

Torque-Link-LXRS

Wireless Torque Sensor



Torque-Link-LXRS - specialized analog sensor node designed to fit over rotating shafts for wireless strain and torque measurements

LORD Sensing LXRS Wireless Sensor Networks enable simultaneous, high-speed sensing and data aggregation from scalable sensor networks. Our wireless sensing systems are ideal for test and measurement, remote monitoring, system performance analysis, and embedded applications.

The gateways are the heart of the LORD Sensing wireless sensing system. They coordinate and maintain wireless transmissions across a network of distributed wireless sensor nodes. Some nodes have integrated sensors, while others are designed with multi-sensor connectivity for application flexibility. The LORD Sensing LXRS wireless communication protocol between LXRS nodes and gateways enable high-speed sampling, ± 32 microseconds node-to-node synchronization, and lossless data throughput under most operating conditions.

Users can easily program nodes for continuous, periodic burst, or event-triggered sampling with the Node Commander software. The optional web-based SensorCloud interface optimizes data aggregation, analysis, presentation, and alerts for sensor data from remote networks.

Product Highlights

- Two to four inch shaft (standard), more sizes available on request
- One or two differential analog input channels designed for full-bridge strain gauge integration
- Ideal for static and dynamic torque measurements with full temperature compensation and bending cancellation
- Rugged ABS housing designed for remote, long-term installation on cylindrical shafts
- User-programmable sample rates up to 4096 Hz
- Application-specific design available on request

Features and Benefits

High Performance

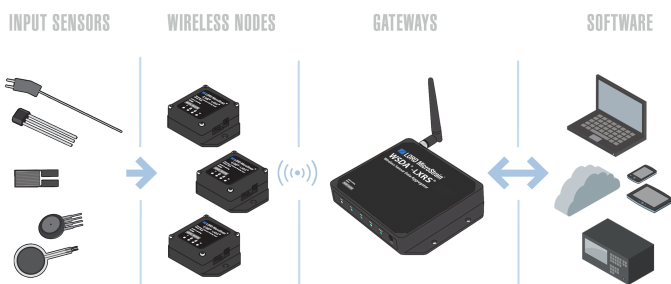
- Lossless data throughput and synchronized node-to-node sampling of ± 32 μ S in LXRS-enabled modes

Ease of Use

- Wireless framework reduces installation complexity
- Installs over existing strain elements and shafts with no mechanical modifications
- Configurable housing geometry will accommodate any shaft size
- Easy custom integration with open-source, comprehensive communications and command library (API)
- Wireless data transmission allows installation on rotating components without a slip ring

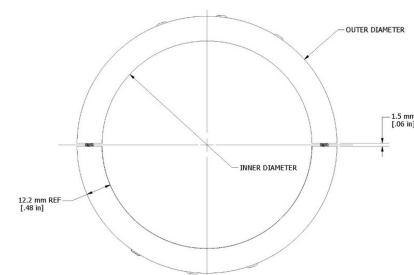
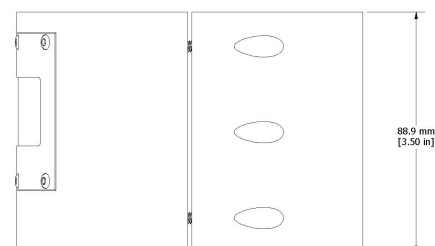
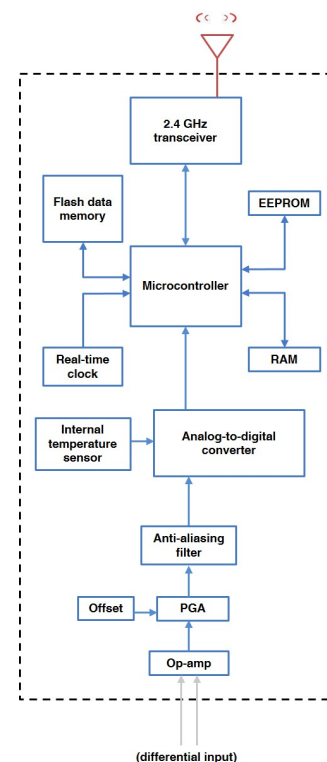
Applications

- Condition-based monitoring
- Health monitoring of rotating components, aircraft, structures, and vehicles
- Static and dynamic torque measurements



Specifications

General	
Sensor input channels	Differential analog, 1 channel (standard), 2 channels (optional)
Integrated sensors	Internal temperature, 1 channel
Data storage capacity	2 M Bytes (up to data points)
Analog Input Channels	
Selectable measurement ranges	Differential: ± 1.22 mV dc to 156 mV dc Single-ended: ± 2.56 V dc, ± 5.12 V dc, ± 10.24 V dc, 0 to 5.12 V dc, 0 to 10.24 V dc
Single-ended input impedance	1 Mohm
Measurement range	Strain: full-bridge, $\geq 350 \Omega$
Resolution	16 bit
Accuracy	$\pm 0.1\%$ full scale typical
Anti-aliasing filter bandwidth	Single-pole Butterworth -3 dB cutoff @ 500 Hz
Bridge excitation voltage	+3 V dc (pulsed @ sample rates ≤ 16 Hz to conserve power)
Measurement gain and offset	20 to 2560, user-set in software
Integrated Temperature Channel	
Measurement range	-40°C to 85°C , $\pm 2^\circ\text{C}$ (at 25°C) typical
Resolution	12 bit
Sampling	
Sampling modes	Synchronized, low duty cycle, datalogging
Sampling rates	Continuous sampling: 1 sample/hour to 512 Hz Periodic burst sampling: 32 Hz to 4096 Hz Datalogging: 32 Hz to 4096 Hz
Sample rate stability	± 3 ppm
Network capacity	Up to 2000 nodes per RF channel depending on settings. See: http://www.microstrain.com/configure-your-system
Synchronization between nodes	$\pm 32 \mu\text{sec}$
Operating Parameters	
Wireless communication range	100 m (typical)
Radio frequency (RF) transceiver carrier	2.405 to 2.475 GHz spread spectrum over 14 channels, power settings from 0 dBm (1 mW) to 16 dBm (39 mW)
RF communication protocol	IEEE 802.15.4
Power source	Replaceable, non-rechargeable battery pack (3.0 V dc, 1.2 Ah Li/MnO ₂ batteries in series configuration)
Power consumption	1 to 25 mA (configuration dependent, see user manual)
Operating temperature	-20°C to $+80^\circ\text{C}$
Angular acceleration limit	500 g standard (high g option available)
Maximum RPM	2500 to 4200 RPM (diameter dependent, see user manual, high RPM option available)
Physical Specifications	
Dimensions	Height 88.9 mm (3.5 inches), ID varies for use on 50.8 to 152.4 mm (2 to 6 inch) diameter shafts (custom sizes available)
Weight	200 to 525 grams (0.44 to 1.16 lb), depending on size
Environmental rating	IP 66, tested to DO-160 standards for temperature variation, humidity, and vibration
Enclosure material	ABS thermoplastic
Integration	
Compatible gateways	All WSDA-101 base stations and gateways
Compatible sensors	Differential analog sensors
Connectors	Strain gauge and battery interface connectors
Shunt calibration	Internal shunt calibration resistor 499 K Ω
Software	SensorCloud, Node Commander, Windows 7 (or newer)
Software development kit (SDK)	Open-source MicroStrain Communications Library (MSCL) with sample code available in C++, Python, and .NET formats http://www.microstrain.com/software/mscl
Regulatory compliance	FCC (U.S.), IC (Canada), ROHS



example diameters (other sizes available)

Shaft		Torque-Link	
Shaft Diameter	Inner Diameter	Inner Diameter	Outer Diameter
50.8mm [2.00 in]	51.3mm [2.02 in]	51.3mm [2.02 in]	75.7mm [2.98 in]
76.2mm [3.00 in]	76.7mm [3.02 in]	76.7mm [3.02 in]	101.1mm [3.98 in]
101.6mm [4.00 in]	102.1mm [4.02 in]	102.1mm [4.02 in]	126.5mm [4.98 in]
127.0mm [5.00 in]	127.5mm [5.02 in]	127.5mm [5.02 in]	151.9mm [5.98 in]
152.4mm [6.00 in]	152.9mm [6.02 in]	152.9mm [6.02 in]	177.3mm [6.98 in]

LORD SENSING

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