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Recent Development Status of High-Capacity 4K Pulse Tube Cryocooler

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A high-capacity 4K two-stage pulse tube cryocooler (PTC) with a remote valve unit that produces cooling capacity of 1.5 W at 4.2 K and 36 W at 45 K simultaneously has been under development at Sumitomo Heavy Industries, Ltd. (SHI). The PTC can be used for dilution cryocoolers, magnet cooling and other cryogenic devices. Compared to the SHI 1W commercial PTC Model RP-082B2S, the cooling capacity at the second stage is improved significantly by enlarging the volume of the second stage regenerator and pulse tube, and by optimizing the DC flow in the cold head of PTC. To achieve the increased cooling capacity, a large compressor unit has also been under development. The electrical power consumption of the new compressor is specified to be about 9.5 kW at 50 Hz. Experimental results of refrigeration performance, load curves, etc of the prototype units will be described in this paper.

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