



NanoSensors – NX Series

Nanopositioning Sensors



NX NanoSensor for the ultimate in position monitoring.

The NX NanoSensor® is a non-contact position measuring system based on the principle of capacitance micrometry. Two sensor plates, a target and a probe, form a parallel plate capacitor.

The spacing of these two plates can be measured using the appropriate electronic controller, to better than 7pm, with a range up to 1.25mm, a frequency response up to 10KHz and linearity down to 0.02%. Because the NanoSensor is a non-contact method, it is free from hysteresis. No power is dissipated at the point of measurement.

Typical applications

- Precision manufacturing
- Metrology
- Deformation measurements
- Stain measurement (used on space station robotic arm and hand)
- Stage control
- Materials testing
- Microscopy
- Active optics
- Precision beam steering

Suggested controllers

The NS2000 or the NS-A-4101 are single channel standalone

Key features

- Sub nanometre position resolution
- Zero hysteresis
- Linearity error down to 0.02%
- Bandwidth from 50Hz up to 10kHz
- High thermal stability construction (Super invar, zerdur and ceramic options available)
- UHV, Radiation, Cryogenic, Nonmagnetic, etc. Variants.

electronic modules for driving the NX NanoSensor® series. Either controller can be synchronised to allowing multiple units to be operated together without interference.

Key benefits

- Very sensitive to atomic scale changes in position
- Precision measurement to picometres
- Tuneable to meet application requirements
- Repeatable measurement
- High Accuracy
- Choice of materials to minimise position drift
- for a wide range of applications and to suit a broad range of environmental challenges.

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Technical specification

Parameter		Value						Units	Comments
Static physical									
Variant		NXB Series		NXC Series		NXD Series			
Active area		22.5		113		282		mm ²	
Material		AL	SI	AL	SI	AL	SI		Note 1
Dynamic physical (Typical values)									
Thermal drift		230	3	230	3	230	3	nm K ⁻¹	Note 2
Short range –S (10pF)	Range	20		100		250		µm	
	Nominal scale factor	2		10		25		µm/V	
	Noise	<0.001		<0.005		<0.013		nmrms Hz-1/2	
	Linearity error	<0.08		<0.05		<0.06		%	Note 3
Long range –L (2pF)	Range	100		500		1,250		µm	
	Nominal scale factor	10		50		125		µm/V	
	Noise	<0.015		<0.075		<0.188		nmrms Hz-1/2	
	Linearity error	<0.08		<0.03		<0.06		%	Note 3
Operating temperature	Controller	+10 to +50						°C	
	Sensor	+10 to +50						°C	
Storage temperature		0 to +70						°C	
Relative humidity		5 to 95 (non-condensing)						%	
Operating pressure	-UHV	10 ⁻⁹						T	Note 4

Notes

1. Aluminium (AL) and Super Invar (SI) material available on all variants. Alternative custom materials, e.g. Stainless Steel or Invar 36 can be used. Please consult Queensgate.
2. This is the thickness contribution only. It does not include the area effect.
3. Linearity error can be dominated by the parallelism of the sensor faces; particularly for short range sensors. Linearity for type 4 compact sensors will have an order of magnitude higher non-linearity.
4. Vacuum sensors should be baked out at 100 °C for two days prior to installation for best vacuum compatibility.

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Ordering information

The NX NanoSensors are available in three sizes, the standard variant is square with a choice of super invar or aluminium. Round variants are available as a custom product and the a rectangular variant of size B is also available.

The size is indicated by letters, B (Smallest) to D (Largest).
The larger the sensor the longer the range.

The shape is indicated by numbers, 2 (Square) and 3 (Rectangular).
The shape does not affect performance.

All NX series sensors are available in Aluminum and Super Invar (0.3ppm K-1).
The round Super Invar sensor has an optional magnetic base.

Alternative materials can be considered as custom products. please consult Queensgate at Prior Scientific.

Example order codes

NXC2-SI-UHV		NXB3-AL	
NX	Specifies an NX capacitance sensor	NX	Specifies an NX capacitance sensor
C	The active area is 113mm ²	B	The active area is 22.5mm ²
2	Square shape 20mm diameter, 5mm thick	3	Rectangular shape 20 x 7.5 x 3.0mm
SI	The sensor will be made of Super Invar and come with magnetic mounting	AL	The sensor will be made of Aluminium
UHV	The sensor will be UHV compatible		

Size and shape variants

