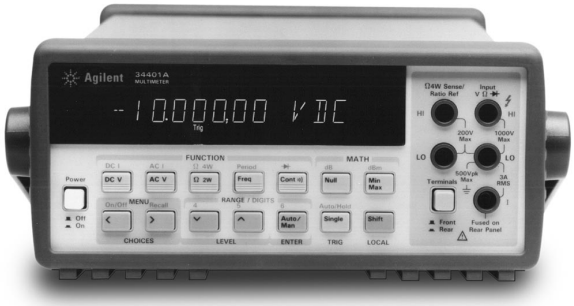
Agilent 34401A Multimeter

Uncompromising Performance for Benchtop and System Testing

Product Overview



- Measure up to 1000 volts with $6\frac{1}{2}$ digits resolution
- 0.0015% basic dcV accuracy (24 hour)
- 0.06% basic acV accuracy (1 year)
- 3Hz to 300kHz ac bandwidth
- 1000 readings/sec. direct to GPIB

Superior performance

The Agilent Technologies 34401A multimeter gives you the performance you need for fast, accurate bench and system testing. The 34401A provides a combination of resolution, accuracy and speed that rivals DMMs costing many times more. $6\frac{1}{2}$-digits of resolution, 0.0015% basic 24-hr dcV accuracy and 1,000 readings/sec direct to GPIB assure you of results that are accurate, fast, and repeatable.

Use it on your benchtop

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

The 34401A gives you the ability to store up to 512 readings in internal memory. For trouble-shooting, 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 34401A gives you faster bus throughput than any other DMM in its class. The 34401A can send up to 1,000 readings/sec directly across GPIB in user-friendly ASCII format.

You also get both GPIB 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 34401A includes three command languages (SCPI, Agilent 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

Commonly accessed attributes, such as functions, ranges, and resolution are selected with a single button press.

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

The included Agilent IntuiLink software allows you to put your captured data to work easily, using PC applications such as Microsoft Excel® or Word® to analyze, interpret, display, print, and document the data you get from the 34401A. You can specify the meter setup and take a single reading or log data to the Excel spreadsheet in specified time intervals. Programmers can use ActiveX components to control the DMM using SCPI commands. To find out more about IntuiLink, visit **www.agilent.com/find/intuilink**

The 34401A can also be used in conjunction with the 34812A BenchLink Meter software. This Windows-based program lets you configure and initiate measurements from your computer, and transfer results from your test instrument to your PC.

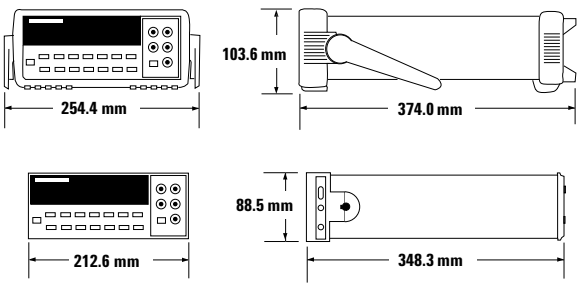
3-year warranty

With your 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.

Agilent Technologies
Innovating the HP Way

Accuracy Specifications ± (% of reading + % of range)[1]

Function	Range[3]	Frequency, etc.	24 Hour [2] 23°C ± 1°C	90 Day 23°C ± 5°C	1 Year 23°C ± 5°C	Temperature Coefficient 0°C – 18°C 28°C – 55°C
dc Voltage	100.0000 mV		0.0030 + 0.0030	0.0040 + 0.0035	0.0050 + 0.0035	0.0005 + 0.0005
	1.000000 V		0.0020 + 0.0006	0.0030 + 0.0007	0.0040 + 0.0007	0.0005 + 0.0001
	10.00000 V		**0.0015 + 0.0004**	**0.0020 + 0.0005**	**0.0035 + 0.0005**	**0.0005 + 0.0001**
	100.0000 V		0.0020 + 0.0006	0.0035 + 0.0006	0.0045 + 0.0006	0.0005 + 0.0001
	1000.000 V		0.0020 + 0.0006	0.0035 + 0.0010	0.0045 + 0.0010	0.0005 + 0.0001
True rms ac Voltage[4]	100.0000 mV	3 Hz - 5 Hz	1.00 + 0.03	1.00 + 0.04	1.00 + 0.04	0.100 + 0.004
		5 Hz - 10 Hz	0.35 + 0.03	0.35 + 0.04	0.35 + 0.04	0.035 + 0.004
		10 Hz - 20 kHz	0.04 + 0.03	0.05 + 0.04	0.06 + 0.04	0.005 + 0.004
		20 kHz - 50 kHz	0.10 + 0.05	0.11 + 0.05	0.12 + 0.04	0.011 + 0.005
		50 kHz - 100 kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
		100 kHz - 300 kHz[6]	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.20 + 0.02
	1.000000 V to 750.000 V	3 Hz - 5 Hz	1.00 + 0.02	1.00 + 0.03	1.00 + 0.03	0.100 + 0.003
		5 Hz - 10 Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
		10 Hz - 20 kHz	**0.04 + 0.02**	**0.05 + 0.03**	**0.06 + 0.03**	**0.005 + 0.003**
		20 kHz - 50 kHz	0.10 + 0.04	0.11 + 0.05	0.12 + 0.04	0.011 + 0.005
		50 kHz - 100 kHz[5]	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
		100 kHz - 300 kHz[6]	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.20 + 0.02
Resistance[7]	100.0000 Ω	1 mA Current Source	0.0030 + 0.0030	0.008 + 0.004	0.010 + 0.004	0.0006 + 0.0005
	1.000000 kΩ	1 mA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0006 + 0.0001
	10.00000 kΩ	100 µA	**0.0020 + 0.0005**	**0.008 + 0.001**	**0.010 + 0.001**	**0.0006 + 0.0001**
	100.0000 kΩ	10 µA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0006 + 0.0001
	1.000000 MΩ	5.0 µA	0.002 + 0.001	0.008 + 0.001	0.010 + 0.001	0.0010 + 0.0002
	10.00000 MΩ	500 nA	0.015 + 0.001	0.020 + 0.001	0.040 + 0.001	0.0030 + 0.0004
	100.0000 MΩ	500 nA || 10MΩ	0.300 + 0.010	0.800 + 0.010	0.800 + 0.010	0.1500 + 0.0002
dc Current	10.00000 mA	<0.1 V Burden Voltage	0.005 + 0.010	0.030 + 0.020	0.050 + 0.020	0.002 + 0.0020
	100.0000 mA	<0.6 V	**0.010 + 0.004**	**0.030 + 0.005**	**0.050 + 0.005**	**0.002 + 0.0005**
	1.000000 A	<1 V	0.050 + 0.006	0.080 + 0.010	0.100 + 0.010	0.005 + 0.0010
	3.00000 A	<2 V	0.100 + 0.020	0.120 + 0.020	0.120 + 0.020	0.005 + 0.0020
True rms ac Current[4]	**1.000000 A**	3 Hz - 5 Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.006
		5 Hz - 10 Hz	0.30 + 0.04	0.30 + 0.04	0.30 + 0.04	0.035 + 0.006
		10 Hz - 5 kHz	**0.10 + 0.04**	**0.10 + 0.04**	**0.10 + 0.04**	**0.015 + 0.006**
	3.00000 A	3 Hz - 5 Hz	1.10 + 0.06	1.10 + 0.06	1.10 + 0.06	0.100 + 0.006
		5 Hz - 10 Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.035 + 0.006
		10 Hz - 5 kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
Frequency or Period[8]	100 mV to 750 V	3 Hz - 5 Hz	0.10	0.10	0.10	0.005
		5 Hz - 10 Hz	0.05	0.05	0.05	0.005
		10 Hz - 40 Hz	0.03	0.03	0.03	0.001
		40 Hz - 300 kHz	**0.006**	**0.01**	**0.01**	**0.001**
Continuity	1000.0Ω	1mA Test Current	0.002 + 0.010	0.008 + 0.020	0.010 + 0.020	0.001 + 0.002
Diode Test	1.0000V	1mA 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 1000Vdc and 750Vac ranges.
4 For sinewave input > 5% of range. For inputs from 1% to 5% of range and < 50kHz, add 0.1% of range additional error.
5 750V range limited to 100 kHz or 8 x107 Volt-Hz.
6 Typically 30% of reading error at 1MHz.
7 Specifications are for 4- wire ohms function or 2-wire ohms using Math Null. Without Math Null, add 0.2 Ω additional error in 2-wire ohms function.
8 Input >100 mV. For 10 mV inputs multiply % of reading error x10.

Measurement Characteristics

dc Voltage

Measurement Method	Continuously Integrating Multi-slope III A-D Converter
A-D Linearity	0.0002% of reading + 0.0001 % of range
Input Resistance	
0.1V, 1V,10 V ranges	Selectable 10 MΩ or >10,000 MΩ
100 V, 1000 V ranges	10 MΩ ± 1%
Input Bias Current	< 30pA at 25° C
Input Protection	1000 V all ranges
dcV:dcV Ratio Accuracy	V_{input} Accuracy + $V_{reference}$ Accuracy

True rms ac Voltage

Measurement Method	ac coupled True rms – measures the ac component of the input with up to 400 Vdc of bias on any range.
Crest Factor	Maximum of 5:1 at Full Scale
Additional Crest Factor Errors (non-sinewave)	Crest Factor 1–2 0.05 % of reading Crest Factor 2–3 0.15 % of reading Crest Factor 3–4 0.30 % of reading Crest Factor 4–5 0.40 % of reading
Input Impedance	1 MΩ ± 2% in parallel with 100 pF
Input Protection	750Vrms all ranges

Resistance

Measurement Method	Selectable 4-wire or 2-wire Ohms. Current source referenced to LO input.
Maximum Lead Resistance (4-wire)	10% of range per lead for 100Ω and 1kΩ ranges. 1kΩ per lead on all other ranges.
Input Protection	1000 V all ranges

dc Current

Shunt Resistance	5Ω for 10 mA,100 mA; 0.1 Ω for 1 A, 3 A
Input Protection	Externally accessible 3 A 250 V Fuse Internal 7 A 250 V Fuse

1 For 1kΩ unbalance in LO lead.
2 For power line frequency ± 0.1%.
3 For power line frequency ± 1% use 40dB or ± 3% use 30dB.
4 Reading speeds for 60Hz and (50Hz) operation.
5 Maximum useful limit with default settling delays defeated.
6 Speeds are for 4½ digits, Delay 0, Auto-zero and Display OFF.

True rms ac Current

Measurement Method	Direct coupled to the fuse and shunt. ac coupled True rms measurement (measures the ac component only).
Shunt Resistance	0.1 Ω for 1 A and 3 A ranges
Input Protection	Externally accessible 3 A 250 V Fuse Internal 7 A 250 V Fuse

Frequency and Period

Measurement Method	Reciprocal counting technique
Voltage Ranges	Same as ac Voltage Function
Gate Time	1 s, 100 ms, or 10 ms.

Continuity / Diode

Response Time	300 samples/s with audible tone
Continuity Threshold	Selectable from 1 Ω to 1000 Ω

Measurement Noise Rejection 60 (50) Hz[1]

dc CMRR	140 dB
ac CMRR	70 dB

Integration Time	Normal Mode Rejection[2]
100 plc / 1.67 s (2 s)	60 dB[3]
10 plc / 167 ms (200 ms)	60 dB[3]
1 plc / 16.7 ms (20 ms)	60 dB
<1 plc / 3 ms or 800 µs	0 dB

Operating Characteristics[4]

Function	Digits	Readings/s
dcV, dcI, and Resistance	6½	0.6 (0.5)
	6½	6 (5)
	5½	60 (50)
	5½	300
	4½	1000
acV, acI	6½	0.15 Slow (3Hz)
	6½	1 Medium (20Hz)
	6½	10 Fast (200Hz)
	6½	50[5]
Frequency or Period	6½	1
	5½	9.8
	4½	80

System Speeds[6]

Configuration Rates	26/s to 50/s
Autorange Rate (dc Volts)	>30/s
ASCII readings to RS-232	55/s
ASCII readings to GPIB	1000/s
Maximum Internal Trig. Rate	1000/s
Max. Ext. Trig. Rate to Memory	1000/s

Triggering and Memory

Reading HOLD Sensitivity	10%, 1%, 0.1%,or 0.01% of range
Samples/ trigger	1 to 50,000
Trigger Delay	0 to 3600 s: 10 µs step size
External Trigger Delay	< 1 ms
External Trigger Jitter	< 500 µs
Memory	512 readings

Math Functions

NULL, Min/Max/Average, dBm, dB, Limit Test (with TTL output)

Standard Programming Languages

SCPI (IEEE-488.2), Agilent 3478A, Fluke 8840A/42A

Accessories Included

Test Lead Kit with probe, alligator, and grabber attachments.
Operating Manual, Service Manual, test report, and power cord.

General Specifications

Power Supply	100 V/120 V/220 V/ 240 V ±10%
Power Line Frequency	45 Hz to 66 Hz and 360 Hz to 440 Hz Automatically sensed at power-on
Power Consumption	25 VA peak (10W average)
Operating Environment	Full accuracy for 0° C to 55° C Full accuracy to 80% R.H. at 40° C
Storage Environment	– 40° C to 70° C
Weight	3.6 kg (8.0 lbs)
Safety	Designed to CSA, UL-1244, IEC-348
RFI and ESD	MIL-461C, FTZ 1046, FCC
Vibration and Shock	MIL-T-28800E, Type III, Class 5 (Sine Only)
Warranty	3 years

Ordering Information

Agilent 34401A Multimeter

Accessories included

Test Lead Kit with probe, alligator, and grabber attachments, IntuiLink connectivity software, 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
AB2 Chinese
AKT Russian

Agilent Accessories

11059A Kelvin Probe set

11060A Surface Mount Device (SMD) test probes

11062A Kelvin clip set

34131 Hard Transit Case

34161A Accessory pouch

34171A Input terminal connector (sold in pairs)

34172A Input calibration short (sold in pairs)

34330A 30 A current shunt

34812A BenchLink Meter software

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 5063-9212)

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