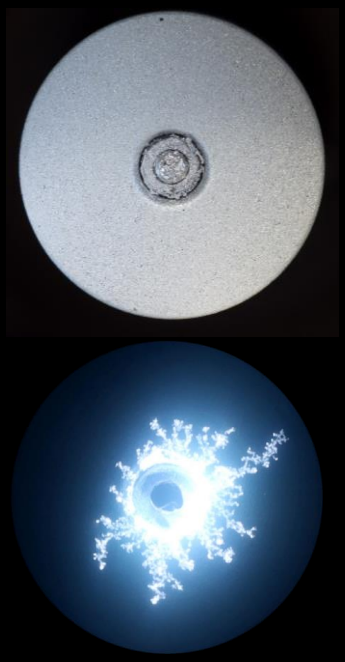
Neumann Drive®

Datasheet

Neumann Space has engineered an innovative plasma propulsion system based on its Centre-Triggered Pulsed Cathodic Arc Thruster technology. The Neumann Drive® family of systems is a safe, simple-by-design and efficient propulsion solution for a variety of mission needs.

The Neumann Drive® creates a plasma from a solid, conductive fuel rod to produce thrust. Its pulsed operation maintains performance efficiencies throughout power input regimes and allows precise tailoring of impulse bit delivery. The Neumann Drive ® family are all non-pressurised, and utilise no hazardous substances throughout integration, transport, launch and in-orbit operations.



Solid molybdenum fuel rod surface at atmosphere and firing plasma in vacuum

MEET THE FAMILY

ND-15	Our first-generation system designed for nanosatellites. Two systems successfully launched to orbit in June and December 2023.
ND-50	A smaller, lighter, more powerful nanosatellite system that has been successfully integrated into spacecraft of our European partners. First units awaiting launch in Q4 2024.
ND-50S	A special version of the ND-50 being designed to withstand high G-loading for a dedicated launch system.
ND-500+	The big brother of the family, the ND-500+ is a solution for SmallSat class spacecraft. Currently in the design phase and entering functional testing in mid-2024.

TECHNICAL BENEFITS

Unique propellant characteristics
Solid state fuel rod simplifies propellant management. Various metals and alloys can be used to customise performance.

Safe
No hazardous substances and chemically inert fuel leads to hassle free handling and logistics, and minimal required training.

Superior fuel efficiency
High Isp, System can be operated to give pulses precisely when needed to minimise inefficiencies.

Simple design, no moving parts
Simple, robust design reduces launch safety concerns and spacecraft failure modes. ITAR Free.

Storable integrated and fuelled
Long shelf life enables minimal schedule disruption and responsive access to space.

Scalable
Thrust scales linearly with power, with high total impulse to density ratio at system level.

Simple manufacturing
Well suited for high volume fast manufacturing and assembly. Perfect for constellations.

Refuellable in the future
Including from Space debris, ideal for a circular in-space propulsion ecosystem to make space operations more resilient.

Quasi-neutral exhaust
No neutralizer required, easy to cluster in close proximity.

Narrow exhaust plume
Increasing the possible footprint of spacecraft.

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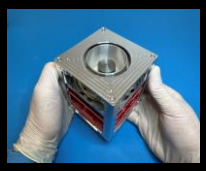
NEUMANN SPACE

	ND-15	ND-50	ND-500+
PRODUCTS			WORK IN PROGRESS
STATUS			
Objective	Technology demonstration only	Commercial CubeSat/SmallSat	Commercial SmallSat
Status	In-orbit	Integrated, Awaiting Flight	In Development
Bus platforms	Skyride (Skykraft), Apogee 6U (Inovor)	CarbSAR (SSTL), Apogee 6U (Inovor), EDISON 6U (Space Inventor)	G-Sat (Gilmour Space)
Missions	June'23, Q4'23	Q4 2024 & Q1 2025	2025
PERFORMANCES			
Minimum Impulse per pulse	45 µN.s	150 µN.s	1 mNs (est)
Maximum Pulse Frequency	83 mHz	0.67 Hz	Up to 6 Hz
Specific Impulse	1,800 to 2,000 s	1,800 to 2,000 s	2,500 s (est)
Maximum Input Power	14 W	50 W*	10 – up to 500W*
Dimensions (fuelled)	150 x 100 x 97 mm	100 x 96 x 96 mm	Various sizes
Total wet mass	1.9 kg	1.4 kg	10 to 20 Kg
DESIGN & QUALIFICATION			
Total Impulse	880 Ns (min.)	1.5 kNs*	Up to 250 kNs (est)
Temperature (operational)	-10°C to 50°C	-20°C to 60°C	-20°C to 60°C
EMC/EMI Test Method (inspired)	MIL-STD-461G	MIL-STD-461G	MIL-STD-461G
Vibrations & Shock	NASA GEVS GSFC-STD-7000B	NASA GEVS GSFC-STD-7000B	NASA GEVS GSFC-STD-7000B
INTERFACES			
Input Voltage (nominal)	14 V	28 V*	28 V*
Bus Interface	UART/CAN/ RS485/RS422	CAN/ RS422	CAN/RS422

* Indicates scope to adjust current capability to mission needs

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