Data Sheet

True RMS Bench Multimeters

2831E and 5491B

TRUE RMS AC+DC

USB (standard)

RS232*

True RMS Bench Multimeters with Dual Display

The B&K Precision models 2831E and 5491B are versatile and dependable bench multimeters suitable for applications in education, service and repair, and manufacturing requiring basic and reliable measurements. Additionally, these instruments enhance your productivity with built-in math functions and USB connectivity, features not found in other bench meters in this price category. Math operations Rel, Max/Min, dBm, dB, %, and Hold provide educators with a convenient tool to teach basic math concepts.

Model	Resolution	
	Count	Digits
2831E	20,000	4 1/2
5491B	50,000	4 3/4

The 2831E and 5491B take typical multimeter measurements such as volts, ohms, and amps with great accuracy, stability, and basic VDC accuracy of 0.02% on the 5491B and 0.03% on the 2831E. The meters are also capable of measuring frequency, period, continuity, and performing diode tests. Readings can be taken at a maximum rate of 25 readings/sec with measurement rates selectable between slow, medium, and fast.

Thes multimeters were designed for cost-conscious users requiring a basic and dependable meter with a broad range of features offered at a value price.

Features & benefits

- Up to 50,000 count display resolution
- Basic VDC accuracy of up to 0.02%
- Dual display to indicate two measurements simultaneously
- AC + DC True RMS
- Up to 25 readings per second measurement rate
- AC volt and amp measurement over wide frequency range (ACV 100 kHz/ACI 20 kHz)
- Limit mode for Pass/Fail testing
- Built-in math functions: Rel, Max/Min, dBm, dB, %, Hold, Compare
- CATI (1000 V)/CATII (300 V) Protection
- USB (Virtual Com) and RS232* interface
- SCPI compatible

*5491B only

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▲ Versatile tools

Dual Display

These meters offer a dual display allowing multiple measurements to be conveniently displayed at once. The display values could be two different measurements or one measurement expressed in different units. For example, you can simultaneously read an AC voltage and a frequency value or a DC voltage value expressed in volts and in dB.

Limit Operation

The limit operation lets you set and control the values that determine a HI / IN / LO status of subsequent measurements. The meter can be configured to emit an audible alarm when readings are outside of the configured limit.

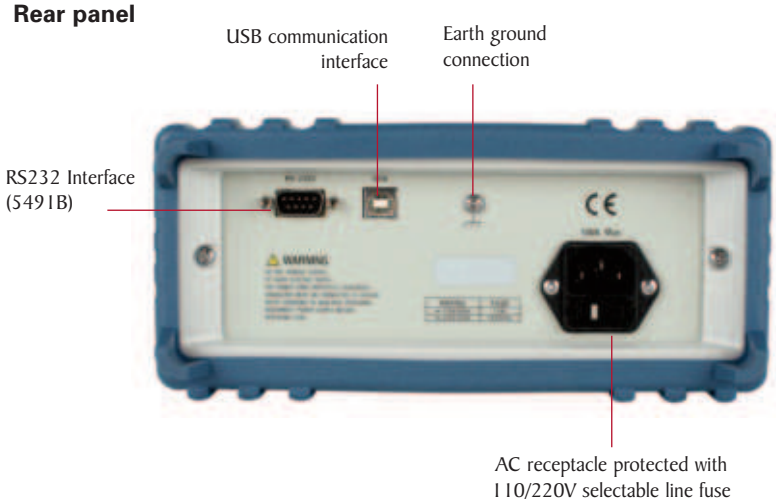
Increase Productivity with PC Connectivity

The 2831E and 5491B are programmable via USB and RS232 (5491B only) interface using industry standard SCPI commands. Users can control and configure the instrument from a remote PC and retrieve measurement results for further analysis. The meters can also be remotely controlled using application software (downloadable from the B&K website), which supports front panel emulation and data logging of measurement results.

Application software screenshot

▲ Easy operation

Rear panel



Specifications

DC Voltage

Resolution, Full Scale Reading and Accuracy ± (% of reading + % of range), 23 °C ± 5 °C

	Rate	Range	Resolution	Full Scale Reading	Accuracy (1 year)	Typical Input Impedance
2831E	Slow	200.00 mV	10 µV	210.00	0.04%+0.09% (1)	>10 MΩ
		2.0000 V	100 µV	2.1000	0.04%+0.08% (1)	>11.1 MΩ
		20.000 V	1 mV	21.000	0.04%+0.09%	>10.1 MΩ
		200.00 V	10 mV	210.00	0.04%+0.09%	10 MΩ
		1000.0 V	100 mV	1010.0 (2)	0.04%+0.08%	10 MΩ
5491B	Slow	500.00 mV	10 µV	510.00	0.02%+0.016% (1)	>10 MΩ
		5.0000 V	100 µV	5.1000	0.02%+0.008% (1)	>11.1 MΩ
		50.000 V	1 mV	51.000	0.02%+0.008%	>10.1 MΩ
		500.00 V	10 mV	510.00	0.02%+0.008%	10 MΩ
		1000.0 V	100 mV	1010.0 (2)	0.02%+0.008%	10 MΩ

(1) under REL status

(2) 1% over-range (1010 V) is readable at 1000 V range

AC Voltage

Resolution, Full Scale Reading and Accuracy ± (% of reading + % of range), 23 °C ± 5 °C

	Rate	Range	Resolution	Full Scale Reading	Accuracy(1 year)(1) 23 °C ± 5 °C			
					20~50 Hz	50~20 kHz	20~50 kHz	50~100 kHz
2831E	Slow	200.00 mV	10 µV	210.00	1.0%+0.2%)	0.5%+0.15%	1.8% + 0.25%	3.0% + 0.75%
		2.0000 V	100 µV	2.1000	1.0%+0.2%)	0.4%+0.05%	1.5% + 0.1%	3.0% + 0.25%
		20.000 V	1 mV	21.000	1.0%+0.2%	0.4%+0.05%	1.5% + 0.1%	3.0% + 0.25%
		200.00 V	10 mV	210.00	----	0.8%+0.075%	1.5% + 0.1%	3.0% + 0.55%
		750.0 V	100 mV	757.5(3)	----	0.8%+0.075%	2.3% + 0.15% (2)	3.3% + 0.8% (2)
5491B	Slow	500.00 mV	10 µV	510.00	1.0%+0.08%)	0.5%+0.06%	1.5% + 0.1%	3.0% + 0.3%
		5.0000 V	100 µV	5.1000	1.0%+0.08%)	0.35%+0.02%	1% + 0.04%	3.0% + 0.1%
		50.000 V	1 mV	51.000	1.0%+0.08%	0.35%+0.02%	1% + 0.04%	3.0% + 0.1%
		500.00 V	10 mV	510.00	----	0.5%+0.03%	1% + 0.04%	4.0% + 0.1%
		750.0 V	100 mV	757.5(3)	----	0.5%+0.03%	2.3% + 0.15% (2)	3.3% + 0.8% (2)

Max. crest factor: 3.0 at full scale

(1) Specifications are for sine wave inputs >5% of range.

(2) Limit at 40 kHz or ≤ 3×10^7 Volt-Hz for 750 V range

(3) 1% over-range (757.50V) is readable at 750V range

DC Current

Resolution, Full Scale Reading and Accuracy ± (% of reading + % of range), 23 °C ± 5 °C

	Rate	Range	Resolution	Full Scale Reading	Accuracy (1 year)	Burden Voltage(1) & Shunt Resistor
2831E	Slow	2.0000 mA	0.1 µA	2.1000	0.08%+0.025% (2)	<0.3 V / 100 Ω
		20.000 mA	1 µA	21.000	0.08%+0.02% (2)	<0.04 V / 1 Ω
		200.00 mA	10 µA	210.00	0.08%+0.02%	<0.3 V / 1 Ω
		2.0000 A	100 µA	2.1000	0.3%+0.025%	<0.05 V / 10 mΩ
		20.000 A	1 mA	21.000 (3)	0.3%+0.025%	<0.6 V / 10 mΩ
5491B	Slow	5.0000 mA	0.1 µA	5.1000	0.05%+0.01% (2)	<0.6 V / 100 Ω
		50.000 mA	1 µA	51.000	0.05%+0.008% (2)	<0.06 V / 1 Ω
		500.00 mA	10 µA	510.00	0.05%+0.008%	<0.6 V / 1 Ω
		5.0000 A	100 µA	5.1000	0.25%+0.01%	<0.1 V / 10 mΩ
		20.000 A	1 mA	21.000 (3)	0.25%+0.01%	<0.6 V / 10 mΩ

(1) Typical voltage across the input terminals at full scale reading.

(2) Use REL function

(3) In 20 A range, >10~20 ADC is readable for 20 seconds maximum

Specifications (cont.)

AC Current (True RMS, AC Coupling)

Resolution, Full Scale Reading and Accuracy ± (% of reading + % of range), 23 °C ± 5 °C

	Rate	Range	Resolution	Full Scale Reading	Accuracy(1 year)(1) 23 °C ± 5 °C		
					20~50 Hz	50~2 kHz	2~20 kHz
2831E	Slow	2.0000 mA	0.1 µA	2.1000	1.5%+0.5%	0.5%+0.3%	2%+0.55%
		20.000 mA	10 µA	21.000	1.5%+0.5%	0.5%+0.3%	2%+0.38%
		200.00 m A	100 µA	210.00	1.5%+0.5%	0.5%+0.3%	2%+0.5%
		2.0000 A	1 mA	2.1000	2.0%+0.5%	0.5%+0.3%	----
		20.000 A	10 mA	21.000 (2)	2.0%+0.5%	0.5%+0.3%	----
5491B	Slow	5.0000 mA	0.1 µA	5.1000	1.5%+0.16%	0.5%+0.08%	2.5%+0.16%
		50.000 mA	10 µA	51.000	1.5%+0.16%	0.5%+0.08%	2%+0.12%
		500.00 m A	100 µA	510.00	1.5%+0.16%	0.5%+0.08%	2%+0.12%
		5.0000 A	1 mA	5.1000	2.0%+0.16%	0.5%+0.1%	----
		20.000 A	10 mA	21.000 (2)	2.0%+0.16%	0.5%+0.1%	----

Max. crest factor: 3.0 at full scale

(1) Specifications are for sine wave inputs >5% of range.

(2) In 20 A range, >10~20 A AC is readable for 20 seconds maximum

Resistance

Resolution, Full Scale Reading and Accuracy ± (% of reading + % of range), 23 °C ± 5 °C

	Rate	Range (1)	Resolution	Full Scale Reading	Test current	Accuracy (1 year)
2831E	Slow	200.00 Ω	10 mΩ	210.00	0.5 mA	0.3%+0.05% (2)
		2.0000 kΩ	100 mΩ	2.1000	0.45 mA	0.10%+0.025% (2)
		20.000 kΩ	1 Ω	21.000	45 µA	0.10%+0.025% (2)
		200.00 kΩ	10 Ω	210.00	4.5 µA	0.10%+0.025%
		2.0000 MΩ	100 Ω	2.1000	450 nA	0.15%+0.025%
		20.000 MΩ	1 kΩ	21.000	45 nA	0.3%+0.05%
5491B	Slow	500.00 Ω	10 mΩ	510.00	0.5 mA	0.10%+0.01% (2)
		5.0000 kΩ	100 mΩ	5.1000	0.45 mA	0.10%+0.008% (2)
		50.000 kΩ	1 Ω	51.000	45 µA	0.10%+0.008% (2)
		500.00 kΩ	10 Ω	510.00	4.5 µA	0.10%+0.008%
		5.0000 MΩ	100 Ω	5.1000	450 nA	0.15%+0.008%
		50.000 MΩ	1 kΩ	51.000	45 nA	0.3%+0.01%

(1) In order to eliminate the noise interference, which might be induced to the test leads, it is recommended to use a shielded test cable for measuring resistance above 100 kΩ.

(2) Using REL function

Continuity

Resolution, Full Scale Reading and Accuracy ± (% of reading + % of range), 23 °C ± 5 °C

	Range	Resolution	Full Scale Reading	Test current	Accuracy (1 year) 23 °C ± 5°C
2831E	200 Ω	100 mΩ	999.9	0.5 mA	0.1%+0.3%
5491B	500 Ω	100 mΩ	999.9	0.5 mA	0.1%+0.04%

Open circuit voltage: <5.5 VDC

Test current: around 0.5 mA DC

Specifications (cont.)

Diode

Resolution, Full Scale Reading and Accuracy ± (% of reading + % of range), 23 °C ± 5 °C				
Rate	Range	Resolution	Full Scale Reading	Test current
Med	2.0000 V	100 µV	2.3000 V	0.5 mA (Approx.)

Frequency

Resolution, Full Scale Reading and Accuracy ± (% of reading + % of range), 23 °C ± 5 °C					
ACV Range	Frequency Range	Best Resolution	Full Scale Reading	Accuracy	Input Sensitivity (Sine Wave)
200 mV (500 mV*) to 750V	10 Hz	100 µHz	9.9999	0.05%+0.02%	200 mV rms
	10~100 Hz	1 mHz	99.999	0.01%+0.02%	300 mV rms
	100~100 kHz	10 mHz	999.99	0.01%+0.008%	300 mV rms
	100k~1 MHz	10 Hz	999.99	0.01%+0.008%	500 mV rms
* Model 5491B					

Period

Resolution, Full Scale Reading and Accuracy ± (% of reading + % of range), 23 °C ± 5 °C					
ACV Range	Frequency Range	Best Resolution	Full Scale Reading	Accuracy	Input Sensitivity (Sine Wave)
200 mV (500 mV*) to 750V	1~10 µs	0.1 ns	9.9999	0.01%+0.008%	500 mV rms
	10 µs~10 ms	1 ns	9.9999	0.01%+0.008%	300 mV rms
	10 ms~100 ms	1 µs	99.999	0.01%+0.02%	300 mV rms
	100 ms	10 µs	199.99	0.05%+0.02%	200 mV rms
* Model 5491B					

General

AC Input	Power Consumption	Operating Environment	Storage Environment	Warm-up	Dimensions (W×H×D)	Net Weight
110/220 V ± 10%, 50/60 Hz ± 5%	≤ 10VA	0 °C to 40 °C, ≤ 90 %RH	-40 °C to 70 °C	at least 30 minutes	225 mm×100 mm×355 mm 8.85" x 3.93 " x 13.97"	2.5 kg 5.51 lbs
One-Year Warranty (2831E), Three-Year Warranty (5491B)						
Included Accessories	Test leads, Power cord, Spare fuse, Operation Manual , Calibration certificate and test report					