

# 2000 6<sup>1</sup>/<sub>2</sub>-Digit Multimeter

Keithley  
2000

## DC CHARACTERISTICS

CONDITIONS: MED (1 PLC) or SLOW (10 PLC)  
or MED (1 PLC) with filter of 10

ACCURACY:  $\pm$ (ppm of reading + ppm of range)  
(ppm = parts per million) (e.g., 10ppm = 0.001%)

FUNCTION	RANGE	RESOLUTION	TEST CURRENT OR BURDEN VOLTAGE ( $\pm$ 5%)	INPUT RESISTANCE	24 HOUR <sup>14</sup> 23°C $\pm$ 1°	90 DAY 23°C $\pm$ 5°	1 YEAR 23°C $\pm$ 5°	TEMPERATURE
								COEFFICIENT 0°-18°C & 28°-50°C
Voltage	100.0000 mV	0.1 $\mu$ V	> 10 G $\Omega$	> 10 G $\Omega$	30 + 30	40 + 35	50 + 35	2 + 6
	1.000000 V	1.0 $\mu$ V	> 10 G $\Omega$	> 10 G $\Omega$	15 + 6	25 + 7	30 + 7	2 + 1
	10.00000 V	10 $\mu$ V	> 10 G $\Omega$	> 10 G $\Omega$	15 + 4	20 + 5	30 + 5	2 + 1
	100.0000 V	100 $\mu$ V	10 M $\Omega$ $\pm$ 1%	10 M $\Omega$ $\pm$ 1%	15 + 6	30 + 6	45 + 6	5 + 1
	1000.000 V <sup>9</sup>	1 mV	10 M $\Omega$ $\pm$ 1%	10 M $\Omega$ $\pm$ 1%	20 + 6	35 + 6	45 + 6	5 + 1
Resistance <sup>15</sup>	100.0000 $\Omega$	100 $\mu$ $\Omega$	1 mA	30 + 30	80 + 40	100 + 40	8 + 6	
	1.000000 k $\Omega$	1m $\Omega$	1 mA	20 + 6	80 + 10	100 + 10	8 + 1	
	10.00000 k $\Omega$	10m $\Omega$	100 $\mu$ A	20 + 6	80 + 10	100 + 10	8 + 1	
	100.0000 k $\Omega$	100m $\Omega$	10 $\mu$ A	20 + 6	80 + 10	100 + 10	8 + 1	
	1.000000 M $\Omega$ <sup>16</sup>	1 $\Omega$	10 $\mu$ A	20 + 6	80 + 10	100 + 10	8 + 1	
	10.00000 M $\Omega$ <sup>11, 16</sup>	10 $\Omega$	700 nA // 10M $\Omega$	150 + 6	200 + 10	400 + 10	70 + 1	
	100.0000 M $\Omega$ <sup>11, 16</sup>	100 $\Omega$	700 nA // 10M $\Omega$	800 + 30	1500 + 30	1500 + 30	385 + 1	
Current	10.00000 mA	10 nA	< 0.15 V	60 + 30	300 + 80	500 + 80	50 + 5	
	100.0000 mA	100 nA	< 0.03 V	100 + 300	300 + 800	500 + 800	50 + 50	
	1.000000 A	1 $\mu$ A	< 0.3 V	200 + 30	500 + 80	800 + 80	50 + 5	
	3.00000 A	10 $\mu$ A	< 1 V	1000 + 15	1200 + 40	1200 + 40	50 + 5	
	Continuity 2W	1 k $\Omega$	100m $\Omega$	1 mA	40 + 100	100 + 100	120 + 100	8 + 1
Diode Test	3.00000 V	10 $\mu$ V	1 mA	20 + 6	30 + 7	40 + 7	8 + 1	
	10.00000 V	10 $\mu$ V	100 $\mu$ A	20 + 6	30 + 7	40 + 7	8 + 1	
	10.00000 V	10 $\mu$ V	10 $\mu$ A	20 + 6	30 + 7	40 + 7	8 + 1	

## DC OPERATING CHARACTERISTICS<sup>2</sup>

FUNCTION	DIGITS	READINGS/s	PLCs <sup>3</sup>
DCV (all ranges), DCI (all ranges), and Ohms (<10M range)	6 $\frac{1}{2}$ <sup>3,4</sup>	5	10
	6 $\frac{1}{2}$ <sup>3,7</sup>	30	1
	6 $\frac{1}{2}$ <sup>3,5</sup>	50	1
	5 $\frac{1}{2}$ <sup>3,5</sup>	270	0.1
	5 $\frac{1}{2}$ <sup>3</sup>	500	0.1
	5 $\frac{1}{2}$ <sup>3</sup>	1000	0.04
	4 $\frac{1}{2}$ <sup>3</sup>	2000	0.01

## DC SYSTEM SPEEDS<sup>3,6</sup>

RANGE CHANGE<sup>7</sup>: 50/s.

FUNCTION CHANGE<sup>7</sup>: 45/s.

AUTORANGE TIME<sup>3,18</sup>: <30 ms.

ASCII READINGS TO RS-232 (19.2K BAUD): 55/s.

MAX. INTERNAL TRIGGER RATE: 2000/s.

MAX. EXTERNAL TRIGGER RATE: 500/s.

## DC GENERAL

LINEARITY OF 10VDC RANGE:  $\pm$ (2ppm of reading + 1ppm of range).

DCV,  $\Omega$ , TEMPERATURE, CONTINUITY, DIODE TEST INPUT

PROTECTION: 1000V, all ranges.

MAXIMUM 4W LEAD RESISTANCE: 10% of range per lead for 100 $\Omega$  and 1k $\Omega$  ranges; 1k $\Omega$  per lead for all other ranges.

DC CURRENT INPUT PROTECTION: 3A, 250V fuse.

SHUNT RESISTOR: 0.1 $\Omega$  for 3A, 1A and 100mA ranges, 10 $\Omega$  for 10mA range.

CONTINUITY THRESHOLD: Adjustable 1 $\Omega$  to 1000 $\Omega$ .

AUTOZERO OFF ERROR: Add  $\pm$ (2ppm of range error + 5 $\mu$ V) for <10 minutes and  $\pm$ 1°C change.

OVERRANGE: 120% of range except on 1000V, 3A and Diode.

## SPEED AND NOISE REJECTION

RATE	READINGS/S	DIGITS	RMS NOISE 10V RANGE	NMR <sup>12</sup>	CMRR <sup>13</sup>
10 PLC	5	6%	< 1.5 $\mu$ V	60 dB	140 dB
1 PLC	50	6%	< 4 $\mu$ V	60 dB	140 dB
0.1 PLC	500	5%	< 22 $\mu$ V	—	80 dB
0.01 PLC	2000	4%	< 150 $\mu$ V	—	80 dB

## DC Notes

<sup>1</sup> Add the following to "ppm of range" uncertainty: 1V and 100V, 2ppm; 100mV, 15ppm; 10k $\Omega$ , 15ppm; <1M $\Omega$ , 2ppm; 10mA and 1A, 10ppm; 100mA, 40ppm.

<sup>2</sup> Speeds are for 60 Hz operation using factory default operating conditions ("RST"). Autorange off, Display off, Trigger delay = 0.

<sup>3</sup> Speeds include measurement and binary data transfer out the GPIB.

<sup>4</sup> Auto zero off.

<sup>5</sup> Sample count = 1024, auto zero off.

<sup>6</sup> Auto zero off, NPLC = 0.01.

<sup>7</sup> Ohms = 24 readings/second.

<sup>8</sup> 1 PLC = 16.67 ms @ 60Hz, 20ms @ 50Hz/400Hz. The frequency is automatically determined at power up.

<sup>9</sup> For signal levels >500V, add 0.02ppm/V uncertainty for the portion exceeding 500V.

<sup>10</sup> Add 120ms for ohms.

<sup>11</sup> Must have 10% matching of lead resistance in Input HI and LO.

<sup>12</sup> For line frequency  $\pm$ 0.1%.

<sup>13</sup> For 1k $\Omega$  imbalance in LO lead.

<sup>14</sup> Relative to calibration accuracy.

<sup>15</sup> Specifications are for 4-wire ohms. For 2-wire ohms, add 1 $\Omega$  additional uncertainty.

<sup>16</sup> For near inputs, add the following to Temperature Coefficient "ppm of reading" uncertainty: 10M $\Omega$  70ppm,

100M $\Omega$  385ppm. Operating environment specified for 0° to 50°C and 50% RH at 35°C.