Specifications

Channels	up to six
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 high speed serial interface 9-pin digital I/O
Software	nPoint control panel LabVIEW and DLL drivers Wave form generator
HV Driver Voltage	-30V to 150V piezo driver signal, -200V to 200V optional
Command Input Voltage	BNC -10V to 10V analog position command signal
Sensor Monitor Output	BNC -10V to 10V analog sensor signal
Sensor Type	Capacitive or Strain Gage, others optional
Max Output Current	100mA/channel standard, 200mA/channel and 350mA/channel optional
Dimensions	342 x 133 x 375 mm (4 channel model), 449 x 133 x 375 mm (6 channel model)
Cables	2m long cables to the nanopositioner (longer cables are available)
Operating Voltage	100 – 240 VAC, 50 – 60 Hz
Operating System	Microsoft Windows XP/Vista/7
Certification	CE

npoint

www.npoint.com
info@npoint.com

sales • 608.824.1770
fax • 608.824.1774

3030 Laura Lane, Suite 100
Middleton, WI 53562

C.400 series DSP Controller

- ☑ **Up to six axes control**
- ☑ **Capacitive or Strain Gage sensor**
- ☑ **Multiple advanced control profiles to choose from**
- ☑ **Stage ID chip compatible**
- ☑ **OEM configurations available**

nanopositioning | motion control

npoint

nPoint controllers combine ultra low-noise driver electronics and motion sensing modules with DSP-based servo control. Up to six axes can be controlled simultaneously with the C.400 controller.

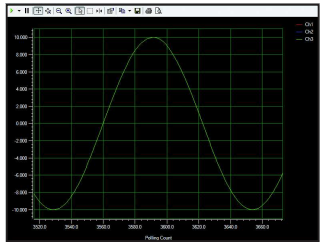
User-generated positioning commands are supplied via the analog BNC inputs, the USB interface or the optional high-speed serial interface. nPoint's linearization technique achieves positioning linearity better than 99.97% over the entire range of travel.

The C.400 is compatible with capacitive and strain gage sensing technology to provide the most flexible nanopositioning controller in the market. Moreover, stage calibration data and other parameters, such as control configurations, are stored in the ID-chip and are read automatically. High power amplifiers provide the necessary current for high-speed applications/ high-load configurations.

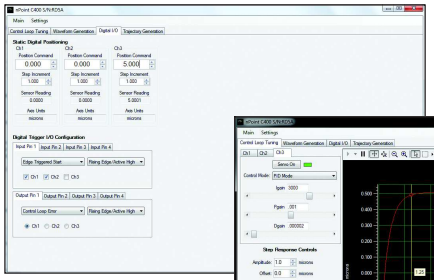
Software Environment

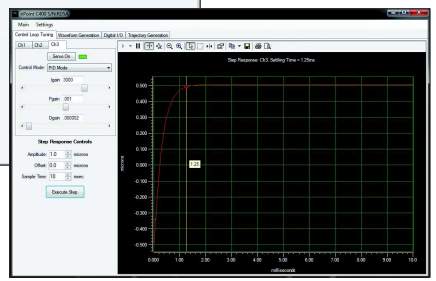
Control is made easy with nPoint's Windows-based software. Graphical controls facilitate easy adjustment of control parameters, step-response verification and enabling of advanced control modes.

The **Control Loop Tuning** window allows the response of a nanopositioning system to 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. The user can command one axis (channel) while simultaneously monitoring additional axes.



The Waveform Generation can be used to generate periodic motion on any stage axis. Different periodic waveforms can be selected for each channel. User-defined waveforms can also be uploaded.





Stage positions can be changed via the Digital I/O window. The sensor reading can be monitored via the same interface.

Communication / Interface

Standard analog and USB

Each channel is equipped with analog control and sensor monitor BNC connectors. The standard USB interface can also be used to command and monitor the position of a stage. LabVIEW and DLL drivers facilitate the integration of nPoint nanopositioning systems with a variety of customer applications.

Digital I/O

The user can assign different triggering functions to the 9-pin digital I/O interface through the front panel software. This facilitates the integration with other instruments and the customization of experiments.

Optional high speed serial interface

The high speed serial 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 six channels every 24 microseconds at 20 bit resolution.

For custom interfaces please contact nPoint at ***support@npoint.com***

C.400 users can select from multiple advanced control modes to provide optimum system response for their specific application.

Advanced Control

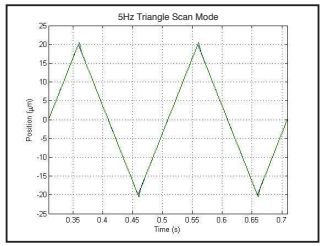
Proportional Integral Differential (PID) is a commonly used and robust control scheme. However, demanding applications require more advanced control schemes. nPoint has developed optimized control algorithms to meet varying performance needs. Up to two notch filters per channel can be enabled.

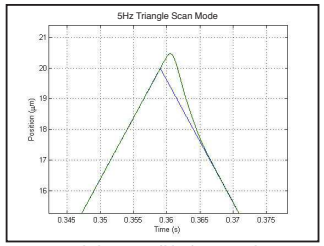
Nanopositioning control requirements can be classified into two main applications: position-and-hold and scanning.

Scanning applications

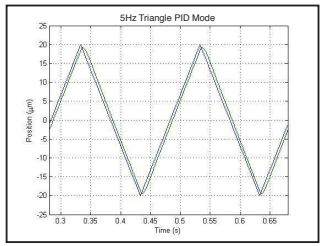
In scanning applications the nanopositioner/scanner is required to follow a triangle input scanning signal. The advanced control mode, "scan mode", developed by nPoint, minimizes linearity errors and eliminates phase-lag errors compared to PID.

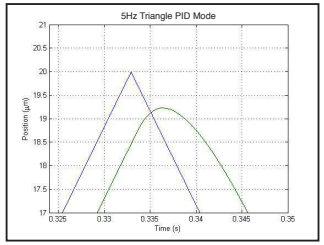
nPoint has significant experience developing custom servo-control and hardware configurations for diverse applications. Our goal is to understand our customers' control needs and identify the solution that best fits those needs.





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

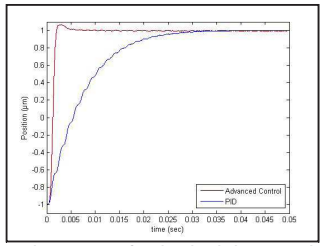




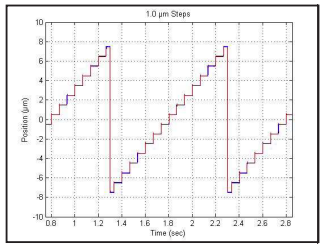
Commanded position (blue) vs. actual position (green) at 5Hz using PID control.

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.