

# SG-Link® -RGD

## Ruggedized Wireless Analog Input Sensor Node

The **SG-Link® -RGD Ruggedized Wireless Analog Input Sensor Node** integrates complete strain gauge signal conditioning, embedded processing and wireless communications in an environmentally hardened form factor that can be mounted directly over a strain gauge. It supports conventional bonded foil, piezo-resistive, and modular Columbia Research Labs strain gauges, as well as external wheatstone bridge type sensors. Also including a triaxial accelerometer and temperature sensor, the SG-Link -RGD provides flexible wireless data acquisition within a scalable network of sensor nodes at distances up to 2 km.



## Features & Benefits

### *Wireless Simplicity, Hardwired Reliability*

- 4 strain, 3 accelerometer, and 1 temperature channel inputs
- quick installation over existing strain gauges, rosettes, strain sensors
- reduces costs associated with wiring installation and weight
- flight certified and qualified to MIL-STD-810F and MIL-STD- 461F
- low profile, environmentally sealed enclosure
- support for hundreds of simultaneous sampling wireless sensor nodes
- programmable wireless communication range to 2 km
- network synchronization up to  $\pm 32 \mu\text{s}$
- low power consumption for extended use
- onboard shunt calibration

## Applications

- Wireless flight testing of fixed and rotary wing aircraft
- Condition-based monitoring of machines, structures, and components
- Smart structures and materials
- Experimental test and measurement
- Robotics and machine automation

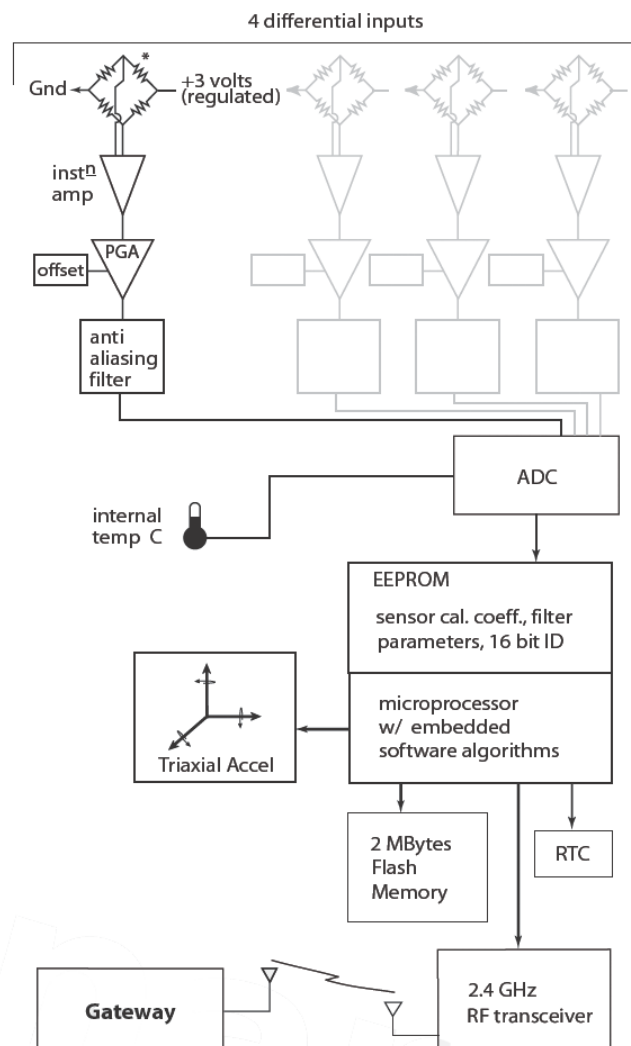
## System Overview

At the heart of **LORD MicroStrain's Ruggedized Wireless Sensor Networks** are WSDA®-RGD gateways, which use our exclusive beaconing protocols to synchronize precision timekeepers within each sensor node in the network. The WSDA-RGD also coordinates data collection from all sensor nodes. Users can easily program each node on the scalable network for simultaneous, periodic, burst, or data logging mode sampling with our **Node Commander®** software, which automatically configures radio communication to maximize the aggregate sample rate. Optional **SensorCloud™** enabled WSDA® support autonomous web-based data aggregation.

## Specifications

Input channels	4 full differential wheatstone bridge input channels, 350 Ω resistance or higher (with optional bridge completion), internal triaxial accelerometer, and internal temperature sensor
Environmental Validation (MIL-STD)	passed evaluation testing for MIL-STD-810F (temperature, vibration, shock, & humidity)
EMI/EMC Validation (MIL-STD)	passed evaluation testing for MIL-STD-461F (RE102 Radiated Emissions and RS103 Radiated Susceptibility)
<b>Strain Inputs</b>	
Anti-aliasing filter bw	-3 dB cutoff at 500 Hz (factory adjustable)
Measurement Accuracy	± 0.1% full scale typical
Resolution	1 microstrain typical for 4 wire full bridge strain gauge (when used in accordance with MicroStrain® recommendations)
DC bridge excitation	+3 volts DC at 50 mA maximum (pulsed to sensors for sample rates of 100 Hz and below to conserve power)
Programmable gain	software programmable: 1 to 512 Hz
Programmable offset	software programmable for remote bridge balance
ADC resolution	successive approximation type, 16 bit resolution
<b>Accelerometer and Temperature Sensor</b>	
Accelerometer type	internal triaxial MEMS
Range	±16 g
Resolution	4 m <sub>g</sub>
Temperature sensor	typical accuracy ±2 °C (at 25 °C), ± 4 °C accuracy across -40 °C to 85 °C operating range
<b>General</b>	
Data storage capacity	2 megabytes (approximately 1,000,000 data points)
Synchronized sample mode	supports multiple synchronized nodes on single RF channel, with sample rates from 1 Hz to 512 Hz
Synchronization between nodes	± 32 μsec @ 10 second beacon interval
Sample rate stability	± 3.5 ppm
Wireless shunt calibration	internal shunt calibration resistor 499 KΩ
Radio frequency (RF) transceiver carrier	2.4 GHz direct sequence spread spectrum, license free worldwide (2.405 to 2.480 GHz) – up to 16 channels, radiated power programmable from 0 dBm (1 mW) to 20 dBm (100 mW)
RF data packet standard	IEEE 802.15.4, open communication architecture
RF data downloading	8 minutes to download full memory
Range for bi-directional RF link	2 km line-of-sight in extended range mode; 70 m in standard range mode
Internal battery	replaceable 3.7 volt 1,700 mAh TL-5935 1/6 D-cell battery
Power consumption*	32 Hz 3 channels, no duty cycling 960uA (3.46mW) 256 Hz 3 channels, no duty cycling 10.6mA (38.16mW) 256 Hz 1 channel, no duty cycling 4.0mA (14.4mW)
Operating temperature	-40 °C to +85 °C
Maximum acceleration Limit	500 g standard (high g option available)
Dimensions	101 mm x 46 mm x 26 mm (enclosure without antenna) for dimensional print go to <a href="http://www.microstrain.com">www.microstrain.com</a>
Weight	150 g (including battery, electronics, enclosure, and potting material); 17 g (circuit board assembly only)
Enclosure material	black polycarbonate
Environmental Protection	Electronics conformal coated and potted with sealed battery replacement cap.
Software	Node Commander® Windows XP/Vista/7 compatible
Compatible base stations	USB, RS-232, Analog, WSDA-Base, WSDA, WSDA-MIL
FCC ID	pending
IC ID	pending

\*all values taken at 3.6 V



\* Optional on-board bridge completion

