The PCI-9524 is a robust, multi-purpose module designed for turnkey material test systems (MTS). Equipped with four strain gauge-based full-bridge transducer input channels, four general purpose analog input channels, and a 3-axis motion controller, the PCI-9524 delivers a complete hardware solution for MTS manufacturers. The PCI-9524 easily integrates physical quantity measurement and implements strategy of software-based close-loop control in a single module package. For transducer measurement, the PCI-9524 supports sensitivity from 1.0 mV/V to 4.0 mV/V and provides a 1/200000 accuracy of measurement of full scale. These features make the PCI-9524 suitable for precise measurement in large-scale transducers.

The PCI-9524 is also equipped with four, 24-bit general purpose analog input channels that allow accurate measurements of the LVDT (Linear Variable Differential Transducer) and Linear wire potentiometer signals to achieve high-resolution of displacement.

With motion control capability and 16-bit DA channels, the PCI-9524 comes with three stepper/servo motor axes and two channels of hydraulic system control function. The built-in incremental encoder feedback channels enable the PCI-9524 to implement the strategem of MTS’ software-based closed-loop control.

The impressive PCI-9524 features permit easy implementation of required control or measurement functionalities with just a single module, saving precious development and integration time for MTS manufacturers.
How to Get 1/200,000 Accuracy

It is common in the weight-scaling or material-testing industries to specify the resolution capability of a measurement device such as the ADLINK PCI-9524, in counts or digits, rather than in bits. For example, a measurement device that is capable of resolving 1 in 1000 counts, can successfully register a 1-gram change on a 1-kg capacity load-cell transducer. Consequently, a measurement device that is capable of resolving 1 in 200,000 counts, can successfully register a 1-gram change on a 200 kg capacity load-cell transducer.

In practical applications, the sensitivity of load-cell transducers vary from model to model (typically from 1 to 4 mV/V), and the full-scale output range of a transducer is usually only a fraction of the full-scale input range of a measurement device. The convenience of using counts rather than bits, is that the specified count achievable by a measurement device is relative to the transducer’s full-scale output, rather than the full-scale input range of the analog input amplifier. Thus, theoretically, no matter what the sensitivity of the 200 kg capacity load-cell transducer you are using, a 200,000 count measurement device can always resolve a 1-gram measurement. Please also note, as a weight/force indicator, the displayed counts or digits shall be flicker-free while the applied force is in steady state. Therefore, a measurement device specified to have a 200,000 count resolution, must guarantee peak-to-peak system noise and short-term drift to below 1/200,000, or 5-ppm of the full-scale output range of the transducer.

The specified 200,000 count resolution capacity of ADLINK’s PCI-9524 is verified by a precision load-cell simulator utilizing 3 mV/V sensitivity, under 10-V excitation and using a six-wire remote-sense connection. The auto-zero function is enabled throughout the acquisition, while the ADC sampling rate is set to 60 samples-per-second (the equivalent data rate is 29 samples-per-second), and using an IIR post digital filter of 32 taps. Under these conditions, the peak-to-peak system noise and drift are well below 150 nV, the limit of 1 in 6.

Software-based Force Feedback Closed-loop Control

Force feedback closed-loop control is common in material test applications. The PCI-9524 supports the necessary control interfaces, including analog/pulse outputs and encoder/encoder. In practical applications, the sensitivity of load-cell transducers vary from model to model (typically from 1 to 4 mV/V), and the full-scale output range of a transducer is usually only a fraction of the full-scale input range of a measurement device. The convenience of using counts rather than bits, is that the specified count achievable by a measurement device is relative to the transducer’s full-scale output, rather than the full-scale input range of the analog input amplifier. Thus, theoretically, no matter what the sensitivity of the 200 kg capacity load-cell transducer you are using, a 200,000 count measurement device can always resolve a 1-gram measurement. Please also note, as a weight/force indicator, the displayed counts or digits shall be flicker-free while the applied force is in steady state. Therefore, a measurement device specified to have a 200,000 count resolution, must guarantee peak-to-peak system noise and short-term drift to below 1/200,000, or 5-ppm of the full-scale output range of the transducer.

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