Technical Bulletin

Signal Strength and Grads Configuration

Insufficient signal strength can be an issue in certain UMC600IS applications, especially when using multiple load cells. This bulletin describes the effect of load cell configuration on excitation voltage and output signal strength, and how changing the grads configuration can compensate for reduced signal.

Load Cell Configuration Effect on Actual Excitation Voltage

Although the excitation voltage supplied by the UMC600IS is rated at 5 VDC, the actual excitation voltage depends on the number and rating of load cells used in the application. Table 1 shows an example of actual excitation voltage values for several load cell configurations.

Load Cell Type	Number of Cells	Excitation Voltage (VDC)
3mV/V, 350Ω	1	4.56
	2	4.28
	3	4.06
	4	3.82
2mV/V, 1000Ω	3	4.39
	4	4.24
	5	4.10

Table 1. Typical Excitation Voltages Supplied for Various Load Cell Configurations

The signal output from a load cell depends on the excitation input: A 3mV/V load cell can produce 3 mV of signal per volt of excitation supplied to it. If the excitation voltage is decreased, the signal will also be decreased. If the excitation voltage drops too far, the reduced signal output can cause an unstable—or blank—weight display.

You can check the actual excitation voltage supplied for your application by using a voltmeter to measure the voltage between the *+EXC* and *–EXC* terminals at the junction box.

If you suspect that insufficient signal strength is causing problems in your application, make the measurements and calculations described below.

Measuring Signal Strength

Determine the actual signal voltage available to the indicator by using a voltmeter to measure the voltage between the *+SIG* and *–SIG* terminals at the junction box. Measure the signal at no load (deadload) and at full scale, then determine the amount of live load signal:

Live load signal = Signal at full scale – Signal at no load

Calculating Signal per Grad

Using the calculated live load signal and the number of grads configured for the indicator (Parameter 1), calculate microvolts per graduation (μV/grad):

Signal per grad = Live load signal / Grads

For example, if the difference in signal measurement from no load to full scale is 4.8 mV and the scale is configured for 20000 grads:

4.8 mV / 20000 grads
= 0.00024 mV/grad = 0.24 μV /grad

In the example above, the very high grads configuration provides insufficient signal strength for the UMC600IS, which has an analog signal sensitivity of 0.3μV/grad.

Configuring the indicator for 1000 grads provides ample signal strength:

4.8 mV / 1000 grads
= 0.0048 mV/grad = 4.8 μV /grad

Summary

The amount of signal available to the indicator is the result of several factors, including the number of load cells, rated output of cells, percent of cell capacity used, excitation voltage, and the grads configured for the indicator. For many intrinsically safe applications, the only factor that can easily be changed to compensate for a low signal level is the grads. Reducing the number of grads configured increases the amount of signal per grad and can stabilize an application.

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