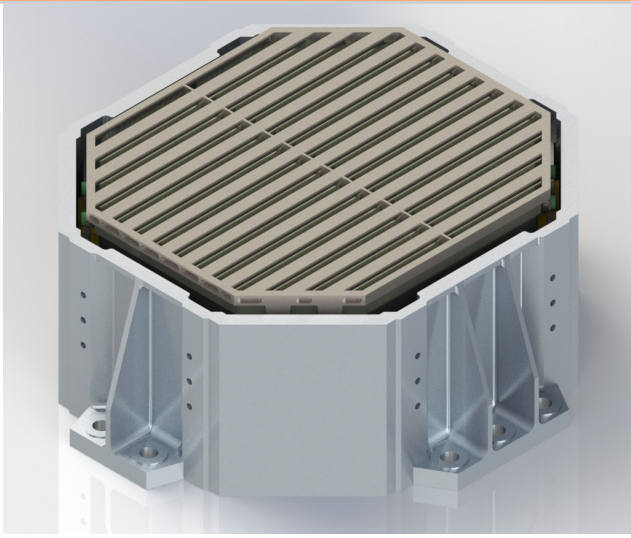
ENPULSION NEO

FEEP | FIELD EMISSION
ELECTRIC PROPULSION

The **NEO thruster** 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 NEO thruster carries over the simplicity, ease of integration and **unmatched impulse density** of ENPULSION's products.



MATURE TECHNOLOGY

The ENPULSION NEO builds on lessons learned from more than a hundred 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 two thousand 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 (>2500s) and propellant density four times higher than xenon the NEO thruster system is both more compact and lighter than traditional EP systems.

COMMODITY PROPELLANT

Indium is the ideal alternative propellant. It is widely available metal primarily used in semi-conductor manufacturing. It is a by-product of zinc refining and has a yearly production of around 1000 tons shared between several countries. It is non-toxic as well as 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.

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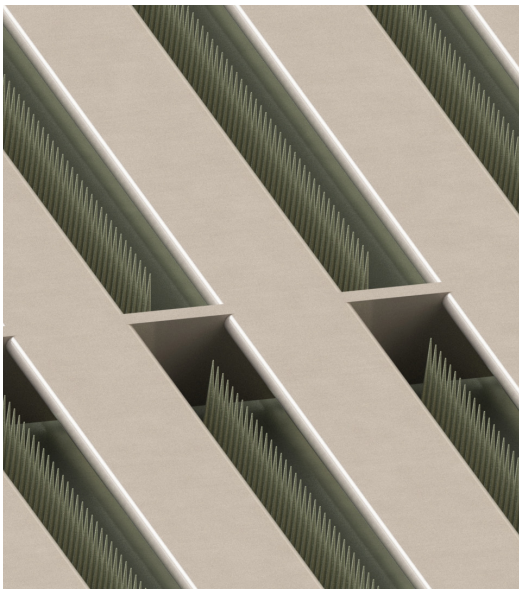
ENPULSION
NEO

A NEW CLASS OF ELECTRIC PROPULSION



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

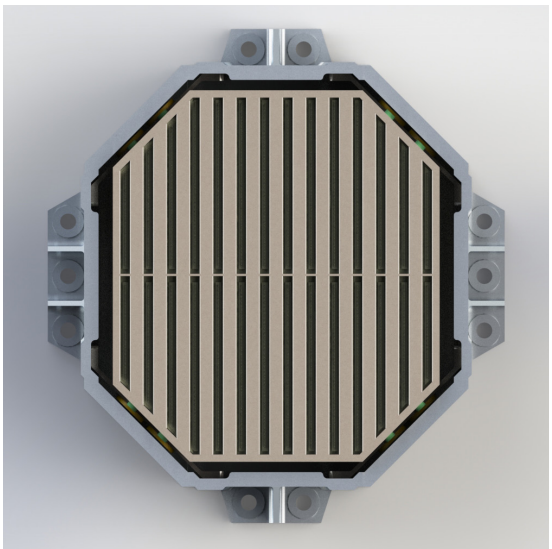
The ENPULSION NEO is **designed for ease of integration**. The thruster head combines emission surface and propellant tanks and features no valves, fill plugs or flow controllers. It is easily bolted on the external panel of a spacecraft with minimal thermal requirements. The thruster head also fits 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 normal parcel carriers. It does not necessitate any special accommodations for integration on the spacecraft or the launcher.

NOMINAL THRUST:[1]		20 mN
SPECIFIC IMPULSE:[1]		~ 1500 s
PROPELLANT MASS:[1]		23 kg
TOTAL IMPULSE:[1]		> 550 kNs
TOTAL SYSTEM POWER:[1]		800 W
DIMENSIONS:	(THRUSTER HEAD INCLUDING TANKS)	ø 340 × 150 mm
MASS (DRY/WET):[1]	(THRUSTER HEAD INCLUDING TANKS)	7 kg (DRY) / 30 kg (WET)
HOT STANDBY POWER:[1,2]		40 – 60 W

DEVELOPMENT

Development and qualification of the ENPULSION NEO thruster is supported by the *European Space Agency* through the *ARTES* program. Based on the thousands of porous needle ion emitters already 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. Qualification of the thruster system is scheduled to start *early 2024*.



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