

DEFENCE AND SPACE

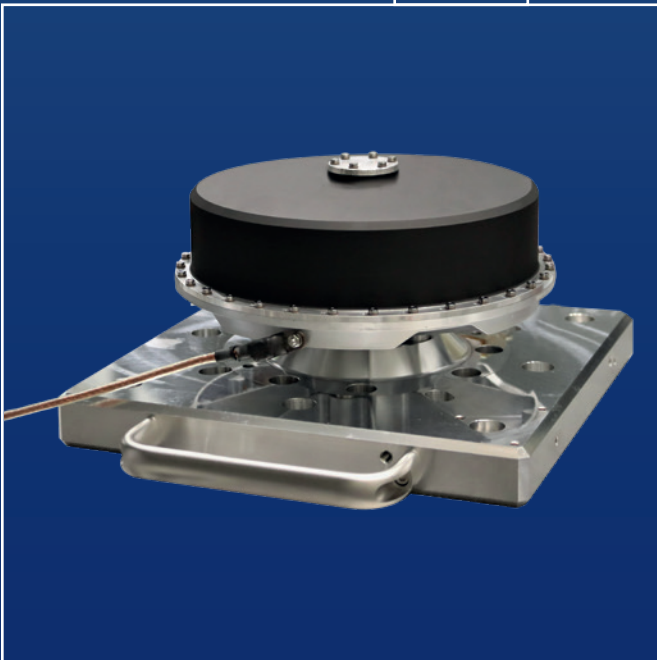
Space Products

HCA 4-1

High Capability Actuator
for Small Satellites



A v i o n i c s



Based on our long heritage and expertise enabling agile satellites, Airbus Space Products has responded to increased demand for small satellite agility with a new product targeting 200-500 kg satellites.

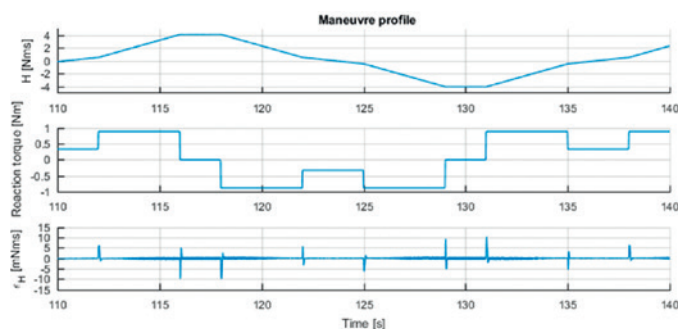
We now offer actuators based on high torque reaction wheels (1Nm with 4Nms) that bring to the small satellite user fast maneuver capability with enhanced pointing control, ideal for EO applications.

Commonly named Smart Wheel, Airbus HCA 4-1 has been designed & developed in order to ensure:

- Local speed control which improves performance and simplifies AOCS
- 100% digital interface with the OBC, simplified interfacing with the satellite
- Possibility to control the wheel in different ways (3 different control modes)

KEY FEATURES

- Agility enabler for 200-500 kg platforms
- Allows high-speed maneuvers and enhanced pointing control
- Unmatched effective torque/consumption ratio
- Precision of angular momentum realization better than 1mNm in imaging conditions
- Combines an ease of use and cost efficiency
- Unmatched ease of integration at platform level with respect to mini-CMG's
- Complete redundant solution comprised of four separate RWA mechanisms, two drive electronics and four supercapacitors



PERFORMANCES		New Scalable Actuator 4-1
Maximum reaction torque		0.980 Nm Qualified (1.2 Nm in dev.)
Maximum angular momentum		4.0 Nms (6.0 Nms with a reduced torque range)
Nominal Mass	Mechanism	5.90 kg
	Electronics	5.60 kg (for two channels in the same box driving one mechanism each)
	BOSC	1.21 kg
Volume	Mechanism	Ø240 mm, H 110 mm
	Electronics	L 240 mm, I 190 mm, H 150 mm
	BOSC	L 190 mm, I 120 mm, H 60 mm
Consumption at null torque		9.3 W @ 0.5Nms 21.6 W @ 4Nms
Consumption at maximum torque		35.2 W @ 0.5Nms 47.5 W @ 4Nms
Stiffness	Mechanism	> 140 Hz
	BOSC	> 140 Hz
Lifetime in LEO orbit		up to 10 years
Communication interface		Digital TM/TC interface
Maturity		Qualified in 2022
Power Bus interface		Unregulated 22-38 V

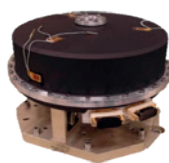
An extended suite of products based on this actuator is currently under development with a qualification in 2024

- Torque evolution up to 4Nm
- Targeted angular momentum of 8 Nms

Mechanism

Its function is to create torque and angular momentum. It is comprised of a motor, high reliability bearings and a high-speed optical encoder.

Qualified.



Electronics

Its purpose is to manage the RWA mechanism and the bank of supercapacitors. It is composed by 2 independent channels driving one mechanism each.

It also provides communication with the satellite platform by way of the serial TM/TC interface based on RS422/485 and performs monitoring and test functions.

Qualified.



BOSC (Bank Of Supercapacitors)

Its purpose is to store energy during operative phases; energy which is then converted into the kinetic energy of the mechanism.

Qualified.

The equipment's operation is based on a reversible conversion of the kinetic energy of the rotor. Energy taken from the satellite bus only compensates for the internal losses of the equipment.

Thanks to its unique operating principle, this new and scalable actuator for small satellite missions stands out from the competition with an excellent maximum torque to consumption ratio. This characteristic simplifies integration on small platforms and paves the way for reaction wheel based agility, providing several operating and control modes to accommodate the needs of different mission phases.