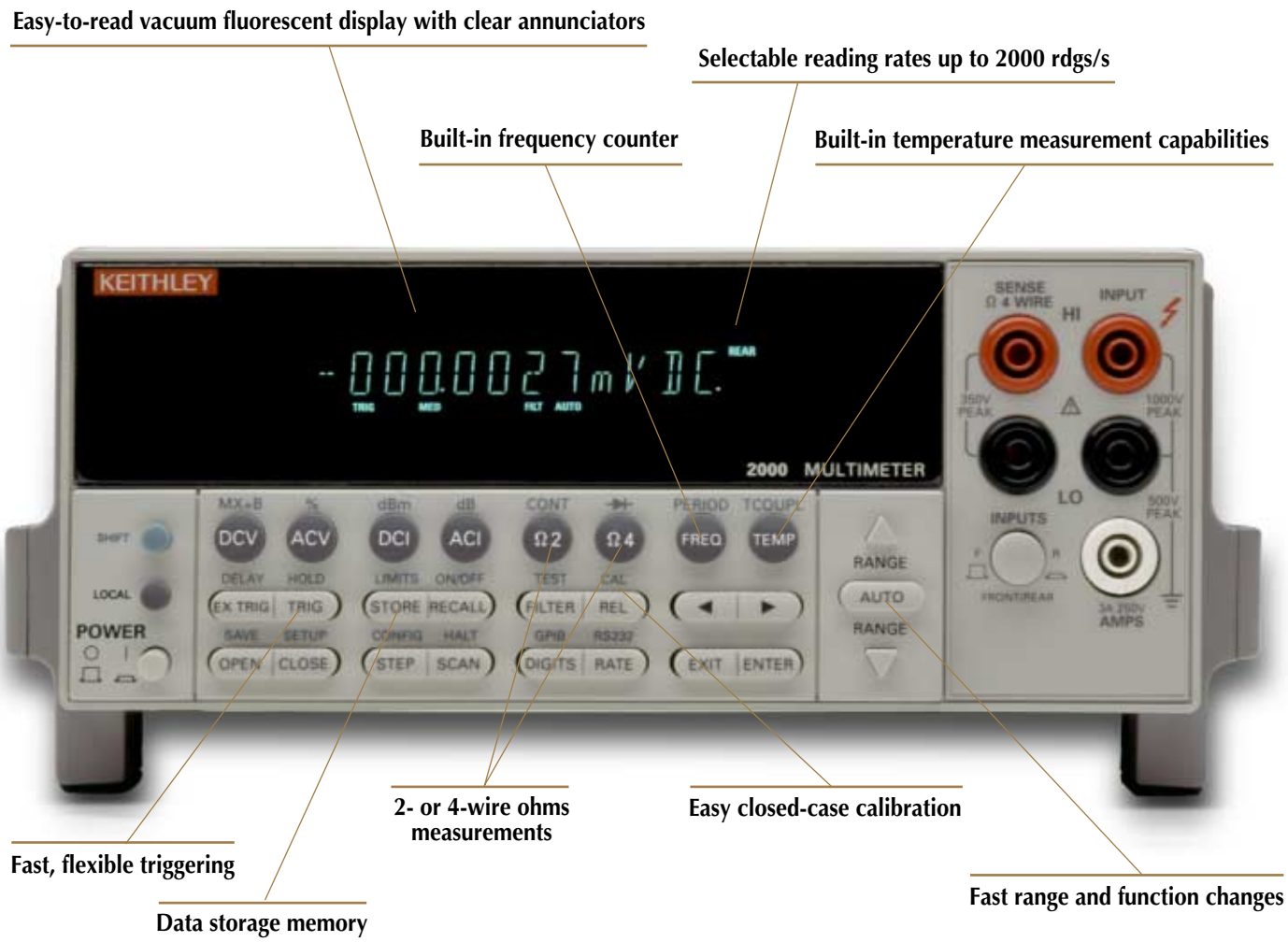
KEITHLEY

Series 2000 High-Performance Digital Multimeters

Keithley's Series 2000 Digital Multimeter Family

The unique combination of measurement capabilities each instrument offers makes them ideal for a broad range of high-speed production testing applications, including device testing of electronic components, telecommunications products, automotive components and subassemblies, etc. The space-saving half-rack design means they'll fit readily into just about any production floor test rack or benchtop. A built-in scanner mainframe makes it easy to do multi-point testing of up to 10 test points, simply by plugging in an economical switch card. With a choice of resolution from 6½ to 8½ digits, there is sure to be a Series 2000 DMM that's appropriate for your application.



Shared core technologies

All four Series 2000 DMMs are designed on the same set of core technologies, so they share many of the same basic capabilities. For example, the entire family is based on the same high-speed, low-noise 28-bit A/D converter technology. The high-end Models 2001 and 2002 incorporate five distinct processors for tighter A-to-D control, higher accuracy, more precise triggering, and higher throughput. All are capable of reading rates of up to 2000 readings/sec (at 4½ digits) for fast throughput in production test applications. Their wide dynamic range minimizes range-shift errors and speeds systems applications.

Model 2000

Model 2010

Model 2001

Model 2002

Other Series 2000 capabilities that contribute to high measurement throughput include fast range and function changes, high-speed auto-ranging, and fast overload recovery. The 2001 and 2002 feature very low trigger delay and triggering uncertainty.

The vacuum fluorescent display has clear annunciators and is designed for easy reading, even in low light conditions. The front panel design is simple to understand and use. This intuitive front panel design helps minimize the user's learning curve when migrating an application from one Series 2000 meter to another. The software architecture was also designed to make it easy to substitute a Series 2000 meter for meters from other manufacturers or replace one Series 2000 meter with another.

High performance plus high value

Series 2000 meters offer measurement stability, speed and accuracy specifications comparable to instruments costing thousands of dollars more. Other features that enhance their value include a built-in scanner mainframe with optional 10-channel switching capacity for multi-point testing applications. This option slot also opens the door to accessories and companion products that can add new features, functions, and measurement ranges to the instruments. The high compatibility of Series 2000 DMMs also eliminates the need to buy multiple versions of the same accessory or companion product in many cases.

Easy interfacing

All Series 2000 DMMs offer IEEE-488 interfaces for interfacing the meter with a computer controller for larger test applications. Several features also allow them to operate in stand-alone mode, without the need for a PC controller, such as their built-in math functions, non-volatile storage buffers, built-in switch mainframes, etc. The Models 2000 and 2010 also include an RS-232 interface for simple low cost PC interfacing.

IEEE-488 bus simplifies controlling a wide range of GPIB instruments

Trigger-Link for fast, precise, repeatable triggering of multiple instruments

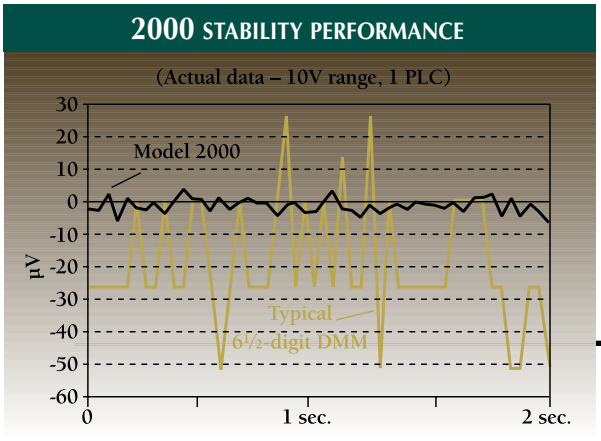
Built-in scanner mainframe accepts optional switching cards for 10-channel multi-point testing

Model 2000 6½-Digit Digital Multimeter

High performance without the high cost

Technical innovations allow the Model 2000 to provide high performance economically. Traditional DMMs require autozeroing the front-end amplifier to reduce offset drifts, slowing the reading rate. The Model 2000's proprietary servo front-end amplifier has extremely low offset drift, reducing the need for autozeroing and increasing throughput for high accuracy measurements.

Using a precision, low-cost A-to-D converter enabled the Model 2000 design team to develop a unique error reduction algorithm. This algorithm corrects for drift errors associated with the resistor networks used for signal conditioning. Therefore, it allows the use of inexpensive resistor networks, while providing higher accuracy.

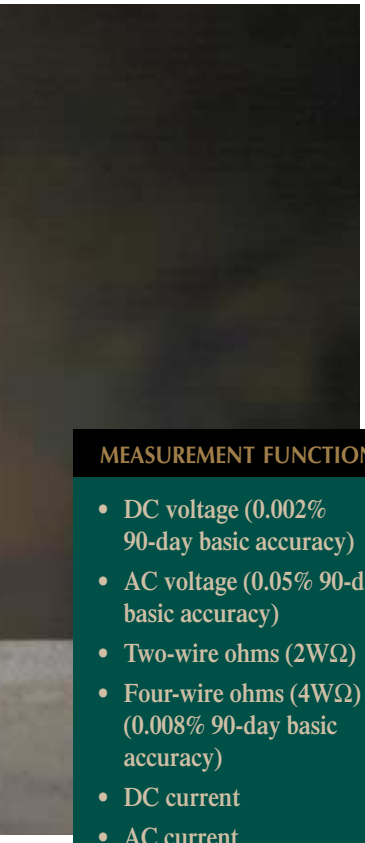


A shared solid-state circuit protects the Model 2000's DC volts, AC volts and ohms circuitry from overloads. This circuit provides low offset error and drift, and fast response to and recovery from overloads. Traditional techniques for protecting these circuits would have required three separate (and expensive) circuits.

The Model 2000's design also helps control costs by using a two-layer printed circuit board rather than a traditional four- or six-layer board, which can double or quadruple board manufacturing costs.

High-speed production testing

In addition to the high performance features common to all Series 2000 DMMs, the Model 2000 offers unique capabilities that simplify building and upgrading automated production test systems. These include a built-in limit testing function, which can be used to sort or grade components or assemblies. It also offers a full resolution reading rate (50 rdg/s) that's nearly ten times faster than any other meter in its class and a maximum speed of 2000 rdg/s. A variety of built-in math functions (Rel, Min/Max/Average/StdDev (of stored reading), dB, dBm, Limit Test, %, and mX+b) allow making calculations on acquired data without a computer. The built-in 10-channel scanner mainframe simplifies making multi-point measurements—just plug in an economical switch card.



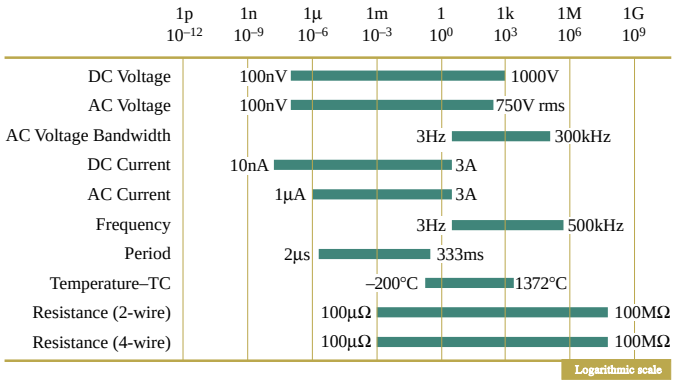
MEASUREMENT FUNCTIONS

- DC voltage (0.002% 90-day basic accuracy)
- AC voltage (0.05% 90-day basic accuracy)
- Two-wire ohms (2WΩ)
- Four-wire ohms (4WΩ) (0.008% 90-day basic accuracy)
- DC current
- AC current
- Continuity
- Period
- Frequency
- dB
- dBm
- Temperature (J, K, and T-type TCs)
- Diode test
- Optional ten-channel switching

Easy system upgrades

The Model 2000 can preserve your investment in control software when you use it to upgrade the performance of an existing application. If the existing IEEE-488 test code was written for the Fluke 8840/42 or the Keithley 196/199, an emulation mode makes it easy to substitute the Model 2000 for the old DMM without modifying the software in most cases. Later, if the application needs the additional resolution or functionality of the Model 2010, 2001 or 2002, the Model 2000 ensures a smooth migration path to higher performance via the SCPI command set.

2000 MEASUREMENT RANGE



Accessories and companion products

- Model 2000-SCAN: 10-Channel Scanner
- Model 2001-SCAN: 10-Channel Scanner (with two high-speed channels)
- Model 2001-TCSCAN: 9-Channel Thermocouple Scanner
- Model 7001: 2-slot Scanner Mainframe
- Model 7002: 10-slot Scanner Mainframe
- More than 40 Series 7000 Switching Cards
- TestPoint® Test Development Software
- Model KPC 488.2 and KPC-488.2AT IEEE-488 Interfaces

Applications

- Benchtop testing
- Production testing
- Multipoint scan/measure solution with optional plug-in cards

Model 2010 7½-Digit Multimeter
Low noise DMM with high accuracy

The Low Noise Model 2010 DMM offers production test system integrators a wide range of advantages, many of them unavailable even in other Series 2000 meters. The 2010 combines high resolution with the high speed and accuracy needed for production applications such as testing sensors, transducers, A/D and D/A converters, regulators, references, connectors, switches and relays. It's equally well-suited for testing subassembly or system level electronics.

Exceptionally low noise floor

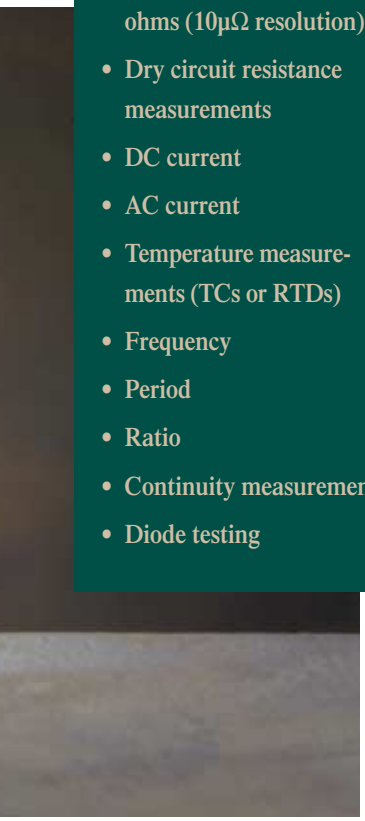
The Model 2010's low noise floor (just 100nV) allows more accurate millivolt- and microvolt-level measurements. Additional advantages include high DCV basic accuracy (7ppm), stability, and linearity (±2ppm of reading + 1ppm of range on the 10VDC range) to reduce total measurement uncertainty. A wide dynamic range minimizes range-shift errors and speeds systems applications by reducing range change delays. The built-in ratio measurement function simplifies precise relative measurements and comparison testing. With speeds up to 2000 readings/second, it also provides the high test throughput required in production applications.

Optimized for ohms measurement

Characterizing the resistance, linearity or isolation of contacts, connectors, switches or relays completely and efficiently are common requirements in production testing and demand an uncommon combination of ohms measurement capabilities. For example, the 2010 allows making low-level resistance measurements with source current as low as 100µA, an order of magnitude lower than is possible with other DMMs, so device self-heating is minimized. Among other benefits, this low-power ohms measurement capability makes the 2010 suitable for end-of-life contact testing per ASTM B539-90.

MEASUREMENT FUNCTIONS

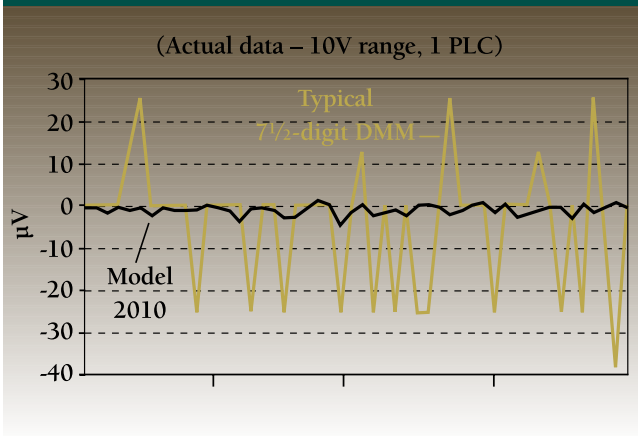
- DC voltage (0.0018% 90-day basic accuracy)
- AC voltage (0.05% 90-day basic accuracy)
- Two-wire and four-wire ohms (10µΩ resolution)
- Dry circuit resistance measurements
- DC current
- AC current
- Temperature measurements (TCs or RTDs)
- Frequency
- Period
- Ratio
- Continuity measurement
- Diode testing



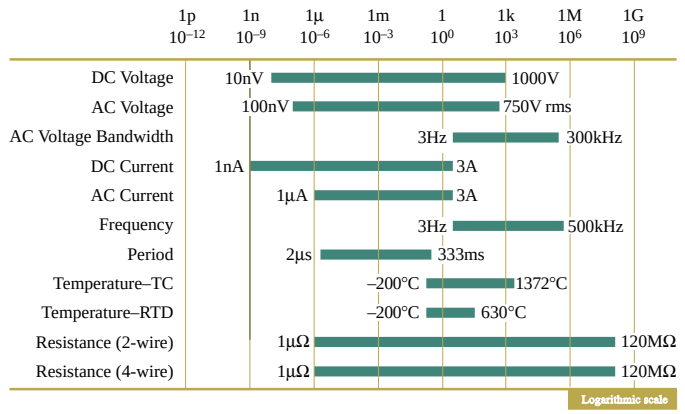
When measuring contact and connector resistances, it is critical to control the test voltage carefully to avoid puncturing any oxides or films that may have formed. The Model 2010's built-in clamp limits the open circuit test voltage to 20mV to ensure dry circuit conditions. An offset compensated ohms function eliminates thermal effects that can create errors in low-level resistance measurements in system environments. The Model 2010's extended ohms measurement range allows for more precise measurements of low resistances.

A variety of built-in math functions (Rel, Min/Max/Average/StdDev (of stored reading), dB, dBm, Limit Test, %, and mX+b) allow making calculations on acquired data without a computer. The built-in 10-channel scanner mainframe simplifies making multi-point measurements—just plug in an economical switch card.

2010 STABILITY PERFORMANCE



2010 MEASUREMENT RANGE



Simplified software migration

An emulation mode helps preserve your IEEE-488 control software investment when upgrading a test system by replacing a Keithley Model 196 or 199 with the Model 2010. The new meter can be substituted for the old one without software modifications in most cases. Similarly, if the software was originally developed for a Model 2000, 2001 or 2002 following SCPI guidelines, there's a smooth migration path to the 2010 when the application demands a different level of resolution or set of functions.

Accessories and companion products

- Model 2000-SCAN: 10-Channel Scanner
- Model 2001-SCAN: 10-Channel Scanner (with two high-speed channels)
- Model 2001-TCSCAN: 9-Channel Thermocouple Scanner
- Model 7001: 2-slot Scanner Mainframe
- Model 7002: 10-slot Scanner Mainframe
- More than 40 Series 7000 Switching Cards
- TestPoint® Test Development Software
- Model KPC-488.2 and KPC-488.2AT IEEE-488 Interfaces

Applications

- Millivolt and microvolt output testing
- Drift characterization
- Precision resistance measurement
- Contact resistance, linearity, and isolation testing
- Mixed measurements

Model 2001 7½-Digit Multimeter
Superior measurement speed and integrity

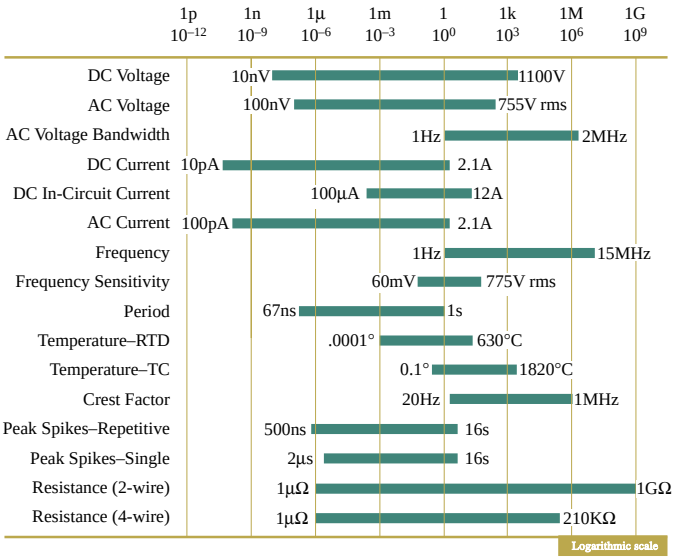
In addition to the wide range of measurement functions and capabilities common to all Series 2000 DMMs, the Model 2001 has many other advantages for test system builders. While other DMMs may claim to offer 7½-digit resolution, they typically must average multiple readings to achieve their specified resolution, which slows the reading rate significantly. In contrast, the Model 2001's true 7½-digit resolution is based on a 28-bit A-to-D converter, so no averaging is needed to discern

smaller changes. This high resolution also provides greater dynamic range, so it's possible to measure from 1µV to 20V on a single range and avoid range-shift errors.

Unique measurement capabilities

Unlike the Model 2000 or 2010, the Model 2001 offers the ability to make peak spikes measurements without the need for a separate oscilloscope. Its internal peak detector can catch 1µs spikes, such as power supply spikes and transients, AC line power surges, and short-duration drop outs on components, as well as up to 1MHz for repetitive signals. The Model 2001 can automatically display and store the highest value, or display the maximum and minimum values of spikes. Similarly, no oscillo-

2001 MEASUREMENT RANGE



scope is required to determine if the crest factor—the ratio of peak value to rms values—of an AC signal is acceptable to ensure measurement accuracy, because the Model 2001 measures AC crest factor directly.

While some DMMs will calculate average AC from the RMS value, these calculations apply only to sine wave inputs. With the Model 2001, it's easy to measure AC peak value, average, and true rms directly to characterize the signal completely. This capability is ideal for AC circuit design or test, and to verifying test voltages specified only in averages.

In-circuit current measurement

Unlike voltage and resistance measurements, which can be made in parallel, measuring current has traditionally required breaking the conductor to connect the meter in series with the signal path. However, cutting the circuit, connecting the meter, making the measurement, then repairing the circuit is often a tedious, time-consuming process. The added lead resistance and voltage burden may also skew the readings by making the circuit perform uncharacteristically. The Model 2001's in-circuit current measurement function offers a convenient, accurate alternative that eliminates the need to break the circuit to insert the meter. It allows taking four readings per second at 1PLC. Because there is so little time between measurements, drift effects are almost zero, for greater measurement accuracy.

MEASUREMENT FUNCTIONS

- DCV
- ACV (peak, avg. and rms)
- AC+DCV (peak, avg. and rms)
- DCI
- AC+DCI (peak, avg. and rms)
- ACI (peak, avg. and rms)
- 2WΩ
- 4WΩ
- Frequency
- Period
- dB, dBm
- Crest factor measurements
- Peak spikes (high and low)
- Time stamp
- DC in-circuit current
- Temperature (TCs and RTDs)
- Lead resistance

High-speed triggering

Trigger latency—the delay between trigger and measurement—is often a barrier to higher throughput. The Model 2001 triggers in less than 2µs ± 1µs—100 to 1000 times faster than other DMMs. The Trigger-Link feature provides control over six separate trigger lines for easier system integration and faster operation.

Multiple measurement displays

The Model 2001 can show the results of up to three different measurements simultaneously on its dual-line display, such as the DC volts, AC volts and the AC frequency from a single measurement connection. More than 20 multiple-measurement display combinations can be set, including a bar-graph display that makes it easy to track meter reading trends around a target value. It can even be used to replace a nulling differential voltmeter. The bar-graph is updated 20 times/second, so it's useful for monitoring fast-moving signals.

Dual function option slot

In addition to operating as a 10-channel scanner mainframe, the Model 2001's back panel option slot can be used in conjunction with the optional Model 1801 Nanovolt Pre-Amp for extended measurement range and sensitivity.

Accessories and companion products

- Model 2000-SCAN: 10-Channel Scanner
- Model 2001-SCAN: 10-Channel Scanner (with two high-speed channels)
- Model 2001-TCSCAN: 9-Channel Thermocouple Scanner
- Model 1801 Nanovolt Pre-Amp
- Model 7001: 2-slot Scanner Mainframe
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- More than 40 Series 7000 Switching Cards
- TestPoint® Test Development Software
- Model KPC-488.2 and KPC-488.2AT IEEE-488 Interfaces

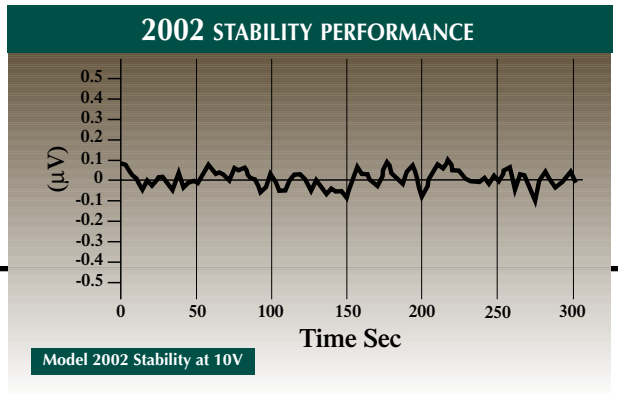
Applications

- Flexible benchtop testing
- High-speed production testing
- Multipoint scan/measure solution with optional plug-in cards

Model 2002 8½-Digit Multimeter
High precision for production test

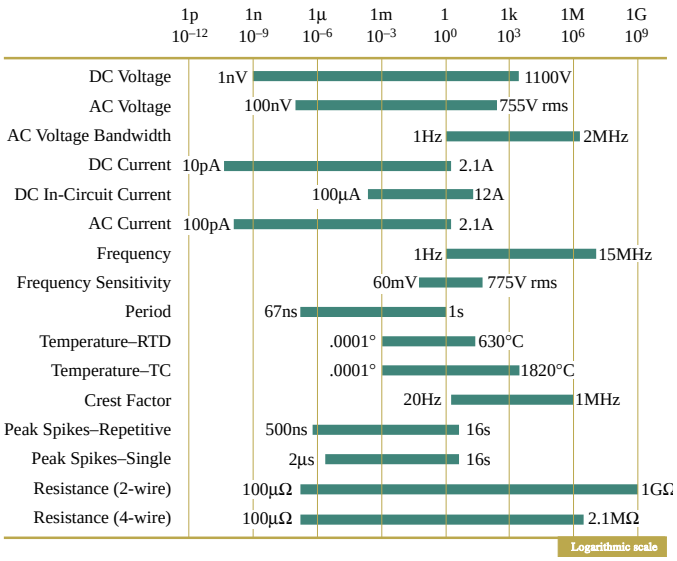
The Model 2002 8½-Digit Multimeter offers all the capabilities any system integrator could want when designing a production test system for high-precision components. It starts with all the capabilities of the Model 2001, then adds an extra decade of resolution and broader DC voltage, temperature, and resistance measurement ranges. An "open lead" detection function makes it easy to identify problems that could lead the system to pass components that should have failed a test. Built-in digital I/O capabilities and a pass/fail testing function simplify connecting it to a variety of handlers for fast, efficient device binning and sorting.

The Model 2002 offers a variety of advantages over other 8½-digit measurement instruments of comparable accuracy, particularly its DC volts and resistance measurement capabilities. For example, its measurement performance is specified for a ±5°C environment, not a ±1°C environment like many others, and its performance is specified for a wide range of measurement speeds. Also, it does not require a daily re-calibration to stay in spec. That makes it ideal for high-accuracy production test applications, because it's not restricted to the tightly controlled confines of the cal lab, as many other high resolution DMMs are. And unlike other 8½-digit meters that must make 4-wire resistance measurements in two phases, the Model 2002 performs them in a single phase, so it can measure twice as fast for a given power line cycle rate. This one-phase technique also eliminates errors due to changing lead resistances that can result from moving test fixtures.



The ability to track reading trends around a target value easily can be just as important as the accuracy of the absolute readings. The Model 2002, like the 2001, offers a bar-graph display

2002 MEASUREMENT RANGE



function that indicates data as a percentage of the selected range from ±0.01% to ±100%. Whether adjusting about zero or any other desired value, this display can replace a nulling differential voltmeter. Two other bar graph displays provide a quick review of data by clearly showing absolute values or high- low limits. The bar-graph updates quickly—20 times/second—so it's well suited for monitoring fast-moving signals.

Answers, not just data

A variety of built-in mathematical calculation capabilities make it easy to retrieve useful information directly from the Model 2002, without the need to transfer raw data to the computer for analysis. Single measurement calculation functions available via the front panel "MATH" key include the measurement of a value as a percentage of a pre-defined target and traditional mX+b scaling, which is often useful in linearizing a sensor's output. Statistical calculation can be performed on a number of buffered sequential measurements, including the sample's arithmetic mean, standard deviation, as well as maximum and minimum values. When the two high-speed, solid-state channels of the Model 2001-SCAN scanner card are used, the Model 2002 can also calculate the ratio or compute the difference between two inputs.

MEASUREMENT FUNCTIONS

- DCV
- ACV (peak, avg., and rms)
- DCI
- ACI (avg. and rms)
- 2WΩ
- 4WΩ
- AC+DCV (peak, avg. and rms)
- AC+DCI (peak, avg. and rms)
- Frequency
- Period
- dB, dBm
- Crest factor measurement
- Peak spikes (high and low)
- Time stamp
- DC in-circuit current
- Temperature (TCs and RTDs)

Designed for compatibility

The Model 2002 is also designed to simplify instrumentation upgrades and replacements to existing test systems. In addition to compliance with IEEE-488.2 and SCPI standards, a built-in language emulation mode allows the Model 2002 to respond to commands developed for the HP 3458A DMM, minimizing the need for control program modifications when upgrading test systems.

Dual function option slot

In addition to operating as a 10-channel scanner mainframe, the Model 2002's back panel option slot can be used in conjunction with the optional Model 1801 Nanovolt Pre-Amp for extended measurement range and sensitivity.

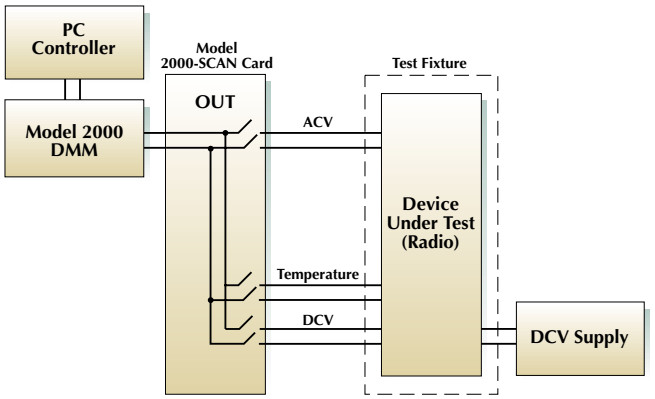
Accessories and companion products

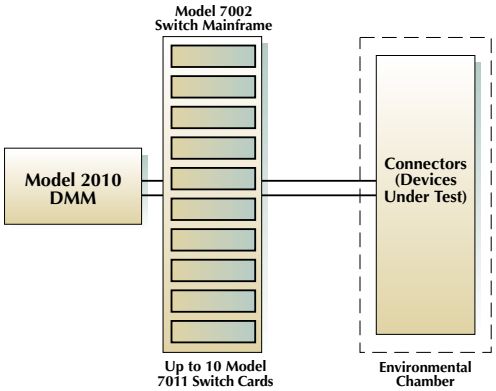
- Model 2000-SCAN: 10-Channel Scanner
- Model 2001-SCAN: 10-Channel Scanner (with two high-speed channels)
- Model 2001-TCSCAN: 9-Channel Thermocouple Scanner
- Model 1801 Nanovolt Pre-Amp
- Model 7001: 2-slot Scanner Mainframe
- Model 7002: 10-slot Scanner Mainframe
- More than 40 Series 7000 Switching Cards
- TestPoint® Test Development Software
- Model KPC-488.2 and KPC-488.2AT IEEE-488 Interfaces

Applications

- Production testing of precision components such as resistors, voltage references, D/A and A/D converters
- Design verification

A Variety of Applications from Engineering...





Model 2000 — Automotive radio testing

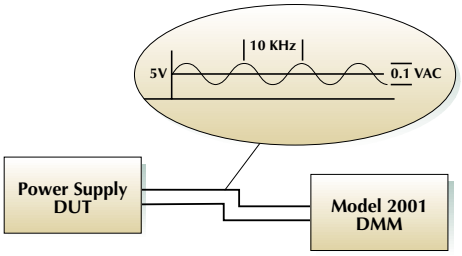
When used with one of the Series 2000 plug-in scanner cards, the Model 2000's unique combination of exceptional measurement speed, accuracy, and low cost make it the basis for an ideal mini-system for multi-point production testing. Manufacturers of automotive radios use the Model 2000 in test systems to make precision DC measurements, audio band AC measurements including amplitude and frequency, as well as measuring the radio's temperature during life-cycle environmental testing. With the addition of a computer controller, power supply and test fixture, the Model 2000 and the scanner card provide all the measurement and switching capabilities the application requires.

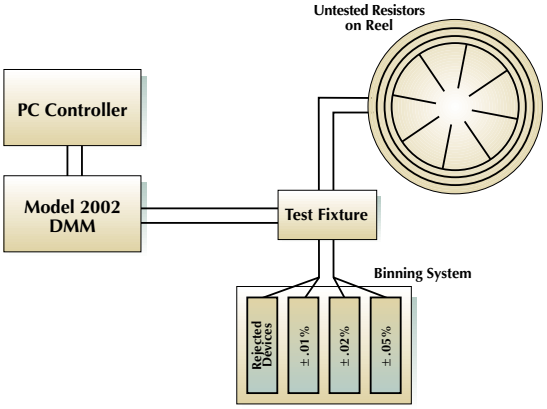
Model 2010 — Low-level resistance testing

The Model 2010's unique combination of resistance measurement capabilities makes it particularly useful for low resistance test applications, such as testing the long-term reliability of electrical connectors. First, with an ohms measurement range from 1μΩ to 120MΩ, the Model 2010 ensures more precise low-level readings. During production testing of low-ohms components, device self-heating is kept to a minimum because resistance measurements can be made with source current as low as 100μA, an order of magnitude lower than other DMMs allow, which ensures more accurate results. This low-power ohms measurement capability makes the 2010 ideal for end-of-life contact testing per ASTM B539-90.

During resistance testing, precise control of the test voltage is essential to avoid puncturing any oxides or films that may have formed on contacts and connectors. With a typical DMM, the open circuit voltage may rise as high as 5V, destroying the DUT or invalidating the test. The Model 2010's dry circuit test mode clamps the open circuit voltage at 20mV to prevent these punctures and ensure the measurement derived reflects the "in-use" resistance. The offset compensated ohms function eliminates thermal effects from cabling and connections that can introduce errors in low-level resistance measurements.

...To High-Speed Production Testing





Model 2001— Power supply monitoring

The Model 2001's multiple display capability makes it easy to gather several pieces of information simultaneously from different aspects of a single signal. For example, one of the Model 2001's displays is especially well-suited for power supply monitoring because it shows the DC voltage of the supply's output, the AC noise level, and the frequency of that noise all at once. Displaying the DC voltage and the frequency of the AC ripple at once makes it simpler to track down the source of the noise and correct it.

The Model 2001's Trigger-Link capability is especially useful for production testing because it acts as a mini trigger controller, capable of controlling the input and output triggers of up to three instruments at once. This flexible triggering model, combined with the Model 2001's exceptional voltage measurement capabilities, makes it suitable for building high-speed, high-accuracy test systems, complete with sourcing and switching hardware.

Model 2002 — Production testing of precision resistors

The Model 2002's unique one-phase 4-wire ohms measurement capability makes it a good choice for applications such as high-speed production testing of precision resistors. Two high and two low limits can be tied to the status of any of four protected digital outputs, so the Model 2002 can be used to sort or grade the resistors automatically after testing. For incoming or outgoing QA tests on small samples, the front panel bar graph display makes it easy to determine the tolerances of individual resistors.

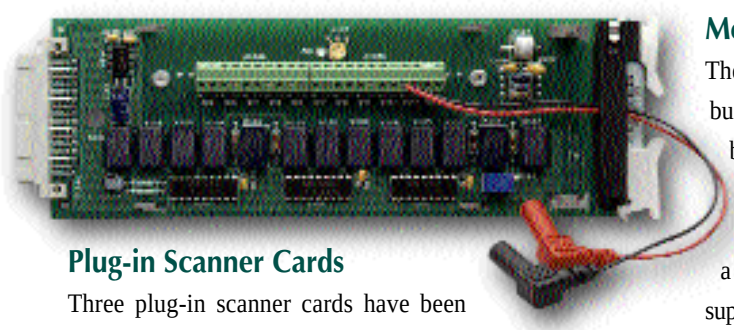
Building Blocks for a Comprehensive Test System Solution

Signal Switching Options

Choosing the right switching system is often the key to measurement integrity and high productivity in production testing for electronic components, subassemblies, and systems. However, given the limited space available in many test racks, system builders must find switching hardware that combines high performance with high switching density. Keithley's Applications Engineers can help you determine the most appropriate switching configuration for your testing application.

Model 7001 80-Channel or Model 7002 400-Channel Switch System

The 7001 and 7002 complement Series 2000 DMMs when building multi-point test systems, such as those for testing battery-powered portable devices like pagers and cellular phones. The Model 7001 High Density Switch System takes up only a half-rack space and has two slots that will accept a wide variety of switching cards for signals up to 1.8 GHz. It supports twice as many channels (80) in half the space of typical switching systems. Similarly, the ten-slot Model 7002 Switch Mainframe will support up to 400 2-pole multiplexer channels or 400 matrix crosspoints, with a unique interactive front panel channel status display. Both mainframes are compatible with more than 40 Keithley switching cards, including many types of multiplexer, matrix, multi-channel relay, thermocouple, scanner, universal adapter, and RF cards.



Plug-in Scanner Cards

Three plug-in scanner cards have been designed specifically for use with Series 2000 DMMs. To create a multipoint test and measurement system that's well suited to applications involving up to ten measurement points, simply insert the appropriate card in the option slot on the DMM's back panel. Combining scan and measure capabilities in a single instrument reduces the need for extra equipment, eliminates complexities of triggering, timing and processing issues, and reduces test time significantly.

Building Blocks for a Comprehensive Test System Solution

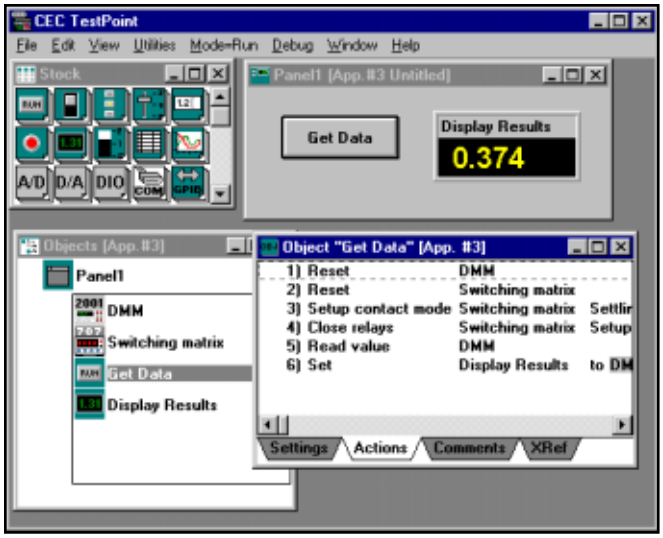
Extended System Capabilities

Model KPC-288.2 and KPC-488.2AT GPIB Interfaces

These interface boards are designed to simplify building PC-controlled test systems. Both boards are compatible with all IEEE-488 instruments, including those that use Standard Commands for Programmable Instruments.

Model 1801 Nanovolt Pre-Amp

The Model 1801 amplifies extremely low-level signals, extending the range and sensitivity of Model 2001 and 2002 DMMs. It combines a variety of measurement functions, including DCV, ACV rms, 4-wire ohms, frequency, and temperature. The remote preamp architecture isolates the Model 1801's sensitive "chopper-type" amplification circuitry, allowing users to locate the unit close to the test set-up and keep test leads short, reducing interference. A nine-foot cable links the pre-amp unit to a power supply card, which installs in the DMM's back panel option slot.



TestPoint® Test Development Software

TestPoint is a multi-tasking, object-oriented software package that simplifies creating custom test, measurement and data acquisition applications in the Microsoft Windows® environment without using conventional programming techniques. It's the only applications development package that combines IEEE-488, RS-232, and RS-485 instrument control capabilities with support for a broad range of data acquisition boards. More than 240 Instrument Driver Libraries simplify control of a wide range of instruments, including the Series 2000 DMMs. TestPoint also offers wide flexibility, providing full access to external subroutines written using conventional programming languages.

2000 Condensed Specifications

DC Volts

RANGE	RESOLUTION	INPUT RESISTANCE	ACCURACY ± (ppm of reading + ppm of range) 24 Hours	90 Days	1 Year
100.0000 mV	0.1 µV	>10 GΩ	30 + 30	40 + 35	50 + 35
1.000000 V	1.0 µV	>10 GΩ	15 + 6	25 + 7	30 + 7
10.00000 V	10 µV	>10 GΩ	15 + 4	20 + 5	30 + 5
100.0000 V	100 µV	10 MΩ	15 + 6	30 + 6	45 + 6
1000.000 V	1 mV	10 MΩ	20 + 6	35 + 6	45 + 6

AC Volts Accuracy

(TRMS), Max. 5:1 crest factor at full scale for inputs > 5% of range. Accuracy: ±(% of reading + % of range), 1 Year, 23°C ± 5°C (all ranges)

RANGE	RESOLUTION	3Hz–10Hz	10Hz–20kHz	20kHz–50kHz	50kHz–100kHz	100kHz–300kHz
200 mV	0.1 µV	0.35 + 0.03	0.06 + 0.03	0.11 + 0.05	0.6 + 0.08	4 + 0.5
2 V	1 µV	0.35 + 0.03	0.06 + 0.03	0.11 + 0.05	0.6 + 0.08	4 + 0.5
20 V	10 µV	0.35 + 0.03	0.06 + 0.03	0.11 + 0.05	0.6 + 0.08	4 + 0.5
200 V	100 µV	0.35 + 0.03	0.06 + 0.03	0.12 + 0.05	0.6 + 0.08	4 + 0.5
750 V	1 mV	0.35 + 0.03	0.06 + 0.03	0.12 + 0.05	0.6 + 0.08	4 + 0.5

Resistance

RANGE	RESOLUTION	TEST CURRENT	ACCURACY ± (ppm of reading + ppm of range) 24 Hours	90 Days	1 Year
100.0000 Ω	100 µΩ	1 mA	30 + 30	80 + 40	100 + 40
1.000000 kΩ	1 mΩ	1 mA	20 + 6	80 + 10	100 + 10
10.00000 kΩ	10 mΩ	100 µA	20 + 6	80 + 10	100 + 10
100.0000 kΩ	100 mΩ	10 µA	20 + 6	80 + 10	100 + 10
1.000000 MΩ	1 Ω	10 µA	20 + 6	80 + 10	100 + 10
10.00000 MΩ	10 Ω	700 nA	150 + 6	200 + 10	400 + 10
100.0000 MΩ	100 Ω	700 nA	800 + 30	1500 + 30	1500 + 30

DC Current

RANGE	RESOLUTION	MAX. BURDEN VOLTAGE	ACCURACY ± (ppm of reading + ppm of range) 24 Hours	90 Days	1 Year
10 mA	10 nA	< 0.15 V	60 + 15	300 + 40	500 + 40
100 mA	100 nA	< 0.03 V	100 + 50	300 + 400	500 + 400
1 A	1 µA	< 0.3 V	200 + 15	500 + 40	800 + 40
3 A	10 µA	< 1 V	1000 + 10	1200 + 15	1200 + 15

AC Current

(TRMS), Max. 5:1 crest factor at full scale for inputs > 5% of range. Accuracy: ±(% of reading + % of range), 1 Year, 23°C ± 5°C (all ranges)

RANGE	RESOLUTION	3Hz–10kHz	10Hz–5kHz
1.000000 mV	1 µV	0.30 + 0.04	0.10 + 0.04
3.000000 V	10 µV	0.35 + 0.06	0.15 + 0.06

Diode Test

RANGE	TEST CURRENT
3V	1m A
10V	10 µA, 100 µA

Frequency and Period

ACV RANGE	FREQUENCY RANGE	PERIOD RANGE	RESOLUTION ± (ppm of rdg.)	ACCURACY (90 Day to 1 Year) ± (ppm of rdg.)
100 mV	3 Hz	333 ms		
to	to	to	0.3	0.01
750 v	300 kHz	2 µs		

Temperature (Thermocouple)

TYPE	RANGE	RESOLUTION	ACCURACY (using 2001-TSCAN)
J	-200° C to +760°C	0.001°C	± 0.65°C
K	-200° C to +1372°C	0.001°C	± 0.70°C
T	-200° C to +400°C	0.001°C	± 0.68°C

General Information

MATH FUNCTIONS: Null, Limit, and Min/Max/Avg/Std Dev of stored readings

DATA STORAGE: Selectable up to 1024 readings max.

STANDARD PROGRAMMING LANGUAGES: SCPI, Fluke 8840A/8842A, Keithley 199/196.

INTERFACES: IEEE-488 and RS-232.

POWER SUPPLY: 100V / 120V / 220V / 240V.

LINE FREQUENCY: 45Hz to 66Hz and 360Hz to 400Hz.

POWER CONSUMPTION: 22VA.

OPERATING ENVIRONMENT: Specified for 0°C to 50°C
Specified to 80% R.H. at 35°C

STORAGE ENVIRONMENT: -40°C to 70°C.

WARRANTY: 3 years.

PHYSICAL: Case Dimensions: 89mm × 213mm wide × 370mm deep.
(3½ in × 8⅜ in × 14⅝ in).
Unit Weight: 2.9kg (6 lbs 3 oz).

STANDARDS: Safety: Designed to CSA, UL-1244, IEC-1010.
EMI: Conforms to VDE 0871B (per Vfg 1046/1984).
Meets FCC part 15 class B. Conforms to CISPR22, EN-5504.
ESD: Conforms to IEC-801-2.

2010 Condensed Specifications

DC Volts

RANGE	RESOLUTION	INPUT RESISTANCE	ACCURACY ± (ppm of reading + ppm of range) 24 Hours	90 Days	1 Year	2 Years
100.00000 mV	10 nV	>10 GΩ	10 + 9	25 + 9	37 + 9	50 + 10
1.0000000 V	100 nV	>10 GΩ	7 + 2	18 + 2	25 + 2	32 + 2
10.000000 V	1 µV	>10 GΩ	7 + 4	18 + 4	24 + 4	32 + 4
100.00000 V	10 µV	10 MΩ	10 + 4	25 + 5	35 + 6	52 + 5
1000.0000 V	100 µV	10 MΩ	17 + 6	31 + 6	41 + 6	55 + 6

AC Volts Accuracy

(TRMS), Max. 5:1 crest factor at full scale for inputs > 5% of range. Accuracy: ±(% of reading + % of range), 1 Year, 23°C ± 5°C (all ranges)

RANGE	RESOLUTION	3Hz–10Hz	10Hz–20kHz	20kHz–50kHz	50kHz–100kHz	100kHz–300kHz
200 mV	0.1 µV	0.35 + 0.03	0.06 + 0.03	0.11 + 0.05	0.6 + 0.08	4 + 0.5
2 V	1 µV	0.35 + 0.03	0.06 + 0.03	0.11 + 0.05	0.6 + 0.08	4 + 0.5
20 V	10 µV	0.35 + 0.03	0.06 + 0.03	0.11 + 0.05	0.6 + 0.08	4 + 0.5
200 V	100 µV	0.35 + 0.03	0.06 + 0.03	0.12 + 0.05	0.6 + 0.08	4 + 0.5
750 V	1 mV	0.35 + 0.03	0.06 + 0.03	0.12 + 0.05	0.6 + 0.08	4 + 0.5

Resistance

RANGE	RESOLUTION	TEST CURRENT	ACCURACY ± (ppm of reading + ppm of range) 24 Hours	90 Days	1 Year	2 Years
10.000000 Ω	1 µΩ	10 mA	15 + 9	40 + 9	60 + 9	100 + 10
100.00000 Ω	10 µΩ	1 mA	15 + 9	36 + 9	52 + 9	90 + 10
1.0000000 kΩ	100 mΩ	1 mA	15 + 2	33 + 2	50 + 2	80 + 2
10.000000 kΩ	1 mΩ	100 µA	15 + 2	32 + 2	50 + 2	80 + 2
100.00000 kΩ	10 mΩ	10 µA	15 + 2	40 + 2	70 + 2	120 + 2
1.0000000 MΩ	100 mΩ	10 µA	20 + 3	50 + 4	70 + 4	125 + 4
10.000000 MΩ	1 Ω	640 nA // 10MΩ	150 + 2	200 + 4	400 + 4	500 + 4
100.00000 MΩ	10 Ω	640 nA // 10MΩ	800 + 4	1500 + 4	1500 + 4	1800 + 4
10.000000 Dry Circuit	10 µΩ	1 mA / 20 mV max.	25 + 90	50 + 90	70 + 90	120 + 90
100.00000 Dry Circuit	100 µΩ	100 µA / 20 mV max.	25 + 90	50 + 90	70 + 90	120 + 90

DC Current

RANGE	RESOLUTION	MAX. BURDEN VOLTAGE	ACCURACY ± (ppm of reading + ppm of range) 24 Hours	90 Days	1 Year	2 Years
10.000000 mA	1 nA	< 0.15 V	60 + 15	300 + 40	500 + 40	740 + 40
100.00000 mA	10 nA	< 0.18 V	100 + 15	300 + 40	500 + 40	740 + 40
1.0000000 A	100 nA	< 0.35 V	200 + 15	500 + 40	800 + 40	1200 + 40
3.000000 A	1 µA	< 1 V	1000 + 10	1200 + 15	1200 + 15	1800 + 15

AC Current

(TRMS), Max. 5:1 crest factor at full scale for inputs > 5% of range. Accuracy: ±(% of reading + % of range), 1 Year, 23°C ± 5°C (all ranges)

RANGE	RESOLUTION	3Hz –10Hz	10Hz–5kHz
1.000000 mV	1 µV	0.30 + 0.04	0.10 + 0.04
3.000000 V	10 µV	0.35 + 0.06	0.15 + 0.06

Frequency and Period Characteristics

ACV RANGE	FREQ. RANGE	PERIOD RANGE	GATE TIME	RESOLUTION ± (ppm of rdg.)	ACCURACY (90 Day to 1 Year) ± (ppm of rdg.)
100 mV	3 Hz	333 ms			
to	to	to	1 s	0.3	0.01
750 v	500 kHz	2 µs			

DC Noise Performance

RATE	DIGITS	10 sec.	2 min.	10 sec.	2 min.	NMRR	CMRR
5 PLC	7½	100 nV	110 nV	1.1 µV	1.2 µV	60 dB	140 dB
5 PLC	6½	120 nV	125 nV	1.3 µV	1.4 µV	60 dB	140 dB
0.1 PLC	5½	1.5 µV	1.6 µV	11 µV	11.5 µV	—	80 dB
0.1 PLC	4½	3.0 µV	2.9 µV	135 µV	139 µV	—	80 dB

General Information

POWER SUPPLY: 100V / 120V / 220V / 240V ±10%.

LINE FREQUENCY: 45Hz to 66Hz and 360Hz to 400Hz, automatically sensed at power-up.

POWER CONSUMPTION: 22VA.

OPERATING ENVIRONMENT: Specified for 0°C to 50°C. Specified to 80% R.H. at 35°C

STORAGE ENVIRONMENT: -40°C to 70°C.

WARRANTY: 3 years.

SAFETY: Designed to UL-3111-1, IEC-1010-1.

EMC: Complies with European Union Directive 89/336/EEC (CE marking requirements), FCC part 15 class B, CTSPR 11, IEC 801-2, IEC 801-3, IEC 801-4.

VIBRATION: MIL-T-28800E Type III, Class 5.

WARMUP: 2 hours to rated accuracy.

2001 Condensed Specifications

DC Volts

RANGE	FULL SCALE	RESOLUTION	DEFAULT RESOLUTION	INPUT RESISTANCE	ACCURACY ± (ppm of reading + ppm of range) 5 Minutes	24 Hours	90 Days	1 Year	2 Years
200 mV	±210.00000	10 nV	100 nV	>10 GΩ	3 + 3	10 + 6	25 + 6	37 + 6	50 + 6
2 V	±2.1000000	100 nV	1 µV	>10 GΩ	2 + 1.5	7 + 2	18 + 2	25 + 2	32 + 2
20 V	±21.000000	1 µV	10 µV	>10 GΩ	2 + 1.5	7 + 4	18 + 4	24 + 4	32 + 4
200 V	±210.00000	10 µV	100 µV	10 MΩ ±1%	2 + 1.5	13 + 3	27 + 3	38 + 3	52 + 3
1000 V	±1100.0000	100 µV	1 mV	10 MΩ ±1%	10 + 1.5	17 + 6	31 + 6	41 + 6	55 + 6

AC Volts Accuracy

(Normal Mode–TRMS), Low Freq. mode extends down to 1Hz; Peak AC, dB, AC+DC modes also included.
90 Days, ±2°C from last AC self-cal for 1% to 100% of range ±(% of reading + % of range)

RANGE	20–50Hz	50–100Hz	0.1–2kHz	2–10kHz	10–30kHz	30–50kHz	50–100kHz	100–200kHz	0.2–1MHz	1–2MHz
200 mV	0.25 + 0.015	0.07 + 0.015	0.03 + 0.015	0.03 + 0.015	0.035 + 0.015	0.05 + 0.015	0.17 + 0.015	0.5 + 0.025	2 + 0.1	5 + 0.2
2 V	0.25 + 0.015	0.07 + 0.015	0.03 + 0.015	0.03 + 0.015	0.035 + 0.015	0.05 + 0.015	0.17 + 0.015	0.5 + 0.025	2 + 0.1	5 + 0.2
20 V	0.25 + 0.015	0.07 + 0.015	0.04 + 0.015	0.06 + 0.015	0.08 + 0.015	0.1 + 0.015	0.17 + 0.015	0.5 + 0.025	4 + 0.2	7 + 0.2
200 V	0.25 + 0.015	0.07 + 0.015	0.04 + 0.015	0.06 + 0.015	0.08 + 0.015	0.1 + 0.015	0.17 + 0.015	0.5 + 0.025	4 + 0.2	
750 V	0.25 + 0.015	0.1 + 0.015	0.08 + 0.015	0.09 + 0.015	0.12 + 0.015	0.15 + 0.015	0.5 + 0.015			

Resistance

RANGE	FULL SCALE	RESOLUTION	CURRENT SOURCE	ACCURACY ± (ppm of reading + ppm of range) 24 Hours	90 Days	1 Year	2 Years
20 Ω	21.000000	1 µΩ	9.2 mA	29 + 7	52 + 7	72 + 7	110 + 7
200 Ω	210.00000	10 µΩ	0.98 mA	24 + 7	36 + 7	56 + 7	90 + 7
2 kΩ	2100.0000	100 µΩ	0.98 mA	22 + 4	33 + 4	50 + 4	80 + 4.5
20 kΩ	21.000000	1 mΩ	89 µA	19 + 4	32 + 4	50 + 4	80 + 4.5
200 kΩ	210.00000	10 mΩ	7 µA	20 + 4.5	72 + 4.5	90 + 4.5	130 + 5
2 MΩ	2.1000000	100 mΩ	770 nA	50 + 4.5	110 + 4.5	160 + 4.5	230 + 5
20 MΩ	21.000000	1 Ω	70 nA	160 + 4.5	560 + 4.5	900 + 4.5	1100 + 5
200 MΩ	210.00000	10 Ω	4.4 nA	3000 + 100	10000 + 100	20000 + 100	30000 + 100
1 GΩ	1.0500000	100 Ω	4.4 nA	9000 + 100	20000 + 100	40000 + 100	60000 + 100

DC Amps

RANGE	FULL SCALE	RESOLUTION	MAXIMUM BURDEN VOLTAGE	ACCURACY ± (ppm of reading + ppm of range) 24 Hours	90 Days	1 Year	2 Years
200 µA	210.00000	10 pA	0.25 V	63 + 25	300 + 25	500 + 25	1350 + 25
2 mA	2.1000000	100 pA	0.31 V	64 + 20	300 + 20	400 + 20	750 + 20
20 mA	21.000000	1 nA	0.4 V	65 + 20	300 + 20	400 + 20	750 + 20
200 mA	210.00000	10 nA	0.5 V	96 + 20	300 + 20	500 + 20	750 + 20
2 A	2.1000000	100 nA	1.5 V	500 + 20	600 + 20	900 + 20	1350 + 20

AC Amps Accuracy

90 Days, 1 Year or 2 Years, TCAL ±5°C, for 5% to 100% of range, ± % of reading + % of range)

RANGE	20Hz – 50Hz	50Hz – 200Hz	200Hz – 1kHz	1kHz – 10kHz	10kHz – 30kHz	30kHz – 50kHz	50kHz – 100kHz
200 µA	0.35 + 0.015	0.2 + 0.015	0.4 + 0.015	0.5 + 0.015			
2 mA	0.3 + 0.015	0.15 + 0.015	0.12 + 0.015	0.12 + 0.015	0.25 + 0.015	0.3 + 0.015	0.5 + 0.015
20 mA	0.2 + 0.015	0.15 + 0.015	0.12 + 0.015	0.12 + 0.015	0.25 + 0.015	0.3 + 0.015	0.5 + 0.015
200 mA	0.3 + 0.015	0.15 + 0.015	0.12 + 0.015	0.15 + 0.015	0.5 + 0.015	1 + 0.015	3 + 0.015
2 A	0.35 + 0.015	0.2 + 0.015	0.3 + 0.015	0.45 + 0.015	1.5 + 0.015	4 + 0.015	

Frequency Counter

RANGE: 1Hz–15MHz.

ACCURACY: ±(0.03% of reading).

DC In-Circuit Current

RANGE: 100µA to 12A.

ACCURACY: ±(5% + 2 counts) over 2 years.

TRACE RESISTANCE: 1mΩ to 10Ω typical.

Temperature

Built-in linearization for J, K, T, E, R, S, B thermocouple types and 100Ω platinum RTDs DIN 43760 or IPTS-68.

For complete specifications, reference the 2001 Technical Data Book.

General/Standards Compliance

POWER

Voltage: 90–134V and 180–264V, universal self-selecting.
Frequency: 50Hz, 60Hz, or 400Hz self-identifying.
Consumption: <55 VA.

ENVIRONMENT

Operating Temperature: 0° to 50°C.
Storage Temperature: –40° to +70°C.
Humidity: 80% R.H., 0° to 35°C.
Altitude: 4,500m (15,000 ft) operating; 12,000m (40,000 ft.) non-operating.

PHYSICAL

Case Dimensions: 90mm high × 214mm wide × 369mm deep (3½ in × 8½ in × 14½ in).
Unit Weight: 4.2kg (9 lbs 3 oz).

STANDARDS

EMI/RFI: Conforms to VDE 0871B (per Vfg 1046/1984),IEC 801-2, FCC part 15 Class B, CISPR-22 (EN55022).
Safety: Conforms to IEC348, CAN/CSA-C22.2 No. 231, MIL-T-28800E1. Designed to UL1244.

2002 Condensed Specifications

DC Volts 10PLC, D_{FILT} 10

RANGE	FULL SCALE	RESOLUTION	INPUT RESISTANCE	ACCURACY ± (ppm of reading + ppm of range) Transfer	24 Hours	90 Days	1 Year	2 Years
200 mV	±210.000000	1 nV	>100 GΩ	0.4 + 1.5	3.5 + 3	15 + 8	19 + 9	23 + 10
2 V	±2.10000000	10 nV	>100 GΩ	0.2 + 0.15	1.2 + 0.3	6 + 0.8	10 + 0.9	14 + 1
20 V	±21.0000000	100 nV	>100 GΩ	0.1 + 0.05	1.2 + 0.1	6 + 0.15	10 + 0.15	14 + 0.15
200 V	±210.000000	1 µV	10 MΩ ±1%	0.5 + 0.08	5 + 0.4	14 + 2	22 + 2	30 + 2
1000 V	±1100.00000	10 µV	10 MΩ ±1%	1 + 0.05	5 + 0.08	14 + 0.4	22 + 0.4	30 + 0.4

AC Volts Accuracy

(Normal Mode–TRMS), Low Freq. mode extends down to 1Hz; Peak AC, dB, AC+DC modes also included.
90 Days, 1 Year or 2 Years, ±2°C from last AC self-cal for 1% to 100% of range, ±(% of reading + % of range)

RANGE	20–50Hz	50–100Hz	0.1–2kHz	2–10kHz	10–30kHz	30–50kHz	50–100kHz	100–200kHz	0.2–1MHz	1–2MHz
200 mV	0.25 + 0.015	0.07 + 0.015	0.02+ 0.01	0.02 + 0.01	0.025 + 0.01	0.05 + 0.01	0.17 + 0.015	0.5 + 0.025	2 + 0.1	5 + 0.2
2 V	0.25 + 0.015	0.07 + 0.015	0.02 + 0.01	0.02 + 0.01	0.025 + 0.01	0.05 + 0.01	0.17 + 0.015	0.5 + 0.025	2 + 0.1	5 + 0.2
20 V	0.25 + 0.015	0.07 + 0.015	0.03 + 0.015	0.04 + 0.015	0.05 + 0.015	0.07 + 0.015	0.17 + 0.015	0.5 + 0.025	4 + 0.2	7 + 0.2
200 V	0.25 + 0.015	0.07 + 0.015	0.03 + 0.015	0.04 + 0.015	0.05 + 0.015	0.07 + 0.015	0.17 + 0.015	0.5 + 0.025	4 + 0.2	
750 V	0.25 + 0.015	0.1 + 0.015	0.05 + 0.015	0.06 + 0.015	0.08 + 0.015	0.1 + 0.015	0.5 + 0.015			

Resistance 10PLC, Offset comp D_{FILT} 10

RANGE	FULLSCALE	CURRENT RESOLUTION	SOURCE	ACCURACY ± (ppm of reading + ppm of range) Transfer	24 Hours	90 Days	1 Year	2 Years
20 Ω	21.0000000	100 nΩ	7.2 mA	2.5 + 3	5 + 4.5	15 + 6	17 + 6	20 + 6
200 Ω	210.000000	1 µΩ	960 µA	2.5 + 2	5 + 3	15 + 4	17 + 4	20 + 4
2 kΩ	2100.00000	10 µΩ	960 µA	1.3 + 0.2	2.5 + 0.3	7 + 0.4	9 + 0.4	11 + 0.4
20 kΩ	21.0000000	100 µΩ	96 µA	1.3 + 0.2	2.5 + 0.3	7 + 0.4	9 + 0.4	11 + 0.4
200 kΩ	210.000000	1 mΩ	9.6 µA	2.5 + 0.4	4.5 + 0.5	17 + 0.8	21 + 0.9	25 + 1
2 MΩ	2.10000000	10 mΩ	1.9 µA	5 + 0.2	10 + 0.3	38 + 0.5	50 + 0.5	62 + 0.5
20 MΩ	21.0000000	100 mΩ	1.4 µA	15 + 0.1	50 + 0.2	175 + 0.6	250 + 0.6	300 + 0.6
200 MΩ	210.000000	1 Ω	1.4 µA	50 + 0.5	150 + 1	500 + 3	550 + 3	600 + 3
1 GΩ	1.05000000	10 Ω	1.4 µA	250 + 2.5	750 + 5	2000 + 15	2050 + 15	2100 + 15

DC Amps

RANGE	FULL SCALE	RESOLUTION	MAXIMUM BURDEN VOLTAGE	ACCURACY ± (ppm of reading + ppm of range) 24 Hours	90 Days	1 Year	2 Years
200 µA	210.00000	10 pA	0.25 V	50 + 6	275 + 25	350 + 25	500 + 25
2 mA	2.1000000	100 pA	0.3 V	50 + 5	275 + 20	350 + 20	500 + 20
20 mA	21.000000	1 nA	0.35 V	50 + 5	275 + 20	350 + 20	500 + 20
200 mA	210.00000	10 nA	0.35 V	75 + 5	300 + 20	375 + 20	525 + 20
2 A	2.1000000	100 nA	1.1 V	350 + 5	600 + 20	750 + 20	1000 + 20

AC Amps Accuracy

90 Days, 1 Year or 2 Years, TCAL ±5°C, for 5% to 100% of range, ± % of reading + % of range)

RANGE	20Hz – 50Hz	50Hz – 200Hz	200Hz – 1kHz	1kHz – 10kHz	10kHz – 30kHz	30kHz – 50kHz	50kHz – 100kHz
200 µA	0.35 + 0.015	0.2 + 0.015	0.4 + 0.015	0.5 + 0.015			
2 mA	0.3 + 0.015	0.15 + 0.015	0.12 + 0.015	0.12 + 0.015	0.25 + 0.015	0.3 + 0.015	0.5 + 0.015
20 mA	0.3 + 0.015	0.15 + 0.015	0.12 + 0.015	0.12 + 0.015	0.25 + 0.015	0.3 + 0.015	0.5 + 0.015
200 mA	0.3 + 0.015	0.15 + 0.015	0.12 + 0.015	0.15 + 0.015	0.5 + 0.015	1 + 0.015	3 + 0.015
2 A	0.35 + 0.015	0.2 + 0.015	0.3 + 0.015	0.45 + 0.015	1.5 + 0.015	4 + 0.015	

Frequency Counter

RANGE: 1Hz–15MHz.
ACCURACY: ± (0.03% of reading)

DC In-Circuit Current

RANGE: 100µA to 12A.
ACCURACY: ± (5% + 500µA), 1 year or 2 years.
TRACE RESISTANCE: 1mΩ to 10Ω.

Temperature

Built-in linearization for J, K, T, E, R, S, B thermocouple types and 100Ω platinum RTDs DIN43760, IPTS-68, and ITS-90.
For complete specifications, reference the 2002 Technical Data Book.

General/Standards Compliance

POWER

Voltage: 90–134V and 180–264V, universal self-selecting.
Frequency: 50Hz, 60Hz, or 400Hz self-identifying.
Consumption: <55 VA.

ENVIRONMENT

Operating Temperature: 0° to 50°C.
Storage Temperature: –40° to +70°C.
Humidity: 80% R.H., 0° to 35°C.
Altitude: 4,500m (15,000 ft) operating; 12,000m (40,000 ft.) non-operating.

PHYSICAL

Case Dimensions: 90mm high × 214mm wide × 369mm deep (3½ in × 8½ in × 14½ in).
Unit Weight: 4.2kg (9 lbs 3 oz).

STANDARDS

EMI/RFI: Conforms to VDE 0871B (per Vfg 1046/1984), IEC 801-2, FCC part 15 Class B, CISPR-22 (EN55022).
Safety: Conforms to IEC348, CAN/CSA-C22.2 No. 231, MIL-T-28800E1. Designed to UL1244.

2000 Series Selector Guide

Model	2000	2010	2001	2002
Maximum Display	1 200 000	12 000 000	20 500 000	205 000 000
Digits	4½ to ½	4½ to 7½	4½ to ½	4½ to 8½
Display	VFD	VFD	Dual-line VFD	Dual-line VFD
DC Volts				
Sensitivity	100 nV	1 nV	10 nV	1 nV
Maximum Reading	1000 V	1000 V	1100 V	1100 V
Basic Accuracy	0.002%	0.0018%	0.0018%	0.0006%
		Ratio	DC Peak Spikes	DC Peak Spikes
			Ratio Option	Ratio Option
AC Volts (TRMS)				
Sensitivity	100 nV	100 nV	100 nV	100 nV
Maximum Reading	750 V	750 V	775V (1100 V pk)	775V (1100 V pk)
Basic Accuracy	0.05%	0.05%	0.03%	0.02%
Bandwidth	3 Hz-300 kHz	3 Hz-300 kHz	1 Hz-2 MHz	1 Hz-2 MHz
Special Features	dB, dBm		Peak/Avg/RMS, dB, dBm	AC, AC+DC
Ohms (2/4 wire)				
Sensitivity	100 µΩ	1 µΩ	1 µΩ	100 nΩ
Maximum Reading	120 MΩ	120 MΩ	1 GΩ	1 GΩ
Basic Accuracy	0.008%	0.0032%	0.0032%	0.0007%
Special Features	Continuity Test, Diode Test	Continuity Test, Diode Test	Offset Comp, Constant Current	Offset Comp, Constant Current
		Offset Comp, Dry Circuit	Lead Res Meas	Open Src Detect, Lead Res Meas
DC Amps				
Sensitivity	10 nA	10 nA	10 pA	10 nA
Ranges	4 (10 mA-3A)	4 (10 mA-3A)	5 (200 µA-2A)	5 (200 µA-2A)
Basic Accuracy	0.03%	0.03%	0.03%	0.027%
Special Features			In Circuit Current	In Circuit Current
AC Amps (TRMS)				
Sensitivity	1 µA	1 µA	100 pA	100 pA
Ranges	2 (1 A-3A)	2 (1 A-3A)	5 (200 µA-2A)	5 (200 µA-2A)
Basic Accuracy	0.1%	0.1%	0.1%	0.1%
Bandwidth	3 Hz-5 kHz	3 Hz-5 kHz	20 Hz-100 kHz	20 Hz-100 kHz
General Features				
Interface	GPIB, RS-232	GPIB, RS-232	GPIB	GPIB
Reading Hold	Yes	Yes		
Digital I/O			Yes	Yes
Reading Memory	1024 readings	1024 readings	Opt to 30,000	Opt to 30,000
Trigger Latency	1 ms	1 ms	2 µs	2 µs
Temperature Measurement	T/C	T/C, RTD	T/C, RTD	T/C, RTD
Real Time Clock				Yes
Language Emulation	8840/42, 196/199	KI 196/199		HP 3458A

All 2000 Series meters contain the following features: 10 channel scanner option, Rel/Null capability, Pass/Fail capability, Math function (mX+b, Min, Max, Avg, Std Dev), Frequency/Period Meas, Auto/Manual Ranging on all functions, Full programmability, SPCI Language, Front/Rear inputs, Trigger-Link, Digital Calibration-bus or front panel, 3 year Warranty.

Specifications subject to change without notice. All trademarks are the property of their respective companies.

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