

# Ultra-compact xyz Fiberoptics Positioning System

The precise alignment of optical elements in a Micro-Opto-Electro-Mechanical System (MOEMS) is of uttermost relevance in order to realize reliable set-ups. Thereby, the application of ultra-compact elements enables on one side the accurate positioning of optical elements such as fibers or optical detectors and on the other side the manufacturing of low loss systems. As a consequence to the increasing requirements in the electro-optics industry, piezoelectric fine adjustment systems have significantly gained in importance as they provide extremely high resolution, responsiveness, and mechanical controllability.

Due their highly successful application as nanopositioning tools in extreme environments the attocube systems positioner can nowadays also be used for precision positioning of optical components. Their ultra-compact size (see Fig. 1) and a modular set-up design thereby allow flexible and universal applications.

The working mechanism of the attocube systems positioner relies on the so called *slip-stick* principle. Via a fast acceleration of a guided rod over a short period of time the movable part of the positioner (sliding block) remains nearly non-displaced due to the overcome of friction. If in a subsequent step the guiding rod moves back to its initial position slowly enough the movable part of the positioner sticks to it and thus performs a net step. Hence, this slip-stick translation stage enables reliable and controllable motion of the sliding block over millimeter ranges with small and reproduceable steps.

The product key features for a fiberoptics positioning system (see Fig. 2) are as follows:

- > Overall size of the positioners: 24x24x53 mm (+ travel)
- > Travel distance: 7x7x6 mm with step sizes down to 50 nm
- > Scan area: 9x9x9  $\mu\text{m}$  (sub-nm resolution)

If a scan area of 9x9x9  $\mu\text{m}$  is not sufficient an optional setup can perform fast and high precision scanning in an area of 40x40x24  $\mu\text{m}$  with sub-nm resolution by using a piezo electric xyz-scanner (ANSxyz100) on top of the described set-up.

Custom designed software enables the automatization of e.g. a fiber alignment process by controlling the piezo electric positioning unit via a feed-back loop. Furthermore, the attocube systems positioners can be operated in extreme working environments such as ultra-low temperature, ultra high vacuum, and high magnetic fields.



Fig. 1: The ultra-compact ANP100 xyz attocube positioners

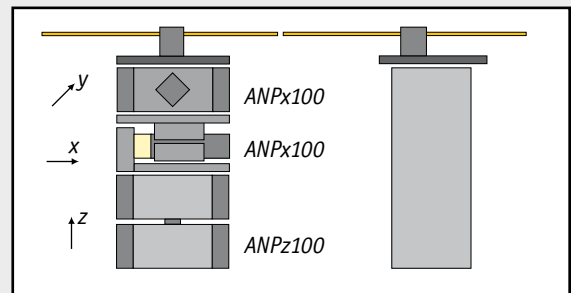


Fig. 2: Schematic of a Fiberoptics Positioning System using an ANPxyz100 positioning unit

## EXAMPLE APPLICATIONS

- > Micro- and Nanopositioning
- > Laser Scanning
- > Mirror Shifting
- > Fiber Alignment
- > Laser Coupling
- > Detector Alignment

## RELATED PRODUCTS

ANPx100	high precision, piezo electric, inertial positioner
ANPz100	high precision, piezo electric, inertial positioner
ANSxyz100	high precision, piezo electric xyz-scanner for high precision 3D scanning
ANC150/3	piezo step controller
ANC200/3	piezo scan controller