

ENPULSION MICRO R³

Building on the heritage of the ENPULSION NANO, ENPULSION is developing a scaled version of the technology to target **small and medium size spacecrafts**. The ENPULSION MICRO R³ is engineered in a modular approach, with units clustering easily together to form building blocks that can be arranged for various mission profiles.

First models for flight demonstration missions will be delivered in Q3 of 2020.



MATURE TECHNOLOGY

The ENPULSION MICRO R³ is a scaled technology of the ENPULSION NANO with a developmental history of over 15 years. During this time, there have been hundreds of emitters tested with an ongoing lifetime test that has surpassed 30,000 hours of firing. This endurance test continues without degradations.



MODULAR PACKAGE WITH HIGH TOTAL IMPULSE

One module and its tank only take up a volume of 1.6 L and can provide more than 50,000 Ns at 4,000 s I_{sp}. The module is simply bolted to the outside of the spacecraft and can be used as a standalone unit or easily be clustered for higher thrust applications.



DYNAMIC PRECISE THRUST CONTROL

Thrust can be controlled through the electrode voltage, which provides excellent controllability, down to a precision of 50 μN with low thrust noise.



DEBRIS SAFETY

Even during active operation, no part of the thruster is pressurized, and no chemical energy is stored. This means that in case of a collision or impact, there will not be an explosive reaction which could harm the spacecraft and create debris.



CONTROLLABLE SPECIFIC IMPULSE UP TO 6,000 S

With its efficient ionization process the ENPULSION MICRO R³ can deliver higher specific impulse than any other ion propulsion system currently on the market. The thruster is capable of a range of I_{sp} from 1,000 s to 6,000 s.



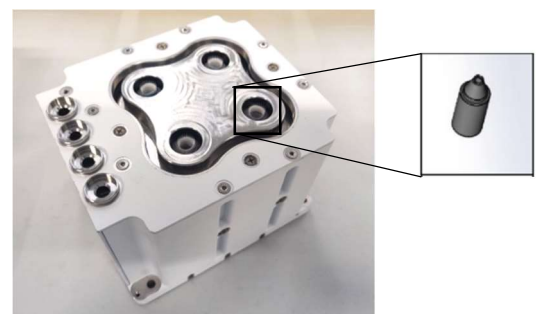
HERITAGE ELECTRONICS

The Power Processing Unit is based on the heritage electronics used in the ENPULSION NANO, leveraging exhaustive on-orbit and testing heritage, as well as introducing component lot control and heritage in EEE part selection. The PPU can be either stacked or integrated separately from the thruster



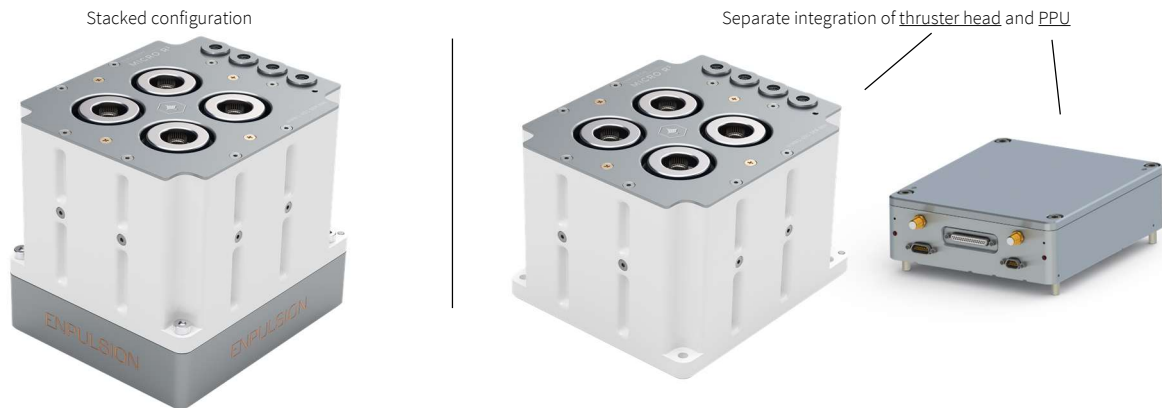
SAFE AND INERT SYSTEM COMPLIANT DURING LAUNCH

The FEEP technology contains no moving parts and uses non-toxic indium as propellant. There are neither liquids or reactive propellants nor pressurized vessels. Stored as a solid and filled at our factory it requires no special handling, integration, or launch procedures.



4 Emitters, reservoir for 1.3 kg of indium in a 14x12x10 cm envelope

Each emitter is identical to used in the ongoing lifetime test (>24,000 h)

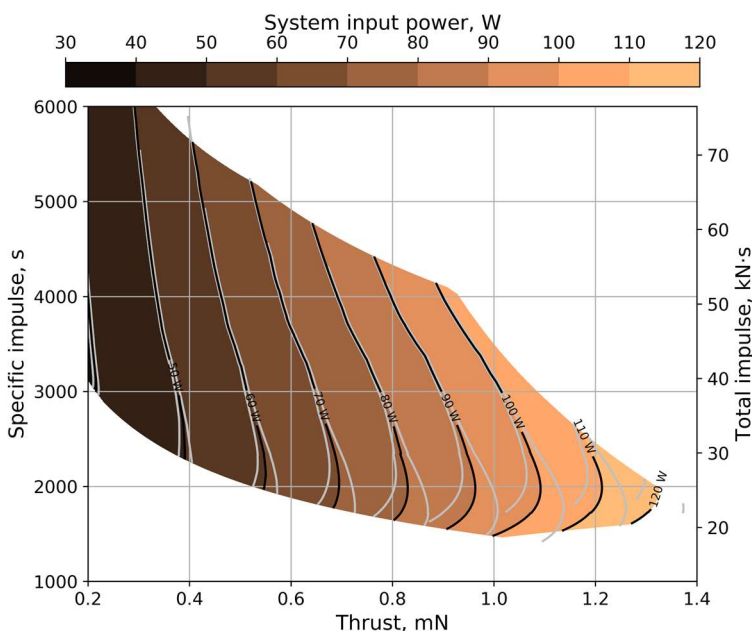


PROPERTIES AND PERFORMANCE

The ENPULSION MICRO R³ can be integrated in a stacked configuration, with the PPU situated directly underneath the thruster head, with same footprint. Alternatively, the PPU box can be integrated separately from the thruster head.

	MICRO R ³ 1 UNIT	MICRO R ³ 4 UNITS
DYNAMIC THRUST RANGE	200 μ N - 1.35 mN	200 μ N – 5.4 mN
NOMINAL THRUST	1 mN	4 mN
SPECIFIC IMPULSE	1,500 - 6,000 s	1,500 - 6,000 s
PROPELLANT MASS	1.3 kg	5.2 kg
TOTAL IMPULSE	> 50 kNs	> 200 kNs
TOTAL SYSTEM POWER	30 - 120 W	30 - 480 W
POWER AT NOMINAL THRUST *	90 - 100 W	360 - 400 W
OUTSIDE DIMENSIONS		
Thruster head	140 x 120 x 98.6 mm	280 x 240 x 98.6 mm
PPU box	140 x 120 x 34.0 mm	280 x 240 x 38.0 mm*
MASS (DRY / WET) including PPU	2.6 kg / 3.9 kg	10.4 kg / 15.6 kg
HOT STANDBY POWER	10 - 15 W	40 - 60 W

**) alternative arrangement of the individual modules possible*



OPERATIONAL ENVELOPE

The ENPULSION MICRO R³ can be operated at a wide range of thrust and specific impulse, depending on the power level available. The operational envelope is based on total system power including typical heater and neutralizers consumption.