



**Nanonics
Integra
Controller**

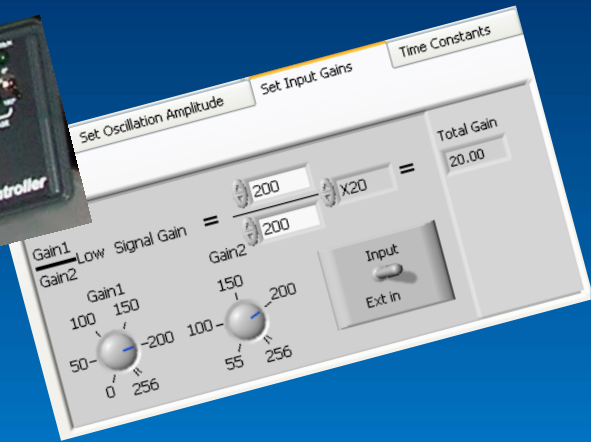
**A New Era
In
MultiDimensional
Scanned Probe Microscopy**



The Best of Both Worlds

Flexible Manual Settings

Or Clear Software Instructions



The Best of Both Worlds *Adjust Individual Critical Parameters for Specialized Protocols & Specialized Control*

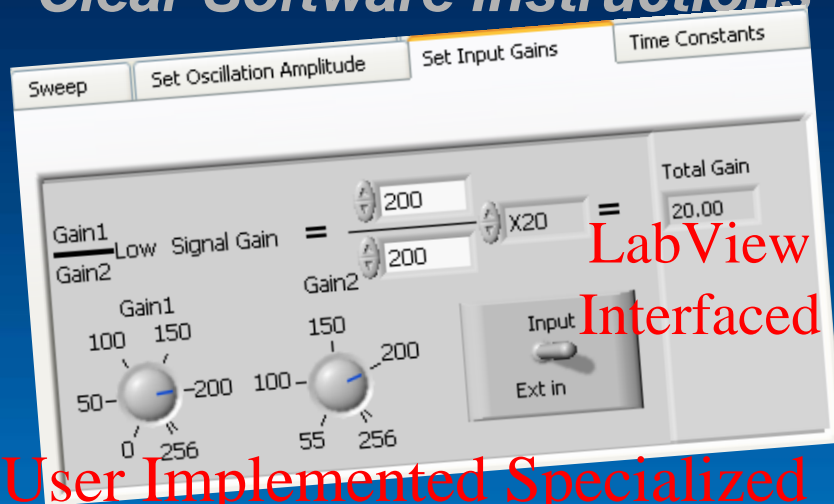


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Or

The Best of Both Worlds

Clear Software Instructions



LabView
Interfaced

User Implemented Specialized
Protocols, Sequences & Instruments



With Integra & LabView

Upgrade
An Entire Laboratory
with
The Singular Capabilities of
Scanned Probe Microscopy &
Enter A New World of
Multidimensional Scanned
Probe Imaging



All Signals Completely Accessible Form The Back Panel of the Controller



Controller
Ports

Lock-in
Ports

Don't Miss A Correlaton!!
Read & Image 8 Data Channels



Modes of Operation

- AFM Contact & AC Mode
- True Non-contact (TNC™) Mode with Tuning Fork
 - No Jump to Contact
- Independent Phase Feedback & Amplitude Feedback.
- AFM Error Signal.
- All Presently Available Additional AFM Modes
 - Phase Imaging [not to be confused with *phase feedback* noted earlier]
 - Either with Amplitude or Phase Feedback
 - Magnetic Force Mode (MFM) with high sensitivity due to Independent Phase & Amplitude Feedback
- Dynamic Control of Tip Oscillation for ultra high sensitivity of dissipation and other phenomena



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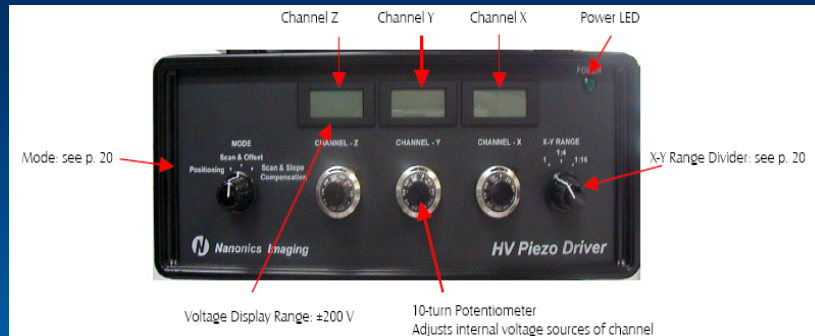


Modes of Operation

- All Modes of Near-field Scanning Optical Microscopy (NSOM) including:
 - Inputs for APD TTL Pulses & PMT Output
 - Controlled Z Data Acquisition
 - Multi tip position differential imaging for Apertureless NSOM (ANSOM) [see lock-in harmonic capabilities below]
 - Tip Enhanced Raman spectroscopy (TERS) with difference imaging
 - Shadow NSOM with difference imaging
 - Control of External Laser Pulses at each pixel for lithographic, near-field & far-field photoexcitation and other NSOM and fiber based delivery options and applications
 - Correlated Imaging with Controlled External Inputs
 - Controlled Scanning with fully integrated external excitation and detection sources such as CCD cameras, Electron or Ion Beam Blanking, etc.



Tip Enabled Nano Optics *TEN* Module



A Simple Connection of Integra to The TEN Module Allows for a variety of tip assisted optical tasks where tip and sample have to be individually relatively placed such as

- ***TERS***
- ***Förster Energy Transfer***
- ***Individual Placement of Tip & Sample Relative to the Lens for Spatially Controlling Photoexcitation & Detection***

Additional Modes of Operation

- With associated compatible electronic modules include:
 - Electrical probing module for both standard silicon electrical probes and glass coax exposed tip electrical probes for multi probe operation
 - ultra sensitive, ultra stable electrical probing with high sensitivity femtoamplifier.
- Thermal conductivity and thermocouple module including associated electronics for differential scanning calorimetry, Thermo Mechanical Analysis
- Kelvin probe module for chemical potential imaging
- Scanning electrochemical microscopy with input for analog bipotentiostat signals



Technical Specifications

- Up to 8 data channels can be read and imaged simultaneously.
- All ADCs are 16 bit and DACs have 16-bit resolution.
- Image size continuously variable from 2x2 to 1024x1024 & multiple Z acquisition
- X, Y, and Z High Voltage Outputs -145V to +145V
- Amplitude to 5 V p-p and maximum resolution of up to 0.2 mV
- Amplitude, Phase and Frequency of the oscillator can be readily controlled
- Any signal can be used for feedback



Designed for Multiprobe Operation

- Complete freedom of input and output of additional probe signals
- Flexible offsets for accurate placement of multiprobes with sample scanning analysis
- Inter-probe triggering
- Integrated multiprobe operation with Raman acquisition, electron and ion beam operation, CCD inputs and outputs,
- Spectral acquisition with multiprobe signal acquisition



Built In Lock-in & Associated Characteristics

- Provides quadrature output
- Information readily available on R/θ and I/Q in Output bandwidths of 15kHz
- Direct Digital Synthesizer (DDS) system for frequency and phase adjustment
- Phase sensitivity of μHz depending on Q factor of probe
- Higher harmonics accessible for ANSOM signal processing
- 32-bit frequency determination and 20-bit phase determination
- Three independent generators
 - Two providing quadrature for lock-in processing
 - Third used for exciting with an autophase
 - Clock frequency of 20 MHz with a stability of 5 ppm and provides frequency resolution of <5 mHz
 - 32-bit 20 MHz clock DACs
 - Frequency scanning of up to 500kHz
 - Direct digital control of frequency



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Additional Features

- Complete access to all signals & any signal can be used for feedback
- Frequency shift, amplitude, phase and excitation are internal signals with easy access and analysis
- No noise or drifts introduced via mixed signals
- Gentle Tip *GT* algorithm feature for ultimate in tip control for experimental protocols with single nanoparticle multiple approach protection (patent pending)
- NanoIndentation implemented with additional software modules only
- Nanoithography implemented with additional software modules only
- Software interfaces for Raman fully integrated with Renishaw PLC
- Scan control makes the interfacing of various instruments readily accessible for interfacing new dimensions to scanned probe analysis



Come Up To The Ultimate in Ultra Low Noise, Flexibility & MultiDimensional SPM Imaging With

Integra

