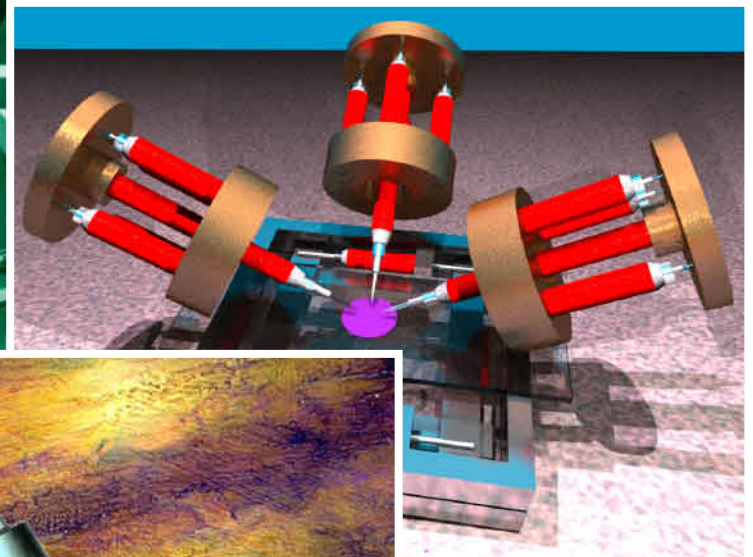
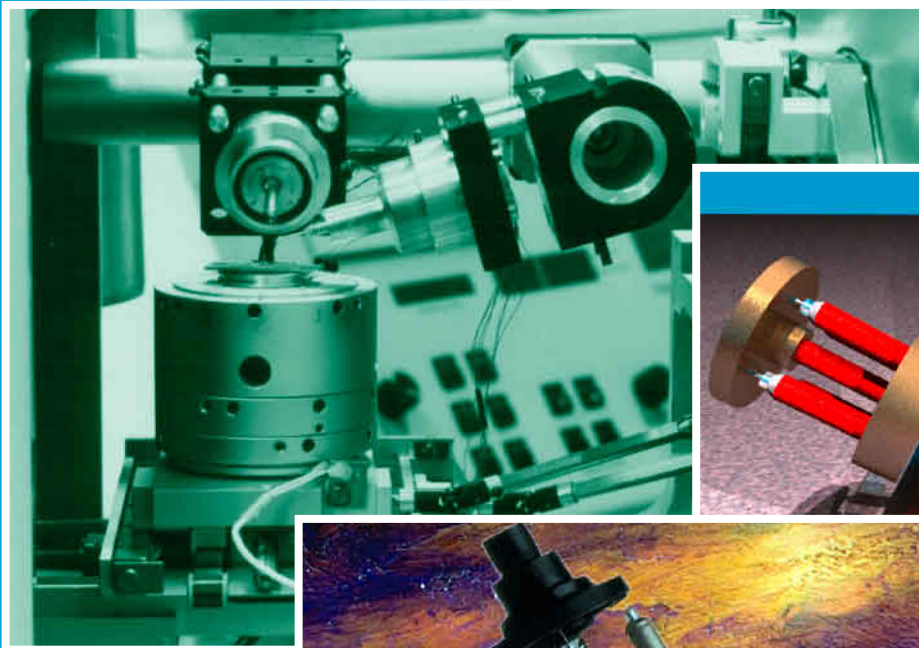


# THE NANOMANIPULATOR

A UNIVERSAL TOOL WITH ONE  
NANOMETER RESOLUTION

- Extremely compact
- Tilting Table + central Nanomotor<sup>®</sup> for z movement
- 5 mm x 5 mm x 19 mm (z) stroke
- With different size and force available
- Single Nanometer resolution
- Thermal compensation if the central Nanomotor points downwards
- Free channel for tools



# THE NANOMANIPULATOR

## Principle:

In the Nanomanipulator a tilting plate is moved by four Nanomotors over mechanical links. Two Nanomotors placed opposite to each other tilt the plate by antiparallel movement (see arrows  $\uparrow$  and  $\downarrow$ ). During that movement the other two Nanomotors build a line around that the tilt movement is guided, to decouple the two directions of tilting. Since a Nanomotor can hold about five times more load than it can lift up the two not moving Nanomotors hold the load of the tilt plate and objects assembled on it.

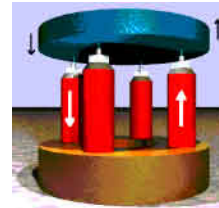


Fig. 1: Tilting table

Adding a central Nanomotor expands the tilt plate to the Nanomanipulator: The tilt plate has a cylindrical tube in its center. This tube has an inner diameter of 5 mm to hold the central object. A 1 mm screw from the side allows to fix the central object. Normally this object is a „Tall“ Nanomotor. Tilting the plate causes an xy-movement of the central Nanomotors tip within about  $5 \times 5 \text{ mm}^2$ . The „Tall“ Nanomotor has a stroke of 19 mm itself.

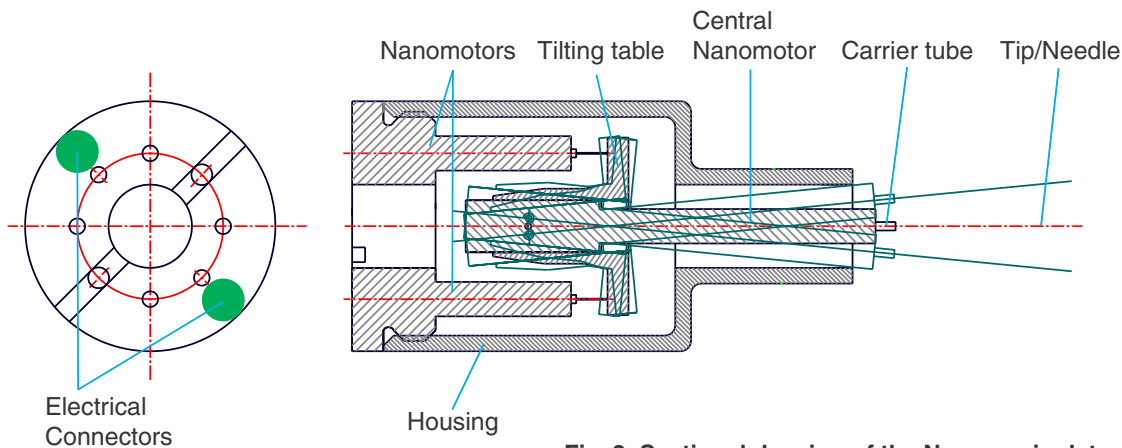


Fig. 2: Sectional drawing of the Nanomanipulator

The Nanomanipulator ends with the top carrier tube of the central „Tall“ Nanomotor. This carrier tube has an outer diameter of 0.8 mm and an inner diameter of 0.55 mm. As option a wire can be fixed on the outer surface of this tube to apply a current with the tip.

The big central hole in the base of the housing is necessary for the 2 D.O.F. cannula gripper, if it is assembled instead of the „Tall“ Nanomotor, see Fig. 3, (3) & (6).

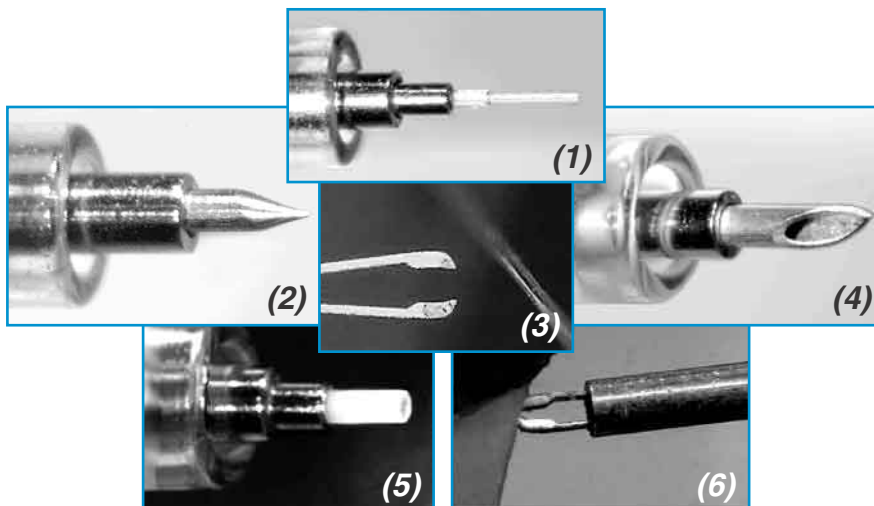
### Properties:

Resolution: 1 nm  
Stroke:  $5 \times 5 \times 19 \text{ mm}^3$   
Speed: up to 5 mm/s

### Housing:

Diameter: 25 mm  
Length: 48 mm

Fig. 3: The carrier tube of the Nanomanipulator can be used to mount all kinds of cylindrical tools with a diameter  $\leq 0.4 \text{ mm}$ . Possible examples are a glass fiber (1), a tip (2), a gripper (3 & 6), a hypodermic needle (4) or a hose (5).



*Precision made in Aachen:*

Klocke Nanotechnik

GERMANY:  
Pascalstr. 17  
52076 Aachen

Phone: +49-2408-95099-20  
Fax: +49-2408-95099-26

www.nanomotor.de  
info@nanomotor.de