Wireless Sensor Nodes

Measuring Inclination with a G-Link[®]-LXRS[®]

OVERVIEW

The G-Link[®]-LXRS[®] wireless node is designed for use as an accelerometer, but with quick modifications to the calibration values it can also be used as a +/- 45° inclinometer. The measurement resolution will be better with +/- 2 *g* node than with a +/- 10 *g* node, but either will achieve an accuracy of +/- 2° .

Using the G-Link -LXRS as an inclinometer is accomplished using the node's factory calibration values and a Microsoft Excel[®] calculator available from the LORD MicroStrain[®] website.

PROCEDURE

1. Find the factory calibration values: The node calibration certificate is provided with the node when it is purchased. It includes the calibration values for *slope* and *offset* for each channel. Locate the calibration values on the certificate. Alternatively these values can be retrieved from the node memory by looking at the channel configuration in Node Commander[®] (*Figure 1 - Node Calibration Values*).



Figure 1 - Node Calibration Values



2. **Open the calculator:** Click the link below to download the inclination calculator from the LORD MicroStrain[®] website. It will launch automatically in Microsoft Excel[®].

G-Link Inclination Calculator

3. Calculate the new slope and offset value: In the calculator, enter the current factory calibration values in the corresponding fields (*Figure 2 - New Calibration Values*). Up to two channels can be calculated at once. The new calibration values are displayed on the graph as the formula y = mx + b, where *m* equals the new slope value and *b* equals the new offset value.



Figure 2 - New Calibration Values

4. Enter the node configuration menu: Open Node Commander[®], and establish communication with the node through the gateway. Open the node configuration menu by right-clicking on the node name and selecting Configure > Configure Node. Check the Channel Enabled check box next to the channel



name, and then the channel Configure button to open the channel configuration menu (*Figure 3 - Modify Calibration Values*).

5. **Change the units:** In the configuration window, change the conversion coefficients class to Custom Units and the units to Degrees (deg).

Configuration - Node 3025	Index In	Contractions Contractions California (Contractions California (Contractions) Frequency		Configuration (Chan Channel Label:	Node	×
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Figure 3 - Modify Calibration Values

6. Enter the new calibration values: Use the Modify button to allow entering of the new values in the channel configuration window. Select Lock when completed and exit the menu (*Figure 4 - Enter New Values*).

Channel Label:					
		Node	Radio Bas Static	PC Node Com Dn	rmander
Inter Acc	nal el	Samples (bits)	Wireless Communication	Samples (bits)	Output Units
	Convers	on Coefficients		Test	
	Class:	Custom Units v		Sample	Channel
		deg 👻		A/D value	
	Dite to a	ha.		- Calibrated	f Value:
	Slope:	0.0927 Of	fset: -178.83999	lock	
	Conver	sion Formula: output=sk e Range: -178.8 to	ope*bits+offset 200.8 deg	1	
	LINCOV	crunger 17010 to	Loono deg		

Figure 4 - Enter New Values



- 8. **Repeat for channel two and apply the settings:** Modify the channel 2 units and calibration values, as determined in the inclination calculator. Apply, and exit the configuration menus.
- 9. **Measure inclination:** Start node sampling in Node Commander[®], and view the acquired data. Data acquisition can be monitored locally in Node Commander or remotely using the SensorCloud[™] platform on an Ethernet-enabled network (*Figure 5 Measuring Inclination with SensorCloud*[™]). Tilt the node on each on the axes with the new calibration values, and verify the outputs.



Figure 5 - Measuring Inclination with SensorCloud™