WATER RESISTOJET PROPULSION

STAR-Water-nano Gen1

A self-contained 2U propulsion system for small satellites, using de-ionised water as propellant. No toxic fluids and no pressurised hazard class at load; a single regulated 12 V feed and an RS-422 link. Thrust is set by mass flow rate and heater power, so the operating point can be traded against total impulse in mission design. Two flight models have been built, acceptance tested and delivered for in-orbit demonstrations.

4 – 15 mN
THRUST, STEADY STATE

175 s
SPECIFIC IMPULSE, MEASURED

330 N·s
TOTAL IMPULSE, ESTIMATED

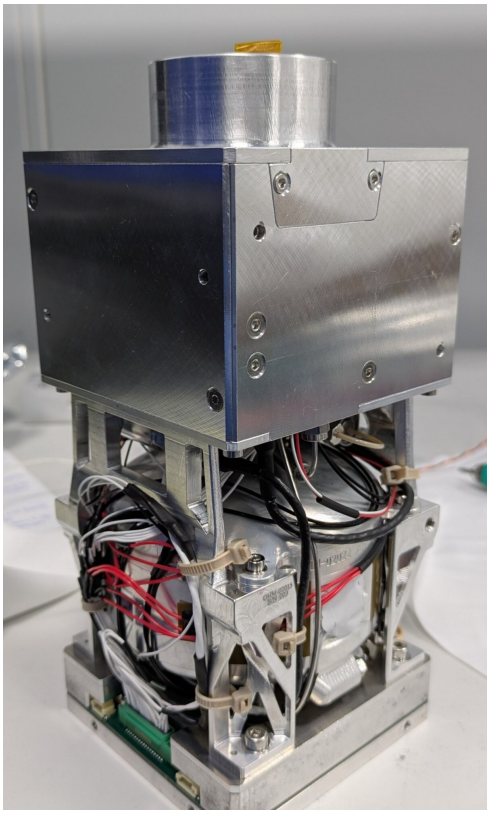
2.00 kg
MASS, WET

35 – 50 W
THRUSTER INPUT POWER

2U + tuna can
ENVELOPE

57.6 – 75.2 W
TOTAL THRUSTING SYSTEM POWER

19.0 W
SURVIVAL HEATERS (OPTIONAL)



STAR-Water-nano Gen1 flight model. The thruster unit and propellant storage and management unit sit above the power control unit; the nozzle exits the −Z face.

TEST EVIDENCE

Random vibration. Acceptance to the Falcon 9 maximum predicted environment, 5.57 g RMS, one minute per axis. Passed on both flight models.

Thermal vacuum. Ten cycles, −34 to +71 °C, 91 hours at 0.005 mbar, with firings hot and cold. Passed.

Tank. Proof at 3.1 × MEOP and 50 pressure cycles, leak tight throughout; rupture at 11.5 × MEOP.

Source: OHM-SWN-RPT-020

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STAR-Water-nano Gen1

PERFORMANCE

Thrust, steady state	4 – 15 mN
Specific impulse	up to 175 s, measured
Total impulse	330 N·s, estimated maximum
Mass flow rate	5 – 8 mg/s, typical
Thruster input power	35 – 50 W
Total thrusting system power	57.6 – 75.2 W, per OHM-SWN-ICD-001
Thrust stability	±1.0 mN

Source: OHM-SWN-RPT-021

MECHANICAL

Envelope	2U plus tuna can volume
Mass, wet	2.00 kg, including 0.200 kg propellant and 0.001 kg pressurant
Mass, dry	1.80 kg
Mounting	4 × M3 inserts on each of the +X, −X, +Y and −Y faces

ELECTRICAL

Nominal supply	11.5 – 12.5 V DC regulated, 75.2 W peak
Survival supply	8 – 28 V DC, regulated or unregulated; 19.0 W peak
Spacecraft connector	Harwin G125-MH104M4-04AD000P, 4 power + 4 signal

DATA

Physical layer	RS-422 per TIA/EIA-422-B, full duplex
Framing	ASCII, CRC-8 checked

Source: OHM-SWN-ICD-003

PROPELLANT AND PRESSURANT

Fluids	De-ionised water, with gaseous nitrogen pressurant
MEOP	6.9 bar (a)
External leak rate	$\leq 10^{-4}$ scc/s GHe
Passivation	Vent to vacuum, 5 minutes maximum

THERMAL

Interface temperature	−24 to +40 °C operating; +5 to +61 °C non-operating
Ground storage	+10 °C to +40 °C

Mechanical, electrical, propellant and thermal: OHM-SWN-ICD-001

SUPPORTING DOCUMENTS OHM-SWN-ICD-001 Interface Control Document | OHM-SWN-ICD-003 Software Interface Control Document | OHM-SWN-RPT-020 Test Activity Summary | OHM-SWN-RPT-021 Performance Summary Report. Figures carry the assumptions and tolerances stated there. Available under NDA.

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