

Rotary viscous damper for deployment rate control

MODEL GRD-05

TRL 4–5

DUAL-BARRIER SEAL · ZERO LEAKAGE

OVERVIEW

RVD is a precision fluid-damping mechanism using high-viscosity silicone fluid contained within dual-barrier seals, tuned for hinge-rate control on deployable structures where predictable deployment speed and containment integrity are mission-critical.

Compared to eddy-current damping, RVD offers higher torque density in a compact envelope, making it suited to heavier deployables where a larger reaction torque is required through the deployment stroke.



High torque density

- Compact envelope for given torque
- Consistent damping through stroke
- Tunable via fluid viscosity grade

Sealed & contained

- Dual-barrier seal architecture
- Zero leakage under launch/vacuum loads
- No external contamination path

Simple integration

- Direct shaft-mount interface
- Compatible with existing hinge lines
- Low part count

TECHNICAL SPECIFICATIONS

DAMPER		INTERFACE	
Damping type	High-viscosity silicone fluid, dual-barrier seal	Shaft material	Stainless steel
Torque range	0.05 – 1.0 N·m (≈0.5 – 10 kgf·cm)	Seal life	100+ bench-test cycles
Mass	60 g	Bearing type	Stainless steel, preloaded pair
Fluid viscosity grade	500,000 cSt silicone	Mounting	Shaft-mount, keyed drive
Containment	Dual-barrier, zero leakage	Shaft interface	Splined, direct hinge-line coupling
Operating temperature	–40°C to +85°C	Power required	None (fully passive)

HOW IT WORKS

A vaned rotor turns within a sealed cavity of high-viscosity silicone fluid as the driven shaft rotates during deployment. Fluid shear generates a reaction torque that opposes rotation, damping deployment speed smoothly across the full stroke while the dual-barrier seal keeps the fluid fully contained under vacuum and launch loads.

Application examples: hinge-rate control for deployable structures, controlled-speed release of heavier appendages, boom and mast deployment damping

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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.