

NEWS

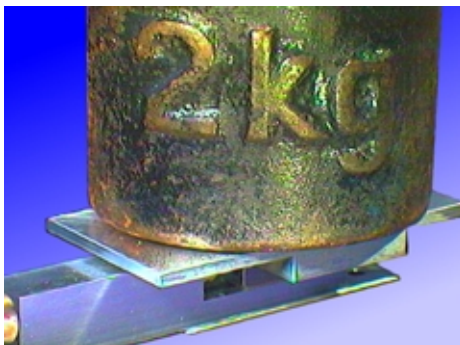
Nano-precise positioning - Piezo driven micro roller table in nanotechnology

*"The step from microtechnology to nanotechnology requires more than a reduction of size by a factor of a thousand. If you want to move precisely in the nano-world, you don't succeed by perfecting proven techniques." **Handelsblatt.***

This statement illustrates the demands of nanotechnology.

The Development

Basing on an invention of the Research Centre Jülich, Dr. Klocke and his team developed a linear motor with control electronics and software since 1992. The Klocke Nanotechnik company produces and sells this „Nanomotor[®]“, the smallest and most precise linear motor in the world. More than 25 man-years of product development, an international network of customers and co-operation partners, as well as the membership in four competence centres in the fields of micro system technology, nanotechnology and new materials enable to deliver innovative solutions - even for complex customer requirements.



Heavy cargo!

Several meetings at trade fairs proved for Schneeberger and Klocke Nanotechnik, that the small products Nanomotor and NDN-table are made for each other.

NMT - a range of motorized roller tables

The range of motorized roller tables presented here offers large strokes with the smallest possible dimensions. The modules are driven by the smallest and most precise linear motor in the world, the Nanomotor of the Klocke Nanotechnik company. The loads are borne by the precise Schneeberger micro roller tables, which as a result of the pre-tensioned roller guideway have a very light and free of „stick slip“ run, which is free of play too. Thus loads of up to 2 kg can be displaced with a resolution of 10 nanometres. The NMT - roller table reacts to a fine step with 2 nm. This corresponds to a movement forwards or backwards by 10 atoms!

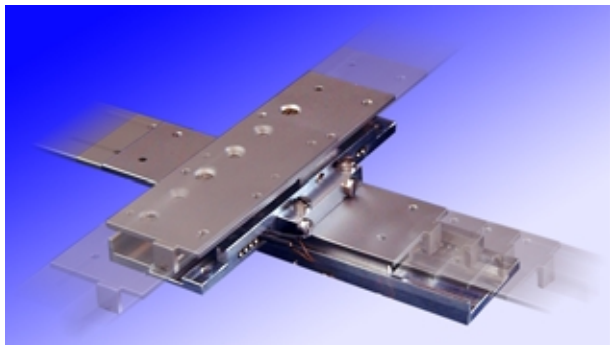
The modules can be combined as two- or three-axis systems. Parallel configurations lead to open-frame tables.

Positioning tables for horizontal operation:

Type	Stroke [mm]	Max. load [kg]	Length [mm]	Width [mm]	Height [mm]	NDN - roller table
NMT 10-L	10	0,2	50	17	13	NDN 05-20.10
NMT 20-L	20	0,2	60	17	13	NDN 05-30.20
NMT 10	10	1	40	26	13	NDN 05-20.10
NMT 20	20	1	50	26	13	NDN 05-30.20
NMT 30	30	1	60	29	13	NDN 1-40.30
NMT 50	50	2	80	34	13	NDN 2-60.50
NMT 60	60	2	90	34	13	NDN 2-70.60
NMT 70	70	2	100	34	13	NDN 2-80.70

Positioner for vertical operation:

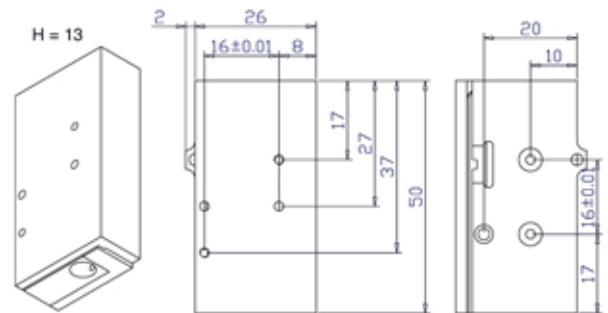
Type	Stroke [mm]	Max. load [kg]	Height [mm]	Base surface [mm]	NDN - roller table
NMT Z10	10	0,05	40	20 x 24	NDN 05-20.10
NMT Z20	20	0,1	50	20 x 24	NDN 05-30.20



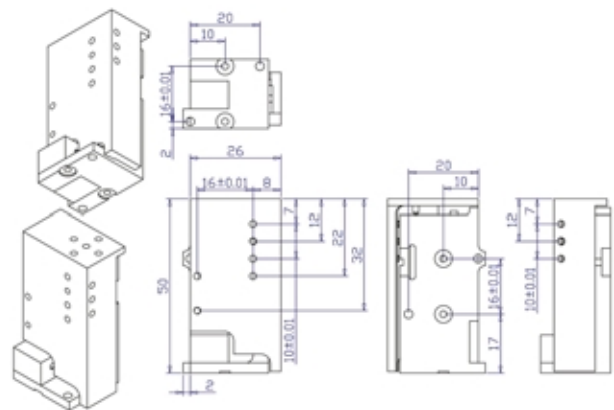
2 x NMT 50

Optionally available are high-resolution position measurement systems for reproducible positioning. The sensors are integrated into these small tables.

The customer receives a system including network-compatible control electronics on a PC - basis and Windows software. Drivers for programmers (DLL for 16-bit and 32-bit Windows®, NT, LabView®) are also available.



Dimensions NMT 20



Dimensions NMT Z20

Applications

The NMT - modules open up a broad field of applications in the microsystem -, communication - and semiconductor technologies, as well as in aerospace, and bio - science. In combination with light - and electron microscopes these modules can operate as micro- and nano-manipulator.

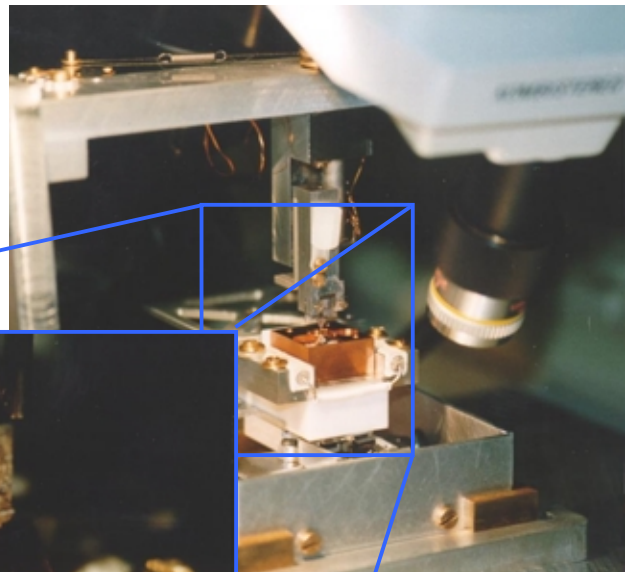
Examples of possible applications are:

Semiconductor market

- Chip-probing: Movement of the contact needles with 10nm resolution and approach of the needles into the silicon structure.
- Alignment of masks, wafers or foils for printed circuit images
- Quality assurance, e.g. for wafer handling systems: XY-table (plus CCD camera) with 10nm resolution for the structure measurement
- Micro-welding - and soldering stage: Movement of a welding unit with a joystick during the SMD assembly of prototypes. A welding or soldering tools is mounted on an xyz - stage made of NMT - modules. The solder is approached with the help of further modules.

MEMS market, microassembly

- Microassembly of glass fibres or of mechanical components onto integrated circuits.
- Microassembly of high frequency components (see picture).
- Dismantling of laser diodes from transistor housings, in order to prepare them for new developments.
- Assembly and interconnection of mechanical components such as sensors and actuators with IC's.
- Precise handling modules in production lines.



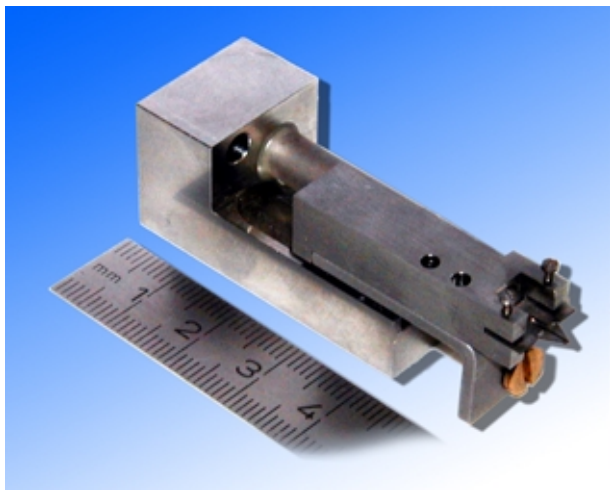
Microassembly
Assembly stage made with NMT - modules and Nanomotor - grippers. Assembled are high frequency components, which are much smaller than a human hair: 100 μm wide and only 30 μm high.

SEM, TEM, FIB Microscopy

- Equipment for all types of scanning electron microscopes and ion-beam microscopes: sample stages, aperture positioners, manipulators, e.g. to process with a calibrated force.

Bio-Technology

- Specimen tables on optical microscopes and confocal laser microscopes.
- Manipulators, e.g., for patch-clamping
- Nano-robots for eye surgery or neuro surgery.
- Handling of liquids, e.g. smallest droplets for a lab on a chip.



NMT Z10 with Nanomotor - gripper

From the linear system to Nano-robotics

All NMT - modules can be joined with dowel pins to form orthogonal systems. Available gripper systems expand the modules to microassembly stages and small production plants. In the same way as linear modules, rotating components can also be driven with Nanomotors. Result is a construction kit of compatible modules, which can be summarized in one word: Nanorobotics.

For further information, please contact:

Johannes Ix
Regional Sales Manager
Schneeberger GmbH
Tel.: +49 2162 67415
Fax: +49 2162 961572
e-mail: jix@schneeberger.com

Klocke Nanotechnik
Dr. Volker Klocke
D-52076 Aachen, Germany
Tel.: +49 2408 95099-20
Fax: +49 2408 95099-26
e-mail: info@nanomotor.de