Overview
The LORD MicroStrain® V-Link®-LXRS® Wireless 7 Channel Analog Input Sensor Node supports a wide range of Wheatstone bridge and analog sensors including acceleration, vibration, strain, load cells, torque, pressure, magnetic fields, displacement, geophones, etc. As a basic function of support for these sensors, the V-Link®-LXRS® is measuring small voltages. This technical note demonstrates how to measure a voltage within a +/-20 mV range on channels 1 through 4 and assumes some familiarity with the V-Link®-LXRS® and Node Commander® software. The technical note goes on to demonstrate measurement of other small voltage ranges.

Apply Test Connector
- Turn the V-Link®-LXRS® off.
- Using 2 each 100 Kohm resistors (<= 1%):
  o connect one leg of resistor 1 to SP+,
  o connect the other leg of resistor 1 to S1-,
  o connect one leg of resistor 2 to GND, and
  o connect the other leg of resistor 2 to S1-.
- Connect a flying lead to S1+.
- Connect a second flying lead to S1-. These flying leads will connect to the voltage source that we are going to measure.

Configure Node Commander®
- Establish communication between the V-Link®-LXRS® and Node Commander® as normal.
- Right-click the Node and a drop-down menu will appear.
- Click Configure. Click Configure Node and the Configuration screen will appear.
- Click the Channels tab.
- Enable Channel 1 by clicking the checkbox; disable all other channels.
- Click the … button for Channel 1 and the Channel 1 Configuration window appears.
- Select +/-20 mV [75] in the Input Range drop-down.
- Set Midscale by clicking the radio button.
- Click the Auto-Balance button.
- An Information window will appear indicating the channel has been auto-balanced to a value of ~2048 with an offset of ~512. In our example we see Channel 1 is balanced to 2038. Click OK and the window will disappear.
- Select Volts in the Class drop-down.
- Select mV in the Units drop-down.
- Click the Modify button in the Bits to mV frame.
- Using the $slope$ indicated for the +/-20mV Input Range in figure 1, we enter 0.0097656 as the Slope in the Bits to V frame.
- Using a calculator, multiply the Slope 0.0097656 by the 2038 Channel 1 balance noted above.
- The result is 19.902. Enter -19.902 as the Offset in the Bits to V frame (we add the minus to subtract the offset of 19.902 and zero the output).
- Click the Lock button.
- Click OK and the Channel 1 Configuration window disappears.
- Click the Streaming tab.
- Unclick the Continuous Streaming checkbox.
- Enter 10000 in the Sweeps in the number scroll box. Click Apply.
- Click OK and the Configuration window disappears.
### Verify Zero Point

- Temporarily short the S1+ flying lead to the S1- flying lead.
- Using Node Commander® software, establish communication with the V-Link®-LXRS®.
- Right-click the Node and a drop-down menu will appear.
- Click Configure.
- Click Configure Node and the Configuration screen will appear.
- Click the Channels tab.
- Enable Channel 1 by clicking the checkbox; disable all other channels.
- Click the Streaming tab.
- Unclick the Continuous Streaming checkbox.
- Enter 10000 in the Sweeps in the number scroll box.
- Click Apply.
- Click OK and the Configuration window disappears.
- Right-click the Node and a drop-down menu will appear.
- Click Sample.
- Click Stream.
- Click Start and the Streaming Graph will appear.
- Verify that the streaming plot is at or near zero. This confirms that the system is reading zero volts when 0 volts is being input.
- Remove the short.

### Connecting to Voltage Source

- For our example, we are connecting to a 10 mV voltage source.
- The flying lead connected to S1+ on the V-Link®-LXRS® is connected to the + (power) side of our voltage source.
- The flying lead connected to S1- is connected to the – (ground) side of our power source.
- Right-click the Node and a drop-down menu will appear.
- Click Sample.
- Click Stream.
- Click Start and the Streaming Graph will appear.
- The streaming will plot at 10 mV.

<table>
<thead>
<tr>
<th>Input Range</th>
<th>Gain</th>
<th>Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>+/- 70 mV</td>
<td>21</td>
<td>0.0348772</td>
</tr>
<tr>
<td>+/- 50 mV</td>
<td>30</td>
<td>0.0244141</td>
</tr>
<tr>
<td>+/- 20 mV</td>
<td>75</td>
<td>0.0097656</td>
</tr>
<tr>
<td>+/- 10 mV</td>
<td>147</td>
<td>0.0049825</td>
</tr>
<tr>
<td>+/- 5 mV</td>
<td>291</td>
<td>0.0025169</td>
</tr>
<tr>
<td>+/- 2.5 mV</td>
<td>569</td>
<td>0.0012872</td>
</tr>
<tr>
<td>+/- 1 mV</td>
<td>1214</td>
<td>0.0006033</td>
</tr>
<tr>
<td>+/- 600 µV</td>
<td>2222</td>
<td>0.0003296</td>
</tr>
<tr>
<td>+/- 350 µV</td>
<td>3799</td>
<td>0.0001928</td>
</tr>
<tr>
<td>+/- 100 µV</td>
<td>13074</td>
<td>0.0000560</td>
</tr>
</tbody>
</table>

*Figure 1: Slope for Each Input Range*
Utilizing Other Input Ranges

This technical note details measuring voltage within the +/-20 mV range. As you may have noted in the Channel 1 Configuration window and/or figure 1, the V-Link®-LXRS® has other Input Ranges available. These wider and narrower ranges can be measured using the same steps laid out in the Configure Node Commander® and Connecting to Voltage Source sections above. Select the correct Slope for the voltage range being measured and calculate the correct Offset as explained.

Support

LORD MicroStrain® support engineers are always available to expand on this subject and support you in any way we can.