

Article

Why Danfoss Hansen FD83 couplings should be your choice in thermal management applications

In this article, **Ophélie Pezard** of Danfoss Power Solutions looks at some common problems associated with traditional thermal management couplings and explores why FD83 couplings could offer solutions.

Introduction

Thermal management applications are increasingly used in a wide variety of industries, including energy storage, renewable energy, medical equipment, electric vehicle charging systems, and IT. These systems require high-performance, state-of-the-art cooling circuits.

Consider data centers, for example, where the need for an efficient cooling system is central. With the computing of increasingly large and rapid amounts of data, the massive development of digitalization, and the arrival of new technologies such as artificial intelligence, data centers are becoming hotter and more powerful, and need reliable, functional cooling components. For example, we hear that "Hyperscale data center capacity is forecasted to nearly triple over the next six years, as AI workloads create demand for substantially more powerful facilities," according to Synergy Research.

Danfoss has chosen to act in these applications and offer solutions tailored to their needs.

For this specific type of application, Danfoss offers its FD83 coupling series. The relevance of this series in this type of field is detailed in this document.



Maximizing system efficiency to improve PUE:

In thermal management applications such as data center cooling systems, we often talk about Power Usage Effectiveness (P.U.E.).

The P.U.E. is a ratio that describes the efficiency with which a data center uses energy. This concept is essential for calculating costs. The more energy a system saves, the more efficient it is and the lower its operating costs.

At Danfoss, we have seen a big demand for full-flow type of couplings for thermal management applications. This straightforward feature reduces pressure drop and increases the overall system efficiency.

In thermal management systems, a big driving factor for energy efficiency are quick disconnect couplings in the cooling circuit.

Couplings with a reduced internal diameter result in a lower flow rate, a greater drop in pressure, and, therefore, an increase in temperature.

To help compensate this pressure-drop, the system consumes more energy to cool itself, resulting in overall system inefficiency.



This is why Danfoss developed its FD83 coupling series, that offers a design without flow diameter constraints. This leads to very low pressure drop and allows high system efficiency and reduction in energy costs.

In this case, the FD83 coupling series' design offers a reduced power consumption of the overall thermal management system that allows an improvement of the system's P.U.E.

Leakage effects on maintenance and operating time:

Thermal management systems are very demanding in terms of component reliability. System owners try to minimize downtime to ensure a good return on investment. If a component malfunctions or is damaged, the entire system risks coming to a standstill. The risk of coupling leaks must, therefore, be avoided. In the event of a leak, it must be possible to restart the system as quickly as possible. The FD83 offers a big advantage here, with its proven reliability of more than 20 years of experience.

Also, the dual sealing adapter allows leakage avoidance. We will look deeper at the security aspect of this coupling series in another paragraph.

Finally, we can also note that the Danfoss Hansen FD83 is also easy to assemble and connect.

Its ergonomic design reduces maintenance (and installation) time, costs, and requires no expert support.

In the event of a leak, the FD83 coupling helps to save time when restarting the system and therefore save costs.



Optimal hose assembly connection:

In any field, the connection of a coupling to a tube or hose line can result in hose twisting. It can also require additional connection adapters. Also, whenever there is a torsion movement, it can create tension on tube lines or hoses.

The FD83 series provide a turn-to feature that allows rotation of the connecting adapter or hose barb. This permits operators to connect hose or tube lines to the FD83 without risk of hose torsion or need of additional connection adapter which reduces assembly time and eliminates risk of leakage due to incorrect assembly.



Safety feature against accidental opening:

In a liquid cooling circuit, accidental disconnection of ball valves, couplings or any other components can create a big spillage inside the thermal management application.

This kind of event can result in major damage of the equipment, system downtime, and significant maintenance costs.

For these type of risks, the Danfoss FD83 coupling series offers a dual interlock safety feature that eliminates accidental opening of valves when disconnected. Additionally, the disconnection cannot be done until valves are fully closed. This works thanks to a patented locking pin design and a lever handle.

There is also no risk of spillage when disconnecting, which leads to reduced maintenance costs and eliminates the risk of catastrophic failure in the thermal management applications.



Simple stock strategy:

In standard couplings, different designs are required for male and female halves. This creates a need to stock two different part numbers. With different configurations, the number of parts on stock and part numbers in the system would increase accordingly.

The FD83 is made of identical coupling halves and proposes only one part number.

This same part number for the identical coupling halves allows a simple stock strategy and reduced amount of part numbers to handle.

Also, for each terminal end configuration, only one part number will be required which reduces complexity.



Sustainability:

FD83 couplings offer a long lifetime in the application thanks to use of stainless-steel material. The choice of stainless steel is made on all components, and seals used in the couplings are REACH/RoHS compliant.

The series also offers a reliable product that helps reduce energy consumption.

These important features, completed with a regional product manufacturing strategy, helps Danfoss achieve its sustainability goals.

At Danfoss, we pioneer solutions for customers to enable decarbonization in an intelligent, cost-optimal manner. Having regional production plants for our thermal management couplings is an important part of this project. Also, liquid cooling applications provide a smaller carbon footprint and minimal water usage.



Conclusion

Thermal management applications are complex and require innovative and reliable products. The Danfoss FD83 couplings series offers the right solution to meet these challenges.

Its full-flow design, safety, and ease of installation features, as well as its reliable, durable and efficient conception, make it the right choice for your thermal management system. It is available in two different sizes (1" and 2") that can fit into different system spaces.

The different end connections available allow the end-user to use the adaptation best suited to each thermal management system. Owners can, therefore, find a customized solution to suit their needs.

Finally, the FD83 coupling system can be used in a wide variety of low-pressure industrial applications.

In addition to liquid cooling, this coupling can be used in other areas, such as fluid transfer, as it offers the same advantages in terms of low pressure drop and safety, as well as good compatibility with other fluids.

