# NANOCOULOMBMETER

# Model 230

**Instrumentation to accurately measure charge when evaluating triboelectric charging phenomena. Faraday cups, buckets and probes plus a complete Inclined Plane Measurement System (ESDA ADV 11.21) are available.**

## Features:

- **Range: 0-2000nC**
- **Resolution: 0.01nC (20nC range)**
- **Built-in 1.00V Calibration Signal**
- **Battery or AC power**
- **Small, medium and large Faraday cups/buckets available**
- **Charge Detector Probe available**
- **Meets all ESDA, EIA, IEC, SAE and military specifications**


## Applications:

Charge is expressed in nanocoulombs (one-billionth of a Coulomb) and is a function of both the voltage on the surface and its capacitance (Q=CV). Charge is measured when an object is dropped, placed or poured into a Faraday cup or bucket. The charge on the surface is transferred to the cup or bucket and detected by the electrometer input circuit of the Model 230. Dynamic charging can be measured using a detector probe that “picks up” charge at a given point on an object that is being triboelectrically charged.

The ETS Model 230 Nanocoulombmeter is an integrated instrument that measures charge directly from 0-2000nC when connected to one of the ETS family of Faraday cups, buckets and charge detector probes. The instrument meets the charge measurement requirements specified in ESDA, EIA, SAE, IEC military plus any application requiring the direct measurement of charge.

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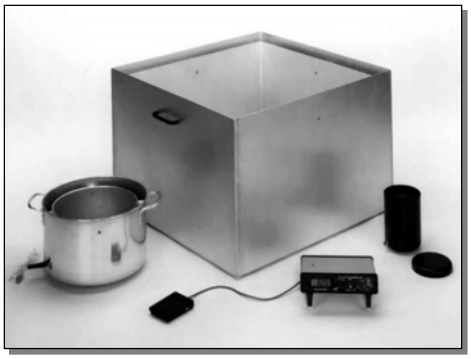
## Description:

**Model 230 Nanocoulombmeter:** A battery/AC powered instrument for measuring charge directly in nanocoulombs (nC). User selectable ranges of 20, 200 and 2000nC cover most triboelectric charge measurement requirements. An integrated 1.00V calibration source is used to charge the supplied 0.1μf, 1% capacitor to enable system calibration to be checked at any time. Using the relationship Q=CV, 1V across the 0.1μf capacitor results in a charge of 100nC.

A 3½-digit LCD meter provides 0.01nC resolution in the 20nC range. The REMOTE output jack on the rear panel enables the Nanocoulombmeter ZERO/READ function to be controlled with an optional foot switch that is extremely useful when performing sensitive measurements inside a controlled environment chamber or when performing multiple tasks.

The Model 230 operates from either two 9 Volt batteries or the included 90-240VAC, 50/60Hz universal power module. An LED BAT LO indicator is located on the front panel. A 36" (92cm) shielded Teflon® BNC-BNC low leakage cable for connection to the ETS family of Faraday cups, buckets and probes is also included.

**Faraday buckets, cups and probes:** Standard models are shown in the figures below. They include the Model 231, 3.125" (80mm) Cup for measuring small objects (included with the Model 235 Inclined Plane Measurement System) plus the Model 232, 7" (178mm) and Model 233, 22" (589mm) Buckets for larger objects or complete instruments. The Model 234 Charge Detector Probe with 0.375" (9.5mm) plug-in conical tip is placed against, or connected to, an object being triboelectrically charged. The Probe includes a remote ZERO/READ switch.



**Faraday Cup/Buckets**

**Inclined Plane**

**Charge Detector Probe**

## Specifications:

**Model 230:**

**Ranges:** 20, 200, 2000nC
**Resolution:** 0.01, 0.1, 1.0nC
**Accuracy:** 2.0% full scale (max), ±1 digit
**Readout:** 3½-digit LCD, ½" (12mm) numeric
**Drift**: <0.05nC/minute
**Zero:** Front panel or optional foot switch.
**Recorder output:** 0-±1.99V, BNC connector
**Calibration output:** +1.00 Volts, ±1%
Calibration capacitor: 0.10 μf, ±1% (Low Leakage)
**Power:** Battery, 2 ea, 9 Volt Alkaline, (20 hrs typical)
AC power module: 95-260VAC, 50/50Hz
**Operating environment:** 0-60% RH
**Dimensions:** 7.5"Wx8.0"Dx1.75"H (191x203x45mm)
**Weight:** 2 lbs.

**Faraday Cups, Buckets, & Probes**

**Electrical connection:** Std. BNC
**Model 231:** Inner cup dia.: 3.1" dia.x4"D (80x102mm)
Overall dimensions: 4" dia.x6"H (102x152mm)
**Model 232:** Inner cup dia.: 7" dia.x3.5"D (178x64mm)
Overall dimensions: 10.4" dia. x6"H (264x142mm)
**Model 233:** In bucket: 22"x22"x15"H (559x559x381mm)
Overall dimensions: 24"x24"x17" (610x610x559mm)
**Model 234:** Plug-in 0.375" (9.5mm) conical probe tip
Overall dimensions: 1.0" dia.x6.0"L (25x152mm)
**Model 235:** System includes the following:
Adj. Cup angle fixture, 36 ea. 1"x1" (25x25mm) teflon & quartz cylinders, ionizer with foot switch, ultrasonic cleaner, static meter with charged plate detector plus accessories

**Warranty:** One (1) Year

*Specifications subject to change without notice* 1/08