

Model 182

Sensitive Digital Voltmeter

VOLTMETER

ACCURACY and STABILITY¹, \pm (ppm of reading + ppm of range):

RANGE	RESOLUTION	ACCURACY			TRANSFER STABILITY
		24 Hours 22°-24°C	90 Days 18°-28°C	1 Year 18°-28°C	5 Minutes $\pm 1^\circ\text{C}$
3 mV	1 nV	20 + 16*	40 + 16*	60 + 16*	5 + 9*
30 mV	10 nV	20 + 6*	40 + 6*	60 + 6*	3 + 2*
300 mV	100 nV	15 + 6	35 + 6	55 + 6	3 + 2
3 V	1 μV	10 + 4	30 + 6	50 + 6	3 + 2
30 V	10 μV	10 + 4	30 + 6	50 + 6	3 + 2

* When properly zeroed using REL function.

¹Integration set to 1 Power Line Cycle (PLC), Analog Filter off, Digital Filter set to medium, 1 hour warm-up. Accuracy specifications exclude calibrator accuracy. Add 4 ppm of reading to accuracy specifications for factory calibration.

ACCURACY TEMPERATURE COEFFICIENT:
 \pm (4 ppm of input + 1 ppm of range)/°C, 0°-18°C and 28°-35°C.

MAXIMUM INPUT: 120V for 10 seconds, 35V continuous.

NOISE vs. SOURCE RESISTANCE¹:

SOURCE RESISTANCE	NOISE	ANALOG FILTER	DIGITAL FILTER
0 - 100 Ω	15 nV p-p	off	medium
1 k Ω	20 nV p-p	off	medium
10 k Ω	50 nV p-p	off	medium
100 k Ω	160 nV p-p	on	slow
1 M Ω	500 nV p-p	on	slow

¹3mV range, Integration set to 1 PLC, 2 minute observation, $\pm 1^\circ\text{C}$.

INPUT IMPEDANCE: >10G Ω (at 6 1/2 digits), >1G Ω (at 4 1/2 digits), 5nF nominal.

INPUT BIAS CURRENT: <50pA.

COMMON MODE CURRENT: <50nA p-p at 50Hz or 60Hz.

EFFECTIVE COMMON MODE REJECTION RATIO¹:

RANGE	ECMRR
3 mV - 3 V	160 dB
30 V	140 dB

¹At DC, 50Hz or 60Hz ($\pm 0.05\%$) with 1k Ω in either input lead.

NORMAL MODE REJECTION RATIO¹:

RANGE	NMRR
3 mV	90 dB
30 mV - 3 V	80 dB
30 V	60 dB

¹At 50Hz or 60Hz ($\pm 0.05\%$), Analog Filter on, Digital Filter set to medium, Integration set to 1 PLC.

ANALOG FILTER: Programmable for off or on. Nominal 8Hz bandwidth.

DIGITAL FILTER: Programmable for off, fast, medium or slow response.

INTEGRATION TIMES: 3ms, 1 PLC, or 100ms.

EXAMPLE READING RATES

RANGE	INTEGRATION	RESOLUTION	READINGS PER SECOND
30 V	3 ms	1 mV	100 ¹
3 mV	1 PLC	1 nV	15 ²
3 mV	1 PLC	1 nV	16 ³
3 mV	1 PLC	1 nV	4 ⁴

¹Into Data Buffer, Analog Filter off, Digital Filter off, Analog Output in source mode.

²Into Data Buffer, Multiple Trigger, Analog Filter off, Digital Filter on.

³IEEE-488 bus, Trigger on Talk, C0 format, Analog Filter off, Digital Filter off.

⁴IEEE-488 bus, Trigger on Talk, C0 format, Analog Filter on, Digital Filter off.

READING REL: Selects value of input which represents 0V reading. The reference value can be either a programmed value or the value of the previous input.

MAXIMUM READING: 3029999 counts.

ANALOG OUTPUT

MAXIMUM OUTPUT: $\pm 3\text{V}$.

ACCURACY: \pm (0.15% of output + 1mV).

OUTPUT RESISTANCE: 1k Ω nominal.

GAIN: Adjustable from 10^{-3} to 10^6 . With gain set to 1, a full range input will produce a 3V output.

OUTPUT REL: Selects value of input which represents 0V at output. The reference value can be either a programmed value or the value of the previous input.

DATA BUFFER

BUFFER TYPE: Linear or circular. Each location stores the reading and the time since the first trigger.

BUFFER MEMORY LENGTH: Programmable 1 to 1024 locations.

BUFFER STATISTICS: Number of Readings, Location, Value, Timestamp, Maximum Reading, Minimum Reading, Average and Standard Deviation.

TRIGGER

MODES: ONE SHOT or MULTIPLE readings per trigger.

INTERVAL: In MULTIPLE Mode, the time between readings can be programmed from 10ms to 999.999s in 1ms increments.

DELAY: Time between trigger and start of first measurement. Selectable from 0 to 999.999s in 1ms increments.

SOURCES: Rear panel BNC (EXTERNAL).
Front panel button (MANUAL).
IEEE-488 (GET, "X", or Talk).

IEEE-488 BUS IMPLEMENTATION

MULTILINE COMMANDS: DCL, LLO, SDC, GET, GTL, UNT, UNL, SPE, SPD.

UNILINE COMMANDS: IFC, REN, EOI, SRQ, ATN.

INTERFACE FUNCTIONS: SH1, AH1, T6, TE0, L4, LE0, SR1, RL1, PP0, DC1, DT1, C0, E1.

PROGRAMMABLE PARAMETERS: All parameters programmable except for IEEE-488 bus address.

GENERAL

RANGING: Manual or autoranging. Measurement range is displayed.

CALIBRATION: Closed case. Internal ratiometric calibration of 3mV and 30mV ranges. Calibrator must provide 300mV, 3V, and 30V. Calibration can be done via the front panel or the IEEE-488 bus.

POWER-UP SETTINGS: Can be programmed by the user.

SELF-TEST: Tests Display, RAM, ROM and EEPROM.

DISPLAY: Vacuum fluorescent, two lines, 49 characters plus annunciators.

FRONT PANEL CONNECTOR: Special low thermal shielded connector.

REAR PANEL CONNECTORS: Analog output, External Trigger input, Meter Complete: BNC, IEEE-488 connector and BNC connectors are chassis grounded.

WARM-UP: 1 hour to rated accuracy.

ISOLATION: 350V peak from either input terminal to earth ground. Impedance from either terminal to earth ground is >1G Ω paralleled by <400pF.

SAFETY: Designed to IEC-348.

EMI/RFI: Meets VDE-0871 class B limits.

OPERATING ENVIRONMENT: 0°-35°C, <80% RH.

STORAGE ENVIRONMENT: -25° to 65°C.

POWER: 105-125V AC or 210-250 V AC (rear panel switch selectable). 90-110V AC or 180-220V AC version available. 50Hz or 60Hz, 35VA maximum.

DIMENSIONS: 90mm high x 213mm wide x 397mm deep (3 1/2 in. x 8 3/8 in. x 15 5/8 in.).

WEIGHT: 3.4 kg (7.4 lbs).

ACCESSORIES SUPPLIED: Line cord, instruction manual, Quick Reference Guide.

CONFIGURATIONS:

182/1506 Includes triax cable terminated with copper alligator clips.

182/1507 Includes triax cable terminated with copper lugs.

182/1482 Includes shielded twisted pair cable, unterminated.

Specifications subject to change without notice.