

8401-0002

Wireless Sensor Networks Technical Note
LORD Corporation, MicroStrain Sensing Systems

Using the DEMOD-DC[®] with V-Link[®]-LXRS[™] and SG-Link[®]-LXRS[™]

Overview

MicroStrain's V-Link[®]-LXRS[™] and SG-Link[®]-LXRS[™] (including SG-Link[®]-OEM-LXRS[™] and SG-Link[®]-OEM-LS) wireless analog sensor nodes have single ended analog input channels designed to acquire and digitize any 0-3 volts DC sensor at 12 bits and transmit the data wirelessly to a host computer. MicroStrain's DEMOD-DC[®] miniature signal conditioner accepts DC power and provides trimmed analog output for any of MicroStrain's DVRT[®] displacement transducers. The DEMOD-DC[®] can be connected to the V-Link[®]-LXRS[™] and SG-Link[®]-LXRS[™] single ended analog channels and its analog **displacement** data can be digitized and transmitted to a host computer. This technical note discusses how to do this integration and assumes the user has some familiarity with the devices and Node Commander[®] software.

DEMOD-DC[®] Customization

The standard DEMOD-DC[®] is designed to be powered with 6 to 16 volts DC. However, the V-Link[®]-LXRS[™] and SG-Link[®]-LXRS[™] only provide 3 volt excitation. This therefore requires customization of the DEMOD-DC[®] at the factory to support a V-Link[®]-LXRS[™] or SG-Link[®]-LXRS[™] connection. To accomplish this, the power regulation circuit of the DEMOD-DC[®] is disarmed, allowing the 3 volts supplied by the V-Link[®]-LXRS[™] or SG-Link[®]-LXRS[™] to directly power the DEMOD-DC[®] circuitry. Each factory customized DEMOD-DC[®] and its accompanying color-coded 3-wire pigtail cable are marked with a tag, 'Input 3 Volts Only!!!'.

V-Link[®]-LXRS[™] Wiring

- Connect your DVRT[®] lead cable to the 4-pin LEMO connector of the DEMOD-DC[®].
- Connect the Micro DB-9 connector of the color-coded 3-wire pigtail cable to the DEMOD-DC[®].
- Connect the 3 flying leads to the V-Link[®]-LXRS[™] as shown in Figure 1.
 - Red lead to SP+.
 - White lead to either Ain5, Ain6 or Ain7; Ain5 shown in figure.
 - Black lead to any GND.



Figure 1. DEMOD-DC[®] wiring for V-Link[®]-LXRS[™]

SG-Link[®]-LXRS[™] Wiring

- Connect your DVRT[®] lead cable to the 4-pin LEMO connector of the DEMOD-DC[®].
- Connect the Micro DB-9 connector of the color-coded 3-wire pigtail cable to the DEMOD-DC[®].
- Connect the 3 flying leads to the SG-Link[®]-LXRS[™] as shown in Figure 2.
 - Red lead to VCX.
 - White lead to Ain.
 - Black lead to either GND.



Figure 2. DEMOD-DC[®] wiring for SG-Link[®]-LXRS[™]

Operation with Node Commander[®] software

- V-Link[®]-LXRS[™] is demonstrated; SG-Link[®]-LXRS[™] operation is nearly identical.
- Launch Node Commander[®], and establish communication with the V-Link[®]-LXRS[™].
- Right-click the node and a drop-down menu will appear.
- Click Configure.
- Click Configuration Node and the Configuration screen will appear.
- Click the Channels tab.
- Check (to enable) Channel 5 (our Ain5 example) and uncheck all other channels.
- Click Apply.
- Click the Configure button (...) to the far right of Channel 5 and the Configuration screen for Channel 5 will appear as shown in Figure 3.

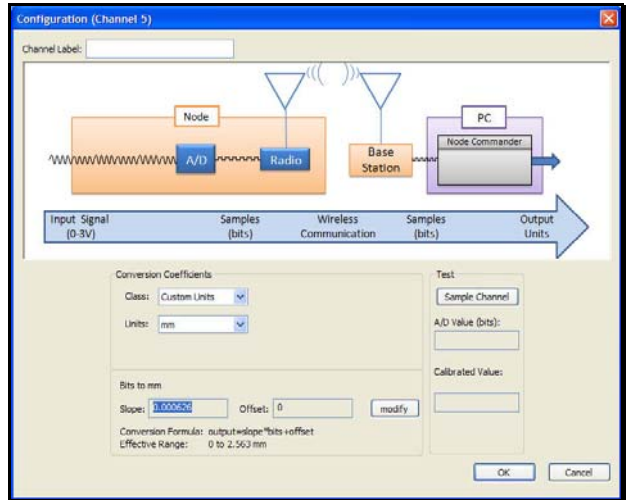


Figure 3. Channel Configuration screen

- In the Class drop-down box, select ‘Custom Units’.
- In the Units drop-down box, select ‘mm’.
- On the first page of your DVRT[®] Certificate of Calibration, you will find the calibrated Slope (mm/V) coefficient.
- For our example we will use the value ‘0.85490’ shown in Figure 4.

	Date of Calibration:	6/30/2011		Sensor Color Key
				___ black
	Sensor Model:	SG-DVRT-4		___ red
	Sensor Serial Number:	1224-473		___ blue
				___ green
	Signal Conditioner Model:	DEMOD-DC		___ yellow
	Signal Conditioner Serial Number:	3118-6087		___ white
	-3dB Bandwidth:	800		
	Slope (mm/V):	0.85490	*	
	Offset(mm):	-2.1165		

Figure 4. Certificate of Calibration

- Using the following formula, we are able to find ‘mm/bit’ which is required for the *Bits to mm* input on the Configuration screen: **0.000626 mm/bit = 0.85490 mm/volt * 3 volts / A to D bits**
 - where mm/bit is the Configuration Slope input required by Node Commander[®],
 - where mm/volt is the calibrated Slope of the DVRT[®],
 - where 3 volts is the V-Link[®] excitation, and
 - where the A to D bits is 4096 for 12-bit V-Link[®], 65536 for the 16-bit V-Link[®]
- Click the Modify button.
- Enter 0.000626 into the Slope box.
- Enter 0 into the Offset box.
- Click the Lock button.
- Click OK and the Channel 5 Configuration screen will disappear.
- Click the Streaming tab.
- Uncheck the Continuous Streaming checkbox.

- Enter 6000 (~8 seconds) into the Sweeps box.
- Click Apply.
- Click OK and the Configuration screen will disappear.
- Right-click the node and a drop-down menu will appear.
- Click Sample.
- Click Stream and click Start to stream the node.
- After ~1 to ~4 seconds (depending on the DVRT[®] being used), exercise the DVRT[®] through its linear stroke and you will observe a streaming output similar to the graph shown in Figure 5.

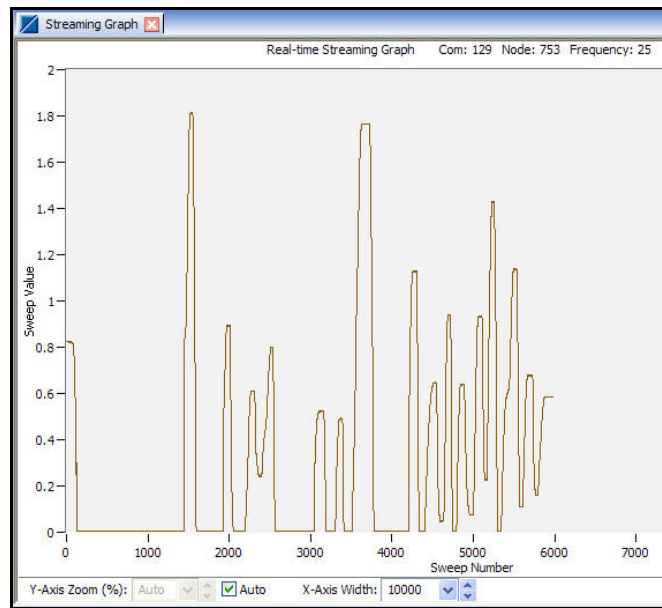


Figure 5. Streaming graph

Important Note: During the first seconds of the streaming session, the DEMOD-DC[®] is charging up its capacitors and the V-Link[®]-LXRS[™]/SG-Link[®]-LXRS[™] output should be disregarded. Once the capacitors are charged, the output is accurate. This charging period must be taken into account during any synchronized sampling, streaming, or datalogging session. Low duty cycle operation is not recommended with the DEMOD-DC[®] and V-Link[®]-LXRS[™]/SG-Link[®]-LXRS[™] combination.

Support

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

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