

## HP 34401A Multimeter

### Uncompromising performance for benchtop and system testing

- Measure up to 1000 volts with 6 1/2 digits resolution
- dc accuracy of 0.0015%
- ac accuracy of 0.06%
- 3Hz to 300kHz ac bandwidth
- 1000 readings/sec. direct to HP-IB

#### Superior performance

The HP 34401A multimeter gives you the performance you need for fast, accurate bench and systems testing. The HP 34401A provides a combination of resolution, accuracy and speed that rivals DMMs costing many times more. A 6 1/2-digit display, 0.0015% Basic 24-hr dcV accuracy and 1,000 readings/sec direct to HP-IB assure you of results that are accurate, fast, and repeatable.

#### Use it on your benchtop

The HP 34401A was designed with your bench needs in mind. Functions commonly associated with pure bench operation, like continuity and diode test, are built in. A Null feature allows you to remove lead resistance or other fixed offsets in your measurements. Other capabilities like min/max/avg readouts and direct dB and dBm measurements make checkout with your DMM faster and easier.

When you want to store readings for future reference, the HP 34401A gives you the ability to store up to 512 readings in internal memory. For troubleshooting, a reading hold feature lets you concentrate on placing your test leads without having to constantly glance at the display.

#### Use it for systems testing

For systems use, the HP 34401A gives you faster bus throughput than any other DMM in its class. The HP 34401A can send up to 1,000 readings/sec directly across HP-IB in user-friendly ASCII format.

You also get both HP-IB and RS-232 interfaces as standard features. Voltmeter Complete and External Trigger signals are provided so you can synchronize to other instruments in your test system. In addition, a TTL output indicates Pass/Fail results when limit testing is used.

To ensure both forward and backward compatibility, the HP 34401A includes three command languages (SCPI, HP 3478A and Fluke 8840A /42A), so you don't have to rewrite your existing test software. An optional rack mount kit is available.

#### Easy to use

To save you time and trouble, all major functions, like selecting the function, range and number of digits, can be accessed on the front panel with one push of a button.



Advanced features are available using menu functions that let you optimize the HP 34401A for your applications.

To further increase your productivity, the HP 34401A can be used in conjunction with HP 34812A BenchLink Meter software. The Windows-based program lets you configure and initiate measurements from your computer, and transfer results from your test instrument to your PC. It even enables direct temperature measurements with the HP 34401A and an RTD or thermistor probe. HP BenchLink Meter also lets you create graphs, charts and histograms to help you evaluate results.

#### 3-year warranty

With your HP 34401A, you get full documentation, a high-quality test lead set, calibration certificate with test data, and a 3-year warranty, all for one low price.

## Accuracy Specifications $\pm$ (% of reading + % of range)<sup>[1]</sup>

Function	Range <sup>[3]</sup>	Frequency, etc.	24 Hour <sup>[2]</sup> $23^\circ\text{C} \pm 1^\circ\text{C}$	90 Day $23^\circ\text{C} \pm 5^\circ\text{C}$	1 Year $23^\circ\text{C} \pm 5^\circ\text{C}$	Temperature Coefficient $0^\circ\text{C} - 18^\circ\text{C}$ $28^\circ\text{C} - 55^\circ\text{C}$
<b>dc Voltage</b>	100.0000 mV 1.000000 V <b>10.00000 V</b> 100.0000 V 1000.000 V		0.0030 + 0.0030 0.0020 + 0.0006 <b>0.0015 + 0.0004</b> 0.0020 + 0.0006 0.0020 + 0.0006	0.0040 + 0.0035 0.0030 + 0.0007 <b>0.0020 + 0.0005</b> 0.0035 + 0.0006 0.0035 + 0.0010	0.0050 + 0.0035 0.0040 + 0.0007 <b>0.0035 + 0.0005</b> 0.0045 + 0.0006 0.0045 + 0.0010	0.0005 + 0.0005 0.0005 + 0.0001 <b>0.0005 + 0.0001</b> 0.0005 + 0.0001 0.0005 + 0.0001
<b>True rms ac Voltage<sup>[4]</sup></b>	100.0000 mV 1.000000 V to 750.000 V <b>10 Hz - 20 kHz</b> 20 kHz - 50 kHz 50 kHz - 100 kHz <sup>[5]</sup> 100 kHz - 300 kHz <sup>[6]</sup>	3 Hz - 5 Hz 5 Hz - 10 Hz 10 Hz - 20 kHz 20 kHz - 50 kHz 50 kHz - 100 kHz <sup>[5]</sup> 100 kHz - 300 kHz <sup>[6]</sup>	1.00 + 0.03 0.35 + 0.03 0.04 + 0.03 0.10 + 0.05 0.55 + 0.08 4.00 + 0.50	1.00 + 0.04 0.35 + 0.04 0.05 + 0.04 0.11 + 0.05 0.60 + 0.08 4.00 + 0.50	1.00 + 0.04 0.35 + 0.04 0.06 + 0.04 0.12 + 0.04 0.60 + 0.08 4.00 + 0.50	0.100 + 0.004 0.035 + 0.004 0.005 + 0.004 0.011 + 0.005 0.060 + 0.008 0.20 + 0.02
<b>Resistance<sup>[7]</sup></b>	100.0000 $\Omega$ 1.000000 k $\Omega$ <b>10.00000 k<math>\Omega</math></b> 100.0000 k $\Omega$ 1.000000 M $\Omega$ 10.00000 M $\Omega$ 100.0000 M $\Omega$	1 mA Current Source 1 mA 100 $\mu\text{A}$ 10 $\mu\text{A}$ 5.0 $\mu\text{A}$ 500 nA 500 nA    10 M $\Omega$	0.0030 + 0.0030 0.0020 + 0.0005 <b>0.0020 + 0.0005</b> 0.0020 + 0.0005 0.002 + 0.001 0.015 + 0.001 0.300 + 0.010	0.008 + 0.004 0.008 + 0.001 <b>0.008 + 0.001</b> 0.008 + 0.001 0.008 + 0.001 0.020 + 0.001 0.800 + 0.010	0.010 + 0.004 0.010 + 0.001 <b>0.010 + 0.001</b> 0.010 + 0.001 0.010 + 0.001 0.040 + 0.001 0.800 + 0.010	0.0006 + 0.0005 0.0006 + 0.0001 <b>0.0006 + 0.0001</b> 0.0006 + 0.0001 0.0010 + 0.0002 0.0030 + 0.0004 0.1500 + 0.0002
<b>dc Current</b>	10.00000 mA <b>100.0000 mA</b> 1.000000 A 3.00000 A	<0.1 V Burden Voltage <0.6 V <1 V <2 V	0.005 + 0.010 <b>0.010 + 0.004</b> 0.050 + 0.006 0.100 + 0.020	0.030 + 0.020 <b>0.030 + 0.005</b> 0.080 + 0.010 0.120 + 0.020	0.050 + 0.020 <b>0.050 + 0.005</b> 0.100 + 0.010 0.120 + 0.020	0.002 + 0.0020 <b>0.002 + 0.0005</b> 0.005 + 0.0010 0.005 + 0.0020
<b>True rms ac Current<sup>[4]</sup></b>	<b>1.000000 A</b> 3.00000 A	3 Hz - 5 Hz 5 Hz - 10 Hz <b>10 Hz - 5 kHz</b> 3 Hz - 5 Hz 5 Hz - 10 Hz 10 Hz - 5 kHz	1.00 + 0.04 0.30 + 0.04 <b>0.10 + 0.04</b> 1.10 + 0.06 0.35 + 0.06 0.15 + 0.06	1.00 + 0.04 0.30 + 0.04 <b>0.10 + 0.04</b> 1.10 + 0.06 0.35 + 0.06 0.15 + 0.06	1.00 + 0.04 0.30 + 0.04 <b>0.10 + 0.04</b> 1.10 + 0.06 0.35 + 0.06 0.15 + 0.06	0.100 + 0.006 0.035 + 0.006 <b>0.015 + 0.006</b> 0.100 + 0.006 0.035 + 0.006 0.015 + 0.006
<b>Frequency or Period<sup>[8]</sup></b>	100 mV to 750 V	3 Hz - 5 Hz 5 Hz - 10 Hz 10 Hz - 40 Hz <b>40 Hz - 300 kHz</b>	0.10 0.05 0.03 <b>0.006</b>	0.10 0.05 0.03 <b>0.01</b>	0.10 0.05 0.03 <b>0.01</b>	0.005 0.005 0.001 <b>0.001</b>
<b>Continuity</b>	1000.0 $\Omega$	1 mA Test Current	0.002 + 0.010	0.008 + 0.020	0.010 + 0.020	0.001 + 0.002
<b>Diode Test</b>	1.0000 V	1 mA Test Current	0.002 + 0.010	0.008 + 0.020	0.010 + 0.020	0.001 + 0.002

[1] Specifications are for 1hr warm-up and 6½ digits, Slow ac filter.

[2] Relative to calibration standards.

[3] 20% over range on all ranges except 1000 Vdc and 750 Vac ranges.

[4] For sinewave input >5% of range. For inputs from 1% to 5% of range and <50 kHz, add 0.1% of range additional error.

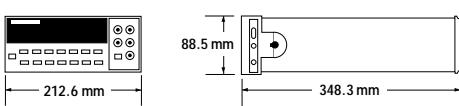
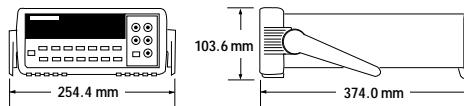
[5] 750 V range limited to 100 kHz or  $8 \times 10^7$  Volt-Hz.

[6] Typically 30% of reading error at 1 MHz.

[7] Specifications are for 4-wire ohms function or 2-wire ohms using Math Null.

Without Math Null, add 0.2  $\Omega$  additional error in 2-wire ohms function.

[8] Input >100 mV. For 10 mV inputs multiply % of reading error x10.



Measurement Characteristics			Operating Characteristics <sup>[4]</sup>		
			Function	Digits	Readings/s
<b>dc Voltage</b>			dcV, dcI, and Resistance	6 1/2	0.6 (0.5)
Measurement Method	Continuously Integrating Multi-slope III A-D Converter			6 1/2	6 (5)
A-D Linearity	0.0002% of reading + 0.0001 % of range			5 1/2	60 (50)
Input Resistance	Selectable 10 MΩ or >10,000 MΩ			5 1/2	300
0.1V, 1V, 10 V ranges				4 1/2	1000
100 V, 1000 V ranges	10 MΩ ± 1%		acV, acI	6 1/2	0.15 Slow (3 Hz)
Input Bias Current	< 30pA at 25° C			6 1/2	1 Medium (20 Hz)
Input Protection	1000 V all ranges			6 1/2	10 Fast (200 Hz)
dcV:dcV Ratio Accuracy	V <sub>input</sub> Accuracy + V <sub>reference</sub> Accuracy		Frequency or Period	6 1/2	50 <sup>[5]</sup>
<b>True rms ac Voltage</b>				5 1/2	1
Measurement Method	ac coupled True rms – measures the ac component of the input with up to 400 Vdc bias on any range.			4 1/2	9.8
Crest Factor	Maximum of 5:1 at Full Scale				80
Additional Crest Factor Errors (non-sinewave)			<b>System Speeds</b> [6]		
Crest Factor 1-2	0.05 % of reading		Configuration Rates	26/s to 50/s	
Crest Factor 2-3	0.15 % of reading		Autorange Rate (dc Volts)	> 30/s	
Crest Factor 3-4	0.30 % of reading		ASCII readings to RS-232	55/s	
Crest Factor 4-5	0.40 % of reading		ASCII readings to HP-IB	1000/s	
Input Impedance	1 MΩ ± 2% in parallel with 100 pF		Maximum Internal Trig. Rate	1000/s	
Input Protection	750 Vrms all ranges		Max. Ext. Trig. Rate to Memory	1000/s	
<b>Resistance</b>			<b>Triggering and Memory</b>		
Measurement Method	Selectable 4-wire or 2-wire Ohms. Current source referenced to LO input.		Reading HOLD Sensitivity	10%, 1%, 0.1%, or 0.01% of range	
Maximum Lead Resistance (4-wire)	10% of range per lead for 100Ω and 1kΩ ranges. 1kΩ per lead on all other ranges.		Samples/ trigger	1 to 50,000	
Input Protection	1000 V all ranges		Trigger Delay	0 to 3600 s: 10 µs step size	
<b>dc Current</b>			External Trigger Delay	< 1 ms	
Shunt Resistance	5Ω for 10 mA, 100 mA; 0.1 Ω for 1 A, 3 A.		External Trigger Jitter	< 500 µs	
Input Protection	Externally accessible 3 A 250 V Fuse Internal 7 A 250 V Fuse		Memory	512 readings	
<b>True rms ac Current</b>			<b>Math Functions</b>		
Measurement Method	Direct coupled to the fuse and shunt. ac coupled True rms measurement (measures the ac component only).		NULL, Min/Max/Average, dBm, dB, Limit Test (with TTL output)		
Shunt Resistance	0.1 Ω for 1 A and 3 A ranges		<b>Standard Programming Languages</b>		
Input Protection	Externally accessible 3 A 250 V Fuse Internal 7 A 250 V Fuse		SCPI (IEEE-488.2), HP 3478A, Fluke 8840A/42A		
<b>Frequency and Period</b>			<b>Accessories Included</b>		
Measurement Method	Reciprocal counting technique		Test Lead Kit with probe, alligator, and grabber attachments.		
Voltage Ranges	Same as ac Voltage Function		Operating Manual, Service Manual, test report, and power cord.		
Gate Time	1 s, 100 ms, or 10 ms.		<b>General Specifications</b>		
<b>Continuity / Diode</b>			Power Supply	100 V/120 V/220 V/240 V ±10%	
Response Time	300 samples/s with audible tone		Power Line Frequency	45 Hz to 66 Hz and 360 Hz to 440 Hz	
Continuity Threshold	Selectable from 1 Ω to 1000 Ω			Automatically sensed at power-on.	
<b>Measurement Noise Rejection 60 (50) Hz<sup>[1]</sup></b>			Power Consumption	25 VA peak (10W average)	
dc CMRR	140 dB		Operating Environment	Full accuracy for 0° C to 55° C	
ac CMRR	70 dB			Full accuracy to 80% R.H. at 30° C	
<b>Integration Time</b>			Storage Environment	-40° C to 75° C	
100 plc / 1.67 s (2 s)	60 dB <sup>[3]</sup>		Weight	3 kg (6.5 lbs)	
10 plc / 167 ms (200 ms)	60 dB <sup>[3]</sup>		Safety	Designed to CSA, UL-1244, IEC-348	
1 plc / 16.7 ms (20 ms)	60 dB		RFI and ESD	MIL-461C, FTZ 1046, FCC	
<1 plc / 3 ms or 800 µs	0 dB		Vibration and Shock	MIL-T-28800E, Type III, Class 5 (Sine Only)	
			Warranty	3 years	

[1] For 1 kΩ unbalance in LO lead.

[2] For power line frequency ± 0.1%.

[3] For power line frequency ± 1% use 40 dB or ± 3% use 30 dB.

[4] Reading speeds for 60 Hz and (50 Hz) operation.

[5] Maximum useful limit with default settling delays defeated.

[6] Speeds are for 4 1/2 digits, Delay 0, Auto-zero and Display OFF.

---

## **Ordering Information**

### **HP 34401A Multimeter**

#### **Accessories included**

Test Lead Kit with probe, alligator, and grabber attachments, operating manual, service manual, calibration certificate, test report, and power cord.

#### **Options**

- Opt. 908** Rack Mount Kit\* (P/N 5062-3972)
- Opt. 910** Extra manual set (English)
- Opt. OBO** DMM without manuals
- Opt. W50** Additional 2-year warranty (5-year total)
- Opt. 1BP** MIL-STD-45662A calibration with data

#### **Manual options (please specify one)**

- ABA US English
- ABD German
- ABE Spanish
- ABF French
- ABJ Japanese
- ABZ Italian
- ABO Taiwan Chinese
- AB1 Korean

#### **Accessories**

- HP 11059A** Kelvin Probe set
- HP 11060A** Surface Mount Device (SMD) test probes
- HP 11062A** Kelvin clip set
- HP 34130** Deluxe test lead set
- HP 34161A** accessory pouch
- HP 34300A** 40 kV ac/dc high voltage probe
- HP 34301A** 700 MHz RF probe
- HP 34302A** Clamp-on ac/dc current probe (100 A)
- HP 34330A** 30 A current shunt
- HP 34812A** BenchLink Meter software
- HP E2308A** 5K thermistor probe

\* For racking two side-by-side, order both items below  
Lock link kit (P/N 5061-9694)  
Flange kit (P/N 5062-3974)

HP BenchLink is a trademark of Hewlett-Packard Company.  
Windows is a trademark of Microsoft Corporation.

**For more information on  
Hewlett-Packard Test and  
Measurement products,  
applications or services please call  
your local Hewlett-Packard sales  
offices. One of the following  
HP centers can help you contact  
your local HP representative.**

#### **United States:**

Hewlett-Packard Company  
Test and Measurement Organization  
5301 Stevens Creek Blvd.  
Bldg. 51L-SC  
Santa Clara, CA 95052-8059  
1 800 452 4844

#### **Canada:**

Hewlett-Packard Canada Ltd.  
5150 Spectrum Way  
Mississauga, Ontario  
L4W 5G1  
(905) 206 4725

#### **Europe:**

Hewlett-Packard  
European Marketing Centre  
P.O. Box 999  
1180 AZ Amstelveen  
The Netherlands

#### **Japan:**

Yokogawa-Hewlett-Packard Ltd.  
Measurement Assistance Center  
9-1, Takakura-Cho, Hachioji-Shi  
Tokyo 192, Japan  
(81) 426 48 3860

#### **Latin America:**

Hewlett-Packard  
Latin American Region Headquarters  
5200 Blue Lagoon Drive, 9th Floor  
Maimi, FL 33126 U.S.A.  
(305) 267 4245/4220

#### **Australia / New Zealand:**

Hewlett-Packard Australia Ltd.  
31-41 Joseph Street, Blackburn  
Victoria 3130, Australia  
131 347 Ext. 2902

#### **Asia Pacific:**

Hewlett-Packard Asia Pacific Ltd.  
17-21/F Shell Tower, Time Square  
1 Matheson Street, Causeway Bay  
Hong Kong  
(852) 2599 7070

Technical information in this document  
is subject to change without notice.

Printed in the U.S.A.

Copyright © 1995  
Hewlett-Packard Company

5964-0145 EN

***Within Budget.  
Without Compromise.***