Specifications

Channels	one, two, or three
Resolution	20-bit
Processor	32-bit floating point DSP
Sampling rate	24 µsec servo-loop
Interfaces	USB analog input (-10V to 10V) analog monitor output (-10V to 10V) optional RS232 optional high speed parallel for NI PCI-6534 or PCI-6533 32-bit DIO card optional Veeco III, IIIa, IV and V AFM controllers, Agilent AFM controllers, and Ambios AFM controllers
Software	nPoint control panel LabVIEW drivers ActiveX DLLs
HV Driver voltage	-30V to 150V piezo driver signal
Input voltage	BNC -10V to 10V analog position command signal
Monitor output	BNC -10V to 10V analog sensor signal
Max output current	100mA/channel standard, 350mA/channel optional
Dimensions	445 x 76 x 324 mm (optional rack mounting)
Cables	2m long cables to the nanopositioner (longer cables are available)
Operating voltage	100/120/220/240 ±10%, 50/60Hz
Operating system	Microsoft Windows NT/2000/XP/Vista
Certification	CE

nPoint manufactures ultra-precision motion control tools used in applications ranging from life science to the semiconductor industry.

www.npoint.com • sales@npoint.com • Sales 608.204.8756
Fax 608.310.8774 • 1617 Sherman Avenue • Madison, WI 53704

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C-300 series DSP Controller

- ☑ **32-bit floating point DSP**
- ☑ **20-bit resolution**
- ☑ **24 µsec servo-loop interval**
- ☑ **Software control panel allows for adjusting control parameters**
- ☑ **Multiple advanced control profiles to choose from**
- ☑ **Analog and digital control inputs**
- ☑ **LabVIEW, ActiveX and DLL drivers**
- ☑ **Three axes control**

Nanopositioning | Motion Control

npoint

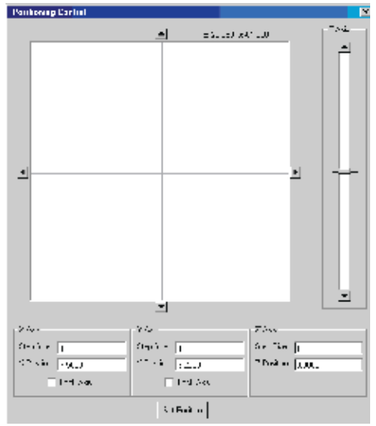
The C-300 series controllers provide nanopositioning control capabilities that are optimized for a variety of applications. These applications range from Atomic Force Microscopy (AFM) where fast, precise and low-noise scanning is essential, to micromachining applications where fast translation and minimal settling times are paramount.

nPoint controllers combine ultra low-noise driver electronics and capacitive sensing modules with DSP-based servo control. Up to three axes can be controlled simultaneously. User generated positioning commands are supplied via the analog BNC inputs, the USB interface or the optional high-speed parallel I/O interface. nPoint's linearization technique achieves positioning linearity better than 99.97% over the entire range of travel.

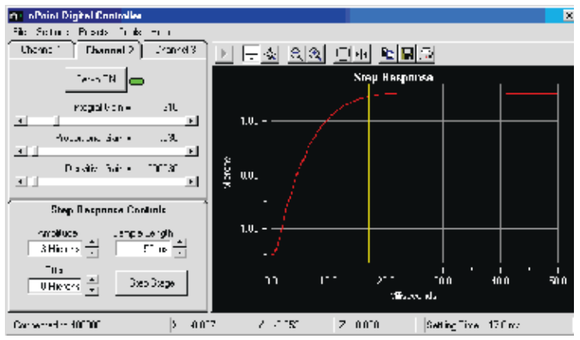
Software Environment

Control is made easy with nPoint's Windows-based software. Graphical controls facilitate easy adjustment of control parameters, step-response verification and enabling of advanced control modes. Stage positions can be changed via user-defined script commands, a graphical digital positioning system or through the optional LabVIEW driver set.

The response of a nanopositioning system can be optimized for various applications via adjustable control parameters. This may be necessary when external factors, such as load, change the dynamic characteristics of the nanopositioning system.



Digital Positioning Control interface



nPoint Digital Controller interface

Communication/Interfaces

Standard analog and USB

Each channel is equipped with analog control (-10V to 10V) and monitoring (-10V to 10V) BNC connectors.

The standard USB interface can also be used to command and monitor the position of a stage. ActiveX control and LabVIEW drivers facilitate the integration of nPoint nanopositioning systems with a variety of customer applications. The USB interface can operate at a maximum command rate of 500 commands per second. These commands can be split evenly between positioning and sensor monitoring or they can be dedicated to one function.

Optional high speed parallel I/O

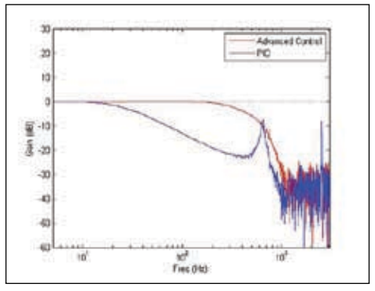
The high speed parallel interface offers communication with the controller at full loop speed.
It allows the user to set the position and read the sensor data for up to three channels every 24 microseconds at 20 bit resolution. The standard configuration uses a National Instruments digital I/O card. Support for custom configurations is also available.

nPoint customers can select from multiple advanced control modes to provide optimum system response for their specific application.

Advanced Control

Proportional Integral Differential (PID) is a commonly used and robust control scheme. However, demanding applications require more advanced control schemes. nPoint has developed optimized control algorithms to meet varying performance needs.

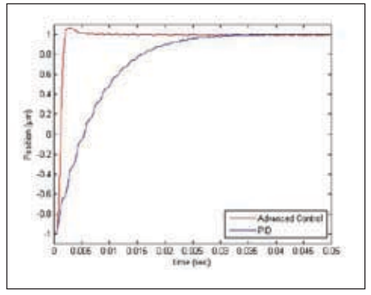
Nanopositioning control requirements can be classified into two main applications: position-and-hold and scanning.



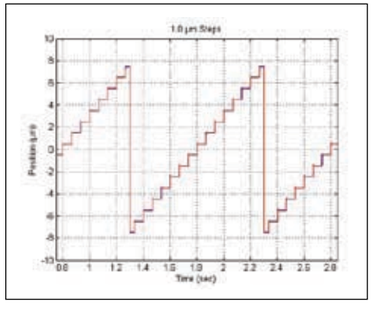
The bandwidth of a nanopositioning system is substantially increased when advanced control is used instead of PID control.

Position-and-hold applications

Applications requiring minimum settling time will greatly benefit from nPoint's proprietary advanced control "step mode". Step mode significantly reduces the settling time when compared to PID control.



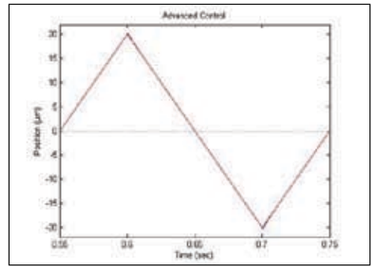
Settling time is significantly reduced when step mode control (red) is used instead of PID control (blue).



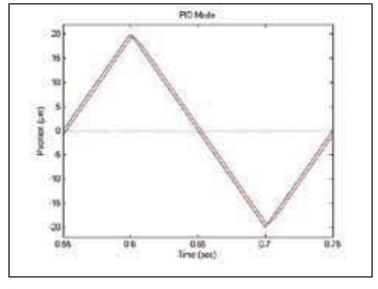
1µm steps performed using step mode control.

Scanning applications

In scanning applications the nanopositioner/scanner is required to follow a triangle input scanning signal. The advanced control mode, "scan mode", developed by nPoint, minimizes linearity errors and eliminates phase-lag errors compared to PID.



Commanded position (blue) vs. actual position (red) at 5Hz using scan mode control.



Commanded position (blue) vs. actual position (red) at 5Hz using PID control.