Paroscientific, Inc.

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# Calibration of Digiquartz® Instruments

Paroscientific is the leader in the high precision pressure measurement field where high resolution, accuracy, reliability, ruggedness, long-term stability, and low cost of ownership are important requirements. The high performance of Digiquartz® Instruments is a result of careful design, meticulous manufacturing, and extensive calibration and testing. The construction, operation, and performance of Paroscientific transducers are described in our Technology Slide Show at http://www.paroscientific.com/cover.htm. Calibration is performed by applying known pressures from primary standards to manifolds of transducers mounted in temperature chambers. Two frequency (or period) output signals are sent from each transducer. Pressure is measured with a force-sensitive quartz crystal whose output period changes with applied load. A second period output comes from a quartz crystal temperature sensor used for thermal compensation. The manifold of transducer signals are multiplexed, measured, and the data fit to derive coefficients for the standard equation that characterizes the transducers. The calibration coefficients are provided with each transducer and the indicated pressure (calculated) will agree with the "true" applied pressure with a typical accuracy of 0.01 percent or better of transducer full scale over the full operational range of pressures and temperatures. Digiquartz® Intelligent Transmitters store the calibration coefficients in nonvolatile EEPROM to provide fully temperature-compensated and linearized outputs on the bi-directional RS-232 and RS-485 interfaces.

Because the recalibration period of Digiquartz® Instruments depends on specific applications and user requirements, we do not recommend a typical interval between calibrations. Some customers never recalibrate their instruments, while others recalibrate periodically every 1 to 3 years. A long-term stability test (http://www.paroscientific.com/pdf/G8806-001_WEB.pdf) on Digiquartz® Barometers shows a median drift rate of - 7 parts per million per year. Equally amazing stability has been shown with high pressure depth sensors in oceanographic deployments. After 30 years and 100,000 transducers, we have not detected a change in span (scale factor) with time. Therefore, the only correction made to instruments during recalibration is usually a small offset adjustment. With no pressure applied to gauge or differential transducers, the adjustment equals the indicated value. For absolute instruments, an effective adjustment (especially on higher pressure ranges) can simply be the difference between the indicated value and a single "true" pressure. The calibration adjustments may be done via the PA (Pressure Adder) and PM (Pressure Multiplier) parameters on the Intelligent Instruments or via the C1 and T1 calibration coefficients for frequency output transducers.

In 1998 the National Oceanographic and Atmospheric Administration (NOAA) issued a policy statement on National Weather Service (NWS) Barometery. This document states that the “Paroscientific Inc. Digiquartz Pressure Transducers are selected as the traveling standard with which to compare the ASOS” (Automatic Surface Observing System). Additionally, it states that “The Paroscientific Inc. Digiquartz® has proven to be a highly accurate (0.01% of reading accuracy) and reliable pressure instrument (little or no drift after 6 years)”. We have recently learned from the NWS that they are considering extending their recalibration cycle from 12 to 18 months.

Paroscientific’s Quality Assurance System, which is certified to the requirements of the ISO 9001 International Quality Standard, provides consistency in our products and processes from design and development through production, calibration, test, and servicing. Our calibration system meets MIL-STD 45662A and is traceable to NIST. Our quality system and commitment to excellence ensure customers of outstanding products and services. As a result, we offer a **market-leading** five year limited **warranty** on all Digiquartz® Transducers with the first two years covered at 100%. All Digiquartz® Barometers come with a 3 year stability warranty to drift less than 0.1 hPa per year.

Digiquartz® absolute transducers, transmitters, and portable standards, with full scale pressure ranges of 500 psia or less, come with a certificate for one FREE inspection, calibration check, zero adjustment, and new Certificate of NIST Traceability within the first two years of shipment.