

DIGITAL VOLTMETER

HP-IB 5 Function DMM

Model 3438A



Description

The 3438A is an autoranging 3½ digit Multimeter with 5 functions of ACV, DCV, ACI, DCI, and Ω . It interfaces to the HP-IB providing both addressable and talk-only modes.

The addressable mode allows triggering either from the Calculating Controller (remote) or internally (local). Function and range are selected manually on the front panel with autoranging of volts and ohms.

Specifications

DC Voltmeter

Ranges:	200 mV	Maximum display:	± 199.9 mV
	2 V		± 1.999 V
	20 V		± 19.99 V
	200 V		± 199.9 V
	1200 V		± 1199 V

Maximum input: 1200 V (DC + peak AC).

Ranging: Automatic or manual.

Sensitivity: 100 μ V on 200 mV range.

Polarity: Automatically sensed and displayed.

Accuracy: (1 year, 15 to 30°C)

Range	Specifications
200 mV	$\pm (0.1\% \text{ of reading} + 2 \text{ digits})$
2 V to 1200 V	$\pm (0.1\% \text{ of reading} + 1 \text{ digit})$

Temperature coefficient: (0 to 15°C and 30 to 55°C) $\pm (0.015\% \text{ reading} + 0.1 \text{ digit})/^{\circ}\text{C}$.

Input resistance: 10 meg $\Omega \pm 1\%$.

Input Type: floating, 500 V maximum com. to ground.

Normal Mode Rejection: >40 dB at 50 Hz and 60 Hz $\pm 0.1\%$

Response time: <0.7 seconds to within 1 digit of final value on one range. Add 1 second for each range change.

Effective common mode rejection: (1 k Ω unbalance) > 120 dB at 50/60 Hz $\pm 0.1\%$.

DC Current

Ranges:	200 μ A	Maximum display:	± 199.9 μ A
	2 mA		± 1.999 mA
	20 mA		± 19.99 mA
	200 mA		± 199.9 mA
	2000 mA		± 1999 mA

Maximum input: current: 2 amp (fuse protected); voltage: 250 V

Ranging: manual only.

Sensitivity: 100 nA on 200 μ A range.

Polarity: automatically sensed and displayed.

Accuracy: (1 year, 15 to 30°C)

Range	Specifications
200 μ A to 200 mA	$\pm (0.3\% \text{ of reading} + 2 \text{ digits})$
2000 mA	$\pm (0.6\% \text{ of reading} + 2 \text{ digits})$

Temperature coefficient: (0 to 15°C and 30 to 55°C) $\pm (0.028\% \text{ of reading} + 0.1 \text{ digits})/^{\circ}\text{C}$.

Voltage burden:

Range	Maximum Burden at Full Scale
200 μ A to 20 mA	< 220 mV
200 mA	< 240 mV
2000 mA	< 400 mV

Response time: <0.7 seconds on any range to within 1 digit of final value.

AC Voltmeter

AC Converter: (average responding RMS calibrated)

Ranges:	200 mV	Maximum Display:	199.9 mV
	2 V		1.999 V
	20 V		19.99 V
	200 V		199.9 V
	1200 V		1199 V



Maximum input: 1700 V (DC + Peak AC), 10⁷ Volt-Hz max.

Ranging: Automatic or manual.

Sensitivity: 100 μ V on 200 mV range.

Accuracy (with display of ≥ 20 digits) 1 year, 15 to 30°C

Frequency	Specifications
30 Hz-50 Hz	$\pm (1.5\% \text{ of reading} + 3 \text{ digits})$
50 Hz-20 kHz	$\pm (0.3\% \text{ of reading} + 3 \text{ digits})$
20 kHz-100 kHz	$\pm (1.5\% \text{ of reading} + 10 \text{ digits})$

Temperature coefficient: (0 to 15°C and 30 to 55°C) $\pm (0.04\% \text{ of reading} + 0.2 \text{ digit})/^{\circ}\text{C}$.

Input impedance: resistance: 5 meg Ω $\pm 5\%$; shunt capacitance: <100 pf.

Response time: <1.6 seconds to within 3 digits of final value on one range. Add 1.2 seconds for each range change.

Input type: floating, 500 V maximum com. to ground.

AC Current

Ranges:	Maximum display:
200 μ A	199.9 μ A
2 mA	1.999 mA
20 mA	19.99 mA
200 mA	199.9 mA
2000 mA	1999 mA

Maximum input: current: 2 amp (fuse protected) voltage: 250 V.

Ranging: Manual only.

Sensitivity: 100 nA on 200 μ A range.

Accuracy (With display of ≥ 20 digits) 1 year, 15 to 30°C

Current Range	Accuracy	Accuracy
2000 mA	$\pm (2\% \text{ of reading} + 5 \text{ digits})$	$\pm (1.2\% \text{ of reading} + 5 \text{ digits})$
200 mA to 200 μ A	$\pm (1.7\% \text{ of reading} + 5 \text{ digits})$	$\pm (0.9\% \text{ of reading} + 5 \text{ digits})$
	30 Hz	50 Hz
		10 kHz

Temperature coefficient: (0 to 15°C and 30 to 55°C) $\pm (0.05\% \text{ of reading} + 0.2 \text{ digits})/^{\circ}\text{C}$.

Voltage burden

Range	Maximum Burden at Full Scale
200 μ A to 20 mA	<220 mV RMS
200 mA range	<240 mV RMS
2000 mA range	<400 mV RMS

Response time: 1.6 seconds on any range to within 3 digits of final value.

Input type: floating, 500 V maximum com. to ground.

Ohmmeter

Ranges:	Maximum display
20 Ω	19.99 Ω
200 Ω	199.9 Ω
2 k Ω	1.999 k Ω
20 k Ω	19.99 k Ω
200 k Ω	199.9 k Ω
2000 k Ω	1999 k Ω
20 M Ω	19.99 M Ω

Input protection: 250 V RMS.

Ranging: automatic or manual.

Sensitivity: 10 milliohm on 20 Ω range.

Accuracy (1 year, 15 to 30°C)

Range	Specifications
20 Ω	$\pm (0.5\% \text{ of reading} + 12 \text{ digits})$
200 Ω to 2 M Ω	$\pm (0.2\% \text{ of reading} + 2 \text{ digits})$
20 M Ω	$\pm (0.8\% \text{ of reading} + 2 \text{ digits})$

Temperature coefficient (0 to 15°C and 30 to 55°C)

Range	Specifications
20 Ω -2 M Ω	$\pm (0.04\% \text{ of reading} + 0.2 \text{ digits})/^{\circ}\text{C}$
20 M Ω	$\pm (1.8\% \text{ of reading} + 0.2 \text{ digits})/^{\circ}\text{C}$

Configuration: 2 wire.

Open circuit voltage: <5 V.

Current through unknown

Range	20 Ω	200 Ω	2 k Ω	20 k Ω	200 k Ω	2 M Ω	20 M Ω
Current	5 mA	5 mA	500 μ A	50 μ A	5 μ A	500 nA	50 nA

Response time: <0.8 seconds to within 1 digit. Add 0.8 seconds for each range change.

HP-IB

Data output format:

$\pm X.XXX$ $E \pm X$ F_n CR LF (13 byte, fixed)

DISPLAY EXPONENT FUNCTION

Function Code: DCV, 1; ACV, 2; DCI, 3; ACI, 4; Ω , 5

Overload Indication: $\pm 1.XXX E + 9$

Talk Modes (Selected by internal switch)

Addressed to talk

Local: continuously sampling input; outputs on Bus when addressed to talk.

Remote: samples input only on command from controller.

Talk only (used without controller)

Input: switch selectable, front or rear.

Reading rate: is function of input level and ranging (2.5 to 4.7/sec. if in proper range).

With Range change

ACV, ACI: add 1.2 seconds for each range change. After arrival on proper range, the first six readings are always discarded. The seventh reading is output on Bus. Allow 1.6 seconds additional for first reading on Bus.

DCV, DCI, k Ω : Add 1 second for each range change. After arrival on proper range, the first reading is always discarded. Allow 310 ms additional for first reading on Bus.

General

Calibration: data sheet specifications guaranteed for 1 year.

Display: 7 segment red 0.3 inch high LED's. Function, range, HB-IB status and annunciation.

Reading rate: 2.4-4.7/sec. depending on input level.

A-D Conversion: dual slope.

Integration time: 100 msec.

Ranging: automatic or manual on ACV, DCV, and ohms. Manual only on AC & DC current.

Storage temperature: -40 to +75°C.

Operating temperature: (0 to 55°C).

Humidity: 95% RH at +40°C.

Power: 48-440 Hz, 12 watts; 86-106 V Opt 100; 104-127 V Opt 115; 190-233 V Opt 210; 208-250 V Opt 230.

Size: 85.7 mm H x 209.6 mm W x 282.2 mm D (3.4" x 8.25" x 11.5").

Weight: 2.8 kg (6.2 lb).

Ordering Information

	Price
11000A Test leads, dual banana both ends	\$17
11002A Test leads, dual banana to dual alligator	\$15
11003A Test leads, dual banana to probe and alligator	\$12
11096B RF Probe 10 kHz to 700 MHz	\$100
34110A Soft vinyl carrying/operating case	\$25
34111A High-voltage Probe 40 kV DC	\$75
34112A Touch-Hold Probe	\$40
11067A Test lead kit	\$5
5061-0072 1/2 module rackmount kit	\$35
10631A HP-IB Cable 1 m (39.4")	\$70
10631B HP-IB Cable 2 m (78.7")	\$75
10631C HP-IB Cable 4 m (157.5")	\$85
10631D HP-IB Cable 1/2 m (19.7")	\$70

3438A Digital Multimeter
Opt 100, 115, 210, or 230 (specify one)

\$875
N/C