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C2Or2A-01: High power high availability single-stage Stirling coolers

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Recent developments at Thales Cryogenics have been aimed at improving the performances of 100 W and 200 W input power class flexure bearing Stirling coolers.

The aim of these developments has been threefold: To enable multi-year operation with a vanishingly small failure probability (high availability), to increase the available heat lift at 77 K (high power for zero boil-off), and to extend the usable range down to below 45 K (low temperature). As the starting point for development, the LSF9589 and LSF9340/LSF9350 cooler ranges were selected. By performing these upgrades, the usability range of the cryocoolers is extended.

Multiple upgrades will be shown such as tuning for low-temperature operations and material upgrades. Test results will be presented and potential future improvements will be discussed.

The work performed was done for a variety of customers, with applications including nitrogen recondensers for zero boil-off dewars, high temperature superconducting filters, and low temperature longwave infrared detectors.

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