

Precision Linear Drive

The University of Wisconsin-Madison Physical Sciences Laboratory has developed a solution to actuation of in-UHV high precision motions with a compact self-contained module. PSL has built numerous monochromators with the drive and has attained better than 0.4 microradian (0.08 arc sec) repeatability on overall total scan angles of up to 41 degrees, equivalent to better than 100nm linear repeatability and 500ppb repeatability over 150 mm travel (including the thermal and barometric effects in a synchrotron-vault environment and the nonrepeatabilities of in-vacuum bearings).

Standard features:

- Bakeable UHV compatible feedthrough link components (drive link and bellows to 200°C & 10^{-10} Torr, all metal welded construction with flexhinges)
- Integral linear encoder with resolution 50 nM (1.97 microinches)
- High axial force (220N / 50 lb), high stiffness and high mechanical resonant frequency
- Integral optical limit switches protect the mechanism from accidental overtravel
- Adjustable auxiliary limit switches and mechanical stops protect the drive and driven mechanism from control system failure or software error
- Home reference included
- Mounting maximizes accuracy & isolation from outside disturbances, and provides alignment
- Linear actuator resolution of microstepping of 12.5 nm (0.49 microinches)
- Microstep-capable 2-phase stepping motor
- Standard travels up to 152 mm (6 inches)
- Deterministic & non-slip. **Open loop** hysteresis less than 320nM; closed-loop repeatability ± 1 count
- All metal exterior (no exposed glass)

Available customizations & options:

- Closed loop servo position maintenance to 50 nm or below, with inherent thermal compensation
- Linear actuator resolution of microstepping of 20, 10, 6.25, 5 or 3.125 nM (as low as 0.123 microinch)
- Linear encoder feedback resolution of 20, 10, 5, 2.5 or 1.25 nM (0.79, 0.39, 0.20, 0.10 or 0.05 microinches)
- Microstepping driver, controller, 9 m (30 feet) cables, and axial position readout
- Polynomial-fit calibration curve with repeatability data
- Slow or fast fine motion attachment for picometer actuation
- Other customizations evaluated on request. If you don't see it here, ask!



For more information call 1-608-877-2200, fax 1-608-877-2201, email SRI@psl.wisc.edu. Or view the PSL web page at <http://www.psl.wisc.edu>.



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