



NASA Selects Tethers Unlimited's HYDROS-C Thruster for First PTD CubeSat Mission

📅 June 30, 2018 👤 Doug Messier 📁 News 💬 Leave a comment

Pathfinder Technology Demonstrator-1 Mission to Demons...



BOTHELL, Wash. (Tethers Unlimited PR) — NASA has selected TUI's HYDROS-C thruster for demonstration on the first Pathfinder Technology Demonstration (PTD) CubeSat mission,



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planned for launch in early 2019.

The HYDROS-C thruster, developed under a NASA Small Business Innovation Research (SBIR) contract and matured to flight-readiness under a NASA Tipping Point Technologies Public-Private Partnership, is a revolutionary space propulsion technology that uses water as propellant.

TUI's HYDROS™ technology uses in-space electrolysis to split water into hydrogen and oxygen gas, which it then burns in a bipropellant thruster. About the size of a grapefruit, the HYDROS-C thruster enables small satellites to launch with a non-explosive, non-toxic, unpressurized propellant to minimize risks to personnel during integration and to other satellites during launch, and then use that propellant to perform large and rapid orbital maneuvers.

Under the NASA Tipping Point Partnership, TUI has also developed a HYDROS-M thruster system sized for microsatellite missions, and is currently finalizing flight units for delivery to its first commercial customer.

Capabilities

HYDROS is a novel high-TRL propulsion architecture that uses a hybrid electrical/chemical scheme to provide small spacecraft with both high thrust (≥ 1.5 N) and high Isp (≥ 310 s) propulsion.

HYDROS propulsion systems enable secondary payloads to perform missions requiring orbit agility and large ΔV s while launching with the ultimate 'green' propellant: water. Once on orbit, the HYDROS system splits the water propellant using electrical power to produce hydrogen and oxygen gas and then combusts these gases in a bipropellant thruster.

- Scalable tankage options are readily optimized to meet mission ΔV requirements.
- Flexible system CONOPS allows HYDROS to scale performance to meet mission-imposed power limits.

Performance

HYDROS-C delivers high performance bipropellant propulsion in a < 1 U form factor.

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- Provides the same performance as a 2.1 mN continuously operated thruster

A 2U 'Saddle Bag' tank configuration has been developed to be readily integrated into a variety of CubeSat and SmallSat configurations.

- 2x H₂O Tanks store 740g of water propellant
 - Freeze tolerant design
- Provides ~200 m/s of ΔV for a 6U CubeSat

Metric	Value
Impulse per Thrust Event	> 1.75 Ns
Isp	> 310 s
Average Thrust	> 1.2 N
Minimum Time to Refill Plenums	825 s
In 2U 'Saddle Bag' Configuration	
Water Capacity	0.74 kg
Total Number of Thrust Events	1,230
Total Impulse Delivered	> 2,151 Ns

Capabilities

- >3 year LEO mission design life
- Flexible mounting options
 - Flanges for deck mounting
 - Ears for rail mounting
- Scalable power consumption
 - 2W active standby
 - < 5W survival heater
 - As little as 5 W operational power
- High level command interface
 - RS-422
 - Ethernet
 - Other options available
- SWaP

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Metric	2U 'Saddlebag' Configuration	Base Thruster
Mass	2.6 kg Wet (1.87 kg Dry)	1.02 kg (Dry)
Size	~2U (190 x 120 x 92 mm)	~1U (92 mm ³)
Power	5 W– 25 W	

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