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New type of “ultra-efficient” chiller cuts cooling energy costs by up to 50 per cent

A new type of ultra-efficient chiller, now being launched simultaneously in the UK and across Europe, delivers unprecedented energy savings for buildings and industry and takes carbon reduction into new territory.

The super-frugal Turbomiser II machine is the fruit of a two-year development programme by pioneering Italian manufacturer Geoclima and UK companies Klima-Therm and Cool-Therm.

It has been heralded as “probably the most efficient HFC-based air-cooled chiller in the world,” able to achieve EERs of 10 and above without the need for additional free-cooling circuits with expensive glycol. This saves both on initial cost and ongoing pump energy.

A first generation version of the chiller recently installed at The Dorchester in London is saving the hotel £10,000 a month in energy costs. The Turbomiser II takes this performance to a higher level still.

The technology can reduce end users' power bills by between 30 and 50 per cent - while at the same time dramatically cutting carbon emissions. On some applications, the saving can cut pay-back time to less than a year.

The performance claims have been independently verified by leading consultant Mike Creamer of Business Edge Ltd, using the ClimaCheck plant performance analyser at the Geoclima's test facility in Italy.

As a result of its innovative design, the machine requires 30 per cent less refrigerant than comparable conventional chillers, reducing servicing costs and potential environmental damage from large-scale leakage.

Roberto Mallozzi, managing director of London-based Klima-Therm, said: "Given the pressure on end users to cut energy bills and emissions, this new chiller effectively enables clients to "future-proof" their businesses. It is the solution people have been looking for."

Ken Strong, managing director of Bristol-based Cool-Therm, said: "The energy performance is staggering. These kind of savings are unheard of with conventional technology, and it gives end users a decisive advantage in terms of running costs. And the savings go on accumulating throughout the life of the plant."

The chiller uses a combination of high efficiency components and technologies, combined with a highly sophisticated adaptive

control system that integrates and optimises performance.

Key design features include:

- Micro-channel aluminium condensers, that reduce refrigerant charge while increasing the effectiveness of heat exchange;
- Flooded evaporators that ensure optimum energy transfer between refrigerant and water;
- Inverter-controlled Turbocor compressors whose output can be precisely matched to load; and
- Use of a liquid refrigerant pump system that significantly increases thermodynamic efficiency across the chiller's operating range.

An important aspect of the control philosophy is that the system is designed to operate with a floating head pressure, providing opportunities for savings not available to conventional designs. Unlike standard chillers whose head pressure is fixed, the Turbomiser II chiller constantly self-regulates and optimises its performance in response to ambient conditions and load.

This is achieved with the use of the 1kW liquid pump system, under the control of some highly sophisticated electronics. This effectively increases capacity at all condensing temperatures, but has greatest effect at lower temperatures. As a result, it can deliver refrigerant many times more efficiently than a compressor.

Another key to the chiller's ultra-low energy consumption is the fact that the compressor does not have to run constantly to maintain a fixed head pressure. By using the liquid system at lower ambient

temperatures the compressor(s) can be switched off, while the liquid pump circulates refrigerant around the system. This glycol-free alternative to conventional free-cooling is highly efficient, and dramatically reduces energy consumption while maintaining refrigeration performance.

A secondary benefit of the reduced compressor run-time is extended plant life. With the low-power liquid pump taking the load, the compressor does not have to work so hard or for so long, reducing wear and the likelihood of breakdown.

As a result of its innovative design, the Turbomiser II can halve the energy costs compared with a conventional screw-based machine, according to the companies behind it. On many applications, this can cut payback time to less than one year.

It is being targeted at building owner-occupiers for whom rising power bills and the need to cut carbon emissions are key factors in buying decisions. It is expected that the Turbomiser II will prove a compelling choice for those having to replace aging, inefficient machines running on R22.

The chiller is available in capacities from 250kW to 1.5MW, and can be applied in most commercial and industrial applications. It is ideal for data centres, large retail developments and deep plan buildings that have a constant base load. Hospitals and hotels with their need for all-year-round cooling, are also excellent applications.

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