# Halo Hall-Effect Thruster

ExoTerra
A Driving Force in Satellites

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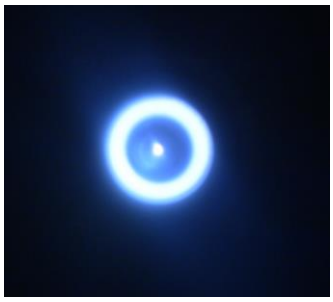
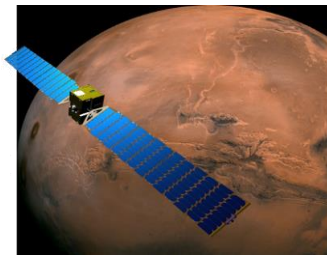
## Product Overview

ExoTerra's Halo is a compact Hall-effect thruster designed for the tight limitations of small spacecraft. Rideshare-compatible Halo thrusters extend the lifespan and utility of CubeSats, making possible new applications and mission architectures that were previously limited to larger spacecraft.

*The fifth-generation Halo design prior to vacuum chamber testing*



*The fifth-generation Halo design operating during vacuum chamber testing*



*Mars CubeSat mission concept with Halo propulsion*

## Big Propulsion for Small Spacecraft

ExoTerra's revolutionary Halo Hall-Effect Thruster allows CubeSats to escape their rideshare constrained orbits to reach optimal orbits and stay there. Halo is designed to meet the tight mass, volume, and thermal constraints of CubeSats and other rideshare spacecraft, and its high $I_{sp}$ and total impulse expand the mission potential of CubeSats by enabling them to attain and maintain targeted orbits for the first time. With Halo, CubeSats can perform better science, extend their useful lifetime, operate together in structured constellations, and even conduct low cost lunar and interplanetary missions.

- Mass: 0.65 kg
- Volume: 0.25 U
- Power range: 75-450 W
- $I_{SP}$ range: 700-1500 s
- Thrust range : 4-33 mN
- Flexible propellants: iodine, xenon, krypton, argon, neon

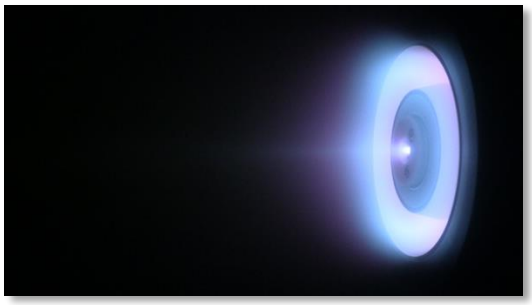
Halo has demonstrated operation at power levels between 75 and 450 W, making it the perfect choice for satellites from 6U CubeSats to ESPA class microsatellites.

## High Performance from a Tiny Package

Hall-effect thrusters are superior to combustion, electrospray, or pulsed plasma propulsion options for CubeSat and small satellite applications. Halo has demonstrated a 6x higher efficiency than traditional combustion engines can achieve, at half the mass and one-third the volume of its closest competitor.

Halo's demonstrated thrust range of 4 to 33 mN decreases total transfer time over alternatives. Specific impulse correspondingly ranges from 700 s to 1500 s, allowing Halo to produce greater ΔV from a given propellant volume than other options.

This high thrust and high efficiency fits into a compact space. Halo weighs a mere 0.65 kg and fits within a 76 mm diameter by 50 mm long envelope (excluding mission-unique gas fittings). Adding to operational flexibility, Halo can use xenon, krypton, or iodine as a propellant.



*Halo operating with xenon propellant*

## About ExoTerra

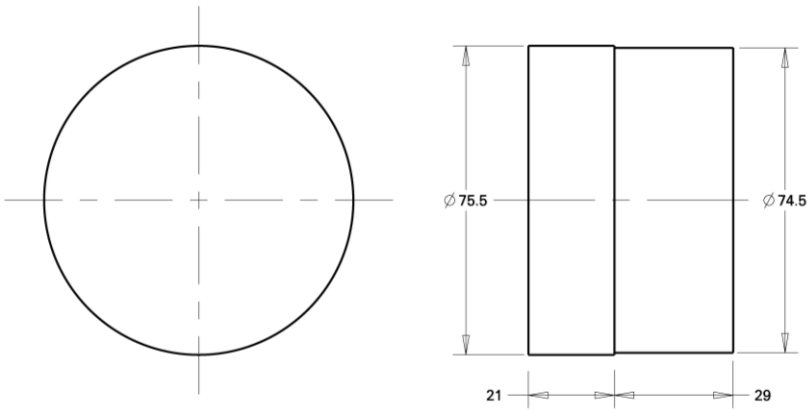
ExoTerra was founded in 2011 with a vision of reducing the cost of space exploration. We pursue this goal by developing affordable technologies that minimize spacecraft mass and volume while enhancing their performance and offering unique capabilities

## Halo Development

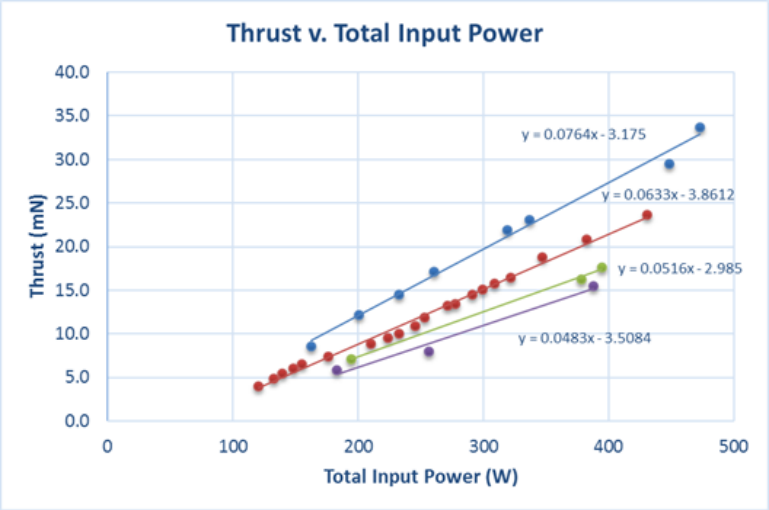
The Halo design has undergone five rounds of vacuum chamber testing, with the latest prototype completing over 300 hrs of operation and over 100 restarts using xenon propellant. The predicted life of Halo is 4,000 hours.

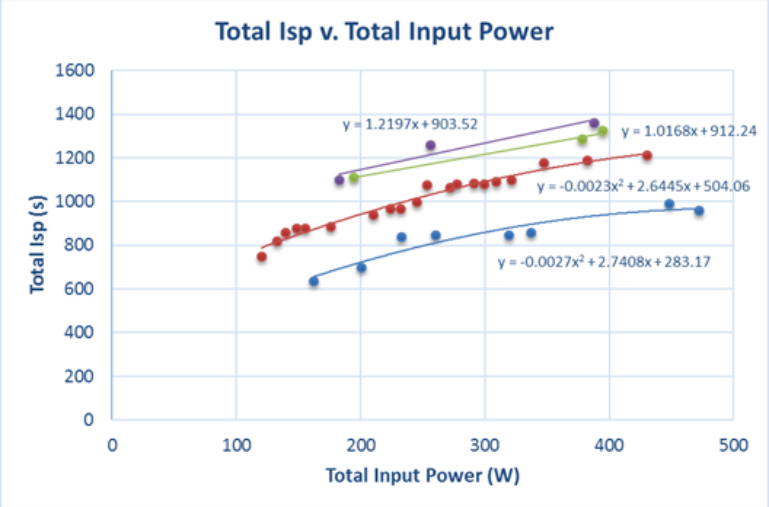
## Part of an Integrated Propulsion and Power System

ExoTerra provides a full solar electric propulsion system solution for CubeSats and microsatellites. Built around the Halo thruster, the EPIC integrated propulsion and power package includes a propellant storage and distribution system, power processing unit, thrust vector controller and high-specific-power fold-out solar arrays. The modular nature of the EPIC propulsion package allows it to be scaled to suit specific mission requirements.




*Halo Thruster Envelope Dimensions*




*Demonstrated Thrust and Specific Impulse*

Demonstrated Thrust and Specific Impulse