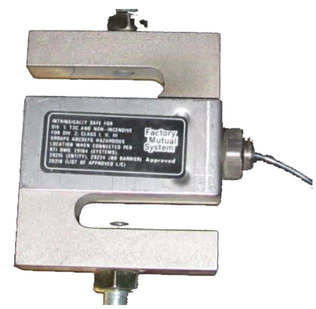
LORD **TECHNICAL NOTE**

V-Link-200

Using A Load Cell

The V-Link-200 is an 8-channel wireless analog sensor node with 4 differential input channels (strain channels) designed to support strain gauges and load cells.

An S Beam Load Cell with a 50 pound capacity and 3 mV/V sensitivity is being used for this example.

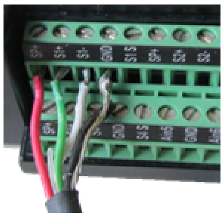


This technical note presents a step-by-step approach to connecting the load cell to the V-Link-200, calibrating the load cell, and operating the system. Familiarity with the V-Link-200, SensorConnect software and load cell operation is assumed.

Wiring Connection

The load cell presents a 5 foot, polyurethane sheathed, shielded, connection cable with 4 flying leads.

1. Connect load cell leads to V-Link-200 as shown below.



Reference	Connection	V-Link-200
Red	EXC+	SP+
Green	SIG+	S#+
White	SIG-	S#-
Black	GND	GND

Figure 1 - Load Cell Leads and Wiring

2. Download the Mv/V to Engineering Unit at: http://microstrain.com/sites/default/files/mv_v_to_eu_bit.xlsx.

3. Enter the load cell specifications, 3 mV/V, 50 lbs, into the calculator.

mV/V to Engineering unit/bit

A to D converter:	18 Bit	ADC bit
load capacity of sensor:	50	Engineering unit (EU)
Sensor Sensitivity @ factory:	3.000	mV/V
Node Excitation Voltage:	4.096	Volts
Full load voltage:	12.288	mV (3 x 4096)
Optimal gain for full load:	203	5000/ 24.576(rounded down)
User Set Gain:	±19.5 mV	Gain = 128 Refer to tables
Max Full Scale Input Voltage:	39.063	mV (5000 / 128)
Full scale sensor range:	158.946	EU (39.063 x (50 x 2) / (12.288 x 2)
Slope:	0.000606	EU/Bit (158.946 / 262144)
Offset for High-scale:	-119.21	Offset for the three scaling levels
Offset for Mid-scale:	-79.47	
Offset for Low-scale:	-39.74	
	(green)	denotes user definable values
	(yellow)	denotes values to enter into SensorConnect

XRS V-Link 12 and 16 bit 3.000 V excitation	
mV Range	Gain
±70mV	21
±50mV	30
±20mV	75
±10mV	147
±5mV	291
±2.5mV	569
±1mV	1214
±600µV	2222
±350µV	3799
±100µV	13074

V-Link 200 18 bit 4.096 excitation	
mV Range	Gain
±156 mV	16
±78.1 mV	32
±39.0 mV	64
±19.5 mV	128
±9.76 mV	256
±4.88 mV	512
±2.44 mV	1024
±1.22 mV	2056

Effective Range		
High-scale	Mid-scale	Low-scale
39.74	79.47	198.68
-119.21	-79.47	-39.74

1. Select the resolution of the device A to D converter from drop down list
2. Enter the capacity of the sensor (if sensor shows +/- use only the + value)
3. Enter the sensors sensitivity (will be shown as mV/V)
4. Enter the excitation voltage (3.0V for XRS, 4.096V for V-Link 200, or external set V
5. Use the Optimal Set Gain to choose a range/gain from one of the tables. Enter the gain selected into User Set Gain field. Refer to the Effective Range table above to see if a higher gain with low or high scale balancing will accomadate the sensor.
6. Enter the Slope in yellow into SensorConnect Slope field
7. Enter the offset in yellow that corresponds to the balance level used into SensorConnect offset field

Figure 2 - Load Cell Capacity and Sensitivity Settings

4. From the Effective Range, it is recommended that the Mid-Scale and Low-Scale balancing be set in the +/- 19.5 mV range. For better resolution, the +/- 9.76 mV range may be set for the Low-Scale. The Calculator shows the Slope as 0.000303 and the Low-Scale at -19.87.

mV/V to Engineering unit/bit

A to D converter:	18 Bit	ADC bit
load capacity of sensor:	50	Engineering unit (EU)
Sensor Sensitivity @ factory:	3.000	mV/V
Node Excitation Voltage:	4.096	Volts
Full load voltage:	12.288	mV (3 x 4096)
Optimal gain for full load:	203	5000/ 24.576(rounded down)
User Set Gain:	±9.76 mV	Gain = 256 Refer to tables
Max Full Scale Input Voltage:	19.531	mV (5000 / 256)
Full scale sensor range:	79.473	EU (19.531 x (50 x 2) / (12.288 x 2)
Slope:	0.000303	EU/Bit (79.473 / 262144)
Offset for High-scale:	-59.60	Offset for the three scaling levels
Offset for Mid-scale:	-39.74	
Offset for Low-scale:	-19.87	
	(green)	denotes user definable values
	(yellow)	denotes values to enter into SensorConnect

XRS V-Link 12 and 16 bit 3.000 V excitation	
mV Range	Gain
±70mV	21
±50mV	30
±20mV	75
±10mV	147
±5mV	291
±2.5mV	569
±1mV	1214
±600µV	2222
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V-Link 200 18 bit 4.096 excitation	
mV Range	Gain
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±39.0 mV	64
±19.5 mV	128
±9.76 mV	256
±4.88 mV	512
±2.44 mV	1024
±1.22 mV	2056

Effective Range		
High-scale	Mid-scale	Low-scale
19.87	39.74	99.34
-59.60	-39.74	-19.87

1. Select the resolution of the device A to D converter from drop down list
2. Enter the capacity of the sensor (if sensor shows +/- use only the + value)
3. Enter the sensors sensitivity (will be shown as mV/V)
4. Enter the excitation voltage (3.0V for XRS, 4.096V for V-Link 200, or external set V
5. Use the Optimal Set Gain to choose a range/gain from one of the tables. Enter the gain selected into User Set Gain field. Refer to the Effective Range table above to see if a higher gain with low or high scale balancing will accomadate the sensor.
6. Enter the Slope in yellow into SensorConnect Slope field
7. Enter the offset in yellow that corresponds to the balance level used into SensorConnect offset field

Figure 3 - Load Cell Effective Range Settings

Sensor Configuration

5. Launch the SensorConnect software, select Configuration > Hardware

6. Under Input Range, select ±9 milliVolts range from the Channel 1 drop down window.

Figure 4 - Input Range

7. Under Hardware Offset, with no load on the cell, select Low (25%) from the Balance Target drop down window, then select Auto Balance. In the blue box, the target achieved should be ±25%. If this reading varies by more than 2-3%, confirm the wiring is secure and there is no load on the load cell. After making adjustments, retry Auto-Balance.

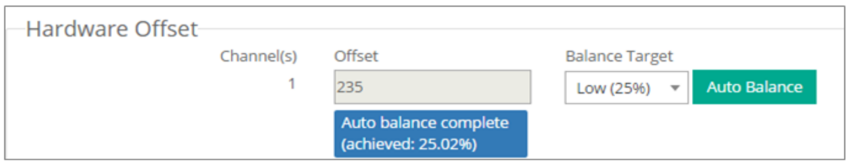


Figure 5 - Auto Balance

8. Under Calibration, Enter the Slope and Offset from the calculator, select Pound from the Unit drop down window, and select Apply Configuration.

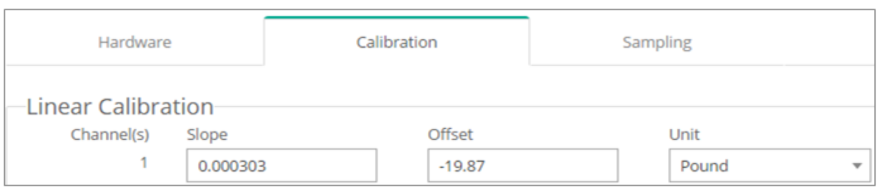


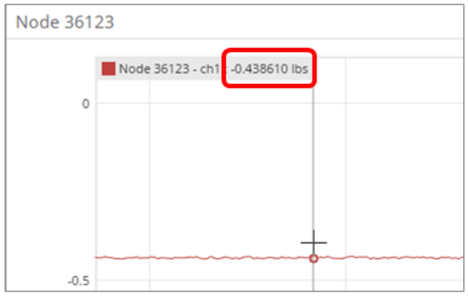
Figure 6 - Calibration

Verify No-Load is at Zero Pounds

9. Collect data to verify no-load is at zero pounds.

10. If it is not at zero pounds, multiply the value by -1 and add or subtract from the offset.

-0.438610 x -1 = 0.438610



-19.97 + 0.438610 = -19.43139

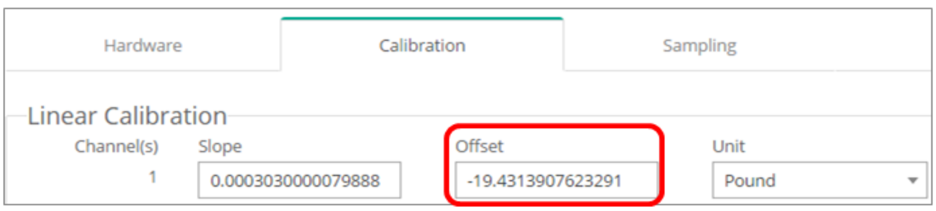


Figure 7 - No Load Data Collection

11. Collect data to verify no-load is at 0 pounds.

Figure 8 - No-Load at Zero

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