

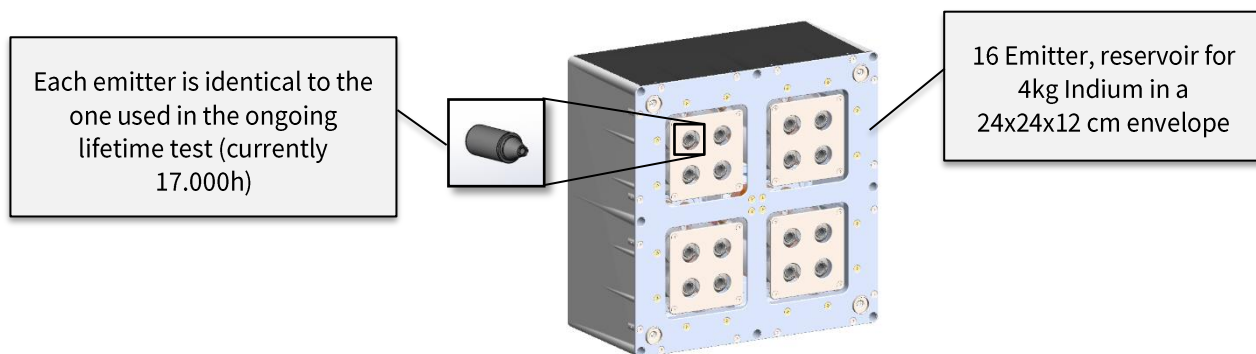
## IFM Micro Thruster

Building on the Heritage of the IFM Nano Thruster, ENPULSION is developing a scaled version of the technology to target **small and medium size spacecrafts**. This product development is funded by a 1.7 M€ (\$2.1 M) development project from the European Commission in cooperation with Airbus, CNRS and EPFL.

**First prototypes for flight demonstration missions will be available end of 2018. A qualified product will be on the market mid 2019.**

### PRODUCT FEATURES

<b>MATURE TECHNOLOGY</b>	The IFM Micro Thruster is using the same emitter as the IFM Nano Thruster, developed under ESA contracts for 15 years. In this time more than 100 emitter have been tested and an ongoing lifetime test has demonstrated more than 17,000 h of firing without degradation of the emitter performance.
<b>DYNAMIC PRECISE THRUST CONTROL</b>	The thrust can be controlled through the electrode voltages, providing excellent controllability over the full thrust range and a low thrust noise.
<b>CONTROLLABLE SPECIFIC IMPULSE UP TO 6000 S</b>	Due to the efficient ionization process, which allows the capacity to ionize up to 60% of the evaporated Indium atoms, the IFM Micro Thruster can provide a higher specific impulse than any other ion propulsion system currently on the market.
<b>SAFE AND INERT SYSTEM COMPLIANT WITH ALL LAUNCHER REQUIREMENTS</b>	The IFM Micro Thruster contains no moving parts and the 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.
<b>THRUST VECTORING</b>	The four segments of the thruster can be controlled individually and provide a significant thrust vectoring capability.



## PROPERTIES AND PERFORMANCE

The following figures are based on testing of the individual emitter, as well as heritage from the IFM Nano Thruster. They therefore represent estimates and design targets. More accurate figures including direct thrust measurements will become available within 2018.

PARAMETER	VALUE
<b>Dynamic thrust range</b>	300 $\mu$ N to 5 mN
<b>Nominal thrust</b>	4 mN
<b>Specific impulse</b>	2,000 to 6000 s
<b>Propellant mass</b>	4 kg
<b>Total impulse</b>	more than 150 kNs @ 4000s Isp
<b>Power at nominal thrust</b>	350 W incl. neutralizer
<b>Outside dimensions</b>	Thruster < 240 x 240 x 133 mm Electronics < 200 x 200 x 40 mm
<b>Mass (dry / wet)</b>	<6.7kg / <10.7 kg
<b>Total system power</b>	50 – 400 W
<b>Hot standby power</b>	3.5-50 W
<b>Command interface</b>	RS422/RS485, other possible
<b>Temperature envelope (non-operational)</b>	-40 to 105°
<b>Temperature envelope (operational)</b>	-20 to 40 °C
<b>Supply voltage</b>	28 V, other voltages upon request

The IFM Micro Thruster can be operated at a wide range of thrust and specific impulse for different power levels. The operational envelope of the IFM Micro based on total system power including heater and neutralizers is shown below.

