

Spring-driven satellite deployment hinge

MODEL GDH-03

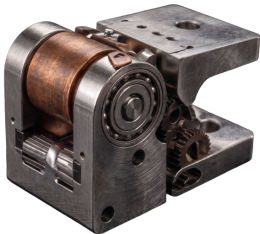
TRL 4–5

ZERO BACKLASH · POSITIVE LATCH

OVERVIEW

The Deployable Hinge is a spring-driven mechanism for solar array, radiator, and boom deployment, engineered for deterministic kinematics and hard-stop repeatability after launch loads. A preloaded torsion spring drives rotation through a geared/bearing assembly to a positive mechanical latch at full deployment.

Zero-backlash construction and a defined torque margin over the full deployment envelope ensure consistent, repeatable deployment behavior across ground testing and on-orbit operation.



Deterministic deployment

- Zero-backlash gear train
- Positive latching at full travel
- Repeatable across ground test cycles

Launch-load rated

- Preloaded bearing assembly
- Hard-stop latch absorbs residual energy
- Survives launch vibration/shock spectrum

Simple integration

- Bolt-pattern mount interface
- Pairs directly with ECD/RVD for rate control
- Low part count, low mass

TECHNICAL SPECIFICATIONS

HINGE MECHANISM	
Deployment torque margin	≥ 2:1 over full travel
Spring torque	0.3 N·m nominal
Mass	85 g
Backlash	Zero (hard-stop latch)
Deployment angle range	90° – 180° (configurable)
Deployment repeatability	±0.5°

LATCH & MOUNT	
Latching force	5 – 15 kgf preload class
Bearing type	Stainless steel, preloaded pair
Mount interface	Bolt-pattern, flush-face
Life rating	500+ ground-test cycles
Operating temperature	–65°C to +100°C
Compatible damping	ECD / RVD shaft-line coupling

HOW IT WORKS

A preloaded torsion spring stores deployment energy at launch-stow. On release command, the spring drives the hinge through its gear train toward full deployment; a rate-control damper (ECD or RVD) on the same shaft line governs deployment speed, and a positive mechanical latch engages at end-of-travel to lock the joint with zero backlash.

Application examples: solar array root and panel hinges, radiator panel deployment, instrument boom deployment, antenna panel unfolding

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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.