

# Three axis Micromanipulator for the Phenom Desktop SEM

Kleindiek Nanotechnik's MM3A-EM micromanipulator can be mounted inside a large version of the Phenom Pro's specimen holder, as shown to the right. A single, upright standing MM3A-EM is shown for reference.

The micromanipulator is used to position the sample relative to a stationary tool. Available tools include:

- Needle tip for manipulating small objects
- Microgripper for pick & place tasks
- Force sensor for AFM imaging
- Low leakage probe for electrical measurements

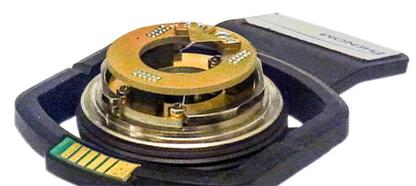
The latter option can be utilized in for Current Imaging. This technique is used in Failure Analysis in order to identify faults within nano-sized semiconductor devices.

Beneath the specimen holder's cap, we've positioned a plug-in holder that can be fitted with various plug-in tools.

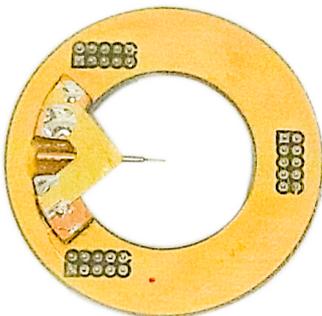


## Technical specifications

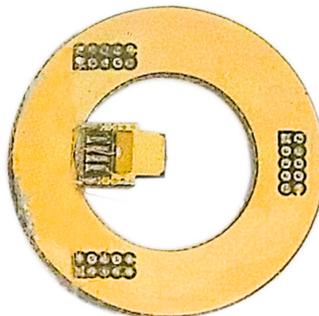
- Operating range XY 5 mm  
Operating range Z 12 mm
- Resolution XY better than 5 nm  
Resolution Z better than 0.5 nm
- Holding force XY 0.1 N  
Holding force Z 1 nm
- Temperature range 273 K to 353 K
- Lowest pressure  $10^{-7}$  mbar
- Material Stainless steel, aluminium



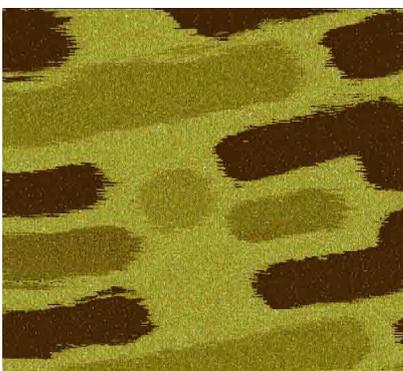
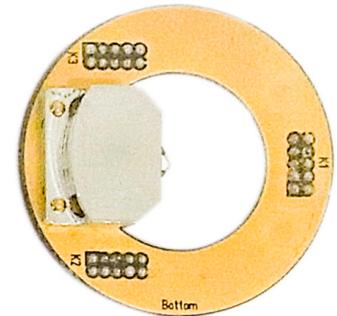
Needle / Probe Tip Holder



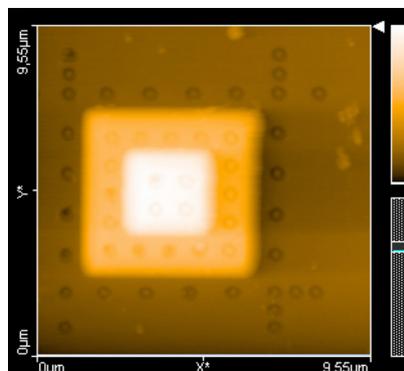
AFM Cantilever



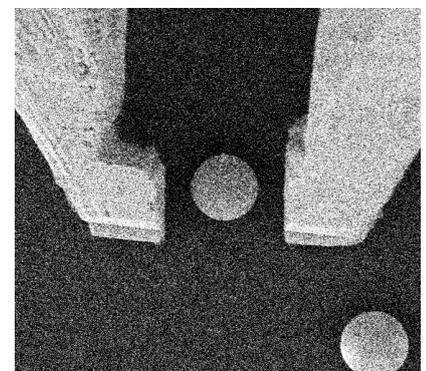
Microgripper



Current Imaging result



AFM image



Micromanipulation

## Further information

- Contact us at [info@kleindiek.com](mailto:info@kleindiek.com)
- Find your local agent at [www.kleindiek.com](http://www.kleindiek.com)

# Dedicated Tilt/Rotation Positioners

Kleindiek Nanotechnik offers a range of accessories for the Phenom desktop microscope. These offer tilt and rotation in various geometries. Some axes can be encoded.



## RETE - Features:

- Tilt through  $\pm 90^\circ$
- Rotation through  $360^\circ$
- Both axes are encoded
- Positioning accuracy:
  - Absolute accuracy  $< 0.2 \text{ deg}$  ( $3 \times 10^{-3} \text{ rad}$ )
  - Repeatability  $< 0.03 \text{ deg}$  ( $4 \times 10^{-4} \text{ rad}$ )
- Resolution:  $< 6 \times 10^{-6} \text{ deg}$  ( $10^{-7} \text{ rad}$ )

## Application example

- Examination of dental samples (tooth sections)

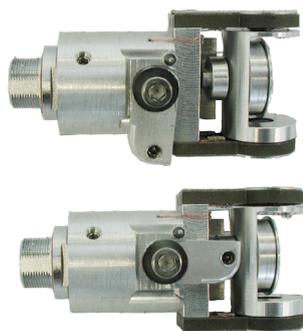


## RET - Features:

- Rotation through  $360^\circ$
- Pre-defined tilt angle:  $54.7^\circ$
- Positioning accuracy:
  - Absolute accuracy  $< 0.2 \text{ deg}$  ( $3 \times 10^{-3} \text{ rad}$ )
  - Repeatability  $< 0.03 \text{ deg}$  ( $4 \times 10^{-4} \text{ rad}$ )
- Resolution:  $< 6 \times 10^{-6} \text{ deg}$  ( $10^{-7} \text{ rad}$ )

## Application example

- Investigation of micro fossils

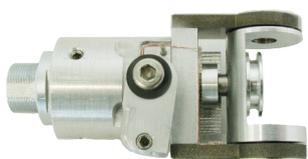


## RT - Features:

- Tilt through  $+90^\circ$  and  $-3^\circ$
- Optional limit to  $+3^\circ$  and  $-3^\circ$
- Rotation through  $360^\circ$
- Resolution:  $< 6 \times 10^{-6} \text{ deg}$  ( $10^{-7} \text{ rad}$ )

## Application example

- 3D imaging



## T - Features:

- Tilt through  $+90^\circ$  and  $-3^\circ$
- Optional limit to  $+3^\circ$  and  $-3^\circ$
- Resolution:  $< 6 \times 10^{-6} \text{ deg}$  ( $10^{-7} \text{ rad}$ )

## Application example

- 3D imaging

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