The Model 2000 6½-Digit Multimeter is part of Keithley’s family of high performance DMMs. Based on the same high speed, low noise A/D converter technology as the Model 2001 and 2002, the 2000 is a fast, accurate, and highly stable instrument that’s as easy to operate as it is to afford. It combines broad measurement ranges with superior accuracy specifications — DC voltage from 100nV to 1kV (with 0.002% 90-day basic accuracy) and DC resistance from 100µΩ to 100MΩ (with 0.008% 90-day basic accuracy). Optional switch cards enable multiplexing up to 20 different input signals for multipoint measurement applications.

**High Throughput**

The 2000 offers exceptional measurement speed at any resolution. At 6½ digits, it delivers 50 triggered rdgs/s over the IEEE-488 bus. At 4½ digits, it can read up to 2000 rdgs/s into its internal 1024 reading buffer, making it an excellent choice for applications where throughput is critical.

For benchtop or stand-alone applications, the 2000 has a front panel design that’s simple to understand and easy to use. The 2000 has 13 built-in measurement functions, including DCV, ACV, DCI, ACI, 2W, 4W, temperature, frequency, period, dB, dBm, continuity measurement, and diode testing. A built-in RS-232 interface connects to a notebook or full-sized PC’s serial port to take, store, process, and display measurements automatically.

### ACCESSORIES AVAILABLE

- **2000-SCAN** 10-channel, General-Purpose Scanner Card
- **2001-SCAN** 10-channel Scanner Card with two high-speed channels
- **2001-TSCAN** 9-channel, Thermocouple Scanner Card with built-in cold junction

### CABLES/ADAPTERS

- 7007-1 Shielded IEEE-488 Cable, 1m (3.3 ft)
- 7007-2 Shielded IEEE-488 Cable, 2m (6.6 ft)
- 7009-5 RS-232 Cable

### RACK MOUNT KITS

- 4288-1 Single Fixed Rack Mount Kit
- 4288-2 Dual Fixed Rack Mount Kit

### GPIB INTERFACES

- KPCI-488LPA IEEE-488 Interface/Controller for the PCI Bus
- KUSB-488A IEEE-488 USB-to-GPIB Interface Adapter

### SERVICES AVAILABLE

- **2000-SCAN-3Y-EW** 1-year factory warranty extended to 3 years from date of shipment
- **2000-3Y-EW** 1-year factory warranty extended to 3 years from date of shipment
- **2001-TSCAN-3Y-EW** 1-year factory warranty extended to 3 years from date of shipment
- C/2000-3Y/ISO 3 (ISO-17025 accredited) calibrations within 3 years of purchase for Models 2000, 2000-SCAN*
- C/2001-3Y/ISO 3 (ISO-17025 accredited) calibrations within 3 years of purchase for Model 2001-TSCAN*

*Not available in all countries
Optional Multiplexer Cards

Creating a self-contained multipoint measurement solution is as simple as plugging a scanner card into the option slot on the 2000’s back panel. This approach eliminates the complexities of triggering, timing, and processing issues and helps reduce test time significantly. For applications involving more than 10 measurement points, the 2000 is compatible with Keithley’s Series 7000 switch matrices and cards.

Model 2000-SCAN Scanner Card
- Ten analog input channels (2-pole)
- Configurable as 4-pole, 5-channel

Model 2001-SCAN Scanner Card
- Ten analog input channels
- Two channels of 2-pole, high-speed, solid-state switching

Model 2001-TCSCAN Thermocouple Scanner Card
- Nine analog input channels
- Built-in temperature reference for thermocouple cold-junction compensation
**6½-Digit Multimeter**

**DC Characteristics**

**Conditions:**
- MED (1 PLC)\(^1\) or SLOW (10 PLC)
- or MED (1 PLC) with filter of 10

<table>
<thead>
<tr>
<th>Function</th>
<th>Range</th>
<th>Resolution</th>
<th>Current or Burden Voltage</th>
<th>Input Resistance</th>
<th>Test Current or Burden Voltage</th>
<th>Input Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>100.0000 mV</td>
<td>0.1 μV</td>
<td>&gt; 10 GΩ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.00000 V</td>
<td>10 μV</td>
<td>&gt; 10 GΩ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.0000 V</td>
<td>10 μV</td>
<td>&gt; 10 GΩ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>100.000 V</td>
<td>100 μV</td>
<td>10 MΩ ±1%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1000.000 V(^7)</td>
<td>1 mV</td>
<td>10 MΩ ±1%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Resistance | 100.000 Ω     | 100 μΩ     | 1 mA                      | 50 + 30           | 1000 + 40                   | 50 + 30           |
|            | 1.00000 kΩ    | 1 mΩ       | 1 mA                      | 20 + 6            | 1000 + 10                   | 50 + 10           |
|            | 10.0000 kΩ    | 10 mΩ      | 100 μA                    | 20 + 6            | 1000 + 10                   | 50 + 10           |
|            | 1.00000 MΩ    | 1 Ω        | 10 μA                    | 20 + 6            | 1000 + 10                   | 50 + 10           |
|            | 10.0000 MΩ\(^{15}\) | 10 Ω 700 nA/10 MΩ | 150 + 6 200 + 10 400 + 10 | 70 + 10 |
|            | 100.0000 MΩ\(^{15}\) | 100 Ω 700 nA/10 MΩ | 800 + 30 1500 + 30 1500 + 30 | 385 + 1 |

| Current    | 10.0000 mA    | 10 mA      | <0.15 V                    | 60 + 30           | 1000 + 40                   | 50 + 10           |
|            | 100.000 mA    | 100 mA     | <0.03 V                    | 100 + 300         | 1000 + 10                   | 50 + 50           |
|            | 1.00000 A     | 1 μA       | <0.3 V                     | 200 + 30          | 1000 + 10                   | 50 + 50           |
|            | 10.0000 A     | 10 μA      | <1 V                       | 1000 + 15         | 1200 + 40                   | 50 + 50           |

| Continuity 2W | 1 kΩ 100 Ω | 1 mA | 20 + 6 30 + 7 40 + 7 | 8 + 1 |
| Diode Test   | 5.0000 V    | 10 μV | 100 μA | 20 + 6 30 + 7 40 + 7 | 8 + 1 |
|              | 10.0000 V   | 10 μV | 100 μA | 20 + 6 30 + 7 40 + 7 | 8 + 1 |

**SPEED AND NOISE REJECTION**

<table>
<thead>
<tr>
<th>Rate</th>
<th>Readings/s</th>
<th>Digits</th>
<th>RMS Noise 10V</th>
<th>NMRR (^{12})</th>
<th>CMRR (^{13})</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 PLC</td>
<td>5</td>
<td>6½</td>
<td>&lt;1.5 μV</td>
<td>60 dB</td>
<td>140 dB</td>
</tr>
<tr>
<td>1 PLC</td>
<td>50</td>
<td>6½</td>
<td>&lt;4 μV</td>
<td>60 dB</td>
<td>140 dB</td>
</tr>
<tr>
<td>0.1 PLC</td>
<td>500</td>
<td>5½</td>
<td>&lt;22 μV</td>
<td>—</td>
<td>80 dB</td>
</tr>
<tr>
<td>0.01 PLC</td>
<td>2000</td>
<td>4½</td>
<td>&lt;150 μV</td>
<td>—</td>
<td>80 dB</td>
</tr>
</tbody>
</table>

**DC NOTES**

1. Add the following to ppm of range accuracy specification based on range: 1V and 100V, 2ppm; 100mV, 15ppm; 1000V, 15ppm; <1MΩ, 2ppm; 10mA and 1A, 2ppm; 100mA, 20ppm.
2. Speeds are for 60Hz operation using factory default operating conditions (*RST). Autorange off, Display off, Trigger delay = 0.
3. Speeds include measurement and binary data transfer out the GPIB.
4. Auto zero off.
5. Sample count = 1024, auto zero off.
6. For line frequency ±0.1%.
7. Must have 10% matching of lead resistance in Input HI and LO.
8. For 2-wire ohms, add 1Ω additional uncertainty.
9. For 1Ω不平衡 in LO lead.
10. For rear inputs, add the following to temperature coefficient “ppm of reading” uncertainty: 10MΩ: 70 ppm, 100MΩ: 385 ppm. Operating environment specified for 0ºC to 50ºC RH at 35ºC.
True RMS AC Voltage and Current Characteristics

### Voltage Range

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Resolution</th>
<th>Calibration Cycle</th>
<th>Accuracy ±(% of reading + % of range), 23°C ±5 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.0000 mV</td>
<td>0.1 µV</td>
<td>90 Days</td>
<td>0.35 + 0.03 0.05 + 0.03 0.11 + 0.05 0.60 + 0.08 4 + 0.5</td>
</tr>
<tr>
<td>1.00000 V</td>
<td>1.0 µV</td>
<td>90 Days</td>
<td>0.35 + 0.03 0.05 + 0.03 0.11 + 0.05 0.60 + 0.08 4 + 0.5</td>
</tr>
<tr>
<td>10.0000 V</td>
<td>10 µV</td>
<td>1 Year</td>
<td>0.35 + 0.05 0.06 + 0.03 0.12 + 0.05 0.60 + 0.08 4 + 0.5</td>
</tr>
<tr>
<td>100.000 V</td>
<td>100 µV</td>
<td></td>
<td>0.35 + 0.05 0.06 + 0.03 0.12 + 0.05 0.60 + 0.08 4 + 0.5</td>
</tr>
<tr>
<td>&gt;50.000 V</td>
<td>1 mV</td>
<td></td>
<td>0.35 + 0.05 0.06 + 0.03 0.12 + 0.05 0.60 + 0.08 4 + 0.5</td>
</tr>
</tbody>
</table>

### Temperature Coefficient

<table>
<thead>
<tr>
<th>Current Range</th>
<th>Resolution</th>
<th>Calibration Cycle</th>
<th>3 Hz–10 Hz</th>
<th>10 Hz–5 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000 A</td>
<td>1 µA</td>
<td>90 Days/1 Year</td>
<td>0.30 + 0.04</td>
<td>0.10 + 0.04</td>
</tr>
<tr>
<td>3.00000 A</td>
<td>10 µA</td>
<td>90 Days/1 Year</td>
<td>0.35 + 0.06</td>
<td>0.15 + 0.06</td>
</tr>
</tbody>
</table>

### AC Operating Characteristics

<table>
<thead>
<tr>
<th>Function</th>
<th>Digits</th>
<th>Readings/s</th>
<th>Rate</th>
<th>Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACV (all ranges), and ACI (all ranges)</td>
<td>6½ Digit</td>
<td>2xreading</td>
<td>SLOW</td>
<td>3 Hz–300 kHz</td>
</tr>
<tr>
<td></td>
<td>6½ Digit</td>
<td>1.4</td>
<td>MED</td>
<td>30 Hz–500 kHz</td>
</tr>
<tr>
<td></td>
<td>6½ Digit</td>
<td>4.8</td>
<td>MED</td>
<td>30 Hz–500 kHz</td>
</tr>
<tr>
<td></td>
<td>6½ Digit</td>
<td>2.2</td>
<td>FAST</td>
<td>50 Hz–300 kHz</td>
</tr>
<tr>
<td></td>
<td>6½ Digit</td>
<td>35</td>
<td>FAST</td>
<td>50 Hz–300 kHz</td>
</tr>
</tbody>
</table>

### Additional Low Frequency Errors ±(% of reading)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Slow</th>
<th>Med</th>
<th>Fast</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Hz</td>
<td>0.5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>30 Hz</td>
<td>0</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>50 Hz</td>
<td>0</td>
<td>1.0</td>
<td>—</td>
</tr>
<tr>
<td>100 Hz</td>
<td>0</td>
<td>0.18</td>
<td>—</td>
</tr>
<tr>
<td>200 Hz</td>
<td>0</td>
<td>0.10</td>
<td>—</td>
</tr>
<tr>
<td>&gt; 300 Hz</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Model 2000 Specifications

- **2000 6½-Digit Multimeter**
- **True RMS AC Voltage and Current Characteristics**
  - **Accuracy ±(% of reading + % of range), 23°C ±5 °C**
  - **Voltage Range**
    - 100.0000 mV: 0.1 µV
    - 1.00000 V: 1.0 µV
    - 10.0000 V: 10 µV
    - 100.000 V: 100 µV
    - >50.000 V: 1 mV
  - **Calibration Cycle**
    - 90 Days
    - 1 Year
  - **Accuracy**
    - 0.35 + 0.03
    - 0.05 + 0.03
    - 0.11 + 0.05
    - 0.60 + 0.08
    - 4 + 0.5
  - **Temperature Coefficient**
    - 0.35 ± 0.003
    - 0.15 + 0.006

### AC System Speeds

- **AC System Speeds**
  - **Function/Range Change**: 0.5 s
  - **Auto Range Time**: <5 s
  - **ASCI Readings to RS-232 (19.2k Baud)**: 50 s
  - **Max. Internal Trigger Rate**: 200 s
  - **Max. External Trigger Rate**: 260 s

### AC General

- **Input Impedance**: 1 MΩ ±2% paralleled by <100 pF
- **ACV Input Protection**: 1000 Vp
- **Maximum DCV**: 400 V on any ACV range
- **ACI Input Protection**: 3 A, 250 V fuse
- **Burden Voltage**: 1 A Range: <0.3 V rms, 3 A Range: <2 V rms
- **Shunt Resistor**: 0.1 W on all ACI ranges
- **AC CMRR**: >70 dB with 1 kΩ in LO lead
- **Maximum Crest Factor**: 5 at full scale
- **VOLT HERTZ PRODUCT**: ≤8 × 10⁷ V·Hz
- **Overrange**: 120% of range except on 750 V and 3 A ranges

### AC Notes

1. Specifications are for SLOW rate and sine wave inputs >5% of range.
2. Speeds are for 60Hz operation using factory default operating conditions (*RST). Auto zero off, Auto range off, Display off, includes measurement and binary data transfer out the GPIB.
3. 0.01% of step settling error. Trigger delay = 400 ms
4. Trigger delay = 0
5. **Detector**: Bandwidth 300, NPLC = 0.1
6. Maximum useful limit with trigger delay = 175 ms
7. Applies to non-sine waves >5 Hz
8. Applies to 0°–18°C and 28°–50°C
Triggering and Memory

READING HOLD SENSITIVITY: 0.01%, 0.1%, 1%, or 10% of reading.
TRIGGER DELAY: 0 to 99 lns (1ms step size).
EXTERNAL TRIGGER LATENCY: 200µs + <300µs jitter with autozero off, trigger delay = 0.
MEMORY: 1024 readings.

Math Functions

Rel, Min/Max,Average,StdDev (of stored reading), dB, dBm, Limit Test, %, and mX+b with user defined units displayed.
DBM REFERENCE RESISTANCES: 1 to 9999Ω in 1Ω increments.

Standard Programming Languages

SCPI (Standard Commands for Programmable Instruments)

Remote Interface

GPIB (IEEE-488.1, IEEE-488.2) and RS-232C.

Frequency and Period Characteristics

<table>
<thead>
<tr>
<th>ACV Range</th>
<th>Frequency Range</th>
<th>Period Range</th>
<th>Gate Time</th>
<th>Resolution ±(ppm of reading)</th>
<th>Accuracy 90 Day/1 Year ±(% of reading)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mV to 750 V</td>
<td>5 Hz to 500 kHz</td>
<td>553 ms to 2 µs</td>
<td>1 s (SLOW)</td>
<td>0.333</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Thermocouple 2, 3, 4 accuracy

Type range resolution relative to reference junction

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy 90 Day/1 Year (23°C ± 5°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>~200 to + 760°C</td>
<td>0.001°C</td>
<td>±0.5°C</td>
</tr>
<tr>
<td>K</td>
<td>~200 to + 1372°C</td>
<td>0.001°C</td>
<td>±0.5°C</td>
</tr>
<tr>
<td>T</td>
<td>~200 to + 400°C</td>
<td>0.001°C</td>
<td>±0.5°C</td>
</tr>
</tbody>
</table>

TEMPERATURE NOTES
1. For temperatures <–100°C, add ±0.1°C and >900°C add ±0.3°C.
2. Temperature can be displayed in °C, K or °F.
3. Accuracy based on ITS-90.
4. Exclusive of thermocouple error.

GENERAL

POWER SUPPLY: 100V / 120V / 220V / 240V ±10%.
LINE FREQUENCY: 45Hz to 66Hz, automatically sensed at power-up.
POWER CONSUMPTION: 22VA.
VOLT HERTZ PRODUCT: ±8 x 10⁻³VHz.
OPERATING ENVIRONMENT: Specified for 0°C to 50°C. Specified to 80% R.H. at 35°C and at an altitude of up to 2000m.
STORAGE ENVIRONMENT: –40°C to 70°C.
EMC: Conforms with European Union Directive 89/336/EEC, EN 55011, EN 50082-1, EN 61000-3-2, EN 61000-3-3, FCC part 15 class B.
WARMUP: 1 hour to rated accuracy.

DIMENSIONS:
- Rack Mounting: 89mm high x 213mm wide x 370mm deep (3” in x 8½ in x 14½ in).
- Bench Configuration (with handle and feet): 104mm high x 238mm wide x 370mm deep (4¼ in x 9½ in x 14¼ in).

NET WEIGHT: 2.9kg (6.3 lbs).
SHIPPING WEIGHT: 5kg (11 lbs).