



MONOPROPELLANT PROPULSION UNIT FOR CUBESATS (MPUC) SYSTEM

LOW FLAME TEMPERATURE GREEN MONOPROPELLANT

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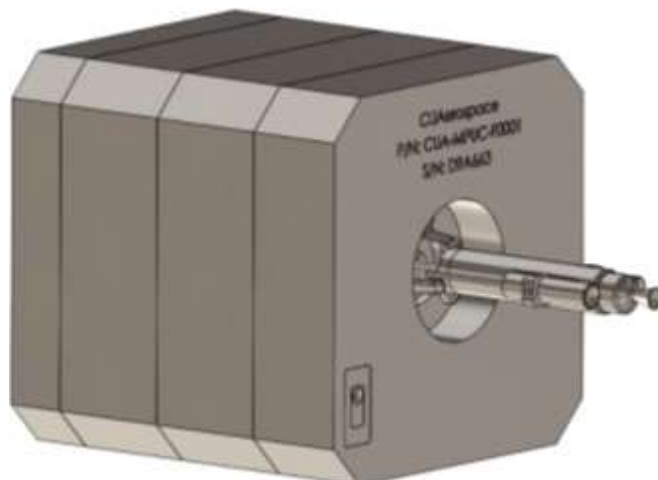
The CU Aerospace (CUA) Monopropellant Propulsion Unit for Cubesats (MPUC) system, is a compact monopropellant thruster using a high performance, non-detonable, low-toxicity (“green”) chemical monopropellant [CUA Monopropellant, formulation 10 (CMP-X)] MPUC has benign storage characteristics, uses an in-house CUA Catalyst, formulation 9, (CC-9) catalyst bed, and uses non-refractory construction materials thanks to a ~950°C flame temp. Detonability of CMP-X was verified by a certified facility with UN Test Series 1,2,3, and 6 to readily meet criteria for either 1.4S or outright exclusion from the explosives class. Propellant is driven by gaseous inert pressurant, providing constant fuel flow and thrust over the system lifetime. High “volumetric impulse” (N-s/liter) performance levels of >700 N-s/liter for the anticipated 2U system and ~180 s specific impulse for the optimized thruster head will provide significant orbital maneuverability and also enable end of mission de-orbiting. The average power requirement is projected to be a moderate ~3 W based on previously-developed hardware. CMP-X thrusters have demonstrated up to 188 s specific impulse at 230 mN thrust during thrust stand testing and continuous firing times > 10 min.



PARAMETER / PROPULSION SYSTEM	MPUC (1.5U*)	MPUC (2U*)
Thruster System Package Volume [cm ³]	1,500	2,000
Available Tank Volume [cm ³]	700	1056
Propulsion Technology	Monopropellant	
Propellant	H ₂ O ₂ -Ethanol	
Nominal Power Draw [W]	3	
Specific impulse [s]	178 (avg. over life)	
Mass Flow Rate [mg/s]	132	
Thrust [mN]	230	
Total impulse [N-s]	1407	2122
Vol. Impulse (total impulse / system volume) [N-s / liter]	938	1061
Propellant Mass [g]	805	1214
Dry Mass [g]	1641	2036
Propulsion System Wet Mass [g]	2446	3250
Delta-V capability (Propulsion Wet Mass + 10 kg) [s]	147	226
TRL Thruster Head (T17)	6	
TRL Integrated System (MPUC 1.5U)	4	

*System package volume assumes the length of the external thruster head can be housed in the CubeSat deployer spring

An MPUC system equipped with CMT technology is an exceptionally compact, moderate thrust, lightweight system with very high volumetric impulse. This system offers affordable access to CubeSat propulsion and is easily scalable to larger sizes depending on mission requirements to meet needs of differing users in DOD, industry, and academia.



CUA | 3001 NEWMARK DRIVE | CHAMPAIGN, IL 61822

T: (217) 239-1701 | INFO@CUA.SPACE | WWW.CUA.SPACE

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