Model 182
Sensitive Digital Voltmeter

VOLTMETER

ACCURACY and STABILITY[1], ±(ppm of reading + ppm of range):

RANGE	RESOLUTION	ACCURACY 24 Hours 22°–24°C	ACCURACY 90 Days 18°–28°C	ACCURACY 1 Year 18°–28°C	TRANSFER STABILITY 5 Minutes ±1°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.

[1]Integration 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:
± (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 RESISTANCE[1]:

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

[1]3mV range, Integration set to 1 PLC, 2 minute observation, ±1°C.

INPUT IMPEDANCE: >10GΩ (at 6½ digits), >1GΩ (at 4½ digits), 5nF nominal.

INPUT BIAS CURRENT: <50pA.

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

EFFECTIVE COMMON MODE REJECTION RATIO[1]:

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

[1]At DC, 50Hz or 60Hz (± 0.05%) with 1kΩ in either input lead.

NORMAL MODE REJECTION RATIO[1]:

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

[1]At 50Hz or 60Hz (±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]

[1]Into Data Buffer, Analog Filter off, Digital Filter off, Analog Output in source mode.
[2]Into Data Buffer, Multiple Trigger, Analog Filter off, Digital Filter on.
[3]IEEE-488 bus, Trigger on Talk, G0 format, Analog Filter off, Digital Filter off.
[4]IEEE-488 bus, Trigger on Talk, G0 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: ±3V.

ACCURACY: ±(0.15% of output + 1mV).

OUTPUT RESISTANCE: 1kΩ 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 >1GΩ 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: 90 mm high × 213 mm wide × 397 mm deep (3½ in. × 8⅜ in. × 15⅝ 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.