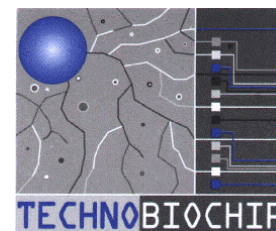


PICOBALANCE

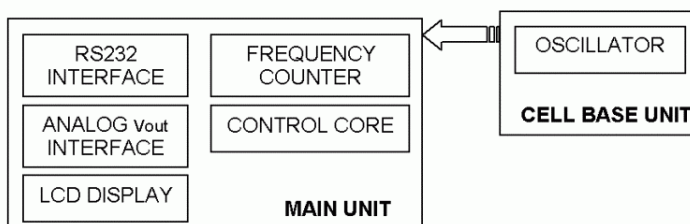


Introduction

Electrochemical experiments can benefit from an independent deposited mass measurement. It is possible to perform simultaneous electrochemical and gravimetric measurements by implementing an electrochemical workstation with an Electrochemical Quartz Crystal Microbalance (EQCM) equipment and a potentiostat/galvanostat. One gold electrode on the quartz can be used at the same time to measure the mass deposition on the oscillating quartz and as the working electrode of the electrochemical cell.

PICOBALANCE is a high-resolution and very low noise electrogravimetric system based on quartz crystal resonators. It is composed by a Main Unit and a Cell Base Unit which holds the measuring cell and hosts oscillator. The Main Unit combines a frequency counter, an LCD display, an RS232 interface, an analog V_{out} interface and a control unit that supervises the entire system.

Frequency absolute value and frequency shift are shown on a LCD Display and sent to the connected PC. The system is driven by **PicoVIEW** software, a user-friendly tool running under MS-Windows®.



The provided cell is made in Teflon®, in order to allow acquisitions both in aqueous and non-aqueous solvents, and it has been designed for a wide range of static measurement experiments. On requests, custom measuring cells can be made on design.

Main Features

- capability to operate both with aqueous and non-aqueous solvents
- low cost
- practically no maintenance costs (the only interchangeable parts are the crystal resonators)
- high accuracy and reliability
- very simple operation
- user-friendly software package

Typical applications are:

- Underpotential deposition
- Electrocrystallization
- Kinetics of electrodeposition
- Electrodissolution and corrosion
- Polymer swelling
- Polymer permeation
- Electropolymerization

Standard equipment:

- One Main Unit and one Cell Base Unit
- One Teflon® measuring cell for static measurements
- Two 10-MHz quartz crystals
- One electrode-holding stainless steel base with clamps
- Analog V_{out} coaxial cable
- 110/220Vac – 12Vcc power supply
- RS232 cable
- 4 silicon o-rings
- Driving software **PicoVIEW**⁽¹⁾

Optional equipment:

- Silicone, nitrile and viton o-rings

PICOBALANCE specifications:**Basic measurement:**

Mass sensitivity⁽²⁾: 4.41 ng/Hz cm²

Main Unit

Frequency counter range: 1÷20 MHz
 Frequency resolution: 1 Hz

Analog V_{out} interface

V_{out} range: ± 3.28 V
 V_{out} resolution: 0.1 mV/Hz
 V_{out} delta frequency range: ± 32768 KHz

Acquisition rate: 4 Acq/sec.

Warm-up time: 20'
 Weight: 1 Kg
 Dimensions (mm): 220 x 140 x 40

Interface: Serial cable (RS232)
 Analog V_{out} interface

Main supply: 12Vcc 800mA

Cell Base Unit:

Oscillators nominal frequency: 10 MHz
 Dimensions (mm): 120 x 70 x 40
 Weight: 300 g

Static Cell:

Static cell volume: 30 ml
 Weight: 100 g

(1) minimum PC Configuration: Proc. Pentium II, 128 Mb, 500MHz
 Windows® 98 SE/ Windows® 2000
 (2) for 10Mhz quartzs

Publications:

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S. Sinopoli, L.Ciotti, S.Fenu, L.Piras and M.Cocco, Picobalance: a new sensor instrument for integrated nanogravimetric and electrochemical measurements, *Proceedings of the 6th Italian Conference on Sensors and Microsystems*, Pisa, Italy, February 5-7, 2001. World Scientific, C.Di Natale, A.D'Amico, P.Dario editors. Pag. 303-308.

L. Piras, S. Fenu, L.Ciotti, M. Cocco, B. Mecheri, G. Caminati and G. Gabrielli, I. Macchia, L.Valli, EQCM study of electroactive molecules embedded in ordered layers of surfactants, *Proceedings of the 6th Italian Conference on Sensors and Microsystems*, Pisa, Italy, February 5-7, 2001. World Scientific, C.Di Natale, A.D'Amico, P.Dario editors. Pag.108-112.

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