

Eddy-current damper for controlled deployment

MODEL GED-04

TRL 4–5

NON-CONTACT · ZERO LEAKAGE

OVERVIEW

ECD is a magnetic hysteresis, non-contact rotational damper developed for controlled-rate deployment of spring-driven spacecraft appendages. A conductive rotor moves through a permanent-magnet field, generating an eddy-current braking torque that is proportional to rotational velocity — with zero physical contact, zero leakage path, and no wear surfaces.

Because damping is purely electromagnetic, ECD requires no external power, no fluid seals, and needs no maintenance across mission life — making it suited to long-duration deployments where predictable, repeatable deployment kinematics are mission-critical.



Passive & maintenance-free

- No external power required
- No fluid paths or seals
- Zero wear surfaces

Predictable damping

- Torque scales linearly with velocity
- Consistent across mission life
- No leakage or outgassing

Simple integration

- Direct shaft-mount interface
- Compact, low-mass package
- Compatible with existing hinge lines

TECHNICAL SPECIFICATIONS

DAMPER	
Damping type	Non-contact, passive eddy-current
Torque range	0.1 – 2.0 N·m (≈1 – 20 kgf·cm)
Mass	45 g
Life rating	No wear surfaces — effectively unlimited
Contamination class	Zero outgassing, zero leakage
Operating temperature	–40°C to +85°C

INTERFACE	
Rotor material	Aluminium alloy / copper
Magnet type	Rare-earth (NdFeB), radiation-tolerant grade
Bearing type	Stainless steel, preloaded pair
Mounting	Shaft-mount, keyed drive
Shaft interface	Splined, direct hinge-line coupling
Power required	None (fully passive)

HOW IT WORKS

As the driven shaft rotates during deployment, a conductive rotor sweeps through a stationary permanent-magnet field. The induced eddy currents generate a reaction torque proportional to angular velocity, slowing the deployment smoothly and preventing end-of-travel shock — with no physical contact between rotor and stator.

Application examples: solar array deployment-rate control, antenna and boom hinge damping, controlled-speed release of spring-driven appendages

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Specifications are representative target values for the current development configuration, pending formal qualification test data. Customizable to application torque and life requirements.