

Agilent 34401A Multimeter

Uncompromising Performance for Benchtop and System Testing

Product Overview

- **Measure up to 1000 volts with 6½ 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. 6½-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 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

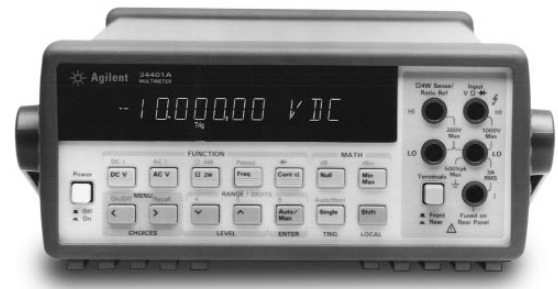
For systems use, the 34401A gives you faster bus throughput than any other DMM in its class. The 34401A can send up to 1,000 readings/sec directly across GPIB in user-friendly ASCII format.

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.

To further increase your productivity, the 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 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 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 |
| | 100.0000 Ω 1.000000 kΩ 10.00000 kΩ 100.0000 kΩ 1.000000 MΩ 10.00000 MΩ 100.0000 MΩ | 1 mA Current Source | 0.0030 + 0.0030 | 0.008 + 0.004 | 0.010 + 0.004 | 0.0006 + 0.0005 |
| | | 1 mA | 0.0020 + 0.0005 | 0.008 + 0.001 | 0.010 + 0.001 | 0.0006 + 0.0001 |
| | | 100 μA | 0.0020 + 0.0005 | 0.008 + 0.001 | 0.010 + 0.001 | 0.0006 + 0.0001 |
| | | 10 μA | 0.0020 + 0.0005 | 0.008 + 0.001 | 0.010 + 0.001 | 0.0006 + 0.0001 |
| | | 5.0 μA | 0.002 + 0.001 | 0.008 + 0.001 | 0.010 + 0.001 | 0.0010 + 0.0002 |
| | | 500 nA | 0.015 + 0.001 | 0.020 + 0.001 | 0.040 + 0.001 | 0.0030 + 0.0004 |
| | | 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.

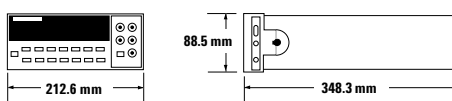
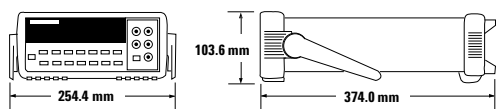
[5] 750V range limited to 100 kHz or 8 x107 Volt-Hz.

[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 M Ω or >10,000 M Ω |
| 100 V, 1000 V ranges | 10 M Ω \pm 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 M Ω \pm 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 100 Ω and 1k Ω ranges. 1k Ω per lead on all other ranges. |
| Input Protection | 1000 V all ranges |

dc Current

| | |
|------------------|---|
| Shunt Resistance | 5 Ω 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 |

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 μ s | 0 dB |

Operating Characteristics ^[4]

| Function | Digits | Readings/s |
|--------------------------|--------|-------------------|
| dcV, dcl, 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 μ s step size |
| External Trigger Delay | < 1 ms |
| External Trigger Jitter | < 500 μ s |
| 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 \pm 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 |

[1] For 1k Ω unbalance in LO lead.

[2] For power line frequency \pm 0.1%.

[3] For power line frequency \pm 1% use 40dB or \pm 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.

Ordering Information

Agilent 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. 0B0 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

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)

Agilent Technologies' Test and Measurement Support, Services, and Assistance

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise

"Our Promise" means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage

"Your Advantage" means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

Get assistance with all your test and measurement needs at:

www.agilent.com/find/assist

Or check your local phone book for the Agilent office near you.

Product specifications and descriptions in this document subject to change without notice.

Copyright © 1998, 2000 Agilent Technologies
Printed in U.S.A. 5/00
5968-0162 EN



Agilent Technologies

Innovating the HP Way