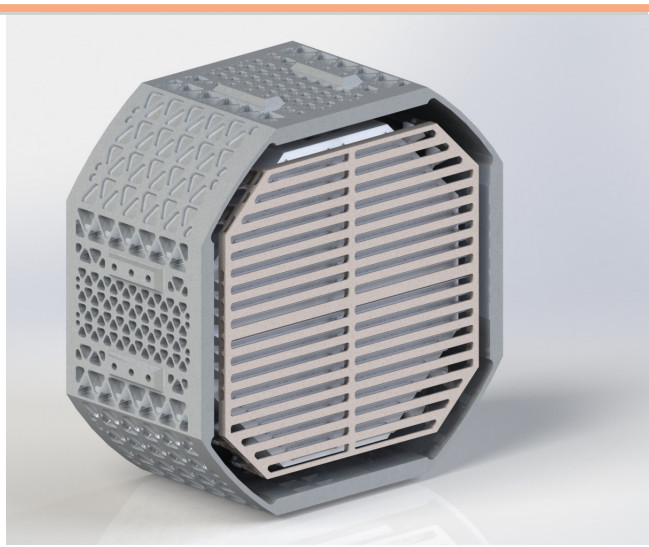
ENPULSION NEO

FEEP | FIELD EMISSION ELECTRIC PROPULSION

as of Jan 2024

The ENPULSION NEO propulsion system is the next step in FEEP technology evolution. By stepping up the number of ion emission sites by an order of magnitude compared to previous electrospray thrusters it allows high power and high thrust operation. The ENPULSION NEO propulsion system carries over the simplicity, ease of integration and unmatched impulse density of ENPULSION's products.

Development and qualification of the ENPULSION NEO propulsion system is supported by the European Space Agency (ESA) through the ARTES program.



MATURE TECHNOLOGY

The ENPULSION NEO builds on lessons learned from close to 200 ENPULSION thrusters already in space. It draws on ENPULSION's extensive production experience with FEEP propulsion systems across all types of missions.

EASE OF INTEGRATION

With no fluidic control system or external tanks, the NEO integration is as simple as bolting the thruster head and electronics on their respective panels and connecting the harness. The NEO is designed to fit within a 15-inch ESPA class separation ring.

REDUNDANCY

With approximately 2,000 ion emission sites the thruster is inherently resilient to micro-damages. The electronics architecture is also designed around parallel high voltage supplies to increase system robustness.

DEBRIS SAFETY

Even during active operation, no part of the thruster is pressurized, and no chemical energy is stored. This increases debris safety and simplifies passivation. It also simplifies range operations.

HIGH SPECIFIC IMPULSE FOR LOW SYSTEM MASS

With its high specific impulse (>2,500 s) and propellant density 4 times higher than xenon the ENPULSION NEO propulsion system is both more compact and at the same time lighter than traditional EP systems.

COMMODITY PROPELLANT

Indium is the ideal alternative propellant. It is a widely available metal primarily used in semi-conductor manufacturing. It is a by-product of zinc refining and has a yearly production of around 1,000 tons shared between several countries. It is non-toxic and unpressurised in all phases of integration and flight.

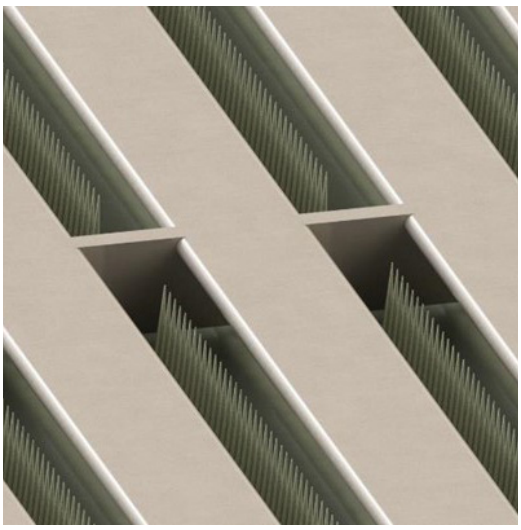
HIGH THRUST TO POWER RATIO

By scaling up main beam power and optimizing the operation point, the efficiency and power-thrust ratio are greatly improved compared to ENPULSION's lower power propulsion systems.

Doc.No: ENP2022-020 | Iss/Rev.: B.1

ENPULSION
NEO

A NEW CLASS OF ELECTRIC PROPULSION



The ENPULSION NEO propulsion system is the most powerful FEEP thruster ever designed. Thousands of individual needles all operate in parallel providing redundancy. The needles are directly placed on top of the liquid metal reservoirs, feeding passively through capilary action.

The ENPULSION NEO propulsion system is designed for ease of integration. The thruster head combines emission surface and propellant tanks and features no valves, fill plugs or flow controllers. It is easily bolted on the external panel of a spacecraft with minimal thermal requirements. The thruster head also fits inside a number of 15-inch ESPA class separation rings.

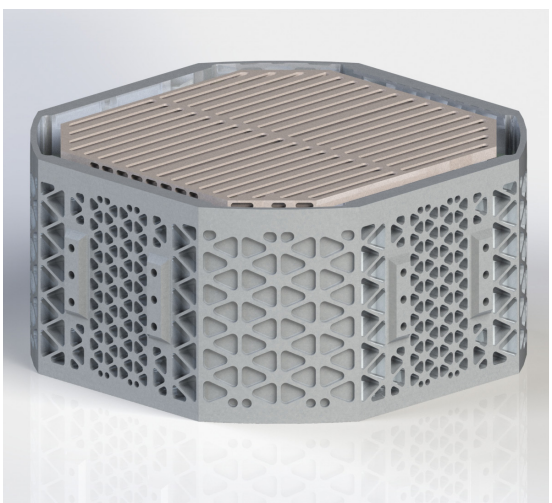
With its non-toxic, non-pressurized propellant the thruster is shipped full to customers through regular parcel carriers. It does not necessitate any special accommodation for integration on the spacecraft or the launcher.

NOMINAL THRUST: [1]		17 mN
SPECIFIC IMPULSE: [1]		~ 2,500 s
PROPELLANT MASS: [1]		20 kg
TOTAL IMPULSE: [1]		> 550 kNs
TOTAL SYSTEM POWER: [1]		1,000 W
DIMENSIONS:	(THRUSTER HEAD INCLUDING TANKS)	ø 340 × 155 mm
MASS (DRY/WET): [1]	(THRUSTER HEAD INCLUDING TANKS)	15 kg / 30 kg
HOT STANDBY POWER: [1,2]		40 – 60 W

DEVELOPMENT

Development and qualification of the ENPULSION NEO propulsion system is supported by the European Space Agency (ESA) through the ARTES program.

Based on the thousands of porous needle ion emitters manufactured for the ENPULSION NANO and MICRO thrusters, a new generation of emitter is in development to increase thrust density, specific impulse, and efficiency. First prototypes of the new ion emitters have already been manufactured and test fired.



1 Preliminary numbers, subject to changes as development progresses.
2 Dependent on accommodation and resulting thermal environment.