

Nullmeter / Nanovoltmeter

- Sub PPM Voltage, Resistance and Temperature Calibration Transfers
- Range: 100 nV to 1000 V
- Accuracy:
 - Analog Meter: 2%
 - Analog Output: 0.5%
- Resolution: 2 nV
- Independent I/V Zero per range
- Isolation: >100 G Ω
- Rechargeable Battery Operation (50 Hrs)
- Floating Measurements to 1000 V
- Selectable Input Impedance



The Model AVM-2000 is a calibration laboratory grade Nullmeter / Nanovoltmeter. It can be used as a stand-alone analog voltmeter or in conjunction with Kelvin-Varley dividers and other calibration laboratory equipment where high sensitivity ratio-metric processes are used.

The AVM-2000 has a very high sensitivity front end amplifier with extremely high common mode rejection making it ideal for comparison/ratio measurements. It is specifically designed for standards comparison and displays readings on an easy to read, dual-scale, mirror-backed meter with null (0) shown at center scale. An isolated, single ended output allows connection to other instrumentation such as chart recorders, data acquisition systems and digital voltmeters. This output also enables the AVM-2000 to be used as a high quality instrumentation amplifier with input impedances ranging from 1 M Ω to 1 G Ω , and gains from 10^3 to 10^7 . Common mode rejection of 80dB, precision adjustable offset voltages and a wide selection of low pass filters ensure operation over the entire range from 100 nV to 1000V without compromising resolution or accuracy.

Mains Isolation

The AVM-2000 may be operated from line power or its internal rechargeable battery (rechargeable with the internal battery charger). Battery operation allows up to 50 hours of total independence and isolation from common mode signals generated through mains and building wiring, minimizing the possibility of errors induced by ground loops and other wiring induced noise.

Easy/Traditional Operation

At its heart, the AVM-2000 employs modern digital technology; however to the user it functions as a traditional analog meter. The AVM-2000 incorporates a mirror-backed, high-accuracy, dual-scale, analog meter display to facilitate use as a Nullmeter. Range is selected by rotating a traditional Range selection knob. All operating modes are pushbutton selected and displayed on an easy to read LCD. Output level, and input offset level are controlled by "press-rotate-press" rotary controls. Settings are held in non volatile memory.

Indicators

A backlit LCD alphanumeric display assists the user in operation and setup of

the instrument. It continuously displays the status of the primary selected parameters and mode of operation. The current range setting is shown in large bold numbers to eliminate range reading errors incurred when reading knob position.

The AVM-2000, utilizing the latest available technology, surpasses all of the specifications of its predecessors. It replaces, and exceeds the performance and functionality of: the PPM model AVM-100 and the discontinued Hewlett Packard HP419A, Fluke 845AB, and Keithley 155.

Unique Features Include:

- Scalable rear panel output ($\pm 0.5 - 1.5$ Volt for Full Scale)
- Low Thermal EMF input binding posts (Gold plated Tellurium Copper)
- Input connector shield for thermal isolation of input terminals
- Wide range of filter settings (0.1 – 100 sec in 1-2-5 sequence)
- Analog sub-system in heavy metal guarded enclosure for long term thermal stability

Specifications

Inputs and Range	<ul style="list-style-type: none"> • One set of input terminations for all ranges • HI LO & Guard • Low end 100 nV full scale deflection with 2 nV resolution • High-end range ≥ 1000 V full scale deflection. with 5 V or better resolution • 21 selectable ranges, (1-3-10 sequence)
Outputs and Indicators	2 output indications <ul style="list-style-type: none"> • Analog meter • Isolated analog real panel output (1 V full scale nominal)
Analog Output	$\pm 0.5\%$ of full scale of range selected (typically 0.1%)
Resolution	Within 0.1% of full scale of selected range (after floor noise compensation)
Linearity	Within 0.5% of full scale of selected range
Analog Meter	$\pm 2\%$ of selected range (1 μV -1000 V), $\pm 5\%$ of 300 nV range, $\pm 15\%$ of 100 nV range
Scaling	Mirrored zero center 10-0-10 and 3-0-3
Resolution	$\leq 2\%$ of full scale of selected range (typically, 0.5% of full scale of selected range)
Linearity	$\leq \pm 1\%$ of full scale of selected range
Input Impedance	100 nV to 1 mV FS 3 mV to 1000 V FS 1, 10, 100 M Ω , or 1 G Ω Selectable 10 M Ω , or 100 M Ω Selectable
Offset Current	Adjustable (± 2.5 nA) to zero at front panel
Filter	10-position digital low pass filter selectable from front panel 100, 200, 500 mSec, 1, 2, 5, 10, 20, 50, 100 Sec
Offset Voltage	Continuously variable offset for all ranges (minimum $\pm 100.0\%$ of range, see IM for limitations)
Resolution	0.01 μV
Accuracy	$\leq \pm 0.5\%$ of offset full scale (1 mV - 1000 V ranges), $\pm 2\%$ (30 μV - 300 μV ranges), $\pm 7.5\%$ (100 nV - 10 μV ranges)
Series Mode Rejection	> 80 dB at 50Hz-60 Hz
Outputs	Isolated yielding ± 0.5 to ± 1.5 V (user adjustable) for full scale deflection
Isolation	Input to case or output > 100 G Ω (typically > 500 G Ω)
Overload Protection	1100 VDC or peak on any range
Indicators	Meter 4 1/2" Mirror Backed with -3 - 0 - +3 and -10 - 0 - +10 Scales Status Backlit LCD: Range, Offset, Filter Response Time, Input Impedance, ZERO/OPERATE Mode, Input Offset Mode and Isolated Output Mode
Dimensions	6.5" H X 11.5" W X 13.5" D
Weight	22.5 lbs
Connectors	<ul style="list-style-type: none"> • Low thermal emf input terminals plus guard • Two output Binding Posts, plus a third for case common • Input terminal cover
Power Supply	<ul style="list-style-type: none"> • Internal rechargeable battery • External 12 to 30 V DC @1.25 Ampere
Environmental	Operating Temperature Range 15 - 30 $^{\circ}\text{C}$ Full Specifications Operating Humidity Range 0 - 50% RH Full Specifications Storage Temperature / Humidity -20 to + 60 $^{\circ}\text{C}$ / 0 - 80% non-condensing
Included Accessories	<ul style="list-style-type: none"> • AC Power Module • GUARD to LO Nickel Plated Shorting Link • Rechargeable Battery • Input Terminal Shield • 2 μF Filter Block Mounted on Dual Banana Jack • Technical (Operation and Maintenance) Manual