

GM Cryocoolers Market Size, Share & Trends Analysis Report By Application (Superconducting Devices, Infrared Detectors), By End-use (Medical & Healthcare, Aerospace & Defense), By Cooling Capacity, By Heating Load, By Region, And Segment Forecasts, 2024 - 2030

<https://marketpublishers.com/r/G017B8A44BFCEN.html>

Date: May 2024

Pages: 152

Price: US\$ 5,950.00 (Single User License)

ID: G017B8A44BFCEN

Abstracts

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GM Cryocoolers Market Growth & Trends

The global GM cryocoolers market size is anticipated to reach USD 1.50 billion by 2030, registering a CAGR of 6.6% from 2024 to 2030, according to a new report by Grand View Research, Inc. The adoption of Gifford-McMahon (GM) cryocoolers is increasing due to their use in cooling down power systems, superconducting magnets, and the semiconductor industry. GM cryocoolers are also used in the defense sector in night vision technology and ground-mounted and airborne military applications. Moreover, the large-scale demand from defense is expected to drive the growth of the cryocoolers market over the forecast period.

The growing demand for cryogenic cooling in emerging economies, particularly in Asia Pacific, is expected to further fuel market growth. Countries such as China and India are investing heavily in space exploration, healthcare, and semiconductor industries, which is expected to drive the demand for single-stage GM cryocoolers. In addition, technological advancements such as the development of miniature and micro cryocoolers are opening new opportunities for their adoption in portable electronic devices, transportation, and defense sectors. These compact cryocoolers offer

improved cooling performance while reducing size, weight, and power consumption.

Companies are focused on developing cryocoolers with higher cooling capacities, improved reliability, and reduced vibration levels to meet the evolving needs of end users. In November 2022, a new addition was made to the range of Gifford-McMahon (GM) Cryocoolers by the SHI Cryogenics Group. The CH-160D2 77K Cryocooler was introduced as SHI's highest-capacity 77K Cryocooler, offering a first-stage capacity of 525/630 W at 77 K (50/60 Hz). The CH-160D2 can be used for various applications like liquid nitrogen generation, clean energy technologies, and high-temperature superconducting applications such as fault current limiters, cables, wind turbines, accelerator magnets, and ship motors.

Ongoing R&D activities aimed at further improving the efficiency and reliability of two-stage GM cryocoolers are also fueling market growth. Manufacturers are investing in the development of advanced materials, innovative compressor designs, and optimized cryogenic regenerative heat exchangers to enhance the performance of these cryocoolers while reducing their size, weight, and power consumption. For instance, in January 2024, SHI Cryogenics Group introduced the RJT-100 4K GM-JT Cryocooler. This advanced cryocooler offers a capacity of up to 9.0 W at 4.2 K (50/60 Hz). By pre-cooling the helium gas, this product removes valve pressure pulsation and delivers temperature-stabilizing performance.

Manufacturers of GM cryocoolers are adopting several strategies, such as expansions, mergers & acquisitions, partnerships/collaborations, and product launches, to enhance market penetration. For instance, in March 2024, Bluefors Oy strengthened its foothold in Asia and North America through notable acquisitions, such as Rockgate in Japan and Cryomech in the U.S. For instance, in May 2023, Bluefors finalized the acquisition of Rockgate, a prominent distributor of cryogenic equipment headquartered in Tokyo. This strategic move enabled the company to establish direct sales and service operations in the Japanese cryogenics technology market, further expanding its global presence.

GM Cryocoolers Market Report Highlights

The superconducting devices application segment dominated the market in 2023. Superconducting devices have significantly impacted the field of cryogenics, particularly the development and optimization of GM cryocoolers. Furthermore, these are essential for maintaining extremely low temperatures needed for superconducting materials to exhibit zero electrical resistance.

Based on application, cryopumping is anticipated to grow at a significant CAGR from 2024 to 2030, due to its widespread use in semiconductor manufacturing to create and maintain high vacuum environments essential for precise deposition and etching of semiconductor materials.

Cryocoolers with a capacity of up to 25 K are designed to achieve and maintain temperatures below 25 K. These systems use advanced cooling technologies to achieve efficient refrigeration at relatively higher temperatures compared to traditional cryogenic systems..

The 2.0 to 10.0 W heating load segment led the market with the largest revenue share in 2023. This is attributed to their versatility and efficiency in cooling applications that require moderate to high cooling power.

The medical & healthcare end-use segment led the market in 2023. Its growth is driven by the need for precise and reliable cooling solutions in various medical applications and equipment. Cryocoolers are extensively used in medical imaging, cryosurgery, cryopreservation, and therapeutic applications, among others

In January 2024, the SHI Cryogenics Group unveiled the RJT-100 4K GM-JT Cryocooler. This cutting-edge GiffordMcMahon/Joule-Thomson (GM-JT) Cryocooler represents SHI's latest and most powerful 4K Cryocooler, boasting a capacity of up to 9.0 W at 4.2 K (50/60 Hz).

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