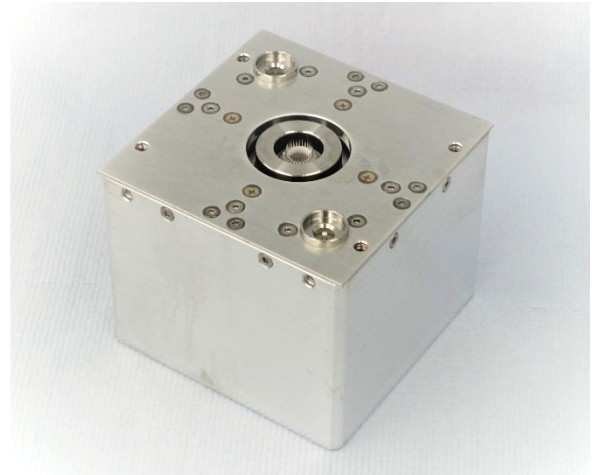


IFM NANO THRUSTER COTS+

FIELD EMISSION ELECTRIC PROPULSION (FEED)

FEED propulsion technology for precise orbit control of scientific satellites in formation flight was developed at FOTEC with **support from ESA** for more than 15 years. ENPULSION has been founded as a Spin-Out company from FOTEC to meet the market demand for small satellite propulsion by introducing **mass production techniques**. The resulting IFM Nano Thruster was commercialized for low-cost, small satellites aiming at **rapid design and short lifecycles**.



LOT CONTROL

All EEE components of the IFM Nano Thruster COTS+ are procured in **lot-controlled batches**. Selected sets of these batches are subjected to radiation testing, so that each thruster delivered to a customer can be traced back to a fully representative qualification model using components from the same batch.



FLIGHT HERITAGE

The IFM Nano Thruster COTS+ is an updated version of the space proven IFM Nano Thruster with **more than 28 units in space***. It is directly building on its heritage, leveraging the proven design and component selection.

*as per March 2020



PROTECTIVE CASING

The thruster is assembled into a protective casing that **shields the electronics** from the hazardous space radiation environment, **facilitates handling** during integration, and allows for either **panel or side mounting**.



VERSATILE PERFORMANCE

Thrust can be controlled through the electrode voltages, providing **excellent controllability** over the full thrust range and a low thrust noise. Due to the efficient ionization process, the IFM Nano Thruster can provide a higher specific impulse than any other ion propulsion system currently on the market.

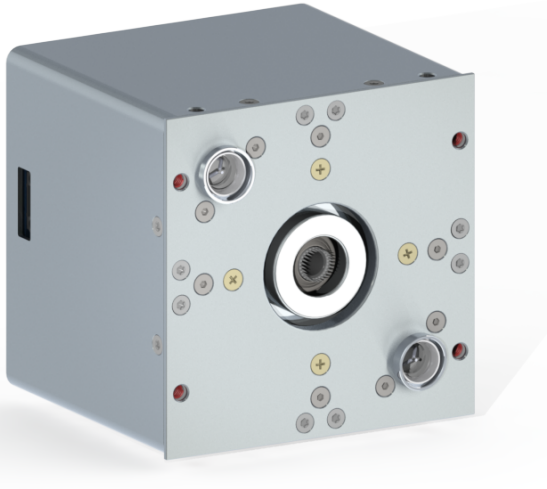


SAFE AND INERT SYSTEM

The IFM Nano Thruster contains **no moving parts** and the indium propellant is in its solid state at room temperature. Avoiding any liquid and reactive propellants as well as pressurized tanks significantly simplifies handling, integration and launch procedures.



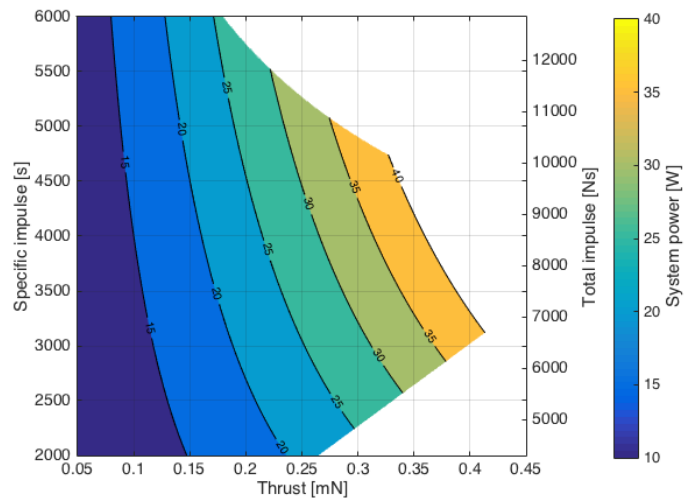
PROPERTIES AND PERFORMANCE



While the required power to operate the IFM Nano Thruster COTS+ starts at around 8 W, at higher power levels one can choose between high thrust and high specific impulse operation. The IFM Nano Thruster COTS+ can operate at an I_{sp} range of 2,000 to 6,000 s.

At any given thrust point, higher I_{sp} operation will increase the total impulse, while also increasing the power demand. The thruster can be operated along the full dynamic range throughout the mission. This means that high I_{sp} and low I_{sp} manoeuvres can be included in a mission planning as well as high thrust orbit manoeuvres and low thrust precision control manoeuvres.

DYNAMIC THRUST RANGE	10 TO 400 μ N
NOMINAL THRUST	350 μ N
SPECIFIC IMPULSE	2,000 TO 6,000 s
PROPELLANT MASS	220 g
TOTAL IMPULSE	MORE THAN 5,000 Ns
POWER AT NOMINAL THRUST	40 W INCL. NEUTRALIZER
OUTSIDE DIMENSIONS	98.0 x 99.0 x 94.5 mm
MASS (DRY / WET)	<1080 / <1300 g
TOTAL SYSTEM POWER	8 - 40 W
HOT STANDBY POWER	3.5 W
COMMAND INTERFACE	RS422 / RS485
TEMPERATURE ENVELOPE (NON-OPERATIONAL)	-40 TO 105°C
TEMPERATURE ENVELOPE (OPERATIONAL)	-20 TO 40 °C
SUPPLY VOLTAGE	12 V, 28 V, OTHER VOLTAGES UPON REQUEST



Depending on available power, the user can choose from any operational point - data shown corresponds to 12 V configuration