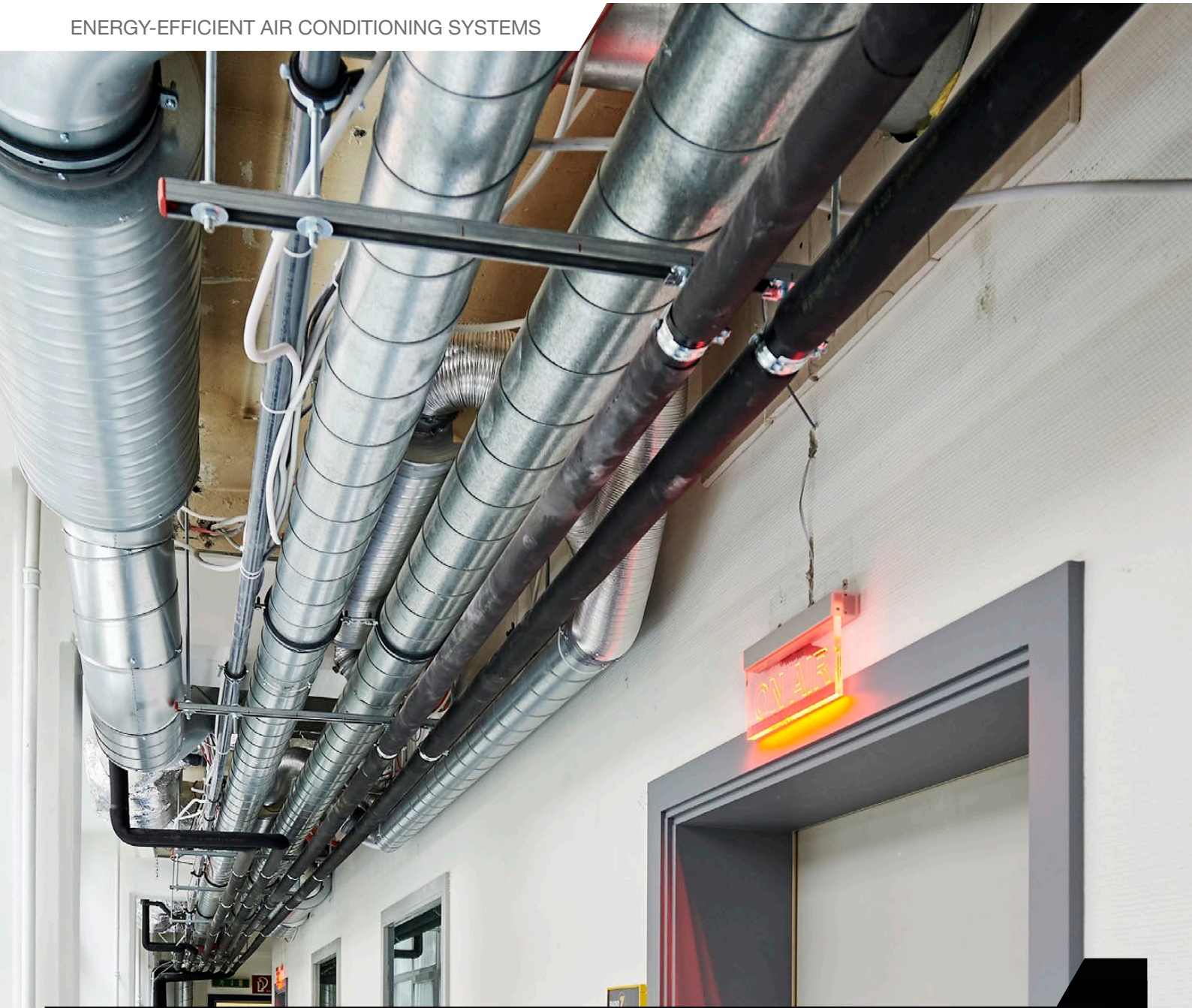


ENERGY-EFFICIENT AIR CONDITIONING SYSTEMS



// Hybrid VRF system Radio Ulm

The broadcaster Radio 7 had three requirements in respect of a new air conditioning system: Above-average energy efficiency, individual temperature control and no refrigerant in rooms used by people.

EVERY GENERATION HAS
SHINING
EXAMPLES



// Hybrid VRF system Radio Ulm

Germany's first Hybrid VRF system installed at Radio 7

These demands can be met by the new, unique Hybrid VRF technology. This new air conditioning solution is based on a 2-pipe system for simultaneous heating and cooling as well as an energy-saving heat recovery function. A special refrigerant distributor transfers the energy from the refrigerant to water and transports it to the indoor units.

Radio 7 is one of the three big regional stations in Baden-Württemberg. More than a million listeners a day tune into the private radio station in its transmission area between Alb and Lake Constance, the Black Forest and Allgäu (MA 2014 Radio I). 70 staff put together the programme for listeners at four locations in Ulm, Aalen, Tuttlingen and Ravensburg. The four Radio 7 studios broadcast news along with a lively mix of entertainment and music. The management was also quick to recognise the

relevance of the internet and has steadily expanded its presence on Facebook and Youtube. Radio 7 communicates with its users quickly and directly via these platforms.

The popular broadcaster's multistorey building is in Ulm city centre. Editing studios, programme management and recording and live studios for the presenters are on the ground floor, while the administrative offices are on the upper floors. The studios are air conditioned on account of their internal location and high heat input generated by the technical equipment. This task was previously performed by the central ventilation system with a heat register supplied by a classic chiller unit. "The disadvantage of the old system was that all the recording studios could only be provided with heat or cooling centrally via the ventilation system; individual control was not possible here, and so all the studios

were either warm or cold. The use of the Hybrid VRF system has now significantly improved the situation,” says a member of the Radio 7 staff.

Hybrid technology - the reliable road to a solution

“An added problem was that the old central air conditioning system operated on the basis of R22 refrigerant. Due to the prohibition on R22, necessary repairs and time-consuming servicing could no longer be carried out,” explains Tobias Merk, chiller system designer and managing director of Erwin Merk GmbH of Weißenhorn, who implemented and oversaw the modernisation. Replacement not only of the environmentally harmful R22 refrigerant but also of the entire air conditioning system was urgently required from the comfort and safety viewpoint. The new air conditioning technology had to satisfy three conditions: energy conservation, i.e. it should require less energy than standard systems for the same output. It should offer a high level of comfort for users, the primary aim being to achieve individual temperature control in each recording studio. And the third criterion was that rooms used by people should be kept free of refrigerant.

Only one company in the market currently offers such a solution. Air conditioning technology manufacturer Mitsubishi Electric has developed a system that combines the advantages of a direct evaporation system with those of a water-based system. In so-called Hybrid City Multi technology, the refrigerant circulates from the outdoor unit to a distributor, the Hybrid BC Controller, which can be located in a defined service room or store room. There the energy is transferred by specially designed and optimised plate heat exchangers from the refrigerant to water as a transport medium. From the Controller, conditioned water is conducted to the indoor units, thereby dispensing with the need for refrigerant in the pipe network and in the air conditioning units in the corridors and rooms of the building.

The design and installation of the new air conditioning system is extremely easy, as the manufacturer has already coordinated all the hydraulic components. The Hybrid VRF system only requires two pipes, facilitating simpler assembly and more reliable operation than a 3-pipe system or cold water system with four pipes, for example. Moreover, no additional pumps, tanks or switching valves are necessary. The pipes themselves can be of virtually the same dimensions as for conventional VRF systems. If EU directives regarding the use of refrigerants are tightened up further, all components such as the indoor units, pipes and control equipment can continue to be used without having to sacrifice operating safety, comfort and energy efficiency. This is a major advantage thanks to the heat exchanger in the distributor which separates the refrigerant from the water circuit.

Simple design thanks to coordinated components

Complete systems for heating, cooling and the supply of hot water can be realised on the basis of renewable energy sources with this technology in a system with cooling capacities of 22.0 to 28.0 kW and heating capacities of between 25.0 and 31.5 kW. An inverter-driven compressor in the outdoor unit has virtually infinitely variable output control and only delivers the output actually required in the building. The same goes for the inverter-driven pumps in the Hybrid BC Controller, which adjust the volume of water circulating to match the individual output requirement. This permits operation without an additional buffer system and supplies the terminal units connected with the required amount of energy.

At Radio 7, an outdoor unit from the R2 series, a Hybrid BC Controller (distributor) with eight connections and eight ceiling concealed units have been used. The type PURY-EP200YLM-A outdoor unit installed here with 22.4 kW of cooling capacity and 25.0 kW of heat output has an impressively high level of efficiency, which in cooling mode (SEER) is in excess of six (6.24)





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Einfahrt
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taking seasonal measuring criteria into account. It is located in the boiler room and replaces an old chiller that was still operated using the environmentally harmful refrigerant R22. “The installation location is down to the limited space available outside. In principle, air conditioning outdoor units can also be installed in the building. Suitable measures then have to be implemented with regard to proper air routing,” says Merk. In the boiler room at Radio 7, the air intake is via a decommissioned chimney, while air is blown out through a newly installed air duct.

Customised comfort with heat recovery

The ceiling concealed units precondition the supply air to the recording studios. They are housed in the suspended ceiling in the corridor and are easily accessible when servicing is required. The units cool or heat the respective studio to suit user requirements through compact air grilles. Adjustment is via a cable remote controller, type PAR 31 MAA, which enables the presenter to set the temperature to suit his or her individual preference. This is the great advantage of the R2 system: every single indoor unit can be operated independently in heating and cooling mode. Heat that is removed from the rooms being cooled is used to heat those rooms where warmth is required. The heat is not discharged unused into the environment via the outdoor units, but remains in a closed system.

The overall efficiency of the R2 system is significantly higher than that of conventional systems thanks to the high proportion of heat recovery, and can be increased further by realising complete climate control and optimised plant and control technology. It is approx. 30-40 percent compared with conventional systems without heat recovery. While the high energy saving is certainly of interest to the operator, it is the perceptible increase in comfort that swings the vote among the employees. “It is very pleasant to be able to select the temperature at which one can do one’s job most productively in the studio and to know that this is saving energy too,” says programme director Mike Wagner, summing up the change.

Conclusion

At Radio 7 in Ulm, the broadcasting and recording studios are air conditioned on account of their internal location and the heat generated by the technical equipment. This task was previously performed by a central ventilation unit and a chiller, which still ran on the R22 refrigerant, now no longer obtainable. The disadvantage of the old system was that all the recording studios could only be provided uniformly with either heat or cooling. The operators consequently decided on an investment that had to



fulfil three requirements: the new air conditioning technology had to conserve energy, offer a high comfort level for the user and keep rooms used by people free of refrigerant.

The new Hybrid VRF system combines the advantages of a direct evaporation system with those of a water-based system without sacrificing operating reliability, comfort or energy efficiency. The technology is based on the VRF R2 heat pump system and consists of a City Multi series R2 outdoor unit, the new Hybrid BC-Controller, which enables refrigerant and water to be combined as a heat-transfer medium, and indoor units equipped with a special water coil. The higher energy efficiency achieved by heat recovery enables energy savings of up to 40% compared to a cold water chiller.

