

Joint German and South African Research

Air cooled dry coolers/condensers and closed evaporation cooling systems as a device combination, turn the hybrid dry cooler into a variably usable device. Thanks to the interaction of wet and dry cooling, the hybrid unit is an effective, novel device.

The hybrid cooler developed by **thermofin**[®] is principally used in industrial processes. Both in dry cooling of refrigerating machines and compressors and in air conditioning and refrigeration technology, it offers the user considerable advantages.

Structure

The hybrid dry cooler/condenser consists of finned heat exchangers with core tube and fins. An electrophoretic deposition increases the durability also in case of difficult ambient conditions. The devices are executed in innovative lightweight design in V-form. All parts with water contact are equipped with stainless steel housing. Optionally, the devices can be equipped with standard or EC fans with a diameter from 0.8 m to 2 m. Thanks to the use of low noise or super low noise fans driven with a sinus converter, belt drives and service interventions can be prevented.

Function

Dry operation:

Compared to conventional finned dry coolers, the cooling process in dry operation is effected without wetting the heat exchangers. During this process, energy is emitted by convection to the ambient air.

Wet operation:

In case of high outside temperatures or high system loads, the performance can be doubled or tripled by wetting the heat exchangers. The cooling of the system is ensured by convection and additionally by evaporation.

A changeover between operation modes allows an optimal use of the device performance in case of changing ambient conditions. By means of the **thermofin**[®] Selection Program the hybrid dry cooler can be designed according to its application and optimised for the planned operation of the system. The climatic conditions at installation site, the annual temperature range and the conceivable load characteristic of the system are considered during the planning. With it, an optimal dimensioning of the dry coolers/condensers and the minimisation of the operating costs of the complete system can be reached.

Advantages

The hybrid dry cooling is characterised by low energy consumption with minor water consumption. With it, the operating costs can be reduced considerably in comparison with evaporation coolers or cooling towers. Compared to wet cooling towers, the hybrid cooler has also the advantage of a vapour-free operation. The theoretically reachable return temperature and with it

the cooling limit of the hybrid dry cooler is 4°C higher than the wet bulb temperature of the ambient air. In case of the free cooling with wet heat exchanger, the outlet temperature of the medium to be cooled can be lower than the outside temperature. With the comparatively low space requirement and low-noise levels, the hybrid unit is able to meet particular customer requirements. Thus, in case of special sound requirements, it is possible to limit the speed of the fans during night mode by means of the specially developed TCS controller.

Integrated Electronic Controller

The TCS is an intelligent controller designed for modern fan drives and is used to monitor, control and collect data of the hybrid dry cooler. The TCS provides optimum operating conditions by individually adjusting the existing performance characteristics of the dry coolers and condensers. Maximum energy efficiency and a fault-free operation are achieved by fast response to the changing external ambient conditions.

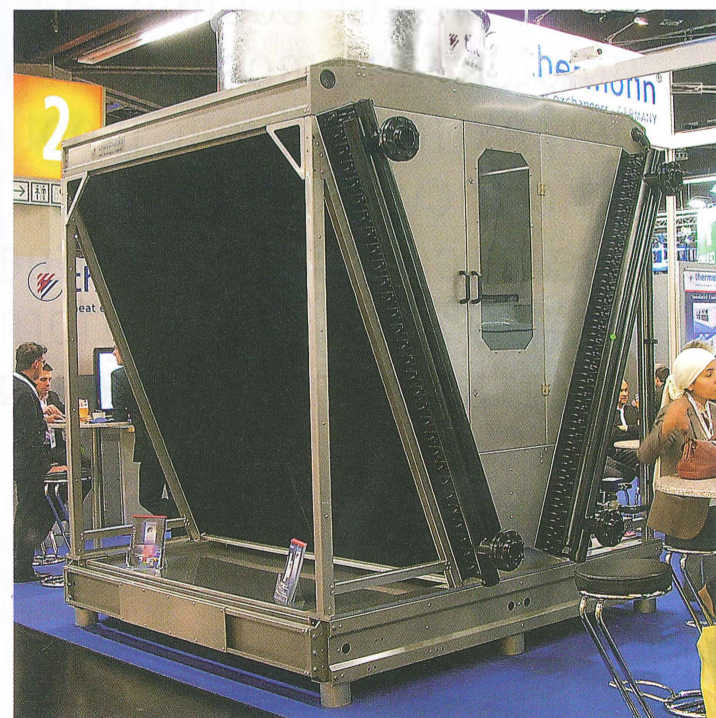
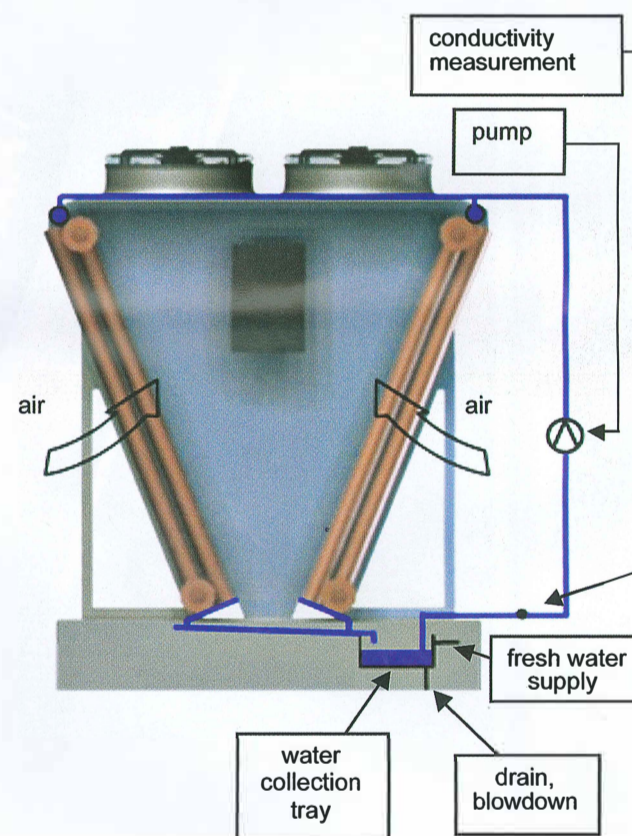
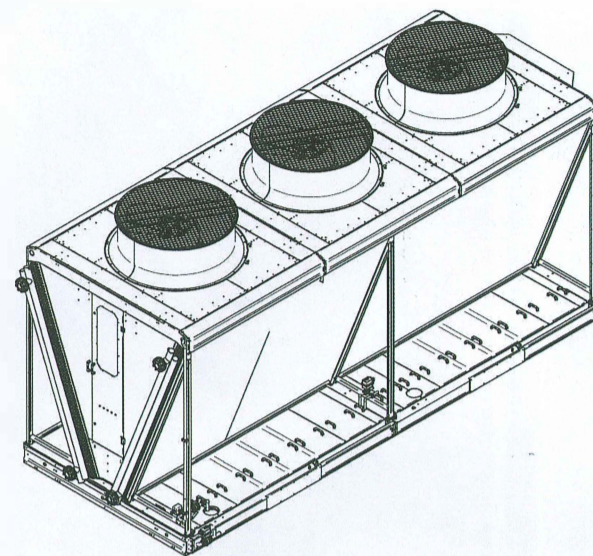
The TCS is executed as a programmable logic controller and allows among others the temperature regulation with sliding set value adjustment, a comprehensive log management for operation and malfunction and the cooling water management.

The supply, ready for connection and the variable, extendible design allow an easy integration into the building management system per contact or a bus bar system. The TCS is easy to parameterise and perfectly suitable for different applications, both in operation of individual devices and in combination.

Development in Co-operation with Stellenbosch University

A close cooperation with the Stellenbosch University in South Africa was the essential basis for the development of this new product. For practical application, **thermofin**[®] has delivered several test coils for basic analyses and measurements during dry and wet operation. Based on these coils, the university supported **thermofin**[®] with different design proposals for units and the series to be developed. The measured values determined during the analyses serve as basis for the calculation algorithm and a calculation program. Further analyses will take place in the near future.

With the energy efficient and environmentally friendly operating method, the hybrid dry cooler not only meets particular customer requirements but is also considered an advanced product.



The thermofin[®] Hybrid cooler at 2012 Chillventa