

PZT/Motor Actuator

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P1 configuration

- Two stage actuator
 - Long-travel PZT fine stage (~200 μm)
 - » Also provides damping via shunt impedance
 - Motor/gearbox/eccentric drive coarse stage (~5 mm)
- This is a “discrete-offload” actuator
 - Tracks ≥ 15 minutes using just the fine stage
 - » Meets the 4.4 nm rms requirement with low crest factor
 - Then offloads quickly, and resumes tracking
 - » The transient is ~1 μm , and lasts several sec.

PZT/motor actuator overview

- PZT stack in scissor mechanism + discrete motor + gearbox + eccentric offload
- For P2, PZTs would be in two hermetic assemblies, each consisting of two 36 mm stacks + one 18 mm long stack, electrically in parallel
- Total stroke: $208 \mu\text{m} \pm 10\%$ at -5C (perf. range); 10 N/ μm
 - As before, stiffness \times stroke² conserved for same range
 - Stroke requirement is 175 μm to achieve 15 min offload period for worst actuator at fastest elevation rate
 - For scoring the efficiency impact of the discrete offload, we used the required range, and average rates adopted from the Gemini data set, and an adopted composite observing scenario

PZT/Motor Actuator Development Model

- ◆ A “hard” (position) actuator
- ◆ Two-stage mechanism
 - Long-travel PZT fine stage with mechanical amplifier for continuous tracking
 - Stepper motor + eccentric-drive coarse stage to offload PZT between observations

