

Table 7-1 HP 44702A/B Specifications

**DC VOLTAGE**

**Accuracy:** ±(% of reading + volts) rear terminal, one hour warmup, specified over time since last calibration, and operating temperature, with auto-zeroing performed within one minute of measurement.

90 Days, 18°C to 28°C

- 40 mV Range: 0.05% + 68 μV
- 320 mV Range: 0.05% + 234 μV
- 2.56 V Range: 0.05% + 1.88 mV
- 10.24 V Range: 0.05% + 7.5 mV

Average Readings, 90 Days 18° to 28°C

Accuracy if 100 readings are averaged:

For 40 mV Range: 0.05% + 39 μV

Accuracy if 10 readings are averaged (little advantage to averaging more readings):

- For 320 mV Range: 0.05% + 156 μV
- For 2.56 V Range: 0.05% + 1.25 mV
- For 10.24 V Range: 0.05% + 5 mV

1 Year: Add 0.05% of reading to the 90 Days Specifications

Temperature Coefficient:

Add as an additional accuracy error using ±(% of reading + volts) per °C change outside 18° to 28°C, as long as the operating temperature is maintained between 0 to 18° or 28° to 55°C.

- For 40 mV Range add 0.004% + 0.488 μV
- For 320 mV Range add 0.002% + 3.91 μV
- For 2.56 V Range add 0.002% + 31.3 μV
- For 10.24 V Range add 0.002% + 125 μV

**Resolution:** 12 bits plus a sign bit

Range	Resolution
40 mV	9.77 μV
320 mV	78.1 μV
2.56 V	625 μV
10.24 V	2.5 mV

Table 7-1 HP 44702A/B Specifications (Cont.)

**Over-ranging:** None; maximum signal (high to low) + common mode voltage (low to chassis) to prevent out-of-range indication is  $\pm 10.24$  V.

**Reading Rate:** 100,000 readings/second with auto-ranging. Proper auto-ranging is ensured as long as a single-channel signal changes no more than 600 volts/second during auto-ranging.

**RESISTANCE**

**Accuracy:**  $\pm$ (% of reading + ohms), 4-wire or 2-wire ohms, maximum expected (resistance function) determines the current source used, rear terminal inputs, one-hour warmup, specified over time since last calibration, and operating temperature, with auto-zeroing performed within one minute of measurement. (Current source compliance voltage is at least 17 V. Only the HP 44711A FET multiplexer is recommended for measuring resistance properly.

90 Days, 18°C to 28°C

Function	Range	Accuracy
10 K $\Omega$ (1 mA current source)	40 $\Omega$	0.07% + 107 m $\Omega$
	320 $\Omega$	0.07% + 234 m $\Omega$
	2.56 K $\Omega$	0.07% + 1.875 $\Omega$
	10.24 K $\Omega$	0.07% + 7.5 $\Omega$
100 K $\Omega$ (100 $\mu$ A current source)	400 $\Omega$	0.07% + 1.07 $\Omega$
	3.2 K $\Omega$	0.07% + 2.34 $\Omega$
	25.6 K $\Omega$	0.07% + 18.75 $\Omega$
	102.4 K $\Omega$	0.07% + 75 $\Omega$
1 M $\Omega$ (10 $\mu$ A current source)	4 K $\Omega$	0.07% + 12.7 $\Omega$
	32 K $\Omega$	0.07% + 39.1 $\Omega$
	256 K $\Omega$	0.07% + 312.5 $\Omega$
	10.24 M $\Omega$	0.07% + 1.25 K $\Omega$

Average Readings, 90 Days 18° to 28°C

Accuracy if 100 readings are averaged:

For 40  $\Omega$  Range: 0.07% + 78.1 m $\Omega$

For 400  $\Omega$  Range: 0.07% + 781 m $\Omega$

For 4 K $\Omega$  Range: 0.07% + 9.77  $\Omega$

Table 7-1 HP 44702A/B Specifications (Cont.)

Accuracy if 10 readings are averaged (little advantage to averaging more readings):

For 320  $\Omega$  Range: 0.07% + 156 m $\Omega$   
For 3.2 K $\Omega$  Range: 0.07% + 1.56  $\Omega$   
For 32 K $\Omega$  Range: 0.07% + 31.25  $\Omega$   
For 2.56 K $\Omega$  Range: 0.07% + 1.25  $\Omega$   
For 25.6 K $\Omega$  Range: 0.07% + 12.5  $\Omega$   
For 256 K $\Omega$  Range: 0.07% + 250  $\Omega$   
For 10.24 K $\Omega$  Range: 0.07% + 5  $\Omega$   
For 102.4 K $\Omega$  Range: 0.07% + 50  $\Omega$   
For 1.024 M $\Omega$  Range: 0.07% + 1 K $\Omega$

1 Year: Add 0.03% of reading to the 90 Days Specifications

Temperature Coefficient:

Add as an additional accuracy error using  $\pm$ (% of reading + ohms) per  $^{\circ}\text{C}$  change outside 18 $^{\circ}$  to 28 $^{\circ}\text{C}$ , as long as the operating temperature is maintained between 0 to 18 $^{\circ}$  or 28 $^{\circ}$  to 55 $^{\circ}\text{C}$ .

For 40  $\Omega$  Range add 0.005% + 0.488 m $\Omega$   
For 400  $\Omega$  Range add 0.005% + 4.88 m $\Omega$   
For 4 K $\Omega$  Range add 0.005% + 48.8 m $\Omega$   
For 320  $\Omega$  Range add 0.003% + 3.91 m $\Omega$   
For 3.2 K $\Omega$  Range add 0.003% + 39.1 m $\Omega$   
For 32 K $\Omega$  Range add 0.003% + 391 m $\Omega$   
For 2.56 K $\Omega$  Range add 0.003% + 31.3 m  $\Omega$   
For 25.6 K $\Omega$  Range add 0.003% + 313 m $\Omega$   
For 256 K $\Omega$  Range add 0.003% + 3.13  $\Omega$   
For 10.24 K $\Omega$  Range add 0.7% + 5  $\Omega$   
For 102.4 K $\Omega$  Range add 0.07% + 50  $\Omega$   
For 1.024 M $\Omega$  Range add 0.07% + 1 K $\Omega$

**Reading Rate:** 100,000 readings/second with auto-ranging. Proper auto-ranging is ensured as long as a single-channel signal changes no more than 600 volts/second during auto-ranging.

**PACER**

**Programmable Intervals:** 10 usec to 17 minutes with .25 usec resolution.

**Accuracy:** Programmed pulse interval  $\pm 0.01\%$  of pulse interval

**Pulse Widths:** 0.5 usec nominally (low true)

Table 7-1 HP 44702A/B Specifications (Cont.)

**INPUT CHARACTERISTICS**

**Noise Rejection:** Min effective common mode rejection specified in dB for DC to 60 Hz with 1 K $\Omega$  in low lead; maximum signal (high to low) + common mode voltage (low to chassis) for proper operation is  $\pm 10.24$  volts.

Range	ECMR
40 mV	90
320 mV	80
2.56 V	70
10.24 V	70

**Maximum Input Voltage:** All inputs (ribbon, rear, and back-plane) are protected to 16 V peak. Input impedance, however, decreases above 12 V due to internal protection circuitry. The analog back-plane can be disconnected from the high-speed voltmeter, allowing the maximum back-plane voltage to be 42 V peak.

**Bandwidth:** 50  $\Omega$  source, 1 M $\Omega$  termination

Range	0.1% Flatness	1.0% Flatness	-3 dB Bandwidth
40 mV	10 kHz	45 kHz	250 kHz
320 mV to 10.24 V	15 kHz	55 kHz	400 kHz

**Input Impedance:** All Ranges.

Impedance	Terminals	
	High to Low	High or Low to Chassis
Power On Resistance ( $\Omega$ )	$>10^8$	$>10^8$
Power Off Resistance ( $\Omega$ ) $V_{in} < 10$ V	$>1000$	$>1000$
Power Off Resistance ( $\Omega$ ) $V_{in} > 10$ V	$>470$	$>470$
Max. Capacitance (pf) at 1MHz	100	200

Table 7-1 HP 44702A/B Specifications (Cont.)

**Maximum Bias Current:** Currents sourced by high or low into rear terminals, ribbon cable, or back-plane. These currents may affect accuracy for source impedances  $>1\text{ K}\Omega$ .

$\pm 1.4\text{ nA DC}$  (0 to  $28^\circ\text{C}$ )  
 $\pm 18\text{ nA DC}$  ( $28^\circ$  to  $55^\circ\text{C}$ )

**Settling Time:** To within 0.1% of step change.

**Fixed Rate:** Any full scale step change (worst case)  $<10\text{ }\mu\text{sec}$

**Range Changes from Lower to Higher Range:**  $<10\text{ }\mu\text{sec}$

**Range Changes from Higher to Lower Range (resulting in a step voltage change at the inputs):**

2.56 V Destination Range:  $<30\text{ }\mu\text{sec}$  (10.24 v step change)  
320 mV Destination Range:  $<20\text{ }\mu\text{sec}$  (2.56 V step change)  
 $<100\text{ }\mu\text{sec}$  (10.24 V step change)  
40 mV Destination Range:  $<20\text{ }\mu\text{sec}$  (320 mV step change)  
 $<120\text{ }\mu\text{sec}$  (2.56 V step change)  
 $<1\text{ msec}$  (10.24 V step change)