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More to PRIOR than meets the eye

NanoScan NPC-D-6000 Series

Closed Loop Digital Controllers

The NPC-D-6000 series are single and multi-channel digital nanopositioning controllers.

The NPC-D-6330 is capable of controlling up to 3 piezo driven actuators and 2 or 3 axis nanopositioning systems. The NPC-D-6110 is a single channel version delivering the same performance for single axis nanopositioning systems.

Designed to operate in closed loop with stages or actuators incorporating capacitance positioning sensors the controllers deliver low noise, low drift, high power and high resolution. Fast position update rates contribute to high speed positioning accuracy for dynamic applications that require high speed movement of the stage.

The NPC-D-6000 series controllers deliver repeatability of movement with improved precision and accuracy for precise imaging and focusing at higher maximum speeds with fast step settle times. This can be particularly important for longer range stages or stages designed for high load bearing.

Key Features

- Closed loop controller with open loop operating mode. Capacitance sensor measurement circuitry for precision closed loop operation.
- Digital signal processing with 24 bit data resolution. Fast 20µs control loop update.
- 4th order linearization algorithm for high positional accuracy.
- Supports Plug and Play NanoMechanisms. The calibration and dynamic settings are held in the stage EEPROM allowing controllers to be interchanged with minimal impact on performance.
- Two notch filters for tuning to meet specific application requirements, reducing noise and preventing stage ringing.
- The low noise design allows stage position noise as low as a few tens of picometres. Delivering a stable system with repeatability of movement, precision and accuracy for precise imaging and focusing.
- Dynamic high-power output NanoMechanism drive with 20 bit resolution.
- Optimized acceleration/deceleration contribute to high speed positioning applications by reducing overshoot and settle time.
- Soft-start/stop technology protects loads and increases piezo life.

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Interfacing

- Analogue command and position output +/-10 V or 0-10V
- Digital commands over USB or optional RS232C and Ethernet control interfaces.
- Easy to interface with OEM software using supplied DLL (Dynamic Link Library).
- Examples of software in C/C++, Python and LabVIEW® provided.
- User programmable Function Playback of custom programmed waveforms such as constant velocity profiles.
- User programmable TTL input/output triggers intregrated with function play back to interface with external devices.
- TTL In-position digital outputs can be used to interface with external devices
- Digital TTL quadrature or step and direction inputs/outputs allowing high speed control with a standard 2 wire motion controller interface, without the need for expensive high precision ADCsS/DACs.

Technical specification

Parameter	Value	Units	Comments
Mechanical			
Size: NPC-D-6330	318 x 240 x 90	mm	Height includes feet. Not including protruding components at front and rear of controller.
NPC-D-6110	318 x 240 x 90	mm	Additional space required for rear connectors and cables.
Weight	3.0	kg	
Cooling	Fan forced air		Vents on rear and base
Electrical			
Power input	100 to 240 nominal 47 to 63	Vrms Hz	Using external supply. Only use approved power supply -provides protective earth connection.
DC power input	± 24 ± 0.75@5A	V	Only use Queensgate approved power supply
DC power input connector	4 pin DIN Plus protective earth connection		Rear panel
Connectivity			
USB	2.0 compliant		USB type B connector. Note: power not taken from USB port.
Ethernet	IEEE 802.3		RJ45 connector. Requires a Cat 5 male to male cable. MUST use shielded Ethernet cable.
Analogue input command	BNC		Per channel - front panel
Analogue Position Monitor output	BNC		Per channel - front panel
“TRIG” input, “TRIG” output, “IN-POS” output and Quadrature Interface	25 pin D-type socket		
Controller Synchronizing signals	9 pin D-type socket		Rear panel
Environmental - Operational			
Temperature	10 to 40	ºC	
Relative Humidity	5 to 80	%RH	Non-condensing

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Technical specification

Parameter	Value	Units	Comments
Environmental - Storage and Shipping			
Temperature	-20 to 70	ºC	
Relative Humidity	0 to 95	%RH	Non-condensing
General			
Warm up time	40 (typ)	Min	
“ANA I/P” analogue input position command per channel	-10 to +10	V	Connector BNC – Single ended MAXIMUM input: ±10V Input maybe cailbrated to 0-10V range if required
“ANA I/P” analogue input impedance (per channel)	> 50k	Ohms	
“POS MON” analogue output position monitor per channel	-10 to +10		Connector BNC – Single ended MAXIMUM input: ±10V Output maybe cailbrated to 0-10V range if required
Function Playback trigger inputs and outputs Stepped inputs and outputs in position output	TTL logiv levels Logic “0” < 0.8 Logic “1” 2.4 to 5	 V V	25 pin D-Type on rear panel. Inputs - input impedance 50 ohms, MAXIMUM input 5.5V Outputs Load impedance: > 1k ohms. MINIMUM
NanoMechanism interfacing – controller – per channel			
Connector	17W2 D type		Mixed signal connector
HV output swing	-30 to +150 -20 to +120	V	Factory set (default) Factory set (optional)
HV drive current	160	mA	Factory set (default)
HV amplifier bandwidth	>50	kHz	
HV amplifier intrinsic noise	0.3	mV	

Ordering information

Product Ref	Description
QGNPC-D-6330	NanoScan NPC-D-6330 Multi-Channel Closed Loop Controller
QGNPC-D-6110	NanoScan NPC-D-6110 Single Channel Closed Loop Controller

Owing to continuous development, we reserve the right to introduce improvements and modify specifications without prior notice.

PRIOR Scientific

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