

Release Date : February 7, 2024

KARI Commences Development of Large-Scale Electric Propulsion Test Equipment for Deep Space Exploration

- Establishment of Vacuum Test Equipment to Verify Performance and Lifespan of Space Electric Propulsion Systems

- ☐ The Korea Aerospace Research Institute (hereinafter referred to as "KARI," led by Director Lee Sang-ryul) has developed large-scale "Electric Propulsion Test Equipment" using pure domestic technology necessary for the development of electric propulsion systems that can be used in artificial satellites, deep space exploration probes, and other spacecraft. A dedication ceremony for the equipment was held at the Hang Woo-yeon headquarters in Daejeon on February 7th (Wednesday).
- ☐ Electric propulsion systems, unlike chemical propulsion systems that utilize combustion reactions, generate and accelerate plasma with electrical energy to obtain thrust, significantly increasing fuel efficiency and reducing the amount of onboard fuel. This technology is essential for deep space exploration. Leveraging these advantages, electric propulsion systems have been applied to low Earth orbit and geostationary orbit satellites, including SpaceX's Starlink satellites.
- ☐ For the development of electric propulsion systems that must operate for tens of thousands of hours in space, performance and lifespan verification are essential. Specialized test equipment capable of creating a vacuum environment with pressures below one-billionth of

atmospheric pressure for plasma generation via discharge, rapid temperature control to transition between low and high temperatures, and plasma diagnostics are required.

- ☐ The electric propulsion test equipment constructed by KARI this time has a diameter of 3.8 meters and a length of 10 meters, making it a large-scale device that is only possessed by the United States, Germany, France, Japan, Russia, and China in terms of scale. Currently, tests are possible for electric propulsion systems with thrusts of up to 200 millinewtons (mN), and KARI plans to gradually upgrade the equipment to enable testing of electric propulsion systems with thrusts of 1 newton (N), the world's highest level of performance, by adding an ultra-low temperature disk*.

*A device designed to adsorb the propellant ions generated by the electric propulsion system onto a disk, maintaining a vacuum environment within the test equipment.

- ☐ The development of this electric propulsion test equipment took three years and approximately 4.2 billion won was invested, and it was completed using purely domestic technology in collaboration with domestic companies.
- ☐ KARI plans to thoroughly manage the national asset of electric propulsion test equipment and open it up to domestic industrial companies and research institutions for joint utilization to be used in future satellite development and deep space exploration.
- ☐ Director Lee Sang-ryul of KARI expressed, "The development of this large-scale electric propulsion test equipment will lay the foundation for South Korea to possess independent capabilities in electric propulsion system development and is expected to be a catalyst for South Korea to leap to a world-class level in space propulsion and space environment testing. "

Att. Photo of Large-Scale Electric Propulsion Test Equipment

Att.

Photo of Large-Scale Electric Propulsion Test Equipment



Photo of EPISODE 3.8*(Side)

*Electric Propulsion In-Space Operation Demonstration Equipment - 3.8m in diameter



Photo of EPISODE 3.8(Front)