

High Precision
System Solutions

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attoMOTION
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hexaCUBE

Integrated 6D Motion Solution



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Brochure version: 2014 - 01

 **attocube**
pioneers of precision



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hexaCUBE

integrated 6D motion solution



Compact Design – Large Travel Ranges

The hexaCUBE offers an outstanding ratio of system volume to travel range. With standard dimensions (hexaCUBE 190) of only $190 \times 170 \times 105 \text{ mm}^3$, travel ranges exceeding $\pm 15 \text{ mm}$ in x,y and z direction and rotations in excess of $\pm 19^\circ$ around these axes are possible.



Multi-Axis Operation – 6D motion

Combining the highest precision linear positioners with the finest quality ball joints, the motion of the stage in six degrees of freedom offers users the highest flexibility in their application.



Closed Loop Control

Featuring integrated optoelectronic encoders, exact and repeatable positioning in absolute and relative terms is an easy task for the hexaCUBE. With a repeatability ranging under 50 nm (1 sigma) in x, y, and z, and $1 \mu\text{rad}$ in Θ_x , Θ_y , and Θ_z , the hexaCUBE belongs to the most precise 6D motion systems currently available.



High Loads & Stiff Design

Aided by a robust mechanical design, the hexaCUBE offers stiffnesses of $1 \text{ N}/\mu\text{m}$ in x,y and $3 \text{ N}/\mu\text{m}$ in z, enabling 6D motion of samples weighing up to 700 g .

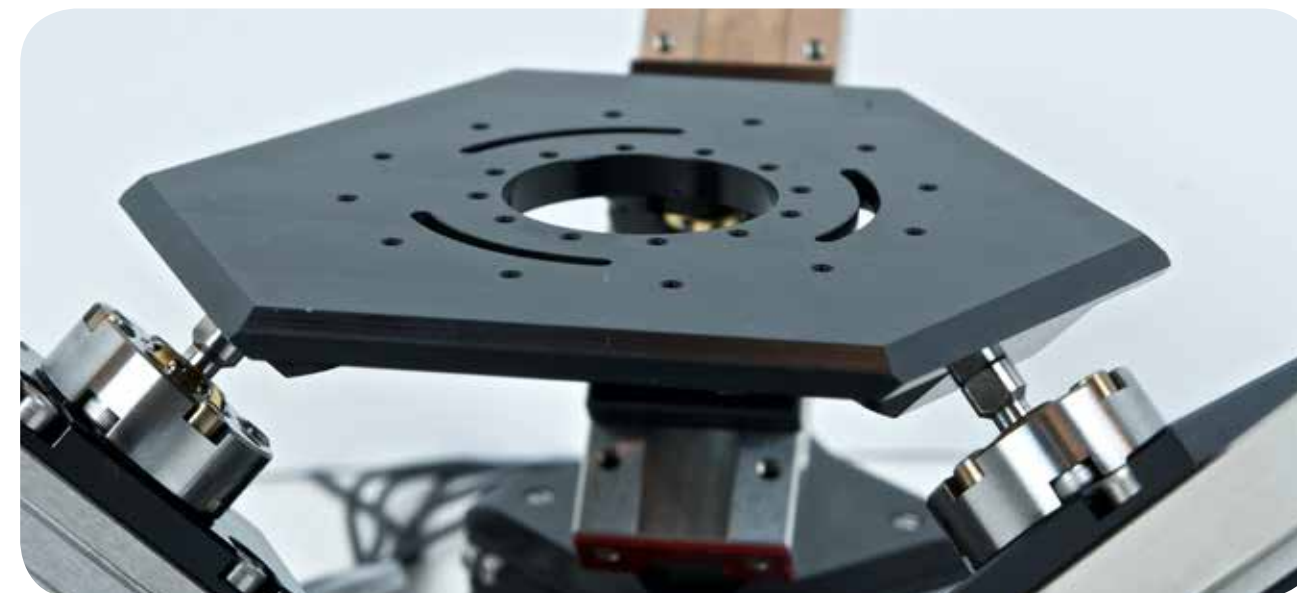
attocube specializes in manufacturing single compact motors as well as fully-integrated system solutions for the most challenging applications in the constantly growing nanotechnology sector.

Focusing on the needs of today's nanotechnology industry for robust and cost-effective integrated motion solutions, attocube has developed the six degrees of freedom hexaCUBE positioning system.

The hexaCUBE combines six linear closed loop piezoelectric motors with an innovative assembly of highest precision ball joints and linear bearings – enabling true motion in 6D with stunning accuracy and repeatability. With its specialized sample platform design with integrated aperture, the hexaCUBE is perfectly suited for the ultraprecise alignment of optical and mechanical components.

Product Benefits

integrated 6D motion solution



MAIN ADVANTAGES



Integrated System Solution

Merging the motion of six independent linear positioners, the hexaCUBE software enables 6D positioning of any sample around a freely adjustable pivot point. A specialized design of the sample platform with integrated aperture makes it the ideal instrument for all optical applications.



Software & Remote Control

In addition to convenient software featuring closed loop motion, arbitrary pivot point definition and programming tools, attocube utilizes the intuitive, easy-to-use joystick „SpaceNavigator“ for 6D manual control of the sample platform.

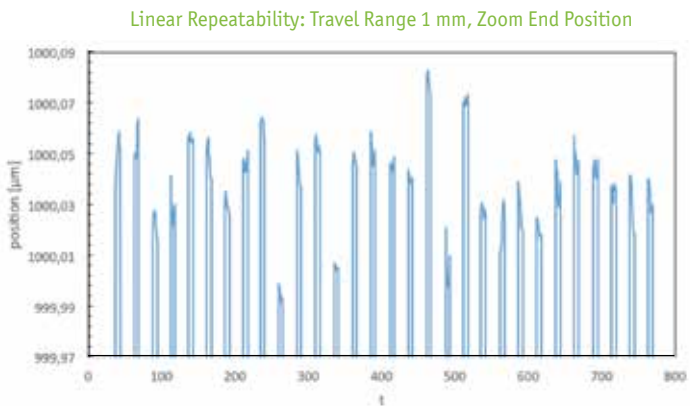
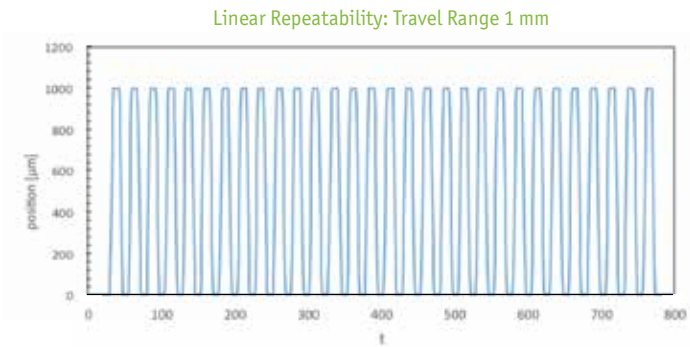


Automation

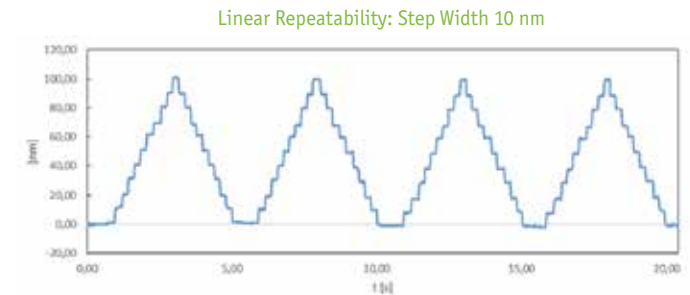
The hexaCUBE is the instrument of choice for all positioning tasks in automated working environments. Typical applications are optical alignment processes, sample adjustment in R&D test setups, and wafer alignment in semiconductor industry.

hexaCUBE

measurements and technical specifications



The hexaCUBE offers an outstanding repeatability of 50 nm for linear motion and 1 μ rad for rotational motion.



The repeatability is even better for smaller step sizes!

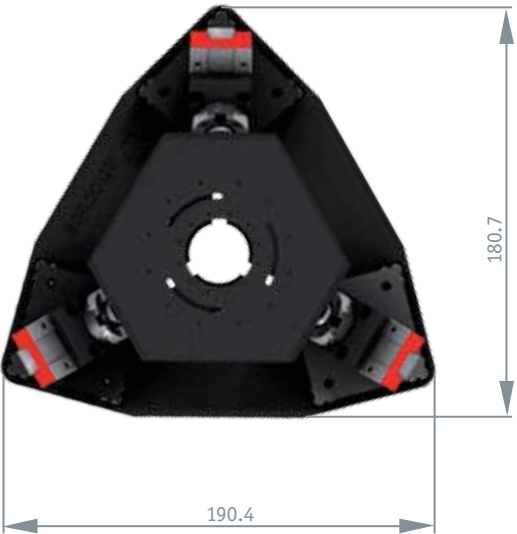
hexaCUBE 190	
Technology	
travel mechanism	six ECS5050/HL linear piezo positioners
Size and Dimensions	
footprint; height	190 mm x 180 mm; 105 mm
maximum size	220 mm x 210 mm; 125 mm
aperture	26 mm (1 inch)
weight	1.95 kg
load	0.7 kg
Travel Range	
linear x	± 15 mm
linear y	± 15 mm
linear z	$\pm 20,0$ mm
rotational Θ_x	$+33 / -19^\circ$
rotational Θ_y	$\pm 21^\circ$
rotational Θ_z	$\pm 19^\circ$
Repeatability (1 sigma)	
x, y, z	50 nm
$\Theta_x, \Theta_y, \Theta_z$	1 μ rad
Physical Properties	
materials	aluminum, stainless steel, plastic
stiffness	1 N/ μ m (x,y), 3 N/ μ m (z)
Working Conditions	
temperature	0...100°C
vacuum	HV/UHV models on request
Compatibility with Electronics	
	two ECC100/PRO required



side view



top view



3D view



ECC100/PRO & SpaceNavigator

integrated 6D motion solution



A combination of two ECC100/PRO motion controllers enables the simultaneous operation of all six piezoelectric motors, supporting a smooth and fast movement of the sample platform. With help of the intuitive PC software, users can control the sample position in closed loop a fashion in 6D, set arbitrary pivot points, and utilize extended programming tools. Apart from additional LabVIEW VI's and .dll support, the hexaCUBE software is fully compatible with the 6D "SpaceNavigator" joystick of 3Dconnexion.



The patented 3Dconnexion "SpaceNavigator" is the ideal supplement for the hexaCUBE due to its easy-to-use, intuitive remote control functionality supporting demanding positioning tasks where up to six degrees of freedom (6DOF) are required. The "SpaceNavigator" is included in all hexaCUBE setups as a standard item.

hexaCUBE software

integrated 6D motion solution



Move your sample!

An easy and straightforward way of getting in touch with the hexaCUBE is the manual control of the system utilizing the "SpaceNavigator". A choice of three different speed levels in combination with the possibility of locking each axis separately already allows for a great flexibility of the user.

This is topped off by an intuitive software allowing for absolute and relative 6D point to point (PTP) movement of the sample in closed loop mode and additional software features.

Configure your measurement routine!

A convenient "path mode" programming kit allows the user to define a dedicated measurement routine. By simply pressing a button the coordinates of selected measurement positions and pre-defined delay times can be added to the path mode.

Define your pivot point!

A further upgrade to the functionality of the setup is the ability to freely assign any position in space being the pivot point of the hexaCUBE and rotating samples located on the sample platform around exactly this spot.