

KEITHLEY

2182A

The Keithley 2182A Nanovoltmeter is a high-performance, two-channel instrument optimized for stable, low-noise voltage measurements and for characterizing low-resistance materials and devices. Featuring an outstanding 1 nV sensitivity, integrated delta mode coordination with Keithley current sources, and extremely low noise, it is a industry standard for precision metrology and superconductivity research.

SPECIFICATIONS

General

Interfaces	GPIB (IEEE-488.2), RS-232, Trigger Link
Display	2-line Vacuum Fluorescent Display (VFD)
Warm-up Time	2.5 hours to rated accuracy

Physical

Power Supply	100 V / 120 V / 220 V / 240 V $\pm 10\%$, 45 Hz to 66 Hz & 360 Hz to 440 Hz, 22 VA
Operating Temperature	0°C to 50°C °C
Dimensions (W×H×D)	213 mm × 89 mm × 370 mm mm
Weight	5 kg kg

System Capabilities and Functions

Number of Input Channels	2 (Channel 1: Nanovolt/Voltage, Channel 2: Voltage/Temperature)
Delta Mode Support	Yes, coordinated low-resistance measurements with Keithley 6220/6221 current sources
Internal Buffer Capacity	1024 readings
Math Functions	MX+B, Percentage, Ratio, Difference
Filter Settings	Analog, Digital (Averaging and Advanced)

DC Voltage Performance

Channel 1 Voltage Ranges	10 mV, 100 mV, 1 V, 10 V, 100 V
Channel 2 Voltage Ranges	100 mV, 1 V, 10 V
Best Voltage Resolution	1 nV
Channel 1 Input Impedance	>10 G Ω (10 mV to 10 V ranges), 10 M Ω $\pm$ 1% (100 V range)
Channel 2 Input Impedance	>10 G Ω (all ranges)
Maximum Input Voltage (Channel 1)	120 V peak (continuous)
Maximum Input Voltage (Channel 2)	15 V peak (continuous)

Noise and Rejection

Channel-to-Channel Isolation	>10 ¹⁰ Ω in parallel with <150 pF
Common Mode Rejection Ratio (CMRR)	>140 dB (DC, 50 Hz or 60 Hz with 1 kΩ unbalance in LO lead)
Normal Mode Rejection Ratio (NMRR)	>60 dB (50 Hz or 60 Hz, ±0.1%)
Peak-to-Peak Noise (0.1Hz to 10Hz)	6 nV p-p (typical at 1 PLC), 1.5 nV p-p (typical at 5 PLC)

Measurement Speeds and Integration

Integration Time Options (NPLC)	0.01 PLC to 50 PLC (50 Hz), 0.01 PLC to 60 PLC (60 Hz)
Maximum Reading Rate to Buffer	2000 readings/second (at 0.01 PLC, 16-bit resolution)

Temperature Measurement

Supported Thermocouples	J, K, T, E, R, S, B, N
Temperature Measurement Resolution	0.001 °C
Reference Junction Compensation Accuracy	±0.5 °C

Input and Output Interfaces

Primary Input Connector Type	Low-thermal LEMO connector (front panel)
Analog Output Voltage Range	±1.2 V full scale
Analog Output Resolution	12-bit
Analog Output Impedance	1 kΩ nominal
Digital I/O Port Configuration	4-bit open-collector outputs, 1 trigger input, 1 end-of-measurement output
Trigger Link Connector	8-pin micro-DIN

Physical Characteristics

Rackmount Support	Yes, 2U half-rack
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Environmental and Safety Compliance

Storage Temperature Range	-40 °C to 70 °C
Operating Humidity Range	Up to 80% RH at up to 35°C (non-condensing)

Power Supply

Line Frequency	45 Hz to 66 Hz and 360 Hz to 440 Hz (automatically sensed)
Power Consumption	22 VA

Measurement Performance

Maximum Common Mode Voltage	350 V peak
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Analog Output

Analog Output Accuracy	±(0.15% of output + 1 mV)
Analog Output Settling Time	2.5 ms (nominal)

Triggering

Trigger Input	TTL compatible, minimum 2 μ s pulse width
Trigger Output	TTL compatible, ~15 μ s pulse width

Interfaces

Command Language Support	SCPI (Standard Commands for Programmable Instruments)
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Delta & Pulse Modes

Delta Mode Compatibility	Keithley 6220 and 6221 current sources
Pulse Mode Compatibility	Keithley 6221 current source

A/D Converter

A/D Converter Architecture	Multi-slope integrating
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Digital I/O

Digital I/O Max Sink Current	100 mA
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Environmental

Operating Altitude Limit	2000 m (6562 ft) above sea level
Shock and Vibration Specification	MIL-T-28800E Type III, Class 5

Compliance & Safety

Safety Conformity	Conforms to European Union Low Voltage Directive, IEC 61010-1
EMC Conformity	Conforms to European Union EMC Directive, EN 61326-1

TECHNOLOGY

Precision Nanovoltmeter

APPLICATIONS

Low-voltage metrology, low-resistance material characterization, superconductivity research, temperature measurements

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