BENCHMARK® space systems

PRODUCT, CONFIGURATION, AND PRICING INQUIRIES
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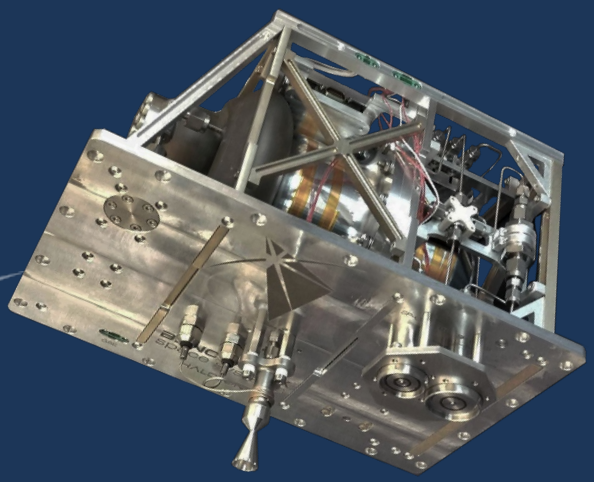
HALCYON

Integrated Non-Toxic Chemical Propulsion Systems

FIRST FLIGHT HERITAGE - 2021



PRODUCT HIGHLIGHTS

Halcyon is a non-toxic ('green'), flight-proven high-thrust propulsion product line developed for 3U through ESPA satellite operations. Our systems are designed to remove common customer pain points by combining intelligent control electronics with a modular system architecture that utilizes readily available materials and propellants to deliver **highly configurable, cost-effective solutions with best-in-class lead times.**

APPLICATIONS

- Orbit Insertion
- Collision Avoidance
- Orbit Transfer
- Station Keeping
- Precision Pointing
- Momentum Management
- RPO and Servicing
- Controlled Deorbit

MISSION-OPTIMIZED TECHNOLOGY

Based on mission-proven methods for catalytic combustion of High-Test Peroxide (HTP), our Halcyon product family offers a range of monopropellant or dual-mode (mono- and bi-propellant operability) thrusters, propellant tank sizes, and system architectures, resulting in a well-equipped toolbox for mission-optimized mobility packages. The Halcyon product line is designed for ease of integration utilizing standard interfaces that alleviate customer pain points and project schedule risk. From rapid maneuver operations to full missions, Halcyon is configured to enhance on-orbit performance for any mission.

Total Impulse: 1000 – 500,000+ Ns

Thruster Quantity: 1, 4, 5, 8, Custom

Optional: ODPS™ on-demand pressurization
RAFTI™ refueling port

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SYSTEM SPECIFICATIONS

HALCYON & HALCYON AVANT

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SYSTEM PICTURED ON PAGE 1

PARAMETER	CATALYTIC MONOPROPELLANT - HTP	DUAL-MODE BIPROPELLANT – HTP + FUEL INJECTION
THRUST	**250 mN, 1 N, 5 N, 10 N**	**2 N, 10 N, 22 N**
SPECIFIC IMPULSE	**150 - 170 s**	**290 - 310 s**
MAX FIRING TIME	**10,000 s** PER THRUSTER	**10,000 s** PER THRUSTER
MAX TOTAL THROUGHPUT (PER THRUSTER)	**250mN: 1.56 kg**/thruster **1N: 6.6 kg**/thruster **5N: 32.5 kg**/thruster **10N: 65.0 kg**/thruster	**2N: 6.8 kg**/thruster **10N: 34.0 kg**/thruster **22N: 74.8 kg**/thruster
CATALYST BED PREHEAT - Optional	**Optimal performance: 10 minutes before maneuver** (enhances performance but not required)	
SYSTEM DIMENSIONS	Configuration Specific	
SYSTEM DRY MASS	Configuration Specific	
PROPELLANT MASS	**.66 kg** (per 1000 N·s Impulse)	**.35 kg** (per 1000 N·s Impulse)
MINIMUM IMPULSE	**<10 mN·s**	**<35 mN·s**
SYSTEM TEMP RANGE (SURVIVABLE)	**-30°C** to **60°C**	
PROPELLANT TEMP (ON-ORBIT)	**-5°C** to **25°C**	
AVERAGE POWER DRAW (IDLE/FIRING)	**<4 W / <15 W**	
PRESSURIZATION TIME	**10-15 minutes for ODPS** (one time event) **N/A if launching pre-pressurized** (traditional pressurization)	
INPUT VOLTAGE RANGE	**12V, 24V - 32V**	**24V - 32V**
PHYSICAL LAYER INTERFACE	**RS422/485**	
PROTOCOL AND COMMAND INTERFACE	**Modular - flexible to preferred customer architecture**	
FIRST FLIGHT	**June 2021**	**Sept 2022**

MORE MISSION. LESS COST.

Benchmark is a full lifecycle partner committed to supporting your mission from operational planning through asset decommission in LEO, GEO, and beyond. By combining our heritage propulsion products and advanced control systems with complementary products and services, Benchmark can deliver bundled in-space mobility solutions for 3U through ESPA and OTV spacecraft with significant cost, schedule, and capability benefits over alternative offerings.

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Contact us today to explore your mission!