

Stirling Cooler Devel. & Testing, Paper No. 3.4

High-Availability Stirling Coolers

***D. Willems, T. Benschop, R. Arts, B. de Veer, and P. Bollens,
Thales Cryogenics BV, Eindhoven, The Netherlands***

Thales Cryogenics has recently introduced a range of coolers for applications requiring high availability. The availability is a figure of merit describing the reliability of a cooler in applications with long-term and continuous (24/7) or near-continuous operation. A high availability is synonymous with and extremely low failure probability. A well-known solution for a high-availability application is a pulse-tube cooler, such as those produced by Thales Cryogenics, which have an intrinsically high availability due to the absence of moving parts in the cold head. However, other aspects such as power density, power efficiency, or cool-down time prohibit the use of pulse tubes in some applications. High-availability Stirling coolers can be considered in these cases. A range of Stirling coolers is available for such applications. In this paper, we will present these coolers and some of the improvements that have taken place. The improvements to the coolers, in the 100 W to 200 W input power range, are not only intended to increase the availability – or reliability – of the coolers, but are also aimed at improving the performance, by either increasing the efficiency or extending the operating window. In addition to performance and reliability improvements, the integration aspects of these cooler types will be presented, and system-level considerations discussed.