



nexoDAQ

Product Datasheet

Description

nexoDAQ is a wireless data acquisition platform designed for many different applications. It is modular, versatile and highly configurable.

nexoDAQ is equipped with three 24-bit data acquisition channels that can be software configured to interface various types of sensors: IEPE/ICP® accelerometers, charge mode sensors, low-voltage differential and single-ended, high voltage single-ended, full bridge and 4–20 mA sensors.

Multiple *nexoDAQ* units form a wireless star network centered on the **Inertia Gateway** and stream the sensor data live at data rates reaching **10kHz per channel**. The synchronization across all channels and units is better than **100ns**. Additionally, the sensor data can also be transmitted wired through USB or stored on the on-board SD card and retrieved later over USB or wirelessly.

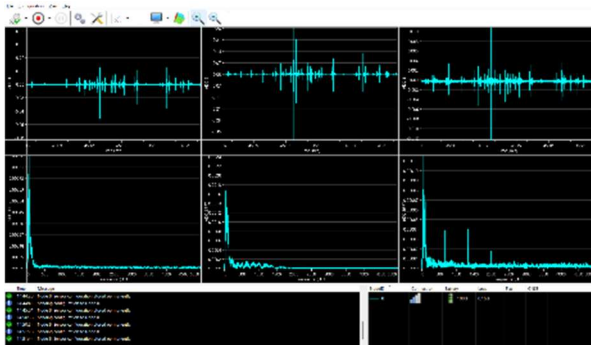
nexoDAQ operates on an internal rechargeable battery with industrial operating range. Alternatively, it can be powered from external sources: 5V standard USB charger or 7–24VDC external source. The enclosure is rugged IP67.

Key Features

- Distributed wireless DAQ with six highly configurable interface modes:
 1. IEPE/ICP®: 6–24V compliance voltage, 0.1–4mA excitation current
 2. Charge mode: differential and single-ended, maximum sensitivity 10pC/V
 3. Low voltage: differential and single-ended signals up to ±10V max
 4. High voltage single ended signals up to ±100V
 5. Full bridge
 6. 4–20mA industrial sensors
- High-speed data sampling and wireless streaming up to 10kHz per channel
- Highly synchronized (better than 100ns)
- Three 24-bit simultaneously-sampled inputs
- Over-the-air setup and reconfiguration
- Full-scale DC bias adjustment with 19µV max. resolution
- Gain adjustable from 1 to 1024 with steps of 1
- 2h running time at highest power mode (continuous sampling and communication).
- Per-channel powering of external sensors up to ±12V, ±20mA max.
- Internal rechargeable battery with industrial operating range
- On-board micro-SD card of 32 GB for data storage
- 7–24V DC power connector (3A max, electrically isolated)
- USB 2.0 FS (12Mbps, electrically isolated)
- IP67 rating and rugged design
- Bridge Completion accessories available
- Plug and use - automatic wireless star network formation centered on Inertia Gateway

Inertia Studio

Inertia Studio enables real-time visualization of the sensor data, as well as over-the-air reconfiguration of the sensors and wireless parameters. All data retrieved by Inertia Studio is logged for post-analysis.



Wireless Network

The wireless network of Inertia operates in the 2.4 GHz and has a speed of 4Mbps. It provides network-wide synchronization with an accuracy better than 100 ns. This means that all sensors are sampled at the same time instance across the network.

Inertia Gateway connects through USB to a computer running Inertia Studio, where the data can be visualized and logged.



Nevertheless, raw sensor data does not always represent the end goal of a measurement session. Specialized data processing is often required to get a meaningful representation of the measured process. The InertiaSDK allows to integrate the nexoDAQ into user applications.

Benefits

- High-quality data acquisition
- Synchronized sampling
- High data rates
- Less cables
- Modular and configurable
- Measures in hard-to-reach places
- One device for all sensor types

Applications

- Measurement and testing
- Industrial vibration monitoring
- Structural health monitoring
- Predictive maintenance
- Condition monitoring
- Active vibration control

Contact information

E-mail info@inertia-technology.com

Phone +31 53 711 3408

Address Hengelsestraat 583,
7521 AG Enschede
The Netherlands

TECHNICAL SPECIFICATIONS

PARAMETER	Conditions	Min	Typical	Max	Unit
General characteristics					
ADC			24-bit, Delta-Sigma		Bits
Data Rate range (f_s)		1		10	kHz
-3dB Bandwidth			$0.49 f_s$		Hz
Passband flatness	DC – 5 kHz	20		40	mdB
Phase nonlinearity	DC – 5 kHz			0.1	deg
Input delay			$42/f_s + 16.4e^{-6}$		s
Stopband frequency			$0.547 f_s$		Hz
Stopband attenuation			100		dB
Oversample rate			$256 f_s$		Hz
Attenuation at oversample rate	$f_s = 10$ kHz		100		dB
Gain range		1		1024	
DC Bias Adjust range	Gain = 1	-FS		FS	
DC Bias Adjust resolution	Gain = 1		19		μ V
Power output voltage (V_{EXT})		± 5		± 12	V
Power output current source/sink	$V_{EXT} = \pm 10$ V			± 20	mA
Differential Low Voltage Mode Characteristics					
Measurement range			± 10		V
Input coupling (selectable)			AC, DC		
Input Impedance (selectable)			10M, >1G		Ω
AC -3dB cutoff frequency	$Z_{INP} = 10M\Omega$		0.048		Hz
Gain error	Gain = 1, Calibrated ¹		± 0.001	± 0.01	%
	Gain > 1, Calibrated ¹		± 0.05	± 0.1	%
	Operating range			± 0.2	%
Gain drift	Gain = 1, Calibrated ¹			± 2	ppm/ $^{\circ}$ C
	Gain > 1, Calibrated ¹			± 20	ppm/ $^{\circ}$ C
	Operating range			± 40	ppm/ $^{\circ}$ C
Offset error	Calibrated ¹		± 50	± 100	μ V
	Operating range			± 1	mV
Offset drift	Calibrated ¹			± 2	μ V/ $^{\circ}$ C
	Operating range			± 20	μ V/ $^{\circ}$ C
Input noise			36		μ V _{RMS}
Total Harmonic Distortion (THD)	1 kHz, -1 dBFS, Gain = 1		-115		dBc
Spurious Free Dynamic Range (SFDR)	1 kHz, 1 V _{RMS} , Gain = 1		120		dB
Crosstalk	1 kHz, -1 dBFS, Gain = 1		-125		dBFS
CMRR	1 kHz, -1 dBFS, Gain = 1		90		dB
Single Ended High Voltage Mode Characteristics					
Measurement range			± 100		V
Input coupling (selectable)			AC, DC		
Input Impedance			1M		Ω
AC -3dB cutoff frequency	$Z_{INP} = 1M\Omega$		0.5		Hz
Gain error	Calibrated ¹		± 0.05	± 0.1	%
	Operating range			± 0.5	%
Gain drift	Calibrated ¹			± 20	ppm/ $^{\circ}$ C
	Operating range			± 100	ppm/ $^{\circ}$ C
Offset error	Calibrated ¹		± 0.5	± 1	mV
	Operating range			± 5	mV
Offset drift	Calibrated ¹			± 20	μ V/ $^{\circ}$ C
	Operating range			± 100	μ V/ $^{\circ}$ C

PARAMETER	Conditions	Min	Typical	Max	Unit
Input noise			36		μV_{RMS}
Total Harmonic Distortion (THD)	1 kHz, -1 dBFS, Gain = 1		-115		dBc
Spurious Free Dynamic Range (SFDR)	1 kHz, 1 Vrms, Gain = 1		120		dB
Crosstalk	1 kHz, -1 dBFS, Gain = 1		-125		dBFS
CMRR	1 kHz, -1 dBFS, Gain = 1		90		dB
IEPE Mode Characteristics					
Compliance Voltage range (V_{IEPE})		6		24	V
Measurement range		0		V_{IEPE}	V
Excitation current range		0.1		10	mA
Input coupling (selectable)			AC, DC		
AC -3dB cutoff frequency			0.5		Hz
Input Impedance			1M		Ω
Gain error	Calibrated ¹		± 0.05	± 0.1	%
	Operating range			± 0.5	%
Gain drift	Calibrated ¹			± 20	ppm/°C
	Operating range			± 100	ppm/°C
Offset error	Calibrated ¹		± 0.5	± 1	mV
	Operating range			± 5	mV
Offset drift	Calibrated ¹			± 20	$\mu\text{V}/^\circ\text{C}$
	Operating range			± 100	$\mu\text{V}/^\circ\text{C}$
Input noise			0.8		mV_{RMS}
Total Harmonic Distortion (THD)	1 kHz, -1 dBFS, Gain = 1		-92		dBc
Charge Mode Characteristics					
Supported Charge interface types	Differential, Single-ended				
Measurement range (selectable)		100p		100n	C
AC -3dB cutoff frequency (selectable)		0.16m		1600	Hz
Gain error	Operating range		± 0.1	± 0.5	%
Gain drift	Operating range		± 100		ppm/°C
Offset error	Operating range		± 0.5		pC
Offset drift	Operating range		± 0.2		pC/°C
Input noise	10nC Range, f_c 1.6Hz, Gain = 1		0.3		pC_{RMS}
Total Harmonic Distortion (THD)	10nC Range, f_c 1.6Hz, 1 kHz, 1 nCrms, Gain = 1		-110		dBc
Spurious Free Dynamic Range (SFDR)	10nC Range, f_c 1.6Hz, 1 kHz, -1 dBFS, Gain = 1		85		dB
Crosstalk	10nC Range, f_c 1.6Hz, 1 kHz, -1 dBFS, Gain = 1		-120		dBFS
CMRR	10nC Range, f_c 1.6Hz, 1 kHz, -1 dBFS, Gain = 1		70		dBFS
4 – 20mA Mode Characteristics					
Measurement range		-25		25	mA
Input coupling			DC		
Input Impedance			235	240	Ω
Gain error	Calibrated ¹		± 0.5	± 1	%
	Operating range			± 2	%
Gain drift	Calibrated ¹			± 200	ppm/°C
	Operating range			± 1000	ppm/°C
Offset error	Calibrated ¹		± 2.5	± 5	μA
	Operating range			± 50	μA

¹ Calibrated refers to the standard calibrated temperature range (0 °C to 50 °C).

PARAMETER	Conditions	Min	Typical	Max	Unit
Offset drift	Calibrated ¹			±0.1	µA/°C
	Operating range			±1	µA/°C
Input noise			3.4		µA _{RMS}
Total Harmonic Distortion (THD)	1 kHz, -1 dBFS, Gain = 1		-92		dBc
Spurious Free Dynamic Range (SFDR)	1 kHz, 4 mA _{RMS} , Gain = 1		94		dB
Crosstalk	1 kHz, -1 dBFS, Gain = 1		-110		dBFS
Wireless communication					
Frequency band			2.4		GHz
Data rate				4	Mbps
TX Power				10	dBm
Range	Line-of-sight, max. TX power			30	m
Software					
Visualization software	Inertia Studio	Real-time data visualization, acquisition and configuration. Runs on Windows, macOS and Linux.			
Connectivity and storage					
Micro-USB		USB interface for configuration, reprogramming, SD card downloading and battery recharging			
Analog inputs		Circular push-pull connector			
External power input	S10 connector		24		V
Storage	micro-SD card		32		GB
Electrical characteristics					
Power consumption	Max. TX power, High-performance IEPE mode	3.9		4.1	W
Internal battery capacity	3.75V Li-Ion rechargeable		2.6		Ah
Internal battery operating temperature	Charge / Discharge	-20 / -50		+60	°C
Miscellaneous					
Dimensions	Without antenna	147 x 96 x 50.5			mm
Weight	With antenna	481			g
Enclosure material		Aluminum and shock-proof plastic covers			
Waterproof	IP rating	IP67			