

# **Micro-Thruster Propulsion Modules Market Forecasts to 2032 – Global Analysis By Propulsion Type (Electrothermal, Electrostatic, Electromagnetic, Chemical Micro-Propulsion and Cold Gas), Fuel Type, Platform, Control Mechanism, End User, and By Geography.**

<https://marketpublishers.com/r/M269D4147DBEEN.html>

Date: November 2025

Pages: 200

Price: US\$ 4,150.00 (Single User License)

ID: M269D4147DBEEN

## **Abstracts**

According to Statistics MRC, the Global Micro-Thruster Propulsion Modules Market is accounted for \$1.2 billion in 2025 and is expected to reach \$3.5 billion by 2032 growing at a CAGR of 16.5% during the forecast period. Micro-Thruster Propulsion Modules are compact propulsion systems designed for small satellites and nanosatellites. They provide precise attitude control and orbital maneuvering using electric, cold gas, or chemical propulsion. These modules enable extended mission lifespans, collision avoidance, and constellation alignment. Their miniaturized design supports integration into CubeSats and other low-mass platforms, making them essential for Earth observation, communication, and scientific research missions. Innovations in fuel efficiency and thrust vectoring are expanding their role in commercial and defense space applications.

According to the American Institute of Aeronautics and Astronautics, the proliferation of small satellite constellations for communications and Earth observation is creating unprecedented demand for compact, high-precision propulsion systems for station-keeping and collision avoidance.

## **Market Dynamics:**

Driver:

## Growing demand for nanosatellite constellations

The surge in nanosatellite constellations for Earth observation, communication, and scientific research is driving demand for micro-thruster propulsion modules. These compact propulsion systems enable precise maneuvering, station-keeping, and collision avoidance in low Earth orbit. As satellite swarms expand, propulsion becomes essential for orbital stability and mission longevity. Governments and private space firms are investing in scalable, low-cost propulsion technologies to support large satellite networks. Micro-thrusters offer the agility and efficiency needed to meet the evolving demands of nanosatellite constellations.

### Restraint:

#### Power and miniaturization limitations

Micro-thruster propulsion modules face engineering constraints related to power availability and component miniaturization. Small satellites have limited onboard energy, restricting thrust capacity and operational duration. Integrating propulsion systems without compromising payload or thermal balance is challenging. Advanced materials, compact electronics, and low-power designs are being explored, but performance trade-offs persist. These limitations hinder deployment in high-demand missions and delay broader adoption. Overcoming power and size constraints is critical to unlocking the full potential of micro-thruster technologies.

### Opportunity:

#### Emerging interplanetary micro-mission projects

The rise of interplanetary micro-missions presents a new frontier for micro-thruster propulsion modules. Universities, startups, and space agencies are developing small-scale probes for lunar, Martian, and asteroid exploration. These missions require lightweight, efficient propulsion systems capable of deep-space maneuvering. Micro-thrusters offer scalable solutions for trajectory correction, attitude control, and orbital insertion. As launch costs decrease and mission ambitions grow, propulsion modules tailored for interplanetary applications will open new commercial and scientific opportunities in space exploration.

### Threat:

## Thermal management and space debris risks

Micro-thruster systems must operate in extreme thermal environments, posing risks to performance and longevity. Inadequate heat dissipation can degrade components and reduce thrust efficiency. Propulsion modules must be designed for precise control and rapid response to avoid debris. Without robust thermal management and debris mitigation strategies, micro-thruster deployments may face operational failures and regulatory scrutiny.

## Covid-19 Impact:

The COVID-19 pandemic disrupted aerospace supply chains and delayed satellite launches, impacting micro-thruster development timelines. However, it also accelerated interest in autonomous, low-cost satellite systems for remote sensing and connectivity. Research institutions and startups adapted by focusing on modular, scalable propulsion designs. Virtual collaboration and simulation tools supported continued innovation. Post-pandemic recovery has reignited demand for agile propulsion solutions, with increased funding and partnerships driving renewed momentum in micro-thruster technology commercialization.

The electrostatic segment is expected to be the largest during the forecast period

The electrostatic segment is expected to dominate the market due to its high efficiency and suitability for small satellite platforms. These thrusters use electric fields to accelerate ions, offering precise thrust control and low fuel consumption. Electrostatic systems are ideal for station-keeping, attitude adjustment, and orbital transfers in nanosatellite missions. Their compact design and compatibility with onboard power systems make them a preferred choice for commercial and academic satellite operators. Continued advancements in ion propulsion will sustain segment leadership.

The propellants segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the propellants segment is predicted to witness the highest growth rate, driven by innovations in fuel chemistry and delivery systems. Emerging propellants offer improved thrust-to-weight ratios, reduced toxicity, and compatibility with miniaturized thruster designs. Green propellants and solid-state options are gaining traction for safe, efficient satellite propulsion. As mission complexity increases, demand

for versatile and high-performance propellants will rise. Research into alternative fuels and hybrid systems will accelerate growth in this segment, supporting diverse satellite applications.

Region with largest share:

During the forecast period, the Asia Pacific region is expected to hold the largest market share, fueled by expanding satellite programs in China, India, and Japan. Regional governments are investing in space infrastructure, nanosatellite constellations, and academic research. Local manufacturers are developing cost-effective micro-thruster systems for domestic and export markets. The region's strong electronics and materials base supports propulsion innovation. Strategic collaborations between space agencies and private firms further enhance market penetration, positioning Asia Pacific as a leader in micro-thruster deployment.

Region with highest CAGR:

Over the forecast period, the North America region is anticipated to exhibit the highest CAGR due to its advanced aerospace ecosystem and strong investment in satellite technologies. The U.S. leads in micro-thruster R&D, supported by NASA, DARPA, and private space companies. Startups and academic institutions are pioneering propulsion innovations for commercial and defense applications. Regulatory support, venture capital, and a robust launch infrastructure drive rapid adoption. As satellite missions diversify and interplanetary ambitions grow, North America will remain a key growth engine for micro-thruster propulsion modules.

Key players in the market

Some of the key players in Micro-Thruster Propulsion Modules Market include Aerojet Rocketdyne, Busek Co., Astra Space, Accion Systems, Exotrail, Enpulsion, ThrustMe, Phase Four, Moog Inc., Northrop Grumman, Safran Spacecraft Propulsion, Bellatrix Aerospace, Dawn Aerospace, MT Aerospace, Rafael Advanced Defense Systems, CU Aerospace, Benchmark Space Systems and ArianeGroup.

### **Key Developments:**

In October 2025, Exotrail and Astra Space announced a partnership to integrate Exotrail's innovative 'ExoMG' nano-electric propulsion systems into Astra's new constellation of small data relay satellites. This collaboration aims to provide precise

orbital insertion and station-keeping capabilities, extending the operational life of the satellites and reducing space debris.

In September 2025, Accion Systems successfully completed on-orbit validation of its new Tiled Ionic Liquid Electropray (TILE) propulsion system. The system, aboard a Planet Labs satellite, demonstrated exceptional thrust precision for fine attitude control and orbit maintenance, marking a significant milestone for the commercialization of its electrostatic thruster technology.

In August 2025, a consortium led by Safran Spacecraft Propulsion and ArianeGroup was selected by the European Space Agency to develop a standardized, modular micro-propulsion 'building block' for next-generation mega-constellations. The initiative aims to create a cost-effective, rapidly producible system to serve the European satellite market.

#### Propulsion Types Covered:

Electrothermal

Electrostatic

Electromagnetic

Chemical Micro-Propulsion

Cold Gas

#### Fuel Types Covered:

Ionized Gases

Propellants

Solid Propellants

Electric Propulsion Fluids

**Platforms Covered:**

CubeSats

NanoSats

SmallSats

Micro-Rovers

**Control Mechanisms Covered:**

Pulse Plasma Control

Continuous Thrust Control

Attitude &amp; Orbit Control

**End Users Covered:**

Space Agencies

Private Launch Companies

University Research Labs

**Regions Covered:**

North America

US

Canada

Mexico

## Europe

Germany

UK

Italy

France

Spain

Rest of Europe

## Asia Pacific

Japan

China

India

Australia

New Zealand

South Korea

Rest of Asia Pacific

## South America

Argentina

Brazil

Chile

Rest of South America

Middle East & Africa

Saudi Arabia

UAE

Qatar

South Africa

Rest of Middle East & Africa

**What our report offers:**

- Market share assessments for the regional and country-level segments
- Strategic recommendations for the new entrants
- Covers Market data for the years 2024, 2025, 2026, 2028, and 2032
- Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)
- Strategic recommendations in key business segments based on the market estimations
- Competitive landscaping mapping the key common trends
- Company profiling with detailed strategies, financials, and recent developments
- Supply chain trends mapping the latest technological advancements

**Free Customization Offerings:**

All the customers of this report will be entitled to receive one of the following free customization options:

Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

### Competitive Benchmarking

Benchmarking of key players based on product portfolio, geographical presence, and strategic alliances

## Contents

### **1 EXECUTIVE SUMMARY**

### **2 PREFACE**

- 2.1 Abstract
- 2.2 Stake Holders
- 2.3 Research Scope
- 2.4 Research Methodology
  - 2.4.1 Data Mining
  - 2.4.2 Data Analysis
  - 2.4.3 Data Validation
  - 2.4.4 Research Approach
- 2.5 Research Sources
  - 2.5.1 Primary Research Sources
  - 2.5.2 Secondary Research Sources
  - 2.5.3 Assumptions

### **3 MARKET TREND ANALYSIS**

- 3.1 Introduction
- 3.2 Drivers
- 3.3 Restraints
- 3.4 Opportunities
- 3.5 Threats
- 3.6 End User Analysis
- 3.7 Emerging Markets
- 3.8 Impact of Covid-19

### **4 PORTERS FIVE FORCE ANALYSIS**

- 4.1 Bargaining power of suppliers
- 4.2 Bargaining power of buyers
- 4.3 Threat of substitutes
- 4.4 Threat of new entrants
- 4.5 Competitive rivalry

### **5 GLOBAL MICRO-THRUSTER PROPULSION MODULES MARKET, BY**

*Micro-Thruster Propulsion Modules Market Forecasts to 2032 – Global Analysis By Propulsion Type (Electrotherma...*

## **PROPULSION TYPE**

- 5.1 Introduction
- 5.2 Electrothermal
- 5.3 Electrostatic
- 5.4 Electromagnetic
- 5.5 Chemical Micro-Propulsion
- 5.6 Cold Gas

## **6 GLOBAL MICRO-THRUSTER PROPULSION MODULES MARKET, BY FUEL TYPE**

- 6.1 Introduction
- 6.2 Ionized Gases
- 6.3 Propellants
- 6.4 Solid Propellants
- 6.5 Electric Propulsion Fluids

## **7 GLOBAL MICRO-THRUSTER PROPULSION MODULES MARKET, BY PLATFORM**

- 7.1 Introduction
- 7.2 CubeSats
- 7.3 NanoSats
- 7.4 SmallSats
- 7.5 Micro-Rovers

## **8 GLOBAL MICRO-THRUSTER PROPULSION MODULES MARKET, BY CONTROL MECHANISM**

- 8.1 Introduction
- 8.2 Pulse Plasma Control
- 8.3 Continuous Thrust Control
- 8.4 Attitude & Orbit Control

## **9 GLOBAL MICRO-THRUSTER PROPULSION MODULES MARKET, BY END USER**

- 9.1 Introduction
- 9.2 Space Agencies
- 9.3 Private Launch Companies
- 9.4 University Research Labs

## **10 GLOBAL MICRO-THRUSTER PROPULSION MODULES MARKET, BY GEOGRAPHY**

- 10.1 Introduction
- 10.2 North America
  - 10.2.1 US
  - 10.2.2 Canada
  - 10.2.3 Mexico
- 10.3 Europe
  - 10.3.1 Germany
  - 10.3.2 UK
  - 10.3.3 Italy
  - 10.3.4 France
  - 10.3.5 Spain
  - 10.3.6 Rest of Europe
- 10.4 Asia Pacific
  - 10.4.1 Japan
  - 10.4.2 China
  - 10.4.3 India
  - 10.4.4 Australia
  - 10.4.5 New Zealand
  - 10.4.6 South Korea
  - 10.4.7 Rest of Asia Pacific
- 10.5 South America
  - 10.5.1 Argentina
  - 10.5.2 Brazil
  - 10.5.3 Chile
  - 10.5.4 Rest of South America
- 10.6 Middle East & Africa
  - 10.6.1 Saudi Arabia
  - 10.6.2 UAE
  - 10.6.3 Qatar
  - 10.6.4 South Africa
  - 10.6.5 Rest of Middle East & Africa

## **11 KEY DEVELOPMENTS**

- 11.1 Agreements, Partnerships, Collaborations and Joint Ventures

- 11.2 Acquisitions & Mergers
- 11.3 New Product Launch
- 11.4 Expansions
- 11.5 Other Key Strategies

## **12 COMPANY PROFILING**

- 12.1 Aerojet Rocketdyne
- 12.2 Busek Co.
- 12.3 Astra Space
- 12.4 Accion Systems
- 12.5 Exotrail
- 12.6 Enpulsion
- 12.7 ThrustMe
- 12.8 Phase Four
- 12.9 Moog Inc.
- 12.10 Northrop Grumman
- 12.11 Safran Spacecraft Propulsion
- 12.12 Bellatrix Aerospace
- 12.13 Dawn Aerospace
- 12.14 MT Aerospace
- 12.15 Rafael Advanced Defense Systems
- 12.16 CU Aerospace
- 12.17 Benchmark Space Systems
- 12.18 ArianeGroup

## List Of Tables

### LIST OF TABLES

Table 1 Global Micro-Thruster Propulsion Modules Market Outlook, By Region (2024-2032) (\$MN)

Table 2 Global Micro-Thruster Propulsion Modules Market Outlook, By Propulsion Type (2024-2032) (\$MN)

Table 3 Global Micro-Thruster Propulsion Modules Market Outlook, By Electrothermal (2024-2032) (\$MN)

Table 4 Global Micro-Thruster Propulsion Modules Market Outlook, By Electrostatic (2024-2032) (\$MN)

Table 5 Global Micro-Thruster Propulsion Modules Market Outlook, By Electromagnetic (2024-2032) (\$MN)

Table 6 Global Micro-Thruster Propulsion Modules Market Outlook, By Chemical Micro-Propulsion (2024-2032) (\$MN)

Table 7 Global Micro-Thruster Propulsion Modules Market Outlook, By Cold Gas (2024-2032) (\$MN)

Table 8 Global Micro-Thruster Propulsion Modules Market Outlook, By Fuel Type (2024-2032) (\$MN)

Table 9 Global Micro-Thruster Propulsion Modules Market Outlook, By Ionized Gases (2024-2032) (\$MN)

Table 10 Global Micro-Thruster Propulsion Modules Market Outlook, By Propellants (2024-2032) (\$MN)

Table 11 Global Micro-Thruster Propulsion Modules Market Outlook, By Solid Propellants (2024-2032) (\$MN)

Table 12 Global Micro-Thruster Propulsion Modules Market Outlook, By Electric Propulsion Fluids (2024-2032) (\$MN)

Table 13 Global Micro-Thruster Propulsion Modules Market Outlook, By Platform (2024-2032) (\$MN)

Table 14 Global Micro-Thruster Propulsion Modules Market Outlook, By CubeSats (2024-2032) (\$MN)

Table 15 Global Micro-Thruster Propulsion Modules Market Outlook, By NanoSats (2024-2032) (\$MN)

Table 16 Global Micro-Thruster Propulsion Modules Market Outlook, By SmallSats (2024-2032) (\$MN)

Table 17 Global Micro-Thruster Propulsion Modules Market Outlook, By Micro-Rovers (2024-2032) (\$MN)

Table 18 Global Micro-Thruster Propulsion Modules Market Outlook, By Control

Mechanism (2024-2032) (\$MN)

Table 19 Global Micro-Thruster Propulsion Modules Market Outlook, By Pulse Plasma Control (2024-2032) (\$MN)

Table 20 Global Micro-Thruster Propulsion Modules Market Outlook, By Continuous Thrust Control (2024-2032) (\$MN)

Table 21 Global Micro-Thruster Propulsion Modules Market Outlook, By Attitude & Orbit Control (2024-2032) (\$MN)

Table 22 Global Micro-Thruster Propulsion Modules Market Outlook, By End User (2024-2032) (\$MN)

Table 23 Global Micro-Thruster Propulsion Modules Market Outlook, By Space Agencies (2024-2032) (\$MN)

Table 24 Global Micro-Thruster Propulsion Modules Market Outlook, By Private Launch Companies (2024-2032) (\$MN)

Table 25 Global Micro-Thruster Propulsion Modules Market Outlook, By University Research Labs (2024-2032) (\$MN)

Note: Tables for North America, Europe, APAC, South America, and Middle East & Africa Regions are also represented in the same manner as above.

## I would like to order

Product name: Micro-Thruster Propulsion Modules Market Forecasts to 2032 – Global Analysis By Propulsion Type (Electrothermal, Electrostatic, Electromagnetic, Chemical Micro-Propulsion and Cold Gas), Fuel Type, Platform, Control Mechanism, End User, and By Geography.

Product link: <https://marketpublishers.com/r/M269D4147DBEEN.html>

Price: US\$ 4,150.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

[info@marketpublishers.com](mailto:info@marketpublishers.com)

## Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/M269D4147DBEEN.html>