

North America Mass Flow Controller Market Size and Forecast (2021 - 2031)

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Abstracts

The North America Mass Flow Controller Market is projected to grow significantly, reaching an estimated US\$ 362.8 million by 2031, up from US\$ 251.4 million in 2024. This growth represents a compound annual growth rate (CAGR) of 5.6% from 2025 to 2031.

Executive Summary and Market Analysis

The mass flow controllers market in North America is divided into three primary regions: the United States, Canada, and Mexico. This region plays a crucial role in the global mass flow controllers market, largely due to supportive government regulations and investments aimed at bolstering semiconductor manufacturing. According to data from the US National Science Foundation, the US government has allocated US\$ 52.7 billion in incentives and subsidies through the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act of 2022. This funding is intended to establish and modernize semiconductor manufacturing facilities across the country, with 70 fabrication plants currently under construction in states like Arizona and Texas. The expansion of these facilities is expected to significantly increase the demand for essential process equipment, particularly mass flow controllers, which are vital for regulating precise flow rates of gases and liquids during critical processes such as chemical vapor deposition (CVD), physical vapor deposition (PVD), etching, doping, and cleaning in chip production.

As semiconductor technology advances, with geometries shrinking to 5nm, 3nm, and beyond, the need for ultra-precise gas flow control becomes paramount. This requires mass flow controllers to achieve tolerances of $\pm 0.15\%$ accuracy and high turndown ratios to ensure wafer uniformity and process yield. The favorable government funding

is also driving the adoption of smart manufacturing and Industry 4.0 initiatives, which integrate real-time diagnostics and digital mass flow controllers into fabrication control systems. Notably, over 64% of chip manufacturers are transitioning to digital communication protocols for their flow systems, further accelerating the adoption of mass flow controllers in fabrication facilities.

In addition to the semiconductor sector, the increasing use of automation and process control technologies across industries such as chemicals, oil and gas, and food production is driving demand for reliable flow control systems like mass flow controllers. As these industries seek to enhance operational efficiency, precision, and safety, automated systems are becoming increasingly vital. Automation facilitates real-time monitoring and adjustment of processes, necessitating highly accurate and repeatable measurement and control of gas and liquid flows, which in turn boosts the adoption of mass flow controllers. The robust chemical industry, coupled with the demand for high-performance solutions and the integration of advanced technologies, is propelling the North American mass flow controller market forward.

Strategic Insights

Market Segmentation Analysis

The North America Mass Flow Controller Market can be segmented based on flow rate, sensor technology, and application:

By Flow Rate: The market is categorized into Low, Medium, and High flow rates, with Low flow rate controllers holding the largest market share in 2024.

By Sensor Technology: The market is divided into Thermal Mass Flow, Coriolis Mass Flow, and Differential-Pressure Mass Flow, where Thermal Mass Flow controllers dominated the market in 2024.

By Application: The applications include Semiconductors, Food and Beverages, Chemicals, Pharmaceuticals and Healthcare, Oil and Gas, and others, with Semiconductors leading the market share in 2024.

Market Outlook

The growing industrial demand for compact, high-accuracy, precise, and energy-

efficient devices in advanced manufacturing processes has led to a rising need for ultra-thin mass flow controllers. Technological innovations are driving miniaturization in sectors such as semiconductors, pharmaceuticals, and biotechnology, prompting manufacturers to develop ultra-thin mass flow controllers that save critical space in equipment and cleanroom environments. These controllers are essential for high-precision gas flow control, particularly in processes like chemical vapor deposition and etching in semiconductor fabrication, where even minor flow irregularities can lead to significant defects or yield loss. For example, in January 2025, HORIBA, Ltd.'s subsidiary HORIBA STEC, Co., Ltd. launched the DZ-107, an ultra-thin mass flow controller that improves full-scale flow by approximately seven times compared to previous models, achieving a maximum mass flow of 20 SLM while maintaining a slim profile of just 10 mm in width. This model also increases the maximum operating temperature from 45°C to 60°C, accommodating gases used in the precision manufacture of advanced semiconductors.

The rapid growth of Internet of Things (IoT) devices and flexible electronics is further driving the demand for ultra-thin mass flow controllers designed for efficient operation within compact and intelligent systems. As global focus on sustainability intensifies, the energy-saving capabilities and material efficiency of mass flow controllers are becoming increasingly appealing to various industries, leading to new market trends.

Country Insights

The North America Mass Flow Controller Market is segmented by country into the United States, Canada, and Mexico, with the United States holding the largest market share in 2024. The US has experienced a significant surge in demand for mass flow controllers, driven by rapid advancements in semiconductor manufacturing, biotechnology, and clean energy applications. The CHIPS Act and initiatives to enhance domestic chip production have notably increased the need for precise gas and fluid control systems. Additionally, the expanding biopharmaceutical industry relies heavily on flow control for research, production, and quality assurance. The US is also focusing on renewable energy sources, particularly green hydrogen generation and fuel cell technology, which positively influences the installation of mass flow controllers. With leading manufacturers, extensive engineering expertise, and robust research capabilities, the US remains at the forefront of innovation in precision flow technologies. The rapid adoption of industrial automation and stricter environmental regulations are also contributing to the swift uptake of these technologies across various manufacturing sectors, solidifying the US's position as a dominant market for mass flow controllers in North America.

Company Profiles

Key players in the North America Mass Flow Controller Market include Parker Hannifin Corporation, Avantor Inc, Dwyer Instruments, Inc., Sensirion Holding AG, Teledyne Technologies Inc, Horiba Ltd, Azbil Corp, Axetris AG, MKS Instruments Inc, and Brooks Instrument. These companies are employing various strategies such as expansion, product innovation, and mergers and acquisitions to deliver innovative products and enhance their market share.

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