Ratis
Scanning Stage

Basic Datasheet

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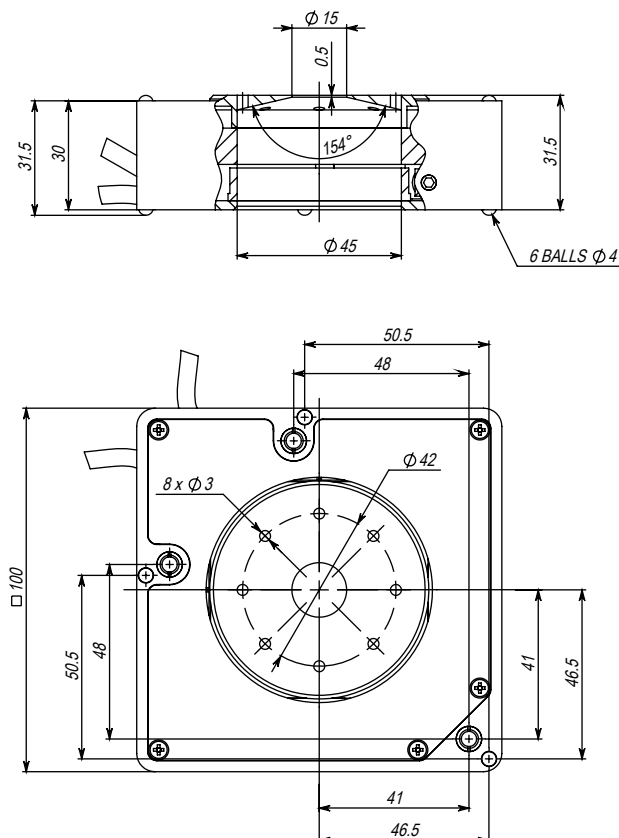Skype: NanoScanTech
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► **Ratis** – plane-parallel device for positioning/ scanning.

► Scanning stage is made of solid metal bar processed with EDM wire-cutting and precise CNC machining. Movable central part hangs on flexible springs and is driven with piezo actuators.

Ratis design provides excellent linearity and flatness of the movement, in contrast to the classical scanners based on piezoelectric tubes, where the scan surface is a sphere. In addition, plane-parallel scanners have higher mechanical strength, compared with fragile piezoelectric tubes.

► Ratis multi-axes scanners are equipped with capacitive displacement sensors for digital feedback loop. It provides high accuracy and linearity of movement and eliminates tthe creep effect of piezoceramics. Capacitance measurements are made with TDC (time-to-digital conversion) chips located as close as possible to sensors. Such a design leads to the low noise and high speed displacement control.

►To control Ratis scanning stage universal controller EG-3000 and NSpec software are used.

► Ratis is applicable for use in the field of scanning probe microscopy, positioning, metrology, biology research, microelectronics, micromanipulation and etc.

Basic Models:

Parameter	X10Y10	X15Y15	X10Y10Z25	X15Y15Z25
XY range, µm	100x100	150x150	100x100	150x150
Z range, µm	-	-	25	25
Minimum scan step, nm	0,1	0,1	0,1	0,1
Angle tilting over the full range, nm	< 0.01 °	< 0.01 °	< 0.01 °	< 0.01 °
Resonant frequency XY, kHz	1	1	1	1
Resonant frequency Z, kHz	-	-	3	3
Maximum scanning speed, Hz (line/sec)	10	10	10	10
Maximum sample weight, g	100	100	100	100

EG-3000
SPM drive digital controller

►Electronic controller EG-3000 is designed to control SPM or scanning confocal microscope. Controller provides data acquisition from internal sensors and external devices, applies control voltage to scanners piezoelectric actuators. All obtained information is transferring to PC workstation for visualization and processing.

►One of the most important parts of the EG-3000 controller is closed loop feedback system realized by means of 20-bit TDC (Time-to-Digital Convertion) to measure displacement capacitance sensors. Controller is capable to operate 6 channels with feedback simultaneously, which allows to independently scan with tip and sample both.

►Any available system signal can be used for SPM feedback.

►EG-3000 SPM controller contains 2-channel lock-in amplifier to provide resonant SPM techniques, for example non-contact SPM mode. Lock in amplifier includes high stable voltage generator based on digital frequency synthesizer. High speed data processing is implemented using programmable logic (FPGA). This allows to perform high quality lock-in detection up to 1.5 MHz band.

►EG-3000 has multy channel (up to 12) control for stepper motor with micro step option, for example, for adjustment of scanning head (stage).

►Controller has analog inputs and outputs for external equipment connections, synchronization inputs and outputs and USB interface for connection with PC. Controller is managed with NSpec software.

►Compatibility with Centaur and Centaur HR, Snotra, Certus Optic, Certus Standard, Certus Light, Ratis.

NSpec – Universal software for all NST devices.

NSpec features:

► Control of SPM head Certus parameters and functions;
► Control of scanning with SPM head or Stage;
► Full control of Centaur system, including spectrometer and CCD camera;
► Stepper motors control;
► Basic data processing.
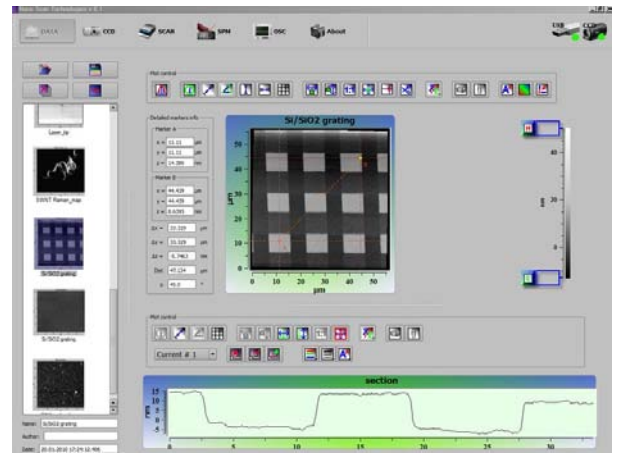
Nspec controls all EG-3000 functionality, and all devices connected to controller (SPM Certus, scanning stage Ratis, stepper motors etc.). Software has capability to operate CCD detectors and spectrometers, connected to PC workstation. Multithread core of the program is build with modern crossplatform compiler (GCC4) and interface part based on QT4 toolkit. Software is compatible with all modern versions OS Windows (XP, 2003, Vista, 7). Version for Linux, *BSD or MacOS X available by customer request.

Please note that only basic data processing functions are implemented in NSpec Software. Specialized data processing (such as Gwyddion http://gwyddion.net) software is recommended for more detailed and powerful data processing. Special spectroscopy data processing software (e.g. GRAMS) is recommended for spectral data processing and filtering. NSpec Software has direct data export to ASCII, gwy (gwyddion), spc (GRAMS) formats.

1	Controller	
1.1	General characteristics	
1.1.1	CPU	32 bit; RISC
1.1.2	PC Interface	USB 2.0
1.1.3	Other interfaces	RS 232, RS485, SYNC I/O
1.2	High-voltage outputs	
1.2.1	Voltage	-10..150 V
1.2.2	Noise	< 5 ppm.
1.2.3	Number of channels	3 or 6
1.2.4	Resolution (digital-analog converters)	18 bit
1.3	Stepper motors control unit	
1.3.1	Number of channels	4/8/12
1.3.2	Power supply	24V, 3A
1.3.3	Microstepping mode support	1/1, ½, ¼, 1/16 step
1.4	Lock-in amplifier	
1.4.1	Number of channels	2
1.4.2	Preamplifier gain	1-100
1.4.3	Input voltage range	±10 V
1.4.4	ADC resolution	16 bit
1.4.4	Frequency range of input signals	0-1,2 MHz
1.4.6	Frequency range of main oscillator	10 Hz – 3 MHz
1.4.7	Output voltage amplitude	10 mV-10 V
1.4.8	Frequency stability	< 5 ppm
1.4.9	Additional channels ADC / DAC	
1.4.9.1	Number of input channels	2
1.4.9.2	Voltage Range	±10 V
1.4.9.3	ADC resolution	16 bit
1.4.9.4	Number of output channels	2
1.4.9.5	Voltage range	±10 V
1.4.9.6	DAC resolution	16 bit
2	Minimal PC configuration	
2.1	CPU	Min 2 GHz
2.2	RAM	512 GB
2.3	HDD	200 GB
2.4	Monitors	2 monitors 20``

NanoScanTechnology
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