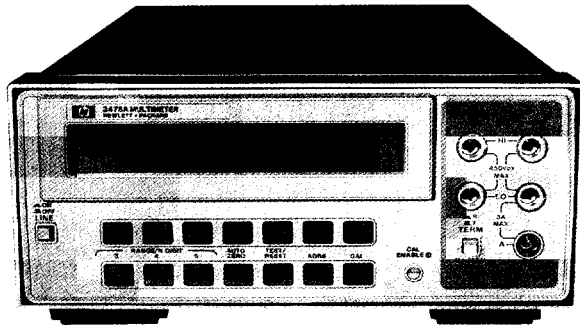


# DIGITAL MULTIMETERS

## High Performance 5½- to 3½- Digit Multimeters

HP 3478A, 3468A/B

- Five functions
- Up to 100 nanovolt resolution
- Electronic calibration



HP 3478A

- Higher accuracy
- Extended ranges
- HP-IB interface
- Front/rear terminals

### Description

The HP 3468A/B and the HP 3478A are autoranging 5½ to 3½ digit DMMs, with five functions: dc volts, true rms ac volts, 2- and 4-wire ohms, dc current, and true rms ac current. All three DMMs feature closed-box electronic calibration, which eliminates all adjustments to provide a lower cost of ownership.

### High Performance

All three DMMs offer high performance. The HP 3468A/B are designed with the bench in mind, while the HP 3478A is optimal for system use. The HP 3478A can perform production tests or acquire experimental data at 90 readings per second with 3½ digit resolution, or take 35 readings per second with 130 dB of noise rejection at 4½ digits. The HP 3478A also offers 100 nV and 100 μΩ resolution in the 5½-digit mode.

All three DMMs measure true rms ac voltage to 300 kHz, with crest factors up to 4:1. They measure true rms ac current to 20 kHz.

For even greater performance consider the new HP 34401A digital multimeters. See page 168.

### Battery Operation

Both the HP 3468A and HP 3468B are available with rechargeable battery and battery-charging circuitry for portable measurements (Option 001). This allows for up to five hours of continuous battery operation.

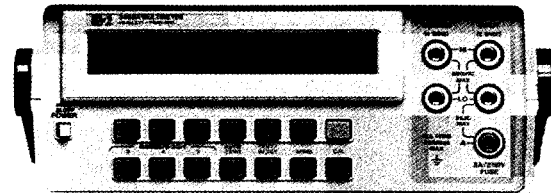
The HP 3468A comes in a streamlined portable package with a handle for convenient carrying; the HP 3468B comes in a plastic system case for easy rack mounting.

### System Operation

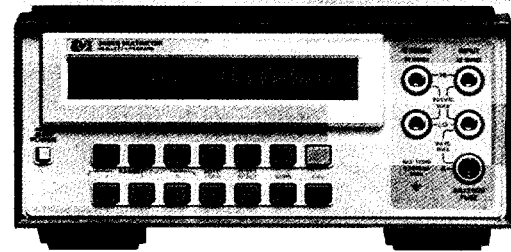
The HP 3478A features selectable front/rear inputs for flexible system connections. The Voltmeter Complete output and External Trigger input allow synchronization of the HP 3478A with a scanner for fast multiplexed measurements without the slower software commands. The test program can write prompt messages or results on the alphanumeric display. The operator can respond by pressing the HP 3478A's SRQ key to interrupt the controller and start the next test.

### Reliability/Cost of Ownership

The HP 3468A/B and the HP 3478A all have demonstrated reliability. Mean time between failure (MTBF) rates exceed 100,000 hours of operation. As a result, we offer a three-year extended warranty (Option W30) for less than 4 percent of the purchase price.



HP 3468A



HP 3468B

- Portable
- Battery option
- Low cost
- HP-IL interface

### Specifications

#### dc Voltage Input Characteristics

Range*	Maximum Reading (5½ digit)	Resolution		
		5½ digit	4½ digit	3½ digit
30 mV	±30.3099 mV	100nV	1 μV	10 μV
300 mV	±303.099 mV	1 μV	10 μV	100 μV
3 V	±3.03099 V	10 μV	100 μV	1 mV
30 V	±30.3099 V	100 μV	1 mV	10 mV
300 V	±303.099 V	1 mV	10 mV	100 mV

\*30 mV range available on HP 3478A only.

**Input resistance:** 30 mV, 300 mV, 3 V ranges: > 10<sup>10</sup>Ω  
30 V, 300 V ranges: 10 MΩ ± 1%

**Maximum input voltage** (nondestructive): Hi to Lo: 303 Vrms or 450 V peak; Hi or Lo to Earth Ground: 500 V peak

**Measurement accuracy:** ±(% of reading + number of counts). Auto zero ON. 5½ digits.

#### HP 3478A

Range	T <sub>cal</sub> * ± 1° C		T <sub>cal</sub> * ± 5° C	
	24 Hours	90 Days	1 Year	
30 mV	0.025 + 40	0.0275 + 40	0.035 + 40	
300 mV	0.004 + 4	0.005 + 5	0.007 + 5	
3 V	0.003 + 2	0.004 + 2	0.006 + 2	
30 V	0.004 + 3	0.005 + 4	0.007 + 4	
300 V	0.004 + 2	0.005 + 2	0.007 + 2	

#### HP 3468 A/B

Range	T <sub>cal</sub> * ± 1° C		T <sub>cal</sub> * ± 5° C	
	24 Hours	90 Days	1 Year	
300 mV	0.005 + 4	0.009 + 5	0.02 + 5	
3 V	0.0035 + 2	0.0072 + 2	0.0181 + 2	
30 V	0.005 + 3	0.009 + 3	0.02 + 3	
300 V	0.0055 + 2	0.009 + 2	0.02 + 2	

\*T<sub>cal</sub> is the temperature of the environment where the HP 3478A and the HP 3468A/B were calibrated. Calibration should be done with the temperature of the environment between 20° C and 30° C. Twenty-four-hour accuracy is relative to calibration standards.

**Temperature coefficient:** 0° C to 55° C, 5½ digits, auto zero ON.  
± (% of reading + number of counts)° C.

Range	HP 3478A	HP 3468A/B
30 mV	0.0028 + 5.0	-----
300 mV	0.0005 + 0.5	0.0008 + 0.5
3 V	0.0004 + 0.05	0.0007 + 0.05
30 V	0.0006 + 0.5	0.0008 + 0.5
300 V	0.0004 + 0.05	0.0007 + 0.05

**Noise rejection:** in dB with 1 k Ω imbalance in Lo lead; ac rejection for 50, 60 Hz ± 0.1%. Auto zero ON.

Display	ac NMR	ac ECMR	dc CMR
5½ digits	80	150	140
4½ digits	59	130	140
3½ digits	0	70	140

**Maximum Reading Rates (readings/sec.) HP 3478A**

Line Frequency	Auto Zero and Display	Resolution		
		3½ digits	4½ digits	5½ digits
60 Hz	Off	90	35	4.4
	On	60	20	2.3
50 Hz	Off	85	30	3.7
	On	50	17	1.9

**ac Voltage (true rms responding) Input Characteristics**

Range	Maximum Reading (5½ Digit)	Resolution		
		5½ digit	4½ digit	3½ digit
300 mV	303.099 mV	1 µV	10 µV	100 µV
3 V	3.03099 V	10 µV	100 µV	1 mV
30 V	30.3099 V	100 µV	1 mV	10 mV
300 V	303.009 V	1 mV	10 mV	100 mV

**Input impedance:** 1 M Ω ± 1% shunted by <60 pF  
**Maximum Input Voltage** (nondestructive): Hi to Lo: 303 Vrms or 450 V peak; Hi or Lo to Earth Ground: ±500 V peak.  
**Measurement accuracy:** ± (% of reading + number of counts). Auto zero ON. 5½ digit display. Accuracy is specified for sinewave inputs only, >10% of full scale.

**1 Year, T<sub>Cal</sub>\* ± 5° C HP 3478A**

Frequency	Ranges		
	300 mV	3 V, 30 V	300 V
20 to 50 Hz	1.14 + 163	1.14 + 102	1.18 + 102
50 to 100 Hz	0.46 + 163	0.46 + 103	0.50 + 102
100 Hz to 20 kHz	0.20 + 120	0.20 + 70	0.24 + 70
20 to 50 kHz	0.38 + 205	0.26 + 140	0.42 + 140
50 to 100 kHz	1.20 + 840	0.87 + 780	0.98 + 780
100 to 300 kHz	10.1 + 3720 (30 V range only)		

**1 Year, T<sub>Cal</sub>\* ± 5° C HP 3468A/B**

Frequency	Ranges		
	300 mV	3 V, 30 V	300 V
20 to 50 Hz	1.14 + 163	1.14 + 102	1.18 + 102
50 to 100 Hz	0.46 + 163	0.46 + 103	0.5 + 102
100 Hz to 20 kHz	0.29 + 163	0.26 + 102	0.33 + 102
20 to 50 kHz	0.56 + 247	0.41 + 180	0.55 + 180
50 to 100 kHz	1.74 + 882	1.05 + 825	1.26 + 825
100 k to 300 kHz	10.1 + 3720 (30 V range only)		

**Crest factor:** >4:1 at full scale

**Resistance (2-wire Ω, 4-wire Ω) Input Characteristics**

Range*	Maximum Reading (5½ Digit)	Resolution		
		5½ digit	4½ digit	3½ digit
30 Ω	30.3099 Ω	100 µΩ	1 m Ω	10 m Ω
300 Ω	303.099 Ω	1 m Ω	10 m Ω	100 m Ω
3 k Ω	3.03099 k Ω	10 m Ω	100 m Ω	1 Ω
30 k Ω	30.3099 k Ω	100 m Ω	1 Ω	10 Ω
300 k Ω	303.099 k Ω	1 Ω	10 Ω	100 Ω
3 M Ω	3.03099 M Ω	10 Ω	100 Ω	1 k Ω
30 M Ω	30.3099 M Ω	100 Ω	1 k Ω	10 k Ω

**Input protection** (nondestructive): Hi to Lo: ±350 V peak; Hi or Lo to Earth Ground: ±500 V peak.

**Measurement accuracy:** ± (% of reading + number of counts). Auto zero ON. 5½ digit display. 4-wire ohms.

Range*	T <sub>Cal</sub> * ± 1° C		T <sub>Cal</sub> * ± 5° C	
	24 Hours	90 Days	90 Days	1 Year
30 Ω	0.023 + 35	0.027 + 41	0.034 + 41	
300 Ω	0.0045 + 4	0.012 + 5	0.017 + 5	
3 k to 300 k Ω	0.0035 + 2	0.011 + 2	0.016 + 2	
3 M Ω	0.0052 + 2	0.011 + 2	0.016 + 2	
30 M Ω	0.036 + 7	0.066 + 7	0.078 + 7	

\*30 Ω range available on HP 3478A only.

**Current Through Unknown**

Range*	30 Ω	300 Ω	3 k Ω	30 k Ω	300 k Ω	3 M Ω	30 M Ω
Current	1 mA	1 mA	1 mA	100 µA	10 µA	1 µA	100 nA

\*30 Ω range available on HP 3478A only.

**dc Current Input Characteristics**

Range*	Maximum Reading (5½ Digit)	Resolution		
		5½ digit	4½ digit	3½ digit
300 mA	303.099 mA	1 µA	10 µA	100 µA
3 A	3.03099 A	10 µA	100 µA	1 mA

**Maximum Input** (nondestructive): 3 A from <250 V source; fuse protected.

**Measurement accuracy:** ± (% of reading + number of counts). Auto zero ON. 5½ digit display.

Range*	T <sub>Cal</sub> * ± 5° C	
	90 Days	1 Year
300 mA	0.11 + 40	0.15 + 40
3 A (<1 A)	0.14 + 6	0.17 + 6
3 A (>1 A)	1.0 + 30	1.0 + 30

\*300 mA range available on HP 3478A only.

**Maximum burden at full scale:** 1 V (3 A range), 0.1 V (0.3 A range)

**ac Current (true rms responding) Input Characteristics**

Range	Maximum Reading (5½ Digit)	Resolution		
		5½ digit	4½ digit	3½ digit
300 mA	303.099 mA	1 µA	10 µA	100 µA
3 A	3.03099 A	10 µA	100 µA	1 mA

**Maximum Input** (nondestructive): 3 A from <250 V source; fuse protected.

**Measurement accuracy:** ± (% of reading + number of counts). Auto zero ON. 5½ digit display. Accuracy specified for sinewave inputs only, >10% of full scale.

**1 Year, T<sub>Cal</sub> ± 5° C**

Frequency	HP 3478A		HP 3468A/B	
	300 mA	3 A	300 mA	3 A
20 to 50 Hz	1.54 + 163	2.24 + 163	1.77 + 163	2.5 + 163
50 to 1 kHz	0.81 + 163	1.50 + 163	1.1 + 163	1.8 + 163
1 k to 10 kHz	0.72 + 163	1.42 + 163	1.0 + 163	1.7 + 163
10 k to 20 kHz	0.86 + 163	1.56 + 163	1.14 + 163	1.84 + 163

**General**

**Operating temperature:** 0 to 55° C  
**Humidity range:** 95% R.H., 0 to 40° C  
**Power:** ac line 48 to 440 Hz; 86 to 250 V, 25 VA max  
**Size:** HP 3468A: 98.4 mm H × 238.1 mm W × 276.2 mm D (3.87 in × 9.37 in × 10.88 in); 3468B: 89 mm H × 213 mm W × 275 mm D (without feet) (3.5 in × 8.39 in × 10.83 in); 3478A: 102 H × 215 W × 356 mm D (4 in × 8.46 in × 14 in)  
**Weight:** HP 3468A/B: 2.1 kg; HP 3468A/B w/Opt 001: 3.1 kg (6.83 lb); HP 3478A: 3 kg (6.61 lb).

**Ordering Information**

**HP 3478A DMM** with test probes & HP-IB **Price** \$995  
**HP 3468A DMM** in Streamlined Portable Case with HP-IL and test probes **Price** \$910  
**HP 3468B DMM** in Rack and Stack Case with HP-IL and test probes **Price** \$910

**Choose one power option (no charge):**

**Opt 315** 100 V, 50 Hz; **Opt 335** 220 V, 50 Hz **Price** \$0  
**Opt 316** 100 V, 60 Hz; **Opt 336** 220 V, 60 Hz **Price** \$0  
**Opt 325** 120 V, 50 Hz; **Opt 345** 240 V, 50 Hz **Price** \$0  
**Opt 326** 120 V, 60 Hz; **Opt 346** 240 V, 60 Hz **Price** \$0  
**HP 3478A Opt W30** extended repair service **Price** \$35  
**HP 3478A Opt 907** Front Handle Kit (5061-0088) **Price** \$60  
**HP 3478A Opt 908** Rack Mount Kit (5061-0072) **Price** \$60  
**HP 3478A Opt 910** Extra Manuals (03478-90008/03478-90009) **Price** \$22  
**HP 3468A/B Option W30** add 3 year Extended Hardware Support **Price** \$25  
**HP 3468A/B Option 001**, add Rechargeable Battery Pack **Price** \$200  
**HP 3468B Option 401**, add Side Handle Kit (HP P/N 5061-1171) **Price** \$50  
**HP 3468B Option 907** Front Handle Kit **Price** \$65  
**HP 3468B Option 908** Rack Mount Kit **Price** \$60  
**HP P/N 5060-0174** Rack Mount Kit for rackmounting two instruments side-by-side **Price** \$87.50

☎ For off-the-shelf shipment, call 800-452-4844.