


Case story | Danfoss Turbocor Compressors

The innovative key to efficiency in mega datacenter

Barclays Project Dart.



50%

reduction in energy
consumption and
CO₂ emissions.



BARCLAYS

turbocor.danfoss.com


A Danfoss partner recently carried out a “mega” data centre cooling project on behalf of Barclays for its award-winning Project Dart.

The innovative cooling solution harnesses the outstanding energysaving capabilities of 12 Turbomiser chillers, with an ice-making system providing cooling back-up and exceptional resiliency, plus Liquid Pressure Amplification (LPA) delivers free cooling for high energy efficiency.

The key project details are:

- A 30,000 m² “mega” data centre
- Requiring 16.8 MW of cooling
- Main objectives: ultra-resilient, to ensure security and continuity of operation, and low Power Usage Effectiveness (PUE)

Key issues and challenges

There was a desire to move away from traditional free cooling, due to its reliance on glycol as a secondary cooling medium, with all the issues of additional expense and control this brings up. Secondly, noise was a critical consideration, since the site was close to a residential area, with bedrooms as close as 50 m. Therefore, the solution had to minimise noise and vibration intrusion to the surroundings.

The key design requirements were:

- 19°C return / 13°C chilled water
- 40°C air on ice making

Solution

The solution involves the use of 12 x 1.4 MW chillers on an N+2 arrangement. The design included integral primary pumping through the chillers to a low-loss header arrangement, with valves in the low-loss header to create a two-chiller ice-making loop. A secondary pumped circuit served the data halls, via buffer vessels and the ice tanks as necessary.

Innovation

- The system is equipped with a Low Pressure Amplification (LPA) system that delivers high-ambient efficiency and low-ambient refrigerant based free-cooling
- It uses “hybrid mode” LPA and condensing control strategies to ensure optimum efficiency all year round
- Series evaporators and inverter-driven duty and standby pumps for maximum efficiency, with four refrigerant circuits and integral bypasses for resiliency
- Integrated acoustic pack for ease of maintenance, longevity and efficiency
- Integral dual electrical supplies and controls UPS



Project Dart

Exceptional energy efficiency and outstanding resilience.

Carbon reduction: comparative usage and savings

Using the standard DEFRA conversion factors for company reporting of equivalent tonnes of CO₂, Turbomiser with LPA and hybrid control will save over 554 tonnes per year of CO₂ compared to a standard chiller solution.

Compared to a traditional free-cooling chiller solution, the Turbomiser with LPA and hybrid control will save 194 tonnes of CO₂.

Summary of benefits

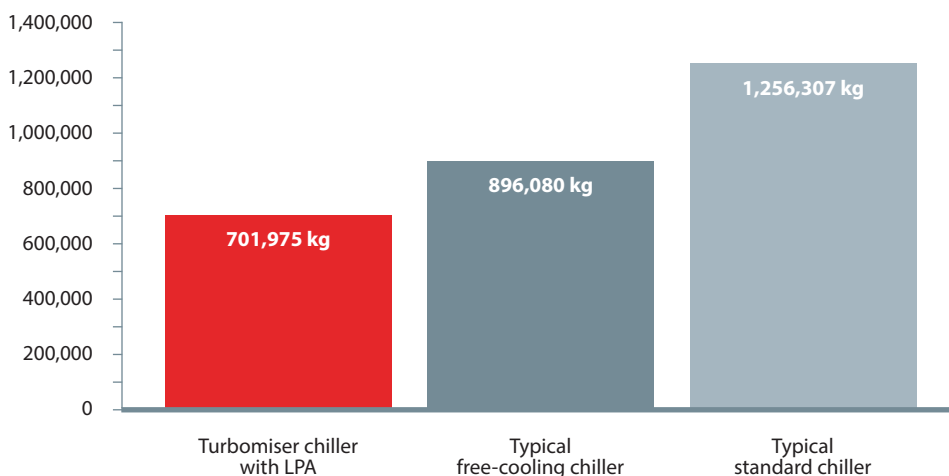
- Energy and carbon – a near 50% reduction in energy and carbon dioxide
- Running costs – at 9p / kWh, Turbomiser would save over £91,000 per year compared to a standard chiller, and over £32,000 compared to a traditional free-cooling machine
- Reliability – one moving part, no vibration and no oil management components to go wrong
- Reduced servicing – see Reliability above
- Noise – no vibration means low noise; high rpm means easy attenuation of any noise that is made; no screw compressor “whine” at part load
- Compactness – lightweight chillers means lightweight structures
- Exceptional resilience

Danfoss Turbocor® Compressor



The compressor has just one moving part, operates without vibration and has no oil management components to go wrong.

Total annual equivalent CO₂ [kg]



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