EPPENDORF UNIVERSITY

HOSPITAL Good climate in lecture theatre, seminar and work rooms.



Unit type: Resolair, Dosolair, Trisolair MAINKOFEN DISTRICT HOSPITAL CENTRE,

GERMANY A district hospital centre with state-of-the-art medical technology and 12 Menerga systems.

Technology Hits MENERGA FITS!

In the health service, very high demands are placed on microbiological-hygienic tests and maintenance. Adconair systems fulfil this approach in that the heat exchanger can be completely cleaned, for example, without having to be dismantled. All components such as filters are readily accessible and simple to replace. The refurbishment of old systems is a particularly practical solution, as old units are not usually fitted with heat recovery; here it is possible to save a large share of the operating costs. An intelligently planned overall system incorporates all of the properties of the building complex. For example, you can make use of the waste heat from kitchens and laundries as heat for the regeneration of brine in our Sorpsolair systems! Here it is possible to save additional costs without having to do without reliable and clean air conditioning. When the refurbishment of a building is being

planned, the focus should not be on the initial investment costs, but instead on consideration of the total costs with significantly lower follow-up costs. Especially in hospitals that are in need of rehabilitation, there is a further advantage: the systems constructed in the 1970s were mostly designed for higher volumes of air. In spite of the large volumes that were planned for, these systems are no longer able to deal with the air volume flows that are required due to the number of additions to the buildings. Menerga systems are usually much more compact than those of the competitors; the systems can be integrated into the plant room more easily, where they provide higher capacity levels. A combination of Menerga systems with existing cooling ceiling systems is possible at any time without difficulty and has proven its worth in practice.

For example: FREIBURG UNIVERSITY HOSPITAL

The Sorpsolair system installed at the University Hospital in Freiburg was evaluated for three years by the Fraunhofer ISE in the so-called LiquiSorp Project. The area to be air-conditioned is approximately 700 m^2 in size and includes a reception area, corridors and six interior rooms with high internal loads. Patients are cared for round-the-clock in this area of the clinic. The heat source for the sorption process is the joint heating network of the University Clinic. The system was installed as a replacement for an approximately 30-year-old ventilation unit, where it was possible to make use of the existing network of ducts on the air side. During the evaluation, period the system was operated with air volume flows of 8,000 m^3/h (6 a.m. to 2 p.m.), and outside these times at $5,000 \text{ m}^3/\text{h}$. The long-term evaluation by the Fraunhofer ISE shows the high energy efficiency levels of the sorption-assisted air conditioning. For cooling in the summer

it was possible to lower the peak value for the electricity power consumption compared to a conventional refrigeration system by almost 75%, i.e. from 13 kW to 3 kW. Owing to the high heat recovery efficiency of 87.2%, it was also possible to reduce the maximum heat requirement in the winter by 70% compared to conventional technology. In direct comparison, the primary energy saving was between 40 and more than 50%.

System types

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Good Climate in Cultural Institutions REQUIREMENTS

A distinction has to be made between two different types of air conditioning in cultural institutions: the air conditioning of rooms in which culture is presented periodically, such as theatres or concert auditoriums, and the air conditioning of rooms which are either themselves historically important or contain historically valuable exhibits. In both cases, a perfect but "invisible" climate is required during visiting times. The technology should carry out its work in the plant room out of site for visitors - and of course producing as little noise as possible.

Good air conditioning adapts fully automatically to the changing numbers

of visitors in order to maintain the air quality at the desired levels at all times. The greater the fluctuations in the numbers of visitors, the more efficiently and faster the system has to compensate for fluctuations in humidity and temperature. It is particularly important that the operation of the system is absolutely silent, because in both the museum and the theatre technology must not be acoustically perceptible. The intelligent distribution of air also makes it possible to avoid draughts.

Air conditioning is of crucial importance when the cultural institution - as in the case of museums or collections - contains valuable and historically important exhibits. Perfectly controlled temperature and air humidity on the surface of the exhibits and in the room itself prevent exhibits from being destroyed or ageing prematurely. In order to preserve the exhibits over the long term, precise air conditioning is required which is in operation around the clock. It is therefore important to have very energyefficient air conditioning which keeps the operating costs to a minimum. Energyefficient operation is of course generally important for all cultural institutions, as the budget of the institution should be used for culture and not for excessively expensive air conditioning.



Unit type: **Dosolair STUTTGART STATE THEATRE** The air conditioning for the choir practice hall required an absolutely "silent" variant.



Unit type: Adsolair URBIS, MANCHESTER The glass building exhibits a journey of discovery through various world metro-

polises.

Oper Düsseldor



Technology Hits MENERGA FITS!

Individual requirements are as different as the cultural institutions themselves. Various Menerga ranges are suitable, depending on how large the rooms to be air-conditioned are and the form the specific conditions placed on the indoor climate takes. All Menerga systems stand out due to their very high levels of compactness and are therefore also ideally suited to refurbishment measures. Similarly, the philosophy of the "minimal energy application" is consistently applied to all types of systems.

For the dehumidification of indoor air, product ranges with integrated compressor refrigeration systems are particularly suitable, such as the different versions of the Adsolair, Adconair or Resolair ranges. If there is a high cooling requirement, e.g. if there are many people in the cultural institution at certain times, the

For example: STUTTGART STATE THEATRE

Theatres live from the plays that they stage - and from air conditioning that is totally silent. For this reason, one of the highest requirements placed on air conditioning - besides the comfortable climate for visitors and actors, as well as the low operating costs - is operation which is both trouble-free and completely silent. Who wants to hear the whirring of a fan while sitting through the effective silence between two movements? The requirements placed on the air conditioning of the choir rehearsal hall at the State Theatre in Stuttgart doubled: In addition to total silence within the room, it must also be ensured that the system is vibration-free, as the plant room is located on the top floor (wooden construction). The solution used was a Dosolair system adapted specifically for the requirements of this customer with a nominal flow rate of 5,500 m³/h. An efficient heat exchanger

use of alternative cooling mechanisms such as indirect adiabatic evaporative cooling is an attractive possibility. In this case, although no energy is required for cooling, the use of water alone produces a reduction in the temperature of more than 14 K. The water is sprayed directly in the heat exchanger in the exhaust air channel, so that the cooling does not increase the air humidity in the room itself.

The first step to acquiring an air-conditioning device which is both energyefficient and precisely regulated is to contact your Menerga sales consultant. We are acquainted with almost every type of challenge and can offer you the ideal solution for your individual requirements.

and continuously adjustable compression refrigeration system of a reversible design are integrated into the system. This means that no hot water connection is required for heating, as the system can heat in the winter in heat pump mode. The system was also equipped with an option for adiabatic evaporative cooling in order to save additional operating costs in the summer months.

System types





Good Climate in Historic Buildings REQUIREMENTS

Historic buildings often contain valuable collections and exhibits – and usually they represent valuable objects themselves. The moisture content of the air in particular is a problem for preserving the assets, some of which are unique. If a historic building is open to the public, visitor flows can have a major effect on the indoor climate. The visitors give off a not inconsiderable amount of humidity to the indoor air in the form of their breath, or if it is a wet day through their clothing.

A historic building is characterised in particular by the fact that its masonry is much more massive than modern designs. With traditional heating this can quickly lead to the so-called "cold wall problem". The much colder outside wall is not reached by the heating provided within the room by a radiant heater. This results in condensation, which represents a danger to paintings or carpets hanging on the wall. It makes much more sense to heat the indoor air in order to achieve a constant temperature and room air humidity. A further aim is to achieve the same degree of air conditioning in front of and behind the exhibit. Controlled dehumidification of the outside air in line with requirements reduces the danger of the condensation of water on the colder external walls. Many historic buildings are listed, which generally excludes the possibility of making structural changes to the fabric of the building. As the structure of the

buildings has "grown" over time, space for the technology is usually limited. The compactness requirements of the technical equipment are increasing. In most cases, elements are not desired on the facade of the building, or are not even permitted.

A precise, intelligent air conditioning concept makes a valuable contribution towards the preventive preservation of the valuable fabric of the building and cultural assets.



Unit type: Resolair, Hybritemp LIBRARY OF THE DUCHESS ANNA AMALIA, WEIMAR In the world-famous building there is a research library with priceless exhibits.



Unit type: Resolair **STRALSUND TOWN HALL**

Stralsund Town Hall is one of the most beautiful secular buildings in the Nordic Brick Gothic style.



Unit type: Adsolair **BAD BERLEBURG CASTLE** Seat of the Sayn-Wittgenstein Berleburg Princely Family.

Technology Hits MENERGA FITS!

In most historical buildings there are central specifications concerning the maintenance of a certain relative air humidity. The Resolair range is particularly suitable for this task, as it works with regenerative energy recovery and can be equipped with downstream cooling and heating coils. These systems stand out due to their very high transmission levels of the sensitive and latent energy, by means of which the majority of the moisture can be recovered in the winter months, for example, in order to keep the air humidity constant. Similarly, it is also possible to control external components such as humidifiers. In the summer months or on wet days, the cooling coil or an integrated compression refrigeration system assists with the dehumidification of the air. Resolair systems also enable very efficient heat recovery. The regenerative heat exchangers contain two heat

packets, through which external and exhaust air are passed alternately. The heat from the exhaust air can be taken up very quickly and returned to the cold air current. Through the reciprocal impingement of the heat packets, the heat in the return air is transferred almost completely to the cold outside air, producing a temperature efficiency level of more than 90%. As a result, a reheating of the supply air can be omitted in the majority of cases.

If humidity recovery does not matter, but dehumidification of the air and high cooling capacity is required Adconair systems are ideal suited. Due to the counterflow plate heat exchanger and the integrated refrigeration system the units achieve the highest recovery efficiencies and enable efficient cooling of the outside air.

For example: DUCHESS ANNA AMALIA LIBRARY

The Duchess Anna Amalia Library in Weimar is a research library for literary and cultural history that is open to the public and which focuses on German literature around the year 1800. It stores literary exhibits from the 9th to the 21st century as sources of cultural history and research, categorises them according to their form and content and makes them available for use. In total, the library has 1 million items.

The library is air-conditioned by three regenerative energy recovery systems of the Resolair range and a compact chilled water unit of the Hybritemp range. In one case a system was housed in the cellar vault of the book tower. The circular tower with a wooden stair railing is one of the highlights of the group of buildings. The cellar vault itself can only be reached through a narrow passage; however, it was possible to pass the

compact system blocks through this narrow access. During installation, the entire system was adapted to the curves of the tower in order to make the most efficient use possible of the space available. The result is that a semicircular installed Resolair system is now operating in the Anna Amalia Library – the only one in Germany. The air conditioning unit was of course also pre-assembled ready for connection in this case and was put into operation immediately after being installed.



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Please refer to our latest catalogue for more details

Adsolair

Resolair

Adconair



Good Climate in Low-energy Buildings REQUIREMENTS

Regardless of its type, an energy-optimised building is always a combination of various energy conservation measures used to achieve an optimum overall result. In this concept, individual measures prove to be of little help - they are only successful in combination. There are many standards for low-energy buildings. For example, in Germany there is the classification of the low and lowestenergy house, there is the passive house standard and the international awards according to LEED, DGNB, GreenBuilding and more. Such buildings are no longer only residential buildings and office complexes. Menerga's references in this segment include, for example, museums, schools, penal institutions and swimming

baths built according to the passive house standard. Even a Belgian research station in the Antarctic has been constructed.

But an intelligent design can save more than just energy – modern buildings are able today to create more energy than they need themselves.

The characteristic feature of all "energysaving houses" is small surfaces in relation to the enclosed room, low transmission heat losses due to very good insulation, the prevention of thermal bridges and rising cooling requirements in the summer months. Frequently, alternative energy resources such as solar and geothermal energy are used, whose energy can also be used for air conditioning. The main aim of air conditioning is to keep the ventilation heat losses as small as possible. For this, very good regenerative or recuperative heat recovery is required. Moreover, it should also be possible to make use of alternative resources such as solar thermal energy or geothermal energy for air conditioning.



Unit type: Trisolair EFFICIENCY HOUSE PLUS, BERLIN

The building generates more energy than a family needs to operate the house and two electric vehicles.



Unit type: **Resolair ETRIUM, COLOGNE** Office building constructed in accordance with the passive house standard with

DGNB Gold Quality Seal.



Unit type: Adsolair ZERO ENERGY HOUSE SEOUL

Flagship project on the subject of energy efficiency, regenerative energy storage media and sustainability.

Technology Hits MENERGA FITS!

All Menerga systems are based on the philosophy of the "minimal energy application". It is not only since the boom in the low energy and passive houses that our systems have enabled the maximum exploitation of resources. Both recuperatively and regeneratively we achieve - for example with our Adconair and Resolair systems - a heat recovery efficiency of more than 90%! It is not surprising that the first units of the Adconair and Resolair series were awarded the coveted passive house certificate for non-residential buildings. Also in the field of swimming pools, the first two swimming pools in Germany

For example: EFFICIENCY HOUSE PLUS, BERLIN

With the Efficiency House Plus in the Berlin suburb of Charlottenburg, the Federal Ministry of Transport, Building and Urban Development (BMVBS) is researching into futuristic building concepts. The search is on to find ways in which the operation of newly constructed buildings might be carbonneutral from 2019 on. The focus is on the house as an electricity-generating power station. As an autonomous unit, it generates the energy required for light, heating and ventilation itself. The power capacity is rated in such a way that any excess can be used for charging up electric vehicles.

The building services in the Efficiency House Plus are aimed at energy efficiency and highlight the state of the art. The two-part energy concept consists of electricity and heat generation. In order to limit the ventilation heat losses, a ventilation unit was required that could achieve a high heat recovery efficiency and be connected to the building management system. Here a decision was taken in favour of an air conditioning unit from the Trisolair range. This is and the first swimming pool in Austria constructed according to the passive house standard were equipped with Menerga systems. Menerga's reference list in the field of low-energy buildings reads like the Who is Who of the industry – a success story which is being continued. Plan with us!



equipped with a recuperative heat recovery system and achieves temperature efficiency levels of more than 80%. The heat is recovered in separate air pathways. This has above all hygienic advantages because when the air is exchanged, neither odours nor pollutants are transferred. The remaining ventilation heat losses are compensated via a pumped hot water heating coil (PWW) that is fed by a heat pump.

Due to the high heat recovery rate, a connection capacity of only 0.8 kW is required to condition the supply air to 22 °C if the outside temperature is -12°C.



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Special Solutions REQUIREMENTS

Does a penguin need a good climate? A question which is easy to answer if you are hoping to produce baby penguins at the zoo: yes.

Many types of penguins are threatened with extinction; producing offspring in the zoo is often the only way to preserve the species for future generations. The condition for successful breeding is the perfect simulation of the natural habitat of the animals, for example the Arctic light and climate conditions. At the Hellabrunn Zoo in Munich, Menerga systems contribute towards making such breeding possible. This project also includes comfort air conditioning - this time not for people, but for the feathered residents.

Menerga are well-known for the fact that they are also able to implement very unusual projects. Where many others only shake their heads because in their view such a project cannot be executed, we enter the ring with enthusiasm. Because unusual projects are an incentive for us to try out new technologies and then use them if appropriate as an improvement for our standard systems. Not for nothing is our Research and Development Department always active and repeatedly surprises us with amazingly efficient developments.



Unit type: Customer specific **ALMA RESEARCH PROJECT IN CHILE** 60 telescopes in the Atacama desert that collect data on the origins of the universe.



Unit type: Frecolair, Resolair, Adsolair **HELLABRUNN ZOO, MUNICH**

Air conditioning for the penguins, amongst others, as well as the monkey enclosure, the visitor halls and the aquarium technology.



PRINCESS ELISABETH STATION

Belgian zero-emission research station built according to the passive house standard and located in the Antarctic.

Technology Hits MENERGA FITS!

Do you have an exciting project? Why not contact us? We look forward to tackling the challenge together with you!

For example: ALMA RESEARCH PROJECT IN CHILE

In the Chinese Atacama Desert, over 60 telescopes provide images of previously unresearched areas of space at an altitude of 5,100 metres as part of the astronomical ALMA research project. The radio antennas received millimetre and submillimetre waves in the range between radio waves and infrared rays and together are intended to simulate one large telescope with a diameter of several kilometres. Given the extreme operating conditions, perfect operation of the telescopes is only possible with a sophisticated air conditioning system that protects the sensitive technology from the large temperature fluctuations, while at the same time using as little energy as possible.

The extreme weather conditions on the Chajnantor Plateau make independent air conditioning of the moving parts of the telescope indispensable. In direct sunlight, the surfaces quickly heat up to 30°C to 40°C, while at the same time minus temperatures can prevail in the shade. In view of the different coefficients of expansion of the materials, thermal distortion can occur here if there is no corresponding air-conditioning technology, thereby rendering reproducible measurements impossible. At the same time, the heat loads in the interior of the antennas have to be led away in order to prevent overheating of the receiver cabin and its computercontrolled measuring instruments.

Vertex Antennentechnik GmbH, the company commissioned with the design and construction of the telescopes,

turned to Menerga with the task of developing an appropriate air conditioning system for these difficult conditions. The aim of the customer-specific development was to ensure that the temperature in the receiver cabin was within the range 16°C to 22°C throughout the year. The air conditioning system developed for this task comprises four components:

- 1st A cold water generator as an external unit with the option of free cooling
- 2nd A glycol distribution system between the cold water generator and the two internal ventilation units
- 3rd Two internal recirc air treatment units for the measurement and recording instruments, as well as the receiver
- Fans for the uniform distribution of 4. air in the area of the receiver cabin that is difficult to access

The development of the air conditioning system for the ALMA telescopes was an unusual and challenging project which could only be carried out in close cooperation with the customers. We are looking forward to more!

System types

All system types and customer-specific developments - please contact us!



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