

## Pico-Force Spectroscopy

Pico Force system, combined with powerful software developed specifically for force spectroscopy, enables accurate force measurements and manipulation of biological or material samples at the pico-Newton level. Most force spectroscopy experiments demand precise, accurate control of tip-sample separation and low-noise detection of cantilever deflection. The new Pico Force incorporates several innovations in nanotechnology that allow unprecedented control of these aspects, making this a particularly interesting product in the study of protein unfolding, antibody-antigen interactions, molecular motors, and nanoscale mechanical properties."

### Specifications

1. *Closed-loop Z axis with capacitive sensor*
  - Delivers accurate, low noise measurement of extension in force curves and height in imaging. The new Pico Force scanner incorporates a closed-loop Z-axis with a 20 microns vertical range and an X-Y scan range of 50 microns. This scanner completely eliminates common problems of piezo creep, hysteresis and non-linearity.
2. *Pico Force controller electronics*
  - Enables thermal tuning of cantilever natural resonance for easy determination of spring constants. The controller also provides convenient access to critical data signals for users with advanced requirements. The controller also incorporates Quadrex technology with lock-in detection and advanced signal routing to provide enhanced phase-measurement capabilities.
3. *Pico Angler tactile sensations*
  - Permits intuitive interpretation of molecular force interactions. It allows users to manually explore tip-sample interactions with unprecedented ease. This innovative tool is particularly useful for single-molecule force spectroscopy, providing highly sensitive approach and retraction of the cantilever tip. Four different levels of sensitivity for manual control of the Z-axis and force-feedback allow exploration of interactions over a wide range of distances and forces.
4. *Advanced graphical user interface*
  - Simplifies acquisition of real-time data. Provides flexible data export. Other software features include automatic cantilever spring constant calibration (required for calculating exact force), user-defined "scripting" for flexible design of experiments, and powerful off-line processing and exporting tools.

## **Applications**

### *Single-Molecule Pulling*

- DNA stretching
- Protein folding/unfolding

### *Intermolecular Interactions*

- Antibody/antigen interactions
- Cell receptor recognition
- Cell adhesion
- Membrane elasticity

### *Colloidal Science*

- Colloidal surface interactions
- Friction forces

### *Polymer Science*

- *Elasticity*
- *Nanoindentation*